

DECbrouter 90T

---

## Installation and Operating Information

Order Number: EK-DECBR-OM. A01

---

**First Edition, April 1993**

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

No responsibility is assumed for the use or reliability of software on equipment that is not supplied by Digital Equipment Corporation or its affiliated companies.

Restricted Rights: Use, duplication, or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013.

**FCC NOTICE:** The equipment described in this manual generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his own expense may be required to take measures to correct the interference.

© Digital Equipment Corporation 1993.

All Rights Reserved.

The following are trademarks of Digital Equipment Corporation: DEC, DECbridge, DECrouter, DECconnect, DECrouter, DECstation, DEC EtherWORKS, HUBwatch, ThinWire, and the Digital logo.

All other trademarks and registered trademarks are the property of their respective holders.

This document was prepared using VAX DOCUMENT, Version 2.1.

---

# Contents

<b>Preface</b> .....	vii
<b>1 Overview</b>	
Features .....	1-1
DECbrouter 90T1 .....	1-2
DECbrouter 90T2 .....	1-2
DECbrouter 90T2A .....	1-3
Typical Configurations .....	1-5
Installation .....	1-8
LEDs and Connectors .....	1-9
<b>2 Installation</b>	
Standalone Installation .....	2-1
Select a location. ....	2-1
Place the DECbrouter 90 on a table. ....	2-1
Mount the DECbrouter 90 on a wall. ....	2-2
Mount the DECbrouter 90 on a wall. ....	2-2
Connect the cables. ....	2-4
Install and verify devices. ....	2-9
Backplane Installation .....	2-10
Remove the back cover. ....	2-10
Mount the DECbrouter 90 in the backplane. ....	2-10
Install and verify devices. ....	2-12

### 3 Troubleshooting

Before You Start . . . . .	3-1
DECbrouter 90 Standalone Troubleshooting . . . . .	3-1
DECbrouter 90 Backplane Configuration Troubleshooting . . . . .	3-3

### A Specifications and Parts List

Physical Dimensions . . . . .	A-1
Environmental Specifications . . . . .	A-1
Operating Environment . . . . .	A-2
Shipping Environment . . . . .	A-2
Electrical Specifications . . . . .	A-2
Power Supply . . . . .	A-3
Power Input . . . . .	A-3
Parts List . . . . .	A-4

### B Related Documentation

### C DECbrouter 90 Installation Information for the United Kingdom

Service Categories . . . . .	C-1
Host Power Rating . . . . .	C-2
Module Isolation . . . . .	C-3
Safety Status . . . . .	C-3
Cable Approval . . . . .	C-3
Supported Cables . . . . .	C-3
Equipment Between the Approved Module and a Digital Circuit (PTT) . . . . .	C-4

### Index

### Figures

1-1	Typical DECbrouter 90T1 Connection . . . . .	1-6
1-2	Typical DECbrouter 90T2 or DECbrouter 90T2A Connection . . . . .	1-7
1-3	DECbrouter 90 LEDs . . . . .	1-9
2-1	Removing the Back Cover . . . . .	2-2
2-2	Mounting the DECbrouter 90 . . . . .	2-3

2-3	DECbrouter 90T1 with a Twisted Pair (10BASET) Connection . . . . .	2-5
2-4	DECbrouter 90T1 with a ThinWire (10Base2) Connection . . . . .	2-6
2-5	DECbrouter 90T2 or DECbrouter 90T2A with a Twisted Pair (10BASET) Connection . . . . .	2-7
2-6	DECbrouter 90T2 or DECbrouter 90T2A with a ThinWire (10Base2) Connection . . . . .	2-8
2-7	Removing the Back Cover . . . . .	2-10
2-8	Mounting the DECbrouter 90 . . . . .	2-11

## Tables

1-1	DECbrouter 90 Features . . . . .	1-4
1-2	DECbrouter 90 LEDs . . . . .	1-10
3-1	Troubleshooting a DECbrouter 90 Standalone Unit . . . . .	3-1
3-2	Troubleshooting a DECbrouter 90 in a DEChub 90 Backplane . . . . .	3-3
A-1	X.21 Cable Connections (BC12F-06, 17-03580-01) . . . . .	A-5
A-2	RS422 Cable Connections (BC12H-06, 17-03767-01) . . . . .	A-6
A-3	V.35 Connection BC12G-06, 17-03766-01 . . . . .	A-8
A-4	RS530A Cable Connections BC12J-06, 17-03760-01 . . . . .	A-9
A-5	RS423 Cable Connections BC12K-06, 17-03761-01 . . . . .	A-11
A-6	V.28/RS232 Cable Connections BC12L-06, 17-03762-01 . . . . .	A-13
A-7	Cable Connections for Console Converter . . . . .	A-15
C-1	BABT-Approved Service Specifications . . . . .	C-2
C-2	Module Power . . . . .	C-2
C-3	Cables Supported by the Approved Module . . . . .	C-3



---

## Preface

This manual describes how to install and maintain the Digital Wide Area Router/Bridge—the DECbrouter 90. This manual contains information on the following three models:

- DECbrouter 90T1—single port
- DECbrouter 90T2—dual port
- DECbrouter 90T2A—dual port

The DECbrouter 90 is designed to work either as a standalone unit or in the DEChub 90 backplane.

### Organization

This manual contains three chapters and three appendices.

- Chapter 1 provides an overview of the DECbrouter 90 and describes the features of the DECbrouter 90.
- Chapter 2 provides instructions for installing the Digital Wide Area Router/Bridge.
- Chapter 3 provides basic troubleshooting information.
- Appendix A provides product specifications and a parts list.
- Appendix B lists related documents that can help you become more familiar with your new system.
- Appendix C contains installation information, which is required for the United Kingdom only.

## Conventions

This manual uses the following conventions:

Convention	Meaning
<b>Note</b>	Provides general information about the current topic.
<b>❶</b>	A number in a black circle in text refers to the corresponding number in an accompanying illustration.



# 1

---

## Overview

This chapter describes the features of the DECbrouter 90, shows several typical configurations, summarizes the installation procedures for the DECbrouter 90, and describes the DECbrouter 90 LEDs and connectors.

The DECbrouter 90 family consists of three models:

- DECbrouter 90T1
- DECbrouter 90T2
- DECbrouter 90T2A

### Features

The DECbrouter 90 provides the following features:

- Choice of Ethernet in either ThinWire (10Base2) or twisted pair (10BASET)
- Choice of serial port configurations:<sup>1</sup>
  - EIA530A<sup>2</sup>
  - RS232/V.28
  - RS449/RS422/V.11<sup>2</sup>
  - RS449/RS423/V.10<sup>2</sup>
  - V.35<sup>3</sup>
  - V.36<sup>2</sup>
  - X.21 Leased Lines (LL)
- Console port
- Installable on a DEChub 90 backplane

---

<sup>1</sup> One serial port for DECbrouter 90T1 and two for either DECbrouter 90T2 or DECbrouter 90T2A models.

<sup>2</sup> Not available for DECbrouter 90T2.

<sup>3</sup> Not available for DECbrouter 90T2A.

## Overview Features

- Simple Network Management Protocol (SNMP) through HUBwatch or other network management system

Table 1-1 summarizes the features for each model of the DECbrouter 90.

### DECbrouter 90T1

The DECbrouter 90T1 is a Digital Wide Area Router/Bridge consisting of two interfaces and one console port. The interfaces consist of one Ethernet interface and one synchronous serial port. The Ethernet interface is either a ThinWire port (10Base2) or a twisted pair port (10BASET) exclusively. The synchronous serial port supports one of the following seven standards as determined by the cable attached to the serial port:

- EIA530A
- RS232/V.28
- RS449/RS422/V.11
- RS449/RS423/V.10
- V.35
- V.36
- X.21 Leased Lines

The console port consists of an asynchronous RS232 serial port.

### DECbrouter 90T2

The DECbrouter 90T2 is a Digital Wide Area Router/Bridge consisting of three interfaces and one console port. The interfaces consist of one Ethernet interface and two synchronous serial ports. The Ethernet interface is either a ThinWire (10Base2) port or a twisted pair (10BASET) port exclusively. The synchronous serial ports support any two of the following three standards, in any combination, as determined by the cable attached to the synchronous serial port:

- RS232/V.28
- V.35
- X.21 Leased Lines

The console port consists of an asynchronous RS232 serial port.

## Overview Features

### DECbrouter 90T2A

The DECbrouter 90T2A is a Digital Wide Area Router/Bridge consisting of three interfaces and one console port. The interfaces consist of one Ethernet interface and two synchronous serial ports. The Ethernet interface is either a ThinWire (10Base2) port or a twisted pair (10BASET) port exclusively. The synchronous serial port supports any two of the following six standards, in any combination, as determined by the cable attached to the synchronous serial port:

- EIA530A
- RS232/V.28
- RS449/RS422/V.11
- RS449/RS423/V.10
- V.36
- X.21

The console port consists of an asynchronous RS232 serial port.

## Overview Features

Table 1–1 summarizes the features of the DECbrouter 90 models.

