

DEC 7000 AXP System VAX 7000 Basic Troubleshooting

Order Number EK-7000B-TS.002

This manual is intended for the system operator and covers the basic troubleshooting procedures for the DEC 7000 and VAX 7000 systems.

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Preface

Intended Audience

This manual is written for the system manager or system operator who has had training in system management tasks and is running a DEC 7000 or a VAX 7000 system.

Document Structure

This manual uses a structured documentation design. Topics are organized into small sections for efficient on-line and printed reference. Each topic begins with an abstract. You can quickly gain a comprehensive overview by reading only the abstracts. Next is an illustration or example, which also provides quick reference. Last in the structure are descriptive text and syntax definitions.

This manual has three chapters and one appendix as follows:

- **Chapter 1, System Troubleshooting**, tells you what to do if something goes wrong.
- **Chapter 2, Self-Test**, explains how to interpret the self-test display.
- **Chapter 3, Getting System Information**, explains how to identify the modules and devices in your system and how to test them.
- **Appendix A** describes the indicators on the various power system components.

Conventions Used in This Document

Terminology. Unless specified otherwise, the use of "system" refers to either a DEC 7000 AXP or VAX 7000 system. The DEC 7000 AXP systems use the Alpha AXP architecture. References in text use DEC 7000 to refer to DEC 7000 AXP systems.

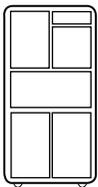
When a discussion applies to only one system, an icon is used to highlight that system. Otherwise, the discussion applies to both systems. Thus, the abstract for a module that applies only to DEC 7000 systems would look like this:



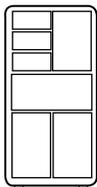
This section shows a sample boot of OpenVMS Alpha AXP from the RRD42 CD drive for DEC 7000 systems. The first step is issuing the show device command to determine the location of the RRD42.

Book titles. In text, if a book is cited without a product name, that book is part of the hardware documentation. It is listed in Table 1 along with its order number.

Icons. The icons shown below are used in illustrations for designating part placement in the system described. A shaded area in the icon shows the location of the component or part being discussed.



Front



Rear

Documentation Titles

Table 1 lists the books in the DEC 7000 and VAX 7000 documentation set. Table 2 lists other documents that you may find useful.

Table 1 DEC 7000/VAX 7000 Documentation

Title	Order Number
Installation Kit	EK-7000B-DK
<i>Site Preparation Guide</i>	EK-7000B-SP
<i>Installation Guide</i>	EK-700EB-IN
Hardware User Information Kit	EK-7001B-DK
<i>Operations Manual</i>	EK-7000B-OP
<i>Basic Troubleshooting</i>	EK-7000B-TS
Service Information Kit—VAX 7000	EK-7002A-DK
<i>Platform Service Manual</i>	EK-7000A-SV
<i>System Service Manual</i>	EK-7002A-SV
<i>Pocket Service Guide</i>	EK-7000A-PG
<i>Advanced Troubleshooting</i>	EK-7001A-TS
Service Information Kit—DEC 7000	EK-7002B-DK
<i>Platform Service Manual</i>	EK-7000A-SV
<i>System Service Manual</i>	EK-7002B-SV
<i>Pocket Service Guide</i>	EK-7700A-PG
<i>Advanced Troubleshooting</i>	EK-7701A-TS

Table 1 DEC 7000/VAX 7000 Documentation (Continued)

Title	Order Number
Reference Manuals	
<i>Console Reference Manual</i>	EK-70C0B-TM
<i>KA7AA CPU Technical Manual</i>	EK-KA7AA-TM
<i>KN7AA CPU Technical Manual</i>	EK-KN7AA-TM
<i>MS7AA Memory Technical Manual</i>	EK-MS7AA-TM
<i>I/O System Technical Manual</i>	EK-70I0A-TM
<i>Platform Technical Manual</i>	EK-7000A-TM
Upgrade Manuals	
<i>KA7AA CPU Installation Guide</i>	EK-KA7AA-IN
<i>KN7AA CPU Installation Guide</i>	EK-KN7AA-IN
<i>MS7AA Memory Installation Guide</i>	EK-MS7AA-IN
<i>KZMSA Adapter Installation Guide</i>	EK-KXMSX-IN
<i>DWLMA XMI PIU Installation Guide</i>	EK-DWLMA-IN
<i>DWMBB VAXBI PIU Installation Guide</i>	EK-DWMBB-IN
<i>H7237 Battery PIU Installation Guide</i>	EK-H7237-IN
<i>H7263 Power Regulator Installation Guide</i>	EK-H7263-IN
<i>BA654 DSSI Disk PIU Installation Guide</i>	EK-BA654-IN
<i>BA655 SCSI Disk and Tape PIU Installation Guide</i>	EK-BA655-IN
<i>Removable Media Installation Guide</i>	EK-TFRRD-IN

Table 2 Related Documents

Title	Order Number
General Site Preparation	
<i>Site Environmental Preparation Guide</i>	EK-CSEPG-MA
System I/O Options	
<i>BA350 DECstor/me Modular Storage Shelf Subsystem Configuration Guide</i>	EK-BA350-CG
<i>BA350 DECstor/me Modular Storage Shelf Subsystem User's Guide</i>	EK-BA350-UG
<i>BA350-LA DECstor/me Modular Storage Shelf User's Guide</i>	EK-350LA-UG
<i>CIXCD Interface User Guide</i>	EK-CIXCD-UG
<i>DEC FDDIcontroller 400 Installation / Problem Solving</i>	EK-DEMFA-IP
<i>DEC LANcontroller 400 Installation Guide</i>	EK-DEMNA-IN
<i>DEC LANcontroller 400 Technical Manual</i>	EK-DEMNA-TM
<i>DSSI VAXcluster Installation and Troubleshooting Manual</i>	EK-410AA-MG
<i>InfoServer 150 Installation and Owner's Guide</i>	EK-INFSV-OM
<i>KDM70 Controller User Guide</i>	EK-KDM70-UG
<i>KFMSA Module Installation and User Manual</i>	EK-KFMSA-IM
<i>KFMSA Module Service Guide</i>	EK-KFMSA-SV
<i>RRD42 Disc Drive Owner's Manual</i>	EK-RRD42-OM
<i>RF Series Integrated Storage Element User Guide</i>	EK-RF72D-UG
<i>TF85 Cartridge Tape Subsystem Owner's Manual</i>	EK-OTF85-OM
<i>TLZ06 Cassette Tape Drive Owner's Manual</i>	EK-TLZ06-OM

Table 2 Related Documents (Continued)

Title	Order Number
Operating System Manuals	
<i>Alpha Architecture Reference Manual</i>	EY-L520E-DP
<i>DEC OSF/1 Guide to System Administration</i>	AA-PJU7A-TE
<i>DECnet for OpenVMS Network Management Utilities</i>	AA-PQYAA-TK
<i>Guide to Installing DEC OSF/1</i>	AA-PS2DA-TE
<i>OpenVMS Alpha Version 1.0 Upgrade and Installation Manual</i>	AA-PQYSA-TE
<i>VMS Upgrade and Installation Supplement: VAX 7000-600 and VAX 10000-600 Series</i>	AA-PRAHA-TE
<i>VMS Network Control Program Manual</i>	AA-LA50A-TE
VMSclusters and Networking	
<i>HSC Installation Manual</i>	EK-HSCMN-IN
<i>SC008 Star Coupler User's Guide</i>	EK-SC008-UG
<i>VAX Volume Shadowing Manual</i>	AA-PBTVA-TE
Peripherals	
<i>Installing and Using the VT420 Video Terminal</i>	EK-VT420-UG
<i>LA75 Companion Printer Installation and User Guide</i>	EK-LA75X-UG

Chapter 1

System Troubleshooting

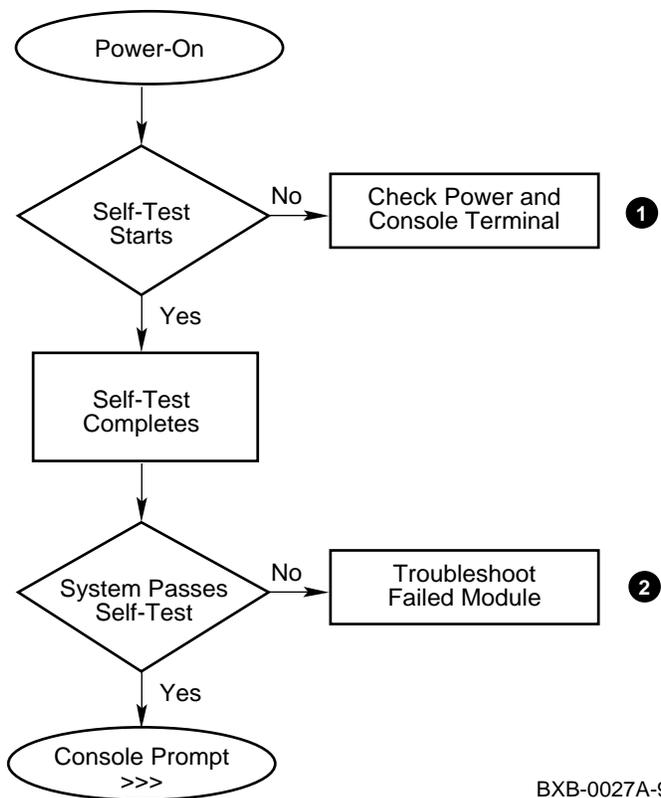
This chapter describes system problems and their symptoms during power- up, booting, and normal operation. Sections include:

- Troubleshooting During Power- Up
- Troubleshooting During Booting
- Troubleshooting a DSSI Plug- In Unit
- Troubleshooting a SCSI Plug- In Unit
- Troubleshooting an XMI Plug- In Unit
- Troubleshooting a TF85 Tape Drive
- Troubleshooting an RRD42 Compact Disk Drive
- Air Pressure Sensor and Temperature Sensors

1.1 Troubleshooting During Power-Up

Figure 1-1 shows the power-up sequence and steps to take if a problem occurs.

