Contents

MicroVAX II 630QY, 630QZ Installation

Order Number EK-002AB-IG-002

The READER'S COMMENTS form on the last page of this document requests the user's critical evaluation to assist in preparing future documentation.

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DELNI	Rainbow	VMS
DEQNA	RSTS	VT
DESTA	RSX	Work Processor
DIBOL	RT	**digital** ™

ML–S809

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

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Appendix A Tabletop Conversion Procedures

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Preface

This manual describes how to install the MicroVAX II 630QY, 630QZ system. The main body of the manual describes how to install the 630QY variant, the pedestal mount. Appendix A describes how to convert the pedestal mount to a tabletop model. Appendix B describes how to rack mount the 630QZ variant.

Installation includes the following steps:

1. Verifying site preparation

2. Checking your shipment

3. Placing the system

4. Installing the console terminal

5. Connecting the console terminal to the system

6. Connecting other devices to the system

7. Setting controls on the system

8. Connecting the power cord

9. Turning on the system and selecting a language

If you prefer not to install the system, DIGITAL provides an installation service.

1 Verify Site Preparation

Prior to receiving your system, you should have received a *Micro Systems Site Preparation Guide*. This guide describes the physical, environmental, and electrical requirements to operate your system. For your convenience, a copy of this guide is also included in your Customer Hardware Information kit. If you have not already done so, please read the guide and follow its instructions for preparing your site.

The installation instructions that follow assume that the site meets all the requirements listed in the *Micro Systems Site Preparation Guide*. The instructions also assume that all terminal data lines, telephone lines, and network lines that you plan to connect to your system are in place and clearly labeled.

2 Check Your Shipment

Your shipment includes several cartons. Before installing your system, unpack all boxes and check the contents against the shipping list to ensure you have received everything you ordered.

NOTE: *Save all packing materials if you plan to reship the system.*

If any item is missing or damaged:

• Contact your delivery agent.

• Contact your DIGITAL sales representative.

Instructions for unpacking the system are on the shipping carton. Figure 1 shows the contents of the shipping carton.

Figure 1: Shipping Carton Contents
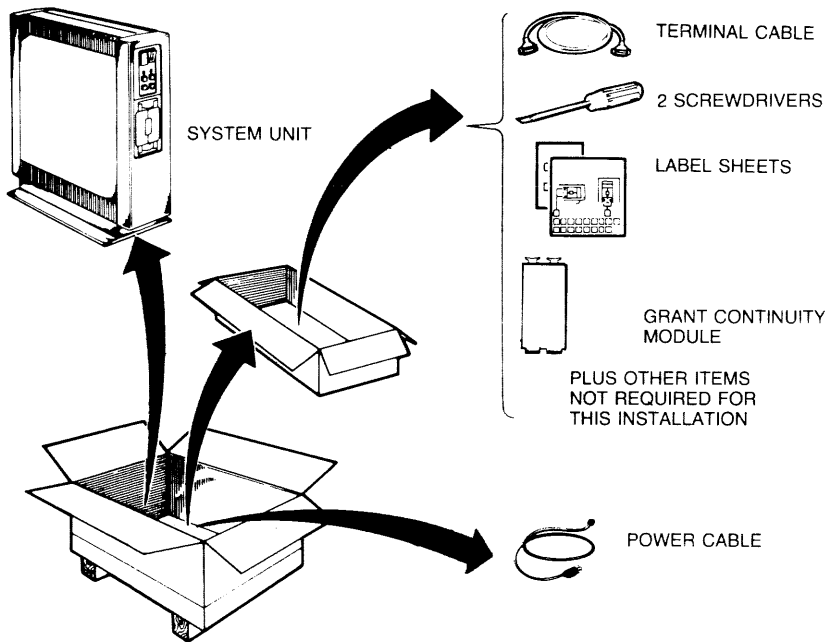
MLO-1396-87

NOTE: *If you ordered the 630QZ variant, you should receive a rack mount kit. Refer to Appendix B for instructions on installing the rack mount version of the MicroVAX II system.*

A box marked "Software" contains system software, software documentation, diagnostic software, and a software license.

Depending on your order, your shipment may include some of the following equipment:

- Additional terminal(s)
- Printer(s)
- Modem(s)
- Cables for connecting additional devices to your system.

3 Place the System

The installation instructions that follow assume you have correctly followed the unpacking instructions on the carton. They also assume you are installing the 630QY pedestal mount. If you are converting the 630QY system to a tabletop mount, substitute the instructions in Appendix A for this section. If you are rack mounting a 630QZ system, substitute the instructions in Appendix B for this section.

After unpacking your system, move it to where it will be used.

WARNING: *Use two people to move the unit. The unit weighs 27 kg (60 lb).*

Your system requires two inches clearance for ventilation on each side. Figure 2 shows the air flow through the system.

Figure 2:   System Air Flow
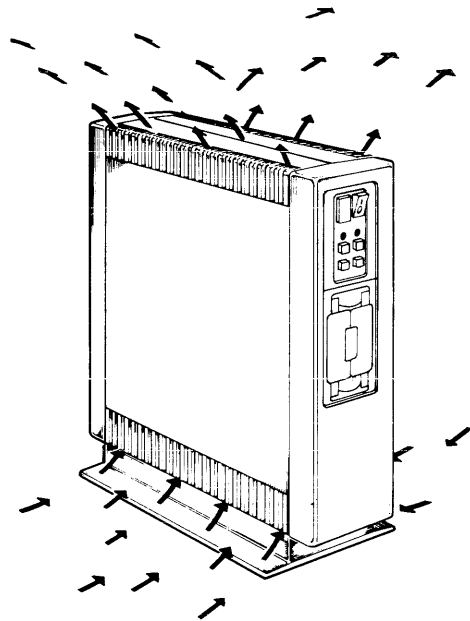
MLO-1397-87

Your system requires no rear ventilation space. However, during installation you should leave about two feet at the rear of the system. You need this space to connect cables, and to access the controls behind the rear cover.

4 Install the Console Terminal

The first step in installing your MicroVAX 630QY, 630QZ system is to set up the console terminal. You use the console terminal to communicate with your system. Your console terminal is packed in several boxes containing the following:

- Video monitor

- Keyboard

- Documentation, including an installation guide and owner's manual.

- System box (graphics terminals only)

Unpack the terminal and documentation. Some typical console terminals are shown in Figure 3.

Figure 3: Console Terminals for MicroVAX II Systems
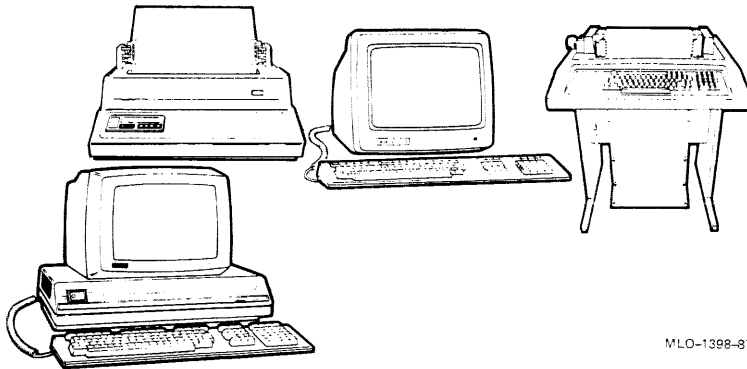
MLO-1398-87

Use the instructions in the terminal installation guide to connect the various components of your terminal.

Read the terminal owner's manual to learn how to turn on and operate the terminal. Before you connect the console terminal to your MicroVAX II system, turn on the terminal to make sure it works correctly and to perform some set-up operations.

The terminal performs a self-test every time you turn it on. The terminal owner's manual describes a successful self-test and possible error messages that display if the terminal is not operating properly. Once the terminal passes the test, you should perform some set-up operations.

Set-up involves choosing how your terminal operates. You choose set-up options from a series of menus that display when you press the [Set-Up] key on the terminal keyboard. Details about how to perform set-up and the set-up options available on your terminal are in your terminal owner's manual.

While most default settings are acceptable, you should perform the following procedure to ensure appropriate set-up values.

1. Press [Set-Up] to display the Set-Up Directory Screen. Choose the Default option. Default correctly sets all values except line speed.

2. Choose the Comm option to display the Communications Set-Up Menu. Choose the Transmit option and change the speed to 9600. Set Receive equal to Transmit.

3. Choose the Return to Set-Up Directory option. Choose the Save Set-Up option to store the set-up values.

Once you have tested your console terminal and performed set-up operations, you are ready to connect the terminal to your MicroVAX II system.

5 Connect the Console Terminal to the System

You connect the console terminal to the CPU panel in the rear of the system. Connect the console terminal to your MicroVAX II system as follows:

1. Remove the rear cover of your system, as shown in Figure 4.

Figure 4: Removing the Rear Cover
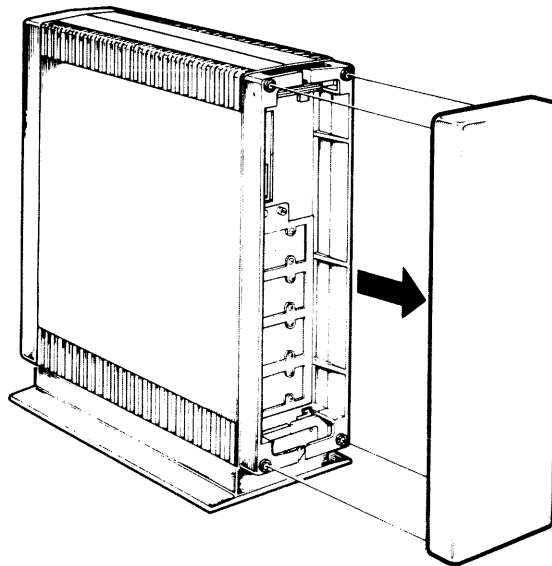
MLO-1399-87

2. Turn off the console terminal.

3. Find the terminal cable in the accessories box.

4. Connect the terminal cable to the Comm Port on the rear of your terminal, according to the instructions in your terminal installation guide. The location of the plug varies with the type of terminal.

5. Connect the other end of the cable to the CPU panel on the rear of the system, as shown in Figure 5.

DIGITAL's VT300-series terminals are factory set to accept an RS–232 CPU panel-to-console terminal connection. If you have a VT300-series terminal, and you are plugging the terminal cable into a modified modular jack (MMJ) on the rear of your VT300-series terminal, you are forming a DEC 423 connection. To make the system recognize your VT300-series console terminal, you must perform the following Set-Up operations:

- Press [Set-Up] to display the Set-Up Directory Screen.

- When the Set-Up menu appears on the screen, enter Global Set-Up.

- Select the Feature "Comm1 Port".

- Change the setting from RS–232 to DEC 423.

- Choose the Return to Set-Up Directory option. Choose the Save Set-Up option to store the set-up value.

You are now ready to connect additional devices to your system.

Figure 5: Connecting the Console Terminal to the System
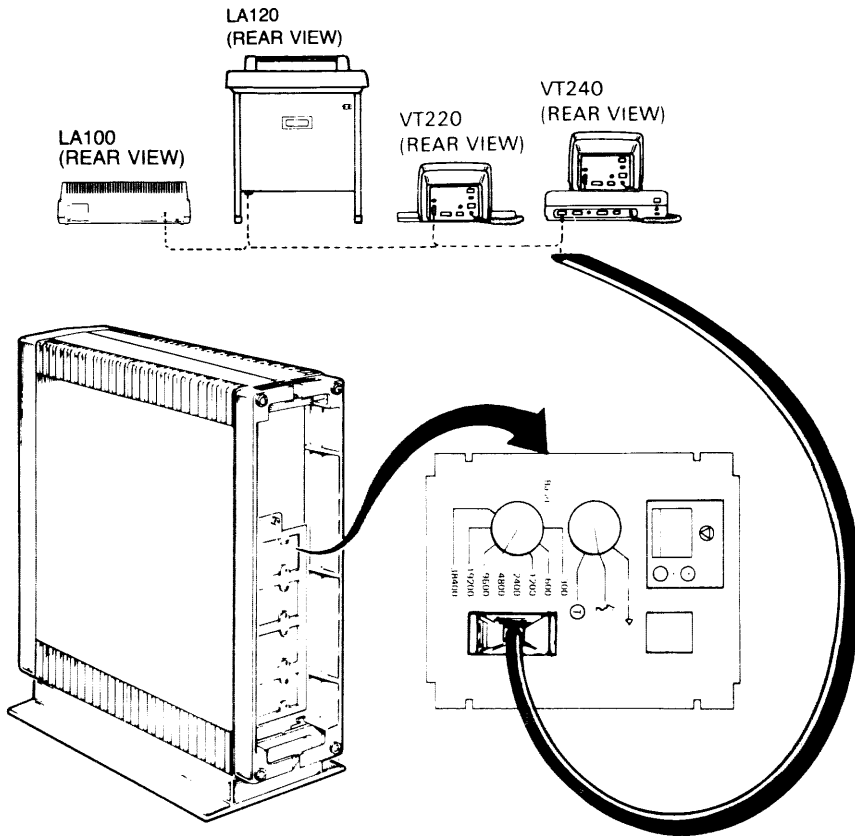
MLO-1400-87

6 Connect Additional Devices to the System

You can connect additional devices to your system, or you can complete installation and load system software before connecting other devices. Skip to the next step if you prefer to connect additional devices later. Use the instructions in this step when you are ready to connect the devices.

Before connecting devices to the system, install and test them according to the documentation provided with the device.

WARNING: *Turn off the devices before connecting them to the system.*

You make all connections to the insert panels, on the back of the system. Internal cabling runs from the connectors on the insert panels to the option modules.

6.1 Connect Terminals and Printers

You can connect up to eight terminals and/or printers to your system for each DHQ11 and DHV11 module, and four for each DZQ11 module installed in your system. If the site has been prepared properly, the lines for the additional terminals and printer(s) are clearly labeled, and terminate near the system.

Connect the additional terminals and printers as shown in Figure 6.

Figure 6: Connecting Additional Devices

CABLE
GUIDE

ADDITIONAL
DEVICES
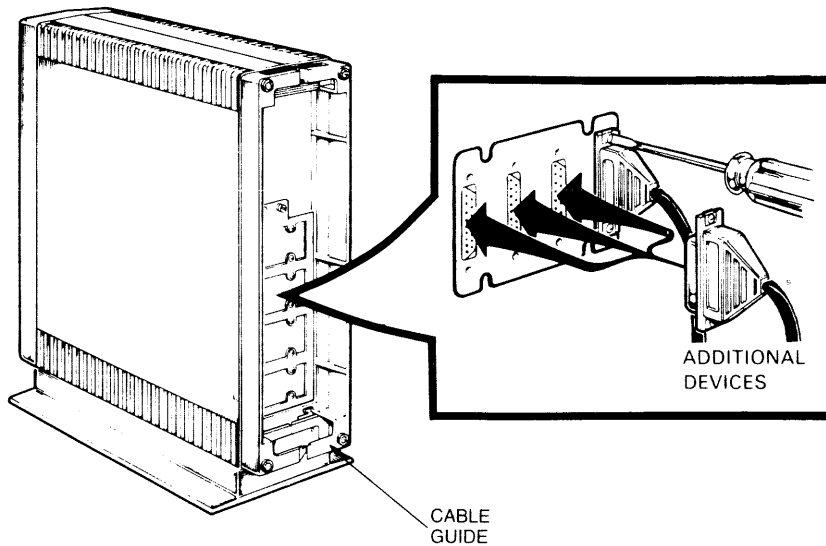
MLO-1401-87

After making connections, thread all cables through the lower cable guide, shown in Figure 6.

6.2 Connect Modems to the System

You connect modem lines to the insert panels the same way you connect terminals and printers. The DHQ11, DHV11, and DZQ11 modules have modem control support.

Connect the other end of the cable to the modem, as described in the modem installation guide. Make sure the modem is plugged into a power source and connected to an active phone jack. See your modem user's guide for instructions on how to use your modem.

6.3 Connect to a Network

You can connect your system to a network if your system has the DELQA or DEQNA option and if the Ethernet cabling is in place. Make a network connection as follows.

1. Find the Ethernet transceiver cable shipped with your system. The cable has a male connector at one end and a female connector at the other end.

2. Connect the male end of the cable to an Ethernet connector on one of the smaller insert panels, as shown in Figure 7. Slide up the locking device on the female connector to secure the connection.

Figure 7: Connecting an Ethernet Cable to the System

SLIDING LOCK

CABLE GUIDE

MLO–1402–87
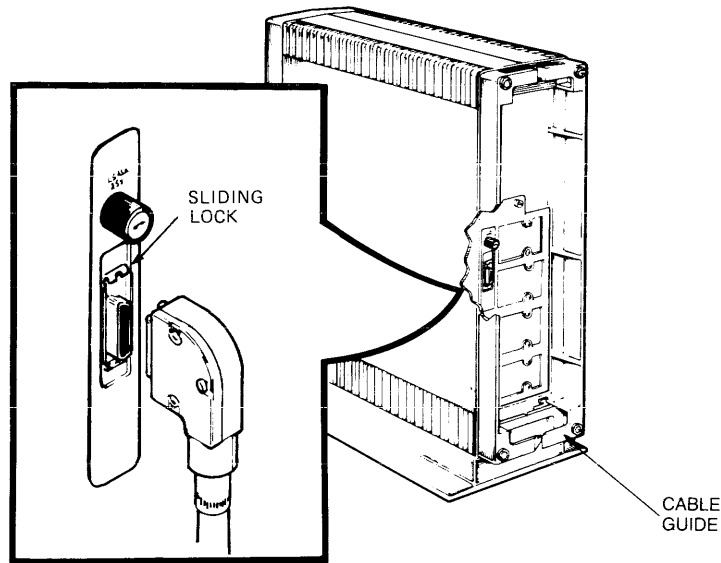
3. Connect the other end of the cable to one of the following devices:

   • An H4000 transceiver located on a traditional baseband Ethernet cable

   • A DELNI, which can, in turn, be connected 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.

7 Set Controls on Your System

Controls on the MicroVAX II 630QY, 630QZ system are in four locations:

- The CPU panel on the rear of the system
- The voltage switch on the rear of the system
- The circuit breaker in the rear of the system
- The control panel in the front of the system

7.1 Set Controls on the CPU Panel

The following controls are located on the CPU panel, shown in Figure 8.

Figure 8: CPU Panel Controls
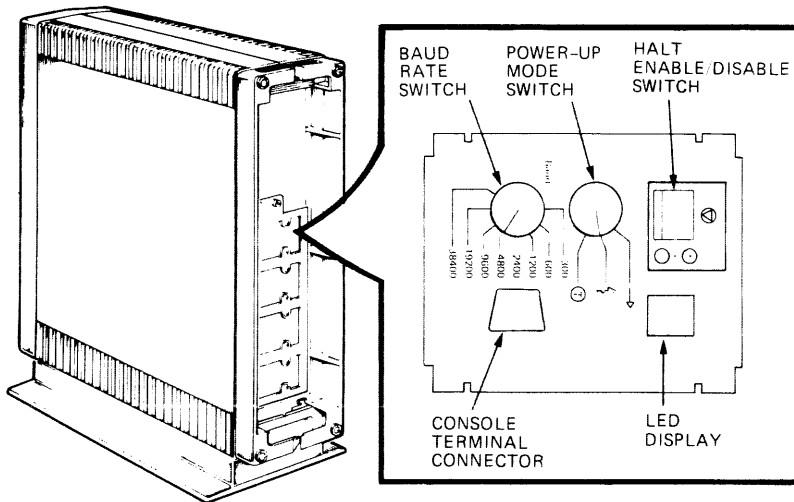
MLO-1403-87

- Halt Enable/Disable Switch. The factory setting is halt disable (left), indicated by the dot outside the circle. Leave the switch set to disable while you start the system for the first time and run diagnostic software to test the system. Before you install system software, move the switch to halt enable (right).

- Power-Up Mode Switch. This 3-position rotary switch determines how the system powers up. The factory setting is Run Mode, indicated by an arrow. Move the switch to the Language Inquiry Mode, indicated by a human profile, before you power up your system the first time.

- Baud Rate. Rotate the baud rate switch to 9600. You should have already set your console terminal baud rate to 9600. The system and the console terminal must be set to the same baud rate to communicate.

7.2 Check the Voltage Setting

Peel back the label covering the switch to see the voltage setting, as shown in Figure 9. If necessary, change the switch setting to match the voltage source you are using.

CAUTION: *An incorrect voltage switch setting will damage your system.*

Figure 9: Checking or Changing the Voltage Setting

115 V

IN N. AMERICA THE
SWITCH IS SET TO
115 V

VOLTAGE SWITCH ————————

LABEL ————————

220 V/230 V/240 V

IN OTHER COUNTRIES
THE SWITCH IS SET
TO **230 V**. IF NOT,
LOOSEN HOLD DOWN
SCREWS AND SLIDE
SWITCH TO **230 V**.

HOLD DOWN
SCREWS

MLO-1404-87

7.3 Check the Circuit Breaker

Because the circuit breaker sometimes trips during shipment, check the position of the circuit breaker, as shown in Figure 10.

Figure 10: Checking the Circuit Breaker
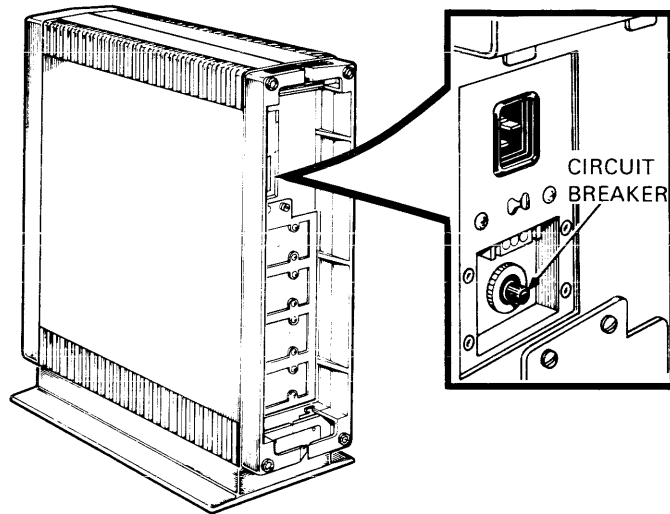
MLO–1405–87

Press in on the circuit breaker to make sure it is in the proper position.

7.4 Label and Set Controls on the Control Panel

Before you set controls, you must attach the labels provided in the accessories kit. Select labels for your language. Two sets of labels are provided for each language: one with the text oriented properly for the pedestal mount as shown in Figure 11, the other with text oriented properly for the rack or tabletop mounts described in Appendixes A and B. If your system contains diskette drives, label them 1 and 2, as shown in Figure 11.

Figure 11: Labeling the Control Panel
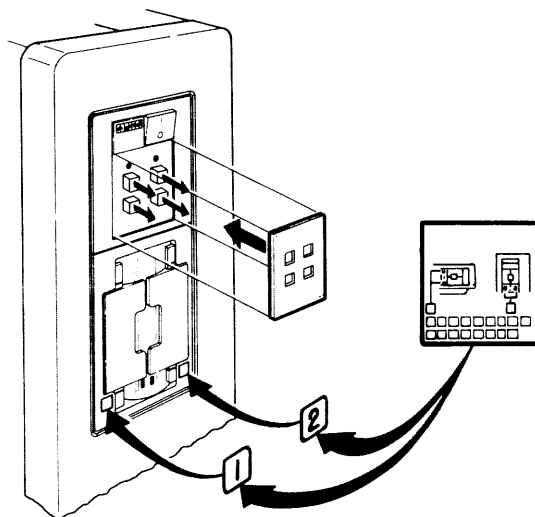
MLO-1406-87

All four buttons on the control panel are 2-position switches that are either in or out. Make sure that *all* four buttons are out.

Set the on/off switch above the four buttons to 0 (off).

8 Connect the System Power Cable

Connect the power cable to the system as follows:

1. Make sure the system on/off switch is set to off (0), and that all devices connected to the system are turned off.

2. Find the power cable packed inside the system shipping carton.

3. Make sure the pronged end of the power cable plug matches the wall outlet. Several types are shown in Figure 12.

Figure 12: Power Cords
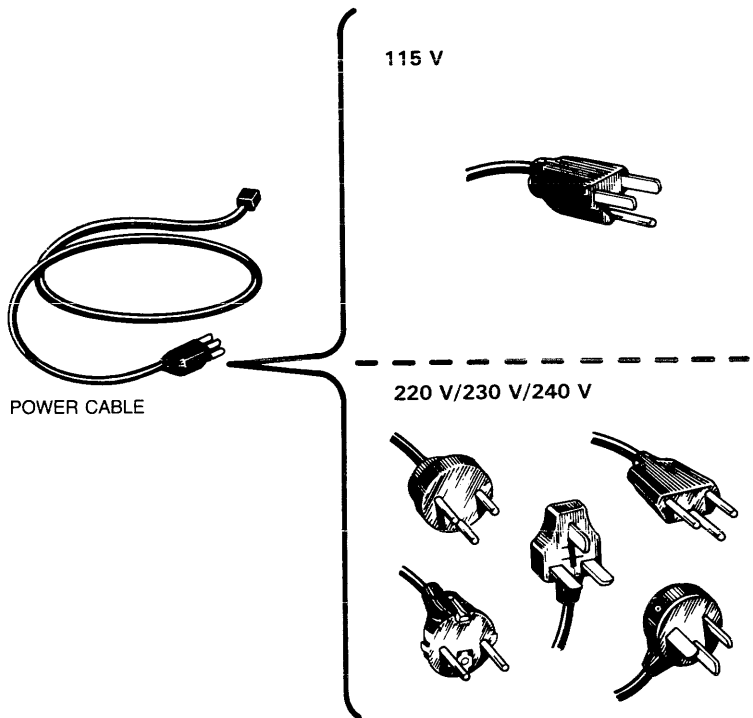
MLO-1407-87

4. Connect the opposite end of the power cable to the system, as shown in Figure 13.

5. Plug the pronged end of the power cable into a wall outlet.

Figure 13: Attaching Power Cord to the System
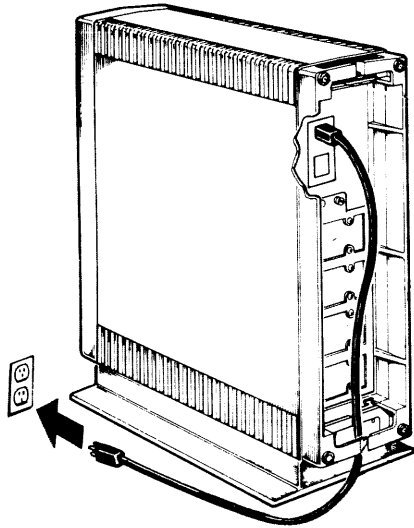
MLO-1408-87

9 Turn On the System and Select a Language

You are now ready to turn on your system and select a language. 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 *MicroVAX II 630QY, 630QZ Technical Information*.

Turn on your system and select a language as follows:

1. Turn on your console terminal and wait until it has performed its self-tests successfully.

2. Turn on your system, by setting the on/off switch to 1 (on).

3. Within a few moments, the Language Selection Menu, shown in Figure 14, should appear on your console terminal.

Figure 14: Language Selection Menu

```
         1) Dansk          7) Nederlands
         2) Deutsch        8) Norsk
         3) English        9) Portuguès
         4) Español       10) Suomi
         5) Français      11) Svenska
         6) Italiano
      (1..11):
```
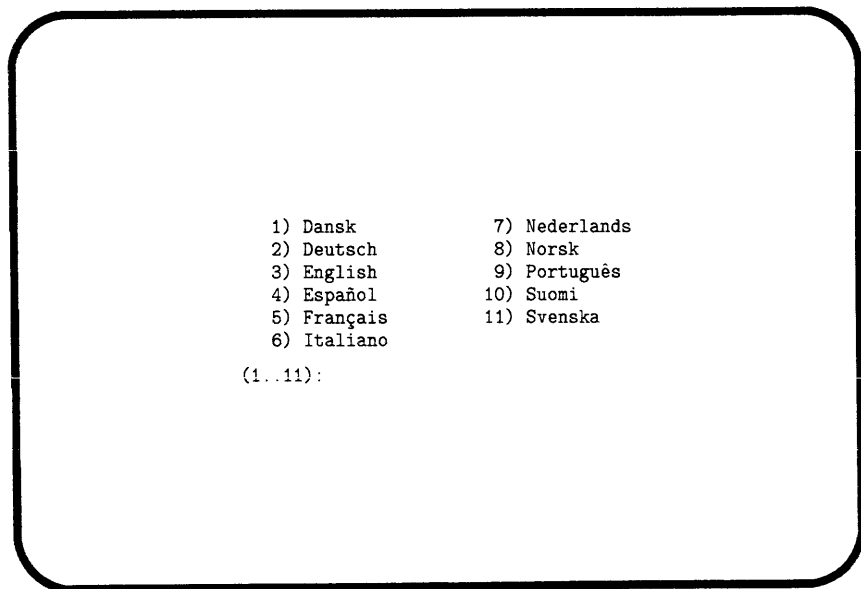
MLO–1409–87

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

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

After you select a language, the system runs power-on 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 15 shows a successful power-on test.

Figure 15: Successful Power-On

```
           Performing normal system tests.

               7..6..5..4..3..

           Tests completed.
```
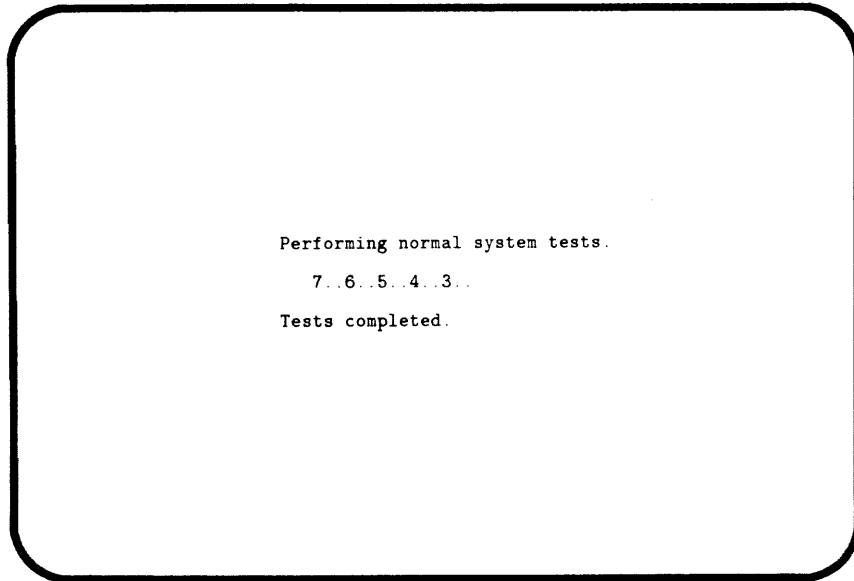
If the self-tests do not run as shown in Figure 15, your system may have a problem. Refer to *MicroVAX II 630QY, 630QZ Troubleshooting* for instructions.

If the self-tests run successfully, turn the Power-Up Mode Switch to the Run Mode, indicated by an arrow. This saves the language you selected.

10 Attach the Rear Panel to the System

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.

11 After Installation

You should now read *MicroVAX II 630QY, 630QZ Operation* to learn how to use your system. You must know how to operate the system controls and the TK50 or TK70 tape drive, or the RX50 diskette drive, before you install system software or run diagnostic software. Both system software and diagnostic software are shipped on either tape cartridges or RX50 diskettes.

While optional, DIGITAL recommends that you run the diagnostic software supplied with your system before you install system software. The diagnostic software is on several RX50 diskettes labeled MV DIAG CUST RX50 or a TK50 tape cartridge labeled MV DIAG CUST TK50. Chapter 3 of *MicroVAX II 630QY, 630QZ Troubleshooting* describes how to run the diagnostic software.

Appendix A
Tabletop Conversion Procedures

This appendix tells you how to convert the MicroVAX II 630QY system from the pedestal mount (as shipped by DIGITAL) to a tabletop version. Perform the conversion as follows:

1. Remove the front and rear covers.

2. Install four rubber feet on the right side of the system.
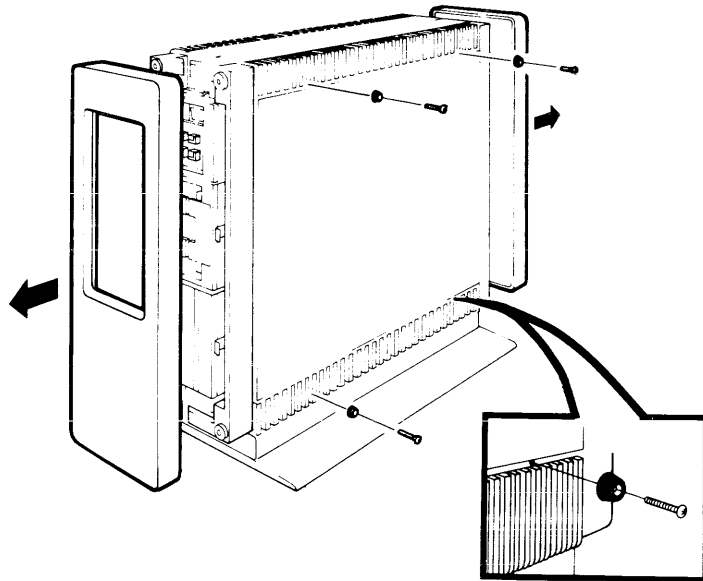
MLO–1411–87

3. Remove the four screws at the base of the system.
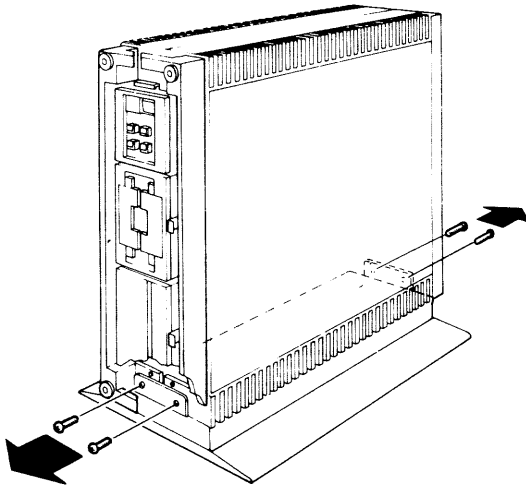
MLO–1412–87

4. Lift the system from the foot stand and place it on a table.

   WARNING: *Use two people to move the system. The system weighs 27 kg (60 lb).*

FOOT
STAND
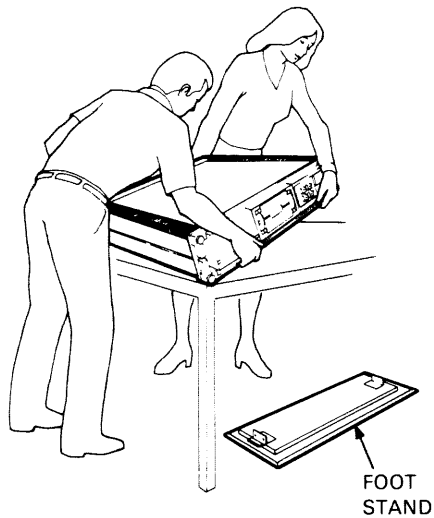
MLO–1413–87

5. Replace the front and rear covers.
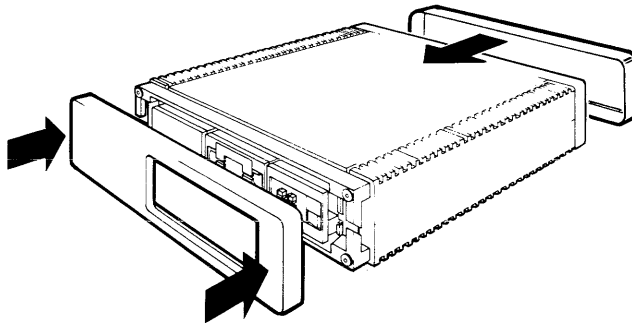
MLO-1414-87

6. Continue with the instructions in Section 4.

Appendix B
Rack Mount Instructions

The following instructions assume installation into a standard cabinet/rack with the following dimensions.

* 48.2 cm (19 in) wide

* 63.5 cm (25 in) between vertical rails

CUSTOMER
SUPPLIED
RACK
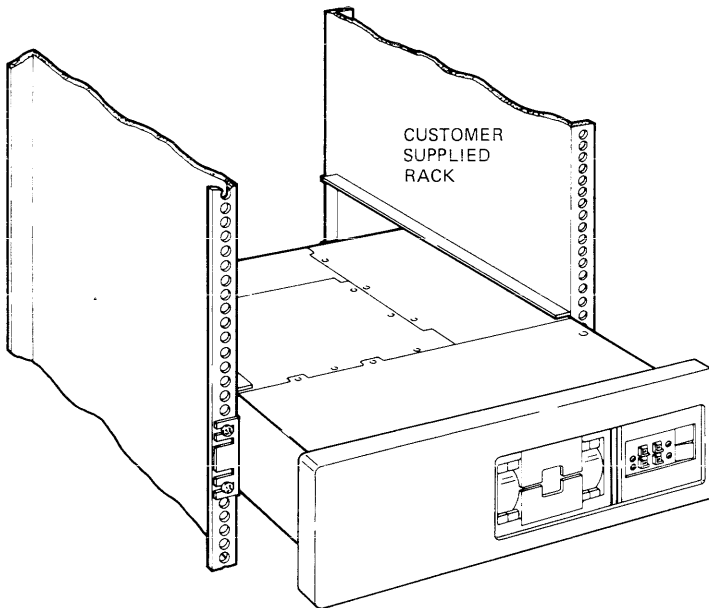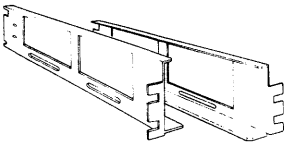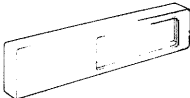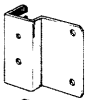
MLO–1415–87

WARNING: *Installation requires two persons. The rack mount system weighs 27 kg (60 lb).*

Install the system as follows:

1. Check the contents of the rack mounting kit against the parts shown. If any item is missing or damaged, call your sales representative.

