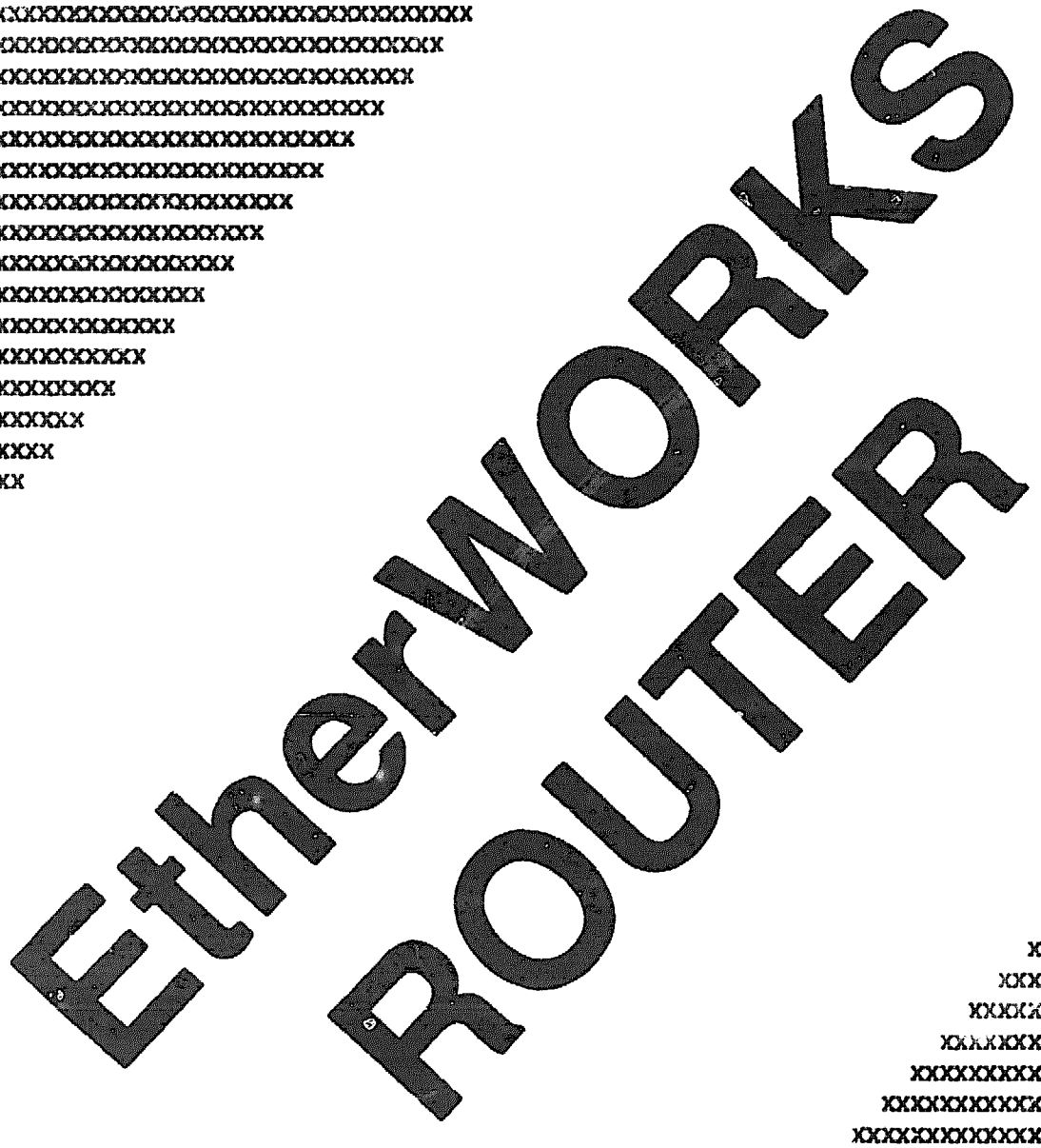

EtherWORKS
ROUTER

EtherWORKS Router

Hardware Installation

This guide describes how to configure, install, and maintain the EtherWORKS router (DE206).

February 1992

Supersession/Update Information:	This is a new manual.
Operating System and Version:	DOS V3.3, V4.0, V4.01
Software Version:	EtherWORKS Router V1.0

Order Number: EK-DEERT-RG.001

EK-DEERT-RG.001
February 1992

This manual was prepared and published by Educational Services Development and Publishing, Digital Equipment Corporation.

FCC NOTICE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

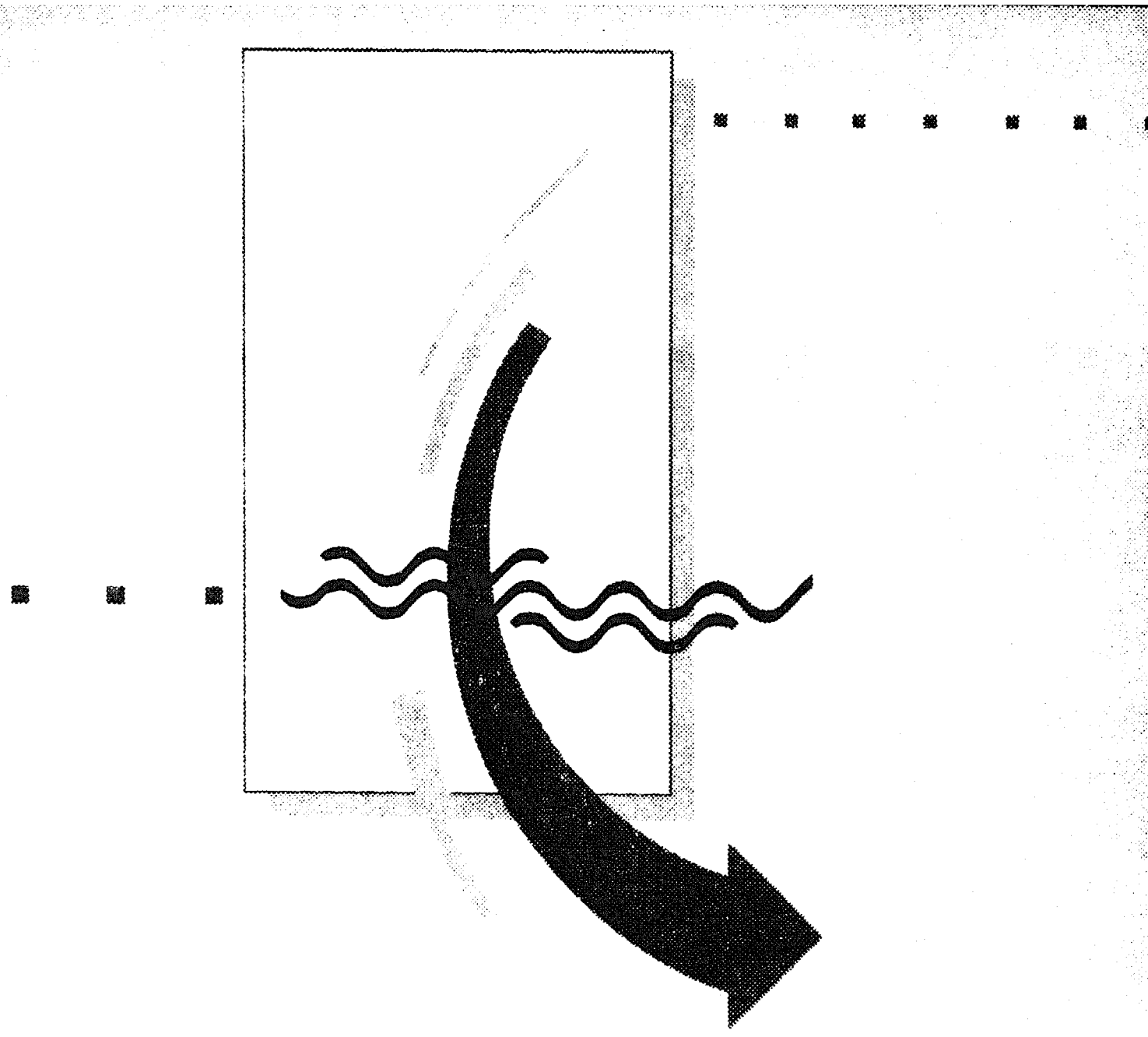
- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Page iv is a blank page

Contents

Figures

Tables



Page viii is a blank page

Preface

This guide describes how to configure, install, and maintain the EtherWORKS router.

Structure of This Guide

This guide contains the following four chapters and four appendices:

Chapter	Contents
1	Provides an overview of the EtherWORKS router and introduces you to the product's features.
2	Describes the configuration rules and conditions of operation for the EtherWORKS router.
3	Provides instructions for installing the EtherWORKS router.
4	Provides problem solving information.
Appendix A	Provides information about specifications and standards.
Appendix B	Provides a list of serial line port adapter cables and extensions.
Appendix C	Provides information pertaining to I/O address register selection.
Appendix D	Provides a sheet that you can use to list installed options, I/O addresses, IRQs assigned, and power consumption used by each slot.

Conventions

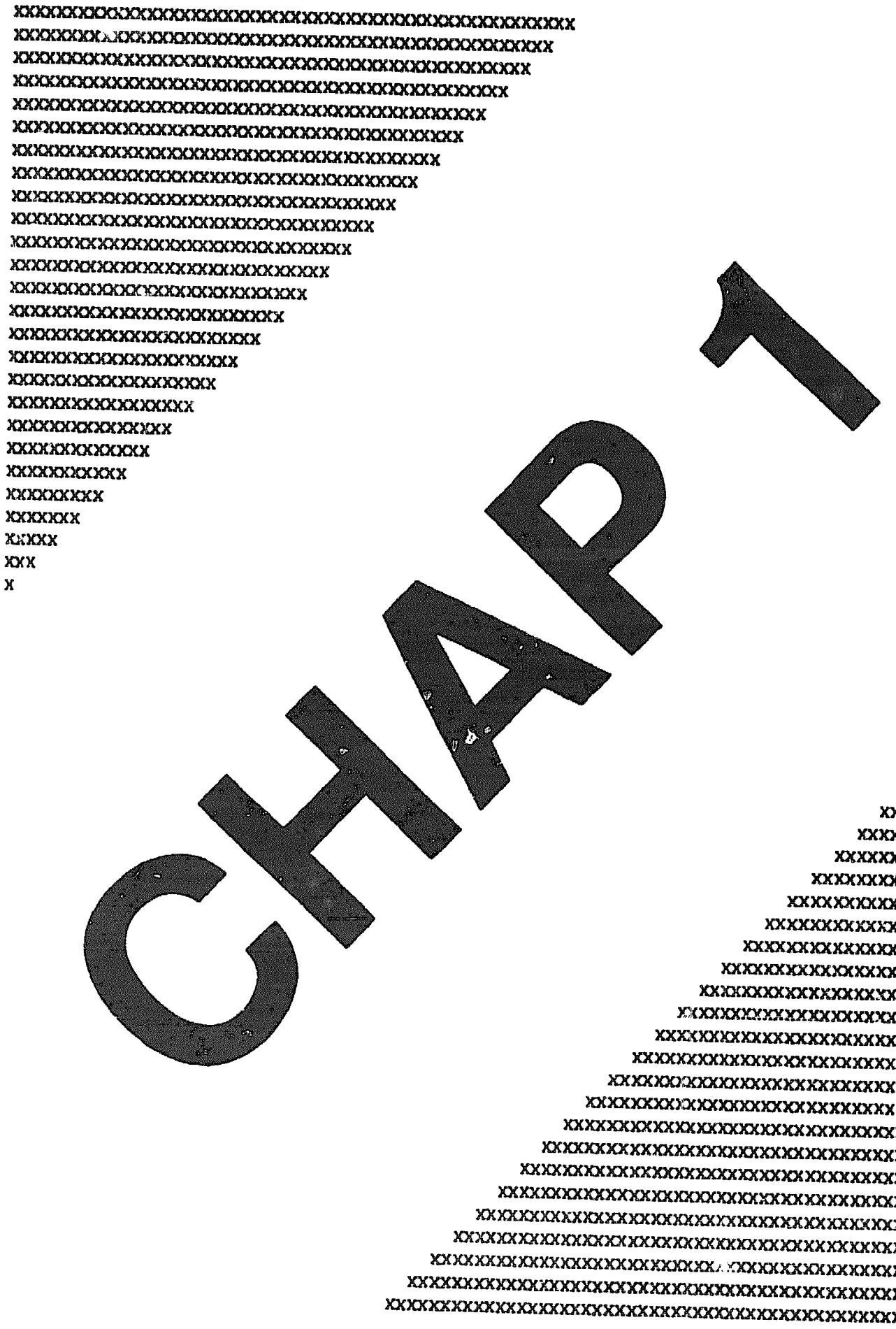
The following conventions are used throughout this guide:

Convention	Meaning
NOTE	Provides general information.
WARNING	Provides information to prevent personal injury.
CAUTION	Provides information to prevent damage to equipment.

