DECstation 200 Service Guide

Order Number EK-PC61A-SV-001

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- Reorient the receiving antenna.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-00398-5.

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About This Guide

The *DECstation 200 Service Guide* is designed to help you diagnose and repair the DECstation 200 system.

Guide Organization

The guide is organized as follows:

- Chapter 1 provides an overview of the DECstation system.

- Chapter 2 details troubleshooting instructions.

- Chapter 3 contains procedures for disconnecting from an Ethernet.

- Chapter 4 describes monitor adjustment procedures.

- Chapter 5 contains procedures for removing and replacing field replaceable (FRU) units.

- Appendix A provides information about jumpers and switches, memory configuration, the Asynchronous Serial Interface, Multiport, and DEPCA boards supported by Digital.

  NOTE
  The DEPCA board used in this system is a DEPCB board. It is equivalent to a DEPCA rev. S3 board.

- Appendix B contains information about Interrupt Request (IRQ) signals used in the DECstation 200 architecture.

For information about network troubleshooting, refer to the *PCSA Network Troubleshooting Guide.* For additional information about personal computer architecture, and the Digital Ethernet Personal Computer Bus Adapter (DEPCA) option board, refer to the *DEPCA Service Guide.*

Intended Audience

The procedures in this guide are for service technicians trained only by
Digital.

Conventions

This document uses the follo ving conventions:

Convention	Meaning
Warning	Provides information to prevent personal injury
Caution	Provides information to prevent damage to equipment
Note	Provides general information you should be aware of
Ctrl Alt Del	Press and hold Ctrl while you press both Alt and Del. Control key sequences have special functions.
Press the F1 key	What the screen displays as a prompt or an instruction is shown in monospaced type.

The computer industry recognizes two open architectures as industry
standards: the IBM-PC/XT/AT bus structure and the Microsoft disk
operating system, MS-DOS. The term industry-standard refers to
compatibility with these architectures. Support for MS-DOS requires
a defined set of Read-Only Memory Basic I/O System (ROM-BIOS), which
the DECstation offers.

Documentation Part Numbers

The following documents are referred to in this guide:

Document	Part Number
PCSA Network Troubleshooting Guide	AA-JU54A-TH
DEPCA Service Guide	EK-DEPCB-SV
DECconnect System Stand-alone ThinWire Networks Planning and Installation Guide	EK-DECSY-TG
DECconnect System Planning and Configuration Guide	EK-DECSY-CG
DECconnect System Installation and Verification Guide	EK-DECSY-VG
DECstation 200 Installation and Operations Guide	ER-PC610-OM
DECstation 200 Technical Reference Manual	ER-PC61Y-AA

CHAPTER 1

1
Overview

1.1 Introduction

The DECstation 200 (Figure 1-1) is a desktop computer. It can be used as a standalone personal computer using MS-DOS operating system or as a node on a network using a DEPCA board connected to a VAX computer or another DECstation with network server software. The DECstation runs Digital and other industry-standard applications.
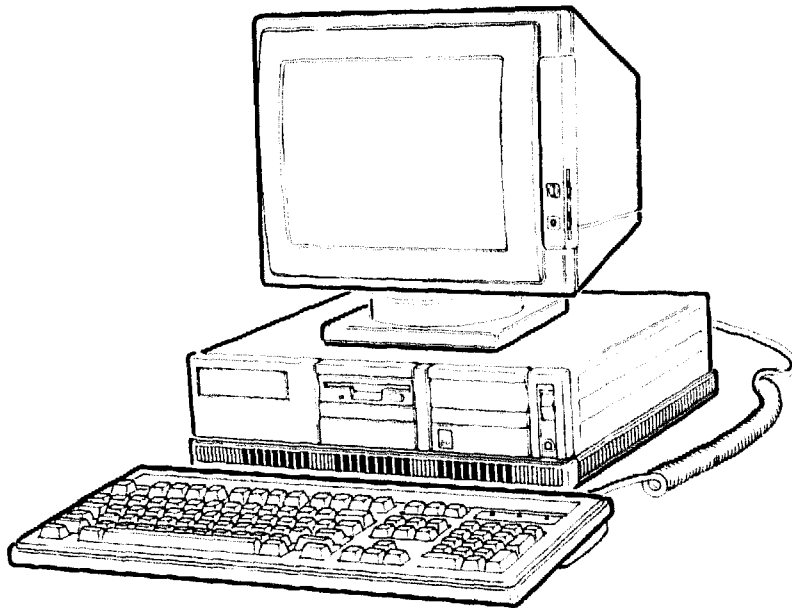
Figure 1-1   DECstation 200

As a node on a Personal Computing System Architecture (PCSA) network, the DECstation is the user's interface with the applications and services that the PCSA family of products provides. As part of a network, the DECstation communicates with other computers on the network and shares the various resources and services offered by Digital computers and servers.

1.2 Components and Options

The following is a list of the DECstation 200 components:

* Monochrome or color monitor

* System with 3.5 inch, 1.44 Mbyte floppy disk drive

* 101/102-key keyboard

* 84 Watt power supply with cooling fan

* Main logic board containing:

  — 80286 processor (8 MHZ)

  — System with 1 Mbyte of RAM memory (expandable to 2 Mbytes)

  — Video controller

  — Floppy drive controller

  — Keyboard controller

  — Mouse controller

  — Bus adapter board connectors for memory expansion and industry-standard options

  — Serial and parallel interfaces

  NOTE
  In some cases, there is not enough space around the parallel port to connect a printer cable to it. If so, use a 25-pin male-to-female adapter (part number 12-27591).

  — Socket for math coprocessor

  — Sound generation circuit, software controllable

* Option slots for industry-standard options

The following are options for the DECstation 200:

- Intel 80287 math coprocessor (8 MHz)

- 1 Mbyte memory upgrade (two, 512 Kbyte SIMMs) for memory upgrade to the main logic board

- Additional memory expansion board containing 2 Mbytes of memory (two rows of nine memory dips)

- Two Mbytes memory upgrade (two rows of nine memory dips) for memory upgrade to additional memory board.

- Maximum of three memory expansion boards providing two to 12 Mbytes of memory.

- DEPCA board

- 3.5 inch 20 Mbyte hard disk drive

- 3.5 inch 40 Mbyte hard disk drive

- 3.5 inch 1.44 Mbyte floppy drive

- 3.5 inch 40 Mbyte streaming tape drive

- Two-button mouse

- *DECstation 200 Technical Reference Manual*

1.3   Model Numbers and Configurations

The DECstation 200 is available in four configurations as shown in
Table 1–1. The DECstation options are listed in Table 1–2.

Table 1–1   DECstation 200 Configurations

Model Number	Configuration
PC610-A2	Base system: Intel 80286 processor based, 8 MHz personal computer with 1 Mbyte RAM, keyboard cable, 1.44 Mbyte floppy disk drive, video controller, keyboard/mouse port, parallel and serial ports, starter kit, hard disk and floppy disk controllers, 120 VAC.
PC610-A3	Base system using 220/240 VAC
PC615-A2	Base system with 20 Mbyte hard disk
PC615-A3	Same as PC615-A2 using VAC
PC616-A2	Base system with 40 Mbyte hard disk
PC616-A3	Same as PC616-A2 using 220/240 VAC

Table 1–2   DECstation 200 Option Configurations

Model Number	Option Configuration
PC6XD-AA	Multiport serial board
PC6XD-AB	Single-port serial board
PC61M-BA	1 Mbyte memory upgrade (two 512Kbyte SIMM) for main logic board
PC61M-AA	Memory expansion board containing 2 Mbyte (18 1 Mbit x 1 bit dips) of memory
PC61M-AB	2 Mbyte upgrade (18 1 Mbit x 1 bit dips) for memory expansion board
PC61P-AA	80287 math coprocessor
PC61R-AA	Additional 1.44 Mbyte floppy disk drive
PC61R-BA	20 Mbyte hard disk drive
PC61R-CA	40 Mbyte hard disk drive
PC61T-AA	40 Mbyte streaming tape drive
PC61S-AA	2-button mouse
PC61Y-AA	*DECstation 200 Technical Reference Manual*

1.4 Description of Components and Options

This section describes the components of the DECstation 200. Figure 1–2 is a block diagram of the components within the system.

BUS ADAPTER
BOARD

EXPANSION
BOARD(S)

FAN

MAIN
BOARD

FLOPPY DISK
DRIVE

POWER
SUPPLY

FLOPPY DISK OR
STREAMING TAPE
DRIVE (OPTIONAL)

HARD
DISK
DRIVE
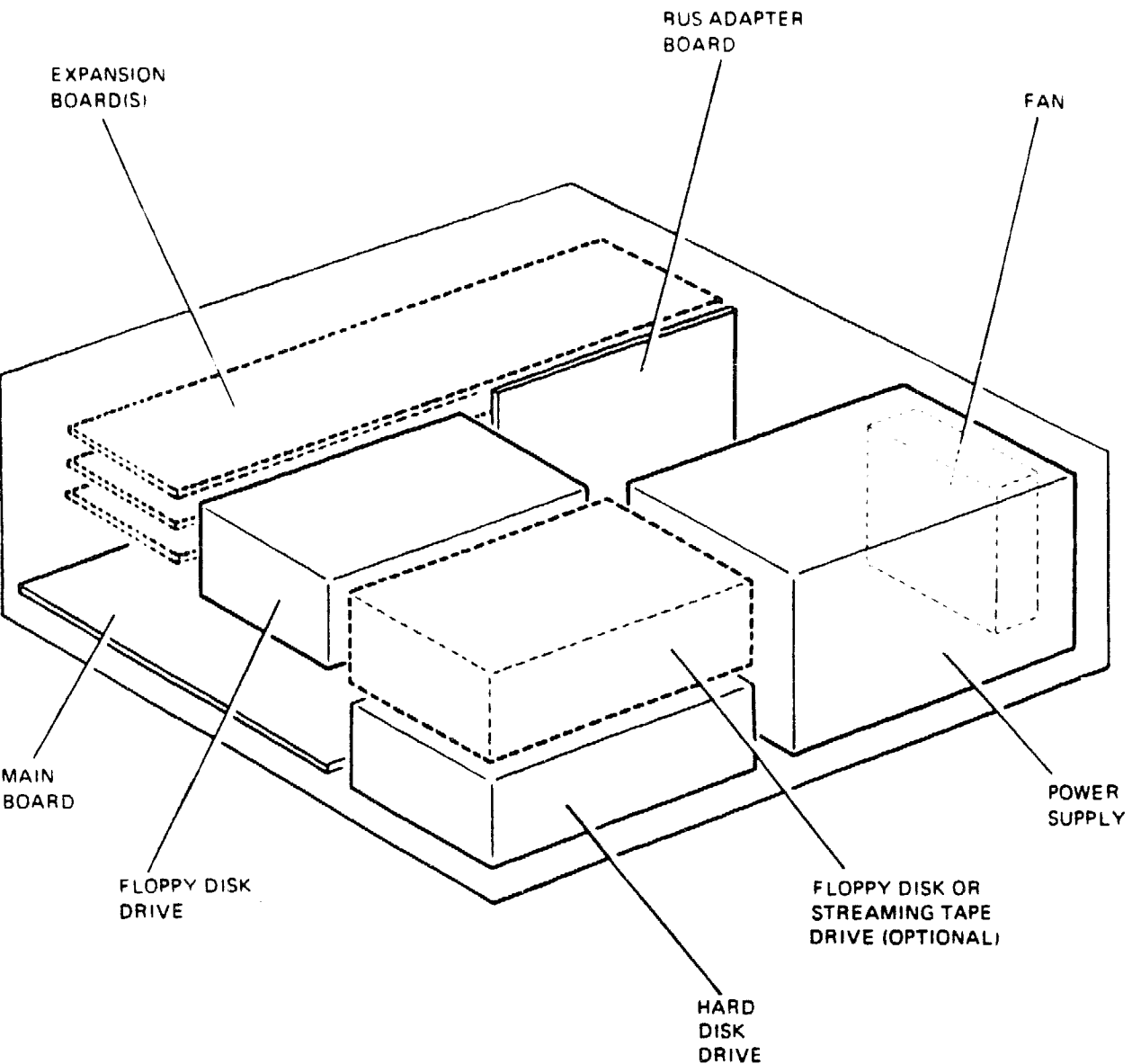
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Figure 1–2   System Unit Components

1.4.1 Main Logic Board

The main logic board contains an Intel 80286 CPU chip with onboard memory management and protection. The main logic board has two, 512 Kbyte, Single-In-line Memory Modules (SIMM). This provides 1 Mbyte of dynamic RAM memory. An optional Intel 80287 math coprocessor may be added to enhance the CPU by providing fast processing of math functions on floating point and other data types.

Also included on the main logic board are controllers for the keyboard, mouse, video, and floppy disk unit, as well as the parallel and serial interfaces.

1.4.2 Bus Adapter Board

The bus adapter board mounts into a bus expansion slot on the main logic board. It has a maximum of three 16-bit expansion slots.

You can install the boards according to the following table.

Board Configurations	Expansion Slot
8-Bit board	8, and 16-bit slot
16-Bit board	16-bit slot

The slots provide connections for industry standard options such as the mouse, memory expansion, and DEPCA controller boards.

1.4.3 Expanded Memory

The main logic board is configured with two, 512 Kbyte SIMMs as standard equipment. This provides 1 Mbyte of dynamic RAM memory. Memory may be increased by the installation of two, 512kbyte SIMMs. This would provide 2 Mbytes of dynamic RAM memory.

As an option, the user may install a memory expansion board, and an upgrade option to the expansion board. Each optional memory board is configured with 2 Mbytes of memory. Each Mbyte of memory consists of nine dips giving a total of 18 dips soldered on the board. There are 18 sockets available for 2 Mbytes of optional memory expansion. If memory boards were installed in all three slots, it would provide the user with up to 12 Mbytes of dynamic RAM memory, not including the SIMMs installed on the main logic board.

1.4.4 Power Supply

The DECstation has a 84 Watt (107 Watt peak) power supply. The power supply provides the necessary power to operate the main logic board, floppy disk drive, and other options installed in the system.

The cooling fan is contained within the power supply. It is used to cool the power supply, standard and option boards, hard disk drive, and floppy disk drive. It cools these components by drawing the hot air out of the DECstation chassis. Power to run the fan is supplied by DC voltage from the power supply.

1.4.5 Monitors

The DECstation 200 supports 12-inch, diagonal monochrome and 14-inch, diagonal color monitors. They are compatible with industry-standard Video Graphics Array (VGA). The graphic resolution of the color monitor offers the following scanning modes and color palettes:

* 640 dots x 480 lines displaying 16 colors from a palette of 256,000

* 320 dots x 200 lines displaying 256 colors from a palette of 256,000

The graphic resolution of the monochrome monitor offers the following scanning modes and levels of gray:

* 640 dots x 48 lines displaying 16 levels of grey from 256

* 320 dots x 20 lines displaying 64 levels of grey from 256

1.4.6 Floppy Disk Drives

The DECstation 200 can house up to two 3.5 inch, 1.44 Mbyte floppy disk drives. One drive is supplied as part of the standard configuration.

1.4.7 Hard Disk Drive

A hard disk drive may be added to the base system. The hard disk drive is available in either 20 Mbyte or 40 Mbyte capacity.

1.4.8 Streaming Tape Unit

A 40 Mbyte streaming tape unit may be installed in the DECstation 200
as an alternative to the second floppy disk drive.

1.4.9 Video Controller

The DECstation 200 contains a video controller resident on the main logic
board. The video controller can support monochrome and color monitors.
It is also compatible with the following standards:

- MCGA - Multi-Color Graphics Array

- EGA - IBM Extended Graphics Adapter

- CGA - IBM Color Graphics Adapter

- IBM PS/2 VGA - IBM Video Graphics Array for PS/2

1.4.10 Keyboards

The keyboard supplied as standard configuration is compatible with
Digital and other industry-standard computers when the appropriate
cable is used. Keyboards are available for different countries.

NOTE
**A Digital LK250 keyboard can be used with the DECstation 200
when the appropriate cable is used.**

1.4.11 Math Coprocessor

The math coprocessor (80287 chip) plugs into the system board and allows
the DECstation to process numeric data faster.

1.5   Connectors, Indicators, and Controls

The external connectors for the system unit are shown in Figure 1-3.
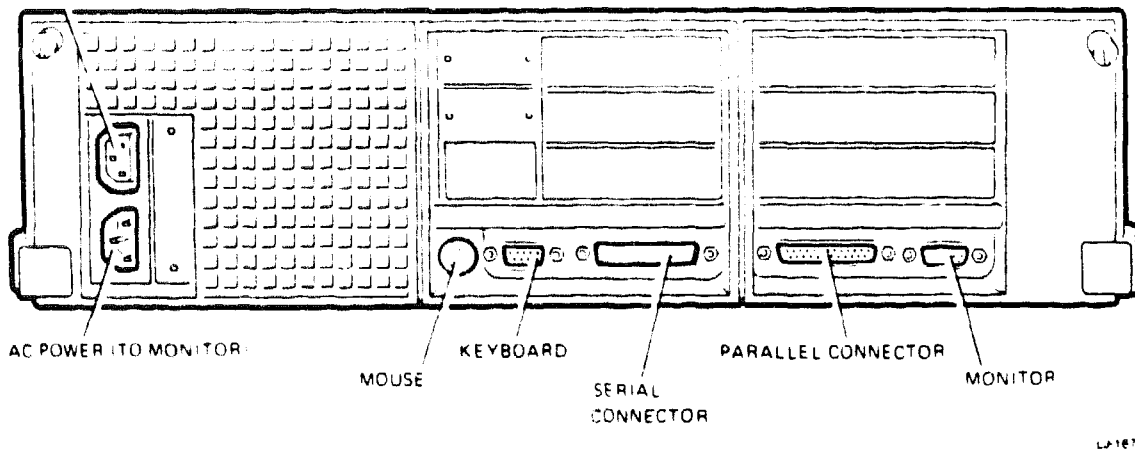
Figure 1-3   External Connectors

Figure 1-4 shows the location of the light emitting diodes (LEDs) and controls in a fully configured system. Their functions are as follows:

* 0/1 is used to turn system power off (0) and on (1).

* The key lock holds the cover to the chassis.

* The hard disk access LED is on when the system accesses the hard disk

* The diskette access LED is on when the system accesses the diskette in the floppy disk drive.

* The streaming tape access LED is on when there is a tape in the unit.

ON/OFF LOCK

DISKETTE LED   HARD DISK LED   KEY LOCK

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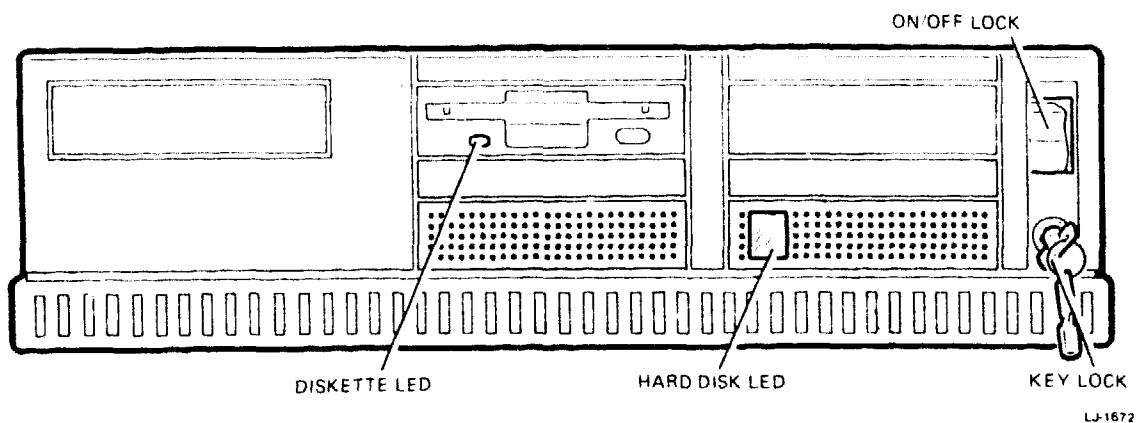
Figure 1-4   Indicators and Controls

1.6 Block Diagram

The functional block diagram is shown in Figure 1–5.

PRINTER · PRINTER · MONITOR · MOUSE · KEYBOARD · MODEM

POWER SUPPLY

KEYBOARD/ MOUSE CONTROLLER · PARALLEL INTERFACE · SERIAL INTERFACE · VIDEO CONTROLLER

80286 · 80287 · ROM · FLOPPY DISK CONTROLLER

EXPANSION BOARD

BUS ADAPTER (8 .16 BIT) · 1 MB MEMORY

FLOPPY DISK DRIVE

STREAMING TAPE DRIVE

HARD DISK CONTROLLER
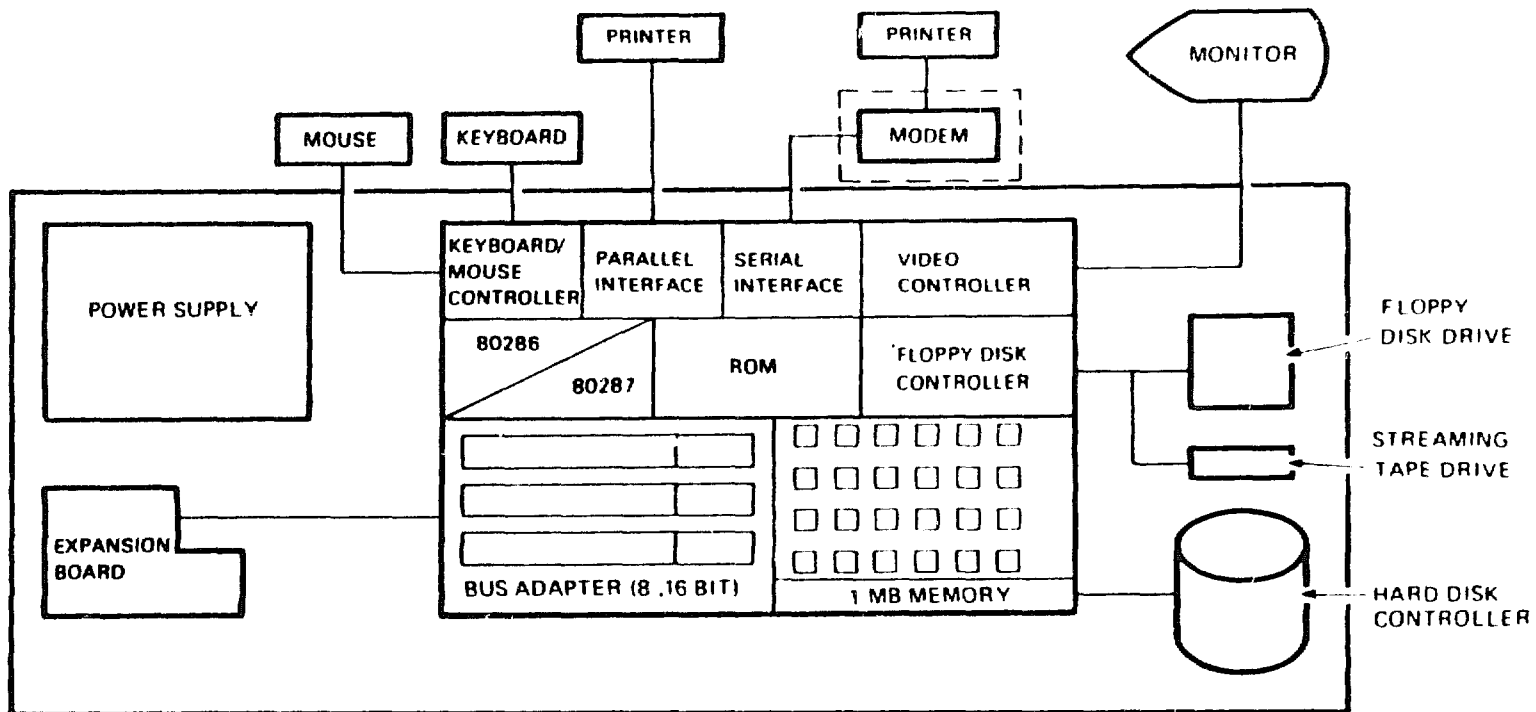
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Figure 1–5   Functional Block Diagram

CHAPTER 2

2
Troubleshooting

This chapter provides information for troubleshooting the DECstation 200. This chapter contains the following sections:

- Normal power-up sequence

- Special tools

- Diagnostic tools

- SETUP utilities

- Troubleshooting procedure

- Power-up error message table with corrective action

- Troubleshooting by symptom table with corrective action

2.1 Normal Power-Up

To perform a normal power-up, turn the system off, wait 10 seconds,
then turn it on again. Each time you turn the system on, the system
automatically runs the power-up diagnostics. In a normal system power-
up, the following takes place:

1. Power to the monitor and system unit are turned on.

2. The system generates a single beep and the fan starts.

3. The resident diagnostics are run and display a list that includes the
   following:

   * The amount and type of memory

     NOTE
     **While in SETUP mode, if you incorrectlyselect the total
     amount of memory installed in the system, the next time
     you turn the system on it will display the incorrect value
     and then prompt you that there is a "Memory Size Error,
     RUN SETUP".**

   * The modules being tested and their pass/fail status

   * The presence/absence of fixed disk, floppy disk, tape drive

   A successful power-up test produces the sample shown in
   Example 2-1.

4. The system boots from either the diskette (if one is in the drive), the
   hard disk (if one is installed), or the network (if connected), in that
   order.

NOTE
The actual information displayed at this time depends on the operating system software.

```
Resident diagnostics Rev n.nn

   CPU (i80286)               Pass
   ROM Checksum               Pass
   Memory Refresh             Pass
   Keyboard controller        Pass
   Base Memory                640 KB
   Extended Memory            256 KB
   Shadow Memory              128 KB
   Total Memory               1024 KB
   Parity Circuitry           Pass
   Interrupts Controllers     Pass
   DMA controllers            Pass
   Keyboard                   Pass
   Clock/Calendar             Pass
   CPU protected mode         Pass
   CMOS RAM                   Pass
   Fixed disks            Not present
   Floppy disks           2 present
   Option ROM at DC000:0000   Pass      (*)


   (*) DEPCA was installed on the system
```

Example 2–1   Sample of Successful Power-Up

2.2 Special Tools

The following tools are included in the service diagnostic kit (22-00484) and a.e needed to troubleshoot the DECstation 200:

- Loopback connectors for:

  - — Mouse (2-button)

  - — Serial port

  - — Parallel port

- 3.5 inch formatted blank diskette for running the diskette drive test

- Service diagnostics diskette

2.3 Diagnostic Tools

There are three types of diagnostics available with the DECstation 200.

- Power-on diagnostics

- System Checkout diagnostics (Utilities Diskette)

- Service diagnostics

2.3.1 Power-on Diagnostics

Power-on diagnostic test are resident on the system and run automatically when power to the system is turned on. They determine what hardware is present and if the hardware is functioning. The power-on diagnostics also run automatically when a software reset is performed (by pressing Ctrl Alt Del).

There is also a built-in setup program that permits the contents of CMOS to be modified. This resident setup program is different from the SETUP utility on the Utilities diskette. Section 2.4.1 describes the built-in setup program.

Testing is performed in individual steps so that all components are tested before being called into operation. If an error occurred during a test, an error message displays.

There are two types of errors:

- *Fatal errors* indicate that the system is unable to function correctly.

- *Non-fatal errors* normally indicate that an error condition has been detected and is still current. Depending on the severity of the error, the system may or may not be able to function correctly.

A check is made to ensure that actual system configuration conforms to the information stored in CMOS RAM memory. If any discrepancies are found, the diagnostics inform the operator that the built-in setup program must be run to update the memorized configuration.

Malfunctions on the main logic board are traced to the defective component. Malfunctions on other boards or peripherals are traced only to the board or peripheral in question.

