RD52-D, -R
Fixed Disk Drive
Subsystem

Owner's Manual

digital™

RD52-D, -R Fixed Disk Drive Subsystem
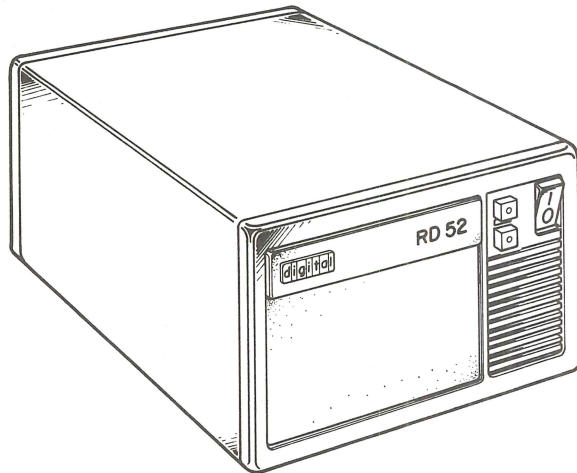
Owner's Manual

The material in this document is for informational purposes and is subject to change without notice; it should not be construed as a commitment by Digital Equipment Corporation.

Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

NOTICE: This equipment 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.

The following are trademarks of Digital Equipment Corporation.

digital	MASSBUS	RSTS
DEC	MicroPDP-11	RSX
DECmailer	MicroVAX	RT
DECmate	MicroVMS	UNIBUS
DECservice	PDP	VAX
DECUS	P/OS	VMS
DECwriter	Professional	VT
DIBOL	Q-Bus	Work Processor
	Rainbow	

Contents

Preface

Contents

Figures

Contents

Tables

You can use your free-standing RD52-D (desktop) or RD52-R (rack mount) subsystems as an add-on to MicroPDP-11, MicroVAX, PDP-11/23 PLUS, and other Q-Bus systems. You can easily attach the subsystems to an existing system or incorporate them in new designs.

Chapter 2, Operation, describes the function of the subsystem control panel switches, buttons, and indicator lights. Refer to your software documentation for information on how to use the subsystem with your system.

These subsystems operate with the RQDX1 RD/RX module installed in the host computer. Chapter 3, Technical Description, discusses the module(s) and cables necessary to prepare the MicroPDP-11, MicroVAX, and PDP-11/23 PLUS systems.

> **NOTE**
> **Only qualified service representatives should install the necessary boards and cables in the host computer. Refer to the *RQDX1 Controller User's Guide* and *11C23-UE/11C23-UC RD52 Installation Guide* for further information.**

Your RD52 fixed disk drive subsystem is a delicate precision instrument and subject to damage if handled improperly. It will give you good, reliable service if you observe the following precautions:

- Follow instructions carefully when installing your RD52 fixed disk drive subsystem.

- Do not drop or bump the fixed disk drive. The maximum impact a fixed disk can withstand is a drop of 15 cm (6 in) to a hard surface.

- Use care when you move your RD52 subsystem.

- Pack your fixed disk drive in its original packing material to prevent damage from shocks and vibrations when transporting or shipping your subsystem.

If you need help:

- Refer to Chapter 4, Troubleshooting.

- For hardware questions, call your service representative.

- For software questions, call your sales representative and ask for an access code number for the Digital Phone Support Center (PSC).

INTRODUCTION

Place the RD52-D, -R subsystem where it is to be used.

- Allow space around the unit for air circulation and servicing.
- Place the unit away from heaters, photocopiers, and direct sunlight.
- Minimize static by placing the unit away from busy office corridors.
- Keep the area free from dust and other abrasive materials.
- Keep the unit away from magnets and equipment that generate magnetic fields, such as motors, transformers, and terminals.

To install an RD52-R, start at page 1-2.
To install an RD52-D, start at page 1-4.

UNPACK THE RD52-R (RACK MOUNT) SUBSYSTEM

If any item is missing or damaged:

* Contact your sales representative.
* Contact your delivery agent.

Prepare the H9302 rack mount kit, which is shipped separately. Refer to documentation provided with the kit for instructions.
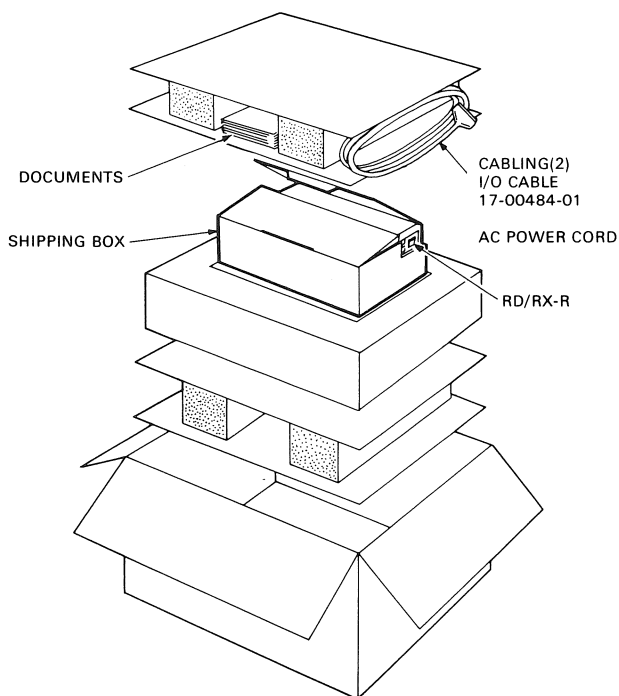
Figure 1-1   Unpacking the RD52-R (Rack Mount) Subsystem

The RD52-R subsystem is shipped completely assembled and ready to install in an H9302 rack mount assembly.

INSTALL THE RD52-R SUBSYSTEM AND FRONT COVER

The front cover is provided with the H9302 rack mount kit.
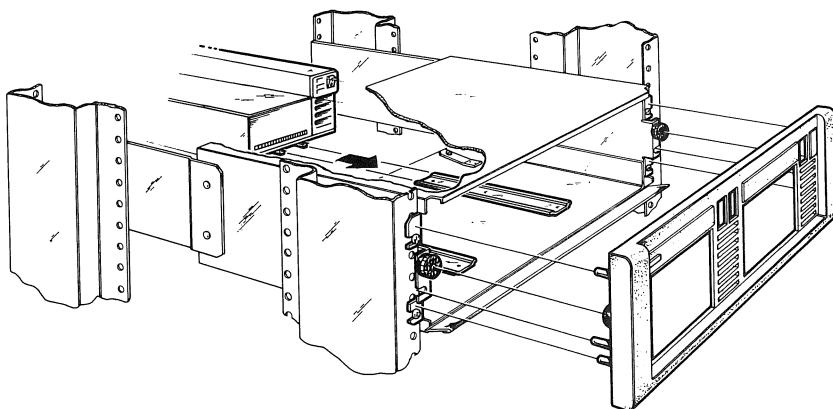
Figure 1-2   Installing an RD52-R Subsystem in a Rack Mount Assembly

UNPACK THE RD52-D (DESKTOP) SUBSYSTEM

If any item is missing or damaged:

- Contact your sales representative.
- Contact your delivery agent.
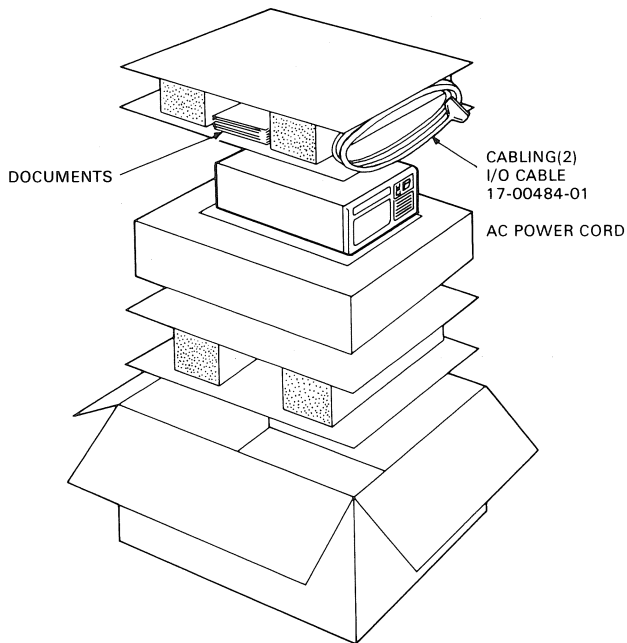
Figure 1-3   Unpacking the RD52-D (Desktop) Subsystem

The RD52-D subsystem is shipped completely assembled and ready to connect to the computer system.

CONNECTING AN RD52-D, -R SUBSYSTEM TO A
MicroPDP-11 OR MicroVAX

Connect the I/O signal cable to the J2 connector of the RD52 disk drive and to the
50-pin connector in the computer patch and filter panel assembly.
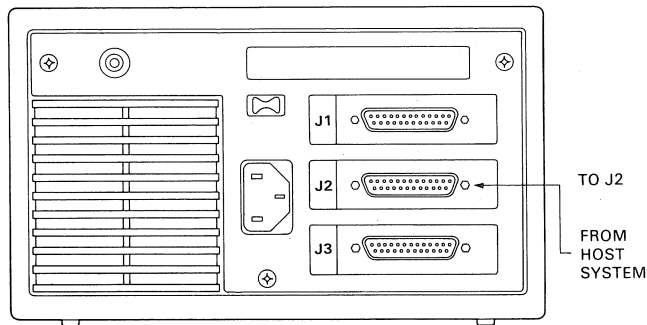
Figure 1-4   An RD52 Subsystem Connected to a MicroPDP-11 or
MicroVAX (BA23 Enclosure)

CONNECTING ONE OR TWO RD52-D, -R SUBSYSTEMS TO A PDP-11/23 PLUS

Connect the I/O signal cable to the J1 connector of the RD52 subsystem and to the 50-pin connector in the computer patch and filter panel assembly.
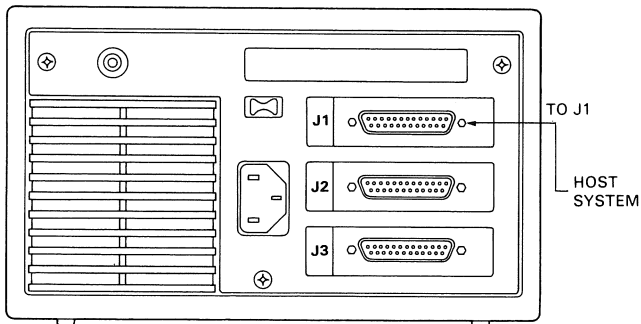
Figure 1-5   One RD52 Subsystem Connected to a PDP-11/23 PLUS (H349)
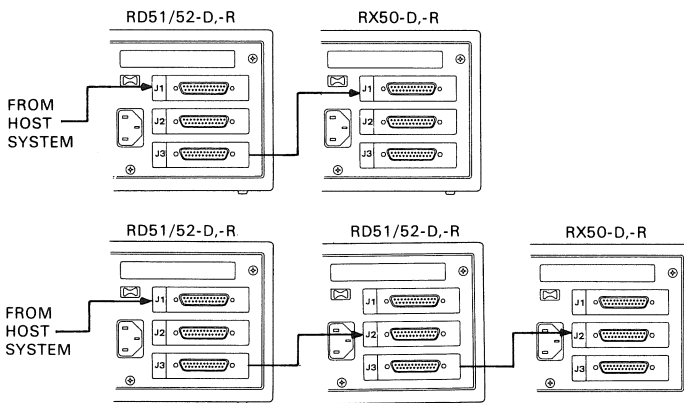
Figure 1-6   Two RD52 Subsystems Connected to a PDP-11/23 PLUS (H349)

Refer to Chapter 3, Configuration for a more technical discussion of considerations involved when installing multiple RD52-D, -R systems.

