

DECstation 5000/ DECsystem 5000

Model 200

Maintenance Guide

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Using This Guide

Intended Audience

This guide is for Digital customer service representatives who have completed training in DECstation/DECsystem 5000 Model 200 maintenance. This guide assumes that you are familiar with basic maintenance and troubleshooting operations and that you have experience with desktop computer systems.

How To Use This Guide

This guide explains how to identify and replace failed field-replaceable units (FRUs). 1, 2, and 3 give background information about the system hardware and operations regularly used for customer service. Chapter 4 describes how to determine which FRU failed. Chapter 5 provides detailed information about troubleshooting and replacing individual FRUs.

For an overview of the system hardware and its configurations, refer to Chapter 1, “A Look at DECstation/DECsystem 5000 Model 200 Hardware.”

To perform routine service operations, refer to Chapter 2, “Service Operations.”

To run tests and interpret their error codes, refer to Chapter 3, “Troubleshooting Tools.”

To identify failed FRUs, refer to Chapter 4, “Identifying Failed FRUs.”

For a description of the hardware, troubleshooting procedures, and replacement procedures for base system FRUs, refer to Chapter 5.

For a description of the hardware, troubleshooting procedures, and replacement procedures for TURBOchannel options, drives, and monitors, refer to the *TURBOchannel Maintenance Guide*.

For equipment specifications, refer to Appendix A.

For equipment part numbers and a recommended spares list, refer to Appendix B.

For an explanation of console commands, refer to Appendix C.

For an explanation of individual system module and memory module tests, refer to Appendix D.

For information about R3000 CPU registers, refer to Appendix E.

For an explanation of console commands used by Version PDE3 ROM chips that are in some systems, refer to Appendix G.

For an explanation of individual test commands and error messages used by VERSIon PDE3 ROM chips, refer to Appendix G.

About the Scope of This Guide

This guide discusses current DECstation/DECsystem 5000 hardware only. The maintenance guide will be revised as additional options become available. Some of these future options are three-dimensional graphics option modules.

Conventions Used in This Guide

Table 1. Conventions Used in This Guide

Convention	Use
Monospace type	Anything that appears on your monitor screen is set in monospace type, like this.
Boldface type	Anything you are asked to type is set in boldface type, like this.
<i>Italic type</i>	<i>Any part of a command that you replace with an actual value is set in italic type, like this.</i>

A Look at DECstation/DECsystem 5000 Model 200 Hardware

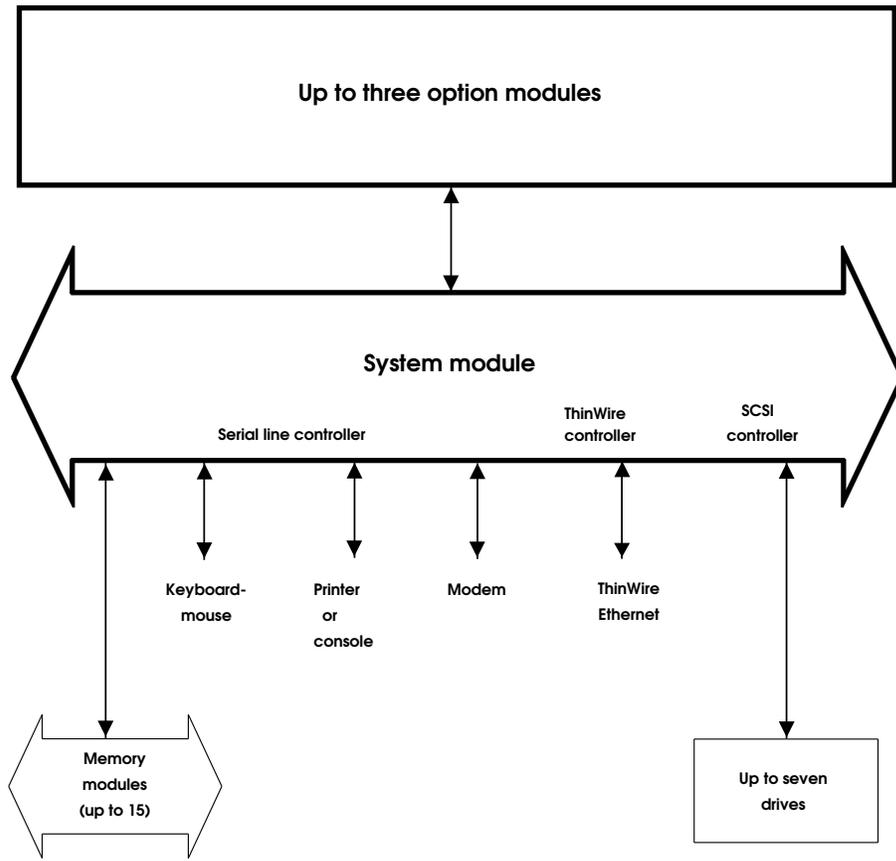
This chapter describes

- Possible system hardware configurations
- Basic system hardware
- Optional system hardware

System Hardware Configurations

The DECstation/DECsystem 5000 Model 200 is a reduced instruction set computer (RISC), ULTRIX-based desktop system. Depending on the actual hardware, the system operates as either a server or a workstation. DECstation/DECsystem 5000 Model 200 system hardware includes basic hardware that supports graphics, drives, additional Ethernet connections, and additional memory.

Figure 1-1 shows the possible configurations of the basic and optional system hardware. Each item in Figure 1-1 is a field-replaceable unit (FRU).



WSE2M001

Figure 1-1. Possible system hardware configurations

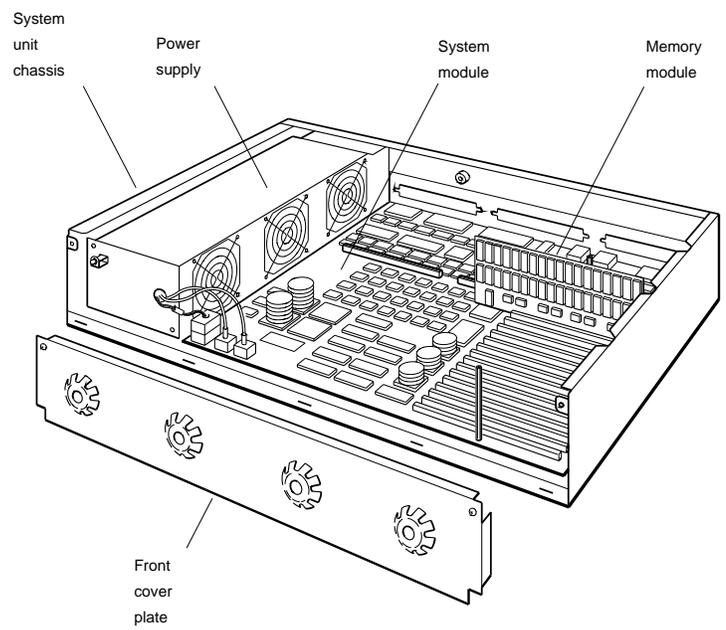
Basic System Hardware

The basic system hardware includes a system unit with controls, indicators, and system connectors.

System Unit

The system unit, shown in Figure 1-2, includes the following:

- One system module and chassis, which includes
 - One central processing unit (CPU)
 - One floating-point unit (FPU)
 - One small computer system interface (SCSI) controller
 - One serial line controller
 - One ThinWire Ethernet controller
 - Fifteen slots for memory modules
 - Three slots for optional graphics, SCSI, and ThickWire Ethernet modules
 - One metal chassis that holds the system module
- One 8-Mbyte memory module connected to the system module
- One power supply, which has three cooling fans
- A removable system unit cover and front cover plate



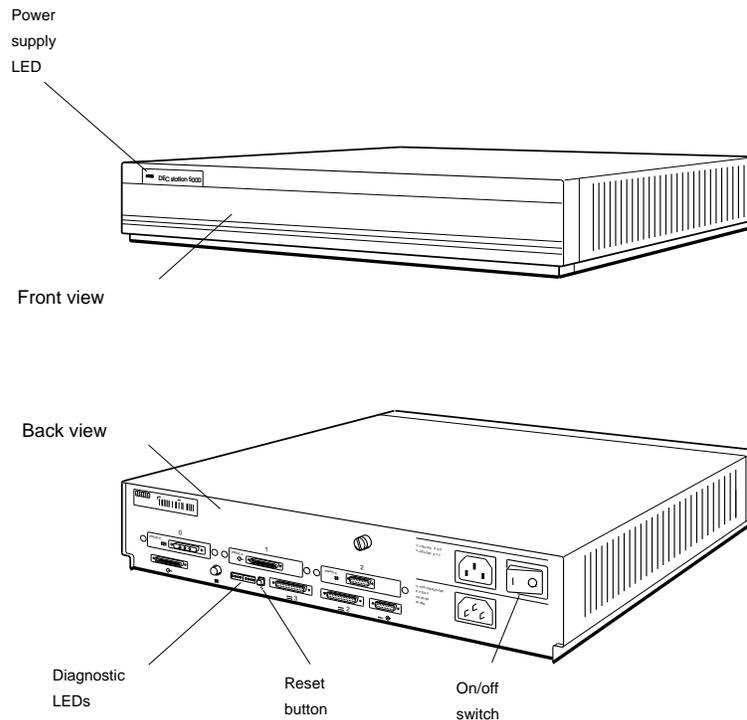
WSE2M002

Figure 1-2. System unit

System Unit Controls and Indicators

The system unit controls and indicators, shown in Figure 1-3, have the following uses:

- The on/off switch turns the system on and off. Press down the 0 on the switch to turn off the power. Press down the 1 on the switch to turn on the power.
- The power indicator glows green when the power supply is operating properly.
- The diagnostic LEDs display binary error codes that indicate test results.
- The reset button initializes the system.



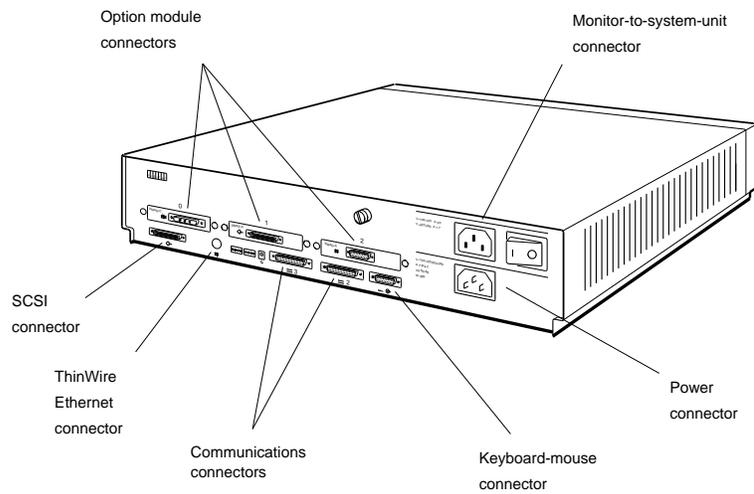
WSE2M003

Figure 1-3. System controls and indicators

System Unit Connectors

The system unit connectors, shown in Figure 1-4, have the following purposes:

- The power connector connects the system unit power supply and the system unit power cord.
- The monitor-to-system-unit connector provides electric power to the monitor power cord.
- The ThinWire Ethernet connector links the system unit to a ThinWire Ethernet.
- The SCSI connector connects the base system SCSI controller to a chain of external drives.
- The keyboard-mouse connector links the system unit to the keyboard-mouse cable.
- The communications connectors provide printer, modem, and console terminal connections. If there is a console terminal, the terminal usually connects to the left communications connector.
- The option module connectors connect option modules to external hardware. The number printed above each option module connector is the slot number for any option module in that slot.



WSE2M004

Figure 1-4. DECstation/DECsystem 5000 connectors

Hardware Options

The system module has slots for additional memory and TURBOchannel option modules.

Figure 1-5 shows the location of memory and option module expansion slots on the system module.

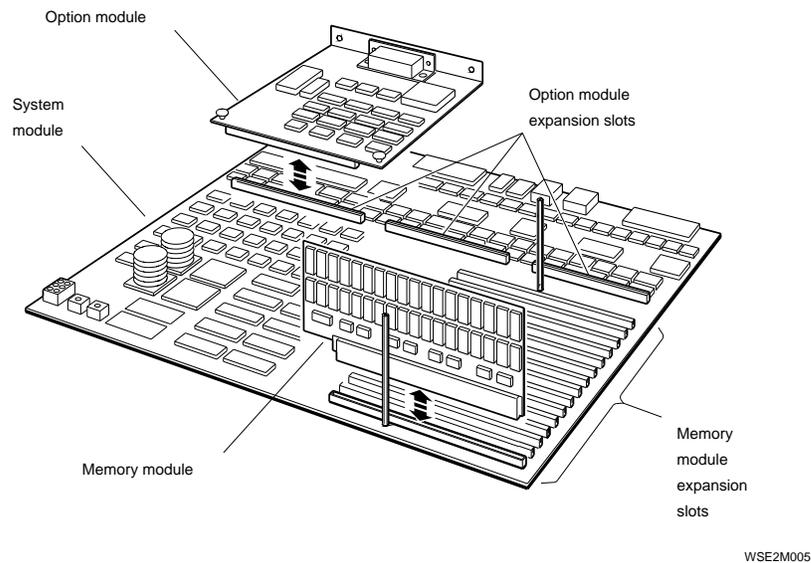


Figure 1-5. Location of memory and expansion slots on the system module

Additional Memory Modules

The system module has 15 expansion slots for additional memory modules. Each memory slot can support one 8-Mbyte memory module.

Optional TURBOchannel Modules

The three TURBOchannel expansion slots on the system unit support a maximum of three option modules.

Any optional SCSI or Ethernet controller modules operate in addition to the SCSI and ThickWire Ethernet controller built in to the system module.

Drives

Each SCSI controller supports up to seven drives that connect in a chain that attaches to the SCSI controller through the back of the system unit.

Monitors and Terminals

The system supports different monitors, depending on the graphics option modules that are in the system. Refer to the *TURBOchannel Maintenance Guide* for a description of the monitors that graphics option modules support.

The system can also display text on a VT320 terminal attached to the communications connector on the left as you face the back of the system unit.

Keyboard and Mouse

The system uses an LK201 keyboard and VSXXX-AA mouse that connect to the back of the system unit through the keyboard-mouse cable.

For Further Information

For further information about the hardware described in this chapter, refer to later chapters that discuss the hardware in which you are interested.

For further information about TURBOchannel option modules, drives, or monitors, refer to the *TURBOchannel Maintenance Guide*.

2

Service Operations

This chapter explains how to perform routine service operations. It explains how to

- Avoid electrostatic damage when handling components
- Use an alternate terminal
- Remove the system unit cover
- Remove the front cover plate
- Remove and replace the serial number plate
- Install and remove terminators and loopback connectors
- Enter console mode and operating mode
- Use console command passwords
- Boot the system software
- Shut down the system software

Using an Antistatic Kit

The Digital antistatic kit contains the equipment you need to handle static-sensitive materials safely. When handling static-sensitive materials, always

- Place the antistatic wrist strap around your wrist and attach the other end of the strap to the snap-on fastener attached to the antistatic mat before you handle any static-sensitive item.
- Place the static-sensitive item on the antistatic mat when you set it down.

Figure 2-1 shows the antistatic kit parts and their proper use.

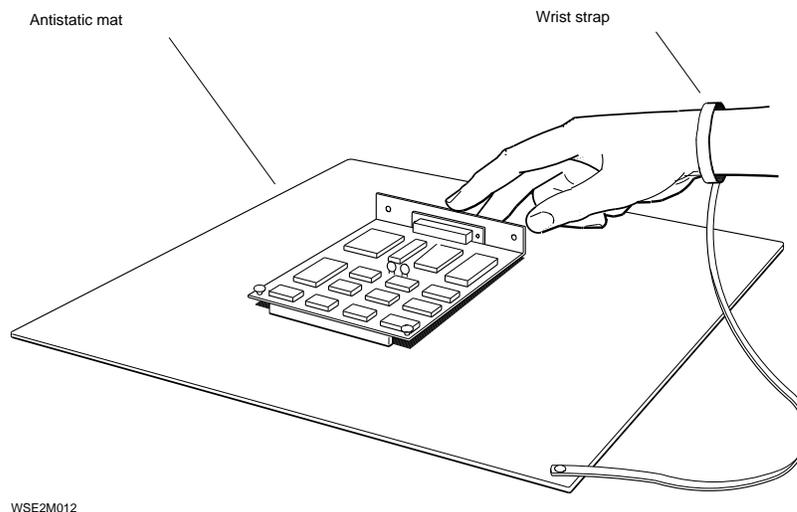


Figure 2-1. Using an antistatic kit

Using an Alternate Terminal

If the original monitor is not working properly, you can use an alternate terminal to run tests.

When the alternate console is set, the alternate terminal displays the same text as a regular system monitor. You can use either the original or alternate keyboard to type commands. Use a VT320 terminal set to 9600 baud.

Figure 2-2 shows how to connect an alternate terminal.

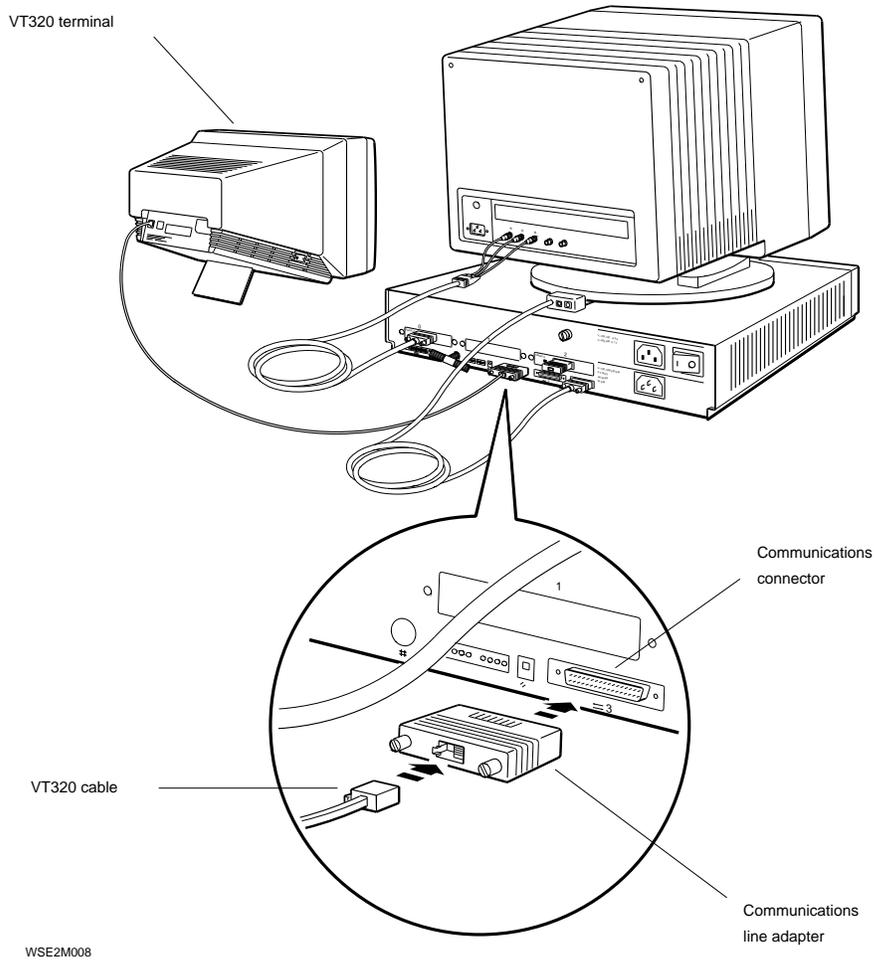


Figure 2-2. Connecting an alternate terminal

Note: *Remove any graphics modules installed in the system before you enable the alternate terminal.*

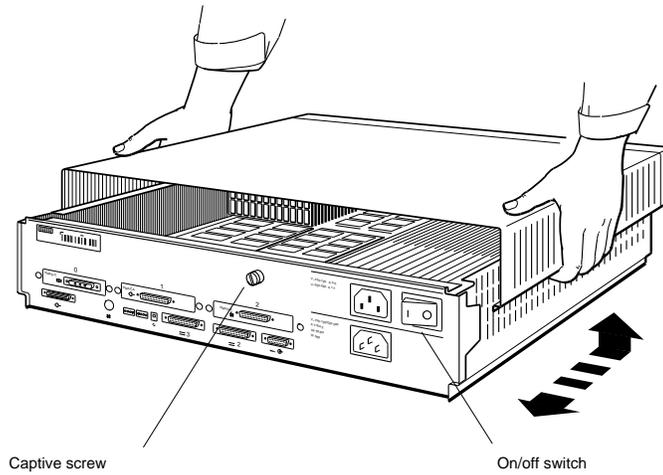
1. Install a communications line adapter on the communications line that is on the left as you face the back of the system. Refer to “Removing and Installing Loopback Connectors and Terminators” later in this chapter for directions.
2. Insert the end of the keyboard cable into the keyboard cable connector on the alternate terminal.
3. Insert the end of the VT320 cable into the communications line adapter on the back of the system unit.
4. Turn on the alternate terminal.
5. Turn on the system unit. The system automatically enables the alternate terminal after you turn on the system unit power.

A display should appear on the alternate terminal.

To return to using the original monitor, replace the graphics module that was installed in the system unit. After you turn on the power, the system returns to using the original monitor.

Removing and Installing the System Unit Cover

Figure 2-3 shows how to remove and install the system unit cover.



WSE2M013

Figure 2-3. Remove and installing the system unit cover

To Remove the System Unit Cover

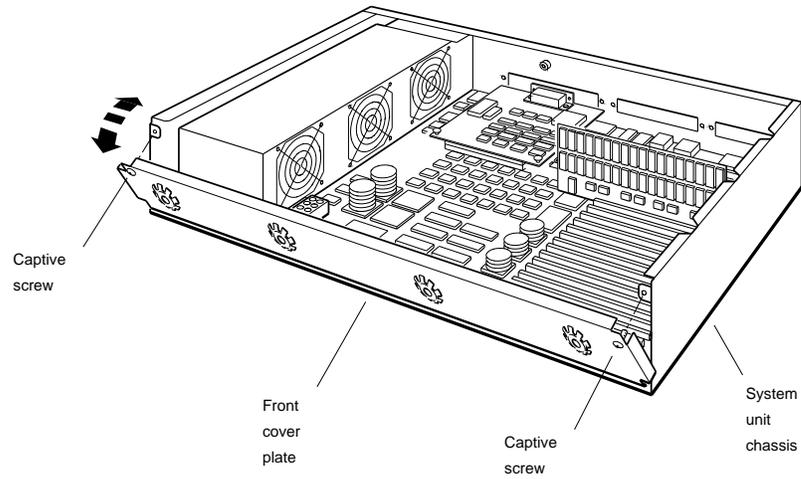
1. Turn off the system power.
2. Disconnect the system unit power cord.
3. Loosen the captive screw that holds the cover.
4. Face the front of the system unit and grip each side of the system unit cover.
5. Pull the cover toward you until it comes loose from the chassis. Then lift the cover up and away from the system unit.

To Install the System Unit Cover

6. Place the system unit cover on the chassis. Leave at least 2 inches between the cover and the back of the system unit.
7. Slide the system unit cover toward the back of the system unit until it pops into place.
8. Tighten the captive screw.
9. Reconnect the system unit power cord to the system unit power connector.

Removing and Installing the Front Cover Plate

Figure 2-4 shows how to remove and install the front cover plate.



WSE2M014

Figure 2-4. Removing and installing the front cover plate

To Remove the Front Cover Plate

1. Make sure the system power is off.
2. Remove the system unit cover. Refer to the previous section for directions.
3. Loosen the two captive screws.
4. Tilt the top of the plate down and lift it away from the chassis.

To Install the Front Cover Plate

5. Make sure the system power is off.
6. Insert the tabs on the bottom of the plate into the slots in the front of the chassis.
7. Tilt the plate forward.
8. Tighten the two captive screws.

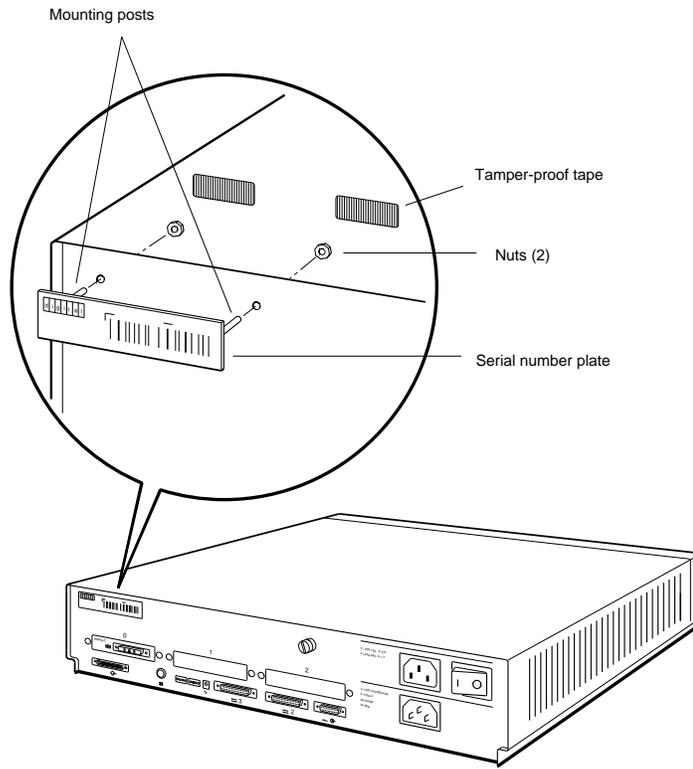
Removing and Installing a Serial Number Plate

To Remove a Serial Number Plate

1. Turn off the system unit power.
2. Remove the system unit cover. Refer to “Removing and Installing the System Unit Cover” earlier in this chapter for directions.
3. Peel the tamper-proof tape off the two nuts that hold the serial number plate.
4. Use a crescent wrench to remove the two nuts that hold the serial number plate.
5. Pull the serial number plate away from the system unit.

To Install a Serial Number Plate

1. Make sure the system unit power is off and the system unit cover is removed.
2. Pass the two posts on the back of the serial number plate through the holes in the back of the system unit.
3. Tighten the two nuts onto the posts.
4. Apply one piece of security tape over each nut and the post surrounding it.



WSE2M050

Figure 2-5. Removing and installing a serial number plate

Removing and Installing Loopback Connectors and Terminators

- To remove and install a ThinWire terminator, follow the directions in Figure 2-6.
- To remove and install a ThickWire loopback connector, follow the directions in Figure 2-7.
- To remove and install a communications loopback connector, follow the directions in Figure 2-8.
- To remove and install a SCSI chain terminator, follow the directions in Figure 2-9.
- To remove and install a communications line adapter, follow the directions in Figure 2-10.

To Remove a ThinWire Terminator

1. Twist the collar on the ThinWire T-connector as far as possible to the left.
2. Pull the T-connector off of the system unit connector.

To Install a ThinWire Terminator

1. Press a terminator onto each unused end of the T-connector. Turn the terminator to the right until it locks into place.
2. Push the T-connector collar onto the ThinWire connector on the system unit.
3. Turn the T-connector collar to the right until it slips past the connector tabs and slides into place.

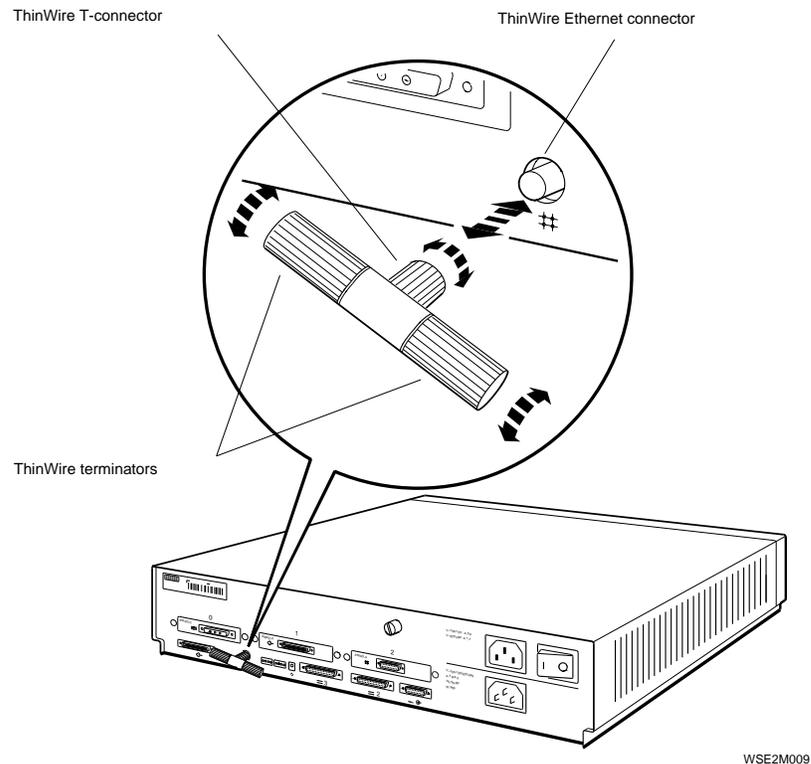


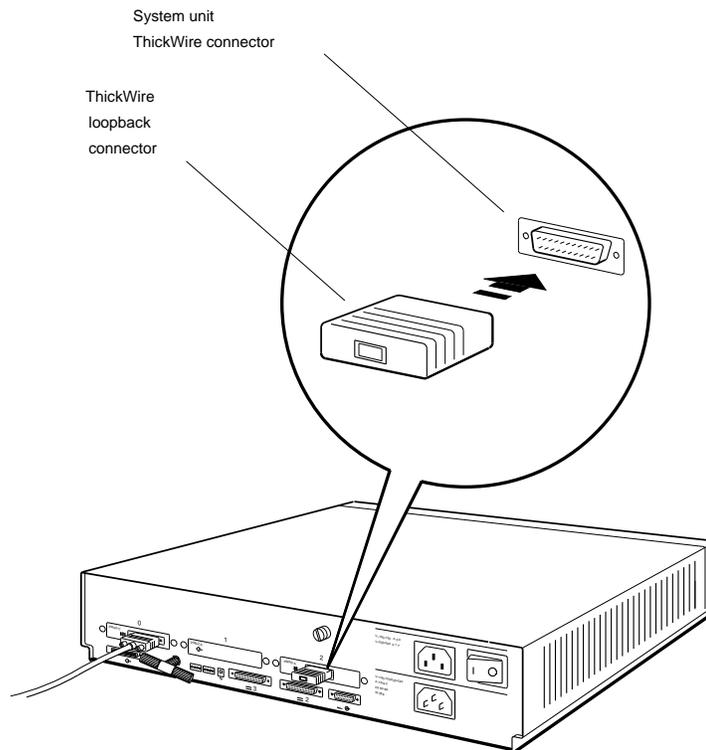
Figure 2-6. Removing and installing a ThinWire Ethernet terminator

To Remove a ThickWire Loopback Connector

1. Firmly grip the ThickWire loopback connector.
2. Pull the ThickWire loopback connector away from the ThickWire connector on the system unit.