☐   RAILS (RIGHT, LEFT)   (1 EACH)
                          LEFT - 7428371 - 02
                          RIGHT - 7428371 - 01

☐   FRONT COVER   (1)

☐   RIGHT REAR BRACKET   (1)
                  7428372 - 02

☐   LEFT REAR BRACKET   (1)
                  7428372 - 01

☐   STOP PLATE   (1)   **NOTE:**
                  7428710 - 01   PHILLIPS HEAD
                                                   SCREWDRIVER
                                                     REQUIRED

☐   RIGHT FRONT BRACKET   (1)
                  7021543 - 01

☐   LEFT FRONT BRACKET   (1)
                  7430071 - 01

☐   NYLON STOP CABLE (1)

☐   PHILLIPS MACHINE SCREWS
        WITH LOCK WASHERS   (13)   ☐   PHILLIPS SCREW WITH
                                              LOCK WASHER   (1)

☐   FLAT HEAD PHILLIPS
        MACHINE SCREWS   (8)   ☐   WASHERS   (2)

☐   PHILLIPS TAP SCREWS   (2)   ☐   FASTENERS   (4)

☐   LOCKING HEX NUT   (1)   ☐   U NUT   (12)

MLO-1416-87

2. Prepare right and left rear brackets.

SLIDE U NUTS
IN PLACE
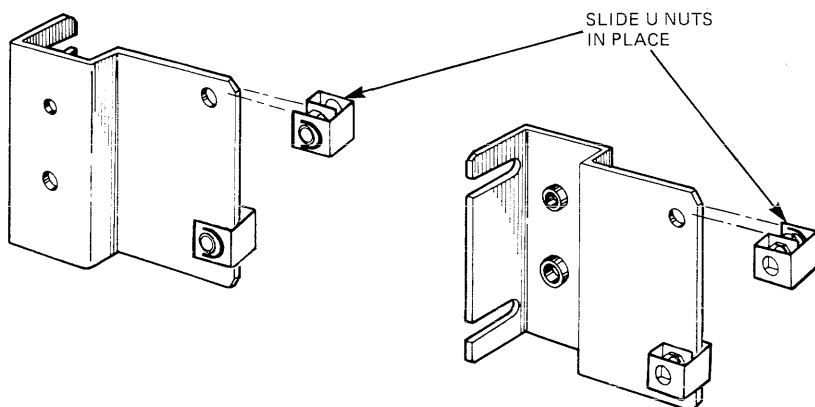
MLO–1417–87

3. Mount the left and right rear brackets onto the rails. Use four 10–32 screws.

RIGHT REAR
BRACKET

NOTE:

POSITION
LARGER HOLE
TOWARD THE
BOTTOM

RIGHT REAR
RAIL

FINGER
TIGHTEN
SCREWS

FINGER
TIGHTEN
SCREWS

LEFT REAR
BRACKET

LEFT REAR RAIL
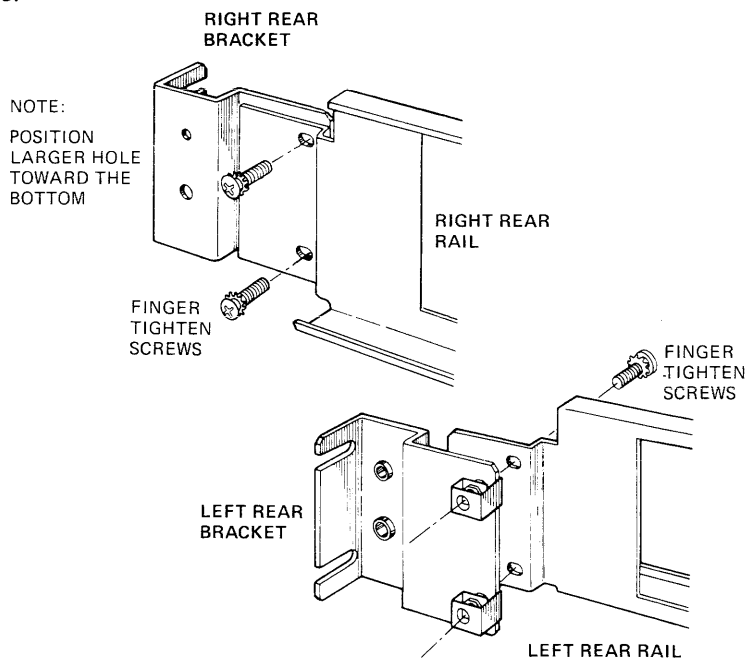
MLO–1418–87

4. Prepare the rack.

SLIDE U NUTS
IN PLACE

LEFT REAR RACK   LEFT FRONT RACK
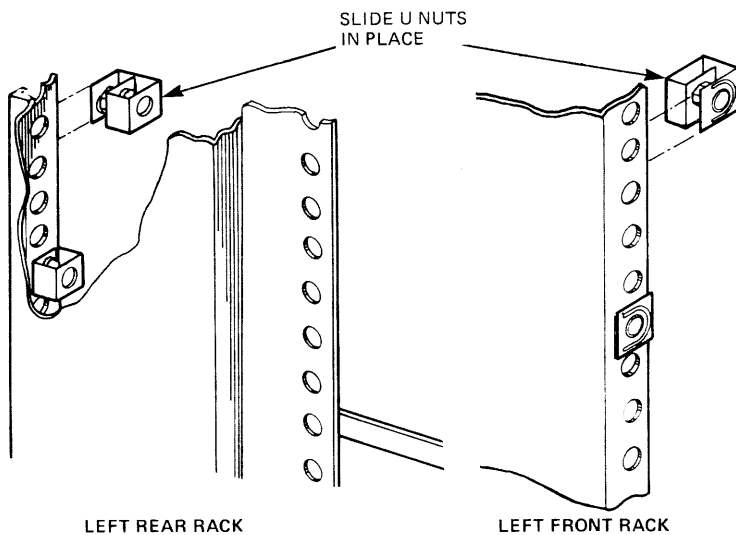
MLO–1419–87

5. Mount the left rail. Use eight 10–32 screws.

LEFT REAR
RAIL

LEFT FRONT
RACK

LEFT REAR RACK
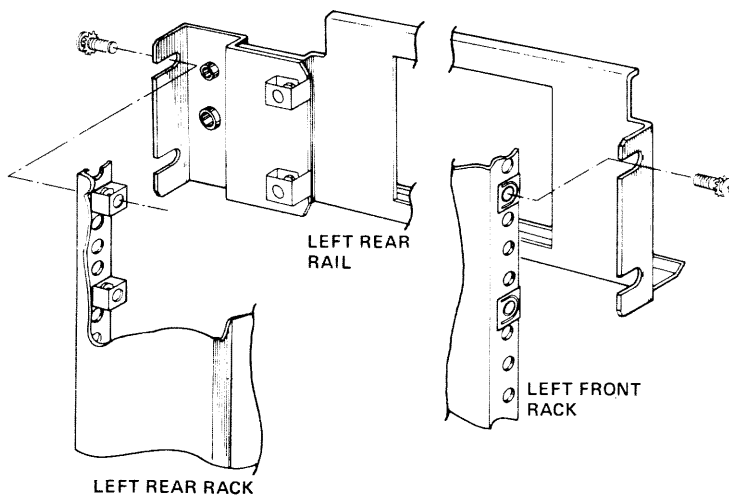
POSITION PREPARED RAIL
AND TIGHTEN ALL SCREWS

MLO–1420–87

6. Repeat steps 4 and 5 to mount the right rails.

7. Attach the stop plate and front brackets. Use eight flat head Phillips machine screws.

STOP PLATE

ATTACH STOP PLATE

ATTACH FASTENERS AND SECURE FRONT BRACKETS TO THE UNIT

RIGHT FRONT BRACKET

LEFT FRONT BRACKET AND FASTENERS
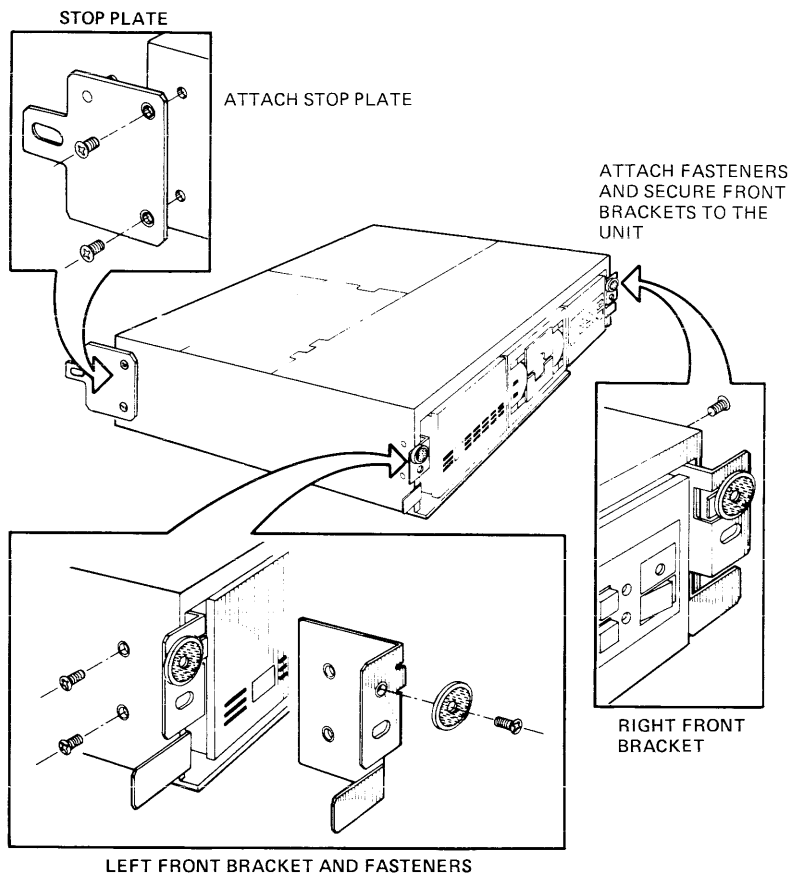
MLO-1421-87

8. Slide the system into the rack.
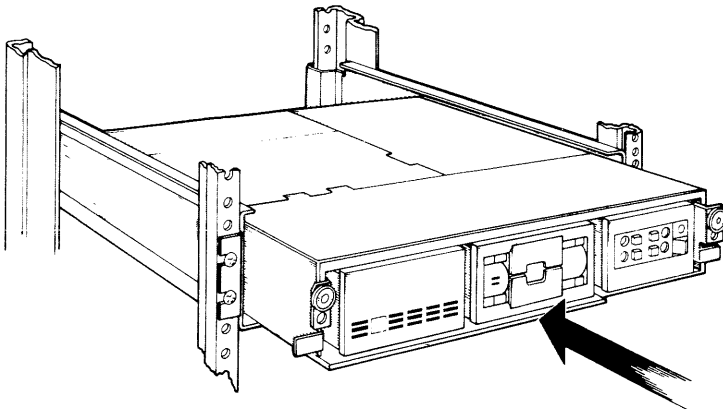
MLO-1422-87

9. Attach the nylon stop cable.

LEFT REAR RACK

NYLON STOP CABLE

SLIDE UNIT IN PLACE AND
SECURE NYLON CABLE AS SHOWN
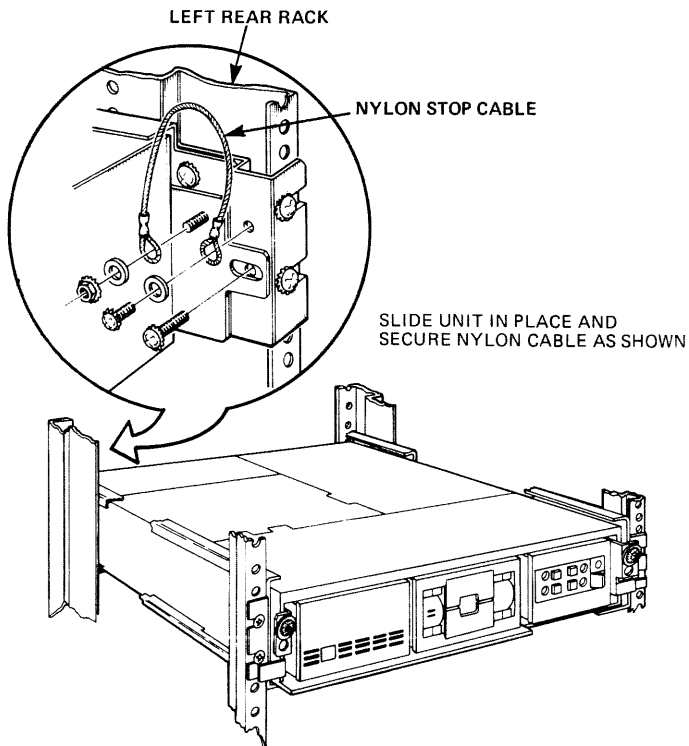
MLO-1423-87

10. Prepare the cover.

TAP SCREW(S)
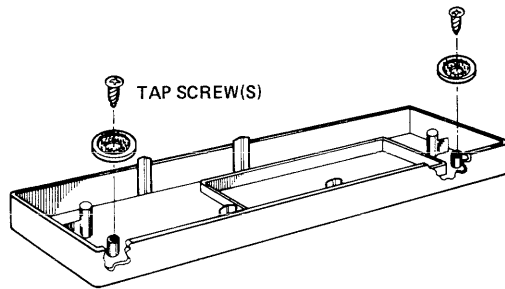
MLO–1424–87

11. Attach the cover.

PRESS FIRMLY IN PLACE
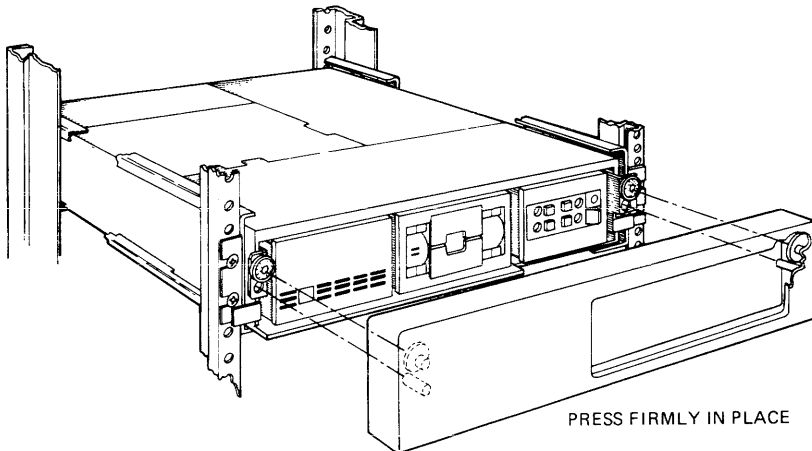
MLO–1425–87

12. Continue with the instructions in Section 4.

MicroVAX II 630QY, 630QZ Operation

Order Number EK-003AB-OM-002

The READER'S COMMENTS form on the last page of this document requests the user's critical evaluation to assist in preparing future documentation.

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DELNI	Rainbow	VMS
DEQNA	RSTS	VT
DESTA	RSX	Work Processor
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ML-S810

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Preface

This manual describes how to operate your MicroVAX II 630QY, 630QZ system. It assumes the system has been properly installed, as described in *MicroVAX II 630QY, 630QZ Installation*.

This manual is structured as follows:

- Chapter 1 provides an overview of the system.

- Chapter 2 describes how to use the system.

- Chapter 3 describes how to use options installed in the system.

- An appendix lists related documentation.

- A glossary defines key terms.

Chapter 1

System Overview

The MicroVAX II 630QY, 630QZ system contains all components in one metal chassis called a BA23 enclosure. Systems installed in a pedestal mount are called 630QY systems. Systems installed in a rack are called 630QZ systems. The illustrations in this manual show a pedestal-mounted system.

Rack-mounted systems differ from pedestal-mounted systems in two ways. The rear panel is not attached, easing access to some controls, and the unit is mounted horizontally. In descriptions of the system, references to *up* become *right* and references to *down* become *left*. The different orientation primarily affects operation of the TK50 and TK70 tape drives.

Descriptions and illustrations in this manual assume the system has mass storage devices. If your system is a satellite node on a VAXcluster (a group of computers networked together under the control of a server node), it may be diskless. Diskless systems boot all software over the network from the server node and store all data on mass storage devices on the server node. Instructions specific to diskless systems occur periodically throughout this manual. Consult your VAXcluster software documentation for more details on using your satellite node.

This chapter introduces you to the system components and their functions. The chapter describes the front and back of the system and the functions of system components. Chapters 2 and 3 describe how to use the system and installed options.

1.1 Front Panel of the Pedestal Mount

The front of the system has a control panel and mass storage devices, unless the system is diskless. All illustrations in this manual show systems with mass storage devices. Systems with mass storage have a fixed-disk drive and one of the following: an RX50 diskette drive, an RX33 diskette drive, a TK50 tape drive, or a TK70 tape drive.

Figure 1–1 shows the front of the pedestal mount equipped with a TK50 tape drive.

Figure 1–1: MicroVAX II 630QY Pedestal Mount

CONTROL
PANEL

TK50
TAPE
DRIVE
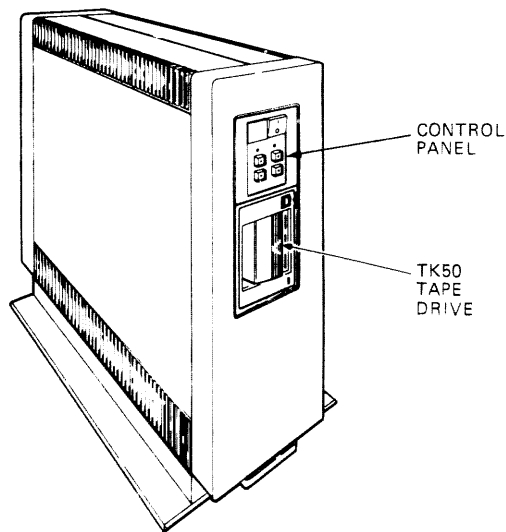
MLO-1426-87

1.1.1 Control Panel

The control panel has several controls and indicators, as seen in Figure 1–2.

Figure 1–2: Control Panel

MLO–1427–87
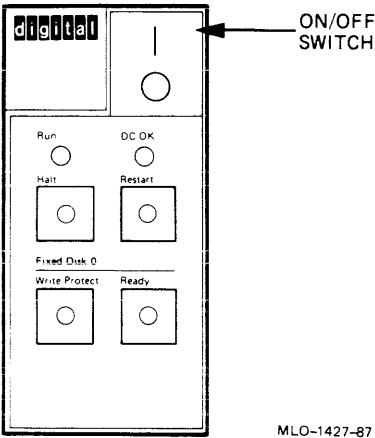
Table 1–1 lists the functions of the various controls and indicators.

Table 1–1: Controls and Indicator Lights

Control	Position	Function
On/Off (1/0) switch	1	Turns on the system.
	0	Turns off the system.
Halt button[1]	Out (not lit)	Normal operating setting.
	In (glows red)	Halt enabled.
Restart button	Momentary contact pushbutton	Returns the system to a power-on condition. Self-tests are run and the system reboots. Work in progress is lost.
Write-Protect button	Out (not lit)	Write enabled, the normal position for software operation. System software can read or write information on the fixed disk.
	In (glows orange)	Write-protected. System software cannot write on the fixed disk.
Ready button	Out (glows green)	Disk is available for use, the normal position for software operation. System software can 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. The green light in the Ready button also indicates disk activity. When the button is out but not lit, activity is occurring. The disk is not available for use until it completes the current operation.
	In (not lit)	Disk is not available for use. System software can neither read from nor write to the fixed disk.

[1]When the Halt Enable/Disable switch on the rear of the system is set to disable, the Halt button has no effect on system operation. The Halt button glows red when depressed, regardless of whether the system is actually halted.

Table 1–1 (Cont.): Controls and Indicator Lights

Indicator	Function
Run	Glows green when the CPU is operating.
DC OK	Glows green when the power supply is generating the correct voltages.

1.1.2 Mass Storage Devices

Your system has two types of mass storage: removable and fixed. The removable type may be an RX50 diskette drive, an RX33 diskette drive, a TK50 tape drive, or a TK70 tape drive. Either is installed just below the control panel. Most illustrations in this manual show a system with an RX50 diskette drive installed. The system's fixed-disk drive is behind the panel, below the diskette drive or tape drive.

Controls for the fixed-disk drive are on the control panel described earlier in this chapter. Controls and indicators for the diskette drives and tape drives are described in the sections on those devices in Chapter 3.

1.2 Rear View of the Pedestal Mount

When you remove the rear panel of the system, you have access to controls on the CPU panel and connectors for peripheral devices.

1.2.1 Controls on the CPU Panel

Figure 1–3 shows the controls on the CPU panel.

The CPU panel has the following components:

- Halt Enable/Disable switch—When the switch is set to the left (dot outside circle), halt is disabled. When the switch is set to the right (dot inside the circle), halt is enabled. When halt is enabled, pressing the Halt button on the control panel or the Break key on the console terminal stops the processor and transfers control to the console program.

Figure 1–3: Controls on the CPU Panel

MLO-1428-87
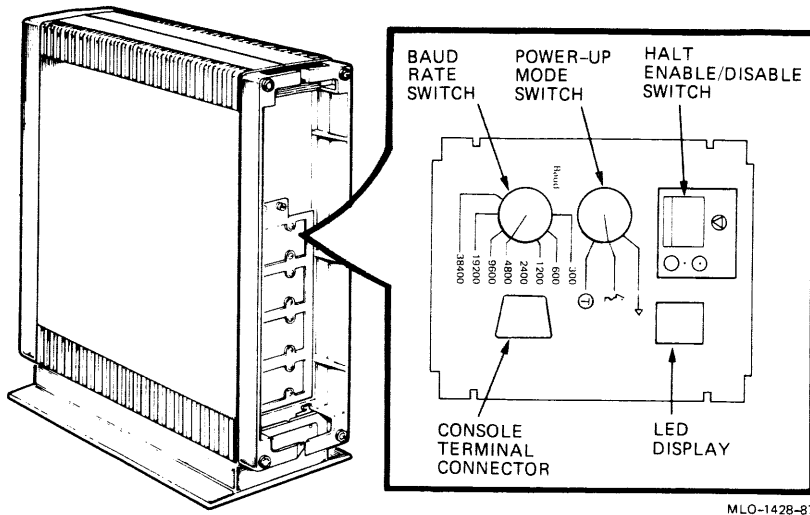
- Power-Up Mode switch—This 3-position rotary switch determines how the system responds at power-up:

    Run Mode (indicated by an arrow) is the normal operation setting.

    Language Inquiry Mode (indicated by a human profile) causes the system to display a language selection menu at power-up (assuming your console terminal supports character sets for multiple languages).

    Loop Back Test Mode (indicated by a T in a circle) causes the system to run loopback tests at power-up. This setting is for DIGITAL service use only.

- Baud rate switch

- Console terminal connector—This provides the connection for the console terminal.

- LED display—This shows the testing sequence during power-up.

1.2.2 Insert Panels for Connecting Devices

Your system has two kinds of insert panels for connecting additional devices. Figure 1–4 shows the two types of insert panels.

Figure 1–4: Insert Panels on the MicroVAX II 630QY
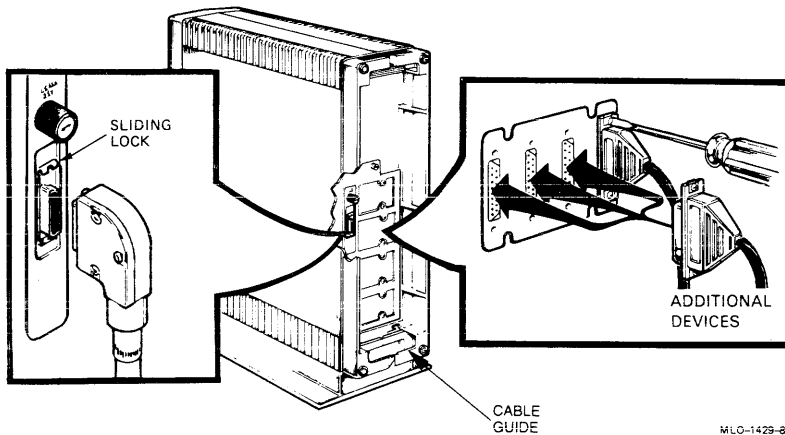
Internal cabling runs from the connectors on the insert panels to the modules installed in the card cage.

1.3 Functional Description of Base System Components

Each MicroVAX II 630QY, 630QZ system includes base system components common to all systems, and perhaps optional components. Your system was preconfigured at the factory, based on your order.

The following sections describe base system components and options in turn.

1.3.1 Base System Components

Base system components include the following:

- Central processing unit (CPU)
- Console serial line unit (SLU)
- Main memory
- Mass storage devices and controllers (except for diskless systems)
- Power supply
- Fans

1.3.1.1 Central Processing Unit (CPU)

The central processing unit (CPU) controls the execution of all instructions and processes. Its circuits contain all the logic, arithmetic, and control functions used by the system, as well as 1 Mbyte of main memory.

1.3.1.2 Console Serial Line Unit (SLU)

Each system has a serial line unit (a line on which each bit of information is sent sequentially on a single channel) connecting the console terminal to the CPU module. The SLU connector is located on the CPU panel. The console serial line provides a means of communicating with the CPU.

1.3.1.3 Main Memory

Main memory provides the physical storage area for all data and instructions used by the CPU. When you start your system, the operating system is loaded into main memory. Any application programs must also be loaded into memory.

When the system cannot load everything into memory at once, it reads in units of data called pages (512 bytes of data) from disk. A large main memory increases the efficiency of processing, as fewer pages must be copied to and from the disk. Each configuration comes with a standard memory option that you can upgrade to increase efficiency.

The contents of memory are volatile. This means they are lost when you turn off power to the system. You use mass storage devices, such as fixed disks and tape cartridges, to store software and data permanently.

1.3.1.4 Mass Storage Devices and Controllers

Mass storage devices record data on magnetic media. The data recorded is not lost when you turn off the system, but can be altered or erased if you record over it. You use mass storage devices to store data and software permanently. When the data or software is needed, the CPU copies it from the mass storage device into main memory.

A diskless system does not have its own mass storage devices, but uses the mass storage devices on the server.

The two primary types of mass storage devices are fixed-disk drives and devices with removable media, such as diskettes and tape cartridges.

Fixed-Disk Drives

One fixed-disk drive is permanently installed in your system, A fixed-disk drive provides large-capacity storage for software and data files, as well as rapid access to the data by the CPU.

Chapter 3 describes how to use the fixed-disk drive on your system.

Devices with Removable Media

The MicroVAX II 630QY, 630QZ system can have one diskette drive (either an RX33 or an RX50) and one tape drive (either a TK50 or a TK70). You can use any of these devices as an input or output device. You use a device as an input device when you install software or copy data from a diskette or tape cartridge to your system. You use a device as an output device when you copy software or data from your system to a diskette or tape cartridge. You can copy individual files or programs, or you can copy (back up) the contents of an entire fixed disk. Your system software manuals explain how to copy data to and from diskettes and tape cartridges.

Mass Storage Controllers

All mass storage devices require a controller, a separate module that controls all activity between the CPU and the mass storage devices. The controller for the fixed-disk drives and the diskette drives (the RQDX3) and the controller for the TK50 or TK70 tape drive (the TQK50 or TQK70, respectively) are installed in the card cage.

1.3.1.5 Power Supply

The system has a power supply that powers all system components. When the power supply is generating the proper voltage, the DC OK light on the front control panel glows green.

1.3.1.6 Fans

Two fans inside the BA23 enclosure draw in air from the bottom of the system and pull it up through the modules and out the top, as shown in Figure 1–5. To reduce the load on the fans, keep the system away from heat sources and provide space for ventilation. Do not block circulation by covering the vents.

Figure 1–5: System Air Circulation
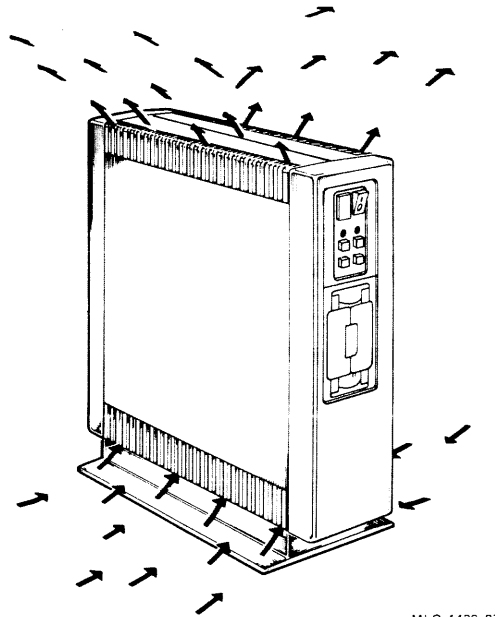
MLO–1430–87

1.3.2 Optional Components

System options can include multiples of components that are part of the base system (for example, additional memory modules) and the following kinds of options:

- Communications controllers

- Real-time controllers

- Printer interfaces

1.3.2.1 Communications Controllers

Every system has a serial line (a line on which each bit of information is sent sequentially on a single channel) connecting the console terminal to the central processing unit (CPU) module. Most systems have additional communications controllers for connecting additional terminals and for communicating with other systems over telephone or network lines. Communications controllers provide standard interfaces between peripheral devices and the system. Many communications controllers provide support for multiple data lines.

The following types of communications controllers are available:

- Asynchronous serial controllers

- Synchronous serial controllers

- Network controllers

Serial controllers transmit data one character at a time. A device at the transmitting end breaks bytes of data into bits. A device at the receiving end assembles incoming bits into bytes of data.

Asynchronous Serial Controllers

Asynchronous serial controllers provide low-speed connections between peripheral devices and the system. Asynchronous communication between the system and the peripheral depends on recognition of a pattern of start and stop bits, not on a time interval.

Asynchronous serial controllers may be divided into those without modem support and those with modem support.

You use asynchronous serial controllers without modem support to connect additional terminals and printers to your system.

NOTE: *Printers equipped with a microprocessor (intelligent printers) may require modem control signals to function correctly. Do not attach a printer requiring*

modem control signals to a controller with no modem support. Check your printer documentation to determine the proper communications interface for your printer.

Communications controllers with modem support allow you to communicate over telephone lines. With a modem connected to your system, you can access other computers and you can dial into your system from a remote terminal or computer.

Computers transmit digital signals, while telephone lines (with the exception of digital leased lines) transmit analog signals. When two computers communicate over telephone lines, a modem is required at both the transmitting and receiving ends of the line. At the transmitting end, the modem converts digital signals from the computer (or terminal) to analog signals prior to transmission over telephone lines. At the receiving end, another modem converts the analog signals from the telephone line back into digital signals the computer can understand.

While all modems have the same basic function, some have more advanced features, such as auto-answer. These advanced features require additional modem control signals. The difference between limited and full modem support depends on the number of modem control signals recognized by the communications device. Full modem support (according to DIGITAL standards) requires recognition of eleven signals.

Synchronous Serial Controllers

Synchronous serial controllers provide a high-speed connection between systems. Communication between synchronous devices depends on time intervals that are synchronized before transmission of data begins. Synchronous devices can also have modem support.

Network Controllers

Network communications controllers allow you to connect to an Ethernet network. With a network connection and appropriate DECnet software, you can use network services, such as mail; access data stored on other systems; perform operations, such as editing and printing on remote systems; and share resources, such as laser printers.

1.3.2.2 Real-Time Controllers

Real-time controllers interface devices that monitor processes, for example, laboratory equipment or manufacturing equipment connected to the system. Typically, real-time controllers are parallel devices, not serial devices. Parallel devices transmit more than one bit of information simultaneously.

1.3.2.3 Printer Interfaces

Some printers require specific interfaces to communicate with the system. For example, the LP25/26/27 printers and the LG01/02 printers require the LPV11 interface.

1.3.2.4 Other Available Options

Your system arrives preconfigured with the options you ordered. As your needs change, you can add more options. Your DIGITAL salesperson can advise you on available options. *MicroVAX II 630QY, 630QZ Technical Information* describes the options currently available for MicroVAX II 630QY, 630QZ systems. DIGITAL Field Service provides option installation.

Chapter 2
Using the System

The first section of this chapter describes procedures appropriate only to new systems. The remainder of the chapter describes how to use your system once the system software has been correctly installed.

2.1 Before You Use a New System

This chapter assumes that your system has been properly installed as described in *MicroVAX II 630QY, 630QZ Installation*.

System software and diagnostic software can be on either RX50 diskettes or TK50-format tape cartridges. If your system has an RX33 diskette drive, you can use the RX50 diskettes. Before running diagnostic software or installing system software, you should read Section 3.1.2.1 (RX50), 3.1.2.2 (RX33), 3.1.3.1 (TK70), or 3.1.3.2 (TK50) on how to operate the appropriate drive.

If a DIGITAL service representative installed your system, he or she ran the diagnostic software shipped with your system. If you installed your own system, you may want to run the diagnostic software before you install system software. See *MicroVAX II 630QY, 630QZ Troubleshooting* for instructions.

After running the diagnostic software, install system software. Follow the instructions provided in the system software installation manual. Some of the instructions may require you to remove the rear panel to change switch settings on the CPU panel.

The remainder of this chapter assumes that system software has been installed.

2.2 Switch Settings

Switch settings vary, depending on the operation being performed. The next two sections describe switch settings for normal and for special operations.

2.2.1 Normal Operation

Switch settings for normal operation are the following:

- The Halt Enable/Disable switch on the CPU panel is set to disable (left). Once system software is installed, DIGITAL recommends you run your system with halt disabled to prevent the user of the console terminal from inadvertently halting the system by pressing [Break] or the Halt button on the front control panel. Halting the system causes all activity to stop. With halt disabled, your system automatically boots system software when powered up.

- The Power-Up Mode switch on the CPU panel is set to Run (indicated by an arrow).

- The baud rate switch on the CPU panel is set to 9600.

- The Write-Protect button for the fixed-disk drive is set to out (not lit). This setting allows system software to write to the disk.

- The Ready button for the fixed-disk drive is set to out (glows green when the disk is not being used). This setting makes the drive available for use.

- The Halt button is set to out (not lit).

2.2.2 Special Operation

Certain operations require that you change some of the normal operating settings.

- When you install system software and perform certain types of backups, your system software manuals may tell you to set the Halt Enable/Disable switch to enable (right).

- If your system has been powered off for more than 10 days, the battery unit that saves the system clock and the language selection may have run down. Set the Power-Up Mode switch to Language Inquiry Mode, indicated by a human profile, before you turn on your system. When you turn on your system, a Language Selection Menu appears, as shown in Figure 2–1.

Figure 2–1: Language Selection Menu

```
KA630-A.V1.2

    1) Dansk            7) Nederlands
    2) Deutsch          8) Norsk
    3) English          9) Português
    4) Español         10) Suomi
    5) Français        11) Svenska
    6) Italiano

(1..11):
```
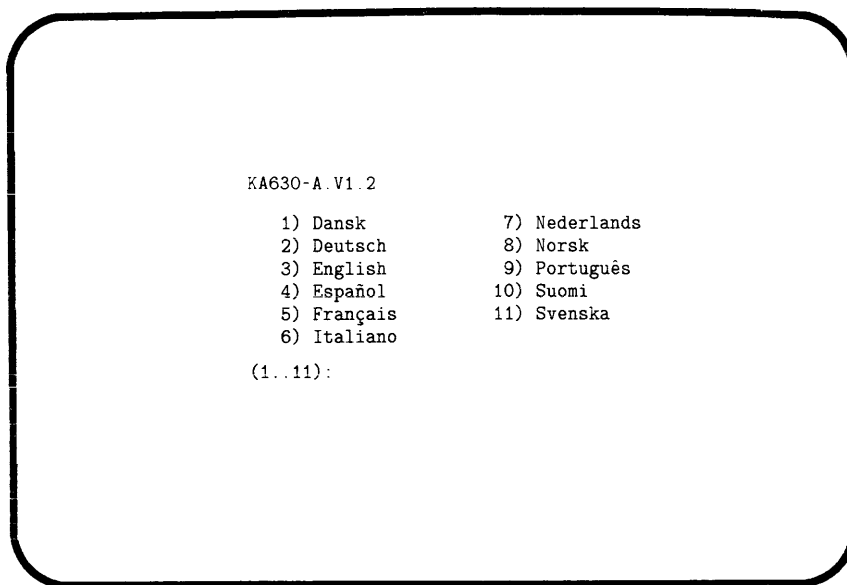
MLO–1672–87

Select a language by typing in the number listed next to the language. Save the language you have selected by rotating the Power-Up Mode switch to Run Mode, indicated by an arrow. Once the system is booted, reset the system clock, as described in your system software manual.

2.3 Turning On the System

Once you have set the switches appropriately, you are ready to turn on the system. Use the following procedure:

1. Turn on the console terminal and wait for it to complete its self-tests.

2. Turn on the system by setting the on/off switch to 1.

When you turn on the power, you should see the indicators listed in Table 2–1.

Table 2–1: Normal Power-On Indications

Indicator	Normal Indication
DC OK	Glows green
Fixed-disk Ready light	Glows green within 30 seconds
TK50 tape drive Load/Unload button	Glows red for 2 seconds and then goes out
TK50 tape drive indicator light	Glows green when red light goes out
TK70 tape drive indicator lights	Orange, yellow, and green lights glow during self-tests. The green light remains on.

If you do not observe the indications in Table 2–1, refer to *MicroVAX II 630QY, 630QZ Troubleshooting*.

Every time you turn on your system, it runs a series of self-tests. Your console terminal displays a countdown from 7 to 3 as the system tests itself. When the tests are successful, you receive the message "Tests completed."

When your system detects an error during its self-tests, the countdown may never start, may stop before reaching 3, or an error message may appear. See *MicroVAX II 630QY, 630QZ Troubleshooting* for help in locating the problem.

2.4 Booting the System

You have the option of autobooting the system or booting from console mode. The setting of the Halt Enable/Disable switch determines how the system boots.

2.4.1 Autobooting the System

When the Halt Enable/Disable switch is set to disable (the normal operating setting), the system attempts to load system software after successfully completing its self-tests. If the system finds bootable system software, you receive the messge "Loading system software", and a countdown from 2 to 0 displays on the screen, as shown in Figure 2–2.

Figure 2–2: Successful Power-On and Automatic Boot

```
          Performing normal system tests.
             7..6..5..4..3..
          Tests completed.
          Loading system software.
             2..1..0..
```
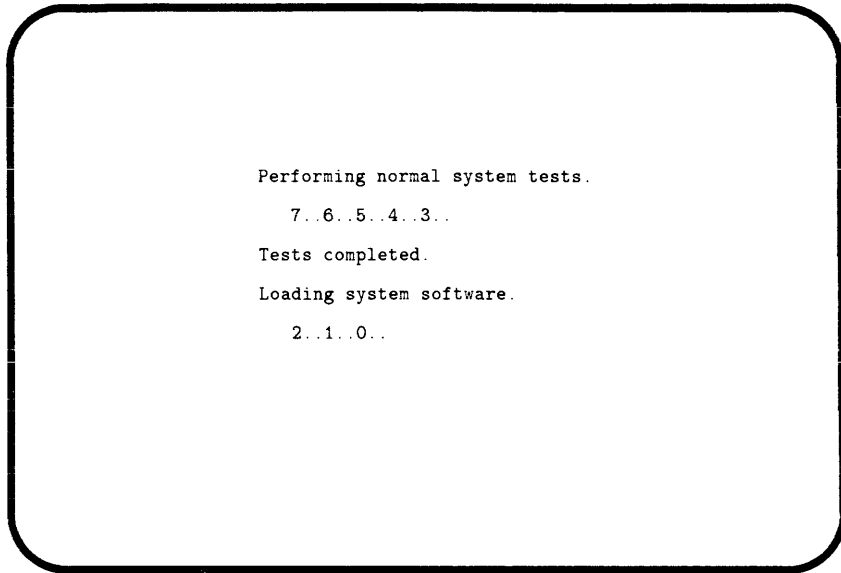
MLO–1431–87

2.4.2 Booting the System from Console Mode

When the Halt Enable/Disable switch is set to enable, the system powers up to console mode (indicated by the >>> prompt) after successfully completing its self-tests. Figure 2–3 shows a successful power-on to console mode.

Figure 2–3: Successful Power-On to Console Mode

```
Performing normal system tests.
   7..6..5..4..3..
Tests completed.
>>>
```
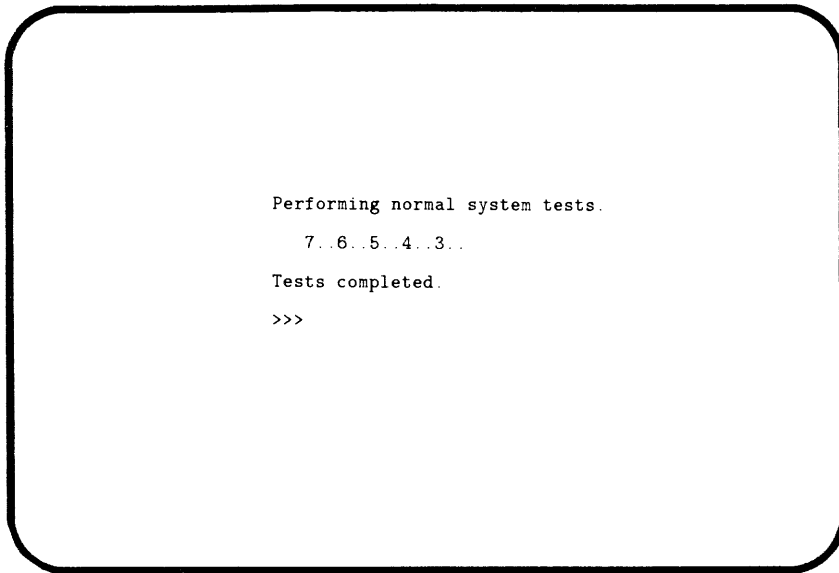
MLO-1432-87

To load system software from console mode, you must use the BOOT command (BOOT device-name). For example, BOOT MUA0 tells the system to boot software from a cartridge in the TK50 or TK70 tape drive. Software manuals may instruct you to power up with halt enabled and to use the BOOT command.

2.5 Using the System

Once the system software is loaded, the first display for the system software appears on the console terminal after a few seconds. That display is described in the system software documentation.

You are now ready to use the system. Refer to the system software manuals and application manuals for more specific instructions on using the system.

Your system software manuals cover the following:

- Installing software on your system
- Running software to perform tasks

- Making and restoring backup copies of system software or data files

- Accessing devices and utilities in your system

2.6 Turning Off the System

Do not turn off your system unless it requires maintenance or you know of a planned power outage.

CAUTION: *Turning off your system without following the shutdown procedure described in your system software manuals may result in loss of data.*

Once you have completed the recommended procedure, you can turn off your system by setting the on/off switch to 0.

NOTE: *Users of diskless systems in a VAXcluster should not turn off, halt, or restart their systems without consulting the cluster manager. These activities affect the functioning of the entire cluster.*

2.7 Halting the System

Halting the system interrupts all processes and returns control to the console program. You may need to halt the system during software installation. Or, you may want to boot the system from another device, for example, a tape cartridge containing MicroVAX diagnostic software.

To halt the system, first set the Halt Enable/Disable switch on the CPU panel to enable (indicated by the dot inside the circle). To halt the system, press in the Halt button on the control panel (glows red) or press the ⌷Break⌷ key on the console terminal. When the console mode prompt >>> appears on your screen, the system is halted.

2.8 Restarting the System

Restarting the system aborts all current and pending operations and returns the system to a power-on condition. The usual power-on tests are run. To prevent loss of data, warn all users to log off prior to restarting the system.

You restart the system by pressing in the Restart button on the control panel.

Chapter 3
Using System Options

This chapter describes how to use options that may already be part of your system, or that you can add to your system. The following types of options are covered:

- Mass storage devices and controllers
- Communications controllers
- Real-time controllers
- Printers

3.1 Mass Storage Options

The following mass storage options are available for the MicroVAX II 630QY, 630QZ system:

- RD50-series fixed-disk drives
- RX50 diskette drive
- RX33 diskette drive
- TK50 tape drive
- TK70 tape drive

3.1.1 RD50-Series Fixed-Disk Drives

RD50-series fixed-disk drives provide high-volume mass storage for your MicroVAX II 630QY, 630QZ system. Your system has one RD50 series drive, Fixed Disk 0. Two buttons on the control panel, the Ready button and the Write-Protect button, control the operation of the fixed disk. Figure 3–1 shows the controls.

Figure 3—1: Fixed-Disk Controls

FIXED-DISK 0
READY BUTTON
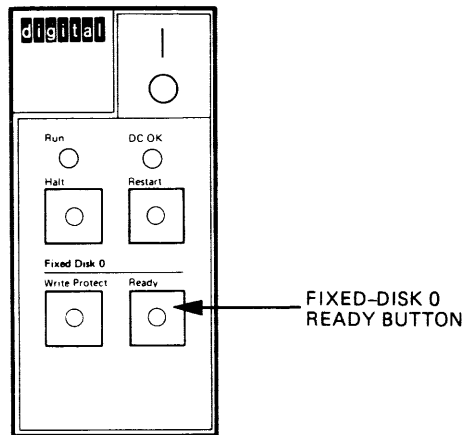
MLO-1433-87

The Ready button controls whether the fixed disk is available for use. To use the fixed disk, you must set the Ready button to out (glows green when the disk is available for use), the normal operating setting. When the Ready button is out, the system can read from the fixed disk. When the Write-Protect button is also out, the system can write to the disk. The green light in the Ready button indicates whether activity is occurring on the disk. When the light is on, no activity is occurring and the disk is available for use. When the light is off, activity is occurring.