IDENTIFY THE POWER CORD AND CHECK THE VOLTAGE SWITCH

Make sure that the plug on the power cord matches the wall outlet.

> **CAUTION**
> **An incorrect voltage setting can damage your subsystem and your computer.**
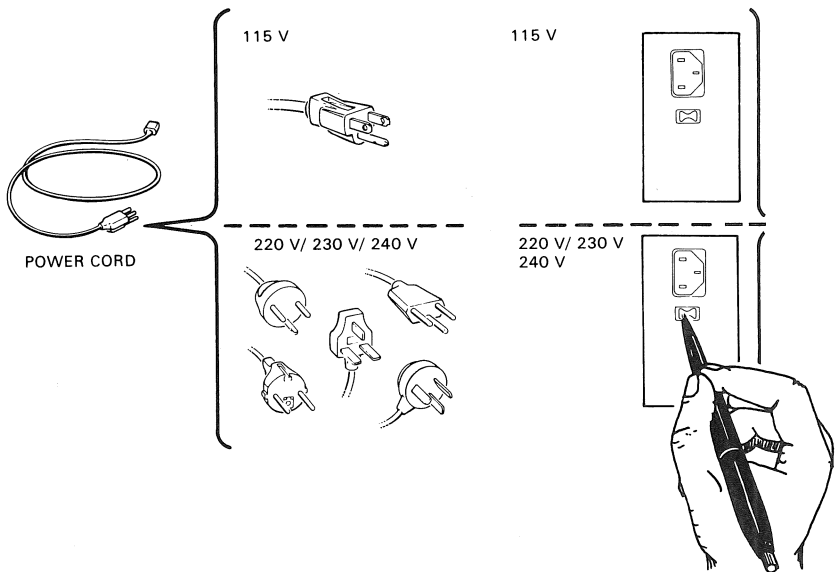
Figure 1-7   Identify the Power Cord and Check the Voltage Switch

CONNECT THE POWER CORD TO THE SUBSYSTEM AND THE WALL OUTLET

If you are adding an RD52-D, -R subsystem to a PDP-11/23 PLUS, connect the power cord to the power controller in the rack.

SET THE POWER SWITCH OF THE COMPUTER AND THE SUBSYSTEM TO 1 (ON)

Make sure the Ready button on the subsystem's control panel is in the out position (lit - green). After 15 seconds, the system displays its start-up message.

Before you can test the system and use the RD52 subsystem, you must first format it.

> **NOTE**
> **Formatting the RD52 subsystem destroys any files that are present on the disk drive. If you think that files exist, make a backup copy before you proceed. Write-protect any other RD51/RD52 fixed disk drives that are present. Refer to your software documentation for instructions.**

Your new subsystem becomes DU1 (disk unit 1) if the cable is connected to the J2 connector and you have a MicroPDP-11 or MicroVAX with an internal RX50 and an RD51 or RD52 fixed disk drive.

Refer to Appendix A, Table A-1, for the disk unit designation for any other arrangement or for a RD52-D, -R subsystem installed on a PDP-11/23 PLUS.

Make sure you label the subsystem. Drive unit labels come with the base computer system.

To format an RD52 subsystem installed on a MicroPDP-11 system, go to page 1-9. To format one installed on a MicroVAX system, go to page 1-14.

FORMATTING A MicroPDP-11 SYSTEM

(User responses are in **COLOR**.)

Find the Field Service Test Diskette 4 (CZXD4D0) and insert it in drive 1. Press the **Return** key.

Type **R ZRQB??** after the "." (period) prompt. Press the **Return** key.

This runs the diagnostic program. The question marks allow any revision of the program to be used. When formatting an RD52 subsystem, make sure you have Version 5 or later. Earlier versions format the RD52 subsystem as though it is an RD51 subsystem (11 Mbytes).

A response similar to the following appears on the terminal.

DR>

You must respond to this prompt with a command to run the program.

Type **START**. Press the **Return** key.

Then answer the following questions.

CHANGE HW (L)?

This is a program that answers hardware questions and is prebuilt to format unit 0 with default answers.

Type **N** (no). Press the **Return** key.

CHANGE SW (L)

This program answers software questions.

Type **N**. Press the **Return** key.

ENTER DATE (in mm-dd-yy format) (A)?

Type the current date. For example, 09-15-84. Press the **Return** key.

ENTER UNIT NUMBER TO FORMAT <0>

This is either drive unit 0 or 1. Type **1** if you are formatting an installed RD52 subsystem. Type **0** if you are formatting an internal RD52 subsystem or a single add-on to a PDP-11/23 PLUS.

Type **1** or **0**. Press the **Return** key.

USE EXISTING BAD BLOCK INFORMATION?

This activates the reformat mode – reads the manufacturer's information on the disk and cylinder.

Type **Y** (yes). Press the **Return** key.

> **NOTE**
> **The program takes approximately 12 minutes to complete. The N (no) response takes approximately 30 minutes to complete.**

CONTINUE IF BAD BLOCK INFORMATION IS INACCESSIBLE

Type **Y**. Press the **Return** key.

ENTER A NONZERO SERIAL NUMBER:

Type your serial number (located on the back panel of your unit). Press the **Return** key.

The system displays a message similar to the one below.

FORMAT BEGUN

After about 12 minutes, the system displays a completion message similar to the one below.

FORMAT COMPLETED

Remove the diskette.

If formatting is not successful, the system displays an error message when the error occurs. Refer to page 1-12 for help.

RUN THE USER TEST

Refer to your specific computer system owner's manual for instructions.

NOTE
Version 5 and later of the MicroPDP-11 User Test supports the addition of an RD52 disk drive.

Upon successful completion of the User Test, the system displays a message similar to the following one.

TESTING OF THIS SYSTEM IS NOW COMPLETE.

You have successfully installed, formatted, and tested your RD52-D, -R disk drive subsystem.

If you encounter any errors, refer to the Troubleshooting section of your specific computer's owner's manual.

FORMATTING HELP AND INFORMATION

The following is a list of error messages generated by the formatter, their probable cause, and what to do. Errors 1, 2, and 3 occur almost immediately; error 4 can appear up to about 1 minute after starting; error 5, from 1 to 10 minutes; and errors 6 and 7, after 10 minutes.

(1) UNIT IS NOT WINCHESTER OR CANNOT BE SELECTED

Unit selected is either unavailable or is an RX50 disk drive. Check to make sure the Winchester is not write-protected.

Make sure the switch on the bottom of the disk drive is set correctly.

(2) INITIAL FAILURE ACCESSING FCT

The format control table cannot be read.

Try reconstruct mode; see page 1-13 for instructions. If that fails, replace the disk.

(3) FACTORY BAD BLOCK INFORMATION IS INACCESSIBLE

Occurs only in reformat mode when bad block data is not accessible.

Run in reconstruct mode; see page 1-13 for instructions.

(4) SEEK FAILURE DURING ACTUAL FORMATTING

There is a hardware error.

Check for hardware problems.

(5) REVECTOR LIMIT EXCEEDED

The disk is bad.

Replace the disk.

(6) RCT WRITE FAILURE

Write to disk failed after successful formatting and surface analysis.

Check write-protect status.

(7) FAILURE CLOSING FCTS

Disk is marked as unformatted.

FORMATTING MODES

Three questions select the type of format mode which is run: reformat, restore, or reconstruct. In order, the three questions are:

1. Use existing bad block information?

2. Down-Line Load?

3. Continue if bad block information is inaccessible?

The first two questions determine which mode is run. The second question does not appear unless the first question is answered N. An answer of N (no) to question 3 causes the diagnostic to stop and print an error if a bad spot is found.

Reformat Mode – If your answer to question 1 is Y, no further questions are asked. The format program reads the manufacturer's bad blocks from a block on the disk. It then formats all of the disk except for these bad blocks. This takes about 12 minutes. If it fails, try restore mode.

Restore Mode – If your answer to question 1 is N, the program asks you to type in a list of the bad blocks. It then formats all of the disk except for the bad blocks you specify. You can input the bad blocks using the list that comes with the drive. It asks you for the serial number. This number is found on the top of the RD52 disk drive. The program only allows you to type in the last 8 digits of the serial number. Restore mode takes about 15 minutes.

Reconstruct Mode – If you answer N to both questions 1 and 2, the program searches the disk and identifies all the bad blocks. It does not use the manufacturer's bad block information. It then formats all of the disk except for the bad blocks it identified. This takes about 30 minutes.

FORMATTING A MicroVAX SYSTEM

Refer to your system technical manual for instructions when formatting an RD52-D, -R subsystem installed in a MicroVAX II.

(User responses are in **COLOR**.)

Find the diagnostic diskette labeled MicroVAX Diagnostics 2 of 2, and insert it in drive 1. Press the **Return** key.

Type **B/10 DUA2** after the system prompt. Press the **Return** key.

This boots the diagnostic test. DUA2 is the disk drive unit designation of drive 1 of the RX50 diskette drive. After the diagnostic supervisor boots, the console terminal displays a header message identifying the version of the diagnostic supervisor.

This prompt is displayed.

DS>

Type **ATTACH RQDX1 HUB DUA 772150**. Press the **Return** key.

772150 is the RQDX1 module address.

Type **ATTACH RD52 DUA DUA1**. Press the **Return** key.

If you are formatting an RD51, type **RD51**. DUA1 is the disk unit designation number of the installed subsystem.

Type **SELECT DUA1**. Press the **Return** key.

Type **RUN EHXRQ/SECT=FORMAT**. Press the **Return** key.

The console terminal displays a message similar to the following.

..PROGRAM:RQDX1 Functional Test, ZZ-EHXRQ, revision 1.0, 24 tests at 08:55:03:12 testing DUA1

This identifies the disk unit to be formatted.

Then answer the following questions.

ENTER TODAY'S DATE (DD-MM-YY)

Type the current date. For example, 09-NOV-84. Press the **Return** key.

ENTER VOLUME SERIAL NUMBER (NNNNNNNN)

Type your serial number. Enter a number from 1 to 8 digits long. This number may be one you invent, or it may be the actual serial number of the disk. The serial number is located on the white bar code label on the fixed disk. Omit all letters from the serial number as the formatter does not accept any letters.

The format program displays a warning prompt.

PREVIOUS DISK CONTENTS WILL BE DESTROYED, IS THIS CORRECT?

Type **YES**. Press the **Return** key.

A **NO** response cancels the formatting program and returns you to the DS> prompt.

