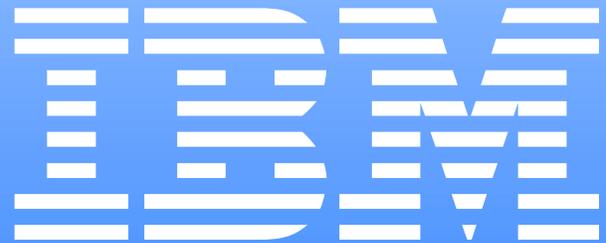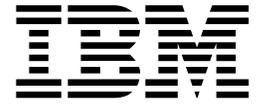IBM IntelliStation Type 6866

IBM

Hardware Maintenance Manual

IBM IntelliStation Type 6866

IBM

Hardware Maintenance Manual

Note: Before using this information and the product it supports, be sure to read the general information under "Notices" on page 137.

First Edition (September 2000)

IBM IntelliStation Type 6866 Hardware Maintenance Manual

Contents

About this manual

This manual contains service and reference information for the IBM® IntelliStation™ Series computer type 6866.

This manual is divided into product service sections (by machine chassis) and a related service section, as follows:

- The product service sections include procedures for isolating problems to a FRU, a Symptom-to-FRU Index, additional service information and an illustrated parts catalog.
- The related service section includes safety notices and safety information, and problem determination tips.

Note

This manual is intended for trained servicers who are familiar with IBM Personal Computer products. Use this manual along with advanced diagnostic tests to troubleshoot problems effectively.

Before servicing an IBM product, be sure to review the "Safety notices (multi-lingual translations)" on page 99 and "Safety information" on page 125.

Important safety information

Be sure to read all caution and danger statements in this book before performing any of the instructions.

Prenez connaissance de toutes les consignes de type Attention et Danger avant de procéder aux opérations décrites par les instructions.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

주의 및 위험 경고문(한글)

중요:

이 책에 나오는 모든 주의 및 위험 경고문은 번호로 시작됩니다. 이 번호는 *Safety Information* 책에 나오는 영문판 주의 및 위험 경고문과 한글판 주의 및 위험 경고문을 상호 참조하는데 사용됩니다.

예를 들어 주의 경고문이 번호 1로 시작되면 *Safety Information* 책에서 이 주의 경고문은 경고문 1번 아래에 나옵니다.

지시를 따라 수행하기 전에 먼저 모든 주의 및 위험 경고문을 읽도록 하십시오.

Accertarsi di leggere tutti gli avvisi di attenzione e di pericolo prima di effettuare qualsiasi operazione.

Leia todas as instruções de cuidado e perigo antes de executar qualquer operação.

Lea atentamente todas las declaraciones de precaución y peligro ante de llevar a cabo cualquier operación.

注意和危险声明（简体中文）

重要事项：

本书中的所有注意和危险声明之前都有编号。该编号用于英语的注意或危险声明与 *Safety Information* 一书中可以找到的翻译版本的注意或危险声明进行交叉引用。

例如，如果一个注意声明以编号 1 开始，那么对该注意声明的翻译出现在 *Safety Information* 一书中的声明 1 中。

在按说明执行任何操作前，请务必阅读所有注意和危险声明。

注意及危險聲明（中文）

重要資訊：

本書中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在「安全資訊」(Safety Information) 一書中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在「安全資訊」(Safety Information) 一書的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

Chapter 1. General checkout

This general checkout procedure is for type **6866** computers.

> **Attention:**
>
> The drives in the computer you are servicing might have been rearranged or the drive startup sequence changed. Be extremely careful during write operations such as copying, saving or formatting. Data or programs can be overwritten if you select an incorrect drive.

Diagnostic error messages appear when a test program finds a problem with a hardware option. For the test programs to properly determine if a test *Passed*, *Failed* or *Aborted*, the test programs check the error-return code at test completion. See "Diagnostics" on page 6.

General error messages appear if a problem or conflict is found by an application program, the operating system, or both. For an explanation of these messages, refer to the information supplied with that software package.

> **Notes:**
> - Type **6866** computers default to come up quiet (no beep and no memory count and checkpoint code display) when no errors are detected by POST.
> - To enable beep and memory count and checkpoint code display when a successful POST occurs, do the following:
>   1. Select **Start Options** in the Configuration/Setup Utility program (see "Setup Utility program" on page 5).
>   2. Set **Power-On Self-Test** to **Enhanced**.
> - Before replacing any FRUs, ensure that the latest level of BIOS is installed on the system. A down-level BIOS might cause false errors and unnecessary replacement of the system board. For more information on how to determine and obtain the latest level BIOS, see "BIOS levels" on page 93.
> - If multiple error codes are displayed, diagnose the first error code displayed.
> - If the computer hangs with a POST error, go to "POST error codes" on page 66.
> - If the computer hangs and no error is displayed, go to "Undetermined problems" on page 81.
> - If an installed device is not recognized by the diagnostics program, that device might be defective.

001

1. Power-off the computer and all external devices.
2. Check all cables and power cords.
3. Make sure the system board is seated properly.
4. Set all display controls to the middle position.
5. Power-on all external devices.
6. Power-on all external devices.
7. Power-on the computer.
8. Check for the following response:
    - Readable instructions or the Main Menu.

DID YOU RECEIVE THE CORRECT RESPONSE?

If NO, continue to **002** .

If YES, proceed to `003` .

002

If the Power Management feature is enabled, do the following:

1. Start the Configuration/Setup Utility program (see "Setup Utility program" on page 5.)

2. Select **Power Management** from the Configuration/Setup Utility program menu.

3. Select **APM**.

4. Be sure **APM BIOS Mode** is set to **Disabled**. If it is not, press Left Arrow (←) or Right Arrow (→) to change the setting.

5. Select **Automatic Hardware Power Management**.

6. Set **Automatic Hardware Power Management** to **Disabled**.

7. If the problem persists, continue to `003` .

003

Run the Diagnostic programs. If necessary, refer to "Running diagnostics tests" on page 6.

-   If you receive an error, replace the part that the diagnostic program calls out or go to "Diagnostics" on page 6.

-   If the test stops and you cannot continue, replace the last device tested.

Chapter 2. General information

Features

The IBM IntelliStation Type 6866 computer is available in 9x7, (nine drive bays, seven expansion slots) four 32-bit, two 64-bit PCI slots, and one AGP slot as a tower model only.

Security

- Cover lock and keys (located behind the CD-ROM cover door)
- Support for the addition of a U-bolt and lockable cable
- Power-on and administrator passwords
- Startup sequence control
- Startup without diskette drive, keyboard, or mouse
- Unattended start mode
- Diskette and hard disk I/O control
- Serial and parallel port I/O control
- Alert on LAN
- Security profile by device
- IBM Security Solutions

Specifications

Specifications Information (ISO/ANSI)

The following machine type specifications information was determined in controlled acoustical environments according to procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779, and are reported in accordance with ISO 9296. Actual sound pressure levels in your location might differ from the average values stated because of room reflections and other nearby noise sources. The declared sound power levels indicate an upper limit, below which a large proportion of machines will operate.

Size	Depth: 606 mm (23.9 inches)
	Height: 440 mm (17.3 inches)
	Width: 216 mm (8.5 inches)
Weight	Minimum configuration as shipped: 29.5 kg (65 lb)
Environment	Air temperature: • System on: 10 to 35 C (50 to 95 F) • System off: 10 to 50 C (50 to 122 F) Humidity: • System on: 8% to 80% • System off: 8% to 80% Maximum altitude: 3048 m (10,000 ft.)
Heat Output	Approximate heat output in BTUs per hour: • Minimum: 340 BTU/hr. (100 watts) • Maximum: 2385 BTU/hr. (700 watts)
Electrical Input	Sine-wave input (47 to 63 Hz) required Low range input voltage: • Minimum: 90 V AC • Maximum: 137 V AC High range input voltage: • Minimum: 180 V AC • Maximum: 265 V AC Input kVA (approximately): • Maximum (as shipped): 1.5kVA
Airflow	Approximately 0.56 cubic meters/minute (20 cubic feet/minute)
Acoustical Noise Emission Values	Average sound pressure levels: At operator position: • - 41 dB operating • - 34 dB idle At bystander position (1 meter): • - 34 dB operating • - 29 dB idle Declared (upper limit) sound power levels: • - 5.3 bels operating • - 4.7 bels idle

Chapter 3. Diagnostics

The following tools are available to help identify and resolve hardware-related problems.

- Setup Utility program
- Power-On Self-Test (POST)
  - POST Beep Codes
  - Error Code Format
- Diagnostics program
- Recovery utility
  - Full recovery
  - Partial recovery
- Repair utility

Setup Utility program

> **Attention:**
>
> A customized setup configuration (other than default settings) might exist on the computer you are servicing. Running the Setup Utility program might alter those settings. Note the current configuration settings and verify that the settings are in place when service is complete.

The Setup Utility (configuration) program is stored in the permanent memory of the computer. This program includes settings for the following:

- System Summary
- Product Data
- Devices and I/O Ports
- Start Options
- Date and Time
- System Security
- Advanced Setup
- ISA Legacy Resource
- Power Management

To run the Setup Utility program, use the following procedure.

1. Power-off the computer and wait for a few seconds until all in-use lights go off.
2. Power-on the computer.
3. When the Setup Utility prompt appears on the screen during start-up, press **F1**. The Setup Utility menu will appear.
4. Follow the instructions on the screen.
5. When finished, select **System Summary** to verify that any configuration changes have been accepted.

Diagnostics

The Diagnostics program uses a full range of diagnostic utilities to determine the operating condition of the computer's hardware components.

For a complete list of error codes and messages, see "Chapter 5. Symptom-to-FRU index," on page 45.

Diagnostics program download

To download the Diagnostics program, do the following:

- Go to **http://www.ibm.com/**.
- Select **Support**.
- Select **Desktop computing** from the "Search by Category" pull-down menu.
- Select **IntelliStation** or Type from the "Product Family" list.
- Search for the machine type in the "Quick Path" box on the left.
- Select **Diagnostics** from the "Downloadable files by Category" pull-down menu or go directly to the link **PC Enhanced Diagnostics diskette** from the "Downloadable files by date" list. This link will take you to the self-starting utility download and instructions.

Navigating through the diagnostics programs

Use the cursor movement keys to navigate within the menus.

- The **Enter** key is used to select a menu item.
- The **Esc** key is used to back up to the previous menu.
- For online help select **F1**.

Running diagnostics tests

There are four ways to run the diagnostic tests.

1. Using the cursor movement keys, highlight **Run Normal Test** or **Run Quick Test** from the Diagnostics menu and then press **Enter**.

   This will automatically run a pre-defined group of tests from each test category. Run **Normal Test** runs a more extensive set of tests than does **Run Quick Test** and takes longer to execute.

2. Press **F5** to automatically run all selected tests in all categories. See "Test Selection".

3. From within a test category, press **Ctrl**-**Enter** to automatically run only the selected tests in that category. See "Test Selection".

4. Using the cursor movement keys, highlight a single test within a test category, then press **Enter**. This will run only that test.

Press **Esc** at any time to stop the testing process.

Test results, (N/A, PASSED, FAILED, ABORTED), are displayed in the field beside the test description and in the test log. See "Viewing the test log" on page 10.

Test selection

To select one or more tests, use the following procedure.

1. Open the corresponding test category.

2. Using the cursor movement keys, highlight the desired test.

3. Press the space bar.

    A selected test is marked by >>. Pressing the space bar again de-selects a test and removes the chevron.

4. Repeat steps 2 and 3 above to select all desired tests.

Module test menu/hardware configuration report

Depending on the diagnostics version level you are using, the installed devices in the computer are verified in one of two ways.

1. At the start of the diagnostic tests, the Module Test Menu is displayed. Normally, all installed devices in the computer are highlighted on the menu.

2. At the start of the diagnostic tests, the main menu appears. From this menu, select **System Info**, then select **Hardware Configuration** from the next menu. Normally, all installed devices in the computer are highlighted on this report.

If an installed device is not recognized by the diagnostics program, then review the following:

- The diagnostic code for the device is not in the Diagnostics program. Run the diagnostics provided with that device.

- The missing device is defective or it requires an additional diskette or service manual.

- An unrecognizable device is installed.

- A defective device is causing another device not to be recognized.

- The SCSI controller failed (on the system board or SCSI adapter).

- Use the procedure in "Undetermined problems" on page 81 to find the problem.

If a device is missing from the list, replace it. If this does not correct the problem, use the procedure in "Undetermined problems" on page 81.

Memory Diagnostic tests

The Memory Diagnostics provide the capability to identify a particular memory module (SIMM, DIMM, or RIMM) which fails during testing. Use the System Board Layout section to reference the memory sockets, or select **F1** *twice* to load the Diagnostics online manual and select "SIMM/DIMM/RIMM Locator".

Follow the steps below to locate the Memory Diagnostic tests options.

1. Select the DIAGNOSTICS option on the toolbar and press **Enter**.

2. Highlight either the *Memory Test-Full* or *Memory Test-Quick* option and press **Enter**.

- **Memory Test-Full**

  The full memory test will take about 80 seconds per MB of memory and will detect marginal, intermittent, and solid (stuck) memory failures.

  - **Memory Test-Quick**

    The quick memory test will take about 20 seconds per MB of memory and will detect solid (stuck) memory failures only.

Notes:

Either level of memory testing can be performed on all memory or a single SIMM, DIMM or RIMM socket.

Only sockets containing a SIMM, DIMM or RIMM can be selected for testing. Unpopulated sockets are noted by .... beside the test description.

Alert-On LAN™ test

The Alert On LAN test does the following:

- Determines if Alert On LAN is supported on the system.
- Checks the revision ID register.
- Verifies the EEPROM checksum.
- Validates that a software alert can be sent.

Asset ID™ test

The Asset ID test does the following:

- Determines if Asset ID is supported on the system.
- Verifies the EEPROM areas.
- Performs an antenna detection test.

Test results

Diagnostics test results will produce the following error code format:

Function Code	Failure Type	DeviceID	Date	ChkDigits	Text

- **Function Code:**

  Represents the feature or function within the PC.

- **Failure Type:**

  Represents the type of error encountered.

- **DeviceID:**

  Contains the component's unit-ID which corresponds to either a fixed disk drive, removable media drive, serial or parallel port, processor, specific SIMM or DIMM, or a device on the PCI bus.

- **Date:**

  Contains the date on which the diagnostic test was run. The date is retrieved from CMOS and displayed using the YYYYMMDD format.

- **ChkDigits:**

  Contains a 2-digit check-digit value to ensure the following:

  — Diagnostics were run on the specified date.

  — Diagnostics were run on the specified IBM computer.

  — The diagnostic error code is recorded correctly.

- **Text:**

  Description of the error.

  Note: See "Diagnostic error codes" on page 47 for error code listings.

Hard file Smart test

Use the Hard File Smart Test when the system management tool has detected a hard file SMART alert.

The Smart test does the following:

- Interrogates IDE devices for support of the SMART instruction set.
- Issues an ENABLE SMART command to make sure SMART functionality is active.
- Checks the SMART RETURN STATUS command to determine if any thresholds have been exceeded.

If thresholds have been exceeded, an error message is shown, and the test fails. If no SMART is supported by the drive, the test returns with "N/A".

Fixed Disk Optimized Test

You can use the Fixed Disk Optimized Test to identify a particular area of a hard disk that fails during testing. You can also use this test to correct types of errors.

To run the Fixed Disk Optimized Test, do the following:

1. From the toolbar, select **Diagnostics**.
2. Select **Fixed Disk Optimized Test**.
3. Select one of the tests:
   - **Hard Disk Test** - **Full** performs a complete test of the hard disk drive.
   - **Hard Disk Test** - **Quick** performs a subset of the full hard disk tests.
   - **Start SMART Hard Disk Test** initiates an IDE extended offline self-test.
   - **SMART Hard Disk Test Results** runs the IDE extended offline self-test and displays the results.

You can run the Start SMART Hard Disk Test and then continue with other diagnostics tests before running the Hard Drive Self-Test Results.

Quick and Full erase - hard drive

The Diagnostics program offers two hard drive format utilities:

- Quick Erase Hard Drive
- Full Erase Hard Drive

The Quick Erase Hard Drive provides a DOS utility that performs the following steps.

- Destroys the Master Boot Record (MBR) on the hard drive.

- Destroys all copies of the FAT Table on all partitions (both the master and backup).
- Destroys the partition table.
- Provides messages that warn the user that this is a non-recoverable process.

The Full Erase Hard Drive provides a DOS utility that performs the following steps.

- Performs all the steps in Quick Erase.
- Provides a DOS utility that writes random data to all sectors of the hard drive.
- Provide an estimate of time to completion along with a visual representation of completion status.
- Provides messages that warn the user about non-recoverable process.

Important:	Make sure that all data is backed up before using the Quick or Full Erase functions.

To select the Quick Erase or Full Erase Hard Drive utility, use the following procedure.

1. Select the UTILITY option on the toolbar and press **Enter**.
2. Select either the QUICK ERASE or FULL ERASE HARD DISK option and follow the instructions.

Iomega Zip drive test

Use the Iomega Zip Drive Test to test the Zip drive and the drive interface. The test takes about 20 seconds to run.

The default tests the following:

- Controller
- Max Seek (50 times)
- Random Seek (300 sectors)

Asset EEPROM backup

When replacing a system board, this utility allows the backup of all Asset information from the EEPROM to diskette. This utility also restores data to the EEPROM from diskette after replacement of the system board.

To run this utility, use the following procedure.

- Select **Utility**
- Select **Asset EEPROM Backup**
- Follow instructions on screen.

Viewing the test log

Errors reported by the diagnostic test will be displayed by the program as a failed test.

To view details of a failure or to view a list of test results, use the following procedure from any test category screen.

- Press **F3** to activate the log file.
- Press **F3** again to save the file to diskette or **F2** to print the file.

When to use the Low-Level Format program

Notes

1. The low-level format is not available on all diagnostic diskettes.

2. Before formatting the hard disk drive, make a backup copy of the files on the drive to be formatted.

Use the Low-Level Format program in the following situations:

- When you are installing software that requires a low-level format.
- When you get recurring messages from the test programs directing you to run the Low-Level Format program on the hard disk.
- As a last resort before replacing a hard disk drive.

Preparing the hard disk drive for use

When the Low-Level Format program is finished, restore to the hard disk all the files that you previously backed up.

1. Partition the remainder of the hard disk for the operating system. (The commands vary with the operating system. Refer to the operating system manual for instructions.)

2. Format the hard disk using the operating system. (The commands vary with the operating system. Refer to the operating system manual for instructions.)

3. Install the operating system.

You are now ready to restore the files.

Chapter 4. FRU replacements

Replacing a processor/installing a second processor

> **Note:** Before installing a second microprocessor, run the Multiprocessor Upgrade Option program, provided on the Software Selections CD. For information about this utility, see `addcpu.txt` file on the Software Selections CD.

1. Remove the cover and front bezel. See "Cover removal" on page 24.

2. Loosen the two screws holding the terminator card or microprocessor. (see "System board layout" on page 17.) and remove from the microprocessor socket.
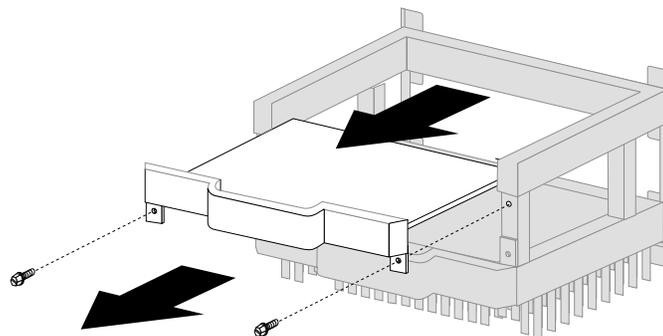
3. Insert the new microprocessor into the guides. Push the microprocessor into the socket until it is properly seated.

13
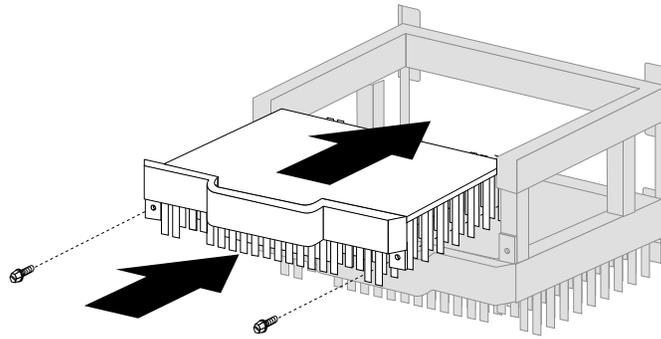
4. Tighten the two screws.

5. To gain access to the second CPU voltage regulator module (VRM) socket on the system board, move aside all power supply cables as necessary.

6. Install the VRM supplied with the microprocessor. See "System board layout" on page 17 for the location of the second CPU VRM socket.

Note: If you add a second microprocessor that runs at a different speed than the primary microprocessor, both will run at the speed of the slower microprocessor.

Replacing a system board

Note:

1. The BIOS and Vital Product Data (VPD) for the computer you are servicing must be installed on the new system board (FRU) after it is installed in the computer. To do this, **you must run the Flash Update program using the Flash Update diskette.** See "BIOS levels" on page 93, "Vital product data" on page 92, and "Flash (BIOS/VPD) update procedure" on page 93.

2. Always ensure the latest level of BIOS is installed on the computer. A down level BIOS may cause false errors and unnecessary replacement of the system board.

3. The processor is a separate FRU from the system board and is not included with the system board FRU. If you are instructed to replace the system board, do the following:

   a. Remove the processor from the old system board and install it on the new system board.

   b. Refer to "System board layout" on page 17 to find the system board rocker switch.

   c. Set switch 1 to the on position.

   d. Power-on the computer. The system senses the change in the switch setting and resets to the default processor speed (266 MHz).

   e. Power-off the computer and set switch 1 back to the off position.

   f. Power-on the computer

      1) Select **Advanced Setup** from the Setup Utility Menu.

      2) Select **Processor Speed Control** from the Advanced Setup menu.

      3) Set the processor speed to match the speed of the installed processor.

4. If the new system board does not correct the problem, reinstall the old system board, then replace the processor.

System board removal
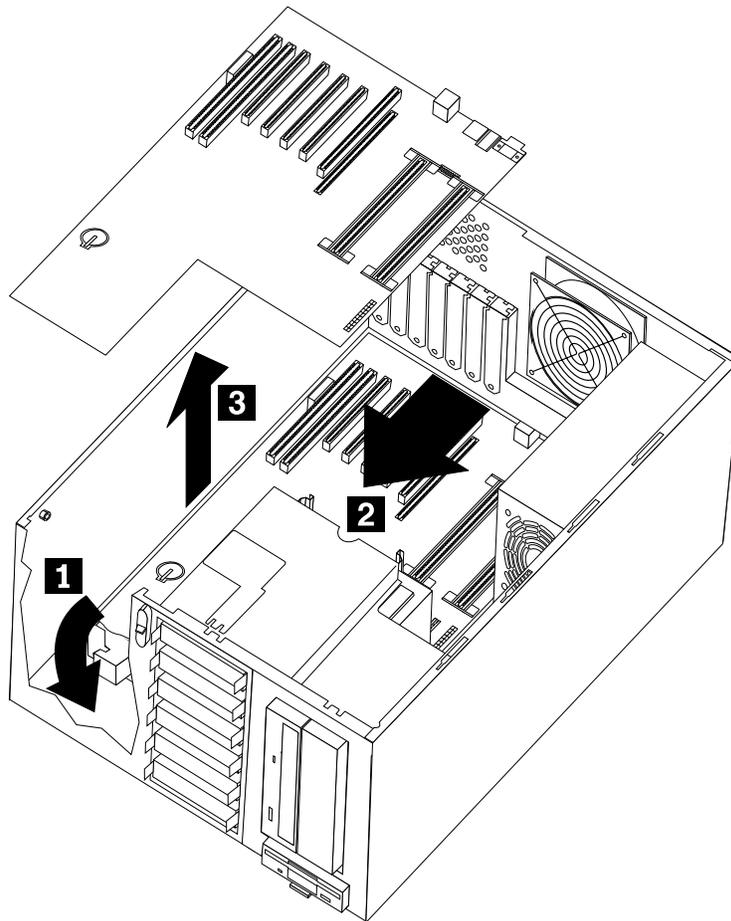
1. Remove the side cover.
2. Remove the memory board.
3. Remove the hard disk fan assembly.
4. Remove adapter cards.
5. Remove the card guide/fan assembly.
6. Disconnect all cables attached to the system board.
7. Release the system board back-plate release latch **1**
8. Slide the system board and back plate toward the front of the system **2** and lift the system board and back-plate **3** out of the chassis.

