
INSTALLATION

DECrepeater™ 200

Installation

December 1989

This guide explains how to install the DECrepeater 200 and how to verify its operation. It also describes the DECrepeater 200 controls and indicators. This document is intended for the hardware installer and the system/network manager.

Supersession/Update Information: This is a revised manual to include two new models.

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EK–DEREN–IN–002
December 1989

The postpaid READER'S COMMENTS form on the last page of this document requests the user's critical evaluation to assist in preparing future documentation.

This manual was produced by Networks and Communications Publications.

Contents

4 DECrepeater 200 Installation

5 What To Do If You Have Problems

A DECrepeater 200 Specifications

Figures

Tables

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Preface

This hardware installation guide contains instructions on how to install the DECrepeater 200 unit and also includes procedures to verify its operation.

The only tool used for installation is a phillips-head screwdriver.

Intended Audience

This document is intended for the hardware installer and the system/network manager.

How to Use This Guide

Chapters 1, 2, and 3 provide a functional overview of the repeater and the installation process including important site preparation information. Read these chapters before installing the repeater. Chapter 4 provides the procedures to install and verify the repeater. Chapter 5 provides procedures in the event that problems are encountered during installation. An appendix is included that contains repeater product specifications.

Structure of This Guide

This guide contains five chapters and one appendix, as follows:

Chapter 1	Introduces the repeater from a functional point of view.
Chapter 2	Describes the contents of the shipment and provides instructions for getting help if the shipment is damaged.
Chapter 3	Discusses important site preparation information that must be considered before the installation.

Chapter 4	Provides illustrated procedures for installing and verifying the operation of the repeater.
Chapter 5	Provides help in isolating problems that can occur during the installation and provides procedures to correct them.
Appendix A	Lists the repeater's product specifications.

Related Documentation

Additional information can be found in the following documents. Ordering information is provided at the back of this guide.

- *DECrepeater 200 Problem Solving* (Order No. EK-DEREN-PS)

  The DECrepeater 200 Problem Solving manual is used by field service representatives to isolate problems and to replace defective field replaceable units (FRUs). Instructions for troubleshooting and removal and replacement of FRUs are included in this manual.

- *DECconnect System Planning and Configuration Guide* (Order No. EK-DECSY-CG)

  Contains planning requirements and guidelines for configuring DECconnect networks and networks that use DECconnect products. This guide also contains detailed product information for all DECconnect System components.

- *DECconnect System Facilities Cabling Installation Guide* (Order No. EK-DECSY-FC)

  Describes the steps and procedures for properly installing Ethernet coaxial, twisted-pair data and voice, ThinWire and fiber optic cables within a DECconnect System site. This includes installation procedures for devices directly related to the facilities cabling (such as transceivers and wallboxes).

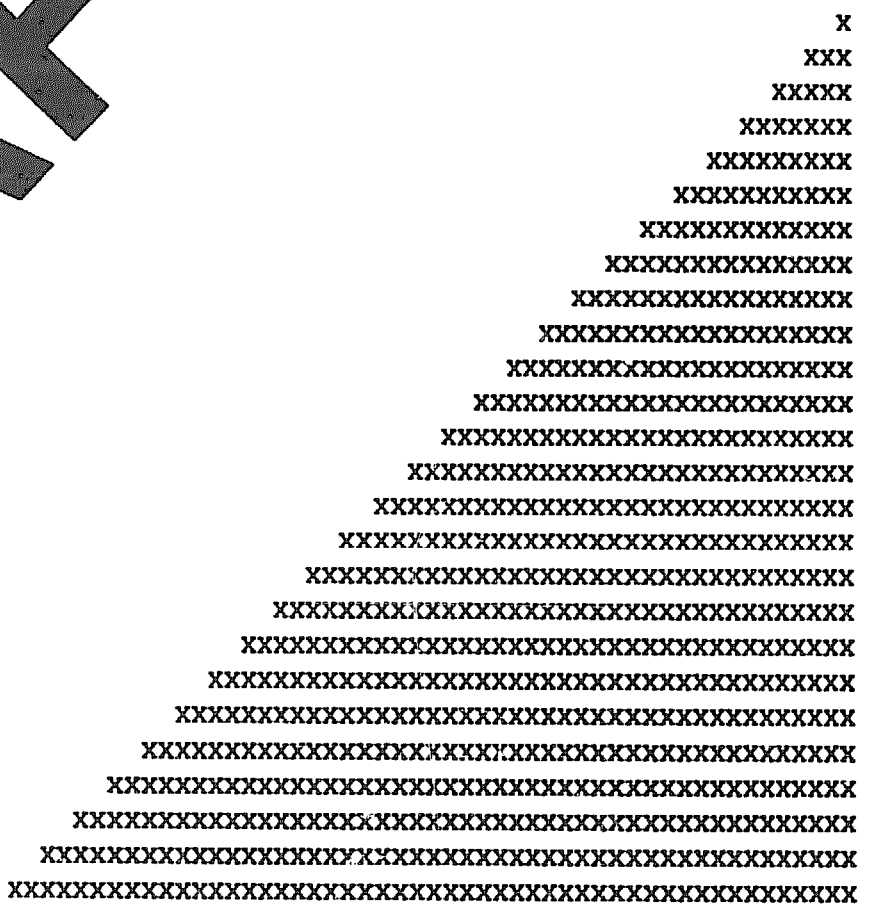
- *DECconnect System Satellite Equipment Room Installation Guide* (Order No. EK-DECSY-SR)

  Describes the steps and procedures for installing the DECconnect System Satellite Equipment Room (SER) active and passive equipment and cables.

- *Networks and Communications Publications Documentation* (Order No. EK-NACPD-RE)

  Lists the title and order number for each publication associated with Digital's Network and Communications products.

CHAPTER 1



1

Overview of the DECrepeater 200

1.1 Introduction

The DECrepeater 200, also referred to as the repeater, is designed to comply with IEEE 802.3 specification and is compatible with Ethernet V2.0 specification. The repeater is used to interconnect, via transceivers and transceiver cables, LAN segments of a 10base5 coaxial cable to another 10base5 coaxial cable or to a fiber optic cable. Two versions of the repeater are discussed in this guide: the local version and the remote version.

The local repeater is used to connect two standard thickwire Ethernets, or two IEEE 802.3 10base5 coaxial cable LAN segments.

The remote repeater is connected to a coaxial cable on one side that is connected to a standard Ethernet/802.3 LAN segment. On the other side it is connected to a fiber optic cable that can be connected to another repeater or bridge.

A repeater retimes, amplifies, and repeats all signals it receives from one coaxial cable segment and passes the signal to the next segment.

The repeater can be installed in a variety of environments, including offices and computer rooms. The unit can be placed on a desk, table, or can be mounted in a standard 19-inch RETMA (Radio Electronic Television Manufacturers Association)* rack cabinet or SER (Satellite Equipment Room) rack.

A wall/partition mounting bracket kit (Order Code H039) can be ordered to suspend the unit from partitioned office walls.

* RETMA racks are standard-sized cabinets that are used by Digital Equipment Corporation and by other major manufacturers of electronic equipment. The cabinet rails, mounting hole patterns, and spacing conform to international standards that allow compatibility with products manufactured by Digital and by others in the industry.

Repeater operation is transparent to other nodes on the LAN and no special software is required on any node.

1.2 Repeater Versions

There are two versions of the DECrepeater 200 product: one local and one remote. The local version has two models and the remote version has four. Each version is described in Table 1-1. Both versions have the same front panel as shown in Figure 1-1. Port B on the I/O backpanel is different for each version and is shown in Figure 1-2.

Table 1–1: Versions of the DECrepeater 200

Version	Model	Description
Local Repeater	DEREN-AA	The local repeater connects 10base5 coaxial cable segments separated by 100 meters (328 feet) or less.
	DEREN-AB*	The distance from the repeater to either segment cannot exceed the maximum allowable transceiver cable length of 50 meters (164 feet). Two transceiver cables provide the maximum distance of 100 meters (328 feet).
Remote Repeater	DEREN-RC	The remote repeater connects a segment of 10base5 cable to a fiber optic link. A fiber optic cable is used to connect two remote repeaters, or to connect a remote bridge and a remote repeater. When connecting two remote repeaters, the fiber optic cable can be up to 1000 meters (3281 feet) in length. When connecting a repeater and a bridge, the fiber optic cable can be up to 1500 meters (4920 feet) in length.
	DEREN-RD*	
	DEREN-RP	
	DEREN-RQ*	
		The fiber optic interface of DEREN-RC/RD is designed to comply with IEEE 802.3 FOIRL specification, whereas the fiber optic interface of the DEREN-RP/RQ is designed to comply with Ethernet V2.0 specification. DEREN/RP-RQ is backward compatible and should be used only for a fiber optic link with DEREP, LAN Bridge 100, and LAN Bridge 150 products. See Table 1-2 for allowable repeater and bridge connections.

*Power cord not supplied, voltage select switch factory set for 240 Vac operation (refer to Table 1-2 to order power cord).

Table 1–2: Allowable Repeater and Bridge Connections

	DEREN-RC/RD	DEREN-RP/RQ	DEBAM-RC/RD	DEBET-R	DEREP-R
DEREN-RC/RD[1]	Yes	No	Yes	No	No
DEREN-RP/RQ[2]	No	Yes[3]	No	Yes	Yes
DEBAM-RC/RD	Yes	No	Yes	No	No
DEBET-R	No	Yes	No	Yes	Yes
DEREP-R	No	Yes	No	Yes	Yes

[1]The fiber optic link of DEREN-RC/RD repeaters is designed to comply with IEEE 802.3 FOIRL specifications.

[2]The fiber optic link of DEREN-RP/RQ repeaters is designed to be compatible with Ethernet V2.0 specifications.

[3]For a fiber optic interrepeater link, DEREN-RC/RD is the preferred solution. DEREN-RP/RQ should be used only for a fiber optic bridge-to-repeater link with DEREP, LAN Bridge 100, and LAN Bridge 150 products.

Figure 1–1: DECrepeater 200

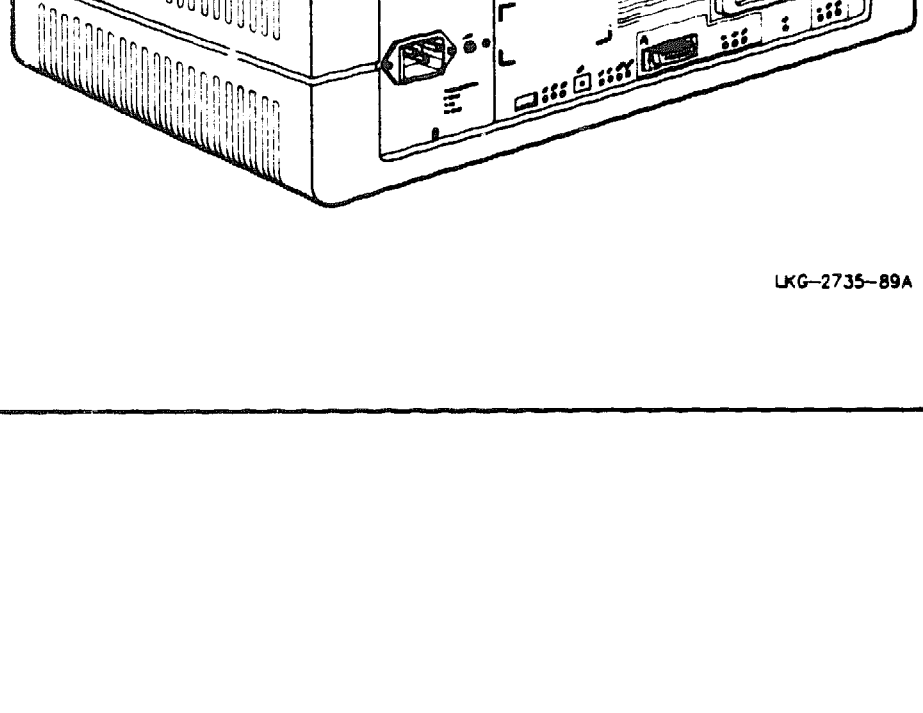


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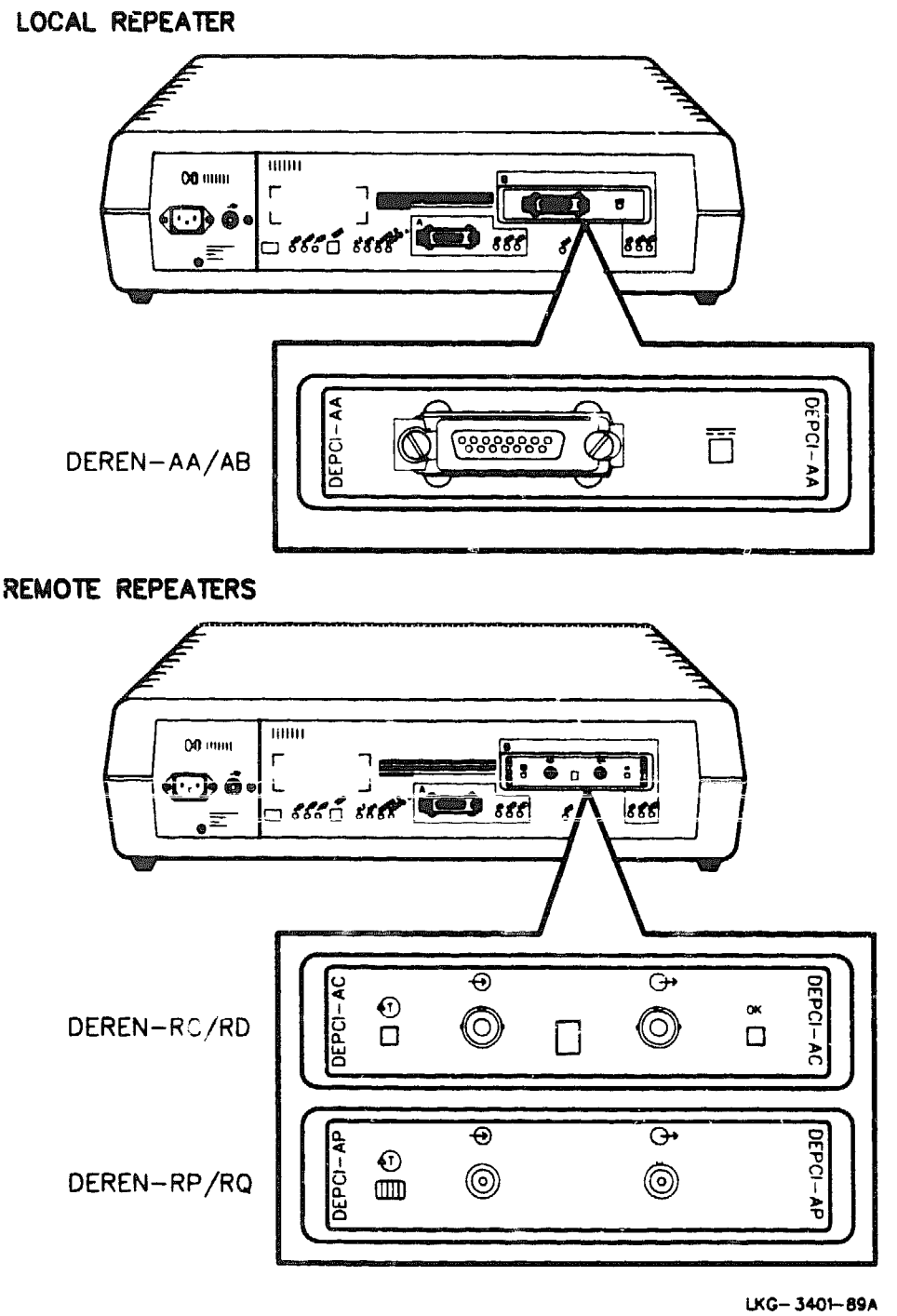
Figure 1–2: DECrepeater 200 I/O Backpanel



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1.2.1 DECrepeater 200 Compatibility

The DECrepeater 200 cannot be used as a standby repeater in any repeater configuration. See Table 1-2 for allowable remote configurations.

1.2.2 Country Power Cords

The DECrepeater 200 unit requires a power cord specific to individual countries. Order codes for country-specific power cords are provided in Table 1-3.

Table 1–3: DECrepeater 200 Power Cord Order Codes

Option	Order Code
United States, Canada	BN20A-2E*
Japan	BN20B-2E
Australia, New Zealand	BN20C-2E
Belgium, Finland, France, Norway, Spain, Sweden, West Germany, Holland	BN20D-2E
Ireland, United Kingdom	BN20E-2E
Switzerland	BN20F-2E
Denmark	BN20H-2E
Italy	BN20J-2E
India, South Africa	BN20K-2E
Israel	BN20L-2E

*Supplied in shipping box with each DEREN-AA/RC/RP only.

1.3 Features

The following is a list of repeater features:

- Repeaters contain an internal self-test feature that simplifies fault isolation.
- The fiber optic interrepeater link can be used between buildings, underground, and in harsh environments.
- The repeater stops repeating to faulty segments until faults are corrected. It then resumes normal signal transmission.

- Diagnostic Light Emitting Diodes (LEDs) located on both local and remote repeaters assist in network troubleshooting.

1.3.1 DEREN-AA/AB

In a 10base5-to-10base5 configuration, the repeater comes with two AUI ports. The AUI port is Ethernet compatible and is designed to comply with IEEE 802.3.

1.3.2 DEREN-RC/RD/RP/RQ

In a 10base5-to-10base5 configuration, the repeater comes with two different interface ports. Port A is an AUI port and Port B is a fiber optic interface. The fiber optic interface allows repeaters to connect to a fiber optic cable. Appendix A lists the fiber optic specifications.

NOTE

The fiber optic interface of DEREN-RC/RD is designed to comply with IEEE 802.3 FOIRL specification, whereas the fiber optic interface of the DEREN-RP/RQ is designed to comply with Ethernet V2.0 specification. DEREN/RP-RQ should be used only for a fiber optic link with DEREP, LAN Bridge 100, and LAN Bridge 150 products. See Table 1-2 for allowable repeater and bridge connections.

1.4 Self-Test

The repeater self-test is performed at two levels: off-line and on-line. Both are discussed in further detail below.

1.4.1 Off-Line Self-Test

While performing off-line self-test, the repeater does not repeat packets from one port to the other port. The TEST LED stays lit while off-line self-test is running. If a fault is detected, the FLT LED lights and the TEST LED remains lit. The repeater cannot be on-line under this condition.

The off-line self-test is performed under the following conditions:

- POWER UP - Internal self-test is automatically performed when the repeater is powered up. All internal logic is tested including logic on the Port B fiber optic module on remote repeaters. Internal self-test does not require loopback connectors or connection to a working media.

- TEST SWITCH - Both internal and external self-test are performed when the TEST switch is momentarily pressed and released. External self-test also tests the transceiver interface and it's associated circuitry for Port A and for Port B. The external loopback of encoded data is first verified on Port A and then on Port B. Test results are observed by noting the conditions of the LEDs on the repeater I/O panel.

1.4.2 On-Line Test

The repeater goes on-line to function as a normal repeater after it has successfully completed the off-line self-test and no faults are detected. The on-line test monitors and responds to fault conditions in the normal repeater mode. If a fault is detected: the FLT LED lights, the TEST LED remains off, and the repeater tries to function as a normal repeater. If the FLT LED lights, the TEST switch is pressed to determine if a hard failure occurred. Faults detected with on-line test probably result from transients and running the off-line self-test will show that no hard faults have occurred. Transient faults can turn the FLT LED on, but they do not permanently interrupt repeater operation.

In a remote repeater network, both repeaters must have self-test invoked individually.

1.5 Repeater Configurations

The following sections provide examples of configurations that utilize both versions (local and remote) of the repeater. Chapter 3 of this guide describes the cables that are available to support your configuration and also provides cable configuration rules for their use. For more information about configuring repeaters and LANs, refer to the *DECconnect System Planning and Configuration Guide*.

Some rules to keep in mind when configuring the repeater include:

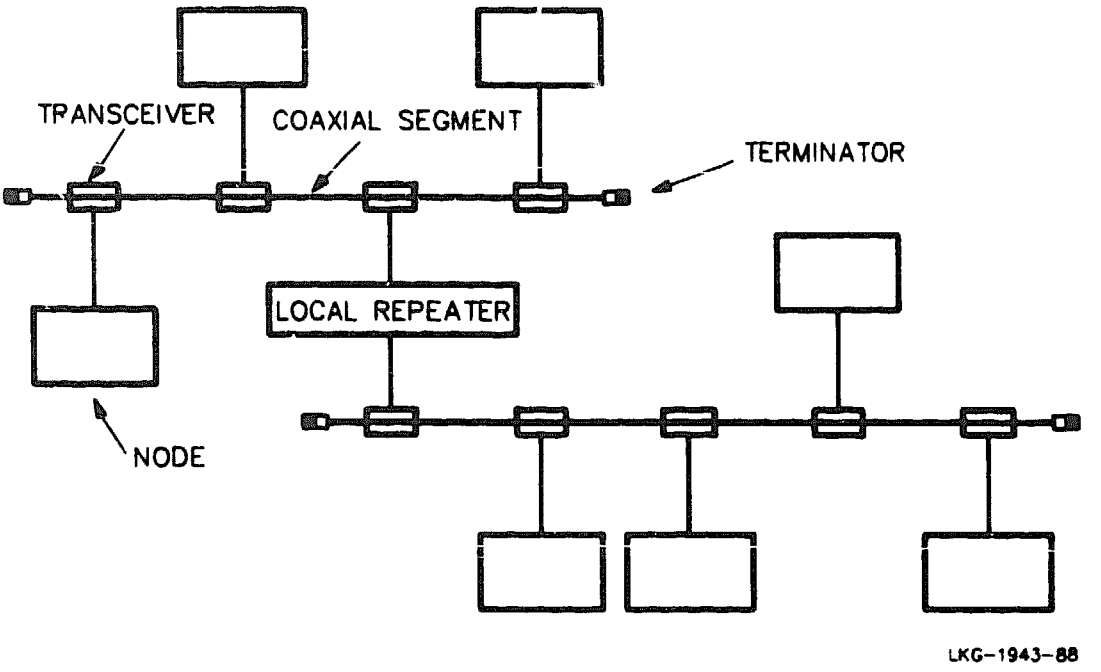
- Repeaters connect 10base5 LAN segments with a maximum of 500 meters (1640 feet) per segment.
- A maximum of four repeaters are used to connect five segments of a LAN. Of the five segments, a maximum of three can be 10base5 coaxial segments. This rule applies to local and remote repeaters.

The maximum length of a LAN using remote repeaters depends on whether two or four repeaters are used, plus the length and type of fiber optic cable used to connect the remote repeaters. Refer to Section 3.2.

1.5.1 Local Repeater Configuration

Figure 1-3 shows a local DECrepeater 200 connecting two LANs that are separated by fewer than 100 meters (328 feet). This is the maximum combined length of the local repeater's transceiver cables, each of which can measure up to 50 meters (164 feet).

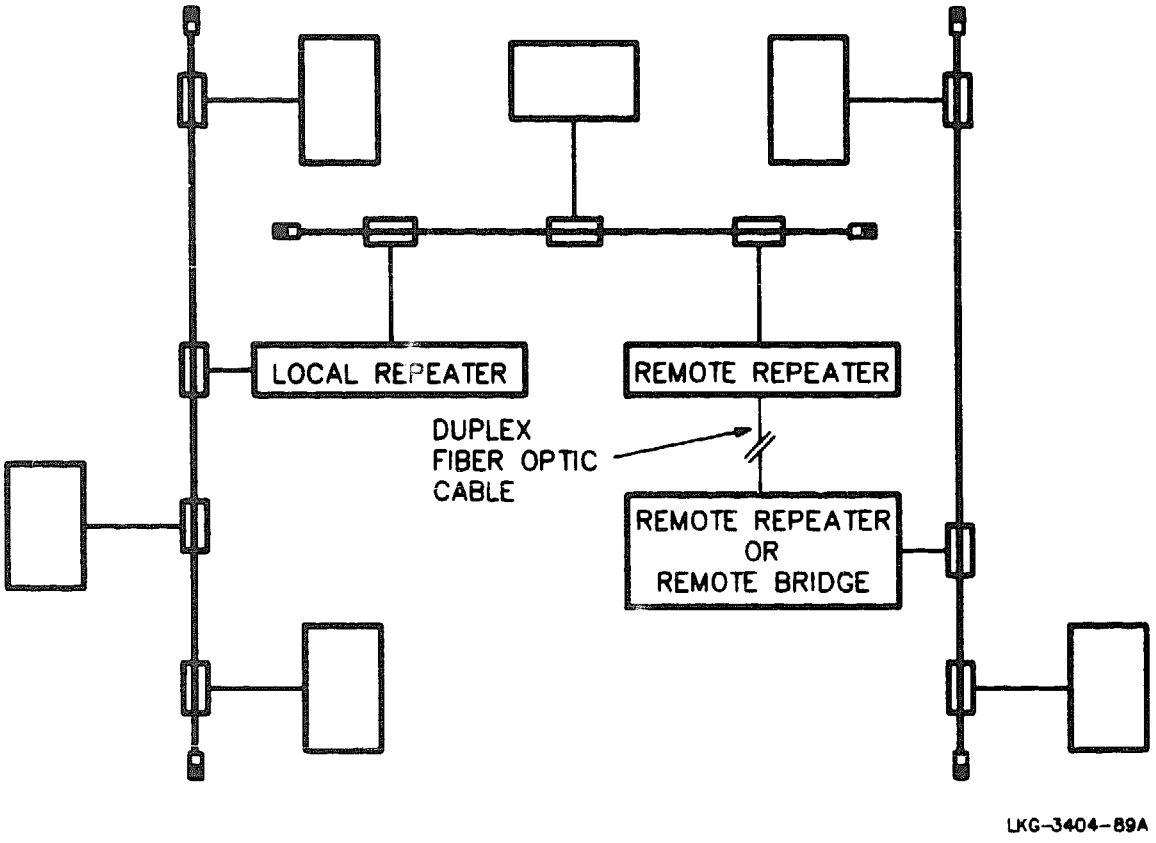
Figure 1–3: Local Repeater Configuration

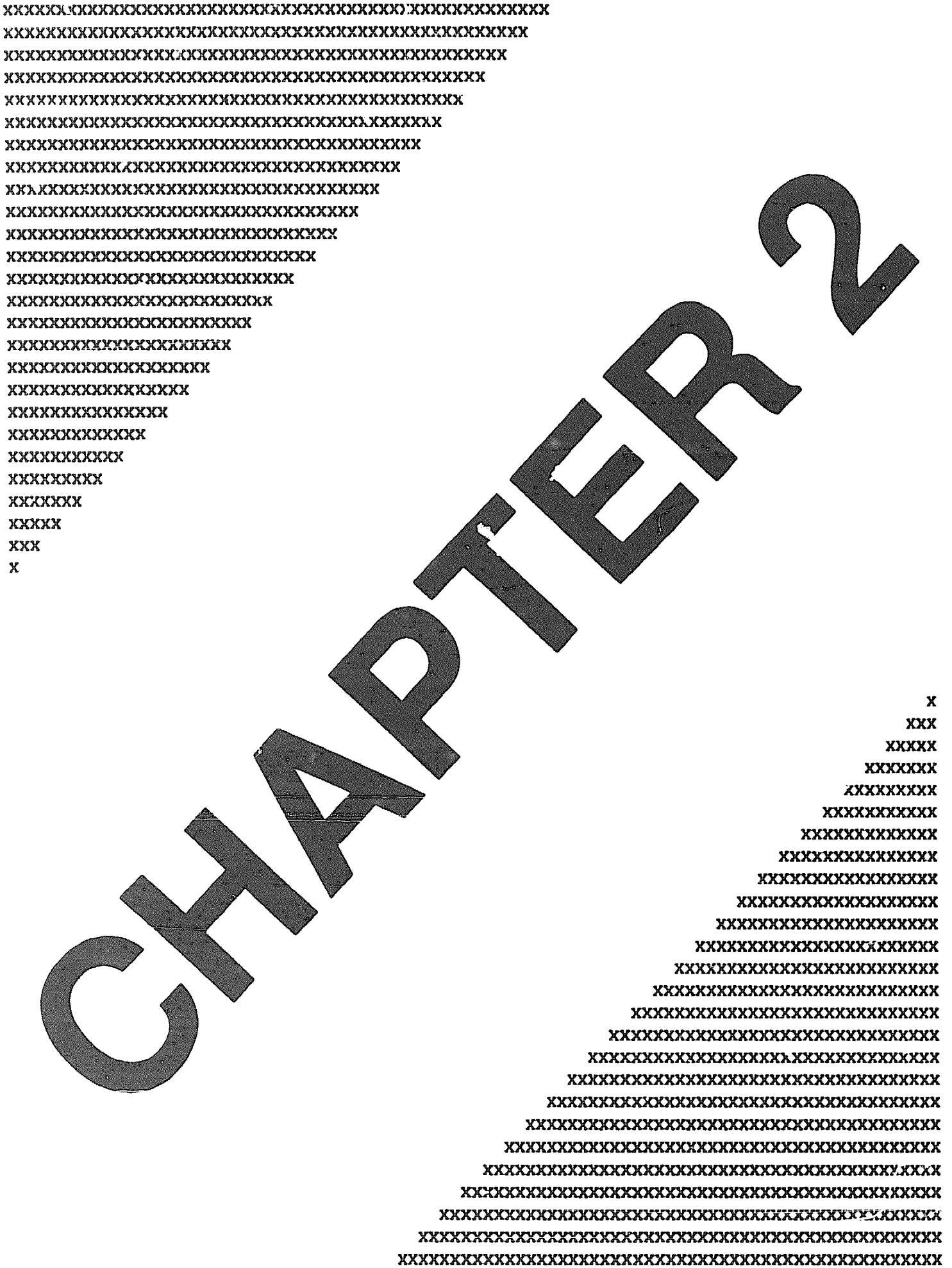


1.5.2 Remote Repeater Configuration

Figure 1-4 shows two remote repeaters connecting two LANs by means of transceiver cables and a fiber optic cable. The fiber optic cable connects one remote repeater to another remote repeater. The fiber optic cable can also be connected to a remote bridge instead of another remote repeater.

