DECpc™ 400ST Series

User's Guide

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Digital Equipment Corporation
Maynard, Massachusetts

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DECpc 400ST Series User's Guide

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The FCC wants you to know...

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 35 of the FCC rules. These limits are designed to provide reasonable protection against interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, can cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Connect the computer into an outlet on a circuit different from that to which the receiver is connected.
- Move the cables connected to the computer to minimize the interference.
- Tighten all screws on cables and the computer housing.
- Install blank panels, originally supplied with the computer, in all unused card slots.

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 U.S. Government Printing Office, Washington, D.C., 20402. Stock No. 004-00398-5.

CAUTION

Any changes or modifications not expressly approved by the grantee of this device can void the user's authority to operate the equipment.

NOTE

If a Class A device is installed within this computer, then the computer is to be considered a Class A computer.

To maintain the Class B limit on this computer product, only peripherals (computer input/output devices, terminals, printers) that comply with the Class B limits may be attached. Operation with non-compliant peripherals is likely to result in interference to radio and TV reception.

This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This digital apparatus does not exceed the Class B limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications.

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This equipment is in the 2nd Class category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential area.

When used near a radio or TV receiver, it may become the cause of radio interference.

Read the instructions for correct handling.

This equipment meets or exceeds requirements for safety in the U.S. (UL 1950), Canada (CSA C22.2 No. 950), and Europe (EN 60950/IEC 950) with Nordic requirements

This equipment meets or exceeds the ergonomic requirements of ZH1/618 and is certified to bear the GS mark by TUV Rheinland of N.A.

This equipment has been tested for radio frequency emissions and has been verified to meet VDE 0871 Class B

Bescheinigung des Herstellers/Importeurs

Hiermit wird bescheinigt, daß der/die/das DECpc 400ST Series computer in Übereinstimmung mit den Bestimmungen der Vfg. 1046/1984 funk-enstört ist.

Der Deutschen Bundespost wurde das inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Digital Equipment Corporation

Declaration of the Manufacturer or Importer

We hereby certify that the DECpc 400ST Series computer is in compliance with vfg 1046/1984 and is RFI suppressed.

The marketing and sale of the equipment was reported to the German Postal Service.

The right to retest this equipment to verify compliance with the regulation was given to the German Postal Service.

Digital Equipment Corporation

ADVARSEL

Lithiumbatteri - Eksplosjonsfare.
Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten.
Brukt batteri returneres apparatleverandøren.

VARNING

Explsionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
Kassers använt batteri enlight fabrikantens instruktion.

VAROITUS

Paristo voi rÆjÆhtÆÆ, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
HÆvitÆ kÆytetty paristo valmistajan ohjeiden sukaisesti.

For more information regarding lithium battery replacement, refer to Chapter 4 of the User's Guide, "Expanding Your Computer."

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About This Guide

Purpose

This user's guide shows you how to operate the DECpc 400ST Series computer. Its goal is to familiarize you with all aspects of the computer and to provide a reference should questions arise in the future. To accomplish this, the user's guide first describes all the key features of the computer. Next, it shows you how to operate the computer, giving easy-to-follow, step-by-step instructions. The user's guide continues by providing configuration, troubleshooting, and corrective maintenance procedures, and concludes with appendices that provide detailed reference information.

Audience

This user's guide is written specifically for an end user or a person responsible for installing and configuring the computer. This guide also assumes a familiarity with the general terminology associated with personal computers.

Organization

This user's guide is organized as follows:

Chapter 1	Computer Description — provides a computer overview, introduces major computer components, and concludes with a description of system board and memory module memory.
Chapter 2	Operating Your Computer — describes how to operate the DECpc 400ST Series computer, use the ROM-based Setup program, and handle mass storage devices and their media.
Chapter 3	Configuring Your Computer — describes how to configure your computer using the System Configuration Diskette.
Chapter 4	Expanding Your Computer — describes how to remove and install the system box covers, install mass storage devices, install system board options, and expansion boards.
Chapter 5	Problem Solving — provides guidelines for solving problems that might arise after configuring your computer.
Appendix A	Technical Characteristics — provides technical specifications, external connector pin assignments, and system board jumper information.
Appendix B	Error Messages — lists system error messages and recommended corrective actions.
Appendix C	Device Mapping — provides tables listing the system board memory map, I/O address map, interrupt map, and DMA map.
Appendix D	Caring For Your Computer — explains how to care for your computer and how to prepare it for relocation.
Appendix E	Equipment Log — provides an equipment log for documenting computer updates.
Appendix F	CPU Modules — provides performance specifications and associated jumper information for the currently available CPU modules.
Index	Index — includes important terms arranged in alphabetical order for quick reference.

Notational Conventions

Notational conventions used throughout this guide include:

*	In connector pinout listings, the asterisk (*) indicates an active low signal. For example, IOCHCK*
h	An h suffix to a numerical value denotes hexadecimal numbers. For example, 0F8h equals 0F8 (hexadecimal).
Kb	A Kb suffix to a numerical value indicates size in kilobits. For example, 512 Kb. A kilobit equals 1024 bits.
KB	A KB suffix to a numerical value indicates size in kilobytes. For example, 640 KB, 7168 KB, etc. A kilobyte equals 1024 bytes.
Mb	An Mb suffix to a numerical value indicates size in megabits. For example, 4 Mb. A megabit equals 1,048,576 bits.
MB	An MB suffix to a numerical value indicates size in megabytes. For example, 1 MB, 256 MB, etc. A megabyte equals 1,048,576 bytes.
GB	A GB suffix to a numerical value is used to indicate size in gigabytes. For example, 1 GB, 256 GB, etc. A gigabyte equals 1,073,741,824 bytes.

An italicized word or phrase is used to represent a variable or to lend emphasis in textual descriptions. File names, path names, and directories are also italicized.

Special Notices

Three kinds of special notices are used throughout this guide to emphasize specific information:

WARNING

WARNING indicates the presence of a hazard that can cause personal injury if the hazard is not avoided.

CAUTION

CAUTION indicates the presence of a hazard that might cause damage to hardware or that might corrupt software.

NOTE

Notes are used to provide important or explanatory information.

Related Documentation

The following documents are available as supplements to the information provided in this user's guide.

Document	Part Number
DECpc 400ST Series Installation Guide (Multilingual)	ER-PCT15-IM
DECpc 400ST Series Installation Guide (English)	ER-PCT15-IA
DECpc 400ST Series Technical Reference Manual	ER-PCT15-TR
DECpc 400ST Series Service Guide	ER-PCT15-SV
DECpc 400ST Series 25 MHz, 33 MHz, 50 MHz CPU Upgrade Kit Installation Guide (Multilingual)	ER-T16AA-IG
DECpc 400ST Series Intel486 DX2 50 MHz and 66 MHz CPU Upgrade Kit Installation Guide (Multilingual)	ER-T31AA-IM
DECpc 400ST Series Intel486 DX2 50 MHz and 66 MHz CPU Upgrade Kit Installation Guide (English)	ER-T31AA-IA

1

Computer Description

Introduction

The DECpc 400ST Series of computers are high-performance, Extended Industry Standard Architecture (EISA)-compatible PCs that can operate as standalone computers or as clients and file servers in a network environment (see Figure 1-1). Developed using the latest modular technology combined with a host of high-performance options, the DECpc 400ST Series offers you the most advanced deskside computers in their class.

Their modular design and versatility allow you to choose any number of Intel486™ microprocessor speeds, types and amount of Dynamic Radom Access Memory (DRAM), and a variety of mass storage devices.

The remainder of this chapter introduces the features, capabilites, and optional kits (both hardware and software) for a typical DECpc 400ST Series computer, including front and back panel controls, indicators, and connectors.

NOTE

The optional modules and kits described in this User's Guide were available at the time of printing. Contact a Digital sales representative or call 1-800-DIGITAL for a current list of options.

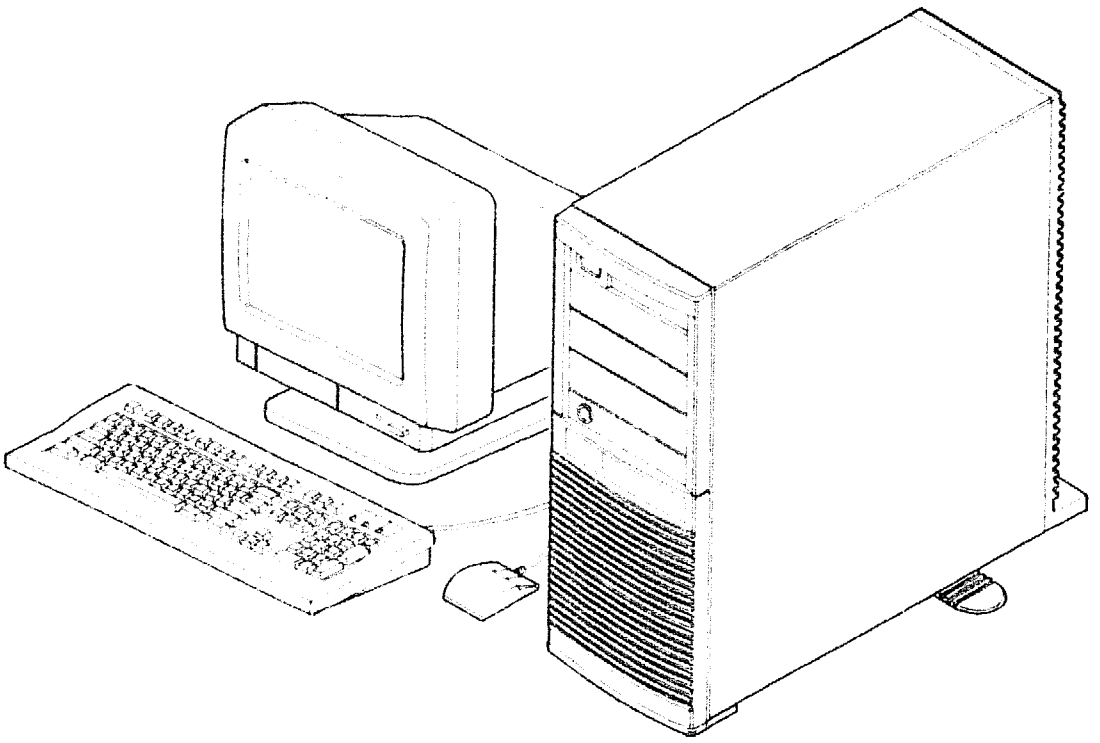

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Figure 1-1. Typical DECpc 400ST Series Computer

Computer Features

All DECpc 400ST Series computers are modular by design and based on a three-board set: a system board, a CPU module, and an optional memory module. The system board contains all bus, Random Access Memory (RAM), I/O device support circuitry, and four Single In-Line Memory Module (SIMM) sockets for installing up to 64 MB of DRAM (128 MB when 32 MB SIMMs become available). The CPU module contains one of several speed-specific Intel486 microprocessors and might contain an external cache. An optional memory module can be installed to increase memory by as much as 128 MB using 16 MB SIMMs (256 MB when 32 MB SIMMs become available).

A 254-watt power supply supports the entire line of fully configured 400ST Series computers. The power supply automatically senses 115 volt or 230 volt input so voltage source presetting is not necessary and provides an auxiliary AC power connector for switched power to a monitor or peripheral device.

An electrical keyboard/mouse lock, mechanical chassis lock, and software-controlled password protection provide computer security. The keyboard/mouse lock and chassis lock are operated using either of the two supplied keys. Software-controlled passwords can be set using the password utility supplied on the System Configuration Diskette (SCU).

System Board Features

The performance features of the system board include:

- Six EISA-bus master slots
- 82350DT™ EISA chip set
- Dedicated memory module connector
- Dual IDE hard disk drive interface
- Diskette drive controller that supports two diskette drives
- Two RS-232C 9-pin serial communication ports
- One 25-pin parallel port
- One PS/2-style keyboard port
- One PS/2-style mouse port
- One speaker
- Non-volatile storage in FLASH memory
- Phoenix Technologies BIOS, based in FLASH memory
- Up to 64 MB of DRAM using 16 MB SIMMs

EISA Slots

The six EISA bus master slots provide computer expandability and performance enhancement. The EISA bus is an extension of the Industry Standard Architecture (ISA) bus. It extends the capability of the ISA bus while maintaining backward compatibility so ISA expansion boards also work.

FLASH Memory

FLASH memory contains the computer's BIOS. FLASH memory contents can be changed with software, enabling you to update your computer's BIOS from a diskette.

System Board Memory

Standard memory (DRAM) is located in four SIMM sockets on the system board. The SIMM sockets support industry standard 36-bit (parity) SIMMs. Table 1-1 lists the computer's memory allocation.

Table 1-1. Computer Memory Allocation

Address Range (in hex)	Function	Size	Shadow	Cache
0010 0000 to 01FF FFFF	Extended memory(1)	192 MB	No	Yes
000F 0000 to 000F FFFF	System BIOS	64 KB	Yes	Yes
000E 8000 to 000E FFFF	EISA configuration information(2)	32 KB	No	No
000E 0000 to 000E 7FFF	Adapter BIOS extension	32 KB	Yes(3)	Yes
000D 0000 to 000D FFFF	Adapter BIOS extension	64 KB	No	No
000C 8000 to 000C FFFF	Adapter BIOS extension	32 KB	Yes(3)	Yes
000C 0000 to 000C 7FFF	Video BIOS or adapter BIOS extension	32 KB	Yes(3)	Yes
000A 0000 to 000B FFFF	Video RAM	128 KB	No	No
0000 0000 to 0009 FFFF	Base memory	640 KB	No	Yes

(1) The SCU provides an option for creating a 1 MB open space between 15 MB and 16 MB to which you can map expansion board BIOS (refer to Chapter 3)
(2) Not available for mapping expansion board memory or BIOS
(3) User configurable (refer to Chapter 3)

NOTE

The DECpc 400ST Series computers do not support the use of the 000E 0000 to 000E FFFF address range for DEC EtherWORKS (DEPCA) controllers. DEC EtherWORKS controllers should be configured for the 000D 0000 to 000D FFFF address range to run in the 64 KB mode or for 000C 8000 to 000C FFFF to run in the 32 KB mode.

CPU Module Features

A variety of CPU modules are available for the DECpc 400ST Series computers. Refer to Appendix F for a current list.

Memory Module Features

The optional memory module contains eight SIMM sockets for installing up to 128 MB of DRAM (256 MB when 32 MB SIMMs become available).

System Box Features

The system box is a small tower that can be installed by your deskside or on a desktop. When installed vertically, it is supported by two feet to prevent tipping. Its small vertical footprint frees space in your entire work area. When installed horizontally on your desktop, the monitor can be placed on top without excessive elevation. Two internal fans provide the necessary cooling airflow. One is installed in the system board bay; the other is installed inside the power supply.

System Board Bay

The system board bay accepts up to 6 full-size EISA/ISA expansion boards, a CPU module, and a memory module. All I/O connectors are mounted on the system board to eliminate cabling between the rear panel connectors and the system board. There is a slot in the divider between this bay and the peripheral bay for power and disk drive data and control cable routing. The cooling fan for this area is temperature sensing and runs at a linearly varying speed depending on ambient airflow temperature.

Peripheral Bay

The peripheral bay contains the power supply and has room for five half-height peripheral devices. The top bay is dedicated and contains a standard 3½-inch 1.44 MB diskette drive. The other three front panel accessible bays are half-height 5¼-inch bays. The fifth bay is hidden and accommodates a half-height 3½-inch peripheral device. Expansion brackets or mounting trays supplied with the drives allow you to install 3½-inch peripheral devices into the 5¼-inch bays. Full-height peripheral devices can be installed into two half-height bays. The cooling fan for this bay runs at a constant speed and is part of the power supply.

Computer Options

Computer options are packaged as kits and are used to enhance the performance or add additional functionality to a DECpc 400ST Series computer. Option kits are available for both software and hardware. The following sections briefly describe the available computer options.

Software Kits

Software kits are available for operating systems and applications. Available operating system software kits include MS-DOS, OS/2, and SCO Unix. When applicable, these kits also include unique Digital enhancements. Available applications depend on your operating system. Contact Digital or an authorized Digital dealer for additional information on all available application kits.

Hardware Kits

Hardware kits provide additional computer capabilities, enhance computer features, or both. Table 1-2 lists and briefly describes some of the available hardware kits. Contact Digital or an authorized Digital dealer for additional information.

Table 1-2. DECpc 400ST Series Hardware Kits

Hardware Kit	Description
Keyboards	101-key and 102-key PS/2 style
Mouse	3-button
Video controllers	Standard VGA, interlaced and non-interlaced enhanced VGA, high resolution 1280 × 1024
Monitors	Color, monochrome, 14-inch, 16-inch, and 19-inch
Diskette drives, 3½-inch	1.44 MB and 2.88 MB half-height
Diskette drives, 5¼-inch	1.2 MB and 360 KB half-height
IDE hard disk drives	52 MB, 105 MB, 120 MB, and 240 MB half-height
SCSI hard disk drives, 3½-inch	245 MB, 429 MB, 800 MB, and 1 GB half-height
SCSI hard disk drives, 5¼-inch	1.0 GB full-height
SCSI tape drives	150 MB, 525 MB, and 2.0/4.0 GB half-height
SCSI controllers	High performance EISA and entry level
Memory	2, 4, 8, and 16 MB 36-bit SIMMs (32 MB when available)
CPU modules	Refer to Appendix F for a current list
External caches	64 KB or 128 KB

Front Panel Controls and Indicators

Table 1-3 lists the front panel controls and indicators; Figure 1-2 shows their locations.

Table 1-3. Front Panel Controls and Indicators

Figure Legend	Control or Indicator	Function
A	Power-On/Off	Turns ac power on and off
B	Diskette access indicator	Lights when the diskette drive is in use
C	Diskette eject pushbutton	Releases the 3½-inch diskette from the diskette drive
D	Reset indicator	Lights when power is on, goes out during a computer reset
E	Reset button	Resets the computer and causes POST to run (less the memory test)
F	Keyboard and mouse lock indicator	Lights when the keyboard and mouse is locked
G	Keyboard and mouse keylock	Locks the keyboard and mouse to prevent unauthorized computer use
H	Hard disk access indicator	Lights when a hard disk is in use

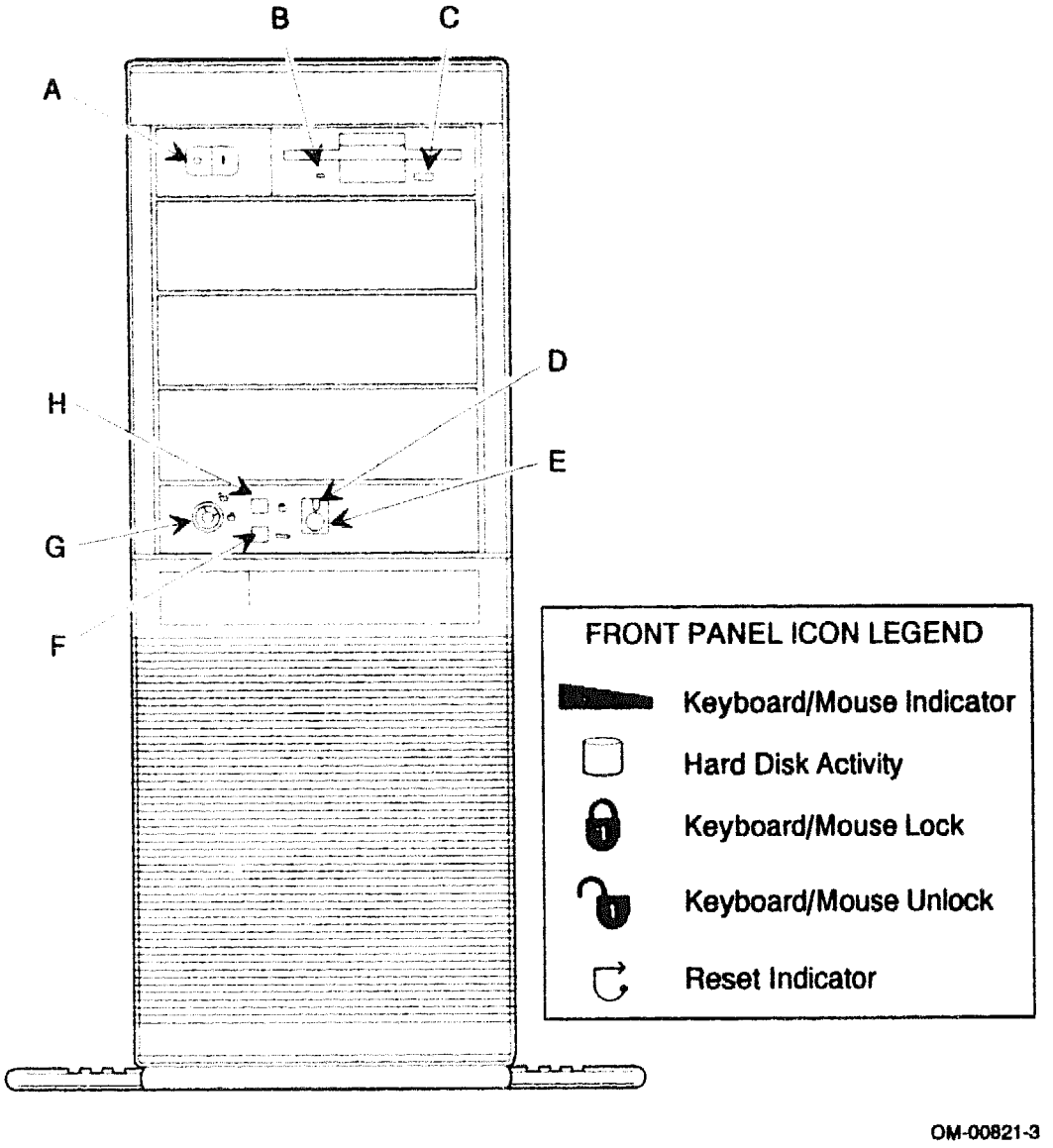

Figure 1-2. DECpc 400ST Series Front Panel

Rear Panel Connectors

Table 1-4 lists the rear panel connectors; Figure 1-3 shows their locations.

Table 1-4. Rear Panel Connectors

Figure Legend	Connector	Function
I	AC output connector	Enables you to connect a peripheral device to AC power
J	AC line connector	Enables you to connect the computer box to an AC power source
K	Chassis keylock	Mechanically locks the side cover to prevent unauthorized access
L	Parallel port connector	Enables you to connect various industry-standard parallel printers
M	Serial port connector	The first of two serial port connectors
N	Serial port connector	The second of two serial port connectors
O	Mouse connector	Enables you to connect a PS/2 style mouse
P	Keyboard connector	Enables you to connect a 101-key or 102-key keyboard

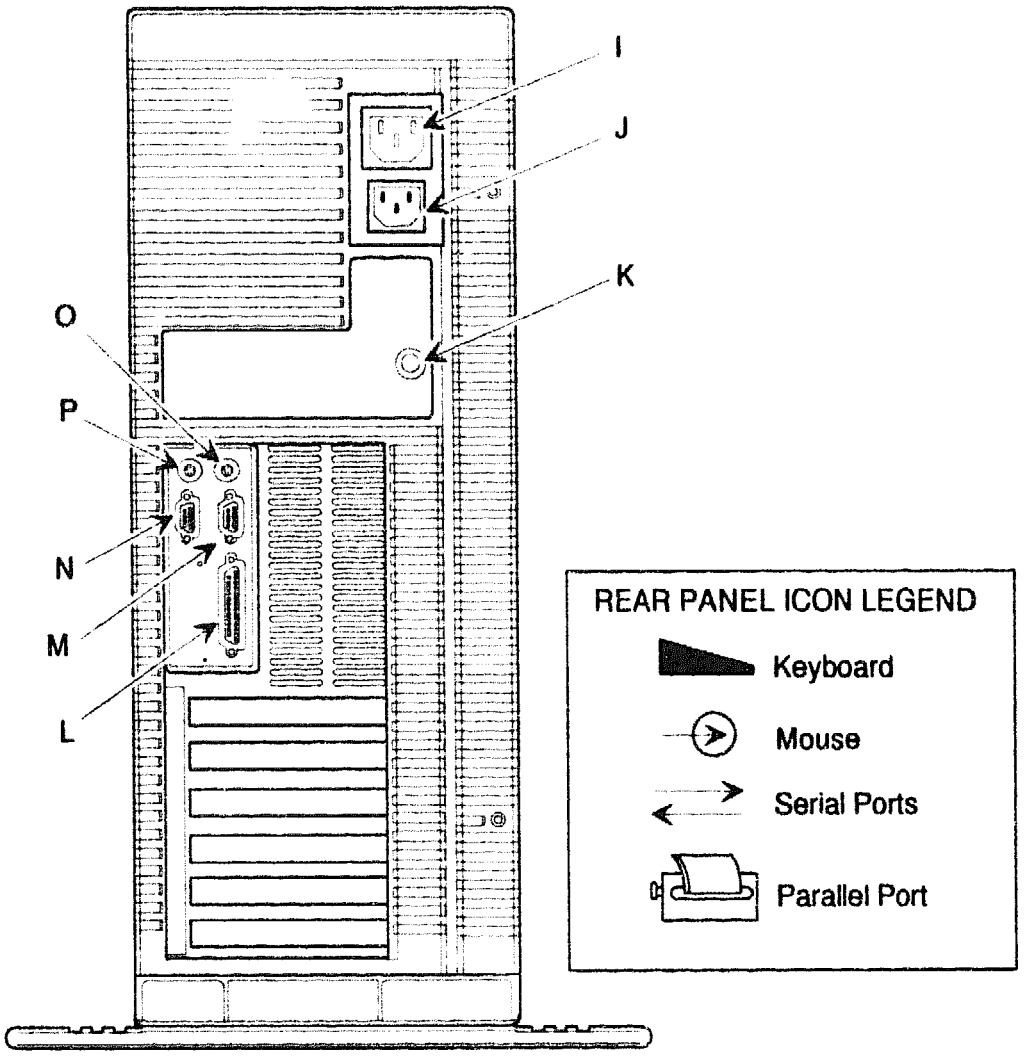

Figure 1-3. DECpc 400ST Series Rear Panel

2

Operating Your Computer

Introduction

This chapter provides information on how to use the following:

- Keyboard
- Keylock
- Power-On Self Test (POST)
- ROM BIOS setup utility
- Optional LCD display
- Disk drives

If the computer does not operate as described in this chapter, follow the instructions in Chapter 5, "Problem Solving." If error messages appear on the screen, refer to Appendix B, "Error and Informational Messages," for possible causes and suggested solutions.

The Keyboard

Your computer comes equipped with a 101-key enhanced keyboard that allows you to communicate with the system box by entering data or commands. Some European language keyboards have 102 keys. Refer to Table 2-1 for keyboard key groups and features and to Figure 2-1 for their locations.

If you need more information about using your keyboard, refer to your operating system and application software documentation.

