

# DECserver 200

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## Problem Determination Guide

June 1989

This guide describes DECserver 200 problem determination and troubleshooting. It is intended for the server manager.

Supersession/Update Information:      This is a revised manual.

Software Version:                          DECserver 200 V3.0

This manual applies to Version 3.0 of DECserver 200 and all subsequent maintenance releases up to the next major product release.

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# Preface

The *DECserver 200 Problem Determination Guide* describes how to troubleshoot the DECserver 200 system software and hardware. The manual also describes the troubleshooting tools and their use.

## Intended Audience

This manual is intended mainly for the server manager, but also Digital Equipment Corporation training, field service, and manufacturing personnel. Knowledge of Ethernet local area networks is a prerequisite for using the manual effectively.

## Document Structure

The sections of this guide and their contents are summarized below:

Chapter 1	Briefly introduces DECserver 200 problem determination.
Chapter 2	Describes the troubleshooting tools and the hardware and software features that are useful for troubleshooting.
Chapter 3	Describes the initial steps to take when you see a problem.
Chapter 4	Describes how to troubleshoot problems that involve all the server ports.
Chapter 5	Describes how to troubleshoot problems that affect one or more, but not all, ports and port devices.
Chapter 6	Describes problems involving communication with service nodes on the Ethernet.

Chapter 7	Describes problems on the Ethernet interface.
Chapter 8	Describes how to use Digital Equipment Corporation maintenance services.

### Other DECserver 200 Manuals

- *Using DECserver 200 Documents*

Directs you to information contained in the DECserver 200 documentation set. Flowcharts for different audiences suggest logical reading sequences. This document is intended for any user of the DECserver 200 documentation set.
- *DECserver 200 Hardware Installation/Owner's Guide*

Explains how to install the DECserver 200 hardware unit and how to test its operation. The guide also describes the DECserver 200 controls and indicators. The guide is intended for the hardware installer.
- *DECserver 200 Identification Card*

Provides the space to record the serial number, Ethernet address, DECnet node address, and DECnet node name of the server. This document is intended for the network manager, the software installer, and the server manager.
- *DECserver 200 Software Installation Guide (op-sys)*

Explains how to install the DECserver 200 software, how to establish down-line load hosts, and how to verify the DECserver 200 system installation. In the title, (op-sys) is the name of the load host operating system. This guide is intended for the load host system manager and the server manager.
- *DECserver 200 User's Guide*

Describes the user interface and the general functions of the server. This guide provides the complete information for using all nonprivileged server commands. This guide is intended for users of interactive terminals connected to the DECserver 200 ports.
- *Terminal Server User's Reference Card*

Describes and gives examples of the most frequently used nonprivileged server commands on a reference card. This card is intended for users of interactive terminals connected to server ports.



- *DECserver 200 Management Guide*

Describes all the initial and day-to-day management tasks required of the DECserver 200 manager. The topics cover all the information needed to configure the ports and to customize the permanent and operational databases of the server. This document is intended for the DECserver 200 manager.

- *Terminal Server Commands and Messages*

Describes the usage and syntax of all terminal server commands. This reference also lists and describes all status and error messages issued by the server. This reference is intended for the server manager but is useful for terminal users who want more detailed reference information.

- *DECserver 200 Commands Mini-Reference*

Summarizes all privileged and nonprivileged server commands and characteristics in a pocket-sized mini-reference. This reference is intended as a memory jog of command syntaxes for both privileged and nonprivileged users.

- *DECserver 200 Technical Manual*

Describes hardware logic, diagnostic firmware and software, and general operating procedures. The manual is intended for use in training, in field service, and in manufacturing. The level of technical information assumes previous training or experience with Ethernet networks and with Digital Equipment Corporation's VAX-11 or PDP-11 architecture.

- *Local Area Transport (LAT) Network Concepts*

Describes the Local Area Transport (LAT) architecture, the LAT protocol, and LAT network concepts. This document is intended for the server manager, the system manager, and the network manager.

- *Terminal Server Glossary*

Defines terms used in the server documentation set. This is intended as a reference tool for all users of server documentation.

### **DECserver 200 On-Line Documentation**

- *DECserver 200 Release Notes*

Describes any discrepancies between the actual product and the information in the documentation set. These notes are intended for the software installer and the server manager.

- *On-Line Help*

Provides two forms of server help: tutorial help and command reference help. Tutorial help provides basic information about logging in and using the server. Command reference help provides detailed information about using the server commands available at your privilege level. Help is intended for all server users.

### **Associated Documents**

- *Guide to Terminal Server Manager and Terminal Server Manager Software Installation Guide*

These documents contain the information necessary to install and run the Terminal Server Manager (TSM) software, an optional network management product, which is installed onto a VMS system running DECnet-VAX. These guides describe how to use TSM to manage a mix of Digital Equipment Corporation's Ethernet terminal servers connected to the same Ethernet as a VAX computer. These guides are intended for the installer and the manager of the TSM product.

### **Conventions Used in this Guide**

To use this manual effectively, familiarize yourself with the conventions discussed below. The following conventions apply to numbers:

- All numbers are decimal unless otherwise noted.
- All Ethernet addresses are given in hexadecimal.

### **Graphic Conventions Used in This Guide**

<b>Convention</b>	<b>Meaning</b>
Special type	This special type indicates system output or user input. System output is in black type; user input is in red type.

Convention	Meaning
UPPERCASE	Uppercase letters in command lines indicate keywords that must be entered. You can enter keywords in either uppercase or lowercase. You can abbreviate command keywords to the smallest number of characters that distinguishes the keyword to the server or to the TSC.
<i>lowercase italics</i>	Italics in command syntax or examples indicate variables for which either the user or the system supplies a value.
<b>Bold</b>	Words appearing in boldface must be typed exactly as shown.
<b>BOLD</b>	In summaries of characteristics, bold type indicates default values.
<b>bold</b>	In text, words appearing in bold type introduce new terms or concepts and can also be found in the glossary.
{ }	Braces in command syntax statements indicate that you must specify one and only one of the enclosed values. Do not type the braces.
[ ]	Square brackets in command syntax statements indicate that the enclosed value(s) are optional. You can enter none or one. Default values apply for unspecified options. Do not type the brackets.
<span style="border: 1px solid black; padding: 2px;">key</span>	Press the specified key. For example, <span style="border: 1px solid black; padding: 2px;">RET</span> means that you should press the RETURN key.
<span style="border: 1px solid black; padding: 2px;">CTRL/x</span>	Hold down the CONTROL key and then press the key specified by <i>x</i> . The server displays this key combination as $\hat{x}$ .
	A slash between command verbs indicates related, alternative commands or options. For example, SET/DEFINE PORT refers to both the SET PORT and the DEFINE PORT command.



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## Introduction to DECserver 200 Problem Determination

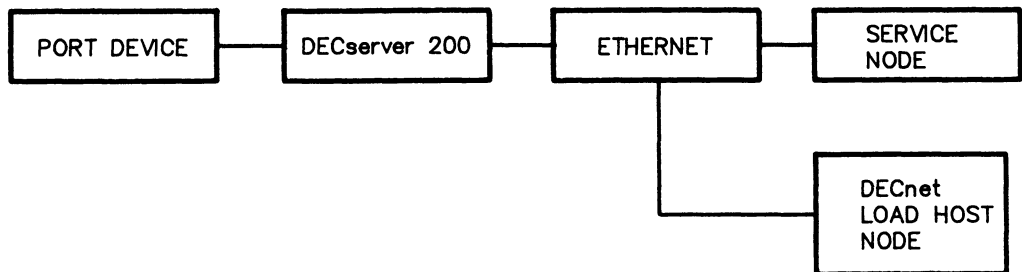
Problem determination, or troubleshooting, of the DECserver 200 terminal server involves isolating server problems from port device or network problems.

A problem can derive from a failure in one of the five network components shown in Figure 1-1. Each network component is broken down into its parts as shown in Figure 1-2. In Figure 1-2, hardware devices are represented by solid-line rectangles. Software is represented by rectangles outlined with dashed lines.

Some external components and parts are customer-replaceable, but most parts must be replaced by a qualified Digital Equipment Corporation service representative.

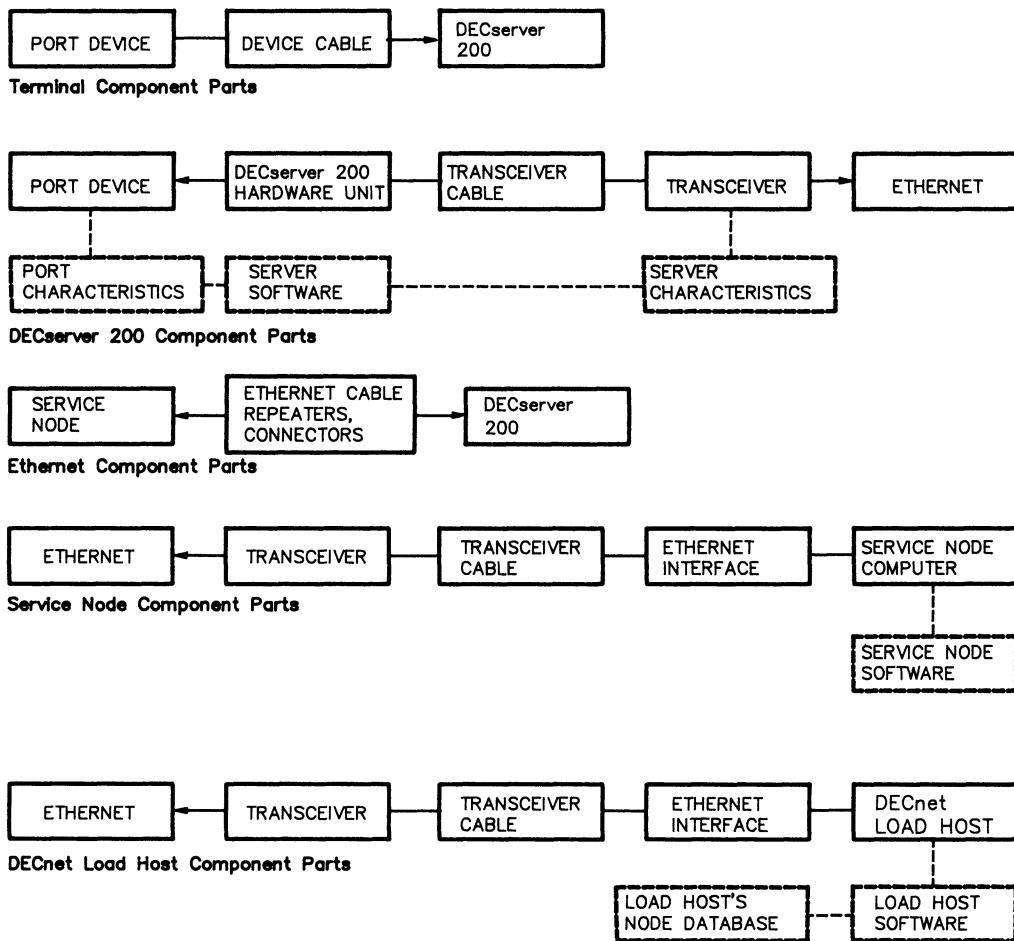
**Figure 1-1: Network Components**

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**Figure 1-2: Composition of Network Components**



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## Troubleshooting Tools

This chapter describes some DECserver features designed to help you in troubleshooting.