If you want to automatically boot from another device, such as an RX50 diskette or a tape cartridge, you must set the Ready button to in (not lit). When the Ready button is in, the system can neither read data from the disk nor write data to the disk. (You can also use the BOOT command from console mode to specify another boot device.)

The Write-Protect button controls whether the system can write data to the fixed disk. To write data to the disk, write-enable the disk by setting the Write-Protect button to out (not lit). Your system disk must be write-enabled for the system to function. Because the MicroVAX II 630QY, 630QZ has only one fixed-disk drive, you should never write-protect the disk.

The storage capacities and other specifications of the various disk drives in the RD50 series are listed in *MicroVAX II 630QY, 630QZ Technical Information.*

3.1.2 Diskette Drives

The MicroVAX II 630QY, 630QZ can have either an RX50 diskette drive or an RX33 diskette drive. You can use RX50 diskettes in an RX33 diskette drive, but the diskette capacity is reduced. You *cannot* use RX33 diskettes in an RX50 diskette drive.

CAUTION: *Inserting an RX33 diskette into an RX50 diskette drive can destroy data on the diskette.*

You can differentiate between the two types of diskettes by the color of the plastic jacket: the RX33 diskette is enclosed in a gray jacket; the RX50 diskette is enclosed in a black jacket.

You can use either diskette as both an input and output device. Use the diskette as an input device to load software or data into your system. Use the diskette as an output device to make copies (or backups) of software or data.

Handling and storage guidelines and write-protecting the two types of diskettes are identical.

Diskette Handling and Storage Guidelines

Figure 3–2 shows the proper way to handle a diskette.

Figure 3–2: Proper Handling of a Diskette
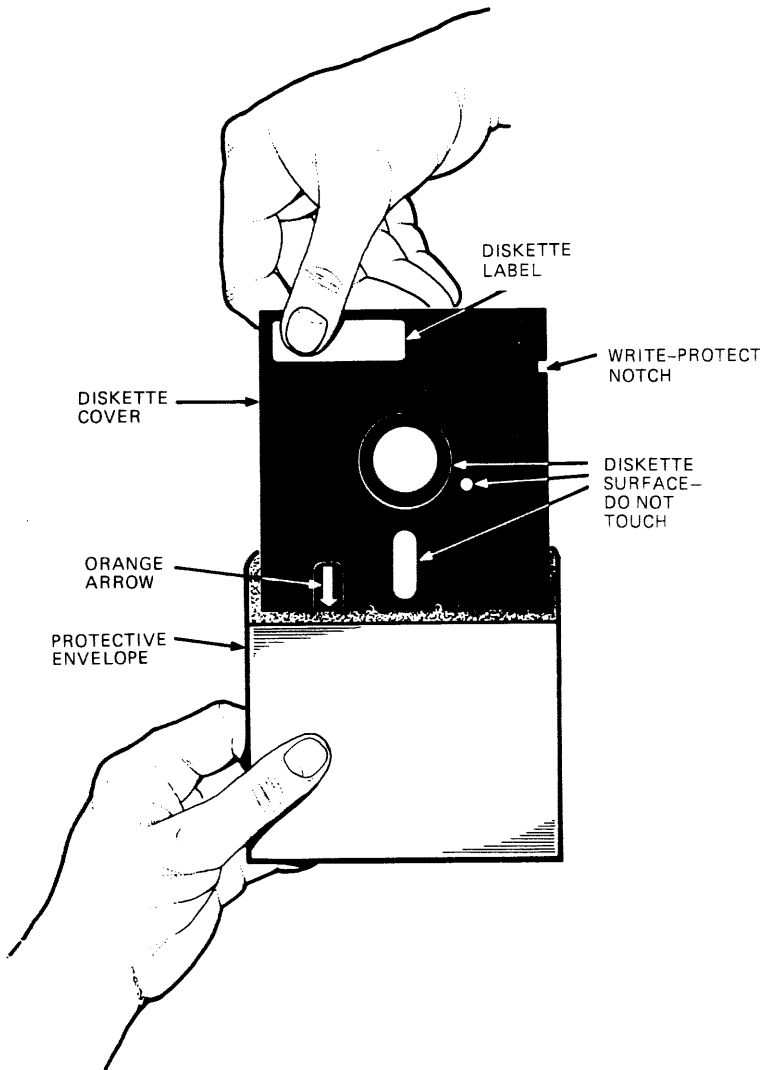
MLO-1434-87

Use the following guidelines when handling or storing diskettes:

- Do not touch the exposed surfaces of the diskettes.

- 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 diskette itself might damage the diskette.

- Keep diskettes away from direct sunlight, heaters, and other sources of heat.

- Keep diskettes away from magnets and equipment that generates magnetic fields, such as motors, transformers, and terminals.

- Make and keep backup copies of all working diskettes. Refer to your system software manuals for instructions.

Write-Protecting a Diskette

Write-protecting a diskette prevents accidental erasure of information stored on the diskette. To write-protect a diskette, cover the write-protect notch with one of the self-adhesive foil tabs supplied with your diskettes. You can later add or change information on the diskette by removing the write-protect tab. The tab is shown in Figure 3–3.

Figure 3–3: Write-Protecting a Diskette

WRITE-
PROTECT
TAB

MLO-1435-87
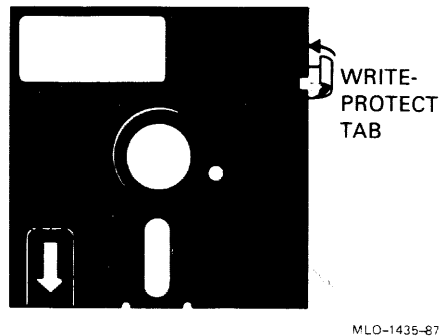
3.1.2.1 RX50 Diskette Drive

The RX50 dual diskette drive holds two 5.25-inch single-sided diskettes. The drives are labeled 1 and 2. (See Figure 3–4.) Each drive has a red indicator light that glows when the drive is in use.

Figure 3–4: RX50 Diskette Drive
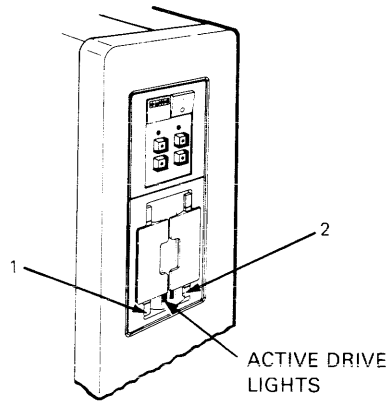
MLO–1436–87

Each diskette stores 400 Kbytes of information, which is roughly 150 typewritten pages. Information is stored magnetically in a specified format.

CAUTION: *Use only preformatted RX50 diskettes, available from DIGITAL or its licensed distributors.*

Because each drive can read and write data on only one side of a diskette, you must insert the diskette properly. Inside each drive door is an orange stripe that you align with an orange arrow on the diskette.

When you insert a diskette into the drive, it rotates inside its protective cover. When the system is reading data from the diskette or writing data to it, the red indicator light for that drive is lit.

CAUTION: *Do not open a drive door when the indicator light for that drive is on. Information stored on the diskette could be lost.*

Inserting and Removing an RX50 Diskette

Use the following procedure to insert an RX50 diskette. (See Figure 3–5.)

1. Open the diskette door by pressing on its outer edge.

2. Align the orange arrow on the diskette with the orange stripe on the drive and insert the diskette.

3. Press the drive door to close it.

Figure 3–5: Inserting an RX50 Diskette
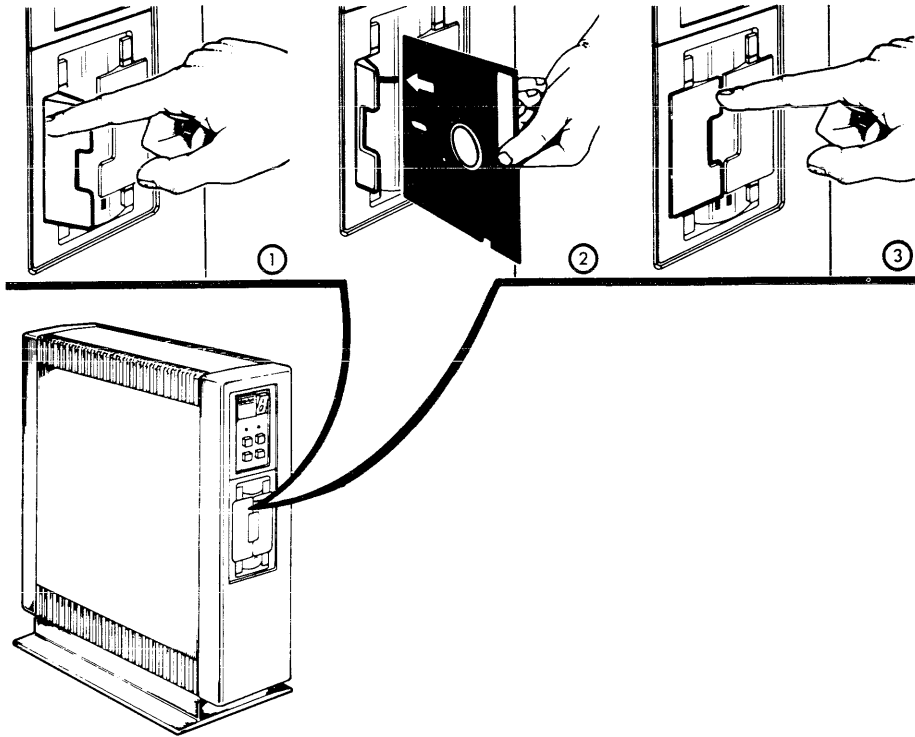
MLO-1437-87

When you are ready to remove the diskette, make sure the red indicator light on the drive is off before you open the drive door. Close the door after you have removed the diskette.

3.1.2.2 RX33 Diskette Drive

The RX33 diskette drive holds one double-sided, high-density RX33 diskette or one single-sided, lower density RX50 diskette. Each RX33 diskette holds 1.2 Mbytes of data (.6 Mbyte on each side). Each RX50 diskette holds .4 Mbyte of data.

RX33 diskettes must be formatted before you can use them. Formatting prepares the diskette to accept data. You format RX33 diskettes by using the Formatter Utility available in the MicroVAX Diagnostic Monitor (MDM). MDM and the Formatter Utility are described in Chapter 3 of *MicroVAX II*

630QY, 630QZ Troubleshooting. Be sure to keep a supply of formatted diskettes on hand. RX50 diskettes come preformatted.

When you insert a diskette into the drive, the diskette rotates inside its protective cover. When the drive is active, the red indicator light on the front of the drive is lit. Figure 3–6 shows the front of the drive, including the indicator light and the lever that controls access to the drive.

CAUTION: *Do not attempt to remove a diskette when the red light is lit. Information stored on the diskette could be destroyed.*

Figure 3–6: RX33 Diskette Drive
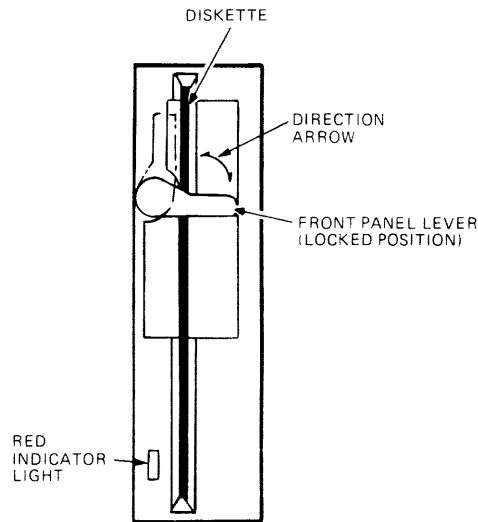
Inserting and Removing Diskettes

Use the following procedure to insert both RX50 and RX33 diskettes. (See Figure 3–7.) Make sure the red indicator light on the drive is not lit before you insert a diskette.

1. Move the lever to the unlocked position.

2. Hold the diskette so that the write-protect notch is down and the diskette label is up. Insert the diskette into the slot until it snaps into place.

3. Move the lever to the locked position.

NOTE: *Do not force the lever. Make sure that the diskette is fully inserted. The lever must be in the locked position for the drive to function.*

Figure 3–7: Inserting a Diskette into the RX33 Diskette Drive
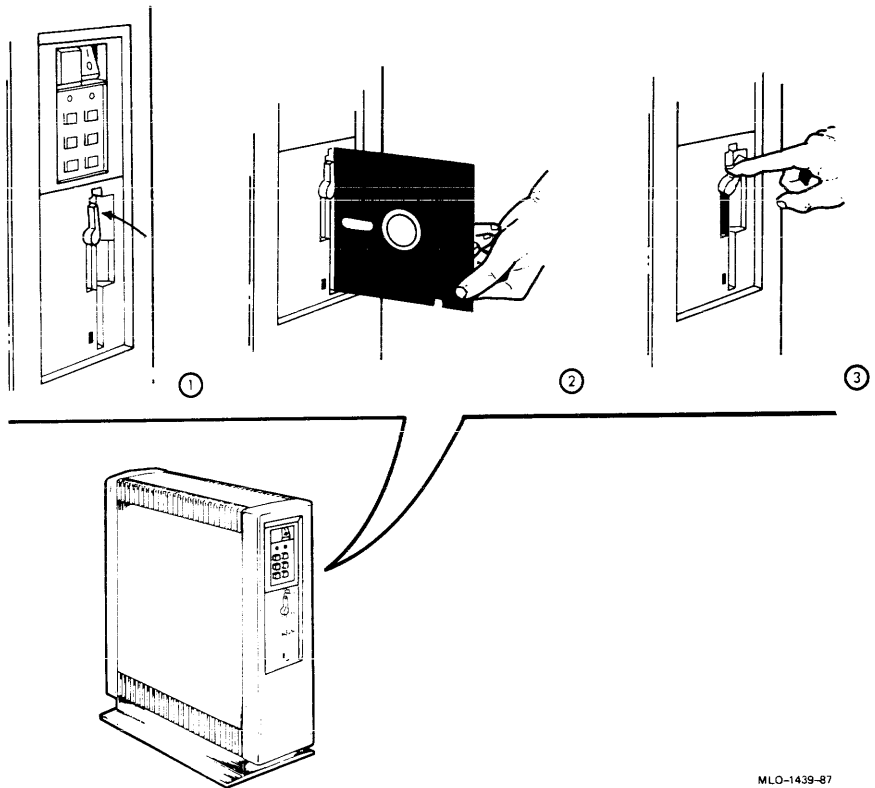
MLO-1439-87

3.1.3 TK-Series Tape Drives

The MicroVAX II 630QY, 630QZ can have either a TK50 or TK70 tape drive. You can record data on blank COMPACTape or COMPACTape II tape cartridges using either drive. However, DIGITAL recommends that you use only COMPACTape II tape cartridges when recording with a TK70 tape drive. You can identify the type of cartridge by the label. The COMPACTape

II has a blue label strip. On the TK50 tape drive, the capacity is 95 Mbytes; on the TK70 tape drive, the capacity is 296 Mbytes.

Once data has been recorded in a particular format (either TK50 format or TK70 format), you can record over the data using the same type of drive. For example, if you recorded data in TK50 format, you can record new data on the tape if you use a TK50 drive. You cannot record new data on the tape using a TK70 drive. The TK70 drive recognizes the TK50 format, and write-protects the tape. Similarly, you cannot use a TK50 to record over a tape first recorded on a TK70 drive.

The TK70 drive can read tapes recorded on a TK50 drive. Software is distributed in the TK50 format and can be read by both TK50 and TK70 drive. The TK50 drive cannot read data recorded by a TK70.

Labeling the cartridges, write-protecting the cartridges, and handling and storage guidelines are identical for COMPACTape and COMPACTape II tape cartridges, regardless of the recording format. The following subsections discuss each of these procedures in turn. The design and operation of the two tape drives differ. If your system has a TK70 tape drive, read Section 3.1.3.1. If your system has a TK50 tape drive, read Section 3.1.3.2.

Labeling a Tape Cartridge

When recording data on a cartridge, label its contents. For your convenience, a slot for the label is provided on the front of the cartridge. Write the identification on the label first, then insert the label in the slot on the front of the cartridge, as shown in Figure 3–8. The label remains visible when the tape is in the drive.

Figure 3–8: Labeling a Tape Cartridge
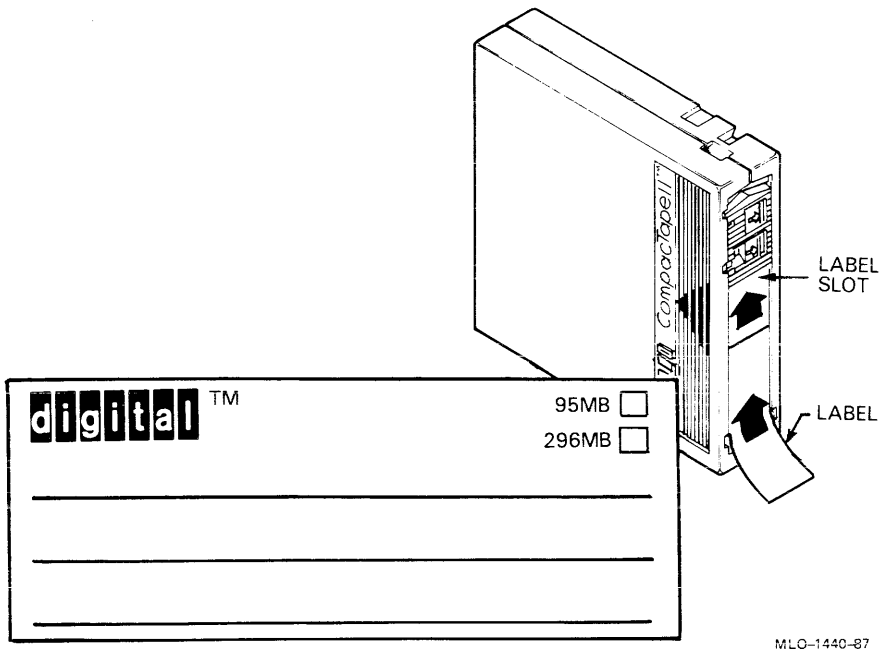
If the tape was recorded on a TK70 tape drive, put a check in the box labeled 296MB. If the tape was recorded on a TK50 drive, check the box labeled 95MB.

NOTE: *Do not write on the tape cartridge or attach labels to the top, bottom, or sides of the cartridge.*

Write-Protecting a Tape Cartridge

Write-protecting a tape cartridge prevents accidental erasure of information stored on the tape. You can write-protect a tape cartridge in two ways:

- Set the write-protect switch on the cartridge to the write-protect position.

- Write-protect the cartridge by using operating system commands described in your system software manuals.

Your system can read information on the tape regardless of the position of the write-protect switch or whether writing is software disabled. However, the system cannot write data to the tape when the write-protect switch is set to the write-protect position, or when writing is software disabled.

When you use a cartridge to install software, make sure the cartridge is write-protected. To write-protect a cartridge, slide the write-protect switch toward the label slot (see Figure 3–9). Two icons on the switch indicate the write-protect status. When the tape is write-protected, an orange rectangle is visible next to the lower icon.

Figure 3–9: Tape Cartridge Write-Protect Switch

NOT WRITE-
PROTECTED
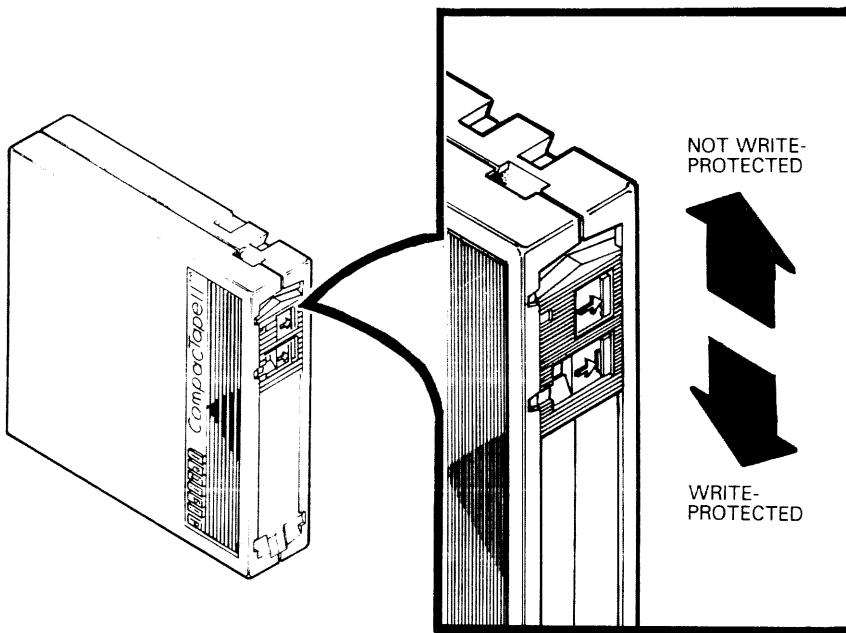
WRITE-
PROTECTED

MLO–1441–87

The system recognizes the tape as being write-protected under any one of the following conditions:

- The write-protect switch on the cartridge is set to the write-protect position.

- An operating system command has write-protected the tape.

- A tape recorded on a TK50 tape drive is inserted into a TK70 drive.

Removing write-protection depends on how the tape was recorded and how it is write-protected. You can remove write-protection on tapes recorded in a compatible format as follows:

- If the cartridge is write-protected *only* by the write-protect switch on the cartridge and not the operating system, moving the switch to the write-enabled position removes the write protection. On the TK70, the orange light goes out at the end of the executing command. On the TK50, you should unload the tape, change the switch setting, then load the tape to make sure the drive recognizes the new write-protect status.

- If the cartridge is write-protected *only* by a software command and not the write-protect switch, removing the operating system restriction removes the write-protection. On the TK70 drive, the orange light goes out.

- If the cartridge is write-protected by *both* the switch on the cartridge and a software command, you must change the switch setting and remove the operating system restriction.

NOTE: *You cannot write-enable a tape recorded in TK50 format for a TK70 tape drive either by moving the write-protect switch on the cartridge or by using software commands. The TK70 drive always recognizes a tape recorded on a TK50 drive as write-protected.*

When you use a tape cartridge to make a backup copy of files, make sure the tape is write-enabled. On the TK70 drive the orange light should be off. If the light is not off, check for any of the write-protect conditions described above. Change the switch setting and/or operating system restriction as necessary. Do not begin your operation until the orange light goes off.

Tape Cartridge Handling and Storage Guidelines

- Do not touch the exposed surface of the tape.

- Do not drop the tape cartridge. The impact from a fall can damage the tape cartridge.

- Allow new tapes to stabilize at room temperature for 24 hours before using them.

- Place an identification label only in the label slot on the front of the tape cartridge.

- Store tape cartridges in a dust-free environment.

- Keep tape cartridges away from direct sunlight, heaters, and other sources of heat. Store tape cartridges in a stable temperature between 10° and 40° Celsius (50° and 104° Fahrenheit).

- Store tape cartridges where the relative humidity is between 20 and 80 percent.

- Keep tape cartridges away from magnets and equipment that generates magnetic fields, such as motors, transformers, terminals, and audio equipment.

- Keep tape cartridges away from x-ray equipment.

3.1.3.1 TK70 Tape Drive

The TK70 tape drive holds one removable COMPACTape II or COMPACTape cartridge. You can use a COMPACTape II or COMPACTape cartridge as an input device to load software or data into your system. The TK70 drive can read data on both types of cartridges written by either a TK70 drive or a TK50 drive.

You should use a COMPACTape II as an output device to make copies or backups of software or data. The TK70 drive cannot write to a COMPACTape II or COMPACTape that has been written by a TK50 tape drive. The tape drive has two primary controls: the cartridge insert/release handle (subsequently referred to as "the handle") and the Unload button. You use the handle to insert or remove a cartridge and lock it into position. Pull the handle open to insert or remove a tape cartridge. Push the handle closed to lock a tape cartridge into position and load the tape.

You use the Unload button to rewind and unload the tape. Unloading and rewinding can also be controlled by software. Refer to your system software manuals for appropriate commands.

The TK70 tape drive also has three indicator lights that let you know the status of the drive.

- Orange light (Write-Protected): A steady orange light indicates that the cartridge is write-protected.

- Yellow light (Tape in Use): A steady yellow light indicates that the tape is loaded. A blinking yellow light indicates that the tape is in motion.

- Green light (Operate Handle): A steady green light indicates that you can move the handle to insert or remove a tape. A blinking green light indicates a cartridge load fault. You can also move the handle when the green light is blinking.

- All three lights blinking simultaneously indicates a fault condition.

Figure 3–10 shows the TK70 tape drive with the controls and indicator lights labeled.

Figure 3–10: TK70 Tape Drive

```
GREEN ————————
YELLOW ————
ORANGE —                      — UNLOAD

                                      — HANDLE
```
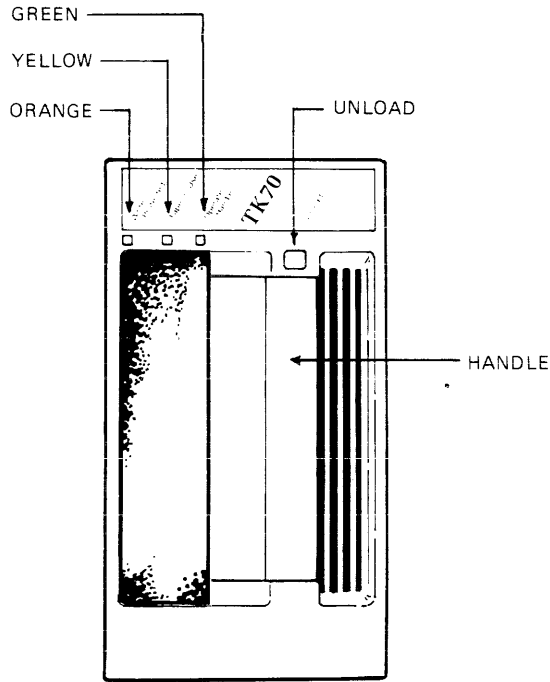
MLO–1442–87

To operate the drive properly, you must carefully monitor the indicator lights. The instructions for inserting and removing cartridges, which appear later in this section, tell you what should happen at each step. A table at the end of the section summarizes light and control combinations.

Design of the Drive

The TK70 tape drive operates somewhat like a reel-to-reel tape deck. Inside the drive is a take-up reel with a leader attached. Inside the cartridge is a single reel containing the magnetic tape. When you insert the cartridge and push in the handle, the leader in the drive automatically couples with

the leader in the cartridge, and the tape winds onto the take-up reel. The coupling and winding process is called loading. When the automatic loading process completes, the tape is ready to use.

Once the cartridge is loaded, you cannot remove it without rewinding and uncoupling the leaders, a process called unloading. Even if you have not used the tape, you must unload it before you can remove the cartridge. When you press the Unload button, the tape rewinds into the cartridge and the leaders uncouple.

Inserting a Tape Cartridge

Before you use the tape drive, make sure the system is turned on (the power switch glows). During power-up, the TK70 drive runs self-tests that last a few seconds. All three lights (orange, yellow, and green) come on momentarily, then the yellow light blinks while the TK70 drive runs self-tests. At the end of the tests, the yellow light goes off and the green light comes on, accompanied by a short beep. The green light and the beep indicate that you can move the handle.

CAUTION: *Move the handle only when the green indicator light is on. Moving the handle while the yellow light is on could damage the drive. If all three lights blink rapidly at any time, a fault condition exists. Press the Unload button once. If the fault is cleared, the tape unloads. The yellow light blinks during unloading, then the green light comes on. If the fault is not cleared, the three lights continue to flash. Do not attempt to use the tape drive or to remove the tape cartridge. Call your DIGITAL service representative.*

Use the following procedure to insert a tape cartridge. (See Figure 3–11.)

1. Pull the handle open.

2. Position the cartridge so the arrow on the cartridge faces left and points toward the drive. Insert the cartridge into the TK70 tape drive until you feel the cartridge lock into place.

3. Push the handle closed.

    The green light goes off and the yellow light blinks as the tape loads. When the yellow light glows steadily, the tape is ready to use.

    NOTE: *If the green light blinks rapidly when you push the handle closed, the drive has detected a cartridge fault. Pull the handle open and remove the cartridge. Use another cartridge.*

Figure 3-11: Inserting a Tape Cartridge into a TK70 Tape Drive
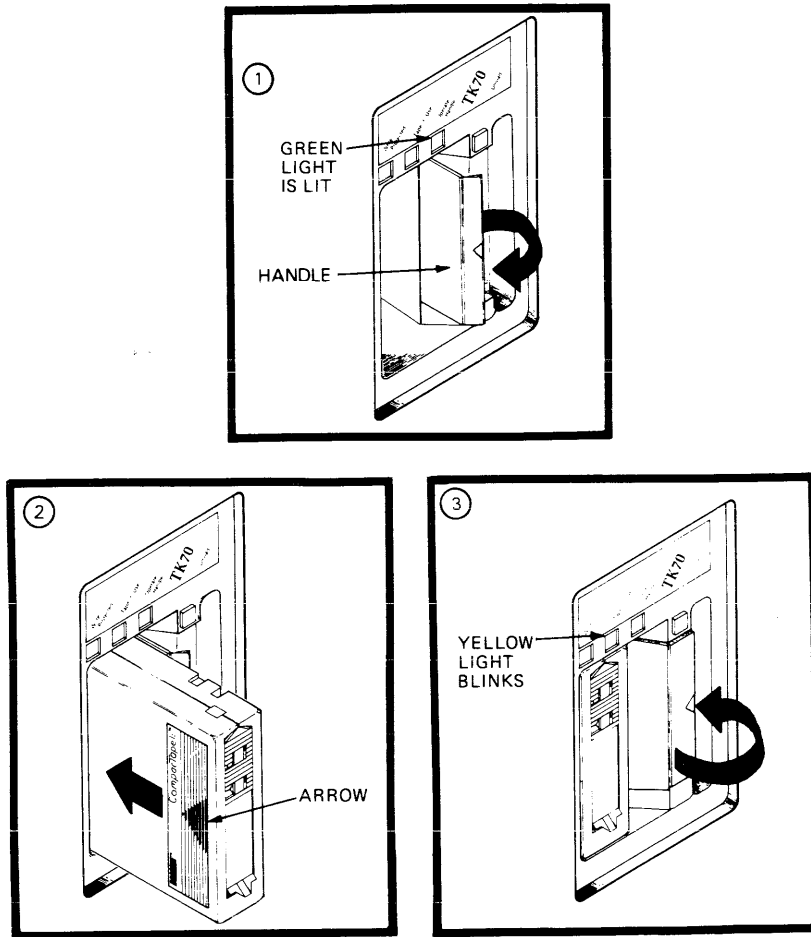
MLO-1443-87

Refer to your system software manual for instructions on how to use the tape cartridge, for example, how to load software or perform backup.

NOTE: *If a cartridge is new, the drive performs a calibration sequence that takes approximately 30 seconds when the drive receives the first command from the operating system. The yellow light blinks rapidly and irregularly during calibration.*

Removing a Tape Cartridge

You must unload a tape before you can remove the cartridge from the tape drive. Use the following procedure. (See Figure 3–12.)

1. Press the Unload button. You can also issue a software command to unload the cartridge. Refer to your system software manuals for the appropriate command.

   The yellow light blinks slowly, as the tape rewinds and unloads into the cartridge. This may take up to 90 seconds.

2. When the yellow light goes off and the green light comes on (you also hear a beep), pull the handle open.

   CAUTION: *Move the handle only when the yellow indicator light is off and the green indicator light is on. Moving the handle while the yellow light is blinking could damage the drive.*

3. Remove the tape cartridge and store it in its container.

4. Push the handle closed.

The green light remains on, indicating that there is power to the drive and that you can safely move the handle.

Figure 3–12: Removing a Tape Cartridge from a TK70 Tape Drive
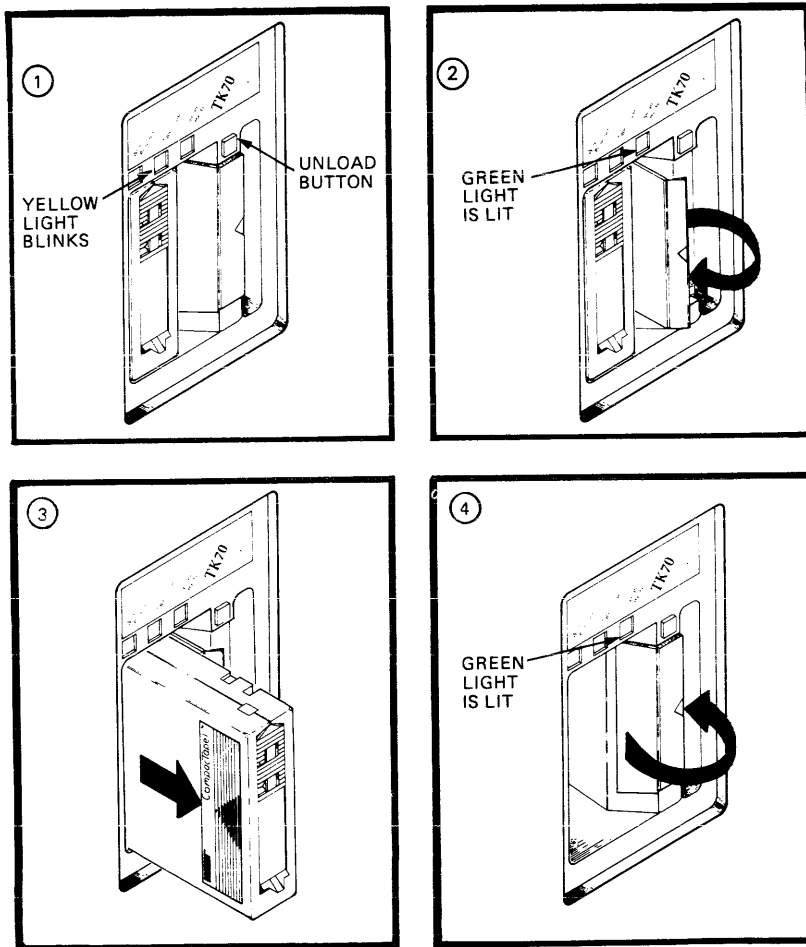
MLO–1444–87

CAUTION: *Remove the tape cartridge from the tape drive when the cartridge is not in use or before you turn off the system. Failure to remove the cartridge may damage it.*

Summary of TK70 Tape Drive Controls and Indicator Lights

Table 3–1 summarizes the TK70 tape drive controls. Table 3–2 describes the meaning of the indicator lights.

Table 3–1: TK70 Tape Drive Controls

Control	Position	Function
Handle	Open	Lets you insert or remove a tape after rewind and unload operations are completed.
	Closed	Locks tape in operating position and begins load sequence.
Unload button	Momentary contact switch	Rewinds and unloads the tape.

Table 3–2: TK70 Tape Drive Indicator Lights

Orange	Yellow	Green	Condition
Off	Off	Off	No power to the tape drive.
Off	Off	On steadily	Safe to move handle. Power is present.
Off	Off	Blinking	Load fault. The cartridge leader may be defective. Pull out the handle and remove the cartridge. Do not use the cartridge.
On/Off	On steadily	Off	Tape is loaded but not in motion.
On/Off	Blinking	Off	Tape is in motion.
On	On steadily/ blinking	Off	Cartridge is write-protected.

Table 3–2 (Cont.): TK70 Tape Drive Indicator Lights

Orange	Yellow	Green	Condition
Blinking	Blinking	Blinking .	A fault is occurring. Press the Unload button to unload the tape cartridge. If the fault is cleared, the yellow light blinks while the tape rewinds. When the green light comes on, you can move the handle to remove the cartridge. If the fault is not cleared, all three lights continue to blink. Do not attempt to remove the tape cartridge. Call your DIGITAL service representative.

3.1.3.2 TK50 Tape Drive

The TK50 tape drive holds one removable COMPACTape or COMPACTape II cartridge. You can use either type of cartridge as both an input and output device. Use the tape cartridge as an input device to load software or data into your system. Use the tape cartridge as an output device to make copies (or backups) of software or data.

The tape drive has two primary controls: the cartridge insert/release handle (subsequently referred to as "the handle") and the Load/Unload button. You use the handle to insert or remove a cartridge and lock it into position. Pull the handle open to insert or remove a tape cartridge. Push the handle closed to lock a tape cartridge into position.

You use the Load/Unload button to control winding or rewinding of the tape. The button is a 2-position control. When you press in the button, the tape winds onto the take-up reel. When you press the button again, it pops out and the tape rewinds back into the tape cartridge.

The drive also has two indicator lights that let you know the status of the drive. A red light is part of the Load/Unload button. A green indicator light is at the opposite end of the drive. Figure 3–13 shows the TK50 tape drive with the controls and indicator lights labeled.

Figure 3–13: TK50 Tape Drive

LOAD/UNLOAD BUTTON
RED LIGHT
HANDLE
GREEN LIGHT

MLO-1445-87
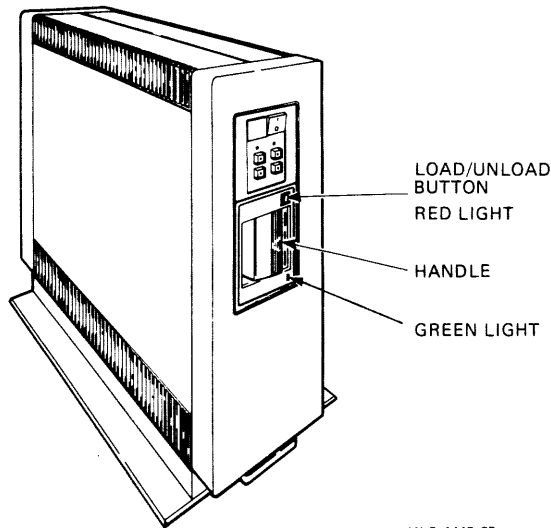
To operate the drive properly, you must carefully monitor the status lights. The instructions for inserting and removing cartridges, which appear later in this section, tell you exactly what should happen at each step. Table 3–3 and Table 3–4 at the end of this section summarize light and control combinations.

Design of the Drive

The TK50 drive operates somewhat like a reel-to-reel tape deck. Inside the drive is a take-up reel with a leader attached. Inside the cartridge is a single reel containing the magnetic tape. When you insert the cartridge and press in the Load/Unload button, the leader in the drive automatically couples with the leader in the cartridge, and the tape winds onto the take-up reel. The coupling and winding process is called loading. When the automatic loading process completes, the cartridge is ready to use.

The method of coupling the two leaders is similar to threading a needle. The leader in the cartridge has a large eye with a notch. The leader in the drive is arrow-shaped. (See Figure 3–14.)

Figure 3–14: Tape Leaders

CARTRIDGE LEADER

EYE

ARROW SHAPED TIP

RETAINING NOTCH

RELATIVE MOTION

TAPE DRIVE LEADER

MLO–1446–87
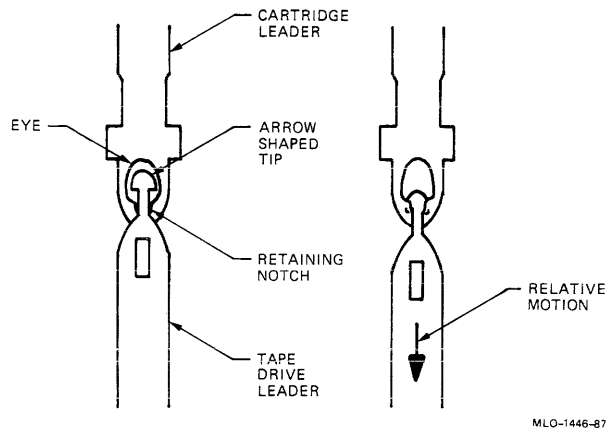
Loading occurs in two stages:

1. When you insert a cartridge, the leader in the drive first threads through the eye of the cartridge leader.

2. When you press in the Load/Unload button, the take-up reel begins to move and the drive leader catches in the notch, pulling the tape onto the take-up reel.

Once the cartridge is loaded, you cannot remove it without rewinding and uncoupling the leaders, a process called unloading. Even if you have not used the tape, you must unload it before you can remove the cartridge. When you move the Load/Unload button to the out position, the tape rewinds into the cartridge and the leaders uncouple.

Although rare, rough handling during shipment may dislodge either the cartridge leader or the drive leader. Because the position of each leader is critical to successful coupling, you should make sure the leaders are properly positioned.

Check the cartridge leader in the following situations:

• When you use a cartridge for the first time. The cartridge could be blank or could contain software.

• After you drop a cartridge, since the shock can dislodge a leader.

- When you have load/unload problems.

Check the tape drive leader in the following situations:

- When you first install the system.

- After you move the system.

- When you have load/unload problems.

The following two sections explain how to check each leader.

Checking the Cartridge Leader

To check the cartridge leader, open the door in the back of the cartridge. With your thumb, lift the door lock, as shown in Figure 3–15, and press on the hinge. The door swings open. The tape leader should appear exactly as shown in Figure 3–15, with most of the leader eye visible.

Figure 3–15: Checking the Cartridge Leader
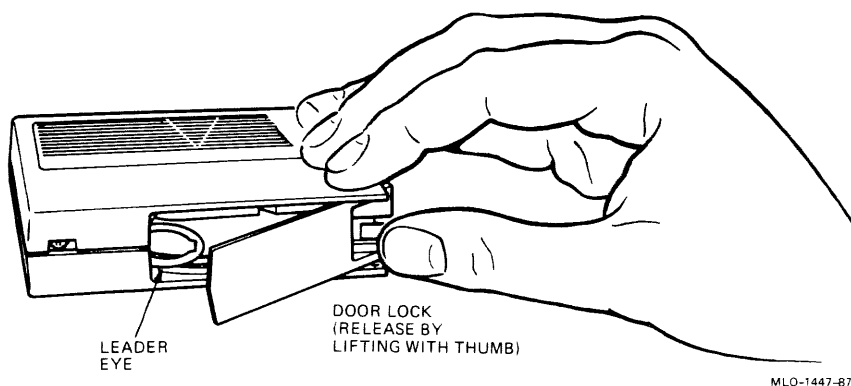

```
LEADER
EYE

DOOR LOCK
(RELEASE BY
LIFTING WITH THUMB)

MLO-1447-87
```

If no leader is visible or if the leader extends out more than is shown in the figure, do not load the cartridge into your tape drive or try to adjust the leader. Contact your DIGITAL service representative for another cartridge. If the leader appears normal, close the cartridge door and proceed.