To Install a ThickWire Loopback Connector

1. Align the wide end of the loopback connector and the wide end of the ThickWire Ethernet connector.
2. Firmly press the loopback connector onto the ThickWire Ethernet connector.



WSE21026

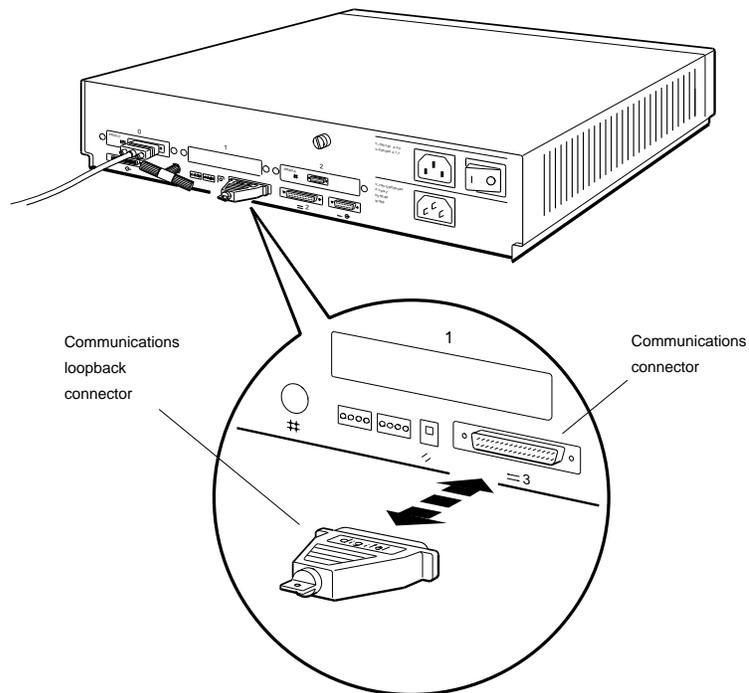
Figure 2-7. Removing and installing a ThickWire loopback connector

To Remove a Communications Loopback Connector

1. Firmly grip the communications loopback connector.
2. Pull the communications loopback connector away from the communications connector.

To Install a Communications Loopback Connector

1. Align the wide end of the loopback connector and the wide end of the communications connector.
2. Firmly press the loopback connector onto the communications connector.



WSE2M048

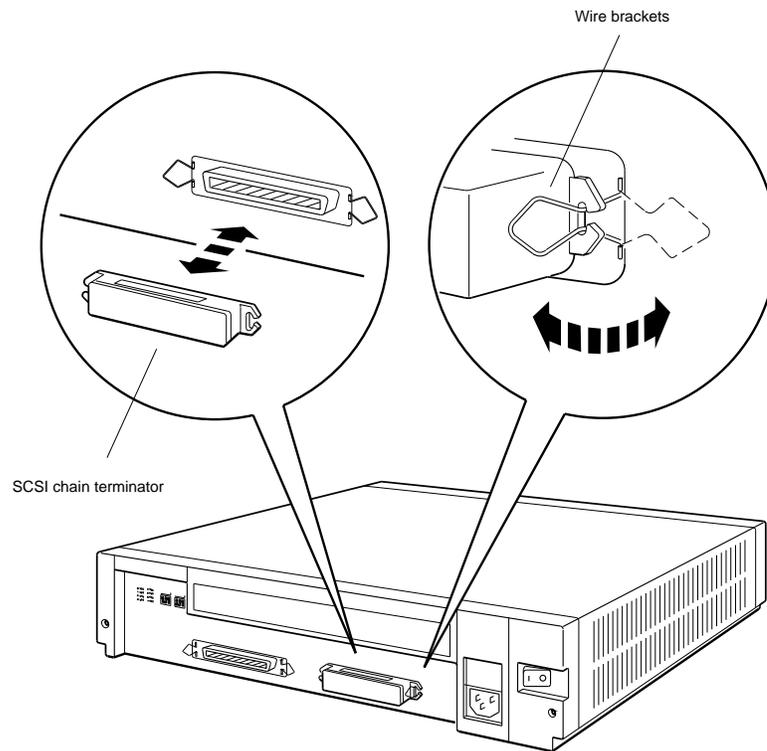
Figure 2-8. Removing and installing a communications loopback connector

To Remove a SCSI Chain Terminator

1. Push the wire brackets away from the terminator.
2. Pull the terminator off of the SCSI connector.

To Install a SCSI Chain Terminator

1. Firmly press the chain terminator onto the unused connector on the drive at the end of the chain.
2. Fasten the SCSI connector wire brackets onto the SCSI terminator.



WSE2M040

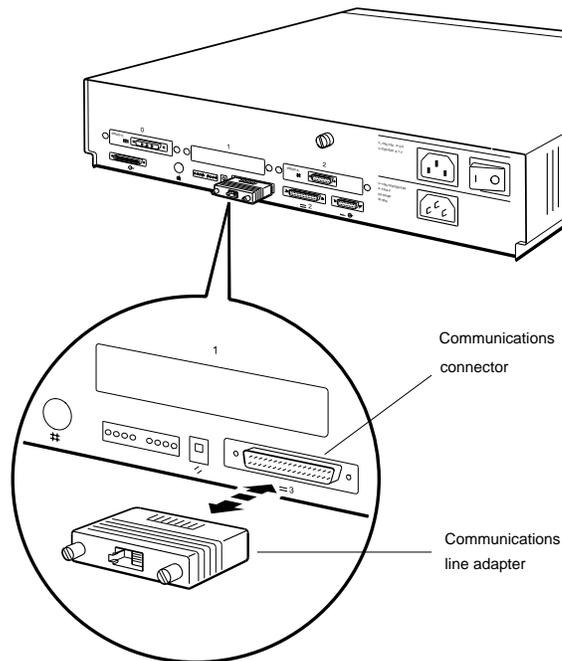
Figure 2-9. Removing and installing a SCSI chain terminator

To Remove a Communications Line Adapter

1. Loosen the two screws that hold the adapter to the communications connector.
2. Pull the communications line adapter away from the system unit.

To Install a Communications Line Adapter

1. Firmly press the communications line adapter onto the communications connector.
2. Tighten the two screws.



WSE2M037

Figure 2-10. Removing and installing a communications line adapter

Entering Console and Operating Modes

The system operates in either of two modes:

- *Console mode*

Use console mode to

- Run tests
- Display hardware configurations
- Set environment variables
- Boot the system software

In console mode, the system displays the prompt `>>` or `R>`. The system displays the prompt `>>` whenever you can use all console commands. If the system displays the prompt `R>`, you can use only the boot and password console commands until you enter the password.

- *Operating mode*

In operating mode, the system displays the appropriate ULTRIX prompt. Use operating mode for regular system operation.

To Enter Console Mode

Enter console mode by turning on the system power or pressing the reset button. If the system is running software, shut down the system software before you enter console mode. When you turn on the system power, the system completes a power-up self-test before displaying the console prompt.

If the system displays the prompt `R>`, you can use only the boot and password commands until you enter a password. To enter the password, type **passwd** and press Return. At the prompt `pwd:`, type the password and press Return. When you have access to all console commands, the system displays the prompt `>>`.

For information about setting and removing console command passwords, refer to “Using Console Command Passwords” later in this chapter.

To Enter Operating Mode

Enter operating mode by booting the system. Refer to “Booting the System Software” later in this chapter for directions.

Using Console Command Passwords

You can set the system so that you can use only the boot and password commands until you enter a password. A system that requires a password before you can use all console commands displays the prompt `R>` until you enter the correct password.

To be able to use all console commands on a system that requires a password, type **passwd** at the prompt `R>`. Then type the password and press Return. The system then allows you to use all console commands. Whenever all console commands are available, the system uses the prompt `>>`.

To Set or Change a Password

To set or change a password, use the password command with the `-s` option.

1. Type **passwd -s** at the prompt `>>` and press Return.
2. At the prompt `pwd:`, type the new password and press Return.
3. The system repeats the prompt `pwd:`. Enter the password a second time at the prompt `pwd:`.

Note that passwords must

- Have at least six characters
- Have no more than 32 characters
- Use uppercase and lowercase letters the same as when you first entered the password

If the two password entries match, the entry becomes the new password. If the two entries do not match, the old password remains in effect.

To Remove a Requirement for a Password

To remove a requirement for a password, type **passwd -c** at the prompt `>>` and press Return.

To Erase a Password You Do Not Know

You can erase a password by inserting a clear-nonvolatile-RAM (NVR) jumper. After you insert a clear-NVR jumper, you will need to reset all environment variables.

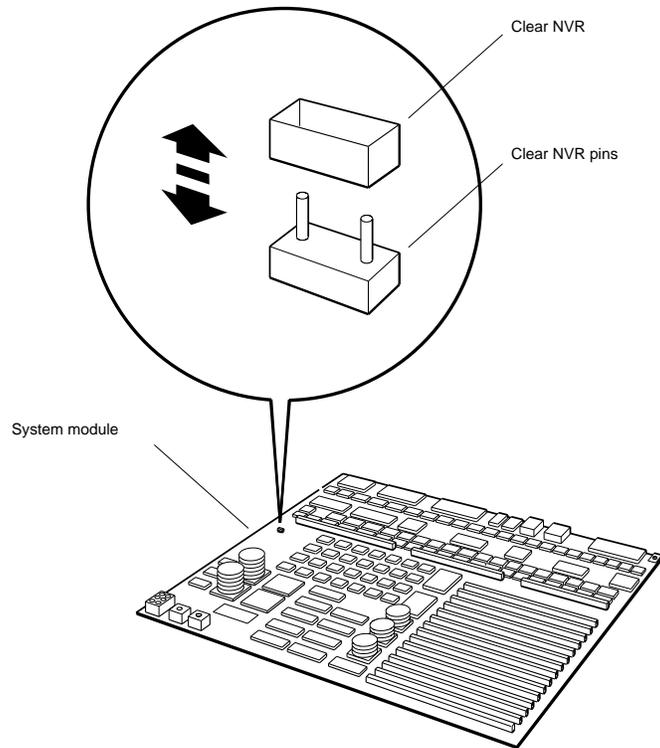
To erase a password you do not know,

1. Turn off the system power.
2. Install the clear-NVR jumper. Refer to the following section for installation directions.
3. Turn on the system and wait for the console prompt to appear.
4. Turn off the system again.
5. Remove the clear-NVR jumper.
6. Turn on the system power.
7. Use the `setenv` command to reset environment variables to the values you want.

After you erase the password, the console commands have no password protection until you set a new password.

Inserting and removing a clear-NVR jumper

Figure 2-11 shows how to insert and remove the clear-NVR jumper.



WSE2M047

Figure 2-11. Inserting and removing a clear-NVR jumper

To insert the jumper,

1. Turn off the system unit.
2. Remove the system unit cover. Refer to “Removing and Installing the System Unit Cover” earlier in this chapter for directions.
3. Locate the clear-NVR pins on the system module. The clear-NVR jumper pins are a two-pin fixture.
4. Slide the jumper entirely over the clear-NVR pins.

To remove the jumper,

1. Make sure the system power is off.
2. Remove the system unit cover if it is on the system unit.
3. Slide the jumper up and away from the clear-NVR pins.

Booting the System Software

To boot the system, use the boot command.

Booting a system can take several minutes. If the system displays the ULTRIX prompt # before the prompt login: appears, press Ctrl-D to continue with the boot operation.

If the boot is successful, the monitor displays the prompt login:.

If the system fails to boot, do the following:

1. Use the printenv command to display the environment variables table.
2. Use the setenv command to set the boot environment variable to a hard disk or to the network that contains the system software.
3. Use the boot command to boot the system.

For a detailed explanation of these console commands, refer to Appendix C.

If the system still does not boot, check any boot error messages that appear on the monitor. Refer to Appendix C to find the meaning of boot error messages.

Shutting Down the System Software

If the system is running ULTRIX software, shut down the system before you perform customer service. To shut down the software, type the following command at the ULTRIX prompt:

```
/etc/shutdown -h (now | hhmm | +n)
```

- Specify the *now* parameter to shut down the software immediately.
- Specify *hhmm* to shut down the software at a specified time. Replace *hhmm* with the hour and minute the shutdown begins, where
 - *hh* represents the hour to begin the shutdown.
 - *mm* represents the minute to begin the shutdown.
- Specify *+n* to shut down the software in a specified number of minutes. Replace *n* with the number of minutes until shutdown begins.

The monitor displays the prompt >> or R> when shutdown is complete.

3

Troubleshooting Tools

This chapter explains the system troubleshooting tools. It explains how to

- Use different types of tests
- Set up tests for groups of selected modules
- Interpret test results
- Examine and interpret error logs
- Use boot error messages
- Use console status messages

Using Tests

The system uses two types of tests to check system hardware operation:

- Power-up self-tests, which run a comprehensive test of the system hardware
- Subtests, which test individual modules that you choose

Subtests can be individual tests or test scripts, which are groups of individual tests. If you run a test script, you can select one of several prepared scripts or create your own.

Using Slot Numbers in Test Commands and Error Messages

Test commands and error messages include slot numbers that identify the hardware to which the test command or error message refers.

The slot number for the system module and memory modules is always 7. Figure 3-1 shows the slot numbers for the SCSI and ThinWire controllers on the system module and the option modules.

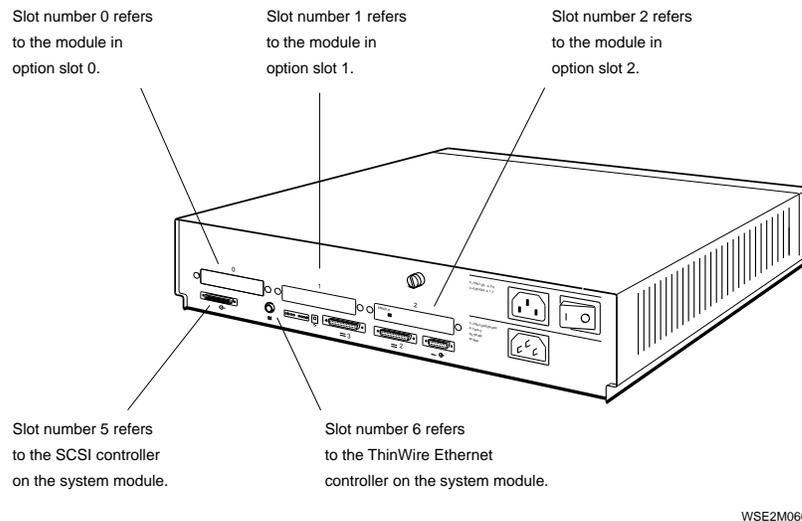


Figure 3-1. Slot numbers for system hardware

Running Power-Up Self-Tests

The system runs a power-up self-test when you turn on the system power. The monitor and diagnostic LEDs report any errors the power-up self-test detects. To find the corrective action for any error codes the power-up self-test reports, refer to Chapter 4.

***Note:** If the monitor displays the message `PDE3: x`, where `x` represents an option module slot number, the system contains incompatible ROM chips. Upgrade the system ROM chips if the `PDE3: x` message appears.*

You can specify a quick or thorough power-up self-test script to run when the system powers up.

- The quick test script is a limited script that minimizes the time until the system boots.
- The thorough script runs an extensive check of system hardware. The thorough power-up self-test script is most useful for field service troubleshooting.

To select a power-up self-test script, use the `setenv` command to set the `testaction` environment variable. Type **`setenv testaction (q | t)`** and press Return.

- Specify `q` to select the quick test.
- Specify `t` to select the thorough test.

Running Subtests

In addition to the power-up self-test, you can use subtests to troubleshoot. Subtests run individual tests or test scripts.

Running Individual Tests

To run an individual test, type

```
t [-l] slot/test [arg1] [arg2] [arg3] . . .
```

When you type an individual test command,

- `t` is the command to run a test.
- Include the optional `-l` parameter to make the test repeat continuously until you type Ctrl-C or reset the system.
- Replace `slot` with the slot number of the module to be tested. Table 3-1 lists the slot numbers assigned to each module.
- Replace `test` with the name of the particular test you want to run.
- The optional extended arguments (*arg-1* and so on) specify individual test conditions. Refer to Appendix D for an explanation of the arguments used for each test.

Table 3-1. Slot Numbers Used in Test Commands

Slot Number	Unit Tested
0	Option module in slot 0 (slot farthest from the power switch)
1	Option module in slot 1 (middle option slot)
2	Option module in slot 2 (slot nearest the power switch)
3	Reserved
4	Reserved
5	SCSI controller on the system module
6	Ethernet controller on the system module
7	System module or memory module

Running Test Scripts

Use the `sh` command to run a test script.

- To run a test script once and then stop, type `sh script`, where you replace *script* with the name of the test script you want to run. Then press Return.
- To have a test script run and keep repeating until you press Ctrl-C, include the optional `-l` parameter in the command. Type `sh -l script`, where you replace *script* with the name of the test script you want to run. Then press Return.

Displaying Lists of Available Tests

To display all individual tests available for a specific module, type `t slot/?`, where you replace *slot* with the slot number of the module for which you want a test listing. Then press Return.

A list of tests similar to this sample listing of tests for the system module appears on the monitor:

```
cache/data      I or D[D]  address[80050000]
cache/isol      I or D[D]
cache/reload    I or D[D]  address[80050000]
cache/seg       I or D[D]  address[80050000]
ecc/gen         address[A0100000]
fpu
mem             board[0]   thrshld[10]  pattern[55555555]
mem/init
mem/float10     address[A0100000]
mem/select
mfg/done
misc/pstemp
misc/refresh
misc/wbpart
rtc/nv          pattern[55]
rtc/period
rtc/regs
rtc/time
tlb/probe
tlb/reg        pattern[55555555]
```

In this list,

- The leftmost column lists the commands for tests that are available for the specific module.

- Entries in the other columns represent the individual test parameters, if any. The value in brackets next to each parameter is the default value for that parameter.

For a detailed explanation of individual self-tests and their parameters, refer to Appendix D.

To display existing scripts that test an individual module

To display all the scripts that do not loop, type **ls *slot***, where *slot* represents the slot number of the module for which you want all test scripts listed. Then press Return.

A display of scripts and other objects that are in the module then appears on the screen. This sample listing is a portion of the ls display for slot 7. This portion lists some of the test scripts present in the system module and memory module.

```
7/pst-m  
7/pst-q  
7/pst-t  
7/test-cpu  
7/test-dz-m  
7/test-dz-q  
7/test-dz-t  
7/test-misc  
7/test-rtc  
7/test-mem-m  
7/test-mem-q  
7/test/mem-t
```

Creating Test Scripts

You can create test scripts that test modules under test conditions you choose.

To create a test script,

1. Type **script** *name*, where you replace *name* with the name that you want to give the script you are creating. Then press Return.
2. Type the test commands for the tests that you want to include in the script. When you type test commands,
 - Type test commands in the same order that you want the tests to run in the test script.
 - Specify any options that you want to include in each test when you type the test command.
 - Press Return after you finish typing each individual test command.
3. Finish creating the test script by pressing Return twice after you enter the name of the last test in the test script.
4. To run the script you just created, type **sh** *name*, where you replace *name* with the name you assigned the script, and press Return.

Note: *The system stores this test script in volatile memory. The test script is lost when you turn off the system unit or press the reset button. You can store only one script at a time.*

Interpreting Test Error Messages

For every error that a self-test detects, an error message appears on the screen. Error messages appear in the following format:

- *?TFL slot/test (code: description) [module]*.
- *?TFL* indicates that an error occurred.
- *slot* represents the slot number of the module that reported the error.
- *test* represents the individual test that failed.
- *code* represents a code that indicates which part of the test failed.
- *description* represents a possible message that describes the failure.
- *module* represents the module identification number.

For an explanation of individual system module and memory module error messages, refer to Appendix D.

For an explanation of individual SCSI, Ethernet, and TURBOchannel option error messages, refer to the *TURBOchannel Maintenance Guide*.

This is a sample error message:

```
?TFL 7/dz/alm (bad interrupt) [KN02-AA]
```

This error message states that the module in slot number 7, the system module, failed the serial line silo alarm test.

The additional message `(bad interrupt)` indicates that the test failed the interrupt operation.

Using Error Logs

The system records events and errors in the ULTRIX error logs. Use the memory error, error and status register, and system overheat error logs to troubleshoot intermittent problems.

Note: *The ULTRIX error logs are not the same as the test error logs that appear when you use the erl console command. The test error log is a record of errors reported by tests run in console mode.*

The following paragraphs describe ULTRIX error log formats and error log parts useful in troubleshooting.

Examining Error Logs

You must be in ULTRIX to examine error logs. At the ULTRIX prompt, type **/etc/uerf -R | more** and press Return. A full display of error log entries appears on the monitor.

The first part of each error log describes the type of error and system conditions in effect when the error occurred. The last part of each log provides specific information about the error and its location.

The first part of all error logs is similar to this:

```
----- EVENT INFORMATION -----
EVENT CLASS                               OPERATIONAL EVENT
OS EVENT TYPE                             SYSTEM STARTUP
SEQUENCE NUMBER                           300.
                                           0.
OPERATING SYSTEM                           ULTRIX 32
OCCURRED/LOGGED ON                         Tue Oct 24 09:06:16 1989
OCCURRED ON SYSTEM                         GRANITE
SYSTEM ID                                  x82020120      HW REV: x20
                                           FW REV: x1
                                           CPU TYPE: R2000A/R3000

PROCESSOR TYPE                              KN02/R3000
```

In this display,

- **EVENT CLASS** lists the error log's general category. Possible **EVENT CLASS** categories are
 - Operational events, which are changes in system operation that are not errors
 - Error events, which are actual errors in system operation
- **OS EVENT TYPE** describes the type of error or event recorded in the log. Table 4-3 lists possible operating system event types and their codes. For information about memory, error and status register, and overheat error logs, refer to the following section “Distinguishing Event Types” and to the discussion of the particular log in which you are interested.
- **SEQUENCE NUMBER** lists the order in which the system logged the event.
- **OPERATING SYSTEM** lists the system's version of **ULTRIX**.
- **OCCURRED/LOGGED ON** shows the time the error occurred.
- **OCCURRED ON SYSTEM** lists the individual system that reported the error.
- **SYSTEM ID** includes several listings:
 - The first number to the right of **SYSTEM ID** is the system ID.
 - **HW REV** lists the system hardware revision number.
 - **FW REV** lists the system firmware revision number.
 - **CPU TYPE** shows the type of CPU used in the system.
- **PROCESSOR TYPE** lists the type of processor chip used in the system.

The remaining error log entry is different for each error log event type. For an explanation of entries contained in memory, error and status register, and overheat error logs, refer to the next section.

Distinguishing Event Types

The second line of each error log lists the code number and name of the error log event type.

The following sections describe memory, error and status, and system overheat error logs. For a detailed explanation of other error logs that involve the system unit, refer to the ULTRIX documentation.

Memory error logs

Memory error logs record errors that occur in the memory modules. This is a sample of the error log sections that are unique to memory error logs.

```
----- UNIT INFORMATION -----
UNIT CLASS                               MEMORY
UNIT TYPE                                KN02 MEMORY
ERROR SYNDROME                            MEMORY CRD ERROR

----- ERROR & STATUS REGS -----
EPC                                       x8006DF4C
KN02 STAT REG                             x07C20001

IO INT 0 PENDING
19,200 BAUD
8 MB MEM MODULE
ECC CMD x0

IO INT 1 ENABLED
IO INT 6 ENABLED
IO INT 7 ENABLED
NORMAL MODE
REFRESH EVEN MEM MODULES

UNSECURE
CPU MEM READ ECC

ERROR ADDR REG                           xD01B37BA
PHYSICAL ERROR ADDR                      x006CDEE8
CHECK SYNDROME                            x00108884

SYND BITS x4
SINGLE BIT ERROR

CHECK BITS x8
MODULE NUM. x0
ERROR COUNT 1.
INVALID PC MEMINTR

----- ADDITIONAL INFO -----
CONTROLLER NO.                            1.
ERRS ON THIS ADDR                         1.
```

The UNIT INFORMATION section describes the type of module that reported the error.

- UNIT CLASS shows that the error occurred in a memory module.
- UNIT TYPE lists the particular type of memory module in which the error occurred.
- ERROR SYNDROME describes the nature of the error.

The ERROR & STATUS REGS section lists the error and status register contents followed by phrases that describe the register contents.

- EPC indicates that this is an exception program counter.
- KN02 STAT REG lists the contents of the CPU status register (CSR).
- ERROR ADDR REG describe the specific error type.
- PHYSICAL ERROR ADDR is the address in the hardware where the error occurred.
- CHECK SYNDROME entries describe the actual error and the module where it occurred.
 - SYND BITS lists the bits in the check syndrome register.
 - The second line states whether this is a single bit or a multibit error.
 - The third line shows the check bits.
 - MODULE NUM shows the slot number of the module that reported the error.
 - ERROR COUNT shows the total number of errors that have occurred in this module since the last time the software was booted.
 - The last line shows whether this is a bus error or memory interrupt error.
- The ADDITIONAL INFO section lists the controller number and total number of errors that have occurred at this address.

Error and status register error logs

Error and status register error logs record nonmemory errors. This is a sample of the error log sections that are unique to error and status register error logs.

```
----- ERROR & STATUS REGS -----
CAUSE                x80002000      EXCEPTION CODE EXTERNAL
INTERRUPT
STATUS              x0000FE04      HW INTERRUPT 3 PENDING
                                      BRANCH DELAY SET
                                      CURRENT INTERRUPT STATE DISABLED

                                      CURRENT MODE KERNEL
                                      PREVIOUS INTERRUPT STATE ENABLED

                                      PREVIOUS MODE KERNEL

                                      OLD INTERRUPT STATE DISABLED

                                      OLD MODE KERNEL
                                      SW INTERRUPT 1 ENABLED
                                      HW INTERRUPT 0 ENABLED
                                      HW INTERRUPT 1 ENABLED
                                      HW INTERRUPT 2 ENABLED
                                      HW INTERRUPT 3 ENABLED
                                      HW INTERRUPT 4 ENABLED
                                      HW INTERRUPT 5 ENABLED

                                      CACHE STATE NORMAL

SP                   xFFFFDC58
KN02 STAT REG       x05C20001      IO INT 0 PENDING
                                      19,200 BAUD
                                      8 MB MEM MODULE
                                      ECC CMD x0
                                      IO INT 1 ENABLED
                                      IO INT 6 ENABLED
                                      IO INT 7 ENABLED
                                      NORMAL MODE
                                      REFRESH ODD MEM MODULES

                                      UNSECURE
                                      CPU I/O WRITE TIMEOUT

ERROR ADDR REG      xE7B00000

PHYSICAL ERROR ADDR x1EC00000
```

The **ERROR & STATUS REGS** section lists the error and status register contents followed by phrases explaining these values.

- **CAUSE** lists the type of event that caused the error.
- **STATUS** lists various system settings in effect when the error occurred.
- **SP** is a stack pointer that identifies where the CPU contents were sent when the error occurred.
- **KN02 STAT REG** lists the contents of the CPU status register.
- **ERROR ADDR REG** describes the specific error type.
- **PHYSICAL ERROR ADDR** indicates where in the hardware the error occurred. Refer to “Using Error Logs to Troubleshoot” in Chapter 4 for possible physical error address values and the hardware they indicate.

System overheat error messages

If the system overheats, **ULTRIX** records the error and the following message on the monitor:

```
"System overheating - suggest shutdown and power-off"
```

For Further Error Log Information

To determine how to respond to a specific error message, refer to “Interpreting Test Results” in Chapter 4.

To interpret memory, error and status register, and overheat logs, refer to “Using Error Logs to Troubleshoot” in Chapter 4.

For an explanation of other error logs, refer to the **ULTRIX** documentation for the **uerf** function.

For an explanation of error logs for SCSI devices, refer to the documentation for the SCSI device that the error log discusses.

4

Identifying Failed FRUs

This chapter explains how to

- Follow the troubleshooting process for this system
- Interpret power-up self-test error messages to identify FRUs
- Troubleshoot when the power-up self-test does not complete
- Interpret error logs to find intermittent failures
- Troubleshoot when the printer, modem, or alternate terminal does not operate properly

Troubleshooting Process

Troubleshoot the system as follows:

1. Make sure there is power to the system unit. If the system unit has no power, refer to “Power Supply” in Chapter 5 to troubleshoot.
2. Turn on the system and check the results of the power-up self-test.
 - If the power-up self-test displays an error message on the monitor, refer to Table 4-1 to troubleshoot.
 - If the power-up self-test does not complete, refer to Table 4-2 to troubleshoot.
 - If the monitor has no display, refer to the *TURBOchannel Maintenance Guide* to troubleshoot.
3. Run the system test. Type **test** and press Return. The system test runs a comprehensive check of the system hardware. If this test returns an error code, refer to Table 4-1 to troubleshoot.
4. If none of these tests reports a problem, check the memory modules. Refer to “Memory Modules” in Chapter 5 to troubleshoot.
5. If the system still reports no errors, but the problem persists, examine the error logs. Refer to “Using Error Logs to Troubleshoot” later in this chapter to troubleshoot.
6. If the system reports no errors, but the printer, modem, or alternate terminal does not operate properly, perform an external loopback serial line test. Refer to “Troubleshooting When a Printer, Modem, or Alternate Terminal Does Not Operate Properly” later in this chapter to troubleshoot.
7. If the system fails to boot, use any console error messages that appear on the monitor to troubleshoot. Refer to Appendix E to interpret console error messages.

Interpreting Test Results

Use the error messages that appear on the monitor and on the diagnostic LEDs to identify failed FRUs.

Interpreting Error Messages That Appear on the Monitor

Error messages on the monitor have the form
`?TFL slot/test_name (n: description) [module]`

- *slot* represents the slot number of the FRU that reported the failure.
- *test_name* is the name of the individual test that failed.
- The string (*n: description* [*module*]) includes additional information that describes the error.

Table 4-1 shows the corrective action indicated by each test that displays an error message on the monitor.

Interpreting LED Displays

In diagnostic LED displays, the number on the four leftmost LEDs, as you face the back of the system, is the slot number of the FRU that failed.

Table 4-2 shows the corrective action indicated by each code on the diagnostic LED displays.

To determine the exact cause of an FRU failure, refer to the troubleshooting information in the chapter that discusses that FRU.