A number of ba ic system components must be functional for the diagnostics to run correctly. These components include the following:

- The CPU

- The clock generator

- The bus controller

- The BIOS EPROM

- The EPROM address, data and control buses

- A minimum subgroup of 80386 processor instructions

- A video controller with at least in 80 x 25 alphanumeric mode must be operational

- A video or parallel port must be functional for test results to be displayed or communicated

2.3.2 System Checkout Diagnostics (Utilities Diskette)

System Checkout diagnostics are located on the utility diskette packaged
with each system as part of the customer starter kit. These diagnostics
are menu-driven. They perform a more thorough test of the system than
the power-on diagnostics. The diskette contains the following utilities:

System Checkout diagnostics (Utilities Diskette)	Runs a test of the entire system, displays a picture of each component as it is tested, tracks percentage of completion, issues pass or fail status.
SETUP Utility	Lists available system parameters. Allows you to modify configuration values stored in CMOS memory. These values are what the system uses when power is on or reset. Section 2.4.2 describes the SETUP utility.

NOTE
**The SETUP utility is different from the built-in setup program in the
power-up diagnostics and the SETUP utility on the Service Diagnostics
diskette.**

Park Disk Heads	Stabilizes disk heads for shipping.
Test One Module	Allows the customer to test each suspected faulty component one at a time. The test displays a picture of the component as it is tested, tracks the percentage of completion, and issues a pass or fail status.

The Utilities diskette also contains utility programs for altering the speed
and performance of the system. These are the Goslow, Gofast, Autoslow,
and Sound utilities.

2.3.3 Service Diagnostics

The following diagnostics are used only by Customer Services personnel.
The menu-driven diagnostics are located on the Service Diagnostics
diskette. It is packaged in the Service Diagnostic Kit (22-00484) and
includes the following:

- Service Diagnostics diskette for the DECstation 350

- Service Diagnostics diskette for the DECstation 300

- Service Diagnostics diskette for the DECstation 200

- Service Diagnostic manual

- Spare 3.5 inch floppy diskette

- Serial loopback connector

- Parallel loopback connector

- Mouse loopback connector

The service diagnostics are more in-depth than the system checkout diagnostics; however, some of the functions are the same. Refer to the *DECstation 200 Service Diagnostics* for detailed information.

The service diagnostics offer the following test options:

System Configuration Check	Tests for the presence of components and options then issues a configuration report after 60 seconds. The presence of components/options displays in reverse video.
SETUP Utility	Allows you to modify the configuration values stored in CMOS RAM. The function is similar to the SETUP utility on the Utilities diskette. See Table 2–1 for the setup parameters and values.
Test One Module	Tests a single module of your choice. Offers subtests for each module and various parameters for running the tests.
Test List	Allows you to create a file containing a list of modules to be tested and test control instructions. Once you create the file, it may be executed or saved on diskette for future use.
Set Test Options	Allows you to select operating modes that affect testing. For example, stop the test or sound the bell if an error is detected.
Error Logging	Allows you to select where you want the list of errors to be logged. You can display the error log on the screen, send it to the printer, store it in a file, or send it to the serial port. If you choose to send it to a serial port, be sure to set the baud rate, parity, bits/ character, and number of stop bits.
Disk Utilities	Allows you to format the hard disk, format the defects, or park the disk heads.

NOTE
Parking the disk heads disables the keyboard. To enable the keyboard, turn the system off then on again.

2.4   SETUP Utilities

There are three types of SETUP utilities available for the DECstation 200:

- Built-in SETUP utility

- SETUP on the System Checkout Diagnostics (Utilities diskette)

- SETUP on the Service Diagnostics Diskette

2.4.1   Using the Built-in Setup Utility

When the system powers up it performs a memory and hardware configuration check. It then checks the information stored in CMOS. If this information is inconsistent with the configuration check, the system invokes the built-in SETUP Utility. To use SETUP, follow these steps:

1. At the Language Selection Menu, enter the number of the language you want to use. The Configuration menu (Figure 2–1) is displayed. It lists nine symbolic items, five of which must be altered: time, date, hard disk unit, floppy disk unit, and video.

2. Select the item to be altered by using function keys 1 through 5:

F1	key	selects time
F2	key	selects date
F3	key	selects hard disk unit
F4	key	selects floppy disk unit
F5	key	selects video

   NOTE
   The remaining four items must not be altered. They are for informational purposes only:

   - Memory

   - 80287 coprocessor

   - Real time clock   (RTC)

   - Battery   (+ -)

3. Read the command line at the bottom of the screen for instructions on which commands to use to modify and save the information. Also, refer to the *DECstation 200 Installation and Operations Guide* for additional information on using these tests.
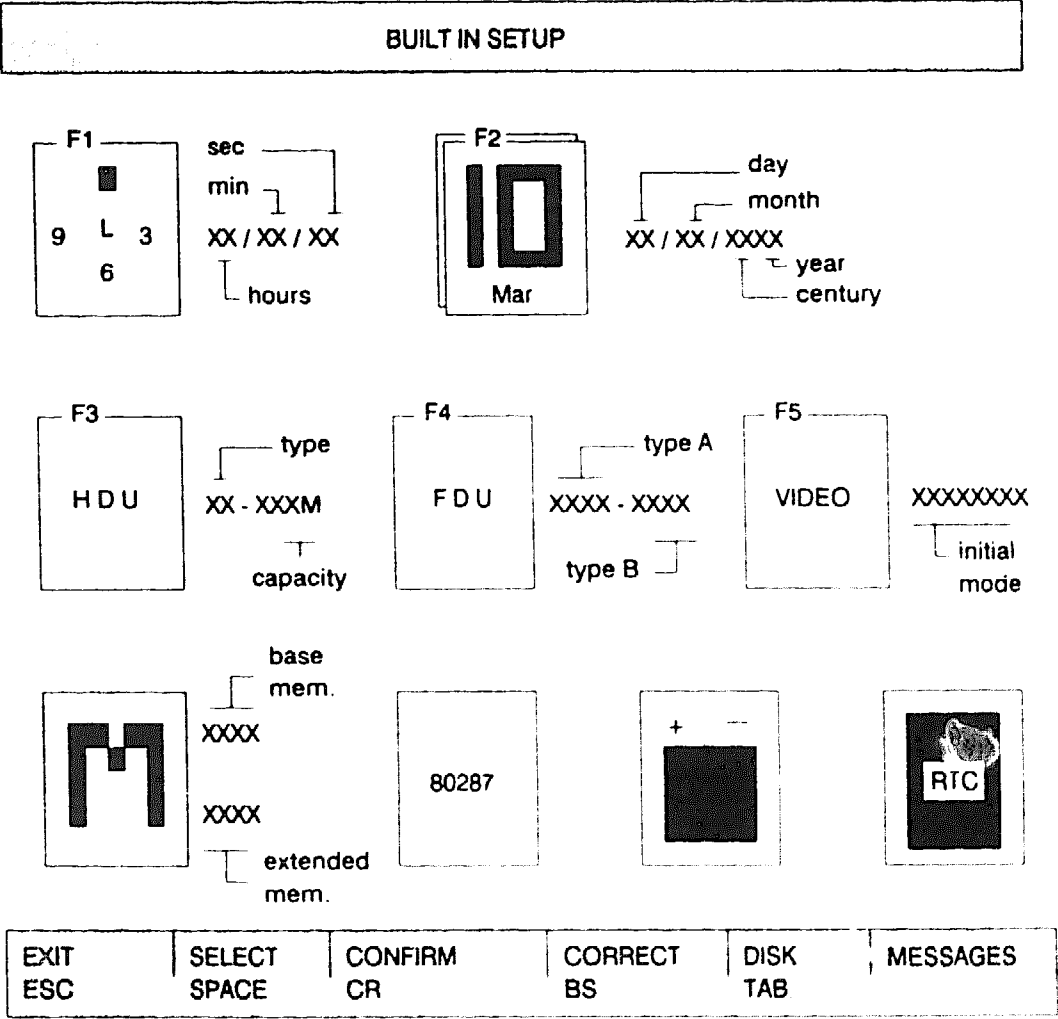
Figure 2-1   Built-in Setup Configuration Menu

2.4.2 Using the SETUP Utility on the Utilities Diskette

One of the SETUP utilities is located on the Utilities diskette. There are several circumstances when SETUP must be run:

- When the power-up diagnostics issue a Run SETUP message

- When any hardware component is added, removed, or changed in the system

- When the memory configuration is changed

To run SETUP, follow these steps:

1. Insert a copy of the Service Diagnostics diskette into the disk drive.

2. If the system is off, turn it on. If the system is already on, reset it by pressing Ctrl Alt Del. The power-up diagnostics display on the monitor, and the floppy disk drive automatically loads the System Checkout diagnostics (Utilities Diskette) application.

3. A message about the usage displays . Press Enter. In certain cases, such as when the battery has been changed, system checkout will automatically run SETUP. Otherwise, the Main Menu displays.

4. At the Main Menu, choose the SETUP utility. The first page of a list of setup parameters displays (there are two pages).

5. Verify the list of parameters. To change the selected parameter us the ' and , keys. Insert your selection by pressing Enter.

6. When your selections are complete, press ESC and remove the diskette from the drive.

Table 2-1 lists the SETUP Utility parameters and possible values.

Table 2–1   SETUP Utility Parameters

Parameter	Value	Comments
Date	mm-dd-yyyy	*mm* is month, *dd* is day, *yyyy* is year.
Time	hh:mm:ss	*hh* is hours, *mm* is minutes, *ss* is seconds.
Base Memory Size	512 Kbyte, 640 Kbyte	Sets the amount of base memory present in the system. This is normally 640Kbytes.
Extended Memory Size	Excess of 640 Kbyte	Tells the system how much memory over the standard 640 Kbyte is installed. The value increases or decreases in 128 Kbytes increments with ↑ and ↓ keys. The value increases or decreases in 1 Mbyte increments with PG/UP or PG/DN.
Shadow Memory	Enabled system and video BIOS, Enabled system BIOS only, Disabled	128 Kbyte dedicated area of RAM for contents of system BIOS and/or video BIOS. Provides faster system processing when RAM is accessed. **Note:** Some boards and applications do not allow shadow memory.
Floppy Drive #1	Not present, 720 Kbyte, 1.44 Mbyte	Presence and storage capacity.
Floppy Drive #2	Not present, 720 Kbyte, 1.44 Mbyte	Presence and storage capacity.
Hard Disk #1	Not present, Type, Capacity	Value on bottom of system unit. Type X for the 20 Mbyte or type 7 for 40 Mbyte hard disk.
80287 Math Coprocessor	Not present, Present	If a coprocessor is installed, select Present. If a coprocessor is not installed, select Not present.
Primary CRT Adapter Type	Enhanced graphics	This is the type of controller.
Additional Setup	NA	**Caution** This option should not be used under normal system configurations. Call customer support for the correct configuration.

2.5 Troubleshooting Procedure

Troubleshoot the DECstation 200 as follows.

CAUTION
Inform the System Administrator before disconnecting the system from the network. Make sure the disconnection does not interfere with other users on the network. Disconnect the system from the network before running the diagnostics. See Chapter 3, Ethernet Connections for a description of the disconnection procedure.

1. Ask the customer to describe the problem. You might want to ask the following:

    •   If an error message was displayed and what the error message was.

    •   When the problem started.

    •   If any new hardware options were added to the system around the time the problem started and if the options are Digital certified or third party.

    •   If any new software was added to the system around the time the problem started.

    •   If the top cover was removed for any reason other than adding an option.

    •   If the operating speed was changed through the Gofast, Goslow, or Autoslow utility.

    •   Describe the results of running the Customer Utility diskette.

2. Have the customer supply you with a *copy* of the Utilities diskette and the MS-DOS Startup and Operating diskette that came with the system.

3. Have the customer provide you with the system configuration. The
    customer may have recorded the configuration in the Information
    Log in the *DECstation 200 Installation and Operations Guide*. If
    the customer does not have this information and the system boots,
    you may want to run the following service diagnostics configuration
    check:

    • Type and amount of memory

    • Type of monitor

    • Type of keyboard

    • Type and number of disk drives

    • Type of tape drive

    • Type of video adapter board

    • Type of network adapter board

    • Type of mouse

    • Type of math coprocessor or coprocessor board

    • Any other options installed in the system

4. Set the power switch to 1 (ON) to run the power-on test (Section 2.1
    describes what happens during normal power-up). Refer to
    Section 2.6, Troubleshooting by Symptom, or to one of the following
    procedures:

    • If the system does not power-up, refer to Section 2.5.1, No Power.

    • If the system powers up but does not boot or there is no video
       display, refer to Section 2.5.2, System Does Not Boot/No Video
       Display.

    • If the system powers up and boots, refer to Section 2.5.3, System
       Boots.

5. Run the Service Diagnostics if you still have not found the problem.
    See Section 2.3.3.

2.5.1 No Power

If the system does not power up, follow these steps. Make sure you have completed the steps in Section 2.5.

1. Set the power switch to 0 (OFF).

2. Check the system for loose cables and connections.

3. Plug the system unit power cord into a working ac outlet.

    Set the power switch to 1 (ON). The following are indications that the system and monitor have powered up.

    *   You can hear the fan running.

    *   You can hear the hard disk spinning.

    *   The floppy disk drive LED will light momentarily if there is a diskette in the drive and the system accesses it.

    *   The hard disk drive LED will light momentarily if the system accesses the disk.

    If the system powers up go to step 13.

5. Center the brightness and contrast controls on the monitor.

6. Check that the power switch and power switch bar are functioning correctly. To do this, remove the system cover (Section 5.2.4). If the switch and switch bar are not functioning, replace the one that is faulty, then repeat step 4. Otherwise go to step 7.

7. Turn the power switch to off (0) again.

8. Unplug the system from the ac outlet. Wait 20 seconds.

9. Remove all options. Refer to Chapter 5 for removing options.

10. Plug the system into a working ac outlet.

11. Turn the system power switch on (1).

    If the system powers up this time, then there was either a faulty
    device, too many options installed, or another power related problem.
    Go to step 12.

    If there is still no power, replace the power supply as described in
    Section 5.2.16, and turn the power on again.

12. Replace the Digital certified options one at a time and see if the
    system powers up each time an option is replaced or a disk drive is
    reconnected.

    When the system powers up, the power-up diagnostics will run
    automatically. Depending on what option you replaced, the system
    may activate the built-in setup program. Section 2.4.1 describes what
    information you must supply for the built-in setup program.

13. Run the diagnostics on the Utilities diskette.

14. Try booting the system from the MS-DOS Startup and Operating
    diskette.

    • If the system powers up but does not boot, refer to Section 2.5.2.

    • If the system powers up and boots, refer to Section 2.5.3.

2.5.2 System Does Not Boot/No Video Display

This procedure is to help determine why the DECstation 200 does not boot. Before starting this procedure be sure to complete the steps in Section 2.5.

1. Check that the monitor power cable and signal cable are connected and that the monitor brightness and contrast controls are adjusted correctly.

2. Check for +5 and +/-12VDC at the power supply. Refer to Section 5.2.16; Figure 5–13 for the location of the test points.

3. Remove any third party options and try to boot the system.

4. Replace the monitor and try to boot the system.

5. Replace the main logic board.

6. Remove two SIMMs installed in bank 0 of the memory expansion board.

7. Try booting from the MS-DOS Startup and Operating diskette.

   • If the system does not boot, verify that all jumpers are set correctly (See Appendix A). Reboot the system by typing [Ctrl] [Alt] [Del].

   • If the system still does not boot, remove all options and try to boot the system.

   • Replace the Digital certified options one at a time and see if the system powers up and boots each time an option is replaced or a disk drive is reconnected.

8. When the system boots, refer to Section 2.5.3.

2.5.3 System Boots

If the system successfully boots but a problem still exists, follow these steps. Make sure you have completed the steps in Section 2.5.

CAUTION
The system must be disconnected from the network before running the diagnostics.

1. Determine what the failure is by any or all of the following methods:

    • Refer to the list of possible symptoms (Section 2.6)

    • Run the service diagnostics

2. Make sure the system is configured correctly by running the SETUP utility on either the Utilities diskette or Service Diagnostics diskette.

3. Replace the necessary FRU and set the appropriate jumpers correctly, if there are any.

4. Run the power-up diagnostics to test the system.

5. You must run the SETUP utility when a new option is installed or when the main logic board is replaced.

2.6   Troubleshooting by Symptom

The following is a list of the troubleshooting tables in th.s chapter. Each table describes symptoms, the possible causes, and suggested corrective actions.

- Table 2–2 - Power up Symptoms

- Table 2–3 - No Boot Symptoms

- Table 2–4 - Magnetic Peripherals Symptoms

- Table 2–5 - Monitor Symptoms

- Table 2–6 - Printer Symptoms

- Table 2–7 - Power up Test Messages (Section 2.7)

Table 2–2   Power up Symptoms

Symptom	Possible Cause	Corrective Action
No display, all LEDs off, fan not working	AC power cable or wall ac outlet	Plug cable into a working wall outlet
	Power switch or power switch bar	Replace switch or make sure switch bar is connected
	Power supply	Replace the power supply
No display, all LEDs on, fan on	Brightness or contrast	Adjust the controls
	Video power and signal cables	Plug in cables securely
	Monitor failure	Replace monitor
	Defective main logic board display driver	Replace main logic board
	First bank memory failure	Replace first memory bank SIMMs on main logic board
No keyboard response	Keyboard cable	Plug in or replace keyboard cable
	Keyboard defective	Replace keyboard

Table 2-2 (Cont.)   Power up Symptoms

Symptom	Possible Cause	Corrective Action
System clock and calendar inaccurate	Battery failure	Replace the main logic board
Speaker volume	Volume level set incorrectly	Use the SOUND utility on the Utilities diskette to adjust the speaker volume level. The SOUND utility stores the volume level in CMOS memory. The *DECstation 200 Installation and Operations Guide* describes how to use the SOUND utility.

Table 2-3   No Boot Symptoms

Symptom	Possible Cause	Corrective Action
System does not boot from the hard disk	There is a diskette in the floppy disk drive	Remove diskette.
	There is no software on the partition	Refer to the MS-DOS user guide
	System software is not on the disk.	Load the system software on the hard disk.
	Requested partition does not exist or is not formatted.	Check the partitions. Format the partition; repartition if necessary using MS-DOS FDISK utiltiy.
	Possible incorrect jumper configuration	Check jumper P6 on main logic board
	Hard disk is not installed properly.	Check hard disk installation.
	Hard disk controller interface	Replace main logic board
	Hard disk failure	Run service diagnostics. Replace hard disk

Table 2-3 (Cont.)   No Boot Symptoms

Symptom	Possible Cause	Corrective Action
System does not boot from the diskette drive.	Diskette is not in the diskette drive.	Insert a diskette containing bootable system software.
	Diskette is not bootable.	Use a diskette containing bootable system software.
	Diskette is worn or damaged.	Try a known bootable diskette.
	Hardware conflict (remote boot)	Verify that the W16 shorting plug has been inserted. This enables the system for local boot
A DEPCA is installed but the node does not boot after using the utility diskette.	The reset generated by the utility diskette is not compatible with the DEPCA board.	Press Ctrl Alt Del at the same time (a soft reset) to correctly reset the hardware, then turn the system power off and on. See the *DEPCA Service Guide*. If the problem continues, replace the DEPCA board.
System does not reboot when the power is turned off and on.	Power was not off long enough.	Turn the power off for at least 10 seconds before rebooting.

Table 2-4   Magnetic Peripherals Symptoms

Symptom	Possible Cause	Corrective Action
Copy protection failure on application programs	Disk access speed is too fast for copy-protection check of application program	It may be necessary to have the customer run the AUTOSLOW.EXE utility located on the Utilities diskette. See the description of the Goslow, Gofast, and Autoslow utilities in the *DECstation 200 Installation and Operations Guide*. If the problem persists, run the service diagnostics.
Tape does not work in the tape drive.	Tape is not fully inserted into the tape drive.	Make sure the tape is fully inserted and the cartridge release handle is locked down.
	Tape is worn or damaged.	Try another tape.
	Tape system failure	Replace tape drive interface cable or tape drive
System cannot find hard disk	Possible confguration error	Run SETUP and verify that the P6 shorting plug has been inserted. This enables the system to recognize a hard disk.
Hard disk cannot read or write information.	Problem exists with the drive or drive adapter.	Run the service diagnostics.
Intermittent hard disk read/write problems.	Possible corrupted files.	Restore disk from back-up files.
	Possible hard disk failure	Run the service diagnostics.

Table 2-4 (Cont.)   Magnetic Peripherals Symptoms

Symptom	Possible Cause	Corrective Action
Hard disk works but produces extra characters or garbled text.	Hard disk is affected by static electricity.	Move system away from any motors, magnetic devices, or photocopiers.
		Increase the humidity in the room and use antistatic mats around the system.
System won't start from the diskette drive or displays the message Abort, Retry, Ignore	The diskette has been demagnetized.	Make sure the diskette drive cable is correctly installed. Replace the diskette.
	Improperly formatted diskette.	Reformat diskette.
Diskette drive cannot read or write information.	The diskette drive is empty.	Insert a diskette into the diskette drive.
	Diskette is not formatted.	Use a preformatted diskette.
	Diskette is worn or damaged.	Try another diskette.

Table 2-5   Monitor Symptoms

Symptom	Possible Cause	Corrective Action
Complete white screen.	Monitor cable is not securely plugged in	Plug in the monitor cable
	VGA interface is deffective	replace main logic board
	The monitor is defective	Replace the monitor
Screen display distorted, rolling, flickering, or wrong or uneven color.	Monitor cable connector pins bent or broken.	Straighten pins or replace monitor.

Table 2-5 (Cont.)   Monitor Symptoms

Symptom	Possible Cause	Corrective Action
	Electromagnetic interference exists.	Move any electro-mechanical device away from the monitor or move the monitor.
	Inproper cable connection	Check cable connection

Table 2-6   Printer Symptoms

Symptom	Possible Cause	Corrective Action
Printer problems	Printer cable	Plug in or replace printer cable
	Printer disabled	Check if printer will operate off-line by pressing the printer's form feed and line feed keys
	Printer in local mode	Set printer to on-line mode
	Incorrect printer configuration	Refer to printer's operating manual for correct configuration
	Possible defective system port	Run service diagnostics
	Paper not feeding	Check paper path

2.7   Power-Up Error Messages

Power-up messages are listed in Table 2-7. If a message occurs and the diagnostics do not continue, press the [F1] key to resume the power-up testing.

Table 2-7   Power-up Test Messages

Error Message	Possible Problem	Corrective Action
Unrecoverable Power-up Error	Bootstrap error	Re-boot the system
Non-system Disk or Disk Error	Bootstrap error	Re-boot the system
Relace Disk and Strike Any Key	Bootstrap error	Re-boot the system
i80286 Error: 1	The CPU failed the FLAG test.	The system proceeds with test. Replace the CPU board.
i80286 Error: 2	The CPU failed the ALU test.	The system proceeds with test. Replace the CPU board.
i80286 Error: 3	The CPU failed the register test.	The system proceeds with test. Replace the CPU board.
Illegal Shutdown Error	Shutdown performed with illegal or undefined value	Replace Main Logic board
ROM Checksum Error	Checksum test failed on the resident ROM	Replace Main Logic board
Timer Error	8253 device not counting	Replace Main Logic board
Memory Refresh Error	Memory refresh timing failure	Replace Main Logic board
Keyboard Controller Error: X	Keyboard controller self test fail	Replace Main logic board
Memory Error	Memory error in the first 8k of RAM	Replace Memory SIMMs first bank

Table 2–7 (Cont.)   Power-up Test Messages

Error Message	Possible Problem	Corrective Action
Protected Mode Error: 1	The PCU failed to LIDT/SIDT and LGDT/SGDT intruction test	Replace Main Logic board
Protected Mode Error: 2	the cpu failed to enter in protected mode	Replace Main Logic board
Protected Mode Error: 3	CPU has failed the test on instructions	Replace Main Logic board
Protected Mode Error: 4	CPU has failed the test on protection violation exception	Replace Main Logic board
CMOS RAM Error: 1	shutdown pattern test failure	Replace Main Logic board
CMOS RAM Error: 2	RAM Read/write test failure	Replace Main Logic board
Memory Error: Addr= s000:oooo ; Wrote= wwww ; Read= rrrr	SIMM(s)	Replace defective SIMM(s)
Parity Error: Addr= s000:oooo ; Wrote= wwww ; Read= rrrr	SIMM(s)	Replace defective SIMM(s)
NMI Error	undefined Non Maskable Interrupt	Bus or CPU related error
Parity Error	Memory parity error failure	Replace defective SIMM(s)
Interrupt Controller Error:	Failure in the 8259 interrupt logic	Replace Main Logic board
DMA Page Registers Error	DMA page register read/write test error	Replace Main Logic board
DMA Controller Error: 1 or 3	DMA controller 8237 has failed read/write test failure	Replace Main Logic board

Table 2-7 (Cont.) Power-up Test Messages

Error Message	Possible Problem	Corrective Action
Speaker Error	The speaker port has failed a read/write pattern test	Replace Main Logic board
Keyboard Error: 1, 2 ,3	Keyboard self test error	Replace Keyboard
Keyboard Error: 6, 8	Keyboard connection	Check Keyboard connection or replace Keyboard
Clock/Calendar Error	CMOS data not valid	Run SETUP or replace Main Logic board
Video Memory Error	Video RAM test pattern failed	Replace Main Logic board
CMOS RAM Battery Error	Battery low condition	Let the system Power on to charge the batttery - change Main logic board
CMOS RAM Checksum Error	CMOS data not valid	Run SETUP
Memory Size Error	CMOS data not valid	Run SETUP and re-configure
Virtual Memory Size Error	CMOS data not valid	Run SETUP and re-configure
80287 Configuration Error	CMOS data not valid	Run SETUP and re-configure
Fixed Disk Configuration Error	CMOS data not valid	Run SETUP
Floppy Disk Configuration Error	CMOS data not valid	Run SETUP
Option ROM Error: Addr= s000:oooo	Option board failed	Replace Option board

CHAPTER 3

3
Ethernet Connections

3.1 Introduction

This chapter describes ThinWire Ethernet and standard Ethernet connections and how to disconnect the DECstation from a network. Figure 3–1 shows the cabling for two ThinWire Ethernet networks linking DECstation systems that have a DEPCA option board.
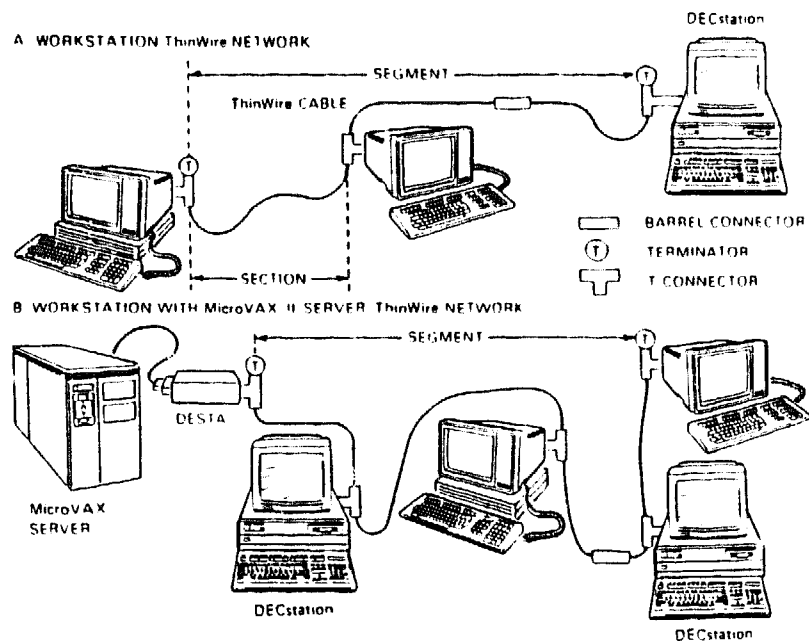
Figure 3–1   Two Sample ThinWire Networks

3.2   Disconnecting From ThinWire Ethernet

Before servicing the DECstation system, disconnect it from the ThinWire network by following these steps.

CAUTION
Inform the system administrator before you disconnect the DECstation system from the network.

1.   Turn power to the system off.

2.   Disconnect the T-connector from the DECstation system (Figure 3–2).
     Do not disconnect the T-connector from the ThinWire Ethernet cable or from the terminator, if one is present.