Figure 1–4: Remote Repeater Configuration




CHAPTER 2

2

Contents of Shipment

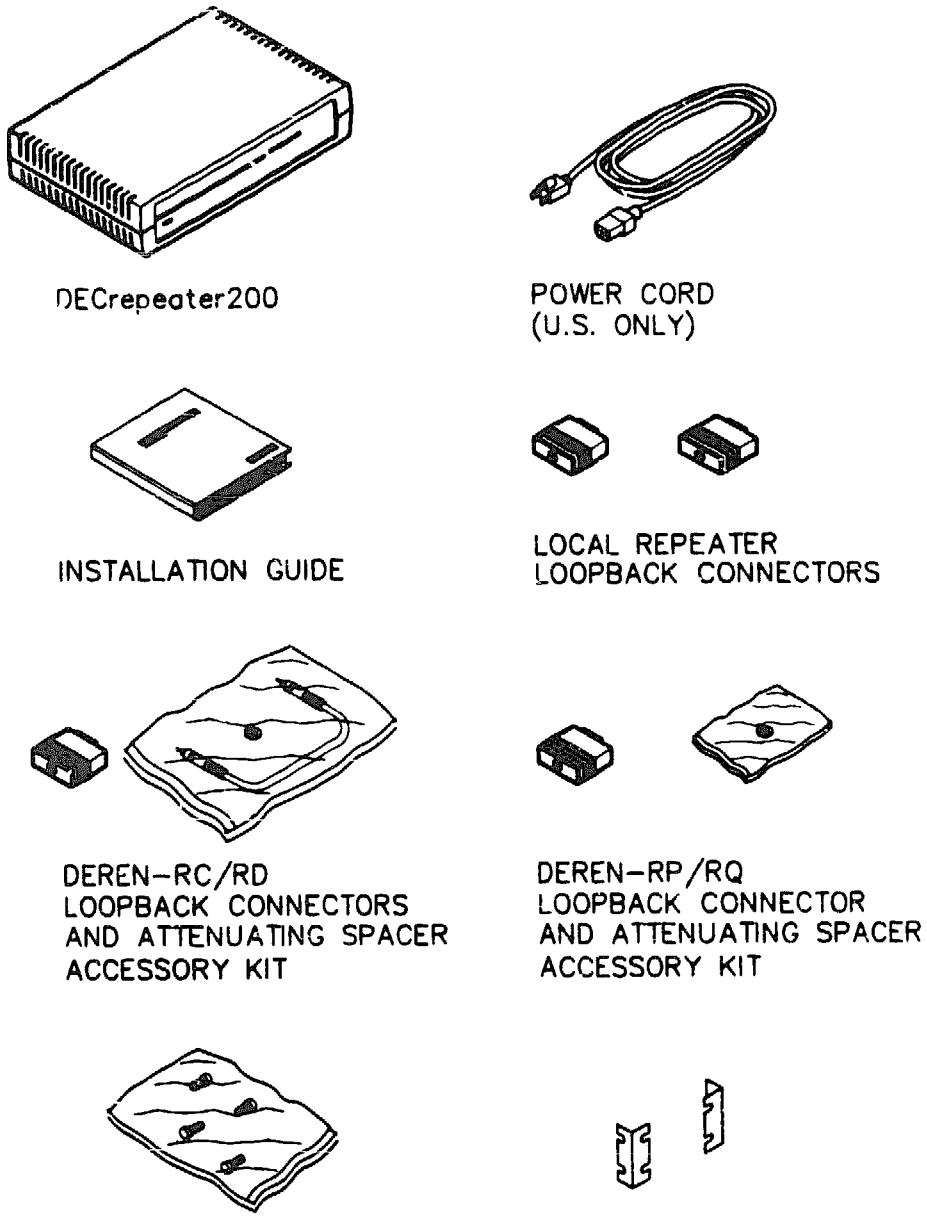
A single DECrepeater 200 shipment consists of one or more boxes depending on what was ordered. Each repeater ordered is individually packaged. Check to make sure you received all your ordered equipment. Check the shipment for damage and missing parts. In case of damage, contact your delivery agent and your Digital sales representative. In case of missing parts, contact your Digital sales representative.

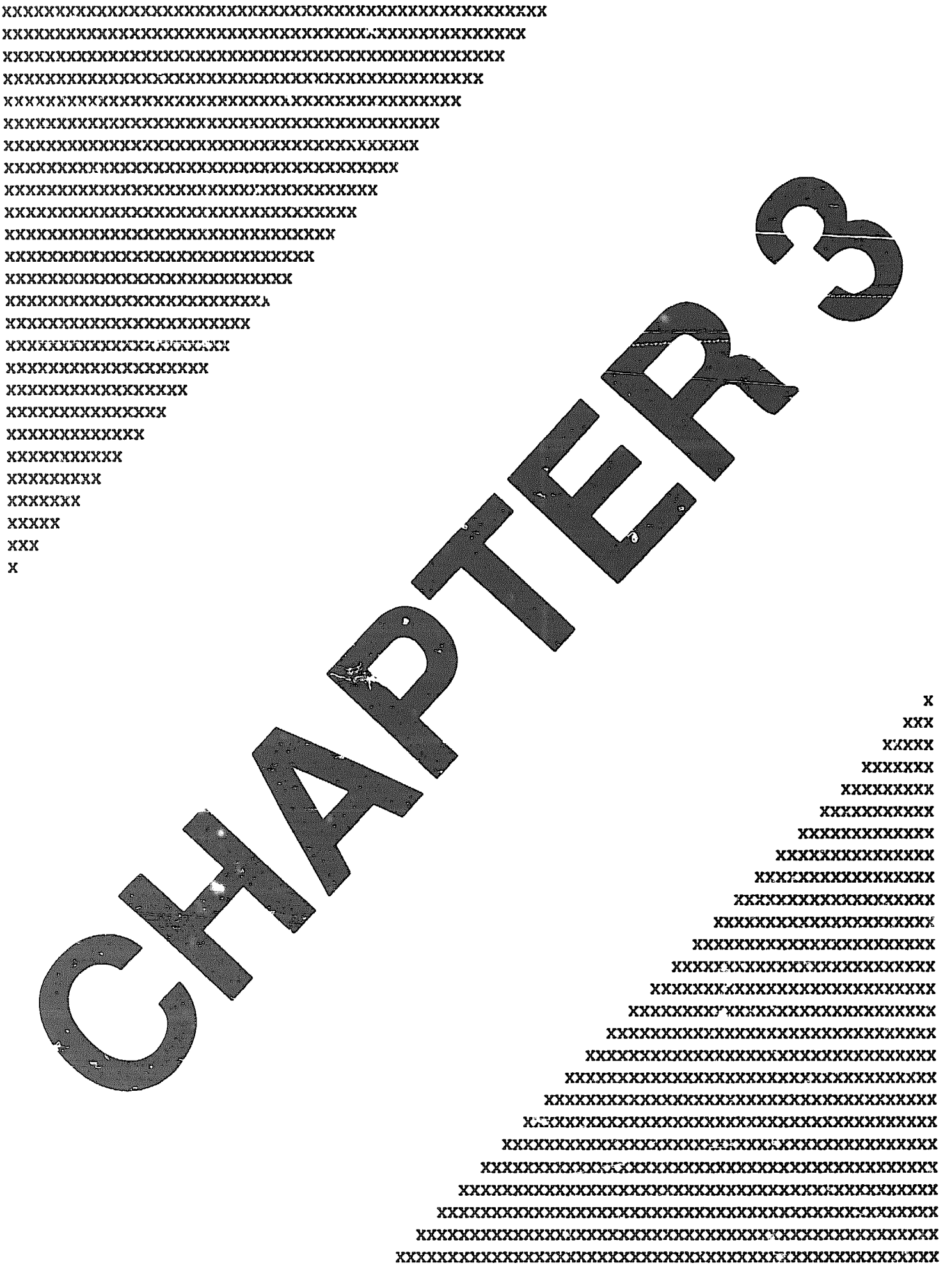
NOTE

A power cord is not supplied with the DEREN-AB/RD/RQ repeaters.

Figure 2-1 shows the contents of a typical shipping carton.

Figure 2–1: Shipping Box Contents




CHAPTER 3

3

Site Verification

3.1 Placement of the DECrepeater 200

The DECrepeater 200 can be placed in various locations, including offices and computer rooms, as long as the environmental requirements are met (refer to Appendix A).

3.1.1 Office Location

Allow 15 centimeters (6 inches) of airspace around the repeater's air vents and place the repeater on a desk or table that is at least 45 centimeters (18 inches) above the floor. This allows adequate ventilation for cooling fans and reduces exposure to excess dust from foot traffic.

NOTE

A wall/partition mounting bracket kit is available from Digital that allows you to suspend the repeater from partitioned office walls. Installation instructions are provided with the kit (Order Code H039).

3.1.2 Rack Mounting the Repeater

The repeater can be rack mounted in a standard rack cabinet. Installation instructions are provided in Chapter 4.

3.1.3 Satellite Equipment Room (SER)

The SER is a component of Digital's DECconnect System. It provides a central location for communications devices. The SER can be configured as the center of a stand-alone network and provides a base from which to expand as network requirements increase. If you are installing the repeater in such an environment,

or as part of a DECconnect System installation, refer to the *DECconnect System Planning and Configuration Guide*.

3.2 Cable Configuration Rules

Ensure that the transceiver cables, fiber optic cables, and the repeater power cable do not exceed the maximum lengths described in Table 3-1 and in the configuration rules that follow.

Table 3–1: Maximum Cable Lengths

From	To	Maximum Cable Length	Cable Type
AUI Cables			
Transceiver	Repeater	50 m (164 ft) See rules 1 to 4	BNE3*x*-*xx** transceiver cable
Transceiver	Repeater	12.5 m (41 ft) See rules 1 to 4	BNE4*x*-*xx** office transceiver cable
Fiber Optic Cables			
Repeater	Repeater	1 km (3281 ft) See rules 1 to 6	Fiber optic cable See Appendix A
Repeater	Bridge	1500 m (4921 ft) See rule 5	Fiber optic cable See Appendix A
Power Cable			
AC Power	Repeater	1.8 m (6 ft)	Repeater power cable included in shipment with DEREN-AA/RC/RP models

*BNE3*x*-*xx* transceiver cable and BNE4*x*-*xx* office transceiver cable can be interconnected. However, the cable attenuation (signal loss) for the office transceiver cable is greater than that of BNE3*x*-*xx* transceiver cable by a factor of four. For example, 2 meters (6.6 feet) of office transceiver cable is electrically equivalent to 8 meters (26.2 feet) of BNE3*x*-*xx* transceiver cable.

Basic configuration rules:

1. If the repeater connects to an IEEE 802.3 transceiver, such as the H4005, the transceiver cable must be an IEEE 802.3 compliant transceiver cable (BNE3H/K/L/M or BNE4C/D). The H4005 must have heartbeat disabled. Refer to the *H4005 Installation Card* to disable heartbeat.

2. If the repeater connects to an Ethernet transceiver, such as the H4000, the transceiver cable can be either Ethernet or IEEE 802.3 compliant.

3. IEEE 802.3 transceiver cables and Ethernet transceiver cables cannot be interconnected.

4. Maximum length for the transceiver cable cannot exceed 50 meters (164 feet).

5. If remote (fiber optic) repeaters are used, they can be used in one of two ways:

   - Repeater-to-repeater application: Two remote repeaters are joined by a fiber optic link. Each repeater is connected to a separate standard baseband Ethernet segment via transceiver cable and a transceiver. Maximum length of the fiber optic link for one pair of remote repeaters is 1 kilometer (3281 feet). If two pair of remote repeaters are located in a series, the total length of fiber optic cable must be less than or equal to 1 kilometer (3281 feet).

   - Bridge-to-repeater application: One remote repeater is joined to a LAN Bridge by a fiber optic link. The repeater and the bridge are connected to separate standard Ethernet segments via transceiver cables and transceivers. Maximum length of the fiber optic link between a single repeater-to-bridge application is 1.5 kilometers (4921 feet).

6. The minimum cable plant loss must be met or the attenuating spacer provided must be used on the transmit connector to attenuate the signal. Refer to Chapter 4 for installation details. Table 3–2 below details the minimum loss requirements.

7. DECrepeater 200-to-DELNI configurations are not supported by Digital Equipment Corporation or IEEE standards.

Table 3–2: Minimum Loss Requirements

Fiber Size	DEREN-RC/RD Minimum Attenuation	DEREN-RP/RQ Minimum Attenuation
50/125	N/A	N/A
62.5/125	N/A	1 dB
85/125	N/A	3 dB
100/140	4 dB	4 dB

3.3 Preinstallation Checks

Before beginning the repeater installation, use the following checklist to ensure that site preparation is complete:

- The appropriate baseband network interface is installed, i.e., H4005 and the required transceiver cabling is in place, tested, and tagged.
- The fiber optic cables (if required) are installed, certified, and tagged.
- The DEREN-RC/RD repeaters use ST-type connectors. The DEREN-RP/RQ repeaters use SMA-type connectors.
- The wall/partition mounting bracket kit is installed (if required) as described in the kit documentation.

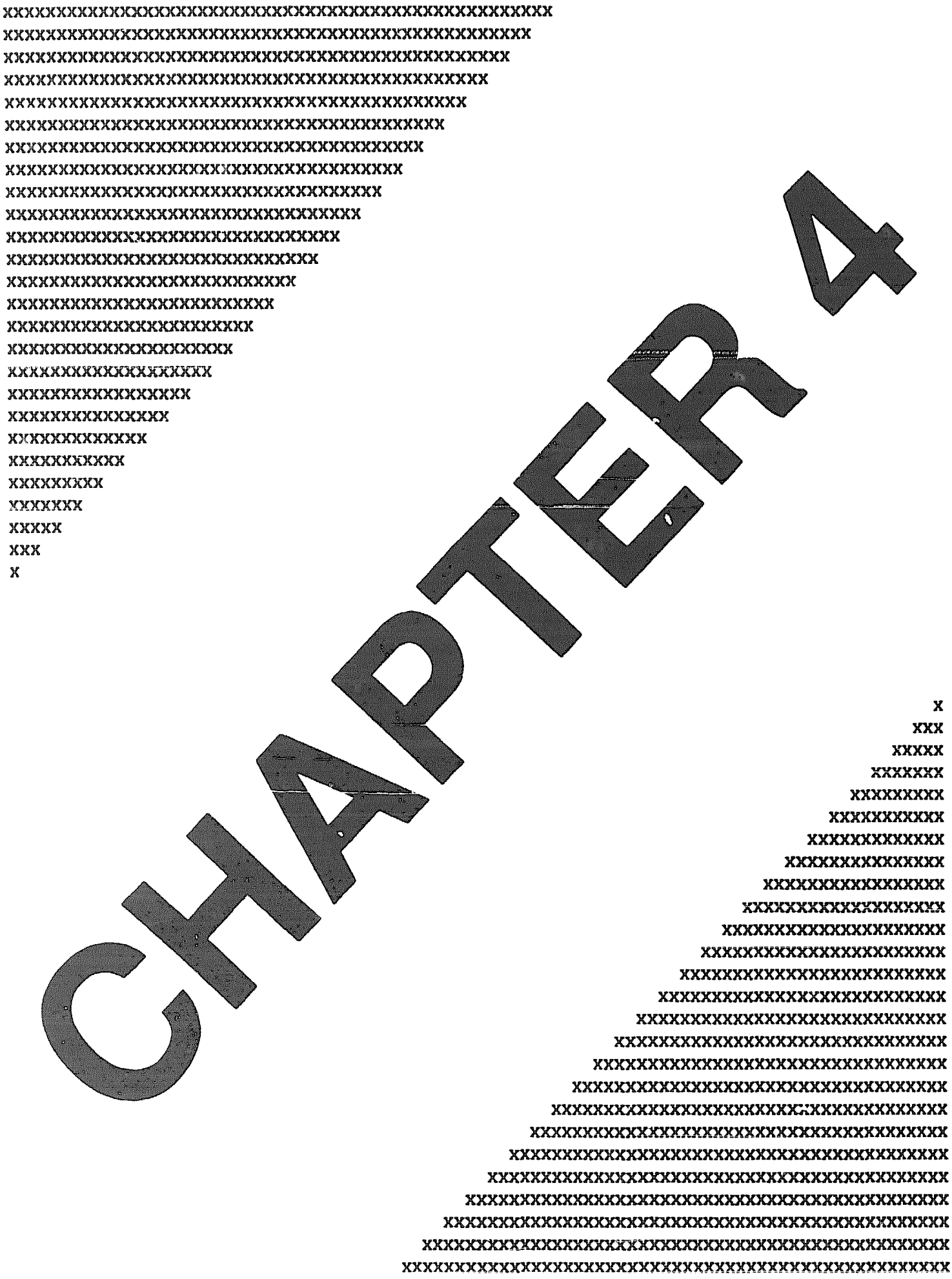
Suitable Environment

The items listed in this checklist must conform to the specifications described in Appendix A of this guide.

- The power outlet matches the power requirements of the repeater you ordered and is within 1.8 meters (6 feet) of the installation site.
- The temperature, altitude, and humidity ranges are correct.
- The space is adequate for ventilation and for maintenance access.
- The location is at least 45 centimeters (18 inches) above the floor surface.

3.4 Service

Your repeater includes a 1-year Digital warranty. For on-site and/or extended warranty information, contact your Digital sales representative.


CHAPTER 4

4

DECrepeater 200 Installation

4.1 Introduction

This chapter explains how to install, power up, and verify the operation of the DECrepeater 200 unit. Before you begin these procedures, read and follow the instructions in Chapter 3.

WARNING

To avoid bodily injury or damage to the equipment, DO NOT connect the repeater power cord until instructed to in the following procedures.

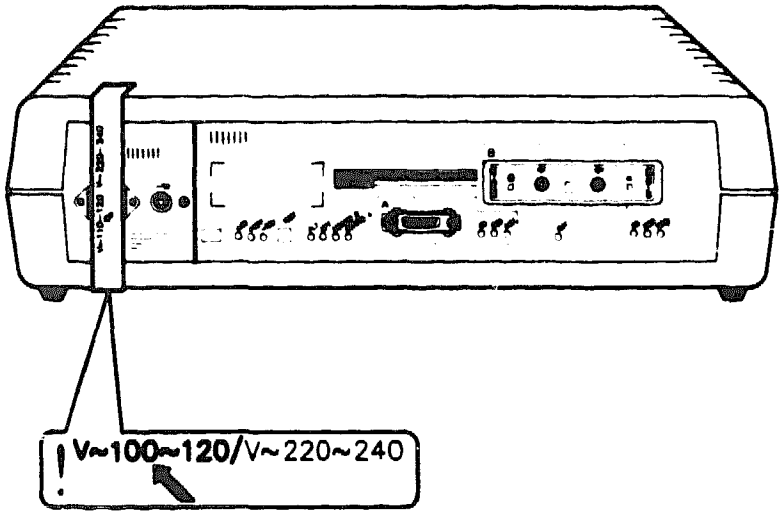
4.2 Verifying Switch Settings

The DECrepeater 200 unit is shipped from the factory with all switches preset for basic repeater operations. The following sections provide information for verifying and resetting the switches (if necessary).

4.2.1 Verifying the Voltage Select Switch Setting

1. Locate the removable voltage label on the repeater I/O panel.

   Note the operating range indicated by the arrow on the label. This is the factory-set operating range of the repeater.



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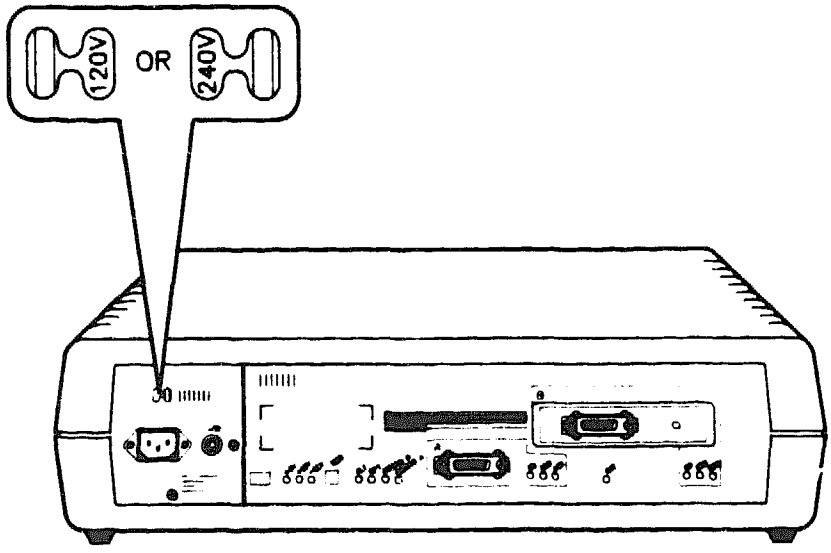
2. Peel the voltage label from the repeater, exposing the voltage select switch.

   Verify that the voltage select switch is set to the operating range indicated by the label, and that this is the correct setting for your power source. (See your electrician if you are not sure.)



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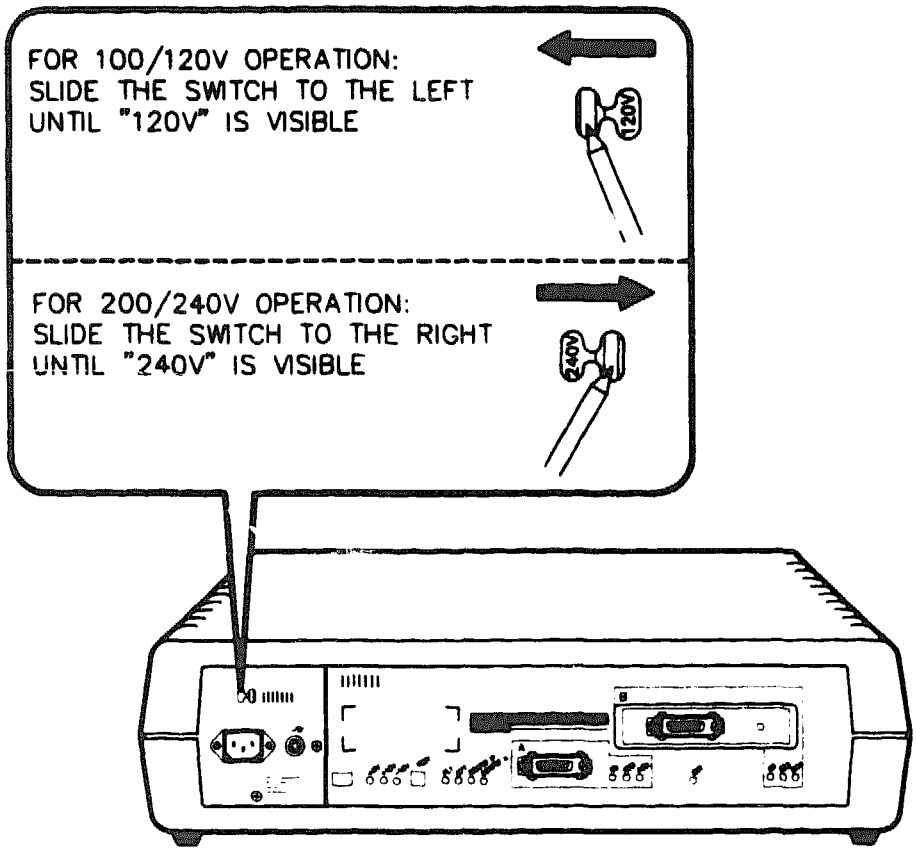
3. If the voltage setting is not correct for your power source, set the voltage select switch to match the power source voltage.

CAUTION

An incorrect voltage setting can damage the repeater.



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4.2.2 Verifying the Remote Repeater (DEREN-RC/RD) Optical Idle Switch Settings

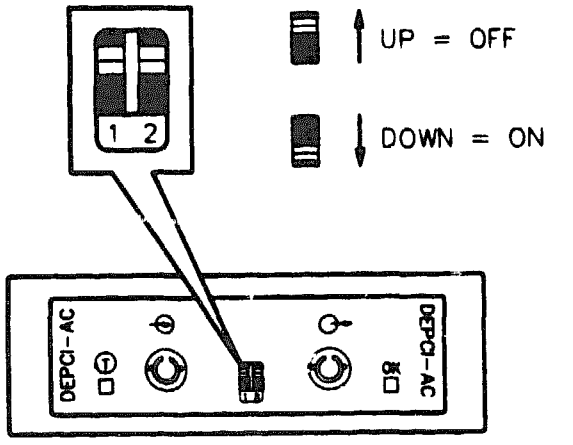
If you are installing a DEREN-RC/RD model, check to see that the optical idle switches are set as shown in Figure 4–1.