Table 2-1. Keyboard Key Groups and Features

Figure Legend	Group or Feature
A	Alphanumeric key group
B	Escape key
C	Function key group
D	Edit key group
E	Indicator lights
F	Numeric key pad
G	Cursor control key group

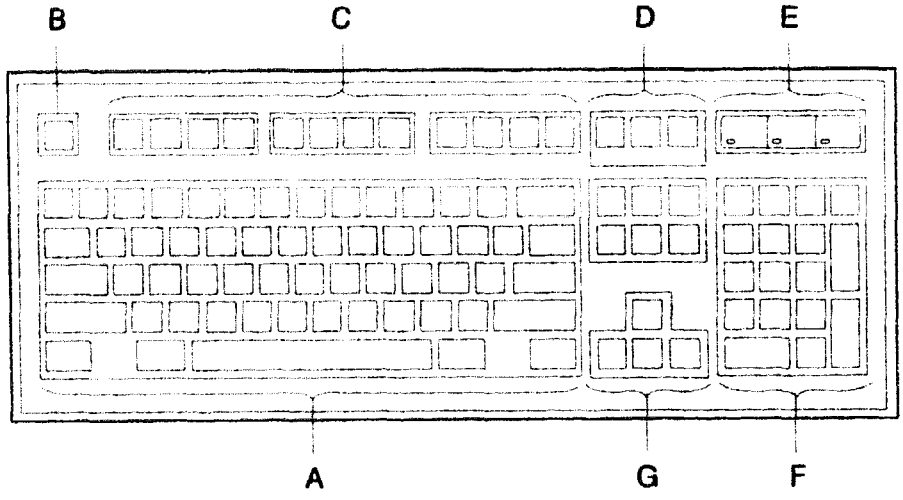

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Figure 2-1. Keyboard Layout

Keylocks

The DECpc 400ST Series system box comes with an electrical keylock that locks the keyboard and mouse to prevent unauthorized access. A set of matching keys is provided to operate the keylock, which is located at the front of the system box (see Figure 2-2). The same keys also operate the mechanical keylock at the rear of the system box (see Figure 2-2). This keylock mechanically locks the system box outside covers to prevent unauthorized access. Icons indicate the locked and unlocked positions of the keylocks.

If additional computer security is required, follow the procedures in Appendix A for disabling the FLASH memory jumper. Disabling the FLASH memory jumper permanently stores computer configuration information in FLASH memory.

NOTE

Be careful not to lose the computer keys. Losing the computer keys prevents you from locking or unlocking the keyboard, mouse, and system box outside cover. Contact your Digital service representative for information on replacing lost keys.

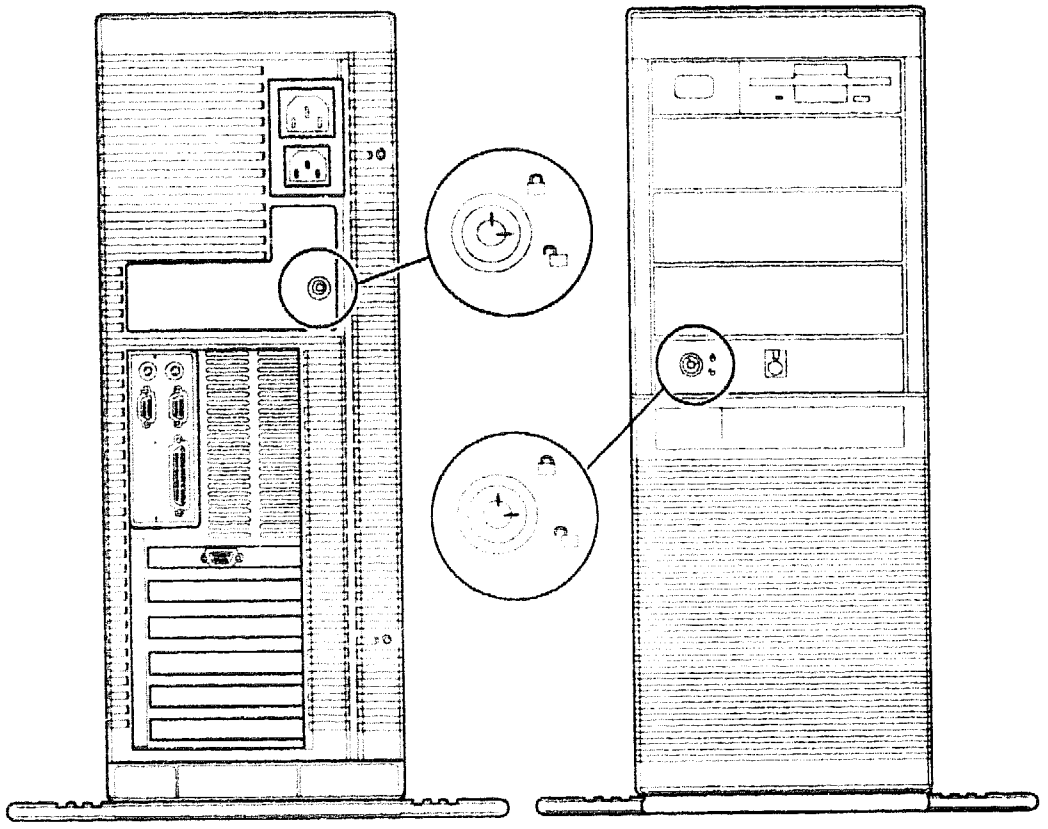

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Figure 2-2. System Box Keylock Locations

Hot Key Sequences

The following hot key sequences are used to invoke special computer functions (refer to Table 2-2). Please note that all numbers and symbols refer to numeric pad keys.

Table 2-2. Hot Key Sequences

Keystroke Sequence	Function
CTRL + ALT + Delete	Soft boots the computer.
CTRL + ALT + 1	Sets slow mode for the current session. CPU module operates at 8 MHz. All caching logic is disabled.
CTRL + ALT + 2	Sets fast mode for the current session. CPU module operates at full rated speed.
CTRL + ALT + +	Controls the keyboard-click sound. The keyboard-click sound increases to a maximum level, after which it returns back to a minimum level and then repeats the sequence.

NOTE

Your installed operating system and application software determines how the above hot key sequences function.

Starting Your Computer for the First Time

Refer to your DECpc 400ST Series Installation Guide for information on connecting your computer to power and on connecting external devices.

POST

Each time you turn on the DECpc 400ST Series computer, POST displays a numeric countdown (840 to 000) sequence as it checks the system board, Intel486 microprocessor, system board timers and logic devices, keyboard, memory, etc. POST countdown numbers 800 through 520 are not displayed on the monitor, but are displayed on the optional LCD display (if installed) and are represented as beep codes on all computers.

NOTE

During the POST memory test, the amount of memory being tested is displayed on the screen. Depending on the amount of extended memory installed, the POST memory test can take several minutes to complete. POST does not check memory after a soft boot (CTRL + ALT + Delete).

If POST does not detect any configuration errors, the computer beeps twice and displays a message similar to the following:

```
PhoenixBIOS (TM) E486 Version x.xx.xx.xxx
Copyright (c) 1985-1991 Phoenix Technologies Ltd.
All Rights Reserved
. . .

  640K Base Memory

03072K Extended

135

To continue press:..................................... SPACEBAR

To configure system in English press:.................. F1

Pour configurer le système en Français appuyer:........ F2

Zur konfiguration Ihres systems für Deutsch drücken sie:... F3

Per configurare il sistema in Italiano premere:........ F4

Para configurar el sistema en Español pulse:........... F5
```

NOTE

After the above message appears, you have approximately 10 seconds to press the appropriate function key to display the initial Setup screen. If you do not press the appropriate function key within the specified time, and if POST failed to detect any configuration errors, the computer will attempt to boot.

If configuration errors are found, the computer beeps more than once and displays a message similar to the following:

```
PhoenixBIOS (TM) E486 Version x.xx.xx.xxx
Copyright (c) 1985-1991 Phoenix Technologies Ltd.
All Rights Reserved
. . .

  640K Base Memory

03072K Extended

150: Invalid configuration information


To continue press: ..........................................ESC

To configure system in English press: .......................F1

Pour configurer le système en Français appuyer: .............F2

Zur konfiguration Ihres systems für Deutsch drücken sie: ...F3

Per configurare il sistema in Italiano premere: .............F4

Para configurar el sistema en Español pulse: ................F5
```

It is normal for the above message to appear the first time you start the computer. If any error messages appear on the screen, refer to Appendix B, "Error and Informational Messages," for possible causes and suggested solutions.

NOTE

If you press Esc to continue, the computer might not operate correctly. Press the appropriate function key to display the initial Setup screen.

After you press the appropriate function key, an initial Setup screen appears. Refer to "BIOS Setup Utility" in the next section for initial Setup screen information and for detailed instructions on when and how to use the BIOS Setup utility.

BIOS Setup Utility

The system board BIOS contains a Setup program that enables you to change certain configuration settings that are stored in CMOS. These settings take effect each time you boot the computer. Refer to "System Board Setup Options" in Chapter 3 for a list of the configuration settings.

Running Setup

To run Setup, wait for POST to complete. Then, press the appropriate function key to display the following initial Setup screen in the chosen language:

```
**** NOTE ****

Since values specified using the BIOS Setup Utility will be
overwritten when the System Configuration Utility (SCU) is
run, it is recommended that the BIOS Setup Utility be used
only if you:

o   Need to enable your diskette drive

o   Do not have access to a diskette drive

o   Have only ISA expansion boards and will not be using the
    SCU

To exit Setup press ESC.

To continue Setup press F1.
```

NOTE

If you use the ROM BIOS setup utility to change any configuration parameter other than time, date, or password, the message "EISA configuration not assured" will be displayed during the next POST cycle. Any subsequent POST cycle or running the System Configuration Utility (SCU) clears this message.

If you press F1 to continue Setup, the current computer configuration information is displayed. To change options, use the up or down arrow keys to move the cursor to a selected option. The cursor moves only to the options that can be changed. Change the field in the selected option by pressing the + or - keys. Each time you press one of these keys, Setup displays one of the possible values for the selected option.

Setup Options

The BIOS Setup Utility displays three pages of configuration options. These options are the same as those provided in the Configure Computer option of the SCU with the exception of password. For an explanation of these options, refer to Table 3-1 in Chapter 3, "Configuring Your Computer." For an explanation of passwords, refer to the "Computer Utilities" section at the end of this chapter.

Exiting Setup

To exit Setup after changing all desired options, press the Escape key to display the following menu:

```
Esc     Continue with SETUP.

F4      Save values, exit SETUP, and reboot.

F5      Load default values for all pages.

F6      Abort SETUP without saving values.
```

Next, press the appropriate function key to continue.

NOTE

After the computer boots, make sure POST completed with no errors (135 will be displayed on the screen). If POST failed to complete, take the appropriate action to correct any errors.

You can also press F5 to load factory default values. Loading these values allows the computer to operate with a minimum of options.

Using the Factory Installed LCD Display

If an optional LCD Display has been installed in your computer, you can use the two-line (20-characters-per-line) display to view:

- Diagnostic information
- Custom message

For further information, refer to the LCD Display User's Guide.

Disk and Tape Drives

The system box uses hard disk drives, diskette drives, and tape drives to store information. It can hold any combination of five half-height drives. Diskette drives and hard disk drives (IDE or SCSI interface-compatible) are available in two sizes: 3½-inch and 5¼-inch. Tape drives are only available in the 5¼-inch size. All drives are available with various capacities.

Diskette drives and tape drives are mounted at the front of the system box for easy access. Hard disk drives can also be mounted in the front peripheral bay (behind the front bezel) and in the internal peripheral bay. Note that the system board's diskette and IDE controllers only support two diskette drives and two IDE hard disk drives.

Drive Identifiers and Computer Prompts

Many software commands use a drive identifier to tell the computer which disk drive to access. DOS uses a single letter followed by a colon (:). For example:

A: Identifies the first diskette drive

B: Identifies the second diskette drive (if installed)

C: Identifies the first hard disk drive or partition

D: Identifies the second hard disk drive or partition (if installed)

DOS uses a computer prompt (at computer startup and after all commands) to let you know which drive is currently selected. The prompt normally includes one of the drive identifiers listed above.

NOTE

A streaming tape device is not recognized with the same type of identifier as are hard disk drives. A streaming tape device uses special software that distinguishes it from a diskette drive or hard disk drive.

Diskettes

The following paragraphs describe how to:

- Handle diskettes
- Write-protect 3½-inch diskettes
- Write-protect 5¼-inch diskettes

Handling Diskettes

The DECpc 400ST Series computer uses 3½-inch and 5¼-inch diskettes. To preserve them, observe the following:

- Do not put heavy objects on a diskette.
- Store diskettes in a temperature range between 50 and 125 °F (10 and 51 °C).
- Keep diskettes away from magnetic fields.

In addition, observe the following when handling 5¼-inch diskettes:

- Do not touch or scratch any exposed portion of the magnetic surface or allow dust or moisture to collect on the diskette.
- Do not bend the diskette.
- When the diskette is removed from the diskette drive, place it in a diskette envelope.
- Use only felt-tipped pens to write on the diskette labels and press very lightly. Ball point pens or pencils can damage the diskette.

Write Protection

Write protection prevents inadvertent writing or deleting of data on diskettes. If a diskette is write-protected, the diskette drive cannot write to it.

Write-Protecting 3½-Inch Diskettes

To write-protect a 3½-inch diskette, turn the diskette over and slide the write-protect switch so the hole is visible. To write data on the diskette, slide the write-protect switch to cover the hole (see Figure 2-3,A).

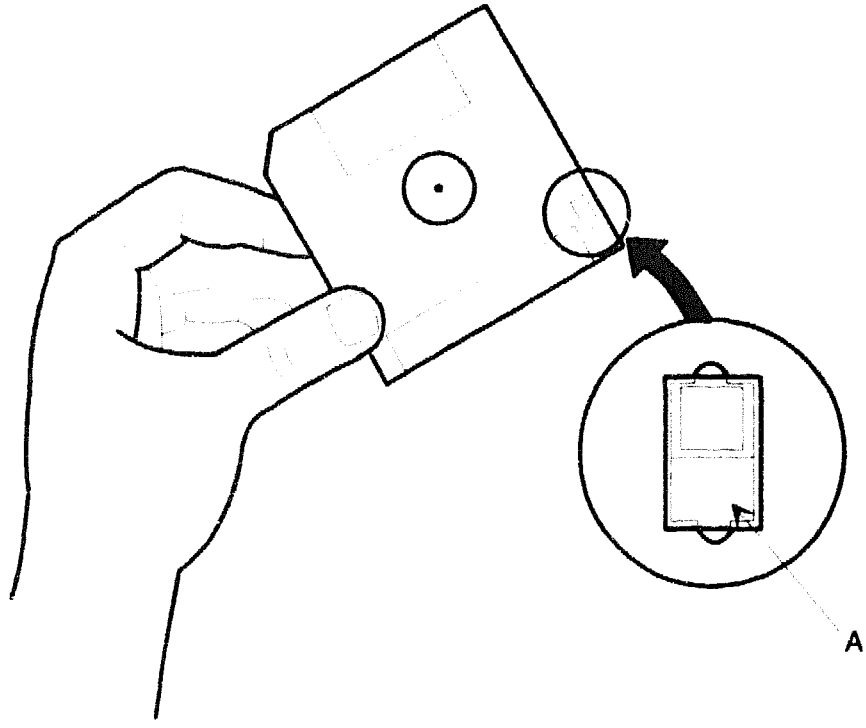


Figure 2-3. Write-Protecting a 3½-Inch Diskette

Write-Protecting 5¼-Inch Diskettes

Most 5¼-inch diskettes have a write-protect notch on the right side. If the notch is uncovered, you can write data on the diskette. If the notch is covered with a write-protect tab (see Figure 2-4), the diskette is write-protected and data cannot be written to it. Diskettes without a notch are permanently write-protected.

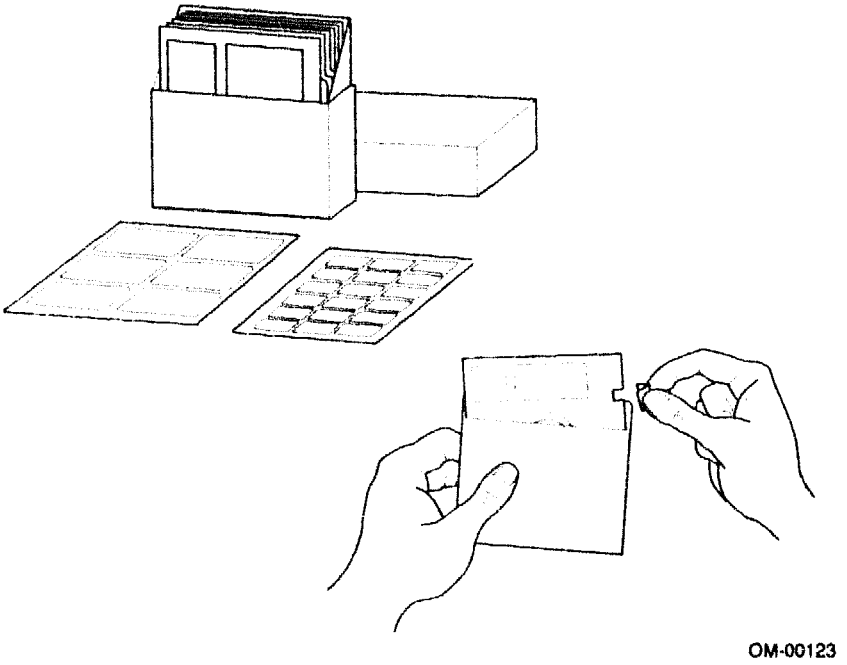


Figure 2-4. Write-Protecting a 5¼-Inch Diskette

System Configuration Diskette Utilities

The System Configuration Diskette supplied with your computer provides the following utilities:

- Access Password Utility
- Copy System Configuration Diskette
- Set Time
- Set Date

Access Password Utility

The password utility allows you to:

- Set an initial power-on password
- Activate or deactivate a network password
- Set a keyboard password
- Lock the keyboard

The power-on password can be set using the SCU or BIOS Setup Utility. It can be from one to seven characters and takes effect each time you boot the computer. Note that the power-on password also becomes the network password and keyboard password at power up.

To change the power-on password, type the following string at the password prompt:

```
Current password/new password/new password
```

To delete the power-on password, type the following string at the password prompt:

```
Current password/
```

NOTE

If your computer is being used as a file server and has both power-on and network passwords set, it will boot and operate without having to enter a power-on or network password. However, you still need to enter a valid password (power-on) if you want to access it locally using the keyboard or mouse. Enter the password at the prompt or at any time prior to using the keyboard or mouse.

A keyboard password (SCU specific) can be set to lock the keyboard while the computer is running. It can be from one to seven characters and will override the power-on password if one has already been set. However, if you boot the computer after you set a keyboard password, it will be lost and the power-on password will become the keyboard password.

Copying System Configuration Diskette

It is recommended that you only use a backup copy of the System Configuration Diskette to run the SCU. Refer to Chapter 3, "Configuring Your Computer," for further information.

Setting the Time and Date

The computer time and date can be set from main menu of the SCU. Refer to Chapter 3, "Configuring Your Computer," for further information.

3

Configuring Your Computer

Introduction

This chapter provides detailed information on how to use the System Configuration Utility (SCU) contained on the System Configuration Diskette. Digital recommends that you use your SCU to initially configure your computer and each time you add hardware, remove hardware, or change system settings.

If you are familiar with EISA architecture and EISA configuration utilities, refer to the appropriate sections in this chapter to setup and configure your computer. Otherwise, carefully read and understand the entire chapter before attempting to use the SCU.

System Configuration Utility

The SCU allows you to setup and configure your computer using the menu driven items listed below. Depending on the installed hardware and the level of computer security required, you might have to access one or more of these items to properly configure your computer.

- Select a specific keyboard type
- Copy the System Configuration Diskette
- Learn about configuring your computer
- Set the computer date and time
- Configure your computer

- Maintain the System Configuration Diskette
- Access the password utility

Each item is available through the main menu of the SCU (see Figures 3-1 and 3-2). Refer to the following sections to learn how to use the SCU, access all menu items, and begin the SCU configuration process.

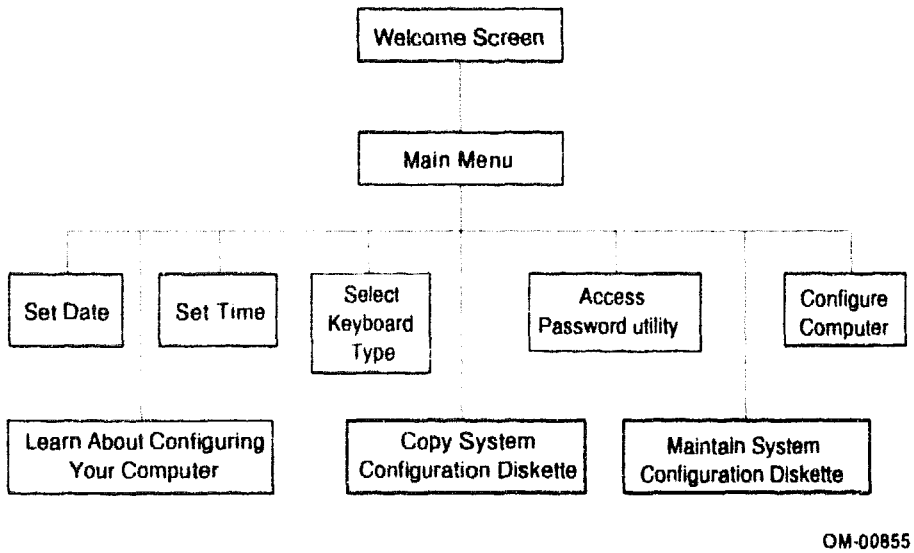


Figure 3-1. SCU Main Menu Options (sheet 1 of 2)

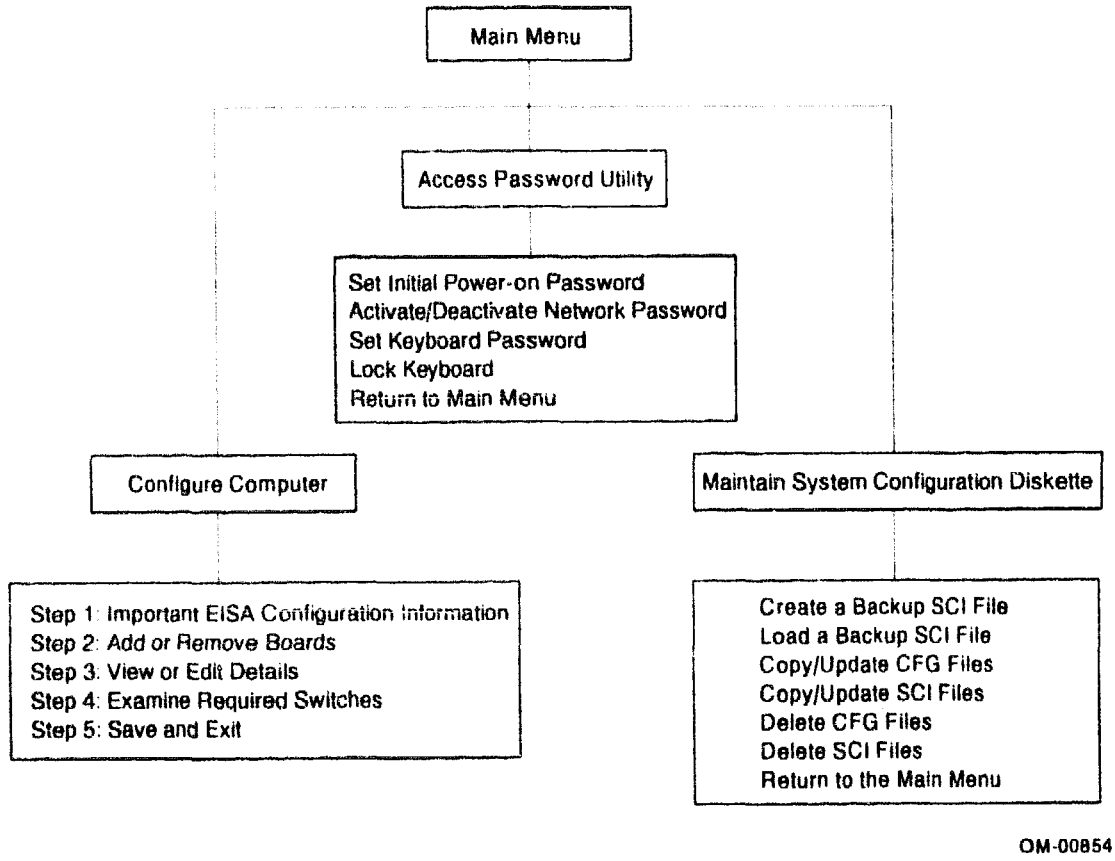


Figure 3-1. SCU Main Menu Options (sheet 2 of 2)

How to Use the SCU

Table 3-1 lists the keyboard function keys used to access the SCU, scroll through the menu screens, and select specific menu items.

Table 3-1. SCU Keyboard Function Keys

Keyboard Key	Function
↓	Moves the cursor down one menu item.
↑	Moves the cursor up one menu item.
→	Moves the cursor one character to the right.
←	Moves the cursor one character to the left.
Enter	Selects the highlighted item.
F1	Displays the help menu.
Esc	Returns the monitor screen to the previously selected menu item.

You can also use the mouse that was shipped with your computer. To use the mouse:

1. Highlight menu items by placing the mouse pointer on the desired choice and then by clicking the left mouse button once.
2. Select menu items by placing the mouse pointer on the desired choice and then by clicking the left mouse button twice.
3. Highlight pull-down menus by placing the mouse pointer on the desired choice, holding the left mouse button down while sliding the mouse to the bottom of the menu, and then by releasing the left mouse button.

SCI Files and CFG Files

The SCU creates a System Configuration Information (SCI) file each time you configure your computer. This SCI file can serve as a backup to the EISA configuration stored in FLASH memory. The SCI file is maintained on the System Configuration Diskette and has a default name called *SYSTEM.SCI*.

Configuration (CFG) files contain system board and EISA expansion board vital characteristics and the computer resources they require for proper operation. If you install additional EISA expansion boards, make sure you copy the expansion board CFG files (and overlays, if applicable) to the System Configuration Diskette before attempting to configure your computer.

Before Using the SCU

Make sure your computer operates as expected using the instructions in the DECpc 400ST Series Installation Guide and then have the following readily available:

1. A 1.44 MB formatted floppy disk.
2. CFG files supplied with any EISA expansion boards you have installed.
3. Kit installation instructions for any optional hardware you have installed.

Configuring Your Computer

This section describes how to configure your computer using the SCU. If this is the first time using the SCU, it is recommended that you follow the procedures in the order given. If this is a subsequent session, refer to the appropriate sections to update your computer configuration.

1. Install any optional hardware, i.e., disk drives, EISA expansion boards, etc., following the instructions in the chapter 4, "Expanding Your Computer."
2. Insert the System Configuration Diskette into drive A.
3. Soft boot the computer (CTRL + ALT + Delete). After a short wait, the SCU introductory screen will be displayed on your monitor screen.

NOTE

The SCU contains help pop-up screens for any selected menu item. Press F1 at anytime to display them and Esc to remove them.

4. Press Enter to display the SCU Welcome screen.

   If no configuration errors appear, the Welcome screen will display information about the SCU. Press Enter to display the Main menu, run the Configure Computer option to create the computer SCI file, and then exit to boot the computer so changes take effect.

   If a configuration error appears, the Welcome screen will display information about the error and tell you to reconfigure your computer. Press Enter to display the Main menu, select the View and Edit Details menu item from the Configure Computer option, make any changes as indicated by POST error messages, and then exit to boot the computer so changes take effect.

NOTE

Make a backup copy of the supplied System Configuration Diskette. Store the original in a secure place and only use the backup copy when running the SCU.