CORRECT

A

INCORRECT

B
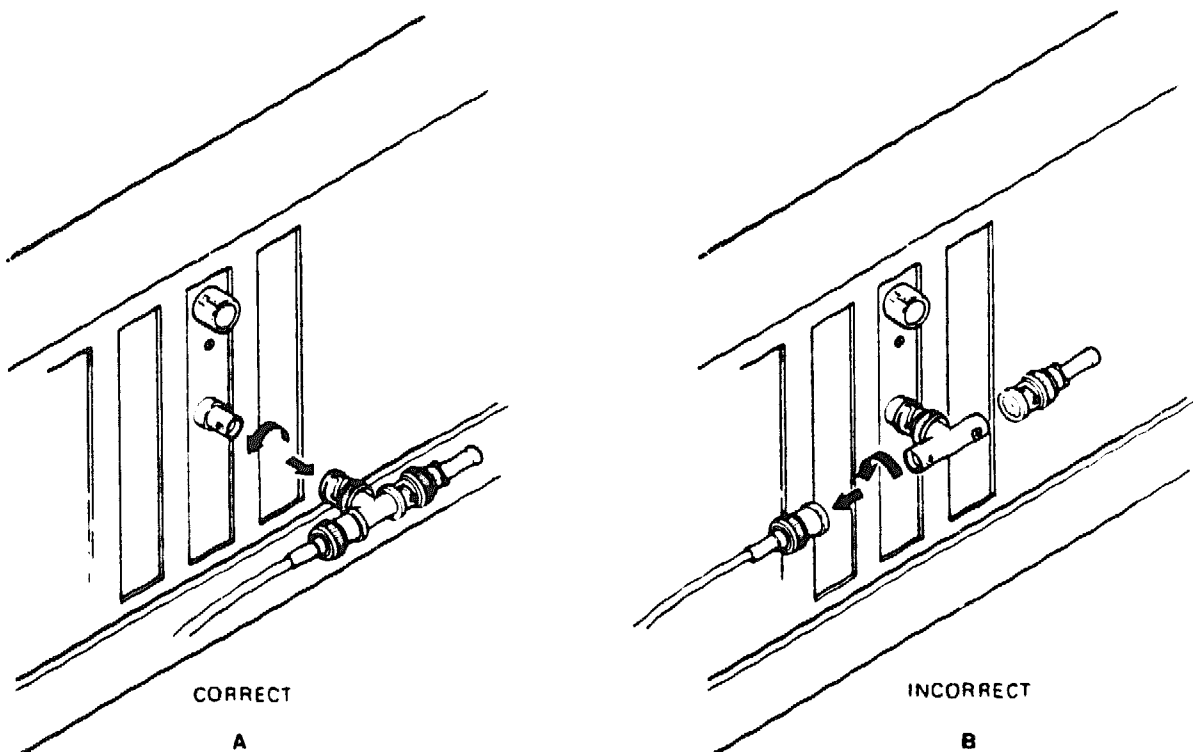
LJ – 1577

Figure 3–2   Disconnecting a T-Connector from a DECstation

When re-connecting a DECstation system to a ThinWire network observe the following:

- Never install a cable at the stem of a T-connector. (Figure 3–3, Example A, shows a correct Ethernet installation.)

- Never join two T-connectors or a barrel and a T-connector together.

- Never create a loop configuration. (Figure 3–3, Example C). There **must** be a terminator at both ends of a segment (Figure 3–3, Example A). Only one end can be a DEMPR.

A

CORRECTLY INSTALLED

B
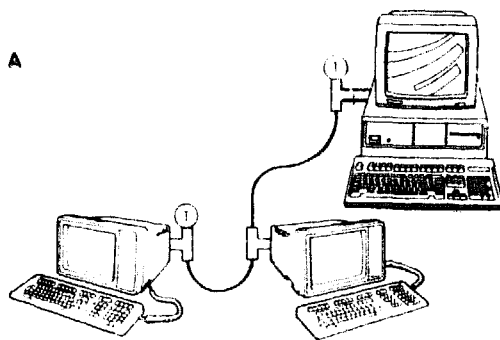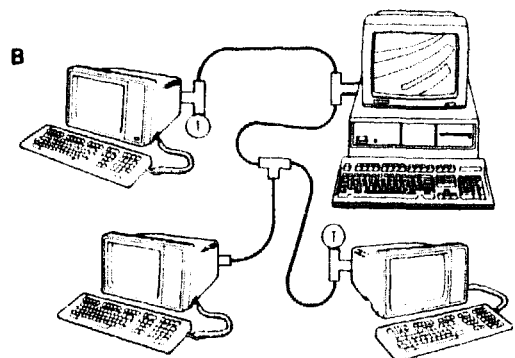
T CONNECTOR INCORRECTLY INSTALLED

C
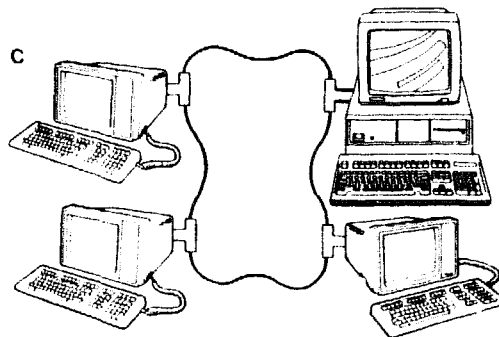
SEGMENT LOOPED MUST BE TERMINATED
AT BOTH ENDS

LJ - 1578

Figure 3–3   Correct and Incorrect ThinWire Segment Connections

For information about installing complex ThinWire networks, see the
*DECconnect System Stand-alone ThinWire Networks Planning and
Installation Guide*, the *DECconnect System Planning and Configuration
Guide*, and the *DECconnect System Installation and Verification Guide*.

3.3   Standard Ethernet Networks

A DECstation system can also be linked directly to a standard Ethernet
network. A DEPCA board with the Attachment Unit Interface (AUI) can
connect to a standard Ethernet network through a Digital Ethernet Local
Network Interconnect (DELNI) or H4000 transceiver (Figure 3–4).
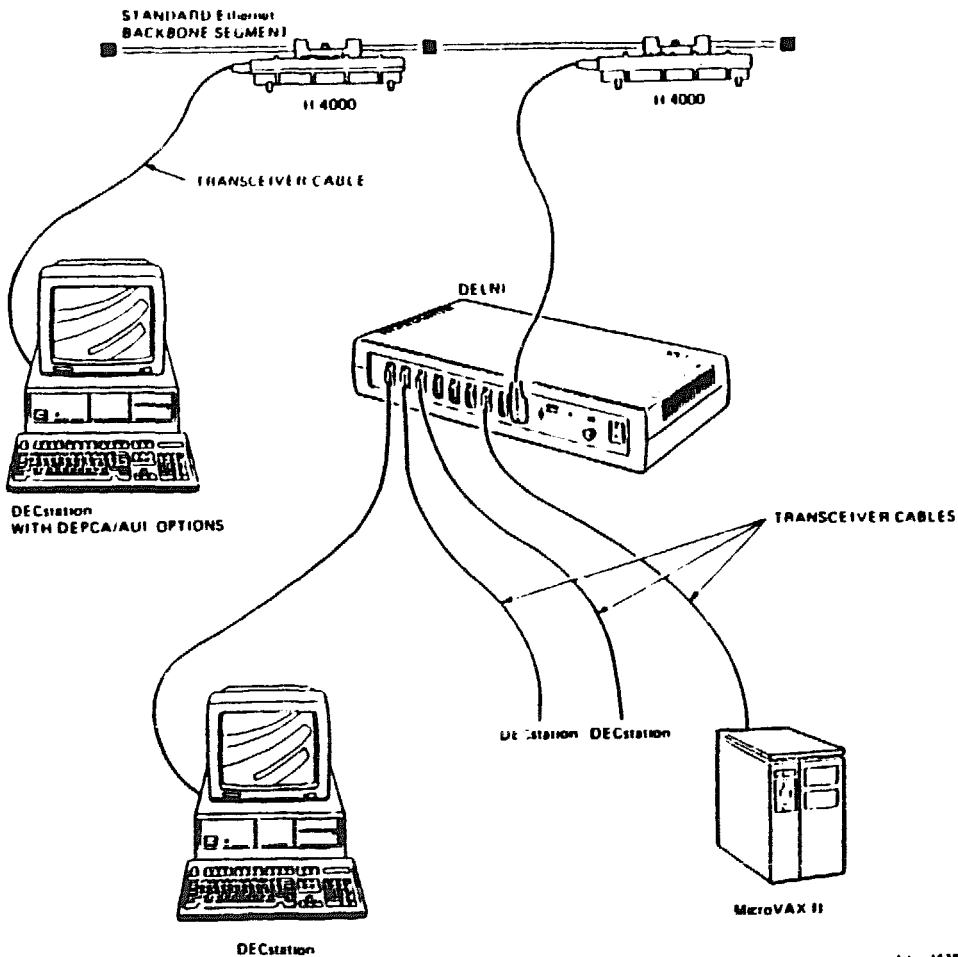
Figure 3–4   DEPCA/AUI Option Network Configurations

To disconnect a DECstation from a standard Ethernet network, use the following procedure.

CAUTION
Inform the system administrator before you disconnect the DECstation system from the network.

1. Turn power to the system off.

2. Disconnect the transceiver cable from the connector on the DECstation system.

To connect the DECstation to a standard Ethernet network, reverse this procedure.

For more information about connecting a DECstation system to a standard Ethernet network, see the *DECconnect System Planning and Configuration Guide*.

CHAPTER 4

4
Monitor Adjustments

4.1 Introduction

This chapter describes general adjustment procedures for the monochrome and color monitors.

4.1.1 Tools

Use the following tools when adjusting either monitor:

- Insulated Phillips (cross head) screwdriver

- Trimming tool (part number 29-26128) and extension (part number 29-23789)

- Service Diagnostics diskette

4.1.2 System Display Check - Monochrome and Color

Before making any adjustments, you need to do the following:

CAUTION
Before you turn power to the system off, the MS-DOS prompt (for example, C>) should display.

1. Turn power to the system off.

2. Insert the Service Diagnostics diskette in the drive.

3. Turn power to the system on. Allow the Power-Up test to complete, then wait 10 minutes. If there is no video display, increase the brightness until the display produces a raster.

4.2   Monochrome Monitor Adjustments

This section contains the following adjustment procedures for the monochrome monitor:

- Horizontal phase

- Vertical and Horizontal linearity

- Width

- Height

- Focus

4.2.1   Removing the Cover - Monochrome Monitor

Only qualified personnel should remove the monitor cover to access the adjustment potentiometers. All adjustment potentiometers, except brightness and contrast, are located inside the monitor.

WARNING
High voltages are present within the monitor case.

CAUTION
Before you turn power to the system off, the MS-DOS prompt (for example, C>) should display.

Remove the cover as follows:

1.   Turn power to the system off.

2.   Disconnect the power cable from the wall outlet.

3.   Disconnect all peripheral cables connected to the system.

4.   Remove the cover retaining screws (Figure 4–1).

5.   Slide the cover off by lifting it upward (Figure 4–1).
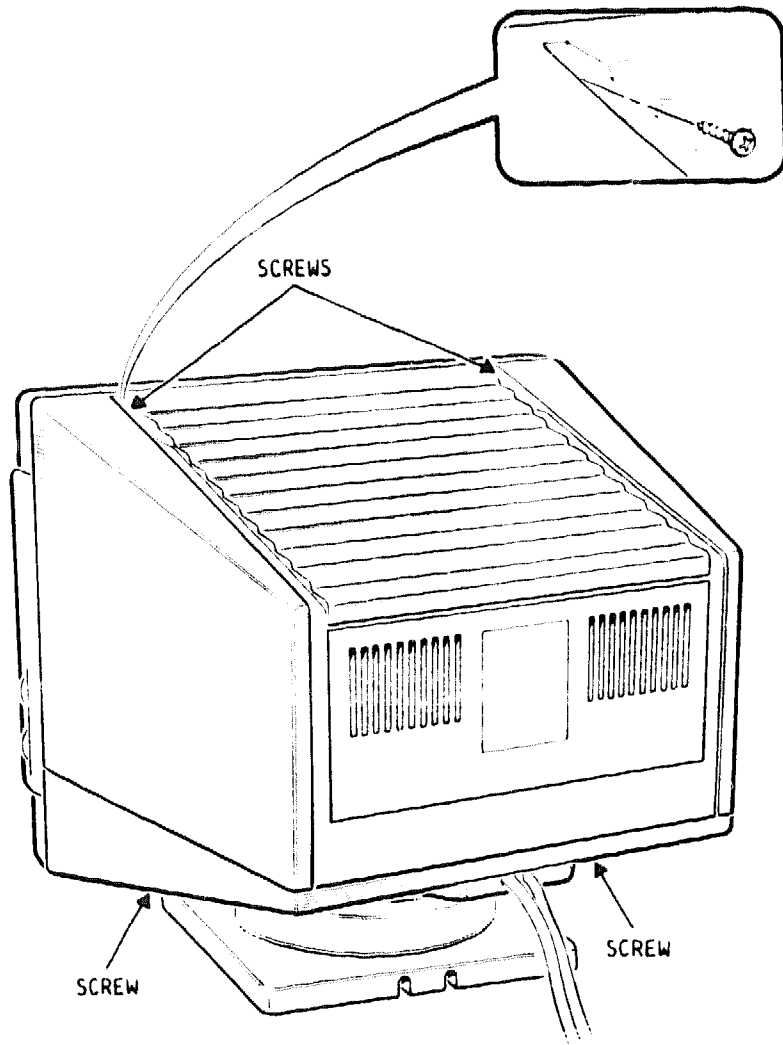
LJ-1646

Figure 4–1   Removing the Monochrome Monitor Cover

4.2.2 Making the Adjustments - Monochrome Monitor

To make any adjustments you must:

1. Reconnect the power cable to the wall outlet.

2. Turn power to the system on. Allow the monitor to stabilize for 5 minutes.

3. Perform the required adjustments procedures (Section 4.2.4 through Section 4.2.8).

   CAUTION
   You must make the adjustments according to the sequence given in these procedures; all the adjustments interact with each other. When done, if the monitor performance is not satisfactory, repeat all the procedures in this sequence.

4.2.3 Quick Reference Chart - Monochrome Monitor

The following table is a quick reference to the adjustment procedure for *experienced* technicians.

Parameter	Test Pattern	Adjustment	
Horizontal phase	Cross Hatch with Circle Option	RV8	-
Vertical linearity	Check Linearity	RV6	-
Horizontal linearity	Check Linearity	-	B3
Width	640 x 480 Graphics	-	B4
Height	640 x 480 Graphics	RV5	-
	640 x 350 Graphics	RV2	-
	640 x 400 Graphics	RV3	-
Focus	Check Linearity	RV10	-

4.2.4 Horizontal Phase Adjustment - Monochrome Monitor

Adjust the horizontal phase as follows:

1. Run the Service Diagnostics diskette and choose the Test One Module selection. Press [Return].

2. After the configuration test, choose the VGA and Monochrome Video selection. Press [Return].

3. Choose the Cross Hatch with Circle selection. Press [Return].

4. Increase the brightness using the external brightness control until the raster area is visible.

5. Adjust trimmer RV8 on the monitor board (Figure 4-2) to bring the character area to the center of the raster area (Figure 4-3).
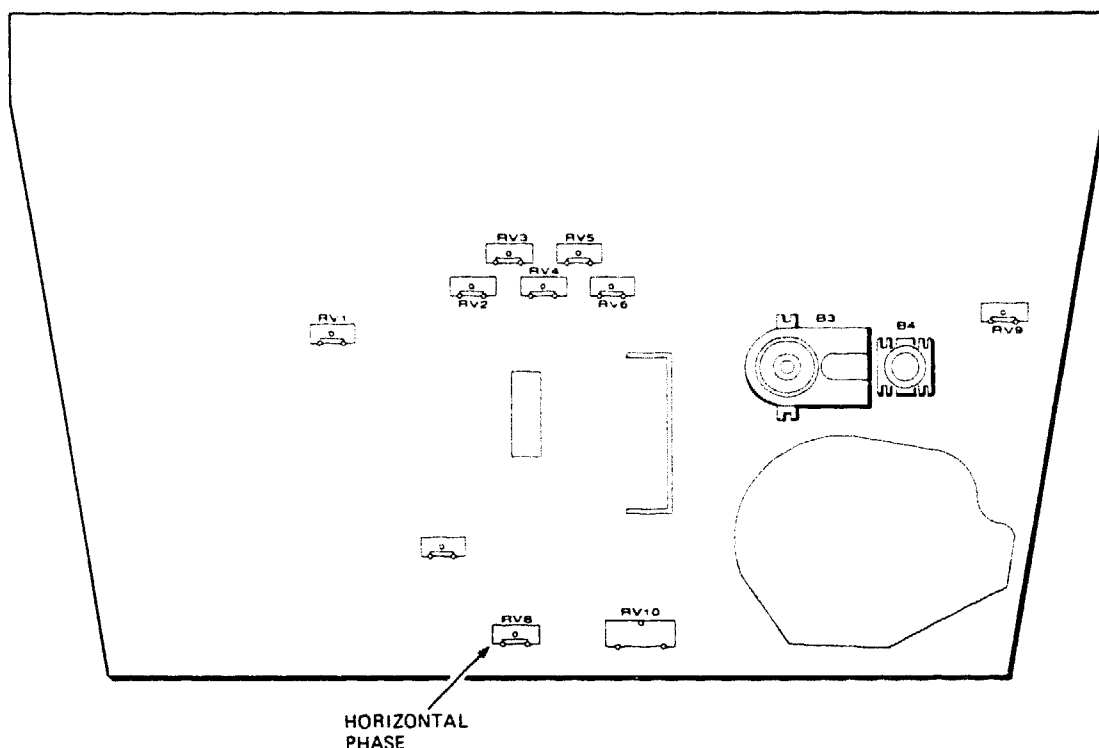
LJ-1647

Figure 4-2   Monitor Board Trimmer RV8

LJ-1648
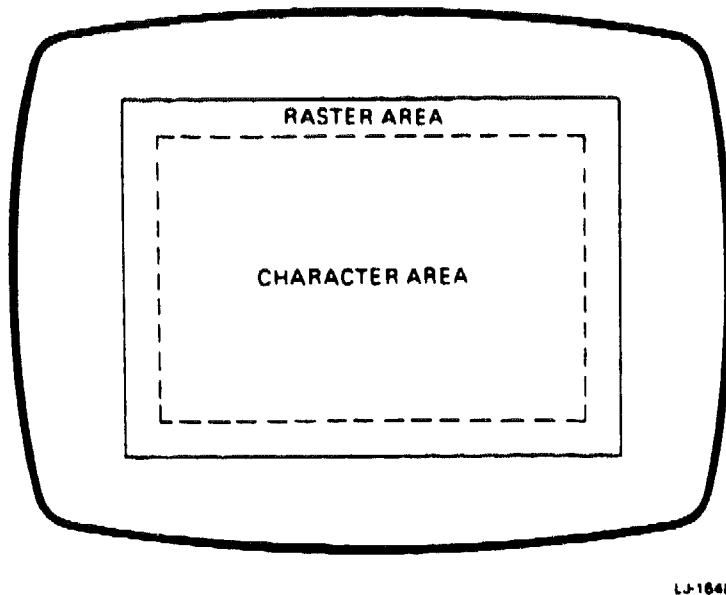
Figure 4–3   Raster/Character Area

4.2.5 Vertical and Horizontal Linearity Adjustment - Monochrome Monitor

Adjust vertical and horizontal linearity as follows:

1. Run the Service Diagnostics diskette and choose the Test One Module selection. Press Return.

2. After the configuration test, choose the VGA and Monochrome monitor selection. Press Return.

3. Choose the Check Linearity selection and press Return.

4. Adjust trimmer RV6 (Figure 4–4) to obtain equal character height (Figure 4–5).

5. Adjust coil B3 (Figure 4–4) to obtain equal character width (Figure 4–5).
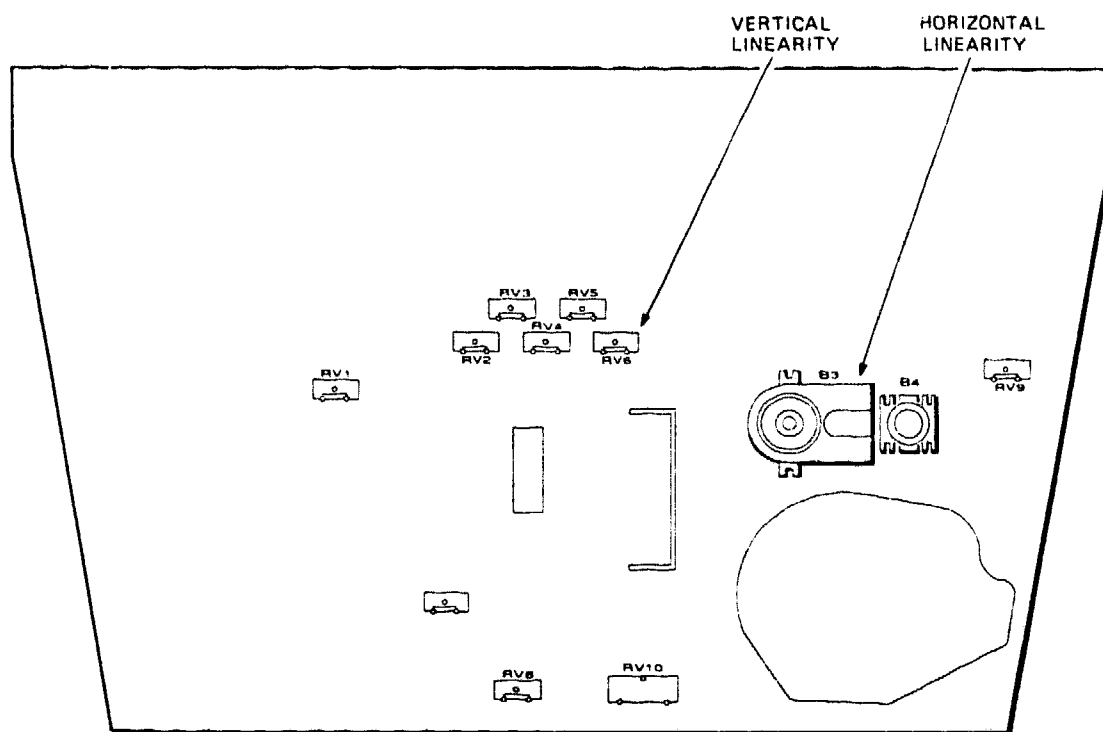
LJ-1650

Figure 4–4   Monitor Board Trimmer RV6 & Coil B3
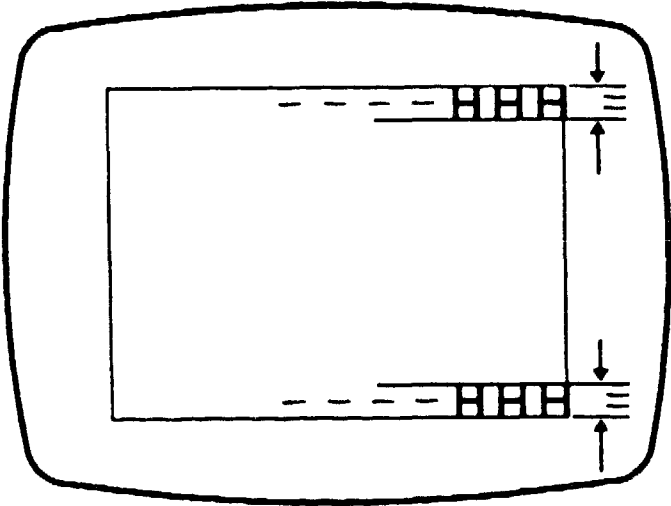
VERTICAL LINEARITY
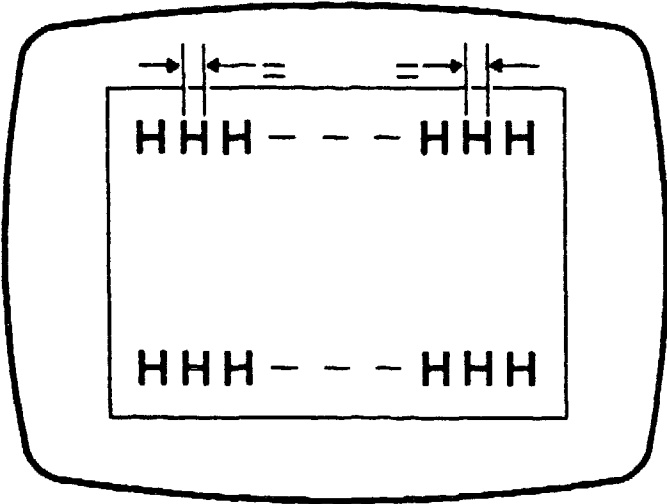
HORIZONTAL LINEARITY

LJ-1649

Figure 4-5   Vertical Linearity Screen Display

4.2.6 Width - Monochrome Monitor

Adjust the width as follows:

1. Run the Service Diagnostics diskette and choose the 640 x 480 Graphics selection.

2. Adjust coil B4 (Figure 4-6) to obtain an image width of 207 mm (8-3/16 inches).
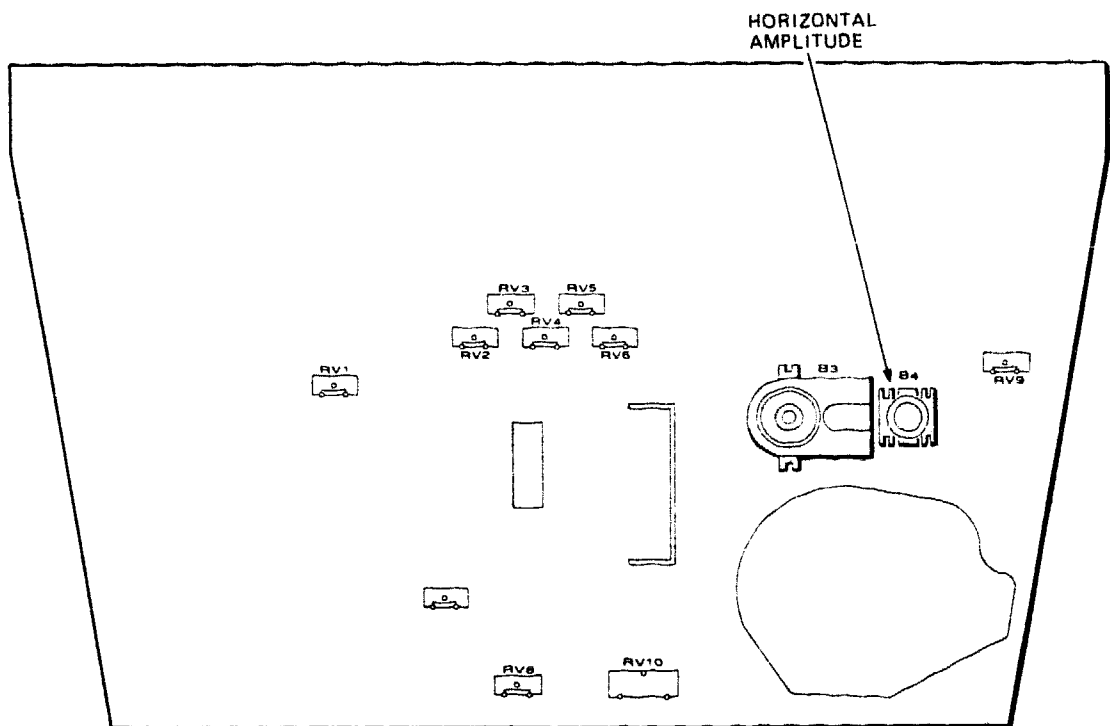
Figure 4-6   Monitor Board Coil B4

4.2.7 Height - Monochrome Monitor

Adjust the height for each of the three possible graphic resolutions as
follows:

1. Run the Service Diagnostics diskette and choose the 640 x 480
    Graphics test selection.

2. Adjust trimmer RV5 (Figure 4–7) for an image height of 155 mm
    (5-15/16 inches).

3. Choose the 640 x 350 Graphics test selection and adjust trimmer RV2
    (Figure 4–7) to obtain an image height of 155 mm (5-15/16 inches).

4. Choose the 640 x 400 Graphics test selection and adjust trimmer RV3
    (Figure 4–7) for an image height of 155 mm (5-15/16 inches).

