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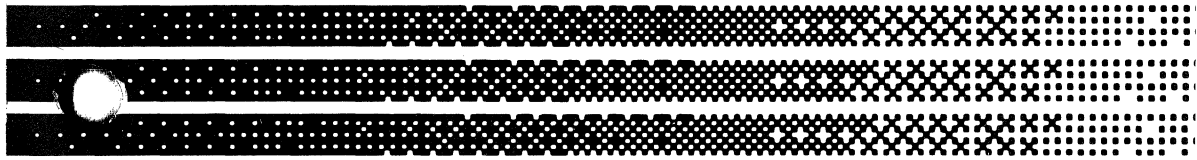

rtVAX 1000

620QY • 620QZ • 620QE
System User's Guide

Prepared by Educational Services
of Digital Equipment Corporation

First Edition, March 1987
Second Edition, September 1987

FCC Notice

This equipment generates, uses, and may emit radio energy. The equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case, the user, at his or her own expense, may be required to take measures to correct the interference. Data interconnect cables for the rtVAX 1000 system need to be shielded in order for the device to meet FCC requirements for a Class A product.

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Preface

Document Structure

This guide describes how to install and operate your rtVAX 1000 system and what to do if you have a problem with your system. It covers rack-mounted (620QZ), pedestal/tabletop-mounted (620QY), and H9642 cabinet-mounted (620QE) models. Digital Equipment Corporation recommends that you carefully read Chapters 2 and 4 of this guide before you try to install and operate your rtVAX 1000 system.

- Chapter 1, "Overview," generally describes the system and provides specifications.
- Chapter 2, "Installation," describes how to install the system, including site preparation and system testing.
- Chapter 3, "Configuration," describes how to configure the base system package.
- Chapter 4, "Operation," describes the system operating procedures, console commands, and error messages.
- Chapter 5, "Troubleshooting," describes how to isolate and repair minor system problems.

Intended Audience

This guide is for the rtVAX 1000 system user; little or no previous computer experience is necessary. To help nontechnical users, a glossary is provided to explain common computer terms.

Associated Documents

Detailed maintenance and other technical information is available in the optional *rtVAX 1000 System Maintenance Guide* and other related documents. These documents, and their order numbers, are listed in Chapter 1.

Chapter 1
OVERVIEW

This chapter provides general information and specifications for the rtVAX 1000 system. It includes an overview of the base system unit hardware and standard system package options. More information on the base system unit hardware and standard system package options is available in Chapter 3 of this guide and also in the *rtVAX 1000 System Maintenance Guide.* A list of related documents and their order numbers is at the end of this chapter.

1.1 GENERAL DESCRIPTION

The rtVAX 1000 system is a high-performance VAX microcomputer designed specifically for real-time computing applications. System software includes any real-time application program developed with VAXELN (Version 2.3 or later) software.

NOTE: *The MicroVMS and VAX/VMS operating systems do not run on the rtVAX 1000 system.*

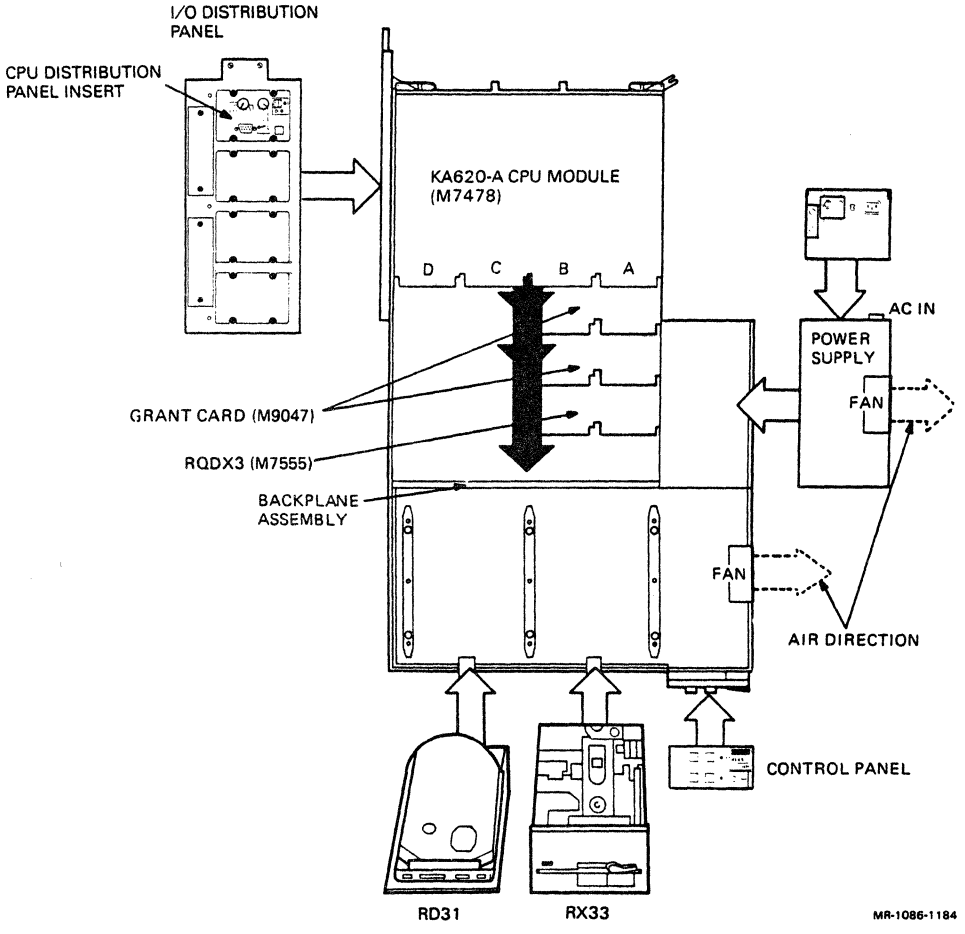
The rtVAX 1000 system is based on the KA620-A CPU and the BA23-A base system enclosure, and is available in several configurations. Standard package system configurations include disk and network models mounted in a rack, pedestal, or H9642 cabinet. The pedestal can convert for tabletop use.

Disk models have an RX33 diskette drive, an RD31 fixed-disk drive, and an RQDX3 disk controller installed at the factory. Figure 1–1 shows the base system components of a disk model. Network models have a DEQNA Ethernet interface controller installed at the factory.

The BA23-A has expansion space for additional system option modules. Options can include MS630 memory expansion modules or any of Digital's other standard Q22-Bus option modules.

NOTE: *The rtVAX 1000 system uses options supported by VAXELN (Version 2.3 or later) software only.*

Figure 1–1: Expanded Internal View of the System



1.2 SPECIFICATIONS

To receive the best possible performance from your rtVAX 1000 system, you must provide correct operating conditions. Figures 1–2 and 1–3 show the system's physical specifications. Tables 1–1 through 1–4 list the correct conditions for your system.

Figure 1–2: Physical Specifications for the Rack-Mount, Pedestal, and Tabletop Models

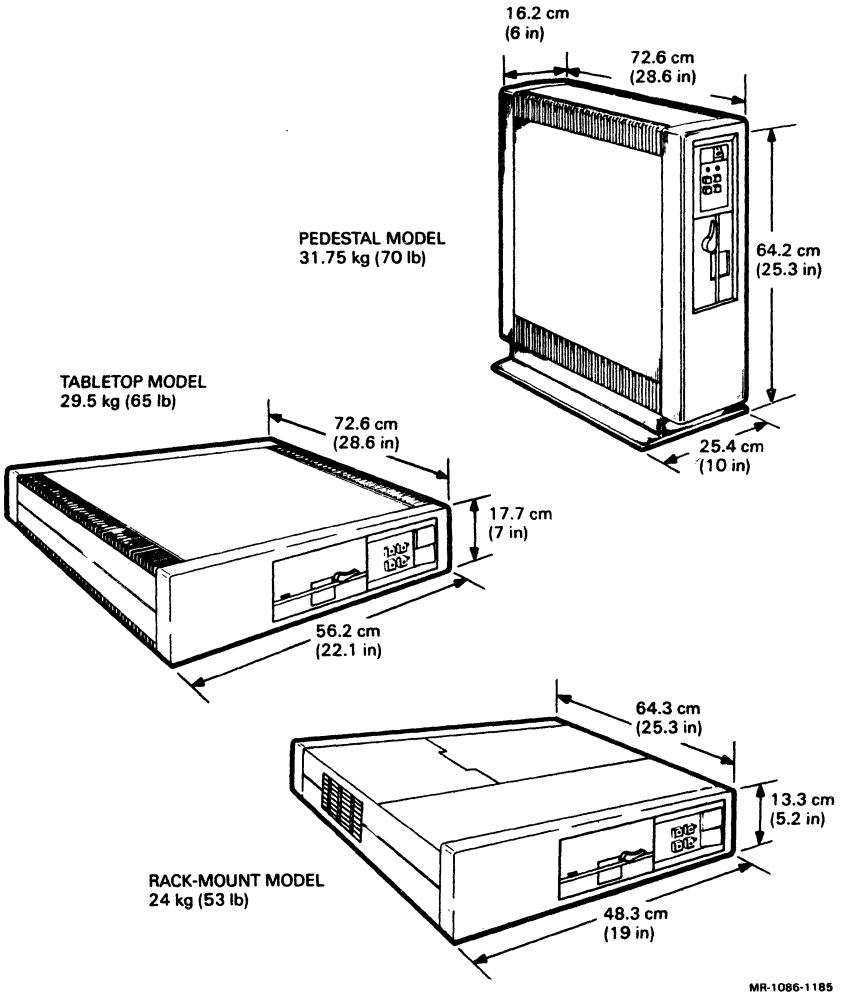


Figure 1–3: Physical Specifications for the Cabinet Model

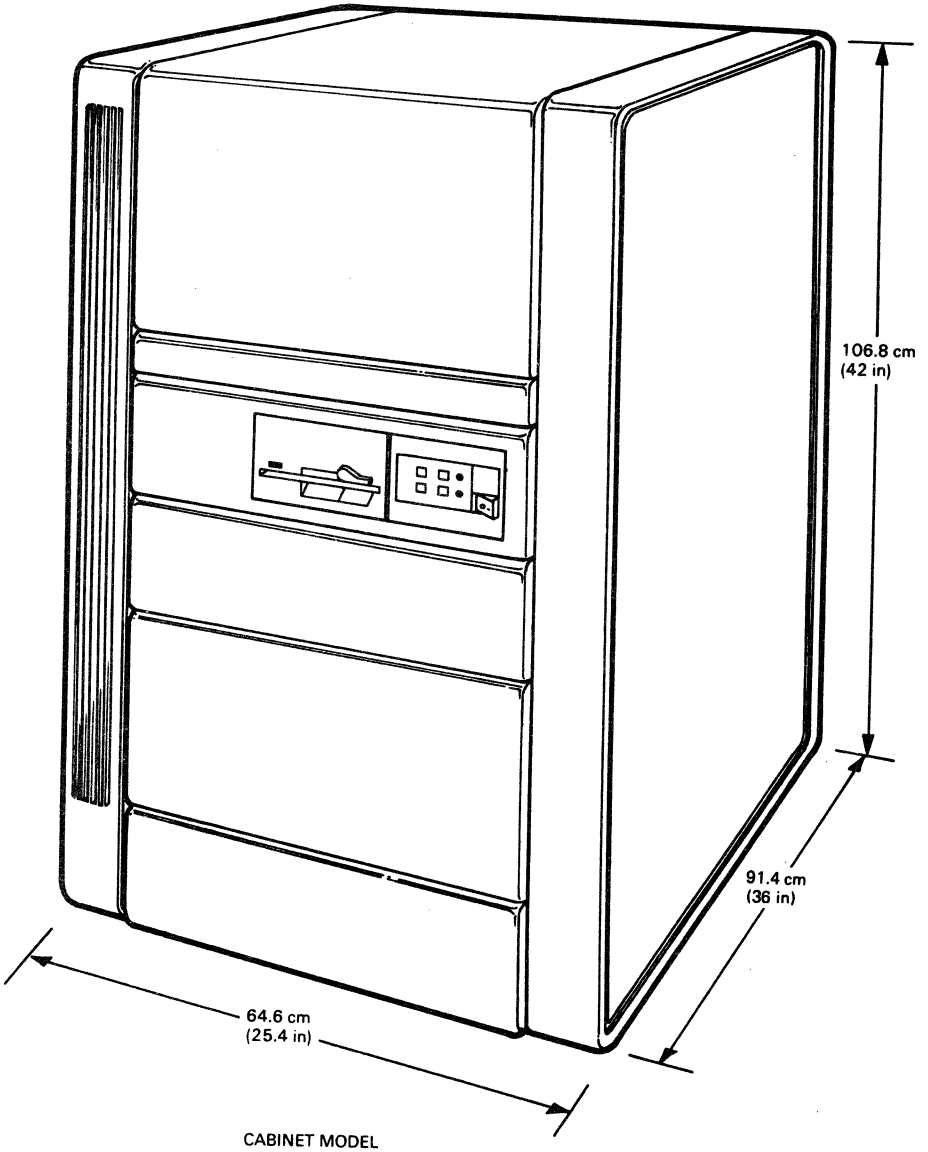


Table 1-1: Electrical Requirements

Characteristic	Specifications [1]	
Line voltage	120 V	240 V
Voltage tolerance	88 V—128 V	176 V—256 V
Power source phasing	Single	Single
Frequency	60 Hz	50 Hz
Line frequency tolerance	47 Hz—63 Hz	47 Hz—63 Hz
Running current	6.0 A	3.0 A
Power consumption (maximum)	345 W	345 W

[1]These depend on the voltage that you select.

Table 1-2: Environmental Conditions

Characteristic	Operating Specification	Nonoperating Specification
Maximum altitude	2.4 km (8000 ft)	4.9 km (16000 ft)
Temperature range[1]	10°C—40°C (50°F—104°F)	-40°C—66°C (-40°F—151°F)
Temperature change rate	11°C/hour (6.6°F/hour)	-
Relative humidity (noncondensing)	20%—80%	10%—95%

[1]Reduce the temperature specification by 1.8°C for each 1000-meter increase (1°F for each 1000-foot increase) in altitude.

NOTE: *Your service contract might require specific temperature and humidity limits.*

Table 1–3: RX33 Diskette Drive Specifications

Characteristic	Specification
Physical Specifications	
Height	4.3 cm (1.7 in)
Width	14.6 cm (5.75 in)
Depth	20.3 cm (8 in)
Weight	1.3 kg (2.9 lb)
Functional Specifications	
Diskettes per drive	1
Recording surfaces per diskette	2
Spindle speed (high density)	360 r/min
Spindle speed (normal density)	300 r/min
Storage Capacity (High Density)	
Per track (15 sectors)	7680 bytes
Performance	
Transfer rate	500K bits/s
Average access time	175 ms
Average seek time	92 ms

Table 1–4: RD31 Fixed-Disk Drive Specifications

Characteristic	Specification
Physical Specifications	
Height	4.1 cm (1.6 in)
Width	14.6 cm (5.75 in)
Depth	20.3 cm (8 in)
Weight	1.6 kg (3.5 lb)
Functional Specifications	
Cylinders	615
Encoding method	MFM
Spindle speed	3600 r/min
Speed variation	+/-1%
Seek Time	
Track-to-track	20 ms
Average	65 ms
Maximum	145 ms
Rotational Latency	
Average	8.33 ms
Start time	24 s maximum to drive ready
Stop time	30 s maximum

1.3 RELATED DOCUMENTATION

The following lists provide the titles and order numbers of related hardware and software documents for the rtVAX 1000 system.

You can order these documents directly from Digital at the following address or by calling 1-800-258-1710.

Digital Equipment Corporation
DECdirect Department
Amherst Street
Nashua, NH 03061

For further information, contact your local sales representative.

1.3.1 Hardware Documents

Title	Order Number
ADV11-C Analog-to-Digital Converter	EK-AXV11-UG
AXV11-C Analog I/O Board	EK-AXV11-UG
DEQNA Ethernet User's Guide	EK-DEQNA-UG
DHQ11 User's Guide	EK-DHQ11-UG
DHQ11 Technical Manual	EK-DHQ11-TM
DHV11 Technical Manual	EK-DHV11-TM
DLV11-J User's Guide	EK-DLV1J-UG
DRV11-J Interface User's Guide	EK-DRV1J-UG
DRV11-WA User's Guide	EK-DRVWA-UG
DZQ11 Asynchronous Multiplexer Technical Manual	EK-DZQ11-TM
DZQ11 Asynchronous Multiplexer User's Guide	EK-DZQ11-UG
DZV11 Asynchronous Multiplexer Technical Manual	EK-DZV11-TM
DZV11 Asynchronous Multiplexer User's Guide	EK-DZV11-UG
KWV11-C Programmable Real Time Clock	EK-AXV11-UG
LPV11 Printer System User Manual	EK-LPV11-OP
MRV11-D PROM Module User's Guide	EK-MRV1D-UG
MS630-BF/MS630-CF Installation Guide	EK-MS630-IN
RD31/32 Fixed Disk Drive Option Installation Guide	EK-RD3XA-IN
RD31-A Disk Drive Technical Description	EK-RD31A-TD
RD32 Fixed Disk Drive Technical Description	EK-0RD32-TD
RQDX3 Controller Module User's Guide	EK-RQDX3-UG
rtVAX 1000 System Maintenance Guide	EK-128AA-MG
rtVAX KA620-A CPU Module User's Guide	EK-KA620-UG
RX33 Diskette Drive Option Installation Guide	EK-RX33A-IN
RX33 Diskette Drive Technical Manual	EK-RX33T-TM
TK50 Tape Drive Subsystem Owner's Manual	EK-LEP05-OM
TK50 Tape Drive Subsystem User's Guide	EK-0TK50-UG
TK50 Tape Drive Subsystem Technical Manual	EK-0TK50-TM

1.3.2 Software Documents

Title	Order Number
MicroVAX Diagnostic Monitor Ethernet Server User's Guide[1]	AA-FNTAC-DN
MicroVAX Diagnostic Monitor Programmer's Guide[1]	AA-GLPAA-MN
MicroVAX Diagnostic Monitor User's Guide[1]	AA-FM7AB-DN
MicroVAX Diagnostic Monitor Reference Card	AV-FMXAA-DN
VAXELN Documentation Set	QL375-GZ
Application Design Guide	AA-EU41B-TE
C Runtime Library Reference Manual	AA-EU40B-TE
FORTRAN Programmer's Guide	AA-HW72B-TE
Host System Guide	AA-JG87A-TE
Installation Manual	AA-EU37B-TE
Introduction to VAXELN	AA-EU37B-TE
Pascal Language Reference Manual	
Part 1: Language Elements	AA-JP29A-TE
Part 2: Programming	AA-JN09A-TC
Release Notes	AA-Z454G-TE
Runtime Facilities Guide	AA-JM81A-TC
VAX Language-Sensitive Editor VAXELN Pascal Guide	AA-GR65B-TE

[1] Self-maintenance diagnostics and these guides are available to customers under license. For information, call Digital's Self-Maintenance Product Group at 1-603-884-5000.

1.3.3 Network Document

Title	Order Number
Network and Communications Buyer's Guide	NA

Chapter 2
INSTALLATION

This chapter describes how to install your rtVAX 1000 system. Installation instructions are provided for the three types of system enclosure: rack, pedestal/tabletop, and cabinet. Installation includes the following steps.

- Verifying site preparation
- Checking your shipment
- Placing the system
- Installing the console terminal
- Connecting the console terminal
- Connecting the Ethernet device (if available)
- Setting the controls on the system
- Connecting the power cord
- Turning on the system and selecting a language
- Testing the system

Digital provides an installation service if you prefer not to install the system yourself.

2.1 VERIFYING SITE PREPARATION

Computer systems are subject to a variety of conditions that can affect their operation and overall dependability. Static discharge, temperature changes, and humidity can reduce system performance.

Good site planning can minimize these effects and add to dependable system operation.

The environmental control system for your computer area should maintain the specified temperature and humidity ranges during all seasons of the year. The control system should filter the air to minimize dust and other abrasive contaminants. The control system should also provide an even distribution of air, to prevent hot spots in the computer area.

When selecting a location for your rtVAX 1000 system, allow a minimum of 5 centimeters (2 inches) of space around the system for air circulation.

2.1.1 Power Considerations

Primary system power is the customer's responsibility. Avoid power disturbances, if possible. If you cannot avoid power disturbances, you might need additional power-conditioning equipment. The customer is responsible for providing and installing this equipment.

Use a power source that can handle system expansion. The electrical power system must conform to all applicable national and local codes and ordinances.

Digital recommends a dedicated circuit from the power source for each system. This circuit should provide an isolated ground path between the system and the power source. The power source should be stable and free from electrical noise.

NOTE: *Do not connect any equipment such as heaters, air conditioners, photocopiers, or coffee pots on the same circuit as your rtVAX 1000 system.*

Figures 2-1 and 2-2 show the power considerations for the pedestal/tabletop and cabinet models.

Figure 2–1: System Power Considerations for the Pedestal/Tabletop Model

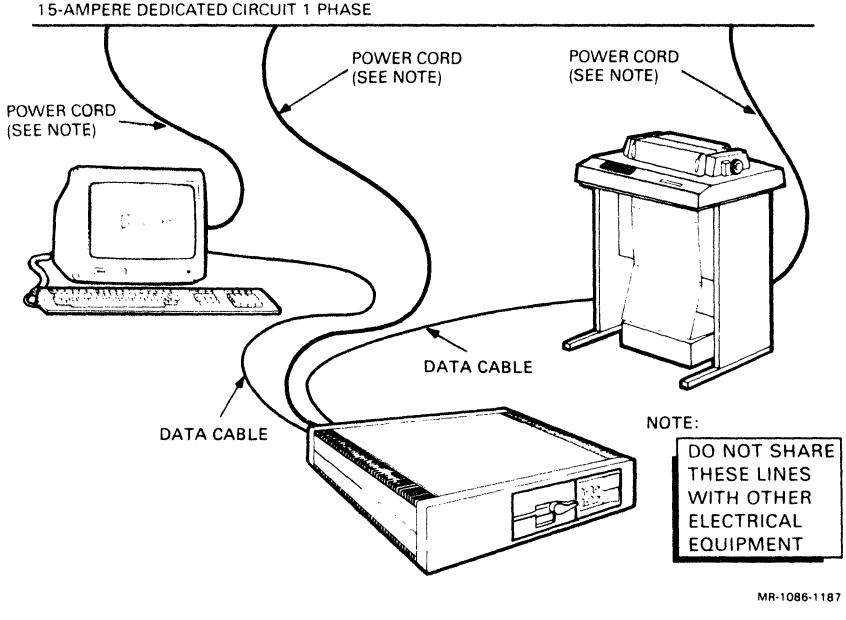
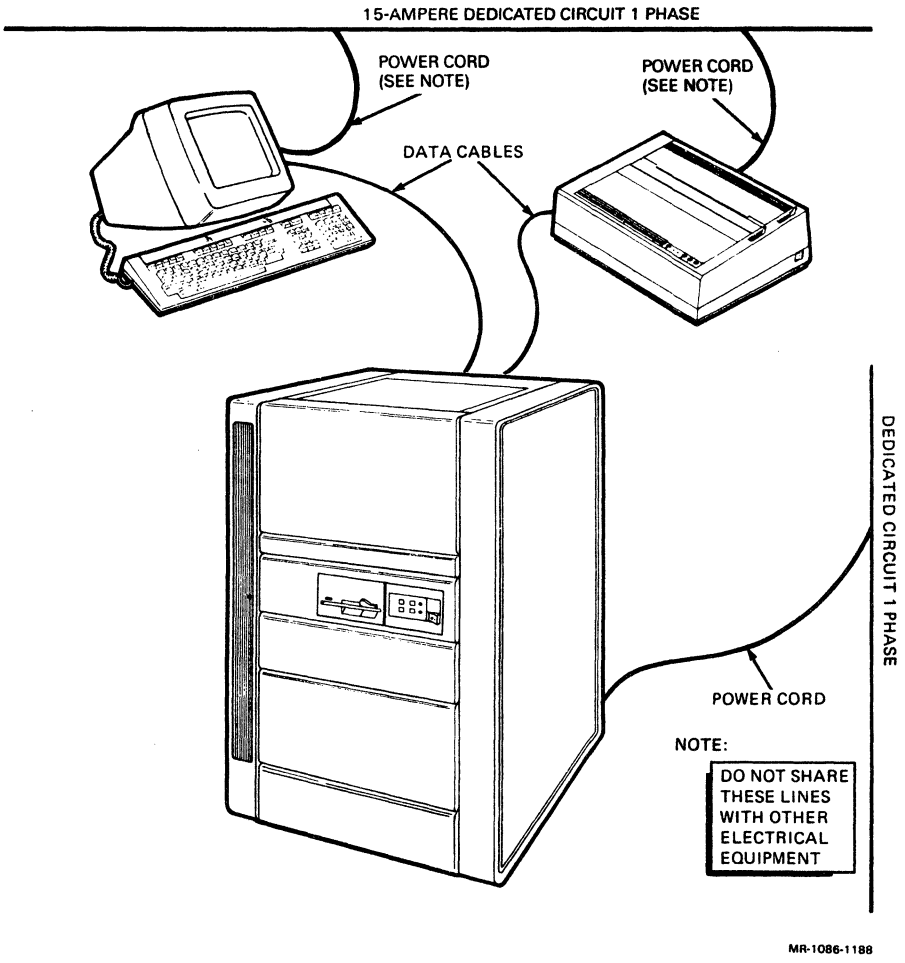


Figure 2–2: System Power Considerations for the Cabinet Model



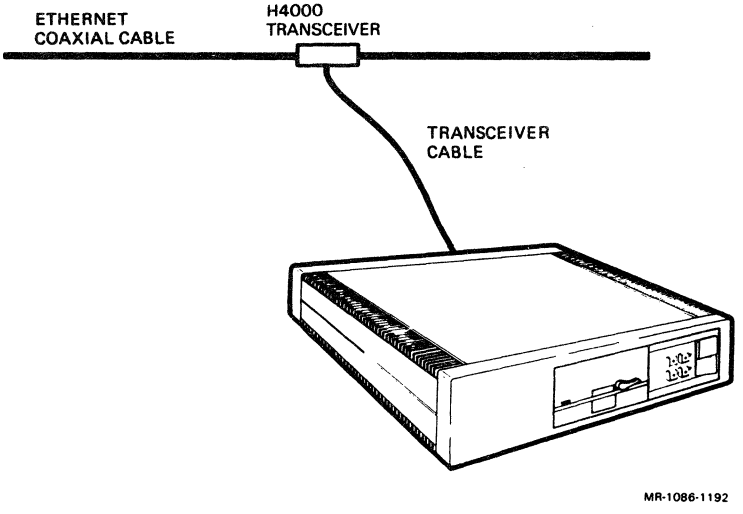
2.1.2 Network Considerations

You can use two methods to load system software into your rtVAX 1000 system. One method is to load the software from a local storage device, such as the diskette or fixed-disk drive. Another method is to down-line load the software from a host system over a local area network (LAN). You must use the down-line load method to load software into an rtVAX 1000 system that does not have a local storage device. The "diskless" rtVAX 1000 system includes a Q-Bus-to-Ethernet communications controller as a standard feature of the base system package.

Before you can down-line load software into your rtVAX 1000 system, the following conditions must be met.

- The rtVAX 1000 system must be connected to an operational Ethernet LAN (Figure 2-3).
- Software on the host system must be configured to recognize, and respond to, software load (boot) requests from your rtVAX 1000 system.

Figure 2-3: System Network Considerations



The customer is responsible for providing the network equipment and configuring the host system software. Digital's Network and Communications (NaC) publications explain the types of network connections possible. Information on configuring host system software and down-line loading software over a network is available in the *VAXELN Host System Guide* and *MicroVAX Diagnostic Monitor Ethernet Server User's Guide.*

2.1.3 Static Electricity Considerations

Static electricity is a common problem for computer systems. Static can cause system downtime and lost data. The most common source of static buildup is contact between people and carpeting or clothing. Low humidity allows the greatest buildup of static charges.

To minimize static buildup in the computer area, follow these guidelines.

- Maintain greater than 40 percent relative humidity in the area.
- Place the computer system away from busy corridors.
- Avoid using carpeting in the computer area. If carpeting is used, use an antistatic carpet. If carpeting is already in place, an antistatic mat placed under and around the system can help minimize the problem.

2.2 UNPACKING AND INSTALLING THE SYSTEM

The shipping list for your system is in a plastic envelope attached to the outside of the shipping container. Before installing your system, check the shipping list to ensure that you received everything you ordered.

2.2.1 Rack-Mount Model

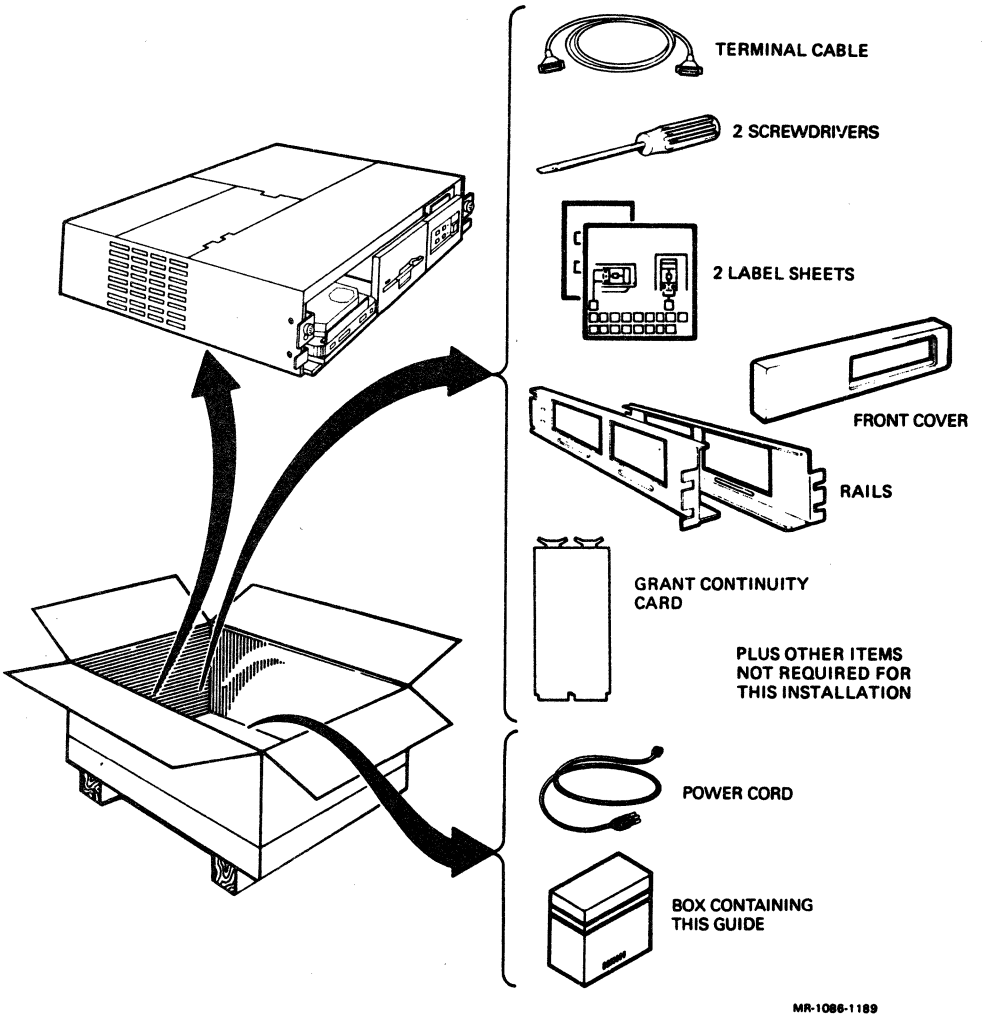
Use the following procedure if your rtVAX 1000 system is a rack-mount model.

1. Unpack your system (Figure 2-4). Instructions for unpacking the system are on the shipping carton.

   If any item is missing or damaged,

   - Contact your delivery agent.
   - Contact your sales representative.

Figure 2–4: Unpacking the Rack-Mount Model

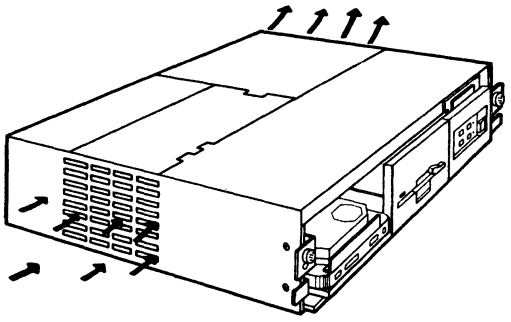


2. Place the system where it will be installed into its rack.

   Make sure the space in and around the rack allows for adequate airflow around the system after installation in the rack (Figure 2-5).

WARNING: *This procedure requires two people because the rack-mount model weighs 24 kilograms (53 pounds).*

Figure 2–5: Airflow Around the Rack-Mount Model



MR-1086-1216

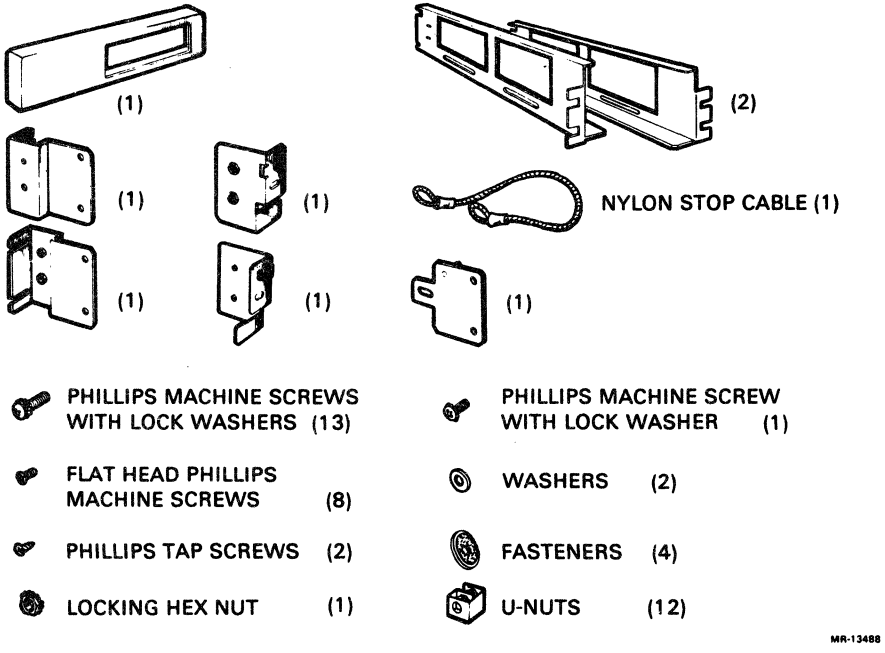
3. Check the contents of the rack mounting kit (Figure 2-6).