Related Documentation

The following table lists related documentation:

Document Title	Order Number
DECconnect Catalog	EB-M4506-78
DECconnect System Planning and Configuration Guide	EK-DECSY-CG
Software Product Description (SPD)	AE-PJHXA-TE
System Support Addendum (SSA)	AE-PJHYA-TE


CHAP 1

1 Introduction

This chapter describes the features of the EtherWORKS™ router.

The EtherWORKS router addresses customer connectivity requirements between isolated local area networks (LANs) by providing wide area network (WAN) packet routing and transport.

The EtherWORKS router is a PC AT-bus Industry Standard Architecture (ISA) and EISA 16-bit compatible, full-size option card. It provides a low-cost and flexible wide area network routing for a variety of small office local area networks in remote locations.

If direct connection between the Ethernet and either the PC AT-bus ISA or EISA is required, an optional EtherWORKS Ethernet controller must also be installed in your system.

1.1 Features

The EtherWORKS router has the following features:

- PC AT-bus (ISA or EISA) compatible full-size 16-bit option card
- Basic memory of 512 kilobytes, expandable up to 2.5 megabytes application dependent
- One NI port for connection to standard ThinWire Ethernet V2.0/IEEE 802.3
- One 68-pin connector with external Y-cable fan-out to two serial ports running synchronous/asynchronous (sync/async) DDCMP protocol. Supports EIA 232/V.24 and EIA 423/V1.0 for low speed async/sync and EIA 422/V.36 for high speed sync.
- Programmable line speeds, up to a maximum of one of the following:
  - Two lines at 19.2 Kbps - async
  - Two lines at 64 Kbps - sync
- Support for Level 1 (intra-area) and Level 2 (inter-area) routing

- Full modem control on all serial ports
- Support for V.22 bis and V.25 bis CCITT autodialing standards
- Support for modem dialback capabilities

1.2 Physical Description

The EtherWORKS router consists of a single full-size printed circuit board, a serial line port adapter cable, and a .6 meter (2 feet) ThinWire cable. The board measures approximately 10.8 centimeters (4.25 inches) high by 25.41 centimeters (10.0 inches) deep and the serial line port adapter cable is approximately .9 meters (3 feet) long. A T-connector is included for the Ethernet port.

Figures 1–1 and 1–2 show two sample configurations.

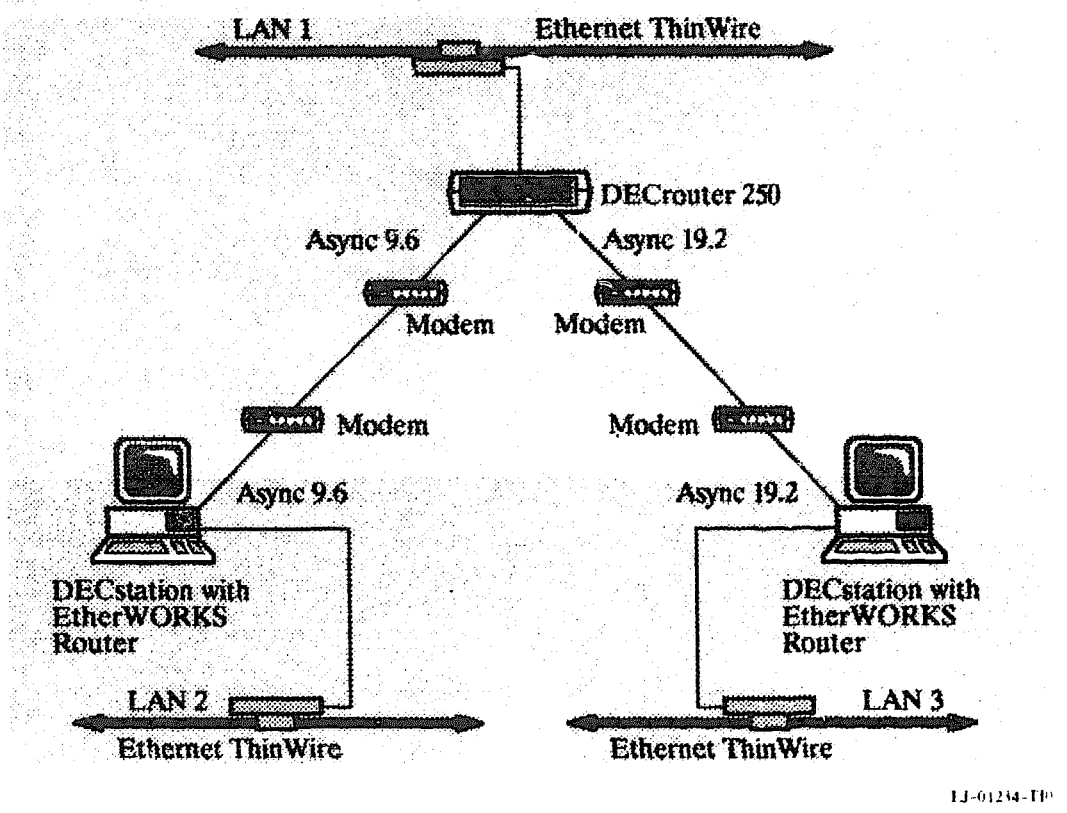


Figure 1–1: Sample EtherWORKS Router Connection 1

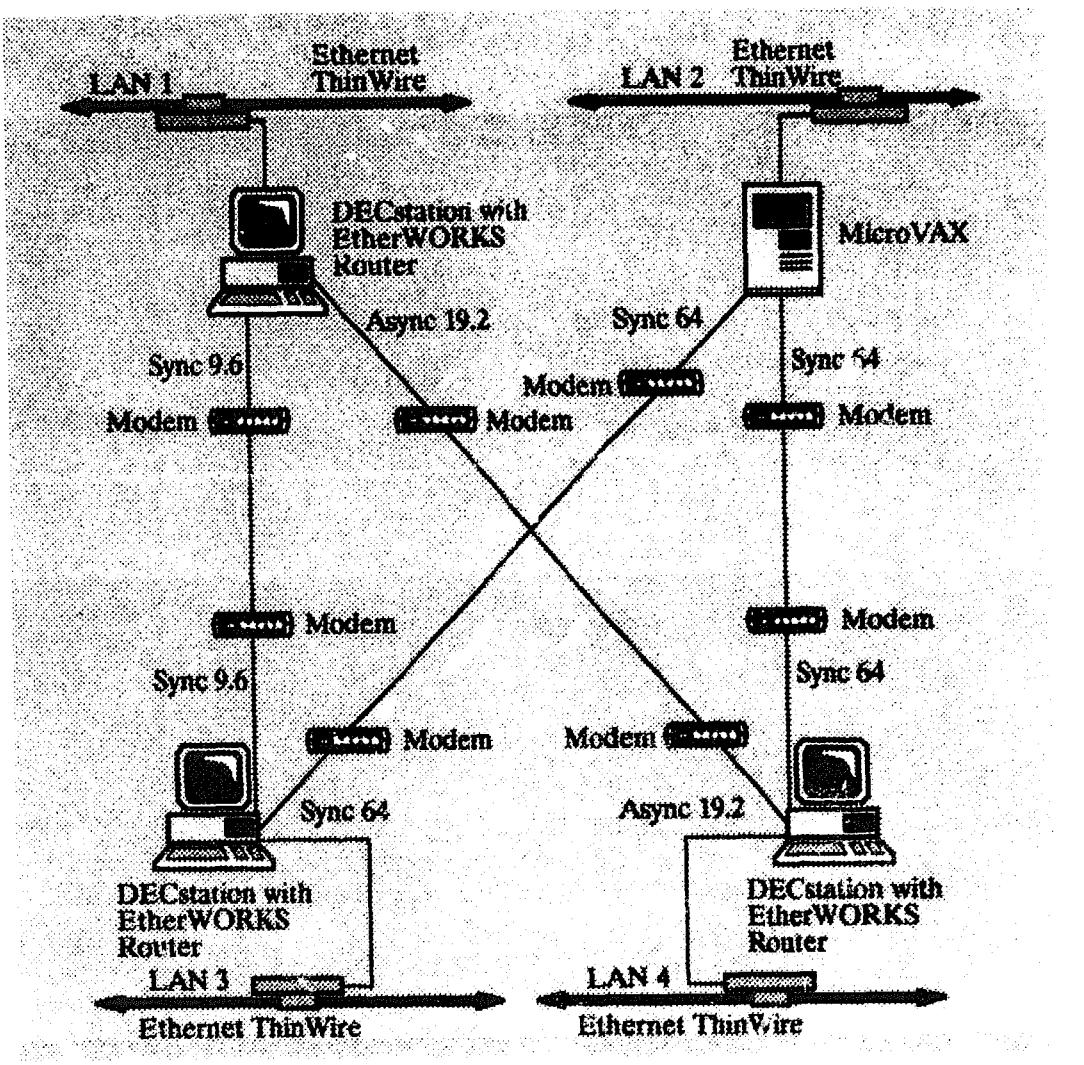


Figure 1–2: Sample EtherWORKS Router Connection 2

Figure 1–3 shows the EtherWORKS router.

1. ThinWire BNC connector
2. 68–pin serial line port connector

3 Jumpers

4 SIMM memory connectors

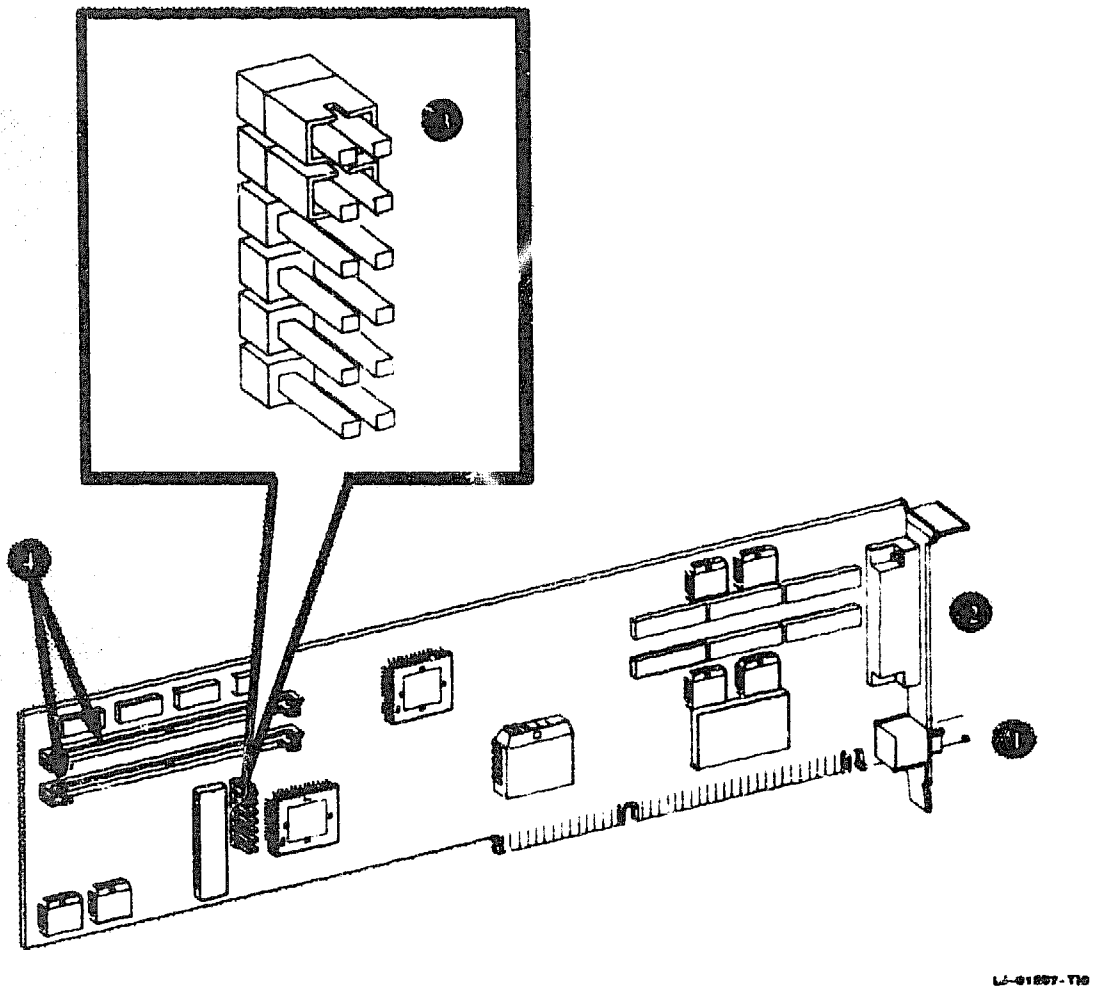


Figure 1–3: EtherWORKS Router

CAUTION

Always use an antistatic kit when installing or handling the EtherWORKS router or SIMM memory modules. Failure to take these precautions could shorten the life expectancy of these options.

1.3 Quick Start

To install and begin using your EtherWORKS router, perform the following after unpacking the unit. For more detailed information, see Chapter 3, "Installing the EtherWORKS Router."

1. Check to see that you have the necessary tools.
2. Check the product kit to ensure that you have a complete kit.
3. Power down the system.
4. Remove the cover on your personal computer (PC) and connect the antistatic kit.
5. Check the hardware configuration of the other options to ensure the following:
   - There are no conflicts in I/O address register assignment.
   - You do not exceed power supply ratings.

