DECrepeater 90C Owner's Manual

Order Number EK–DECMR–OM. C01

This document was prepared using VAX DOCUMENT, Version 2.1.

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About This Manual

This manual describes how to install, operate, and maintain the Digital ThinWire multiport repeater - the DECrepeater 90C. The DECrepeater 90C is a 7-port repeater designed to work either as a standalone unit or as a managed repeater in the DEChub 90 backplane.

Organization

This manual contains five chapters, and three appendixes.

* Chapter 1 provides an overview of the DECrepeater 90C and introduces you to the product's features.

* Chapter 2 describes the configuration rules and operating conditions for the ThinWire multiport repeater in a ThinWire Ethernet system or standard Ethernet network.

* Chapter 3 provides instructions for installing the ThinWire multiport repeater.

* Chapter 4 provides information on managing the ThinWire multiport repeater on a network or in a standalone configuration.

* Chapter 5 provides basic troubleshooting information.

* Appendix A provides product specifications and the parts list.

* Appendix B lists related documents that can help you become more familiar with your new system.

* Appendix C provides more detailed information on management issues.

Conventions

This manual uses the following conventions:

Convention	Meaning
NOTE	Provides general information on the current topic.
❶	A number in a black circle in text refers to the corresponding number in an accompanying illustration.
[ ]	In command descriptions, brackets indicate optional elements.
variables	In command descriptions, italic type indicates a variable that you supply.
SHOW ADDRESS	In text, commands are shown in all upper case letters to differentiate them from regular text. For the VMS operating system, you can enter commands in either upper case or lower case letters. For the ULTRIX operating system, commands must be entered as indicated in the examples.
`DECbridge>`	Text that the system displays on the screen is shown in monospaced type.
`SHOW REPEATER 1`	Text that you enter is shown in bold monospaced type.

1
Overview

This chapter describes the features of and summarizes the installation procedures for the DECrepeater 90C.

Features

The DECrepeater 90C provides the following features:

- Seven ThinWire ports

- Standalone or managed operation (on a DECbridge 90 work group bridge)

- Installable on a DEChub 90 backplane

The DECrepeater 90C is a 7-port repeater designed for the IEEE 802.3 CSMA/CD networks using the ThinWire Ethernet cable. The DECrepeater 90C is also compatible with the 802.3 standard for the 10Base2 networks.

The repeater can operate in a standalone configuration or as a managed repeater installed in Digital's DEChub 90 Ethernet backplane with Digital's DECbridge 90 work group bridge. Figure 1-1 shows a typical configuration of the DECrepeater 90C in an Ethernet local area network (LAN).

If you use the DECrepeater 90C as a standalone unit, it operates as a 7-port unmanaged repeater and uses a separate power supply. The modular power supply connects to a 7-pin connector on the repeater and comes in two versions, for use with 120 Volt or 240 Volt power outlets.
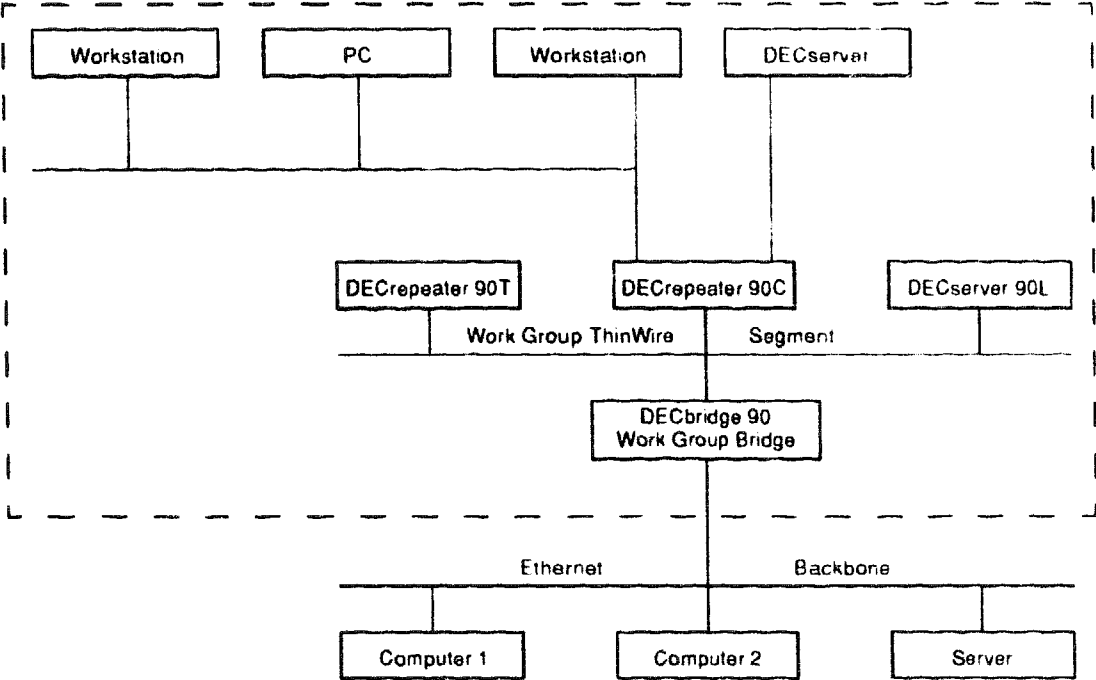
Figure 1–1   Sample DECrepeater 90C Connection

Installation

The DECrepeater 90C is easy to install and use. It does not require any programming or other assistance from the system management. After unpacking the repeater:

1. Plug the connector from the power supply into your DECrepeater 90C, then plug the power supply into a working ac power outlet.

   When the repeater is plugged in, all LED indicators turn on. Only the network activity LED turns off.

2. Connect the repeater to a properly terminated ThinWire Ethernet.

3. Connect any personal computers, workstations, or other 10Base2 devices to the ports you plan to use.

   The port status LEDs for unconnected ports should turn off when network traffic is established.

For more detailed information on configuring the DECrepeater 90C, see Chapter 2. For more detailed information on installing and using the DECrepeater 90C, see Chapter 3.

LEDs and Connectors

The next table describes the DECrepeater 90C LEDs and connectors, shown in the illustration following the table.

Table 1–1 DECrepeater 90C LEDs

❶	Ⓐ	**Power indicator**—Monitors the status of the +5.0 Vdc voltage. **On:** The +5.0 Vdc voltage is normal. **Off:** The voltage is abnormal (as in a power failure.)
❷	◯	**Network activity indicator**—Monitors the network activity. **On:** There is network activity. **Off:** There is no network activity.
❸	⌗	**Port 0 status indicator**—Monitors the status of the ThinWire input to the repeater. **On:** Port 0 is functional. **Off:** Port 0 has failed or has been partitioned. **Flashing:** The port has been partitioned by management.
❹		**Port 1 to 6 status indicators**— Monitor the activity of each port. The top LED represents port 1, and the bottom LED represents port 6. **On:** The port has a connection. **Off:** The port does not have a connection or has been partitioned. **Flashing:** The port has been partitioned by management.
❺		**Port 0 network connector (BNC)**— Connects the repeater to the work group ThinWire segment. Not used when the repeater is installed in the DEChub 90 backplane.
❻		**Port 1 to 6 connectors (BNC)** – Connect DECservers, workstations, and personal computers to the DECrepeater 90C.
❼		**Power connector**—Provides +5 volts from the DECrepeater 90C power supply. Not used when the repeater is installed in the DEChub 90 backplane.
❽		**Backplane connector**—Provides network and power connections to the DECrepeater 90C when the repeater is installed in the DEChub 90 backplane.
❾		**Back cover**—Comes on standalone units only. Covers the backplane connector and contains a wall-mounting assembly.

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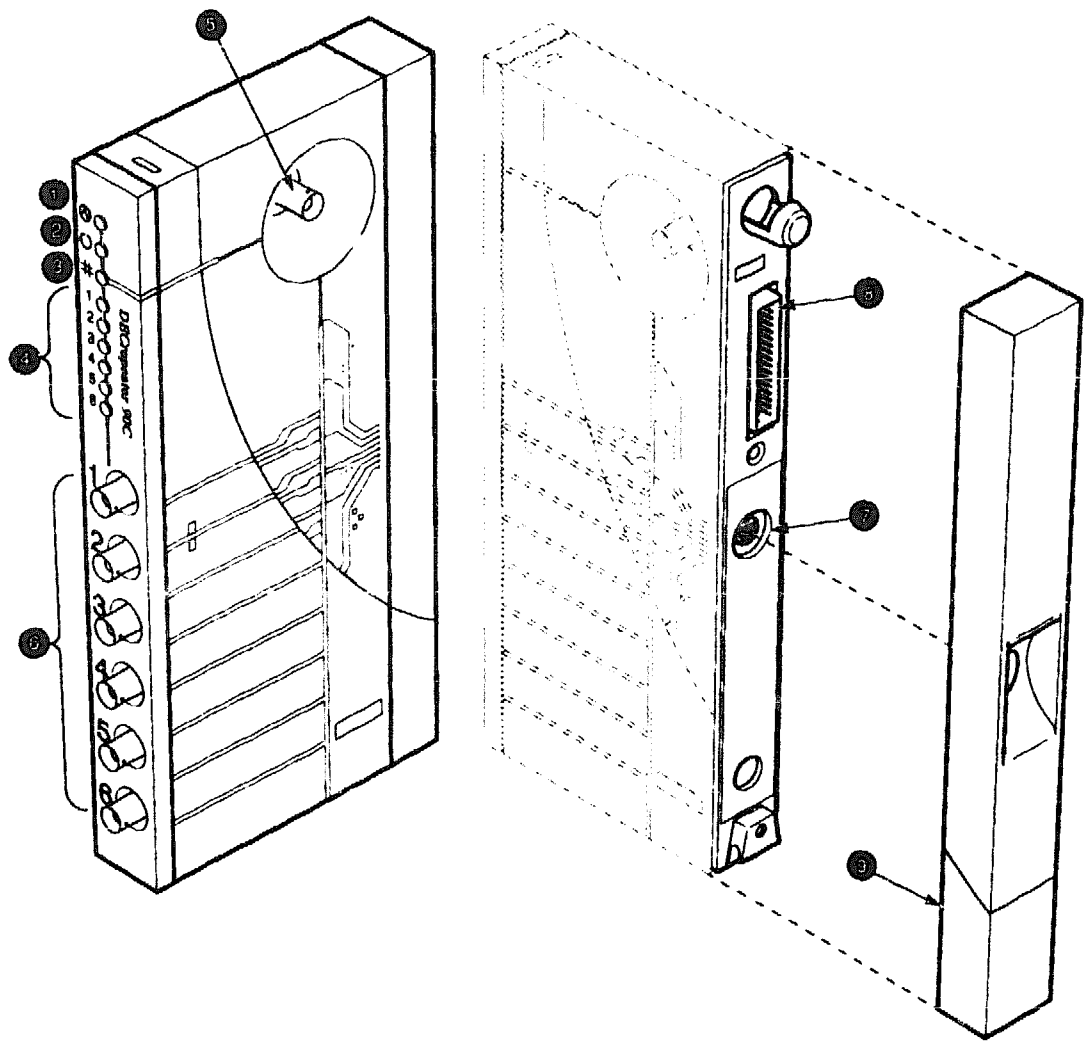
2
Configuration