The system displays a message similar to the following.

FORMAT BEGUN

Formatting an RD51 subsystem takes about 12 minutes; formatting an RD52 subsystem takes about 30 minutes. When the disk has been formatted, the system displays a message similar to the following.

FORMAT COMPLETE

Information is also provided about the number of blocks on the disk that were revectored and the number of bad blocks that were found.

After these messages the system displays an end-of-run message followed by the DS> prompt.

Refer to your system's owner's manual for instructions to test the RD52-D, -R subsystem.

Operation 2

INTRODUCTION

This chapter contains an overview of the operation of the RD52 subsystem. It is intended as a quick reference for the user. An in-depth explanation of the subsystem can be found in Chapter 3, Technical Description.

FRONT PANEL

The RD52 subsystem is controlled by using the on/off switch and the Ready and
Write-Protect buttons. Several indicator lights show the ready, write-protect, and
voltage status of the subsystem. Figure 2-1 shows the front panel and Table 2-1
summarizes the operation of the on/off switch and the control buttons, and explains
the function of the indicator light.
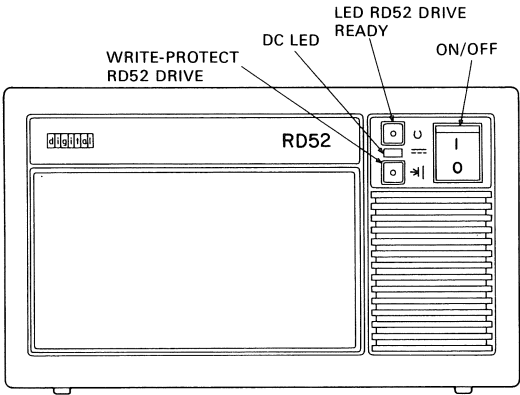
Figure 2-1   Front Panel

Table 2-1   Control Panel Switch, Buttons, and Indicator

Switch	Position	Function
On/Off	1 (lit - red)	Switches the subsystem on.
	0	Switches the subsystem off.

Button	Position	Function
Ready	Out (lit - green)	The subsystem is ready to be used for information storage by the system software.
	In	Disables the subsystem. In effect, the subsystem is turned off.
Write-Protect	Out	Out is the normal operating position. System software is able to read and write information on the disk.
	In (lit - yellow)	Prevents the system software from writing on the fixed disk. Write-protect the disk when making backup copies of the disk's contents. Write-protect the disk when running tests to prevent accidental erasure if the wrong diagnostic program is chosen.

Indicator	Function
DC	This indicator is lit (green) when the power supply is generating the correct dc voltage.

REAR PANEL ASSEMBLY

The rear panel contains three multi-pin connectors, an ac power outlet, voltage switch, ac circuit breaker, and fan exhaust (Figure 2-2). Table 2-2 describes the use of the three connectors.
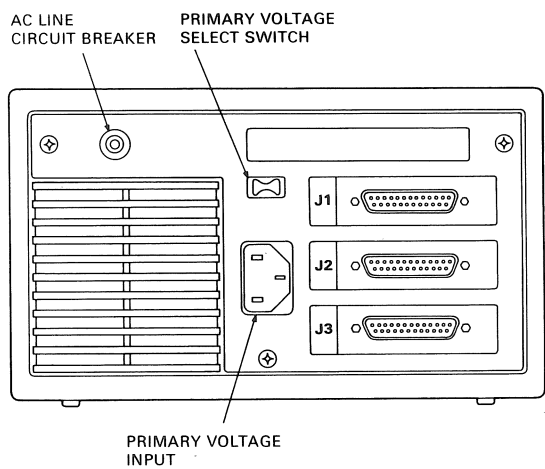
Figure 2-2   Rear Panel Assembly

Table 2-2   **Rear Panel Components**

Component	Function	Description
Connectors J1 and J2	Input	Receives signals from the computer or another subsystem. Only one of these connectors can be used at one time on a subsystem.
Connector J3	Output	Connects two subsystems together. A cable connected to J3 is attached to J1 or J2 of an adjacent subsystem. Only a PDP-11/23 PLUS accommodates more than one subsystem.

The RD52 subsystem is a 133.4 mm (5.25 in) fixed disk drive enclosed in either a free-standing or rack mounted housing. Each RD52 subsystem contains its own power supply and fan and stores 31 Mbytes of information. Information is stored magnetically in much the same way that sound is recorded on audio tape. Information stored on a fixed disk can be erased and replaced with new information.

CARE AND HANDLING OF THE RD52 SUBSYSTEM

- Never bump or drop the subsystem.

- Back up all files on a regular basis. Refer to your system software documentation for backup instructions.

- Write-protect the disk when making backup copies onto diskettes or tape to prevent accidental loss of information.

- Write-protect the disk when you test the system. This prevents accidental loss of information if you choose a wrong test.

- Keep the fixed disk drive away from direct sunlight, heaters, photocopiers, and X-ray equipment.

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

INTRODUCTION

This chapter contains two sections. The first section describes the following attributes of the RD52-D, -R fixed disk drive.

- Physical features
- Operating features
- Environmental requirements
- Power supply
- Fan
- Front panel controls
- Rear panel
- Logical unit numbers

The second section discusses configuration requirements for MicroPDP-11, MicroVAX, and PDP-11/23 PLUS systems using the RD52 subsystems, and includes several typical configurations.

PHYSICAL FEATURES

The RD52 subsystem is a free-standing 133.4 mm (5.25 in) mass storage device. You can use it as an add-on to MicroPDP-11, MicroVAX, PDP-11/23 PLUS, and some other Q-Bus hosts. The subsystem can also be expanded into multiple drive configurations. For both desktop and rack mount units, a simple cable connection between contiguous subsystems enables the multi-drive arrangement (see Figure 3-1).

It is also a random-access storage device with four nonremovable disks as the storage media. The 18-sector format has a total capacity of 31 Mbytes. Refer to Chapter 1, Installation, for the formatting procedure.

Each RD52 subsystem consists of a mounting chassis that holds the fixed disk drive, power supply, dc cooling fan, printed circuit board for external cable signal distribution, and front and rear panels.

A. RD52 SUBSYSTEM, DESKTOP MODEL

1. FRONT BEZEL

2. COVER

3. CHASSIS

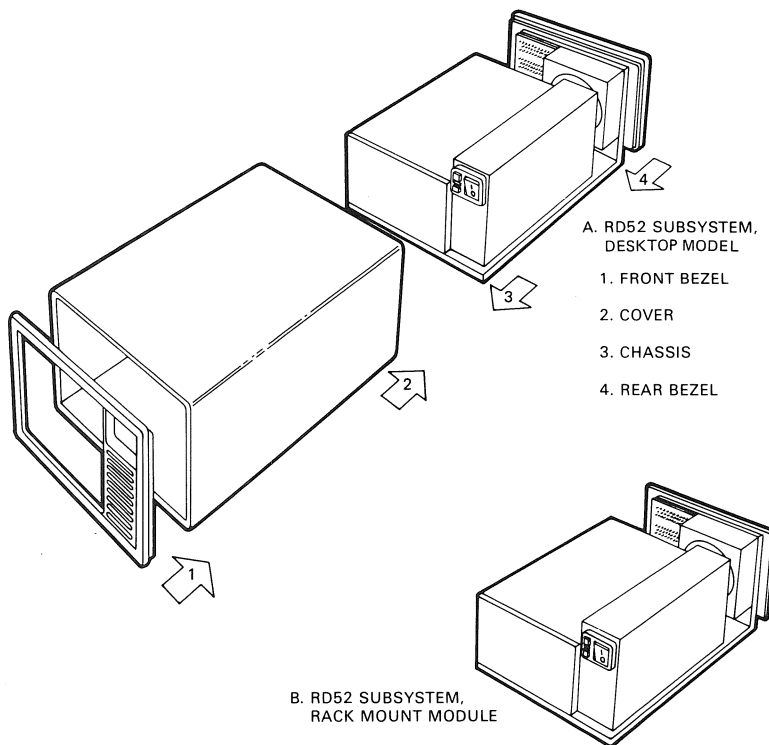4. REAR BEZEL

B. RD52 SUBSYSTEM, RACK MOUNT MODULE

Figure 3-1   Desktop and Rack Mount Subsystems

Rack mount units must be mounted within an H9302 rack mount kit. The rack mount kit, which ships separately, holds two subsystems side by side and fits a standard 19-inch rack. Desktop units have a cover and front and rear bezels already installed.

The subsystem operates with either 120 V (RD52-DA, -RA) or 240 V (RD52-DB, -RB) primary power. Primary power is controlled by using the on/off switch on the front panel. Refer to Appendix B for specifications.

The RD52 disk drive is a field replacable unit (FRU). Refer to Chapter 4, Troubleshooting, for FRU procedures.

OPERATING FEATURES

The RD52 subsystem operates with the RQDX1 (M8639) RD/RX controller module and RQDX1-E (M7512) extender module installed in MicroPDP-11, MicroVAX, or PDP-11/23 PLUS systems.

The RD52 disk drive is fully supported by PDP-11 and MicroVMS software and is compatible with the Digital Storage Architecture (DSA) Mass Storage Control Protocol (MSCP).

ENVIRONMENTAL REQUIREMENTS

Disk drives are susceptible to high humidity, shock, and radiated emissions. The fixed disk drive can withstand a maximum impact of a drop of 15 cm (6 in) to a hard surface. Refer to Appendix B for environmental and operating specifications.

POWER SUPPLY

The RD52 power supply uses either 120 Vac or 240 Vac primary power that is selected by a switch (VOLT SEL) on the rear panel. The switch is factory set to 120 Vac (RD52-DA, -RA) or 240 Vac (RD52-DB, -RB). The power supply provides:

- +12 A Vdc for the fixed disk drive
- +12 B Vdc for the dc cooling fan
- +5 Vdc for the control logic

The +5 Vdc and +12 Vdc regulators are not adjustable.

The circuit breaker (CB) protection on the primary line includes protection to prevent overheating of the disk media. Refer to Appendix B for power supply specifications.

DC COOLING FAN

The dc cooling fan receives +12 B Vdc from the power supply. The fan attaches to the internal side of the rear panel and pulls air from the front of the subsystem and exhausts it out the rear.

FRONT PANEL

The front panel contains control switches, buttons, and indicators. **Figure 3-2** shows the layout of the control panel.
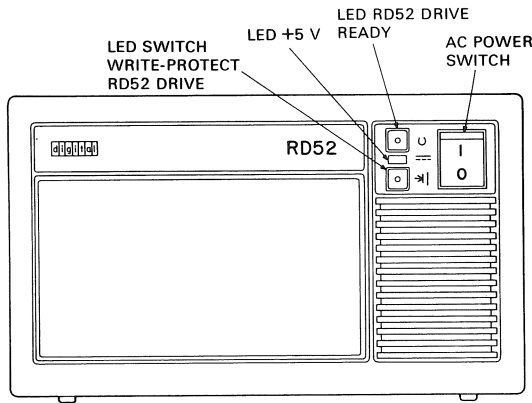
Figure 3-2   Front Panel Switches and Indicators

The function of the switches and indicators is as follows:

- A rocker type switch labeled ON/OFF connects/disconnects ac power to the internal power supply.