   If any item is missing or damaged,

   - Contact your delivery agent.
   - Contact your sales representative.

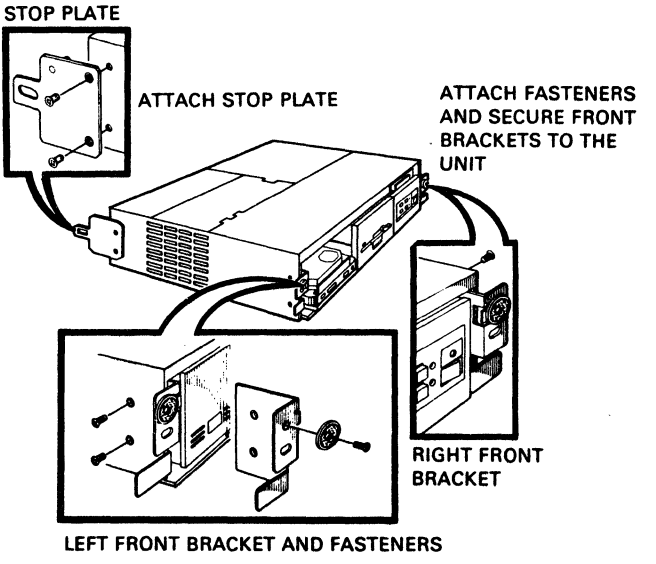
   If you need help, call your service representative.

Figure 2-6: Checking the Contents of the Rack Mounting Kit



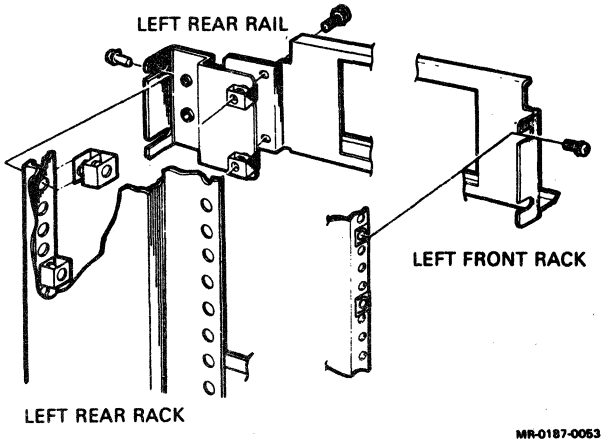
4. Install all brackets and the front fasteners (Figure 2-7).

Figure 2–7: Installing the Brackets and Fasteners



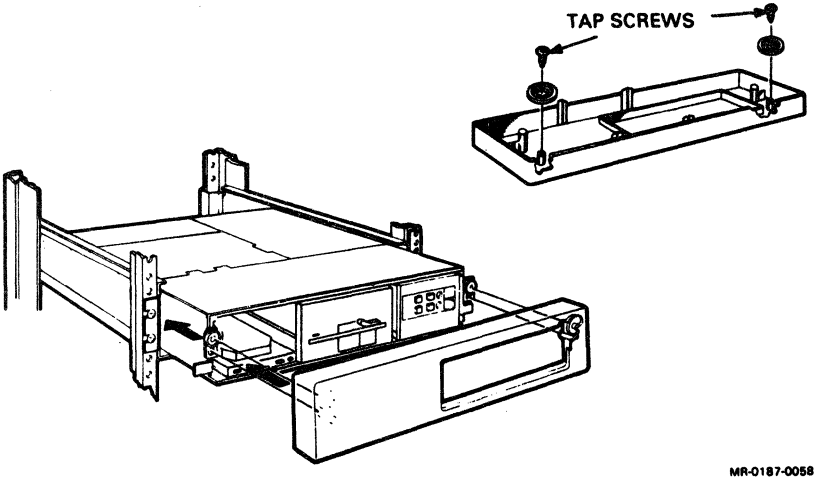
5. Secure the end plate to the rails and attach the left and right rails to the rack (Figure 2-8).

Figure 2–8: Securing the Mounting Rails



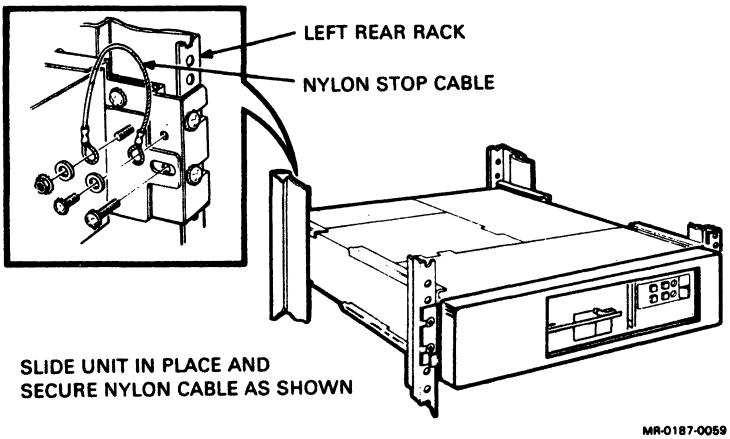
6. Slide the system into the rack and attach the front cover (Figure 2-9).

Figure 2–9: Installing the System into the Rack



7. Secure the restraining cable and attach the locking plate to the rack (Figure 2-10).

Figure 2-10: Securing the Restraining Cable



8. Proceed to step 4 (label the control panel) in Section 2.2.2.

2.2.2 Pedestal Model

Use the following procedure if your rtVAX 1000 system is a pedestal model.

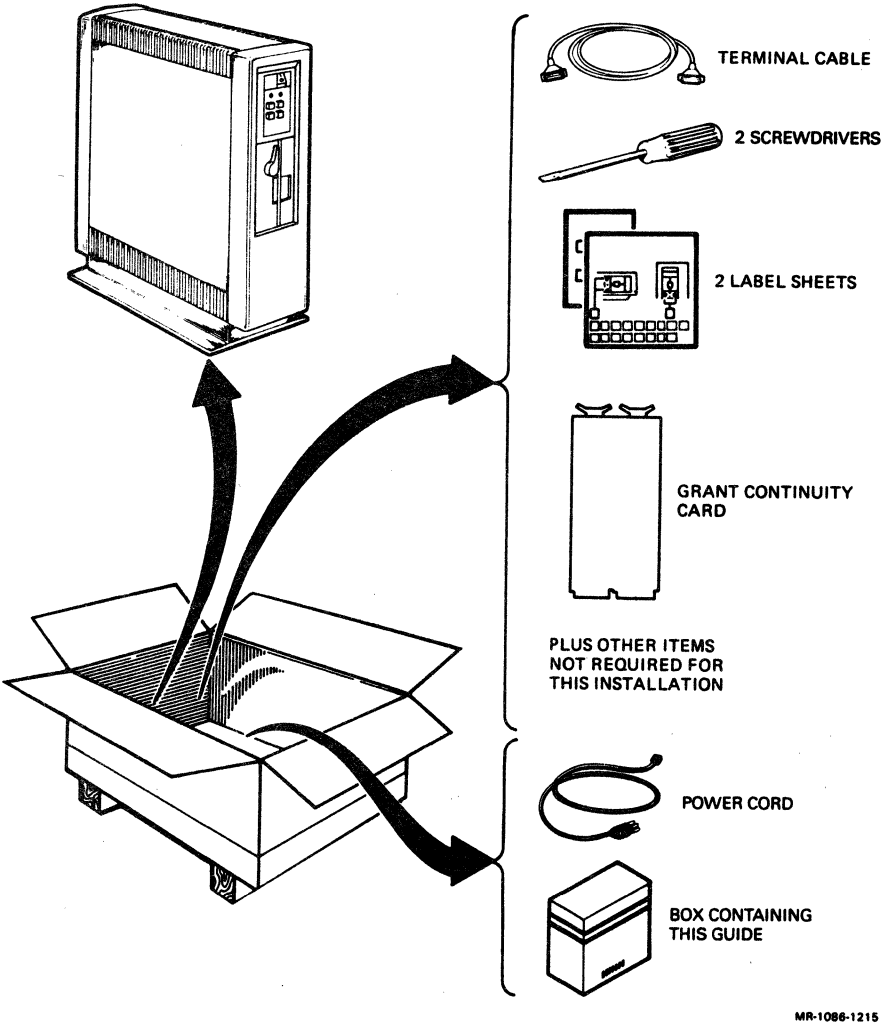
1. Unpack your system (Figure 2-11). Instructions for unpacking the system are on the shipping carton.

   If any item is missing or damaged,

   - Contact your delivery agent.
   - Contact your sales representative.

CAUTION: *Do not pick up the pedestal model by its front and rear covers when moving it.*

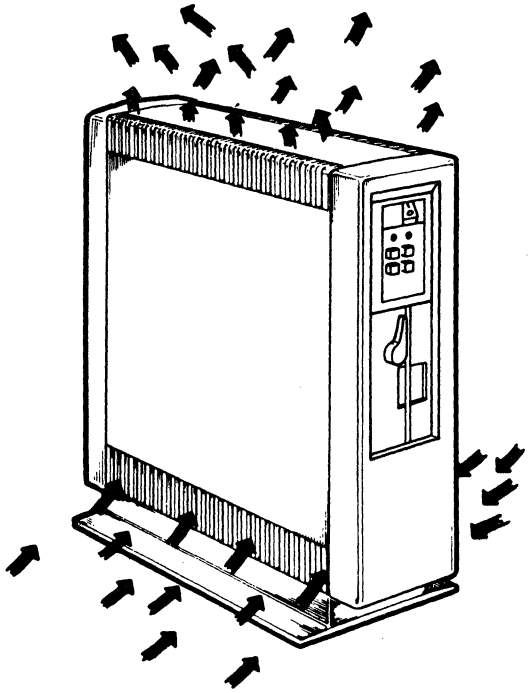
Figure 2–11: Unpacking the Pedestal Model



2. Place your system where it will be used.
   - Allow space around the unit for airflow and servicing (Figure 2-12).
   - Keep food and liquid away from the unit.
   - Place the unit away from heaters, photocopiers, and direct sunlight.
   - Minimize static by placing the unit away from busy corridors.
   - Keep the area free from dust and other abrasive materials.
   - Install the system in an operating environment that meets the specifications listed in Chapter 1.

WARNING: *This procedure requires two people because the pedestal model weighs 31.75 kilograms (70 pounds).*

Figure 2–12: Airflow Around the Pedestal Model



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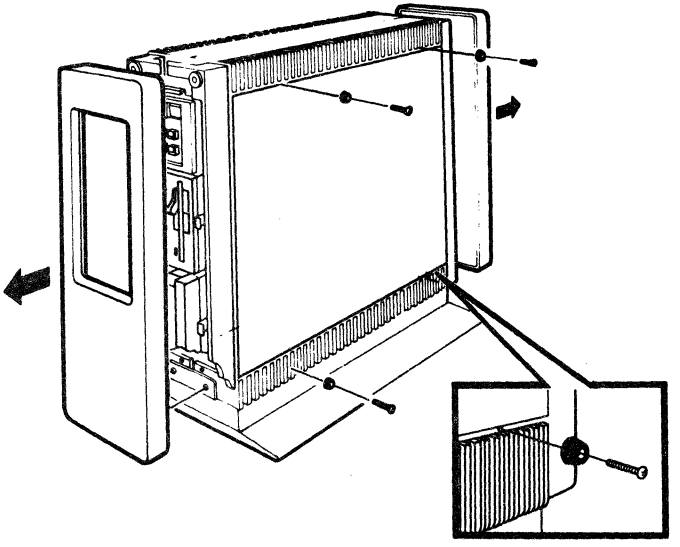
NOTE: *If you DO NOT want to convert your rtVAX 1000 system from floor to tabletop mounting, skip steps 3a through 3d.*

3. Convert the system from floor to tabletop mounting.

   a. Remove the front and rear covers and install the four rubber feet on the right side of the system (Figure 2-13).

Figure 2–13: Removing the Front and Rear Covers



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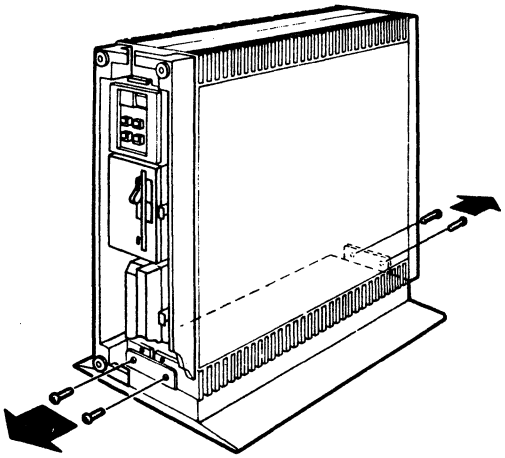
b. Remove the four screws at the base of the system (Figure 2-14).

Figure 2–14: Removing the Pedestal Base



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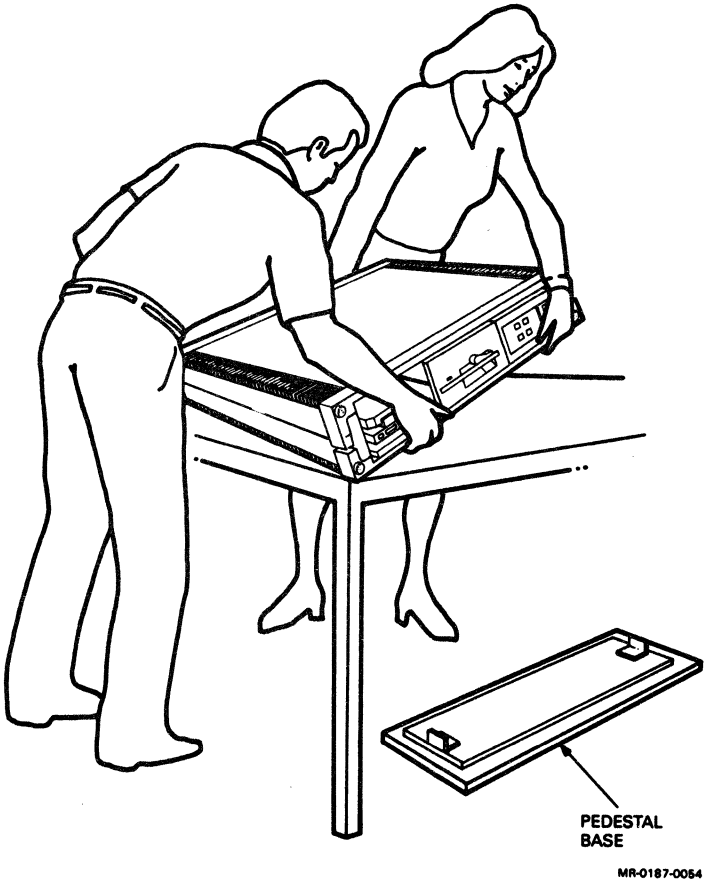
c. Place the system on a table (Figure 2-15).

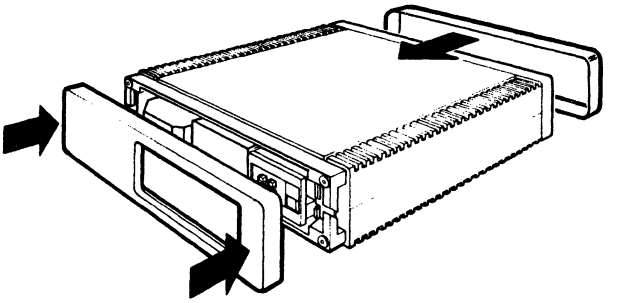
WARNING: *This procedure requires two people because the tabletop model weighs 29.5 kilograms (65 pounds).*

Figure 2–15: Placing the System on a Table



d. Replace the front and rear covers (Figure 2-16).

Figure 2–16: Replacing the Front and Rear Covers



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4. Label the control panel.

   - Select labels for the appropriate language.

     Two sets of labels are provided for each language. Use one set for rack-mount and tabletop models (Figure 2-17). Use the second set for the pedestal model (Figure 2-18).

   - Make sure that all buttons on the control panel are in their out position.

Figure 2–17: Labeling the Control Panel on the Rack-Mount and Tabletop Models

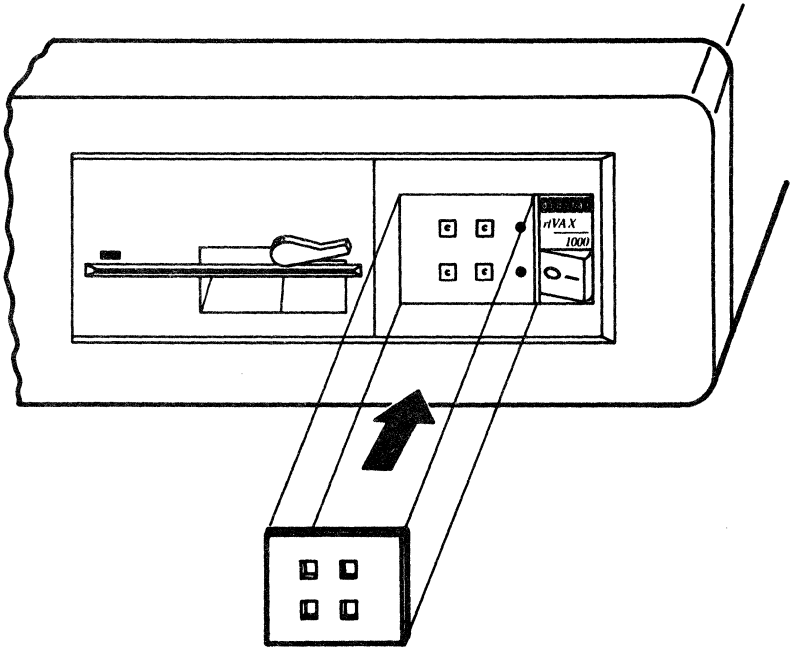
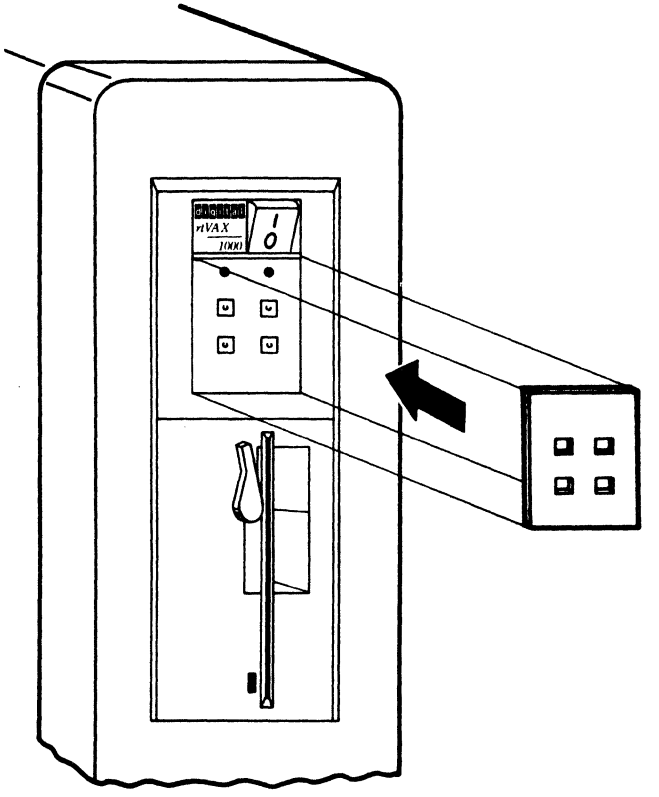


Figure 2–18: Labeling the Control Panel on the Pedestal Model



5. Unpack the installation guide for the terminal you want to connect to the system (Figure 2-19). This terminal is called the system console terminal.

Figure 2–19: Unpacking the Console Terminal Installation Guide

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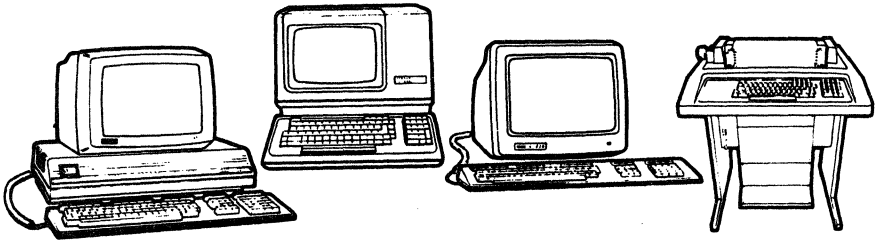
6. Use the installation and user guides to unpack and install the system console terminal (Figure 2-20).

Figure 2–20: Installing the Console Terminal



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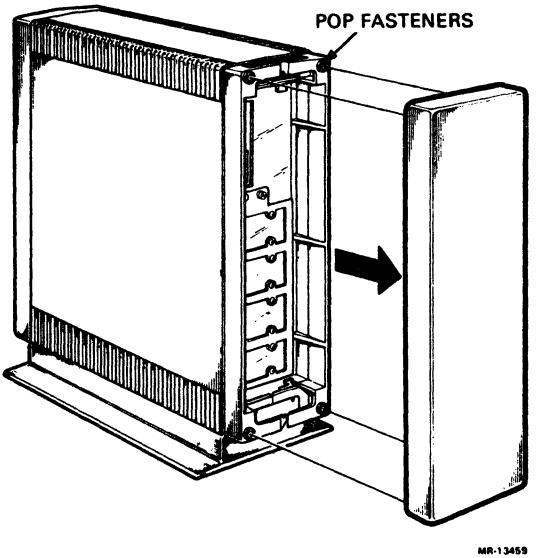
7. Pull off the rear cover of your system (Figure 2-21). It is held in place by pop fasteners.

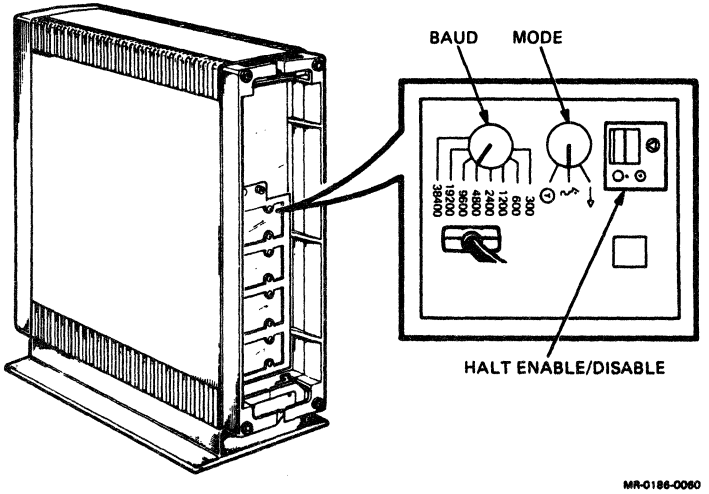
NOTE: *The rack-mount model is shipped with the rear cover removed.*

Figure 2–21: Removing the Rear Cover from the Pedestal/Tabletop Model



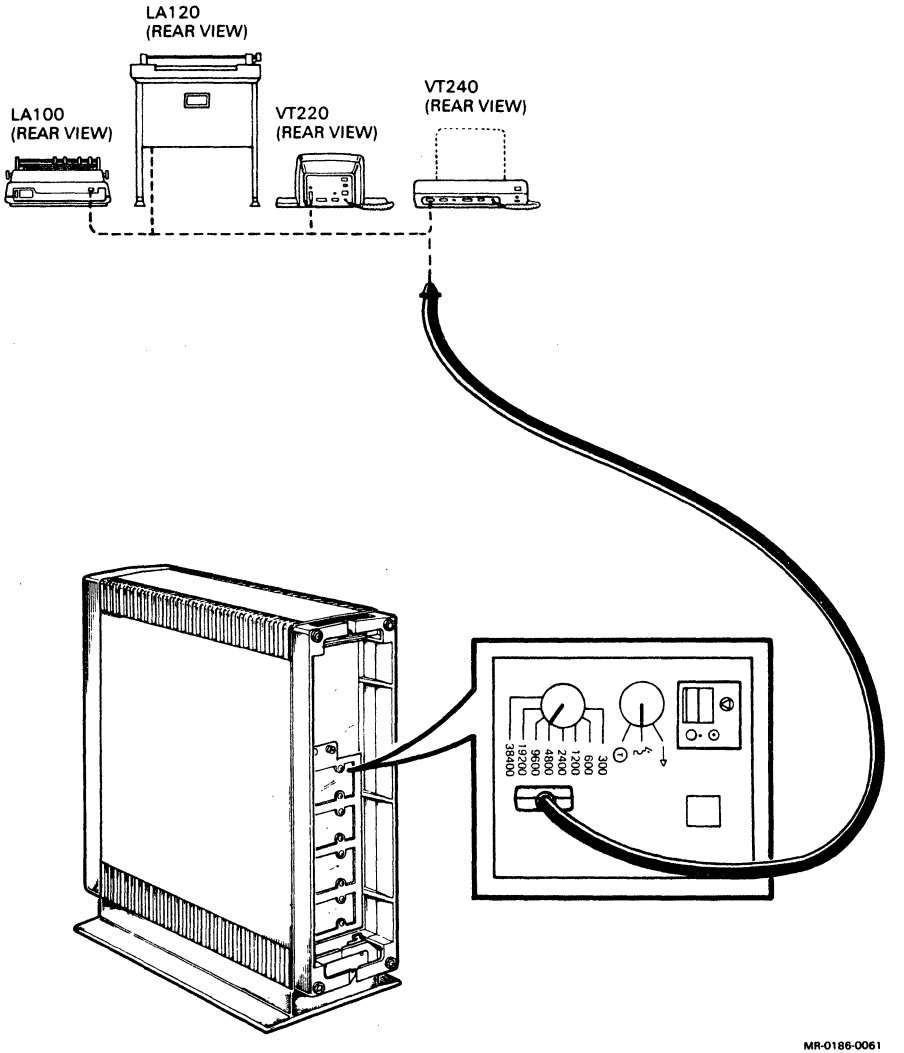
8. Set the controls on the CPU distribution panel insert at the rear of the system to the positions listed below (Figure 2-22).
   - Set the halt enable/disable switch to the disable position (left on the pedestal model, down on the rack-mount and tabletop models).
   - Turn the mode switch to the middle (language inquiry) position.
   - Turn the baud switch to match the speed setting you selected for the console terminal. The factory setting is 4800.

Figure 2-22: Setting the CPU Distribution Panel Insert Controls on the Pedestal Model



9. Connect the console terminal cable to the console terminal and the system (Figure 2-23).

Figure 2–23: Connecting the Console Terminal to the Pedestal Model



10. You can connect your system to a network only if your system has an Ethernet communications controller installed and the Ethernet cabling is in place. Make the network connection as follows.

    a. Find the optional Ethernet transceiver cable. The cable has a male connector at one end and a female connector at the other end.

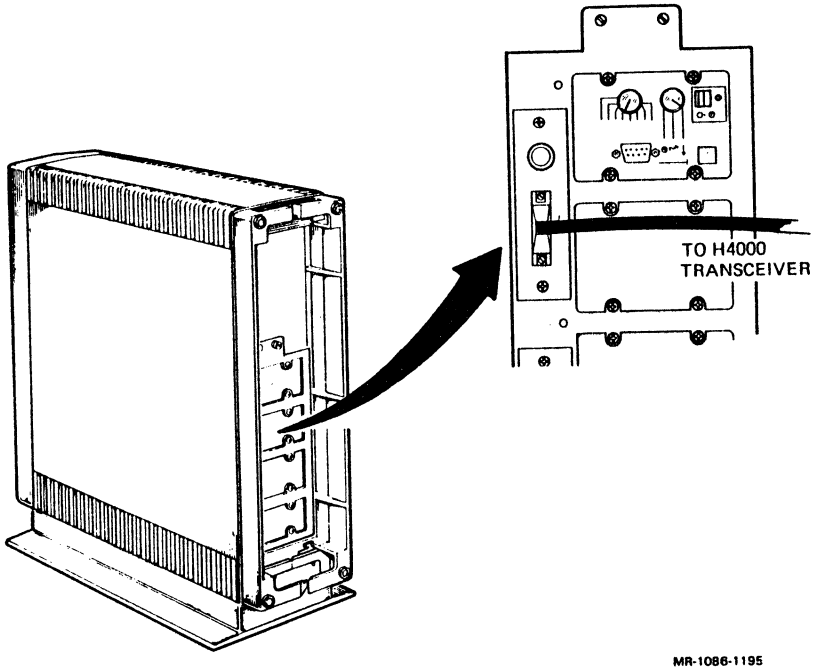
    b. Connect the male end of the cable to the Ethernet controller I/O distribution panel insert at the rear of the system (Figure 2-24). Slide the locking device on the connector to secure the connection.

    c. Connect the female end of the cable to one of the following devices.

    - An H4000 tranceiver on a traditional baseband Ethernet cable
    - A DELNI, which can, in turn, connect to a baseband Ethernet cable or which can connect up to eight systems in a local area network (LAN)
    - A DESTA converter, if you need to connect to a ThinWire network

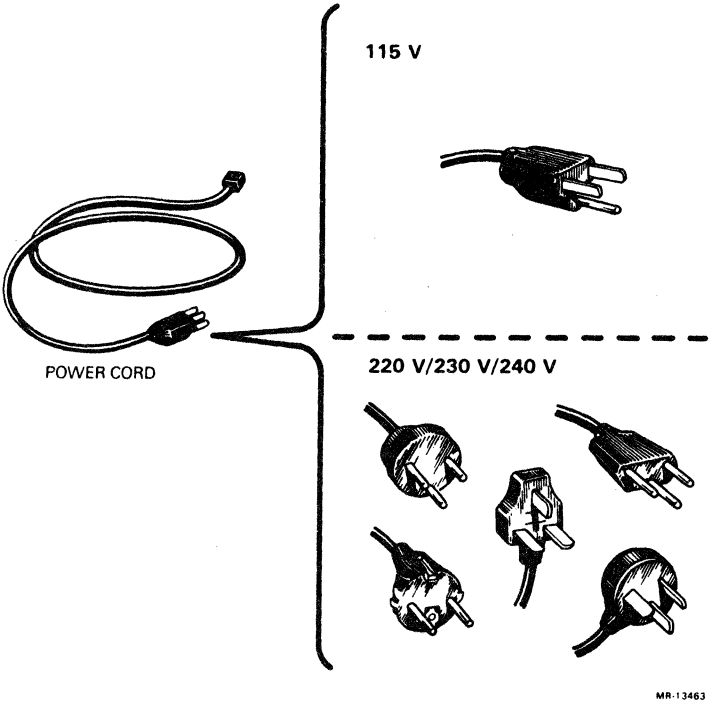
    Digital's Network and Communications (NaC) publications explain the types of network connections possible.

Figure 2–24: Connecting the Ethernet Controller on the Pedestal Model



11. Identify the power cord. Make sure the plug matches the outlet it will be plugged into (Figure 2-25).

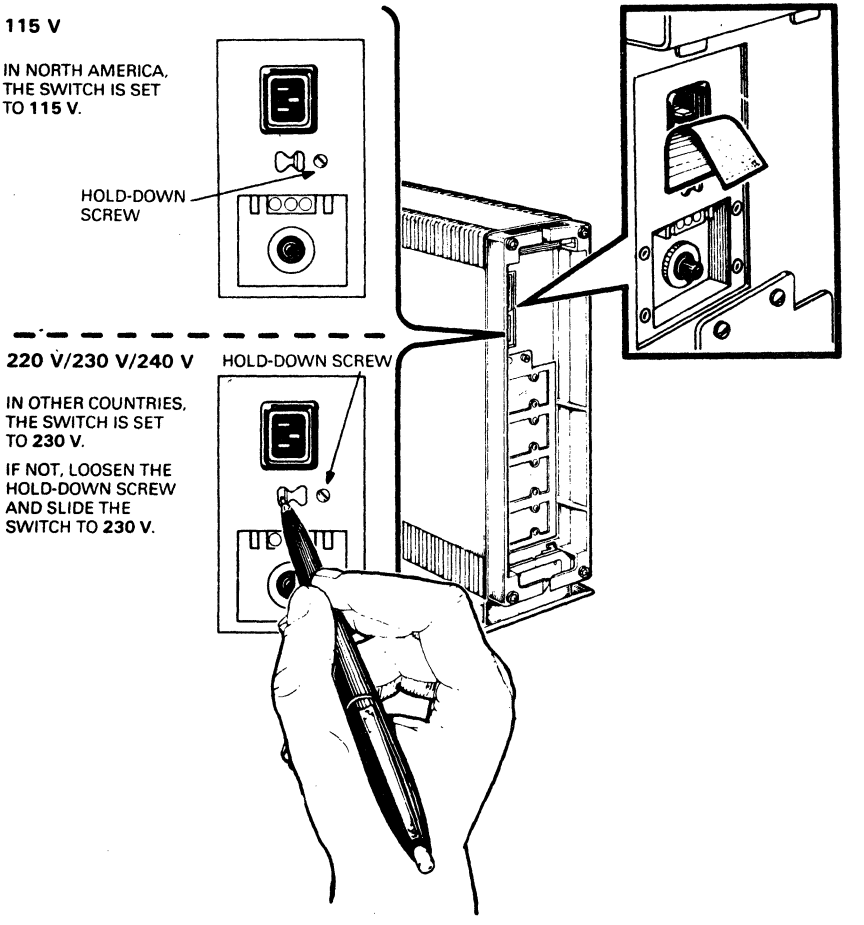
Figure 2-25: Identifying the Power Cord on the Rack-Mount, Pedestal, and Tabletop Models



12. Check the voltage switch. Peel back the label covering the switch to see the voltage setting (Figure 2-26). If necessary, change the setting to match the voltage source you are using.

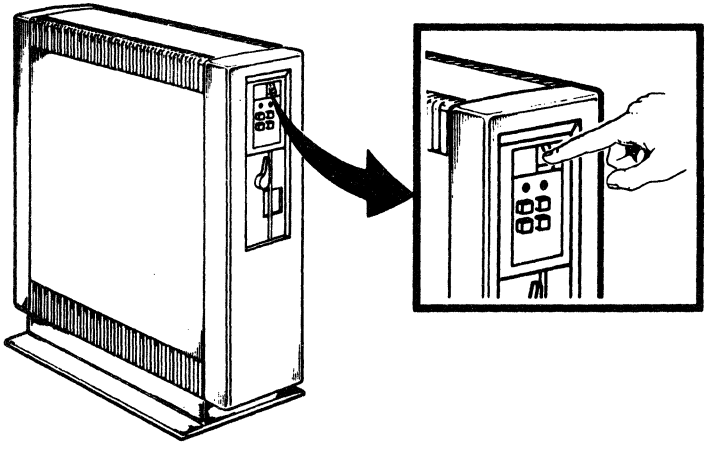
CAUTION: *An incorrect voltage setting can damage your system.*

Figure 2–26: Checking the Voltage Setting on the Pedestal Model



13. Set the power switch on the control panel to 0 (off) (Figure 2-27).

Figure 2–27: Setting the Power Switch to 0 (Off) on the Pedestal Model



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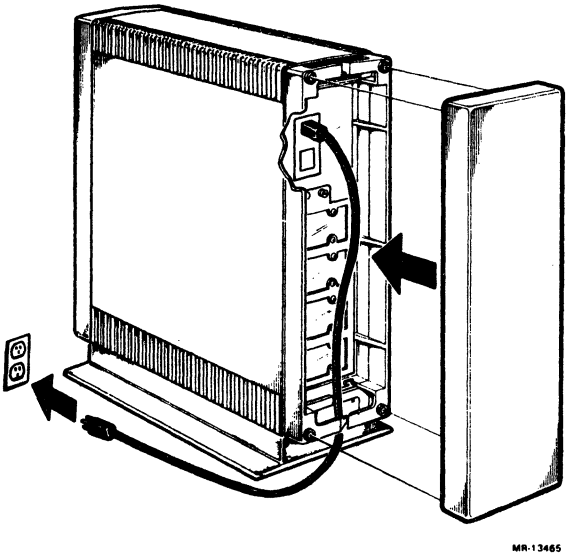
14. Plug in the power cord (Figure 2-28).