This chapter contains the configuration rules you must follow for correct installation of the DECrepeater 90C.

This chapter also contains information on port partitioning and the different operations that cause ports to partition. The DECrepeater 90C does not require any special instructions for it to operate correctly.

Configuration Rules

For a complete list of configuration rules, see the *Open DECconnect Building Wiring Component and Application Catalog.*

Port Termination and Grounding

Each end of a ThinWire segment must be terminated with 50 ohms. The DECrepeater 90C terminates ports 1 through 6 internally; you must terminate the other end of the segment with a 50-ohm terminator. Port 0 is not terminated internally. Use a T-connector when connecting port 0 to a ThinWire segment.

Each segment can have only one ground. Ports 1 through 6 only are grounded internally; no other connections to ground are allowed. A ThinWire segment attached to Port 0 must be grounded externally to the repeater.

Configuration Guidelines

Digital repeaters comply with Ethernet and IEEE 802.3 standards. These standards are subject to revision, therefore, network planners may need to consult the standards frequently for detailed information. This chapter contains sufficient information, however, to use the DECrepeater 90C in a typical network configuration.

You can have a maximum of four repeaters and five segments in a network path between two stations. A network path with four repeaters must have at least two point-to-point link segments. Link segments contain two transceivers (MAUs). When not used as a point-to-point link, a ThinWire segment may contain 30 transceivers.

NOTE
The DECrepeater 90C port has an integral transceiver.

A ThinWire segment can be a maximum of 185 meters long.

Port Partitioning

Any messages or data packets received from any port backbone by the repeater are transmitted to all ports. The port status LEDs on the repeater indicate the status of each port, including partitioning activity:

On	The port is either active or not partitioned.
Off	The port is autopartitioned.
Flashing	The port is partitioned by management, independent of any other partitioning.

Each port is automatically controlled and can be partitioned for any one of the four following reasons:

Table 2-1   DECrepeater 90C Partitioning

LED	Faults	Nonfaults
Port 0 Off	Open cables. Shorted cables. Cables incorrectly terminated or connected without a T-connector.	Nothing connected to the port.
Port 0 to 6 Flashing	—	Partitioned by management.
Port 1 to 6 Off	Open cables. Shorted cables. Cables improperly terminated by using a T-connector.	Nothing connected to the port.

3
Installation

This chapter describes how to install the DECrepeater 90C as a standalone unit or in a DEChub 90 Ethernet backplane. You can install a standalone unit on a table or wall.

To install the repeater on a table or wall, see the "Standalone Installation" section.

To install the repeater in a DEChub 90 Ethernet backplane, see the "Backplane Installation" section.

Standalone Installation

To install the DECrepeater as a standalone unit on a table or wall, perform the following procedures:

Select a location.

The location should have access to a power outlet that supplies the correct voltage.

Place the repeater on a table.

When you pale the DECrepeater 90C on a table top, your only requirement is to follow the environmental specifications found in Appendix A.

Mount the repeater on a wall.

1. Remove the back cover of the repeater (if necessary)

    a. Insert a small screwdriver into the top mounting hole on the cover.

    b. Lift the internal latch with the screwdriver, then pull the cover away and down from the top of the repeater.
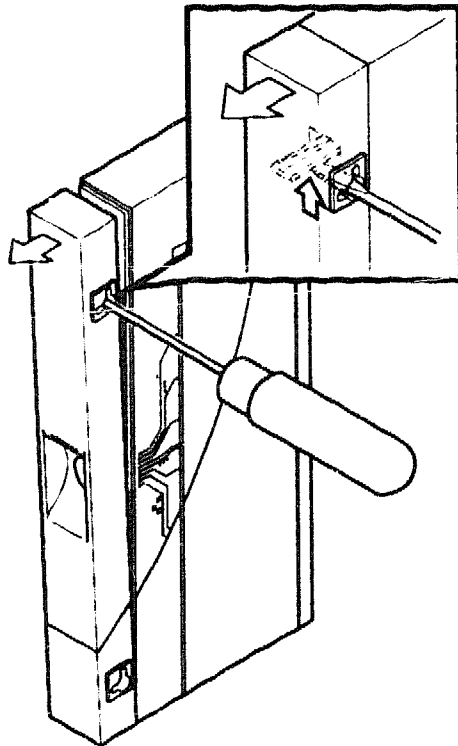
LJ 00320 110

2. Use the mounting holes on the cover to determine a position for the mounting screws on the wall.

3. Secure the back cover to the wall using the mounting screws.

    The screws should be tight enough to to provide some resistance if you try to remove the back cover from the wall. Do not make them so tight that the cover is distorted or cannot be removed from the wall.

4. Remove the back cover from the wall.
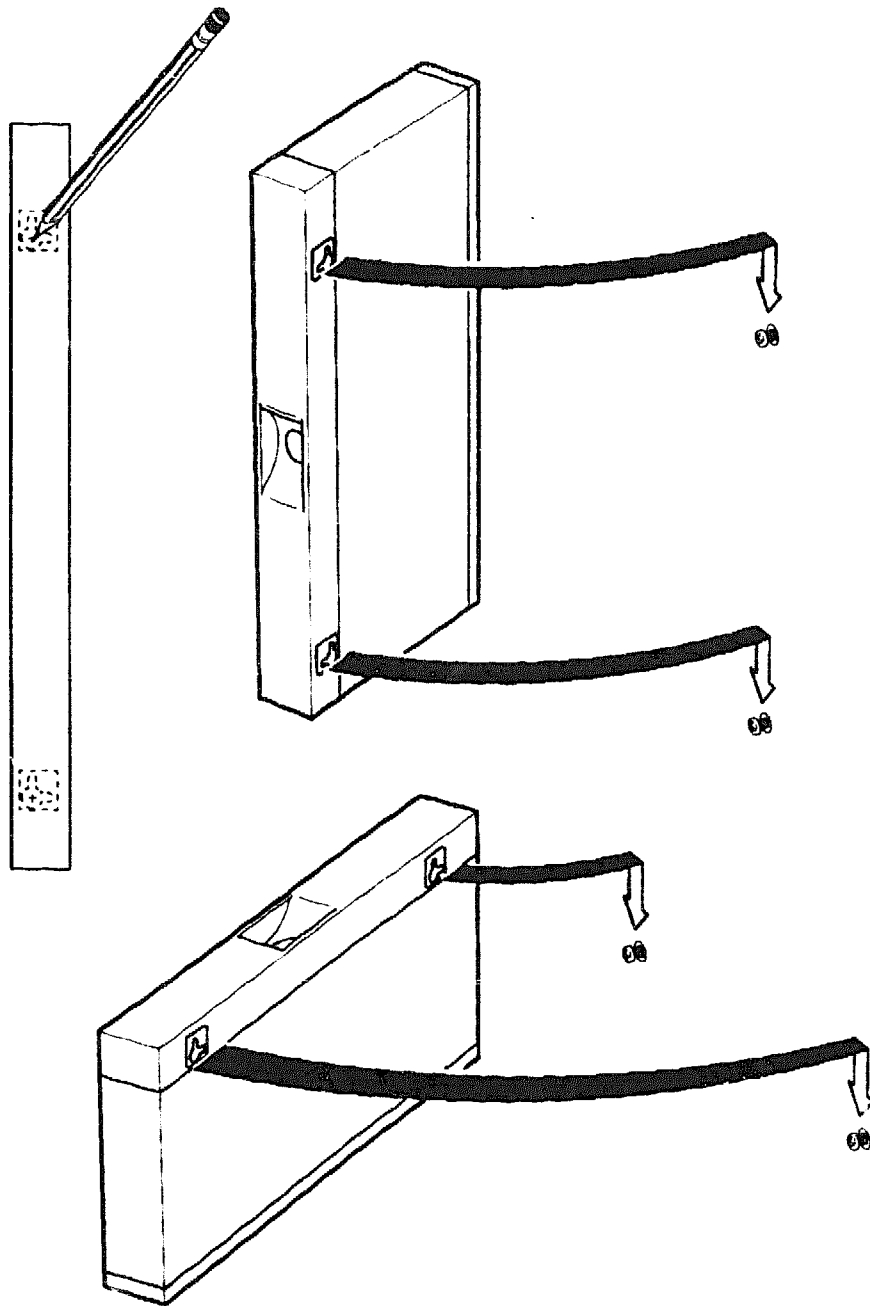
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5. Attach the back cover to the repeater.

