IBM PC Servers

S06J-0433-00

310 - Type 8639

Hardware Maintenance Manual Supplement

May 1997

We Want Your Comments!
(Please see page 117)

Use this supplement with the PC Servers Hardware Maintenance Manual

Note

Before using this information and the product it supports, be sure to read the general information under “Notices” in this manual.

First (September 1996)

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About This Supplement

This supplement contains diagnostic information, Symptom-to-FRU Indexes, service information, error codes, error messages, and configuration information for the PC Server 310 Type 8639.

This supplement should be used with the advanced diagnostic tests and the information in the IBM *Personal System/2 Hardware Maintenance Manual* (part number 83G8990, form number S52G-9971) and *IBM PC Servers Hardware Maintenance Manual* (part number 70H0751, form number S30H-2501 to troubleshoot problems effectively.

Important

This manual is intended for trained servicers who are familiar with IBM PC Server products.

Before servicing an IBM product, be sure to review "Safety Information" on page 110.

Related Publications

The following publications are available for IBM products. For more information, contact IBM or an IBM Authorized Dealer.

For Information About	See Publication
IBM PC Servers not listed in this manual	IBM PC Servers Hardware Maintenance Manual (S30H-2501)
PS/2 Computers	IBM Personal System/2 Hardware Maintenance Manual (S52G-9971)
PS/ValuePoint Computers	IBM PS/ValuePoint Hardware Maintenance Service and Reference (S61G-1423)
Laptop, Notebook, Portable, and ThinkPad Computers (L40, CL57, N45, N51, P70/P75, ThinkPad 300, 350, 500, 510, 710T, Expansion Unit, Dock I, Dock II)	IBM Mobile Systems Hardware Maintenance Manual Volume 1 (S82G-1501)
ThinkPad Computers (ThinkPad 340, 355, 360, 370, 700, 701, 720, 750, 755)	IBM Mobile Systems Hardware Maintenance Manual Volume 2 (S82G-1502)
ThinkPad Computers (ThinkPad 365, 760)	IBM Mobile Systems Hardware Maintenance Manual Volume 3 (S82G-1503)
Monitors (Displays) (February 1993)	IBM PS/2 Display HMM Volume 1 (SA38-0053)
Monitors (December 1993)	IBM Color Monitor HMM Volume 2 (S71G-4197)
IBM Monitors (P Series) (February 1996)	IBM Monitor HMM Volume 3 (S52H-3679)
IBM 2248 Monitor (February 1996)	IBM Monitor HMM Volume 4 (S52H-3739)
Disk Array technology overview and using the IBM RAID Configuration Program	Configuring Your Disk Array booklet (S82G-1506)
Installation Planning for Personal System/2 computers	Personal System/2 Installation Planning and Beyond (G41G-2927)
Installation Planning for Advanced Personal System/2 Servers	Advanced PS/2 Servers Planning and Selection Guide (GG24-3927)

Contents

PC Server 310 - Type 8639

Features

Note

All PC Server computers have Selectable Startup.

Microprocessor

- Intel® Pentium®

Cache Memory

- Level-1, 16 KB
- Level-2:
  - Standard: 256 or 512 KB, varies by model
  - Expandable to 512 KB

Memory

- Standard: 16 or 32 MB, varies by model
- Expandable to 160 MB or 192 MB, varies by model
- 60 ns, ECC-parity
- Four SIMM sockets in two banks and one DIMM socket in one bank or six SIMM sockets, varies by model

Diskette Drive

- Standard: 3.5-inch, 1.44 MB
- Optional (internal): 3.5-inch, 1.44 MB

Hard Disk Drives

- Number and capacities of drives vary by model
- Supports up to three internal drives

CD-ROM Drive

- Standard: SCSI

Expansion Bays

- Two 5.25-inch drive bays
- Three 3.5-inch drive bays
- The number of bays available for expansion varies by model

Expansion Slots

- Two 16-bit ISA slots
- Three 32-bit PCI/ISA shared slots
- The number of slots available for expansion varies by model

Video

- Super video graphics array (SVGA)
- Compatibility:
  - Color graphics adapter (CGA)
  - Video graphics array (VGA)

Security Features

- Bolt-down capability
- Door lock
- Selectable drive-startup
- Power-on and administrator passwords

Upgradable POST and BIOS

- Upgradable EEPROM on the system board
- POST/BIOS upgrades (when available)

Input/Output Connectors

- One infrared port
- One keyboard port
- One mouse (auxiliary-device) port
- One serial port
- Two universal serial bus (USB) ports

- One parallel port
- One video (monitor) port
- One SCSI-2 Fast/Wide PCI Adapter
  - One 8-bit internal port
  - One 16-bit internal port
  - One 16-bit external port
- One Ethernet Quad-BT or -B2 PeerMaster Server Adapter (installed on some models)
  - 10Base-T
  - 10Base2
  - 10Base5

Power Supply

- 200 Watt with voltage switch (115–230 V ac)
- Built-in overload and surge protection

Keyboard and Mouse (Auxiliary-Device)

- IBM keyboard
- Mouse

Diagnostics and Test Information

The diagnostic procedure required for servicing a PC Server 310 Type 8639 is determined by the architecture of the server.

- For ISA Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, OXT, 0Z0, and OZT go to “General Checkout (Models 0XT, 0Z0, 0ZT, 0D0, 0DT 0E0, 0E4, 0E5, 0EV)” on page 6.
- For Micro Channel Models MDT, MXT, and MZT to “General Checkout (Models MDT, MXT, MZT)” on page 8.

General Checkout (Models 0XT, 0Z0, 0ZT, 0D0, 0DT 0E0, 0E4, 0E5, 0EV)

This general checkout procedure is for Type 8639 (Model 0XT, 0Z0, 0ZT, 0D0, 0DT, 0E0, 0E4, 0E5, 0EV) servers.

If you are servicing a Type 8639 (Models MDT, MXT, MZT) server, see "General Checkout (Models MDT, MXT, MZT)" on page 8.

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 "Return Codes" on page 36.

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

1. Before replacing any FRUs, ensure the latest level of BIOS is installed on the system. A down-level BIOS may 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 19.
2. If multiple error codes are displayed, diagnose the first error code displayed.
3. If the computer hangs with a POST error, go to "Symptom-to-FRU Index Supplement" on page 72.
4. If the computer hangs and no error is displayed, go to "Undetermined Problem" on page 51.
5. If a device is not highlighted on the Module Test menu, that device may be defective.

001

– Power-off the computer and all external devices.
– Check all cables and power cords.
– Set all display controls to the middle position.
– Insert the Diagnostics diskette into drive A.
– Power-on all external devices.

(Step **001** continues)

001 (continued)
– Power-on the computer.
– Check for the following responses:

1. One beep.
2. Readable instructions or the Main Menu.

DID YOU RECEIVE THE CORRECT RESPONSES?

Yes **No**

002

If you are servicing a model 0E0, 0E4, 0E5, 0EV, go to "Symptom-to-FRU Index Supplement" on page 72.
– or –
If you are servicing a model 0D0, 0DT, 0XT, 0Z0, 0ZT, MDT, MXT, or MZT, go to Step 006 on page 8.

003

Note

The ethernet adapter (EtherJet card) will not appear on the Module Test menu. The diagnostic tests for the EtherJet card are on the LANAID diskette supplied with the system.

ARE ALL ADAPTERS AND DEVICES INSTALLED IN THE COMPUTER HIGHLIGHTED ON THE MODULE TEST MENU?

Yes **No**

004

Go to "Module Test Menu" on page 16.

005

Run the Advanced Diagnostics test. If necessary, refer to "Additional Service Information" on page 17.

- If you receive an error, go to "Symptom-to-FRU Index Supplement" on page 72.
- If the test stops and you cannot continue, replace the last device tested.
- If the computer has incorrect keyboard responses, go "Keyboard" on page 515 in your PC Server Hardware Maintenance Manual.
- If the printer has incorrect responses, go "Printer on page 524 in your PC Server Hardware Maintenance Manual.
- If the display has problems such as jittering, rolling, shifting, or being out of focus, go "Display on page 490 in your PC Server Hardware Maintenance Manual.

006

If Rapid Resume is displayed, do the following:

1. Disable Rapid Resume, See “Running Rapid Resume Manager” on page 39.
2. Run the Diagnostics tests.
3. Enable Rapid Resume after service is complete.

– or –

If the computer hangs during Rapid Resume, do the following:

1. Power-off; then, power-on the computer.
2. When the hard-disk drive activity light comes on, press **Ctrl+Alt+Del** to exit Rapid Resume and restart the computer. (Rapid Resume is now turned off.)

– or –

Go to the “Symptom-to-FRU Index Supplement” on page 72.

General Checkout (Models MDT, MXT, MZT)

This general checkout procedure is for Type 8639 (Models MDT, MXT, MZT) servers.

On Type 8639 (Models MDT, MXT, MZT) Micro Channel computers, you can start the advanced diagnostics programs in one of three ways:

1. From the PC Server 310 (Models MDT, MXT, MZT) Reference Diskette
2. From the PC Server 310 (Models MDT, MXT, MZT) Diagnostics Diskette
3. From the System Partition.

From the Reference Diskette: The Reference Diskette is bootable. Starting the diagnostic programs from the Reference Diskette allows you to test the options installed in the computer or test the base system.

To Test Options

Notes

1. Ensure that Rapid Resume is disabled before starting this procedure.
2. If Rapid Resume is displayed during this procedure, see “Running Rapid Resume Manager” on page 39.
3. Re-run the Diagnostics tests.

To test the options installed in the computer, do the following.

1. Power-off the computer and all external devices.
2. Check all cables and power cords.
3. Set all display controls to the middle position.

4. Insert the Reference Diskette into drive A.
5. Power-on all external devices.
6. Power-on the computer.
7. Check for the following responses:
   a. One beep
   b. IBM Logo
   c. Readable instructions or the Main Menu
8. If you received the correct responses, press **Ctrl+A** (Test the Computer screen appears). Select **Options diagnostics** and follow the instructions on the screen.
9. If you **did not** receive the correct responses, go to "Symptom-to-FRU Index Supplement" on page 72.

To Test the Base System

Notes

1. Ensure that Rapid Resume is disabled before starting this procedure.
2. If Rapid Resume is displayed during this procedure, see "Running Rapid Resume Manager" on page 39.
3. Re-run the Diagnostics tests.

To test the base system, do the following:

1. Power-off the computer and all external devices.
2. Check all cables and power cords.
3. Set all display controls to the middle position.
4. Insert the Reference Diskette into drive A.
5. Power-on all external devices.
6. Power-on the computer.
7. Check for the following responses:
   a. One beep
   b. IBM Logo
   c. Readable instructions or the Main Menu
8. If you received the correct responses, do the following.
   a. Press **Ctrl+A**
      (Test the Computer screen appears).
   b. Select **System board diagnostics** and follow the instructions on the screen.
   c. When the QAPlus/Pro Main Menu appears, press **Ctrl+A**.
   d. Select **Diagnostics**.
   e. Select **Module Test**.
      - If the Module Test Menu is correct, run diagnostics.
      - If the Module Test Menu is not correct, go to "Module Test Menu" on page 16.
9. If you **did not** receive the correct responses, go to "Symptom-to-FRU Index Supplement" on page 72.

From the Diagnostics Diskette

Important

If the diagnostic program is started from the diagnostics diskette, you **will not** have the option to test the Micro Channel options installed in the computer.

The Diagnostics Diskette is bootable. The procedure for starting the Diagnostics Diskette when servicing a Type 8639 server is the same for all models. See "General Checkout (Models 0XT, 0Z0, 0ZT, 0D0, 0DT 0E0, 0E4, 0E5, 0EV)" on page 6.

From the System Partition: Starting the diagnostic programs from the System Partition gives you the option of testing the options installed in the computer or testing the base system.

To Test Options

Notes

1. Ensure that Rapid Resume is disabled before starting this procedure.
2. If Rapid Resume is displayed during this procedure, see "Running Rapid Resume Manager" on page 39.
3. Re-run the Diagnostics tests.

To test the options installed in the computer, do the following.

1. Power-off the computer and all external devices.
2. Check all cables and power cords.
3. Set all display controls to the middle position.
4. Remove all media from the drives.
5. Power-on all external devices.
6. Power-on the computer.
7. Check for the following responses:
   a. One Beep
   b. IBM Logo
8. When the F1 prompt appears in the lower left-hand corner of the screen, press **F1** (the IBM logo appears, then the System Programs Main Menu).
9. Press **Ctrl+A**
   (Test the Computer screen appears).
10. If you received the correct responses, select **Options** and follow the instructions on the screen.
11. If you **did not** receive the correct responses, reinstall the System Partition on the hard disk drive from the Reference Diskette.

To Test the Base System

Notes

1. Ensure that Rapid Resume is disabled before starting this procedure.
2. If Rapid Resume is displayed during this procedure, see "Running Rapid Resume Manager" on page 39.
3. Re-run the Diagnostics tests.

To test the base system, do the following.

1. Power-off the computer and all external devices.
2. Check all cables and power cords.
3. Set all display controls to the middle position.
4. Remove all media from the drives.
5. Power-on all external devices.
6. Power-on the computer.
7. Check for the following responses:
   a. One Beep
   b. IBM Logo
8. When the F1 prompt appears in the lower left-hand corner of the screen, press **F1** (a second IBM logo appears followed by the System Programs Main Menu).
9. If you received the correct responses, do the following:
   a. Press **Ctrl+A**
      (Test the Computer screen appears).
   b. Select **System board diagnostics** and follow the instructions on the screen.
   c. When the QAPlus/Pro Main Menu appears, press **Ctrl+A**
   d. Select **Diagnostics**.
   e. Select **Module Test**.
   f. If the Module Test Menu is correct, run diagnostics.
   g. If the Module Test Menu is not correct, go to "Module Test Menu" on page 16.
10. If you **did not** receive the correct responses, reinstall the System Partition on the hard disk drive from the Reference Diskette.

System Programs: The system programs are utility programs for Micro Channel computers that allow you to:

- Change the system configuration
- Set passwords
- Change the date and time
- Set power management features
- Test the computer

The programs are installed in a special protected area of the hard disk drive called the System Partition.

The System Partition appears on the FDISK and FDISKPM screens for DOS and OS/2, so that the partition can be

deleted and the disk space (about 6MB) can be used for other programs. Before you delete the System Partition, you must first use the **Back up/Restore system programs** option on the system programs Main Menu to make current copies of the Reference, Diagnostic, and QAPlus/Pro diskettes. Without the System Partition, you must use these diskettes to configure and diagnose the computer.