Table 4-1. Interpreting Test Error Messages Displayed on the Monitor

Test Listed in the Error Message	Component Tested	Corrective Action
box	Graphics module for which the slot number appears in the error message	Refer to the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
cntl	SCSI controller for which the slot number appears in the error message.	Refer to Chapter 5 for directions.
curs	Graphics module for which the slot number appears in the error message	Refer to the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
dmaaddr	Graphics module for which the slot number appears in the error message	Refer to “Two-Dimensional Graphics Accelerator Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
dz/cache	System module	Replace the system module and chassis.
ecc	Memory modules	Refer to “Memory Modules” in Chapter 5 to troubleshoot.
esar ext	Ethernet controller	Ethernet controller for which the slot number appears in the error message.
fb fbfill	Graphics module for which the slot number appears in the error message	Refer to “Two-Dimensional Graphics Accelerator Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
fpu	System module	Replace the system module and chassis. Refer to Chapter 5 for directions.
int	Ethernet controller or graphics module	Ethernet controller or graphics module for which the slot number appears in the error message. Refer to “Ethernet Controller Modules” or to “Color Frame-Buffer Graphics Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
intr-dma	Graphics module for which the slot number appears in the error message	Refer to “Two-Dimensional Graphics Accelerator Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
mem	Memory modules	Refer to “Memory Modules” in Chapter 5 to troubleshoot.

(continued on next page)

Table 4-1 (Cont.). Interpreting Test Error Messages Displayed on the Monitor

Test Listed in the Error Message	Component Tested	Corrective Action
misc/kbd misc/mouse	Keyboard or mouse	Refer to “Keyboard and Mouse” in Chapter 5 to troubleshoot.
misc/pstemp	Power supply	Refer to “Power Supply” in Chapter 5 to troubleshoot.
misc/wbpart	System module	Replace the system module and chassis. Refer to Chapter 5 for directions.
ptrns patrns	Graphics module for which the slot number appears in the error message	Refer to “Color Frame-Buffer Graphics Modules” or “Two-Dimensional Graphics Accelerator Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
ram reg	Ethernet controller for which the slot number appears in the error message	Refer to “Ethernet Controller Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
shades stamp stic	Graphics module for which the slot number appears in the error message	Refer to “Color Frame-Buffer Graphics Modules” or “Two-Dimensional Graphics Accelerator Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
target	SCSI bus for which the slot number appears in the error message.	Refer to “SCSI Controller Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.
tlb	System module	Replace the system module and chassis. Refer to Chapter 5 for directions.
vdac vdacsig vram	Graphics module for which the slot number appears in the error message	Refer to “Color Frame-Buffer Graphics Modules” or “Two-Dimensional Graphics Accelerator Modules” in the <i>TURBOchannel Maintenance Guide</i> to troubleshoot.

Troubleshooting When the Power-Up Self-Test Does Not Complete

If the power-up self-test does not complete, the left set of diagnostic LEDs display an error code that indicates the slot number of the FRU that caused the power-up self-test to stop.

Table 4-2 lists the corrective action for each location where the test can stop.

Table 4-2. Troubleshooting When the Power-Up Self-Test Does Not Complete

Left LED Display (1=0n)	Corrective Action
None; test does not start.	Check for loose and damaged connectors and reseat any loose modules. If the system still does not start, there is a basic problem in the system. Contact the Digital Customer Support Center.
1111	A hardware problem is preventing the diagnostics from executing. Contact the Digital Customer Support Center for assistance.
0111	Replace the memory module in memory slot 0 and repeat the power-up self-test. If the power-up self-test still stops and the left diagnostic LEDs display 0111, replace the system module and chassis.
0110	Replace the system module and chassis.
0101	Replace the system module and chassis.
0010 0001	Replace the option module that has the same slot number as the left LED display. If the problem option module is a 2D graphics accelerator module, replace the VSIMM and repeat the power-up self-test before you replace the 2D graphics accelerator module. If the 2D graphics accelerator module still fails after you replace the VSIMM, replace the 2D graphics accelerator module.
0000	If the right LED display is 0000, the self-test completed successfully. If the the left LED display is not 0000, replace the option module in option slot 0.

Using Error Logs to Troubleshoot

The event type listed on the second line of the error log describes the general event that the error log recorded. Table 4-3 lists possible event type codes and their meaning.

Table 4-3. Error Log Event Types

Code	Event Type
100	Machine check
101	Memory error
102	Disk error
103	Tape error
104	Device controller error
105	Adapter error
106	Bus error
107	Stray interrupts
108	Asynchronous write error
109	Exception or fault
113	CPU error and status
200	Panic (bug check)
250	Informational ASCII message
251	Operational message
300	System startup message
310	Time change message
350	Diagnostic information

The following information explains how to interpret memory, error and status register, and overheat error logs. To interpret other error logs, refer to the ULTRIX documentation or the documentation for the device that the error log discusses.

Memory Error Logs

Use these parts of the memory error log to determine the error:

- The number after MODULE NUM in the log's check syndrome section is the slot number of the memory module that reported the error.
- The phrase after ERROR ADDR REG describes the type of error that occurred.

Replace the memory module in the slot for which the number appears in the MODULE NUM listing. Refer to "Memory Modules" in Chapter 5 for directions.

Error and Status Register Error Logs

Use the last two lines in the error and status register error logs to determine the error and its location.

- The phrase after ERROR ADDR REG describes the error that occurred.
- The number after PHYSICAL ADDR is the physical address where the error occurred. Table 4-4 lists the system hardware physical addresses and the FRUs in which they are located.

Although addresses 1EC00000 to 1F3FFFFFF are reserved, error logs sometimes list these as the error's physical address. Errors attributed to these addresses are system module errors.

Table 4-4. Hardware Physical Addresses

Physical Address Range	Indicated Hardware
00000000 to 1DFFFFFF	Main memory
1E000000 to 1E3FFFFFF	Module in option slot 0
1E400000 to 1E7FFFFFF	Module in option slot 1
1E800000 to 1EBFFFFFF	Module in option slot 2
1EC00000 to 1EFFFFFF	Reserved
1F000000 to 1F3FFFFFF	Reserved
1F400000 to 1F7FFFFFF	SCSI controller on the system module
1F800000 to 1FBF0000	Ethernet controller on the system module
1FC00000 to 1FFFFFFF	System module interface

Replace the FRU that contains the hardware indicated by the error log. For directions, refer to the section in Chapter 5 of this guide, or the *TURBOchannel Maintenance Guide* that discusses the FRU you want to replace.

Overheat Error Messages

If the system reports an overheat error, shut down the system software and then turn off the system power. Refer to “Power Supply” in Chapter 5 to troubleshoot the power supply fans.

Troubleshooting When a Printer, Modem, or Alternate Terminal Does Not Operate Properly

If the system tests report no errors, but a printer, modem, or alternate terminal does not operate properly, run an external loopback serial line test to isolate the problem.

Before you run the external loopback serial line test, make sure the following items are installed on the back of the system unit:

- Communications loopback connectors on both communications connectors
- A keyboard-mouse cable that has the following attached:
 - A keyboard attached to the keyboard connector
 - A mouse or mouse loopback connector attached to the mouse connector

To run the external loopback serial line test, type **t dz/modem/ [line] [cts-lbk]**. Then press Return.

When you type the external loopback test command,

- Use the *line* parameter to specify the serial line you want to test.
 - Specify *comm* to test the communications line that is on the right as you face the back of the system.
 - Specify *port* to test the communications line that is on the left as you face the back of the system.
- Use the *cts-lbk* parameter to specify the type of test to run.
 - Specify *n* to run a data-leads-only test.
 - Specify *y* to run a clear-to-send test.

If the external loopback serial line test reports an error, the serial line controller is faulty. Replace the system module and chassis. Refer to “System Module” in Chapter 5 for directions.

If the external loopback serial line test succeeds, the printer or modem is faulty. Refer to the printer or modem service guide to troubleshoot.

For Further Information

For an explanation of troubleshooting the SCSI, Ethernet, TURBOchannel options, and the drives and monitors they support, refer to the *TURBOchannel Maintenance Guide*.

5

Basic Hardware

This chapter discusses hardware, troubleshooting procedures, and removal and installation instructions for the following FRUs:

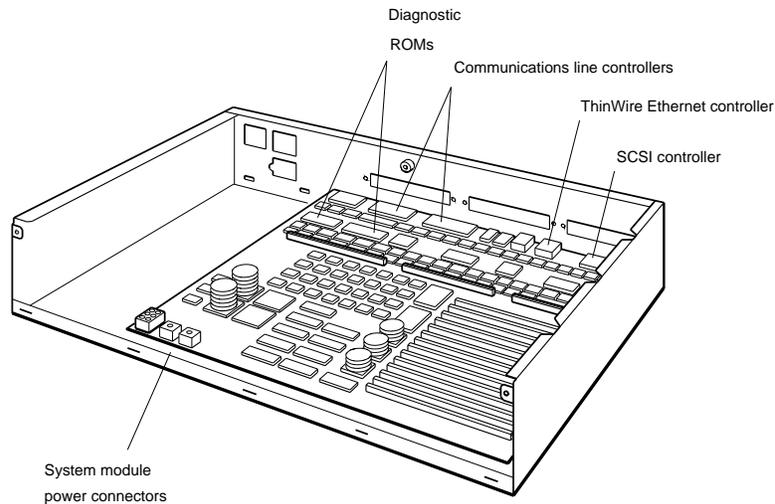
- System module and chassis
- Memory module
- Keyboard
- Mouse
- Power supply

System Module and Chassis

System Module and Chassis Hardware

The system module and chassis, shown in Figure 5-1, provides basic system functions. The system module and chassis are a single unit that contains

- Two diagnostic system ROMs
- One Ethernet station address register (ESAR) chip
- One SCSI controller with its own diagnostic ROM
- One ThinWire Ethernet controller with its own diagnostic ROM
- Two communications line controllers
- Three option module slots
- Fifteen memory module slots
- One metal system chassis



WSE2M016

Figure 5-1. System module and chassis

Troubleshooting the System Module

Table 5-1 lists the appropriate response to each system module test error message.

Table 5-1. Interpreting System Module Error Messages

Failed System Module Test	Component Tested	Corrective Action
cache/dz	System module	Replace the system module and chassis. Refer to this section for directions.
ecc	Memory module	Refer to “Memory Modules” later in this chapter to troubleshoot.
fpu	System module	Replace the system module and chassis.
mem	Memory module	Refer to “Memory Modules” later in this chapter to troubleshoot.
misc/kbd	Keyboard or mouse	Refer to “Keyboard and Mouse” later in this chapter to troubleshoot.
misc/mouse		
misc/pstemp	Power supply	Refer to “Power Supply” later in this chapter to troubleshoot.
misc/wbpart	Memory modules	Refer to “Memory Modules” later in this chapter to troubleshoot.
tlb	System module	Replace the system module and chassis. Refer to this section for directions.

For a detailed explanation of an individual system module error code, refer to the individual test descriptions in Appendix D.

Replacing a System Module and Chassis

To replace a system module and chassis, transfer the removable parts from the old system module onto the new system module.

Warning: *The system module and chassis are one unit. Never remove a system module from the chassis. Removing the system module from the chassis destroys the system module compliance with FCC radio emission regulations.*

Never touch the system module heat sinks. The heat sinks are fragile and break easily.

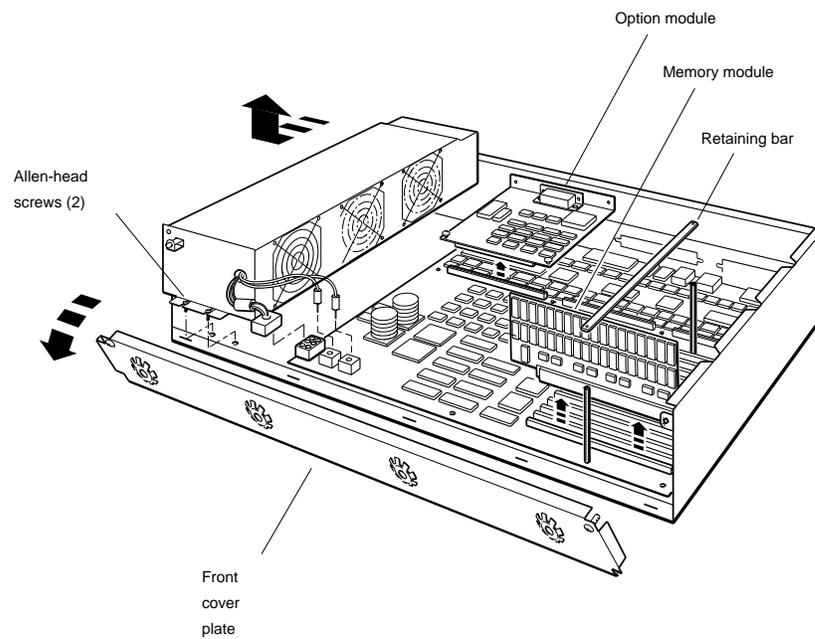
Figure 5-2 shows how to remove parts attached to the old system module.

Figure 5-3 shows how to install these parts on the new system module.

To remove parts from the old system module,

1. Turn off the system unit.
2. Remove the system unit cover and front cover plate. Refer to Chapter 2 for directions.
3. Disconnect any cables attached to the back of the system unit. For directions, refer to the *TURBOchannel Maintenance Guide*.
4. Remove any option modules attached to the system module. Refer to the *TURBOchannel Maintenance Guide* for directions.
5. Remove and save the memory module retaining bar.
6. Remove any memory modules attached to the system unit. Refer to “Removing and Installing a Memory Module” later in this chapter for directions.
7. Remove the power supply. Refer to “Power Supply” later in this chapter for directions.
8. Remove the ESAR address chip from the old system module. Refer to “Removing and installing an ESAR chip” later in this chapter for directions.

9. Remove the serial number plate from the back of the system unit. Refer to Chapter 2 for directions.
10. Check whether there are customer property identification labels on the old system unit chassis. If the old system unit chassis has any such tags, have the customer transfer the tags to the new system unit module and chassis.

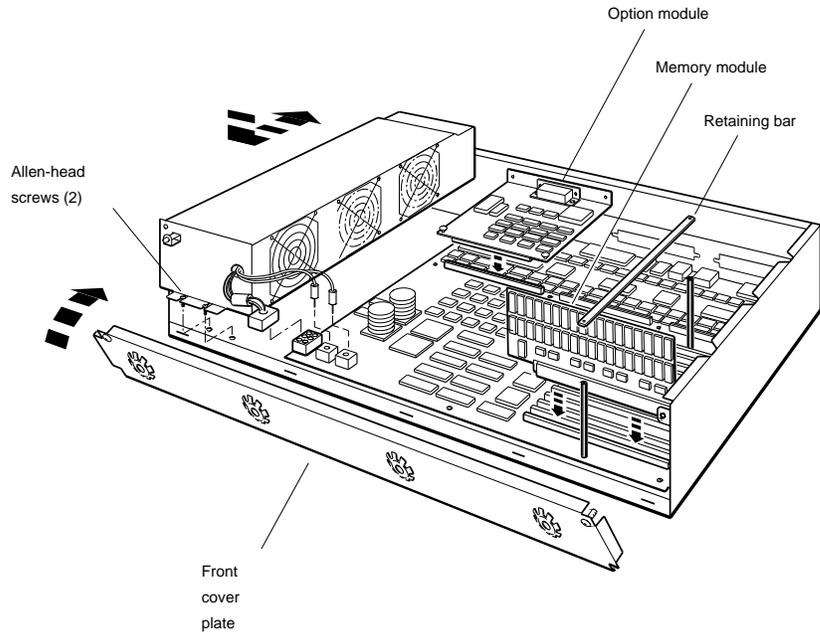


WSE2M017

Figure 5-2. Removing hardware from an old system module

To install parts on the new system module,

1. Remove the system unit cover if it is on the chassis. Refer to Chapter 2 for directions.
2. Install the ESAR chip from the old system module in the new system module. Refer to “Removing and installing an ESAR chip” later in this chapter for directions.
3. Install the serial number plate from the old system unit onto the new system unit. Refer to Chapter 2 for directions.
4. Install the memory modules that you removed earlier. Refer to “How to Remove and Install a Memory Module” later in this chapter for directions.
5. Install the option modules that you removed from the system module. Refer to the *TURBOchannel Maintenance Guide* for directions.
6. Install the retaining bar that you removed from the old system module.
7. Connect any cables that were attached to the back of the old system unit.
8. Install the power supply and reconnect the system module power cords. Refer to “Power Supply” later in this chapter for directions.
9. Replace the front cover plate and system unit cover. Refer to Chapter 2 for directions.
10. Turn on the system and check the power-up self-test results to make sure the system runs properly.



WSE2M018

Figure 5-3. Installing hardware on a new system module

To remove and install an ESAR chip

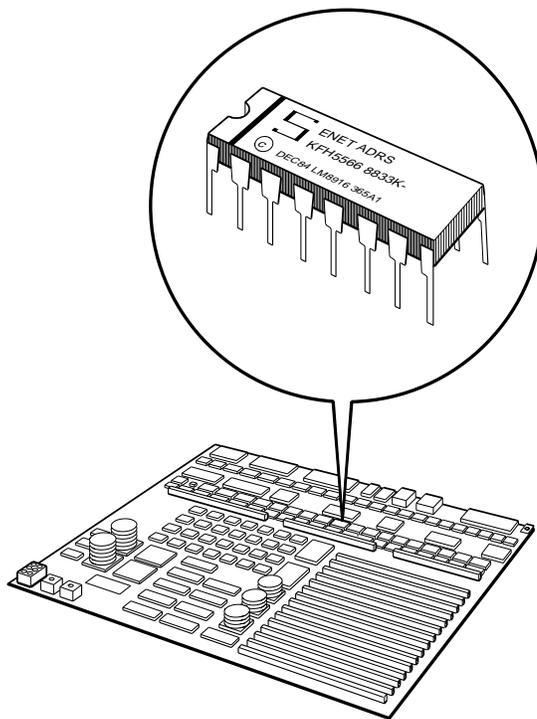
Figure 5-4 shows how to remove and install an ESAR chip.

To remove an ESAR chip,

1. Turn off the system unit power and remove the system unit cover.
2. Locate the ESAR chip.
3. Gently pry the ESAR chip loose.

To install an ESAR chip,

1. Orient the chip as shown in Figure 5-4. The notched end of the chip should face the power supply.
2. Press the chip pins into the ESAR socket on the system module. Be careful not to bend the pins.



WSE2M044

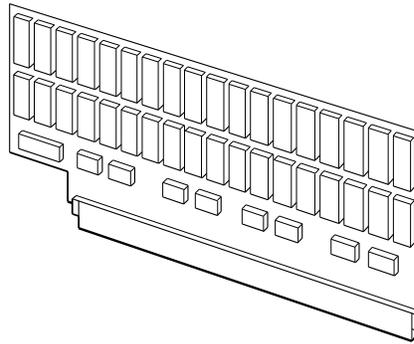
Figure 5-4. ESAR chip location

Memory Modules

Memory Module Hardware

The system module memory slots support up to 15 of the 8-Mbyte modules shown in Figure 5-5.

Table 5-2 shows the address range assigned to each memory slot.



WSE2M019

Figure 5-5. Memory module

Table 5-2. Memory Module Address Ranges

Memory Module Slot Number	Memory Address Range
0	a0000000 to a07FFFFFFF
1	a0800000 to a0FFFFFFF
2	a1000000 to a17FFFFFFF
3	a1800000 to a1FFFFFFF
4	a2000000 to a27FFFFFFF
5	a2800000 to a2FFFFFFF
6	a3000000 to a37FFFFFFF
7	a3800000 to a3FFFFFFF
8	a4000000 to a47FFFFFFF
9	a4800000 to a4FFFFFFF
10	a5000000 to a57FFFFFFF
11	a5800000 to a5FFFFFFF
12	a6000000 to a67FFFFFFF
13	a6800000 to a6FFFFFFF
14	a7000000 to a77FFFFFFF

Troubleshooting the Memory Modules

If a self-test reports an error code that includes `mem`, the problem is in a memory module or the system module. The additional information statement in the error message lists the slot number of the memory module that reported the problem.

Before replacing either module, make sure the memory modules are firmly seated on the system module. If the problem persists, use the RAM board test, described in the next section, to determine whether the problem is in the memory module.

If the system reports that all memory modules are bad,

1. Remove all the memory modules on the system module.
2. In the system module, insert a memory module that you know is good.
3. Repeat the RAM board test. If the system reports that the new memory module is bad, replace the system module and chassis.

If the system reports that not all the memory modules failed, replace only those individual modules that the RAM board test indicates are bad.

RAM board test

The RAM board test checks the operation of individual memory modules. This test can take several minutes for each memory module tested.

To run a RAM board test on all memory modules, type `t 7/mem *` and press Return. The system then tests each memory module separately.

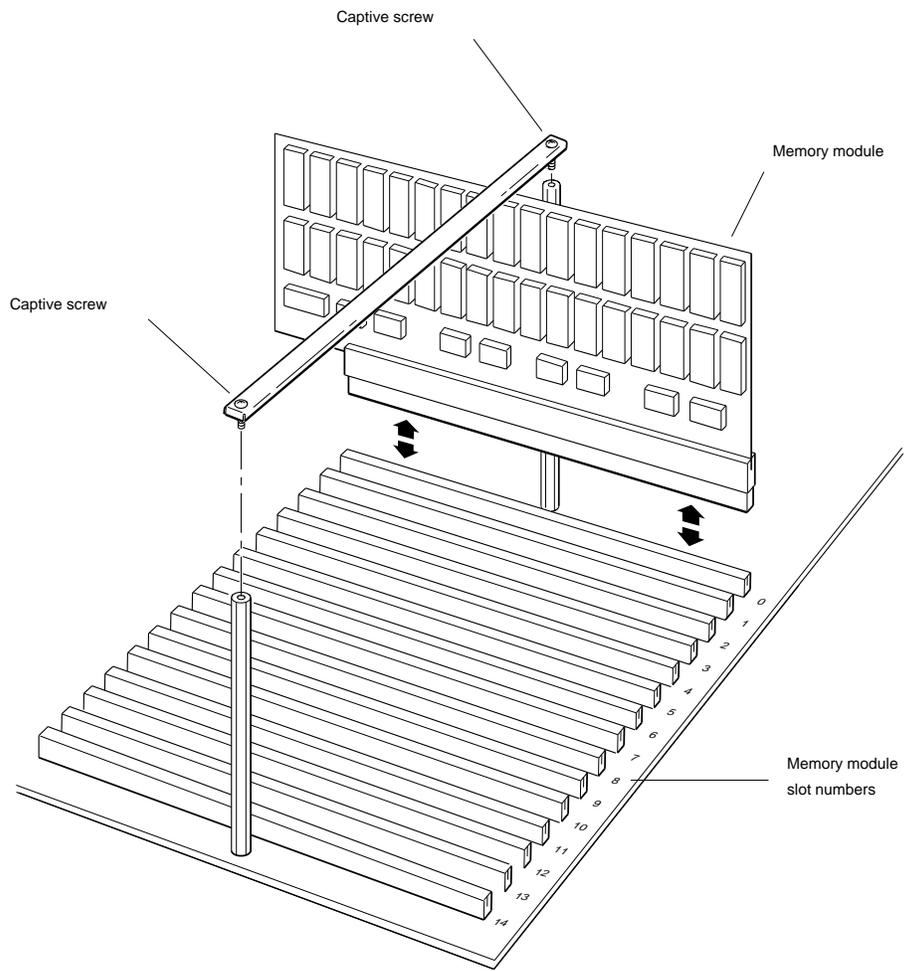
To run a RAM board test on a single module, type `t 7/mem board` and press Return. When you type this command, replace *board* with the slot number of the memory module you want to test.

RAM board test error messages use the format
`?TFL 7/mem/code: board (x: description)`.

- The string `?TFL 7/mem` indicates that the RAM board test failed.
- *code* is a number that indicates which part of the RAM board test failed.
- *board* indicates the memory module that reported the problem. The number after *board* is the slot number of the memory module that reported the error.
- *description* represents additional information that describes the failure.

Removing and Installing a Memory Module

Figure 5-6 shows how to remove and install a memory module.



WSE2M020

Figure 5-6. Removing and installing a memory module

To remove a memory module,

1. Turn off the workstation.
2. Remove the system unit cover. Refer to “Removing and Installing the System Unit Cover” in Chapter 2 for directions.
3. Loosen the two captive screws that hold the memory module retaining bar. Then remove the bar.
4. Grip each end of the memory module and pull the module out of its connector. Gently rock the module back and forth to remove it. If necessary, use the hooked end of the retaining bar to pull up the memory module edge.

To install a memory module,

5. Look at the slot numbers printed beside the memory module slots and find the unused slot with the lowest number.
6. Align the memory module connectors above the unused slot with the lowest number.
7. Push the memory module connectors all the way into the memory module slot. Gently rock the module back and forth if necessary.
8. Replace the retaining bar and tighten the two captive screws.
9. Replace the system unit cover.
10. Turn on the system and check the power-up self-test results to make sure the system works properly.
11. Run the RAM board test to make sure that the new memory module operates properly.

Keyboard and Mouse

Keyboard and Mouse Hardware

The system uses a LK201 keyboard and VSXXX-AA mouse. The keyboard and mouse each connect to the end of a keyboard-mouse cable that connects to the back of the system unit, as shown in Figure 5-7.

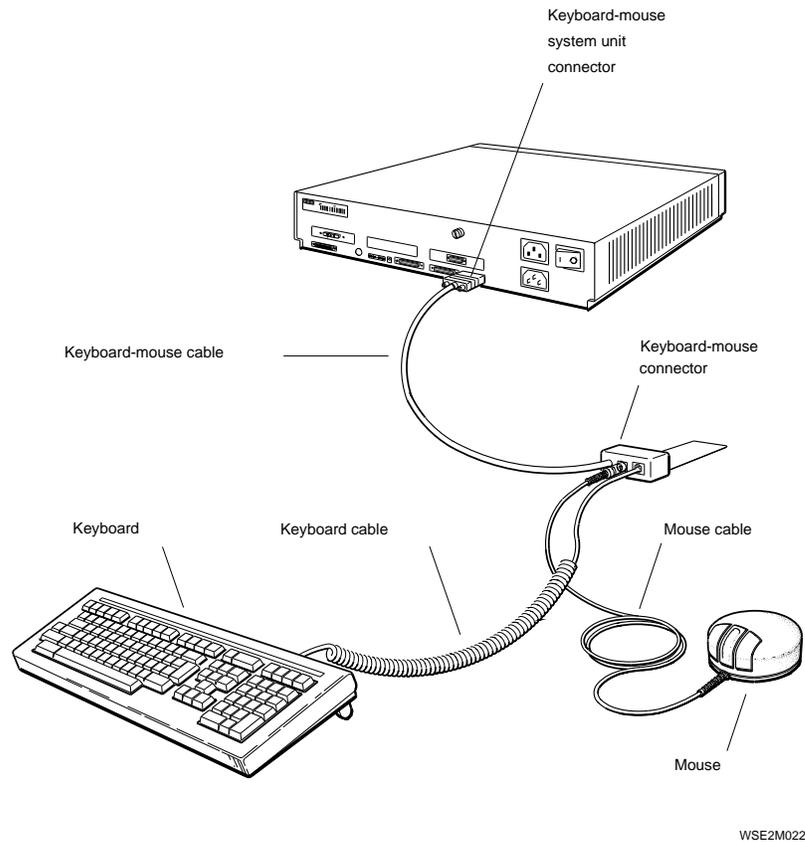


Figure 5-7. Keyboard and mouse hardware

Troubleshooting the Keyboard and Mouse

If the system reports an error message that includes misc/kbd or misc/mouse, the problem is in the keyboard, mouse, keyboard-mouse cable, or system module. Troubleshoot these items as follows:

1. Make sure that the keyboard and mouse are attached correctly to the keyboard-mouse cable and that the keyboard-mouse cable is attached correctly to the system unit.
2. Repeat the power-up self-test by turning the system unit power off and then on again.
3. If the power-up self-test still returns the error message misc/kbd or misc/mouse, replace the keyboard or the mouse.
 - If the error message is misc/kbd, replace the keyboard.
 - If the error message is misc/mouse, replace the mouse.
4. If the power-up self-test still returns the error message misc/kbd or misc/mouse after you replace the problem item, replace the keyboard-mouse cable. Then repeat the power-up self-test.
5. If the power-up self-test returns message code misc/kbd or misc/mouse after you replace the keyboard, mouse, and keyboard-mouse cable, replace the system module and chassis. Refer to “Replacing a System Module and Chassis” earlier in this chapter for directions.

Keyboard test

The keyboard test checks the keyboard.

To run the keyboard test, type **t 7/misc/kbd** and press Return.

This is a sample keyboard test error message:

```
?TFL 7/misc/kbd (missing?)
```

The message `misc/kbd` after the slot number indicates that the keyboard test failed. The additional message `missing?` indicates that the keyboard is either missing or working improperly.

Mouse test

The mouse test checks the mouse and serial line controller on the system module.

To run the mouse test, type **t 7/misc/mouse** and press Return.

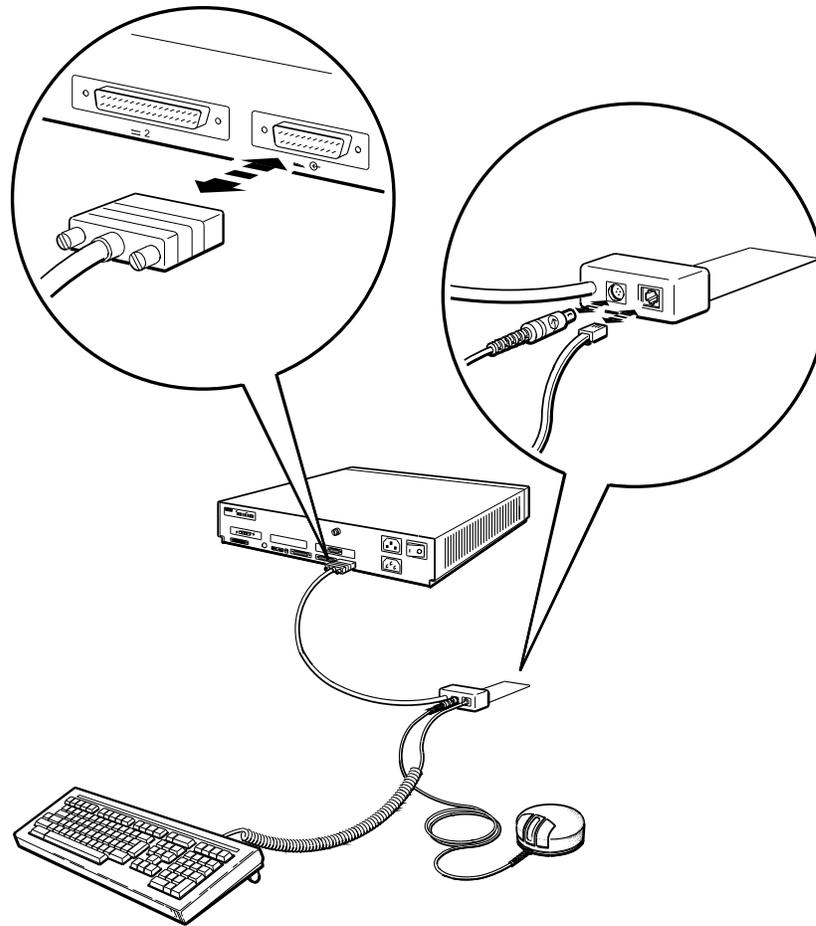
This is a sample mouse test error message:

```
?TFL 7/misc/mouse (missing?)
```

The message `misc/mouse` after the slot number indicates that the mouse test failed. The additional information statement `missing?` indicates that the mouse is either missing or working improperly.