5. Choose 640 x 480 graphics test selection and recheck the image
    height. The height should still be 155 mm (5-15/16 inches).
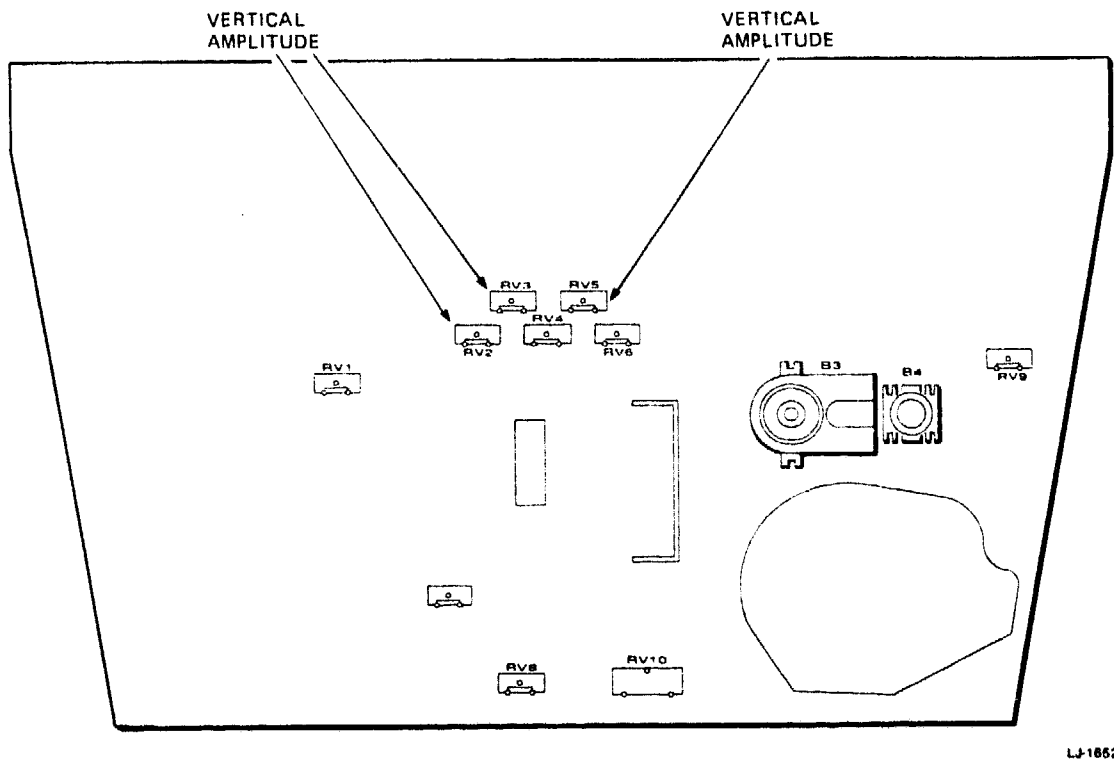
Figure 4–7   Monitor Board Trimmer RV2, RV3, & RV5

4.2.8 Focus

Adjust the monitor focus as follows:

1. Run the Service Diagnostics diskette and choose the Check Linearity selection.

2. Use the external brightness control to increase the brightness until the raster area is visible.

3. Reduce the brightness control until the raster area is no longer visible.

4. Adjust the external contrast control to the maximum position.

5. Adjust RV10 (Figure 4–8) so the character display in the center and corners has the best possible clarity.

FOCUS
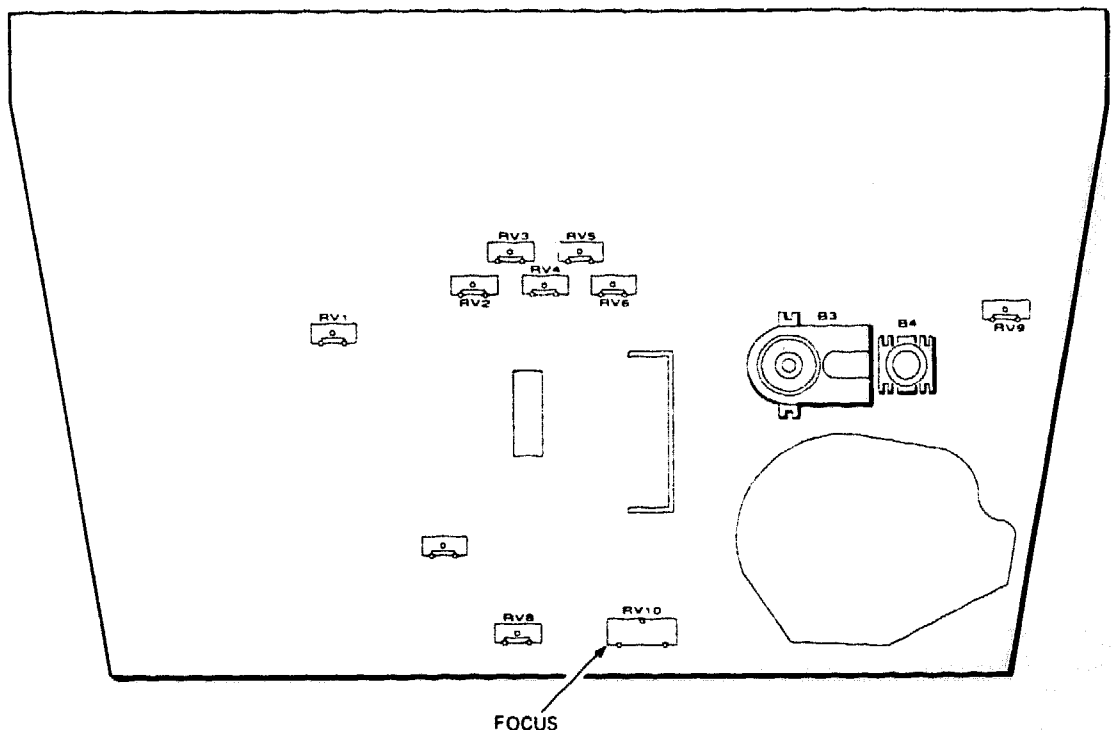
LJ-1853

Figure 4–8   Monitor Board Trimmer RV10

4.2.9 Checking the Adjustments - Monochrome Monitor

Check the adjustments as follows:

1. Run the full video system test.

2. If the display passes all the video tests continue to the next step; otherwise return to Section 4.2.

3. Turn power to the system off.

4. Unplug the power cable.

5. Wait 20 seconds then replace the monitor cover.

4.3   Color Monitor Adjustments

This section contains the following adjustment procedures for the color monitor:

- Horizontal phase
- Pincushion distortion
- Horizontal linearity
- Height
- Vertical linearity
- Width

4.3.1   Removing the Cover - Color Monitor

Only qualified personnel should remove the monitor cover to access the adjustment potentiometers. All adjustment potentiometers, except brightness and contrast, are located inside the monitor.

WARNING
High voltages are present within the monitor case.

CAUTION
Before you turn power to the system off, the MS-DOS prompt (for example, C>) should display.

Remove the monitor cover as follows:

1. Turn power to the system off.

2. Disconnect the power cable from the wall outlet.

3. Disconnect all peripheral cables from the system.

4. Remove the cover retaining screws (Figure 4–9).

5. Slide the cover off by first lifting it up then away from the unit (Figure 4–9).

6. Remove the top plate retaining screws and lift the plate off to clear the bracket (Figure 4–10).

7. Slide the plate to the back of the monitor and remove it (Figure 4–10).
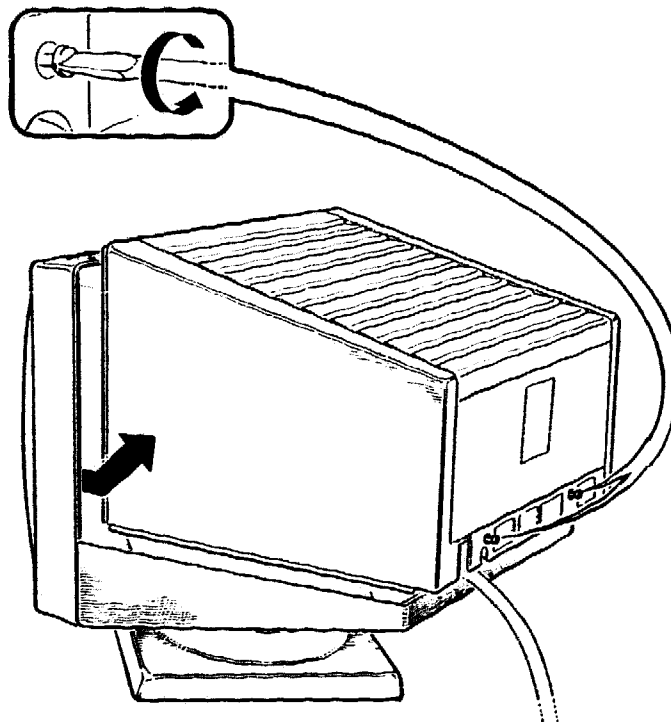
LJ-1654

Figure 4–9   Removing the Color Monitor Cover

SCREWS

METAL
SCREEN

SCREW

SCREW
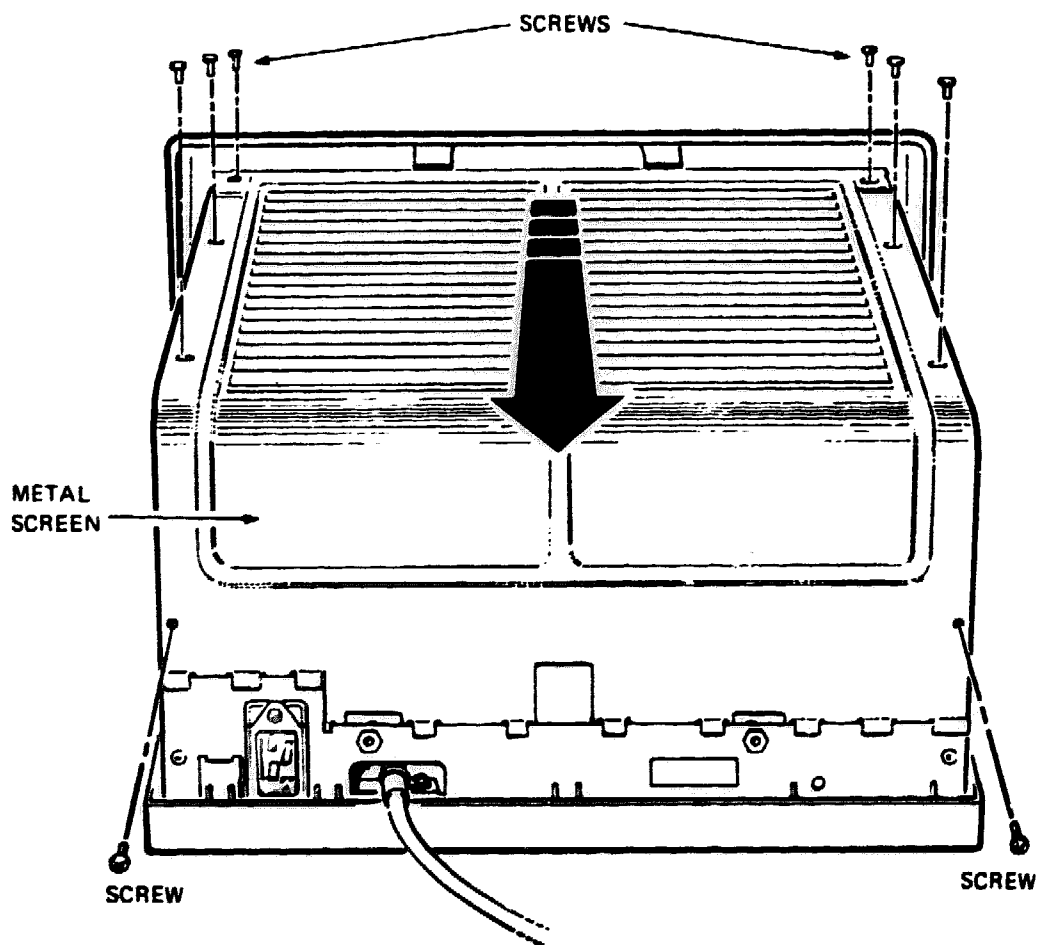
LJ-1655

Figure 4–10   Top Plate Removal

4.3.2 Making the Adjustments - Color Monitor

Before making any adjustments, you must:

1. Reconnect the power cable to the wall outlet.

2. Turn power to the system on and allow the monitor to stabilize for 10 minutes.

3. Perform all the adjustment procedures in Section 4.3.4 through Section 4.3.8.

    CAUTION
    You must make the adjustments according to the sequence given in these procedures; all the adjustments interact with each other. When done, if the monitor performance is not satisfactory, repeat all the procedures in this sequence.

4.3.3 Quick Reference Chart - Color Monitor

The following table is a quick reference to the adjustment procedures for *experienced* technicians.

Parameters	Test Pattern	Adjustment	
Horizontal phase	Cross Hatch	RV2	-
Pincushion distortion	Cross Hatch	RV9	-
Horizontal linearity	Check Linearity	-	B1
Height	640 x 350	RV2	-
Vertical linearity	Check Linearity	RV6	-
Width	640 x 480	RV10	-

4.3.4 Horizontal Phase Adjustment - Color Monitor

Adjust the horizontal phase as follows:

1. Run the Service Diagnostics diskette and choose the Test One Module selection. Press Return .

2. After the configuration test, choose the VGA and Color Video selection. Press Return .

3. Choose the Test Patterns with Cross Hatch selection. Press Return .

4. Use the external brightness control to increase the brightness until the raster area is visible.

5. Adjust trimmer RV2 on the monitor board (Figure 4–11) to bring the character area to the center of the raster area (Figure 4–12).
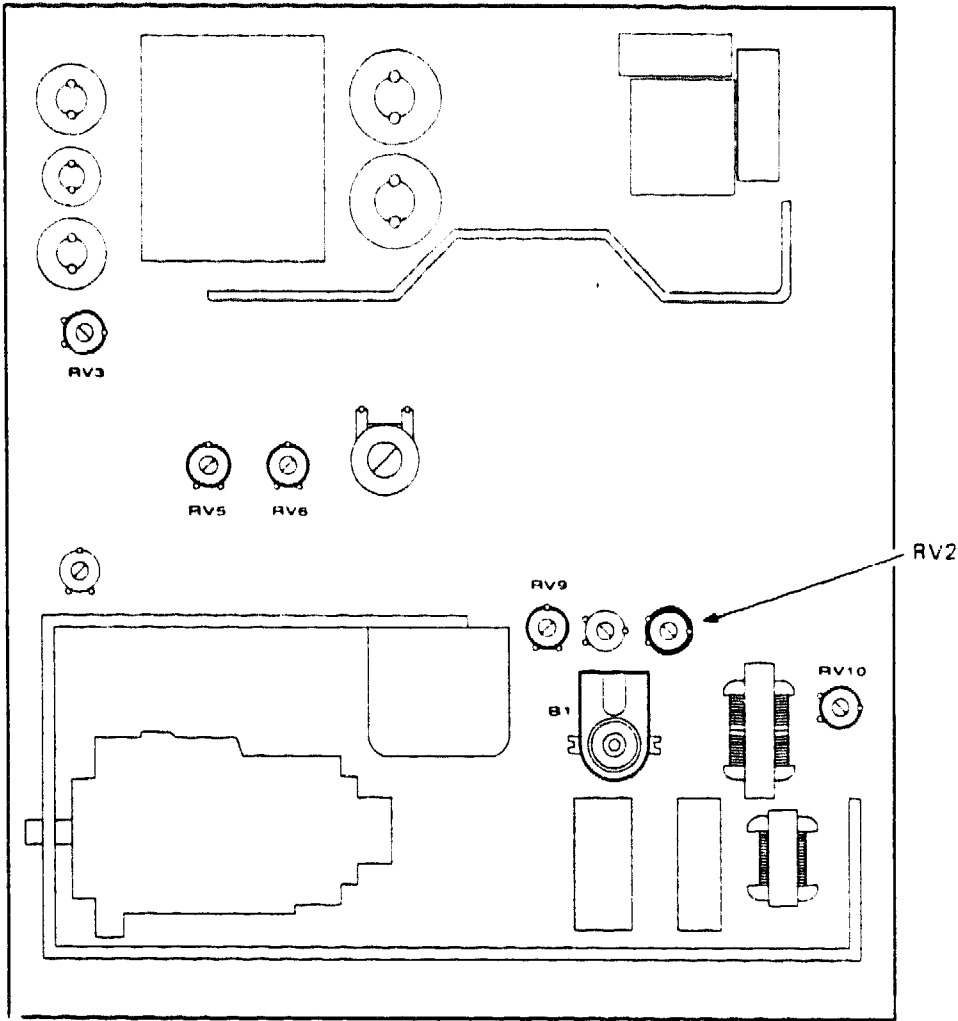
LJ-1856

Figure 4–11   Mother Board Trimmer RV2
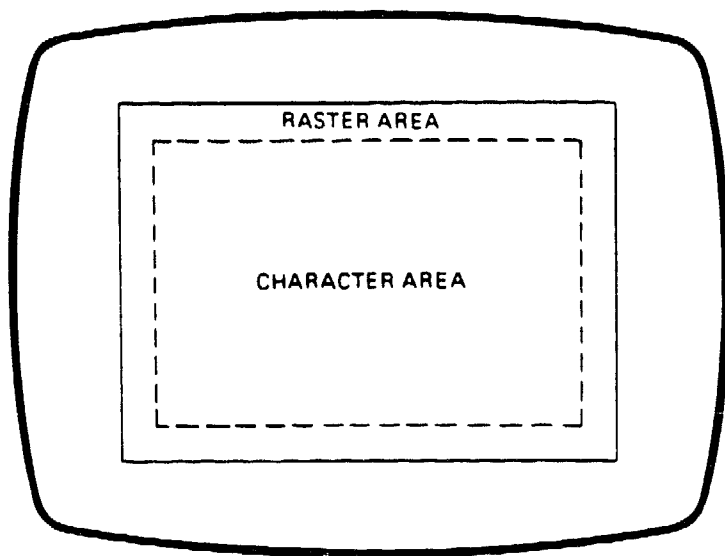
LJ-1648

Figure 4-12   Raster/Character Area

4.3.5 Pincushion Distortion Reduction - Color Monitor

Reduce pincushion distortion as follows:

1. Run the Service Diagnostics diskette and choose the Cross Hatch with Circle selection.

2. Adjust trimmer RV9 (Figure 4–13) to obtain a rectangular image.
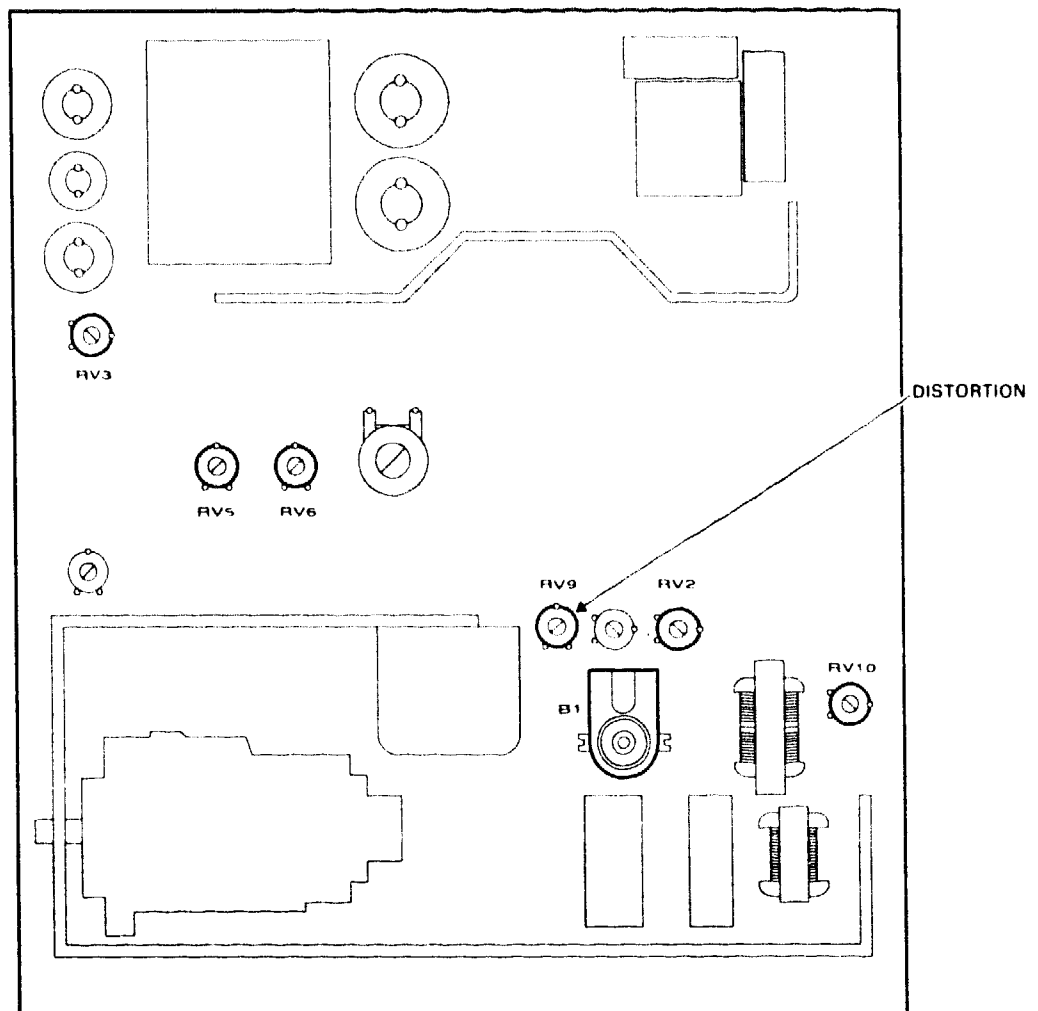
LJ-1657

Figure 4–13   Mother Board Trimmer RV9

4.3.6 Horizontal Linearity - Color Monitor

Adjust the horizontal linearity as follows (Figure 4-14):

1. Run the Service Diagnostics diskette and choose the Check Linearity selection.

2. Adjust coil B1 to achieve uniform character width across the screen.

4.3.7 Height - Color Monitor

Adjust the height as follows (Figure 4-14):

1. Run the Service Diagnostics diskette and select the 640 x 350 Graphics selection.

2. Adjust trimmer RV2 for an image height of 180 mm (7-1/8").

3. Choose the 640 x 480 Graphics selection and adjust trimmer RV5 to obtain an image height of 180 mm (7-1/8 inches).
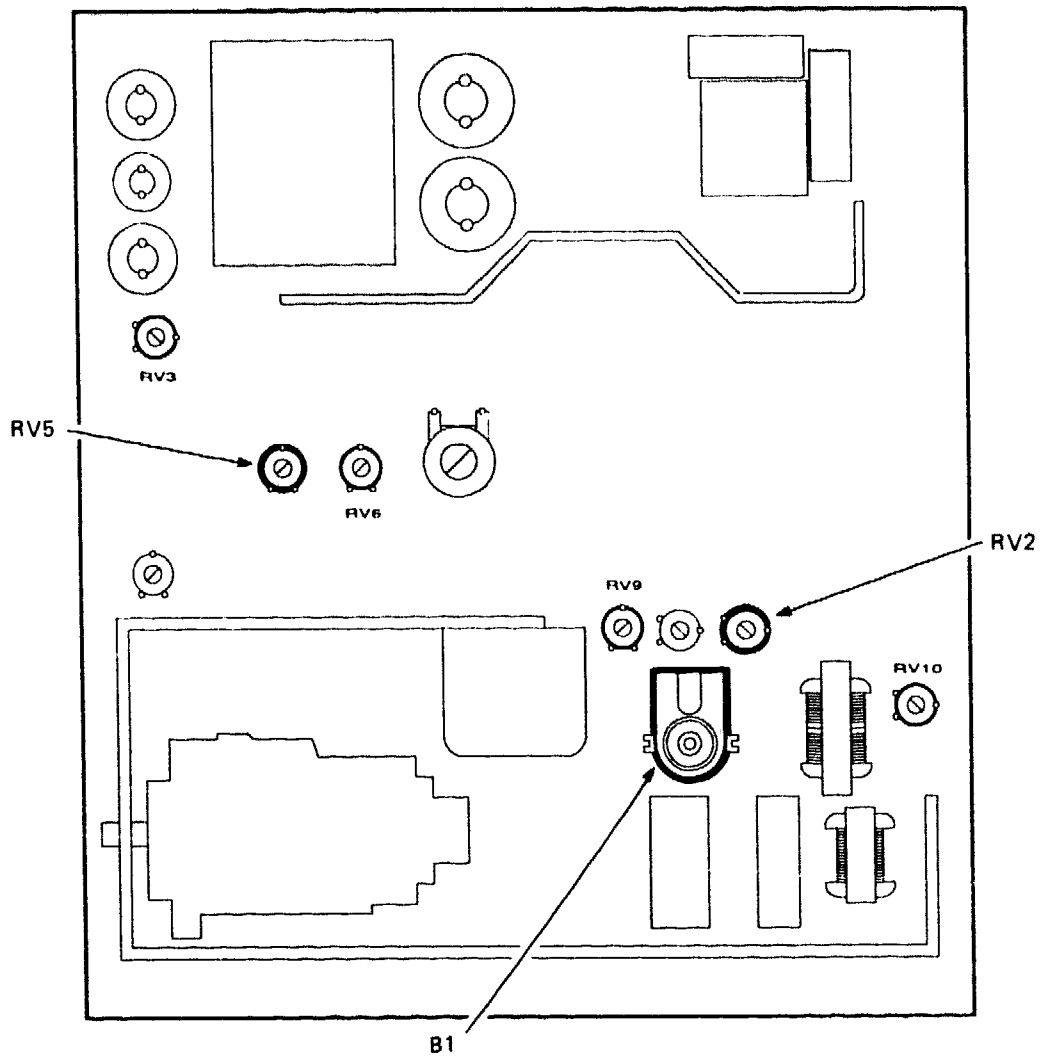
Figure 4–14   Mother Board Trimmer RV2, RV5, and Coil B1

4.3.8 Vertical Linearity - Color Monitor

Adjust vertical linearity as follows (Figure 4–15):

1. Run the Service Diagnostics diskette and choose the Check Linearity selection.

2. Adjust trimmer RV6 to obtain uniform character height at all points of the screen.

4.3.9 Width - Color Monitor

Adjust the width as follows (Figure 4–15):

1. Run the Service Diagnostics diskette and choose the 640 x 480 Graphics selection.

2. Adjust the trimmer RV10 to obtain an image width of 240 mm
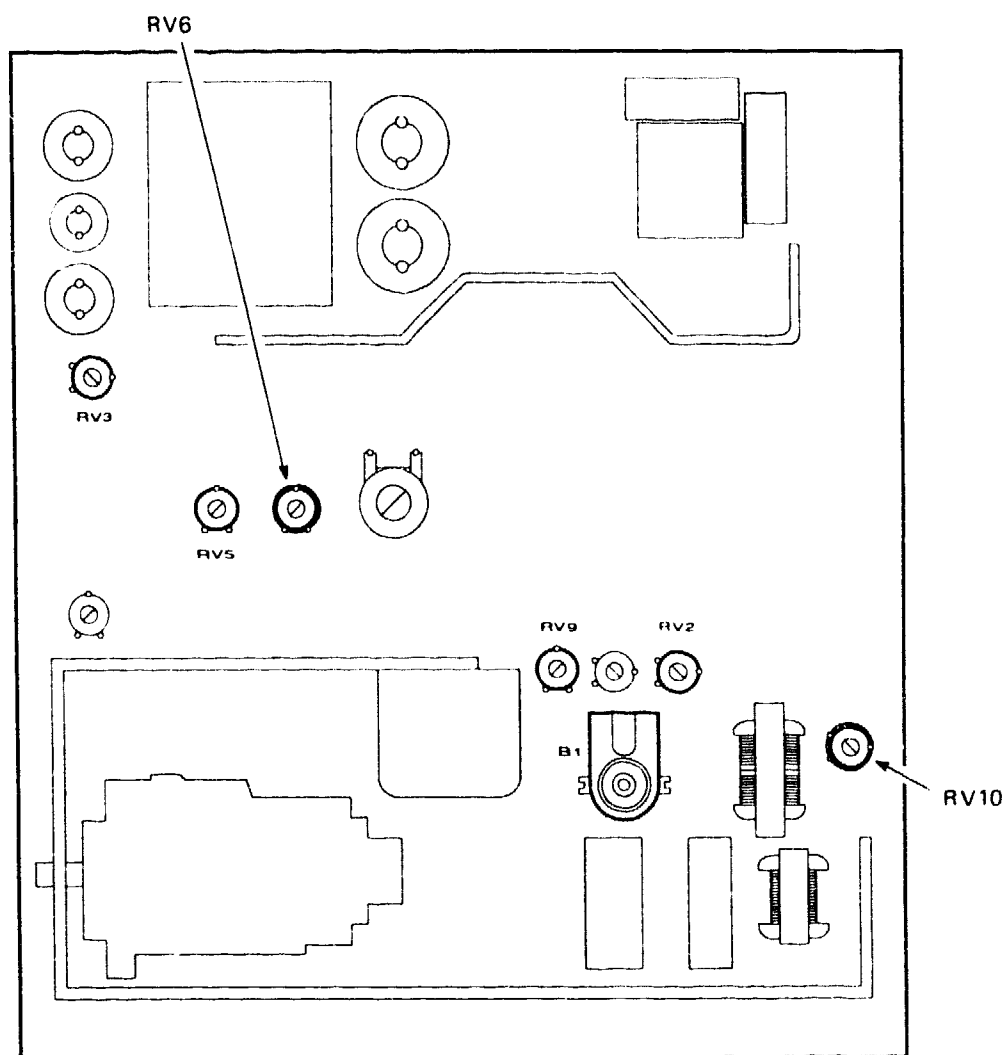
LJ-1659

Figure 4-15 Mother Board Trimmer RV6 and RV10

4.3.10 Checking the Adjustments - Color Monitor

1. Run the full video system test.

2. If the display passes all the video tests continue to the next step; otherwise return to Section 4.3.

3. Turn power to the system off.

4. Unplug the power cable from the AC outlet.

5. Wait 20 seconds then replace the monitor cover.

CHAPTER 5

5
FRU Removal and Replacement

This chapter describes how to remove and replace each DECstation 200 field replaceable unit (FRU). To install many of the FRUs, reverse the removal procedure. Only qualified service technicians should remove and replace FRUs.