If the computer was manufactured without a hard disk drive, the system programs were provided on three diskettes:

- Reference Diskette
- Diagnostics Diskette
- QAPlus/PRO for IBM Diskette

Starting the System Programs: You can start the system programs from the hard disk drive or from the Reference Diskette.

If an error occurs during startup, the computer automatically starts the system programs to help you isolate and correct the problem. If you **do not** want the system programs to automatically start when an error occurs, change the **Bypass System Programs on error** setting in the system programs.

From the Hard Disk Drive: To start the system programs from the hard disk drive, do the following:

1. Remove all media from all the drives.
2. Power-off the computer; then, power it back on. (The IBM logo appears on the screen.)
3. When the F1 prompt appears, press **F1**. (A second IBM logo appears, followed by the system programs main menu.

From the Reference Diskette: To start the system programs from the Reference Diskette, do the following:

1. Power-off the computer.
2. Remove all media from the drives.
3. Insert the Reference Diskette into the primary diskette drive.
4. Power-on the computer.

After a few seconds, the IBM logo appears on the screen; then a second IBM logo screen appears, followed by the system programs main menu.

System Programs Main Menu: The following tables contain a listing of the System Programs Main Menu items followed by a description of the item.

Item	Description
Start operating system	Exits from the system programs and loads the operating system.
Back up/Restore system programs: • **Back up the system diskettes**	Makes a backup copy of the Reference, Diagnostic, and QAPlus/PRO diskettes.
• **Back up the System Partition**	Copies the system programs from the System Partition to the backup diskettes. Also creates backup Reference, Diagnostic, and QAPlus/PRO diskettes. You need at least three 2MB diskettes for the backup procedure.
• **Restore the System Partition**	Reinstalls the system programs from backup diskettes to the System Partition. Use this program to rebuild the System Partition in case of accidental loss or damage.
Update System Programs	Copies a new version of the system programs to the System Partition from an updated set of system diskettes.
Set Configuration	Views, changes, backs up, or restores the configuration information stored in the battery-backed memory. The configuration information consist of: • The amount of memory installed • The built-in features and their assignments • The installed options with their location and assignments
• **View configuration**	Displays the present configuration information for Micro Channel adapters and built-in features.
• **Change configuration**	Allows you to change the configuration of the Micro Channel adapters. You can also change the **Bypass System Programs** setting from this menu.
• **Back up configuration**	Copies the configuration information from the battery-backed memory to the hard disk drive.

Item	Description
• **Restore Configuration**	Retrieves the Micro Channel configuration copied by the Back up Configuration program and restores that information to the battery-backed memory.
• **Run Automatic Configuration**	Verifies and updates the configuration information for the Micro Channel adapters and built-in features.
• **Display memory map**	Displays the memory address assigned to the adapters.
• **Set and View Micro Channel SCSI devices**	Displays the existing Micro Channel device settings and allows you to make limited modification to some devices. Only the information enclosed in brackets ([...]) can be changed.
• **View PCI configuration**	Displays the current configuration of Peripheral Component Interconnect devices and adapters. Because PCI components are automatically configured each time the computer starts up, you cannot change these settings.
Set Features • **Set date and time**	Changes the date and time in battery-backed memory.
• **Set password and security features**	Helps prevent the use of the computer by unauthorized persons. Two types of passwords are available from this program: a power-on password and a privileged-access password.
• **Set keyboard speed**	Changes the speed at which a character repeats when a key is held down.
• **Set console**	Select this choice if the computer is going to be used as a server, without a keyboard.
• **Set startup sequence**	Allows you to specify the sequence of the drives that the computer will attempt to start from when you power it on.

Item	Description
• **Set power management features** **Note:** If similar power management features are set in the operating system, they will override these settings.	Allows you to change the settings for the following: • Rapid Resume • Standby Timeout • Wake Up on Ring • Wake Up on Alarm
Copy an option diskette	Copies configuration and diagnostic files from a diskette that comes with an optional device.
Test the Computer	Allows you to test the base computer by selecting **System board diagnostics**, or test the Micro Channel options by selecting **Option diagnostics.**
More Utilities • **Display revision levels**	Displays updates and changes.
• **Display system error log**	Displays entries in the error log. Any memory and privileged-access password errors are recorded in this log.
• **Stand alone utility information**	Describes how to use the UINSTALL program to get information about additional utility programs available on the Diagnostics Diskette. Some of these programs can be used only with specific operating systems. Make sure you read all of the information before installing any of these utility programs.
• **Set and view system identification**	Records the computer serial number and displays the identification numbers for the system unit, processor board, and system board. This information is also know as the vital product data (VPD).
• **Set video display information**	Allows you to choose the display type and set a horizontal frequency and refresh rate.

Module Test Menu

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. To start the Setup Utility program see “Setup Program” on page 38.

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

- If an adapter or device that is not installed in the computer is highlighted on the menu, use the procedure in “Undetermined Problem” on page 51 to find the problem.
- If an adapter or device is installed in the computer and is not highlighted on the menu, you have one of the following conditions:
  - The diagnostic code for the adapter or device is not on the diagnostic diskette. Run the diagnostics provided with that device.
  - The SCSI controller failed (on the system board or SCSI adapter).
  - An unrecognizable adapter is installed.
  - The missing device is defective or it requires an additional diskette or service manual.
  - A defective adapter caused the device not to be highlighted on the menu.

If a device is missing from the list, replace it. If this does not correct the problem, use the procedure in “Undetermined Problem” on page 51.

Additional Service Information

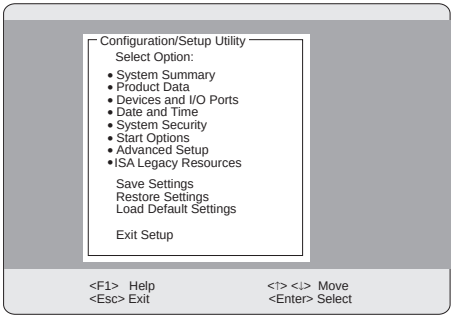
The following information and tools are available to help identify and resolve hardware-related problems:

Configuration/Setup Utility Program

The built-in Configuration/Setup utility program provides a convenient method to configure various system features.

Always run the Configuration/Setup utility program if you have added or removed any hardware option, or if you receive an error message instructing you to do so. Review this information and the information that comes with the device before making changes. Also, record the current settings before making any changes.

The following menu appears when you start the Configuration/Setup utility program.



Note

Depending on the level of password protection, a limited version of the menu might appear. See "System Programs" on page 11 for more information.

In most cases, the server will operate using the default settings. You need to change the settings only to resolve configuration conflicts or to enable or change device function (for example, defining diskette types).

You can advance through the screens by pressing the **Page Up (PgUp)** or **Page Down (PgDn)** key. Use the Up Arrow (↑) or Down Arrow (↓) key to move through the items on the screen. To change a setting, highlight the item that you want to change; then, use the Left Arrow (←) or Right Arrow (→) key to view the choices.

Press **F1** for on-line Help information on each selection.

Starting the Configuration/Setup Utility Program:

To access the Configuration/Setup Utility program:

1. Power-on the server and watch the screen.
2. When the message `Press F1 to enter Configuration/Setup` appears, press **F1**.
3. Follow the instructions on the screen to view or change the configuration.
4. Select the **Exit Setup** option on the menu bar or press **Esc** to exit the Configuration/Setup utility program.

You must *correctly* exit from the Configuration/Setup utility program to save the configuration information.

If you change configuration information, and it causes an error during the &post. (POST), a "▲" displays next to the menu selection that contains the change.

Installing a 70 ns Memory Upgrade: The main memory in the server uses memory modules for temporary storage of data and instructions. These modules are also known as *single-inline memory module (SIMMs)* and *dual-inline memory modules (DIMMs)*.

The server is shipped with either 16 MB or 32 MB, 60 nanosecond, fast page (FP), parity memory. The memory is in the form of SIMMs or DIMMs dependant on availability. 0E0, 0E4, 0E5, and 0EV models support a maximum of 128 MB of memory when only SIMMs are installed and a maximum of 160 MB of memory when SIMMs and DIMMs are installed. The remaining models support a maximum of 192 MB of SIMMs only.

The POST always sets the system memory to 60 ns timing. When 70 ns SIMMs or DIMMs are installed, the Configuration/Setup utility program must be used to set the memory accordingly.

Note

The server will operate properly with a combination of 60 ns and 70 ns memory modules, if you set the speed to 70 ns.

To set the memory to 70 ns:

1. Install the 70 ns SIMMs or DIMMs in the available sockets.
2. Start the Configuration/Setup utility program as described in “Configuration/Setup Utility Program” on page 17.
3. Select **Advanced Setup** from the Configuration/Setup utility program menu.
4. Select **Memory Control**.
5. Use the arrow keys to select 70 ns timing.
6. Save the new settings and power-off the server.

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. RETAIN
  2. Bulletin board system (BBS)

3. HelpCenter
4. Levels 1 and 2 Support.

- Sources for obtaining the latest level BIOS available.
  1. Bulletin board system (BBS)
  2. HelpCenter
  3. Levels 1 and 2 Support

To update (flash) the BIOS, see “Flash (BIOS/VPD) Update Procedure” on page 24.

Checkpoint Codes

The following checkpoint codes may be displayed during POST. The routine listed next to the checkpoint code is started after the checkpoint code is displayed.

Note

Checkpoint codes occurring before the video is initialized will not be displayed.

Checkpoint Code	Routine Name
02h	ChipSetResetInit
05h	Phase1EnterBigReal
06h	CacheInit
06h	CacheInitWarm
0ah	StdCMOSChecksum_NS
0bh	MidCMOSChecksum_NS
0ch	ExtCMOSChecksum_NS
0dh	InitChip_NS
0eh	DetermineDRAMSize_NS
0eh	DetermineMemoryType_NS
07h	InitRefresh
08h	WaitForRTC
10h	Check4Parity_NS
10h	Check4ParityWarmboot_NS
10h	pci_burst
11h	DisableParity
12h	PeriphInit
13h	TestCPURegs
14h	InitRTC
15h	ChecksumROMinRAM
16h	InitTimer0
17h	InitTimer2
18h	TestDMA
19h	TestPageRegs
1ah	VerifyRefresh
1dh	TestFirst640k

Checkpoint Code	Routine Name
1fh	POSTwithStack
20h	CopyROMtoRAM
21h	BIOSShadow
23h	Phase2POST
24h	ShadowVPD
25h	InitKBDData
26h	SaveId
26h	CheckP54C
27h	InitQBoot
28h	PeriphConfig
2ah	InitTimeoutTables
2bh	Pos_Setup
2ch	TCPC
2dh	FindSerialPorts
2eh	FindParallelPorts
2fh	TestDMALocations
30h	TestPICs
31h	InitVectorTable
32h	EnableTimerInt
33h	InitKeyboard
34h	ClearMemSizeError
35h	CheckConfiguration
36h	CSET_BFR_VIDROM
36h	SetUSBClockinPIIX3
37h	PCIReset
38h	PCIVideo
39h	MfgBootFork
3bh	SignOn
3ch	TestTimerTick
40h	CSET_BFR_SIZMEM
41h	SizeMemoryAbove640k
42h	CSET_AFT_SIZMEM
43h	TestTimer2
44h	PasswordNotEntered
45h	TestPS2Mouse
46h	CheckForMouseButtons
47h	InitKBDFlags
48h	TestKBD
49h	TCPC_Errors
4bh	MemTestPrompt

Checkpoint Code	Routine Name
4ch	TestMemory
1bh	EnableParity
4eh	CSET_AFT_MTEST
4fh	AllocateEBDA
50h	xfer_ebda_vars
51h	SetWarmBootFlag
52h	ClearSpeedBits
53h	E_FLOB
54h	EnableSystemInterrupts
56h	InitKBD
57h	TestRTC
58h	CheckForNPX
59h	reset_hdctl
5ah	cold_FD_INIT
5ah	FD_INIT
5bh	SetFloppyConfig
5ch	InitA20
5dh	CacheConfig
5eh	HDSETUP
5fh	GiveUpIRQ15
60h	PnP_AssignCardSelectNumbers
62h	VerifyCMOSConfig
63h	ClearScreen
64h	DriveInit
65h	IBM_DDC
66h	CSET_BFR_OPROM
67h	PnP_AssignResources
68h	CSET_AFT_OPROM
69h	PCIConfigure
6ah	MFGHook_65
6bh	InitTimeOfDay
6ch	CheckForLockedKBD
6dh	InitEnableNMI
6eh	SetBootSpeed
6fh	SetKBDLEDs
70h	CheckForSetupHotKey
70h	CheckForSetupHotKey
71h	InitFlushKBD
72h	MoveErrorLogToEBDA
73h	InitDisableMouse

Checkpoint Code	Routine Name
74h	SysReset
75h	Phas
e2ExitBigReal	76h
BOOT_STRAP_1	79h
EnablePlanarVideoIRQ	88h
CoreInit	

Error Messages

Messages generated by the software—the operating system or application programs—generally are text messages, but they also can be numeric. Basically, there are five types of error messages.

- POST error messages
- POST beep codes
- Diagnostic error messages
- Software generated messages
- Multiple messages

Error Message	Description
POST Error Messages	Displayed when POST finds problems with the hardware or detects a change in the hardware configuration.
POST Beep Codes	Sounds emitted from the speaker if POST finds a problem. One beep indicates POST completed successfully. Multiple beeps indicate a problem was found by the POST.
Diagnostic Error Messages	Displayed when a test program finds a problem with a hardware option.
Software Generated Error Messages	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 that software package.
Multiple Messages	The first error that occurs can cause additional errors. Follow the suggested action of the first error displayed. In this case, the system displays more than one error message. Always follow the suggested action instructions for the *first* error message displayed.

Flash (BIOS/VPD) Update Procedure

1. Power-off the computer and all external devices.
2. Insert the Flash/VPD diskette into diskette drive A.
3. Power-on all external devices, then power-on the computer.
4. When the POST/BIOS Update Utility appears; type the number for your country/language, then press **Enter**.
5. If the computer serial number was previously recorded, the serial number is displayed with the 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.

Microprocessor Upgrades

The operation of the server can be enhanced by upgrading the microprocessor to a more powerful microprocessor. To do this, replace the existing microprocessor in the processor socket with a new microprocessor.

Installing Microprocessor Upgrades

Before you begin:

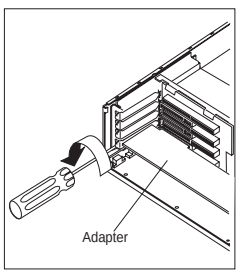
- Read the instructions that came with the microprocessor upgrade.
- Power-off the server.
- Disconnect all external cables and power cords; then, remove the server cover.