Removing and Installing the Keyboard and Mouse

Figure 5-8 shows how to remove and install a keyboard and mouse.



WSE2M023

Figure 5-8. Removing and installing a keyboard and mouse

To remove the keyboard and mouse and their cables

To remove the mouse, pull the end of the mouse cable out of its connector.

To remove the keyboard, pinch the tab on the end of the keyboard cable. Then pull the cable out of its connector.

To detach the keyboard-mouse cable from the back of the system unit, loosen the connector holding screws. Then pull the cable away from the keyboard-mouse connector.

To install the keyboard and mouse and their cables

To install the keyboard-mouse cable, firmly push the cable end into the back of the system unit. Then tighten the two screws on the cable connector.

To connect the mouse, align the mouse icons on the end of the mouse cable and the mouse connector on the keyboard-mouse cable. Then push the mouse connector into the keyboard-mouse cable.

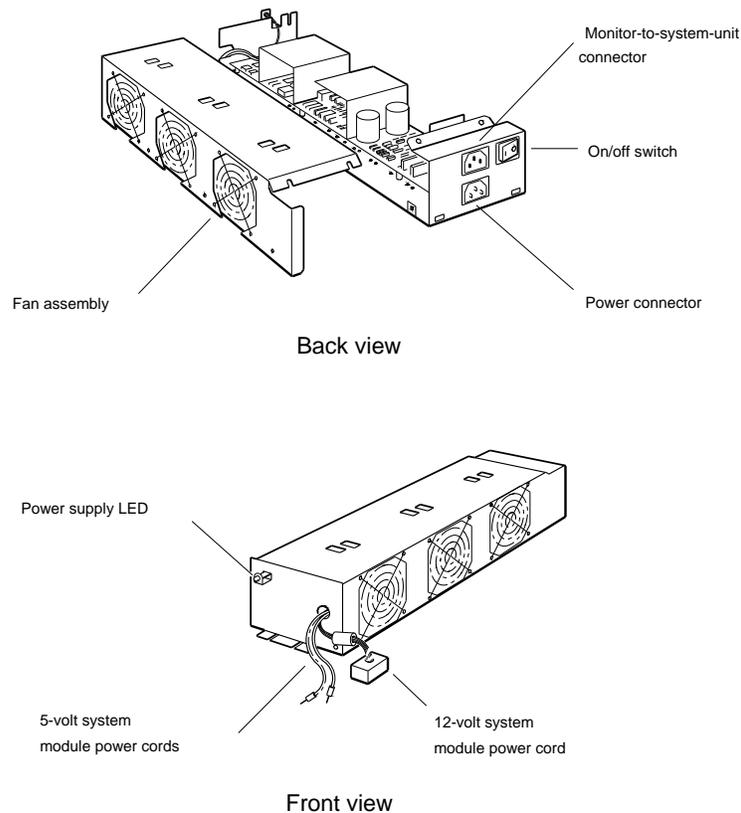
To connect the keyboard, press the jack on the keyboard cable into the keyboard-mouse cable connector until the tab snaps into place.

Power Supply

Power Supply Hardware

The power supply, shown in Figure 5-9, provides 244 watts of DC power to the system unit. The back of the power supply has a power connector and monitor-to-system-unit connector. An LED on the front panel glows green when the power supply is operating properly.

The power supply consists of a power supply base and a removable panel with three fans that cool the system unit.



WSE2M024

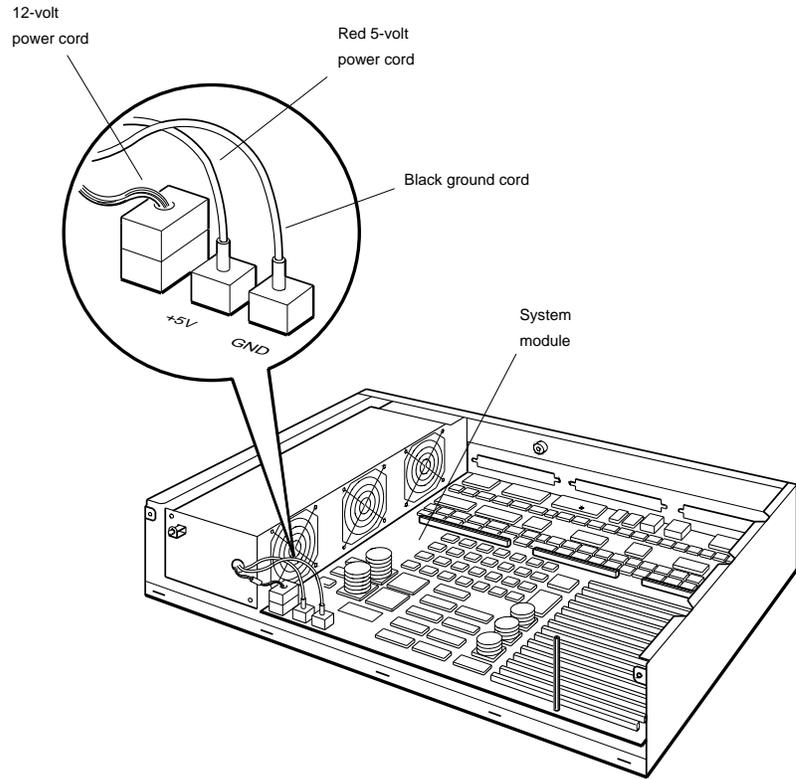
Figure 5-9. Power supply hardware

Troubleshooting the Power Supply

Troubleshooting if the system unit has no power

If the system unit has no power,

1. Check the power supply LED. If the LED does not glow green, make sure the power is on and the power cord is connected to the back of the system unit and to a power outlet.
2. If the problem persists, make sure the red 5-volt and black ground system module power cords are connected properly.
 - a. Turn off the system unit power.
 - b. Disconnect the system unit power cord.
 - c. Remove the system unit cover and front cover plate. Refer to Chapter 2 for directions.
 - d. Make sure the 5-volt system module power cord and black ground cord are in the correct connectors. Figure 5-10 shows the correct cord connections.
 - e. Replace the system unit cover and front cover plate.
3. If the system unit still has no power, replace the power supply. Refer to the following section for directions.



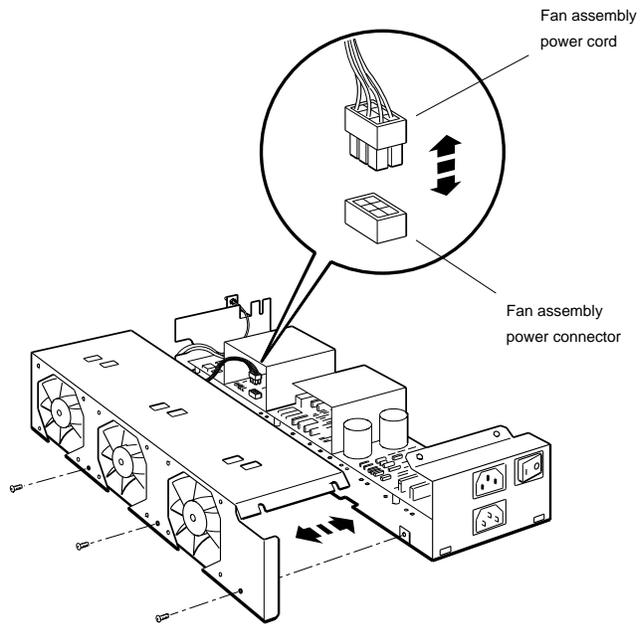
WSE2M051

Figure 5-10. System module power cord connections

Troubleshooting if the system unit overheats

If the system reports the message 7/misc/pstemp (system is *HOT*!), troubleshoot the power supply fans.

1. Remove the system unit cover.
2. Turn on the system power.
3. Check whether the power supply fans rotate when the system unit power is on.
 - *If all three fans rotate*, the power supply fans are operating properly. If the overheat problem persists, contact the Digital Customer Support Center.
 - *If one or two fans rotate*, replace the power supply. Refer to “Removing and Installing the Power Supply” later in this chapter for directions.
 - *If all three fans are motionless*, make sure the fan assembly power cord is connected properly. Figure 5-11 shows how to check the fan assembly power cord connection.
 - a. Turn off the system power.
 - b. Remove the eight screws that hold the fan assembly to the power supply base.
 - c. Hold the fan assembly away from the power supply base.
 - d. Make sure the fan assembly power cord is connected properly to the fan assembly power connector.
 - e. Align the screw holes on the fan assembly housing and power supply base. Then replace the eight screws that hold the fan to the power supply base.
 - f. If the problem persists, replace the power supply. Refer to “Removing and Installing the Power Supply” later in this chapter for directions.

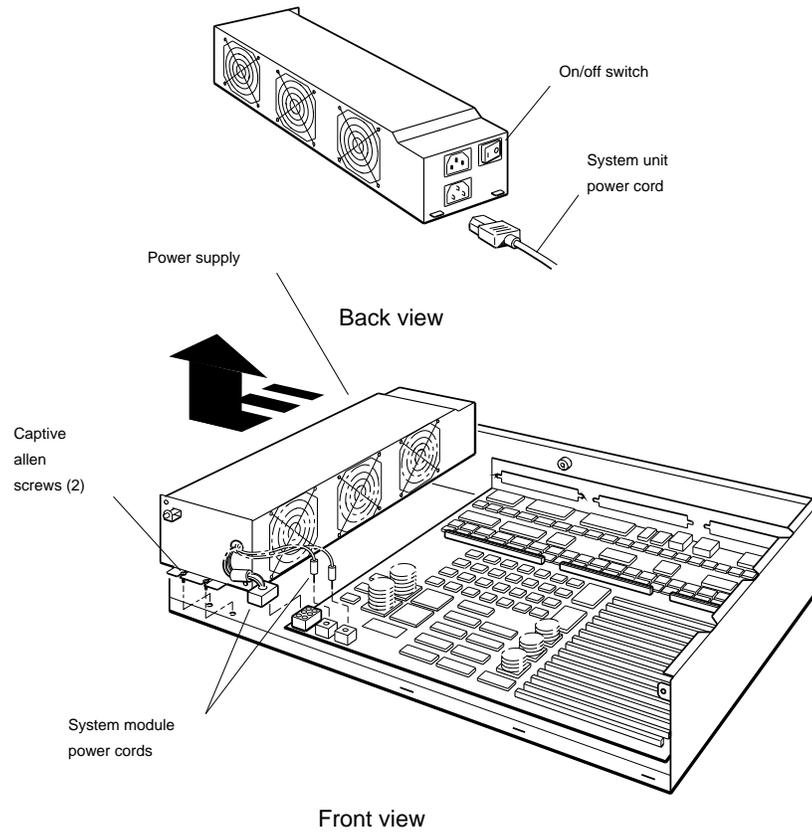


WSE2M045

Figure 5-11. Checking the power supply fan assembly connection

Removing and Installing the Power Supply

Figure 5-12 shows how to remove and install the power supply.



WSE2M025

Figure 5-12. Removing and installing the power supply

To remove the power supply,

1. Turn off the workstation.
2. Disconnect the power cord.
3. Remove the system unit cover and front cover plate. Refer to Chapter 2 for directions.
4. Disconnect the system module power cords.
5. Loosen the two captive Allen screws that hold the power supply.
6. Pull the power supply away from the back of the system unit and out of the system unit chassis.

To install the power supply,

7. Make sure the power supply switch is off. (Press down the 0 on the switch.)
8. Place the power supply in the system unit chassis. The power supply on/off switch should face the back of the system unit.
9. Tighten the two captive Allen screws.
10. Reconnect the system module power cords to the system module.
11. Replace the front cover plate and system unit cover. Refer to Chapter 2 for directions.
12. Reconnect the power cord.
13. Turn on the system unit.

For Further Information

For information about troubleshooting internal SCSI drives, SCSI controllers, Ethernet controllers, or TURBOchannel option module, refer to the *TURBOchannel Maintenance Guide*.

For information about system console commands, refer to Appendix C.

A

Equipment Specifications

This appendix lists the physical specifications, operating conditions, and nonoperating conditions for the following components:

- System unit
- LK201 keyboard
- VSXXX-AA mouse

Table A-1. System Unit Description

	Weight	Height	Width	Depth
System unit	12.7 kg (28 lb)	92 mm (3.62 in)	509.5 mm (20.06 in)	434.8 mm (17.12 in)

Table A-2. System Unit Specifications

Input voltage	Adjust to 100 to 120 Vac to 220-240 Vac
Input current	5 amps at 100 to 120 Vac 2.4 amps at 220 to 240 Vac
Power	
– Frequency	50 to 60 Hz
– Heat dissipation	359 watts maximum

Table A-3. System Unit Operating Conditions

Temperature range	10° C to 40° C (50° F to 104° F)
Temperature change rate maximum	11° C (20° F) per hour
Relative humidity	20% to 80%, noncondensing
Maximum wet-bulb temperature	28° C (82° F)
Minimum dew-point temperature	2° C (36° F)
Altitude	2400 m (8000 ft) at 36° C (96° F)

Table A-4. System Unit Nonoperating Conditions

Temperature range	- 40° C to 66° C (- 40° F to 151° F)
Relative humidity	10% to 95%, noncondensing
Maximum wet-bulb temperature	46° C (115° F), packaged
Minimum dew-point temperature	2° C (36° F)
Altitude	4900 m (16,000 ft) at 36° C (96° F)

Table A-5. LK201 Keyboard Description

	Weight	Height	Width	Depth
Keyboard	2 kg (4.5 lb)	51 mm ¹ (2 in)	533 mm (21 in)	171 mm (6.75 in)

¹Including attachable feet

Table A-6. LK201 Keyboard Specifications

Number of keys	105
Number of indicators	4 status LEDs
Language variations	15
Diagnostics	Self-testing and self-identifying with respect to revision level but not with respect to language variants
Cable	1.76 m (6 ft) uncoiled, detachable; 4-pin mmj connector at both ends
Baud rate	4800
Power consumption	4.2 watts maximum
Power input	11.8 V +/- 6% @ 350 mA
Electrical interface	EIA RS 423
Volume control	8 levels, plus off; maximum 65 dba 1 ft above keyboard
Keystroke timing	20 Msec minimum

Table A-7. LK201 Keyboard Operating Conditions

Temperature range	10° C to 40° C (50° F to 104° F)
Relative humidity	10% to 90%
Maximum wet-bulb temperature	28° C (82° F)
Minimum dew-point temperature	2° C (36° F)
Altitude	2,400 m (8,000 ft) at 36° C (96° F)

Table A-8. LK201 Keyboard Nonoperating Conditions

Temperature range	- 40° C to 66° C (- 40° F to 151° F)
Relative humidity	10% to 95%, noncondensing
Maximum wet-bulb temperature	46° C (115° F), packaged
Minimum dew-point temperature	2° C (36° F)
Altitude	4,900 m (16,000 ft) at 36° C (96° F)

Table A-9. VSXXX-AA Mouse Description

	Weight	Height	Diameter
Mouse	170 g (0.37 lb)	40 mm (1.57 in)	88 mm (3.47 in)

Table A-10. VSXXX-AA Mouse Specifications

Baud rate	4800
Cable length	1.5 m (5 ft), shielded, 6 conductors and terminals in a 7-pin micro-DIN-type connector (male)
Resolution	79 counts (200 counts/in)
Tracking speed	73.5 cm (30 in/sec)
Electrical interfaces	EIA RS-232-C or TTL
Operating modes	Incremental or polling
Tracking rate	In incremental mode: 55 reports/sec In polling mode: up to 95 reports/sec
Accuracy	+/- 3% 0 to 24.5 cm/sec (0 to 10 in/sec) any direction +/- 15% 24.5 to 49 cm/sec (10 to 20 in/sec) any direction +/- 30% 49 to 73.5 cm/sec (20 to 30 in/sec) any direction
Data format	Delta binary
Buttons	3
Diagnostics	Self-testing and self-identifying with respect to revision level
Power requirements	+5 V +/- 5% at 130 mA - 12 V +/- 10% at 20 mA

Table A-11. VSXXX-AA Mouse Operating Conditions

Temperature range	10° C to 40° C (50° F to 104° F)
Relative humidity	10% to 90%, noncondensing
Maximum wet-bulb temperature	28° C (82° F)
Minimum dew-point temperature	2° C (36° F)
Altitude	2,400 m (8,000 ft) at 36° C (96° F)

Table A-12. VSXXX-AA Mouse Nonoperating Conditions

Temperature range	- 40° C to 66° C (- 40° F to 151° F)
Relative humidity	5% to 95%
Maximum wet-bulb temperature	46° C (115° F), packaged
Minimum dew-point temperature	2° (36° F)
Altitude	4,900 m (16,000 ft) at 36° C (96° F)

B

Recommended Spares List

Tables B-1 through Table B-6 in this appendix contain the part numbers for DECstation/DECsystem 5000 Model 200 loopback connectors, plugs, test media, major FRUs, basic components, cords, cables, connectors, and related documentation.

Item numbers in Table B-2 correspond to item numbers shown in Figure B-1.

Table B-1. Loopback Connectors, Plugs, Test Media, and Miscellaneous Items

Item	Part Number
Communications loopback connector	12-15336-06
MMJ loopback connector	12-25083-01
Communications line adapter	12-23599-01
ThinWire T-connector	12-25869-01
ThinWire terminators	12-26318-01
Jumper to clear NVR	12-14314-00
Tape, tamper-proof	36-33513-01

Figure B-1. DECstation 5000 Unit Assembly

Table B-2. Major FRUs

Item Number	Description	Part Number
1	System module and chassis	70-26722-02
2	Power supply assembly	30-32506-01
3	Memory module, 8Mb	MS02-AA
4	System unit cover	70-27056-01
5	Front cover plate	70-27053-01

Table B-3. Basic Components

Item	Order Number
VR262, 19-inch monochrome monitor, 120 volts	VR262-AA
VR262, 19-inch monochrome monitor, 240 volts	VR262-A3
VR297, 16-inch color monitor, 120 volts	VR297-DA
VR297, 16-inch color monitor, 240 volts, Northern Hemisphere	VR297-D3
VR297, 16-inch color monitor, 240 volts, Southern Hemisphere	VR297-D4
VR299, 19-inch color monitor, 120 volts	VR299-DA
VR299, 19-inch color monitor, 240 volts, Northern Hemisphere	VR299-D3
VR299, 19-inch color monitor, 240 volts, Southern Hemisphere	VR299-D4
VRT19, 19-inch color monitor, 120 volts	VRT19-DA
VRT19, 19-inch color monitor, 240 volts, Northern Hemisphere	VRT19-D3
VRT19, 19-inch color monitor, 240 volts, Southern Hemisphere	VRT19-D4
RZ55 hard disk drive, 332 Mbytes	RZ55-E
- RZ55 hard disk drive PCB	29-27347-01
RZ56 hard disk drive, 665 Mbytes	RZ56-E
- RZ56 hard disk drive HDA and frame assembly	29-27890-01
- RZ56 hard disk drive PCB	29-27889-01

(continued on next page)

Table B-3 (Cont.). Basic Components

Item	Order Number
RZ57 hard disk drive, 1.2 Gbytes	RZ57-E
- RZ57 hard disk drive HDA and frame assembly	29-28158-01
- RZ57 hard disk drive PCB	29-28159-01
RRD40 optical compact disc drive, 600 Mbytes	RRD40-FA
TK50Z tape drive, 95 Mbytes, 120 volts	TK50Z-GA
TK50Z tape drive, 95 Mbytes, 240 volts	TK50Z-G3
TLZ04 tape drive, 1.2 Gbytes, 120 volts	TLZ04-DA
Mouse	VSXXX-AA
Keyboard	LK201

Table B-4. Cords, Cables, and Connectors

Item	Part Number	Order Number
Monitor-to-system-unit power cord (U.S.)	17-00442-26	—
System unit or expansion box power cord	17-00606-10	BN19P-K
Expansion-box-to-expansion-box cable	17-01351-04	BC19J-1E
Keyboard-mouse cable	17-02640-01	—
Serial line cable	—	BC16E-10
System-unit to expansion-box cable	17-02641-02	BC09D-06
ThinWire cable (12 ft)	17-01241-12	BC16M-12
ThinWire LAN assembly kit	22-00112-01	BC16T-12

Table B-5. Software Documentation

Item	Order Number
ULTRIX Media and Doc-TK50	QA-VV1AA-H5
<i>ULTRIX Guide to the Error Logger</i>	AE-ME95B-TE
<i>Technical Summary for RISC Processors</i>	AA-MM35A-TE
<i>Documentation Overview for RISC Processors</i>	AA-MM05A-TE

Table B-6. Hardware Documentation

Item	Order Number
DECstation 5000 User Documentation Kit	EK-384AA-DK
<i>DECstation 5000 Model 200 Installation Guide</i>	EK-365AA-IN
<i>DECstation 5000 Model 200 Operator's Guide</i>	EK-366AA-OG
<i>DECstation 5000 Model 200 Workstation Reference Card</i>	EK-367AA-IC
<i>DECstation 5000 Model 200 Maintenance Guide</i>	EK-370AA-MG
<i>DECstation 5000 Field Service Pocket Guide</i>	EK-371AA-PG
<i>TURBOchannel Maintenance Guide</i>	EK-TRBOC-MG
Components and Add-Ons	
<i>The RZ55 Disk Drive Service Manual</i>	EK-RZ55D-SV
<i>The RZ56 Disk Drive Subsystem Service Manual</i>	EK-RZ56D-SV
<i>The RZ57 Disk Drive Subsystem Service Manual</i>	EK-RZ57D-SV
<i>The RRD40 Owner's Manual</i>	EK-RRD40-OM
<i>The TLZ04 Cassette Tape Drive Owner's Manual</i>	EK-TLZ04-OM
<i>Installing and Using the LN03</i>	EK-0LN03-UG
<i>LN03 PLUS User Guide</i>	EK-LN03S-UG
<i>ScriptPrinter Installation Guide</i>	EK-LN03R-UG
<i>ScriptPrinter Operator Guide</i>	EK-LN03R-OG
<i>LA100 Letterwriter User Documentation Kit</i>	EK-LW100-UG
<i>Installing and Using the LA75 Companion Printer</i>	EK-0LA75-UG
<i>Installing and Using the LJ250/252 Companion Color Printer</i>	EK-LJ250-DK
<i>TK50Z Tape Drive Subsystem Owner's Manual</i>	EK-LEP05-OM
<i>TK50Z User's Guide</i>	EK-OTK50-UG
<i>TK50Z Technical Manual</i>	EK-OTK50-TM

C

Console Commands

This appendix explains

- The rules to follow when you type console commands
- Terms commonly used in this discussion of console commands
- The command format and purpose of each console command
- Possible console command error messages

Entering Console Commands

This section describes the conventions to follow when you enter console commands.

Rules for Entering Console Commands

You can use console commands when the system monitor displays the prompt >> or R>. When the system displays the prompt R>, you can use only the boot and passwd commands until you enter the console command password.

Follow these rules when you type console commands:

- Type uppercase and lowercase letters exactly as they appear in command lines. The system treats uppercase and lowercase letters as different input.
- Press Return after you type a command.
- Enter number values as follows:
 - Enter *decimal values* as a string of decimal digits with no leading zeros (for example, 123).
 - Enter *octal values* as a string of octal digits with a leading zero (for example, 0177).
 - Enter *hexadecimal values* as a string of hexadecimal digits preceded by 0x (for example, 0x3ff).
- When reading or writing to memory, enter data as bytes, halfwords, or words. Because a word is 4 bytes, successive addresses referenced by a word are successive multiples of 4. For example, the address following 0x80000004 is 0x80000008. An error occurs if you specify an address that is not on a boundary for the data size you are using.
- The following key combinations have an immediate effect when the system is in console mode:
 - Ctrl-s freezes the screen display.
 - Ctrl-q releases a frozen screen display.
 - Ctrl-c aborts a command.
 - Ctrl-u erases a partially typed command line.

Conventions Used in This Chapter

- **Letters in boldface type like this** are to be typed exactly as they appear.
- *Letters in italic type like this* are variables that you replace with actual values.
- Arguments enclosed in square brackets ([]) are optional.
- Ellipses (...) follow an argument that can be repeated.
- A vertical bar (|) separates choices. You can think of the bar as a symbol meaning *or*.
- Parentheses enclose a group of values from which you must select one value. For example, `-(b | h | w)` means enter `-b` or `-h` or `-w`.

Some Terms Used in This Chapter

Controller — A hardware device that directs the operation and communication between devices or other controllers. Each controller in the system has a unique controller ID number.

Devices — Peripherals, such as hard disks and tape drives, capable of receiving, storing, or transmitting data.

Script — A collection of console commands that run in a set order. Test scripts, which are collections of individual tests and other test scripts, are commonly used for troubleshooting the system.

Slot — The physical location of a module or modules.

- The system module and memory modules occupy slot 7.
- The base system Ethernet controller occupies slot 6.
- The base system SCSI controller occupies slot 5.
- The TURBOchannel options occupy slots 2, 1, and 0.

Console Command Reference

This section describes console commands used by the following hardware:

- System module
- Memory modules
- Ethernet controllers
- SCSI controllers
- Color frame-buffer graphics modules
- 2D graphics accelerator modules
- 3D graphics modules

Console commands in this appendix appear in the same order as they appear in the system console command Help menu.

For information about console commands used by TURBOchannel options not in this list, refer to the *TURBOchannel Maintenance Guide*.

Console Command Format Summary

Here are the console commands and their formats displayed in the Help menu that appears when you enter ?:

CMD:

```
boot [[-z #] [-n] #/path [ARG...]  
cat SCRIPT  
cnfg [#]  
d [-bhw] [-S #] RNG val  
e [-bhwcdoux] [-S #] RNG  
erl [-c]  
go [ADR]  
init [#] [-m] [ARG...]  
ls [#]  
passwd [-c] [-s]  
printenv [EVN]  
restart  
script SCRIPT  
setenv EVN STR  
sh [-belvS] [SCRIPT] [ARG..]  
t [-l] #/STR] [ARG..]  
unsetenv EVN
```

The following sections describes these commands in detail. Note that the command descriptions do not always use the same command format that appears in the Help menu.

Table C-1 lists each console command and its function.

Table C-1. Console Command Functions

Commands	Function
?	Displays a list of console commands and formats.
boot	Boots the system.
cat	Displays the contents of a script.
cnfg	Displays system configuration information.
d	Deposits data into memory.
e	Examines memory contents.
erl	Displays the error message log.
go	Transfers control to a specific address.
init	Resets the system.
ls	Displays the scripts and other files that are in a module.
passwd	Sets and clears the console password.
printenv	Prints environment variables.
restart	Attempts to restart the software that is specified in the restart block.
script	Creates a temporary script of console commands.
setenv	Sets an environment variable.
sh	Runs a script.
t	Runs tests.
test	Runs a comprehensive test script that checks the system hardware.
unsetenv	Removes an environment variable.

? Command

Use the ? command to display a list of available console commands and their formats.

The ? command format is
? [cmd]

When you type the ? command,

- To display the format for all available console commands, omit the optional *cmd* parameter.
- To display the format for a single command, replace the optional *cmd* parameter with the name of the test for which you want a command format display.

boot Command

Use the boot command to boot the system software.

When you type the boot command, use the format
boot [-z secs] [-n] [slot/path] [-a] [args...]

- Include the *-z secs* parameter to have the system wait before starting the bootstrap. Replace *secs* with the number of seconds the system should wait before the bootstrap operation starts.
- Include the *-n* parameter to have the boot command load, but not execute, the specified file.
- Replace *slot/path* with the file specification for the file you are using to boot. The file specification format depends on the type of boot device you use.
 - To boot from the Ethernet, the file specification form is *slot/protocol/[file]*, where *slot* represents the slot number of the Ethernet controller you are using to boot. The *protocol* parameter represents the name of the network protocol that performs the boot. Replace *protocol* with either *mop* or *tftp*. The optional *file* parameter represents a specific file that you use to boot.

For example, to use the protocol named *mop* to boot from the base system Ethernet, which has the slot number 6, type **6/mop** and press Return.

- To boot from a drive, the file specification form is *slot/(rz | tz)drive/ file*.

When you type this file specification, use the (rz | tz) parameter to specify the type of drive that performs the boot operation. Specify rz to boot from a hard disk or compact disc drive. Specify tz to boot from a tape drive.

Replace *slot* with the SCSI controller slot number.

Replace *drive* with the drive SCSI ID for the drive you are using to boot.

Replace *file* with the name of the specific file you want to boot.

For example, to boot the file named vmunix from a hard disk drive with SCSI ID 1 that is on the SCSI bus connected to the base system SCSI controller in slot 5, type **5/rz1/vmunix** and press Return.

To boot the file called vmunix from a tape drive, with SCSI ID 2 that is on the SCSI bus connected to a SCSI controller in option slot 1, type **1/tz2/vmunix** and press Return.

- To perform a multiuser boot, include the -a parameter. If you omit the -a parameter, the system performs a single-user boot.

Important information about typing the boot command

- If you include no arguments in the boot command, the system uses the boot environment variable as the argument string for the boot command.
- If you include any additional arguments, you must type the entire argument string in the boot command. The system ignores the boot environment variable whenever you specify any additional arguments in the boot command.
- If you use any spaces or tabs in the boot environment variable, you must surround the entire variable with double quotes. For example, to set the boot environment variable to use the protocol mop to perform a multiuser boot from the Ethernet in slot 6, type **"6/mop -a"**.

cat Command

Use the cat command to display the contents of a script or other file.

The cat command format is
cat *slot/script*

When you type the cat command,

- Replace *slot* with the slot number of the module that has the contents you want to display.
- Replace *script* with the name of the script whose contents you want to display.

For example, to display the individual self-tests contained in the thorough power-up self-test for the Ethernet controller in slot 6, type **t 6/pst-t** and press Return.

A list of the individual tests that are in the Ethernet controller power-up self-test then appears on the monitor.

cnfg Command

Use the `cnfg` command to display hardware configurations.

The `cnfg` command format is

cnfg [*slot*]

- To display a general system configuration, type the `cnfg` command without the *slot* parameter.
- To display a detailed configuration for an individual module, replace the optional parameter *slot* with the slot number of the module for which you want a configuration display.

General system configuration displays

The following sample general system configuration display is for a system with optional Ethernet, SCSI, and color frame-buffer modules.

```
>>cnfg
7:  KN02-AA  DEC    T5.2a    TCF0    ( 24 MB)
6:  PMAD-AA  DEC    T5.2a    TCF0    (enet:08-00-2b-0c-e0-d1)
5:  PMAZ-AA  DEC    T5.2a    TCF0    (scsi = 7)
2:  PMAD-AA  DEC    X5.1f    TCF0    (enet: 08-00-2b-0f-43-31)
1:  PMAZ-AA  DEC    X5.1e    TCF0    (scsi = 7)
0:  PMAG-BA  DEC    T5.2a    TCF0    (CX -- d=8)
```

In this display,

- The leftmost column lists the module slot number.
- The column second from the left lists the module names.
- The column third from the left lists the module manufacturer.
- The column third from the right lists the firmware version in each module ROM.
- The column second from the right lists the firmware type in each module ROM.