Figure 2–28: Plugging in the Power Cord on the Pedestal Model



Do not replace the rear cover at this time.

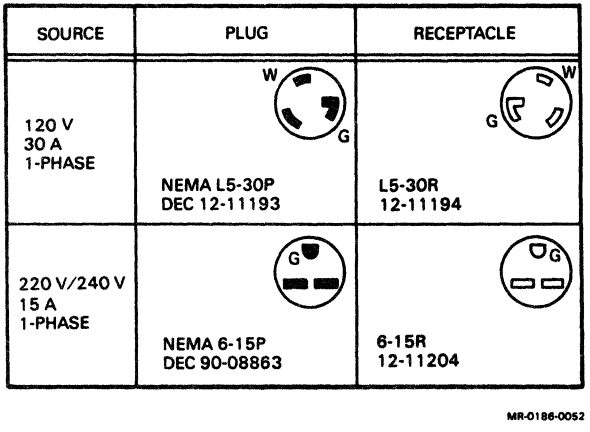
The system is now ready to be tested. Proceed to Section 2.3 (Testing).

2.2.3 Cabinet Model

Use the following procedure if your rtVAX 1000 system is a cabinet model.

1. Verify the type of power receptacle in the area your system will be used. Your cabinet-mounted system requires one of the following electrical receptacles (Figure 2-29).
   - For 120 V service—NEMA L5-30R (rated at 30 A)
   - For 240 V service—NEMA 6-15R (rated at 15 A)

Figure 2-29: Receptacles for the Cabinet Model

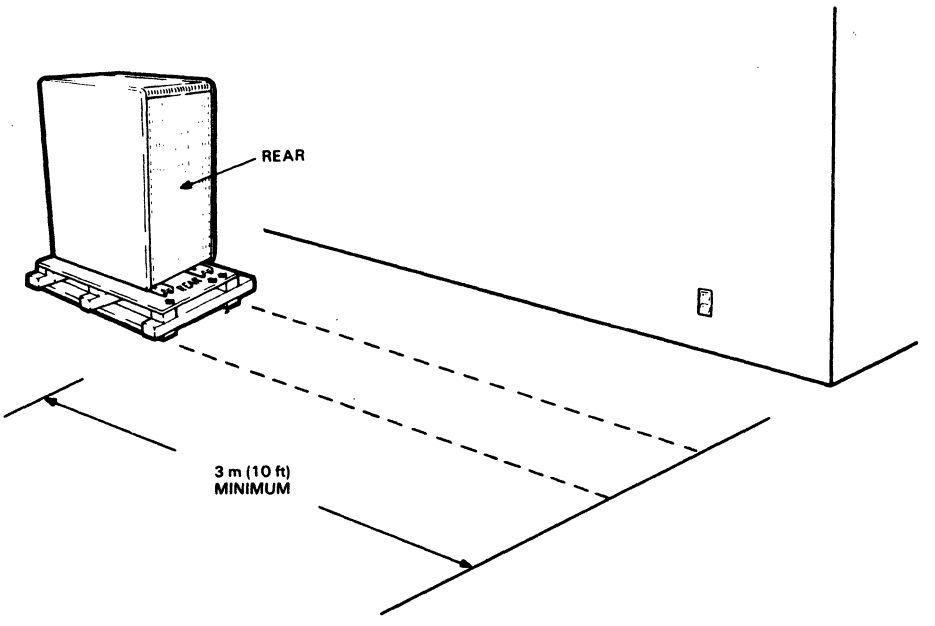


2. Unpack your system. Instructions for unpacking the system are on the shipping carton. Make sure you have at least 3 meters (10 feet) of space to remove the cabinet from its skid (Figure 2-30).

   If any item is missing or damaged,

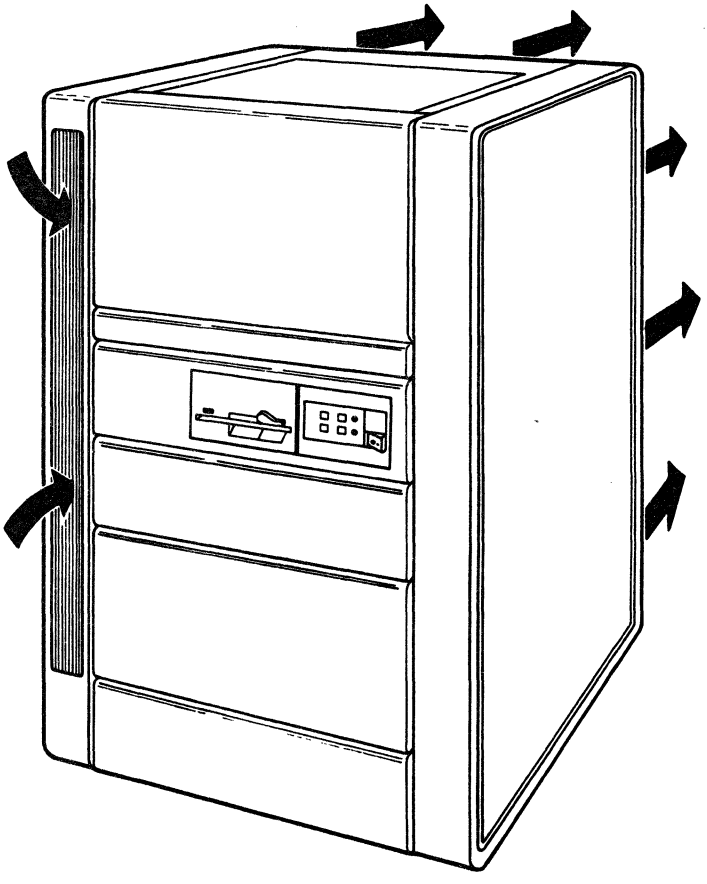
   - Contact your delivery agent.
   - Contact your sales representative.

Figure 2-30: Clearance Required for Unpacking the Cabinet Model



3. Roll the system to where it will be used and lower the four leveling feet as described in the instructions on the shipping carton. Allow enough space around the system for airflow and servicing (Figure 2-31).

Figure 2-31: Airflow Around the Cabinet Model



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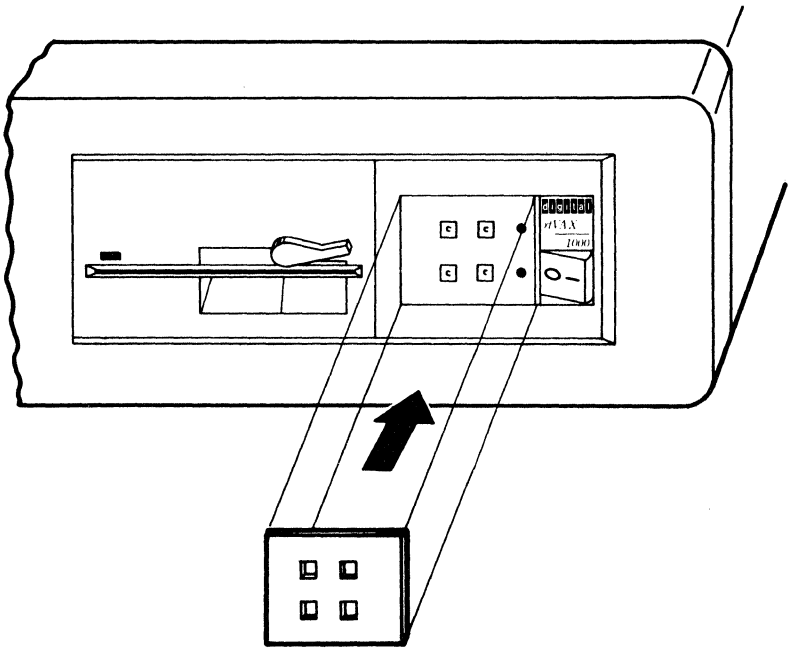
4. Label the control panel (Figure 2-32).
   - Select labels for the appropriate language.
   - Make sure that all buttons on the control panel are in the out position.

Figure 2–32: Labeling the Control Panel on the Cabinet Model



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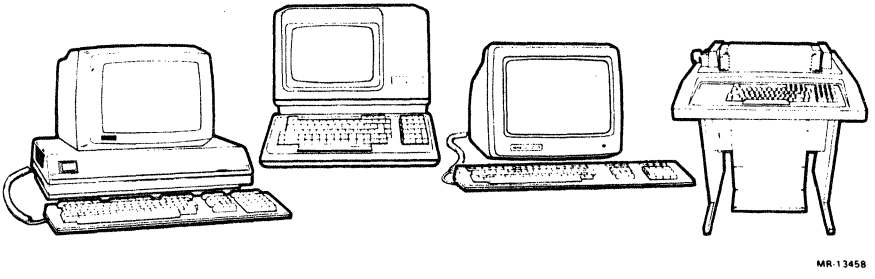
5. Unpack the installation guide for the terminal you want to connect to the system (Figure 2-33). This terminal is called the system console terminal.

Figure 2-33: Unpacking the Console Terminal Installation Guide

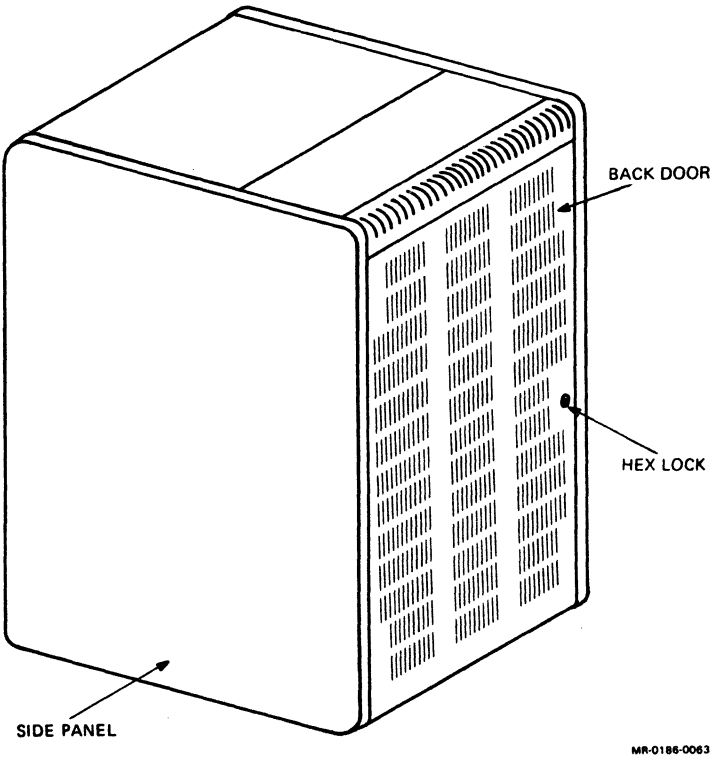
6. Use the installation and user guides to unpack and install the system console terminal (Figure 2-34).

Figure 2-34: Installing the Console Terminal



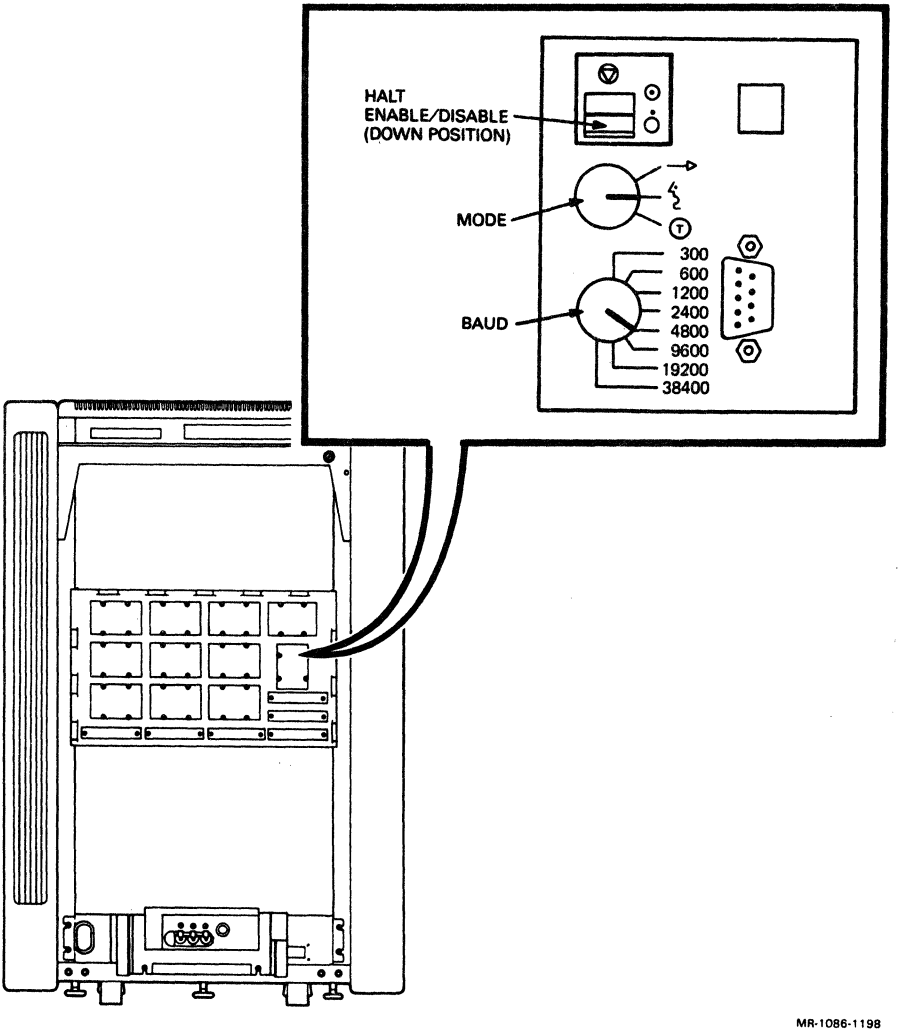
7. Remove the back door of the cabinet.
   a. Unlock the door by using the hexagonal key (allen wrench) provided Figure 2-35.
   b. Open the door by swinging it from right to left.
   c. Remove the door by pressing the top spring hinge on the top inside of the door.

Figure 2-35: Unlocking the Back Door on the Cabinet Model



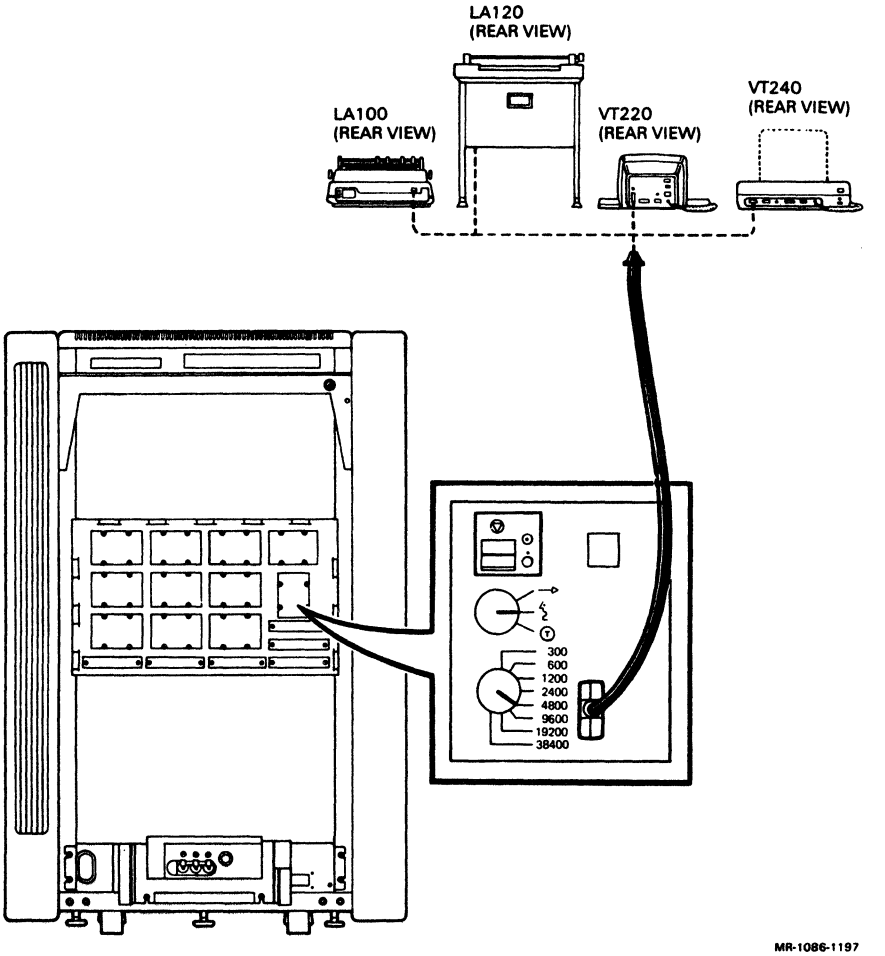
8. Set the controls on the CPU distribution panel insert at the rear of the system to the positions listed below (Figure 2–36).
   a. Set the halt enable/disable switch to the disable (down) position.
   b. Turn the mode switch to the middle (language inquiry) position.
   c. Turn the baud switch to match the speed setting you selected for the console terminal. The factory setting is 4800.

Figure 2–36: Setting the CPU Distribution Panel Insert Controls on the Cabinet Model



9. Connect the console terminal cable to the console terminal and the system (Figure 2-37).

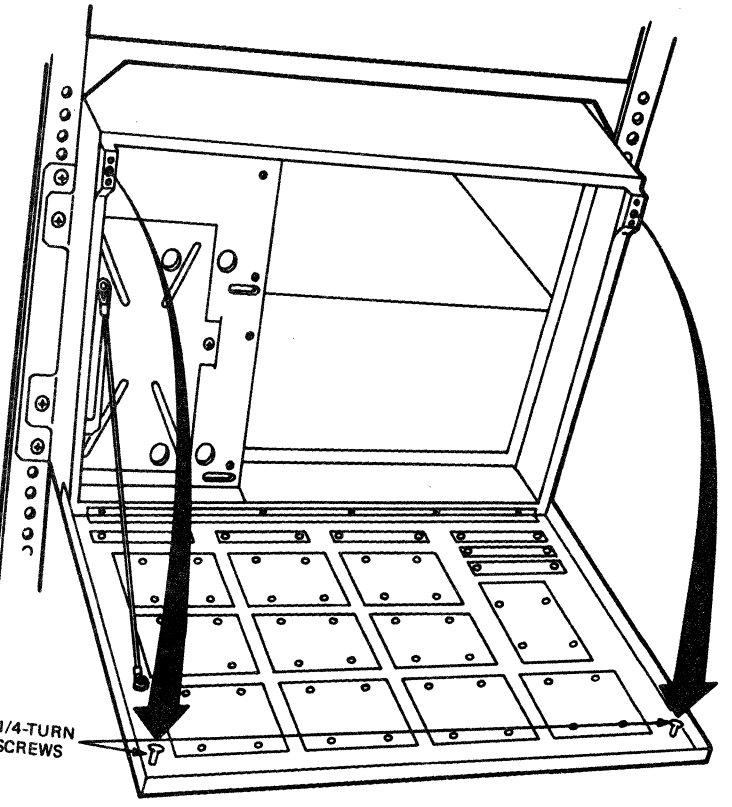
Figure 2-37: Connecting the Console Terminal to the Cabinet Model



10. Check the voltage switch.

    a. Loosen the two screws that hold the backpanel and lower the backpanel (Figure 2–38).

Figure 2–38: Opening the Backpanel on the Cabinet Model



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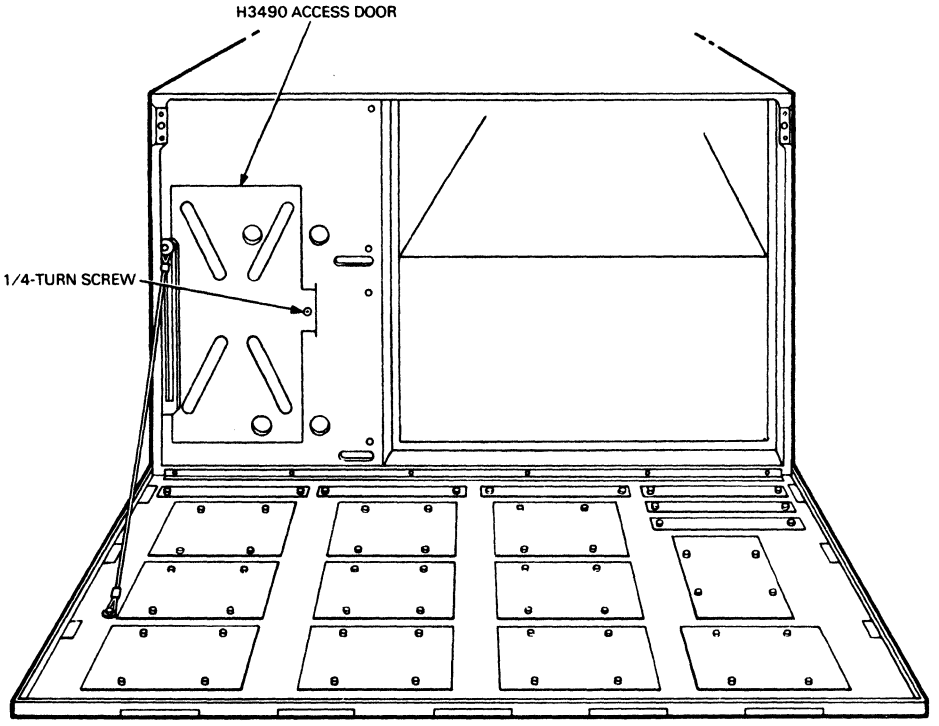
b. Loosen the screw that holds the access door and open the door to the left. The voltage switch is behind this door (Figure 2-39).

Figure 2-39: Opening the Door That Covers the Voltage Switch on the Cabinet Model



c. Peel back the label covering the switch to see the voltage setting.

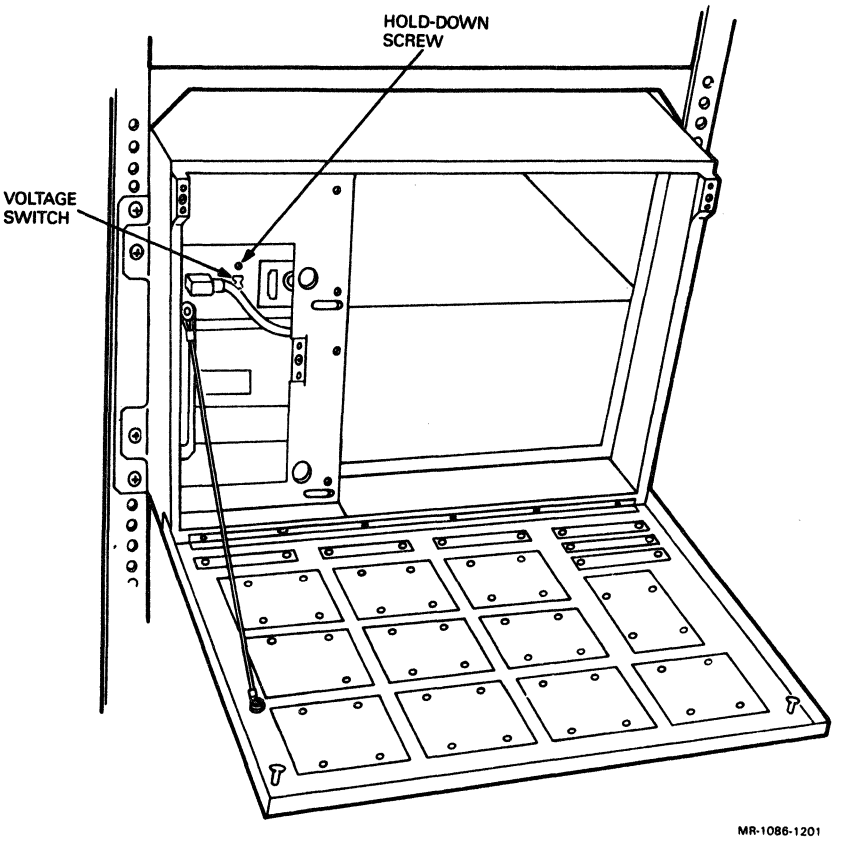
d. If necessary, change the switch setting to match the voltage source you are using (Figure 2–40).

CAUTION: *An incorrect voltage setting can damage your system.*

e. Close the access door and secure the door screw.

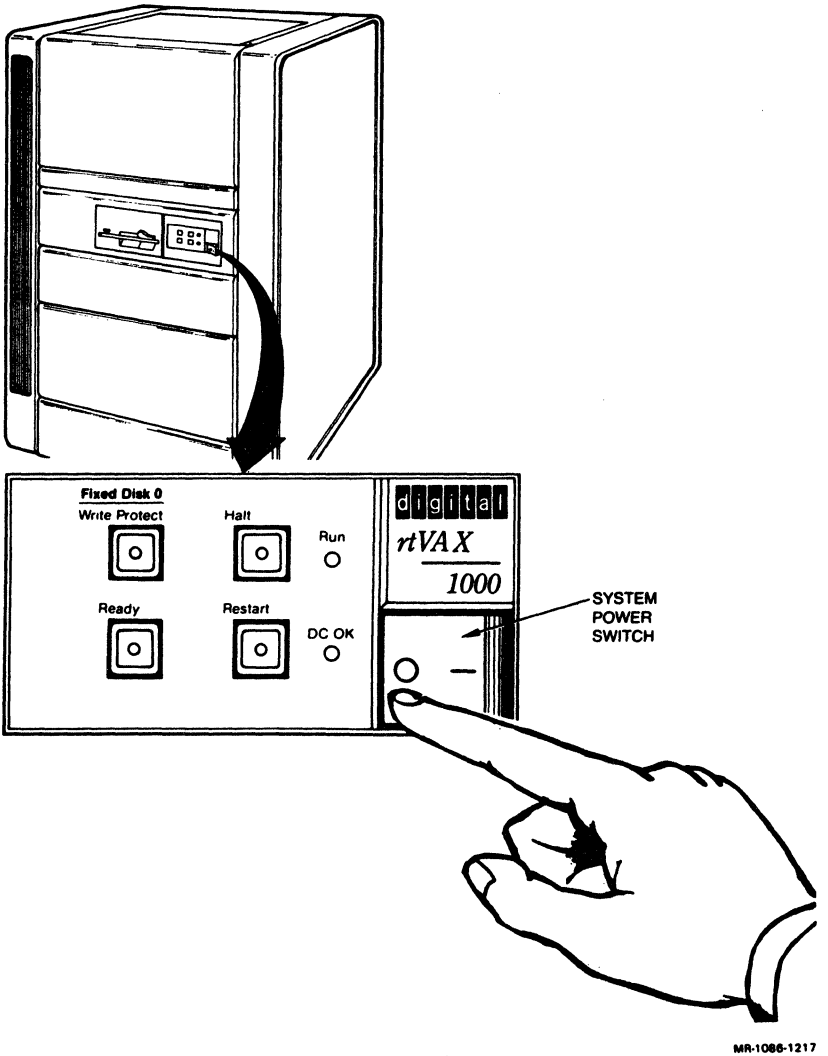
f. Raise the backpanel and secure the two screws.

Figure 2–40: Checking the Voltage Setting on the Cabinet Model



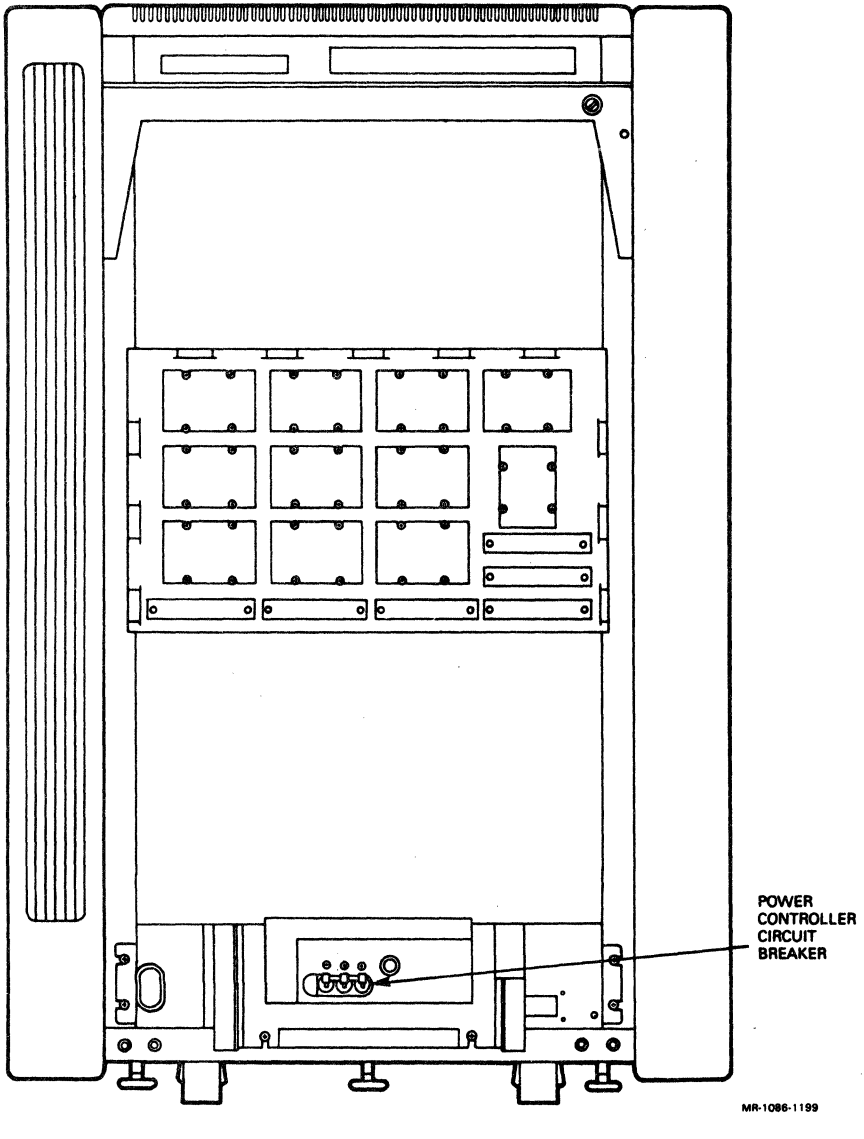
11. Set the power switch on the control panel to 0 (off) (Figure 2-41).

Figure 2-41: Setting the Power Switch to 0 (Off) on the Cabinet Model



12. Plug the power cord into the appropriate electrical receptacle.
13. Make sure the circuit breaker at the lower rear of the system is set to 1 (on) (Figure 2-42).

Figure 2-42: Setting the Power Controller Circuit Breaker to 1 (On)

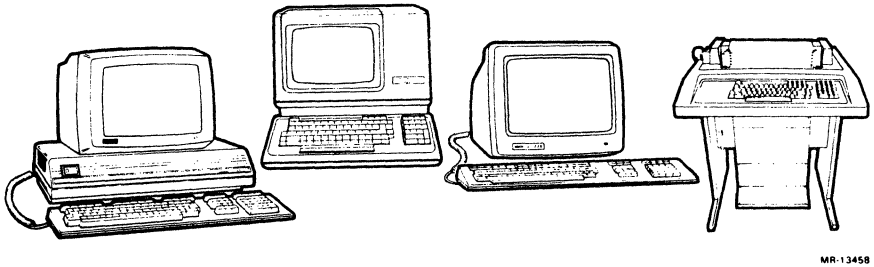


2.3 TESTING

Testing your system consists of turning the system on, selecting a language, and running the power-up self-tests. The language you select controls only the language of the console program. The console program enables you to give commands to the system and also generates error messages. The console program is described in Chapter 3. The console commands and error messages are described in Chapter 4.

1. Turn on your console terminal (Figure 2-43) and wait until it has performed its self-tests successfully.

Figure 2-43: Turning on the Console Terminal

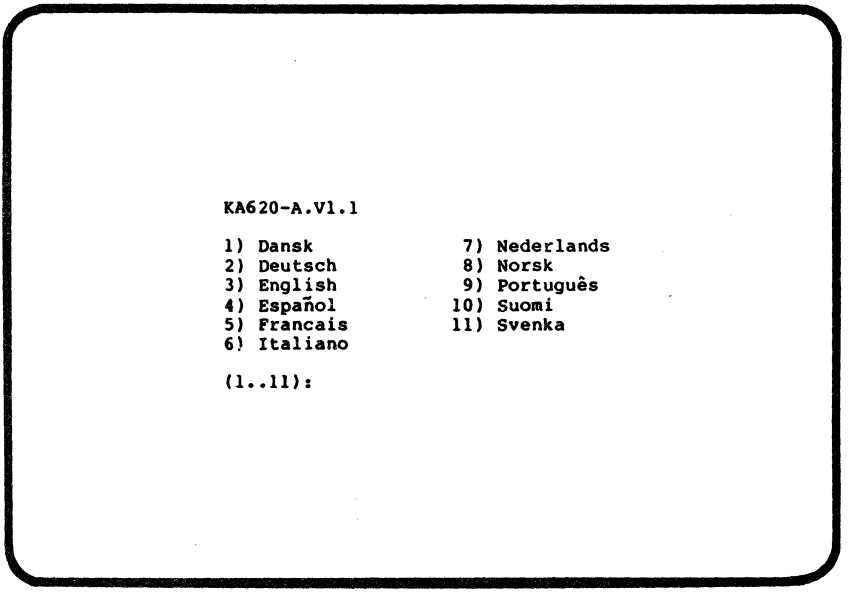


2. Turn on your system by setting the power switch to 1 (on).

   Within a few moments, the language selection menu should appear on your console terminal (Figure 2-44).