**Table 1–1 DECbrouter 90 Features**

Interface/Console Supported	Features by Model Number		
	90T1	90T2	90T2A
Interfaces	2	3	3
Ethernet <sup>1</sup>	1	1	1
Synchronous Serial <sup>2</sup>	1	2	2
EIA530A	X	–	X
RS232/V.28	X	X	X
RS449/RS422/V.11	X	–	X
RS449/RS423 /V.10	X	–	X
V.35	X	X	–
V.36	X	–	X
X.21 Leased Lines	X	X	X
Console	1	1	1

<sup>1</sup>Choice of either Twisted Pair (10BASET) or ThinWire (10Base2).  
<sup>2</sup>Each serial port can use one of the signal configurations indicated by an "X".

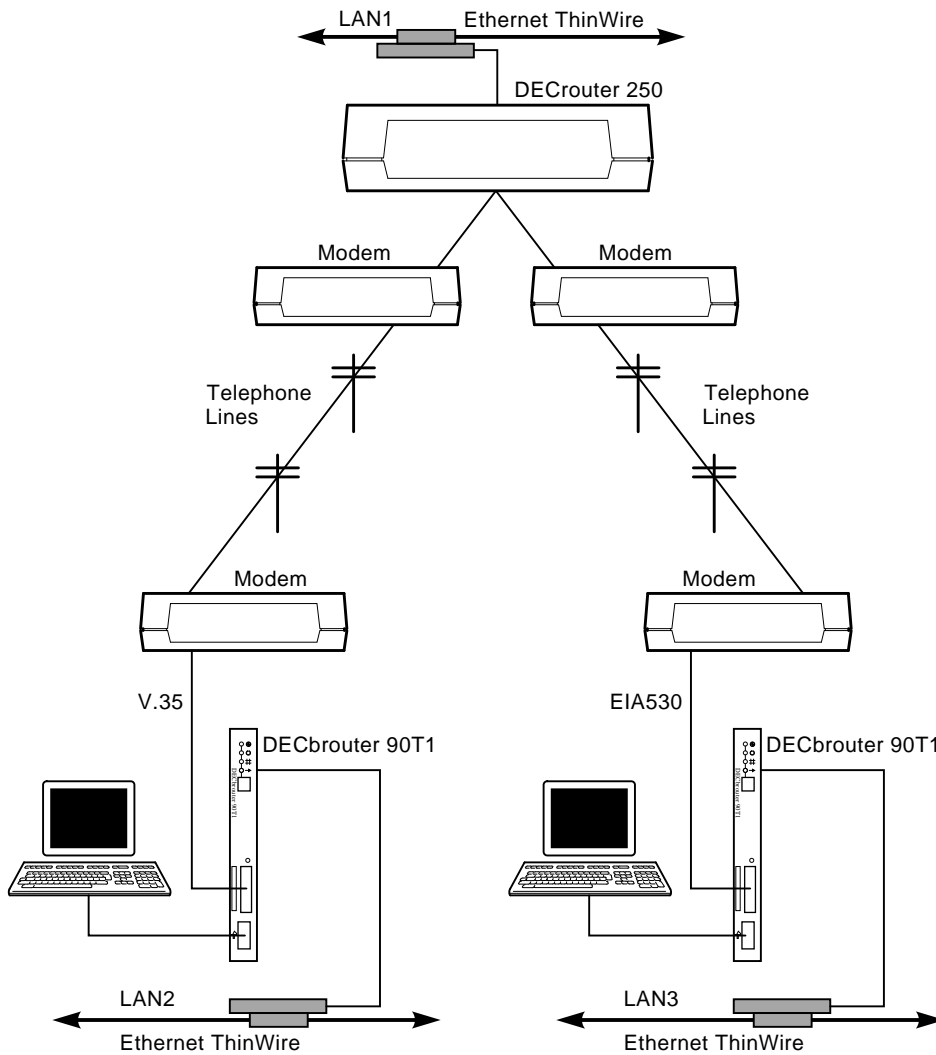
## **Typical Configurations**

The DECbrouter 90 can operate in either a standalone configuration or installed in Digital's DEChub 90 Ethernet backplane. Figure 1-1 shows a typical configuration of the DECbrouter 90T1 in an Ethernet local area network (LAN).

If you use the DECbrouter 90 as a standalone unit, then it operates without using the DEChub 90 and uses a separate power supply. The modular power supply connects to a 7-pin connector on the DECbrouter 90 and includes an auto-ranging power supply and appropriate power cord for use with either 120 Volt or 240 Volt power outlets.

**Overview  
Typical Configurations**

**Figure 1-1 Typical DECbrouter 90T1 Connection**

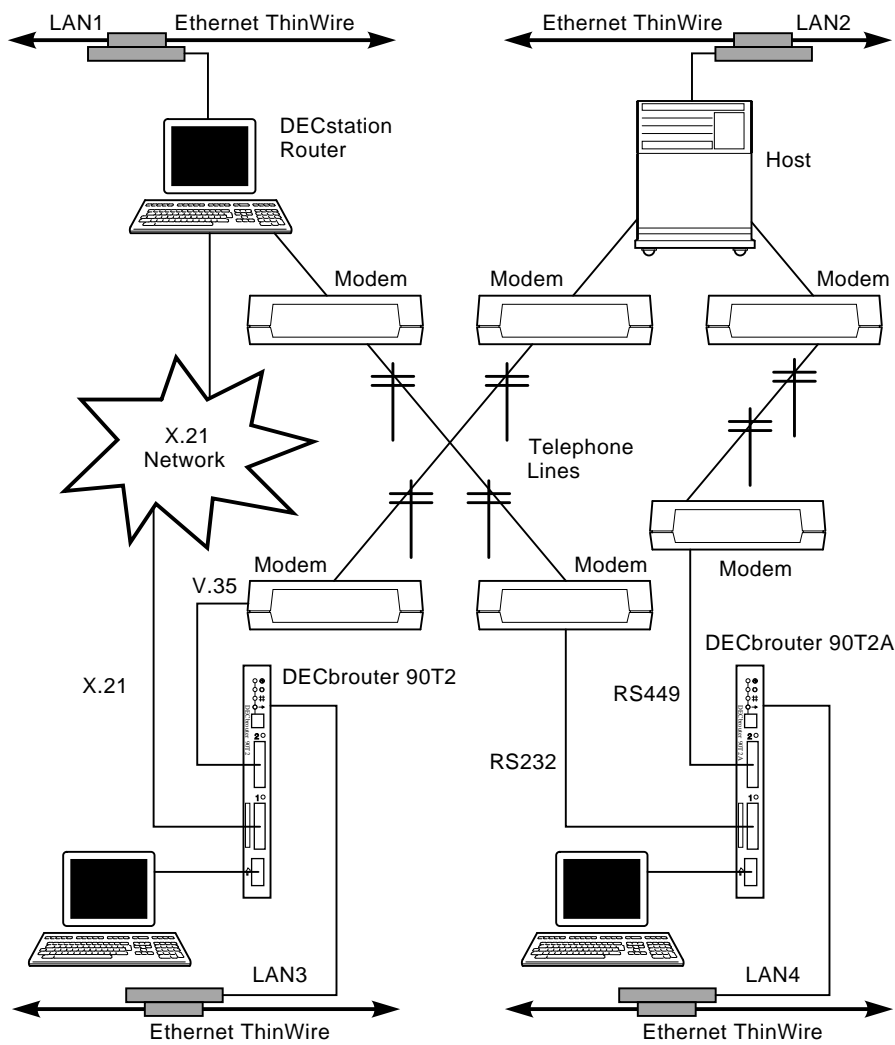


LJ-02754-T10

## Overview Typical Configurations

Figure 1-2 shows a typical configuration of either the DECbrouter 90T2 or DECbrouter 90T2A in an Ethernet LAN.

Figure 1-2 Typical DECbrouter 90T2 or DECbrouter 90T2A Connection



LJ-02755-T10

## Overview Installation

### Installation

The DECbrouter 90 is easy to install and use. After unpacking the DECbrouter 90:

1. Plug the connector from the power supply into your DECbrouter 90. Connect one end of the power cord into the power supply and the other end into a working ac power outlet.
2. Connect the DECbrouter 90 to either a properly terminated ThinWire (10Base2) or to a twisted pair (10BASET) Ethernet device, but do not connect to both.
3. Connect the synchronous serial ports using the cables for the various types of connections. Refer to Appendix A, Tables A-1 through A-6, for a listing of the different types of cables and the various connections.
4. Connect a console device to the console port.

