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Installation Guide

Digi Xem System (AccelePort)
PCI, ISA, EISA and MC Host Adapters

PORTS/16em, PORTS/8em and PORTS/8emp
Asynchronous Serial Interface Modules

90027500 Rev H

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Table of Contents

Approvals and Notices....vi
Federal Communications Commission (FCC) Statement....vi
Industry Canada Compliance Statement....vii
European Union EMC Directive....vii
Safety....vii

Introduction....1
The Digi Xem System....1
Host Adapter....1
PORTS Modules....2

Installation Tips....3
Memory Map Utility....5
User Diagnostics....6
ISA, EISA and Micro Channel Host Adapters....6
PCI Host Adapters....7

Installation....8
PCI Installation....9
Configuring the Host Adapter....9
Installing the PCI Host Adapter in your Computer....9
ISA Installation....10
Selecting an I/O Port....10
Jumper Settings....11
Installing the Host Adapter in Your Computer....12
EISA Installation....13
Jumper Settings....13
Installing the Host Adapter in your Computer....13
System Configuration....14
Micro Channel Installation....16
Jumper Settings....16
Installing the Host Adapter in your Computer....16
Configuring the Host Adapter....17
PORTS Module Installation....18
Power / Low Power Indicator....18

Connecting Peripherals....20
Connecting to a Modem....20
DB-25 Equipped PORTS Modules....20
RJ-45 Equipped PORTS Modules....21
ALTPIN Modem Wiring (RJ-45 Versions)....22

Connecting to a DTE Device....23
DB-25 Equipped PORTS Modules....23
Software Handshaking (XON/XOFF)....23
Hardware Handshaking (Ready/Busy)....24
RJ-45 Equipped PORTS Modules....25
Software Handshaking (XON/XOFF)....25
Hardware Handshaking (Ready/Busy)....26
Parallel Printers....27

EIA-232 Serial Interface....28
Cables....28
Grounding....28
Environment....28
Capacitance vs. Length of Run....29
Connector Options....30
DB-25 Connectors....30
RJ-45 Connectors....32
RJ-45 to DB-25 Conversion....33

Specifications....35

Appendix—Memory Conflicts....37
Contention for Memory Addresses....37
ISA Host Adapters....39
EISA Host Adapters....40
Micro Channel Host Adapters....40

Digi Support Services....41
The Digi Bulletin Board System....41
Internet FTP Server....42
World Wide Web Server....42
DigiFACTs FaxBack Server....42
Technical Support....44
Customer Service....44
Return Procedures....45

Index....46

List of Figures

Figure 1 Xem Host Adapter Installation Flow Chart 4
Figure 2 DIP Switch Settings for I/O Port Starting Address..... 11
Figure 3 EBI and AUX POWER Connectors 18
Figure 4 Modem Cable for DB-25 Modules 20
Figure 5 Full 10-Wire Modem Cable for RJ-45 Modules..... 21
Figure 6 8-Wire Modem Cable for use with ALTPIN Configuration..... 22
Figure 7 Simple Terminal/Printer Cable for DB-25 PORTS Modules 23
Figure 8 Terminal/Printer Cable with DTR Handshaking (DB-25)..... 24
Figure 9 Simple Terminal/Printer Cable for RJ-45 PORTS Modules..... 25
Figure 10 Terminal/Printer Cable with DTR Handshaking (RJ-45) 26
Figure 11 PORTS/8emp Parallel Printer Port 27
Figure 12 PORTS/16em Asynchronous Connectors (DB-25 Version)..... 30
Figure 13 PORTS/8em and PORTS/8emp Asynchronous Connectors..... 30
Figure 14 Correspondence of Different RJ Plugs to RJ-45 Jack..... 32
Figure 15 RJ-45 to DB-25 “Cable Leg”..... 33
Figure 16 Typical PC Memory Usage - 1st Megabyte..... 38

List of Tables

Table 1 DB-25 Connector Pin Assignments..... 31
Table 2 Cable Leg Options and Part Numbers 33

Approvals and 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 A digital devices pursuant to Part 15 of the FCC Rules. 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 Digi may void the user's authority to operate this equipment.

Cables **(FCC 15.27)**

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

Industry Canada Compliance Statement

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

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

European Union EMC Directive

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

- EN 55022 Class A
- EN 50082-1

Safety

This product complies with the following safety standards:

- UL 1950
- CSA 22.2 No. 950
- EN 60950

Notes

Introduction

This manual covers the installation of the Digi PCI/Xem, PC/Xem, EISA/Xem and MC/Xem (also known as AccelePort Xem - PCI, AccelePort Xem - ISA, AccelePort Xem - EISA and AccelePort Xem - MC) host adapters and one to four PORTS/16em, PORTS/8em and/or PORTS/8emp modules. Software installation is described in a separate manual.

The Digi Xem System

The Digi Xem system consists of a host adapter and up to four Digi PORTS/16em, PORTS/8em and/or PORTS/8emp modules. The host adapter plugs into the host computer, and is connected by a high-speed Digi EBI (External Bus Interface) cable to the PORTS module. Each PORTS module is equipped with eight (PORTS/8em, PORTS/8emp modules) or sixteen (PORTS/16em module) EIA-232 asynchronous serial ports, and up to four modules may be daisy-chained together for a total of up to 64 asynchronous serial channels.

Host Adapter

Digi Xem host adapters are intelligent boards that connect the EIA-232 channels on the PORTS modules to the host computer. At the heart of the host adapter is a 32-bit 20 MHz 3051 RISC processor, giving it the data processing equivalent of 16 VAX MIPS. Xem host adapters have 256K bytes to 1 Megabyte (depending on the model and options) of dual-ported high-speed RAM used for program code and data buffering. The Digi Xem system supports “cooked” throughput speeds of up to 115K bps for each asynchronous port.

PORTS Modules

Digi offers three different PORTS modules: the **PORTS/16em** module provides sixteen asynchronous serial ports; the **PORTS/8em** module provides eight asynchronous serial ports; and the **PORTS/8emp** module provides eight asynchronous serial ports plus a parallel printer port.

The Digi PORTS modules contain eight or sixteen EIA-232 asynchronous ports, and are connected to the host adapter by a Digi EBI cable. Three additional PORTS module can be "daisy-chained" to the first, for a total of up to 64 ports.

The EIA-232 ports are accessed either through standard male DB-25 connectors, or compact 10-pin RJ-45 female connectors, located on the back of the PORTS module. Full modem control is supported on all ports. If full modem control is not necessary for a particular port on an RJ-45 PORTS module, then RJ-11 connectors may be used between the PORTS module and the peripheral.

The parallel printer port is accessed via a female DB-25 connector located on the left side of the PORTS/8emp module, and is compatible with the standard parallel ports furnished with most personal computers.