NOTE

Go to step 8 if you plan to use the default jumper settings.

6. Set the address for the I/O address register.
7. Set the PC Bus Reset Enable Jumper.
8. Remove the PC slot cover.
9. Install the EtherWORKS router. (Remember to record the Ethernet address.)
10. Replace the cover on the PC.
11. Connect to a network.
12. Power up the system.
13. Install the software. (Refer to the *EtherWORKS Router Software Installation and Use* guide.)

For detailed information about configuring the EtherWORKS router, see Chapter 2 and Appendix C. For information on installing and using the EtherWORKS router, see Chapter 3.


СНАР 2

2

Configuring the EtherWORKS Router

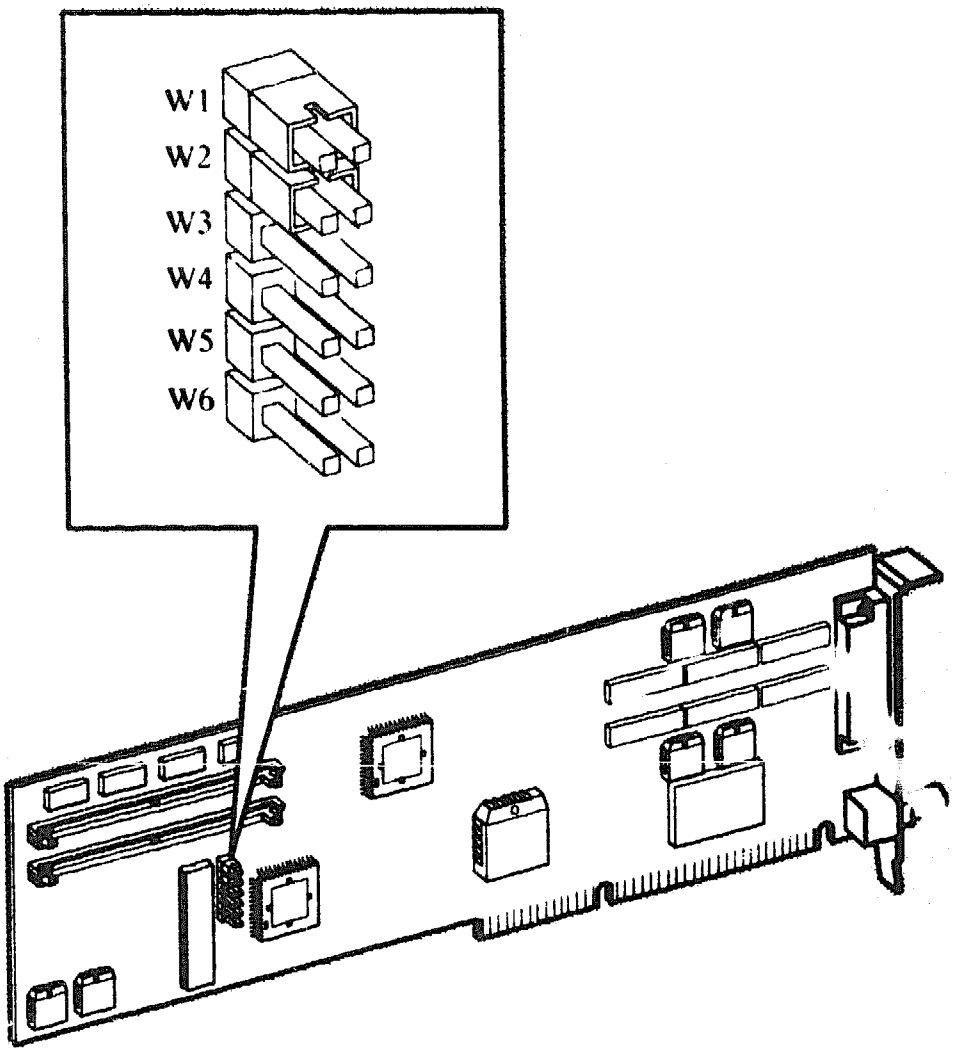
This chapter provides you with the information you need to configure the jumper settings on the EtherWORKS router. Before installing the router in your system, verify the jumper settings and change them if necessary.

2.1 Default Jumper Settings

The EtherWORKS router is shipped with default settings that work in most installations. Table 2–1 lists the default settings and their functions. Figure 2–1 shows the location of the jumpers on the EtherWORKS router board. If you plan to use the default jumper settings for your installation, skip this chapter and go to Chapter 3.

Table 2–1: Default Settings on the EtherWORKS Router

Jumper	Condition	Function
W1, W2	Installed	I/O address 240-242H.
W3	Removed	Disable the personal computer bus reset.
W4, W5, W6	Removed	Factory use only.



LKG-5250-911

Figure 2–1: Default Jumper Settings

2.2 Selecting Input/Output Register Address Space

The EtherWORKS router has six jumper positions. Only the two top jumpers (W1, W2) are used to enable operation without input/output (I/O) address conflicts. The following sections describe how to change the jumper settings.

If you have other add-on options in your system, you might have to change the I/O register address on the EtherWORKS router to create a compatible operating environment. You can also change the I/O address of one of the other controller modules, instead of changing the I/O address jumper on the EtherWORKS router. If you choose to change the I/O address of one of the other controller modules, refer to the appropriate documentation.

CAUTION

Always use an antistatic kit when you install or handle the EtherWORKS router or SIMM memory modules. Failure to take these precautions can shorten the life expectancy of these options.

Table 2–2 provides information to select the I/O register addresses.

Table 2–2: I/O Register Address Range Jumpers

Jumpers		I/O Address	
W1	**W2**	**Begin**	**End**
Installed *	Installed *	240H	242H
Installed	Removed	2C0H	2C2H
Removed	Installed	340H	342H
Removed	Removed	3C0H	3C2H

* Default

2.3 Checking the Other PC Option Modules

Check the other PC option modules to ensure that their I/O register addresses do not conflict with the EtherWORKS router. For detailed information on setting I/O address registers, see Appendix C.

2.4 PC Bus Reset Enable Jumper

Use the third jumper from the top (W3) to change how the PC bus reset function affects the EtherWORKS router. When you install jumper W3, it enables a PC bus reset to reset the EtherWORKS router. When you remove jumper W3, an IPL 7 interrupt to the EtherWORKS router is generated when the PC bus is reset.

Table 2-3 provides information to select the function of the PC bus reset enable.

Table 2-3: PC Bus Reset Enable Jumper

Jumper	Position	Function
W3	Installed	Enables Reset
W3	Removed *	Disables Reset

* Default

Jumpers W4, W5, and W6 are preset and should never be moved from the factory configuration.

2.5 Configuration Record Keeping

Use the configuration sheet in Appendix D to keep a record of the I/O addresses, IRQs, and power supply loads for each option module in your personal computer. Your system manual is a good place to save the configuration sheet.


CHAP 3

3

Installing the EtherWORKS Router

This chapter describes how to install the EtherWORKS router. For a successful installation, make sure that you are connecting the EtherWORKS router to a working Ethernet whose configuration parameters will not be exceeded. You should also be familiar with personal computers.

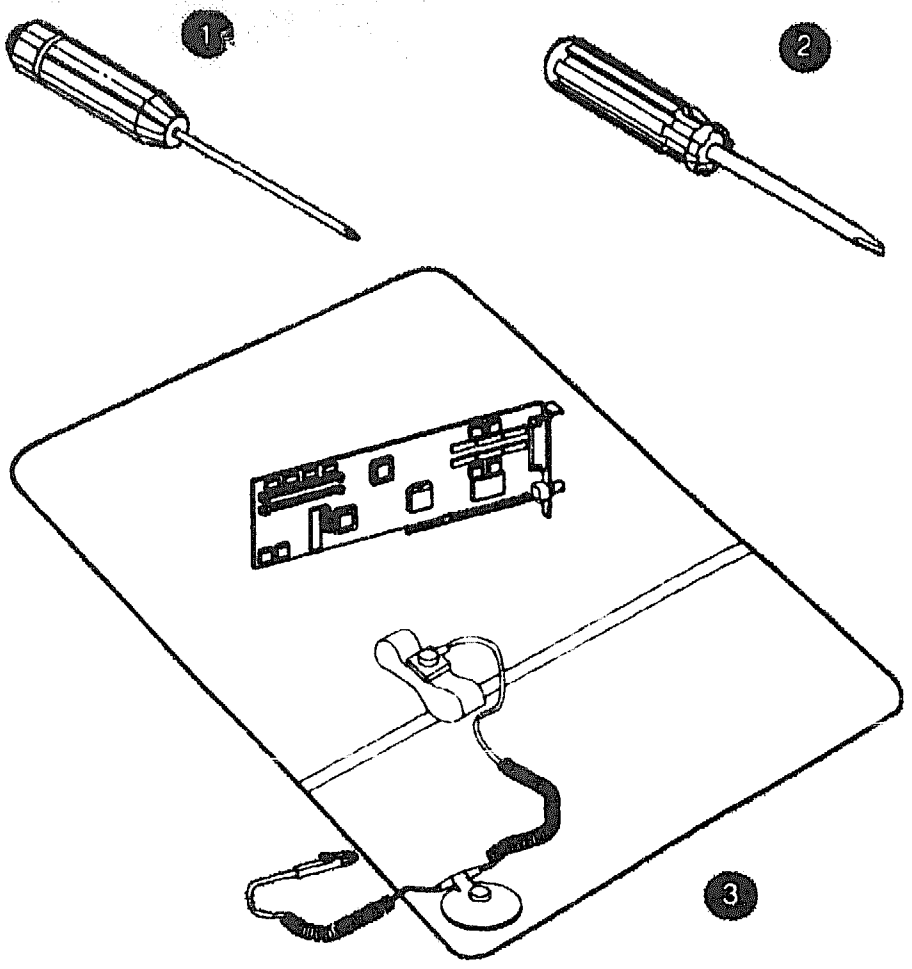
CAUTION

Always use an antistatic kit when you install or handle the EtherWORKS router or SIMM memory modules. Failure to take these precautions can shorten the life expectancy of these options.

3.1 Necessary Installation Tools

Figure 3–1 shows the tools you need to install the EtherWORKS router.

1. Phillips screwdriver
2. Flat-head screwdriver
3. Antistatic kit



LKG-5761-91I

Figure 3–1: Necessary Installation Tools

3.2 Product Kit Contents

Figure 3–2 shows the items included in the EtherWORKS router kit. Check the contents of your product kit against the items shown in Figure 3–2 to verify that you have received a complete kit.

1. EtherWORKS router printed circuit board in an antistatic bag
2. 3 1/2-inch software disks
3. 5 1/4-inch software disks
4. Antistatic wrapper