System board layout
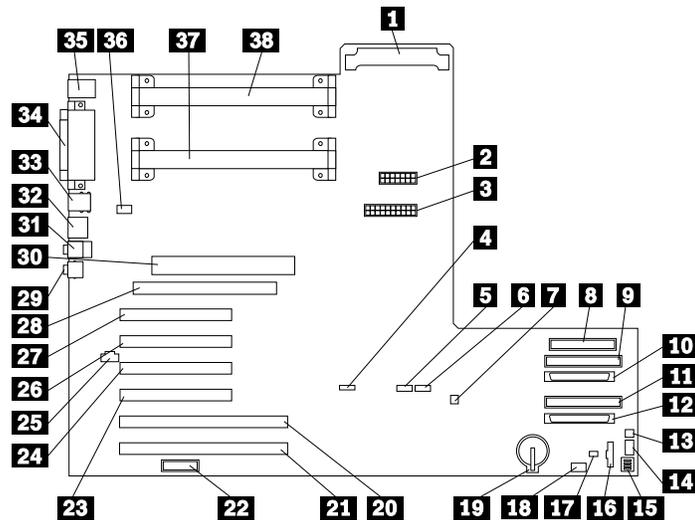
1	Second CPU voltage regulator module (VRM)
2	Power 2
3	Power 1
4	Hard disk LED
5	Wake on LAN connector
6	Alert on LAN connector
7	Wake on Modem connector
8	Diskette drive connector
9	Secondary IDE connector
10	SCSI channel B
11	Primary IDE connector
12	SCSI channel A
13	Internal speaker connector
14	Front fan connector
15	Rocker switch
16	Front panel connector
17	Tamper detection switch connector
18	Radio Frequency antenna connector
19	Battery
20	Slot 6 (64-bit PCI adapter)
21	Slot 7 (64-bit PCI adapter)
22	MIDI/joystick connector
23	Slot 5 (32-bit PCI adapter)
24	Slot 4 (32-bit PCI adapter)
25	CD audio connector

26	Slot 3 (32-bit PCI adapter)
27	Slot 2 (32-bit PCI adapter)
28	Slot 1 (AGP adapter)
29	Microphone
30	Memory card connector
31	Line out/head phone and audio line connectors
32	Ethernet connector
33	USB connectors
34	Parallel and serial connectors
35	Mouse and Keyboard connectors
36	Rear fan connector
37	Microprocessor 1
38	Microprocessor 2

System board switch settings

Note: The default switch settings for the rocker switch is off.

Switch	Description
1	Reset Frequency
2	Reserved
3	Clear CMOS & Force Bootblock
4	Reserved

Processor Speed Settings

Processor speed for the PC 300 type 6866 computer is set in the Setup Utility (configuration) program.

System board memory

Note: RAMBUS inline memory module (RIMM) is used in the type 6866 computer. RIMM modules are not compatible with SIMM or DIMM memory modules. refer to the information below regarding RIMM memory for type 6866.

Locating components on the memory card

The type 6866 uses a four or eight RIMM memory card for system memory. The memory card contains RIMM connectors, a power connector, and a hard disk fan connector.

Eight RIMM memory card

8-RIMM Memory Card

Hard
Disk
Fan

RIMM Socket 1

RIMM Socket 2

RIMM Socket 3

RIMM Socket 4

RIMM
Pair 3

RIMM
Pair 1

RIMM
Pair 2

Power

RIMM Socket 5

RIMM Socket 6

RIMM
Pair 4

RIMM Socket 7

RIMM Socket 8

Four RIMM memory card

4-RIMM Memory Card

Hard
Disk
Fan

Power

RIMM Socket 1

RIMM Socket 2

RIMM
Pair 2

RIMM Socket 3

RIMM Socket 4
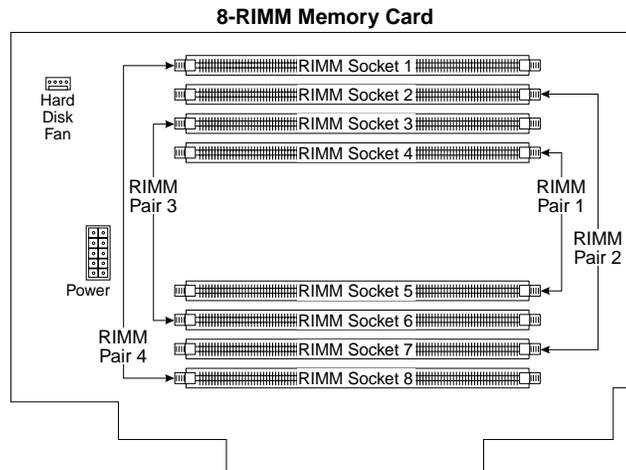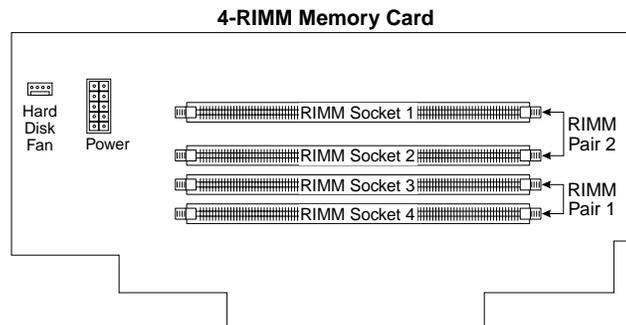
RIMM
Pair 1

Type 6866 memory

Rambus inline memory modules (RIMMs)

The IBM-installed RIMMs are ECC (error checking and correction) RDRAM (Rambus dynamic random access memory) modules.

When installing or replacing RIMMs, take the following information into consideration:

- RIMM connectors do not support dual inline memory modules (DIMMs)

- Use only PC600 or PC800 RIMMs.

- There are four or eight RIMM memory cards. RIMMs must be installed in pairs. The RIMMs installed in a RIMM connector pair must be of the same speed, and size.

- For four RIMM cards, any connector that does not have a RIMM installed must have a *continuity RIMM* (C-RIMM).

- For eight RIMM cards, pairs 1 and 3 must have RIMMs or C-RIMMs installed in them. If RIMMs are installed in pair 2, RIMMs or C-RIMMs must be installed in pair 4. For the arrangement of the RIMM connector pairs on the computer memory card, see "Locating components on the memory card" on page 18

- Install only ECC RIMMS to enable ECC. If ECC and non-ECC memory are used together, the memory will function as non-ECC memory.

Note: If PC600 and PC800 RIMMs are used together, all memory will function at the speed of the slowest RIMM.

Eight RIMM Memory card configuration

Memory placement for 8-RIMM Memory Card

	1	2	3	4	5	6	7	8
2 RIMMs	(1)	(1)	C-RIMM	RIMM	RIMM	C-RIMM	(1)	(1)
4 RIMMs	C-RIMM	RIMM	C-RIMM	RIMM	RIMM	C-RIMM	RIMM	C-RIMM
4 RIMMs*	(1)	(1)	RIMM	RIMM	RIMM	RIMM	(1)	(1)
6 RIMMs	C-RIMM	RIMM	RIMM	RIMM	RIMM	RIMM	RIMM	C-RIMM
8 RIMMs	RIMM	RIMM	RIMM	RIMM	RIMM	RIMM	RIMM	RIMM
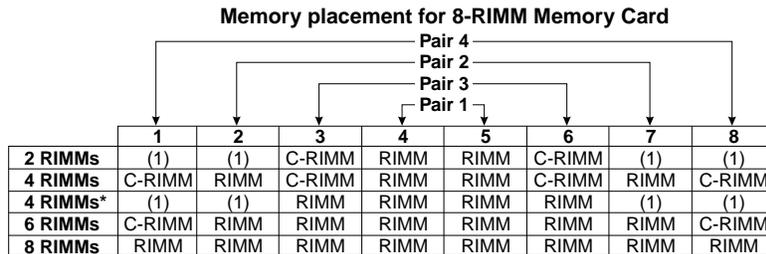
Note: Memory must be installed in matched pairs.
* Non-optimal performance configuration
(1) These connectors may either be left empty or used to store c-rimms.

Four RIMM Memory card configuration

Memory placement for 4-RIMM Memory Card

	3	4	1	2
2 RIMMs	RIMM	RIMM	C-RIMM	C-RIMM
4 RIMMs	RIMM	RIMM	RIMM	RIMM
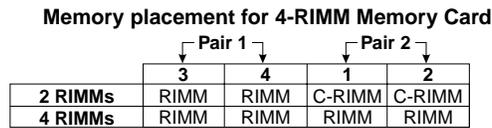
Note: Memory must be installed in matched pairs.

Removing a RIMM or C-RIMM

Attention: Standby power present, disconnect power cord before servicing computer.

1. To locate the RIMM connectors, see "System board layout" on page 17 and "Locating components on the memory card" on page 18.

2. Press the tab on the front fan and push the adapter guide latch toward the front of the chassis until it snaps into place.
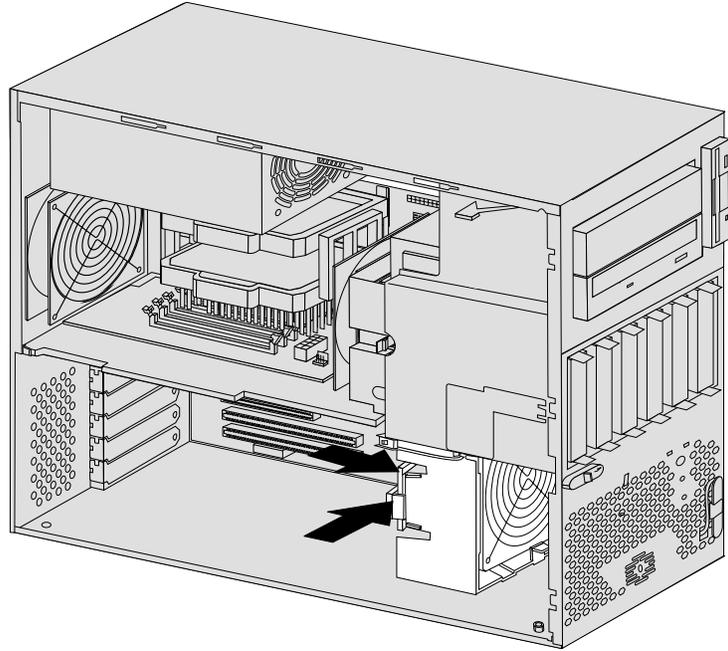
3. Disconnect the power and hard disk drive fan cables on the memory card.

4. Push the tab on the back of the memory card inward and pull the memory card out of the chassis.
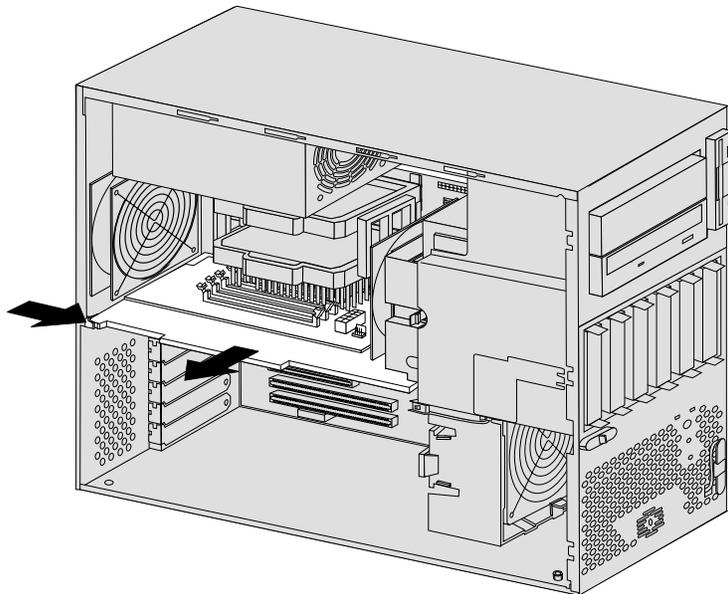
5. At both ends of the RIMM connector, push outward on the retaining clips until the module is loosened. Lift the RIMM or C-RIMM out of the connector.

   Note: Be careful not to push too hard on the retaining clips, because the RIMM or C-RIMM might eject too quickly.
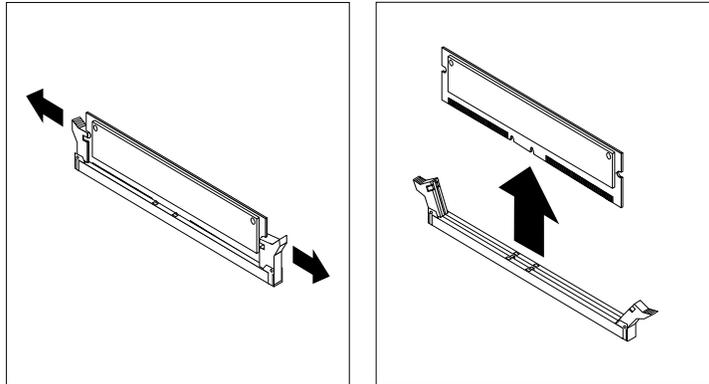
Installing a RIMM or C-RIMM

1. Position the RIMM or C-RIMM above the connector so that the two notches on the bottom edge of the module align properly with the empty connector.

   Note: Pay attention to the orientation of the notches on the connectors and RIMMs. Adjacent connectors might not have the same orientation on the memory card.

2. Firmly push the module straight down into the connector until the retaining clips pop up and fit snugly around both ends of the module.
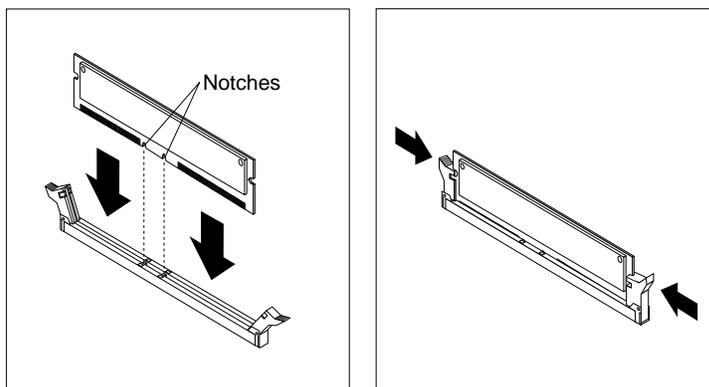
3. Place the memory card back in the slot on the system board and reattach the power and hard disk drive fan cables to the connectors on the memory card.

4. Release the adapter guide latch on the front fan.

Procedures to determine memory errors:

1. If a memory error occurs, and the system is operational, run memory diagnostics.

2. If a memory error occurs, and the system is not operational:

   a. Replace one RIMM module at a time until the system comes up.

      Note: All unused RIMM sockets must have a C-RIMM installed.

   b. Run memory diagnostics.

   c. Install the other RIMM and run diagnostics again to identify the failing RIMM.

Computer exploded view
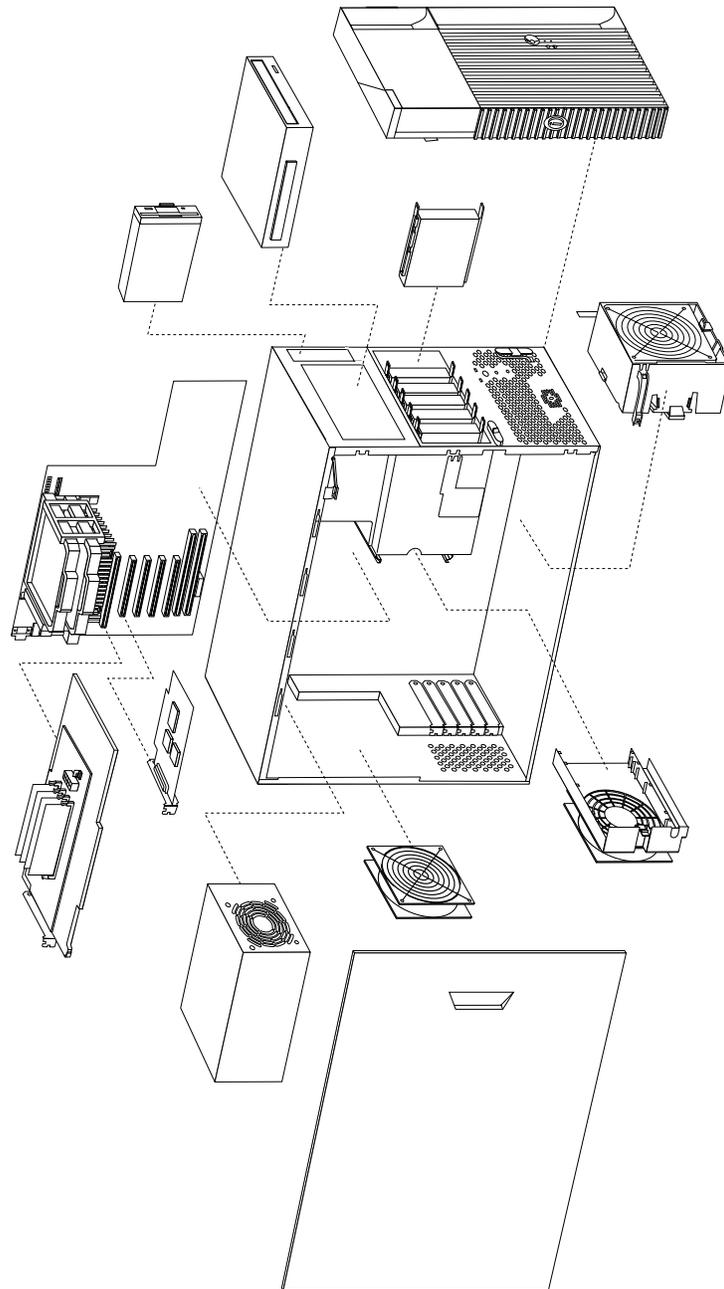
I/O connectors and removal procedures for the cover and front bezel, Diskette drive, CD-ROM drive, hard drive, card guide/fan assembly, hard disk fan assembly, system board, long adapters, power supply, and battery removal are on the following pages.

Input/Output connectors
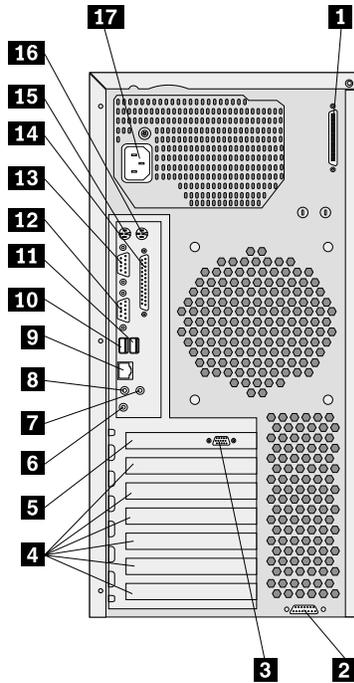
1	SCSI connector
2	MIDI/joystick connector
3	Monitor connector
4	Adaptor slots
5	AGP Adaptor
6	Microphone in connector
7	Audio line in connector
8	Line out/headphone connector
9	Ethernet connector
10	USB connector
11	USB connector
12	Serial connector 2
13	Serial connector 1
14	Parallel connector
15	Keyboard connector
16	Mouse connector
17	Power connector

Cover removal

1. If the key-lock button is locked, unlock it.
2. Press the key-lock button on the left side of the front bezel and slide the side cover toward.
3. Lift the side cover from the computer.
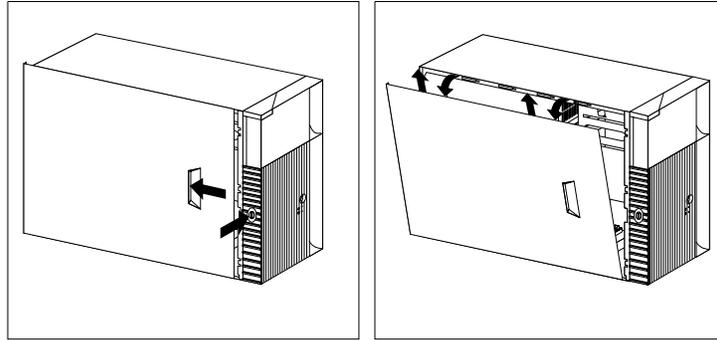
Front bezel removal

1. Lift the lever at the top of the chassis and pull the front bezel from the front of the computer.
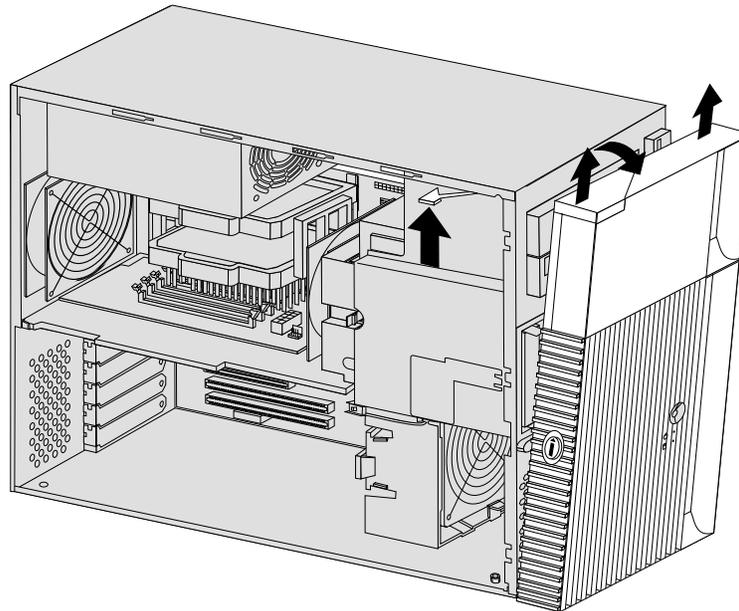
Card guide/fan assembly removal

1. Remove the cover and front bezel.
2. Press the latch tab on the card guide/fan assembly and push the adapter guide latch toward the front of the chassis until it snaps into place.
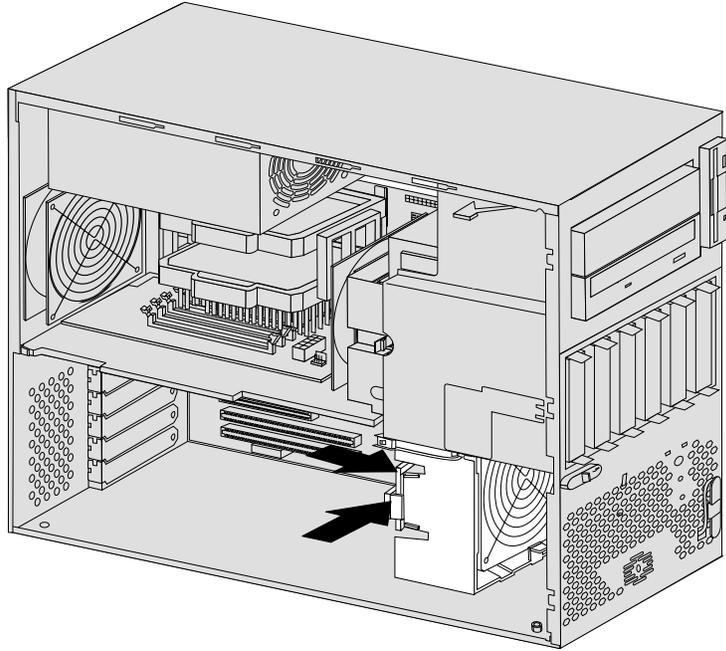
3. Disconnect the memory power cable and the hard disk drive fan cable on the memory card.

4. Push the tab on the back of the memory card inward and pull the memory card out of the chassis. see "Removing a RIMM or C-RIMM" on page 20.

5. Remove any long adapters installed in the PCI slots.

6. Press the latch tabs on the card guide/fan assembly to release it, move the assembly towards the back and out of the chassis.

Battery removal and installation

1. Turn off the computer and all attached devices.

2. Unplug the power cord.

3. Remove the cover.

4. Remove the memory card (see "Removing a RIMM or C-RIMM" on page 20).

5. Remove any long adapters installed in the PCI slots (see "Installing long adapters" on page 27).

6. Remove the card guide/fan assembly (see "Card guide/fan assembly removal" on page 25).

7. Locate the battery. Refer to the system board label inside your computer or see "System board layout" on page 17.

8. Remove the old battery.
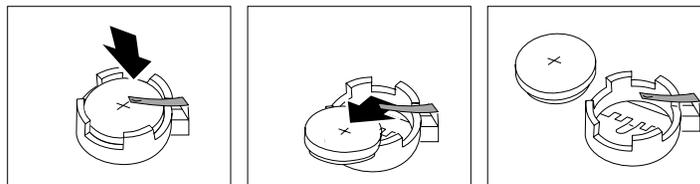
9. Install the new battery.
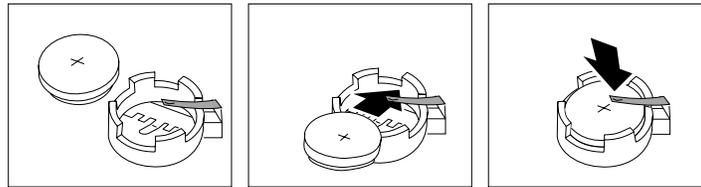
Installing long adapters

1. Press the tab on the card guide/fan assembly and push the adapter guide latch back to allow room for a full size adapter to slide into the adapter guide on the assembly.
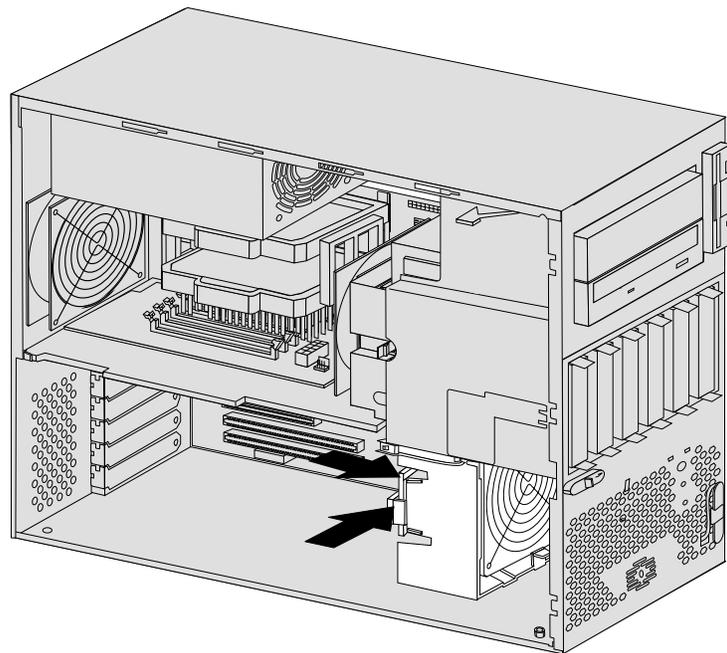
2. Remove the screw and the appropriate expansion slot cover.