### 2.1 The Console Port

For the effective troubleshooting of problems involving DECserver initialization or down-line loading, you should have a port set up as the console port. The port should have an interactive terminal connected to it. The console port terminal displays status messages that make troubleshooting easier. For installation of your DECserver 200 terminal server, the console terminal must be configured to operate with a speed of 9600 bits per second (bps) and a character size of 8 bits with no parity. After installation, you can use the DEFINE/SET PORT commands to set up the console port with other values for speed, character size, and parity. The *DECserver 200 Management Guide* has more details about the console port.

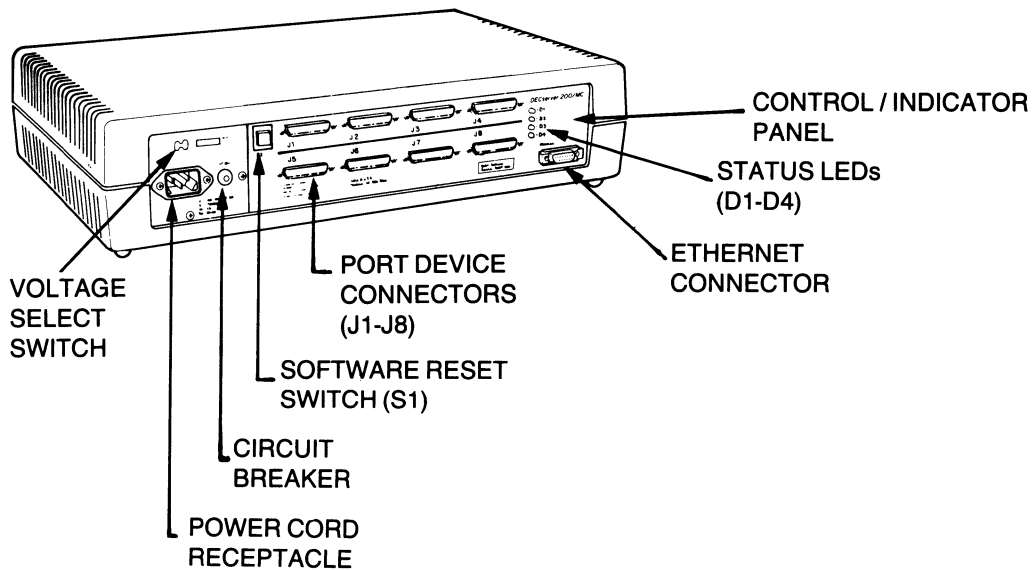
### 2.2 The Status LEDs

The DECserver 200 status LEDs (light emitting diodes) are labeled D1 to D4 and are arranged vertically on the control/indicator panel. Figure 2-1 shows the control/indicator panel of the DECserver. From top to bottom, the LEDs indicate the following:

**Table 2-1: Status LED Indications**

LED	Indication
Power D1	ON = DC voltage ok OFF = DC voltage problem
Diagnostic D2	ON = self-test passed OFF = fatal error or test in progress BLINKING = nonfatal error
Software D3	ON = server image loaded, no error OFF = down-line load in progress BLINKING = multiple load failure
Ethernet D4	ON or FLICKERING = network active OFF = network inactive

**Figure 2-1: DECserver 200 Control/Indicator Panel**



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## 2.3 The DECserver 200 Self-test

The DECserver 200 diagnostic self-test performs a number of DECserver 200 hardware tests. The self-test executes (and a down-line load occurs) whenever the DECserver initializes. You can initialize the DECserver in a number of ways: (1) by powering up the server, (2) by executing the INITIALIZE command, (3) by executing a NCP LOAD command on a DECnet load host, (4) by pressing **CTRL/P** on the console port terminal if there is an error that prevents down-line loading during the most recent self-test, and (5) by executing NCP TRIGGER.

The D2 status LED on the control/indicator panel displays the results of the self-test.

- If the LED remains off after the self-test, there is a fatal hardware error.
- If the LED blinks, there is a nonfatal hardware error. For such an error, an error message appears on a terminal attached to the console port (see Section 2.1).
- If the LED glows steadily, the self-test detected no hardware errors.

## 2.4 DECserver 200 TEST Commands

The TEST SERVICE command lets you test the communications between a port on your DECserver and a service node that offers a service. The TEST PORT command lets you test a server port or port device. The TEST LOOP command lets you test communication between the server and any DECnet node. Refer to *Terminal Server Commands and Messages* for details on using these commands.

### 2.4.1 The TEST SERVICE Command

The TEST SERVICE command establishes a special LAT session between the server port issuing the command and the service node and port you specify. You cannot use the TEST SERVICE command if Multisessions is enabled at the port where you are issuing the command.

Data is transmitted to the service node and is looped back for integrity checking by the server. The user then receives a status message.

Data can be looped back from the service node in one of three ways:

- By the service node at the protocol level
- By using internal loopback at the specified port

- By using an external loopback connector at the specified port

By default, a loopback is performed at the protocol level. The DECserver 200 terminal server supports protocol, internal loopback, and external loopback.

Some service nodes may not support internal loopback. The system displays an error message when you request a loopback type that is not supported by the remote node you specified.

External loopback requires that you place a loopback connector in the specified port on the specified node.

The TEST SERVICE command can be issued from a remote host by using the Remote Console feature.

#### NOTE

The TEST SERVICE command does not apply to all terminal server products. See the Software Product Description (SPD) for the server you are trying to test.

### 2.4.2 The TEST PORT Command

This command sends a stream of data to the internal port hardware, the external port hardware, or to the port device. When you specify that the data be sent to the internal or external port hardware, the data is looped back, and the DECserver sends a status message to the port where TEST PORT was issued. (You must use a DECserver port loopback connector for the external test.)

When you specify that the data be sent to the port device, the data appears as output on the device itself. The user examines the data for errors.

#### NOTE

If you do not specify a value for the COUNT option in the TEST PORT command, the default count is in effect, and 23 lines are displayed. You can stop the test by pressing **BREAK** or the local switch character.

With the Remote Console Facility (RCF), you can stop the test using the local switch character.

### 2.4.3 The TEST LOOP Command

This command tests communication between a server and a DECnet node. If an Ethernet component is not working normally, the test displays at your terminal one or more error messages indicating the fault. See the DECnet documentation of the DECnet node for a list and explanation of all the error messages generated by the loop-back tests.

You can also run circuit-level loop-assist tests to check more complex problems with Ethernet circuits. Loop-assist tests loop data between a source node and a destination node on the Ethernet; the tests use a third node on the Ethernet to relay the data. This third node is called an assistant node; it is physically located between the source and the destination nodes. You can use the assistant node in three ways:

- The assistant node relays the test data on the way to the destination node (transmit assist).
- The assistant node relays the test data on the way back from the destination node (receive assist).
- The assistant node relays the test data both on the way to and from the destination node (full assist).



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## What to Do First

This chapter presents the first troubleshooting procedures to follow when you discover a problem with your DECserver 200 terminal server. First, determine whether or not the problem affects all ports.

- When the problem involves all the ports:
  1. If status LED D1 is off, go to Section 4.1.
  2. If fatal bugcheck message 913 appears on the console terminal, stop and refer to Section 4.8. When a condition generates this message, the server automatically initializes.
  3. If interactive users can enter server commands, they should terminate their active sessions and log out from the server. Go to step 4.
  4. If users cannot enter commands at their port devices, power up the DECserver 200 terminal server by unplugging and replugging the server power cord. The server executes a self-test. After approximately 20 seconds, the status LED D2 does one of the following: stays off, blinks, or goes on.
    - If D2 stays off, see Section 4.2.
    - If D2 blinks, see Section 4.3.
    - If D2 goes on, refer to Sections 4.4, 4.5, 4.6, and 4.9 unless D3 is also blinking. If D3 is also blinking, go to Step 5.
  5. If LED D3 blinks, go to Section 4.7.
- When the problem does not affect all ports, see Chapter 5.



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## Problems on All Ports

You should read Chapter 3, "What to Do First," before you read this chapter. This chapter describes what to do after initialization when you have problems on all ports.

### 4.1 Status LED D1 Off — No DC Voltage

**Problem** Power is not reaching the server.

**Correction:** Secure the power cable at the server and at the wall outlet.

**Correction:** Check the wall outlet using another electrical device, or plug the server into another outlet.

**Correction:** Ensure that the voltage select switch is properly set. The correct level for North America is 120V; for most other countries, 240V is the correct voltage level. At installation, the control/indicator panel has a label covering the proper voltage setting. Peel off the label and set the select switch to the voltage indicated by the arrow. For more detailed instructions, refer to the *DECserver 200 Hardware Installation/Owner's Guide* for the correct setting.

**Correction:** Check the circuit breaker on the rear of the server. If the white center button of the circuit breaker pops out, a voltage overload has occurred. Reset the circuit breaker by pressing in the white button. If the circuit breaker trips more than once, you must return the server to Digital Equipment Corporation for replacement.

**Correction:** Check for a defective server power cord. You can use the power cord from a Digital Equipment Corporation terminal as a temporary replacement.