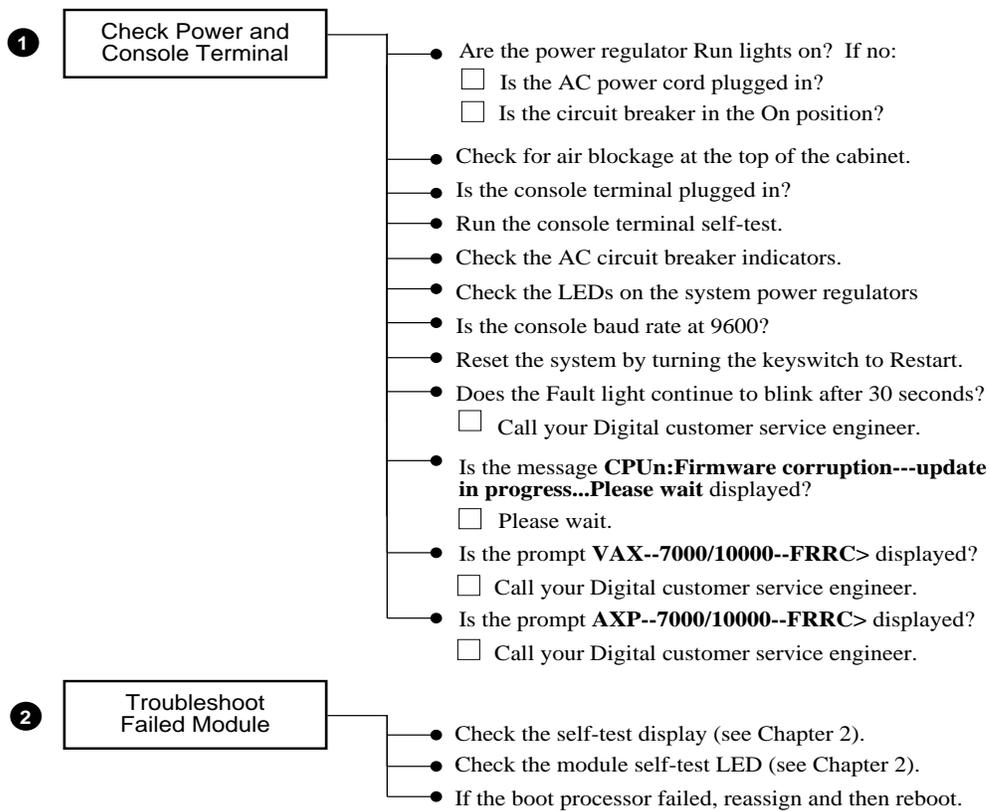
Figure 1-1 Power-Up Troubleshooting Flowchart



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Troubleshooting steps during power-up are described in Figure 1-2.

Figure 1-2 Power-Up Troubleshooting Steps



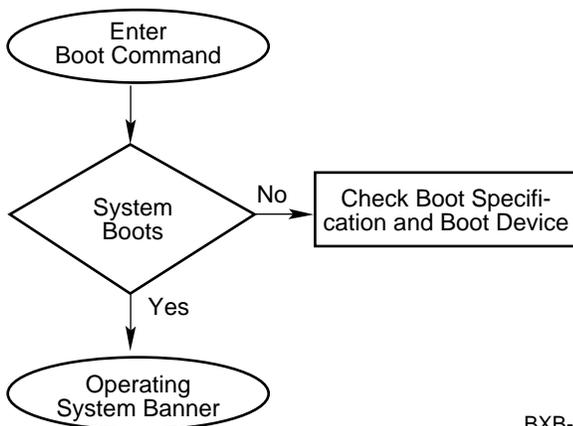
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For more information:
Operations Manual
Console Reference Manual

1.2 Troubleshooting During Booting

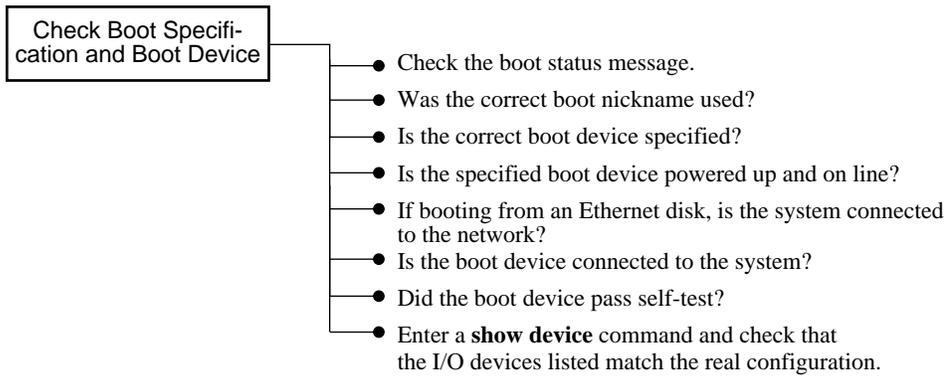
When booting fails, you can check several parameters. Figure 1-3 shows the boot sequence. Figure 1-4 shows the steps to take if a problem occurs during booting. If you are unable to correct the problem, call your Digital customer service engineer.

Figure 1-3 Booting Troubleshooting Flowchart



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Figure 1-4 Troubleshooting Steps During Booting



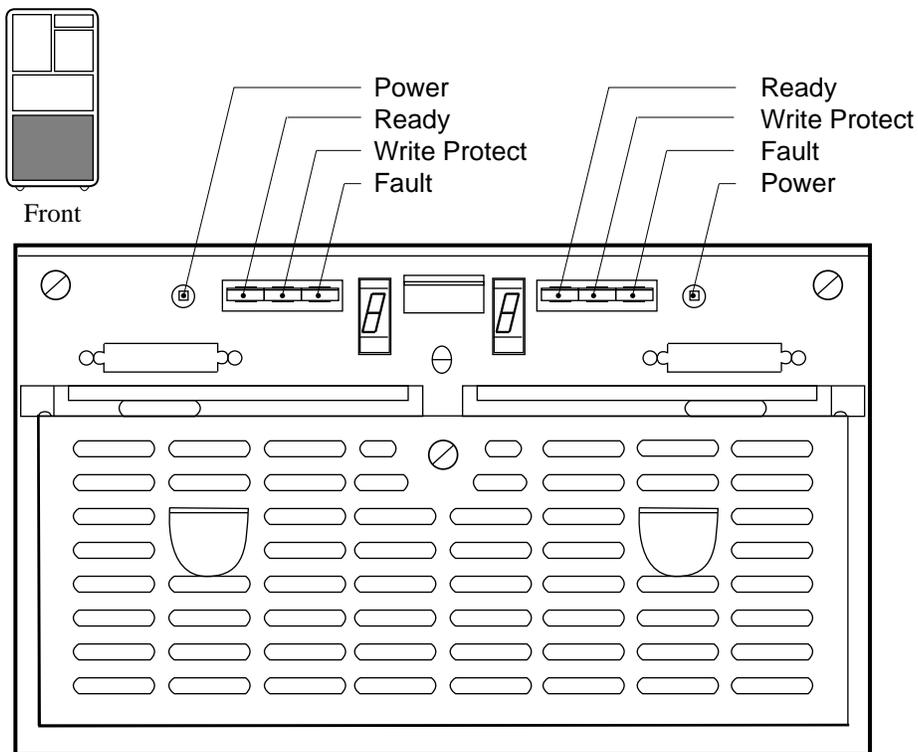
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For more information:
Operations Manual

1.3 Troubleshooting a DSSI Plug- In Unit

Check the disk control panel. The control panel has four indicator switches. Table 1- 5 lists the functions of the indicator switches.

Figure 1-5 DSSI Disk Control Panel



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Table 1- 1 Indicator Switches on DSSI Disk Control Panel

Indicator Switch	Pushbutton Position	Light	Function
DC Pwr (Green)	Out	On	DC power present.
	In	Off	DC power not present.
Ready (Green)	In	On	Integrated storage element is on- line.
	Out	Off	Integrated storage element is off- line.
Wrt Prot (Yellow)	In	On	Write- protect enabled.
	Out	Off	Write- protect disabled.
Fault (Red)	Momentary Switch	On	Fault condition.
		Off	Normal operation.

