
HARDWARE
INSTALLATION

DECserver 510

Hardware Installation

December 1989

This manual provides information for installing and testing the DECserver 510 hardware. It also includes procedures for troubleshooting hardware installation problems.

Supersession/Update Information: This is a new manual.

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Order Number: EK–DS510–IN–001

EK–DS510–IN–001
December 1989

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Preface

This manual explains how to install and test the DECserver 510 terminal server hardware. This manual also provides information on specifications, cabling configurations, and simple troubleshooting procedures.

Intended Audience

DECserver 510 Hardware Installation is intended for the hardware installer. The installer is responsible for ensuring that the hardware is installed and tested. The person installing the DECserver 500 software verifies the system installation.

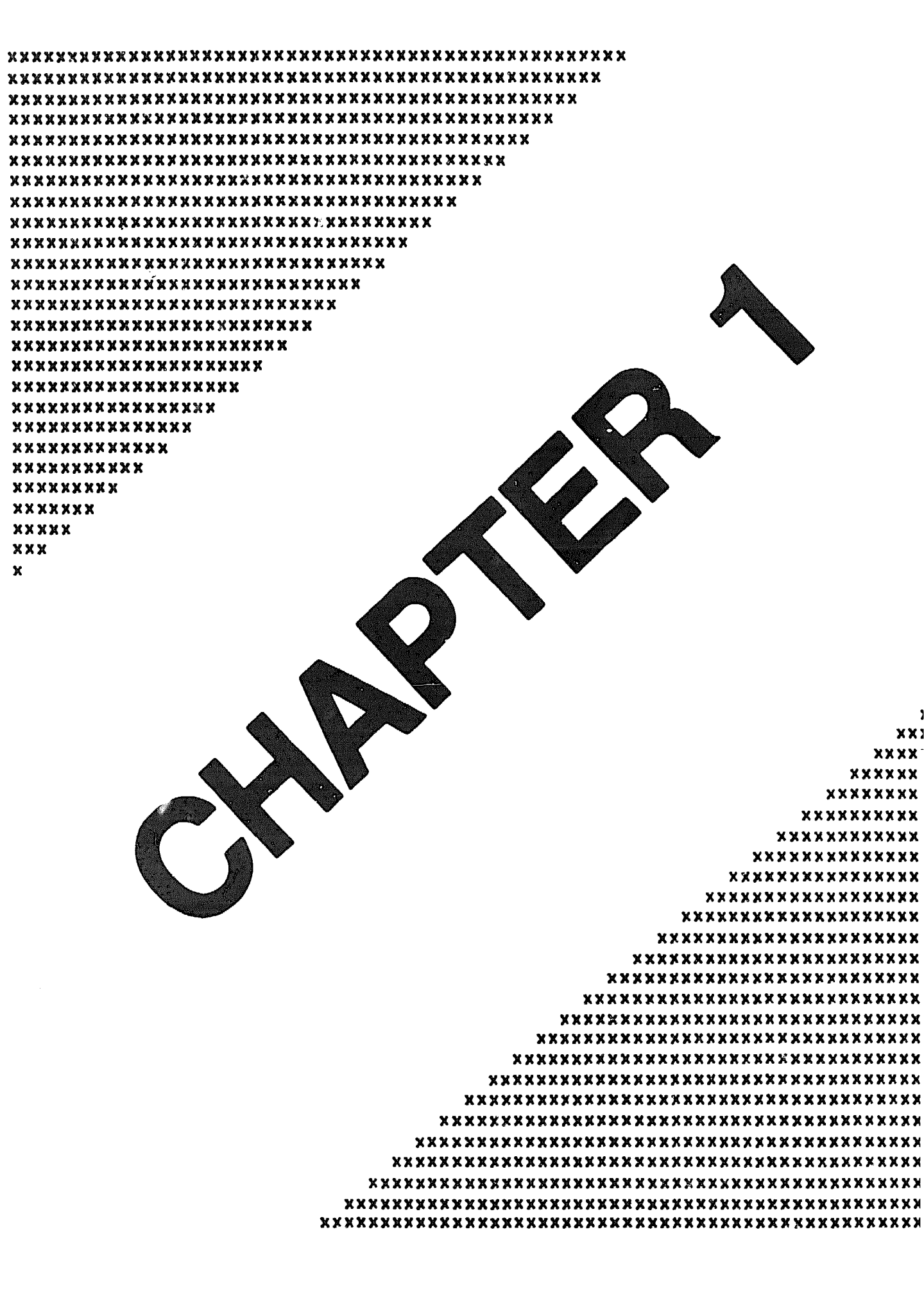
Document Structure

This document has the following chapters and appendix:

- **Chapter 1** provides an overview of the system installation and an overview of the DECserver 510 hardware.
- **Chapter 2** describes how to verify that the installation site is prepared to accept the server hardware. This chapter also lists technical specifications for the DECserver 510 hardware, and it suggests various ways that the server can connect to the Ethernet local area network.
- **Chapter 3** provides instructions for installing and configuring the server hardware.
- **Chapter 4** provides instructions for connecting cables to the server and testing the server hardware.
- **Chapter 5** provides simple troubleshooting steps to correct problems encountered during the power–on self–test.

- **Appendix A** describes the connector pins for the various DECserver 510 connectors and provides wiring diagrams for the BC16E cable and the H8571–*x* passive adapter.

The postage–prepaid **Reader's Comments** form on the last page of this document requests the user's critical evaluation to assist us in preparing future documentation.


CHAPTER 1

1

Overview

This chapter provides information on the following:

- Installation flow chart and tools needed
- Hardware overview
- Server connectors
- Server switches
- Server indicators

Installation Flow Chart and Tools Needed

You can use this flow chart as a checklist or to familiarize yourself with the installation procedure. You will need only a maximum of four tools to install the server hardware.

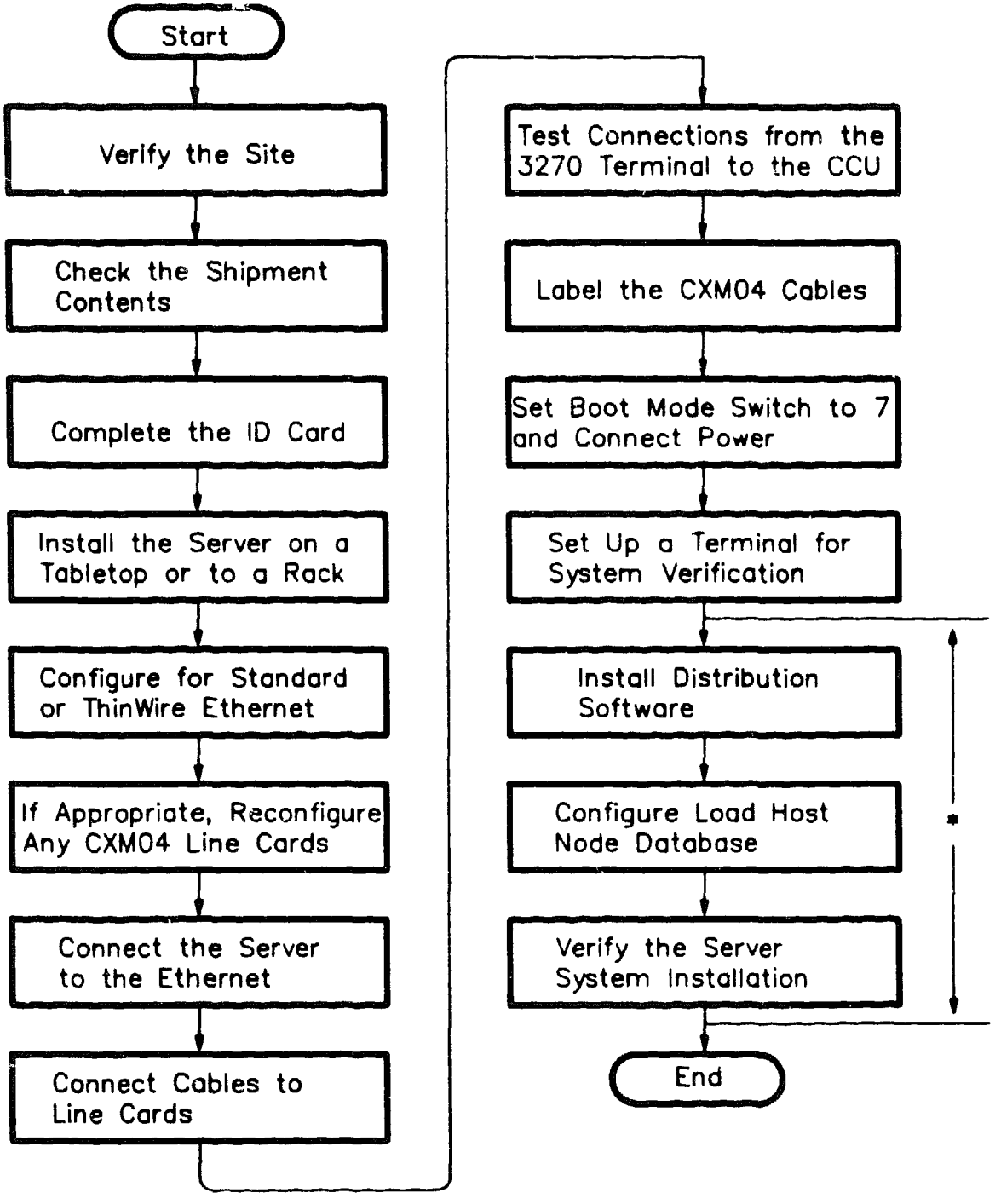
The flow chart lists all the major steps in the installation process. Chapter 2 contains the detailed procedures to verify the site. Chapter 3 contains the detailed procedures for all the steps from checking the shipment contents to setting up a terminal for system verification. The *DECserver 500 Software Installation* manual contains the procedures from installing the software to verifying the server system installation.

If you are very familiar with installing DECserver terminal servers, you can use the flow chart as a checklist. If you are not familiar with installing DECserver terminal servers, you can use the flow chart to familiarize yourself with the installation procedure before you actually install the DECserver 510 hardware.

You will need the following tools to install the DECserver 510 hardware:

- Phillips screwdriver
- Antistatic wrist strap
- Small, flat–blade screwdriver
- Pen

Exhibit 1–1: Installation Flow Chart



* Refer to the *DECserver 500 Software Installation (op. sys.)*

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Hardware Overview

The DECserver 510 terminal server connects to IBM 3270 terminals (or equivalent devices) and a 3*x*74 cluster control unit (CCU). The server also connects to either a standard or ThinWire Ethernet. The hardware consists of four field–replaceable units (FRUs).

The DECserver 510 hardware supports connections to IBM 3270 Information Display System terminals that operate in Control Unit Terminal (CUT) mode. The hardware also supports various IBM personal computers (PCs) that emulate the 3270 terminal in CUT mode. The *3270 Terminal Option Software Product Description* lists the supported devices. Hereafter, the term "3270 terminal" is used to mean any 3270 terminal or PC connected to the server.

The hardware also supports connections to an IBM 3x74 (or equivalent) CCU. All CCU connections on one line card must be to the same CCU; however, each CXM04 line card can connect either to different CCUs or the same CCU.

The following is a brief description of each FRU:

- **System enclosure:** The system enclosure contains the card cage for the modules, the backplane, and the power supply.

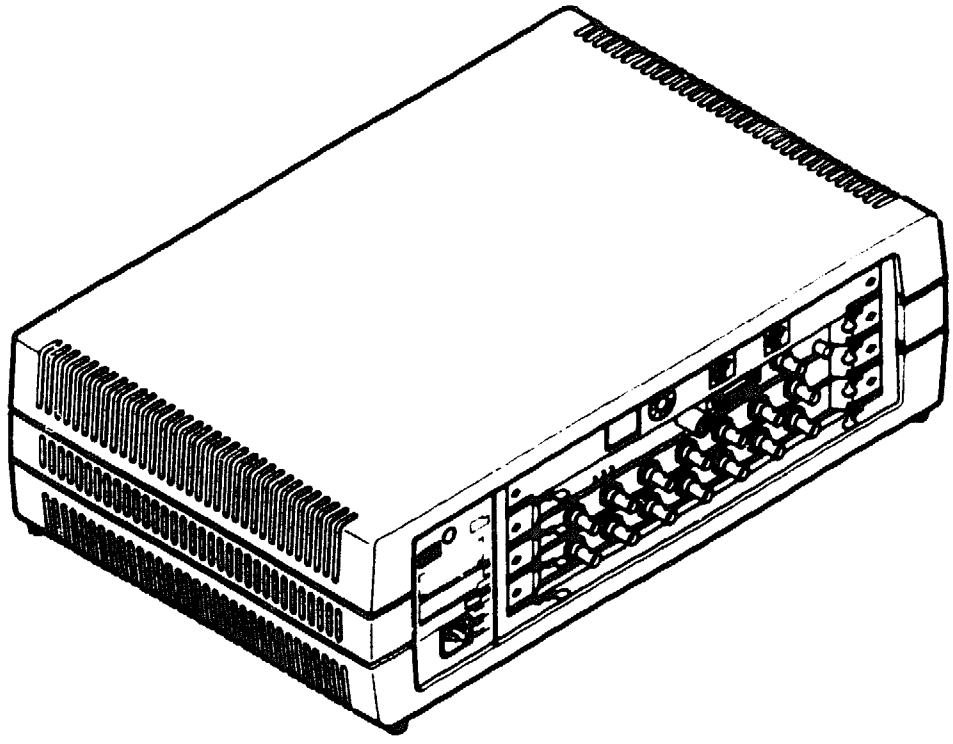
  The power supply is equipped with automatic voltage selection. This feature allows the power supply to configure itself automatically to the incoming voltage; therefore, a 120/240 Vac switch is not needed.

- **CXM04 line cards:** The server hardware contains two CXM04 line cards. Each line card can support up to eight 3270 terminals or up to four 3270 terminals with connections to a CCU.

- **Ethernet controller module:** This module provides the connection to either a standard or ThinWire Ethernet network.

- **Central processor unit (CPU) module:** The CPU manages all the functions of the server and is controlled by the server software and firmware. The CPU also monitors the diagnostic self–tests.

Exhibit 1–2: DECserver 510 Hardware



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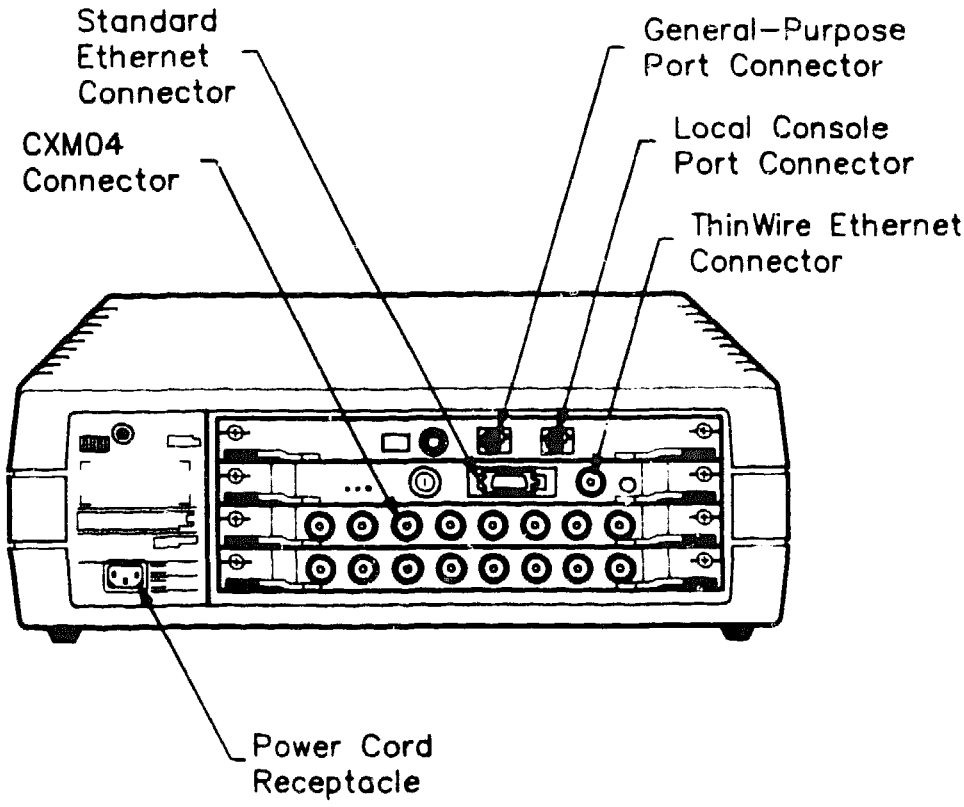
Server Connectors

There are two connectors on the CPU module and Ethernet controller module. Each CXM04 line card has eight connectors.

The following is a brief description of each connector:

- **Local console port connector:** Connector A1 is a modular EIA–423–A connector on the CPU module that is used for server management and diagnostic purposes. Refer to *DECserver 500 Problem Solving* for instructions on the uses of this connector.
- **General–purpose port connector:** Connector A2 is a modular EIA–423–A connector on the CPU module that the firmware uses to output server configuration information to a local console terminal.
- **Standard Ethernet connector:** This single, female D connector with a slide latch supports connection to a standard Ethernet local area network using a transceiver cable.
- **ThinWire Ethernet connector:** This single BNC connector supports connection to a ThinWire Ethernet local area network using a ThinWire cable.
- **CXM04 connectors:** Each CXM04 line card has eight BNC connectors that support either up to eight 3270 terminals or four 3270 terminals with connections to a CCU.
- **Power cord receptacle:** The server power cord plugs into this receptacle.

Exhibit 1–3: Server Connector Locations



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Server Switches

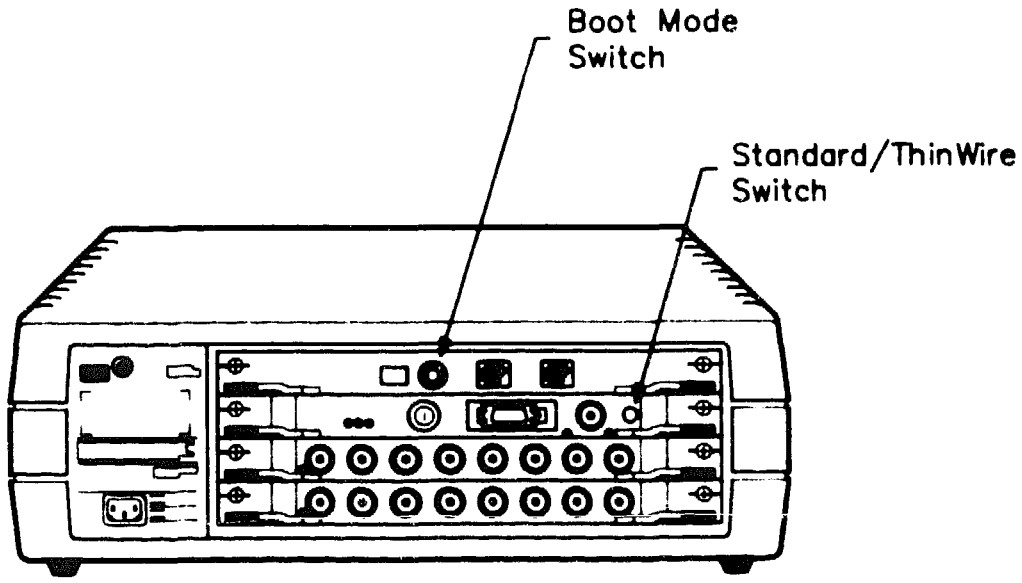
The server can have either one or two switches. The CPU module has the boot mode switch. The Ethernet controller might have a standard/ThinWire switch, depending on the version of the module.

The boot mode switch on the CPU module is a 16–position switch that selects which power–on procedure is executed when the server is powered on. The following boot modes are available:

- Mode 0 – Normal boot mode. The server boots regardless of any line card errors. Remote console is enabled.
- Mode 1 – Normal boot mode. The server boots only if there are no errors. Remote console is enabled.
- Mode 2 – Local console mode. No boot.
- Mode 3 – System configuration assist mode. No boot.
- Modes 4 through 6 – Reserved.
- Mode 7 – Installation mode. The server boots only if there are no errors. This boot mode has more extensive testing than boot mode 1.
- Modes 8 through F – Reserved.

The standard/ThinWire switch on the Ethernet controller module is a pushbutton that selects whether the Ethernet controller is configured for standard or ThinWire Ethernet. The in position is for the standard Ethernet configuration, and the out position is for the ThinWire Ethernet configuration. Early versions of the Ethernet controller module do not have this switch.

Exhibit 1–4: Server Switch Locations



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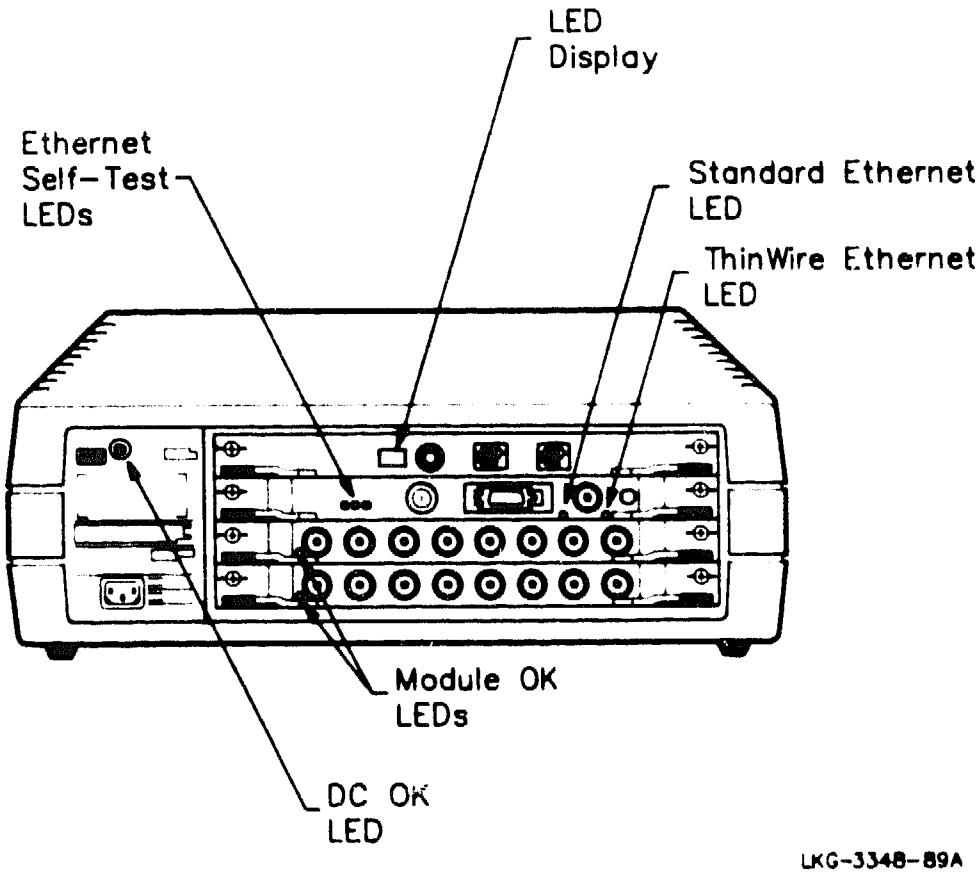
Server Indicators

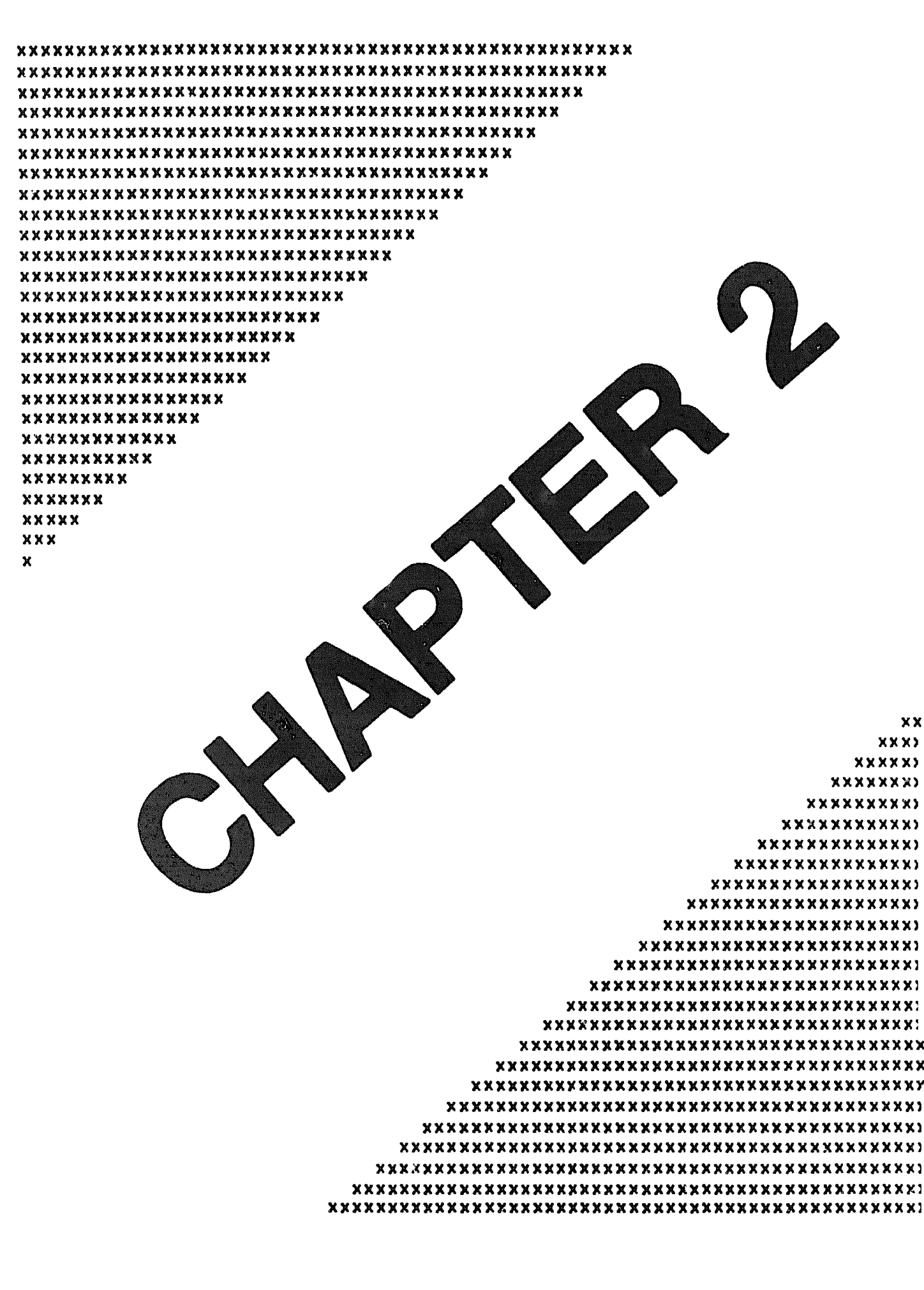
Each CPU module, power supply, and CXM04 line card has only one LED apiece. The Ethernet controller module has three self–test LEDs and two status LEDs.

The following is a brief description of each indicator:

- **LED display:** Displays a hexadecimal number (or alternating numbers) to indicate the status of the server. If a fault occurs, the number or numbers displayed can be used to help identify the cause of the fault.
- **DC OK LED:** Lights up (green) to indicate that the power supply is functioning properly. The LED is off when the server is not connected to a power source or the power supply is not functioning.
- **Module OK LEDs:** Light up (green) to indicate that the line card passes the power–on self–test. If a line card's module OK LED is off, a problem exists with that line card.
- **Ethernet self–test LEDs:** Light up at server power–up. The first LED (labeled 1) turns off when the tests begin. The second LED (labeled 2) turns off after the Ethernet controller module passes the module's internal loopback test. The third LED (labeled 3) turns off after the module passes its external loopback test.
- **Standard Ethernet LED:** Lights up to indicate that the Ethernet controller module is configured to accept a standard Ethernet connection.
- **ThinWire Ethernet LED:** Lights up to indicate that the Ethernet controller module is configured to accept a ThinWire Ethernet connection.

Exhibit 1–5: Server Indicator Locations




CHAPTER 2

2

Site Verification

This chapter provides information on the following:

- Server physical specifications
- Server environmental and electrical specifications
- Cabling requirements for CXM04 line cards and power cord
- Server to standard Ethernet connection requirements
- Server to ThinWire Ethernet connection requirements
- Software requirements

Server Physical Specifications

The tabletop and rack–mount versions of the server have different dimensions. Both versions, however, require additional space for cables, air, and service access.

When determining where to place the server, you must take into consideration the server's dimensions, weight, and clearance space required.

When the server is installed on a tabletop, be sure to leave 7.7 cm (3 in) on either side of the server for air circulation. When you install the server in a rack, be sure to leave 9 cm (3.5 in) of space between the server and the next device below in the rack.

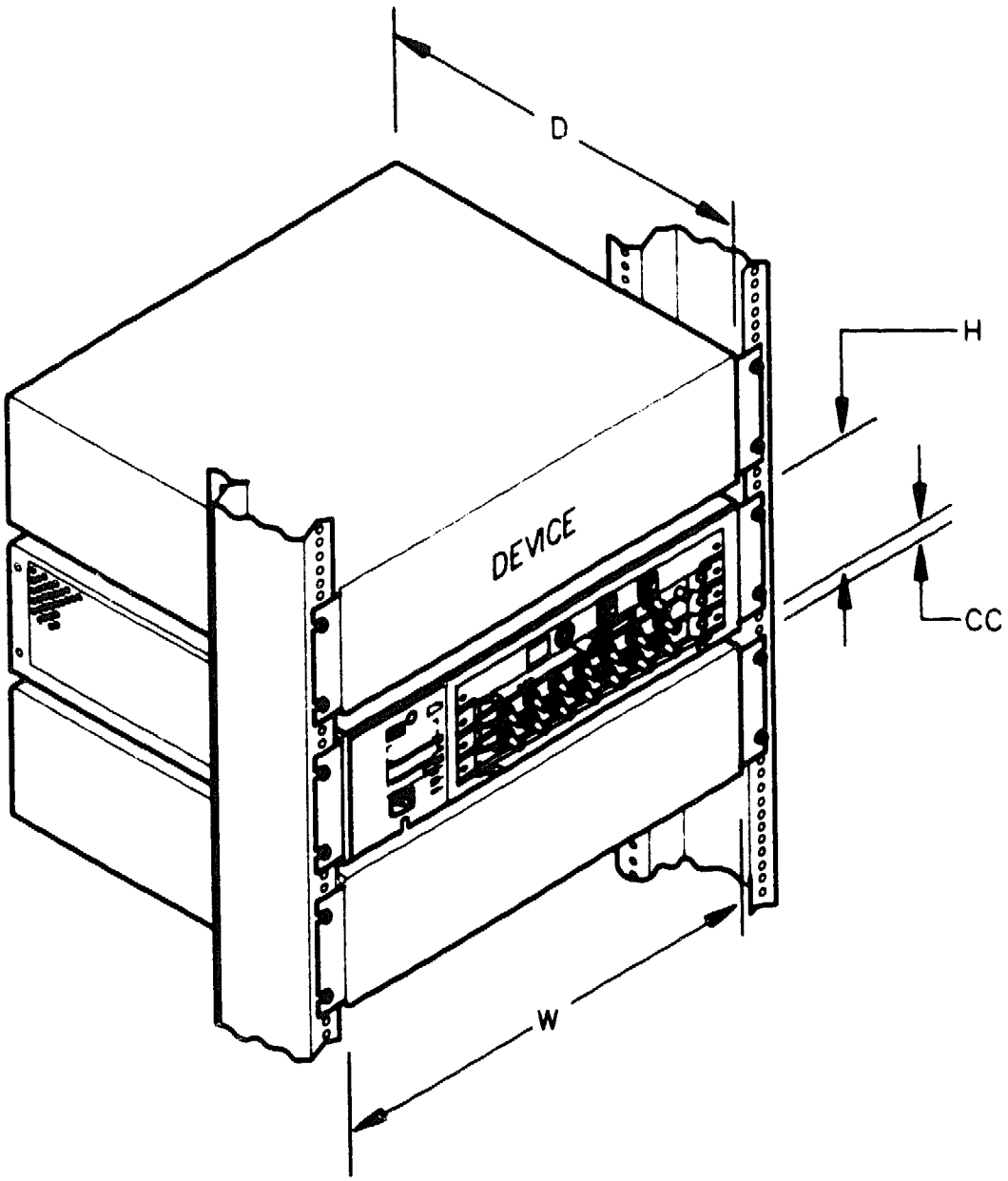
Leave a space of 15.4 cm (6 in) in front of the module end of the server for cables. Also, leave an area of 123 cm (48 in) in front of the module end for easy service access.

The following table provides the physical specifications of the DECserver 510 hardware.

Parameter	Tabletop — Plastic Enclosure	Rack–Mount — No Plastic Enclosure
Height	16. 2 cm (6.4 in)	13.3 cm (5.3 in)
Width	49.4 cm (19.4 in)	46.0 cm (18.28 in)
Depth	31.3 cm (12.3 in)	29.8 cm (11.7 in)*1*
Weight	11.6 kg (25.5 lb)	9.5 kg (21.0 lb)
Service clearance	123.0 cm (48 in)	123.0 cm (48 in)
Side clearance (for air circulation)	7.7 cm (3 in)	n/a
Cable clearance	15.4 cm (6 in)	15. 4 cm (6 in)
Cable clearance between server and next device below in a rack	n/a	9 cm (3.5 in)

1 Width indicated for the rack–mount server is the distance between the holes on the mounting rails of the rack.

Exhibit 2–1: Dimensions of the DECserver 510 Rack–Mount Hardware



Legend:

D – Depth
H – Height
W – Width
CC– Cable Clearance Under Server

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Server Environmental and Electrical Specifications

Verify that the site conforms to the server's environmental and electrical specifications.

Verify that the site conforms to all the server's environmental specifications before unpacking the server hardware.

Be sure that a power outlet is available for the server and that the outlet conforms to all the server's electrical specifications. The power cord supplied with the server hardware should be appropriate for your country. If not, refer to either *DECserver 510 Problem Solving* or *DECserver 500 Introduction* for the part number of the correct power cord.

Exhibit 2–2: Environmental Specifications

Parameter	Minimum	Maximum
Operating temperature	5° C (41° F)	50° C (122° F)
Nonoperating temperature	–40° C (–40° F)	66° C (151° F)
Maximum temperature change per hour	n/a	20° C (36° F)
Operating altitude	n/a	2438 meters (8000 feet)
Relative humidity – operating (noncondensing)	10%	95%
Relative humidity – nonoperating (noncondensing)	10%	95%

Exhibit 2–3: Electrical Specifications

Parameter	120 Vac	240 Vac
Voltage range	00 to 120 Vac	220 to 240 Vac
Frequency	47 to 63 Hz	47 to 63 Hz
Line current – typical	1. 0 A	0.5 A
Line current – maximum	1. 2 A	0.6 A
Power (ac)	120 W	120 W

Cabling Requirements for CXM04 Line Cards and Power Cord

The maximum cabling distance depends upon whether the CXM04 line card is configured for 3270 terminals and a CCU, and the type of cable used.

The CXM04 line card has two configurations: 3270 terminals only and 3270 terminals with connections to a CCU. Furthermore, there are three types of cables that can be used to connect the devices to the line card: coaxial, shielded twisted–pair, and unshielded twisted–pair.

If you are using coaxial cable (RG62A/U or equivalent), you can have a maximum of 1500 meters (4920 feet). If the line card is configured for a CCU and 3270 terminals, then you can not use more than a total length of 1500 meters from the CCU to the line card and from the line card to the terminal.

NOTE

The 50–ohm ThinWire Ethernet cable can not be used interchangeably with the RG62A/U cable. The RG62A/U cable can be used with the CXM04 line cards.

If you are using shielded or unshielded twisted–pair, use the distances supplied in the table as a guideline. The maximum distance depends on the type of cables and baluns used.

NOTE

A balun adapts the BNC connector of a coaxial cable to a twisted–pair cable that has an RJ11 connector.

If you use a combination of unshielded and shielded twisted–pair or coaxial and either twisted–pair cables, then use the following formula:

```
            Length of coaxial
 +          (5 x length of unshielded twisted-pair)
 +          (2 x length of shielded twisted-pair)
is less than or = 1524 meters (5,000 feet)
```

Exhibit 2–4: CXM04 Device and Power Cord Maximum Cabling Distances

Connection	Maximum Distance	Cable Type
Server to power outlet	1.8 meters (6 feet)	Server power cable (standard U.S.)
Server to 3270 terminal or equivalent device (no connection to a CCU)	1500 meters (4920 feet)	Coaxial only (RG62A/U or equivalent)
Server to 3270 terminal or equivalent device (no connection to a CCU)	305 meters (1000 feet)	Unshielded twisted pair only *2*
Server to 3270 terminal or equivalent device (no connection to a CCU)	610 meters (2000 feet)	Shielded twisted pair only *1*
CCU to server to 3270 terminal or equivalent device	1500 meters (4920 feet) *2*	Coaxial only (RG62A/U or equivalent)
CCU to server to 3270 terminal or equivalent device	244 meters (800 feet) with four baluns total between the 3270 terminal and CCU *2*	Unshielded twisted pair only *1*
CCU to server to 3270 terminal or equivalent device	366 meters (1200 feet) with four baluns total between the 3270 terminal and CCU *2*	Shielded twisted pair only *1*
CCU to server to 3270 terminal or equivalent device	Use the following formula to determine the maximum distance: Length of coaxial + (5 x length of unshielded twisted pair) + (2 x length of shielded twisted pair) = or is less than 1524 meters (5000 feet) *2*	Any combination of coaxial (RG62A/U or equivalent), unshielded twisted pair, and shielded twisted pair *1*

1 The maximum cabling distance for twisted–pair cables depends on the type of cable and baluns used. The maximum distance shown in this table should be used as a guideline.

2 Combined distance from the 3270 terminal to the server and from the server to the CCU.

Server to Standard Ethernet Connection Requirements

The Ethernet cable drop from an appropriate Ethernet device must be installed and tested before you can install the DECserver 510 hardware to a standard Ethernet network.

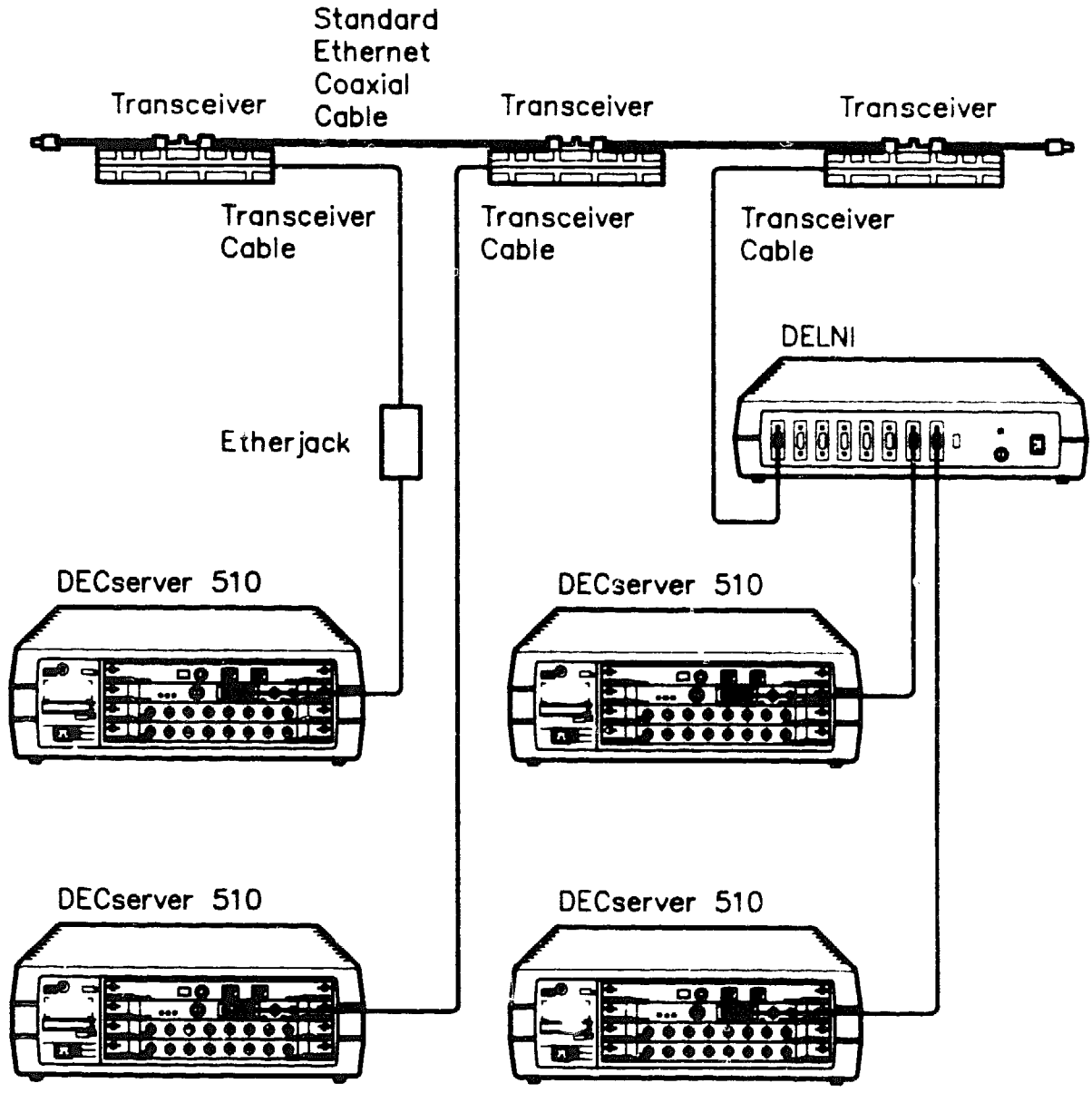
The server hardware connects to a broadband or baseband standard Ethernet LAN through appropriate Ethernet devices, such as the following:

- A DELNI network concentrator
- A transceiver (for example, an H4005 for a baseband Ethernet network)

The cable from the Ethernet device and the device itself must be installed and tested before you install the server. If you are using BNE3*x*–*xx* cable, make sure that the cable does not exceed 50 meters (164 feet). If you are using BNE4*x*–*xx* cable, make sure that the cable does not exceed 12.5 meters (41 feet).

The following exhibit shows an example of servers connecting to a standard Ethernet through a DELNI network concentrator, directly to a transceiver, and to the transceiver through an Etherjack.

Exhibit 2–5: Example of Server–to–Network Connection Using Standard Ethernet



Server to ThinWire Ethernet Connection Requirements

Verify that an appropriate connection is available for the server to connect to a ThinWire Ethernet network. Do not follow this procedure if you intend to install the server to a standard Ethernet.

The server can connect to a ThinWire Ethernet directly or through a variety of devices, including the ThinWire Ethernet Multiport Repeater (DEMPR).

The cable from the ThinWire Ethernet device and the device itself must be installed and tested before you install the server. Also, verify that the ThinWire cable does not exceed a maximum of 185 meters (606.8 feet) or is less than a minimum of 0.5 meter (1.64 feet) between the server connection and the next device on the ThinWire network.