**Problem** The DECserver 200 hardware unit is defective.

**Correction:** Return the hardware unit to Digital Equipment Corporation for repair or for replacement. See Chapter 8.

## 4.2 Status LED D2 OFF — Fatal Error or Test in Progress

If D2 remains off for more than 20 seconds after LED D1 goes on, there is a fatal hardware error. You must return the server to Digital Equipment Corporation for repair or for replacement. See Chapter 8.

## 4.3 Status LED D2 Blinking

If D2 blinks after power up, the server has detected a nonfatal hardware error during self-test. The primary indication is a message that appears on the console port terminal, port 1 by default. Refer to Section 2.1 for information about setting up the console terminal.

The following sections list and explain the error messages that coincide with the blinking of LED D2. Each error message or set of error messages is followed by one or more probable problems and corrective actions.

### 4.3.1 Error Messages 920 and 921

Local -920- Parameter checksum error on port *n*  
Local -921- Factory-set parameters applied to port *n*

**Problem** These messages indicate a port checksum error. The permanent characteristics for the indicated port do not pass the internal checksum test. The factory-set defaults are in effect.

**Correction:** Enter the DEFINE PORT command to reset the server characteristics to values of your choice. Then reinitialize the server using the INITIALIZE command.



**Correction:** Reset the server characteristics using the software reset switch (S1) on the back of the server. Press and hold this switch in while you remove and reinsert the server power cord.

Resetting S1 causes the factory-set port characteristics to be reloaded into the server permanent database. If resetting S1 fails to correct the problem, the server nonvolatile memory that stores the server characteristics is faulty. Return the server to Digital Equipment Corporation for repair or for replacement. See Chapter 8.

### 4.3.2 Error Messages 922 and 923

Local -922- Port hardware error on port *n*  
Local -923- Port *n* has been disabled

**Problem** These messages indicate a port hardware error.

**Correction:** There is no corrective procedure for this condition. Return the server to Digital Equipment Corporation for repair or for replacement. See Chapter 8.

### 4.3.3 Error Messages 930 and 931

Local -930- Server parameters checksum error  
Local -931- Factory-set server parameters applied

**Problem** The server characteristics in the permanent database are not operational. The factory-set defaults are operating.

**Correction:** Enter the DEFINE SERVER command to reset the server characteristics to values of your choice. Then reinitialize the server using the INITIALIZE command.

Reset the server characteristics using the software reset switch (S1) on the back of the server. Press and hold this switch while you remove and reinsert the server power cord. If this action fails to correct the problem, the memory used to store the characteristics is faulty. Return the server to Digital Equipment Corporation for repair or for replacement. See Chapter 8.

#### 4.3.4 Error Messages 935 and 936

Local -935- Service characteristics checksum error  
Local -936- Service has been disabled

**Problem** The service characteristics in the permanent database are not operational. The factory-set defaults are operating.

**Correction:** Enter the DEFINE SERVICE command to reset the service characteristics to values of your choice. Then reinitialize the server using the INITIALIZE command.

**Correction:** Reset the service characteristics using the software reset switch (S1) on the back of the server. Press and hold this switch while you remove and reinsert the server power cord. If this action fails to correct the problem, the memory used to store the characteristics is faulty. Return the server to Digital Equipment Corporation for repair or for replacement. See Chapter 8.

#### 4.3.5 Error Message 932

Local -932- Hardware revision level checksum error

**Problem** The server nonvolatile memory is faulty.

**Correction:** There is no correction for this problem. Return the server to Digital Equipment Corporation for repair or for replacement. See Chapter 8.

#### 4.3.6 Error Messages 941, 942, and 950

The following error messages indicate an Ethernet loopback error. This usually indicates that the server is not connected properly to its transceiver. These messages may also indicate that the transceiver is faulty.

Local -941- Transceiver loopback error  
Local -942- Image load not attempted  
Local -950- Troubleshooting procedures should be followed

**Problem** The fault is in the transceiver cabling between the server and the coaxial cable.

**Correction:** Check the transceiver cable that runs from the server to the transceiver, to the DELNI, or to the Etherjack. Ensure that there is a secure connection at both ends of the cable. Check the cable for damage. If the cable is damaged, replace the cable.

If the preceding correction does not help, perform the following procedure. You will need the Ethernet loopback connector P/N 12-22196-01 that was included in the DECserver 200 shipment.

#### **NOTE**

When you use the Ethernet loopback connector to perform the following tests, if the tests cause LED D2 to stay on, the server tries to down-line load the server software. Since the server is disconnected from the network, the down-line loading fails. The server responds by causing LED D3 to blink and issues error messages 902 and 912 to the console terminal.

1. Disconnect the transceiver cable from the server.
2. Plug the Ethernet loopback connector into the Ethernet connector on the server.
3. Initialize the server by pressing **CTRL/P** on your console terminal, or by unplugging and reinserting the server power cord.
4. Wait 20 seconds for the diagnostic test to complete, then observe the status of LED D2:
  - a. If LED D2 continues to blink and the error messages reappear after the self-test, the server is faulty. Return the server to Digital Equipment Corporation for repair or for replacement.
  - b. If LED D2 stays on, go to step 5 to isolate and to determine the faulty unit.
5. Unplug the Ethernet loopback connector from the Ethernet connector on the server.
6. Reconnect the transceiver cable to the Ethernet connector on the server.
7. Disconnect the other end of the transceiver cable from the DELNI, from the Etherjack, or from the transceiver on the Ethernet coaxial cable.
8. Plug the Ethernet loopback connector into the transceiver cable.
9. Initialize the server by pressing **CTRL/P** on the console terminal, or by unplugging and reinserting the server power cord. Wait 20 seconds for the self-test to complete.
  - a. If LED D2 continues to blink, the transceiver cable is faulty and must be replaced.
  - b. If LED D2 stays on, the faulty unit is the device the transceiver cable was connected to — the DELNI, the Etherjack extension, the transceiver, or the Ethernet tap for the transceiver. See the following problem.

**Problem**     The transceiver unit or transceiver Ethernet tap is faulty.

**Correction:** Remove and reinstall the transceiver in a new location. Initialize by pressing **CTRL/P** on the console terminal, or by unplugging and reinserting the server power cord. If D2 stays on, the new Ethernet tap is working, and the DECserver 200 unit will function properly. If the error messages persist, the transceiver is probably faulty. Replace the transceiver.

#### NOTE

Pressing **CTRL/P** on the console terminal only initializes the DECserver when there has been an error that prevents down-line loading. **CTRL/P** is not valid at a local > prompt.

## 4.4 Ethernet Heartbeat Error

Local -943- Transceiver heartbeat error

Local -944- Check transceiver type for heartbeat support

These messages indicate that a heartbeat signal was not detected by self-test. This does not cause LED D2 to blink.

**Problem** The transceiver is an 802.3 compatible transceiver, or it is a non-Digital transceiver that was made to conform to the Ethernet version 1.0 specification. The signal is used in all Digital Equipment Corporation Ethernet transceivers. Not all third-party or 802.3 transceivers use this signal and the signal is not detected. If this condition occurs on a Digital Equipment Corporation transceiver or a DELNI, there may be a problem with the transceiver.

**Correction:** If you are using a non-Digital (or 802.3) transceiver, disable the server heartbeat detection ability by defining the server characteristic HEARTBEAT as DISABLED. Enter the DEFINE/SET SERVER HEARTBEAT DISABLED commands described in the *Terminal Server Commands and Messages Reference*.

**Problem** The fault is in the transceiver or the transceiver cable.

**Correction:** Refer to Section 4.3.6.

## 4.5 Insufficient Memory Resources

The server has a limited pool of memory and, with large networks or many port sessions, it is possible to exhaust this memory. When server memory is exhausted, the server database cannot hold additional information or complete local commands.

**Problem** The server cannot store any more information about service nodes.

The server cannot complete a host-initiated request or create queue entries for host-initiated requests.

Look at the Resource Errors in the SHOW SERVER STATUS display. Resource Errors indicate the number of times an internal data structure could not be created due to the lack of system memory. If Resource Errors are incrementing, server memory is full. See the following corrections.

**Correction:** Adjust groups to restrict the least-used nodes from being stored in the server database.

**Correction:** Restrict memory usage by adjusting the server node, session, and queue limits.

**Correction:** After adjusting groups and the node, session, and queue limits, free up additional memory space by purging some service nodes from server memory. The server node purge mechanism allows you to do this purging.

**Correction:** Find the port sessions that have the status Disconnecting or Disconnected in SHOW SESSIONS. Disconnect these sessions at the port and then log out the same ports provided they have no other sessions.

## 4.6 No Console Messages

The console port terminal has no display when the server initializes.

**Problem** The port to which the terminal is physically connected is not defined as the console port.

**Correction:** Refer to the *DECserver 200 Management Guide* for information on setting up a console port. Check the setup by entering the SHOW SERVER CHARACTERISTICS command to list the console port. Ensure that the device is physically connected to that port on the server unit.

**Problem** The console terminal is faulty.

**Correction:** Refer to Chapter 5 for troubleshooting procedures for individual port devices.

**Problem** The internal characteristics for the console port terminal and for the console port are not compatible.

**Correction:** Refer to Chapter 5 for troubleshooting procedures for individual ports.

#### NOTE

For DECserver 200 installation, the console terminal must operate at 9600 bps, and the character size must be 8 bits, no parity. After installation, use the DEFINE/SET PORT commands and set the console port with values for speed, character size, and parity.

## 4.7 Down-Line Loading Problems — Status LED D3 Blinking

LED D3 blinking indicates a failure to load the server image after three attempts.

Two sequences of 900 series messages on the console terminal indicate down-line loading problems. Each is covered in the following sections.

#### NOTE

Have event logging enabled for events 0.3 and 0.7 on all DECnet load hosts that may be down-line loading the server. Refer to the

DECnet load host documentation for information about event logging, or see the system manager for the DECnet load host.

#### 4.7.1 Down-Line Load Starts, Then Fails

The following sequence of messages appears on the console terminal at 30-second intervals:

```
Local -902- Waiting for image load
Local -903- Loading from host host-address
Local -912- Load failure, timeout
```

**Problem** The directory with the software image on the load host is not defined. This problem relates to VMS hosts only. For example, on a load host running VMS, the logical symbol MOM\$LOAD that must point to the DECserver load directory is not defined.