- The rightmost column lists additional information about each module. The meaning of each message depends on the type of module being described.
 - For the system module and memory modules, the additional information lists the amount of memory on the system.
 - For Ethernet controllers, the additional information lists the Ethernet station address.
 - For SCSI controllers, the additional information lists the SCSI ID for the SCSI controller.
 - For graphics modules, the first part of the additional information identifies the type of graphics module in the system.

CX indicates that the is a color frame-buffer graphics module. PX indicates that the module is a 2D graphics accelerator module. DA indicates that the module is a low 3D graphics module. EA indicates that the module is a mid 3D graphics module. FA indicates that the module is a high 3D graphics module.

The second part of this information string lists the number of bits that make up the pixel width.

Individual configuration displays begin with the same line that describes that module in the general system configuration.

Base system configuration displays

To obtain a base system configuration display, type **cnfg 7** and press Return.

This is a sample configuration display for the base system configuration, which is in slot 7.

```
7:      KN02-AA  DEC      T5.2a      TCF0      ( 24 MB)
      mem( 0): a0000000:a07ffffff ( 8 MB)
      mem( 1): a0800000:a0ffffff ( 8 MB)
      mem( 2): a1000000:a17ffffff ( 8 MB)
```

In the base system configuration display,

- The first line has the same meaning as the base system description in the general system configuration display.
- Subsequent lines describe the memory modules.
 - The number after mem is the slot number for the memory module.
 - The values separated by a colon are the starting and ending physical addresses in the memory module.
 - The last entry is the memory module capacity, in Mbytes.

Ethernet controller configuration displays

To obtain an Ethernet controller configuration display, type **cnfg slot**, where you replace *slot* with the slot number of the Ethernet controller for which you want a configuration display, and press Return.

The following is a sample Ethernet controller configuration display for the ThinWire Ethernet controller in slot 6.:

```
6:      PMAD-AA  DEC      T5.2a      TCF0      (enet: 08-00-2b-0c-e0-d1)
```

The Ethernet controller configuration display has the same meaning as the Ethernet controller description in the general system configuration display. For an explanation of the Ethernet controller configuration display, refer to “General system configuration displays” earlier in this section.

SCSI controller displays

To display a SCSI controller configuration, type **cnfg slot**, where you replace *slot* with the slot number of the SCSI controller for which you want a configuration display, and press Return.

The following is a sample SCSI controller configuration display for a SCSI bus with two hard disk drives, one tape drive, and one optical compact disc drive:

```
5 : PMAZ-AA  DEC      T5.2a      TCF0      (SCSI = 7)
-----
DEV  PID                      VID          REV      SCSI DEV
=====
rz0  RZ55      (C) DEC      DEC          0700     DIR
rz1  RZ56      (C) DEC      DEC          0200     DIR
rz4  RRD40     (c) DEC      DEC          0700     CD-ROM
tz5                                     SEQ
```

In the SCSI configuration display, the first line has the same meaning as the SCSI description in the general system configuration display. For an explanation of this first line, refer to “General system configuration display” earlier in this section.

Lines following the first line describe drives on the SCSI bus.

- DEV lists the general category of the drive and its SCSI ID.
 - rz indicates that the drive is a hard disk or optical compact disc drive.
 - tz indicates that the drive is a tape drive.
 - The number at the end of the entry is the drive SCSI ID.
- PID lists the product ID for some types of drives.
 - The term on the left is the specific drive type.
 - The term on the right describes the product manufacturer.
- VID lists the drive vendor.

- REV shows the revision number for the drive.
- SCSI DEV also describes the drive type.
 - DIR, which represents a direct access drive, appears in entries for hard disk drives.
 - SEQ, which represents a sequential access drive, appears in entries for tape drives.
 - CD-ROM appears in entries for optical compact disc drives.

Color frame-buffer graphics module configuration displays

To obtain a color frame-buffer graphics module configuration display, type **cnfg slot**, where you replace *slot* with the slot number for the color frame-buffer graphics module for which you want a configuration display, and press Return.

The following is a sample color frame-buffer graphics module configuration display for a color frame-buffer graphics module in slot 1:

```
0:    PMAG-BA  DEC    T5.2a    TCF0    (CX -- d=8)
```

The color frame-buffer graphics module configuration display means the same as the color frame-buffer graphics module description in the general system configuration display. For an explanation of the color frame-buffer graphics module configuration display, refer to “General system configuration displays” earlier in this section.

2D graphics accelerator module configuration displays

To obtain a 2D graphics accelerator module configuration display, type **cnfg slot**, where you replace *slot* with the slot number for the 2D graphics accelerator module for which you want a configuration display, and press Return.

The following is a sample configuration display for a 2D graphics accelerator module in option slot 1:

```
1:      PMAG-CA  DEC      T5.2a      TCF0      (PX -- D=8)
```

The 2D graphics accelerator module display has the same meaning as the 2D graphics accelerator module description in the general configuration display. For an explanation of the 2D graphics accelerator module configuration display, refer to “General system configuration displays” earlier in this section.

3D graphics module configuration displays

To obtain a 3D graphics module configuration display, type **cnfg 1**, where 1 is the slot number for the 3D graphics module, and press Return.

The following is a sample configuration display for a low 3D graphics module:

```
1:      PMAG-DA  DEC      T5.2a      TCF0      (DA: PXG -- D=8, z=24)
```

In this display,

- The leftmost column lists the low 3D graphics module slot number. The low 3D graphics module slot number is always 1.
- PMAG-DA is the part identifier for low and mid 3D graphics modules. High 3D graphics module displays list PMAG-FA as the part identifier.
- DEC is the module manufacturer.
- The column third from the right lists the firmware version in each module ROM.
- The column second from the right lists the firmware type in each module ROM.

- The rightmost phrase indicates the 3D graphics module type and how many VSIMMs and z-buffer modules are on the base graphics module.
 - The first part of the phrase identifies the type of graphics module in the system. The value DA: PXG indicates that the module is a low 3D graphics module. The value EA: PXG indicates that the module is a mid 3D graphics module. The value PXG_T indicates that the module is a high 3D graphics module.
 - The second part of the phrase describes the VSIMM and z-buffer modules. The value after D= is the number of planes available for color generation. The value after Z= is the number of bits available in the z-buffer modules.

***Note:** If the last phrase in the 3D cnfg display is (ERR: invld cnfgtbl) or ends with question marks (???), there is a problem in the graphics module hardware. Refer to the **TURBOchannel Maintenance Guide** to troubleshoot the 3D graphics module.*

d Command

Use the d command to deposit values in memory.

The d command format is

d [-(b | h | w)] [-S *count*] *rng*

- Include the optional -b | h | w parameter to specify whether to store the values as bytes, halfwords, or words.
 - Specify -b to deposit the values as bytes.
 - Specify -h to deposit the values as halfwords.
 - Specify -w to deposit the values as words.
- Include the optional -S *count* parameter to store the same value more than once. Replace *count* with the number of times that you want the value to be stored.
- Use the *rng* parameter to set the range of addresses across which the values are stored.
 - To deposit values at a single address, replace *rng* with that address.

- To deposit a number of values across a range of addresses, replace *rng* with the address range. Use the form *address_low:address_high* to define the range.

When you enter the address range, replace *address_low* with the starting address for storing values and replace *address_high* with the ending address for storing values.

- To deposit values at a series of addresses, replace *rng* with the starting address and the number of successive addresses at which you want to store values.

Use the form *address_low#count* to specify the addresses where you store values. When you type this address range format, replace *address_low* with the starting address for storing values. Then replace *count* with the number of values you want to store values.

- To specify more than one address range, separate each range specification by commas. Leave no spaces between the range specifications.

e Command

Use the **e** command to examine the contents of a specific address.

The **e** command format is

e [-b] [-e] [-w] [-c] [-d] [-o] [-u] [-x] [-S *count*] *rng*

- Specify **-b** to examine the contents as bytes.
- Specify **-h** to examine the contents as halfwords.
- Specify **-w** to examine the contents as words.
- Specify **-x** to display the contents in hexadecimal format.
- Specify **-o** to display the contents in octal format.
- Specify **-u** to display the contents in unsigned decimal format.
- Specify **-d** to display the data in decimal format.
- Specify **-c** to display the data as ASCII characters.

- Include the optional *-S count* parameter to have the command repeatedly fetch the value but display the value only once. When you type this parameter, replace *count* with the number of times that you want to fetch the value.
- Use the *rng* parameter to specify the range of addresses you want to examine.

- To examine values at a single address, replace *rng* with that address.

- To examine values at a range of addresses, replace *rng* with the address range. Use the form *address_low:address_high* to define the range.

When you enter the address range, replace *address_low* with the starting address for storing values and replace *address_high* with the ending address for storing values.

- To examine values at a series of addresses, replace *rng* with the starting address and the number of successive addresses you want to examine.

Use the form *address_low#count* to specify the addresses where you store values. When you type this address range format, replace *address_low* with the starting address for storing values. Then replace *count* with the number of addresses at which you want to store values.

- To specify more than one address range, separate each range specification by commas. Leave no spaces between the ranges.

erl Command

Use the `erl` command to display or clear the log of the first several errors that occurred since the most recent power-up or reset. The `erl` command format is **erl** [-c]

- To display the current error message log, use the `erl` command without the `-c` option.
- To clear the error message log, include the `-c` option when you type the `erl` command.

go Command

Use the `go` command to transfer system control to a specific system address.

The `go` command format is **go** [*address*]

- To transfer system control to the address specified in the last boot `-n` command, type the `go` command without the *address* parameter. If you omit the parameter *address*, and if no previous boot `-n` command has been issued, the system ignores the `go` command.
- To transfer system control to the contents of a specific address, include the parameter *address*. Replace the parameter *address* with the address to which you want to transfer control.

init Command

Use the `init` command to initialize module hardware.

The `init` command format is

init [*slot*] [- **m**]

- To initialize the entire system, include no additional arguments the `init` command.
- To initialize an individual module, replace the optional *slot* parameter with the slot number of the module that you want to initialize.
- If you perform an `init` operation on the system module and memory modules in slot 7, include the optional `-m` parameter to zero all memory in the system module and memory modules.

ls Command

Use the `ls` command to display the scripts and other files in system ROM.

The `ls` command format is

ls [*slot*]

To display the files available in an individual module, replace the optional *slot* parameter with the slot number of the module that has the files you want to display.

passwd Command

Use the `passwd` command to enter, set, or clear a password.

The `passwd` command format is **passwd** [-**c**] [-**s**]

If the console prompt is `R>`, you can use only the `boot` and `passwd` commands until you enter the correct password.

To enter an existing password, type the `passwd` command without any additional parameters. At the `pwd:` prompt enter the password, then press Return.

After you enter the correct password, or if the system requires no password, the system displays the console prompt `>>`. You can use all console commands whenever the console prompt is `>>`.

- To clear an existing password, include the `-c` parameter when you type the `passwd` command. First use the `passwd` command to enter the existing password. After the console prompt `>>` appears, type **`passwd -c`** and press Return. The system then removes the password requirement.
- To set a new password, include the `-s` parameter. Enter the new password at the `pwd:` prompt. When the `pwd:` prompt appears a second time, type the password again. If the two password entries match, the system sets the new value as the password.

printenv Command

Use the `printenv` command to display the list of environment variables.

The `printenv` command format is

`printenv` [*variable*]

- To display the entire environment variable table, omit the optional *variable* parameter.
- To display an individual environment variable, replace *variable* with the name of the environment variable you want to display.

restart Command

Use the `restart` command to restart the system software. For the restart operation to succeed, the software must have a restart block set up in memory.

The `restart` command format is **`restart`**.

script Command

Use the `script` command to create a temporary set of console commands that in an order that you establish.

The `script` command format is **`script`** *name*.

When you type the `script` command, replace *name* with the name that you are giving the script, and press Return.

After you press Return, type the commands that you want to include in the script. Press Return after each command that you type. When you finish typing the commands that you are including, enter Ctrl-d or press Return twice to complete the script.

To run the script, use the `sh` command described later in this appendix. When you run the script, the commands execute in the same order as you entered them when you created the script.

setenv Command

Use the `setenv` command to set an environment variable.

The `setenv` command format is **`setenv`** *variable value*.

When you type the `setenv` command,

- Replace *variable* with the name of the environment variable you want to set.
- Replace *value* with the new value that you want to assign to the environment variable. Note that if the new value contains blank spaces or tabs, you must use double quote marks (") at the beginning and end of the value.

Table C-2 lists environment variables that appear in the environment variable display.

Table C-2. Environment Variables in the Environment Variable Display

Environment Variable	Description
boot	Sets the default boot path.
console	Selects the system console. <ul style="list-style-type: none">- If you set the console to s, the system uses a terminal connected to the printer connector as the console.- If you set console to any value other than s, the system automatically configures the console.
haltaction	Specifies which action to take if the system halts. <ul style="list-style-type: none">- b causes the console to boot after the console halts.- h causes the console to halt and attempt no other action if the system halts.- r causes the console to restart, then attempt a boot if the restart fails.
more	Sets the screen size. <ul style="list-style-type: none">- Specify zero (0) to suppress the “more” pagination.- Specify a number other than zero to turn on the “more” pagination.
osconsole	Contains the slot numbers of the console drivers. If a tty driver from slot <i>x</i> serves as the console, osconsole is set to <i>x</i> . If a crt driver from slot <i>y</i> and a kbd driver from slot <i>z</i> serve as the console, osconsole is set to <i>y,z</i> . Although the environment variable display includes the osconsole setting, you can not set this variable. The system automatically sets the osconsole value.
testaction	Specifies the type of power-up self-test that the system runs. <ul style="list-style-type: none">- Specify q to run a quick test when the power-up self-test runs.- Specify t to specify a thorough test when the power-up self-test runs.
#	Specifies the slot number of the module that contains the current script. If no script is active, the system specifies the base system module, which has slot number 7. Although the environment variable display includes the # setting, you can not set this variable.

sh Command

Use the sh command to run a script.

The sh command format is

sh [-b] [-e] [-l] [-v] [-s] [*slot/script*] [*arg...*]) When you type the sh command,

- Include the optional -b parameter to run a script. This runs the script directly, instead of by a subshell.
- Include the optional -e parameter to stop the script if an error occurs.
- Include the optional -l parameter to have a script loop until you press Ctrl-c.
- Include the optional -S parameter to suppress any error messages if the script is not found.
- Include the optional -v parameter to echo the script to the console as the test runs.
- To run a specific script, include the optional *slot/script* parameter.
 - Replace *slot* with the slot number of the module that has the script you want to run.
 - Replace *script* with the name of the script you want to run.
- The use of any additional arguments depends on the particular script you specified in the sh command.

You can also run a script by typing *slot/script*.

- Replace *slot* with the slot number of the module that contains the script you want to run.
- Replace *script* with the name of the script you want to run.

For example, to run the thorough power-up self test script for the SCSI controller and drives in slot 5, type **sh 5/pst-t** and press Return.

t Command

Use the `t` command to run individual tests.

The `t` command format is `t [-l] slot/test [arg...]`

When you type the `t` command,

- Include the optional `-l` parameter to have the test loop until you press Ctrl-c or reset the system.
- Replace *slot* with the slot number of the specific module that you want to test.
- Replace *test* with the name of the specific test you want to run.
- Uses for additional arguments depend on the particular test you are running. For an explanation of the additional arguments used in an individual test, refer to Appendix D.

To display the name and format for all individual tests for a module, type `t slot/?`, where you replace *slot* with the slot number of the module for which you want to display tests, and press Return.

test Command

Use the `test` command to run a thorough test of all system hardware.

The `test` command format is `test`.

unsetenv Command

Use the `unsetenv` command to remove an environment variable.

The `unsetenv` command format is `unsetenv variable`.

When you type the `unsetenv` command, replace *variable* with the name of the environment variable that you want to remove.

Console Command Error Messages

Table C-3 lists the error messages that the console commands can return.

Table C-3. Console Command Error Messages

Error Message	Meaning
?IO: <i>slot/device</i>	An I/O device reported an error. <i>slot</i> represents the I/O device slot number. <i>device</i> represents an additional message about the error.
?IO: <i>slot/device</i>	Module with the slot number represented by <i>slot</i> does not recognize the device represented by <i>device</i> .
PDE3: <i>slot</i>	Module with the slot number represented by <i>slot</i> contains an early ROM chip version. The ROM chip must be upgraded.
?SNF: <i>script</i>	System did not find the script that was to be run.
?TXT:	Name specified in the script command is not a valid script name.
?STX: <i>usage</i>	Console command contained a syntax error. The <i>usage</i> parameter is the correct syntax.
?STX: <i>error</i>	Console command contained a syntax error. The <i>error</i> parameter is the incorrect portion of the command.
?EV: <i>ev_name</i>	Specified environment variable does not exist.
?EVV: <i>value</i>	Specified environment variable value is invalid.
?TFL: <i>slot/test</i>	Test failure occurred. <i>slot</i> represents the slot number of the module that reported the error. <i>test</i> represents the name of the failed test.

D

Test Commands and Messages

This appendix describes commands and messages for the following tests:

- System module tests
- Memory module tests
- Initial power-up tests

Locating Individual Tests in This Appendix

This appendix groups together individual tests for each module. The individual tests in each group are listed in alphabetical order by test command. Table D-1 lists the individual tests for each module.

Table D-1. Individual Tests and Utilities for Each Module

Module Tested	Individual Test	Test Command
System module	Cache data test	<i>7/cache/data/cache address</i>
	Cache isolate test	<i>7/cache/isol cache</i>
	Cache reload test	<i>7/cache/reload cache offset</i>
	Cache segment test	<i>7/cache/seg [cache] [address]</i>
	Serial line silo alarm test	<i>7/dz/alm [loopback] [line]</i>
	Serial line modem and printer test	<i>7/dz/modem [port] [cts-lbk]</i>
	Serial line silo overflow test	<i>7/dz/ovrflw</i>
	Serial line single silo test	<i>7/dz/silo -l [loopback] [line]</i>
	Serial line mixed silo test	<i>dz/silo -m</i>
	Serial line transmit and receive test	<i>7/dz/tx-rx [loopback] [line]</i>
	Error-correcting code (ECC) generate test	<i>7/ecc/gen address</i>
	Floating-point unit test	<i>7/fpu</i>
	Keyboard test	<i>7/misc/kbd [loopback]</i>
	Mouse test	<i>7/misc/mouse [loopback]</i>
	Overheat detect test	<i>7/misc/pstemp</i>
	RAM refresh test	<i>7/misc/rfrsh</i>
	Partial write test	<i>7/misc/wbpart</i>

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Table D-1 (Cont.). Individual Tests and Utilities for Each Module

Module Tested	Individual Test	Test Command
	Nonvolatile RAM (NVR) test	<i>7/rtc/nvr [pattern]</i>
	Real-time clock period test	<i>7/rtc/period</i>
	Real-time clock register test	<i>7/rtc/regs</i>
	Real-time test	<i>7/rtc/time</i>
	Translation lookaside buffer (TLB) probe test	<i>7/tlb/prb</i>
	Translation lookaside buffer (TLB) registers test	<i>7/tlb/reg [pattern]</i>
Memory module	RAM board test	<i>7/mem [board] [threshold] [pattern]</i>
	Floating I/O memory test	<i>7/mem/float10 [address]</i>
	RAM address select lines test	<i>7/mem/select</i>

System Module Tests

The following entries explain the commands, parameters, and error codes for each individual system module test.

Cache Data Test

The cache data test writes data patterns to the cache and then reads them. To run the cache data test, type **t 7/cache/data** [*cache*] [*address*] and press Return.

When you type the cache data test command,

- Replace *cache* with a value that specifies the cache you want to test.
 - Specify I to test the I cache.
 - Specify D to test the D cache.
- Replace the optional *address* parameter with a specific cache address where you want the test to start. Note that using the optional *address* parameter command requires that you be familiar with the firmware specifications.

Cache data test error information

Cache data test error messages have the form ?TFL: 7/cache/data (*code* : *description*)

- ?TFL 7/cache/data indicates that the cache data test reported an error.
- *code* represents a code that identifies which portion of the test failed.
- *description* represents additional information that describes the failure.

Table D-2 lists the codes and extended descriptions used in cache data test error messages.

Table D-2. Cache Data Test Error Messages

Error Information	Description
<i>(address=xxxxxxxx, sb yyyyyyyy)</i>	Error occurred writing data pattern to cache RAM. The address value is the actual value at a given address, followed by the correct value.
(2)	Cache parity error occurred while test was reading floating 1.
<i>(3: address =xxxxxxxx, sb yyyyyyyy)</i>	Error occurred when test read data pattern in cache. The address value is the actual value at a given address, followed by the correct value.
(4)	Cache parity error occurred while test was reading floating 0.
<i>(5: address= xxxxxxxx, sb yyyyyyyy)</i>	Error occurred when test wrote address complement to cache RAM. The address value is the actual value at a given address, followed by the correct value.
(6)	Cache parity data error occurred.
<i>(7: address= xxxxxxxx, sb yyyyyyyy)</i>	Error occurred reading address complement. The address value is the actual value at a given address, followed by the correct value.
(8)	Cache address read caused a parity error.

Cache Isolate Test

The cache isolate test isolates data patterns to the cache and then reads and writes them. To run the cache isolate test, type **t 7/cache/isol** [*cache*] and press Return.

When you type the cache isolate test command, replace *cache* with a value that specifies the cache you want to test.

- Specify I to test the I cache.
- Specify D to test the D cache.

Cache isolate test error messages

Cache isolate test error messages have the form

?TFL: 7/cache/isol (*code*)

- ?TFL 7/cache/isol indicates that the cache isolate test reported an error.
- *code* represents a code that identifies which portion of the cache isolate test failed.

Table D-3 describes error codes used in cache isolate test error messages.

Table D-3. Cache Isolate Test Error Codes

Error Code	Description
(1)	Reading 00000000 pattern resulted in a cache parity error.
(2)	Reading 00000000 pattern resulted in a cache miss error.
(3)	Reading 00000000 pattern returned a data miscompare.
(4)	Reading 55555555 pattern resulted in a cache parity error.
(5)	Reading 55555555 pattern resulted a cache miss error.
(6)	Reading 55555555 pattern resulted in a data miscompare.
(7)	Reading AAAAAAAAA pattern resulted in a cache parity error.
(8)	Reading AAAAAAAAA pattern resulted in a cache miss error.
(9)	Reading AAAAAAAAA pattern resulted in a data miscompare.
(10)	Reading data address pattern resulted in a cache parity error.
(11)	Reading data address pattern resulted in a parity error.

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Table D-3 (Cont.). Cache Isolate Test Error Codes

Error Code	Description
(12)	Reading data address pattern returned a miscompare error.

Cache Reload Test

The cache reload test uses rotating-parity data patterns to perform a read and write operation on the cache. To run the cache reload test, type **t 7/cache/reload** [*cache*] [*address*] and press Return.

When you type the cache reload test command,

- Replace *cache* with a value that specifies the cache you want to test.
 - Specify I to test the I cache.
 - Specify D to test the D cache.
- Replace *address* with the address where you want the test to start. Note that you must be familiar with the firmware specifications to use the optional *address* parameter correctly.

Cache reload test error information

Cache reload test error messages have the form
?TFL: 7/cache/reload (*code* : *description*)

- **?TFL 7/cache/reload** indicates that the cache/reload test reported an error.
- *code* represents some code that identifies which portion of the test failed.
- *description* represents additional information that describes the failure.

Table D-4 describes error descriptions used in cache reload test error messages.

Table D-4. Cache Reload Test Error Descriptions

Error Description	Meaning
(PE <i>address</i> = <i>xxxxxxxx</i> , sb <i>yyyyyyyy</i>)	Unexpected parity error occurred. The address value is the actual value at a given address, followed by the correct value.
(PE @ <i>xxxxxx</i> (C))	Parity error occurred. <i>xxxxxx</i> represents the address where the error occurred.

Cache Segment Test

The cache segment test checks individual cache segments.

To run the cache segment test, type **t 7/cache/seg** [*cache*] [*address*] and press Return.

When you type the cache segment test command,

- Replace the optional *cache* parameter with a value that specifies the cache you want to test.
 - Specify D to test the D cache.
 - Specify I to test the I cache.
- Replace *address* with a specific address you want to test. Note that using the optional *address* parameter correctly requires thorough knowledge of the firmware specifications.

Cache segment test error messages

Cache segment test error messages have the form
?TFL: 7/cache/seg (*code* : *description*)

- ?TFL 7/cache/seg indicates that the cache segment test reported an error.
- *code* represents some code that identifies which portion of the test failed.
- *description* represents additional information that describes the failure.

Table D-5 describes error codes and descriptions found in cache segment test error messages.

Table D-5. Cache Segment Test Error Codes and Descriptions

Error Code and Description	Meaning
(1: <i>address= xxxxxxxx</i> , sb <i>yyyyyyyy</i>)	Error occurred when the system tried to read the cache contents. The <i>address</i> parameter is the actual value at a given address, followed by the correct value.
(2: <i>address= xxxxxxxx</i> , sb <i>yyyyyyyy</i>)	Error occurred when the system tried to read the memory contents. The <i>address</i> parameter is the actual value at a given address, followed by the correct value.
(3: <i>address =xxxxxxx</i> , sb <i>yyyyyyyy</i>)	Error occurred when the system performed a read and write operation on the RAM. The <i>address</i> value is the actual value at a given address, followed by the correct value.
(4: <i>address =xxxxxxx</i> , sb <i>yyyyyyyy</i>)	Cache data was inconsistent. The address value is the actual value at a given address, followed by the correct value.

Serial Line Silo Alarm Test

The serial line silo alarm test checks the ability of the serial line controller to generate a silo alarm interrupt.

To run this test, type **t 7/dz/alm** [*loopback*] [*line*] and press Return.

When you type the serial line silo alarm test,

- Replace *loopback* with a value that specifies the type of test you want to run.
 - Specify *intl* to run an internal loopback test.
 - Specify *extl* to run an external loopback test.
- Replace *line* with a value that specifies the serial line you want to test. Note that if you specify a line to test, you must specify a internal or external loopback test.
 - Specify 0 to test the keyboard serial line.
 - Specify 1 to test the mouse serial line.
 - Specify 2 to test the right communications serial line.
 - Specify 3 to test the left communications serial line.

Serial line silo alarm test error messages

Serial silo alarm test error messages have the form
?TFL: 7/dz/alm (*description*)

- **?TFL 7/dz/alm** indicates that the serial line silo alarm test reported an error.
- *description* represents an additional statement that describes the failure.

Table D-6 lists the descriptions found in serial line silo alarm test error messages.

Table D-6. Serial Line Silo Alarm Test Error Descriptions

Error Description	Meaning
(bad interrupt)	Unexpected silo alarm interrupt occurred.
(timeout: no TRDY)	Silo alarm timeout error occurred.
(no interrupt)	No silo alarm interrupt occurred.

Modem and Printer Test

The modem and printer test checks the ability of the serial line controller to interface with a modem, printer, or alternate terminal connected to a communications line.

To run the modem and printer test, type **t 7/dz/modem** [*port*] [*cts-lbk*] and press Return.

When you type the modem and printer test command,

- Replace *port* with a value that specifies the communications you want to test.
 - Specify *comm* to test the right communications line.
 - Specify *print* to test the left communications line.
- Replace *cts-lbk* with the value that specifies the type of loopback you want to run.
 - Specify *n* to run a data-leads-only test.
 - Specify *y* to run a clear-to-send test.

Modem and printer test error messages

Modem and printer test error messages have the form
?TFL: 7/modem (*description*)

Where

- **?TFL 7/modem** indicates that the modem and printer test reported an error.
- *description* represents additional information that describes the failure.

Table D-7 lists the descriptions found in modem and printer test error messages.

Table D-7. Modem and Printer Test Error Descriptions

Error Description	Meaning
(MSR reg not idle: <i>xxxx</i>)	Modem status register was active when it should have been inactive.
(no DSR: MSR= <i>xxxx</i>)	Data- set-ready signal was not given.
(send: no CTS: MSR= <i>xxxx</i>)	Clear to send signal was not given.

Serial Line Silo Overflow Test

The serial line silo overflow test checks the ability of the serial line controller to signal a silo overflow. To run this test, type **t 7/dz/ovrflw** and press Return.

When you type the serial line silo overflow test command, never specify the *intl* or *extl* parameter that appears in the test command format display. This parameter is for manufacturing use only.

Serial line silo overflow test error messages

Serial line silo overflow test error messages have the form
?TFL: 7/dz/overflow (*description*)

- **?TFL 7/dz/ovrflw** indicates that the serial line overflow test reported an error.
- *description* represents additional information that describes the failure.

Table D-8 describes the error descriptions found in serial line silo overflow error messages.

Table D-8. Serial Line Silo Overflow Test Error Descriptions

Error Description	Meaning
(line N: timeout: no trdy)	Timeout occurred while waiting for transmit ready (trdy) response. N represents the number of the line on which the timeout occurred.
(line N check: CSR=xxxx, sb yyyy)	Error occurred while checking for correct line in serial line current status register (CSR). N represents the number of the line in which the error occurred. CSR lists the value in CSR, followed by the correct value.
(timeout: no RDONE)	Timeout occurred while waiting to receive done response.
(RBUF= xxxx, sb yyyy)	Value in receive buffer (RBUF) is incorrect. RBUF lists the value in the receive buffer (RBUF), followed by what the value should be.
(line N: mismatch: RBUF= xxxx, sb yyyy)	Mismatch occurred in RBUF. N represents the number of the line in which the mismatch occurred. RBUF lists the value in the RBUF, followed by what the value should be.

Serial Line Single Silo Test

The serial line single silo test checks the ability of the serial line controller to fill and empty the silo. To run the serial line single silo test, type **t 7/dz/silo-1** [*loopback*] [*line*] and press Return.

When you type the serial line single silo test,

- Replace *loopback* with a value that specifies the type of test you want to run.
 - Specify *intl* to run an internal loopback test.
 - Specify *extl* to run an external loopback test.
- Replace *line* with a value that specifies the line you want to test. Note that if you specify a line to test, you must also specify a loopback parameter.
 - Specify 0 to test the keyboard serial line.
 - Specify 1 to test the mouse serial line.
 - Specify 2 to test the right communications serial line.
 - Specify 3 to test the left communications serial line.

Serial line single silo test error messages

Serial line silo test error messages have the form
?TFL: 7/silo-l (*description*)

- **?TFL 7/dz/silo-l** indicates that the serial line silo test reported an error.
- *description* represents additional information that describes the failure.

Table D-9 lists the error descriptions used in serial line single silo test error messages.

