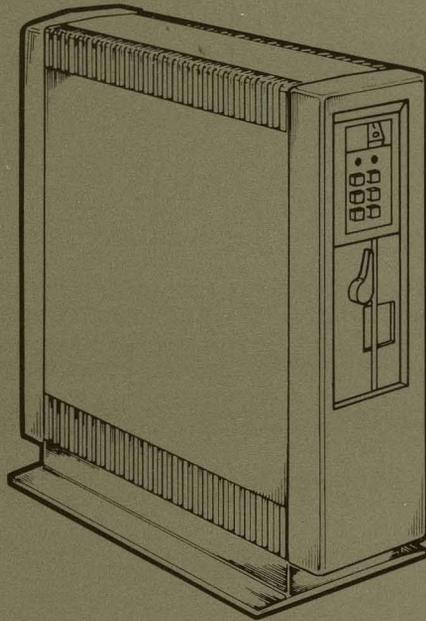


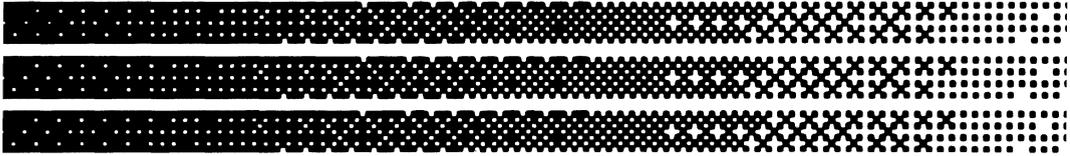
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MicroPDP-11/53 System

Supplement Manual

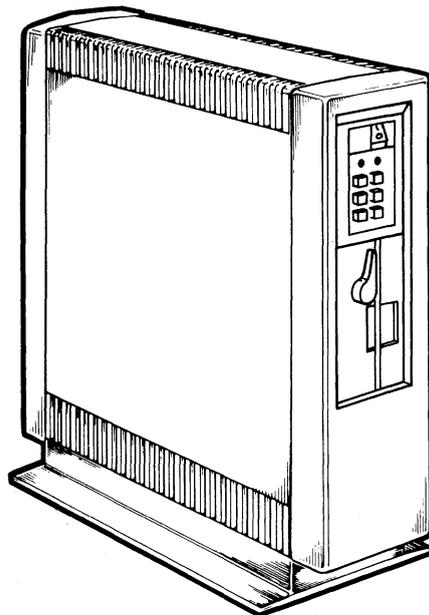


digitalTM



MicroPDP-11/53 System

Supplement Manual



Prepared by Educational Services
of Digital Equipment Corporation

1st Edition, June 1986

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Appendix A System Specifications

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This manual supplements the MicroPDP-11 Systems Owner's Manual (EK-MIC11-OM) and the MicroPDP-11 Systems Technical Manual (EK-MIC11-TM).

This manual covers the MicroPDP-11/53 system only and often refers to the owner's manual and technical manual.

Document Overview

Chapter 1 briefly describes system installation and operation.

Chapter 2 describes the MicroPDP-11/53 enclosure.

Chapter 3 describes the MicroPDP-11/53 base system and the automatic boot and console modes.

Chapter 4 lists and describes available options.

Chapter 5 describes how to configure the MicroPDP-11/53 system.

Chapter 6 briefly describes the start-up self-test, console ODT mode, and user diagnostics.

Chapter 7 lists the MicroPDP-11/53 system's field replaceable units (FRUs) and describes their removal and replacement.

Related Documents

MicroPDP-11 Systems Owner's Manual	(EK-MIC11-OM)
MicroPDP-11 Systems Technical Manual	(EK-MIC11-TM)
KDJ11-DA User's Guide	(EK-KDJ1D-UG)
RD3n-A Disk Drive Technical Description	(EK-RD31A-TD)
RX33 Disk Drive Technical Manual	(EK-RX33-TM)
Microcomputer and Memories Handbook	(EB-18451-20)
Microcomputer Interfaces Handbook	(EB-20175-20)

1.1 INTRODUCTION

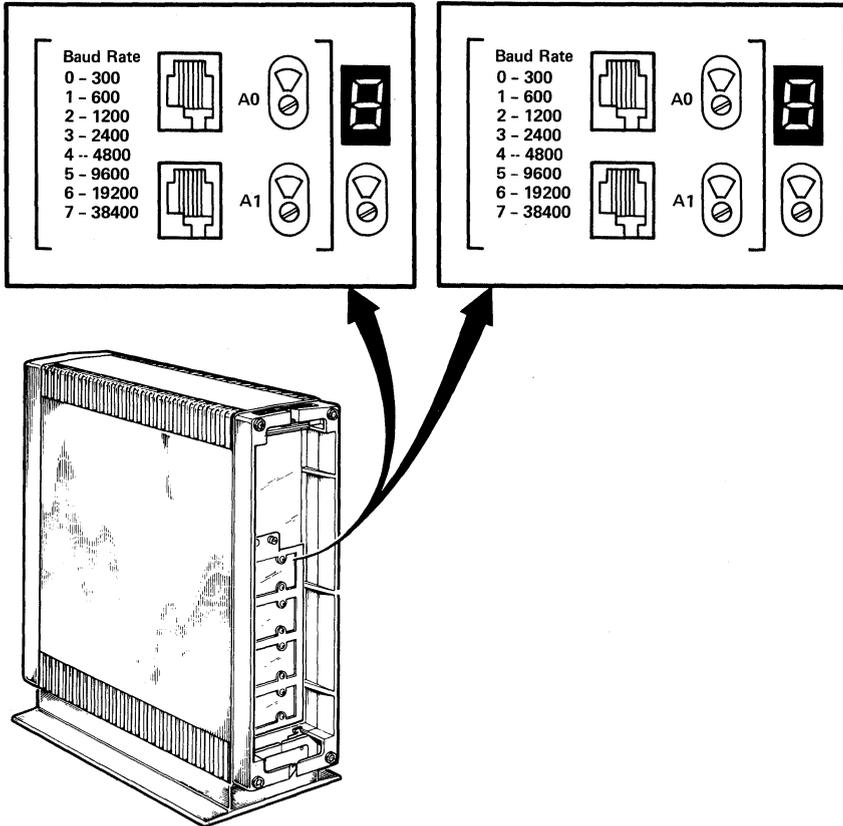
Unpacking and installing a MicroPDP-11/53 system is the same as for the MicroPDP-11/73 or MicroPDP-11/83 system (in a BA23-A enclosure). See the MicroPDP-11 Systems Owner's Manual (EK-MIC11-OM) for unpacking and installation procedures.

However, procedures for setting the MicroPDP-11/53 system baud rate, connecting its console terminal, and inserting diskettes into the RX33 diskette drive are slightly different.

1.2 INSTALLATION

Set the baud rate, connect the console terminal, and insert diskettes as follows.

1. Turn the baud rate switch to the desired setting for A0 (console terminal) and A1 (printer terminal) (Figure 1-1).
2. Connect the console terminal cable to the console terminal and the system unit (Figure 1-2).



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Figure 1-1 Setting the Baud Rate

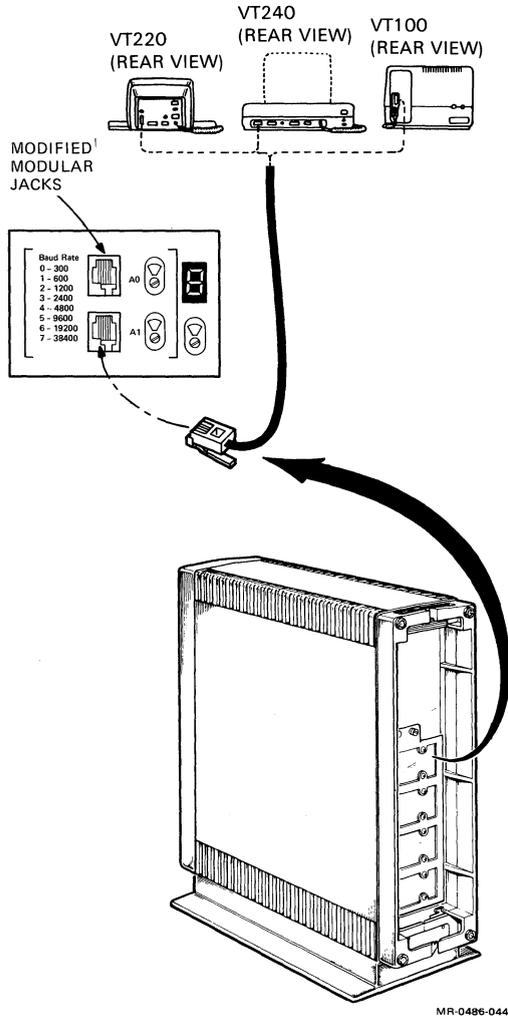


Figure 1-2 Connecting the Console Terminal

INSTALLATION AND OPERATION

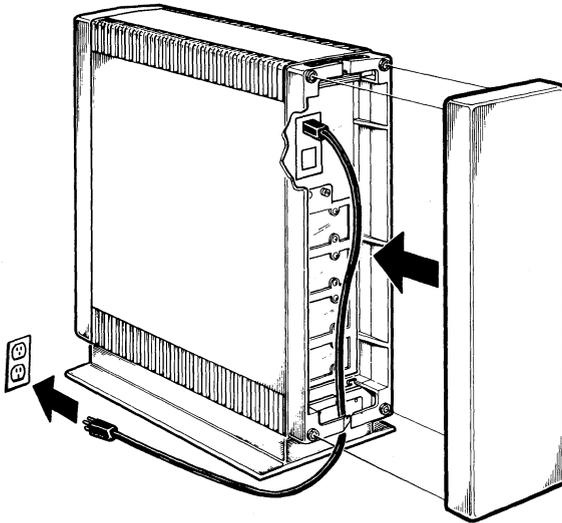
3. Plug in the power cord (Figure 1-3).
4. Thread all the cables through the lower cable guide.
5. Replace the cover.

NOTE

Do not turn on your system yet.

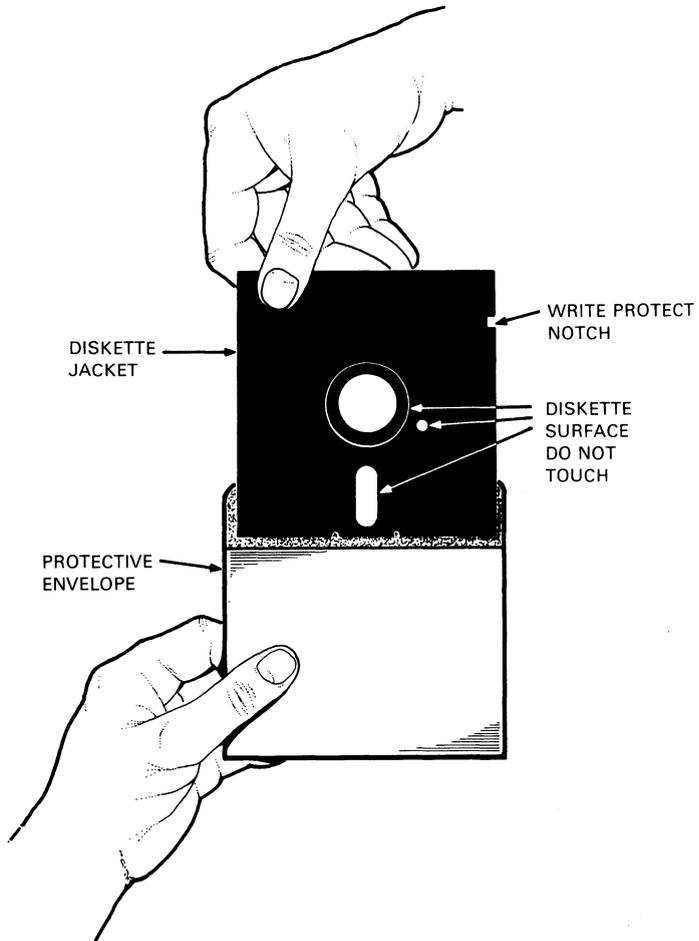
6. Find the customer test diskettes (Figure 1-4) and use the diskette labeled as follows.

Micro-11 Cust RXnn A



MR-13465

Figure 1-3 Plugging in the Power Cord



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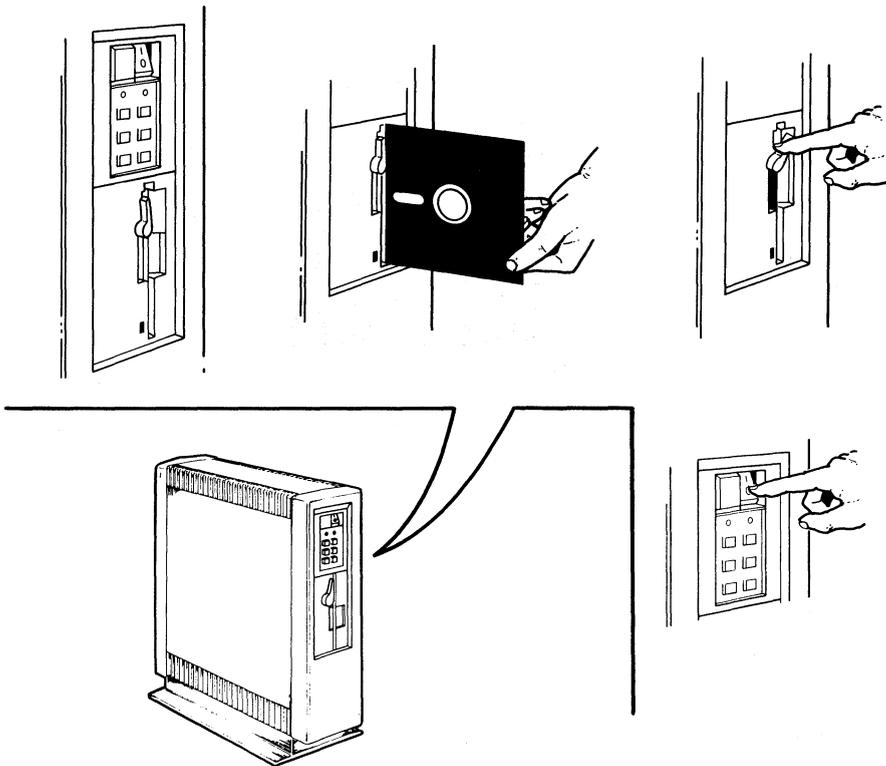
Figure 1-4 Customer Test Diskettes

INSTALLATION AND OPERATION

- Put the diskette drive's release lever in the up position, insert the diskette, and place the release lever in the down position (Figure 1-5).

NOTE

The write protect notch must be in the down position when you insert a diskette into a floorstand (or pedestal) system. The notch must be on the left when you insert the diskette into a tabletop system.

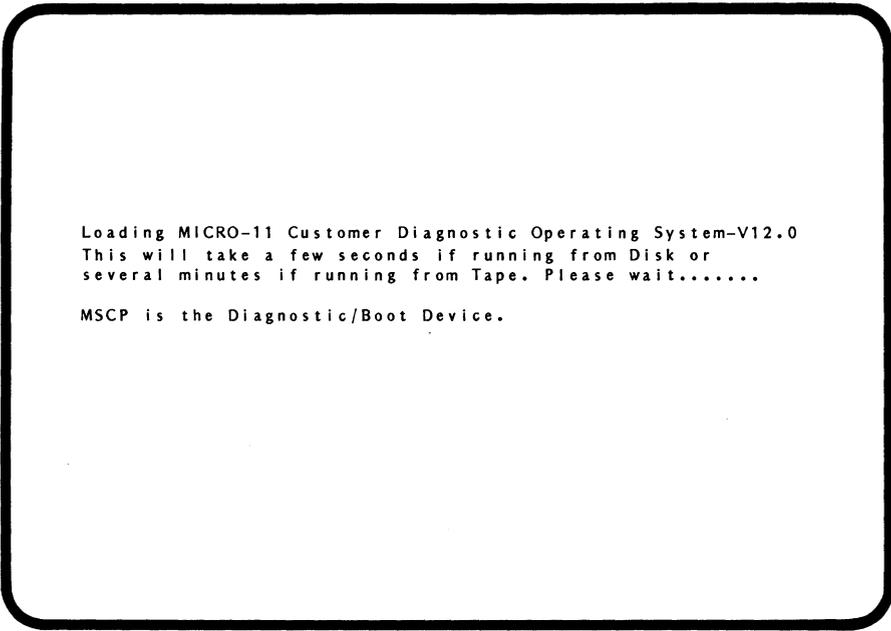


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Figure 1-5 Inserting the Diskette

8. Set the power switch to 1 (on).

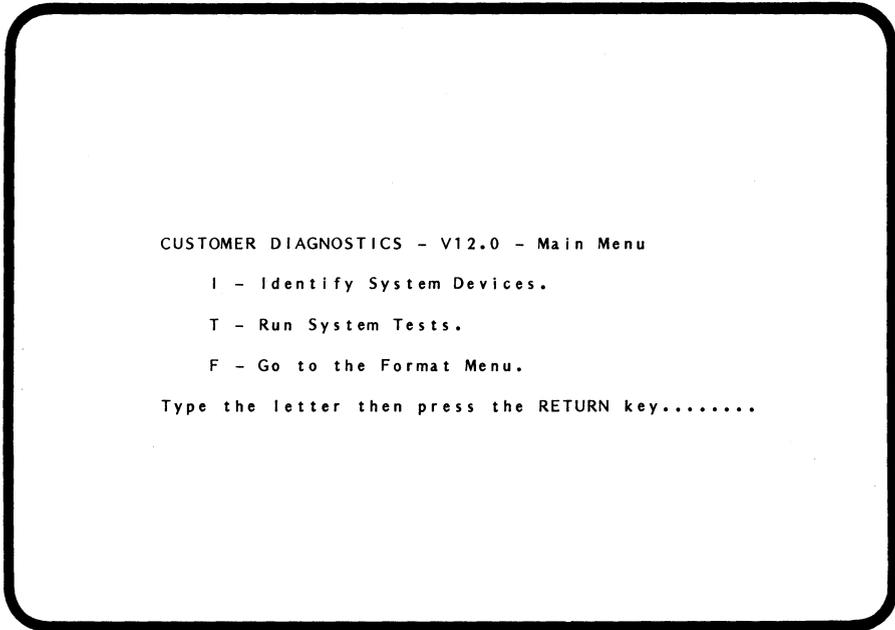
In a few minutes the console terminal will display the following message.



```
Loading MICRO-11 Customer Diagnostic Operating System-V12.0  
This will take a few seconds if running from Disk or  
several minutes if running from Tape. Please wait.....  
  
MSCP is the Diagnostic/Boot Device.
```

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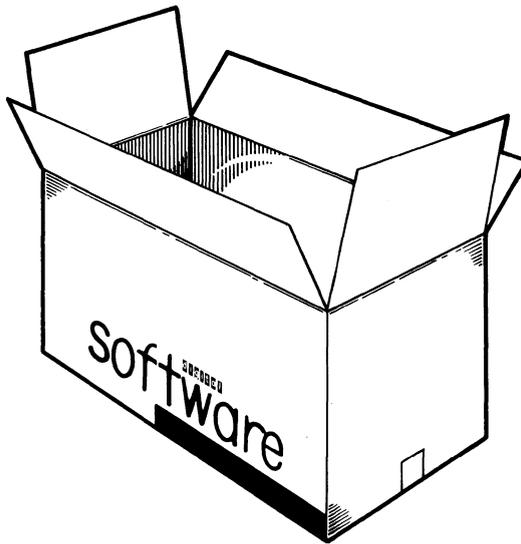
Next, the following Customer Diagnostics Menu is displayed on the screen.