- The top (green) LED lights when the disk drive is ready to be used for information storage by the system software.

  The Ready indicator is an LED pushbutton switch and is operator controlled. The light goes out when the button is pushed in and indicates that the disk is unavailable for read/write operations.

- The middle (green) LED lights when dc power is present.

- The bottom (yellow) LED lights when the disk drive is write-protected. The disk can be read by the system software.

  The Write-Protect indicator is an LED pushbutton switch and is operator controlled. The light goes out when the button is out. Information can be read and written to the disk by the system software.

  WARNING
  AC power can be present within the chassis, even though the dc (green) LED is not lit and/or the dc fan is not turning. Never access the internal chassis without unplugging the unit from the ac power source.

REAR PANEL

The rear panel contains the circuit breaker (CB) that fuses the ac power coming into the subsystem and the primary voltage selection switch (VOLT SEL) set for either 120 Vac or 240 Vac. It also contains the ac line connector that accommodates the ac power cord, the dc fan housing exhaust opening, and connectors J1 through J3. Figure 3-3 shows the rear panel layout.
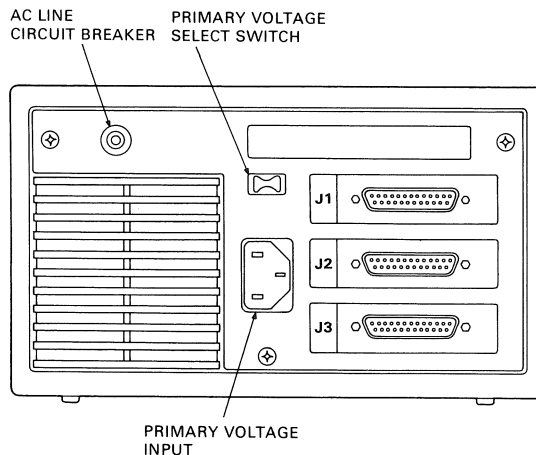

Figure 3-3   Rear Panel

The J1 connector of the RD52 subsystem responds to a DRV SEL 3 (L) signal on the drive interface cable coming from the host. The system software labels the RD52 DU0 (disk unit 0) when this connector is used. Use this connector only when you are installing an RD52 subsystem with a PDP-11/23 PLUS system. Refer to Appendix A for a listing of DU (disk unit) designations and possible logical unit number arrangements on the RQDX1 module.

The J2 connector of the RD52 subsystem responds to a DRV SEL 4 (L) signal on the drive interface cable coming from the host. The system software labels the RD52 DU1 when this connector is used. Refer to Appendix A for a listing of DU (disk unit) designations and possible logical unit number arrangements on the RQDX1 module. Also refer to your system's technical manual for more information.

> **NOTE**
> Only one of these connectors (J1 or J2) on a single drive can be used at one time.

The J3 connector connects two adjacent disk drive subsystems and carries the signal out from the first subsystem attached to the host.

> **NOTE**
> The design of the RD52 subsystems allows a maximum total cable length of 3.6 m (12 ft). If you have a total cable length in excess of this, you may have problems.

Refer to Appendix C for a listing of J1, J2, and J3 pin number and signal names and for a listing of pins and voltages on the 12-pin dc power ouput connector.

LOGICAL UNIT NUMBER (LUN)

The RQDX1 module supports a variety of peripheral devices, including multiple arrangements of RD51, RD52, and RX50 disk drives.

The LUNs and the LUN jumpers may prove useful for future expansions. Jumpers on the RQDX1 controller module select the LUN. These jumpers determine the lowest LUN assigned to any RD51, RD52, and RX50 disk drives present in the system.

The RQDX1 module automatically sizes the logical unit configuration during initialization of the system to determine how many of the four possible units are actually present. This automatic sizing eliminates the need for reconfiguration of jumpers when units (RD51/RD52 or RX50 drives) are added to or removed from the controller module. The system software automatically assigns disk unit numbers (DUN) to any drives that are present.

The system software always assigns the lowest DUNs to any RD51 or RD52 fixed disks that are present. For example, the system software assigns DU0 to an internal fixed disk and DU1 to a fixed disk connected to the host computer through the J2 connector on the subsystem. The system software then assigns DU2 and DU3 to the RX50 diskette drive.

Appendix A lists the standard LUN jumper configuration for the RQDX1 module and the DUN assignment for various combinations of RD51/RD52 and RX50 drives. An RX50 diskette drive is two units.

CONFIGURATION

Configuring an RD52 disk drive into a particular system requires auxiliary equipment. The following describes the requirements and cables to use for each system configuration.

SYSTEM CONTROLLER AND CABLE OPTIONS

Tables 3-1 and 3-2 describe the function of the components needed to configure various systems. Refer to your system technical manual, the *RQDX1 Controller User's Manual*, and the *11C23-UE/11C23-UC RD52 Installation Guide* for further details.

Table 3-1   System Controller Options and Kits

Model	Description
RQDX1 (M8639)	The RQDX1 is the controller/interface for the RX50 and RD51 or RD52 disk drive. It accommodates the MSCP Q-Bus.
	One controller handles up to four logical units with no more than two RD52 subsystems per controller. The controller is programmed to assume an RX50 disk drive is present. One RX50 disk drive is equal to two LUNs.*
RQDX1-E (M7512)	This bus extender module and cable enable external disk drives (RX50, RD51, or RD52) to connect to the MicroPDP-11 internal controller-to-drive bus.
	It allows either one external RX50, RD51, or RD52 disk drive to be connected to the MicroPDP-11 controller, depending on the RQDX1 configuration guidelines.
CX-RQDXE-KA	This is the cabinet cable kit for installing the RQDX1-E extender in a BA23 enclosure (MicroPDP-11 or MicroVAX).
CX-RQDX1-KC	This is the cabinet cable kit for installing the RQDX1 controller in a H349 enclosure (PDP-11/23 PLUS).

*   The RQDX1 controller has a capacity of four logical unit numbers (LUNs), three of which are used internally by standard MicroPDP-11 and MicroVAX systems. An internal RX50 disk drive uses two of these logical unit numbers. An RD51-D, -R or RD52-D, -R subsystem can use the remaining logical unit number. The system software labels these LUNs as disk unit numbers 0 to 3 (DU0 to DU3).

The RQDX1 module accommodates only two fixed disk drives (see Appendix A). The RQDX2 controller module accommodates up to four fixed disk drives.

Table 3-2   Cable Options*

Model	Description
17-00484-01	This 2.75 m (9 ft) host-to-external-drive interconnection cable is a 50-pin "D" subminiature male to a 50-pin "D" subminiature male, shielded, molded cable.
BC17Y 1J	This .3 m (1 ft) external drive-to-drive interconnection cable is a 50-pin "D" subminiature male to a 50-pin "D" subminiature male, shielded, molded cable.

*   The design of the RD52-D, -R subsystem allows a maximum total cable length of 3.6 m (12 ft). If you have a total cable length in excess of this, you may have problems.

MicroPDP-11 AND MicroVAX

Most MicroPDP-11 and MicroVAX systems contain inboard RD51-A or RD52-A and RX50-AA drives and each system resides in a BA23 enclosure. Each system also contains an RQDX1 controller. Before installing a subsystem, add an RQDX1-E extender module and cable to the BA23 enclosure and connect the cable to the patch and filter panel (Figure 3-4).
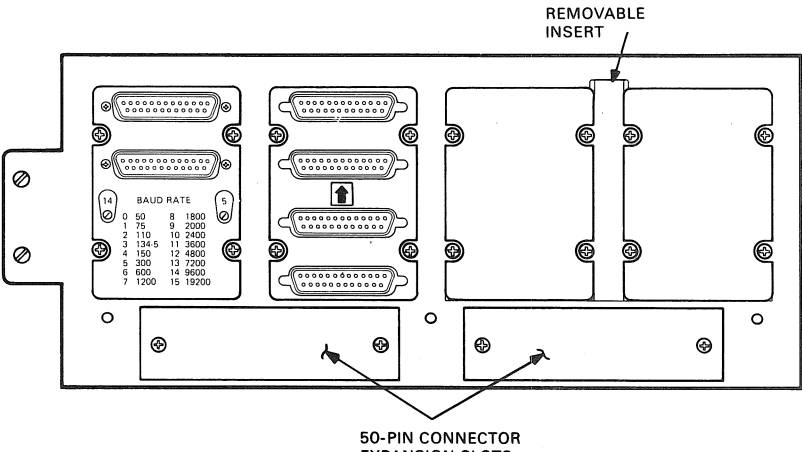

Figure 3-4   BA23 Patch and Filter Panel

The BA23 patch and filter panel contains areas for use in system expansion. The cabinet cable kits contain the necessary cabling for system expansion. This cabling connects to a proper connector on the internal side of the patch panel. The subsystem user can simply connect to the external connector on the patch panel. Table 3-1 discusses the cabinet kits and Table 3-2 lists the external cable options.

MicroPDP-11 AND MicroVAX CONFIGURATION

A BA23 enclosure (MicroPDP-11 and MicroVAX), prior to any add-on RD52 sub-system, contains the following:

- 1 RQDX1 controller
- 1 CK-RQDX1-KA cabinet kit
- 1 RD51-A (drive only) or RD52-A (drive only)
- 1 RX50-AA (drive only)

Figure 3-5 illustrates how to add a single RD52 subsystem to a MicroPDP-11 or MicroVAX (BA23 enclosure). In this configuration, the BA23 enclosure already contains two inboard drives (an RD51-A or RD52-A and an RX50-AA), an RQDX1 controller, and the internal cable (CK-RQDX1-KA).
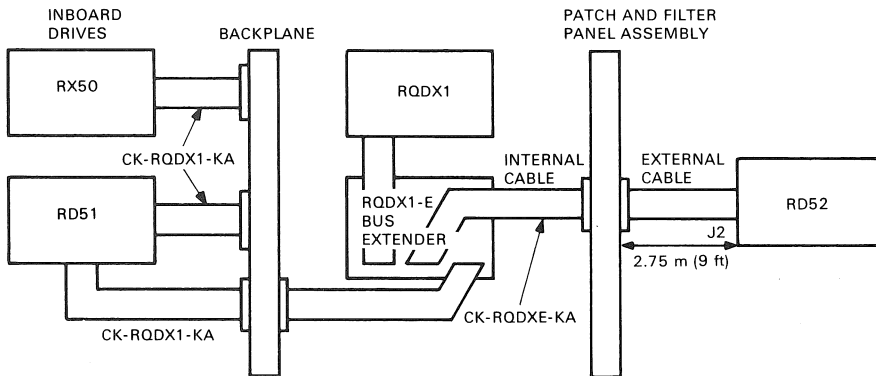

Figure 3-5   One RD52 Subsystem With a BA23 Enclosure

The requirements for adding the external RD52 subsystem are:

- 1 RQDX1-E bus extender*
- 1 CK-RQDXE-KA cabinet kit RD/RX controller extender BA23*
- 1 RD52-D subsystem
  or
- 1 RD52-R subsystem with 1 H9302 rack mount kit

---

*   Order as one item with a system for factory RQDX1-EP integration.