Table D-9. Serial Line Single Silo Test Error Descriptions

Error Description	Meaning
(timeout: no trdy)	Timeout occurred while waiting for transmit ready (trdy) response.
(line: CSR= <i>xxxx</i> , sb <i>xxxx</i>)	Error occurred in a serial line. CSR lists the value in the serial line current status register (CSR), followed by the correct value.
(timeout: no trdy: CSR= <i>xxxx</i> , sb <i>xxxx</i>)	Timeout occurred while waiting for correct line and trdy response in CSR. CSR lists the value of the current status register (CSR), followed by the correct value.
(RBUF= <i>xxxx</i> , sb <i>xxxx</i>)	The value in RBUF is incorrect. RBUF lists the RBUF value, followed by what the value should be.

Serial Line Mixed Silo Test

The serial line mixed silo test checks the ability of the serial line controller to fill and empty the silo using multiple lines. To run the serial line mixed silo test, type **t 7/dz/silo-m** [*loopback*] and press Return.

When you type the serial line mixed silo test command, never specify the *intl* or *extl* parameter that appears in the test command format display. This parameter is for manufacturing use only.

Serial line mixed silo test error messages

Serial line mixed silo test error messages have the form
?TFL: 7/dz/silo-m (*description*)

- **?TFL 7/dz/silo-m** indicates that the serial line mixed silo test reported an error.
- *description* represents additional information that describes the failure.

Table D-10 lists the error descriptions found in serial line mixed silo test error messages.

Table D-10. Serial Line Mixed Silo Test Error Descriptions

Error Description	Meaning
(timeout: line N: no trdy)	Timeout occurred while waiting for transmit ready. N represents the number of the line that reported the timeout.
(line N: CSR=xxxx, sb yyyy)	Error occurred in a serial line. N represents the number of the line that reported the timeout. CSR lists the value in the serial line (CSR), followed by what the value should be.
(timeout: line N: no rdone: CSR= xxxx, sb yyyy)	Timeout occurred while waiting for receive done response in CSR. N represents the number of the line that reported the interrupt. CSR lists the value in the serial line current status register (CSR), followed by what the value should be.
(line N: RBUF= xxxx, sb yyyy)	The value in RBUF is incorrect. N represents the number of the line that reported the timeout. The RBUF value is the value in the RBUF register, followed by what the value should be.

Serial Line Transmit and Receive Test

The serial line transmit and receive test checks the ability of the serial line controller to receive and transmit characters. To run the serial line transmit and receive test, type **t 7/dz/tx-rx** [*loopback*] [*line*] and press Return.

When you type the serial line transmit and receive test command,

- Replace the optional *loopback* parameter with a value that specifies the type of test you want to run.
 - Specify *intl* to run an internal loopback test.
 - Specify *extl* to run an external loopback test.
- Replace the optional *line* parameter with a value that specifies the line you want to test.
 - Specify 0 to test the keyboard serial line.
 - Specify 1 to test the mouse serial line.
 - Specify 2 to test the right communications serial line.
 - Specify 3 to test the left communications serial line.)

Serial line transmit and receive test error messages

Serial line transmit and receive test error messages have the form ?TFL: 7/dz/tx-rx (*description*)

- ?TFL 7/dz/tx-rz indicates that the serial in transmit and receive test reported an error.
- *description* represents additional information that describes the failure.

Table D-11 lists the error descriptions found in serial line transmit and receive test error messages.

Table D-11. Serial Line Transmit and Receive Test Error Descriptions

Error Description	Meaning
(TCR= <i>xxxx</i> , sb <i>yyyy</i>)	The value in the transmit control register (TCR) is incorrect. The TCR value is the actual value in the TCR register, followed by what the value should be.
(tx: CSR= <i>xxxx</i> , sb <i>yyyy</i>)	Error occurred during transmission operation. CSR lists the value in the CSR register (CSR), followed by the correct value.
(no tx intrpt)	No transmission interrupt occurred.
(timeout: CSR= <i>xxxx</i> , sb <i>yyyy</i>)	Timeout occurred while waiting for transmission. CSR lists the value in the serial line current status register (CSR), followed by the correct value.
(no rcv intrpt)	No receive interrupt occurred.
(bad data= <i>xxxx</i> , sb <i>yyyy</i>)	Received data was incorrect. The bad data parameter lists the incorrect data, followed by what the value should be.

Error-Correcting Code (ECC) Generate Test

The error-correcting code (ECC) generate test performs a write and read operation in memory and then compares the resulting ECC with the computed value. To run the ECC generate test, type **t 7/ecc/gen** *[address]* and press Return.

When you type the ECC generate test command, replace the optional *address* parameter with the specific address at which you want to perform the read and write operation.

ECC generate test error codes

ECC generate test error messages have the form
?TFL: 7/ecc/gen (*code*)

- ?TFL 7/ecc/gen indicates that the ECC generate test reported an error.
- *code* represents a code that identifies which portion of the test failed.

Table D-12 lists the error codes used in ECC generate test error messages.

Table D-12. ECC Generate Test Error Codes

Error Code	Meaning
1	Test failed to clear error address register.
2	Test failed to clear CHKSYN register.
3	Data blocks read from LOW bank memory did not match.
4	Checkbit read from CHKLO did not have VALID bit set.
5	LOW bank generated incorrect checkbits.
6	Data read from HIGH bank memory did not match computed value.
7	Checkbit read from CHKHI did not have VALID bit set.
8	HIGH bank generated incorrect checkbits.

Floating-Point Unit (FPU) Test

The floating-point unit (FPU) test uses the FPU to perform simple arithmetic and compares the result to known values.

To run the FPU test, type **t 7/fpu** and press Return.

FPU test error messages

FPU test error messages have the form `?TFL: 7/(code)`

- `?TFL 7/fpu` indicates that the FPU test reported an error.
- *code* represents a code that identifies which portion of the test failed.

Table D-13 lists the error codes used in FPU test error messages.

Table D-13. FPU Test Error Codes

Error Code	Meaning
1	Values did not match. Value should be 00000000.
2	Values did not match. Value should be 55555555.
3	Values did not match. Value should be AAAAAAAAAA.
4	Values did not match. Value should be FFFFFFFF.
5	Least-significant bit failed when the system was converting doubleword to word (CVT D. W.).
6	Most-significant bit failed when the system was converting doubleword to word (CVT D. W.).
7	Double miscompare occurred.
8	Double miscompare occurred.
9	Convert float-double. Value should be 55555555.
10	FPU CSR double error occurred.
11	Single miscompare occurred.
12	Single miscompare occurred.
13	Convert float-double. Value should be 55555555.
14	FPU CSR single error occurred. Value should be 00000000.
15	Single division failed. Value should be 00005555.
16	Single multiplication failed.
17	Double multiplication failed.
18	Double division failed.
19	Conversion error occurred. Pattern readback did not match.
20	FPU interrupt was pending when it should not have been.
21	FPU did not trap on overflow exception.
22	FPU did not signal fault to CPU.

RAM Select Lines Test

The RAM select lines test checks for RAM select line faults during RAM register selection. To run the RAM select lines test, type **t 7/mem/select** and press Return.

RAM select lines test error messages

The only RAM select test error message is
?TFL: 7/mem/select (1: *address= xxxxxxxx*, sb *yyyyyyyy*).

- *address* represents the memory address where the error occurred.
- *xxxxxxx* represents the actual value at the listed address.
- *yyyyyyy* represents what the correct value at the listed address should be.

Keyboard Test

The keyboard test checks the keyboard and its serial line controller on the system module.

To run the keyboard test, type **t 7/misc/kbd** [*loopback*] and press Return.

When you type the keyboard test command, replace the optional *loopback* parameter with a value that specifies whether the test should look for a keyboard loopback.

- Specify **y** to have the test search for a keyboard or keyboard loopback.
- Specify **n** to have the test search only for a keyboard.

Keyboard test error messages

Keyboard test error messages have the form
?TFL: 7/misc/kbd (*description*)

- **?TFL 7/msic/kbd** indicates that the keyboard test reported an error.
- *description* represents additional information that describes the failure.

Table D-14 lists the error descriptions found in keyboard test error messages.

Table D-14. Keyboard Test Error Descriptions

Error Description	Meaning
(missing?)	Keyboard is missing or not operating properly.
(failed self-test: <i>xx</i>)	Keyboard failed its self-test. The <i>xx</i> lists the keyboard self- test result.

Mouse Test

The mouse test checks the mouse and its serial line controller on the system module.

To run the mouse test, type **t 7/misc/mouse** [*loopback*] and press Return.

When you type the mouse test command, use the optional *loopback* parameter to specify whether the test should also search for a mouse or mouse loopback connector.

- Specify *y* to have the test search for a mouse loopback connector.
- Specify *n* to have the test search only for a mouse connector.

Mouse test error messages

Mouse test error messages have the form
?TFL: 7/misc/mouse (*description*)

- **?TFL 7/misc/mouse** indicates that the mouse test reported an error.
- *description* represents additional information that describes the failure.

Table D-15 lists the error descriptions found in mouse test error messages.

Table D-15. Mouse Test Error Descriptions

Error Description	Meaning
(missing?)	Mouse is missing or not operating properly.
(failed self-test: <i>xx</i>)	Mouse failed its self-test. <i>xx</i> represents the mouse test result.

RAM Refresh Test

The RAM refresh test checks whether the RAM refresh process is working. To run the RAM refresh test, type **t 7/misc/rfrsh** and press Return.

RAM refresh test error messages

RAM refresh test error messages have the form
`?TFL: 7/misc/rfrsh [(RTC)]`

The message `?TFL 7/misc/rfrsh` indicates that the RAM refresh test reported an error.

- A RAM refresh test error message without the (RTC) error description indicates that the refresh bit failed to toggle.
- A RAM refresh test error message that includes the (RTC) error description indicates that a timeout occurred while the system was waiting for the RTC interrupt.

Overheat Detect Test

The overheat detect test checks whether the system unit is overheating. To run the overheat detect test, type **t 7/misc/pstemp** and press Return.

Overheat detect test error message

The only overheat detect test error message is

`?TFL: 7/misc/pstemp (system is *HOT*),`

which indicates that the system is probably overheating.

Partial Write Test

The partial write test writes to a specific memory address and then checks whether the written values are correct. To run the partial write test, type **t 7/misc/wbpart** and press Return.

Partial write test error messages

Partial write test error messages have the form
`?TFL: 7/misc/wbpart (code)`

- `?TFL 7/misc/wbpart` indicates that the partial write test reported an error.
- `code` represents some code that identifies which portion of the test failed.

Table D-16 lists the error codes used in partial write test error messages.

Table D-16. Partial Write Test Error Codes

Error Code	Meaning
1	Pattern that was read showed mismatch on word access.
2	Byte 0 failed partial byte write.
3	Byte 1 failed partial byte write.
4	Byte 2 failed partial byte write.
5	Byte 3 failed partial byte write.
6	Halfword 0 failed partial halfword write.
7	Halfword 1 failed partial halfword write.

Nonvolatile RAM (NVR) test

The nonvolatile RAM (NVR) test checks the system module nonvolatile RAM. To run the NVR test, type **t 7/rtc/nvr** [*pattern*] and press Return.

When you type the NVR test command, replace the optional *pattern* parameter with a specific pattern that you want to use in the test.

NVR test error messages

NVR test error messages have the form
?TFL: 7/rtc/nvr (code: description)

- **?TFL 7/rtc/nvr** indicates that the NVR test reported an error.
- *code* represents a code that identifies which portion of the test failed.
- *description* represents additional information that describes the failure.

Table D-17 lists error codes and descriptions found in NVR test error messages.

Table D-17. NVR Test Error Codes and Descriptions

Error Code and Description	Meaning
(1: <i>address=xx</i> , sb <i>yy</i>)	Incorrect pattern read from NVR. The address value is the actual value found at that address, followed by what the value should be.
(2: <i>address=xx</i> , sb <i>yy</i>)	Incorrect pattern read from NVR. The address value is the actual value found at that address, followed by what the value should be.

Real-Time Clock (RTC) Period Test

The real-time clock (RTC) period test checks the RTC periodic interrupt operation. To run the RTC period test, type **t 7/rtc/period** and press Return.

RTC period test error messages

RTC period test error messages have the form ?TFL: 7rtc/period/ (*code*)

- ?TFL 7/rtc/period indicates that the RTC period test reported an error.
- *code* represents a code that identifies which portion of the test failed.

Table D-18 describes the error codes used in RTC period test error messages.

Table D-18. RTC Period Test Error Codes

Error Code	Meaning
1	Update-in-progress (UIP) bit remained set past allotted time.
2	Real-time clock interrupt was pending when it should not have been.
3	Allowed time ran out while waiting for interrupt.

Real-Time Clock Register Test

The real-time clock register test checks the real-time clock (RTC) registers. To run the real-time clock register test, type **t 7/rtc/regs** and press Return.

Real-time clock register test error messages

Real-time clock register test error messages have the form `?TFL: 7/rtc/regs (code description)`

- `?TFL 7/rtc/regs` indicates that the real-time clock register test reported an error.
- `code` represents a code that identifies the portion of the test that failed.
- `description` represents additional information that describes the failure.

Table D-19 describes the additional error codes and descriptions found in real-time clock register test error messages.

Table D-19. Real-Time Clock Register Test Error Codes and Descriptions

Error Code and Description	Meaning
1 (2: <i>register =xx, sb yy</i>)	UIP bit remained set past allotted time. The test failed to write pattern correctly. The <i>register</i> value is the actual value in the named register, followed by what the value should be.

Real-Time Test

The real-time test checks times generated by the real-time clock against hard-coded time values. To run the real-time test, type **t 7/rtc/time** and press Return.

Real-time test error codes

Real-time test error messages have the form
`?TFL: 7/rtc/time (code)`

- `?TFL 7/rtc/real` indicates that the real time test reported an error.
- `code` represents a code that identifies which portion of the test failed.

Table D-20 describes the error codes used in real-time test error messages.

Table D-20. Real-Time Test Error Codes

Error Code	Meaning
1	UIP bit remained set past allotted time.
2	Real-time clock interrupt was pending when it should not have been.
3	Allowed time ran out while waiting for interrupt.
4	Allowed time ran out while waiting for second interrupt.
5	UIP bit remained set past second allotted time.
6	Real-time clock seconds were not set to zero on wraparound.
7	Real-time clock minutes were not set to zero.
8	Real-time clock hours were not set to zero.
9	Real-time clock day-of-the-week was not set to 1.
10	Real-time clock date was not set to 1.
12	Real-time clock month was not set to 1.
13	Real-time clock year was not set to zero.

Translation Lookaside Buffer (TLB) Probe Test

The TLB probe test checks whether all TLB registers respond to an address match operation.

To run the TLB probe test, type **t 7/tlb/prb** and press Return.

TLB probe test error messages

The only TLB probe test error message is

?TFL: 7/tlb/prb (match(0,*N*)= *xxxxxxxx*, sb *yyyyyyyy*),

which indicates that the value at address 0 did not match the value at the address represented by *N*.

Translation Lookaside Buffer (TLB) Registers Test

The translation lookaside buffer (TLB) registers test performs a read and write operation on the TLB. To run the TLB registers test, type **t 7/tlb/reg** [*pattern*] and press Return.

TLB registers test and error messages

TLB registers test error messages have the form ?TFL: 7/tlbregs/ (*description*)

- ?TFL 7/tlb/regs indicates that the test reported an error.
- *description* represents additional information that describes error.

Table D-21 discusses additional error codes found in TLB registers test error messages.

Table D-21. TLB Registers Test Error Codes

Error Message	Meaning
(tlblo [N]= xxxxxxxx, sb yyyyyyy)	Pattern in TLB LO register was not the expected pattern. N represents the number of the register with the incorrect value, followed by the actual and expected values.
(tlbhi [N]= xxxxxxxx, sb yyyyyyy)	Pattern in TLB HI register was not the expected pattern. N represents the number of the register with the incorrect value, followed by the actual and expected values in the register.

Memory Module Tests

The following entries explain the commands and error codes for each memory module self-test.

RAM Board Test

The RAM board test performs a full pattern test on an entire memory module. To run the RAM board test, type **t 7/mem** [*board*] [*threshold*] [*pattern*] and press Return.

When you type the RAM board test command,

- Use the *board* parameter to specify which memory module you want to test.
 - To test a single memory module, specify the slot number of the memory module that you want to test.
 - To test all memory modules, specify an asterisk (*).
- Replace the optional *threshold* parameter with the number of single-bit errors the test allows before the test fails.
- Replace the optional *pattern* parameter with a specific pattern that you want to use in the test.

RAM board test error messages

RAM board test error messages have the form ?TFL: 7/mem (*code*: *description*)

- ?TFL 7/mem indicates that the RAM board test reported an error.
- *code* represents a code that identifies which portion of the test failed.
- *description* represents additional information that describes the failure.

Table D-22 describes the error codes and descriptions found in RAM test error messages.

Table D-22. RAM Board Test Error Codes and Descriptions

Error Code and Description	Meaning
(1: board <i>x</i> : too many MBEs: <i>y</i>)	More than the allowable number of multiple-bit errors occurred. The <i>x</i> represents the slot number of the memory module that failed the test. The <i>y</i> represents the number of MBEs that the memory module reported.
(2: board <i>x</i> : too many SBEs: <i>y</i>)	More than the allowable number of single-bit errors occurred. The <i>x</i> represents the slot number of the memory module that failed the test. The <i>y</i> represents the number of SBEs that the memory module reported.

Floating 1/0 Memory Test

The floating 1/0 memory test writes floating 1s across one location in RAM. To run the floating 1/0 memory test, type **t 7/mem/float10** [*address*] and press Return.

When you type the floating 1/0 memory test, replace the optional *address* parameter with a specific address at which you want to start writing 1s.

Floating 1/0 memory test error messages

The only floating 1/0 memory test error message is ?TFL: 7/mem/float10 (MBE= *x*, SBE= *y*), which indicates that the floating 1/0 test failed. The *x* represents the number of MBEs the memory module reported. The *y* represents the number of SBEs the memory module reported.

Zero Memory Utility

The zero memory utility floods memory with zeroes as fast as possible. To run the zero memory test, type **t 7/mem/init** and press Return.

The zero memory utility returns no error codes.

Power-Up LED Displays

The system completes a series of tests and other functions whenever you turn on the system power. If the system halts at one of these functions, the diagnostic LEDs display a code that indicates where in the power-up sequence the system halted.

Table D-23 lists the hexadecimal equivalent of the power-up LED displays and what they indicate about the power-up sequence.

Table D-23. Power-Up LED Displays

ff	Hardware initialization has not started.
7f	Firmware initialization started. First memory module test started.
7e	Firmware initialization started. Console memory test completed.
7b	Console terminal initialization started.
x3	The system detected an error during the power-up sequence. The <i>x</i> represents the slot number of the module that reported the error.
00	The system detected no errors during the power-up sequence.
x2	Firmware in an individual module started to execute. The <i>x</i> represents the slot number of the module with the firmware that has started to execute.
x1	System software loaded in an individual module started to execute. The <i>x</i> represents the slot number of the module with the software that has started to execute.

Console Commands Generated by Version PDE3 ROM Chips

This appendix explains the use and format of the console commands generated by Version PDE3 ROM chips. It tells you how to

- Follow console command conventions
- Display information about system hardware
- Set environment variables
- Enable and disable serial line connections
- Write data into memory
- Examine memory contents
- Display a list of all console commands and their formats
- Reset the system
- Enter memory at a specific address
- Boot the system

Information About Using Console Commands

Rules for Typing Console Commands

Use console commands when the system monitor displays the prompt >>. When typing console commands, follow these rules:

- Type uppercase and lowercase letters exactly as they appear in command lines. The system recognizes uppercase and lowercase letters as different input.
- To enter commands, press Return after typing a command message.
- Enter number values as follows:
 - Enter *decimal values* as a string of decimal digits with no leading zeros (for example, 123).
 - Enter *octal values* as a string of octal digits with a leading zero (for example, 0177).
 - Enter *hexadecimal values* as a string of hexadecimal digits preceded by 0x (for example, 0x3ff).
 - Enter *binary values* as a string of binary digits preceded by 0b (for example, 0b1001).
- When reading or writing to memory, you have a choice of data sizes: byte, halfword, or word. Because a word is 4 bytes, successive addresses referenced by a word are successive multiples of 4. For example, the address following 0x80000004 is 0x80000008. An error occurs if you specify an address that is not on a boundary for the data size you are using.

- The following key combinations have an immediate effect in console mode:
 - Ctrl-S freezes the screen display.
 - Ctrl-Q releases a frozen screen display.
 - Ctrl-C aborts a command.
 - Ctrl-U erases a partially typed command line.

Conventions Used in This Appendix

- **Letters in bold face type like this** are to be typed exactly as they appear.
- *Letters in italics like this* are variables that you replace with actual values. (Note that your help and menu screens display these variables in all capital letters.)
- Arguments enclosed in square brackets ([]) are optional.
- Ellipses (...) follow an argument that can be repeated.
- A vertical bar (|) separates choices for a given. You can think of it as a symbol meaning *or*.
- Parentheses enclose values of which you must select one. For example, -(b | h | w) means enter -b or -h or -w.

Table E-1 is an alphabetical list of the valid console commands.

Table E-1. Console Commands

Command	Use
boot	Boots the operating system.
cnfg	Displays the system's hardware configurations.
ctrs	Displays network counters.
d	Deposits data at a given address.
disable	Disables a device.
dump	Dumps memory to the screen.
e	Examines memory.
enable	Enables a device.
fill	Deposits data in an address range.
go	Resumes execution of the program in memory.
help	Displays the syntax of console commands.
?	Displays the syntax of console commands.
init	Reinitializes memory.
printenv	Displays console environment variables.
setenv	Sets console environment variables.
t	Runs individual tests and test scripts.
test	Runs the system test.
unsetenv	Removes console environment variables.

Displaying Information About System Hardware

To see what hardware the system has and how it is configured, use the `cnfg` command.

To see which devices are on a SCSI bus, use the `scsi prb` command.

cnfg Command

The `cnfg` command displays the system's current hardware configurations. To use the `cnfg` command, type **cnfg** [*unit* | *d* | *f*] and press Return.

Configuration summary

Use the `cnfg` command without additional parameters to display a brief summary of all the system hardware.

The following is a sample `cnfg` display for a system with one memory module and a graphics module in option slot 0.

```
BSys -
      Mem: 8388608 bytes (8M)
      RS232:
      Optn# 5 -
      SCSI: ID=6
      Optn# 6 -
      Net: 00-00-00-00-00-00
      Net: 08-00-2B-0F-45-72
      Optn# 0 -
      Vid: 8 bit color frame buffer
```

In this display

- Bsys refers to the system and memory modules. Entries under the Bsys heading mean the following:
 - Mem lists the amount of system memory.
 - RS232 is the system's communications protocol.
 - Optn# 5 is the SCSI controller on the system module. Listings under Optn# 5 show any devices on this SCSI controller's bus.
 - Optn# 6 is the ThinWire Ethernet on the system module. The strings of numbers under Optn# 6 are the ThinWire Ethernet station address.
- Entries for Optn# 0, Optn# 1, and Optn# 2 show information about modules, if any, that are in the option slots. The cnfg display provides no listing for empty option slots. This display reports that a graphics module is in option module slot 0. The Vid term in this display indicates that this a color frame-buffer graphics module.

SCSI, Ethernet, and graphics configurations To display detailed information about a SCSI bus, Ethernet controller, or graphics module configuration replace the optional unit parameter with the unit number of the item about which you want information.

The first line of the optional module configuration display has the form:

```
Optn# x - [AAAA-BB/ 0xcccc/ 0xd]
```

The leftmost term in the first line is the module's option slot number. The following groups of letters and numbers separated by slash marks have the following meaning:

- The leftmost group is the module type code name.
- The middle group is the module's identification number.
- The rightmost group shows the version of the module's ROM.

This is a sample configuration display for a SCSI bus with RZ55 disk drives at SCSI ID addresses 1 and 2:

```
Optn# 2 - [PMAZ-AA /0x5419876/0x0]
SCSI: (szn/ncr53c94 chip) [x.-000]
2: rz(1,2) -- Pid="RZ55' (C)DEC", Vid=DEC, Rev"0700"
1: rz(1,1) -- Pid="RZ55' (C)DEC", Vid=DEC, Rev"0700"
```

The second line shows the following:

- The leftmost term indicates the module's type.
- The terms enclosed by parentheses give information about the module hardware. The left term is the module's driver type. The right term is the module's type of interface.
- The last term in this line shows the version of the module ROM's firmware.

The last two lines describe drives linked to the SCSI controller.

- The leftmost term is the device's SCSI ID address.
- The term second from the left indicates the drive's type, the system's number for the drive's SCSI bus, and the drive's SCSI ID address again.

- Following entries describe the drive itself. Table E-2 explains entries that may appear in these lines.

This is a sample display for a graphics module in option slot 0:

```
Optn# 0 - [PMAG-BA /0x1010/0x0]
  Vid: 8-bit color frame buffer (crta/crta) [x.-000]
```

The second line indicates the type and version of the graphics module.

This is a sample display for an Ethernet controller module in option slot 1:

```
Optn# 1 - [PMAD-AA /0x5419874/0x0]
  Net: 00-00-00-00-00-00 (mop/LANCE chip) [xx.y-000]
  Net: 08-00-2B-0F-45-72 (mop/LANCE chip) [x.-000]
```

The second line indicates [tbd].

The third line lists the optional module's Ethernet station address.

Table E-2. Symbols Used in Optional Module Configuration Displays

Symbol	Meaning
rz	Drive is a hard disk or optical compact disc drive.
tz	Drive is a streaming tape drive.
Vid	In a graphics module display, Vid indicates that the module is a graphics module. In a SCSI controller display, Vid indicates the identification code for the device's vendor.
Pid	The device's product identification code.
Rev	The device's product revision number.
RMB	The drive's media is removable.
Sync	Device supports synchronous operation.
ANSI	Value after ANSI indicates the device's SCSI conformance level.

System and memory module configurations

To obtain a detailed configuration display for the system and memory modules, type **cnfg f** and press Return. A display similar to this appears on the monitor:

```
BSys -
  Mem: 8388608 bytes (8M)
  RS232: (tty/DZ chip) [xx.y-000]
    #0 - [Kbd]
    #1 - [Pdev]
    #2 -
    #3 -
  Optn# 5 - [PMAZ-AA /0x5419876/0x0]
  SCSI: 2: rz(0,2) -- Pid = RZ55 (C)DEC, Vid=DEC, Rev=0700
        1: rz(0,1) -- Pid = RZ55 (C)DEC, Vid=DEC, Rev=0700
  Optn# 6 -
  Net: 00-00-00-00-00-00 (mop/LANCE chip) [xx.y-00]
  Net: 08-00-2B-0C-E3-EA (mop/LANCE chip) [x.-00]
```

In this display, Bsys refers to the system and memory modules. Entries under the Bsys heading have the following meanings:

- Mem shows the amount of system memory.
- RS232 shows the system's serial line hardware. The values to the right of RS232 show the serial line controller's version. Entries under the RS232 heading list each serial line and any device connected to it.
- Optn# 5 is the SCSI controller on the system module. Listings under Optn# 5 show any drives connected to this SCSI controller. This system has two hard disk drives connected to the system module's SCSI controller.
- Optn# 6 is the ThinWire Ethernet on the system module. The string of numbers under Optn# 6 is the ThinWire Ethernet station address.

Driver configurations

To display the system's drivers and their hierarchies, type **cnfg d** and press Return. A display similar to the following appears on the monitor:

```
mop: [boot server/se ethernet]
     se( 0) Optn# 6 [LANCE chip/LANCE Ethernet driver]
rz:  [scsi disk]
     szn( 0) Optn# 5 [ncr53c94 chip/NCR53C94 SCSI Port driver]
tz:  [scsi tape]
     szn( 0) Optn# 5 [ncr53c94 chip/NCR53C94 SCSI Port driver]
tty( 0) Optn# f [DZ chip/dz serial line]
crta( 0) Optn# 0 [crta/CFB crt driver]
```

This display distinguishes between two driver types:

- Class drivers, which call other drivers. Class driver listings use the format *Driver name: [Description]* where
 - *Driver name* represents the system's name for the driver.
 - *Description* represents some phrase that describes the driver.
- Port drivers, which interact directly with hardware. Port driver listings use the format:
Driver unit Optn# slot [hrdwr / desc]
where
 - *Driver* represents the driver that interacts with the driven hardware.
 - *unit* represents the unit driven by the driver.
 - *slot* represents the unit number of the slot containing the driven hardware.
 - *hrdwr* represents the name of the hardware interface being driven.
 - *desc* represents some term that describes the port driver.

In the cnfg d display, an indented driver listing indicates the driver is called by the driver listed above it.

scsi prb Command

The scsi prb command displays all the devices on a SCSI bus. To use the scsi prb command, type **scsi prb szn(x)**, where *x* represents the device specification for the SCSI controller of the bus you want about which you want information, and press Return. Note that the device specification is different than the controller's unit number.

The monitor's scsi prb display looks similar to this:

```
6: *
5: Pid="", Vid="", Rev=""
   0x0001d001<PDT=Tape,PQ=0,DTQ=50,RMB,ANSI=1,RDF=0>
   0x00000000
3: Pid="RZ56" (C) DEC", Vid="DEC", Rev="0102"
   0x01010000<PDT=Disk,PQ=0,DTQ=0,ANSI=1,RDF=1>
   0x1000001f<Alen=31,Sync>
```

In this display, the numbers in the left column are the device's SCSI addresses. An asterisk appears after the SCSI controller's address. Lines after other SCSI addresses show additional information about the device. Table E-2 describes the terms used in these displays.

Setting Environment Variables

Environment variables set system operating conditions. Console commands allow you to display, set and remove environment variables.

- To display existing environment variables, use the `printenv` command.
- To set environment variables, use the `setenv` command.
- To remove environment variables, use the `unsetenv` command.

Table E-3 describes the environment variables that you can set.

In addition to environment variables you set, there are environment variables set only by the system. These environment variables are listed in Table E-4.

Table E-3. Environment Variables Set by the User

Environment Variable	Description
baud2	Baud rate of the right communications line. The default value is 1200. ¹
baud3	Baud rate of the left communications line. The default value is 4800. ¹
bootpath	Default bootpath specification.
testaction	Test script to run when the system power turns on. <ul style="list-style-type: none">– Specify q to select the limited quick test.– Specify t to select the extensive thorough test.
haltaction	Action the system takes when the system power turns on or the system is reset. <ul style="list-style-type: none">■ Specify h for the system to halt.■ Specify r for the system to restart.■ Specify b for the system to bootstrap. <p>If an attempted restart fails, the system attempts an automatic bootstrap. If a bootstrap fails, the system halts.</p>
bootaction	Type of boot the system performs automatically when haltaction attempts a bootstrap. <ul style="list-style-type: none">■ Specify m for a multiuser boot.■ Specify s for a single-user boot. <p>Before starting, the boot sequence delays for 5 seconds, during which you can stop the boot by entering Ctrl-C.</p>

¹Valid baud rate settings are 75, 110, 134, 150, 300, 600, 1200, 1800, 2400, 4800, and 9600.