The Fault indicator switch goes on for approximately 10 seconds during power- up, and then goes off. If the Fault indicator switch stays on, press the switch to diagnose the problem (see Table 1- 2).

Table 1- 2 DSSI Disk PIU Fault Diagnosis

Fault Indicator Switch	When Pressed...	Meaning
On	Slow Flash	Integrated storage element calibrations being performed.
On	Fast Flash	Disk control panel failure. Call your Digital customer service engineer.

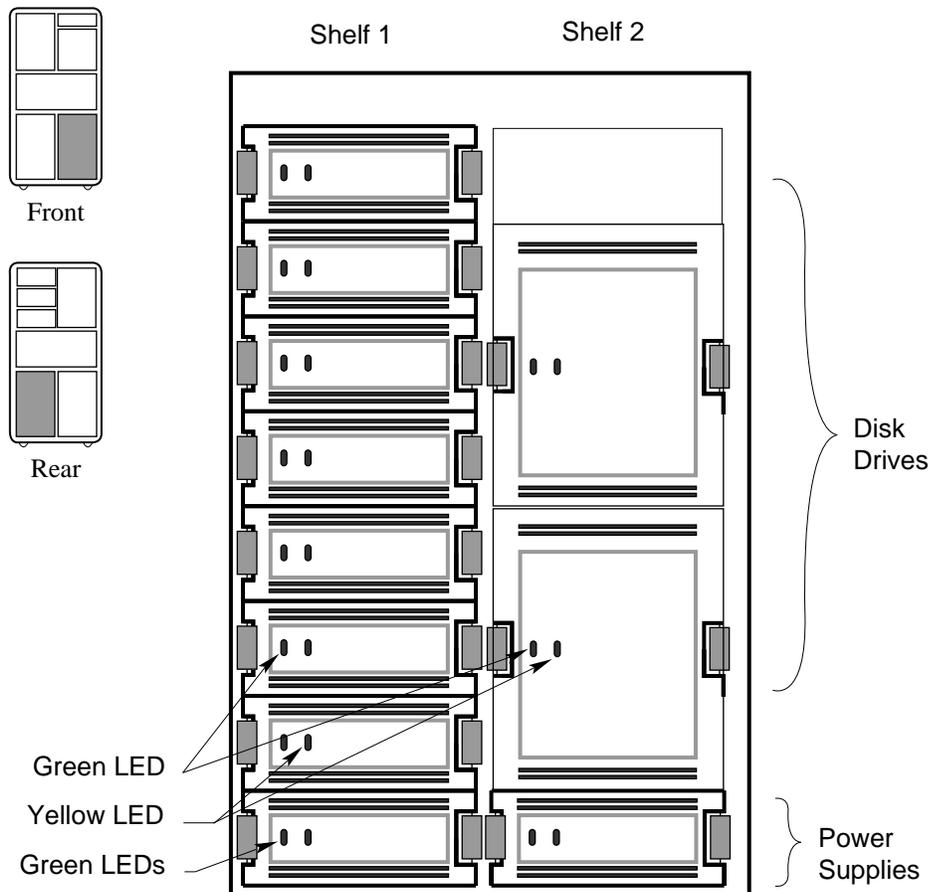
For more information:

RF Series Integrated Storage Element User Guide

1.4 Troubleshooting a SCSI Plug-In Unit

SCSI indicator LEDs are located on each disk drive and power supply. Table 1-3 and Table 1-4 list the functions of the LEDs shown in Figure 1-6.

Figure 1-6 SCSI Indicator LEDs



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Table 1-3 SCSI Disk Drive LEDs

Indicator LED	LED State	Meaning
Green	Off	No activity
	Flashing	Activity
	On	Activity
Yellow	Off	Normal
	Flashing	Spin up/spin down
	On ¹	Not used.

¹This LED state is not supported on DEC 7000 systems.

Table 1-4 SCSI Power Supply LEDs

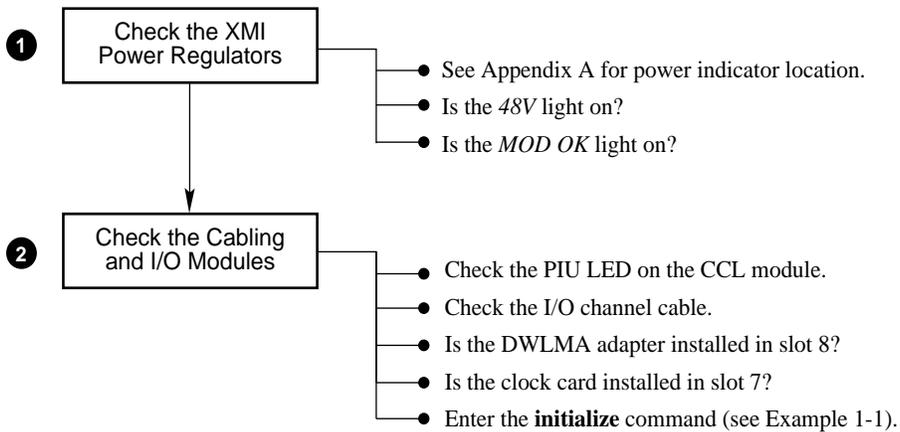
Indicator LED	LED State	Meaning
Green (left)	Off	Shelf fault
	On	Shelf OK
Green (right)	Off	Power fault
	On	Power OK

If the power supply LEDs indicate a problem, call your Digital customer service engineer.

1.5 Troubleshooting an XMI Plug- In Unit

You can perform several checks if you suspect a problem with an XMI plug- in unit. See Figure 1- 7. If you are unable to correct the problem, call your Digital customer service engineer.

Figure 1- 7 Troubleshooting an XMI Plug- In Unit



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In Example 1- 1 an **initialize** command is issued, causing a system reset and self- test. Self- test results indicate a failing DWLMA adapter. See Chapter 2 for more information on the self- test display.

Example 1- 1 Sample Self- Test Display, Failing DWLMA Adapter

```
P00>>> initialize          ! Resets the entire system.
Initializing the system...
F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE #
      A M . . . . . P P TYP
      O + . . . . . + + ST1
      . . . . . E B BPD
      O + . . . . . + + ST2
      . ❶ . . . . . E B BPD
      + + . . . . . + + ST3
      . . . . . E B BPD

      . . . . . C0 XMI - ❷
      . . . . . C1
      . . . . . C2
      . . . . . C3

      . A0 . . . . . ILV
      . 128 . . . . . 128Mb

Firmware Rev = V1.0-1625 SROM Rev = V1.0-0 SYS SN = GA01234567
P00>>>
```

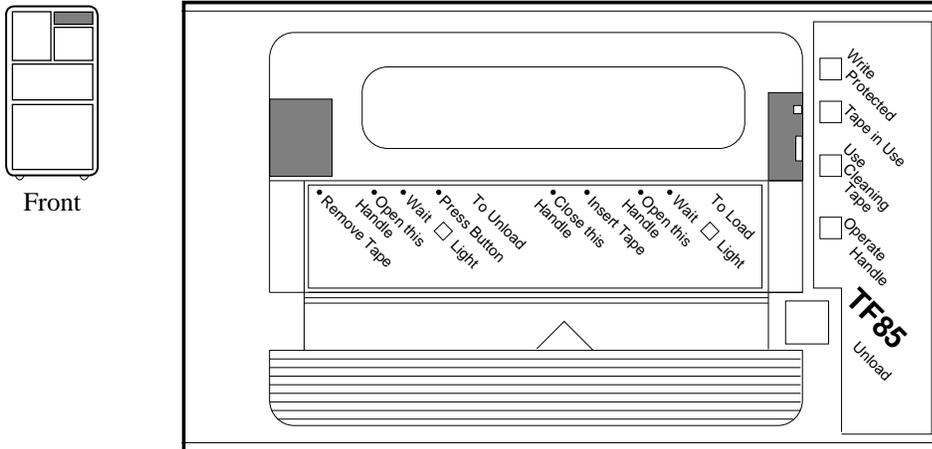
- ❶ In Example 1- 1 the IOP module passes self- test, as indicated by the plus sign (+) at node 8 on self- test line ST3.
- ❷ The DWLMA adapter fails self- test, as indicated by the minus sign (-) displayed on the **C0 XMI** line. When a DWLMA fails self- test, the failure is reported, and the results of the I/O adapter self- tests are not displayed.

For more information:
Console Reference Manual

1.6 Troubleshooting a TF85 Tape Drive

Check the controls and indicators on the TF85 tape drive. Table 1- 5 lists the functions of the controls and indicators shown in Figure 1- 8.

Figure 1- 8 TF85 Controls and Indicators



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Table 1- 5 TF85 Light Summary

Light	State	Condition
Green (Operate Handle)	On	OK to operate handle.
	Off	Do not operate handle.
	Blinking	Defective cartridge. Pull the handle to the open position and remove cartridge. Try another cartridge.
Yellow (Tape in Use)	Steady	Drive ready.
	Blinking	Drive in use.
Orange (Write Protected)	On	Tape write protected.
	Off	Tape write enabled.
Orange (Use Cleaning Tape)	On	Drive needs cleaning.
	Off	No cleaning needed.
All four lights	Blinking	Drive fault. Reset by pressing the unload button.