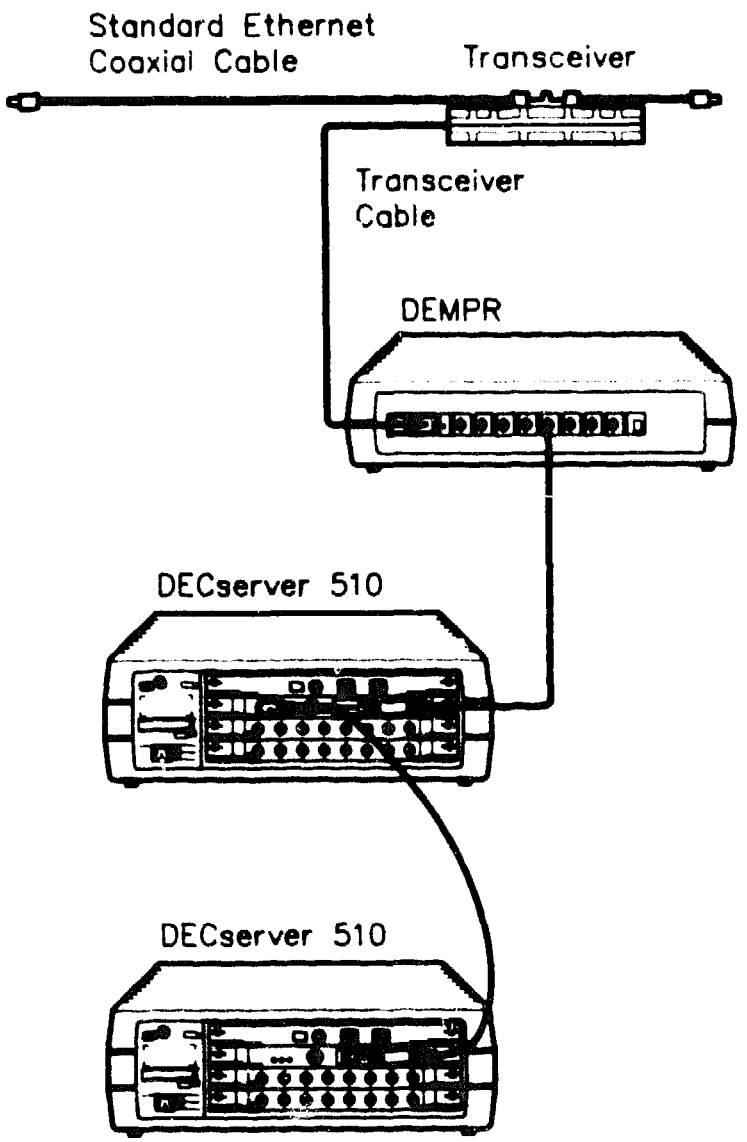
Verify that the ThinWire cable easily reaches the server without violating the 4–centimeter (1.6–inch) minimum bend radius.

The following exhibit shows an example of two servers in a ThinWire network connecting to a DEMPR device, which in turn connects to a standard Ethernet through a transceiver.

NOTE

The ThinWire cable is not the same cable as the coaxial cable used to connect 3270 terminals and a CCU to the CXM04 card. These cables can not be used interchangeably.

Exhibit 2–6: Example of Server–to–Network Connection Using ThinWire Ethernet



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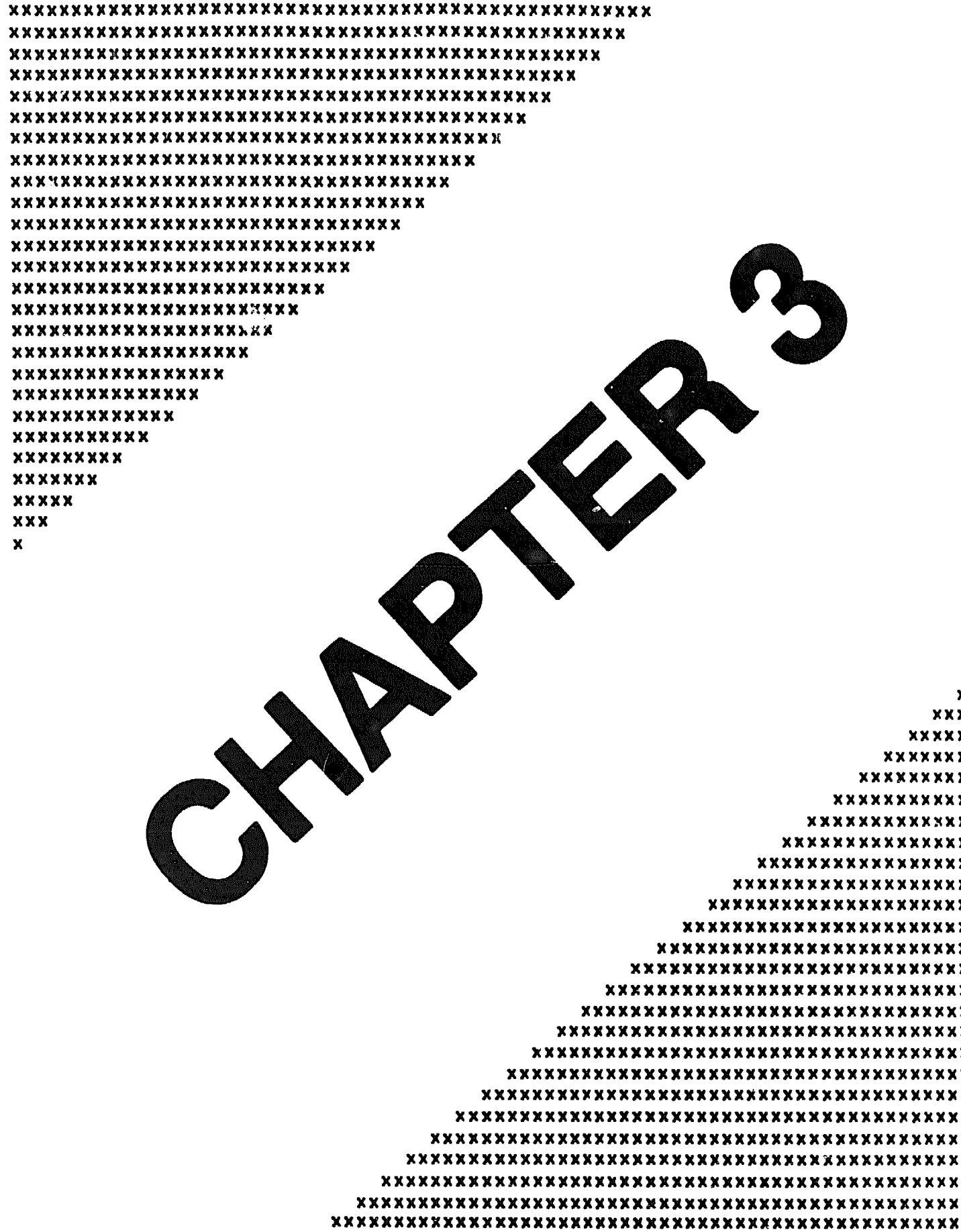
Software Requirements

Perform the following software checks.

- Verify that DECnet Phase IV or higher is installed and running on the load host.
- Verify that the person installing the software has installed or is ready to install the Local Area Transport (LAT) service node software on the load host and other service nodes (if required).
- Verify that the person installing the software has installed or is ready to install the DECserver 500 and 3270 Terminal Option software on the load host.


CHAPTER 3

3

Installation and Configuration Procedures

This chapter tells you how to:

- Check the shipment contents
- Complete the server ID card
- Install the server on a tabletop or remove the plastic enclosure
- Remove the two side screws and install the rack–mount brackets
- Install the server to the rack
- Configure the Ethernet controller for ThinWire or standard Ethernet
- Configure the jumper block to standard Ethernet
- Reinstall the Ethernet controller
- Configure the CXM04 line card
- Reset the CXM04 line card jumpers and switch
- Reinstall the CXM04 line card

Check the Shipment Contents

The server and all its accessories and documentation are packaged together in one shipping carton. Verify that all the contents are present and undamaged.

First, check the server hardware for damage. Report any damage to the shipper, and notify the Digital representative.

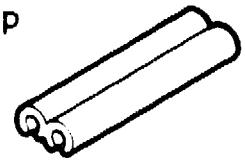
In addition to the server, the shipping carton contains the following documentation and labels. Verify that you have all the listed items.

- *DECserver 510 Hardware Installation* (this manual)
- *DECserver 510 Identification Card*
- *DECserver 510 Hardware Problem Solving*
- Software license
- Two sheets of blank labels for cables – 48 labels per sheet
- VDE Post Card – intended for use only in West Germany (not shipped with all kits)

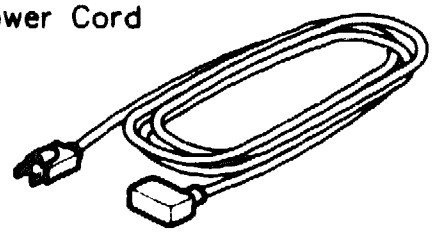
Along with the server and documentation are the server accessories, which are shown in the following exhibit. Make sure that all the accessories are present and undamaged. Report any damage or shortage to the shipper, and notify the Digital representative.

Exhibit 3–1: Server Accessories

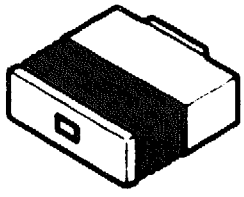
☐ ThinWire Strain–Relief Clamp



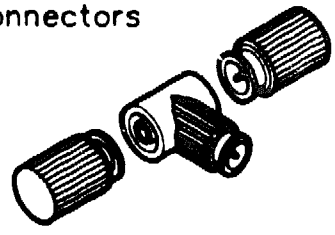
☐ Power Cord



☐ Ethernet Loopback Connectors



Standard



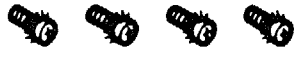
ThinWire (T Connector and Two Terminators)

☐ 4 Barrel Connectors

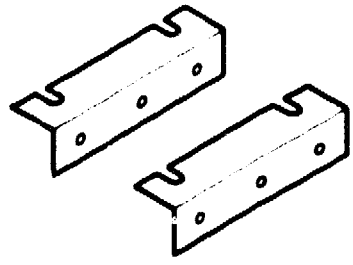
☐ Rack Mount Kit

6 Screws with Lockwashers (8–32)

4 U–Nuts



4 Screws with Lockwashers (10–32)



2 Brackets

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Complete the Server ID Card

The *DECserver 510 Identification Card* is used to pass on hardware information to the software installer.

You need to fill in the top part of the card. The serial number is located above the power cord receptacle. The Ethernet address is on a label on the Ethernet controller.

At this point, you need to determine the configuration of both CXM04 line cards. Each line card is factory set to connect to a CCU and 3270 terminals (4 ports); however, the cards can be reconfigured to accept 3270 terminals only (8 ports).

If the CXM04 line card in slot LC1 is to be connected to 3270 terminals and a CCU, check CCU (4 ports). If the CXM04 line card is to be connected to 3270 terminals only, check 3270 only (8 ports). Repeat this for the CXM04 line card in slot LC2.

Afterwards, fill in the location of the server (for example, building number, floor, section, and so on) and your name and date.

When you are done, give this card to the system or network manager, who needs to complete the card. The person installing the software needs all this information to configure the server on a load host.

DECserver 510 Identification Card

The serial number and Ethernet address uniquely identify your Decserver 510 hardware unit. Please copy the information from your hardware unit onto this card. Include your name, the date of installation, and the location (for example, office number, building, floor) of the hardware unit. You should then give this card to your system/network manager at the same time that you hand over the software carton.

Serial number | | | | | | | | | | |

Ethernet address | | | - | | | - | | | - | | | - | | | - | | |

LC1: CCU (4 ports) _____ or 3270 only (8 ports) _____

LC2: CCU (4 ports) _____ or 3270 only (8 ports) _____

Location _____

Your name _____ Date ____ /____ /____

The system/network manager should record the next set of information. It is used to configure the load host database after installation of the distribution software on a load host. The card should be given to the server manager.

DECnet node name _____ (1 to 6 alphanumeric characters)

DECnet address | | | . | | | | | (area number . node number)

The server manager should record the following information when initially setting up or modifying values for the NAME, NUMBER, and IDENTIFICATION server characteristics. The server manager or network manager should keep this card.

Server Name _____ Server Number _____

Server Identification _____

Order number: _____

Install the Server on a Tabletop or Remove the Plastic Enclosure

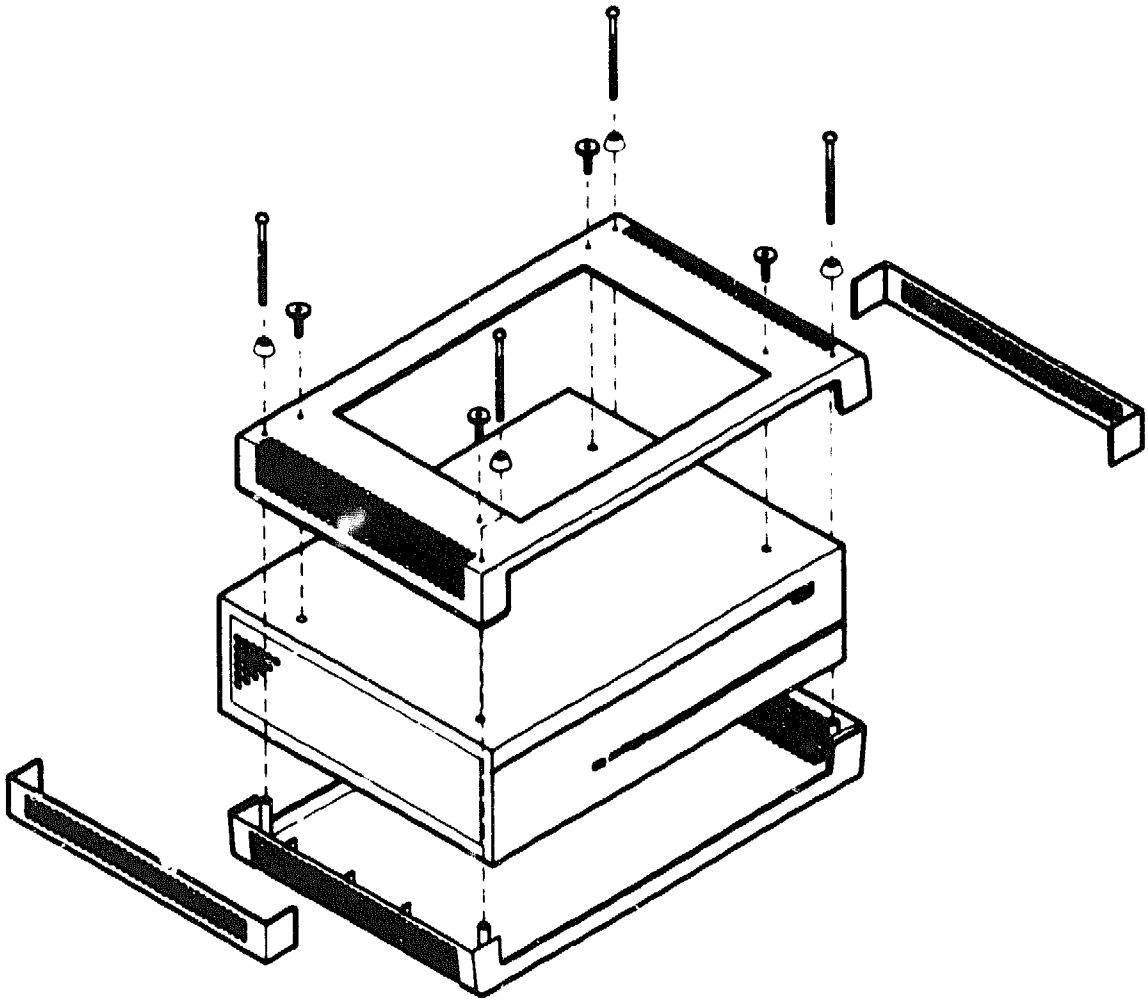
Either you can place the server in an office environment, or you can install the server to a rack. If you intend to install the server to a rack, you must first remove the plastic enclosure.

To install the server in an office environment, place the server on a tabletop or similar location. Ensure that the server has the appropriate clearance space as defined in Chapter 2 in the "Server Physical Specifications" section.

If the server is to be installed to a rack, you must remove the plastic enclosure as follows:

1. Remove the 8 screws from the bottom of the server hardware. Four of these screws are part of the rubber feet.
2. Remove the plastic enclosure (4 pieces).
3. Reassemble and store the enclosure for future use (in case you wish to reconfigure the server back to a tabletop unit at some future time).

Exhibit 3–3: Removing the Server Plastic Enclosure



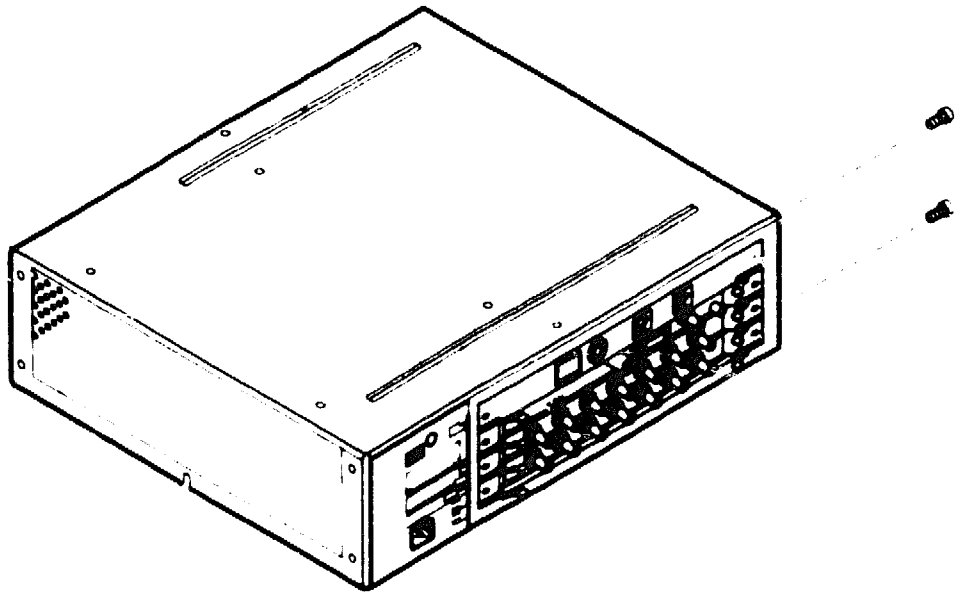
LKG–3381–89

Remove the Two Side Screws and Install the Rack–Mount Brackets

After you remove the plastic enclosure, you need to install the rack–mount brackets to the server.

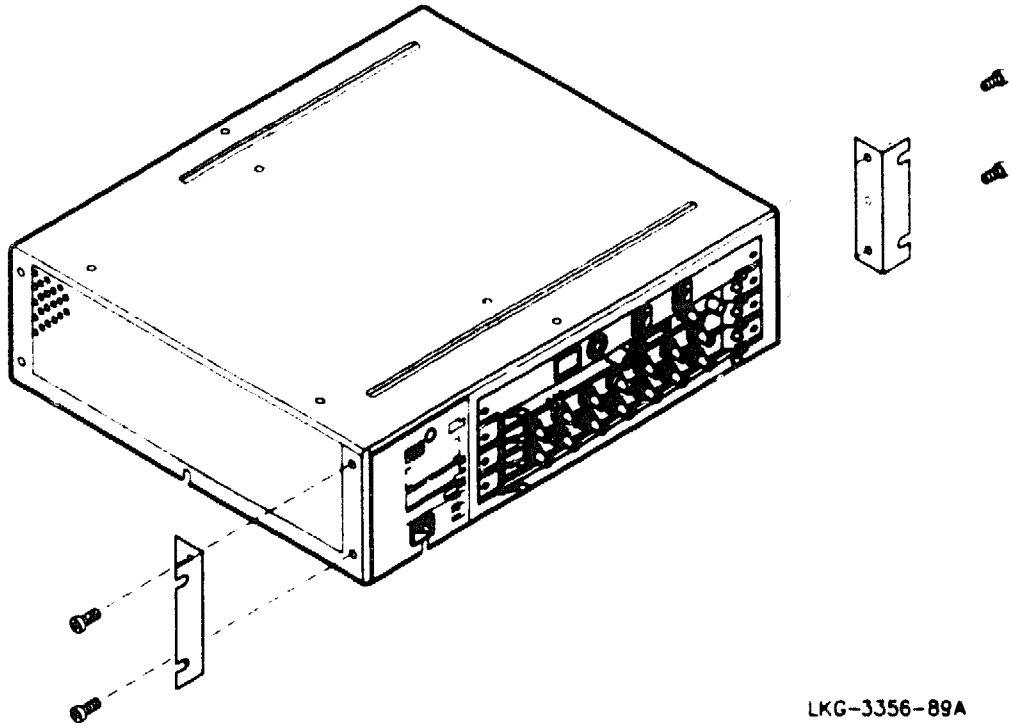
1. Remove the 2 screws from the right side of the server, as you are facing the module end of the server.
2. Locate the two brackets and six 8–32 Phillips–head screws with lockwashers from the rack–mount kit. You will need only four of these screws.
3. Use the screws to install the brackets to the sides of the server as shown in Exhibit 3–5.

Exhibit 3–4: Removing the Side Screws



LKG-3355-89A

Exhibit 3–5: Installing the Brackets



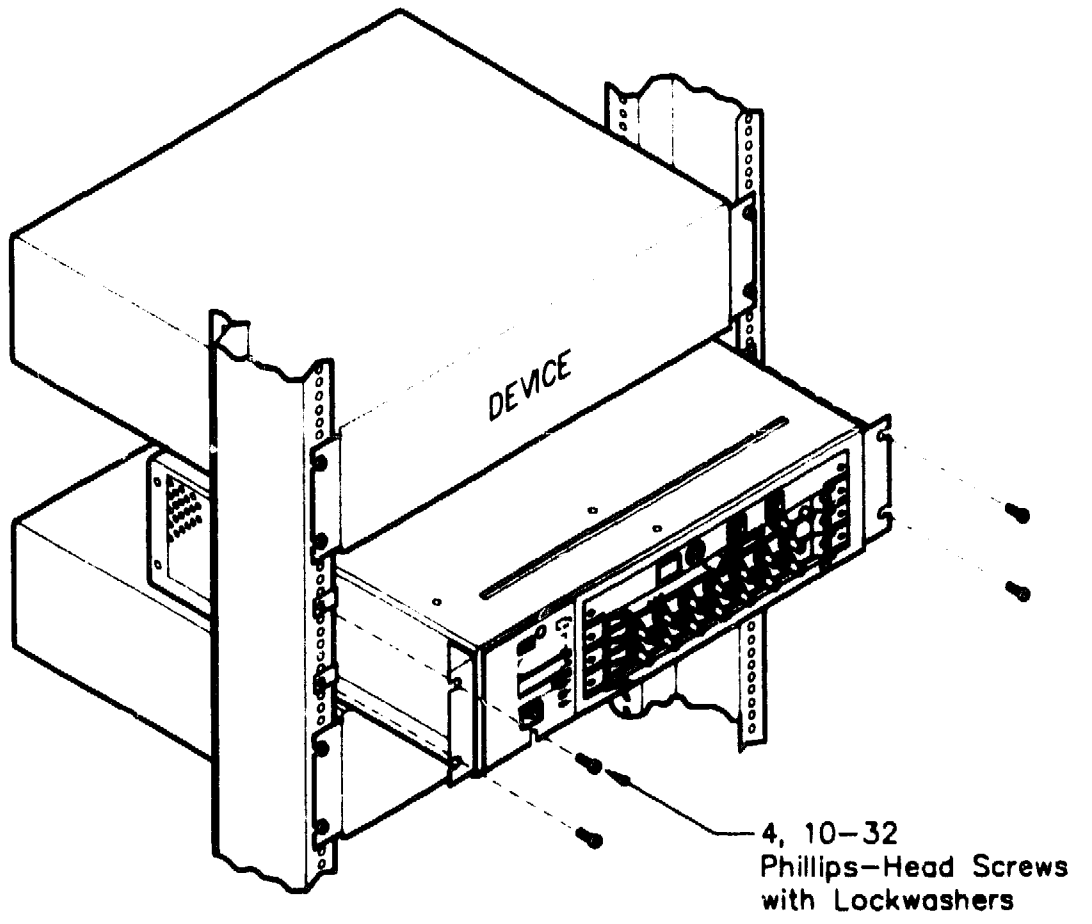
LKG-3356-89A

Install the Server to the Rack

Once you have installed the rack–mount brackets, the server can be mounted in a standard 48–centimeter (19–inch) RETMA rack cabinet using the rack–mount kit provided with the server.

1. Locate the four 10–32 Phillips–head screws with lockwashers and the four u–nuts provided with the server.
2. Determine where you will mount the server in the rack. Be sure to leave 9 cm (3.5 in) of space between the server and the next device below the server in the rack to allow cables to pass to the back of the rack.
3. Install the u–nuts to the cabinet rails.
4. Use the 4 screws to secure the server and brackets to the rack.

Exhibit 3–6: Installing the Server to a Rack



Configure the Ethernet Controller for ThinWire or Standard Ethernet

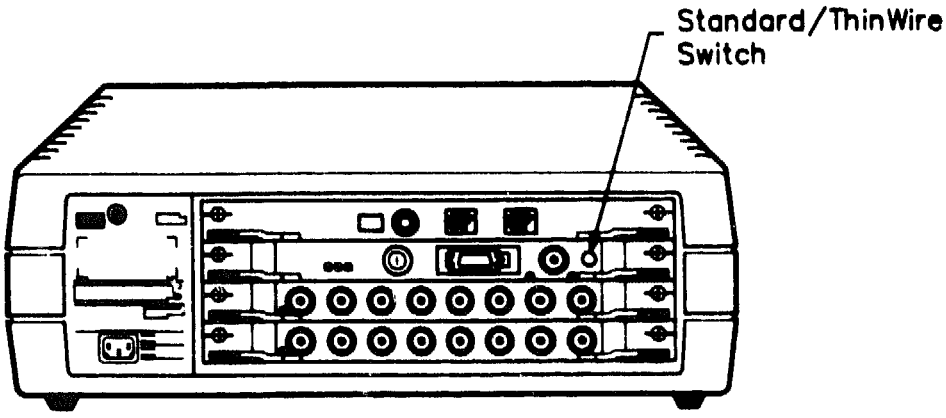
The Ethernet controller has either a pushbutton or a jumper block that must be set to the type of Ethernet that you have.

There are two versions of the Ethernet controller module. One has a pushbutton on the faceplate to configure the module for ThinWire or standard Ethernet, as shown in the following exhibit. The other version does not have the pushbutton; instead, the module has a jumper block. You must remove the module from the server to access the jumper block.

Perform the following to configure the module:

1. Determine whether the server will be connected to a ThinWire or standard Ethernet LAN.
2. If the module has a pushbutton, make sure that the button is in the out position for ThinWire configuration or in the in position for standard configuration.
3. If you are connecting to a ThinWire Ethernet and the module does not have a pushbutton, do not do anything. The jumper block is factory set for ThinWire configuration.
4. If you are connecting to a standard Ethernet and the module does not have a pushbutton, you must perform the procedure, "Configure the Jumper Block to Standard Ethernet."

Exhibit 3–7: Ethernet Controller Standard/ThinWire Switch Location



LKG–3391–89A

Configure the Jumper Block to Standard Ethernet

In order to reconfigure the Ethernet controller module with a jumper block, you must first remove the module from the server, then reposition the jumper block.

CAUTION

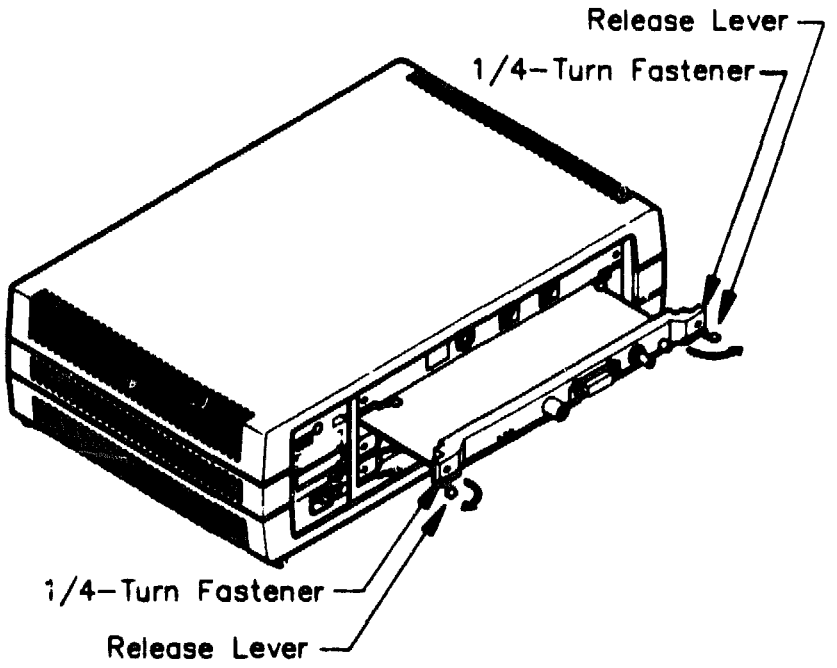
Static electricity can damage system components. Use an antistatic wrist strap (part number 29–11762–00) and grounded work surface when accessing any internal part of the system.

1. On the Ethernet controller, turn the two 1/4–turn fasteners counterclockwise with a Phillips screwdriver.
2. Simultaneously pull the module's two release levers outwards to disengage the module from the backplane.
3. Remove the module from the server by gently sliding the module forward.
4. Locate the jumper block on the module. Notice that there are three rows of pins. The jumper block connects the center row of pins to the pins labeled THINWIRE.
5. To configure the server for a standard Ethernet LAN connection, carefully grasp the jumper block with your fingers and remove it.
6. Install the jumper block to the center row of pins and the row of pins labeled THICKWIRE.

NOTE

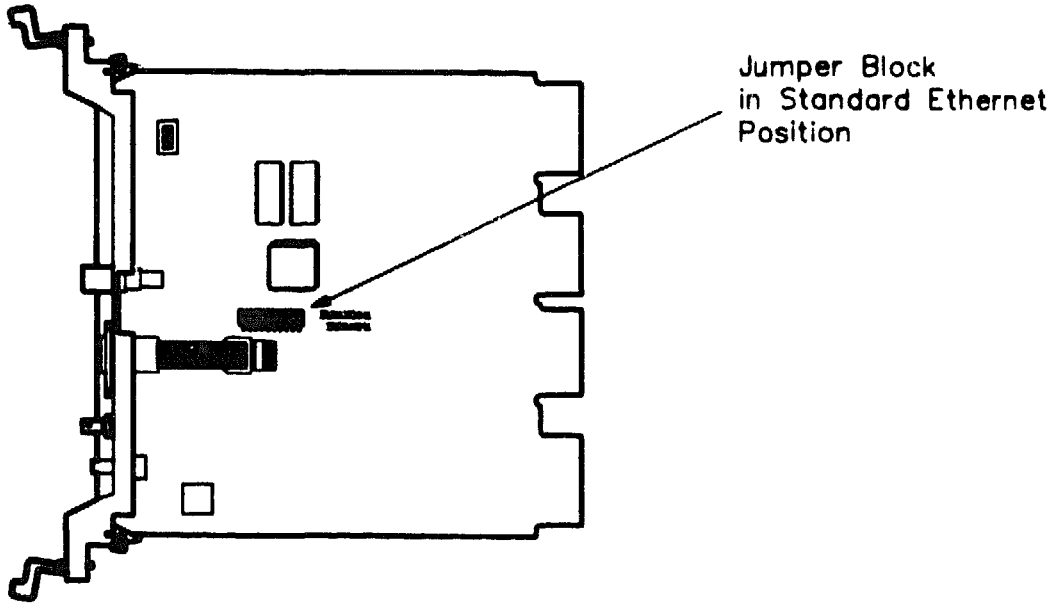
If you wanted to configure the Ethernet controller for a ThinWire LAN connection, you would install the jumper block to the center row of pins and the row of pins labeled THINWIRE.

Exhibit 3–8: Removing the Ethernet Controller



LKG–3358–89A

Exhibit 3–9: Reconfiguring the Jumper Block



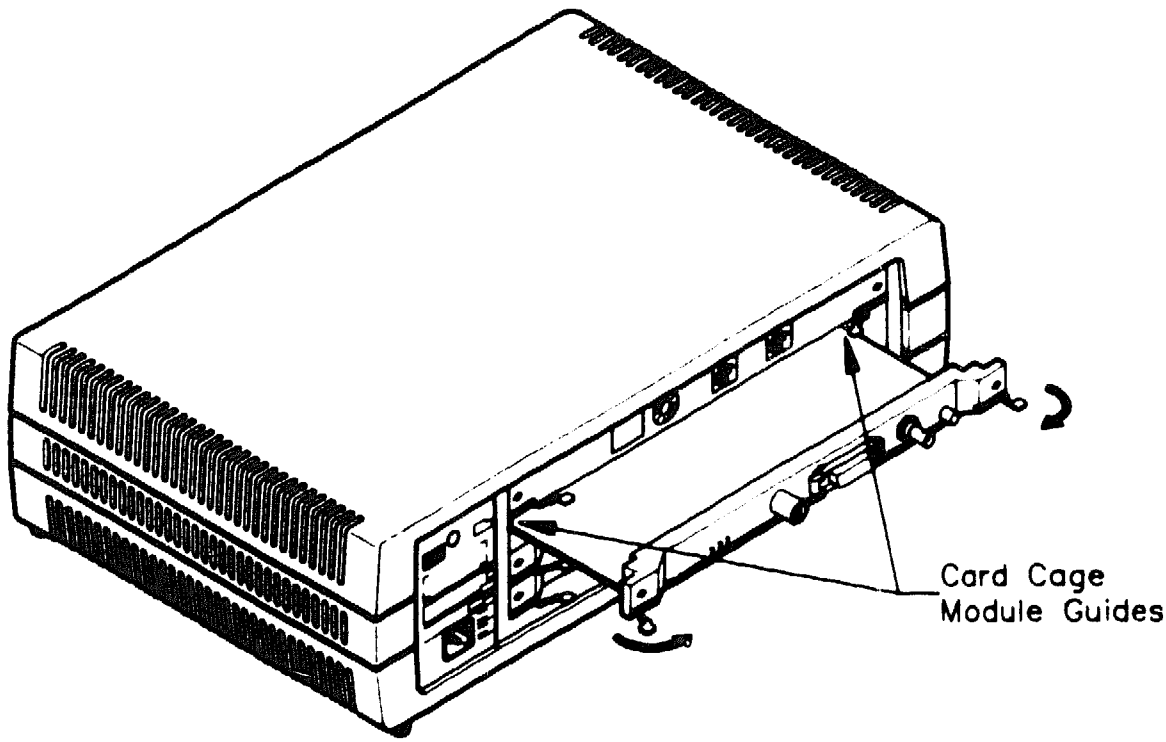
LKG–3359–89A

Reinstall the Ethernet Controller

After you reconfigure the jumper block, you need to slide the module back into the card cage, being careful to seat the module correctly.

1. Align the module with the card cage module guides. The component side must face the CPU module (above).
2. Slide the module into the slot until it engages the backplane. The module handle should now be 1/4 inch from being flush with the adjacent module handle.
3. Simultaneously pull the two release levers towards each other. The module handle should now be flush with the adjacent module.
4. Press in and turn the fasteners clockwise to secure the module.

Exhibit 3–10: Reinstalling the Ethernet Controller



LKG–3360–89A

Configure the CXM04 Line Card

The CXM04 line card is factory set for connections to 3270 terminals and a CCU. If you wish to configure a CXM04 line card for 3270 terminals only, you must first remove the card from the server to access the switches and jumpers.

The CXM04 line card can be configured to connect to 3270 terminals and a CCU or to 3270 terminals only. The card is factory set to connect to 3270 terminals and a CCU. If you plan to connect to a CCU, you do not need to do anything. In this case, proceed to Chapter 4 to connect the cables to the server.

If you intend to connect one or both CXM04 line cards to 3270 terminals only, you must first remove the card from the server as follows:

CAUTION

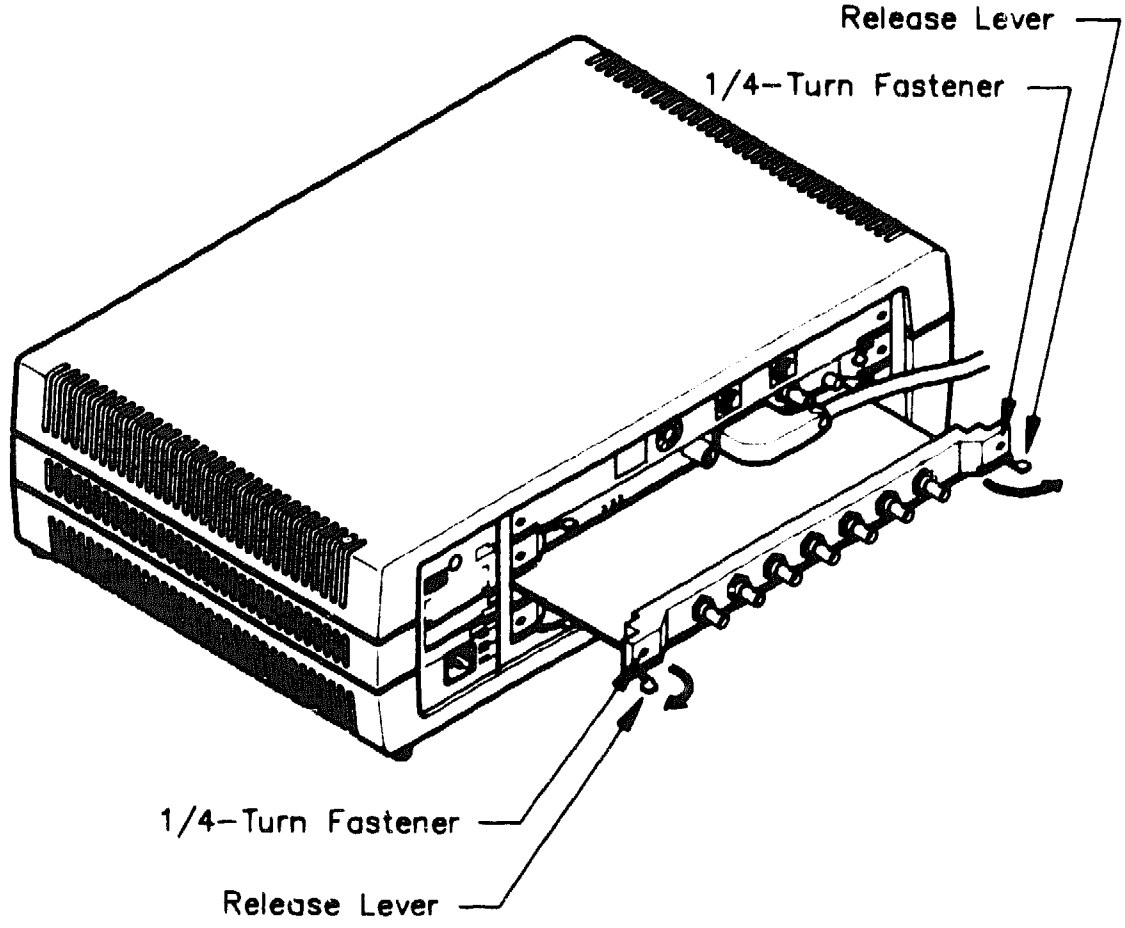
Static electricity can damage system components. Use an antistatic wrist strap (part number 29–11762–00) and grounded work surface when accessing any internal part of the system.

NOTE

Remove only one line card from the server at a time. Each line card is configured for its particular card slot and must not be placed in a different slot.

1. At the appropriate line card, turn the two 1/4–turn fasteners counterclockwise with a Phillips screwdriver.
2. Simultaneously pull the line card's two release levers outwards to disengage the line card from the backplane.
3. Remove the line card from the server by gently sliding the line card forward.

Exhibit 3–11: Removing the CXM04 Line Card



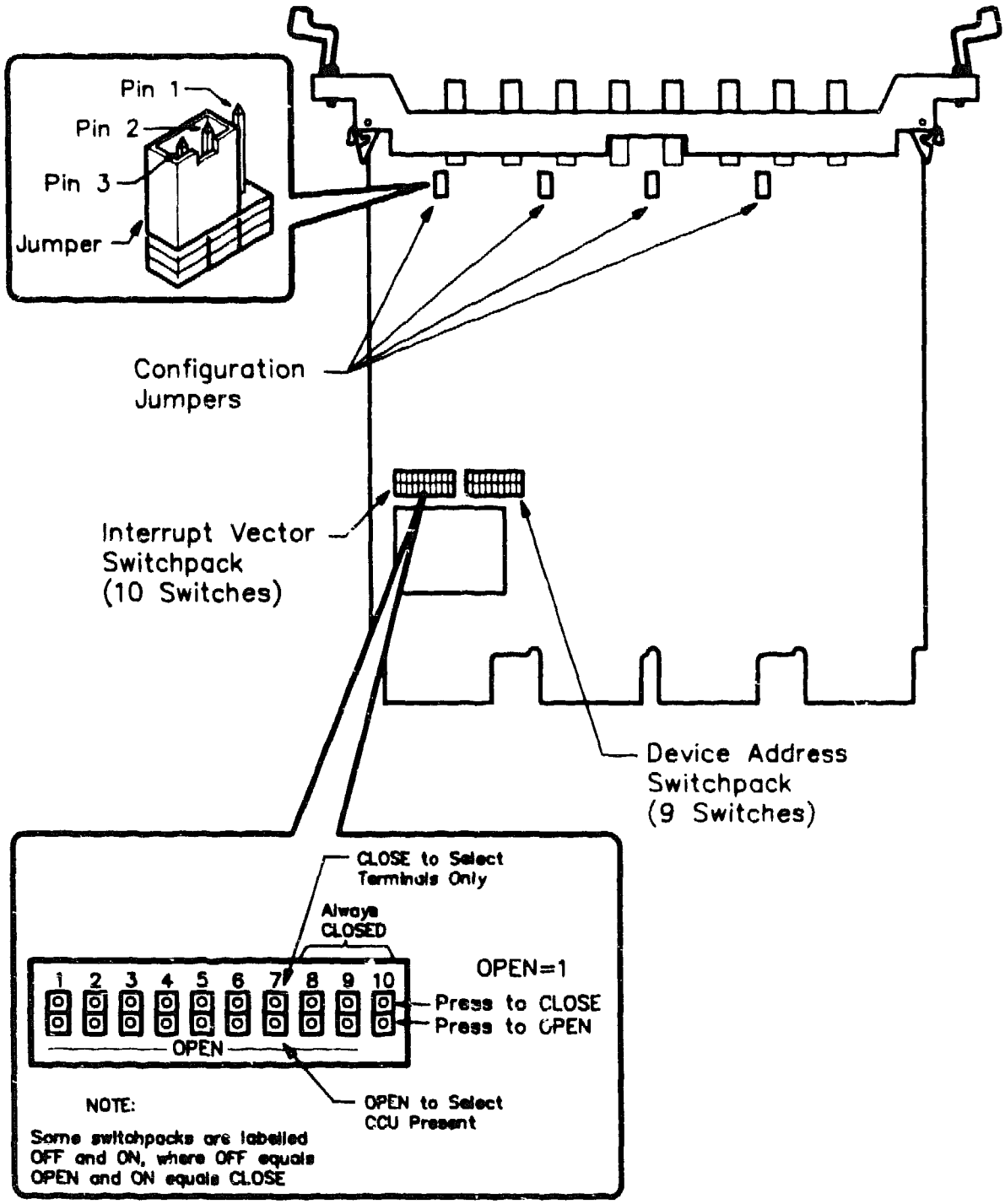
Reset the CXM04 Line Card Jumpers and Switch

To configure the CXM04 line card for 3270 terminals only, you need to reconfigure the four jumpers and the CCU present switch.

Perform this procedure only if the line card is to connect to 3270 terminals only.

1. Lift each jumper and place it on pins 1 and 2. All four jumpers must be placed on pins 1 and 2.
2. Set pole 7 (CCU present) on the interrupt vector switch to the closed position to select 3270 terminals only.