CAUTION: *Using a cartridge with a mispositioned leader can damage the tape drive.*

Checking the Drive Leader

To check the leader in the drive, look inside the drive (you may need to use a light). You should look for two things:

1. The pointed end of the leader should be clearly visible and straight (not bent up or down).

2. The leader should be hooked onto the buckling link, as shown in Figure 3–16.

Figure 3–16: Checking the Drive Leader


```
BUCKLING
LINK

NOTCH IN
LEADER

TAKE-UP
LEADER

HANDLE
CLOSED
```
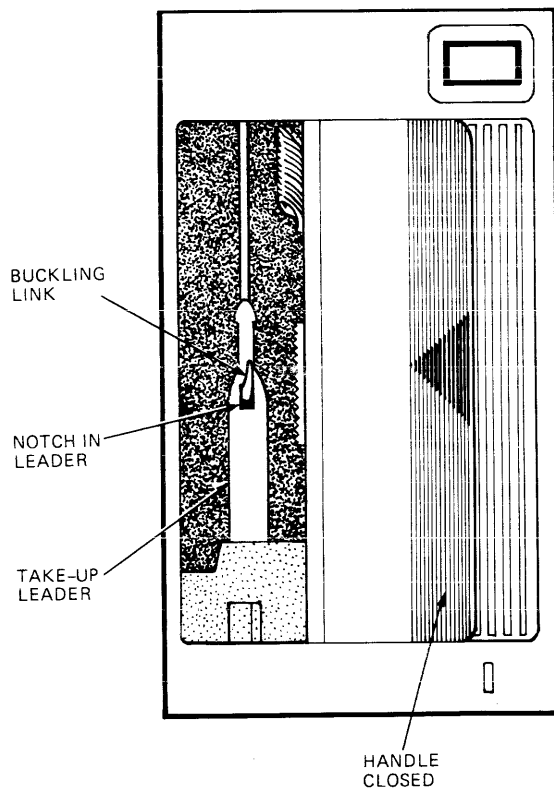
MLO–1448–87

If the leader is unhooked or if you cannot clearly see the pointed end, do not insert the cartridge into the drive or attempt to fix the drive leader. Contact your DIGITAL service representative.

CAUTION: *Using a tape drive with a mispositoned leader can damage your tape drive.*

If the cartridge leader and drive leader appear normal, proceed with the next step.

Inserting a Tape Cartridge

Before you use the tape drive, make sure the system is turned on (the on/off switch is set to 1) and the Load/Unload button is in the unload (out) position. The Load/Unload button glows red for approximately four seconds when you power on your system.

When the red light goes off and the green light comes on, you can move the handle.

CAUTION: *Move the handle only when the red indicator light is off and the green indicator light glows steadily. Moving the handle while either indicator light is blinking could damage your system. If the red light blinks rapidly at any time, press the Load/Unload button four times. If the problem persists, do not attempt to use the tape drive or to remove the tape cartridge. Call your DIGITAL service representative.*

Use the following procedure to insert a tape cartridge. (See Figure 3–17.)

1. Pull open the handle when the green light is on.

2. Position the cartridge so the arrow on the cartridge faces toward the left and points toward the drive. Insert the cartridge into the TK50 tape drive until you feel the cartridge lock into place.

   The red light comes on.

   The green light goes off.

3. Push the handle closed.

   The red light goes off.

   The green light comes on.

4. Push the Load/Unload button to the load (in) position.

   The red light comes on.

   The green light goes off.

Figure 3–17: Inserting a Tape Cartridge into a TK50 Tape Drive

HANDLE   GREEN LIGHT   ARROW
            IS LIT
                                   LOAD/UNLOAD
                                   BUTTON IN
                                 RED LIGHT
                                   IS LIT

MLO–1449–87
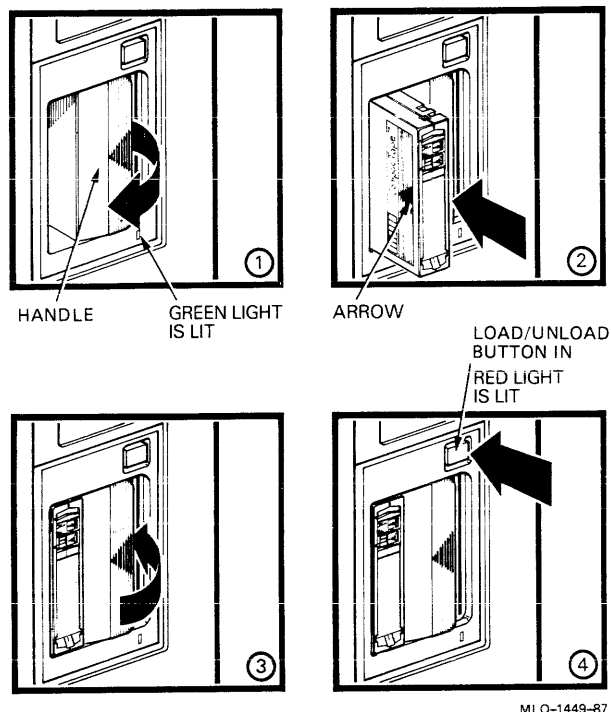
The tape loads in 10–15 seconds. During loading, the two leaders couple and the tape winds onto the take-up reel inside the tape drive. The red light remains on during loading.

When the green light also comes on, the tape drive is ready. Refer to your system software manual for instructions on how to use the tape cartridge, for example, how to load software or perform backup.

NOTE: *If a cartridge is new, the system performs a calibration sequence that takes approximately 40 seconds. The green light blinks rapidly and irregularly during calibration.*

Removing a Tape Cartridge

You must unload a tape before you can remove the cartridge from the tape drive. Use the following procedure. (See Figure 3–18.)

1. Set the Load/Unload button to the unload (out) position.

    The red and green lights blink slowly, but not in unison, as the tape rewinds to the beginning. This may take up to 90 seconds. (Rewinding a tape can also be done under software control. Refer to your software manual for information.)

    The red light remains on and the green light goes off as the tape unloads into the cartridge.

    When the tape is unloaded, the red light goes off and the green light comes on.

2. Pull the handle open only after the green light comes on.

    CAUTION: *Move the handle only when the red indicator light is off and the green indicator light glows steadily. Moving the handle while either indicator light is blinking could damage your system. If the red light blinks rapidly at any time, press the Load/Unload button four times. If the problem persists, do not attempt to use the tape drive or to remove the tape cartridge. Call your DIGITAL service representative.*

3. Remove the tape cartridge and store it in a safe place.

4. Push the handle closed.

The green light remains on, indicating that there is power to the drive and that you can safely move the handle.

Figure 3–18: Removing a Tape Cartridge from a TK50 Tape Drive

LOAD/UNLOAD BUTTON OUT ①
HANDLE   GREEN LIGHT IS LIT ②
ARROW ③
④

MLO-1450-87
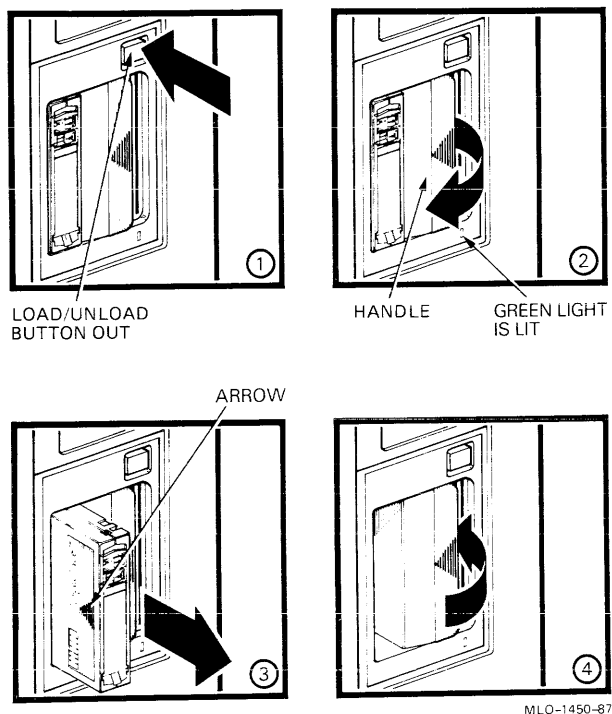
Summary of TK50 Controls and Indicator Lights

Table 3–3 summarizes the TK50 tape drive controls. Table 3–4 describes the meaning of the indicator lights.

Table 3–3: TK50 Tape Drive Controls

Control	Position	Function
Handle	Open	Lets you insert or remove a tape after rewind and unload operations are completed.
	Closed	Locks tape in operating position.
Load/Unload button	In	Loads the tape (10–15 seconds).
	Out	Rewinds and unloads the tape.

Table 3–4: TK50 Tape Drive Indicator Lights

Green Light	Red Light	Condition
Off	Off	No power to the tape drive.
On	Off	Safe to move the handle. Power is present.
Off	On	Do not move the handle. One of the following is in effect: • Power-on self-test is occurring. • Cartridge is inserted but handle is still open. • Tape is loading or unloading. • Tape is stopped.
On	On	Tape loaded successfully.
Blinking	On	Tape is in motion (except rewind). Read/write commands are being processed. Irregular fast blinking means tape calibration is occurring.
Blinking	Blinking	Tape is rewinding.

Table 3–4 (Cont.): TK50 Tape Drive Indicator Lights

Green Light	Red Light	Condition
Off	Blinking rapidly	A fault is occurring. Press and release the Load/Unload button four times. If the problem persists, do not attempt to remove the tape cartridge. Call your DIGITAL service representative.

3.2 Communications Options

The following types of communications options are available for the MicroVAX II 630QY, 630QZ:

- Asynchronous serial controllers

- Synchronous serial controllers

- Network controllers

3.2.1 Asynchronous Serial Controllers

Asynchronous controllers are available with and without modem support.

3.2.1.1 Without Modem Support

Before using any peripheral device connected to a serial communications controller, check the following:

1. Make sure the peripheral device is properly connected to the system, as explained in *MicroVAX II 630QY, 630QZ Installation*.

2. Make sure the peripheral device is properly installed, plugged into an appropriate power source, and turned on.

3. Make sure the device is properly set up. Set-up involves choosing how the device operates. Some set-up choices are matters of personal choice, for example, the number of columns that display on a terminal screen. Others, such as baud rate (a measure of the speed at which data is transmitted over a data line), must match the system setting, if the device and system are to communicate. Refer to your terminal or printer manual for set-up instructions. Generally the default settings for your terminal should be acceptable.

A sample set-up for a VT200-series terminal follows:

1. Press ⌈Set-Up⌉ to display the Set-Up Directory Screen. Choose the Default option. Default correctly sets all values, except line speed.

2. Choose the Comm option to display the Communications Set-Up Menu. Choose the Transmit option and change the speed to 9600 to match the system setting. Set Receive equal to Transmit.

3. Choose the Return to Set-Up Directory option. Choose the Save Set-Up option to store the set-up values.

Your operating system may have other requirements for using serial devices. Refer to your system software manuals.

3.2.1.2 With Modem Support

Using serial controllers with modem control support requires that you install two modems: one connected to the system and one connected to the remote terminal. Both must be connected to phone lines.

Before you can use modems with your system, check the following:

1. Make sure each modem is connected to the system, as explained in *MicroVAX II 630QY, 630QZ Installation*.

2. Make sure the modem is properly installed and connected to a phone jack.

3. Set controls on the modem according to instructions in the modem user's guide.

Before you can use the modem connected to the remote terminal, check the following:

1. Make sure the modem is properly installed and connected to a phone jack.

2. Set controls on the modem according to instructions in the modem user's guide.

3. Check the settings on the terminal attached to the modem. Depending on the type of modem and type of lines used, the baud rate may be 300, 1200, or 2400. Other settings should be the same as those described in the previous section.

Before using a line with modem control support, you must set certain system software parameters, such as line speed. See your system software manuals for details.

3.2.2 Synchronous Controllers

Before using a synchronous controller you must verify the following:

- The system you want to communicate with has an appropriate synchronous controller. Synchronous communications require a synchronous controller on both the transmitting and receiving systems.

- Both the transmitting and receiving systems must have supporting host software installed. Synchronous communications operate under specific protocols that define how data is interpreted. Two common protocols are X.25 and PSI. Appropriate host software is required to interpret the protocol.

3.2.3 Network Controllers

Before using a network controller, you must do the following:

1. Make sure the transceiver cable connected to the DEQNA or DELQA module in the system is properly connected to the network in one of the following ways:

   - To an H4000 transceiver located on a traditional Ethernet.

   - To a DELNI, which can be connected to a larger Ethernet or which can serve to connect up to eight systems in a local area network.

   - To a DESTA, an adapter that enables you to connect to a ThinWire Ethernet.

2. Have the DECnet application installed on your system.

3. Register your node with the network manager so your node is recognized by other systems in the network.

Refer to your system software manuals and DECnet manuals for other requirements and further instructions on using a network connection.

3.3 Real-Time Controllers

Before using a real-time controller, make sure the devices connected to the controller are properly set up. Refer to documentation for the real-time device.

3.4 Printer Options

Before using a printer, make sure it is properly set up and passes any self-tests. Verify that the printer is connected to an appropriate controller. Some printers, such as the LP25/26/27 and LG01/02, require the LPV11 interface. Other printers require modem control signals. Consult your printer documentation for the interface requirements.

3.5 Adding New Options

If you have available slots, you may be able to add new modules to your system. Possible limitations to adding new modules include the following:

- Power limitations

- Physical space limitations

- Bus limitations (ac/dc loading)

Your DIGITAL sales representative can advise you about modules available for your system and what you need to order. A DIGITAL service representative should perform the installation, as the system must be properly configured to work correctly.

CAUTION: *Do not attempt to remove, rearrange, or install new modules. Contact DIGITAL Service for assistance. If you want to perform maintenance on your system, you should purchase the MicroVAX Systems Maintenance Guide.*

Appendix A
Related Documentation

Document	Order Number
Hardware Documentation	
MicroVAX Systems Maintenance Guide	EK–O01AA–MG
MicroVAX Maintenance Hardware Information Kit	00–ZNABX–GZ–116
MicroVAX 630 CPU Module User's Guide	EK–KA630–UG
Software Documentation	
MicroVMS User's Manual V4.4	AA–JG66A–TN
Installing or Upgrading MicroVMS from a Tape Cartridge V4.4	AA–HL74NA–TN
MicroVMS Programming Support Manual V4.4	AA–DC87B–TE
MicroVMS Programmer's Manual V4.4	AA–Z212B–TE
MicroVMS User's Pocket Reference V4.4	AA–Z211C–TE
MicroVMS Programming Pocket Reference V4.4	AA–Z214B–TE
ULTRIX–32m Installation Guide	AA–CN29A–TE
VAXELN User's Guide	AA–EU38A–TE
Microcomputer Handbook Series	
VAX Architecture Handbook	EB–19580–20
VAX Software Handbook	EB–21812–20
Microcomputer Interfaces Handbook	EB–20175–20
Microcomputers and Memories Handbook	EB–18451–20

Documentation specific to supported options is listed with the option in *MicroVAX II 630QY, 630QZ Technical Information.*

Glossary

Application program
A program designed to meet specific user needs, such as a program that monitors a manufacturing process.

Backplane
The connector block that all MicroVAX II printed circuit boards plug into.

A printed circuit board containing the bus.

Back up
The process of making copies of the data stored in your disk drive(s) so that you can recover that data after an accidental loss. You make these copies on a tape cartridge and then store it in a safe place.

Backup copy
A duplicate copy of data on your fixed disk that is stored on a tape cartridge.

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 circuitry by two voltage levels.

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 to start a computer system.

Bootable medium
A fixed disk or magnetic tape containing software (such as an operating system) that the bootstrap program can load into the system memory.

Bootstrap

A program that you start when you turn on the MicroVAX II. The bootstrap loads software contained on a fixed disk or magnetic tape cartridge into memory. The MicroVAX II then stops executing the bootstrap and starts executing the software in memory. The software usually loads an operating system or other software into memory, so that the MicroVAX II can start processing.

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 communications among the other printed circuit boards.

Byte

A group of eight binary digits (bits). A byte is one-half the size of a MicroVAX II word and one-quarter the size of a MicroVAX II longword.

Central processing unit (CPU)

The part of a computer system that controls the interpretation and execution of instructions.

Command

An order given by a user to a computer, often through a terminal keyboard.

Communication line

A cable along which electrical signals are transmitted. MicroVAX II systems or devices connected by communication lines can share information and resources.

Computer system

A combination of computer hardware, software, and external devices that performs specific operations or tasks.

Console terminal

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

Controller

A MicroVAX II component that regulates the operation of one or more peripheral devices. Controllers are often called interface units.

CPU
See *Central processing unit*

Data
A representation of facts, concepts, or instructions, suitable for communication, interpretation, or processing by human beings 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 the MicroVAX II that is capable of receiving, storing, or transmitting data.

Device name
The name by which a device or controller is identified within a MicroVAX II 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 MicroVAX II hardware operation. The MicroVAX Diagnostic Monitor software contains several diagnostic programs.

Disk
A flat circular plate with a coating on which data is stored magnetically in concentric circles (tracks).

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

EIA
Electronic Industries Association.

Error message
A message displayed by the MicroVAX II to indicate it has detected an error or malfunction.

File
A collection of related information treated by the computer as a single item.

Firmware
Software instructions stored in a fixed form, usually in read-only memory (ROM). In a MicroVAX system, the power-on self-tests and bootstrap program are firmware.

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

Hardware
The physical components—mechanical and electrical—that make up a computer 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 computer. A keyboard is an input device.

Input/Output (I/O) device
A piece of equipment that accepts data for transmission both to and from a computer. A terminal is an input/output device.

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

Interface
A device or piece of software that lets different components of a computer communicate with one another.

I/O
Abbreviation for input/output.

Kbyte

Abbreviation for 1024 bytes.

LED

Light emitting diode. A LED on the CPU cover panel displays a countdown during the power-on sequence.

Load

1. To move software, usually from a peripheral device into memory.

2. To place a disk in a disk drive, or tape in a tape drive.

Longword

A group of 32 bits, equal to two words or four bytes.

Magnetic tape

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

Mbyte

Abbreviation for 1,048,576 bytes.

Memory

The area where a computer 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 computer system.

Operating system

A collection of programs that controls the overall operation of a computer and performs such tasks as:

• 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 a computer 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 terminal, and printers.

Power-on 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 a computer.

Program

The complete sequence of instructions necessary for a computer to perform a task. See *Software*.

Prompt

A character or words that a computer displays to indicate it is waiting for you to type a command.

Read-only memory (ROM)

A memory that does not allow modification of its contents. The computer can use data in a ROM but cannot change it.

Reboot

To restart a computer system. Pressing the Restart button reboots the MicroVAX II system.

Record

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

ROM

See *Read-only memory*.

Run

1. A single continuous execution of a program.

2. To execute a program.

Software

Programs executed by a computer 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 tape cartridge.

Store

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

System

A combination of computer 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 computer system.

Terminal

An input/output device generally used for communication between the users of a computer system and the system itself.

Video terminal

A terminal that displays information on the screen of a cathode ray tube (CRT).

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.

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MicroVAX II 630QY, 630QZ Troubleshooting

Order Number EK–O04AB–SG–002

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DELNI	Rainbow	VMS
DEQNA	RSTS	VT
DESTA	RSX	Work Processor
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ML-S811

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Preface

Troubleshooting is the process of isolating and diagnosing problems with your system. When your system does not operate as described in *MicroVAX II 630QY, 630QZ Operation*, use the information in this manual to diagnose the problem.

This manual is divided into three chapters:

- Chapter 1 describes problems you may experience at power-up and corrective actions.

- Chapter 2 describes problems you may have during normal operation of your system and corrective actions.

- Chapter 3 describes the MicroVAX Diagnostic Monitor (MDM), a diagnostic tool you can use to test your system periodically or to isolate a particular problem.

The troubleshooting techniques described in this manual 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.

Chapter 1
Troubleshooting During Power-On

Whenever you power on your system, the MicroVAX II processor performs a series of self-tests and start-up routines. After successful completion of the self-tests, the system attempts to load system software. *MicroVAX II 630QY, 630QZ Operation* describes the display you see during the normal power-on sequence.

A countdown from F (15 in hexadecimal numbers) to 0 occurs during the normal sequence. Only the hexadecimal portion from 7 to 0 displays on the console terminal screen. The full countdown displays on the light emitting diode (LED) on the central processing unit (CPU) panel. 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.

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

1. RX50 diskette

2. RD50-series of fixed-disk drive

3. TK50/TK70 tape cartridge

4. Ethernet adapter

Normally, your system boots from system software installed on a fixed disk. However, when you install system software or run diagnostic software, the system boots from either an RX50 diskette or a tape cartridge.

NOTE: *If you have a diskless system that is part of a local area network (LAN), you must obtain the MicroVAX II Ethernet Server Customer Diagnostics Kit to run the MicroVAX Diagnostic Monitor (MDM). Contact your DIGITAL sales representative to order the MicroVAX II Ethernet Server Customer Diagnostics Kit.*

If you have a diskless system that is not part of a LAN, you cannot run MDM. Contact a DIGITAL service representative to diagnose problems on a diskless system that is not part of a network.

If you do not observe this sequence, refer to the possible problems and corrective actions described in Table 1–1.

Table 1–1: Troubleshooting Power-On Problems

Problem	Possible Cause	Corrective Action
Problems During Self-Tests		
No response when the on/off switch is turned on (switch is not lit).	System is not plugged in.	Set the on/off switch to 0. Plug in the system. Set the on/off switch to 1.
	No power at the wall outlet.	Use a different wall outlet, or check the circuit breaker controlling power to the wall outlet.
	System circuit breaker is in the out position.	Set the on/off switch to 0. Reset the circuit breaker (located below the power cable plug in the rear of the system) by pushing it in. Set the on/off switch to 1. If the circuit breaker trips again, call your DIGITAL service representative.
	Power cable is incorrectly installed.	Set the on/off switch to 0. Check that the cable is fully seated in the socket. Set the on/off switch to 1.
The system has power (the on/off switch is set to 1), but no display appears on the console terminal.	Console terminal is turned off.	Turn on the console terminal.
	Console terminal is off-line.	Put the terminal on-line. Refer to the terminal documentation for instructions.

Table 1–1 (Cont.): Troubleshooting Power-On Problems

Problem	Possible Cause	Corrective Action
	Console terminal cable is not installed correctly.	Make sure the cable is installed properly at both ends.
	Baud rate setting of the system and the terminal do not match.	Set the terminal baud rate to match the system. The normal operating setting is 9600.
	Power-Up Mode switch on the CPU panel is set to T.	Set the switch to Run (indicated by an arrow).
	Terminal is defective.	Run MDM diagnostics to check status of the terminal.
	The self-tests halted before reaching 7.	Check the LED display on the CPU panel. If an F,E,D,C,B,A, 9 or 8 displays, the system has detected an internal error. Copy the number and call your DIGITAL service representative.
The self-tests halted between 7 and 3 and an error message 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.

General Problems During Boot Sequence

Problem	Possible Cause	Corrective Action
Instead of automatically starting, system power-on results in >>> being displayed on the console terminal.	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 (located on the CPU panel) to the disable (left) position. Restart the system by pressing the Restart button, located on the control panel. To boot from console mode, use the BOOT command (BOOT device-name).
The message "?54 RETRY" appears on the console terminal twice.	No bootable media was found.	See actions listed below for the boot device you are using.

Table 1—1 (Cont.): Troubleshooting Power-On Problems

Problem	Possible Cause	Corrective Action
Problems Booting from a Fixed Disk		
The countdown continues from 2 to 0; however, operating system error messages display on the console terminal.	The system disk is write-protected.	Set the write-protect switch to the out (write-enabled) position.
The countdown does not continue from 2 through 0, even though the Halt Enable/Disable switch is set to disable. The message "?4D DEVOFFLINE" appears on the console terminal.	The system disk is off-line.	Set the Ready button to the out position (glows green).
The countdown does not continue from 2 through 0, even though the Halt Enable/Disable switch is set to disable. The message "?42 NOSUCHFILE" appears on the console terminal.	The system disk contains no bootable system software.	Install system software.
The countdown does not continue from 2 through 0, even though the Halt Enable/Disable switch is set to disable. The message "?4C CTRL ERR" appears on the console terminal.	A problem exists with the controller or fixed disk.	Run the MDM software described in Chapter 3.

Table 1–1 (Cont.): Troubleshooting Power-On Problems

Problem	Possible Cause	Corrective Action
Problems Booting from a Diskette		
System does not boot (the countdown does not continue from 2 to 0) or boots from another device (the wrong software appears on the console terminal).	No diskette in diskette drive.	Insert a diskette containing startable system software into the diskette drive.
	Diskette drive door is not closed.	Close the diskette drive door.
	Diskette is in the drive upside down.	Check that the orange stripe on the diskette matches the stripe on the drive.
	Diskette is not bootable (does not contain a bootstrap program).	Use a diskette containing a bootstrap program to start system software.
	Diskette is worn or damaged.	Try another diskette.
Problems Booting from a Tape Cartridge		
System does not boot (the countdown does not continue from 2 to 0) or boots from another device (the wrong software appears on the console terminal).	No tape cartridge in the tape drive.	Insert a cartridge containing system software into the tape drive.
	Fixed-disk drive is on-line (Ready button is lit). Your system starts from the fixed disk, if it is on-line.	Push in the Ready button to place the fixed disk off-line.

Table 1–1 (Cont.): Troubleshooting Power-On Problems

Problem	Possible Cause	Corrective Action
	Tape is not bootable (does not contain a bootstrap program).	Use a tape containing a bootstrap program to start system software.
	Tape is worn or damaged.	Try another tape cartridge.

Chapter 2

Troubleshooting During Normal Operation

Problems that occur during normal operation of your system may result from a defect in the system, from faulty settings, or from incorrect procedures.

Table 2–1 lists problems, possible causes, and corrective actions. If the actions listed do not solve the problem, call your DIGITAL service representative.

Table 2–1: Troubleshooting Operation Problems

Problem	Possible Cause	Corrective Action
System Problems		
System loses power during operation. Lights on control panel are off.	The system has become unplugged.	Set the on/off switch to 0. Plug in the system. Set the on/off switch to 1.
	No power at the wall outlet.	Use a different wall outlet, or check the circuit breaker controlling power to the wall outlet.
	System circuit breaker is in the out position.	Set the on/off switch to 0. Reset the circuit breaker (located below the power cable plug on the back of the system) by pushing it in. Set the on/off switch to 1. If the circuit breaker trips again, call your DIGITAL service representative.
	Power cable is incorrectly installed.	Set the on/off switch to 0. Check that the cable is fully seated in the socket. Set the on/off switch to 1.

Table 2–1 (Cont.): Troubleshooting Operation Problems

Problem	Possible Cause	Corrective Action
The system loses power during operation.	The power supply has failed.	Check the DC OK light located on the control panel. An unlit DC OK light indicates a power supply problem. Turn off your system and call your DIGITAL service representative.
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 panel to the disable (left) position to prevent recurrences. Press the Restart button (on the control panel) to restart the system.
Fixed Disk Problems		
Fixed disk write error message is displayed.	Disk is write-protected (Write-Protect button glows orange).	Press and release Write-Protect button (not lit).
Fixed disk read error message is displayed.	Disk is off-line because the Ready button is in (not lit).	Press and release the Ready button (glows green) to put fixed disk on-line.
	Disk is write-protected (Write-Protect button glows orange).	Press and release Write-Protect button (not lit).
Diskette Drive Problems		
Diskette read error message is displayed.	No diskette in the diskette drive.	Insert a diskette into the drive.
	Diskette drive door is not closed.	Close the diskette drive door.
	Diskette is in the drive upside down.	Check that the orange stripe on the diskette matches the stripe on the drive.
	Diskette is not formatted.	Use a preformatted RX50 diskette.
	Diskette is worn or damaged.	Try another diskette.

Table 2–1 (Cont.): Troubleshooting Operation Problems

Problem	Possible Cause	Corrective Action
Diskette write error message is displayed.	No diskette in the diskette drive.	Insert a diskette into the drive.
	Diskette drive door is not closed.	Close the diskette drive door.
	Diskette is in the drive upside down.	Check that the orange stripe on the diskette matches the stripe on the drive.
	Diskette is not formatted.	Use a preformatted RX50 diskette.
	Diskette is worn or damaged.	Try another diskette.
	Diskette is write-protected.	Remove the write-protect tab.

TK70 Tape Drive Problems

Problem	Possible Cause	Corrective Action
Green light blinks rapidly after you insert the tape.	Tape cartridge leader is defective.	Pull the handle open and remove the cartridge. Use another cartridge.
Orange, yellow, and green lights blink in unison.	A problem with the drive.	Press the Unload button once. If the orange and green lights go out and the yellow light blinks, the cartridge is unloading. When the green light comes on and you hear the beep, remove the tape cartridge. If all three lights continue to blink after you press the Unload button, the fault is not cleared. Do not try to remove the cartridge. Call your DIGITAL service representative.
Handle does not move.	Power-on test is still in progress.	If you are trying to insert a cartridge, wait for the orange and yellow lights to go off and the green light to remain on steadily. Then try again.

Table 2—1 (Cont.): Troubleshooting Operation Problems

Problem	Possible Cause	Corrective Action
	Tape drive is active.	Do not attempt to move the handle while the yellow light is on.
Handle does not lock.	Cartridge is not inserted properly.	Reinsert the tape cartridge. If the problem persists, call your DIGITAL service representative.
Cartridge does not unload	Unload button is not working properly.	Try unloading the cartridge with a software command. Refer to your system software manuals.
TK70 passes power-on self-test but does not work.	The controller may be bad, or the connection between the drive and the controller may be loose.	Run MDM software, described in Chapter 3.

TK50 Tape Drive Problems

Problem	Possible Cause	Corrective Action
TK50 red light blinks rapidly, but no unusual sounds occur.	A problem exists in the tape drive.	Press the Load/Unload button four times. If the problem persists, do not attempt to use the tape drive or to remove the tape cartridge, if loaded. Call your DIGITAL service representative.
Red light blinks rapidly and you hear a whirring sound.	Leaders are not coupled properly.	Immediately turn off the system by setting the on/off switch to 0 (off). Call your DIGITAL service representative. Do not attempt to remove the cartridge.
Cartridge release handle does not move.	Power-on test is still in progress.	If you are trying to insert a cartridge, wait for the red light to go out and the green light to come on steadily. Then try again.
	Tape drive is active.	Do not attempt to move the handle until the red light is off and the green light is on steadily.
Cartridge release handle does not lock.	Cartridge is not inserted properly.	Reinsert the tape cartridge. If the problem persists, call your DIGITAL service representative.

Table 2–1 (Cont.): Troubleshooting Operation Problems

Problem	Possible Cause	Corrective Action
Cartridge does not unload	Load/Unload button is in the load (in) position.	Make sure the Load/Unload button is in the unload (out) position. Wait for the red light to go out and the green light to come on before trying to remove the cartridge.
	Load/Unload button is not working properly.	If you are trying to remove a cartridge, try loading and unloading the cartridge again. Set the Load/Unload button to the load (in) position for a few seconds, then press it again to the unload (out) position. Move the cartridge release handle only after the red light goes off and the green light comes on. If the problem persists, call your DIGITAL service representative.
TK50 passes power-on self-test but does not work.	The controller may be bad, or the connection between the drive and the controller may be loose.	Run the MDM software, described in Chapter 3.

Chapter 3
Running the MicroVAX Diagnostic Monitor (MDM)

The MicroVAX Diagnostic Monitor (MDM) is a software package containing diagnostic tests designed to isolate and identify faults in your system. The diagnostic tests are packaged with your system on either RX50 diskettes (labeled MV DIAG CUST RX50) or a TK50 tape cartridge (labeled MV DIAG CUST TK50).

If you have a diskless system that is part of a local area network (LAN), you must obtain the MicroVAX II Ethernet Server Customer Diagnostics Kit to run MDM.

NOTE: *If you have a diskless system that is not part of a LAN, you cannot run MDM. Call your DIGITAL service representative.*

The MicroVAX II Ethernet Server Customer Diagnostics Kit enables you to install MDM software on a host VAX/VMS or MicroVMS operating system and down-line load MDM to other systems that are part of the LAN using the DECnet/Ethernet network facilities. When MDM is down-line loaded to target systems from a host system, the time required to load MDM is reduced significantly.

Call your DIGITAL sales representative to order the MicroVAX II Ethernet Server Customer Diagnostics Kit.

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.

Customers requiring more complete diagnostic testing should purchase the MicroVAX Maintenance Kit. The kit includes the *MicroVAX System Maintenance Guide* and the service diagnostic tests. Only qualified service personnel should use the service diagnostic tests.

Before you run the MDM software:

• Be sure you understand the instructions in *MicroVAX II 630QY, 630QZ Operation* for using the device appropriate for your diagnostic media — either the RX50 diskette drive or the TK50/TK70 tape drive.

• Make sure the media (tape cartridge or RX50 diskette) is write-protected.

3.1 Starting MDM

The diagnostic tests run the same way whether or not software has been installed.

NOTE: *Before booting MDM on a system with software installed, warn all users to log off and perform system shutdown, as described in your system software manuals.*

You must start the diagnostic tests differently, depending on the media used. If you are booting MDM from an RX50 diskette, read Section 3.1.1. If you are installing MDM from a tape cartridge, read Section 3.1.2.

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.*

3.1.1 RX50 Instructions

Because the system automatically boots first from an RX50 diskette, you can run MDM software the same way, whether or not the system software has been installed on the system. To run diagnostic software from RX50 diskettes, do the following:

1. Press the fixed disk 0 Ready button on the system control panel to the out position.

2. Insert diskette RX50A into one of the drives (be careful to align the orange arrow on the diskette with the orange stripe on the drive) and close the door.

3. Press the Restart button if the system is running, or turn on the system if the system is off.

4. 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.

5. At this point, you may be prompted to remove diskette RX50A and insert the next diskette. Remove diskette RX50A and insert diskette RX50B.

6. Within a few moments you should see the MDM introductory display, as shown in Figure 3-1.

Figure 3—1: MDM Introductory Display

```
            VAXELN V2.2-11

    MicroVAX Diagnostic Monitor - Version 2.11

                    CONFIDENTIAL DIAGNOSTIC SOFTWARE
                            PROPERTY OF
                    DIGITAL EQUIPMENT CORPORATION

      Use Authorized Only Pursuant to a Valid Right-to-Use License

    Copyright (c) 1987
    Digital Equipment Corporation

    The current date and time is: 17-NOV-1987 00:00:01.64

    Press the RETURN key to continue
    or enter new date and time, then press the RETURN key.

        [DD-MMM-YYYY HH:MM]:
```

MLO–1531–87

NOTE: *The version number on your display may differ from that shown in Figure 3–1.*

7. 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 3–1. For example, enter 25–DEC–1987 02:30 and press Return to continue.

8. Within moments you receive a message that the system is preparing for testing, as shown in Figure 3–2.

Figure 3-2: Preparing for Testing Message

```
The system is preparing for testing.
This may take several minutes.
Please wait . . .
```
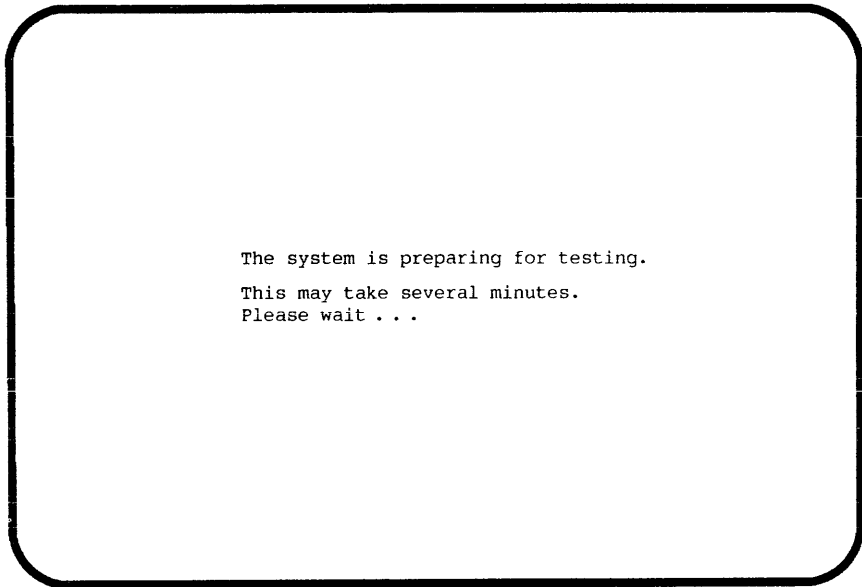
MLO-1532-87

9. Insert numbered diskettes in order, when prompted by the system, as shown in Figure 3-3.

Figure 3–3: Diskette Removal Display

```
          Please remove the diskette.
          Insert the next diskette in the same drive
          and press the RETURN key.
          If you can not insert the next diskette,
          type 1 and press the RETURN key.
          >
```
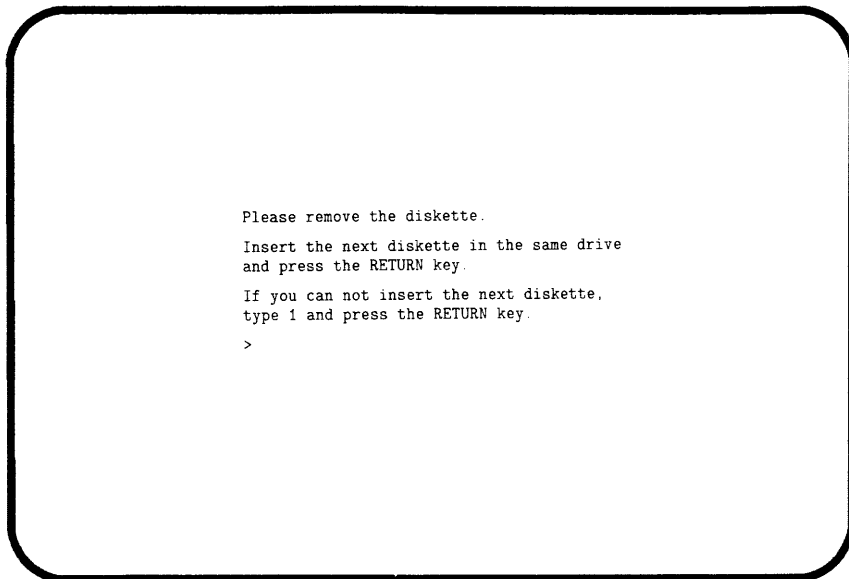
MLO–1533–87

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

10. After a few minutes, you receive a message that the system is ready for testing, as shown in Figure 3–4.

Figure 3–4: Ready for Testing Message
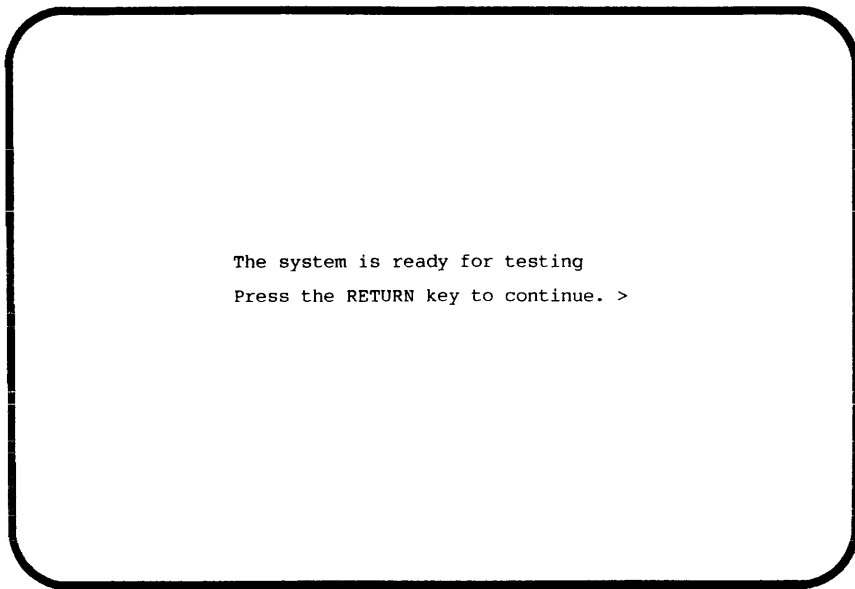
```
            The system is ready for testing
            Press the RETURN key to continue. >
```

When you press Return, the Main Menu appears. Section 3.2 describes options on the Main Menu.

3.1.2 TK50/TK70 Instructions

NOTE: *Before running MDM on your TK50 or TK70 tape drive, you may want to reread the tape drive operating instructions found in MicroVAX II 630QY, 630QZ Operation.*

If you are running diagnostic software from a tape cartridge, do the following:

1. Make sure the write-protect switch on the tape cartridge is in the write-protected position.

2. Remove the rear cover of your system, if it is not already removed.

3. Move the Halt Enable/Disable switch on the CPU panel to enable (dot inside the circle).

4. Press the Restart button if the system is running, or turn on the system if the system is off.

5. When the green light on the tape drive glows steadily (orange and yellow lights go out) insert the tape cartridge containing the MDM software into the tape drive and lock it into place.

6. Press the Load/Unload button to the load (in) position. While you are inserting and loading the tape cartridge, the normal power-on countdown from 7 through 3 should appear on the console terminal. When the countdown reaches 3, you should see the >>> prompt indicating console mode.