For more information:

TF85 Cartridge Tape Subsystem Owner's Manual

1.7 Troubleshooting an RRD42 Compact Disk Drive

Table 1-6 lists the functions of the green LED on the RRD42 compact disk (CD) drive.

Figure 1-9 RRD42 CD Drive Control Panel

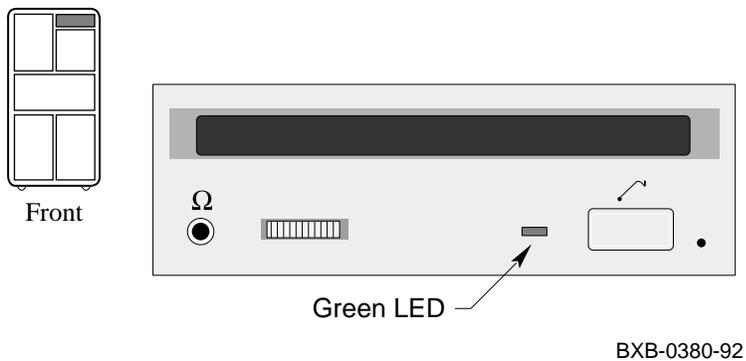


Table 1-6 RRD42 LED Summary

LED	State	Condition
Green	Off	No activity
(Activity)	On	Data is being transferred

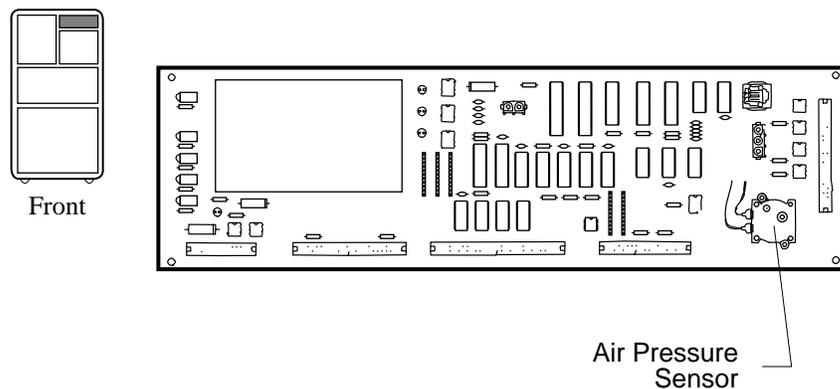
For more information:

RRD42 Disc Drive Owner's Manual

1.8 Air Pressure Sensor and Temperature Sensors

An air pressure sensor is located on the cabinet control logic (CCL) module and is connected to the LSB card cage by a tube. If the sensor detects a pressure differential, then the system power regulators are disabled.

Figure 1-10 CCL Air Pressure Sensor



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The air pressure sensor monitors the pressure differential across the upper cabinet. If the air pressure drops below normal, all system power regulators are disabled and the control panel Fault light will blink.

CAUTION: Do not place any materials on top of the cabinet. Doing so may cause your system to shut down.

The system also has temperature sensors located on the system power regulators, the disk converter module, the PIU power regulators, and the CCL module.

Chapter 2

Self- Test

This chapter discusses the testing that the system performs and the record displayed at power- up and at a system reset. The console self- test display allows you to identify both passing and failing modules in the system.

This chapter includes the following sections:

- Self- Test Overview
- Testing Sequence
- Sample Self- Test Display
- Self- Test Lines NODE # and TYP
- Self- Test Lines ST and BPD
- Self- Test Lines C0, C1, C2, and C3
- Self- Test Lines ILV and Mb
- Self- Test Identification Line

NOTE: The description of self-test results applies to VAX 7000 systems and DEC 7000 systems.

Following power- up and system reset, the system performs testing. Self- test results are indicated by the following:

- Fault light on the control panel
- Self- test LEDs on the modules
- Self- test display

The self- test display is discussed in detail in this chapter.

During system self- test, the yellow Fault light on the control panel lights. If a module fails self- test, the Fault light remains lit. If all modules pass self- test, the Fault light goes off.

Each CPU and memory module has a green LED that lights when the module passes self- test. These LEDs can be viewed through the module enclosure from the front and rear of the cabinet when the doors are open. If a module fails self- test, its green LED does not light.

I/O modules have yellow LEDs that light when each module in the I/O card cage passes self- test. These LEDs can be seen through the PIU enclosure.

2.2 Testing Sequence

The self- test display shows the results of system self- test. The pass (+) or fail (-) status of each module is indicated.

Figure 2-2 Testing Sequence

```

F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE #
      A M . . . . . P P TYP
      O + . . . . . + + ST1
      . . . . . E B BPD
      O + . . . . . + - ST2
      . . . . . B E BPD
      + + . . . . . + - ST3
      . . . . . B E BPD

      . . . . . C0 XMI -
      + . . . . . + . . . - . . C1 XMI +
      . . . . . C2
      . . . . . C3

      . A0 . . . . . ILV
      . 128 . . . . . 128Mb

Firmware Rev = v1.0-1625  SROM Rev = v1.0-0  SYS SN = GA01234567

P01>>>                                     BXB-0030A-92

```

During the first round of testing each module runs its own self- test and the results are shown on the ST1 line. The boot processor is then determined (indicated by a **B** on the first BPD line). This processor then generates the results of testing to this point (**❶**).

NOTE: If a processor fails self-test (ST1) in a multiprocessor system, there is no indication of its failure in the self-test display. The failing processor is logically disconnected from the backplane to prevent faulty system operation. The processor failure is indicated by the control panel Fault light remaining lit after power-up.

Next, the processors run a second round of tests using the memory modules. In this testing the processor that had been designated as boot processor could fail (as shown in Figure 2- 2), so the boot processor is again determined. Results are displayed on the ST2 line (**❷**).

Finally, the processors run a third round of tests, the multiprocessing tests. Once again the boot processor is determined. The status of the boot processor and secondary processors is then displayed on the third BPD line (**❸**).

Results of the I/O adapter self- test are displayed next. The results are shown in columns 1 through E, which stand for XMI node numbers.

The boot processor next configures memory and displays the configuration. Note that it is the boot processor determined at (**❸**) that displays the lines after the third BPD line. The final line before the console prompt contains the boot processor's ROM revision and system serial number.

Each line of the self- test display is described in detail in the following sections of this chapter.

2.3 Sample Self-Test Display

The primary processor reports the results of self-test. Results are displayed on the console terminal, as shown in Figure 2-3.

Figure 2-3 Self-Test Results

```

F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE #
      A M . . . . . P P TYP
      O + . . . . . + + ST1
      . . . . . E B BPD
      O + . . . . . + - ST2
      . . . . . B E BPD
      + + . . . . . + - ST3
      . . . . . B E BPD

      . . . . . C0 XMI -
      + . . . . . + . . . - . . C1 XMI +
      . . . . . C2
      . . . . . C3

      . A0 . . . . . ILV
      . 128 . . . . . 128Mb

Firmware Rev = v1.0-1625 SROM Rev = v1.0-0 SYS SN = GAO1234567
P01>>>
  
```

The self-test display reflects the system configuration listed in Table 2-1 and Table 2-2. Each numbered item in the example is explained in Section 2.4 through Section 2.8. These sections assume the same system configuration.

Table 2-1 System Configuration for Figure 2-3

Module	LSB Node #	Module Type
KA7AA	0	Processor; fails ST2 testing.
KA7AA	1	Processor; operating as boot processor following ST2 testing.
MS7AA	7	Memory (128 Mbytes).
IOP	8	I/O adapter leading to I/O buses.

Table 2-2 I/O Subsystem Configuration for Figure 2-3

Module	XMI Node #	Module Type
I/O Channel C0		
DWLMA	8	I/O adapter; fails self-test, no devices report.
I/O Channel C1		
DWLMA	8	I/O adapter; passes self-test.
DEMNA	E	Ethernet adapter; passes self-test.
KFMSA	3	Disk adapter; fails self-test.

2.4 Self- Test Lines NODE # and TYP

The first two lines of the self- test printout provide the node number identification (NODE #) and the type of module (TYP).

Figure 2-4 Self- Test Results: NODE # and TYP

```

F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE # ①
          A M . . . . . P P TYP ②
          O + . . . . . + + ST1
          . . . . . E B BPD
          O + . . . . . + - ST2
          . . . . . B E BPD
          + + . . . . . + - ST3
          . . . . . B E BPD

. . . . . C0 XMI -
+ . . . . . + . . . . - . . C1 XMI +
. . . . . C2
. . . . . C3

. A0 . . . . . ILV
. 128 . . . . . 128Mb

Firmware Rev = v1.0-1625 SROM Rev = v1.0-0 SYS SN = GAO1234567
P01>>> BXB-0030B-92

```

The system configuration being tested is discussed in Section 2.3. See Table 2- 1.

- ❶ The NODE # line lists the node numbers on the LSB and XMI buses. The nodes on this line are numbered in hexadecimal. Nodes 0 through 3 reflect the right- to- left position of the LSB slots as you view the LSB from the front of the cabinet. Nodes 4 through 8 reflect the right- to- left position of the LSB slots as you view the LSB from the rear of the cabinet.