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9. Follow the instructions displayed on the Main Menu.

Now you can install your software (Figure 1-6). Follow the instructions provided with your software.



MR-13472

Figure 1-6 Customer Software

1.3 OPERATION

To operate your MicroPDP-11/53 system, see the MicroPDP-11 Systems Owner's Manual (EK-MIC11-OM).

When reading the owner's manual, you will notice that the front control panel shown is different from the MicroPDP-11/53 system front panel. The MicroPDP-11/53 uses a 6-button control panel that has two write protect and two ready buttons.

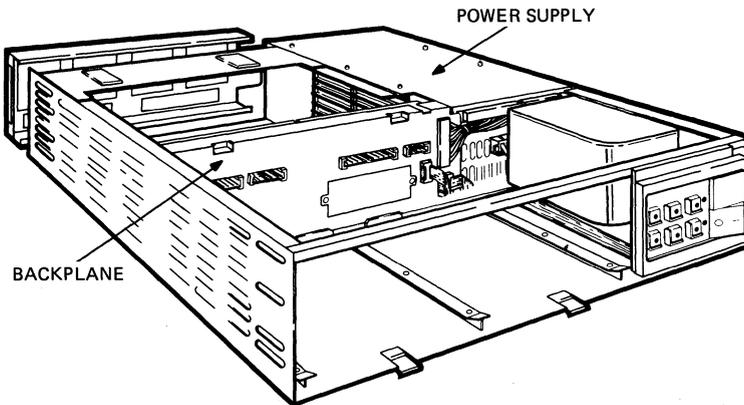
The second set of write protect and ready buttons function only if two RD3n fixed disk drives are installed in the system. To disable these buttons, see Paragraph 2.2.3 in this manual.

When you turn the power on, the system will run its start-up self-test. If the start-up self-test is successful, the system will try to boot the storage media.

2.1 INTRODUCTION

The MicroPDP-11/53 system is housed in the BA23-A enclosure (Figure 2-1). The enclosure is the same as the MicroPDP-11/23, MicroPDP-11/73, and MicroPDP-11/83 system enclosures.

The BA23-A enclosure houses the power supply and the backplane assembly. It also provides mounting space for three 5.25-inch half-height or two 5.25-inch full-height mass storage devices, the front control panel, the rear I/O distribution panel, and cooling fans.



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Figure 2-1 BA23-A Enclosure

The enclosure can be housed either in a plastic floor-stand or rack-mounted in a cabinet. The floorstand model can be converted for tabletop use. Table 2-1 shows the dimensions and weights of the various models.

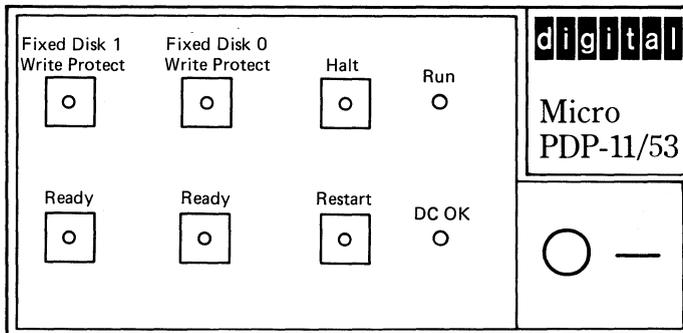
Table 2-1 MicroPDP-11/53 Dimensions and Weights

	Floorstand	Tabletop	Rackmount
Height	64.2 cm (24.5 in)	17.7 cm (7 in)	13.3 cm (5.2 in)
Width	25.4 cm (10 in)	56.2 cm (22.13 in)	48.25 cm (19 in)
Depth	72.6 cm (28.6 in)	72.6 cm (28.6 in)	64.3 cm (25.3 in)
Weight	31.75 kg (70 lb)	29.5 kg (65 lb)	24 kg (53 lb)

2.2 FRONT CONTROL PANEL

The BA23-A enclosure front control panel (Figure 2-2) is a 6-button panel. The 6-button control panel allows for the use of two half-height fixed disk drives. The control panel contains switches and indicators for monitoring and controlling the system.

Table 2-2 describes the front control panel switches and indicators functions.



MR-0486-0413

Figure 2-2 BA23-A Enclosure Front Control Panel

Table 2-2 Front Control Panel Switches and Indicators

Switches	Indicators	Function
On/off		Rocker switch with integral red indicator -- red light comes on when system ac power is on.
	DC OK	Green light comes on when dc voltages are present and within tolerance.
	Run	Green light comes on when the CPU is executing in the run mode.
Halt		Push-on/push-off switch -- halts the CPU when pushed in.
	Halt	Red light comes on when the CPU has halted.
Restart		Contact pushbutton switch -- when pressed, causes a simulated power-down/power-up sequence to restart the CPU.
Write protect		Push-on/push-off switch -- fixed disk is write protected when switch is pushed in.
	Write protect	Amber light comes on to indicate the fixed disk is write protected.
Ready*		Push-on/push-off switch -- cannot read or write to fixed disk when switch is pushed in. The fixed disk is off-line.
	Ready	Green light comes on to indicate the fixed disk can be accessed. The fixed disk is on-line.

* With two half-height fixed disk drives installed, the second set of write protect and ready switches are functional at the front control panel (6-button panel).

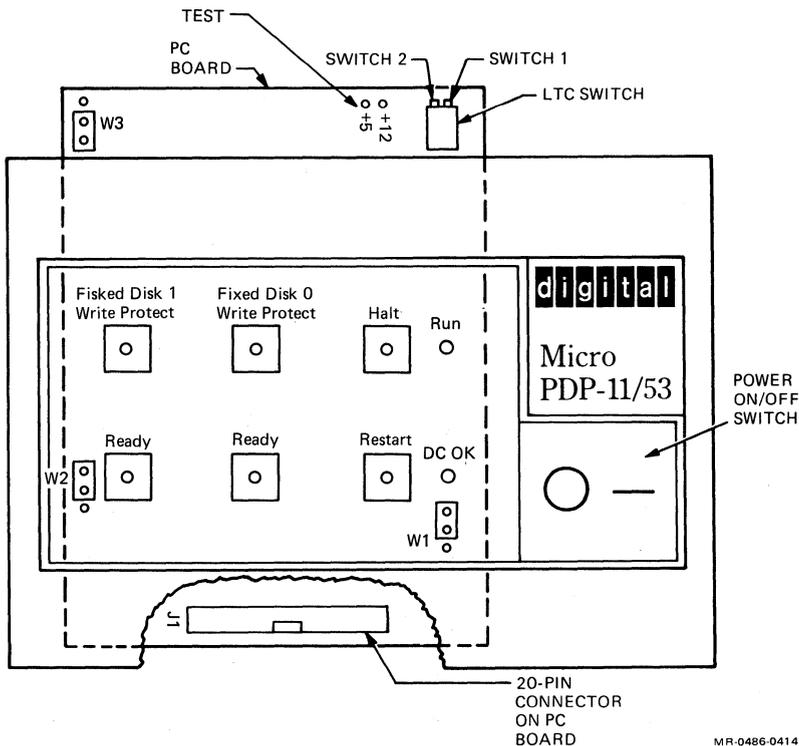
2.2.1 Control Panel Printed Circuit Board

The control panel printed circuit board is behind the molded plastic front control panel. This board provides access to the +5 V and +12 V test points. It also provides access to a line time clock (LTC) switch unit, to the restart enable switch, and to jumpers W1, W2, and W3.

The printed circuit board also contains the control panel buttons, LEDs, and a 20-pin connector (J1) for the backplane assembly cable. A bracket on back of the front panel holds the system power on/off (I/O) switch.

2.2.2 LTC DIP Switch Unit

The LTC DIP (dual in-line package) switch unit has two switches labeled 1 and 2 (Figure 2-3). Setting switch 1 to off enables the Q22-Bus BEVNT timing signal and lets the LTC function under software control. Switch 1 is called the BEVNT Enable switch.



MR-0486-0414

Figure 2-3 Control Panel and Printed Circuit Board

Setting switch 2 (Restart/Enable) to on lets the front control panel restart switch function as described in Table 2-2. Setting the Restart/Enable switch to off disables the front control panel restart switch. The Restart/Enable switch should normally be in the on position.

2.2.3 Jumpers W1, W2, and W3

The control panel printed circuit board also contains the following three jumpers.

W1 -- You can set this jumper so the RD0 Write Protect switch LED is inoperative (see note). RD0 is the first RD3n disk drive in the BA23-A enclosure.

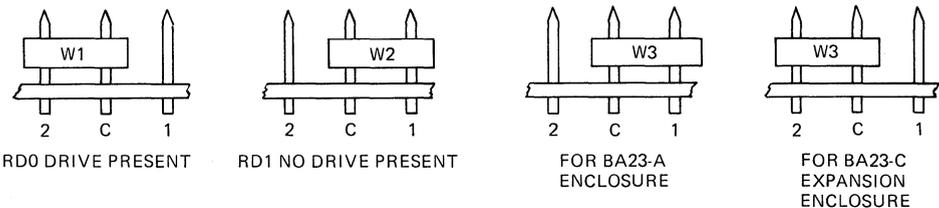
W2 -- You can set this jumper so the RD1 Write Protect switch LED is inoperative (see note). RD1, the second RD3n disk drive, is located piggybacked on the first RD3n drive.

W3 -- This jumper is used in a BA23-C expansion enclosure to ensure that DC OK LED is directly controlled by the Q22-Bus B DC OK H signal (see note).

NOTE

The factory configurations (2 to C) for W1 and W2 are shown in Figure 2-4. Both RD0 and RD1 Write Protect switches are enabled. If an RD3n disk drive is not present, the associated LED jumper should be set (1 to C) so the LED is inoperative.

The W3 jumper on the printed circuit board is also shown in Figure 2-4. For the BA23-C expansion enclosure, the jumper is set so C and 2 are tied together. For the BA23-A enclosure, the jumper is set so C and 1 are tied together.



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Figure 2-4 Jumper W1, W2, and W3

The following jumper settings are possible. (In figure 2-4 2 is the top pin, C is the center pin, and 1 is the bottom pin.)

- W1 2 and C -- drive RD0 is present in mass storage area.
C and 1 -- no drive present.
- W2 2 and C -- drive RD1 is present (piggybacked) in the mass storage area.
C and 1 -- drive RD1 is not present
- W3 2 and C -- panel is installed in a BA23-C expansion box.
C and 1 -- panel is installed in a BA23-A enclosure.

2.3 MASS STORAGE

The front bezel cover spaces are for mounting mass storage devices. The top (or right) space usually contains a half-height RX33 dual diskette drive. This space can also accommodate a TK50 tape drive or an RX50 diskette drive. This space is called port 1. The bottom (or left) space usually contains a half-height RD3n fixed disk drive. This space is called port 0.

NOTE

Two half-height fixed disk drives can be installed (piggyback style) in port 0.

2.4 BACKPLANE ASSEMBLY

The MicroPDP-11/53 system uses the same backplane assembly (H9278) as other MicroPDP-11 systems (Figure 2-5). The backplane assembly major components are the mass storage signal distribution panel and the Q22-Bus backplane.

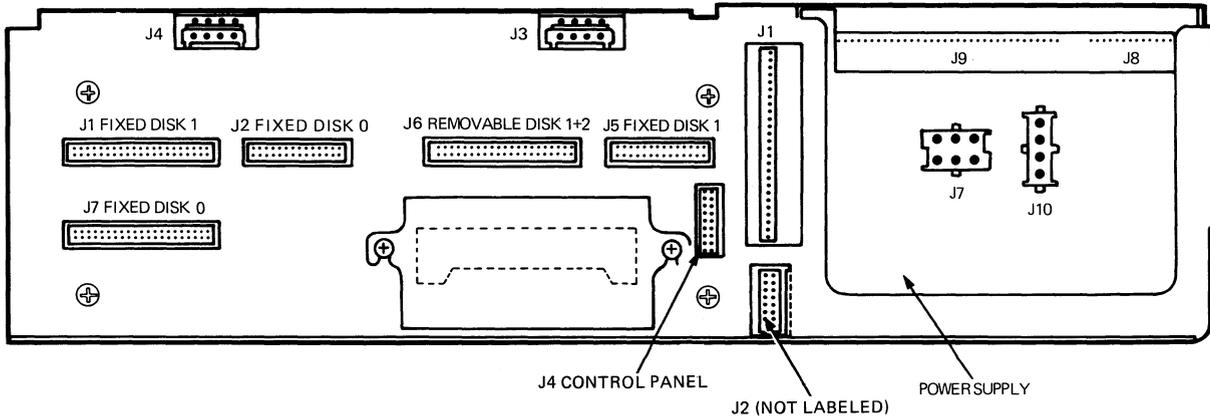
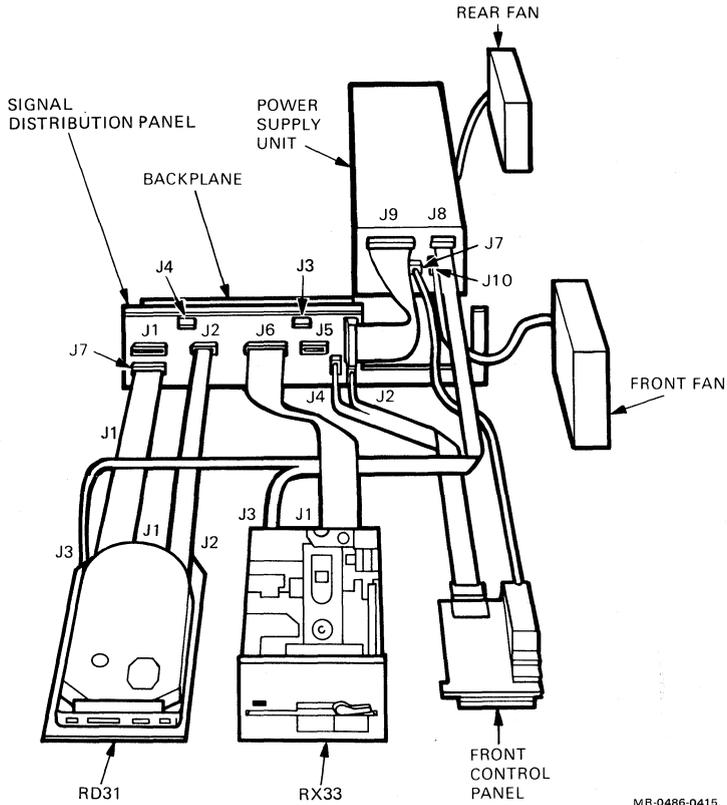


Figure 2-5 H9278 Backplane Assembly
(Showing the Distribution Panel)

MR-15165

2.4.1 Mass Storage Distribution Panel

The diskette drive and fixed disk drive, installed in the BA23-A enclosure, connect to the mass storage signal distribution panel. Figure 2-6 shows the internal cabling setup for the BA23-A enclosure.



MR-0486-0415

Figure 2-6 BA23-A Enclosure Internal Cabling

The signal distribution panel carries the signals from an RQDX3 controller module installed in the Q22-Bus backplane. Six connectors on the signal distribution panel provide the following functions.

J6 Removable Disk 1 and 2 -- provide the signals to an RX33 diskette drive. With a fixed disk drive installed, the system ROM code labels the RX33 diskette drive as disk unit 1 (DU1).

NOTE

When two RD3n disk drives are installed, the system ROM code labels the RX33 diskette drive as disk unit 2 (DU2).

J7 Fixed Disk 0 and J2 Fixed Disk 0 -- provide the signals to a RD3n disk drive installed in port 0 of the enclosure (left slot). This is the first fixed disk drive to be booted, and the system ROM code labels it disk unit 0 (DU0).

J1 Fixed Disk 1 and J5 Fixed Disk 1 -- provide the signals to a second RD3n disk drive installed piggyback on the first fixed disk drive. This is the second fixed disk drive to be booted, and the system ROM code labels it disk unit 1 (DU1).

J4 -- provides the signals to the control panel printed circuit board from the mass storage signal distribution panel.

2.4.2 Q22-Bus Backplane

The MicroPDP-11/53 system backplane is a 10.7 inch by 4.5 inch assembly that implements the extended LSI-bus, which uses 22-bit addressing to support up to 4 megabytes of memory. This bus is commonly called the Q22-Bus.

The backplane, driven by the MicroPDP-11/53 CPU, supports up to 22 ac loads and 20 dc loads from all modules inserted in the Q22 backplane. The ac loading is the amount of capacitance that a module presents to a bus signal line; one ac load equals 9.35 picofarads (pF). The dc loading is the amount of dc leakage that a module presents to a bus signal line; one dc load is approximately 105 microamperes (uA). The backplane itself contributes less than six ac loads (< 56 pF) and no dc loads on any signal line.

The four connectors on side 2 (Figure 2-4) of the backplane provide the following functions.

J1 -- is an 18-pin straight single in-line connector used to supply power and signals to the backplane from the power supply.

J2 -- is a 10-pin connector that provides signals to the front control panel from the CPU module (KDJ11-DA).

J3 and J4 -- are 4-pin Mate-n-Lock connectors that provide termination for the mass storage device power cable when no mass storage device is present.

For more information on the system backplane, power supply, and fans, see the MicroPDP-11 Systems Technical Manual (EK-MIC11-TM).

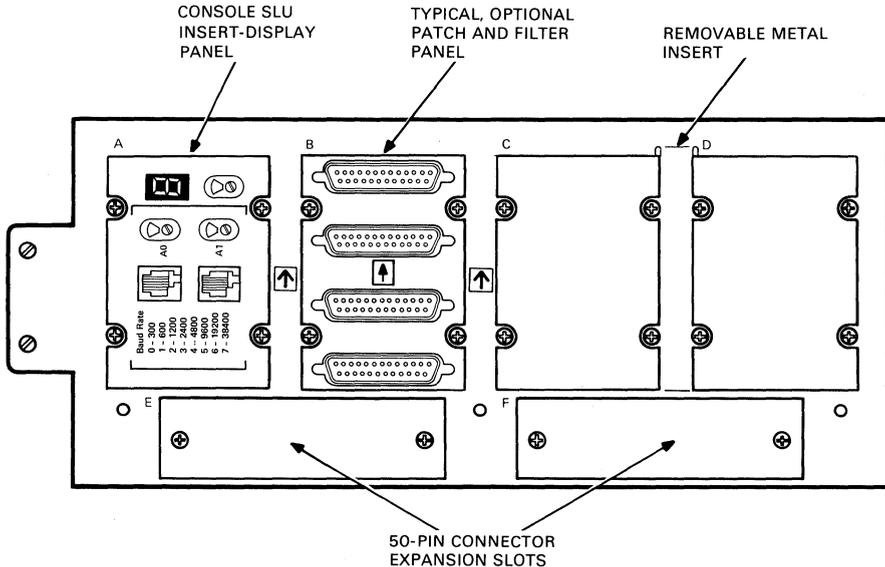
2.5 REAR I/O DISTRIBUTION PANEL

External devices connect to the system through the enclosure's rear I/O distribution panel.