(continued on next page)

Table E-3 (Cont.). Environment Variables Set by the User

Environment Variable	Description
console	<p>One or more devices to use as the console terminal. If more than one device is designated as a console, the system accepts input from and sends output to all designated devices. The following are allowable values:</p> <ul style="list-style-type: none">■ tty(0), which enables the system's regular console■ tty(2), which enables a terminal attached to the right communications line connector■ tty(3), which enables a terminal attached to the left communications line connector <p>The regular console is the system's default console, if available. If this console is not available, the next default is a console attached to the right communications line connector.</p>
Kbd	<p>Keyboard language. Specify the number that corresponds to the keyboard language you want to use. To display available languages and numbers, set Kbd to 0 and turn off the system unit. The list of keyboard languages appears on the monitor.</p>
scsiid0	<p>Address given to the controller on the system's first SCSI bus. Default is 6.</p>
scsiid1	<p>Address given to the controller on the system's second SCSI bus. Default is 6.</p>
scsiid2	<p>Address given to the controller on the system's third SCSI bus. Default is 6.</p>
scsiid3	<p>Address given to the controller on the system's fourth SCSI bus. Default is 6.</p>

Table E-4. Environment Variables Set by the System

Environment Variable	Description
bitmap	Address in memory of a bitmap of good and bad memory pages. You cannot change this variable by using the setenv command.
bitmaplen	The bitmap's length in words. You cannot change this variable by using the setenv command.
inetaddr	System's Internet address.
osconsole	Devices that were enabled when the system turned on. You cannot change this variable by using the setenv command.

printenv Command

To display the system's environment variables, use the `printenv` command. Type **printenv** [*var*], and press Return.

- Replace *var* with the exact name of an environment variable about which you want information.
- Include no parameter to display all environment variables.

This a sample `printenv` display of all environment variables:

```
baud2=1200
baud3=9600
bootpath=mop()/ms/lpx

testaction=q
haltaction=h
bootaction=m
console=0
kbd=4
scsiid0=6
scsiid1=6
scsiid2=6
scsiid3=6
bitmap=
bitmaplen=
systype=0x82020120
inetaddr=0
osconsole=8
```

setenv Command

To set an environment variable, use the `setenv` command. Type `setenv var val`, and press Return. When you use this command,

- Replace *var* with the environment variable you want to set.
- Replace *val* with the new value you want to give this environment variable.

unsetenv Command

To remove an environment variable from the list of console variables, use the `unsetenv` command. Type `unsetenv var`, where you replace *var* with the environment variable you want to remove, and press Return. The `unsetenv` command does not remove variables that can be set by the user.

Writing Data into Memory

To write a byte, halfword, or word at a specific memory address, use the `d` (deposit) command.

To write a specific value to a range of memory, use the `fill` command.

d (deposit) Command

The `d` (deposit) command writes a single byte, halfword, or word to a specified address. To use the `d` command, type `d` `[-(b | h | w)] addr val` and press Return.

Use the optional first parameter to specify data size. `word` is the default value.

- Specify `-b` to deposit 1 byte of data.
- Specify `-h` to deposit a halfword (2 bytes) of data.
- Specify `-w` to deposit a word (4 bytes) of data.

Replace the `addr` parameter with the address to which you want to write data. System addresses range from `0x80000000` to `0xBF000000`.

Replace the `val` parameter with the data you want to deposit at the specified address.

Example:

```
>> d -w 0x80000000 0xFFFFFFFF
```

This command deposits the value `0xFFFFFFFF`, with a data size of one word, at address `0x80000000`.

fill Command

Use the fill command to write a specific value to a range of memory. To use the fill command, type **fill** [- | **-h** | *w*] [-v**bold**)*val*] *rng* and press Return.

include the optional first parameter to specify data size. Word is the default value.

- Specify -b to use bytes.
- Specify -h to use halfwords.
- Specify -w to use words.

Include the optional -v *val* parameter to specify the numeric value to write to memory. If you do not specify a value, all zeros are written. If the size of *val* does not match the data size parameter, *val* is shortened or expanded as necessary.

Use the *rng* parameter to specify the memory range. There are two possible ways to specify the range:

- *addr#cnt*, which fills addresses beginning at *addr* and continuing for *cnt* locations
 - Replace *addr* with the address where you want to start writing.
 - Replace *cnt* with the number of locations in which you want to continue writing.
- *addr:addr* fills all locations between the two given addresses.
 - Replace the first *addr* parameter with the beginning address to which you want to write.
 - Replace the second *addr* parameter with the ending address for the values you write to memory.

Example:

```
>> fill -v 0xffffffff 0x80000010:0x800000ff
```

This command sets all bits to 1 at addresses 16 to 255.

Setting Serial Line Connections

To remove a terminal from the possible working consoles, use the `disable` command.

To enable a terminal to work as a console, use the `enable` command.

disable Command

The `disable` command disables a working console. It also removes the console from the recognized console terminals in the environment variables list. To use the `disable` command, type **`disable [tty(x)]`** and press Return.

Include the optional `tty(x)` parameter to disable a specific console. If you do not include `tty(x)`, the `disable` command displays the list of currently enabled console devices. The following are allowable values for `x`:

- `tty(0)`, which disables the system's regular console
- `tty(2)`, which disables a terminal attached to the left communications line connector
- `tty(3)`, which disables a terminal attached to the right communications line connector

Enable Command

The `enable` command enables a working console. It also adds the console to the recognized console terminals in the environment variables list. To use the `enable` command, type **enable [tty(x)]** and press Return.

Include the optional `tty(x)` parameter to enable a specific console. If you do not specify `tty(x)`, the `enable` command displays the list of currently enabled console devices. The following are allowable values for `x`:

- `tty(0)`, which enables the system's regular console
- `tty(2)`, which enables a terminal attached to the left communications line connector
- `tty(3)`, which enables a terminal attached to the right communications line connector

Examining Memory Contents

To obtain a formatted display of memory contents, use the `dump` command.

To see the contents at a specific address, use the `examine` command.

To display the network counters, use the `ctrs` command.

dump Command

The `dump` command gives a formatted display of the contents of memory. To use the `dump` command, type **dump** **[-(b | h | w)]** **[-(o | d | u | x | c | B)]** *rng* and press Return.

Include the first optional parameter to specify data size to be used in the display.

- Specify `-b` to display memory in bytes.
- Specify `-h` to display memory in halfwords.
- Specify `-w` to display memory in words.

If you do not include this parameter, the display will be written in words.

Include the second optional parameter to specify the display format.

- Specify `-o` to display memory in octal format.
- Specify `-d` to display memory in decimal format.
- Specify `-u` to display memory in unsigned decimal format.
- Specify `-x` to display memory in hexadecimal format.
- Specify `-c` to display memory in ASCII format.
- Specify `-B` to display memory in binary format.

If you do not include this parameter, the display is written in hexadecimal format.

The *rng* parameter specifies the memory range to display. You can specify the range in one of two ways:

Use the *rng* parameter to specify the memory range. There are two possible ways to specify the range:

- *addr#cnt*, which displays data beginning at address *addr* and continuing for *cnt* locations.
 - Replace *addr* with the address where you want to start displaying.
 - Replace *cnt* with the number of locations in which you want to continue displaying.
- *addr:addr*, which displays data at all locations between the two given addresses.
 - Replace the first *addr* parameter with the address at which you want to begin the display.
 - Replace the second *addr* parameter with the address at which you want to end the display.

Examples:

```
>> dump 0x80000000#0xf
```

This command uses hexadecimal format to display the first 15 words in memory to the screen.

```
>> dump -b 0x80000000#0xf
```

This command uses hexadecimal format to display the first 15 bytes in memory to the screen. The dump display shows rows of address contents. The leftmost column gives the address of the first field in each row.

e (examine) Command

The e (examine) command displays the byte, halfword, or word at a specific address. To use the e command, type **e** **[-(b | h | w)]** *addr* and press Return.

The optional first parameter specifies the data size used in the display. If you do not include this parameter, the display uses words.

- Specify **-b** for a display in single bytes.
- Specify **-h** for a display in halfwords.
- Specify **-w** for a display in words.

Replace *addr* with the address you want to examine. Use an address from 0x80000000 to 0xBF000000.

When you use the examine command, a display similar to the following appears:

```
0x80000005: 65 0x41 'A'
```

The leftmost value is the address you entered.

The next three entries are the address's contents in decimal, hexadecimal, and ASCII formats, respectively. If the ASCII character is unprintable, it is displayed as an octal value preceded by a backslash: for example, '\032'.

Example:

```
>> e 0x80000000
```

This command examines the word at address 0x80000000. The resulting display might look like this:

```
0x80000000:          1008385985          0x3c1abfc1          '\301'
```

ctrs Command

Use the ctrs command to display all the network counters. To use the ctrs command, type **ctrs** and press Return.

A display of network counters then appears on the screen. A typical display looks like this:

```
15905 : seconds since zeroed
0 : bytes received
0 : bytes sent
0 : frames received
0 : frames sent
0 : multicast bytes received
0 : multicast frames received
0 : frames sent deferred
0 : frames sent, single collision
0 : frames sent, multiple collision
0 : send failures
0 : send failure bitmap
0 : receive failures
0 : receive failure bitmap
0 : unrecognized destinations
0 : data overruns
0 : unavailable system buffers
0 : unavailable user buffers
```

Note: *The counter values will have values other than zero after an Ethernet boot.*

Entering a Specific Address

To enter a specific address, use the go command. To use the go command, type **go pc** and press Return.

Replace *pc* with the specific address where you want to enter. If you do not specify an entry address, the system enters the address of the most recently loaded program module. If no module was loaded, the system enters at address 0.

Displaying Console Command Formats

To display a list of console commands and their format, use the `help` command or the `?` command.

To display a list of test commands and their format, use the `t ?` command.

help Command

To use the `help` command, type **help** *[cmd]* and press Return.

Include the optional *cmd* parameter to display the format for a single command. Replace *cmd* with the name of the command about which you want information. If you do not include *cmd*, the complete console menu appears.

For example, entering **help e** displays the syntax for the examine (e) command:

```
e [-(b|h|w)] ADDR
```

Note that whenever you type an incorrect command line, you automatically get a help screen.

For example, the `e` command requires an *addr* argument. Typing **e -b** without entering an address causes the screen to display the correct syntax for the command:

```
e [-(b|h|w)] ADDR  
>>
```

? Command

The `?` command functions the same as the `help` command. To use the `?` command, type **?** *[cmd]* and press Return.

The use of the optional *cmd* parameter and displays is the same as with the `help` command.

t ? Command

The `t ?` command displays a list of test commands and their format. To use the `t ?` command, type `t ? test` and press Return.

Include the optional `test` parameter to display the format of a specific test. Replace `test` with the number of the test whose format you want to display. If you do not specify a test number, a list of all test commands and their formats appear on the monitor.

Resetting the System

To reset the entire system, use the `init` command.

To reset a SCSI bus use the `scsi rst` command.

init Command

The `init` command fully initializes the system. The effect of the `init` command is the same as pressing the reset button or turning the power on, except that the system does not run a power-up self-test.

scsi rst Command

The `scsi rst` command resets all devices on a SCSI bus. To use the `scsi rst` command, type `scsi rst dev`, where you replace `dev` with the device specification of the SCSI bus.

Booting the System Software

Use the boot command to boot the system software. Type **boot** [*-file*] [*-n*] [*arg...*] and press Return.

The boot command loads the file that contains the operating system.

- To boot a specific file, replace the optional *-f file* parameter with the name of the file you want to use. If you do not specify *-f file*, the system loads the file specified by the bootpath environment variable.

The *file* parameter has the format

dev([*controller*],[*unit-number*] [,*partition-number*])[*filename*]

where

- *dev* represents the device from which you are booting the operating system. Typical devices are *rz* for a hard disk, *tz* for a tape, and *mop* for a network. Typing **mop** nullifies the other arguments in the list, so that *file* takes the
- *controller* represents the ID number of the default controller.
- *unit-number* represents the unit number of the SCSI or Ethernet device from which you are booting the operating system.
- *partition-number* represents the number (or other designator) of the partition from which you are booting the operating system. When booting from a tape, this number is not used because the boot file must be the first thing on the tape. When booting from a disk, this number depends on how you partitioned the disk when you installed your operating system software. Refer to the software installation manual if you need a reminder about disk partition indicators.
- *file name* represents the name of the operating system file.

- Include the optional `-n` parameter to load but not execute a specific file.
- The optional `arg` parameter contains any information to be passed to the booted image.

Examples:

```
>> boot -f rz(0,0,0)vmunix
```

This command boots the file `vmunix`, located in the A partition of the first hard disk (unit number 0), using controller 0.

```
>> boot -f rz(0,4,c)vmunix
```

This command boots the file `vmunix` from the optical compact disc drive, which is unit 4 in this example.

```
>> boot -f tz(0,5)
```

This command boots from the tape, which is unit 5 in this case.

F

Test Commands and Messages Produced by Version PDE3 ROM Chips

This appendix describes test commands and messages that the old PDE3 ROM chips generate for the following:

- System module tests
- Memory module tests
- SCSI controller tests
- Ethernet controller tests
- Graphics module tests
- Initial power-up tests

System Module Tests

The following entries explain the commands, parameters, and error codes for each individual system module test.

FPU Test

This test uses the FPU to perform simple arithmetic.

To run the FPU test, type **t f21** and press Return.

FPU test error messages

In FPU test error messages, the parameter *P1* indicates the value the test last read from the coprocessor.

Table F-1 lists the error codes used in FPU test error messages.

Table F-1. FPU Error Codes

Error Code	Meaning
1	Could not enable coprocessor 1 (CP1) in status register.
2	Could not write to CP1 register.
3 - 6	Patterns did not match.
7	Convert doubleword to word (CVT D. W.) least significant failed.
8	CVT D. W. most significant failed.
9 - 10	Double miscompare occurred.
11	Misconversion occurred.
12	FPU cache status register double error occurred.
13 -14	Single miscompare occurred.
15	Misconversion occurred.
16	FPU CSR single error occurred.
17	Single division failed.
18	Single multiplication failed.
19	Double multiplication failed.
20	Double divide failed.
21	Pattern readback did not match.
22	FPU interrupt was pending when it should not.
23	FPU did not trap on overflow exception (P1 = FCR31).
99	All tests passed.

Serial Line Test

The Serial Line test checks the serial line controller's ability to receive and transmit characters.

To run this test, type **t f41 P1 P2** and press Return.

Serial line test parameters and error messages

Table F-2 describes the parameters used in serial line test commands and error messages.

Table F-3 lists the error codes found in serial line test error messages.

Table F-2. Serial Line Test Parameters

Parameter	Description
P1	Specifies the test's loopback setting. Specify 0 for internal loopback; specify 1 for external loopback.
P2	Specifies the serial line to be tested. <ul style="list-style-type: none">- Specify 0 to test TBD.- Specify 1 to test TBD.- Specify 2 to test TBD.- Specify 3 to test TBD.
P3	Actual value in register named in the subtest.
P4	Expected value of register named in the subtest.
P5	Baud rate written to the serial line parameter register (lpr).

Table F-3. Serial Line Test Error Codes

Error Code	Meaning
1	Serial line transmit/receive test failed.
2	Serial line was not ready.
3	Serial line received no interrupt.
4	Serial line timeout error occurred.
5	Serial line interrupt error occurred.
6	Serial line read buffer error occurred.
7 - 9	Not used.
10	Write/read error occurred on serial line to transmit control register bits.

Serial Line Silo Alarm Test

The serial line silo alarm test checks the serial line controller's ability to generate a silo alarm interrupt.

To run this test, type **t f42 P1 P2** and press Return.

Serial line silo alarm test error messages

Table F-4 describes the parameters in serial line silo alarm test commands and error messages.

Table F-5 lists the error codes found in serial line silo alarm error messages.

Table F-4. Serial Line Silo Alarm Test Parameters

Parameter	Description
P1	Specifies the test's loopback setting. Specify 0 for internal loopback; specify 1 for external loopback.
P2	Specifies the serial line to be tested. <ul style="list-style-type: none">- Specify 0 to test the keyboard.- Specify 1 to test the mouse.- Specify 2 to test the right communications line .- Specify 3 to test the left communications line.
P3	Actual value in register named in the subtest.
P4	Expected value in register named in the subtest.

Table F-5. Serial Line Silo Alarm Test Error Codes

Error Code	Meaning
1	Silo alarm test failed.
2	Unexpected silo alarm interrupt occurred.
3	Silo alarm timeout error occurred.
4	No silo alarm interrupt occurred.

Serial Line Single Silo Test

The serial line single silo test checks the serial line controller's ability to fill and empty the silo. To run this test, type **t f43 P1 P2** and press Return.

Serial line single silo test error messages

Table F-6 describes the parameters in serial line single silo test commands and error messages.

Table F-7 describes the error codes found in serial line single silo error messages.

Table F-6. Serial Line Silo Alarm Test Parameters

Parameter	Description
P1	Specifies the test's loopback setting. Specify 0 for internal loopback; specify 1 for external loopback.
P2	Specifies the serial line to be tested. <ul style="list-style-type: none">- Specify 0 to test the keyboard.- Specify 1 to test the mouse.- Specify 2 to test the right communications line.- Specify 3 to test the left communications line.
P3	Actual value in register named in the subtest.
P4	Expected value in register named in the subtest.
P5	Baud rate written to the serial line printer.

Table F-7. Serial Line Single Silo Test Error Codes

Error Code	Meaning
1	Single silo test failed.
2	Timeout occurred while waiting for transmit ready (trdy).
3	Error occurred while checking for correct line in serial line current status register (CSR).
4	Timeout occurred while waiting for correct line and trdy in CSR.
5	RBUF- dval + line + received character.

Serial Line Silo Overflow Test

The serial line silo overflow test checks the serial line controller's ability to signal a silo overflow. To run this test, type **t f44 P1**, and press Return.

Serial line silo overflow test error messages

Table F-8 describes the parameters in serial line silo overflow test commands and error messages.

Table F-9 describes the error codes found in serial line silo overflow error messages.

Table F-8. Serial Line Silo Overflow Test Parameters

Parameter	Description
P1	Specifies the test's loopback setting. Specify 0 for internal loopback; specify 1 for external loopback.
P2	Actual value in register named in the subtest.
P4	Expected value in register named in the subtest.

Table F-9. Serial Line Silo Overflow Test Error Codes

Error Code	Meaning
1	Silo overflow test failed.
2	Timeout occurred while waiting for trdy.
3	Error occurred while checking for correct line in serial line CSR.
4	Timeout occurred while waiting for correct line and trdy in CSR.
5	RBUF - dval + line + received character.
6	RBUF - dval + oerr + line + character.

Serial Line Mixed Silo Test

The serial line mixed silo test checks the serial line controller's ability to fill an empty the silo with multiple lines. To run this test, type **t f45 P1** and press Return.

Serial line single silo parameters and error messages

Table F-10 describes the parameters used in serial line mixed silo test commands and error messages.

Table F-11 describes the error codes found in serial line mixed silo error messages.

Table F-10. Serial Line Mixed Silo Test Parameters

Parameter	Description
P1	Specifies the test's loopback setting. Specify 0 for internal loopback; specify 1 for external loopback.
P2	Actual value in register named in the subtest.
P3	Expected value in register named in the subtest.
P4	Serial line being tested when failure occurred. <ul style="list-style-type: none">- Specify 0 to test the keyboard.- Specify 1 to test the mouse.- Specify 2 to test the right communications line.- Specify 3 to test the left communications line.

Table F-11. Serial Line Mixed Silo Test Error Codes

Error Code	Meaning
1	Multiple Silo test failed.
2	Timeout occurred while waiting for trdy.
3	Error occurred while checking for correct line in serial line CSR.
4	Timeout occurred while waiting for correct line and trdy in CSR.
5	RBUF - check for dval + line + character

Modem and Printer Test

The modem and printer test checks the serial line controller's ability to interface with the modem and printer.

To run this test, type **t f46 P1 P2** and press Return.

Modem and printer test parameters and error messages

Table F-12 describes the parameters used in modem and printer test commands and error messages.

Table F-13 lists the meaning of modem and printer test error codes.

Table F-12. Modem and Printer Test Parameters

Parameter	Description
P1	Specifies a modem or printer test. Specify 0 to test the modem. Specify 1 to test the printer.
P2	Includes ready to send (RTS)/clear to send (CTS) loopback in the test.
P3	Actual value in register named in the subtest.
P4	Expected value of register named in the subtest.

Table F-13. Modem and Printer Test Error Codes

Error Code	Meaning
1	External loopback modem control test failed.
2	Serial line MSR register was not ready.
3	Serial line MSR DTR2/DSR2
4	Second RTS/CTS failed.
5	Third DTR/CSR failed.
6	Third RTS/CTS3 failed.

Keyboard and Mouse Test

The keyboard and mouse test checks the keyboard, mouse and serial line controller on the system module.

To run a keyboard and mouse test, type **t f41 P1 P2** and press Return.

Keyboard and mouse test parameters and error messages

Table F-14 lists the parameters used in keyboard and mouse test commands and error messages.

Table F-15 lists the error codes used in keyboard and mouse test error messages.

Table F-14. Keyboard and Mouse Test Parameters

Parameter	Description
P1	Specifies which item to test. <ul style="list-style-type: none">– Replace <i>P1</i> with 0 to test the keyboard.– Replace <i>P1</i> with 1 to test the mouse.
P2	Specifies whether to run an internal or external loopback test. <ul style="list-style-type: none">– Replace <i>P2</i> with 0 to run an internal loopback test.– Replace <i>P2</i> with 1 to run an external loopback test.
P3	Actual value in register named in the subtest.
P4	Expected value in register named in subtest.
P5	Four characters the self-test returned.
P6	Character the controller sent to the device to start the test.

Table F-15. Keyboard and Mouse Test Error Codes

Error Code	Meaning
1	Self-test failed.
2	Serial line timeout waiting for receive done (rdone).
3	Search for loopback failed.
4	Returned value was not zero.

Real-Time Clock Register Test

The real-time clock register test checks the real-time clock registers. To run the real-time clock register test, type **t f51** and press Return.

Real-time clock register test error codes

Table F-16 describes the error codes used in real-time clock register test error messages.

Table F-16. Real-Time Clock Register Test Error Codes

Error Code	Meaning
1	Update in progress (UIP) bit remained set past allotted time.
2	Writing pattern to time/alarm/registers failed.
3	Miscompare occurred reading pattern from time/alarm registers.

Real-Time Test

The real-time test checks times generated by the real-time clock against hard-coded time values. To run the real-time test, type **t f51** and press Return.

Real-time test parameters and error messages

The parameter P1 in real-time test error messages indicates the actual value in the real-time clock.

Table F-17 describes the error codes used in real-time test error messages.

Table F-17. Real-Time Test Error Codes

Error Code	Meaning
1	UIP bit remained set past allotted time.
2	Error occurred when setting real-time clock control registers.
3	Real-time clock interrupt was pending when its should not be.
4	Error occurred setting real-time clock time registers.
5	Allowed time ran out while waiting for interrupt.
6	Real-time clock seconds were not set to zero on wraparound.
7	Real-time clock minutes were not set to zero on wraparound.
8	Real-time clock hours were not set to zero on wraparound.
9	Real-time clock day was not set to 1 on wraparound.
10	Real-time clock date was not set to 1 on wraparound.
11	Real-time clock month was not set to 1 on wraparound.
12	Real-time clock seconds were not zeroed on wraparound.

Real-Time Clock Period Test

The real-time clock period test checks the real-time clock's periodic interrupt operation. To run the real-time clock period test, type **t f53** and press Return.

Real-time clock period test error messages

Table F-18 describes the error codes used in real-time clock period test error messages.

Table F-18. Real-Time Test Error Codes

Error Code	Meaning
1	UIP bit remained set past allotted time.
2	Error occurred when setting real-time clock control registers.
3	Real-time clock interrupt was pending when it should not be.
4	Error occurred reenabling periodic interrupts.
5	Allowed time ran out while waiting for interrupt.

Cache Data Test

The cache data test writes then reads and verifies data patterns to the cache. To run the cache data test, type **t f60 P1 P2** and press Return.

Cache data test parameters and error messages

Table F-19 describes the parameters used in cache data test commands and error messages. Table F-20 describes cache data test error codes.

Table F-19. Cache Data Test Parameters

Parameter	Description
P1	Specifies which cache to test. <ul style="list-style-type: none">- Specify 0 to test the D-cache.- Specify 1 to test the I-cache.
P2	Memory address where the failure occurred.
P3	Data pattern read from memory.

Table F-20. Cache Data Test Error Codes

Error Code	Description
1	Error occurred writing data pattern to cache RAM.
2	Cache did not hold data pattern.
3	Cache parity error occurred.
4	Error occurred writing data pattern to cache RAM.
5	Cache did not hold data pattern.
6	Cache parity data error occurred.
7	Flooding cache RAM with address pattern failed.
8	Cache data miscompare occurred.
9	Cache address read caused a parity error.

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Table F-20 (Cont.). Cache Data Test Error Codes

Error Code	Description
10	Cache read miscompare occurred. Value read back should be address complement.
11	Cache address complement read caused a parity error.

Cache Isolate Test

The cache isolate test isolates then reads and writes data patterns to the cache. To run the cache isolate test, type **t f61 P1** and press Return.

Cache isolate test parameters and error messages

Table F-21 describes the parameters used in cache isolate test commands and error messages.

Table F-22 describes cache isolate test error codes.

Table F-21. Cache Isolate Test Parameters

Parameter	Description
P1	Specifies which cache to test. <ul style="list-style-type: none">- Specify 0 to test the D-cache.- Specify 1 to test the I-cache.
P2	Memory address where the failure occurred.
P3	Data pattern read from memory.
P4	Value expected from memory.

Table F-22. Cache Isolate Test Error Codes

Error Code	Description
1	Error occurred isolating cache.
2	Test failed writing 00000000 pattern.
3	Test failed reading 00000000 pattern.
4	Reading 00000000 pattern returned a cache parity error.
5	Reading 00000000 pattern returned a cache miss error.
6	Reading 00000000 pattern returned a data miscompare.
7	Test failed reading 55555555 pattern.
8	Reading 55555555 pattern returned a cache parity error.
9	Reading 55555555 pattern returned a cache miss error.

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Table F-22 (Cont.). Cache Isolate Test Error Codes

Error Code	Description
10	Reading 55555555 pattern returned a data miscompare.
11	Test failed reading AAAAAAAAAA pattern.
12	Reading AAAAAAAAAA pattern returned a cache parity error.
13	Reading AAAAAAAAAA pattern returned a cache miss error.
14	Reading AAAAAAAAAA pattern returned a data miscompare.
15	Failure occurred reading data address pattern.
16	Reading data address pattern returned a cache parity error.
17	Reading data address pattern returned a parity error.
18	Reading data address pattern returned a miscompare error.

Overtemp Detect Test

The overtemp detect test checks the overtemperature bit in CSR. To run the overtemp detect test, type **t f90** and press Return.

Overtemp detect test error messages

The system returns error code 1 if the overtemperature bit fails the overtemp detect test.

Show Versions Utility

The show versions utility displays the ID numbers of all versions of the system and optional modules. To run the show versions utility, type **t fC3 *module***, and press Return.

To find the version ID of a single module, replace *module* with the slot number of the module for which you want the version ID number. The default is all modules.

Test Error Control Host Tests

The test error control host (TECH) tests are for manufacturing use only. Although the t ? display includes these tests, they are not for field service use.

Table F-23 lists the TECH tests and their commands found in the t ? display.

Table F-23. TECH Tests, Utilities, and Commands

Test	Command
TECH test	t fD0
TECH Set utility	t DD
TECH Loop utility	t DE
TECH Stat utility	t DF

Show Error History Utility

The show error history utility displays all error messages the system has generated since ??? To use the show error history utility, type **t FD** and press Return. The error messages then appear on the screen.

Script Acquire Utility

The script acquire utility creates test scripts. This utility asks the user a series of questions that set test script conditions.

To use the script acquire utility, type **ffe P1**, where *P1* represents the memory address where the script is stored, and press Return. The series of prompts for setting test conditions then appears on the monitor.

Display Tests Utility

The display tests utility displays information about available tests and test scripts. To use the display tests utility, type **t fff P1**, where the optional *P1* represents the number of an individual test, and press Return.

- To display information for all available tests, do not include the *P1* parameter.
- To display information for an individual test or test script, replace *P1* with the number of the test for which you want information.

Memory Module Tests

The following entries explain the commands and error codes for each memory module self-test.

RAM Data Test

The RAM data test checks the operation of individual memory modules.

To run a RAM data test on all memory modules, type **8f21** and press Return.

To run a RAM data test on a single module, type **t f31 P1** and press Return. In this command, replace *P1* with the number of the slot holding the memory module you want to test.

RAM data test error messages

Table F-24 describes each RAM data test error parameter.

Table F-25 describes each RAM data test error code.

Table F-24. RAM Data Test Error Parameters

Parameter	Description
P1	Memory module's slot number
P2	Amount by which test increments between addresses
P3	Test's starting address
P4	Pattern used to test memory
P5	Pattern read from memory

Table F-25. RAM Data Test Error Codes

Error Code	Meaning
1	First attempt to write to memory failed.
2	First attempt to read memory failed.
3	Reading complement pattern failed.

RAM Configuration Test

The RAM configuration test checks memory module's base addresses.

To run the RAM configuration test, type **f32** and press Return.

RAM configuration test error messages

Table F-26 describes each RAM Data test error code.

Table F-26. RAM Configuration Test Error Codes

Error Code	Meaning
1	Attempt to write pattern to module's base address failed.
2	Attempt to read back pattern from module's base address failed.

Error Correcting Code Generate Test

The error correcting code (ECC) test performs a write and read operation in memory, then compares the resulting ECC with the computed value. To run the ECC generate test, type **f33 P1** and press Return.

ECC generate test error messages

Table F-27 describes the parameters in ECC generate test error messages.

Table F-28 lists the error codes used in ECC generate test error messages.

Table F-27. ECC Generate Test Parameters

Parameter	Description
P1	The test's starting address
P2	Pattern read from memory
P3	Checkbits read back from CHKSYN

Table F-28. ECC Generate Test Error Codes

Error Code	Meaning
1	Test failed to clear error address register. P1's value equals the register's bad contents.
2	Test failed to clear CHKSYN register. P1's value equals the register's bad contents.
3	Test failed writing floating 1 pattern to memory.
4	(Not used)
5	Data blocks read from memory did not match.
6	Checkbit read from CHKLO did not have VALID bit set.
7	LOW BANK generated incorrect checkbits.
8	Data read from memory did not match computed value.
9	Checkbit read from CHKHI was invalid.
10	HIGH bank generated incorrect checkbits.

ECC Single Bit Error Fix Test

The ECC single bit error (SBE) fix test writes floating 1s with ECC set for zero then checks if the results are zero. To run this test, type **t f34 P1**, where you replace *P1* with the address at which you want to start writing 1s, and press Return.