3. Install the adapter and screw it into place.
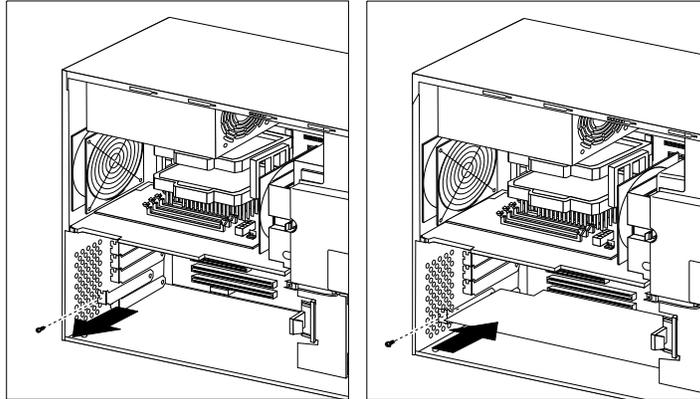
4. Release the adapter guide latch.

Installing internal drives
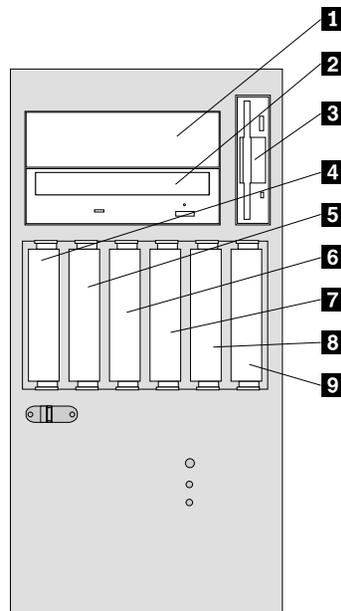
1	Drive bay 1
2	Drive bay 2 (CD-ROM drive)
3	Drive bay 3 (diskette drive)
4	Drive bay 4
5	Drive bay 5
6	Drive bay 6
7	Drive bay 7
8	Drive bay 8
9	Drive bay 9 (hard disk drive)

Note:

1. Install removable-media drives in bay 1.
2. Only one diskette drive is supported.
3. Bays 4, 5, and 6 support either three 25.4 mm (1.0 in.) drives or two 40.6 mm (1.6 in.) drives.
4. Bays 7, 8, and 9 support either three 25.4 mm (1.0 in.) drives or two 40.6 mm (1.6 in.) drives.

See the following illustration for possible drive arrangement.
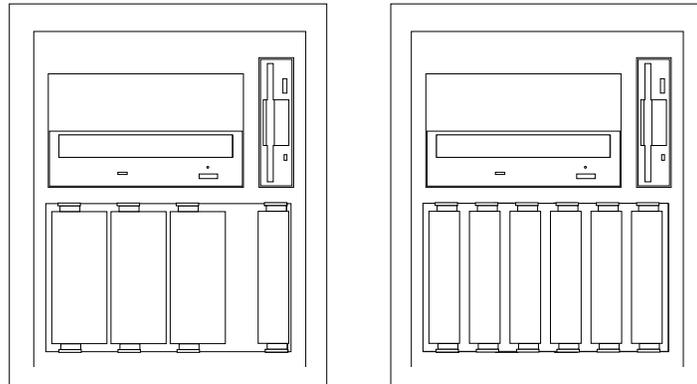
Installing a drive in bay 1

Note: A 3.5-inch drive into bay 1 requires an industry standard bay adapter bracket.
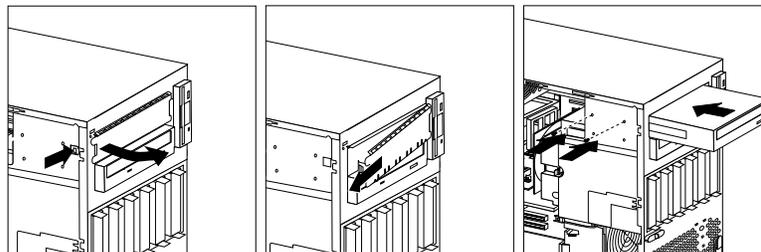
Note: For removable media drives remove the front bay panel.
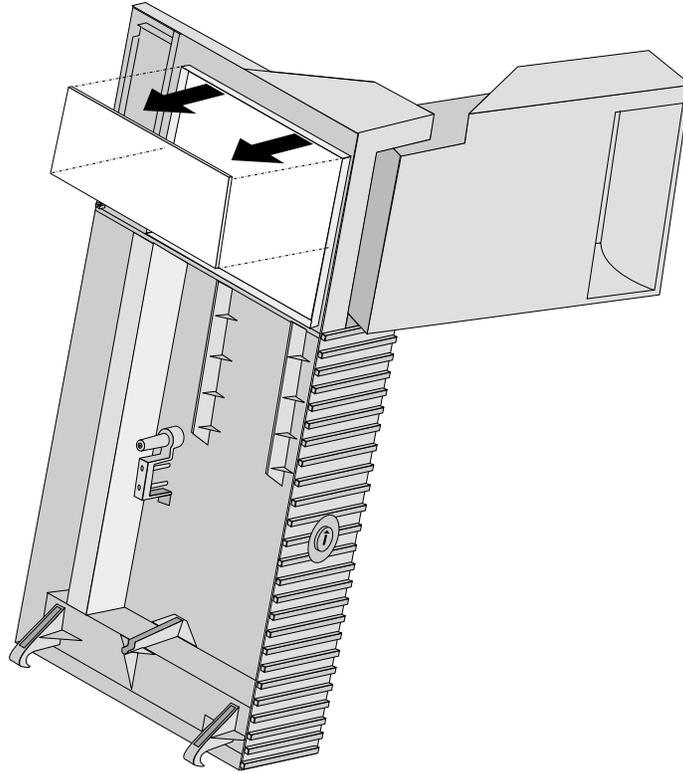
Removing drives in bays 4, 5, 6, 7, 8, and 9

1. Unplug the hard disk drive fan power cable from the connector on the memory card.

2. Pull the tab release on the hard disk fan toward the rear of the chassis and slide the hard disk drive fan out of the chassis.
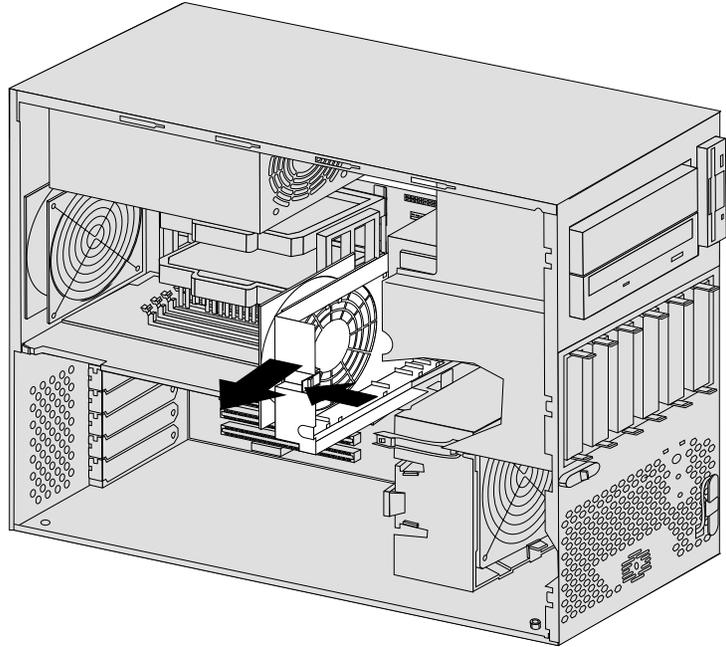
3. Remove all cables to the drive.
4. Press in the tabs on the sliding rails and remove the hard disk drive.
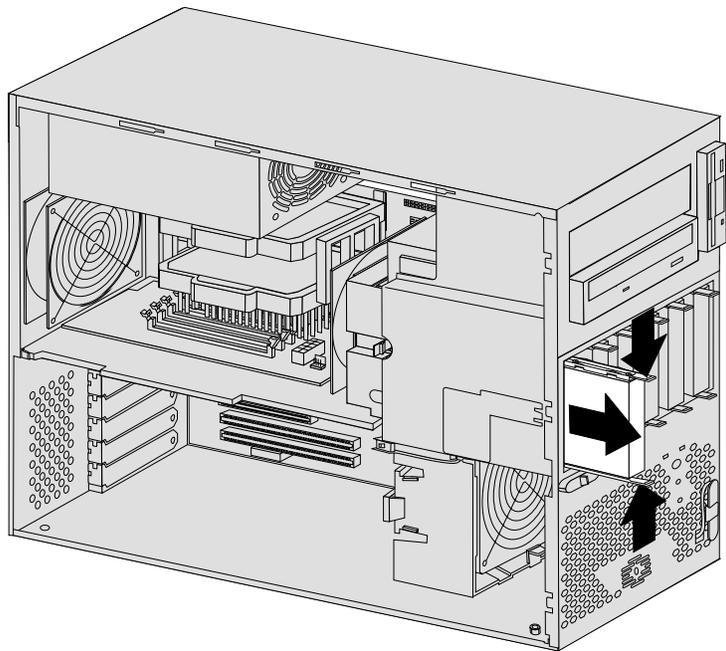
Hard disk drive jumper settings

IDE hard disk drives for the IntelliStation computers use jumpers to set the drives as primary (master) or secondary (slave).

Attention: For drives not shown below, refer to the label on the hard disk drive for the hard disk drive settings.

IDE hard disk drive settings

1	Primary (Master) Hard Disk Drive
2	Secondary (Slave) Hard Disk Drive
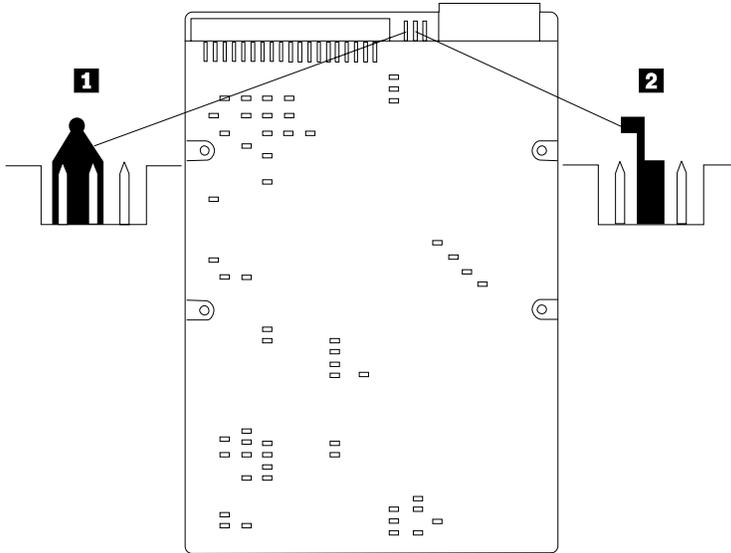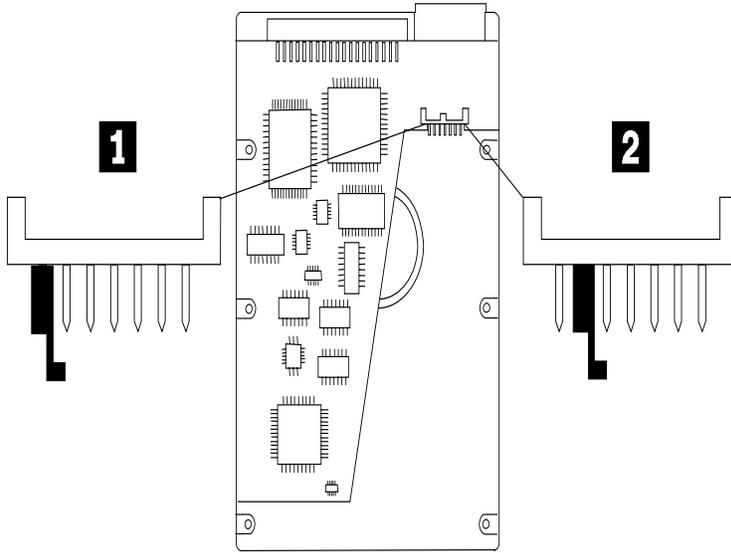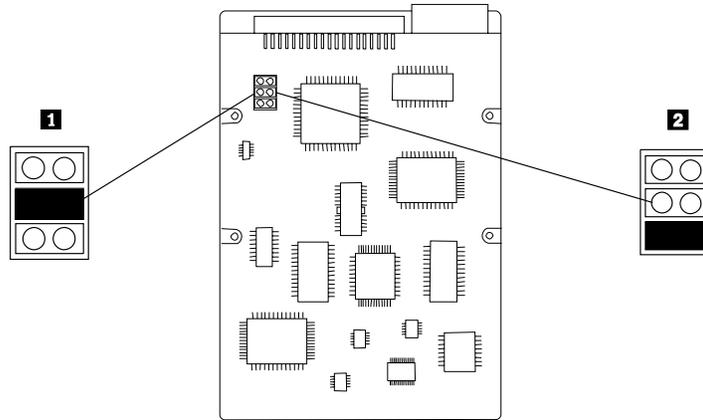
CD-ROM drive jumper settings

CD-ROM and PC/CD-ROM drives use jumpers or tabs to set the drives as primary (master) or secondary (slave). Refer to the drive connector labels or the figures below for the drive settings.

AUDIO   IDE INTERFACE   DC INPUT

R G G L   39 ——— 1   5V G G 12V
          40 ——— 2

See jumper
settings below
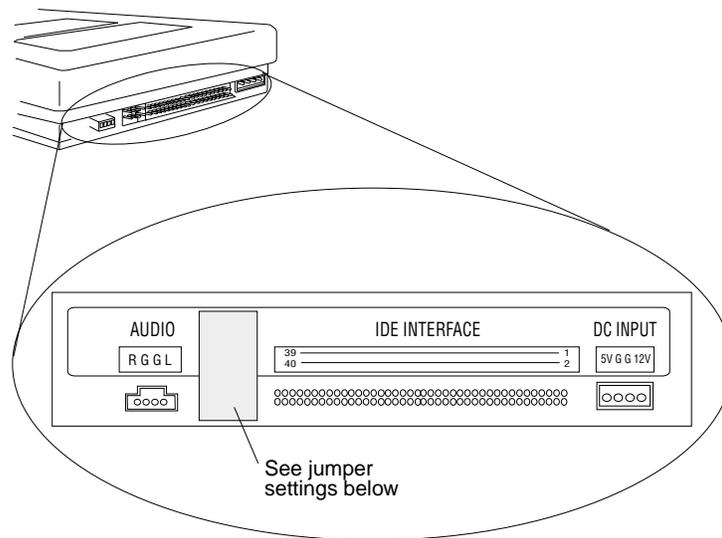
CD-ROM, PD/CD-ROM Type	Primary (Master)	Secondary (Slave)
16X Max CD-ROM	: : ▮	: ▮ :
24X Max CD-ROM	: : ▮	: ▮ :
32X Max CD-ROM	: : ▮	: ▮ :
40X Max CD-ROM	: : ▮	: ▮ :
48X Max CD-ROM	: : ▮	: ▮ :

Power supply removal

To remove the power supply, do the following:

1. Remove the side cover.
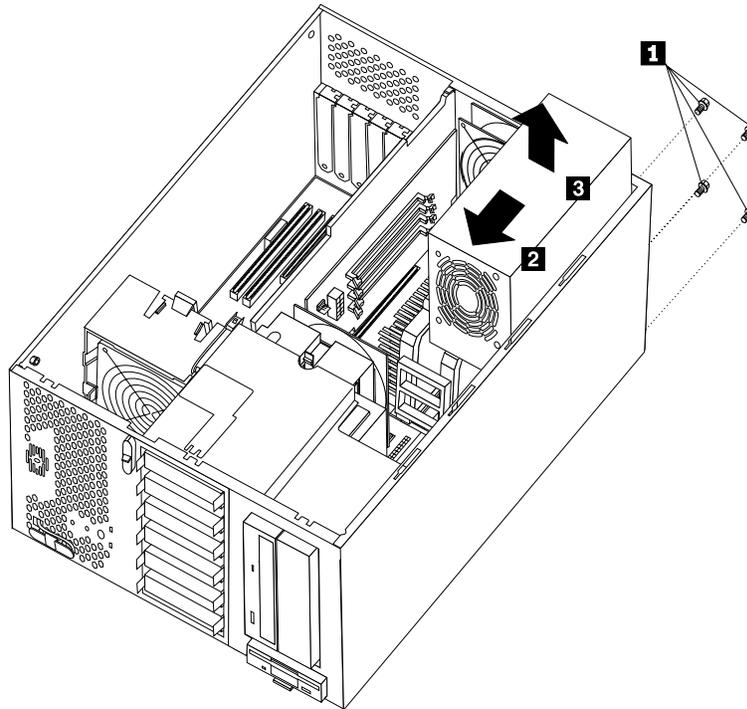
2. Disconnect the power supply cables.
3. Remove the power supply screws **1**
4. Slide the power supply toward the front of the system **2** and lift the power supply out of the system **3** .

20-pin power supply connection

See "System board layout" on page 17 for connector location.

Attention: These voltages must be checked with the power supply cables connected to the system board.
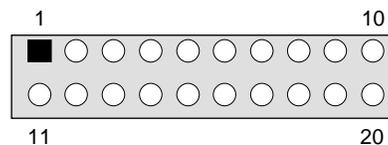
Pin	Signal	Function
1	3.3 V	+3.3 V dc
2	3.3 V	+3.3 V dc
3	COM	Ground
4	5 V	+5 V dc
5	COM	Ground
6	5 V	+5 V dc
7	COM	Ground
8	POK	Power Good
9	5VSB	Standby voltage
10	12 V	+12 V dc
11	3.3 V	+3.3 V dc
12	- 12 V	- 12 V dc
13	COM	Ground
14	PS-ON	DC Remote Enable
15	COM	Ground
16	COM	Ground
17	COM	Ground
18	- 5 V	- 5 V dc
19	5 V	+5 V dc
20	5 V	+5 V dc

If the voltages are not correct, and the power cord is good, replace the power supply.

Rack mount configuration

To configure the Type 6866 in a rack mount there are three major steps:

1. Preparing the computer for installation in a rack enclosure.
2. Preparing the rack enclosure.
3. Installing the computer into the rack enclosure.

Preparing the computer for installation

Parts needed:

- Part number 10L7006, Netfinity Tower-Rack Conversion Kit
- Two 3.5 mm flange nuts which are provided in a plastic bag taped inside the CD-ROM drive cover
- The inner slide from two slide bracket assemblies
- 6 pan-head short screws

Attention: To avoid damage to internal components, use only the pan-head short screws included with the rack mount kit.

To prepare the Type 6866 for installation in a rack enclosure:

1. Remove the left side cover.

2. Remove the top and right cover (secured by four slotted screws).

3. Place the computer on its right side to gain access to the inside.

4. Reach in and remove the four feet at the bottom of the computer.

5. Move the computer back to the tower position.

6. Install the new right side cover using three slotted screws.

7. Place the computer on its right side.

8. Install the new left side cover (the left cover has a thumbscrew attached). Tighten the thumbscrew.

9. Install L-bracket part number 20L1419 on the left and L-bracket part number 20L1418 on the right, using two slotted screws per L-bracket.

10. Remove the rubber thread protectors on the two bolt studs near the power supply (as shown in the following illustration).

11. Remove the screw between the two bolt studs (as shown in the following illustration).

12. Install the cable-arm bracket onto the two bolt studs on the rear of the computer. This cable-arm bracket is secured using two 3.5 mm flange nuts which are provided in a plastic bag taped inside the CD-ROM drive cover.

    Note: This cable-arm bracket will not attach to the computer unless you have first removed the screw near the power supply.
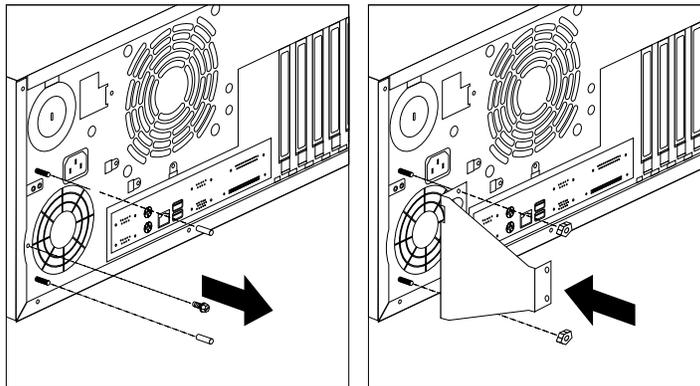
13. Attach the inner slide section of each slide rail to the side of the computer.

    a. Pull the inner slide until the safety latch locks.

    b. Press the safety latch; then, pull the inner slide firmly until it detaches from the outer slide rail.
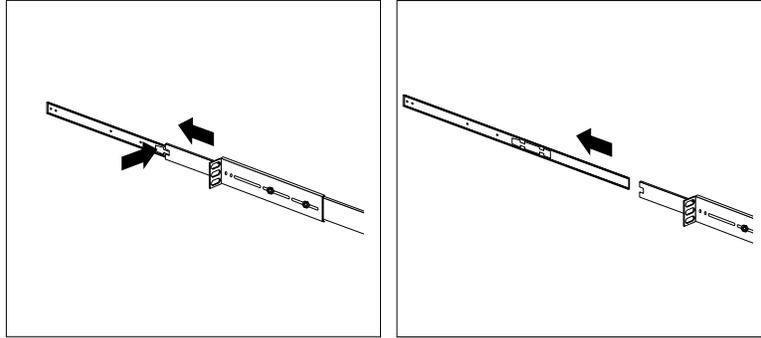
   c.   Align the holes on the inner slide with the holes on sides of the computer; then, attach the slide with three pan-head short screws.
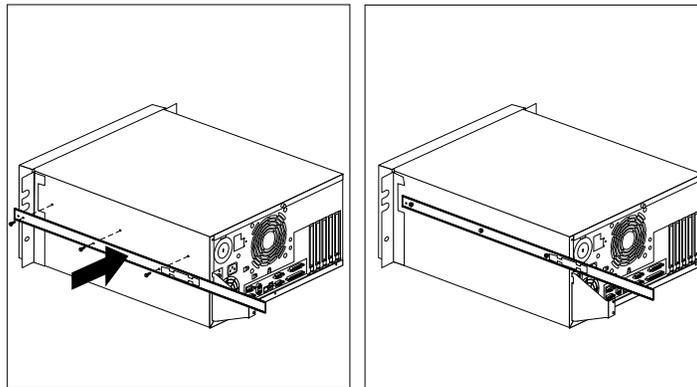
Preparing the rack enclosure

Parts needed:

- Two slide bracket assemblies
- Two slide rails (fitted to system unit)
- One cable-management arm
- Ten long screws
- Ten cage nuts
- Installation template

Attention: To ensure cabinet stability, install computers in the rack enclosure starting from the bottom.

Attention: This procedure requires two people.

To attach the mounting hardware to the rack enclosure:

1.   Mark the positions of the slide brackets on the mounting rails on the rack enclosure:

   a.   Position the template on the front mounting rail on the rack enclosure, aligning the holes. Secure the template in place with tape.

   b.   Mark the holes for the slide brackets and cage nuts.

c. Remove the tape from the mounting rails, and attach the template to the rear mounting rails. Mark the locations for the slide brackets and cage nuts.

   Notes:

   1) Align the slide brackets correctly, or the installation cannot be completed.

   2) The slide rails have four screws each to allow for length adjustment.