   NOTE: *If your terminal does not support multiple languages, the language selection menu does not appear and the system defaults to English.*

Figure 2–44: Language Selection Menu



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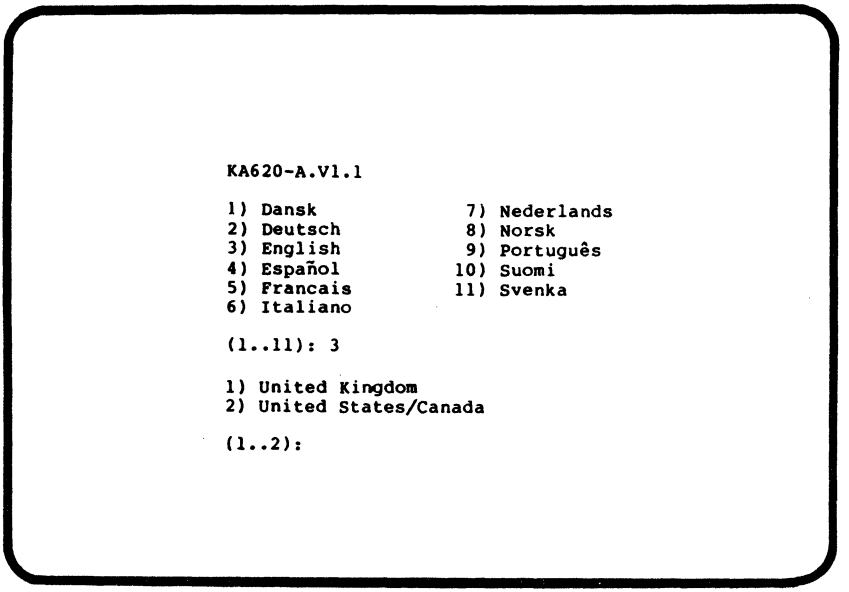
NOTE: *The version number on your display can differ from that shown in Figures 2–44 and 2–45.*

3. Select a language by typing the number corresponding to your choice and pressing Return.

   If you selected English (menu number 3), you are prompted for a version choice of either United Kingdom or United States/Canada (Figure 2–45).

4. Select a version of English by typing the number corresponding to your choice and pressing Return.

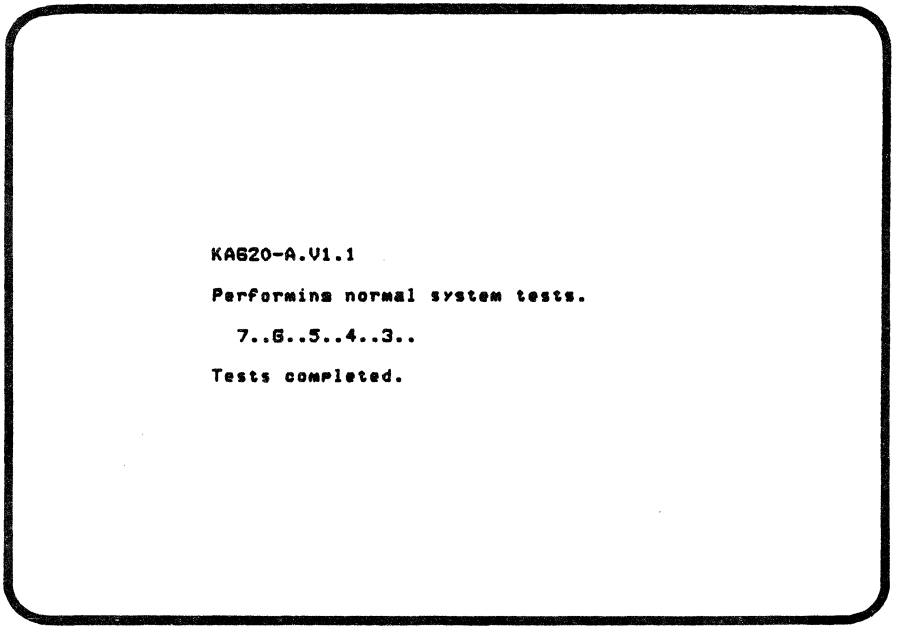
Figure 2-45: English Language Selection



MR-1086-1205

After you select a language, the system runs power-up self-tests. Within a few moments you should see a countdown from 7 through 3 on the console terminal, as the system completes self-tests. Figure 2–46 shows a successful power-up test.

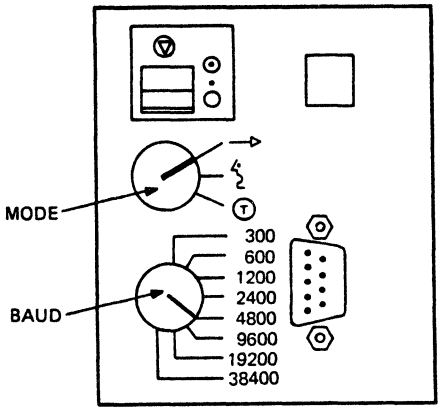
Figure 2–46: Successful Power-Up Display



MR-0187-0064

5. If the self-tests do not run as shown in Figure 2–46, your system may have a problem. Refer to Chapter 5 for instructions.
6. If the self-tests run successfully, turn the mode switch on the CPU distribution panel insert at the rear of the system to the right (or up) to the run position, indicated by an arrow (Figure 2–47). This saves the language you selected.

Figure 2-47: Saving the Selected Language



7. Reattaching the rear panel is the final step of installation. However, you may want to wait until after you install system software, since you need access to the halt enable/disable switch during software installation. When you have finished installing system software, attach the rear panel. Make sure that all cables are threaded through the guide at the bottom of the system. Push the rear panel into place.

You should now read Chapter 4 to learn how to use your system. You must know how to operate the system controls and load software from the RX33 diskette drive or over the network from a host system.

Digital recommends that you run the diagnostic software supplied with your system before you install system software. The diagnostic software, for disk based systems, is on several RX50 diskettes labeled MV DIAG CUST RX50. The diagnostic software, for diskless systems, is on media suitable for loading on the network host system. Chapter 5 describes how to run the diagnostic software.

Chapter 3
CONFIGURATION

This chapter contains information for configuring the rtVAX 1000 system. Information is included for all system components that are a standard part of an rtVAX 1000 base system package, such as the the RQDX3 disk controller. For information on configuring option modules that are not part of the base system, see the user's or installation guide supplied with the option module, or see the *rtVAX 1000 System Maintenance Guide*.

3.1 CPU AND MEMORY

The rtVAX 1000 system contains a KA620-A CPU module and a CPU distribution panel insert. The CPU module has on-board memory and supports up to two MS630 memory modules, with total support of 16 megabytes of physical memory. Each MS630 memory module is optional.

NOTE: *When two 8-megabyte memory modules (MS630-CA) are installed, the 1 megabyte of on-board memory is disabled. The rtVAX 1000 system has a 16-megabyte limit on physical memory.*

3.1.1 KA620-A CPU Module

The KA620-A CPU module includes the following features.

- rtVAX processor chip, with a subset of the VAX instruction set and data types, as well as a VAX-compatible, demand-paged, memory management unit
- rtVAX floating-point unit chip
- 1 megabyte of on-board memory, with support for up to 16 megabytes of physical memory
- Console serial line unit (SLU) with externally selectable baud rate (The console SLU is accessed through four VAX internal processor registers (IPRs).)

- Interval timer with 10-millisecond interrupts, which are enabled through an IPR
- 64-kilobyte boot/diagnostic ROM, with a subset of the VAX console program, power-up diagnostics, and boot programs for standard devices
- Q22-Bus map/interface (Direct memory access (DMA) for all local memory. The KA620-A fields Q22-Bus interrupt requests BR7 through BR4.)
- Support for up to 4 gigabytes (2**32) of virtual memory

The KA620-A supports the following VAX data types.

- Byte, word, longword, and quadword
- Character string
- Variable length bit field
- f_floating, d_floating, and g_floating

The remaining VAX data types are supported through software emulation.

The KA620-A implements the following subset of the VAX instruction set.

- Integer
- Address
- Variable length bit field
- Control and procedure call
- Queue
- Character string moves (MOVC3 and MOVC5)
- Floating point

The remaining VAX instructions are supported by software emulation.

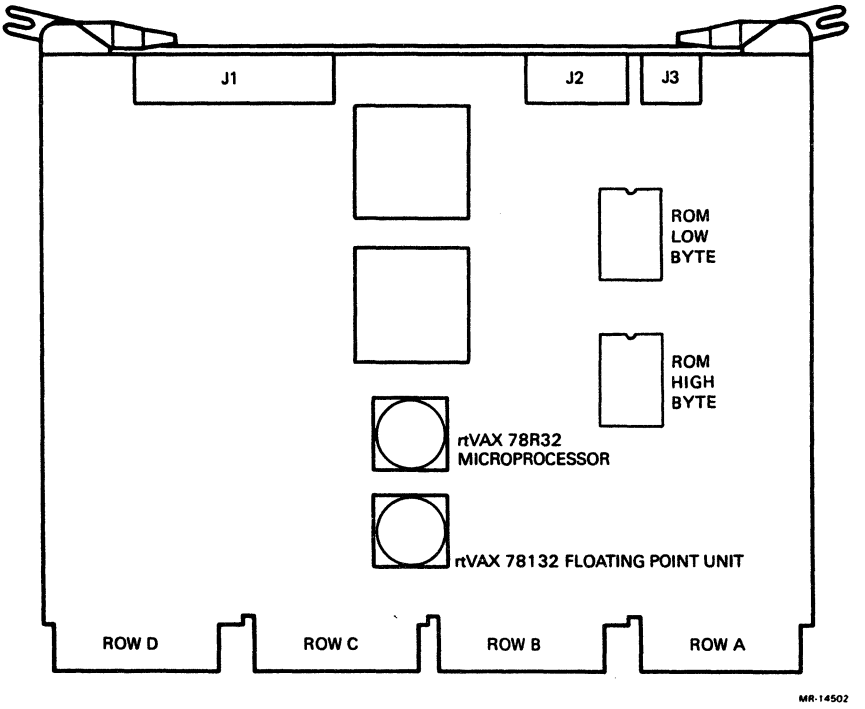
The KA620-A communicates with mass storage and peripheral devices by using the Q22-Bus. The KA620-A communicates with MS630 memory modules through a local memory interconnect (CD interconnect) in the CD rows of backplane slots 1, 2, and 3 of the BA23-A enclosure, and through a cable between the KA620-A and MS630s.

The KA620-A (Figure 3-1) has three connectors.

- J1, for a cable to an MS630 memory module
- J2, for a cable to the configuration and display connector on the CPU distribution panel insert
- J3, for a cable to the internal console SLU connector on the CPU distribution panel insert

CAUTION: *The KA620-A CPU module must be installed in slot 1 of the BA23-A backplane.*

Figure 3–1: KA620-A CPU Module



3.1.1.1 Console Program

The console program is in two ROM chips on the KA620-A. This program receives control whenever the processor halts. For the KA620-A, a halt means only that processor control passes to the console program, not that instruction execution stops. The processor halts when any of the following occur.

- System power-up
- A halt signal is received from one of the following

  The operator's console terminal
  The Halt button on the control panel
  The Restart button on the control panel
- Processor execution of a halt instruction
- A serious system error

At power-up, the system enters one of three power-up modes selected by the mode switch on the CPU distribution panel insert. The console program then determines the console device type and console language.

If the console device supports the multinational character set (MCS), the console program prompts the user for the language (11 choices) to use. Then the user's language is recorded in battery backed-up RAM. When the mode switch is in the → (run) position, the selected language is saved when the system is turned off.

If the console device does not support the MCS, the language prompt does not appear and the console program defaults to English.

The first message displayed on the console terminal at power-up or restart is "Performing normal system tests." The terminal also displays a countdown of the tests as each test runs. This countdown appears on the console terminal, on the LED display on the CPU distribution panel insert, and on LEDs on the KA620-A. These tests check the CPU, memory, and Q22-Bus interface. Diagnostic codes and corresponding tests are described in Chapter 5.

If halts are enabled by the switch on the CPU distribution panel insert, the console program enters console mode in response to any halt condition (including system power-up). Console mode lets the user control the system through the console terminal by using a console command language (described in Chapter 4). The console mode prompt is >>>.

3.1.1.2 Primary Bootstrap Program

If the halt enable/disable switch on the CPU distribution panel insert is set to disable halts and the tests run successfully, the console program tries to load and start (bootstrap) system software. The program searches for a 64-kilobyte segment of correctly functioning memory. Then the program copies a primary bootstrap program, called virtual memory bootstrap (VMB), from the console program ROM into the segment. The console program branches to the VMB, which tries to bootstrap system software from one of the devices in Table 3-1 (in the order shown).

Table 3–1: Console Program Boot Sequence

Boot Sequence	Device	Device Designator[1]
1	RQDX3	DUmn (removable disk)
2	RQDX3	DUmn (fixed disk)
3	TQK50	MUmn
4	MRV11	PRmn
5	DEQNA	XQmn

[1] m = controller designator (A = first, B = second, and so on)
n = unit number of device on the controller

When VMB determines that a controller is present, VMB searches for a bootable unit that has removable media (in order of increasing unit number). If VMB finds none, it repeats the search for nonremovable media.

You can also direct the system to enter VMB through console mode. To do this, type the boot command at the console terminal followed by the controller designation and unit number (for example, >>> BOOT DUA0).

When the operating system boots, the processor no longer executes instructions from the console program ROM. The processor is then in program mode. In program mode, the operating system handles terminal interaction.

3.1.2 CPU Distribution Panel Insert

The CPU distribution panel insert (Figure 3-2) is mounted in the I/O distribution panel at the rear of the system enclosure. The CPU distribution panel insert contains the following components.

3 switches
1 LED display
1 external connector
2 internal connectors
1 battery backup unit (BBU)

Figure 3–2: CPU Distribution Panel Insert

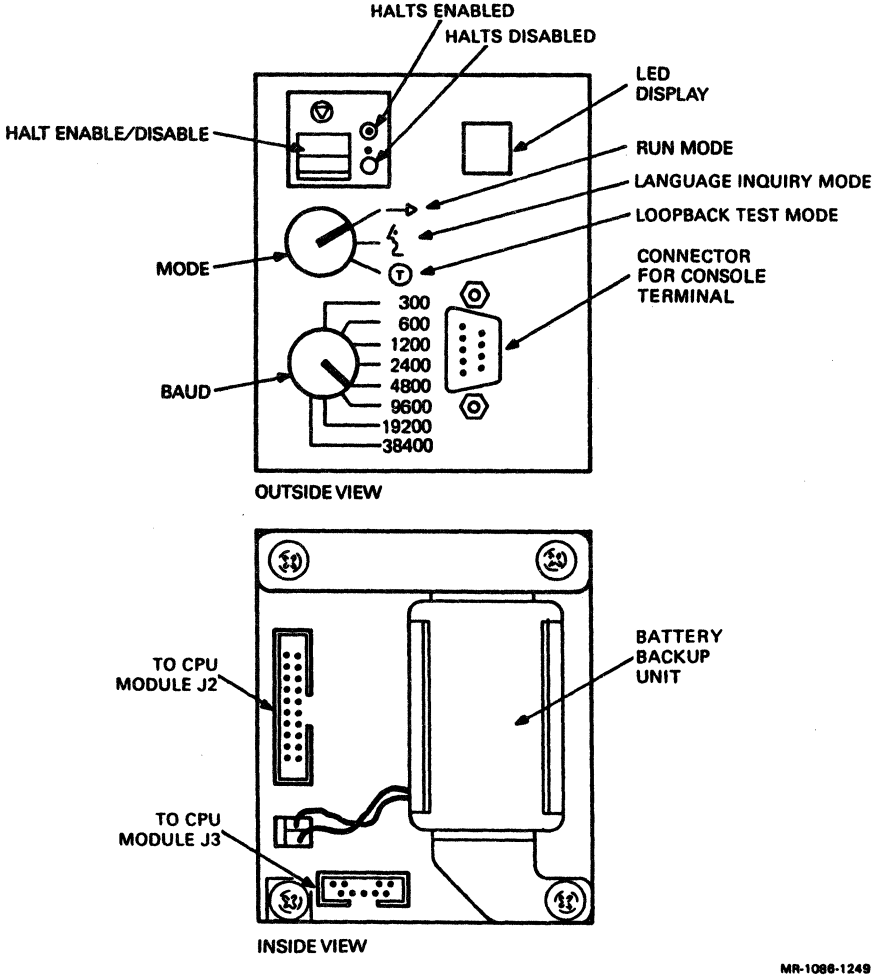


Table 3-2 lists the functions of the three switches on the CPU distribution panel insert.

Table 3–2: Switches on the CPU Distribution Panel Insert

Switch	Position	Function
Halt enable/disable (2-position toggle)	Dot outside circle (factory setting)	Disables halts. On power-up or restart, the system tries to load software from the first available device at the completion of start-up diagnostics.
	Dot inside circle	Enables halts. On power-up or restart, the system enters console mode at the completion of start-up diagnostics.
Mode (3-position rotary)	Arrow (factory setting)	Sets the system to run mode. If the console terminal supports multiple languages, the user is prompted for a language only if the battery backup unit failed. Full start-up diagnostics run.
	Face	Sets the system to language inquiry mode. If the console terminal supports multiple languages, the user is prompted for a language at every power-up and restart. Full start-up diagnostics run.
	T in a circle	Sets the system to loopback test mode. ROM programs run wraparound serial line unit (SLU) tests.
Baud (8-position rotary)	300 600 1200 2400 4800 (factory setting) 9600 19200 38400	Sets the baud rate of the console terminal's serial line. The baud rate of this switch must match that of the console terminal.

The LED display on the CPU distribution panel insert displays power-up test numbers and booting procedures in hexadecimal notation. If a failure occurs, the display indicates the most probable cause of the failure. Chapter 5 lists the definitions of test numbers.

The console SLU connector (external) is a 9-pin connector for a cable to the console terminal.

The console SLU connector (internal) is a 9-pin connector for a cable to connector J3 of the KA620-A.

The configuration and display connector (internal) is a 20-pin connector for a cable to connector J2 of the KA620-A. This cable connects the three switches and the LED display to the KA620-A.

When the system is off, the battery backup unit (BBU) (internal) provides power to the time-of-year (TOY) clock chip on the KA620-A. The code for the user's language is stored in RAM on this chip and is lost if the BBU fails.

For more information, see the *rtVAX KA620-A CPU Module User's Guide.*

3.1.3 MS630 Memory Module

The MS630 memory module provides memory expansion for the KA620-A CPU module. MS630 is available in four versions (Table 3-3), all with 256K RAM chips. MS630 does not require jumper or switch configuration.

Table 3–3: MS630 Memory Module Versions

Version	Size (Megabytes)	Module Height	Module Number
MS630-AA	1	Dual	M7607
MS630-BA	2	Quad	M7608
MS630-BB	4	Quad	M7608
MS630-CA	8	Quad	M7609

You can use one or two MS630s in the rtVAX 1000 system. The MS630s interface with the KA620-A through the local memory interconnect (in the CD rows of slots 1 through 3 on the backplane), and through a 50-pin cable. This cable is installed between J1 of the KA620-A and the corresponding J connector on one or both MS630s.

Hardware settings on the module are not necessary.

CAUTION: *Install MS630-B modules only in slots 2 or 3. Do not install these modules in Q22-Bus slots 4 through 8. Install the MS630-AA module only in the CD rows, with grant cards in the AB rows, of slots 2 or 3.*

3.2 ETHERNET COMMUNICATIONS CONTROLLER

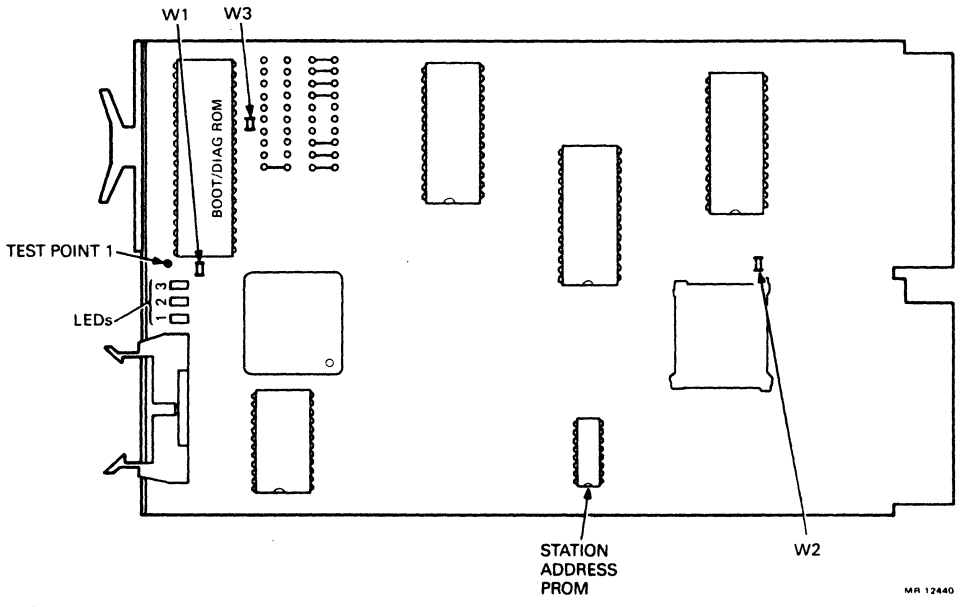
Some rtVAX 1000 systems are shipped with a DEQNA Q-Bus-to-Ethernet communications controller as a standard feature of the base system package.

The DEQNA is a dual-height module used to connect a Q22-Bus system to a local area network (LAN) based on Ethernet. The DEQNA can transmit data at a rate of 1.2 megabytes per second through an Ethernet coaxial cable.

For high Ethernet traffic, a second DEQNA can be installed. See Digital's *Network and Communications Buyer's Guide* for ordering information.

The DEQNA module is configured by using three jumpers, W1 through W3 (Figure 3-3).

Figure 3–3: DEQNA Ethernet Controller Module



DELQA Ø8 11 2-ØD-GG-DØ

Jumper 1 (W1) determines the CSR address assignment. The DEQNA CSR addresses are fixed, as in Table 3-4.

Table 3–4: DEQNA CSR Address Assignment

Module	CSR Address
1	17774440
2	17774460

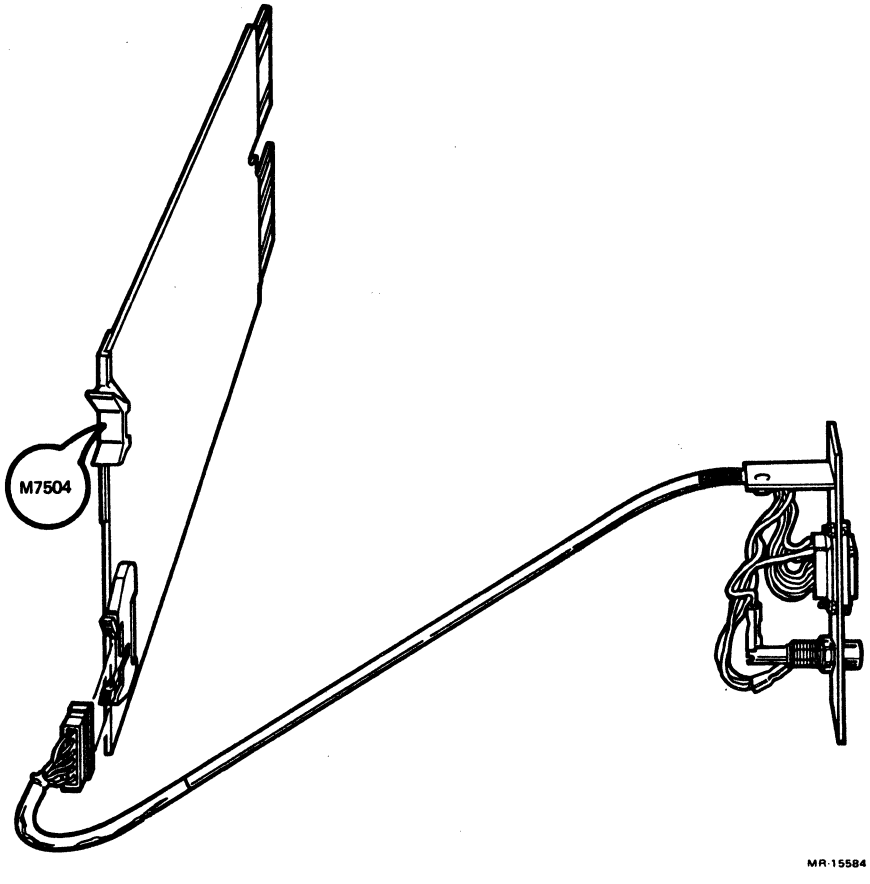
If you are installing two DEQNAs, move jumper W1 of the second DEQNA onto the left and center pins (module edge toward you, Figure 3-3).

The interrupt vector is fixed at 120 for the first DEQNA and floating for a second DEQNA. Hardware configuration is not required.

Jumper W2 is usually removed. When removed, it provides fair access to all DMA devices that use the Q22-Bus by causing the DEQNA to wait 5 microseconds before requesting the bus again. Jumper W3 is usually installed. When installed, W3 disables a sanity timer at initialization. Figure 3-4 shows the DEQNA internal cabling.

For more information, see the *DEQNA Ethernet User's Guide*.

Figure 3–4: DEQNA Internal Cabling



3.3 MASS STORAGE DEVICES

Some rtVAX 1000 systems are shipped with mass storage devices installed as standard components of the base system package. The mass storage devices are an RQDX3 disk controller, RX33 diskette drive, and RD31 fixed-disk drive.

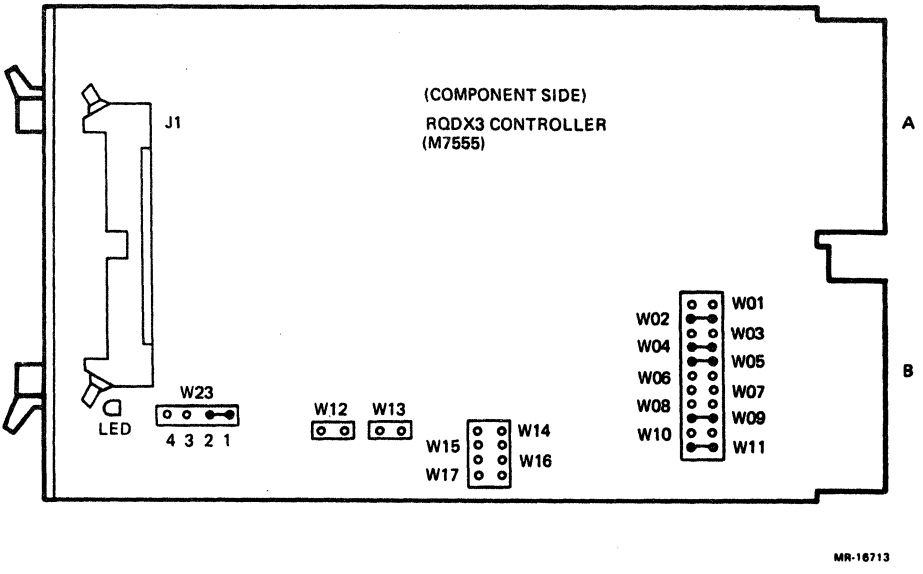
3.3.1 RQDX3 Disk Controller

The RQDX3 is an intelligent controller with on-board microprocessors that interface diskette drives and fixed-disk drives to the Q22-Bus. Direct memory access (DMA) transfers data between the controller and system memory. Programs communicate with the controller and drives by using Mass Storage Control Protocol (MSCP).

The RQDX3 can control up to four drives. Each RX33 counts as one drive, and each RD31 counts as one drive.

Figure 3-5 shows the jumper and LED locations for the RQDX3.

Figure 3-5: RQDX3 Disk Controller Module



The CSR address of the first MSCP controller is fixed (17772150). If a second controller is installed, its CSR address is floating. Table 3-5 lists the factory setting and common settings for a second MSCP controller.

Table 3–5: RQDX3 CSR Address

Starting Address	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2
Factory Setting											
17772150	1	0	1	0	0	0	1	1	0	1	0
Possible Settings for a Second RQDX3											
17760334	0	0	0	0	0	1	1	0	1	1	1
17760354	0	0	0	0	0	1	1	1	0	1	1
17760374	0	0	0	0	0	1	1	1	1	1	1

Address Bits (Jumpers)

1 = Installed
0 = Removed

The interrupt vector for the RQDX3 is set under program control. The first controller is assigned a fixed interrupt vector of 154. If a second controller is installed, its interrupt vector is floating.

You should not install logical unit number (LUN) jumpers (W12 through W17) on the RQDX3 installed in your rtVAX 1000 system.

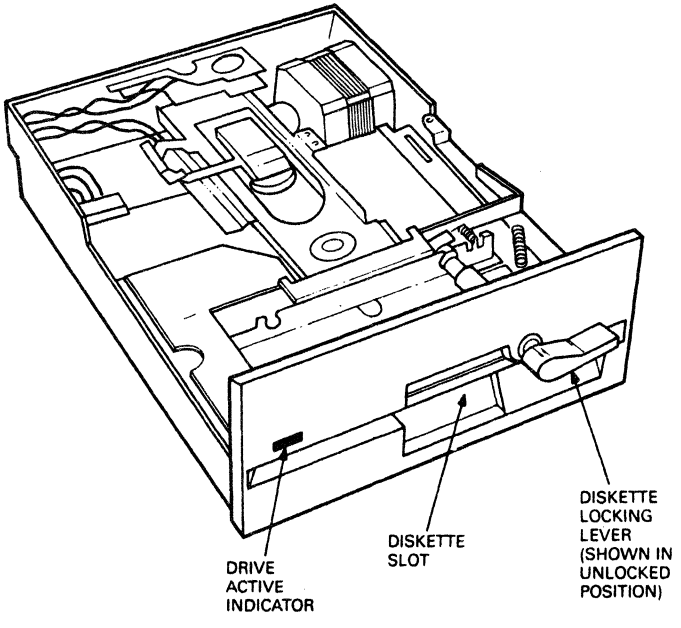
For more information, see the *RQDX3 Controller Module User's Guide*.

3.3.2 RX33 Diskette Drive

The RX33 is a 13.3-centimeter (5.25-inch), double-sided, half-height, diskette drive (Figure 3-6). It has two operating speeds for normal and high density (up to 96 tracks per inch). At normal-density speed, the RX33 provides full read/write compatibility with RX50 single-sided drives. At high-density speed, the RX33 provides full read/write compatibility with industry-standard double-sided drives. With RX33K media installed and operating at high-density speed, the RX33 provides a total formatted capacity of 1.2 megabytes.

The RX33 mounts in the BA23-A base system enclosure and interfaces to the Q22-Bus through the RQDX3 disk controller. An indicator on the front of the RX33 indicates when the system is reading or writing the diskette in the drive.

Figure 3-6: RX33 Diskette Drive



To configure the RX33, you must install jumpers and components on its drive electronics board (Figure 3-7). Table 3-6 lists the RX33 jumpers installed in a standard rtVAX 1000 system configuration.

Figure 3-7: RX33 Configuration Components

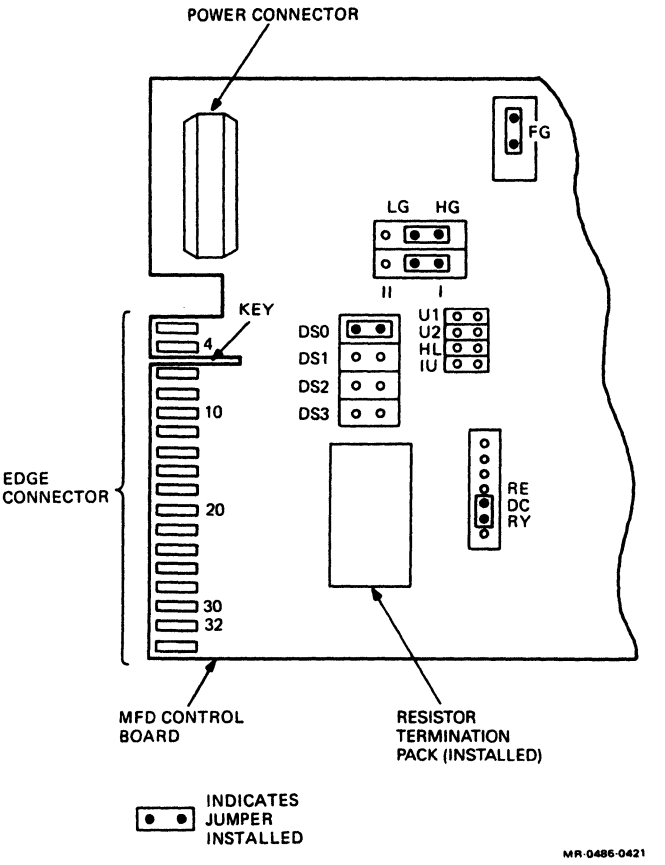


Table 3–6: RX33 Standard Configuration Jumper Settings

Jumper Installed	Function
DS0	Configures the drive to respond to drive select line 0 from the controller.
HG and I	Allows the system software to control the drive operating speed (normal or high density).
FG	Grounds the frame by connecting the 0 volt return pins on the dc power connector to the RX33 frame.
DC	Selects the diskette change signal.

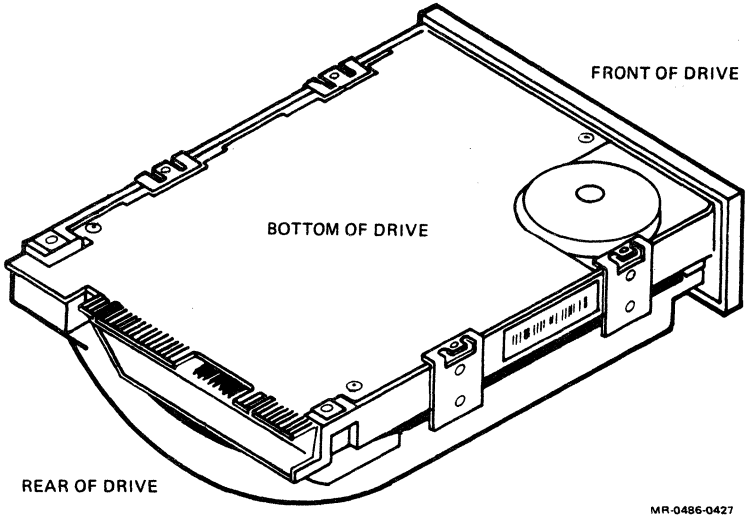
The RX33 used in the rtVAX 1000 system has a resistor termination pack installed.

For more information, see the *RX33 Diskette Drive Technical Manual.*

3.3.3 RD31 Fixed-Disk Drive

The RD31 is a 13.3-centimeter (5.25-inch), half-height, fixed-disk drive with a formatted storage capacity of 20 megabytes (Figure 3-8). The drive is a random access, noncontact drive that uses nonremovable disks.

Figure 3–8: RD31 Fixed-Disk Drive



The RD31 mounts in the BA23-A system enclosure and interfaces with the Q22-Bus through the RQDX3 disk controller.

To configure the RD31, you must install jumpers and components on its drive electronics board (Figure 3-9). Table 3-7 lists the RD31 jumpers installed in a standard rtVAX 1000 system configuration.