NOTE

The switches on the DEREN-RC/RD unit (or Digital device) at the other end of the link must also be set as shown in Figure 4–1, that is, both switches are OFF (up).

If you are connecting the DEREN-RC/RD unit to a non-Digital 802.3 compliant device, set switch 1 OFF (up = OFF) and set switch 2 ON (down = ON).

Figure 4–1: Verifying the Optical Idle Switch Settings (for DEREN-RC/RD Units Only)



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4.3 Placement of the DECrepeater 200 Unit

The DECrepeater 200 unit is housed in a plastic enclosure that allows for placement on a table or desk. The plastic enclosure can be easily removed for mounting the unit in a standard 48-centimeter (19-inch) RETMA rack cabinet (rack mounting brackets are provided). An optional kit (Order Code H039) is available for mounting the repeater on a partition without removing the plastic enclosure. Installation instructions are provided with the installation kit.

CAUTION

Whichever installation you choose, allow a minimum of 15 centimeters (6 inches) clearance around the repeater's air inlets and outlets to ensure optimal air flow.

NOTE

Always place the repeater so that the I/O panel is visible. This allows you to monitor the repeater status LEDs.

4.3.1 Table Top Installation

Do not remove the plastic enclosure when installing the repeater in an office environment. Allow 15 centimeters (6 inches) of airspace around the repeater's air vents, and place the repeater on a table or desk that is at least 45 centimeters (18 inches) above the floor. This allows adequate ventilation for cooling fans and reduces exposure to excess dust from foot traffic.

4.3.2 Rack Mount Installation

Rack mounting requires removal of the repeater's plastic enclosure.

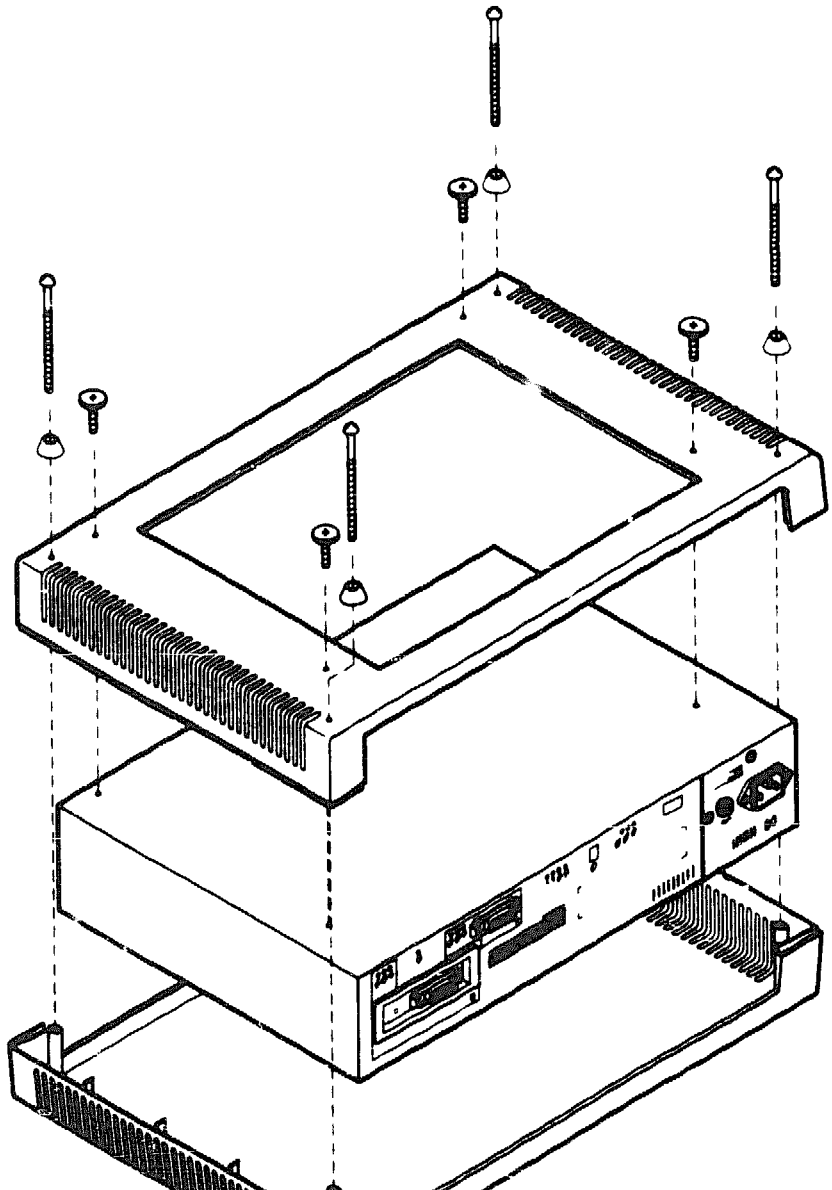
To rack mount the DECrepeater 200 unit, proceed as follows:

1. Place the repeater upside down on a sturdy surface or floor.
2. Remove the eight screws from the bottom of the unit, then remove the plastic enclosure. Store the unused plastic enclosure for possible future use or reconfiguration. Refer to Figure 4–2.

CAUTION

Do not reinstall screws in the repeater's metal casing. Doing so could damage the repeater.

Figure 4–2: Removing the Plastic Enclosure



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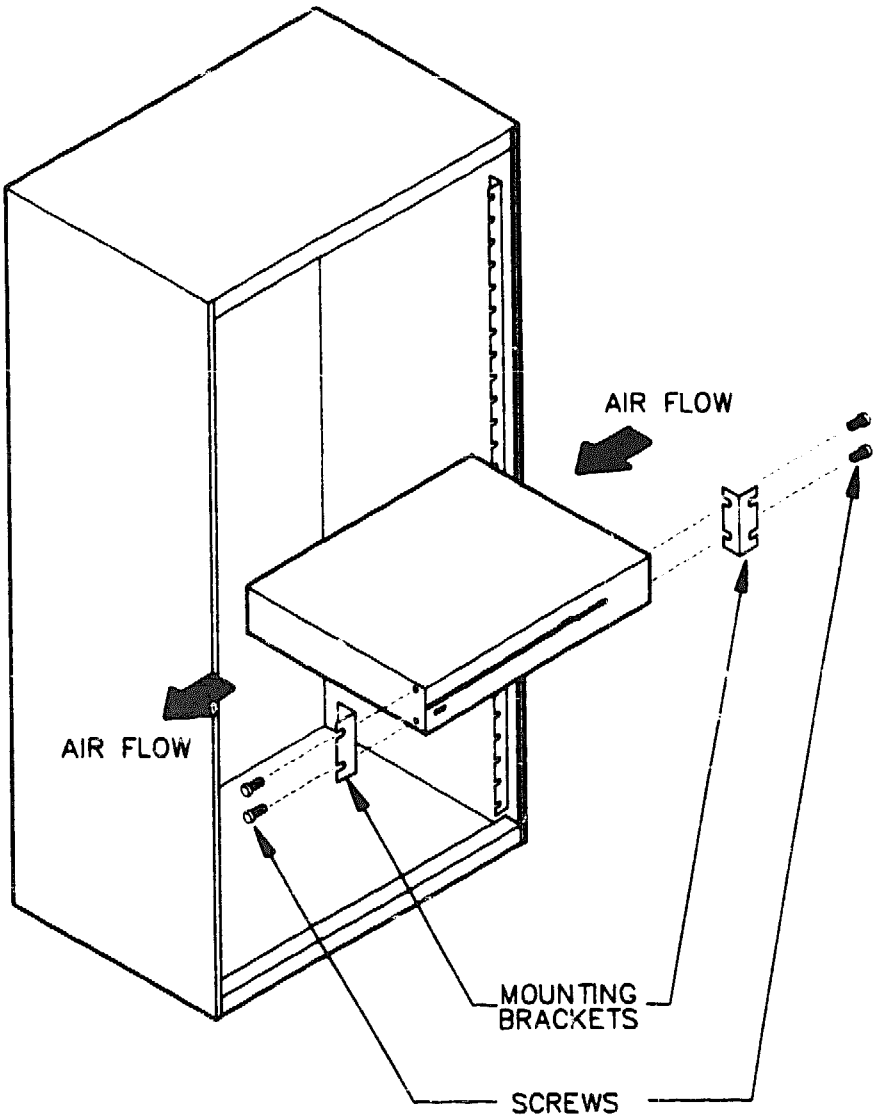
3. Locate the rack mounting brackets in the shipping box.

4. Fasten the rack mounting brackets to the repeater with the screws provided.

5. Fasten the repeater to the rack (screws not provided) as shown in Figure 4–3.

Figure 4–3: Rack Mounting the Repeater



CAUTION

The air inside the rack is hotter than the ambient room temperature. Therefore, ensure that the air entering the repeater's air inlet does not exceed the repeater's maximum temperature of 50 ° C (122 ° F).

Ensure that all cables connecting to a rack mounted repeater are secured to one side of the rack. If any fiber optic cables are used, ensure the cable bend radius is not LESS than 7.5 centimeters (3 inches).

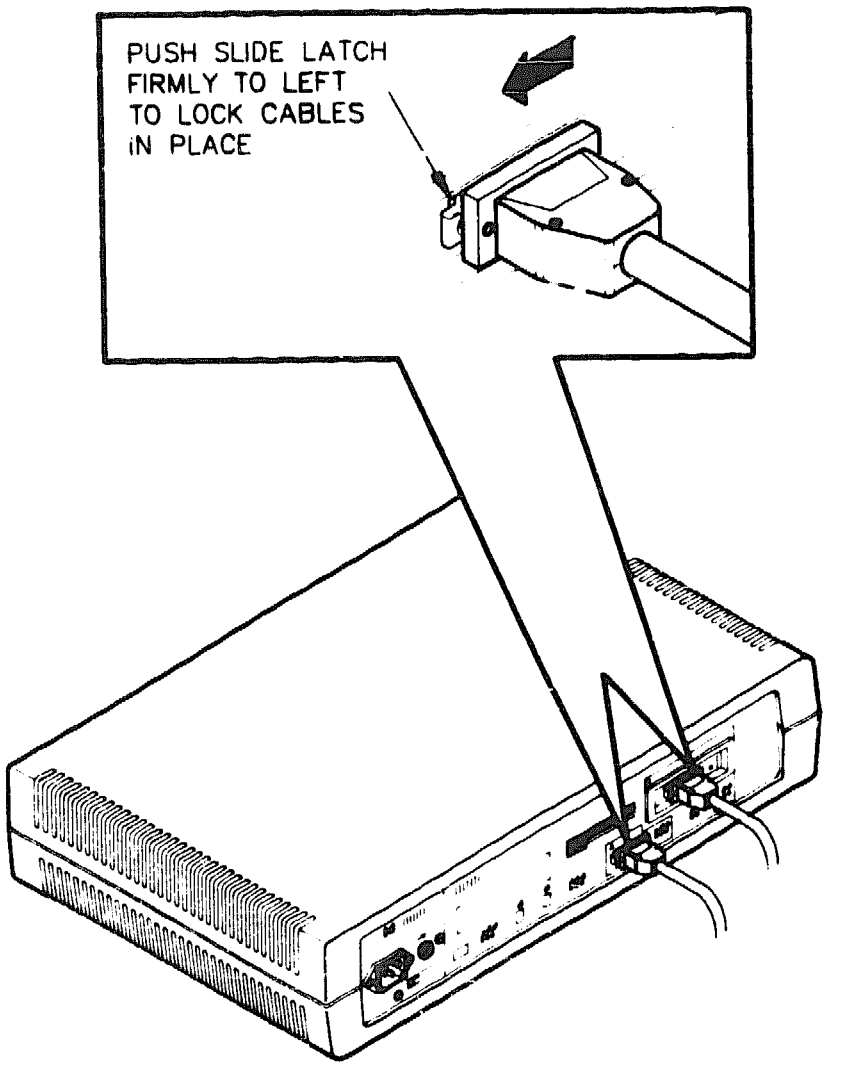
4.4 Connecting the Transceiver Cables

This procedure shows how to connect transceiver cables to both Ports A and B of a local DECrepeater 200 unit. Note that if you are installing a remote DECrepeater 200 unit that uses fiber optic cables at Port B, there will be only one transceiver cable to install at Port A.

To install the transceiver cable(s), proceed as follows:

1. Push the port connector slide latch to the right, then plug the transceiver cable into the port connector.
2. Push the port connector slide latch to the left until it snaps into the locking position as shown in Figure 4–4.
3. Gently pull on each plug to make sure that the latch is secure.

Figure 4–4: **Connecting Transceiver Cables**



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4.5 Connecting the Fiber Optic Cables

For proper operation of the remote link, you may need to install attenuator spacers on the transmit connections at both ends of the link before you connect the fiber optic cables. To determine if you need to install the attenuator spacers and prior to installing the cable ends, do the following:

1. Note the labeling on the fiber optic cable designated for the unit you are about to install:

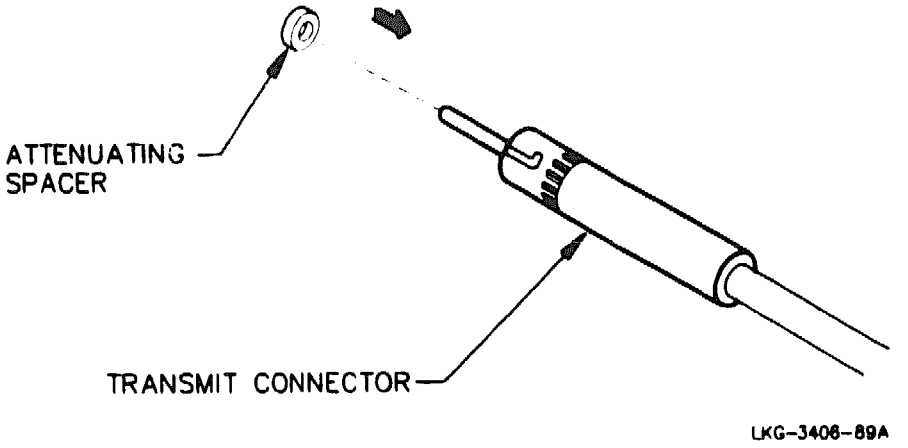
   The cable installer should have tagged the cable according to fiber type (for exampie, 50/125, 62.5/125, 85./125, or 100/140 micron fiber) and the attenuation of each cable should also have been characterized and recorded. The characterized attenuation value (measured in dB units) determines if the attenuator spacers are necessary for the installation.

2. If 100/140 micron cable is used for link lengths of LESS than 1 kilometer (3281 feet), install the attenuator spacers on the transmit connectors at both ends of the link.

3. If the characterized attenuation value recorded on the label is LESS than the value listed in Table 4–1 for the given product and fiber size, install the attenuator spacers on the transmit connectors at both ends of the link.

Table 4–1: Minimum Loss Requirements

Fiber Size	DEREN-RC/RD Minimum Attenuation	DEREN-RP/RQ Minimum Attenuation
50/125	N/A	N/A
62.5/125	N/A	1 dB
85/125	N/A	3 dB
100/140	4 dB	4 dB



The following procedure shows how to connect the fiber optic cables to the repeater:

NOTE

The DEREN-RC uses ST-type connectors. If the fiber optic cable has a different type of connector, such as SMA-type, an adapter must be used to complete the connection.

1. Pull the protective caps from the fiber optic connectors and cable plugs as shown in Figure 4–5.

WARNING

Never look into a fiber optic connector or cable. High-intensity light can damage your eyes.

2. Note the labeling on the cable connections (the cable installer should have labeled the transmit and receive ends of the cable while installing the cable runs).

3. If required, install the attenuation spacers on the transmit connections at both ends of the fiber optic cable. Refer to Section 4.5.

4. Be sure the transmit and receive tabs correspond to the connections as labeled on the repeater.

5. Connect the transmit cable to the transmit connector (marked ⊖⊳) at Port B of the repeater. Refer to Figure 4–6.

6. Connect the receive cable to the receive connector (marked ⊖) at Port B of the repeater. Refer to Figure 4–6.

7. In the event that the cables were not labeled, connect one cable end to the receive connector of the repeater and the other cable end to the transmit connector of the repeater. The cable connections are reversed on the other remote repeater.

CAUTION

The fiber optic cable will be damaged by sharp bends. Ensure the cable bend radius is not LESS than 7.5 centimeters (3 inches).

The connector ferrule of the transmitter optical port (DEREN-RC) should be 7.87 ± .025 mm (.310 ± .001 inches) long. Ferrules that are shorter could cause less power to be launched into the fiber.

Figure 4–5: Removing Fiber Optic Protective Caps

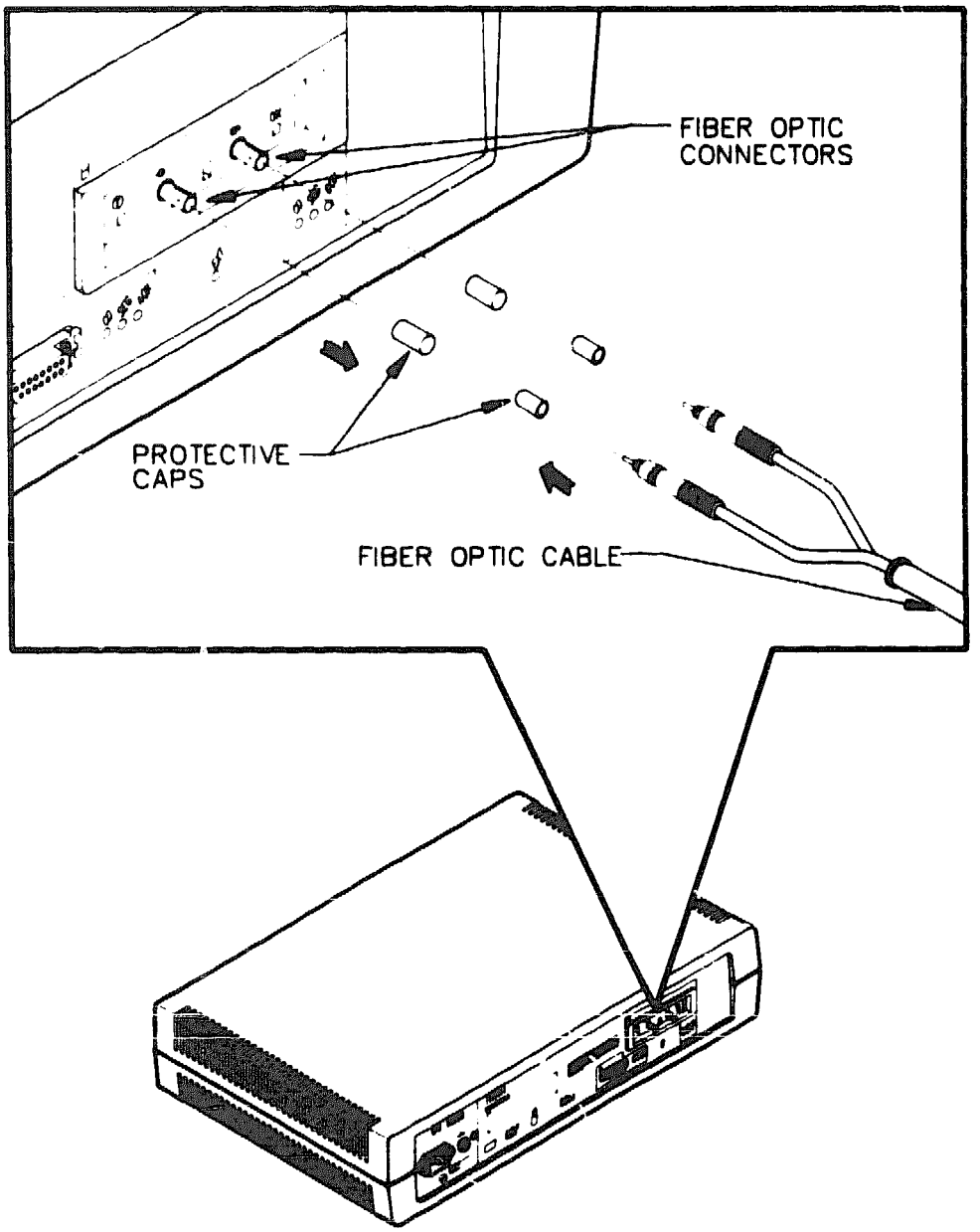


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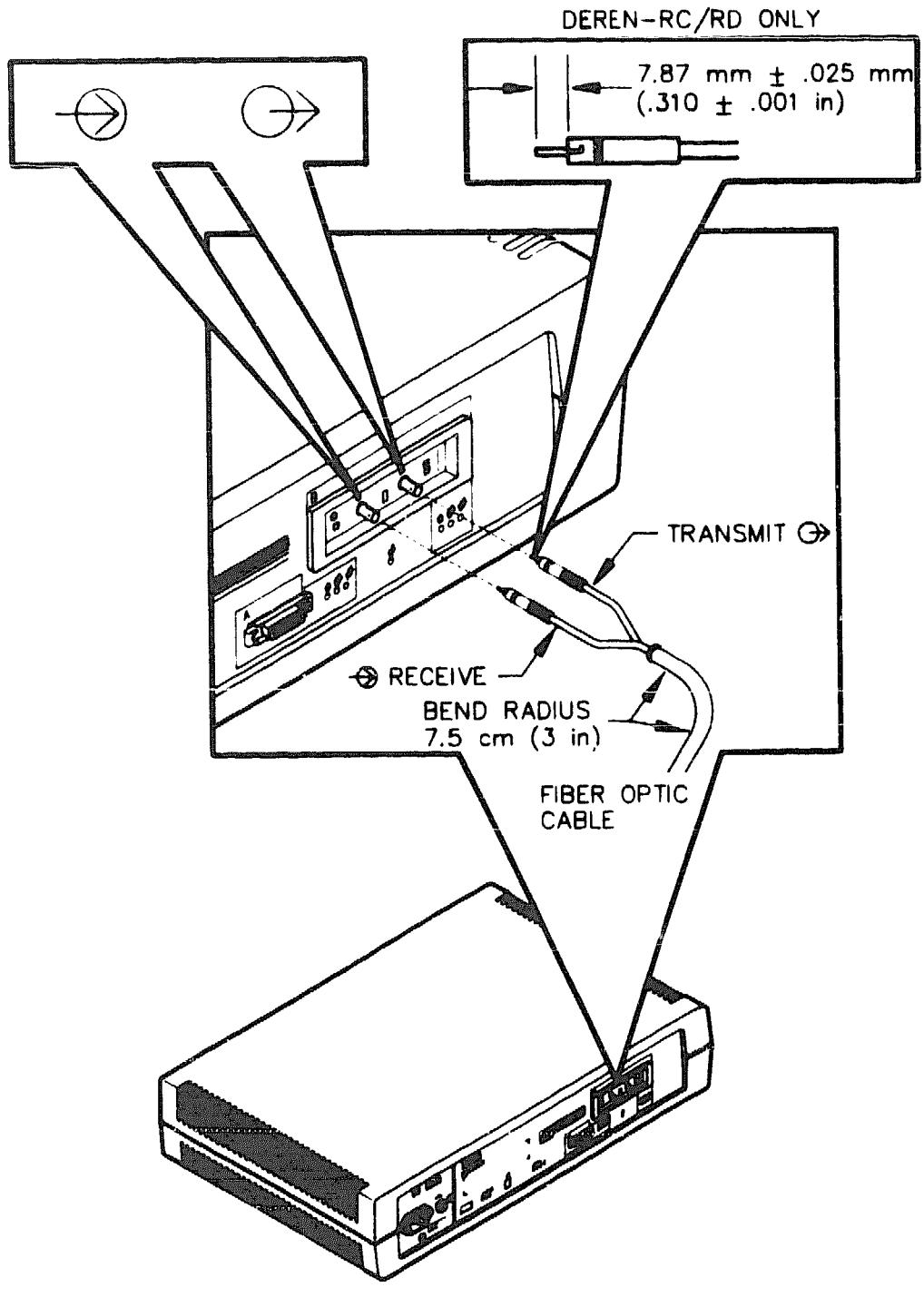
Figure 4–6: Connecting the Fiber Optic Cables



4.6 Before Connecting Power

Make sure the transceiver cable connections are secure at both ends of the cable.

If you are installing a remote repeater (DEREN-RC/RD), be sure that the fiber optic cables are securely connected to the remote device at the other end of the link. If the cables are not connected when you plug in the power cord, the Link OK LED will not illuminate (indicating a link failure).

At power up the DEREN-RC/RD repeater's remote circuitry transmits signals and receives feedback from the remote repeater (or device) at the other end of the link. This is for checking the link state between the two remote devices. If the other remote device is NOT powered up, the repeater senses a link failure (no signal received) and fails to illuminate the Link OK LED (indicating a link failure).

As soon as the device at the other end of the link is powered up (and transmitting signals), the repeater receives and acknowledges the feedback and illuminates the Link OK LED. Both devices must be powered up in order to establish and confirm a link between the two devices.

The DEREN-RP/RQ does not implement the LINK OK function. Verify the link via node-to-node communication.

4.7 Connecting Power

The DECrepeater 200 unit does not have a power ON/OFF switch. Plugging in the repeater power cord applies power directly to the unit and initiates the repeater self-test which last for about 5 seconds. The self-test verifies that the basic repeater functions are operational and provides a brief 2-second lamp check of the status LEDs (see note).

NOTE

The status LEDs on the fiber optic version do NOT illuminate during the lamp check.

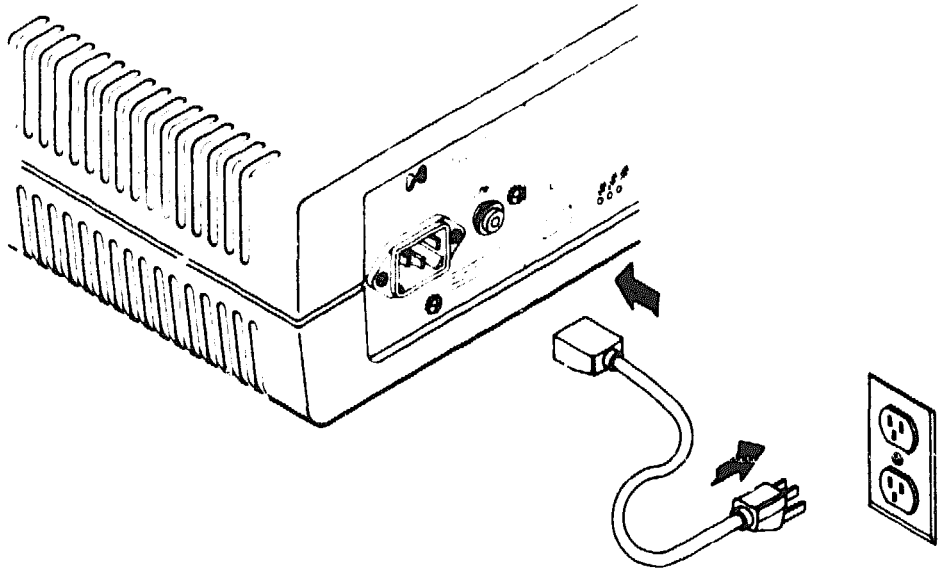
To connect the repeater power cord, proceed as follows:

WARNING

To avoid bodily injury or equipment damage use care when connecting the repeater power cord.