2. Install the cage nuts in the marked positions as shown.
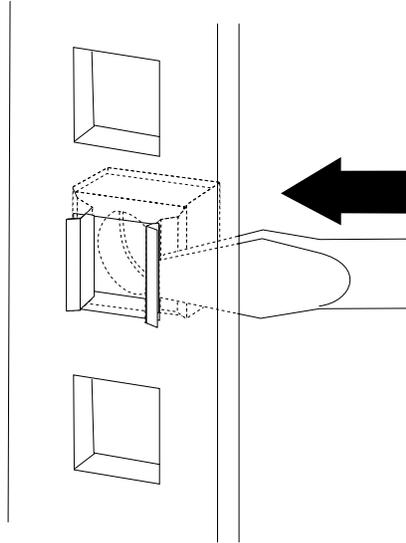
3. Attach the slide rail to the left side of the rack enclosure.

   a. Extend the outer slide rail until the slide bracket is flush against the outside of the left front mounting rail. Align the slide rail with the cage nuts on the mounting rail.

   b. From the front of the rack enclosure, insert two long screws through the slide bracket and mounting rail. Press the slide bracket until it is flush with the outer edge of the mounting rail; then, tighten the screws.
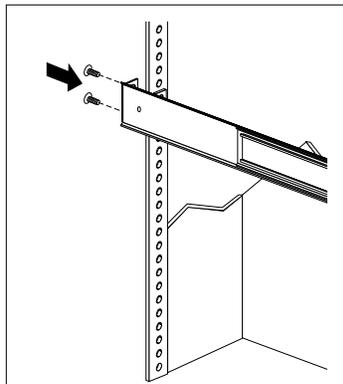
   c. Attach the slide bracket to the left rear side of the rack enclosure.

   1) Align the holes on the slide bracket with the cage nuts on the rear mounting rail.

2) From the rear of the rack enclosure, insert two long screws through the slide bracket and mounting rail; then, tighten the screws.

3) If it was necessary to adjust the length of the slide rails, tighten the nuts on the slide rail, using pliers, a socket wrench, or an adjustable wrench.
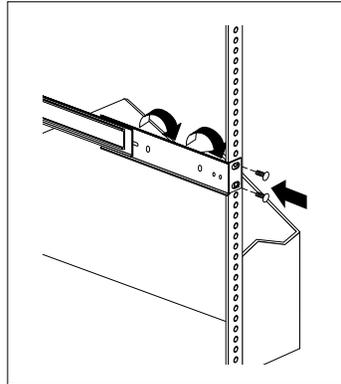
4. Attach the slide rail to the right side of the rack enclosure.

   a. Extend the outer slide rail until the slide bracket is flush against the outside of the right front mounting rail. Align the slide bracket with the cage nuts on the mounting rail.

   b. From the front of the rack enclosure, insert two long screws through the slide bracket and mounting rail. Press the slide rail so that it is flush with the outer edge of the mounting rail and tighten the screws.
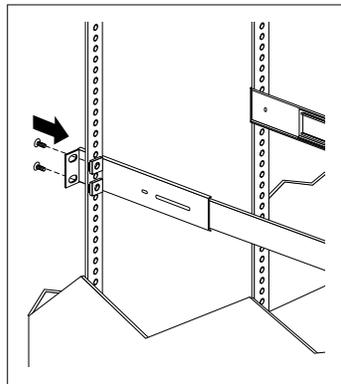
   c. Attach the slide bracket to the right rear of the rack enclosure.

      1) Align the holes on the bracket with the cage nuts on the rear mounting rail.
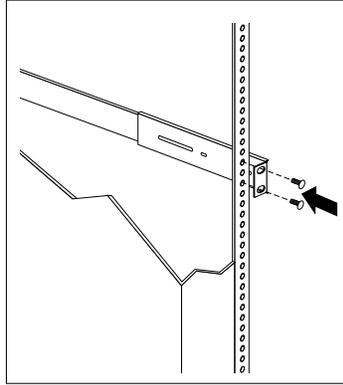
2) From the rear of the rack enclosure, insert a long screw through holes in the slide bracket and mounting rail; then, tighten the screws.

5. Attach the cable-management arm to the right rear of the rack enclosure.

a. Align the holes on the cable-management arm mounting panel with the cage nuts on the rear mounting rail.
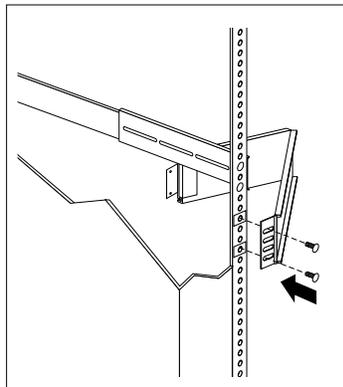
b. From the rear of the rack enclosure, insert a long screw through the holes in the cable-management arm mounting panel and cage nut; then, tighten the screws.

Notes:

1) You can choose to wait to attach the cable-management arm to the rack until after you have attached the other end of the cable-management arm to the computer.

2) To facilitate alignment of the cable-management arm, be sure to insert the screws through the first and fourth holes, as shown.

Installing the computer in the rack enclosure

Parts needed:

- Four long screws
- Two cage nuts
- One cable-management arm
- Cable ties

To install the computer into the rack enclosure:

1. Install a cage nut in each front mounting rail in the marked positions, as shown.
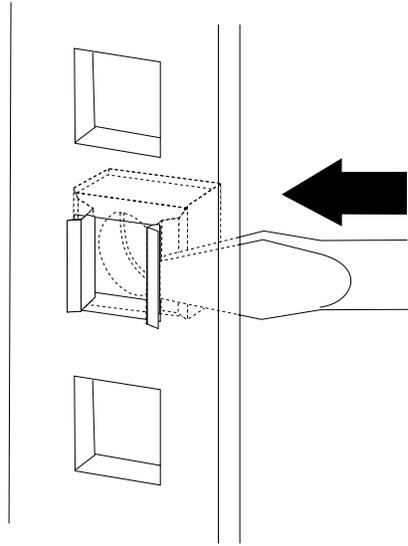
2. Position the computer horizontally, with the 3.5-inch drive bays on the top.

3. Align the inner slides of the computer with the slide rails; then, slide the computer onto the outer slide, until the slide rails click into place.

   Note: When the computer is fully extended, safety latches on the slide rails lock into place. This prevents the computer from being accidentally pulled out too far and dropped. To release the safety latch, press in.
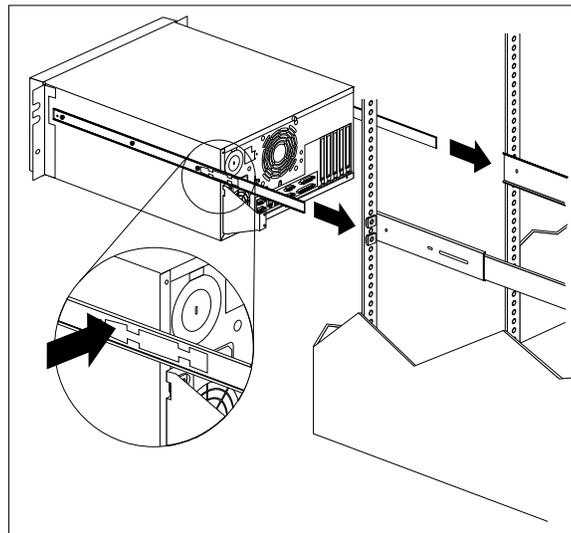
4. Press the safety latches and slide the computer about halfway into the rack enclosure.

5. Attach the cable-management arm to the cable-arm bracket, using two long screws.
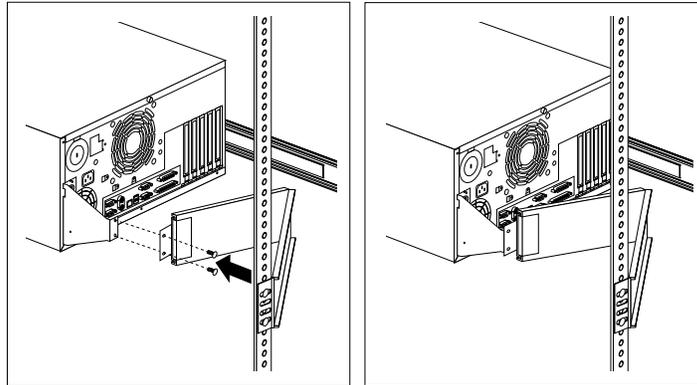
6. Attach the cable-management arm to the rack.

7. Attach the monitor, keyboard, and power cables.

8. Attach the cables to the cable-management arm using the cable ties provided.

   Note: Be sure to route the cables above the top edge or below the bottom edge of the cable-management arm to avoid overstressing the cables.
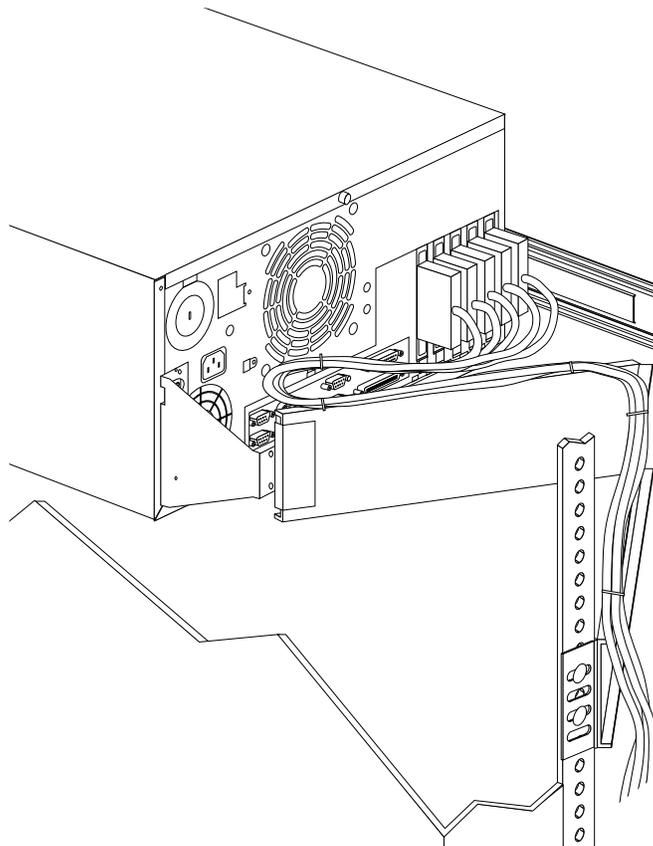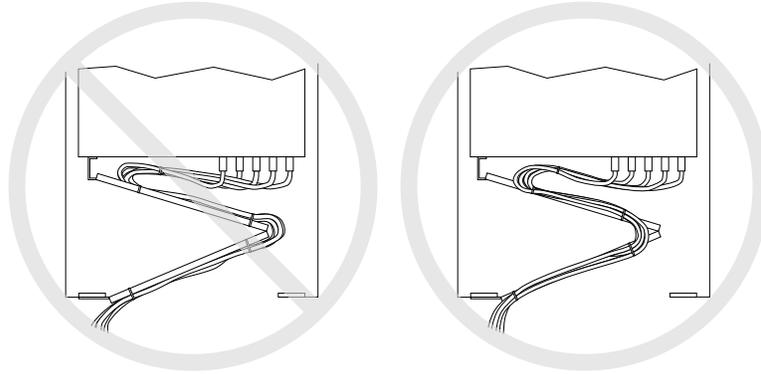
9. Secure the computer in the rack enclosure.

    a. Slide the computer into the rack enclosure.

    b. Secure the computer to both sides of the rack enclosure by inserting a long
        screw through the chassis bracket, mounting rail, and cage nut.

Chapter 5. Symptom-to-FRU index

The Symptom-to-FRU index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with "Chapter 1. General checkout," on page 1. This index can also be used to help you decide which FRUs to have available when servicing a computer. If you are unable to correct the problem using this index, go to "Undetermined problems" on page 81.

Notes:

- If you have both an error message and an incorrect audio response, diagnose the error message first.

- If you cannot run the diagnostic tests or you get a diagnostic error code when running a test, but did receive a POST error message, diagnose the POST error message first.

- If you did not receive any error message, look for a description of your error symptoms in the first part of this index.

- Check all power supply voltages before you replace the system board (see "20-pin power supply connection" on page 34).

- Check the hard disk drive jumper settings before you replace a hard disk drive (see "Hard disk drive jumper settings" on page 31).

Important:

Some errors are indicated with a series of beep codes (see "Beep symptoms" on page 64).

Type 6866 computers default to come up quiet (no beep and no memory count and checkpoint code display) when no errors are detected by POST. To enable beep and memory count and checkpoint code display when a successful POST occurs, do the following:

1. Select **Start Options** in the Configuration∕Setup Utility program (see "Setup Utility program" on page 5).

2. Set **Power-On Self-Test** to **Enhanced**.

The processor is a separate FRU from the system board; the processor is not included with the system board FRU.

SIMM/DIMM/RIMM memory errors

SIMM∕DIMM∕RIMM error messages issued by the IBM PC Enhanced Diagnostics.

Error	FRU/Action
2xx-1y A memory error was detected in SIMM socket Y.	Replace the SIMM in the socket identified by the last digit of the error code. Re-run the test. If the same error code occurs again, replace the system board.

Error	FRU/Action
2xx-2y A memory error was detected in DIMM/RIMM socket Y	Replace the DIMM/RIMM in the socket identified by the last digit of the error code. Re-run the test. If the same error code occurs again, replace the system board or where memory is on the processor card, replace the processor card.
Corrupt BIOS Information in BIOS is not as expected. Not able to find expected DMI information from BIOS. Memory controller chipset vendor ID does not match expected value.	Reflash the BIOS. Perform boot block recovery. Replace the system board.
Test aborted by user	Restart test.

> **Note:** *Y* is the SIMM/DIMM/RIMM socket number. Use the System Board Layout section in the latest Hardware Maintenance Manual (HMM) to reference the memory sockets.

Hard disk drive boot error

A hard disk drive boot error (error codes 1962 and I999030X) can have the following causes.

Error	FRU/Action
The start-up drive is not in the boot sequence in configuration.	Check the configuration and ensure the start-up drive is in the boot sequence.
No operating system installed on the boot drive.	Install an operating system on the boot drive.
The boot sector on the start-up drive is corrupted.	The drive must be formatted, do the following: 1. Attempt to access and recover (back-up) the failing hard disk drive. 2. Using the operating systems programs, format the hard disk drive. 3. Go to "Preparing the hard disk drive for use" on page 11".
The drive is defective.	Replace the hard disk drive.

Diagnostic error codes

Refer to the following diagnostic error codes when using the diagnostic tests. See "Chapter 3. Diagnostics," on page 5 for the specific type for information about the Diagnostic programs.

In the following index, *X* can represent any number.

Diagnostic Error Code	FRU/Action
000-000-XXXBIOS Test Passed	1. **No action**
000-002-XXXBIOS Timeout	1. **Flash the system** 2. System board
000-024-XXXBIOS Addressing test failure	1. **Flash the system** 2. System board
000-025-XXXBIOS Checksum Value error	1. **Flash the system** 2. Boot block 3. System board
000-026-XXXFLASH data error	1. **Flash the system** 2. Boot block 3. System board
000-027-XXXBIOS Configuration/Setup error	1. **Run Setup** 2. Flash the system 3. Boot block 4. System board
000-034-XXXBIOS Buffer Allocation failure	1. **Reboot the system** 2. Flash the system 3. Run memory test 4. System board
000-035-XXXBIOS Reset Condition detected	1. **Flash the system** 2. System board
000-036-XXXBIOS Register error	1. **Flash the system** 2. Boot block 3. System board
000-038-XXXBIOS Extension failure	1. **Flash the system** 2. Adapter card 3. System board
000-039-XXXBIOS DMI data error	1. **Flash the system** 2. System board
000-195-XXXBIOS Test aborted by user	1. **Information** 2. Re-start the test, if necessary
000-196-XXXBIOS test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
000-197-XXXBIOS test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test

Diagnostic Error Code	FRU/Action
000-198-XXX BIOS test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
000-199-XXX BIOS test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
000-250-XXX BIOS APM failure	1. **Flash the system** 2. System board
000-270-XXX BIOS ACPI failure	1. **Flash the system** 2. System board
001-000-XXX System Test Passed	1. **No action**
001-00X-XXX System Error	1. **System board**
001-01X-XXX System Error	1. **System board**
001-024-XXX System Addressing test failure	1. **System board**
001-025-XXX System Checksum Value error	1. **Flash the system** 2. System board
001-026-XXX System FLASH data error	1. **Flash the system** 2. System board
001-027-XXX System Configuration/Setup error	1. **Run Setup** 2. Flash the system 3. System board
001-032-XXX System Device Controller failure	1. **System board**
001-034-XXX System Device Buffer Allocation failure	1. **Reboot the system** 2. Flash the system 3. Run memory test 4. System board
001-035-XXX System Device Reset condition detected	1. **System board**
001-036-XXX System Register error	1. **System board**
001-038-XXX System Extension failure	1. **Adapter card** 2. System board
001-039-XXX System DMI data structure error	1. **Flash the system** 2. System board
001-040-XXX System IRQ failure	1. **Power-off/on system and re-test** 2. System board
001-041-XXX System DMA failure	1. **Power-off/on system and re-test** 2. System board
001-195-XXX System Test aborted by user	1. **Information** 2. Re-start the test, if necessary

Diagnostic Error Code	FRU/Action
001-196-XXX System test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
001-197-XXX System test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
001-198-XXX System test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
001-199-XXX System test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
001-250-XXX System ECC error	1. **System board**
001-254-XXX **001-255-XXX** **001-256-XXX** **001-257-XXX** System DMA error	1. **System board**
001-260-XXX **001-264-XXX** System IRQ error	1. **System board**
001-268-XXX System IRQ1 failure	1. **Device on IRQ1** 2. System board
001-269-XXX System IRQ2 failure	1. **Device on IRQ2** 2. System board
001-270-XXX System IRQ3 failure	1. **Device on IRQ3** 2. System board
001-271-XXX System IRQ4 failure	1. **Device on IRQ4** 2. System board
001-272-XXX System IRQ5 failure	1. **Device on IRQ5** 2. System board
001-273-XXX System IRQ6(diskette drive) failure	1. **Diskette Cable** 2. Diskette drive 3. System board
001-274-XXX System IRQ7 failure	1. **Device on IRQ7** 2. System board
001-275-XXX System IRQ8 failure	1. **Device on IRQ8** 2. System board
001-276-XXX System IRQ9 failure	1. **Device on IRQ9** 2. System board
001-277-XXX System IRQ10 failure	1. **Device on IRQ10** 2. System board

Diagnostic Error Code	FRU/Action
001-278-XXX System IRQ11 failure	1. **Device on IRQ11** 2. System board
001-279-XXX System IRQ12 failure	1. **Device on IRQ12** 2. System board
001-280-XXX System IRQ13 failure	1. **Device on IRQ13** 2. System board
001-281-XXX System IRQ14(hard disk drive) failure	1. **Hard disk drive cable** 2. Hard disk drive 3. System board
001-282-XXX System IRQ15 failure	1. **Device on IRQ15** 2. System board
001-286-XXX **001-287-XXX** **001-288-XXX** System Timer failure	1. **System board**
001-292-XXX System CMOS RAM error	1. **Run Setup and re-test** 2. System board
001-293-XXX System CMOS Battery	1. **Battery** 2. System board
001-298-XXX System RTC date/time update failure	1. **Flash the system** 2. System board
001-299-XXX System RTC periodic interrupt failure	1. **System board**
001-300-XXX System RTC Alarm failure	1. **System board**
001-301-XXX System RTC Century byte error	1. **Flash the system** 2. System board
005-000-XXX Video Test Passed	1. **No action**
005-00X-XXX Video error	1. **Video card, if installed** 2. System board
005-010-XXX **005-011-XXX** **005-012-XXX** **005-013-XXX** Video Signal failure	1. **Video card, if installed** 2. System board
005-016-XXX Video Simple Pattern test failure	1. **Video Ram** 2. Video card, if installed 3. System board
005-024-XXX Video Addressing test failure	1. **Video card, if installed** 2. System board
005-025-XXX Video Checksum Value error	1. **Video card, if installed** 2. System board

Diagnostic Error Code	FRU/Action
005-027-XXX Video Configuration/Setup error	1. **Run Setup** 2. Video drivers update 3. Video card, if installed 4. System board
005-031-XXX Video Device Cable failure	1. **Video cable** 2. Monitor 3. Video card, if installed 4. System board
005-032-XXX Video Device Controller failure	1. **Video card, if installed** 2. System board
005-036-XXX Video Register error	1. **Video card, if installed** 2. System board
005-038-XXX System BIOS extension failure	1. **Video card, if installed** 2. System board
005-040-XXX Video IRQ failure	1. **Video card, if installed** 2. System board
005-195-XXX Video Test aborted by user	1. **Information** 2. Re-start the test, if necessary
005-196-XXX Video test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
005-197-XXX Video test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
005-198-XXX Video test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
005-199-XXX Video test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
005-2XX-XXX **005-3XX-XXX** Video subsystem error	1. **Video card, if installed** 2. System board
006-000-XXX Diskette interface Test Passed	1. **No action**
006-0XX-XXX Diskette interface error	1. **Diskette drive Cable** 2. Diskette drive 3. System board
006-195-XXX Diskette interface Test aborted by user	1. **Information** 2. Re-start the test, if necessary

Diagnostic Error Code	FRU/Action
006-**196**-**XXX** Diskette interface test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
006-**197**-**XXX** Diskette interface test warning	1. **If a component is called out, make sure it is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
006-**198**-**XXX** Diskette interface test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
006-**199**-**XXX** Diskette interface test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
006-**25X**-**XXX** Diskette interface Error	1. **Diskette drive cable** 2. Diskette drive 3. System board
011-**000**-**XXX** Serial port Interface Test Passed	1. **No action**
011-**001**-**XXX** Serial port Presence	1. **Remove external serial device, if present** 2. Run setup, enable port 3. System board
011-**002**-**XXX** **011**-**003**-**XXX** Serial port Timeout/Parity error	1. **System board**
011-**013**-**XXX** **011**-**014**-**XXX** Serial port Control Signal/Loopback test failure	1. **System board**
011-**015**-**XXX** Serial port External Loopback failure	1. **Wrap plug** 2. System board
011-**027**-**XXX** Serial port Configuration/Setup error	1. **Run Setup, enable port** 2. Flash the system 3. System board
011-**03X**-**XXX** **011**-**04X**-**XXX** Serial port failure	1. **System board**
011-**195**-**XXX** Serial port Test aborted by user	1. **Information** 2. Re-start the test, if necessary
011-**196**-**XXX** Serial port test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
011-**197**-**XXX** Serial port test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test

Diagnostic Error Code	FRU/Action
011-198-XXX Serial port test aborted	1. **If a component is called out, make sure it is connected and/or enabled**
	2. Flash the system and re-test
	3. Go to the "Undetermined problems" section
011-199-XXX Serial port test failed, cause unknown	1. **Go to the "Undetermined problems" section**
	2. Flash the system and re-test
	3. Replace component under function test
011-2XX-XXX Serial port signal failure	1. **External serial device**
	2. System board
014-000-XXX Parallel port Interface Test Passed	1. **No action**
014-001-XXX Parallel port Presence	1. **Remove external parallel device, if present**
	2. Run setup, enable port
	3. System board
014-002-XXX **014-003-XXX** Parallel port Timeout/Parity error	1. **System board**
014-013-XXX **014-014-XXX** Parallel port Control Signal/Loopback test failure	1. **System board**
014-015-XXX Parallel port External Loopback failure	1. **Wrap plug**
	2. System board
014-027-XXX Parallel port Configuration/Setup error	1. **Run Setup, enable port**
	2. Flash the system
	3. System board
014-03X-XXX **014-04X-XXX** Parallel port failure	1. **System board**
014-195-XXX Parallel port Test aborted by user	1. **Information**
	2. Re-start the test, if necessary
014-196-XXX Parallel port test halt, error threshold exceeded	1. **Press F3 to review the log file**
	2. Re-start the test to reset the log file
014-197-XXX Parallel port test warning	1. **Make sure the component that is called out is connected and/or enabled**
	2. Re-run test
	3. Component that is called out in warning statement
	4. Component under test
014-198-XXX Parallel port test aborted	1. **If a component is called out, make sure it is connected and/or enabled**
	2. Flash the system and re-test
	3. Go to the "Undetermined problems" section
014-199-XXX Parallel port test failed, cause unknown	1. **Go to the "Undetermined problems" section**
	2. Flash the system and re-test
	3. Replace component under function test

Diagnostic Error Code	FRU/Action
014-**2XX**-**XXX** **014**-**3XX**-**XXX** Parallel port failure	1. **External parallel device** 2. System board
015-**000**-**XXX** USB port Interface Test Passed	1. **No action**
015-**001**-**XXX** USB port Presence	1. **Remove USB device(s) and re-test** 2. System board
015-**002**-**XXX** USB port Timeout	1. **Remove USB device(s) and re-test** 2. System board
015-**015**-**XXX** USB port External Loopback failure	1. **Remove USB device(s) and re-test** 2. System board
015-**027**-**XXX** USB port Configuration/Setup error	1. **Flash the system** 2. System board
015-**032**-**XXX** USB port Device Controller failure	1. **System board**
015-**034**-**XXX** USB port buffer allocation failure	1. **Reboot the system** 2. Flash the system 3. Run memory test 4. System board
015-**035**-**XXX** USB port Reset condition detected	1. **Remove USB device(s) and re-test** 2. System board
015-**036**-**XXX** USB port Register error	1. **System board**
015-**040**-**XXX** USB port IRQ failure	1. **Run setup and check for conflicts** 2. Flash the system 3. System board
015-**195**-**XXX** USB port Test aborted by user	1. **Information** 2. Re-start the test, if necessary
015-**196**-**XXX** USB port test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
015-**197**-**XXX** USB port test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
015-**198**-**XXX** USB port test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
015-**199**-**XXX** USB port test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
018-**000**-**XXX** PCI Card Test Passed	1. **No action**