Installation Tips

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

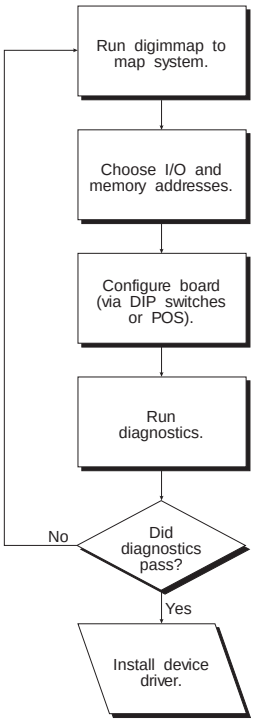
Installing your Xem host adapter is easy; however, since the boards require unique I/O and memory addresses, you may experience conflicts with other devices in your system. To minimize installation difficulties, two utilities are available: **DIGIMMAP.EXE**, a program which will help you find a block of available memory address space in your computer (ISA, EISA and Micro Channel boards only — PCI adapters are configured automatically), and **UD-RISC.EXE** (**UD-PCI.EXE** for PCI host adapters), a diagnostic program which will verify that the board is functioning correctly, and help you to identify any hardware problems or conflicts with the board. These utilities are on the diagnostics diskette.

Note: The diagnostics diskette is a DOS format diskette; if you purchased the board for a UNIX system, the diagnostics diskette is not included, but the programs may be obtained via our BBS, FTP server, or by calling Digi Customer Service. See the Customer Support Services section in the back of this book for addresses and phone numbers.

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.

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

Figure 1 Xem Host Adapter Installation Flow Chart



Note: If you are installing the PCI version of the Xem host adapter, skip the first three boxes in the flow chart and simply run the diagnostics.

Memory Map Utility

Note: If you are installing the PCI version of the Xem host adapter, skip this procedure. PCI boards are mapped automatically.

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 diskette containing the diagnostic software in the diskette drive and enter: **A:\RISC\DIGIMMAP** (assuming that you put the diskette in drive A).
5. After reading the initial screen, press <**E**> to execute the utility.
6. The center column will contain a list of 32K 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 & D8000h)
    2. Addresses beginning with "**C**" (C0000h & C8000h)
    3. Addresses beginning with "**E**" (E0000h & E8000h)

User Diagnostics

ISA, EISA and Micro Channel Host Adapters

The **\RISC** directory on the Digi Diagnostics diskette contains a user diagnostic program called **UD-RISC.EXE**.

1. After starting MS-DOS, insert the diskette containing the diagnostic software in the diskette drive and enter **A:\RISC\UD-RISC** (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 host adapter's I/O address (set by DIP switches or a configuration utility) 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:	**32K**
IRQ:	**Disabled**
Machine Environment:	**ISA**
Port:	**1**
EIA-232/422:	**232**
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).

PCI Host Adapters

The **\PCI** directory on the Digi diskette contains a user diagnostic program called **UD-PCI.EXE**.

1. After starting MS-DOS, insert the diskette containing the diagnostic software in the diskette drive and enter **A:\PCI\UD-PCI** (assuming that you put the diskette in drive A).
2. When asked for a board family, press <**A**>.
3. The program will display the adapter base address that was assigned by the host. The other parameters are be filled in with the following default values:

Port:	**1**
EIA-232/422:	**232**
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.

Note: For more information on the diagnostic software, see the text files **USERPCI.TXT** and **RELNOT-P.TXT**, in the **\PCI** directory of the diagnostics diskette.

Installation

Installation of the Digi Xem system consists of configuring and installing the host adapter board in your computer, connecting the PORTS module(s) and installing the device driver software. This section covers the hardware installation—device driver installation is discussed in a separate manual, included with the device driver software.

PCI, ISA, EISA and Micro Channel installations are covered in separate subsections.

Important! Write down the serial number of your Xem host adapter (see the figure in the appropriate subsection for the location of the serial number on your board) before plugging the board into your computer. This will save you having to remove the board later if you need technical assistance.

PCI Installation

Configuring the Host Adapter

No hardware configuration is required for PCI Xem host adapters.

Installing the PCI Host Adapter in your Computer

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 PCI slot in your computer and remove the slot plate.
3. Plug the host adapter into the PCI slot and screw the endplate to the computer chassis.
4. Replace your computer's cover.

ISA Installation

Selecting an I/O Port

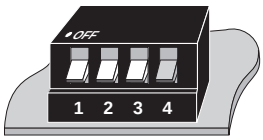
The device driver software controls the Xem host adapter through an I/O port mapped into the host computer's I/O bus. The host adapter must have its own I/O port address, not used by any other device in your system (this address is actually a starting address—the host adapter uses four bytes for its I/O register).

Refer to the documentation for your other add-in cards to determine what I/O port addresses they may be using, and make sure you select an I/O port address that doesn't conflict. The starting address choices are (in hex): 104h, 114h, 124h, 204h, 224h, 304h and 324h.

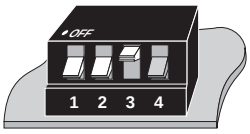
Important! Be sure to make a note of the I/O address you have selected, as you will need this information when you install the device driver software.

Now use switches 1, 2 and 3 of the DIP switch to set the address of the I/O port. See Figure 2 for information on setting the switches for your choice of I/O port.

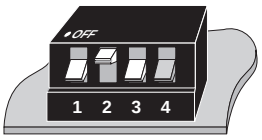
Figure 2 DIP Switch Settings for I/O Port Starting Address



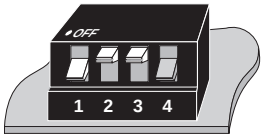
324h (ON-ON-ON)



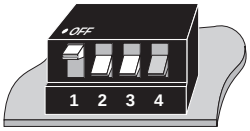
304h (ON-ON-OFF)



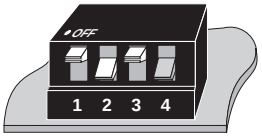
224h (ON-OFF-ON)



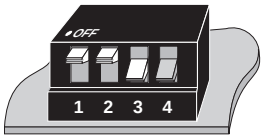
204h (ON-OFF-OFF)



124h (OFF-ON-ON)



114h (OFF-ON-OFF)



104h (OFF-OFF-ON)

(Note that switch #4 is not used.)

Jumper Settings

Your Xem host adapter may have one or more jumpers installed. These jumpers are set in the factory, and must not be moved.

Installing the Host Adapter in Your Computer

Once you have set the DIP switches as described in the previous section, you are ready to install the host adapter in your machine. Follow the instructions below, and also refer to your computer manufacturer's documentation for information about adding boards to your system.