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

The filter connectors mount in the insert panels and the insert panels are installed in cutouts in the rear I/O distribution panel. The enclosure's rear I/O distribution panel provides space for up to six insert panels, two of which can contain 50 pin connectors.

Figure 2-7 shows the rear I/O distribution panel with a typical insert panel installed. Figure 2-7 also shows the serial line unit console display panel of the KDJ11-DA CPU module, which is usually installed in the top (or left) cutout.



MR-0486-0416

Figure 2-7 Rear I/O Distribution Panel

1.1 INTRODUCTION

This chapter identifies the MicroPDP-11/53 base system and describes the following.

- KDJ11-DA CPU module
 - Automatic boot mode
 - Console mode
- Test code error messages

3.2 SYSTEM IDENTIFICATION

The MicroPDP-11/53 base system contains a KDJ11-DA CPU module (M7554) with onboard memory. The system also contains an RQDX3 controller module (M7555) to support the RX33 and RD3n disk drives. Expansion memory modules may also be present.

NOTE

The MSV11-QA/QB and MSV11-PL/PK (M7551-AA/AB and M8067-L/K) are expansion memory modules for the MicroPDP-11/53 system.

The MicroPDP-11/53 system does not provide a high-speed interconnect (private memory interconnect, or PMI) between the CPU module and expansion memory module(s).

3.3 KDJ11-DA CPU MODULE

The KDJ11-DA is a quad-height Q22-Bus PDP-11 processor module that operates at 15 MHz. The KDJ11-DA CPU module has the following standard features.

- PDP-11 instruction set, including extended instruction set (EIS) and floating point instruction set (FP11)
- Memory management
- 512 kilobytes of local (onboard) parity memory
- 32 kilobytes of boot and diagnostic ROM
- Line frequency clock
- Console serial line unit (SLU) and a printer port serial line unit
- DCJ11 CPU chip set

NOTE

Instruction set differences for the J11 processors are listed in the DCJ11 Microprocessor User's Guide, Appendix C (EK-DCJ11-UG).

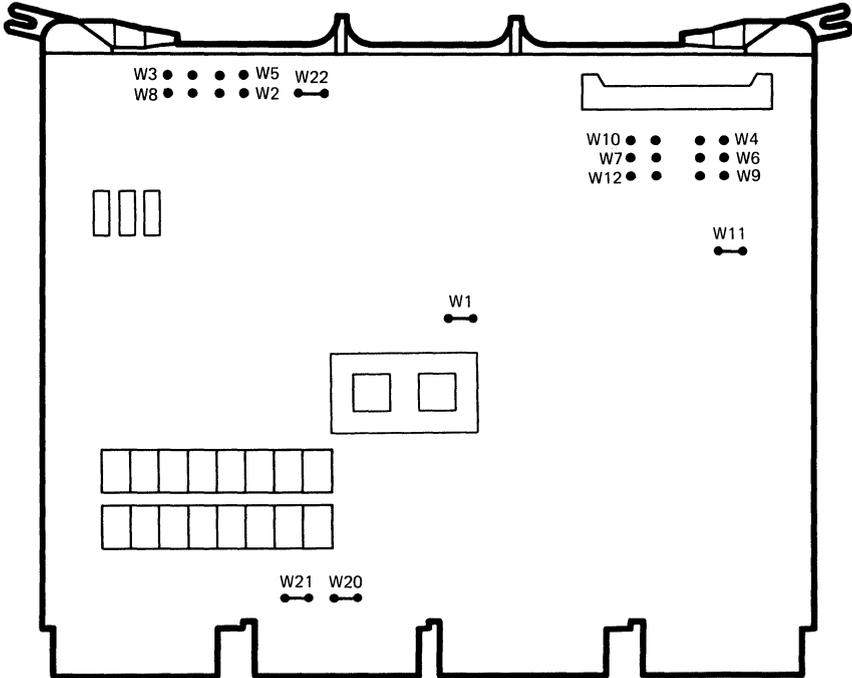
Figure 3-1 shows the location of switches, connectors, and jumpers on the CPU module. Table 3-1 lists the switches and jumpers factory settings.

Table 3-1 KDJ11-DA Switch and Jumper Factory Settings

Switches	Description	Ship Configuration	
Boot mode select	Directs bootstrap execution	Position 0	
Baud rate	SLU 0 (A0)	Position 5 9600 baud	
Baud rate	SLU 1 (A1)	Position 5 9600 baud	
Jumper	Description	Function	Position
W1	Trap on kernel halt	Disabled	In
W11	SLU 0 halt on break	Enabled	Out
W20	BIAK CM2 -- CN2	Enabled	In
W21	BDMG CR2 -- CS2	Enabled	In

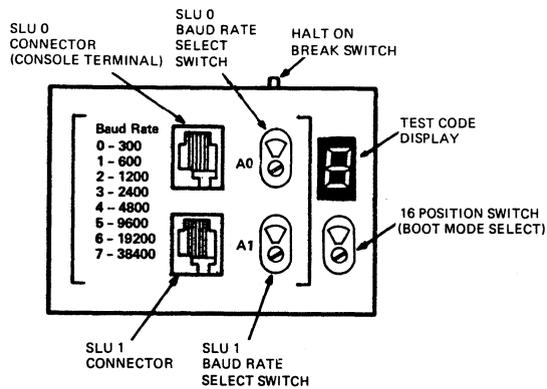
NOTE

Jumpers W2 through W10 and W12 MUST be OUT to allow the MicroPDP-11/53 console display panel rotary switches (Figure 3-2) to control baud rates and boot selections. Figure 3-3 shows the KDJ11-DA internal cabling.



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Figure 3-1 KDJ11-DA Module Layout



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Figure 3-2 MicroPDP-11/53 Console Display Panel

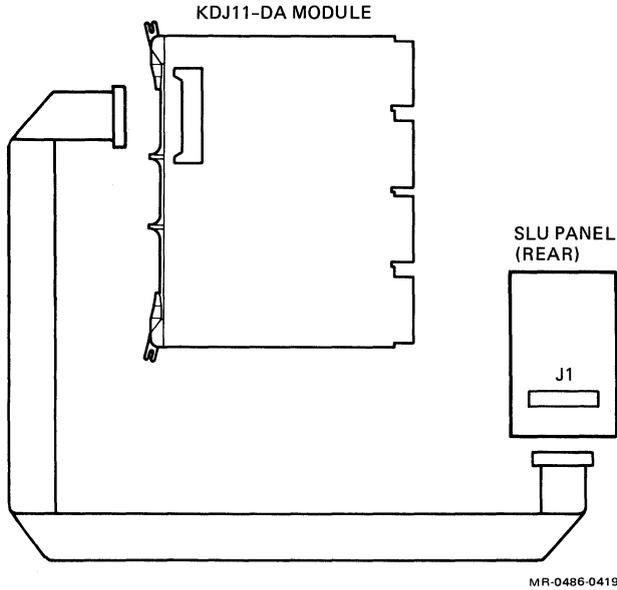


Figure 3-3 KDJ11-DA Internal Cabling

Table 3-2 lists switch settings for the baud rate select switches on the console display panel.

Table 3-2 Baud Rate Select Switch

Switch Settings	Baud Rate
0	300
1	600
2	1200
3	2400
4	4800*
5	9600†
6	19200
7	38400

* Most Digital Equipment Corporation terminals are set to operate at 4800 baud.

† Factory setting when shipped.

Table 3-3 lists the system boot selections, using the console display panel 16-position rotary switch and Jumper W22 (on the CPU module).

Table 3-3 System Boot Selections

Switch	W22	Function
0	I*	Test -- enter console mode using English text
1	I	Test -- enter console mode using French text
2	I	Test -- enter console mode using German text
3	I	Test -- enter console mode using Dutch text
4	I	Test -- enter console mode using Swedish text
5	I	Test -- enter console mode using Italian text
6	I	Test -- enter console mode using Spanish text
7	I	Test -- enter console mode using Portuguese text
8	I	Test -- enter console mode (reserved)
9	I	Test -- enter console mode (reserved)
10	I	Test -- enter console mode (reserved)
11	I	Test -- enter console mode (reserved)
12	I	Test† -- autoboot tapes and disks, user selects language
13	I	Test -- autoboot DPV11, DUV11, DLV11-E/F, TU58, and RK05
14	I	Test -- autoboot DEQNAs 0 and 1
15	I	Manufacturing test loop
0	R‡	Test -- autoboot tapes and disks using English text
1	R	Test -- autoboot tapes and disks using French text
2	R	Test -- autoboot tapes and disks using German text
3	R	Test -- autoboot tapes and disks using Dutch text
4	R	Test -- autoboot tapes and disks using Swedish text
5	R	Test -- autoboot tapes and disks using Italian text
6	R	Test -- autoboot tapes and disks using Spanish text
7	R	Test -- autoboot tapes and disks using Portuguese text
8	R	Test -- autoboot tapes and disks (reserved)
9	R	Test -- autoboot tapes and disks (reserved)
10	R	Test -- autoboot tapes and disks (reserved)
11	R	Test -- autoboot tapes and disks (reserved)
12	R	Emulate power up mode 24 with no messages
13	R	Halt and enter ODT if trap on halt disabled, else loop
14	R	Test -- autoboot DEQNAs 0 and 1
15	R	Test -- enter console mode, user selects language

* Installed (factory shipped)

† High-speed autoboot, memory address/shorts test is bypassed.

‡ Removed (factory shipped)

The items included in Table 3-3 for tapes and disks are DU0-255, DU0-255 at floating address, DL0-3, DX0-1, DY0-1, MU0, and MS0. For DU, removable media is booted before fixed media.

Version 1 (V1.00) of the ROM code supports only English and Spanish text. Switch positions 1 through 5 and 7 through 11 require the user to select the desired language.

Version 2 (V2.00) of the ROM code supports English, Spanish, French, German, Dutch, Swedish, Italian, and Portuguese text. Switch positions 8 through 11 require the user to select the desired language. Switch positions 8 through 11 are reserved for future languages.

To correctly display text for the various languages, the terminal used as the console terminal must have certain abilities.

For V1.00 of the ROM code the terminal only needs to display standard ASCII for both English and Spanish text. Bit 7 for all input is stripped to zero.

For V2.00 of the ROM code, some languages require that the terminal have the multinational character set (MCS) available along with ASCII. The terminal should be set up so characters from 0 through 127(10) select ASCII and characters from 128(10) to 255(10) select MCS. Some languages use 8-bit input also.

Table 3-4 lists the terminal requirements for the various languages.

If a VT220 is used as the console terminal, it must be set to VT220 mode to let it display MCS characters.

Bootstrap and diagnostic programs for a MicroPDP-11/53 system reside in two read-only memories or erasable-programmable read-only memories (ROMs or EPROMs) on the KDJ11-DA module. The programs (ROM code) test the CPU module and memory at power-up or restart, and boot user's software from various devices.

Table 3-4 Terminal Requirements

Language	Terminal Requirements for Output	Terminal Requirements for Input
English	ASCII	7 bit
French	ASCII and MCS	8 bit
German	ASCII and MCS	8 bit
Dutch	ASCII	7 bit
Swedish	ASCII and MCS	8 bit
Italian	ASCII	7 bit
Spanish	ASCII and MCS	8 bit
Portuguese	ASCII and MCS	8 bit

* 7-bit input can be used as long as bit 7 of each character is set to zero and the user types in only the minimum number of characters needed for each command.

NOTE

The language selection message itself needs a terminal with MCS to correctly display all the selections.

The ROM code has the following three general areas.

- The first area includes diagnostics that are run when the ROM code is started. The diagnostics verify that the KDJ11-DA and additional Q22-Bus memories (if any) are working correctly.

NOTE

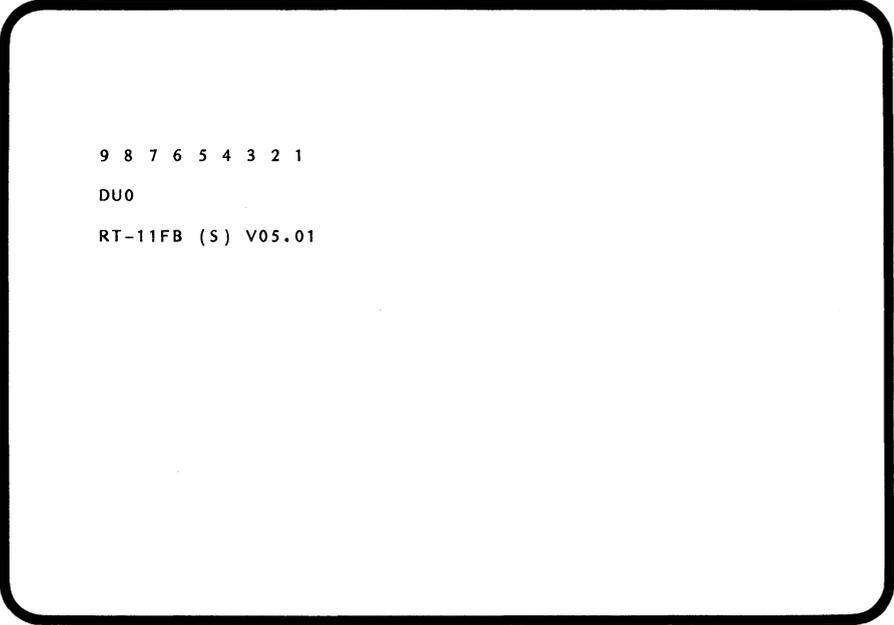
The test run time is longer when additional memory modules are installed.

- The second area includes bootstrap routines for most Digital Equipment Corporation tape, disk, and network products.
- The third area includes all of the support routines and user commands.

For more detailed information about switches and jumper settings, see the KDJ11-DA CPU Module User's Guide (EK-KDJID-UG).

3.3.1 Automatic Boot Mode

After the system start-up self-test passes, the ROM code automatically tries to load and start (autoboot) a program from the user's disk or tape drive. If successful, the ROM code displays a message at the console terminal. Example 3-1 shows a message for a typical system bootstrap in automatic boot mode. The user's software is RT11 booted from device DU0.



```
9 8 7 6 5 4 3 2 1  
DU0  
RT-11FB (S) V05.01
```

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Example 3-1 Successful Automatic Boot Message

The descending number sequence is displayed to indicate that tests are executing. Messages following DUO are generated by the booted software, not the ROM code. At that point the ROM code is not executing and all commands and messages are determined by the user's software.

If the autoboot is not successful in booting the user's disk or tape drive, the ROM code displays an error message to indicate that the autoboot was not successful, and makes continuous passes until the autoboot is successful or aborted.

There are two types of bootstrap error messages. One is associated with automatic boot mode at power-up or restart, and the other with the console mode Boot command.

Example 3-2 shows an error message for a typical system bootstrap in the automatic boot mode.

```
9 8 7 6 5 4 3 2 1
KDJ11-D/S E.01
No bootable devices found.
Boot in progress, type CTRL C to exit.
```

MR-0586-0728

Example 3-2 Unsuccessful Automatic Boot Message

When an error occurs in a boot program called with the console mode Boot command, the ROM code displays one of the following specific error messages.

NOTE

The errors listed may not apply to all boot programs.

Drive not ready
Media not bootable
Nonexistent controller, address = 177nnnnnn
Nonexistent drive
Invalid unit number
Invalid device
Controller error
Drive error

Examples 3-3 and 3-4 show console mode Boot command error messages.

Commands are Help, Boot, List, Map, Test, and Wrap.
Type a command then press the RETURN Key: B DL3<RETURN>

KDJ11-D/S E.05
Nonexistent drive

Commands are Help, Boot, List, Map, Test, and Wrap.
Type a command then press the RETURN Key:

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Example 3-3 Unsuccessful Console Mode Boot Error Message

Commands are Help, Boot, List, Map, Test, and Wrap.
Type a command then press the RETURN Key: B DU1<RETURN>

KDJ11-D/S E.04
Nonexistent controller, address = 17772152

Commands are Help, Boot, List, Map, Test, and Wrap.
Type a command then press the RETURN Key:

MR-0586-0730

Example 3-4 Unsuccessful Console Mode Boot Error Message

See Paragraph 2.4 for the test code error messages.

3.3.2 Console Mode

Console mode lets the user select a boot device, list available boot programs, run ROM resident tests, obtain a map of all memory and I/O page locations, and Wrap the console SLU to the second SLU.

You can enter console mode in the following two ways.

1. Depending on the contents of native register (NR) <12:08>, console mode is entered after testing is complete. In console mode, the ROM code lets the user determine the execution sequence by entering keyboard commands through the console terminal.
2. You can also enter console mode by typing <CTRL/C> during testing or the boot sequence. In this case, the native register bits are ignored.

When console mode is entered, the ROM code displays the message shown in Example 3-5, and waits for the user to enter a command.

```
9 8 7 6 5 4 3 2 1
```

```
Commands are Help, Boot, List, Map, Test and Wrap.  
Type a command then press the RETURN Key:
```

MR-0586-0731

Example 3-5 Successful Power-up to Console Mode Message

Console mode gives the user a choice of six commands, listed in the prompt message. For a brief description of the commands, the user can type either ?<RETURN> or H<RETURN>. Table 3-5 lists the console mode commands and control characters. Paragraph 3.3.2.1 describes the six commands and control characters.

Table 3-5 Console Mode Commands and Control Characters

Command	Description
Help	Lists console mode commands.
Boot	Boots from selected device.
List	Lists ROM boot programs.
Map	Sizes memory and map I/O page.
Test	Runs tests 3 through 6.
Wrap	Wraps SLU0 to SLU1.
?	Alternate form of HELP command.
/A	Boot command switch -- nonstandard CSR address.
/A	Wrap command switch -- wraps SLU0 to specified SLU.
/O	Boot command switch -- overrides boot block definition.
<DELETE>	Deletes previous command character.
<RETURN>	Command delimiter.
<CTRL/C>	Aborts operation -- enters/requests console mode.
<CTRL/D>	Aborts Wrap and reenters console mode.
<CTRL/H>	Console is a hardcopy terminal.
<CTRL/L>	Displays language inquiry message.
<CTRL/R>	Redisplays command line.
<CTRL/U>	Deletes command line.
<CTRL/V>	Console is a video terminal.

3.3.2.1 Console Mode Commands and Control Characters -- You can execute console mode commands by typing any or all of the command characters in the correct sequence, starting with the first, then pressing <RETURN>.