1. Plug one end of the power cord into the DECrepeater 200 power receptacle.
2. Plug the other end of the power cord into the wall outlet or into the appropriate power source receptacle as shown in Figure 4–7.
3. Observe the brief illumination of the Status LEDs to ensure they are operational.

Figure 4–7: Connecting the Repeater Power Cord



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4.8 Verifying the Installation

Proper installation of the DECrepeater 200 unit is verified by the condition of the status LEDs on the I/O panel. The conditions of the LEDs can vary, depending whether the unit is a remote repeater or a local repeater.

The CPT LED remains ON if either transceiver (H4005) connected to the repeater has SQE test (heartbeat) enabled.

NOTE

If you are installing a remote DECrepeater 200 unit, both ends of the link must be powered up before verifying the installation.

If you are installing a local DECrepeater 200 unit (DEREN-AA/AB), refer to Section 4.8.1 to verify correct installation.

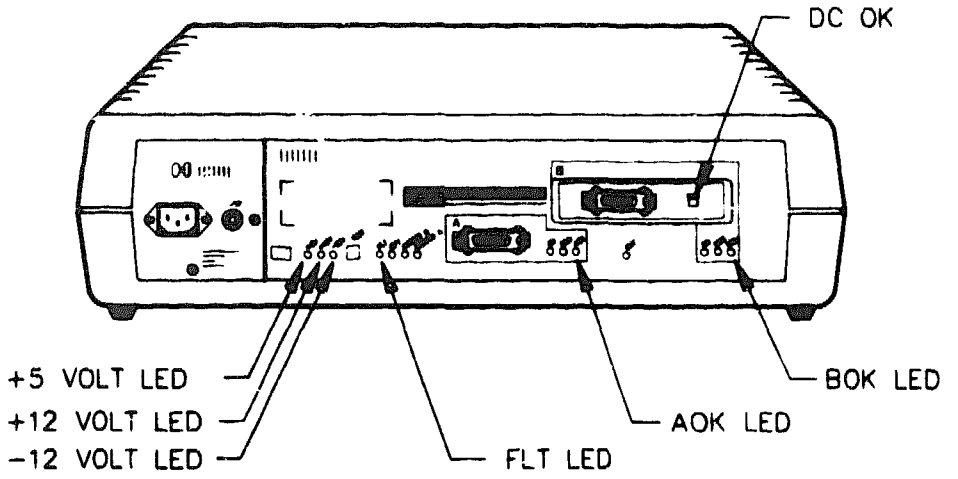
If you are installing a remote DECrepeater 200 unit, refer to Sections 4.8.2 and 4.8.3 to verify correct installation.

4.8.1 Verifying the Local Repeater Installation (DEREN-AA/AB)

After powering up the repeater allow up to 5 seconds for the repeater's self-test to complete, then compare the state of the status LEDs on the repeater with those shown in Figure 4–8.

A local repeater is connected properly when the +5 V, +12 V, -12 V, DC OK, AOK, BOK LEDs are lit and the TEST and FLT LEDs are out.

Figure 4–8: Local Repeater Hardware Verification



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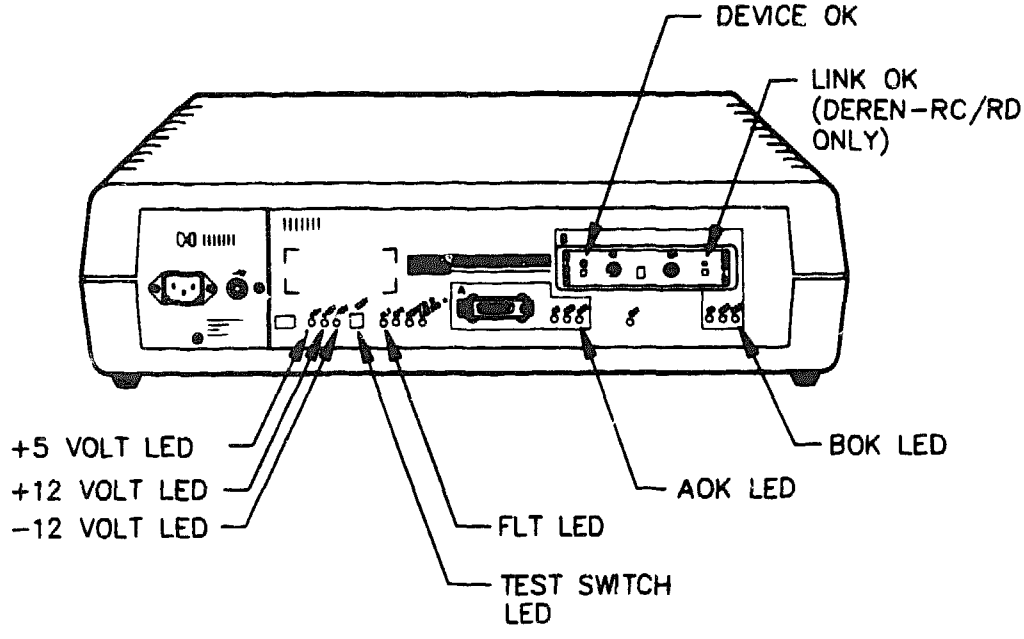
4.8.2 Verifying the Remote Repeater Installation

After powering up the repeater allow up to 5 seconds for the repeater's self-test to complete, then compare the state of the status LEDs on the repeater with those shown in Figure 4–9.

A remote repeater is connected properly when the +5 V, +12 V, DEVICE OK, LINK OK (DEREN-RC/RD only), AOK, BOK LEDs are lit, and the TEST and FLT LEDs are out.

After both remote repeaters are installed and powered, one of the repeaters has the SEG LED blinking. This repeater must be reset by pressing the TEST switch. This runs the self-test, resets the SEG LED, and conditions the repeater for normal operation.

Figure 4–9: Remote Repeater Hardware Verification



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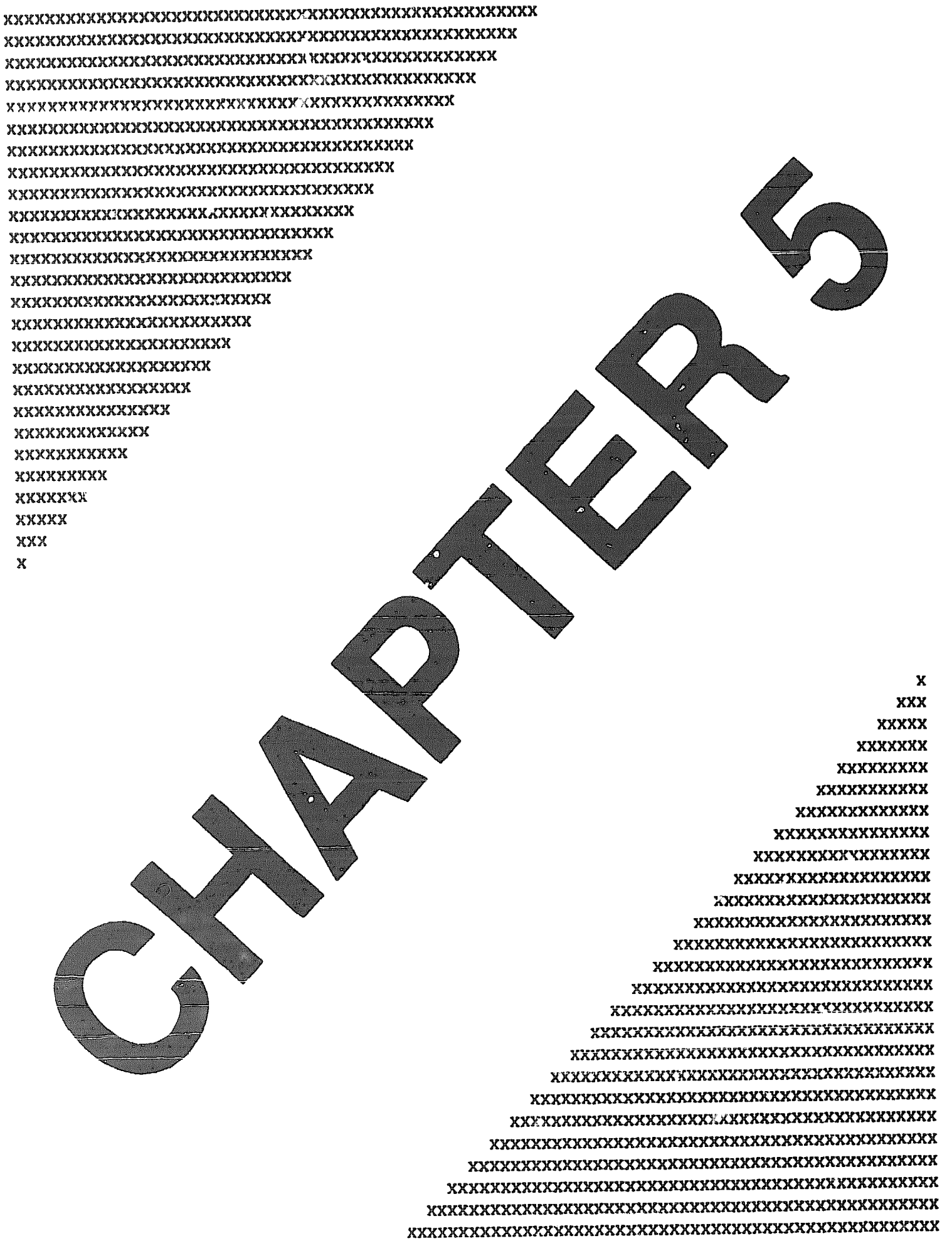
4.8.3 Verifying the Remote Repeater Installation (DEREN-RP/RQ)

Send a message from a station on one side of the repeater to a station on the other side. You can do this by creating a logical link connecting your terminal to a station on the other side of the repeater as a virtual terminal. On a VAX/VMS host running DECnet, you can do this by using the SET HOST command.

4.9 Network Verification

Check with your network manager that the repeater is operational in the network configuration.

Hardware installation is now complete.


CHAPTER 5

5

What To Do If You Have Problems

5.1 Introduction

This chapter helps you identify and correct problems that you could have during the initial installation of the repeater. If problems persist after completing these steps, notify the system/network manager. Additional information about troubleshooting the repeater can be found in the *DECrepeater 200 Problem Solving* manual.

5.2 Repeater I/O Panel

All the repeater's switches, connectors, and indicators are located on the I/O panel of the repeater (refer to Figure 5-1).

Tables 5-1 and 5-2 describe the normal state of the repeater control switches and status LEDs. Table 5-3 is a problem solving table which lists symptoms and suggested corrective action.

After diagnosing and correcting the problem, return to Section 4.8 of this manual to verify the correct operation of the DECrepeater 200 unit.

Table 5–1: Repeater Control Switches

Switch	Description
Voltage Switch	The voltage select switch is used to set the repeater input voltage to the required range, either 120 or 240 volts.
Circuit Breaker	The circuit breaker provides overcurrent protection for the repeater. If an overcurrent condition causes the circuit breaker to trip, the white center portion of the circuit breaker pops out as a visual indication and the ac power is cut off from the repeater. The circuit breaker can be reset by pressing in the white center portion of the circuit breaker.
Test	This is a momentary switch. It is depressed once to reset the repeater and to initiate self-test.

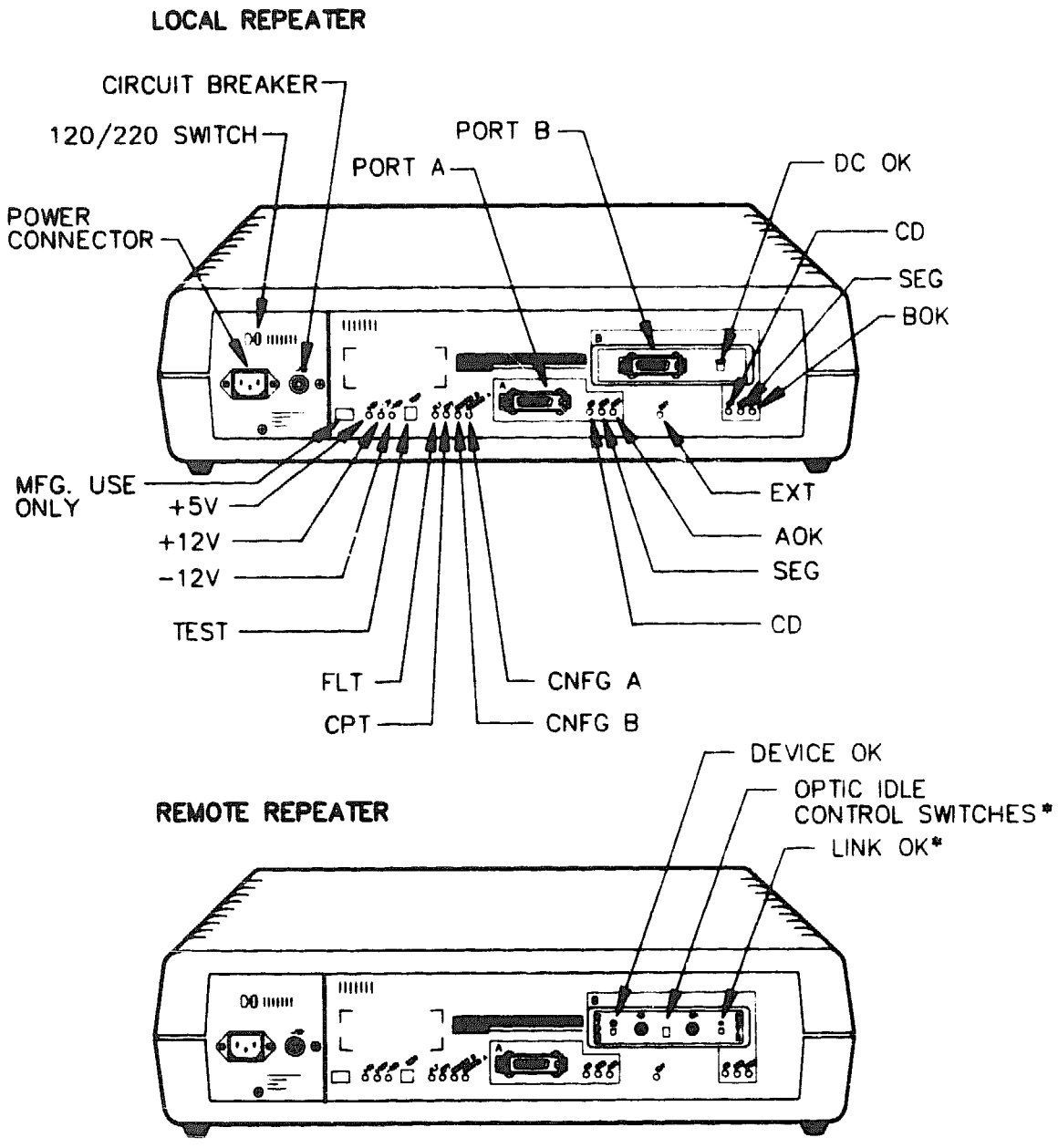
Table 5–2: Status LEDs

LED	Normal State	Description
+5 V	ON	+5 volt supply functioning
+12 V	ON	+12 volt supply functioning
-12 V	ON	-12 volt supply functioning
TEST	OFF	ON when repeater is executing self-test, remains lit when repeater fails self-test.
FLT	OFF	ON when self-test failed.
CPT	ON/OFF	ON when repeater is receiving SQE TEST from one or both transceivers.
CNFGB	OFF	ON, configuration error on Port B. The transceiver has heartbeat enabled (802.3 mode).
CNFGA	OFF	ON, configuration error on Port A. The transceiver has heartbeat enabled (802.3 mode).
CD A	Should flicker	Flickers when carrier received on Port A is transmitted to Port B.
SEG A	OFF	ON when repeater is segmented on Port A. Blinks when a fault was detected on Port A but was corrected.
CD B	Should flicker	Flickers when carrier received on Port B is transmitted to Port A.

Table 5–2 (Cont.): Status LEDs

LED	Normal State	Description
SEG B	OFF	ON when repeater is segmented on Port B. Blinks when a fault was detected on Port B but was corrected.
AOK/BOK	ON	Port A and B are operational.
EXT	OFF	OFF when self-test passes. If self-test fails, FLT or EXT LED may be on indicating subsystem failure.
DEVICE OK	ON	OFF, indicates module in Port B has malfunctioned.
LINK OK (DEREN-RC/RD only)	ON	OFF indicates that fiber optic link between remote repeaters is broken or disconnected. Or could indicate incompatible optical idle switch settings.

Figure 5–1: Repeater I/O Panel



*DEREN–RC/RD ONLY

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5.3 Diagnosing Problems

The troubleshooting procedures in Table 5-3 are symptom oriented. The symptoms are possible problems that could occur during power up or during normal repeater operation. For example, when power is applied to the repeater most of the LEDs light momentarily then extinguish. This indicates that power is reaching the repeater. If power is missing, the LEDs do not light.

Table 5–3: Problem Solving

Symptom	Suggested Corrective Action
All repeater lights are OFF.	Check that both ends of the power cord are completely plugged in. Check the circuit breaker. If it has tripped, the white center portion extends out. The circuit breaker can be reset by pressing in the white center portion of the circuit breaker.
The Carrier Detect A LED (green) is continuously OFF.	Press the TEST button. All LEDs should light and remain lit for approximately 2 seconds. If the carrier A LED fails to turn ON, the LED is defective. Run self-test with the loopback connector installed to verify repeater functionality. *For local repeaters, interchange transceiver cable inputs:* Try swapping transceiver cable inputs to see if the inactive indications shift to Port B of the repeater. If the indication does shift to the other port of the repeater, suspect inactivity (no traffic) on that segment, or a problem with the transceiver and/or transceiver cable. *For remote repeaters, try using a different transceiver or transceiver cable:* If the CD indication improves, suspect a problem in the transceiver or transceiver cable. If the CD indication does not improve, suspect inactivity on Port A or a faulty logic module.

Table 5–3 (Cont.): Problem Solving

Symptom	Suggested Corrective Action
The Carrier Detect B LED (green) is continuously OFF.	Check that the fiber optic data path is not broken or disconnected. Check other indicators (5 V and 12 V LEDs) to determine that the repeater is properly powered and whether the transceiver is getting power. Press the TEST button. All LEDs should light and remain lit for approximately 2 seconds. If the carrier B LED fails to turn ON, the LED is defective. Run self-test with the loopback connector installed to verify repeater functionality. *For local repeaters, interchange transceiver cable inputs:* Try swapping transceiver cable inputs to see if the inactive indications shift to Port A of the repeater. If the indication does shift to the other port of the repeater, suspect inactivity (no traffic) on that segment, or a problem with the transceiver and/or transceiver cable. *For remote repeaters:* Install the loopback connector on Port B and press the TEST switch to run self test. If the repeater passes self-test, check the fiber optic cable or the other repeater for failure.
The SEG (A) LED (yellow) lights indicating that Port A is currently segmented.	Press the TEST button (with the loopback connector installed) to reset the segmented LEDs and verify repeater functionality. *For local repeaters, try interchanging transceiver cable inputs:* Try swapping transceiver cable inputs to see if the segmented indication shifts to Port B of the repeater. If the indication does shift to the other port of the repeater, suspect a problem outside the repeater such as a transceiver, transceiver cable, or coaxial segment.

Table 5–3 (Cont.): Problem Solving

Symptom	Suggested Corrective Action
	For remote repeaters: Check the setting of the optical idle switches. Refer to Section 4.2.2 for proper setting.
The SEG (B) LED (yellow) lights indicating that Port B is currently segmented.	Press the TEST button (with loopback connector installed) to reset the segmented LEDs and to verify repeater functionality. *For local repeaters, try interchanging transceiver cable inputs:* Try swapping transceiver cable inputs to see if the segmented indication shifts to Port A of the repeater. If the indication does shift to the other port of the repeater, suspect a problem outside the repeater such as a transceiver, transceiver cable, or coaxial segment. *For remote repeaters:* Check the setting of the Optical Idle Switches. Refer to Section 4.2.2 for proper setting.
The +12 V LED is OFF.	Verify that the power cord is connected to the power source. Check the AOK LED on Port A. If the AOK LED is OFF, suspect the power supply. If the AOK LED is ON, suspect that the +12 V LED is not functioning.
The -12 V LED is OFF.	Verify that the power cord is connected to the power voltage source.
If the TEST LED remains lit, the self-test has failed and the repeater never exits self-test.	Notify the system/network manager that the repeater must be returned to Digital for repair or replacement.

Table 5–3 (Cont.): Problem Solving

Symptom	Suggested Corrective Action
The FLT LED (red) is ON indicating that self-test has failed a particular test.	Notify the system/network manager that the repeater must be returned to Digital for repair or replacement.
The +5 V LED (green) is OFF.	Verify that the power cord is connected to the power voltage source. Check both the +12 V LED and the -12 V LED to determine if the power supply is functioning.
The EXT, TEST and FLT LEDs remains ON signifying that the repeater failed external self-test.	Press the TEST switch (with loopback connector installed) and verify repeater functionality. Notify the system/network manager that the repeater must be returned to Digital for repair or replacement.
The AOK/BOK (green) LEDs do not light signifying that those ports are not operational.	Notify the system/network manager that the repeater must be returned to Digital for repair or replacement.
DEVICE OK LED on Port B PCI module remains OFF.	Port B module has malfunctioned. Notify the system/network manager that the repeater must be returned to Digital for repair or replacement.
The LINK OK LED on Port B PCI module remains OFF (DEREN-RC/RD only).	Check the fiber optic link between remote repeaters.


APPENDIX A

A

DECrepeater 200 Specifications

A.1 Introduction

This appendix lists the physical, environmental, and electrical specifications for the DECrepeater 200 product.

A.2 Physical Dimensions

The repeater's plastic enclosure can be easily removed for mounting the unit in a standard 19-inch RETMA rack cabinet (mounting brackets are provided). An optional kit (Order Code H039) is available for mounting the repeater on a partition without removing the plastic enclosure.

Dimension	With Enclosure	Without Enclosure
Height	11.7 cm (4.6 in)	8.89 cm (3.5 in)
Width	49.3 cm (19.4 in)	43.49 cm (17.12 in)
Depth	31.2 cm (12.3 in)	30.48 cm (12 in)
Weight	5.08 kg (11.2 lb)	3.4 kg (7.5 lb)

A.3 Environmental Requirements

The DECrepeater 200 product is designed to operate in a non-airconditioned environment or in an exposed area of an industrial site. However, 50° C (122° F) is the maximum ambient temperature allowable at the air intake of the repeater. This applies even when the DECrepeater 200 unit is mounted in a cabinet. The repeater is not intended to operate in an air plenum.

Parameter	Minimum	Maximum
Temperature		
Operating	5° C (41° F)	50° C (122° F)
Non-operating	-40° C (-40° F)	66° C (151° F)
Maximum temperature change per hour	—	20° C (36° F)
Altitude		
Operating	—	2.4 km (8000 ft)
Non-operating	—	9.1 km (30,000 ft)
Relative Humidity		
Operating (noncondensing)	10%	95%
Non-operating (noncondensing)	0%	95%
Wet-bulb temperature (operating)	—	32° C (90° F)
Dew point (operating)	—	2° C (36° F)
Air flow *	—	37.5 CFM

*A minimum of 10 cm (4 in) of space must be provided on both ends of the unit for adequate air flow.

A.4 Fiber Optic Specifications

To obtain maximum transmission distances, or to extend an existing link, careful attention must be paid to the total optical loss of the cable plant. High-quality cables, connectors and splices are strongly recommended. Any cable plant, long or short, should be similar with respect to fiber type. Mixing fiber types usually results in very high losses and is not recommended.

New installations should be wired with 62.5/125 micron Graded Index Multimode Optical Fiber conforming to Digital Equipment Corporation's General Specification 1710002-GS. Other optical fiber sizes can be used but can result in lower maximum transmission distances. Your cable installer should provide proof of compliance.

The following sections provide maximum transmission distances obtainable by the DECrepeater 200 unit when various types of optical fiber are used.

A.4.1 DEREN-RC/RD-to-DEREN-RC/RD Links

The DEREN-RC/RD uses 850 nanometers wavelength LED transmitters and was designed to support 50, 62.5, 85 and 100 micron core fiber types. A maximum distance of 1 kilometer (3280 feet) is possible between two DEREN-RC/RD models.

NOTE

DEREN-RP/RQ-to-DEREN-RP/RQ is not recommended.

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1.0 km (3280 ft)	9 dB	N/A
62.5/125	850 nm	1.0 km (3280 ft)	14 dB	N/A
85.0/125	850 nm	1.0 km (3280 ft)	15 dB	N/A
100/140	850 nm	1.0 km (3280 ft)	16 dB	4 dB

A.4.2 DEREN-RP/RQ-to-Remote DEREP Links

The DEREN-RP/RQ uses 850 nanometer wavelength LED transmitters and was designed to support 50, 62.5, 85, and 100 micron core fiber types. A maximum distance of 1 kilometer (3280 feet) is possible between a DEREN-RP/RQ and a remote DEREP repeater.

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1 km (3280 ft)	6.5 dB	NA
62.5/125	850 nm	1 km (3280 ft)	10.5 dB	1 dB
85/125	850 nm	1 km (3280 ft)	11.5 dB	3 dB
100/140	850 nm	1 km (3280 ft)	12.5 dB	4 dB

A.4.3 DEREN-RC/RD-to-Remote Bridge Links

Ethernet timing requirements restrict distances between a repeater and a bridge to a maximum of 1.5 kilometers (4920 feet). Refer to Table 1-2 for Repeater-to-Bridge compatibility rules.

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1.5 km (4920 ft)	9 dB	N/A
62.5/125	850 nm	1.5 km (4920 ft)	14 dB	N/A
85.0/125	850 nm	1.5 km (4920 ft)	15 dB	N/A
100/140	850 nm	1.5 km (4920 ft)	16 dB	4 dB

A.4.4 DEREN-RP/RQ-to-Remote Bridge Links

Ethernet timing requirements restrict distances between a repeater and a bridge to a maximum of 1.5 kilometers (4920 feet).

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1.5 km (4920 ft)	6.5 dB	NA
62.5/125	850 nm	1.5 km (4920 ft)	10.5 dB	1 dB
85/125	850 nm	1.5 km (4920 ft)	11.5 dB	3 dB
100/140	850 nm	1.5 km (4920 ft)	12.5 dB	4 dB

A.4.5 DEREN-RC/RD/RP/RQ Fiber Cable Measurement Correction

The values in this table are used to correct the measured loss of an optical fiber when using the equipment and procedure specified in Section 9.5.1 of the *DECconnect System Facilities Cabling Installation Guide*. The correction is required to account for the difference in wavelength between the DEREN-RC/RD/RP/RQ transmitter and the test equipment transmitter.