Note that LSB entries use nodes 0 through 8, while the XMI has entries in nodes 1 through E. The LSB has 9 slots. The LSB slot numbers and node numbers are identical.

Each XMI bus has 14 slots. The XMI slot and node numbers are identical. Node numbers are 1 through E on the XMI.

- ❷ The TYP line in the printout indicates the type of module at each LSB node:
 - An adapter: the I/O port module (A)
 - A memory module (M)
 - A processor (P)

A period (.) indicates that the slot is not populated or that the module is not reporting.

2.5 Self- Test Lines ST and BPD

The next six lines of the self- test display provide test information on the processors (ST1, ST2, and ST3) and boot processor designation (BPD).

Figure 2- 5 Self- Test Results: ST and BPD

```

F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE #
      A M . . . . . P P TYP
      O + . . . . . + + ST1
      . . . . . . . E B BPD
      O + . . . . . + - ST2
      . . . . . . . B E BPD
      + + . . . . . + - ST3
      . . . . . . . B E BPD

      . . . . . . . . . . C0 XMI -
      + . . . . . + . . . - . . C1 XMI +
      . . . . . . . . . . C2
      . . . . . . . . . . C3

      . A0 . . . . . . . ILV
      . 128 . . . . . . . 128Mb

Firmware Rev = v1.0-1625  SROM Rev = v1.0-0  SYS SN = GAO1234567
P01>>>
BXB-0030C-92

```

- ③ The ST1 line shows the results of self- test. This information is taken from the self- test passed bit in the LCNR register of each module. The entries are:
- + (pass)
 - o (does not apply)

NOTE: If a processor fails self- test (ST1) in a multiprocessor system, there is no indication of its failure in the self- test display. The failing processor is logically disconnected from the backplane to prevent faulty system operation. The processor failure is indicated by the control panel Fault light remaining lit after power- up.

Since the I/O port module does not have a module- resident self- test, its entry for the ST1 line is always "o".

- ④ The BPD line indicates boot processor designation. When the system goes through self- test, the processor with the lowest ID number that passes self- test (ST1 line is +) becomes the boot processor, unless you intervene.

The results on the BPD line indicate:

- The boot processor (B)
- Processors eligible to become the boot processor (E)
- Processors ineligible to become the boot processor (D)

This BPD line is printed three times. After the first determination of the boot processor, the processors go through two more rounds of testing. Since it is possible for a processor to pass self- test (at line ST1) and fail ST2 or ST3 testing, the processors again determine the boot processor following each round of tests.

In Figure 2- 5 the processor at node 0 failed self- test, so the processor at node 1 was chosen boot processor.

- ⑤ During the second round of testing (ST2) all processors run additional CPU tests involving memory. In Figure 2- 5 results printed on the ST2 line indicate that the processor at node 0 failed ST2 (–), while the processor at node 1 passed ST2 (+).
- ⑥ During the third round of testing (ST3) all processors run multiprocessor tests, and the status of each processor is once again reported on the BPD line. The primary CPU also tests the IOP module at this time.

2.6 Self-Test Lines C0, C1, C2, and C3

The I/O channel lines (C0, C1, C2, and C3) of the self-test display provide information on the node numbers and self-test status for modules in the XMI card cages, which are connected to the system bus through the IOP module and the DWLMA adapter.

Figure 2-6 Self-Test Results: C0, C1, C2, and C3

```

F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE #
      A M . . . . . P P TYP
      O + . . . . . + + ST1
      . . . . . . . E B BPD
      O + . . . . . + - ST2
      . . . . . . . B E BPD
      + + . . . . . + - ST3
      . . . . . . . B E BPD

      . . . . . . . . . . . C0 XMI - 7
      + . . . . . + . . . . . - . . C1 XMI + 8
      . . . . . . . . . . . C2 9
      . . . . . . . . . . . C3 10

      . A0 . . . . . . . ILV
      . 128 . . . . . . . 128Mb

Firmware Rev = v1.0-1625 SROM Rev = v1.0-0 SYS SN = GAO1234567
P01>>> BXB-0030D-92

```

The system configuration being tested is discussed in Section 2.3. See Table 2- 1.

The I/O channel lines, C0 through C3, indicate the:

- I/O channel that connects the XMI I/O bus to the system bus
 - DWLMA adapter self- test results
 - XMI adapters' self- test results
- ⑦ In Figure 2- 6 the DWLMA adapter accessed through C0 failed (-) self- test (C0 XMI -).
- ⑧ The other DWLMA adapter was accessed through C1 and passed (+) self- test (C1 XMI +); however, one XMI adapter, node 3, failed its self- test.

I/O channels C2 (⑨) and C3 (⑩) are not used in this system configuration.

When a DWLMA adapter passes self- test, each node on that XMI is indicated by symbols + and -, indicating the self- test status for that node number on the XMI. A period (.) indicates that that node number is not used. When a DWLMA adapter fails self- test, the failure is reported, and the XMI adapter self- tests are not displayed.

NOTE: The XMI clock module, always node 7, is not reported in the self- test display.

The **show configuration** command gives additional information on XMI I/O subsystems and adapters (see Section 3- 1).

2.7 Self-Test Lines ILV and Mb

The ILV line details the interleaving of the memories, and the Mb line gives the Mbytes of each memory module and the total size of the system memory.

Figure 2-7 Self-Test Results: ILV and Mb

```

F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE #
      A M . . . . . P P TYP
      O + . . . . . + + ST1
      . . . . . . . E B BPD
      O + . . . . . + - ST2
      . . . . . . . B E BPD
      + + . . . . . + - ST3
      . . . . . . . B E BPD

      . . . . . . . . . . C0 XMI -
      + . . . . . + . . . - . . C1 XMI +
      . . . . . . . . . . C2
      . . . . . . . . . . C3

      . A0 . . . . . . . ILV 11
      . 128 . . . . . . . 128Mb 12

```

Firmware Rev = v1.0-1625 SROM Rev = v1.0-0 SYS SN = GAO1234567

P01>>>

BXB-0030E-92

The system configuration being tested is discussed in Section 2.3. See Table 2- 1.

- ⑪ The ILV line contains a memory interleave value (ILV) for each memory. The default memory configuration algorithm attempts to maximize memory interleaving; arrays on a single memory module are interleaved by default. In Figure 2- 7, the memory module at node 7 is in a two- way system interleave indicated by the first interleave set A. Information on memory interleaving can be obtained by entering a **show memory** command:

```
>>> show memory
Set   Node   Size   Base Addr   Intlv   Position
A     7      128M   00000000   2-Way   0
```

A system with four memory modules is shown in the following example:

```
F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE #
. B0 A3 A1 A0 . . . . ILV
. 64 64 64 128. . . . 320Mb
```

In this example, there are two memory interleave sets designated by the letters A and B. Note that there is no A2 designator on the ILV line; the memory at node 4 provides on- board interleaving, and so supplies both the A0 memory word and the A2 memory word (which is not reported on the ILV line). Also note that different size memory arrays can be interleaved into a single set by "stacking" the smaller arrays to interleave with their larger counterparts.

- ⑫ The line after the ILV line displays the size of each configured memory module in the system and gives the total size of system memory. In Figure 2- 7 the total size is 128 Mbytes.

For more information:
MS7AA Memory Technical Manual
Console Reference Manual

2.8 Self-Test Identification Line

The last line of the self-test display gives the firmware revision numbers, the SROM revision numbers, and the serial number of the machine.

Figure 2-8 Self-Test Results: Identification Line

```

F E D C B A 9 8 7 6 5 4 3 2 1 0 NODE #
      A M . . . . . P P TYP
      O + . . . . . + + ST1
      . . . . . E B BPD
      O + . . . . . + - ST2
      . . . . . B E BPD
      + + . . . . . + - ST3
      . . . . . B E BPD

      . . . . . C0 XMI -
      + . . . . . + . . . - . . C1 XMI +
      . . . . . C2
      . . . . . C3

      . A0 . . . . . ILV
      . 128 . . . . . 128Mb

Firmware Rev = v1.0-1625 SROM Rev = v1.0-0 SYS SN = GAO1234567
  13                14                15
P01>>>                                     BXB-0030F-92

```

The system configuration being tested is discussed in Section 2.3. See Table 2- 1.

- ⑬ In Figure 2- 8 the Firmware Rev information, reported by the primary processor, indicates the version of the console firmware.
- ⑭ The SROM Rev information indicates the primary processor's serial ROM version. The serial ROM contains the first level of console, diagnostic, and bootstrap code. This code initializes the CPU programmable features and diagnoses any faults detected along the bootstrap path and bootstrapping code execution out to the main console program (the second level of console, diagnostic, and bootstrap code).
- ⑮ SYS SN gives the system serial number. The serial number of the system is stored in the EEPROM of each processor and also appears on the cabinet.

For more information:

KA7AA CPU Technical Manual

KN7AA CPU Technical Manual

Chapter 3

Getting System Information

This chapter discusses how to get information on your hardware configuration and how to test your system. For more information, see the *Console Reference Manual* or enter the **help** command at your console terminal. Sections include:

- Show Command
 - Show Configuration
 - Show Network
 - Show Device
- Test Command
 - Testing the System
 - Testing a Subsystem
 - Testing a Module or a Device
- Error Reports

3.1 Show Command

To get system information, enter a show configuration, show network, or show device command. The show command output identifies the subsystem, module, or device you may want to test. The following sections explain the show command output.