7. Use the command BOOT MUA0 to tell your system to load the MDM software from the tape cartridge. Loading the software takes a few minutes. An indicator light on the tape drive flashes while the loading occurs. (If you are using a TK50 tape drive, a green light flashes. If you are using a TK70 tape drive, a yellow light flashes.)

8. Within a few moments you should see the MDM introductory display, as shown in Figure 3–5.

Figure 3–5: MDM Introductory Display

```
        VAXELN V2.2-11

MicroVAX Diagnostic Monitor - Version 2.11
               CONFIDENTIAL DIAGNOSTIC SOFTWARE
                         PROPERTY OF
               DIGITAL EQUIPMENT CORPORATION

  Use Authorized Only Pursuant to a Valid Right-to-Use License

Copyright (c) 1987
Digital Equipment Corporation

The current date and time is: 17-NOV-1987 00:00:01.64

Press the RETURN key to continue
or enter new date and time, then press the RETURN key.

      [DD-MMM-YYYY HH:MM]:
```

MLO–1535–87

NOTE: *The version number on your display may differ from that shown in Figure 3–5.*

9. 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 3–5. For example, enter 25–DEC–1987 02:30 and press Return to continue.

10. Within moments you receive a message that the system is preparing for testing, as shown in Figure 3–6.

Figure 3–6: Preparing for Testing Message

```
            The system is preparing for testing.
            This may take several minutes.
            Please wait . . .
```
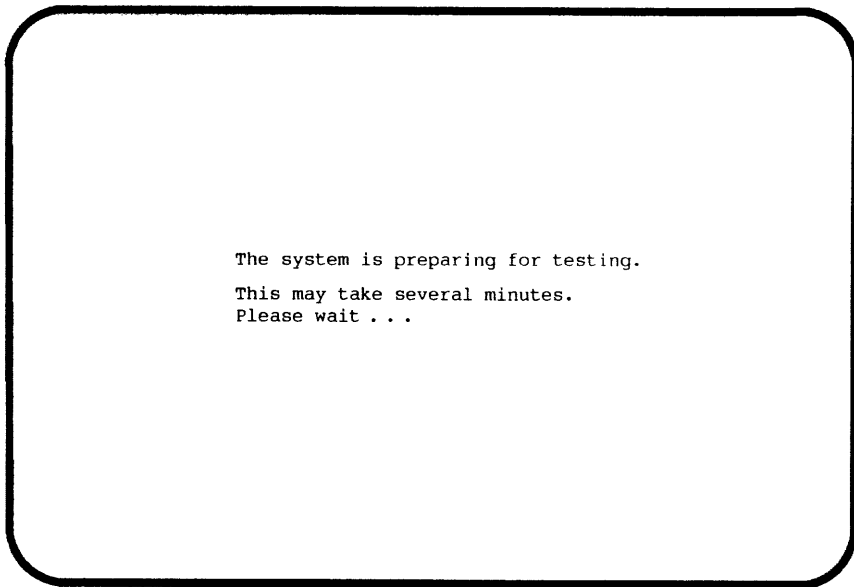
11. After a few minutes, you receive a message that the system is ready for testing, as shown in Figure 3–7.

Figure 3–7: Ready for Testing Message

```
                    The system is ready for testing
                    Press the RETURN key to continue. >
```
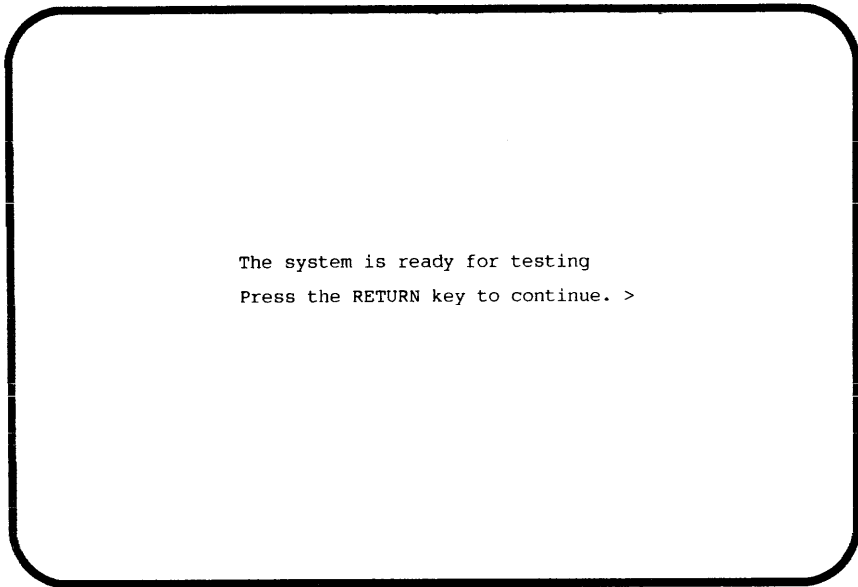
MLO–1537–87

When you press [Return], the Main Menu appears. Section 3.2 describes options on the Main Menu.

3.2 Main Menu Options

The Main Menu has five options, as shown in Figure 3–8. Choose an option by typing the number and pressing [Return].

Figure 3–8: MDM Main Menu

```
MAIN MENU
        1 - Test the system
        2 - Display System Configuration and Devices
        3 - Display the System Utilities Menu
        4 - Display the Service Menu
        5 - Exit MicroVax Diagnostic Monitor
    Type the number; then press the RETURN key. >
```
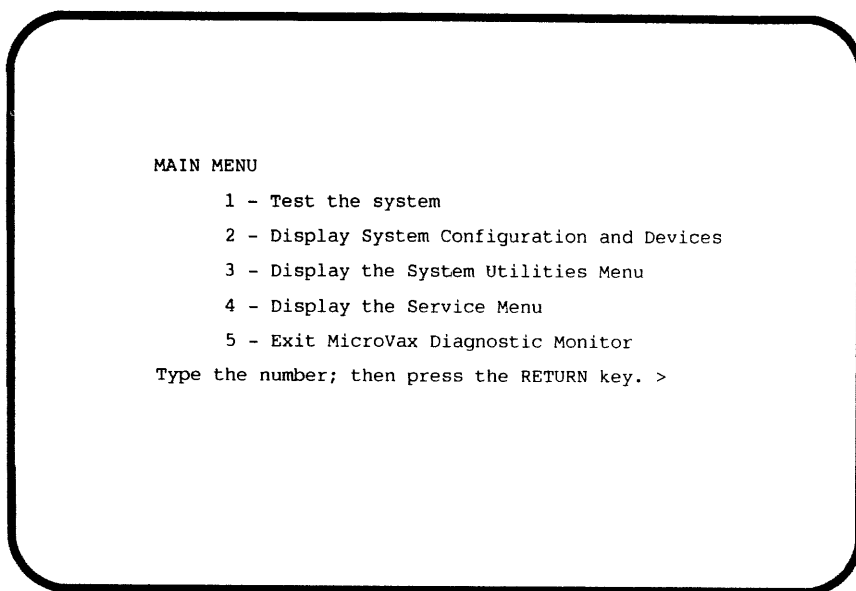
MLO–1538–87

Option 4, Display the Service Menu, is available only if you have purchased the MicroVAX Maintenance Kit.   The maintenance kit contains service diagnostics and the *MicroVAX System Maintenance Guide*.   Only qualified service personnel should use the MicroVAX Maintenance Kit.

The next few sections describe the five options on the Main Menu.

3.2.1 Test the System

Test the System runs a quick, general test of the devices in the system and how they work together.   You can run the test at any time without jeopardizing data.

When you select Test the System, a screen explaining the testing procedures appears, as shown in Figure 3–9.

Figure 3-9: System Test Screen

```
MAIN MENU
SYSTEM TEST

    This is a test of the MicroVAX computer and its devices.

    No additional preparation for this testing is required;
    the MicroVAX is ready to be tested.

    Testing occurs in two parts: the functional tests quickly
    test each device sequentially; the exerciser test (lasting
    about 4 minutes) tests how the devices work together.

    To halt the test at any time and return to the Main Menu,
    type CTRL-C by holding down the CTRL key and pressing the C key.

Press the RETURN key to begin testing,
or type O and press the RETURN key to return to the Main Menu. >
```

MLO-1539-87

When you are ready to begin the test, press [Return]. The Begin Device Tests
screen appears, as shown in Figure 3-10.

Figure 3–10:   Begin Device Tests Screen

```
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

RQDXA . . . . . . . . . . . . . .     passed

TKXXA . . . . . . . . . . . . . .     passed

DELQAA . . . . . . . . . . . . . .    passed

DH-CX0A . . . . . . . . . . . . . .
```
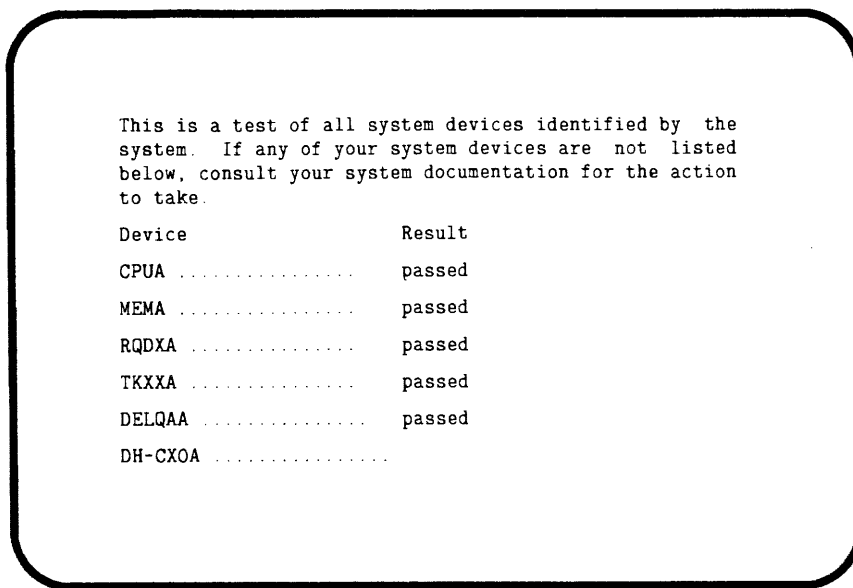
As each device passes the test, it is listed on the screen, as shown in Figure 3–10.

NOTE: *Because of the internal similarity of some communications 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, as shown in Figure 3–11.

Figure 3—11: Device Failure Screen

```
FAILURE DETECTED
      A failure was detected while testing the
            OPTION: DH-CXOA 8/16 line asynchronous multiplexer
      No Field Replaceable Unit (FRU) was identified.
      Consult your system documentation for the action
      to take.
Press the RETURN key to return to the previous menu. >
```
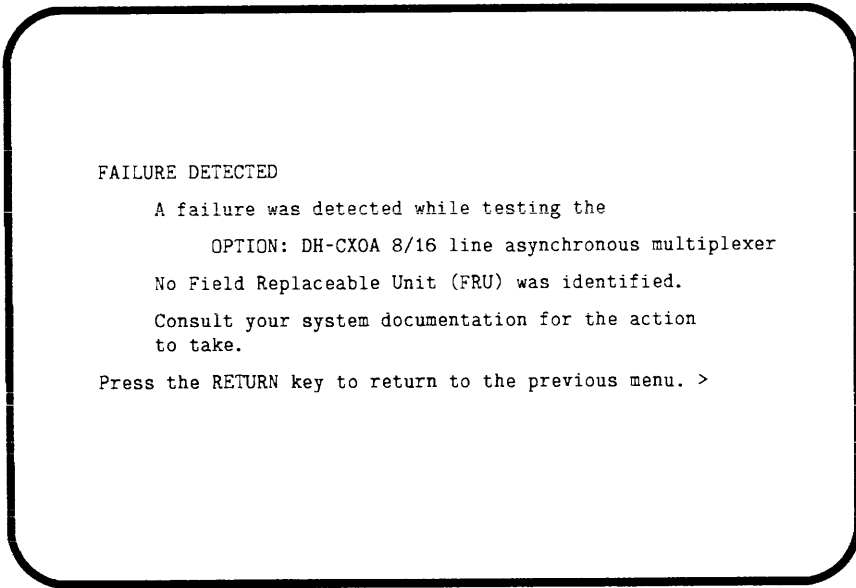
MLO-1541-87

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, as shown in Figure 3—12.

Figure 3–12: System Test Passed Screen

```
SYSTEM TEST PASSED

        All devices passed functional tests and the system passed
        the exerciser test.

        At this point you may exit from the maintenance system
        or perform more specialized testing. If you would like
        additional information, consult the Maintenance Section
        of your System Technical Manual.

    Press the RETURN key to return to the previous menu. >
```
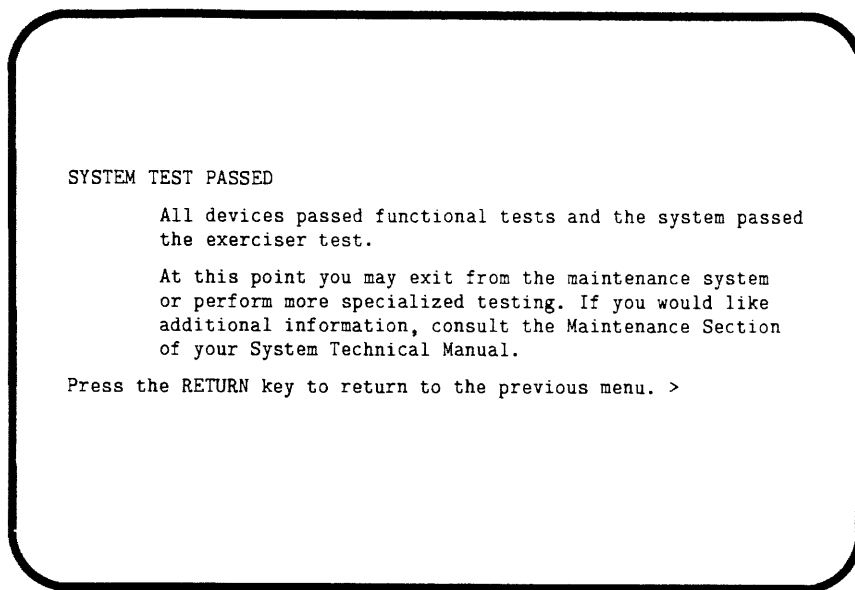
At the end of the system test, press Return. The Main Menu appears. From the Main Menu you can either exit MDM by choosing option 5, or you can choose one of the other options.

3.2.2 Display System Configuration and Devices

The Display System Configuration and Devices screen identifies devices recognized by the diagnostic software. Figure 3–13 shows a sample system configuration and devices screen.

Figure 3–13: Sample System Configuration and Devices Display

```
MAIN  MENU
SYSTEM CONFIGURATION AND DEVICES

      CPUA ... MicroVAX/rtVAX CPU
          KA630-A MC=00 HW=01
      MS630-AA ... memory module:
          banks 1 and 2, each bank has 4MB
      RQDXAQA ... Q-bus SDI disk controller.
          RQDXA-Q - REV MC=5 HW=3
      TKXXA ... TK50/TK70 CONTROLLER
          TK-Q-REV MC=4
      DH-CX0A ... Diagnostics for asynchronous multiplexers
          CXA/CXB16 16 line No modem ctrl.
      DELQAA ... Ethernet controller
          DELQA     08-00-2B-06-0F-CD

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

MLO-1543-87

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 KDA50 controller described in Figure 3–13 is at revision 5 for microcode (MC=5) and revision 3 for hardware (HW=3).

Besides the general information listed for each device, additional information for specific devices is listed as follows:

- CPU — type of CPU, presence of a floating-point unit (FPU)

- MEM — total amount of memory in megabytes and pages, number and type of memory modules

- RQDX3 — type, unit number, and description of each mass storage device supported by the controller

- DELQA/DEQNA — the Ethernet station address

- Communications devices — the type of device and whether it has modem control

In addition to showing information about testable device options, MDM displays message indicating the presence of nontestable systems devices. If a device is physically present in the system but is not listed under the System Configuration and Devices display, one of the following two messages can indicate the reason.

Message 1:

```
No Dg KAA ... Message number %x00000000
```

The "No Dg" (no diagnostic) "KAA" (KA630 CPUA) message appears in place of the device name because a diagnostic was not loaded for the CPUA. This can happen when the media is not installed properly or the diagnostic is not present on the media.

MDM displays a "No Dg" message for each DIGITAL device present in the system under these circumstances. For example, an unloaded TK70 diagnostic results in the message, "No Dg TKA." TKA indicates that the device is a TK70.

Message 2:

```
Invld Dev ... Message number %x00000000
```

The "Invld Dev" (invalid device) message indicates that a device not recognizable to MDM has been attached to the system. The message appears under the following circumstances:

- A device is configured to a nonstandard CSR address.

- A DIGITAL device that has no diagnostic has been attached to the system. This may occur if a device not supported on a MicroVAX II system has been attached.

- A non-DIGITAL device has been attached to the system.

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

3.2.3 Display the Utilities Menu

When you choose Display the Utilities Menu, you see the System Utilities Menu, as shown in Figure 3–14.

Figure 3–14: System Utilities Screen

```
MAIN  MENU
SYSTEM UTILITIES

    Utility selections are:

    1 - Customer Disk Drive Formatter.

Type the number; then press the RETURN key,
or type 0 and press the RETURN key to return to the previous menu. >
```
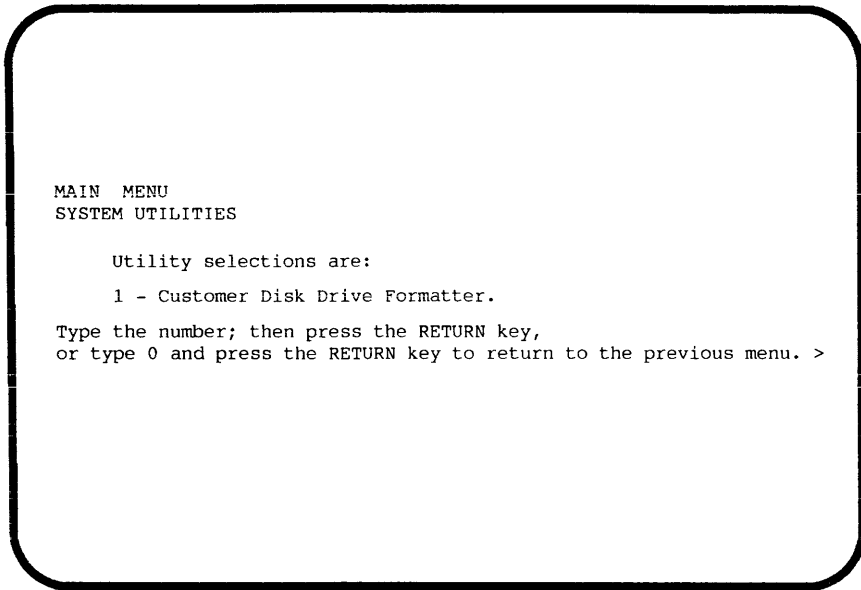
MLO-1544-87

The only option available is the Customer Disk Drive Formatter. Choosing
this option enables you to format a fixed disk on your system or an RX33
diskette.   Choose the option by typing 1 and pressing Return.   Because
formatting destroys all data on the disk or diskette, a warning displays, as
shown in Figure 3–15.

Figure 3-15: Formatting Utility Warning Screen

```
          This DIGITAL Supported Software product is warranted to
          conform to the DIGITAL SOFTWARE PRODUCT DESCRIPTION (SPD)
          applicable for this product at the time of shipment.
          DIGITAL disclaims all other warranties, express or implied,
          including all warranties of merchantability and fitness
          for a particular purpose.  Any use of this product in a
          manner inconsistent with the SPD is an unsupported use,
          for which DIGITAL assumes no liability.
   WARNING, this utility will destroy any user data on the selected drive.

   Do you want to continue [YES=1,(NO=0)] ? 1

   Write protect all drives not being formatted, and press RETURN to
   continue.
```

MLO-1545-87

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 insert it into the diskette drive. Remove the write-protect tab, insert the diskette into the drive, and lock the lever.

If you are formatting the fixed-disk drive, set the Write-Protect button for the drive to write-enable (out).

NOTE: *Because the MicroVAX II 630QY, 630QZ system has only one fixed-disk drive, running the formatting utility destroys all data on the disk. Use this utility only if you want to erase the contents of the disk and reinstall system software.*

Press Return when you are ready to continue.

A list of the drives and their unit numbers appears, as shown in Figure 3-16.

Figure 3—16: List of Drives in System

```
Controller information for field service personnel:
        MSCP Controller Model  #:  19
             Microcode Version #:   2

Your MicroVAX system contains the following drives:
        Unit    Drive Name
         0      RD53 Fixed Disk

What unit do you want to format (0-0) ?
```
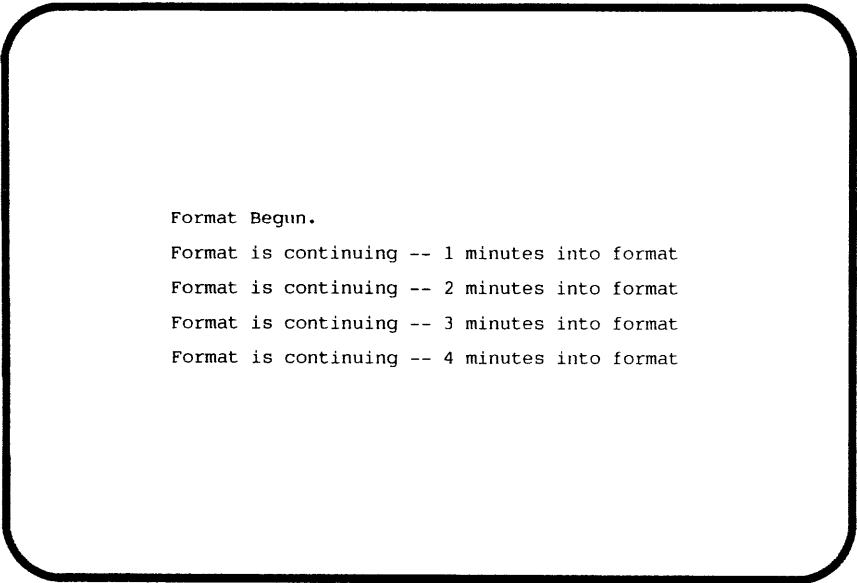
MLO—1546—87

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 status messages, as shown in Figure 3–17.

Figure 3–17: 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
```

MLO–1547–87

At the completion of the formatting operation, you receive a success message, as shown in Figure 3–18.

Figure 3–18: Formatting Success Message

```
Format is continuing -- 32 minutes into format
Format is continuing -- 33 minutes into format
Format is continuing -- 34 minutes into format

The drive has been formatted successfully.
Would you like to format another unit [YES=1,(NO=0)] ?
```
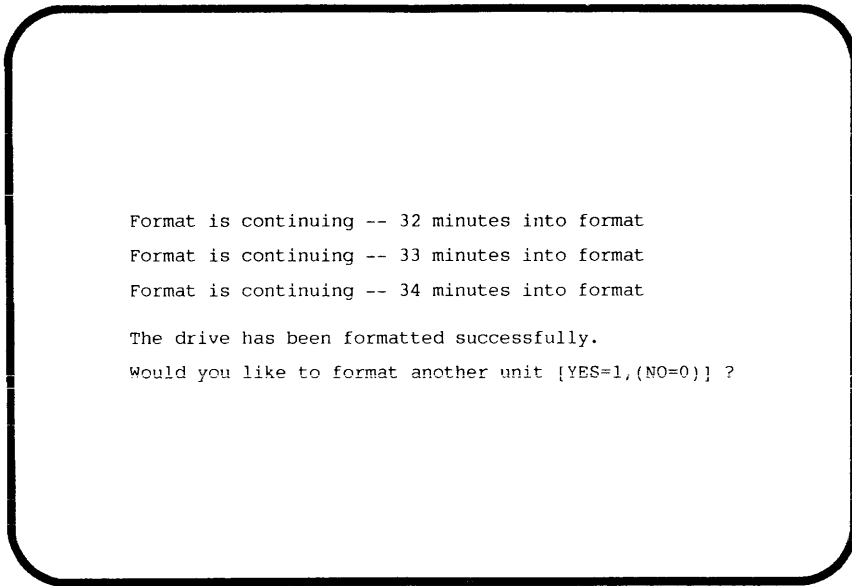
MLO-1548-87

If you want to format another unit, type 1 and press Return to begin the formatting process again. For example, if you want to format another RX33 diskette, remove the one just formatted, insert another, and 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.

3.2.4 Display the Service Menu

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

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 shown in Figure 3–19.

Figure 3–19: Exit Display

```
MicroVAX  Diagnostic Monitor - Version 2.11

Exiting MicroVAX Maintenance System.

     Exit complete. You may now load your system software.
```
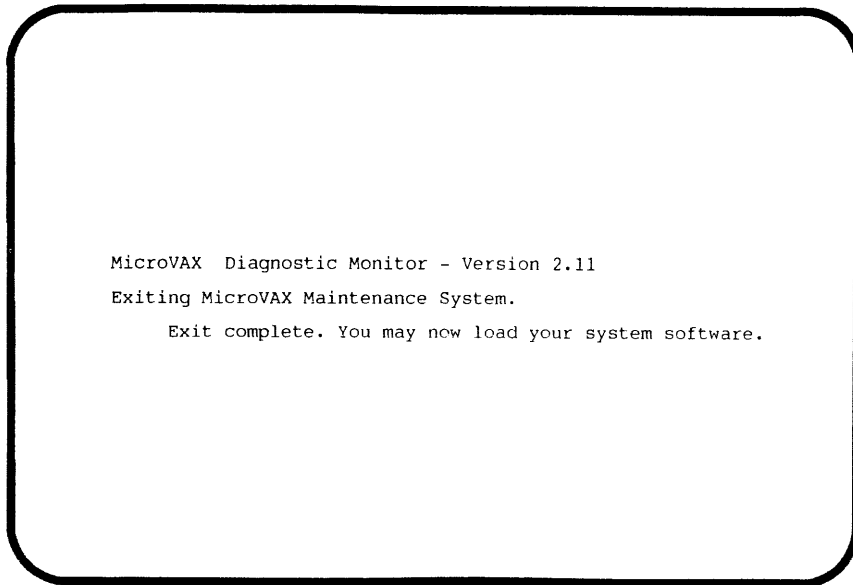
Remove the RX50 diskette or tape cartridge, as explained in *MicroVAX II 630QY, 630QZ Operation*.

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

- Press Break or the Halt button on the control panel. When the console mode prompt >>> appears, use the command BOOT DUA1. DUA1 is the device name of the fixed disk containing your system software. After the system software is loaded, set the Halt Enable/Disable switch to disable, indicated by the dot outside the circle, to avoid inadvertently halting the system by pressing the Break key.

- 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-on sequence again and automatically load system software.

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MicroVAX II 630QY, 630QZ Technical information

Order Number EK-OO5AB-IS-OO2
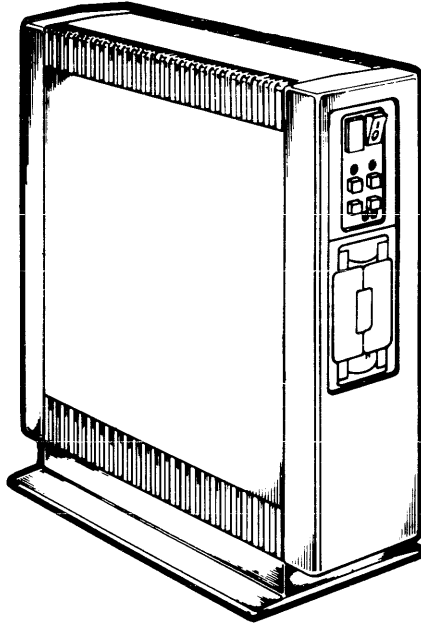
digital equipment corporation
maynard, massachusetts

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Preface

This book summarizes technical information about the MicroVAX II 630QY, 630QZ system. The book is organized as follows:

- Chapter 1 describes the base system specifications, including the CPU module and associated memory options.

- Chapter 2 describes specifications for optional components available for the MicroVAX II 630QY, 630QZ system.

- Chapter 3 contains information on expanding your system.

Chapter 1

Base System Specifications

The MicroVAX II 630QY, 630QZ base system includes a KA630 CPU module and one or two MS630 memory modules in a BA23 enclosure. The MicroVAX II CPU normally resides in slot 1 of the backplane. It may not be installed in slots 4–8. Memory options may reside in slots 2 and 3.

1.1 Base System Operation

Base system operation includes the KA630 firmware and the controls on the CPU panel.

1.1.1 KA630 Firmware

Two read-only memory (ROM) chips on the KA630 module contain firmware. The firmware contains three major programs:

- A console program

- A set of self-tests for the CPU and memory

- A primary bootstrap program (VMB)

The console program receives control whenever the processor halts. For the KA630 CPU, a halt means only that processor control has passed to the console program, not that instruction execution stops. The standard VAX console functionality is emulated by executing a program in ROM, rather than by CPU microcode or a separate processor.

Control passes to the firmware under any of the following conditions:

- The system is powered up

- The Restart button is pressed

- The Q22-bus BHALT signal is asserted (typically by pressing the Break key or the Halt button when the Halt Enable/Disable switch is set to enable)

- A halt instruction is executed

- A system error occurs

At power-up, the system enters one of three power-up modes that are set using the Power-Up Mode switch on the CPU panel. (The modes and their meanings are described later in the chapter.) The console program then determines the console device type and console language.

The console program then runs the self-tests for the CPU and memory. The message

       Performing normal system tests

is displayed on the terminal. As the tests progress, a countdown displays on the console terminal and on a LED display on the CPU panel. *MicroVAX II 630QY, 630QZ Operation* describes the power-on sequence and shows examples of successful power-on operations. *MicroVAX II 630QY, 630QZ Troubleshooting* describes possible problems that can occur during power-on.

If the self-tests are successful, the system does one of two things, depending on whether the Halt Enable/Disable switch on the CPU panel is set to disable or enable.

If the Halt Enable/Disable switch is set to disable, the CPU tries to load and start (bootstrap) an operating system. It locates a 64-Kbyte segment of system memory and copies a primary bootstrap program, called VMB, from the ROM chip into the base address plus 512. The CPU then begins executing VMB, which attempts to bootstrap an operating system from one of the devices in Table 1-1 in the order shown.

Table 1-1:   Console Program Boot Sequence

Controller Type	Controller	Device Name
MSCP (Disk)	RQDX	DUmn[1]
MSCP (Tape)	TQK50/TQK70	MUmn
PROM	MRV11	PRAn
Ethernet adapter	DEQNA/DELQA	XQAn

[1] m = MSCP controller designator (A = first, B = second etc.)
n = unit number

When VMB determines that a controller is present, it searches in order of increasing unit number for a bootable unit with a removable volume, then proceeds to the next controller. If it finds none, it will repeat the search for a nonremovable volume.

If halt is enabled, the console program enters console I/O mode in response to any halt condition, including system power-up. Console I/O mode allows you to control the system by typing commands at the console terminal.

You can direct the system to boot a specific device when in console I/O mode. Use the BOOT command, followed by the device name as listed in Table 1–1. For example, to boot from the TK50 tape drive you would issue the command: BOOT MUA0.

1.1.2 CPU Panel Operation

The CPU panel (accessible only after removing the back cover) contains the following components, as shown in Figure 1–1.

- Three switches

- One LED display

- One external connector for the console terminal serial line unit (SLU)

- One battery backup unit (BBU) for the time-of-year clock and language selection

Figure 1–1: CPU Panel

MLO–1396–87
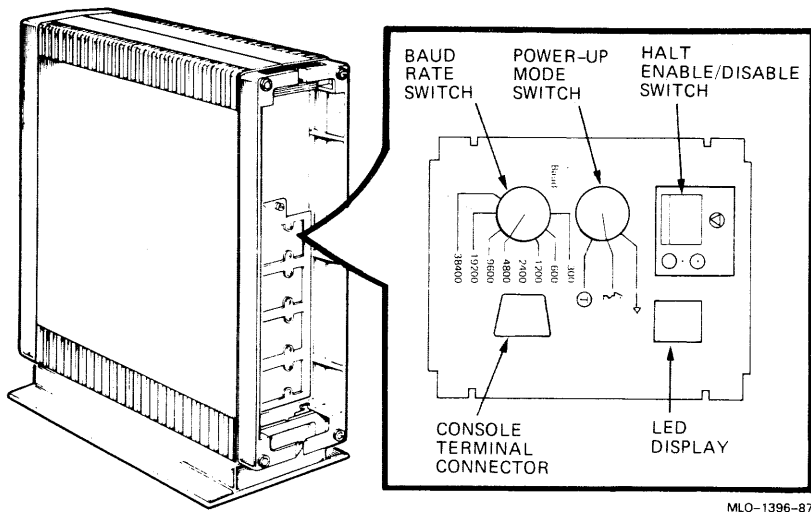
1.1.2.1 Switches

The three switches on the CPU panel (shown in Figure 1–1) operate as follows:

Halt Enable/Disable Switch (2-position toggle)

Switch Position	Function
○	Halt disable (factory setting). On power-up or restart, the system attempts to load software from one of the boot devices at the completion of self-tests.
⊙	Halt enable. On power-up or restart, the system enters console I/O mode at the completion of self-tests.

Power-Up Mode Switch (3-position rotary)

Switch Position	Mode
⟶▷	Run (factory setting). If the console terminal supports Multinational Character Sets (MCS), the user is prompted for language on power-up and restart only if the battery backup has failed. Full start-up diagnostics are run.
⟨	Language inquiry. If the console terminal supports Multinational Character Sets (MCS), the user is prompted for language on every power-up and restart. Full start-up diagnostics are run.
Ⓣ	Test. ROM programs run wraparound serial line unit (SLU) tests.

Baud Rate Switch (8-position rotary)

The baud rate switch has eight possible settings:

- 300

- 600

- 1200

- 2400

- 4800

- 9600

- 19200

- 38400

To change the baud rate, rotate the switch.

1.1.2.2 LED Display

The LED display on the CPU panel displays a countdown sequence as the system runs its self-test diagnostics and bootstrap routine. The countdown begins with F (15 in decimal) to 0. (The same display appears on the console terminal beginning with 7.) See *MicroVAX II 630QY, 630QZ Operation* for examples of successful power-on sequences, and *MicroVAX II 630QY, 630QZ Troubleshooting* for examples of problems you may encounter during power-on.

1.1.2.3 Console Terminal Connector

The console cable is connected to the CPU panel as shown in Figure 1–1.

1.1.2.4 Battery Backup Unit (BBU)

A battery backup unit (BBU), located on the inside of the CPU panel, provides power for maintaining the correct time-of-year and language selection when power to the system is turned off. Both the time-of-year and language selection code are lost if the BBU fails. The BBU provides power for up to ten days if the system power is turned off.

1.2 Base System Specifications

1.2.1 KA630 Processor Specifications

The KA630 is a Q22-bus compatible VAX CPU, based on the MicroVAX chip set.

Central Processor	
Clock rate	20 megahertz
Data path width	32 bits
Number of data types	Hardware: 9
	Software emulated: 7
Number of instructions	Hardware: 245
	Software emulated: 59
General purpose registers	16 (32-bit wide)
Addressing modes	General register: 8
	Program counter: 4
Index:	9
PDP–11 compatibility mode	Emulated in software
Time bases	Time-of-year clock: 1
	Interval timer: 1 (10 milliseconds)
I/O bus interface	One Q22-bus interface with 8096 entry map

Memory Management and Control

Page size	512 bytes
Virtual address space	4 gigabytes
Physical memory space	16 Mbytes
Number of memory modules	2 maximum
On-board memory	1 Mbyte

Performance

Instruction prefetch buffer size	8 bytes
Translation buffer	Direct mapped
Size	8 entry
Associativity	Fully associative
On-board memory cycle time	400 nanoseconds
I/O bus buffer size	
Input	32 bytes
Output	4 bytes
Maximum I/O bandwidth	
DMA Read	2.6 Mbytes/second
DMA Write	3.3 Mbytes/second

Console Serial Line

Interface standards	EIA RS–423–A/CCITT V.10 X.26
	EIA RS–232–C/CCITT V.28
Data format	1 start bit, 8 data bits, 0 parity bits, 1 stop bit
Baud rates	300, 600, 1200, 2400, 4800, 9600, 19200, 38400

Ordering Information

KA630–AA	KA630–AA CPU module only

Ordering Information

CK–KA630–AF	KA630–A cabinet kit

Configuration Information

Form factor	Quad height
Power requirements	+5 Vdc, 6.2
	+12 Vdc, 0.14
Bus loads	2.7 ac
	1.0 dc

Operating System Support

MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	All versions
Self-tests	Yes

Related Documentation

EK-KA630-UG	MicroVAX 630 CPU Module User's Guide

1.2.2 MS630 Memory Options

Three MS630 memory options are available for MicroVAX systems. One or two MS630 modules can be used in the MicroVAX system. The MS630 modules interface with the KA630 CPU through the MicroVAX local memory interconnect, made up of the CD rows of slots 1 through 3 of the backplane and a 50-pin cable.

CAUTION: *MS630–B and –C modules can only be installed in slots 2 or 3 of the BA23 enclosure. Installing them in backplane slots that have Q22-bus signals in the CD rows may damage the MS630 modules as well as other modules in the backplane.*

1.2.2.1 MS630–BA

The MS630–BA memory option is a 2-Mbyte, 36-bit wide array (32-bit data and 4 parity bits) implemented with 256-Kbyte dynamic RAMs in dual in-line packages (DIPs).

Performance	
Cycle time	400 nanoseconds

Ordering Information	
MS630–BA	2-Mbyte module[1]

Configuration Information	
Form factor	Dual height
Power requirements	+5 Vdc, 1.3
	+12 Vdc, 0.0
Bus loads	0.0 ac
	0.0 dc

Operating System Support	
MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support	
MicroVAX Diagnostic Monitor	All versions
Self-tests	Tested by KA630 self-test

[1]50-pin CPU memory interconnect cable included

1.2.2.2 MS630–BB

The MS630–BB memory option is a 4-Mbyte, 36-bit wide array (32-bit data and 4 parity bits) implemented with 256-Kbyte dynamic RAMs in dual in-line packages (DIPs).

Performance	
Cycle time	400 nanoseconds

Ordering Information	
MS630–BB	4-Mbyte module[1]

Configuration Information	
Form factor	Quad height
Power requirements	+5 Vdc, 1.8
	+12 Vdc, 0.0
Bus loads	0.0 ac
	0.0 dc

Operating System Support	
MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support	
MicroVAX Diagnostic Monitor	All versions
Self-tests	Tested by KA630 self-test

[1]50-pin CPU memory interconnect cable included

1.2.2.3 MS630–CA

The MS630–CA memory option is an 8-Mbyte, 36-bit wide array (32-bit data and 4 parity bits) implemented with 256-Kbyte dynamic RAMs in zig-zag in-line packages (ZIPs).

Performance	
Cycle time	400 nanoseconds

Ordering Information	
MS630–CA	8-Mbyte module[1]

Configuration Information	
Form factor	Quad height
Power requirements	+5 Vdc, 3.1 A
	+12 Vdc, 0.0
Bus loads	0.0 ac
	0.0 dc

Operating System Support	
MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support	
MicroVAX Diagnostic Monitor	All versions
Self-tests	Tested by KA630 self-test

[1] 50-pin CPU memory interconnect cable included

Chapter 2

Option Specifications

This chapter describes the options currently available for the MicroVAX II 630QY, 630QZ system. Some of the options described in this chapter are already installed. If you want to add other options to your system, your DIGITAL sales representative can advise you. Chapter 3 offers some guidelines on determining what options you can add to your system.

Options must be properly configured so that the system recognizes them. Each module in a system has a device address, commonly referred to as a Control and Status Register (CSR) address, and an interrupt vector that must be set when the option is installed. Options are usually configured by adjusting switches or jumpers. Your DIGITAL service representative configures the option properly when installing it in your system.

Self-maintenance customers can find information on setting CSR addresses and interrupt vectors in the *MicroVAX Systems Maintenance Guide*.

Descriptions of options in this chapter are grouped as follows:

- Mass storage options

- Communications controllers

- Real-time controllers

- Printer options and their interfaces

Descriptions of options include the following, if applicable:

- Functional information

- Ordering information

- Performance

- Configuration information

- Operating system support

- Diagnostic support

- Related documentation

2.1 Mass Storage Options

The MicroVAX II 630QY, 630QZ system has two types of mass storage options: disk drives and tape drives. Each drive has a controller that directs its activity. The following sections describe each controller and the devices it controls.

2.1.1 Disk Drives and Controllers

The MicroVAX II 630QY, 630QZ system has two controller options that support disk drives.

- RQDX3 controller

- RRD50 controller

2.1.1.1 RQDX3 Controller

The RQDX3 is an intelligent controller with an on-board microprocessor. The controller is used to interface RD50-series fixed-disk drives and RX50 and RX33 diskette drives to the Q22-bus.

The RQDX3 can control a maximum of four drives. However, only one fixed-disk drive can be installed in the 630QY, 630QZ. The RX50, a dual diskette drive, counts as two drives.

Functional Information

Controller protocol	MSCP
Supported drives	RX33, RX50, RD52, RD53, RD54
Drives per controller	4
Drive interconnect	Radial (TTL open collector)
Bad block replacement	Yes
Controllers per system	1 maximum

Ordering Information

RQDX3–BA	RQDX3 controller kit
RQDX3–M	RQDX3 module

Performance Optimizations

Read/Write data transfers	Up to 32-byte block mode DMA
Data buffering	8.5 Kbyte (1 sector)
Command buffering	12 (V1.0), 16 (V2.0)

Configuration Information

Form factor	Dual height
Power requirements	+5 Vdc, 2.48 A (typical)
	+12 Vdc, 0.06 A (typical)
Bus loads	1.9 ac
	0.5 dc

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.06 and later
Self-tests	Yes

Related Documentation

EK–RQDX3–UG	RQDX3 Controller Module User's Guide

RX33 Diskette Drive

The RX33 is a 5.25-inch, double-sided, half-height diskette drive. It has two operating speeds, one for normal and one for high-density diskettes. The RX33 provides full read/write compatibility with an RX50 single-sided drive. The RX33 also provides an industry-standard 1.6-megabyte capacity with the RX33 media installed.