1. Locate the processor socket on the server &sb., see "Locations" on page 57.

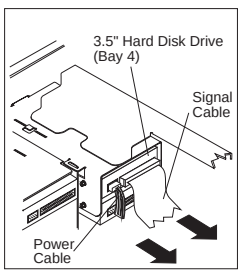
   Note

   When you install a microprocessor upgrade, you also might have to change microprocessor jumper positions on the system board, see "Locations" on page 57.

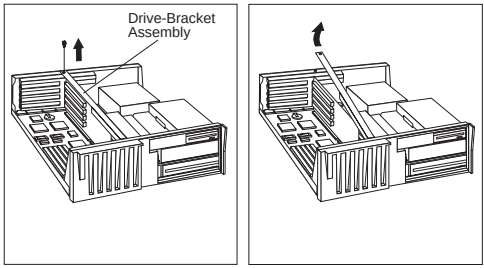
2. Note the slot position of any installed adapters; then, remove any adapters that block access to the processor socket.



3. Disconnect the signal and power cables from the drives in bays 4 and 5.



4. Remove the drive-bracket assembly from the server.



5. Locate the configuration switch set and the processor socket.
6. When installing a microprocessor upgrade, you must change the microprocessor/bus speed-ratio switch-set to the correct settings.

   The wrong setting will result in an incorrect value being displayed in the Configuration/Setup utility program and unreliable server operation.

   Use the following illustration to set switches (1 to 4) on the configuration switch set.

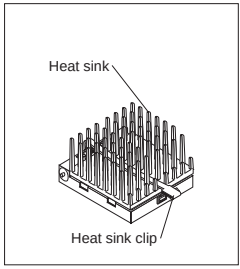
   Note

   The following illustration shows the switch set as viewed from the rear of the server.

7. Press on the heat sink clip tab to release the heat sink clip from the socket flange.

Note

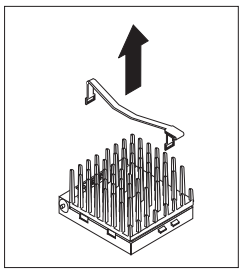
Your heat sink and heat-sink clip might differ from those shown here. Refer to your upgrade kit for further details.



8. Remove the heat sink clip and heat sink.

Attention

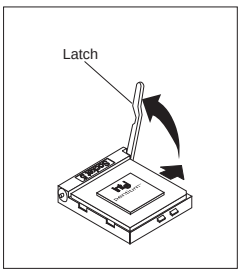
A thermal compound is on the top of the microprocessor and the base of the heat sink. Avoid getting this material on your skin or clothing. You should use a soft, lint-free cloth to remove the thermal compound before storing the old microprocessor, heat sink, and heat sink clip.

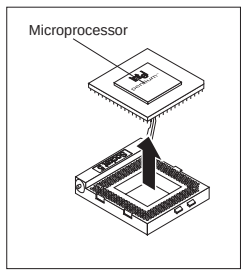


9. Lift the latch on the socket. Carefully lift the microprocessor from the socket.

Attention:

The pins on the base of the microprocessor bend easily. Once bent, the pins will not easily fit into another socket.





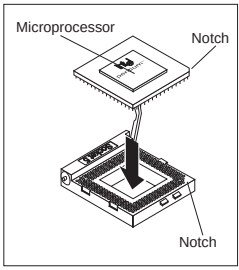
10. Store the old microprocessor in a static-protective package. Make a note of the microprocessor type for future reference. Store the old heat sink and heat sink clip in a safe place.

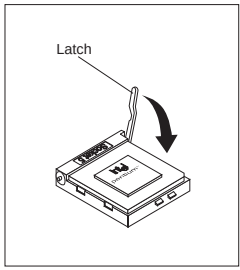
11. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.

12. Install the new microprocessor:

> **Note**
>
> To install the new microprocessor, follow the instructions given here, plus the instructions that come with the new microprocessor. You might have to coat the microprocessor with a conductive lubricant or change the heat sink. Refer to your upgrade kit for further details.

a. Locate the notch (beveled corner) on the microprocessor.
b. Align the notch of the microprocessor with the notch on the socket.



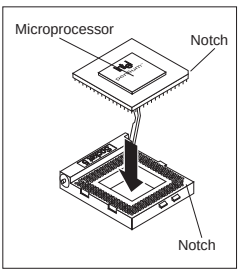


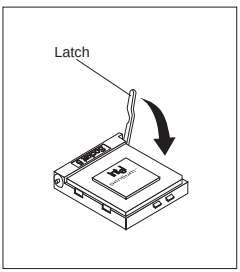
c. Center the microprocessor over the socket.
d. Carefully insert the microprocessor into the socket. Ensure that the pins on the microprocessor align with the holes in the socket.

Attention:

Do not force the pins into the socket. If you feel any resistance, remove the microprocessor and check the orientation and alignment.

e. Move the latch downward until the microprocessor is completely locked into the socket. Make sure that the latch is in the fully closed position.



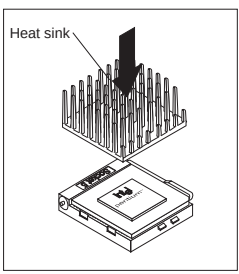


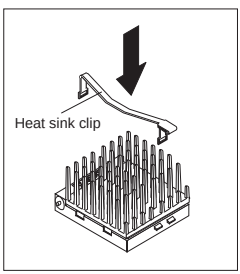
13. Reinstall the heat sink and heat-sink clip:

Note

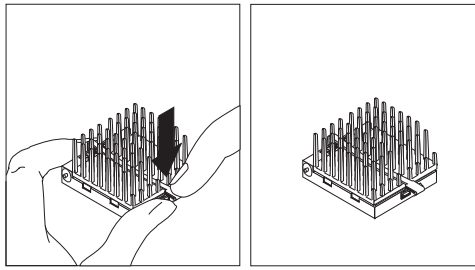
To install the heat sink and heat-sink clip, follow the instructions given here, plus the instructions that come with the new microprocessor. You might have to coat the microprocessor with a conductive lubricant or change the heat sink.

a. Position the heat-sink clip over the flange, as shown.

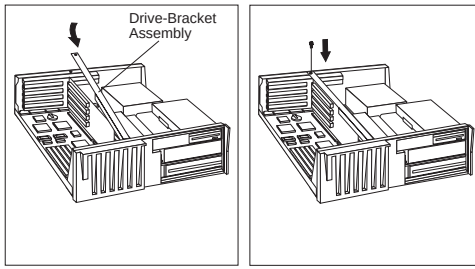




b. Clip one end of the heat-sink clip over the flange. Then, place the clip over the top of the heat sink and press down until it is secure on both sides of the socket.



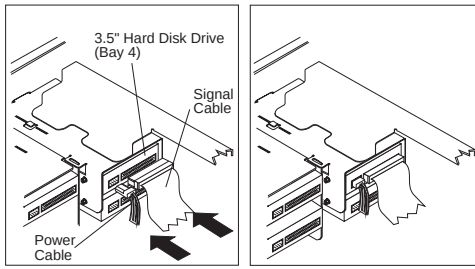
14. Reinstall the drive-bracket assembly.



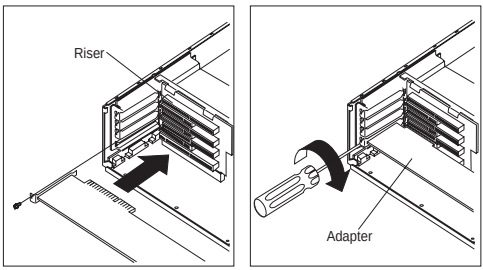
15. Reconnect the signal and power cables to the drives. As an example, the following illustration shows how to connect the cables to the drive in bay 4.

Note

Cable connectors are keyed and connect only one way.



16. Reinstall any previously removed adapters into the same slots from which they were removed.



POST Beep Codes

The Power On Self-Test generates a beeping sound to indicate successful completion of POST or to indicate that the tests detect an error.

One beep and the appearance of text on the display indicates successful completion of the POST. More than one beep indicates that the POST detects an error.

Power-on Password (Models 0D0, 0DT, 0XT, 0Z0, 0ZT, MDT, MXT, MZT)

To service Type 8639 computers with an active and unknown power-on password, power-off the computer and do the following:

Note

This procedure will not remove the Administrator Password.

1. Unplug the power cord and remove the top cover.
2. Refer to "System Board (FRUs 60H7198 and 11H5545)" on page 66 for the jumper location.
3. Move the password jumper to connect the center pin and the pin on the opposite end of the connector.
4. Power-on the computer. The system senses the change in the position and erases the password.
   - It is not necessary to move the jumper back to the previous position.
5. Remind the user to enter a new password when service is complete.

Power-on Password (Models 0E0, 0E4, 0E5, 0EV)

To service Type 8639 computers with an active and unknown power-on password, power-off the computer and do the following:

Note

This procedure will not remove the Administrator Password.

1. Unplug the power cord and remove the top cover.
2. Refer to “System Board (FRU 93H1758)” on page 69 for the jumper location.
3. Move the Reset CMOS jumper to connect the center pin and the pin on the opposite end of the connector.
4. Wait for 1 minute.
5. Moved the Reset CMOS jumper back to it's original position.
6. Power-on the computer.

Note

The date, time, and any non-default options must be reset.

Power-On Self-Test (POST)

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:

- 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 your operating system or application program appears.

If the POST detects a problem, an error message appears on your 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.

Power Supply

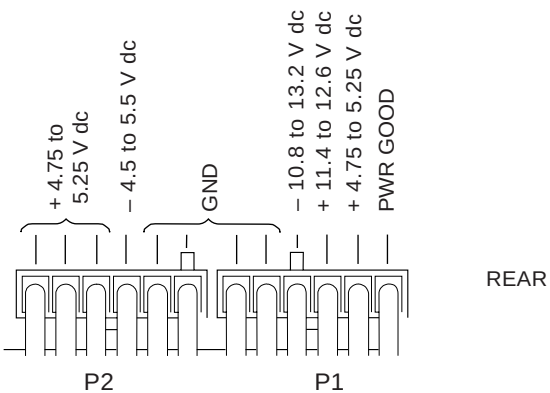
If the power-on indicator is not on, the power-supply fan is not running, or the computer will not power-off, do the following.

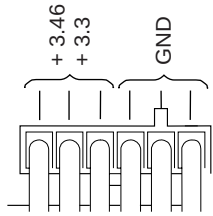
Check/Verify	FRU/Action
1. Verify that the voltage-selector switch is set for the correct voltage.	**Correct the voltage-selector switch setting.**
2. Check the following for proper installation. • Power Cord • On/Off Switch connector • On/Off Switch Power Supply connector • System Board Power Supply connectors	**Reseat**
3. Check the power cord for proper continuity.	**Power Cord**
4. Check the power-on switch for continuity.	**Power-on Switch**

If these are correct, check the following voltages.

System Board Connections

Note: These voltages must be checked with the power supply cables connected to the system board.





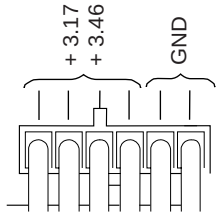
P11

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

If the voltages are correct, and the computer you are servicing has a power supply connector on the riser card, check the following riser card voltages.

Riser Card Connections

Note: These voltages must be checked with the power supply cable connected to the riser card.



P10

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

Processor Upgrades and FRUs

If you are installing an Intel Pentium Pro Processor in an IBM PC Server, the system BIOS must be at the latest level. Check the latest BIOS level for the system on the IBM PC Server World Wide Web page at: http://www.pc.ibm.com/servers/

If the system BIOS level is the same as the BIOS level available on the Web, you do not have to update the system BIOS.

If the system BIOS level is at a lower level (lower numeric value) than the BIOS level available on the Web, you must download the later level and update the BIOS.

1. Download the latest system BIOS from either of the following:
   - IBM PC Server World Wide Web page at http://wwww.pc.ibm.com/servers/

- IBM PC Company Bulletin Web page at http://wwww.pc.ibm.com/servers/

2. Copy the system BIOS update to a diskette.
3. Shut down the server.
4. Restart the system with the system BIOS update diskette in the diskette drive.
5. Follow the on-screen prompts to update the system BIOS.

For additional BIOS information see “BIOS Levels” on page 19.

Processor Replacement

Looking from the front of the computer, install all processors with the beveled corner located at the right-front corner of the processor socket.

Important

If the processor is not installed correctly, the system board and the processor can be damaged.

Return Codes

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. To register the test properly in the test log, the test programs must generate one of the following return codes:

Return Code	Description
0	Indicates the device passed its test.
1	Indicated the device failed its test.
2 or greater	Indicates the test stopped or was aborted.

SCSISelect Utility Program

The SCSI adapter comes with a menu-driven configuration utility program, called SCSISelect, that allows you to view and change SCSI settings.

You can use the SCSISelect Utility program to:

- Change the default values
- Verify and change configuration conflicts
- Format a new SCSI hard disk

Note

For detailed information about the SCSISelect Utility program, refer to the publications provided in the &ulc. package that comes with your server.

Starting the SCSISelect Utility Program:

You can access this program when you start the server. The SCSISelect prompt appears after the IBM PC Server screen appears briefly and then disappears. Press **Ctrl**+**A** immediately after the SCSISelect prompt appears. Use the Up Arrow (↑) or Down Arrow (↓) key to move the highlight bar to the various menu choices. Press **Esc** to return to the previous menu. Also, you can press the F5 key to switch between color and monochrome modes (if your monitor permits). To change the settings of the displayed items, follow the directions on the screen.

SCSISelect Utility Program Options: The following options appear on the SCSISelect Utility program menu:

- Configure/View Host Adapter Settings
- SCSI Disk Utilities

Configure/View Host Adapter Settings: To view or change the SCSI controller settings, select **Configure/View Host Adapter Settings** and follow the directions on the screen. This menu has the following selections:

- Host Adapter SCSI ID

  Select this choice to change the SCSI ID of the SCSI controller from its default value of 7.
- SCSI Parity Checking

  Select this choice to enable or disable SCSI adapter parity checking. The default value is *Enabled*.
- Host Adapter SCSI Termination

  Select this choice to configure SCSI controller termination. The default value is *Enabled*.
- SCSI Device Configuration

  Select this choice to configure SCSI device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.
- Advanced Configuration Options

  Select this choice to view or change the settings for advanced configuration options. These options include enabling support for large hard disk drives and support for multiple drives with DOS 5.0 and higher.

SCSI Disk Utilities: To see the IDs that are assigned to each SCSI device or to format a SCSI device, select **SCSI Disk Utilities** from the SCSISelect Utility program menu.

To use the utility program, select a drive from the list. Read the screens carefully before making a selection.

Using the Low-Level Format Program: You can format hard disk drives using the *Low-Level Format* feature of the SCSISelect Utility program.