3.1.1 Show Configuration

Enter a show configuration command to display the system hardware configuration.

Example 3-1 Sample System Hardware Configuration

```
P00>>> show configuration ❶
```

	Name	Type	Rev	Mnemonic ❷	
LSB					
0+	KA7AA	(8002)	0000	ka7aa0	
1+	KA7AA	(8002)	0000	ka7aa1	
7+	MS7AA	(4000)	0000	ms7aa0	
8+	IOP	(2000)	0001	iop0	
C0	XMI			xmi0	❸
8+	DWLMA	(102A)	0104	dwlma0	
C+	KDM70	(0C22)	1E11	kdm700	
E+	DEMNA	(0C03)	0802	demna0	❹
C1	XMI			xmi1	❸
2+	KFMSA	(0810)	A2A6	kfmsa0	
8+	DWLMA	(102A)	0104	dwlma1	
A+	CIXCD	(0C05)	4611	cixcd0	
C+	KDM70	(0C22)	1E11	kdm701	
E+	DEMNA	(0C03)	0802	demna1	

- ❶ In Example 3- 1 the operator enters a **show configuration** command to show the system hardware configuration.
- ❷ The mnemonic for each processor, memory module, I/O adapter, and I/O subsystem is displayed in this column. You use mnemonics to identify the subsystem, module, or device you wish to test.
- ❸ This system has two XMI I/O subsystems; in the mnemonics column they are identified as **xmi0** and **xmi1**. To test the xmi0 subsystem, you would issue the command **test xmi0** (see Section 3.2.2).
- ❹ To test an I/O adapter, such as the DEMNA adapter, you would enter the command **test demna0** (see Section 3.2.3).

For more information:

Console Reference Manual

3.1.2 Show Network

Enter a show network command to display network devices.

Example 3-2 Sample Output of Show Network Command

```
>>> show network ❶  
polling for units on demna0 ❷ ,slot 1, xmi0...  
exa0.0.0.1.0: 08-00-2B-25-D5-96 ❸  
polling for units on demna1 ❹ ,slot 2, xmi1...  
exb0.0.0.2.1: 08-00-2B-25-D5-BB ❺  
>>>
```

- ❶ In Example 3- 2 the operator enters a **show network** command to show the network adapters in the system.
- ❷ The first DEMNA adapter is identified by the demna0 mnemonic. This DEMNA adapter is in slot 1 of the I/O card cage connected to I/O channel 0.
- ❸ The unit number for demna0 is exa0.0.0.1.0. The hardware address is 08- 00- 2B- 25- D5- 96.
- ❹ The second DEMNA adapter is demna1. This adapter is in slot 2 of the I/O card cage connected to I/O channel 1.
- ❺ The unit number for demna1 is exb0.0.0.2.1. The hardware address is 08- 00- 2B- 25- D5- BB.

3.1.3 Show Device

Enter a show device command to display system devices.

Example 3-3 Sample Output of Show Device Command

```
>>> show device ①
polling for units on cixcd0, slot 2, xmi0... ②
dua73.13.0.2.0 ③ $200$DUA73 ④ (HSC000) ⑤ RA70 ⑥
dua77.13.0.2.0 $200$DUA77 (HSC000) RA70
dua20.14.0.2.0 $100$DUA20 (HSC000) RA82
dua21.14.0.2.0 $100$DUA21 (HSC000) RA82
dua22.14.0.2.0 $100$DUA22 (HSC000) RA82
dua23.14.0.2.0 $100$DUA23 (HSC000) RA82
dua24.14.0.2.0 $100$DUA24 (HSC000) RA82
dua72.14.0.2.0 $100$DUA72 (HSC000) RA82
dua73.14.0.2.0 $100$DUA73 (HSC000) RA82
dua90.14.0.2.0 $100$DUA90 (HSC000) RA90
dua91.14.0.2.0 $100$DUA91 (HSC000) RA90
dua92.14.0.2.0 $100$DUA92 (HSC000) RA90
dua93.14.0.2.0 $100$DUA93 (HSC000) RA90
>>>
```

- ❶ In Example 3- 3 the operator enters a **show device** command to show all disks and tapes supported by the system.
- ❷ The first I/O adapter polled is the CIXCD with the mnemonic cixed0. This CIXCD is located in slot 2 of the I/O card cage. The I/O channel number is 0.
- ❸ Device information is displayed. Device mnemonics are listed in the first column. In this example, all devices are disks.
- ❹ The name of each disk as presented by the HSC controller is displayed in the second column.
- ❺ The third column lists the HSC controller for each disk. All disks are connected to the system through the HSC000 controller.
- ❻ Device types are listed in the fourth column.

3.2 Test Command

You can use the test command to test the entire system, an I/O subsystem, a module, a group of devices, or a specific device. Enter a show configuration command to see a list of the subsystems and devices that you may want to test. Examples of the test command are shown in the following sections.

Example 3-4 Sample Test Commands

1. >>> test -q ! Runs a system test. Since a test
! run time was not specified, the
! entire system will be tested
! provided that testing does not
! exceed 10 minutes. Status messages
! will not be displayed.
2. >>> test kdm700 -t 90 ! Runs the KDM700 self-test and then
! tests all devices associated with
! the KDM700 I/O adapter. Test run
! time is 90 seconds.
3. >>> test ms7aa* ! Tests all memory modules in the
! system.
4. >>> test xmi0 ! Tests the XMI0 I/O subsystem.
5. >>> test dua80.0.0.2.1 ! Tests the disk unit 80 on
! controller A. The disk adapter is
! located in slot 2 of the xmi1 card
! cage.

All **test** command options are described in the *Console Reference Manual*. Two helpful ones are outlined in Table 3- 1. Environment variables commonly used with **test** are listed in Table 3- 2.

Table 3- 1 Test Command Options

Option	Meaning
- t <value>	Specifies the test run time in seconds. For a system test the default run time is 600 seconds (10 minutes). The run time for a device test is dependent upon the number and type of devices selected for testing. The - t option takes any value between 30 and 99999999.
- q	Disables the status messages displayed by default as exerciser processes are started and stopped during testing.

Table 3- 2 Test Command Environment Variables

Environment Variable	Meaning
d_report	Specifies the type of error report displayed. Values are summary and full . Summary is the default value.
d_harderr	Specifies the action taken when a hard error occurs. Values are halt or continue . Halt is the default value.
d_softerr	Specifies the action taken when a soft error occurs. Values are halt or continue . Continue is the default value.

3.2.1 Testing the System

To test the entire system, enter the test command.

Example 3-5 Sample Test Command, System Test

```
P00>>> test -t 180 ❶
Configuring system...
Testing system...
Type Ctrl/C to abort

Starting floating point exerciser on ka7aa0 (id #57) ❷
Starting floating point exerciser on ka7aa1 (id #58)
Starting memory exerciser, running on ka7aa0 (id #59)
Starting memory exerciser, running on ka7aa1 (id #60)
Starting multiprocessor exerciser on ka7aa* (id #61)
Starting network exerciser on exa0.0.0.4.0 in external mode (id #62)
Starting network exerciser on exb0.0.0.5.0 in external mode (id #63)
Starting network exerciser on exc0.0.0.4.1 in external mode (id #64)
Starting device exerciser on dual0.14.0.1.0 (id# 67)
Test time has expired... ❸

Stopping floating point exerciser on ka7aa0 (id #57) ❹
Stopping floating point exerciser on ka7aa1 (id #58)
Stopping memory exerciser (id #59)
Stopping memory exerciser (id #60)
Stopping multiprocessor exerciser on ka7aa* (id #61)
Stopping network exerciser on exa0.0.0.4.0 (id #62)
Stopping network exerciser on exb0.0.0.5.0 (id #63)
Stopping network exerciser on exc0.0.0.4.1 (id #64)
Stopping device exerciser on dual0.14.0.1.0 (id# 67)
The following devices were not tested: ❺
dual1.14.0.1.0
P00>>> ❻
```

In Example 3- 5:

- ❶ At the console prompt, the operator enters a **test - t 180** command. The option - t specifies a system test run time of 180 seconds.
- ❷ Status messages indicate the start of the console- based exercisers.
- ❸ The exercisers run for 180 seconds; not enough time to test the entire system, so this status message is displayed.
- ❹ All exercisers are stopped, as indicated by the status messages.
- ❺ Untested devices are reported.
- ❻ The console prompt returns.

3.2.2 Testing a Subsystem

To test a portion of the system, such as an I/O subsystem, enter the test command and the I/O subsystem mnemonic. I/O subsystem mnemonics are displayed when you enter a show configuration command.