Wavelength	Correction Value
790 nm	-0.2 dB/km
795 nm	-0.1 dB/km
800 nm	0 dB/km
805 nm	0.1 dB/km
810 nm	0.2 dB/km
815 nm	0.3 dB/km
820 nm	0.4 dB/km
825 nm	0.5 dB/km
830 nm	0.6 dB/km
835 nm	0.65 dB/km
840 nm	0.7 dB/km
845 nm	0.8 dB/km
850 nm	0.9 dB/km

A.4.6 Fiber Optic Connectors

DECrepeater 200 (DEREN-RC/RQ) remote units are provided with ST-type transmit and receive connectors (see below). ST-type connectors are also required on the fiber optic cables to make the connection.

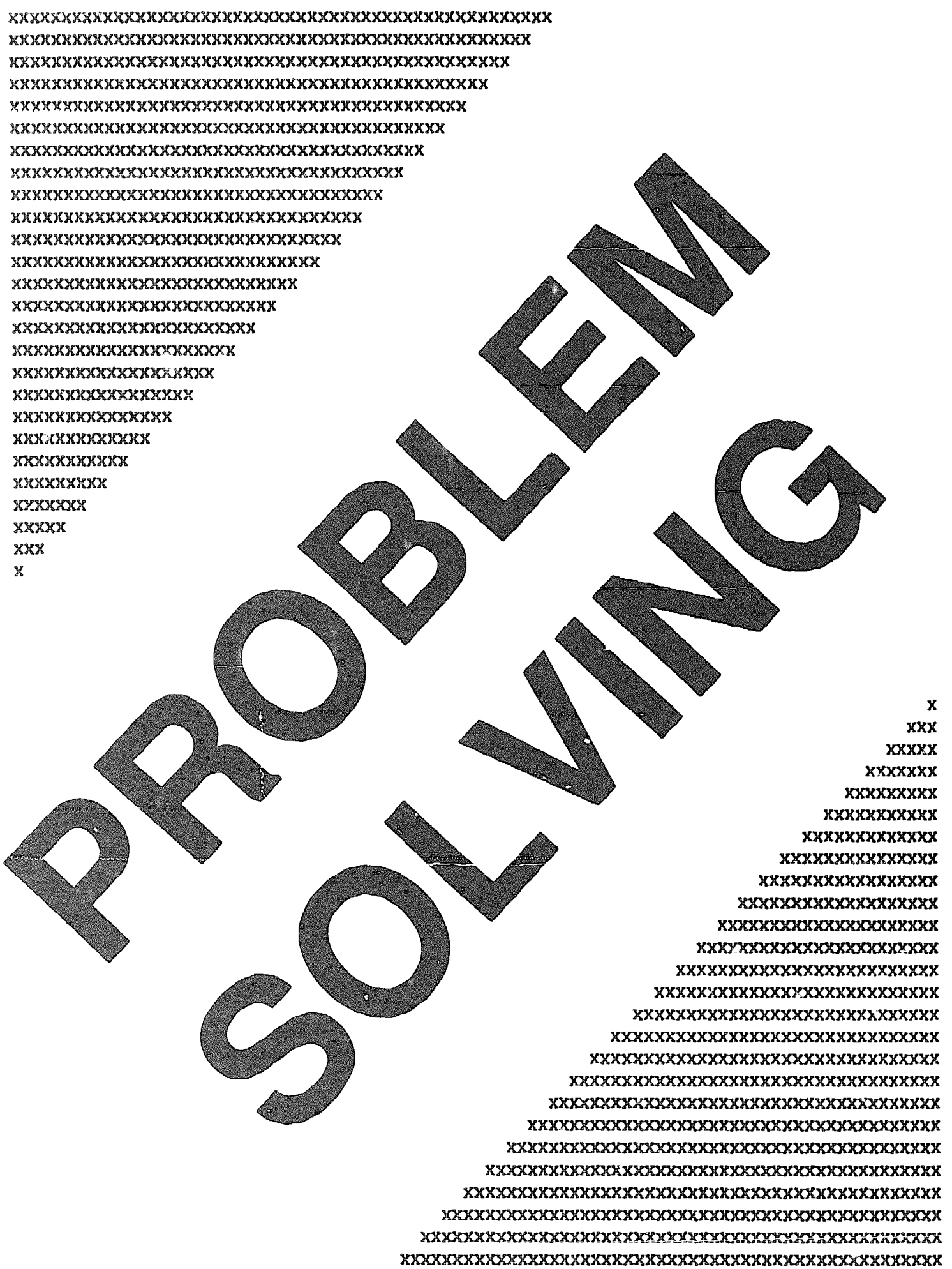
CAUTION

Your cable installer should verifty that the ferrule on the transmit end of the fiber optic cable's connector measures 7.87 ± .025 mm (.310 ± .001 inches) in length. Ferrules that are shorter may cause less power to be launched into the fiber.

Quantity	Connector Type	Maximum Attenuation
2	ST (2.5 mm [.10 in])	Less than 1.0 dB

A.5 Power Requirements

Parameter	120 Vac Operation DEREN-AA/RC/RP	240 Vac Operation DEREN-AB/RD/RQ
Voltage (Nominal)	120 V range	220 V range
	88 Vac to 132 Vac	176 Vac to 264 Vac
Line Current	1.6 amps	.8 amps
Frequency	47 to 63 Hz	47 to 63 Hz
Power Consumption	160 watts	160 watts
Heat Dissipation	500 BTU/hr	500 BTU/hr


PROBLEM
SOLVING

DECrepeater™ 200

Problem Solving

December 1989

This guide is intended for use in training, in field service, and in manufacturing. The level of technical information assumes previous training or experience with Ethernet networks.

Supersession/Update Information:	This is a revised manual to include two new models.

digital™

Order Number: EK-DEREN-PS-002

EK–DEREN–PS–002
December 1989

The postpaid READER'S COMMENTS form in the front of this document requests the user's critical evaluation to assist in preparing future documentation.

This manual was produced by Networks and Communications Publications.

Contents

3 Removal and Replacement Procedures

A DECrepeater 200 Specifications

Figures

Tables

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Preface

This manual contains troubleshooting, field replaceable unit (FRU) removal, and replacement procedures.

No special tools are required.

Common tools required are a Phillips-head screwdriver and a small adjustable wrench.

Intended Audience

This document is intended for the Digital Equipment Corporation field service representative, the self-maintainer, and the system/network manager.

Structure of This Guide

This guide contains three chapters and one appendix, as follows:

Chapter 1	Describes the maintenance strategy, lists the field replaceable units (FRUs) and required equipment, and describes the test procedures for the DECrepeater 200 unit.
Chapter 2	Describes how to perform preliminary problem checks and DECrepeater 200-specific troubleshooting procedures.
Chapter 3	Provides removal and replacement procedures for each of the field replaceable units.
Appendix A	Provides the DECrepeater 200 product specifications

Related Documentation

Additional information can be found in the following documents. Ordering information is provided at the back of this guide.

- *DECrepeater 200 Installation* (Order No. EK-DEREN-IN)

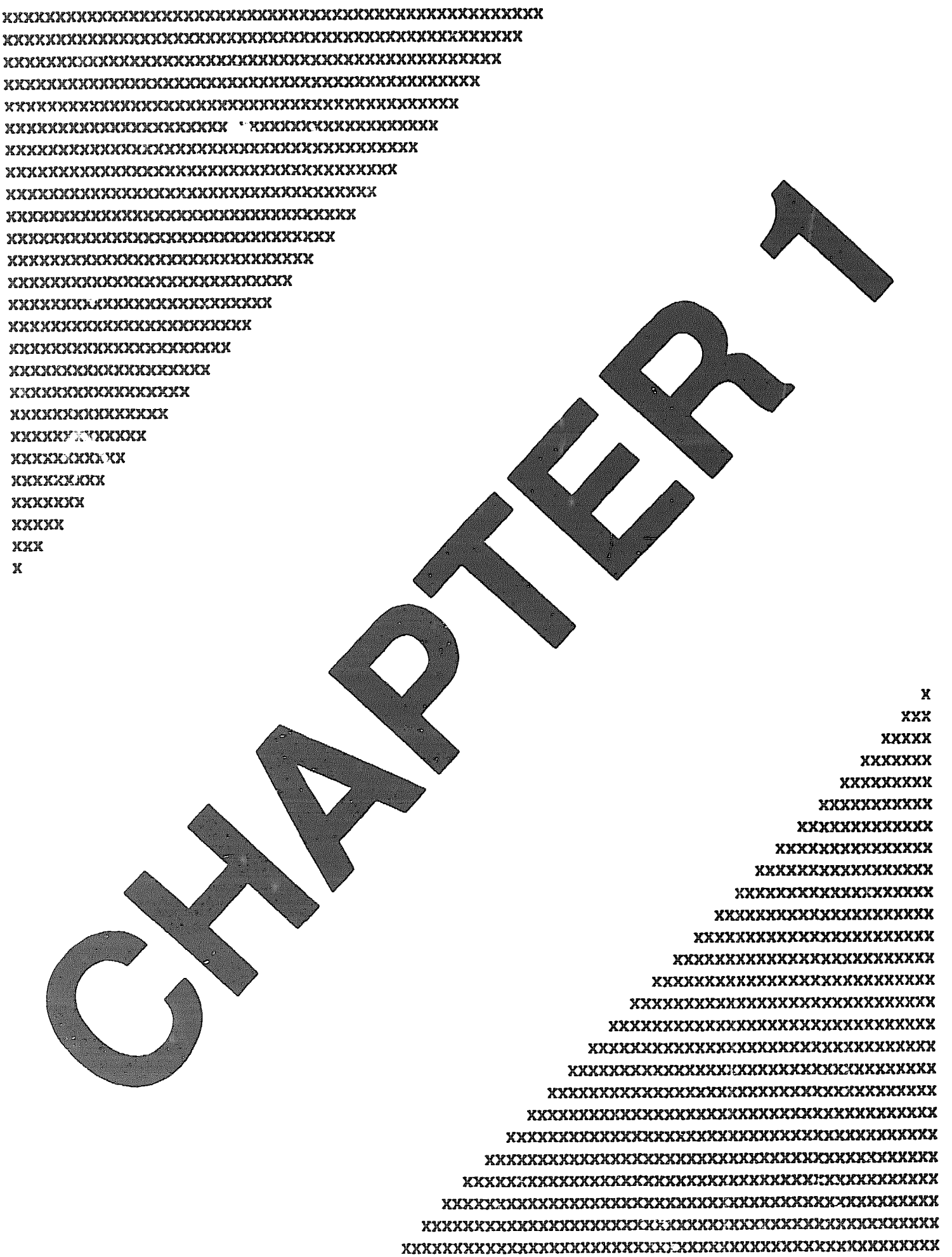
  Contains instructions on how to install the DECrepeater 200 and also includes procedures to verify its operation.

- *DECconnect System Planning and Configuration Guide* (Order No. EK-DECSY-CG)

  Contains planning requirements and guidelines for configuring DECconnect System networks and networks that use DECconnect products. This guide also contains detailed product information for all DECconnect System components.

- *DECconnect System Facilities Cabling Installation Guide* (Order No. EK-DECSY-FC)

  Describes the steps and procedures for properly installing Ethernet coaxial, twisted-pair data and voice, Thinwire and fiber optic cables within a DECconnect System site. This includes installation procedures for devices directly related to the facilities cabling (such as transceivers and wallboxes).


CHAPTER 1

1

Introduction

1.1 Scope of This Manual

This manual provides the necessary information to repair the DECrepeater 200, also referred to as the repeater. It is intended for use by system/network managers, branch field service engineers, and self-maintenance customers.

To help determine what field replaceable unit (FRU) requires replacement, illustrations of the repeater and coded information related to failing circuits are provided.

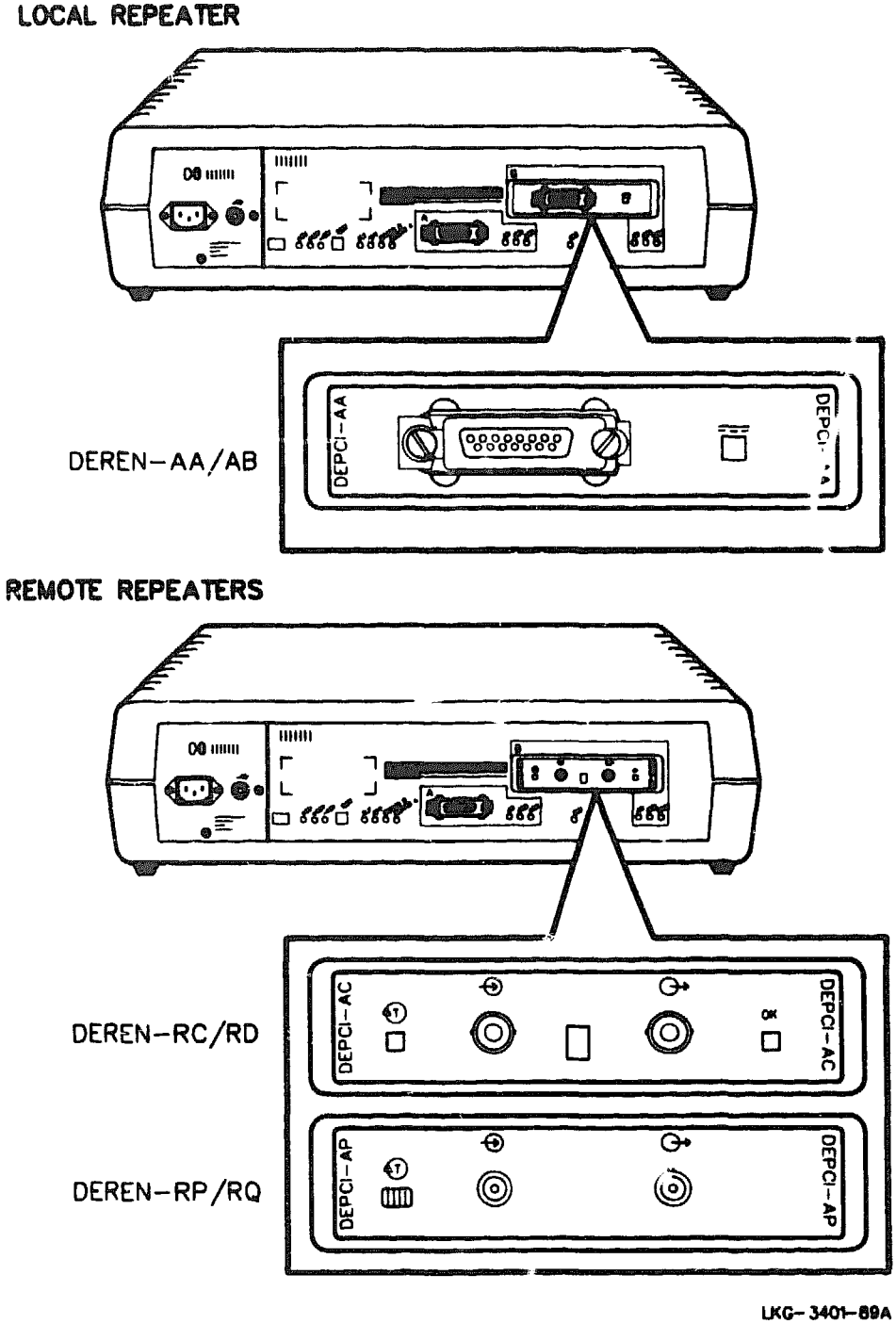
A local repeater connects two LAN segments. Remote repeaters connect two LAN segments separated by a fiber optic link extending the distance between the two LANs. Figure 1-1 shows the difference between a local and remote DECrepeater 200.

1.2 Maintenance Strategy

The maintenance strategy for the DECrepeater 200 unit is to identify and replace a faulty FRU.

Determining which FRU is faulty is accomplished by running the repeater's built-in diagnostic self-test and monitoring the LEDs. Instructions for replacing a faulty FRU are included in this manual.

Figure 1–1: Local and Remote Repeater I/O Panel



1.3 Field Replaceable Units

Field replaceable units are listed in Table 1-1

Table 1–1: Field Replaceable Units

Description	Part Number
59 W power supply	30-27484-01
PCI module (local)	DEPCI-AA
PCI module (remote)	DEPCI-AC
PCI module (remote)	DEDCI-AP
Logic module	54-18363-01
Fan assembly	70-23165-02

1.4 Required Equipment

Required equipment consists of the following:

- DEREN-AA/AB local repeater - two 15-pin loopback connectors, P/N 12-22196-01 (supplied).
- DEREN-RC/RD remote repeater - one 15-pin loopback connector, P/N 12-22196-01 (supplied), and one fiber optic accessories kit P/N 22-00437-01 (supplied). Accessories kit consists of one loopback connector, P/N 17-02372-01, and one attenuating spacer, P/N 12-30068-02.
- DEREN-RP/RQ remote repeater - one 15-pin looback connector, P/N 12-22196-01 (supplied), and one attenuating spacer P/N 12-30068-01 (supplied).
- *DECrepeater 200 Installation* guide - Order No. EK-DEREN-IN (supplied).
- Phillips-head screwdriver - (not supplied).
- Small adjustable wrench - (not supplied).

1.5 Built-In Self-Test (BIST)

Both off-line and on-line diagnostics are provided by the DECrepeater 200 built-in self-test (BIST) logic. Off-line diagnostic tests are performed by either a power up (internal self-test only) or by momentarily pressing the TEST switch (internal and external self-test). When the repeater is operational, the on-line diagnostics continue to check for internal fault conditions.

1.5.1 Off-Line Diagnostics

Off-line diagnostics consists of two distinct tests: internal and external. While the repeater is performing off-line self-test, it does not perform as an operational repeater (packets are not repeated from port-to-port). The TEST LED is always on while off-line self-test is running. If a fault is detected, the FLT LED turns on and the TEST LED remains on. The repeater does not go on line under these conditions.

1.5.1.1 Internal Self-Test

After a power up, a 2-second lamp test is performed followed by internal self-test. All LEDs, with the exception of the LEDs on the Port B module of a DEREN-RC/RD/RP/RQ, light during the lamp test. All internal logic is tested including logic on the Port B module of a DEREN-RC/RD/RP/RQ. Internal self-test does not require loopback connectors or connection to a working medium. If no faults are detected, internal self-test completes and the TEST LED goes out within 5 seconds after power up.

The TEST LED is lit while internal self-test is running. If a fault is detected, the FLT LED lights, the TEST and FLT LEDs remain lit, and the repeater does not go on line. If either of these LEDs remain lit, refer to Chapter 2, Problem Solving. A successful pass is indicated if both the TEST and FLT LEDs go out after approximately 5 seconds.

1.5.1.2 External Self-Test

When the TEST switch is momentarily pressed, the 2-second lamp test is performed followed by internal and external self-test. If internal self-test passes, test packets are transmitted from both ports.

In a local repeater configuration, the loopback is provided by the loopback connector (if installed) or the transceiver. In a remote repeater configuration, loopback is provided by the fiber loopback connector (if installed) or by a fiber connection to another operational remote repeater or bridge.

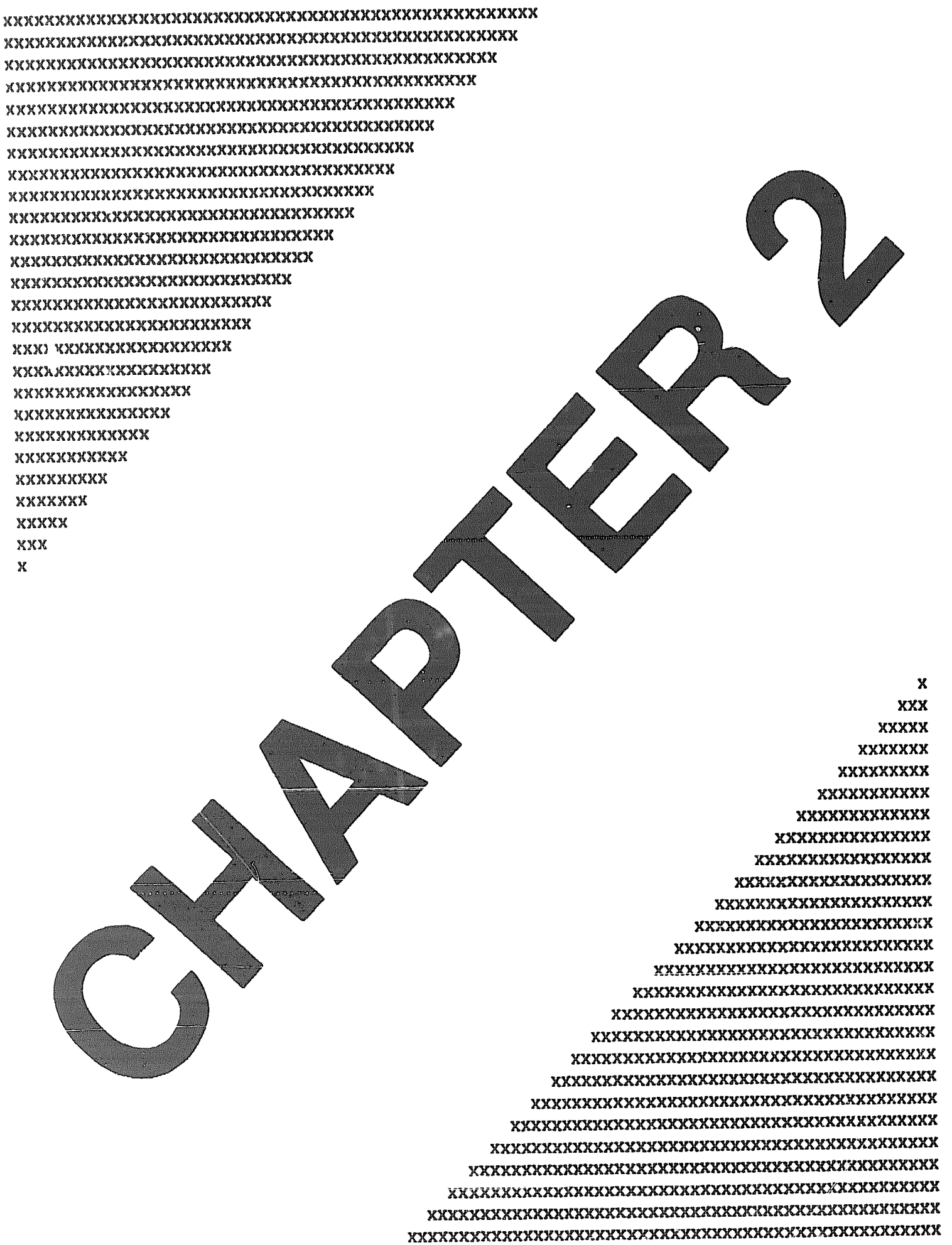
The TEST LED is lit while internal/external self-test is running. If a fault is detected, the FLT LED lights, the TEST and FLT LEDs remain lit, and the repeater does not go on line. If either of these LEDs remain lit refer to Chapter 2, Problem Solving. A successful pass is indicated if both the TEST and FLT LEDs go out after approximately 5 seconds.

NOTE

Remote repeaters do not pass external self-test unless both repeaters are fully connected and operating, or fiber optic loopback connectors are installed on each repeater. The self-test must be performed individually on each repeater.

1.5.2 On-Line Diagnostics

When the repeater has successfully completed off-line self-test with no faults detected, it can be connected to the medium and go on line as a functioning repeater. While on line, the diagnostic logic continues to monitor and respond to fault conditions. If a fault is detected, the FLT LED turns on (the TEST LED will not turn on) and the repeater continues to function as a repeater if possible. If the FLT LED is observed to be on when the repeater is on line, the TEST switch should be pressed to invoke off-line diagnostics in order to determine if a hard failure occurred. Faults detected with on-line self-test probably result from transients and by running an off-line self-test it shows that no hard fault occurred. A transient fault does not permanently interrupt the repeater operation.


CHAPTER 2

2

Problem Solving

2.1 Introduction

This chapter provides problem solving procedures for diagnosing and isolating faulty field replaceable units (FRUs) in the DECrepeater 200.

Refer to the appropriate manual when the problem solving procedures lead to a malfunction in a transceiver or other network related device.

2.2 Recommended Approach to Problem Solving

A fault can exist in the transceiver or other equipment that is electrically close to the DECrepeater 200. In some cases, this type of fault initially appears to be in the DECrepeater 200 unit. Following the problem solving procedures in this chapter, you can either isolate the problem to a faulty FRU in the repeater, or possibly to an external problem.

2.3 Problem Solving Checklist

Use the following checklist to ensure that an easily overlooked condition is not causing the problem.

- Ensure that the power cord is secure at the repeater and at the power source receptacle.
- Ensure that the appropriate power is available at the electrical outlet.
- Ensure the circuit breaker (located on the repeater I/O panel) has not tripped. If it has, press in the white button to reset the breaker.

- Ensure that the repeater's voltage select switch is set to match the appropriate power source, see Figure 2-1.

- Ensure that both optical idle switches on Port B of a remote repeater (DEREN-RC/RD only) are set to switch 1 OFF (up) and switch 2 ON (down) in a DECrepeater-to-non-Digital 802.3 FOIRL (repeater or bridge) compatible configuration, see Figure 2-2.

- Ensure that both optical idle switches on Port B of a remote repeater (DEREN-RC/RD only) are set to OFF (up) in a DECrepeater-to-DECrepeater configuration.

- Ensure that the slide latches on the transceiver cables are firmly locked in place.

- Check that the fiber optic cable is firmly attached and that the transmit and receive connections are not interchanged.

- The minimum cable plant loss must be met or the attenuating spacer provided must be used on the transmit connector to attenuate the signal. Refer to Table 2–1 for minimum loss requirements.

- Port A and Port B inputs to local repeaters are identical; reversing the transceiver cables may identify if the fault is in the repeater or outside the repeater.

- When transceiver cables are swapped, malfunctions existing outside the repeater appear to move to the repeater's other side (from Port A to Port B or vice-versa). In contrast, malfunctions existing within the repeater generally remain with the repeater's same side even when transceiver cables are swapped.

- Check the +5 V, +12 V, -12 V LEDs to see if they are lit. Also check if the repeater fans are running. If the fans are not running, or the LEDs ar not lit, power may not be reaching the repeater or the power supply.

- Consider possible environmental problems such as power fluctuations, high-ambient temperature, or interference from other equipment.

The minimum cable plant loss must be met or the attenuating spacer provided must be used on the transmit connector to attenuate the signal, see Figure 2-3. Table 2–1 provides the minimum loss requirements.