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

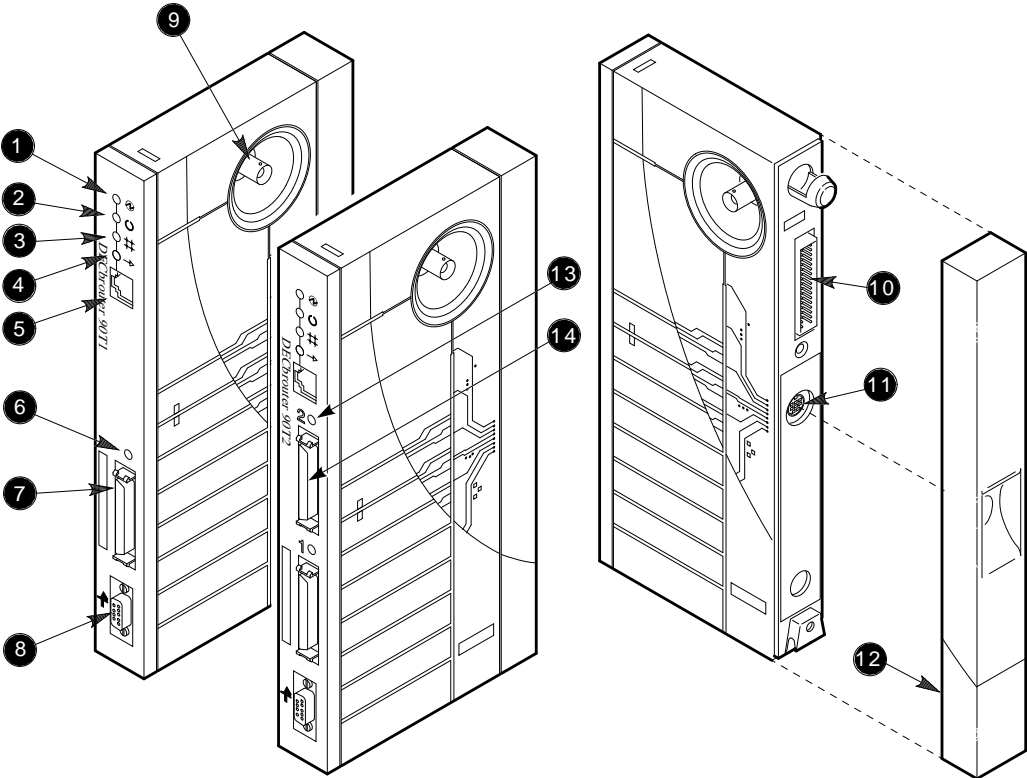
For more detailed information on configuring the DECbrouter 90, see the *DECbrouter 90 Products Configuration and Reference - Volume 1*, *DECbrouter 90 Products Configuration and Reference - Volume 2*, and *DECbrouter 90 Products Configuration and Reference - Volume 3* manuals. For more detailed information on installing and using the DECbrouter 90, see Chapter 2.



### LEDs and Connectors

Figure 1-3 shows the DECbrouter 90 LEDs and Table 1-2 describes the LEDs and connectors.





Figure 1-3 DECbrouter 90 LEDs



LJ-02747-T10.DG

**Overview**  
**LEDs and Connectors**

**Table 1–2 DECbrouter 90 LEDs**

❶		<p><b>Power indicator</b>—Monitors the status of the +5.0 Vdc voltage. <b>On:</b> The +5.0 Vdc voltage is normal.  <b>Off:</b> The voltage is abnormal (as in a power failure).</p>
❷		<p><b>Network activity indicator</b>—Monitors the network activity.  <b>On:</b> There is network activity.  <b>Off:</b> There is no network activity.</p>
❸		<p><b>Port 0 status indicator</b>—Monitors the status of either the ThinWire (10Base2) or the twisted pair (10BASET) input to the DECbrouter 90.  <b>On:</b> Port 0 is functional.  <b>Off:</b> Port 0 has failed or has been partitioned.</p>
❹		<p><b>Port 0 activity status indicator</b>—Monitors the activity of the Ethernet port.  <b>On:</b> The port is transmitting or receiving data.  <b>Off:</b> The port is not transmitting or receiving data.</p>
❺		<p><b>Twisted Pair (10BASET) connector</b>—Connects the DECbrouter 90 to a 10BASET twisted pair. Not used when the DECbrouter 90 is installed in the DEChub 90 backplane.</p>
❻		<p><b>Port 1 serial line status indicators</b>—Monitors the activity of port one.  <b>On:</b> Port 1 is transmitting or receiving data.  <b>Off:</b> Port 1 is not currently transmitting or receiving data.</p>

(continued on next page)

## Overview LEDs and Connectors

Table 1–2 (Cont.) DECbrouter 90 LEDs

7	<p><b>Synchronous serial port 1 connection</b>—This port supports the following standards:</p> <ul style="list-style-type: none"><li>• EIA530A<sup>1</sup></li><li>• RS232/V.28</li><li>• RS449/RS422/V.11<sup>1</sup></li><li>• RS449/RS423/V.10<sup>1</sup></li><li>• V.35<sup>2</sup></li><li>• V.36<sup>1</sup></li><li>• X.21 leased lines</li></ul>
8	<p><b>Console port connection</b>—This port connects a console terminal, used for managing the DECbrouter 90. The console port is an RS232, which uses a DB9 connector.</p>
9	<p><b>Port 0 network connector (BNC)</b>—Connects the DECbrouter 90 to the work group ThinWire segment. Not used when the DECbrouter 90 is either installed in the DEChub 90 backplane or connected through the twisted pair (10BASET) connector.</p>
10	<p><b>Backplane connector</b>—Provides Port 0 network and power connections to the DECbrouter 90 when the DECbrouter 90 is installed in the DEChub 90 backplane.</p>
11	<p><b>Power connector</b>—Provides +5.0 volts from the DECbrouter 90 power supply. Not used when the DECbrouter 90 is installed in the DEChub 90 backplane.</p>
12	<p><b>Back cover</b>—Comes with standalone units only. Covers the backplane connector and contains a wall-mounting assembly.</p>
13	<p><b>Port 2 serial line status indicators</b>—Monitors the activity of port two. <b>On:</b> Port 2 is transmitting or receiving data. <b>Off:</b> Port 2 is not transmitting or receiving data.</p>

<sup>1</sup>Not available on DECbrouter 90T2.

<sup>2</sup>Not available on DECbrouter 90T2A.

(continued on next page)

## Overview

### LEDs and Connectors

Table 1–2 (Cont.) DECbrouter 90 LEDs

---

14	<p><b>Synchronous serial port 2 connection</b>—This connection supports one of the following standards:</p> <ul style="list-style-type: none"><li>• EIA530A<sup>1</sup></li><li>• RS232/V.28/V.24</li><li>• RS449/RS422/V.11<sup>1</sup></li><li>• RS449/RS423/V.10<sup>1</sup></li><li>• V.35<sup>2</sup></li><li>• V.36<sup>1</sup></li><li>• X.21 leased lines</li></ul>
----	---

---

<sup>1</sup>Not available on DECbrouter 90T2.

<sup>2</sup>Not available on DECbrouter 90T2A.

---

# 2

---

## Installation

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

To install the DECbrouter 90 on a table or wall, see the “Standalone Installation” section.

To install the DECbrouter 90 in a DEChub 90 Ethernet backplane, see the “Backplane Installation” section.

### Standalone Installation

To install the DECbrouter 90 as a standalone unit either on a table or wall, perform the following procedures:

#### **Select a location.**

The location should be accessible to a power outlet that supplies the correct voltage.

#### **Place the DECbrouter 90 on a table.**

When you place the DECbrouter 90 on a table top, follow the environmental specifications in Appendix A.

## Installation

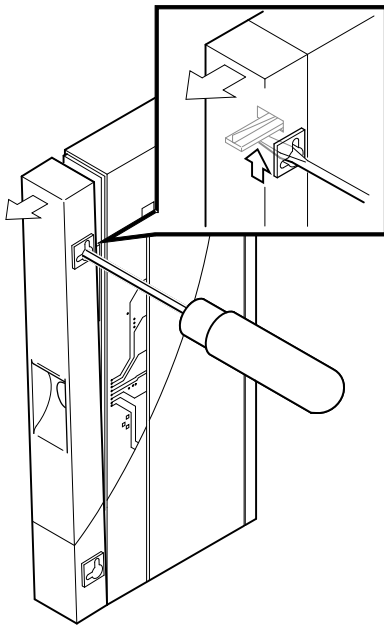
### Standalone Installation

#### Mount the DECbrouter 90 on a wall.

Remove the back cover of the DECbrouter 90 (if necessary).

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 DECbrouter 90 as shown in Figure 2-1.