1. Turn off the power to your computer. Remove the cover according to the instructions in your computer's manual.

2. Unscrew and remove the cover plate from the slot into which you intend to plug the host adapter. Make sure the slot is an AT (16-bit) slot.

3. Carefully insert the Xem host adapter into the slot and press firmly into the edge connector on the computer's motherboard. Screw the board's end plate into the computer chassis (use the screw you removed from the cover plate).

4. Replace the computer's cover.

This completes the ISA Xem host adapter installation. Now proceed to page 18 for instructions on connecting PORTS modules to the host adapter.

EISA Installation

Jumper Settings

Your Xem host adapter may have one or more jumpers installed. These jumpers are set in the factory, and must not be moved.

Installing the Host Adapter in your Computer

1. Turn off your computer and disconnect any attached peripheral devices.

2. Remove the cover from the computer. Refer to your system's documentation for instructions on how to remove the cover, and for other add-in board installation instructions and precautions.

3. Unscrew and remove the external slot cover plate from the slot into which you wish to install the EISA Xem host adapter.

4. Carefully insert the host adapter into the slot in the computer. Press the board firmly into the EISA bus connector, and replace the screw in the host adapter's endplate.

5. Replace the computer's cover.

System Configuration

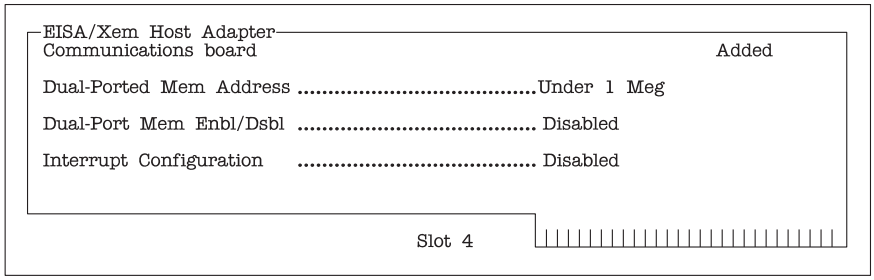
1. Boot up your EISA system with the EISA Configuration Diskette. During the boot-up process, the system should display a message to the effect that an unknown board has been found. This is the EISA Xem host adapter installed in the previous procedure.

2. When the boot-up has been completed, copy the file **`!DBI0201.CFG`** from the Digi distribution diskette to your EISA system's Configuration Diskette.

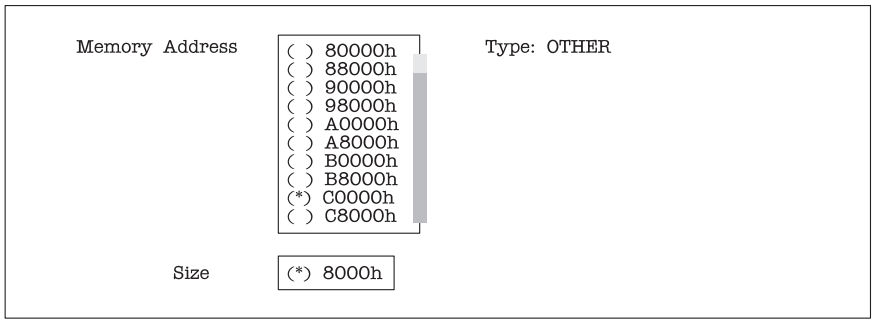
3. Run the configuration program to add the EISA host adapter.

4. From the **Edit** pull-down menu, select **Add**. The program will display a list of the **`.CFG`** configuration files for boards; select **EISA/Xem Host Adapter** (if this is not displayed as an option, you may not have copied the **`.CFG`** file to the correct directory in Step 2).

5. Use a mouse, or the arrow keys and <Tab> key to pull down the **View** menu, and choose **Detailed by Slot**. Next, use the up and down arrow keys to move to "**EISA/Xem Host Adapter**". You should see a screen similar to the following:



6. Place the cursor on "**Dual-Ported Mem Address**" and press <Enter>. A screen similar to the following will appear:



The following address choices are available:

Below 1 Megabyte:*

80000h	88000h	90000h	98000h
A0000h	A8000h	B0000h	B8000h
C0000h	C8000h	D0000h	D8000h
E0000h	E8000h	F0000h	F8000h

Above 1 Megabyte:

F0000000h	F1000000h	F2000000h	F3000000h
F4000000h	F5000000h	F6000000h	F7000000h
F8000000h	F9000000h	FA000000h	FB000000h
FC000000h	FD000000h	FE000000h	FF000000h

* *Although there are 16 choices offered for memory start addresses below 1 megabyte, a limited number of these choices is likely to be available. Of the 16, the best choices are probably **D0000** and **D8000**. See the appendix on memory conflicts on page 37 for more information.*

Multiple Xem host adapters may share the same addresses.

7. Use the cursor keys to select one of the listed addresses, or press <Enter> to accept what the configuration program has chosen. Write this address down—you will need to know it when installing the device driver software.

8. Leave the **Dual-Port Mem Enbl/Dsbl** at "**Disabled**".

9. Leave the **Interrupt Configuration** at "**Disabled**".

10. Pull down the **SYSTEM** menu, and choose "**Exit**". Make sure that you SAVE the new configuration as the program suggests.

Micro Channel Installation

Jumper Settings

Your Xem host adapter may have one or more jumpers installed. These jumpers are set in the factory, and must not be moved.

Installing the Host Adapter in your Computer

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 Micro Channel slot in your computer and remove the external slot plate (you will need to loosen the thumbscrew to do this). The Xem host adapter can be installed in either a 16 or 32-bit slot—note, however, that if a 16-bit slot is used, the memory start address is limited to one of the choices *below* 1 megabyte or in the sixteenth megabyte (i.e. 24-bit addresses). *If you plug the board into a 16-bit slot, be sure that the exposed 32-bit extension does not come into contact with any components on the motherboard.*

3. Plug the Xem host adapter into the Micro Channel slot, making sure that the "fork" is in position under the endplate thumbscrew. Tighten the thumbscrew.

4. Replace your computer's cover.

Configuring the Host Adapter

Note: This procedure is necessary for **PS/2** compatible machines only. If you are installing the host adapter in an **RS-6000** system, skip this procedure.

1. Insert your *working* copy (don't use the original copy) of the IBM Reference Diskette into your boot drive and turn on the computer's power. Expect an error message—the host adapter board won't be found in the configuration file at this point.

2. Select "**Copy an Option Diskette**" from the main menu. Follow the instructions given on your computer screen for copying ADF files onto your Reference Diskette.