5. Using the Select Keyboard Type option, select the keyboard type that best describes the one you want to use.
6. Using the Copy System Configuration Diskette option, make a backup copy of the supplied System Configuration Diskette. Two copy options are available:
   a. Copy diskette from diskette drive A to diskette drive A
   b. Copy diskette from drive A to diskette drive B

NOTE

Use the copy diskette from drive A to diskette drive B option only if you have two 3½-inch diskette drives installed.

Choose the appropriate drive destination and then follow the prompts on your monitor screen to correctly backup the System Configuration Diskette.

7. Using the Maintain System Configuration Diskette option, copy the CFG files supplied with any EISA or ISA (if supplied) expansion board.

8. If applicable, select the Learn About Configuring Your Computer option to familiarize yourself with the SCU.

9. Set the current computer time and date using the Set Time and Set Date menu items.

10. Select the Configure Computer option to configure your computer. Refer to the "Configure the Computer" discussion later in this chapter for further information.

NOTE

If the message "Unable to update configuration information in FLASH memory" appears on the monitor screen while accessing the Configure Computer option, make sure the FLASH memory jumper is correctly set before continuing. Refer to Appendix A, "Technical Specifications," for additional information on the FLASH memory jumper.

11. If applicable, select the Maintain System Configuration Diskette option to create, change, or update SCI or CFG files.

12. If applicable, select the Access Password Utility option to set computer and network passwords and lock the keyboard.

13. After properly configuring your computer, select the Exit From This Utility option to end the SCU session.

14. If applicable, install your operating system and any application software. Refer to the operating system and application software documentation for further information.

NOTE

It is recommended that you do not install the SCU or any of its utilities on a hard disk drive. Running the SCU or any of its utilities from a hard disk drive might cause memory conflicts between the SCU and application software. This specifically applies to memory managers and Windows™ applications.

Configure the Computer

If you are accessing this menu item for the first time, it is recommended that you follow the menu items listed below in the order given. If this is a subsequent session, refer to the appropriate menu item to update your computer configuration.

- Important EISA configuration Information
- Add or remove boards
- View or edit details (Setup)
- Examine required switches
- Save and exit

Important EISA Configuration Information

This menu item provides basic EISA configuration information on several screens. These screens are available at any time during the configuration process by pressing F1 and by selecting "EISA configuration" from the help menu.

Adding or Removing Boards

This menu item allows you to add or delete EISA/ISA expansion boards. This menu item also allows you to graphically show where the system board and all expansion boards are physically installed in your computer.

NOTE

EISA computers identify hardware using a unique product identification code. The SCU matches this product identifier with the appropriate configuration files on the System Configuration Diskette and attempts to automatically configure the system board and EISA expansion boards.

The SCU automatically detects any EISA expansion board installed in your computer. The SCU does not automatically detect ISA expansion boards.

View or Edit Details

This menu item allows you to view and edit the configuration of your system board (setup), all EISA expansion boards, and certain ISA expansion boards (including .CFG files if supplied and installed). Note that the number of options will vary depending on your specific configuration.

Table 3-2 lists the configuration (setup) options for the system board. Note that the options are in the order as they appear in the SCU. Based on your installed options, this order might not be the same for the BIOS Setup Utility. Following Table 3-2 are detailed descriptions of the setup options that need further explanation.

For more information on a specific option, move the cursor to that option and then press F1 to display the appropriate help screens.

NOTE

Depending on when your computer was purchased, certain setup options listed in the Table 3-2 might not be supported. Error message "This option not available" will be displayed each time a non-supported option is selected.

Table 3-2. System Board Setup Options

SCU Setup Field	Settings	Comments
System processor module	Not user selectable	Displays the currently installed processor module
System board extended memory	Not user selectable	Displays the current amount of extended memory
System base memory option	512 KB 640 KB	Sets size of base (conventional) memory
User definable hard drives	Types 2 and 3 Types 48 and 49	The SCU allows types 2 and 3 or types 48 and 49 to be user definable(1)
Cache control	Disabled	Disables the Intel486 internal and external cache (if applicable)
	Enabled - write through	Enables the external cache as write through and enables the Intel486 internal cache
	Enabled - write back	Enables the external cache as write back and enables the Intel486 internal cache
Onboard floppy controller	Enabled	Enables the onboard diskette controller interface
	Disabled	Disables the onboard diskette controller interface
Diskette A Diskette B	Disabled	Disables the selected diskette drive
	3½-inch 720 KB, 1.44 MB, or 2.88 MB densities	Selects size and density of 3½-inch diskette drives
	5¼-inch 360 KB or 1.2 MB densities	Selects size and density of 5¼-inch diskette drives

(1) Some operating systems do not recognize hard disk drive types above 29

Table 3-2. System Board Setup Options *(continued)*

SCU Setup Field	Settings	Comments
Onboard IDE hard disk controller	Enabled	Enables the onboard IDE controller interface; the controller can be used as the primary interface to the bootable hard disk drive
	Disabled	Disables the onboard IDE controller interface
Hard drive 1 Hard drive 2	Drive types 1-49	Enables hard drive size and specific parameters from a predetermined list of drive types. Drive types 2 and 3 or 48 and 49 are user definable for hard drives not listed in the BIOS drive table.(2)
	Not installed	Disables the selected hard disk drive

(2) Drive type 48 or 49 information is aliased to drive type 2 or 3 when application software does not recognize drive types above 47

Table 3-2. System Board Setup Options *(continued)*

SCU Setup Field	Settings	Comments
Parallel port	Disabled	Disables the onboard parallel port(3 and 4)
	Enabled Base address 378h: compatible Base address 378h: bi-directional Base address 278h: compatible Base address 278h: bi-directional	Enables bi-directional mode (PS/2 compatible) or compatible mode (PC/AT Centronics™ compatible) (3 and 4)
Serial port 1	Disabled	Disables the onboard serial port 1(3 and 4)
	Enabled Base address 03F8h: Base address 02F8h: Base address 03E8h:	Enables serial port 1 to the specified address(3 and 4)

(3) Refer to the appropriate section at the end of this chapter for further explanation
(4) Refer to Appendix C for additional information on IRQ assignments

Table 3-2. System Board Setup Options *(continued)*

SCU Setup Field	Settings	Comments
Serial port 2	Disabled	Disables the onboard serial port 2(3 and 4)
	Enabled Base address 02F8h: Base address 03E8h: Base address 02E8h:	Enables serial port 2 to the specified address(3 and 4)
COM1 redirection, COM2 redirection	Disabled	Disables redirection of video signals to the logical COM1 or COM2 computer serial ports
	Enabled 1200 baud 2400 baud 9600 baud	Allows the use of "scan-code" terminals to act as the computer console through the logical COM1 and COM2 computer serial ports(5 and 6)
Video type	Not installed EGA / VGA CGA 40 columns CGA 80 columns MDA	Allows you to specify the type and mode of the video adapter that has been installed
VGA/EGA video adapter installed	No	Video BIOS does not appear at C0000h
	Yes	Video BIOS appears at C0000h

(5) Overall computer performance will be degraded if this option is enabled but not used
(6) Redirection is not available for the COM3 and COM4 serial ports

Table 3-2. System Board Setup Options *(continued)*

SCU Setup Field	Settings	Comments
Shadow C0000 to C7FFFh	Disabled	Disables shadowing of the 32 KB BIOS area 000C:0000h to 000C:7FFFh
	Enabled	Enables shadowing of the 32 KB BIOS area 000C:0000h to 000C:7FFFh
Shadow C8000 to CFFFF	Disabled	Disables shadowing of area 000C:8000h to 000C:FFFFh
	Enabled	Enables shadowing of area 000C:8000h to 000C:FFFFh
Shadow E0000 to E7FFF	Disabled	Disables shadowing of area 000E:0000h to 000E:7FFFh
	Enabled	Enables shadowing of area 000E:0000h to 000E:7FFF
Keyboard control	Enabled	Reports keyboard errors during POST
	Disabled	Does not report keyboard errors during POST and allows the computer to boot without a keyboard
Onboard mouse control	Enabled	Enables the onboard PS/2 mouse port
	Disabled	Disables the onboard PS/2 mouse port
Speaker control	Enabled	Turns the speaker on
	Disabled	Turns the speaker off
CPU speed	Fast	CPU module operates at its full rated speed
	Slow	CPU module operates at 8 MHz

Table 3-2. System Board Setup Options *(continued)*

SCU Setup Field	Settings	Comments
NumLock on at boot	No	Off when computer boots
	Yes	On when computer boots
I/O recovery time	Standard	Sets a slower I/O recovery time
	Enhanced	Sets a faster I/O recovery time
Posted I/O writes	Disabled	Disables posted I/O writes
	Enabled	Enables posted I/O writes
Concurrent refresh	Disabled	Disables concurrent refresh cycles
	Enabled	Enables concurrent refresh cycles
Scan FLASH memory user area	Disabled	Disables scanning (execution) of the 8 KB FLASH memory user area (000E:A000h to 000E:BFFFh) for a valid code block
	Enabled	Enables scanning (execution) of the 8 KB FLASH memory user area (000E:A000h to 000E:BFFFh) for a valid code block
Reserved system resources	None	Reserved resources only for the system board; not available for expansion boards

System Board Extended Memory. This function indicates the amount of extended memory (memory addressable beyond 1 MB) resident on the system board and an optional memory module (if installed). The amount of extended memory is automatically detected and cannot be modified using the SCU.

NOTE

Extended memory installed on EISA or ISA boards is not included in the quantity of extended memory indicated.

An extended memory configuration checking feature checks for consistency between the amount of extended memory configured in FLASH memory, by the SCU, and the amount detected during POST. The computer displays a configuration error when the amounts do not match.

NOTE

This feature is available in these and later versions of the system BIOS (Version 1.00.05) and the SCU (Version 2.00.01).

System Base Memory. This feature allows users with a MECA chip, Version 1.1 or later, to configure computer base memory size for either 512 KB or 640 KB. Selecting *512 KB* allows you to map an expansion board's BIOS or an expansion board's memory to the 128 KB area between 512 KB and 640 KB.

NOTE

This option is disabled during POST if MECA chip Version 1.0 is installed on the system board. The message "This option not available" will also be displayed.

User Definable Hard Disk Drive. System BIOS contains a table of drive types for hard disk drives. Of these, you can define the number of sectors, cylinders, heads, etc., for types 2 and 3 or types 48 and 49. Choose types 48 and 49, unless your Local Area Network (LAN) software does not recognize them. Otherwise, use types 2 and 3. Note that this option does not apply to SCSI devices.

Hard Drive 1. This option must be configured to determine drive-specific parameters. Choose the drive type for the drive from types 1 through 47. If hard drive 1 is not installed, then select "Not Installed."

NOTE

If the primary bootable drive is a SCSI device, most SCSI controllers and SCSI devices require both hard drive options to be disabled. If applicable, refer to the documentation supplied with the SCSI controller for more information.

If your computer has both SCSI and IDE drives, the IDE drive will always be drive C (the boot drive).

User-definable types 2, 3, 48, and 49 require you to enter specific parameters (cylinders, heads, precompensation, landing zone, and sectors). You can select either types 2 and 3 or types 48 and 49 as user-definable. Because certain operating systems do not recognize BIOS drive type parameters above type 47, the parameters for drive types 48 and 49 might be aliased to types 2 and 3 using this option.

Hard Drive 2. This option is the same as the hard drive 1 option.

Parallel Port and Serial Ports. The computer logically assigns parallel printer ports LPT1 and LPT2 and serial ports COM1 through COM4 to the following address ranges:

- Parallel ports in the address order 378h and 278h
- Serial ports in the address order 3F8h, 2F8h, 3E8h, and 2E8h

This occurs during each boot process. For example, if you disable the serial port that is assigned to 3F8h as COM1, during the next boot cycle the computer will reassign the name COM1 to the next enabled serial port in the sequence.

VGA/EGA Video Adapter Installed. This option allows you to specify whether or not a VGA/EGA expansion board BIOS is mapped to the C0000h to C7FFFh address range. If a VGA/EGA expansion board is installed, make sure *Yes* is selected so POST can initialize it during the normal video initialization process. Otherwise, POST will only initialize it at POST countdown number 080, during a general option ROM scan at the end of the boot process.

Shadow C0000h to C7FFFh, C8000h to CFFFFh, and E0000h to E7FFFh. These options allow you to independently shadow an expansion board BIOS which is mapped at one of three separate address areas: C0000h to C7FFFh, C8000h to CFFFFh, and E0000h to E7FFFh. Shadowing an expansion board BIOS in one of these three areas greatly improves computer performance. For example, shadowing a video expansion board BIOS, normally located at C0000h to C7FFFh, will increase its performance.

NOTE

Independently shadowing locations C8000h to CFFFFh, and E0000h to E7FFFh is only available if a MEM Bus-to-EISA Control Array (MECA) chip, Version 1.1, is installed on the system board. The MECA chip is located just above the CPU module connector. For earlier versions of the MECA chip, the computer displays the message "This option not available."

If an expansion board BIOS is mapped to any of these three areas and the BIOS does not support caching, make sure the appropriate shadowing option is disabled.

CPU Speed. This option determines the speed used by the computer each time you turn it on or reboot it. Fast is the normal setting for CPU speed and causes it to run at its rated speed. Slow (equivalent to 8 MHz) is used to reduce the effective CPU speed to be compatible with some speed dependent application programs. If an application program does not run correctly at full speed, try changing the CPU speed to slow.

I/O Recovery Time, Posted I/O Writes, and Concurrent Refresh. Enabling these options allow you to increase the overall performance of your computer by as much as six percent. Some expansion boards (typically network) might not operate or be able to take full advantage of these performance options. If this is the case, disable the appropriate option to remedy any conflicts.

Scan FLASH Memory User Area. This option allows you to enable or disable the scanning of the 8 KB FLASH memory user area (000E:A000h to 000E:BFFFh). Scanning this area causes a user provided resident program to execute prior to computer boot.

Examine Required Switches

This menu item allows you to list the switches and jumpers that must be manually set on the system board and any expansion board.

If you need to manually set switches or jumpers, make sure you write down the ones that need set before you exit the SCU and power down your computer.

NOTE

Do not attempt to install any software driver until you are confident that your computer is properly configured and operating as expected.

Save and Exit

This menu item allows you to save all changes and exit from the Configure Computer menu. Note that when you exit, your computer boots so all changes take effect immediately.

Advanced SCU Features

The SCU provides the advanced features described below. You can access any of these features by pressing CTRL/A at the SCU Welcome screen.

Extended Memory Range Definition

This feature defines the extended memory ranges for system board extended memory and, if applicable, for the memory module. These ranges are automatically updated by the SCU when memory is modified. Use this feature to verify that extended memory has been modified when the "Expansion Board Address Space" option is enabled.

CAUTION

The SCU automatically checks extended memory and lists the address ranges for it. Use caution when modifying these extended memory ranges.

Expansion Board Address Space

Certain expansion boards require 128 KB of address space to run. Because this address space may not be available in certain situations, it can be mapped into extended memory or into the memory space between 512 KB and 640 KB.

If expansion boards are installed that require 128 KB of address space and at least 16 MB of memory is installed on the system board or memory module, select the "Enabled" option. This opens a 1 MB space between 15 MB and 16 MB in memory. The upper 128 KB is reserved for the system BIOS and the remainder of the 1 MB (F00000h to FDFFFFh) provides 896KB of memory for expansion boards.

If less than 16 MB of memory is installed, map expansion boards requiring 128 KB of address space to the memory space between 512 KB and 640 KB or to an address range outside actual extended memory but within the 16 MB range.

CAUTION

Certain operating systems do not support an open 1 MB space in extended memory.

Expansion Slot 4 Operation

This feature sets the operation of expansion slot 4, to accommodate certain types of expansion boards.

The available options for slot 4 are "EISA Compatible" and "ISA Compatible." Setting the option to EISA Compatible implements the EISA addressing scheme. The default setting is "EISA Compatible." This setting enables expansion slot 4 to accept EISA expansion boards as well as ISA expansion boards that do not use I/O addresses in the 0 to 255 (decimal) range.

If you install an ISA expansion board that uses the 0 to 255 (decimal) I/O addressing range, set this option to "ISA Compatible."

4

Expanding Your Computer

Introduction

This chapter provides instructions for installing:

- Optional 3½-inch or 5¼-inch drives
- System board options:
  a. CPU module
  b. External cache
  c. Memory module
  d. Additional system board memory
- Expansion boards
- Real-time clock (RTC)

Before You Begin

Have the following tools available:

- A medium-sized Phillips screwdriver
- A flat-blade screwdriver
- An antistatic wrist strap (recommended)
- Small needle-nose pliers (for RTC disposal)
- Insulating tape (for RTC disposal)

NOTE

Make sure you save all manufacturer shipping containers and packing material for future use.

Equipment Log

Use the equipment log in Appendix E to record the model and serial number of your computer, all options you install, and any other pertinent information. You will need this information when configuring your computer and if you need technical assistance or service.

Removing System Box Outside Cover

The system box outside cover must be removed prior to installing any computer option. To remove the outside cover:

1. Turn off power to all external devices connected to the system box, for example, a printer or monitor.
2. Turn off power to the system box.

WARNING

Unplug the ac power cord and monitor power cord before performing the following procedure. Failure to disconnect power before removing the system box outside cover can result in personal injury or equipment damage.

3. Disconnect all external cables from the system box and tag them for identification.
4. Unlock the outside cover (see Figure 1-3).
5. Loosen the two captive restraining screws that secure the outside cover to the system box chassis (see Figure 4-1,A).

6. Remove the outside cover by sliding it toward the rear of the system box (to release the locking tabs) and then by pulling it toward you (see Figure 4-1).

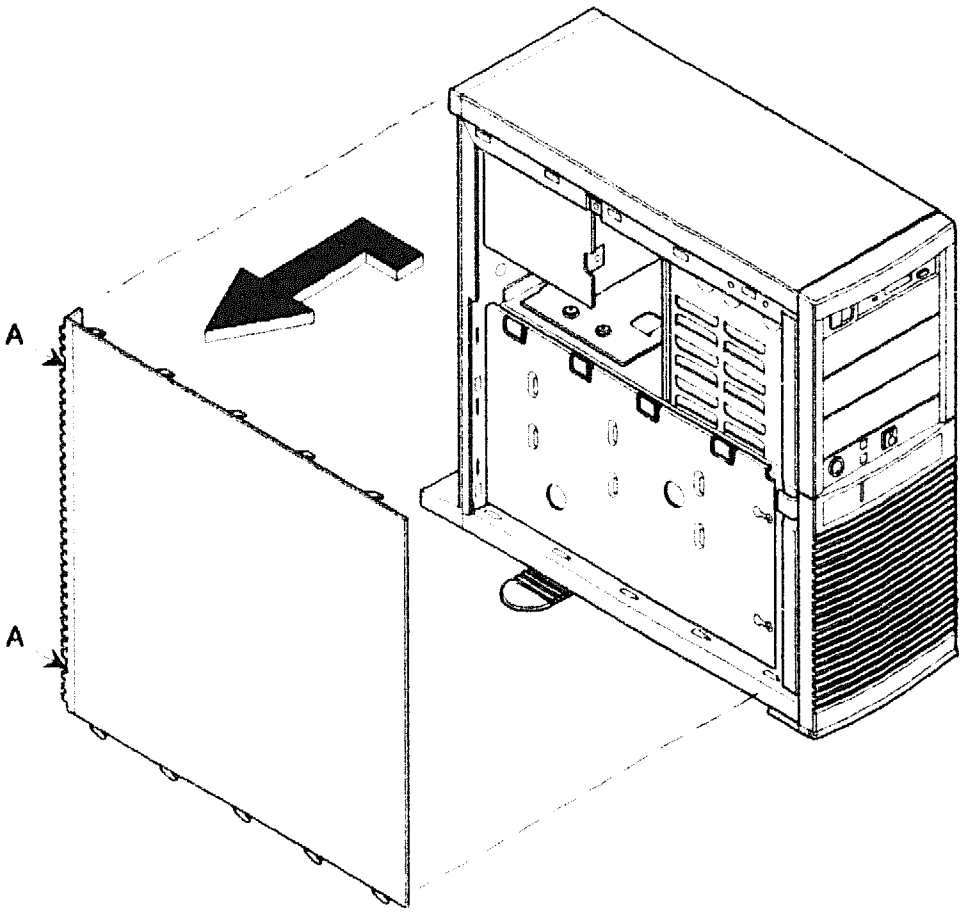


Figure 4-1. Removing the System Box Outside Cover

Removing System Box Inner Cover

To remove the system box inner cover:

1. Remove the two screws that secure the system box inner cover to the chassis (see Figure 4-2,A).
2. Remove the system box inner cover by sliding it toward the front of the system box (to release the locking tabs) and then by pulling it toward you (see Figure 4-2).

Installing a Mass Storage Device

The DECpc 400ST system box contains a front peripheral device bay that supports a variety of 3½-inch and 5¼-inch mass storage devices. The system box also contains an internal peripheral device bay that supports a single 3½-inch device. Refer to the following procedures to install mass storage devices into either peripheral device bay.

NOTE

If you plan on installing a SCSI device, you will also need to install a SCSI host adapter that supports up to seven internal or external SCSI devices.

To facilitate cabling inside the system box, note the following guidelines:

1. Install an optional diskette drive in the bay just below the supplied 3½-inch diskette drive.
2. If you are installing a streaming tape or CD-ROM, place either one in the bay just below the optional diskette drive. Otherwise, place them in the bay just below the supplied 3½-inch diskette drive.

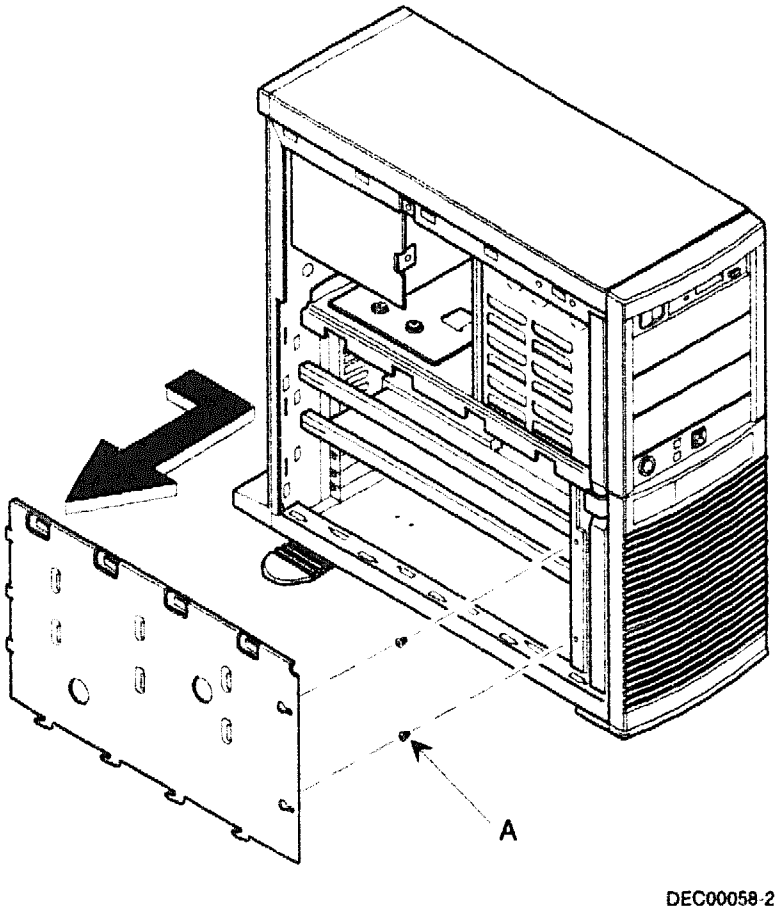


Figure 4-2. Removing the System Box Inner Cover

3. If you are installing one IDE hard disk drive, place it in the internal bay below the power supply. After connecting the drive, place the rest of the IDE ribbon cable between the internal bay and the power supply.

4. If you are installing two IDE hard disk drives, place the first one in the internal bay below the power supply and the second one in the very bottom slot of the front peripheral device bay.

5. If you are installing a full-height SCSI device, use the two bays just below the supplied 3½-inch diskette drive (if an optional drive is not already installed in one of bays). Otherwise, use the next two available bays.

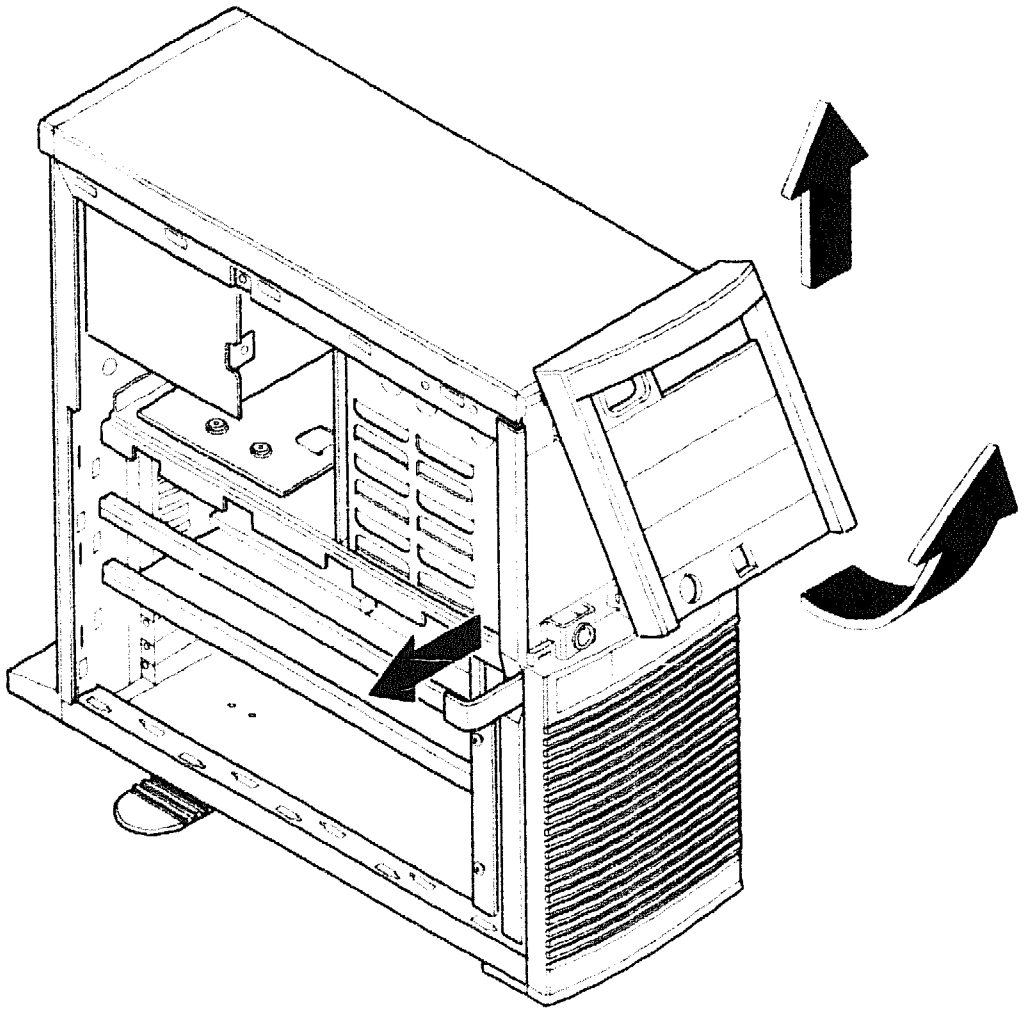
6. SCSI half-height devices can be installed in any of the remaining front peripheral device bays.