Exhibit 3–12: Resetting the CXM04 Jumpers and Switch



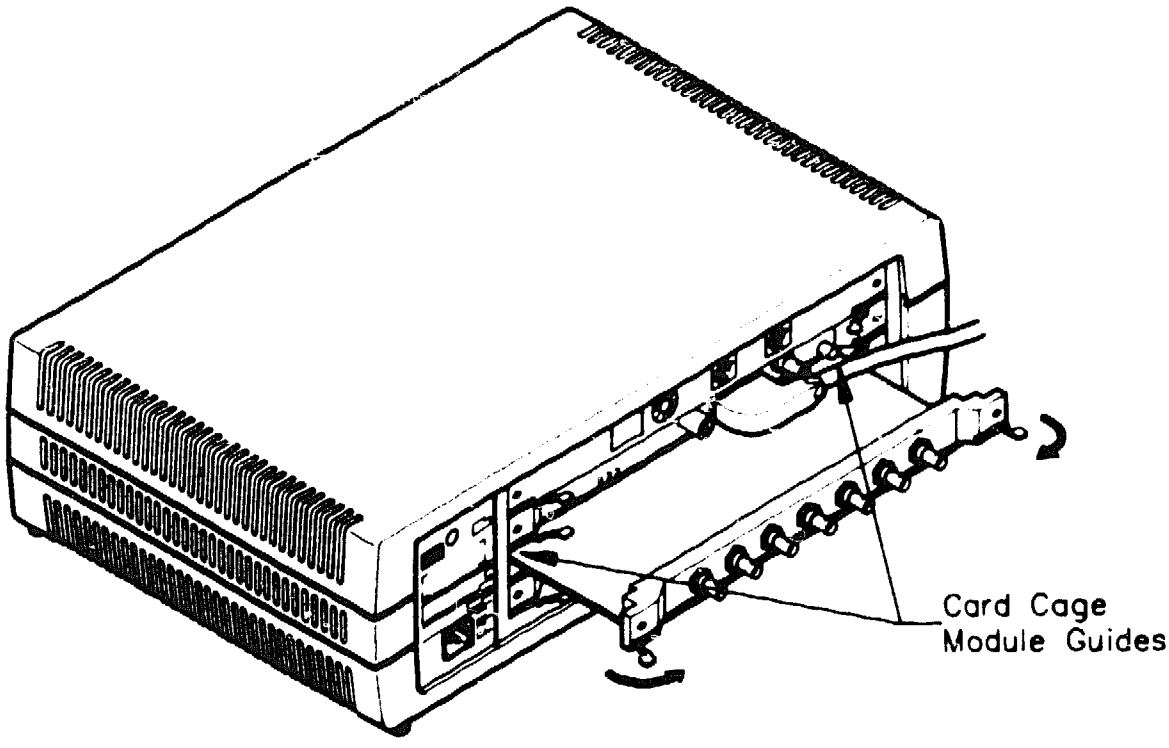
LKG-3364-89A

Reinstall the CXM04 Line Card

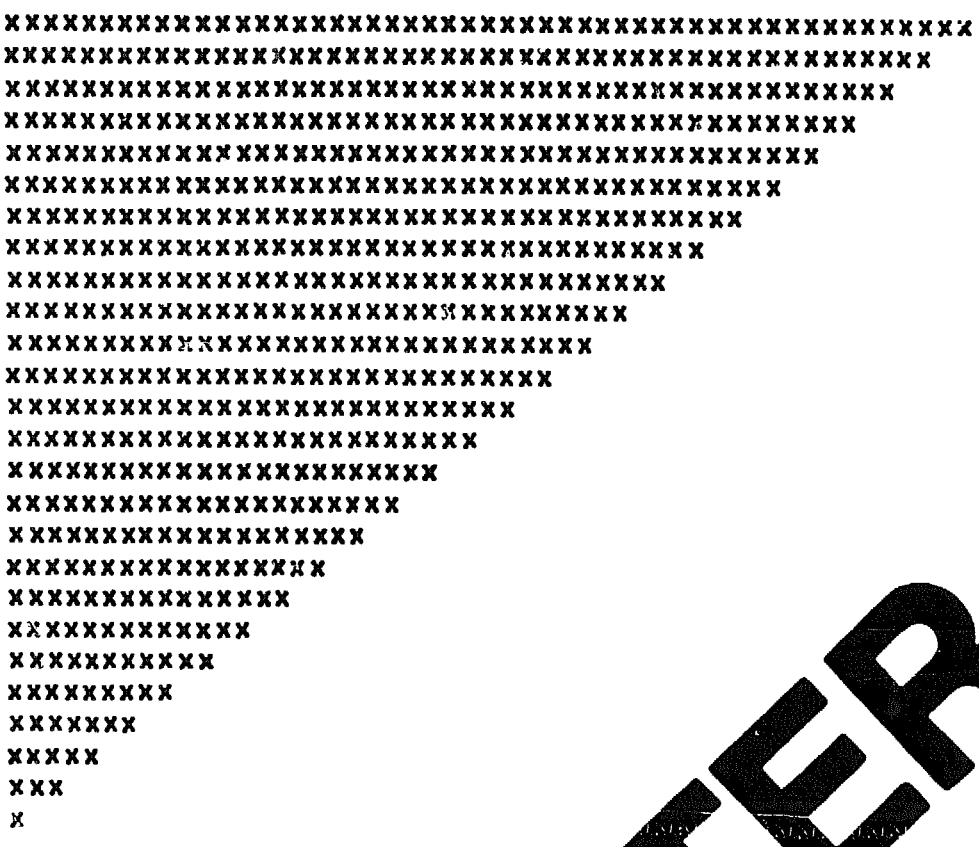
After you configure the CXM04 line card, you need to reinstall the card into the server, being careful to seat the card correctly.

1. Align the line card with the card cage module guides. The component side must face the CPU module (above).
2. Slide the line card into the slot until it engages the backplane. The line card handle should now be 1/4 inch from being flush with the adjacent line card handle.
3. Simultaneously pull the two release levers towards each other. The line card handle should now be flush with the adjacent line card.
4. Press in and turn the fasteners clockwise to secure the line card.
5. Proceed to Chapter 4 to connect the cables to the server.

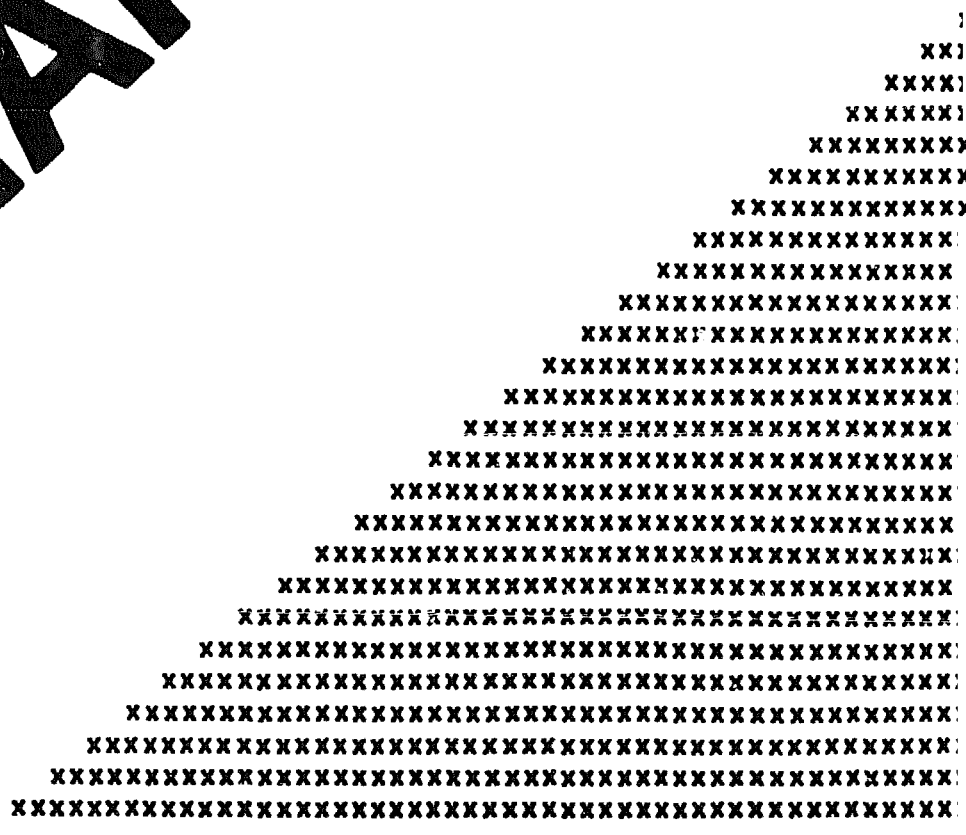
Exhibit 3–13: Reinstalling the CXM04 Line Card



LKG–3365–89A



CHAPTER 4



4

Cable and Test Procedures

This chapter tells you how to:

- Connect the server to the standard Ethernet LAN
- Connect the server to the ThinWire Ethernet LAN
- Install theTninWire Ethernet strain–relief clamp
- Familiarize yourself with the 3270 terminal and CCU cable configuration
- Connect the 327[illegible] terminal and CCU cables to the line cards
- Connect the cables to the line cards (no CCU connections)
- Determine the CXM04 port numbers
- Label each CXM04 cable
- Test the 3270 terminal to CCU connections
- Set the boot mode switch to 7 and connect power
- Set up a terminal and finish the installation

Connect the Server to the Standard Ethernet LAN

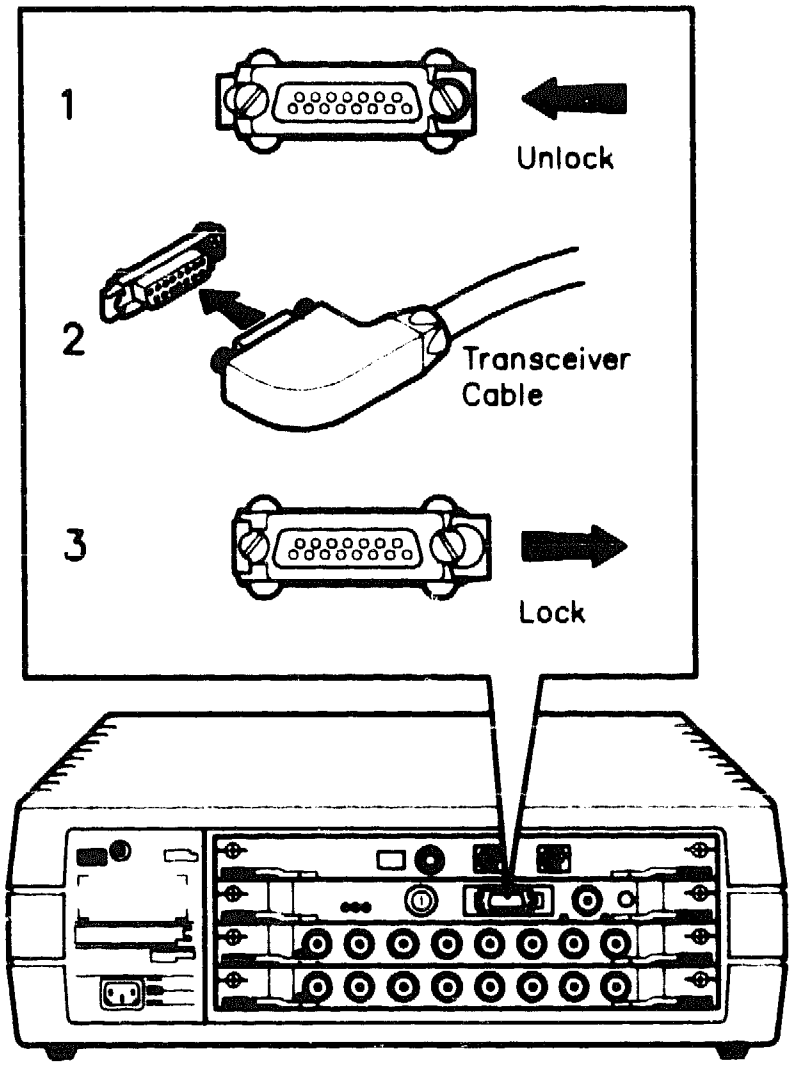
If the Ethernet controller is configured for standard Ethernet, connect the cable from the Ethernet device to the Ethernet controller.

1. If necessary, unlock the slide latch on the server's Ethernet connector.
2. Connect the transceiver cable to the server's Ethernet connector. The cable should have a right-angled end connector.
3. Lock the slide latch on the Ethernet connector. Tug gently on the cable to make sure that it is securely connected.

CAUTION

Installing or removing the Ethernet cable or pressing the standard/ThinWire switch while the server power is on could cause the server to reset.

Exhibit 4–1: Connecting to the Standard Ethernet LAN



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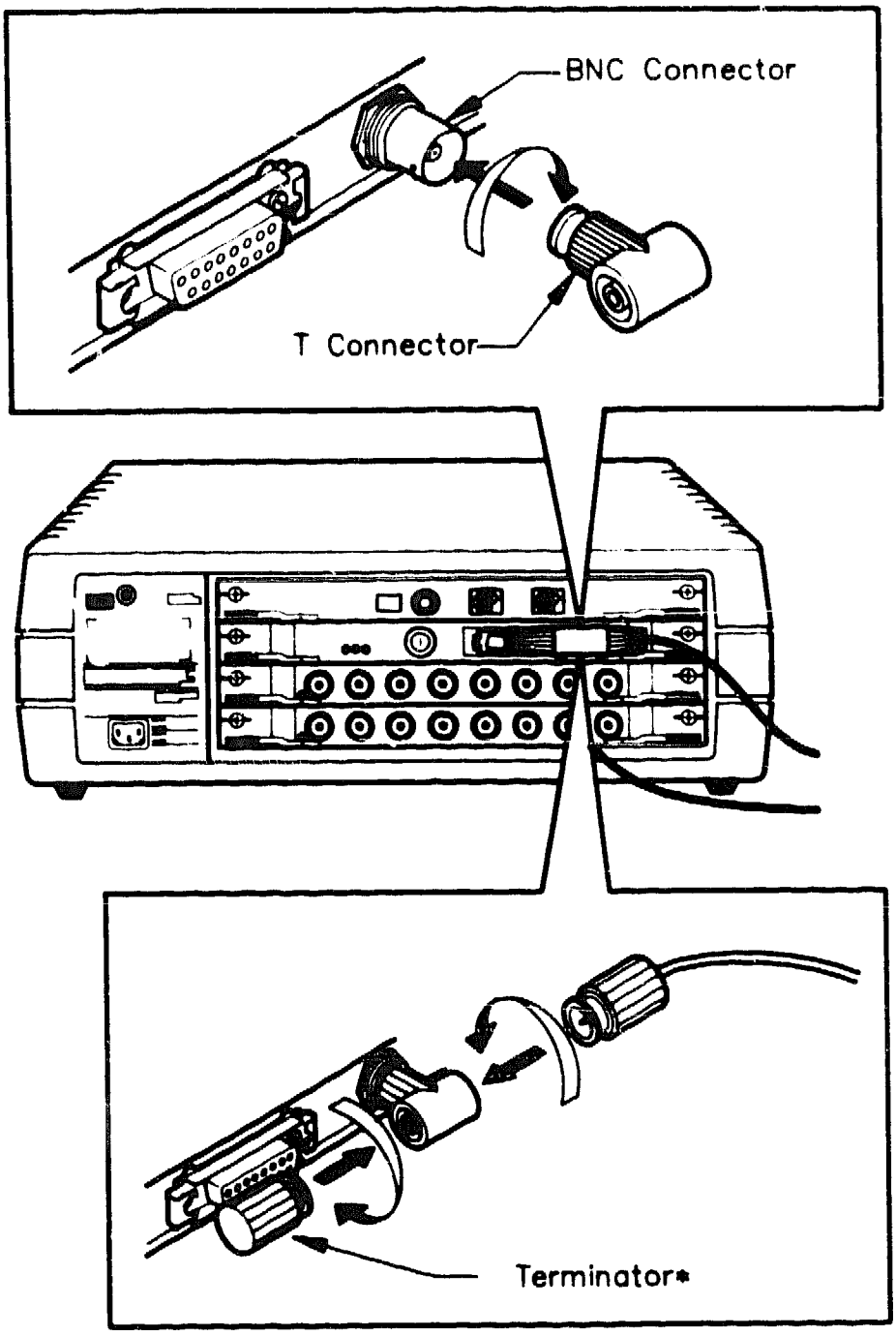
Connect the Server to the ThinWire Ethernet LAN

If the Ethernet controller is configured for ThinWire Ethernet, connect the cable from the Ethernet device to the Ethernet controller.

1. Locate the T connector on the ThinWire Ethernet LAN cable.
2. Hold the T connector so that the T portion is in a horizontal position. Then install the connector onto the BNC connector, which is located on the front of the Ethernet controller module.
3. If the server is the last device in the Ethernet network, make sure that you install a terminator to the T connector.
4. If the server is not the last device in the network, you must perform the procedure "Install the ThinWire Ethernet Strain-Relief Clamp."

Exhibit 4–2: Connecting to the ThinWire Ethernet LAN



*If this is the last device.

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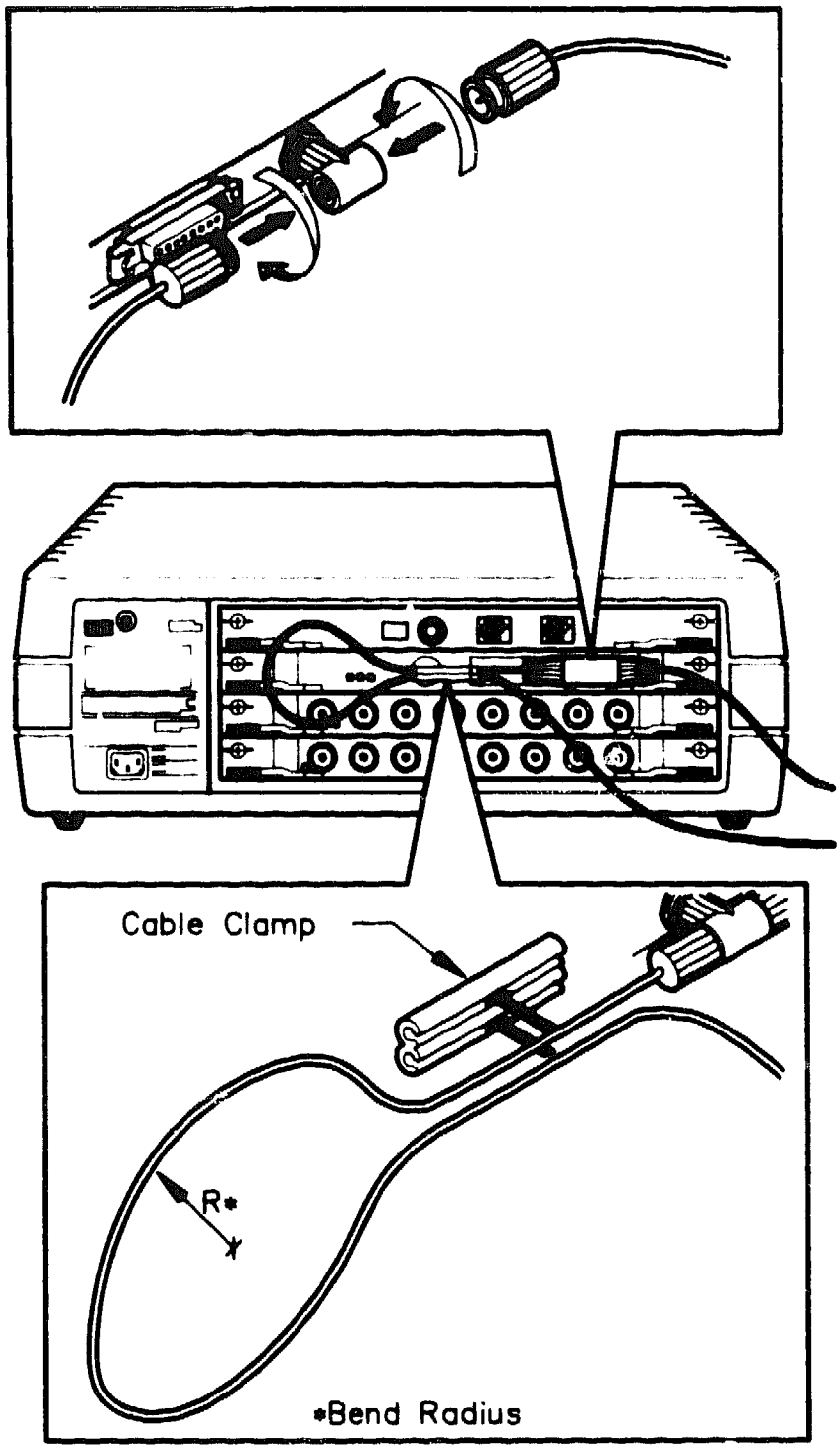
Install the ThinWire Ethernet Strain–Relief Clamp

You must connect the strain–relief clamp and adhere to the minimum bend radius if the server is not the last device in the ThinWire Ethernet network.

If the server is not the last device in the ThinWire Ethernet network, perform the following:

1. Put the cable going to the next device in a loop, making sure that you do not crimp the cable.
2. Make sure that the loop has at least a 4–centimeter (1.6–inch) minimum bend radius. To get the bend radius, you measure the distance from the center of the cable loop to the cable.
3. Use the ThinWire strain–relief cable clamp to secure the cable. The ThinWire strain–relief cable clamp is included with the server accessories.

Exhibit 4–3: Installing the ThinWire Strain–Relief Clamp



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Familiarize Yourself with the 3270 Terminal and CCU Cable Configuration

When the CXM04 line card is configured for a CCU and terminals, the line card is configured so that each 3270 terminal can communicate to only one CCU line. Also, certain connectors are configured for the CCU only.

Each CCU connection to a 3270 terminal can have different features as defined by the software. If you plan to install the DECserver 510 hardware to an existing CCU and 3270 terminal setup, be careful that each 3270 terminal is connected to the same CCU connection through the CXM04 line card. This way, all users will retain their unique configurations.

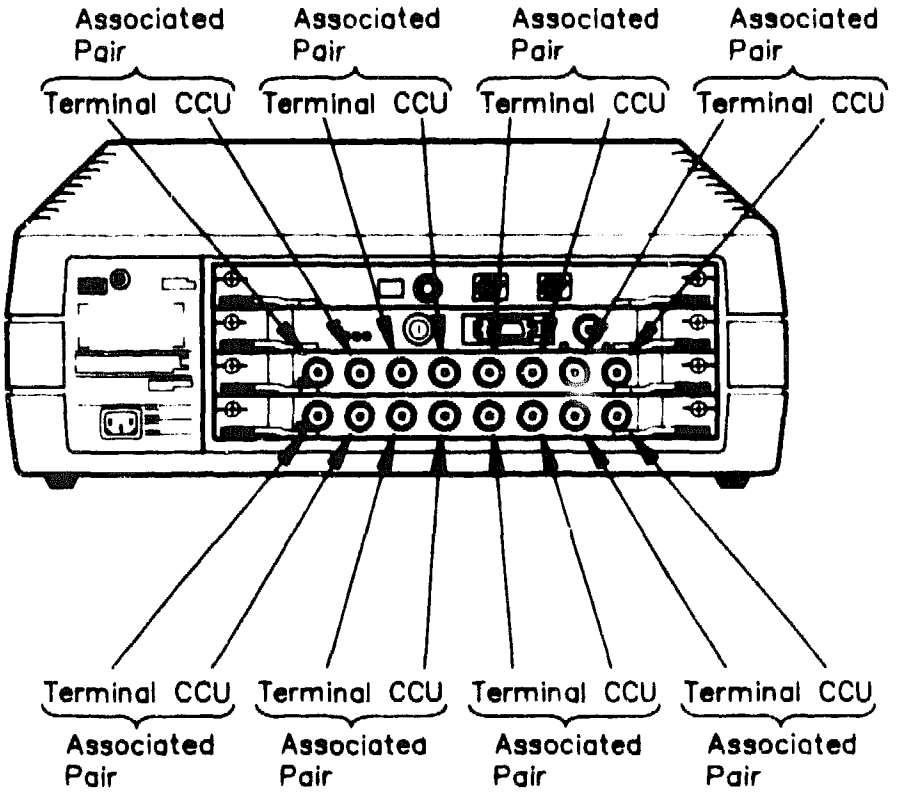
The CXM04 line card connectors are arranged in pairs. Each pair is for a CCU connection and its associated 3270 terminal. The CCU connection is always to the right of its associated 3270 terminal connection, as shown in the following exhibit. The 3270 terminal connected to the card can communicate only with the CCU line that is attached at the connector to the immediate right of the terminal connector.

When connecting the CXM04 line card in slot LC1 to a CCU, all connections must be to the same CCU. When connecting the CXM04 line card in slot LC2 to a CCU, all connections must be to the same CCU. Both line cards can connect to either the same CCU or to different CCUs.

CAUTION

The equipment will not operate properly if you connect one CXM04 line card to more than one CCU.

Exhibit 4–4: CXM04 Line Card Configuration for a CCU and 3270 Terminals



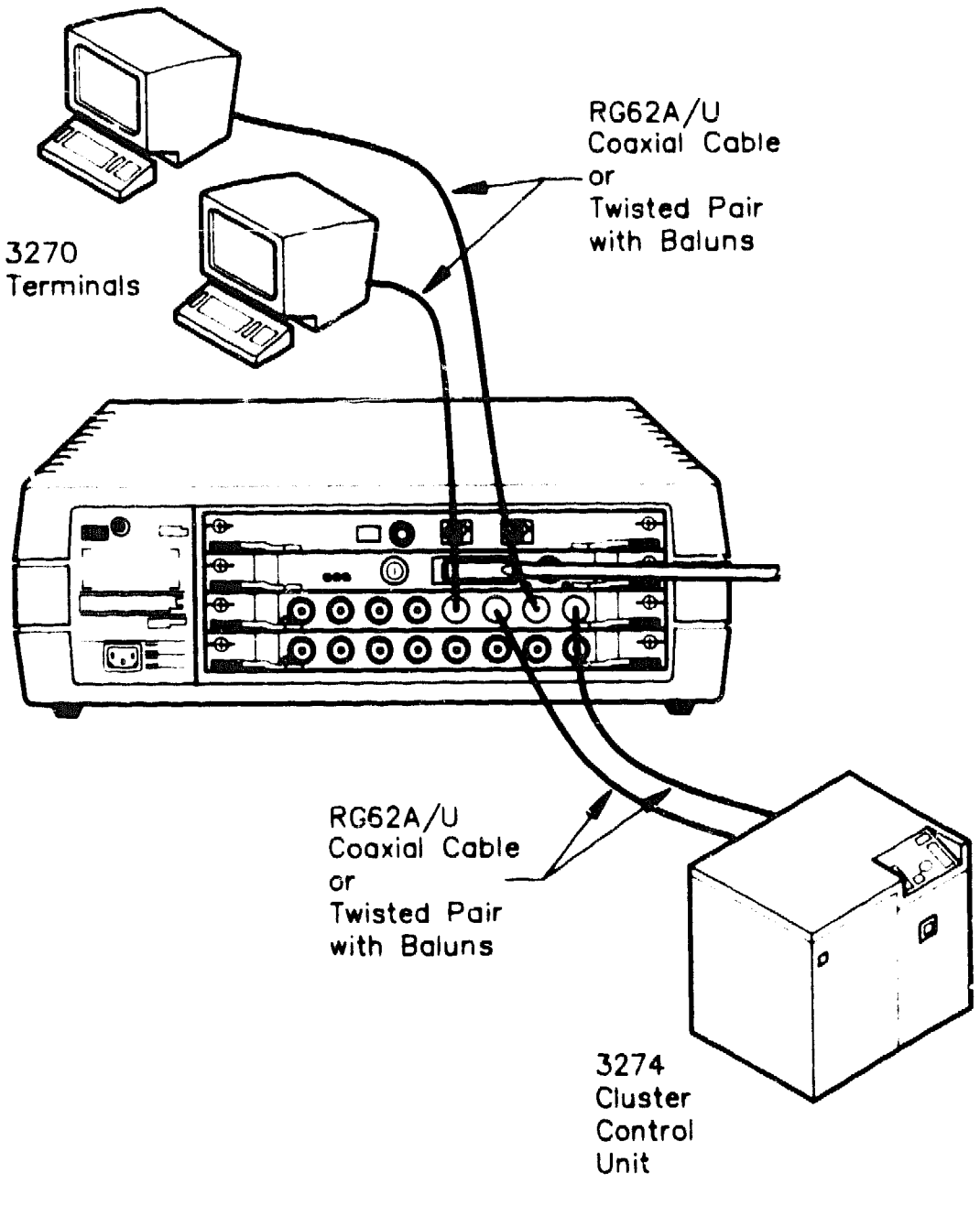
Connect the 3270 Terminal and CCU Cables to the Line Cards

If you are connecting the CXM04 line card to a CCU and 3270 terminals, you must be careful to install each cable to the correct connector.

1. Locate the 3270 terminal cable and the cable to the terminal's associate CCU line.
2. Connect the cable from the CCU to the rightmost connector on the line card. Lock the cable in place by turning the connector clockwise.
3. Connect the cable from the associated 3270 terminal to the adjacent connector. Lock the cable in place by turning the connector clockwise.
4. Locate the next pair of cables from the CCU and associated 3270 terminal. Connect these cables to the next two connectors with the CCU cable connecting to the rightmost connector.
5. Repeat the previous step for the third and fourth pairs of CCU and associated 3270 terminal cables.

NOTE

The 50–ohm ThinWire Ethernet cable can not be used interchangeably with the RG62A/U cable. The RG62A/U cable can be used with the CXM04 line cards.


RG62A/U
Coaxial Cable
or
Twisted Pair
with Baluns
3270
Terminals
RG62A/U
Coaxial Cable
or
Twisted Pair
with Baluns
3274
Cluster
Control
Unit
LKG-3368-89A

Connect the Cables to the Line Cards (No CCU Connections)

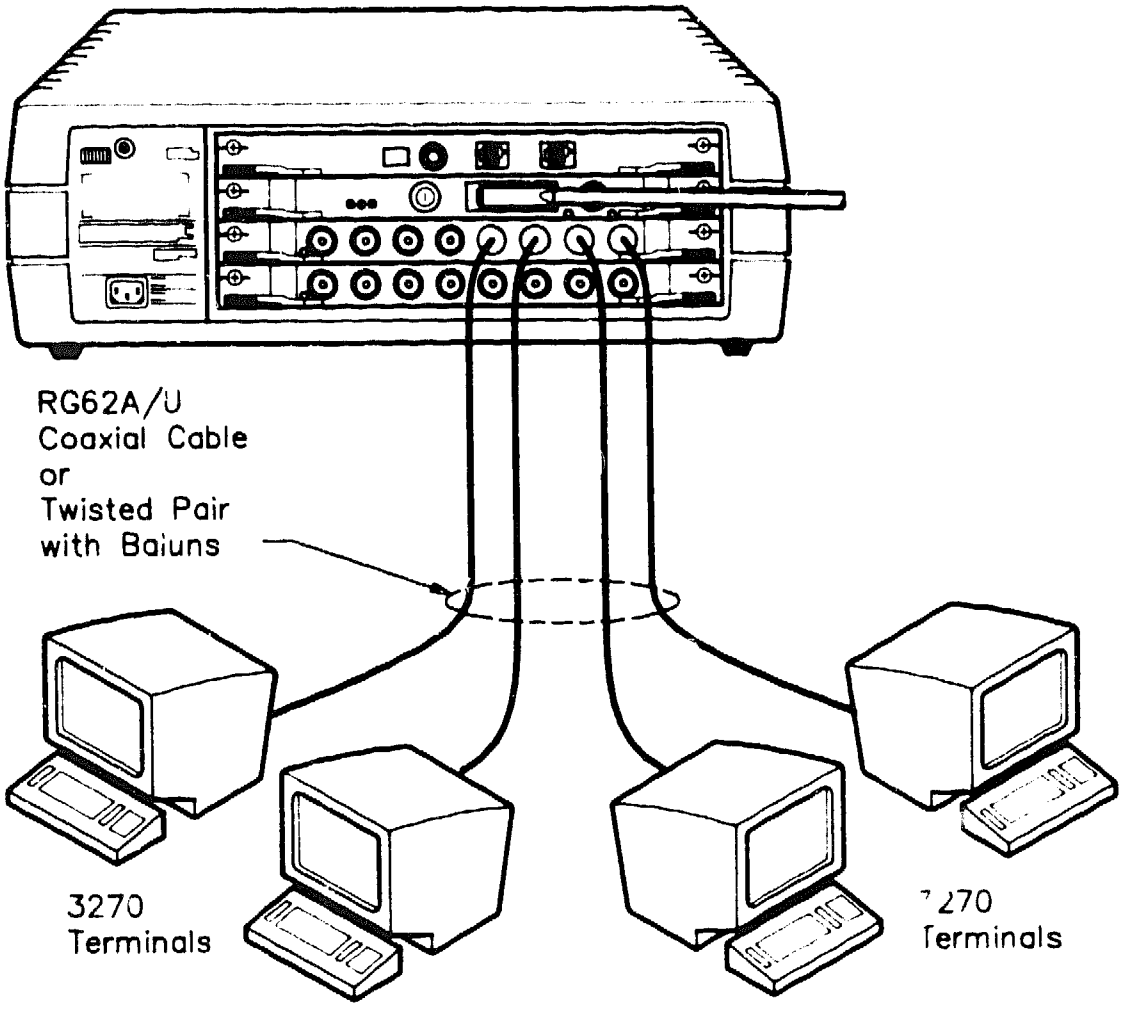
If you are installing 3270 terminals only to the CXM04 line card, install the cables to the connectors starting from the right.

1. Connect the cable from the first 3270 terminal to the rightmost connector on the line card. Lock the cable in place by turning the connector clockwise.
2. Connect the cable from each 3270 terminal to the adjacent connectors. Lock the cable in place by turning the connector clockwise.

NOTE

The 50–ohm ThinWire Ethernet cable can not be used interchangeably with the RG62A/U cable. The RG62A/U cable can be used with the CXM04 line cards.

Exhibit 4–6: Connecting 3270 Terminal Cables to the CXM04



Determine the CXM04 Port Numbers

The CXM04 line card is configured either for 4 ports or for 8 ports.

The following exhibits show the port numbers of the CXM04 line card when the line card is configured for 4 ports (CCU and 3270 terminals) and for 8 ports (3270 terminals only).

When the CXM04 line card is configured for 4 ports, two connectors share the same port number. This way, the CCU connection has the same port number as its associated 3270 terminal connection.

When the CXM04 line card is configured for 8 ports, the ports are not arranged in an ascending numerical order. The even numbered connectors on the CXM04 line card in slot LC1 (starting from the right) are ports 1 through 4, while the odd–numbered connectors are ports 5 through 8. The ports are necessarily arranged this way for the hardware to be able to support the CCU and 3270 terminal configuration.

It is important to know how the ports are arranged on the line cards, so that you can have a one–to–one correspondence between the hardware and the software.

Exhibit 4–7: CXM04 Port Numbers (CCU and 3270 Terminals)

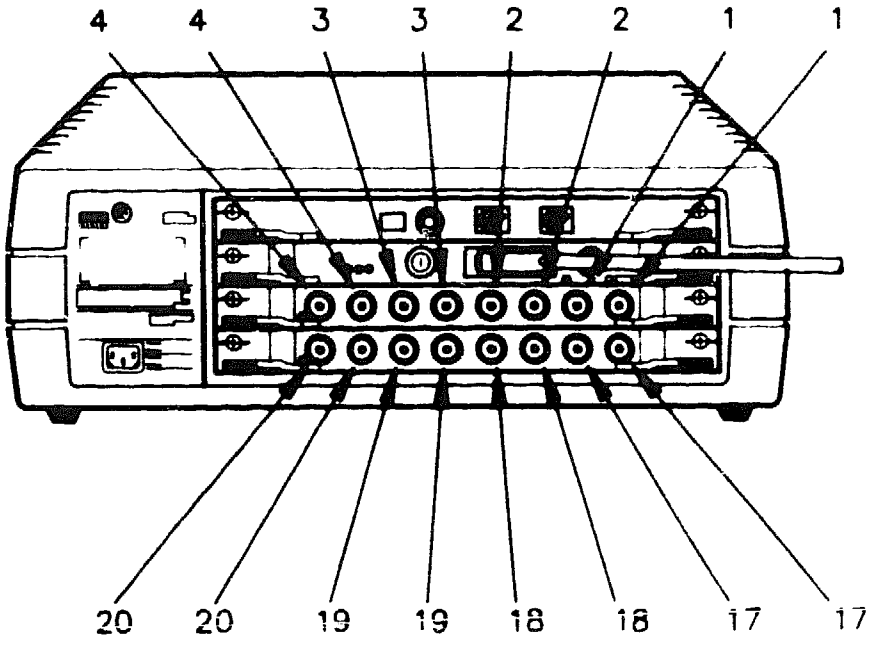


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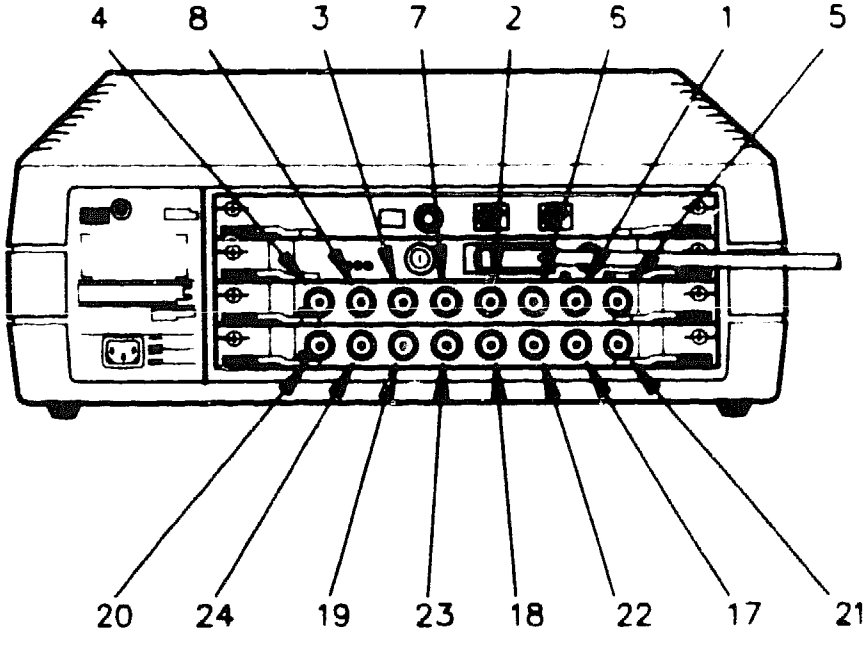
Exhibit 4–8: CXM04 Port Numbers (3270 Terminals Only)



LKG-3372-89A

Test the 3270 Terminal to CCU Connections and Then Label Each CXM04 Cable

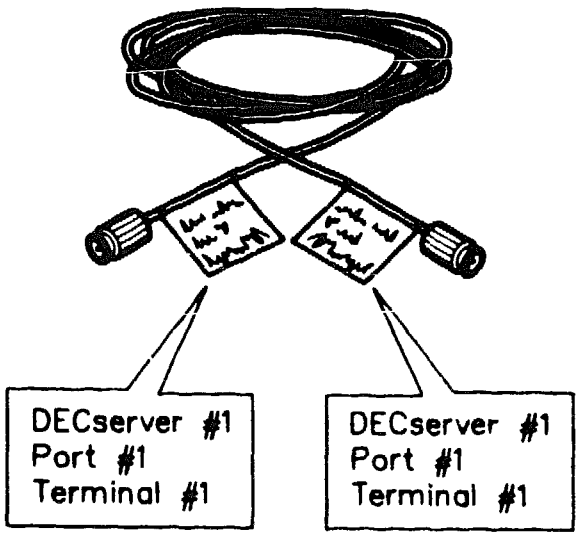
After you connect all the cables, you should test the cable connections between the CCU and the 3270 terminals. After this, you should label each cable connected to the CXM04 line card to avoid confusion at a later date.

Perform the following steps at each 3270 terminal (or equivalent device). Do not apply power to the server.

1. Simultaneously press ALT and TEST (or equivalent keys) on the left side of the keyboard.
2. Type a random series of keys on the main keypad.
3. Verify that the terminal display shows the keys that you typed. If not, recheck the cable connections.
4. If the problem persists, refer to the *DECserver 510 Hardware Problem Solving*.
5. Repeat the previous steps for each 3270 terminal and CCU connection.

Perform the following to label the cables connected to the CXM04 line cards:

1. Locate the two sheets of labels that were shipped with the server hardware.
2. Make two labels for each cable.
3. If a numbering scheme is used, write down on each label the terminal or CCU number, the server number, and the port number.



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Set the Boot Mode Switch to 7 and Connect Power

Start the server self-test by setting the boot mode switch to 7 and plugging the power cord into the appropriate power outlet.

1. If the boot mode switch is not set to 7, then set the switch to 7 using a small screwdriver.
2. Plug one end of the power cord into the server power receptacle, and the other end into the appropriate power outlet. The power supply automatically switches to 120 or 240 Vac depending on the incoming voltage.
3. If you are connected to a standard Ethernet, make sure that the standard Ethernet LED (labelled J4) on the Ethernet controller is on. If you are connected to a ThinWire Ethernet, make sure that the ThinWire Ethernet LED (labelled J1) is on. If the appropriate LED is not on, unplug the power cord immediately. Go back to Chapter 3 to configure the Ethernet controller correctly.

   CAUTION

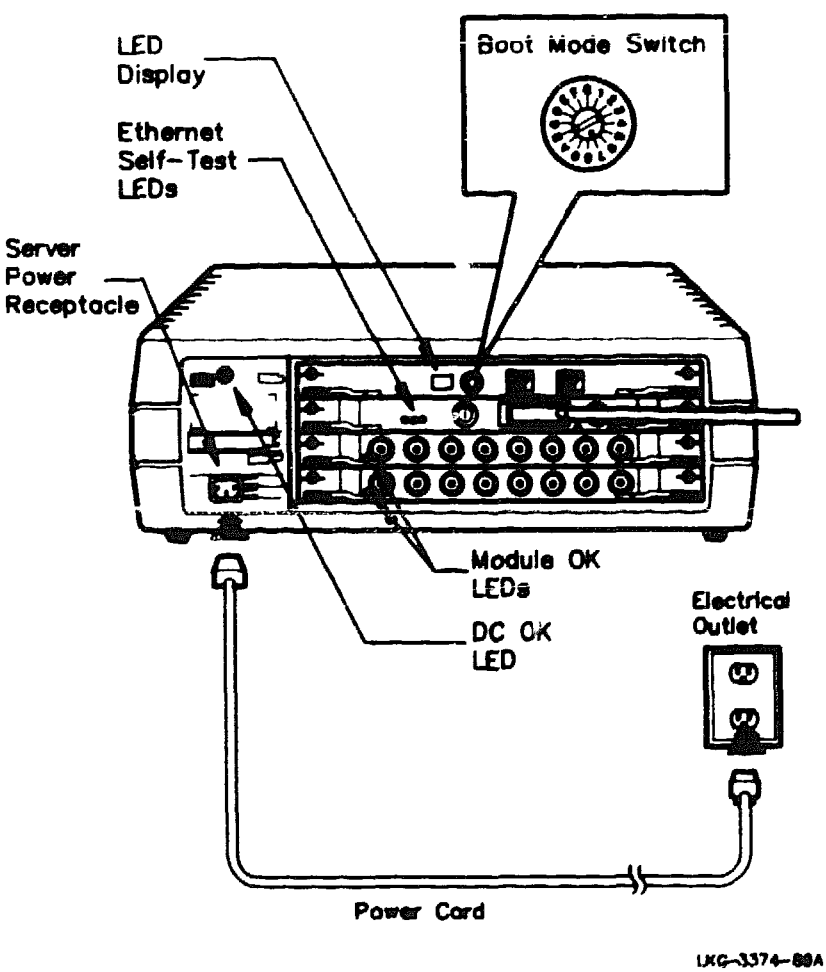
   Equipment failure will result if the Ethernet controller is not configured properly.

4. Verify that the server LEDs light up as indicated in the following exhibit.
5. If the software is not loaded on a load host, verify that the LED display alternates between B and 2.

   If the software is loaded on a load host, verify that the LED display alternates between B and 4. When the server finishes loading the software, the LED alternates between 0 and 8. This indicates that the server is up and running.
6. If the events in steps 4 and 5 occurred, set the boot mode switch to position 0; otherwise, proceed to Chapter 5 to troubleshoot the problem.

- The DC OK LED is on.
- For 5 seconds after the power cord is plugged in, the LED display on the CPU module shows a 7.
- All three Ethernet self–test LEDs turn on immediately. Then the LEDs turn off one at a time until no LEDs are on.
- The CXM04 Module OK LEDs turn on. Each LED turns off and on as each line card is tested.
- The LED display on the CPU module shows alternating numbers (such as 1 alternating with 2, then 1 alternating with 3, and so on) as different diagnostic tests run.

Exhibit 4–11: Powering on the Server



Set Up a Terminal and Finish the Installation

Set up either a console terminal or a 3270 terminal. Then have the server software installer verify the server system installation in accordance with the procedure in the *DECserver 500 Software Installation* manual.

1. The software installer needs one terminal available to verify system installation. The terminal can be either a console terminal or a 3270 terminal, described as follows:

   a. If you have an asynchronous (EIA–232–D or EIA–423–A compatible) terminal, connect the cable to the A1 connector (local console port) on the CPU module. The following exhibit shows how to connect the console to the server. Then set the terminal communication parameters to the following:

      Character size: 8

      Parity: None

      Speed: 9600

   b. If you do not have an asynchronous terminal, you can use a 3270 terminal that is connected to a CXM04 line card; however, the terminal must be set to VT mode and set to the following communication parameters after the DECserver 500 and 3270 Terminal Option software are loaded into the server. The *3270 Terminal Option Use* manual describes the procedure to set up a 3270 terminal.