Figure 2-1 Removing the Back Cover



LJ-00320-T10

#### Mount the DECbrouter 90 on a wall.

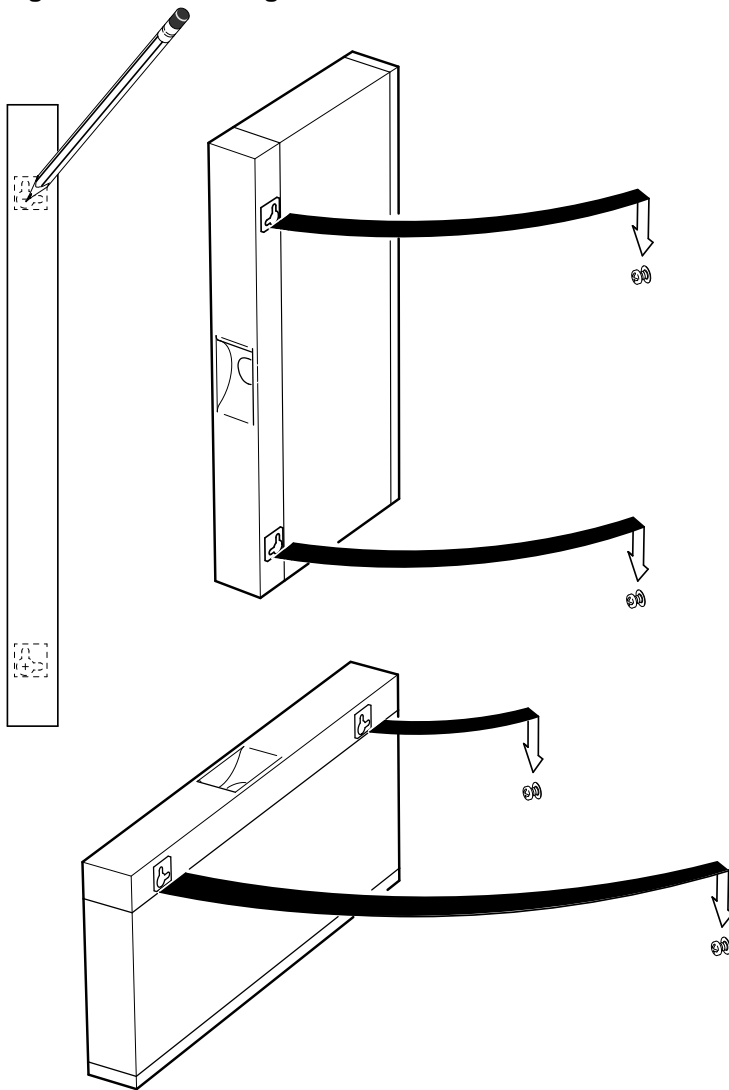
1. Use the mounting holes on the cover to determine the position of the mounting screws on the wall as shown in Figure 2-2.
2. Secure the back cover to the wall using the mounting screws.

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

## Installation Standalone Installation

3. Remove the back cover from the wall.

Figure 2-2 Mounting the DECbrouter 90



LJ-00701-T10

4. Attach the back cover to the DECbrouter 90.
5. Mount the DECbrouter 90 onto the mounting screws.

## Installation

### Standalone Installation

#### Connect the cables.

Refer to the appropriate figure listed in the following table based on the type of connection you need for your DECbrouter 90:

Type Connection	Figure
DECbrouter 90T1 with a Twisted Pair (10BASET) Connection	2-3
DECbrouter 90T1 with a ThinWire (10Base2) Connection	2-4
DECbrouter 90T2 or DECbrouter 90T2A with a Twisted Pair (10BASET) Connection	2-5
DECbrouter 90T2 or DECbrouter 90T2A with a ThinWire (10Base2) Connection	2-6

To connect the cables, refer to the appropriate figure as listed above and perform the following:

1. Connect the cable from the power supply to the 7-pin power connector on the DECbrouter 90. Align the power symbol on the dc power connector with the power symbol on the DECbrouter 90 and push the connector straight in.
2. Connect the DECbrouter 90 power supply to the power source.
  - a. Place one end of the power cord into the connector located on the power supply.
  - b. Plug the other end of the power supply cord into the wall outlet.
3. Connect either the Ethernet ThinWire T-connector to the port 0 BNC network connector or the 10BASET connector to the twisted pair connector. If you are connecting to a ThinWire, then terminate the connection with a 50-ohm terminator or extend the Ethernet segment to the next device.

---

#### Note

---

Connection should never be made to both the ThinWire (10Base2) and twisted pair (10BASET) connectors simultaneously.

---

4. The port 0 status activity LED should be on or flashing to indicate the amount of network traffic. The LED intensity varies.
5. Connect the serial cables to port 1 for DECbrouter 90T1 and to ports 1 and 2 for DECbrouter 90T2 and DECbrouter 90T2A.

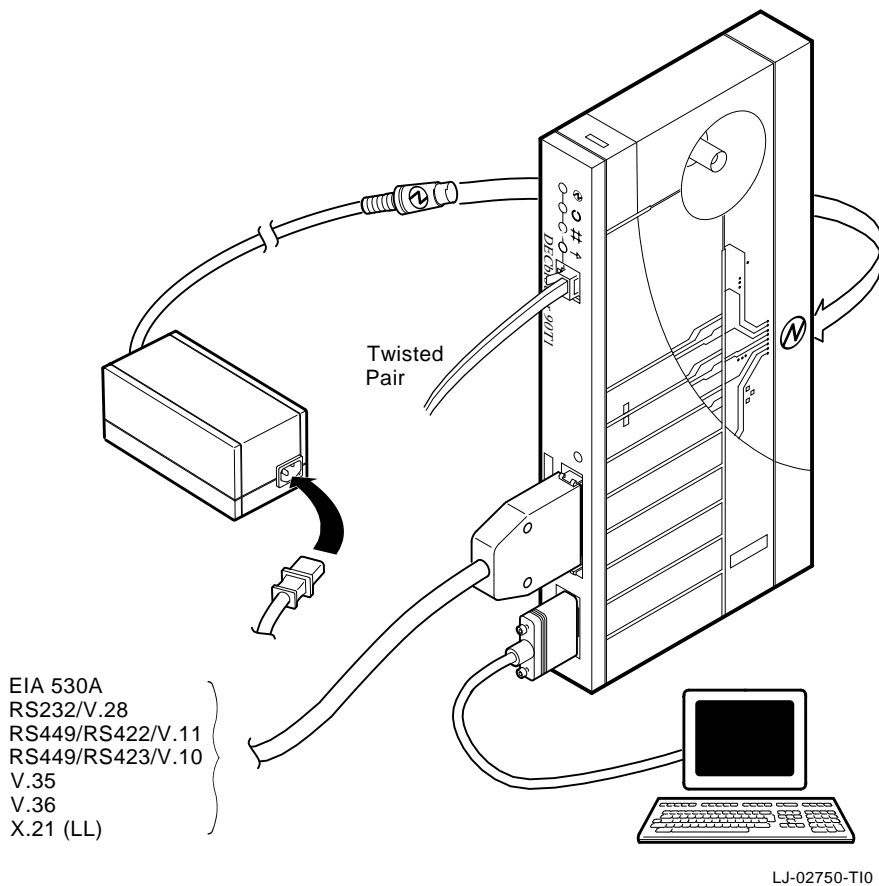


## Installation Standalone Installation

6. Connect the console using an RS232 DB9 connector.

Figure 2-3 shows the DECbrouter 90T1 with a twisted pair connection.

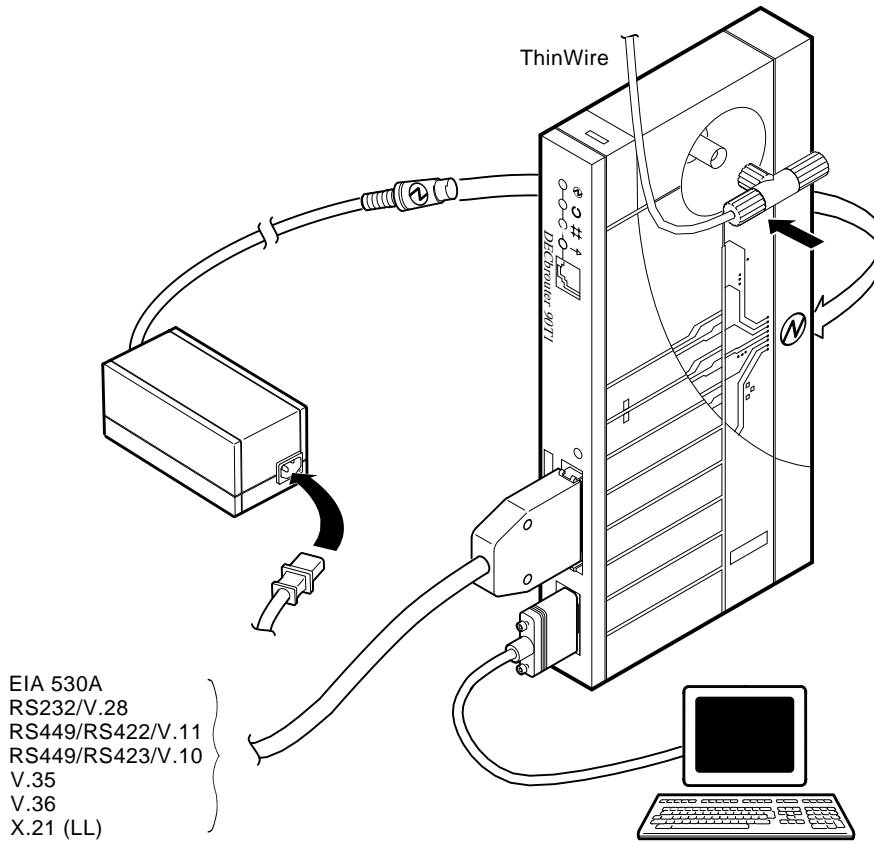
**Figure 2-3 DECbrouter 90T1 with a Twisted Pair (10BASET) Connection**



## Installation Standalone Installation

Figure 2-4 shows the DECbrouter 90T1 with a ThinWire connection.