**Correction:** On VMS systems, the logical symbol MOM\$LOAD must be defined so that it points to SYS\$SYSROOT:[DECSERVER], the location of the DECserver image file. Issue the following command to see if MOM\$LOAD is defined to point to SYS\$SYSROOT:[DECSERVER].

```
$ SHOW LOGICAL MOM$LOAD 
```

If SYS\$SYSROOT:[DECSERVER] is not defined for MOM\$LOAD, then have the system manager enter the following statement in the system startup file on the load host, and then execute the command. Here, *current-search-string* is any other equivalence string defined for MOM\$LOAD, if any.

```
$ DEFINE/SYSTEM/EXEC/NAMEATTRIBUTE=NOALIAS/NOLOG -
_ $ MOM$LOAD "current-search-string", SYS$SYSROOT:[DECSERVER]
```

**Problem** The server has been incorrectly configured on the load host, or the server distribution software has been improperly installed.

**Correction:** Perform the procedures outlined in Section 4.7.2.

**Problem** The server characteristic SOFTWARE has been changed. The new file name for the server software image is not defined on the load host.



**Correction:** The server SOFTWARE characteristic should be defined as PR0801ENG. The *DECserver 200 Management Guide* explains how to reset SOFTWARE to PR0801ENG. The load host system manager can ensure that the file name on the load host is correct. For example, the file specification for the server software on a VMS load host should be MOM\$LOAD:PR0801ENG.SYS.

#### 4.7.2 Down-Line Load Does Not Start

The following messages appear on the console terminal:

```
Local -902- Waiting for image load
Local -912- Load failure, timeout
```

**Problem** The load host does not contain a node database entry for the server, or the load host does not contain the proper node information.

**Correction:** Verify that:

- The load host contains a node entry for the server.
- All information pertaining to down-line loading is correct.

For a VMS load host, do the following:

1. Execute the command file DSVCONFIG.COM in the directory with the logical name SYS\$SYSROOT:[DECSERVER]. This is the procedure used to configure a DECserver 200 terminal server in the load host database.
2. Enter number 1 in the menu of options. This option displays the DECnet address, the DECnet node name, the Ethernet address, and the up-line dump file for the server. For example:

DECnet Address	DECnet Name	Server Type	Service Circuit	Ethernet Address	Load File	Dump File
55.126	LAT004	DS200	UNA-0	08-00-2B-02-24-43	PR0801ENG.SYS	DS2LAT004.DMP

If this information is wrong, run DSVCONFIG.COM and choose item 2, 3, or 4 from the menu of options.

3. Enter the following NCP command using the DECnet node name of the server. This command lists the server characteristics that are stored in the load host database.

```
NCP> SHOW NODE LAT004 CHARACTERISTICS
```

The following is an example of display information generated by this command:

```
Node Volatile Characteristics as of 6-DEC-1988 16:40:53
Remote node = 13.3 (LAT004)
Service circuit = UNA-0
Hardware address = 08-00-2B-02-24-43
Load file = SYS$SYSROOT:[DECSEVER]PRO801ENG.SYS
Dump file = SYS$SYSROOT:[DECSEVER]DS2LAT004.DMP
```

If the information in step 3 is entered completely and accurately, the server is configured properly on the load host. If not, the system manager can use DSVCONFIG.COM.

**Problem** The directory with the software image on the load host is not defined. This problem relates to VMS hosts only. For example, on a load host running VMS, the logical symbol MOM\$LOAD that must point to the DECserver load directory is not defined.

**Correction:** On VMS systems, the logical symbol MOM\$LOAD must be defined so that it points to SYS\$SYSROOT:[DECSEVER], the location of the DECserver image file. Issue the following command to see if MOM\$LOAD is defined to point to SYS\$SYSROOT:[DECSEVER].

```
$ SHOW LOGICAL MOM$LOAD 
```

If SYS\$SYSROOT:[DECSEVER] is not defined for MOM\$LOAD, then have the system manager enter the following statement in the system startup file on the load host, and then execute the command. Here, *current-search-string* is any other equivalence strings defined for MOM\$LOAD, if any.

```
$ DEFINE/SYSTEM/EXEC/NAMEATTRIBUTE=NOALIAS/NOLOG -  
_$_ MOM$LOAD "current search-string", SYS$SYSROOT:[DECSERVER]
```

**Problem** The DECnet load host for the server is not available.

**Correction:** Ensure that the DECnet load host is available on the network. Ensure that the load host has the network properly defined and that the state of the Ethernet circuit is ON. Use the load host Network Control Program (NCP), as documented in the load host DECnet documentation, to verify that:

- The network is up.
- The Ethernet connection is on.
- Service is enabled on the service circuit.

The following is an example of the NCP commands needed to perform these checks and the NCP output:

```
NCP>SHOW EXECUTOR STATUS
```

```
Node Volatile Status as of 6-DEC-88 13:12:00
```

```
Executor node = 4.6(BOSTON)
```

```
State = on
```

```
Physical address = AA-00-04-00-06-10
```

```
NCP> SHOW ACTIVE LINES STATUS
```

```
Active Line Volatile Status as of 6-DEC-88 13:12:15
```

```
Line State
```

```
UNA-0 on
```

```
NCP> SHOW ACTIVE CIRCUITS STATUS
```

```
Active Circuit Volatile Status as of 6-DEC-88 13:12:25
```

Circuit	State	Loopback Name	Adjacent Node	Block Size
UNA-0	on		4.37(LAB01)	576

```
NCP> SHOW ACTIVE CIRCUIT CHARACTERISTICS
```

```
Active Circuit Volatile Characteristics as of 6-DEC-88 13:13:02
```

```
Circuit = UNA-0  
State = on  
Service = enabled  
Designated router = 4.1 (TWO)  
Cost = 3  
Router priority = 16  
Hello timer = 15  
Type = Ethernet  
Adjacent node = 4.1 (TWO)  
Listen timer = 45
```

**Problem** The DECserver load host is not on the same Ethernet.

**Correction:** The network manager must assign a node on the same Ethernet as the DECserver to be a load host for the DECserver 200 terminal server. Have the system manager on the load host add the server to the load host database by running the DSVCONFIG procedure.

**Correction:** Reconfigure the network to ensure that the load host is on the same physical Ethernet as the server.

**Problem** Transmissions between the DECserver 200 terminal server and the load host fail due to Ethernet problems.

**Correction:** Have the system manager of a DECnet Phase IV node execute the NCP LOOP CIRCUIT command, specifying the DECserver 200 terminal server as the specified node. The NCP facility shows the results of the loopback test at the DECnet node.

## 4.8 Message Number 913 Appears

If message number 913 appears on the console port terminal, it means that the DECserver 200 terminal server detected an internal fatal error, called a fatal bugcheck.

A software problem, or bug, is likely to cause only intermittent fatal bugchecks of the DECserver 200 terminal server. Your server may operate again for a period of time, then fail again. If there is more than one server on the Ethernet, the problem may affect all the servers.

If the fatal error was a hardware error, the problem is probably isolated to one server. The hardware problem may be intermittent and only affect the terminal server occasionally.

After a fatal bugcheck, the server will automatically attempt to up-line dump to the server software (if server DUMP characteristic is enabled). The server then executes its self-test and requests a down-line load of the server software. If status LED D2 is off or blinking after the self-test, see Section 2.2 or Section 2.3.

**Problem** A fatal hardware error has been detected.

**Correction:** There is no corrective procedure for this problem. If the failures happen often enough to be disruptive, return the unit to Digital Equipment Corporation and install a replacement. Record the values for the five parameters in the 913 error message. Forward this information and the server up-line dump file to Digital Equipment Corporation (see Chapter 8). Up-line dumping after a fatal bugcheck is discussed below.

If the replacement unit works, a hardware error probably caused the first unit to crash.

Two nonstandard self-tests can help you confirm a hardware failure in the original unit. If you can enter commands at a port, execute these tests by issuing the following INITIALIZE commands:

```
INITIALIZE DIAGNOSE FULL
```

```
INITIALIZE DIAGNOSE FULL COUNT number
```

The *Terminal Server Commands and Messages* has the complete command description for the INITIALIZE command.

Use the first command to check for a hardware error that causes a crash each time you use the server (nonintermittent error). Use the second to check for intermittent errors. LED D2 indicates the result in the same manner as it does for the standard self-test.

The self-test for the first command takes about 20 seconds. The time required for the self-test generated by the second command depends on the value you specify for *number*. When you increase *number* by 1, you add about 20 seconds to the length of the test. For example, a value of 180 for *number* generates a test that lasts about one hour.

**Problem** A fatal software error is detected.

**Correction:** There is no correction for this problem. Record the values for the five parameters in the error message. Send this data in a software performance report (SPR), and the dump file to Digital Equipment Corporation. See Chapter 8.

After a fatal bugcheck, the server attempts an up-line dump of its memory to a load host on the Ethernet. The server reinitializes and loads the server image. If there are several load hosts defined, the address of the one accepting the up-line dump can be determined using the SHOW SERVER STATUS command. The Ethernet address of the dump host appears in the display along with the crash information from the fatal bugcheck message. Normally, the dump is directed to the host that loaded the server image.

The file name of the dump file on the host is:

DS2nnnnnn.DMP

Here *nnnnnn* is the DECnet name for the DECserver 200 terminal server on the load host. For example, a DECserver 200 terminal server with a DECnet name of LAT004 generates a dump file at SYS\$SYSROOT:[DECSERVER]DS2LAT004.DMP on a VMS host.

If error message 914 appears on the console port terminal more than four times, the up-line dump is not successful. There may be Ethernet transmission problems inhibiting transmissions between the server and the load host. Refer to Chapter 7.

## 4.9 Server Port or Port Device Hardware Problems

If you have only a few devices attached to a DECserver, individual port or port device problems may appear to be a single problem affecting all ports. If the problems in Sections 4.1 to 4.8 do not apply, troubleshooting is isolated to the port devices or the DECserver port hardware.

Follow the troubleshooting procedures for individual port devices as detailed in Chapter 5. If you solve the problem, repeat the procedure for all the devices.





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## Problems with Individual Port Devices

This chapter discusses troubleshooting for problems that appear to affect individual DECserver ports or port devices.

### 5.1 Check These Things First

When you have a problem with any kind of port device, first check the items in Table 5-1. If necessary, take the corrective actions specified in the table. If the problem persists, go to the section that addresses your problem.