      Character size: 8

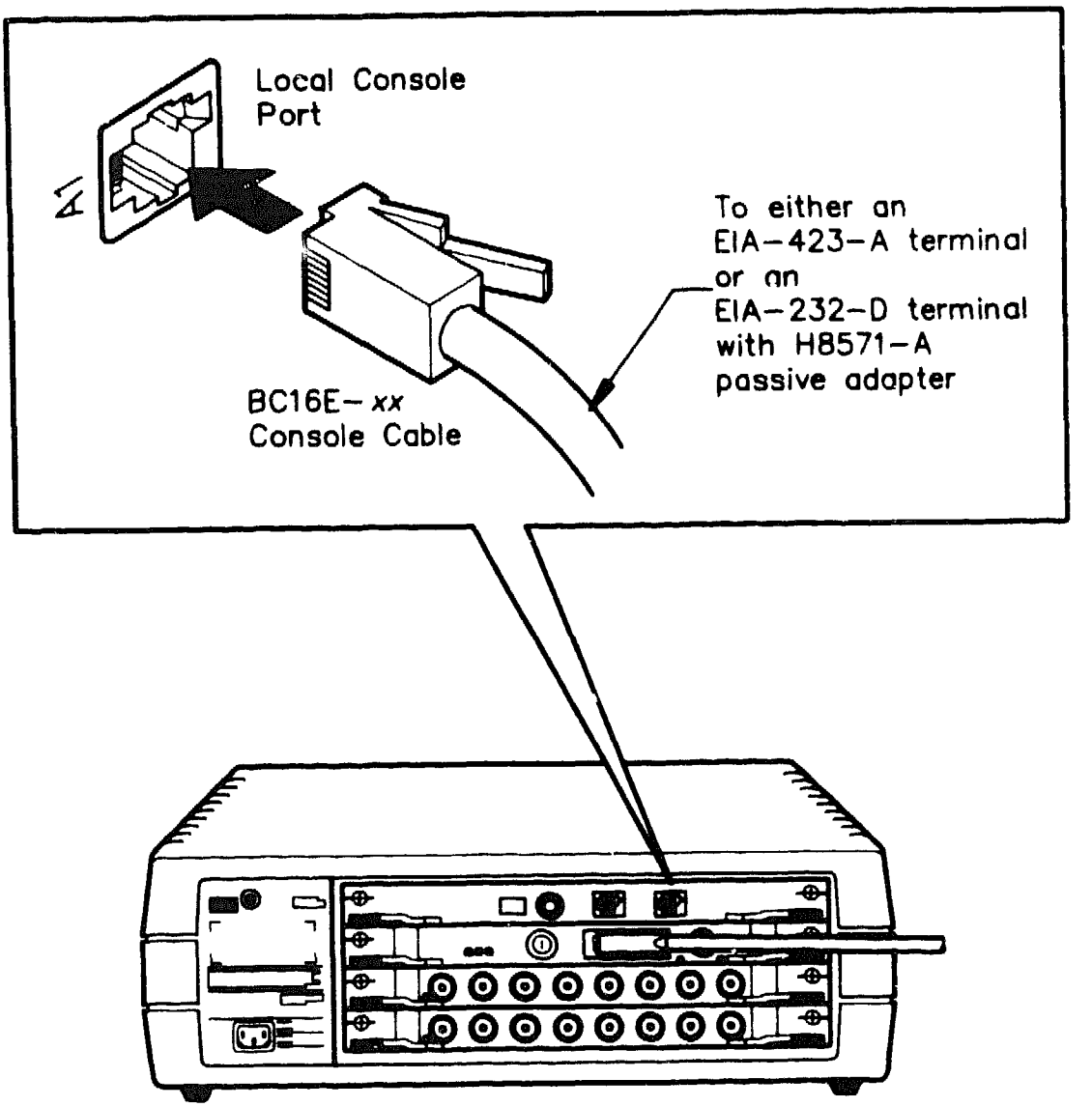
      Parity: None

      Speed: 9600

2. Notify the software installer that the hardware installation is complete. The software installer must then verify the server system installation. This procedure is described in the *DECserver 500 Software Installation* manual.

3. Leave this hardware installation manual with the server hardware for future reference.

Exhibit 4–12: Connecting a Console Terminal



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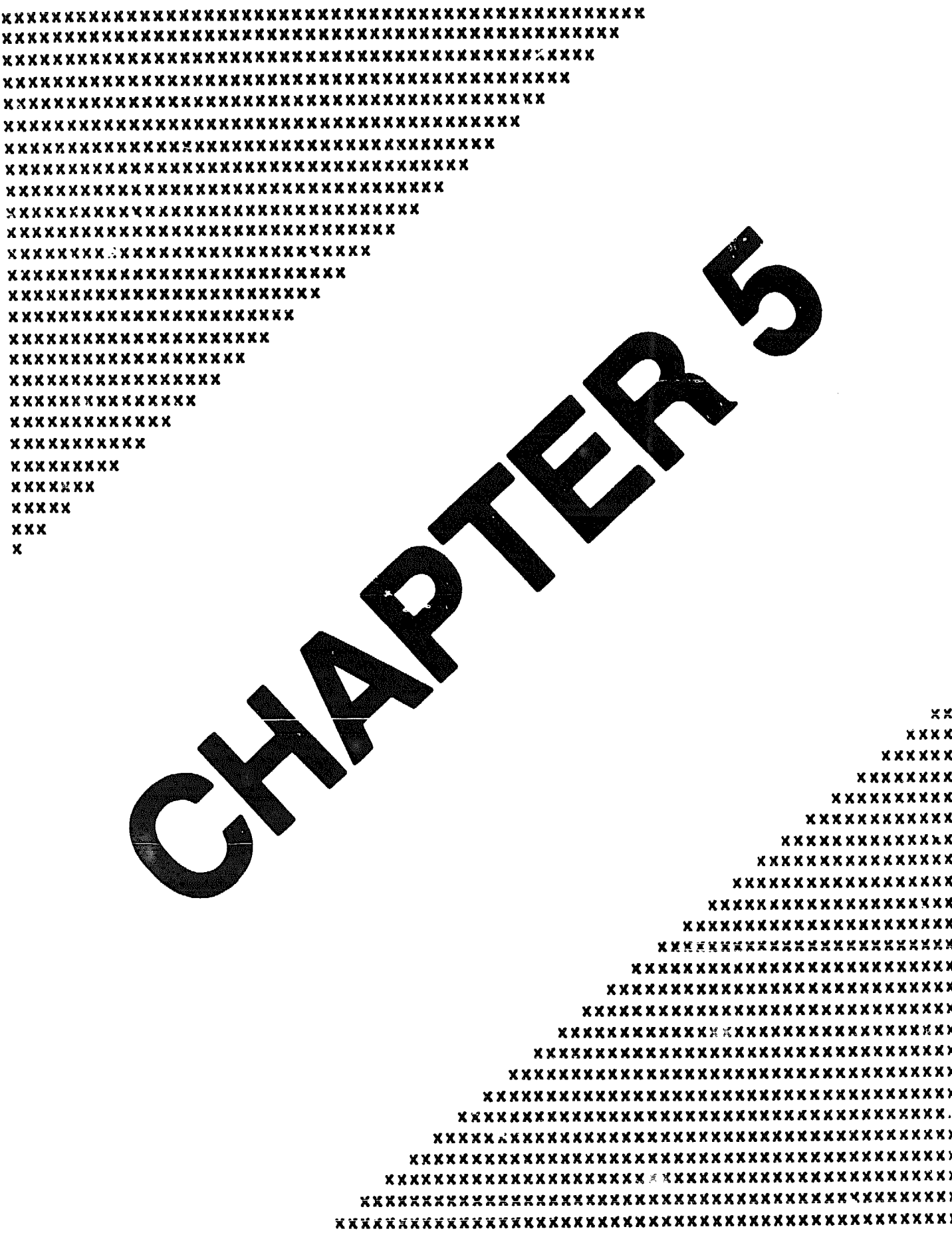

CHAPTER 5

5

What to Do If You Have Problems

This chapter provides information on the following:

- How to reseat a module
- Troubleshooting flow chart for installation problems

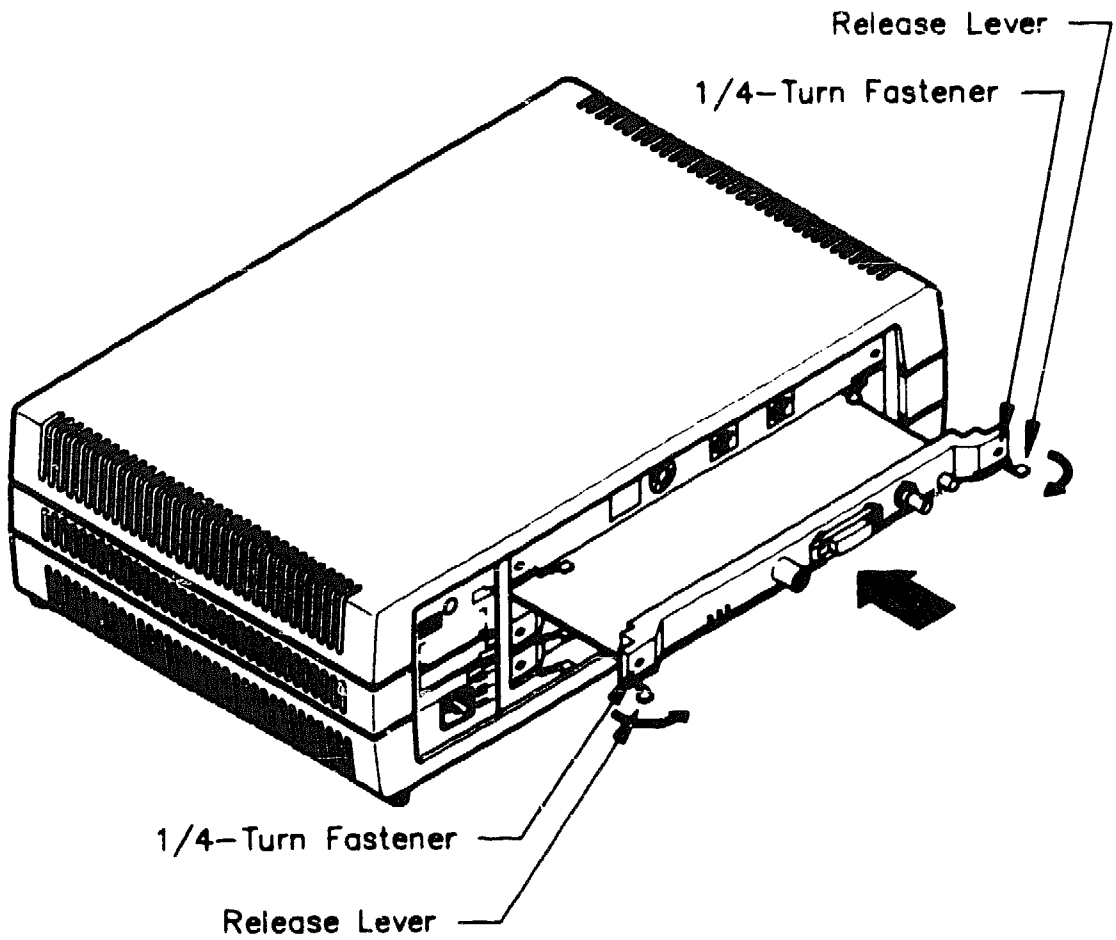
How to Reseat a Module

A correctly seated module is flush with the other modules. Any module which is not flush with the other modules must be reseated. When you reseat a module, make sure that the power is off.

All module faceplates should be flush with one another. If a module is not flush with the others, you must perform the following to reseat the module:

1. Make sure that the two 1/4–turn fasteners are in the unlocked position by turning them counterclockwise.
2. Slide the module into the slot until it engages the backplane. The module handle should now be 1/4 inch from being flush with the adjacent module handle.
3. Simultaneously pull the two release levers towards each other. The module handle should now be flush with the adjacent module.
4. Press in and turn the two fasteners clockwise to secure the line card.

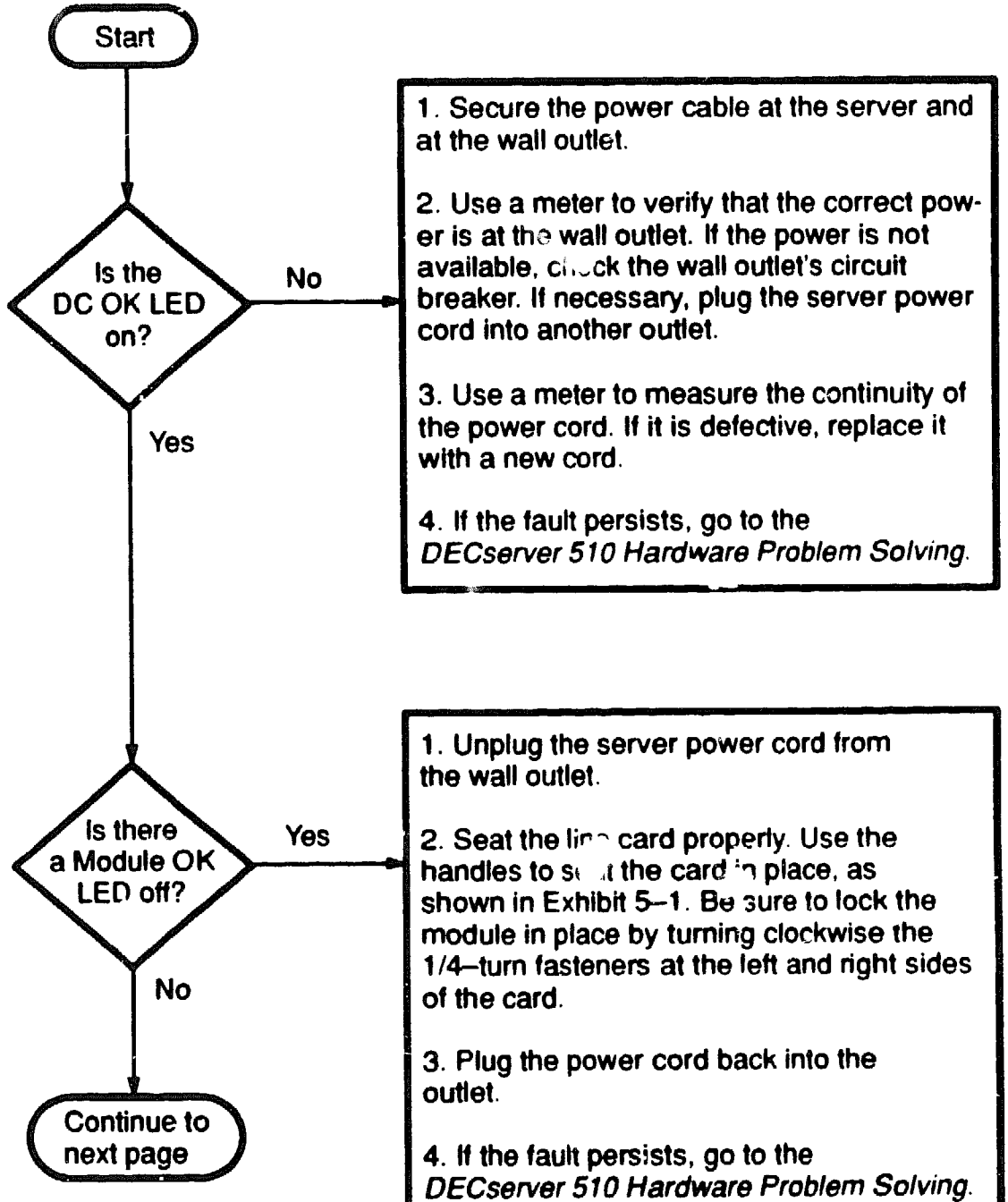
Exhibit 5–1: Reseating a Module



Troubleshooting Flow Chart for Installation Problems

The flow chart is designed to solve problems that could have developed during the installation procedure.

If you have any problems after you install the hardware, perform the steps in the following flow chart. If the flow chart does not solve the problem, refer to the *DECserver 500 Problem Solving* for software problems or the *DECserver 510 Hardware Problem Solving* for hardware problems.


Start
Is the DC OK LED on?
No
Yes
1. Secure the power cable at the server and at the wall outlet.
2. Use a meter to verify that the correct power is at the wall outlet. If the power is not available, check the wall outlet's circuit breaker. If necessary, plug the server power cord into another outlet.
3. Use a meter to measure the continuity of the power cord. If it is defective, replace it with a new cord.
4. If the fault persists, go to the DECserver 510 Hardware Problem Solving.
Is there a Module OK LED off?
Yes
No
1. Unplug the server power cord from the wall outlet.
2. Seat the line card properly. Use the handles to seat the card in place, as shown in Exhibit 5–1. Be sure to lock the module in place by turning clockwise the 1/4–turn fasteners at the left and right sides of the card.
3. Plug the power cord back into the outlet.
4. If the fault persists, go to the DECserver 510 Hardware Problem Solving.
Continue to next page

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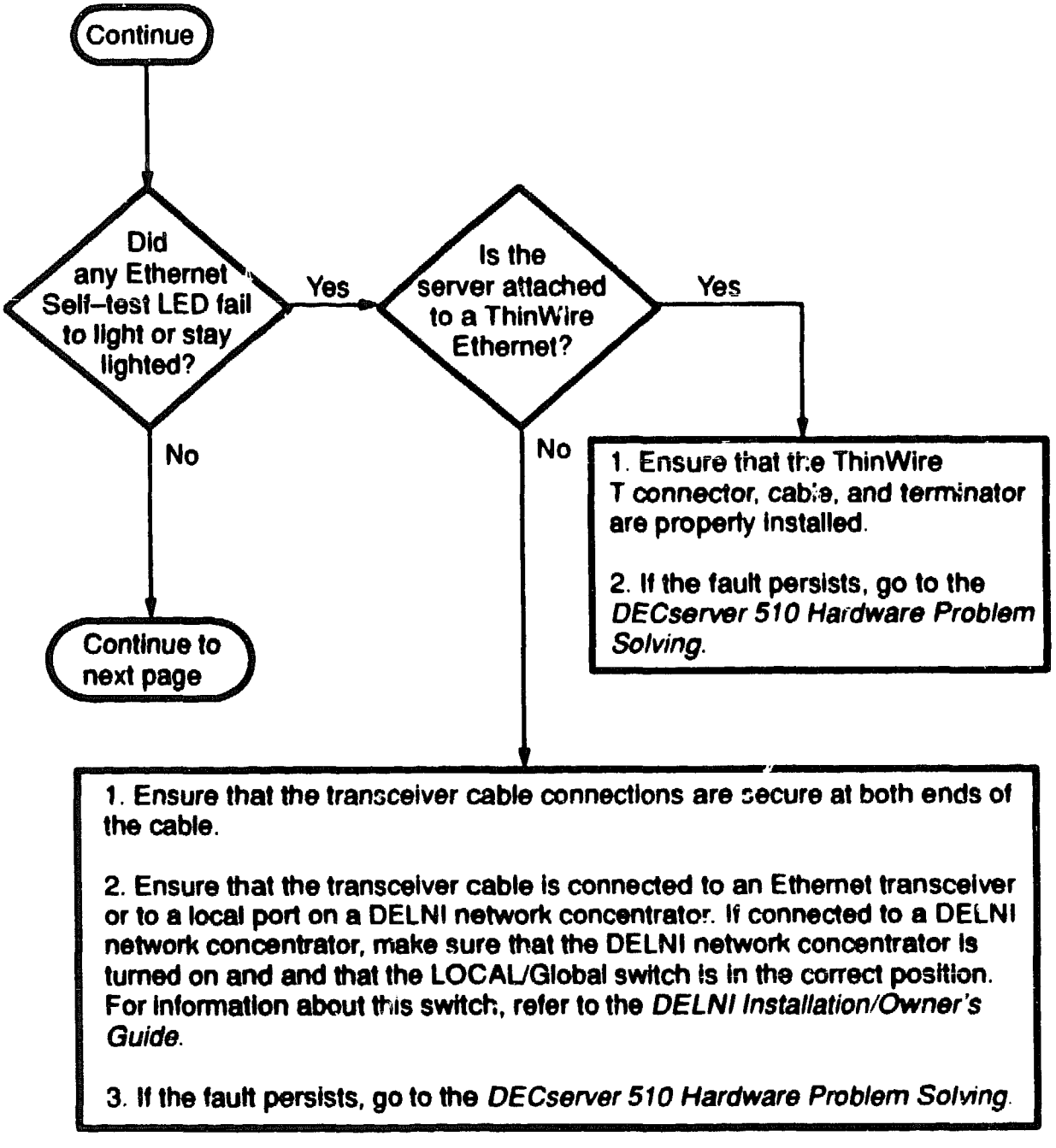
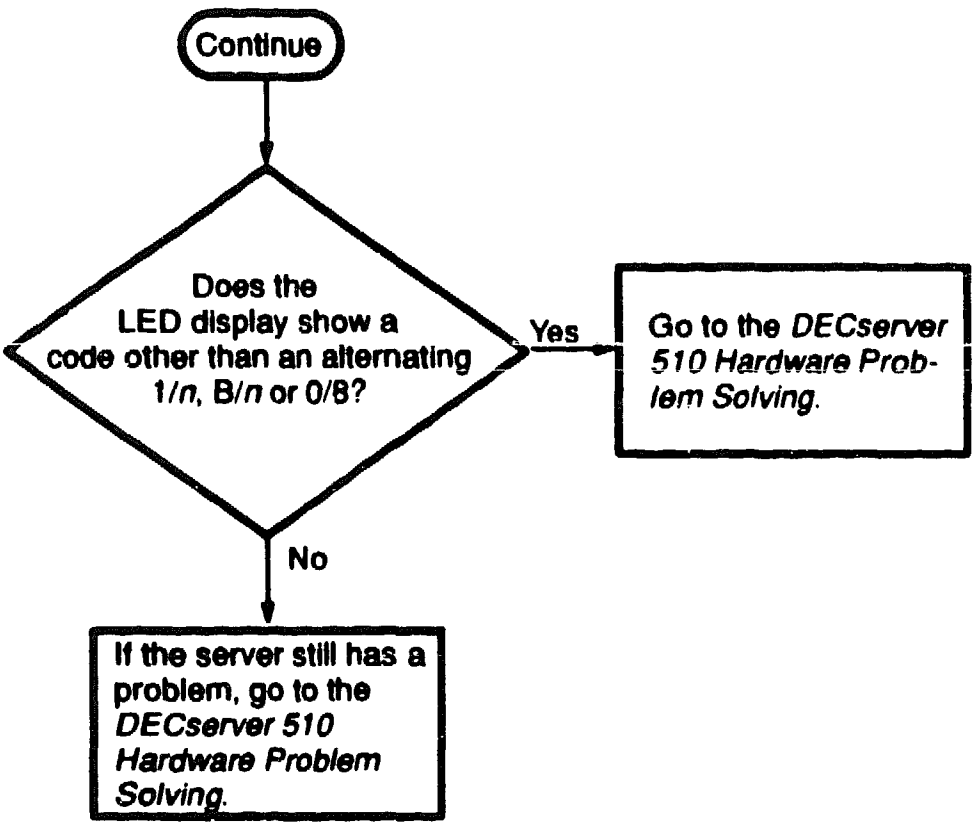

Continue
Did any Ethernet Self–test LED fail to light or stay lighted?
Yes
Is the server attached to a ThinWire Ethernet?
Yes
No
No
1. Ensure that the ThinWire T connector, cable, and terminator are properly installed.
2. If the fault persists, go to the DECserver 510 Hardware Problem Solving.
Continue to next page
1. Ensure that the transceiver cable connections are secure at both ends of the cable.
2. Ensure that the transceiver cable is connected to an Ethernet transceiver or to a local port on a DELNI network concentrator. If connected to a DELNI network concentrator, make sure that the DELNI network concentrator is turned on and and that the LOCAL/Global switch is in the correct position. For information about this switch, refer to the DELNI Installation/Owner's Guide.
3. If the fault persists, go to the DECserver 510 Hardware Problem Solving.
LKG–3377–891


Continue
Does the LED display show a code other than an alternating 1/n, B/n or 0/8?
Yes
Go to the DECserver 510 Hardware Problem Solving.
No
If the server still has a problem, go to the DECserver 510 Hardware Problem Solving.
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APPENDIX A

A

Connector and Cable Pin Descriptions

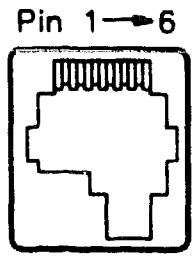
This appendix provides pin descriptions for the following:

- CPU module modified modular jacks (MMJs)
- Ethernet controller standard Ethernet connector
- Ethernet controller ThinWire and CXM04 BNC connectors
- BC16E cable
- H8571–*x* passive adapters

CPU Module Modified Module Jacks (MMJs)

The CPU module has 2 modular EIA–423–A connectors, labeled A1 and A2. Both have the same pin definitions.

Exhibit A–1: Pin Numbers for the CPU A1 and A2 Connectors



Pin	Description
1	DTR (data transmit ready)
2	Transmit data
3	Transmit common
4	Receive common
5	Receive data
6	DSR (data set ready)

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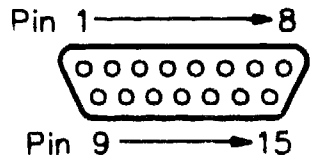
Ethernet Controller Standard Ethernet Connector

The Ethernet controller module has a 15–pin connector for the standard Ethernet interface.

Exhibit A–2: Pin Numbers for Standard Ethernet Transceiver Interface Connector



Pin Number	Signal
1	Shield
2	Collision presence +
3	Transmit +
4	Reserved
5	Receive +
6	Power return
7,8	Reserved
9	Collision presence –
10	Transmit –
11	Reserved
12	Receive –
13	Power
14,15	Reserved

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Ethernet Controller ThinWire and CXM04 BNC Connectors

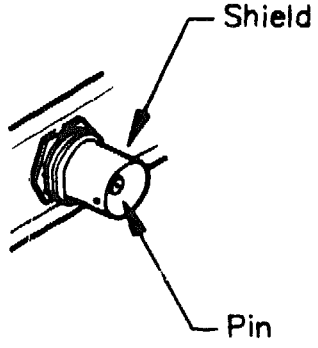
The Ethernet controller module has a BNC connector for the ThinWire Ethernet interface, and the CXM04 line card contains 8 BNC connectors.

Each BNC connector has one pin and a shield.

NOTE

The ThinWire Ethernet cable can not be used interchangeably with the Coax–A cable. The Coax–A cable can be used with the CXM04 line cards.

Exhibit A–3: Ethernet Controller ThinWire and CXM04 Line Card Connector



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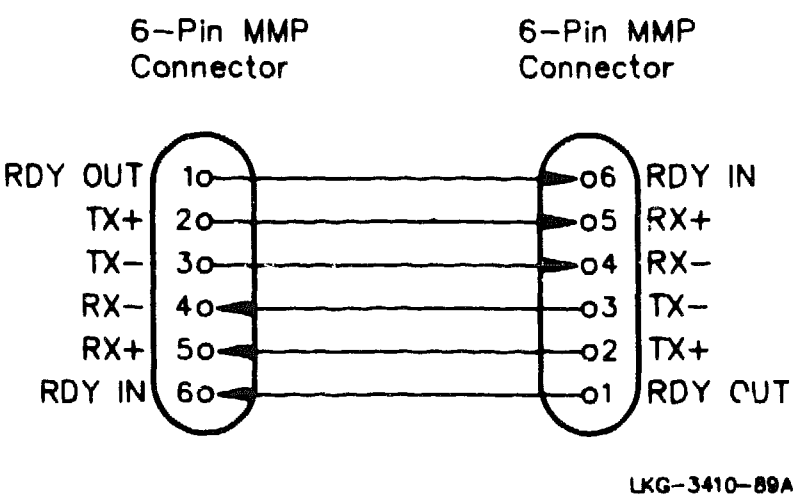
BC16E–*xx* Cable

The BC16E is an unshielded, 6–conductor flat cable. This cable is terminated at both ends with a modified modular plug (MMP). This cable is used to connect a console terminal to the server CPU local console port.

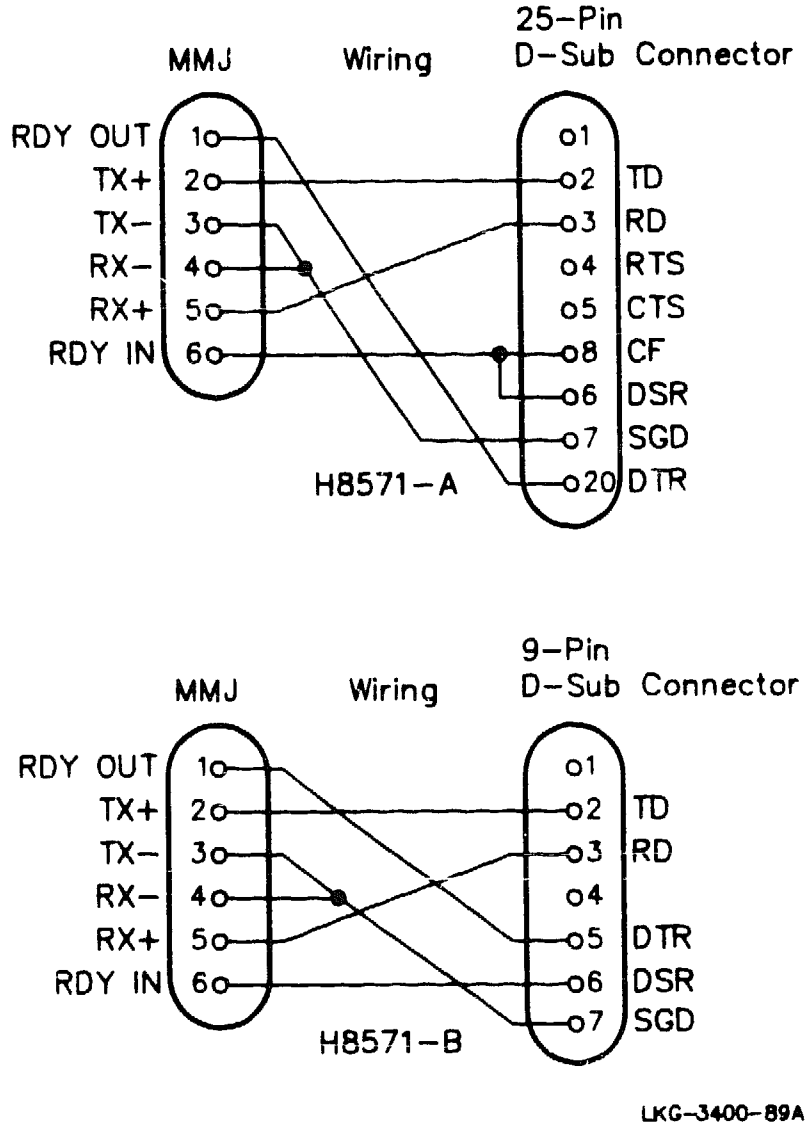
Exhibit A–4: Wiring Diagram for BC16E–*xx* Cable



H8571–*x* Passive Adapter

There are two different H8571 adapters, H8571–A and H8571–B. The adapters are used to adapt 25–pin (H8571–A) and 9–pin (H8571–B) connectors to modified modular jacks (MMJs).

Exhibit A–5: Wiring Diagrams for H8571 Adapters

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HARDWARE
PROBLEM
SOLVING

DECserver 510

Hardware Problem Solving

December 1989

This manual describes the hardware troubleshooting tools and procedures for the DECserver 510 terminal server product. It also explains how to repair the server to the field–replaceable unit level.

Supersession/Update Information: This is a new manual.

digital™

Order Number: EK–DS510–PS–001

EK-DS510-PS-001
December 1989

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5 Removal Procedures

6 Installation and Test Procedures

A Parts List

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Preface

This manual describes how to troubleshoot and service the DECserver 510 hardware. The manual also describes the troubleshooting tools and their use and lists the spares and test equipment required to troubleshoot and repair the server.

This manual is used in conjunction with the *DECserver 500 Problem Solving*.

Intended Audience

DECserver 510 Hardware Problem Solving is intended for the server manager, field service representative, or any other person qualified to work on the server hardware. Knowledge of Ethernet local area networks and the general operation of server hardware are prerequisites for using this manual effectively.

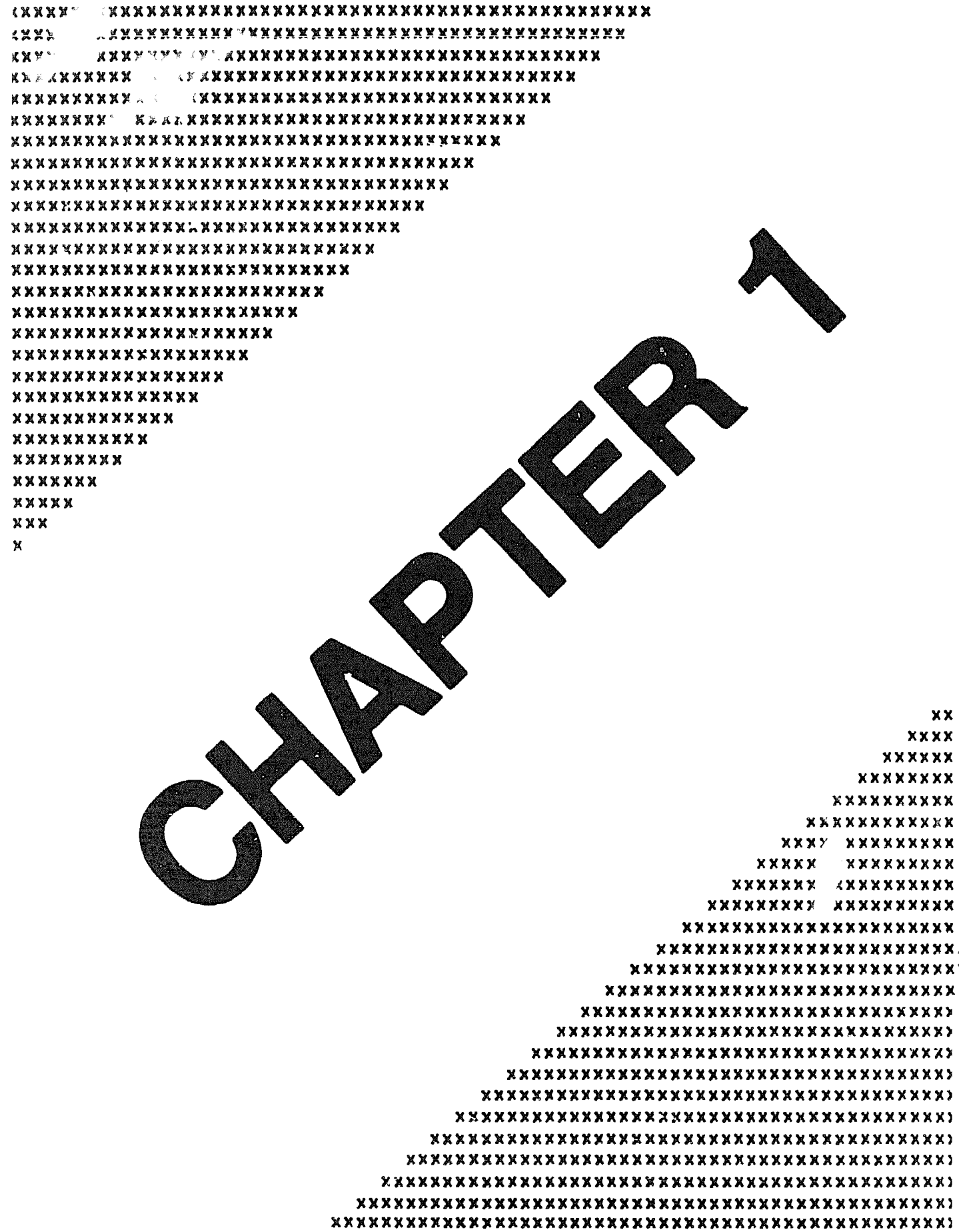
Additionally, a knowledge of typical IBM configurations is required to troubleshoot problems that occur with 3270 Information Display System (3270) terminals. If the source of the problem is the 3270 terminal or other IBM equipment, the customer should contact the service representative responsible for the IBM equipment to have it repaired.

Document Structure

This document has the following chapters and appendix:

- **Chapter 1** provides an overview of the DECserver 510 hardware and a detailed description of the troubleshooting tools.
- **Chapter 2** contains the initial troubleshooting steps and a detailed flow chart to troubleshoot a problem that occurs on one port.
- **Chapter 3** contains the steps to troubleshoot a problem that occurs on multiple ports of a single line card.
- **Chapter 4** contains the initial troubleshooting steps and a detailed flow chart to troubleshoot a problem that occurs on all ports of the server.
- **Chapter 5** contains the FRU removal procedures.
- **Chapter 6** contains the FRU installation and test procedures. This chapter also contains the procedure to install the server to a rack.
- **Appendix A** provides a list of FRU, hardware accessories, and document part numbers.

The postage–prepaid **Reader's Comments** form on the last page of this document requests the user's critical evaluation to assist us in preparing future documentation.


CHAPTER 1

1

Troubleshooting Tools

This chapter provides information on the following:

- Hardware overview
- Description of the server connectors
- The boot mode switch as a troubleshooting tool
- Description of boot modes 0, 1, and 2
- Description of boot mode 3
- Description of boot modes 7 and F
- Server indicators as troubleshooting tools
- Definition of the LED display diagnostic codes
- Definition of the LED display software codes
- The local console terminal as a troubleshooting tool
- The Ethernet loopback and barrel connectors as troubleshooting tools

Hardware Overview

The DECserver 510 terminal server connects to IBM 3270 terminals (or equivalent devices) and a 3*x*74 cluster control unit (CCU). The server also connects to either a standard or ThinWire Ethernet. The hardware consists of four different field–replaceable units (FRUs).

The DECserver 510 hardware supports connections to IBM 3270 Information Display System terminals that operate in Control Unit Terminal (CUT) mode. The hardware also supports various IBM personal computers (PCs) that emulate the 3270 terminal in CUT mode. The *3270 Terminal Option Software Product Description* lists the supported devices. Hereafter, the term "3270 terminal" is used to mean any 3270 terminal or PC connected to the server.

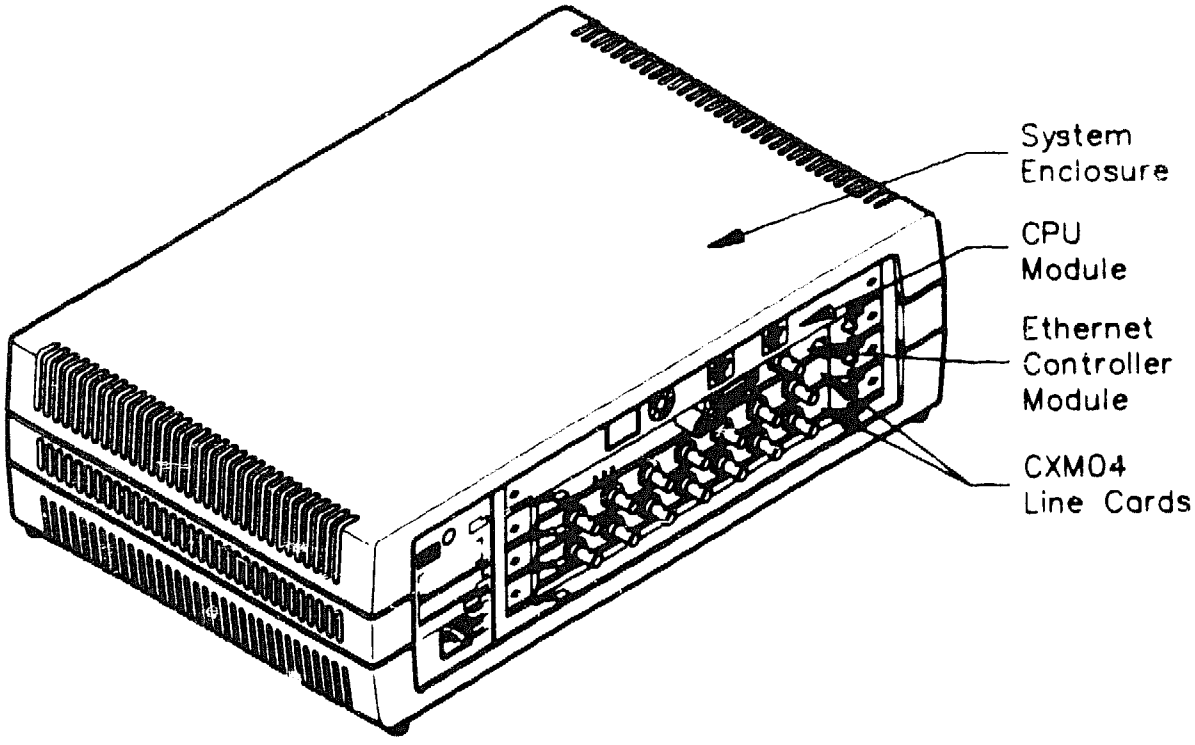
The hardware also supports connections to an IBM 3*x*74 (or equivalent) CCU. All CCU connections on one line card must be to the same CCU; however, each CXM04 line card can connect to a different CCU.

The following is a brief description of each FRU:

- **Central processor unit (CPU) module:** The CPU manages all the functions of the server and is controlled by the server software and firmware. The CPU also monitors the diagnostic self–tests.
- **Ethernet controller module:** This module provides the connection to either a standard or ThinWire Ethernet network.
- **CXM04 line cards:** The server hardware contains two CXM04 line cards. Each line card can support up to eight 3270 terminals or up to four 3270 terminals with connections to a CCU.
- **System enclosure:** The system enclosure contains the card cage for the modules, the backplane, and the power supply.

  The power supply is equipped with automatic voltage selection. This feature allows the power supply to configure itself automatically to the incoming voltage; therefore, a 120/240 switch is not needed.

Exhibit 1–1: DECserver 510 Hardware



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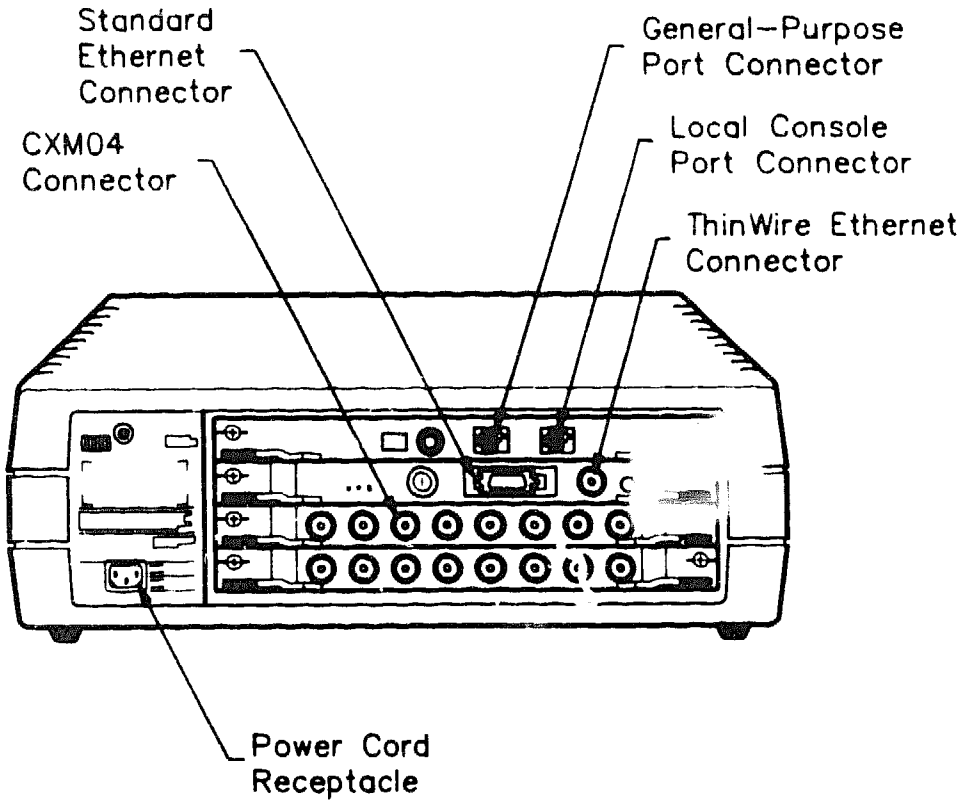
Description of the Server Connectors

There are two connectors on the CPU module and Ethernet controller module. Each CXM04 line card has eight connectors.