Figure 3-9: RD31 Configuration Components

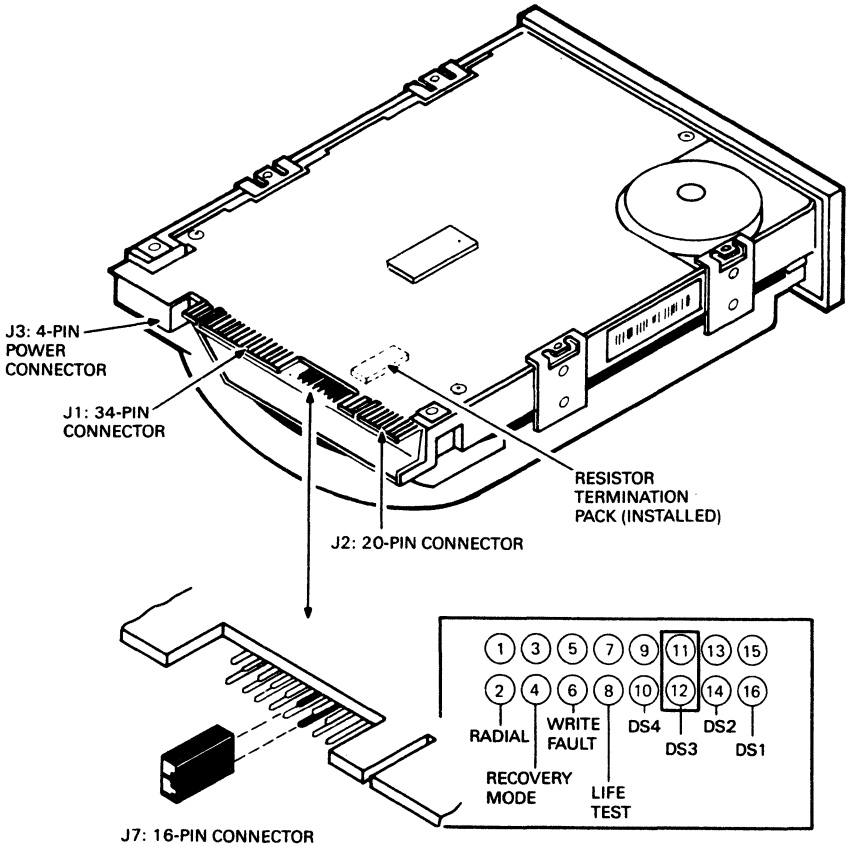


Table 3–7: RD31 Standard Configuration Jumper Settings

Jumper Installed	Function
DS3 (pins 11 to 12)	Configures the drive to respond to drive select line 3 from the controller.

CAUTION: *Do not install the life test pins (7 to 8) or the recovery mode pins (3 to 4). These jumpers are for factory test use only.*

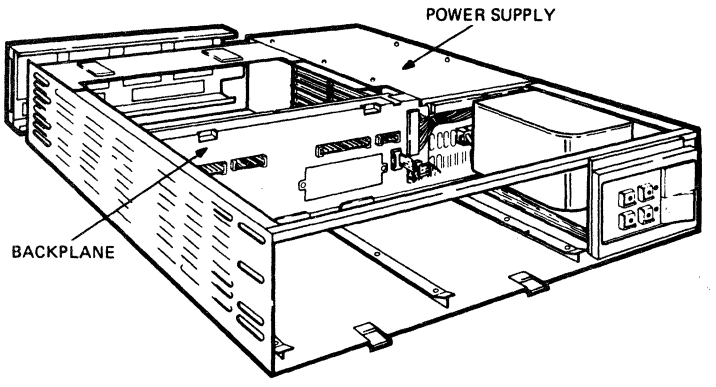
The RD31 used in the rtVAX 1000 system has a resistor termination pack installed.

For more information, see the *RD31-A Disk Drive Technical Description.*

3.4 BASE SYSTEM ENCLOSURE

The BA23-A is the base system enclosure in all rtVAX 1000 systems. The BA23-A is an air-cooled enclosure that houses the base system components, such as the power supply and backplane assembly (Figure 3-10). The BA23-A also provides space for two 13.3-centimeter (5.25-inch) mass storage devices.

Figure 3–10: BA23-A Base System Enclosure



The BA23-A mounts in a rack, pedestal, or H9642 cabinet. The pedestal can convert for tabletop use. Table 3-8 shows the dimensions and weight of various configurations.

Table 3–8: System Enclosure Dimensions and Weights

	Pedestal	Tabletop	Rack	Cabinet
Height	64.2 cm (25.3 in)	17.7 cm (7 in)	13.3 cm (5.2 in)	106.8 cm (42 in)
Width	25.4 cm (10 in)	56.2 cm (22.1 in)	48.3 cm (19 in)	64.6 cm (25.4 in)
Depth	72.6 cm (28.6 in)	72.6 cm (28.6 in)	64.3 cm (25.3 in)	91.4 cm (36 in)
Weight	31.75 kg (70 lb)	29.5 kg (65 lb)	24 kg (53 lb)	133.81 kg (295 lb)

3.4.1 Mass Storage

The front bezel on the BA23-A enclosure covers two slots for mounting standard 13.3-centimeter (5.25-inch) mass storage devices. The rtVAX 1000 system with factory-installed disks has an RX33 diskette drive in the top (or right) slot and an RD31 fixed-disk drive in the bottom (or left) slot.

3.4.2 Backplane Assembly

The backplane assembly in the BA23-A enclosure consists of the following three major parts (Figure 3-11)

BA23-A mass storage signal distribution panel
Sheet metal mounting bracket
H9278 backplane

3.4.2.1 Mass Storage Signal Distribution Panel

The RX33 diskette and RD31 fixed-disk drives installed in the BA23-A enclosure connect to the mass storage signal distribution panel. Figure 3-12 shows the internal cabling setup for the BA23-A enclosure.

Figure 3–11: Backplane Assembly (Front View)

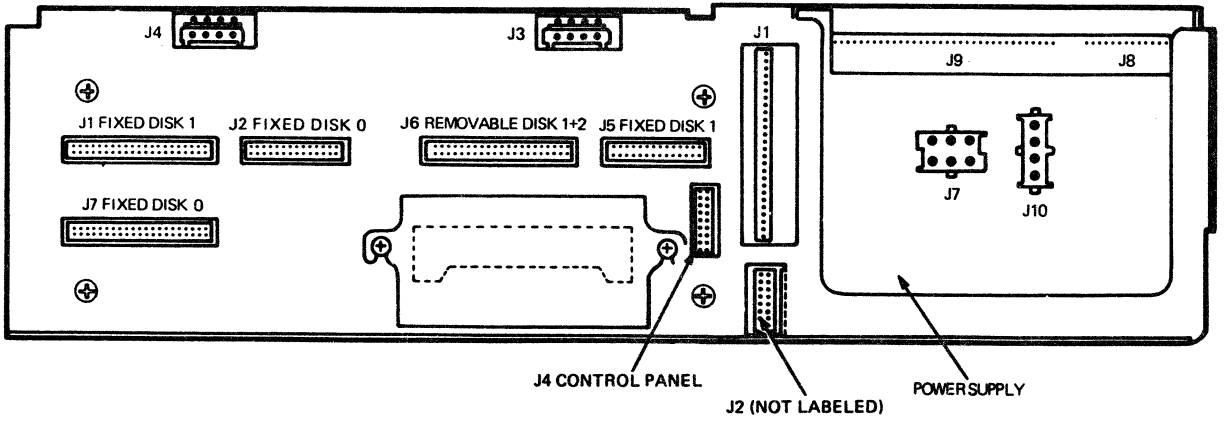
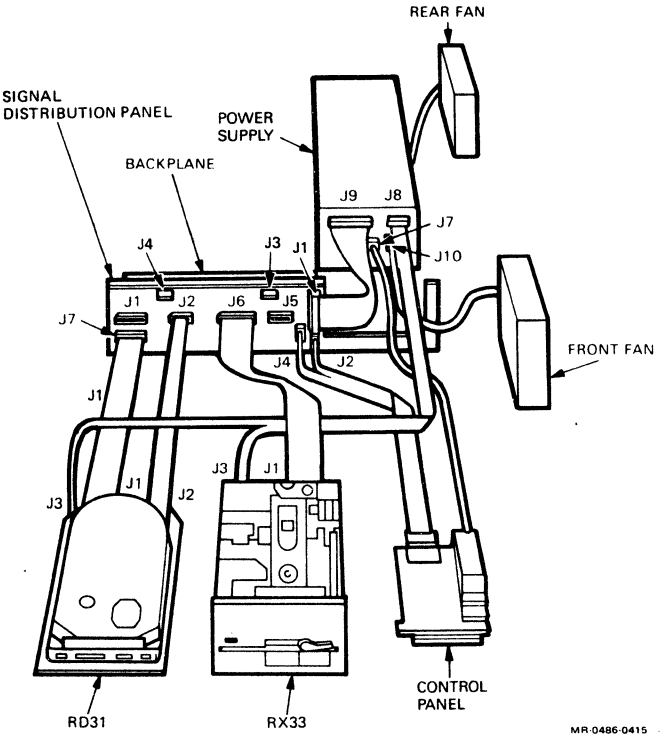


Figure 3–12: BA23-A Internal Cabling



The mass storage signal distribution panel provides the signal connectors for internal cabling between the RQDX3 disk controller in the Q22-Bus backplane and the disk drives. Six connectors on the panel provide the following functions.

- J6 REMOVAL DISK 1+2 provides the signals to a single- (RX33) or dual- (RX50) unit diskette drive. When a fixed-disk drive is present, the ROM code labels the single-unit diskette drive as disk unit 1 (DUA1), and the dual-unit diskette drive as disk unit 1 (DUA1) and disk unit 2 (DUA2).
- J2 FIXED DISK 0 and J7 FIXED DISK 0 provide the signals to the first fixed-disk drive to be booted. The ROM code labels this fixed-disk drive as disk unit 0 (DUA0).
- J1 FIXED DISK 1 and J5 FIXED DISK 1 provide the signals to the second fixed-disk drive to be booted. Use these connectors when installing a second fixed-disk drive in the BA23-A enclosure. The ROM code labels this disk drive as disk unit 1 (DUA1).

- J4 CONTROL PANEL provides the signals to the control panel printed circuit (PC) board from the mass storage signal distribution panel.

3.4.2.2 H9278 Backplane

The H9278 backplane in the BA23-A enclosure supports up to 30 ac loads and 20 dc loads. AC loading is the amount of capacitance a module presents to a bus signal line; 1 ac load equals 9.35 picofarads. DC loading is the amount of dc leakage a module presents to a bus signal line; 1 dc load is about 105 microamperes. The backplane itself presents seven ac loads and no dc loads.

NOTE: *When a second (optional) BA23 enclosure is added to the H9642 cabinet model, each H9278 backplane supports up to 17 ac loads and 20 DC loads. For more information on configuring multiple-backplane systems, see the rtVAX 1000 System Maintenance Guide.*

Four connectors on side 2 of the backplane provide the following functions (Figures 3-11 and 3-12).

- J1 provides the connection for the power supply backplane cable that carries the dc power and signals from the power supply.
- J2 provides the signals to the control panel PC board from the KA620-A CPU module.
- J3 and J4 provide for termination of the mass storage power cable when no mass storage device is present.

The backplane implements the extended LSI-11 bus, which uses 22-bit addressing. This bus is commonly called the Q22-Bus.

The backplane contains eight slots of connectors for inserting modules compatible with the Q22-Bus. Four rows, A, B, C, and D, run across each slot. Figure 3-13 shows the connectors that supply the Q22-Bus signal to the modules. The figure also shows the priority and grant continuity of the backplane.

See Section 3.5 for module removal and installation procedures. Section 3.7 describes the configuration rules that you should follow when configuring your system.

3.4.3 Power Supply and Fans

The H7864 power supply (Figure 3-14) features protection against excess voltages and currents, and temporary fluctuations in the ac supply.

Figure 3–13: Backplane Priority and Grant Continuity Chain

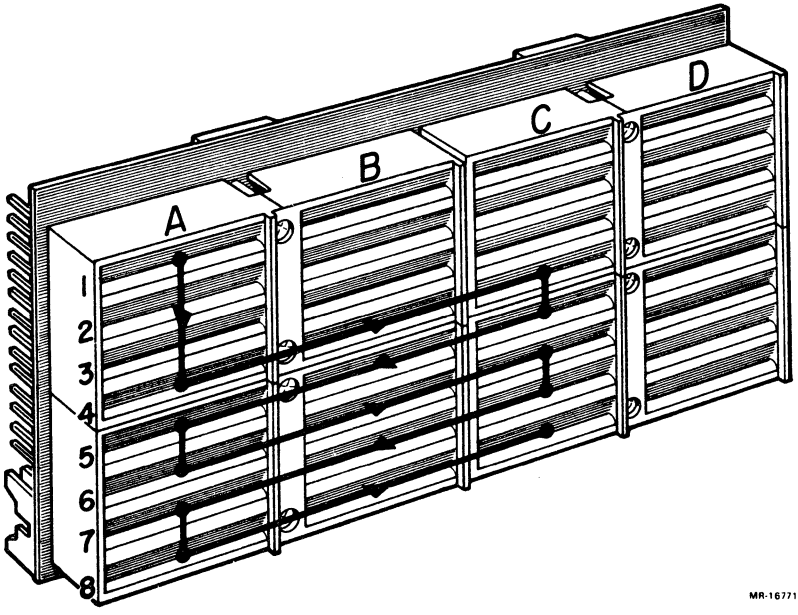
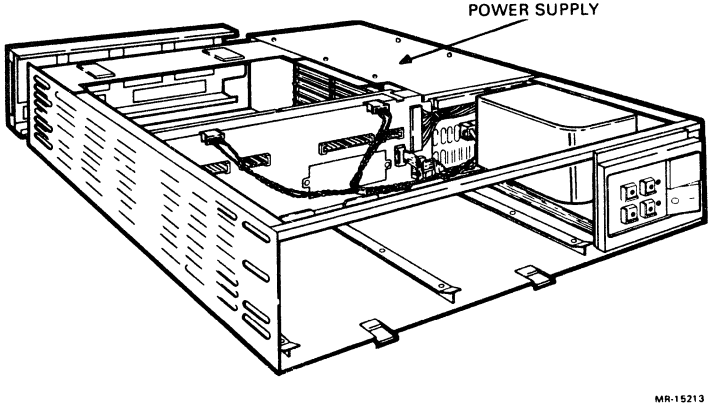


Figure 3–14: Power Supply Location



This power supply is a 230-watt unit that supplies +5 Vdc at 4.5 A to 36 A and +12 Vdc at 0 A to 7 A to the following components.

Backplane
Fixed-disk drive
Diskette drive

The power supply also includes two +10 Vdc at 0.45 A fan outputs for the front and rear dc fans. The required fan power does not affect the 230-watt output specification. Table 3-9 lists the power supply specifications.

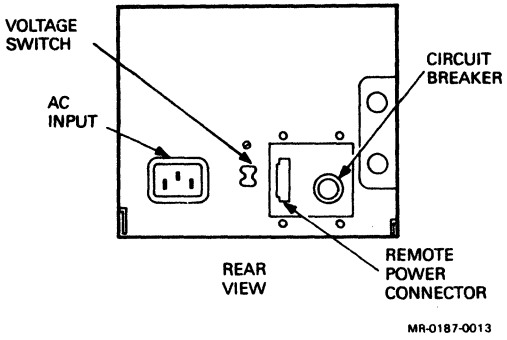
Table 3-9: H7864 Power Supply Specifications

Power	Specification
+5 Vdc Output	
Voltage	+5.1 Vdc +/-2.5%
Current	36 A maximum 4.5 A minimum
Overcurrent	37 A minimum (averaged over 1 ms, must not trip) 42 A maximum (averaged over 1 ms, must trip)
Ripple and noise	50 mV peak-to-peak maximum
+12 Vdc Output	
Voltage	+12.1 Vdc +/-2.5%
Current	7 A maximum 0 A minimum
Normal overcurrent	7.2 A minimum (averaged over 1, must not trip) 8 A maximum (averaged over 1, must trip)
Start-up overcurrent	9 A for 10-s minimum (must not trip) 10 A for 5-s minimum (must not trip)
	11.5 A for 1-s minimum (must not trip)
	13 A for 500 microseconds (must trip)
Ripple and noise	75 mV peak-to-peak maximum

The rear of the power supply contains a connector for remote power control (Figure 3-15). An ac input connector provides compatibility with international line cords. A circuit breaker protects the input power line. The voltage switch selects the following two ranges.

120 V = 88 Vac—128 Vac
240 V = 176 Vac—256 Vac

Figure 3–15: Power Supply (Rear View)



The rear fan power cable is an integral part of the H7864 power supply.

The front of the power supply contains four connectors that provide the following functions (Figures 3-11 and 3-12).

- J7 provides the power for the control panel.
- J8 provides the voltages for the mass storage power cable. The mass storage power cable terminates in J3 on the backplane assembly if a removable media drive is not present, and in J4 if an RD31 fixed-disk drive is not present.
- J9 provides the power for the backplane. The backplane power cable terminates in J1 on the backplane assembly.
- J10 provides the power for the front fan.

3.4.4 I/O Distribution Panel

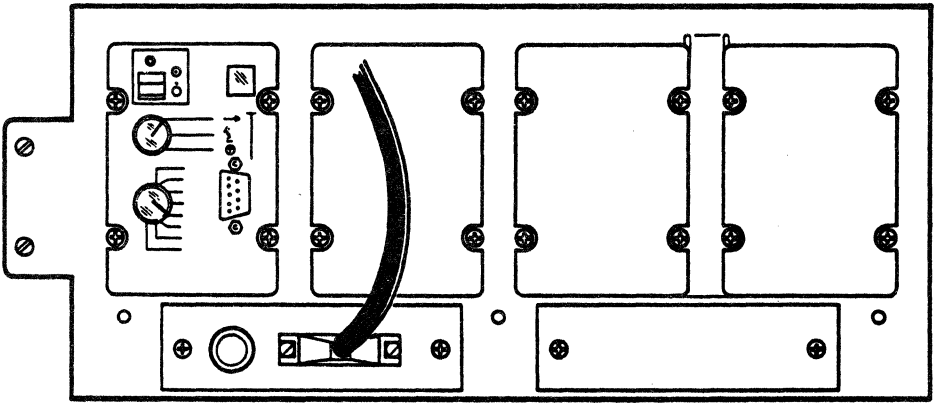
External devices connect to the system through the I/O distribution panel on the rear of the BA23-A enclosure.

Each module that connects to an external device comes with an internal cable, a filter connector, and an insert panel. Together, these three items are called a cabinet kit.

The filter connectors mount in the insert panels. The inserts install in cutouts in the I/O distribution panel. The BA23-A I/O distribution panel provides a place to install up to 6 (17 on the H9642 cabinet model) inserts, 2 of which (6 on the H9642 cabinet model) can contain 50-pin connector inserts.

Figure 3-16 shows the I/O distribution panel with the CPU distribution panel insert, which is typically installed in the top (or left) cutout.

Figure 3–16: I/O Distribution Panel



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The I/O distribution panel on the rack-mount, pedestal, and tabletop models has the following cutouts.

Two type A cutouts, 1.6 cm × 8.1 cm (0.6 in × 3.2 in)
Four type B cutouts, 6.2 cm × 8.1 cm (2.5 in × 3.2 in)

The I/O distribution panel on the H9642 cabinet model has the following cutouts.

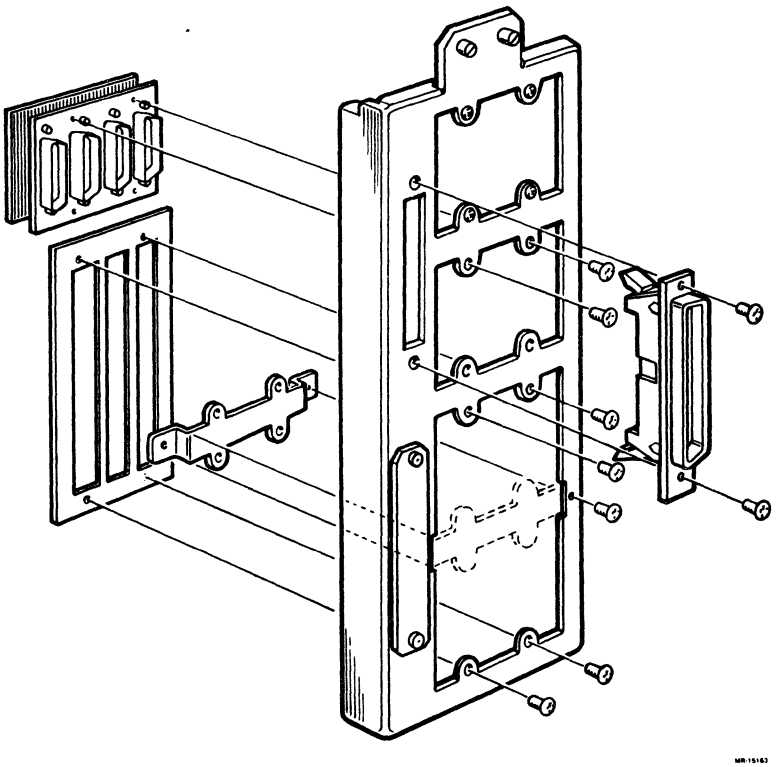
Six type A cutouts, 1.6 cm × 8.1 cm (0.6 in × 3.2 in)
Eleven type B cutouts, 6.2 cm × 8.1 cm (2.5 in × 3.2 in)

The inserts correspond to the following I/O distribution panel cutouts.

Type A = 2.5 cm × 10.1 cm (1 in × 4 in)
Type B = 6.6 cm × 8.2 cm (2.6 in × 3.2 in)

In addition, a removable bracket between the third and fourth cutouts lets you install three more type A inserts by installing an adapter plate. Figure 3-17 shows typical type A and type B inserts and the adapter plate.

Figure 3–17: I/O Insert Panels and Adapter Plate



3.5 MODULE REMOVAL AND INSTALLATION

CAUTIONS: *Static electricity can damage modules. Always use a grounded wrist strap and grounded work surface when you work with or around modules. An antistatic kit (PN 29-11762-00) provides the appropriate tools for use in module removal and replacement.*

Remove and install modules carefully to avoid damaging module components and other modules, especially when changing the switch settings.

NOTES: *New modules are wrapped in special antistatic packaging. A silica gel packet is also included to prevent damage from moisture. Use this antistatic packaging and silica gel packet to protect any modules you store, transport, or return.*

If you install dual-height Q22-Bus modules in slots 2 or 3 of the BA23-A backplane, you must install them in the AB rows. MS630-AA modules, if present, must be installed in the CD rows.

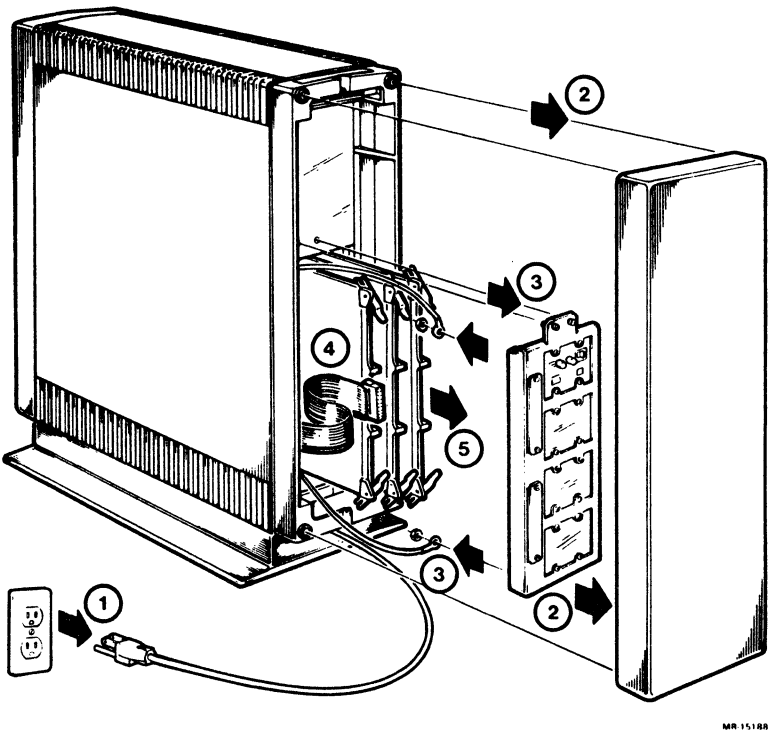
If no modules are to be installed in the AB rows of slots 2 or 3, you should install an M9047 grant continuity card in the AB rows of these slots. If you install dual-height modules in slots 4 through 8, you should also install an M9047 grant continuity card in the other two rows (AB or CD) if a second dual-height module is not installed in the same slot.

Use the following procedure to remove modules from the BA23-A enclosure (Figure 3-18). This procedure uses the pedestal model as an example.

1. Remove the ac power cord from the wall outlet.
2. Remove the rear cover and all cables. Label all cables for reinstallation later.
3. Loosen the two screws holding the I/O distribution panel assembly. Swing the assembly open and remove the ground strap screws.
4. Disconnect any cables attached to the back of the I/O distribution panel assembly. Note their location and the orientation of the red stripe on each cable.
5. Slide the modules partially out of the backplane and remove any cables that are present. Note the orientation of the red stripe on each cable.
6. Remove the module from the chassis.

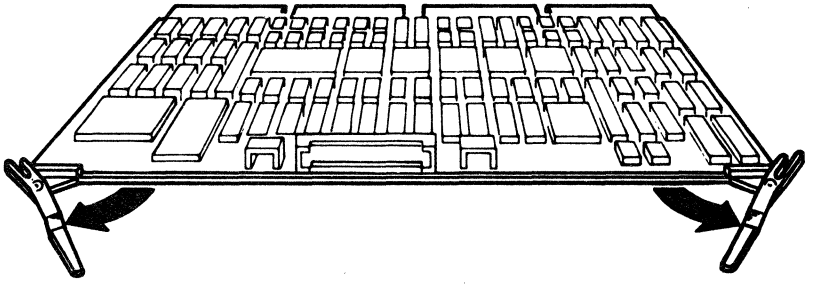
NOTE: *Write down the location of each module as you remove it to ensure correct reinstallation.*

Figure 3-18: Module Removal and Replacement



NOTE: *The Q22-Bus quad-height module has levers at each end that lock the module in place and release it from the backplane. Figure 3-19 shows how to operate these ejector levers.*

Figure 3–19: Quad-Height Module Ejector Levers



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Use the following procedure to install modules.

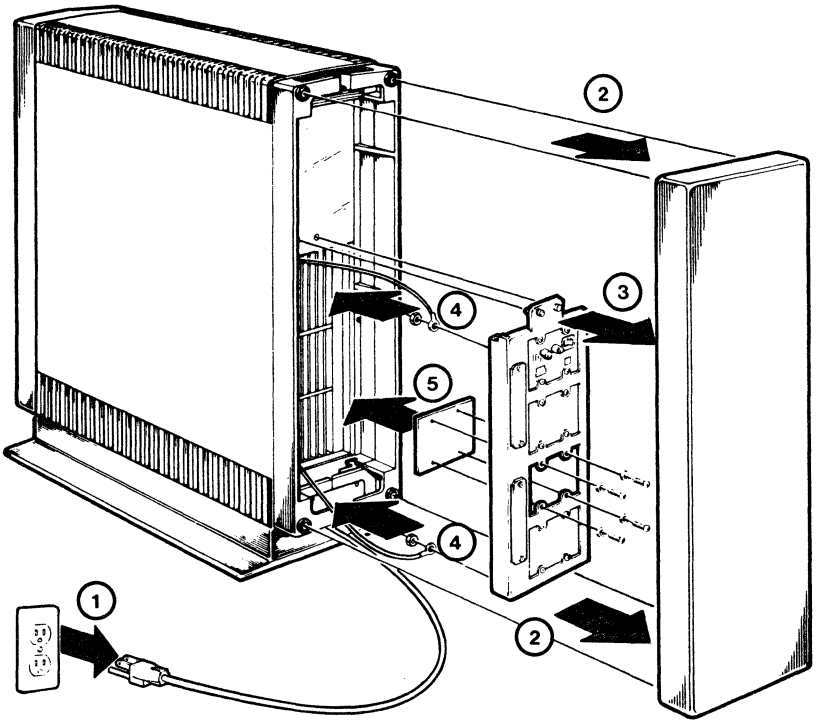
1. Make sure you set the jumper and switch configuration of new modules correctly. Check the setting against the old module or see the user's or installation guide supplied with the new module.
2. Reverse steps 1 through 6 of the removal procedure.
3. Retest the system to confirm that it is working correctly.

3.6 I/O DISTRIBUTION PANEL INSERT REMOVAL

Use the following procedure to remove an insert from the I/O distribution panel (Figure 3-20). This procedure uses the pedestal model as an example.

1. Remove the ac power cord from the wall outlet.
2. Remove the rear cover and all cables attached to the panel insert that is to be removed. Label the cables for identification.
3. Loosen the two screws holding the I/O distribution panel assembly. Swing the assembly open and remove the ground strap screws.
4. Disconnect any cables attached to the insert. Note the orientation of the red stripe on each cable.
5. Remove the four screws holding the insert (two screws for the type A insert) to the I/O distribution panel assembly and remove the insert.

Figure 3–20: I/O Distribution Panel Insert Removal



3.7 CONFIGURATION RULES

You must consider four areas when configuring the rtVAX 1000 system.

Module slot priorities
Backplane and I/O distribution panel expansion space
Power requirements
Module CSR addresses and interrupt vectors

The BA23-A backplane in the rtVAX 1000 system is the connector block; all system modules plug into it. The backplane contains eight slots of connectors for inserting modules compatible with the Q22-Bus. See Figure 3-13 to determine the module priority and grant continuity chain of the backplane.

NOTE: *Install in the rtVAX 1000 system backplane only those option modules supported by VAXELN software (Version 2.3 or later). For more information on supported options, see the rtVAX 1000 System Maintenance Guide.*

A dual-height module has connectors that fit into two rows of a backplane slot. Two dual-height modules can occupy one backplane slot.

A quad-height module has connectors that fit into all four rows of a backplane slot. One quad-height module occupies one backplane slot.

NOTES: *The C and D rows of slots 1, 2, and 3 provide a connection between the three slots. This connection is called the CD interconnect. Install only those modules that conform to the CD interconnect specification in the CD rows. You can install any dual-height Q22-Bus module in the AB rows of slots 2 and 3 (slot 1 is always used by the KA620-A CPU module).*

Dual-height modules in either the AB or CD rows of slots 4 through 8 require another dual-height module, or an M9047 grant card, in the slot's other two rows.

3.7.1 Module Physical Priority

The order in which you place options in the backplane affects system performance. You should install modules according to the following rules.

- The KA620-A CPU module must be installed in slot 1.
- MS630-B/C memory modules must be installed in slots 2 and 3.
- MS630-AA memory modules must be installed in the CD rows of slots 2 and 3.
- If other dual-height modules are installed in slots 2 or 3, they must be placed in the AB rows. No grant continuity card is necessary.
- Dual-height modules installed in slots 4 through 8 can be in either the AB or CD rows. The adjacent rows must contain either another dual-height module or an M9047 grant continuity card.

NOTE: *If slots 2 and 3 are not used for MS630 memory modules, and are not required for Q22-Bus options, you should reserve these slots for future memory expansion by installing M9047 grant continuity cards in the AB rows.*

The following list shows the recommended module priority sequence.

1. KA620-A CPU
2. Local memory (no more than two)

   MS630-AA
   MS630-BA
   MS630-BB
   MS630-CA
3. Real-time clock

   KWV11-C
4. Q22-Bus memory

   MRV11 (M8578)
5. Real-time general purpose

   ADV11-C (A8000)
   AXV11-C (A0026)
   DRV11-J (M8049)
   DRV11-W (M7651)

6. Line printer interface

   LPV11 (M8027)

7. Asynchronous communications—no silos

   DLVJ1 (M8043)

8. Asynchronous communications—with silos

   DZV11 (M7957)
   DZQ11 (M3106)

9. Ethernet communications—smart DMA

   DEQNA (M7504)

10. Asynchronous communications—with silo/DMA

    DHQ11 (M3107)
    DHV11 (M3104)

11. Streaming tape controller—smart DMA

    TQK50 (M7546)

12. Mass storage controller—smart DMA

    RQDX3 (M7555)

The relative priority of these modules is based on their preferred interrupt and DMA priority.

3.7.2 Backplane and I/O Distribution Panel Expansion Space

Eight backplane slots are available for Q22-Bus-compatible modules. The configuration examples in this chapter show the slots occupied by modules and the remaining open slots.

Two type A and four type B cutouts are available on the I/O distribution panel of the rack-mount, pedestal, and tabletop models for mounting inserts. Six type A and eleven type B cutouts are available on the I/O distribution panel of the H9642 cabinet model for mounting inserts. Table 3-10 lists the type of inserts used for supported modules. You can use the configuration worksheets (Figures 3-21 and 3-22) to keep track of the number of inserts used.

3.7.3 Power Requirements

Table 3-10 lists the current drawn at +5 V and +12 V and the power used by supported Q22-Bus options. You can use the configuration worksheets (Figures 3-21 and 3-22) to keep track of current and power used in the system. The total current and power of the system modules and mass storage devices must not exceed the following limits.

Current = 36 A at +5 Vdc and 7 A at +12 Vdc
Power = 230 watts

CAUTION: *The 230-watt limit will be exceeded if the maximum +5 Vdc and +12 Vdc currents are drawn at the same time.*

Bus loads must not exceed 30 ac or 20 dc loads. Although these limits will not be reached by using standard Q22-Bus options, they are included in Table 3-9 in case you install a nonstandard module. In that case, you should check the total bus loads of installed modules to be sure the total does not exceed these limits.

NOTE: *When a second (optional) BA23 enclosure is added to the H9642 cabinet model, each H9278 backplane supports up to 17 ac loads and 20 DC loads. For more information on configuring multiple-backplane systems, see the rtVAX 1000 System Maintenance Guide.*

Table 3–10: Power Requirements, Bus Loads, and I/O Distribution Panel Inserts

		Current (A)			Bus Loads		Insert
Option	Module	+5 V	+12 V	Power (W)	AC	DC	Type
KA620-A	M7478	6.2	0.14	32.7	2.7	1.0	B
MS630-AA	M7607	1.0	0.0	5.0	-	-	-
MS630-BA	M7608	1.3	0.0	6.5	-	-	-
MS630-BB	M7608	1.8	0.0	9.0	-	-	-
MS630-CA	M7609	3.5	0.0	17.5	-	-	-
MRV11-D	M8578	1.6	0.0	8.0	3.0	0.5	-
DRV11-JP	M8049	1.6	0.0	8.0	2.0	1.0	A (2)
DRV11-WA	M7651	1.8	0.0	9.0	2.0	1.0	A[1]

[1]The number and type of insert used depends on the cabinet kit used: CK-DRV1B = A (2), CK-DRV1W = B.