Storage Capacity

Normal density (RX50 diskette)

Per drive	409.6 Kbytes
Per surface	409.6 Kbytes
Per track	5.12 Kbytes

High density (RX33 diskette)

Per drive	1.23 Mbytes
Per surface	614.4 Kbytes
Per track	7.68 Kbytes

Performance

Normal density (RX50 diskette)

Average seek time	95 milliseconds
Average rotational latency	100 milliseconds
Average access time	195 milliseconds
Transfer rate	31 Kbytes/second

High density (RX33 diskette)

Average seek time	92 milliseconds
Average rotational latency	83 milliseconds
Average access time	175 milliseconds
Transfer rate	62 Kbytes/second

Physical Specifications

Height	4.3 cm (1.69 in)
Width	14.6 cm (5.75 in)
Depth	20.32 cm (8 in)
Weight	1.31 kg (2.9 lb)

Ordering Information

RX33–A	RX33 diskette drive
RX33A–AA	RX33–A with cable to distribution panel

Configuration Information

Form factor	Standard 5.25 inch footprint
Power requirements	+5 Vdc, 0.5 A
	+12 Vdc, 0.3 A
Bus loads	0.0 ac
	0.0 dc

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.16 and later
Self-tests	None

Related Documentation

EK–RX33T–TM	RX33 Diskette Drive Technical Description Manual

RX50 Diskette Drive

The RX50 diskette drive is a random access, dual-diskette drive that uses two single-sided 5.25-inch RX50 diskettes.

Storage Capacity

Per diskette	409,600 bytes
Per track (10 sectors)	5,120 bytes
Per sector (1 logical block)	512 bytes

Performance

Average seek time	164 milliseconds
Average rotational latency	100 milliseconds
Average access time	264 milliseconds
Transfer rate	12.8 Kbytes/second

Physical Specifications

Height	8.25 cm (3.25 in)
Width	14.60 cm (5.75 in)
Depth	21.60 cm (8.50 in)
Weight	2.80 kg (4.18 lb)

Ordering Information

RX50A–AA	RX50 drive and cabinet kit
RX50–A	RX50 diskette drive

Configuration Information

Form factor	Standard 5.25 inch footprint
Power requirements	+5 Vdc, 0.85 A
	+12 Vdc, 1.8 A
Bus loads	0.0 ac
	0.0 dc

Operating System Support	
MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support	
MicroVAX Diagnostic Monitor	All revisions
Self-tests	None

Related Documentation	
EK–LEP01–OM	RX50–D, –R Dual Flexible Disk Drive Subsystem Owner's Manual

RD52 Disk Drive

The RD52 disk drive is a fixed-disk drive with a formatted storage capacity of 31 Mbytes.

Storage Capacity	
Total capacity	33,554,532 bytes[1]
User capacity	30,956,760 bytes[1]
User capacity (blocks)	60,480 blocks[1]

Performance	
Average seek time	49.00 milliseconds
Average rotational latency	8.33 milliseconds
Average access time	57.33 milliseconds
Transfer rate	184.32 Kbytes/second[1]

[1]When operating with the RQDX3 controller

Physical Specifications

Height	8.25 cm (3.25 in)
Width	14.60 cm (5.75 in)
Depth	20.32 cm (8.00 in)
Weight	3.18 kg (7.00 lb)

Ordering Information

RD52A–AA	RD52 disk drive kit

Configuration Information

Form factor	Standard 5.25-in footprint
Power requirements	+5 Vdc, 1.3 A
	+12 Vdc, 1.34 A
Bus loads	0.0 ac
	0.0 dc

Operating System Support

MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.02 and later
Self-tests	None

Related Documentation

EK–LEP04–OM	RD52–D, –R Fixed Disk Drive Subsystem Owner's Manual

RD53 Disk Drive

The RD53 disk drive is a fixed-disk drive with a formatted storage capacity of 71 Mbytes.

Storage Capacity

Total capacity	71,000,064 bytes[1]
User capacity	70,987,776 bytes[1]
User capacity (blocks)	138,672 blocks[1]

Performance

Average seek time	30.00 milliseconds
Average rotational latency	8.33 milliseconds
Average access time	38.33 milliseconds
Transfer rate	552.96 Kbytes/second[1]

Physical Specifications

Height	8.25 cm (3.25 in)
Width	14.60 cm (5.75 in)
Depth	20.32 cm (8.00 in)
Weight	3.18 kg (7 lb)

Ordering Information

RD53A–AA	RD53 disk drive kit

Configuration Information

Form factor	Standard 5.25-in footprint
Power requirements	+5 Vdc, 0.9 A
	+12 Vdc, 2.5 A
Bus loads	0.0 ac
	0.0 dc

[1]When operating with the RQDX3 controller

MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.02 and later
Self-tests	None

Related Documentation

EK–LEP06–OM	RD53–D Fixed Disk Drive Subsystem Owner's Manual

RD54 Disk Drive

The RD54 disk drive is a fixed-disk drive with a formatted storage capacity of 159 Mbytes.

Storage Capacity

Total capacity	191,394,000 bytes
User capacity	159,334,000 bytes
User capacity (blocks)	311,200 blocks

Performance

Average seek time	30.00 milliseconds
Average rotational latency	8.33 milliseconds
Average access time	38.33 milliseconds
Transfer rate	552.96 Kbytes/second

Physical Specifications

Height	8.25 cm (3.38 in)
Width	14.60 cm (5.75 in)
Depth	20.32 cm (8.20 in)
Weight	2.8 kg (6.3 lb)

Ordering Information

RD54A–AA	RD54 disk drive kit

Configuration Information

Form factor	Standard 5.25-in footprint
Power requirements	+5 Vdc, 0.9 A
	+12 Vdc, 4.7 A
Bus loads	0.0 ac
	0.0 dc

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 1.2 and later
VAXELN	Version 2.1 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.14 and later
Self-tests	None

Related Documentation

EK–LEP07–OM	RD54 Fixed Disk Drive Subsystem Owner's Manual
EK–RD54A–TM	RD54 Technical Manual

2.1.1.2 RRD50 Disk Subsystem

The RRD50 subsystem is a read-only storage device that reads data stored on 11.75-cm (4.7-in) optical disks. One optical disk stores 600 Mbytes of data. The RRD50 subsystem includes the RRD50 controller and the RRD50 drive.

Functional Information	
Controller protocol	MSCP
Drives per controller	2
Drive interconnect	Direct
Storage capacity	600 Mbytes

Ordering Information	
RRD50–A2	RRD optical disk drive subsystem (includes disk drive, controller, and cables) for 100/120 V
RRD50–A3	RRD optical disk drive subsystem (includes disk drive, controller, and cables) for 220/240 V

Performance	
Average access time	1.5 second
Transfer rate	150 Kbyte/second
Read data transfer	Up to 16-byte block mode DMA

Configuration Information	
Form factor	Dual height
Power requirements	+5 Vdc, 3.0 A
	+12 Vdc, 0.0 A
Bus loads	0.5 ac
	0.5 dc

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Not supported as of Version 1.1
VAXELN	Not supported as of Version 2.0

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.08 and later
Self-tests	Yes

Related Documentation

EK–RRD50–UG	RRD50 Digital Disk Drive User's Guide
EK–RRD50–PS	RRD Subsystem Pocket Service Guide

2.1.2 Tape Drives and Controllers

The MicroVAX II 630QY, 630QZ system has three controllers that support tape drives. The supported drive specifications are listed after each controller.

- TQK50 controller

- TQK70 controller

- TSV05 controller

2.1.2.1 TQK50 Controller

The TQK50 controller module provides the interface between the TK50 tape drive and the Q22-bus. The controller uses the Tape Mass Storage Control Protocol (TMSCP).

Functional Information	
Controller protocol	TMSCP
Supported drive	TK50
Drives per controller	1
Drive interconnect	Direct

Ordering Information	
TQK50–AA	TQK50 controller subsystem

Performance	
Data throughput rate	45 Kbytes/second
Read/Write data transfers	Up to 8-byte burst mode DMA

Configuration Information	
Form factor	Dual height
Power requirements	+5 Vdc, 2.9 A
	+12 Vdc, 0.0 A
Bus loads	2.8 ac
	0.5 dc

Operating System Support

MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	Yes

TK50 Tape Drive

The TK50 is a streaming tape drive subsystem that can store up to 95 Mbytes on a tape cartridge for backup data storage.

Functional Information

Recording media	Magnetic tape
Tape dimensions	1.27 cm (0.5 in) wide, 182.9 m (600 ft) long
Mode of operation	Streaming
Read/Write method	Serpentine
Recording density	1710 bits/cm (6667 bits/inch)
Number of tracks	22
Storage capacity	94.5 Mbytes formatted

Physical Specifications

Height	8.25 cm (3.25 in)
Width	14.60 cm (5.75 in)
Depth	21.44 cm (8.44 in)
Weight	2.27 kg (5 lb)

Ordering Information

TQK50–AA	TQK50 controller subsystem
TK50–AA	TK50 tape drive and blank cartridge

Performance

Tape start time	300 milliseconds maximum
Tape speed	2925 cm (75 in)/second
Streaming data rate	62 Kbytes/second
Access time (from insertion of new tape)	35 minutes maximum

Configuration Information

Form factor	Standard 5.25-inch footprint
Power requirements	+5 Vdc, 1.35 A
	+12 Vdc, 2.4 A
Bus loads	0.0 ac
	0.0 dc

Operating System Support

MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	Yes

Related Documentation

EK–LEP05–OM	TK50 Tape Drive Subsystem Owner's Manual

Related Documentation

EK–OTK50–TM	TK50 Tape Drive Subsystem Technical Manual

2.1.2.2 TQK70 Controller

The TQK70 controller module provides the interface between the TK70 tape drive and the Q22-bus.

Functional Information

Controller protocol	TMSCP
Supported drive	TK70
Drives per controller	1
Drive interconnect	Direct
Controllers per system	1 maximum

Ordering Information

TQK70–AA	TQK70 controller
TK70S–AA	TK70 tape drive subsystem: includes TQK70 controller and TK70–AA tape drive

Performance

Data throughput rate	80 Kbytes/second
Read/Write data transfers	Up to 16-word burst mode DMA, truncated to 8-word burst mode if another device is requesting the bus.
Buffer size	64 Kbytes

Configuration Information

Form factor	Dual height
Power requirements	+5 Vdc, 3.5 A
	+12 Vdc, 0.0 A

Configuration Information

Bus loads	4.3 ac
	0.5 dc

Operating System Support

MicroVMS	Version 4.6 and later
ULTRIX–32	Version 2.2 and later
VAXELN	Not supported as of Version 2.4

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 2.11 and later
Self-tests	Yes

TK70 Tape Drive

The TK70 is a streaming tape drive subsystem that can store up to 296 Mbytes on a tape cartridge for backup data storage. The TK70 can read data from tape cartridges recorded by a TK50 drive, but it cannot write data to cartridges recorded by a TK50 drive.

Functional Information

Recording media	Magnetic tape
Tape dimensions	1.27 cm (0.5 in) wide, 182.9 m (600 ft) long
Mode of operation	Streaming
Recording method	Serpentine
Recording density	10,000 bits/inch
Number of tracks	48
Storage capacity	296 Mbytes formatted

Physical Specifications

Height	8.25 cm (3.25 in)
Width	14.60 cm (5.70 in)
Depth	21.44 cm (8.44 in)
Weight	2.27 kg (5.0 lb)

Ordering Information

TK70–AA	TK70 tape drive
TK70S–AA	TK70 tape drive subsystem: includes TQK70 controller and TK70–AA tape drive

Performance

Tape start time	325 milliseconds maximum
Tape stop time	200 milliseconds maximum
Tape speed	100 in/second
Streaming data rate	125 Kbytes/second
Access time (from insertion of tape)	
TK50 mode (read only)	35 minutes maximum
TK70 mode	60 minutes maximum

Configuration Information

Form factor	Standard 5.25-inch footprint
Power requirements	+5 Vdc, 1.3 A
	+12 Vdc, 2.4 A
Bus loads	0.0 ac
	0.0 dc

Operating System Support

MicroVMS	Version 4.6 and later
ULTRIX–32	Version 2.2 and later
VAXELN	Not supported as of Version 2.4

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 2.11 and later
Self-tests	Yes

Related Documentation

EK–OTK70–OM	TK70 Tape Drive Subsystem Owner's Manual
EK–OTK70–TM	TK70 Tape Drive Subsystem Technical Manual
EK–OTK70–SM	TK70 Tape Drive Subsystem Service Manual

2.1.2.3 TSV05 Controller

The TSV05 tape drive controller is used to interface the TS05 tape drive.

Functional Information

Controller protocol	Controller unique
Supported drive	TS05
Drives per controller	1
Drive interconnect	Direct

Ordering Information

TSV05	TSV05 controller
TSV05–BA/BB	TSV05 tape drive system mounted in a 106-cm (41.7-inch) H9642-type cabinet with controller module.

Performance

Buffer size	3.5 Kbytes

Configuration Information

Form factor	Quad height
Power requirements	+5 Vdc, 6.5 A (typical)
	+12 Vdc, 0.0 A (typical)
Bus loads	3.0 ac
	1.0 dc

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 1.1 and later
VAXELN	None

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.06 and later
Self-tests	None

Related Documentation

EK–TSV05–UG	TSV05 Tape Transport System User's Guide

TS05 Tape Drive

The TS05 is a one-half-inch reel-to-reel streaming tape drive. The drive has a maximum capacity of 40 Mbytes, using the industry-standard PE format.

Functional Information

Recording media	Magnetic tape
Tape dimensions	1.27 cm (0.5 in) wide, 731.5 m (2400 ft) long
Mode of operation	Streaming
Recording method	Phase Encoded (PE)
Recording density	410 bits/cm (1600 bits/inch)
Number of tracks	9
Storage capacity	40 Mbytes formatted

Ordering Information

TSV05–BA/BB	TSV05 tape drive system mounted in a 106-cm (41.7-inch) H9642-type cabinet with controller module.

Performance

Handling	Bidirectional reel-to-reel with compliance arm
Tape velocity	64 or 254 cm/sec (25 or 100 in/sec)
Maximum data transfer rate	40 or 160 Kbytes/second
Rewind time (731 m (2400 ft tape) on 26.7 cm (10.5 in) reel)	2.8 minutes

Physical Specifications

Height	22.2 cm (8.75 in)
Width	43 cm (17 in)
Depth	62 cm (24.5 in)
Weight	36 kg (80 lb)

Configuration Information	
Form factor	10.5-in high, full rack width

Operating System Support	
MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 1.1 and later
VAXELN	None

Diagnostic Support	
MicroVAX Diagnostic Monitor	Revision 2.11 and later
Self-tests	Yes

Related Documentation	
EK–TSV05–UG	TSV05 Tape Transport System User's Guide
EK–TSV05–TM	TSV05 Tape Transport Subsystem Technical Manual

2.2 Communications Options

Communications options supported by MicroVAX II 630 QY,QZ systems include asynchronous serial controllers, synchronous serial controllers, and network controllers.

2.2.1 Asynchronous Serial Controllers

Asynchronous serial controllers provide low-speed connections between peripheral devices and the system. Asynchronous communication between the system and the peripheral depends on recognition of a pattern of start and stop bits, not on a time interval.

2.2.1.1 DHV11 Asynchronous Multiplexer

The DHV11 is an asynchronous multiplexer that supports eight serial lines for data communication with full modem control.

Functional Information	
Supported line interfaces	EIA RS–423–A/CCITT V.28
	EIA RS–232–C/CCITT V.24
Split speed operation	All lines
Flow control (XON/XOFF)	All lines
Operating mode	Full and half-duplex
Supported data formats	16 programmable formats (each with 1 start bit)
	• 5, 6, 7, or 8 data bits, 0 or 1 parity bits, and 1 stop bit
	• 5 data bits, 0 or 1 parity bits, and 1.5 stop bits
	• 6, 7, or 8 data bits, 0 or 1 parity bits, and 2 stop bits
	Parity, if enabled, can be either odd or even.
Modem control	Full
Supported modems	DIGITAL: DF01, DF02, DF03, DF112
	Bell: 103, 113, 212

Ordering Information

DHV11–M	DHV11 module only
CK–DHV11–AB	DHV11 cabinet kit. Includes two type B filter connectors and the appropriate pair of cables.
External cable	BC22K full modem support
	BC22E limited modem support
	BC22D VT series terminals

Performance

Transmit data transfers	Single-character programmed transfers or up to 16-character block mode DMA transfers
Receive data transfers	Single-character programmed transfers
Transmit buffer size	One character for programmed transfers
	64-character FIFO for DMA transfers
Receive buffer size	256-character FIFO
Supported baud rates	16 programmable baud rates: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 19200, 38400[1]
Throughput at maximum baud rate:	
Transmit	1000 characters/second in single-character transfer mode
	2000 characters/second in DMA mode
Receive	4000 characters/second

Configuration Information

Form factor	Quad height
Power requirements	+5 Vdc, 4.5 A (typical)
	+12 Vdc, 0.55 A (typical)

[1] 38400 baud rate is not supported by DIGITAL operating systems.

Configuration Information

Bus loads	2.9 ac
	1.0 dc
Insert panels	2 type B
Insert panel connectors	4 subminiature 25-pin male D-type connectors

Operating System Support

MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	All revisions
Self-tests	Yes

Related Documentation

EK–DHV11–TM	DHV11 Technical Manual

2.2.1.2 DHQ11 Asynchronous Multiplexer

The DHQ11 is an asynchronous multiplexer that supports eight serial lines for data communication with full modem control with the RS–232 interface and no modem control with the RS–423 interface.

Functional Information

Supported line interfaces	EIA RS–423–A/CCITT V.10
	EIA RS–232–D/CCITT V.28
Split speed operation	All lines
Flow control (XON/XOFF)	All lines

Functional Information

Supported data formats	16 programmable formats (each with 1 start bit)
	• 5, 6, 7, or 8 data bits, 0 or 1 parity bits, and 1 stop bit
	• 5 data bits, 0 or 1 parity bits, and 1.5 stop bits
	• 6, 7, or 8 data bits, 0 or 1 parity bits, and 2 stop bits
	Parity, if enabled, can be either odd or even.
Modem control	Full (RS–232) or none (RS–423)
Supported modems	DIGITAL: DF01, DF02, DF03, DF112
	Bell: 103, 113, 203c, 202d, 212

Ordering Information

DHQ11–M	DHQ11 module only
CK–DHQ11–AB	DHQ11 cabinet kit for EIA RS–232–D interface. Includes two type-B distribution panels.
CK–DHQ11–WB	DHQ11 cabinet kit for EIA RS–423–A interface. Includes one type-B distribution panel that provides EIA RS–423–A conversion.

Performance

Transmit data transfers	Single character programmed transfers or up to 64-character block mode DMA transfers
Receive data transfers	Single character programmed transfers
Transmit buffer size	One character for programmed transfers
	64-character FIFO for DMA transfers
Receive buffer size	256-character FIFO

Performance

Supported baud rates	16 programmable baud rates: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 19200, 38400[1]
Throughput at maximum baud rate:	
Transmit	1000 characters/second in single-character transfer mode
	2000 characters/second in DMA mode
Receive	4000 characters/second
5 data bits, 0 parity bits, 1 stop bit	87,771 characters/second (all lines)
7 data bits, 1 parity bit, 1 stop bit	61,440 characters/second (all lines)

Configuration Information

Form factor	Dual height
Power requirements	+5 Vdc, 1.4 A for EIA RS–232–D (typical)
	+5 Vdc, 1.9 A for EIA RS–423–A (typical)
	+12 Vdc, 0.23 A (typical)
Bus loads	3.2 ac
	0.5 dc
Insert panels	2 type B
Insert panel connectors	EIA RS–232–D: 4 subminiature D-type female connectors
	EIA RS–423–A: 8 modified modular jacks (MMJs)

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 2.11 and later
Self-tests	Yes

[1]38400 baud rate is not supported by DIGITAL operating systems.

Related Documentation

EK–DHQ11–TM	DHQ11 Technical Manual
EK–DHQ11–UG	DHQ11 User Guide

2.2.1.3 DZV11 Asynchronous Multiplexer

The DZV11 is an asynchronous multiplexer that supports four serial lines for data communication with limited modem control.

Functional Information

Supported line interfaces	EIA RS–232–C/CCITT V.28
Split speed operation	All lines
Flow control (XON/XOFF)	All lines
Supported data formats	18 programmable formats (each with 1 start bit)
	• 5, 6, 7, or 8 data bits, 0 or 1 parity bits, and 1 stop bit
	• 5 data bits, 0 or 1 parity bits, and 1 or 1.5 stop bits
	• 6, 7, or 8 data bits, 0 or 1 parity bits, and 2 stop bits
	Parity, if enabled, can be either odd or even.
Modem control	Auto-answer with full-duplex modems
Support modems	Bell 103, 113, 212

Ordering Information

DZV11–M	DZV11 module only
CK–DZV11–DB	DZV11 cabinet kit. Includes one type B filter connector and a 36-in internal cable.

Ordering Information

External cable	BC22D for VT-series terminals
	BC22E for DF100–200 series asynchronous modems

Performance

Transmit data transfers	Single-character programmed transfers
Receive data transfers	Single-character programmed transfers
Transmit buffer size	One character for programmed transfers
Receive buffer size	256-character FIFO
Supported baud rates	15 programmable baud rates: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600
Throughput at maximum baud rate	10,970 characters/second

Configuration Information

Form factor	Quad height
Power requirements	+5 Vdc, 1.2 A (typical)
	+12 Vdc, 0.39 A (typical)
Bus loads	3.9 ac
	1.0 dc
Insert panels	1 type B
Insert panel connectors	4 subminiature 25-pin male D-type

Operating System Support

MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	All revisions
Self-tests	Yes

Related Documentation

EK–DZV11–TM	DZV11 Asynchronous Multiplexer Technical Manual
EK–DZV11–UG	DZV11 Asynchronous Multiplexer User's Guide

2.2.1.4 DZQ11 Asynchronous Multiplexer

The DZQ11 is an asynchronous multiplexer that supports four serial lines for data communication with limited modem control. The DZQ11 permits dial-up (autoanswer) operation with modems using full-duplex operations.

Functional Information

Supported line interfaces	EIA RS–423–C/CCITT V.24
	EIA RS–232–C/CCITT V.28
Split speed operation	No
Flow control (XON/XOFF)	All lines
Supported data formats	18 programmable formats (each with 1 start bit)
	• 5, 6, 7, or 8 data bits, 0 or 1 parity bits, and 1 stop bit
	• 5 data bits, 0 or 1 parity bits, 1 or 1.5 stop bits
	• 6, 7, or 8 data bits, 0 or 1 parity bits, and 2 stop bits
	Parity, if enabled, can be either odd or even.
Modem control	Limited
Supported modems	DIGITAL: DF01, DF02, DF03, DF112
	Bell: 103, 113, 212

Ordering Information

DZQ11–M	DZQ11 module only
CK–DZQ11–DB	DZQ11 cabinet kit. Includes one type B filter connector and a 36-in internal cable.
External cable	BC22D for VT series terminals
	BC22E for DF100–200 series asynchronous modems

Performance

Transmit data transfers	Single-byte programmed transfers
Receive data transfers	Single-byte programmed transfers
Transmit buffer size	One byte for programmed transfers
Receive buffer size	64-character FIFO
Supported baud rates	15 programmable baud rates: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 7200, 9600, 19200
Throughput at maximum baud rate:	
5 data bits, 0 parity bits, 1 stop bit	10,970 characters/second (all lines)

Configuration Information

Form factor	Dual height
Power requirements	+5 Vdc, 1.0 A (typical)
	+12 Vdc, 0.36 A (typical)
Bus loads	1.0 ac
	1.0 dc
Insert panels	1 type B
Insert panel connectors	4 subminiature 25-pin male D-type connectors

Operating System Support	
MicroVMS	Version 4.1m and later
ULTRIX–32m	Version 1.1 and later
VAXELN	Version 2.0 and later

Diagnostic Support	
MicroVAX Diagnostic Monitor	All revisions
Self-tests	Yes

Related Documentation	
EK–DZQ11–UG	DZQ11 Asynchronous Multiplexer User's Guide
EK–DZQ11–TM	DZQ11 Asynchronous Multiplexer Technical Manual

2.2.1.5 DLVJ1 Asynchronous Interface

The DLVJ1 is an asynchronous interface that connects up to four separate lines to the Q-bus. The DLVJ1 was previously known as the DLV11–J.

Functional Information	
Supported line interfaces	EIA RS–423–A/CCITT V.10
	EIA RS–422
	EIA RS–232–C/CCITT V.28
Split speed operation	No
Flow control (XON/XOFF)	All lines
Supported data formats	Selected by installing and removing jumpers. Factory configuration is 8 data bits, 1 start bit, and 1 stop bit.
	• 7 or 8 data bits, 1 or 2 parity bits, and 1 or 2 stop bits
	Parity, if enabled, can be either odd or even.

Functional Information

Modem control	Limited

Ordering Information

DLVJ1–M	DLVJ1 module only
CK–DLVJ1–LB	DLVJ1 cabinet kit for EIA RS–423–A/CCITT V.10, EIA RS–232–C/CCITT V.28. Includes one type B filter connector and a 36-in cable.
CK–DLVJ1–EB	DLVJ1 cabinet kit for EIA RS–422.
External cables	BC22D for VT series terminal
	BC22E for DF100–200 series asynchronous modems

Performance

Transmit data transfers	Single-byte programmed transfers
Receive data transfers	Single-byte programmed transfers
Transmit buffer size	1 byte
Receive buffer size	1 byte
Supported baud rates	9 jumper-selectable baud rates: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.[1] The factory configuration is 9600 baud for Channels 0, 1, and 2 and 300 baud for Channel 3.

Configuration Information

Form factor	Dual height
Power requirements	+5 Vdc, 1.25 A (typical)
	+12 Vdc, 0.25 A (typical)
Bus loads	1.0 ac
	1.0 dc

[1] 38400 baud rate is not supported by DIGITAL operating systems.

Configuration Information	
Insert panels	1 type B
Insert panel connectors	4 subminiature 25-pin male D-type connectors

Operating System Support	
MicroVMS	None
ULTRIX–32m	None
VAXELN	Version 2.0 and later

Diagnostic Support	
MicroVAX Diagnostic Monitor	All revisions
Self-tests	No

Related Documentation	
EK–DLVJ1–UG	DLV11–J User's Guide

2.2.1.6 KMV1A Programmable Communications Controller

The KMV1A is a medium-speed, programmable data communications interface for Q-bus systems. The KMV1A can be programmed to operate in asynchronous or synchronous mode. The KMV1A was formerly known as the KMV11.

Functional Information	
Supported line interfaces	EIA RS–232–C/V28
	EIA RS–422–A/V11
	EIA RS–423–A/V10
Supported protocol	Synchronous (bit-oriented or byte-oriented)
Split speed	Yes
Modem support	Full

Ordering Information

KMV1A–M	KMV1A module only
CK–KMV1A–AB	Cabinet kit for EIA RS–232–C/V28 interface
CK–KMV1A–EB	Cabinet kit for EIA RS–422–A/V11 interface
CK–KMV1A–FB	Cabinet kit for EIA RS–423–A/V10 interface

Performance

Transmit buffer size	1032 bytes
Supported baud rates	1200, 2400, 4800, 9600, 19200

Configuration Information

Form factor	Quad height
Power requirements	+5 Vdc, 2.6 A
	+12 Vdc, 0.2 A
Bus loads	3.0 ac
	1.0 dc
Insert panels	1 type B

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	None
VAXELN	None

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.08 and later
Self-tests	Yes

Related Documentation

EK–KMV11–TM	KMV11 Programmable Communications Controller Technical Manual
EK–KMV11–UG	KMV11 Programmable Communications Controller User's Guide

2.2.2 Synchronous Controllers

Synchronous serial controllers provide high-speed connections between systems. Communication between synchronous devices depends on time intervals that are synchronized before transmission of data begins.

2.2.2.1 DMV11 Synchronous Controller

The DMV11 is an intelligent synchronous communications controller that provides high-speed communications for Q-bus systems in distributed networks. The DMV11 is available in four system options, each with a different interface capability. The option you choose depends on the interface requirements of your system.

Functional Information	
Supported line interfaces	RS-232–C/CCITT V.28
	CCITT V.35/DDS
	Integral modem
	EIA RS–423–A/CCITT V.24
Supported protocol	Digital Data Communications Message Protocol (DDCMP) in either point-to-point or multipoint mode.
Operating mode	Full or half-duplex
Modem support	Full or limited
Supported modems	All DIGITAL modems; Bell 200 series

Ordering Information	
EIA RS–232–C/CCITT V.28 interface	
DMV11–M	Module only
BC22E	External cable for limited modem support
BC22F	External cable for full modem support
CK–DMV11–AB	Cabinet kit

Ordering Information

CCITT V.35/DDS interface

DMV11–M	Module only
CK–DMV11–BB	Cabinet kit
BC17E–25	25-ft external modem cable

Integral modem interface

DMV11–N	Module only
CK–DMV11–CB	Cabinet kit

EIA RS–423–A/CCITT V.24 interface

DMV11–M	Module only
CK–DMV11–FB	Cabinet kit
BC55D	External cable

Performance

Transmit/Receive data transfers	Single DMA transfers
Transmit/Receive buffer size	784 bytes

Data rates

EIA RS–232–C	Up to 19.2 Kbits/second
CCITT V.35	Up to 56 Kbits/second
Integral modem	56 Kbits/second only
EIA RS–423–A	Up to 56 Kbits/second

Configuration Information

Form factor	Quad height

Power requirements

DMV11–M	+5 Vdc, 3.4 A (typical)
	+12 Vdc, 0.4 A (typical)
DMV11–N	+5 Vdc, 3.4 A (typical)
	+12 Vdc, 0.26 A (typical)

Configuration Information

Bus loads	2.0 ac
	1.0 dc
Insert panels	1 type A (–BB and –FB cabinet kits)
	1 type B (–AB and –CB cabinets)

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	None
VAXELN	None

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.02 and later
Self-tests	None

Related Documentation

EK–DMV11–UG	DMV11 Synchronous Controller User's Guide
EK–DMV11–TM	DMV11 Synchronous Controller Technical Manual

2.2.2.2 DPV11 Synchronous Interface

The DPV11 connects the Q-bus to a modem, using a synchronous serial line. EIA compatibility is provided for use in local communications only (timing and data leads only). The DPV11 is intended for character-oriented protocols, such as Digital Data Communications Message Protocol (DDCMP), or communication protocols that are bit-oriented, such as Synchronous Data Line Control (SDLC).

Functional Information

Supported line interfaces	EIA RS–232–C/CCITT V.28
	EIA RS–423–A
	EIA RS–422–A
Supported protocols	Digital Data Communications Message Protocol (DDCMP)
	BISYNC
	SDLC
Operating mode	Full or half-duplex
Character size	Program selectable (5–8 bits with character-oriented protocols and 108 bits with bit-oriented protocols)
Modem support	Limited
Supported modems	All DIGITAL modems; Bell 200 series

Ordering Information

DPV11–M	Module only
CK–DPV11–AB	DPV11 cabinet kit

Performance

Transmit/Receive data transfers	Single-byte programmed transfer
Transmit buffer size	2 bytes
Receive buffer size	2 bytes
Data rate	56 Kbits/second

Configuration Information

Form factor	Dual height
Power requirements	+5 Vdc, 1.2 A (typical)
	+12 Vdc, 0.3 A (typical)

Configuration Information

Bus loads	1.0 ac
	1.0 dc
Insert panels	1 type A
Insert panel connectors	40-pin Berg

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	None
VAXELN	None

Diagnostic Support

MicroVAX Diagnostic Monitor	All revisions
Self-tests	No

Related Documentation

EK–DPV11–UG	DPV11 Synchronous Interface User's Guide
EK–DPV11–TM	DPV11 Synchronous Interface Technical Manual

2.2.3 Network Controllers

Network controllers connect your system to an Ethernet network. With a network connection and appropriate DECnet software, you can use all network services.

2.2.3.1 DELQA Ethernet Controller

The DELQA network controller provides a high-speed synchronous connection between a Q-bus system and a local area network (LAN) based on Ethernet. The DELQA has all the functions of the DEQNA, plus Maintenance Operation Protocol (MOP) functions.

Functional Information	
Supported protocols	Ethernet
	MOP

Ordering Information	
DELQA–M	Module only
CK–DELQA–YB	DELQA cabinet kit

Performance	
Transmit/Receive data transfers	Up to 32-byte block mode DMA
Transmit data transfers	2-Kbyte FIFO for DMA transfers
Receive data transfers	4-Kbyte FIFO for DMA transfers
Throughput at maximum rate	10 megabits/second

Configuration Information	
Form factor	Dual height
Power requirements	+5 Vdc, 1.50 A
	+12 Vdc, 0.50 A
Bus loads	3.3 ac
	0.5 dc
Insert panels	1 type A

Configuration Information

Insert panel connectors	1 10-pin D-type

Operating System Support

MicroVMS	Version 4.6 and later
ULTRIX–32	Version 2.2 and later
VAXELN	Not supported as of Version 2.4

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 2.11
Self-tests	Yes

Related Documentation

EK–DELQA–UG	DELQA Ethernet User's Guide

2.2.3.2 DEQNA Ethernet Interface

The DEQNA is used to connect a Q-bus system to a local area network (LAN) based on Ethernet. Ethernet is a communications system that allows data exchange between computers within a moderate distance (2.8 km/1.74 mi).

Functional Information

Supported protocol	Ethernet

Ordering Information

DEQNA–M	Module only
CK–DEQNA–KB	Cabinet kit
BNE3A–D	External cable

Performance

Transmit/Receive data transfers	Up to 32-byte block mode DMA
Transmit data transfers	2-Kbyte FIFO for DMA transfers
Receive data transfers	4-Kbyte FIFO for DMA transfers
Throughput at maximum rate	10 megabits/second

Configuration Information

Form factor	Dual height
Power requirements	+5 Vdc, 3.5 A
	+12 Vdc, 0.5 A
Bus loads	2.2 ac
	0.5 dc
Insert panels	1 type A
Insert panel connectors	1 9-pin D-type

Operating System Support

MicroVMS	Version 4.1m or later
ULTRIX–32m	Version 2.0 or later
VAXELN	Version 1.0 or later

Diagnostic Support

| MicroVAX Diagnostic Monitor | All revisions |
| Self-tests | Yes |

Related Documentation

| EK–DEQNA–UG | DEQNA Ethernet User's Guide |

2.3 Real-Time Controllers

Real-time controllers interface devices that monitor processes, for example, laboratory equipment or manufacturing equipment. Real-time controllers are typically parallel devices that transmit more than one bit of information simultaneously.

2.3.1 DRQ3B Parallel Interface

The DRQ3B is a high-speed parallel interface that provides two independent, 16-bit, unidirectional data channels.

Functional Information	
Two unidirectional channels	Each 512-word FIFO
Interrupt vectors	One for both DMA channels
	One for all other interrupts

Ordering Information	
DRQ3B–AA	DRQ3B module only
CK–DRQ3B–KA	Cabinet kit
Cables	Used to connect the DRQ3B to a user device or to another DRQ3B. Order two cables for each DRQ3B module.
	• BC19T-25: 7.6 m (25 ft)
	• BC19T-50: 15.2 m (50 ft)

Configuration Information	
Form factor	Quad height
Power requirements	+ 5 Vdc, 4.5 A
	+12 Vdc, 0.0 A
Bus loads	3.2 ac
	0.5 dc

Configuration Information	
Insert panels	2 type A
Insert panel connectors	2 50-pin female IEEE connectors
I/O port data transceivers	16 mA, sink 64 mA

Performance	
Throughput rates	Flyby burst: 500 kilowords
	Block mode: 1.2 megawords
	Height speed: 1.4 megawords

Operating System Support	
MicroVMS	Version 4.6 or later
ULTRIX–32	None
VAXELN	None

Diagnostic Support	
MicroVAX Diagnostic Monitor	Revision 2.11 and later
Self-tests	Yes

Related Documentation	
EK–047AA–UG	DRQ3B Parallel DMA Input/Output Module User's Guide

2.3.2 DRV11–J Parallel Interface

The DRV11–J is a high-density parallel interface with four bidirectional, 16-bit, parallel ports.

Functional Information

Number of lines	Total: 80
	16 input/output data lines with individual interrupts
	48 input/output data lines
	8 input control lines
	8 output control lines
Transmit/Receive data transfers	1- or 2-byte programmed transfers
Buffer size	2 bytes

Ordering Information

DRV11-J	Module only
CK–DRV1J–KA	Cabinet kit

Performance

Line characteristics	Data line outputs (tri-state)
	$V(OL) = 0.5$ V @ $I(OL) = 8$ mA
	$V(OL) = 0.4$ V @ $I(OL) = 4$ mA
	$V(OH) = 2.4$ V @ $I(OL) = -2.6$ mA
	Data line inputs
	$I(IL) = -0.2$ mA @ $V(IL) = 0.4$ V
	$I(IH) = 20$ μA @ $V(IH) = 2.7$ V
	Control line outputs (tri-state)
	$V(OL) = 0.55$ V @ $I(OL) = 64$ mA
	$V(OH) = 2.4$ V @ $I(OH) = -15$ mA
	Control line inputs
	Termination $= 120$ Ω
	$I(IL) = -27$ mA @ $V(IL) = 0.5$ V
	$I(IH) = 80$ μA @ $V(IH) = 2.7$ V

Configuration Information

Form factor	Dual height
Power requirements	+5 Vdc, 1.6 A (typical)
	+12 Vdc, 0.0 A
Bus loads	2.0 ac
	1.0 dc
Insert panels	2 type A

Operating System Support

MicroVMS	None as of Version 4.2
ULTRIX–32m	None as of Version 1.2
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	Yes

Related Documentation

EK–DRV1J–UG	DRV11–J Interface User's Guide

2.3.3 DRV11–WA Parallel Interface

The DRV11–WA is a general-purpose, parallel interface with one 10-bit input port and one 16-bit output port. The DRV11–WA supports DMA.

Functional Information

Number of lines	Total: 50
	16 data output lines
	16 data input lines
	3 user-definable input status lines
	3-user-definable output control lines
	8 input control lines
	4 output control lines
Line characteristics	
Input data lines	1 TTL unit load each
Input control lines	1 TTL unit load each
Output data lines	10 TTL unit loads each
Output control lines	10 TTL unit loads each
Logic levels	High = logic 1
	Low = logic 0

Ordering Information

DRV11–WA	Module only
CK–DRV1B–KA	DRV11–WA cabinet kit

Performance

Transfer mode	Up to 2-byte programmed transfers
	Up to 8-byte burst mode DMA transfers and unlimited burst mode DMA transfers (unsupported)
Data transfer rate	Up to 250,000 16-bit words/second in single-cycle mode
	Up to 500,000 16-bit words/second in burst mode

Configuration Information	
Form factor	Dual height
Power requirements	+5 Vdc, 1.8 A (typical)
	+12 Vdc, 0.0 A
Bus loads	2.0 ac
	1.0 dc
Insert panels	2 type A
Insert panel connectors	2 40-pin connectors

Operating System Support	
MicroVMS	Version 4.4 and later
ULTRIX–32m	None
VAXELN	None

Diagnostic Support	
MicroVAX Diagnostic Monitor	Revision 1.0 and later

Related Documentation	
EK–DRVWA–UG	DRV11–WA General Purpose DMA User's Guide

2.3.4 IEQ11 Controller

The IEQ11 option is a DMA controller that interfaces a Q-bus system to two independent instrument buses (IEC/IEEE).

Functional Information	
Supported interfaces	IEEE–488–1978
	IEC 625–1
Supported interface functions	Automatic source handshake
	Automatic acceptor handshake

Functional Information

Talker and extended talker (includes serial poll capability)

Listener and extended listener

Service request

Remote local

Parallel poll

Device clear

Device trigger

Controller

Ordering Information

IEQ11–AD	IEQ11 module and cable to first controller

Performance

Transfer mode	Programmed I/O transfers with interrupt DMA data transfers
Data transfer rate	Up to 150 Kbytes/second during a DMA block transfer

Configuration Information

Form factor	Quad height
Power requirements	+5 Vdc, 3.5 A (typical)
	+12 Vdc, 0.0 A
Bus loads	2.0 ac
	1.0 dc
Insert panels	1 type B for each IEEE/IEC bus

Configuration Information

Insert panel connectors	Standard 24-pin IEEE 488 connector (IEQAA–AC)
	Standard 25-pin IEC 625 connector (IEQ11–AD)

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 2.0 and later
VAXELN	None

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.08 and later

Related Documentation

EK–IEUQ1–UG	IEU11–A/IEQ11–A User's Guide

2.4 MRV11–D Programmable Read-Only Memory

The MRV11–D memory module contains sixteen 28-pin sockets that accept static random-access memory (RAM) and a variety of user-supplied read-only memory (ROMs). By placing appropriate programmable ROMs into the module, you can design your own boot sequence.

Ordering Information	
MRV11–D	MRV11–D module

Configuration Information	
Form factor	Dual height
Power requirements	+5 Vdc, 1.6 A
	+12 Vdc, 0.0 A
Bus loads	3.0 ac
	0.5 dc

Operating System Support	
VMS	Version 4.6A and later
ULTRIX–32	Version 2.2 and later
VAXELN	Not supported as of Version 2.4

Diagnostic Support	
MicroVAX Diagnostic Monitor	Revision 2.11 and later
Self-tests	No

Related Documentation	
EK–MRV1D–UG	MRV11–D Universal PROM Module User's Guide

2.5 Printers and Printer Interfaces

MicroVAX II systems have the following types of printer options:

- Line printers

- Dot matrix printers

- Daisy wheel, letter-quality printers

- Laser printers

2.5.1 Line Printers

MicroVAX II systems have five line printer options: the LP25, LP26, LP27, LG01, and LG02 line printers. All require the LPV11 printer interface.