6. Mount the repeater onto the mounting screws.

Connect the cables.

Refer to the following figure to perform these steps.

1. Connect the cable from the power supply to the 7-pin power connector on the DECrepeater 90C. Align the power symbol on the dc power connector with the power symbol on the DECrepeater 90C and push straight in.

2. Connect the DECrepeater 90C to the power supply.

   - For a **240-volt** power outlet, connect the power supply cord to the modular power supply. Then plug the other end of the power supply cord into the 240-volt power outlet.

   - For a **120-volt** power outlet, plug the modular power supply directly into the 120-volt outlet.

3. All the LED indicators should turn on during initial power-up. After approximately 0.5 seconds, the network activity LED should turn off while the other LEDs remain on.

4. Connect the Ethernet ThinWire T-connector to the port 0 BNC network connector. Terminate the connection with a 50-ohm terminator or extend the Ethernet segment to the next device.

5. The port 0 status activity LED should be on or flashing to indicate the amount of network traffic. The LED intensity varies.

6. Connect ThinWire Ethernet cables to ports 1 through 6. Do *not* use T-connectors. These ports have built-in terminators.

Install and verify devices.

1. Connect devices to ports 1 through 6, using correctly terminated ThinWire segments.

   A port LED should turn on when the port is correctly terminated and first receives network activity.

2. Verify the operation of each device by sending information to the port being tested.

The DECrepeater 90C is now installed.

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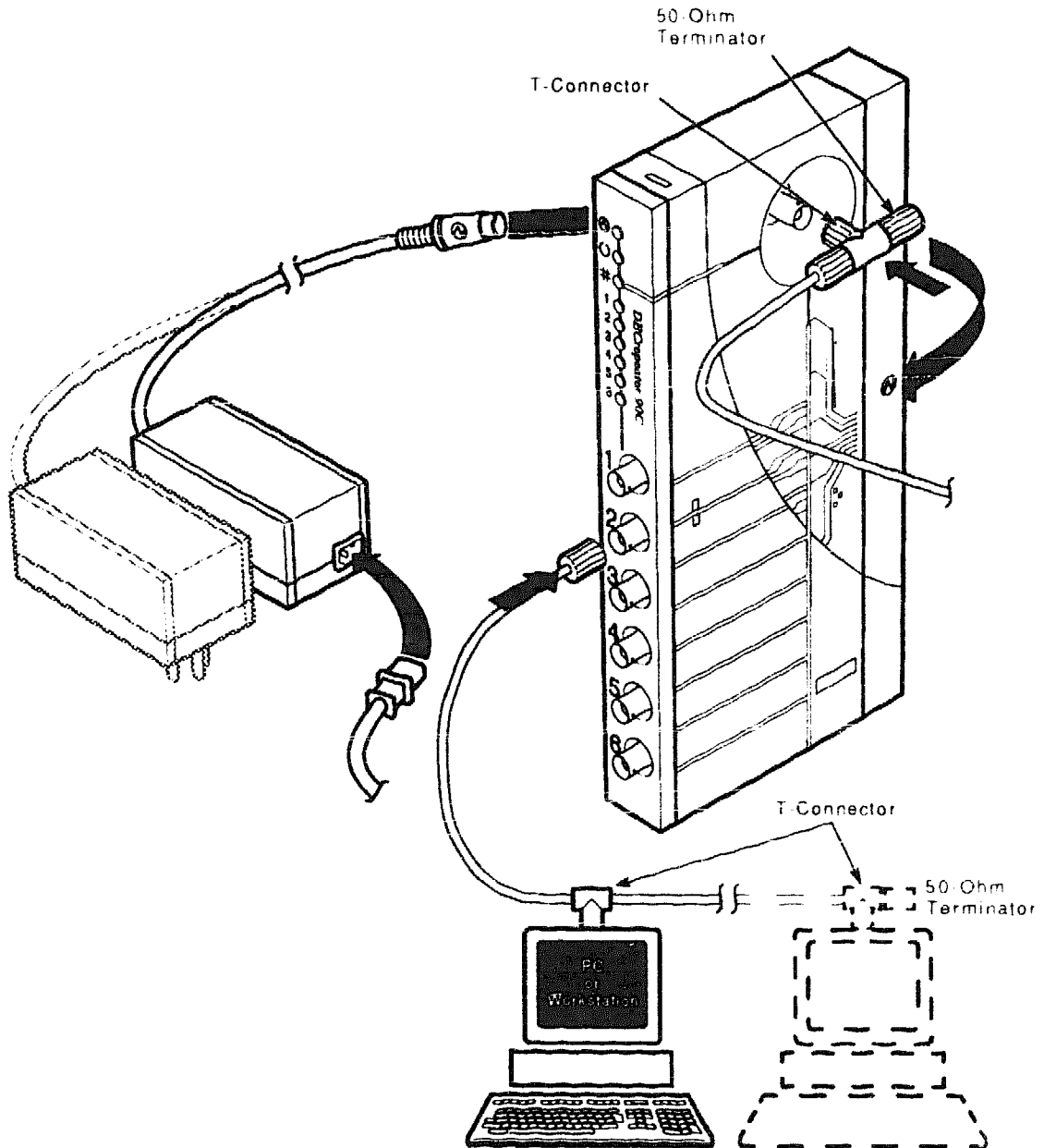
Backplane Installation

To install the repeater in the DEChub 90 Ethernet backplane, perform the following procedures:

Remove the back cover.

Remove the back cover if one is present.

1. Insert a small screwdriver into the top mounting hole on the cover.

2. Lift the internal latch with the screwdriver, then pull the cover away and down from the top of the repeater.
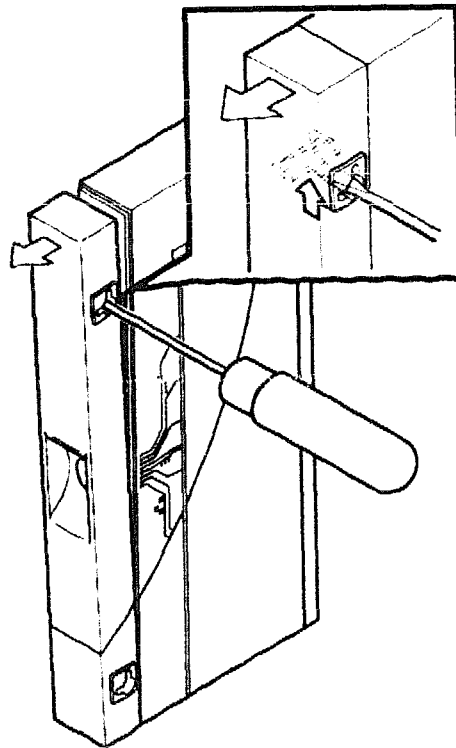
LJ 00320 TI0

Mount the repeater in the backplane.

1. Install the repeater in the backplane as shown in the following figure. Place the lower mounting tab, on the back of the DECrepeater 90C, in the correct mounting slot on the backplane.

2. Rock the repeater into place. You hear an audible click when the repeater securely latches in place.

LJ-00954-TI0
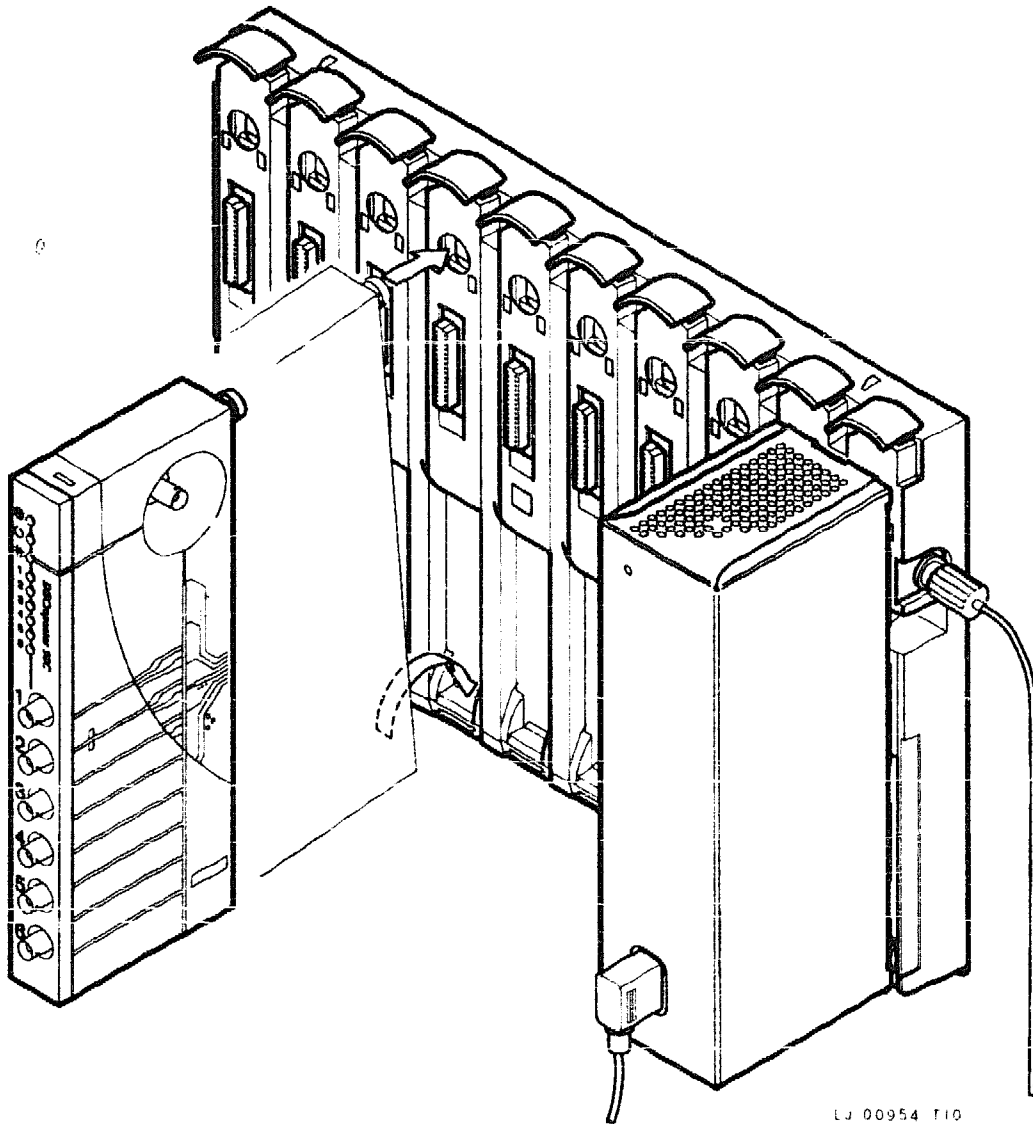
> **NOTE**
> The DECrepeater 90C can be installed into or removed from the DEChub 90 Ethernet backplane while power is applied to the backplane (hot swap).