Figure 2-4 DECbrouter 90T1 with a ThinWire (10Base2) Connection

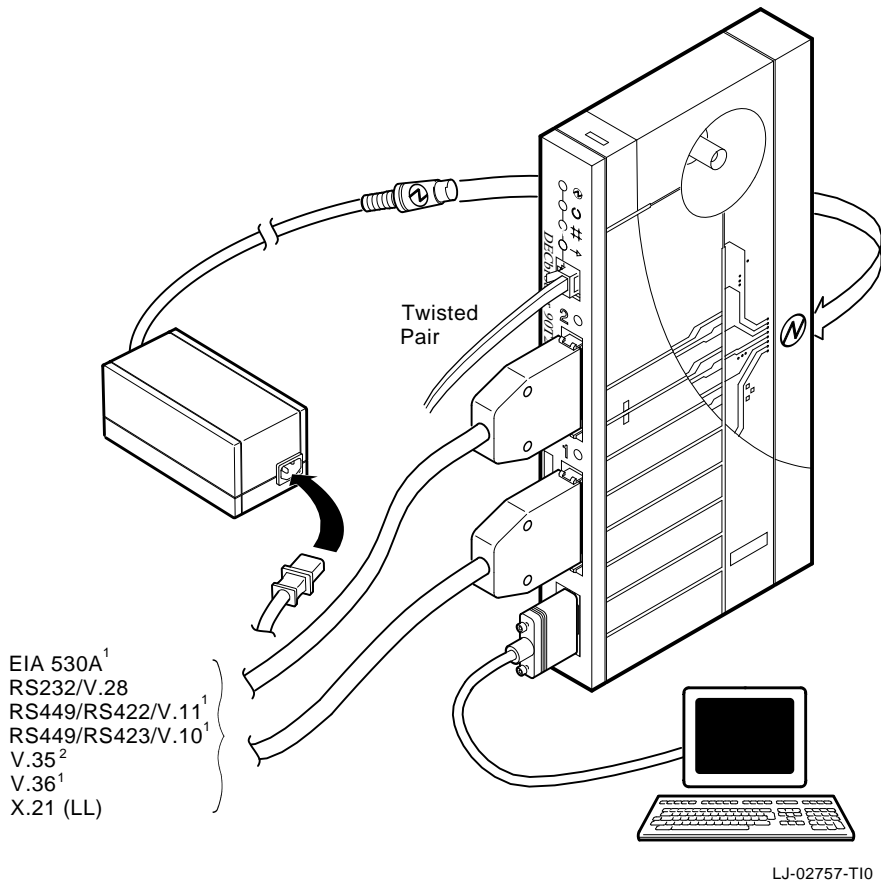


LJ-02751-T10

## Installation Standalone Installation

Figure 2-5 shows the DECbrouter 90T2 or DECbrouter 90T2A with a twisted pair connection.

**Figure 2-5 DECbrouter 90T2 or DECbrouter 90T2A with a Twisted Pair (10BASET) Connection**



<sup>1</sup> Not available on the DECbrouter 90T2.

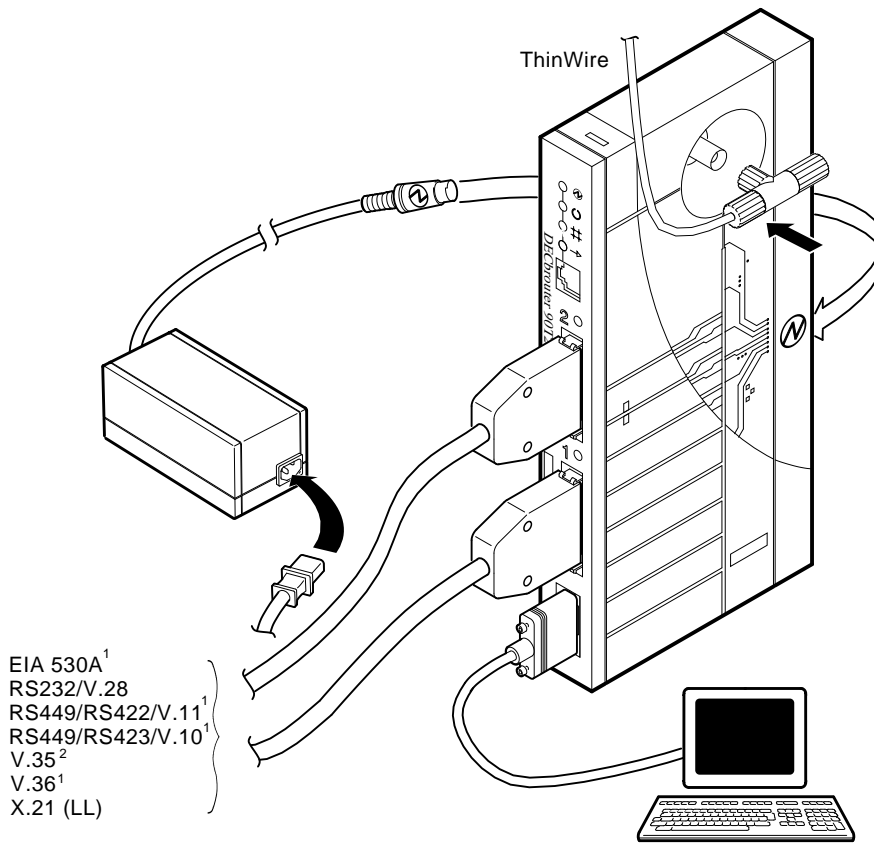
<sup>2</sup> Not available on the DECbrouter 90T2A.

## Installation

### Standalone Installation

Figure 2-6 shows the DECbrouter 90T2 or DECbrouter 90T2A with a ThinWire connection.

**Figure 2-6 DECbrouter 90T2 or DECbrouter 90T2A with a ThinWire (10Base2) Connection**



LJ-02756-T10

<sup>1</sup> Not available on the DECbrouter 90T2.  
<sup>2</sup> Not available on the DECbrouter 90T2A.

## **Installation Standalone Installation**

### **Install and verify devices.**

1. Connect the devices to ports 1 and 2.  
A port LED should turn on if the port is correctly connected and when the device receives its first network activity.
2. Verify the operation of each device by sending information to the port being tested.

You have now installed the DECbrouter 90.

## Installation

### Backplane Installation

## Backplane Installation

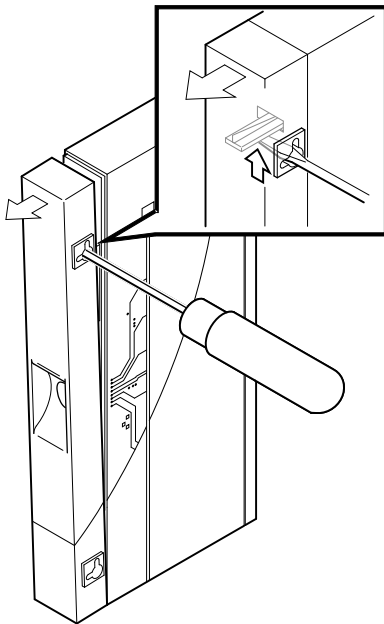
To install the DECbrouter 90 in the DEChub 90 Ethernet backplane, perform the following procedures:

### 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 DECbrouter 90 as shown in Figure 2-7.

Figure 2-7 Removing the Back Cover



LJ-00320-T10

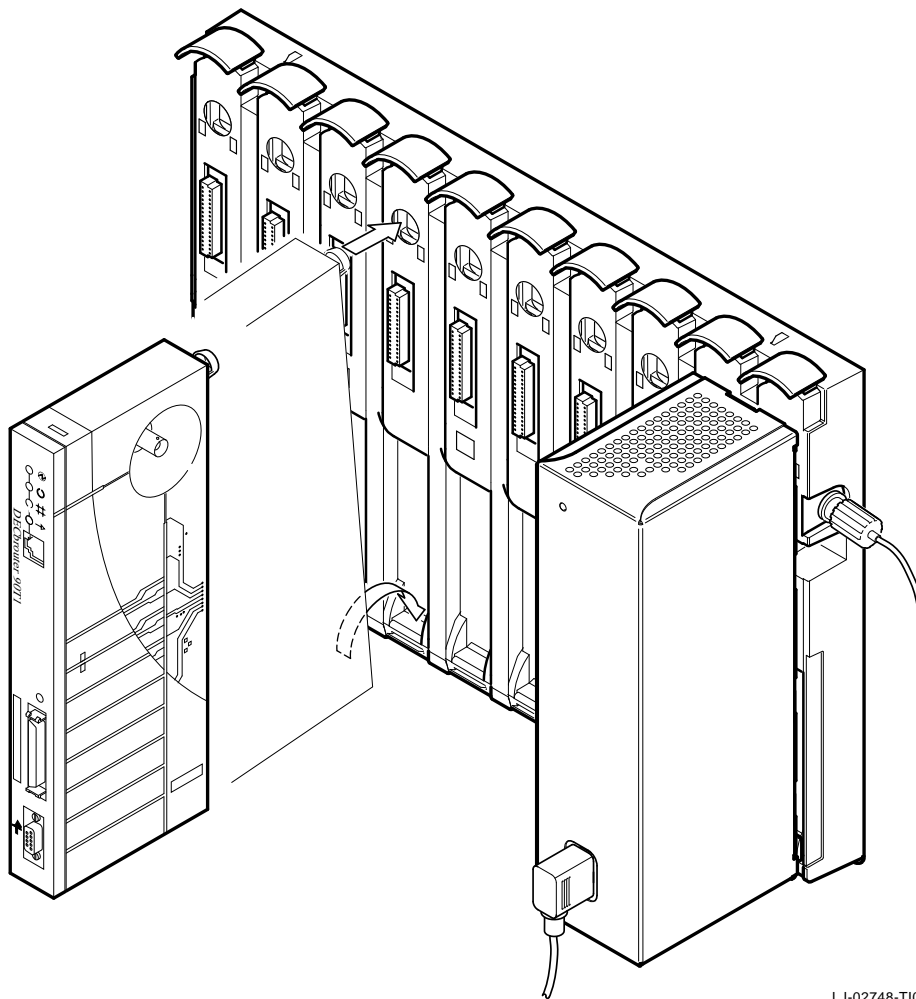
### Mount the DECbrouter 90 in the backplane.