The following is a brief description of each connector:

- **Local console port connector:** Connector A1 is a modular EIA–423–A connector on the CPU module that is used for server management and diagnostic purposes. Refer to *DECserver 500 Problem Solving* for instructions on the uses of this connector.
- **General–purpose port connector:** Connector A2 is a modular EIA–423–A connector on the CPU module that the firmware uses to output server configuration information to a local console terminal.
- **Standard Ethernet connector:** This single, female D connector with a slide latch supports connection to a standard Ethernet local area network using a transceiver cable.
- **ThinWire Ethernet connector:** This single BNC connector supports connection to a ThinWire Ethernet local area network using a ThinWire cable.
- **CXM04 connectors:** These eight BNC connectors support up to eight 3270 terminals or four 3270 terminals with connections to a CCU.
- **Power cord receptacle:** The server power cord plugs into this receptacle.

Exhibit 1–2: Connector Locations



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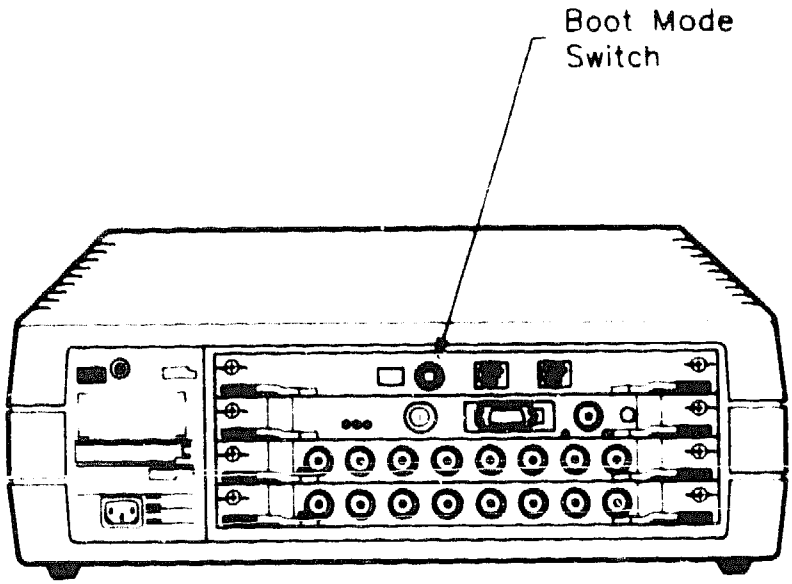
The Boot Mode Switch As a Troubleshooting Tool

The boot mode switch can be used to run various server diagnostic tests.

The boot mode switch is a 16–position switch located on the CPU module that selects which power–on procedure is executed when the server is powered on.

There are six different boot modes available: modes 0 through 3, 7, and F. The other boot mode switch positions (4 through 6, and 8 through E) are reserved. The following pages describe each boot mode in detail.

Exhibit 1–3: Boot Mode Switch Location



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Description of Boot Modes 0, 1, and 2

Boot modes 0 and 1 are normal boot modes. Boot mode 2 is the local console mode.

Mode 0: This is a normal boot mode. The server boots regardless of any line card errors. The Remote Console Facility (RCF) is enabled. This mode allows the server to operate with hardware faults that affect port devices only. This gives the server manager the option of putting the server into service even though some lines might not be usable. This mode executes the following tests before requesting a down–line load of the server software:

- System kernel test
- Ethernet citizenship test
- Board–level line card test
- Configuration Verification Program
- System Exerciser in internal loopback mode

Mode 1: This is the same as boot mode 0; however, the server boots only if there are no errors. The Remote Console Facility is enabled. When any hardware error is detected, the test is halted and an error code is shown in the LED display.

Mode 2: This is the local console mode with no boot. It requires a local console terminal. This mode first executes the following tests:

- System kernel test
- Ethernet citizenship test
- Board–level line card test
- Configuration Verif cation Program

This mode then places the server under control of the local console terminal, so that you can run more extensive diagnostic tests u ing the Console Commands interface commands. Refer to *DECserver 500 Pr blem Solving* for a list and description of these commands.

- **Boot Mode 0**

  Use this mode for line card failures for one of the following reasons:

  - To keep the working port devices online
  - To use the Console Commands Interface. (See *DECserver 500 Problem Solving* for more information.)

- **Boot Mode 1**

  Use this mode for hardware failures. The diagnostic test will stop and show an error code in the LED display.

- **Boot Mode 2**

  Use this mode to run more extensive diagnostic tests (Console Commands Interface) from the local console terminal. See *DECserver 500 Problem Solving* for more information on the Console Commands Interface.

  The Remote Console Facility is enabled during this mode so that you can activate a remote console. See *DECserver 500 Problem Solving* for more information on RCF.

Description of Boot Mode 3

Boot mode 3 is the System Configuration Assistance Program.

This mode requires a local console terminal and does not boot the server. This mode sends a map of the server hardware to the local console terminal. The map shows the address, vector address, device name, and status of each module in the server, as shown in Exhibit 1–5. The only difference between the map you see on the local console terminal and the map in Exhibit 1–5 should be the Ethernet address.

This mode executes the following tests:

- System kernel test
- Ethernet citizenship test
- Board–level line card test
- Configuration Verification Program
- System Configuration Assistance Program

You can select each module slot using the boot mode switch to generate information that corresponds to the selected slot number. For instance, you can set the boot mode switch to "3" to select the CXM04 line in slot 3 (labeled LC1). The console terminal would then print out the following information:

- Selected module slot number (3)
- Device address (17760440–17760456)
- Vector address (310)
- Module type (CXM04)

This test will also cause the Module OK LEDs to blink.

This mode is best used to verify the address switch settings, especially after replacing a module.

Exhibit 1–5: System Configuration Assistance Program Printout (Boot Mode 3)

```
                MAP OF THE DECserver 500/550

Slot    Qbus Address        Vector    Name  Device    Installed        Status
                            Exp  Act
1                                     CPU   KDJ11-SD, 18 MHz, 1024kb Good
2   17774440 - 17774456     120  120  NET0  DESQA, 08-00-00-00-00-01 Good
3   17760440 - 17760456     310  310  LC01  CXM04                    Good
4   17760460 - 17760476     320  320  LC02  CXM04                    Good
5   17760500 - 17760516     330       Nothing installed
6   17760520 - 17760536     340       Nothing installed
7   17760540 - 17760556     350       Nothing installed
8   17760560 - 17760576     360       Nothing installed
9   17760600 - 17760616     370       Nothing installed
10  17760620 - 17760636     400       Nothing installed
11  17760640 - 17760656     410       Nothing installed
12  17760660 - 17760676     420       Nothing installed
```

Description of Boot Modes 7 and F

Boot mode 7 is for installation testing. Boot mode F is for manufacturing testing.

Mode 7: This mode executes extended diagnostic tests that are not executed by boot modes 0 and 1. This mode is normally used once during the initial installation of the server hardware and software. The server then boots only if there are no errors. This mode executes the following tests:

- System kernel test
- Ethernet citizenship test
- Board–level line card test
- Configuration Verification Program
- Extended Ethernet interface test in internal loopback mode
- Extended line card test in internal loopback mode
- System Exerciser in internal loopback mode

Mode F: This mode is intended for manufacturing testing during final assembly and testing of the server hardware. The server must be connected to an Ethernet LAN, and staggered loopback connectors must be installed on all line connectors. This mode executes the following tests:

- System kernel test
- Ethernet citizenship test
- Board–level line card test
- Configuration Verification Program
- Extended Ethernet interface test in external loopback mode
- Extended line card test in staggered external loopback mode
- System Exerciser in staggered external loopback mode

- **Boot Mode 7**

  Use this mode for the initial installation of the server hardware and software, or when you need to run the extended diagnostic tests.

- **Boot Mode F**

  This mode is used for manufacturing testing only. (Staggered loopback connectors are available to manufacturing personnel only.)

  The system exerciser test in this mode runs continuously. If an error is detected, the test halts and an error code is shown in the LED display.

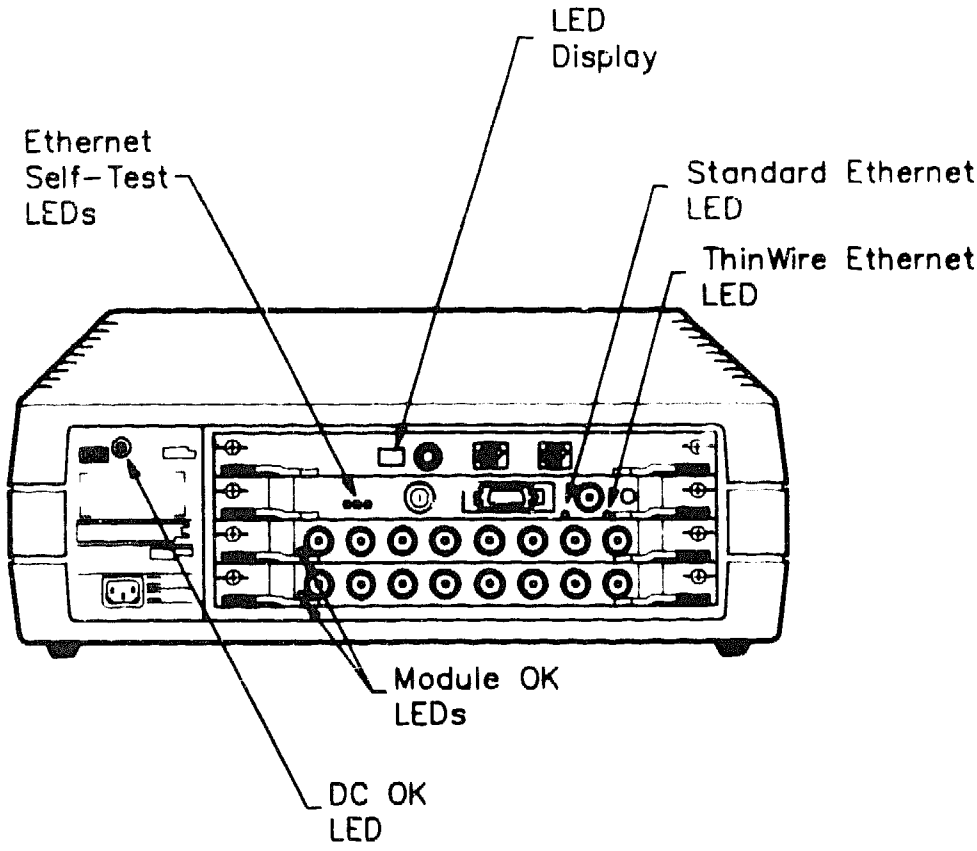
Server Indicators As Troubleshooting Tools

Each CPU module, power supply, and CXM04 line card has only one LED apiece. The Ethernet controller module, however, has three self–test LEDs and two status LEDs.

The following is a brief description of each indicator:

- **LED display:** Displays a hexadecimal number (or alternating numbers) to indicate the status of the server. If a fault occurs, the number or numbers displayed can be used to help identify the cause of the fault. The following pages describe the diagnostic and status codes shown by the LED display.
- **DC OK LED:** Lights up (green) to indicate that the power supply is functioning properly. The LED is off when the server is not connected to a power source or the power supply is not functioning.
- **Module OK LEDs:** Light up (green) to indicate that the line card passes the power–on self–test. If a line card's Module OK LED is off, a problem exists with that line card.
- **Ethernet self–test LEDs:** Light up at server power–up. The first LED (labeled 1) turns off when the tests begin. The second LED (labeled 2) turns off after the Ethernet controller module passes the module's internal loopback test. The third LED (labeled 3) turns off after the module passes its external loopback test.
- **Standard Ethernet LED:** Lights up to indicate that the Ethernet controller module is configured to accept a standard Ethernet connection.
- **ThinWire Ethernet LED:** Lights up to indicate that the Ethernet controller module is configured to accept a ThinWire Ethernet connection.

Exhibit 1–7: Indicator Locations



Definition of the LED Display Diagnostic Codes

The LED display on the CPU module shows the status of each diagnostic test as the tests are executed. Should a diagnostic test fail, the LED display shows a code that can be used to isolate the problem.

The following lists and defines the diagnostic error codes. A slash (/) indicates that the LED is alternating between two hexadecimal numbers.

- 0 -- indicates that the system kernel test failed. Probable CPU module failure.
- E/2 — indicates that the Ethernet citizenship test or board–level line card test failed. If the board–level test failed, the Module OK LED on the faulty card is off.

  If the Ethernet citizenship test failed, at least one Ethernet controller status LED is on. This indicates that the Ethernet controller, transceiver, or transceiver cable is faulty.
- E/3 — indicates that the extended Ethernet interface test failed. The Ethernet controller, transceiver, or transceiver cable failed.
- E/4 — indicates that the extended line card test failed. The Module OK LED is off on the faulty card.
- E/5 — indicates that the system exerciser test failed. The CPU module, Ethernet controller, or Ethernet LAN failed.
- E/B — indicates that the efforts to down–line load the server software from a load host failed. The load host or Ethernet LAN failed.
- E/C — indicates that a software error occurred within the diagnostic self–test program.
- E/D — indicates that the efforts to dump server memory to a host computer failed. The server, Ethernet LAN, or dump host failed.
- E/F — indicates that a hardware configuration error was detected by the Configuration Verification Program.

7	Appears only if boot mode 7 is used; otherwise the LED display will show the boot mode selected.
1	Indicates that the system kernel test is running.
1/2	Indicates that the Ethernet citizenship and board–level line card tests are running.
1/C	Indicates that the Configuration Verification Program is running.
1/3	Indicates that the extended Ethernet interface is running. This test also verifies the Ethernet transceiver connection.
1/4	Indicates that the extended line card test is running.
1/5	Indicates that the system exerciser test is running.

When the LED display shows a 1/6, then the server is controlled by the local console. When the LED display shows a 1/7, then the server is controlled by a remote console.

Definition of the LED Display Software Codes

The LED display on the CPU module shows the server status each time the server loads software or performs a dump. Should a failure occur, the LED display shows a code that can be used to isolate the problem.

The following lists and defines the software error codes. A slash (/) indicates that the LED is alternating between two hexadecimal numbers.

- E/C — indicates that a software error occurred within the diagnostic self-test program.
- F — indicates that the server failed to complete software initialization because of either an internal software problem or an unsupported hardware configuration. This error should not occur unless the software has been corrupted or has detected an illegal or inconsistent configuration.

Exhibit 1–9: LED Display Codes During Software Loads and Dumps

Software Load Status Codes:

B/1	Indicates that the server is requesting a load host by specific address. If you see this code, then you will not see the B/2 code.
B/2	Indicates that the server is requesting a load host by issuing a multicast message. The first host computer to respond becomes the load host for the duration of the down–line load. If you see this code, then you will not see the B/1 code. If the software is not available, the display will continually show the B/2 code.
B/3	Indicates that the load host has responded and that the server is requesting a down–line load.
B/4	Indicates that the software is being down–line loaded.
B/5	Indicates that the software is initializing.
0/8	Indicates that the software is running normally.

Dump Status Codes:

D/1	Indicates that the server requested a specific host computer to serve as a dump host. If you see this code, then you will not see the D/2 code.
D/2	Indicates that the server issued a multicast message for a dump host volunteer. If you see this code, then you will not see the D/1 code.
D/3	Indicates that server memory is being dumped to a host computer.
D/4	Indicates that server memory has been dumped to a host computer.

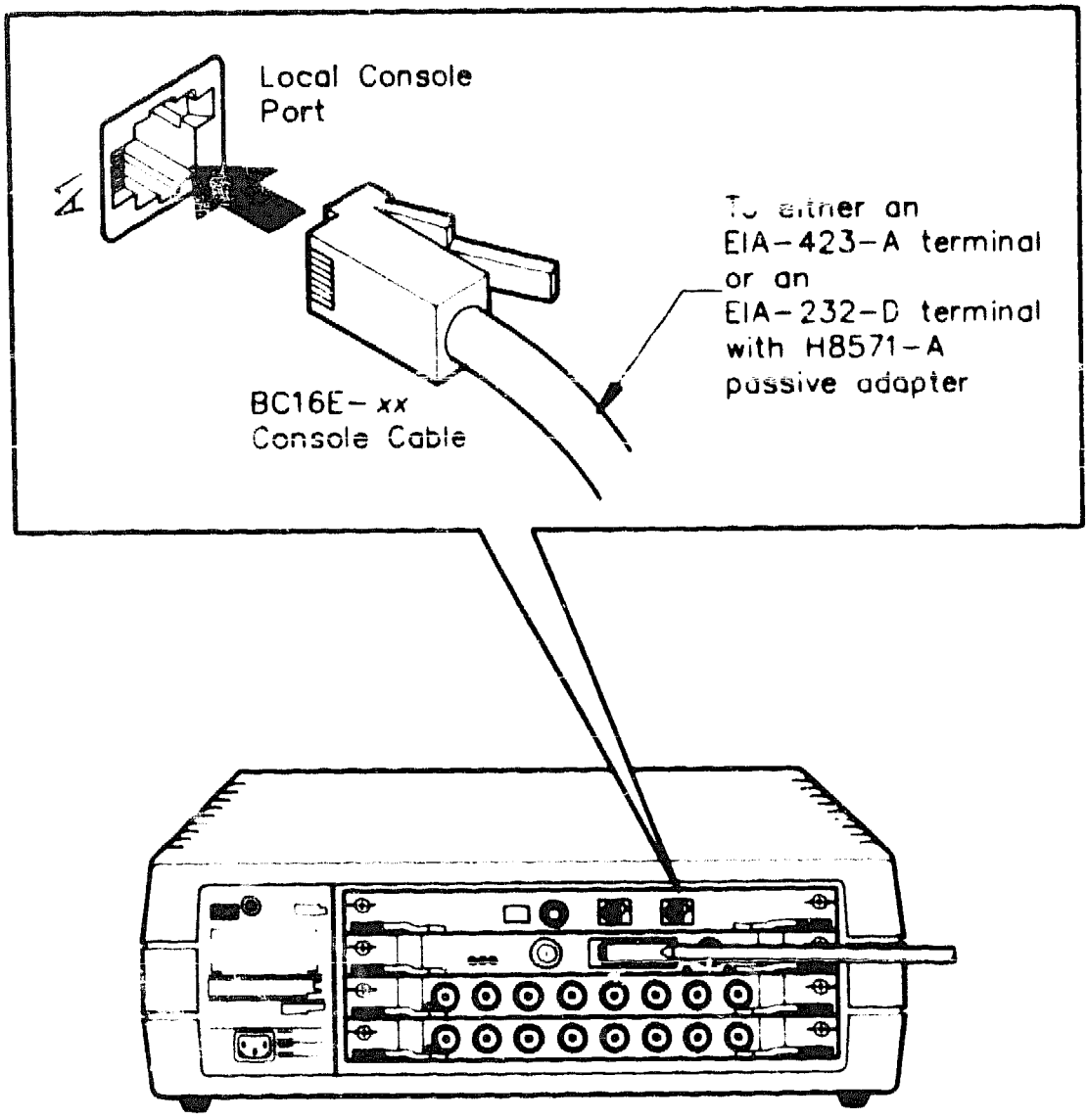
The Local Console Terminal As a Troubleshooting Tool

The local console terminal is an asynchronous terminal connected to the local console port on the CPU module. The local console terminal is necessary to run certain diagnostic tests on the server.

The local console terminal is required in order to use boot modes 2 and 3. In boot mode 2, the local console is needed to use the Console Commands Interface. See *DECserver 500 Problem Solving* for more information on the Console Commands Interface.

The local console terminal can be any asynchronous EIA–232–D or EIA–423–A terminal. The terminal connects to the local console port connector located on the CPU module (connector A1). An EIA–232–D terminal requires an H8571–A passive adapter to connect to the local console port.

Exhibit 1–10: Connecting a Terminal to the Local Console Port



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The Ethernet Loopback and Barrel Connectors As Troubleshooting Tools

The Ethernet loopback connectors are used to test the Ethernet controller. The barrel connectors are used to remove the CCU and 3270 terminal connections from the CXM04 line card.

The server hardware is shipped with a standard Ethernet loopback connector, ThinWire Ethernet loopback connector, and four barrel connectors.

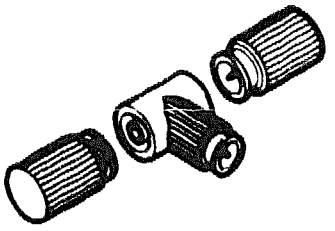
The 15–pin standard Ethernet loopback connector is used to troubleshoot the Ethernet controller when the controller is configured for standard Ethernet and to troubleshoot the transceiver cable. When you have a problem with the Ethernet controller, perform the Ethernet diagnostic test (use an appropriate boot mode) with this loopback connector installed to the Ethernet controller standard interface connector. If the test passes, repeat the test with the transceiver cable installed to the Ethernet controller and the loopback connector installed at the far end of the transceiver cable.

The ThinWire Ethernet loopback connector is used to check out the Ethernet controller when the controller is configured for ThinWire Ethernet. The loopback connector is comprised of a T connector and two terminators. Install the loopback connector to the Ethernet controller ThinWire connector, and perform the Ethernet diagnostic test (use an appropriate boot mode).

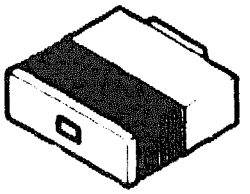
The barrel connectors are used to connect 3270 terminals directly to the CCU, taking the CXM04 line card out of the connection. These connectors should be used only when replacing a CXM04 line card or, as a last resort, when troubleshooting a CCU/3270 terminal problem. These connectors are not effective for CXM04 line cards that are configured for 3270 terminals only.

Exhibit 1–11: Ethernet Loopback and Barrel Connectors

ThinWire Ethernet Loopback Connector
(T Connector and 2 Terminators)



Standard Ethernet Loopback Connector



Barrel Connector

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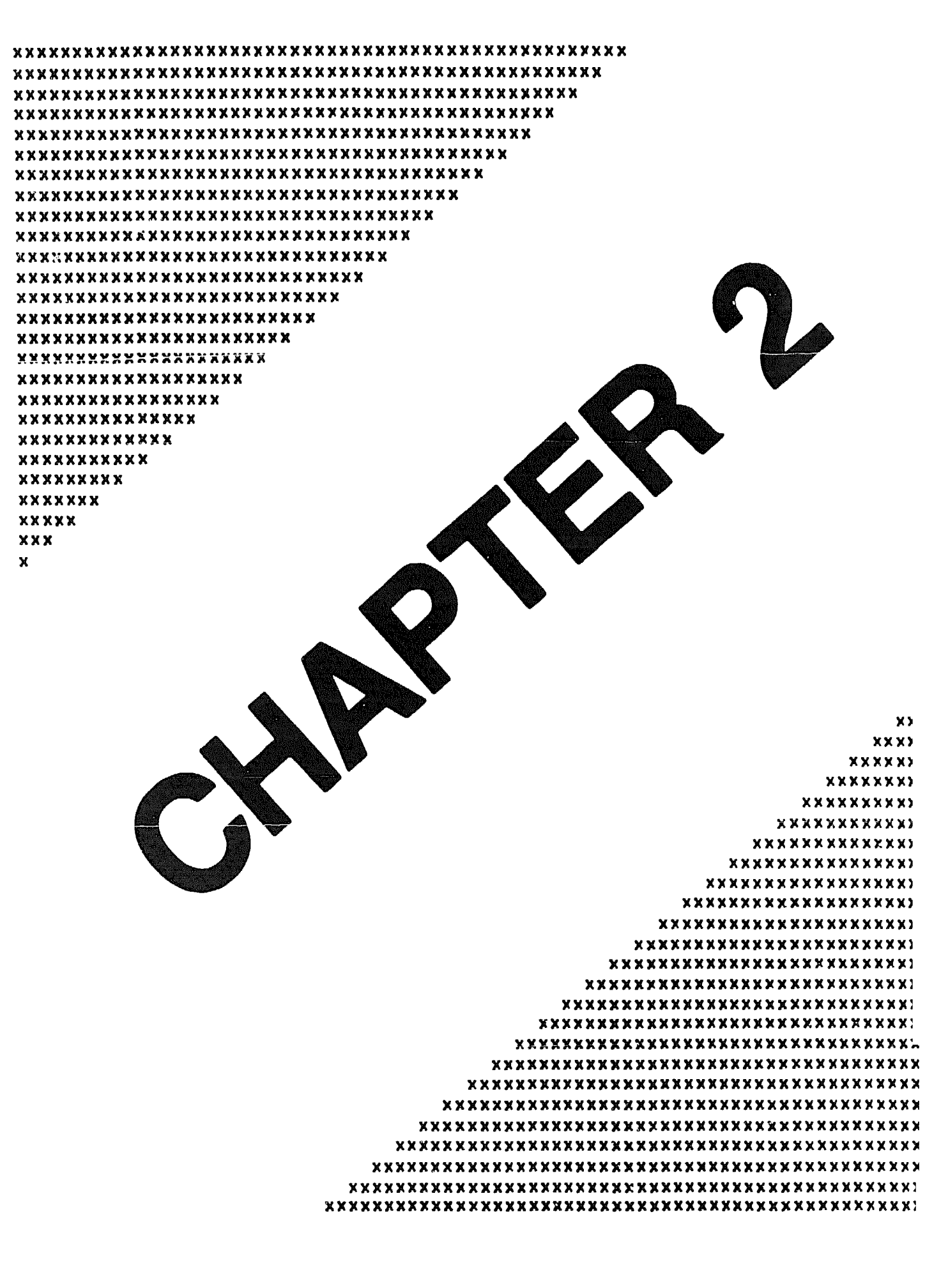
CHAPTER 2

2

Problems with an Individual Port

If you have a problem with a single port, use the procedures in this chapter. First, use the initial troubleshooting steps listed on the following page. If the problem persists, use the detailed flow chart.

Initial Troubleshooting Steps

Check the terminal power and cable connections. Also verify that the terminal is a supported device.

These troubleshooting steps assume that only one port is failing, and that everything else is working properly.

First check that the 3270 terminal, or personal computer (PC), is powered on and that the cables are secure. Also, verify that this is a supported terminal or PC.

What to Check	Procedure
Device power	Check the power indicator for the terminal. If it is off, do the following: (1) be sure that the terminal is plugged into an active outlet, (2) check that the power on/off switch is on, and (3) if the terminal has a fuse, replace it; if the terminal has a circuit breaker, reset it. If you do not see the cursor after approximately one minute, assume that the terminal either has no power or is faulty. Call the service representative for your equipment.
Terminal cable	Be sure the terminal's cable is secure at the server line card port and at the terminal.
CCU cable	If a CCU is connected to the server line card, make sure the cable is secure at the server line card port and at the CCU.
Support for the terminal type or mode	Refer to the *3270 Terminal Option Software Product Description* and verify that the 3270 terminal or PC is one supported by the 3270 Terminal Option product. **Restrictions:** If the terminal or PC is one that is supported, verify that the terminal is a Control Unit Terminal (CUT) and not a Distributed Function Terminal (DFT). The server hardware does not support terminals in DFT mode. Also, 3270 terminals and PCs connected to the CXM04 line cards cannot be used to perform file transfers.

Troubleshooting Flow Chart for Problems on One Port

Use the flow chart to identify the faulty FRU.

The flow chart tells you when to use various troubleshooting tools. Refer to Chapter 1 if you are not familiar with a particular tool.

If this flow chart does not solve the problem, refer to *DECserver 500 Problem Solving* to troubleshoot the software.

Exhibit 2–2: Troubleshooting Flow Chart (1 of 4)

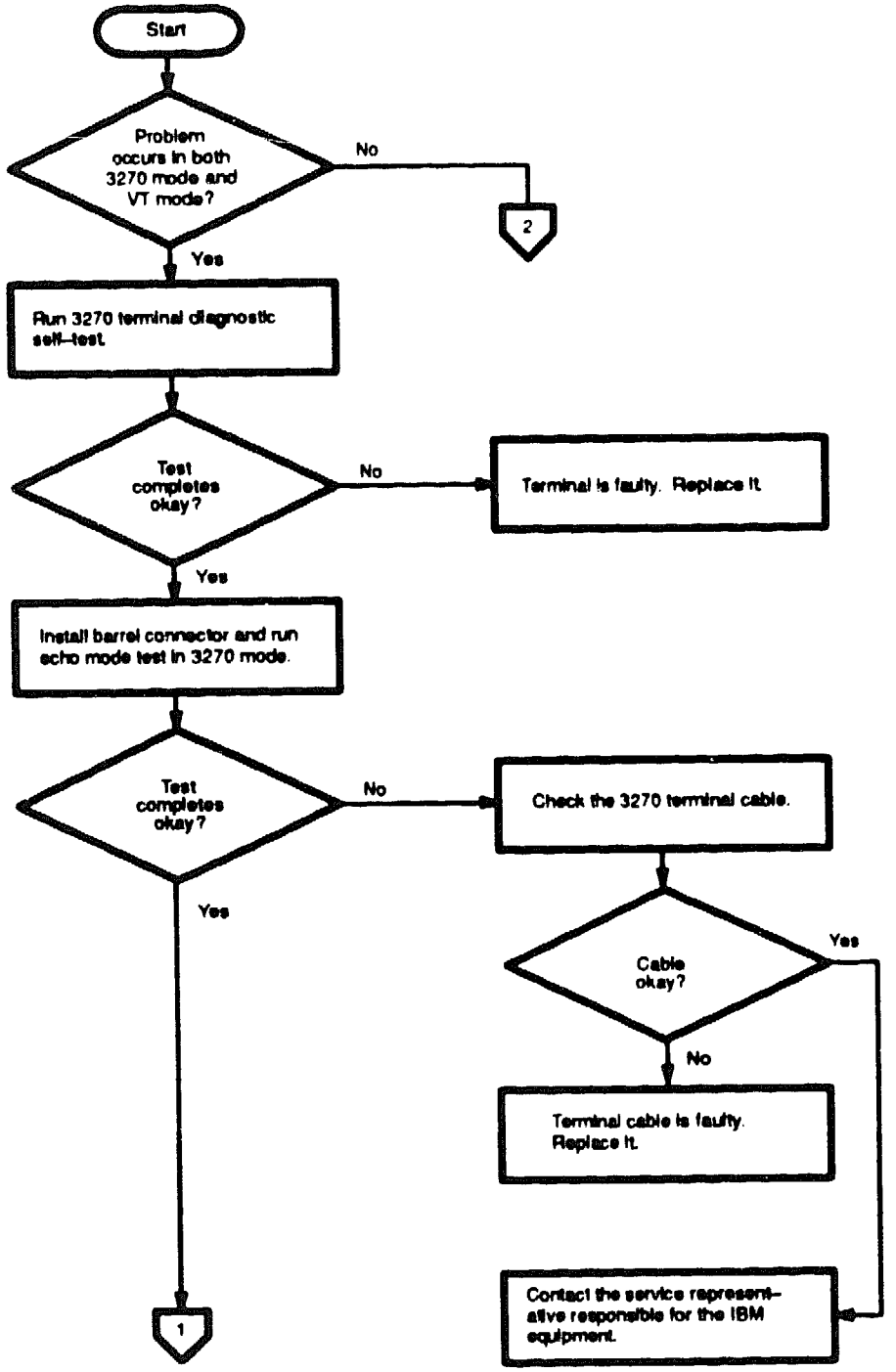

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Exhibit 2–3: Troubleshooting Flow Chart (2 of 4)

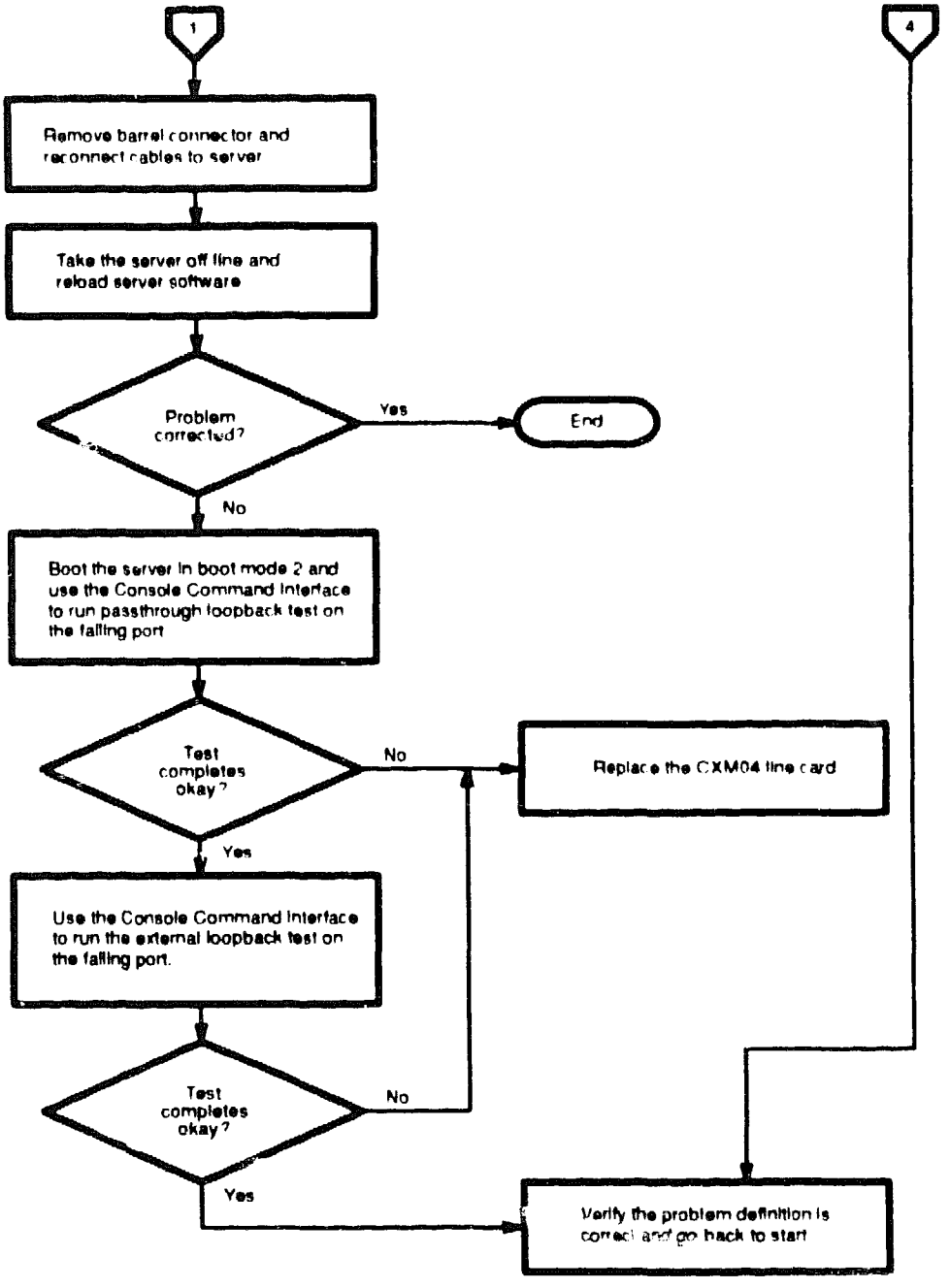


Exhibit 2–4: Troubleshooting Flow Chart (3 of 4)

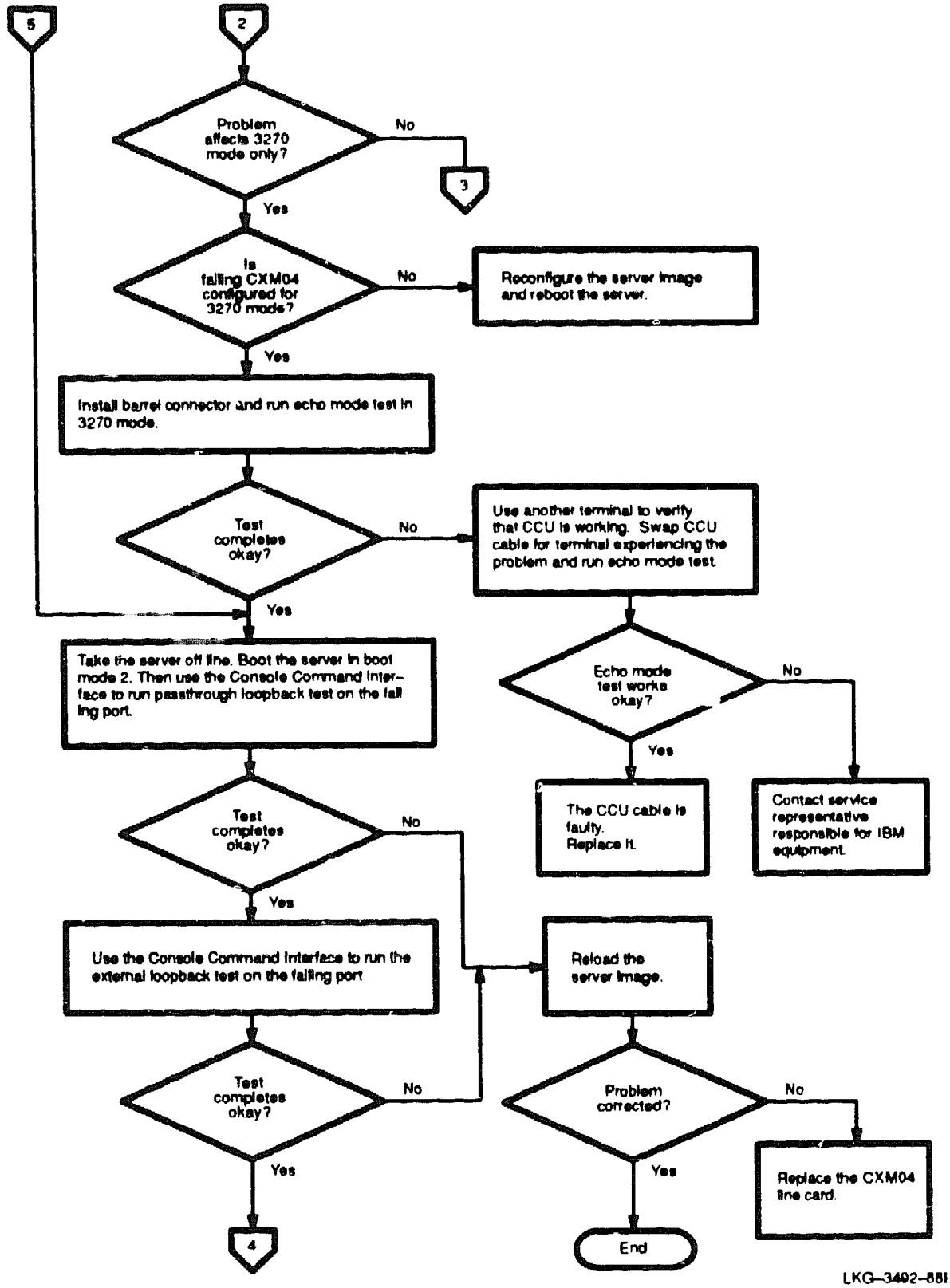
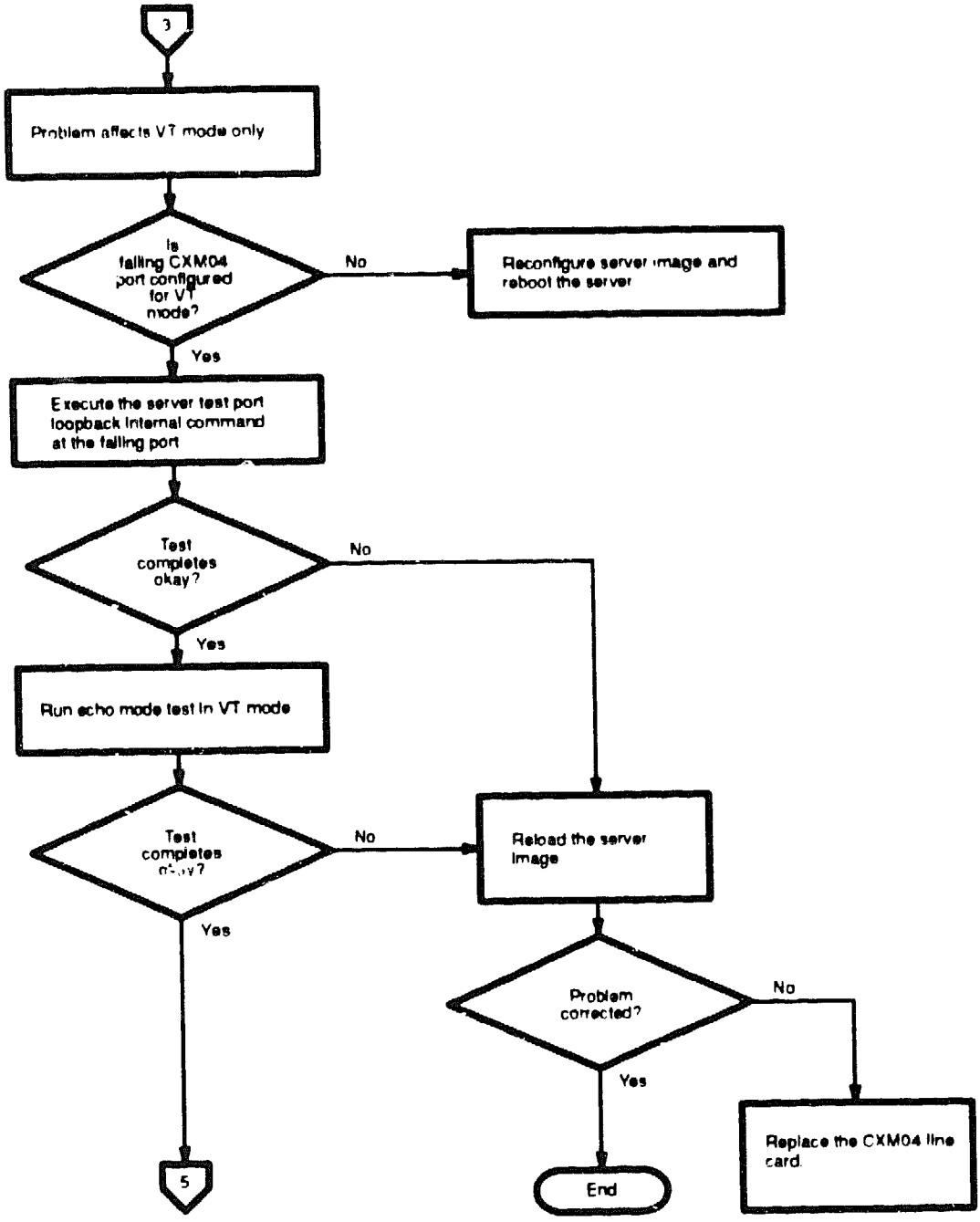


Exhibit 2–5: Troubleshooting Flow Chart (4 of 4)



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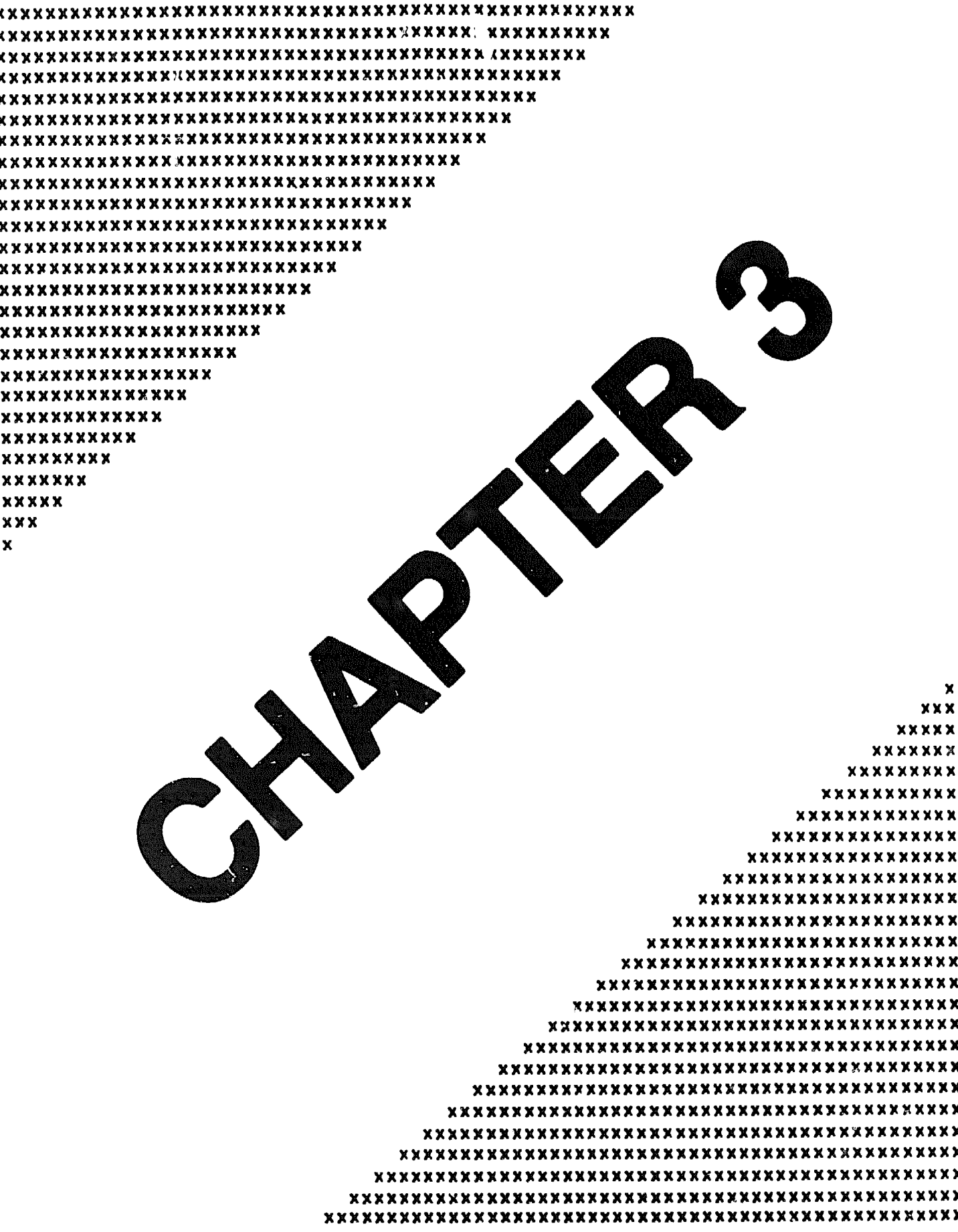

CHAPTER 3

3

Problems with Multiple Ports on the Same Line Card

If you have a problem with more than one port on the same line card, use the troubleshooting steps listed on the following page.