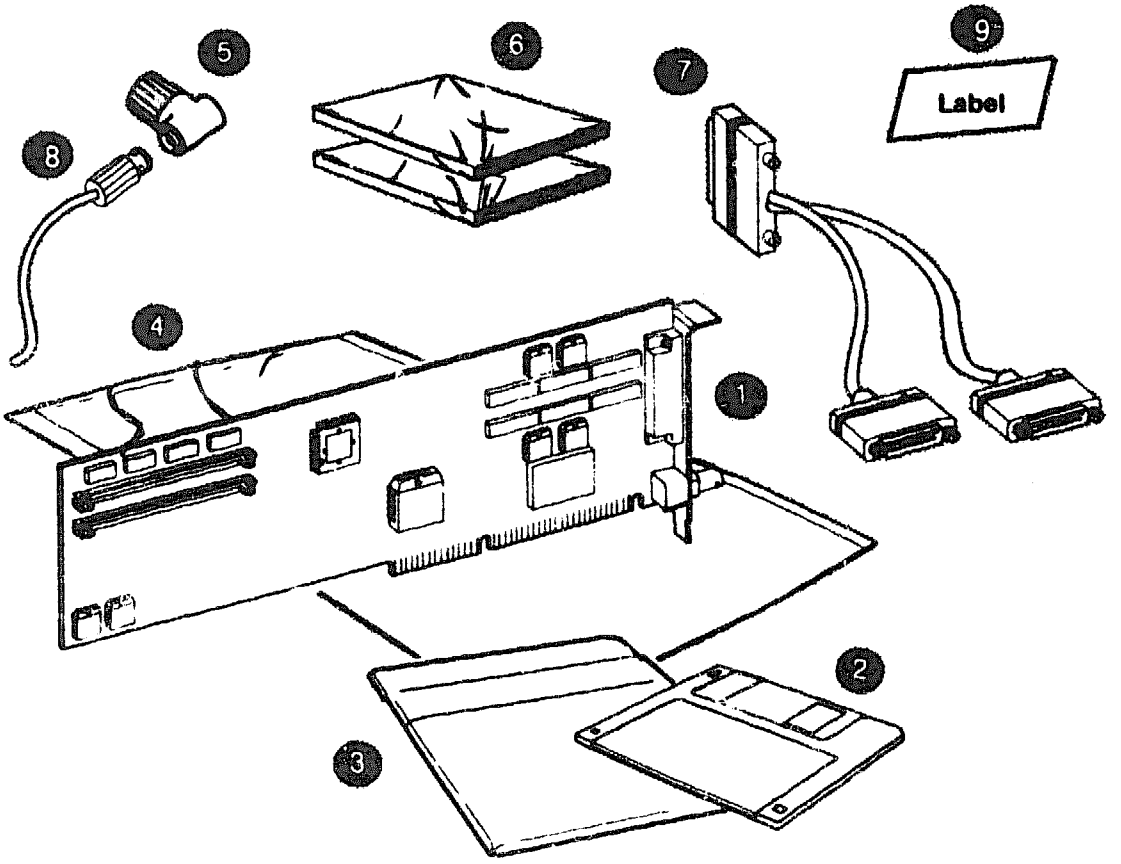
5. T-connector

6. Hardware and software installation manuals

7. Serial line port adapter cable (See Appendix B for a list of additional adapter cables.)

8. 6 meter (2 feet) ThinWire cable

9. Label (optional - regarding power-down)



LKG-5762-91I

Figure 3–2: Product Kit Contents

3.3 Pre-Installation Tasks

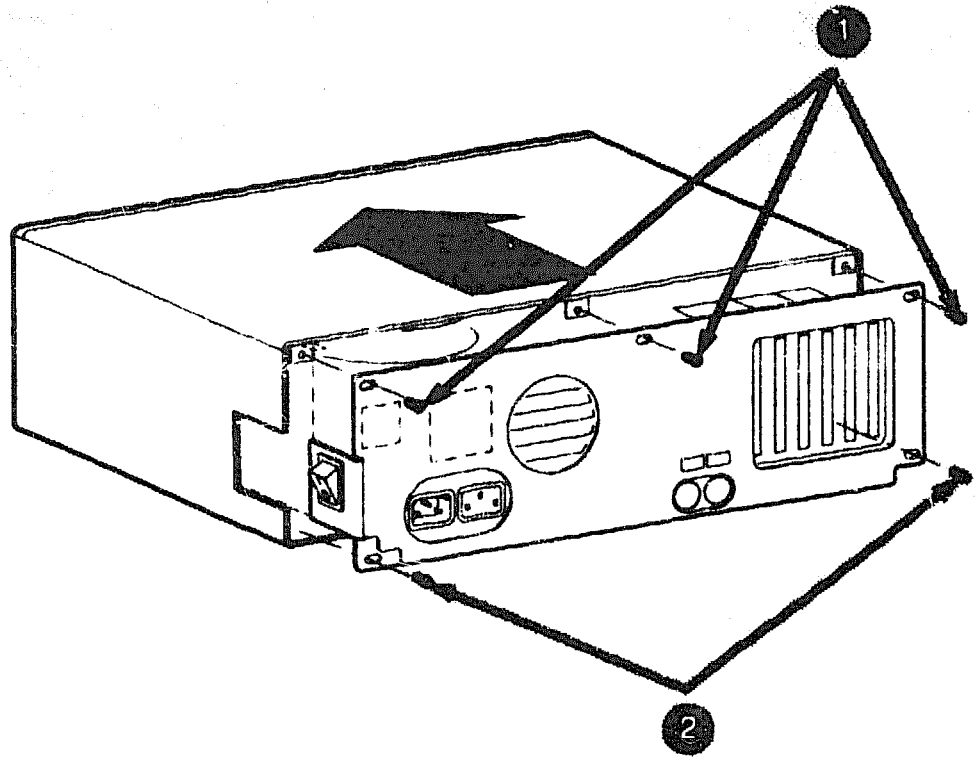
Before you begin the hardware installation, perform these steps on your PC:

1. Remove the diskettes from the diskette drive.

2. Set the power switch to the off position (0).
3. Unplug the power cord from the wall outlet.
4. Unplug the power cord from the back of the PC.
5. Remove the cover on your personal computer as shown in Figure 3–3. Refer to your personal computer's installation guide for more specific instructions.

   ❶ Remove the screws from the back of the computer.

   ❷ Slide the cover toward the front of the computer.



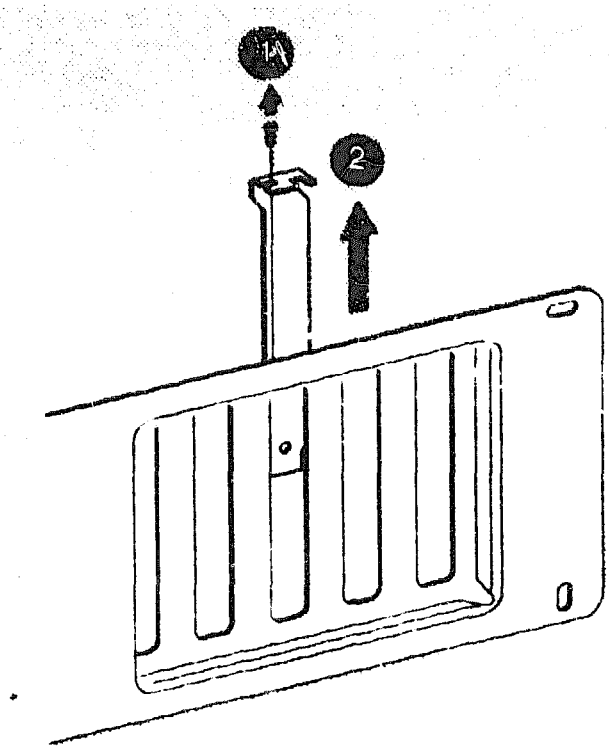
LJ-01288-TI0

Figure 3–3: Removing the Cover of Your Personal Computer

6. Attach the antistatic kit to your personal computer using the instructions supplied with the antistatic kit.
7. Remove the slot cover on your personal computer as shown in Figure 3–4:

   ❶ Remove the screw.

   ❷ Remove the slot cover.



LJ-01240-TI0

Figure 3–4: Removing the Slot Cover on Your Personal Computer

3.4 Performing the Installation

Before proceeding, position the EtherWORKS router on the antistatic mat and remove the protective antistatic wrapping from the router.

NOTE

Record the Ethernet address on the PC configuration sheet in Appendix D. The Ethernet address is located on a sticker on the noncomponent side of the board.

Follow these steps to install the EtherWORKS router into your personal computer (Figure 3–5):

1. Insert the EtherWORKS router into a full size (two-edge connector) open option slot 2 in the personal computer. Rock the printed circuit board gently, from front to back, until the board's fingers are fully seated in the option slot.

NOTE

On some personal computers you may need to start the rocking motion from back to front.

❸ Secure the board by tightening the screw.

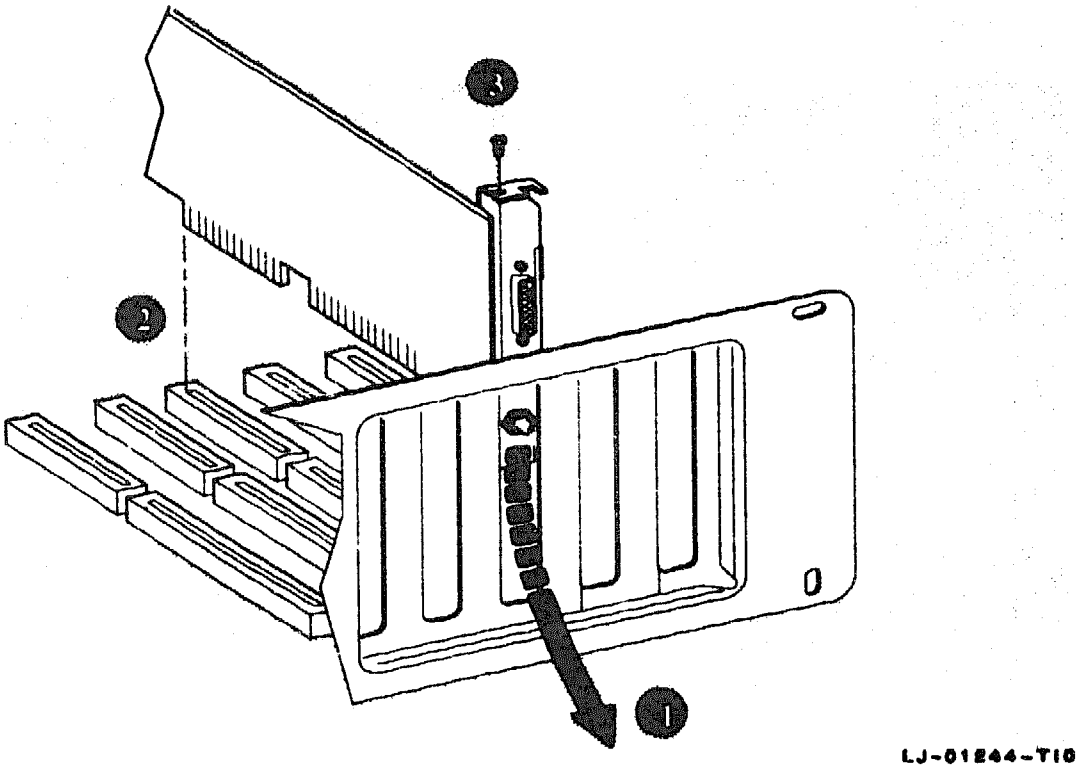


Figure 3–5: Installing the EtherWORKS Router Board

Now that you have installed the board, replace the cover on your personal computer (Figure 3–6). Refer to your personal computer installation manual for specific instructions on how to:

❶ Slide the cover onto your personal computer.

❷ Insert and tighten the screws.

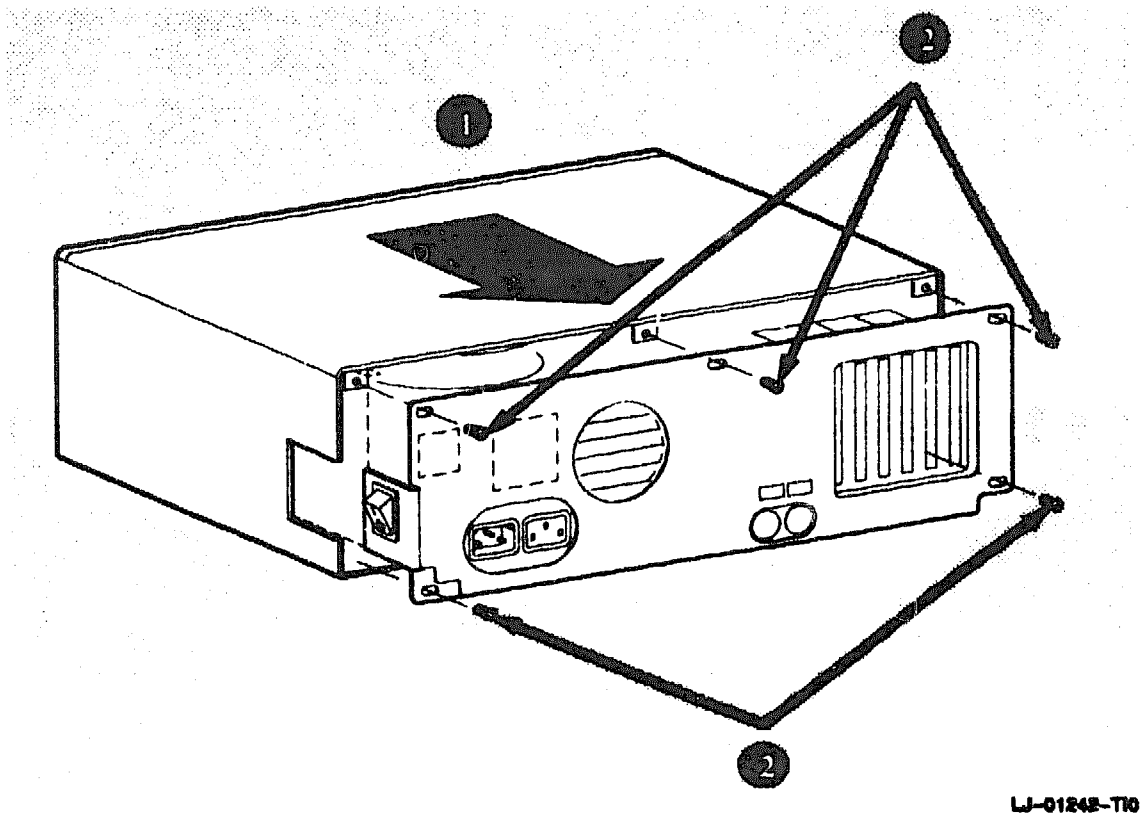


Figure 3–6: Replacing the Cover on the Personal Computer

3.5 Connecting to a Network

The EtherWORKS router has two interface connectors located at the back of the board: a 68-pin port connector and a coaxial 802.3 10base2 Ethernet connector. These connectors enable you to connect the EtherWORKS router to either a local area network (LAN) or a wide area network (WAN), or both. An adapter cable (Y-shaped) is secured to the 68-pin port using a latching connector. This adapter cable splits into two serial lines. Different adapter cables are necessary to interface different combinations of the two independent serial line standards as described in Appendix B.