3. If this is a new installation, supply power to the backplane.

4. All LEDs on the repeater turn on either immediately or at initial power-up. After approximately 0.5 seconds, the port 0 status LED and port status LEDs turn on with intensity proportional to the amount of activity on the indicated port.

> **NOTE**
> The port status LEDs for unconnected ports should turn off when network traffic is established.

Install and verify devices.

1. Connect the desired devices to ports 1 to 6, using correctly terminated ThinWire segments. The corresponding port LEDs should turn on.

2. Verify the operation of each device you plan to use by connecting and sending information to each port you have connected.

The DECrepeater 90C is now installed.

4

Management

This chapter provides information on managing the DECrepeater 90C on a network or in a standalone configuration. The chapter describes available functions and commands, how to access the maintenance operations protocol (MOP), management techniques, and messages.

Managing the DECrepeater 90C

When you install the DECrepeater 90C in a DEChub 90 Ethernet backplane, you can manage the repeater by using a DECbridge 90 work group bridge. All commands that affect the DECrepeater 90C are part of the DECbridge 90 command set.

Functions

Online management allows you to perform the following functions on the DECrepeater 90C:

- Identify all repeaters in the DEChub 90.

- Examine the port status (enabled, disabled, properly operating, or inoperative) of repeater ports that share the DEChub 90 backplane with a bridge.

- Examine the work group address database entries 1 to 200, annotated with the repeater port to which each is attached, if any.

- Reset any repeater in the DEChub 90 backplane.

- Enable or disable a repeater port.

- Define the bridge password.

See the "Command Descriptions" section for information on command syntax.

Components Needed

You need the following components to manage a DECrepeater 90C online:

* DEChub 90 backplane

* DECbridge 90 work group bridge

* DECrepeater 90C

Accessing the MOP from VMS

On a VMS operating system, the MOP console carrier is included as part of the network control program (NCP) facility, which requires a DECnet license.

You do not need increased user privileges to use NCP. To establish a console carrier session, you must know

* The Ethernet address of the bridge to be managed

* The Ethernet name of the circuit that contains the bridge

The circuit name is needed because a VMS operating system may have more than one Ethernet interface. The Ethernet address should be on the label on the DECbridge 90 front panel. The following Ethernet circuit names, based on system type, apply:

System	Ethernet Circuit Name
VAX 6000 and VAX 9000 XMI computers	MNA-0
BI-based systems (VAX 6300 and VAX 6400 computers)	BNA-0
VAX 4000 computer series	ISA-0
MicroVAX/3600/3900	QNA-0
VAXstation 2000 and 3000 computer series	SVA-0
VAX-11/780 and VAX-11/785 computers (UNIBUS)	UNA-0

Example

Here is a typical VMS command to establish a session from a VAXstation 3100, using a bridge address of 08-00-2B-01-23-45 and the Ethernet circuit name SVA-0:

```
$ MCR NCP CONNECT VIA SVA-0 PHYSICAL ADDRESS 08-00-2B-01-23-45
```

When you establish the connection, the screen displays the following:

```
Console connected (press CTRL/D when finished)
```

Accessing a Bridge Repeatedly

If you need to access a specific bridge repeatedly, you can enter the Ethernet address for it in the NCP database. This is usually done by choosing an arbitrary address in area 13. Bridge names in the NCP database can have a maximum of six characters.

Example:

If you call your bridge DBRG1 on address 13.87 and access it from a VAX 6400 (Ethernet circuit name BNA-0), you could use the following commands:

```
$ NCP

NCP> DEFINE NODE DBRG1 ADDRESS 13.87 HARDWARE 08-00-2b-01-23-45
SERVICE CIR BNA-0
NCP> SET NODE DBRG1 ALL
```

To access the bridge, type:

```
$ NCP CONNECT NODE DBRG1
```

Accessing the MOP from ULTRIX

On ULTRIX operating systems, the console carrier is a separate utility included as part of the MOP option. The option is part of the regular distribution, but is not selected by default and is not included in the basic installation. You can install MOP from the original distribution media by using the setld utility. You must be have superuser privileges to invoke the console carrier.

After the MOP option is installed, each bridge to be managed must be given a name and a dummy node number, using the addnode utility. For example:

```
# addnode 13.1 DBRG1
```

After the name and node number is assigned, you can establish the link at any time by using the ccr command:

```
#   ccr -n DBRG1 -h 08-00-2b-01-23-45 -c sva-0
```

In this example, the -h qualifier is followed by the station address of the DECbridge unit to be attached. The -c qualifier is followed by the name of the Ethernet circuit to use for the connection. The following Ethernet circuit names, based on system type, apply:

System	Ethernet Circuit Name
VAX 6000 and 9000 XMI computers	mna-0
BI-based systems (VAX 6300 and VAX 6400 computers)	bna-0
VAX 4000 computer series	isa-0
MicroVAX/3600/3900	qna-0
VAXstation 2000 and 3000 computer series	sva-0
VAX-11/780 and VAX-11/785 computers(UNIBUS)	una-0

Console Carrier User Interface

The DECbridge 90 is not shipped with a preset password, so no password prompt displays when you connect for the first time. For secure operation of the DECbridge 90, you should define a password using the DEFINE BRIDGE PASSWORD command.

The password prompt is represented by the pound sign (#). If you do not define a password, the password prompt does not display when you log in.

You have three attempts to enter a password; if all three attempts fail, you must disconnect and try again.

After you enter the correct password, or if there is no password, the DECbridge console carrier management banner and prompt display on the screen:

```
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DECbridge 90 V1.0 25-JAN-1991 08-00-2B-01-23-45
Flash EPROM V1.0 31-JAN-1991
DECbridge>
```

Console Carrier Command Language

You can type a question mark (?) at any point in the command line to display a list of the options available at that point in the command line. The system accepts unique abbreviations of commands.

Table 4-1 summarizes the DECbridge commands that apply to the DECrepeater 90C. For a complete list of commands, see the *DECbridge 90 Owner's Manual*.

Table 4-1 Summary of DECrepeater 90 Commands

Command	Argument and Parameter

DEFINE[1]	BRIDGE HUB_MANAGEMENT
	    ENABLE
	    DISABLE

	BRIDGE PASSWORD *password string*
LIST	BRIDGE

SET*	BRIDGE HUB_MANAGEMENT
	    ENABLE
	    DISABLE

	PORT [*hub number,*] *slot number, port number*
	    ENABLE
	    DISABLE

	REPEATER [[*hub number,*] *slot number* RESET
SHOW	ADDRESS [*start index,*[*stop index*]]
	PORT [*hub number,*] *slot number, port number*
	REPEATER [[*hub number,*] *slot number*]

[1]The DEFINE commands change only the default settings that are invoked at power-up or a reset. DEFINE commands do not change the currently active values, with the exception of DEFINE BRIDGE PASSWORD. DEFINE BRIDGE PASSWORD takes effect immediately.
    The SET commands change only the currently active values, but do not affect the defaults that are invoked at power-up or a reset.

Command Parameters

A *start index* or *stop index* for an address is a decimal index into the work group forwarding database in the range of 1 to 200.

A *slot number* is a number from 1 through 8 that identifies a hub slot containing a DECrepeater 90.

If two DEChub units are connected together, the *hub number* (1 or 2) is specified before the slot number. For example:

> 2, 4 refers to the fourth slot from the left in the second DEChub, which is the hub that does not contain the DECbridge 90.

A *password string* is a string of a maximum of 16 characters.

A *port number* is either a DECbridge 90 port, or the number of a port on a DECrepeater installed in the DEChub backplane that has the bridge. The DECbridge backbone port is the single digit 1. The work group port is 2. A repeater port is identified by a *hub number* as just described, and the port number within the slot (0 to 8). For example:

> 2, 4 refers to the fourth port on a repeater in slot 2, in the same hub as the DECbridge 90.
> 2, 4, 1 refers to the first port on a repeater in the fourth slot of the second hub.

Command Descriptions

The command examples are based on the sample configuration in Figure 4–1.

DEFINE BRIDGE HUB_MANAGEMENT DISABLE
SET BRIDGE HUB_MANAGEMENT DISABLE

Disables all repeater management through the DECbridge 90 unit for DECrepeater 90 units in the DEChub 90 backplane. When management is disabled, you will get an error with the SHOW REPEATER, SET PORT or SHOW PORT commands on repeater ports, and you will not get port number information from the SHOW ADDRESS command.