Troubleshooting Steps

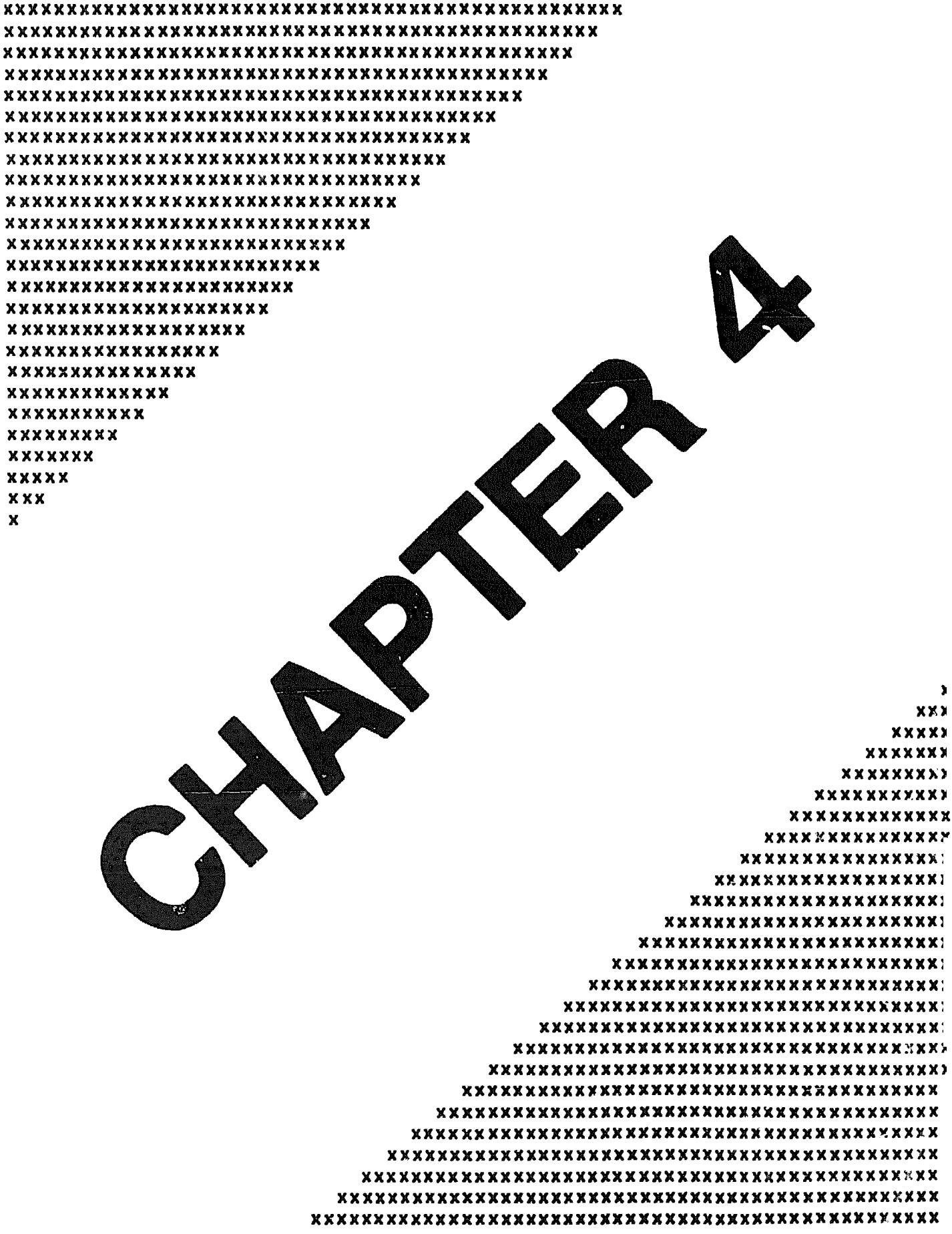
Before concluding that the line card is faulty, check the cable connections and patch panel first. Then verify that the line card hardware and 3270 Terminal Option software are configured properly.

If more than one, but not all ports are having problems, check the patch panel, if present, for errors. Also, check the cable connections on the affected ports.

If all ports on the line card have problems, check the software and hardware configuration. Either the line card is configured for 3270 terminals only (8 ports) or for 3270 terminals and a CCU (4 ports). The hardware jumper and CCU present switch setting on the line card must match the software configuration. Chapter 5 provides the procedure to remove the module, and Chapter 6 provides the procedure to set the line card switches and jumpers.

What to Check	Procedure
Patch panel (if present)	Verify that there are no errors at the patch panel, and that all connections are secure.
Terminal cable	Be sure the terminal's cable is secure at the server line card port and at the terminal.
CCU cable	If a CCU is connected to the CXM04 line card, make sure the cable is secure at the CXM04 line card port and at the CCU.
Support for the terminal type or mode	Refer to the *3270 Terminal Option Software Product Description* and verify that the 3270 terminal or PC is one supported by the 3270 Terminal Option product. **Restrictions:** If the terminal or PC is one that is supported, verify that the terminal is a Control Unit Terminal (CUT) and not a Distributed Function Terminal (DFT). The server hardware does not support terminals in DFT mode. Also, 3270 terminals and PCs connected to the CXM04 line cards cannot be used to perform file transfers.
Card configuration	Verify that the software and the hardware are configured the same way (either both for 4 ports or both for 8 ports). If the ports are configured properly, reload the software image and check to see whether the problem is corrected.

If none of the above corrects the problem, replace the line card (refer to Chapters 5 and 6).


CHAPTER 4

4

Problems with All Server Ports

If you have a problem with all the server ports, use the procedures in this chapter. First, use the initial troubleshooting steps listed on the following page. If the problem persists, use the detailed flow chart.

Initial Troubleshooting Steps

Check the server power and cable connections. Check the various LED indicators.

These troubleshooting steps assume that there is no port on the server working.

First check that the server power cable is installed correctly and receiving the correct voltage. Then check the Ethernet cable. If the cables are secure, check the LED indicators. Proceed to the troubleshooting flow chart if you can not quickly assess the problem.

Exhibit 4–1: List of Initial Troubleshooting Steps

What to Check	Procedure
Server power	Check the DC OX LED. If it is off, be sure that the server is plugged into an active outlet. If the outlet is active, check that the voltage appears on the server end of the power cord. If the power cord is good, then the server power supply is faulty and you must replace the server enclosure. Go to Chapter 5 to remove all the modules from the server enclosure.
Ethernet cable	Verify that the standard or ThinWire Ethernet cable is properly installed.
Standard and ThinWire Ethernet LEDs	If the server is connected to a standard Ethernet, verify that the standard Ethernet LED (to the immediate right of the connector) on the Ethernet controller is on. If the server is connected to a ThinWire Ethernet, verify that the ThinWire Ethernet LED (to the immediate right of the connector) is on. If the incorrect LED is on, power off the server. If the controller has the standard/ThinWire Ethernet pushbutton, push the switch in for a standard Ethernet connection, or out for a ThinWire Ethernet connection. If the controller does not have the pushbutton, go to Chapter 6 to configure the Ethernet controller. After the controller is configured correctly, power on the server and see if the problem is resolved.
LED display	Check the LED display on the CPU module. Chapter 1 lists the diagnostic and software error codes on pages 1–16 and 1–18, respectively.

Troubleshooting Flow Chart for Problems on All Server Ports

Use the flow chart to identify the faulty FRU.

The flow chart tells you when to use various troubleshooting tools. Refer to Chapter 1 if you are not familiar with a particular tool.

If this flow chart does not solve the problem, refer to *DECserver 500 Problem Solving* to troubleshoot the software.

Exhibit 4–2: Troubleshooting Flow Chart (1 of 5)

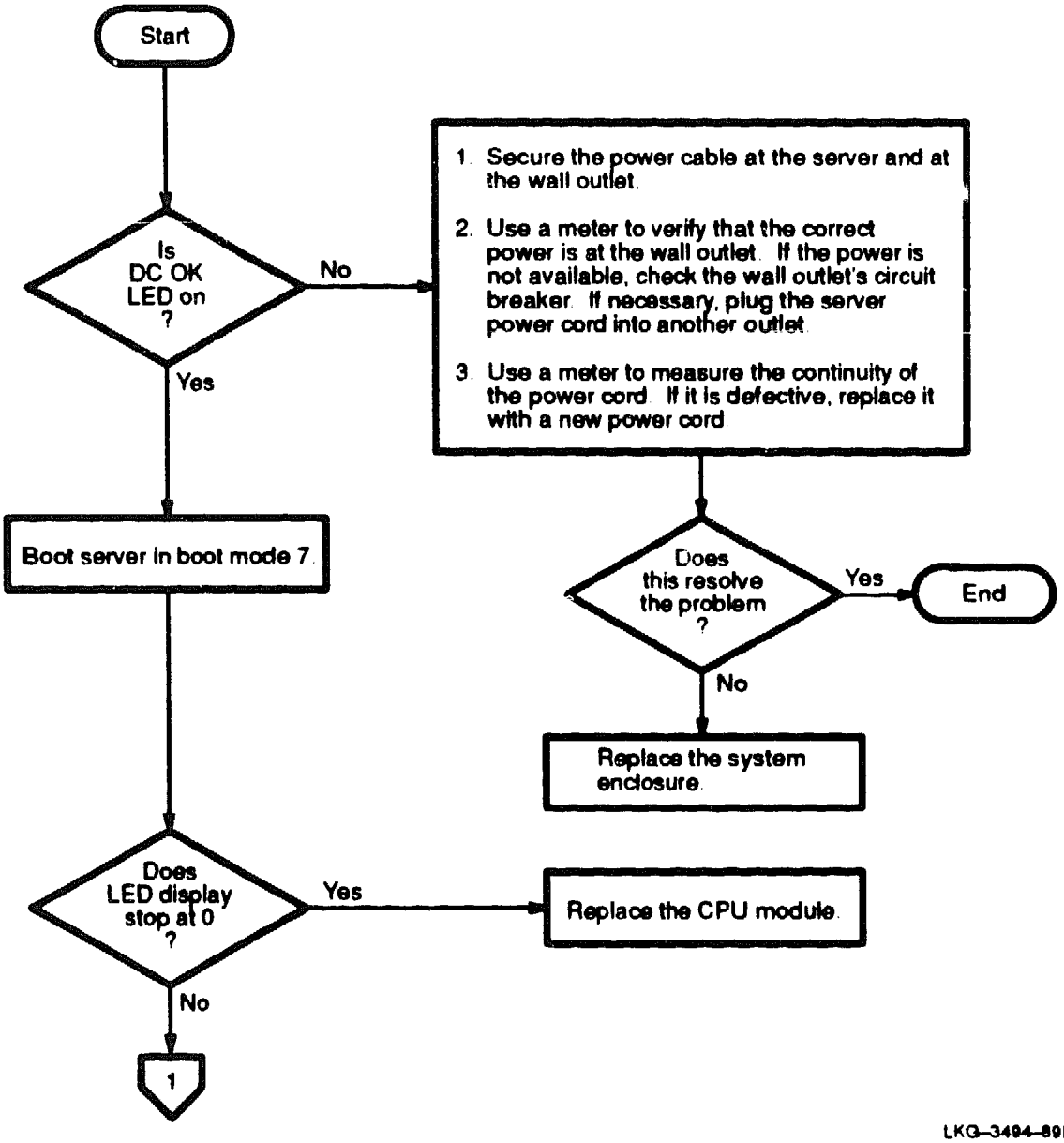


Exhibit 4–3: Troubleshooting Flow Chart (2 of 5)

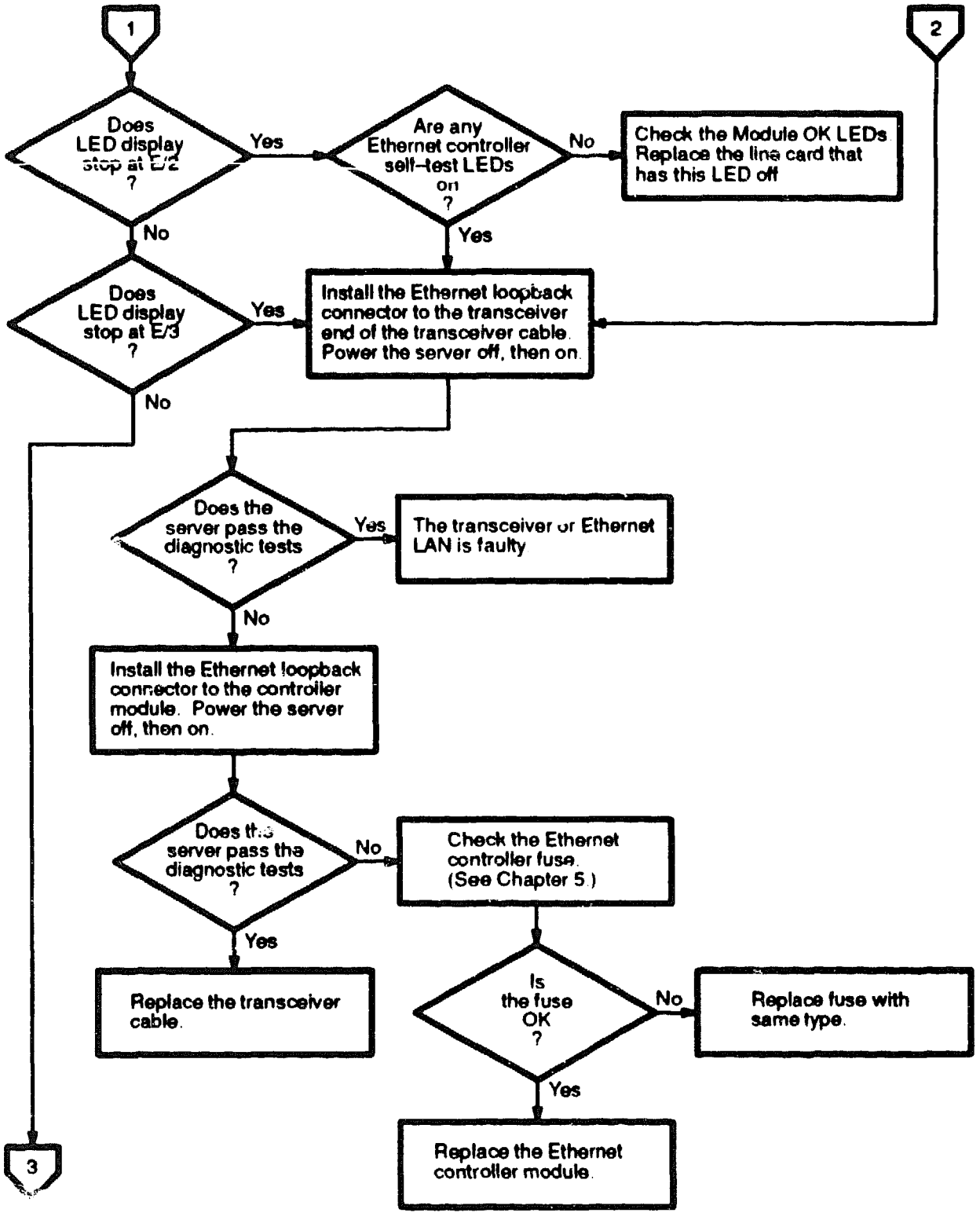


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Exhibit 4–4: Troubleshooting Flow Chart (3 of 5)

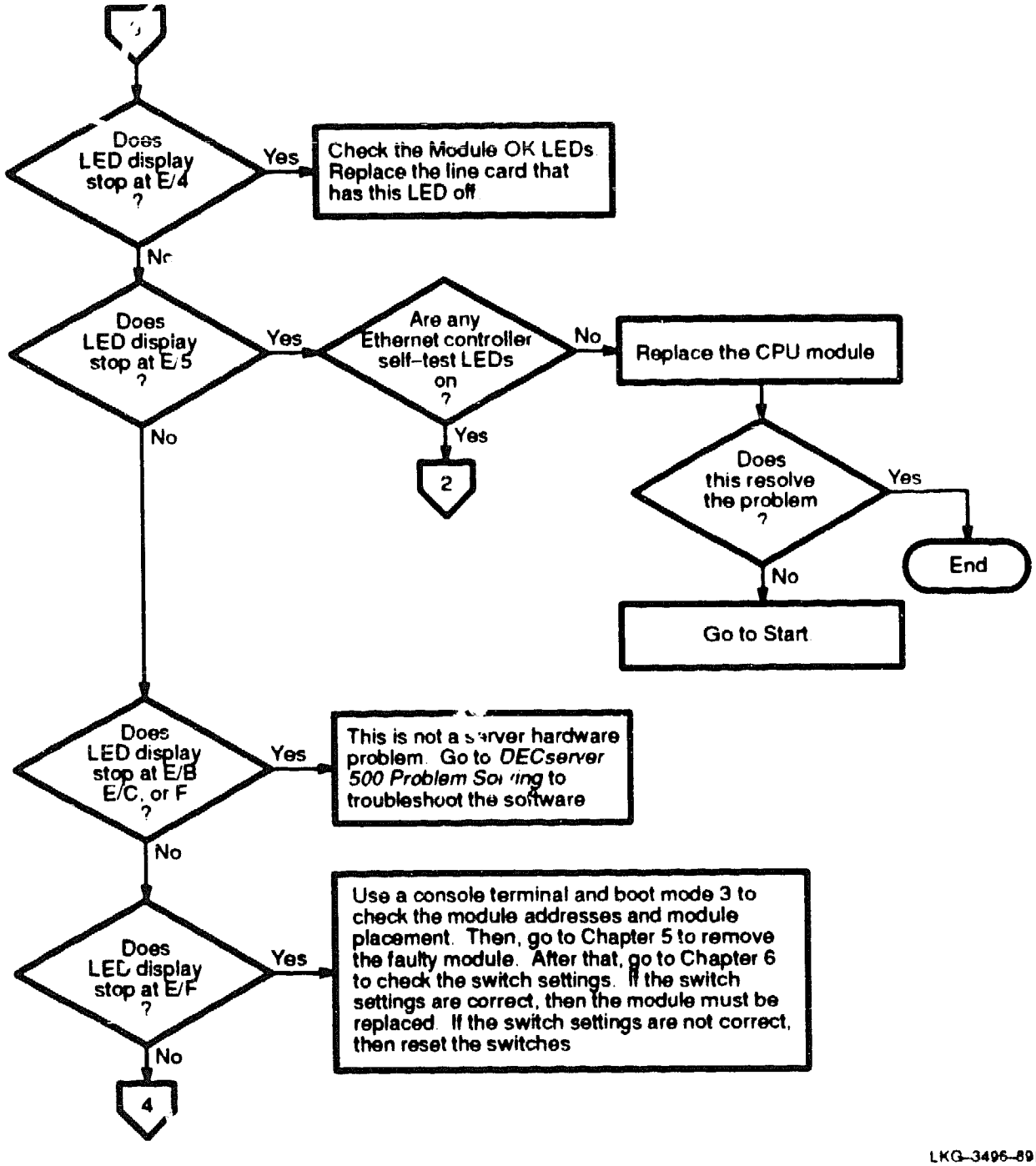

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Exhibit 4–5: Troubleshooting Flow Chart (4 of 5)

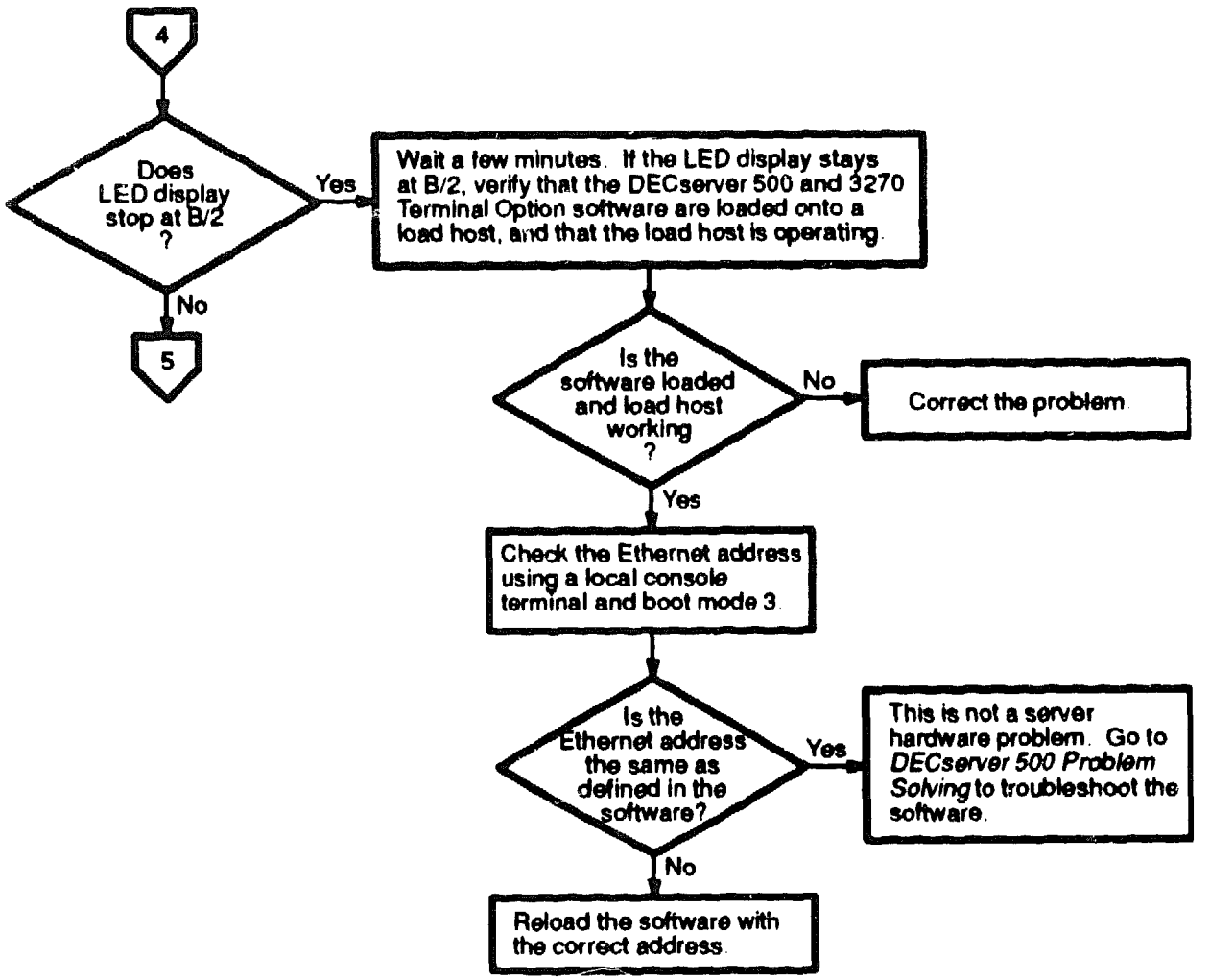

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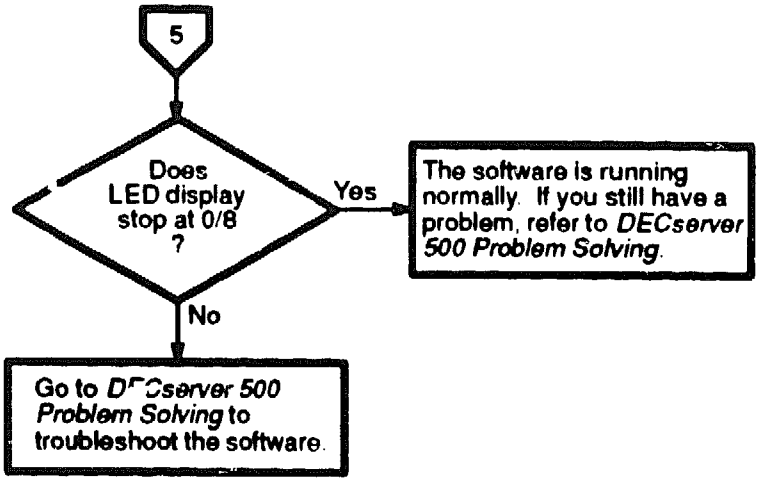
Exhibit 4–6: Troubleshooting Flow Chart (5 of 5)



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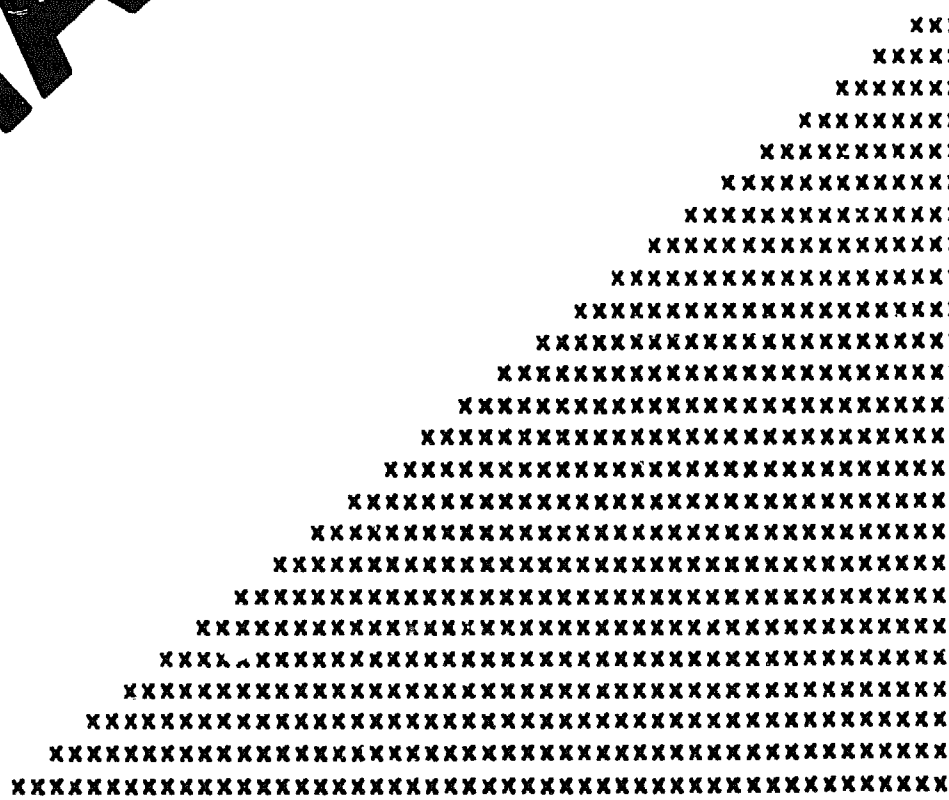
CHAPTER 5



5

Removal Procedures

This chapter tells you how to:

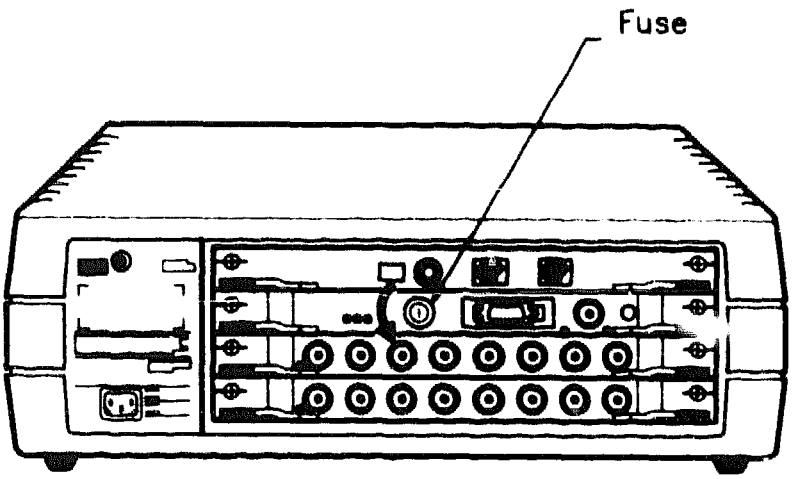
- Remove and (if necessary) replace the Ethernet controller fuse
- Remove the standard Ethernet cable from the Ethernet controller module
- Remove the ThinWire Ethernet cable from the Ethernet controller module
- Remove the cables from the CXM04 line card
- Remove the faulty module

Remove and (If Necessary) Replace the Ethernet Controller Fuse

Remove the fuse from the Ethernet controller. If the fuse is bad, replace it with a fuse of the same rating.

1. Locate the fuse in the front of the Ethernet controller.
2. Use a small flat-blade screwdriver to turn the fuse holder counterclockwise. The fuse disengages from the holder after a slight turn.
3. Remove the fuse and check for continuity.
4. If the fuse is bad, replace the fuse with a fuse of the same rating.
5. Install the fuse into the holder on the module. Turn the fuse clockwise slightly to lock the fuse in place.

Exhibit 5–1: Removing the Ethernet Controller Fuse



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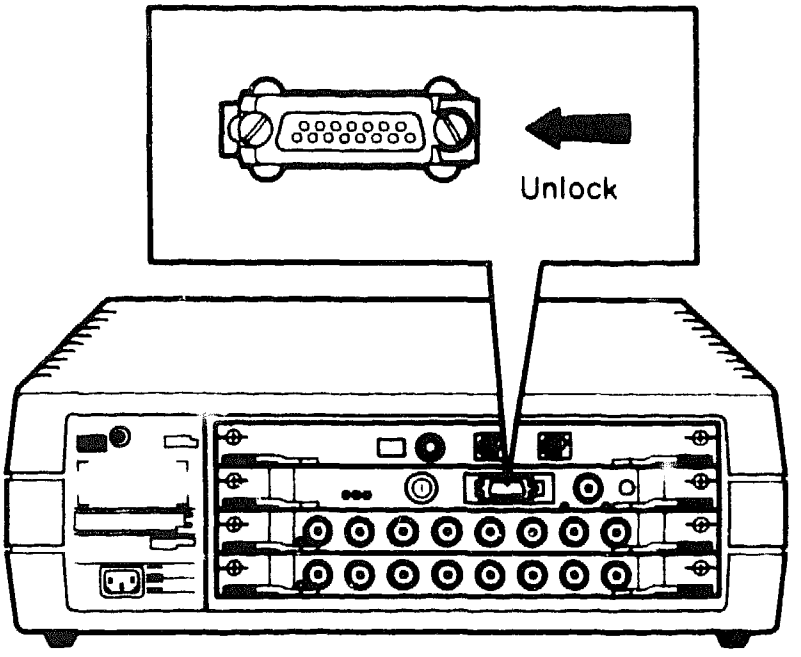
Remove the Standard Ethernet Cable from the Ethernet Controller Module

If you are replacing a faulty Ethernet controller module that is connected to a standard Ethernet, you must first remove the cable.

1. Locate the standard Ethernet cable attached to the server.
2. Slide the cable to the left to unlock it.
3. Remove the cable.

Exhibit 5–2: Removing the Standard Ethernet Cable



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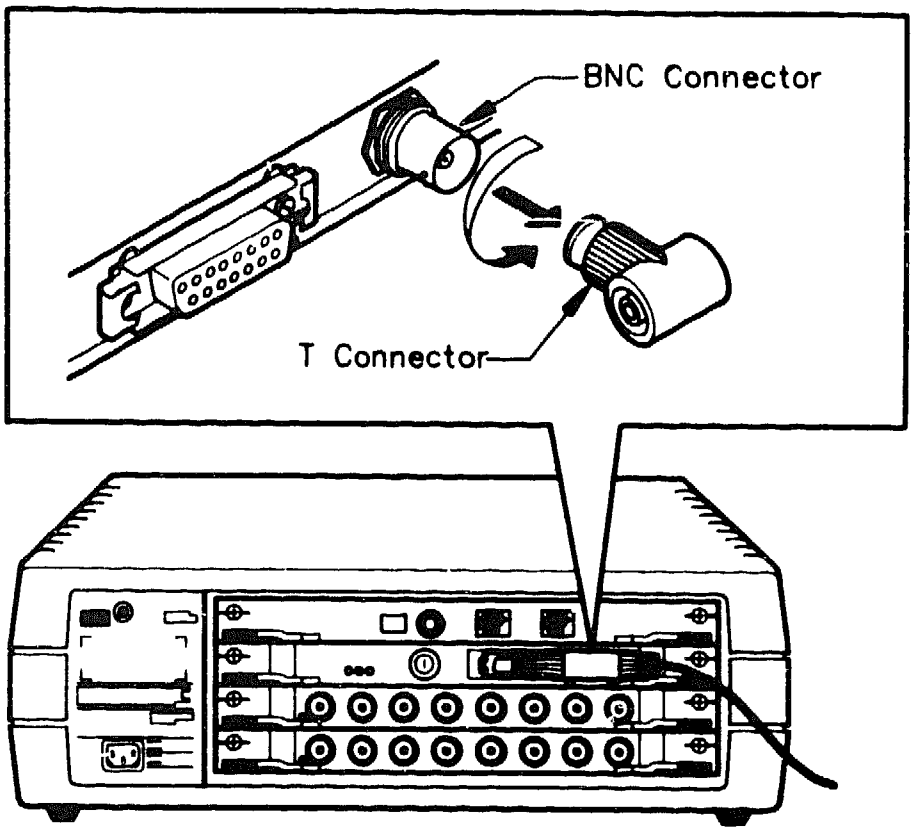
Remove the ThinWire Ethernet Cable from the Ethernet Controller Module

If you are replacing a faulty Ethernet controller module that is connected to a ThinWire Ethernet, you must first remove the cable.

1. Locate the ThinWire Ethernet cable connected to the server.
2. Turn the T connector counterclockwise.
3. Remove the T connector and cable.

Exhibit 5–3: Removing the ThinWire Ethernet Cable



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Remove the Cables from the CXM04 Line Card

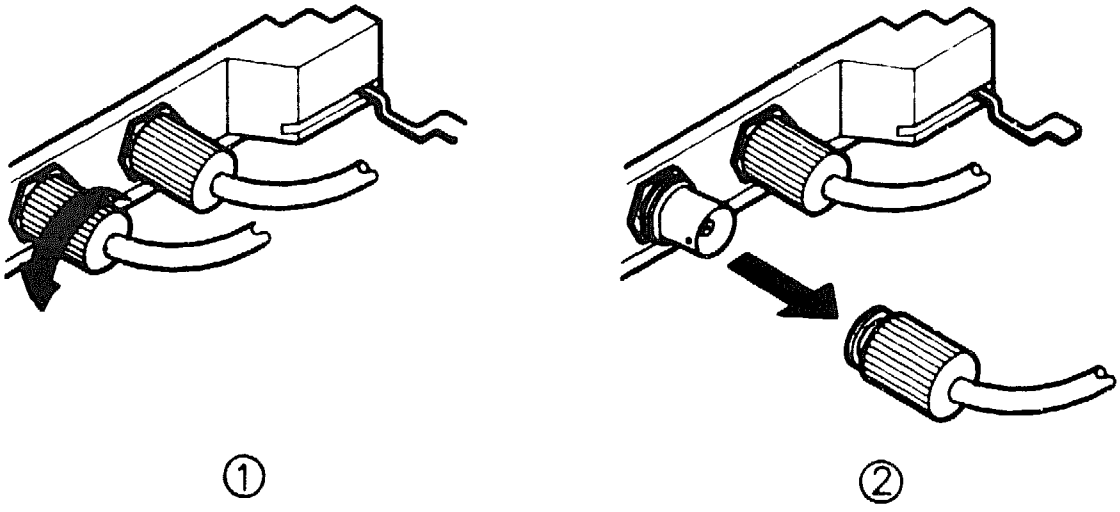
If you are replacing a faulty CXM04 line card, you must first remove the cables.

1. Make sure that all the cables are labeled.
2. Locate the leftmost cable connected to the server as you face the CXM04 line card.
3. Turn that BNC connector counterclockwise and remove the cable or balun.
4. Remove each cable or balun, working from the left to the right.

NOTE

A balun adapts the BNC connector of a coaxial cable to a twisted–pair cable that has an RJ11 connector.

Exhibit 5–4: Removing the CXM04 Line Card Cables



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Remove the Faulty Module

Unplug the server power cord. Loosen the two fasteners and use the module levers to remove the module.

1. Unplug the server power cord.
2. Put on an antistatic wrist strap.

CAUTION

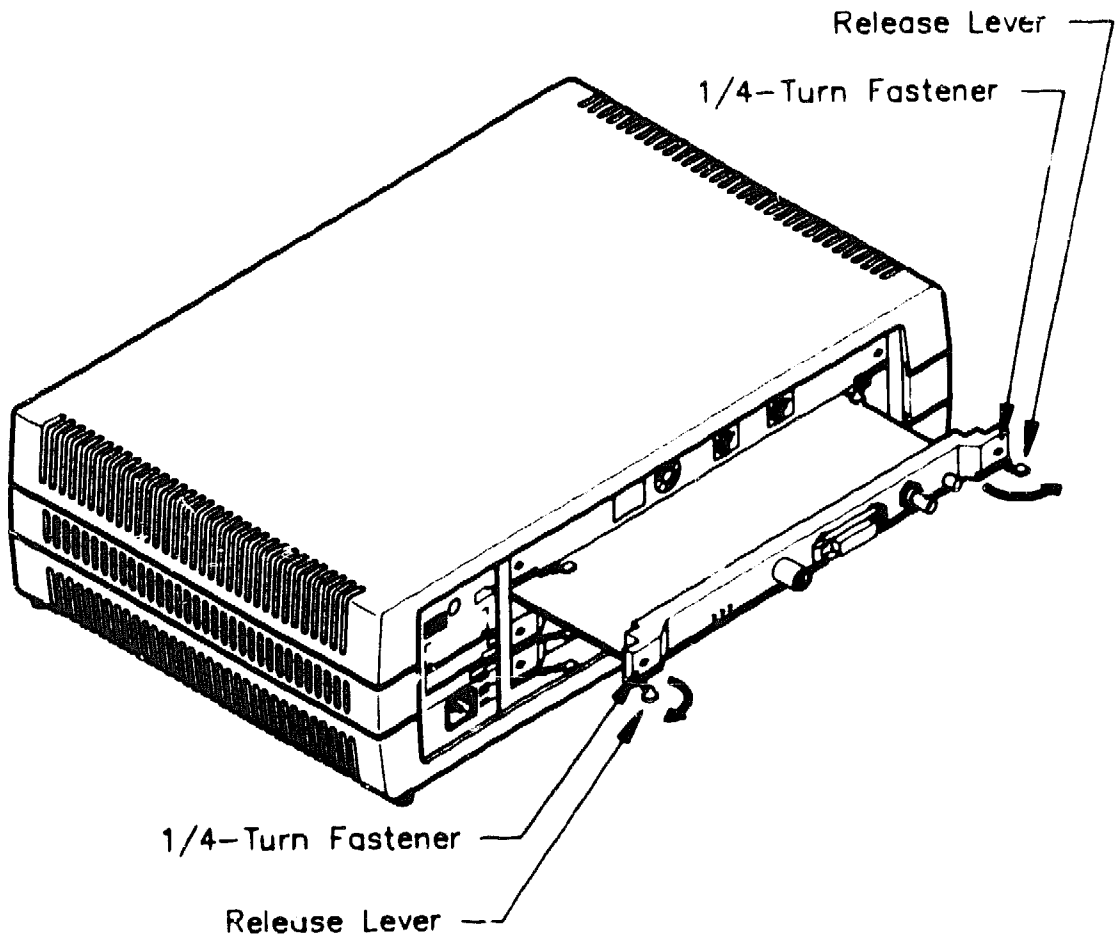
Do not remove or install any server modules while server power is on. Also, you must wear an antistatic wrist strap to avoid damaging the modules. The wrist strap must be connected to server ground.

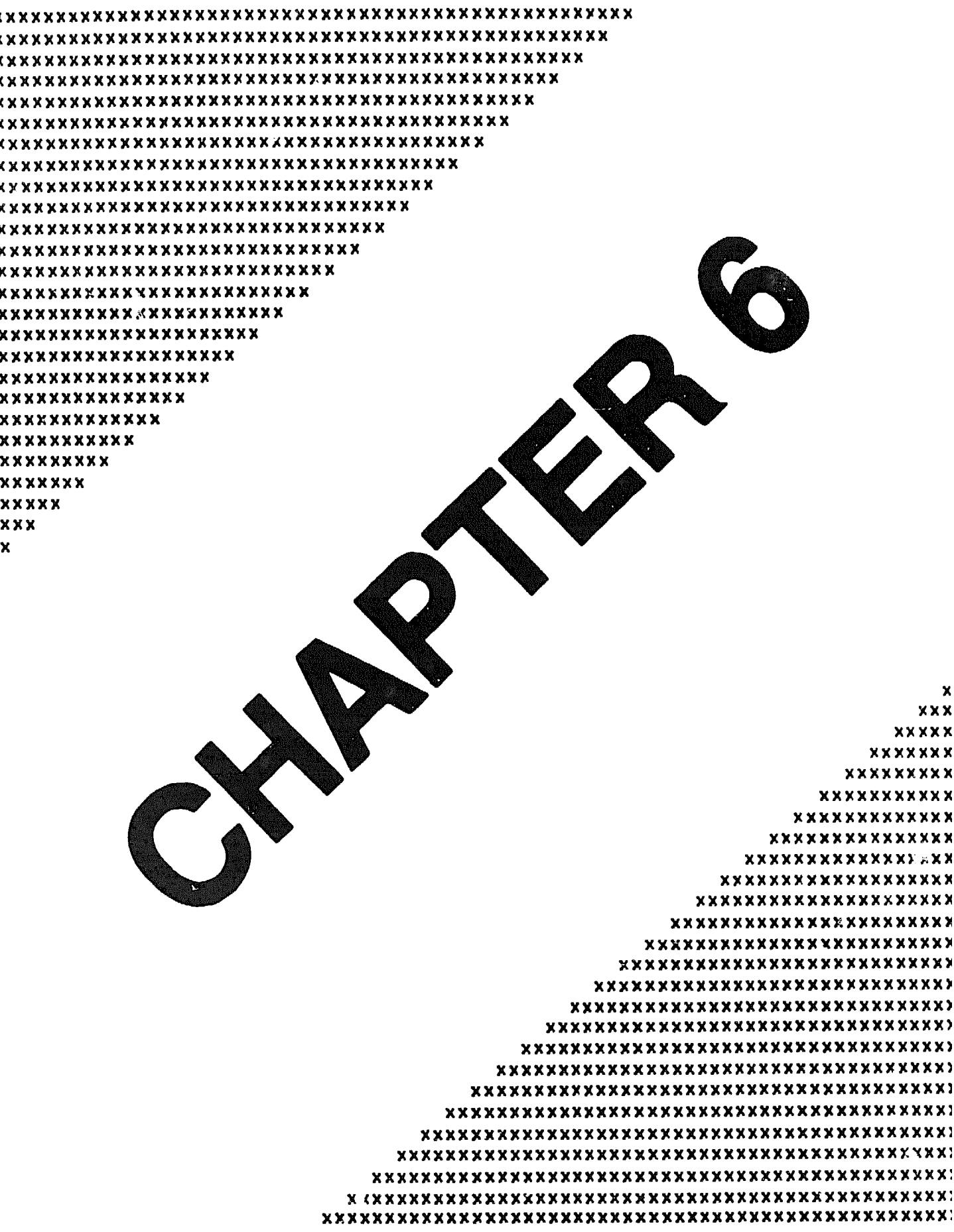
3. With a Phillips screwdriver, press in and turn the two 1/4–turn fasteners counterclockwise.
4. Simultaneously pull the left and right release levers outward to disengage the module from the backplane. Gently slide the module outward and remove it from the server.
5. If you are replacing the module with a new module, use the shipping container and packing material from the new module to pack and ship the old one. If you are replacing the Ethernet controller, make sure that this module is available when installing the replacement Ethernet controller.