7. SCSI half-height hard disk drives can also be installed in the internal peripheral device bay.

Installing Devices into the Front Peripheral Bay

1. Remove the system box outside cover and inner cover. Refer to the removal procedures previously discussed.

2. Remove the front peripheral bay bezel by releasing the locking tab, lifting the bezel up from the bottom, and then away from the front of the system box (see Figure 4-3).



DEC00056-2

Figure 4-3. Removing the Front Peripheral Bay Bezel

3. If installing a device with removable media, remove the appropriate filler panel by gently pulling the front peripheral bezel (Figure 4-4,A) away from one side of the filler panel (Figure 4-4,B) and then by lifting it up and out.

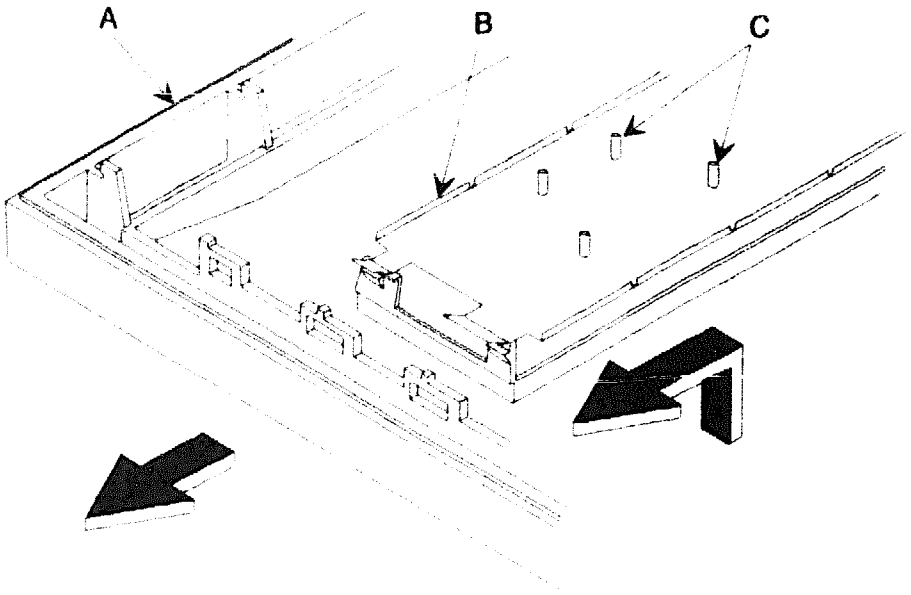


Figure 4-4. Removing a Filler Panel

NOTE

Refer to the manufacturer's instructions for your mass storage device to determine if switches, jumper settings, or terminating resistors need to be set or installed on the device. Set all switch or jumper settings accordingly.

Also, Intelligent Drive Electronics (IDE) hard disk drives are usually furnished with a list of defective tracks and sectors. Keep this list and record the drive type number of the hard disk drive in the equipment log.

4. If you are installing an additional 3½-inch or 5¼-inch diskette drive, make sure its drive ID is set to 1. Refer to the supplied kit installation instructions for the appropriate drive ID locations.

NOTE

If a 5¼-inch hard disk drive has a bezel attached, it must be removed prior to installation.

5. Before installing a 5¼-inch device, attach the supplied slide rails and grounding clips as shown in Figure 4-5. Use either upper or lower mounting holes depending on the device you are installing.

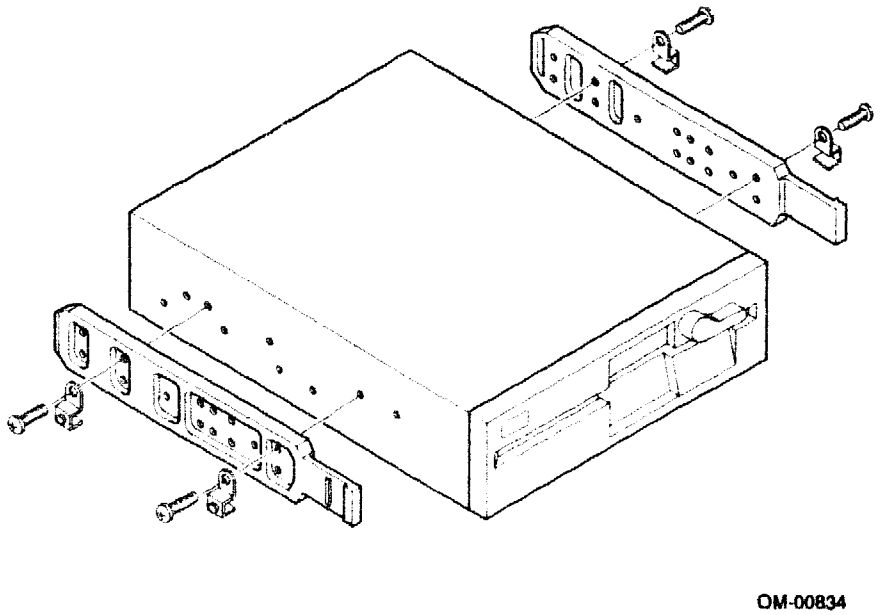


Figure 4-5. Attaching Slide Rails

6. Before installing a 3½-inch device, attach the expansion brackets and grounding clips supplied with the device prior to attaching the slide rails (see Figure 4-6).

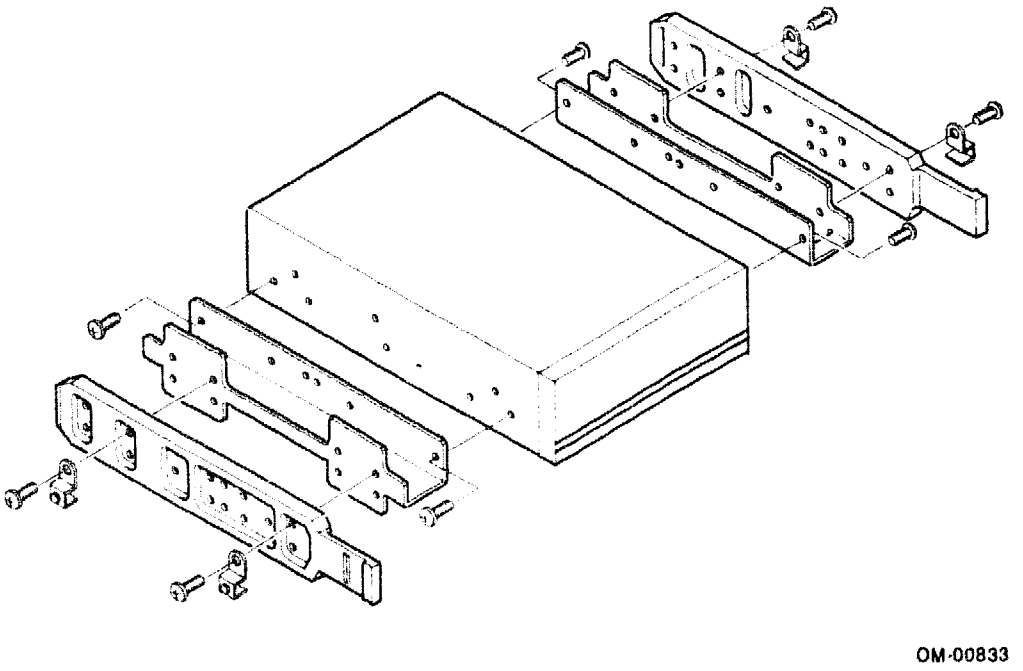
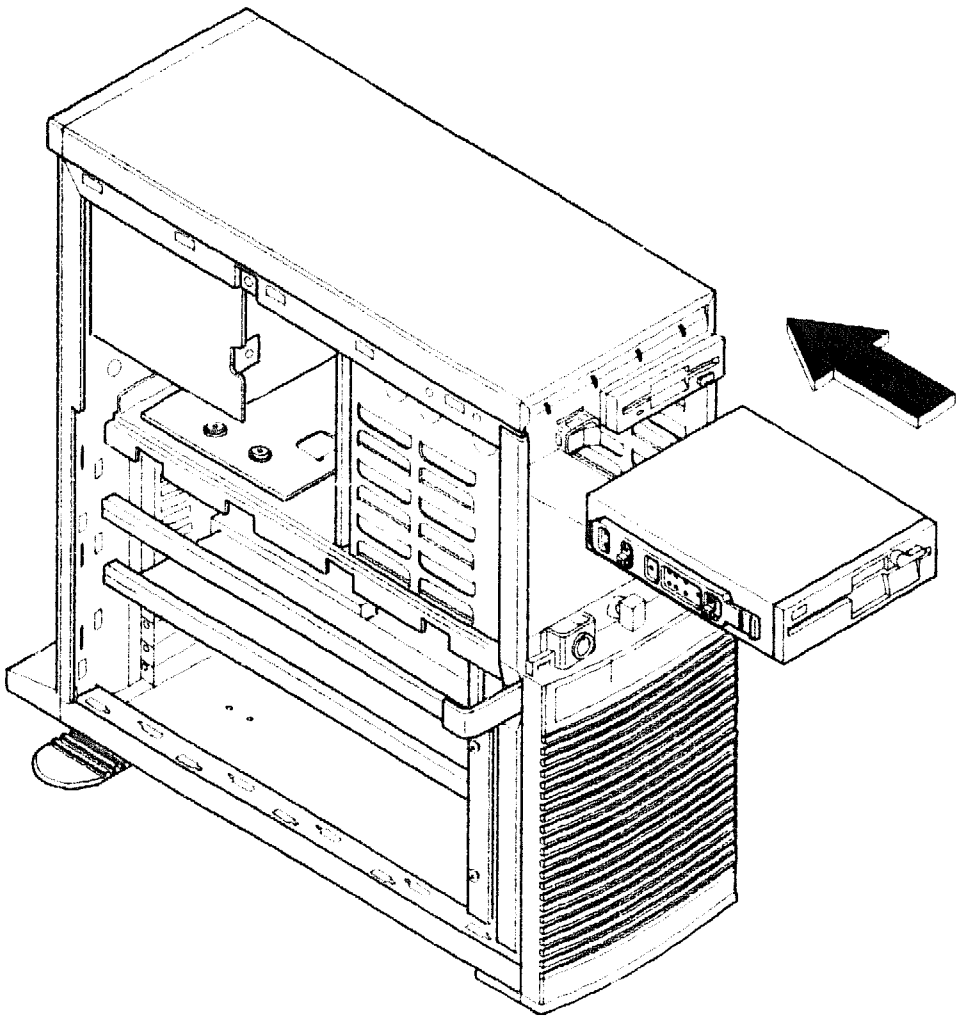


Figure 4-6. Attaching Expansion Brackets and Slide Rails

7. Insert a device into the front peripheral bay making sure the slide rails are aligned with the rail guides (see Figure 4-7).



DEC00059-2

Figure 4-7. Installing a Device into the Front Peripheral Bay

8. Plug in an available power connector to the mating power connector located at the rear of the installed device (see Figures 4-8,A and 4-9,A).

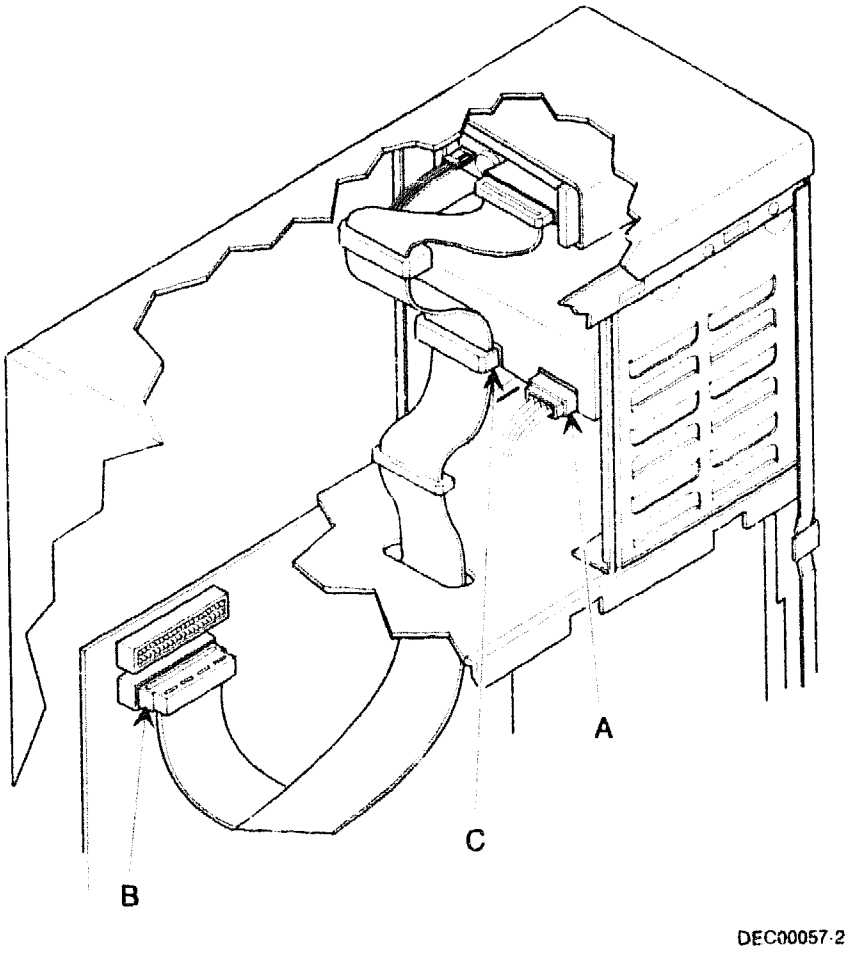


Figure 4-8. Typical Diskette Drive Rear Connections (Front Bay)

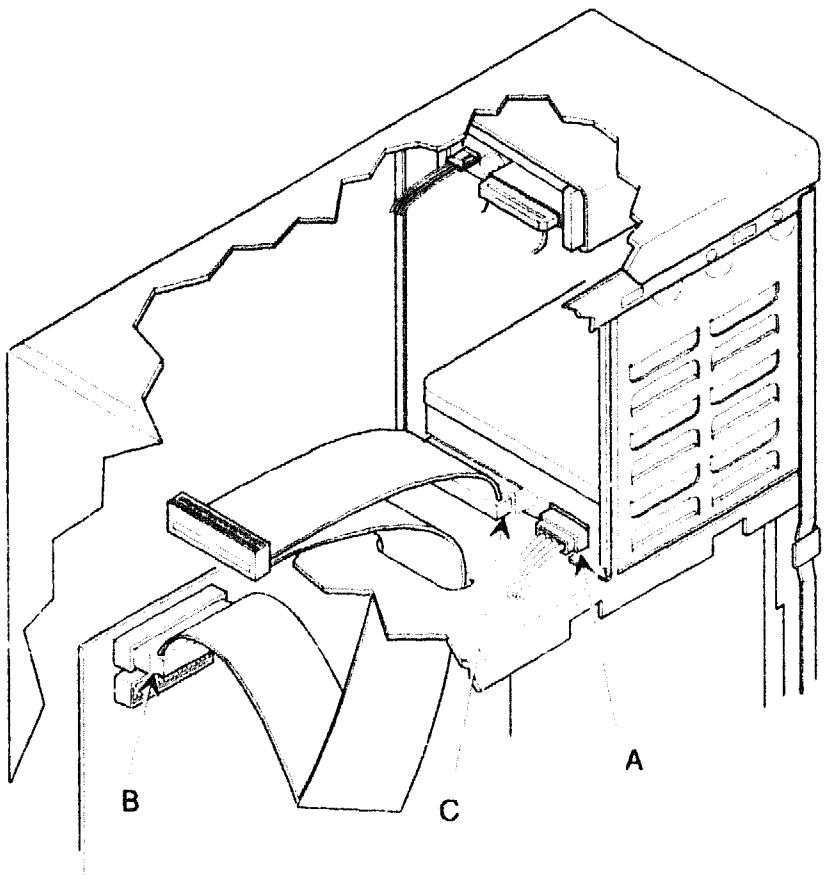


Figure 4-9. Typical Disk Drive Rear Connections (Front Bay)

NOTE

The diskette drive and IDE drive ribbon cables can only be installed one way. Before making any connection, make sure the key on the appropriate ribbon cable connector lines up with the slot in the device's rear connector.

In addition, the DECpc 400ST Series computer is shipped with a 3½-inch diskette drive designated as diskette drive A. If you add an additional 3½-inch or 5¼-inch diskette drive and you want to designate either one as diskette drive A, you must use the proper diskette drive cable connectors (refer to Table 4-1 and Figure 4-10).

Table 4-1. Diskette Drive Cabling Scheme

Optional Diskette Drive	Drive Designation	Connector Number
3½-inch	B	4
3½-inch	A	1
5¼-inch	B	3
5¼-inch	A	2

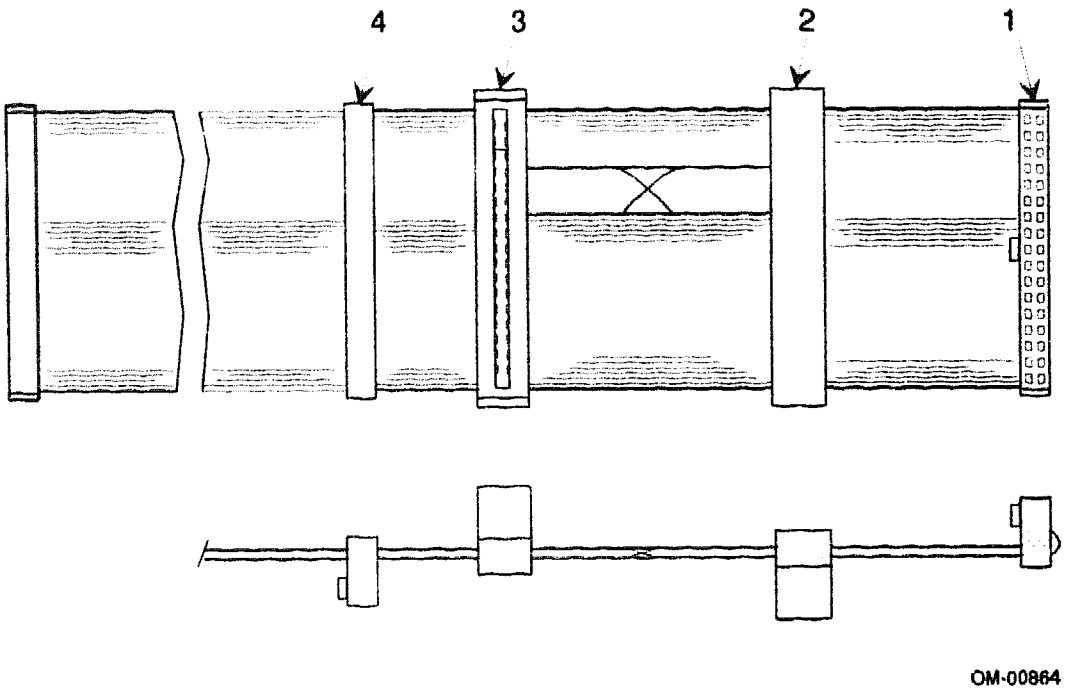


Figure 4-10. Diskette Drive Cable Connector Locations

9. For diskette drives, make sure one end of the supplied ribbon cable is connected to J0820 on the system board (see Figure 4-8,B, 4-11,A, and Table 4-2). Connect the other end to the data/control connector at the rear of the diskette drive (see Figure 4-8,C). Make sure both connectors on the ribbon cable are fully seated.

Table 4-2. System Board Layout

Figure Legend	Connector(s)
A	Diskette drive
B	IDE hard disk drive
C	SCSI activity
D	Expansion slots
E	CPU module
F	Memory module
G	Serial
H	Parallel
I	Keyboard
J	Mouse
K	SIMM
L	RTC (system battery)

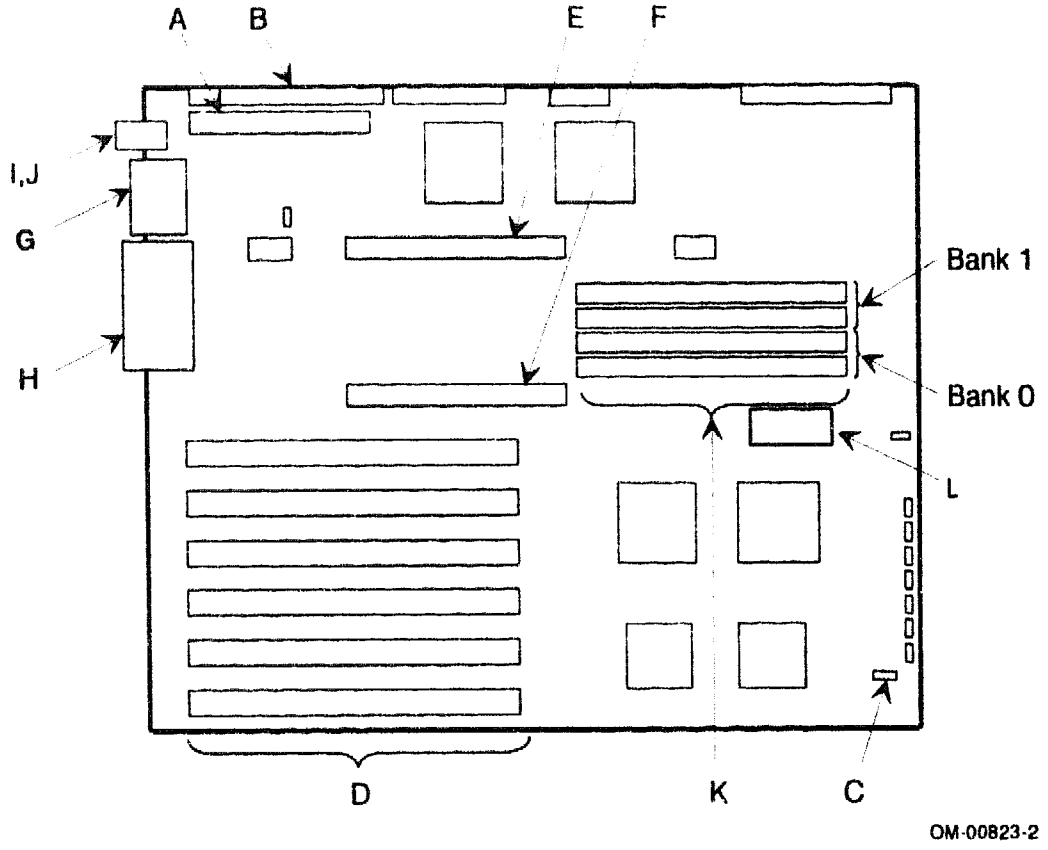


Figure 4-11. System Board Layout

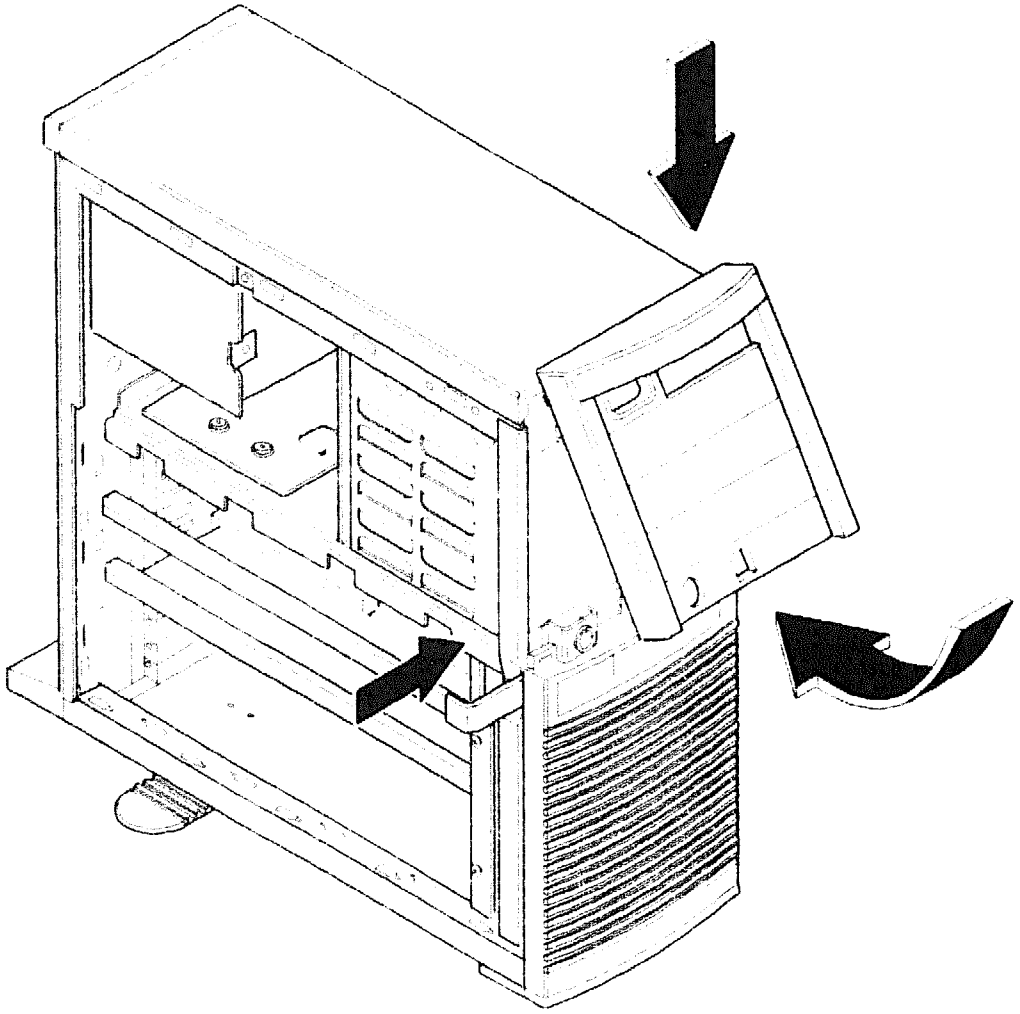
10. For IDE hard disk drives, connect one end of the supplied ribbon cable to J0821 on the system board (see Figure 4-9,B and 4-11,B). Connect the other end to the data/control connector at the rear of the hard disk drive (see Figure 4-9,C). Make sure both connectors on the ribbon cable are fully seated.

NOTE

If you are installing a SCSI device, remove its terminating resistors (if installed) and then connect one of the connectors at the terminating end of the ribbon cable (supplied with the SCSI controller board) to the rear of the SCSI device. Connect the opposite end to the appropriate connector on the SCSI controller board. Refer to the kit installation instructions supplied with the SCSI device for further details.

11. If applicable, replace any filler panel. When replacing filler panels, note the orientation of the retaining posts for the Electromagnetic Interference (EMI) shield (see Figure 4-4,C). Follow this orientation while pressing any filler panel into place.

12. Replace the front peripheral bay bezel (see Figure 4-12).



DEC00056-3

Figure 4-12. Replacing the Front Peripheral Bay Bezel

13. Install the inner cover and outside cover. Refer to the replacement procedures described at the end of this chapter.

WARNING

To contain overheating during any fault condition, always follow procedures to install the inner and outside covers before powering on the computer.

14. Run the System Configuration Utility (SCU) "Configuring Your Computer" option if the installed mass storage device (diskette or IDE) is an addition to the system box or a different drive type. Refer to Chapter 3, "Configuring Your Computer," for detailed instructions on running the SCU.