Table 3–10 (Cont.): Power Requirements, Bus Loads, and I/O Distribution Panel Inserts

Option	Module	Current (A) +5 V	Current (A) +12 V	Power (W)	Bus Loads AC	Bus Loads DC	Insert Type
LPV11-XP	M8027	0.8	0.0	4.0	1.4	1.0	A
DLVJ1-LP	M8043	1.0	0.25	8.0	1.0	1.0	B
DZV11	M7957	1.15	0.4	10.8	4.1	1.0	B
DZQ11	M3106	1.1	0.236	8.3	1.5	1.0	B
DHQ11	M3107	2.3	0.3	15.1	2.9	0.5	B[2]
DHV11-AP	M3104	4.3	0.475	27.2	2.9	1.0	B[2]
DEQNA-KP	M7504	3.5	0.5	23.5	2.2	0.5	A
ADV11-C	A8000	2.0	0.0	10.0	1.3	1.0	B (1/2)
AXV11-C	A0026	2.0	0.0	10.0	1.3	1.0	B (1/2)
KWV11-C	M4002	2.2	0.013	11.2	1.0	1.0	B (1/2)
TQK50	M7546	2.9	0.0	14.5	2.0	1.0	-
RQDX3	M7555	2.48	0.06	13.12	1.9	0.5	-
KDA50-Q	M7164/M7165	13.5	0.03	67.9	3.0	0.5	B (2)
RX33-A	-	0.35	0.22	4.4	-	-	-
RD31-A	-	0.8	0.9	14.8	-	-	-
RD32-A	-	0.58	1.05	14.8	-	-	-
RX50-A	-	0.85	1.8	25.9	-	-	-
RD51-A	-	1.0	1.6	24.2	-	-	-
RD52-A	-	1.0	2.5	35.0	-	-	-
RD53-A	-	0.9	2.5	34.5	-	-	-
TK50-A	-	1.35	2.4	33.55	-	-	-

[2]The number of type B inserts used depends on the cabinet kit used: CK-DHQ11-AB = B (2), CK-DHQ11-WB = B, CK-DHV11-AB = B (2), CK-DHV11-V/W = B.

Figure 3–21: Configuration Worksheet for the Rack-Mount, Pedestal, and Tabletop Models

ADD THESE COLUMNS

BACKPLANE SLOT	MODULE	CURRENT (A) +5 V	CURRENT (A) +12 V	POWER (W)	I/O PANEL INSERTS B	I/O PANEL INSERTS A
1 AB CD						
2 AB CD						
3 AB CD						
4 AB CD						
5 AB CD						
6 AB CD						
7 AB CD						
8 AB CD						
MASS STORAGE 1						
2						
COLUMN TOTALS:						
MUST NOT EXCEED:		36.0	7.0	230	4	2*

* IF MORE THAN TWO TYPE A FILTER CONNECTORS ARE REQUIRED, AN ADAPTER TEMPLATE (PN 74-27740-01) MAY BE USED. THIS ALLOWS THREE ADDITIONAL TYPE A FILTER CONNECTORS BUT REDUCES THE AVAILABLE TYPE B CUTOUTS TO TWO.

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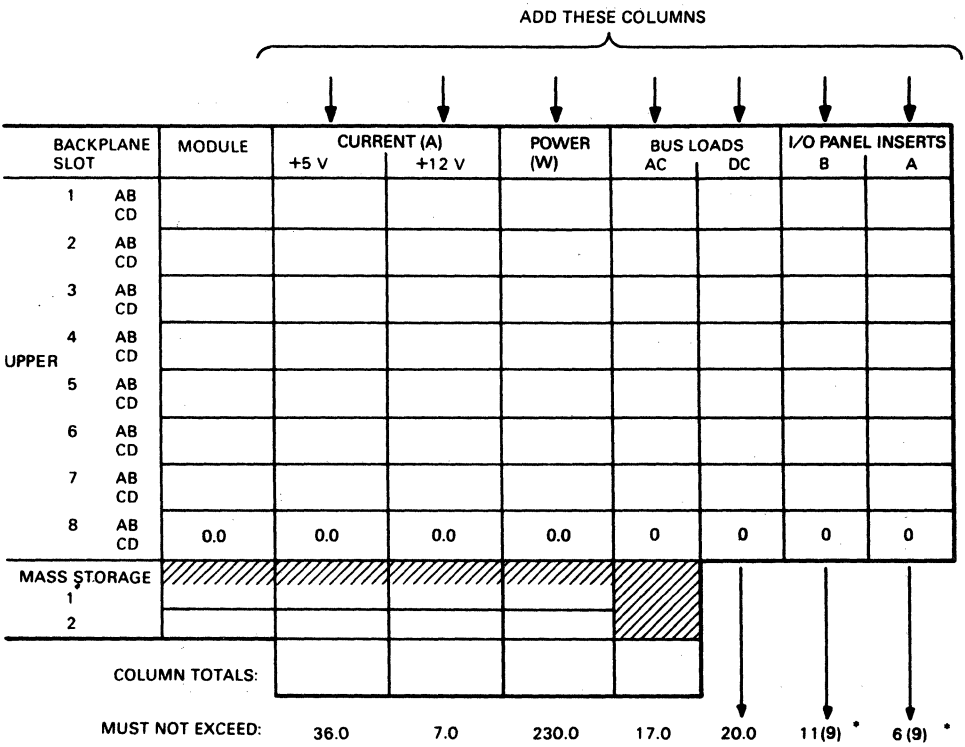
Figure 3–22: Configuration Worksheet for the Cabinet Model



* BRACKET CAN BE INSTALLED THAT INCREASES TYPE A TO 9, DECREASES TYPE B TO 9. SEE SECTION 3.4.4.

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3.7.4 Module CSR Addresses and Interrupt Vectors

Modules must be set to the correct CSR address and interrupt vector. Use Table 3-11 to determine the correct settings. Observe the following rules.

1. Check off all the modules to be installed in the system.
2. If an F is in the vector column, the module has a floating interrupt vector. Assign a vector to each module checked, starting at 300 (octal) and continuing as follows.

   DLVJ1 (Increment by 40 to next module.)
   DRV11 (Increment by 10 for subsequent modules.)
   DZV11
   DZQ11
   Second MSCP (First is fixed at 154.)
   Second TQK50 (First is fixed at 260.)
   DHV11 (or DHQ11)
   Second DEQNA (First is fixed at 120.)

   For example, from the list of modules above, systems that contain the following options would be assigned vectors as follows.

   Example 1
   DLVJ1 300
   DZV11 340
   DRV11 350
   Second MSCP 360
   DHV11 (or DHQ11) 370

   Example 2
   DZQ11 300
   Second MSCP 310
   DHV11 (or DHQ11) 320

   The floating vectors of the second MSCP, TQK50, and DEQNA controllers are program set. They are not configured by using jumpers or switches. If your system has a second MSCP or TQK50, you must still determine the vector because that vector determines the vector of following modules.
3. If an F is in the CSR address column, the module has a floating CSR address. Use Table 3-12 to determine the correct addresses for these modules. If a module has a floating vector and CSR address, more modules of the same type will also have a floating vector and CSR address.

Table 3–11: Address and Vector Settings

Option	Module	Unit	Check if in System	Vector	CSR Address (N = 177)
KA620-A	M7478	-	-	-	-
MS630-A	M760x	-	-	-	-
DRV11-JP	M8049	1	□	F	N64160
DRV11-JP	M8049	2	□	F	N64140
LPV11	M8027	1	□	200	N77514
DLVJ1	M8043	1	□	F[1]	N76500
DLVJ1	M8043	2	□	F	N76540
DZV11	M7957	1	□	F	F
DZQ11	M3106	1	□	F	F
DHQ11	M3107	1	□	F	F
DHV11	M3104	1	□	F	F
DEQNA	M7504	1	□	120	N74440
DEQNA	M7504	2	□	F	N74460
ADV11-C	A8000	1	□	400	N70400
AXV11-C	A0026	1	□	400	N70400
KWV11-C	M4002	1	□	440	N70420
TQK50	M7546	1	□	260	N74500
RQDX3	M7555	1	□	154	N72150

[1]You can set the DLVJ1 vector only at 300 or 340. If the first available vector is 310, 320, or 330, you should set the DLVJ1 to 340 and the next device to 400.

3.7.4.1 Floating CSR Addresses

Table 3-12 lists the floating CSR addresses for common combinations of devices that require configuration. These settings are valid for only the devices listed. The settings can change if you install other devices with floating CSR addresses.

Go down through the columns in Table 3-12 to find the column that matches your configuration. Any device added to or removed from the list does not affect the addresses of the devices above it.

For example, if you have only one DHV11 (or DHQ11), then its floating CSR address is 17760440. You can find this information from the first column.

The following information is derived from the fifth column.

DZQ11: 17760100
DHV11: 17760500
DHQ11: 17760520

Table 3–12: Floating CSR Addresses

Device	Substitute the Numbers Below for the nnn in 17760nnn.								
DZQ/V 1				100	100	100	100	100	100
DZQ/V 2				110[1]	110[1]	110	110[1]	110	110[1]
DZQ/V 3				120[1]		120		120	
Second MSCP		334	354[1]		354[1]	374	374	414	
Second TK50	404[1]	444[1]	444[1]	444[1]		504[1]	504[1]	504	444[1]
DHV11 1	440	500	500	500	500	540	540		500
DHV11 2	460	520	520	520	520				520
DHQ11 1	440	500	500	500	500	540	540		500
DHQ11 2	460	520	520	520	520				520

[1]Device may or may not be installed.

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3.7.5 Configuration Examples

The BA23-A enclosure allows a variety of system configurations. Figures 3-23 through 3-25 show the base configuration for three packaged versions of the rtVAX 1000 system.

Figure 3–23: Diskless System Configuration

BACKPLANE SLOT	BACKPLANE ROW				I/O CUTOUTS (STANDARD I/O)	
	A	B	C	D	TYPE A	TYPE B
					4	6
1	KA620-A (QUAD) CPU MODULE					1
2	MS630-BA (QUAD) 2 MEGABYTE MEMORY					
3	M9047 GRANT CARD		EMPTY			
4	M7504 DEQNA		EMPTY		1	
5						
6						
7						
8						
				TOTAL USED:	1	1
				AVAILABLE:	3	5

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Figure 3–24: Disk System Configuration for the Rack-Mount, Pedestal, and Tabletop Models

BACKPLANE SLOT	BACKPLANE ROW				I/O CUTOUTS (STANDARD I/O)	
	A	B	C	D	TYPE A	TYPE B
					4	6
						1
1	KA620-A (QUAD) CPU MODULE					
2	M9047 GRANT CARD		EMPTY			
3	M9047 GRANT CARD		EMPTY			
4	M7555 RQDX3		EMPTY			
5						
6						
7						
8						
				TOTAL USED:	0	1
				AVAILABLE:	4	5

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Figure 3–25: Disk System Configuration for the Cabinet Model

BACKPLANE SLOT	BACKPLANE ROW				I/O CUTOUTS (STANDARD I/O)	
	A	B	C	D	TYPE A	TYPE B
					6	11
						1
1	KA620-A (QUAD) CPU MODULE					
2	M9047 GRANT CARD		EMPTY			
3	M9047 GRANT CARD		EMPTY			
4	M7555 RQDX3		EMPTY			
5						
6						
7						
8						
				TOTAL USED:	0	1
				AVAILABLE:	6	10

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Chapter 4
OPERATION

This chapter describes how to operate your rtVAX 1000 system. Basic operation includes the following activities.

- Using the controls and indicators on the front panel
- Turning the system on and off
- Using the disks, if available on your model
- Using the console commands
- Using the console error messages

NOTE: *Descriptions and illustrations in this chapter assume disk drives are installed in the rtVAX 1000 system. Diskless systems load (boot) all software over a network from a host system. Consult the VAXELN Host System Guide and MicroVAX Diagnostic Monitor Ethernet Server User's Guide for information on booting software over a network.*

4.1 CONTROL PANEL

The control panel has a power (1/0) switch, several system buttons, and several indicators (LEDs). Table 4–1 describes the function of each control and indicator shown in Figure 4–1.

More controls and indicators are on the CPU distribution panel insert at the rear of the system. Those controls and indicators are not used during normal system operation. They are described in Chapter 3.

Figure 4–1: Control Panel

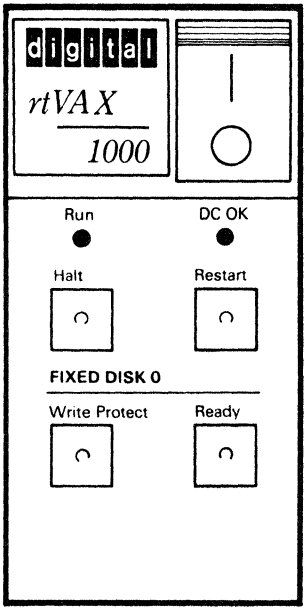

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Table 4–1: Controls and Indicators

Control/Indicator	Position	Indication	Function
1/0 (power)	1	Lights orange.	Turns the system on.
	0	Does not light.	Turns the system off.
Run	-	Lights green.	Indicates that the CPU is operating.
DC OK	-	Lights green.	Indicates that the power supply is generating the correct voltages.
Halt	Out	Does not light.	Allows software operation (usual position).
	In	Lights red.	Stops usual software operation and puts the CPU in console mode. See Sections 4.5 and 4.6 for console commands and console error messages. When the halt enable/disable switch on the CPU distribution panel insert is in the left (or down) position (usual), the Halt button has no effect on system operation.
Restart	Pressed once.	Lights continuously.	Restarts the system as if the power switch had just been turned on. Work in progress is lost. You can disable the Restart button by a switch behind the front cover. See the *rtVAX 1000 System Maintenance Guide*.
Write-Protect	Out	Does not light.	Allows software operation (usual position). System software is free to read or write information on the fixed disk if the Ready button is also in the out position.
Write-Protect	In	Lights orange.	Prevents system software from writing on the fixed disk. You can write-protect the disk so that information is not erased accidentally from the disk if a wrong diagnostic program is chosen.

Table 4–1 (Cont.): Controls and Indicators

Control/Indicator	Position	Indication	Function
Ready	Out	Lights green.	Allows software operation (usual position). System software is free to read information on the fixed disk. If the Write-Protect button is in the out position, system software can also write on the fixed disk.
	In	Does not light.	Prevents fixed-disk read and write operations.

4.2 TURNING THE SYSTEM ON

Your system must be installed as described in Chapter 2 for this procedure. The following steps define the initial settings for the control panel and console terminal switch.

1. Turn on the console terminal.
2. Set all buttons on the control panel to the out position.
3. Set the power switch to 1 (on).

When you turn the power on, the control panel should appear as described in Table 4–2.

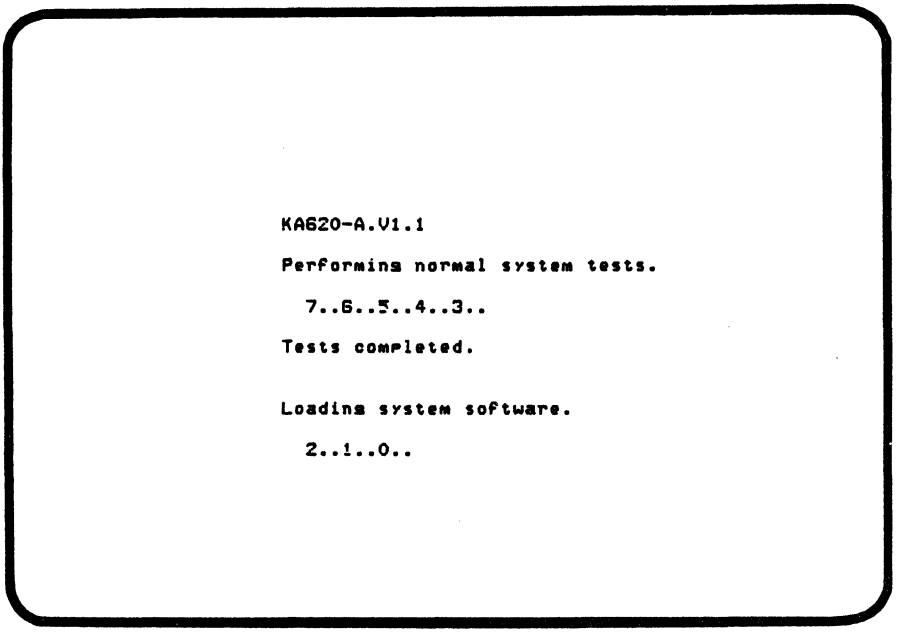
Table 4–2: Power-Up Indications

Control/Indicator	Indication
1/0 (power)	Lights orange.
Run	Lights green.
DC OK	Lights green.
Ready	Lights green within 30 seconds.

If you do not see the indications listed in Table 4-2, see Chapter 5 for information on system troubleshooting.

The terminal should slowly display the numbers 7 though 3, indicating completion of steps in the power-up system tests (Figure 4-2). The rtVAX 1000 system runs these tests each time you turn the system on.

Figure 4–2: Power-Up System Test Terminal Display



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The last part of the display shows the numbers 2 through 0 to indicate that the system is loading the system application or diagnostic software. The first display for the software appears on the console terminal after a few seconds.

If you do not see this sequence of events, see Chapter 5 for information on troubleshooting your system.

You are now ready to use the system. See the *VAXELN Host System Guide* for further instructions on using your system.

4.3 TURNING THE SYSTEM OFF

Follow the system shutdown procedures required by the system software in use. In some applications, system shutdown procedures might not be specified. In other applications, you might need to verify that the software is not in the process of writing information to a disk or communicating over the network. This verification ensures an orderly system shutdown that will prevent accidental loss of information.

Turn the system off by setting the power switch to 0 (off).

4.4 USING THE DISKS

If your system is supplied without any drives installed, proceed to Section 4.5 (Console Commands). For instructions on loading system software over a local area network (LAN), refer to the *VAXELN Host System Guide* or *MicroVAX Diagnostic Monitor Ethernet Server User's Guide*.

4.4.1 RD31 Fixed-Disk Drive

The RD31 fixed-disk drive is behind the front panel of the enclosure. Information is stored on fixed (nonremovable) disks. The RD31 has a formatted data capacity of 20 megabytes. It comes preformatted from the factory.

The RD31 is referred to as drive 0.

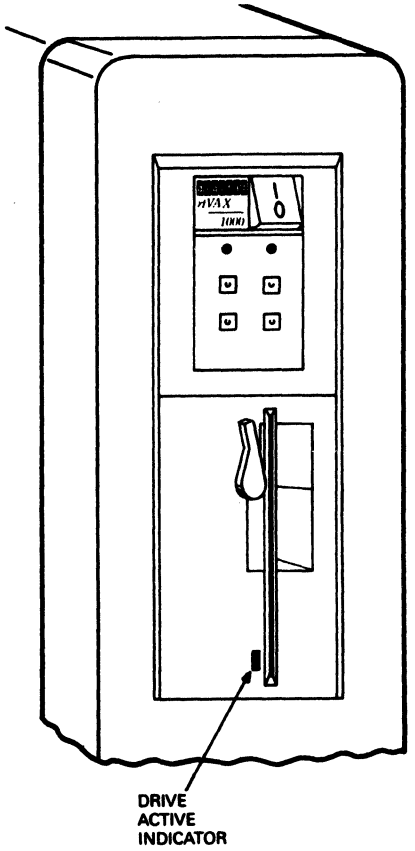
4.4.2 RX33 Diskette Drive

The RX33 diskette drive holds a single, double-sided, double-density, 13.3-centimeter (5.25-inch) diskette. Each diskette stores 1.2 megabytes of information, which is roughly 450 typewritten pages.

An indicator (LED) on the front of the drive (Figure 4–3) lights (red) when the drive is in use.

CAUTION: *Do not open (unlock) the front panel lever when the indicator is lit. Information could be lost.*

Figure 4–3: RX33 Drive Active Indicator



4.4.3 Making Backup Copies

A backup copy is a copy of files stored on the fixed disk or diskette. You should make backup copies of files to ensure against accidental loss of information. Follow these quidelines when making backup copies.

- Make backup copies on diskettes or magnetic tape.
- Make a daily backup copy of all information you create or change that day.
- Make a weekly backup copy of all information stored on the fixed disk.
- Store all backup copies in a safe place.

4.4.4 RX33 Diskette

The RX33 diskette must be formatted before you can use it. Formatting prepares the diskette to accept information. To format the diskette, use the formatting utility in the MicroVAX Diagnostic Monitor (MDM).

- Information is stored magnetically.
- Information is stored on only both sides of an RX33 diskette.
- Information stored previously can be erased and new information stored in its place.
- The diskette rotates inside its cover. The soft fabric lining of the cover cleans the diskette continuously.

CAUTION: *Digital recommends that you use only RX33K diskettes, available from Digital or its licensed distributors.*

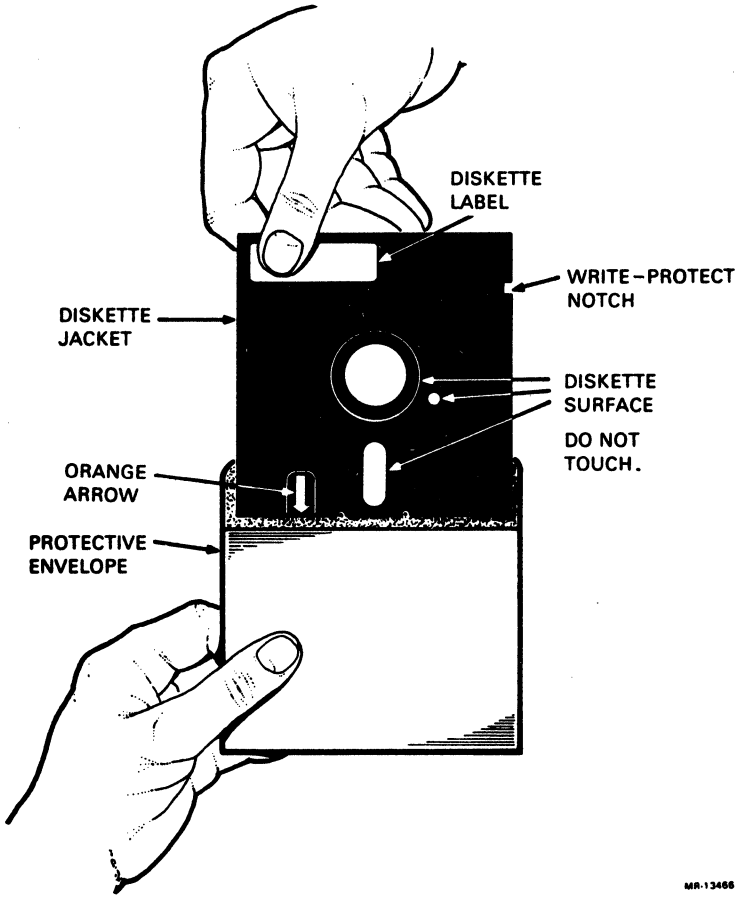
4.4.4.1 Diskette Handling and Storage

Follow these guidelines when handling and storing diskettes (Figure 4.4).

- Do not touch the exposed surfaces of the diskette.
- Always return a diskette to its protective envelope to keep out dust and dirt.
- Do not bend or fold a diskette.
- Always store diskettes vertically and loosely to prevent the covers from becoming warped.

- Write on the diskette label before applying it to the diskette. Writing on the label after it has been applied to the diskette might damage the diskette.
- Keep diskettes away from direct sunlight, heaters, and other sources of heat.
- Keep diskettes away from magnets and equipment that generate magnetic fields, such as motors, transformers, and terminals.
- Keep the lever on the front of the drive in the locked position when using a diskette. The drive does not work with the lever in the unlocked position.
- Make and keep backup copies of all working diskettes.

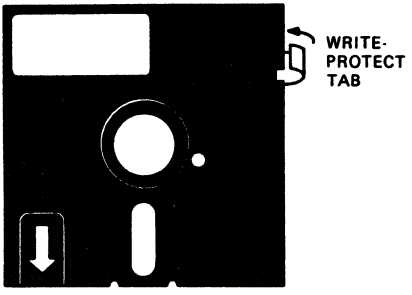
Figure 4-4: Diskette Handling



4.4.4.2 Write-Protecting a Diskette

To prevent the system from accidentally adding, changing, or deleting information on a diskette, cover the write-protect notch with one of the self-adhesive foil tabs supplied with the diskette (Figure 4–5). This procedure is known as write-protecting the diskette. You can later add or change information on the diskette by removing the write-protect tab.

Figure 4–5: Write-Protecting a Diskette



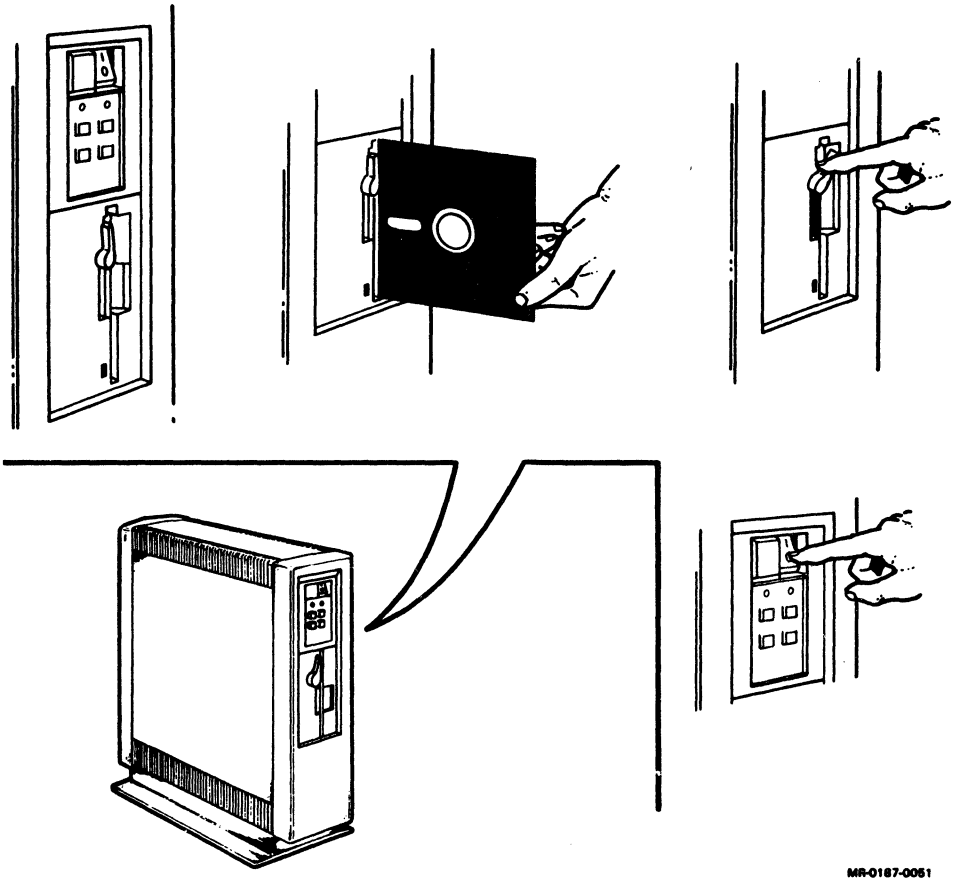
4.4.4.3 Inserting a Diskette

Use the following procedure to insert a diskette into the drive (Figure 4–6).

1. If the lever on the front of the drive is covering the diskette slot (locked position), turn the lever 90 degrees to the right (or up) to uncover the slot (unlocked position).
2. Insert the diskette into the slot, making sure the label is facing up (or left) and the write-protect notch is on the left (or down).
3. Lock the lever by turning it 90 degrees to the left (or down).

CAUTION: *Do not force the lever. You can turn the lever only when a diskette is fully inserted into the drive.*

Figure 4–6: Inserting a Diskette



4.5 CONSOLE COMMANDS

4.5.1 Console Command Syntax

The console terminal accepts commands up to 80 characters long. Longer commands result in error messages. The character count does not include rub-outs, rubbed-out characters, or the terminating <return>.

You can abbreviate a command by dropping characters from the end of its keyword. However, you must supply enough characters of the keyword for the system to distinguish one command from another.

The console treats multiple, adjacent spaces and tabs as a single space. Leading and trailing spaces and tabs are ignored. Command qualifiers can appear after the command keyword, or after any symbol or number in the command.

All numbers (addresses, data, counts) are hexadecimal, but symbolic register names include decimal digits. The hexadecimal digits are as follows.

0 1 2 3 4 5 6 7 8 9 A B C D E F

The console accepts upper- and lowercase letters in hexadecimal numbers (A through F) and commands.

4.5.2 References to Processor Registers and Memory

The KA620-A console mode is implemented in macrocode executed from ROM. For this reason, the actual processor registers cannot be modified by the command interpreter. When console I/O mode is entered, the console saves the processor registers in a scratch page, and all command references to them are directed to the corresponding scratch page locations, not to the registers themselves. When the console returns to program mode, the saved registers are restored. Only then changes take effect. References to processor memory are handled as usual, except where noted below.

Usually, the scratch page is a free page on the interrupt stack, so the console does not modify the machine state. If a free page on the interrupt stack cannot be located, the console program uses the last valid page in contiguous physical memory, and the original machine state is lost. Usually, this modification should occur only on power-up.

EXAMINE and DEPOSIT command references to the console scratch page must be qualified by the /U qualifier. (Access is primarily to simplify console program debugging.) The BINARY LOAD and UNLOAD commands cannot reference the console scratch page.

4.5.3 Console Commands

4.5.3.1 BINARY LOAD and UNLOAD

X <address> <count> <return> <checksum>

The X command is used by automatic systems communicating with the console. It is not for operator use. The console loads or unloads (that is, writes or reads memory) the specified number of data bytes, starting at the specified address.

If count bit 31 is clear, the console is to receive data and deposit it in memory. If count bit 31 is set, the console is to read data from memory and send it. The remaining count bits are the number (positive) of bytes to load or unload.

The console accepts the command when it receives the <return>. The next byte the console receives is the command checksum, which is not echoed. The command checksum is verified by adding all command characters, including the checksum (but not including the terminating <return>, rub-outs, or characters deleted by rub-out), into an 8-bit register that is initially set to zero. If no errors occur, the result is zero. If the command checksum is correct, the console responds with the input prompt, and either sends data to the requester or prepares to receive data. If the command checksum is in error, the console responds with an error message. The intent is to prevent the operator from inadvertently entering a mode where the console is accepting keyboard characters as data, with no possible escape sequence.

For a BINARY LOAD command (count bit 31 is clear), the console responds with the input prompt, then accepts the specified number of data bytes to deposit into memory, and an additional byte of received data checksum. The data is verified by adding all data characters and the checksum character into an 8-bit register initially set to zero. If the final register content is not zero, the data or checksum is in error, and the console responds with an error message.

For a BINARY UNLOAD command (count bit 31 is set), the console responds with the input prompt, followed by the specified number of binary data bytes. As each byte is sent, it is added to a checksum register initially set to zero. At the end of the transmission, the 2's complement of the low byte of the register is sent.

If the data checksum is incorrect on a load, or if memory or line errors occur during the data transmission, the transmission is completed before the console issues an error message. If an error occurs during loading, the loaded memory contents are unpredictable.

Echo is suppressed during the data string and checksum reception.

During a BINARY UNLOAD, the console can be controlled with control characters (<ctrl>c, <ctrl>s, <ctrl>o). The same control is not possible during a BINARY LOAD because all received characters are valid binary data.

Data being loaded with a BINARY LOAD command must be received by the console at a rate of 1 byte per second or higher. Within 10 seconds of the <return> terminating the command line, the console must receive the command checksum preceding the data. Within 10 seconds of the last data byte, the data checksum must be received. If any of these timing requirements are not met, the console aborts the transmission by issuing an error message and prompting for input.

The entire command, including the checksum, can be sent to the console as a single burst of characters at the console's specified character rate. The console can receive at least 4 kilobytes of data in a single X command.

4.5.3.2 BOOT

BOOT [<qualifier list>][<device>]

The device specification format is ddcu, where dd is a 2-letter device mnemonic, c is an optional 1-digit controller number, and u is a 1-digit unit number.

The console initializes the processor and starts VMB running. VMB boots the operating system from the specified or default device.

Qualifier

- /R5:<data>—After initializing the processor and before starting VMB, R5 is loaded with the specified data. This allows a console user to pass a parameter to VMB. (To remain compatible with previous processors, /<data> will also be recognized to have the same result.)

4.5.3.3 COMMENT

! <comment>

The comment command (exclamation point) is ignored. It is used to annotate console I/O command sequences.

4.5.3.4 CONTINUE

CONTINUE

The processor begins instruction execution at the address currently in the program counter. Processor initialization is not performed. The console enters program I/O mode.

4.5.3.5 DEPOSIT

DEPOSIT [<qualifier list>]<address> <data>

Deposits the data into the specified address. If no address space or data size qualifiers are specified, the defaults are the last address space and data size used in a DEPOSIT or EXAMINE command. After processor initialization, the default address space is physical memory, the default data size is long, and the default address is zero.

If the specified data is too large to fit in the data size to be deposited, the console ignores the command and issues an error response. If the specified data is smaller than the data size to be deposited, it is extended on the left with zeros.

The address may also be one of the following symbolic addresses.

- PSL (processor status longword)—No address space qualifier is legal. When PSL is examined, the address space is identified as M (machine-dependent).
- PC (program counter—general register 15)—The address space is set to /G (defined on the next page).
- SP (stack pointer—general register 14)—The address space is /G.
- Rn (general register n)—The register number is in decimal. The address space is /G. For example:

  D R5 1234 is equivalent to D/G 5 1234.
  D R10 6FF00 is equivalent to D/G A 6FF00.

- + (plus sign)—The location immediately following the last location referenced in an EXAMINE or DEPOSIT. For references to physical or virtual memory spaces, the location referenced is the last address, plus the size of the last reference (1 for byte, 2 for word, 4 for long). For other address spaces, the address is the last address referenced, plus one.
- - (minus sign)—The location immediately preceding the last location referenced in an EXAMINE or DEPOSIT. For references to physical or virtual memory spaces, the location referenced is the last address minus the size of this reference (1 for byte, 2 for word, 4 for long). For other address spaces, the address is the last address referenced, minus one.
- * (asterisk)—The location last referenced in an EXAMINE or DEPOSIT.
- @ (at sign)—The location addressed by the last location referenced in an EXAMINE or DEPOSIT.

Qualifiers

- /B—The data size is byte.
- /W—The data size is word.
- /L—The data size is longword.
- /V—The address space is virtual memory. All access and protection checking occurs. If the access would not be allowed to a program running with the current PSL, the console issues an error message. Virtual space DEPOSITs cause the PTE<M> bit to be set. If memory mapping is not enabled, virtual addresses are equal to physical addresses.
- /P—The address space is physical memory.
- /I—The address space is internal processor registers (IPRs). These registers are addressed by the MTPR and MFPR instructions.
- /G—The address space is the general register set, R0 through PC (R15).
- /U—Access to console program memory is allowed. This qualifier also disables virtual address protection checks.
- /N:<count>—The address is the first of a range. The console deposits to the first address, then to the specified number of succeeding addresses. Even if the address is the symbolic address - (minus sign), the succeeding addresses are at larger addresses. The symbolic address specifies only the starting address, not the direction of succession. For repeated references to preceding addresses, use REPEAT DEPOSIT - <data>.