Table 5–1 lists the DECstation 200 FRUs and part numbers.

Table 5–1   DECstation 200 Field Replaceable Units

FRU	Digital Part Number
Recommended Spare Part	
BA240 main logic board 1 Mbyte	29-27659-01
Power supply assembly 120V ALI PS07/B	29-27745-01
Power supply assembly 220V ALI PS07/B	29-27660-01
Bus converter board IN113	29-27661-01
Hard disk drive 20 Mbyte 3.5 inches	30-31830-01
Hard disk drive 40 Mbyte 3.5 inches	30-31849-01
Floppy disk drive 1.44 Mbyte 3.5 inches	30-31834-01
Streaming tape drive 40 Mbytes 3.5 inches	30-31833-01
G0518 Memory expansion board 2 Mbyte	20-31795-01
Main logic board SIMM: 1 Mbyte x 9; 120 nseconds	29-27666-01
Main logic board SIMM: 512 Kbytes x 9; 120 nseconds	29-27744-01
80287 Math coprocessor	19-31800-01
Mouse PS2 compatible	30-31750-01
Multiport serial card	20-31808-01
Single serial port card	20-31809-01
Keyboards:	
USA 101 key keybord	30-31826-01
Israel 101 key keybord	30-31820-01
Greek/Latin 101 key keybord	30-31823-01
Belgium 102 key keybord	30-31827-01
Danish 102 key keybord	30-31828-01
Finish/Swedish 102 key keybord	30-31829-01
German 102 key keybord	30-31835-01
Italian 102 key keybord	30-31836-01

Table 5–1 (Cont.)   DECstation 200 Field Replaceable Units

FRU	Digital Part Number
Recommended Spare Part	
Swiss French/German 102 key keybord	30-31837-01
Norwegian 102 key keybord	30-31838-01
French 102 key keybord	30-31810-01
Spain National 102 key keybord	30-31811-01
Portuguese 102 key keybord	30-31821-01
U.K. 102 key keybord	30-31822-01
Spain internationl 102 key keybord	30-31825-01
French querty 102 key keybord	30-31824-01
Monitors:	
Monochrome 12 inches 120V N.H.[1]	30-31812-01
Monochrome 12 inches 220V N.H.	30-31815-01
Monochrome 12 inches 120V S.H.[1]	30-31814-01
Monochrome 12 inches 220V S.H.	30-31813-01
Color 14 inches 120V N.H.	30-31816-01
Color 14 inches 220V N.H.	30-31819-01
Color 14 inches 120V S.H.	30-31818-01
Color 14 inches 220V S.H.	30-31817-01
System Box Power Cord	
North European	17-02467-01
Swiss	17-02468-01
UK	17-02469-01
USA	17-02470-01
Australia	17-02471-01
Diagnostic kit	22-00484-01

[1]N.H. stands for Northern Hemisphere; S.H. stands for Southern Hemisphere.

Table 5-1 (Cont.)   DECstation 200 Field Replaceable Units

FRU	Digital Part Number
Extended Spare Parts	
Streaming tape drive 40 Mbytes 3.5 inches controller	29-27668-01
Floppy disk - streaming tape drive signal cable	29-27672-01
Main power cable	29-27684-01
5V and 12V Power cable	29-27686-01
Keys group	29-27687-01
Hard disk drive LED cable	29-27688-01
Hard disk drive cable kit	29-27691-01
Floppy disk - streaming tape drive power cable	29-27671-01
Neutral metal shield	29-27693-01
ON/OFF switch bar	29-27694-01
ON/OFF switch command	29-27695-01
Boards support	29-27696-01
Cover fixing screw	Contact your area office.
Spacer	Contact your area office.
PCB fixing screw	Contact your area office.
Front panel	29-27981-01
Upper cover	29-27982-01
Back panel	29-27983-01
Keyboard cable	29-27980-01

5.1   Before Replacing FRUs

The following criteria apply when removing or installing DECstation FRUs.

CAUTION
The system should display the MS-DOS prompt (for example, C>) before you turn the system power off.

CAUTION
If a hard disk is present, wait 20 seconds after you turn power to the system off before disconnecting the power cord.

* Always turn power to the system and monitor off, unplug the system from the wall outlet, and disconnect all external cables before removing any FRU.

    NOTE
    Before disconnecting the DECstation 200 from a network, inform the system administrator that you are going to disconnect the ThinWire T-connector from the computer. Do not disconnect any cable or terminator from the T-connector. Doing so disrupts network operation.

* Always use a grounded wrist strap and grounded work surface when opening the system box and handling suspected damaged or replacement components. Static electricity can damage printed circuit boards and mass storage devices.

* After replacing the FRU verify that the FRU and the system function correctly.

5.2 Replacing FRUs

This section describes removal and replacement procedures. Figure 5–1 shows the location of components inside the system.
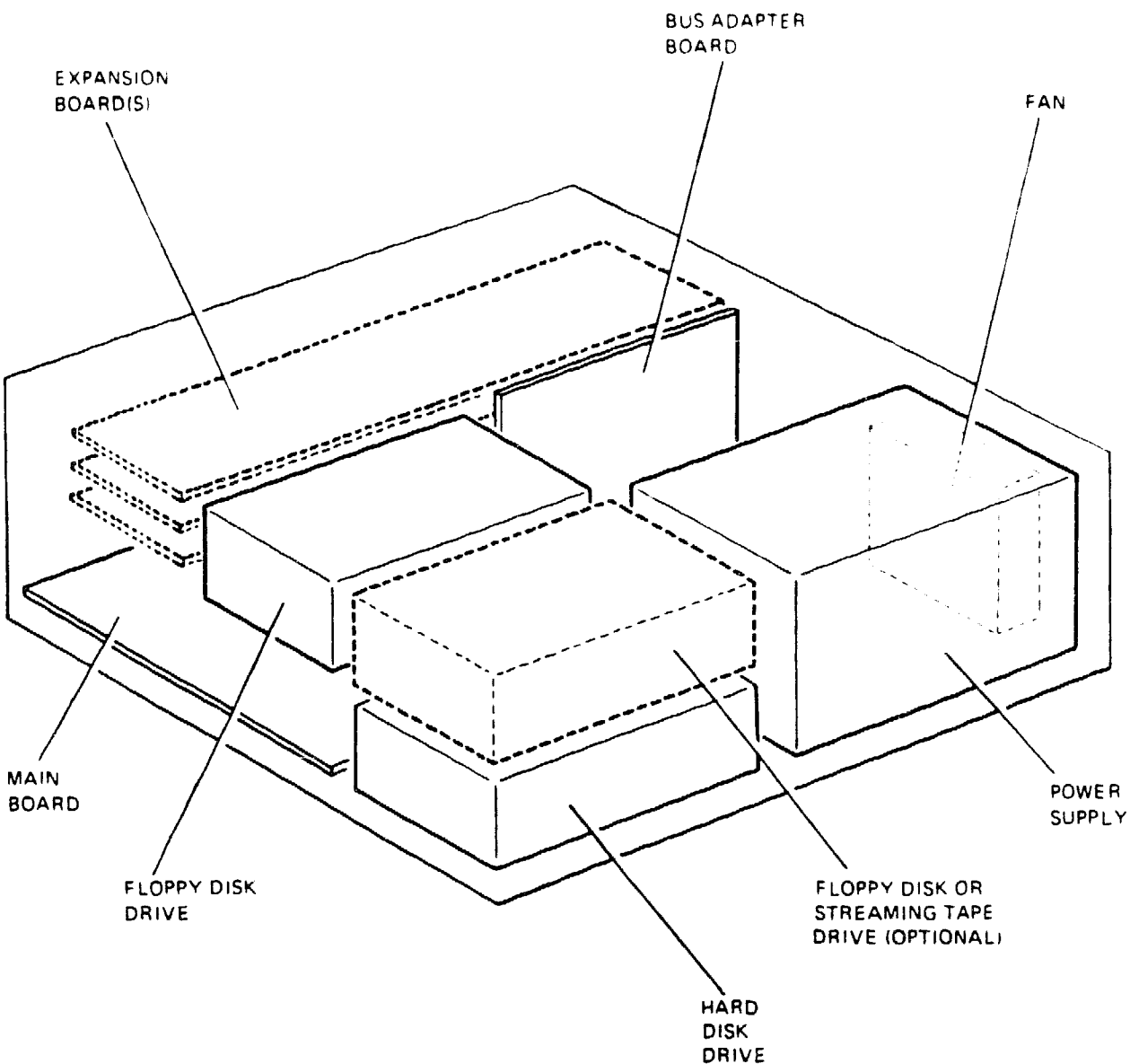
Figure 5–1   Inside the DECstation 200

5.2.1 Keyboard Replacement

Replace the keyboard as follows:

1. Turn power to the system and monitor off. Wait 20 seconds.

2. Disconnect the keyboard cable from the system.

3. Connect the cable from the new keyboard to the system.

4. Turn power to the system on.

5.2.2 Monitor Replacement

Replace the monitor as follows:

1. Turn power to the system off. Wait 20 seconds.

2. Unplug the main power cord from the wall outlet.

3. Unplug the monitor power cable and signal cable from the system box.

   NOTE
   The monochrome monitor has two cables permanently attached to it. The color monitor power cable is detachable.

4. Connect the replacement monitor power cable and signal cable to the system box.

5. Plug the main power cord from the system into the wall outlet.

6. Turn power to the system on.

5.2.3 Mouse Replacement

Replace the mouse as follows:

1. Turn power to the system and monitor off. Wait 5 seconds.

2. Disconnect the mouse cable from the system.

3. Connect the cable from the new mouse to the system.

4. Turn power to the system on.

5.2.4 Cover Removal

Remove the top cover as follows:

1. Turn power to the system and monitor off. Wait 20 seconds

2. Unplug the main power cord from the wall outlet.

3. Disconnect all cables from the system.

4. Remove the monitor and other external devices from the system.

5. Turn the front panel key counter-clockwise to release the internal frame, then remove the key.

6. Loosen the two top cover mounting screws (Figure 5–2).

7. Remove the top cover by pushing it towards the front of the system then lifting it up.
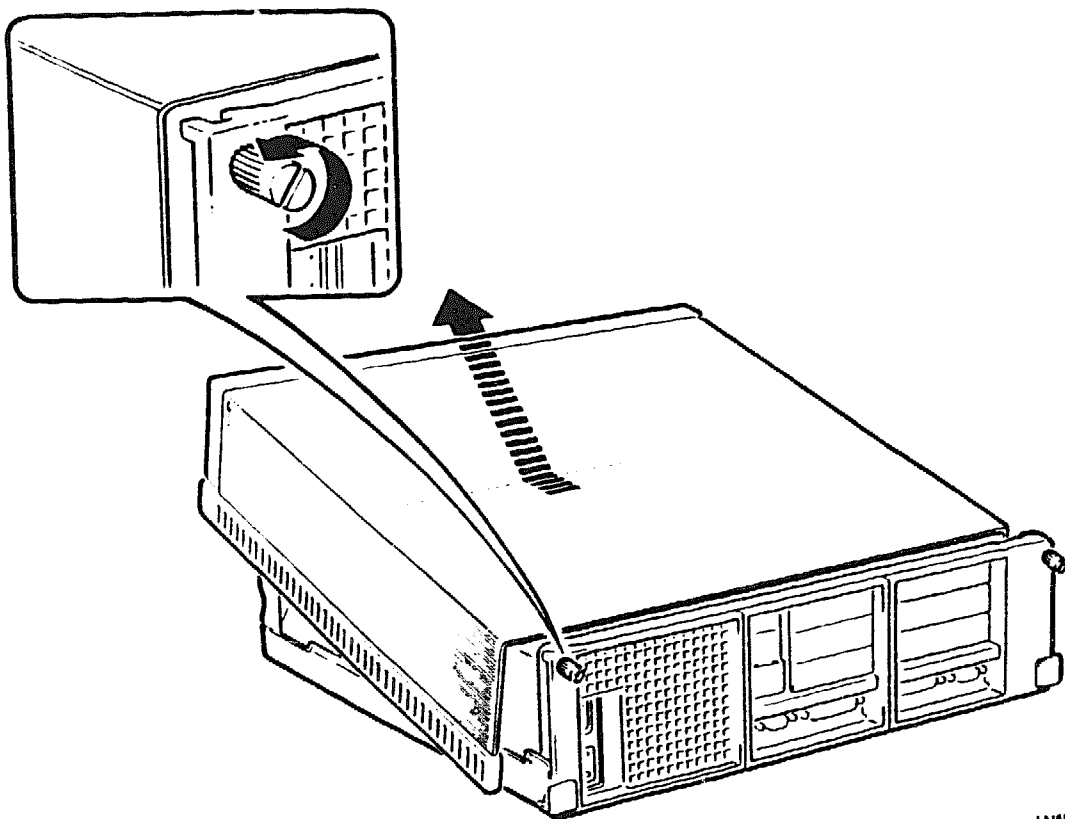
Figure 5–2   Removing the Top Cover

5.2.5 Single In-line Memory Module Replacement

Replace Single In-line Memory Modules (SIMMs) on the main logic board as follows (Figure 5-3):

1. Remove the top cover from the system (Section 5.2.4).

   The main logic board has four connectors that hold the SIMMs. The connectors are logically grouped into two banks (bank 0, and 1) each containing two connectors (Figure 5-4). There must be two SIMMs per bank. A bank cannot have less than two SIMMs to be complete.

2. Remove the defective SIMM(s) by releasing the retaining clips, pushing the SIMM into a vertical position, then lifting the SIMM out of the socket.

3. Install the new SIMM in the correct memory board bank by pushing the SIMM into the connector and snapping it in place.

NOTE
Jumpers P1 and P2 on the main logic board only have to be reconfigured if you have changed the total amount of memory contained on the board (Section A.1).

CAUTION
You can not mix 512Kbyte and 1Mbyte SIMMs within banks 0 and 1 on the main logic board.

NOTE
The main logic board is configured with two, 512kbyte SIMMs as standard equipment. This provides one Mbyte of dynamic RAM memory. Memory may be increased by the installation of two, 512kbyte SIMMs. This would provide two Mbytes of dynamic RAM memory. You may also replace all the SIMMs with 1Mbyte SIMMs. This would provide four Mbytes of dynamic RAM.

SPRING EDGE CONNECTORS (30)

SIMM DOUBLE SOCKET

LATCH   LOCK   LOCK   LATCH

SIMM BOARD (ONE OF TWO)

KEY NOTCH
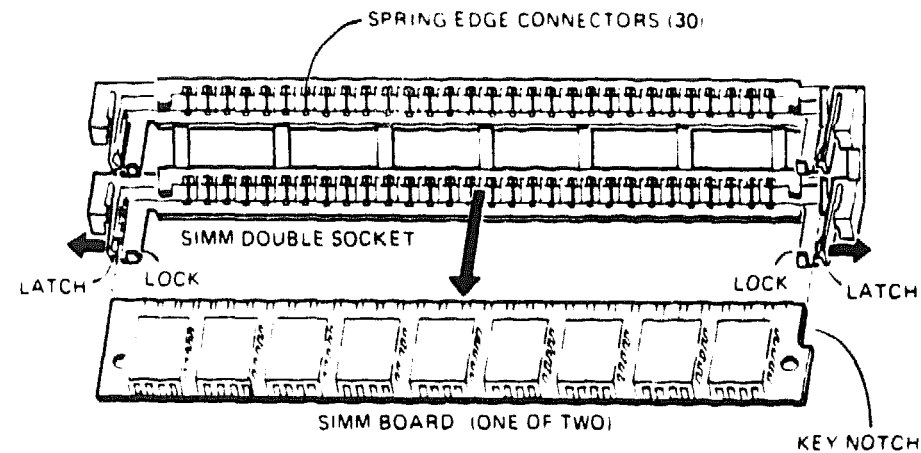
LJ   1588

Figure 5–3   Replacing a SIMM
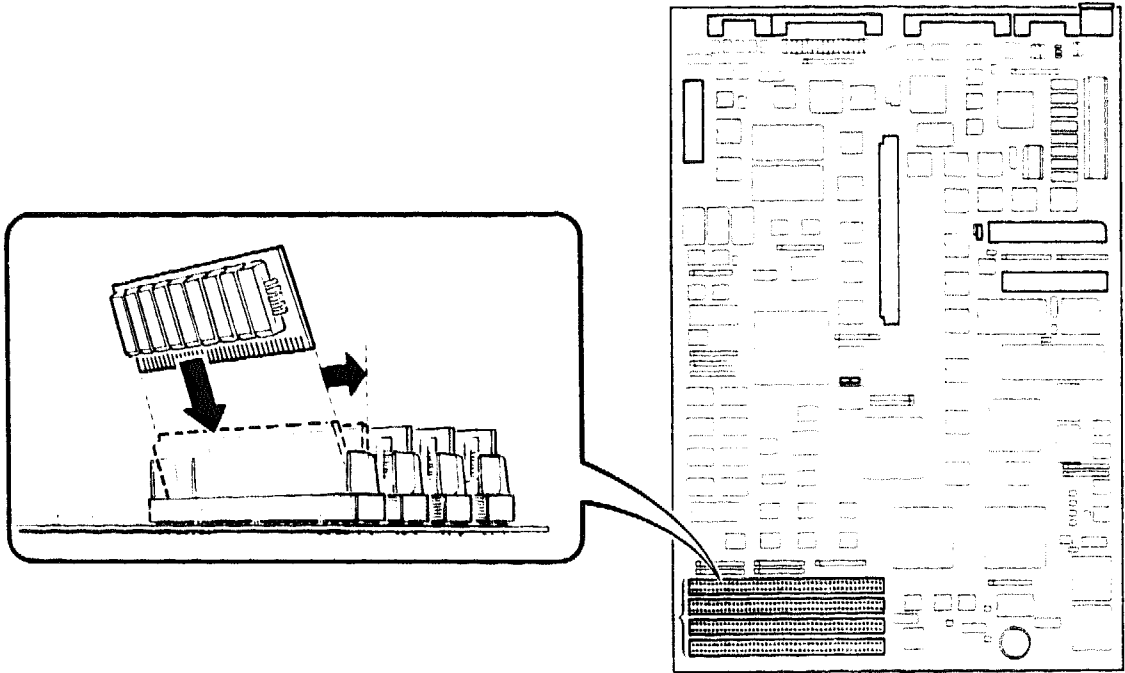
LJ-1686

Figure 5–4   SIMM Banks

5.2.6 Battery Replacement

The battery itself is not replaceable because it is an integral part of the main logic board. If the battery is not functioning, you must replace the main logic board (Section 5.2.17).

5.2.7 Option Board Replacement

Replace an option board as follows (Figure 5–5):

1. Turn the power to the system off and wait 20 seconds.

2. Unplug the system from the wall outlet.

3. Remove the top cover from the system (Section 5.2.4).

4. Remove any cables attached to the board.

5. Remove the screw that secures the board retaining bracket into the expansion slot.

6. Detach the board(s) from the bus expansion board connector(s) by pulling outward.

7. Make the necessary switch and jumper settings to the replacement board (Appendix A, Jumpers and Switches).

8. Install the replacement board.

9. Relace the top cover and all cables.

10. Run the SETUP Utility on the Service Diagnostics diskette.
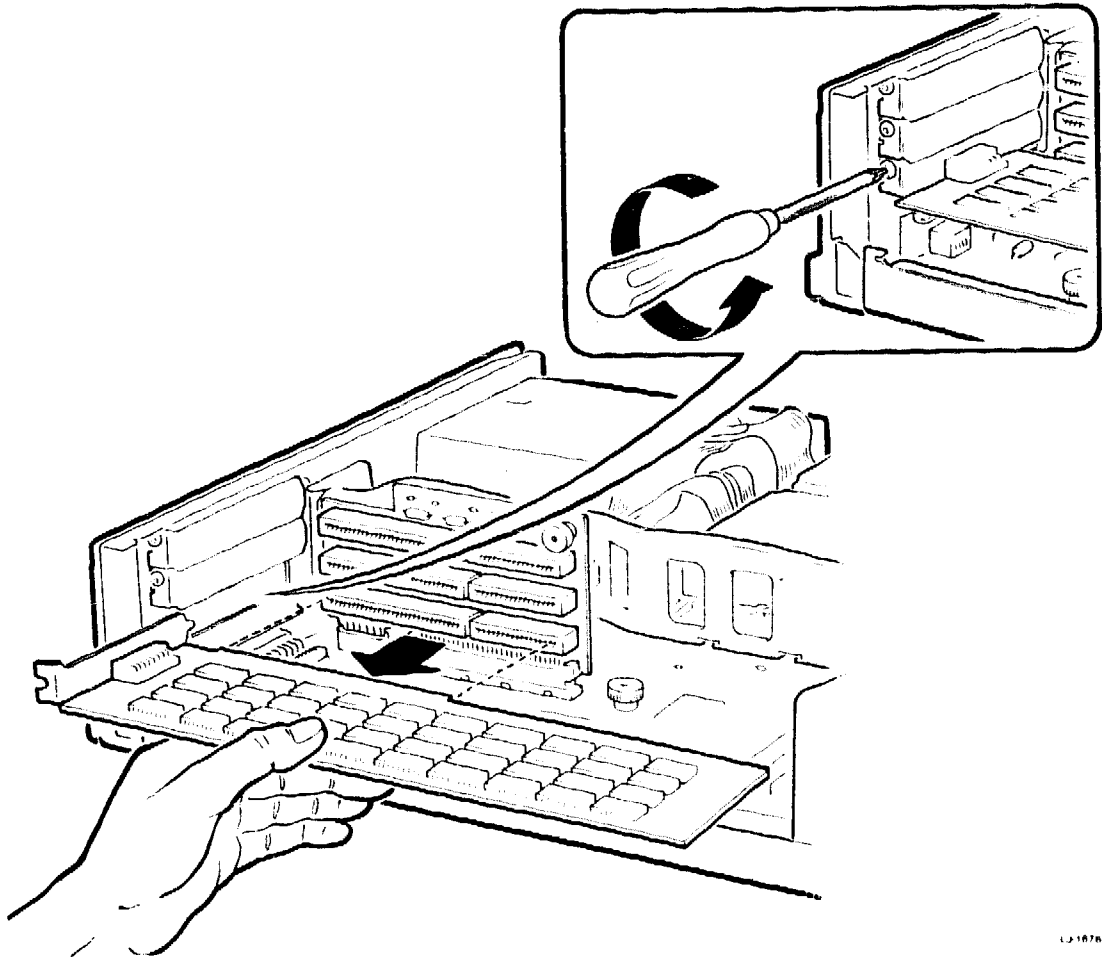
Figure 5–5   Removing an Option Board from the Bus Expansion Board

5.2.8 8- and 16-Bit Option Boards

The bus expansion board has three slots into which option boards may be inserted. Eight- and 16-bit boards may be installed in any 16-bit slot.

The following table lists the possible board configurations and the expansion slots option boards can be installed in.

Board Configurations	Expansion Slot
8-Bit board	16-bit slot
16-Bit board	16-bit slot
32-Bit board	Can not be installed

Install a board on the bus expansion board by doing the following:

1. Determine which option slot to use by identifying the shape of the board (Figure 5–6).

2. Insert the board in the correct slot.

   Eight-bit and 16-bit boards may be inserted in any slot. A 32-bit board may not be inserted in the DECstation 200.

3. Re-install the retaining screw and any cables.

4. Replace the top cover and all cables.
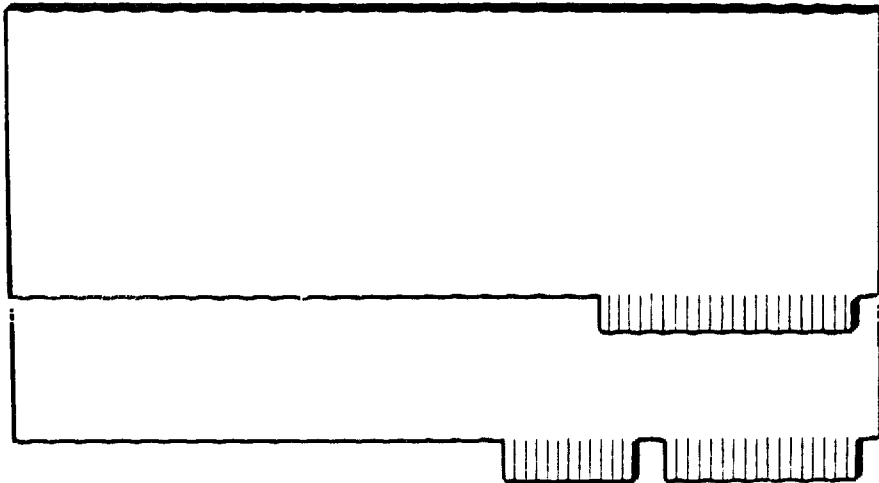
LJ-1683

Figure 5–6   8- and 16-bit Board Shapes

5.2.9 Memory Expansion Board Replacement

Replace a memory expansion board as follows (Figure 5-5):

1. Turn the power to the system off and wait 20 seconds.

2. Unplug the system from the wall outlet.

3. Remove the top cover from the system (Section 5.2.4).

4. Remove the screw that secures the board retaining bracket into the expansion slot.

5. Detach the board(s) from the bus expansion board connector(s) by pulling in an outward direction.

6. Make the necessary switch and jumper settings to the replacement board (Appendix A, Jumpers and Switches).

7. Install the replacement board.

8. Run the SETUP Utility on the Service Diagnostics diskette.

NOTE
Before replacing the memory expansion board, remove any memory chips from the old board and install them on the new board. For more information about the different types of memory used in this system refer to Section 1.4.3.