Installing a Device into the Internal Peripheral Bay

1. Remove the system box outside cover and inner cover. Refer to the removal procedures previously discussed.
2. Loosen the captive retaining screw that secures the internal mounting tray to the chassis (see Figure 4-13,A).

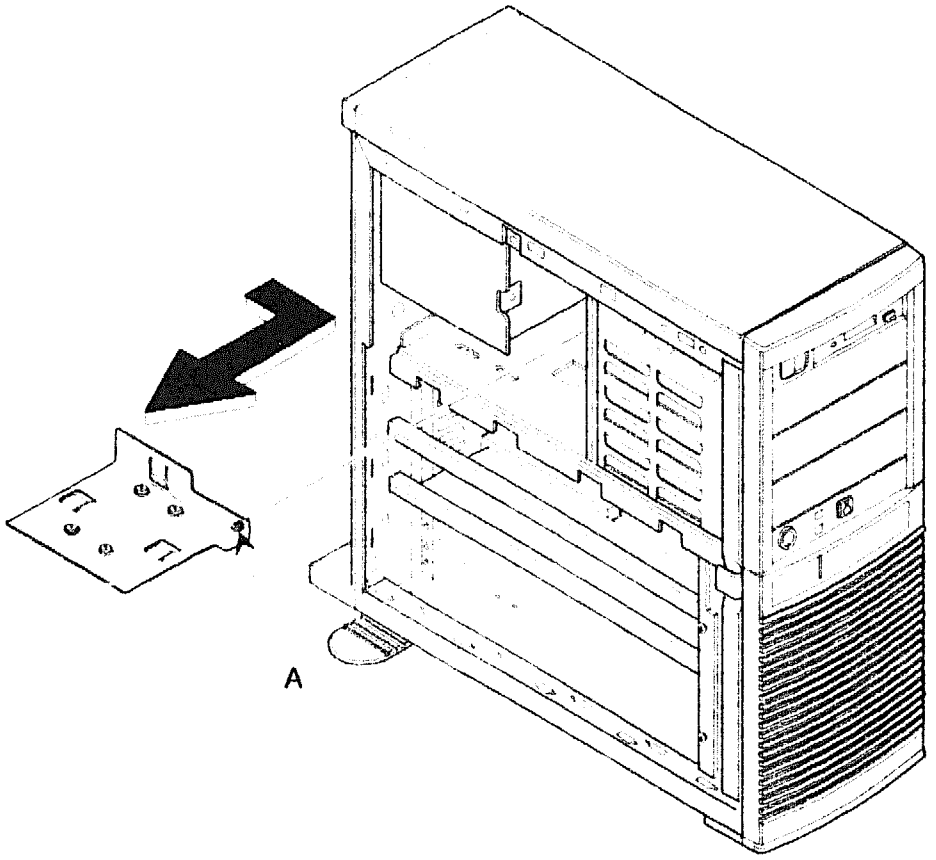


Figure 4-13. Removing the Internal Mounting Tray

3. Remove the tray by sliding it toward the front of the system box (to release the locking tabs) and then by lifting it up and away from the chassis (see Figure 4-13).

4. Attach the mass storage device to the mounting tray (see Figure 4-14).

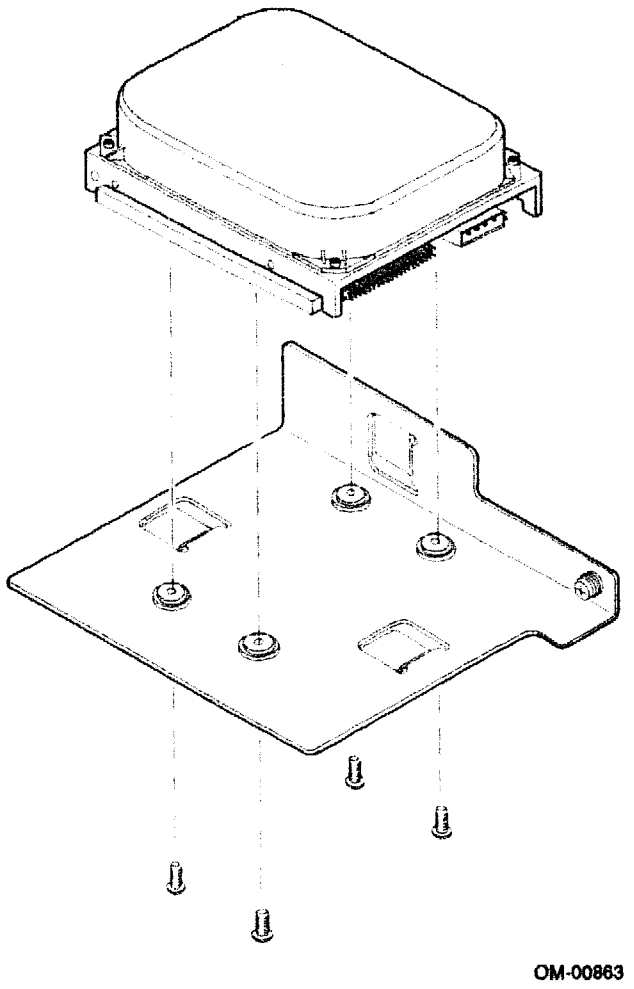


Figure 4-14. Attaching a Device to the Internal Mounting Tray

5. Secure the internal mounting tray to the chassis using the locking tabs and captive retaining screw (see Figure 4-15,A).

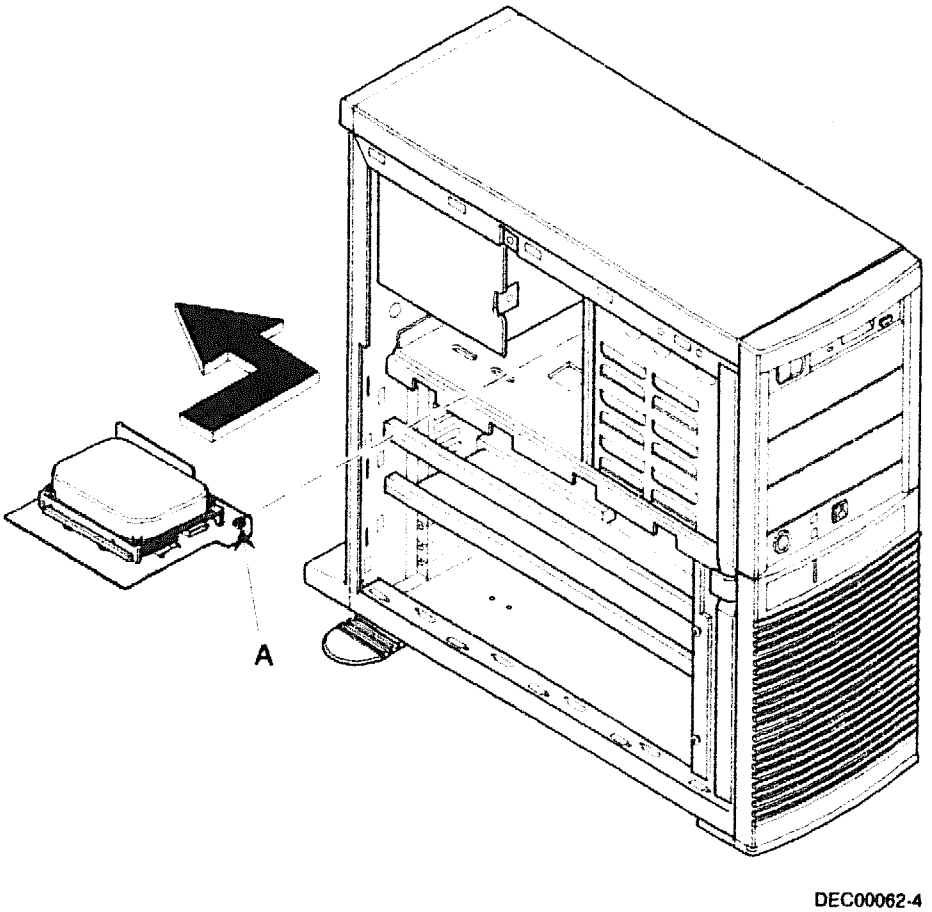


Figure 4-15. Installing the Internal Mounting Tray

6. Plug in an available power connector to the mating power connector located at the rear of the installed device (see Figure 4-16,A).

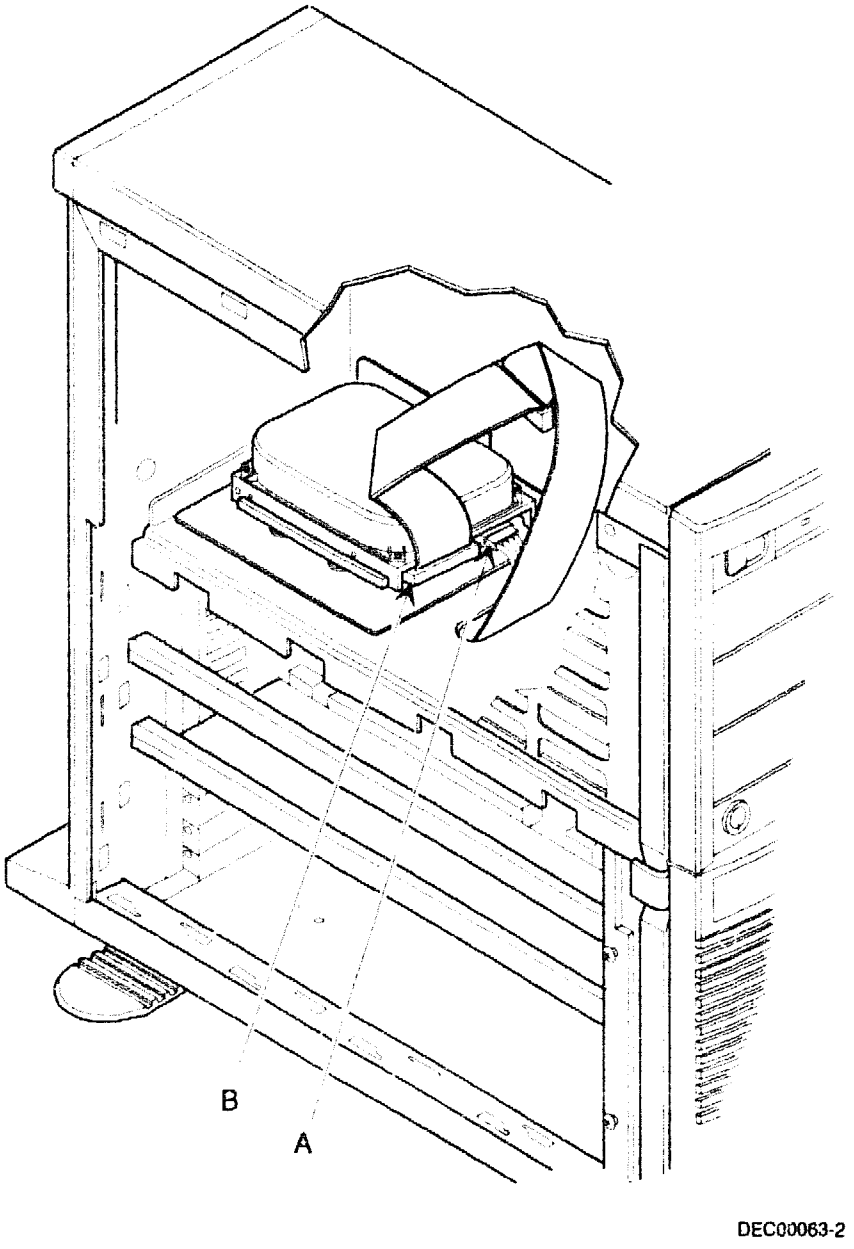


Figure 4-16. Typical Device Rear Connections (Internal Bay)

NOTE

The IDE drive ribbon cable can only be installed one way. Before making any connection, make sure the key on the IDE ribbon cable connectors line up with the header on the system board (J0821) and with the slot in the device's rear data/control connector.

7. Connect one end of the ribbon cable supplied with your IDE hard disk drive to J0821 on the system board (see Figure 4-11,B) and the other end to the data/control connector at the rear of the hard disk drive (see Figure 4-16,B). Make sure both connectors on the ribbon cable are fully seated.

NOTE

If you are installing a SCSI device, remove its terminating resistors (if installed) and then connect one of the connectors at the terminating end of the ribbon cable (supplied with the SCSI controller board) to the rear of the SCSI device. Connect the opposite end to the appropriate connector on the SCSI controller board. Refer to the kit installation instructions supplied with the SCSI device for further details.

8. Install the inner cover and outside cover. Refer to the replacement procedures described at the end of this chapter.

WARNING

To contain overheating during any fault condition, always follow procedures to install the inner and outside covers before powering on the computer.

9. Run the SCU "Configuring Your Computer" option if the installed IDE hard disk drive is an addition to the system box or a different drive type. Refer to Chapter 3, "Configuring Your Computer," for detailed instructions on running the SCU.

Installing System Board Options

The following system board options can be added to enhance the performance of your DECpc 400ST Series computer:

- A CPU module
- An external cache
- A memory module (with up to 128 MB of DRAM)
- A 4 MB, 8 MB, 16 MB, or 32 MB SIMM kit
- EISA/ISA expansion boards

Removing a CPU Module

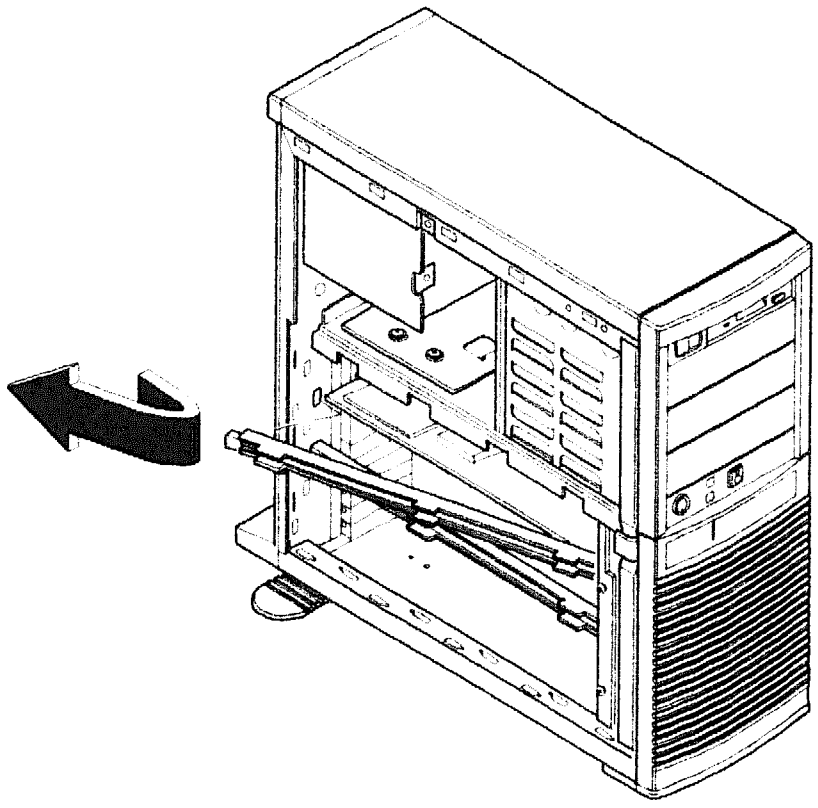
The CPU module must be removed to:

- Install an external cache
- Install a faster CPU module
- Add system board memory

To remove a CPU module:

1. Remove the system box outside cover and inner cover. Refer to the removal procedures previously discussed.

2. Release the CPU module retaining bracket by gently squeezing in at the end nearest the rear of the chassis. Remove the bracket by sliding it toward the front of the system box while lifting it away from the chassis (see Figure 4-17).



DEC00064-2

Figure 4-17. Removing the CPU Module Retaining Bracket

CAUTION

Do not touch any electrical component unless you are properly grounded. Proper grounding can be established by wearing a grounded wrist strap or by touching an exposed metal part of the system box chassis. A static discharge from your fingers can result in permanent damage to electronic components.

3. Carefully remove the CPU module from the system board (see Figure 4-18).
4. Place the CPU module in a suitable antistatic package, or if installing an external cache, place it on an antistatic foam pad or a grounded workstation surface.
5. Install an external cache if applicable. Refer to the external cache installation procedures later in this chapter.
6. Install any additional system board memory if applicable. Refer to the system board memory installation procedures later in this chapter.

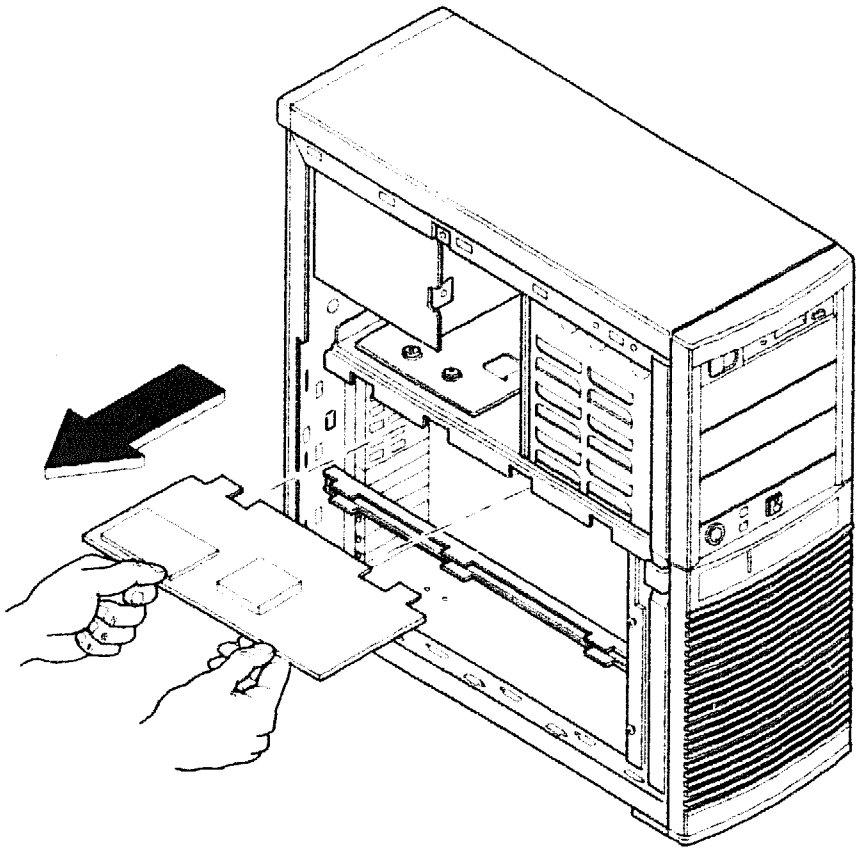


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Figure 4-18. Removing the CPU Module

Installing a CPU Module

Use the following procedure to install a new CPU module. If you are installing an existing CPU module, begin with step 5.

CAUTION

Do not touch any electrical component unless you are properly grounded. Proper grounding can be established by wearing a grounded wrist strap or by touching an exposed metal part of the system box chassis. A static discharge from your fingers can result in permanent damage to electronic components.

1. Remove the CPU module from its protective wrapper and place it on an antistatic foam pad or grounded workstation surface.
2. Record its serial number in the equipment log (refer to Appendix E).
3. Install an optional external cache if applicable. Refer to the external cache installation procedures later in this chapter.

5. Place the previously removed retaining bracket over the CPU module.

6. Replace the retaining bracket by gently squeezing in at the end nearest the rear of the chassis while sliding the bracket toward the rear of the system box (see Figure 4-20).

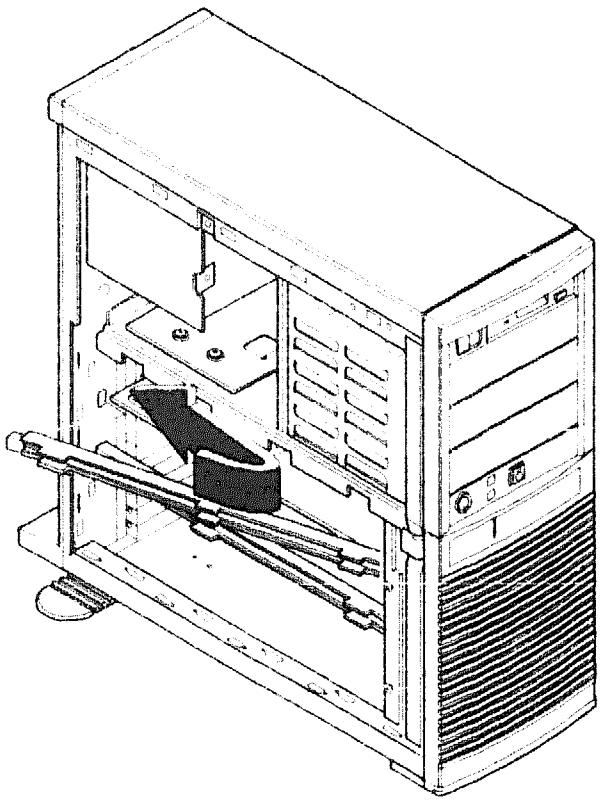


Figure 4-20. Installing the CPU Module Retaining Bracket

7. Install the inner cover and outside cover. Refer to the replacement procedures described at the end of this chapter.

WARNING

To contain overheating during any fault condition, always follow procedures to install the inner and outside covers before powering on the computer.

8. If you upgraded your computer with a faster CPU module, attach the new medallion to the front bezel. Refer to the instructions supplied with the CPU upgrade kit for further details.

9. Run the SCU to configure the computer for the previously installed option(s). Refer to Chapter 3, "Configuring Your Computer," for detailed instructions on running the SCU.

Installing an External Cache

An external cache plugs directly into a dedicated socket on some CPU modules. To install an external cache:

CAUTION

Do not touch any electrical component unless you are properly grounded. Proper grounding can be established by wearing a grounded wrist strap or by touching an exposed metal part of the system box chassis. A static discharge from your fingers can result in permanent damage to electronic components.

1. Remove the CPU module. Refer to the CPU module removal procedures previously discussed.

2. Remove the external cache from its antistatic package, being careful not to touch its pins.

3. Position the external cache relative to the CPU module as shown in Figure 4-21. Make sure the guide pin on the external cache lines up with the appropriate pin on the socket (see Figure 4-21,A).

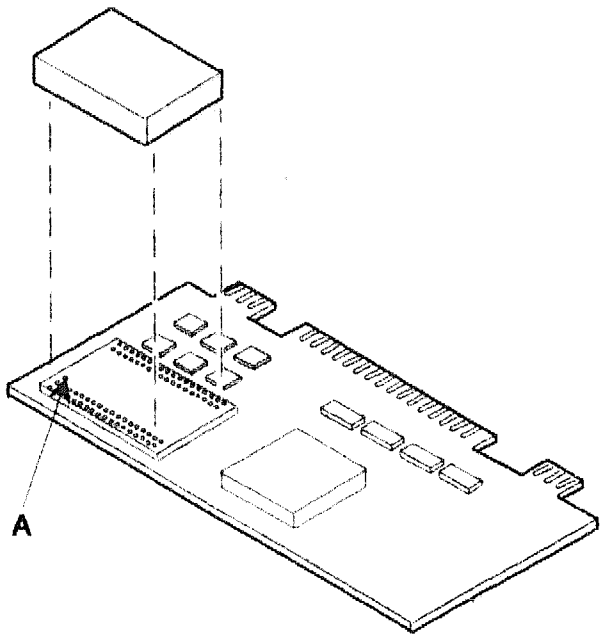


Figure 4-21. Installing an External Cache

4. Align the external cache's pins with the socket contacts.
5. Press down on the external cache until it fully seats in the socket. Be careful not to bend the pins.
6. Install any appropriate external cache jumpers on the CPU module. Refer to Appendix F for additional information.
7. Install the CPU module. Refer to the installation procedures previously discussed.
8. Run the SCU to configure the computer for external cache operation. Refer to Chapter 3, "Configuring Your Computer," for detailed instructions on running the SCU.

Installing a Memory Module

To install a memory module:

CAUTION

Do not touch any electrical component unless you are properly grounded. Proper grounding can be established by wearing a grounded wrist strap or by touching an exposed metal part of the system box chassis. A static discharge from your fingers can result in permanent damage to electronic components.

1. Remove the system box outside cover and inner cover. Refer to the removal procedures previously discussed.

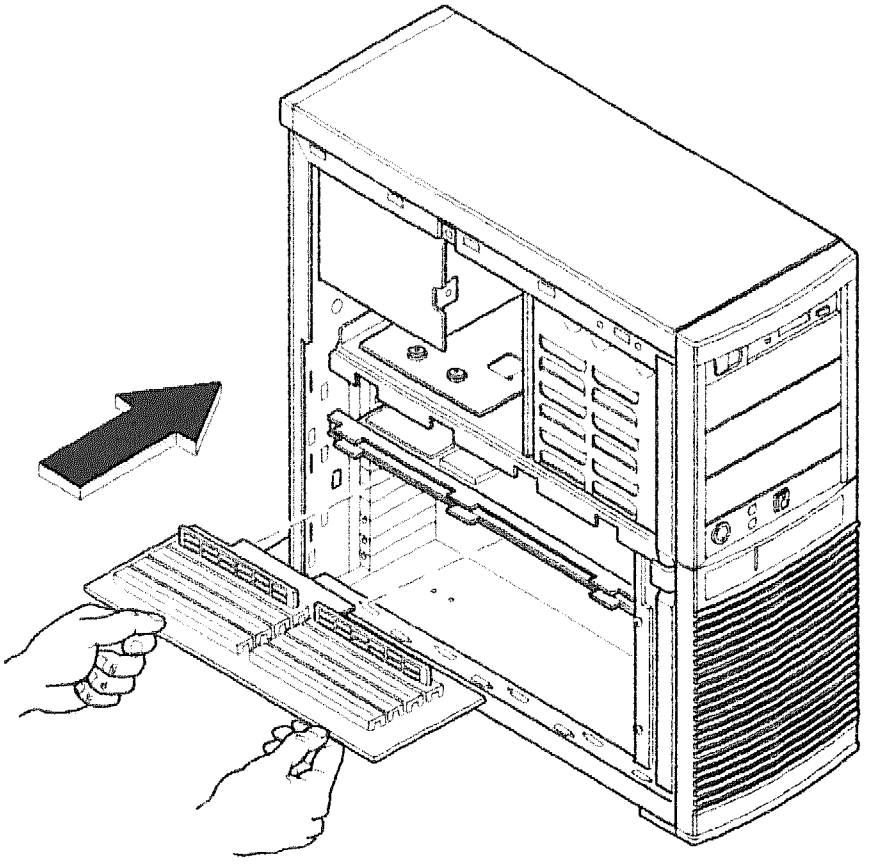
2. Release the memory module retaining bracket by gently squeezing in at the end nearest the rear of the chassis. Remove the bracket by sliding it toward the front of the system box while lifting it away from the chassis (see Figure 4-17).

3. Remove the memory module from its protective wrapper and place it on an antistatic foam pad or grounded workstation surface.

4. Record its serial number in the equipment log (refer to Appendix E).

5. Install any additional SIMMs on the memory module. Refer to the instructions supplied with the memory module upgrade kit for further details.

6. Install the memory module into the appropriate connector on the system board (see Figure 4-11,F and 4-22).



DEC00060-2

Figure 4-22. Installing a Memory Module

7. Place the previously removed retaining bracket over the memory module.
8. Replace the retaining bracket by gently squeezing in at the end nearest the rear of the chassis while sliding the bracket toward the rear of the system box (see Figure 4-20).
9. Install the inner cover and outside cover. Refer to the replacement procedures described at the end of this chapter.