Diagnostic Error Code	FRU/Action
018-**0XX**-**XXX** PCI Card Failure	1. **Riser card, if installed** 2. System board
018-**195**-**XXX** PCI Card Test aborted by user	1. **PCI card** 2. Information 3. Re-start the test, if necessary
018-**196**-**XXX** PCI Card test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
018-**197**-**XXX** PCI Card test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
018-**198**-**XXX** PCI Card test aborted	1. **Make sure the component that is called out is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
018-**199**-**XXX** PCI Card test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
018-**250**-**XXX** PCI Card Services error	1. **PCI card** 2. Riser card, if installed 3. System board
020-**000**-**XXX** PCI Interface Test Passed	1. **No action**
020-**0XX**-**XXX** PCI Interface error	1. **PCI card** 2. Riser card, if installed 3. System board
020-**195**-**XXX** PCI Test aborted by user	1. **Information** 2. Re-start the test, if necessary
020-**196**-**XXX** PCI test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
020-**197**-**XXX** PCI test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
020-**198**-**XXX** PCI test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section

Diagnostic Error Code	FRU/Action
020-199-XXX PCI test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
020-262-XXX PCI system error	1. **PCI card** 2. Riser card, if installed 3. System board
025-000-XXX IDE interface Test Passed	1. **No action**
025-00X-XXX **025-01X-XXX** IDE interface failure	1. **IDE signal cable** 2. Check power supply 3. IDE device 4. System board
025-027-XXX IDE interface Configuration/Setup error	1. **IDE signal cable** 2. Flash the system 3. IDE device 4. System board
025-02X-XXX **025-03X-XXX** **025-04X-XXX** IDE Interface failure	1. **IDE signal cable** 2. Check power supply 3. IDE device 4. System board
025-195-XXX IDE interface Test aborted by user	1. **Information** 2. Re-start the test, if necessary
025-196-XXX DE interface test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
025-197-XXX IDE interface test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
025-198-XXX IDE interface test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
025-199-XXX IDE interface test failed, cause unknown	1. Go to the "Undetermined problems" section 2. Flash the system and re-test 3. Replace component under function test
030-000-XXX SCSI interface Test Passed	1. **No action**

Diagnostic Error Code	FRU/Action
030-00X-XXX **030-01X-XXX** SCSI interface failure	1. **SCSI signal cable** 2. Check power supply 3. SCSI device 4. SCSI adapter card, if installed 5. System board
030-027-XXX SCSI interface Configuration/Setup error	1. **SCSI signal cable** 2. Flash the system 3. SCSI device 4. SCSI adapter card, if installed 5. System board
030-03X-XXX **030-04X-XXX** SCSI interface error	1. **SCSI signal cable** 2. Check power supply 3. SCSI device 4. SCSI adapter card, if installed 5. installed System board
030-195-XXX SCSI interface Test aborted by user	1. **Information** 2. Re-start the test, if necessary
030-196-XXX SCSI interface test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
030-197-XXX SCSI interface test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
030-198-XXX SCSI interface test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
030-199-XXX SCSI interface test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
035-000-XXX RAID interface Test Passed	1. **No action**
035-0XX-XXX RAID interface Failure	1. **RAID signal cable** 2. RAID device 3. RAID adapter card, if installed 4. System board
035-195-XXX RAID interface Test aborted by user	1. **Information** 2. Re-start the test, if necessary
035-196-XXX RAID interface test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file

Diagnostic Error Code	FRU/Action
035-**197**-**XXX** RAID interface test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
035-**198**-**XXX** RAID interface test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
035-**199**-**XXX** RAID interface test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
071-**000**-**XXX** Audio port Interface Test Passed	1. **No action**
071-**00X**-**XXX** **071**-**01X**-**XXX** **071**-**02X**-**XXX** Audio port error	1. **Run Setup** 2. Flash the system 3. System board
071-**03X**-**XXX** Audio port failure	1. **Speakers** 2. Microphone 3. Audio card, if installed 4. System board
071-**04X**-**XXX** Audio port failure	1. **Run Setup** 2. Audio card, if installed 3. System board
071-**195**-**XXX** Audio port Test aborted by user	1. **Information** 2. Re-start the test, if necessary
071-**196**-**XXX** Audio port test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
071-**197**-**XXX** Audio port test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
071-**198**-**XXX** Audio port test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
071-**199**-**XXX** Audio port test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test

Diagnostic Error Code	FRU/Action
071-25X-XXX Audio port failure	1. **Speakers** 2. Audio card, if installed 3. System board
080-000-XXX Game Port interface Test Passed	1. **No action**
080-XXX-XXX Game Port interface Error	1. **Remove the game port device and re-test the system**
080-195-XXX Game Port interface Test aborted by user	1. **Information** 2. Re-start the test, if necessary
080-196-XXX Game Port interface test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
080-197-XXX Game Port interface test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
080-198-XXX Game Port interface test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
080-199-XXX Game Port interface test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
086-000-XXX Mouse Port interface Test Passed	1. **No action**
086-001-XXX Mouse Port interface Presence	1. **Mouse** 2. System board
086-032-XXX Mouse Port interface Device controller failure	1. **Mouse** 2. System board
086-035-XXX Mouse Port interface Reset	1. **Mouse** 2. System board
086-040-XXX Mouse Port interface IRQ failure	1. **Run Setup** 2. Mouse 3. System board
086-195-XXX Mouse Port interface Test aborted by user	1. **Information** 2. Re-start the test, if necessary
086-196-XXX Mouse Port interface test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
086-197-XXX Mouse Port interface test warning	1. Make sure the component that is called out is connected and/or enabled 2. Re-run test 3. Component that is called out in warning statement 4. Component under test

Diagnostic Error Code	FRU/Action
086-**198**-**XXX** Mouse Port interface test aborted	1. If a component is called out, make sure it is connected and/or enabled 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
086-**199**-**XXX** Mouse Port interface test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
089-**000**-**XXX** Microprocessor Test Passed	1. **No action**
089-**XXX**-**XXX** Microprocessor failure	1. **Microprocessor(s)** 2. System board
089-**195**-**XXX** Microprocessor Test aborted by user	1. **Information** 2. Re-start the test, if necessary
089-**196**-**XXX** Microprocessor test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
089-**197**-**XXX** Microprocessor test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
089-**198**-**XXX** Microprocessor test aborted	1. **Flash the system and re-test** 2. Go to the "Undetermined problems" section
089-**199**-**XXX** Microprocessor test failed, cause unknown	1. **If a component is called out, make sure it is connected and/or enabled** 2. Go to the "Undetermined problems" section 3. Flash the system and re-test 4. Replace component under function test
170-**000**-**XXX** Voltage Sensor(s) Test Passed	1. **No action**
170-**0XX**-**XXX** Voltage Sensor(s) failure	1. **Flash system** 2. System board
170-**195**-**XXX** Voltage Sensor(s) Test aborted by user	1. **Information** 2. Re-start the test, if necessary
170-**196**-**XXX** Voltage Sensor(s) test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
170-**197**-**XXX** Voltage Sensor(s) test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test

Diagnostic Error Code	FRU/Action
170-198-XXX Voltage Sensor(s) test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to the "Undetermined problems" section
170-199-XXX Voltage Sensor(s) test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
170-250-XXX **170-251-XXX** Voltage Sensor(s) Voltage limit error	1. **Power supply** 2. System board
170-254-XXX Voltage Sensor(s) Voltage Regulator Module error	1. **Voltage Regulator Module (VRM)** 2. Microprocessor 3. System board
175-000-XXX Thermal Sensor(s) Test Passed	1. **No action**
175-0XX-XXX Thermal Sensor(s) failure	1. **Flash system** 2. System board
175-195-XXX Thermal Sensor(s) Test aborted by user	1. **Information** 2. Re-start the test, if necessary
175-196-XXX Thermal Sensor(s) test halt, error threshold exceeded	1. **Press F3 to review the log file** 2. Re-start the test to reset the log file
175-197-XXX Thermal Sensor(s) test warning	1. **Make sure the component that is called out is connected and/or enabled** 2. Re-run test 3. Component that is called out in warning statement 4. Component under test
175-198-XXX Thermal Sensor(s) test aborted	1. **If a component is called out, make sure it is connected and/or enabled** 2. Flash the system and re-test 3. Go to "Undetermined problems" section
175-199-XXX Thermal Sensor(s) test failed, cause unknown	1. **Go to the "Undetermined problems" section** 2. Flash the system and re-test 3. Replace component under function test
175-250-XXX **175-251-XXX** Thermal Sensor(s) limit error	1. **Check fans** 2. Check Power supply 3. Microprocessor 4. System board
185-000-XXX Asset Security Test Passed	1. **No action**
185-XXX-XXX Asset Security failure	1. **Flash system** 2. System board
185-278-XXX Asset Security Chassis Intrusion	1. **Assure Asset Security Enabled** 2. C2 Cover Switch 3. System board

Diagnostic Error Code	FRU/Action
201-**000**-**XXX** System Memory Test Passed	1. **No action**
201-**XXX**-**XXX** System Memory error	1. **Replace the memory module called out by the test** 2. System board
202-**000**-**XXX** System Cache Test Passed	1. **No action**
202-**XXX**-**XXX** System Cache error	1. **Cache, if removable** 2. System board 3. Microprocessor
206-**000**-**XXX** Diskette Drive Test Passed	1. **No action**
206-**XXX**-**XXX** Diskette Drive error	1. **Diskette Drive Cable** 2. Check power supply voltages 3. Diskette drive 4. System board
215-**000**-**XXX** CD-ROM Drive Test Passed	1. **No action**
215-**XXX**-**XXX** CD-ROM Drive error	1. **CD-ROM Drive Cable** 2. Check power supply voltages 3. CD-ROM drive 4. System board
217-**000**-**XXX** Hard Disk Drive Test Passed	1. **No action**
217-**25X**-**XXX** **217**-**26X**-**XXX** Hard Disk Drive (IDE) error	1. **Hard Disk Drive Cable** 2. Check power supply voltages 3. Hard Disk drive (IDE) 4. System board
217-**28X**-**XXX** **217**-**29X**-**XXX** Hard Disk Drive (SCSI) error	1. **Hard Disk Drive Cable** 2. Check power supply voltages 3. Hard Disk drive (SCSI) 4. SCSI adapter card 5. System board
220-**000**-**XXX** Hi-Capacity Cartridge Drive Test Passed	1. **No action**
220-**XXX**-**XXX** Hi-Capacity Cartridge Drive error	1. **Remove the Hi-Capacity Cartridge Drive and re-test the system**
301-**XXX**-**XXX** Keyboard error	1. **Keyboard** 2. Check and test mouse 3. System board
301-**000**-**XXX** Keyboard Test Passed	1. **No action**
302-**000**-**XXX** Mouse Test Passed	1. **No action**
302-**XXX**-**XXX** Mouse error	1. **Mouse** 2. Check and test Keyboard 3. System board
303-**000**-**XXX** Joystick Test Passed	1. **No action**
303-**XXX**-**XXX** Joystick error	1. **Remove the Joystick and re-test the system**

Diagnostic Error Code	FRU/Action
305-000-XXX Monitor DDC Test Passed	1. **No action**
305-250-XXX Monitor DDC self test failure	1. **Run Setup to enable DDC** 2. Cable 3. Monitor 4. Video card 5. System board
415-000-XXX Modem Test Passed	1. **No action**
415-XXX-XXX Modem error	1. **Remove the Modem and re-test the system**

Beep symptoms

Beep symptoms are short tones or a series of short tones separated by pauses (intervals without sound). See the following examples.

Beeps	Description
1-2-X	• One beep • A pause (or break) • Two beeps • A pause (or break) • Any number of breaks
4	Four continuous beeps

Use the following table to diagnose beep symptoms.

Beep Symptom	FRU/Action
1-1-3 CMOS read-write error	1. **Run Setup** 2. System Board
1-1-4 ROM BIOS check error	1. **System Board**
1-2-X DMA error	1. **System Board**
1-3-X	1. **Memory Module** 2. C-RIMM 3. System Board
1-4-4	1. **Keyboard** 2. System Board
1-4-X Error detected in first 64 KB of RAM	1. **Memory Module** 2. System Board
2-1-1, **2-1-2**	1. **Run Setup** 2. System Board
2-1-X First 64 KB of RAM failed	1. **Memory Module** 2. System Board
2-2-2	1. **Video Adapter (if installed)** 2. System Board
2-2-X First 64 KB of RAM failed	1. **Memory Module** 2. System Board
2-3-X	1. **Memory Module** 2. System Board
2-4-X	1. **Run Setup** 2. Memory Module 3. System Board
3-1-X DMA register failed	1. **System Board**
3-2-4 Keyboard controller failed	1. **System Board** 2. Keyboard
3-3-4 Screen initialization failed	1. **Video Adapter (if installed)** 2. System Board 3. Display
3-4-1 Screen retrace test detected an error	1. **Video Adapter (if installed)** 2. System Board 3. Display
3-4-2 POST is searching for video ROM	1. **Video Adapter (if installed)** 2. System Board
4	1. **Video Adapter (if installed)** 2. System Board
All other beep code sequences	1. **System Board**

Beep Symptom	FRU/Action
One long and one short beep during POST.Base 640 KB memory error or shadow RAM error	1. **Memory Module** 2. System Board
One long beep and two or three short beeps during POST.(Video error)	1. **Video Adapter (if installed)** 2. System Board
Three short beeps during POST	1. **See "System board memory" on page 18.** 2. System Board
Continuous beep	1. **System Board**
Repeating short beeps	1. **Keyboard stuck key?** 2. Keyboard Cable 3. System Board

No-beep symptoms

Important:	Type 6866 computers default to come up quiet (no beep and no memory count and checkpoint code display) when no errors are detected by POST.
	To enable beep and memory count and checkpoint code display when a successful POST occurs, do the following:
	1. Select **Start Options** in the Configuration/Setup Utility program (see "Setup Utility program" on page 5").
	2. Set **Power-On Self-Test** to **Enhanced**.

Symptom/Error	FRU/Action
No beep during POST but computer works correctly.	1. **System Board**
No beep during POST.	1. **See "Undetermined problems" on page 81.** 2. System Board 3. Memory Module 4. Any Adapter or Device 5. Power Cord 6. Power Supply

POST error codes

Each time you power-on the system, it performs a series of tests that check the operation of the system and some options. This series of tests is called the *Power-On Self-Test*, or *POST*. POST does the following operations.

- Checks some basic system-board operations
- Checks the memory operation
- Starts the video operation
- Verifies that the diskette drive is working

- Verifies that the hard disk drive is working

If the POST finishes without detecting any problems, a single beep sounds and the first screen of the operating system or application program appears.

Note: Type 6866 computers default to come up quiet (no beep and no memory count and checkpoint code display) when no errors are detected by POST.

To enable beep and memory count and checkpoint code display when a successful POST occurs, do the following:

1. Select **Start Options** in the Configuration/Setup Utility program (see "Setup Utility program" on page 5).

2. Set **Power-On Self-Test** to **Enhanced**.

If the POST detects a problem, an error message appears on the screen. A single problem can cause several error messages to appear. When you correct the cause of the first error message, the other error messages probably will not appear on the screen the next time you turn on the system.

In the following index, *X* can represent any number.

POST Error Code	FRU/Action
000 SCSI Adapter not enabled	1. **Verify adapter device and Bus Master fields are enabled in PCI configuration program. See documentation shipped with computer.**
02X	1. **SCSI Adapter**
08X Check SCSI terminator installation.	1. **SCSI Cable** 2. SCSI Terminator 3. SCSI Device 4. SCSI Adapter
101 System board interrupt failure	1. **System Board**
102 System board timer error	1. **System Board**
106	1. **System Board**
110 System board memory parity error	1. **Memory Module** 2. System Board
111 I/O channel parity error	1. **Reseat adapters** 2. Any adapter 3. System Board
114 Adapter ROM error	1. **Adapter Memory** 2. System Board
129 Internal cache test error	1. **Processor** 2. L2 Cache Memory 3. System Board
151 Real-time clock failure	1. **System Board**
161 Bad CMOS battery	1. **Run Setup** 2. CMOS Backup Battery (see "Safety information" on page 125) 3. System Board
162 Configuration mismatch	1. **Run Setup and verify Configuration** 2. Had a device been added, removed, changed location? If not, suspect that device. 3. Power-on external devices first, then power-on computer 4. CMOS Backup Battery (see "Safety information" on page 125) System Board 5. System Board
162 And unable to run diagnostics	1. **Diskette Drive** 2. System Board 3. Diskette Drive Cable
163 Clock not updating or invalid time set	1. **Time and Date Set?** 2. CMOS Backup Battery (see "Safety information" on page 125) 3. System Board

POST Error Code	FRU/Action
164 POST detected a base memory or extended memory size mismatch error or RIMM socket 3 is populated with a RIMM memory module	1. **Run Setup. Check System Summary menu for memory size change. (See "Setup Utility program" on page 5)** 2. Run the Extended Memory Diagnostic tests
166 Boot Block Check Sum Error	1. **Run Flash Recovery using Boot Block. See "Flash recovery boot block jumper" on page 80.** 2. System Board
167 Microprocessor installed that is not supported by the current POST/BIOS	1. **Run Setup. Check Stepping level for the BIOS level needed, then perform the flash update.** 2. Processor
168 Alert on LAN error	1. **Run Setup. Check to see that Ethernet and Alert on LAN2 are enabled.** 2. System Board
17X, 18X	1. **C2 Security**
175	1. **Run Configuration. See "Setup Utility program" on page 5.** 2. System Board
176	1. **Covers were removed from the computer**
177 Corrupted Administrator Password	1. **System Board**
178	1. **System Board**
183	1. **Enter the administrator password**
184 No RFID Antenna	**Make sure Asset Care and Asset ID are enabled in Configuration/Setup** 2. RFID Antenna 3. System Board
185 Corrupted boot sequence	1. **Set configuration and reinstall the boot sequence**
186	1. **System Board**
187	1. **Clear Administration password** 2. System Board
189	1. **More than three password attempts were made to access the computer**
190 Chassis intrusion detector was cleared. This is information only, no action required. If this code does not clear, see FRU/Action.	1. **System Board**
1XX Not listed above	1. **System Board**
201, 20X Memory data error	1. **Run Enhanced Diagnostics Memory Test** 2. Memory Module 3. System Board
225	1. **Unsupported Memory**
229 External cache test error	1. **L2 Cache Memory** 2. System Board

POST Error Code	FRU/Action
262 POST detected a base memory or extended memory type error	1. **Run Setup. Check System Summary menu for memory. (See "Setup Utility program" on page 5")** 2. Run the Extended Memory Diagnostic tests.
301	1. **Keyboard** 2. Keyboard Cable 3. System Board
303 With an 8603 error	1. **Mouse** 2. Keyboard 3. Keyboard Cable 4. System Board
303 With no 8603 error	1. **Keyboard** 2. Keyboard Cable 3. System Board
3XX Not listed above	1. **Keyboard** 2. Keyboard Cable 3. System Board
5XX	1. **Video Adapter (if installed)** 2. System Board
601	1. **Diskette Drive A** 2. Diskette Drive Cable 3. System Board
602	1. **Bad Diskette?** 2. Verify Diskette and retry
604 And able to run diagnostics	1. **Run Setup and verify diskette configuration settings** 2. Diskette Drive A/B 3. Diskette Drive Cable 4. System Board
605 POST cannot unlock the diskette drive	1. **Diskette Drive** 2. Diskette Drive Cable 3. System Board
662	1. **Diskette drive configuration error or wrong diskette drive type; run Setup Configuration**
6XX Not listed above	1. **Diskette Drive** 2. System Board 3. External Drive Adapter 4. Diskette Drive Cable 5. Power Supply
762 Math coprocessor configuration error	1. **Run Setup** 2. Processor 3. System Board

POST Error Code	FRU/Action
7XX Not listed above	1. **Processor**
	2. System Board
962 Parallel port configuration error	1. **Run Configuration**
	2. Parallel Adapter (if installed)
	3. System Board
9XX	1. **Printer**
	2. System Board
1047	1. **16-Bit AT™ Fast SCSI Adapter**
107X Check SCSI terminator installation	1. **Check SCSI terminator installation**
	2. SCSI Cable
	3. SCSI Terminator
	4. SCSI Device
	5. SCSI Adapter
1101 Serial connector error, possible system board failure	1. **Run Enhanced Diagnostics**
1101, 1102, 1106, 1108, 1109	1. **System Board**
	2. Any Serial Device
1107	1. **Communications Cable**
	2. System Board
1102 Card selected feedback error	1. **Run Enhanced Diagnostics**
1103 Port fails register check	1. **Run Enhanced Diagnostics**
	2. System Board
1106 Serial option cannot be turned off	1. **Run Enhanced Diagnostics**
	2. System Board
1107	1. **Serial Device Cable**
	2. System Board
1110 Register test failed	1. **Run Enhanced Diagnostics**
	2. System Board
1116 Interrupt error	1. **Run Enhanced Diagnostics**
1117 Failed baud rate test	1. **Run Enhanced Diagnostics**
1162 Serial port configuration error	1. **Run Configuration**
	2. Serial Adapter (if installed)
	3. System Board
11XX Not listed above	1. **System Board**
1201	1. **System Board**
	2. Any Serial Device
1202, 1206, 1208, 1209, 12XX	1. **Dual Async Adapter/A**
	2. System Board
	3. Any Serial Device

POST Error Code	FRU/Action
1207	1. **Communications Cable** 2. Dual Async Adapter/A
13XX	1. **Game Adapter**
1402 Printer not ready	Information only
1403 No paper error, or interrupt failure	Information only
1404 System board timeout failure	1. **Run Enhanced Diagnostics**
1405 Parallel adapter error	1. **Run Enhanced Diagnostics**
1406 Presence test error	1. **Run Enhanced Diagnostics**
14XX Not listed above. Check printer before replacing system board	1. **Printer** 2. System Board
15XX	1. **SDLC Adapter**
1692 Boot sequence error	1. **Run FDISK to ensure at least one active partition is set active**
16XX	1. **36/38 Workstation Adapter**
1762 Hard disk drive configuration error	1. **Run Configuration. (See "Setup Utility program" on page 5.)**
1780 (Disk Drive 0)**1781** (Disk Drive 1)**1782** (Disk Drive 2)**1783** (Disk Drive 3)	1. **See "Power supply" on page 30.** 2. Hard Disk Drive 3. System Board 4. Hard Disk Cable 5. Power Supply
180X, 188X PCI configuration or resource error	1. **Run Setup and verify PCI/ISA configuration settings.** 2. If necessary, set ISA adapters to *Not available* to allow PCI adapters to properly configure. 3. Remove any suspect ISA adapters. 4. Rerun diagnostics. 5. PCI Adapter
1962 Boot sequence error	1. **Possible hard disk drive problem; see "Hard disk drive boot error" on page 46.**
209X	1. **Diskette Drive** 2. Diskette Cable
20XX Not listed above	1. **BSC Adapter**
21XX	1. **SCSI Device** 2. 16-bit AT Fast SCSU adapter 3. Alternate BSC adapter
2401, 2402 If screen colors change	1. **Display**
2401, 2402 If screen colors are OK	1. **System Board** 2. Display
2409	1. **Display**

POST Error Code	FRU/Action
2410	1. **System Board** 2. Display
2462 Video memory configuration error	1. **Check cable connections** 2. Run Setup and verify video configuration settings 3. Video Memory Modules 4. Video Adapter (if installed) 5. System Board
4611, 4630	1. **Multiport/2 Interface Board** 2. Multiport/2 Adapter
4612, 4613, 4640, 4641	1. **Memory Module Package** 2. Multiport/2 Adapter
4650	1. **Multiport/2 Interface Cable**
46XX Not listed above	1. **Multiport/2 Adapter** 2. Multiport/2 Interface Board 3. Memory Module
5600	1. **Financial System Controller Adapter**
5962 An IDE device (other than hard drive) configuration error	1. **Run Configuration** 2. CD-ROM Drive 3. CD-ROM Adapter 4. Zip or other ATAPI device 5. System Board
62XX	1. **1st Store Loop Adapter** 2. Adapter Cable
63XX	1. **2nd Store Loop Adapter** 2. Adapter Cable
64XX	1. **Network Adapter**
71XX	1. **Voice Adapter**
74XX	1. **Video Adapter (if installed)**
76XX	1. **Page Printer Adapter**
78XX	1. **High Speed Adapter**
79XX	1. **3117 Adapter**
80XX	1. **PCMCIA Adapter**
84XX	1. **Speech Adapter** 2. Speech Control Assy.
8601, 8602	1. **Pointing Device (Mouse)** 2. System Board