5.2.10 Mouse Controller Board Replacement

Replace a mouse controller board as follows (Figure 5–5):

1. Turn the power to the system off and wait 20 seconds.

2. Unplug the system from the wall outlet.

3. Remove the top cover from the system (Section 5.2.4).

4. Remove the screw that secures the board retaining bracket into the expansion slot.

5. Detach the board(s) from the bus expansion board connector(s) by pulling in an outward direction.

6. Make the necessary switch and jumper settings to the replacement board (Appendix A, Jumpers and Switches).

7. Install the replacement board.

8. Run the SETUP Utility on the Service Diagnostics diskette.

5.2.11 Bus Expansion Board Replacement

Replace the bus expansion board as follows:

1. Remove the top cover of the system (Section 5.2.4).

2. Remove all boards from the bus expansion board (Section 5.2.7).

3. Remove the knob that secures the expansion board to the chassis (Figure 5–7).

4. Lift the bus expansion board from the system (Figure 5–7).

5. Reverse this procedure to install the new bus expansion board.
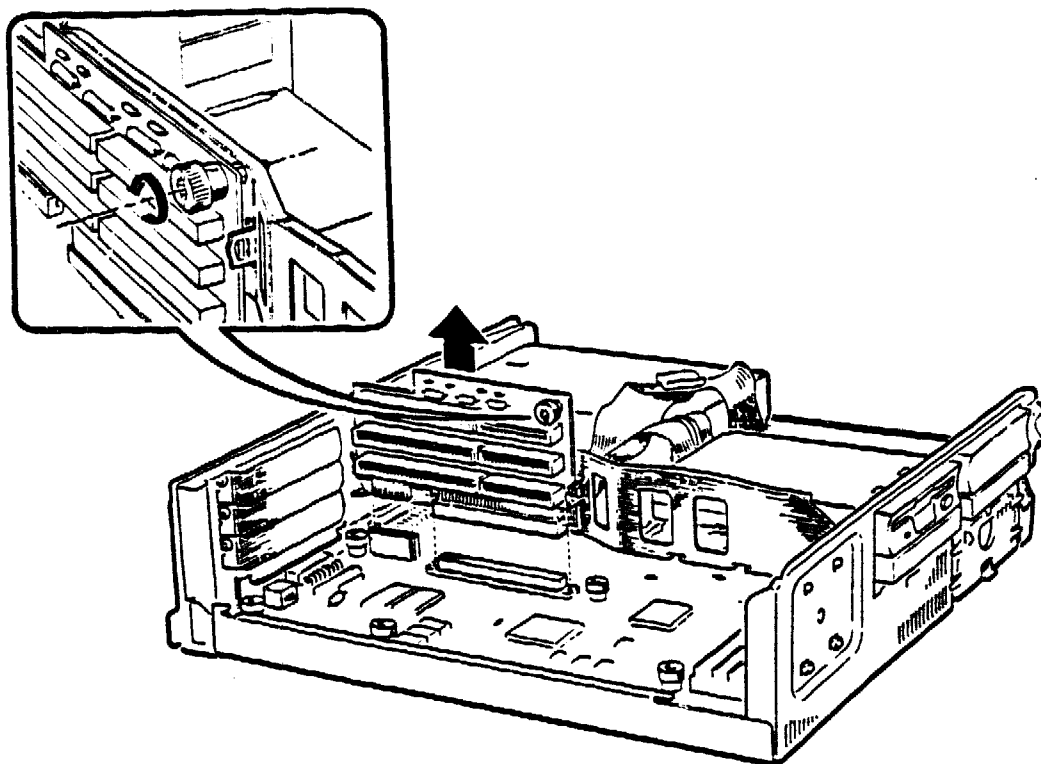
Figure 5–7   Removing the Bus Expansion Board

5.2.12 Floppy Disk Drive Replacement

Replace the floppy disk drive as follows:

1. Remove the top cover (Section 5.2.4).

2. Disconnect the monitor power cable and signal cable from the drive (Figure 5–8).

3. Lift the release lever on the front of the drive and slide the drive out of the system (Figure 5–9).

4. Insert the new drive. The cable connectors are keyed to the cable connection on the drive.
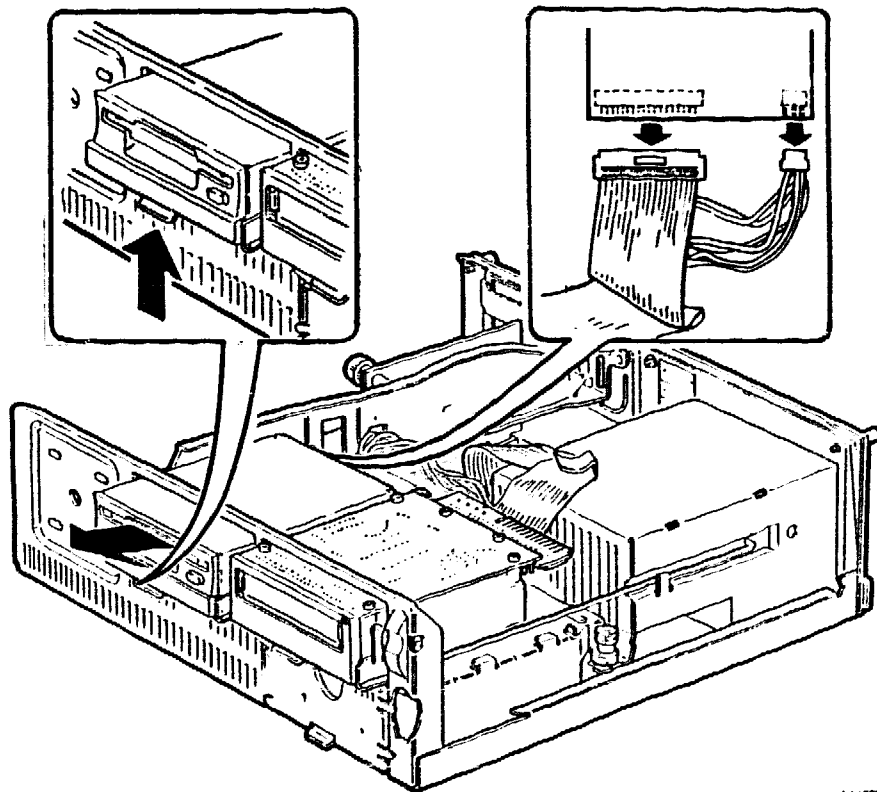
Figure 5–8   Removing the Floppy Disk Drive

L3-1877
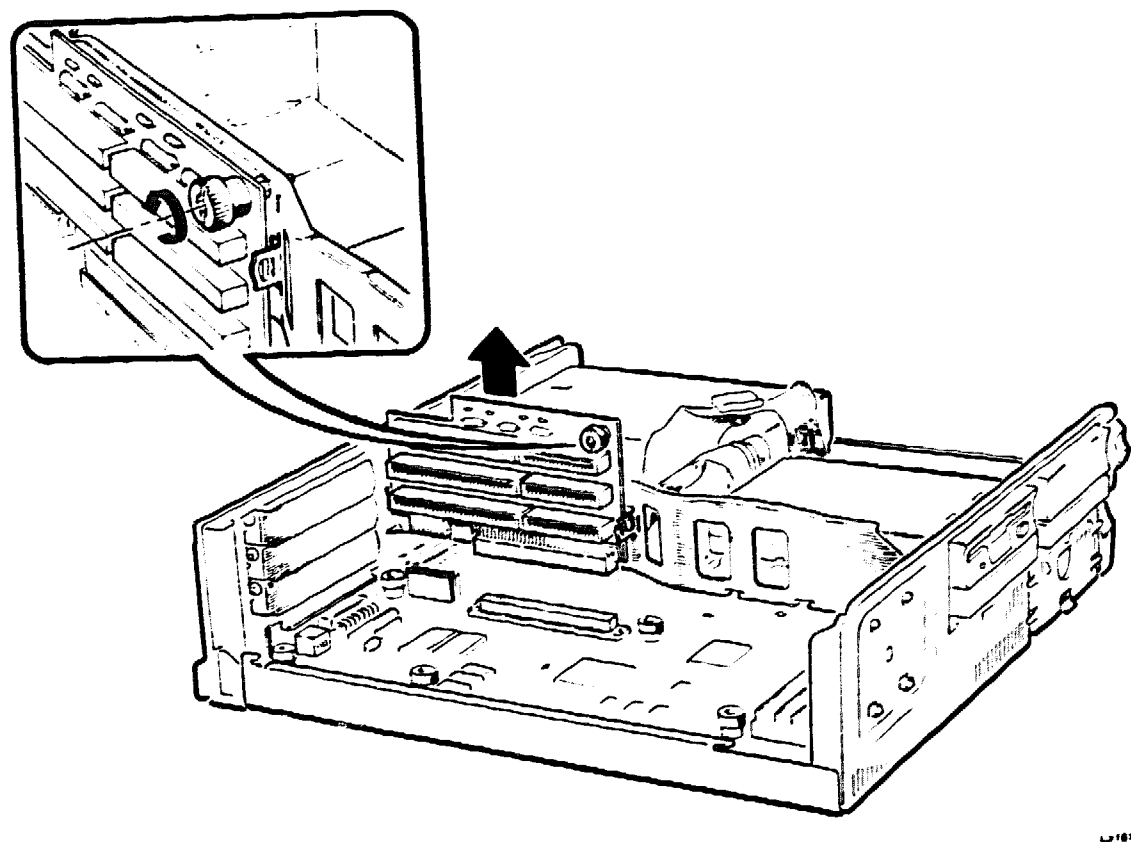
Figure 5–9   Release Lever

5.2.13 Math Coprocessor Replacement

Replace the math coprocessor (80287 chip) as follows:

1. Turn power to the system off and wait 20 seconds.

2. Unplug the system from the wall outlet.

3. Remove the top cover (Section 5.2.4).

4. Disconnect the monitor power cable and signal cable from the floppy drive (Section 5.2.12).

5. Lift the math coprocessor from its socket by pulling straight up.

6. Insert the new math coprocessor by aligning the corner notch as shown in Figure 5–10.

    CAUTION
    Be careful not to bend the pins of the coprocessor when you are installing it in the socket.

7. Press the math coprocessor evenly, on oposite corners so that all the pins are submerged in the connector.

8. Replace the top cover and connect all cables.

9. Run the SETUP Utility on the Utilites diskette to update the system configuration.
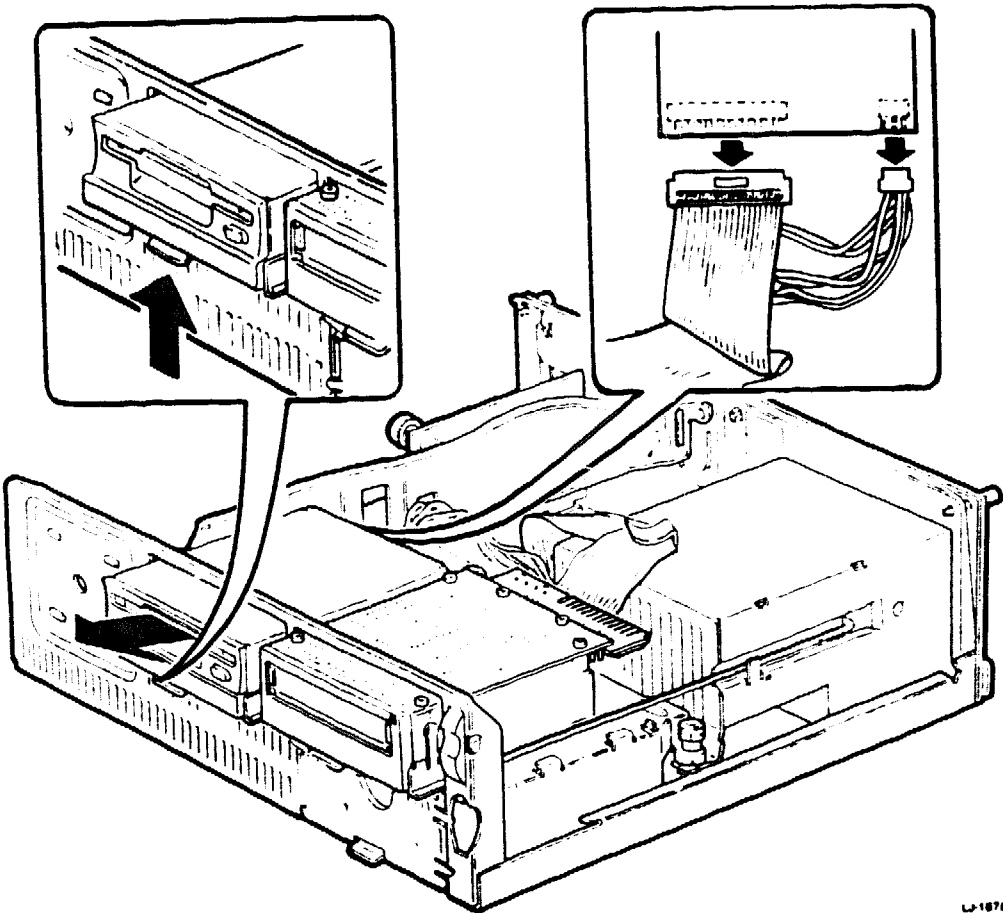
LJ-1678

Figure 5–10   Replacing the Math Coprocessor

5.2.14 Streaming Tape Drive Replacement

Replace the streaming tape drive as follows:

1. Remove the top cover (Section 5.2.4).

2. Lift the release lever and slide the drive out approximately one inch.

3. Disconnect the monitor power cable and signal cable from the drive. Be careful not to distort the board when disconnecting the signal cable. (Figure 5–11).

4. Slide the drive out of the system (Figure 5–9).

5. Insert the new drive and connect the cables.
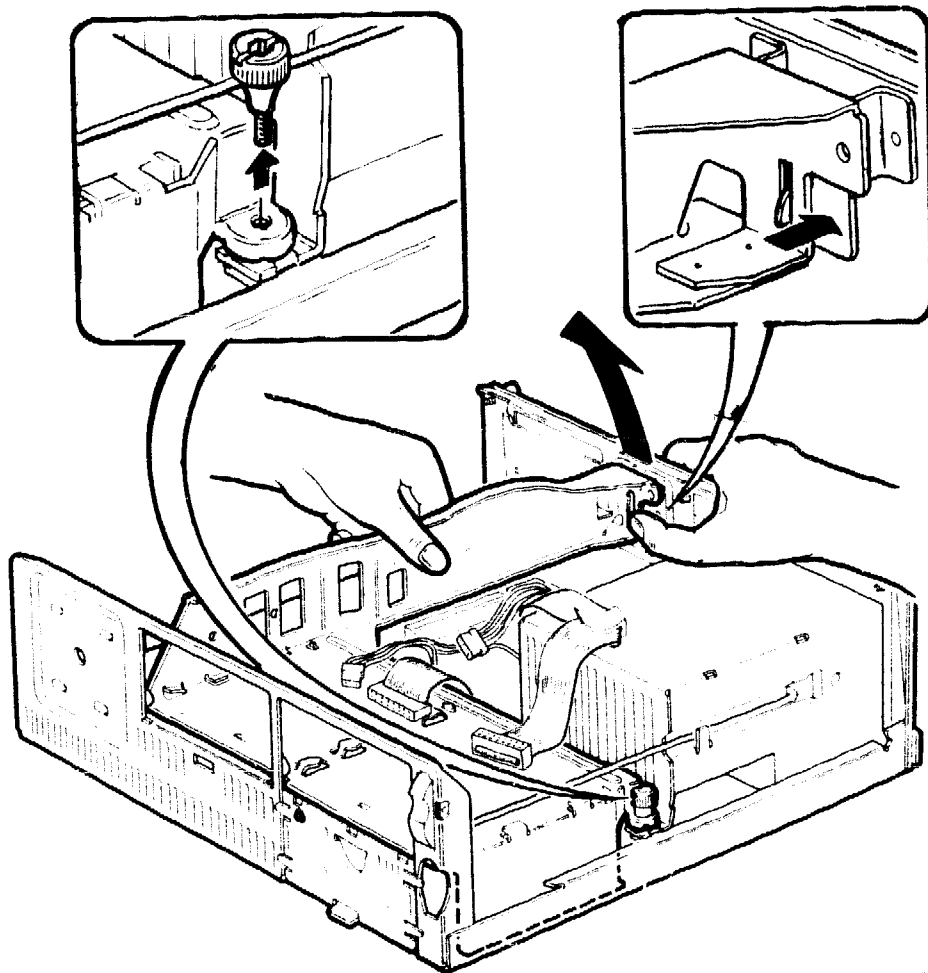
LJ-1687

Figure 5–11   Removing the Streaming Tape Drive

5.2.15 Hard Disk Replacement

Replace the hard disk as follows: (Figure 5–12)

1. Remove the top cover (Section 5.2.4).

2. Remove the floppy disk drive (Section 5.2.12).

3. Remove the bus expansion board (Section 5.2.11).

4. Remove the bus adapter board.

5. Loosen the knob that secures the metal deck to the system.

6. Remove the deck by pressing the release tab, tilting up the rear of the deck slightly, and moving the deck to the rear. This clears the deck from the retaining tabs at the front of the chassis. Lift the deck away from the system.

7. Lift the release lever (Figure 5–9) and slide the drive out approximately one inch.

8. Disconnect the monitor power cable and signal cable from the main logic board.

9. Remove the cables from the hard disk.

10. Slide the drive out of the system.

11. Install the new drive by doing the following:

    • Slide it in partially.

    • Attach the montior power cable and signal cable to the drive.

    • Slide the drive in fully until it clicks into position.
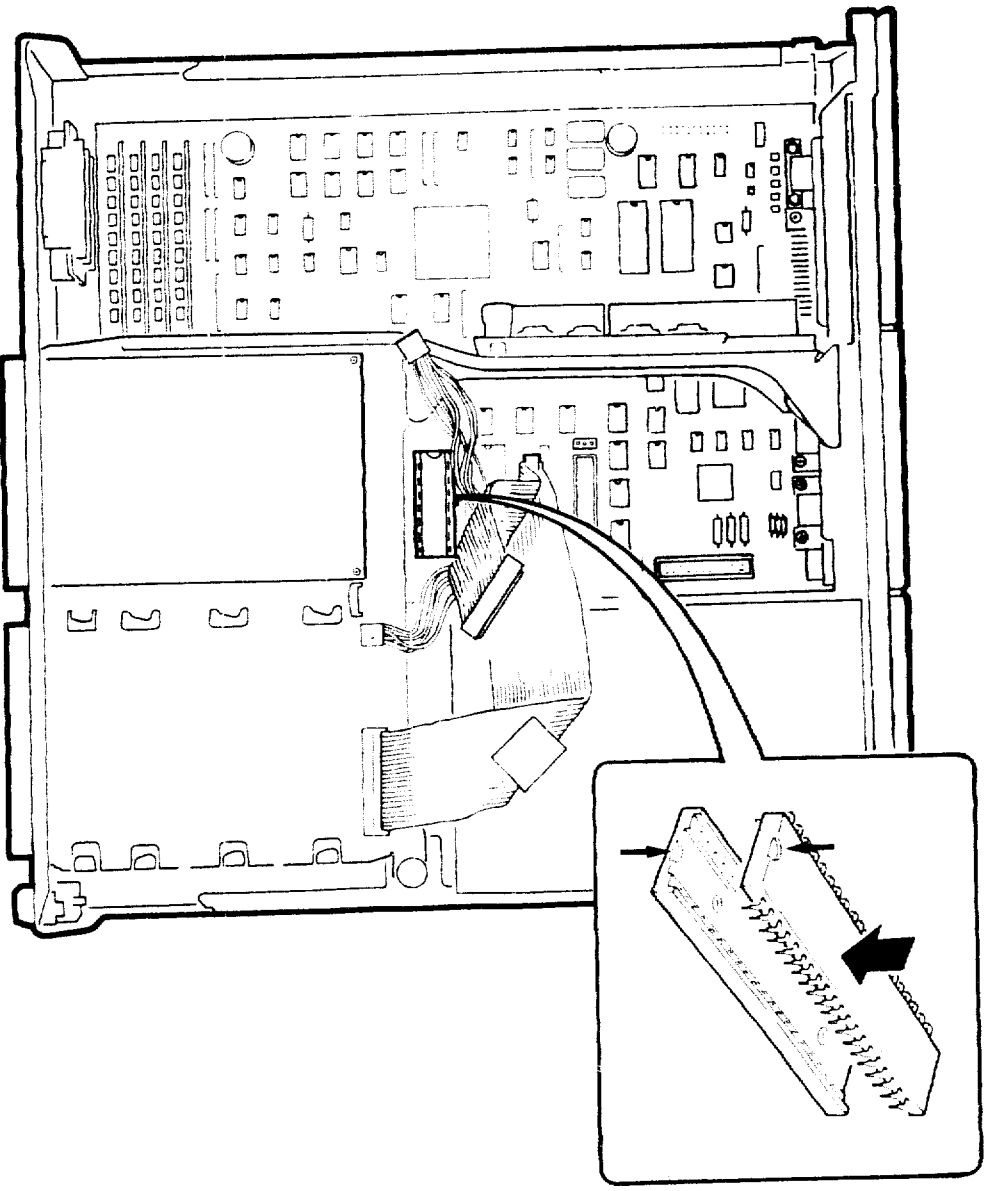
Figure 5-12   Removing the Hard Disk

LJ-1679

5.2.16   Power Supply Replacement

Replace the power supply as follows:

1. Remove the top cover of the system (Section 5.2.4).

2. Remove the floppy disk drive (Section 5.2.12) and streaming tape drive (Section 5.2.14) if present. If there is a second floppy disk drive, remove it also.

3. Remove any options installed on the bus adapter board.

4. Remove the bus adapter board.

5. Loosen the knob that secures the metal deck to the system.

6. Remove the deck by pressing the release tab, tilting up the rear of the deck slightly, and moving the deck to the rear. This clears the deck from the retaining tabs at the front of the chassis. Lift the deck away from the system (Figure 5–13).

7. Detach the power switch bar by lifting it over the guide tab and pulling the end of the bar straight out of the switch that is mounted in the side of the power supply.

8. Slide the signal cable out of the retaining clip located on top of the power supply.

9. Remove the six-wire and five-wire power supply cable from the twelve-pin connector at location J1 on the main logic board (Figure 5–13).

10. Remove the power cable to all the magnetic peripherals.

11. Tilt the front of the power supply upwards, disengage the tabs from the slots in the chassis, and lift the power supply out of the system module (Figure 5–13).

12. Install the new power supply.

    WARNING
    Make sure the power supply does not interfere with the power switch bar and the chassis.

13. Re-install the metal deck.

14. Re-install the remaining drive(s) and connect the cables. Insert the signal cable in the retaining clip on the power supply.

15. Re-install the adapter board and any options.

When the replacement is complete, set the power switch to 1. After the power-up diagnostics are complete, run the system test on the Utilities diskette.
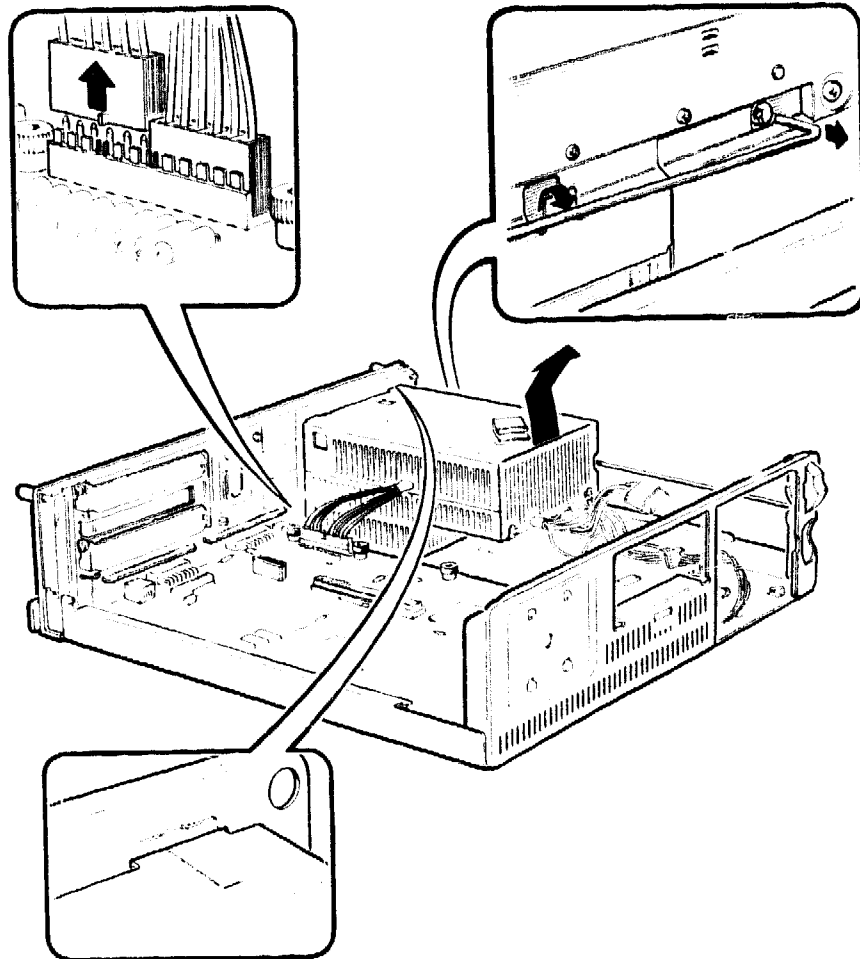
Figure 5-13   Removing the Power Supply

5.2.17 Main Logic Board Replacement

Replace the main logic board as follows: (Figure 5–14)

1. Follow steps 1 through 6 in Section 5.2.16, Power Supply
    Replacement. It is not necessary to remove the hard disk drive or
    power supply.

2. Remove the math coprocessor, if there is one (Section 5.2.13). The
    math coprocessor must be transferred to the new main logic board.

3. Remove all memory SIMMs from the main logic board and install
    them in the new main logic board (Section 5.2.5).

4. Remove all cables from the main logic board.

5. Remove the nine thumbwheels that secure the main logic board to the
    system.

6. Remove the main logic board by lifting the front at roughly a 30<°
    angle and sliding it out of the back panel.

7. Install the new main logic board. Make sure all jumpers are correctly
    in place. See Appendix A.

8. Enter new configuration information in the built-in SETUP Utility.
    (When you restore power to the system after replacing the main logic
    board, the system automatically activates the built-in SETUP Utility.
    To use this utility, see Section 2.4.1, Using the Built-in Setup Utility.
    The built-in SETUP Utility prompts you for time, day, and year. It
    also prompts you for hard disk, floppy disk, and video configuration
    information. The information you enter is stored in CMOS.