3. Select "**Set Configuration**" from the main menu. Then select "**Run Automatic Configuration**" from the Set Configuration menu. Auto-Config will find non-conflicting address and interrupt parameters for the board for you. If you choose to set the parameters manually, you will be given the following choices:

Memory Start Address:

Below 1 megabyte:
0D8000h, 0D0000h, 0C8000h, 0C0000h

Sixteenth megabyte:
FC0000h, FA0000h, F80000h

Fourth gigabyte (32-bit slot only):
F0000000h, F2000000h, F4000000h, F6000000h, F8000000h and FA000000h.

I/O Port Address:
108h, 118h, 128h, 208h, 228h, 308h or 328h.

Interrupt Select:
IRQ 3, 5, 7, 10, 11, 12, 15 or None (disabled).

PORTS Module Installation

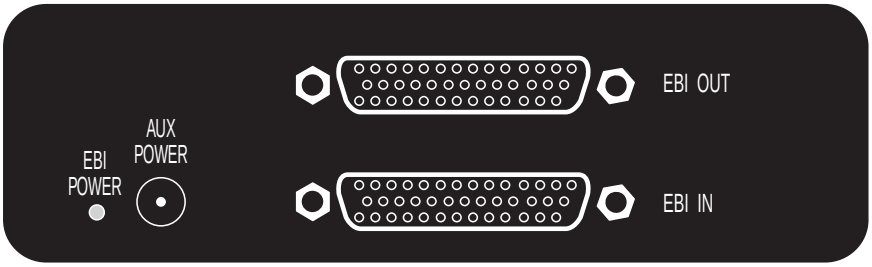
The PORTS modules are connected to the host adapter with the Digi EBI cable. Plug one end of the cable into the host adapter, and the other end into the connector on the PORTS module labeled EBI IN.

Up to three additional modules can be daisy-chained to the first module with an EBI cable between the EBI OUT connector of the first module and the EBI IN connector of the added module (a short cable is provided with additional PORTS modules for this purpose).

Any combination of PORTS modules (16em, 8em, 8emp) can be connected in this manner.

Important! When adding PORTS modules to an existing system, it may be necessary to reconfigure or reinstall the device driver software before the additional ports are recognized. Refer to your device driver software manual for details.

Figure 3 EBI and AUX POWER Connectors (PORTS/16em Module)



(Left side of PORTS module)

Power / Low Power Indicator

Ports modules are equipped with an LED indicator which burns steadily when input power is sufficient (+5 Volts), or flashes when input power drops below 4.63 Volts. If low voltage is indicated and the PORTS module is powered by the host adapter, it may be necessary to provide an auxiliary power supply for the PORTS module (see notes on the following page).

Important! Make sure that power to the host system is turned OFF before plugging the PORTS module into the host adapter. Also make sure that power to the host system is turned OFF before connecting two PORTS modules with a daisy-chain cable.

Note: To remain within Class A emissions standards, the Digi-supplied cabling between the host adapter and PORTS module (or between two PORTS modules) must be used.

Important! Micro Channel Xem systems with multiple PORTS modules require an auxiliary power supply for the second, third and fourth PORTS modules. This is because the Micro Channel bus can provide only enough power for a host adapter and one PORTS module.

PCI, ISA and EISA Xem systems with three or four PORTS modules require an auxiliary power supply for the third and fourth PORTS module.

The LED indicator on the side panel of the PORTS module blinks when the input power is less than the required minimum of 4.63 Volts. If this happens, install an auxiliary power supply.

The power supply must be plugged into the "AUX POWER" connector of the PORTS module. *Be sure to plug the power supply into the PORTS module* before *plugging it into the AC receptacle*.

When ordering additional PORTS modules for an existing Xem system, the auxiliary power supply must be ordered separately. Auxiliary power supplies are different depending upon the country in which they will be used:

U.S. (120V)	P/N 76000109
Europe (220V)	P/N 76000110
U.K. (240V)	P/N 76000111

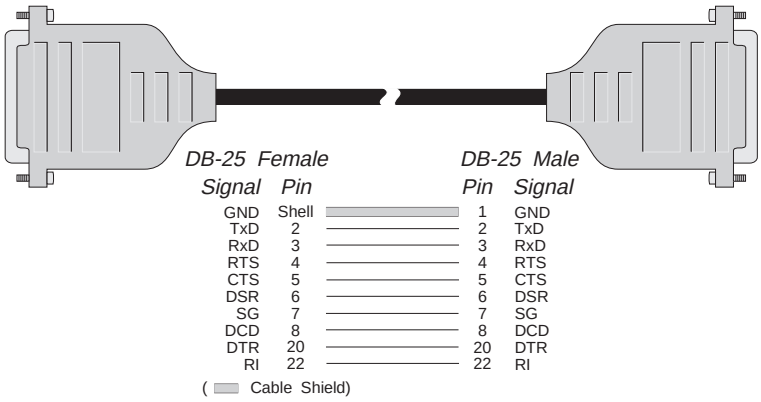
Contact your Digi sales representative to order.

Connecting Peripherals

Connecting to a Modem

DB-25 Equipped PORTS Modules

Figure 4 **DB-25 to DB-25 Modem Cable**



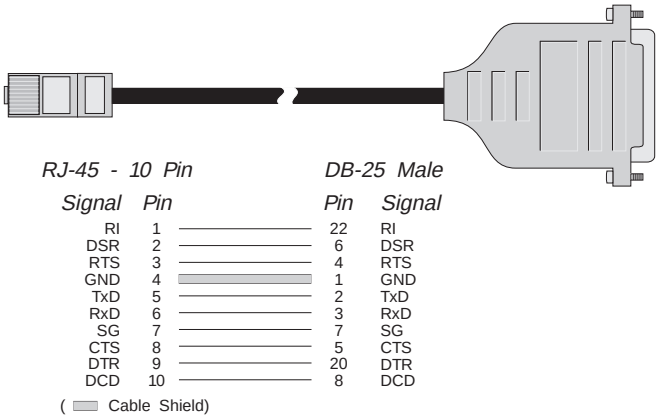
To connect a DB-25 equipped PORTS module to a modem, use a standard "straight-through" cable (see Figure 4) to connect the modem to one of the DB-25 connectors on the rear of the PORTS module.

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

RJ-45 Equipped PORTS Modules

The simplest way to connect a modem to a PORTS module with RJ-45 connectors is to use RJ-45 to DB-25 "Cable Legs", available from Digi (see page 33 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 5 RJ-45 to DB-25 Modem Cable (10 Wire)



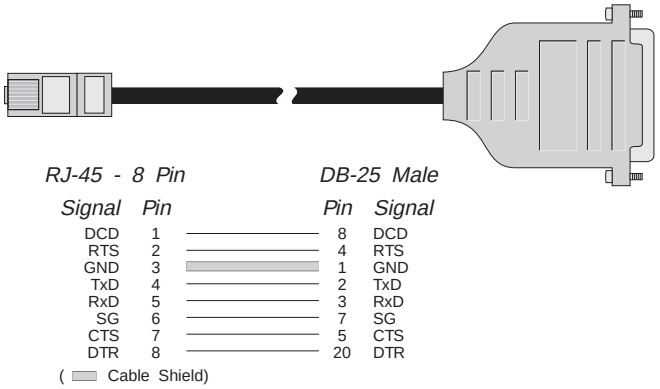
If you wish to build your own modem cable, follow the diagram in Figure 5.