NOTE: *Only memory can be accessed as bytes or words. Registers, the PSL, and the IPRs must be accessed by using the longword reference. This means that the /B and /W qualifiers cannot be used with the /I and /G qualifiers.*

Example

D/P/B/N:1FF 0 0	Clears the first 512 bytes of physical memory.
D/V/L/N:3 1234 5	Deposits 5 into 4 longwords starting at virtual address 1234.
D/N:8 R0 FFFFFFFF	Loads general registers R0 through R8 with -1s.
D/N:200 - 0	Starting at the previous address, clears 513 bytes.

If conflicting address space or data sizes are specified, the console ignores the command and issues an error response.

4.5.3.6 EXAMINE

EXAMINE [<qualifier list>] [<address>]

Examines the contents of the specified address. If no address is specified, + (plus sign) is assumed. The address may also be one of the symbolic addresses described under DEPOSIT.

Qualifiers

- EXAMINE can use the same qualifiers as DEPOSIT.
- RESPONSE: <tab> <address space identifier> <address> <tab> <data>

The address space identifier can be as follows.

- P—Physical memory. Note that when virtual memory is examined, the address space and address in the response are the translated physical address.
- G—General register.
- I—Internal processor register.
- M—Machine-dependent (used only for display of the PSL).

4.5.3.7 FIND

FIND [<qualifier list>]

The console searches main memory starting at address 0 for a page-aligned, 64-kilobyte segment of good memory, or a restart parameter block (RPB). If the segment or block is found, its address plus 512 is left in SP. If the segment or block is not found, an error message is issued, and the contents of SP are unpredictable. If no qualifier is specified, /RPB is assumed.

Qualifiers

- /MEMORY—Search memory for a page-aligned, 64-kilobyte segment of good memory. The search includes a read/write test of memory and leaves the contents of memory unpredictable.
- /RPB—Search memory for a restart parameter block. The search leaves the contents of memory unchanged.

4.5.3.8 INITIALIZE

INITIALIZE

A processor initialization is performed. The following registers are set (all values are hexadecimal).

PSL	041F0000
IPL	1F
ASTLVL	4
SISR	0
ICCS	0
RXCS	0
TXCS	80
MAPEN	0

All other registers are unpredictable.

The previous console reference defaults (the defaults used to fill in unsupplied qualifiers for DEPOSIT and EXAMINE commands) are set to physical address, longword size, and address 0.

4.5.3.9 HALT

HALT

The HALT command has no effect; the processor is already halted when in console I/O mode.

4.5.3.10 REPEAT

REPEAT <command>

The console repeatedly displays and executes the specified command. The repeating stops when the operator types Ctrl C. Any valid console command can be specified for the command, with the exception of the REPEAT command.

4.5.3.11 START

START [<address>]

The console starts instruction execution at the specified address. If no address is given, the current PC is used. If no qualifier is present, macroinstruction execution is started. If memory mapping is enabled, macroinstructions are executed from virtual memory. The START command is equivalent to a DEPOSIT to PC, followed by a CONTINUE. No INITIALIZE is performed.

4.5.3.12 TEST

TEST [<test number>]

The console invokes a diagnostic test program denoted by <test number>. Valid hexadecimal test numbers are 3 through 7, and B. If a test number is not supplied, no test is performed.

4.5.3.13 UNJAM

UNJAM

An I/O bus reset is performed.

4.6 CONSOLE ERROR MESSAGES AND EXPLANATIONS

Table 4–3: Console Error Messages

Hex Value	Message	Explanation
02	EXT HLT	Break was pressed at the console; QBINIT or QHALT was asserted.
04	ISP ERR	Caused by attempt to push interrupt or exception state onto the interrrupt stack, when the interrupt stack is mapped NO ACCESS or NOT VALID.
05	DBL ERR	A second machine check occurred while the processor was attempting to report a machine check to the operating system.
06	HLT INST	The processor executed a HALT instruction in kernel mode.
07	SCB ERR3	Vector bits <01:00> = 3.
08	SCB ERR2	Vector bits <01:00> = 2.
0A	CHM FR ISTK	A change mode instruction was executed when PSL<IS> was set.
0B	CHM TO ISTK	Exception vector bit <00> was set for a change mode.
0C	SCB RD ERR	A hard memory error occurred during a processor read of an exception or interrupt vector.
10	MCHK AV	An access violation or invalid translation occurred during machine check exception processing.
11	KSP AV	An access violation or invalid translation occurred during invalid kernel stack pointer exception processing.
15	CORRPTN	The console data base was corrupted. The console simulates a power-up sequence and rebuilds its data base.
16	ILL REF	The requested reference would violate virtual memory protection, address is not mapped, is invalid in the specified address space, or value is invalid in the specified destination.

Table 4-3 (Cont.): Console Error Messages

Hex Value	Message	Explanation
17	ILL CMD	The command string cannot be parsed.
18	INV DGT	A number has an invalid digit.
19	LTL	The command was too large for the console to buffer. The message is issued only after the <return> terminating the command is received.
1A	ILL ADR	The specified address is not in the address space.
1B	VAL TOO LRG	The specified value does not fit in the destination.
1C	SW CONF	For example, an EXAMINE command specifies two different data sizes.
1D	UNK SW	The switch is not recognized.
1E	UNK SYM	The EXAMINE or DEPOSIT symbolic address is not recognized.
1F	CHKSM	An X command's command or data checksum is incorrect. If the data checksum is incorrect, this message is issued, and is not abbreviated to "illegal command."
20	HLTED	The operator entered a HALT command.
21	FND ERR	A FIND command failed to find either the RPB or 64 kilobytes of good memory.
22	TMOUT	Data failed to arrive in the expected time during an X command.
23	MEM ERR	A parity error was detected.
24	UNXINT	An unexpected interrupt or exception occurred.
40	NOSUCHDEV	No bootable devices found.
41	DEVASSIGN	The device is not present.
42	NOSUCHFILE	The program image is not found.
43	FILESTRUCT	The boot device file structure is invalid.
44	BADCHKSUM	Header file has bad checksum.
45	BADFILEHDR	File header is bad.
46	BADIRECTORY	Directory file is bad.

Table 4–3 (Cont.): Console Error Messages

Hex Value	Message	Explanation
47	FILNOTCNTG	Program image file is invalid.
48	ENDOFFILE	A premature end-of-file was found.
49	BADFILENAME	A bad file name was given.
4A	BUFFEROVF	The program image does not fit in available memory.
4B	CTRLERR	A boot device I/O error occurred.
4C	DEVINACT	Failed to initialize boot device.
4D	DEVOFFLINE	Device is off-line.
4E	MEMERR	A memory initialization error occurred.
4F	SCBINT	Unexpected SCB exception or machine check occurred.
50	SCBZNDINT	Unexpected exception occurred after starting program image.
51	NOROM	No valid ROM image was found.
52	NOSUCHNODE	The load servers gave no response.
53	INSFMAPREG	Memory configuration is invalid.
54	RETRY	No devices are bootable. Retrying.

Chapter 5
TROUBLESHOOTING

Troubleshooting is the process of isolating and diagnosing problems with your rtVAX 1000 system. When your system does not operate as described in Chapter 4, use the information in this chapter to diagnose the problem.

This chapter describes three levels of troubleshooting.

- Power-up messages—A list of indications that appear when your system is turned on and what they mean.
- Corrective actions—A simple checklist of potential problems and what to do.
- The MicroVAX Diagnostic Monitor (MDM)—A diagnostic tool you can use to test your system or to isolate a particular problem.

The troubleshooting techniques described in this chapter do not identify all possible problems with your system, nor do the actions suggested remedy all problems. If the actions suggested do not solve the problem, call your Digital service representative.

5.1 POWER-UP MESSAGES

Whenever you power-up your system, the rtVAX 1000 processor performs a series of self-tests and start-up routines. After successful completion of the self-tests, the system attempts to load (boot) system software. Chapter 4 describes the display you see during the normal power-up sequence.

A countdown from F (16 in hexadecimal numbers) to 0 occurs during the normal sequence. Only the portion from 7 to 0 displays on the console terminal screen. The full countdown displays on the light emitting diode (LED) on the CPU distribution panel insert at the rear of the system. The countdown sequence has three major parts.

- From F through 8, the system performs internal tests.
- From 7 through 3, the system tests memory and the CPU.
- From 2 through 0, the system loads system software.

Usually, the display progresses from F to 0, as in Table 5-1. If the display stops in the range of F to 3, the system might have a hardware error. See the *rtVAX 1000 System Maintenance Guide* for details or call your Digital service representative.

When attempting to autoboot, the system looks for bootable software on the following devices in the order shown below.

- RX33 diskette drive
- RD31 fixed-disk drive
- Ethernet communications controller

If the display stops on test code 1, the most likely problem is that the start-up device does not contain bootable software. Complete the system software installation as directed in the *VAXELN Host System Guide.*

Table 5-1: ROM Start-Up/Diagnostic Test Output Codes

Display	Description
F	Waiting for DCOK assertion.
E	Waiting for POK assertion.
D	Running checksum test on ROM and TOY RAM tests.
C	Searching for RAM memory required to run ROM programs.
B	Reading IPCR register (accesses Q22-Bus).
A	Testing QxSS video console display (if present).
9	Identifying console terminal.
8	Language inquiry or CPU halted.
7	Running data tests on RAM memory.
6	Running address tests on RAM memory.
5	Running tests that use Q22-Bus map to access RAM memory.
4	Running CPU instruction and register tests.
3	Running interrupt tests.
2	Searching for a start-up bootstrap device.
1	Loading secondary bootstrap.
0	Testing completed.

5.2 CORRECTIVE ACTIONS

The corrective actions in this section are for minor problems that you can easily check and correct. For example, an incorrect switch position can cause problems.

The types of problems you might find are grouped into three areas.

- Power-up problems—Table 5–2 lists problems that typically occur during power-up. These problems can occur whether or not you have already installed system software.
- Software installation problems—Table 5–3 lists problems that can occur during installation of diagnostic or system software.
- General problems—Table 5–4 lists problems that can occur anytime.

The corrective actions in these tables assume a fairly simple cause. If these actions do not solve your problem, run the MicroVAX Diagnostic Monitor, described in Section 5.3.

Table 5–2: Power-Up Problems

Problem	Possible Cause	Corrective Action
The power switch is on (1) but does not light. The system does not respond.	The system is not plugged in.	Set the power switch to 0. Plug in the system. Set the power switch to 1.
	No power is at the wall outlet.	Use a different wall outlet, or check the circuit breaker controlling power to the wall outlet.
	The system circuit breaker is in the out position.	Set the power switch to 0. Reset the circuit breaker by pushing it in (Figures 5-1 and 5-2). Set the power switch to 1. If the circuit breaker trips to the out position again, call your Digital service representative.
	The power cable is incorrectly installed.	Set the power switch to 0. Check that the cable is fully seated in the socket in the rear of the system. Set the power switch to 1.

Table 5–2 (Cont.): Power-Up Problems

Problem	Possible Cause	Corrective Action
	The voltage switch is incorrectly set.	Set the voltage switch to match the voltage source you are using (Figures 2-26 and 2-40).
The power switch is on (1) and lit, but the console terminal has no display.	The console terminal is off.	Turn the terminal on.
	The console terminal brightness and contrast controls are incorrectly set.	Adjust brightness and contrast until the screen display appears. See the manual that came with the terminal.
	The console terminal is off-line.	Put the terminal on-line. See the manual that came with the terminal.
	The console terminal cable is not installed correctly.	Make sure the cable is installed correctly at both ends.
	The baud rate setting of the system and the terminal do not match.	Make sure the baud rate settings are the same (Sections 2.2.2 and 2.2.3).
	The mode switch on the CPU distribution panel insert is set to T.	See step 8 in Section 2.2.2 or 2.2.3 for the correct switch setting.
	The self-tests halted before reaching 7.	Check the LED display on the CPU distribution insert panel. If an F, E, D, C, B, A, 9 or 8 is displayed, the system has detected an internal error. Copy the error message number and call your Digital service representative.
The self-tests halted between 7 and 3 and an error message is displayed on the console terminal.	The system detected an error while testing the CPU or memory.	Copy the number of the error message and call your Digital service representative.

Table 5–2 (Cont.): Power-Up Problems

Problem	Possible Cause	Corrective Action
The system does not automatically start. The console mode prompt >>> displays on the console terminal.	The halt enable/disable switch is set to the enable position. The system is in console mode.	To autoboot, exit console mode by setting the halt enable/disable switch (on the CPU distribution insert panel) to the disable (left or down) position. Restart the system by pressing the Restart button on the control panel. To boot from console mode, use the BOOT command (BOOT device-name).

Table 5–3: Software Installation Problems

Problem	Possible Cause	Corrective Action
The system does not boot (the countdown does not continue from 2 through 0, even though the halt enable/disable switch is set to disable) or boots from the another device (the wrong software appears on the console terminal).	No bootable software was found.	See the actions listed for the boot device you are using.
The "?54 RETRY" message appears on the console terminal twice.	No bootable software was found.	See the actions listed for the boot device you are using.
The system does not start from the fixed-disk drive.	The fixed-disk drive is offline. The Ready button is in (not lit).	Press and release the Ready button to put the fixed-disk drive on-line. The Ready button should light green.
	No bootable software is on the disk.	Load bootable software onto the disk, using the instructions in the *VAXELN Host System Guide*.
	A problem exists with the disk controller or fixed-disk drive.	Run the MDM software described in Section 5.3.

Table 5–3 (Cont.): Software Installation Problems

Problem	Possible Cause	Corrective Action
The system does not start from the diskette drive.	No diskette is in the drive.	Insert a diskette containing bootable software in the diskette drive.
	The diskette drive lever is not in the locked position.	Turn the lever 90 degrees to the left (or down) to the locked position.
	The diskette is in the drive upside down.	Make sure the label is facing up (or left) and the write-protect notch is on the left (or down).
	No bootable software is on the diskette.	Use a diskette containing bootable software or load bootable software onto the diskette, using the instructions in the *VAXELN Host System Guide*.
	The diskette is worn or damaged.	Try another diskette.
	The fixed-disk drive is on-line. (The Ready button is lit.) Your system starts from the fixed disk, if it is on-line.	Press and release the Ready button to place the fixed-disk drive off-line.
	A problem exists with the disk controller or diskette drive.	Run the MDM software described in Section 5.3.
The system does not start from the local area network (LAN).	The system does not have an Ethernet communications controller installed.	Install an Ethernet communications controller.
	The Ethernet transceiver cable is incorrectly installed.	Make sure the cable is installed correctly at both ends. (See step 10 in Section 2.2.2.).
	The Ethernet communications controller I/O fuse has blown.	Replace the fuse on the Ethernet communications controller I/O distribution panel insert located next to the Ethernet transceiver cable.

Table 5–3 (Cont.): Software Installation Problems

Problem	Possible Cause	Corrective Action
	A problem exists with the Ethernet communications controller.	Run the MDM software described in Section 5.3.
	The host system does not respond to your system's software load (boot) requests.	Configure the host operating system to respond to boot requests from your system or refer the problem to you network system manager.
	The fixed-disk drive is on-line. (The Ready button is lit.) Your system starts from the fixed disk, if it is on-line.	Press and release the Ready button to place the fixed-disk drive off-line.
	The diskette drive has a diskettte installed that contains bootable software.	Remove the diskette from the drive.

Table 5–4: General Problems

Problem	Possible Cause	Corrective Action
The system loses power during operation. The indicators on the control panel are off.	The system has become unplugged.	Set the power switch to 0. Plug in the system. Set the power switch to 1.
	No power is at the wall outlet.	Use a different wall outlet, or check the circuit breaker controlling power to the wall outlet.
	The system circuit breaker is in the out position.	Reset the circuit breaker by pushing it in (Figures 5-1 and 5-2). If the circuit breaker trips to the out position again, call your Digital service representative.

Table 5–4 (Cont.): General Problems

Problem	Possible Cause	Corrective Action
	The power cable is incorrectly installed.	Set the power switch to 0. Check that the cable is fully seated in the socket in the rear of the system. Set the power switch to 1.
	The power supply has shut down due to overheating.	Turn off your system. Remove surrounding objects that restrict or impede system airflow. Allow 5 minutes for the power supply to cool before turning on your system.
	The power supply has failed.	Check the DC OK indicator on the control panel. An unlit indicator indicates a power supply problem. Turn off your system and call your Digital service representative.
The system halts unexpectedly during normal operation. The console mode prompt >>> displays on the console terminal.	The Break key on the console terminal was pressed inadvertently.	Set the halt enable/disable switch on the CPU distribution insert panel to the disable (left or down) position to prevent recurrences. Type C Return on the console terminal or press the Restart button (on the control panel) to restart the system.
	The Halt button was pressed inadvertently (lights red).	Set the halt enable/disable switch on the CPU distribution insert panel to the disable (left or down) position to prevent recurrences. Press the Halt button again (not lit). Type C Return on the console terminal or press Restart to restart the system.
A fixed-disk write error message is displayed.	The disk is write-protected (Write-Protect button lights orange).	Press and release the Write-Protect button (not lit).

Table 5–4 (Cont.): General Problems

Problem	Possible Cause	Corrective Action
A fixed-disk read error message is displayed.	The disk is off-line. The Ready button is in (not lit).	Press and release Ready (lights green) to put the disk on-line.
A diskette read error message is displayed.	No diskette is in the drive.	Insert a diskette into the drive.
	The diskette drive lever is not in the locked position.	Turn the lever 90 degrees to the left (or down) to the locked position.
	The diskette is in the drive upside down.	Make sure the label is facing up (or left) and the write-protect notch is on the left (or down).
	The diskette is not formatted.	Use the formatting utility in the MDM to format the diskette (RX33 only).
	The diskette is worn or damaged.	Try another diskette.
A diskette write error message is displayed.	No diskette is in the drive.	Insert a diskette into the drive.
	The diskette drive lever is not in the locked position.	Turn the lever 90 degrees to the left (or down) to the locked position.
	The diskette is in the drive upside down.	Make sure the label is facing up (or left) and the write-protect notch is on the left (or down).
	The diskette is not formatted.	Use the formatting utility in the MDM to format the diskette (RX33 only).
	The diskette is worn or damaged.	Try another diskette.
	The diskette is write-protected.	Remove the write-protect tab.

Figure 5–1: Checking the Circuit Breaker on the Rack-Mount, Pedestal, and Tabletop Models

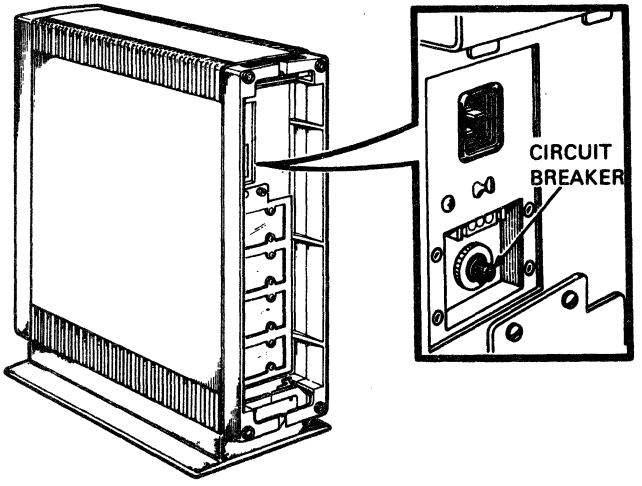
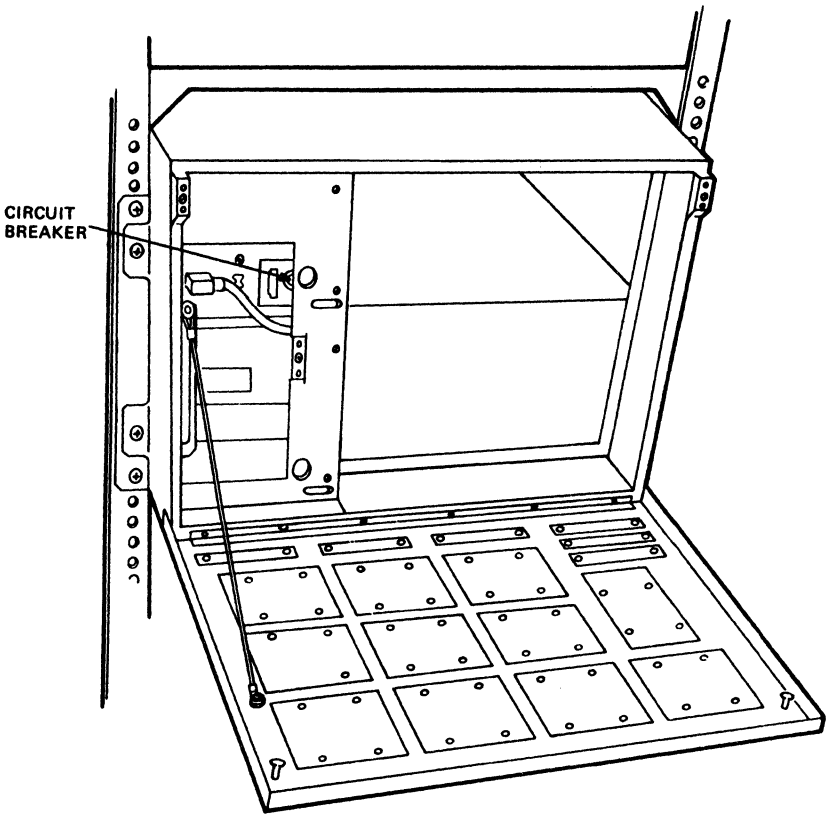


Figure 5–2: Checking the Circuit Breaker on the Cabinet Model



5.3 THE MicroVAX DIAGNOSTIC MONITOR

The MicroVAX Diagnostic Monitor (MDM) is a software package containing diagnostic tests designed to isolate and identify faults in your rtVAX 1000 system. If your system has disk drives, the diagnostic tests are on diskettes (labeled MV DIAG CUST RX50) packaged with your system. If your system is diskless, the diagnostic tests are in the MicroVAX Diagnostic Ethernet Customer Kit (labeled MV DIAG ENET CUST) packaged with your system.

The MicroVAX Diagnostic Ethernet Customer Kit contains the MDM diagnostic software and the *MicroVAX Diagnostic Monitor Ethernet Server User's Guide*. The guide describes how to install MDM software on a host MicroVMS or VAX/VMS operating system and how to down-line load MDM to a diskless target system by using the DECnet/Ethernet network facilities.

If you have a diskless system that is part of a local area network (LAN), see the *MicroVAX Diagnostic Monitor Ethernet Server User's Guide* at this time. (If you have a diskless system that is not part of a LAN, you cannot run MDM. Call your Digital service representative.) Once you have installed and down-line loaded MDM into your system, see Section 5.3.2 of this guide for specific instructions on running MDM.

WARNING: *If your system is connected to a cluster, notify your cluster manager before halting the system to load MDM.*

You generally run MDM in three situations.

- Before you install system software on a new system
- When you receive an error message or experience a problem with your system
- When you want to test your system periodically to ensure that all components are operating correctly

The customer version of MDM is a subset of the service version of MDM. The customer system test has two parts: a functional part that individually tests each device installed in your system and an exerciser part that tests how the devices work together. The customer tests cannot check every device in the system. For example, customer tests check the controller but not the disk drive, as testing the drive requires writing to the disk and possibly destroying data. Nor can the customer tests check each device as thoroughly as the service diagnostic tests.

The customer tests check only the devices in the system, not the connectors or lines between peripheral devices and the system. If devices pass the customer tests, but you still experience problems, contact a Digital service representative for further testing.

5.3.1 LOADING MDM

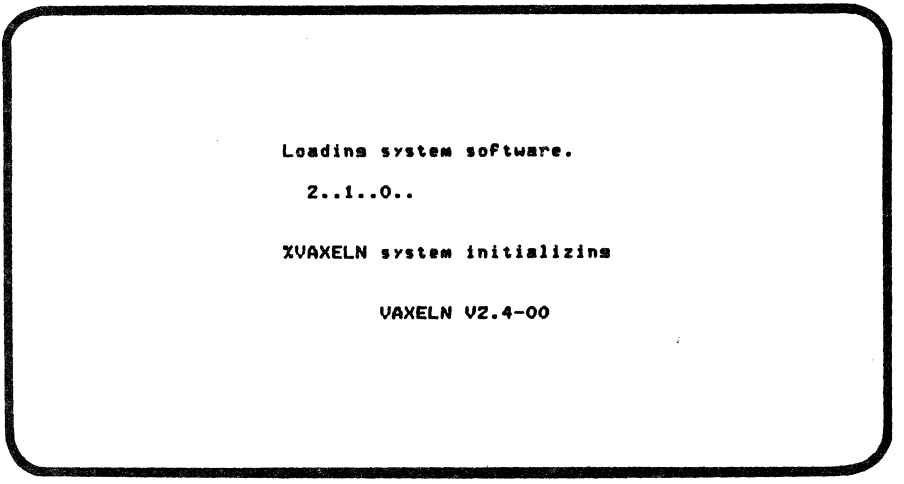
Before loading (booting) the MDM software,

- Be sure you understand the instructions in Chapter 4 for using the RX33 diskette drive.
- Make sure the MDM media (RX50 diskettes) are write-protected.

NOTE: *See the MicroVAX Diagnostic Monitor Ethernet Server User's Guide for instructions on loading MDM into a diskless system. Once you have installed and down-line loaded the MDM software into your system, see Section 5.3.2 of this guide for specific instructions on running MDM.*

1. Find the MDM diskettes (labeled MV DIAG CUST RX50) that were packaged with your system. The diskettes are numbered sequentially to show the order of their use.
2. Set the fixed disk 0 Ready button on the control panel to the out position.
3. Insert diskette 1 into the RX33 diskette drive.
4. Press the Restart button if the system is running, or turn on the system if the system is off.
5. A countdown from 7 through 3 should appear on the console terminal as the system performs self-tests. The countdown continues from 2 to 0 as the system loads the diagnostic software (Figure 5-3).

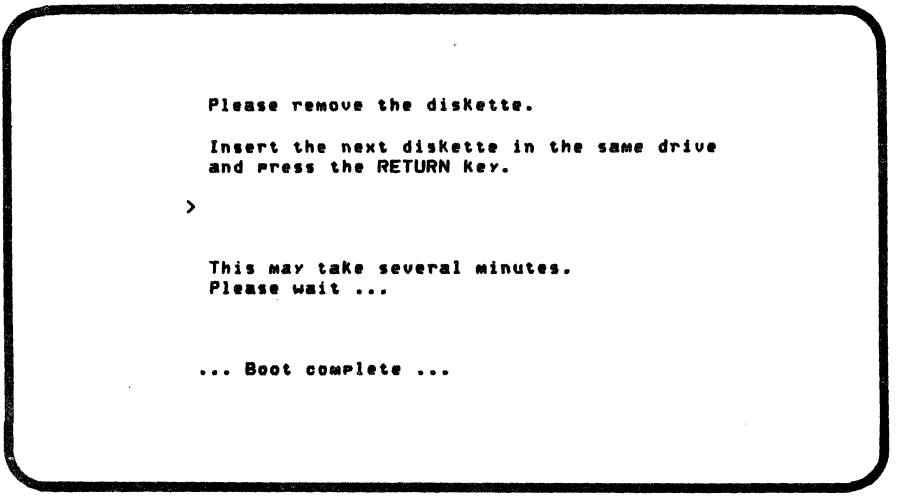
Figure 5–3: Loading MDM from Diskette



MR-0787-0689

6. A few moments later, you should see the MDM boot disk removal display (Figure 5–4). Remove diskette 1 and insert diskette 2. Press Return to continue loading MDM.

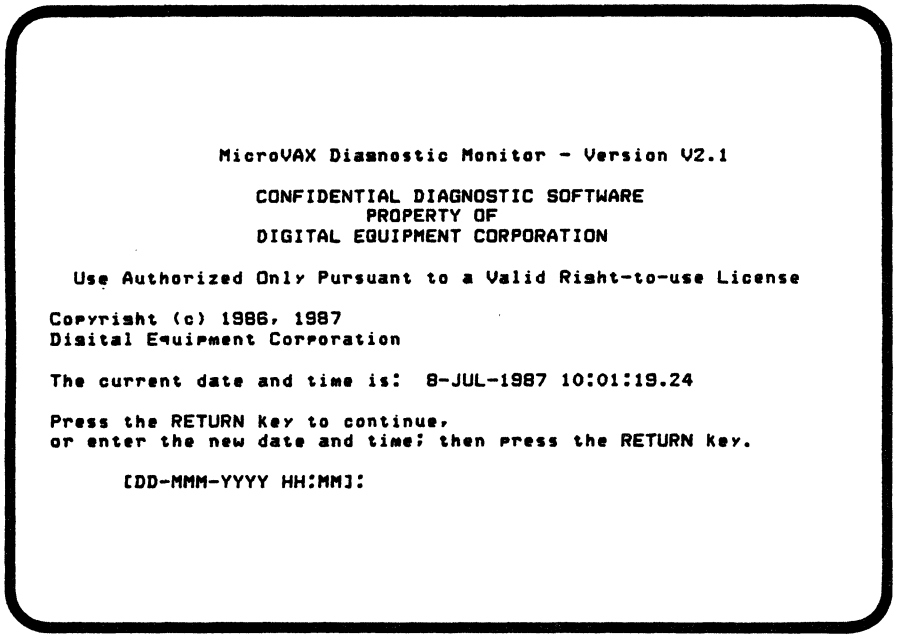
Figure 5–4: MDM Boot Diskette Removal



MR-0787-0690

7. Within a few moments, you should see the MDM introductory display (Figure 5-5).

Figure 5-5: MDM Introduction



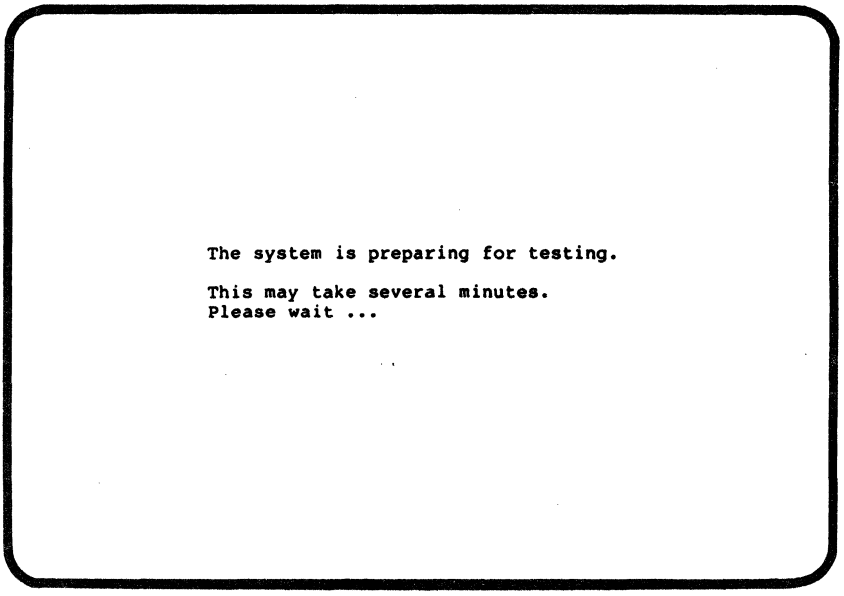
MR-0187-0004

NOTE: *The version numbers on your display may differ from that shown in Figure 5-5.*

8. Make sure the current date and time in the introductory display are correct. If the current date and time are correct, press Return to continue. If incorrect, type the correct date and time, using the format shown in Figure 5-5. For example, enter 25-DEC-1987 02:30 and press Return to continue.

9. You should next see the test preparation display (Figure 5-6).

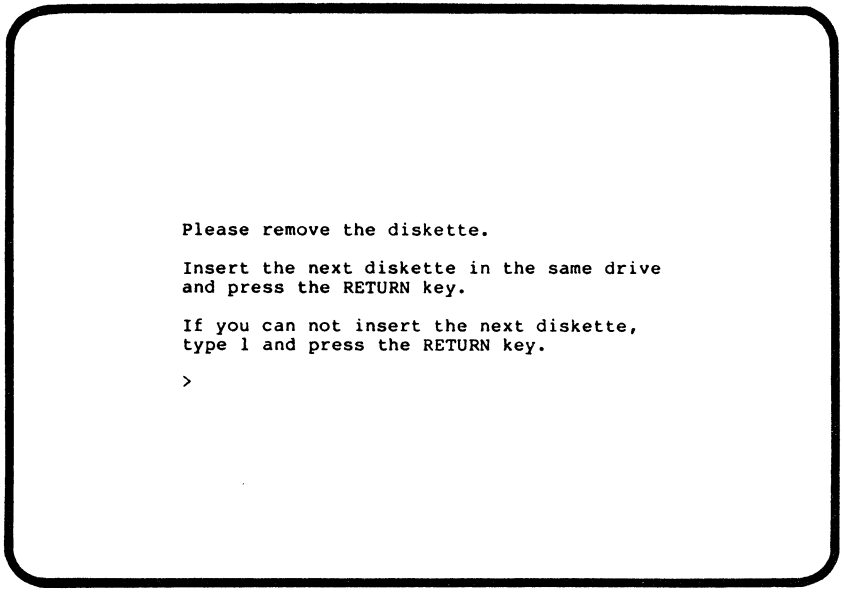
Figure 5–6: MDM Test Preparation



MR-0187-0065

10. Insert additional diskettes in numerical order when prompted by the system (Figure 5-7).

Figure 5-7: Diskette Removal Display

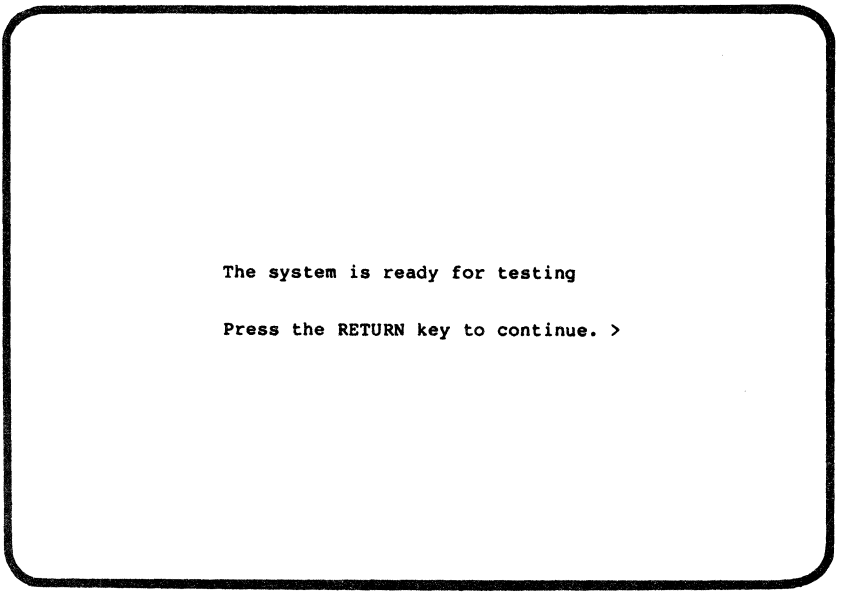


MR-0187-0066

NOTE: *If your system does not request all the diskettes containing diagnostic software, your configuration does not need the additional diskettes for testing.*

11. After a few minutes, you receive a message that the system is ready for testing (Figure 5-8). When you press Return, the MDM Main Menu appears (Figure 5-9) and MDM is now ready to test your system.