1. Install the DECbrouter 90 in the backplane as shown in Figure 2-8. Place the lower mounting tab on the back of the DECbrouter 90, in the correct mounting slot on the backplane.

## Installation Backplane Installation

2. Rock the DECrouter 90 into place. You will hear an audible click when the DECrouter 90 is securely latched in place.

Figure 2–8 Mounting the DECrouter 90



LJ-02748-T10

---

### Note

You can install or remove the DECrouter 90 from the DECchub 90 Ethernet backplane while the backplane power is still on (hot swap).

---

## **Installation**

### **Backplane Installation**

3. If this is a new installation, then turn on power to the backplane.
4. The port 0 status LED and the synchronous serial port on the DECbrouter 90 light up with intensity proportional to the amount of activity on the indicated port.
5. Connect the console using an RS232 DB9 connector.

### **Install and verify devices.**

1. Connect serial ports 1 and 2 using the proper cables for the signals desired. The corresponding port LEDs should turn on when activity occurs.
2. Verify the operation of each device you plan to use by connecting and sending information to each connected port.

You have now installed the DECbrouter 90.



# 3

---

## Troubleshooting

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

### Before You Start

1. Verify the installation of the repeater.
2. Note the fault condition.
3. Isolate the problem.

Use Table 3-1 to troubleshoot a standalone DECbrouter 90. Use Table 3-2 to troubleshoot a DECbrouter 90 installed in a DEChub 90 configuration.

### DECbrouter 90 Standalone Troubleshooting

Use Table 3-1 to troubleshoot a standalone DECbrouter 90.

**Table 3-1 Troubleshooting a DECbrouter 90 Standalone Unit**

If...	Then...	Do this...
All LEDs are off	There is a problem with the ac power connection.	Check that the ac power supply is properly plugged into the power outlet. Check the power to the power outlet.  Check the 7-pin connector to the power supply. If the connections are fine, then replace both the power supply cord and power supply.

(continued on next page)

## Troubleshooting DECbrouter 90 Standalone Troubleshooting

**Table 3–1 (Cont.) Troubleshooting a DECbrouter 90 Standalone Unit**

If...	Then...	Do this...
The network activity LED is off	<p>There is low network activity or no network activity.</p> <p>If the network activity LED turns on momentarily, then the network activity LED portion of testing has passed. If the network LED still fails to turn on, then the DECbrouter 90 is defective.</p>	<p>Ensure that network activity is present. If the network activity LED still fails to turn on, then turn the unit off and on by unplugging and replugging the power supply.</p> <p>Check that the network activity LED turns on momentarily.</p> <p>Replace the DECbrouter 90.</p>
The serial port status LED is off	<p>Ensure that the cable has activity on it. If the LED still fails to turn on, then the port is defective.</p>	<p>Switch ports on either a DECbrouter 90T2 or DECbrouter 90T2A and replace the defective DECbrouter 90T1 with a working DECbrouter 90T1.</p>

**Troubleshooting**  
**DECbrouter 90 Backplane Configuration Troubleshooting**

## DECbrouter 90 Backplane Configuration Troubleshooting

Use Table 3–2 to troubleshoot a DECbrouter 90 installed in a DEChub 90 configuration.

**Table 3–2 Troubleshooting a DECbrouter 90 in a DEChub 90 Backplane**

If...	Then...	Do this...
The power LED is off	The DECbrouter 90 is not receiving +5.0 V.	Check the power LED on the DEChub 90 power supply.
	If the power LED on the DEChub 90 is off, then there is a problem with the DEChub 90 power supply.	See the troubleshooting procedures in the <i>DEChub 90 Ethernet Backplane Owner's Manual</i> .
	If the DEChub 90 power LED is on and the other power LED components are on, then the DECbrouter 90 has a power problem.	Reseat the DECbrouter 90 in either the same slot or another slot.
	If the power LED on the DEChub 90 power supply is on and the other power LED components are off, then the DEChub 90 has a power problem.	See the troubleshooting procedures in the <i>DEChub 90 Ethernet Backplane Owner's Manual</i> .
	If the power LED turns on when reseated in the same slot, then the DECbrouter 90 was not properly seated.	Make sure the DECbrouter 90 is properly seated in the slot.
	If the power LED turns on when reseated in another slot, then the problem is with the DEChub 90.	See the troubleshooting procedures in the <i>DEChub 90 Ethernet Backplane Owner's Manual</i> .

(continued on next page)

## Troubleshooting DECrouter 90 Backplane Configuration Troubleshooting

**Table 3–2 (Cont.) Troubleshooting a DECrouter 90 in a DEChub 90 Backplane**

If...	Then...	Do this...
The port 0 network activity LED is off	If the DECrouter 90 does not turn on in a known good slot, then the DECrouter 90 is defective.	Replace the DECrouter 90.
	The DECrouter 90 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 DECrouter 90 is connected to a known active segment and the port 0 LED is off, then the DECrouter 90 is defective.	Replace the DECrouter 90.

# A

---

## Specifications and Parts List

This appendix provides the following specifications for the DECbrouter 90:

- Physical dimensions
- Environmental specifications
- Electrical specifications

This appendix also contains a parts list and the proper cable connections for the X.21, RS422, V.35, RS530A, RS423, and V.24/RS232 standards.

### Physical Dimensions

The following table describes the physical dimensions of the DECbrouter 90.

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 DECbrouter 90 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.

## Specifications and Parts List

### Environmental Specifications

#### Operating Environment

The following table describes the operating environment specifications for the DECbrouter 90.

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% (non-condensing)
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 DECbrouter for adequate air flow.

#### Shipping Environment

The following table describes the shipping environment specifications for the DECbrouter 90.

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 DECbrouter 90 features a self-contained power supply and power cord option.

## Specifications and Parts List Electrical Specifications

### Power Supply

The following table describes the power supply specifications for the DECbrouter 90.

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

### Power Input

The following table describes the power input specifications for the DECbrouter 90.

Specification	Value
Input voltage	4.75 Vdc to 5.25 Vdc
Input current	1.8 amp

## Specifications and Parts List

### Parts List

### Parts List

The following table provides a parts list for the DECbrouter 90.

Replacement Part	Part Number
DECbrouter 90T1	DEWB1
DECbrouter 90T2	DEWBR
DECbrouter 90T2A	DEWB2
Power supply, Universal	H7827-BA
Power cord, term, 110 Vac	17-00083-39
Power cord, 220 Vac	
Pwr cord, term 3.100MM 250V 2.5M	17-00199-21
Pwr cord, term 3-1.0 MM	17-00364-18
Pwr cord,term 3-1.0 MM	17-00210-13
Pwr cord, term 3-1.0 MM 10A	17-00457-16
Pwr cord, term STR	17-00198-14
Pwr cord, term 3-1.0 MM 10A	17-00456-14
Cable, EIA530A	BC12J-06, 17-03760-01
Cable, RS232/V.28	BC12L-06, 17-03762-01
Cable, RS449/RS422/V.11	BC12H-06, 17-03767-01
Cable, RS449/RS423/V.10	BC12K-06, 17-03761-01
Cable, V.35	BC12G-06, 17-03766-01
Cable, X.21 (LL)	BC12F-06, 17-03580-01



## Specifications and Parts List Parts List

Table A-1 describes the cable connections for the X.21 standard.

**Table A-1 X.21 Cable Connections (BC12F-06, 17-03580-01)**

From Pin Connector (P1)	To X.21 Pin Connector (P2)	Signal Name
1, 2, 26	–	Code Ground
5 30	2 9	T(A) TX Data A T(B)TX Data B <sup>1</sup>
6 31	5 12	I(A) DCD A I(B) DCD B <sup>2</sup>
8 33	3 10	C(A) RTS A C(B) RTS B
10 35	4 11	R(A) RX Data A R(B) RX Data B <sup>2</sup>
17 42	6 13	S(A) TX Clock A S(B) TX Clock B <sup>2</sup>
13, 15	–	RX Clock A DTE Clock A <sup>1</sup>
38, 40	–	RX Clock B DTE Clock B <sup>1</sup>
37	8	G DTE Ground

<sup>1</sup>Contacts tied together.

<sup>2</sup>120 OHM resistor, 1/2W between pins 6 and 31, 10 and 35, 17 and 42. The resistors are located at P1 end of cable.

**Specifications and Parts List**  
**Parts List**

Table A-2 describes the cable connections for the RS422 standard.

**Table A-2 RS422 Cable Connections (BC12H-06, 17-03767-01)**

From Pin Connector (P1)	To RS422 Pin Connector (P2)	Signal Name
1, 27	–	Code Ground <sup>1</sup>
4 29	11 29	DSR A DSR B
5 30	4 22	TX Data A TX Data B
6 31	13 31	DCD/I A DCD/I B
8 33	7 25	RTS/C A RTS/C B
9 34	9 27	CTS A CTS B
10 35	6 24	RX Data A RX Data B <sup>2</sup>
11	15	Ring Indicate
12	20	DCE Ground
1 38	8 26	RX Clock A RX Clock B <sup>2</sup>

<sup>1</sup>Contacts tied together.