Figure 3–7 shows how to connect the EtherWORKS router to the Ethernet local area network and to a wide area network.

1. Install the T-connector and make sure that the ThinWire Ethernet cable is attached to a properly configured Ethernet segment.
2. Connect the adapter cable to the 68-pin serial line port connector.
3. Connect the other ends of the adapter cables to modems[1] or modem eliminators.

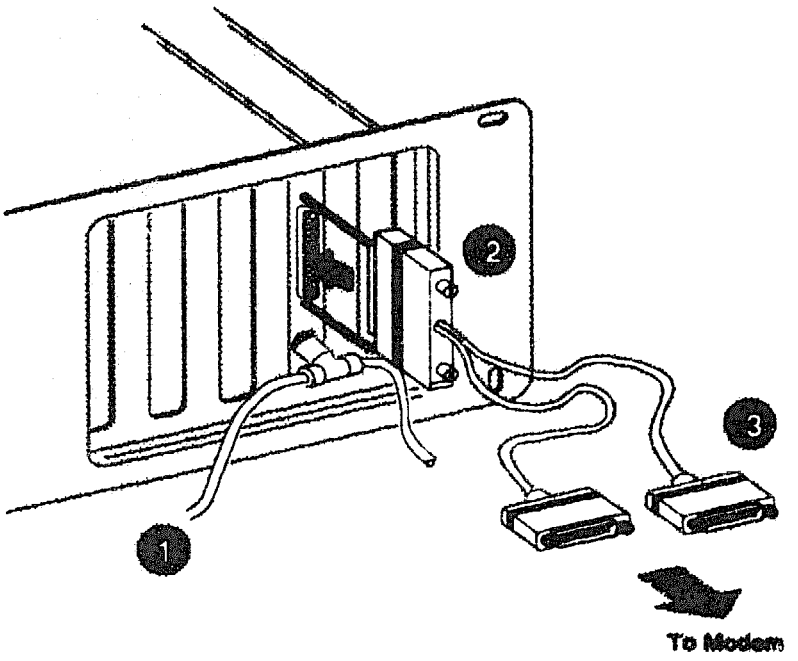


Figure 3–7: Connecting to a Network

[1] Modem selection is a function of serial line speed on a communication line provided by the telephone company. See the *Software Product Description* (SPD) for a list of modems supported for the EtherWORKS router.

The following warnings and conditions apply only in the UK:

WARNING

The ports indicated by the safety label do not provide isolation sufficient to satisfy the requirements of the relevant parts of BS6301. Apparatus connected to these ports[2] must have been either approved to the relevant parts of BS6301 or have previously been evaluated against British Telecom (Post Office) Technical Guides 2 or 26 and given permission to attach. Other usage will invalidate any approval given to this apparatus.

Interconnection directly, or by way of other apparatus, of ports marked "SAFETY WARNING - See Instructions for Use" as indicated above, with ports marked or not so marked, may produce hazardous conditions on the network, and advice should be obtained from a competent engineer before such a connection is made.

3.6 Power Up

Power up the personal computer and begin the software installation.

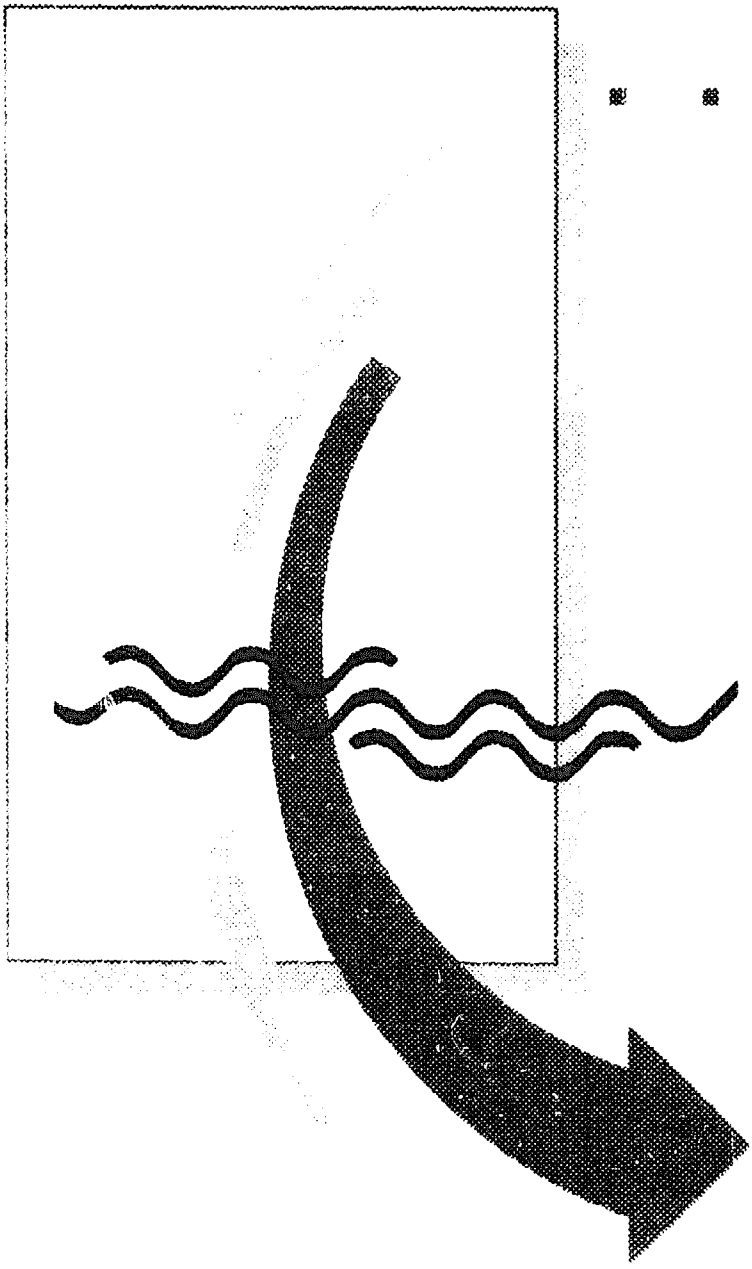
NOTE

If your product kit contains the optional label, you can install it now. This label cautions you that powering down the system will disable the EtherWORKS router from being accessed by all users on the network. We recommend that you place the label near the power switch.

Refer to the *EtherWORKS Router Software Installation and Use* guide for instructions on installing the software.

---

[2] Products complying to the Oftel's General Approval NS/G/23/J/100003 may be connected to the EtherWORKS router and need not carry the BS6301-1 warning text or label. All products supplied to Digital comply with this General




CHAP 4

4 Problems and Solutions

This chapter describes problems you might encounter after you install the EtherWORKS router, and suggests possible causes and solutions.

4.1 Problems and Solutions

Table 4–1 lists two possible problems and suggests actions to take.

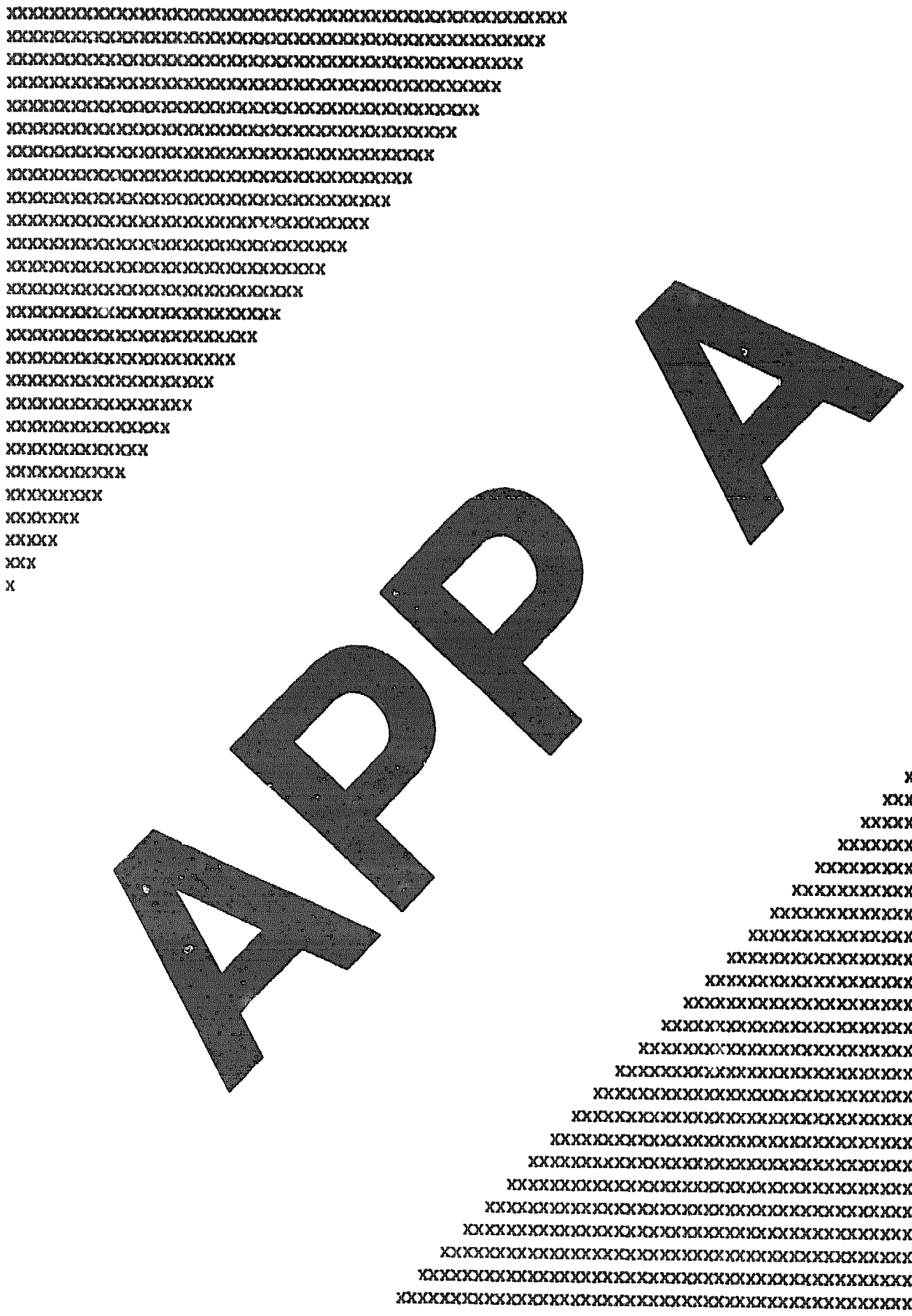
Table 4–1: Problem Solving

Symptom	Suggested Action
Personal computer does not boot correctly	• Check that the board is seated correctly in the card slot. • Remove the board and check to see if the system boots correctly without it. • Verify that the I/O address on the EtherWORKS router is unique. If an I/O address conflict exists change the I/O address[1] to a different value. (Make sure to keep note of the initial address in use.) An I/O address conflict (or overlap) can cause undesired interference. • Check to see if installation of the board exceeded the power supply limit. If so, move the board to another personal computer on the LAN.

[1] See Chapter 2 for configuration information.

Table 4–1 (Cont):Problem Solving

Symptom	Suggested Action
EtherWORKS router does not boot routing code	• Check that the module is properly seated in the card slot. • Check that the Ethernet cable is fully seated. • Check that the Ethernet cable is properly terminated. • Check that the length of the Ethernet cable segment between any local Ethernet adapter and EtherWORKS router is .5 meters (1.7 feet) or longer. • Check the following if SIMM memory modules are present (Figure 1-3): – SIMM memory modules are a pair of the same mechanical size, storage size, and speed. – SIMM memory modules are properly seated in the card slots. – The SIMM memory modules contain 80ns DRAM devices. • Check for I/O address conflicts with other modules. • Check that the personal computer containing the boot source code is properly connected to the local LAN. • The boot source code may not be properly installed. Refer to the software installation guide. • Follow the software installation guide debug procedure.


APPA

A

EtherWORKS Router Specifications

This appendix provides the following information for the EtherWORKS router:

- Physical dimensions
- Environmental specifications
- Electrical specifications
- Standards

A.1 Physical Dimensions

Table A-1 lists the physical dimensions of the EtherWORKS router.

Table A-1: Physical Dimensions

Dimension	Value
Height	10.8 cm (4.25 in)
Depth	25.41 cm (10.0 in)
Weight	318 g (.7 lb)

A.2 Environmental Specifications

The following sections provide the environmental specifications.

A.2.1 Shipping Environment

Table A-2 lists the environmental requirements for shipping the EtherWORKS router.

Table A-2: Shipping Environment Specifications

Item	Value
Temperature	-40° C to 66° C (-40° F to 151° F)
Relative humidity	10% to 95% (noncondensing)
Altitude	Sea level to 4.9 km (16000 ft)

A.2.2 Creepage Clearance (UK only)

The EtherWORKS router is approved only for installation in a host and with host attachments, which are either type approved for such apparatus, or if supplied after 1st March 1989 are marked with or supplied with a statement that the host is supplied under General Approval Number NS/G/1234/J/100003.