Depending on the hard disk capacity, the Low-Level Format program could take up to two hours.

When To Use the Low-Level Format Program:

Use the Low-Level Format program:

- When installing software that requires a low-level format
- When recurring messages from the diagnostic tests directing you to run the Low-Level Format program on the hard disk
- As a last resort before replacing a failing hard disk drive

Note

For information about backing files, see the operating-system documentation.

Starting the Low-Level Format Program

Attention:

The Low-Level Format program erases *all* data and programs.

1. If the hard disk is working, make a backup copy of all the files and programs on the hard disk.
2. Select **Format disk** from the SCSISelect Disk Utilities menu; then, follow the instructions on the screen.

   Note

   Hard disks normally contain more tracks than their stated capacity (to allow for defective tracks). A message appears on the screen if the defect limit is reached. If this happens, replace the drive.

3. For information about installing an operating system after the hard disk drive is formatted, refer to the information supplied with the operating system.

Setup Program

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

- Devices and I/O Ports
- Date and Time
- Security
- Start Options
- Advanced Setup
- ISA Legacy Resources

- Rapid Resume Manager

> **Note**
>
> Rapid Resume Manager is not support on models 0E0, 0E4, 0E5, and 0EV.

To run the Setup Utility program, do the following:

1. Power-off the computer and wail 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 appears.
4. Follow the instructions on the screen.

Rapid Resume Manager Personal computers come with built-in energy-saving capabilities. If the computer you are servicing was shipped with DOS and Windows preinstalled, Rapid Resume Manager is available. Rapid Resume Manager reduces the power consumption of the computer. The following are features of Rapid Resume Manager:

- Rapid Resume
- Standby
- Scheduler
- Wake Up on Ring

Rapid Resume: With Rapid Resume activated, the computer saves its current state when you power it off with the power switch. Rapid Resume retains all current settings, remembers which programs were active, and saves the position and size of windows and other objects on the screen. When the computer is restarted (with the power-on switch, the Scheduler, or Wake-Up on Ring), it quickly returns to full-power operation in exactly the same state. The programs that were being used will reappear in the state they were in when you suspended operation of the computer.

Running Rapid Resume Manager: To select and activate, deactivate, or change Rapid Resume Manager do the following.

1. From the Windows Program Manager, select **IBM Management Plus**.
2. Select **Rapid Resume Manager**.
3. View or change settings.
4. Follow the instructions on the screen.

Standby: When the Standby feature is enabled, it initiates reduced power modes for the display, microprocessor, and hard disk drive after a specified period of inactivity. The default setting for automatically initiating standby is 20 minutes. The display is blanked

and the hard disk drive "spins down' (enters a reduced-power state). Any use of the keyboard, mouse, or hard disk drive causes the computer to exit standby and return to full-power operation. For example, if 40 minutes is selected as the specified period, the computer goes into standby state if the mouse, keyboard, or microprocessor is not active for more than 40 minutes.

To select and activate, deactivate, or change the Standby feature, see “Running Rapid Resume Manager” on page 39.

Scheduler: Use the Scheduler to set a time for the computer to do the following:

- Start a program
- Display a message
- Power-off the computer

If the computer will not already be power-on when it is time to start a program or display a message, a setting can be selected to power-on the computer at the appropriate time.

To select and activate, deactivate, or change the Scheduler feature, see “Running Rapid Resume Manager” on page 39.

Wake Up on Ring: You can select settings so that, if the modems receives a call the computer is in the suspend state, the computer "wakes up" on the first ring; that is, it returns to full-power.

To select the Wake Up on Ring settings, feature, see “Running Rapid Resume Manager” on page 39.

Formatting Diskettes: To format a diskette within the Diagnostic programs, select one of the following options:

Format A: high density — 1.44MB

Format A: low density — 720KB

Format B: high density — 1.44MB

Format B: low density — 720KB

After selecting a diskette format option, follow the instructions that appear on the screen.

Hard Disk Drive Boot Error: A hard disk drive boot error (error codes 1996 and I999030X) can be caused by the following:

Cause	Actions
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.	In stall an operating system on the boot drive.

Cause	Actions
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 41.
The drive is defective.	Replace the hard disk drive.

When To Use the Low-Level Format Program

Note

Before formatting the hard disk drive, make a back-up copy of the files on the drive to be formatted.

Use the Low-Level Format program:

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

You are now ready to restore the files.

File Editor: The File Editor is an ASCII text editor that uses simple function key commands.

To access the File Editor:

1. Select **File Editor** from the ***Utility Menu***; then press **Enter**.

2. Insert a diskette into Drive A or Drive B before selecting the file you want to edit, then select the file you want to edit from the Files selection box.
3. Make your changes. The arrow keys move the cursor, and the function keys perform search and block editing functions. (See "File Edit Function Key Usage.")
4. When you are done, press **F10** to update the file with the changes you made, or press **Esc** to quit the editing process without saving the changes.

File Edit Function Key Usage The following information describes the function of the function keys and keyboard keys when you are using the File Editor.

Key	Description
Arrows	Move the cursor to the place in the text where you want to make changes.
Home	Press **Home** once, to move the cursor to the start of the current line. Press **Home** twice, to move to the beginning of the file. Press **Home** three times, to move to the beginning of the file.
End	Press **End** once, to move the cursor to the end of the current line. Press **End** twice, to move the cursor to the end of the current screen. Press **End** three times, to move the end of the file.
F2	Press **F2** to be in search mode, You are prompted to enter the search word or words on a reverse highlighted line at the bottom of the File Edit Screen. After typing in the search word, press **Enter.**
F3	Press **F3** to find the next occurrence of a search word.
F4	Press **F4** to mark the start of a block of text (if you have not previously marked it). If you previously marked the block of text, pressing this key unmarks the text block.

Key	Description
F5	Press **F5** to complete the block marking (started with F4). If you did not previously press **F4** to start marking a block of text, **F5** is ignored.
F6	Press **F6** while the cursor is within the active block to move an active (marked) block of text. Move the cursor to the new location where the active block is to be moved, then press **F6** again. If there is no active block of text, **F6** is ignored.
F7	To copy an active (marked) block of text to a new location, move the cursor to the new location and then press **F7**. If there is no active block of text **F7** is ignored.
F8	To delete an active (marked) block of text, move the cursor within the active block and press **F8.** If there is no active block of text, **F8** is ignored.
F10	Press **F10**, to save all changes and exit the file.

Notes

- Always make a backup copy on a self-starting diskette of the AUTOEXEC.BAT and CONFIG.SYS files *before* making any changes.
- The default text editing mode of the File Editor is the insert mode. To toggle between overtype and insert modes, press Insert.

Diagnostics Control Keys: The following is a list of the Diagnostics Control Keys, when used and a description of the Diagnostics response.

Control Keys	When Used	Diagnostics Response
Ctrl+A	Main Menu	Allows you to select test from the sub menus that are highlighted with red letters. **Attention: If selected, these test will erase the information stored on the diskette or hard disk drive.**
Up and Down Arrow Keys	Main Menu Module Test Menu Test Group Menu	Highlights an item you want to select.
Space Bar	Module Test Menu Test Group Menu	Adds a diamond to the left of the highlighted test. The test will run when **Run All Selected** is highlighted and the Enter key is pressed. Also removes the diamond to the left of the item. The test will not run when **Run All Selected** is highlighted and the Enter key is pressed.
Tab Key	Main Menu Module Test Menu	Selects the additional test for the menu you are in.
+/– Keys	Test Group Menu	Selects additional test. The LUN displayed on the top right Test Group Menu shows which test is selected and how and remain (example LUN 1 of 2).

System Board Memory (FRUs 60H7198, 88G4270, 11H5545):

The following matrix cross-references the name of the computer (printed on the logo) and the size, speed, and type of memory modules supported in the computer.

Computer Name	Memory Module		
	Size	Speed	Type
Type 8639 SIMMs must be installed in matched pairs.	4MB 8MB 16MB 32MB	70ns	Parity

System Board Memory (FRU 93H1758):

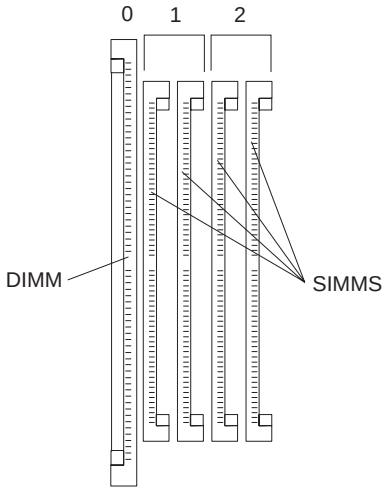
These are the recommended combinations of memory-module kits. Each bank must contain a matched pair of SIMMs having the same size and speed. The maximum (SIMMs/DIMMs) memory supported is 192 MB.

DIMM (0) and SIMMs (1 and 2) in the following figure correspond to the memory banks (0, 1, and 2).

Bank 0 holds DIMM memory modules. Bank 1 and Bank 2 hold matched-pair SIMM memory modules. The banks are filled according to the following memory tables. When installing SIMM memory, a matched-pair is first installed into Bank 1, and then into Bank 2.

Notes:

1. Industry standard 72-pin tin-lead SIMMs and 168-pin gold-lead DIMMs are supported.
2. Install only parity SIMMs/DIMMs to enable parity.
3. A mix of parity and non-parity SIMMs/DIMMs will configure as non-parity.



Important

Only memory modules with a maximum height of no more than 3.05 cm (1.2 inches) can be installed on this system board.

The following table shows the SIMMs and DIMMs that are supported.

Type	Speed	Access Mode	Parity	Sizes Supported
SIMM	60 ns	EDO	N	4, 8, 16, 32 MB
SIMM	60 ns	FP	Y	8, 16, 32 MB
SIMM	70 ns	FP	N	4, 8, 16, 32 MB
SIMM	70 ns	FP	Y	4, 8 MB
DIMM	60 ns	EDO	N	8, 16, 32 MB
DIMM	60 ns	FP	Y	16, 32 MB

Specifications

Size

- With pedestal:
  - Depth: 455 mm (17.9 in.)
  - Height: 450 mm (17.7 in.)
  - Width: 260 mm (10.2 in.)
- Without pedestal:
  - Depth: 455 mm (17.9 in.)
  - Height: 420 mm (16.5 in.)
  - Width: 155 mm (6.1 in.)

Weight

- Typical configuration as shipped: 14.2 kg (31.2 lb)

Environment

- Air temperature:
  - System on: 10° to 35° C (50° to 95° F)

    Altitude: 0 to 914 m (3000 ft.)
  - System on: 10° to 32° C (50° to 90° F)

    Altitude: 914 m to 2133 m (3000 ft. to 7000 ft.)
  - System off: 10° to 43° C (50° to 110° F)

    Maximum Altitude: 2133 m (7000 ft.)
- Humidity:
  - System on: 8% to 80%
  - System off: 8% to 80%
- Maximum altitude: 2133 m (7000 ft)

Electrical Input

- Sine-wave input (50 to 60 Hz) is required
- Input voltage:
  - Low range:
    - Minimum: 90 V ac
    - Maximum: 137 V ac
  - High range:
    - Minimum: 180 V ac
    - Maximum: 265 V ac
  - Input kilovolt-amperes (kVA) approximately:
    - Minimum configuration as shipped: 0.08 kVA
    - Maximum configuration: 0.52 kVA

Total Power Available for Drives

- Nominal Operating Current allowed:
  - +5 V dc line: 9.3 A
  - +12 V dc line: 6.0 A

---

1 Maximum configuration weight depends on options installed. Figures above are a system fully populated with options.

2 Maximum power and heat specifications are based on the 200-watt maximum capacity of the system power supply.

3 For additional information, see the *ISO Supplier's Declaration* available from IBM.

System Board Replacement

Notes

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 shipped with the new system board FRU**. See "BIOS Levels" on page 19 "Vital Product Data" on page 57, and "Flash (BIOS/VPD) Update Procedure" on page 24.
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.
4. Install the processor from the old system board on the new system board.
5. If any of the following options are on the old system board, install them on the new system board.
   - External cache memory and cache tag RAM
   - Memory modules
   - Extended video memory
6. Ensure that the new system board jumper settings match the old system board jumper settings.
7. If the new system board does not correct the problem, reinstall the options on the old system board, reinstall the old system board, then replace the processor.

Termination

SCSI devices are cabled to each other and to the SCSI adapter. The device at each end of the interface must be terminated.

If the server has only internal SCSI devices connected to the internal connector on the SCSI adapter, the controller becomes the termination at one end of the cable.

If you use the internal connector *and* the external connector on the SCSI adapter, you must disable the termination of the adapter by using the SCSISelect utility program included with the server.

The following rules apply to SCSI-device termination:

Note

For specific information about termination, refer to the instructions supplied with the device.

- If both internal SCSI devices and external SCSI devices are connected to the adapter, the devices at the ends of the internal and external cables must be terminated. The adapter must not be terminated.
- If only one external device is attached to the adapter, that device must be terminated.
- Ensure that the end of a SCSI adapter cable is not connected to the CD-ROM drive (the CD-ROM drive has no built-in terminator).
- If the server came with a hard disk drive preinstalled, the termination for the hard disk drive is set to Enabled. When installing additional internal SCSI devices, you must disable the termination for the devices before you install them.

  Models that do not come with a preinstalled hard disk drive have a terminator attached to the last connector on the internal SCSI cable. When installing an internal SCSI device that will use the last connector on the internal SCSI cable, you must remove the terminator from the cable; set the termination for the device to Enabled; then attach the end of the SCSI cable to the device.

Test Programs

The Diagnostics test programs, developed by DiagSoft for IBM, are the primary method of testing the computer. You can use them to test the IBM components of the system and some external devices. The amount of time required to test all components depends on the number of components. The more optional adapters and devices you have attached to your system, the longer the testing takes.

The test programs on the Diagnostic Diskette include the following features:

Feature	Description
Advanced Diagnostic Tests	Identifies most problems associated with the following major components: • System board • Hard disk drives • Diskette drives • CD-ROM drives • RAM • Serial and parallel ports • Video adapter • Printer • Keyboard • Mouse

Feature	Description
Flexible Test Control	Allows you to: • Run groups of tests in batch • Specify parameters to use for each test (for example, video modes, disk cylinders, and port addresses) • Specify the number of passes you want to run (one to continuous) • Log the test results to a text dBase (DBF) format file • Save all test settings for future use • View System Information • View the server's configuration information. (For example, you can view the IRQ/DMA assignments, memory usage, and device drivers) • Select System Utilities • Run a low-level format also contains system utilities. • Format a diskette

Undetermined Problem

Check the power supply voltages. See “Power Supply” 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, one at a time:
   a. Non-IBM devices
   b. External devices (modem, printer, or mouse)
   c. Any adapters
   d. Riser card
   e. Memory modules
      Before removing or replacing memory modules, see “System Board Memory (FRUs 60H7198, 88G4270, 11H5545)” on page 45.
   f. Extended video memory
   g. External Cache
   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 “System Board Replacement” on page 48.