**Table 5-1: Port Device Problem — Check These Things First**

---

Device power	Check the power indicator for the port device. If it is off, do the following: (1) be sure the terminal is plugged into an active outlet, (2) check that the power switch is on, (3) if the device has a fuse, replace it; if the device has a circuit breaker, reset it. Then, if the power indicator stays off for more than one minute, assume that the device is faulty.
Device cable	Be sure the device cable is secure on the DECserver port and on the port device. If the cable is spliced, be sure all junctions are secure.  If the port device is connected to a DECserver 200/DL unit, check all device cable connections at couplers, at adapters, and at the cable concentrator (harmonica). The <i>DECserver 200 Hardware Installation/Owner's Guide</i> shows you where these auxiliary devices are typically located between the port device and the port.

**Table 5-1 (Cont.): Port Device Problem — Check These Things First**

---

	<p>Inspect the cable for cuts and/or crimps. Use another cable.</p> <p>Be sure not to exceed the maximum allowable length for the cable you are using. Refer to the <i>DECserver 200 Hardware Installation/Owner's Guide</i> for your DECserver 200 unit.</p>
Speed for port and port device	<p>Match the device speed to the port speed stored in the server database. You can set the device speed to match the port speed, or you can modify the port speed to match the device speed. DECserver 200 units support the following speeds: 75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, and 19,200 bps. If your device does not offer one of these baud rates, you cannot use the device with a DECserver 200 unit.</p> <p>If you intend to use the autobaud feature with the device, the input and the output speeds of the device must match. See the <i>DECserver 200 Management Guide</i>. However, the DECserver 200 unit does offer split-speed operation. When using split-speed, you must match the input speed of the device with the output speed of the server port. The output speed of the device must match the input speed of the server port.</p>
Character size and parity for port and port device	<p>Match the device parity and the character size to the values for the port in the server database. You can set the device parity and the character size to match the character size and parity in the server database. Alternatively, you can modify the database to match the device character size and parity.</p> <p>The DECserver 200 supports devices with odd, even, mark, and no parity. It supports character sizes of 7 and 8 bits. If your device does not offer these options, you will not be able to use the device with a DECserver 200 unit.</p> <p>If you use the autobaud feature (see the <i>DECserver 200 Management Guide</i>), the parity and the character size settings of the device must be one of the following:</p> <ul style="list-style-type: none"><li>■ 8 bits and no parity</li><li>■ 7 bits and even parity</li></ul>

## Table 5-1 (Cont.): Port Device Problem — Check These Things First

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If your device does not offer these parameters, you cannot use autobaud. You must set speed, character size, and parity for the port to match those for the port device.

---

### 5.2 An Interactive Terminal Is Not Working

An interactive terminal can be a terminal with a video monitor (CRT) and keyboard, a printer with a keyboard, or a PC in terminal emulation mode. If a user has a problem with a terminal, FIRST carry out the checks described in Table 5-1. If the problem persists, find the problem and correction in the following discussions.

**Problem** There is no video display, and the terminal is nonresponsive.

**Or** A working terminal no longer responds.

**Correction:** At a working port, enter the SHOW PORT CHARACTERISTICS command for the port where the problem device is attached. See if the problem port is set up for autobaud operation. If the device parameters are not properly set, the server will not allow autobaud operation. If using autobaud, the port device must be set in one of the following configurations:

- A character size of 8 bits, no parity, or a character size of 7 bits, even parity
- An input and output speed set to: 75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, or 19,200 bps

**Correction:** If a port has a dedicated service and the service is not available, the attached device will appear not to respond. Use another port to verify if a dedicated service is set up for the problem port. If a service is set up, verify that the service is available. If the service is available, verify that the problem port and the service have a common service group.

**Correction:** At a privileged port, enter the SHOW PORT *n* STATUS command for the port with the problem. Check the XOFFED status field in the display. If this field says YES, the server port has XOFFED communications. The *DECserver 200 Management Guide* has more information about this field. Try a "clear comm" on the device, or log out twice at a privileged port (the second logout bypasses any flow problems.)

**Correction:** See if the port hardware is faulty. Plug the port loopback connector supplied with your hardware unit into the port connector on the control/indicator panel. From another terminal, enter the TEST PORT LOOPBACK EXTERNAL command using the faulty port number. You must disconnect the terminal to install the loopback connector.

You can also specify an internal loopback to check the internal port hardware. Use the TEST PORT LOOPBACK INTERNAL command.

#### NOTE

When you use the TEST PORT command for loopbacks, the input and the output speeds for the port must be the same. Be sure you also use the correct port loopback connector. Use 12-15336-08 or an equivalent.

Check the error counters when the test is completed. If the error counters are nonzero for either loopback option, the port is faulty. Return the DECserver 200 unit to Digital Equipment Corporation (see Chapter 8).

If you do not specify a value for the COUNT option in the TEST PORT command, the default count is in effect, and 23 lines are displayed.

You can stop the test by pressing **BREAK** or the local switch character. With the Remote Console Facility (RCF), you can stop the test using the local switch character.

**Correction:** Make sure that the ACCESS characteristic for the problem port is set up as LOCAL or DYNAMIC. (Use the SHOW PORTS CHARACTERISTICS display for the problem port to check this.) If the port has dynamic access, set the INTERRUPTS characteristic to ENABLED.

With ACCESS LOCAL, the terminal user can always use the terminal interactively. With ACCESS DYNAMIC and INTERRUPTS ENABLED, the user can stop a remote session and then use the terminal interactively. With ACCESS set up as REMOTE or NONE, the terminal does not respond to user input.

**Problem** Nonsense characters appear.

**Correction:** At a working port, enter the SHOW PORT CHARACTERISTICS command for the port where the problem device is attached. See if the problem port is set for autobaud operation. If the device parameters are not properly set, the server will not allow autobaud operation. If using autobaud, the port device must be set in one of the following configurations:

- A character size of 8 bits, no parity, or character size 7 bits, even parity
- An input and output speed set to: 75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, or 19,200 bits/second

**Correction:** See if the port hardware is faulty. Plug the port loopback connector supplied with your hardware unit into the port connector on the control/indicator panel. From another terminal, enter the TEST PORT LOOPBACK EXTERNAL command using the faulty port number. You must disconnect the terminal to install the loopback connector.

You can also specify an internal loopback to check the internal port hardware. Use the TEST PORT LOOPBACK INTERNAL command.

#### NOTE

When you use the TEST PORT command for loopbacks, the input and the output speeds for the port must be the same. Be sure you also use the correct port loopback connector. Use 12-15336-08 or an equivalent.

Check the error counters when the test is completed. If the error counters are nonzero for either loopback option, the port is faulty. Return the DECserver 200 unit to Digital Equipment Corporation (see Chapter 8).

If you do not specify a value for the COUNT option in the TEST PORT command, the default count is in effect, and 23 lines are displayed. You can stop the test by pressing **BREAK** or the local switch character. With the Remote Console Facility (RCF), you can stop the test using the local switch character.

**Problem** Not all characters are displayed.

**Correction:** Enable flow control for the port. This ensures that characters are not lost because of insufficient buffer space at the DECserver port or port device. You can set up the XON/XOFF characters as flow control characters. With the DECserver 200/MC unit, you can also specify that the CTS/RTS or DSR/DTR modem signals implement flow control. Use the FLOW CONTROL options for the SET PORT and the DEFINE PORT commands as explained in *Terminal Server Commands and Messages*. Be sure that the flow control characters or signals you choose for the DECserver port are also enabled on the terminal. Refer to the terminal operator's guide. Ensure that you also use a suitable cable for CTS/RTS flow control — BC22R or an equivalent.

Use the SHOW/MONITOR PORT *n* CHARACTERISTICS command to display the values currently set for flow control. The SHOW/MONITOR PORT *n* STATUS command displays the operating condition of the port, including the XOFF status and modem signals being asserted or read by the server.

**Problem** The terminal is nonoperational.

**Correction:** Switch the terminal to off-line mode (refer to the operator's manual). If the problem persists when you enter characters, the terminal is probably faulty. Verify the operation of the terminal at another location. Use the same device characteristics when verifying the operation.

## 5.3 Problems with Non-LAT Host Devices

This section discusses possible problems and solutions for ports that are directly connected to non-LAT host systems or to data switches. These connected devices are offered as services on the network.

For many of these problems, the `SHOW/MONITOR PORT STATUS` command may be helpful, especially when modem connection problems are indicated and you need to verify that the correct signals are being exchanged between the modem and the server.

**Problem** You cannot connect to the service that offers the non-LAT host.

**Correction:** Verify that the service has been set up correctly. Enter a `SHOW SERVICES LOCAL CHARACTERISTICS` command on the destination server. Check that the service is offered on the desired Ports and that Connections are enabled.

**Correction:** Verify that the destination server has been correctly configured as a service node. Enter a `SHOW SERVER CHARACTERISTICS` command. Check that Announcements is enabled and that the Service Groups include those of the users who need to connect to the service.

**Correction:** Verify that the destination port has been configured correctly. It should be set up for `ACCESS REMOTE`, for `MODEM ENABLED`, and for `AUTOBAUD DISABLED`. Refer to the *DECserver 200 Management Guide* for more configuration information.

**Correction:** Verify that the users' ports have group access to the service. Check both `AUTHORIZED GROUPS` and `GROUPS`. At least one group on the users' ports should match the service groups of the destination service node.

**Correction:** Verify that a port offering the service is available. Specify the service name in a `SHOW SERVICE` command on the user's server, and examine the service rating. If it is zero, all ports offering the service are in use.

**Correction:** You can use the `TEST SERVICE` command to test communication between the server port and the service node offering the requested service. See Section 2.4. (You cannot use the `TEST SERVICE` command if Multisessions is enabled at the port where you are issuing the command.) If the port user issued a connection request for a specific service node and port, you can also specify that node and port in the `TEST SERVICE` command. Whatever form of the command you use, the server displays the results of the test at the privileged port.

When a connection cannot be made to the service, enter the TEST SERVICE command without the LOOPBACK option. By default, the data is then looped back at the protocol level on the target node to test the ability of the node to accept connections.

**Correction:** Verify that the two servers can communicate over the Ethernet. Specify the Ethernet address of the server offering the service in the TEST LOOP command.