PDP-11/23 PLUS

The PDP-11/23 PLUS does not contain any internal RD/RX disk drives. Before adding a subsystem to a PDP-11/23 PLUS, an RQDX1 controller and cabinet key cable (CK-RQDX1-KC) must be connected to the H349 distribution panel (Figure 3-6).
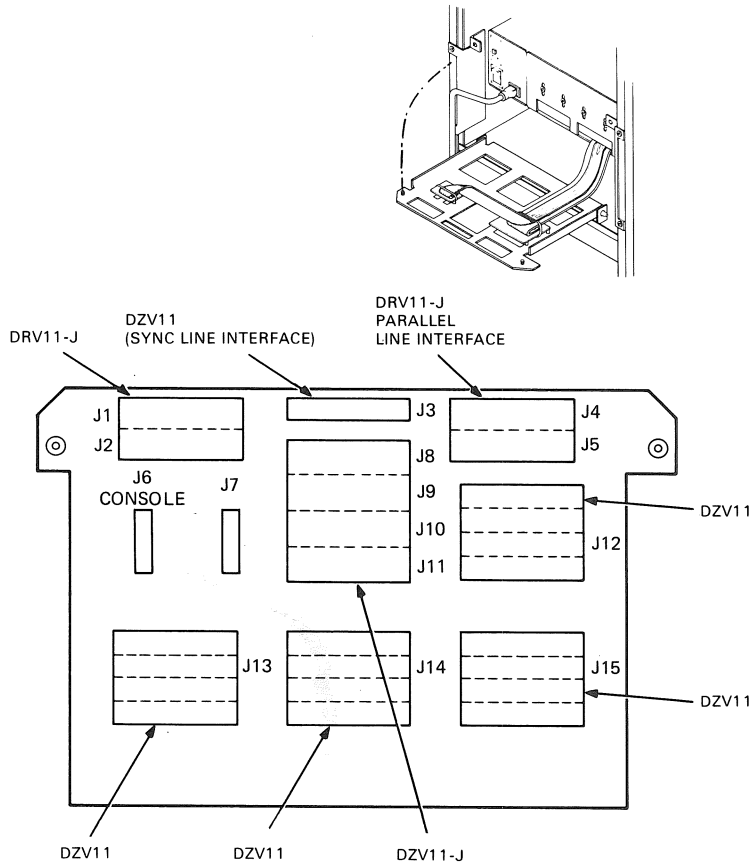

Figure 3-6   PDP-11/23 PLUS H349 Distribution Panel

The H349 distribution panel contains areas for use in system expansion. The cabinet kits contain the cabling for system expansion. This cabling connects to a proper connector on the internal side of the patch panel. The subsystem user can simply connect to the external connector on the patch panel. Table 3-1 discusses the cabinet kits and Table 3-2 lists the external cable options.

PDP-11/23 PLUS CONFIGURATION

To accommodate external add-on drives, a PDP-11/23 PLUS system requires an RQDX1 controller and a cabinet key cable (CK-RQDX1-KC) connected to the H349 distribution panel.

Figure 3-7 illustrates a single RD52 subsystem add-on to a PDP-11/23 PLUS via the H349 panel. This arrangement is suitable for a range of applications involving a single add-on RD52 subsystem.
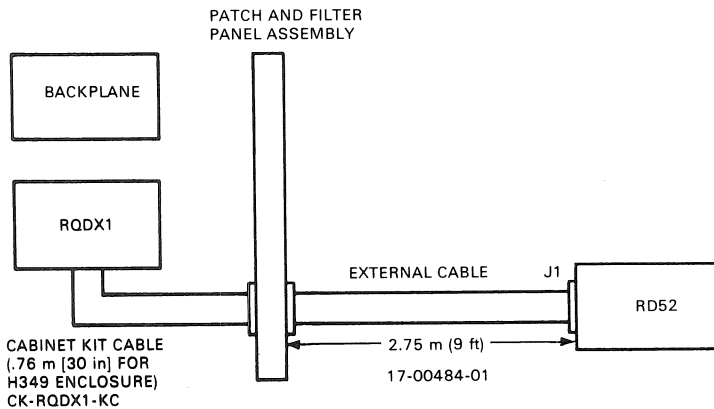
PATCH AND FILTER
PANEL ASSEMBLY

BACKPLANE

RQDX1

EXTERNAL CABLE   J1

RD52

CABINET KIT CABLE
(.76 m [30 in] FOR
H349 ENCLOSURE)
CK-RQDX1-KC

2.75 m (9 ft)

17-00484-01

Figure 3-7   One Subsystem Add-On for a PDP-11/23 PLUS

The requirements for adding this single external drive to the PDP-11/23 PLUS are as follows:

- 1 RQDX1 controller
- 1 CK-RQDX1-KC cabinet kit
- 1 RD52-D subsystem
  or
- 1 RD52-R subsystem and 1 H9302 rack mount kit

Figure 3-8 illustrates how to add two subsystems via the H349 panel.
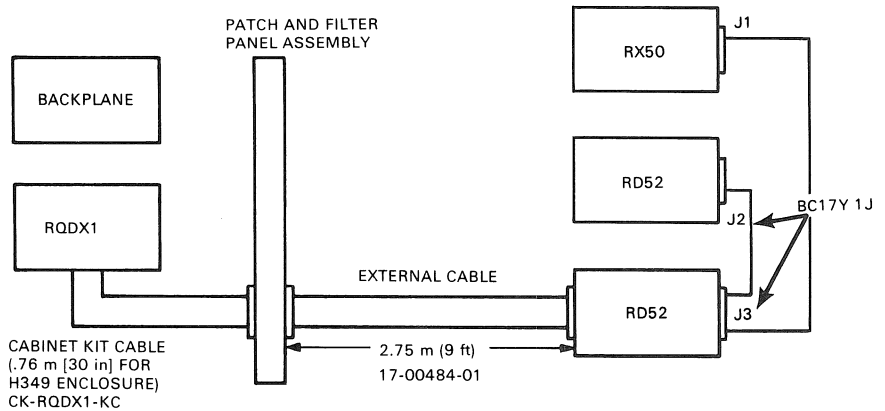

Figure 3-8   Two Subsystem Add-Ons to a PDP-11/23 PLUS

The requirements for adding two subsystems are as follows:

- 2 RD52-D subsystems or 2 RD51-R subsystems with 1 H9302 rack mount kit
  or
- 2 RX50-D subsystems or 2 RX50-R subsystems with 1 H9302 rack mount kit
  or
- 1 RD52-D or -R subsystem with 1 H9302 rack mount kit and 1 RX50-D or -R subsystem
- 1 BC17Y-1J subsystem interconnection cable for two drive configurations

3-13

INTRODUCTION

Troubleshooting is the process of isolating and repairing minor problems. System diagnostic tests check almost every part of the system every time you turn the system on. In addition, the MicroPDP-11 and MicroVAX User Test and field service diskettes contain extended tests for the circuitry and various devices that may be installed on the system.

Troubleshooting of the RD52 subsystem generally involves running the system User Test or running the program from the system boot/diagnostic ROM. Refer to your system owner's manual for User Test instructions. Refer to your system technical manual for system boot/diagnostic ROM testing procedures.

TROUBLESHOOTING TABLES

From time to time you may encounter an error that is not related to system diagnostic tests. Table 4-1 provides a basic checklist of some of these problems, their possible cause, and ways to correct them. The corrective procedures listed here are for minor problems.

> **NOTE**
> **Major repair or replacement of any parts of this subsystem should be carried out only by qualified repair personnel.**

The procedure for replacing an RD52 subsystem starts on page 4-4.

Table 4-1   Basic Troubleshooting Procedure

Problem	Possible Cause	Corrective Action
System does not start from the subsystem.	Power cable is not plugged in or power switch is off.	Plug in the subsystem power cord. Make sure the power switch is set to 1 (on).
	Subsystem cable is incorrectly installed.	Make sure the subsystem cables are installed in the proper connectors.
	The Ready button is pressed in.	Press and release the **Ready** button. The button should be out and the light should be lit (green).
	The Halt button on the host is pressed in (lit - red).	Press and release the host **Halt** button. The button should be out and the light should not be lit.
	There is no software on the subsystem.	Load your software onto the fixed disk drive. Follow the instructions provided with your software.
Fixed disk read error message.	The Ready button is pressed in.	Press and release the **Ready** button. The button should be out and the light should be lit.
	The test detected a bad block.	Copy data from the RD52 disk drive to diskettes and retry the test. If the problem persists, replace the disk drive.

Table 4-1   Basic Troubleshooting Procedure (Cont)

Problem	Possible Cause	Corrective Action
Fixed disk write error message.	The Ready button is pressed in.	Press and release the **Ready** button. The button should be out and the light should be lit.
	The disk is write-protected.	Press and release the **Write-Protect** button. The button should be out and the light should not be lit.
Subsystem did not write but there were no read errors.	There is incompatible software.	Check that the correct software is installed.

REMOVAL AND REPLACEMENT PROCEDURES

The field replaceable units (FRU) associated with the RD52-D, -R subsystem are shown in Table 4-2.

Table 4-2   RD52 Subsystem FRUs

FRU	Part Number
Cables	
Host to subsystem, 2.75 m (9 ft)	17-00484-01
Drive to drive, .3 m (1 ft)	BC17Y-1J*
RD52-A disk drive	30-21721-02
	or
	30-23227-02
Main printed circuit board	29-24992-00†
Power supply assembly	30-22561-01
Fan assembly	70-21260-01

*   The RD52-D, -R is designed for a maximum total cable length of 3.6 m (12 ft). Combined cable length in excess of this can produce problems.

†   The MPCB is an FRU only on RD52-A disk drives with a part number of 30-21721-02.

WARNING
Only qualified field service personnel should attempt to repair or replace any parts of this subsystem.

Make sure to back up all files on a fixed disk before you attempt any repair or replacement procedures.

Make sure you format a newly installed RD52 disk drive. See Chapter 1, Installation, for instructions.

Only format a disk drive when you replace a complete RD52 drive assembly.

RD52 FIXED DISK DRIVE REMOVAL

To remove the RD52 fixed disk drive from the rack mount or desktop subsystems:

1. Set the subsystem power switch to 0 (off).

2. Remove the ac power cord and all other cables from the subsystem.

    WARNING
    Failure to remove the power cord exposes you to extreme danger. AC power can be present within the chassis, even though the green dc LED is not lit and/or the fan is not turning.

3. Press the quick-release tab on the rear of the rack mount unit and pull the basic chassis from the rack (see Figure 4-1).