If an invalid command is entered, an invalid message is displayed and the prompt is redisplayed to request additional input. Example 3-6 shows an invalid entry.

```
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key: MP<RETURN>  
  
Invalid Input  
  
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key:
```

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Example 3-6 Invalid Entry Message

Help Command -- displays a brief description of all console mode commands. You can execute this command by typing either ?<RETURN> or H<RETURN>. Console mode is restarted at the end of this command. Example 3-7 shows the Help command message.

```
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key: H<RETURN>  
  
Command      Description  
Boot         Load and start a program from a device  
List        List boot programs  
Map         Map memory and I/O page  
Test       Run continuous self test -- type CTRL C to exit  
Wrap       Wrap console to SLU1, type CTRL D to exit  
  
Commands are Help, Boot, List, Map, Test and Wrap.  
Type a command then press the RETURN key:
```

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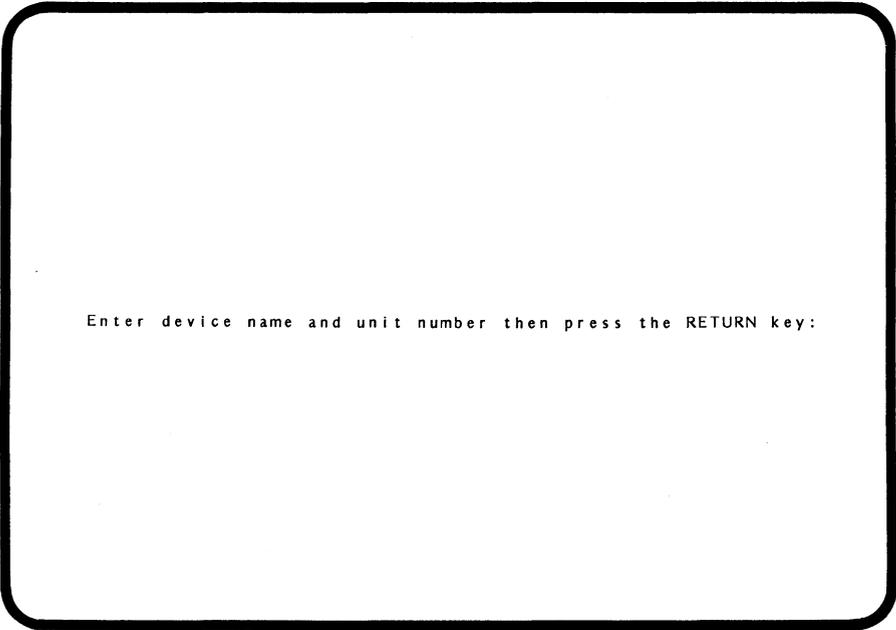
Example 3-7 Help Command Message

Boot Command -- The Boot command lets the user select a boot device. The command uses arguments and optional switches.

Arguments to the command specify the device name and unit number. The device name is a two letter mnemonic that describes the device. An optional third letter specifies the controller. If the unit number is omitted, the program assumes unit zero.

You can enter the Boot command in the following two ways.

1. Type B<RETURN>. The system prompts for the device name and unit number, as shown in Example 3-8. Example 3-9 shows a successful boot message (using device DL2).
2. Type B<SPACE>, the device name and unit number, and <RETURN>.



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Example 3-8 **Boot Command Argument Prompt**

The following optional switches can be used with the Boot command.

/A -- Requests that the user type in a nonstandard CSR address for the controller.

/O -- Overrides the standard boot block definition.

The switch is typed immediately after the Boot command and before the device name and unit number, for example: B/A.

```
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key: B DL2<RETURN>
```

```
DL2
```

```
RT-11FB (S) V05.01
```

```
.SET IT QUIET
```

```
.R DATIME
```

```
Date? [dd-mmm-yy]
```

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Example 3-9 Boot Command Using DL2

List Command -- This command displays a list of all available boot programs found in ROM. The list includes the device name, unit number, and a short device description.

The device name is usually a two letter mnemonic. The valid letter range is A through Z.

The unit number range is the valid range for a particular boot program. The range varies from 0 to 225, depending on the device.

The description, or device type, is intended to be the name on the outside of the physical device. For example, device name DL is described as an RL02.

Example 3-10 shows the List command message.

```
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key: L<RETURN>
```

Device	Unit	Description
DU	0-225	RDnn, RXnn, RC25, RAnn
DL	0-3	RL01, RL02
DX	0-1	RX01
DY	0-1	RX02
DD	0-1	TU58
DK	0-7	RK05
MU	0-225	TK50
MS	0-3	TS05, TK25
XH	0-1	DECnet Ethernet
NP	0-1	DECnet DPV11
NU	0-15	DECnet DUV11
NE	0-15	DECnet DLV11-E
NF	0-15	DECnet DLV11-F

```
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key:
```

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Example 3-10 **List Command Message**

Map Command -- displays the current ROM code version number, determines and displays the size of consecutive memory, identifies all memory in the system, and maps all locations in the I/O page.

Memory is mapped from location zero to the I/O page, in 1 kilobyte increments. Not every location is mapped because it takes too much time. The map routine tries to identify the size of each system memory and each memory's CSR address (if applicable). If two or more noncontiguous memories are present, ROM code displays their descriptions separated by a blank line.

NOTE

If two memories share some common addresses, or have CSRs with the same address, the map command does not work correctly.

After all memory is mapped, the ROM code waits for the user to press <RETURN>. The command then continues the map, displaying all responding I/O page addresses. The I/O page map addresses are 17760000 through 17777776. All responding CPU addresses are also listed with a short description.

There is no description for addresses that respond and are on the external bus, with the exception of memory CSR's, if present, and Q-Bus devices DU, MU, and XH. The map only identifies DU (disk MSCP controller) and MU (tape MSCP controller) at their standard addresses of 17772150/2 and 17774500/2. The map identifies XH at addresses 17774440/56 and 17774460/76.

During the I/O page portion of the map command, when the onboard line time clock CSR at address 17777546 is reached, the ROM code follows the LTC CSR printout with either BEVNT = 0 or BEVNT = 1. This identifies whether the BEVNT signal is present on the Q-Bus (1 indicates the signal is present and 0 indicates the signal is not present). The line time clock test does not fail if the BEVNT signal is not present.

When the ROM code detects a device at addresses 17774440--17774456 or 17774460--17774476 during the I/O page portion of the map command, it identifies that device as XH for an Ethernet controller. Then the ROM code reads and types the six byte station address starting at either 17774440 or 17774460. The ROM code prints out in hexadecimal bits 7:4 then 3:0 of each of the six bytes. The map command message in Example 3-11 shows one DEQNA present at location 17774440--17774456.

Commands are Help, Boot, List, Map, Test, and Wrap.
Type a command then press the RETURN key: M<RETURN>

KDJ11-D/S ROM V1.0
512 kilobytes

00000000--01777776 512 KB CSR = 17772100

Press the RETURN key when ready to continue <RETURN>

17772100	MCSR
17772150--17772152	DU
17772200--17772216	SIPDR0-7
17772220--17772236	SDPDR0-7
17772240--17772256	SIPAR0-7
17772260--17772260	SDPAR0-7
17772300--17772316	KIPDR0-7
17772320--17772336	KDPDR0-7
17772340--17772356	KIPAR0-7
17772360--17772376	KDPAR0-7
17772516	MMR3
17773000--17773776	CPU ROM
17774440--17774456	XH 08-00-2B-02-71-E2
17774500--17774502	MU
17776500--17776506	SLU1

17777520	NR
17777546	LTC CSR, BEVNT=1
17777560--17777566	SLU0
17777572--17777576	MMR0,1,2
17777600--17777616	UIPDR0-7
17777620--17777636	UDPDR0-7
17777640--17777656	UIPAR0-7
17777660--17777660	UDPAR0-7
17777750	MREG
17777766	CPUER
17777772	PIRQ
17777776	PSW

Commands are Help, Boot, List, Map, Test, and Wrap.
Type a command then press the RETURN key:

Test Command -- causes the ROM code to run most of the power-up tests in a continuous loop. The ROM code starts at test 3, runs all applicable tests and subtests, then restarts the loop after test 6 is complete. You can abort testing and restart console mode at any time by typing <CTRL/C>. If an error occurs, the test 3 through 6 error routine is entered. You can do one of the following two actions at this time.

- Restart console mode by typing <CTRL/C>.
- Loop through all of the tests, ignoring errors, by typing L<RETURN>.

After exiting the test loop, the ROM code displays the total number of loops (passes) and the total number of errors (if any) in the following format.

nnn/xxx

n is the number of errors and x is the number of times the tests were attempted.

In Example 3-12 the Test command is entered to run all loopable tests. After four passes, the testing sequence is aborted with no errors.

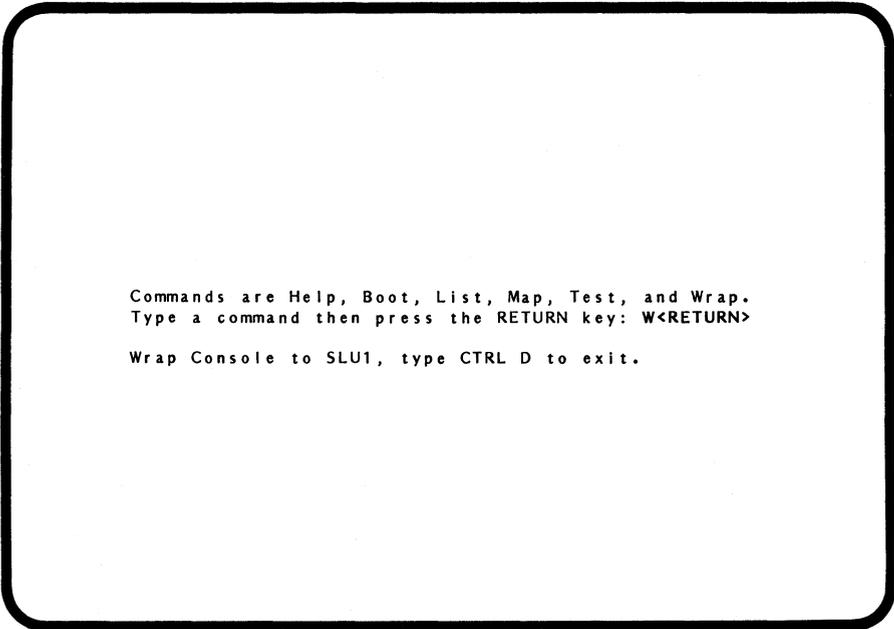
```
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key: T<RETURN>  
  
Continuous self test -- type CTRL C to exit <CTRL/C>  
  
0/4  
  
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key:
```

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Wrap Command -- takes all input from the console terminal (DLART0) and sends it to the second SLU (DLART1), or a selected SLU. All input from DLART1 or the selected SLU is sent to the console terminal. This lets the user at DLART0 communicate with another system through DLART1 or another selected SLU. The command has one optional switch: /A.

Entering the Wrap command with the switch causes the ROM code to request an alternate SLU address. The valid alternate address range is 17776500 through 17776676.

Example 3-13 shows the Wrap command being entered without the switch. The console wraps to the second SLU at address 17776500.



Commands are Help, Boot, List, Map, Test, and Wrap.
Type a command then press the RETURN key: W<RETURN>
Wrap Console to SLU1, type CTRL D to exit.

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Example 3-13 Wrap Command Message without Switch

Example 3-14 shows the Wrap command being entered with an alternate SLU address.

```
Commands are Help, Boot, List, Map, Test, and Wrap.  
Type a command then press the RETURN key: W/A<RETURN>  
  
Address = 17776520  
  
Wrap Console to SLU1, type CTRL D to exit.
```

MR-0586-0740

Example 3-14 Wrap Command Message With Switch

The <DELETE>, <CTRL/H>, <CTRL/U>, <CTRL/V>, and <CTRL/R> keys are used as follows.

<DELETE> -- deletes the previously entered character.

<CTRL/H> -- selects the console terminal as a hardcopy terminal. The only effect this has is when the DELETE key is used. When DELETE is used the ROM code identifies deleted characters with / (slash) characters.

<CTRL/U> -- deletes the entire command line.

<CTRL/V> -- selects the console terminal as a video terminal. The only effect this has is when the Delete key is used. When Delete is used, the deleted characters are erased from the screen (Default selection).

<CTRL/R> -- reprints the command line. <CTRL/R> is normally used on hardcopy terminals to reprint command lines deleted with the Delete key.

For more information about automatic boot mode and console mode, see the KDJ11-DA CPU Module User's Guide (EK-KDJ1D-UG).

3.4 TEST CODE ERROR MESSAGES

3.4.1 Test 1 Errors

When started, the ROM code runs a series of tests that verify the basic Memory Management Unit (MMU) operation and the ROM code. At this point in the testing sequence, the comprehensive error message display routines are disabled. If an error occurs during test 1, the ROM code displays the following error message.

KDJ11-D/S 1.00

This message indicates that a fatal error condition occurred. The ROM code ignores any keyboard input, except to display the error message each time input is received.

3.4.2 Test 2 Errors

This test checks the console SLU. When the SLU0 test is running, the ROM code assumes that error messages cannot be displayed. Therefore, if an error occurs, the ROM code loops on the error.

3.4.3 Test 3 through 6 Errors

These are the main CPU and memory tests. These are also the tests continuously looped when you use the Test command. If an error is detected during these tests, the ROM code displays a brief error message. All errors are treated as fatal errors. The user is expected to fix the problem before continuing. However, errors can be bypassed for troubleshooting.

3.4.4 Override Errors

To bypass an error, you must type one of two commands when the error message is displayed. The ROM code displays the KDJ11-D/S prompt and waits for input. Table 3-6 lists the error override commands and results.

Table 3-6 Error Override Commands

Command	Results
<CTRL/O><RETURN>	Overrides error and enters console mode.
L<RETURN>	Restarts tests at test 2. Loops through tests ignoring errors. Type <CTRL/C> to exit loop.

CAUTION

System media should either be removed or write protected before you bypass an error.

4.1 INTRODUCTION

This chapter describes the options available for MicroPDP-11/53 systems. These options, as well as commonly used peripheral devices, are divided into the following categories.

Communications

Memory

Mass Storage Devices

4.1.1 Ordering Options

When ordering options, you must order two items, a base module and the appropriate cabinet kit, to get all the parts necessary for the option.

Example

DRV11-J Base module

CK-DRV1J-KB Cabinet kit

NOTE

Contact your sales representative for more information about ordering options.

4.2 COMMUNICATION

The MicroPDP-11/53 system uses many of the same communication devices as the MicroPDP-11/73 and MicroPDP-11/83 systems. For more information on communication devices, see the MicroPDP-11 Systems Technical Manual (EK-MIC11-TM).

4.3 EXPANSION MEMORY

For information about the MSV11-PL/PK expansion memory module, see the MicroPDP-11 Systems Technical Manual (EK-MIC11-TM) or the MSV11-P User's Guide (EK-SVOP-UG).

4.3.1 MSV11-Q Memory Module

The MSV11-Q memory module is a quad-height module (M7551) that contains the LSI-11 bus interface, timing and control logic, refresh circuitry, and a MOS storage array. The module also contains circuitry to generate and check parity, and a control and status register.

The module's starting address can be set on any 128 KB boundary within the 4096 KB LSI-11 address space. The MSV11-Q allows the top 4K of the LSI-11 address space to be reserved for the I/O peripheral page.

One of the following three variations of the MSV11-Q module (Figure 4-1) can be used as an option for the MicroPDP-11/53 system.

- MSV11-QA (etch revision A) -- 64K RAMs fully populated; cannot be configured for battery backup (1 megabyte).
- MSV11-QA (etch revision C or later) -- 64K RAMs fully populated; can be configured for battery backup (1 megabyte).
- MSV11-QB -- 256K RAMs half populated; can be configured for battery backup (2 megabyte).

NOTE

The KDJ11-DA on board memory does not support battery backup.

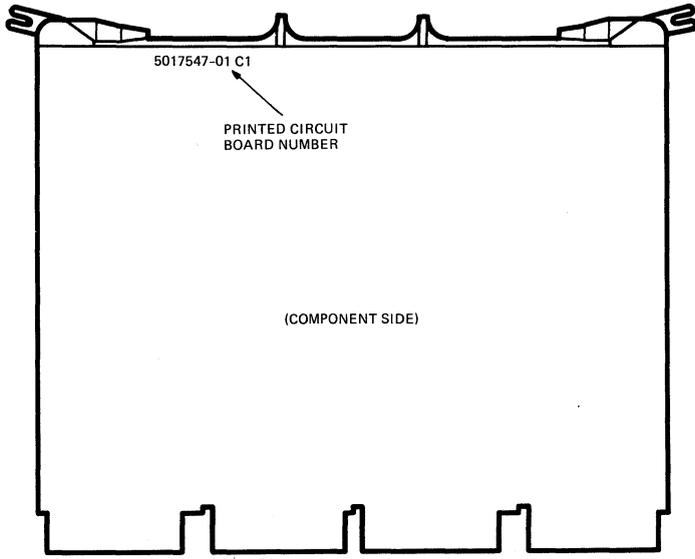
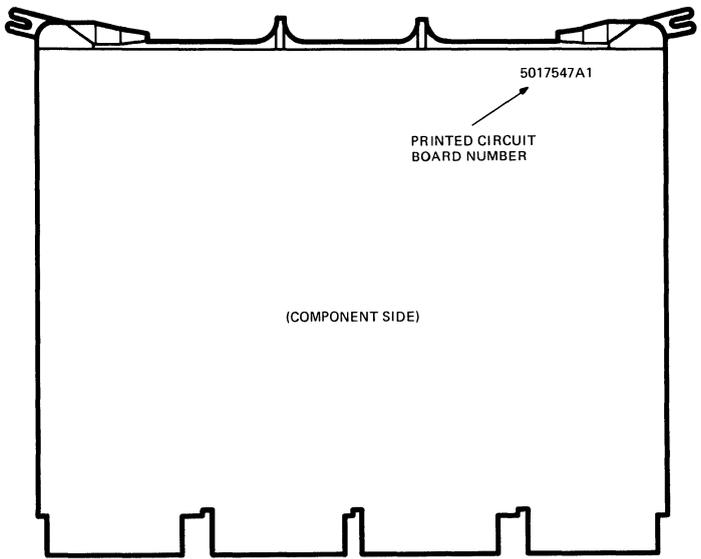
4.3.1.1 Configuration -- This paragraph contains information for configuring the MSV11-QA (etch revision C or later) and the MSV11-QB memory module. The rest of this chapter refers to these variations as the MSV11-Q.

NOTE

Configuring the MSV11-QA (etch revision A) is not described in this manual. For information about how to configure MSV11-QA module revision A, see the MSV11-Q MOS Memory User's Guide, Chapter 2 (EK-MSV1Q-UG).

The MSV11-Q module has one red LED to indicate parity errors. The module contains the following jumpers.

- CSR register selection (jumpers J4 through J11)
- Test jumpers used by manufacturing (J1 through J3) -- DO NOT REMOVE
- Chip select jumpers used by manufacturing (J12 through J17) -- DO NOT REMOVE



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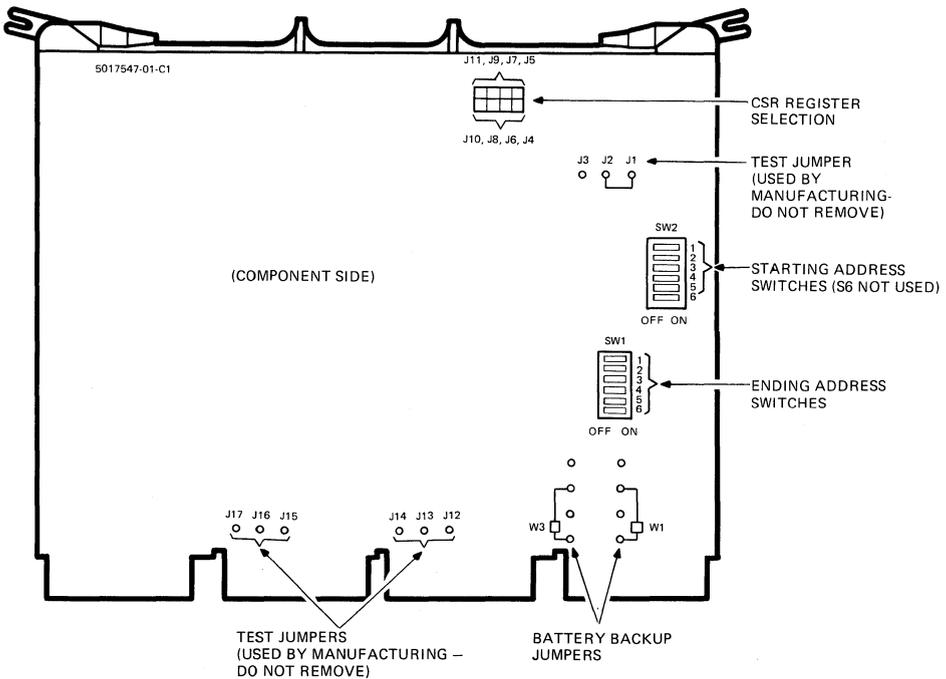
Figure 4-1 Module Identification

The module also has two dual in-line package (DIP) switch packs. Each DIP switch pack consists of six switches. The two switch packs are used to set the starting and ending addresses for the MSV11-Q module.