**Problem** You can connect to the service but cannot communicate with the non-LAT host or the port device.

**Correction:** First, verify that the physical characteristics for the destination port match those of the port device, as described in Section 5.1.

**Correction:** Verify that MODEM CONTROL has been enabled on both the destination port and the non-LAT host interface.

**Correction:** Verify that the destination port has been configured correctly. It should be set up for ACCESS REMOTE, for MODEM ENABLED, and for AUTOBAUD DISABLED. Refer to the *DECserver 200 Management Guide* for more configuration information. You should use DEFINE commands to set up the port; then log it out.

**Correction:** Verify that the correct cable type is used on the destination port. It should be a BC22R or BC17D null modem cable or equivalent. See Appendix D of the *DECserver 200/MC Hardware Installation/Owner's Guide* for cable descriptions.

**Correction:** Check that you have set up the DTRWAIT port characteristic to be compatible with the port device. You should normally set DTRWAIT ENABLED for remote-access ports (by default it is DISABLED). Refer to the *DECserver 200 Management Guide* for a description of this characteristic.

**Correction:** If you are connecting to a data switch that requires assertion of Ring Indicator (RI) before it activates, verify that the port characteristic RING is ENABLED and that the device is connected with a BC22R cable or equivalent. Use the SHOW/MONITOR PORT *n* STATUS command to see if the RI signal is being monitored on input.



**Correction:** You can use the `TEST SERVICE` command to test communication between the server port and the service node offering the requested service. See Section 2.4.1. (You cannot use the `TEST SERVICE` command if Multisessions is enabled at the port where you are issuing the command.) You can specify the node and the port where the service is offered in the `TEST SERVICE` command. Whatever form of the command you use, the server displays the results of the test at the privileged port.

Specify `LOOPBACK INTERNAL` with `TEST SERVICE` to have the data looped back to your server from the internal hardware at the port you specify (or at the port the server chooses if you do not specify one).

Specify `LOOPBACK EXTERNAL` to check the communication to the external hardware of the port where the non-LAT host is connected. To use `LOOPBACK EXTERNAL`, you must place a port loopback connector in the target port.

## 5.4 Problems with Dial-In Modem Ports

This section discusses possible problems and solutions for ports connected to modems, to which users will dial in from a remote location. For many of these problems, the `SHOW/MONITOR PORT STATUS` command may be helpful. The command displays the modem signals being asserted or read by the server.

**Problem** The modem does not answer the phone. The user's modem may or may not provide a reason for this depending on the modem type. The first three corrections should be performed by the dial-in user, the remainder by the server manager.

**Correction:** (for the dial-in user) Check the phone number and any long-distance calling codes that might be necessary. Retry with the correct number.

**Correction:** (for the dial-in user) Connect a telephone to the Telephone Line port on the modem (if provided) and put the modem into Talk mode (usually by pushing a button). Verify that you hear a dial tone. If you do not hear a dial tone, your modem is not connected to the telephone network correctly. Refer to your modem documentation for help.

**Correction:** (for the dial-in user) After getting a dial-tone, call the number manually. A successful modem connection will result in a loud, continuous high-pitched tone after a few rings. If you hear a busy signal, the modem is in use; try later. If someone answers, you have the wrong number. If there is no reply, call the server manager responsible for the dial-in modem port for assistance.

**Correction:** If the modem does not answer, you should check that the server port characteristics are correctly set up. A key characteristic is MODEM ENABLED. See the *DECserver 200 Management Guide* for more configuration information on port setup.

**Correction:** Verify that the correct cable is used between the server port and the modem. Use a BC22E or BC22F straight-through cable or equivalent. See Appendix D of the *DECserver 200/MC Hardware Installation/Owner's Guide* for cable descriptions.

**Correction:** Verify that the modem is detecting DTR from the server when the call comes in. Usually, a light marked DTR or TD will indicate this. Most modems will not answer the call without this signal. If DTRWAIT is enabled, the server will not assert DTR until the modem asserts Ring Indicator (RI) when a call comes in. If you set DTRWAIT ENABLED on the port, verify that your modem asserts RI before DTR is asserted. If not, set DTRWAIT DISABLED.

**Correction:** If the modem is still not detecting DTR after the above checks, then the modem cable may be bad. Replace the cable with a good cable and retry.

**Correction:** Verify that the server port hardware is operating correctly. Enter a SHOW SERVER STATUS display, and examine the self-test status field. The *DECserver 200 Management Guide* describes the meaning of this status field.

You can also use the TEST PORT command to test the port hardware. Plug the port loopback connector supplied with your hardware unit into the port connector on the control/indicator panel. From another terminal, enter the TEST PORT LOOPBACK EXTERNAL command using the port number. You must disconnect the port device to install the loopback connector.

You can also specify an internal loopback to check the internal port hardware. Use the TEST PORT LOOPBACK INTERNAL command.

## NOTE

When you use the TEST PORT command for loopbacks, the input and the output speeds for the port must be the same. Be sure you also use the correct port loopback connector. Use 12-15336-08 or an equivalent.

Check the error counters. If the error counters are nonzero for either loopback option, the port is faulty. Return the DECserver 200 unit to Digital Equipment Corporation (see Chapter 8).

If you do not specify a value for the COUNT option in the TEST PORT command, the default count is in effect, and 23 lines are displayed. You can stop the test by pressing **BREAK** or the local switch character. With the Remote Console Facility (RCF), you can stop the test using the local switch character.

**Correction:** If the modem is detecting DTR but not answering the phone, then either the modem is not working, or it is not set up for autoanswer. Refer to the modem documentation for more information.

### Problem

The modem answers the phone, but the Carrier Detect (CD or CAR) light does not come on. These correction procedures apply to the dial-in user.

**Correction:** (for the dial-in user) Your modem and the dial-in modem may not be communicating at a compatible speed. For example, you are calling from a modem set to 2400 bps to a modem set to 1200 bps. Verify the dial-in speed with the server manager, and call in at the appropriate speed.

**Correction:** (for the dial-in user) A marginal phone connection may have occurred, and the modems have not established quality communication. Hang up, and retry the connection. If the problem persists, your telephone network may not be able to support communication at your modem speed. Tell your server manager and request a dial-in modem with a lower speed.

**Problem** The modem answers the phone, the Carrier Detect (CD or CAR) light comes on, but you cannot communicate with the server. The dial-in user can do the first two corrections. The server manager can do the others.

**Correction:** (for the dial-in user) If your modem has a fallback speed capability, your modem may now be using this speed. Set your terminal to this speed while the connection is up, and type your normal log-in sequence. If this is not successful, return the terminal to the original dial-in speed. Call your server manager for assistance.

**Correction:** (for the dial-in user) If you see a # when you connect to the server, you are being prompted for a password. Ask your server manager for the password. If you are typing the correct password but are being logged out for entering the wrong password, line noise may be corrupting your password entries. Type the password quickly, or request that the server manager increase the value for the PASSWORD LIMIT server characteristic.

**Correction:** Check port characteristics on the dial-in port. First, verify physical characteristics as described in Section 5.1. Then, for local-access dial-in ports, set AUTOBAUD ENABLED, ACCESS LOCAL, and MODEM ENABLED.

**Correction:** Verify that the correct cable is being used between the server port and the modem. Use a BC22E or BC22F straight-through cable or equivalent. See Appendix D of the *DECserver 200/MC Hardware Installation/Owner's Guide* for cable descriptions.

**Correction:** If the server port is configured with a dedicated service, verify that the dedicated service is available. Verify that at least one of the AUTHORIZED GROUPS for the port matches a service group of the dedicated service.

**Correction:** Verify that the server port hardware is operating correctly. Enter a SHOW SERVER STATUS display, and examine the self-test status. The *DECserver 200 Management Guide* describes the meaning of this status field.

You can also use the TEST PORT command to test the port hardware. Plug the port loopback connector supplied with your hardware unit into the port connector on the control/indicator panel. From another terminal, enter the TEST PORT LOOPBACK EXTERNAL command using the port number. You must disconnect the port device to install the loopback connector.

You can also specify an internal loopback to check the internal port hardware. Use the TEST PORT LOOPBACK INTERNAL command.

#### NOTE

When you use the TEST PORT command for loopbacks, the input and the output speeds for the port must be the same. Be sure you also use the correct port loopback connector. Use 12-15336-08 or an equivalent.

Check the error counters. If the error counters are nonzero for either loopback option, the port is faulty. Return the DECserver 200 unit to Digital Equipment Corporation (see Chapter 8). If you do not specify a value for the COUNT option in the TEST PORT command, the default count is in effect, and 23 lines are displayed. You can stop the test by pressing **BREAK** or the local switch character. With the Remote Console Facility (RCF), you can stop the test using the local switch character.

## 5.5 Problems with Dial-Out Modem Ports

This section discusses problems and solutions for ports connected to dial-out modems, which are offered as services on the network. For many of these problems, the SHOW/MONITOR PORT STATUS command may be helpful. The command displays the modem signals being asserted or read by the server.

**Problem** You cannot connect to the dial-out service.

**Correction:** Verify that the service has been set up correctly. Enter a SHOW SERVICES LOCAL CHARACTERISTICS command on the destination server. Check that the service is offered on the desired ports and that Connections is enabled.

**Correction:** Verify that the destination server has been correctly configured as a service node. Enter a `SHOW SERVER CHARACTERISTICS` command, and check that `Announcements` is enabled and that the service groups include those of the users who need to connect to the service.

**Correction:** Verify that the modem port has been configured correctly. It should be set up for `ACCESS REMOTE`, for `MODEM ENABLED`, and for `AUTOBAUD DISABLED`. Refer to the *DECserver 200 Management Guide* for more configuration information.

**Correction:** Verify that the users' ports have group access to the service. Check both `AUTHORIZED GROUPS` and `GROUPS`. At least one group on the users' ports should match the service groups of the destination service node.

**Correction:** Verify that a port offering the service is available. Specify the service name in a `SHOW SERVICE` command on the user's server, and examine the service rating. If it is zero, all ports offering the service are in use.

**Correction:** You can use the `TEST SERVICE` command to test communication between the server port requesting the service and the service node offering the service. (You cannot use the `TEST SERVICE` command if `Multisessions` is enabled at the port where you are issuing the command.) If the port user issued an unsuccessful connection request for a specific service node and port, you can specify the node and port in the `TEST SERVICE` command. Whatever form of the command you use, the server displays the results of the test at the privileged port.