Using the Test Programs

The test programs provide advanced functions and utilities for users and service or support professionals to troubleshoot even the most difficult problems.

Program Navigation: You can maneuver within the test programs by typing the first letter of a menu choice, using the function keys, or using command-line options.

Using the First Letter of a Menu Choice

Throughout the test programs, pressing the first letter of an option on a menu is the same as moving to that item with the cursor and pressing Enter; however, this function is not enabled on Test Group Screens.

Using the Function Keys

Use the following keys to maneuver throughout the test programs:

Keys	Action
Enter	Select an item, run the test module, or run the test
Down Arrow (↓)	Moves the cursor down
Up Arrow (↑)	Moves the cursor up
F1	Calls up the appropriate Help information. Use the up arrow key (↑) or the down arrow key (↓) to scroll through the information. Pressing F1 from within a Help screen provides a help index from which you can select different categories. One of the important help categories is function key usage. Pressing Esc exits Help and returns to where you left off.
Esc	Go back to the previous menu

Additional functions are available in the Test Module Selection screen and the Test Group screen using the following keys:

Keys	Action
Tab	Move to test group (or move to parameters)
Spacebar	Toggle modules on/off (or toggle tests on/off)
F2	View test results log

Keys	Action
F10	Local menu
+	Next logical unit number (for example, LUN 1, LUN 2, and so on)
–	Previous logical unit number

Command Line Options

If installed, the following Command Line Options are available when initially starting the diagnostic program from within its directory.

Type **QAPLPRO/XXX** (where **/XXX** represents one of the following from the list below) then press Enter.

Command	Action
/B&W	The **/B&W** command line option forces the program to load in Black and White (Monochrome) mode, which is often more readable on laptop computers.
/LOG=file	The **/LOG=file** command line option directs the test programs to start using a specified Error Log file.
/INT10	The **/INT10** command line option forces the test programs to use the BIOS for screen writes.
/OXXX	The **/OXXX** command line option, where XXX=test group (for example, MBD/MEM/VID/HDU/ FDU/KBD/COM/LPT, and so on), omits the designated test group from testing.
/USRCONFIG =file	The **/USERCONFIG=file** command line option tells the test programs to look for a user diagnostic configuration file other than the default USERDIAG.CFG.
/SCRIPT =file[,R]	The **/SCRIPT=file[,R]** command line option with the ",R" runs the selected script. Please see "Scripting" on page 54 for a description of scripting. **Note:** You can use a "–" instead of a "/" as the command line switch.

Viewing the Test Groups: As you move the cursor bar up or down in the Test Module Selection window, the right hand screen changes to show the attributes, parameters, and the selected tests of the corresponding Test Group. The ◊ mark indicates a module selected for testing.

The indicated attributes are characteristics of the selected test module that are used by the test programs to determine which tests to run or how to run selected tests. Attributes are also used to limit the allowable range of parameters (for example, – ending cylinder).

Parameters are values you select to establish the scope of tests. For example, you can select Extended Memory testing parameters and limit the testing to a specific range of test blocks by specifying the starting and ending memory block. This might be appropriate if prior experience indicates that problems are likely to exist in a specific area of memory. By selecting these limiting parameters, you reduce memory testing time.

Scripting: Scripting allows you to select specific groups of tests, testing parameters, and options. Your selection is saved for later use as a test *Script*. To set up a test script, first select all the appropriate test groups and specific tests you want to run from the Module Testing section under Diagnostics. You should also select appropriate testing parameters and options. See "Program Navigation" on page 52, for instructions to save a test script.

Changing Logical Unit Numbers: In some instances, you can have more than one logical unit number (LUN) for a particular module. LUNs represent individual devices within a test group or module. For example, you might have two diskette drives or two hard disk drives; or, you might have base, extended, shadow, and cache memory installed in the computer. This configuration might result in as many as four or five different LUNs in the Memory Test Group. Or you might have base, extended, shadow, and cache memory installed in the system which might result in as many as four or five different LUNs in the Memory Test Group.

From either the Module Test Menu or the Test Group window, you can change to a different LUN (where applicable) by pressing the plus (+) key (next LUN), or the minus (–) key (previous LUN).

Test Group Specifications: In the upper-right-hand portion of the testing screen (or just the upper portion if you switched to an individual test group screen) are the specifications for the related test group.

Note: In the Hard Disk Test Group specification area, if a

software program was to compress your drive, the indicated size is the compressed size of the logical drive.

Starting the Diagnostics Diskette

1. Insert the Diagnostics diskette into drive A.
2. Power-on the computer.
3. When the Diagnostics **Main Menu** is displayed, press **Ctrl+A**. (The screen will not change.)
4. Select Diagnostics; then, press **Enter**.
5. Follow the instructions that appear on your screen. If an error is displayed, go to "Symptom-to-FRU Index Supplement" on page 72.

Module Testing Mode

If the test programs do not find a problem, or you want to perform in-depth testing, the Module Testing mode provides a method to run individual tests on a single module. For example, you can run an individual test for the diskette drive, or you can run groups of tests for several modules.

In the Module Testing mode, you can define how many times each test should run and how the test program should log the errors.

To start the Module Testing mode:

1. Start the Diagnostics diskette. See "Starting the Diagnostics Diskette."
2. Select **Diagnostic** from the Main Menu.
3. Select **Module Tests** from the next menu.
4. Use the up and down arrow keys (↑ and ↓) to move the highlight bar from one selection to the next.
5. Follow the instructions on the screen.

Note: As you scroll down the selection menu, the Test Group window to the right changes to correspond to the highlighted Module.

Running Selected Module Tests

To run all selected tests for a test group:

1. Use the up and down arrow keys (↑ and ↓) to move the cursor to your selection.
2. Press **Enter**.

Note: A ◊ appears next to your selection.

Running All Selected Modules

To run all selected test modules:

1. Use the down arrow key (↓) to move the cursor to the last choice, **Run All Selected Modules**.
2. Press **Enter**.

Note: A ◊ appears next to your selection.

Changing Selected Tests in Test Groups

To change selected tests in a Test Group:

1. In the Module Tests Menu, use the up and down arrow keys (↑ and ↓) to move the cursor to your selection.
2. Press **Tab** to move into the expanded Test Group window.
3. Scroll to the test you want to select or deselect.

   Attention

   Items indicated by a directly adjacent "*" (**red** text on color screens) are destructive tests.

4. Press the spacebar at the highlighted test to toggle between select (indicated by a ◊) and deselect.

   Note: Pressing the first letter of a test does not activate the test, unlike menu operation.

5. Press **Enter**.

Running an Individual Test

To run an individual test:

1. Use the up and down arrow keys (↑ and ↓) to move to the highlighted bar to the test you want to run.
2. Press **Enter** to run the test.

   Note: The results of the test appear in the lower-right-hand Test Log window. Also, if you enabled Test Logging, the results are recorded in the Test Log.

3. When the test completes, press Esc to return to the Test Group Menu.

Stopping the Tests: To stop running a specific test or stop testing after you have started a test, press Esc while the test is running. The test pauses at the first possible opportunity, and the Skip/Abort Test Menu appears with the following options:

Option	Action
Continue	The test program begins testing where it left off.
Skip to next test	The test program skips the current test, but remaining tests for the selected Test Module continue.
Skip to next group	The test program skips the remaining tests in the current test group.
Abort all tests	The test program stops and returns to the previous menu.

Vital Product Data

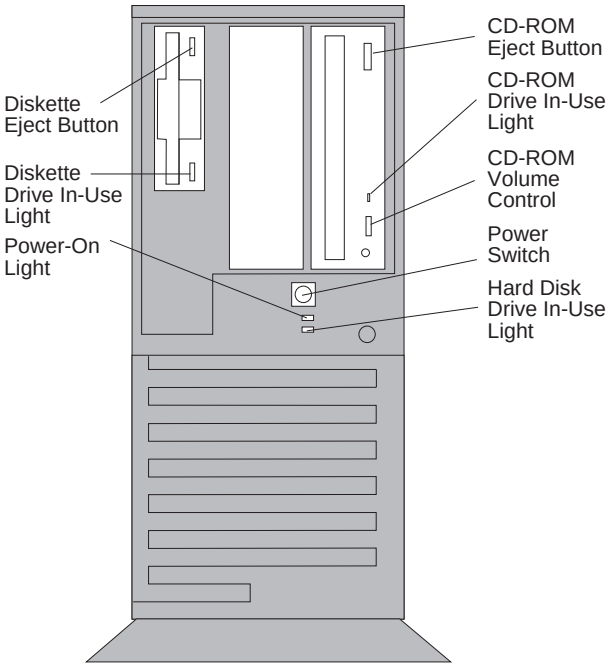
Each computer has a unique vital product data (VPD) code stored in the nonvolatile memory on the system board. After you replace the system board the VPD must be updated. To update the VDP, see “Flash (BIOS/VPD) Update Procedure” on page 24.

Locations

The following location information is for the PC Server 310 Type 8639.

Controls and Status Indicators

The most commonly used controls and status indicators are on the front of the server.



Diskette Eject Button: Push to release a diskette from the drive.

Diskette-Drive In-Use Light: Comes on when the drive is accessing a diskette.

Power-On Light: Comes on when the server is powered on.

CD-ROM Eject Button: Releases a compact disc (CD) from the CD read-only memory (CD-ROM) drive.

CD-ROM Drive In-Use Light: Comes on when the CD-ROM drive is accessed. .*

CD-ROM Volume Control: Adjusts the CD-ROM playback volume.

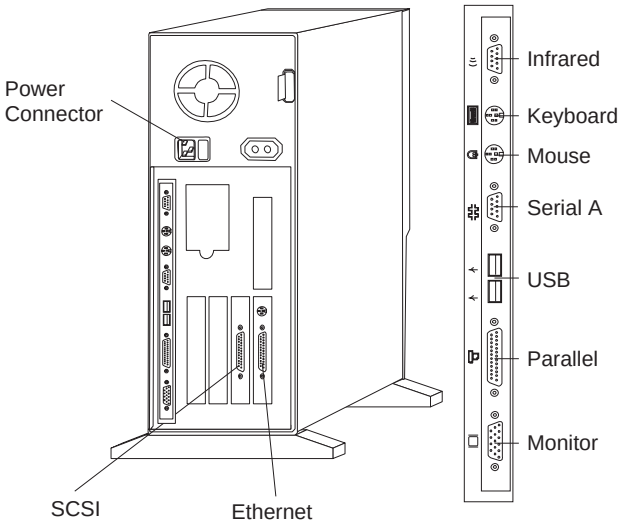
Power Switch: Powers the server on or off.

Note

Do not power-off the server if any of the drive In-Use lights are on. This might damage the information stored on a hard disk or diskette.

Hard Drive In-Use Light: Comes on when your server is accessing a small computer system interface (SCSI) device.

Input/Output Connectors



Power Connector: The server power cable connects here.

SCSI Connector: External SCSI devices attach here.

Ethernet Connectors: Ethernet connectors for 10Base-T, 10Base2, or 10Base5 media go here.

Infrared Connector: The infrared (IR) transceiver module option connects here. To use the infrared transceiver feature, a chip must be selected that supports it.

Keyboard Connector: The keyboard cable connects here.

Mouse Connector: The mouse cable connects here. (Also sometimes called the auxiliary-device port.)

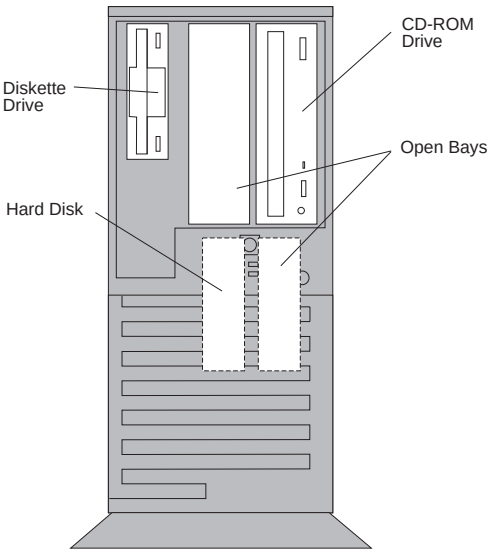
Serial Connector: The server has one 9-pin, universal asynchronous receiver/transmitter (UART) serial connector (A). Serial signal cables for modems or other serial devices connect here. To attach 25-pin signal cables, a 9-pin-to-25-pin adapter cable must be used.

Universal Serial Bus Connectors: Attach I/O devices to these two universal serial bus (USB) connectors. A 4-pin cable is required to connect devices to USB 1 or 2.

Parallel Connector: The server has one 25-pin parallel port. A signal cable for a parallel device, such as a printer, connects here.

Monitor Connector: The monitor signal cable connects here.

Expansion Bays



Open Bays: Accommodates 3.5-inch and 5.25-inch hard disk, tape, and rewritable optical-disc drives.
CD-ROM Drive: Comes with a SCSI CD-ROM drive.
Diskette Drive: The 3.5-inch, 1.44 MB diskette drive uses 1 MB (unformatted) or 2 MB (unformatted) diskettes.
Hard Disk Drive: All models come with an &scul.. The number and capacities of the hard disk drives vary by model.

Expansion Slots (Models 0D0, 0DT, 0XT, 0Z0, 0ZT, MDT, MXT, and MZT.

These models have seven expansion slots, two of which are PCI expansion slots. The other five expansion slots are either Micro Channel or ISA, depending on model.

The PCI slots and their adjacent Micro Channel or ISA expansion slots are *shared expansion slots*. This means that an adapter can be installed in either the PCI expansion slot or the adjacent Micro Channel or ISA expansion slot, but not in both.

A SCSI-2 Fast/Wide PCI Adapter is installed in one of the PCI expansion slots. An Ethernet adapter is installed in one of the Micro Channel or ISA slots.

This leaves one PCI slot and three Micro Channel or ISA slots available for future expansion. For example, you can add adapters to provide communications, specialized graphics, and sound.

Expansion Slots (Models 0E0, 0E4, 0E5, 0EV)

These models have eight expansion slots, three of which are PCI expansion slots. The other five expansion slots are either Micro Channel or ISA, depending on model.

The PCI slots and their adjacent ISA expansion slots are *shared expansion slots*. This means that an adapter can be installed in either the PCI expansion slot or the adjacent ISA expansion slot, but not in both.