GROOVE FOR CHANNEL GUIDE

BASIC CHASSIS FRONT VIEW

QUICK RELEASE CATCH

A. SUBSYSTEM MOUNTING ARRANGEMENT, UNDERSIDE OF BASIC CHASSIS.

RACK MOUNT HOUSING REAR VIEW

QUICK RELEASE TAB

B. MATING MOUNTING ARRANGEMENTS (2), ON FLOOR OF RACK MOUNTING HOUSING.
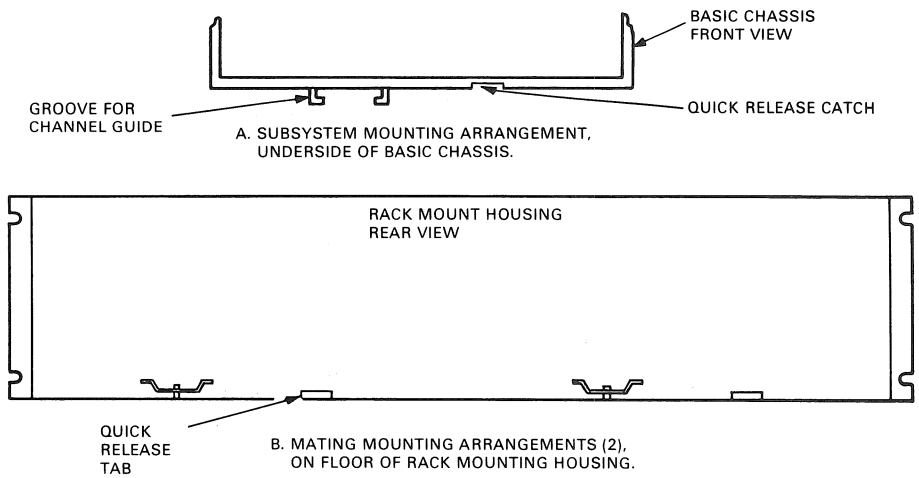
Figure 4-1   Removal from Rack Mount Housing

For the desktop model (RD52-D), remove the rear bezel (three screws) and slide the basic chassis out from the rear of the unit. Use tab located at upper middle of rear panel to pull unit out (see Figure 4-2).

A. RD52 SUBSYSTEM, DESKTOP MODEL

1. FRONT BEZEL

2. COVER

3. CHASSIS

4. REAR BEZEL
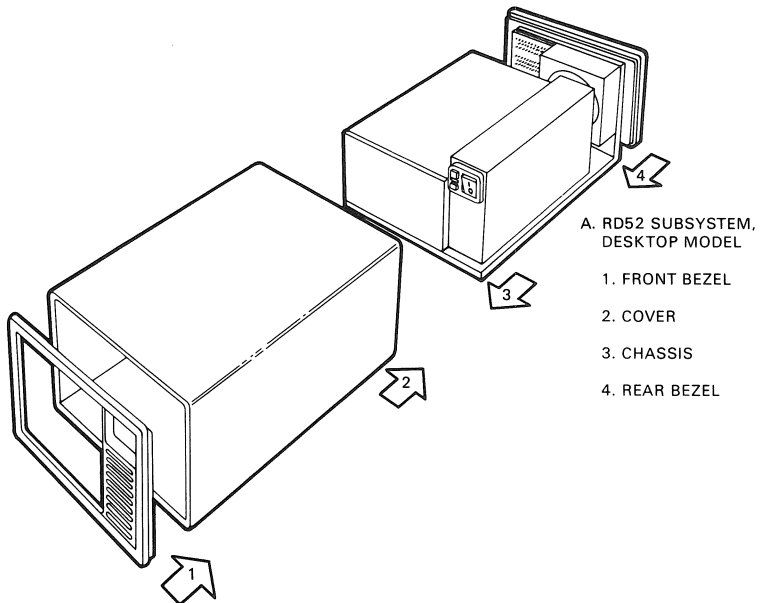
Figure 4-2   Removal from Desktop Housing

4. Press the latch with a pencil and slide the fixed disk forward (see Figure 4-3).

CAUTION
Do not drop or bump the fixed disk drive. It is a precision instru-
ment and subject to damage if handled roughly.
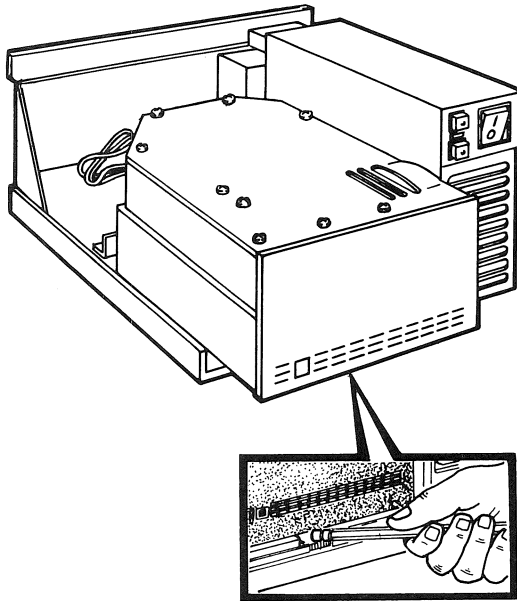
Figure 4-3   Sliding the Fixed Disk Drive Forward

5. Unplug the 4-wire power cord from the back of the fixed disk drive (see Figure 4-4).

4-WIRE CONNECTOR   FIXED DISK CONNECTOR
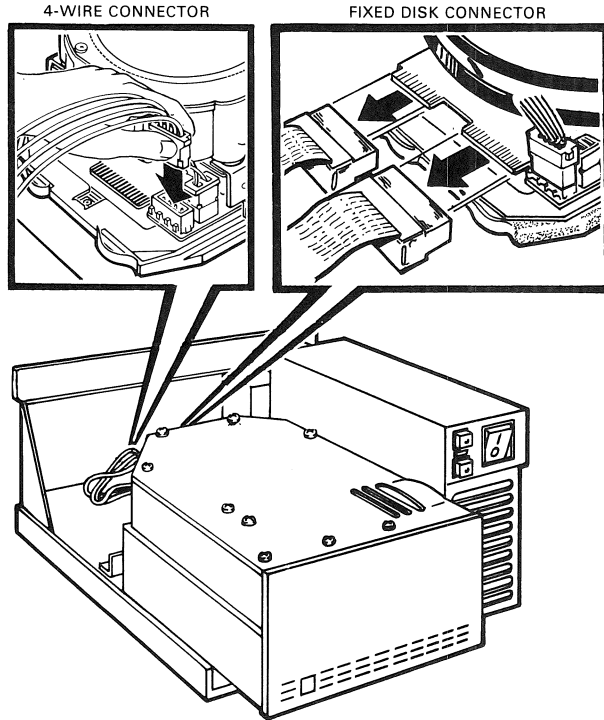
Figure 4-4   Remove the Power Cord and Drive Cables

6. Pull the fixed disk drive cable straight out of the back of the fixed disk drive as shown in Figure 4-4. Do not remove this cable at an angle to the disk drive.

7. Slide the fixed disk drive out of the chassis. Use the replacement fixed disk drive's shipping carton to package the drive if it is to be returned.

MAIN PRINTED CIRCUIT BOARD REMOVAL (RD52 DISK DRIVE WITH PART NUMBER 30-21721-02 ONLY)

If you remove an RD52 disk drive with this part number, replace the main printed circuit board (MPCB) before replacing the whole drive (see Figure 4-5).
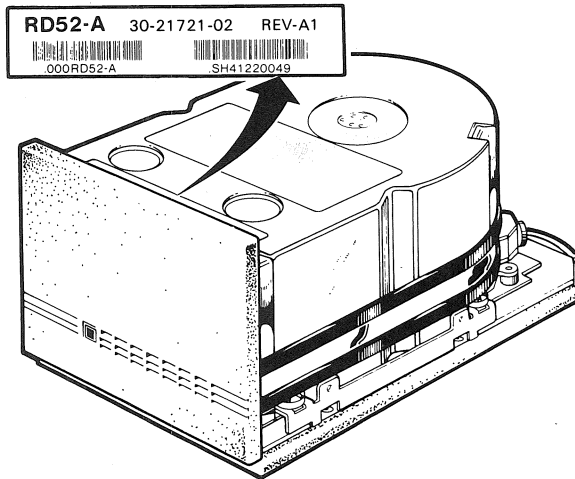
Figure 4-5   RD52 Disk Drive Serial Number

NOTE
The screws that you will be removing from the slide plate and MPCB are different sizes. Make sure you install the screws in their proper locations.

To remove the main printed circuit board:

1. Place the drive upside down on a flat work surface and remove the four Phillips screws retaining the slide plate and ground clip. Set the slide plate aside (see Figure 4-6).
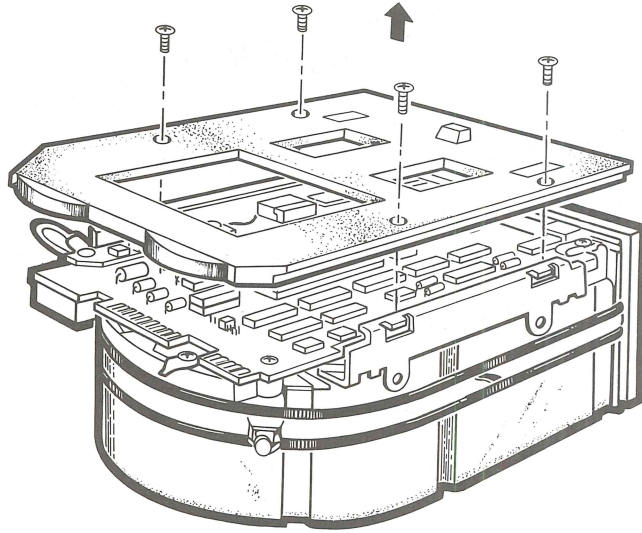
Figure 4-6   Remove the Slide Mounting Plate

2. Unplug the 2-pin connector (near the front bezel) from the MPCB with your fingers (see Figure 4-7).

3. Remove the two Phillips screws that attach the front bezel to the drive, as shown in Figure 4-7.
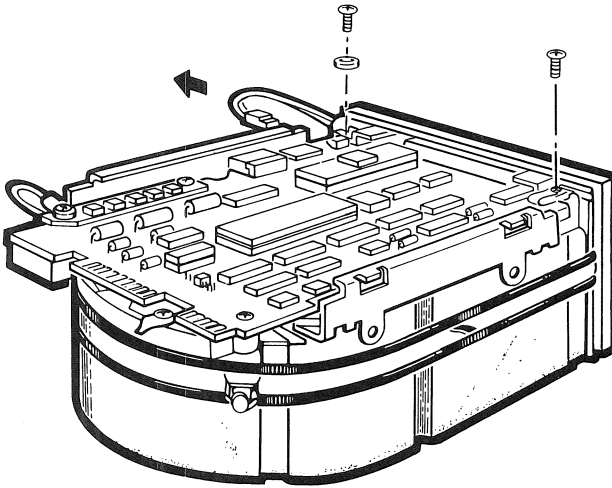
Figure 4-7   Remove the 2-Pin Connector and Screws