Specify `LOOPBACK INTERNAL` with `TEST SERVICE` to have the data looped back to your server from the internal hardware at the destination port you specify (or at the port the server chooses if you do not specify one).

Specify `LOOPBACK EXTERNAL` to check the communication to the external hardware of the port where dial-out modem is connected. To use `LOOPBACK EXTERNAL`, you must place a port loopback connector in the target port.

**Problem** You can connect to the service but cannot communicate with the modem.

**Correction:** First, verify that the physical characteristics for the destination port match those of the port device, as described in Section 5.1.

**Correction:** Verify that the destination port has been configured correctly. It should be set up for ACCESS REMOTE, for MODEM ENABLED, and for AUTOBAUD DISABLED. Refer to the *DECserver 200 Management Guide* for more configuration information. You should use DEFINE commands to set up the port, then log it out.

**Correction:** Verify that the correct cable type is used on the destination port. It should be a BC22E or BC22F straight-through modem cable or equivalent. See Appendix D of the *DECserver 200/MC Hardware Installation/Owner's Guide* for cable descriptions. Note that pins 12 and 23 are used for alternate speed detection.

**Correction:** Check that you have set up the DTRWAIT port characteristic to be compatible with the modem. You should normally set DTRWAIT ENABLED for remote-access ports (by default it is DISABLED). Refer to the *DECserver 200 Management Guide* for a description of this characteristic.

**Correction:** If you are using the ALTERNATE SPEED feature, verify that the SPEED and the ALTERNATE SPEED characteristics match the primary and fallback speeds of the modem. See the *DECserver 200 Management Guide* for a description of alternate speed.

**Correction:** Verify that the forward, backward, and local switch characters for the port have not been defined to be the same as special characters required by the modem, such as `CTRL/B`. Verify that the BREAK characteristic is also compatible with the modem.

**Correction:** Check the modem and verify that it is configured correctly. Make sure the Data/Talk button is in the Data position. Refer to the modem documentation for more information. You can check the circuit Input/Output modem signals asserted for the port by entering a SHOW PORT *n* STATUS command.

**Correction:** Verify that the server port hardware is operating correctly. Enter a SHOW SERVER STATUS display, and examine the self-test status field. The *DECserver 200 Management Guide* describes the meaning of this status field. You can also use the TEST PORT command to test the port hardware. Plug the port loopback connector supplied with your hardware unit into the port connector on the control/indicator panel. From another terminal, enter the TEST PORT LOOPBACK EXTERNAL command by using the port number. You must disconnect the port device to install the loopback connector.

You can also specify an internal loopback to check the internal port hardware. Use the TEST PORT LOOPBACK INTERNAL command.

## NOTE

When you use the TEST PORT command for loopbacks, the input and the output speeds for the port must be the same. Be sure you also use the correct port loopback connector. Use 12-15336-08 or an equivalent.

Check the error counters. If the error counters are nonzero for either loopback option, the port is faulty. Return the DECserver 200 unit to Digital Equipment Corporation (see Chapter 8).

If you do not specify a value for the COUNT option in the TEST PORT command, the default count is in effect, and 23 lines are displayed. You can stop the test by pressing **BREAK** or the local switch character. With the Remote Console Facility (RCF), you can stop the test using the local switch character.

**Problem** You can communicate with the modem but cannot complete dial out to the remote modem.

**Correction:** If the modem supports fallback speeds (check the modem documentation), verify that the ALTERNATE SPEED characteristic has been correctly set up on the port. See the *DECserver 200 Management Guide* for more information.

**Correction:** Check that the modem is correctly configured for dial out. Refer to the modem documentation for more information.

**Correction:** Check that the modem is correctly connected to the telephone network. Connect a telephone to the modem line and verify that you hear a dial tone.

**Correction:** If you hear a dial tone, the problem is likely to be with the remote (dial-in) modem or with the device to which it is connected. Follow the user procedures for dial-in modems (Section 5.4), or contact the person responsible for the modem at the remote location.



## 5.6 A PC File Transfer Fails

A user can operate a personal computer (PC) as a DECserver 200 port device. The user can transfer files to and from service nodes or to and from remote PCs that are attached locally to service nodes.

Successful file transfers between a port user's PC and a service node depend on the LAT software running on the service node. Service node software that supports data transparency for file transfers is included with the VMS operating system and with certain other operating systems. Ask your service node system manager which systems have data transparency support.

**Problem** The file transfer fails. A VMS service node with data transparency support does not automatically enable data transparency for the file transfer.

**Correction:** Use the CONNECT command to start a session with the service node. Enter SET SESSION PASSALL or SET SESSION PASTHRU in local mode. Use PASSALL for binary file transfers, PASTHRU for ASCII file transfers. RESUME the session and restart the file transfer using the service node file transfer utility.

**Problem** A file transfer fails with a service node that does not have data transparency support.

**Or** A file transfer fails with a PC attached locally to a service node.

**Correction:** In local mode, enter SET SESSION PASSALL or SET SESSION PASTHRU. Use PASSALL for binary file transfers, PASTHRU for ASCII file transfers. RESUME the session and restart the file transfer using the file transfer utility of the service node or of the remote PC.

**Correction:** Refer to the service node or to the remote PC documentation for information on setting characteristics for file transfers. For example, on a VMS service node, use the following command to set the characteristics. (The command example shown is in continuation format.)

```
$ SET TERMINAL /PASSALL/NOHOSTSYNC/NOTTSYNC/NOBROADCAST -  
_ $ /EIGHTBIT/NOWRAP
```

## 5.7 A Line Printer Fails at a Remote-Access Port

A line printer is a port device attached to a remote-access port. A problem in one of the following areas can cause VMS-initiated printing jobs to fail:

- The printer is set up incorrectly on the VMS service node.
- The printer is set up incorrectly on your DECserver 200 unit.
- The printer device or its server port is malfunctioning.

The LAT/VMS documentation that comes with your operating system tells the system manager how to address printer problems at the service node. This section discusses problems involving the printer device and its port. The following material discusses problems related to setting up the printer on your DECserver 200 unit.

**Problem** VMS-initiated PRINT tasks do not execute on the printer. The printer stalls; a "checkpointed" error message appears in the VMS SHOW QUEUE/FULL display.

**Correction:** The printer port must have the ACCESS port characteristic set up to REMOTE or to DYNAMIC. Use the DEFINE PORT command to assign this value for ACCESS, then use the LOGOUT command to log out the port.

**Correction:** Ensure that the printer port and the service node have at least one group code that matches.

**Correction:** The application port on the VMS service node is not correctly mapped to the remote-access port on the server. Ensure that the VMS system manager has the correct value for the server NAME characteristic and for the port NAME characteristic. If you set up the printer as a service on one or more ports, make sure the system manager has the correct service name.

**Problem** Garbled characters or nonsense characters are printed in VMS host-initiated print requests.

**Correction:** Check the AUTOBAUD characteristic for the printer port. Ensure that it is defined as DISABLED. Verify that the parity and character-size characteristics for the printer match those set up for the port. Some printers come with 7-bit, MARK parity; the default server port setting is 8-bit, no parity. In this case, these printers may work initially, but flow control causes a failure.

**Problem** VMS host-initiated printing sessions are disconnected before printing tasks are completed.

**Correction:** With ACCESS DYNAMIC at the port and INTERRUPTS ENABLED, local users can disconnect remote sessions and start local sessions. Determine whether printing requirements justify the port used exclusively for a printer. If so, use the DEFINE PORT or the SET PORT command to set ACCESS to REMOTE.

**Correction:** With ACCESS DYNAMIC, you can limit the local user's access by setting INTERRUPTS to DISABLED. Then the port user cannot stop ongoing remote sessions.

**Correction:** If SIGNAL CHECK is enabled, the print queue stalls with a suspended printing error whenever the printer is powered off during a remote session. The server logs out the port when the attached printer is powered off. The users might have to reenter their PRINT commands after you turn on the printer. The system manager might also have to issue queue management commands.

**Problem** Host-initiated requests in the server queue are delayed in being connected to a printer on an ACCESS DYNAMIC port.

**Correction:** No printing tasks can execute until a local user disconnects service sessions and the port is logged out. You can define the port characteristic INACTIVITY LOGOUT as ENABLED. Then if a local user has no active sessions, the server logs the user out automatically when the INACTIVITY TIMER expires. Assign a value to INACTIVITY TIMER with the SET SERVER or the DEFINE SERVER command.

**Correction:** If printing requirements justify it, set ACCESS to REMOTE so that only remote sessions are serviced at the port.



---

## Problems with Service Nodes

Problems can occur between the DECserver 200 terminal server and one or more service nodes. If the problem involves more than one service node and more than one server, there may be an Ethernet problem. Refer to Chapter 7. If the problem occurs during communication with a single service, the problem is probably with the service node hardware, including the Ethernet interface. The problem may also be in the service node LAT software residing on the service node.

Users often depend on error messages to identify service node problems. The messages indicate that a connection cannot be established or why a service session has been terminated.

### 6.1 Message Timing Problems

Connections between the DECserver 200 terminal server and a service node may fail because of timing problems involving messages transmitted between the server and the service node. Either of the following two messages indicates that the service node exceeded a time-out limit. Either of the next two messages indicates that the value of the server circuit timer is out of a specified range.

Local -201- Connection to *service-name* not established  
No response within timeout period

Local -206- Connection to *service-name* terminated  
No response within timeout period

**Problem** The service node exceeded a time-out limit.

**Correction:** Attempt to reconnect to the service. This condition means that the service node has crashed or is otherwise unreachable. You can check the node status using the SHOW NODE SUMMARY command with the node name. Report the problem to the service node system manager.

Local -224- Connection to *service-name* not established  
Circuit timer out of range

Local -264- Connection to *service-name* terminated  
Circuit timer out of range

**Problem** The server circuit timer value is out of the range specified by the service node system manager.

**Correction:** SET SERVER CIRCUIT TIMER command to reset the timer value. Refer to the *DECserver 200 Management Guide*. With the circuit timer value set, enter the new timer value with DEFINE SERVER CIRCUIT TIMER. This command places the new value in the permanent database.