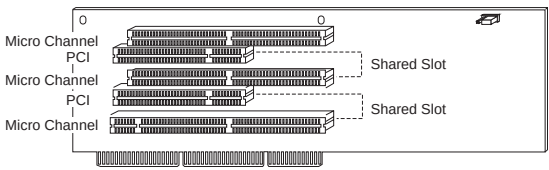
A Ultra/Ultra Wide SCSI PCI adapter is installed in one of the PCI expansion slots. An Ethernet adapter maybe installed in one of the ISA slots.

This leaves one PCI slot and four ISA slots available for future expansion. For example, you can add adapters to provide communications, specialized graphics, and sound.

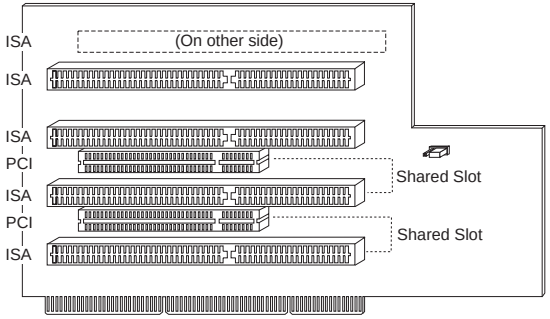
Riser Cards

There are three types of riser cards, PCI/Micro Channel (FRU 06H4023), PCI/ISA (FRU 06H4008), PCI/ISA (FRU 06H9899). PCI/Micro Channel Riser card (FRU 06H4023) and PCI/ISA Riser card (FRU 06H4008) are supported on models 0D0, 0DT, 0XT, 0Z0, 0ZT, MDT, MXT, and MZT. PCI/ISA Riser card (FRU 06H9899) is supported on models 0E0, 0E4, 0E5, and 0EV.

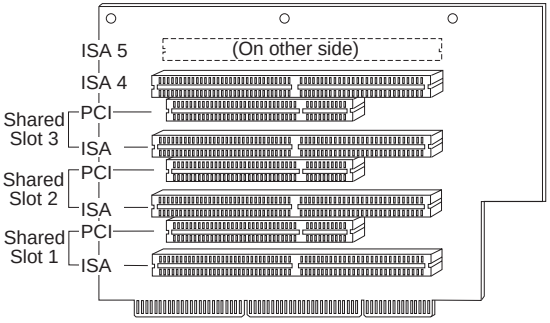
PCI/Micro Channel (FRU 06H4023): The following illustration shows the location and numbering of the PCI and Micro Channel expansion slots. Note the location of the shared expansion slots.



PCI/ISA (FRU 06H4008): The following illustration shows the location and numbering of the PCI and ISA expansion slots. Note the location of the shared expansion slots.



PCI/ISA (FRU 06H9899): The following illustration shows the location and numbering of the PCI and ISA expansion slots. Note the location of the shared expansion slots.



Riser Card (ISA) Administrator Password (FRU 06H4008 Only):

ISA Riser cards have an administrator password jumper located to the left of the battery.

Note: This jumper **will not** remove the password.

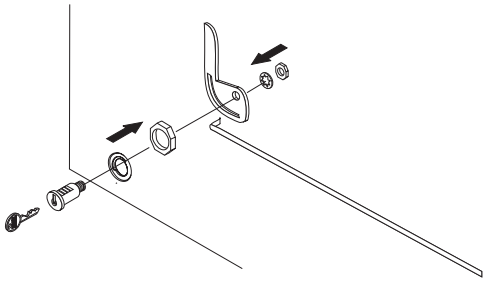
The setting of this jumper determines if an Administrator Password can or cannot be set on the computer.

Important

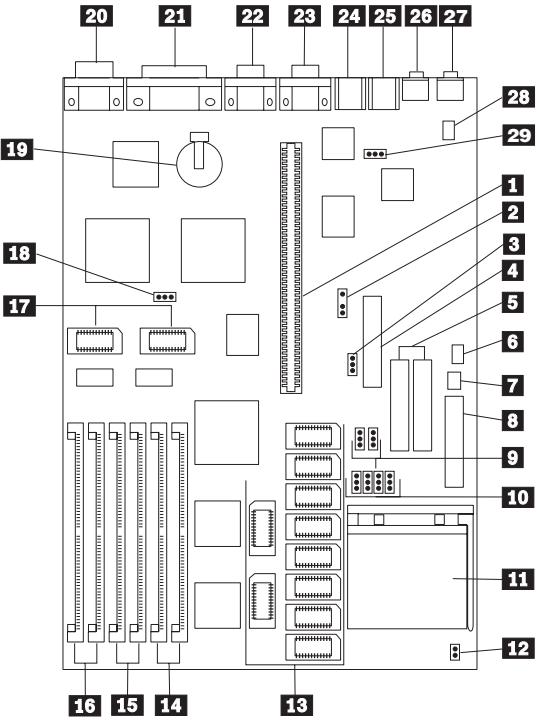
If the Administrator Password is lost or forgotten, the password cannot be changed or removed. If this occurs, the system board must be replaced.

Jumper Position	Results
1-2 (pins closest to the battery)	Administrator Password **can** be set
2-3 (pins farthest from the battery)	Administrator password **cannot** be set

Keylock Assembly Exploded View



System Board (FRUs 60H7198 and 11H5545)



System Board (Continued)

1		Riser connector
2	MRD	Modem Ring Detect jumper
3	WP	Diskette drive write protect jumper
4		Diskette drive connector
5		Hard disk drive connectors
6	J38	On/Off Switch Power Supply Connector
7	J37	On/Off Switch Connector
8		Power supply connectors
9	J26, J27	Bus/CPU Speed (MHz)
10		256KB/1MB Cache jumpers
11		Processor connector
12	J101	Bus/Core Ratio
13		Cache connectors
14		Memory connectors (Bank 2)
15		Memory connectors (Bank 1)
16		Memory connectors (Bank 3)
17		Video memory modules
18	PWD	Power-on password jumper
19		Battery
20		Display connector
21		Parallel connector
22		Serial connector
23		Serial connector
24		Keyboard connector
25		Mouse connector
26		Audio (input jack)
27		Audio (output jack)
28		IDE CD-ROM Audio connector
29	J28	Mouse jumper

Jumper Settings

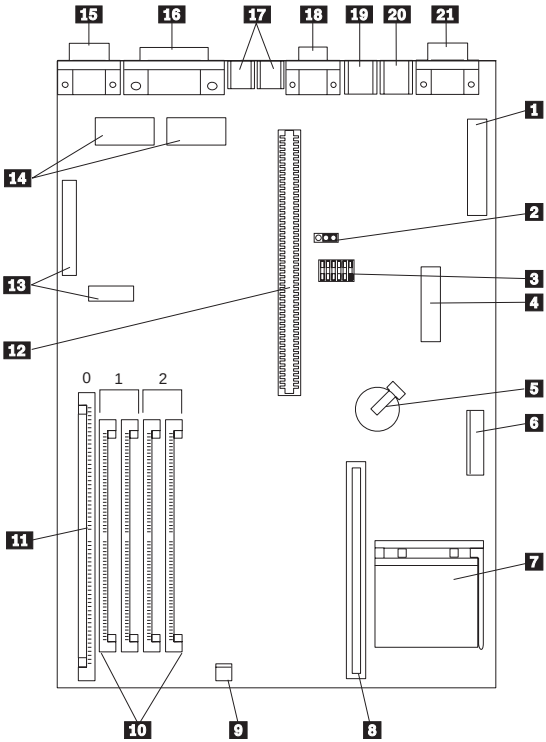
The following tables contain the jumper setting information. (D) indicates the default setting.

Jumper	Setting	Description
MRD	2-3 (D) 1-2	Modem answer on ring. Modem no answer on ring.
WP	2-3 (D) 1-2	Enable writing to a diskette Disable writing to a diskette.
Cache	1-2 (D) 2-3	256KB Cache 1MB Cache
J101	1-2 (D) 2-3	2/3 Bus/Core Ratio 1/2 Bus/Core Ratio
PWD	1-2 (D) 2-3	Password enabled. Password reset.

Bus/CPU Speed MHz Settings: The following table contains the Bus/CPU Speed Settings

Jumper	50/75	60/90 60/120	66/100 66/133
J26 J27	2-3 2-3	2-3 1-2	1-2 1-2

System Board (FRU 93H1758)



System Board (Continued)

1	Power connector (5 V)
2	Password jumper (CMOS clear)
3	Configuration switch set
4	Diskette connector
5	Battery
6	Power connector (3.3 V)
7	Processor socket
8	Cache memory module connector
9	Power LED connector
10	SIMM connectors (Bank 1/2)
11	DIMM connector (Bank 0)
12	Riser connector
13	VESA passthrough connectors
14	Video upgrade sockets
15	Video port
16	ECP/EPP parallel port
17	USB ports (1, 2)
18	Serial (A) port
19	Mouse port
20	Keyboard port
21	Infrared port

Jumper Settings

The following tables contain the switch and jumper setting information. (D) indicates the default setting.

Processor Speed Switch Settings (SW1 1-4)

Speed	SW1-1	SW1-2	SW1-3	SW1-4
75 MHz	Off	Off	On	On
90 MHz	Off	Off	On	Off
100 MHz	Off	Off	Off	On
120 MHz	On	Off	On	Off
133 MHz	On	Off	Off	On
150 MHz	On	On	On	Off
166 MHz	On	On	Off	On
200 MHz	Off	On	Off	On

Additional Switch Settings (SW1 5-6)

Description	SW1-5	SW1-6
Normal Diskette Operation	N/A	Off (D)
Read-Only Diskette Operation	N/A	On

Password Jumper Settings

Jumper	Setting	Description
J15	1-2 2-3 (D)	Password Clear Password Enabled

Symptom-to-FRU Index Supplement

The Symptom-to-FRU Index lists error symptoms and possible causes. The most likely cause is listed first. Always begin with "General Checkout (Models 0XT, 0Z0, 0ZT, 0D0, 0DT 0E0, 0E4, 0E5, 0EV)" on page 6. 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 Problem" on page 51.

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, but did receive a POST error message, diagnose the POST error message.
- 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 "Power Supply" on page 34.)

Important

1. Some errors are indicated with a series of beep codes. (See "Beep Symptoms" on page 73.)
2. The processor is a separate FRU from the system board; the processor is not included with the system board FRU. (See "System Board Replacement" on page 48.)

Beep Symptoms

Beeps 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 beeps
4	Four continuous beeps

Beep Symptom	FRU/Action
1-3 Video controller error	1. **Video Adapter** 2. System Board
1-1-3 CMOS read/write error	1. **Run Setup** 2. System Board
1-1-4 ROM BIOS checksum error	1. **System Board**
1-2-1 Programmable Interval Timer error	1. **System Board**
1-2-2 DMA initialization error	1. **System Board**
1-2-3 DMA page register read/write error	1. **System Board**
1-2-3 RAM refresh verification error	1. **System Board**
1-2-X DMA error	1. **System Board**
1-3-1 First 64KB RAM error	1. **Memory Module** 2. System Board
1-3-1 First 64KB RAM parity error	1. **Memory Module** 2. System Board
1-3-X	1. **Memory Module** 2. System Board
1-4-4	1. **Keyboard** 2. System Board
1-4-X Error detected in first 64KB of RAM.	1. **Memory Module** 2. System Board
2-1-1 Slave DMA register error	1. **Run Setup** 2. System Board
2-1-2 Master DMA register error	1. **Run Setup** 2. System Board

Beep Symptom	FRU/Action
2-1-3 Master interrupt mask register error	1. **Run Setup** 2. System Board
2-1-4 Slave interrupt mask register error	1. **Run Setup** 2. System Board
2-2-2 (Models 0D0, 0DT, 0XT, 0Z0, 0ZT, MDT, MXT, MZT)	1. **Video Card** 2. System Board
2-2-2 (Modesl 0E0, 0E4, 0E5, 0EV) Keyboard controller error	1. **System Board**
2-2-X First 64KB of RAM failed.	1. **Memory Module** 2. System Board
2-3-2 Screen memory test in process or error	1. **Memory Module** 2. System Board
2-3-3 Screen retrace test in process or error	1. **Memory Module** 2. System Board
2-3-4 Search for video ROM error	1. **Memory Module** 2. System Board
2-3-X	1. **Memory Module** 2. System Board
2-4-1 Screen believed to be inoperable error	1. **Run Setup** 2. Memory Module 3. System Board
2-4-X	1. **Run Setup** 2. Memory Module 3. System Board
3-1-1 Timmer tick interrupt error	1. **System Board**
3-1-2 Interval timer channel 2 error	1. **System Board**
3-1-4 Time-of-day clock error	1. **System Board**
3-1-X DMA register failed.	1. **System Board**
3-2-4 (Models 0D0, 0DT, 0XT, 0Z0, 0ZT, MDT, MXT, MZT) Keyboard controller failed.	1. **System Board** 2. Keyboard
3-2-4 (Models 0E0, 0E4, 0E5, 0EV) CMOS memory size against actual compare error	1. **Memory** 2. System Board
3-3-1 Memory size mismatch error	1. **Memory** 2. System Board

Beep Symptom	FRU/Action
3-3-4 Screen initialization failed.	1. **Video Adapter** 2. System Board 3. Display
3-4-1 Screen retrace test detected an error.	1. **Video Adapter** 2. System Board 3. Display
3-4-2 POST is searching for video ROM.	1. **Video Adapter** 2. System Board
4	1. **Video Adapter** 2. System Board
All other beep code sequences.	1. **System Board**
One long and one short beep during POST. Base 640KB 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. **Display Adapter, if installed.** 2. System Board
Three short beeps during POST.	1. **See "System Board Memory (FRUs 60H7198, 88G4270, 11H5545)" on page 45.** 2. System Board
Continuous beep.	1. **System Board**
Repeating short beeps.	1. **Keyboard stuck key?** 2. Keyboard Cable 3. System Board

No Beep Symptoms

Symptom/Error	FRU/Action
No beep during POST but computer works correctly.	1. **System Board**
No beep during POST.	1. **See "Undetermined Problem" on page 51.** 2. System Board 3. Memory Module 4. Any Adapter or Device 5. Riser Card 6. Power Cord 7. Power Supply

Numeric Error Codes

In the following index, “X” can represent any number.