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

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 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 6 8-Wire Modem Cable for use with ALTPIN Configuration



If you wish to build an 8-wire modem cable for an RJ-45 equipped PORTS module, use an 8-pin RJ-45 plug wired as shown in Figure 6.

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

Connecting to a DTE Device

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

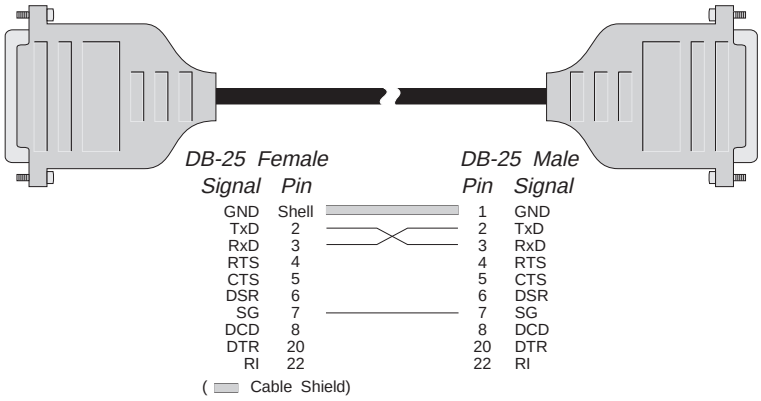
DB-25 Equipped PORTS Modules

Software Handshaking (XON/XOFF)

In most cases, serial terminals and printers need only a "three-wire" connection to the PORTS module. 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 the Digi device driver 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 PORTS module is shown in Figure 7.

Figure 7 Simple Terminal/Printer Cable (DB-25)



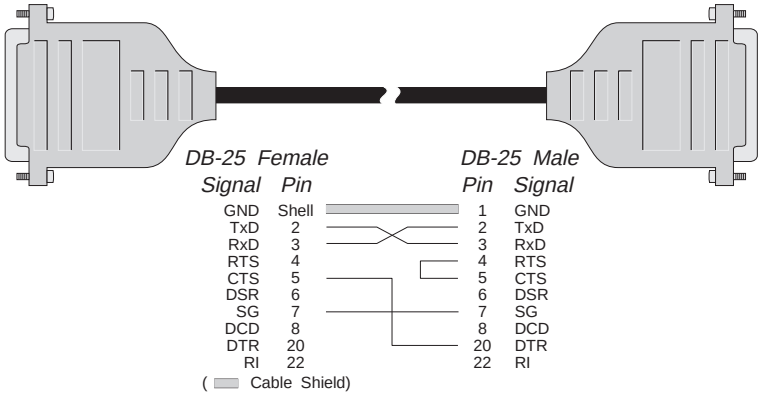
Important! Shielded cable must be used to remain in compliance with Part 15 of FCC rules.

The cable shown in Figure 7 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 rear of the PORTS module.

Hardware Handshaking (Ready/Busy)

Figure 8 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 8 supports this method.

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

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.

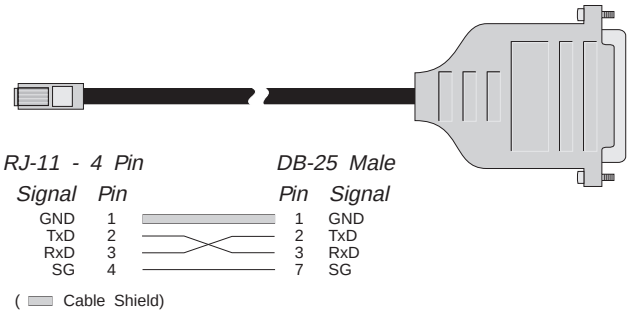
RJ-45 Equipped PORTS Modules

Software Handshaking (XON/XOFF)

In most cases, serial terminals and printers need only a "three-wire" connection to the PORTS module. 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 PORTS module is shown in Figure 9.

Figure 9 Simple Terminal/Printer Cable (RJ-45)

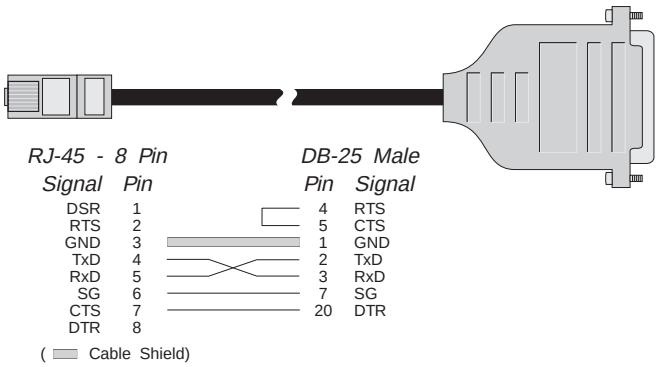


The cable shown is a three-wire null modem cable—that is, Transmitted Data on one end of the cable is connected to Received Data at the other end, and vice versa.

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.

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

Figure 10 Terminal/Printer Cable with DTR Handshaking (RJ-45)



Most terminals and printers use Data Terminal Ready (DTR) for Ready/Busy hardware handshaking. The cable shown in Figure 10 supports this method.

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

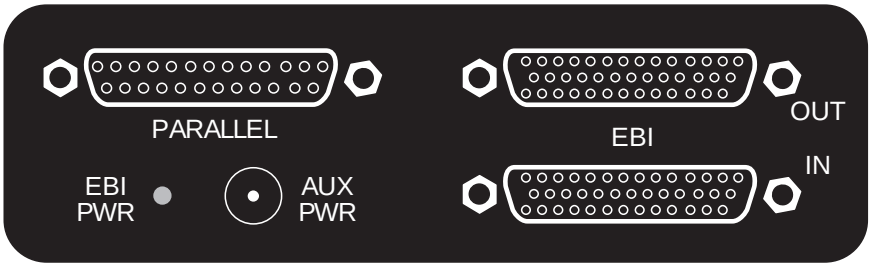
Note: Some Okidata printers use a control signal on pin 11, called Supervisory Send Data (SSD) instead of DTR. In this case, simply connect CTS on the RJ-45 side to pin 11 of the DB-25, instead of pin 20.