WARNING

To contain overheating during any fault condition, always follow procedures to install the inner and outside covers before powering on the computer.

10. Run the SCU to configure the computer for memory module operation. Refer to Chapter 3, "Configuring Your Computer," for detailed instructions on running the SCU.

Installing System Board Memory

Your DECpc 400ST Series system board supports up to 64 MB of memory (using 16 MB SIMMs). You can increase memory using the 4 SIMM sockets located on the system board (see Figure 4-23,B). Each socket holds one double-sided SIMM. SIMMs can be 2 MB, 4 MB, 8 MB, or 16 MB in size as follows:

- 2 MB SIMMs consist of sixteen 256 KB × 4-bit data devices and eight 256 KB × 1-bit parity devices
- 4 MB SIMMs consist of eight 1 MB × 4-bit data devices and four 1 MB × 1-bit parity devices
- 8 MB SIMMs consist of sixteen 1 MB × 4-bit data devices and eight 256 KB × 1-bit parity devices
- 16 MB SIMMs consist of sixteen 4 MB × 4-bit data devices and eight 1 MB × 1-bit parity devices

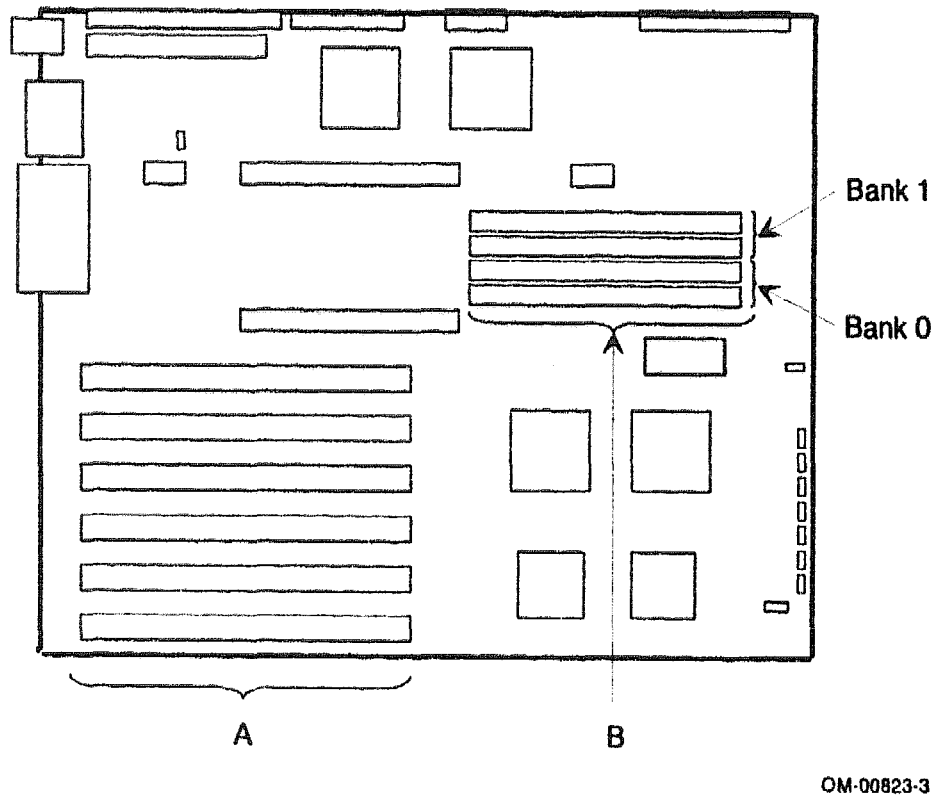


Figure 4-23. SIMM Socket and Expansion Slot Locations

The base computer is shipped with 4 MB of DRAM. Your computer might contain more than 4 MB if specified at the time of order. When you add additional memory, you must adhere to the following:

- The DECpc 400ST Series computer requires SIMMs having an access time of 80 ns or faster
- Always fill two sockets at a time using the same SIMM size, type and speed
- Always fill bank 0 before bank 1 (see Figure 4-23), starting with the vacant socket nearest the bottom edge of the system board
- Each socket must be filled with either 2 MB, 4 MB, 8 MB, 16 MB SIMMs

To Install additional memory:

1. Remove the system box outside cover, peripheral bay bracket (if applicable), and inner cover. Refer to the removal procedures previously discussed.

CAUTION

Do not touch any electrical component unless you are properly grounded. Proper grounding can be established by wearing a grounded wrist strap or by touching an exposed metal part of the system box chassis. A static discharge from your fingers can result in permanent damage to electronic components.

Use care when installing SIMMs. The retaining clips on the sockets can be easily bent or broken by using too much force.

2. Remove the CPU module and memory module (if applicable). Refer to the CPU and memory module removal procedures previously discussed.
3. Holding the SIMMs only by their edges, individually remove them from the antistatic package.

4. Carefully position each SIMM with the notch on the left. Insert its bottom edge into the socket slot beginning with the vacant socket nearest the bottom edge of the system board (see Figure 4-24).

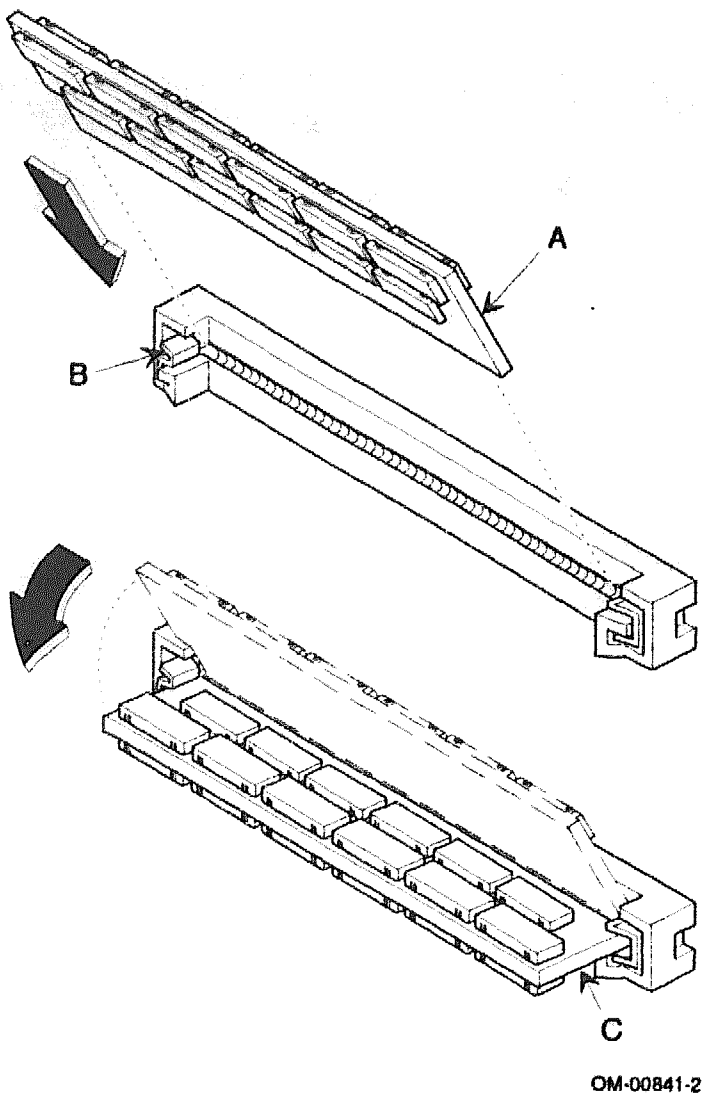


Figure 4-24. Installing System Board SIMMs

5. When each SIMM seats correctly, hold the ends (Figure 4-24,A) and gently push the top edge toward the slot retaining clips (Figure 4-24,B) until it snaps into place (Figure 4-24,C).

6. If a SIMM did not seat correctly, gently spread the retaining clips just enough to permit the top edge of the SIMM to be pulled away from the clips and then reseat.

NOTE

If 16 MB or 32 MB SIMMs are being installed, jumpers on the system board must be set. Refer to Appendix A for additional information.

7. Install the CPU module and memory module (if applicable). Refer to the CPU and memory module installation procedures previously discussed.

8. Install the inner cover, peripheral bay bracket (if applicable), and outside cover. Refer to the replacement procedures described at the end of this chapter.

WARNING

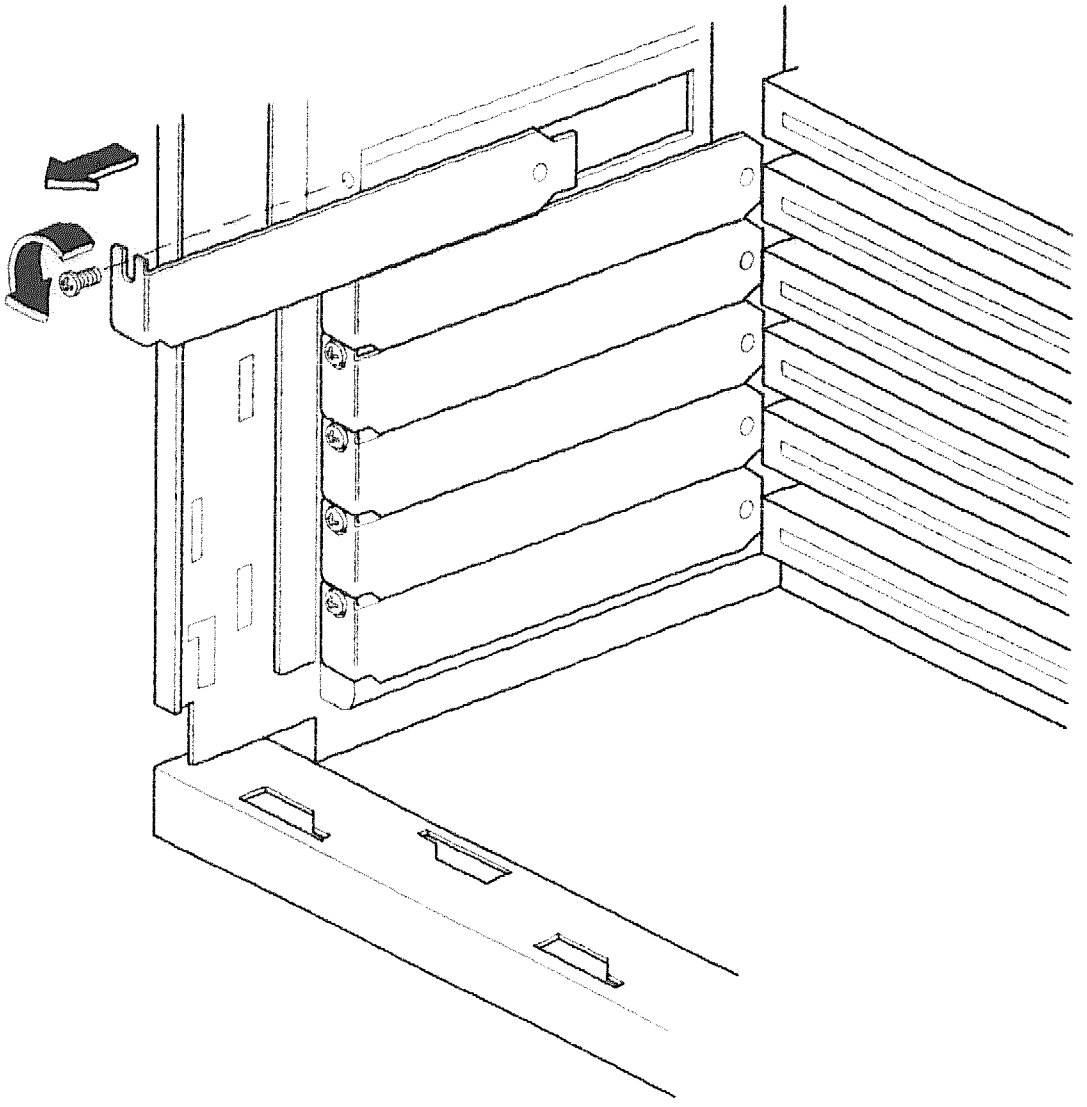
To contain overheating during any fault condition, always follow procedures to install the inner and outside covers before powering on the computer.

9. Run the SCU to configure the computer for the additional amount of memory installed. Refer to Chapter 3, "Configuring Your Computer," for detailed instructions on running the SCU.

Installing Expansion Boards

The following procedures can be used to install any EISA/ISA expansion board.

1. Remove the system box outside cover and inner cover. Refer to the removal procedures previously discussed.
2. Locate the expansion slots on the system board (see Figure 4-23,A).
3. Select an expansion slot and then remove the expansion slot metal cover (see Figure 4-25).



DEC00065

Figure 4-25. Removing an Expansion Slot Cover

CAUTION

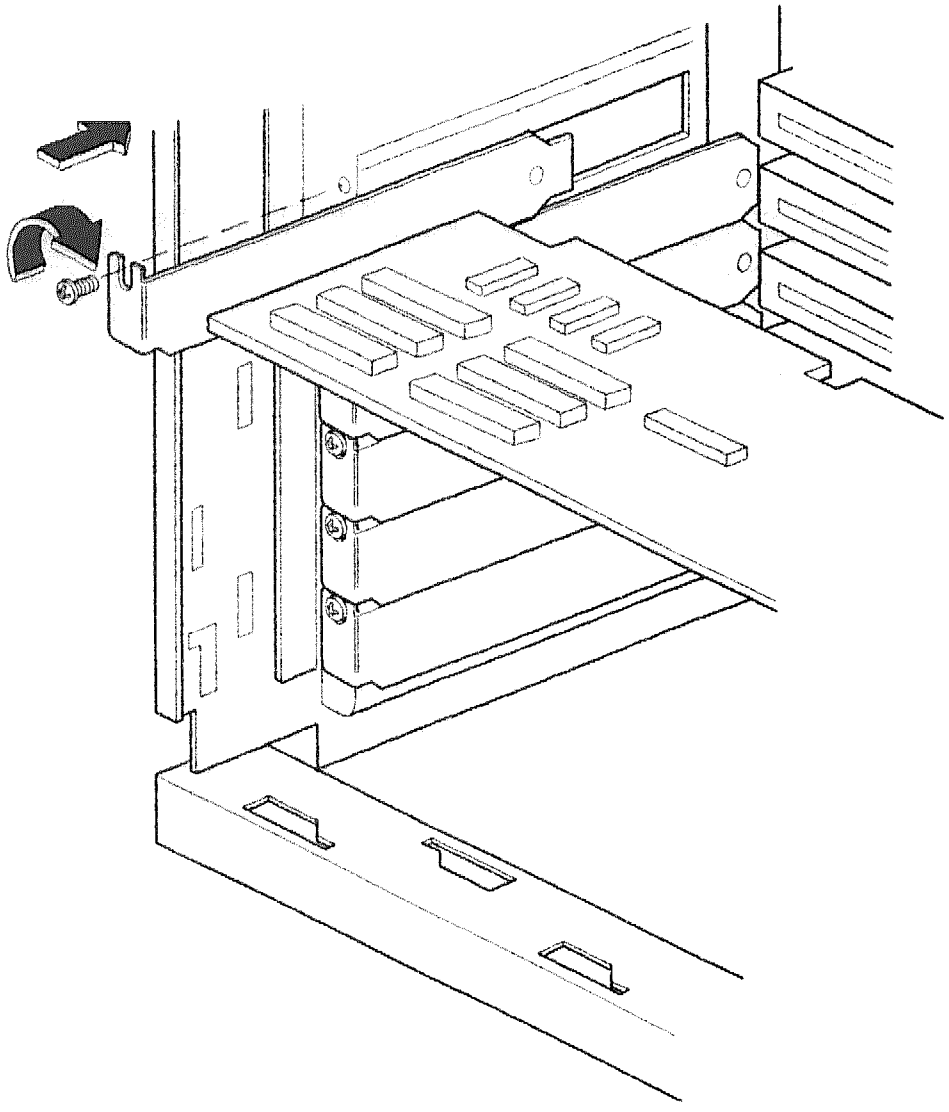
Do not touch any electrical component unless you are properly grounded. Proper grounding can be established by wearing a grounded wrist strap or by touching an exposed metal part of the system box chassis. A static discharge from your fingers can result in permanent damage to electronic components.

Do not lay the expansion board on any ungrounded surface after removing it from its protective wrapper. This includes laying it on the wrapper itself, which can contain static voltage on its outside layers.

4. Remove the expansion board from its antistatic wrapper. Hold the expansion board by its edges and avoid touching components and the gold connectors.

5. Record the expansion board's serial number and any jumper or switch settings in the equipment log located in Appendix E.

6. Insert the expansion board's connectors into the system board expansion slot by firmly pressing it into the slot while holding the top edge or upper corners (see Figure 4-26). The bottom of the expansion board's retaining bracket should fit into the slot on the inside of the rear I/O panel.



DEC00066-2

Figure 4-26. Installing an Expansion Board

7. Align the hole in the expansion board's retaining bracket with the screw slot in the expansion slot frame. The expansion board retaining bracket fits into the space that was previously occupied by the expansion slot cover.

8. Insert the screw while making sure the bracket screw slot is pushed all the way against the screw before tightening. If this is not done, the board retaining bracket might interfere with an adjacent expansion board bracket.

9. Install the inner cover and outside cover. Refer to the replacement procedures described at the end of this chapter.

WARNING

To contain overheating during any fault condition, always follow procedures to install the inner and outside covers before powering on the computer.

10. Run the SCU to configure the computer for the expansion board(s) installed. Refer to Chapter 3, "Configuring Your Computer," for detailed instructions on running the SCU.

Replacing the Real-Time Clock (RTC)

WARNING

The RTC contains a lithium battery. It is safety sealed and should not be opened. To prevent explosion hazards, avoid shorting the battery. Do not attempt to recharge it.

For continued safe operation of this computer, only replace the RTC with the recommended Digital part.

A lithium battery inside the RTC provides power for CMOS RAM, which holds computer configuration information. The following procedures are provided in case the RTC needs to be replaced.

1. If you have not created a SYSTEM.SCI file, create one using the SCU. Refer to Chapter 3, "Configuring Your Computer," for detailed information on running the SCU.
2. Remove the system box outside cover and inner cover. Refer to the removal procedures previously discussed.

CAUTION

Do not touch any electrical component unless you are properly grounded. Proper grounding can be established by wearing a grounded wrist strap or by touching an exposed metal part of the system box chassis. A static discharge from your fingers can result in permanent damage to electronic components.

3. Remove the CPU module and memory module (if applicable). Refer to the appropriate module removal procedures previously discussed.

NOTE

For Nordic requirements regarding lithium battery replacement, see front matter.

4. Locate the RTC on the system board (see Figure 4-11,L and 4-27) and carefully lift it from its socket.

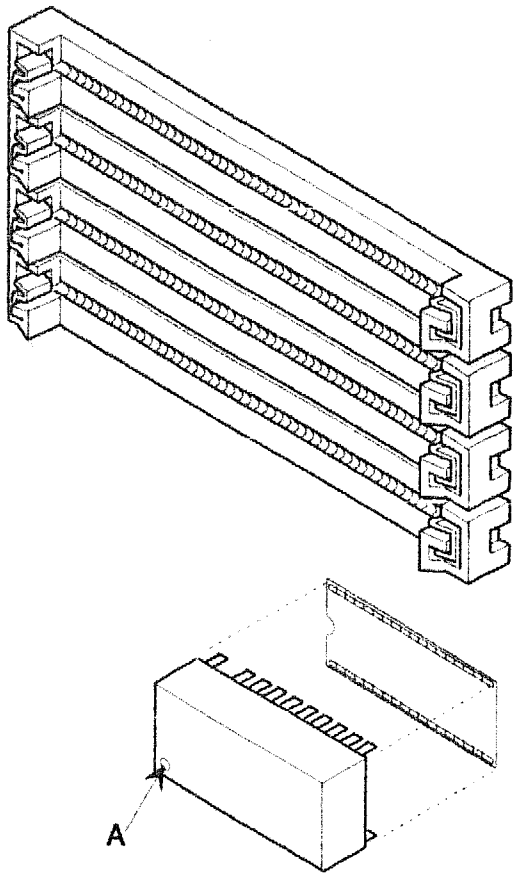


Figure 4-27. Replacing the RTC

5. Properly dispose of the RTC. Refer to the RTC disposal procedures provided later in this chapter.
6. Carefully remove the replacement RTC from its antistatic package. Do not touch its pins.
7. Position the new RTC so pin 1 (marked by a dot) is aligned with the pin 1 marking on the system board (see Figure 4-27,A).
8. Align the pins of the chip with the RTC socket.
9. Gently insert the chip, being careful not to bend the pins.
10. Install the CPU module and memory module (if applicable). Refer to the appropriate module installation procedures previously discussed.
11. Install the inner cover and outside cover. Refer to the replacement procedures described at the end of this chapter.

WARNING

To contain overheating during any fault condition, always follow procedures to install the inner and outside covers before powering on the computer.

12. Configure your computer using the SCU. Refer to chapter 3, "Configuring Your Computer," for detailed instructions on running the SCU.

RTC Disposal

Use the following procedures to properly dispose of the RTC:

1. Clip all exposed chip leads. Do not short any leads together.
2. Wrap the chip in insulating tape to prevent accidental shorting.
3. Pack the chip so it cannot be crushed.
4. Place the chip into an appropriate trash receptacle.

Replacing the System Box Inner Cover

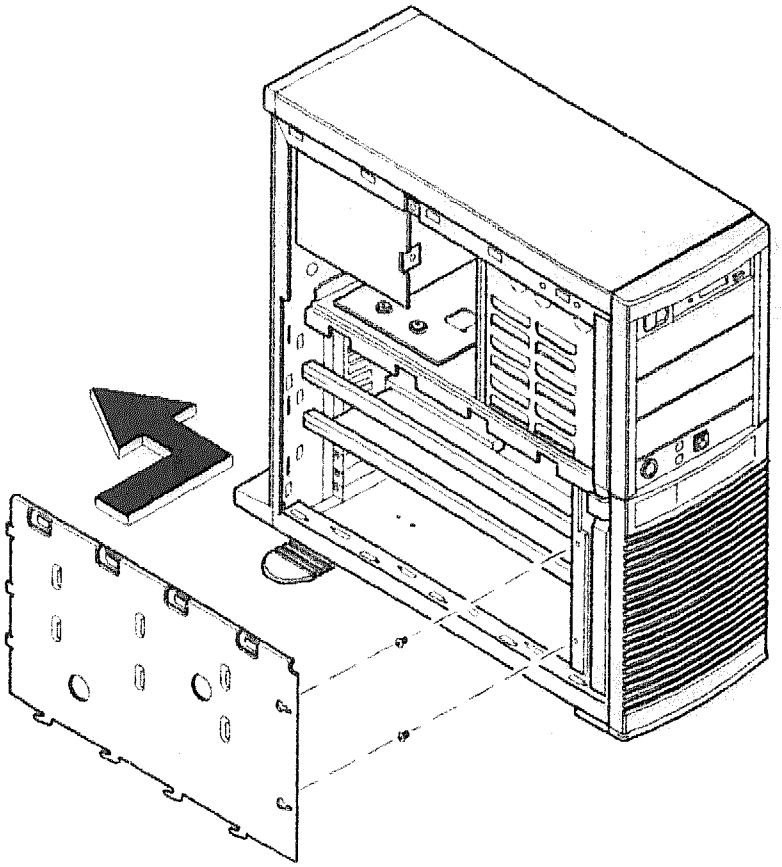
To replace the system box inner cover:

1. Align the inner cover with the openings at the middle of the chassis and with the inner locking tab openings at the bottom of the chassis. Push the inner cover toward the rear of the chassis until it engages the locking tabs (see Figure 4-28).

NOTE

To minimize EMI, make sure the three tabs at the left rear of the inner cover fully engage the corresponding slots at the rear of the chassis.

2. Replace the two retaining screws to secure the inner cover to the chassis (see Figure 4-28).



DEC00058-3

Figure 4-28. Installing the System Box Inner Cover

Replacing the System Box Outside Cover

To replace the system box outside cover:

1. Align the outside cover with the openings at the top of the chassis and with the outer locking tab openings at the bottom of the chassis. Push the outside cover toward the front of the chassis until it engages the locking tabs (see Figure 4-29).
2. Secure the outside cover to the chassis using the two captive retaining screws (see Figure 4-29,A).
3. Lock the outside cover (see Figure 1-3).
4. Connect all previously removed external cables and then remove their identification tags.

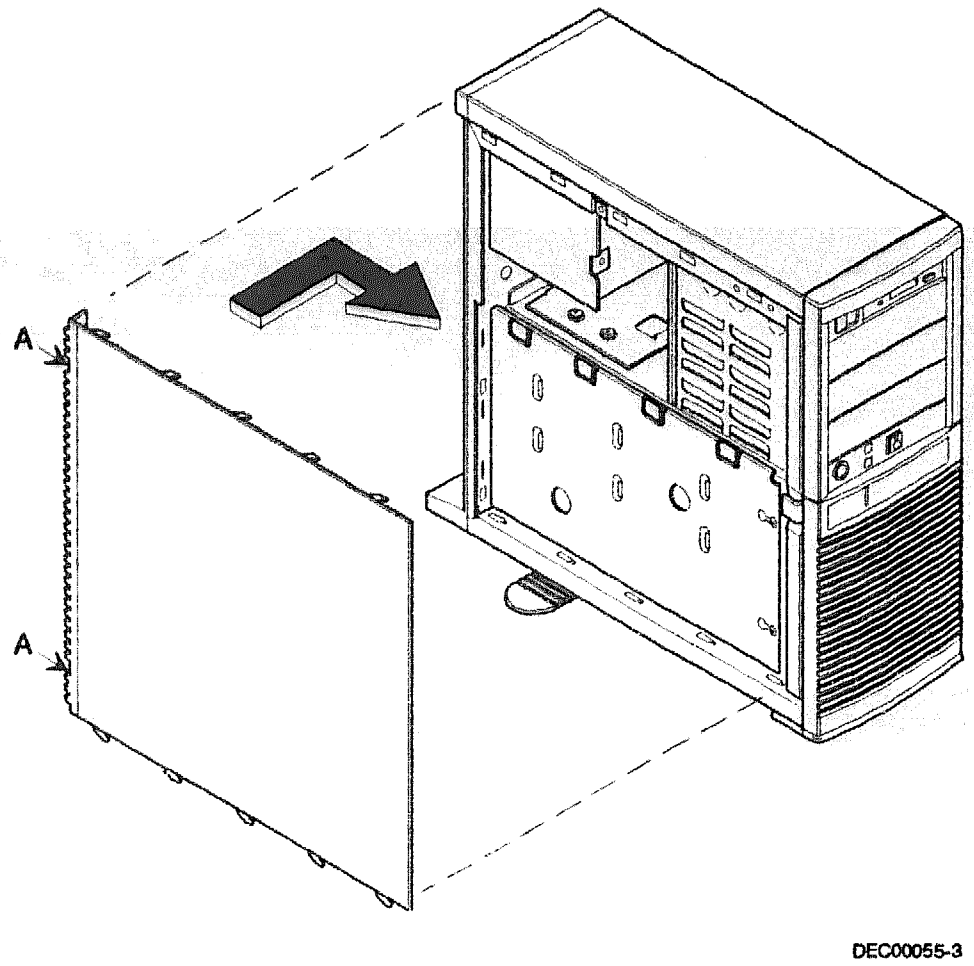


Figure 4-29. Installing the System Box Outside Cover

5

Problem Solving

Introduction

Depending on your type of warranty, if the DECpc 400ST Series computer fails, you might need to return some or all components to Digital for service. This chapter suggests corrective actions that can be taken prior to returning any computer components. If you have installed options, refer to the documentation supplied with each one.