Except at the edge connector, which plugs into the host's expansion slot, you must maintain clearance and creepage distances of Xmm and Ymm, between the EtherWORKS router boards and other parts of the host, including any other expansion cards fitted.

Table A-3 lists the EtherWORKS router printed circuit board creepage clearances.

Table A-3: EtherWORKS Router Printed Circuit Board Creepage Clearances

Clearance Xmm	Creepage Ymm [1]	Voltage used or generated by other parts of host or expansion card (Vrms or Vdc)
2.0	2.4 (3.8)	up to 50
2.6	3.0 (4.8)	up to 125
4.0	5.0 (8.0)	up to 250
4.0	6.4 (10.0)	up to 300

[1]The creepage distances apply when you install the EtherWORKS router board in a normal office environment. The creepage distances shown in parentheses apply where the local environment within the host computer is subject to conductive pollution or dry nonconductive pollution which could become conductive due to condensation.

You can check the creepage and clearance distances by measuring between the adjacent parts as shown in Figure A-1.

- X shows the clearance distance which is the shortest distance in air between two points.
- Y shows the creepage path between the same two points.

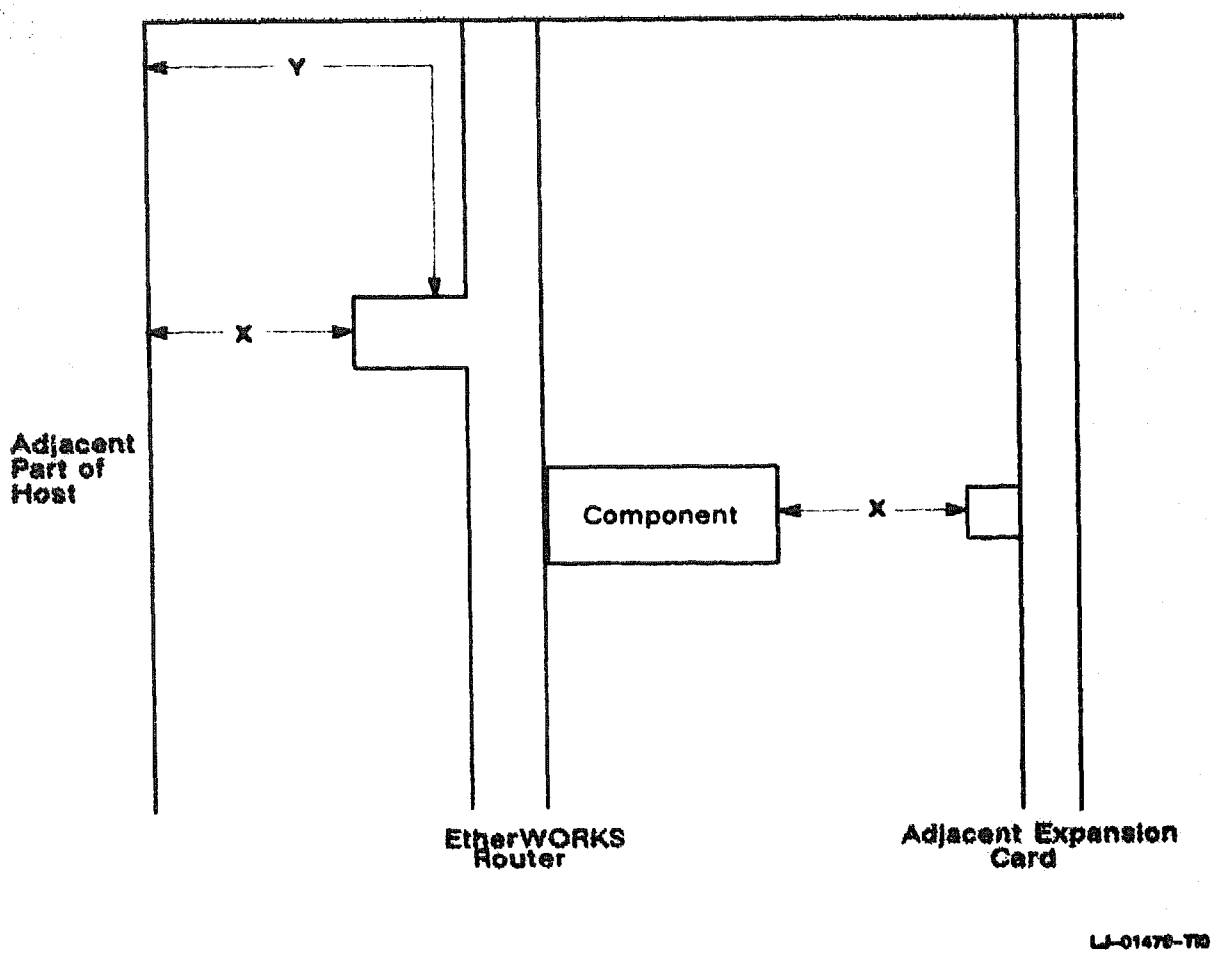


Figure A–1: Creepage Clearances

If in doubt, obtain advice from a telecommunications safety engineer. Failure to install the EtherWORKS router, in accordance with these instructions will invalidate the approval.

A.2.3 Operating Environment

Table A–4 lists the operating environment specifications for the EtherWORKS router.

Table A–4: Operating Environment Specifications

Item	Value
Temperature	5° C to 50° C (41° F to 122° F)
Maximum rate of change	20° C /hr (36° F/hr)
Relative humidity	10% to 95% (noncondensing)
Wet-bulb temperature	32° C (90° F) maximum
Dew point	2° C (36° F) minimum
Altitude	Sea level to 2.4 km (8000 ft)
Air Flow	Convectively cooled. A minimum of 10 cm (4 in) of space must be provided on both ends of the unit for adequate air flow.

A.3 Electrical Specifications

Table A–5 lists the EtherWORKS router electrical specifications.

Table A–5: Electrical Specifications

Item		Typical Value (Maximum)
Input voltage		+ 5 Vdc (+ 5.25 Vdc) + 12 Vdc (+ 12.6 Vdc) -12 Vdc (-13.2 Vdc)
Input current	@ + 5 Vdc @ + 12 Vdc @ -12 Vdc	2.5 A (2.75 A) 100 mA (105 mA) 100 mA (110 mA)
Power consumption		15 watts total

The user must ensure that the power drawn by the EtherWORKS router, together with the host and other auxiliary apparatus drawing power from the host, is within the rating of the host power supply.

A.4 Standards

The following sections provide information about features, connectors, UK service categories, standards, and line signals that are supported by the EtherWORKS router.

A.4.1 EtherWORKS Router Features

Devices that connect to the EtherWORKS router (including adapter cables) by means of synchronous or asynchronous ports, include modems, personal computers running DECnet (PATHWORKS Client/Server), and larger computers running DECnet. For a list of devices supported by your software, see the *Software Product Description* (SPD).

The EtherWORKS router offers the following features:

- Connections to the Ethernet local area network (LAN) and to a DECnet wide area network (WAN) for DECnet nodes with sychronous or asynchronous, full duplex, DDCMP devices, that use any of the standards listed in this chapter
- DECnet routing (for example, message switching and best path analysis) that allows processors more time for applications tasks
- Reduced and simplified cabling requirements for connecting nodes to the DECnet network
- Support for dial-in and dial-out modems
- Support for dial-back security

A.4.2 Connectors

Using the EtherWORKS router (including the adapter cables), you can connect synchronous and asynchronous devices to each other through 25-pin and 37-pin D-connectors, and to a local area network. The EtherWORKS router supports these standards:

- EIA-232-D/V.24/V.28
- EIA-449,EIA423-A/V.10
- EIA-449,EIA422-A/V.11
- V.36

A.4.3 UK Service Categories

Table A-6 lists types of interface, data rate, and service requirements for service categories 1 and 2.

Table A-6: UK Service Categories

Service Category	Interface Type	Data Rate	Service Requirements		PTO *		
			Physical	Electrical	BT	Hull	MCL
1	CCITT Recommend X.21 bis	2400 4800 9600 19200	ISO 2110 BS.6623: Part 1 1985	V.24/V.28 Cable: BC09S-03 or BC09R-03 with BC22F-25	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes Yes
2	CCITT Recommend X.21 bis	48K 56K 64K	ISO 4902 BS6623: Part 4 1986	V.36 Cable: BC09T-03 or BC09R-03 with BC55D-25 BT Kilostream Cable: BC09T-03 or BC09R-03 with BC21G-02 and BC22Z-25	Yes Yes	Yes	Yes Yes Yes

* BT - British Telecommunications plc
Hull - Kingston Communications (Hull) plc
MCL - Mercury Communications Limited

The maximum approved cable length is 9 m (30 ft), comprising

Cat 1 V.24 .9 m (3 ft) for adapter cable BC09S-03
or .9 m (3 ft) for adapter cable BC09R-03
with 7.5 m (25 ft) for extension BC22F-25

Cat 2 V.36 .9 m (3 ft) for adapter cable BC09T-03
or .9 m (3 ft) for adapter cable BC09R-03
with 7.5 m (25 ft) for extension BC55D-25

Cat 2 BT Kilostream .9 m (3 ft) for adapter cable BC09T-03
or .9 m (3 ft) for adapter cable BC09R-03
with .9 m (3 ft) for adapter cable BC21G-02
and with 7.5 m (25 ft) for extension BC22Z-25

The EtherWORKS router is approved for direct connection to a particular digital circuit. This approval includes interconnecting cable with mating connectors conforming to BS6623 part 1 and part 4.

If the product is connected to the service with anything other than its own approved cables, then those cables must benefit from the relevant general approval and/or conform with any other applicable requirements.

A.4.4 EIA/CCITT Standards

Table A-7 provides EIA/CCITT standards equivalents.

Table A-7: EIA/CCITT Standards Equivalency

EIA Interchange Circuit Definition Standard (DCE to DTE with Connector	CCITT Electrical Characteristic Standard	CCITT Interchange Circuit Definition Standard (DCE to DTE) Without Connector	Recommended CCITT Interchange Connector
EIA-232-C	CCITT V.28	CCITT V.24	ISO 2110
EIA-449	CCITT V.10/X.28	CCITT V.24	ISO 4902
EIA-449	CCITT V.11/X.27	CCITT V.24	ISO 4902

A.4.5 Line Signals Supported by the EtherWORKS Router

The following tables describe line signals supported by the EtherWORKS router, for the following standards:

- EIA-232-C
- EIA-422-A
- EIA-423-A
- EIA449/EIA422, BT Kilostream

Table A-8 provides EIA-232-C interface pin/signal designations.

Table A-8: EIA-232-C Interface Pin/Signal Designations

Pin	Circuit	Direction	Function	CCITT
1	AA		Protective Ground (Station Grnd)	101
7	AB		Signal Ground (Common Return)	102
2	BA	To modem	Transmits Data	103
3	BB	From modem	Receives Data	104
4	CA	To modem	Request-To-Send	105
5	CB	From modem	Clear-To-Send	106
6	CC	From modem	Data Set Ready	107
20	CD	To modem	Data Terminal Ready	108.2
22	CE	From modem	Ring Indicator	125
8	CF	From modem	Carrier Detector	109
	CG	From modem	Signal Quality Detector	110
23	CH	To modem	Data Signal Rate Selector	111
24	DA	To modem	Transmitter Signal Element Timing	113
15	DB	From modem	Transmitter Signal Element Timing	114
17	DD	From modem	Receiver Signal Element Timing	115

Table A-9 provides EIA-422-A and EIA-423-A interface pin/signal designations.

Table A–9: EIA-422-A and EIA-423-A Interface Pin/Signal Designations

Pin	Circuit	Direction	Function	CCITT
1	SHIELD		Protective Ground	
3	SPARE			
4	SD	To modem	Send Data (+)	103
5	ST	From modem	Send Timing (+)	114
6	RD	From modem	Receive Data (+)	104
7	RS	To modem	Request-To-Send	105
8	RT	From modem	Receive Timing (+)	115
9	CS	From modem	Clear-To-Send	106
11	DM	From modem	Data Mode (+)	107
12	TR	To modem	Terminal Ready (+)	108.2
13	RR	From modem	Receiver Ready (+)	109
15	IC	From modem	Incoming Call	125
16	SF/SR	To modem	Select Frequency	126
			Signal Rate Select	111
17	TT	To modem	Terminal Timing (+)	113
19	SG	To modem	Signal Ground	102
20	RC	From modem	Receive Common	102b
21	SPARE			
22	SD	To modem	Send Data (-)	
23	ST	From modem	Send Timing (-)	
24	RD	From modem	Receive Data (-)	
26	RT	From modem	Receive Timing (-)	
27	CS	From modem	Clear-To-Send (-)	
29	DM	From modem	Data Mode (-)	
30	TR	To modem	Terminal Ready (-)	
31	RR	From modem	Receiver Ready (-)	
35	TT	To modem	Terminal Timing (-)	
37	SC	To modem	Send Common	102a

Table A–10 provides BT Kilostream to EIA449/EIA422 adapter cable circuits and pin-to-pin connections information, specific to the UK only.