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

Parallel Printers

The PORTS/8emp module includes a parallel printer port, which is located on the left-hand side of the module (see Figure 11). To connect a parallel printer to the PORTS/8emp module, use a standard PC printer cable with a DB-25 male connector at one end, and a 36 pin Centronics connector at the other end. Printer cables of this type are readily obtainable from any computer store. The recommended maximum cable length is 10 feet; longer cables (up to 25 feet) may work, but are not supported.

Figure 11 **PORTS/8emp Parallel Printer Port**



(Left side of PORTS module)

EIA-232 Serial Interface

Digi PORTS modules' EIA-232 asynchronous serial interface ports are provided via either DTE-wired male DB-25 connectors or RJ-45 modular jacks, located on the rear of the unit.

Cables

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

Grounding

The shield should be grounded at both ends of the cable. Chassis Ground, available on pin 4 of the 10-pin RJ-45 connector, and on pin 1 or the metal shell of the DB-25 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 picofarads 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.

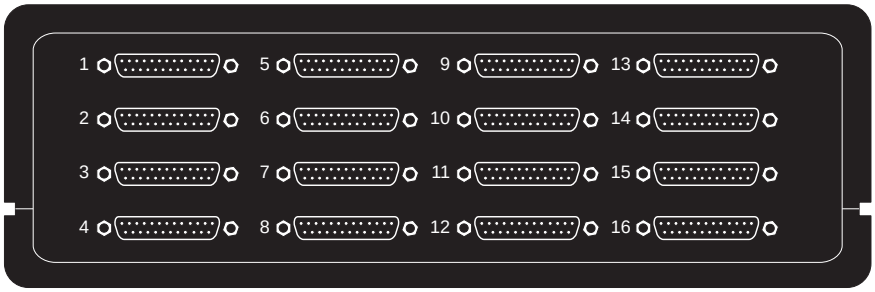
In situations where low-capacitance cable is unavailable, or very long cable runs are required, "short-haul" modems, available from suppliers such as Black Box, can be used to increase the effective range of the EIA-232 interface. Short-haul modems are similar to standard modems, except that they are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

Connector Options

Digi PORTS modules are available with either DB-25 connectors or 10-pin RJ-45 “modular” connectors.

DB-25 Connectors

Figure 12 PORTS/16em Asynchronous Connectors (DB-25 Version)



The DB-25 versions of the PORTS modules are equipped with male DTE-wired DB-25 connectors. The pin assignments for the DB-25 connectors follow the usual conventions for DTE EIA-232 wiring. See Table 1, on the following page, for the pin assignments.

Figure 13 PORTS/8em and PORTS/8emp Asynchronous Connectors

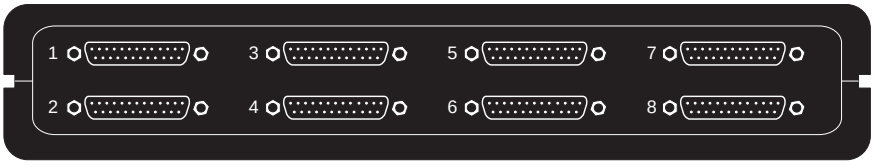


Table 1 DB-25 Connector Pin Assignments

Signal	Description	Pin
GND	Chassis Ground	1*
TxD	Transmitted Data	2
RxD	Received Data	3
RTS	Request to Send	4
CTS	Clear to Send	5
DSR	Data Set Ready	6
SG	Signal Ground	7
DCD	Data Carrier Detect	8
DTR	Data Terminal Ready	20
RI	Ring Indicator	22

*Chassis Ground is also available on the connector shell.

RJ-45 Connectors

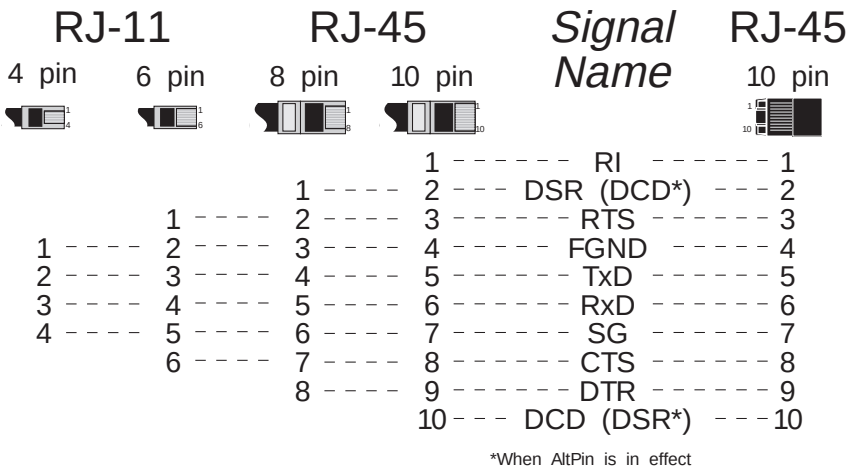
There are four types of modular plugs that can be used with the PORTS module's 10-pin RJ-45 jacks. These are the 4 or 6-pin RJ-11 plugs, and the 8 or 10-pin RJ-45 plugs.

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.

The diagram below illustrates the relationship of the various modular plug configurations to Digi's standard 10-pin RJ-45 jack, and show which EIA-232 signals are available in each configuration.

Figure 14 Correspondence of Different RJ Plugs to RJ-45 Jack

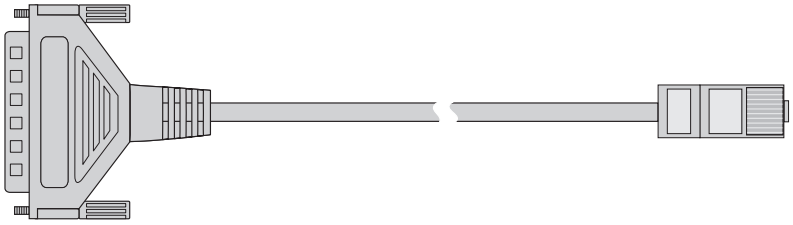


RJ-45 to DB-25 Conversion

Since most EIA-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.

Figure 15 **RJ-45 to DB-25 "Cable Leg"**

DB-25 *RJ-45 - 10 Pin*



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 2 **Cable Leg Options and Part Numbers**

	DB-25 Male	**DB-25 Female**	**DB-9 Female**
24 Inch Cables	61020024	61030024	61070024
48 Inch Cables	61020048	61030048	N/A

The pin configuration of the DB-25 connector on the Cable Leg is shown in the diagram on the preceding page.

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 end-user in any desired configuration.