DEFINE BRIDGE HUB_MANAGEMENT ENABLE
SET BRIDGE HUB_MANAGEMENT ENABLE

Reverses the effect of the SET or DEFINE BRIDGE HUB_ MANAGEMENT DISABLE commands.

DEFINE BRIDGE PASSWORD *password string*

Lets you changes the password string. You are prompted twice for a
new password. The password may be up to 16 characters long and is
not displayed on the screen. The new password is saved. There is no
corresponding SET command because the DEFINE BRIDGE PASSWORD
takes effect immediately.

MOP provides a mechanism for setting and checking passwords. This
mechanism is only intended to provide protection against accidental
tampering with parameters and is not intended as a security feature. No
attempt is made to prevent compromise of the password by malicious
users. The DECbridge 90 should not be used in applications that
absolutely depend on the prevention of any unauthorized modifications to
the parameters.

LIST BRIDGE

Displays the nonvolatile bridge-wide parameters.

SET PORT [*hub number,*] *slot number,port number* **DISABLE**

Disables the attachment of a specific repeater port in the DEChub
backplane. The port status indicator on the selected DECrepeater 90 will
flash, indicating that the port was disconnected by the network manager.
There is no equivalent DEFINE command for disabling repeater ports.

Example: The expected response to a SET PORT DISABLE command is
shown.

```
DECbridge>  SET PORT 1,3,2 DISABLE
Hub 1 slot 3 port 2 segment counter 0 status: disabled
```

SET PORT [*hub number,*] *slot number, port number* **ENABLE**

Reverses the effect of SET PORT DISABLE for DECrepeater 90 ports.

Example: The expected response to a SET PORT ENABLE command is
shown.

```
DECbridge>  SET PORT 1,3,2 ENABLE
Hub 1 slot 3 port 2 segment counter 0 status: no carrier loopback
```

SET REPEATER [hub number,] slot number **RESET**.

Resets a specific repeater. There is no output response to this command.
All disabled ports are enabled.

SHOW ADDRESS [start index,[stop index]]

Displays the station address for the selected range of entries in the
address database. All addresses in this database are in the work group.
The indexes range from 1 to 200. The start index is always displayed, but
other entries in the range are only displayed if they are not empty. If you
omit indexes, the command displays the addresses of all stations in the
work group.

When the DECbridge 90 is used with the DECrepeater 90C or 90T,
this commands also displays the hub slot number and repeater port
that each station is attached to. It may take several minutes for the
SHOW ADDRESS command to accurately reflect the correct repeater port
number for stations recently added to the network or moved from one port
to another. See Appendix C for further details on SHOW ADDRESS.

Example: All addresses contained within the hub configuration are
shown. Addresses 5 and 7 display the same hub, host, and port because
both devices are daisy-chained on the same port.

```
DECbridge>  SHOW AD
Address 1:  08-00-2B-0F-19-23
Address 2:  08-00-2B-10-20-30 hub 2 slot 8 port 4
Address 5:  08-00-2B-10-6A-31 hub 2 slot 3 port 3
Address 6:  08-00-2B-A6-43-17 hub 1 slot 3 port 5
Address 7:  08-00-2B-16-23-4C hub 2 slot 3 port 3
```

Example: The expected response of a SHOW ADDRESS command to a
nonexistent address is shown.

```
DECbridge>  SHOW AD 3
Address 3:  unused address
```

Example: The expected response of a SHOW ADDRESS command to a valid address is shown.

```
DECbridge>  SHOW AD 2
Address 2: 08-00-2B-10-20-30 hub 2 slot 8 port 4
```

Example: The expected response of a SHOW ADDRESS command for a range of address is shown.

```
DECbridge>  SHOW AD 2,6
Address 2: 08-00-2B-10-20-30 hub 2 slot 8 port 4
Address 5: 08-00-2B-10-6A-31 hub 2 slot 3 port 3
Address 6: 08-00-2B-A6-43-17 hub 1 slot 3 port 5
```

SHOW PORT [*hub number,*] *slot number, port number*

Shows whether the port is enabled or disabled and lists the operating status of the port. The hub number may be 1 or 2, and the slot numbers may be 1 to 8. For the DECrepeater 90C, port numbers are 1 to 6.

Example: The expected response to a SHOW PORT command is shown. The hub was not defined in the command, so the default (1) was used.

```
DECbridge>  SHOW PORT 3,2
Hub 1 slot 3 port 2 segment counter 0 status: disabled-no
    carrier loopback
```

Example: A SHOW PORT command for hub 2 is shown.

```
DECbridge>  SHOW PORT 2,3,2
Hub 2 slot 3 port 2 segment counter 0 status: operational
```

SHOW REPEATER [[*hub number,*] *slot number*]

Shows the type of repeater and the port status for each port on that repeater. The hub number may be 1 or 2, and slot numbers may be 1 to 8. If you do not include parameters, the command displays information for all repeaters in both hubs.

Example: The expected response of a SHOW REPEATER command is shown. Note that DECrepeater 90T and DECrepeater 90C units are installed in the hub.

```
DECbridge>  SHOW REP
Hub 1 slot 3 twisted pair repeater, rev.1, 8 ports.
Hub 1 slot 4 ThinWire repeater, rev.1, 6 ports.
Hub 2 slot 3 ThinWire repeater, rev.1, 6 ports.
Hub 2 slot 6 twisted pair repeater, rev.1, 8 ports.
Hub 2 slot 8 twisted pair repeater, rev.1, 8 ports.
```

Example: The response to a SHOW REPEATER command to a slot that contains a device other than a repeater is shown.

```
DECbridge> SHOW REPEATER 1
No repeater responds.
```

Example: The response to a SHOW REPEATER command to an empty slot is shown.

```
DECbridge> SHOW REPEATER 7
No repeater responds.
```

Example: The response to a SHOW REPEATER command for a particular repeater is shown.

```
DECbridge> SHOW REP 3
Hub 1 slot 3 twisted pair, rev.1, 8 ports.
Hub 1 slot 3 port 0 segment counter 0 status: operational
Hub 1 slot 3 port 1 segment counter 1 status: no carrier loopback
Hub 1 slot 3 port 2 segment counter 0 status: disabled
Hub 1 slot 3 port 3 segment counter 0 status: operational
Hub 1 slot 3 port 4 segment counter 1 status: no carrier loopback
Hub 1 slot 3 port 5 segment counter 1 status: no carrier loopback
Hub 1 slot 3 port 6 segment counter 1 status: no carrier loopback
Hub 1 slot 3 port 7 segment counter 1 status: no carrier loopback
Hub 1 slot 3 port 8 segment counter 1 status: no carrier loopback
```

Example: The response to a SHOW REPEATER command for hub 2, slot 3 is shown.

```
DECbridge> SHOW REP 2,3
Hub 2 slot 3 ThinWire, rev.1, 6 ports.
Hub 2 slot 3 port 0 segment counter 0 status: operational
Hub 2 slot 3 port 1 segment counter 1 status: no carrier loopback
Hub 2 slot 3 port 2 segment counter 1 status: no carrier loopback
Hub 2 slot 3 port 3 segment counter 1 status: no carrier loopback
Hub 2 slot 3 port 4 segment counter 1 status: no carrier loopback
Hub 2 slot 3 port 5 segment counter 0 status: operational
Hub 2 slot 3 port 6 segment counter 1 status: no carrier loopback
```

Example: The response to a SHOW REPEATER command when the DECbridge 90 is not the hub manager or the DECbridge 90 is still in the power-up stage is shown. After power-up, there is a 60-second delay before the DECbridge takes control of the hub.

```
DECbridge> SHOW REP
The DECbridge 90 is not the designated hub manager.
```

Typical Management Techniques

You can manage a DECrepeater 90C as a standalone unit or within a group of repeaters in a DEChub 90 backplane. For a standalone unit, you refer to the DECrepeater 90C LEDs for system status. In a DEChub 90 environment, you can refer to the LEDs and perform online management by using a DECbridge 90 work group bridge.

Whether you use a standalone or DEChub 90 configuration, Digital recommends that you create a network topology map. This map makes it easier to perform management tasks. Figures 4-2 and 4-3 show typical topology maps.

Remote Network Management With the DECbridge 90

You can manage a DECrepeater 90C remotely, through a DECbridge 90 work group bridge and a DEChub 90 backplane. The DECbridge 90 communicates across the DEChub 90 backplane to any DECrepeater in the DEChub 90. You can connect two DEChub 90 backplanes together and manage the repeaters in both DEChub 90s with one DECbridge 90.

The DECbridge 90 communicates with the DECrepeater 90C by using private signals on the DEChub backplane. The two DEChub 90 units are connected by two cables:

- ThinWire coaxial cable, to carry the work group Ethernet signals

- DECconnect office cable, to carry the management signals

NOTE
If two DEChub backplanes are being managed by one bridge, the backplanes must be connected with ThinWire cable (BNC to BNC) (PN BC16M-*xx*) and a DECconnect office cable (PN BC16E-*xx*).