Figure 5–8: Ready for Testing Message

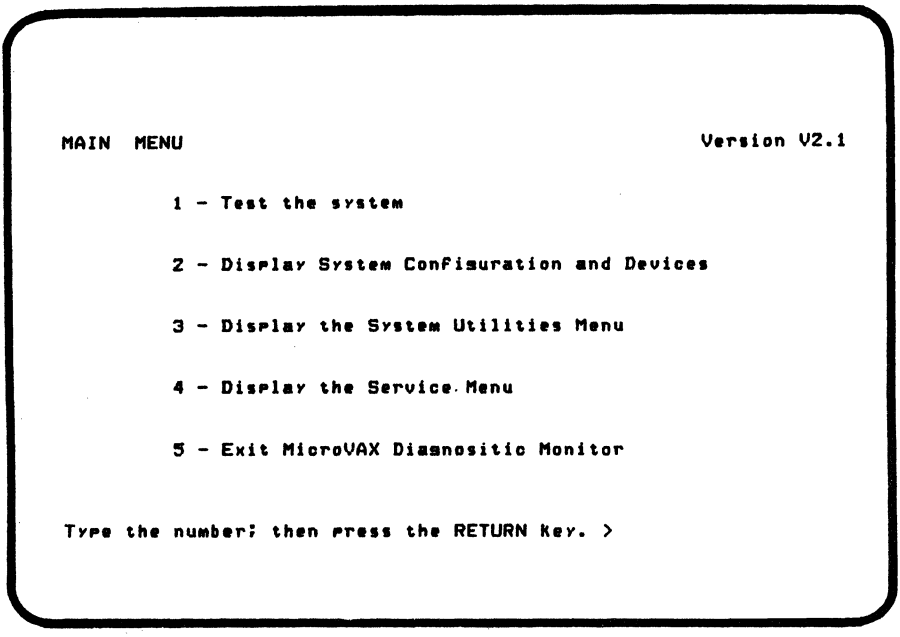


MR-0187-0068

5.3.2 RUNNING MDM

The MDM Main Menu has five options (Figure 5–9). Select an option by typing the number corresponding to your choice and pressing Return.

Figure 5–9: MDM Main Menu



MR-0187-0089

Option 4, Display the Service Menu, is available only if you have purchased a MicroVAX Maintenance Information Kit. The kit contains service diagnostics and rtVAX 1000 system maintenance information. Only qualified service personnel should use the kit.

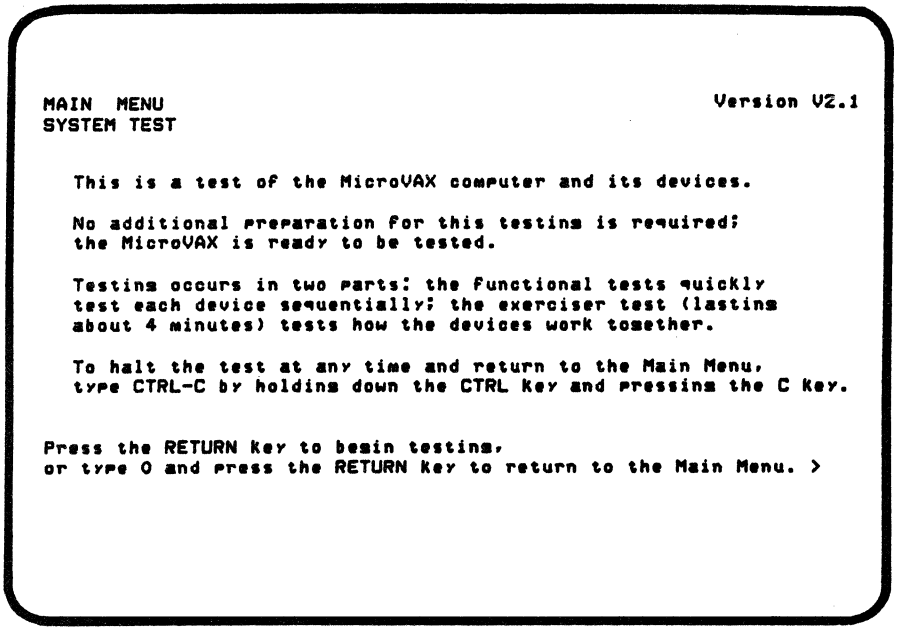
The following sections describe the five options on the Main Menu.

5.3.2.1 Test the System

Test the System runs a quick and general test of the devices in the system. It also tests to see if the devices work together. Digital recommends that you always backup your data before testing your system to guard against unexpected data loss.

When you select Test the System, a screen explaining the testing procedures appears (Figure 5–10).

Figure 5-10: Selecting the System Test



MR-0187-0070

When you are ready to begin the test, press Return. The Begin Device Tests display appears (Figure 5-11).

NOTE: *Unless instructed to do so, do not change any settings or manipulate devices while the tests are running. The diagnostic software interprets any change of state as an error.*

Figure 5-11: Beginning the Tests

```
BEGIN DEVICE TESTS

     This is a test of all system devices identified by the
     system.  If any of your system devices are  not  listed
     below, consult your system documentation for the action
     to take.

     Device                    Result

     CPUA .................
                               Passed
     MEMA .................
                               Passed
     DEGNAA ...............
                               Passed
     RQDXA ................
                               Passed

BEGIN EXERCISER TEST

    Results are reported at the end of the testing.
```

MR-0187-0005

As each device passes the test, it is listed on the screen (Figure 5-11).

NOTE: *Because of the internal similarity of some communication options, the diagnostic test sees these options as the same device. A DHV11 and DHQ11 appear the same to the diagnostic test. A generic device name, DH-CX0, is listed for similar communications options. The last letter in each device name differentiates among multiple devices of the same type. For example, DH-CX0A indicates one communications option; DH-CX0B a second, and so forth.*

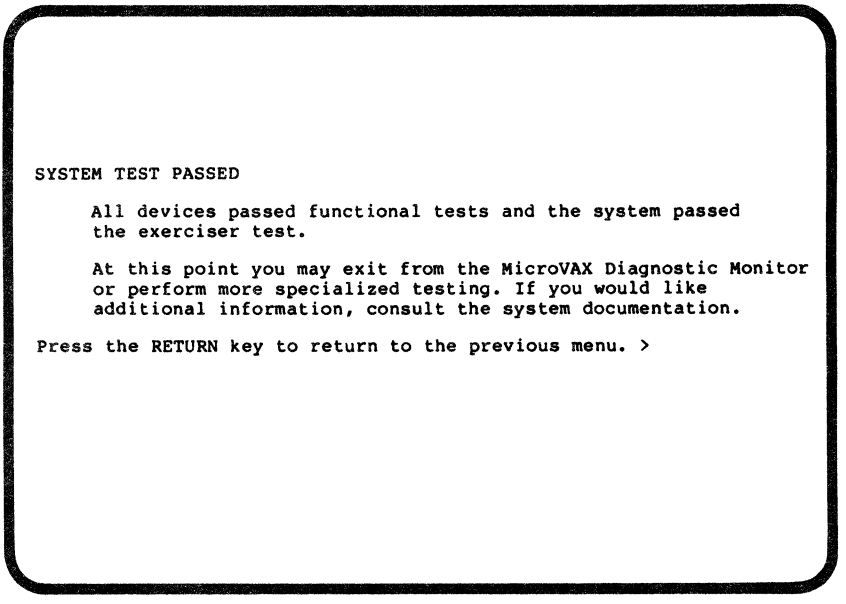
If a device fails the test, you receive a failure message. Each failure message identifies the device being tested when the failure occurred and the field replaceable unit (FRU). Copy the failure message and report it to your Digital service representative.

If your system has serious problems, the following message may appear: `All devices disabled, no tests run.` Report the message to your Digital service representative.

When a failure message occurs, the testing stops.

When all devices pass the first part of the test, the exerciser test begins. This test takes about four minutes and tests how the devices work together. At the end of the test, you receive a success message (Figure 5–12).

Figure 5–12: System Test Passed Screen



MR-0187-0006

At the end of the system test, press Return. The Main Menu appears. From the Main Menu you can either exit MDM by choosing option 5, or you can choose one of the other options.

5.3.2.2 Display System Configuration and Devices

Display System Configuration and Devices identifies devices recognized by the diagnostic software. Figure 5–13 shows a sample system configuration and devices display.

Figure 5–13: System Configuration and Devices Display

```
MAIN  MENU                                                  Version V2.1
SYSTEM CONFIGURATION AND DEVICES

    CPUA ... MicroVAX/rtVAX CPU
        KA620-AA MC=00 HW=00
    MEMA ... MicroVAX/rtVAX memory system
        5 megabytes. 10240 Pages.
              KA620 ... CPU module, 1MB on-board memory
              MS630-BB ... Quad height memory module, 4MB
    DEGNAA ... Ethernet controller
        DEGNA     08-00-2B-03-C6-FD
    RQDXA ... Winchester/diskette controller.
        Revisions =2 and 1
              RD31 ...  Unit #0, Nonremovable
              RX33 ...  Unit #1, Removable, Write protected

Press the RETURN key to return to the previous menu. >
```

MR-0187-0096

At least two lines of information are provided for each device. The first line lists the name of the device and gives a brief description. The second line indicates the revision level of the device. The revision level can refer to hardware or microcode. For example, the KA620 CPU described in Figure 5–13 is at revision 0 for microcode (MC = 0) and revision 0 for hardware (HW = 0).

In addition to the general information listed for each device, information for specific devices is listed as follows.

- **CPU** — Type of CPU, presence of a floating point unit (FPU)
- **MEMA** — Total amount of memory in megabytes and pages, number and type of memory modules

- **RQDXA** — Type, unit number, and description of each mass storage device supported by the controller
- **DEQNA** — The Ethernet station address

NOTE: *When you have two of the 8-megabyte memory options (MS630-CA) installed, you receive a message that the 1-megabyte of memory on-board the CPU is disabled. This message does not indicate an error. The rtVAX 1000 system has a 16-megabyte limit on physical memory.*

If the MDM software cannot correctly test a device, you may receive one of two messages: "No Diag" or "Unknown."

The message "No Diag" indicates that the MDM software has found a device that it recognizes, but that the software lacks a diagnostic program to test the device. The message "No Diag" could occur under the following circumstances.

- A device is configured to the wrong address.
- The software loaded into the system does not contain a program to test the device.
- A device is malfunctioning.

The message "Unknown" indicates one of the following problems.

- A non-Digital device, unrecognized by MDM, has been installed in the system.
- A Digital device that has no diagnostic program written for it has been installed in the system. This may occur if the device installed is not supported by the current version of the VAXELN or MDM software.

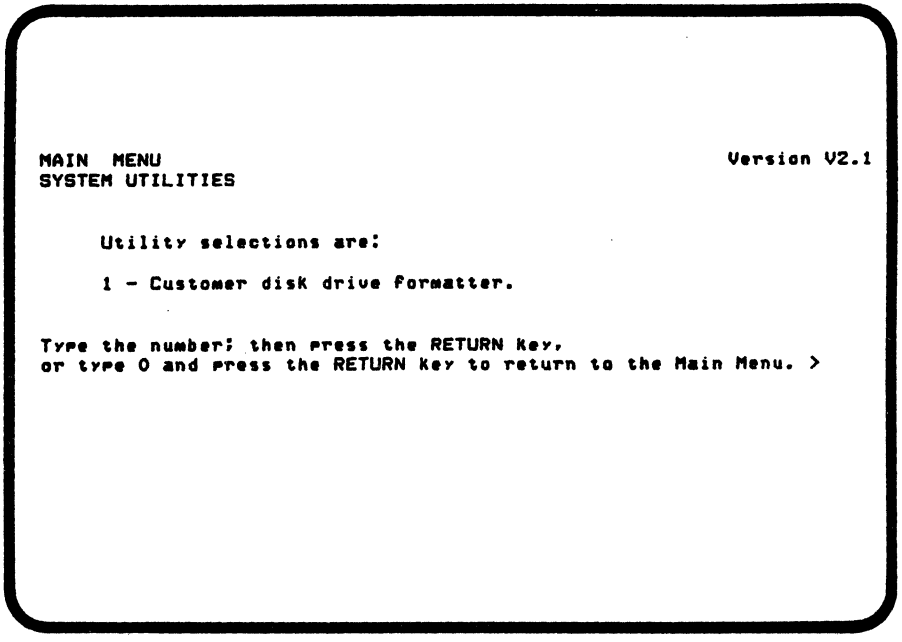
In either case, the message "Unknown" does not indicate anything about the condition of a device or the integrity of the system. It simply indicates that the MDM software cannot test the device.

Once all devices have been listed, you can return to the Main Menu by pressing Return.

5.3.2.3 Display the Utilities Menu

When you choose Display the Utilities Menu, you see the System Utilities Menu (Figure 5-14).

Figure 5-14: System Utilities Menu



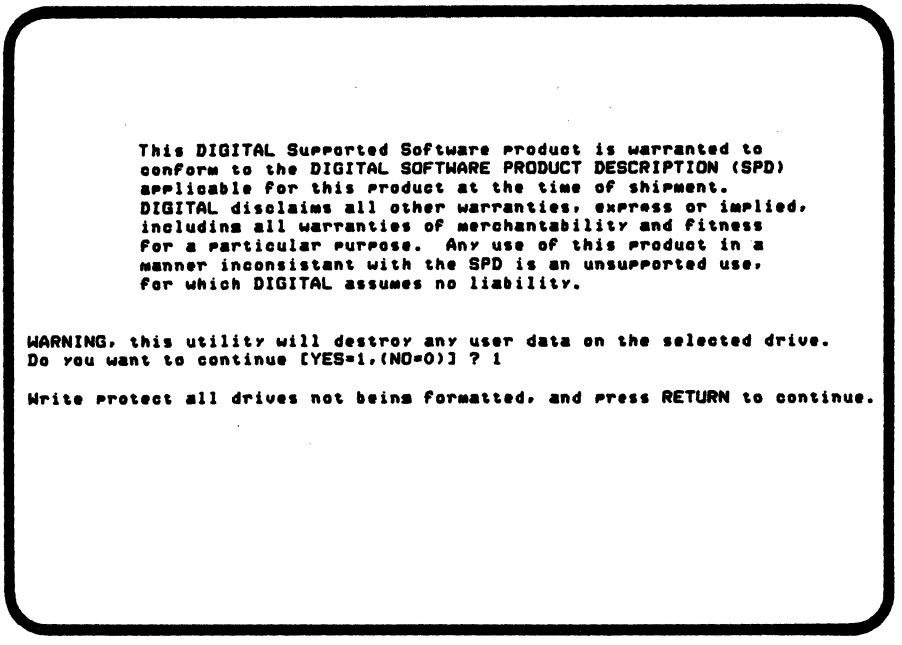
MR-0187-0007

The only option available is the Customer Disk Drive Formatter. Choosing this option enables you to format your RD31 fixed-disk or an RX33 diskette. Choose the option by typing 1 and pressing Return.

NOTE: *If your fixed-disk drive was installed at the factory, it is already formatted and should not be reformatted unless there is a problem or you want to erase the data on the disk. If your fixed-disk drive is an option that you installed, it will require formatting before it can be used to store data.*

Because formatting destroys all data on the disk or diskette, a warning displays when you choose this option (Figure 5-15).

Figure 5–15: Formatting Utility Warning



MR-0187-0006

To begin the formatting operation, type 1 and press Return. You are prompted to write-protect all drives except the one you want to format.

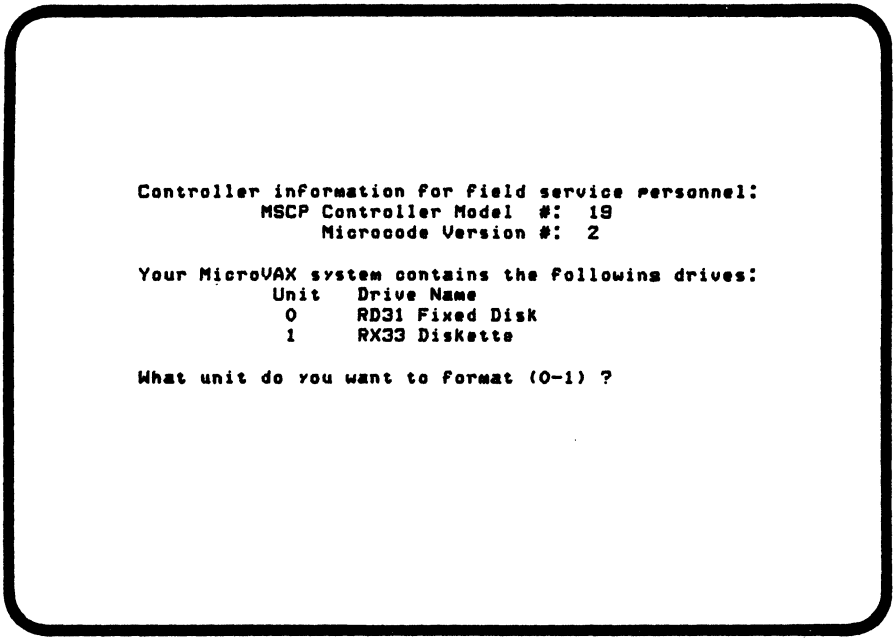
If you are formatting an RX33 diskette, you must remove the write-protect tab before inserting the diskette into the drive.

If you are formatting the RD31 fixed-disk drive, you must set the Write-Protect button on the control panel to the write-enable (out) position.

WARNING: *Running the formatting utility destroys all data on the disk. Use this utility only if you want to erase the contents of the disk.*

Press Return when you are ready to continue. A list of the drives and their unit numbers appears (Figure 5–16).

Figure 5–16: List of Drives in System

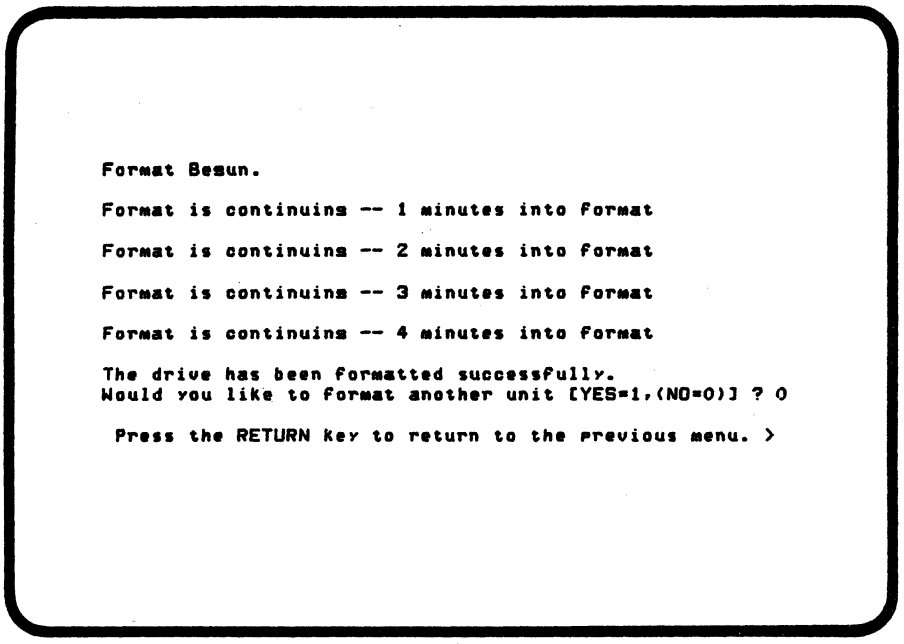


MR-0187-0009

You are prompted to enter the unit number of the drive you want to format. Type the number and press Return. You are asked to verify the unit number. If the unit number is incorrect, type 0, press Return, and re-enter the unit number. If the unit number is correct, type 1 and press Return. The formatting operation begins. As the operation progresses, you receive formatting status messages (Figure 5–17).

Figure 5–17: Formatting Messages

```
Format Begun.

Format is continuing -- 1 minutes into format

Format is continuing -- 2 minutes into format

Format is continuing -- 3 minutes into format

Format is continuing -- 4 minutes into format

The drive has been formatted successfully.
Would you like to format another unit [YES=1,(NO=0)] ? 0

 Press the RETURN key to return to the previous menu. >
```



MR-0187-0010

If you want to format another unit, type 1 and press Return to begin the formatting process again. For example, to format another RX33 diskette, remove the one just formatted, insert another, and then repeat the process. Otherwise, type 0 and press Return. The Utilities Menu displays. To return to the MDM Main Menu, type 0 and press Return again.

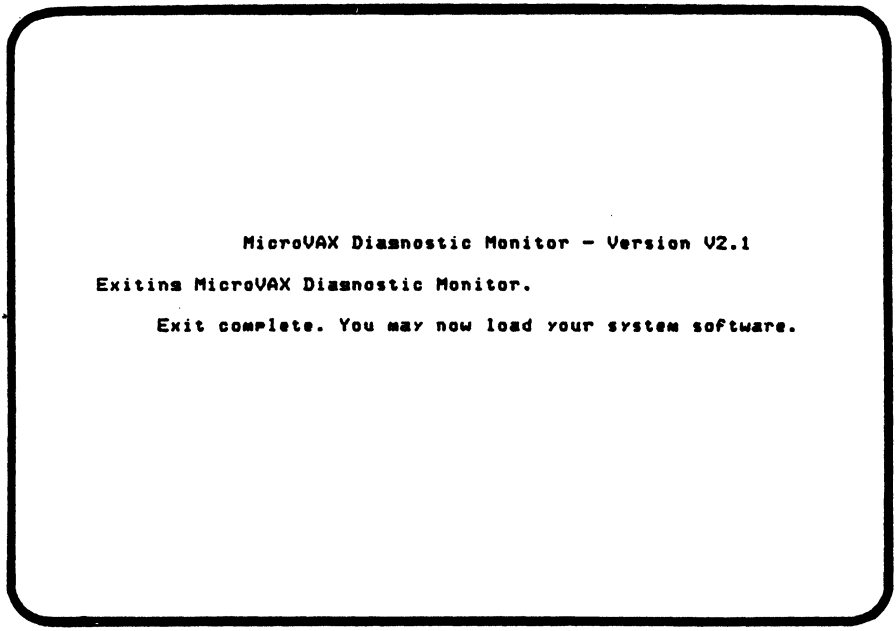
5.3.2.4 Display the Service Menu

This option is available only if you have purchased the MicroVAX Maintenance Information Kit, which includes the service diagnostics. Only qualified service personnel should run the service diagnostics.

5.3.2.5 Exit MDM

Choose this option when you are ready to leave MDM. Type 5 and press Return. You receive the exit message (Figure 5–18).

Figure 5–18: Exit Display



MR-0187-0087

If you have run MDM on a new system, you are ready to install your system software. Follow the instructions in your VAXELN software manuals. If you have used the Disk Formatter Utility to format your fixed disk, you must reinstall your system software. Set the Write-Protect button to write-enable (out), then install the software.

If you have run MDM on a system containing system software, you must reboot your system software.

You can reboot your system software in two ways.

- Set the halt enable/disable switch on the CPU distribution panel insert at the rear of the system to the enable position, indicated by the dot inside of the circle. Press Break on the console terminal or the Halt button on the control panel. When the console mode prompt >>> appears, use the console BOOT command followed by the logical device name of the boot device. For example, to load system software from the RD31 you would type `>>>BOOT DUA0`.

  After the system software is loaded, set the halt enable/disable switch to disable, indicated by the dot outside the circle. This eliminates the possibility of accidently halting the system if the Break key on the console terminal is inadvertently pressed.

- Set the halt enable/disable switch to disable and press the Restart button on the control panel. This causes your system to begin the power-up sequence again and automatically load system software.

Glossary

Application program
A program designed to meet specific user needs, such as a program that monitors a manufacturing process or other time-critical events.

Backplane
A connector block that printed circuit boards plug into. A printed circuit board containing the bus.

Back up
The process of making copies of the information stored on a disk so that you can recover that information after an accidental loss. You make these copies on RX33 diskettes or TK50 magnetic tape cartridges and then store them in a safe place.

Backup copy
A duplicate copy of information on your fixed disk that is stored on RX33 diskettes or TK50 magnetic tape cartridges.

Baud rate
The speed at which signals are transmitted serially along a communication line. One baud equals one bit per second.

Binary
A number system that uses only two digits: 0 and 1. These digits are usually represented in rtVAX 1000 system circuitry by two voltage levels. All rtVAX 1000 programs run in binary form.

Bit
A binary digit, the smallest unit of information in a binary system of notation, designated as a 0 or a 1.

Boot
To use a bootstrap program for the purpose of bringing a system to a defined state where the system can operate on its own.

Bootable medium
A fixed disk, diskette, or magnetic tape containing software (such as an application or diagnostic program) that the bootstrap program can load into the rtVAX 1000 system.

Bootstrap
A program that you start when you turn on an rtVAX 1000 system. The bootstrap program loads software from either the local storage medium, such as the fixed disk or RX33 diskette, or over the Ethernet into system memory. The rtVAX 1000 system then stops running the bootstrap and starts running the software in memory.

Bug
An error in the design or implementation of hardware or software system components.

Bus
A printed circuit board that is part of the backplane. The bus permits communication among the rtVAX 1000 printed circuit boards.

Byte
A group of eight binary digits (bits). A byte is one-half the size of an rtVAX 1000 word and one-quarter the size of an rtVAX 1000 longword.

Central processing unit (CPU)
The part of an rtVAX 1000 system that controls the interpretation and execution of instructions. In an rtVAX 1000 system, all CPU functions are on one rtVAX CPU chip.

Command
An order given by a user to an rtVAX 1000 system, often through a terminal keyboard.

Communication line
A cable along which electrical signals are transmitted. Devices or computer systems connected by communication lines can share information and resources.

Computer system
A combination of rtVAX 1000 hardware, software, and external devices that performs specific operations or tasks.

Console terminal
The terminal that you use when installing software and running diagnostic programs.

Controller
An rtVAX 1000 system component, usually a printed circuit board such as the RQDX3 disk controller, that regulates the operation of one or more peripheral devices. Controllers are often called *interface units*.

Control panel
The area on the front of an rtVAX 1000 cabinet that contains control switches and indicators.

CPU
Central processing unit.

Data
A representation of facts, concepts, or instructions suitable for communication, interpretation, or processing by humans or by machines.

Data transmission
The movement of data, in the form of electrical signals, along a communication line.

Debug
To detect, locate, and correct errors (bugs) in system hardware or software.

Device
The general name for any entity connected to an rtVAX 1000 system that can receive, store, or transmit data. (*See* Input device, Output device, Input/output device, *and* Controller.)

Device name
The name by which a device or controller is identified within an rtVAX 1000 system. You use the device name to refer to that device when communicating with the system.

Diagnostic program
A program that detects and identifies abnormal rtVAX 1000 system hardware operation. The MicroVAX Diagnostic Monitor software used to test an rtVAX 1000 system contains several diagnostic programs.

Disk
A flat circular plate with a coating on which information is stored magnetically in concentric circles (tracks). The rtVAX 1000 disks are the fixed disk used in the RD31 fixed-disk drive and the flexible disk used in the RX33 diskette drive.

Disk drive
A device that contains a fixed disk or diskette. The drive contains electromechanical components that spin the disk and move the read/write heads that store and read information on the surface of the disk.

Diskette
A flexible magnetic disk used to store information. Diskettes are contained in a square paper envelope.

Diskette drive
A device that is limited to the use of diskettes for storing information. (*See* Disk drive.)

EIA
Electronic Industries Association.

Error message
A message displayed by the rtVAX 1000 system to indicate that it has detected an error or malfunction.

File
A collection of related information treated by the rtVAX 1000 system as a single item.

Formatted data
Data laid out in a particular pattern to conform to a predetermined structure. The structure is dictated by the system software.

Hard-copy terminal
A terminal that displays information on paper, rather than on a screen. (*Compare* Video terminal.)

Hardware
The physical components—mechanical and electrical—that make up the rtVAX 1000 system. (*Compare* Software.)

Head
The part of a fixed-disk drive, diskette drive, or tape drive that reads, records, and erases data. Also called *read/write head.*

Input device
A piece of equipment used to transfer data into the rtVAX 1000 system. A keyboard is an input device.

Input/output (I/O) device
A piece of equipment that accepts data for transmission both to and from the rtVAX 1000 system. A terminal is the input/output device.

Interactive
The method of communicating with the rtVAX 1000 system. You type a command at the keyboard, the system executes the command, and then responds with a message or prompt for another command.

Interface
A device or piece of software that lets different components of an rtVAX 1000 system communicate with one another.

I/O
Abbreviation for input/output.

K
When referring to the storage capacity of the rtVAX 1000 system, the symbol that means a binary thousand or 2 to the 10th power (1024 in decimal notation).

Kbyte
Abbreviation for kilobyte.

Kilobyte
1024 bytes.

LED
Light emitting diode. LEDs are used as indicators on the control panel. A segmented LED display on the CPU distribution panel insert on the rear of the rtVAX 1000 cabinet displays the characters 0 through 9 and A through F during the power-up sequence to indicate CPU status and normal and abnormal system operation.

Load
To move software, usually from a peripheral device into memory. To place a disk in a disk drive, or tape in a tape drive.

Longword
A group of 32 bits, equal to 2 words or 4 bytes.

M
When referring to the storage capacity of the rtVAX 1000 system, the symbol that means a binary million or 2 to the 100th power (1,048,576 in decimal notation).

Magnetic tape
A long strip of plastic coated with magnetic oxide, used for storing information. Often called *magtape*. The tape contained in a TK50 magnetic tape cartridge.

Mbyte
Abbreviation for megabyte.

MDM
MicroVAX Diagnostic Monitor software used to isolate and identify system faults.

Megabyte
1,048,576 bytes.

Memory
The area where the rtVAX 1000 system finds the instructions and data it will process.

Menu
A displayed list of options. The list usually contains commands you can enter.

Off-line
Pertaining to equipment, devices, and events that are not under direct control of the rtVAX 1000 system.

On-line
Pertaining to equipment, devices, and events that are in direct communication with the rtVAX 1000 system.

Operating system
A collection of programs that controls the overall operation of the rtVAX 1000 system and performs such tasks as the following.

Assigning places in memory to programs and data
Processing requests, scheduling jobs
Controlling the operation of input and output devices

Output device
A device by means of which data can be extracted from the rtVAX 1000 system. For example, a printer.

Peripheral device
Any device distinct from the central processing unit that provides it with additional memory storage or communication capability. Examples are disk and diskette drives, video terminals, and printers.

Power-up sequence
A series of ordered events that occurs when you supply power to a system by turning it on.

Printer
A peripheral device that provides paper copies of information stored in the rtVAX 1000 system.

Program
The complete sequence of instructions necessary for the rtVAX 1000 system to perform a task. (*See* Software.)

Prompt
A character or words that the rtVAX 1000 system displays to indicate it is waiting for you to type a command.

Real-time
Pertaining to computer actions controlled by external conditions and actual times.

Real-time application
The precise synchronization of a computer's operations with a machine and input/output device.

Real-time processing
The method of processing in which an event causes a given reaction within an actual time limit.

Real-time system
The rtVAX 1000 system. A computer system performing computations while a related or controlled physical activity is occurring so the results of the computation can be used in guiding the process.

Read-only memory (ROM)
A memory that does not allow modification of its contents. The rtVAX 1000 system can use data in a ROM but cannot change it.

Reboot
To restart the rtVAX 1000 system. Pressing the Restart button on the control panel reboots the rtVAX 1000 system.

Record
A set of related data that a program can treat as a unit. A file consists of a number of records.

ROM
Read-only memory.

Run
A single continuous execution of a program. To execute a program.

Software
Programs executed by the rtVAX 1000 system to perform a chosen or required function. (*Compare* Hardware.)

Software package
A set of related programs that performs a specific task.

Storage medium
Any device capable of recording information, for example, a diskette.

Store
To enter information into a storage device, such as a disk, or into memory.

System
A combination of rtVAX 1000 hardware and software and external devices that performs specific processing operations.

System management
Tasks performed by the operating system to control the overall operation of the rtVAX 1000 system.

Terminal
An input/output device generally used for communication between the user of an rtVAX 1000 system and the system itself. Terminals can be grouped into two basic categories: video and hard-copy.

Video terminal
A terminal that displays information on the screen of a cathode ray tube (CRT). (*Compare* hard-copy terminal.)

Word
A word is 16 bits long.

Write-protect
To protect a disk, diskette, or other storage medium against the addition, revision, or deletion of information.

Write-protect notch
The small notch in the side of an RX33 diskette. You can cover the notch with an adhesive-backed label or tab to write-protect the diskette.

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ORTRONICS DB-25F

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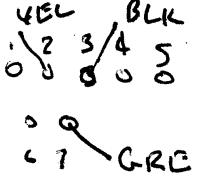

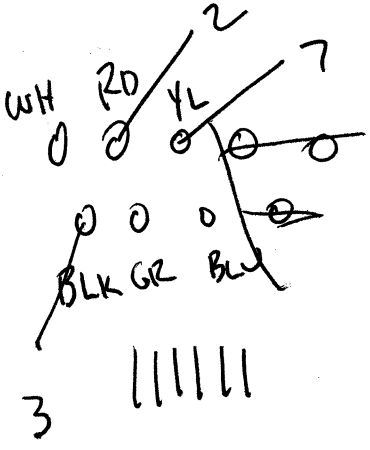

MDM Loading Procedure for Disk Systems

The MDM tests are on diskettes packaged with your rtVAX 1000 system. The system boot diskettes are labeled as follows.

MVII DIAG CUST SYS RX50A
MVII DIAG CUST SYS RX50B

The diagnostic diskettes are labeled as follows.

MVII DIAG CUST RX50 #1 through #7

When loading MDM diagnostics from the RX33 diskette drive, be sure to load the boot diskette labeled RX50A first. Then load the boot diskette labeled RX50B. Next, load the diskettes labeled RX50 #1 through RX50 #7, as required by the system.

NOTE: *If your system does not request all the diskettes containing diagnostic software, your system's configuration does not need the additional diskettes for testing.*

October, 1987

rtVAX 1000 System User's Guide Addendum

Order Number EK-172AA-AD-001

MicroVAX Diagnostic Monitor (MDM) Update
This addendum updates the procedure for loading MDM diagnostics from the RX33 diskette drive to the rtVAX 1000 system.

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