Error Code	FRU/Action
000 SCSI Adapter not enabled.	1. **Be sure 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 Interrupt failure.	1. **System Board**
102 Timer error.	1. **System Board**
103, 104, 105, 106, 107, 108, 109	1. **System Board**
110 System board parity error.	1. **Memory Module** 2. System Board
111 I/O channel parity error.	1. **Reseat adapters** 2. Any Adapter 3. System Board
114 External ROM checksum error.	1. **Memory Module** 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. Clock Battery (See “Battery Notice” on page 115) 3. System Board
162 And unable to run diagnostics.	1. **Diskette Drive** 2. System Board 3. Diskette Drive Cable
162	1. **Run Setup** 2. Clock Battery (See “Battery Notice” on page 115) 3. System Board

Error Code	FRU/Action
163 Clock not updating or invalid time set.	1. **Time and Date Set?** 2. Clock Battery (See “Battery Notice” on page 115) 3. System Board
164 POST detected a base memory or extended memory size mismatch error.	1. **Run Setup. Check System Summary menu for memory size change. (See “Setup Program” on page 38.)** 2. Run the Extended Memory Diagnostic tests.
17X, 18X	1. **C2 Security**
175	1. **Riser Card** 2. System Board
176	1. **Covers were removed from the computer.**
177 Corrupted Administrator Password.	1. **Riser Card** 2. System Board
178	1. **Riser Card** 2. System Board
183	1. **Enter the administrator password**
184 Password removed due to check-sum error.	1. **Enter new password**
185 Corrupted boot sequence.	1. **Set configuration and reinstall the boot sequence.**
186	1. **Riser Card** 2. System Board
189	1. **More than three password attempts were made to access the computer.**
1XX Not listed above.	1. **System Board**
201 Memory data error.	1. **Memory Module** 2. System Board
225	1. **Unsupported Memory**
229 External cache test error.	1. **L2 Cache Memory** 2. System Board

Error Code	FRU/Action
262 POST detected a base memory or extended memory type error.	1. **Run Setup. Check System Summary menu for memory type change. (See "Setup Program" on page 38.)** 2. Run the Extended Memory Diagnostic tests.
301, 302	1. **Keyboard** 2. Keyboard Cable 3. System Board
303 With an 8603 error.	1. **Mouse** 2. Keyboard 3. Keyboard Cable 4. System Board
304, 305	1. **Keyboard** 2. Keyboard Cable 3. System Board
3XX Not listed above.	1. **Keyboard** 2. Keyboard Cable 3. System Board
5XX	1. **Display Adapter** (if installed) 2. System Board
601, 602	1. **Diskette Drive A** 2. Diskette Drive Cable 3. System Board
604 And unable to run diagnostics.	1. **Diskette Drive A** 2. Diskette Drive Cable 3. System Board
604 And able to run diagnostics.	1. **Diskette Drive B** 2. Diskette Drive Cable 3. 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 Set 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. Math Coprocessor 3. System Board
7XX Not listed above.	1. **Math Coprocessor** 2. System Board

Error Code	FRU/Action
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 Advanced 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 Advanced Diagnostics**
1103 Port fails register check.	1. **Run Advanced Diagnostics** 2. System Board
1106 Serial option cannot be turned off.	1. **Run Advanced Diagnostics** 2. System Board
1107	1. **Serial Device Cable** 2. System Board
1110 Register test failed.	1. **Run Advanced Diagnostics** 2. System Board
1116 Interrupt error.	1. **Run Advanced Diagnostics**
1117 Failed baud rate test.	1. **Run Advanced 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

Error Code	FRU/Action
1202, **1206**, **1208**, **1209**, **12XX**	1. **Dual Async Adapter/A** 2. System Board 3. Any Serial Device
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 Advanced Diagnostics**
1405 Parallel adapter error.	1. **Run Advanced Diagnostics**
1406 Presence test error.	1. **Run Advanced 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 Program" on page 38.)**
1780 (Disk Drive 0) **1781** (Disk Drive 1) **1782** (Disk Drive 2) **1783** (Disk Drive 3)	1. **See "Power Supply" on page 34.** 2. Hard Disk Drive 3. System Board 4. Hard Disk Cable 5. Power Supply
1800 1801, 1802, 1803, 1804, 1805	1. **Ensure that the PCI adapters are properly installed** 2. Remove redundant PCI adapters.
1962 Boot sequence error.	1. **Possible hard disk drive problem, see "Hard Disk Drive Boot Error" on page 40.**

Error Code	FRU/Action
209X	1. **Diskette Drive** 2. Diskette Cable 3. 16-Bit AT Fast SCSI Adapter
20XX Not listed above	1. **BSC Adapter** 2. Riser Card
21XX	1. **SCSI Device** 2. 16-Bit AT Fast SCSI Adapter 3. Alternate BSC Adapter 4. Riser Card
2401, 2402 If screen colors change.	1. **Display**
2401, 2402 If screen colors are OK.	1. **System Board** 2. Display
2409	1. **Display**
2410	1. **System Board** 2. Display
2462 Video memory configuration error.	1. **Run Configuration** 2. Video Memory Modules 3. Video Adapter (if installed) 4. System Board
3015, 3040 Check for missing wrap or terminator plug on the adapter.	1. **Network Attached?** 2. LF Translator 3. Cable Problem 4. PC Network Adapter 5. Riser Card
30XX	1. **PC Network Adapter** 2. LF Translator 3. Cable Problem? 4. Riser Card
3115, 3140	1. **Network Attached?** 2. LF Translator 3. Alternate PC Network-Adapter 4. Cable Problem 5. Riser Card
31XX	1. **Alternate PC Network Adapter** 2. LF Translator 3. Cable Problem? 4. Riser Card
36XX	1. **GPIB Adapter** 2. Riser Card
38XX	1. **DAC Adapter** 2. Riser Card
4611, **4630**	1. **Multiport/2 Interface Board** 2. Multiport/2 Adapter

Error Code	FRU/Action
4612, **4613 4640**, **4641**	1. **Memory Module Package** 2. Multiport/2 Adapter
4650	1. **Multiport Interface Cable**
46XX Not listed above.	1. **Multiport/2 Adapter** 2. Multiport/2 Interface Board 3. Memory Module
5600	1. **Financial System** **2. Controller Adapter**
5962 CD-ROM configuration error.	1. **Run Configuration** 2. CD-ROM Drive 3. CD-ROM Adapter 4. 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. **Display Adapter** (if installed) 2. Riser Card
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 Assembly 3. Riser Card
8601, **8602**	1. **Pointing Device** (Mouse) 2. System Board
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 3. Riser Card
91XX	1. **Optical Drive** 2. Adapter
96XX	1. **SCSI Adapter** 2. Any SCSI Device 3. System Board

Error Code	FRU/Action
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
10450, **10451**, **10490** **10491**, **10492**, **10499** Read/write error.	1. **Run Advanced Diagnostics** 2. Riser Card 3. Hard Disk Drive 4. System Board
10452 Seek test error.	1. **Run Advanced Diagnostics**
10453 Wrong drive type?	Information only
10454 Sector buffer test error.	1. **Run Advanced Diagnostics**
10455, **10456** Controller error.	1. **Run Advanced Diagnostics**

Error Code	FRU/Action
10459 Drive diagnostic command error.	Information only
10461 Drive format error	1. **Run Advanced Diagnostics**
10462 Controller seek error.	1. **Run Advanced Diagnostics**
10464 Hard Drive read error.	1. **Run Advanced Diagnostics**
10467 Drive non fatal seek error.	1. **Run Advanced Diagnostics**
10468 Drive fatal seek error.	1. **Run Advanced Diagnostics**
10469 Drive soft error count exceeded.	1. **Run Advanced Diagnostics**
10470, **10471**, **10472** Controller wrap error.	1. **Run Advanced 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 Advanced Diagnostics**
10482 Drive select acknowledgement bad.	1. **Run Advanced 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

Error Code	FRU/Action
119XX	1. **3119 Adapter**
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 Display Adapter** 2. Adapter Video Memory
148XX	1. **Display Adapter**
14901, **14902** **1491X**, **14922**	1. **Display Adapter** 2. System Board 3. Display (any type)
14932	1. **External Display** 2. Display Adapter
16101	1. **Riser Card Battery (See "Battery Notice" on page 115)** (See "Battery Notice" on page 115)
161XX	1. **FaxConcentrator Adapter**
164XX	1. **120MB Internal Tape Drive** 2. Diskette Cable 3. System Board
16500	1. **6157 Tape Attachment Adapter**
16520, **16540**	1. **6157 Streaming Tape Drive** 2. 6157 Tape Attachment Adapter
166XX, 167XX	1. **Token Ring Adapter** 2. System Board 3. Riser Card
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

Error Code	FRU/Action
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
20005 to **20010**	1. **Image Adapter/A Image-I Adapter/A** 2. Memory Module DRAM, VRAM
200XX Not listed above.	1. **Image Adapter/A Image-I Adapter/A** 2. Memory Module DRAM, VRAM 3. 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. **210XX**X**1** 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

Error Code	FRU/Action
Tape Drive green "in use" LED fails to come on.	1. **Tape Drive** 2. SCSI Adapter or System Board 3. SCSI Cable (internal) SCSI Cable (external)
Tape automatically ejected from drive.	1. **Tape Cassette** 2. 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/breaks in drive. Verify that the tapes used meet ANSI standard X3B5.	1. **Tape Cassette**
212XX	1. **SCSI Printer** 2. Printer Cable
213XX	1. **SCSI Processor**
214XX	1. **WORM Drive**
215XXXC **215XX**XD **215XX**XE **215XX**XU If an external device, and power-on LED is off, check external voltages.	1. **CD-ROM Drive I** **CD-ROM Drive II** **Enhanced CD-ROM Drive II** **Any CD-ROM Drive** 2. SCSI Cable 3. 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 juke box.	1. **Changer**
219XX	1. **SCSI Communications Device**
24201Y0, **24210**Y0 Be sure wrap plug is attached.	1. **ISDN/2 Adapter** 2. ISDN/2 Wrap Plug 3. ISDN/2 Communications Cable
273XX	1. **1Mbps Micro Channel Infrared LAN Adapter**
27501, **27503** **27506**, **27507**	1. **ServerGuard Adapter** 2. System Board

Error Code	FRU/Action
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 missing.** 2. WMSELF.DGS diagnostics file 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
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 Adapter** 2. System Board
27880 to **27889**	1. **External FRU (Speaker, Microphone)**
I**99903**0X Hard disk reset failure.	**Possible hard disk drive problem, see "Hard Disk Drive Boot Error" on page 40.**
I**9990301**	1. **Hard Disk Drive failure, run the Hard Disk Drive diagnostics.**

Error Code	FRU/Action
I9990305	1. **No Boot Partition, run the Hard Disk Drive diagnostics.**

Error Messages

Error Message/Symptom	FRU/Action
Address Exceeds the Size of Your Memory An invalid memory address was entered. Diagnostics Tests display this message during the Locate Bad Chips option.	1. **Enter the correct address.** 2. Memory Module 3. System Board
Arithmetic Functions Failed An error was detected during the CPU Test.	1. **Microprocessor** 2. System Board
Base Memory Test Failed An error was detected in base memory.	1. **Memory Module** 2. System Board
Boot Sector Unreadable A boot sector read error was detected on the hard disk drive.	1. **Hard Disk Drive** 2. Hard Disk Drive Cable 3. Hard Disk Drive Adapter (if installed) 4. System Board
Bus Noise Test Failed RAM Test detected an error in the memory bus.	1. **Memory Module** 2. System Board
Butterfly Cylinder Access Test Failed Hard Disk Drive Test detected mismatch between the data read and the data stored on the drive.	1. **Hard Disk Drive** 2. Hard Disk Drive Cable 3. Hard Disk Drive Adapter (if installed) 4. System Board
Clock Stopped Real-time clock has stopped working.	1. **Real-Time Clock Assembly** 2. System Board
CMOS Clock Test Failed Time and Date Settings for CMOS and DOS **do not** Match.	1. **Real-Time Clock Assembly** 2. System Board
Controller Diagnostic Test Failed An error was detected while testing the Hard Disk Controller (Adapter).	1. **Hard Disk Drive Adapter** (if installed) 2. Hard Disk Drive 3. System Board
Cylinder 0 errors Test detected an error reading the first cylinder of the hard disk drive.	1. **Hard Disk Drive** 2. Hard Disk Drive Adapter (if installed) 3. System Board
Device is Not Ready **Ready the Device...** **or** **Press Any Key**	1. **Ensure the device is powered-on.** 2. Replace failing device 3. Device Adapter (if installed) 4. System Board

Error Message/Symptom	FRU/Action
Disk Error Encountered Opening Output File Press Any Key To Continue.	1. **Hard Disk Drive** 2. Hard Disk Drive Adapter (if installed) 3. System Board
DMA #X Failed Main Components Test detected an error while testing the DMA controller.	1. **System Board**
DMA Page Register Failed DMA page register error	1. **System Board**
Drive (x) Media (y) Mismatch FAT ID mismatch with installed drive.	1. **Check diskette and diskette drive capacity.** 2. Diskette Drive 3. System Board
Error in video buffer. Bad bits. Video memory test error.	1. **Video Adapter** 2. System Board 3. Display
Exception Interrupt In Protected Mode Diags Cannot Continue Server error, remove one adapter at a time until the symptom goes away.	1. **Any Adapter** 2. System Board 3. Processor
Extended Memory Test Failed Extended memory error.	1. **Memory Module** 2. System Board
Floppy Drive Failed Diskette drive(s) failed.	1. **Diskette Drive** 2. System Board 3. Diskette Drive Cable
General Function Failed Remove one adapter at a time until the symptom goes away.	1. **Any Adapter** 2. System Board 3. Processor
Hard Drives Failed Hard Disk Drive test error.	1. **Hard Disk Drive** 2. Hard Disk Drive Adapter (if installed) 3. System Board
Incorrect DOS version	1. **Ensure you are using DOS version 3.0 or higher.**
INT Mask Register Failed INT Mask Register error.	1. **Microprocessor** 2. System Board
Invalid Date Clock/DOS date mismatch.	1. **Real-Time Clock Assembly** 2. System Board
Invalid Time Clock/DOS time mismatch. Back-up clock and DOS time of day settings do not match.	1. **Real-Time Clock Assembly** 2. System Board