Figure 4-2 shows the physical location of the jumpers and switches.

4.3.1.2 CSR Register Selection Jumpers -- The MSV11-Q can provide up to 16 CSR register address selections when the user installs or removes appropriate jumper blocks. Table 4-1 shows the jumper positions and the corresponding CSR addresses. Figure 4-3 shows the jumper settings for a CSR register address of 17772102, representing a second MSV11-Q module installed.

If more than one CSR parity type of memory is installed in the system, be careful to ensure that no two modules have the same address.



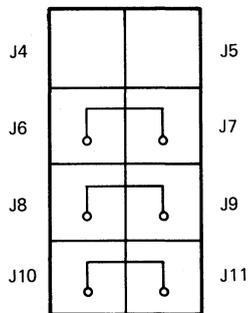
MR-15794

Figure 4-2 MSV11-Q Jumpers and Switches

Table 4-1 CSR Register Selection

Number Memory	CSR	Jumper Connections				CSR Register Address
		J4 to J5	J6 to J7	J8 to J9	J10 to J11	
1st		in	in	in	in	17772100*
2nd		out	in	in	in	17772102
3rd		in	out	in	in	17772104
4th		out	out	in	in	17772106
5th		in	in	out	in	17772110
6th		out	in	out	in	17772112
7th		in	out	out	in	17772114
8th		out	out	out	in	17772116
9th		in	in	in	out	17772120
10th		out	in	in	out	17772122
11th		in	out	in	out	17772124
12th		out	out	in	out	17772126
13th		in	in	out	out	17772130
14th		out	in	out	out	17772132
15th		in	out	out	out	17772134
16th		out	out	out	out	17772136

* Reserved for KDJ11-DA onboard memory. DO NOT use in the MicroPDP-11/53 system.



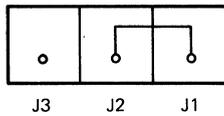
MR-0486-0422

Figure 4-3 CSR Jumper Settings

SYSTEM OPTIONS

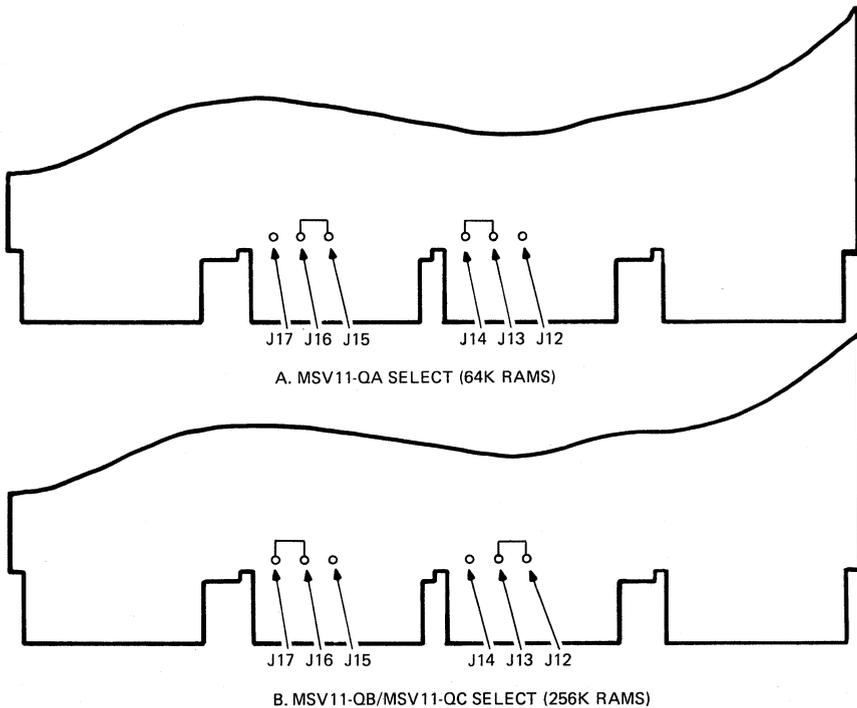
4.3.1.3 Test Jumpers J1 through J3 -- Test jumpers on J1 through J3 (Figure 4-4) are used by manufacturing and should not be removed by the user. Jumper J1 is always connected to J2.

4.3.1.4 Chip Select Jumpers -- To select the 64K RAMs used in the MSV11-QA (etch revision C or later) memory module, jumper J15 must be connected to J16 and jumper J13 must be connected to J14. To select the 256K RAMs used in the MSV11-QB memory module, jumper J16 must be connected to J17 and jumper J13 must be connected to J14 (Figure 4-5). All other jumper combinations are illegal and must not be attempted by the user.



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Figure 4-4 Test Jumpers J1 through J3



MR-0486-0425

Figure 4-5 Chip Select Jumper Settings

4.3.1.5 Address Switches -- The two MSV11-Q DIP switch packs (for address selection) are labeled SW1 and SW2. DIP switch SW2 selects the starting address of the MSV11-Q and DIP switch SW1 selects the ending address. Switch 6 of DIP SW2 (starting address) is not used. Switch 6 of DIP SW1 is turned on enabled (0) for a starting address of all zeros and turned off or disabled (1) for all other starting addresses. Table 4-2 shows the switch settings for the starting addresses and ending addresses.

Table 4-2 Starting and Ending Address Switch Settings

Desired Starting Address in Kilobytes	SW2 Switch Positions					SW1 Switch Position 6	Desired Ending Address In Kilobytes	SW1 Switch Positions				
	1	2	3	4	5			1	2	3	4	5
0	0	0	0	0	0	0	128	1	1	1	1	1
128	1	1	1	1	1	1	256	0	1	1	1	1
256	0	1	1	1	1	1	384	1	0	1	1	1
384	1	0	1	1	1	1	512	0	0	1	1	1
512	0	0	1	1	1	1	640	1	1	0	1	1
640	1	1	0	1	1	1	768	0	1	0	1	1
768	0	1	0	1	1	1	896	1	0	0	1	1
896	1	0	0	1	1	1	1024 (1 MB)	0	0	0	1	1
1024 (1 MB)	0	0	0	1	1	1	1152	1	1	1	0	1
1152	1	1	1	0	1	1	1280	0	1	1	0	1
1280	0	0	1	1	0	1	1408	1	0	1	0	1
1408	1	0	1	0	1	1	1536	0	0	1	0	1
1536	0	0	1	0	1	1	1664	1	1	0	0	1
1664	1	1	0	0	1	1	1792	0	1	0	0	1
1792	0	1	0	0	1	1	1920	1	0	0	0	1
1920	1	0	0	0	1	1	2048 (2 MB)	0	0	0	0	1
2048	0	0	0	0	1	1	2176	1	1	1	1	0
2176	1	1	1	1	0	1	2304	0	1	1	1	0
2304	0	1	1	1	0	1	2432	1	0	1	1	0
2432	1	0	1	1	0	1	2560	0	0	1	1	0
2560	0	0	1	1	0	1	2688	1	1	0	1	0
2688	1	1	0	1	0	1	2816	0	1	0	1	0
2816	0	1	0	1	0	1	2944	1	0	0	1	0
2944	1	0	0	1	0	1	3072 (3 MB)	0	0	0	1	0
3072 (3 MB)	0	0	0	1	0	1	3200	1	1	1	0	0
3200	1	1	1	0	0	1	3328	0	1	1	0	0
3328	0	1	1	0	0	1	3456	1	0	1	0	0
3456	1	0	1	0	0	1	3584	0	0	1	0	0
3584	0	0	1	0	0	1	3712	1	1	0	0	0
3712	1	1	0	0	0	1	3840	0	1	0	0	0
3840	0	1	0	0	0	1	3968	1	0	0	0	0
3968	1	0	0	0	0	1	4096 (4 MB)	0	0	0	0	0

1 = off
0 = on

NOTE

Starting addresses 0 through 384 and ending addresses 128 through 512 are reserved for the KDJ11-DA on board 512 kilobyte memory.

SYSTEM OPTIONS

For more information, see the MSV11-Q MOS Memory User's Guide (EK-MSV1Q-UG).

4.4 MASS STORAGE

The MicroPDP-11/53 system uses some of the same mass storage subsystems (RX50 drive, TK50 drive, and RD53 drive) as the MicroPDP-11/73 and MicroPDP-11/83 systems. For more information on these subsystems, see the following documents or consult your sales representative.

MicroPDP-11 Systems Technical Manual	(EK-MIC11-TM)
RX50 Diskette Drive Owner's Manual	(EK-LEP01-OM)
RD53 Fixed Disk Drive Owner's Manual	(EK-LEP06-OM)
TK50 Tape Subsystem Technical Manual	(EK-OTK50-TM)

This section covers only the RX33 dual diskette drive, RD3n fixed disk drive, and RQDX3 controller module.

4.4.1 RX33 Diskette Drive (Figure 4-6)

Order number: RX33A-AA

The RX33A-AA kit includes the following components.

RX33A-A	Diskette drive
17-00286-00	34-pin signal cable
74-25652-01	Skid plate
74-28201-03	Ground plate
90-40001-01	Screws
74-33594-02	Snap on cover

The RX33 is a 5.25-inch, double-sided, dual-speed, half-height, floppy diskette drive. It has single-sided read/write compatibility as well as the industry standard formatted capacity of 1.2 megabytes on a double-sided, high-density floppy diskette.

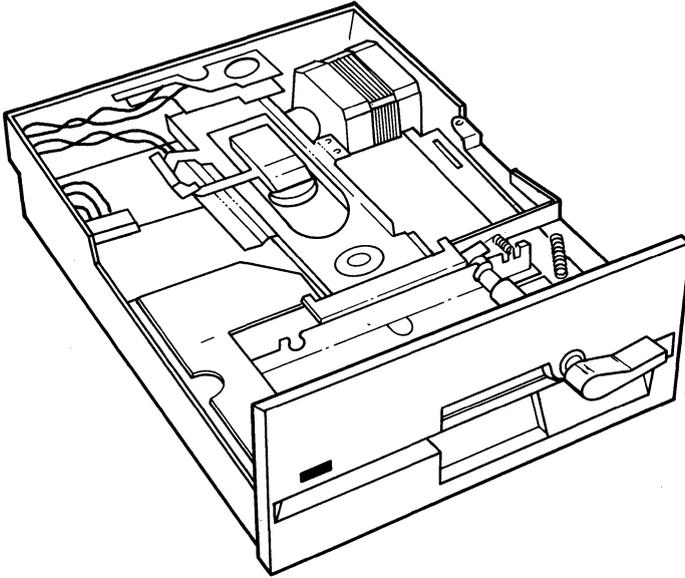
The RX33 drive is mounted in the system enclosure (BA23-A) and interfaces to the Q22-Bus through the RQDX3 controller module.

The specific configuration of the RX33 drive is established by the installation of jumpers and components on the device electronics board (Figure 4-7).

For more information, refer to the RX33 Diskette Drive Technical Manual (EK-RX33-TM).

NOTE

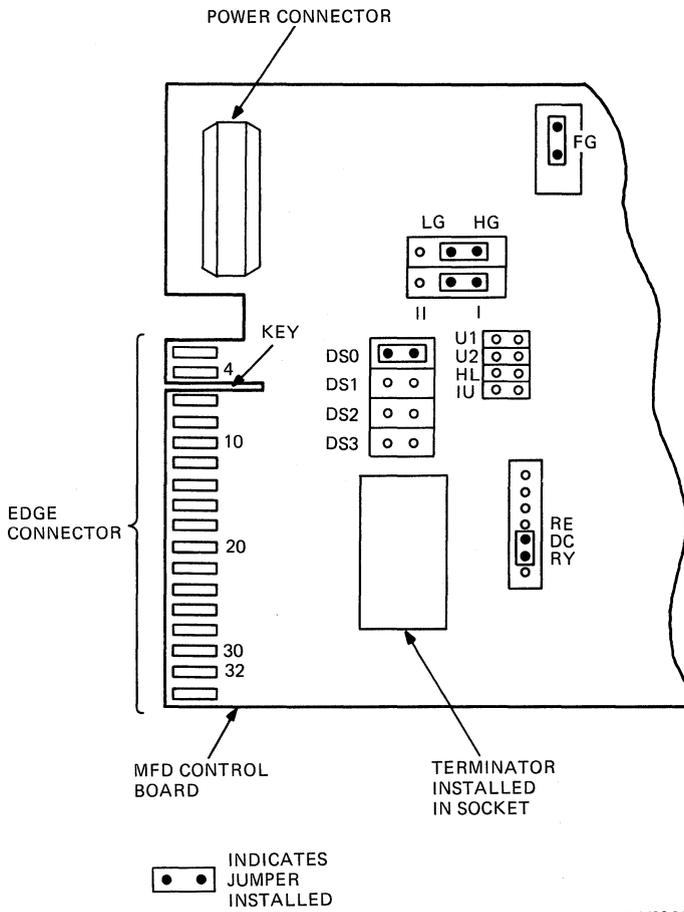
The red LED on the front of the RX33 drive continuously flashes, indicating the drive is polling for something to read or write.



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Figure 4-6 RX33 Diskette Drive

SYSTEM OPTIONS



MR-0486-0421

Figure 4-7 RX33 Jumper Settings

4.4.2 RD3n-A Fixed Disk Drive (Figure 4-8)

Order number: RD3nA-AA

An RD3nA-AA kit includes the following components.

30-25289-01	Disk drive only
17-00282-00	20-pin data transfer cable
17-00286-00	34-pin control signal cable
74-25652-01	Skid plate
74-28201-01	Ground plate
90-06021-01	Screws

The RD3n-A is a 5.25-inch, half-height, fixed disk drive with a formatted storage capacity of 20 megabytes. The drive is a random access, noncontact drive using nonremovable hard disks.

The RD3n drive is mounted in the system enclosure (BA23-A) and interfaces with the Q22-Bus through the RQDX3 controller module.

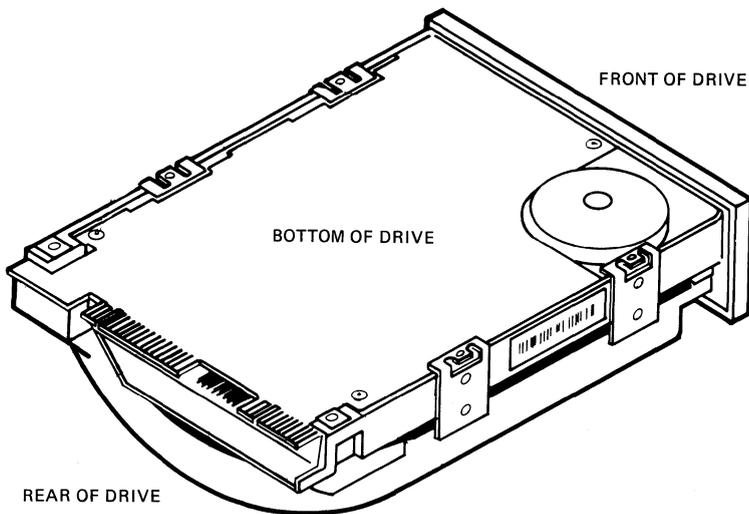


Figure 4-8 RD3n Fixed Disk Drive

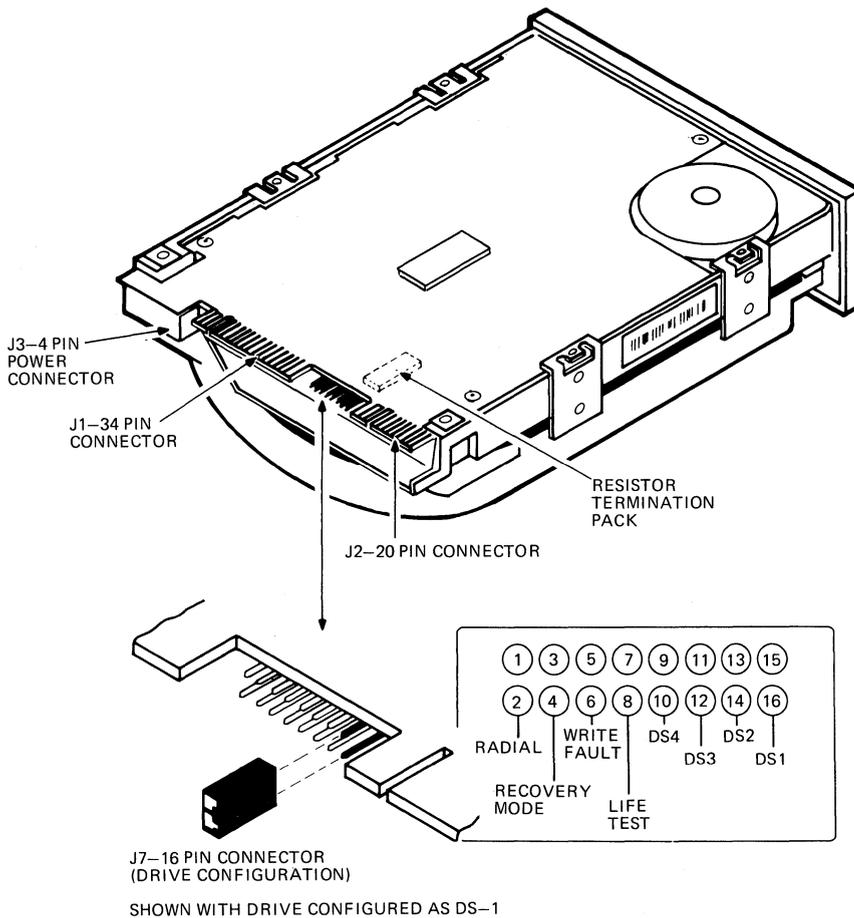
SYSTEM OPTIONS

The specific configuration of the drive is established by the installation of jumpers and components on the device electronics board (Figure 4-9).

A jumper should be placed on one of the drive selects (one through four or radical). Tables 4-3 and 4-4 show the drive configuration options.

NOTE

Jumpers should not be placed on the fifth and seventh position switches. These switches are for factory test use only.