Management Disconnect

A port can be partitioned at any time by the management protocol. The management protocol can only be used for the repeater ports mounted in the DEChub 90 backplane and connected to a DECbridge 90. When a port is disconnected by the management protocol, it can be reconnected by either turning the power off and on again, or by using the management protocol. If a port is partitioned by the management protocol, the port LED flashes approximately twice a second.
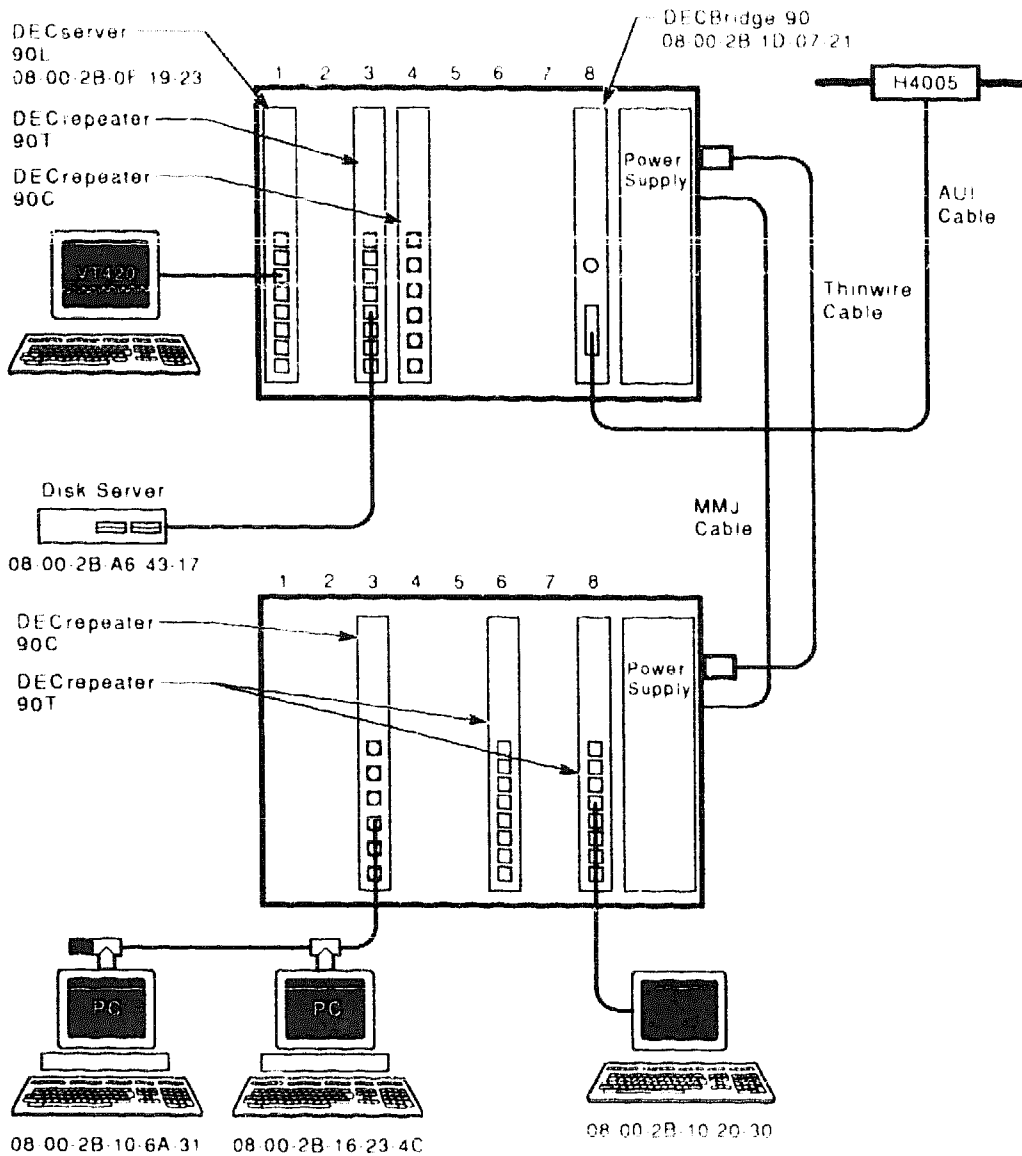
Figure 4-1   Sample Configuration and Topology Map

Whether your configuration is a standalone or a DEChub 90, you should create a network topology map. The map helps facilitate management tasks.

DECnub 90

Slot 1	DECrepeater 90T	Slot 2	DECrepeater 90C	Slot 8	DECBridge 90
Port 1	Node - Address - Username	Port 1	Node - Address - Username	Port 1	Address
Port 2	Node - Address - Username	Port 2	Node - Address - Username		
Port 3	Node - Address - Username	Port 3	Node - Address - Username		
Port 4	Node - Address - Username	Port 4	Node - Address - Username		
Port 5	Node - Address - Username	Port 5	Node - Address - Username		
Port 6	Node - Address - Username	Port 6	Node - Address - Username		
Port 7	Node - Address - Username				
Port 8	Node - Address - Username				

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Figure 4-2   Typical Network Topology Map

Management Session

To perform online management commands, you establish a MOP console carrier session with the bridge from any remote node.

After you connect to the bridge, the following prompt displays:

```
DECbridge>
```

When a bridge goes through a power cycle or is reset, the bridge begins to poll repeaters for status. This process includes a special algorithm to determine which repeater ports have stations attached. The time to complete this algorithm depends on the number of repeaters and amount of network activity. You should allow time for this process to complete before proceeding to manage the hub. For the same reason, it may take time for the system to report on stations or repeaters that are moved in the hub. See Appendix C for more details.

Example of a typical management session

1. Determine what repeaters are in the hub.

    ```
    DECbridge> SHOW REPEATER
    Hub 1 slot 5 ThinWire repeater, rev.0, 6 ports.
    ```

    In this example, there is a ThinWire repeater (DECrepeater 90C) in the same hub as the bridge (hub 1), if this is a 2-hub configuration. The repeater is in slot 5 of the hub and has 6 ThinWire ports.

2.   Determine what stations are connected to the repeaters in the hub.

```
DECbridge> SHOW ADDRESS
Address 1: 08-00-2B-19-94-FB
Address 2: 08-00-2B-1E-2D-0C hub 1 slot 5 port 3
```

This example indicates that a station with address 08-00-2B-1E-2D-0C is connected to the repeater in slot 5, on port 3. At this point, without physical examination, you have enough information to construct a network map.

If Problems Are Reported

If a problem is reported, there are a number of useful commands available. Using the previous sample management session, you can determine which repeater and port connects the user's station.

Enter the following command to display the status of all ports on the repeater in slot 5:

```
DECbridge> SHOW REPEATER 5
Hub 1 slot 5 ThinWire, rev.1, 6 ports.
Hub 1 slot 5 port 0 segment counter 0 status: operational
Hub 1 slot 5 port 1 segment counter 0 status: excessive collisions
Hub 1 slot 5 port 2 segment counter 0 status: excessive length collision
Hub 1 slot 5 port 3 segment counter 0 status: operational
Hub 1 slot 5 port 4 segment counter 0 status: excessive length collision
Hub 1 slot 5 port 5 segment counter 0 status: excessive length collision
Hub 1 slot 5 port 6 segment counter 0 status: excessive length collision
```

The following table lists the possible status messages and their most common causes.

Message	Most Common Cause
Operational	Cable is connected, everything is okay.
Excessive length collision or Excessive collisions	Cable fault, usually a port that is not connected to anything or an unterminated cable.
No carrier loopback or Transmit carrier drop out	Cable fault, usually a shorted cable.
Jabber	Station(s) connected to this port continue to transmit, expect a faulty station.

The operational condition is normal. All other conditions cause the repeater to automatically partition the port. When the condition clears, the repeater automatically reconnects the port and reports it as operational again.

To help solve intermittent problems, the repeater reports a segmentation count. This count runs from 0 to 15, then latches at 15. Every time you use the SHOW REPEATER command, this count is set to zero.

If this count is not zero, you can tell that a port has partitioned since the last SHOW REPEATER command. This partitioning is normal when users turn stations on and off, or when cables are connected or disconnected from the repeater during installation and reconfiguration. If none of these normal causes have occurred, you should suspect an intermittent problem with cabling or attached stations.

Other Commands

There are two more commands that are useful in managing repeater networks.

```
DECbridge> SET PORT 5,1 DISABLE
Hub 1 slot 5 port 1 segment counter 0 status: disabled-no carrier loopback
```

This command allows the manager to disable a particular port on a repeater. This command may be useful if stations attached to the port are causing network difficulties.

```
DECbridge> SET REPEATER 5 RESET
```

This command resets the repeater to the power-up condition. This includes restoring any ports that were partitioned by the manager and resetting the segmentation counters.

Messages

Table 4-2 describes DECbridge 90 messages that apply to the
DECrepeater 90C. For a complete list of messages, see the *DECbridge
90 Owner's Manual*.

Table 4-2   DECbridge 90 Messages

This message . . .	Indicates that . . .
Address *n*: unused address	Address number *n* does not contain a station address.
Confirmation error - password not changed.	The second entry or verification of a new password given in a DEFINE BRIDGE PASSWORD command did not match the first entry.

DECbridge 90 is not the designated hub manager	The DECbridge 90 was not the designated hub manager when the SHOW PORT or SHOW REPEATER command was issued. This occurs when
	
	• The bridge is reset, and the DECbridge is not the hub manager for 60 seconds.
	
	• Another DECbridge unit is acting as the current hub manager.
	
	• A fault exists in one of the following, preventing management communication:
	
	  — In the MMJ cable or connections between two DEChub backplanes
	
	  — In the power supply of one of the DEChub units
	
	  — In the serial port transceivers in the DEChub 90

Hub management disabled	A SHOW PORT or SHOW REPEATER command was issued to a DECbridge 90 that has repeater management disabled. Enable repeater management with the SET BRIDGE HUB_MANAGEMENT ENABLE command before trying again.