9. Use the Service Diagnostics diskette to run the following:

    •   The System Configuration Check

    •   The SETUP Utility

    •   The Test One Module utility
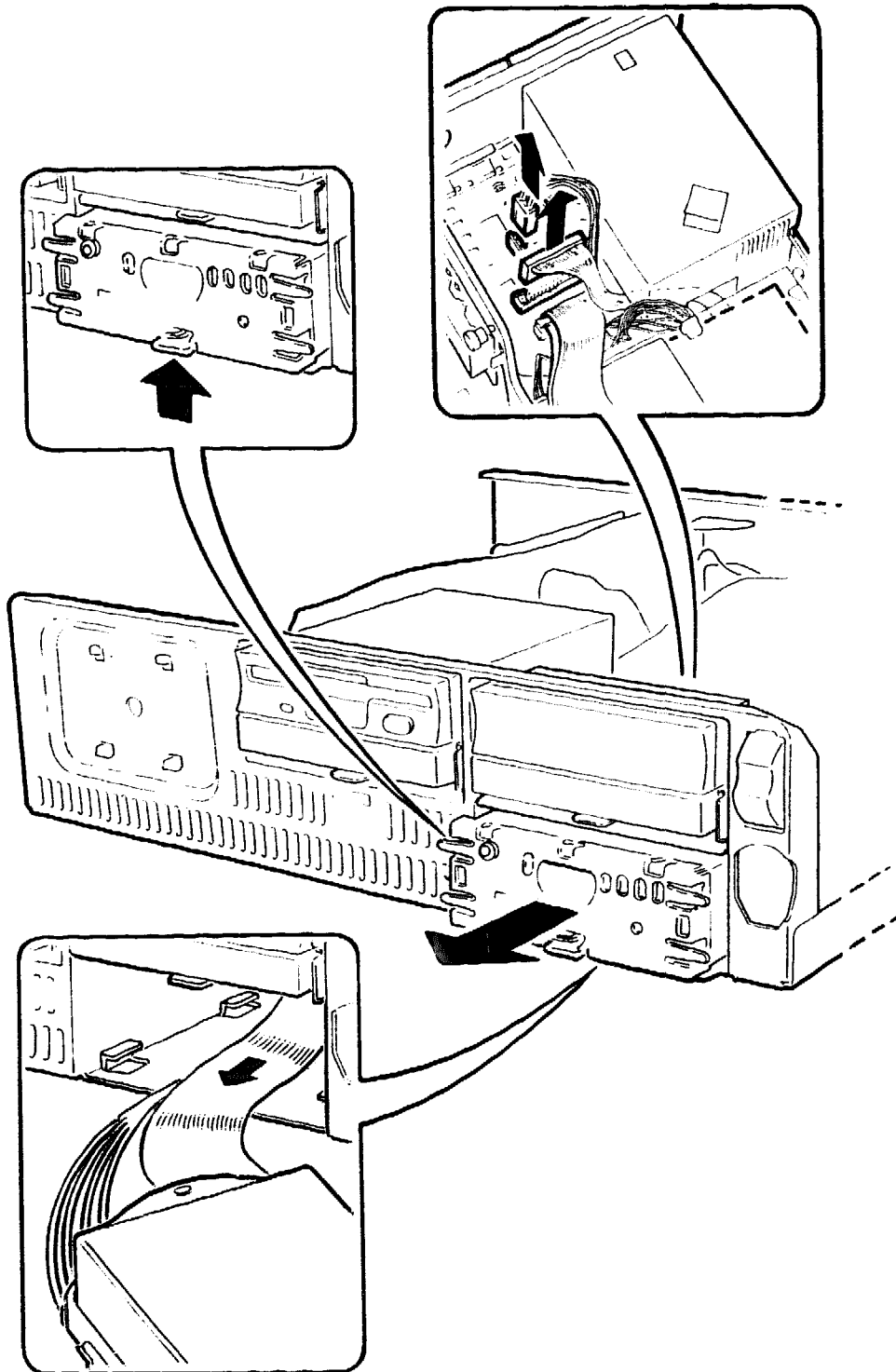
LJ-1681

Figure 5–14   Removing the Main Logic Board

APPENDIX A

A
Jumpers and Switches

This appendix shows the location and describes the function of the jumpers and switches on the following DECstation 200 items:

- Main logic board

- Memory board

- Asynchronous serial interface board

- Multiport board

- DEPCA Board

A.1   Main Logic Board Jumpers

There are five jumpers on the DECstation 200 main logic board
(Figure A–1). The jumper functions are as follows:

* Jumper P8 is for the system battery. It is always installed.

* Jumper P6 determines if the hard disk drive has a capacity of 20
  Mbytes or 40 Mbytes:

    20 Mbyte = plug installed on middle pin and pin nearest the *rear*
    of the system (P6).
    40 Mbyte = plug installed on middle pin and pin nearest the *front*
    of the system (P6).

  CAUTION
  **There is a new 20 Mbyte hard disk drive for the DECstation
  200. It is configured as a 40 Mbyte hard disk. The only way
  to identify the new hard disk from the old hard disk is by the
  part numbers. The part number for the new 20 Mbyte hard
  disk is 30-31830-01 REV B01.**

* Jumpers P1 and P2 select the active memory banks as shown in the
  following table:

P1	P2	SIMM Type	Banks Used	Number of SIMMs	Total Memory
installed	removed	512 Kbytes	Bank 0 only	2	1 Mbyte
removed	removed	512 Kbytes	Banks 0 and 1	4	2 Mbytes
installed	installed	1 Mbyte	Bank 0 only	2	2 Mbytes
removed	installed	Configuration not used			

A.2   Asynchronous Serial Interface Board

The switch settings for the asynchronous serial interface board are shown
in Figure A–2.
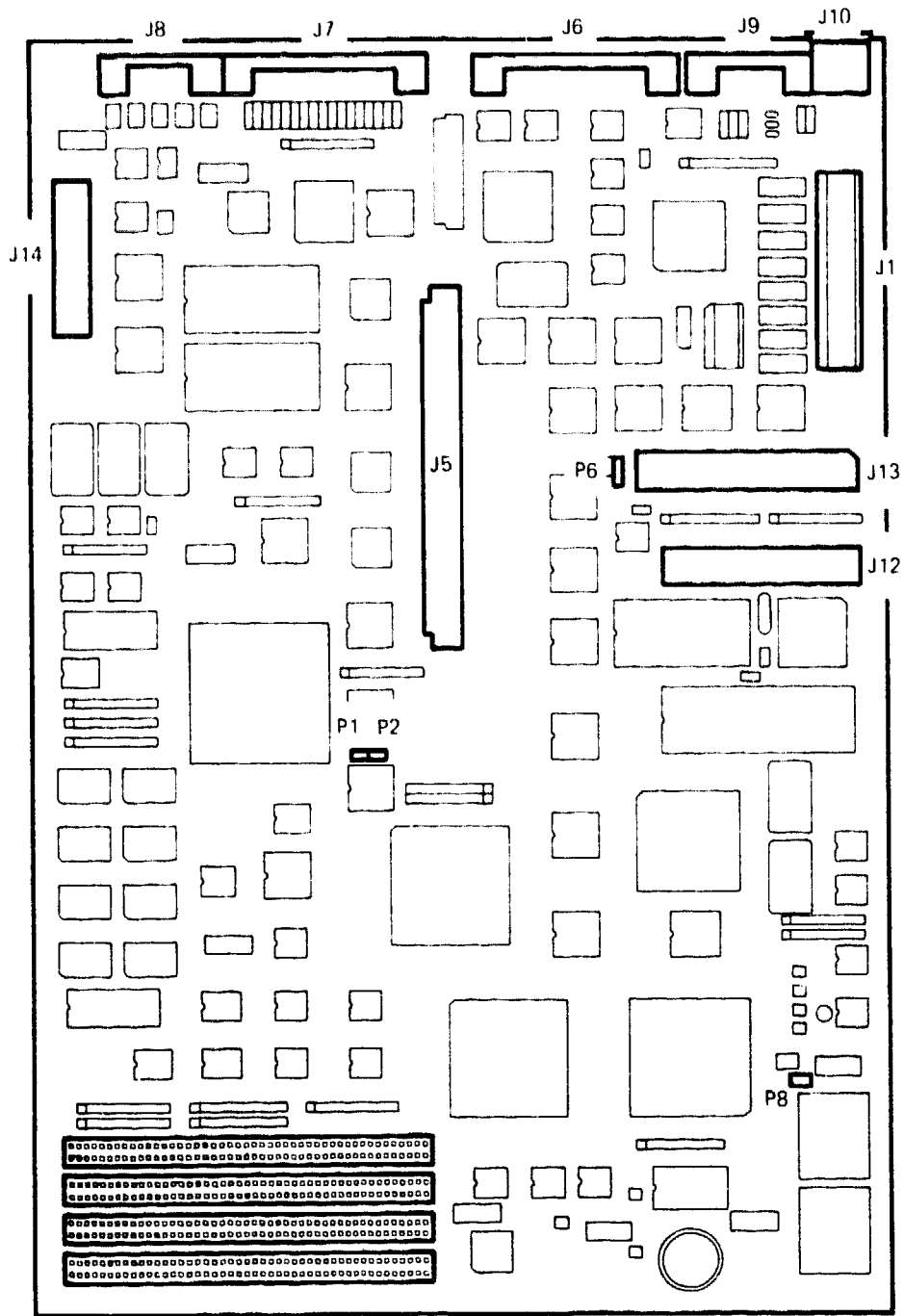
LJ-1685

Figure A–1   Location of Jumpers on Main Logic Board
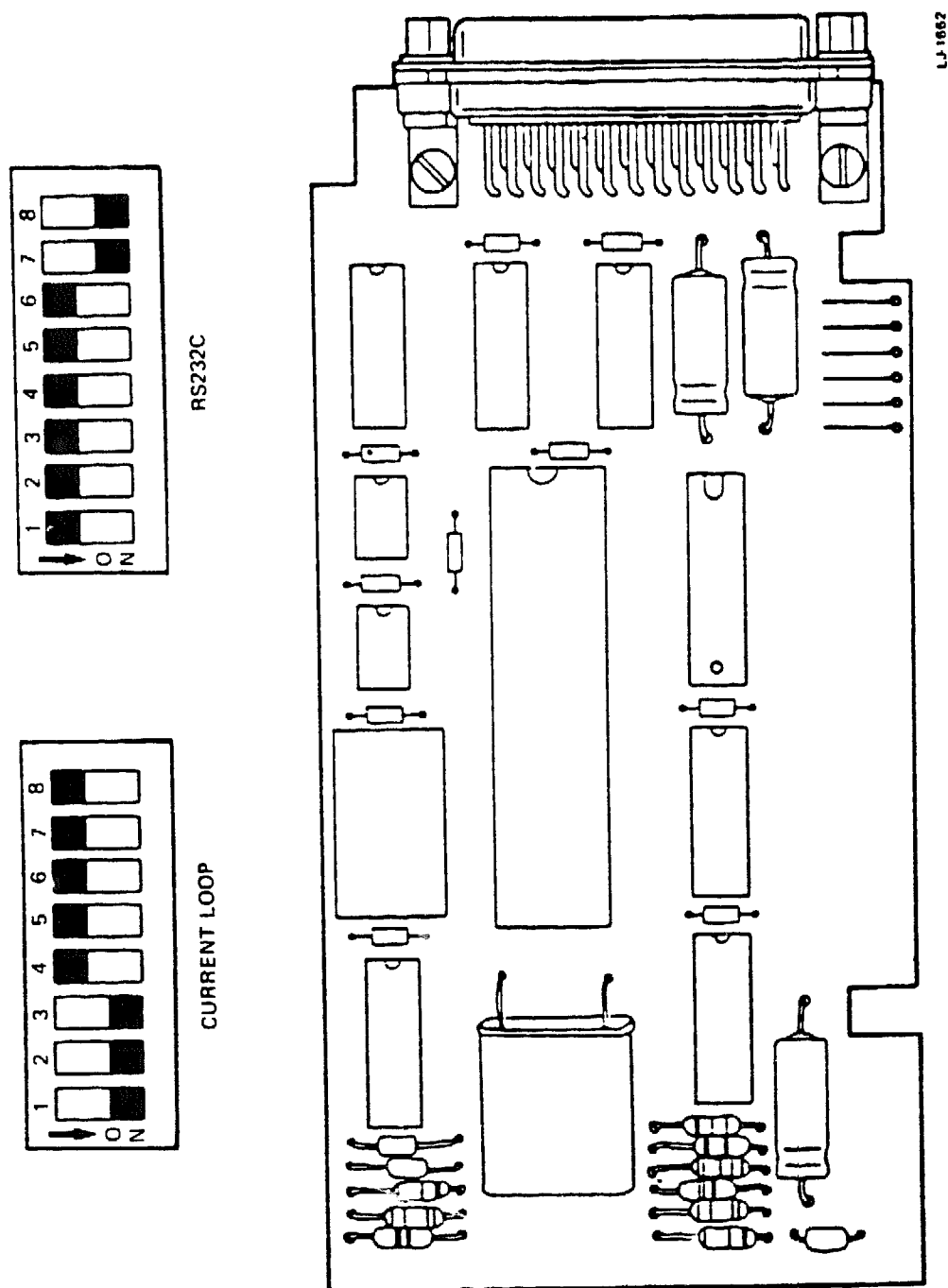
Figure A-2 Asynchronous Serial Interace Board Switches

A.3 Multiport Board

The following is a list of three switches, their settings, and their corresponding interrupt requests on the multiport board (Figure A–3).

SW1 settings and interrupt request functions in the ON position:

Setting 1	IRQ2
Setting 2	IRQ3
Setting 3	IRQ4

SW2 settings and interrupt request functions in the ON position:

Setting 1	IRQ5
Setting 2	IRQ6
Setting 3	IRQ7

SW3 settings determine the board operating mode (compatible or expanded) and the I/O addresses to which the board responds.

A.4 DEPCA Board Jumpers W1 and W2

Set the DEPCA board jumpers on pins W1 and W2 (Figure A–4). W1 selects IRQ2 as the default mouse setting. W2 selects IRQ3 as the default network setting. Make sure the jumper for W1 is connected to the top and middle pins. Make sure the jumper for W2 is connected to the middle and bottom pins.

NOTE
The DEPCA board used in this system is a DEPCB board. It is equivalent to a DEPCA REV S3 board. For all DEPCA settings refer to the DEPCA Service Guide.
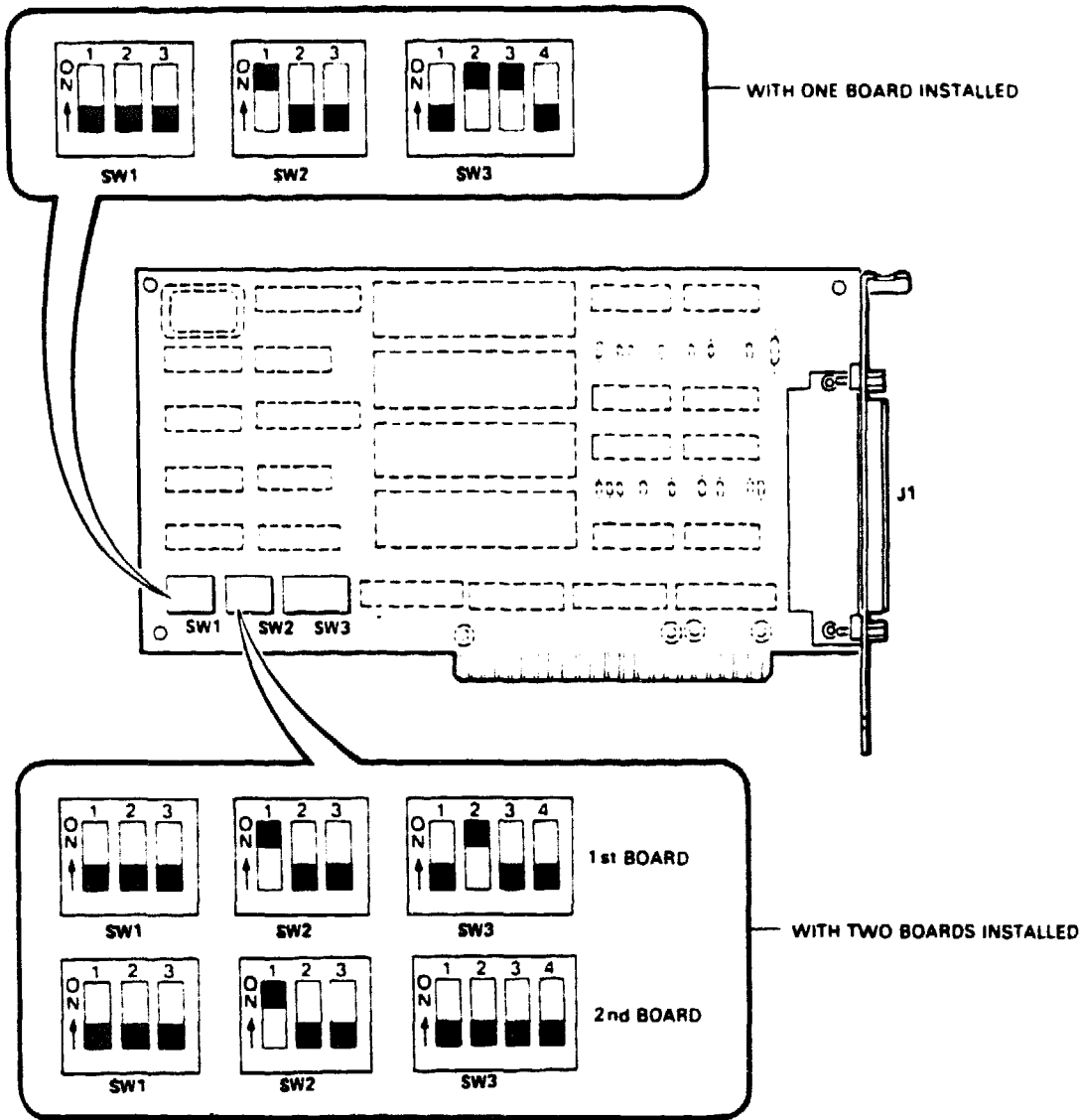
Figure A-3   Multiport Board Switches

W9 through W14

W16

W15

CONNECTOR FOR AUI (J4)

GOLD PLATED
EDGE CONNECTOR
FINGERS (J2)

W17

W1 through W5

W6   W7   W8

LL-1092
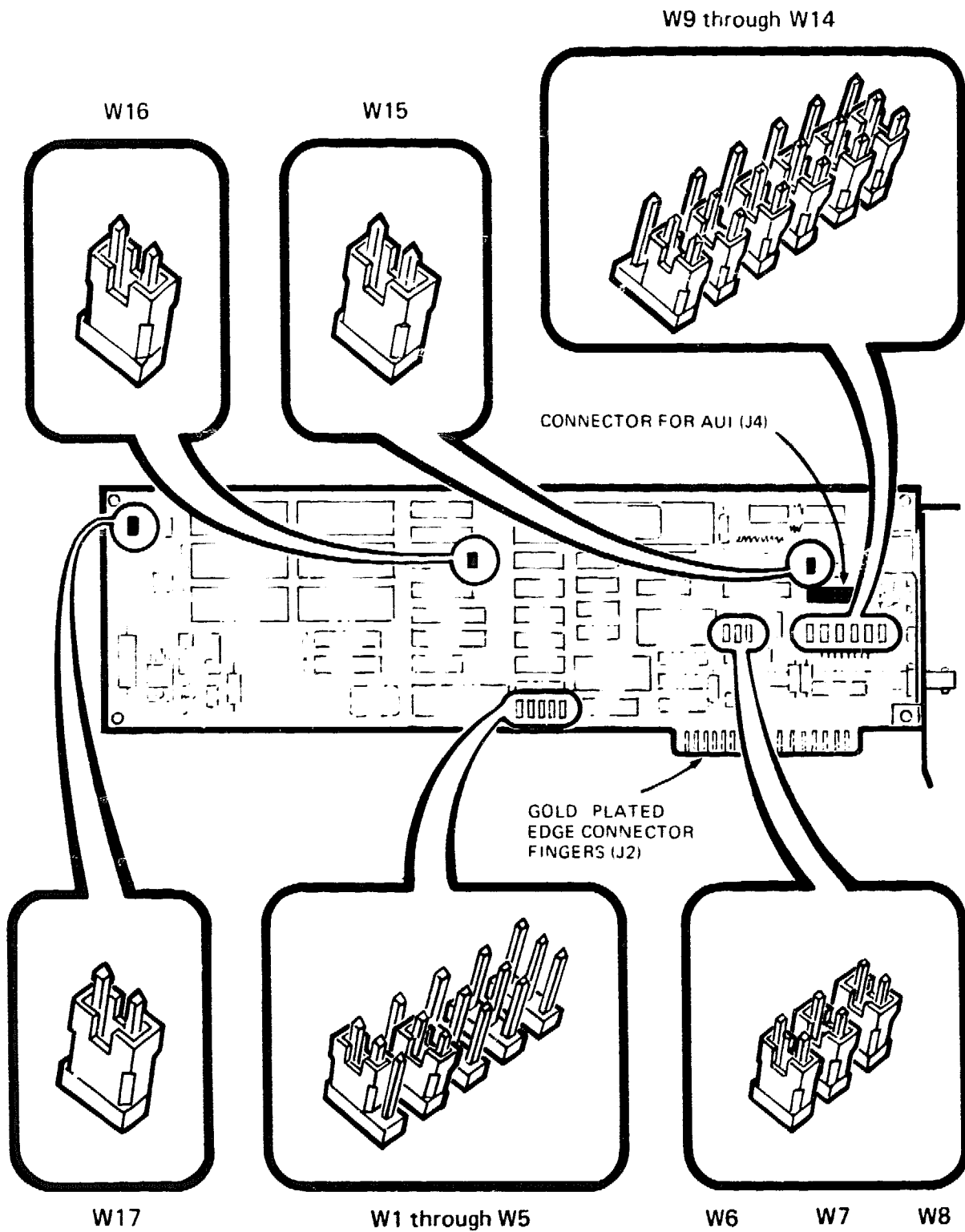
Figure A–4   DEPCA Board Settings

APPENDIX B

B
Interrupt Requests

This appendix describes the function of each interrupt request line within the DECstation 200.

When an interrupt request line is enabled the system automatically interrupts the current process and then processes the event that caused the interrupt. When the interrupt has been processed the system returns to the point were the original process was interrupted. The interrupt controller can handle up to 16 maskable interrupt request lines. Only 15 interrupt lines are available because IRQ2 is used by the controller hardware.

The following table lists all the interrupt request lines available, a priority level the CPU assigns to each interrupt line, and a functional description of each interrupt line.

NOTE
An interrupt line with a priority level one has a higher priority level to the system than an interrupt line with a priority level 17.

IRQ Line	Priority Level	Description of Interrupt Request
NMI[1]	1	Parity error in the on-board RAM, or external device
IRQ0	2	Channel 0 of the intergrated timer chip
IRQ1	3	Keyboard controller
IRQ2	4	Second interrupt controller. Not available externally
IRQ3	13	Reserved for optional boards (DEPCA) or serial interface board 2
IRQ4	14	Serial interface board 1
IRQ5	15	Reserved for optional boards (DEPCA mouse) or parallel interface board 2
IRQ6	16	Floppy disk drive controller
IRQ7	17	Parallel interface board 1
IRQ8	5	Real time clock
IRQ9	6	Reserved for option boards
IRQ10	7	Reserved for option boards
IRQ11	8	Reserved for option boards
IRQ12	9	Reserved for option boards
IRQ13	10	80287 math coprocessor
IRQ14	11	Hard disk drive controller
IRQ15	12	Reserved for option boards

[1]NMI stands for non-maskable interrupt.

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DISKLESS
INFO

1 DECstation 200 Diskless Information

1.1 Product Description

The DECstation 200 Diskless system (PC611-A2/A3) has the same specifications as the DECstation 200 system (PC610-A2/A3), except that the PC611 is delivered without a hard disk or floppy disk.

1.2 Troubleshooting

The ROM resident "Power on Diagnostics" can be used to debug almost all the hardware related problems on the PC611 diskless system. If further troubleshooting procedures are necessary, the appropriate software programs can be loaded from a specifically installed 3.5" 1.44 Mbyte floppy disk.

The floppy disk and special cable spare part numbers are:

Micro floppy disk 3.5" 1.44 Mbyte	30-31834-01
Floppy disk unit flat ribbon cable	29-27672-01

Use the following procedure to install the floppy disk:

1. Turn power to the system off.

2. Remove the cover (see Section 5.2.4 in the DECstation 200 manual).

3. Remove the left hand blanking plate by lifting the release lever.

4. Plug the floppy disk flat ribbon cable into the J12 connector on the processor board.

5. Insert the floppy disk unit partially into the cabinet.

6. Connect the power and signal cables to the floppy disk unit. The connector at the end of the shorter length of the ribbon cable must be inserted into the floppy disk unit.

7. Slide the floppy disk unit completely into the cabinet.

DECstation 220
MAINT ADVISORY

DECstation 220 Maintenance Advisory

Order Number EK-PC640-MA-001

Digital Equipment Corporation

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Contents

Figures

Tables

1 Overview

The Maintenance Advisory has been published to document the differences between the DECstation 200 (PC61x-A2/A3) and the DECstation 220 (PC64x-A2/A3).

The advisory must be used with the DECstation 200/220 Service Manual (order number EK-PC61A-SV-001).

The advisory identifies and details the essential physical, technical and functional differences between the DECstation 200 and the DECstation 220 so that the Field Service personnel have all necessary information in one manual.

Section 2 of the document tables product information and details standard configurations.

All technical and functional differences are detailed in Section 3.

Memory upgrades, jumper settings and other specific Field Service information is given in Section 4.

Section 5 lists the Options Part numbers for the product.

A list of Field Replaceable Units (FRU) and their part numbers are provided in Section 6.

Section 6 also includes an Illustrated Parts Breakdown providing descriptions and figure references for illustrations used in this manual.

The following documentation is specific to the DECstation 220 and must be read in conjunction with this document:

Table 1: DECstation 220 documents

Document	Part Numbers
Olivetti M250E Functional Checks Manual	ER-PC61A-DI-001
DECstation 200/220 Installation guide	ER-PC610-OM-001
DECstation 200/220 Technical Reference Manual	ER-PC61Y-AA-001
DECstation 220 addendum to DECstation 200 Service Guide, that is, the Maintenance Advisory	EK-PC640-MA-001
DECstation 200/220 service guide	EK-PC61A-SV-001

Reference should be made to the DECstation 200/220 Technical Reference Manual ER-PC61Y-AA-001 for further product details.

The following diagnostic software is available:

Table 2: Diagnostic Kit

Description	Part Numbers
DECstation 220 diagnostic disk	29-28226-01
Diagnostic kit (upgraded with the above)	22-00484-01 rev: B01

2 Product description

The DECstation 220 replaces the DECstation 200 as an upgraded version.

The DECstation 220 Personal computer is a low range, desk-top system based on the Intel, 12 MHZ 80286 processor and with a 16-bit data bus. The system is AT compatible.

The DECstation 220 comprises three major parts: a system box, a keyboard and a display.

The system box houses a motherboard, a power supply unit, a 3.5" Floppy Disk Unit (FDU), a 3.5" intelligent Hard Disk Unit (HDU) and a bus adapter which provides space for three industry standard AT compatible expansion cards.

The motherboard can accommodate 1, 2 or 4 MB of memory. Installable expansions include memory boards (expansion details can be referenced in Section 4), hard disk drive and streaming tape.

The keyboard has a standard AT-type layout.

The display unit is a VGA type monitor, positive monochrome or colour, with maximum resolution of 640x480.

3 Functional and Technical upgrades

3.1 Functional differences.

The main functional differences between the DECstation 200 and the DEC-station 220 are listed below:

- Clock speed is 12MHZ instead of 8MHZ on the DECstation 200

- Memory access time is 80ns instead of 120ns which means that a new type of memory has been implemented.

- A new Processor chip set has been implemented.

- No memory parity circuitry is implemented on the processor board

- No keylock to disable the use of the machine.

3.2 Technical differences

The following table details the technical differences between the two DECstations:

Table 3:   Technical Differences

FIELD	DECstation220	DECstation200
PROCESSOR BOARD:		
- Clock speed	12 MHZ	8 MHZ
- Memory Parity cicuitry	None	Present
- Rechargeable battery	1 Cell of 3.6 volts	2 cells of 3.6 volts
- Serial interface	Input threshold adjustable with jumper P15	No adjustment
PROCESSOR BOARD MEMORY:		
- Access time	80 ns	120 ns
- First MB of memory	Soldered	SIMM - Installable
- Upgrade	up to 4MB	Up to 2MB
CONNECTORS AND MECHANICS:		
- Keyboard connector	6 pin mini-din (reference Figure 2)	9 pin D keyboard connector
- Lock device and key	None	Present

The processor board is detailed in Section 4.

4 Service Procedure changes

Regarding Troubleshooting, FRU removal and replacement, no major changes have been introduced. The following nominal changes are detailed below.

4.1 Processor Memory upgrade

The processor memory can be upgraded as follows:

Table 4:   Memory Upgrades

Configuration	Soldered memory	Position 1	Position 2	Position 3	Position 4
1MB	1MB				
2MB	1MB	SIMM 512K	SIMM 512K		
4MB	1MB	SIMM 512K	SIMM 512K	SIMM 1MB	SIMM 1MB

Note

Make sure that you are installing the right SIMM modules and respect the above procedure. Reference the part numbers in Section 6.

Note

After having installed the SIMM module, set the processor board jumpers P1 and P2 as illustrated in the Figure below.