4. Remove the front bezel by pulling it away from the drive. The bezel is held in place with pop fasteners (see Figure 4-8).
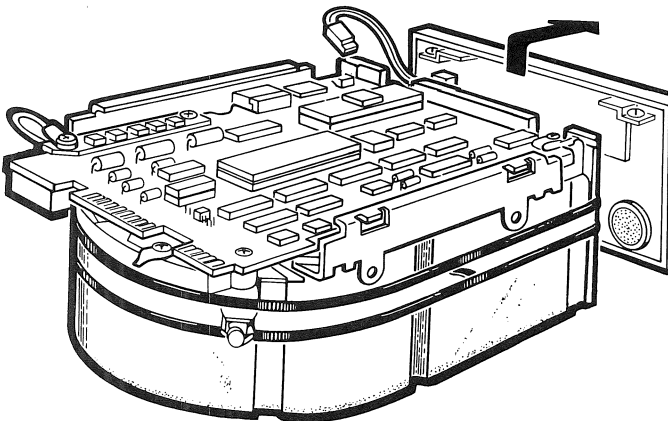
Figure 4-8   Remove the Front Bezel

5. Remove the three Phillips screws from the heatsink, the grounding strip, and the corner opposite the heatsink (see Figure 4-9).
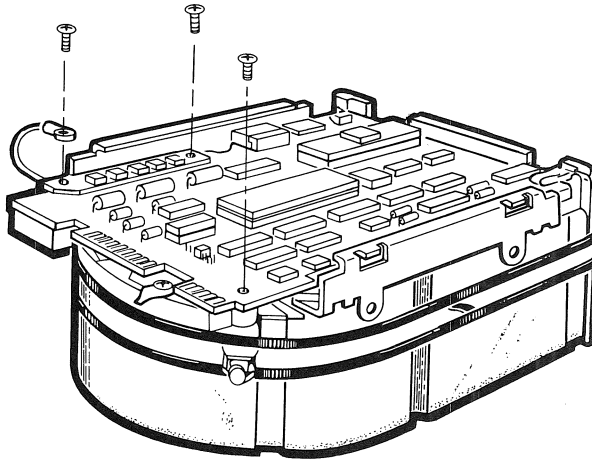
Figure 4-9   Remove Phillips Screws from Heatsink

6. Lift the MPCB straight up until it clears the chassis. This disconnects the 12-pin fixed plug (P4) at the front end of the drive (see Figure 4-10).

7. Disconnect the 10-pin connector (P5) on the heatsink side of the MPCB, as shown in Figure 4-10.
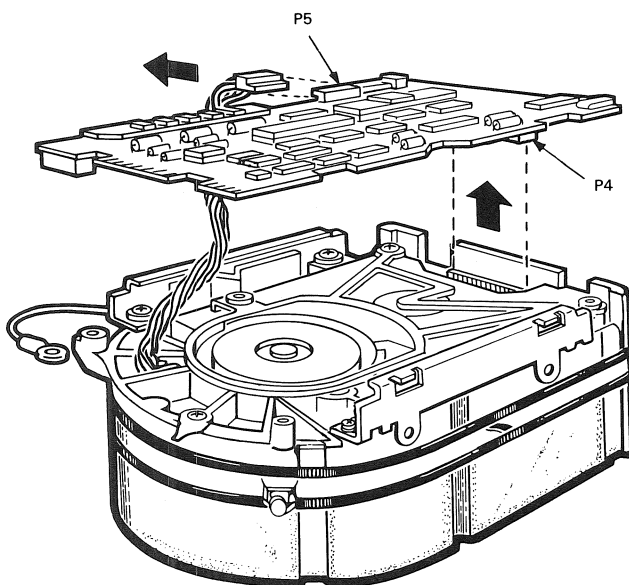
Figure 4-10   Remove the MPCB

To install a replacement MPCB, reverse steps 1 through 7.

FIXED DISK DRIVE INSTALLATION

To install a replacement fixed disk drive:

1. Make sure the jumper clip on the fixed disk drive is set at DS3 (see Figure 4-11).
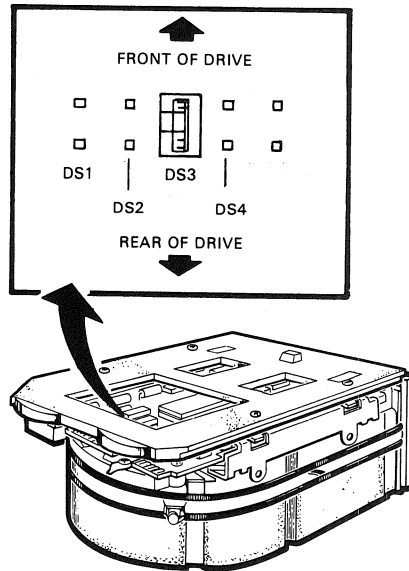
Figure 4-11   Set Jumper Clip

2.   Align the the groove on the bottom of the disk drive with the channel guide on the floor of the chassis, shown in Figure 4-12.

GROOVE FOR
CHANNEL GUIDE   A. UNDERSIDE RD52

CATCH FOR
QUICK RELEASE
CHANNEL GUIDE   SPRING

B. MATING MOUNTING ARRANGEMENT,
ON FLOOR OF CHASSIS
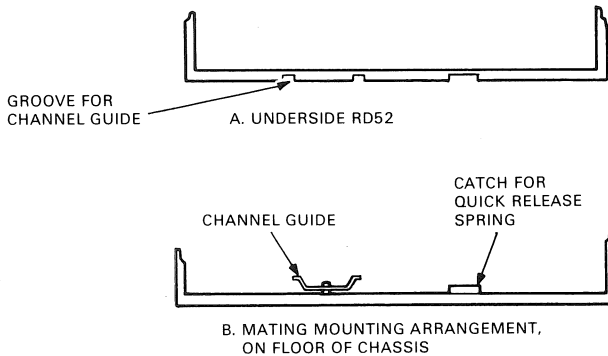
Figure 4-12   RD52-D, -R Subsystem Groove and Channel Guide

Reverse steps 1 through 7 of the removal procedure to install the disk drive.

You must format a newly installed RD52 fixed disk drive before it can be used. Take care to insert the proper disk unit number where directed in the format procedure (see Appendix A for the proper DUN). Refer to Chapter 1, Installation, for formatting and testing instructions.

WARNING
Write-protect any other fixed disk drives that may be present before you format a newly installed RD52 fixed disk drive.

Only format a disk drive when you replace a complete RD52 drive assembly.

POWER SUPPLY REMOVAL

Use the following procedure to remove the power supply.

> **NOTE**
> **The power supply is a complete FRU. It is not adjustable and does not contain replaceable printed circuit boards.**

1. Remove all cables from the RD52 subsystem.

2. Remove the rear bezel (three screws) and slide the chassis out the rear of the unit.

    Remove the front bezel from rack mounted units, press the quick release tab, and remove the chassis from the rack.

3. Remove the two screws located on the top plate of the power supply and tip the power supply assembly gently to the right (looking from the front).
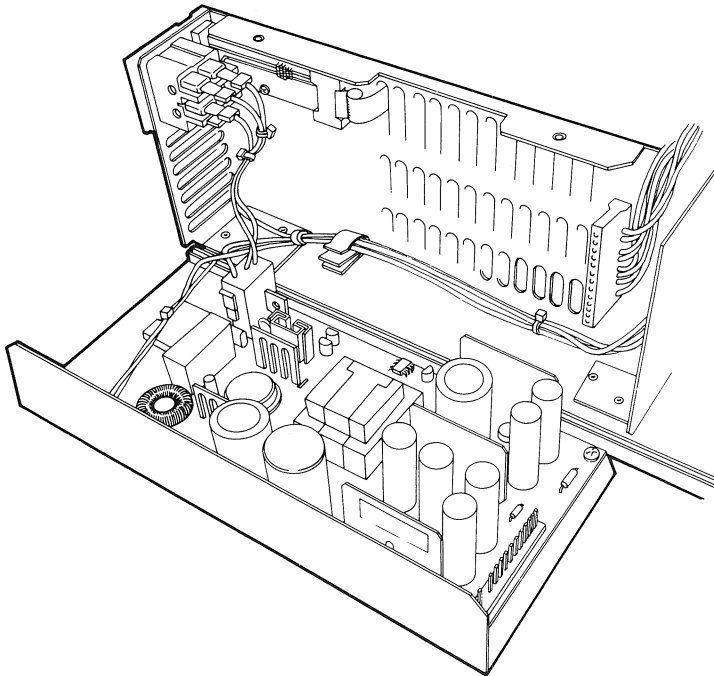
Figure 4-13   Power Supply, Component Side View

4. Disconnect the dc power connector located at the rear of the power supply (see Figure 4-13).

5. Lift the power supply assembly out of the chassis.

6. Disconnect the ac power connector located at the lower front of the power supply (see Figure 4-13).

Reverse steps 1 through 6 to install a replacement power supply.

FAN ASSEMBLY REMOVAL

1. Remove all cables from the RD52 subsystem.

2. Remove the rear bezel (three screws) and slide the chassis out the rear of the unit.

    Remove the front bezel from rack-mounted units, press the quick release tab, and remove the chassis from the rack.

3. Disconnect the dc plug to the fan assembly and remove the four screws on the rear panel holding the fan assembly in place.

4. Remove the fan assembly.

Reverse steps 1 through 4 to install a replacement fan.

DISK UNIT NUMBER DESIGNATION

When an RD52-D, -R subsystem is connected to a MicroPDP-11, MicroVAX, or PDP-11/23 PLUS system, the computer software labels the unit as DU0 or DU1 (disk unit). Table A-1 shows the disk unit designations made by the system software for the MicroPDP-11, MicroVAX, and PDP-11/23 PLUS systems. Make sure you label the subsystem. Drive unit labels come with the base computer system.

You can only have two RD51 or RD52 fixed drives installed with your system at any one time.

Table A-1   Disk Unit Designations

Disk Drive(s)	MicroPDP-11	MicroVAX	PDP-11/23 PLUS
Internal RX50	DU0,DU1	NA	NA
Internal RX50 and	DU0,DU1	NA	NA
Add-On RX50	DU2,DU3*	NA	NA
Internal RX50 and	DU1,DU2	DU1,DU2	NA
Internal RD51/2	DU0	DU0	NA
Internal RX50 and	DU2,DU3	DU2,DU3	NA
Internal RD51/2 with Add-On	DU0	DU0	NA
RD51/2	DU1	DU1	NA

*   Refer to the *RQDX1 Owner's Manual* for correct jumper settings. Jumper settings should be done by trained field service personnel.

Table A-1   Disk Unit Designations (Cont)

Disk Drive(s)	MicroPDP-11	MicroVAX	PDP-11/23 PLUS
No internal Add-On RX50†	NA	NA	DU0,DU1
No internal Add-On RD51/2	NA	NA	DU0
No internal Add-On RX50 and RX50	NA NA	NA NA	DU0,DU1 DU2,DU3
No internal Add-On RX50 and RD51/2	NA NA	NA NA	DU1,DU2 DU0
No internal Add-On RD51/2 and RD51/2	NA NA	NA NA	DU0 DU1
No internal Add-On RD51/2 and RD51/2 and RX50	NA NA NA	NA NA NA	DU0 DU1 DU2,DU3

†   Refer to the *11C23-UE/11C23-UC Installation Guide* for specific requirements for PDP-11/23 PLUS systems.

LOGICAL UNIT NUMBERS (LUN)

The logical unit numbers and the LUN jumpers provide for future expansion capability of more than one RQDX1 module per system. Jumpers on the RQDX1 controller module select the LUN. These jumpers determine the lowest LUN assigned to any RD51, RD52, and RX50 disk drives present in the system.