Table 4-2 (Cont.)   DECbridge 90 Messages

This message . . .	Indicates that . . .
Hub number and slot number | \[hub\], slot\]. Hub is 1 or 2, slot is 1-15	One or more parameters in a SHOW REPEATER command were out of range. The hub number must be 1 or 2. The slot number must be from 1 to 15.
Hub h slot s - port number out of range	The port number in a SHOW PORT command was out of range for the device in hub n slot s. Use the SHOW REPEATER command to determine the number of ports for the device, and to specify a port number within that range.
Hub h slot s not a repeater	The device does not use the same management protocol as the DECrepeater 90C and 90T. The device's ports, if any, cannot be managed by the DECbridge 90.
Hub h slot s unrecognized type	The repeater type in hub h slot s is not known to the DECbridge 90, but the repeater ports can still be managed with the DECbridge 90.
No repeater responds	There is no repeater installed in the requested hub slots, or the repeater is not functioning.
No such port	The bridge port number in a SHOW PORT command was invalid. Valid numbers are 1 and 2.
Password too long - not changed	A password in a DEFINE BRIDGE PASSWORD command was more than 16 characters.
Port number \[\[hub,\]slot,\]port	One of the parameters in a SET PORT or DEFINE PORT command was not a valid hub, slot, or port number.
Station address number \[first \[,last\] \] in range 1-200	One or more parameters in a SHOW ADDRESS command was out of the valid range of 1 to 200.
???	A command or parameter was not recognized. Type ? to display valid commands.
180501	A loopback diagnostic has run and passed on the backbone port. If the backbone port is not receiving any messages, this diagnostic is run every 10 minutes.

Table 4–2 (Cont.)   DECbridge 90 Messages

This message ...	Indicates that ...
180201	A loopback diagnostic has run and passed on the work group port. If the work group port is not receiving any messages, this diagnostic is run every 10 minutes.
1805:00-00-00-00 01	A loopback diagnostic has run and failed on the backbone port. The diagnostic is retried every 5 seconds until the test passes.
1802:00-00-00-00 01	A loopback diagnostic has run and failed on the work group port. The diagnostic is retried every 5 seconds until the test passes.

Standalone Configuration Management

The recommended process for managing a small stand-alone network is:

- Maintain records indicating which stations are connected to each port on each repeater. Digital recommends drawing a network topology map.

- Observe the LEDs on the DECrepeater to determine the network status.

Figure 4–3 shows a typical standalone network topology map. Table 4–3 describes each LED and its function.

DECrepeater 90C

Port 1	Node - Address - Username
Port 2	Node - Address - Username
Port 3	Node - Address - Username
Port 4	Node - Address - Username
Port 5	Node - Address - Username
Port 6	Node - Address - Username

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Figure 4–3   Typical Standalone Topology Map

Note on LED Sequence After Power-Up

After you power up a standalone DECrepeater 90C, all LEDs except
the network activity LED remain on until an active connection, either
hardware or network activity. This is a normal condition. After an active
station is connected to one of the ports, the LED for the active port
remains on and all other port LEDs turn off.

Table 4-3   DECrepeater 90C Status LEDs

⊘	**Power indicator**—Monitors the status of the +5.0 Vdc voltage. **On:** The +5.0 Vdc voltage is normal. **Off:** The voltage is abnormal (as in a power failure.)
○	**Network activity indicator**—Monitors the network activity. **On:** There is network activity. **Off:** There is no network activity.
╫	**Port 0 status indicator**—Monitors the status of the ThinWire input to the repeater. **On:** Port 0 is functional. **Off:** Port 0 has failed or has been partitioned. **Flashing:** The port has been partitioned by management. **Port 1 to 6 status indicators**— Monitor the activity of each port. The top LED represents port 1, and the bottom LED represents port 6. **On:** The port has a connection. **Off:** The port does not have a connection or has been partitioned. **Flashing:** The port has been partitioned by management.

5
Troubleshooting

This chapter provides troubleshooting information for the DECrepeater 90C when used as a standalone unit or when installed in the DEChub 90 backplane.

Before You Start

1. Verify the installation of the repeater The installation must meet the configuration rules in Chapter 2.

2. Note the fault condition.

3. Isolate the problem.

   Use Table 5–1 to troubleshoot a standalone DECrepeater 90C. Use Table 5–2 to troubleshoot a DECrepeater installed in a DEChub 90 configuration.

DECrepeater 90C Standalone Troubleshooting

Use Table 5–1 to troubleshoot a standalone DECrepeater 90C.

Table 5–1   Troubleshooting a DECrepeater 90C Standalone Unit

If...	Then...	Do this...
All LEDs are off.	Check the ac power connection.	Check that the power supply is properly plugged into the power outlet. Check the power to the power outlet.
	Check the power supply.	Check the 7-pin connector to the power supply. If the connections are okay, replace either the power supply (for 120 V operation) or both the power supply cord and power supply (for 220 V operation).
The network activity LED is off.	There is low network activity or no network activity.	Ensure that network activity is present.
	If the network activity LED still fails to turn on,	Turn the unit off and on by unplugging and replugging the power supply in. Check that the network activity LED turns on momentarily.
	If the network activity LED turns on momentarily, the network activity LED portion of testing has passed. If the network LED still fails to turn on, the DECrepeater 90C is defective.	Replace the DECrepeater 90C.
The port status LED is off.	Ensure that the cable has activity on it. If the LED still fails to turn on, the port is defective.	Switch to an unused port or replace the DECrepeater 90C.

Table 5-1 (Cont.) Troubleshooting a DECrepeater 90C Standalone Unit

If...	Then...	Do this...
All port LEDs are off.	A connection has not been made.	Remove all network connections (items ⑤ and ⑥). Turn the repeater off and on by unplugging and replugging the power supply. All LED indicators turn on. Only the network activity LED turns off.
	If any LED other than the network activity LED turns off, the DECrepeater 90C has failed this part of the self-test.	Replace the DECrepeater 90C.
	If all LEDs except the network activity LED are on, this portion of the self test has passed.	Connect a known active ThinWire network segment to the repeater. The status LED for the connected port stays on, while all status LEDs for the unconnected ports should turn off as soon as the first connection is made to the active segment.
	If the status LED for the connected port stays on and the status LED for the unconnected ports stay off, then the connected port is okay.	Continue installing the other network cables for each port that you are going to use.
	If the status LED for the unconnected ports do not turn off while the LED for the connected port remains on, there is a possible problem with the cable or port.	Try another port. If the same condition continues, check for a cable problem by connecting a good cable with a good device at the other end.

Table 5-1 (Cont.)   Troubleshooting a DECrepeater 90C Standalone Unit

If...	Then...	Do this...
	If the same condition exists when a good cable is plugged in, the DECrepeater 90C is defective.	Replace the DECrepeater 90C.
	Continue installing other network cables for each port you are going to use.	The indicator LED for each properly terminated port should turn on.
	If the LED for each properly terminated port remains off when a cable is connected, the DECrepeater 90C is defective.	Replace the DECrepeater 90C.
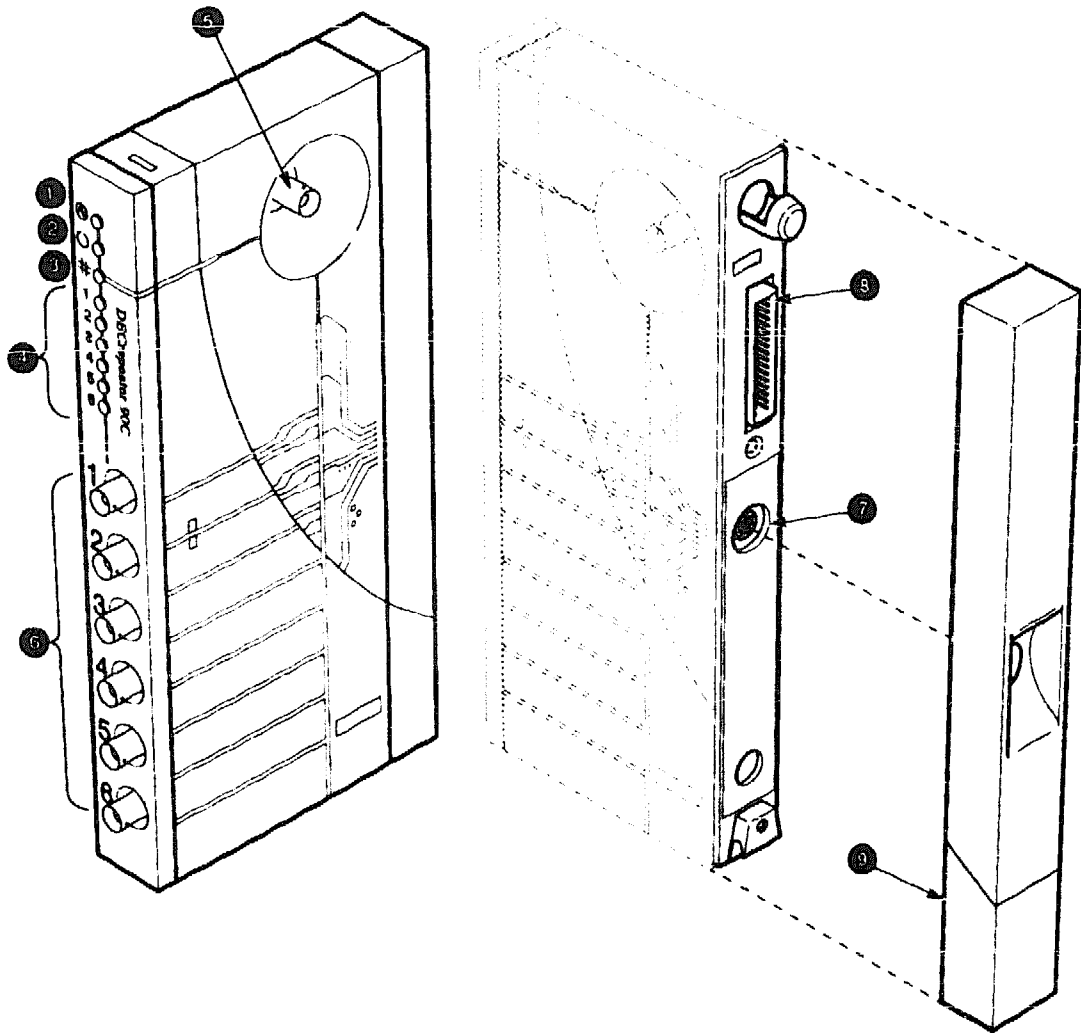
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DECrepeater 90C Backplane Configuration Troubleshooting

Use Table 5–2 to troubleshoot a DECrepeater installed in a DEChub 90 configuration.