ECC SBE fix test error messages

Table F-29 describes the parameters in ECC SBE fix test commands and error messages.

Table F-30 lists the error codes used in ECC SBE fix test error messages.

Table F-29. ECC SBE Fix Test Parameters

Parameter	Description
P1	Starting address for writing floating 1s
P2	Pattern read from memory
P3	Contents last read from ERRADR register
P4	Contents last read from CHKSYN register

Table F-30. ECC SBE Fix Test Error Codes

Error Code	Meaning
1	ECC could not compute current value of CSR
2	Test failed to clear ERRADR register.
3	Test failed to clear CHKSYN register.
4	Writing floating 1 pattern into memory failed.
5	Writing into diagnostic latch failed.
6	Reading back pattern with chips in diagnostic correction mode failed.
7	Test did not read back expected value of 0.
8	Corrected READ did not generate memory interrupt.
9	Clearing ERRADR register failed to clear memint.

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Table F-30 (Cont.). ECC SBE Fix Test Error Codes

Error Code	Meaning
10	ERRADR VALID bit was not set. Error was possibly not detected.
11	ERRADR CPU bit was not set.
12	ERRADR WRITE bit was set on what should have been a read error.
13	ERRADR ECCERR bit was not set.
14	ERRADR address does not match check parameters.
15	Checkbit syndrome (CHKSYN) VALID bit was not set.
16	CHKSYN SNGLO bit was not set.
17	Test failed while checking multiple bit error read.

Partial Write Test

This test performs a read and write to a specific address, then checks if the read and write values are the same. To run the Partial Write test, type **t f35 P1**, where you replace *P1* with the memory address to which you want to write, and press Return.

Partial write test error messages

Table F-31 describes the parameters in partial write test commands and error messages.

Table F-32 lists the error codes used in partial write test error messages.

Table F-31. Partial Write Test Parameters

Parameter	Description
P1	Memory address to which to write pattern
P2	Pattern read back from memory

Table F-32. Partial Write Test Error Codes

Error Code	Meaning
1	Pattern that was read showed mismatch on word access.
2	Byte 0 failed partial byte write.
3	Byte 1 failed partial byte write.
4	Byte 2 failed partial byte write.
5	Byte 3 failed partial byte write.
6	Halfword 0 failed partial halfword write.
7	Halfword 1 failed partial halfword write.

Build Bitmap Utility

This utility constructs a bitmap that contains memory size, and good and bad pages. To run the Bitmap utility, type **t f3d**, and press Return.

Zero RAM Test

The Zero RAM test floods memory with zeroes as fast as possible. To run the Zero RAM test, type **t f3E** and press Return.

RAM Refresh Test

The RAM refresh test checks if the REFEVEN memory refresh bit in CSR toggles as it should. To run the RAM refresh test, type **t 3f** and press Return.

RAM Refresh test error messages

Table F-33 lists the error codes used in RAM refresh test error messages.

Table F-33. RAM Refresh Test Error Codes

Error Code	Meaning
2	Error occurred setting RTC control registers.
3	Time allowed to wait for RTC interrupt passed.
4	Time allowed to wait for REFEVEN to toggle passed.

Ethernet Tests

The following entries explain the purpose, test commands, and error messages for each individual Ethernet test.

Registers Test

The registers test performs a read/write operation on the Ethernet register. To run the registers test, type **t x01**, where *x* represents the unit number of the Ethernet controller you want to test, and press Return.

Registers test parameters and error codes

In registers test error messages, P1 indicates the last value that was read from CSR0.

Table F-34 lists the error codes used in registers test error messages.

Table F-34. Registers Test Error Codes

Error Code	Description
1	First write to Ethernet CSRs failed.
2	Reading CSR values and comparing them to zero failed.
3	Comparing value in CSR1 to pattern of all ones failed.
4	Comparing value in CSR2 to pattern of all ones failed.
5	Test for bit leak from CSR2 to CSR1 failed.
6	Test for bit leak from CSR1 to CSR2 failed.
7	Immediate write/read test failed.

Internal Loopback Test

The internal loopback test sends and receives data packets to the Ethernet in internal loopback mode. To run the internal loopback test, type **t x02 P1**, and press Return.

When you use this test command

- Replace *x* with the unit number of the Ethernet module you want to test.
- Replace *P1* with the address in the Ethernet RAM buffer in which you want to set up structures.

Internal loopback test parameters and error codes

Table F-35 describes the parameters used in internal loopback test commands and error messages.

Table F-36 lists the error codes used in internal loopback test error messages.

Table F-35. Internal Loopback Test Parameters

Error Code	Description
P1	Ethernet RAM address used to set up structures
P2	Return status from any of the common subroutines
P3	Last value read from CSR0

Table F-36. Internal Loopback Test Error Codes

Error Code	Description
1	Error occurred reading Ethernet station address ROM.
2	Error occurred initializing the Ethernet controller chip.
3	Error occurred sending packet.
4	Error occurred receiving packet.
5	Packet sizes miscompared.
6	Packet contents miscompared.

External Loopback Test

The external loopback test sends an external loopback packet and tests the system's connection to the network. To run the external loopback test, type **t x03 P1**, and press Return.

When you use this test command

- Replace *x* with the unit number of the Ethernet module you want to test.
- Replace *P1* with the address in the Ethernet RAM buffer in which you want to set up structures.

External loopback test parameters and error codes

Table F-37 describes the parameters used in external loopback test commands and error messages.

Table F-38 lists the error codes used in external loopback test error messages.

Table F-37. External Loopback Test Parameters

Error Code	Description
P1	Ethernet RAM address used to set up structures
P2	Return status from any of the common subroutines
P3	Last value read from CSR0
P4	Number of retries performed
P5	Bitmask of errors that occurred in external loopback

Table F-38. External Loopback Test Error Codes

Error Code	Description
1	Error occurred initializing the Ethernet controller chip.
2	Error occurred reading Ethernet station address ROM.
3	Error occurred sending packet.
4	Error occurred receiving packet.
5	Packet sizes miscompared.
6	Packet contents miscompared.
7	Fatal error occurred.

Cyclic Redundancy Code Detect Test

The cyclic redundancy code (CRC) detect test checks the ethernet's CRC verification and bad CRC detection abilities. To run the CRC detect test, type **t x04 P1** and press Return. When you use this test command,

- Replace *x* with the unit number of the Ethernet controller you want to test.
- Replace the optional *P1* with the Ethernet address in which you want to set up structures.

CRC detect test parameters and error codes

Table F-39 describes the parameters used in CRC detect test commands and error messages.

Table F-40 lists the error codes used in CRC detect test error messages.

Table F-39. CRC Detect Test Parameters

Parameter	Description
P1	Ethernet address used for setting up structures
P2	Return status from any of the common subroutines
P3	Last value read from CSR0

Table F-40. CRC Detect Error Codes

Error Code	Description
1	Error occurred reading Ethernet station address ROM.
2	Error occurred initializing Ethernet chip.
3	Error occurred transmitting packet.
4	Error occurred receiving packet.
5	Ethernet chip flagged a good CRC on a packet with a bad CRC.
6	Miscellaneous packet receive error occurred.
7	Error occurred initializing the Ethernet chip.
8	Error occurred transmitting data packet.
9	Error occurred receiving data packet.
10	Ethernet chip did not detect a bad CRC in an incoming packet.
11	Error other than CRC failure occurred in packet receive operation.

Collision Test

The collision test checks the Ethernet's collision detect circuitry by forcing a collision on transmit. To run the collision test, type **t x05 P1** and press Return. When you use this test command,

- Replace *x* with the unit number of the Ethernet controller that you want to test.
- Replace the optional P1 parameter with the Ethernet address in which you want to set up structures.

Collision test parameters and error codes

Table F-41 describes the parameters used in collision test commands and error messages.

Table F-42 lists the error codes used in collision test error messages.

Table F-41. Collision Test Parameters

Parameter	Description
P1	Ethernet address used for setting up structures
P2	Return status from any of the common subroutines
P3	Last value read from CSR0

Table F-42. Collision Test Error Codes

Error Code	Description
1	Error occurred reading Ethernet station address ROM.
2	Error occurred transmitting packet.
3	Packet went normally when it should have failed.
4	Error other than retry error occurred during packet transmission.

Promiscuous Mode Test

The promiscuous mode test checks the Ethernet's ability to receive packets in promiscuous mode. To run the promiscuous mode test, type **t x06 P1**, and press Return.

When you use this test command

- Replace *x* with the unit number of the Ethernet module that you want to test.
- Replace the optional parameter P1 with the specific address in the Ethernet RAM buffer in which you want to set up structures.

Promiscuous mode test parameters and error codes

Table F-43 describes the parameters used in promiscuous mode test commands and error messages.

Table F-44 lists the error codes used in promiscuous mode test error messages.

Table F-43. Promiscuous Mode Test Parameters

Parameter	Description
P1	Ethernet RAM address used to set up structures
P2	Return status from any of the common subroutines
P3	Last value read from CSR0

Table F-44. Promiscuous Mode Test Error Codes

Error Code	Description
1	Error occurred reading Ethernet station address ROM.
2	Error occurred initializing the Ethernet controller chip.
3	Error occurred sending packet.
4	Error occurred receiving packet.
5	An inappropriate packet was received in nonpromiscuous mode.
6	Packet receive routine returned a miscellaneous error.
7	Error occurred initializing Ethernet chip in promiscuous mode.
8	Error occurred transmitting packet.
9	Error occurred receiving internal loopback packet.

Multicast Test

The multicast test checks the Ethernet's ability to filter multicast packets. To run the multicast test, type **t x07 P1**, and press Return.

When you use this test command

- Replace *x* with the unit number of the Ethernet controller that you want to test.
- Replace the optional parameter P1 with a specific address in the Ethernet RAM buffer in which you want to set up structures.

Multicast test parameters and error codes

Table F-45 describes the parameters used in multicast test commands and error messages.

Table F-46 lists the error codes used in multicast test error messages.

Table F-45. Multicast Test Parameters

Parameter	Description
P1	Ethernet RAM address used to set up structures
P2	Return status from any of the common subroutines
P3	Last value read from CSR0

Table F-46. Multicast Test Error Codes

Error Code	Description
1	Error occurred reading Ethernet station address ROM.
2	Error occurred initializing the Ethernet controller chip.
3	Error occurred sending packet.
4	Error occurred receiving packet.
5	Ethernet received a multicast packet when multicast function was disabled.
6	Packet receive routine returned a miscellaneous error.
7	Error occurred initializing Ethernet chip.
8	Error occurred transmitting packet.
9	Ethernet did not receive expected packet.

Interrupt Request Test

The interrupt request (IRQ) test checks the Ethernet controller's ability to generate an interrupt to the R3000 chip. To run the IRQ test, type **t x08 P1**, and press Return.

When you use this test command

- Replace *x* with the unit number of the Ethernet controller that you want to test.
- Replace the optional parameter *P1* with a specific address in the Ethernet RAM buffer in which you want to set up structures.

IRQ test parameters and error codes

Table F-47 describes the parameters used in IRQ test commands and error messages.

Table F-48 lists the error codes used in IRQ test error messages.

Table F-47. IRQ Test Parameters

Parameter	Description
P1	Ethernet RAM address used to set up structures
P2	Return status from any of the common subroutines
P3	Last value read from CSR0

Table F-48. IRQ Test Error Codes

Error Code	Description
1	Error occurred reading Ethernet station address ROM.
2	Error occurred initializing the Ethernet controller chip.
3	Error occurred sending packet.
4	No interrupt generated on packet transmit.

Ethernet RAM Test

The Ethernet RAM test checks the Ethernet RAM's operation. To run the Ethernet RAM test, type **t x20 P1** and press Return.

When you use this command,

- Replace *x* with the unit number of the Ethernet controller you want to test.
- Replace the optional parameter *P1* with the address at which you want the test to start.

Ethernet RAM test parameters and error codes

Table F-49 describes the parameters used in Ethernet RAM test commands and error messages.

Table F-50 lists the error codes used in Ethernet RAM test error messages.

Table F-49. Ethernet RAM Test Parameters

Parameter	Description
P1	Ethernet RAM address from which to start test
P2	Increment to move to next test address
P3	Pattern read back from RAM

Table F-50. RAM Test Error Codes

Error Code	Description
1	First write operation to Ethernet RAM failed.
2	A read miscompare occurred on the first pass.
3	A read miscompare occurred on the second pass.

Ethernet Station Address ROM Test

The ethernet station address ROM (ESAR) test checks the ethernet station address ROM on the Ethernet controller. To run the ESAR test, type **t x21** and press Return.

ESAR test error codes

Table F-51 lists error codes used in ESAR test error messages.

Table F-51. ESAR Test Error Codes

Error Code	Description
1	First read to ESAR failed.
2	ESAR contained all zeros.
3	ESAR contained broadcast address.
4	Error occurred computing checksum.
5	Checksum miscompare occurred in lower byte.
6	Checksum miscompare occurred in lower byte.
7	Reverse copy mismatch occurred.
8	Forward copy mismatch occurred.
9	Test pattern FF mismatch occurred.
10	Test pattern 00 mismatch occurred.
11	Test pattern 55 mismatch occurred.
12	Test pattern AA mismatch occurred.
13	Test pattern FF mismatch occurred.
14	Test pattern 00 mismatch occurred.
15	Test pattern 55 mismatch occurred.
16	Test pattern AA mismatch occurred.

SCSI Controller Tests

The following entries explain each SCSI controller test and its test commands and error messages.

SCSI Controller Chip Test

The SCSI controller chip test checks the SCSI controller chip's operation. To run the SCSI controller chip test, type **x11**, where *x* represents the unit number of the SCSI controller you want to test, and press Return.

SCSI controller chip test parameters and error codes

Table F-52 describes the parameters used in SCSI controller chip test error messages. Table F-53 lists error codes used in test error messages.

Table F-52. SCSI Controller Chip Test Parameters

Parameter	Description
P1	Expected read value.
P2	Actual read value.

Table F-53. SCSI Controller Chip Test Error Codes

Error Code	Description
1	Chip reset failed.
2	Values read from configuration register did not match.
3	Error occurred in first in first out load.
4	Error occurred in counter transfer.

SCSI Buffer Test

The SCSI buffer test checks the SCSI buffer's operation. To run the SCSI buffer test, type ***x12 P1 P2*** and press Return.

When you type this command,

- Replace *x* with the unit number of the SCSI controller you want to test.
- Replace the optional parameter *P1* with the address at which you want the test to start.
- Replace the optional parameter *P2* with the increment by which you want the next test pass's starting address to increase.

SCSI buffer test parameters and error codes

Table F-54 describes the parameters used in SCSI buffer test commands and error messages. Table F-55 lists error codes used in SCSI buffer test error messages.

Table F-54. SCSI Buffer Test Parameters

Parameter	Description
P1	Test's starting address.
P2	Increment by which each test pass's starting address increases.

Table F-55. SCSI Buffer Test Error Codes

Error Code	Description
1	Write to SCSI RAM failed.
2	Read and write values from first pass did not match.
3	Read and write values from second pass did not match.

SCSI RAM Test

The SCSI RAM test performs a read/write operation on the SCSI controller's RAM. To run the SCSI RAM test, type $x13$, where x represents the unit number of the SCSI controller you want to test, and press Return.

SCSI RAM test parameters and error codes

The SCSI RAM test returns an error message if the read and write values do not match. Table F-56 describes the parameters used in SCSI RAM test error messages.

Table F-56. SCSI RAM Test Parameters

Parameter	Description
P1	Expected write value
P2	Actual write value
P3	Address at which read/write failure occurred

SCSI Port Test

The SCSI port test checks the devices on a specified SCSI controller's bus. To run the SCSI port test, type ***x14 P1*** and press Return.

When you type this command,

- Replace *x* with the unit number of the SCSI controller's bus you want to test.
- Replace the optional parameter *P1* with the SCSI address of a specific device you want to test.

SCSI port test parameters and error codes

Table F-57 describes the parameters used in SCSI port test commands and error messages. Table F-58 lists error codes used in SCSI port test error messages.

Table F-57. SCSI Port Test Parameters

Parameter	Description
P1	Device's SCSI address
P2	Status returned by diagnostics
P3	Status register's contents

Table F-58. SCSI Port Test Error Codes

Error Code	Description
1	Device showed a check condition.
2	Device rejected the command send diagnostics.
3	Driver's attempt to check device reported an error.

Graphics Module Tests

The following entries explain each individual graphics module test and its test commands and error messages.

Initialize Video Digital to Analog Converter Registers Test

The initialize video digital to analog converter (VDAC) registers test attempts to initialize the VDAC registers. To run the initialize VDAC registers test, type **x01**, where *x* represents the graphics module's unit number, and press Return.

Initialize VDAC registers test parameters and error codes

Table F-59 describes the parameters used in initialize VDAC registers test error messages. Table F-60 lists error codes used in initialize VDAC registers test error messages.

Table F-59. Initialize VDAC Registers Test Parameters

Parameter	Description
P1	Debug flag setting
P2	Contents in VDAC register
P3	VDAC low address register
P4	VDAC high address register

Table F-60. Initialize VDAC Registers Test Error Codes

Error Code	Description
1	Could not initialize read id register.
2	Could not initialize command registers.
3	Could not initialize cursor command registers.
4	Could not initialize cursor RAM.
5	Could not initialize color map.
6	Could not initialize overlay map.
7	Could not initialize cursor palette.
8	Could not initialize interrupt line.

Video RAM Test

The video RAM test performs a read/write operation on the video RAM. To run the video RAM test, type **x02**, where *x* represents the graphics module unit number, and press Return.

Video RAM test parameters and error codes

Table F-61 describes the parameters used in video RAM test error messages. Table F-62 lists error codes used in video RAM test error messages.

Table F-61. Video RAM Test Parameters

Parameter	Description
P1	Debug flag setting
P2	Test's starting address
P3	Test's ending address
P4	Data pattern in test's fourth pass
P5	Expected pattern from memory
P6	Actual pattern read from memory

Table F-62. Video RAM Test Error Codes

Error Code	Description
1	Error during write loop.
2	Values in memory miscompared.
3	Complemented values in memory miscompared.

Font Test

The font test fills the monitor screen with a specified character. To run the Font test, type **x03**, and press Return.

- Replace *x* with the graphics module unit number.
- Replace the optional parameter *P1* with the hexadecimal value for the specific character you want to display. Replace *P1* with 0 to display all fonts.

Font test parameters and error codes

The parameter P1 used in font test commands and error messages is the hexadecimal value for the character displayed on the monitor. The font test generates no error messages.

Interrupt Test

The interrupt test attempts to initialize the VDAC interrupt line. To run the interrupt test, type **x04**, where *x* represents the graphics module unit number, and press Return.

Interrupt test error codes

If the interrupt test returns error code 1, the VDAC did not receive the interrupt.

Box Test

The box test lights pixels at the monitor's perimeter. To run the box test, type **x11**, where *x* represents the graphics module's unit number, and press Return.

Box test parameters and error codes

The box test reports no test parameters or error codes.

Cursor Test

The cursor test the cursor RAM. To run the cursor test, type **x12**, where *x* represents the graphics module unit number, and press Return.

Cursor test parameters and error codes

Table F-63 describes the parameters used in cursor test commands and error messages. Table F-64 lists error codes used in cursor test error messages.

Table F-63. Cursor Test Parameters

Parameters	Description
P1	Cursor's horizontal position
P2	Cursor's vertical position
P3	Cursor command register contents
P4	Actual cursor RAM contents
P5	Expected cursor RAM contents

Table F-64. Cursor Test Error Codes

Error Code	Description
1	Test failed to read ID or initialize VDAC.
2	Cursor RAM failed incremented values.
3	Cursor RAM failed decremented values.

Analog Video Output Test

The analog video output test displays a series of patterns on the monitor. To run the analog video output test, type **x13**, where you replace *x* with the graphics module unit number, and press Return.

Analog video output test parameters and error codes

Table F-65 describes the parameters used in pattern test commands and error messages. Table F-66 lists error codes used in pattern test error messages.

Table F-65. Analog Video Output Test Parameters

Parameter	Description
P1	Test's starting address
P2	Test's ending address
P3	VDAC test register contents

Table F-66. Analog Video Output Test Error Codes

Error Code	Meaning
1	Color bars test failed.
2	Grey scale bars test failed.
3	Red screen test failed.
4	Green screen test failed.
5	Blue screen test failed.
6	Blue-green to blue-red pattern test failed.
7	Red-green to blue-green test failed.
8	Red-blue to red-green test failed.

Initial Power-Up Tests

The system completes a series of initial system checks whenever you turn on the system power. If the system halts at one of these tests, the diagnostic LEDs display a code that indicates the problem. Table F-67 lists initial power-up test LED displays and their meaning.

Table F-67. Initial Power-Up Test Error Codes

Error Code	Description
EE	Test could not run on LEDs.
ED	Write to memory failed.
EC	Reading memory failed. If a miscompare occurred, the read/write operation loops forever.
EB	Test halted trying to check the security jumper and clearing the nonvolatile RAM.
EA	Test could not determine if the system is in a power-up or rest situation.
E9	Test halted trying to verify the ERRADR's power-up state.
E8	Test could not begin the power-up test sequence.
E7	Initializing base system, RAM or stack failed.
E6	Test could not perform system configuration and device checks.
E5	Console initialization routines halted.
E4	Attempt to display power-up banner failed.
E3	Test could not invoke diagnostic executive.
E2	Setting power-on flag failed.
E0	Diagnostics halted after returning from main console code.
D8	Test halted while trying to initialize state while running reboot code.
D7	Test halted while trying to initialize base system, RAM, and stack while running reboot code.
D6	Diagnostic reset script did not complete.
D5	Console initialization failed.

(continued on next page)

Table F-67 (Cont.). Initial Power-Up Test Error Codes

Error Code	Description
D4	Test could not invoke portable diagnostic executive to dump any pending error messages.
D0	Test halted after return from main console.
DF	Test halted at start of test stack.
DE	Writing pattern of 5s to the first 192 Kbytes failed.
DD	Reading pattern of 5s from first 192 Kbytes returned a miscompare.
DC	Reading pattern of As returned a miscompare.
DB	Reading pattern of Fs returned a miscompare.
D0	Test did not return to power-up self-test script.



Console Status and Error Message Codes Generated by Version PDE3 ROM Chips

This appendix explains the codes used in console status and error messages generated by the Version PDE3 ROM chips. It includes

- Major error and status code numbers and phrases, which indicate the general condition that generated the console message.
- Minor error and status code numbers and phrases, which provide specific information about the condition that generated the console message.

Major Error and Status Code Numbers and Phrases

Table G-1 lists the major codes found in console error and status messages.

Table G-1. Major Error and Status Error Codes

Major Code	Displayed Phrase	Meaning
20	Invld prm	Invalid parameter received.
21	Intrnl err optn	Error detected in an optional controller ROM code.
22	Intrnl err	Internal error detected in the system module ROM code.
23	Rstrt flr	Restart attempt failed.
24	Boot flr	Boot operation failed.
25	Cmd flr	Requested console command failed.
26	Invld env	Specified environment variable was invalid.
27	Adrs err	Specified address was invalid.
28	Ntwrk err	Network-related error occurred.
29	Mth err	Invalid arithmetic result or operation detected.
2A	Invld cmd	Console command format was invalid.
2B	Tbl fl	One of the console's tables of required data is already full.
2C	Invld data	Invalid data encountered.
2D	HW flr	Hardware failure occurred.
2E	Intrpt	Interrupt occurred.
30	Opn err	I/O error detected during an open operation.
31	Cls err	I/O error detected during a close operation.
32	ioctl err	I/O error detected during an ioctl operation.
33	Rd err	I/O error detected during a read operation.

(continued on next page)

Table G-1 (Cont.). Major Error and Status Error Codes

Major Code	Displayed Phrase	Meaning
34	Wrt err	I/O error detected during a write operation.
35	IO err	I/O error detected.
a0	Bootng (^C => abrt)	System is booting. To abort the boot operation. press Ctrl-C.
a1	Rstrtng	System is restarting.
a2	Xfr adrs	Transfer address value.
a3	TOD clck init	Time-of-day clock is initialized.
a4	Exit	System exited to console mode.
a5	Dvs	The following information is a list of devices.
a6	Usage informa- tion	The following message gives informa- tion about the system usage.
a7	Prv cmd	Access to console command requires a password.
a8	HLT	Console halt operation performed.

Minor Console Error and Status Error Codes

Table G-2 lists minor codes used in error and status messages.

Table G-2. Minor Error and Status Error Codes

Minor code	Meaning
03e9	Option configuration is invalid.
03ea	There is no driver to support the controller.
03eb	Auto boot attempted but no bootpath is set.
03ec	Boot process failed.
03ed	Test parameter is out of allowed range.
03f0	Parameter in boot command is invalid.
03f1	Invalid haltaction value found.
03f2	Haltaction boot failed.
03f3	Invalid argc value received by main.
03f9	Entry-point restart failed.
03fa	Bootpath parameter was null.
03fb	Internal ROM error encountered.
03fc	Write range would overlay ROM.
03fd	Restart command failed for some reason.
03fe	Address table is full.
0403	Booted a.out has invalid byte order.
0404	Reading data portion of a.out image reported an error.
0405	Booted a.out has invalid form.
0406	Booted a.out has invalid size.
0407	Reading text portion of a.out image reported an error.
0408	Boot device is not explicit and bootpath environment variable is null.
0409	Write range would overlay ROM.
040c	Device is already enabled as a console device.
040d	System unable to disable console device.
040e	System unable to open desired console device.
040f	Console device to be disabled is not enabled.

(continued on next page)

Table G-2 (Cont.). Minor Error and Status Error Codes

Minor code	Meaning
0410	Console device must be a character device.
0411	Command is not defined in command table.
0412	System cannot give help on undefined command.
0413	String overflow occurred in video_enable.
0416	Overflow occurred in ahtob routine.
0417	Overflow occurred in atob routine.
0418	Console device table is full.
0419	Parser detected a syntax error.
0421	Setting serial line baud rate reported an error.
0422	Serial line I/O error occurred.
0423	System cannot use keyboard environment variable.
0424	Error exists in hard disk driver buffer size.
0427	Tape drive controller is nonexistent.
0428	No unit state block available on tape drive.
0429	String space overflow occurred.
042a	String space overflow occurred in new_str2.
042b	String space overflow in set_str.
042c	Internal error due to bad string index.
042d	Insufficient space exists to create another string.
042e	Insufficient space to create another string in new_str.
042f	Data in time-of-day (TOD) clock is invalid.
0430	TOD clock won't initialize.
0431	TZ request is too large.
0432	TZ backspace error on unit.
0433	TZ mode select error on unit.
0434	TZ error rewinding unit at open.
0435	TZ specified unit busy.
0436	TZ error writing file mark on unit.
0439	TOD clock values indicate dead battery.
043d	Opening: AUTO is unknown file-sys type.

(continued on next page)

Table G-2 (Cont.). Minor Error and Status Error Codes

Minor code	Meaning
043e	Unable to handle empty circular buffer here.
043f	No more unused I/O available.
0440	No more unused I/O-control blocks available.
0441	Invalid file name encountered by filename parser.
0442	Corrupted job pointer.
0443	Opening: Required controller not found.
0444	Opening: Required port driver or controller not found.
0445	Opening: Not a file system.
0446	Invalid read address size specified.
0447	Read: Block alignment error.
0448	Read: Unable to locate job for file descriptor.
044a	One or both of the fds received by <code>_is_samedev</code> is corrupted.
044b	The <code>how-2</code> seek option is unsupported.
044c	Invalid seek option was specified.
044d	Unable to locate job corresponding to file descriptor.
044e	Attempted to find driver data for unknown device.
044f	Opening: Unsupported file-sys type.
0450	The never-to-be-called I/O stub was called.
0451	Write: Block alignment error occurred.
0452	Invalid write address size was specified.
0454	Invalid MOP message code.
0455	MOP load number mismatch for memory load message.
0456	MOP load number mismatch for parameter load message.
0457	MOP file name is too long.
0458	MOP receive message failed.
0459	MOP receive message timeout occurred.
045a	MOP send message failed.
045b	No ioctls are supported by MOP.
0456	MOP I/O function error.
045d	Password has less than 8 or more than 32 characters.

(continued on next page)

Table G-2 (Cont.). Minor Error and Status Error Codes

Minor code	Meaning
045e	Password string hashed to zero.
045f	Unprivileged user attempted privileged form of password.
0460	Two new password strings did not match.
0461	Unprivileged user attempted to use privileged form of password.
0462	Privileged command attempted.
0463	Invalid function code was received by _pconsstrategy.
0464	The prom_halt entry point was called.
0465	Attempt to setting a read-only environment variable occurred.
0466	Environment variable should be numeric but it is not.
0467	Environment variable value for this mapped environment variable is invalid.
0468	This environment variable cannot be unset.
046a	TFTP condition is not defined.
046b	TFTP access violation occurred.
046b	TFTP file was not found.
046d	TFTP disk is full, or allocation is exceeded.
046e	TFTP operation is illegal.
046f	TFTP transfer ID is unknown.
0470	TFTP file already exists.
0471	TFTP is a nonexistent user.
0474	SCSI reported check condition.
0475	SCSI reported check condition.
0476	SCSI reported an unexpected status.
0477	SCSI sense failure reported.
0478	SCSI message length is invalid.
0479	SCSI message reject received.
047a	SCSI must specify class driver.
047b	SCSI must specify port driver.
047c	SCSI unexpected status reported.

(continued on next page)

Table G-2 (Cont.). Minor Error and Status Error Codes

Minor code	Meaning
047d	SCSI has no iopb.
047e	SCSI device is inappropriate type.
047f	SCSI check condition status reported.
0480	SCSI unexpected status reported.
0481	SCSI sense failure occurred.
0482	SCSI sense failure occurred.
0483	SCSI did not handle message.
0484	SCSI did not handle message.
0485	TFTP acknowledgment message block number does not match.
0486	TFTP filename is too long.
0487	TFTP data message block number does not match.
0489	TFTP I/O function error occurred.
048a	TFTP server could not find file.
048b	No ioctls are supported by TFTP.
048c	TFTP invalid host or server IP address was specified.
048d	TFTP host or file name is too large.
048e	TFTP does not support read and write mode.
048f	TFTP backward seek occurred.
0490	TFTP backward seek occurred.
0491	Ethernet hardware error occurred during LANCE initialization.
0492	Ethernet did not finish initialization.
0493	Ethernet internal error occurred.
0494	Ethernet did not implement ioctl function.
0495	Ethernet did not implement network protocol.
0496	Ethernet data overrun occurred.
0497	No room for Ethernet channel.
0498	Ethernet data was truncated during write.
0499	Common SCSI error occurred.
049a	SCSI experienced spurious interrupt.

(continued on next page)

Table G-2 (Cont.). Minor Error and Status Error Codes

Minor code	Meaning
049b	Major SCSI problem occurred.
049c	SCSI IO parity error occurred.
049d	SCSI sent too many message bytes.
049e	SCSI sent no message.
049fS	SCSI reselect error occurred.
04a0	SCSI is selected when it should not be.

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