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Figure 4-9 Electronics Board Configuration Components

Table 4-3 Electronics Board Configuration Options (Drive Select)

Characteristic	J7 Pin Description	Connector	Option Methodology			
			DS1	DS2	DS3	DS4
Drive address						
	Drive 1	15 to 16	I	0	0	0
	Drive 2	13 to 14	0	I	0	0
	Drive 3	11 to 12	0	0	I	0
	Drive 4	9 to 10	0	0	0	I

I = jumper in
 0 = jumper out

Table 4-4 Electronics Board Configuration Options (All Other Configurations)

Characteristic	Jumper Location	Jumper In	Jumper Out
Life test	7 to 8	Factory use only	Normal mode*
Write fault	5 to 6	Latched	Normal mode*
Recovery mode	3 to 4	Factory use only	Normal mode*
Radial	1 to 2	Radial mode	Normal mode*

* Normal configuration

The RD3n-A drives used in most systems have the resistor termination pack installed. For specific exceptions, see the system installation procedures. If instructed to remove the terminator resistor, be sure to store it in a safe place to prevent loss.

For more information, see the RD3n-A Technical Description (EK-RD3nA-TD).

4.4.3 RQDX3 Controller Module

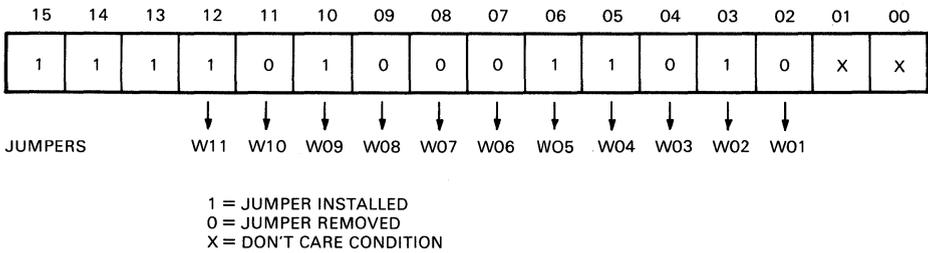
The RQDX3 controller is a dual-height module that interfaces up to four logical drive units to the Q22-Bus. The RQDX3 is an intelligent controller with onboard microprocessors and Q-Bus block mode DMA data transfer capability in 16-, 18-, or 22-bit addressing mode.

The RQDX3 controller module plugs into any available slot on the BA23 backplane, except slot one rows A--D (reserved for CPU module) and slots 2 and 3, rows C and D.

SYSTEM OPTIONS

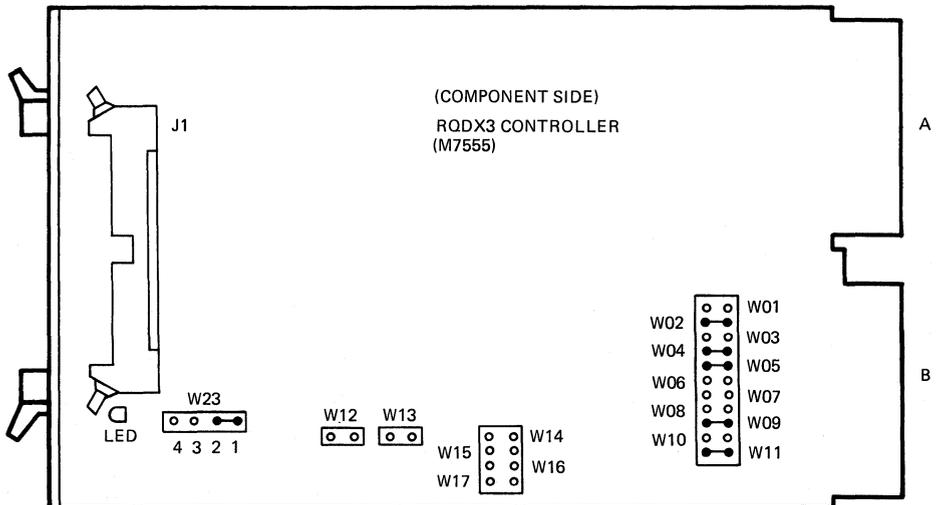
4.4.3.1 Base Address -- The module base address is configured by installing jumpers W02, W04, W05, W09, and W11, and removing jumpers W01, W03, W06, W07, W08, and W10 as shown in Figure 4-10. Address bits 13--15 are always asserted high because they are jumpered permanently by hard-wire connections.

4.4.3.2 Starting Logical Unit Number (LUN) -- The starting LUN equals the binary number represented by jumpers W12 (LSB) through W17 (MSB) multiplied by four. When jumpers W12 through W17 are removed (Figure 4-11), a starting LUN of zero is selected. See Table 4-5 for typical examples.



MR-16767

Figure 4-10 Base Address Jumper Assignments



MR-16713

Figure 4-11 RQDX3 Module Layout

Table 4-5 Typical Examples of Starting LUNs

Starting LUN	Jumpers Installed	Jumper Representations	
		Binary	Decimal
0	None*	000000	0
4	W12	000001	1
8	W13	000010	2
12	W13 and W12	000011	3
16	W14	000100	4

* Factory configuration

4.4.3.3 Jumper W23 -- Jumper W23 is installed as shown in Table 4-6.

Table 4-6 W23 Installation

Pins				Remarks
1	2	3	4	
W23				
o---o		o	o	This factory configuration allows the HEADSEL 3(L) and REDUCWRTI (L) signals to be tied to the same connector pin (pin 22 of J1).
W23				
o	o----o		o	W23 connected between points 2 and 3 ties the HEADSEL 3 (L) signal to pin 9 of J1, and the REDUCWRTI (L) signal to pin 22 of J1.

For more information, see the RQDX3 Controller Module User's Guide (EK-RQDX3-UG).



5.1 CONFIGURATION RULES

You must consider the following factors when configuring a system in a BA23-A enclosure.

- The module physical priority in the backplane
- The I/O panel expansion space occupied
- The power requirements
- The module CSR addresses and interrupt vectors

5.1.1 Module Physical Priority

The order in which options are placed in the backplane affects system performance. The following rules govern the configuration of a MicroPDP-11/53 system.

- All MicroPDP-11/53 Q-Bus options are installed below the CPU module, in slots 2 through 8.

NOTE

Expansion memory modules are installed in slots 2 and 3. No empty slots are allowed between the CPU and expansion memory modules.

- Quad-height options may be installed anywhere in slots 2 through 8.
- Dual-height options can be installed anywhere in slots 4 through 8 (rows AB or CD) and in slots 2 and 3 on the AB rows only. No dual-height options may be installed in slots 2 or 3 on the CD rows.
- Dual-height options alone in slots 4 through 8 rows AB or CD, require an M9047 grant card next to them when followed by another module (quad or dual) in the next slot.
- The backplane can accommodate modules that total up to 22 ac loads.
- Loading (dc) of all modules in the system cannot exceed 20 dc loads.

CONFIGURATION

Option modules should be placed in the system backplane in the following sequence.

Tape transport subsystem controller

TSV05 (M7196)

General purpose parallel communication interfaces

DRV11-J (M8049)

DRV11 (M7941)

Line printer interface

LPV11 (M8027)

Asynchronous communication interfaces

DLVE1 (M8017)

DLVJ1 (M8043)

Asynchronous communication interfaces -- with Silo

DZQ11 (M3106)

DHQ11 (M3107)

Synchronous communication interfaces -- DMA

DMV11-M (M8053)

DMV11-N (M8064)

Asynchronous communication multiplexer -- with/Silo and DMA

DHV11 (M3104)

Synchronous communication interface

DUV11 (M7951)

High-performance synchronous communication controller -- DMA

DEQNA (M7504)

Tape cartridge subsystem interface

TQK50 (M7546)

Disk controller interface -- DMA

RLV12 (M8061)

MSCP RD/RX disk drive controller -- DMA

RQDX3 (M7555)

MSCP disk controller interface (KLESI) -- DMA

RQC25-BA (M7740)

General purpose parallel communication interface -- DMA

DRV11-WA (M7651)

6.1 INTRODUCTION

This chapter describes the following topics.

- Start-up self-test
- Console on-line debugging technique (ODT) mode
- Diskette or tape diagnostics
- BA23-A enclosure (troubleshooting)

6.2 START-UP SELF-TEST

The factory configuration of the KDJ11-DA CPU module is set for diagnostic self-test and boot mode. This test runs each time the system is turned on or restarted, and tests the following modules.

CPU module (with on-board memory)
Expansion memory modules

The self-test begins by testing a small portion of the CPU module, then progressively tests more and more of the base system. The system enters automatic boot mode on successful completion of the start-up test (see Chapter 3 in this manual). If an error or failure is discovered during this self-test, an error message is displayed. Table 6-1 lists start-up self-test error codes and descriptions.

Table 6-1 Start-up Self-test Errors

Error Number Hexadecimal	Description
0	HALT switch on, CPU fault, power supply fault, or control has passed from ROM code to secondary boot
1	Preliminary CPU testing -- limited error messages
2	Console SLU testing
3	CPU testing
4	Onboard memory testing
5	External memory testing
6	Floating-point, LTC interrupt, SLU0 interrupt, SLU1 interrupt, and MMU abort testing
7	not used
8	not used
9	not used
A	not used
B	not used
C	ODT mode in progress
D	Wrap mode in progress
E	Boot in progress
F	Console mode in progress

6.2.1 Test Error Messages

Normally, an error message is displayed in the following two locations in the system.

- On the console terminal (Example 6-1 shows a console terminal error message)
- On the console display panel (displays the error code number)

```
KDJ11-D/S 4.62
Error, see troubleshooting section in owner's manual for help
RAM VPC=024722 PA=17606552 01000000/125200 <> 125252
KDJ11-D/S>
```

MR-0586-0741

Example 6-1 Onboard RAM Test Error Message

The three lines of the message are interpreted as follows (the fourth line is the KDJ11-D/S prompt).

Line 1 -- KDJ11-D/S is the CPU identifier and is the same in any error message. 4.62 is the test subtest. The test number (4) is the same number that is in the native register (NR<03:00>) and displayed in the remote LEDs.

Line 2 -- This line is standard in any error message.

DIAGNOSTICS

Line 3 -- Has the following four parts.

1. A short description of the failed area:

J11 = J11 test error
J11 FP = floating point test error
J11 MMU = memory management test error
J11 nnn = unexpected trap to virtual address nnn
LTC CSR = line time clock test error
SLU0 = console SLU test error
SLU1 = second SLU test error
ROM = ROM checksum test error
RAM = onboard memory test error
RAM CSR = onboard memory parity test error
Q-Bus RAM = Q-Bus memory test error
Q-Bus CSR = Q-Bus memory parity test error

All areas except Q-Bus RAM and Q-Bus CSR are on the KDJ11-DA module.

2. The virtual PC of the failure -- generally useful only with a program listing
3. The physical address of the failure -- generally useful only with a program listing
4. Only displayed with RAM errors, this part displays:

address/found data <> expected data

(the failing location, the bad data, and the expected data)

6.3 CONSOLE ODT MODE

Console ODT mode is entered in one of the following ways.

- The operator pressing the console terminal <BREAK> key, if halt-on-break jumper W11 (on the CPU module) is not installed, or the halt-on-break switch is not disabled (on the console display panel printed circuit board).

NOTE

The break key must be enabled on the terminal also. For example, on a VT220 the break key can be disabled.

- Execution of a Halt instruction in kernel mode, if halt option jumper W1 (on the CPU module) is installed.
- Q22-Bus BHALT line is asserted on the backplane.

When the system has entered console ODT mode, it displays the following on the console terminal:

```
nnnnnn
@
```

The number nnnnnn is the octal location of the next instruction to be executed, and the @ is the ODT prompt.

ODT consists of a group of commands and routines for finding error conditions, and for simple communication with the system. You can examine or modify the contents of the system's registers and memory locations by entering ODT commands. Table 6-2 describes ODT commands. See the Microcomputer and Memory Handbook (EB-18451-20) for a more detailed description.

Table 6-2 Console ODT Commands

Command	Character/Key	Function
Internal register	S or R	Specifies the location as a processor register if followed by 0--7 or S (R0, \$1, etc.).
PSW designator	S	Specifies the location as the processor status word (PSW) if preceded by R or \$ (RS/).
Open location	/	Prints the contents of a specified location.
Close location	<RETURN>	Closes an open location.
Close then open location	<LINE FEED>	Closes an open location then prints the contents of the next contiguous location.
Go	G	Starts program execution.
Proceed	P	Resumes program execution.
Binary dump	<CTRL/SHIFT/S>	Manufacturing test only.

6.4 USER TEST DISKETTES

The user or customer test diskette package contains the user-friendly diagnostic for checking the system.

6.4.1 User Diagnostics

The user or customer diagnostics let you verify the operation of the entire system. The diskettes are labeled as follows.

Micro-11 Cust RXnn A*
Micro-11 Cust RXnn B
Micro-11 Formtr RXnn

The part number for the complete kit is ZYA03-P3.

The customer diagnostic diskettes include software modules necessary to build a run-time exerciser for the entire system, including options.

Place the diskette labeled Micro-11 Cust RXnn A into the diskette drive to load the diagnostics. To run the customer diagnostic tests, select the test command (T) from the menu.

If the tests do not find errors, a message is displayed at the terminal and testing is complete.

Example 6-2 shows the Customer Diagnostics -- Main Menu.

*RXnn represents RX33 or RX50 diskettes.

```
CUSTOMER DIAGNOSTICS -- V12.0 -- Main Menu

I - Identify System Devices.

T - Run System Tests.

F - Go to the Format Menu.

Type the letter then pres the RETURN key.....
```

MR-0586-0742

Example 6-2 Customer Diagnostics -- Main Menu

6.5 FIELD SERVICE TEST DISKETTES

The Field Service test diskettes (or maintenance diskettes) package contains XXDP+ diagnostic software. The package has part number ZYA05-P3. XXDP+ includes the program modules necessary to build a run-time exerciser for the entire system (including options). Independent device diagnostics are also included.

6.5.1 Field Service Test Diagnostics

The Field Service or maintenance diskettes let the user gain access to the XXDP monitor. At the XXDP monitor, the user can run an individual device test by typing in its name. You can also gain access to the XXDP monitor from the Maintenance Diagnostics -- Expert XXDP Menu or the Disk Format Menu. See Examples 3 through 6. Example 3 shows the Maintenance Diagnostics -- Main Menu message.

NOTE

Only trained service personnel familiar with XXDP+ software should use the XXDP+ monitor or the maintenance diskettes.

```
MAINTENANCE DIAGNOSTICS -- V12.0 -- Main Menu  
I - Identify System Devices.  
T - Run System Tests.  
F - Go to the Format Menu.  
E - Go to the Expert XXDP User's Menu  
  
Type the letter then the RETURN key.....
```

MR-0586-0743

Example 6-3 Maintenance Diagnostics -- Main Menu

Example 6-4 shows the Maintenance Diagnostics -- Expert XXDP Menu.

```
MAINTENNCE DIAGNOSTICS -- V12.0 -- Expert XXDP Menu
S - Run System Tests in Expert XXDP User's Mode.
X - XXDP V2 monitor is entered, see the V2 User's Guide.
M - Return to the Maintenance Diagnostics - Main Menu.

Type the letter then press RETURN key.....
```

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Example 6-4 Maintenance Diagnostics -- Expert XXDP

Type the letter then press RETURN key.....

DIAGNOSTICS

Example 6-5 shows the message displayed at the terminal after you select X from the Maintenance Diagnostics - Expert XXDP Menu.

```

                                XXDP MONITOR NOTICE

Some diagnostic programs are incompatible with the XXDP V2
Extended Monitor because of their interaction with Memory
Management Hardware. If you are in doubt about the Extended
Monitor compatibility with the programs you wish to run, it is
recommended that you now boot the Small Monitor.

Which Monitor would you like to boot?

S - Boot the Small Monitor.

X - Boot the Extended Monitor.

Type the letter then press the RETURN key.....
```

MR-0586-0745

Example 6-5 XXDP Monitor Message

Example 6-6 shows the message displayed at the terminal after selecting Small Monitor (see Example 6-5).

```

*****
*   XXDP V2 Small Monitor   *
*****

BOOTING UP XXDP-SM SMALL MONITOR

XXDP-SM SMALL MONITOR - XXDP V2.2
REVISION: C0
BOOTED FROM DU1
28KW OF MEMORY
NON-UNIBUS SYSTEM

RESTART ADDR: 152010
TYPE "H" FOR HELP
.
```

MR-0586-0746

Example 6-6 Small Monitor Message

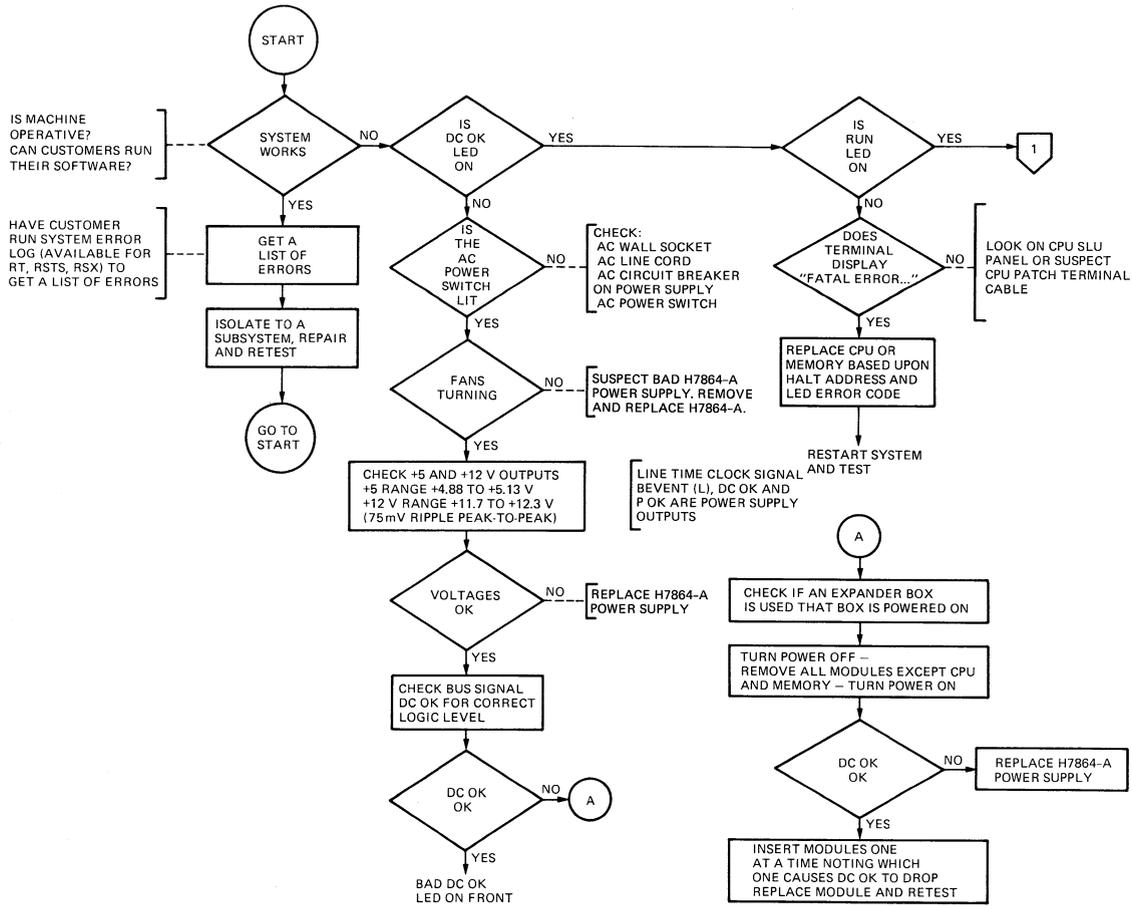
Your version numbers may be different from those shown in the examples.