POST Error Code	FRU/Action
8603, 8604	1. **System Board** 2. Pointing Device (Mouse)
86XX Not listed above	1. **Mouse** 2. System Board
89XX	1. **PC Music Adapter** 2. MIDI Adapter Unit
91XX	1. **Optical Drive** 2. Adapter
96XX	1. **SCSI Adapter** 2. Any SCSI Device 3. System Board
10101, 10102, 10104, 10105, 10106, 10107, 10108, 10109, 10111, 10112, 10113, 10114, 10115, 10116	1. **Have customer verify correct operating system device drivers are installed and operational.** 2. Modem
10103, 10110, 101171	1. **System Board** 2. Data ⁄ Fax Modem
10117 Not listed above	1. **Check system speaker** 2. Check PSTN cable 3. External DAA (if installed) 4. Modem
10118	1. **Run Diagnostics and verify the correct operation of the modem slot** 2. Modem
10119	1. **Diagnostics detected a non-IBM modem** 2. Modem
10120	1. **Check PSTN Cable** 2. External DAA (if installed) 3. Modem
10132, 10133, 10134, 10135, 10136, 10137, 10138, 10139, 10140, 10141, 10142, 10143, 10144, 10145, 10146, 10147, 10148, 10149, 10150, 10151, 10152	1. **Modem**
10153	1. **Data/Fax Modem** 2. System Board
101XX Not listed above	1. **Modem Adapter/A** 2. Data ⁄ Fax Modem 3. System Board

POST Error Code	FRU/Action
10450, 10451, 10490, 10491, 10492, 10499 Read/write error	1. **Run Enhanced Diagnostics** 2. Hard Disk Drive 3. System Board
10452 Seek test error	1. **Run Enhanced Diagnostics**
10453 Wrong drive type?	Information only
10454 Sector buffer test error	1. **Run Enhanced Diagnostics**
10455, 10456 Controller error	1. **Run Enhanced Diagnostics**
10459 Drive diagnostic command error	Information only
10461 Drive format error	1. **Run Enhanced Diagnostics**
10462 Controller seek error	1. **Run Enhanced Diagnostics**
10464 Hard Drive read error	1. **Run Enhanced Diagnostics**
10467 Drive non-fatal seek error	1. **Run Enhanced Diagnostics**
10468 Drive fatal seek error	1. **Run Enhanced Diagnostics**
10469 Drive soft error count exceeded	1. **Run Enhanced Diagnostics**
10470, 10471, 10472 Controller wrap error	1. **Run Enhanced Diagnostics**
10473 Corrupt data. Low level format might be required	Information only
10480	1. **Hard Disk Drive (ESDI)** 2. Drive Cable 3. System Board
10481 ESDI drive D seek error	1. **Run Enhanced Diagnostics**
10482 Drive select acknowledgement bad	1. **Run Enhanced Diagnostics**
106X1	1. **Check Configuration** 2. Ethernet Adapter
10635	1. **Power-off computer, wait ten seconds then power-on the computer** 2. Ethernet Adapter
10651, 10660	1. **Check Cables** 2. Ethernet Adapter
106XX Not listed above	1. **Ethernet Adapter**
107XX	1. **5.25-inch External Diskette Drive** 2. 5.25-inch Diskette Drive Adapter/A
109XX Check the adapter cables	1. **ActionMedia Adapter/A** 2. System Board
112XX This adapter does not have cache	1. **SCSI Adapter** 2. Any SCSI Device 3. System Board
119XX	1. **3119 Adapter**

POST Error Code	FRU/Action
121XX	1. **Modem Adapter** 2. Any Serial Device 3. System Board
136XX	1. **ISDN Primary Rate Adapter** 2. System Board
137XX	1. **System Board**
141XX	1. **Realtime Interface Coprocessor Portmaster Adapter/A**
143XX	1. **Japanese Display Adapter** 2. System Board
14710, 14711	1. **System Board Video Adapter** 2. Adapter Video Memory
148XX	1. **Video Adapter**
14901, 14902, 1491X, 14922	1. **Video Adapter (if installed)** 2. System Board 3. Display (any type)
14932	1. **External Display** 2. Video Adapter
161XX	1. **Fax Concentrator Adapter**
164XX	1. **120 MB Internal Tape Drive** 2. Diskette Cable 3. System Board
16500	1. **6157 Tape Attachment** 2. Adapter
16520, 16540	1. **6157 Streaming Tape Drive** 2. 6157 Tape Attachment Adapter
166XX, 167XX	1. **Token Ring Adapter** 2. System Board
18001 to 18029	1. **Wizard Adapter** 2. Wizard Adapter Memory
18031 to 18039	1. **Wizard Adapter Cable**
185XXXX	1. **DBCS Japanese Display Adapter/A** 2. System Board
20001 to 20003	1. **Image Adapter/A Image-I Adapter/A** 2. Memory Module DRAM, VRAM
20004	1. **Memory Module DRAM, VRAM** 2. Image Adapter ∕ A Image-I Adapter ∕ A

POST Error Code	FRU/Action
20005 to 20010	1. **Image Adapter/A** **Image-I Adapter/A** 2. Memory Module DRAM, VRAM
200XX Not listed above	1. **Image Adapter/A** 2. Image-I Adapter/A 3. Memory Module DRAM, VRAM 4. System Board
20101 to 20103	1. **Printer/Scanner Option** 2. Image Adapter/A 3. Memory Module DRAM, VRAM
20104	1. **Memory Module DRAM, VRAM** 2. Printer/Scanner Option 3. Image Adapter/A
20105 to 20110	1. **Printer/Scanner Option** 2. Image Adapter/A 3. Memory Module DRAM, VRAM
Image Adapter/A Memory Test failure indicated by graphic of adapter	1. **Replace memory module (shown in graphic)**
206XX	1. **SCSI-2 Adapter** 2. Any SCSI Device 3. System Board
208XX Verify there are no duplicate SCSI ID settings on the same bus.	1. **Any SCSI Device**
210XXXX Internal bus, size unknown **210XXX1** External bus, size unknown	1. **SCSI Hard Disk Drive** 2. SCSI Adapter or System Board 3. SCSI Cable 4. SCSI ID Switch (on some models)
Tape Drive amber LED remains on	1. **Tape Drive** 2. SCSI Cable (internal) 3. SCSI Adapter or System Board
Tape Drive green "in use" LED fails to come on	1. **Tape Drive** 2. SCSI Adapter or System Board 3. SCSI Cable (internal) 4. SCSI Cable (external)
Tape automatically ejected from drive	1. **Tape Cassette** **Drive**
SCSI ID on rotary switch does not match SCSI ID set in configuration. Verify drive switches inside cover are set to zero	1. **Rotary Switch Circuit Board** 2. Circuit Board Cable 3. Tape Drive
Tape sticks or breaks in drive. Verify that the tapes used meet ANSI standard X3B5	1. **Tape Cassette**

POST Error Code	FRU/Action
212XX	1. **SCSI Printer** 2. Printer Cable
213XX	1. **SCSI Processor**
214XX	1. **WORM Drive**
215XXXC, 215XXXD, 215XXXE, 215XXXU If an external device, and power-on LED is off, check external voltages	1. **CD-ROM Drive I** 2. CD-ROM Drive II Enhanced CD-ROM Drive II Any CD-ROM Drive 3. SCSI Cable 4. SCSI Adapter or System Board
216XX	1. **Scanner**
217XX If an external device, and power-on LED is off, check external voltages	1. **Rewritable Optical Drive** 2. SCSI Adapter or System Board 3. SCSI Cable
218XX Check for multi CD tray or jukebox	1. **Changer**
219XX	1. **SCSI Communications Device**
24201Y0, 24210Y0 Be sure wrap plug is attached	1. **ISDN/2 Adapter** 2. ISDN/2 Wrap Plug 3. ISDN/2 Communications Cable
273XX	1. **1 Mbps Micro Channel** 2. Infrared LAN Adapter
27501, 27503, 27506, 27507	1. **ServerGuard Adapter** 2. System Board
27502, 27504, 27510, 27511, 27533, 27534, 27536, 27537	1. **ServerGuard Adapter**
27509	1. **Remove redundant adapters, run Auto Configuration program, then retest.**
27512	1. **WMSELF.DGS diagnostics file is missing** 2. WMSELF.DGS diagnostics file is incorrect
27535	1. **3V Lithium Backup Battery** 2. ServerGuard Adapter
27554	1. **Internal Temperature out of range** 2. ServerGuard Adapter
27555, 27556	1. **ServerGuard Adapter** 2. Power Supply
27557	1. **7.2V NiCad Main Battery Pack** 2. ServerGuard Adapter
27558, 27559, 27560, 27561	1. **PCMCIA Type II Modem** 2. ServerGuard Adapter

POST Error Code	FRU/Action
27562	1. **External Power Control not connected** 2. External Power Control 3. ServerGuard Adapter
27563, 27564	1. **External Power Control** 2. ServerGuard Adapter
275XX	1. **Update Diagnostic Software**
27801 to 27879	1. **Personal Dictation System** 2. Adapter 3. System Board
27880 to 27889	1. **External FRU (Speaker, Microphone)**
999030X Hard disk reset failure	1. **Possible hard disk drive problem; see "Hard disk drive boot error" on page 46.**

Miscellaneous error messages

Message/Symptom	FRU/Action
CMOS Backup Battery inaccurate	1. **CMOS Backup Battery (see "Safety information" on page 125"Safety Information" on page 112.** 2. System Board
Changing colors	1. **Display**
Computer will *not* power-off. See "20-pin power supply connection" on page 34	1. **Power Switch** 2. System Board
Computer will *not* RPL from server	1. **Ensure that network is in startup sequence as first device or first device after diskette** 2. Ensure that network adapter is enabled for RPL 3. Network adapter (Advise network administrator of new MAC address)
Computer will *not* Wake On LAN (if applicable)	1. **Check power supply and signal cable connections to network adapter** 2. Ensure that the operating system settings are set to enable Wake on LAN 3. Ensure Wake On LAN feature is enabled in Setup/Configuration (see "Setup Utility program" on page 5 4. Ensure network administrator is using correct MAC address 5. Ensure no interrupt or I/O address conflicts 6. Network adapter (advise network administrator of new MAC address)
Dead computer. See "20-pin power supply connection" on page 34.	1. **Power Supply** 2. System Board

Message/Symptom	FRU/Action
Diskette drive in-use light remains on or does not light when drive is active.	1. **Diskette Drive** 2. System Board 3. Diskette Drive Cable
Flashing cursor with an otherwise blank display.	1. **System Board** 2. Primary Hard Disk Drive 3. Hard Disk Drive Cable
Incorrect memory size during POST	1. **Run the Memory tests** 2. Memory Module 3. System Board
"Insert a Diskette" icon appears with a known-good diagnostics diskette in the first 3.5-inch diskette drive.	1. **System Board** 2. Diskette Drive Cable 3. Network Adapter
Intensity or color varies from left to right of characters and color bars	1. **Display** 2. System Board
No power or fan not running	1. **See "Power supply" on page 30.**
Non-system disk or disk error-type message with a known-good diagnostic diskette.	1. **Diskette Drive** 2. System Board 3. Diskette Drive Cable
Other display symptoms not listed above (including blank or illegible display)	1. **Display** 2. System Board
Power-on indicator or hard disk drive in-use light not on, but computer works correctly	1. **Power Supply** 2. System Board 3. LED Cables
Printer problems	1. **Printer**
Program loads from the hard disk with a known-good diagnostics diskette in the first 3.5-inch diskette drive	1. **Run Setup** 2. Diskette Drive 3. Diskette Drive Cable 4. System Board 5. Power Supply

RPL computer cannot access programs from its own hard disk.	1. **If network administrator is using LCCM Hybrid RPL, check startup sequence:**
	  a. **First device - network**
	  b. **Second device - hard disk**
	2. Hard disk drive

RPL computer does not RPL from server	1. **Check startup sequence** 2. Check the network adapter LED status
Serial or parallel port device failure (system board port)	1. **External Device Self-Test OK?** 2. External Device 3. Cable 4. System Board

Message/Symptom	FRU/Action
Serial or parallel port device failure (adapter port)	1. **External Device Self-Test OK?** 2. External Device 3. Cable 4. Alternate Adapter 5. System Board
Some or all keys on the keyboard do not work	1. **Keyboard** 2. Keyboard Cable 3. System Board

Undetermined problems

Check the power supply voltages (see "20-pin power supply connection" on page 34). If the voltages are correct, return here and continue with the following steps.

1. Power-off the computer.
2. Remove or disconnect the following components (if installed) one at a time.
   a. Non-IBM devices
   b. External devices (modem, printer, or mouse)
   c. Any adapters
   d. Memory modules
      Before removing or replacing memory modules, see "System board memory" on page 29.
   e. Extended video memory
   f. External Cache
   g. External Cache RAM
   h. Hard disk drive
   i. Diskette drive
3. Power-on the computer to re-test the system.
4. Repeat steps 1 through 3 until you find the failing device or adapter.

If all devices and adapters have been removed, and the problem continues, replace the system board (see "Replacing a system board" on page 15).

Chapter 6. Parts listing
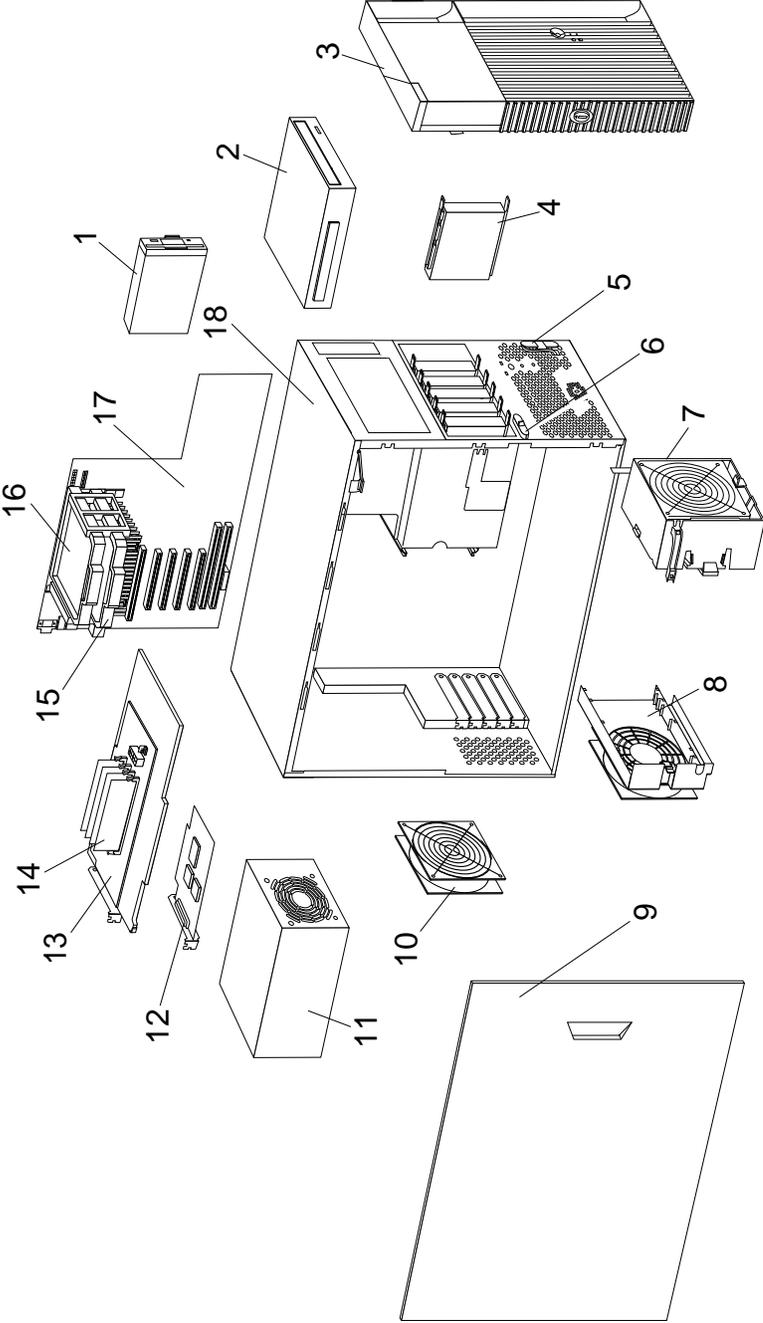
System

This Type 6866 parts listing supports the following models:

11x, 14x, 15x, 16x, 19x, 21x, 24x, 25x, 26x, 27x, 29x, 30x, 31x, 34x, C4x, 38x, 40x, 41x, 44x, D4x, 48x, 50x, E0x, 54x, E4x, 56x, E6x, 58x, E8x, 5Ax, AAx, 5Bx, ABx, 5Cx, ACx, 6Ax, BAx, 6Bx, BBx, 6Cx, BCx, 6Dx, BDx, 60x, F0x, 64x, F4x, 68x, F8x, 69x, F9x.

Index	System (IntelliStation – Type 6866)	FRU No.
1	1.44 MB, 3.5-Inch Diskette Drive (all models)	75H9550
2	CD-ROM (48X Max) (all models)	09N0737
2	CD-ROM (48X) (all models)	24P3605
3	Front Bezel w/Keylock Assembly (all models)	00N3505
4	9.1 GB SCSI 10K RPM LVD Hard Disk Drive (Models 11x, 15x, 25x, 21x, 14x, 24x, 30x, 40x, D0G, 34x, C4G, 44x, D4G, 50x, E0G, 54x, E4G only)	36L8767
4	9.1 GB SCSI 10K RPM U160 Hard Disk Drive (Models 5Ax, AAG, 5Cx, ACG only)	19K1483
4	18.2 GB SCSI 10K RPM LVD Hard Disk Drive (Models 16x, 26x, 27x, 31x, 41x, D1G, 56x, E6G, 58x, E8G only)	36L8769
4	18.2 GB SCSI 10K RPM U160 Hard Disk Drive (Models 5Bx, ABG, 6Ax, BAG, 6Bx, BBG, 6Cx, BCG, 6Dx, BDG, 60x, F0G, 64x, F4G, 69x, F9G only)	19K1485
4	36.4 GB SCSI 10K RPM U160 Hard Disk Drive (Models68x, F8G only)	19K1487
5	RFID Antenna and Cable Assembly (all models)	03K9654
6	"I" Cover Latch Assembly (all models)	01N2262
7	Card Guide w/Fan Assembly/C2 Switch Assembly (all models)	00N3509
8	Hard Disk Fan Assembly, 120mm (all models)	00N3513
9	"I" Cover Assembly (side cover) (all models)	00N3507
10	Fan Assembly Rear, 120x38mm (all models)	00N3512
11	Power Supply-490W (all models)	20L2312
12	Video card - 3D Pro 4110 (Models 16x, 26x, 27x, 31x, 41x, D1G, 56x, E6G, 5Bx, ABG, 6Cx, BCG only)	37L2406
12	Video card - 3D Pro 4210 (Models 58x, E8G, 6Dx, BDG, 68x, F8G only)	00N3439
12	Video card - IBM FIRE GL1 (AGP) 32 MB (Models 15x, 25x only)	37L2375
12	Video Card - Matrox G400 Rev E (models 11x, 21x, 30x, 40x, D0G, 50x, E0G only)	01N2197
12	Video Card - ELSA Gloria ll (Models 14x, 24x, 34x, C4G, 44x, D4G, 54x, E4G only)	01N2256
12	Video card - Matrox G450 (Models 5Ax, AAG, 6Ax, BAG, 60x, F0G only)	09N9237
12	Video card - FIRE GL2 64MB (Models 69x, F9G only)	06P2359
12	Video card - Nvidia NV11GL 32MB (Models 5Cx, ACG, 6Bx, BBG, 64x, F4G)	06P2361
13	Memory Card (4-Slot) - includes memory card holder (Models 11x, 15x, 25x, 19x, 29x, 21x, 30x, 40x, D0G, 50x, E0G, 5Ax, AAG, 6Ax, BAG, 60x, F0G only)	00N3496

Index	System (IntelliStation – Type 6866)	FRU No.
13	Memory Card (8-Slot) - includes memory card holder (Models 16x, 26x, 14x, 24x, 27x, 31x, 41x, D1G, 34x, C4G, 44x, D4G, 54x, E4G, 56x, E6G, 58x, E8G, 5Bx, ABG, 5Cx, ACG, 6Bx, BBG, 6Cx, BCG, 6Dx, BDG, 64x, F4G, 68x, F8G, 69x, F9G only)	00N3498
14	Memory - 128 MB PC600 Memory RIMM, ECC (Models 11x, 15x, 16x, 25x, 14x, 24x, 21x, 30x, 50x, E0G, 5Ax, AAG, 6Ax, BAG, 60x, F0G only)	33L3096
14	Memory - 256 MB PC600 Memory RIMM, ECC (Models 26x, 27x, 31x, 40x, 41x, D0G, D1G, 34x, C4G, 44x, D4G, 54X, E4G, 56x, E6G, 58x, E8G, 5Bx, ABG, 5Cx, ACG, 6Bx, BBG, 6cx, BCG, 6Dx, BDG, 64x, F4G, 68x, F8G, 69x, F9G only)	33L3098
14	Memory Continuity Card (all models)	00N5223
15	Pentium lll Xeon Processor 667 MHz/256 KB cache (Models 11x, 15x, 14x, 16x, 19x only)	00N3422
15	Pentium lll Xeon Processor 733 MHz/256 KB cache (Models 21x, 24x, 25x, 26x, 27x, 29x only)	01N2259
15	Pentium lll Xeon Processor 800 MHz/256 KB cache (Models 30x, 31x, 34x, C4G only)	09N9230
15	Pentium lll Xeon Processor 866 MHz/256 KB cache (Models 40x, 41x, 44x, 48x, D0G, D1G, D4G, 5Ax, AAG, 5Bx, ABG only)	09N9202
15	Pentium lll Xeon Processor 933 MHz/256 KB cache (Models 50x, 54x, 56x, 58x, E0G, E4G, E6G, E8G, 6Ax, BAG, 6Bx, BBG, 6BC, 6Dx, BDG only)	09N9257
15	Pentium lll Xeon Processor 1 GHz/256 KB (Models 60x, F0G, 64x, F4G, 68x, F8G, 69x, F9G only)	06P2212
16	Terminator Card w/Housing (all models)	00N3434
17	System Board w/Backing Plate (no processor, no memory, no VRM) (all models)	00N3499
18	Chassis Assembly (all models)	00N3515
	Keylock Assembly (all models)	00N3508
	Bezel Latch and Handle Assembly (all models)	01N2017
	Hard Disk Filler (all models)	00N3511
	C2 Switch Assembly (all models)	00N3514
	Fan Assembly, 120mm (all models)	00N3494
	Memory Card Holder Kit (all models)	00N3504
	Processor Retainer Kit (all models)	10L5599
	System Board Backing Plate (all models)	00N3501
	Air duct (Models 50x, 54x, 58x, EOG, E4G, E6G, E8G, 6Ax, BAG, 6Bx, BBG, 6Cx, BCG, 6Dx, BDG, 60x, F0x, 64x, F4G, 68x, F8G, 69x, F9G only)	06P1974
	LED/Power Switch Cable Assembly (all models)	20L3021
	Speaker (all models)	01K4909
	VRM Processor Power Supply (all models)	20L2318
	Cable - SCSI - 6 Drop LVD (all models)	00N3502
	Cable - CD-ROM, IDE (all models)	61H0314
	Cable - Diskette Drive (all models)	61H0308
	Cable - CD-ROM Audio (all models)	75H9219

Index	System (IntelliStation – Type 6866)	FRU No.
	Cable - MIDI External (all models)	00N3510
	Cable - SCSI External (all models)	00N3521
	Cable - IDE ATA 66 Hard Disk (all models)	00N3503
	Cable Duct Moulding (all models)	61H0353
	Video card 4xAGP Dongle (Models 58x, E8G, 6Dx, BDG, 68x, F8G only)	09N3435
	Foot (4) (all models)	01N2196
	"L" Cover Assembly (all models)	00N3506
	5.25" Blank Bezel (all models)	00N3259
	Door Assembly (all models)	00N3520
	Label Kit (all models)	00N3519
	Mouse - Scrollpoint ll (all models)	28L1868
	Hard Disk Rails (all models)	19K5331
	EMC Shield Kit, contains:	00N3500

- EMC Shield, Planar (1)
- Shield, EMC Hardfile(1)
- Shield, 5.25" Blank (1)
- 7 position I/O shield (1)

	Miscellaneous Hardware Kit, contains:	00N3517

- Screw, M3.5 x 7 (13)
- Screwlock, Female 4-40/4-40 (2)
- I/O Blank Brackets (Tabs) (6)
- Screwlock, Female 4-40/2-56 (2)
- Clip, RFID (1)
- Isolation Grommets (20)
- Guide, Card Memory (1)
- Clamp, Cable (1)
- Clamp, Cable (1)
- Clamp, Cable (1)
- Screws, 6-32 shoulder (20)
- Screw, S/T M5 - Fan (4)

Keyboards

Keyboards - PCNext Lite	FRU
Arabic	37L2555
Belgian-French	37L2556
Belgian-UK	37L2557
Brazil/Portugal	37L2554
Bulgarian	37L2558
Chinese	37L2585
Czech	37L2559
Danish	37L2560
Dutch	37L2561
French	37L2562
French/Canadian-ID 058	37L0913
French/Canadian-ID 445	37L2552
German	37L2563
Greek	37L2564
Hebrew	37L2565
Hungarian	37L2566
Icelandic	37L2567
Italian	37L2568
Korean	28L1905
Japanese	37L2584
Latin/Spanish	37L2553
Norwegian	37L2569
Polish	37L2570
Portuguese	37L2571
Romania	37L2572
Russian	37L2573
Serbian/Cyrillic	37L2574
Slovakian	37L2575
Spanish	37L2576
Swed/Fin	37L2577
Swiss French/German	37L2578
Thailand	37L2587
Turkish (ID 179)	37L2579
Turkish (ID 440)	37L2580
UK English	37L2581
US English	37L2551
UK English (ISO Compliant)	37L2583
Yugoslavian	37L2582

Computer power cords

Arabic Countries	14F0033
Argentina	36L8880
Australia	93F2365
Belgium	1339520
Bulgaria	1339520
Canada	93F2364
Chile	14F0069
Czechoslovakia	1339520
Denmark	13F9997
Finland	1339520
France	1339520
Germany	1339520
Hungary	1339520
Israel	14F0087
Italy	14F0069
Latin-America	6952301
Netherlands	1339520
New Zealand	93F2365
Norway	1339520
Paraguay	36L8880
Poland	1339520
Portugal	1339520
Serbia	1339520
Slovakia	1339520
South Africa	14F0015
Spain	1339520
Switzerland	1339520
Switzerland (French, German)	14F0051
U.S.	93F2364
UK, Ireland	14F0033
Uruguay	36L8880
Yugoslavia	1339520

The following tools are required to service these computers:

- A volt-ohm meter, IBM P/N 73G5404
- Wrap plug, IBM P/N 72X8546
- T10 Torx bit from Torx bit set, IBM P/N 93F2830

Chapter 7. Additional service information

Security features

Security features in this section include the following:

- Passwords
- Vital Product Data
- Management Information Format (MIF)
- Alert on LAN

Passwords

The following section provides information about computer hardware and software-related passwords.