<sup>2</sup>120 OHM resistor, 1/2w between pins 10 and 35, 13 and 38, 17 and 42. The resistors are located at P1 end of cable.

(continued on next page)

**Specifications and Parts List  
Parts List**

**Table A-2 (Cont.) RS422 Cable Connections (BC12H-06, 17-03767-01)**

From Pin Connector (P1)	To RS422 Pin Connector (P2)	Signal Name
14	12	DTR A
39	30	DTR B
15	17	Clock A
40	35	Clock B
1	5	TX Clock A
42	23	TX Clock B <sup>2</sup>
18	18	Test Indicate
37	19, 37	DTE Ground <sup>1</sup>
20	10	Local Loop
41	16	Speed Select
45	14	Remote Loop
Shell	Shell	Shield braid

<sup>1</sup>Contacts tied together.

<sup>2</sup>120 OHM resistor, 1/2w between pins 10 and 35, 13 and 38, 17 and 42. The resistors are located at P1 end of cable.

**Specifications and Parts List**  
**Parts List**

Table A-3 describes the cable connections for the V.35 standard.

**Table A-3 V.35 Connection BC12G-06, 17-03766-01**

<b>From Pin Connector (P1)</b>	<b>To V.35 Pin Connector (P2)</b>	<b>Signal Name</b>
1, 26	-	Code Ground <sup>1</sup>
4	E	DSR A
6	F	DCD/I A
9	D	CTS A
11	J	Ring Indicate
21 46	Y A	TX Clock A TX Clock B
22 47	U W	CK A Clock B
23 48	R T	RX Data A RX Data B
24 49	P S	TX Data A TX Data B
25 50	V X	RX Clock A RX Clock B
32	C	RTS

<sup>1</sup>Contacts tied together.

(continued on next page)

**Specifications and Parts List  
Parts List**

**Table A-3 (Cont.) V.35 Connection BC12G-06, 17-03766-01**

From Pin Connector (P1)	To V.35 Pin Connector (P2)	Signal Name
12, 29	B	DTE Ground 31, 34, 37 <sup>1</sup>
44	H	DTR
Shell	Braid Strap	Overall Cable Shield
20	K	Local Loop

<sup>1</sup>Contacts tied together.

Table A-4 describes the cable connections for the RS530A standard.

**Table A-4 RS530A Cable Connections BC12J-06, 17-03760-01**

From Pin Connector (P1)	To RS530A Pin Connector (P2)	Signal Name
1, 26, 27	–	Code Ground <sup>1</sup>
4	6	DSR A
5 30	2 14	TX Data A TX Data B
6 31	8 10	DCD/I A DCD/I B

<sup>1</sup>Contacts tied together.

(continued on next page)

**Specifications and Parts List  
Parts List**

**Table A-4 (Cont.) RS530A Cable Connections BC12J-06, 17-03760-01**

<b>From Pin Connector (P1)</b>	<b>To RS530A Pin Connector (P2)</b>	<b>Signal Name</b>
8	4	RTS/C A
33	19	RTS/C B
9	5	CTS A
34	13	CTS B
10	3	RX Data A
35	16	RX Data B <sup>2</sup>
11	22	Ring Indicate
12	23	DCE Ground
13	17	RX Clock A
38	9	RX Clock B <sup>2</sup>
15	24	Clock A
40	11	Clock B
17	15	TX Clock A
42	12	TX Clock B <sup>2</sup>
18	25	Test Indicate
20	18	Local Loop

<sup>2</sup>120 OHM resistor, 1/2W between pins 10 and 35, 13 and 38, 17 and 42. The resistors are located at P1 end of cable.

(continued on next page)

**Specifications and Parts List  
Parts List**

**Table A-4 (Cont.) RS530A Cable Connections BC12J-06, 17-03760-01**

From Pin Connector (P1)	To RS530A Pin Connector (P2)	Signal Name
29, 37	7	DTE Ground <sup>1</sup>
44	20	DTR
45	21	Remote Loop
Shell	Shell	Shield Braid

<sup>1</sup>Contacts tied together.

Table A-5 describes the cable connections for the RS423 standard.

**Table A-5 RS423 Cable Connections BC12K-06, 17-03761-01**

From Pin Connector (P1)	To RS423 Pin Connector (P2)	Signal Name
1, 2, 27	-	Code Ground <sup>1</sup>
4	11	DSR A
29	29	DSR B
6	13	DCD/I A
31	31	DCD/I B
7	4	TX Data
9	9	CTS A
34	27	CTS B

<sup>1</sup>Contacts tied together.

(continued on next page)

**Specifications and Parts List  
Parts List**

**Table A-5 (Cont.) RS423 Cable Connections BC12K-06, 17-03761-01**

<b>From Pin Connector (P1)</b>	<b>To RS423 Pin Connector (P2)</b>	<b>Signal Name</b>
10	6	RX Data A
35	24	RX Data B
11	15	Ring Indicate
12	20	DCE Ground
13	8	RX Clock A
38	26	RX Clock B
17	5	TX Clock A
42	23	TX Clock B
18	18	Test Indicate
20	10	Local Loop
32	7	RTS/C
37	19, 22, 25, 30, 35, 37	DTE Ground <sup>1</sup>
41	16	Speed Select
44	12	DTR
45	14	Remote Loop

<sup>1</sup>Contacts tied together.

(continued on next page)



**Specifications and Parts List  
Parts List**

**Table A-5 (Cont.) RS423 Cable Connections BC12K-06, 17-03761-01**

From Pin Connector (P1)	To RS423 Pin Connector (P2)	Signal Name
Shell	Shell	Shield Braid
19	17	Clock

Table A-6 describes the cable connections for the V.24/RS232 standard.

**Table A-6 V.28/RS232 Cable Connections BC12L-06, 17-03762-01**

From Pin Connector (P1)	To V.24/RS232 Pin Connector (P2)	Signal Name
1, 2	–	Code Ground <sup>1</sup>
4	6	DSR A
6	8	DCD/I A
7	2	TX Data
9	5	CTS A
10	3	RX Data A
11	22	Ring Indicate
13	17	RX Clock A

<sup>1</sup>Contacts tied together.

(continued on next page)

**Specifications and Parts List  
Parts List**

**Table A–6 (Cont.) V.28/RS232 Cable Connections BC12L-06, 17-03762-01**

<b>From Pin Connector (P1)</b>	<b>To V.24/RS232 Pin Connector (P2)</b>	<b>Signal Name</b>
17	15	TX Clock A
18	25	Test Indicate
19	24	Clock
20	18	Local Loop
32	4	RTS
12, 29, 31, 34, 35, 37, 38, 42	7	DTE Ground <sup>1</sup>
41	23	Speed Select
44	20	DTR
45	21	Remote Loop
<sup>1</sup> Contacts tied together.		

**Specifications and Parts List**  
**Parts List**

Table A-7 describes the cable connections for the console converter.

**Table A-7 Cable Connections for Console Converter**

<b>From Pin Connector (P1)</b>	<b>To Pin Connector (P2)</b>	<b>Signal Name</b>
1	4	DTR
2	3	RD
3, 4	5	GND
5	2	SD
6	8, 6, 1	CTS, DSR, DCD



# B

---

## Related Documentation

The following documents are shipped with the DECbrouter 90:

<b>Document Title</b>	<b>Order Number</b>
<i>DECbrouter 90 Installation and Operating Information</i>	EK-DECBR-OM
<i>DECbrouter 90 Products Configuration and Reference - Volume 1</i>	EK-DECB1-CG
<i>DECbrouter 90 Products Configuration and Reference - Volume 2</i>	EK-DECB2-CG
<i>DECbrouter 90 Products Configuration and Reference - Volume 3</i>	EK-DECB3-CG
<i>DECbrouter 90 Systems Error Messages</i>	EK-DECBR-ML
<i>DECbrouter 90 Products Command Summary</i>	EK-DECBR-CS
<i>DECbrouter 90 Products Getting Started</i>	EK-DECBR-GS

You can order the following documents from Digital:

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



# C

---

## DECbrouter 90 Installation Information for the United Kingdom

This appendix contains the following installation information, which is required for the United Kingdom only:

- Service categories
- Host power rating
- Module isolation
- Safety warnings (for UK installations only)
- Cable approval
- Supported cables
- Equipment between the approved module and a Digital circuit (PTT)

### Service Categories

Table C-1 lists the BABT-approved service specifications for the DECbrouter 90 for UK compliance.