For more information about the diagnostic system, see the following documents.

DEC/X11 User's Manual	(AC-F053-MC)
DEC/X11 Cross Reference Manual	(AC-F055C-MC)
XXDP+/SUPR User's Manual	(AC-F348A-MC)
XXDP+ DEC/X11 Programming Card	(EK-OXXDP-MC)

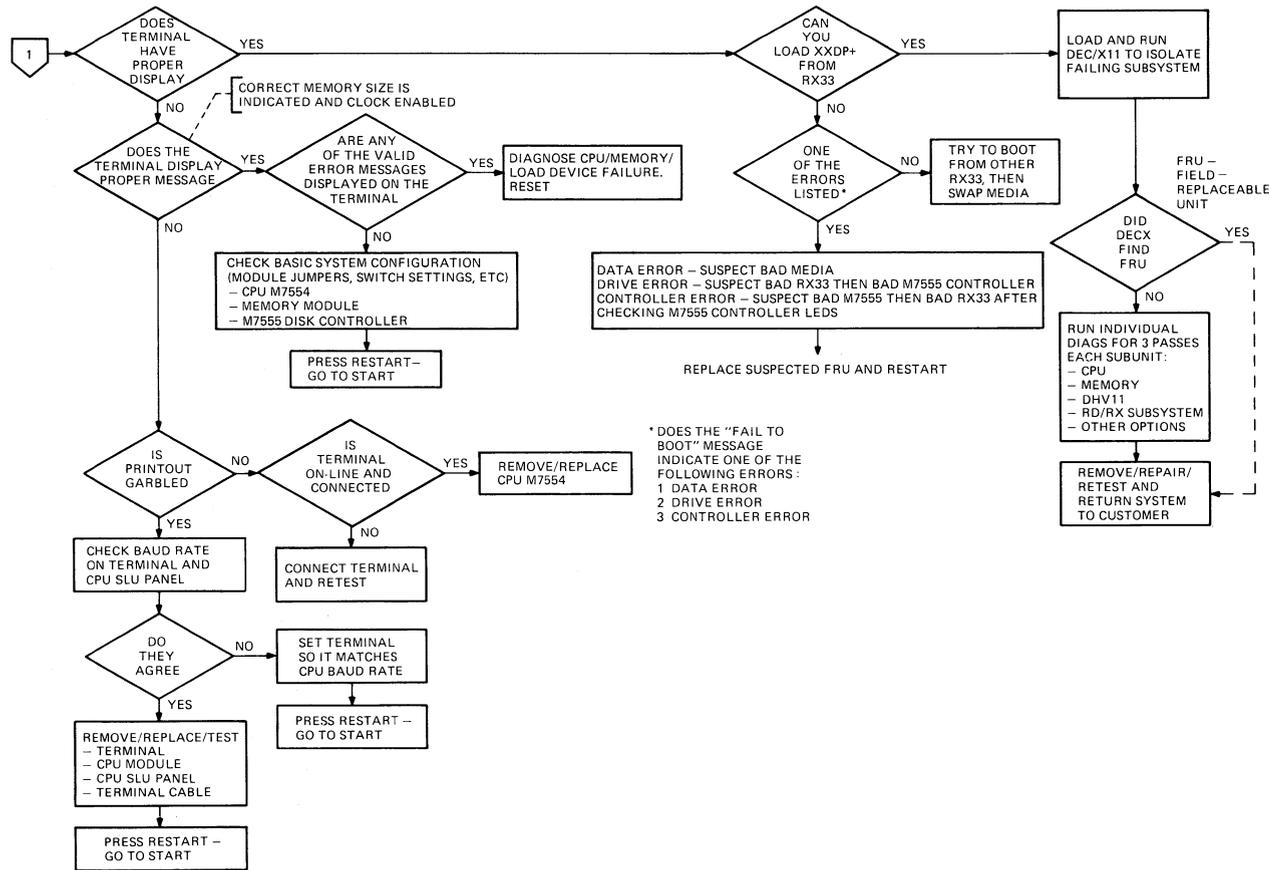
6.6 TROUBLESHOOTING THE BA23-A ENCLOSURE

The start-up diagnostics automatically run the CPU and memory self-tests. Table 6-1 lists the error numbers produced by this testing and the error's probable cause. The customer and maintenance diskettes provide further system testing. To isolate the problem to the failing FRU, follow the troubleshooting flowchart (Figure 6-1). See Chapter 7, FRU Removal and Replacement, for the appropriate removal and replacement procedures.



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Figure 6-1 Troubleshooting Flowchart (Sheet 1 of 2)



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Figure 6-1 Troubleshooting Flowchart (Sheet 2 of 2)

7.1 INTRODUCTION

This chapter describes how to remove and replace the field replaceable units (FRUs) in the MicroPDP-11/53 system. Figure 7-1 shows the major FRUs from the front of the BA23-A enclosure. Table 7-1 lists the FRUs and their part numbers.

CAUTION

Static electricity can damage modules installed in the system and in mass storage devices. Always use a grounded wrist strap and work surface when you work on any internal part of your system.

NOTE

Only qualified service personnel should perform any of these removal and replacement procedures.

Unless otherwise specified, you can replace FRUs by performing the removal procedure in reverse.

Table 7-1 MicroPDP-11/53 Field Replaceable Units

Component	Order Number
H7864-A power supply	30-21749-01*
Power supply ac power cable with ac switch	70-20434-01
Fan, dc	12-17556-01
Fan power cable, dc	70-20449-00
Backplane assembly	70-19986-00
Signal distribution panel	54-15633-00
Backplane dc power cord	70-20450-01
RX50 diskette drive	RX50A-A
RX50 signal cable	17-00285-02
RX/RD power cable	70-20435-1K
RD52 fixed disk drive (RD52A-AA)	RD52-A
RD52 read/write board	29-24992-00
RD53 fixed disk drive (RD53A-AA)	RD53-A
RD53 read/write board	29-25339-00
RD3n fixed disk drive	30-25289-01†
RD3n signal cable (20-pin)	17-00282-00
RD3n signal cable (34-pin)	17-00286-00
RX33 diskette drive	RX33A-A†
RX33 signal cable	17-00286-00
TK50 tape drive	TK50A-A

REMOVAL AND REPLACEMENT

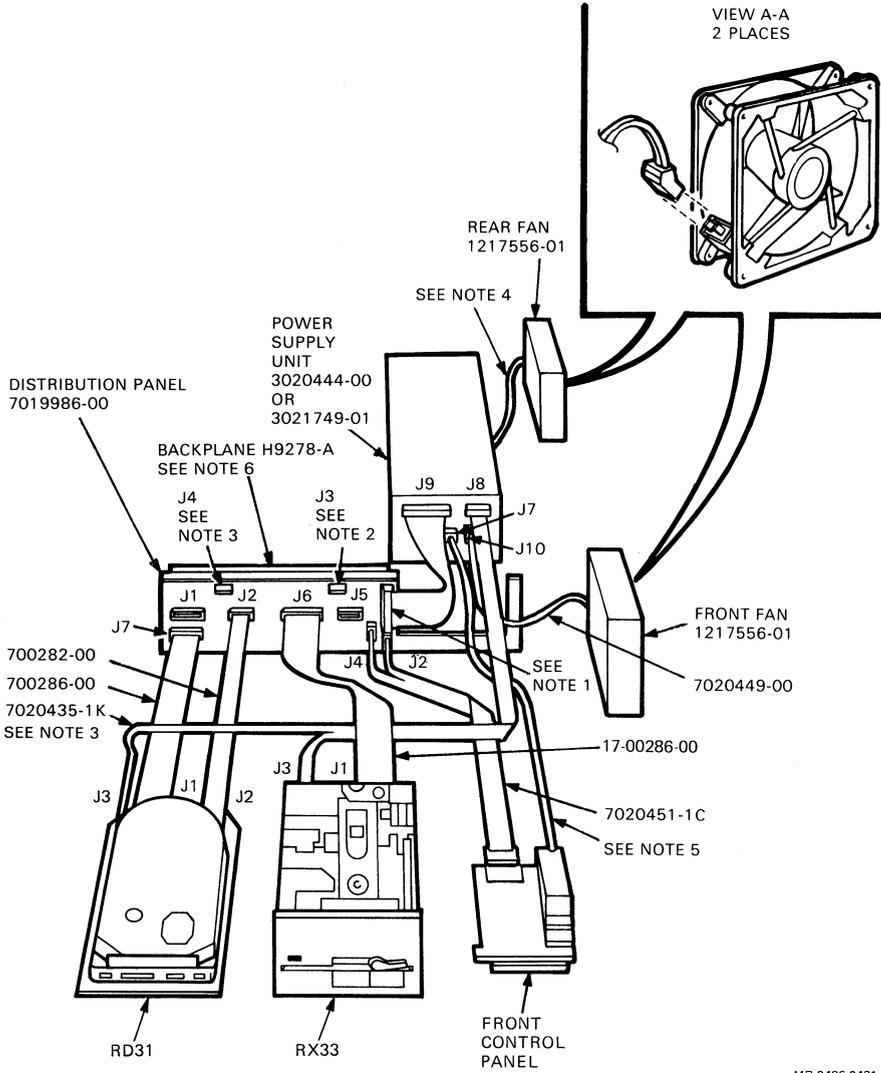


Figure 7-1 BA23-A Enclosure FRUs

MR-0486-0431

Table 7-1 MicroPDP-11/53 Field Replaceable Units (Cont)

Component	Order Number
TKQ50 controller (cable)	70-22300-01
TKQ50 controller	M7546
RD5n signal cable (20 wire)	17-00282-00
RD5n signal cable (34 wire)	17-00286-00
RQDX3 controller	M7555
RQDXE extender module	M7513
KDJ11-DA	M7554
MSV11-QA	M7551-AA
MSV11-QB	M7551-AB
MSV11-PK	M8067-K
MSV11-PL	M8067-L
DEQNA	M7504
DZV11	M7957
DLVJ1	M8043
Grant card	M9047
Front control panel	70-22007-02
Control panel cable	70-20451-1C
Adapter plate	74-28684-01
I/O distribution panel	70-19979-00
Console insert panel	70-23709-01
Patch cable (from CPU module)	17-00867-01
Cable (to terminals)	17-00811-03
Front bezel (rack mount)	74-29501-01
Front bezel (floor/table)	74-29559-00
Rear bezel	74-27560-00
Enclosure plastic skins	70-20469-01
Pedestal (floor)	74-27012-00
Rack mount kit	70-22025-01
Chassis support kit	70-20761-01
Loopback connectors	12-15336-00

* A replacement power supply must have the same part number as the power supply you removed.

† If you are adding a drive to a system that did not already contain a drive, order the AA or AB option. The AA or AB options include the necessary cables.

NOTES

1. Connectors J1 and J2 are located on the backplane assembly.
2. If the diskette drive is not present, the power cable connector should be plugged into J3 on the distribution panel.
3. If the fixed disk drive is not present, the power cable connector should be plugged into J4 on the distribution panel.
4. The rear fan cable is an integral part of the power supply.
5. The cable is an integral part of the front control panel power switch assembly.

7.2 RX33 DISKETTE DRIVE REMOVAL

Remove the RX33 diskette drive as follows (Figure 7-2).

NOTE

The diskette drive is a single field replaceable unit. Do not disassemble the diskette drive or remove any of the printed circuit boards. All adjustments must be made in a special test configuration.

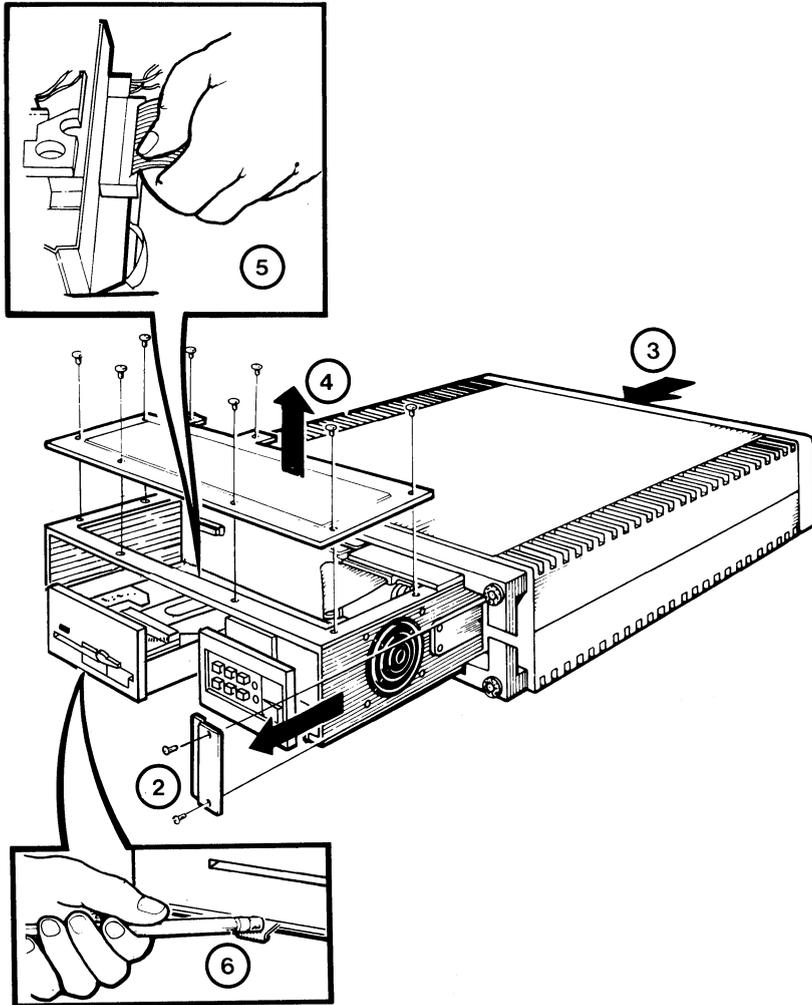
Only use RX33 diskettes available from Digital Equipment Corporation and its licensed distributors.

1. Remove both covers and the ac power cord.
2. Remove the front chassis retaining bracket.
3. Push the subsystem forward.
4. Remove the subsystem storage cover.
5. Disconnect the signal cable and the dc power cable from diskette drive by pulling out on the connectors.
6. Push down on the release tab, slide the RX33 diskette drive forward, and remove the drive.
7. Remove the drive release lever from the drive being replaced and the replacement drive.
8. Pull out on the RX33 drive cover plate to remove it from the drive.
9. Attach the cover plate to the replacement drive.
10. Reinstall the replacement drive release lever.

NOTE

Put the drive release lever in its up position and remove the cardboard shipping insert from the new RX33 diskette drive.

You can also use this procedure (steps 1 through 6 only) to remove the RX50 diskette drive or the TK50 tape drive.



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Figure 7-2 RX33 Diskette Drive Removal

7.3 RD3n FIXED DISK DRIVE REMOVAL

Remove the RD3n fixed disk drive as follows (Figure 7-3).

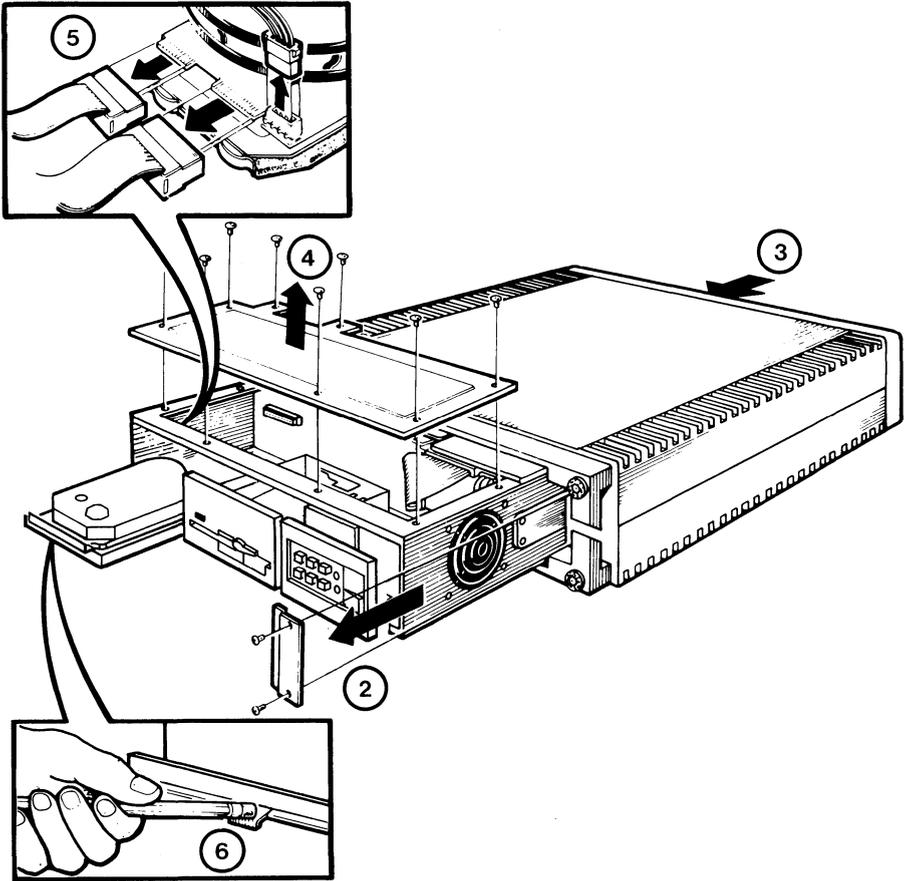
CAUTION

Handle any fixed disk drive with care. Dropping or bumping the drive can damage the disk surface.

NOTE

Pack any disk drive to be returned in the replacement disk drive's shipping carton. If the shipping carton is not available, you can order one (Digital PN 99-90045-01).

1. Remove both covers and the ac power cord.
2. Remove the front chassis retaining bracket.
3. Push the subsystem forward.
4. Remove the subsystem storage cover.
5. Remove the power cable and two ribbon cables from the RD3n drive.
6. Push down on the release tab, slide the RD3n disk drive forward, and remove the drive.
7. To configure an RD3n drive as DU0, you must adjust the jumper at J7 (see Table 4-3).



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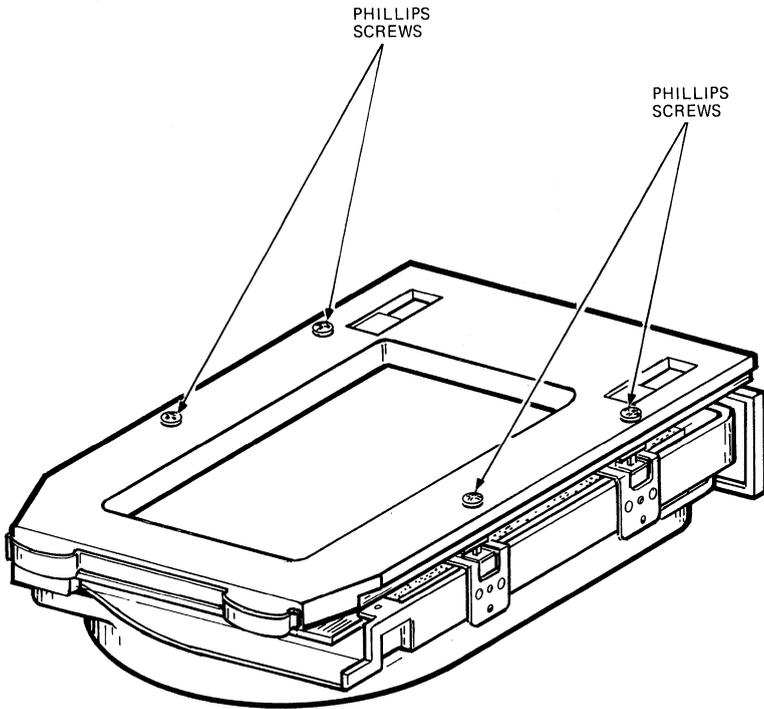
Figure 7-3 RD3n Removal

7.3.1 RD3n Printed Circuit Board Removal

CAUTION

Do not remove any of the screws that secure the cover (cover/filter assembly) to the base casting. Removing any of the screws violates the clean area.