Specifications

- Power requirements:

  PCI/Xem, AccelePort Xem - PCI:
  +5 Volts +/-5% 0.43 amps (typical), Vio (at +5 Volts) 0.020 Amps, plus PORTS module power draw (see below). *Only two PORTS modules can be powered by the PCI bus—third and fourth modules must have auxiliary power supplies connected).*

  PC/Xem, AccelePort Xem - ISA:
  +5 Volts +/-5% 1.75 amps (typical), plus PORTS module power draw (see below). *Only two PORTS modules can be powered by the ISA bus—third and fourth modules must have auxiliary power supplies connected).*

  EISA/Xem, AccelePort Xem - EISA:
  +5 Volts +/-5% 1.25 amps (typical), plus PORTS module power draw (see below). *Only two PORTS modules can be powered by the EISA bus—third and fourth modules must have auxiliary power supplies connected).*

  MC/Xem, AccelePort Xem - MC:
  +5 Volts +/-5% 0.87 amps (typical), plus PORTS module power draw (see below). *Only one PORTS module can be powered by the Micro Channel bus—second, third and fourth modules must have auxiliary power supplies connected).*

  PORTS Modules (each):

PORTS/16em:	.7 amps (typical)
PORTS/8emp:	.65 amps (typical)
PORTS/8em:	.55 amps (typical)

- Environmental (host adapter and PORTS module):

Ambient Temperature	10 Degrees C to 55 Degrees C
Relative Humidity	5% to 90%
Air Movement	30 CFM Forced (host adapter only)
Altitude	0 to 12,000 Feet

- Mechanical (host adapter):

  PCI/Xem, AccelePort Xem - PCI:

Length	6.75 inches	Width	.5 inches
Height	4.2 inches	Weight	4 ounces

  PC/Xem, AccelePort Xem - ISA:

Length	10.9 inches	Width	.6 inches
Height	3.7 inches	Weight	9 ounces

  EISA/Xem, AccelePort Xem - EISA:

Length	10.8 inches	Width	.6 inches
Height	3.8 inches	Weight	9 ounces

  MC/Xem, AccelePort Xem - MC:

Length	12.3 inches	Width	.6 inches
Height	3.5 inches	Weight	9 ounces

- Mechanical (PORTS/16em module):

  RJ-45 version:

Length	12 inches	Depth	7 inches
Height	2.25 inches	Weight	2 pounds

  DB-25 Version:

Length	12 inches	Depth	7 inches
Height	4.2 inches	Weight	4 pounds

- Mechanical (PORTS/8em and PORTS/8emp modules):

Length	12 inches	Depth	7 inches
Height	2.25 inches	Weight	2 pounds

- Emissions:

  FCC Part 15, Subpart J, Class A

  CSA C108.8-M83, Class A

  Note: To remain within Class A emissions standards, the Digi-supplied shielded cabling between the host adapter and PORTS module (or between two PORTS modules) must be used.

Appendix—Memory Conflicts

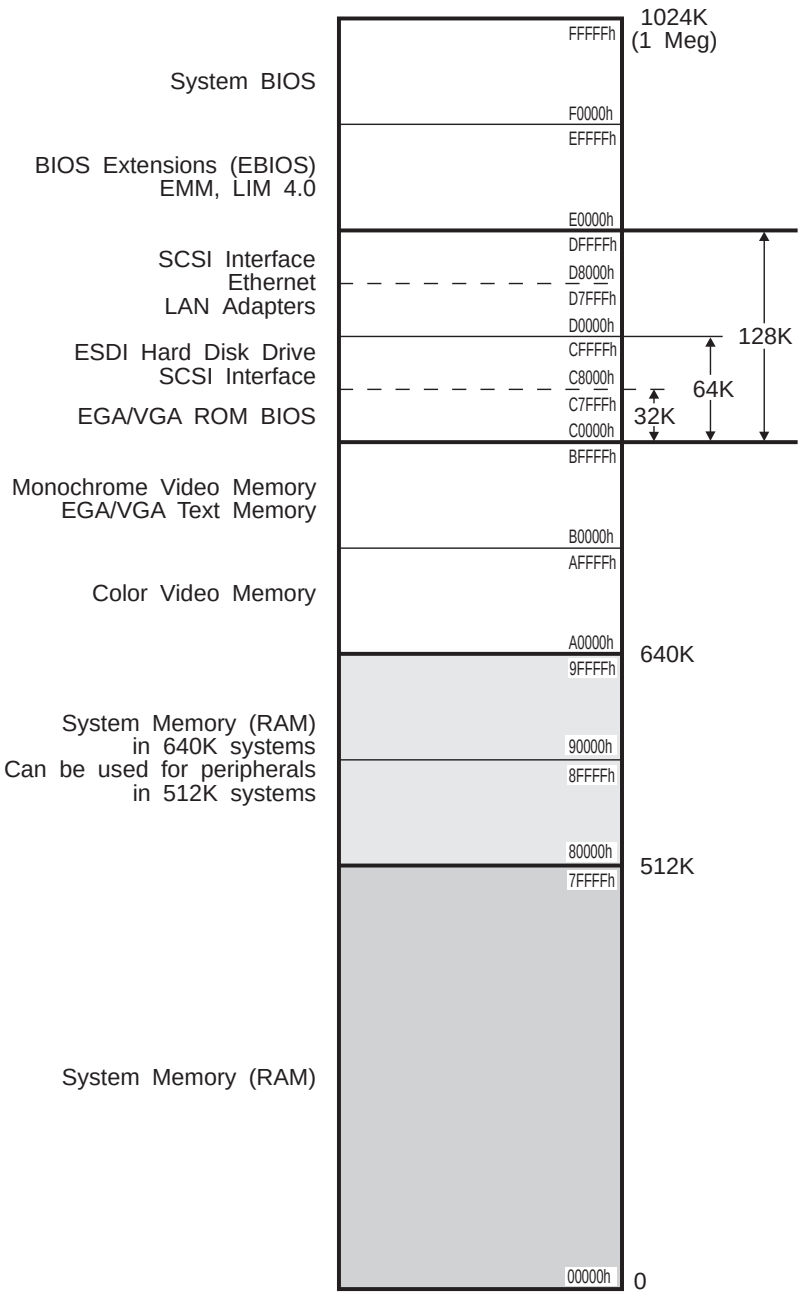
Contention for Memory Addresses

Many intelligent peripheral devices require a block of vacant memory addresses on the host computer's bus for their own use. These memory addresses may be used to access a dual-ported RAM on the peripheral device to facilitate the transfer of large volumes of data between the host and the peripheral (memory-to-memory transfers are much faster than I/O bus transfers), or they may point to a ROM BIOS (a firmware program used by the host computer to control the peripheral device). In either case, the host computer sees this memory as its own, and can use the same high-speed memory-referencing commands that it uses with its internal memory.