## DECbrouter 90 Installation Information for the United Kingdom Service Categories

Table C-1 BAPT-Approved Service Specifications

Service Category	Interface Type (CCIT recommendation)	Service Requirements				Public Telecommunications Operators <sup>1</sup>		
		Electrical	Physical	Approved Cables	Data Rate (bps)	BT	Hull	MCL
1	X.21bis	V.24 /V.28	ISO 2110, BS.6623: part1, 1985.	<b>Adapter:</b> BC12L-06	2400	Yes	Yes	Yes
				(17-03762-01)	4800	Yes	Yes	Yes
				<b>Extension:</b> BC22F-xx <sup>2</sup>	9600	Yes	Yes	Yes
				BC13P-10 (10 feet)	19200	No	No	Yes
2	X.21bis	V.35	ISO 2593, BS.6623: part4, 1986.	<b>Adapter:</b> BC12G-06,	48K	Yes	Yes	Yes
				(17-03766-01)	56K	Yes	No	Yes
				<b>Extension:</b> BC19L-XX	64K	No	No	Yes
				(xx feet) <sup>2</sup>	2048K	No	No	No

<sup>1</sup>BT — British Telecommunications plc.  
Hull — Kingston Communications (Hull) plc.  
MCL — Mercury Communications Limited.

<sup>2</sup>xx represents the cable length in feet. The total length of cable used must not exceed 27 feet.

## Host Power Rating

Digital has designed all permutations of the host configuration to operate within the limits of the host power rating as shown in Table C-2.

Table C-2 Module Power

Input Voltage (Volts dc)	Maximum Input Current (Amperes)
+5.25Vdc	1.8 amp



## DECbrouer 90 Installation Information for the United Kingdom Module Isolation

### Module Isolation

No special clearances or creepage distances need to be maintained as the DECbrouer 90 is contained within its own cabinet, which meets all clearances for PTT approval.

### Safety Status

All interconnection points on this product are SELV circuits and should only be connected to products with like SELV circuits.

### Cable Approval

The module is approved for direct connection to a particular digital circuit. This approval includes an interconnecting cable with mating connectors that conform to the British standard BS6623, parts 1 and 4. If the module is connected to the service with anything other than its own approved cables, those cables must benefit from relevant general approval NS/G/1235/100009 and/or conform to any other applicable requirements.

### Supported Cables

Digital supports all of the cables in Table C-3. The approved module may not use all of these cables; therefore, check the instructions to determine which interface types are supported.

**Table C-3 Cables Supported by the Approved Module**

Interface	Cable Type	Name	Molding	Pins
V.24/V.28	Adapter	BC12L-06	Straight	50-25
V.24/V.28	Extension	BC22F-xx <sup>1</sup>	–	–
V.24/V.28	Extension low cap	BC13P-10 <sup>1</sup>	–	–
V.10	Adapter	BC12K-06	Straight	50-37
V.35	Adapter	BC12G-06	Straight	50-34
V.35	Extension	BC19L-xx <sup>1</sup>	–	–
X.21	Adapter	BC12F-06	Straight	50-15
X.21	Extension	BC22Z-xx <sup>1</sup>	–	–

<sup>1</sup>Where xx is the length in feet. Total cable length with extension should never exceed 27 feet.

## **DECbrouter 90 Installation Information for the United Kingdom Equipment Between the Approved Module and a Digital Circuit (PTT)**

### **Equipment Between the Approved Module and a Digital Circuit (PTT)**

If you are going to connect any other equipment, including cables or wiring, between the approved module and the point of connection to any particular digital circuit, then that equipment must conform to the following:

- The overall transmission characteristics of all other equipment must not have any material effect on the electrical conditions between the equipment and the digital circuit.
- The equipment must be approved, which may be subject to limitations on its use, for the purpose of connection between it and a particular digital circuit.
- Cable or wiring must comply with a code of practice for the installation of equipment covered by this standard or other requirements that may be applicable.

---

# Index

## B

---

- Back cover, 1-11
- Backplane
  - connector, 1-11
  - DEChub 90, 1-5
- BNC network connector, 1-11

## C

---

- Cable
  - BC12F-06, A-5
  - BC12G-06, A-7 to A-9
  - BC12H-06, A-6 to A-7
  - BC12J-06, A-9 to A-11
  - BC12K-06, A-11 to A-13
  - BC12L-06, A-13 to A-14
- Cable Connections
  - RS422, A-6 to A-7
  - RS423, A-11 to A-13
  - RS530A, A-9 to A-11
  - V.24, A-13 to A-14
  - V.35, A-7 to A-9
  - X.21, A-5
- Cables
  - connections, 2-4
- Configurations
  - installation, 2-1
- Connection
  - sample, 1-5, 1-7
- Connections
  - RS422, A-6 to A-7
  - RS423, A-11 to A-13
  - RS530A, A-9 to A-11

- Connections (cont'd)
  - V.24, A-13 to A-14
  - V.35, A-7 to A-9
  - X.21, A-5
- Connector
  - backplane, 1-11
  - power, 1-11
- Connectors
  - port (10BASET), 1-10
  - port (twisted pair), 1-10
  - ThinWire (BNC), 1-11
- Console port Connection, 1-11
  - RS232, 1-11
- Cover, 1-11

## D

---

- DC OK indicator, 1-10
- DEChub 90, 1-5
- DECRepeater
  - input current, A-3
  - input voltage, A-3
- Depth, A-1
- Dew point, A-2
- Dimensions
  - physical, A-1

## E

---

- EIA530A, 1-1 to 1-3, 1-11 to 1-12
- Environment
  - operating, A-2
- Environmental
  - specifications, A-1

## F

---

Features, 1-1

## H

---

Height, A-1

Humidity, A-2

## I

---

Installation

backplane, 2-10 to 2-12

configurations, 2-1

standalone, 2-1 to 2-9

wall-mounted, 2-1 to 2-9

## L

---

leased lines, 1-11

LED indicators

DC OK, 1-10

network activity, 1-10

port 0 activity, 1-10

port 0 status, 1-10

port 1 activity, 1-10

## N

---

Network activity indicator, 1-10

Network connector ThinWire (BNC), 1-11

## O

---

Operating

altitude, A-2

dew point, A-2

environment, A-2

relative humidity, A-2

temperature, A-2

temperature change, A-2

## P

---

Part

BC12F-06, A-5

BC12G-06, A-7 to A-9

BC12H-06, A-6 to A-7

BC12J-06, A-9 to A-11

BC12K-06, A-11 to A-13

BC12L-06, A-13 to A-14

Part number, A-4

Part Number 17-03580-01, A-5

Part Number 17-03760-01, A-9 to A-11

Part Number 17-03761-01, A-11 to A-13

Part Number 17-03762-01, A-13 to A-14

Part Number 17-03766-01, A-7 to A-9

Part Number 17-03767-01, A-6 to A-7

Physical dimensions, A-1

Port activity indicators, 1-10

port 0, 1-10

Port connector (10BASET), 1-10

Port connector (twisted pair), 1-10

Port status indicators, 1-10

port 0, 1-10

port 1, 1-10

Power

120 Vac, 1-5

240 Vac, 1-5

Power connector, 1-11

Power supply, 1-5

current, A-3

frequency, A-3

output current, A-3

output voltage, A-3

power consumption, A-3

specifications, A-2

voltage, A-3

## R

---

Relative humidity, A-2

Repeater

managed, 1-5

unmanaged, 1-5

Replacement part number, A-4  
RS232, 1-1, 1-2, 1-3, 1-11, 1-12  
RS422, 1-1, 1-2, 1-3, 1-11, 1-12, A-6 to  
A-7  
RS423, 1-1, 1-2, 1-3, 1-11, 1-12, A-11 to  
A-13  
RS449, 1-1, 1-2, 1-3, 1-11, 1-12  
RS530A, A-9 to A-11

## S

---

Sample connection, 1-5, 1-7  
Shipping  
altitude, A-2  
environment, A-2  
relative humidity, A-2  
temperature, A-2  
Specifications  
environmental, A-1  
power supply, A-2  
Standalone unit  
installation, 2-1 to 2-9  
Status indicators  
port 0, 1-10  
port 1, 1-10  
Synchronous serial port 1, 1-11  
EIA530A, 1-11  
RS232, 1-11  
RS422, 1-11  
RS423, 1-11  
RS449, 1-11  
V.10, 1-11  
V.11, 1-11  
V.28, 1-11  
V.35, 1-11  
V.36, 1-11  
X.21 leased lines, 1-11  
Synchronous serial port 2, 1-12  
EIA530A, 1-12  
RS232, 1-12  
RS422, 1-12  
RS423, 1-12  
RS449, 1-12  
V.10, 1-12  
V.11, 1-12

## Synchronous serial port 2 (cont'd)

V.28, 1-12  
V.35, 1-12  
V.36, 1-12  
X.21 leased lines, 1-12

## T

---

Temperature, A-2  
maximum rate of change, A-2  
Troubleshooting, 3-4  
DECbrouter 90 in 90 backplane, 3-4  
DECbrouter 90 in DEChub 90 backplane,  
3-3  
standalone DECbrouter 90, 3-1 to 3-2

## V

---

V.10, 1-1, 1-2, 1-3, 1-11, 1-12  
V.11, 1-1, 1-2, 1-3, 1-11, 1-12  
V.24, A-13 to A-14  
V.28, 1-1, 1-2, 1-3, 1-11, 1-12  
V.35, 1-1, 1-2, 1-11, 1-12, A-7, A-9  
V.36, 1-1, 1-2, 1-3, 1-11, 1-12

## W

---

Weight, A-1  
Width, A-1

## X

---

X.21, A-5  
X.21 leased lines, 1-1, 1-2, 1-3, 1-11, 1-12