CAUTION

Do not apply power to the server unless all modules are installed.

Exhibit 5–5: Removing a Module




CHAPTER 6

6

Installation and Test Procedures

This chapter tells you how to:

- Unpack and install the CPU module
- Unpack the Ethernet controller and check the switches
- Swap the Ethernet address chip and address plate
- Configure the Ethernet controller for standard or ThinWire Ethernet
- Install the Ethernet controller
- Connect the Ethernet controller to the standard Ethernet LAN
- Connect the Ethernet controller to the ThinWire Ethernet LAN
- Install the ThinWire Ethernet strain–relief clamp
- Unpack the CXM04 line card and set the device address switch
- Set the CXM04 vector address/CCU present switch and jumpers
- Install the CXM04 line card
- Connect the cables to the CXM04 line card
- Unpack the DECserver 510 enclosure and install the modules
- Remove the plastic enclosure – to install the server to a rack
- Remove the two side screws and install the rack–mount brackets
- Install the server to the rack
- Test the new FRU

Unpack and Install the CPU Module

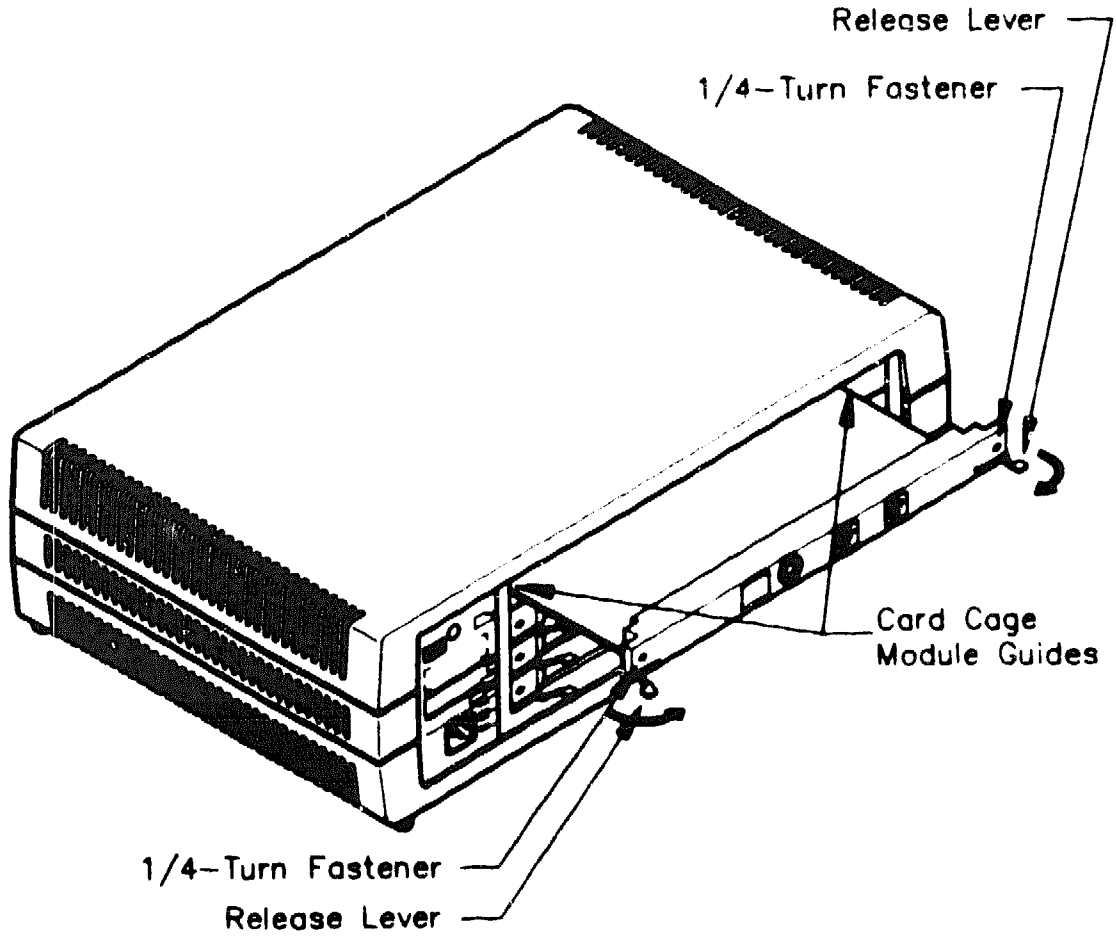
Unpack the replacement CPU module and check for damage. Install the module into the server.

CAUTION

You must wear an antistatic wrist strap to avoid damaging the module. The wrist strap must be connected to server ground.

1. Before opening the shipping container, look for external damage such as dents, holes, or crushed corners.
2. Open and unpack the container. Use the container and packing materials to return the faulty CPU module to Digital Equipment Corporation.
3. Inspect the components on the module for shipping damage. Carefully check the module for cracks, breaks, and loose components. Report any damage to the shipper and notify the Digital representative.
4. Make sure that the server power is off.
5. Hold the module up to the CPU module slot with the component side facing up towards the power supply.
6. Align the module with the card cage guides and slide it into the slot until it engages the backplane. The module handle should be about 1/4 inch from being flush with the Ethernet controller module handle.
7. To seat the module fully, simultaneously pull the two release levers in (towards each other). The module handle should now be flush with the Ethernet controller module handle.
8. Press in the two 1/4–turn fasteners and turn them clockwise to secure the module.
9. Go to the "Test the New FRU" procedure at the end of this chapter.

Exhibit 6–1: Installing the CPU Module



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Unpack the Ethernet Controller and Check the Switches

Unpack the replacement module and check for damage. Check the switch configurations.

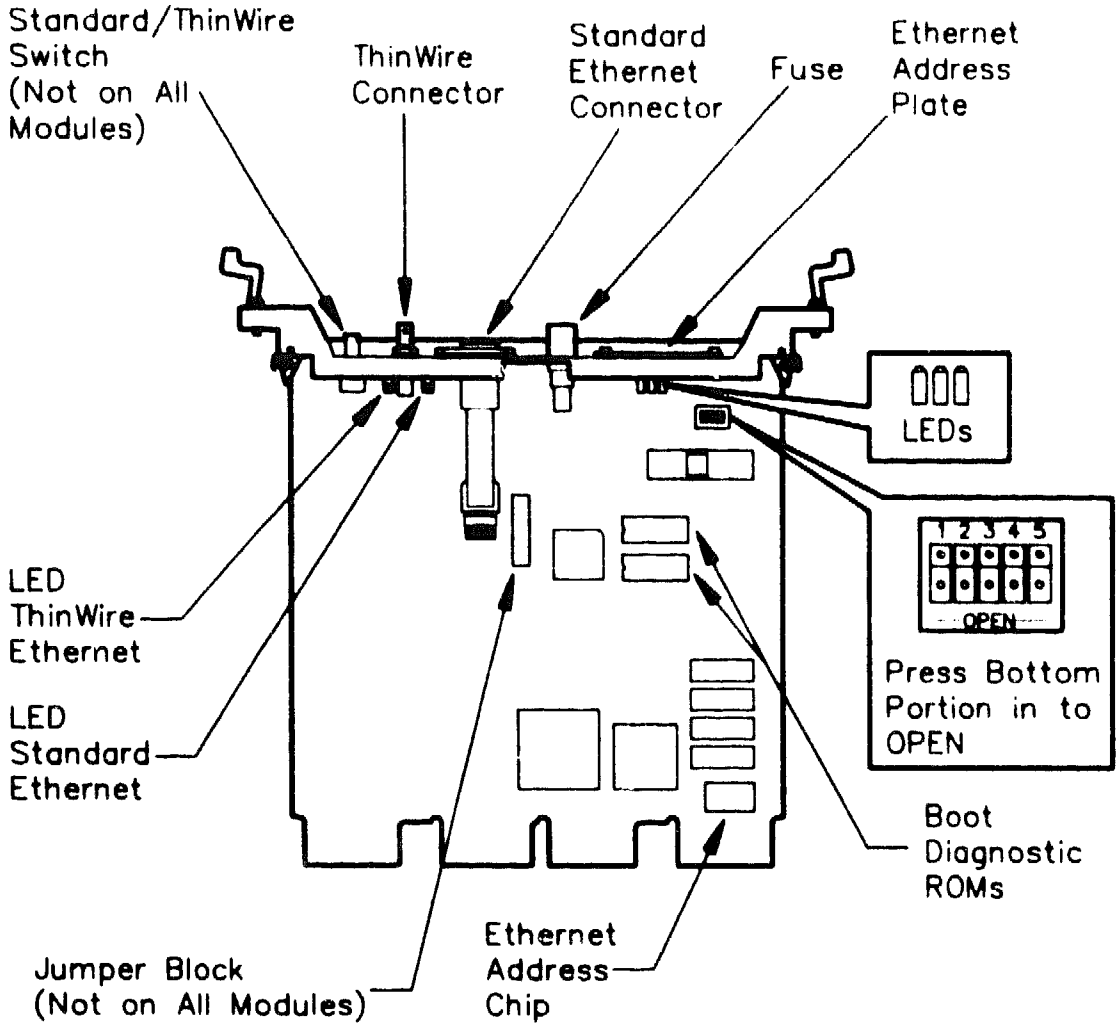
CAUTION

You must wear an antistatic wrist strap to avoid damaging the module. The wrist strap must be connected to server ground.

1. Before opening the shipping container, look for external damage such as dents, holes, or crushed corners.
2. Open and unpack the container. Use the container and packing materials to return the faulty module to Digital Equipment Corporation.
3. Inspect the components on the module for shipping damage. Carefully check the module for cracks, breaks, and loose components. Report any damage to the shipper and notify the Digital representative.
4. Locate switches S1 through S5.
5. Make sure that the switches are configured as follows:

S1	closed (base address)
S2	closed (reserved)
S3	closed (normal mode)
S4	open (MOP remote boot enabled)
S5	closed (reserved)

Exhibit 6–2: Location of the Ethernet Controller Switches



LKG-3484-89A

Swap the Ethernet Address Chip and Address Plate

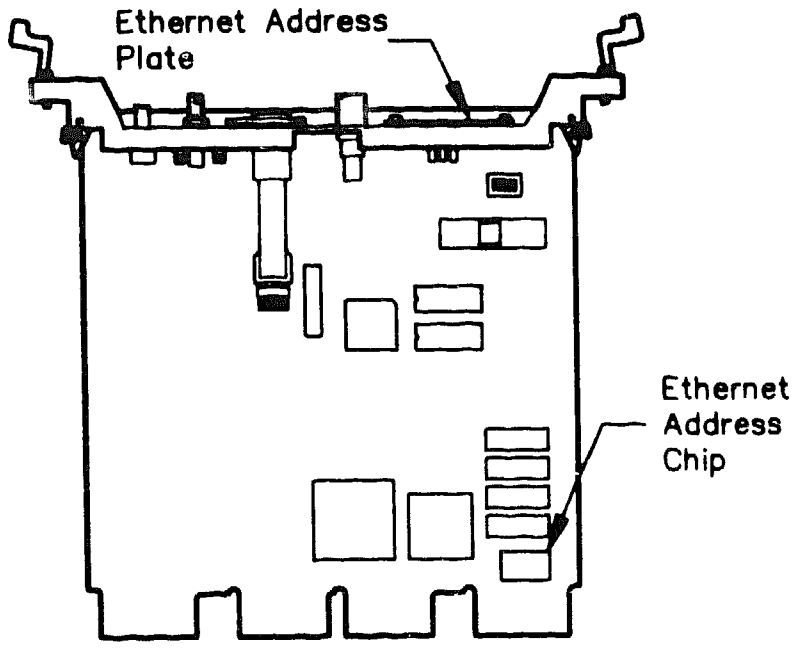
Remove the Ethernet address chip and address plate from the new Ethernet controller. Remove the Ethernet address chip and address plate from the old Ethernet controller, and place them in the new controller.

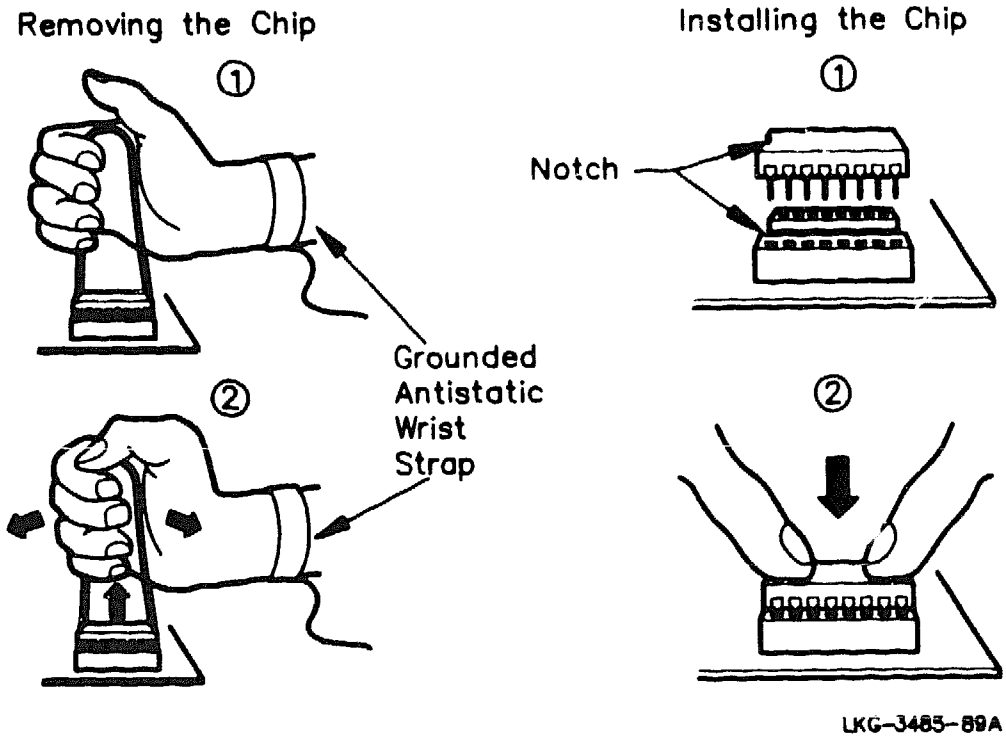
CAUTION

You must wear an antistatic wrist strap to avoid damaging the module. The wrist strap must be connected to server ground.

1. Locate the Ethernet address chip and address plate on the new module. The address plate is on the module's faceplate.
2. Use a chip removal tool to remove the Ethernet address chip from the new module.
3. Remove the Ethernet address plate from the new module.
4. Put the chip and plate into an envelope and label it "new address parts." This will prevent you from confusing the new parts with the old parts.
5. Remove the address chip and plate from the old Ethernet controller module.
6. Position the old address chip over the chip socket slots on the new module. Make sure that the notch on the chip is on the correct side, and align one side at a time before pressing the chip down into the socket.
7. Press the chip in place. Be careful not to bend the legs.
8. Install the old address plate on the new module.

Exhibit 6–3: Swapping the Ethernet Address Chip and Plate





Configure the Ethernet Controller for Standard or ThinWire Ethernet

The Ethernet controller module has either a switch or a jumper block that is used to configure the module for standard or ThinWire Ethernet. Set the switch or the jumper to the appropriate position.

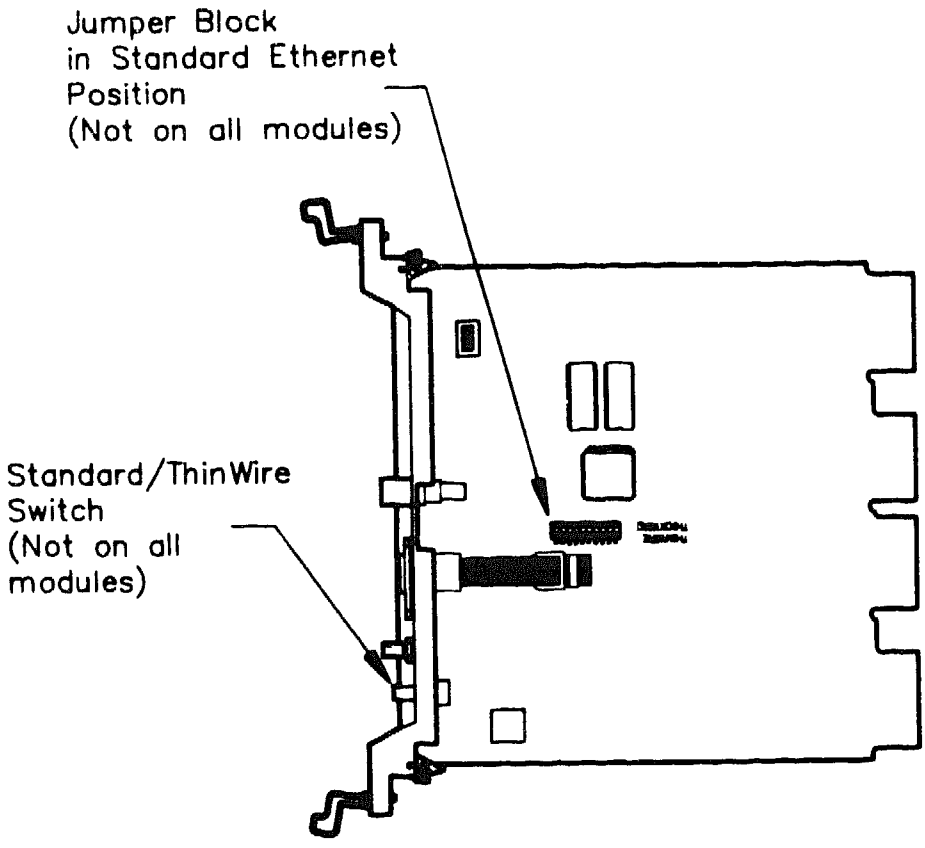
1. Determine if the new module has a standard/ThinWire switch (pushbutton) on the faceplate. If the controller does not have this switch, then there is a jumper block on the module.
2. If the module has a standard/ThinWire switch, press the switch to the in position for the standard Ethernet connection, or press the switch to the out position for the ThinWire Ethernet connection.

CAUTION

You must wear an antistatic wrist strap to avoid damaging the module. The wrist strap must be connected to server ground.

3. If the module has a jumper block, perform the following:
   a. At the jumper block, notice that there are three rows of pins. The jumper block connects the center row of pins to either the pins labeled THINWIRE or the pins labeled THICKWIRE.
   b. If the server is to be connected to a ThinWire Ethernet LAN, verify that the jumper block is installed on the row of pins labeled THINWIRE.
   c. If the server is to be connected to a standard Ethernet LAN, verify that the jumper block is installed on the row of pins labeled THICKWIRE.
   d. If the jumper block is not in the correct position, carefully grasp it with your fingers and remove it. Then reinstall it in the correct position.

Exhibit 6–4: Location of the Ethernet Jumper Block and Standard/ThinWire Switch



Install the Ethernet Controller Module

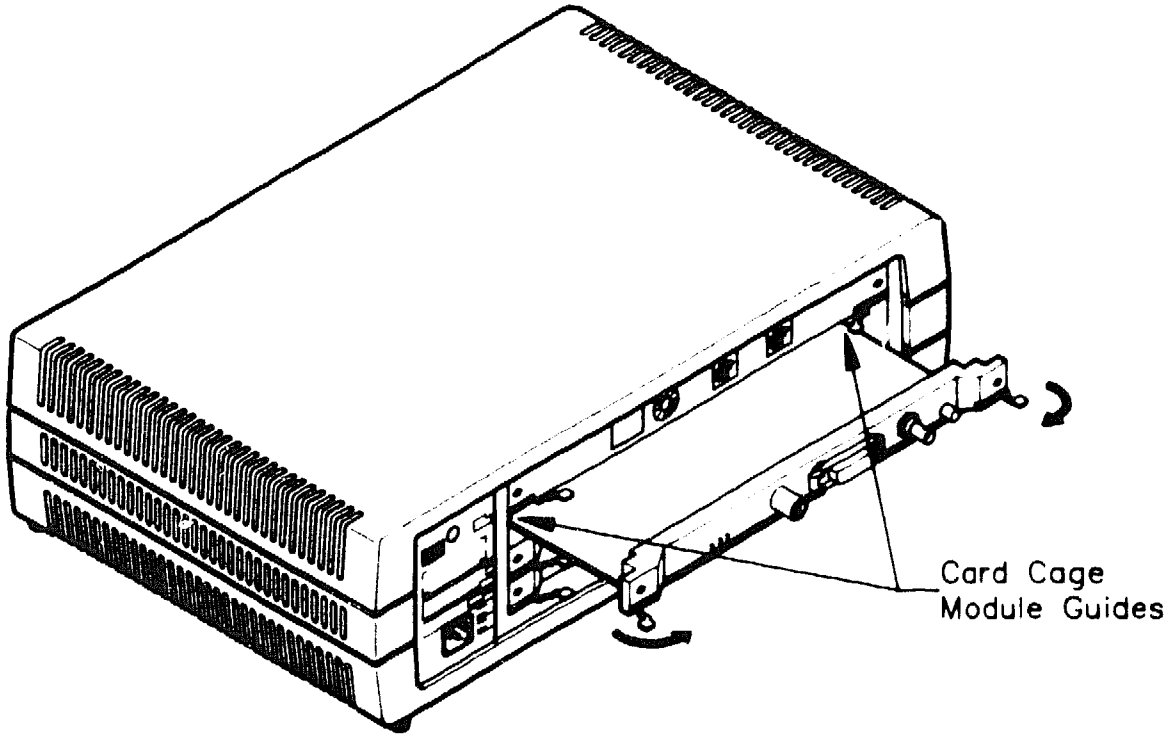
Install the module into the server.

CAUTION

You must wear an antistatic wrist strap to avoid damaging the module. The wrist strap must be connected to server ground.

1. Make sure that the server power is still off.
2. Hold the module up to the Ethernet module slot with the component side facing up towards the CPU module.
3. Align the module with the card cage guides and slide it into the slot until it engages the backplane. The module handle should be about 1/4 inch from being flush with the CPU module handle.
4. To seat the module fully, simultaneously pull the two release levers in (towards each other). The module handle should now be flush with the CPU module handle.
5. Press in the two 1/4–turn fasteners and turn them clockwise to secure the module.

Exhibit 6–5: Installing the Ethernet Controller Module



LKG-3360-89A

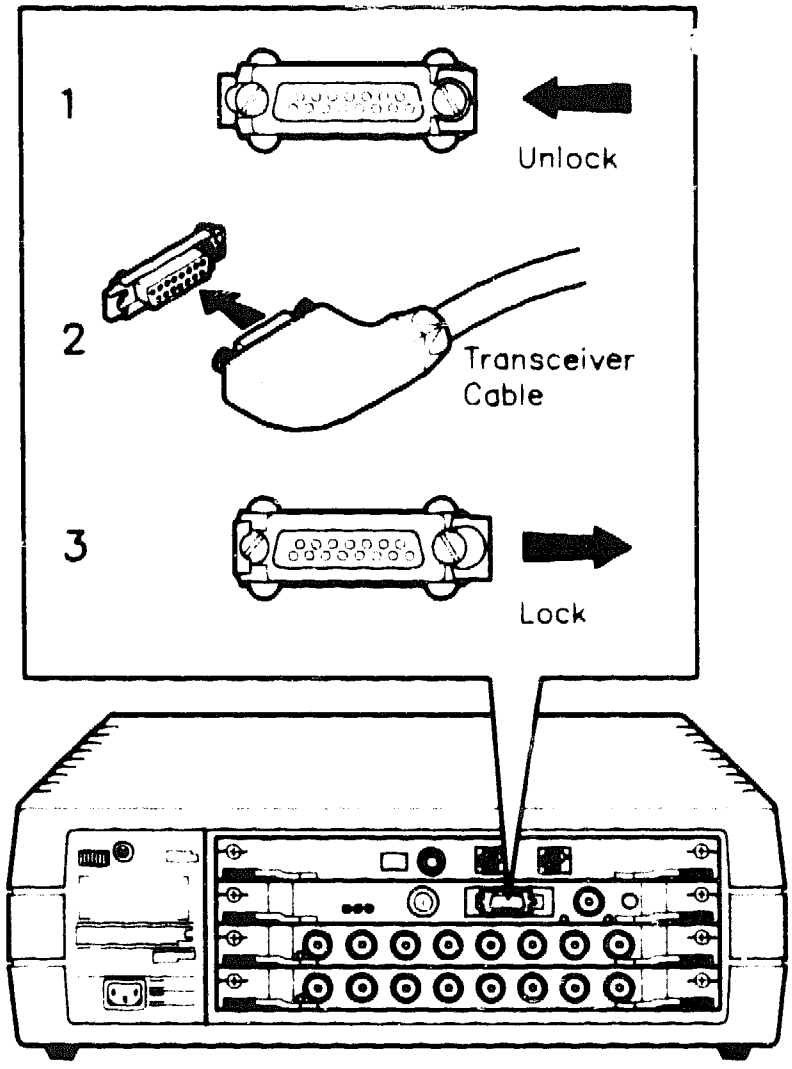
Connect the Ethernet Controller to the Standard Ethernet LAN

Connect the cable from the transceiver or other standard Ethernet device to the Ethernet controller. Do not perform this procedure if you are installing the server to a ThinWire Ethernet.

1. If necessary, unlock the slide latch on the server's Ethernet connector.
2. Connect the transceiver cable to the server's Ethernet connector. The cable should have a right-angled end connector.
3. Lock the slide latch on the Ethernet connector. Tug gently on the cable to make sure that it is securely connected.
4. Go to the "Test the New FRU" procedure at the end of this chapter.

CAUTION

Installing or removing the Ethernet cable or pressing the standard/ThinWire switch while the server power is on could cause the server to reset.



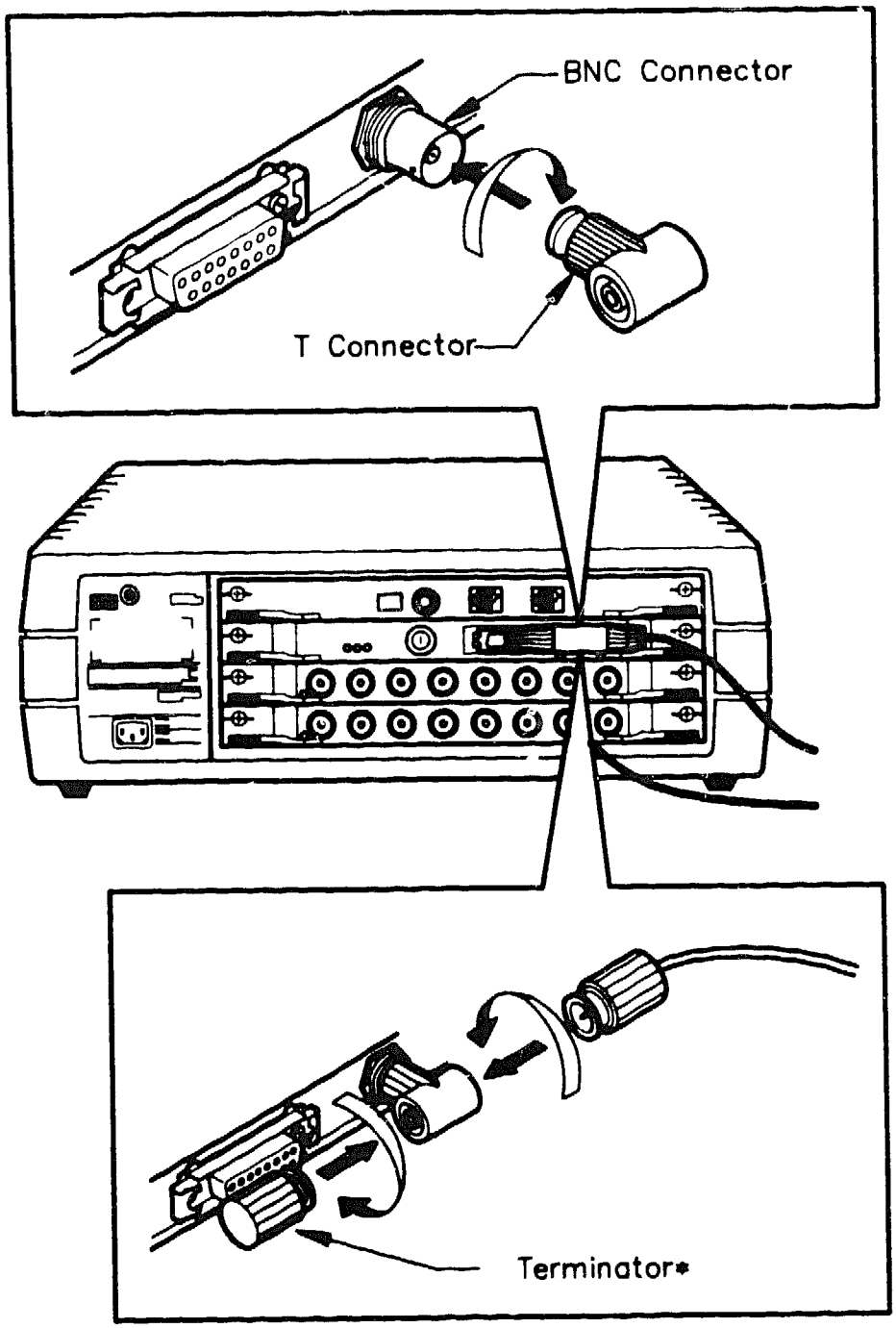
LKG–3361–89A

Connect the Ethernet Controller to the ThinWire Ethernet LAN

If the Ethernet controller is configured for ThinWire Ethernet, connect the cable from the Ethernet device to the Ethernet controller.

1. Locate the T connector on the ThinWire Ethernet LAN cable.
2. Hold the T connector so that the crossbar portion of the T is in a horizontal position. Then install the connector onto the BNC connector, which is located on the front of the Ethernet controller module.
3. If the server is the last device in the Ethernet network, perform the following:
   a. Install a terminator to the T connector.
   b. Go to the "Test the New FRU" procedure at the end of this chapter.
4. If the server is not the last device in the network, you must perform the procedure "Install the ThinWire Ethernet Strain–Relief Clamp."

Exhibit 6–7: Connecting to the ThinWire Ethernet LAN



*If this is the last device.

LKG–3362–89A

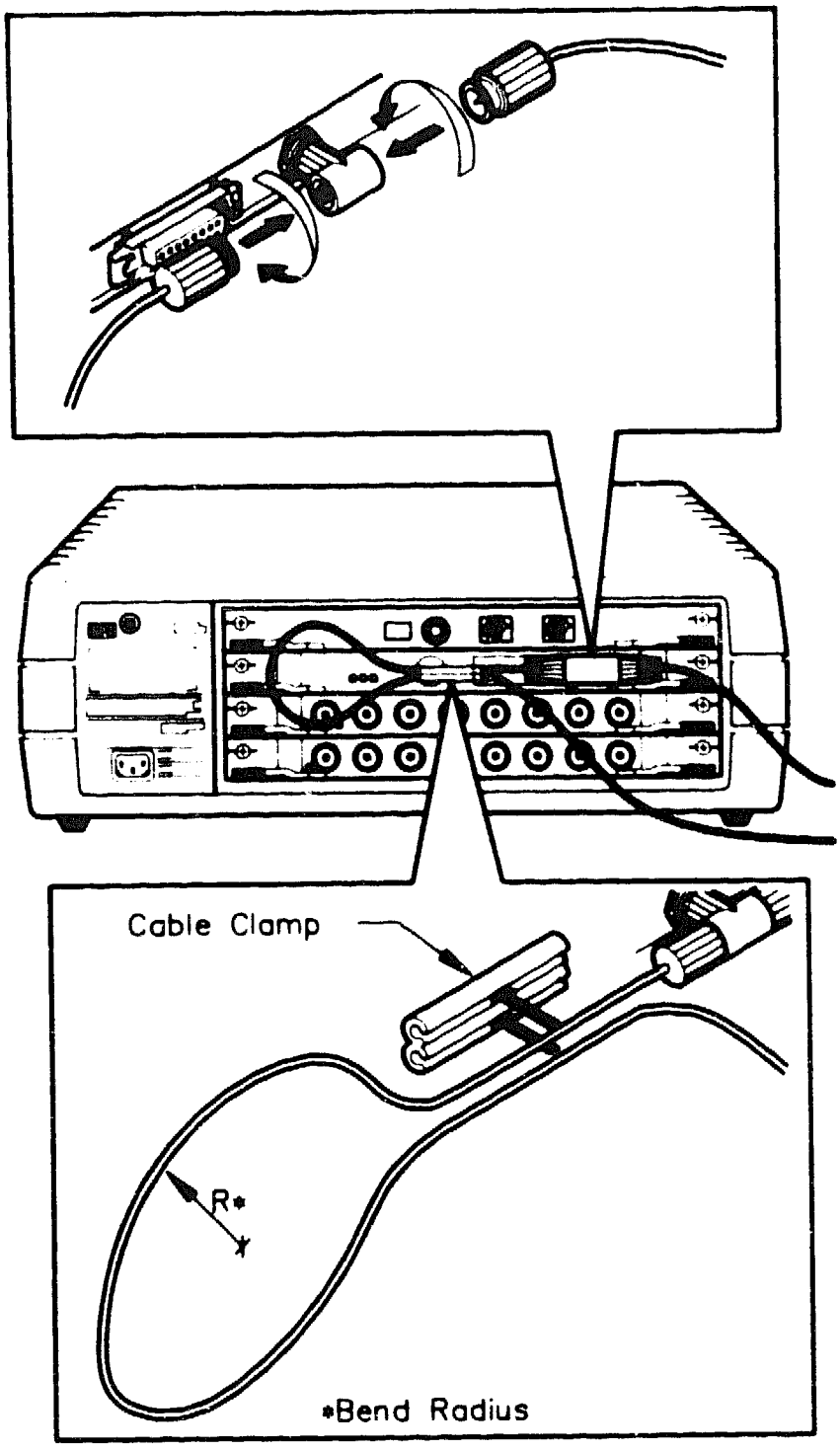
Install the ThinWire Ethernet Strain–Relief Clamp

You must connect the strain–relief clamp and adhere to the minimum bend radius if the server is not the last device in the ThinWire Ethernet network.

If the server is not the last device in the ThinWire Ethernet network, perform the following:

1. Put the cable going to the next device in a loop, making sure that you do not crimp the cable.
2. Make sure that the loop has at least a 4–centimeter (1.6–inch) minimum bend radius. To get the bend radius, you measure the distance from the center of the cable loop to the cable.
3. Use the ThinWire strain–relief cable clamp to secure the cable.
4. Go to the "Test the New FRU" procedure at the end of this chapter.

Exhibit 6–8: Installing the ThinWire Strain-Relief Clamp



LKG- 3411-89A

Unpack the CXM04 Line Card and Set the Device Address Switch

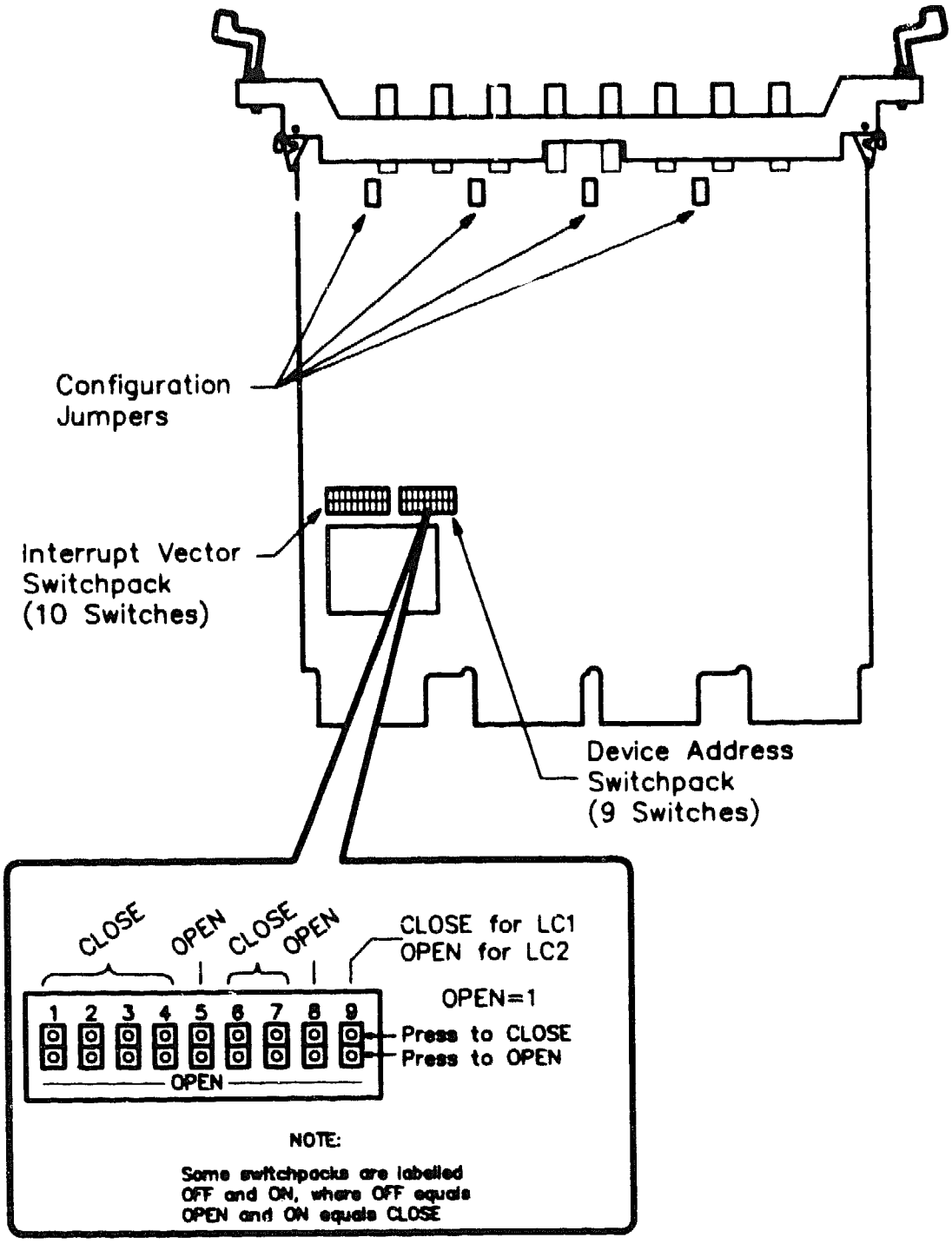
Unpack the replacement CXM04 line card and check for damage. Set the device address switch for the LC1 or LC2 slot.

CAUTION

You must wear an antistatic wrist strap to avoid damaging the module. The wrist strap must be connected to server ground.

1. Before opening the shipping container, look for external damage such as dents, holes, or crushed corners.
2. Open and unpack the container. Use the container and packing materials to return the faulty module to Digital Equipment Corporation.
3. Inspect the components on the module for shipping damage. Carefully check the module for cracks, breaks, and loose components. Report any damage to the shipper and notify the Digital representative.
4. Locate the line card device address switch. This is a 9-position switch.
5. Make sure that pins 1 through 4, 6, and 7 are closed.
6. Make sure that pins 5 and 8 are open.
7. Set pin 9 to close if the line card is to be installed in slot LC1. (The device address is 17760440.)
8. Set pin 9 to open if the line card is to be installed in slot LC2. (The device address is 17760460.)

Exhibit 6–9: Setting the CXM04 Device Address Switch



LKG-3487-89A

Set the CXM04 Vector Address/CCU Present Switch and Jumpers

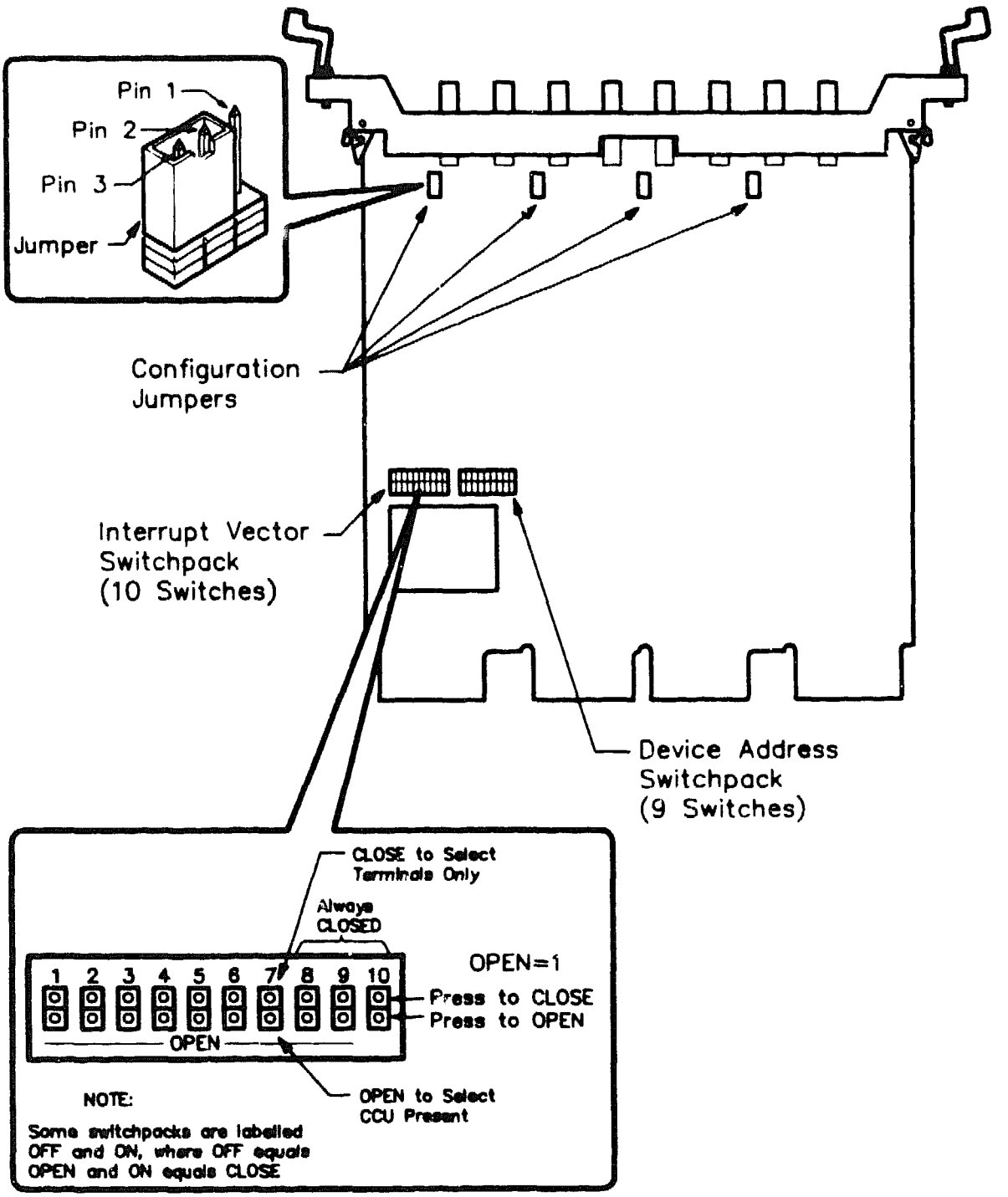
Set the vector address switch for the line card slot. Set the CCU present switch and jumpers to accept either 3270 terminals and CCU (4 ports) or 3270 terminals only (8 ports).

CAUTION

You must wear an antistatic wrist strap to avoid damaging the module. The wrist strap must be connected to server ground.

1. Locate the line card vector address switch. This is a 10–position switch.
2. Make sure that pins 3, 6, and 8 through 10 are closed.
3. Make sure that pins 4 and 5 are open.
4. Set pin 1 to open and pin 2 to close if the line card is to be installed in slot LC1. (This is interrupt vector 310.)
5. Set pin 1 to close and pin 2 to open if the line card is to be installed in slot LC2. (This is interrupt vector 320.)
6. Pin 7 of this switch is the CCU present switch. Set this pin to open to select the CCU/3270 terminal (4–port) configuration. Set this pin to close to select the 3270 terminal only (8–port) configuration.
7. Locate the four jumpers on the card.
8. If the line card is to connect to 3270 terminals and a CCU, make sure that the jumpers are installed on pins 2 and 3. This is the factory default setting.
9. If the line card is to connect to 3270 terminals only, remove the jumpers and install them on pins 1 and 2.