Table A–10: BT Kilostream to EIA449/EIA422 Adapter Cable Circuits and Pin–to–Pin Connections

FROM	TO			
EIA449 /EIA422	X.21			
PIN	15-PIN			
CONNECTOR (P1)	**CONNECTOR (P2)**	**SIGNAL NAME**	**INSULATION COLOR**	**TWISTED PAIR**
4	2	TX DATA A	RED	
22	9	TX DATA B	BLACK	1
7,9 (RTS-CTS)	3	CONTROL A	YELLOW	
25, 27 (RTS, CTS)	10	CONTROL B	BLACK	2
6[1]	4	RX DATA A	WHITE	
24[1]	11	RX DATA B	BLACK	3
8, 5[2] (114-115)	6	SIGNAL TIMING A	BLUE	
26, 23[2] (114-115)	13	SIGNAL TIMING B	BLACK	4

[1] There is a 120 Ohm resistor between pins 6 and 24 RX DATA.

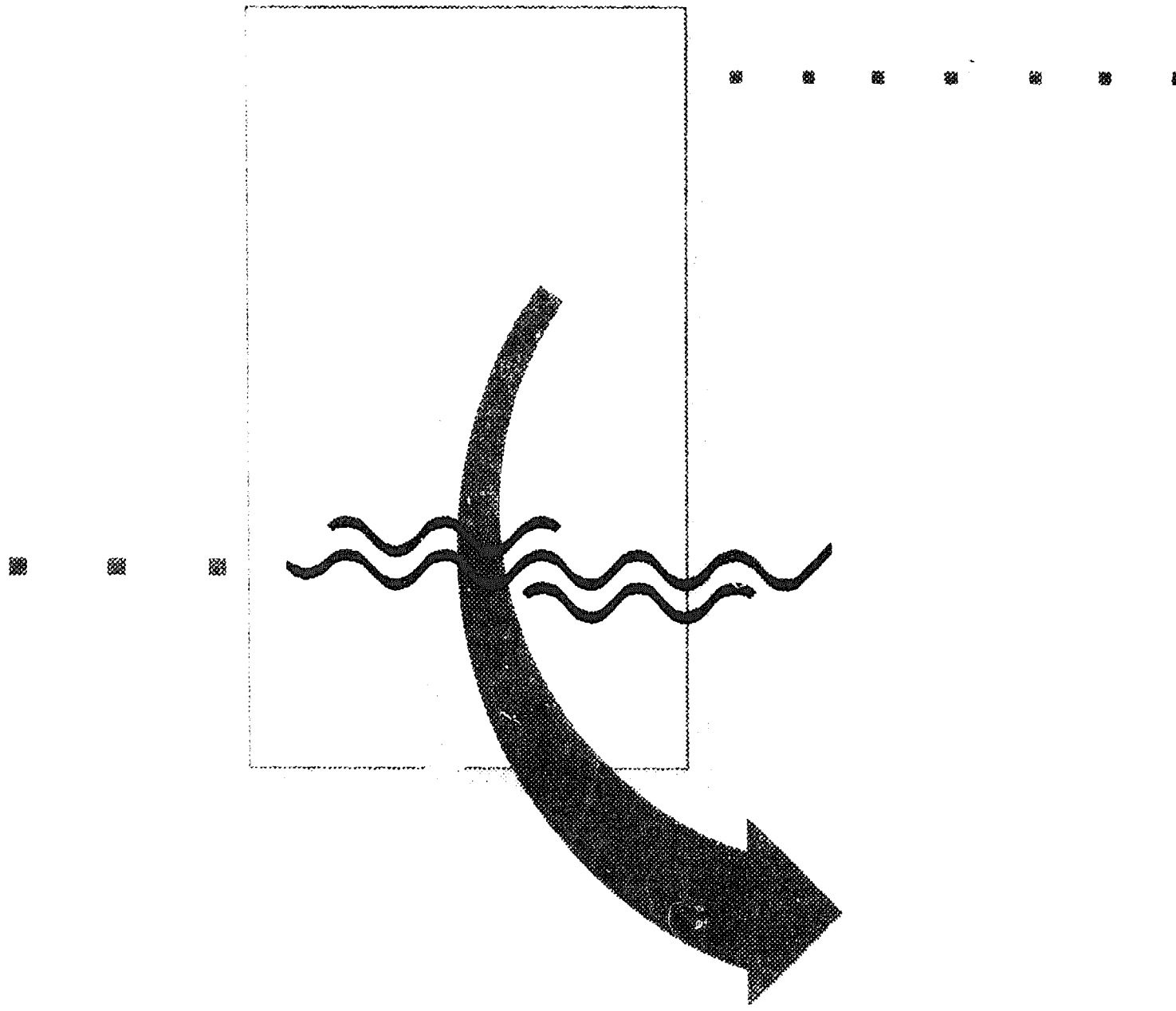
[2] There is a 120 Ohm resistor between pins 5 ans 23 SIGNAL TIMING.

Table A–10 (Cont.): BT Kilostream to EIA449/EIA422 Adapter Cable Circuits and Pin–to–Pin Connections

FROM	TO			
EIA449 /EIA422	X.21			
PIN	15-PIN			
CONNECTOR (P1)	CONNECTOR (P2)	SIGNAL NAME	INSULATION COLOR	TWISTED PAIR
13[3]	5	INDICATION A	GREEN	
31[3]	12	INDICATION B	BLACK	5
19,37	8	DTE GND	ORANGE	
		DRAIN WIRE	BLACK	6
11,12		DSR A TO DTR B	WHITE	
29,30		DSR B TO DTR B	RED	7
10, 18		LOCAL LOOP TO	WHITE	
		TEST INDICATE	YELLOW	8
15, 16		DSRS TO RI	WHITE	
			BLUE	9
P1-SHELL	P2-SHELL	SHIELD BRAID		

[1] There is a 120 Ohm resistor between pins 6 and 24 RX DATA.

[2] There is a 120 Ohm resistor between pins 5 ans 23 SIGNAL TIMING.




APP B

B

Serial Line Port Adapter Cables and Extensions

This appendix provides a list of additional serial line port adapter cables and extensions you can use to configure the EtherWORKS router for different connections.

B.1 Serial Line Port Adapter Cables and Extensions

Table B–1 lists the part numbers and descriptions for additional serial line port adapter cables and extensions.

Table B–1: Serial Line Port Adapter Cables and Extensions

DEC Cable Part Number	DEC Option Part Number	Description
17-03133-01	BC09R-03	One EIA232 serial port at up to 19.2 Kbps and one EIA422 serial port at up to 64 Kbps, .9 meters (3 feet) long.
17-03134-01	BC09S-03	Two EIA232 serial ports at up to 19.2 Kbps, .9 meters (3 feet) long.
17-03135-01	BC09T-03	Two EIA449/EIA422 serial ports at up to 64 Kbps, .9 meters (3 feet) long.
17-03100-01	BC21G-02	BT Kilostream to EIA449/EIA422 sync line adapter cable, 6 meters (2 feet) long.
17-00372-00	BC55D-XX *	Sync line extension cable, V.36/EIA449 /EIA422/EIA423 extension cable, XX is length.

* Where XX is one of the following lengths:

10:	3.1 m (10 ft)
25:	7.6 m (25 ft)
50:	15.2 m (50 ft)
A0:	30.5 m (100 ft)

Table B–1 (Cont.): Serial Line Port Adapter Cables and Extensions

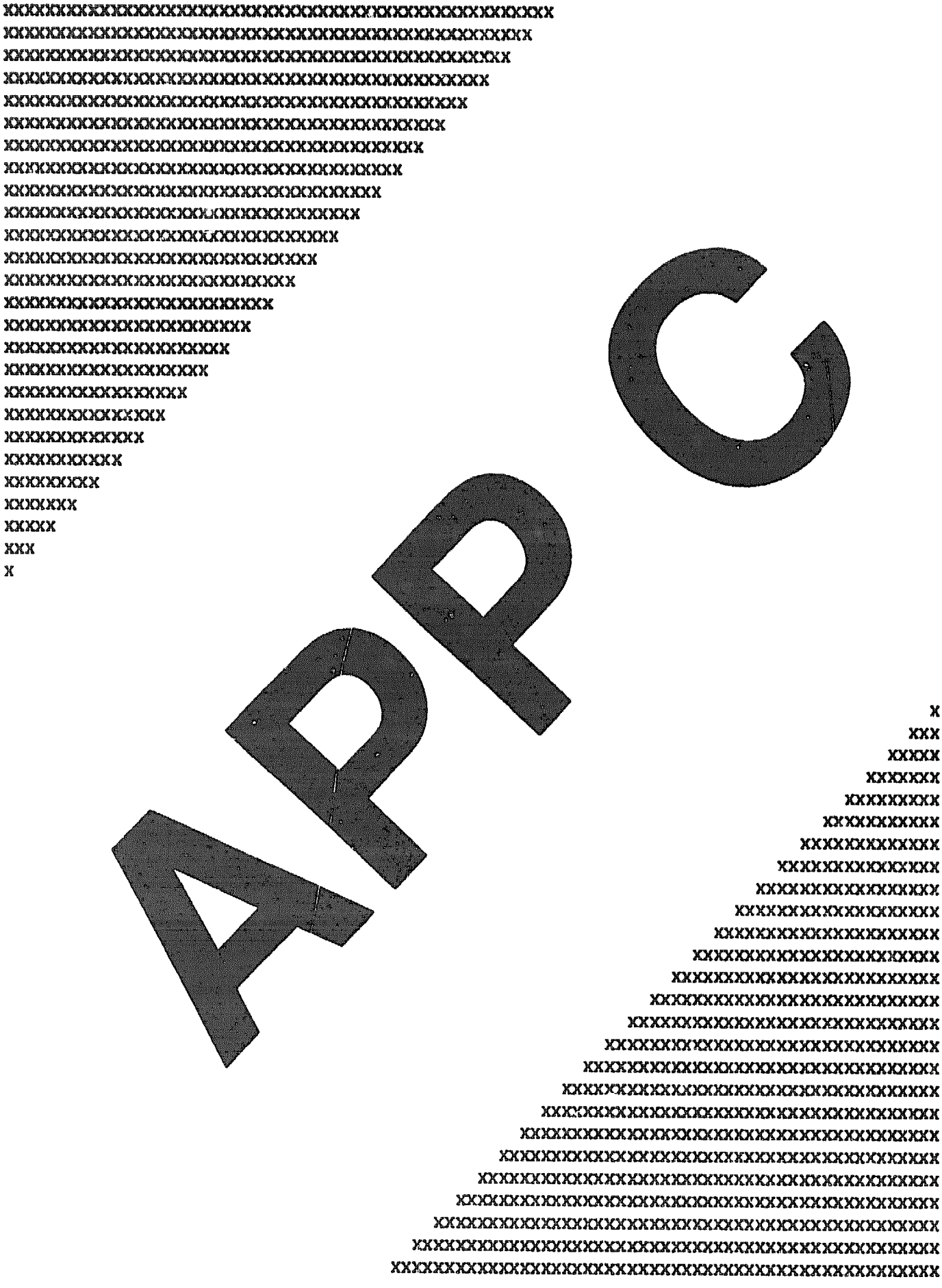
DEC Cable Part Number	DEC Option Part Number	Description
17-00323-00	BC22F-YY †	Async line extension cable, V.24/EIA232 extension cable, YY is length.
17-01494-00	BC22Z-XX *	BT Kilostream to BT Kilostream line extension cable, XX is length.

† Where YY is one of the following lengths:

10:	3.1 m (10 ft)
15:	4.6 m (15 ft)
25:	7.6 m (25 ft)

* Where XX is one of the following lengths:

10:	3.1 m (10 ft)
25:	7.6 m (25 ft)
50:	15.2 m (50 ft)
A0:	30.5 m (100 ft)


APP C

C

I/O Address Information

1. Use the absolute address that is a 5-byte address between A0000 and F0000. Note that the leading hex character is assumed to be zero and is not written.

or

2. Use the paragraph address that is a 4-byte address where the least significant 4 bits (least significant hex character) have been dropped and are assumed assumed to be zero.

Because the address buffer used by a video card is usually assigned to A0000 and because its size is between 64 kilobytes to 128 kilobytes, A0000 to BFFFF are usually taken over by the video card. This leaves C0000, D0000, E0000, F0000 as available 64-kilobyte blocks or C0000, C8000, D0000, D8000, E0000, E8000, F0000, F8000 as available 32-kilobyte blocks that can be assigned to different modules. However, the mother board ROM Bios code is sometimes located within the upper most block of this buffer memory space, in which case F0000 might not be available to user option cards, further reducing the set of available choices.

The enabling and the location of the buffer memory used by the EtherWORKS router is configurable under program control by writing the two I/O registers assigned to the router. The user does not have to move jumpers.

To downline load software images over the PC bus for the EtherWORKS router, the buffer memory address range cannot be used by any other adapter on the system at load time. The buffer memory address range can be used after completion of the software load. For example, a system image can be loaded using the bus as memory location D0000. Once the load is complete, an Ethernet adapter can be loaded which may also use the same address range of D0000.

C.1.3 Interrupt Request (IRQ) Lines

There are a total of 15 IRQ lines. Of these, IRQ15, IRQ11,IRQ10,IRQ09, IRQ5 are the only ones assignable to the EtherWORKS router.