The RQDX1 module automatically sizes the logical unit configuration during initialization of the system to determine how many of the four possible units are actually present. The system software automatically assigns disk unit numbers to any drives that are present. An RX50 diskette drive is two units. Table A-2 shows the standard LUN jumper configuration.

Table A-2   RQDX1 Standard Logical Unit Number Configuration

Jumper	State
LUN 1	Out (Logical unit number [0])*
LUN 2	Out
LUN 3	Out
LUN 4	Out
LUN 5	Out
LUN 6	Out
LUN 7	Out
LUN 8	Out

* Indicates that logical unit numbers 0 – 3 are assigned to this controller module. The controller automatically determines if less than four logical units are present. When this configuration, or any other configuration, of LUN jumper setting is used, the system software always assigns disk unit numbers (DUN) of DU0 to DU3.

The LUN jumper format allows only one jumper to be installed at a time. To configure the module for LUNs beginning with other than unit number 0, use the format shown in Table A-3. The system software presently assigns any selection as DU0 to DU3.

Table A-3   RQDX1 Logical Unit Number Jumper Configuration Choices

LUN Jumper Installed	LUNs Specified	DUN Assignment
No jumper installed	0–3	DU0–DU3
1	4–7	DU0–DU3
2	8–11	DU0–DU3
3	12–15	DU0–DU3
4	16–19	DU0–DU3
5	20–23	DU0–DU3
6	24–27	DU0–DU3
7	28–31	DU0–DU3
8	32–35	DU0–DU3

* The controller automatically determines if fewer than four logical units are present.

As an example, Table A-4 shows the LUN and DU designations when LUN jumper 4 is installed.

Table A-4   RQDX1 Logical Unit Number Jumper 4 Format

Jumper Installed	Unit Number Specified
4	16 = first unit
	17 = second unit
	18 = third unit
	19 = fourth unit

ENVIRONMENT

To receive the best possible performance from the RD52-D, -R subsystem, you must provide the right operating environment, as shown in Table B-1.

Table B-1   General Environmental Requirements

Environment	Operating	Nonoperating
Maximum altitude	2.4 km (8,000 feet)	9.1 km (30,000 feet)
Temperature range*	10°C–40°C (50°F–104°F)	–40°C–66°C (–40°F–150.8°F)
Temperature change rate	1°C/hour (1.8°F/hour)	–
Relative humidity (non-condensing)	20% to 80%	10% to 95%
Heat dissipation	119 BTU/hr (typ.) 148 BTU/hr (max.)	

*   Reduce the temperature specification by 1.8°C (35.2° F) for each 1000 m (3,300 ft) increase in altitude.

SUBSYSTEM DIMENSIONS

Height	13.97 cm (5.50 in)
Width	22.86 cm (9 in)
Length	30.58 cm (12 in)
Weight	6.36 kg (14 lb)

RD52 FIXED DISK DRIVE

Performance Specifications

Average access time	53 m/s
Average rotational latency	8.5 m/s
Transfer rate	5 Mbits/s

Media Characteristics

Formatted capacity	30.96 Mbytes
Recording surfaces (heads)	8
Disks	4
Bytes per track	10,416
Tracks per drive	3,072
Track density (tpi)	591
Recording method	Modified Frequency Modulation (MFM)

Physical Specifications

Height	8.25 cm (3.25 in)
Width	14.6 cm (5.75 in)
Depth	20.32 cm (8.00 in)
Weight	3.15 kg (7 lbs)

POWER SUPPLY

Inputs

Line voltage (switch selectable)	100–120 Vac nominal, single phase, 3 wire 200–240 Vac nominal, single phase, 3 wire
Line frequency	47 Hz–63 Hz either input range
Line current	120 V, 2 amp RMS (max.) 240 V, 1 amp RMS (max.)

Outputs

Power	65 W maximum
dc voltages	+12 A Vdc ±5%, 0.1 A (min.) to 4.5 A (max.) +12 B Vdc ±10%, 0.12 A (max.) (dc fan only) +5 Vdc ±5%, 0.3 A (min.) to 2.0 A (max.)

J1, J2, AND J3 CONNECTORS

Connectors J1, J2, and J3 have identical signal names and pin numbering.

Table C-1   Connector Signals

Pin No.	Signal Name
J1–01	MEMWRTDT1 (H) (RD51/RD52 only signal)
J1–34	MEMWRTDT1 (L) (RD51/RD52 only signal)
J1–18	GROUND
J1–02	HEAD SET 2 (L) (RDXX only signal)*
J1–35	GROUND
J1–19	SEEKOPLT
J1–03	RD1 RDY (H) (RD51/RD52 only signal)
J1–36	WPT FAULT (L)
J1–20	GROUND
J1–04	READ SEL 1 (L)
J1–37	RX0WPTLED (L) (RX50 only signal)
J1–21	RD0 RDY (H) (RD51/RD52 only signal)
J1–05	RX1WPTLED (L) (RX50 only signal)
J1–38	DRVSLOACK (L) (RD51/RD52 only signal)
J1–22	MEMRDDAT0 (H) (RD51/RD52 only signal)
J1–06	MFMRDDAT0 (L) (RD51/RD52 only signal)
J1–39	MFMWRTDT0 (H) (RD51/RD52 only signal)
J1–23	MFMWRTDT0 (L) (RD51/RD52 only signal)
J1–07	MFMRDDAT1 (H) (RD51/RD52 only signal)
J1–40	MFMRDDAT1 (L) (RD51/RD52 only signal)
J1–24	GROUND
J1–08	RFDUCWRTI (L)
J1–41	RD0WRTPRO (L) (RD51/RD52 only signal)
J1–25	DRV SEL 4 (L)

*   Reserved for future use.

Table C-1   Connector Signals (Cont)

Pin No.	Signal Name
J1–09	GROUND
J1–42	INDEX (L)
J1–26	RD1WRTPRO (L) (RD51/RD52 only signal)
J1–10	DRV SEL 1 (L)
J1–43	DRV SEL 2 (L)
J1–27	DRV SEL 3 (L)
J1–11	RX2WPTLED (L) (RX50 only signal)
J1–44	RXMOTORON (L) (RX50 only signal)
J1–28	GROUND
J1–12	DIRECTION (L)
J1–45	GROUND
J1–29	STEP (L)
J1–13	GROUND
J1–46	RXWRTDATA (L) (RX50 only signal)
J1–30	GROUND
J1–14	WRT GATE (L)
J1–47	GROUND
J1–31	TRACK 00 (L)
J1–15	RX3WPTLED (L) (RX50 only signal)
J1–48	DRVSL1ACK (L) (RD51/RD52 only signal)
J1–32	GROUND
J1–16	READ DATA (L)
J1–49	GROUND
J1–33	HEAD SEL 0 (L)
J1–17	GROUND
J1–50	READY (L)

POWER SUPPLY CONNECTORS

Table C-2   AC Power Input Connectors

Pin No.	Signal
1	Ground
2	AC phase
3	AC neutral

Table C-3   DC Power Output Connectors

Pin No.	Signal
1	+5 V
2	+5 V
3	+5 V
4	Return
5	Return
6	Return
7	Return
8	+12 A V
9	+12 A V
10	+12 B V
11	No pin
12	No connection

Table D-1   The RD52 Subsystem Library

Document	Order Number
MicroPDP-11 Systems Owner's Manual	EK-MIC11-OM
MicroPDP-11 Systems Technical Manual	EK-MIC11-TM
MicroVAX I Owner's Manual	EK-630QA-OM
MicroVAX I Technical Manual	EK-UVAX2-TM
RQDX1 Controller Module User's Guide (includes RQDX1-E Bus Extender)	EK-RQDX1-UG
11C23-UE/11C23-UC RD52 Installation Guide	EK-RD52U-IN
H9302 Rack Mount Kit Installation Guide	EK-LEP03-IN

If you have decided to have Digital Equipment Corporation maintain your system, Digital Field Service offers a flexible range of plans from which you may choose.

ON-SITE SERVICE

This offers the convenience of repair service at your site and the insurance against unplanned and unbudgeted repair costs. For a small monthly cost, you can receive personal service from our service specialists. Usually, within a few hours of your call, a specialist is dispatched to your site with the necessary equipment and spare parts to give your equipment fast, dependable service.

Under basic service, full coverage is available from 8 a.m. to 5 p.m., Monday through Friday. Options are available to extend your coverage to 12-, 16- or 24-hour coverage and to Saturdays, Sundays, and holidays.

If you require uninterrupted operations, you can choose DECservice, a premium on-site service that guarantees extra-fast response and nonstop remedial maintenance. The representative does not leave until the problem is solved.

Under basic service and DECservice, all parts, materials, and labor are covered in full.

CARRY-IN SERVICE

This is offered to customers who do not need the convenience of on-site coverage, but do require the same fast, personal response and the ability to plan their maintenance expenditures, at an lesser monthly cost than on-site service.

When a unit is brought to one of the 160 Digital Service Centers worldwide, you can be sure that your unit will receive expert repair service from factory-trained personnel. Your unit is guaranteed to be repaired within two days, normally within 24 hours. Carry-in service is available on selected terminals and systems. Contact your local Digital Field Service Office to determine if this service is available for your unit.

DECmailer

This is our service for users who have technical resources to perform the first line of maintenance themselves. DECmailer customers can troubleshoot, identify, and isolate the component(s) that caused the problem and mail it to our Customer Returns Center. Here, the module receives expert repair and is return-mailed back to you within five days. With DECmailer service, you are charged for each use, rather than a monthly rate.

PER CALL SERVICE

This is for users who wish to establish a maintenance program on a noncontractual, time, and materials cost basis. It is available with either on-site or carry-in service, and is appropriate for users who have sufficient expertise to perform first-line maintenance, but who may occasionally need greater support from Field Service.

PER CALL

This is also offered as a supplementary program for Basic Service Plan Customers who require remedial maintenance outside their contracted hours of coverage; in that case, however, there is no charge for materials.

ON-SITE PER CALL SERVICE

This is provided on a best-effort basis, with a normal response time of two to three days. It is available 24 hours a day, seven days a week.

CARRY-IN PER CALL SERVICE

Service is available during normal business hours, with a turn-around time of two to three days.

For additional information about these Digital Service Plans, their prices, and special rates for volume customers, contact your local Digital Field Service Office. Call one of the information numbers for the location of the Digital Field Service Office nearest you.

DIGITAL INTERNATIONAL FIELD SERVICE INFORMATION NUMBERS

U.S.A.	1-800-554-3333
Canada	(800) - 267-5251
United Kingdom	(734) 868711
Belgium	(02) 2425095
West Germany	(089) 95910
Italy	(02) 617961
Japan	(03) 989-7161
France	(6) 0778292
Denmark	(2) 889666
Spain	(1) 7331900
Finland	(0) 423511
Holland	(30) 640293
Switzerland	(01) 8169111
Sweden	(8) 7338000
Norway	(2) 160290
Austria	(222) 6776410
Ireland	(1) 308433
Portugal	(1) 725402
Australia	(02) 4125555