Exhibit 6–10: Setting the CXM04 Vector Address/CCU Present Switch and Jumpers



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Install the CXM04 Line Card

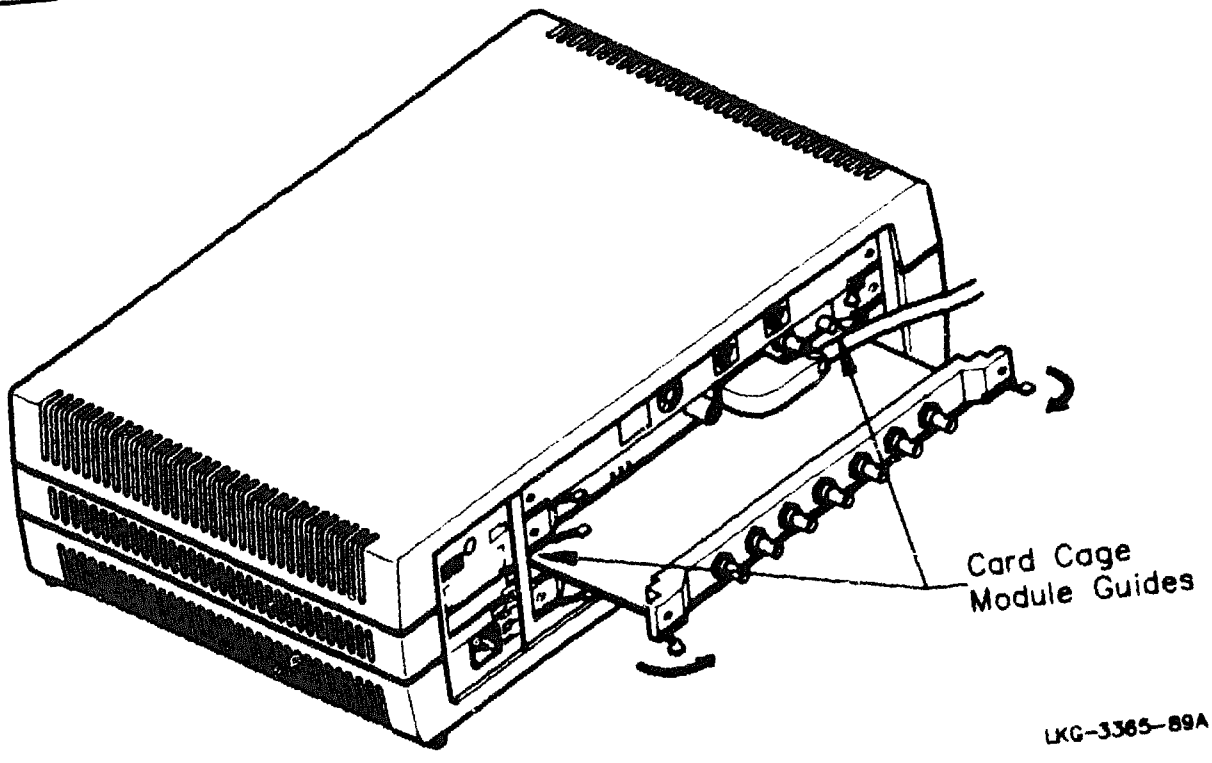
Install the module into the server.

CAUTION

You must wear an antistatic wrist strap to avoid damaging the module. The wrist strap must be connected to server ground.

1. Make sure that the server power is off.
2. Hold the module up to either the LC1 or LC2 slot with the component side facing up towards the CPU module.
3. Align the module with the card cage guides and slide it into the slot until it engages the backplane. The module handle should be about 1/4 inch from being flush with the adjacent module handle.
4. To seat the module fully, simultaneously pull the two release levers in (towards each other). The module handle should now be flush with the adjacent module handle.
5. Press in the two 1/4–turn fasteners and turn them clockwise to secure the module.

Exhibit 6–11: Installing the CXM04 Line Card



Connect the Cables to the CXM04 Line Card

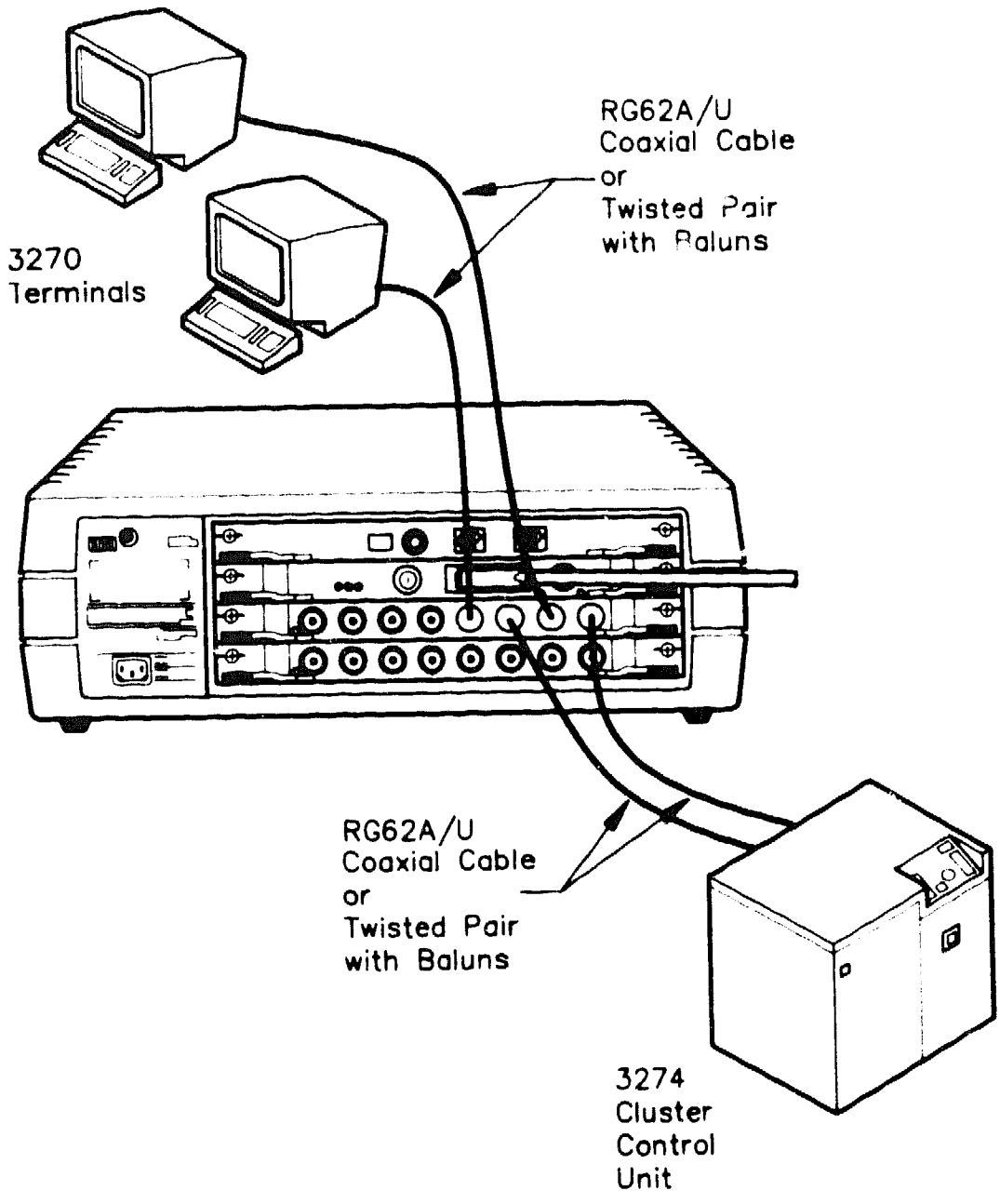
Reinstall the 3270 terminal and CCU cables.

If you labeled the cables before removing the old CXM04 line card, then reinstall the cables exactly as they were connected to the old line card. Install the first cable to the rightmost connector, then install each cable to the next adjacent connector.

If the cables are unmarked, perform the following:

1. If you have a 3270 terminal only configuration (no CCU), connect the terminal cables to the connectors starting with the rightmost connector. Lock the cable in place by turning the connector clockwise.
2. If you have a CCU and 3270 terminal configuration, perform the following:
   a. Locate the 3270 terminal cable and the cable to the terminal's associate CCU line.
   b. Connect the cable from the CCU to the rightmost connector on the line card. Lock the cable in place by turning the connector clockwise.
   c. Connect the cable from the associated 3270 terminal to the adjacent connector. Lock the cable in place by turning the connector clockwise.
   d. Locate the next pair of cables from the CCU and associated 3270 terminal. Connect these cables to the next two connectors with the CCU cable connecting to the rightmost connector.
   e. Repeat the previous step for the third and fourth pairs of CCU and associated 3270 terminal cables.
3. Go to the "Test the New FRU" procedure at the end of this chapter.

Exhibit 6–12: CCU and 3270 Terminal Cable Configuration



Unpack the DECserver 510 Enclosure and Install the Modules

Unpack the enclosure and check for damage. Install each module into the enclosure using the procedures previously listed in this chapter.

1. Before opening the shipping container, look for external damage such as dents, holes, or crushed corners.
2. Open and unpack the container. Use the container and packing materials to return the faulty enclosure to Digital Equipment Corporation.
3. Inspect the enclosure for shipping damage. Report any damage to the shipper and notify the Digital representative.
4. Install the CPU module using the procedure listed in the following exhibit.
5. Install the Ethernet controller module using the procedures listed in the following exhibit.
6. Configure and install the CXM04 line card using the procedures listed in the following exhibit.
7. If the server is to be placed on a tabletop, first place the server and then connect the cables to the Ethernet controller and CXM04 line cards, using the following procedures as appropriate:
   a. "Connect the Ethernet Controller to the Standard Ethernet LAN"
   b. "Connect the Ethernet Controller to the ThinWire Ethernet LAN"
   c. "Install the ThinWire Ethernet Strain–Relief Clamp"
   d. "Connect the Cables to the CXM04 Line Card"
8. If the server is to be installed in a rack, you must remove the plastic enclosure, remove 2 screws from the server, install the brackets, install the server to the rack, and connect the cables. The following pages give the details for these procedures.

CPU Module

Use the procedure on pages 6–2 and 6–3 to install the module into the server enclosure.

Ethernet Controller Module

Use the procedure on pages 6–4 and 6–5 to check the configuration switches.

Use the procedure on pages 6–8 and 6–9 to configure the Ethernet controller for standard or ThinWire Ethernet.

Use the procedure on pages 6–10 and 6–11 to install the controller into the server enclosure.

CXM04 Line Card

Use the procedure on pages 6–18 and 6–19 to check the device address switch settings. It is very important to set the device address for the appropriate slot (LC1 or LC2).

Use the procedure on pages 6–20 and 6–21 to check the vector address and CCU present switch settings. The procedure to check the jumpers is also on these pages.

Use the procedure on pages 6–22 and 6–23 to install the line cards into the server enclosure.

NOTE

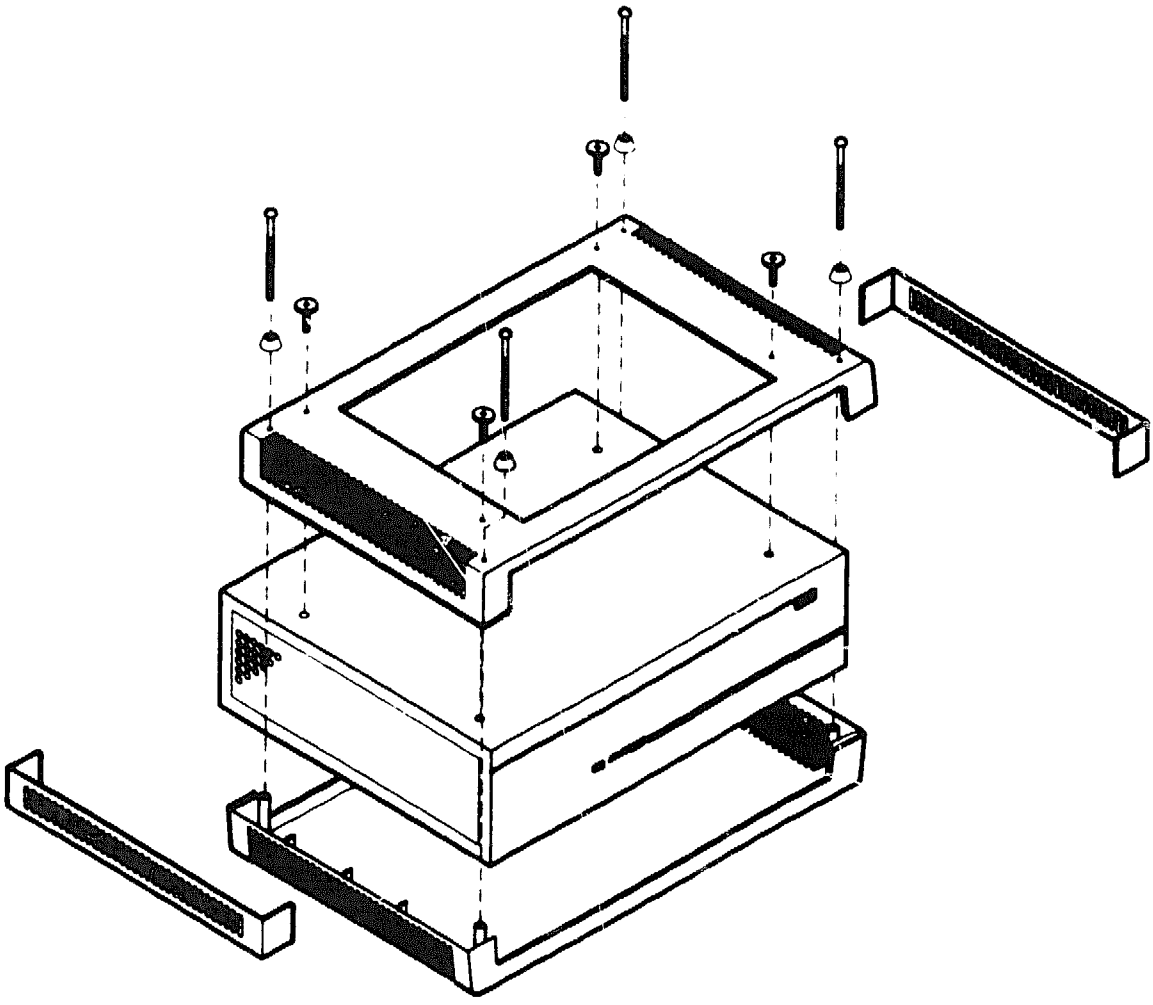
Install the server in its proper location before you install the cables.

Remove the Plastic Enclosure – to Install the Server to a Rack

If you intend to install the server to a rack, remove the eight screws that hold the server's plastic enclosure in place.

1. Remove the 8 screws from the bottom of the server hardware Four of these screws are part of the rubber feet.
2. Remove the plastic enclosure (4 pieces).
3. Reassemble and store the enclosure for future use (in case you wish to reconfigure the server back to a tabletop unit at some future time).

Exhibit 6–14: Removing the Server Plastic Enclosure



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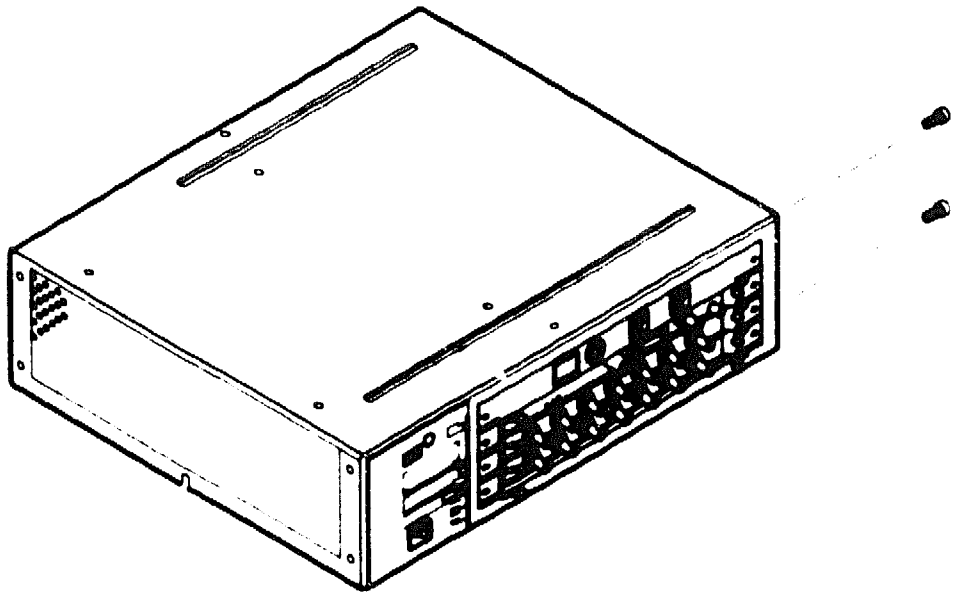
Remove the Two Side Screws and Install the Rack–Mount Brackets

After you remove the plastic enclosure, you need to install the rack–mount brackets to the server.

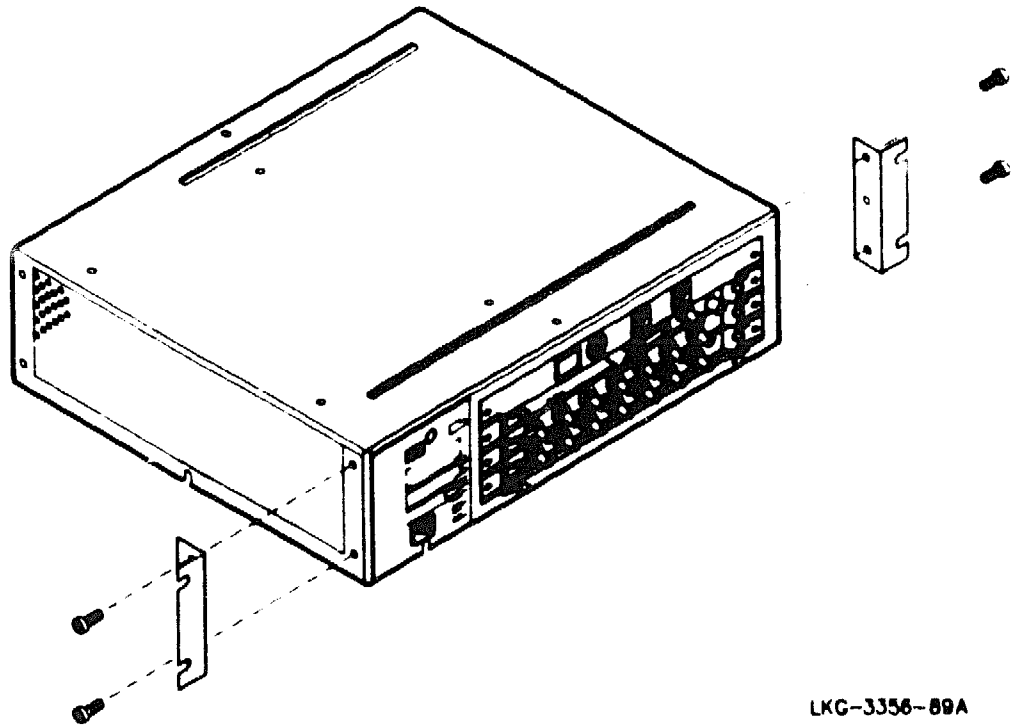
1. Remove the 2 screws from the right side of the server, as you are facing the module end of the server.
2. Locate the two brackets and four 8–32 Phillips–head screws with lockwashers. These were supplied with the original enclosure. If the original enclosure was installed to the rack, then remove this hardware from the original enclosure.
3. Use the screws to install the brackets to the sides of the server.

Exhibit 6–15: Removing the Side Screws



LKG-3355-89A

Exhibit 6–16: Installing the Brackets



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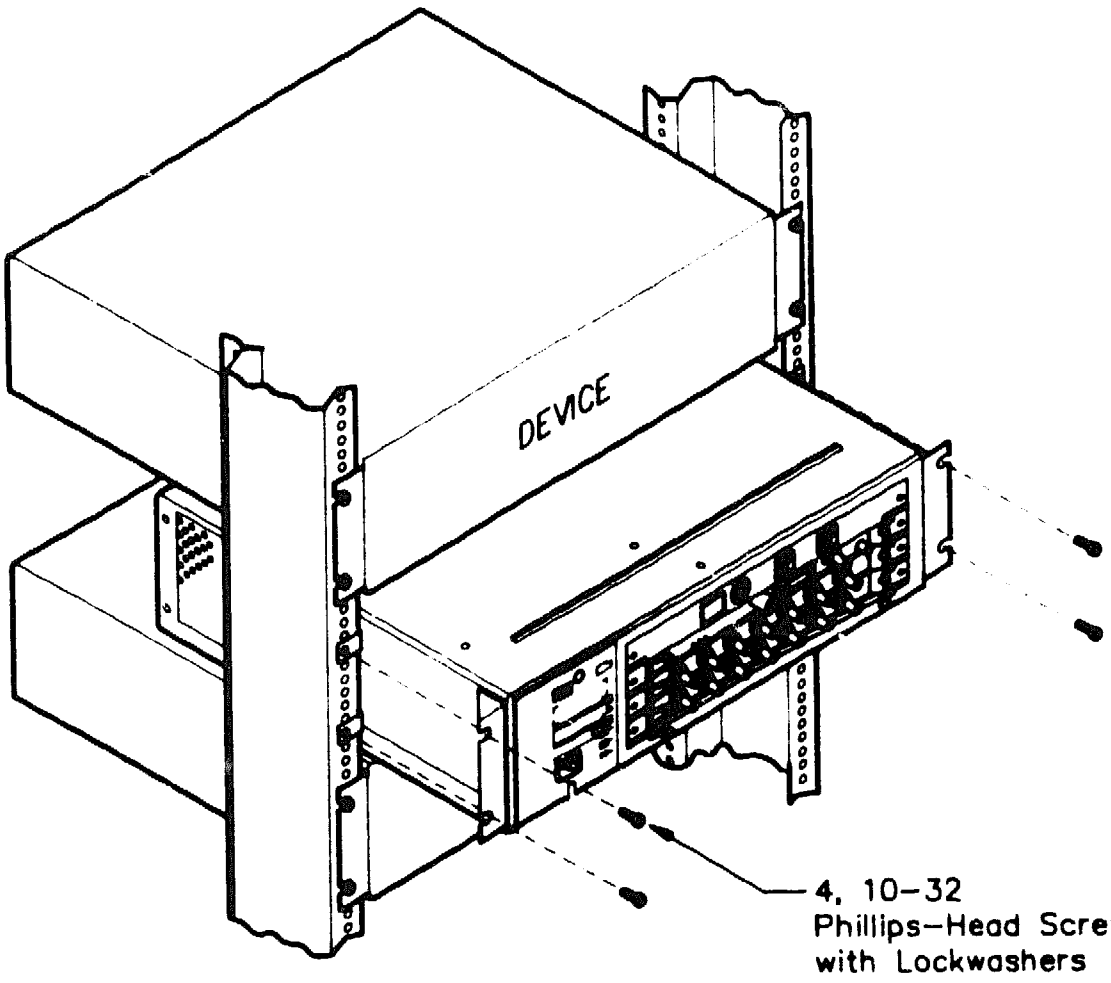
Install the Server to the Rack

Once you have installed the rack–mount brackets, the server can be mounted in a standard 48–centimeter (19–inch) RETMA rack cabinet.

1. Locate the 4 screws with lockwashers and 4 u–nuts provided with the server. If the original server was installed to the rack, then this hardware might still be installed to the rack. In this case, proceed to step 4.
2. Determine where you will mount the server in the rack. Be sure to leave 9 cm (3.5 in) of space between the server and the next device below the server in the rack to allow cables to pass to the back of the rack.
3. Install the u–nuts to the cabinet rails.
4. Use the 4 screws to secure the server and brackets to the rack.

Exhibit 6–17: Installing the Server to a Rack



LKG–3357–89A

Test the New FRU

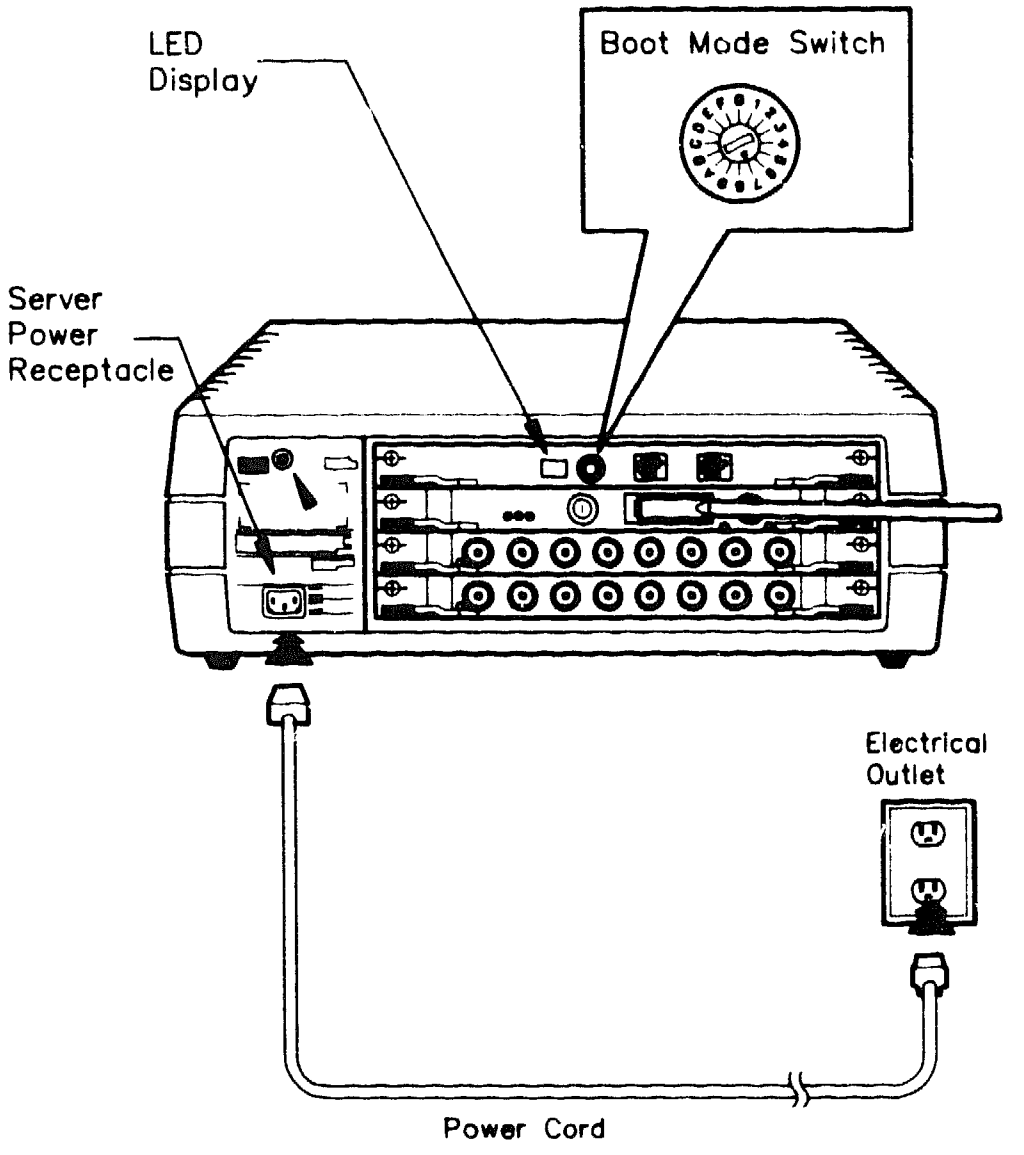
If you have a local console terminal available, run boot mode 2; otherwise, run boot mode 7.

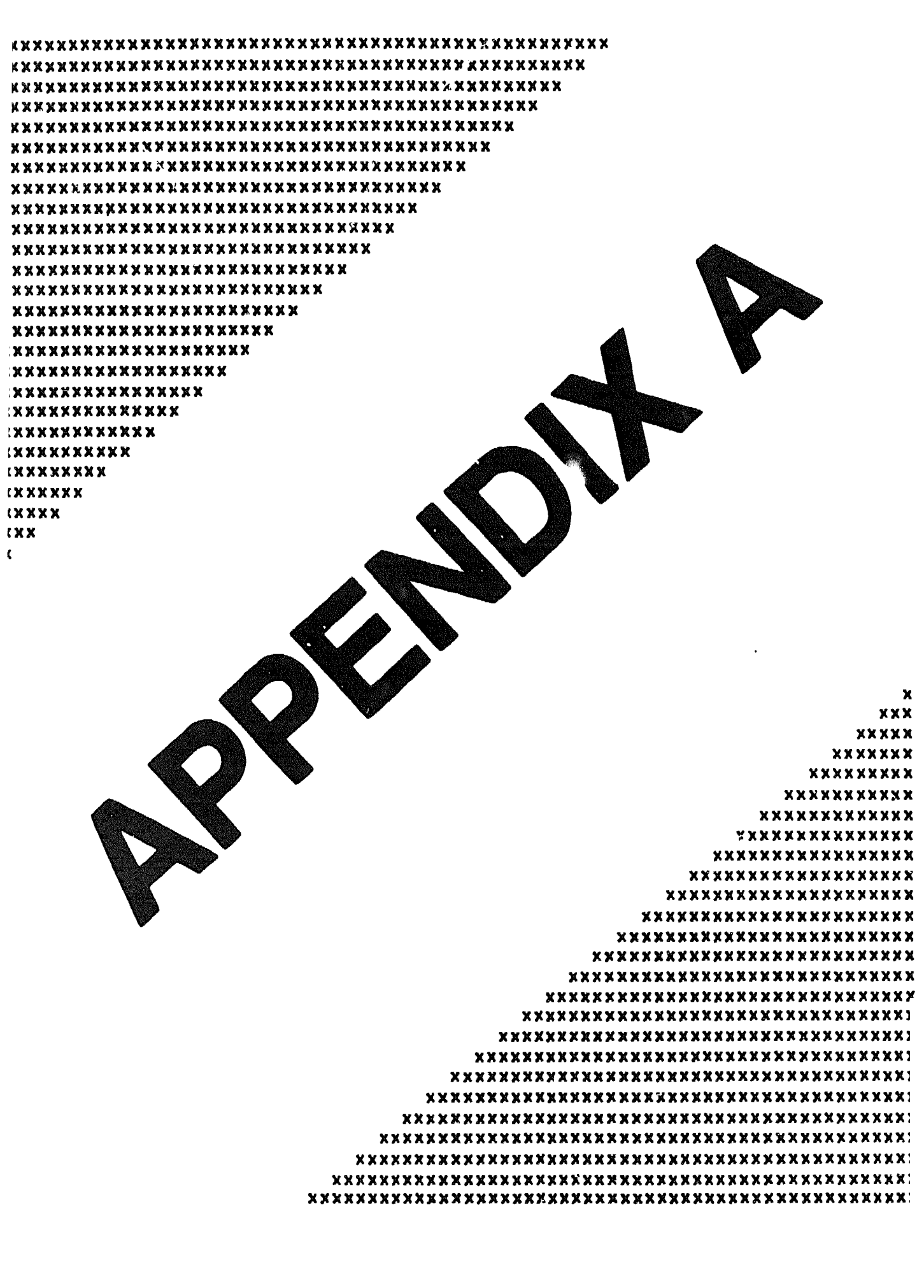
1. If a local console terminal is available, perform the following:
   a. Connect the terminal to the local console port as described on pages 1–20 and 1–21.
   b. Use a small screwdriver to set the boot mode switch to 2.
   c. Power on the server by plugging the power cord into the appropriate outlet.
   d. Verify that the LED display on the CPU module shows the diagnostic test being run, then displays a 1/6.
   e. Enter the following commands at the local console prompt (Console >):

```
Console>DESEL/Test:ALL [RET]
Console>SEL/Test:SYS [RET]
Console>START/EOP:1 [RET]
```

   f. Observe the local console for error information. If the test succeeds, the message "End of Pass 1" is displayed. If the test fails, the message "*n* errors" is displayed (*n* equals the number of errors detected). If the test fails, go to the appropriate chapter to troubleshoot the problem.
2. Use a small screwdriver to set the boot mode switch to 7 (whether or not a console terminal is available).
3. Reset the server by first unplugging the power cord and then plugging it into the appropriate outlet.
4. Verify that the LED display on the CPU module shows the diagnostic tests being run. Afterwards, the display shows a B/1 or B/2 if software is not installed on a load host. If software is installed on a load host, the display shows a B/4, then a 0/8 indicates that the software is running normally.

Exhibit 6–18: Setting the Boot Mode Switch




APPENDIX A

A

Parts List

This appendix contains information on the following:

- FRU part numbers
- Hardware accessories part numbers
- Cable and power cord part numbers
- DECserver 500 software document part numbers
- 3270 Terminal Option and Terminal Server Manager software document part numbers
- DECserver 510 hardware document part numbers

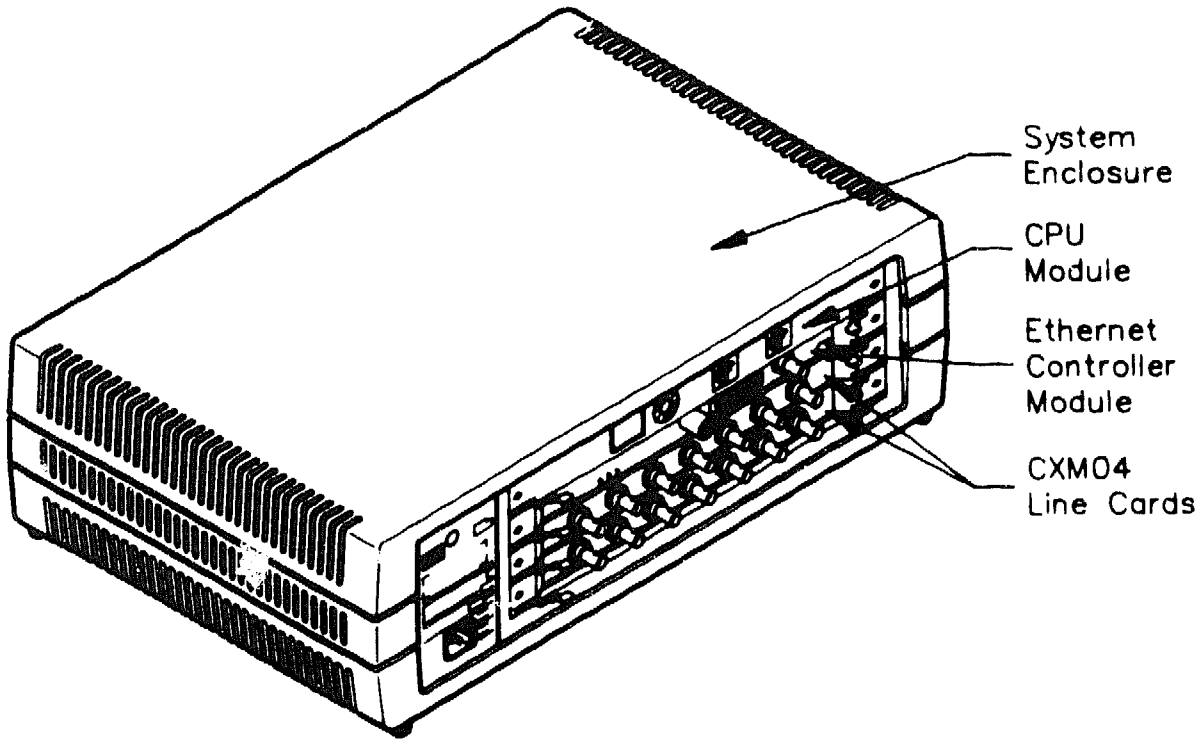
FRU Part Numbers

The DECserver 510 consists of four different FRUs.

The order code for a complete DECserver 510 hardware system is DSRVN–AA. The following lists the part number for each FRU:

FRU	Part Number
System enclosure	BA216–A2
CPU module	KDJ11–SD
Ethernet controller module	DESQA–SF
CXM04 line card	F6–M3134–PA

Exhibit A–1: DECserver 510 Hardware



LKG–3476–89A

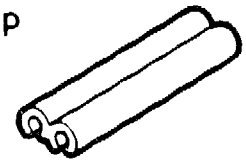
Hardware Accessory Part Numbers

There are various accessories available for the DECserver 510 hardware. These include console terminal, loopback connectors, and rack mount kit.

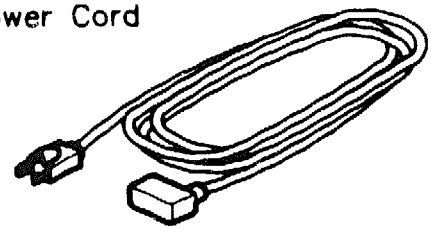
Accessory	Part Number
ThinWire loopback connector, which consists of one H8223 T connector and two H8225 terminators	H8223/H8225
Standard Ethernet 15–pin loopback connector	12–22196–01
BNC barrel connector	H8224
Console terminal	Any asynchronous EIA–423–A or EIA–232–D terminal
CXM04 coaxial loopback cable – used to test the CXM04 line card ports	BC16K–02
ThinWire strain–relief clamp	12–29702–01
Etherjack kit – used to cover and secure the transceiver cable connections	DEXJK
Rack mount kit	H041–AC
Mounting panel for adapting a rack mount patch panel to the CXM04 line card	H3107–F

Exhibit A–2: DECserver 510 Hardware Accessories Shipped with the Server

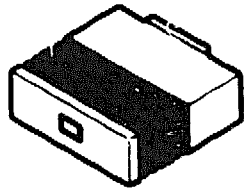
☐ ThinWire Strain–Relief Clamp



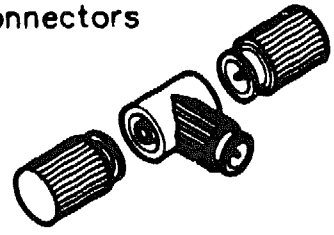
☐ Power Cord



☐ Ethernet Loopback Connectors



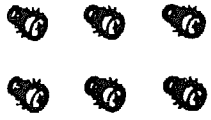
Standard



ThinWire (T Connector and Two Terminators)

☐ 4 Barrel Connectors

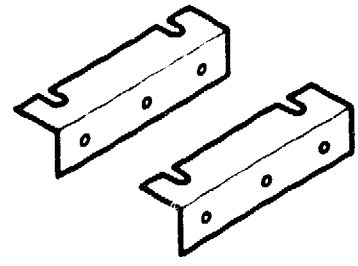
☐ Rack Mount Kit



6 Screws with Lockwashers (8–32)

4 U–Nuts

4 Screws with Lockwashers (10–32)



2 Brackets

LKG–3352–89A

Cable Part Numbers

There are various Ethernet and terminal cables available for the DECserver 510 hardware.

The BC16E cable is available for connecting a console terminal to the server. The H8571 passive adapters are used to connect an EIA–232–D terminal or printer to the server's local console port.

There are a variety of Ethernet cables available. The BNE3 cable is for a standard Ethernet and comes in PVC or FEP. PVC cable is for use in air spaces that are not environmentally controlled. FEP cable is for use on return–air conduits. This cable is available in lengths of 5 meters (16.4 feet), 10 meters (32.8 feet), 20 meters (65.6 feet), and 40 meters (131.2 feet).

The BNE4 office cable is also a standard Ethernet cable and is available in PVC version only. This cable is a smaller diameter than the BNE3 cable, which makes it ideal for use in office environments. However, the cable signal loss is four times greater than with the BNE3 cable. This cable is available in lengths of 2 meters (6.6 feet) and 5 meters (16.4 feet).

ThinWire Ethernet cable is also available in PVC and FEP versions and is used in ThinWire Ethernet configurations. The ThinWire cable does not come with BNC connectors. These connectors must be ordered separately.

Exhibit A–3: List of Cable Part Numbers

Cable or Adapter	Part Number
Cable for console terminal	BC16E
8–line Type A coaxial cable (a single cable with 8 separate coaxial lines) – connects 3270 terminals to the CXM04 line card	BC58A–10
25–pin EIA–232–D to EIA–423–A passive adapter for terminals	H8571–A
9–pin EIA–232–D to EIA–423–A passive adapter for printers	H8571–B
Standard Ethernet cable – PVC with a straight connector	BNE3A–*xx*
Standard Ethernet cable – PVC with a right–angle connector	BNE3B–*xx*
Standard Ethernet cable – FEP with a straight connector	BNE3C–*xx*
Standard Ethernet cable – FEP with a right–angle connector	BNE3D–*xx*
Standard office Ethernet cable – PVC with a straight connector	BNE4A–*xx*
Standard office Ethernet cable – PVC with a right–angle connector	BNE4B–*xx*
ThinWire Ethernet cable – PVC 304.8 meter (1,000 foot) roll	H8243–A
ThinWire Ethernet cable – FEP 304.8 meter (1,000 foot) roll	H8244–A
Male BNC connectors for ThinWire Ethernet cable	H8222–A

Power Cord Part Numbers

There are a variety of power cords available for the different countries that order the DECserver 510 hardware.

There are a variety of power cords for the server to accommodate the various electrical requirements of different countries.

Exhibit A–4: List of Power Cord Part Numbers

Country	Part Number
Australia	BN05A–2E
Central Europe	BN03A–2E
Denmark	BN06A–2E
India	BN18M–2E
Ireland	BN02A–2E
Israel	BN18L–2E
Italy	BN07A–2E
New Zealand	BN05A–2E
South Africa	BN18M–2E
Switzerland	BN04A–2E
United Kingdom	BN02A–2E

DECserver 500 Software Document Part Numbers

There are two DECserver 500 software document sets: the complete set that is shipped with the software and the user kit.

The DECserver 510 hardware requires the DECserver 500 software (VMS version). Exhibit A–5 lists the complete set of documentation that ships with the software. This document set can be ordered separately. The order number is QA–03KAA–GZ.

The *DECserver 500 Use* and *Terminal Server User's Reference Card* are also available as a separate user kit. This kit can be ordered by the customer for each terminal server user. The order number is QA–03KAB–GZ.

DECserver 500 Software Product Description

DECserver 500 Introduction

DECserver 500 Software Installation (VMS)

DECserver 500 Use

Terminal Server User's Reference Card

DECserver 500 Management

Terminal Server Commands and Messages

DECserver 500 Commands Quick Reference

Local Area Transport (LAT) Network Concepts

DECserver 500 Problem Solving

Terminal Server Glossary

3270 Terminal Option and Terminal Server Manager Software Document Part Numbers

There are two 3270 Terminal Option software document sets: the complete set that is shipped with the software and the user kit. There is only one Terminal Server Manager documentation set, which consists of two manuals.

The DECserver 510 hardware requires the 3270 Terminal Option software. Exhibit A–6 lists the complete set of documentation that ships with the software. This document set can be ordered separately. The order number is QA–VV9AA–GZ.

All the documents in the set, except for the *3270 Terminal Option Software Product Description* and *3270 Terminal Option Software Installation*, are also available as a separate user kit. This kit can be ordered by the customer for each 3270 Terminal Option user. The order number is QA–VV9AB–GZ.

The TSM software product is optional for the DECserver 510 server. There are three documents that ship with the software. The order number for the TSM document set is QA–VDHAA–GZ.

3270 Terminal Option Documents:

3270 Terminal Option Software Product Description

3270 Terminal Option Software Installation

3270 Terminal Option Use

3270 Terminal Option Keyboard Quick Reference Card

3270 Terminal Option Keyboard Quick Reference Card for ALL–IN–1

3270 Terminal Option Keyboard Quick Reference Card for PCs

3270 Terminal Option Keyboard Template

Terminal Server User's Reference Card

Terminal Server Manager Documents:

Terminal Server Manager Software Product Description

Guide to Terminal Server Manager

Terminal Server Manager Installation Guide

DECserver 510 Hardware Document Part Numbers

There are three DECserver 510 hardware documents.

These documents ship with the hardware and can be ordered separately.

Document	Part Number
DECserver 510 Hardware Installation	EK–DS510–IN
DECserver 510 Hardware Problem Solving	EK–DS510–PS
DECserver 510 Identification Card	EK–DS510–ID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