Table 2–1: Minumum Loss Requirements

Fiber Size	DEREN-RC/RD Minimum Attenuation	DEREN-RP/RQ Minimum Attenuation
50/125	N/A	N/A
62.5/125	N/A	1 dB
85/125	N/A	3 dB
100/140	4 dB	4 dB

Figure 2–1: Voltage Select Switch

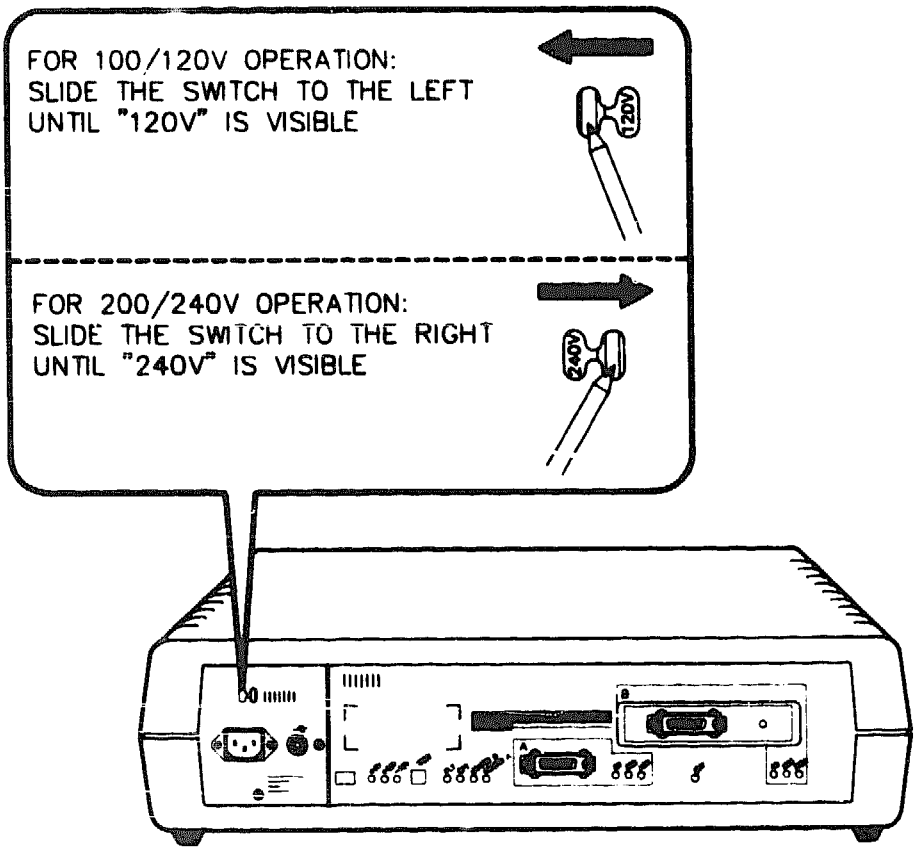


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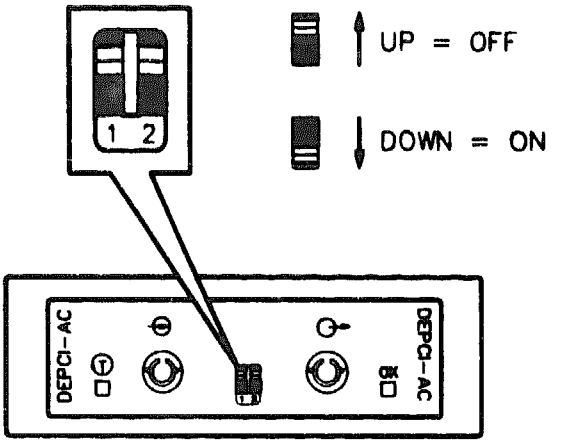
Figure 2–2: Optical Idle Switches for DEREN-RC/RD



The switches on the DEREN–RC/RD unit (or Digital device) at the other end of the link must also be set to the OFF position as shown above.

If you are connecting the DEREN–RC/RD unit to a non–Digital 802.3 compliant device, set switch 1 OFF (up = OFF) and set switch 2 ON (down = ON).

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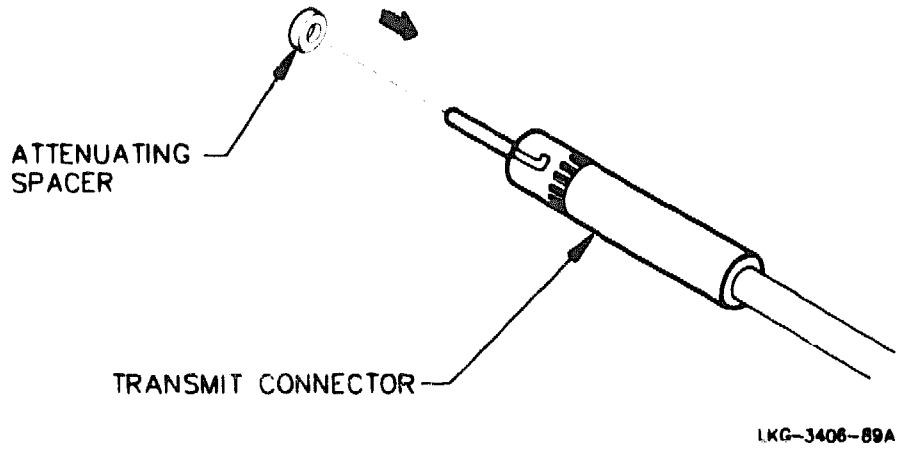
Figure 2–3: Attenuating Spacer



2.4 Initial Problem Solving Steps

The following procedures assume that the problem has been isolated to the DECrepeater 200 hardware unit.

1. Disconnect the power cable from the power source.
2. Disconnect the communications cables from Port A and Port B isolating the repeater from the network.
3. For a local repeater, install AUI loopback connectors to Port A and Port B, see Figure 2-4.
4. For a remote repeater, install an AUI loopback connector on Port A and a fiber optic loopback connector to the transmit and receive connectors on Port B, see Figure 2-5.
5. Connect the power cord to the power source.

Applying power causes all of the LEDs to light (excluding the LEDs on Port B of a remote repeater) allowing the location of faulty LEDs. After 2 seconds some of the LEDs extinguish and the repeater starts internal diagnostic self-test. This completes after approximately 5 seconds.

When self-test is running, the TEST LED in the TEST switch is lit. Self-test has no effect on a remote repeater's LEDs on Port B, DEVICE OK or LINK OK.

Figure 2–4: Loopback Connectors Installed on a Local Repeater

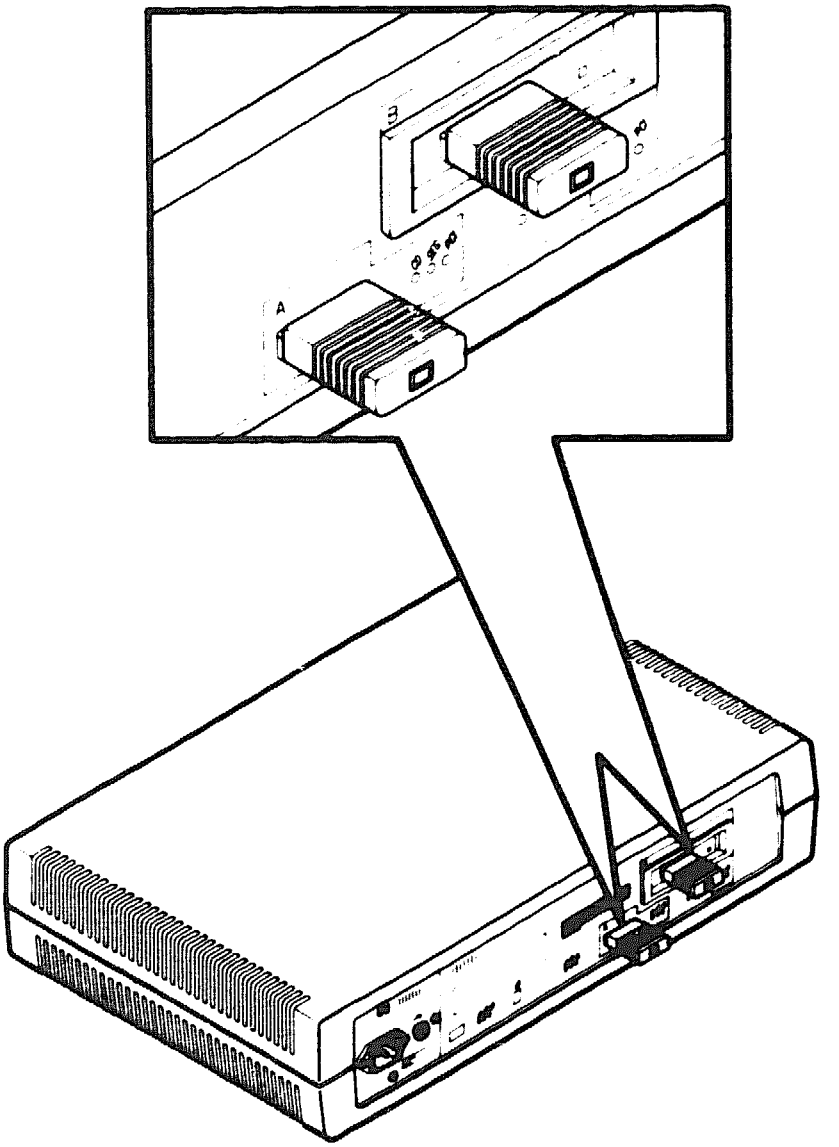


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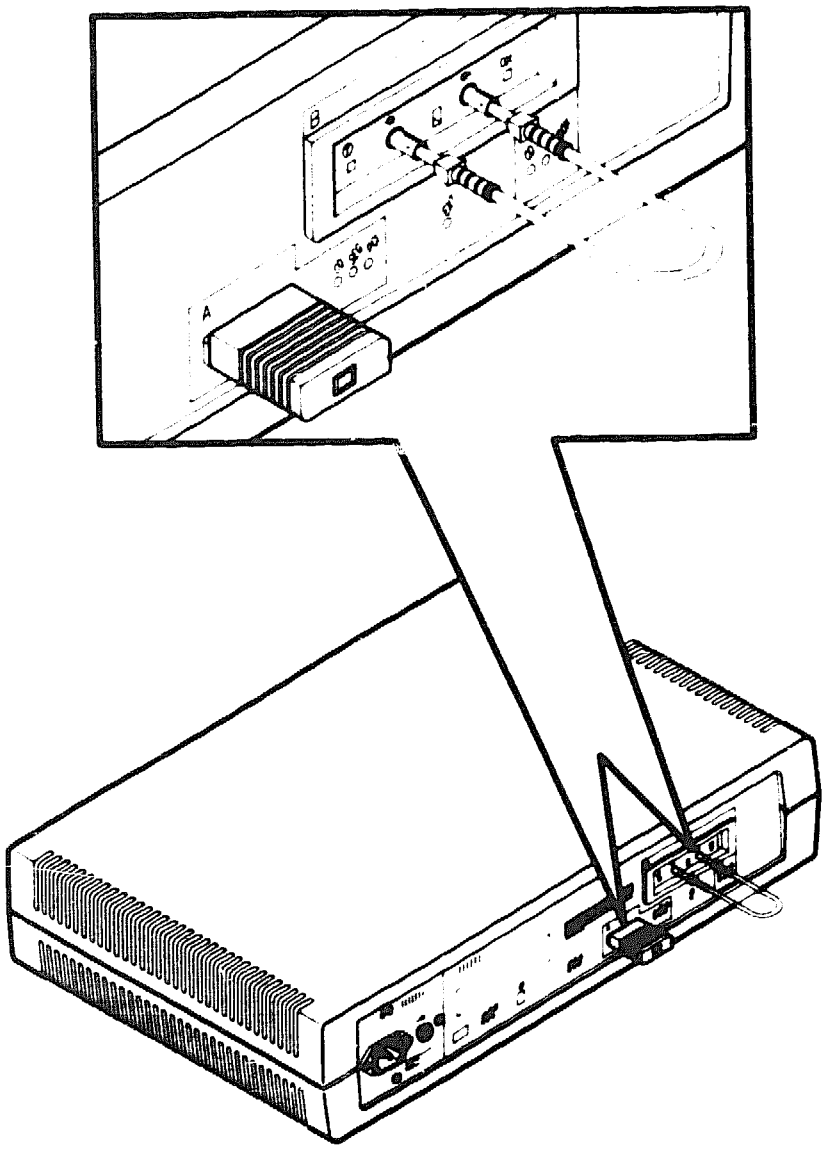
Figure 2–5: Loopback Connectors Installed on a Remote Repeater



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NOTE

DEREN-RP/RQ does not use a fiber loopback connector.

2.4.1 Verifying Local Repeater Operation (DEREN-AA/AB)

A local repeater is operating properly when the +5 V, +12 V, -12 V, DC OK, AOK, BOK LEDs are lit, and the TEST and FLT LEDs are out. Figure 2-6 shows these four LEDs. The LEDs in the loopback connectors are also lit. Some of the other repeater LEDs have a different meaning during self-test. These are described in Table 2–1, Coded LEDs.

Refer to Table 2–3 for a description of the LEDs during normal operation.

2.4.2 Verifying Remote Repeater Operation (DEREN-RC/RD/RP/RQ)

A remote repeater is operating properly when the +5 V, +12 V, -12 V, DEVICE OK, LINK OK (DEREN-RC/RD only), AOK, BOK LEDs are lit, and the TEST and FLT LEDs are out. Figure 2-7 shows these LEDs. The LED in the Port A loopback connector is also lit. The Port B loopback connector uses the Port B LINK OK LED to indicate connectivity (DEREN-RC/RD only). Some of the other repeater LEDs have a different meaning during self-test. These are described in Table 2–1, Coded LEDs.

Refer to Table 2-4 for a description of the LEDs during normal operation.

Figure 2–6: Local Repeater Hardware Verification

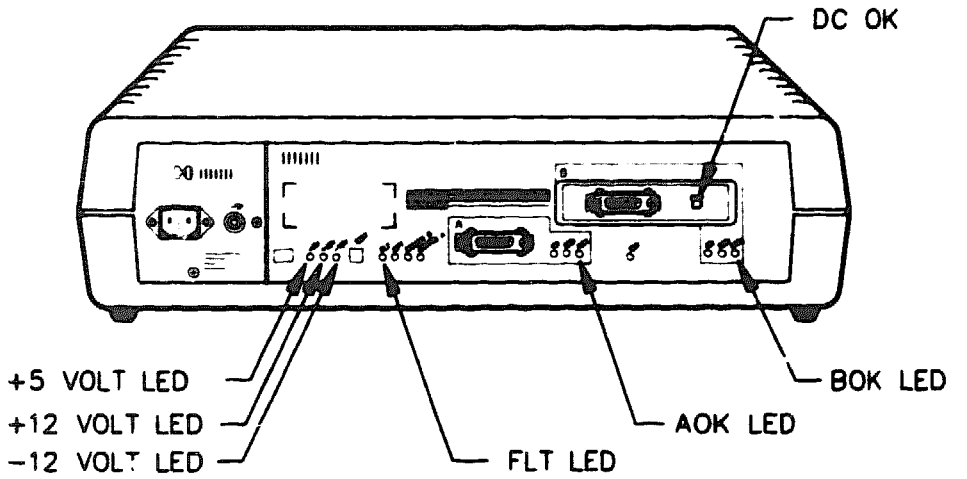
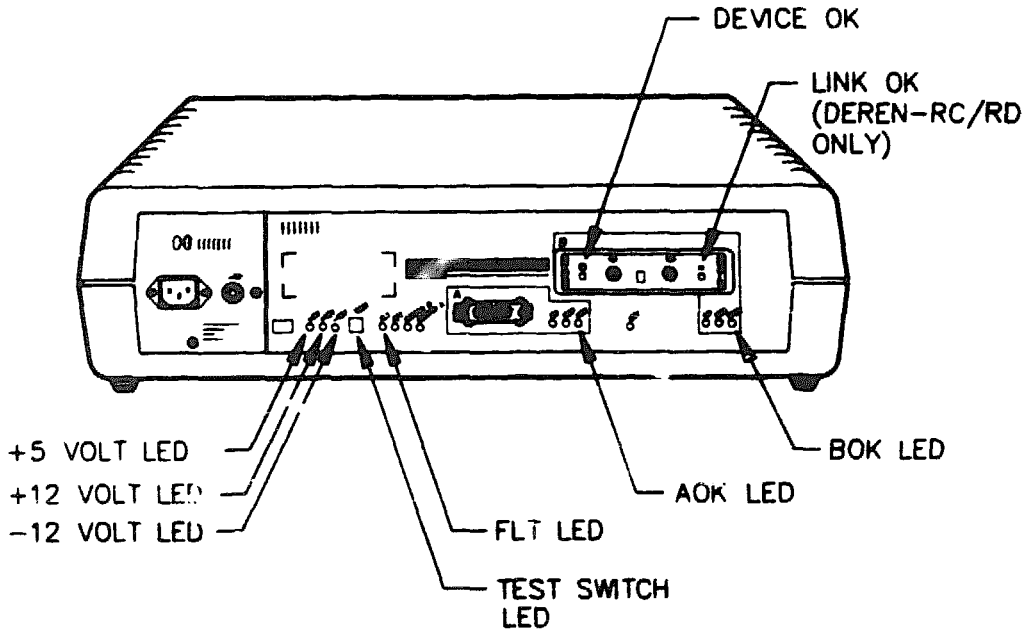


Figure 2–7: Remote Repeater Hardware Verification



2.5 Self-test and Coded LEDs

When running self-test and a failure has occurred, four of the LEDs are used to indicate the FRU/logic block under test. When self-test fails the TEST and FLT LEDs remain lit and the four LEDs depict a code that relate to the FRU/logic block that has failed. These LEDs are the CPT, CNFGA, CNFGB, and EXT LEDs. Table 2–2 shows the possible LED combinations for each FRU. In some cases, a fault is not definitely isolated to a single FRU.

Figure 2-8 shows the location of the LEDs that are used to determine the code. Use the four coded LEDs and the LED descriptions to isolate the fault to the repeater FRU, or to other possible sources of malfunction. Always check the power supply +5, +12, and -12 LEDs to verify the source of the problem is not lack of DC power. If one or more of the power supply LEDs are out, replace the power supply, and repeat internal/external testing by pressing the TEST switch.

Press and release the test switch on the repeater. All LEDs (with the exception of the LEDs on Port B of a remote repeater) should light for approximately 2 seconds. Following the 2-second check of the LEDs, internal self-test for the logic module runs, followed by external self-test.

Table 2–2 shows the LED groupings for the logic module FRU and the PCI module FRU. The four LEDs on the left side of the table show the ON or OFF state of the LED. The FRU to replace is shown on the right side of the table. Table 2–3 is provided if an external self-test failure occurred. Observe the SEGA and SEGB LEDs and take the appropriate action.

Table 2–2: Coded LEDs

LED				
CPT	CNFGB	CNFGA	EXT	Field Replaceable Unit
OFF	OFF	OFF	OFF	Replace Logic Module
OFF	OFF	ON	OFF	Replace Logic Module
ON	ON	OFF	OFF	Replace Logic Module
ON	OFF	ON	ON	Replace Logic Module
OFF	ON	OFF	ON	Replace Logic Module
OFF	ON	ON	OFF	Replace Logic Module
ON	OFF	OFF	OFF	Replace Logic Module
ON	OFF	OFF	ON	External self-test failed (refer to Table 2-3)
ON	OFF	ON	OFF	Replace Logic Module
OFF	ON	OFF	OFF	Replace Logic Module
ON	ON	ON	OFF	Replace Logic Module
ON	ON	ON	ON	1 - Replace Port B PCI Module or: 2 - Replace logic module

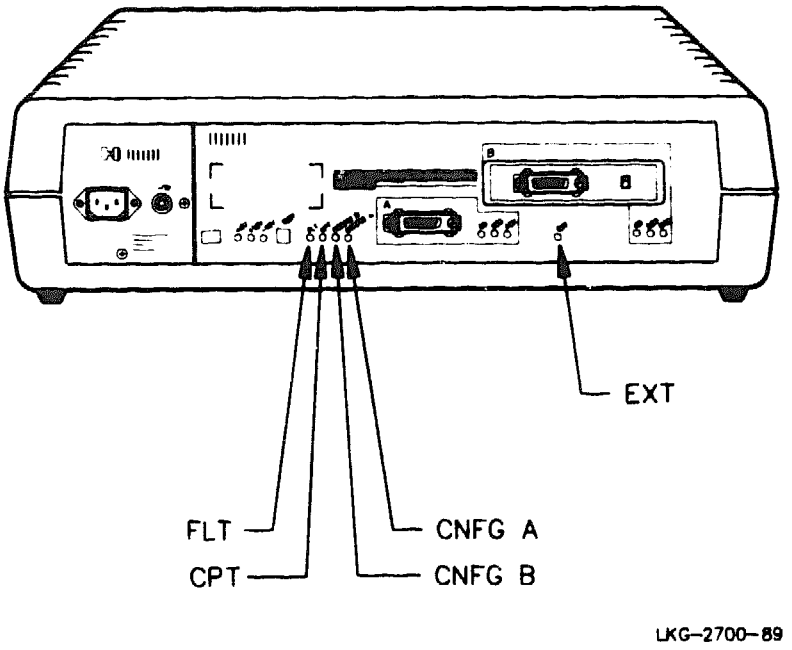
Table 2–3: External Self-Test Fault Isolation

SEGA	SEGB	Action
OFF	OFF	Replace the logic module
OFF	ON	If medium attachment is on Port B, press the TEST switch to rerun internal and external self-test with the loopback connector on Port B. If loopback connector on Port B, replace the Port B module. If the condition persists, replace the logic module.
ON	OFF	If medium attachment is on Port A, press the TEST switch to re-run internal and external self-test with the loopback connector on Port A. If the loopback connector is on Port A, replace the logic module.

Table 2–3 (Cont.): External Self-Test Fault Isolation

SEGA	SEGB	Action
ON	ON	If medium attachment is on either port, press the TEST switch to re-run internal and external self-test with the loopback connectors installed. If the loopback is on both ports, replace the logic module.

Figure 2–8: Coded LEDs

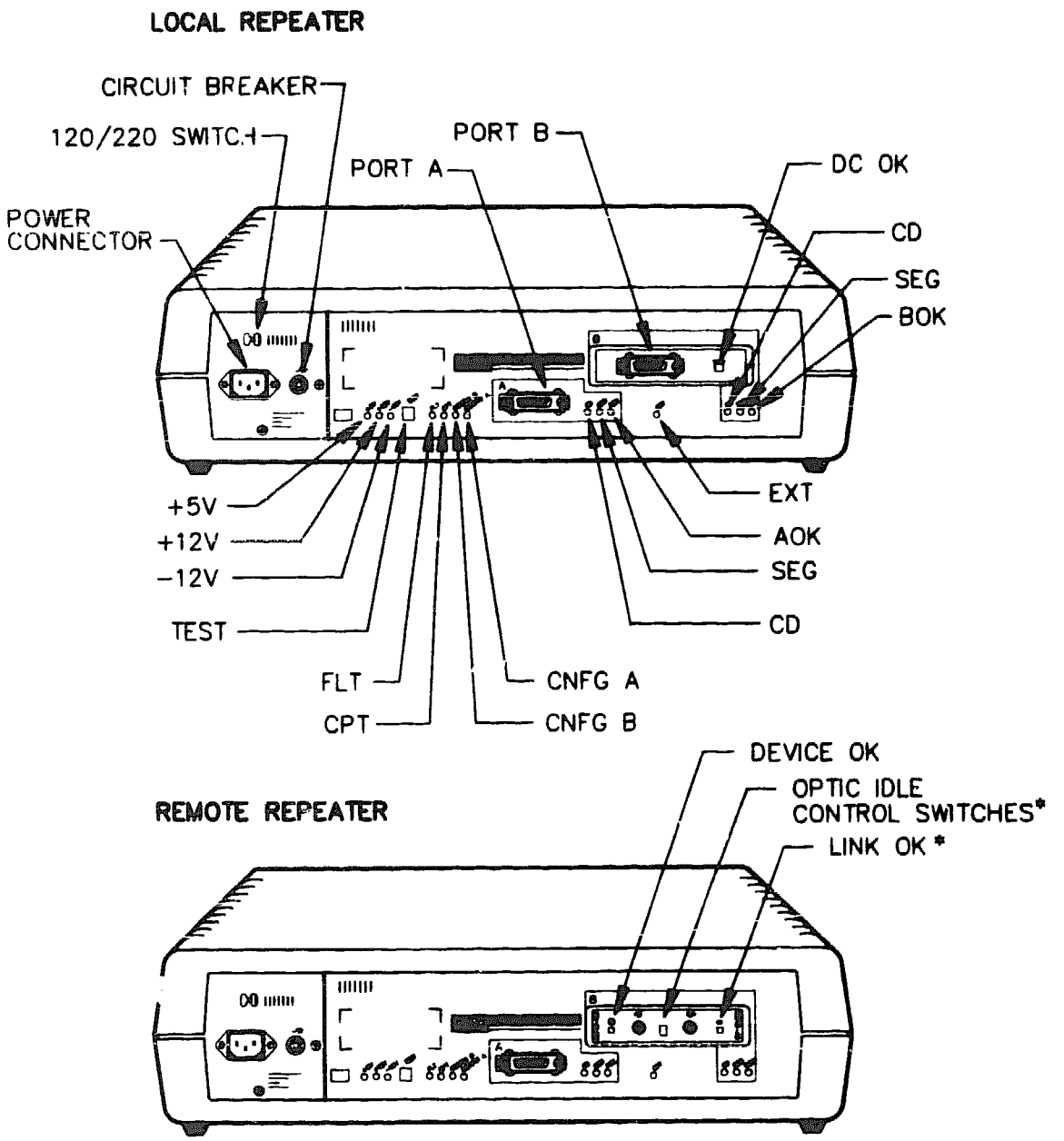


2.6 Repeater I/O Panel

All the repeater's switches, connectors, and indicators are located on the I/O panel of the repeater (see Figure 2-9).

Tables 2-4 and 2-5 describe the normal state of the repeater status LEDs and control switches. Table 2–6 is a simple problem solving table that lists symptoms and suggested corrective action.

Figure 2-9: Repeater I/O Panel



*USED ON DEREN-RC/RD ONLY

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Table 2–4: Status LEDs

LED	Normal State	Description
+5 Vdc	ON	+5 volt supply functioning
+12 Vdc	ON	+12 volt supply functioning
-12 Vdc	ON	-12 volt supply functioning
TEST	OFF	ON when repeater is executing self-test, remains lit when repeater fails self-test.
FLT	OFF	ON when self-test failed.
CPT*	ON/OFF	ON when repeater is receiving SQE TEST from one or both transceivers.
CNFGB*	OFF	ON when configuration error is on Port B. Repeater connected to 802.3 transceiver with heartbeat enabled.
CNFGA*	OFF	ON when configuration error is on Port A. Repeater connected to 802.3 transceiver with heartbeat enabled.
CD A	Should Flicker	Flickers when carrier received on Port A is transmitted to Port B.
SEG A	OFF	ON when repeater is segmented on Port A. Blinks when a fault was detected on Port A but was corrected.
CD B	Should Flicker	Flickers when carrier received on Port B is transmitted to Port A.
SEG B	OFF	ON when repeater is segmented on Port B. Blinks when a fault was detected on Port B but was corrected.
AOK/BOK	ON	Port A and B are operational.
EXT*	OFF	Off when self-test passes. If self-test fails, FLT or EXT LED may be on indicating subsystem failure.
DEVICE OK (remote repeater only)	ON	OFF when module in Port B has malfunctioned.
LINK OK (DEREN-RC/RD only)	ON	OFF when the fiber optic link between remote repeaters is broken or disconnected. Can also indicate incompatible optical idle switch settings.