- Power-on Password
- Administrator Password
- Operating System Password

Power-on and Administrator passwords are set in the Setup Utility program. See "Setup Utility program" on page 5 for information about running the Setup Utility.

Power-on password

A power-on password denies access to the computer by an unauthorized user when the computer is powered on. When a power-on password is active, the password prompt appears on the screen each time the computer is powered on. The computer starts after the proper password is entered.

Removing a power-on password

To service a computer with an active and unknown power-on password, power-off the computer and use the following procedure:

1. Unplug the power cord and remove the top cover.

2. Refer to "System board layout" on page 17 to find the system board rocker switch.

3. Set switch 3 to the on position.

4. Power-on the computer. The system senses the change in the switch setting and erases the password.

5. Set switch 3 back to the off position.

6. Remind the user to enter a new password when service is complete.

Administrator password

The administrator password is used to restrict access to the Configuration/Setup Utility program. If the administrator password is activated, and you do not enter the administrator password, the configuration can be viewed but not changed.

> **Note:**
>
> Type 6866 has Enhanced Security Mode. If Enhanced Security mode is enabled and there is no password given, the computer will act as if Enhanced Security is disabled.
>
> If Enhanced Security is Enabled and an administrator password is given, the administrator password must be entered to use the computer. If the administrator password is lost or forgotten, the system board in the computer must be replaced in order to regain access to the Configuration/Setup Utility program.

Administrator password control

The Administrator password is set in the Setup Configuration. Refer to "Setup Utility program" on page 5.

Operating system password

An operating system password is very similar to a power-on password and denies access to the computer by an unauthorized user when the password is activated. The computer is unusable until the password is entered and recognized by the computer.

Vital product data

Each computer has a unique Vital Product Data (VPD) code stored in the nonvolatile memory on the system board. After you replace the system board, the VPD must be updated. To update the VPD, see "Flash (BIOS/VPD) update procedure" on page 93.

Alert on LAN2

Alert on LAN2 provides notification of changes in the computer, even when the computer power is turned off. Working with DMI and Wake on LAN® technologies, Alert on LAN2 helps to manage and monitor the hardware and software features of the computer. Alert on LAN2 generates notifications to the server of these occurrences:

• Computer disconnected from the network

• Computer unplugged from the power outlet

• All POST errors

• Operating system or POST hang condition

Alert on LAN2 events are configured to be Enabled or Disabled from the LAN server only, and not from the computer. See the LAN administrator for configuration status information.

BIOS levels

An incorrect level of BIOS can cause false error and unnecessary FRU replacement. Use the following information to determine the current level of BIOS installed in the computer, the latest BIOS available for the computer, and where to obtain the latest level of BIOS.

- Current Level BIOS information
  — Run the Configuration Utility to determine the level of BIOS installed.
- Sources for determining the latest level BIOS available
  1.
     IBM Home Page, Support

     http://www.ibm.com/support
  2. PC PartnerInfo-Technical Database (CTSTIPS.NSF)
  3. HelpCenter®
  4. Levels 1 and 2 Support
  5. RETAIN®
- Sources for obtaining the latest level BIOS available
  1.
     IBM Home Page, Support

     http://www.ibm.com/support
  2. PC PartnerInfo-Technical Database (CTSTIPS.NSF)
  3. HelpCenter
  4. Levels 1 and 2 Support

To update (flash) the BIOS, see "Flash (BIOS/VPD) update procedure".

Flash (BIOS/VPD) update procedure

> **Attention:**
> Refer to the information label located inside the system unit cover for any model-specific information.

1. Power-off the computer.
2. Insert the flash update diskette into drive A.
3. Power-on the computer.
4. When the Update Utility appears; select the country/keyboard, then press **Enter**.
5. If the computer serial number was previously recorded, the number is displayed with an option to update it. Press **Y** to update the serial number.
6. Type the 7-digit serial number of the computer you are servicing, then press **Enter**.
7. Follow the instructions on the screen to complete the flash (BIOS/VPD) update procedure.

Flash recovery boot block switch

> **Attention:**
> If an interruption occurs during a Flash/BIOS upgrade, the BIOS might be left in an unusable state. The Boot Block switch enables you to restart the system and recover the BIOS.

To perform a Flash/BIOS recovery, use the following procedure.

1. Power-off the computer and remove the cover and front bezel.

2. Move the system board rocker switch 3 to the **on** position. Refer to "System board layout" on page 17 or the label inside the computer for more information.

3. Insert the upgrade diskette into the diskette drive.

4. Power-on the computer. The IBM Logo will appear.

   Note: Depending on the amount of memory installed, it may take up to a minute for the Logo to appear.

5. When the Flash Update Utility appears, select the country/keyboard, then press **Enter**.

6. If the computer serial number was previously recorded, the number is displayed with an option to update it. Press **Y** to update the serial number.

7. Type the 7-digit serial number of the computer you are servicing, then press **Enter**.

8. Follow the instructions on the screen to complete the flash (BIOS/VPD) update procedure.

9. When you are instructed to reboot the computer, power-off the computer and move the rocker switch 3 to the **normal (off)** position. Then replace the cover and power-on the computer.

Power management

Power management reduces the power consumption of certain components of the computer such as the system power supply, processor, hard disk drives, and some monitors. Advanced Power Management and Rapid Resume™ Manager are features of some personal computers.

Advanced Configuration and Power Interface (ACPI) BIOS

Being an ACPI BIOS system, the operating system is allowed to control the power management features of the computer and the setting for Advanced Power Management (APM) BIOS mode are ignored. Not all operating systems support ACPI BIOS mode.

Advanced Power Management

Energy-saving settings can be viewed and changed by using the Advanced Power Management menu in the Configuration/Setup Utility program.

> **Attention:**
>
> If a device, such as a monitor, does not have power-management capabilities, it can be damaged when exposed to a reduced-power state. Before making energy-saving selections for the monitor, check the documentation supplied with the monitor to see if it supports Display Power Management Signaling (DPMS).

Automatic Hardware Power Management features

Automatic Hardware Power Management can reduce the power states of the computer, processor, and monitor (if the monitor supports DPMS) if they are inactive for a predetermined length of time.

There are three levels of specified time that the computer must be inactive before the power management options that are selected take effect. Select the amount of time that is offered within each level.

Level 1	Set time from 5 minutes to 4 hours.
Level 2	Set time from 10 minutes to 5 hours.
Level 3	Set time from 15 minutes to 6 hours.

At each level, you can define the amount of energy savings by specifying values for the following options.

- **System Power**

  — Select **On** for the computer to remain on.

  — Select **Off** for the computer to shut down.

- **Processor Speed**

  Set the microprocessor to be **disabled**, or to run at **1**, **10**, **25**, or **50** percent of its internal clock speed.

- **Display**

  Set display to be disabled or to be reduced at these power states:

  — **Standby:** Screen is blank, but can be restored immediately when any activity is detected.

  — **Suspend:** Monitor uses less power than in Standby mode. Screen image is restored after a few seconds when any activity is detected.

  — **Off:** Monitor power is off. Press Monitor power button to restore power. On some monitors, you might have to depress the power button twice.

Setting Automatic Hardware Power Management features

1. Start the Configuration/Setup Utility program (see "Setup Utility program" on page 5).

2. Select **Advanced Power Management** from the Configuration/Setup Utility program menu.

3. Select the **APM BIOS Mode** and be sure it is set to **Enabled**. If it is not, press Left Arrow (←) or Right Arrow (→) to change the setting.

4. Select **Automatic Hardware Power Management**.

5. Set **Automatic Hardware Power Management** to **Enabled**.

6. Select values for the two categories of power management (system power, and display), as necessary.

7. Set **IDE Hard Disk** to **Enabled** or **Disabled**.

   Note: This does not apply to SCSI drives.

8. Select **Low Power Entry Activity Monitor** and enable or disable the listed options.

9. Select **Low Power Exit Activity Monitor** and enable or disable the listed options.

10. Press **Esc** twice to return to the Configuration/Setup Utility program menu.

11. Before you exit from the program, select **Save Settings** from the Configuration/Setup Utility program menu.

12. To exit from the Configuration/Setup Utility program, press **Esc** and follow the instructions on the screen.

Automatic Power-On features

The Automatic Power-On features within the Power Management menu allow you to enable and disable features that turn on the computer automatically.

- **Serial Port A Ring Detect**: With this feature set to **Enabled** and an external modem connected to serial port (COM1), the computer will turn on automatically when a ring is detected on the modem.

- **PCI Modem Ring Detect**: With this feature set to **Enabled**, the computer will turn on automatically when a ring is detected on the internal modem.

- **PCI Wake Up:** This feature allow PCI cards that support this capability to wake the system.

- **Wake Up on Alarm**: You can specify a date and time at which the computer will be turned on automatically. This can be either a single event or a daily event.

- **Wake on LAN**: If the computer has a properly configured token-ring or Ethernet LAN adapter card that is Wake on LAN-enabled and there is remote network management software, you can use the IBM-developed Wake on LAN feature. When you set Wake on LAN to **Enabled**, the computer will turn on when it receives a specific signal from another computer on the local area network (LAN). For further information, see "Wake on LAN" on page 97.

Network settings

This section applies only to computers that are linked to a network.

The Configuration/Setup Utility program includes settings that can be enabled and disabled to configure the network interface in the computer. These settings are the following:

- Flash over LAN (Update POST/BIOS over Network)
- Wake on LAN

Flash over LAN (update POST/BIOS over network)

Note: For local Flash (BIOS/VPD) update, see "Flash (BIOS/VPD) update procedure" on page 93.

This setting is used to enable or disable the Flash over LAN feature. When the feature is enabled, the system programs, in the computer, can be updated remotely from a network server. If the administrator password is set in the computer, it does not have to be entered by the server.

To access the Flash over LAN setting, use the following procedure.

1. Start the Configuration/Setup Utility program. See "Setup Utility program" on page 5.
2. Select **System Security**.
3. Select **POST/BIOS Update** from the Configuration/Setup Utility program menu.
4. To enable Flash over LAN, select **Enabled**. To disable Flash over LAN, select **Disabled**.
5. Press **Esc** twice to return to the Configuration/Setup Utility program menu.
6. Before you exit from the program, select **Save Settings** from the Configuration/Setup Utility program menu.
7. To exit from the Configuration/Setup Utility program, press **Esc** and follow the instructions on the screen.

Wake on LAN

This setting is used to enable or disable the IBM-developed Wake on LAN feature. This feature makes it possible for the computer to be turned on remotely by a network server. Remote network management software must be used in conjunction with this feature.

To access the Wake on LAN setting, use the following procedure.

1. Start the Configuration/Setup Utility program. See "Setup Utility program" on page 5.
2. Select **Advanced Power Management.**
3. Select **Automatic Power On** from the program menu.
4. Select **Wake on LAN** from the *Automatic Power On* menu.
5. To enable Wake on LAN, select **Enabled**. To disable Wake on LAN, select **Disabled**.
6. Press **Esc** until you return to the Configuration/Setup Utility program menu.
7. Before you exit from the program, select **Save Settings** from the Configuration/Setup Utility program menu.
8. To exit from the Configuration/Setup Utility program, press **Esc** and follow the instructions on the screen.

Chapter 8. Related service information

Safety notices (multi-lingual translations)

The caution and danger safety notices in this section are provided in the following languages.

- English
- Portuguese (Brazil)
- Chinese
- French
- German
- Italian
- Korean
- Spanish

DANGER

To avoid a shock hazard, do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.

To avoid shock hazard:

- The power cord must be connected to a properly wired and earthed receptacle.

- Any equipment to which this product will be attached must also be connected to properly wired receptacles.

When possible, use one hand to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.

Electrical current from power, telephone, and communications cables is hazardous. To avoid shock hazard, connect and disconnect cables as described following when installing, moving, or opening covers of this product or attached devices.

To Connect	To Disconnect
1. Turn Everything OFF.	1. Turn Everything OFF.
2. First, attach all cables to devices.	2. First, remove power cord(s) from outlet.
3. Attach signal cables to receptacles	3. Remove signal cables from receptacles.
4. Attach power cord(s) to outlet.	4. Remove all cables from devices.
5. Turn device ON.	
Note: In the UK, by law, the telephone cable must be connected after the power cord.	**Note:** In the UK, the power cord must be disconnected after the telephone cable.

CAUTION:

When replacing the battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer.

The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

CAUTION:

When a CD-ROM drive is installed, note the following.

Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

Removing the covers of the CD-ROM drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive. Do not remove the CD-ROM drive covers.

DANGER
Some CD-ROM drives contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.
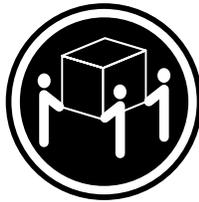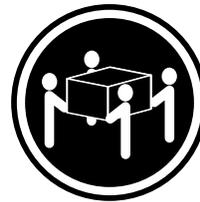
≥ 32 kg (70.5 lbs)   ≥ 55 kg (121.2 lbs)

CAUTION:

Use safe lifting practices when lifting your machine.

CAUTION:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunications systems, networks, and modems before you open the server covers, unless instructed otherwise in the installation and configuration procedures.

PERIGO

Para evitar choques elétricos, não conecte ou desconecte nenhum cabo, nem efetue instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.

Para evitar choques elétricos:

- O cabo de alimentação deve ser conectado a um receptáculo corretamente instalado e aterrado.
- Todos os equipamentos aos quais este produto será conectado devem também ser conectados a receptáculos corretamente instalados.

Quando possível, utilize uma das mãos para conectar ou desconectar cabos de sinal, para evitar um possível choque ao tocar duas superfícies com potenciais elétricos diferentes.

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicação é perigosa. Para evitar choques elétricos, conecte e desconecte os cabos conforme descrito a seguir, ao instalar, movimentar ou abrir tampas deste produto ou de dispositivos conectados.

Para Conectar	Para Desconectar
1. DESLIGUE tudo.	1. DESLIGUE tudo.
2. Conecte primeiro todos os cabos nos dispositivos.	2. Remova primeiro o(s) cabo(s) de alimentação das tomadas.
3. Conecte os cabos de sinal nos receptáculos.	3. Remova os cabos de sinal dos receptáculos.
4. Conecte o(s) cabo(s) de alimentação nas tomadas.	4. Remova todos os cabos dos dispositivos.
5. LIGUE o dispositivo.	

Cuidado:

Ao substituir a bateria, utilize apenas o Número de Peça IBM 33F8354 ou um tipo de bateria equivalente recomendado pelo fabricante. Se seu sistema possuir um módulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de módulo, produzido pelo mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de forma adequada.

Não:

• Jogue ou coloque na água

• Aqueça a mais de 100°C (212°F)

• Conserte nem desmonte.

Descarte a bateria conforme requerido pelas disposições e regulamentações locais.

Cuidado:

Quando uma unidade de CD-ROM estiver instalada, observe o seguinte.

A utilização de controles ou ajustes ou a execução de procedimentos diferentes daqueles especificados nesta publicação pode resultar em exposição perigosa à radiação.

A remoção das tampas da unidade de CD-ROM pode resultar em exposição a radiação perigosa de laser. Não existem peças que possam ser consertadas no interior da unidade de CD-ROM. Não remova as tampas da unidade de CD-ROM.

PERIGO

Algumas unidades de CD-ROM contém um diodo de laser da Classe 3A ou da Classe 3B. Observe o seguinte.

Radiação de laser quando aberto. Não olhe diretamente para o feixe de laser, não olhe diretamente com instrumentos óticos, e evite exposição direta ao raio.
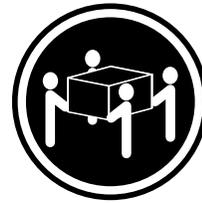
≥ 32 kg (70.5 lbs)   ≥ 55 kg (121.2 lbs)

Cuidado:

Utilize práticas seguras para levantamento de peso ao levantar sua máquina.

Cuidado:

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicação é perigosa. Para evitar ferimentos pessoais ou danos aos equipamentos, desconecte os cabos de alimentação, sistemas de telecomunicação, redes e modems antes de abrir as tampas do servidor, a menos que receba outras instruções nos procedimentos de instalação e configuração.

声明 1

⚠️

危险！

为避免电击危险，请不要在暴风雨期间连接或断开任何电缆，
或是进行此产品的安装、维护或重新配置操作。

为避免电击危险：

- 电源线必须连接到适当的电线及接地插座。

- 此产品将要连接的所有设备也必须连接到正确接线的插座上。

如果可能，请使用一只手连接或断开连接信号电缆，以避免在
接触两个具有不同电势的表面时遭到电击。

电源线、电话线以及通信电缆中的电流非常危险。为避免电击，
请在安装、移动或打开本产品或连接设备的外盖时，按照下述
步骤连接或断开电缆。

要连接电缆	要断开电缆
1.关闭所有设备。	1.关闭所有设备。
2.首先将所有电缆与设备连接。	2.首先从电源插座拔下电源线。
3.将信号线连接到插座。	3.从插座拔下信号电缆。
4.将电源线连接到电源插座。	4.从设备上拔下所有电缆。
5.打开设备。	

声明 2

注意！

当更换电池时，仅可使用 IBM 部件号为 33F8354 的产品或由制造商推荐的同等电池。如果系统中有包含锂电池的模块，则只能使用由相同制造商制造的相同类型模块更换。该电池含有锂，如果使用、操作或处理不当会发生爆炸。

<u>不要：</u>

– 将其投入或浸于水中

– 加热超过100℃ （212℉)

– 修理或拆卸

应按照当地法规和条例对此电池进行处理。

声明 3

注意 ！

在已安装 CD-ROM 驱动器的情况下，请注意下面的内容。

不遵循此处指定的控制、调整、或操作过程的操作将可能导致危险的辐射泄漏。

取下 CD-ROM 驱动器的外盖会导致危险的激光辐射泄漏。CD-ROM 驱动器内没有可以使用的部件。请不要取下 CD-ROM 驱动器的外盖。

声明 4

危险 ！

一些 CD-ROM 驱动器中包含内置的 3A 类或 3B 类激光二极管。请注意下述内容。

打开驱动器会产生激光辐射。请不要凝视激光束，请不要使用光学仪器直接观看激光束，同时也要避免人体直接暴露在激光束下。

声明 5

32 kg (70.5 磅)　　　**55 kg (121.2 磅)**

注意！

搬运机器时，请进行安全搬运操作。

声明 10

注意！

电源线、电话线以及通信电缆中的电流非常危险。为避免人身伤害或设备损坏，除非在安装和配置过程中特别指明，请在打开服务器外盖前断开已连接的全部电源线、电信系统、网络及调制解调器。

· 聲明 1

危險

為了避免雷擊，在閃電期間，請勿連接或拔掉本裝置上的任何電纜線，或請勿安裝、維修或重新架構本產品。

為了避免雷擊：

- 電源線必須連接到接線及接地正確的插座。
- 本產品所連接的設備也必須連接到接線正確的插座。

儘可能使用單手來連接或拔掉信號電纜，以避免因接觸兩不同電位的平面，而受到電擊。

電源、電話及通信電纜上均有電流流通。為了避免電擊，在安裝、移動本產品，或開啟本產品的蓋子或與本產品連接之裝置的蓋子時，請依照下列「連接」及「拔掉」電纜線的步驟操作。

連接	拔掉
1. 關掉所有開關。	1. 關掉所有開關。
2. 首先,將所有電纜線連接到裝置。	2. 首先,自電源插座拔掉電源線。
3. 將信號電纜連接到信號插座。	3. 拔掉信號插座上的所有信號電纜。
4. 將電源線連接到電源插座。	4. 拔掉裝置上的所有電纜線。
5. 開啓裝置電源。	

- 聲明 2

⚠

注意:
更換電池時,只可使用 IBM 零件編號 33F8354 的電池,或廠商建議
的相當類型的電池。如您系統中的模組含有鋰電池,更換時,請使
用相同廠商製造的相同模組類型。如未正常使用、處理或捨棄含有
鋰的電池時,可能會造成爆炸。

嚴禁:.

- 丟入或浸入水中
- 加熱超過攝氏100度(華氏 212 度)
- 修補或拆解

處理廢棄電池時,請遵照當地法令規章處理。

- 聲明 3

⚠

注意:
安裝光碟機時,請注意下列事項:

不依此處所指示的控制、調整或處理步驟,恐有遭致輻射之虞。

移開光碟機蓋子,恐有遭致雷射輻射之虞。光碟機中沒有需要維修
的部分。請勿移開光碟機的蓋子。

- 聲明 4

⚠

危險

光碟機含有內嵌式 Class 3A 或 Class 3B 雷射二極體時,請
注意下列事項:

開啓時會產生雷射輻射。請勿凝視光束,不要使用光學儀器
直接觀察,且應避免直接暴露在光束下。

• 聲明 5
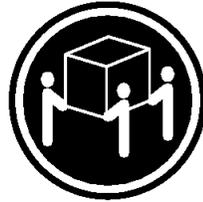
>= 32 公斤(70.5 磅)   >= 55 公斤(121.2 磅)

注意：
提昇機器時，請使用安全提昇措施。

• 聲明 10

注意：
電源、電話及通信電纜上均有電流流通。在安裝及架構之時，若非
專家指導，為了避免人員受傷、設備受損，在開啓伺服器蓋子之前
，請切斷電源線、電信系統、網路及數據機。

DANGER

Pour éviter tout risque de choc électrique, ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.

Pour éviter tout risque de choc électrique:

* Les cordons d'alimentation du présent produit et de tous les appareils qui lui sont connectés doivent être branchés sur des socles de prise de courant correctement câblés et mis à la terre.

Afin d'éviter tout risque de choc électrique provenant d'une différence de potentiel de terre, n'utilisez qu'une main, lorsque cela est possible, pour connecter ou déconnecter les cordons d'interface.

Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux. Pour éviter tout risque de choc électrique, lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.

Connexion	**Déconnexion**
1. Mettez les unités hors tension.	1. Mettez les unités hors tension
2. Commencez par brancher tous les cordons sur les unités.	2. Commencez pas débrancher les cordons alimentation des socles de prise de courant.
3. Branchez les câbles d'interface sur les prises.	3. Débranchez les câbles d'interface des prises.
4. Branchez les cordons d'alimentation sur un socle de prise de courant.	4. Débranchez tous les câbles des unités.
5. Mettez les unités sous tension.	

Attention:

Remplacez la pile usagée par une pile de référence identique exclusivement - voir la référence IBM - ou par une pile équivalente recommandée par le fabricant. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et présente donc un risque d'explosion en cas de mauvaise manipulation ou utilisation.

- Ne la jetez pas à l'eau.
- Ne l'exposez pas à une température supérieure à 100° C.
- Ne cherchez pas à la réparer ou à la démonter.

Pour la mise au rebut, reportez-vous à la réglementation en vigueur.

Attention:

Si une unité de CD-ROM est installée, prenez connaissance des informations suivantes:

Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.

Pour éviter une exposition directe au rayon laser, n'ouvrez pas l'unité de CD-ROM. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.