LPV11 Printer Interface

The LPV11 printer interface controls the flow of data between the Q-bus and a line printer.

Ordering Information	
LPV11–B	LPV11/LP25 printer system
LPV11–F	LPV11/LP26 printer system
LP27–QA/QB	LPV11/LP27 printer system
LPV11–00	LPV11 controller module
CK–LPV1A–KA	LPV11 cabinet kit

Configuration Information	
Form factor	Dual height
Power requirements	+5 Vdc, 0.8 A (typical)
	+12 Vdc, 0.0 A
Bus loads	1.4 ac
	1.0 dc

Operating System Support	
MicroVMS	Version 4.2 and later

Operating System Support

ULTRIX–32m	Version 2.0 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	No

Related Documentation

EK–LPV11–OP	LPV11 Printer User's Manual

LP25 Printer

Performance

Printing speed	300 lines/minute with 64-character set
	215 lines/minute with 96-character set
Print technology	Full-character, impact, band
Character spacing	10 characters/inch
Line spacing	6 or 8 lines/inch
Paper slew speed	37.5 cm/second (15 in/second)
Character set	64- or 96-character ASCII (printing and non-printing characters)
Buffer capacity	132 characters
Paper	Fanfold: 7.6 cm x 40.6 cm (3 in x 16 in)
	Multipart forms: up to 6 parts, fanfold carbon
	Thickness: 0.06 cm (0.025 in)

Power Requirements

Line voltage and frequency	90–132 Vac, at 60 Hz
	190–250 Vac, at 50 Hz

Power Requirements

Power consumption	350 W
Heat dissipation	1200 Btu/hour

Physical Characteristics

Height	111 cm (43.8 in)
Width	76 cm (30.3 in)
Depth	85 cm (33.6 in)
Weight	89 kg (195 lb)

Ordering Information

LP25–BA	LP25 printer
LPV11–B	LPV11/LP25 printer system

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 2.0 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	Yes

LP26 Printer

Performance

Printing speed	600 lines/minute with 64-character set
	215 lines/minute with 96-character set
Print technology	Full-character, impact, band
Character spacing	10 characters/inch
Line spacing	6 or 8 lines/inch
Paper slew speed	37.5 cm/second (15 in/second)
Character set	64- or 96-character ASCII (printing and non-printing characters)
Buffer capacity	132 characters
Paper	Fanfold: 7.6 cm x 40.6 cm (3 in x 16 in)
	Multipart forms: up to 6 parts, fanfold carbon
	Thickness: 0.06 cm (0.025 in)

Power Requirements

Line voltage and frequency	90–132 Vac, at 60 Hz
	190–250 Vac, at 50 Hz
Power consumption	475 W
Heat dissipation	1619 Btu/hour

Physical Characteristics

Height	111 cm (43.8 in)
Width	76 cm (30.3 in)
Depth	85 cm (33.6 in)
Weight	89 kg (195 lb)

Ordering Information

LP26–EB	LP26 printer

Ordering Information

LPV11–F	LPV11/LP26 printer system

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 2.0 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	Yes

LP27 Printer

Performance

Printing speed	1200 lines/minute with 64-character set
	800 lines/minute with 96-character set
Print technology	Full-character, impact, band
Character spacing	10 characters/inch
Line spacing	6 or 8 lines/inch
Paper slew speed	127 cm/second (50 in/second)
Character set	64- or 96-character ASCII (printing and non-printing characters)
Buffer capacity	132 characters
Paper	Fanfold: 8.9 cm x 47.6 cm (3.5 in x 18.8 in)
	Multipart forms: up to 6 parts, fanfold carbon
	Thickness: 0.05 cm (0.020 inch)

Power Requirements

Line voltage and frequency	90–132 Vac, at 60 Hz

Power Requirements

	190–250 Vac, at 50 Hz
Power consumption	455 W, standby; 1100 W, printing
Heat dissipation	3754 Btu/hour

Physical Characteristics

Height	124.5 cm (49 in)
Width	99.9 cm (35 in)
Depth	96.5 cm (38 in)
Weight	257.2 kg (567 lb)

Ordering Information

LP27–UA	LP27 printer (120 V)
LP27–UB	LP27 printer (240 V)
LP27–QA/QB	LPV11/LP27 printer system

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 2.0 and later
VAXELN	Version 2.0 and later

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	Yes

Related Documentation

EK–0LP27–UG	LP27 Lineprinter User's Guide

LG01 Text Printer

The LG01 is a 600-lines-per-minute, text-only impact printer with multiple printing modes.

Performance

Printing speed	Draft mode: 600 lines/minute with 64-character set; 480 lines/minute with 96-character set
	Correspondence mode: 280 lines/minute with 64-character set; 240 lines/minute with 96-character set
Print technology	Full-character, impact, matrix
Character spacing	Draft mode: 5/10/15 characters/inch
	Correspondence mode: 10/12 characters/inch
Line spacing	6 or 8 lines/inch
Paper slew rate	20 inch/second
Character set	64- or 96-character ASCII, OCRA, OCRB
Buffer capacity	1000-character input buffer
Paper	Fanfold: Form width: 15.6 cm to 62.4 cm (4 in to 16 in); form length: 11.7 cm to 78 cm (3 in to 20 in)
	Multipart forms: up to 6 parts, carbon or carbonless
	Thickness: 0.06 cm (0.025 in)

Power Requirements

Line voltage and frequency	90–128 Vac, at 60 Hz
	180–256 Vac, at 50 Hz
Power consumption	1000 W average
Heat dissipation	3000 Btu/hour

Physical Characteristics

Height	97.8 cm (38.5 in)
Width	85.1 cm (33.5 in)
Depth	57.2 cm (22.5 in)

Physical Characteristics	
Weight	157.5 kg (350 lb)

Ordering Information	
LG01–BA	LG01 printer, LPV11 controller, and BC27A–30 cable
CK–LPV1A–KA	Cabinet kit

Operating System Support	
MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 2.0 and later
VAXELN	Version 2.0 and later

Diagnostic Support	
MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	Yes

Related Documentation	
EK–0LG01–IN	LG01 600 LPM Text Printer Installation/Operator's Manual
EK–0LG01–UG	LG01 600 LPM Text Printer User's Guide
EK–0LG01–TM	LG01 600 LPM Text Printer Technical Manual

LG02 Text and Graphics Printer

The LG02 is a 600-lines-per-minute impact printer with multiple printing modes and graphics.

Performance	
Printing speed	Draft mode: 600 lines/minute with 64-character set; 480 lines/minute with 96-character set
	Correspondence mode: 280 lines/minute with 64-character set; 240 lines/minute with 96-character set
Print technology	Full-character, impact, matrix
Character spacing	Draft mode: 5/10/15/16.2 characters/inch
	Correspondence mode: 10/12 characters/inch
Line spacing	6 or 8 lines/inch
Paper slew rate	20 inch/second
Character set	64- or 96-character ASCII, OCRA, OCRB
Graphics	DIGITAL sixel protocol
Buffer capacity	1000-character input buffer
Paper	Fanfold: Form width: 15.6 cm to 62.4 cm (4 in to 16 in); form length: 11.7 cm to 78 cm (3 in to 20 in)
	Multipart forms: up to 6 parts, carbon or carbonless
	Thickness: 0.06 cm (0.025 in)

Power Requirements

Line voltage and frequency	90–128 Vac, at 60 Hz
	180–256 Vac, at 50 Hz
Power consumption	1000 W average
Heat dissipation	3000 Btu/hour

Physical Characteristics

Height	97.8 cm (38.5 in)
Width	85.1 cm (33.5 in)
Depth	57.2 cm (22.5 in)
Weight	157.5 kg (350 lb)

Ordering Information

LG02–BA	LG02 printer, LPV11 controller, and BC27A–30 cable
CK–LPV1A–KA	Cabinet kit

Operating System Support

MicroVMS	Version 4.2 and later
ULTRIX–32m	Version 2.0 and later
VAXELN	Version 2.0

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 1.03 and later
Self-tests	Yes

Related Documentation

EK–0LG02–IN	LG02 600 LPM Text and Graphics Printer Installation/Owner's Manual

Related Documentation

EK–0LG02–UG	LG02 600 LPM Text and Graphics Printer User's Guide
EK–0LG02–TM	LG02 600 LPM Text and Graphics Printer Technical Manual
EK–0LG02–RM	LG02 600 LPM Text and Graphics Printer Mini-Reference Manual

2.5.2 Dot Matrix Printers

Four dot matrix printers are available for the MicroVAX II 630QY,QZ system:

- LA75 Companion printer
- LA100 Letterwriter
- LA120 printer/terminal (DECwriter III)
- LA210 Letterprinter

LA75 Companion Printer

The LA75 is a high-speed, dot matrix printer designed for the office environment.

Performance	
Printing speed	Draft mode: 250 characters/second
	Memo mode: 125 characters/second
	Near-letter-quality mode: 42 characters/second
	Letter-quality mode: 32 characters/second
Print technology	Bidirectional, dot matrix
Print density	Draft mode: 12 x 9 matrix
	Memo mode: 24 x 9 matrix
	Near-letter-quality mode
	Letter-quality mode: 36 x 18 matrix
	Bit-map graphics mode
Character spacing	10, 12, 16.5, 17.1 characters/inch (standard-width characters)
	5, 6, 8.25, 8.55 characters/inch (double-width characters)
Line spacing	2, 3, 4, 6, 8, 12 lines/inch
Graphics	DIGITAL sixel protocol

Performance

Character sets	Nine built-in character sets: U.S. ASCII, National Replacement (NRC), ISO 8-bit Supplemental, DEC Supplemental, DEC Technical, VT100 Special Graphic, plus IBM Proprinter Line Drawing, Chart Drawing, and Symbol Drawing sets.
Buffer capacity	2047-character input buffer

Communications

Baud rates	110 to 9600 bits/second
Character code	7- or 8-bit ASCII with odd, even, mark, space, or no parity
Interface	EIA RS–423
	EIA RS–232–C parallel

Paper

Type	Fanfold. Form width: 11.4 cm to 25.4 cm (4.25 in to 10 in)
	Single-sheet: 21.6 cm x 27.9 cm (8.5 in x 11 in)
	Envelopes
	Multipart forms: up to 4 parts, carbon or carbonless
Thickness	0.06 cm (0.002 to 0.012 in)

Power Requirements

Line voltage and frequency	120 Vac, at 50/60 Hz
	240 Vac, at 50/60 Hz

Physical Characteristics

Height	12.1 cm (4.8 in)

Physical Characteristics

Width	42.7 cm (16.8 in)
Depth	34.5 cm (13.6 in)
Weight	9.5 kg (21 lb)

Ordering Information

LA75–CA	EIA RS–423–A serial interface printer, U.S., Canada (English, French)
	13 other country-specific serial models available
LA75P–CA	Parallel model, U.S., Canada (English, French)
	13 other country-specific parallel models available
H8571–A	Adapter for 25-pin male host printer port
H8571–B	Adapter for 9-pin male host printer port

Operating System Support

MicroVMS	Dependent on serial interface port
ULTRIX–32m	Dependent on serial interface port
VAXELN	Dependent on serial interface port

Diagnostic Support

MicroVAX Diagnostic Monitor	Revision 2.11 and later
Self-tests	Yes

Related Documentation

EK–0LA75–UG	Installing and Using the LA75 Companion Printer
EK–0LA75–RM	LA75 Companion Printer Programmer Reference Manual

LA100 Letterwriter

The LA100 Letterwriter is a wide-carriage, tabletop printer/terminal.

Performance	
Print speed	240 characters/second (draft mode)
	30 characters/second (letter-quality mode)
	80 characters/second (memo mode), optional
Print technology	Bidirectional, dot matrix
Print matrix	Draft-quality: 7 x 9 dots per character cell
	Near-letter-quality: 33 x 18 dots per character cell
	Memo-quality: 33 x 9 dots/inch
	Graphics: 132 x 72 dots/inch
Character pitch	16.5, 13.2, 12, 10, 8.25, 6.6, 6, or 5 characters/inch
Line spacing	2, 3, 4, 6, 8, or 12 lines/inch
Character sets	ASCII, Multinational, Line Drawing Set are standard.
Fonts	Courier-10, Courier-12, Orator-10, Gothic-10, and Gothic-12
Buffer capacity	400 characters

Communications	
Baud rates	50, 75, 110, 134.5, 200, 300, 600, 1200, 1800, 2400, 4800, 7200, or 9600
Parity	7-bit: odd, even, mark, space, or none
	8-bit: odd, even, or none
Interface	EIA RS–232–C
	Optional 20 mA interface

Paper

Type	Single sheet, roll, or continuous forms
Dimensions	7.6 cm to 37.8 cm (3.0 in to 14.9 in) wide
Multiple forms	Original plus 3 parts
Thickness	0.051 cm (0.020 in) maximum

Power Requirements

Voltage	120 V nominal (87–128 Vac range)
Frequency	47 to 63 Hz
Power consumption	138 W, printing maximum

Physical Characteristics

Height	17.7 cm (7 in)
Width	55.9 cm (22 in)
Depth	39.34cm (15.5 in)
Weight	11.3 kg (25 lb)

Ordering Information

LA100–BA	Letterwriter 100 US/UK KSR model
LA100–BB	Letterwriter 100 international KSR model

Operating System Support

MicroVMS	Dependent on serial interface port
ULTRIX–32m	Dependent on serial interface port
VAXELN	Dependent on serial interface port

Diagnostic Support

MicroVAX Diagnostic Monitor	Dependent on serial interface port

Diagnostic Support	
Self-tests	Yes

Related Documentation	
EK–LW100–OP	Letterwriter 100 Operator Guide
EK–LW100–IN	Letterwriter 100 Installation Guide
EK–LW100–RM	LA100-Series Programmer Reference Manual

LA120 Printer/Terminal (DECwriter III)

The LA120 is a dot matrix, pedestal-mounted printer/terminal.

Performance	
Print speed	180 characters/second (draft mode)
Print technology	Bidirectional, dot matrix
Print matrix	Draft-quality: 7 x 9 dots per character cell
	Graphics: 132 x 72 dots/inch
Character pitch	13.2, 12, 10, 8.25, 6.6, 6, or 5 characters/inch
Line spacing	2, 3, 4, 6, 8, or 12 lines/inch
Buffer capacity	1 Kbyte or optional 4 Kbytes
Character sets	ASCII and optional international character sets
Fonts	Courier-10, Courier-12, Orator-10, Gothic-10, and Gothic-12

Communications	
Baud rates	50, 75, 110, 134.5, 200, 300, 600, 1200, 1800, 2400, 4800, 7200, or 9600
Split speeds	600 or 1200 receive with 75 or 150 transmit

Communications

	2400 or 4800 receive with 300 or 600 transmit
Parity	7-bit: odd, even, or none
	8-bit: mark or space
Interface	EIA RS–232–C

Paper

Type	Fanfold
Dimensions	7.6 cm to 37.8 cm (3.0 in to 14.9 in) wide
Multiple forms	Up to 6 parts
Thickness	0.051 cm (0.020 in) maximum

Power Requirements

Voltage	120 or 240 Vac, 50 or 60 Hz
Power consumption	440 W, printing maximum

Physical Characteristics

Height	85.1 cm (33.5 in)
Width	69.9 cm (27.5 in)
Depth	61.0 cm (24.0 in)
Weight	46.4 kg (102 lb)

Ordering Information

LA120–DA	LA120 DECwriter III international KSR model

Operating System Support

MicroVMS	Dependent on serial interface port
ULTRIX–32m	Dependent on serial interface port
VAXELN	Dependent on serial interface port

Diagnostic Support

MicroVAX Diagnostic Monitor	Dependent on serial interface port
Self-tests	Yes

Related Documentation

EK–LA120–RG	LA120 Operator's Reference Card
EK–LA120–TM	LA120 Technical Manual
EK–LA120–UG	LA120 User Guide

LA210 Letterprinter

The LA210 Letterprinter is a multimode, dot matrix, desktop printer.

Performance

Print speed	240 characters/second (draft mode)
	40 characters/second (letter mode)
	80 characters/second (memo mode), optional
Throughput speed	185 characters/second (draft mode)
	30 characters/second (letter-quality mode)
Print technology	Bidirectional, dot matrix
Print matrix	Draft-quality: 7 x 9 dots per character cell
	Near-letter-quality: 33 x 18 dots per character cell
	Memo-quality: 33 x 9 dots per inch
Character sets	ASCII, Multinational, Line Drawing Set are standard. Other character sets available on optional cartridges.
Fonts	Courier-10 is standard. Other fonts available on optional cartridges.

Communications

Baud rates	50, 75, 110, 134.5, 200, 300, 600, 1200, 1800, 2400, 4800, 7200, or 9600
Parity	No parity, 7-bit, mark
	No parity, 7-bit, space
	Even parity, 7-bit; odd parity, 7-bit
	Even parity, 8-bit; odd parity, 8-bit
	No parity, 8-bit
Interface	EIA RS–232–C
	Optional parallel interface

Paper

Type	Single sheet, pinfeed or continuous forms
Dimensions	8.9 to 37.8 cm (3.5 to 14.9 in) wide
Multiple forms	Original plus 3 parts (bottom feed only)
Thickness	0.038 cm (0.015 in) maximum

Power Requirements

Voltage	120 V nominal (90–128 Vac range)
	240 V nominal (180–256 Vac range)
Frequency	47 to 63 Hz
Power consumption	154 W, printing maximum

Physical Characteristics

Height	12.7 cm (5 in) without tractor
	22.8 cm (9 in) with tractor
Width	54.6 cm (21.5 in)
Depth	34.3 cm (13.5 in)
Weight	12.15 kg (27 lb)

Ordering Information

LA210–AA	United States (English)
LA210–AE	UK/Ireland (English)
	Other country-specific models are available

Operating System Support

MicroVMS	Dependent on serial interface port
ULTRIX–32m	Dependent on serial interface port
VAXELN	Dependent on serial interface port

Diagnostic Support

MicroVAX Diagnostic Monitor	Dependent on serial interface port
Self-tests	Yes

Related Documentation

EK–LA210–UG	LA210 Letterprinter User Guide
EK–LA210–IN	Installing the LA210 Letterprinter
EK–LA210–RM	LA210 Letterprinter Programmer Reference Manual

2.5.3 Letter-Quality Printers

The LQP series of printers provides letter-quality printing for MicroVAX II systems.

LQP02 Printer

The LQP02 letter-quality printer is a full-size, 96-petal daisywheel printer.

Performance	
Print speed	32 characters/second (letter-quality, Shannon text)
Print technology	Bidirectional, full-character, impact
Print density	Full-character, even density
Character pitch	Variable pitch, software selectable (10 characters/inch default)
Line spacing	Variable, includes proportional spacing (6 lines/inch default)
Vertical slew speed	5 in/second
Buffer capacity	256 characters
Buffer control	XON/XOFF
Paper	Cutsheet: 7.6 cm x 34.3 cm (3 x 13.5 in) wide
	Fanfold: 7.6 cm x 38.1 cm (3 x 15 in) wide
	Thickness: 0.025 cm (0.011 in) maximum

Communications	
Baud rates	75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, and 9600, full-duplex transmission
Data interface	EIA RS–232–C
Parity	7-bit, odd, even, mark, or space

Power Requirements

LQP02–AA	120 Vac, 60 Hz
LQP02–AD	240 Vac, 50 Hz
Power consumption	120 W, average RMS

Physical Characteristics

Width	63.5 cm (25 in)
Depth	40.6 cm (16 in)
Height	17.8 cm (7 in)
Weight	22 kg (48 lb)

Ordering Information

LQP02–AA	LQP02 printer (120 V)
LQP02–AD	LQP02 printer (240 V)

Operating System Support

MicroVMS	Dependent on serial interface port
ULTRIX–32m	Dependent on serial interface port
VAXELN	Dependent on serial interface port

Diagnostic Support

MicroVAX Diagnostic Monitor	Dependent on serial interface port
Self-tests	Yes

Related Documentation

AA–L662A–TK	Installing and Using the LQP02 Printer
EK–LQP02–RM	LQP02 Printer Programmer Reference Manual

LQP03 Printer

The LQP03 letter-quality printer is a compact, 130-petal daisywheel printer.

Performance	
Print speed	25 characters/second (Shannon text at 10 characters/inch)
	34 characters/inch (triple-A text at 12 characters/inch)
Print technology	Bidirectional, full-character, impact
Print density	Full-character, even density
Paper	Cutsheet. U.S.: 21.6 x 27.9 cm (8.5 x 11 in); A4: 21.1 x 29.7 cm (8.3 x 11.7 in); both in vertical and horizontal orientation; 16–24 lb bond

Type Characteristics	
Character sets	ASCII, English/U.K., French, French-Canadian, German, Italian, Spanish, Swedish, Finnish, Norwegian, Danish, JIS Roman, Multinational
Character pitches	Printwheels available in 10, 12, and 15 pitch
Maximum print columns	110 at 10 pitch, 132 at 12 pitch, 165 at 15 pitch
Margins	Left, right, top, and bottom
Tabs	256 contiguous horizontal; 168 contiguous vertical
Character code	7-bit and 8-bit ASCII, switch-selectable
Horizontal pitch	Variable pitch, software-selectable
Vertical pitch	Variable pitch, software-selectable
Horizontal resolution	120 increments/inch
Lines/inch	Variable, includes proportional spacing (6 lines/inch default)
Characters/inch	Variable (10 characters/inch default)

Communications

Baud rates	110, 150, 300, 600, 1200, 2400, 4800, and 9600
Data interface	EIA RS–232–C
Parity	Odd, even, mark, or space, switch-selectable
Transmission rate	Full-duplex, from 110 to 9600 baud
Buffer capacity	256 characters
Buffer control	XON/XOFF

Power Requirements

Voltage/Frequency	90–132 V, 57 to 63 Hz; 180–264 V, 47 to 53 Hz
Line current	14 A, maximum starting current; 1 A nominal operating current
Power consumption	Less than 100 W, average RMS
Heat dissipation	410 Btu/hour, nominal operation

Physical Characteristics

Width	52.7 cm (20.75 in)
Depth	38.7 cm (15.25 in)
Height	19.7 cm (.757 in)
Weight	22.7 kg (28 lb)

Ordering Information

LQP03–A	LQP03 printer (120 V)
LQP03–B	LQP03 printer (240 V)

Operating System Support

MicroVMS	Dependent on serial interface port
ULTRIX–32m	Dependent on serial interface port
VAXELN	Dependent on serial interface port

Diagnostic Support

MicroVAX Diagnostic Monitor	Dependent on serial interface port
Self-tests	Yes

Related Documentation

EK–LQP03–UG	Installing and Using the LQP03 Printer
EK–LQP03–RM	LQP03 Printer Programmer Reference Manual
EK–LQP03–TM	LQP03 Printer Technical Manual

2.5.4 Laser Printers

Three models of the LN03 laser printer offer laser imaging and xerographic printing in a desktop unit.

- LN03—basic text printer

- LN03 PLUS—text and bit-mapped graphics

- LN03R SCRIPTPRINTER—bit-mapped graphics with support for POSTSCRIPT, a page description language that can integrate text and graphics

Performance	
Print speed	Eight pages/minute (about 333 characters/second letter-quality, 2500 characters/page)
Recommended duty cycle	3500 pages/month
Paper feed	Adjustable 250-sheet cassette (16 to 24 lb paper)
Paper output	250 sheets sequenced
Print orientation	Portrait: 66 lines/page, 120 characters/line
	Landscape: 66 lines/page, 150 characters/line
Resolution	300 x 300 dots per inch
Image area	2400 dots/scan line x 3225 scan lines (ANSI A)
	2400 dots/scan line x 3400 scan lines (A4)
Paper sizes	Standard ANSI A: 21.6 x 27.9 cm (8.5 x 11 in)
	European A4: 21 x 29.7 cm (8.3 x 11.7 in)
Character sets	Built-in: ASCII, DEC Supplemental, DEC Technical, and Line Drawing Set
	Downline-loaded: 10 additional available
Fonts	LN03 and LN03 PLUS: 16 resident fonts

Performance

	LN03R: 29 resident fonts
	Other fonts available on ROM cartridges or by downline loading them from a host
Graphics	Sixel protocol (LN03 PLUS and LN03R)
	TEKTRONIX 4010/4014 files (LN03 and LN03R)
	ReGIS (LN03R)
RAM	LN03: no on-board RAM; accepts two RAM cartridges
	LN03 PLUS: 1 Mbyte on-board RAM; accepts two RAM cartridges
	LN03R: 2 Mbytes on-board RAM; accepts two RAM cartridges
ROM	LN03: no on-board ROM; accepts two precoded ROM font cartridges
	LN03 PLUS: no on-board ROM; accepts two precoded ROM font cartridges
	LN03R: 1 Mbyte of on-board ROM for POSTSCRIPT interpreter; accepts two precoded ROM font cartridges

Communications

Interfaces	EIA RS–232–C
Baud rates	1200, 2400, 3600, 4800, 7200, 9600, 19200
Parity	If enabled, even/mark or odd/space

Power Requirements

Voltage/Frequency	90–128 V at 50/60 Hz
	190–256 V at 50 Hz
Power consumption	1 kVA max
Heat dissipation	3400 Btu/hour

Physical Characteristics

Height	38.1 cm (15 in) with exit tray
Width	53.4 cm (21 in)
Depth	59.7 cm (23.5 in) with tray
Weight	36.3 kg (80 lb)

Ordering Information

LN03–AA	U.S. model of LN03
LN03S–AA	U.S. model of LN03 PLUS
LN03R–AA	U.S. model of LN03R SCRIPTPRINTER
	21 other country-specific models available

Operating System Support

VMS	Dependent on serial interface port
ULTRIX–32	Dependent on serial interface port
VAXELN	Dependent on serial interface port

Diagnostic Support

MicroVAX Diagnostic Monitor	Dependent on serial interface port
Self-tests	Yes

Related Documentation

EK–0LN03–UG	Installing and Using the LN03
EK–0LN03–RM	LN03 Programmer Reference Manual

Chapter 3
System Expansion

Expanding a system involves three kinds of activities:

- Determining whether the system can accommodate a particular set of supported options

- Configuring the options appropriately

- Installing the options in the correct positions within the system

This chapter describes only how to determine what options you can add to your system. You evaluate your system by filling in a worksheet (Figure 3–1) with the options currently in your system and those you want to add. The information you need for all options is in Table 3–1.

This chapter does not describe how to configure the new options or how to install them into your system. Configuring the option involves assigning a Control and Status Register (CSR) address and an interrupt vector. This is usually done by means of switches or jumpers on the options themselves. Your DIGITAL service representative configures the options when installing them. Your DIGITAL service representative also determines the proper placement of options within the system according to specific guidelines.

Self-maintenance customers may obtain the information required to configure and install modules by ordering the *MicroVAX System Maintenance Guide*.

3.1 Determining Expansion Capacity

To determine what you can add to your system, you must list the options currently installed and their power requirements in the worksheet provided in Figure 3–1 at the end of this chapter. Table 3–1 lists the information you need for each option supported in the BA23 enclosure.

Table 3-1: Power Requirements

Option	Module	Current (Amps) +5V	Current (Amps) +12V	Power (Watts)
DELQA	M7615	1.5	0.5	13.5
DEQNA	M7504	3.5	0.5	23.5
DHQ11	M3107	1.4 (RS-232)	0.23	9.76
DHQ11	M3107	1.9 (RS-423)	0.23	12.26
DHV11	M3104	4.5	0.55	29.1
DLVJ1	M8043	1.25	0.25	9.25
DMV11-M	M8053	3.4	0.4	21.8
DMV11-N	M8064	3.4	0.26	20.12
DPV11	M8020	1.2	0.3	9.6
DRQ3B	M7658	4.5	0.0	22.5
DRV11-J	M8040	1.6	0.0	8.0
DRV11-WA	M7941	1.8	0.0	9.0
DZQ11	M3106	1.0	0.36	9.32
DZV11	M7957	1.2	0.39	10.7
IEQ11	M8634	3.5	0.0	17.5
KA630	M7606	6.2	0.14	32.7
KMV1A	M7500	2.6	0.2	15.4
LPV11	M8027	0.8	0.0	4.0
MRV11	M7942	1.6	0.0	8.0
MS630-BA	M7608-AA	1.3	0.0	6.5
MS630-BB	M7608-BA	1.8	0.0	9.0
MS630-CA	M7609-AA	3.1	0.0	15.5
RD52		1.3	1.34	22.6
RD53		0.9	2.5	34.5
RD54		0.9	4.7	60.9
RQDX3	M7555	2.48	0.06	13.2
RRD50	M7552	3.0	0.0	15.0

Table 3-1 (Cont.): Power Requirements

Option	Module	Current (Amps) +5V	Current (Amps) +12V	Power (Watts)
RX33		0.5	0.3	5.6
RX50		0.85	1.8	25.9
TK50		1.35	2.4	33.55
TK70		1.3	2.4	35.3
TQK50	M7546	2.9	0.0	14.5
TQK70	M7559	3.5	0.0	17.5
TSV05	M7196	6.5	0.0	32.5

Figure 3-1 shows the worksheet for the BA23 enclosure. Use the worksheet as follows:

1. In the module column, list all options currently installed in your system, except the controllers for the fixed-disk drives and tape drive. Begin with the CPU and memory options.

2. List the options you would like to add to your system.

3. List the controllers for the TK50/70 tape drive and disk/diskette drives last.

4. Using the information from Table 3-1, list the power requirements for each module and each mass storage device.

5. Add each column and make sure the resultant figures do not exceed the limits listed below each column. As long as the figures are within range, the listed options can be installed in the system.

This worksheet is only a guide. Confirm your system expansion plans with your DIGITAL sales representative. While certain combinations of options may be possible from a hardware standpoint, they may not be recommended, depending on the nature of your application software.

Figure 3-1: BA23 Configuration Worksheet

ADD THESE COLUMNS

BACKPLANE SLOT	MODULE	CURRENT (AMPS) +5 V	+12 V	POWER (WATTS)
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				

TOTAL THESE COLUMNS:

MUST NOT EXCEED: 36.0   7.0   230

MLO-1397-87

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Micro Systems
Site Preparation Guide

Order Number EK-O67AB-PG-002

BASEWAY	Micro/RSTS	RT
BI Bus	MicroPDP-11	UNIBUS
DEC	Micro/RSX	VAX
DEC/MAP	MicroVAX II	VAXcluster
DECmate	MicroVAX 3500	VAXserver 3600
DECnet	MicroVAX 3600	VAXserver 3602
DECUS	PDP	VAXstation II
DECwriter	P/OS	VAXstation II/GPX
DELNI	Professional	VMS
DIBOL	Q22-bus	VT
EDCS	Rainbow	
FMS	RSTS	
MASSBUS	RSX	**digital** ™

Contents

About This Guide

This guide describes the physical, environmental, and electrical requirements for installing any of the micro systems listed in the following table. You should verify that your site meets these requirements *before* moving a system to its installation point.

Micro Systems Covered by This Guide

System	Enclosures
MicroPDP-11	BA23, BA123, H9642
MicroVAX II	BA23, BA123, BA213*, H9644, H9642
MicroVAX 3500	BA213*
MicroVAX 3600	H9644
VAXserver 3600	H9644
VAXserver 3602	H9644
VAXstation II	BA23, BA123
VAXstation II/GPX	BA23, BA123, H9642

*The BA213 enclosure referred to in this guide contains mass storage and two power supplies.

The BA23, BA123, and BA213 enclosures are designed for use in open office environments. The BA23 enclosure is available in a pedestal or a tabletop version. The BA123 and BA213 are floorstand enclosures.

You can also have the BA23 and BA213 rack mounted in a cabinet designed for computer rooms rather than office environments. The BA23 rack mounts in the H9642 cabinet. The BA213 rack mounts in the H9644 cabinet.

Digital recommends that you have a Digital Field Service Engineer install your system. When the system arrives, you should inspect it with a Digital Field Service Engineer, to ensure that the system and all ordered options have arrived undamaged.

Each micro system is shipped in one large box that is clearly labeled. Other boxes that arrive with your shipment may contain terminals, printers, and software.
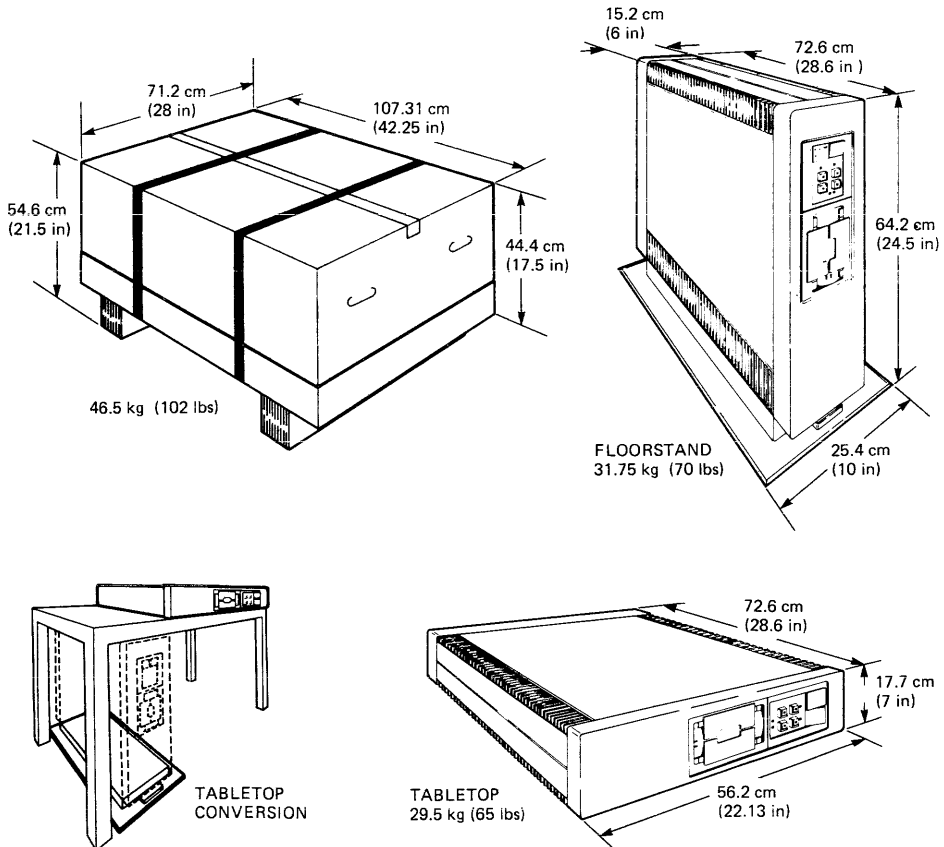
Physical Requirements

Before unpacking any system, make sure you have enough room to remove the system from its shipping container. Also make sure you leave enough room around the system so it can be serviced. Use the following sections to determine your system's dimensions.

System Dimensions for the BA23 Enclosure

The following figure shows the dimensions of a micro system in the BA23 enclosure. The figure also shows the dimensions of the shipping container.

CAUTION: *Due to the weight of the equipment, Digital recommends that at least two people handle the system and terminal boxes.*

15.2 cm
(6 in)

72.6 cm
(28.6 in)

71.2 cm
(28 in)

107.31 cm
(42.25 in)

54.6 cm
(21.5 in)

64.2 cm
(24.5 in)

44.4 cm
(17.5 in)

46.5 kg (102 lbs)

FLOORSTAND
31.75 kg (70 lbs)

25.4 cm
(10 in)

TABLETOP
CONVERSION

72.6 cm
(28.6 in)

17.7 cm
(7 in)

TABLETOP
29.5 kg (65 lbs)

56.2 cm
(22.13 in)

MA-0168-87

System Dimensions for the BA123 Enclosure

The following figure shows the dimensions of a micro system in the BA123 enclosure. The figure also shows the dimensions of the shipping container.

CAUTION: *Due to the weight of the equipment, Digital recommends that at least two people handle the system and terminal boxes.*
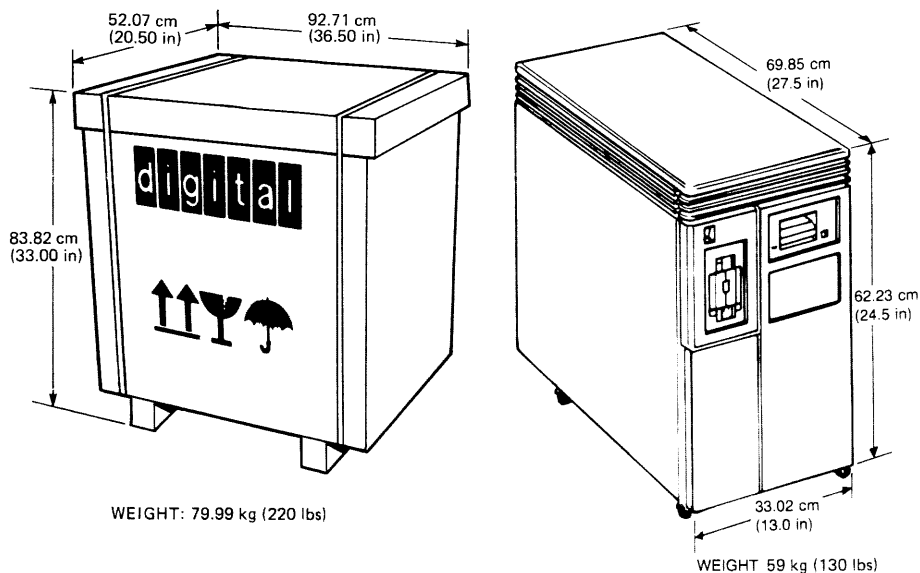

52.07 cm (20.50 in)   92.71 cm (36.50 in)

83.82 cm (33.00 in)

WEIGHT: 79.99 kg (220 lbs)

69.85 cm (27.5 in)

62.23 cm (24.5 in)

33.02 cm (13.0 in)

WEIGHT 59 kg (130 lbs)

MA 0162 87

System Dimensions for the BA213 Enclosure

The following figure shows the dimensions of a micro system in the BA213 enclosure. The figure also shows the dimensions of the shipping container.

CAUTION: *Due to the weight of the equipment, Digital recommends that at least two people handle the system and terminal boxes.*
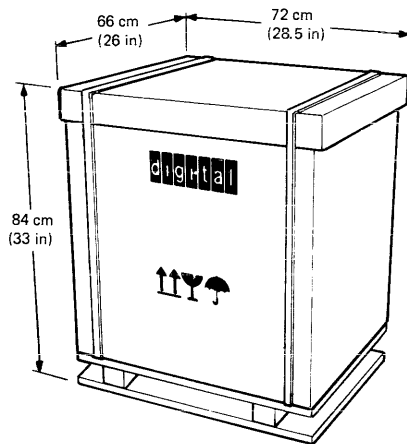
WEIGHT: 45 kg to 68 kg
(100 lbs to 150 lbs)
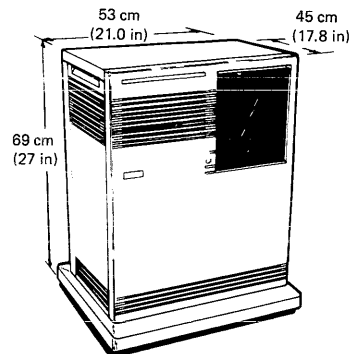
WEIGHT: 45 kg (100 lbs)

MA-1371-86

You must leave at least 61 cm (24 in) of clearance at the front of the system, for access to system controls. You also must leave at least 5 cm (2 in) of clearance at the sides and rear, for airflow. Since the base of the enclosure is 5 cm (2 in) wider than the cabinet in front and rear, you can place the rear of the system against a wall or table, and the system will have enough room for adequate airflow.
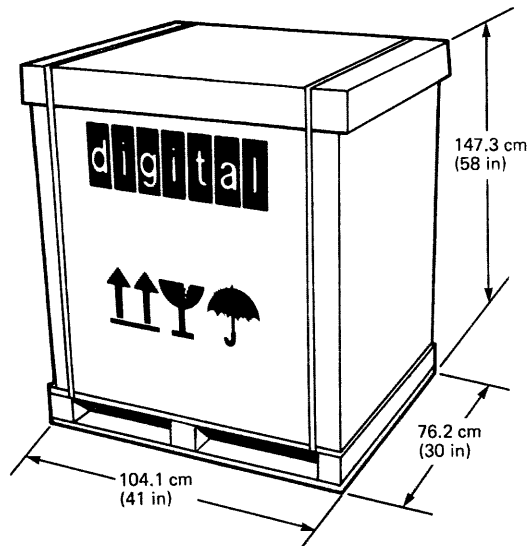
System Dimensions for the H9642 Cabinet

Systems that use the H9642 cabinet are shipped in large containers secured to wooden pallets by four metal hold-down brackets. Other containers arriving with your shipment may contain terminals, printers, software, and other options.

WARNING: *A forklift is required to move this system and some options (those mounted on pallets). Do not try to move or lift this equipment by yourself.*

The cabinet is mounted on four wheels and has four adjustable leveling feet for stability.

The weight of systems using the H9642 cabinet varies from 168 kg to 311 kg (358 lbs to 685 lbs), depending on the mass storage subsystems contained in the cabinet. Plan your installation accordingly. A fully loaded system with RA60 and RA81 disk drives weighs 311 kg (685 lbs).

The following figure shows the shipping dimensions of a micro system in the H9642 cabinet.

147.3 cm
(58 in)

76.2 cm
(30 in)

104.1 cm
(41 in)

MA-0196-87

The following figure shows the dimensions of an unpacked micro system in the H9642 cabinet.