5

4.2 Jumpers and switches

The following Processor board jumpers settings must be respected:

Table 5: Jumper settings

Element	Jumper	Positions	Configuration	Comments
RAM	P1 P2	OFF ON	1MB	default
		CENTRAL	2MB	
		ON OFF	4MB	
HDU Type	P6	1:1	40MB Hard Disk	
		3:1	20MB Hard Disk(*)	
BATTERY	P8	ON	With battery inserted	default
VGA	P12	1-2	VGA on board enabled	default
		2-3	VGA on board disabled	

Note

CAUTION: There is a new 20MB hard disk drive for the
DECstation 220. It is configured as a 40MB hard disk. The
only way to identify the new hard disk is by part number. The
part number for the new hard disk is 30-31830-01 rev.B01

Figure 1: DECstation 220 processor board & Jumpers

ON - BOARD RAM

1M   2M   4M

HDU TYPE

1:1   3:1

VGA
ON-BOARD

ENABLED   DISABLED

P12

P6

P2
P1

80287
SOCKET

1 2 3 4

SOCKET FOR
FDU EXTERNAL
OSCILLATOR

BGS6A

P8

BATTERY

ON   OFF

JUMPER IN
JUMPER OUT
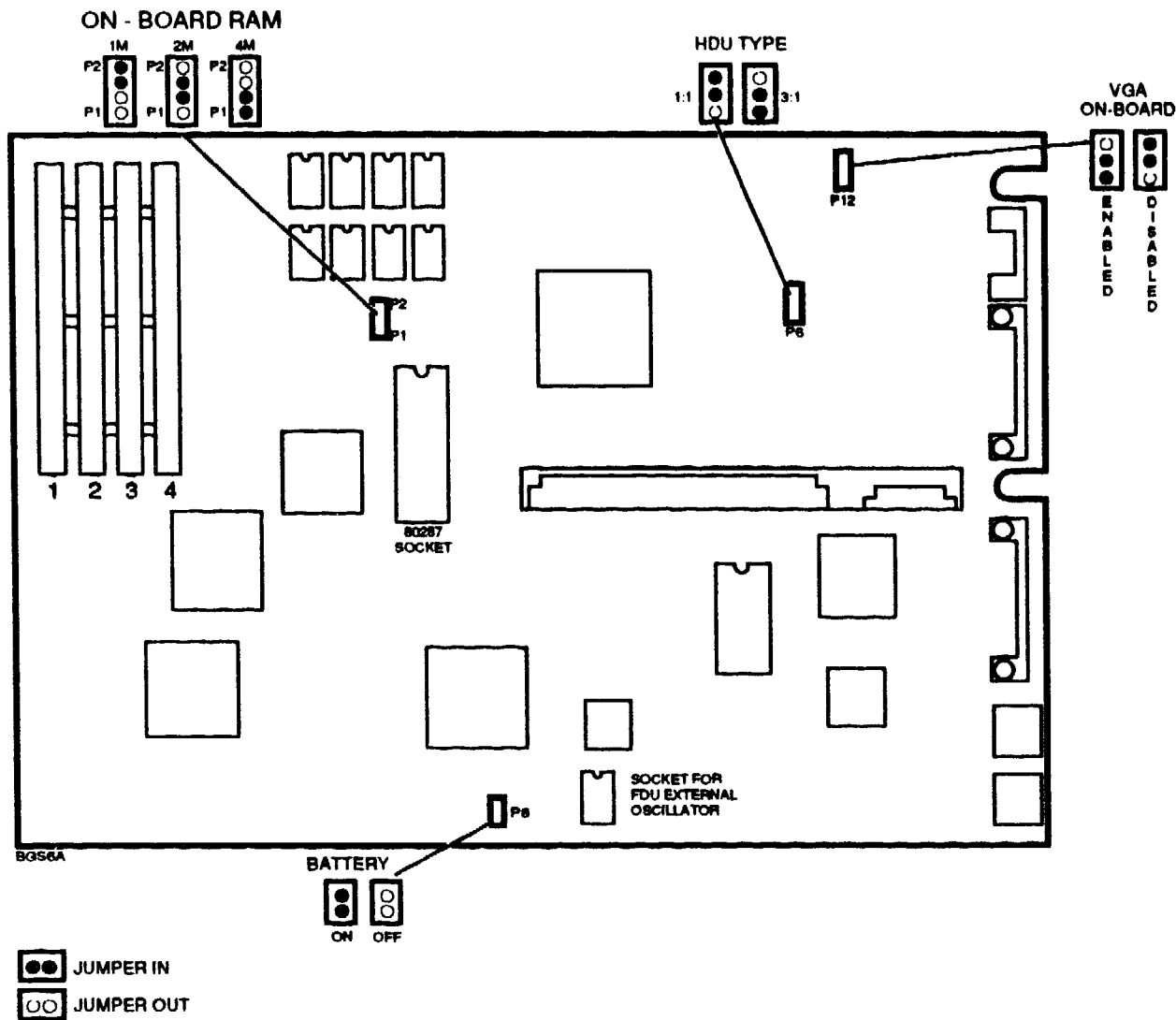
Figure 2: Keyboard Connector

MINI DIN

FEDCBA
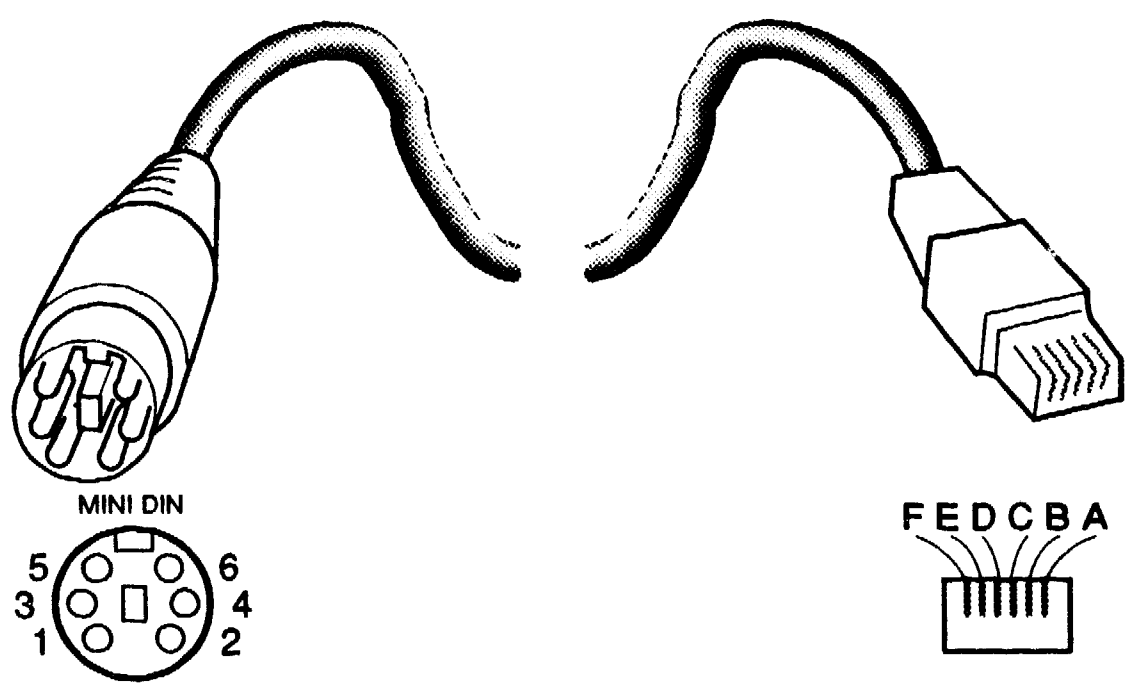
Pin	Description	Pin
1	Transmit/Receive Data	B
2	not connected	
3	Ground	C
4	+5V	E
5	Clock	D
6	not connected	

5 Options Part Numbers

Table 6: Available configurations

Model	Power	Configuration
PC640-A2	120Vac 60Hz	80286/12MHZ, 1MB RAM, Keyboard Cable, VGA, 3.5" 1.44MB FDU Controller, Keyboard, Mouse, Parallel and Serial ports, Pentalingual starter kit
PC640-A3	220/240Vac 50Hz	same as above
PC641-A2	120Vac	80286/12MHZ, 1MB RAM, Keyboard Cable, VGA, FDU Controller, Daisy Chain FDU cable, Keyboard, Mouse, Parallel and Serial ports, Pentalingual starter kit
PC641-A3	220/240Vac	Same as above
PC645-A2	120Vac 60Hz	80286/12MHZ, 1MB RAM, Keyboard Cable, VGA, 3.5" 1.44MB FDU and Controller,Keyboard, Mouse, Parallel and Serial ports , Pentalingual starter kit, 20MB Hard Disk
PC645-A3	220/240Vac 50Hz	same as above
PC646-A2	120Vac 60Hz	80286/12MHZ, 1MB RAM, Keyboard Cable, VGA, 3.5" 1.44MB FDU and Controller,Keyboard, Mouse, Paral'·l and Serial ports , Pentalingual starter kit, 40MB Hard Disk
PC646-A3	120Vac 60Hz	same as above

Table 7: DECstation 220 Unique Options

Model	Configuration
PC64M-BA	1MB upgrade to Processor Board, increases memory to 2MB
PC64M-BB	2MB upgrade to Processor Board, increases memory to 4MB
PC64M-AA	Memory Expansion Board with 2MB, expandable to 4MB
PC64M-AB	2MB upgrade option for expansion board
PC64R-AA	Additional (second) 1.44MB Floppy Disk Unit
PC64R-BA	20MB Hard Disk Drive option
PC64R-CA	40MB Hard Disk Drive option
PC64T-AA	40MB Streamer Tape Drive
PC64S-AA	2 Button Mouse (IBM PS/2 Compatible)
PC64Y-AA	DECstation 200/220 Tecnical Reference Manual

6 DECstation 220 Spare Parts List (FRU)

The following parts are identified as FRU:

Table 8: Recommended Spares List

	Digital Part Number	Description
	19-31800-01	80287 COPROCESSOR - 8 MHZ
	20-31795-01	G0518 MEM.EXPAN.BOARD 2MB
#	29-28156-01	BA241 PROCESSOR P ᴗARD 1MB
	29-27745-01	POWER SUP. ASS. 120ᵛ ᵛ ALI PS07/B
	29-27660-01	POWER SUP. ASS. 220V ALI PS07/B
#	29-28223-01	SIMM 1MBx9 80ns. - NR1
#	29-28224-01	SIMM 512Kx9 80ns. - NR.1
#	29-28157-01	BUS ADAPTER IN118
	30-31750-01	MOUSE PS2 COMPATIBLE
	30-31830-01	HDU 20MB 3.5"
	30-31849-01	HDU 3.5" 40MB
	30-31834-01	MFD 3.5" 1.44MB
	30-31833-01	STU 3.5" 40MB
#	29-28226-01	DECSTATION 220 DIAGNOSTIC

Note

Parts marked # are DECstation 220 specific.

Parts marked @ are common to DECstation 220 and DECstation 300.

Table 9: Extended Spare Parts List

	Digital Part Number	Description
	29-27668-01	STU 40MB 3.5" ACTUATIONS PCB
	29-27672-01	FDU-STU SIGNAL CABLE
@	29-28010-01	KEYBOARD CABLE
	29-27667-01	FAN WITH FIXING RUBBERS
	29-27669-01	SOCKET FOR POWER SUPPLY
	29-27670-01	PLUG FOR POWER SUPPLY 220V
	29-27685-01	BATTERY 3,6V
	29-27686-01	5V. 12V POWER CABLE
	29-27688-01	HDU LED CABLE
	29-27691-01	HDU CABLE KIT
	29-27693-01	NEUTRAL METAL SHIELD
	29-27694-01	ON/OFF SWITCH BAR
	29-27695-01	ON/OFF SWITCH COMMAND
	29-27696-01	BOARDS SUPPORT
	12-33398-01	COVER FIXING SCREW
	12-33399-01	SPACER
#	12-33397-01	PCB FIXING SCREW
#	29-28227-01	BACK PANEL 100/120V VERSION
#	29-27983-01	BACK PANEL 220/240V VERSION
	29-27981-01	FRONT PANEL
	29-27982-01	UPPER COVER
#	29-28225-01	KEY COVER

Note

Parts marked # are DECstation 220 specific.
Parts marked @ are common to DECstation 220 and DECstation 300

Table 10:   Common Modules - Recommended Spare Parts List

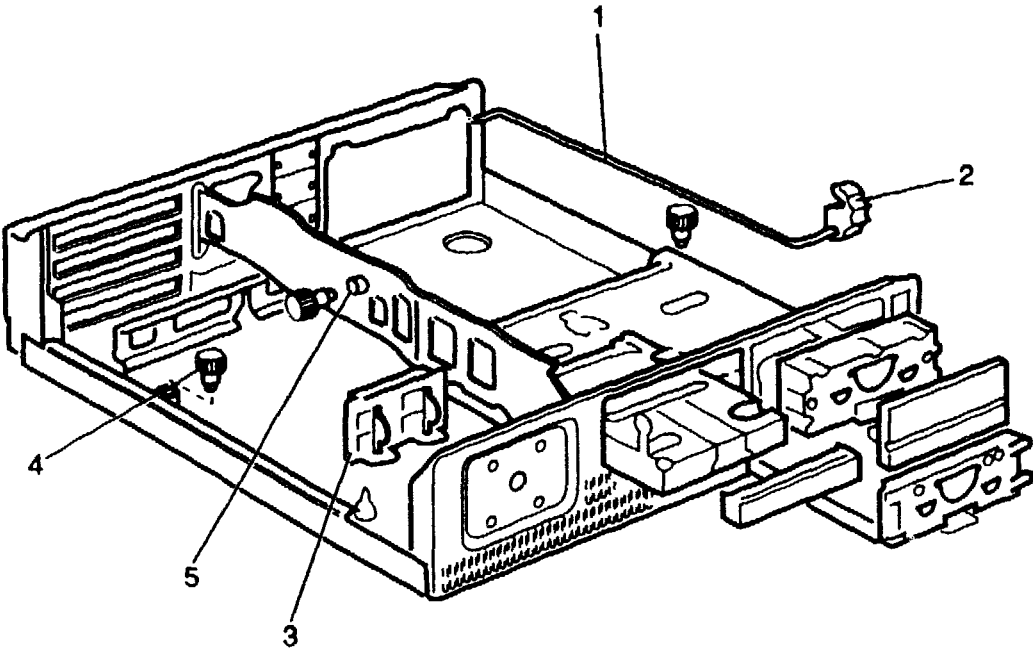| Digital Part Number	Description
20-31808-01	MULTIPORT SERIAL CARD
20-31809-01	SINGLE SERIAL PORT CARD
30-31826-01	KEYBOARD USA 101 KEY
30-31820-01	KEYBOARD ISRAEL 101 KEY
30-31823-01	KEYBOARD GREEK/LATIN 101 KEY
30-31827-01	KEYBOARD BELGIUM 102 KEY
30-31828-01	KEYBOARD DANISH 102 KEY
30-31829-01	KEYBOARD FINISH/SWEDISH 102 KEY
30-31835-01	KEYBOARD GERMAN 102 KEY
30-31836-01	KEYBOARD ITALIAN 102 KEY
30-31837-01	KEYBOARD SWISS FRE/GER 102 KEY
30-31838-01	KEYBOARD NORWEGIAN 102 KEY
30-31810-01	KEYBOARD FRENCH 102 KEY
30-31811-01	KEYBOARD SPAIN NATIONAL 102 KEY
30-31821-01	KEYBOARD PORTUGUESE 102 KEY
30-31822-01	KEYBOARD U.K. 102 KEY
30-31825-01	KEYBOARD SPAIN INTERNATIONAL 102 KEY
30-31812-01	12" MONOCHROME MONITOR 120V N.H.
30-31315-01	12" MONOCHROME MONITOR 220V N.H.
30-31814-01	12" MONOCHROME MONITOR 120V S.H.
30-31813-01	12" MONOCHROME MONITOR 220V S.H.
30-31816-01	14" COLOR MONITOR 120V N.H.
30-31819-01	14" COLOR MONITOR 220V N.H.
30-31818-01	14" COLOR MONITOR 120V S.H.

Table 11: Common Modules - continued

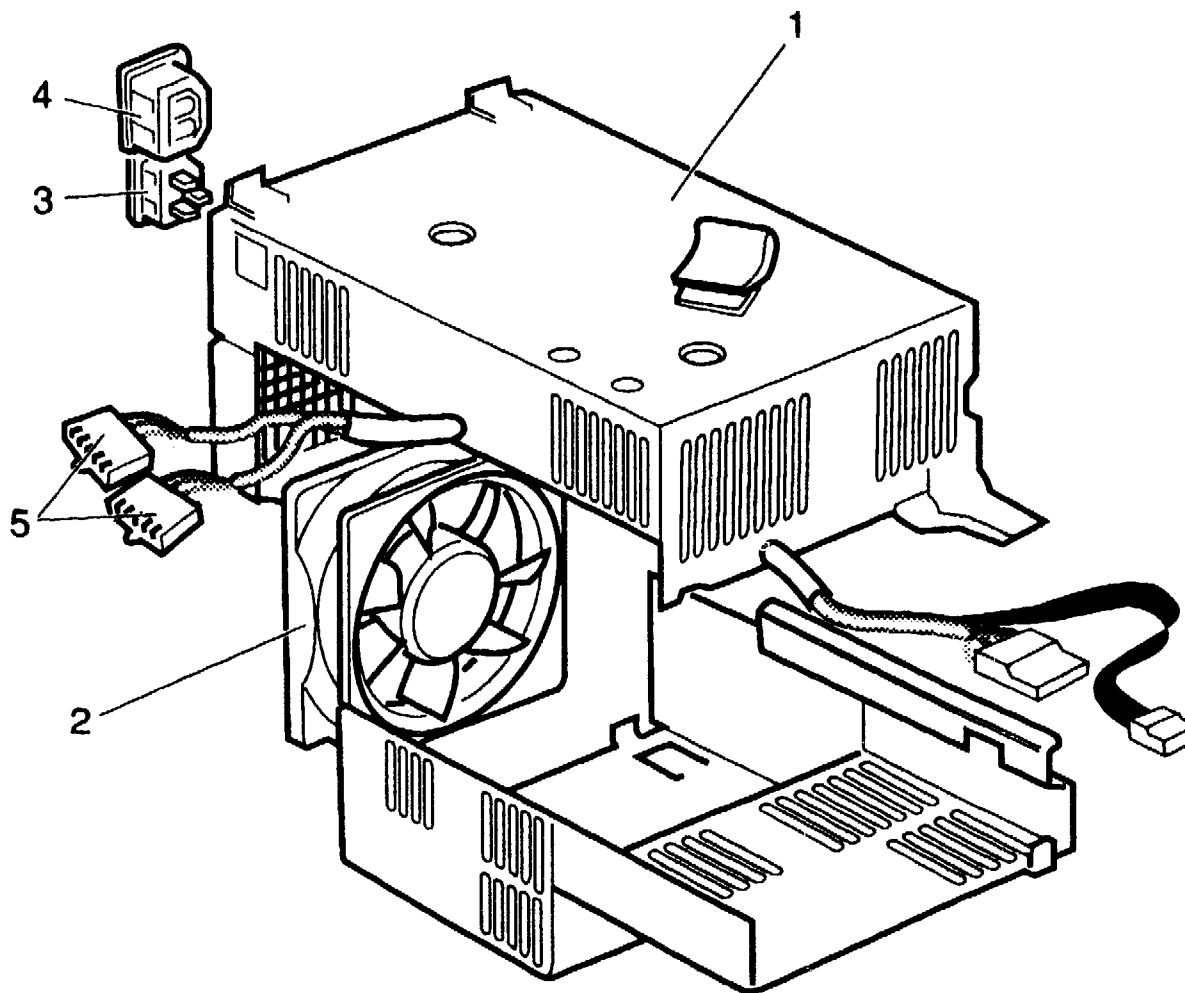| Digital Part Number	Description
30-31817-01	14" COLOR MONITOR 220V S.H.
22-00484-01	DIAGNOSTIC KIT
17-02467-01	SYSTEM BOX POWER CORD NORTH EUROPE
17-02468-01	SYSTEM BOX POWER CORD SWISS
17-02469-01	SYSTEM BOX POWER CORD UK
17-02470-01	SYSTEM BOX POWER CORD USA
17-02471-01	SYSTEM BOX POWER CORD AUSTRALIA

Figure 3: DECstation 220 Cover assembly
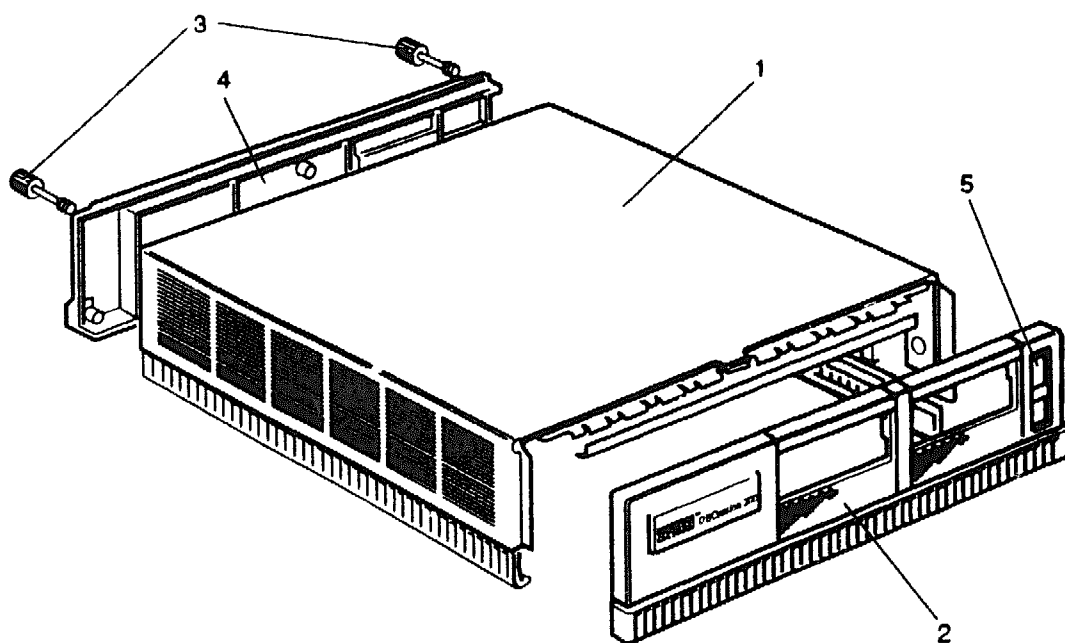
Reference	Part Numbers	Description
1	29-27982-01	Uppercover
2	29-27981-01	Front panel
3	12-33398-01	Cover fixing screw
4	29-27983-01	Back panel

Figure 4: DECstation 220 Internals

Reference	Part Numbers	Description
1	29-27694-01	On/Off Switch bar
2	29-27695-01	On/Off Switch
3	29-27696-01	Board Support
4	12-33397-01	PCB fixing screws
5	12-33399-01	Spacer

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Figure 5: Power Supply

Reference	Part Numbers	Description
1	29-27745-01	PSU 120V ALI PS07B
1	29-27660-01	PSU 220V ALI PS07B
2	29-27667-01.B01	Fan assembly
3	29-27669-01	Socket for PSU
4	29-27670-01	Plug for PSU. 220V
5	29-27686-01	5V/12V Power cable

Figure 6: Bus Adapter Board
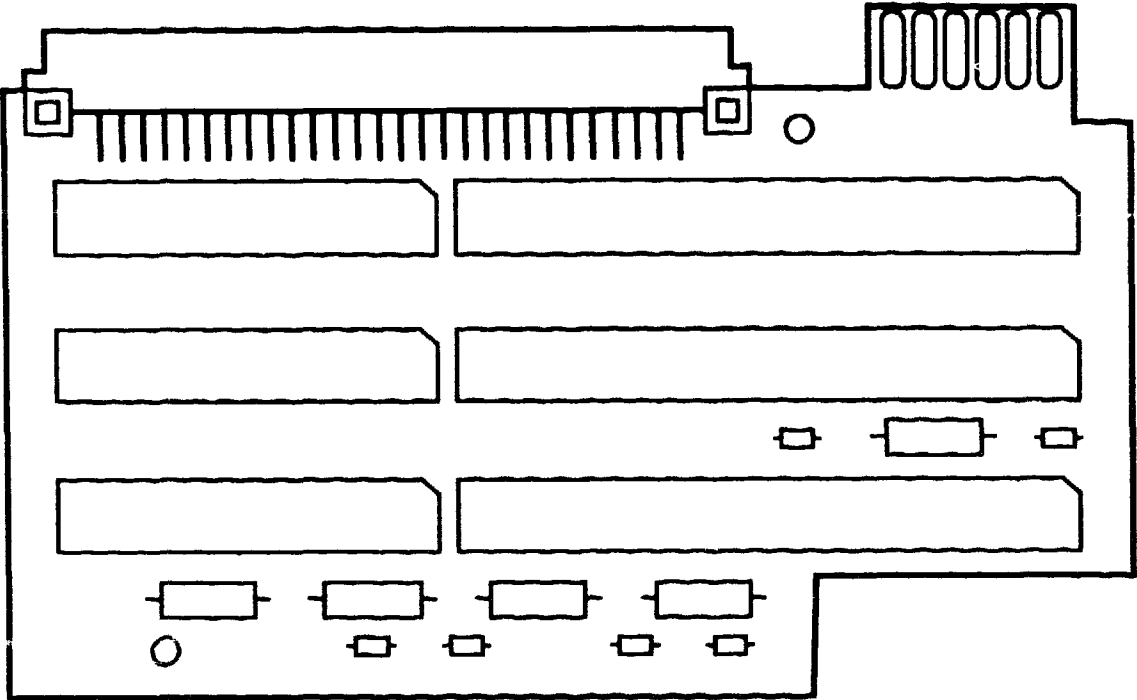
Reference	Part Numbers	Description
1	29-28157-01	Bus Adapter Board IN118

Figure 7: Cables
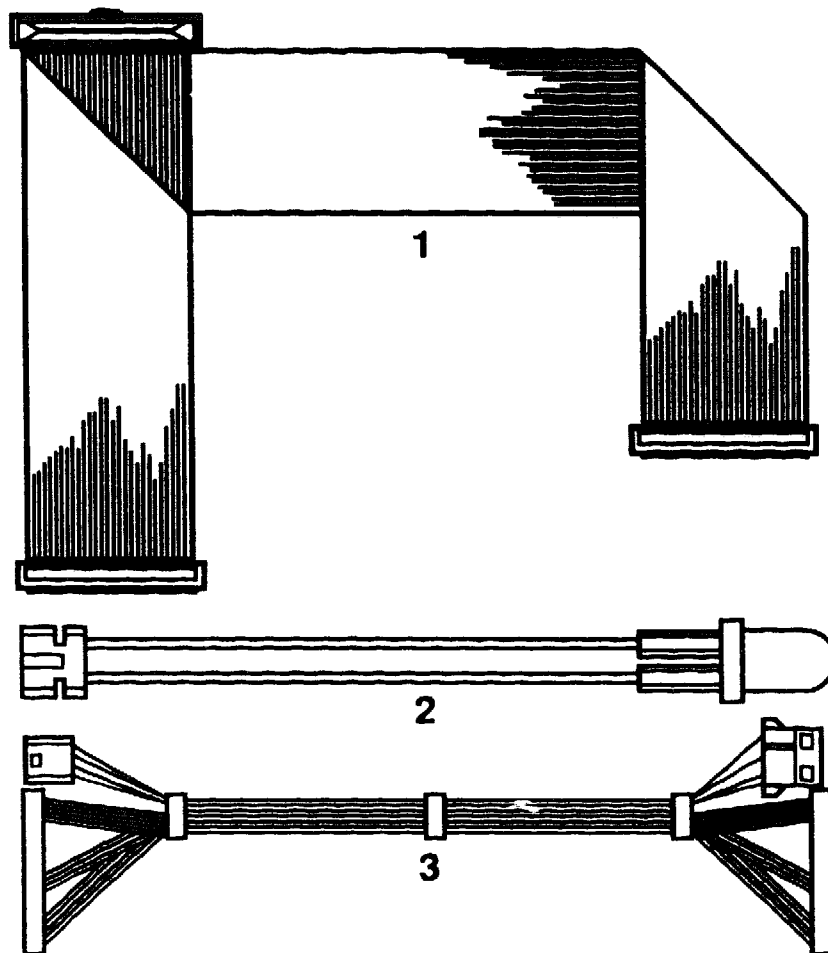
Reference	Part Numbers	Description
1	29-27672-01	FDU-STU Signal Cable
2	29-27688-01	HDU LED Cable
3	29-27691-01	HDU Cable Kit