Figure 16 shows a map of the first megabyte of a host system's memory bus. The shaded areas represent the computer's internal RAM. (This is nearly always 640K, but can often be reduced to 512K; there is also usually more RAM above the 1 Megabyte boundary.) The area between the RAM and the 1 Megabyte boundary is used for the host system's BIOS, option ROMs and peripheral memory. The memory map shows the locations typically used by some of the most common peripheral devices.

The memory map on the following page shows typical *memory usage. To be certain of what areas are available in your system, you will need to consult the documentation for your computer and peripheral devices.*

Figure 16 **Typical PC Memory Usage - 1st Megabyte**



ISA Host Adapters

The ISA Xem host adapter has 256K bytes of on-board dual-ported RAM which is accessed through a 32K "window", which can be mapped into any 32K region in the first sixteen megabytes of the computer's memory address space (32K byte boundaries end with either 0000h or 8000h).

Current Digi device drivers support sixteen preconfigured 32K address ranges for ISA Xem host adapters, beginning at 80000h, 88000h, 90000h, 98000h, A0000h, A8000h, B0000h, B8000h, C0000h, C8000h, D0000h, D8000h, E0000h, E8000h, F0000h or F8000h. These addresses are all below the 1 megabyte boundary. In practice, only four of these address ranges are likely to be available. The addresses E0000h-FFFFFh are typically used for the system BIOS and BIOS extensions; the addresses A0000h-BFFFFh are used for video buffers, and the addresses 80000h-9FFFFh are between 512K and 640K, and so can only be used with host computers having no more than 512K of base memory (memory below 1 megabyte). Since most computers have 640K of base memory, only the addresses from C0000h-DFFFFh are generally usable. To complicate matters, most intelligent peripheral devices require some memory address space in this region for their ROM or shared memory. It is therefore necessary to insure that the memory address range chosen for the ISA Xem host adapter does not conflict with the range used by any other device in your system.

Some typical sources of contention are:

- Plug-in VGA and EGA cards, which have a ROM BIOS beginning at C0000h.
- ESDI hard disk controllers, which typically have a ROM BIOS beginning at C8000h or CC000h.
- SCSI interfaces, which have a ROM BIOS that may be located anywhere in the C0000h-DFFFFh range.

Consult the documentation for your peripheral devices to determine what (if any) memory addresses they may be occupying on the host memory bus.

EISA Host Adapters

EISA/Xem host adapters support 32-bit addressing, and so can be placed anywhere in the memory address space up to the 4 gigabyte limit. The EISA/Xem configuration file provides sixteen address ranges below 1 megabyte, and sixteen address ranges in the fourth gigabyte.

When installed at an address *below* 1 megabyte, the same considerations apply as for the ISA/Xem host adapter (see page 39).

Micro Channel Host Adapters

Micro Channel Xem host adapters support 32-bit addressing, and so can be placed anywhere in the memory address space up to the 4 gigabyte limit. The Micro Channel Xem configuration file provides four address ranges below 1 megabyte, three address ranges in the sixteenth megabyte and eight address ranges in the fourth gigabyte. To use the address ranges in the fourth gigabyte, the host adapter must be installed in a 32-bit slot.

When installed at an address *below* 1 megabyte, the same considerations apply as for the ISA Xem host adapter (see page 39).

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) 912-4800**. In Europe, dial **+49 221 9205211**; in Asia, dial **+65 735 2460**.

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.dgii.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.dgii.com**.

DigiFACTs FaxBack Server

Manuals and technical information can also be obtained by FAX. To use the FaxBack server, simply call (612) 912-4990 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) 912-3456**. In Europe, call **+49 221 920520**, and in Asia, call **+65 732 1318**. FAX numbers are: (612) 912-4958 (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 preceding 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@dgii.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 Digi product for repair (see page *45*). They may be reached at **(612) 912-3456**. Digi Customer Service may be contacted by FAX at (612) 912-4959.

Digi Customer Service can also be reached via Internet E-mail. Please send correspondences to **cust_serv@dgii.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) 912-3456.**



Be sure to have the serial number of your Digi product 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.



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

Index

Adapter
    RJ-45 to DB-25, 33
ADF Files, 17
ALTPIN, 22
BBS, 41
Bulletin Board, 41
Cable configuration
    EIA-232 peripherals, 21, 23, 24, 25, 26
Cable legs, 21, 33
Cables
    Capacitance, 29
Configuration
    Automatic, 17
    EISA, 14
    ISA, 10
    Micro Channel, 17
Contention
    Memory addresses, 37
        Sources, 39
Customer Assistance, 44
Customer Service, 44
DB-25 connectors, 23, 24, 30
    Pin assignments, 31
DB-25 to RJ-45 conversion, 33
Diagnostics, 6, 7
Digi BBS, 41
DTE connections, 23
EBI Cable, 18
EBI connectors, 18
EBI In, 18
EBI Out, 18
EISA
    Configuration, 14
    Installation, 13
    Jumper Settings, 13
E-Mail addresses, 44
Environment, 28
FaxBack, 42
Flow control, 23, 24, 25, 26
    DTR, 24, 26
    Hardware, 24, 26
    Ready/Busy, 24, 26
    Software, 23, 25
FTP server, 42
Grounding, 28
Handshaking, 23, 24, 25, 26
    DTR, 24, 26
    Hardware, 24, 26
    Ready/Busy, 24, 26
    Software, 23, 25
I/O Port
    ISA, 10
    Micro Channel, 17
Installation, 8
    EISA, 13
    ISA, 10
    Micro Channel, 16
    PORTS modules, 18
Installation tips, 3
Internet, 42
ISA
    Configuration, 10
    I/O Port, 10
    Installation, 10
    Jumper Settings, 11
Jumper Settings
    EISA, 13
    ISA, 11
    Micro Channel, 16
Memory address
    Contention, 37
        Sources, 39
Memory addresses
    EISA, 15
    Micro Channel, 17
Memory conflicts, 37
    EISA, 40
    ISA, 39
    Micro Channel, 40
Memory map, 38
Memory map utility, 3, 5
Micro Channel
    Configuration, 17

I/O Port, 17
Installation, 16
Jumper Settings, 16
Memory addresses, 17
Modems, 21
Modular plugs, 32
Parallel printers, 27
PORTS modules
Installation, 18
Power supply
Auxiliary, 19
Printer port, 27
PS/2, 17
Reference Diskette, 17
Return Procedures, 45
RJ-11 plugs, 32
RJ-45 connectors, 21, 22, 25, 26, 32
RJ-45 plugs, 32
RJ-45 to DB-25 conversion, 33
RMA, 45
RS-6000, 17
Specifications, 35
Emissions, 36
Environmental, 35
Mechanical
Host adapter, 36
PORTS/16em module, 36
PORTS/8em(p) module, 36
Power requirements, 35
Technical Support, 44
World Wide Web, 42
XON/XOFF, 23, 25

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