Initial Troubleshooting

Follow this general procedure to initially troubleshoot your DECpc 400ST Series computer:

1. Press the Ctrl + Alt + Del keys. If your computer fails to boot, turn it off, wait 20 seconds, and then turn it back on.
2. Check for loose cables and connections.
3. Check the computer and monitor indicator lights.
4. Observe any POST messages. Refer to Appendix B, "Error and Informational Messages," take the appropriate steps to correct the problem, and then reset the computer.
5. Run the System Configuration Utility (SCU) and make sure the computer is properly configured for the installed hardware and software.
6. Seek assistance. Contact Digital Customer Service for software or hardware related problems.
7. If you need to return a failed component, pack it in its original container and return it to Digital for service.

3. If you are a self-maintenance customer, call Digital Customer Service for assistance and recommendations.

For your convenience, you can place orders by phone, by mail, or in person at any Digital sales office.

Call 1-800-DIGITAL between 8:30 a.m. and 8:00 p.m. Eastern time, or write to:

Digital Equipment Corporation
P.O. Box CS2008
Nashua, NH 03061

Computer Troubleshooting

Tables 5-1 through 5-3 list how to identify and solve problems that might occur.

Table 5-1. System Box Troubleshooting

Problem	Possible Cause	Action
No response when the system box is turned on	System box is not plugged in	Turn off the system box, plug it in, and turn it on again
	No power at the wall outlet	Use another wall outlet
Power is on, but there is no monitor display	Monitor brightness and contrast controls are not properly set	Adjust the monitor brightness and contrast controls
	Monitor is off	Turn on the monitor
	Monitor cable is incorrectly installed	Check all monitor connections

Table 5-1. System Box Troubleshooting *(continued)*

Problem	Possible Cause	Action
Power is on, but there is no monitor display	Video expansion board failure	Make sure the video expansion board is properly installed and firmly seated
System box does not boot from an IDE hard disk drive	Operating system software is not installed on the IDE hard disk dri	Install the operating system on the hard disk
	IDE hard disk drive is not properly formatted or the requested partition does not exist	Format the IDE hard disk drive or correctly partition the IDE hard disk drive using the supplied operating system software
	There is no software on the requested partition	Install software on the requested partition
	IDE hard disk drive jumpers incorrectly set	Refer to the supplied IDE hard disk drive kit installation instructions
	IDE drive type incorrect	Run the SCU to identify the correct drive type
	Loose cables	Check all cable connections
No monitor display until end of POST	Configuration error	Run the SCU and set VGA/EGA adapter installed option to *yes*.

Table 5-1. System Box Troubleshooting *(continued)*

Problem	Possible Cause	Action
System box does not boot from a SCSI hard disk drive	Operating system software is not installed on the SCSI hard disk drive	Install the operating system
	Requested partition does not exist	Partition the SCSI hard disk drive and then reload the operating system
	SCSI hard disk drive jumpers incorrect	Refer to the supplied SCSI hard disk drive kit installation instructions
	SCSI ID conflicts	Refer to the supplied SCSI hard disk drive kit installation instructions on setting SCSI IDs
	Terminating resistors not removed from the SCSI hard disk drive	Remove terminating resistors. Refer to the supplied kit installation instructions
	System box not configured for SCSI hard disk operation	Run the SCU to configure the system box for SCSI operation
	IDE drive is configured in the system box	Remove the IDE drive or install the boot software on the IDE drive

Table 5-1. System Box Troubleshooting *(continued)*

Problem	Possible Cause	Action
System box does not boot from a target diskette drive	Drive ID incorrectly set	Make sure the drive ID is correctly set (refer to Chapter 4)
	Diskette drive not enabled	Run BIOS Setup Utility to enable diskette drive
	Diskette does not contain start-up files	Insert diskette with correct start-up files
	Diskette drive is empty	Insert the diskette that contains an operating system
	Diskette is worn or damaged	Try another diskette
	Loose cables	Check all cable connections
System box will not boot from System Configuration Diskette	System Configuration Diskette faulty	Contact Digital or an authorized dealer
No response to keyboard commands	Keyboard is password protected	Enter the keyboard password
	Keyboard is not connected	Connect the keyboard
	Keyboard is connected to the mouse port	Connect the keyboard to keyboard port
	Keyboard is locked	Unlock the keyboard

Table 5-2. Disk Drive Troubleshooting

Problem	Possible Cause	Action
IDE/SCSI hard disk drive cannot read or write information	Incorrect jumper settings	Refer to the supplied kit installation instructions
	Loose or incorrectly installed cables	Make sure all cables are correctly installed
	IDE/SCSI hard disk drive is not properly formatted or partitioned	Format and partition as required using the supplied operating system
	IDE drive type incorrect	Run the SCU to identify the correct drive type
	System box not configured for SCSI hard disk operation	Run the SCU to configure the system box for SCSI operation
Target diskette drive cannot read or write information	Diskette is not formatted	Format the diskette
	Diskette is worn or damaged	Try another diskette
	Diskette is write-protected	Slide the write-protect switch so the hole is not visible (3½-inch diskette) or uncover the write-protect notch (5¼-inch diskette)
	Diskette drive is empty	Insert a diskette

Table 5-3. Monitor Troubleshooting

Problem	Possible Cause	Action
Monitor power indicator is not on	Monitor is turned off	Turn on the monitor
	Power cord is not connected	Connect the power cord to the system box
	No power at wall outlet	Use another outlet
	Power indicator is defective	Contact your local Digital service representative
No monitor display	Configuration error	Check video board cabling and jumper settings
	Monitor brightness and contrast controls are not properly set	Adjust the monitor brightness and contrast controls
Distorted, rolling, or flickering screen display, or wrong/uneven color	Monitor incorrectly adjusted	Adjust accordingly
	Monitor signal cable incorrectly installed	Straighten any bent connector pins and then reseat
Color monitor displaying monochrome	System box was turned on before the monitor was turned on	Turn off the system box, turn on the monitor, then turn the system box back on

A

Technical Specifications

This appendix provides information about the technical characteristics of the DECpc 400ST Series computer. Information includes:

- Computer specifications
- External computer connectors
- Expansion slot current limitations
- Computer current requirements
- System board jumpers

Computer Specifications

Tables A-1 through A-4 list the DECpc 400ST Series computer performance, dimension, environmental, and acoustic specifications.

Table A-1. Computer Performance Specifications

Attributes	Specification
Microprocessor	Intel486
EISA bus speed	8.33 MHz
Data I/O	8-, 16-, and 32-bits
Interrupts	15
Physical addressing	4 GB
Virtual addressing	64 terabytes
Supported addressing	192 MB
FLASH configuration memory	8 KB
ROM BIOS Size	128 KB
System board memory	4 MB to 64 MB (using 16 MB SIMMs)

Table A-2. Computer Dimensions

Dimension	Specification
Width	7.0 inches (17.78 cm)
Length	18.3 inches (46.48 cm)
Height(1)	18.5 inches (46.99 cm)
Weight(1)	39.25 pounds (17.80 kg)

(1) With chassis feet attached

Table A-3. Computer Environmental Specifications

Attributes	Specification
Operating temperature	10 ° C to 35 ° C (50 ° F to 95 ° F)
Storage temperature	-20 ° C to 60 ° C (-4 ° F to 140 ° F)
Operating humidity (non-condensing)	20% to 80% relative humidity, max wet bulb 33 ° C
Storage humidity (non-condensing)	95% relative humidity, max wet bulb 35 ° C
Altitude	10,000 feet (3,048 m) maximum (operating)
Operating shock	2.0 G, 11 ms, ½ sine
Non-operating shock	30 G, trapezoidal wave, 170 ips Δ velocity

Table A-4. Acoustics: Preliminary Declared Values per ISO 9296 and ISO 7779(1)

	LwAd	LpAm(2)
Idle	5.5 bels	46 dBA
Operating	5.5 bels	46 dBA

(1) Current values for specific configurations are available from Digital representatives
(2) Operator position

External Computer Connectors

This section lists all external computer connectors located at the rear of the system box (see Figure A-1). Each of the following connectors are subsequently described.

- Parallel printer connector, 25-pin D-submini female
- Serial connectors, 9-pin D-submini male
- Keyboard and mouse connectors, 6-pin mini-DIN

Also, note that in the following external connector listings, an asterisk (*) that follows a signal name indicates an active low signal. For example, STB-R*.

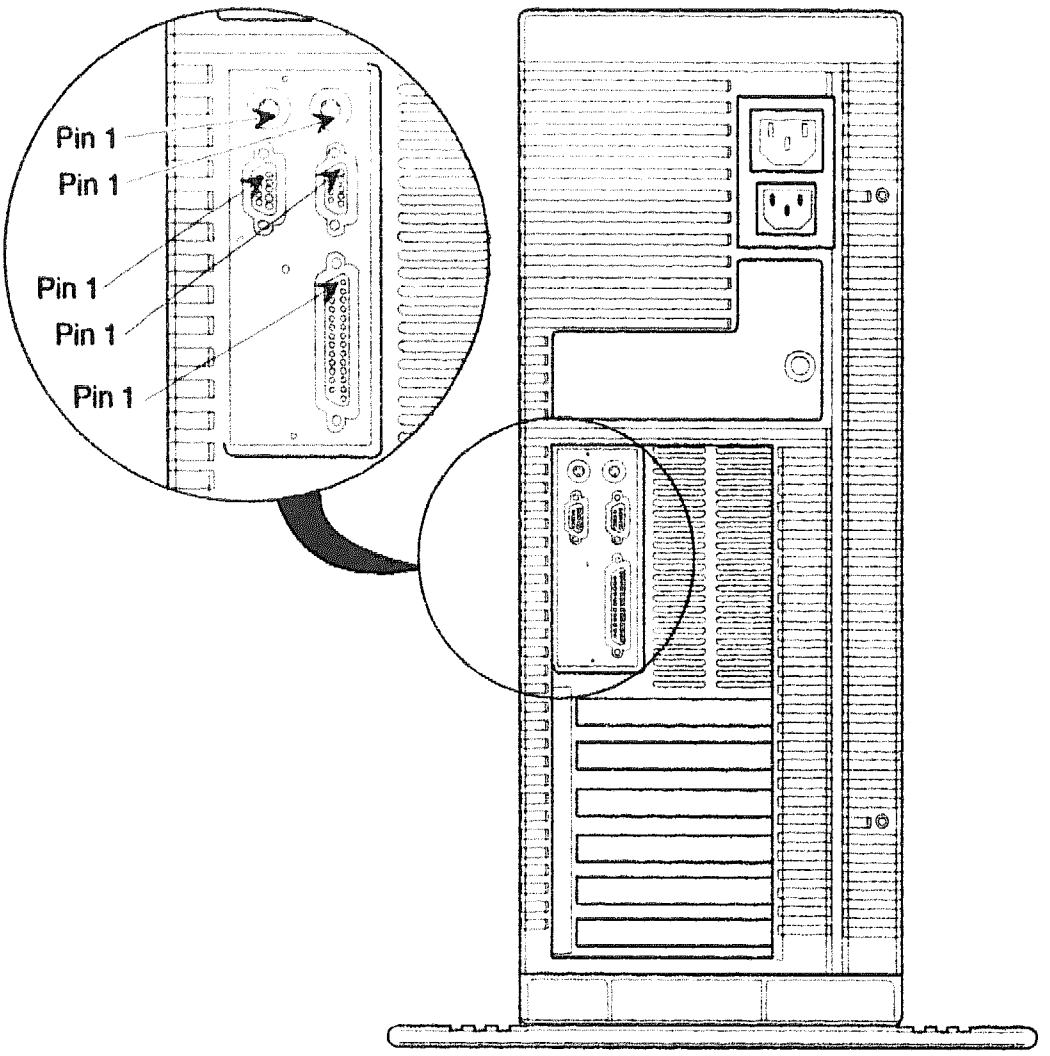


Figure A-1. Pin 1 Location for Each External Connector

Parallel Printer Connector

The parallel printer connector provides an interface to a printer or other parallel devices. Table A-5 lists its pin assignments.

NOTE

The computer logically assigns LPT*x* names to parallel ports in the address order 378h and 278h. This occurs during each boot process. For example, if you disable the parallel port that is assigned to 378h as LPT1, during the next boot cycle the computer will reassign the name LPT1 to the next enabled parallel port in the sequence.

Table A-5. Parallel Printer Pinout

DB25 Pin	Signal	Function
1	STB-R*	Strobe
2	PRTD0	Printer data bit 0
3	PRTD1	Printer data bit 1
4	PRTD2	Printer data bit 2
5	PRTD3	Printer data bit 3
6	PRTD4	Printer data bit 4
7	PRTD5	Printer data bit 5
8	PRTD6	Printer data bit 6
9	PRTD7	Printer data bit 7
10	ACK*	Acknowledge
11	BUSY	Busy
12	PE	Paper end
13	SLCT	Select
14	AUTOFDXT*	Auto feed
15	ERR*	Error
16	INIT*	Initialize printer
17	SLCTIN*	Select input
18-25	GND	Ground

Serial Port Connectors

The serial port connectors consist of two 9-pin D-submini connectors. Table A-6 lists the pins assignments. These two serial port connectors are not interchangeable. The connector closest to the system board is serial port 2; the other is serial port 1. The baud rates supported by the computer for the serial ports are 300, 1200, 2400, 4800, 9600, 19200, and 38400.

NOTE

The computer logically assigns COM*x* names to serial ports in the address order 3F8h, 2F8h, 3E8h, and 2E8h. This occurs during each boot process. For example, if you disable the serial port that is assigned to 3F8h as COM1, during the next boot cycle the computer will reassign the name COM1 to the next enabled serial port in the sequence.

Table A-6. 9-Pin Serial Port Pinout

DB9 Pin	Signal	Function
1	DCD	Data carrier detect
2	RXD	Receive data
3	TXD	Transmit data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

Keyboard and Mouse Connectors

The keyboard and mouse connectors consist of two 6-pin mini-DIN connectors. The connector closest to the system board is the keyboard connector; the other is the mouse connector. Table A-7 lists the pin assignments.

Table A-7. Keyboard and Mouse Connector Pinouts

Pin	Signal
1	Data
2	No connection
3	Ground
4	+5 V dc (fused)
5	Clock
6	No connection

Expansion Slots

The system board contains six EISA bus master expansion slots, which are also ISA-compatible (see Figure 4-24,A). The maximum available +5 V dc current allowable to any expansion slot depends upon the following parameters:

- Power supply capacity of 35 A at +5 V dc
- The +5 V dc requirements of the board set, including CPU and memory modules
- The +5 V dc requirements of the peripherals
- The power demands of all other slots in use

WARNING

EISA bus expansion boards are limited to 4.5 A at +5 V dc maximum per board. The power supply connectors are limited to 5 A per pin maximum having a total of 35 A maximum for 7 pins. These limitations plus the maximum capacity of the power supply itself might be more restrictive than the current limitations of the pins/connectors and expansion slots. As an overall limitation, do not exceed 35 A total when computing the total +5 V dc current drain for the system board. This avoids damage to the power supply and system board.

Power Supply and Input Power Requirements

The power supply provides four dc voltages: +12 V dc, −12 V dc, +5 V dc, and −5 V dc. These voltages are used by the various components within the system box. Table A-8 lists the input power requirements.

Table A-8. Computer Input Power Requirements

Rated Voltage Range	Maximum Range	Maximum Input Current(1)	Operating Frequency Range
100 - 120 V ac	90 - 132 V ac	10 A	47 - 63 Hz
200 - 240 V ac	180 - 264 V ac	5.5 A	47 - 63 Hz

(1) Includes outlet current

Computer Component Current Requirements

The DECpc 400ST Series computer has a 254 W power supply. Table A-9 specifies the nominal current requirements for typical computer components.

Table A-9. Computer Component Current and Power Requirements

Assembly	+5 V dc	+12 V dc	-12 V dc	Total Power (w/o surge)
System board (32 MB memory)	6.0 A	0.06 A	0.06 A	31.4 W
486/50, 256 KB cache	4.7 A			23.5 W
486/33, 128 KB cache	4.2 A			21.0 W
486/25, 128 KB cache	4.0 A			20.0 W
64 MB memory	3.0 A			15 W
3½-inch diskette drive	0.8 A	1.00 A		16 W
5¼-inch diskette drive	0.2 A	0.20 A		3.4 W
Keyboard and mouse	0.5 A			2.5 W
1 EISA slot	2.0 A	0.06 A	0.06 A	11.4 W
6 EISA slots	12 A	0.36 A	0.36 A	69 W
3½-inch hard drive	1.1 A	0.80 A (2 A surge)		15.1 W
5¼-inch hard drive (half-height)	1.0 A	1.50 A (4.5 A surge)		23 W
5¼-inch hard drive (full-height)	1.5 A	2.00 A (4.5 A surge)		31.5 W

NOTE

If your hard disk drives are configured to spin up at power on, calculate the total +12 V dc current requirement using the surge values. If this requirement exceeds 10 A, you should configure one or more of the drives to spin up on command if your controller supports it.

System Board Jumpers

Jumper pins allow you to set specific computer parameters. They are set by changing the pin location of jumper blocks. A jumper block is a small plastic-encased conductor (shorting plug) that slips over the pins. To change a jumper setting, remove the jumper from its current location with your fingers. Position the jumper over the two pins designated for the desired setting. Press the jumper evenly onto the pins. Be careful not to bend the pins.

Figure A-2 shows the location of the system board jumper pins. Note that the square pin of each jumper block is pin 1.

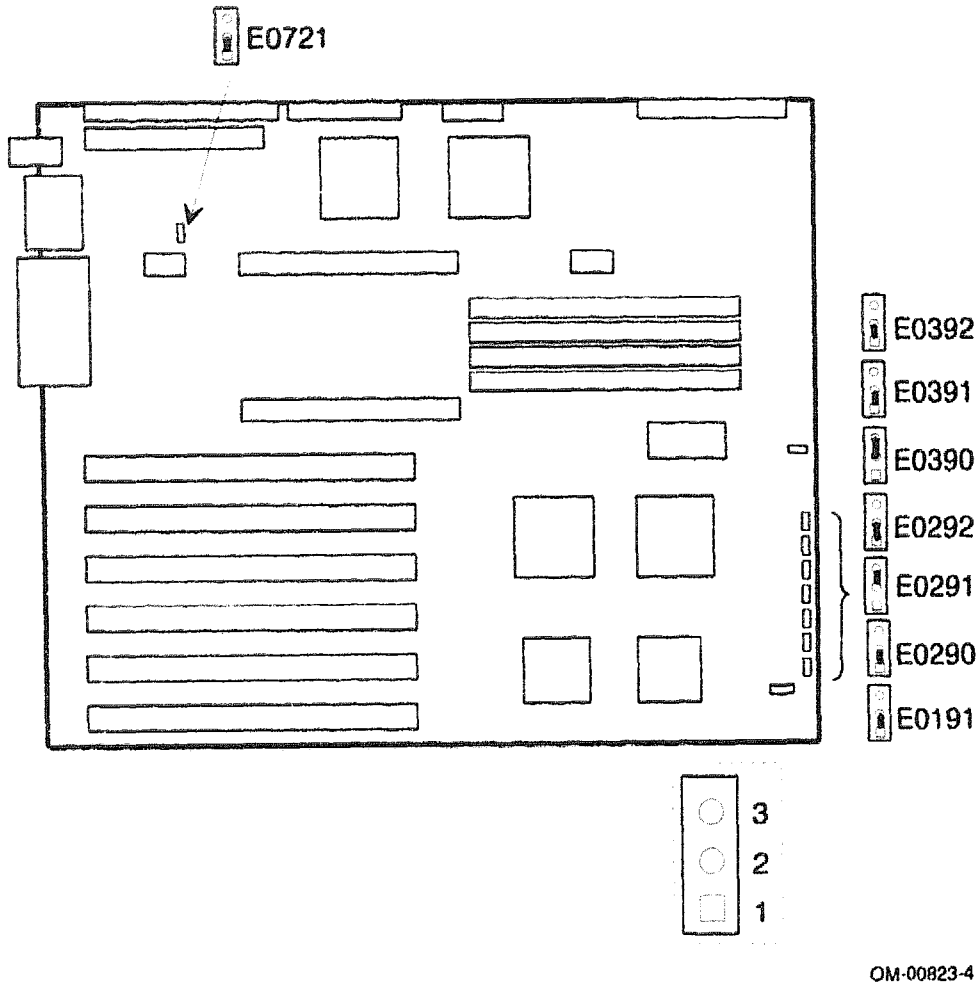


Figure A-2. System Board Jumper Locations

Jumper Settings

Table A-10 lists the system board jumpers and factory default settings.

CAUTION

Do not touch any electronic component unless you are properly grounded. Proper grounding can be established by wearing a grounded wrist strap or by touching an exposed metal part of the system box chassis. A static discharge from your fingers can result in permanent damage to electronic components.

Table A-10. System Board Jumper Settings

Jumper	Description	Setting
E0191	Reserved for factory use	1, 2 installed(1)
E0290	Reserved for factory use	1, 2 installed(1)
E0291	Diskette write enable Diskette write protect	2, 3 installed(1) 1, 2 installed
E0292	Reserved for factory use	1, 2 installed(1)
E0390	Reserved for factory use	2, 3 installed(1)
E0391	Memory bank 1 2, 4, 8 MB SIMMs 16 or 32 MB SIMMs	 1, 2 installed(1) 2, 3 installed
E0392	Memory bank 0 2, 4, 8 MB SIMMs 16 or 32 MB SIMMs	 1, 2 installed(1) 2, 3 installed
E0721	FLASH memory write enable FLASH memory write disable	1, 2 installed(1) 2, 3 installed

(1) Factory setting

B

Error and Informational Messages

Introduction

This appendix describes the DECpc 400ST Series computer errors that might be displayed or heard during power up. The error messages are grouped as follows:

- POST and boot error messages
- Run-time error messages
- Beep codes for fatal errors
- Beep codes for non-fatal errors

POST and Boot Messages

POST displays messages to alert you to errors in hardware, software, and firmware, or displays information about your computer.

During POST, the system board speaker beeps to alert you to specific POST steps. Two beeps signal the start of the time during which you can enter Setup. Another beep signals the end of that time, and then a subsequent beep signals a computer boot has begun.

If an error occurs during POST, the countdown is stopped. If an error occurs before the monitor is initialized, specific beep codes sound to alert you to a problem. Also, the POST number will be displayed on the optional LCD display, if one is installed. If an error occurs after the monitor is initialized, both the POST number and the error message are displayed on the monitor.

Table B-1 lists a general grouping of messages arranged by POST countdown number. Where applicable, the message is accompanied by an error message and a recommended solution to the problem.

NOTE

Italics indicate variable parts of a message such as memory addresses, hex values, etc. These messages can differ at each occurrence.

Table B-1. POST and Boot Messages

POST No.	Message	Error Message	Solution
840	Start of POST		
830	CPU register test		
820	8742 initialization		
810	RTC RAM and register test	RTC RAM and register test failure	Contact your Digital service representative.
800	System BIOS checksum test	System BIOS checksum failure	Contact your Digital service representative.
790	Initialize programmable interval timer	Programmable interval timer failure	Contact your Digital service representative.
780	DMA channel test	DMA channel failure	Contact your Digital service representative.
770	DMA page register test	DMA page register failure	Contact your Digital service representative.
760	Verify RAM refresh test	RAM refresh failure	Contact your Digital service representative.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
740	First 64 Kb RAM test		
755		First 64 Kb RAM chip or data line failure, bit 0-15	Contact your Digital service representative.
756		First 64 Kb RAM chip or data line failure-multi-bit	Contact your Digital service representative.
757		First 64 Kb RAM odd/even logic failure	Contact your Digital service representative.
758		First 64 Kb RAM address line failure	Contact your Digital service representative.
759		First 64 Kb RAM parity test failure	Contact your Digital service representative.
730	Initialize stack		
710	Initialize keyboard buffer		
700	Chipset initialization 4	Shadow of onboard BIOS failed	Computer DRAM has failed. Replace any failed SIMM.
702	VGA/EGA adapter installed option selected	No BIOS found at C0000h	Run the SCU and deselect the VGA/EGA adapter installed option.
690	CMOS checksum test	CMOS power failure	The configuration information stored in CMOS does not agree with your hardware configuration. Run the SCU to verify configuration. Reboot computer.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
691		CMOS checksum failure	See 690.
692		Extended CMOS checksum failure	See 690.
693	Flash erasure or write failure occurred	Default configuration failure, unable to write FLASH memory	Run the SCU to properly configure your computer.
680	Initialize EISA slots		
670	Initialize serial ports		
660	Initialize parallel ports		
655	DMA register test (slave)	DMA register failure (slave)	Contact your Digital service representative.
650	DMA register test (master)	DMA register failure (master)	Contact your Digital service representative.
645	Programmable interrupt controller register test (master)	Programmable interrupt controller register failure (master)	Contact your Digital service representative.
640	Programmable interrupt controller register test (slave)	Programmable interrupt controller register failure (slave)	Contact your Digital service representative.
620	Initialize interrupt vector table		
610	Enable timer tick interrupt		
600	Initialize keyboard controller	Keyboard controller failure	Contact your Digital service representative.
590	Check video configuration		
570	VGA/EGA expansion board configured but not detected	VGA/EGA configuration error	Run the SCU to properly configure your computer.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
540	VGA/EGA video BIOS failed to initialize	Video BIOS failed to initialize	Run the SCU to properly configure your computer for VGA/EGA adapter.
520	Initialize console redirection		
500	Display signon message		
490	Timer tick interrupt test	No timer tick interrupt	Contact your Digital service representative.
480	Shutdown test	Shutdown failure	Contact your Digital service representative.
460	EISA extended devices test	Fail safe timer NMI failure	Contact your Digital service representative.
461		Software port NMI failure	Contact your Digital service representative.
450	Chipset initialization 6		
440	Size memory above 64 Kb	Gate A20 failure	The computer cannot switch into protected mode. Contact your Digital service representative.
441		Unexpected interrupt in protected mode	The computer received an interrupt while in protected mode (probably while testing memory). If the problem persists, contact your Digital service representative.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
430	Interval timer 2 test	Timer 2 failure	The Integrated System Peripheral (ISP) chip on the system board might have failed. If the problem persists, contact your Digital service representative.
390	Initialize keyboard flags		
370	Test keyboard	Keyboard controller failure	Contact your Digital service representative.
371		Keyboard clock line failure	The keyboard or the keyboard cable connection has failed. Check the keyboard connection. If the connection is good, the keyboard might have failed. Try another keyboard. If the problem persists, Contact your Digital service representative.
372		Keyboard data line failure	See 371.
373		Keyboard stuck key failure	One or more of the keys were pressed. Release the key or keys and try again.
374		Keyboard failure	Replace keyboard.
350	Re-initialize keyboard controller		
330	Initialize auxiliary device		
310	Initialize keyboard controller output port		
300	Initialize gate A20		