Table 5–2   Troubleshooting a DECrepeater 90C in a DEChub 90 Backplane

If...	Then...	Do this...
The power LED is off.	The DECrepeater 90C is not receiving +5 V.	Check the power LED on the DEChub 90 power supply.
	If the power LED on the DEChub 90 is off, there is a problem with the DEChub 90 power supply.	See the troubleshooting procedures in the *DEChub90 Owner's Manual*.
	If the power LED on the DEChub 90 power supply is on, are the power LEDs on other components off? If other components are on, the DECrepeater 90C has a power problem.	Try reseating the DECrepeater 90C in either the same slot or another slot.
	If the power LED on the DEChub 90 power supply is on, are other component power LEDs off? If other components are off, the DEChub 90 has a power problem.	See the troubleshooting procedures in the *DEChub 90 Owner's Manual*.

Table 5-2 (Cont.) Troubleshooting a DECrepeater 90C in a DEChub 90 Backplane

If...	Then...	Do this...
	If the power LED turns on when reseated in the same slot, the DECrepeater 90C was not properly seated.	Make sure the DECrepeater 90C is properly seated in the slot.
	If the power LED turns on when reseated in another slot, the problem is with the DEChub 90.	See the troubleshooting procedures in the *DEChub 90 Owner's Manual*.
	If the DECrepeater 90C does not turn on in a known good slot, the DECrepeater 90C is defective.	Replace the DECrepeater 90C.
The port 0 network activity LED is off.	The DECrepeater or any other unit in the DEChub 90 may not be connected to an active segment.	Connect a known active segment to any unit in the DEChub 90.
	If the DECrepeater 90C is connected to a known active segment and the port 0 LED is off. The DECrepeater 90C is defective.	Replace the DECrepeater 90C.
The port 0 network activity LED is on.	This portion of the self-test ran successfully.	Check that the LED for each port with a connected cable is on.
	If the LED for the connected cable is off, the DECrepeater 90C does not acknowledge the connection to its port.	Check that the cable is properly terminated at the other end.

Table 5–2 (Cont.)   Troubleshooting a DECrepeater 90C in a DEChub 90 Backplane

If...	Then...	Do this...
	If the cable is not connected at the other end.	Connect the other end of this cable and terminate.
	If the cable is connected at other end, the cable may not be continuous.	Check the cable for continuity.
	The cable may be defective.	Replace with a known good cable.
	If the cable is continuous, the cable may not be properly terminated.	Properly terminate the cable.
	If the port LED turns on, the port is okay.	No action is required.
	If the port LED remains off, test the failing port.	Remove the cable from failing port and replace with a 50-ohm terminator.
	If the port LED remains off, the DECrepeater 90C is defective.	Replace the DECrepeater 90C.

A
DECrepeater 90C Specifications

This appendix provides the following specifications for the DECrepeater 90C:

- Physical dimensions

- Environmental specifications

- Electrical specifications

- Parts list

Physical Dimensions

Dimension	Measurement
Height	3.5 cm (1.4 in)
Width	28.0 cm (11.0 in)
Depth	14.0 cm (5.5 in)
Weight	0.77 kg (1.7 lb)

Environmental Specifications

The DECrepeater 90C is designed to operate in an office environment or equipment room environment such as telephone closets or satellite equipment rooms. It is not intended to operate in an air plenum.

Operating Environment

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

Shipping Environment Specifications

Condition	Value
Temperature	-40°C to 66°C (-40°F to 151°F)
Relative humidity	10% to 95% (non-condensing)
Altitude	Sea level to 4.9 km (16,000 ft)

Electrical Specifications

The DECrepeater 90C features either a self-contained power supply or self-contained power supply and power cord option.

Power Supply

Specification	Value
Voltage (domestic)	104 Vac to 128 Vac (nominal 120 Vac)
Voltage (international)	208 Vac to 256 Vac (nominal 240 Vac)
AC cord length	6 feet
Current at 120 volts	.25 amps
Current at 240 volts	.125 amps
Frequency	50 Hz to 60 Hz
Power consumption	9 watts
Output voltage	5.1 Vdc
DC cord length	8 feet
Output current	1.8 A

DECrepeater 90C Input

Specification	Value
Input voltage	4.75 Vdc to 5.25 Vdc
Input current	1.0 amp

Parts List

Replacement Part	Part Number
DECrepeater 90C	DECMR-MA
Power supply, 110 Vac	H7082-AA
Power supply, 220 Vac	H7082-BA

B
Related Documentation

You can order the following documents from Digital:

Document Title	Order Number
DECbridge 90 Owner's Manual	EK-DEWGB-OM
DEChub 90 Owner's Manual	EK-DEHUB-OM
Open DECconnect Building Wiring Components and Application Catalog	EB-K2407-42
DECrepeater 90T Owner's Manual	EK-DETMR-OM
DECconnect System Planning and Configuration Guide	EK-DECSY-CG

C
Management Details

Chapter 4 provides information on managing the DECrepeater 90C on a network or in a standalone configuration. This appendix provides more information on managing a DECrepeater 90C in a DEChub 90 backplane:

- Designating a hub manager

- Annotating the bridge address table

- Using the WGB address table for work group management

Designating a Hub Manager

The protocol used on the DEChub management bus allows only one manager unit to access the management bus. When a DECbridge 90 is first powered on or reset, it waits 60 seconds before designating itself as the designated hub manager. This delay ensures that there is no other manager unit in use in the hub.

During this 60-second period, you cannot manage the DECrepeater 90 units remotely. This restriction does not apply to the repeaters themselves. A repeater inserted into the hub is immediately manageable by whatever unit is currently the designated hub manager.

If you receive the message The DECbridge 90 is not the designated hub manager. after the DECbridge 90 has been running for more than 60 seconds, there is something wrong.

- If you are using two DEChub 90 units, make sure the MMJ cable is wired correctly, and it not shorted or broken.

- If you are using only one hub, the MMJ connector should be disconnected.

- Only one DECbridge 90 unit is allowed in the hub. If more than one DECbridge 90 unit is installed, only one of them can manage the repeaters. The other unit issues the message indicating it is not the manager.

If for some reason you do *not* want a specific DECbridge 90 unit to be the designated hub manager, you can disable the hub management features with the command DEFINE BRIDGE HUB_MANAGEMENT DISABLE.

After the DECbridge 90 has become the designated hub manager, you can use SET or SHOW REPEATER and SET or SHOW PORT commands without restriction. There is, however, an additional delay before the SHOW ADDRESS command provides complete information.

DEFINE commands do not take effect until the next SET ALL or RESET of the DECbridge 90. To have the command take effect immediately, you must also issue the corresponding SET command.

Annotating the Bridge Address Table

The DECbridge 90 SHOW ADDRESS command lists the DECrepeater slot number and port number for every station in the work group that is connected to the same DEChub by a DECrepeater. However, when changes are made to the network topology, it takes time for that information to appear in the DECbridge 90 address table. The algorithm for creating this information proceeds as follows:

For every station in the work group

- Tell the repeaters to wait for a message from this station.

- Wait up to 90 seconds for the station to transmit a message.

- Ask the repeaters what port it came from.

If a station does not transmit a message within 90 seconds, the algorithm proceeds to the next station. In a typical network situation, this process is completed in a few minutes. After a bridge is newly installed or reset, you can expect this information to be complete after about 10 minutes of operation.

If some stations do not often transmit messages, the DECbridge may hang on those stations for up to 90 seconds each before moving on. If you add a station, or move it to another port, you can expect it to take about 10 minutes before a SHOW ADDRESS command recognizes this move.

If you remove a station from the network entirely, it will take a full address age time (default is 30 minutes) for the DECbridge 90 to notice. If you remove many stations at once, the DECbridge 90 hangs on each of these stations for 90 seconds, until they age out of the bridge address database. In this case, it will usually take the full address age time (30 minutes) before the port number annotations are complete.

As a worst-case example, if it takes 60 seconds for each of the allowed 200 stations to transmit a message, it could take 200 minutes to complete the address database annotations. However, the DECbridge 90 tries to hurry things along.

• If the station remains quiet after waiting 30 seconds for a message, the DECbridge 90 tries to generate a response by using the IEEE XID request.

• If the IEEE XID request fails, the DECbridge 90 tries a MOP System-ID request.

For these reasons, the DECbridge 90 never hangs for more than 30 seconds on an IEEE-conforming station, nor more than 60 seconds on any Digital station that predates the IEEE specifications. If you are monitoring messages and protocols on your work group Ethernet, you occasionally see these messages.

Using the WGB Address Table for Work Group Management

The work group bridge (WGB) Ethernet address table is dynamic. Ethernet addresses are added to the table when a device first transmits on the network. Addresses are removed when a devices does not retransmit within a user-specified period, from 1 to 32767 seconds (about 10 hours). The default setting is 15 minutes. When a device is learned or relearned after it has timed out, its address is listed in the lowest empty entry of the address table.

This continuous learning, timeout, and relearning of the Ethernet addresses means that devices in a particular work group may or may not be in the address table at any moment. If they are in the address table, they may not be in a consistent database location. Devices such as personal computers and laptops that are often removed and reconnected will certainly time out from the address table. When reconnected, the addresses for these devices are be stored in a different address table location.

Because the address table is dynamic, the network manager cannot easily compare printouts of the WGB address table to determine work group changes on a day-to-day or week-to-week basis.

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