DANGER

Certaines unités de CD-ROM contiennent une diode laser de classe 3A ou 3B. Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. évitez une exposition directe au rayon.
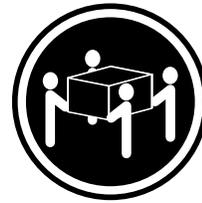
≥ 32 kg (70.5 lbs)   ≥ 55 kg (121.2 lbs)

Attention:

Ce produit pèse un poids considérable. Faites-vous aider pour le soulever.

Attention:

Le courant électrique circulant dans les câbles de communication et les cordons téléphoniques et d'alimentation peut être dangereux. Pour votre sécurité et celle de l'équipement, avant de retirer les carters du serveur, mettez celui-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui le relient aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).

VORSICHT

Aus Sicherheitsgründen bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.

Aus Sicherheitsgründen:

- Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.

- Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.

Signalkabel möglichst einhändig anschließen oder lösen, um einen Stromschlag durch Berühren von Oberflächen mit unterschiedlichem elektrischem Potential zu vermeiden.

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich. Um einen Stromschlag zu vermeiden, nur nach den Anweisungen arbeiten, die für Installation, Transport oder öffnen von Gehäusen dieses Produkts oder angeschlossenen Einheiten gelten.

Kabel anschließen	Kabel lösen
1. Alle Geräte ausschalten und Netzstecker ziehen.	1. Alle Geräte ausschalten.
2. uerst alle Kabel an Einheiten anschließen.	2. Zuerst Netzstecker von Steckdose lösen.
3. ZSignalkabel an Anschlußbuchsen anschließen.	3. Signalkabel von Anschlußbuchsen lösen.
4. Netzstecker an Steckdose anschließen.	4. Alle Kabel von Einheiten lösen.
5. Gerät einschalten.	

Achtung:

Eine verbrauchte Batterie nur durch eine Batterie mit der IBM Teilenummer 33F8354 oder durch eine vom Hersteller empfohlene Batterie ersetzen. Wenn Ihr System ein Modul mit einer Lithium-Batterie enthält, ersetzen Sie es immer mit dem selben Modultyp vom selben Hersteller.Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht

- mit Wasser in Berührung bringen.
- über 100 C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

Achtung:

Wenn ein CD-ROM-Laufwerk installiert ist, beachten Sie folgendes. Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.

Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, die vom Benutzer gewartet werden müssen. Die Verkleidung des CD-ROM-Laufwerks nicht öffnen.

VORSICHT

Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.

Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.
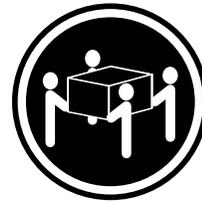
≥ 32 kg (70.5 lbs)   ≥ 55 kg (121.2 lbs)

Achtung:

Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

Achtung:

An Netz-, Telefon- und Datenleitungen können gefährliche elektrische Spannungen anliegen. Um eine Gefährdung des Benutzers oder Beschädigung des Geräts zu vermeiden, ist der Server auszuschalten. Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem öffnen des Servergehäuses zu unterbrechen (sofern in Installations-und Konfigurationsanweisungen nicht anders angegeben).

PERICOLO

Per evitare il pericolo di scosse elettriche durante i temporali, non collegare o scollegare cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto.

Per evitare il pericolo di scosse elettriche:

- collegare il cavo di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza;
- collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.

Quando possibile, collegare o scollegare i cavi di segnale con una sola mano per evitare il rischio di scosse derivanti dal contatto con due superfici a diverso potenziale elettrico.

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa. Per evitare scosse elettriche, collegare e scollegare i cavi come descritto quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o durante il collegamento delle unità.

Per collegare	Per scollegare
1. SPEGNERE tutti i dispositivi.	1. SPEGNERE tutti i dispositivi.
2. Collegare prima tutti i cavi alle unità.	2. Rimuovere prima il(i) cavo(i) di alimentazione dalla presa elettrica.
3. Collegare i cavi di segnale alle prese.	3. Rimuovere i cavi di segnale dalle prese.
4. Collegare il(i) cavo(i) di alimentazione alla presa elettrica.	4. Rimuovere tutti i cavi dalle unità.
5. ACCENDERE le unità.	

Attenzione:

Quando si sostituisce la batteria, utilizzare solo una batteria IBM o batterie dello stesso tipo o di tipo equivalente consigliate dal produttore. Se il sistema di cui si dispone è provvisto di un modulo contenente una batteria al litio, sostituire tale batteria solo con un tipo di modulo uguale a quello fornito dal produttore. La batteria contiene litio e può esplodere se utilizzata, maneggiata o smaltita impropriamente.

Evitare di:

- Gettarla o immergerla in acqua
- Riscaldarla ad una temperatura superiore ai 100° C
- Cercare di ripararla o smaltirla

Smaltire secondo la normativa in vigore (D.Lgs 22 del 5/2/97) e successive disposizioni nazionali e locali.

Attenzione:

Quando è installata un'unità CD-ROM, notare quanto segue:

L'utilizzo di controlli, regolazioni o l'esecuzione di procedure on descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.

L'apertura di un'unità CD-ROM può determinare l'esposizione a radiazioni laser pericolose. All'interno dell'unità CD-ROM non vi sono parti su cui effettuare l'assistenza tecnica. Non rimuovere i coperchi dell'unità CD-ROM.

PERICOLO

Alcune unità CD-ROM contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.
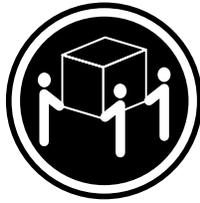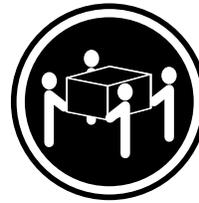
≥ 32 kg (70.5 lbs)   ≥ 55 kg (121.2 lbs)

Attenzione:

Durante il sollevamento della macchina seguire delle norme di di sicurezza.

Attenzione:

La corrente circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa. Per evitare situazioni pericolose per le persone o danneggiamenti all'apparecchiatura, scollegare i cavi di alimentazione, i sistemi di telecomunicazioni, le reti e ed i modem prima di aprire i coperchi del servente se non diversamente indicato nelle procedure di installazione e configurazione.

경고문 1

⚠️
위험

전기 충격을 피하려면 날씨가 나쁠 때(예: 눈 또는 비가 오거나 천둥 번개가 칠 때)는 케이블을 연결하거나 끊지 않도록 하고 이 제품의 설치, 유지보수 또는 재구성 등의 작업을 수행하지 않도록 하십시오.

전기 충격을 피하려면 다음과 같아야 합니다.

— 고압선은 적절한 배선 및 접지 상태의 콘센트로 연결되어야 합니다.

— 이 제품이 접속될 모든 장비도 적절한 배서 상태의 콘센트로 연결되어야 합니다.

다른 전위를 가진 두 표면을 만졌을 때 발생할 수 있는 전기 충격을 피하려면 한 손으로 신호선을 연결하거나 끊으십시오.

전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다. 전기 충격을 피하려면 이 제품이나 접속 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케이블을 연결하고 끊도록 하십시오.

연결하려면	연결해제하려면
1. 모든 스위치를 켠다.	1. 모든 스위치를 끈다.
2. 먼저 모든 케이블을 장치에 연결한다.	2. 먼저 모든 케이블을 장치에 제거한다.
3. 신호선을 콘센트에 연결한다.	3. 신호선을 콘센트에서 제거한다.
4. 전원을 콘센트에 연결한다.	4. 장치에서 모든 케이블을 제거한다.
5. 장치 스위치를 켠다.	

경고문 2

⚠

주의:

배터리를 교체할 때는 IBM 부품 번호 &PN. 또는 제조업체에서 추천하는 동등한
유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를 포함하는 모듈이 있으면
이것은 동일한 제조업체에서 생산된 동일한 모듈 유형으로만 교체하십시오.
배터리에는 리튬이 포함되어 있으므로 제대로 사용, 처리 또는 처분하지 않으면
폭발할 수 있습니다.

다음을 주의하십시오.

– 던지거나 물에 담그지 않도록 하십시오.
– 100℃(212℉) 이상으로 가열하지 않도록 하십시오.
– 수리하거나 분해하지 않도록 하십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3

⚠

주의:
CD-ROM 드라이브가 설치되어 있으면 다음 사항을 명심하십시오.

여기에서 지정하지 않은 방식으로 CD-ROM 드라이브를 제어 또는 조절하거나 다른 절차로
사용하면 위험한 방사능 노출이 발생할 수 있습니다.

CD-ROM 드라이브의 덮개를 제거하면 위험한 레이저 방사능이 노출될 수 있습니다.
CD-ROM 드라이브 내에는 정비할 수 있는 부품이 없습니다. CD-ROM 드라이브 덮개를
제거하지 않도록 하십시오.

경고문 4

위험

일부 CD-ROM 드라이브에는 클래스 3A 또는 3B 레이저 2극
진공관(다이오드)이 들어 있습니다. 다음 사항을 명심하십시오.

열면 레이저 방사능이 노출됩니다. 광선을 주시하거나 광학 기계를
직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

경고문 5

32kg(70.5 파운드) 55kg(121.2 파운드)

주의:
기계를 들 때는 안전하게 들어 올리십시오.

경고문 10

주의:
전원, 전화 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다. 설치 및 구성 절차에
다른 지시가 없으면, 다치거나 장비 손상이 생기지 않게 하기 위해 서버 덮개를 열기
전에 접속된 전선, 원격 통신 시스템, 네트워크 및 모뎀의 연결을 끊으십시오.

PELIGRO

Para evitar una posible descarga eléctrica, no conecte ni desconecte los cables ni lleve a cabo ninguna operación de instalación, de mantenimiento o de reconfiguración de este producto durante una tormenta eléctrica.

Para evitar una posible descarga:

* El cable de alimentación debe conectarse a un receptáculo con una instalación eléctrica correcta y con toma de tierra.
* Los aparatos a los que se conecte este producto también deben estar conectados a receptáculos con la debida instalación eléctrica.

Cuando sea posible, utilice una sola mano para conectar o desconectar los cables de señal a fin de evitar una posible descarga al tocar dos superficies con distinto potencial eléctrico.

La corriente eléctrica de los cables de comunicaciones, teléfono y alimentación puede resultar peligrosa. Para evitar una posible descarga, siga las indicaciones de conexión y desconexión de los cables siempre que tenga que instalar, mover o abrir las cubiertas de este producto o de los dispositivos acoplados.

Instrucciones de conexión	Instrucciones de desconexión
1. Apague todos los componentes (OFF).	1. Encienda todos los componentes (ON).
2. En primer lugar, conecte todos los cables a los dispositivos.	2. En primer lugar, retire los cables de alimentación de las tomas.
3. Conecte los cables de señal a los receptáculos.	3. Retire los cables de señal de los receptáculos.
4. Conecte los cables de alimentación a las tomas.	4. Retire todos los cables de los dispositivos.
5. Encienda el dispositivo (ON).	

⚠️

Percaución:

Al cambiar la batería, utilice únicamente la batería IBM Número de pieza 33F8354 o un tipo de batería equivalente recomendado por el fabricante. Si el sistema tiene un módulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de módulo del mismo fabricante. La batería contiene litio y puede explotar si no se utiliza, manipula o desecha correctamente.

Lo que no debe hacer

*   Tirar o sumergir el producto en agua.

*   Exponer el producto a una temperatura superior a 100°C.

*   Reparar o desmontar el producto.

Cuando quiera desechar la batería, siga las disposiciones y reglamentaciones locales.

⚠️

Percaución:

Cuando instale una unidad de CD-ROM, tenga en cuenta la siguiente información.

Si se llevan a cabo controles o ajustes o se utilizan métodos que no se atengan a lo aquí especificado, se puede producir una exposición peligrosa a las radiaciones.

Si se retiran las cubiertas de la unidad de CD-ROM, se puede producir una peligrosa exposición a radiaciones de láser. Dentro de la unidad de CD-ROM no existen piezas reparables. No retire las cubiertas de la unidad de CD-ROM.

PELIGRO

Algunas unidades de CD-ROM tienen incorporado un diodo de láser de Clase 3A o de Clase 3B Tenga en cuenta la siguiente información.

Cuando la unidad está abierta se generan emisiones de rayos láser. No dirija la mirada al haz, no lo observe directamente con instrumentos ópticos y evite la exposición directa.
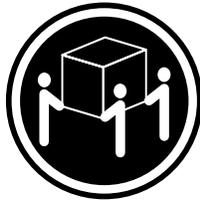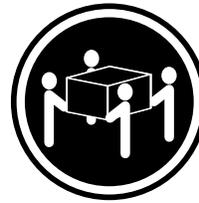
≥ 32 kg (70.5 lbs)   ≥ 55 kg (121.2 lbs)

Percaución:

Alce la máquina con cuidado; el sobrepeso podría causar alguna lesión.

Percaución:

La corriente eléctrica de los cables de comunicaciones, de teléfono y de alimentación puede resultar peligrosa. Para evitar posibles lesiones o daños del aparato, desconecte los cables de alimentación, los sistemas de telecomunicaciones, las redes y los módems antes de abrir las cubiertas del servidor, salvo que se indique lo contrario en las instrucciones de las operaciones de instalación y configuración.

Safety information

This section contains the safety information with which you need to be familiar, before you service an IBM mobile computer.

General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:

    1. Ensure you can stand safely without slipping.
    2. Distribute the weight of the object equally between your feet.
    3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
    4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*

- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing. **Remember:** Metal objects are good electrical conductors.
- Wear safety glasses when you are doing any of the following: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Electrical safety

> **Important**
>
> Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.
>
> Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

Observe the following rules when working on electrical equipment.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:

    — Performing a mechanical inspection
    — Working near power supplies
    — Removing or installing main units

- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:

    — Ensure that another person, familiar with the power-off controls, is near you.

      Remember: Another person must be there to switch off the power, if necessary.
    — Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

      Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
    — When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
    — Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

    Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts (or similar units) *with the power on* when they are removed from their normal operating places in a machine. This practice ensures correct grounding of the units.)

    — Power supply units
    — Pumps
    — Blowers and fans
    — Motor generators

- If an electrical accident occurs:

    — **Use caution; do not become a victim yourself.**
    — **Switch off power.**
    — **Send another person to get medical aid.**

Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when

there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

Use the following precautions when handling ESD-sensitive parts.

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

    Note: The use of a grounding system is desirable but not required to protect against ESD damage.

    — Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
    — Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
    — Use the round ground-prong of the ac plug on ac-operated computers.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.

Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the following checks with the power off, and the power cord disconnected.

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for the following:

    a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
    b. The power cord should be the appropriate type as specified in the parts listings.
    c. Insulation must not be frayed or worn.

4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Problem determination tips

Because there is a large variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination.

- Verify any recent hardware changes. See "Hardware considerations" on page 131.
- Verify any recent software changes. See "Software considerations" on page 130.
- Verify that the BIOS is at the latest level. See "BIOS" on page 130.
- Verify that the drivers are at the latest levels. See "Drivers" on page 130.
- Verify that the Configuration matches the hardware. See "System resource conflicts" on page 132.
- Verify that the Diagnostics diskette is at the latest level. See "File updates".

As you go through problem determination, consider these questions.

- Do diagnostics fail?

- What, when, where, single, or multiple systems?

- Is the failure repeatable?

- Has this configuration ever worked?

- If it has been working, what changes were made prior to it failing?

- Is this the original reported failure?

Important

To eliminate confusion, systems are considered identical only if the following are *exactly* identical for *each* system:

1. Machine type and model

2. BIOS level

3. Adapters/attachments (in same locations)

4. Address jumpers/terminators/cabling

5. Software versions and levels

6. Reference/Diagnostics Diskette

7. Configuration options set in the system

8. Setup for operation system control files

Comparing the configuration and software setup between "working" and "non-working" systems will often resolve problems.

File updates

Use the IBM support area on the World Wide Web (WWW) to download Diagnostic, BIOS Flash, and Device Driver files.

http://www.ibm.com/support

Adding adapters to the system

When adapters are added to the system, an area in memory has to be allocated to run its programs. This can be done with either **hardware switches** or **software mapping**.

If there is a conflict in software mapping, then the following may be true.

- The first device to attach to an IRQ, DMA, I/O Address, or RAM location will probably function. The second device will not be found.
- Standalone diagnostics might function properly because the device that was found is the only device running.

Software configuration conflicts occur when the following are true.

- Hardware has a different configuration than the software that is using it expects.
- Hardware memory address space is in conflict with memory used by the application software.

Software considerations

Suspect a software failure if one of the following is true.

- Hardware diagnostics run error-free.
- Swapping hardware components fails to isolate the problem.

A software problem might be the result of a mismatch between the hardware and the operating system device drivers or direct drivers.

BIOS

The BIOS acts as an interface between the system hardware, application software, and the operating system.

The BIOS contains the instructions to operate the basic system components:

- Keyboard
- Serial and parallel ports
- Diskette drive
- Hard disk drive
- VGA display
- Clock
- Memory controller.

The BIOS then starts the IPL or Boot functions.

Drivers

Device drivers are the BIOS for additional hardware. They are the communicators of the hardware assignments to the operating system, including the following:

- IRQ level
- DMA channel
- I/O address
- ROM or RAM.

Some device drivers like HIMEM.SYS are position sensitive and must be placed before other device drivers in the CONFIG.SYS file.

Not all device drivers are found in the CONFIG.SYS file. Advanced operating systems use .INI files to set up and start devices.

Device drivers can access the hardware in five ways.

- **Operating system direct to hardware using a direct driver**

  Direct drivers, which bypass BIOS, have the advantage of faster throughput, but the disadvantage of limited error-handling capability and reduced software and hardware compatibility and flexibility. This method is not used in the IBM PC Series systems.

- **Operating system to BIOS to hardware**

  This is the recommended way. It's the most flexible because it is independent of the hardware.

- **Applications to operating system to BIOS to hardware**

  This method is inflexible and is dependent on the operating system.

- **Applications to BIOS to hardware**

  This method has some flexibility but it is dependent on the BIOS.

- **Applications to hardware**

  This method is dependent on the hardware and is very inflexible. However, it is very fast, very efficient, and it has no overhead.

Hardware considerations

Use the following tools to help identify and resolve hardware-related problems.

- Power-on self-test (POST)
- POST Beep codes
- Test programs
- Error messages

POST does the following operations.

- Checks some basic system board operations
- Checks the memory operation
- Starts the video operation
- Verifies that the diskette drive is working
- Verifies that the hard disk drive is working

Use the test programs that come with this HMM or with the system you are servicing to test the IBM components of the system and some external devices. Also, from the DOS prompt or from OS/2 Utilities, use the **CHKDSK** command to check and repair hard disk data allocation errors.

Error messages generated by the software (the operating system or application programs), generally are text messages. However, error messages can be text, numeric, or both text and numeric.

Any time there is an error message indicating a problem with the system, follow the General Checkout procedures in this HMM to resolve the problem.

Basically, there are five types of error messages.

- **POST error messages** are displayed when the POST finds problems with the hardware or detects a change in the hardware configuration.

- **POST Beep codes** are sounds emitted from the speaker if the POST finds a problem. One beep indicates that the POST completed successfully. Multiple beeps indicate a problem was found.
- **Diagnostic error messages** are displayed when a test program finds a problem with a hardware component.
- **Software-generated error messages** are displayed if a problem or conflict is found by an application program, the operating system, or both. For an explanation of these messages, refer to the information supplied with the installed software package. Also, refer to "Software considerations" on page 130.
- **Multiple messages** occur when the first error causes additional errors. Follow the suggested action of the first error displayed.

System resource conflicts

System failures occur when there are system resource conflicts with the following:
- Interrupt Request Queue (IRQ)
- Direct Memory Access (DMA)
- I/O Address
- ROM and RAM Addresses.

IRQ
- Assigns a unique interrupt request line to every I/O device (line numbers range from 0 to 15).
- Interrupts the processor to force it to service the request.
- Handles interrupts on a priority basis (low numbers have the highest priority).
- Queues interrupt request.

IRQ conflicts occur when there are multiple assignments to the same interrupt level. If there is an IRQ conflict, the system will hang. Use the systems diagnostics to check for multiple assignments to the same interrupt level before replacing any hardware component.

DMA
- **Accesses the memory by bypassing the processor.** This allows the processor more time for applications and programs.
- Accesses memory directly from the serial and parallel ports on some systems.
- **Accesses memory directly from some adapters using a DMA channel.** This allows the adapter to operate faster.
- **Provides from 4 to 15 DMA channels.** The number varies depending on the system.

If multiple assignments of the same DMA channel occur, the system will hang. Use the system diagnostics to check for multiple assignments to the same DMA channel before replacing any hardware components.

I/O address

A unique I/O address is assigned to each system component.

If multiple assignments of the same I/O address occur, the system will hang. Use the **DOS MEM** command to check for multiple assignments to the same I/O address before replacing any hardware component.

ROM and RAM Addresses

Adapter cards with processors can contain RAM and ROM. If the adapter cards have onboard memory, then the following are true.

- ROM contains operating instructions for the adapter I/O.

- RAM is used for buffering.

Two adapters using the same memory area will cause a failure. This failure might appear as a hardware failure.

The IRQ levels, DMA channels, I/O address, and ROM and RAM addresses all become potential conflicts and system problems. When conflicts arise, they might show up as system hangs, lost or missing devices, incorrect or bad data, or failing diagnostics. **Always eliminate conflicts in these areas before replacing any hardware components.**

Miscellaneous information

Acronyms, Abbreviations, and Terms

Term	Information
ACPA/A	Audio Capture and Playback Adapter
ADP	Automatic Data Processing
AGP	Advanced Graphics Port
Alt	Alternate
ANSI	American National Standards Institute
ARTIC	A Real Time Interface Coprocessor
ASCII	American National Standard Code for Interface Interchange
AT	Advanced Technology (refer to AT Bus)
AVC	Audio Video Connection
BIOS	Basic Input/Output System
bps	Bits Per Second
BPS	Bytes Per Second
CCITT	The International Telephone and Telegraph Consultative Committee
CCS	Common Command Set
CCSB	Common Complete Status Block
CCSB	Configuration Control Sub Board
CD	Compact Disc
CDPD	Cellular Digital Packet Data
CD-ROM	CD Read-Only Memory
CGA	Color Graphics Adapter (See EGA)
CRC	Cyclic Redundancy Check
CRT	Cathode Ray Tube
CSA	Canadian Standards Association
CSD	Corrective Service Diskette
DASD	Direct Access Storage Device (hard disk)
DMA	Direct Memory Access
DRAM	Dynamic Random Access Memory
ECA	Engineering Change Announcement
ECC	Error Correction Code
EGA	Enhanced Graphics Adapter
ESD	Electrostatic Discharge
ESDI	Enhanced Small Device Interface
EEPROM	Electrically Erasable Programmable Read-Only Memory
EWS	Energy Work Station
FRU	Field Replaceable Unit (replaceable part)
GPIB	General Purpose Interface Bus (IEEE 348)
GSA	General Services Administration
Ht	Height
IDE	Integrated Drive Electronics
IC	Integrated Circuit
IEEE	Institute of Electrical and Electronics Engineers
IEC	International Electrotechnical Commission
IML	Initial Machine Load
IPL	Initial Program Load
ISA	Industry Standard Architecture
ISO	International Organization for Standardization
ISDN	Integrated-Services Digital Network
LAN	Local Area Network
LBA	Local Block Address
LTB	Local Transfer Bus
LUN	Logical Unit Number (refer to SCSI)
MAP	Maintenance Analysis Procedure
MCGA	Modified Color Graphics Adapter
MCA	Micro Channel Architecture (bus structure)

Term	Information
MHz	Mega Hertz (million cycles per second)
MIDI	Musical Instrument Digital Interface
MM	Multimedia
N/A	Not Available or Not Applicable
NDD	National Distribution Division
NDIS	Network Driver Interface Specification
NMI	Non-Maskable Interrupt
NSC	National Support Center
NVRAM	Non-Volatile Random Access Memory
OEM	Original Equipment Manufacturer
PCI	Peripheral Component Interconnect
PCMCIA	Personal Computer Memory Card International Association
POS	Programmable Option Select
PUN	Physical Unit Number (refer to SCSI)
RAID	Redundant Array of Inexpensive Disks
RAM	Random Access Memory (read/write)
RGB	Red Green Blue (refer to monitors)
RIPL	Remote Initial Program Load
ROM	Read-Only Memory
SASD	Sequential Access Storage Device (Tape)
SCB	Subsystem Control Block
SCSI	Small Computer Systems Interface
SCSI ID	SCSI Identification Number
SPD	Software Product Description
SR	Service Representative
SRAM	Static Random Access Memory
SVGA	Super Video Graphics Array (800x600x16)
STN	Super Twisted Nematic
T/A	NDD Technical Advisor (see your Marketing Representative)
TDD	Telecommunications Device for the Deaf
TFT	Thin-Film Transistor
TPF	ThinkPad File
TSR	Terminate and Stay Resident
UL	Underwriters Laboratory
VCA	Video Capture Adapter
VESA	Video Electronics Standards Association
VGA	Video Graphics Array (640x480x16)
VPD	Vital Product Data
VRAM	Video Random Access Memory
WORM	Write Once Read Many (storage medium)
XGA	Extended Graphics Array
Y/C	Luminance/Chrominance Signal (Video)

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