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
290	Test memory above 64 Kb	Memory parity failure at *XXXX*:0000 to *XXXX*:FFFF	One of the SIMMs or associated circuitry has failed. Check for failed SIMM and replace if necessary. If the message repeats, contact your Digital service representative.
291		Memory data line failure at *XXXX*:0000 to *XXXX*:FFFF	See 290.
292		Memory odd/even logic failure at *XXXX*:0000 to *XXXX*:FFFF	One of the SIMMs or associated circuitry has failed. Check for failed SIMM and replace if necessary. If the message repeats, contact your Digital service representative.
293		Memory double word logic failure at *XXXX*:0000 to *XXXX*:FFFF	See 292.
294		Memory high address failure at *XXXX*:0000 to *XXXX*:FFFF	See 292.
295		Memory address line failure at *XXXX*:*YYYY*, read *QQQQ* expecting *ZZZZ*	See 292.
296		Memory write/read failure at *XXXX*:*YYYY*, read *QQQQ* expecting *ZZZZ*	See 292.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
297		Decreasing available memory	This message immediately follows any memory error message informing you that memory modules are failing. Check that all SIMMs are installed correctly.
270	Initialize extended BIOS data area		
250	Chipset initialization 7		
230	Enable hardware interrupts		
210	Read keyboard ID		
190	Real-time clock test	Real-time clock failure	The internal battery for the clock is probably dead. Replace the real-time clock device.
160	Coprocessor test	Coprocessor failed	The coprocessor failed or is missing.
150	Check for invalid configuration		
140	Shadowing of system BIOS failed	Shadow of system BIOS failed	Contact your Digital service representative.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
130	Initialize diskette subsystem	Diskette drive failure	Drive has either failed or is missing. Verify the drive settings using the BIOS Setup Utility. Make sure drive is present and the diskette is inserted properly. If they are, drive might have failed.
131		Diskette drive 0 failure	Drive 0 has either failed or is missing. Verify the settings for drive 0 using the BIOS Setup program. Make sure drive 0 is present and the diskette is inserted properly. If it is, drive 0 might have failed.
132		Diskette drive 1 failure	See 131.
135	Enter ROM BIOS Setup utility(1)		
120	Initialize hard drive subsystem	Hard drive configuration error	Check the computer configuration and drive type by running the SCU.
122		Hard drive 0 failure	See 120 and 121.
121		Hard drive controller failure	See 120. Check both ends of the controller's cables.
110	Chipset initialization 9		

(1) Earlier versions of the BIOS allowed you to enter the setup utility at POST countdown message 130

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
090	Enable cache	Internal cache test failed-cache disabled	Cache failed. Replace CPU module.
080	Initialize option ROMs	*XXXX0*h optional ROM bad checksum=*YY*h	Expansion board configuration error. Run the SCU.
085	Shadowing of ISA address range E0000h to E7FFFh failed	Shadow of BIOS at E0000h to E7FFFh failed	Contact your Digital service representative.
084	Shadowing of ISA address range C8000h to CFFFFh failed	Shadow of BIOS at C8000h to CFFFFh failed	Contact your Digital service representative.
083	Shadowing of ISA address range C0000h to C7FFFh failed	Shadow of BIOS at C0000h to C7FFFh failed	Contact your Digital service representative.
070	Set system clock	Time of day clock not set	Run the SCU.
060	Check for electrical keylock	Keyboard is locked-please unlock	Unlock the keyboard.
040	Report configuration errors and prompt for configuration utility	Configuration error; slot *X*	Run the SCU for the board in slot *X*.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
041		ID mismatch error; slot *X*	(A) The board in slot *X* is bad and returns a bad ID. (B) The board ID does not match the ID that the SCU expects for slot *X*. The mismatch is due to either the wrong board in the slot or the wrong configuration file for the board. Run the SCU to configure slot *X*, or replace the bad board. If the problem persists, contact your Digital service representative.
042		Invalid ISA configuration information	An ISA board has not been properly configured. Run the SCU and check switch and jumper settings.
043		Invalid EISA configuration information	An EISA board has not been properly configured. Run the SCU and verify all settings.
044	Computer configuration has changed without running the SCU	EISA configuration NOT ASSURED!	Run the SCU to configure your computer.
020	Enable parity checking and NMI		
000	Boot	Diskette read failure	No diskette in drive A. Insert a diskette and try again.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
001		Not a bootable diskette	The diskette in Drive A is not formatted as a bootable diskette. Replace the diskette with a bootable diskette and try again.
002		No boot device available	If booting from a diskette, it is a non-bootable type or the diskette drive has failed. If booting from a hard disk drive, it might not be formatted or the drive might have failed. The problem might also be the SCSI controller board. Make sure the diskette in drive A contains an operating system. If applicable, make sure the hard disk drive contains an operating system.

Table B-1. POST and Boot Messages *(continued)*

POST No.	Message	Error Message	Solution
003		Hard drive read failure	The hard disk drive has failed. Check the computer configuration and drive type by running the SCU. Check both ends of the controller's cables, and reseat the hard disk controller board. If the problem persists, contact your Digital service representative.
004		No boot sector on hard drive	The hard disk drive is not formatted as a bootable disk.

Run-Time Error Messages

Run-time messages are displayed on the monitor screen and the LCD (if installed) if an error occurs after the computer boots. Table B-2 lists the run-time error messages by number.

Table B-2. Run-Time Messages

POST No.	Message	Solution
980	Unresolved memory parity error	Computer DRAM has failed. Replace any failed SIMM.
981	Memory parity error at *XXXX:YYYY*	See 980.
982	I/O expansion board NMI; slot *X*	Malfunction or configuration error for expansion board in slot *X*. Run the SCU and verify settings.
983	Unresolved I/O expansion board NMI	See 982. Slot is unknown.
984	Expansion board disabled	Configuration error or malfunctioning expansion board. Run the SCU and verify settings.
985	Fail safe timeout NMI	Expansion board malfunction. Replace defective board.
986	Unresolved bus timeout NMI	See 985.
987	Bus timeout NMI; slot *X*	
988	Software NMI	
970	Unexpected software interrupt	There is an error in a software utility. Try turning the computer off and then on again. If the problem persists, contact your software manufacturer's representative.
971	Unexpected hardware interrupt	This could be any hardware-related problem. Check all cables, connections, jumpers, and boards. If the problem persists, contact your Digital service representative.

Beep Codes

If POST finds an error and cannot display a message, the system board speaker emits a series of beeps to indicate the error and places a value in I/O port 80h. The corresponding POST number is displayed on the optional LCD display, if one is installed.

For example, a failure of bit three in the first 64 KB of DRAM is indicated by a 2-1-4 beep code (a burst of two beeps, a single beep, and a burst of four beeps).

Tables B-3 and B-4 list the beep codes and the values POST writes to I/O port 80h when it encounters an error. Table B-3 lists fatal errors (errors that lock up the computer), and Table B-4 lists nonfatal errors (errors that do not lock up the computer).

One beep code is not listed in either table: a long beep followed by one or more short beeps indicates a video controller failure. No beep code is sounded if a test is aborted while in progress.

Table B-3. Beep Codes for Fatal Errors

Beep Code	Error Message	Port 80h
1-1-3	RTC write/read failure	02h
1-1-4	ROM BIOS checksum failure	03h
1-2-1	Programmable interval timer failure	04h
1-2-2	DMA initialization failure	05h
1-2-3	DMA page register write/read failure	06h
1-3-1	DRAM refresh verification failure	08h
1-3-3	1st 64 KB DRAM chip or data line failure	0Ah
1-3-4	1st 64 KB DRAM odd/even logic failure	0Bh
1-4-1	1st 64 KB DRAM address line failure	0Ch
1-4-2	1st 64 KB DRAM parity test in progress/failure	0Dh

Table B-3. Beep Codes for Fatal Errors *(continued)*

Beep Code	Error Message	Port 80h
2-1-1	Bit 0 1st 64 KB DRAM failure	10h
2-1-2	Bit 1 1st 64 KB DRAM failure	11h
2-1-3	Bit 2 1st 64 KB DRAM failure	12h
2-1-4	Bit 3 1st 64 KB DRAM failure	13h
2-2-1	Bit 4 1st 64 KB DRAM failure	14h
2-2-2	Bit 5 1st 64 KB DRAM failure	15h
2-2-3	Bit 6 1st 64 KB DRAM failure	16h
2-2-4	Bit 7 1st 64 KB DRAM failure	17h
2-3-1	Bit 8 1st 64 KB DRAM failure	18h
2-3-2	Bit 9 1st 64 KB DRAM failure	19h
2-3-3	Bit A 1st 64 KB DRAM failure	1Ah
2-3-4	Bit B 1st 64 KB DRAM failure	1Bh
2-4-1	Bit C 1st 64 KB DRAM failure	1Ch
2-4-2	Bit D 1st 64 KB DRAM failure	1Dh
2-4-3	Bit E 1st 64 KB DRAM failure	1Eh
2-4-4	Bit F 1st 64 KB DRAM failure	1Fh
3-1-1	Slave DMA register failure	20h
3-1-2	Master DMA register failure	21h
3-1-3	Master interrupt mask register failure	22h
3-1-4	Slave interrupt mask register failure	23h
3-2-4	Keyboard/mouse controller test failure	27h

Table B-4. Beep Codes for Non-Fatal Errors

Beep Code	Error Message	Port 80h
3-3-4	Screen memory test failure	2Bh
3-4-1	Screen initialization failure	2Ch
3-4-2	Screen retrace test failure	2Dh

C

Device Mapping

Introduction

This appendix provides four tables that list the computer's memory map, I/O address map, interrupt map, and DMA map.

Table C-1. Computer Memory Map

Address Range (In hex)	Function	Size	Shadow	Cache
0010 0000 to 01FF FFFF	Extended memory(1)	192 MB	No	Yes
000F 0000 to 000F FFFF	System BIOS	64 KB	Yes	Yes
000E 8000 to 000E FFFF	EISA configuration information(2)	32 KB	No	No
000E 0000 to 000E 7FFF	Adapter BIOS extension	32 KB	Yes(3)	Yes
000D 0000 to 000D FFFF	Adapter BIOS extension	64 KB	No	No
000C 8000 to 000C FFFF	Adapter BIOS extension	32 KB	Yes(3)	Yes
000C 0000 to 000C 7FFF	Video BIOS or adapter BIOS extension	32 KB	Yes(3)	Yes
000A 0000 to 000B FFFF	Video RAM	128 KB	No	No
0000 0000 to 0009 FFFF	Base memory	640 KB	No	Yes

(1) The SCU provides an option for creating a 1 MB open space between 15 MB and 16 MB to which you can map expansion board BIOS (refer to Chapter 3)
(2) Not available for mapping expansion board memory or BIOS
(3) User configurable (refer to Chapter 3)

NOTE

The DECpc 400ST Series computers do not support the use of the 000E 0000 to 000E FFFF address range for DEC EtherWORKS (DEPCA) controllers. DEC EtherWORKS controllers should be configured for the 000D 0000 to 000D FFFF address range to run in the 64 KB mode or for 000C 8000 to 000C FFFF to run in the 32 KB mode.

Table C-2. I/O Address Map

Range (in hex)	Function
0000:000F	ISP DMA controller one
0020:0021	ISP interrupt controller one
0026	MECA and CLASIC configuration index
0027	MECA and CLASIC configuration data
0040:0043	IPS timer one
0048:004B	ISP timer two
0060	Keyboard data
0061	ISP NMI
0064	Keyboard command/status
0070 (bit 7)	ISP enable NMI
0070 (bits 6:0)	Real-time clock address
0071	Real-time clock data
0078	BIOS timer
0080:008F	ISP DMA
0092	System control port
00A0:00A1	ISP interrupt
00C0:00DE	ISP DMA
00F0	Reset numeric error
01F0:01F7	IDE controller
0278:027B	Parallel 2
02E8:02EF	Serial 4
02F8:02FF	Serial 2

Table C-2. I/O Address Map *(continued)*

Range (in hex)	Function
0378:037F	Parallel 1
03B0:03BB	Video registers
03C0:03BF	Alternate parallel port(1)
03E8:03EF	Serial 3
03F0:03F5	Diskette controller
03F6	IDE
03F7 (bit 7)	Diskette controller status
03F7 (bits 6:0)	IDE status
03F7 (bits 1:0)	Diskette data rate (write)
03F8:03FF	Serial 1
0400:040B	ISP high DMA
040C:040F	ISP control and test
0461:0464	ISP extended NMI
0464:0465	ISP bus master
0480:048F	ISP high DMA
04C2:04CE	ISP extended DMA
04D0:04D1	ISP interrupt edge/level
04D2:04FF	ISP extended DMA
0C01:0C07	Baseboard configuration
0C09:0C79	Baseboard configuration
0C80:0C83	Baseboard EISA identification
0C84	Baseboard enable
0C85:0CFF	Baseboard configuration

(1) Used only with MDA video

Table C-3. Computer Interrupt Levels

Priority	Interrupt Controller	Interrupt Number	Interrupt Source
1	1	IRQ0	System timer
2	1	IRQ1	Keyboard controller
3-10	1	IRQ2	Interrupt controller 2
3	2	IRQ8*	Real-time clock (RTC)
4	2	IRQ9	EISA connector
5	2	IRQ10	COM*x*/EISA connector(1)
6	2	IRQ11	COM*x*/EISA connector(1)
7	2	IRQ12	Mouse/EISA connector
8	2	IRQ13	Numeric coprocessor
9	2	IRQ14	Hard disk drive/EISA connector
10	2	IRQ15	EISA connector
11	1	IRQ3	COM*x*/EISA connector(1)
12	1	IRQ4	COM*x*/EISA connector(1)
13	1	IRQ5	LPT*y*/EISA connector(2)
14	1	IRQ6	Diskette drive/EISA connector
15	1	IRQ7	LPT*y*/EISA connector(2)

(1) Can be COM1 through COM4
(2) Can be either LPT1 or LPT2

Table C-4. DMA Channel Assignment

Channel	Controller	Function
0	1	Refresh
1	1	Not used
2	1	Diskette controller
3	1	Not used
4	1	Not used
5	2	Not used
6	2	Not used
7	2	Not used

D

Caring for Your Computer

Introduction

This chapter describes how to:

- Clean the outside of the computer
- Clean the monitor screen
- Clean the mouse
- Prepare the computer for moving

CAUTION

Make sure you turn off the computer and disconnect any external devices before doing any cleaning operations. When using a moistened cloth for cleaning, do not allow any excess fluid to leak into the computer, keyboard, or monitor. In addition, wait until the computer is completely dry before applying power.

Cleaning the Computer

Clean the outside of the computer periodically with a soft cloth. Use a cloth lightly moistened with a mild detergent solution. Do not use solvents or abrasive cleaners.

Cleaning the Screen

If the monitor screen gets dirty, clean it with a sponge or chamois cloth lightly dampened with a mild detergent. Do not use solvents or abrasive cleaners.

Cleaning the Mouse

If your mouse cursor moves erratically across the screen, chances are there is an accumulation of dirt on a ball located inside the mouse. To clean a ball, turn the mouse over, release the mouse ball cover, and then place the mouse cover and ball on a clean surface. Next, take a cotton swab, lightly dampened with a mild detergent, and clean the ball and the inside of the mouse. Replace the ball and mouse ball cover.

Moving the Computer

Do the following if you are shipping or moving the computer:

1. Back up all files stored on hard disk drives.
2. Turn off the computer and disconnect the power cord.
3. Turn the monitor off, disconnect the power cord from the switched peripheral power outlet.
4. Disconnect the monitor signal cable.
5. Disconnect the keyboard cable connector from the computer.
6. Disconnect any other external peripheral devices, such as printers and modems.
7. Insert a drive protection card in all 5¼-inch and 3½-inch diskette drives (if applicable). If you do not have drive protection cards, use blank diskettes.
8. Package the computer as described below in the section titled "Packing the Computer."

Packing the Computer

If you are moving the computer a short distance (from one room to another in the same building), you don't have to pack the computer. If you are shipping the computer or moving it by vehicle, pack the computer to avoid damage.

WARNING

Use extreme care when moving the DECpc 400ST Series system box. Due to its weight, two people are required to lift it. Failure to use two people violates certain safety regulations and can result in personal injury or equipment damage.

Pack the computer in the original packing material and containers, using the unpacking instructions in the DECpc 400ST Series Installation Guide. If you did not save the boxes and packing material, use a sturdy carton and cushion the computer well to avoid damage.

Installing the Computer at a New Location

After moving the computer to a new location, follow the instructions in the DECpc 400ST Series Installation Guide to unpack it and install it.

E

Equipment Log

Equipment Log

Use the equipment log form in this appendix to record pertinent information about the DECpc 400ST Series computer. You will need this information during computer configuration and if the computer needs servicing. You should also update the equipment log when you add options.

Record the model and serial numbers of all components, dates of removal and/or replacement of components, and the name of the vendor from whom the component or computer was purchased.

In addition to storing information, the equipment log also provides a warranty record of when the computer was placed in service, and the dates of all computer upgrades and configuration changes.

Serial Numbers

Record the model and serial numbers of computer components in the equipment log. Also record the model and serial numbers of any components added to the computer, such as hard disk drives, expansion boards, diskette drives, etc.

Record the model and serial number of the chassis key, system board, and CPU module. The model and serial number of the system box is recorded on a label attached to the rear cover. The key for the chassis lock has a serial number engraved on it. The serial number of the system board is located on the edge of the board next to the computer jumpers. The serial number for the CPU module is located on the component side of the module at the right end.

The location of serial numbers on hard disk drives, expansion boards, diskette drives, and external equipment (monitors, printers, etc.) vary from one manufacturer to another. Accompanying literature with these products should illustrate or describe the location of model and serial numbers.

Equipment Log

Use the following equipment log to record important computer information.

Component	Vendor/ Type/Size	Model No.	Serial No.	Date Installed
DECpc 400ST Series system box				
DECpc 400ST Series system board				
CPU module				
DECpc 400ST Series key number				
Monitor				
Keyboard				
Installed diskette drive				
Device 2				
Device 3				
Device 4				
Device 5				
Device 6				
Device 7				

Component	Vendor	Model No.	Serial No.	Date Installed

F

CPU Modules

Introduction

Your DECpc 400ST Series computer will have one of several CPU modules installed. If you do not know which CPU module is installed in your computer, run the System Configuration Utility (SCU). Specific CPU module speeds are detected by the SCU and displayed in one of the "View or Edit Details" screens under the "Configure Computer" option (refer to Chapter 3).

The remainder of this Appendix lists the performance specifications and associated jumper information for the CPU modules that were available at the time of printing. Contact your Digital sales representative or call 1-800 DIGITAL for a current list of CPU modules.

If you are adding an optional component to an existing CPU module or installing a different CPU module, refer to the respective CPU upgrade kit installation guide supplied with the component or CPU module.

CPU Module Descriptions

Table F-1 identifies the current CPU modules and lists the optional components that are available for each.

Table F-1. CPU Module Features

Model Number	Microprocessor	External Cache
DECpc 425ST	25 MHz Intel486SX	Optional
DECpc 433ST	33 MHz Intel486DX	Optional
DECpc 450ST	50 MHz Intel486DX	Standard
DECpc 452ST	50 MHz Intel486 DX2	Optional

25 MHz CPU Module

Table F-2 lists the performance specifications for the 25 MHz CPU module.

Table F-2. 25 MHz CPU Module Specifications

Attributes	Specification
Primary microprocessor	Intel486SX
Cache	Optional external cache 64 or 128 KB Zero wait-state cache hit Write-through cache technique
Memory interface	486 burst-mode support using fast page mode 64-bit dual-bank memory Zero wait-state one deep-posted memory write 6-1-1-1 burst reads

33 MHz CPU Module

Table F-3 lists the performance specifications for the 33 MHz CPU module.

Table F-3. 33 MHz CPU Module Specifications

Attributes	Specification
Primary microprocessor	Intel486DX 33 MHz
Cache	Optional external cache 64 or 128 KB Zero wait-state cache hit Write-through cache technique
Memory interface	486 burst-mode support using fast page mode, 64-bit dual-bank memory Zero wait-state one deep-posted memory write 7-1-2-1 burst reads

50 MHz CPU Module

Table F-4 lists the performance specifications for the 50 MHz CPU module.

Table F-4. 50 MHz CPU Module Specifications

Attributes	Specification
Microprocessor	Intel486DX50 MHz
Cache	82490DX/82495DX based fixed cache 256 KB Zero wait-state cache hit Write-back cache technique
Memory interface	486 burst-mode support using fast paged mode, 64-bit dual-bank memory Zero wait-state one deep-posted memory write 10-2-2-2 burst reads

Intel486 DX2 50 MHz CPU Module

Table F-5 lists the performance specifications for the Intel486 DX2 50 MHz CPU module.

Table F-5. Intel486 DX2 50 MHz CPU Module Specifications

Attributes	Specification
Microprocessor	Intel486 DX2 50 MHz
Cache	Optional external cache 64 or 128 KB Zero wait-state cache hit Write-through cache technique
Memory interface	486 burst-mode support using fast page mode 64-bit dual-bank memory Zero wait-state one deep-posted memory write 6-1-1-1 burst reads

CPU Module Jumpers

Some DECpc 400ST Series CPU modules have jumper blocks that designate the microprocessor type and cache memory size. The following sections describe the jumper blocks associated with the currently available CPU modules.

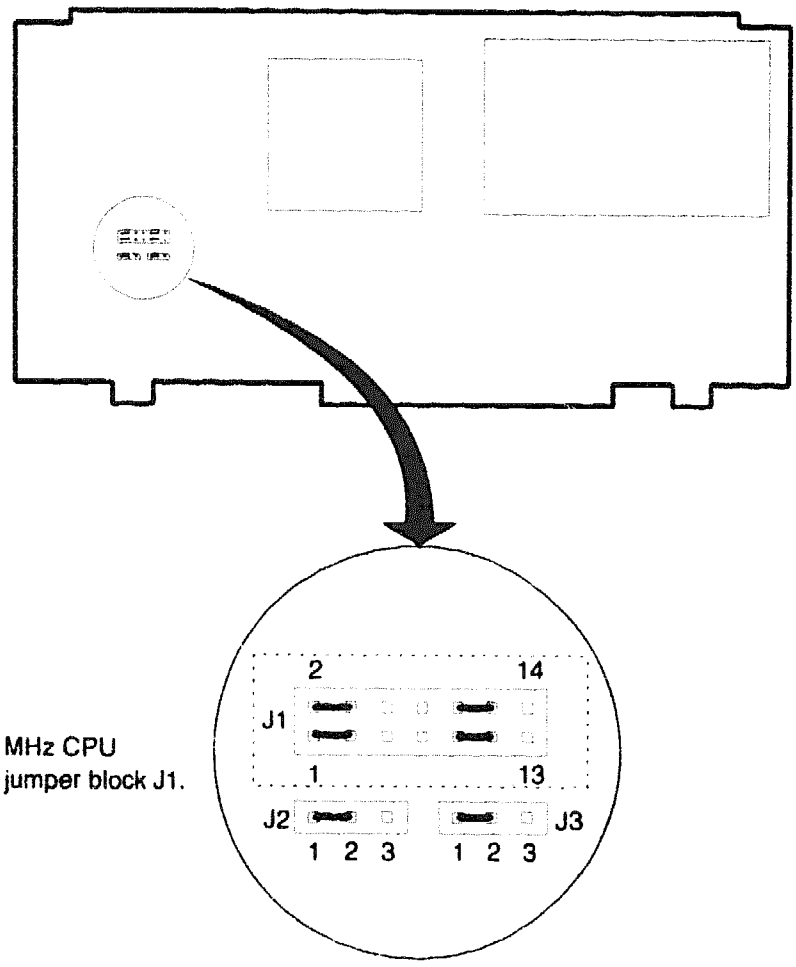
25 MHz CPU Module Jumpers

Jumper block J1 sets the type of microprocessor installed on the CPU module. Jumper block J3 sets the size of the external cache (refer to Table F-6 and Figure F-1).

Table F-6. 25 MHz CPU Module Jumper Settings

Jumper Block	Jumper Setting	Description
J1	1, 3(1) 2, 4(1) 9, 11(1) 10, 12(1)	Microprocessor type
J2		Not used
J3(2)	1, 2 2, 3	128 KB cache memory 64 KB cache memory

(1) Factory setting
(2) If no cache is installed, jumper can be in either position



Note: Only the 25 MHz CPU module has jumper block J1.

Figure F-1. 25 MHz and 33 MHz CPU Module Jumper Settings

33 MHz CPU Module Jumpers

Jumper block J2 sets the type of microprocessor installed on the CPU module. Jumper block J3 sets the size of external cache (refer to Table F-7 and Figure F-1).

Table F-7. 33 MHz CPU Module Jumper Settings

Jumper Block	Jumper Setting	Description
J2	1, 2(1)	Microprocessor type
J3(2)	1, 2	128 KB cache memory
	2, 3	64 KB cache memory

(1) Factory setting
(2) If no cache is installed, the jumper can be in either position

50 MHz CPU Module Jumpers

The 50 MHz CPU module does not contain any jumpers.

Intel486 DX2 50 MHz CPU Module Jumpers

Jumper block J3 sets the size of external cache (refer to Table F-8 and Figure F-2).

Table F-8. Intel486 DX2 50 MHz CPU Module Jumper Settings

Jumper Block	Description	Setting
J3(1)	1, 2 installed	Cache memory size — 128 KB
	2, 3 installed	Cache memory size — 64 KB

(1) If no cache is installed, jumper can be in either position

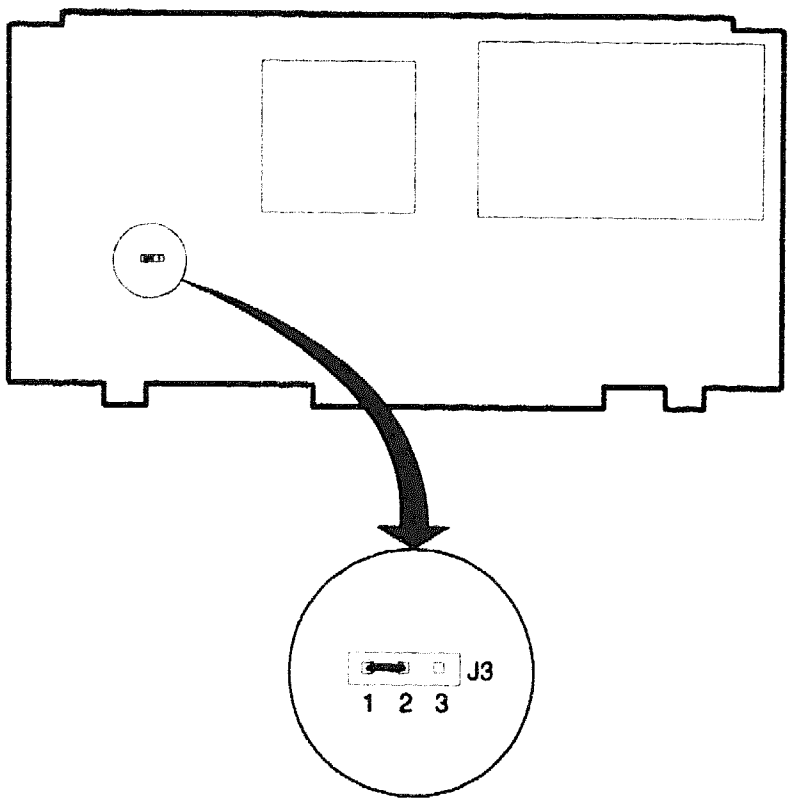


Figure F-2. Intel486 DX2 50 MHz CPU Module Jumper Location

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