1. Remove the four screws that secure the skid plate and attached ground clip to the frame (Figure 7-4). Remove the plate and set it aside.



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Figure 7-4 RD3n Skid Plate Removal

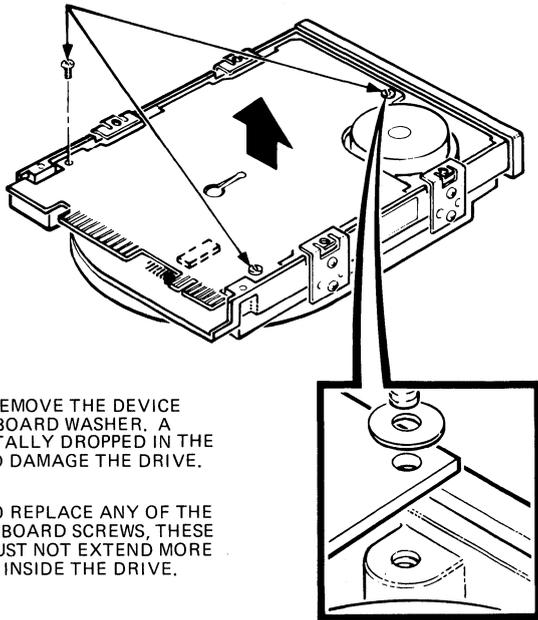
2. Remove the three screws that hold the printed circuit board in place (Figure 7-5).

CAUTION

Make sure you replace the insulating washer at the rear of the unit.

CAUTION

Flexible circuit material is fragile and requires careful handling to avoid damage.



CAUTION: MAKE SURE YOU REMOVE THE DEVICE PRINTED CIRCUIT BOARD WASHER. A WASHER ACCIDENTALLY DROPPED IN THE DISK DRIVE COULD DAMAGE THE DRIVE.

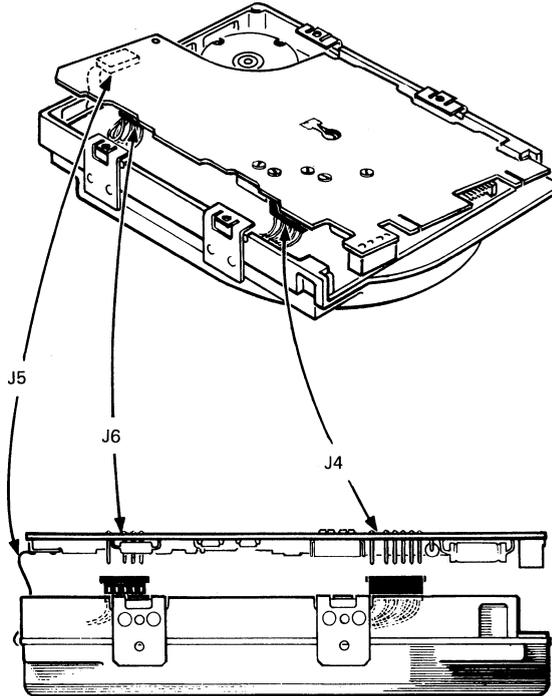
NOTE: IF IT IS NECESSARY TO REPLACE ANY OF THE DEVICE ELECTRONICS BOARD SCREWS, THESE MOUNTING SCREWS MUST NOT EXTEND MORE THAN 0.64 CM (0.25 IN) INSIDE THE DRIVE.

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Figure 7-5 Printed Circuit Board Screws Removal

REMOVAL AND REPLACEMENT

3. Disconnect the board plugs from connectors J4, J5, and J6 (Figure 7-6). All connectors and cables are fragile, handle them with care.
4. The board is now free and can be replaced.

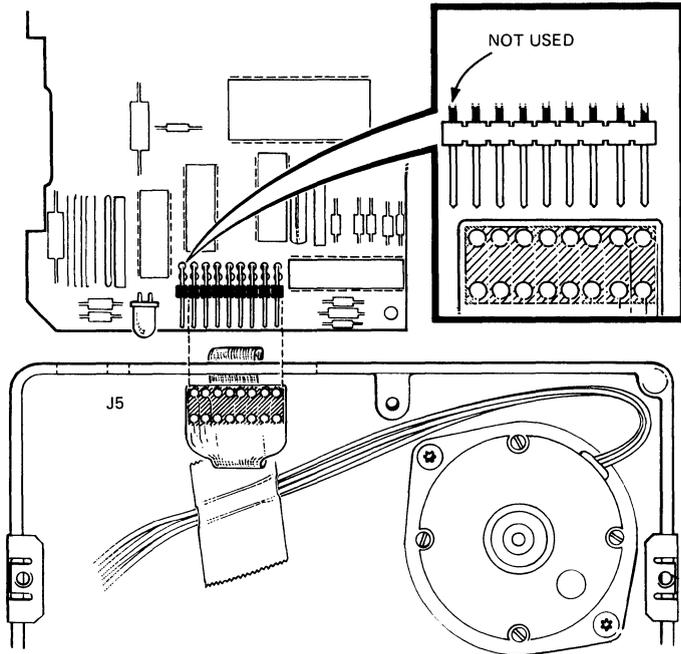


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Figure 7-6 Disconnecting the Plugs

CAUTION

When you make a connection at J5, note that connector J5 has nine pairs of pins, but the plug has eight pairs of slots. This plug does not have a key and can be replaced incorrectly. Do not use the pair of pins on connector J5 closest to the LED (Figure 7-7).



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Figure 7-7 Connecting J5

REMOVAL AND REPLACEMENT

See Chapter 6 of the MicroPDP-11 systems Technical Manual (EK-MIC11-TM) to remove and replace the following FRUs.

Front control panel

RD52/53 fixed disk drive and printed circuit boards

Backplane assembly

Power supply

Rear and front cooling fans

Modules

Rear I/O insert panel

**APPENDIX A
SYSTEM SPECIFICATIONS**

To receive the best possible performance from your MicroPDP-11/53 system, you must provide the right operating conditions. Figures A-1 and A-2, and Tables A-1 and A-2 show the correct operating environment and the system's physical specifications.

NOTE
Your terminal and printer may be different from those shown.

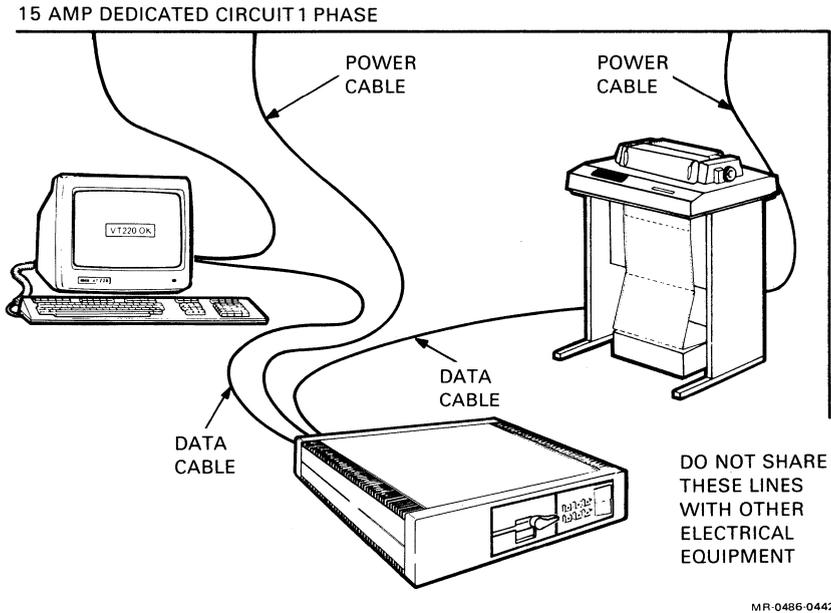
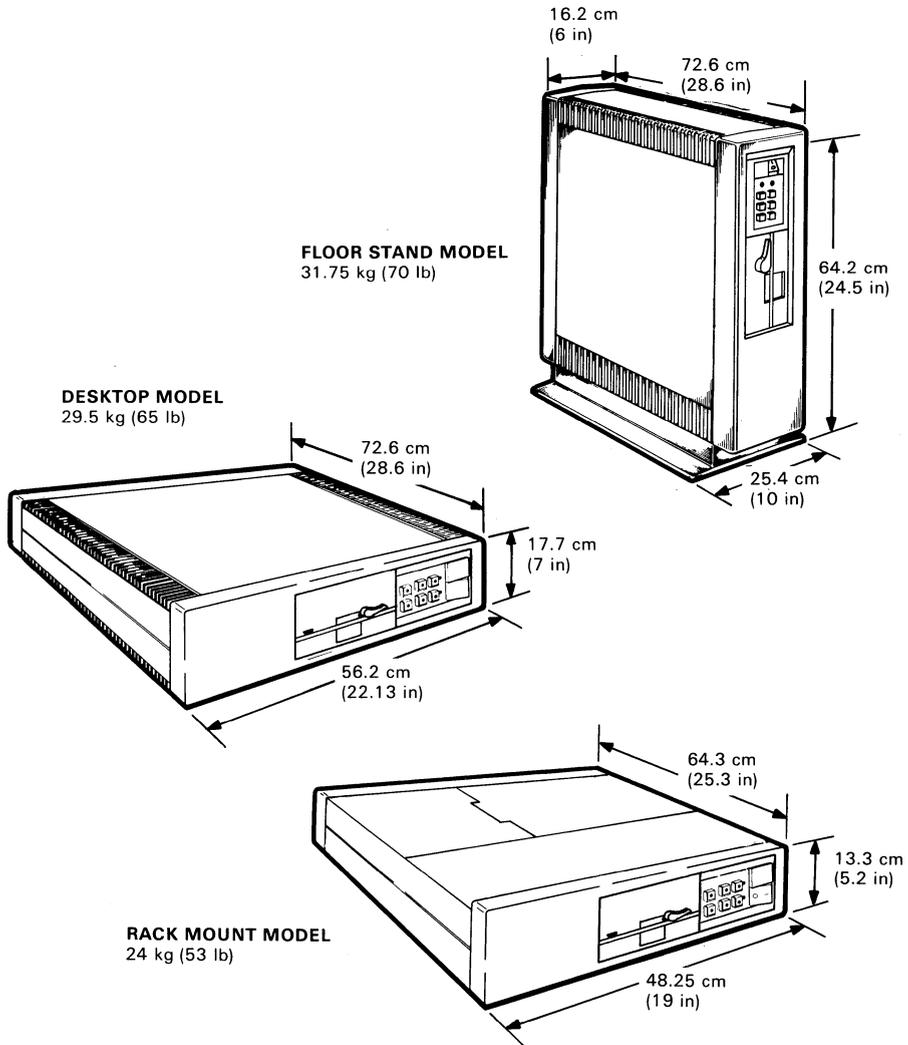


Figure A-1 Power Installation



MR-0486-0443

Figure A-2 Physical Specifications

A.1 Operating Environment

Table A-1 Electrical Requirements

Input	Specifications	
	120 V	240 V
Line voltage	120 V	240 V
Voltage tolerance	88 V -- 128 V	176 V -- 256 V
Power source phasing	Single	Single
Frequency	60 Hz	50 Hz
Line frequency tolerance	47 Hz -- 63 Hz	47 Hz -- 63 Hz
Running current	6.0 A	3.0 A
Power consumption (maximum)	345 W	345 W
Universal power supply	Switchable for input voltage	

Table A-2 Environmental Conditions

	Operating	Nonoperating
Maximum altitude	2440 m (8000 ft)	9100 m (30000 ft)
Temperature	10 ^o --40 ^o C	-34 ^o --60 ^o C
Range*	(50 ^o --104 ^o F)	(-30 ^o --140 ^o F)
Temperature	11 ^o C	
Change rate	(20 ^o F)	
Relative humidity (noncondensing)	20%--80%	10%--90%

* Reduce the temperature specification by 1.8^oC (35.2^oF) for each 1000 meter increase in altitude.

NOTE

Your service contract may require specific temperature and humidity limits.

APPENDICES

A.2 Physical Specifications (MicroPDP-11/53)

RX33 Half-High Diskette Drive

Physical Specifications

Height	1.69 in (43 mm)
Width	5.75 in (146 mm)
Depth	8.0 in (203.2 mm)
Weight	2.9 lb (1.31 kg)

Performance

Diskettes per drive	1
Recording	
Surfaces per diskette	1
Storage capacity (high density)	
Per track (15 sectors)	7,680 bytes
Transfer rate	500Kbits/s
Average access time	175 ms
Average seek time	92 ms
Spindle speed	
High density	360 rpm

RD31-A Disk Drive

Physical Specifications

Height	1.63 in (41.4 mm)
Width	5.75 in (146.05 mm)
Depth	8.0 in (203.2 mm)
Weight	3.5 lb (1.59 kg)

Functional Specifications

Cylinders	615
Encoding method	MFM
Spindle speed	3600 rpm
Speed variation	+/- 1.0%

Performance

Seek time	
Track-to-track	20.0 ms
Average	65.0 ms
Maximum	145.0 ms

Rotational latency

Average	8.33 ms
Start time	24 s maximum to drive ready
Stop time	30 s maximum

APPENDIX B
FIXED DISK AND DISKETTE FORMATTING

B.1 RD3n DISK AND RX33 DISKETTE FORMATTING

B.1.1 RD3n Fixed Disk Formatting Procedure

RD3n fixed disk drives are usually formatted at the factory. Use the procedure in this appendix only if there is a valid reason for formatting the disk. If data is stored on the RD3n drive, the data is destroyed when the disk is formatted. If you are not sure that the fixed disk drive needs to be formatted, contact your Field Service engineer.

1. You can gain access to the Disk Format Menu in one of the following ways.

Select F (Go to the Format Menu) at the Customer Diagnostics -- Main Menu.

Select F (Go to the Format Menu) at the Maintenance Diagnostics -- Main Menu.

2. Insert the diskette labeled: Micro-11 Formatr RXnn

NOTE

In order to format a disk on a system that has an RQDX3 disk controller, you must run a diagnostic program called ZRQC?? from the XXDP monitor. The ?? refers to the latest revision.

NOTE

Write down the serial number of the fixed disk drive before you install it. You will need this number during the manual formatting procedure.

3. Select X (exit to the XXDP monitor) at the Format Menu. This displays the XXDP monitor prompt.

APPENDICES

4. Format the RD3n disk (automode) as follows.

<CR> = carriage return

XXDP Monitor Prompt	User Response
.	R ZRQCCO* <CR>
ZRQCCO.BIC	
DRSXM-B0	
ZRQC-C-0	
RQDX3 Disk Format Utility	
Unit is RD51,RD52,RD53,RD3n,RD54,RX33	
Answer "Y" to "Change HW (L) ?"	
Restart Address 142060	
DR>	Sta <CR> (start)
Change HW (L) ?	Y <CR> (yes)
# Units (D) ?	1 <CR>
unit 0	
IP Address (0) 172150 ?	<CR>
Vector Address (0) 154 ?	<CR>
Auto Format Mode (L) Y ?	Y <CR> (yes)
Logical Drive (0-255)	
(D) 0 ?	0 <CR>
Drive Serial Number	
(1-32000) (D) 12345 ?	<CR>
WARNING all the data on this drive will be DESTROYED	
Proceed to format the drive	
(L) N ?	Y <CR>
AUTOSIZER FOUND:	
UNIT 0 WINCHESTER-616 CYLINDERS	
UNIT 1 RX33 FLOPPY (FORMATABLE)	
UNIT 2 NONEXISTENT	
UNIT 3 NONEXISTENT	
MSCP Controller model #: 19	
Microcode version #: 2	
Format begun	

*CO may not be the latest revision; check with your sales representative.

Pass 00001 Beg
Format complete

00003 Rev LBNS
00000 Bad RCT/RBNS
00000 Bad DBNS
00000 Bad XBNS00000 retired on passes
PCT used successfully
TEST UNIT 000000, LOGICAL DRIVE 000000 is finished
ZRQC EDP 1
0 Cumulative errors

DR> Exit <CR>

3.1.2 RX33 Diskette Formatting Procedure

All ordered optional RX33 diskettes must be formatted before they can be used. To format the diskette(s) you must gain access to the Disk Format Menu.

1. You can gain access to the Disk Format Menu in one of the following ways.

Select F (Go to the Format Menu) at the Customer Diagnostics -- Main Menu.

Select F (Go to the Format Menu) at the Maintenance Diagnostics -- Main Menu.

2. Insert the diskette labeled: Micro-11 Formatr RXnn.

NOTE

In order to format a disk on a system that has an RQDX3 disk controller, you must run a diagnostic program called ZRQC?? from the XXDP monitor. The ?? refers to the latest revision.

Place the diskette you want to format into the RX33 drive.

3. Select X (Exit to the XXDP monitor) at the Format Menu. This displays the XXDP monitor prompt.

APPENDICES

4. Format the RX33 diskette as follows.

<CR> = carriage return

XXDP Monitor Prompt	User Response
.	R ZRQCCO* <CR>
ZRQCCO.BIC	
DRSXM-B0	
ZRQC-C-0	
RQDX3 Disk Format Utility	
Unit is RD51,RD52,RD53,RD31,RD54,RX33	
Restart Address 142060	
DR>	Sta <CR> (start)
Change HW (L) ?	Y <CR> (yes)
# Units (D) ?	1 <CR>
unit 0	
IP Address (0) 172150 ?	<CR>
Vector address (0) 154 ?	<CR>
Auto Format Mode (L) Y ?	Y <CR>
Logical Drive (0-255)	
(D) 0 ?	1 <CR>
Drive Serial Number	
(1-32000) (D) 12345 ?	<CR>
*** WARNING all the data on this drive will be DESTROYED ***	
Proceed to format the	
drive (L) N ?	Y <CR>
AUTOSIZER FOUND	
UNIT 0 WINCHESTER - 616 CYLINDERS	
UNIT 1 RX33 FLOPPY (FORMATTABLE)	
UNIT 2 NONEXISTENT	
UNIT 3 NONEXISTENT	
MSCP Controller Model #: 19	
Microcode version #: 2	
WARNING -- Remove boot diskette is in drive.	
Insert a diskette to be formatted and	
press <RETURN>, (L) N ?	<CR>

*CO may not be the latest revision, consult your sales representative.

Format Begun

FCT was not used

Do you want to format another
diskette (L) Y ?

N <CR> (type Y if
there is another
diskette to be
formatted)

If boot drive, reinsert boot
diskette & press <RETURN>
(L) N ?

<CR>

TEST UNIT 00000, LOGICAL DRIVE 00001 is finished.
pass aborted for this unit
ZRQC EOP 1
0 Cumulative errors

DR

Exit <CR>

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