*CPT, CNFGB, CNFGA, and EXT have alternate meaning when read as coded LEDs

Table 2–5: Repeater Control Switches

Switch	Description
Voltage Select Switch	Used to set the repeater input voltage to the required range, either 120 or 240 volts.
Circuit Breaker	Provides overcurrent protection for the repeater. If an overcurrent condition causes the circuit breaker to trip, the white center portion of the circuit breaker pops out as a visual indication and the ac power is cut off from the repeater. The circuit breaker can be reset by pressing in the white center portion of the circuit breaker.
Test	This is a momentary switch. It is depressed once to reset the repeater and to initiate self-test.
Optical Idle Switches (DEREN-RC/RD only)	Sets idle signal scheme between remote repeaters. DEREN-RC/RD-to-Digital device switches are both OFF (up). DEREN-RC/RD-to-non Digital 802.3 compliant device, switch 1 OFF (up) and switch 2 ON (down). See Figure 2-2.

2.7 Diagnosing Problems

The repeater's LEDs indicate the status of the unit and are also used in diagnosing repeater problems. When a problem occurs, check the repeater's LEDs to determine a symptom. Symptoms are possible problems that could occur during power-up or during normal repeater operation. For example, when power is applied to the repeater most of the LEDs light momentarily then extinguish. This indicates that power is reaching the repeater. If power is missing, the LEDs do not light.

Check Table 2–6 and compare the symptom that the repeater is having with those listed in the table. Try the suggested corrective action to resolve the problem.

Table 2–6: Simple Troubleshooting

Symptom	Suggested Corrective Action
All repeater lights are off.	Check that both ends of the power cord are completely plugged in. Check that there is power at the electrical outlet. Check the repeater circuit breaker. If it has tripped, the white center portion extends out. The circuit breaker can be reset by pressing in the white center portion of the circuit breaker. If LEDs remain OFF, replace the power supply.

Table 2–6 (Cont.): Simple Troubleshooting

Symptom	Suggested Corrective Action
The CD A LED (green) is continuously OFF.	Press the TEST button. All LEDs should light and remain lit for approximately 2 seconds. If the carrier A LED fails to turn ON, the LED is defective. Run self-test with the loopback connectors installed to verify repeater functionality. *For local repeaters:* Swap transceiver cable inputs to see if the inactive indications shift to Port B of the repeater. If the indication does shift to the other port of the repeater, suspect inactivity (no traffic) on that segment, or a problem with the transceiver and/or transceiver cable. Replace the logic module if the above procedures fail to correct the problem. *For remote repeaters:* Try using a different transceiver or transceiver cable. If the CD indication improves, suspect a problem in the transceiver or transceiver cable. If the CD indication does not improve, suspect inactivity on Port A or a faulty logic module.
The Carrier Detect B LED (green) is continuously OFF.	Check that the fiber optic datapath is not broken or disconnected (remote repeater only). Check other indicators (5 V and 12 V LEDs) to determine that the repeater is properly powered and whether the transceiver is getting power. Press the TEST button. All LEDs should light and remain lit for approximately 2 seconds. If the carrier B LED fails to turn ON, the LED is defective. Run self-test with the loopback connector installed to verify repeater functionality (DEREN-RC/RD only).

Table 2–6 (Cont.): Simple Troubleshooting

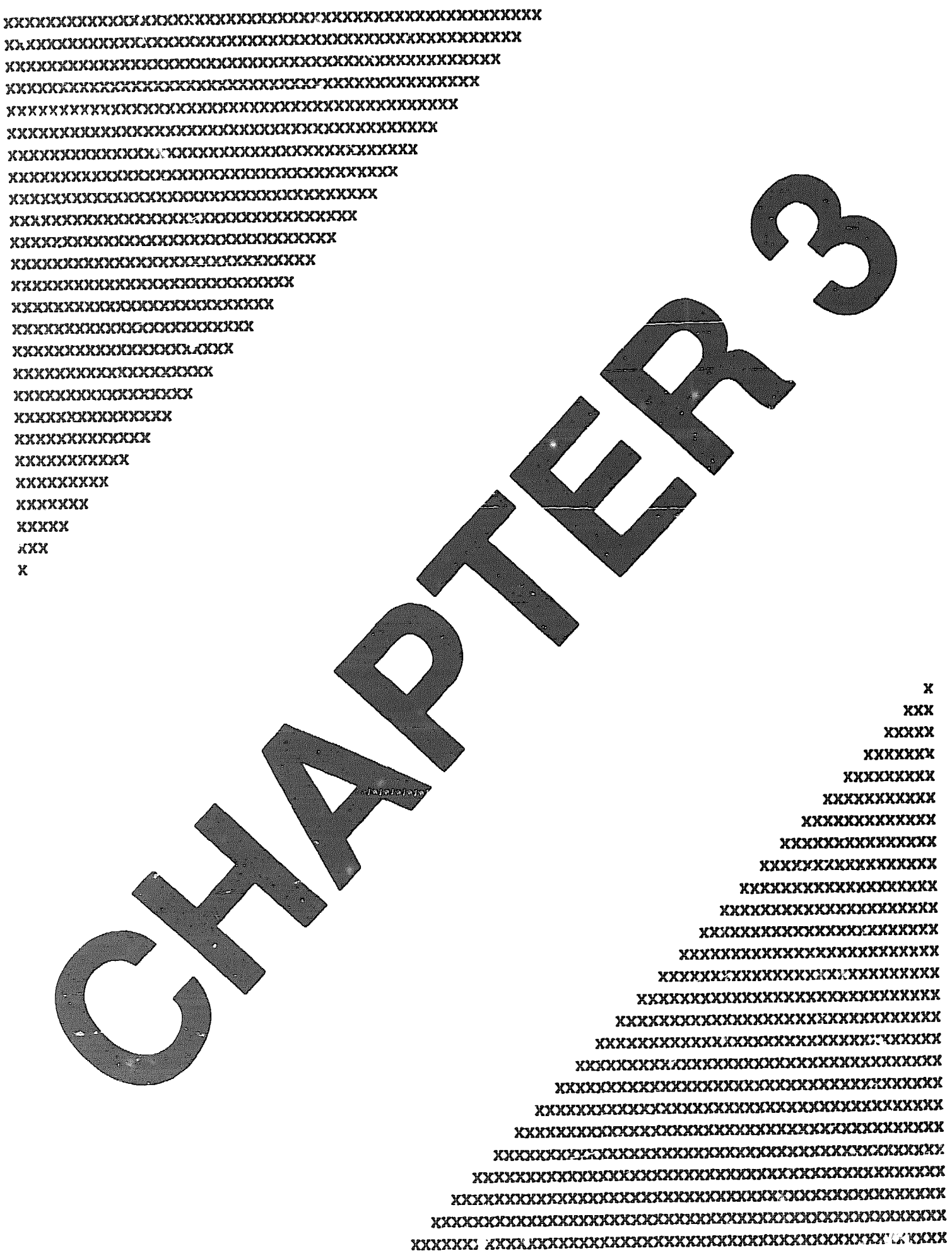
Symptom	Suggested Corrective Action
	For local repeaters: Swap transceiver cable inputs to see if the inactive indications shift to Port A of the repeater. If the indication does shift to the other port of the repeater, suspect inactivity (no traffic) on that segment, or a problem with the transceiver and/or transceiver cable. *For remote repeaters:* Install the loopback connector on Port B and press the TEST switch to run self-test. If the repeater passes self-test, check the fiber optic cable or the other repeater for failure.
The SEG (A) LED (yellow) lights indicating that Port A is currently segmented.	Press the TEST button (with the loopback connector installed) to reset the segmented LEDs and verify repeater functionality. *For local repeaters:* Swap transceiver cable inputs to see if the segmented indication shifts to Port B of the repeater. If the indication does shift to the other port of the repeater, suspect a problem outside the repeater such as a transceiver, transceiver cable, or coaxial segment. Use the SET HOST command from a system on one side of the repeater to contact a known system on the other side of the repeater in question. Replace the logic module if the above procedures fail to correct the problem. *For remote repeaters:* Check the setting of the optical idle switches. Refer to Table 2-4 (DEREN-RC/RD only).
The SEG (B) LED (yellow) lights indicating that Port B is currently segmented.	Press the TEST button (with loopback connector installed) to reset the segmented LEDs and to verify repeater functionality

Table 2–6 (Cont.): Simple Troubleshooting

Symptom	Suggested Corrective Action
	For local repeaters:
	Swap transceiver cable inputs to see if the segmented indication shifts to Port A of the repeater. If the indication does shift to the other port of the repeater, suspect a problem outside the repeater such as a transceiver, transceiver cable, or coaxial segment.
	Use the SET HOST command from a system on one side of the repeater to contact a known system on the other side of the repeater in question. Check the LED codes in Table 2–1.
	For remote repeaters:
	Check the fiber optic link between repeaters.
	Check the LED codes in Table 2–1.
	Check the setting of the optical idle switches. Refer to Table 2-4.
The +12 V LED is OFF.	Verify that the power cord is connected to the power source.
	Check the AOK LED on Port A. If the AOK LED is OFF, suspect the power supply. If the AOK LED is ON, suspect that the +12 V LED is not functioning.
	Replace the power supply.
The -12 V LED is OFF.	Verify that the power cord is connected to the power voltage source.
	Check both the +12 V LED and the -12 V LED to determine if the power supply is functioning.
If the TEST LED remains lit, the self-test has failed and the repeater never exits self-test.	Check the LED codes in Table 2–1 to determine which FRU to replace.
The FLT LED (red) is ON indicating that self-test has failed a particular test.	Check the LED codes in Table 2–1 to determine which FRU to replace.

Table 2–6 (Cont.): Simple Troubleshooting

Symptom	Suggested Corrective Action
The +5 V LED (green) is OFF.	Verify that the power cord is connected to the power voltage source. Check both the +12 V LED and the -12 V LED to determine if the power supply is functioning. Replace the power supply.
The EXT, TEST and FLT LEDs remain ON signifying that the repeater failed external self-test.	Press the TEST switch (with loopback connector installed) and verify repeater functionality. Check the LED codes in Table 2–1.
The CNFGA or CNFGB LED is ON.	If ON, the port has an improper configuration. Check the CPT LED. If the CPT LED is ON, disable heartbeat on the transceiver and reset the unit by pressing the TEST switch. Also, make sure that the DECrepeater 200 is not connected to a DELNI, this configuration is not supported.
The AOK/BOK (green) LEDs do not light signifying that those ports are not operational.	Check the power cable and cable connections to the ports.
DEVICE OK LED on Port B PCI module remains OFF.	Port B module has malfunctioned. Replace the module.
The LINK OK LED (DEREN-RC/RD only) on Port B PCI module remains OFF.	Check the fiber optic link between remote repeaters or check for incompatible optical idle switch settings.


CHAPTER 3

3

Removal and Replacement Procedures

3.1 Introduction

This chapter provides removal and replacement procedures for the DECrepeater 200 field replaceable units (FRUs).

Figure 3-1 shows the location of the FRUs in the DECrepeater 200. Each FRU, shown on the right side of the drawing, is supported by text and a figure.

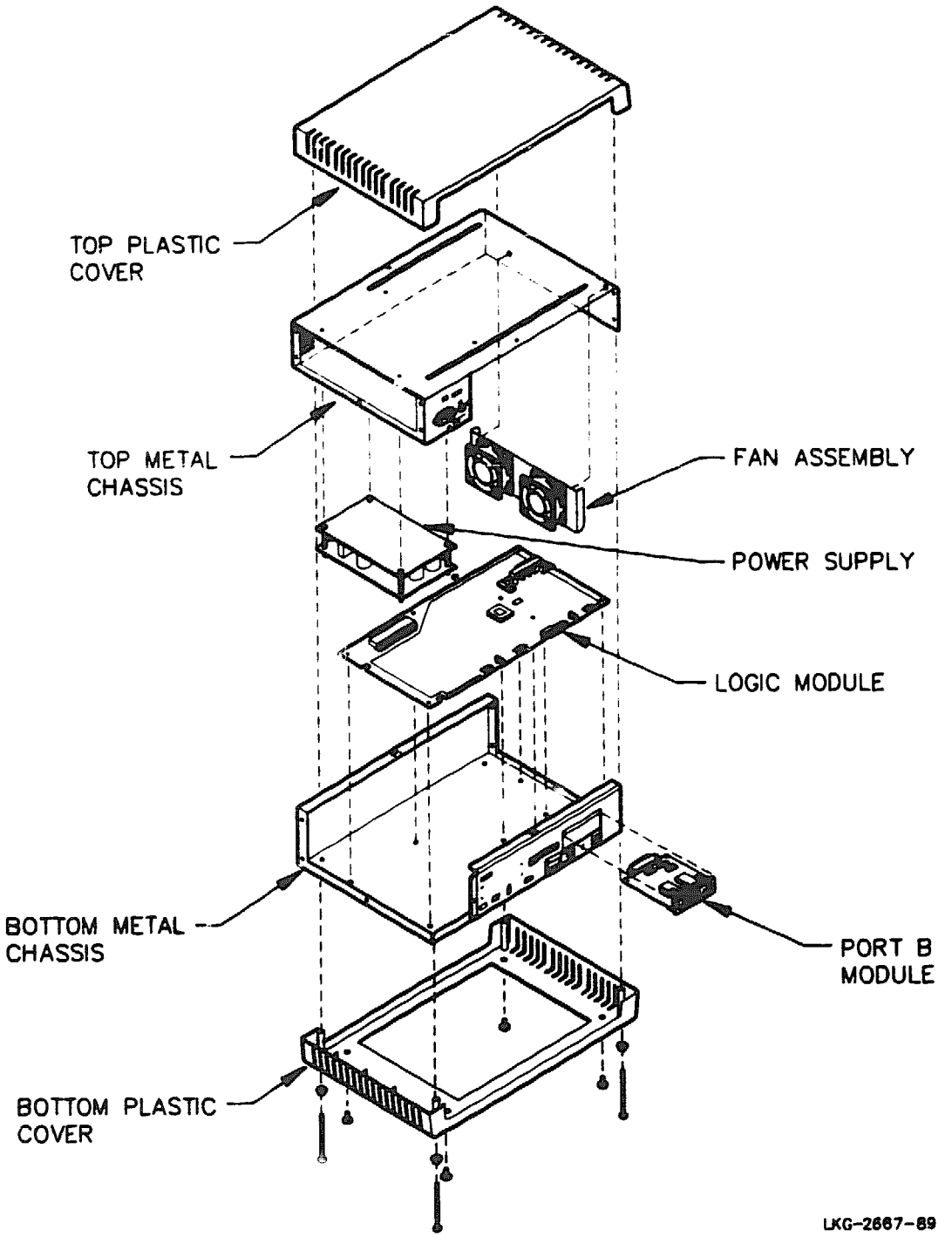
CAUTION

Modules in the repeater can be damaged by electrostatic discharge (ESD). Do not work on the unit unless a static control wrist strap is placed on your wrist and the wire from it is grounded to the metal chassis. A wrist strap, ground wire, and table pad are included in the Field Service Kit (Digital P/N 29-11762).

NOTE

Anytime transceivers are changed or swapped, disconnect the power source from the repeater. Reset the repeater by pressing the TEST switch after the power source has been re-connected to the repeater. This automatically performs internal and external self-test on the repeater and the medium.

Figure 3–1: DECrepeater 200 FRU Location



3.2 Preparing the Repeater for Servicing

If the repeater is in a rack it must be removed before servicing. If the repeater resides on a desktop, the plastic enclosures must be removed. The following two sections provide steps to remove the unit from a rack or to remove the plastic enclosure.

3.2.1 Rack Mount Removal

To remove the DECrepeater 200 unit from a rack:

1. Unplug the repeater power cord from the ac power source and remove the cord from the DECrepeater 200 unit.
2. Disconnect the cables from Port A and Port B.
3. Support the defective repeater and remove the screws holding the mounting brackets to the rack. Remove the repeater.
4. Remove the brackets from the repeater.

3.2.2 Plastic Enclosure Removal

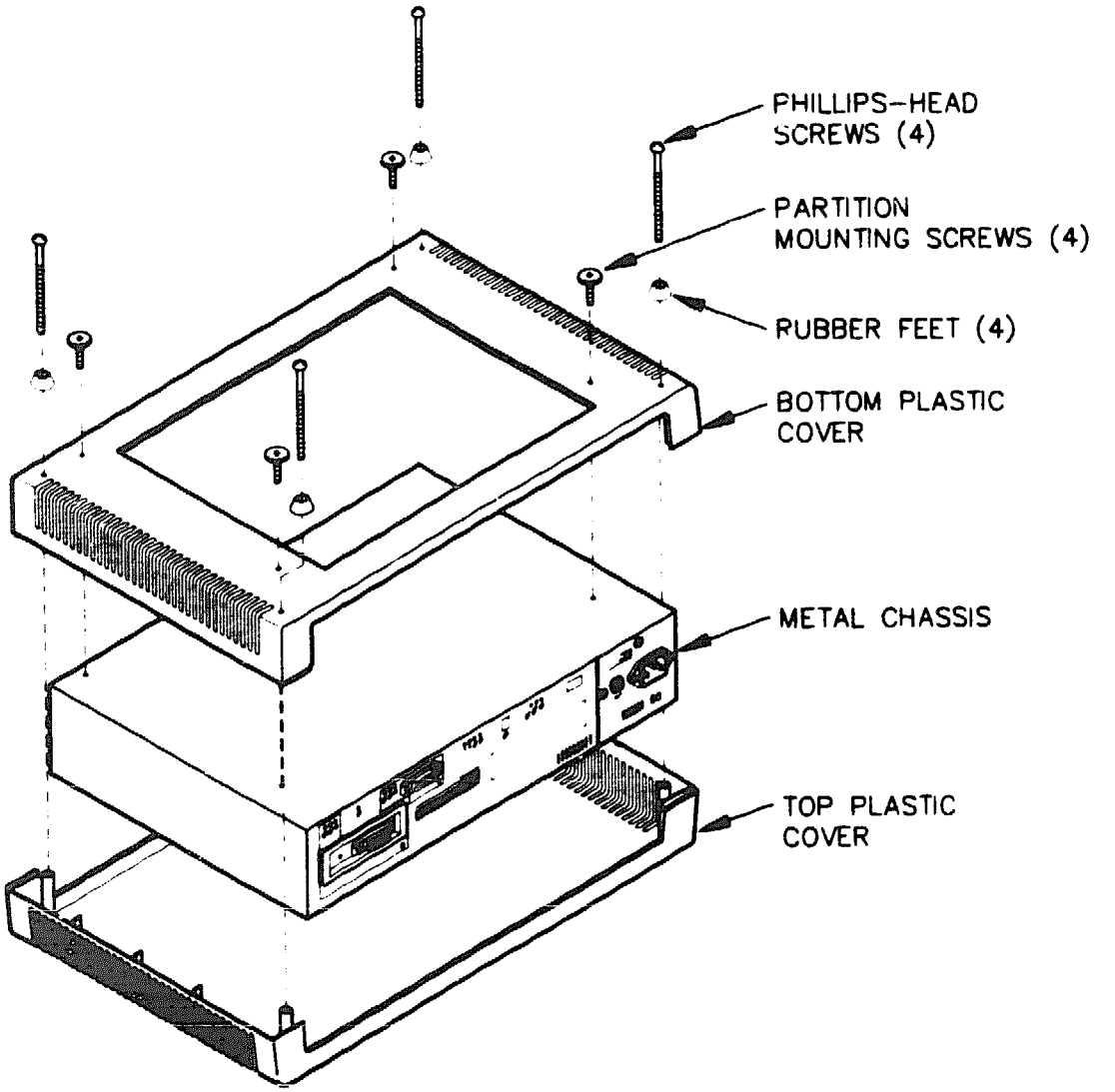
CAUTION

Do not stand a remote repeater on the I/O panel. The ST connectors extend beyond the face of the I/O panel and could be damaged.

To remove the plastic enclosure from the repeater:

1. Turn the repeater upside down and remove the 4 screws and rubber feet from the bottom of the unit, refer to Figure 3-2.
2. Remove the 4 partition mounting screws from the bottom of the unit.
3. Lift the bottom plastic cover from the unit.
4. Lift the metal chassis from the top cover and turn the metal chassis right-side up.

Figure 3–2: Removing the Plastic Covers



3.3 Removing and Replacing the FRUs

Removal and replacement procedures for the following modules are provided:

- Power supply module—refer to Section 3.4
- PCI module—refer to Section 3.5
- Logic module—refer to Section 3.6
- Fan assembly module—refer to Section 3.7

WARNING

Do not attempt to remove any of the FRUs while the ac power cord is connected.

3.3.1 Opening the Metal Chassis

Be sure to use the ESD wrist strap when opening the metal chassis. To open the metal chassis:

1. Remove the 9 Phillips-head screws from the chassis. Two of these screws are flat-head screws that must be put back in the same location, see Figure 3-3.
2. Lift the top portion of the chassis up and lay it upside down, see Figure 3-4.

Figure 3–3: Removing Chassis Screws

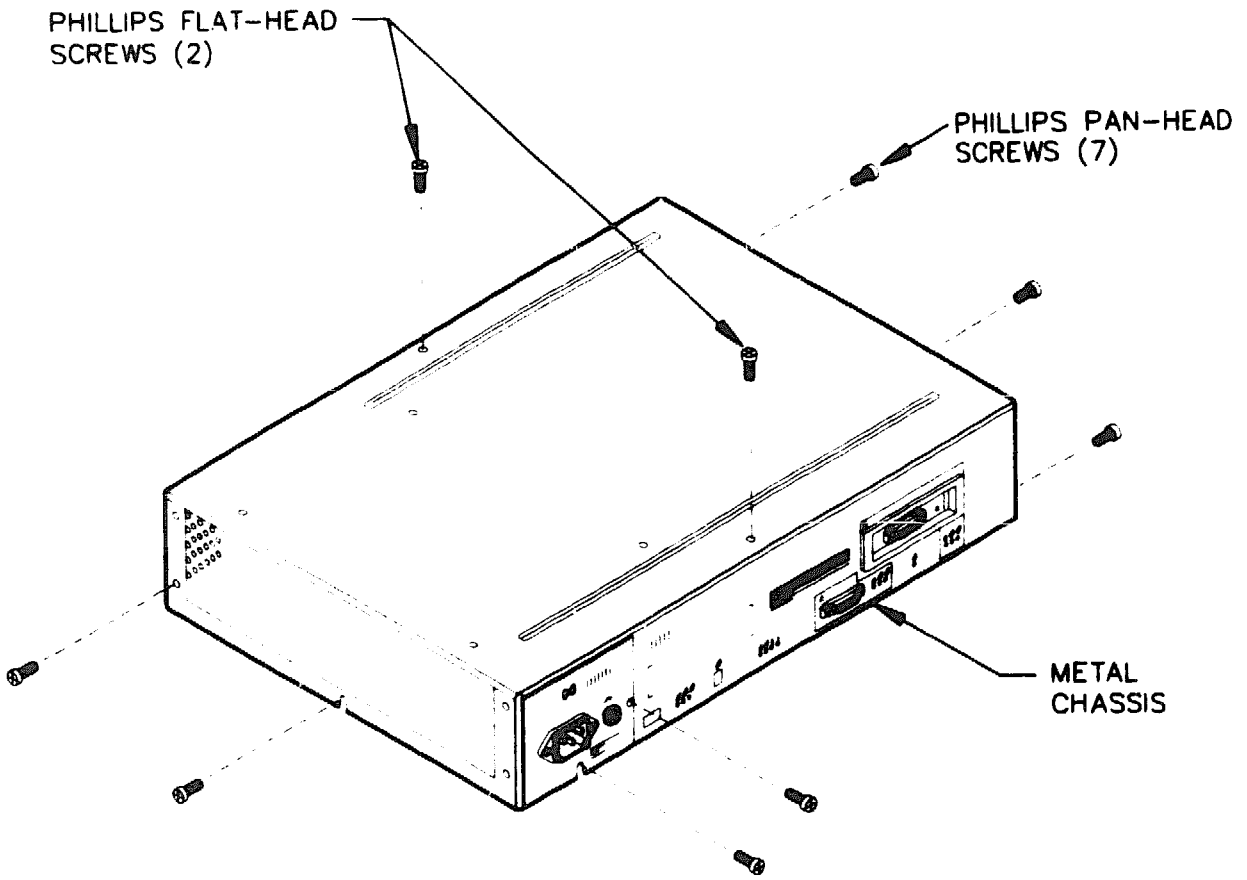
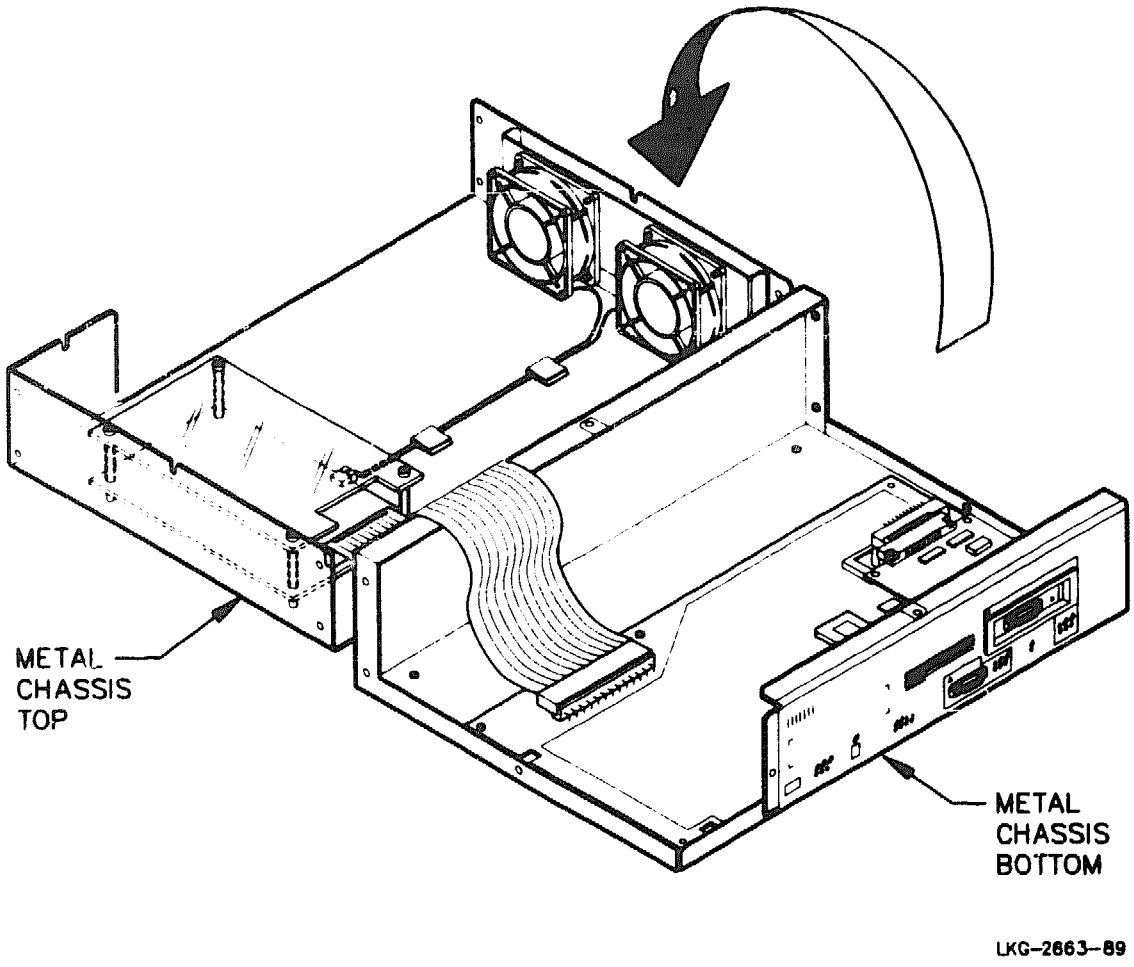


Figure 3–4: Opening the Metal Chassis



3.4 Power Supply Removal and Replacement

This section describes how to replace the power supply.