The enabling and location of the IRQ lines used by the EtherWORKS router is configurable under program control by writing the router's two I/O registers. The user does not have to move jumpers.

This appendix provides information pertaining to I/O address register selection.

C.1 I/O Address Information

The EtherWORKS router board may require one hardware configuration - I/O register space, and two software configurations - buffer memory address space and interrupt request (IRQ) lines.

You must carefully configure the I/O register address, buffer memory addres space, and IRQ lines with respect to other personal computer options you .. using to avoid duplicated, overlapping, or conflicting assignments between the option modules.

C.1.1 I/O Registers Address

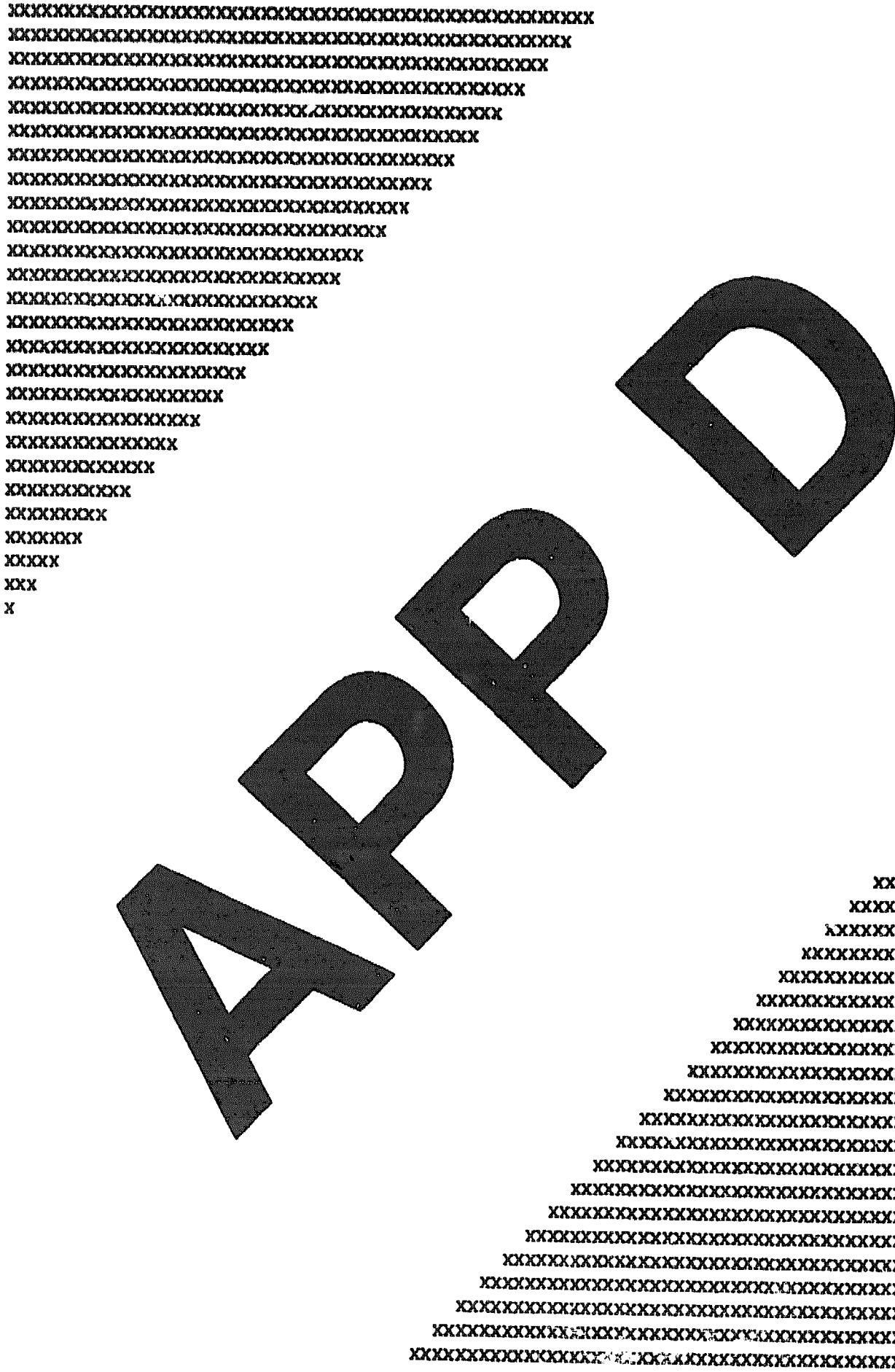
I/O registers address is usually a 3 (hex) character I/O address of the form 2XX or 3XX and refers to the I/O address at which any control and status registers for the module will be located. The PC I/O address range is 64 kilobytes but only the lower 1 kilobyte has been designated for use by the PC bus option cards. The PC mother-board I/O devices use I/O addresses in the range 0XX-1XX (512 bytes). PC bus option modules use I/O addresses between 2XX to 3XX for the remaining 512 bytes. Note that some option modules might use more than one I/O address range assignment and the range could be of different sizes but is usually less than 16 bytes. Also, note that there are some standard assignments, such as the personal computer communication port #1 (COM1) which is usually at 202-204.

The EtherWORKS router has two I/O control status registers that can be configured by the user into any one of four locations.

C.1.2 Buffer Memory Address Location

The buffer memory address location is usually assigned in 32-kilobyte or 64-kilobyte blocks. This address range is within the uppermost region (above 640 kilobytes) of the first megabyte of memory address space, between 0A0000 and 0F0000.

There are two ways to specify a memory buffer address:


APP D

D

PC Configuration Sheet

This appendix provides a configuration sheet that you can use to list installed options, Ethernet addresses, I/O addresses, IRQs assigned, and power consumption used by each slot.

D.1 Configuration Sheet

Option Slot	Ethernet Address	I/O Address	IRQ	Power		
				+ 5 V	+ 12 V	- 12 V
0						
1						
2						
3						
4						
5						
6						
7						
8						
9						


INDEX

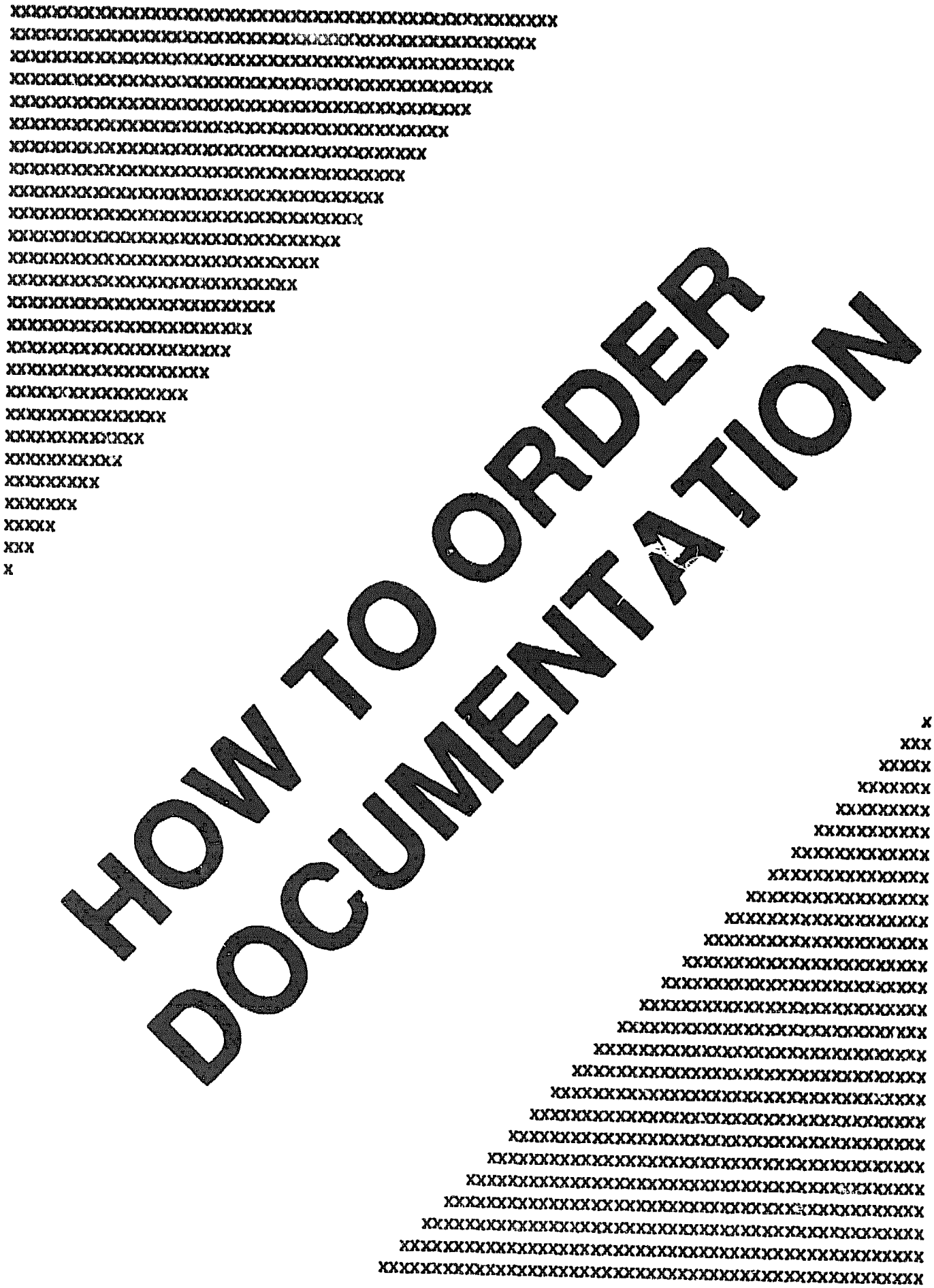
Index

S

T

U

W


HOW TO ORDER
DOCUMENTATION

HOW TO ORDER ADDITIONAL DOCUMENTATION

DIRECT TELEPHONE ORDERS

In Continental USA
and Puerto Rico
call 800-258-1710

In Canada
call 800-267-6146

In New Hampshire
Alaska or Hawaii
call 603-884-6660

DIRECT MAIL ORDERS (U.S. and Puerto Rico*)

DIGITAL EQUIPMENT CORPORATION
P.O. Box CS2008
Nashua, New Hampshire 03061

DIRECT MAIL ORDERS (Canada)

DIGITAL EQUIPMENT OF CANADA LTD.
940 Belfast Road
Ottawa, Ontario, Canada K1G 4C2
Attn: A&SG Business Manager

INTERNATIONAL

DIGITAL
EQUIPMENT CORPORATION
A&SG Business Manager
c/o Digital's local subsidiary
or approved distributor

Internal orders should be placed through Publishing and Circulation Services (P&CS),
Digital Equipment Corporation, 444 Whitney Street, Northboro, Massachusetts 01532-2597

*Any prepaid order from Puerto Rico must be placed
with the Local Digital Subsidiary:
809-754-7575


READER
COMMENTS

READER'S COMMENTS

1. **How did you use this manual? (Circle your response.)**

   (a) Installation (c) Maintenance (e) Training
   (b) Operation/use (d) Programming (f) Other (Please Specify.) _____

2. **Did the manual meet your needs? Yes ☐ No ☐ Why?** _____

   _____

3. **Please rate the manual on the following categories. (Circle your responses.)**

	Excellent	Good	Fair	Poor	Unacceptable
Accuracy	5	4	3	2	1
Clarity	5	4	3	2	1
Completeness	5	4	3	2	1
Table of Contents, Index	5	4	3	2	1
Illustrations, examples	5	4	3	2	1
Overall ease of use	5	4	3	2	1

4. **What did you like *most* about this manual?** _____

   _____

5. **What did you like *least* about this manual?** _____

   _____

6. **Please list and describe any errors you found in the manual.**

Page	Description/Location of Error
_____	_____
_____	_____
_____	_____
_____	_____

7. **Which of the following most clearly describes your job? (Circle your response.)**

   (a) Administrative Support (e) System Manager (i) Educational/Trainer
   (b) Manager/Supervisor (f) Computer Operator (j) Sales/Marketing
   (c) Scientist/Engineer (g) Software Support (k) Other (Please specify)
   (d) Programmer/Analyst (h) Hardware Support _____

OPTIONAL INFORMATION

Name _____ Street _____
Company _____ City/State _____
Department _____ Country _____ Postal (ZIP) code (_____)
Job Title _____ Telephone Number _____

THANK YOU FOR YOUR COMMENTS AND SUGGESTIONS

Please do not use this form to order manuals. Contact your representative at Digital Equipment Corporation or (in the USA) call our DECdirect™ department at this toll-free number: 800–344–4825.

 LES

RC-1

FOLD HERE AND TAPE DO NOT STAPLE

digital™

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 33 MAYNARD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

DIGITAL EQUIPMENT CORPORATION
Educational Services/Quality Assurance
12 Crosby Drive BU0/E08
Bedford, MA 01730-1493

FOLD HERE AND TAPE DO NOT STAPLE

RC-2