105.91 cm
(41.7 in)

91.44 cm
(36 in)

64.77 cm
(25.5 in)
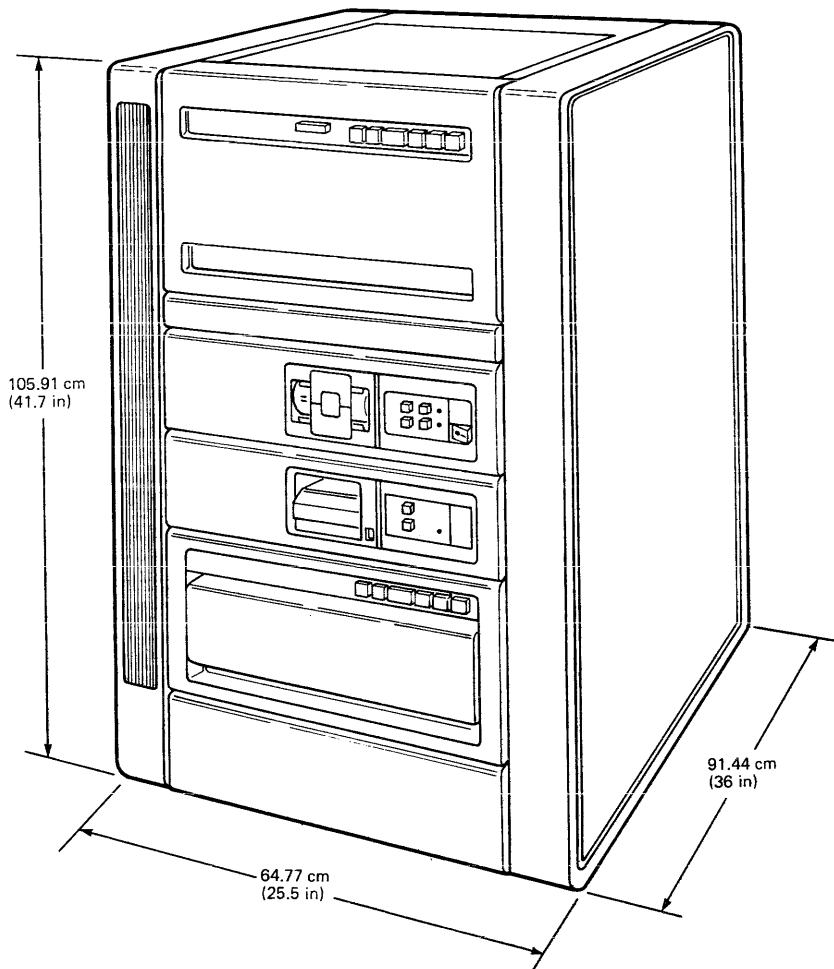
MA-0167-87

Leave a minimum of 1.2 m (4 ft) from the front of the system to the nearest stationary object, so the disk drives can be extended. The drives are approximately 86.5 cm (33.75 in) deep.

WALL

DISK DRIVE

1.22 m
(4 ft)

STABILIZER FOOT
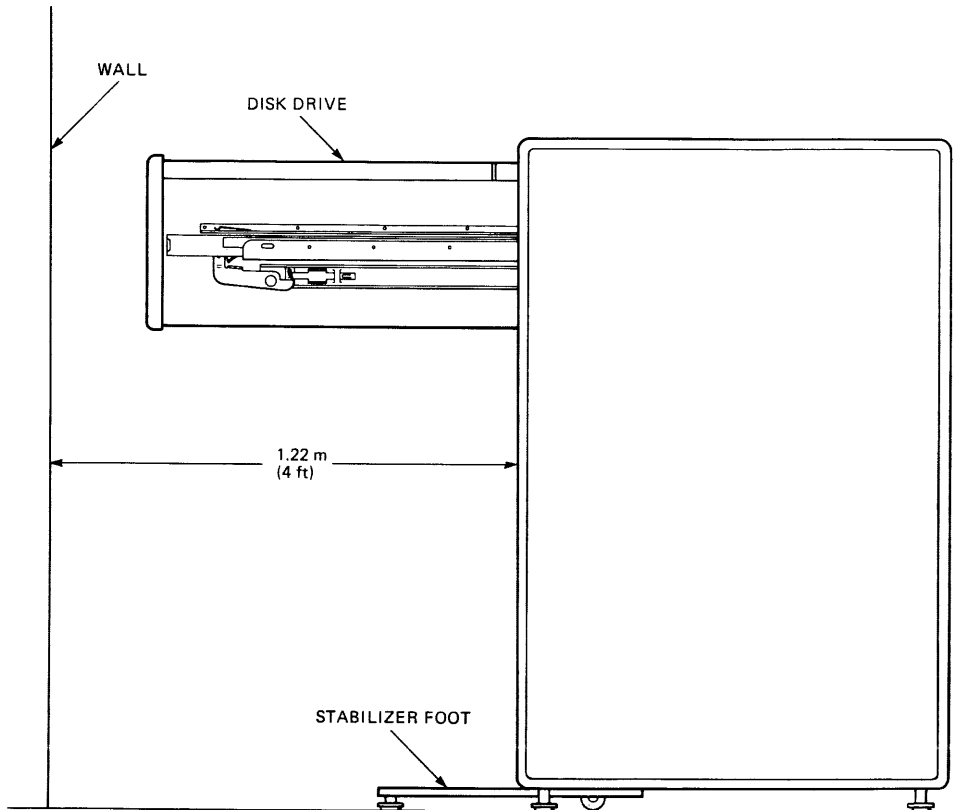
MA-0166-87

Leave a minimum of 1.2 m (4 ft) from the rear of the system to the nearest stationary object, so the rear door can be opened or removed. The rear door is approximately 51.3 cm (20.0 in) wide.

Leave space on each side of the system to remove the side panels.

MA-0165-87
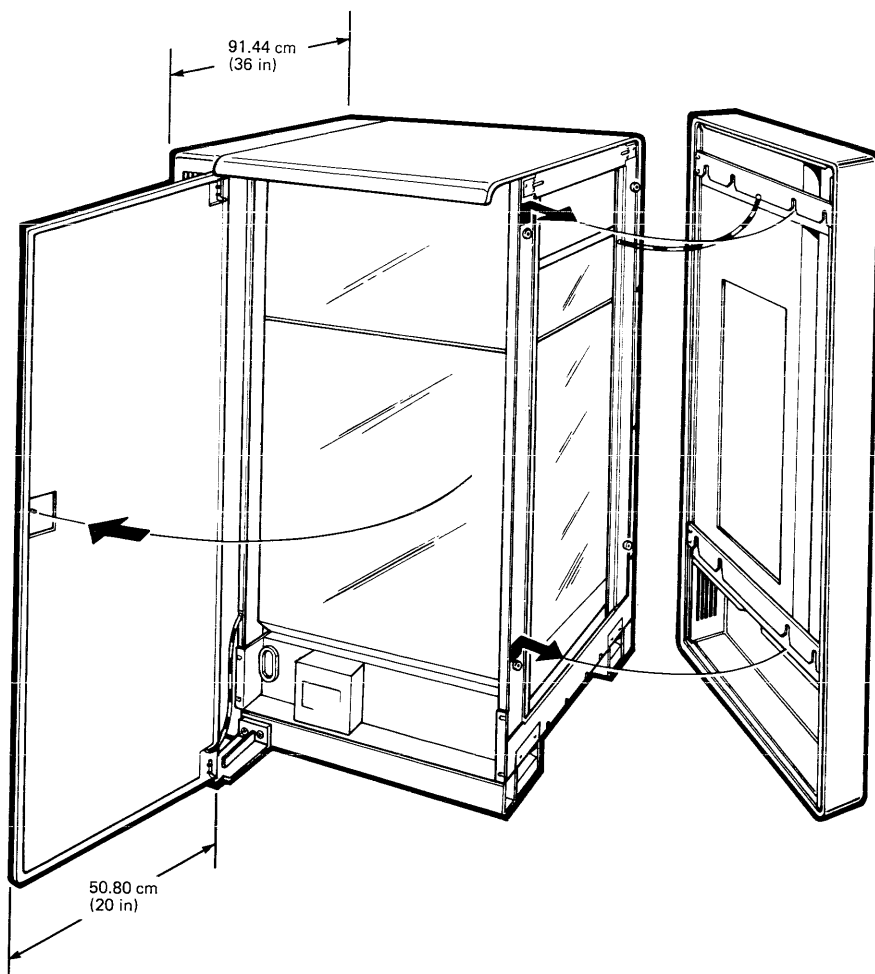
System Dimensions for the H9644 Cabinet

Systems that use H9644 cabinets are shipped in large containers secured to wooden pallets by metal hold-down brackets. Other containers arriving with your shipment may contain terminals, printers, software, and other options. Plan to use about 3 m (10 ft) of floor space for removing each cabinet from its pallet.

WARNING: *You need a forklift to move this system and any option mounted on a pallet. Do not try to move or lift this equipment by yourself.*

The cabinet is mounted on four wheels.

A fully loaded H9644 cabinet, with an RA81 or RA82 disk drive, two RA series disk drives, and a TK70 tape drive, weighs 206.6 kg (455 lbs). Plan your installation accordingly.

The following figure shows the shipping dimensions of a micro system in the H9644 cabinet.
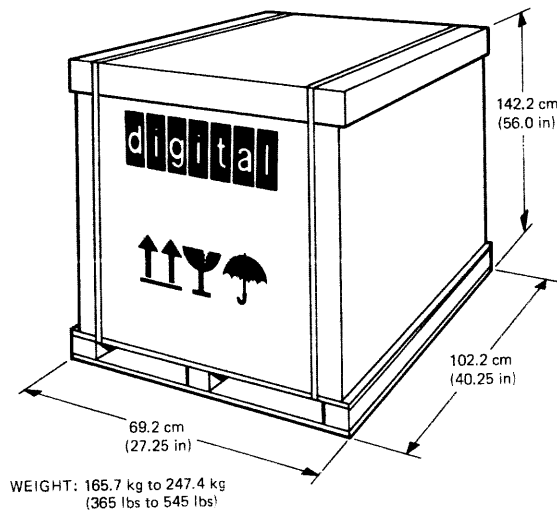
142.2 cm
(56.0 in)

102.2 cm
(40.25 in)

69.2 cm
(27.25 in)

WEIGHT: 165.7 kg to 247.4 kg
(365 lbs to 545 lbs)

MA-1440-87

The following figure shows the dimensions of an unpacked micro system in the H9644 cabinet.

106.8 cm
(41.6 in)

80.0 cm
(31.5 in)

54 cm
(21.25 in)

WEIGHT: 124.9 kg to 206.6 kg
(275 lbs to 455 lbs)

MA-1350-87A

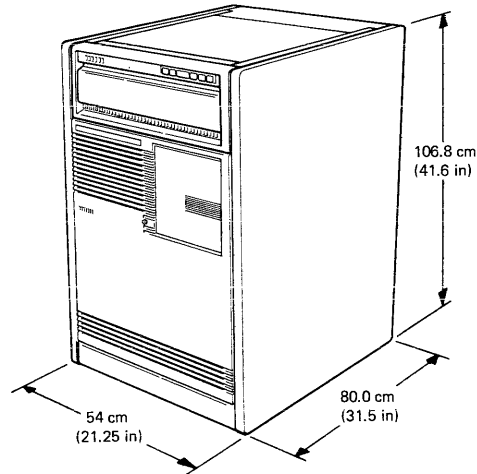If your system includes an auxiliary cabinet with an RA82 drive in the bottom, leave a minimum of 1.2 m (4 ft) from the front of the cabinet to the nearest stationary object, so the disk drives can be extended. The drive is approximately 86.5 cm (33.75 in) deep.

Leave approximately 1 m (3 ft) from the rear of the system to the nearest stationary object, so the rear door can be removed.

For cabinets containing a TU81E tape deck, leave enough room above the cabinet to raise the cover of the tape deck.

Additional Equipment

In addition to the space required for the micro system, you should make sure there is enough space for terminals, a printer, mass storage media, printer paper, and other necessary supplies. The temperature and humidity at which mass storage media are kept should be the same as that of the computer area.

If you plan to connect your system to peripheral devices such as printers, terminals, or modems, you will need additional cabling. Cables connecting the system to peripheral devices must be ordered separately.

When planning cable routing for multiple-terminal systems, you should consider factors such as safety, convenience, future expansion, and cost. The system installer has other special factors to consider when cabling a multiple-terminal system on more than one floor in the same building, or in more than one building. Digital offers several cable types for these applications, and Digital Customer Service personnel are available to help you plan your installation. Your sales representative can provide more information.

NOTE: *Cabling from peripheral devices should already be in place and labeled before the system is installed.*

Acoustics

The BA23, BA123, and BA213 enclosures are designed for use in offices and other general working areas. However, the H9642 and H9644 cabinets generate more noise than is acceptable for office use. Micro systems using the H9642 or H9644 cabinet should be installed in a computer room.

Table 1: Operating Acoustic Emission Levels

Enclosure	LNPE (B)	LPA (dB)
BA23	6.1	48
BA123	6.0	46
BA213	5.8	43
H9642 with no RA drives	6.0	45
H9642 with RA60 and RA81	7.6	64
H9644 with no RA drives	5.3	42
H9644 with RA82-AA (60 Hz)	7.3	62
H9644 with RA82-AD (50 Hz)	7.1	60

LNPE = Noise power emission level (A-weighted sound power level) measured in bels re 1 pw.
LPA = Sound pressure measured in decibels at 1.0 m from the front edge of the unit and 1.5 m above the floor.

Levels may be lower than those shown, depending on the kind and number of mass storage devices in the system.

All data measured in accordance with ANSI S12.10-1985 (American National Standards Institute) and ISO/DIS 7779 (International Standards Organization).

Operating Environment

Computer systems in office areas are subject to discharge of static electricity, temperature changes, and humidity. These conditions can affect the operation and overall dependability of the computer system.

Your system should be installed in a well-ventilated area, where the temperature and humidity ranges listed for your system are maintained throughout the year. Rapid temperature changes may affect system performance. Therefore, do not operate systems near heating or cooling devices, large windows, or doors that open to the outside. Air should contain a minimum of dust and other abrasive contaminants.

Static Electricity

Static electricity is a common problem for microcomputer systems. It can cause system failure and loss of 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, follow these guidelines.

- Maintain relative humidity of at least 40 percent.

- Locate your system away from busy office corridors.

- If possible, avoid using carpeting in the computer area. If you install carpeting, use antistatic carpeting. If carpeting is already in place, place an antistatic mat under the system.

- If your site has antistatic floors, carpeting, or mats, make sure you maintain their antistatic properties by following the manufacturer's recommendations for cleaning.

Heat Dissipation

Table 2 lists the values for heat dissipated by each of the micro system enclosures.

Table 2: Heat Dissipation

Enclosure	Heat Dissipation (BTU/h)
BA23	1177.4
BA123	2355
BA213	2304
H9642	5872 at 120 V, 6022 at 240 V
H9644 with no RA82	2408 at 120 V and 240 V
H9644 with RA82	4605 at 120 V and 240 V

Temperature and Humidity Ranges

The following tables list the temperature and humidity ranges for systems in each type of enclosure. The tables also list the altitude limits.

Table 3: Temperature and Humidity Ranges for Micro Systems in the BA23 and BA123 Enclosures

Parameter		Range
Temperature	Operating:*	10°C to 40°C 50°F to 104°F
	Nonoperating:	-40°C to 60°C -40°F to 140°F
Temperature rate of change	Operating:	11°C per hour maximum 19.8°F per hour maximum
Relative humidity	Operating:	20% to 80% (noncondensing)
	Nonoperating:	10% to 95%
Maximum altitude	Operating:	2440 m (8000 ft)
	Nonoperating:	4900 m (16,000 ft)

*For operation above sea level, decrease the operating temperature by 1.8°C per 1000 m (or 1°F per 1000 ft).

Table 4: Temperature and Humidity Ranges For Micro Systems in the BA213 Enclosure

Parameter		Range
Temperature	Operating:*	10°C to 40°C 50°F to 104°F
	Nonoperating:	-40°C to 66°C -40°F to 151°F
Temperature rate of change	Operating:	11°C per hour maximum 19.8°F per hour maximum
Relative humidity	Operating:	20% to 80% (noncondensing)
	Nonoperating:	10% to 90%
Maximum altitude	Operating:	2440 m (8000 ft)
	Nonoperating:	4900 m (16,000 ft)

*For operation above sea level, decrease the operating temperature by 1.8°C per 1000 m (or 1°F per 1000 ft).

Table 5: Temperature and Humidity Ranges for Micro Systems in the H9642 and H9644 Cabinets

Parameter		Range
Temperature	Operating:*	15°C to 32°C 59°F to 90°F
	Nonoperating:	-40°C to 66°C -40°F to 151°F
Temperature rate of change	Operating:	11°C per hour maximum 19.8°F per hour maximum
Relative humidity	Operating:	20% to 80% (noncondensing)
	Nonoperating:	10% to 95% (H9642) 10% to 90% (H9644)
Maximum altitude	Operating:	2440 m (8000 ft)
	Nonoperating:	4900 m (16,000 ft)

*For operation above sea level, decrease the operating temperature by 1.8°C per 1000 m (or 1°F per 1000 ft).

Electrical Requirements

The power source should be able to handle the original system and allow for system expansion. Digital recommends a dedicated circuit from the power source to each micro system. A dedicated circuit provides electrical isolation from possible power surges or electrical noise caused by other appliances. For this reason, you should not connect appliances such as air conditioners, office copiers, or coffee pots to the same circuit as the micro system. The dedicated circuit should provide an isolated ground path between the micro system and the power source.

If you cannot avoid power disturbances, your system will need additional power-conditioning equipment. For more information, contact your Digital sales representative.

Electrical Requirements for Micro Systems In the BA23 and BA123 Enclosures

Table 6 lists the power cords used to operate a micro system at 240 V in the BA23 and BA123 enclosures. For more information on 240 V operation, check with your Digital sales representative.

Table 6: 240 V Power Cords for Micro Systems In the BA23 and BA123 Enclosures

Power Cord Number	Countries
BN02A-2E	United Kingdom and Ireland
BN03A-2E	Austria, Belgium, Czechoslovakia, Finland, France, Germany, Hungary, Netherlands, Norway, Poland, Portugal, Spain, and Sweden
BN04A-2E	Switzerland
BN05A-2E	Australia and New Zealand
BN06A-2E	Denmark
BN07A-2E	Italy

Table 7 lists the electrical requirements for micro systems in the BA23 enclosure.

Table 7: Electrical Requirements for Micro Systems In the BA23 Enclosure

Nominal AC Voltage ⟹	100 Vac	120 Vac	220-240 Vac
Voltage range	90 to 110 Vac	104 to 128 Vac	191 to 256 Vac
Power source phase	Single	Single	Single
Nominal frequency	50 to 60 Hz	50 to 60 Hz	50 to 60 Hz
Frequency range	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
Maximum steady state current at nominal voltage	5.3 A	4.4 A	2.2 A
Maximum steady state current at minimum voltage	6 A	5.5 A	2.7 A
Maximum inrush current	100 A	100 A	100 A
Maximum power consumption	345 W	345 W	345 W

Table 8 provides electrical requirements for micro systems in the BA123 enclosure.

Table 8: Electrical Requirements for Micro Systems In the BA123 Enclosure

Nominal AC Voltage ⟹	100 Vac	120 Vac	220-240 Vac
Voltage range	90 to 110 Vac	104 to 128 Vac	191 to 256 Vac
Power source phase	Single	Single	Single
Nominal frequency	50 to 60 Hz	50 to 60 Hz	50 to 60 Hz
Frequency range	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
Maximum steady state current at nominal voltage	10.5 A	8.8 A	4.4 A
Maximum steady state current at minimum voltage	12 A	11.0 A	5.5 A
Maximum inrush current	100 A	100 A	100 A
Maximum power consumption	690 W	690 W	690 W

Electrical Requirements for Micro Systems In the BA213 Enclosure

Table 9 lists the power cords used to operate a micro system at 240 V in the BA213 enclosure.

Table 9: 240 V Power Cords for Micro Systems In the BA213 Enclosure

Power Cord Number	Countries
BN20B-2E	Japan
BN20C-2E	Australia and New Zealand
BN20D-2E	Austria, Belgium, Czechoslovakia, Finland, France, Germany, Hungary, Netherlands, Norway, Poland, Portugal, Spain, and Sweden
BN20E-2E	United Kingdom and Ireland
BN20F-2E	Switzerland
BN20H-2E	Denmark
BN20K-2E	India, South Africa
BN20L-2E	Israel
BN20J-2E	Italy

Table 10 and Table 11 show electrical requirements for micro systems in the BA213 enclosure.

Table 10: Electrical Requirements for MicroVAX II And MicroPDP Systems in the BA213 Enclosure

Nominal AC Voltage ⟹	100 Vac	120 Vac	220-240 Vac
Voltage range	90 to 110 Vac	104 to 128 Vac	191 to 256 Vac
Power source phase	Single	Single	Single
Nominal frequency	50 to 60 Hz	50 to 60 Hz	50 to 60 Hz
Frequency range	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
Maximum steady state current at nominal voltage	10.2 A	8.6 A	4.7 A
Maximum steady state current at minimum voltage	11.3 A	9.8 A	5.4 A
Startup current (30 seconds)	13.5 A	11.5 A	6.3 A
Maximum inrush current	100 A	100 A	100 A
Maximum power consumption	670 W	670 W	670 W

Table 11: Electrical Requirements for MicroVAX 3500 Systems in the BA213 Enclosure

Nominal AC Voltage ⟹	101 Vac	120 Vac	220-240 Vac
Voltage range	88 to 110 Vac	104 to 132 Vac	176 to 264 Vac
Power source phase	Single	Single	Single
Nominal frequency	50 to 60 Hz	50 to 60 Hz	50 to 60 Hz
Frequency range	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
Maximum steady state current at nominal voltage	10.2 A	8.6 A	4.7 A
Maximum steady state current at minimum voltage	1.2 A	1.0 A	0.54 A
Startup current (30 seconds)	13.5 A	11.5 A	6.3 A
Maximum inrush current	100 A	100 A	100 A
Maximum power consumption	670 W	670 W	670 W

Electrical Requirements for Micro Systems In the H9642 Cabinet

For 120 V operation, micro systems in the H9642 cabinet must use a NEMA (National Electrical Manufacturers Association) L5-30R ac electrical receptacle rated at 30 amps.

For 240 V operation, most micro systems in the H9642 cabinet do not use the NEMA connector. Those 240 V systems that do use the NEMA connector operate on 60 Hz. Contact your Digital sales representative for information on any restrictions that may apply to 240 V, 60 Hz systems.

Table 12 lists the power cords used to operate a micro system at 240 V in the H9642 cabinet.

Table 12: 240 V Power Cords for Micro Systems In the H9642 Cabinet

Power Cord Number	Country	Service
BN18B-4E	United Kingdom and Ireland	240 V
BN18C-4E	Austria, Belgium, Finland, Netherlands, Norway, Portugal, Spain, and Sweden	220 V
BN18D-4E	Australia and New Zealand	240 V
BN18E-4E	Italy and Switzerland	220 V
BN18F-4E	Israel	230 V
BN18H-4E	India	220 V
BN18J-1K	US	240 V
BN18K-1K	Japan	100 V

Tables 13 and 14 show the electrical requirements for fully configured systems in the H9642 cabinet.

Maximum current and power values represent systems with two RA81 disk drives installed.

Table 13: Electrical Requirements for MicroPDP-11 Systems in the H9642 Cabinet

Nominal AC Voltage ⟹		120 Vac	240 Vac
Voltage range		93 to 132 Vac	186 to 264 Vac
Power source phase		Single	Single
Nominal frequency		60 Hz	50 Hz
Frequency range		59 to 61 Hz	49 to 51 Hz
Steady state current	Typical:	16.4 A	8.6 A
	Maximum:	24.0 A	12.0 A
Power consumption	Typical:	1710 W	1750 W
	Maximum:	3132 W	3216 W

Table 14: Electrical Requirements for MicroVAX II and VAXstation II/GPX Systems in the H9642 Cabinet

Nominal AC Voltage ⟹		120 Vac	240 Vac
Voltage range		90 to 128 Vac	184 to 256 Vac
Power source phase		Single	Single
Nominal frequency		60 Hz	50 Hz
Frequency range		59 to 61 Hz	49 to 51 Hz
Steady state current	Typical:	16.4 A	8.6 A
	Maximum:	24.0 A	12.0 A
Power consumption	Typical:	1722 W	1766 W
	Maximum:	3132 W	3216 W

Electrical Requirements for Micro Systems In the H9644 Cabinet

For 120 V operation, micro systems in the H9644 cabinet must use a NEMA L5-30R ac electrical receptacle rated at 30 amps. These systems require a CSA 12-3 type power cord.

For 240 V operation, micro systems in the H9644 cabinet must use a NEMA L6-15R ac electrical receptacle rated at 15 amps. Contact your Digital sales representative for information on any restrictions that may apply to 240 V, 60 Hz systems. Power cords for 240 V operation in the H9644 cabinet are the same as those for the H9642 cabinet. See Table 12 for a list of cord numbers.

Table 15 lists the electrical requirements for MicroVAX 3600 and VAXserver systems that use one H9644 cabinet. Tables 16 and 17 list the electrical requirements for a second H9644 cabinet in a MicroVAX 3600 and VAXserver system, respectively.

Table 15: Electrical Requirements for MicroVAX 3600 And VAXserver Systems in the H9644 Cabinet

Nominal AC Voltage $\Longrightarrow$	101 Vac	120 Vac	240 Vac
Voltage range	90 to 110 Vac	90 to 128 Vac	184 to 256 Vac
Power source phase	Single	Single	Single
Nominal frequency	50 to 60 Hz	50 to 60 Hz	50 to 60 Hz
Frequency range	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
Maximum steady state current			
At nominal voltage	28.5 A	24.0 A	12.0 A
At typical voltage	12.0 A	11.3 A	5.9 A
Startup current			
For 10 seconds	57 A	48 A	24 A
For 50 seconds	36 A	30 A	15 A
Typical power consumption	not specified	1090 W	1140 W

Table 16: Electrical Requirements for Auxiliary Cabinet Used With MicroVAX 3600 Systems

Nominal AC Voltage ⟹	101 Vac	120 Vac	240 Vac
Voltage range	not used	90 to 128 Vac	184 to 256 Vac
Power source phase	–	Single	Single
Nominal frequency	–	50 to 60 Hz	50 to 60 Hz
Frequency range	–	47 to 63 Hz	47 to 63 Hz
Maximum steady state current			
At typical voltage	–	8.0 A	4.1 A
At maximum voltage	–	8.3 A	4.6 A
Startup current (150 milliseconds)	–	44.0 A	33.0 A
Power consumption			
Typical	–	620 W	620 W
Maximum	–	960 W	960 W

Table 17: Electrical Requirements for Auxiliary Cabinet Used With VAXServer 3602 Systems

Nominal AC Voltage ⟹	101 Vac	120 Vac	240 Vac
Voltage range	90 to 110 Vac	90 to 128 Vac	184 to 256 Vac
Power source phase	Single	Single	Single
Nominal frequency	50 to 60 Hz	50 to 60 Hz	50 to 60 Hz
Frequency range	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz
Maximum steady state current at typical voltage	10.2 A	8.6 A	4.7 A
Maximum available current for cabinet	28.5 A	24.0 A	12.0 A
Startup current (10 seconds)	57.0 A	48.0 A	24.0 A
Power consumption			
Typical	670 W	670 W	670 W
Maximum limit of the power controller	2880 W	2880 W	2880 W

MicroVAX Services

Order No. EK-026AA-SV-001

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Preface

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Preface

This manual describes the hardware, software, and educational services provided by DIGITAL for MicroVAX systems.

1 Optimum Service

Integrated services provide a total solution to your hardware, software, and training needs. Optimum Service provides consistent, comprehensive, integrated services for the life of your system.

Start-up and long-term plans are available under DIGITAL's Optimum Service. The first-year Optimum Service automatically supplements the existing warranty services so that your system is covered for the first year.

The following sections describe each portion of the Optimum Service package.

1.1 Hardware Services

Optimum Service includes hardware installation and DECservice, DIGITAL's most comprehensive onsite service product. DECservice provides the following:

- A 4-hour service response time (for a system located within 100 miles of a DIGITAL service location)

- Continuous repair until a problem is solved

- A program of preventive maintenance

- Installation of the latest engineering changes

- Automatic escalation for complex coverage needed to support an application — up to 24 hours a day, 7 days a week

1.2 Software Services

Optimum Service includes the following:

- Startup service packages

- Media and documentation for licensed software purchased with the system

- Concurrent installation of the operating system and dependent products

- DECstart services that provide startup consulting service for system orientation, documentation review, system management, direct assistance, and hands-on experience with system operation and setup

- DECsupport or Basic service for software covering the operating system on dependent products for one year

Startup packages for software provide customers with the support necessary to successfully install, operate, and maintain software during the first year. DIGITAL offers three comprehensive Startup Packages. These packages are priced at the system level; that is, they cover all DIGITAL licensed software operating on a particular system at no additional charge.

Startup Package III

Package III is ideal for providing technical assistance and training to get system users off to quick and productive starts. It contains a comprehensive full year of service support for operating systems and their dependent software.

Package III includes the following:

- Software Product Services DECsupport service agreement
- Initial media and documentation for operating system and dependent software
- Training
- DECstart Plus
- Installation of operating system and designated dependent software

Startup Package II

Package II is appropriate for a technical staff that has the resources to support the new system, after DIGITAL has installed the product and trained the staff.

Package II includes the following:

- Software Product Services Basic service agreement
- Initial media and documentation for operating system and dependent software
- Training
- DECstart
- Installation of operating system and designated dependent products

Startup Package I

Package I is appropriate for a technical staff requiring minimal training and having the resources and skill to install and support the new system. DIGITAL provides telephone advisory support and media updates to maintain the software at its most current level.

Package I includes the following:

- Software Product Services Basic service agreement

- Initial media and documentation for operating system and dependent software

- Training on selected systems

1.3 Educational Services/Training

The training component of Optimum Service consists of a DECplan account with a specific amount of funds to purchase training appropriate to your needs. A DECplan account representative provides assistance in determining the most beneficial ways to allocate DECplan funds.

The training component in certain packages contains a specific educational product; for example, a computer-based instruction course or a DIGITAL Press book.

You may open a DECplan account any time you purchase training in advance from Educational Services. You always have the option of purchasing additional training at discount rates.

Refer to Section 4 for further information on available training.

2 Software Services

Software Services offers a wide range of comprehensive services to support you during any aspect of your system analysis, software development, or implementation efforts. These services start with the personal attention of a DIGITAL software consultant and continue for as long as you own the system.

2.1 Professional Services

DIGITAL's Professional Services organization offers a full range of consulting services to help you analyze, develop, implement, and productively use your DIGITAL computer system. These services provide benefits at all stages of a system's lifecycle: from planning and design, to the development and delivery of solutions, through a successful system startup and user implementation. In addition, Professional Services offers productivity services such as performance monitoring and capacity planning, and migration and conversion services.

Professional Services consultants possess extensive practical experience in areas such as manufacturing, office automation, information systems, artificial intelligence, and networks. The following sections describe the offerings of DIGITAL's Professional Services.

2.1.1 Planning and Design Services

Planning and Design Services assist you in evaluating your needs by determining the best approach to estimating the structure, systems, environment, and cost factors to provide the optimal solution. Areas of concentration include: long range growth planning, networks, office systems, and specific applications.

Network Planning and Design Services help you construct a new network or reconstruct an existing one to meet information flow requirements based on business needs, organization structure, and operational procedures.

Office Analysis and Design Services provide critical management analysis and planning tasks that precede the implementation of an office automation system. A DIGITAL consultant studies how each department in the organization works, and determines the technology and applications that will most effectively achieve specific business objectives.

Artificial Intelligence Planning and Design Services provide critical data to help select AI applications with the highest potential payoff and the lowest potential risks to meet business objectives.

2.1.2 Custom Applications Consulting and Projects

By working with you to understand and analyze your unique computing needs and applications, Professional Services provides solutions designed for specific applications. A large scale project could result in an entire turnkey solution; a smaller scale project could mean the building of a new application or the expansion of an existing one.

2.1.3 DECstart Consulting Services

DECstart Consulting Services are structured fixed-price consulting services automated system management tools that prepare you to effectively use and manage your systems. They are available for all major DIGITAL operating systems and networks.

2.1.4 Office Application Support Services

Office Application Support Services provide customized support and individualized onsite consulting for office staff. This includes orientation in the use of office products, support for the transition to an automated office, office procedures consulting, and training on customized applications installed on your systems.

2.1.5 Performance and Capacity Planning

Performance and Capacity Planning helps you monitor your systems, evaluate performance, resolve problems, and make recommendations on how to optimize system utilization. Specific areas of focus are system performance monitoring and capacity planning, and network management control and DECnet monitoring.

2.1.6 Migration and Conversion Services

RPG Migration Assistance Services assist in the organization, planning and implementation of the conversion of RPG source programs, data files, and command procedures from IBM System/3, System/34, or System/36 environments to the DIGITAL VAX environment.

Conversion services enable you to move from one operating system to another or from other vendors' software to DIGITAL's.

2.2 Networking Services

Software Product Service agreements apply to DIGITAL's software networking products. For large installations, Personal Computer services can be tailored to a Master Service Agreement for multiple systems.

3 Field Service

DIGITAL's Field Service organization supports customers with more than 20,000 service professionals in over 550 locations worldwide. Supporting every Field Service office are the resources to provide backup materials and technical support whenever needed. These include vast parts inventories, a computerized logistics network, and a team of support specialists at district, area, and headquarters levels.

3.1 Field Service Agreements for MicroVAX Customers

Field Service offers a wide variety of services through various contract and noncontract arrangements. For MicroVAX customers, Field Service offers DECservice and Basic Service Agreements.

3.1.1 DECservice Agreement

Onsite service agreements are available with coverage for 8 to 24 hours a day, and up to 7 days a week. DIGITAL's most comprehensive onsite service includes a written commitment to respond to your call for service within a specified time, within 4 hours if your site is within 100 miles of a DIGITAL Field Service Branch. Once a service representative is onsite, repairs are made quickly and remedial work continues until your system is operational again. Automatic "problem escalation" is also a part of the DECservice Agreement, drawing upon additional backup support as required to achieve timely repairs.

Scheduled preventive maintenance, parts, labor, and materials are provided under the DECservice Agreement. Under this agreement, DIGITAL installs the latest engineering modifications to keep equipment up to date. In addition, a field service representative is assigned responsibility for your system's maintenance and remedial service, and a comprehensive site management guide is provided at your site.

3.1.2 Basic Service Agreement

If you do not require a fixed response time and continuous remedial efforts, Field Service also offers a Basic Service Agreement. Basic Service typically provides next day response and continuous repair effort during coverage hours (8:00 A.M. through 5:00 P.M., Monday through Friday). Basic Service also provides problem escalation, preventive maintenance, labor, materials, installation of engineering modifications, assigned service representatives, and a comprehensive site management guide.

3.2 Software Product Services

DIGITAL's Software Product Services (SPS) organization provides advisory, preventive, and remedial service to help you before, during, and after software installation. These services provide special startup packages for the first year of a new system and include ongoing support that offers the opportunity to keep software up to date and running smoothly, while making the most productive use of your technical staff.

SPS offers several levels of support on a per-product basis. For customers purchasing new systems, Startup Packages are available through Optimum Service. For customers purchasing additional systems, contracts and add-on services are offered. SPS also has special services for multiple systems, products sold through OEMs and distributors, and small business applications.

3.3 Service Agreements

Field Service offers three types of service agreements: DECsupport, Basic, and Self-Maintenance.

3.3.1 DECsupport Service for Software

DECsupport service offers the most complete software service. DECsupport includes routine software maintenance, installation of updates, and onsite assistance when required.

3.3.2 Basic Service for Software

Basic service offers highly responsive answers to questions or problems your technical staff may have when maintaining your systems.

3.3.3 Self-Maintenance Service for Software

Self-Maintenance service offers software and documentation updates, as well as technical bulletins.

Table 1 lists the services provided by the three options.

Table 1: Software Service Options

DECsupport	Basic	Self-Maintenance
Installation of Updates		
Preventive Maintenance		
Remedial Support		
Telephone Support	Telephone Support	
DIGITAL's Software Information Network	DIGITAL's Software Information Network	
Software Media and Documentation Updates	Software Media and Documentation Updates	Software Media and Documentation Updates
Technical Newsletter	Technical Newsletter	Technical Newsletter
Software Performance Reports	Software Performance Reports	Software Performance Reports

3.4 Service Agreement Components

3.4.1 Installation of Updates

This service includes DIGITAL installation of new software release and interim updates for all operating systems and dependent products under contract. Products may be installed remotely by a Customer Support Center specialist assigned to your account or installed onsite by a local specialist. Remote delivery includes fast installation pretested to your unique system configuration and scheduled at a time that is convenient. Remote delivery is available on applicable products and scheduling is subject to the approval of the Customer Support Center (CSC). Remote delivery includes outbound calls from the CSC specialist assigned to you. Onsite installations are arranged at your request.

3.4.2 Remedial Support

Remedial support includes remote diagnostics, fault isolation, and correction of problems by installing solutions or workarounds. Onsite remedial support is available during contracted hours of coverage for problems that cannot be resolved by telephone, and that, by mutual agreement, are critical.

3.4.3 Telephone Support

Advisory assistance is provided by DIGITAL's Customer Support Centers 24 hours a day, 7 days a week for most DIGITAL operating systems.

3.4.4 DIGITAL's Software Information Network

You may access this easy-to-use service database for software information. Flash messages alert you to any serious software problems and their solutions.

3.4.5 Software Media and Documentation Updates

You automatically receive new software releases and interim updates with corresponding documentation for any operating system and dependent product under contract.

3.4.6 Technical Newsletters

Technical newsletters and dispatches contain information about new software developments and enhancements, programming notes, and documentation updates.

3.4.7 Software Performance Reports (SPRs)

A software performance report is a formal software problem report. Response may include any of the following: indication of status, specific workaround, specific solution, publication entry of information in the DIGITAL Software Information Network.

3.5 A La Carte Options for Single and Multiple Systems

The availability of these supplementary options may vary by country. Contact the nearest DIGITAL sales or service office for information on availability.

3.5.1 Installation Service

The purchase of installation as a separate service is appropriate when there is no need to purchase a Startup Package or there is a need to have add-on dependent products installed. Installation Service ensures that customers have received all of the proper distribution materials and ensures that the system generation process for the operating system and/or dependent software products is completed.

3.5.2 DECstart Service

For maximum productivity and cost-effectiveness, DECstart should be part of a Startup Package. However, it is available as a standalone service.

3.5.3 Software Product Updates

A software product update (H kit) provides the most current release of a software product, including documentation, for those who do not have SPS service, and standalone update service. Applicable software products are A–to–Z and M–DAS.

4 Educational Services

DIGITAL's Educational Services organization offers a wide range of high quality instructional programs and courses, enabling you to make the most effective use of training funds before, during, and after your systems are installed. Comprehensive educational curricula are available in a selection of course formats: seminars, instructor-led training, audiovisual courses, onsite training, self-paced instruction (SPI), and computer-based instruction (CBI). You may select the format, program, or delivery mechanism that best matches your training needs.

For information on seminars and instructor-led courses, call the Educational Services registrar in Bedford, MA at (617) 276-4949. To order CBI or SPI courses, call 1-800-343-8321 (outside Massachusetts) or 1-800-462-8066 (within Massachusetts). For information about CBI or SPI courses, write to:

Training and Information Products Group
Digital Equipment Corporation
12A Esquire Road
North Billerica, MA 01862

For information about seminars, call the seminar registrar at (617) 276-4949 or write to:

Seminar Programs
Educational Services
Digital Equipment Corporation
12 Crosby Drive
Bedford, MA 01730

4.1 Technical and Management Seminars

Technical and Management Seminars are designed for data processing professionals and managers, as well as for nontechnical personnel. Seminars that enable students to understand data processing and that focus on the newest technologies can be delivered at your site, at a local DIGITAL Training Center, or in a hotel conference facility.

4.2 Instructor-Led Courses

Instructor-led courses provide classroom lectures combined with hands-on experience in system or application software at one of DIGITAL's Training Centers or onsite at your facility. Students benefit from the expertise and personal attention of an expert instructor, as well as from classroom interaction with other course participants.

4.3 Self-Paced Instruction (SPI)

Self-paced instruction provides self-contained modular instructional units, exercises, and texts, enabling students to select specific topics necessary for their job requirements. SPI course content is often comparable to the content of DIGITAL's instructor-led courses. With SPI, however, you can learn at your own site, at your own pace.

4.4 Computer-Based Instruction (CBI)

Computer-based instruction provides a series of "packaged courses" that allows training to be presented on-line, combining study from text or workbook and interactive dialog with the student's computer. Students can learn at their own pace, scheduling CBI instruction around work needs, and can conveniently access these courses, which are provided on magnetic tape or on diskette.

4.5 Interactive Video Information System (IVIS)

Interactive Video Information System (IVIS) is a powerful, integrated hardware and software training tool. DIGITAL's IVIS combines the computing power of the Professional 300 Series computer with high-resolution video, dual-channel audio, sophisticated graphics, and text resulting in a versatile, dynamic learning workstation.

4.6 DIGITAL Press

DIGITAL Press publishes books for use by today's computer community, including engineers, computer professionals, and first-time computer users. Written by authorities and practitioners in the computer field, these publications address the interests of computer designers, system managers and users, as well as the academic needs of students and instructors. DIGITAL Press develops books in computer technology, computer management and business applications, general applications, the history of computing, subjects for first-time computer users, and books with specific reference to DIGITAL products.

4.7 Onsite Training

Seminars and instructor-led courses can be delivered at customer sites, particularly for customers with large-scale and multiuser training needs. Onsite instruction provides the added benefit of allowing users to learn one subject or more, together with their colleagues, on their own system.