Refer to Sections 3.2.2 and 3.3.1 to remove the plastic covers and open the metal chassis.

3.4.1 Power Supply Removal

To remove the power supply, (see Figure 3-5):

1. Disconnect the power supply ground connection from the metal chassis.
2. Disconnect the fan cable assembly from the power supply.
3. Remove the 4 Phillips-head screws and the plastic protective cover from the power supply.
4. Remove the ac connector from the power supply.
5. Remove the dc power cable from the power supply.
6. Remove the 4 standoffs using the small adjustable wrench.
7. Remove the faulty power supply from the unit and set it aside.

3.4.2 Power Supply Replacement

To install a new power supply:

1. Set the new power supply on the chassis assembly in the proper position, see Figure 3-5.
2. Install the 4 standoffs through the power supply and into the metal chassis.
3. Touch both halves of the metal chassis to bring them to the same potential.
4. Install the dc power cable to the power supply.

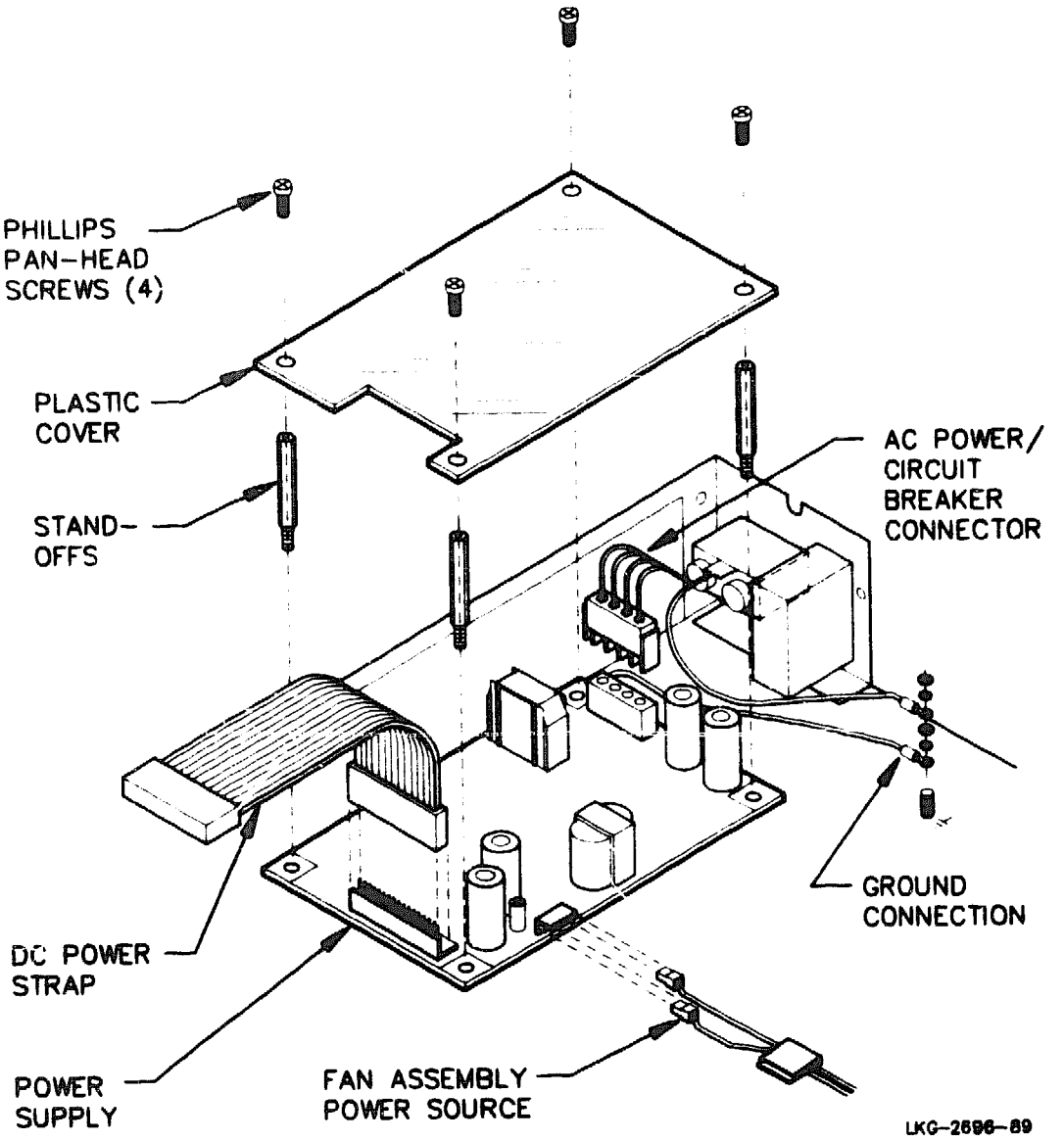
NOTE

The dc power strap is keyed, therefore if it was removed from both connectors, it cannot be installed improperly.

5. Install the ac connector to the power supply.
6. Connect the fan cable assembly to the power supply.
7. Attach the plastic protective cover to the standoffs with the 4 screws.
8. Fasten the power supply ground connection to the metal chassis. Torque the ground connection to 27 inch-pounds (±10%).

9. Refer to Section 3.8 to reassemble the unit.

Figure 3–5: Removing the Power Supply



3.5 PCI Module Removal and Replacement

This section describes how to replace the PCI module in Port B. Refer to Sections 3.2.2 and 3.3.1 to remove the plastic covers and open the metal chassis.

3.5.1 PCI Module Removal

To remove the PCI module from Port B (see Figure 3-6):

1. Remove the 2 Phillips-head screws from the front of the PCI module.
2. Loosen the 2 Phillips-head screws that hold the PCI retaining clip at the rear of the PCI module. It is not necessary to remove the screws and the clip to remove the module.
3. Remove the PCI module from the connector by placing your thumbs and index fingers at the points indicated by the arrows and pull the module out.
4. Set the faulty module aside.

3.5.2 PCI Module Replacement

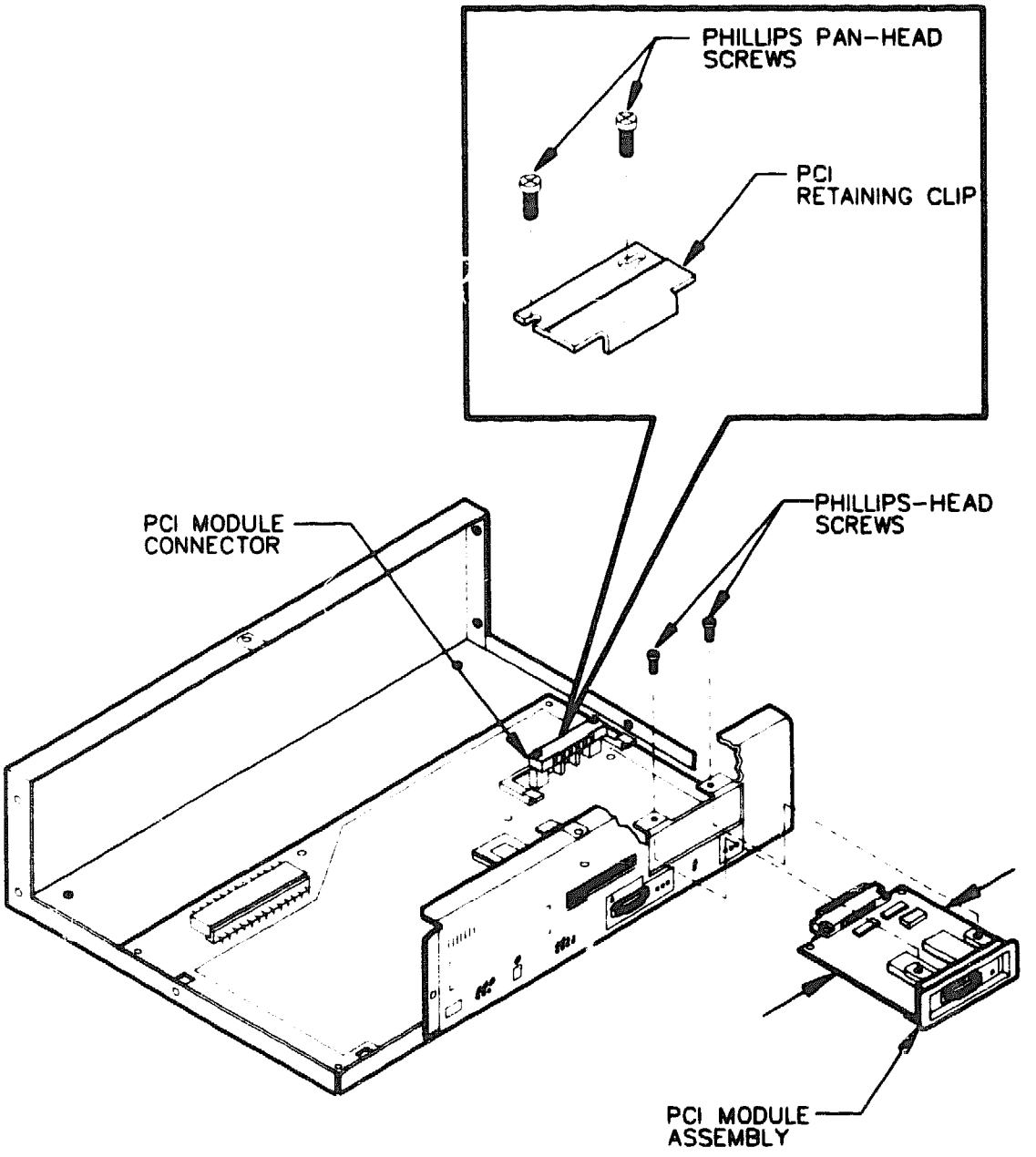
CAUTION

Do not touch the gold edge-mate connector on the PCI module. Oil from human fingers could cause a poor contact.

To install the PCI module:

1. Insert the new PCI module through the front of the metal chassis, see Figure 3-6.
2. Push the PCI module into the connector. Hold the back of the connector while pushing the PCI module into it making sure the PCI module seats properly.
3. Install the 2 top front Phillips-head screws through the PCI module and into the chassis.
4. Install the PCI retaining clip over the PCI module and secure it with the 2 top rear Phillips-head screws.
5. Refer to Section 3.8 to reassemble the unit.

Figure 3–6: Removing PCI Module



3.6 Logic Module Removal and Replacement

This section describes how to replace the logic module.

Refer to Sections 3.2.2 and 3.3.1 to remove the plastic covers and open the metal chassis.

Refer to Section 3.5 for PCI module removal instructions.

3.6.1 Logic Module Removal

To remove the logic module (see Figure 3-7):

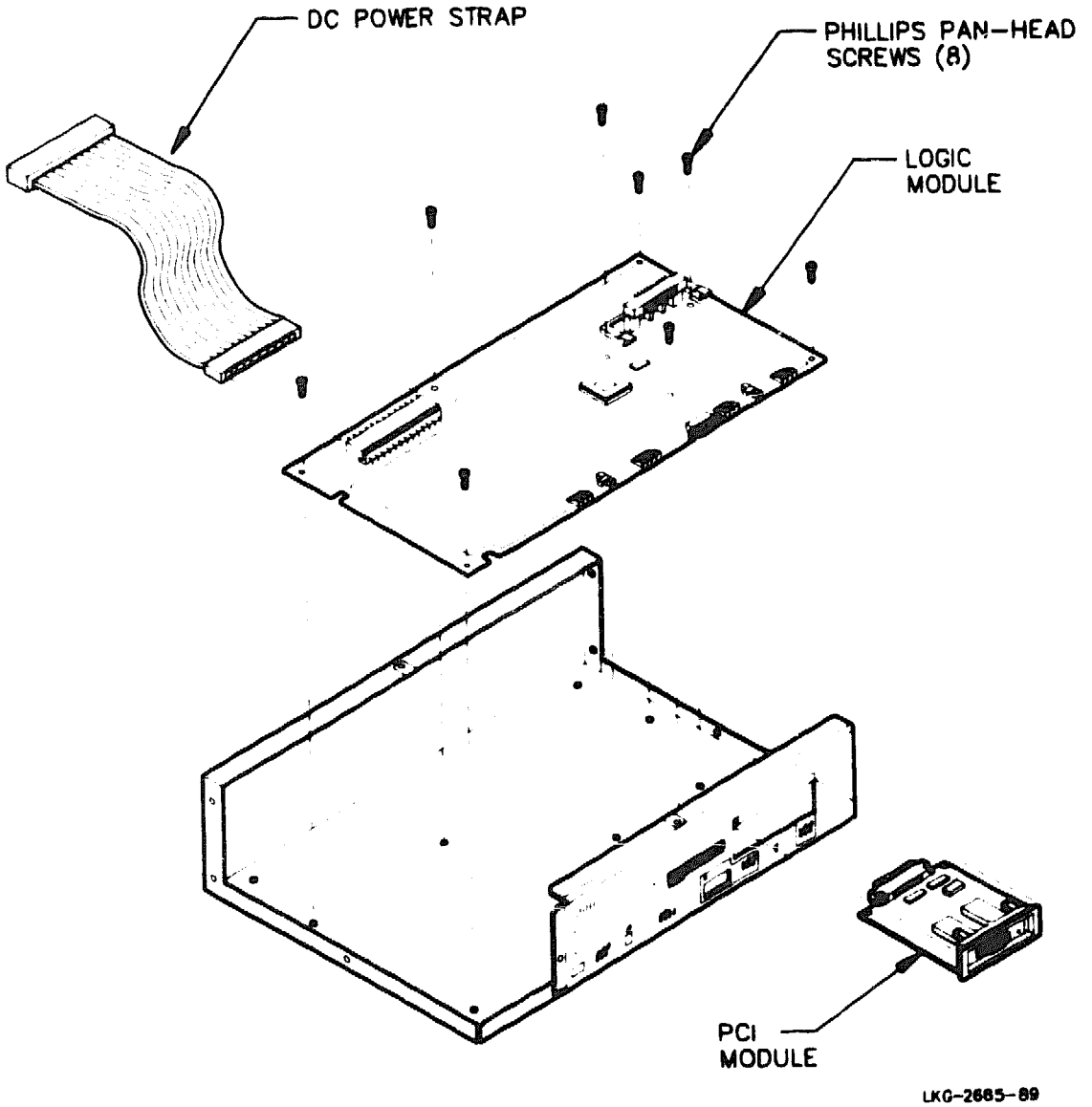
1. Remove the dc power cable from the logic module.
2. Remove the Phillips pan-head screws from the logic module and metal chassis.
3. Remove the faulty logic module and set it aside.

3.6.2 Logic Module Replacement

Perform the following steps to install the logic module.

1. Set the new logic module on the metal chassis in the proper position, see Figure 3-7.
2. Push the logic module toward the I/O panel and install the Phillips pan-head screws through the logic module and into the metal chassis. This helps to properly position the mating connector for the PCI module.
3. Touch both halves of the metal chassis to bring them to the same potential.
4. Connect the dc power cable to the logic module.
5. Install the PCI module in the repeater, refer to Section 3.5 for PCI module installation instructions.
6. Refer to Section 3.8 to reassemble the unit.

Figure 3–7: Removing the Logic Module



3.7 Fan Assembly Removal and Replacement

This section describes how to replace the fan assembly.

Refer to Sections 3.2.2 and 3.3.1 to remove the plastic covers and open the metal chassis.

3.7.1 Fan Assembly Removal

To remove the fan assembly (see Figure 3-8):

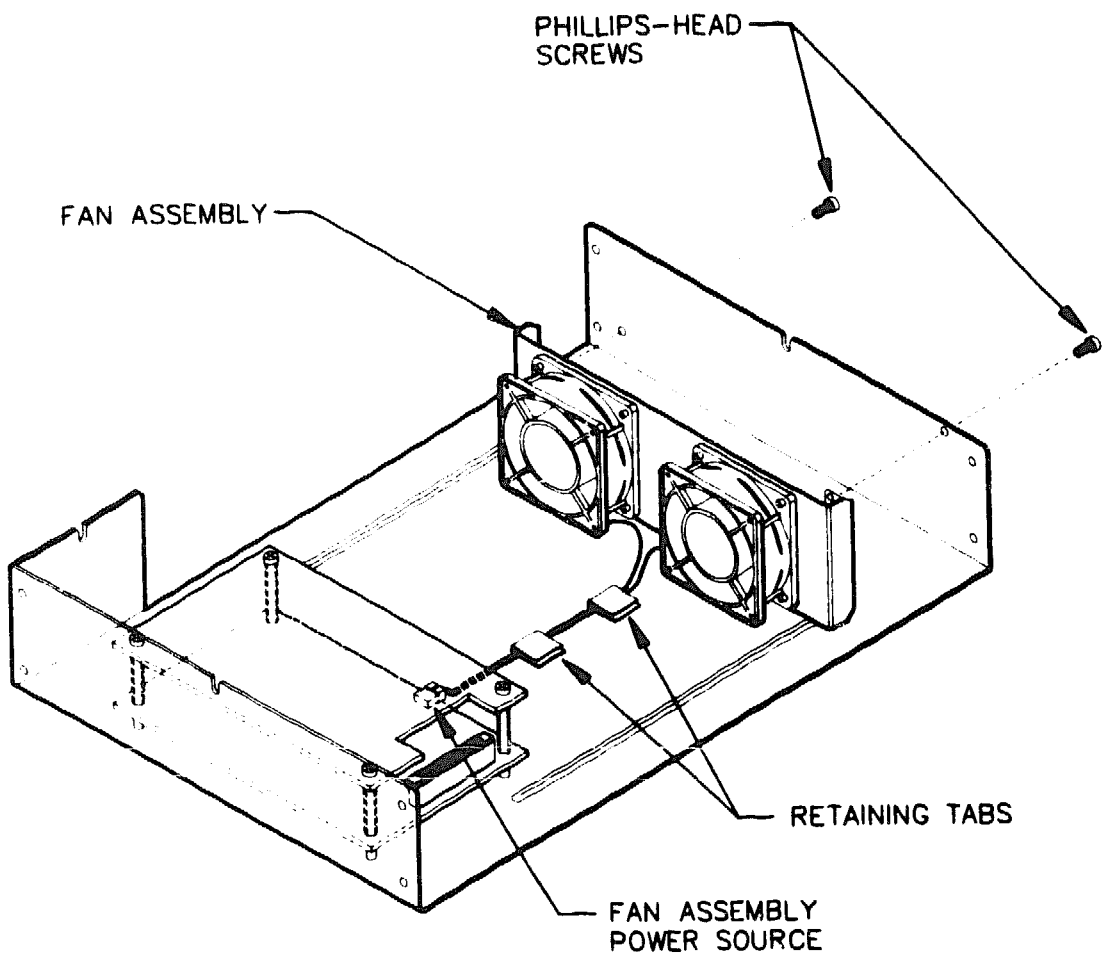
1. Disconnect the fan cable assembly from the power supply.
2. Open the retaining tabs that hold the fan wires and remove the wires.
3. Remove the two screws from the metal chassis and the fan assembly.
4. Lift the fan assembly out of the unit and set it aside.

3.7.2 Fan Assembly Replacement

To install the fan assembly:

1. Set the new fan assembly in the unit in the proper position, see Figure 3-8.
2. Fasten the fan assembly to the metal chassis using the 2 screws.
3. Slide the fan assembly wires under the tabs and close the tabs.
4. Connect the fan cable assembly to the power supply.
5. Refer to Section 3.8 to reassemble the unit.

Figure 3–8: Removing the Fan Assembly



3.8 Reassembly Procedures

To reassemble the unit:

1. Lift the top half of the metal chassis and close it over the lower half.
2. Install the 9 Phillips-head screws, see Figure 3-3. The 2 flat-head, Phillips-head screws go in the top center edge of the chassis.
3. Reinstall the unit in a rack, or if you removed the plastic covers continue with the following steps.

4. Place the top plastic cover upside down on a table, see Figure 3-2.
5. Turn the metal chassis upside down and set it in the top plastic cover.
6. Set the bottom cover over the metal chassis and align it with the top cover.
7. Install the 4 screws and rubber feet.
8. Turn the repeater rightside up.
9. Run the repeater self-test in accordance with Chapter 2 and verify that the repeater is operating properly.


APPENDIX A

A

DECrepeater 200 Specifications

A.1 Introduction

This appendix lists the physical, environmental, and electrical specifications for the DECrepeater 200 product.

A.2 Physical Dimensions

The repeater's plastic enclosure can be easily removed for mounting the unit in a standard 19-inch RETMA rack cabinet (mounting brackets are provided). An optional kit (Order Code H039) is available for mounting the repeater on a partition without removing the plastic enclosure.

Dimension	With Enclosure
Height	11.7 cm (4.6 in)
Width	49.3 cm (19.4 in)
Depth	31.2 cm (12.3 in)
Weight	5.08 kg (11.2 lb)

A.3 Environmental Requirements

The DECrepeater 200 product is designed to operate in a non-air-conditioned environment or in an exposed area of an industrial site. However, 50° C (122° F) is the maximum ambient temperature allowable at the air intake of the repeater. This applies even when the DECrepeater 200 unit is mounted in a cabinet. The repeater is not intended to operate in an air plenum.

Parameter	Minimum	Maximum
Temperature		
Operating	5° C (41° F)	50° C (122° F)
Non-operating	-40° C (-40° F)	66° C (151° F)
Maximum temperature change per hour	—	20° C (36° F)
Altitude		
Operating	—	2.4 km (8000 ft)
Non-operating	—	9.1 km (30,000 ft)
Relative Humidity		
Operating (noncondensing)	10%	95%
Non-operating (noncondensing)	0%	95%
Wet-bulb temperature (operating)	—	32° C (90° F)
Dew point (operating)	—	2° C (36° F)
Air flow *	—	37.5 CFM

*A minimum of 10 cm (4 in) of space must be provided on both ends of the unit for adequate air flow.

A.4 Fiber Optic Specifications

To obtain maximum transmission distances, or to extend an existing link, careful attention must be paid to the total optical loss of the cable plant. High-quality cables, connectors and splices are strongly recommended. Any cable plant, long or short, should be similar with respect to fiber type. Mixing fiber types usually results in very high losses and is not recommended.

New installations should be wired with 62.5/125 micron Graded Index Multimode Optical Fiber conforming to Digital Equipment Corporation's General Specification 1710002-GS. Other optical fiber sizes can be used but can result in lower maximum transmission distances. Your cable installer should provide proof of compliance.

The following sections provide maximum transmission distances obtainable by the DECrepeater 200 unit when various types of optical fiber are used.

A.4.1 DEREN-RC/RD-to-DEREN-RC/RD Links

The DEREN-RC/RD uses 850 nanometers wavelength LED transmitters and was designed to support 50, 62.5, 85 and 100 micron core fiber types. A maximum distance of 1 kilometer (3280 feet) using 62.5 fiber is possible between two DEREN-RC/RD models.

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1.0 km (3280 ft)	9 dB	N/A
62.5/125	850 nm	1.0 km (3280 ft)	14 dB	N/A
85/125	850 nm	1.0 km (3280 ft)	15 dB	N/A
100/140	850 nm	1.0 km (3280 ft)	16 dB	4 dB

A.4.2 DEREN-RP/RQ-to-Remote DEREP Links

The DEREN-RP/RQ uses 850 nanometer wavelength LED transmitters and was designed to support 50, 62.5, 85 and 100 micron core fiber types. A maximum distance of 1 kilometer (3280 feet) is possible between a DEREN-RP/RQ and a remote DEREP repeater.

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1.0 km (3280 ft)	6.5 dB	N/A
62.5/125	850 nm	1.0 km (3280 ft)	10.5 dB	1 dB
85/125	850 nm	1.0 km (3280 ft)	11.5 dB	3 dB
100/140	850 nm	1.0 km (3280 ft)	12.5 dB	4 dB

A.4.3 DEREN-RC/RD-to-Remote Bridge Links

Ethernet timing requirements restrict distances between a repeater and a bridge to a maximum of 1.5 kilometers (4920 feet).

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1.5 km (4920 ft)	9 dB	N/A
62.5/125	850 nm	1.5 km (4920 ft)	14 dB	N/A
85/125	850 nm	1.5 km (4920 ft)	15 dB	N/A
100/140	850 nm	1.5 km (4920 ft)	16 dB	4 dB

A.4.4 DEREN-RP/RQ-to-Remote Bridge Links

Ethernet timing requirements restrict distances between a repeater and a bridge to a maximum of 1.5 kilometers (4920 feet).

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1.5 km (4920 ft)	6.5 dB	N/A
62.5/125	850 nm	1.5 km (4920 ft)	10.5 dB	1 dB
85/125	850 nm	1.5 km (4920 ft)	11.5 dB	3 dB
100/140	850 nm	1.5 km (4920 ft)	12.5 dB	4 dB

A.4.5 DEREN-RC/RD/RP/RQ Fiber Cable Measurement Correction

The values in this table are used to correct the measured loss of an optical fiber when using the equipment and procedure specified in Section 9.5.1 of the *DECconnect System Facilities Cabling Installation Guide*. The correction is required to account for the difference in wavelength between the DEREN-RC/RD/RP/RQ transmitter and the test equipment transmitter.

Wavelength	Correction Value
790 nm	-0.2 dB/km
795 nm	-0.1 dB/km
800 nm	0 dB/km
805 nm	0.1 dB/km
810 nm	0.2 dB/km
815 nm	0.3 dB/km
820 nm	0.4 dB/km
825 nm	0.5 dB/km
830 nm	0.6 dB/km
835 nm	0.65 dB/km
840 nm	0.7 dB/km
845 nm	0.8 dB/km
850 nm	0.9 dB/km

A.4.6 Fiber Optic Connectors

DECrepeater 200 remote units are provided with ST-type transmit and receive connectors (see below). ST-type connectors are also required on the fiber optic cables to make the connection.

CAUTION

Your cable installer should verify that the ferrule on the transmit end of the fiber optic cable's connector measures 7.87 ± .025 mm (.310 ± .001 inches) in length. Ferrules that are shorter may cause less power to be launched into the fiber.

Quantity	Connector Type	Maximum Attenuation
2	ST (2.5 mm [.10 in])	Less than 1.0 dB

A.5 Power Requirements

Parameter	120 Vac Operation DEREN-AA/RC/RP	240 Vac Operation DEREN-AB/RD/RQ
Voltage (Nominal)	120 V range	220 V range
	88 Vac to 132 Vac	176 Vac to 264 Vac
Line Current	1.6 amps	.8 amps
Frequency	47 to 63 Hz	47 to 63 Hz
Power Consumption	160 watts	160 watts
Heat Dissipation	500 BTU/hr	500 BTU/hr