## 6.2 LAT Protocol Errors

A service node or the server detected messages that violate the LAT protocol. One of the following error messages may appear:

Local -202- Connection to *service-name* not established  
Communication protocol error

Local -207- Connection to *service-name* terminated  
Communication protocol error

**Problem** The server received a message indicating a protocol error from a service node. A connection attempt fails, or an existing session terminates.

**Correction:** Attempt to reconnect to the service. This condition indicates a problem with the LAT software on the service node. Report the problem to the service node system manager.

Local -226- Connection to *service-name* not established  
Invalid message or slot received

Local -266- Connection to *service-name* terminated  
Invalid message or slot received

**Problem** The service node is receiving server messages that violate the LAT protocol.

**Correction:** Use the CONNECT command. If connection to the service fails, initialize the server to down-line load the server software. If the error messages reappear for CONNECT, submit an SPR to Digital Equipment Corporation.

### 6.3 Authorized Groups Mismatch

The following messages at a port may indicate that the port and the service node do not have a group in common.

Local -711- Service *service-name* not known

Local -716- Access to service *service-name* denied

Local -725- Access to node *node-name* denied

**Problem** There is no match between a service node group and any of the current groups set up for the port.

**Correction:** Confirm the mismatch by entering the SHOW SERVICES *service-name* command at the port. If the service node does not appear in the display, the groups do not match.

Determine the groups that are enabled for the service node. Then adjust the AUTHORIZED GROUPS list for the port as described in the *DECserver 200 Management Guide*.

### 6.4 Server Capacity Exceeded

The following messages at a port may indicate that the server capacity has been exceeded.

Local -711- Service *service-name* not known

Local -716- Access to service *service-name* denied

Local -725- Access to node *node-name* denied

**Problem** The server node limit has been reached, so there is no room to store additional service nodes.

**Correction:** Either increase the server node limit, or use group codes to restrict the number of service nodes for which the server stores information.

## 6.5 Service Node Software Not Running

One of the following error messages may appear:

Local -711- Service *service-name* not known

Local -715- Service *service-name* not currently available

**Problem** The LAT service node software is not running on any service node offering the service.

**Correction:** Ask the system manager of a node that offers the service to restart the service node software. The *DECserver 200 Software Installation Guide* and the documentation for the service node operating system contain details about the procedure. For VMS systems, refer to the LAT documentation that comes with your operating system.

**Problem** The number of service nodes on the network exceed the value for the server node limit characteristic.

**Correction:** Use group codes to restrict the number of service nodes in the server database, or raise the server node limit.

## 6.6 Service Node Not Available

The following message may appear when a user tries to connect to a service:

Local -715- Service *service-name* not currently available

**Problem** A service node has shut down, maybe due to a system crash.

**Correction:** Attempt to connect to the service. If other service nodes offer the service, the server establishes a session. If no session is established, contact the system manager of the nonoperational service node.



---

## Problems with the Ethernet

This chapter contains guidelines for monitoring the Ethernet using the SHOW SERVER COUNTERS display. The SHOW SERVER COUNTERS data is the primary source for detecting Ethernet problems. You can use the MONITOR SERVER COUNTERS command to get a continuously updated screen display of server counters. The *DECserver 200 Management Guide* describes the counters and possible error indications. Note that Ethernet problems can also be indicated by down-line load or up-line dump failures.

**Problem** The counters listed in the right-hand column of the SHOW COUNTERS display exceed guidelines.

**Or** Message 915 on the console port terminal indicates that a transmission failed after several attempts during a down-line load or an up-line dump.

**Or** Down-line loads or up-line dumps fail intermittently.

**Correction:** Use the privileged TEST LOOP command to test the circuits between the DECserver 200 unit and any node on the Ethernet. The command syntax is discussed in detail in Chapter 2 of the *Terminal Server Commands and Messages Reference*. The server software sends a message to your port device to indicate whether the loop test is successful or not. Message 512 indicates a successful test. Message 513 appears if the returned data was corrupted or if the test timed out with no response from the target node. If TEST LOOP fails, work with your network manager to resolve the Ethernet problem.

**Correction:** Ask the load host system manager to check the host Ethernet counters. If the counters indicate an Ethernet problem, the system manager can use the NCP LOOP CIRCUIT command to test the Ethernet between the load host and the DECserver 200 unit. If the test indicates a problem, contact the network manager.

---

## Digital Equipment Corporation Service

This chapter presents guidelines to follow before you contact Digital Equipment Corporation about a problem with your DECserver 200 unit. It also has instructions for returning your DECserver 200 terminal server and tells what to return if you have a problem with your DECserver 200 software.

The hardware and software service options available from Digital Equipment Corporation are described in the *DECserver 200 Hardware Installation/Owner's Guide*. One hardware option and one software option operate on a DECserver 200 system. Contact your Digital Equipment Corporation sales representative for more information.

### 8.1 Before You Contact Digital Equipment Corporation

To ensure a prompt solution:

- Be sure you have used the procedures described in this chapter.
- Use a terminal or other port device to perform troubleshooting procedures. A console terminal provides useful information about problems involving DECserver initialization and down-line loading.
- Record your server serial number, its software version number, and the information on the Engineering Change Order (ECO) status label.
- If possible, record the symptoms when the server failed. Record the troubleshooting steps you took and the results of these steps.

- If you are reporting a software problem, up-line dump the server memory by using the privileged CRASH command. The up-line dump file is useful for finding internal logic errors in the software. See Section 8.3 for details on how to send crash dump files to Digital Equipment Corporation.

## 8.2 Repackaging a DECserver for Shipping

If you return the DECserver 200 unit to Digital Equipment Corporation for repair or for replacement, pack the unit carefully. If possible you should use the original shipping carton and packaging material.

## 8.3 Forwarding Up-Line Dump Data

If a fatal bugcheck, message 913, caused an up-line dump of the server memory image (see Section 4.7), send the dump file to Digital Equipment Corporation. Copy the file to a 1600 bits per inch (bpi) magnetic tape, a TU58 cartridge, a TK50 cartridge, an RX01 or an RX02 diskette. Indicate the format of the copy (BACKUP,FLX,etc.) on the medium. Forward the data to the address available from your Digital Equipment Corporation representative.

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# How To Order Documents

This section provides all the information you need to order additional documents. The ordering procedure you use depends on:

- Whether you are a customer or a Digital employee
- Your location: USA or Puerto Rico, Canada, or other
- Your means of placing the order: telephone, electronic mail, or regular mail

The following sections give specific ordering procedures and the order numbers for software and hardware manuals.

## Order Numbers

For software manuals, use the documentation kit order number. For hardware manuals, use the document order number. Software kits are available for four operating systems: VMS, RSX-11M-PLUS, Micro/R SX and ULTRIX-32.

## VMS Software Documentation Kit

The order number for the DECserver 200 VMS documentation kit is QA-VCBAA-GZ. The kit contains one each of the following manuals:

- *Software Product Description*
- *DECserver 200 Software Installation (VMS)*
- *Using DECserver 200 Documents*

- *Local Area Transport (LAT) Network Concepts*
- *User's Guide*
- *Terminal Server User's Reference Card*
- *Commands Mini-Reference*
- *Terminal Server Commands and Messages*
- *Management Guide*
- *Problem Determination Guide*
- *Terminal Server Glossary*

### **RSX-11-M-PLUS Software Documentation Kit**

The order number for the DECserver 200 RSX-11-M-PLUS documentation kit is QRZ07-GZ. This kit contains the same manuals as the VMS documentation kit except that the RSX-11M-PLUS kit contains *DECserver 200 Software Installation (RSX-11M-PLUS)* instead of the VMS version.

### **Micro/RSX Software Documentation Kit**

The order number for the DECserver 200 Micro/RSX documentation kit is QYZ07-GZ. This kit contains the same manuals as the VMS documentation kit except that the Micro/RSX kit contains *DECserver 200 Software Installation (Micro/RSX)* instead of the VMS version.

### **ULTRIX-32 Software Documentation Kit**

The order number for the DECserver 200 ULTRIX-32 documentation kit is QA-VDEAA-GZ. This kit contains the same manuals as the VMS documentation kit except that the ULTRIX-32 kit contains *DECserver 200 Software Installation (ULTRIX-32)* instead of the VMS version.

## DECserver 200 User's Documentation Kit

The order number for the DECserver 200 User's Documentation kit is QA-VDEAB-GZ. The kit contains the following manuals:

- *DECserver 200 User's Guide*
- *Terminal Server User's Reference Card*

## Hardware Documents

Table 1 lists the order numbers for the hardware manuals.

**Table 1: Hardware Documents**

Manual Title	Order Number
DECserver 200 Hardware Installation	EK-D200H-IN
DECserver 200 Identification Card	EK-D200T-ID
DECserver 200 Technical Description	EK-DECS2-TM
DECconnect System Installation and Verification Guide	EK-DECSY-VG
DECconnect System Planning and Configuration Guide	EK-DECSY-CG

## Ordering Procedures for Customers

If you are a customer, refer to Tables 2 and 3.

**Table 2: How to Order by Phone**

If You Live In	Phone
United States	(800) DIGITAL
Puerto Rico	(800) 754-7575 x2012
Canada	(800) 267-6215

**Table 3: How to Order by Mail**

<b>If You Live In</b>	<b>Write to</b>
USA or Puerto Rico*	Digital Equipment Corporation CS2008 Nashua, New Hampshire 03061
Canada	Digital Equipment of Canada LTD. 940 Belfast Road Ottawa, Ontario, Canada K1G 4C2 Attn: A&SG Business Manager
Other	Digital Equipment Corporation A&SG Business Manager c/o Digital's local subsidiary or approved distributor

\* Any prepaid order from Puerto Rico must be placed with your local Digital Subsidiary: (809)-754-7575 x2012.

## Ordering Information for Digital Employees

### Software Documentation Kits

If you are a Digital employee, use the Internal Software Order Form. The form is available from Office Services and the Software Distribution Center (SDC). Complete the form according to instructions and mail it.

### Hardware Manuals

If you are a Digital employee, you can order hardware manuals by telephone, VAXmail, or DECmail as follows:

- Telephone number: (508) 351-4323 (DTN: 234-4323)
- DECmail address: ORDER @NRO
- VAXmail address: NEST::ORDER

### Note

If you use electronic MAIL, DECmail is preferred to VAXmail.

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Completeness	1	2	3	4	5

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