Example 3-6 Sample Test Command, I/O Subsystem Test

```
>>> test xmi0 ❶
Configuring xmi0 subsystem...
Testing xmi0
Type Ctrl/C to abort

KA7AA0 running module tests on DWLMA0
DWLMA0 module tests passed ❷
Initializing DEMNA0
Initializing CIXCD0
Initializing KDM700
Initializing DEMFA0
DEMNA0 self-test passed ❸
CIXCD0 self-test passed
KDM700 self-test passed
DEMFA0 self-test passed
Starting network exerciser on exa0.0.0.4.0 in internal mode (id #31) ❹
Starting network exerciser on fxa0.0.0.e.0 in external mode (id #33)
Starting device exerciser on dua0.0.0.6.0 (id #34)
Starting device exerciser on dub0.0.0.a.0 (id #35)
Starting device exerciser on dual.1.1.0.6.0 (id #36)
Starting device exerciser on dub1.1.0.a.0 (id #37)
Starting device exerciser on dua2.2.0.6.0 (id #38)

Stopping network exerciser on exa0.0.0.4.0 (id #31)
Stopping network exerciser on fxa0.0.0.e.0 (id #33)
Stopping device exerciser on dua0.0.0.6.0 (id #34)
Stopping device exerciser on dub0.0.0.a.0 (id #35)
Stopping device exerciser on dual.1.1.0.6.0 (id #36)
Stopping device exerciser on dub1.1.0.a.0 (id #37)
Stopping device exerciser on dua2.2.0.6.0 (id #38)

>>> ❺
```

- ❶ At the console prompt, the operator enters a **test xmi0** command to test all adapters and I/O devices on the XMI0 I/O bus.
- ❷ The status message indicates that the DWLMA adapter passes all tests. Next, the adapters in the XMI0 card cage are initialized.
- ❸ All XMI0 adapters pass self- test.
- ❹ The status messages report that all exercisers started and completed.
- ❺ The console prompt returns.

3.2.3 Testing a Module or a Device

To test a processor, memory module, or an I/O adapter and its associated devices, enter the test command and the correct mnemonic. Mnemonics are displayed when you enter a show configuration or a show device command.

Example 3-7 Sample Test Command, I/O Adapter Test

```
>>> test demna0 ❶
Configuring demna0...
Testing demna0
Type Ctrl/C to abort

Initializing DEMNA0 ❷
DEMNA0 self-test passed
Starting network exerciser on exa0.0.0.4.0 in internal mode (id #30) ❸
Stopping network exerciser on exa0.0.0.4.0 (id #30)
>>>
```

In Example 3- 7:

- ❶ At the console prompt, the operator enters **test demna0**. The device mnemonic, **demna0**, was identified by issuing a **show configuration** command.
- ❷ The DEMNA0 adapter is initialized and passes self- test.
- ❸ The status messages report that the network exercisers started and completed.

Example 3-8 Sample Test Command, Device Test

```
>>> test dua2.2.0.8.0 -q ❶  
Testing dua2.2.0.8.0 ❷  
Type Ctrl/C to abort  
Done testing...  
>>>
```

In Example 3- 8:

- ❶ Enter **test dua2.2.0.8.0 - q**. Testing is executed on the single disk with the device mnemonic dua2.2.0.8.0. The **- q** option is used to disable status messages.
- ❷ Testing begins.

Example 3-9 Sample Test Command, Memory Module Test

```
>>> test ms7aa0 ❶  
Testing ms7aa0  
Type Ctrl/C to abort  
Starting memory exerciser, running on kn7aa0 (id #77) ❷  
Stopping memory exerciser on kn7aa0 (id #77)  
Done testing...  
>>>
```

In Example 3- 9:

- ❶ Enter **test ms7aa0**.
- ❷ The ms7aa0 memory module is tested by the memory exerciser, a series of tests executed from the kn7aa0 processor.

3.3 Error Reports

In the event of an error, either a summary or a full error report is displayed at the console. Error reports are specified by setting the `d_report` environment variable. See Example 3- 10 and Example 3- 11.

Example 3- 10 Sample Summary Error Report

```
>>> set d_report summary      ! Command to set the type of error
                                ! report to summary (default value).
>>> test kdm700              ! Command to test the kdm700 adapter
                                ! and its devices.

Configuring kdm700...
Testing kdm700
Type Ctrl/C to abort

Initializing KDM700
KDM700 self-test passed
Starting device exerciser on duc1.0.0.12.0 (id #20)
Starting device exerciser on duc2.0.0.12.0 (id #21)
Starting device exerciser on duc4.0.0.12.0 (id #22)

Bad MSCP status (4|0) received
Failed to send Read to duc4.0.0.12.0

*** Hard Error - Error #1 on FRU: duc4.0.0.12.0
Error in read of 2097152 bytes at location 07E00000 from duc4.0.0.12.0.

  ID  Program      Device      Pass Hard/Soft Test      Time
-----
  481  dsk_ex    duc4.0.0.12.0      18    1    0    1 12:07:01
***End of Error***
```

In Example 3- 10:

- ❶ Testing begins on each disk.
- ❷ A hard error, error #1, is reported on FRU duc4.0.0.12.0, a disk associated with the kdm700 adapter. The three types of errors reported are hard, soft, and fatal. The error number, in this case error #1, corresponds to the location of the actual error report call within the source code for the failing diagnostic. The FRU, or field- replaceable unit, is duc4.0.0.12.0.
- ❸ The process identification number (ID) is 481. This is the process ID of the failing diagnostic.
- ❹ The program running when the error occurred is dsk_ex, or, the disk exerciser.
- ❺ The target device selected for testing at the time of the error. The device name in this field may or may not match the device mnemonic displayed in the FRU field (❷).
- ❻ The current pass count, 18, is the number of passes executed when the error was detected.
- ❼ The current hard error count is 1. The hard and soft (❸) error counts are the number of errors detected and reported by the failing diagnostic since the testing started.
- ❽ In this example, the failing test number is 1.
- ❾ The time stamp shows when the error occurred.

Example 3- 11 Sample Full Error Report

```
>>> set d_report full      ! Command to set the type of
                             ! error report to full.
>>> test demna0           ! Command to test the DEMNA
                             ! adapter with the mnemonic
                             ! demna0.
```

Configuring demna0...

Testing demna0

Type Ctrl/C to abort

Initializing demna0

demna0 self-test passed

Starting network exerciser on exa0.0.0.1.0 (id #183)

***Hard Error - Error #15 on FRU: exa0.0.0.1.0

External loopback error, no packet received

ID	Program	Device	Pass	Hard/Soft	Test	Time
183	net_ex	exa0.0.0.1.0	5	1	0	1 12:31:01

Address Expected Received ❶

00240000 AAAAAAAAA AAAAAAAAA

00240004 55555555 45554555 ❷

00240008 CCCCCCCC CCCCCCCC

0024000C 33333333 33333333

00240010 88888888 88888888

00240014 77777777 77777777

00240018 FFFFFFFF FFFFFFFF

*** End of Error ***

NOTE: Except for the extended error information shown in Example 3- 11, the information shown in a full and a summary error report is the same. See Example 3- 10 for a description of the common error report entries.

In Example 3- 11:

- ❶ This full error report shows a list of addresses and the expected and received data values for each address.
- ❷ The expected value at address 00240004 was 55555555. The received value was 45554555.

Appendix A

Power System Indicators

This appendix describes the lights and indicators on the power modules.
Sections include:

- AC Input Box
- Control Panel
- System Power Regulator
- XMI PIU Power Regulators
- Cabinet Control Logic Module

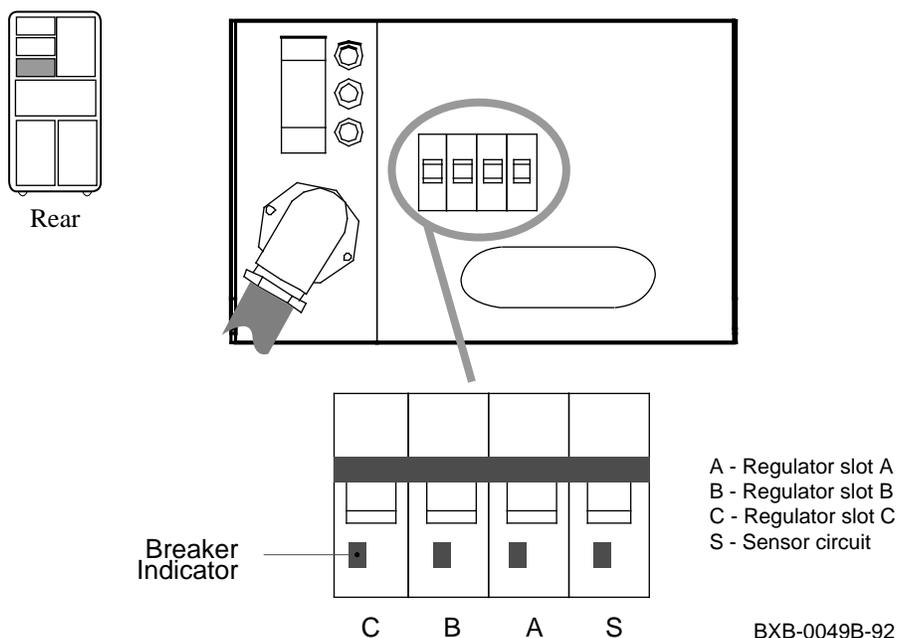
A.1 AC Input Box

The AC input box with circuit breaker is located in the upper left rear of the cabinet (see Figure A- 1). The AC input box accepts three- phase power; the three leftmost indicators on the circuit breaker show the state of each pole (one pole per phase). If an indicator is green, the pole is in the off position or tripped due to an overload. If an indicator is red, the pole is in the on position and is not tripped.

The fourth rightmost indicator reflects the mechanical position of the circuit breaker. The indicator is red when the circuit breaker is in the on position and green when the circuit breaker is in the off position.

NOTE: The function of the poles and indicators differs on the 202V AC input box. If one pole trips, all poles will trip, including the fourth pole. All indicators will be green in this condition.

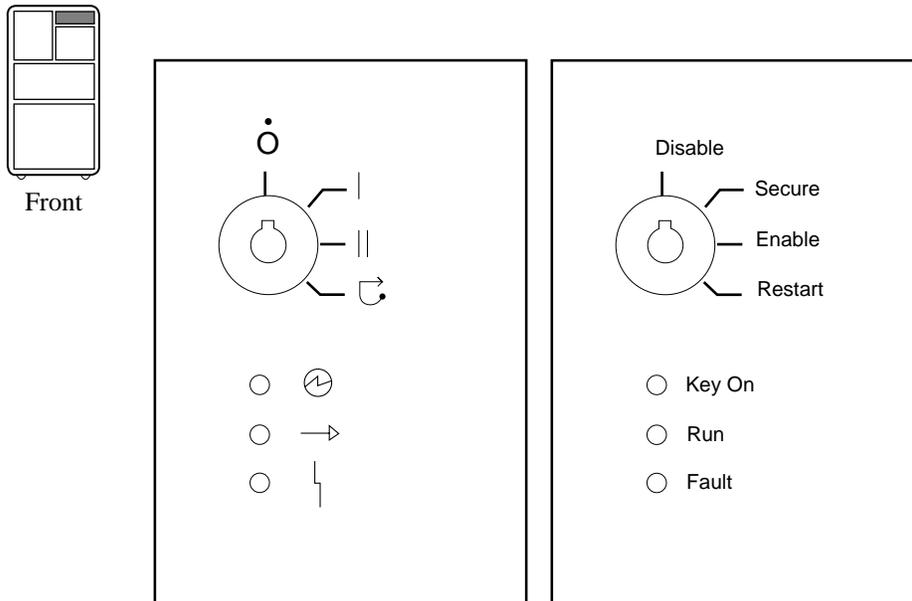
Figure A- 1 AC Input Box



A.2 Control Panel

The control panel has three indicator lights and one keyswitch (see Figure A- 2). You turn the keyswitch to Enable to power up the system. The Fault light blinks slowly, goes on momentarily during self- test, and then goes off. The Key On and Run lights should remain on. If the Fault light does not go off, there is a hardware problem. Call your Digital customer service engineer.

Figure A- 2 Control Panel

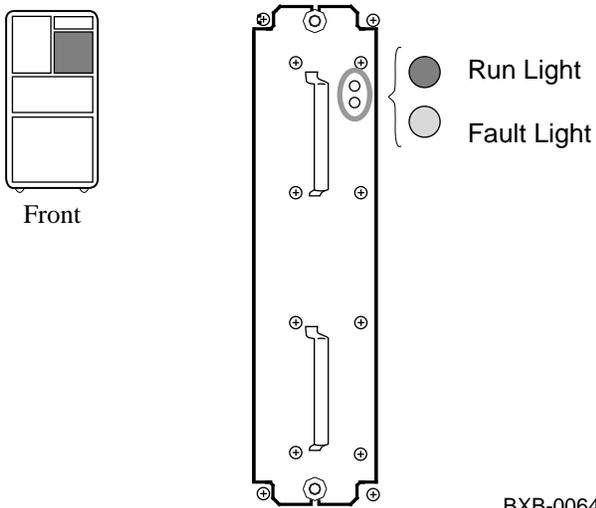


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A.3 System Power Regulator

Power regulators are located in the upper right front of the cabinet. A system can have one, two, or three power regulators. Each power regulator has a Run light and a Fault light.

Figure A-3 System Power Regulator



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Table A- 1 lists the functions of the power regulator indicators shown in Figure A- 3.

Table A- 1 System Power Regulator Light Summary

Run Light (Green)	Fault Light (Yellow)	Condition
Off	Off	No AC power
Off	On	Fatal fault
Fast flash	Off	AC power present and keyswitch in Disable position
On	Fast flash	Nonfatal fault
On	Slow flash	Battery discharge mode
On	Off	Normal operation

A.4 XMI PIU Power Regulators

An XMI plug-in unit (PIU) has two power regulators, regulator A and regulator B (see Figure A- 4). You can see the power regulators through the PIU enclosure when the front cabinet door is open. Both regulators have indicator lights. Regulator B also has a reset switch and an enable/disable switch for Digital customer service use only.

Figure A- 4 XMI PIU Power Regulators

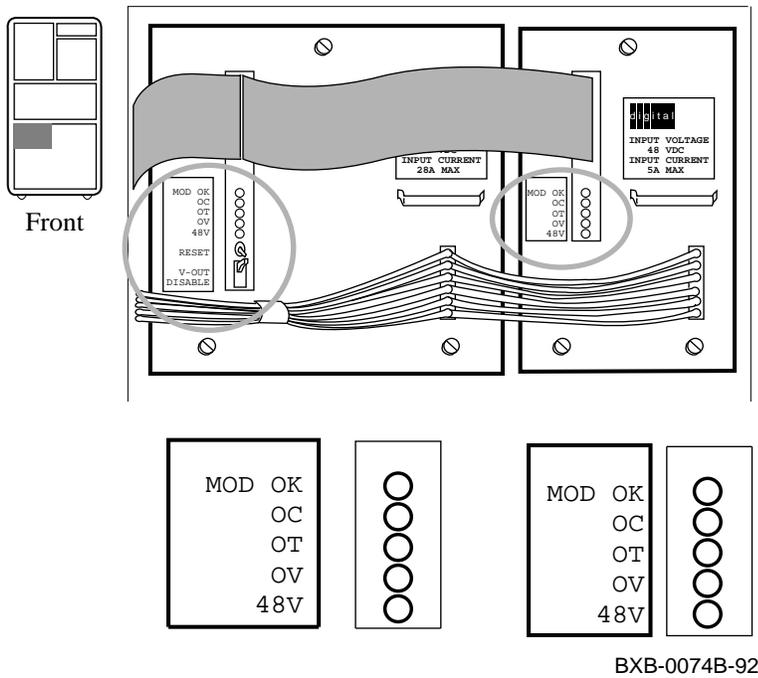


Table A- 2 lists the functions of the indicators shown in Figure A- 4.

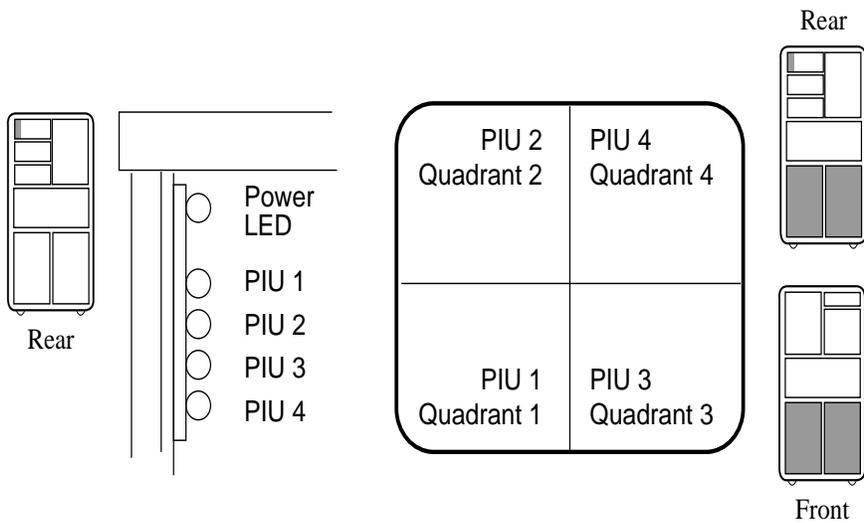
Table A-2 XMI PIU Power Regulator Lights

Light	Color	State	Meaning
MOD OK	Green	On	Regulator is working.
		Off	Regulator is not working.
OC	Yellow	On	Overcurrent condition has been detected. The light turns on and stays on even if the fault condition no longer exists.
OT	Yellow	On	Temperature condition has been detected. The light turns on and stays on even if the fault condition no longer exists.
OV	Yellow	On	Overvoltage condition has been detected. The light turns on and stays on even if the fault condition no longer exists.
48V	Green	On	48V is present.

A.5 Cabinet Control Logic Module

The cabinet control logic (CCL) module is located in the upper rear of the cabinet, behind the control panel. The CCL module has four PIU LEDs. At power-up, a PIU LED goes on to indicate that power is present in the PIU power regulators. The CCL module also has its own power LED to indicate that power is present on the module. You can see the CCL LEDs when the rear door is open (see Figure A- 5).

Figure A- 5 CCL Module LEDs



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