Error Message/Symptom	FRU/Action
Linear Cylinder Access Test Failed Hard disk drive error.	1. **Hard Disk Drive** 2. Hard Disk Drive Cable 3. Hard Disk Drive Adapter (if installed) 4. System Board
Logic Function Failed CPU Logic test error.	1. **Microprocessor** 2. System Board
Loopback Error COM Port Test or Parallel Port error. A wrap plug must be installed to successfully complete these tests.	1. **System Board** 2. Wrap Plug
Main Components Failed System board error.	1. **System Board** 2. Processor
Memory test cannot run at this location in memory Not enough free memory available to start the memory test.	1. **Memory Module** 2. System Board
Missing QAPlus/PRO Files(s) One or more diagnostic support files are missing.	1. **Diagnostic Diskette**
NO LOOP-BACK PLUG. Skipping External loopback test No wrap plug installed.	1. **Install wrap plug on the serial port, rerun test.** 2. System Board
Not ready Printer not on-line or not ready.	1. **Ready Printer** 2. Printer 3. Printer Cable 4. System Board
No 'type-amatic' repeat At least one repeat key must be tested during this test or an error will occur. Type-amatic test error.	1. **Keyboard** 2. System Board
Not used by any standard device IRQ is not currently being used by a non-standard device.	1. **System Board**
Numeric Proc Failed NPU test error.	1. **Microprocessor** 2. System Board
Parallel Ports Failed Test Report Summary message.	1. **System Board**
Pass (N): ** Errors ** Drive (X) Failed Diskette drive read/write test error.	1. **Diskette Drive** 2. System Board 3. Diskette Drive Cable

Error Message/Symptom	FRU/Action
Pass (N) Drive Not Ready Diskette drive door is open or defective.	1. **Ensure diskette drive is ready.** 2. Diskette Drive 3. System Board 4. Diskette Drive Cable
Pass (N): Drive (X) Write Protected or Unformatted	1. **Insert a non-write protected, formatted diskette into the diskette drive; then rerun the test.** 2. Diskette Drive 3. System Board 4. Diskette Drive Cable
Pass (N): Unknown Media Drive (X) Diskette Drive Test error.	1. **Diskette** 2. Diskette Drive 3. System Board 4. Diskette Drive Cable
Place Hi-density Media in Drive Media/drive mismatch.	1. **Diskette** 2. Diskette Drive 3. System Board 4. Diskette Drive Cable
Printer Failed Printer powered-on and ready?	1. **Printer** 2. Printer Cable 3. System Board
Printer Fault Printer powered-on and ready?	1. **Printer** 2. Printer Cable 3. System Board
Printer Not Selected Ensure the printer is powered-on and ready.	1. **Printer** 2. Printer Cable 3. System Board
Program or File Not Found Press Any Key Diagnostics cannot find the USER(N).COM file.	1. **Diagnostic Diskette** 2. Diskette Drive 3. System Board
Program Too Big To Fit In Memory Too many Terminate and Stay Resident programs in memory.	1. **Reboot the system from the Diagnostic Diskette.**
QAPlus/PRO Cannot Be Re-run Because Of Error In Relocating Program Diagnostics failed to relocate the Diagnostics Test programs so the memory space it resides in was not tested.	1. **Diagnostic Diskette** 2. Memory Module 3. System Board
RAM Memory Error in Block n. Bad bits n Memory error.	1. **Memory Module** 2. System Board
RAM Test Failed Memory error.	1. **Memory Module** 2. System Board

Error Message/Symptom	FRU/Action
Read error on cylinder n Hard disk drive format error.	1. **Hard Disk Drive** 2. Hard Disk Drive Adapter (if installed) 3. System Board
Read Errors Diskette drive read error.	1. **Diskette** 2. Diskette Drive 3. System Board 4. Diskette Drive Cable
Receive Error Serial Port loopback test error.	1. **Serial Port Cable** 2. System Board
Refresh Failure Diagnostics Test detected an error while testing the DMA controller's RAM refresh cycle.	1. **Memory Module** 2. System Board
RTC Interrupt Failure Diagnostics Test cannot detect the Real-Time clock interrupt.	1. **Real-Time Clock Assembly** 2. System Board
Serial Chip Error COM Port error, general.	1. **Serial Port Cable** 2. System Board
Serial Compare Error COM Port error, information transmitted is not the same as information received.	1. **Serial Port Cable** 2. System Board
Serial Time-out Error COM Port error, time interval is too long between transmitted and received data.	1. **Serial Port Cable** 2. System Board
Serious Memory Error — Diags Cannot Continue Memory Test error.	1. **Memory Module** 2. System Board
Sorry You Need A Mouse Mouse or mouse driver was not detected.	1. **Mouse** 2. System Board
System Hangs Go to “Undetermined Problem” on page 51.	1. **Any device** 2. Any adapter 3. System Board
The Address Exceeds The Size Of Your Memory An invalid memory address was entered. The Diagnostics Tests display this message during the Locate Bad Chips option under the interact menu if an invalid memory address was entered at the "Enter Memory Address Of Bad Chip" prompt.	1. **Enter correct address** 2. Memory Module 3. System Board

Error Message/Symptom	FRU/Action
That Number is Out Of Range An invalid bit number was entered. Diagnostics Tests display this message during the Locate Bad Chips option.	1. **Enter the correct number.** 2. Memory Module 3. System Board
Too Many Errors — Test Aborted Too many errors, the Diagnostics Test cannot continue.	1. **Microprocessor** 2. System Board
Transmit Error Internal or external serial port loopback test failure.	1. **Serial Port Cable** 2. System Board
Video Adapter Failed Test Result Summary, displayed if "Fail" was at the Quit/Fail/Pass menu of any video test.	1. **Video Adapter** 2. System Board 3. Display
Write error on cylinder n Hard disk drive write error.	1. **Hard Disk Drive** 2. Hard Disk Drive Adapter (if installed)
Write Errors Diskette drive write error.	1. **Diskette** 2. Diskette Drive 3. System Board 4. Diskette Drive Cable
Write Protected or Unformatted Diskette is Write Protected or not formatted.	1. **Insert a non-write protected, formatted diskette into the diskette drive; then rerun the test.** 2. Diskette Drive 3. System Board 4. Diskette Drive Cable
You Cannot Delete the Motherboard "Remove Board" option was selected. The Diagnostics Tests display this message during the Locate Bad Chips option.	1. **Make the correct selection.** 2. Memory Module 3. System Board 4. Processor

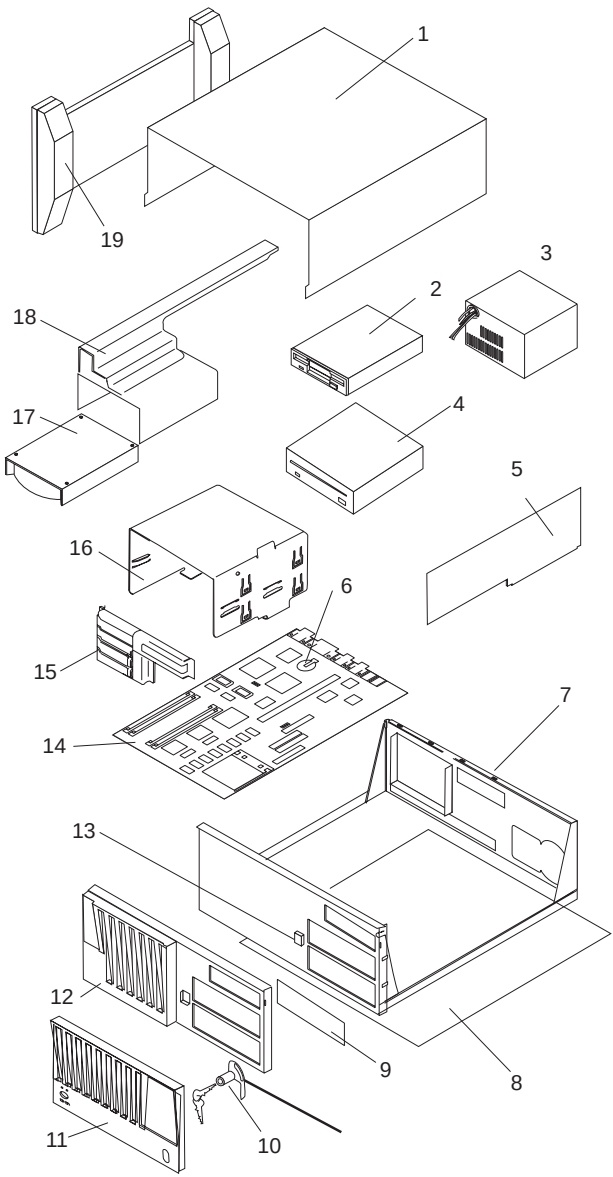
Miscellaneous Error Messages

Message/Symptom	FRU/Action
Changing colors.	1. **Display**
Computer will **not** power-off. See “Power Supply” on page 34.	1. **Power Switch** 2. System Board
Dead computer. See “Power Supply” on page 34.	1. **Power Switch** 2. Power Supply 3. System Board
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. **Diskette Drive** 2. System Board 3. Diskette Drive Cable 4. 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 34.**
Nonsystem 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. **See "Display on page 490 in your PC Server Hardware Maintenance Manual.** 2. System Board 3. Display
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. **See "Printer on page 524 in your PC Server Hardware Maintenance Manual.**
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

Message/Symptom	FRU/Action
Serial or parallel port device failure (system board port).	1. **External Device Self-Test OK?** 2. External Device 3. Cable 4. System Board
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 6. Riser Card
Some or all keys on the keyboard do not work.	1. **Keyboard** 2. Keyboard Cable 3. System Board
Clock Battery inaccurate.	1. **Clock Battery (See "Battery Notice" on page 115)** 2. System Board

Parts Listings

Service Position.



System

Notes

- The model(s) listed for the following FRUs indicates FRUs that the models may contain at the time of shipping. However, other FRUs are supported in each model as options.
- ISA Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0XT, 0Z0, 0ZT
- Micro Channel Models MDT, MXT, MZT

Index	System (Server 310 - Type 8639)	FRU No.
1	**Cover (Top)** (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1771**
1	**Cover (Top)** (Models 0E0, 0E4, 0E5, 0EV)	**75H7986**
2	**Diskette Drive** see DASD (Server 310 - Type 8639)	
3	**Power Supply Assembly (200W, 3.3V)** (Models 0E0, 0E4, 0E5, 0EV)	**06H8825**
3	**Power Supply Assembly (210W, 3.3V)** (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H2968**
4	**CD ROM Drive** see DASD (Server 310 - Type 8639)	
5	**I/O Riser Card 5X5** (Models 0D0, 0DT, 0XT, 0Z0, 0ZT)	**06H4008**
5	**I/O Riser Card 5X5** (Models 0E0, 0E4, 0E5, 0EV)	**07H1266**
5	**I/O Riser Card 5X5** (Models MDT, MXT, MZT)	**06H4023**
6	**Battery** (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT) see“Battery Notice” on page 115	**33F8354**
7	**Base Frame** (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H9405**
7	**Base Frame** (Models 0E0, 0E4, 0E5, 0EV)	**60H7797**
8	**Bottom Cover** (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1791**
9	**5.25-Inch Blank Bezel** (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**96G2484**

Index	System (Server 310 - Type 8639)	FRU No.
10	**Keylock with Keys** (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**33F8433**
11	**Door Assembly** (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**96G2446**
11	**Door Assembly** (Models 0E0, 0E4, 0E5, 0EV)	**60H7783**
12	**Front Bezel** **(Models 0D0, 0DT, 0E0, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)**	**96G2445**
12	**Front Bezel** **(Models 0E0, 0E4, 0E5, 0EV)**	**60H7782**
13	**Power Button** (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1777**
14	**System Board without Memory and Processor** (Models 0D0, 0DT, 0XT, 0Z0, 0ZT)	**88G4270**
14	**System Board without Memory and Processor** (Models 0E0, 0E4, 0E5, 0EV)	**93H1758**
14	**System Board without Memory and Processor** (Models MDT, MXT, MZT)	**11H5545**
14	**System Board without Memory and Processor** (Models 0D0, 0DT, 0Z0, 0ZT)	**60H7198**
14	**System Board without Memory and Processor** (Models MZT, MDT)	**60H7197**
15	**Card Guide** (Models 0D0, 0DT, 0XT, 0Z0, 0ZT)	**06H1779**
15	**Card Guide (ISA)** (Models 0E0, 0E4, 0E5, 0EV)	**07H1091**
15	**Card Guide** (Models MDT, MXT, MZT)	**06H1778**
16	**DASD Tray (Removal)** (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1780**
17	**Hard Disk Drive** DASD (Server 310 - Type 8639)	
18	**DASD Tray (Non-Removal)** (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1781**
19	**Floor Stand Assembly** (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**07H0516**
19	**Floor Stand Assembly** (Models 0E0, 0E4, 0E5, 0EV)	**76H3952**

Index	System (Server 310 - Type 8639)	FRU No.
	1MB Video DRAM (60ns) (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**92G7432**
	256KB L2 Cache - 12ns (Models 0D0, 0DT, 0Z0, 0ZT, MDT, MZT)	**60H7416**
	256KB L2 Cache - 12ns (Models 0E0, 0EV)	**07H1150**
	256KB L2 Cache - 15ns (Models 0XT, MXT)	**06H6052**
	512KB L2 Cache - 12ns (Models 0E0, 0EV)	**42H2781**
	512KB L2 Cache - 12ns (Models 0E4, 0E5)	**60H9808**
	8MB Memory SIMM (Parity) (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**92G7521**
	8MB Memory SIMM (Parity-ECC) (Models 0E0, 0EV)	**42H2786**
	16MB Memory DIMM (Models 0E0, 0EV)	**60H7832**
	32MB Memory DIMM (Models 0E4, 0E5)	**42H2784**
	Blank Bezels (Models MDT, MXT, MZT)	**06H1784**
	C2 Switch Assembly (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1788**
	Cover Latch (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1783**
	Cover Latch (Models 0E0, 0E4, 0E5, 0EV)	**07H0844**
	Door Hinge (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**96G2447**
	EMC Clip (6 each) (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H5734**
	EMC DASD (Models 0E0, 0E4, 0E5, 0EV)	60H7794
	EMC Shield (4 each) (Models 0D0, 0E0, 0E4, 0E5, 0EV, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1782**
	Ethernet Card Assembly (Models 0D0, 0DT, 0XT, 0Z0, 0ZT)	**48G7170**
	EtherJet (Ethernet) Card Assembly (Models 0E0, 0EV)	**13H9263**
	Ethernet Card Assembly (Model 0E4)	**85H8367**

Index	System (Server 310 - Type 8639)	FRU No.
	Ethernet Card Assembly (Models MDT, MXT, MZT)	**48G7172**
	Fan Assembly (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1796**
	Fan Guard (Models 0E0, 0E4, 0E5, 0EV)	**06H5733**
	Jumper Kit (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZ)	**93F0067**
	Keyboard with Cable see“Keyboards (101/102 Key - RD)” on page 105 , “Enhanced Keyboards (101/102 Key - BS)” on page 106	
	LED and Cable Power (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**93F2389**
	Miscellaneous Mounting Screws (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**93F0041**
	Mouse (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H4595**
	P54C 50/75MHz Processor Chip with Heat Sink (Model 0XT, MXT) See“Processor Upgrades and FRUs” on page 35 .	**06H5210**
	P54C 66/100 Chip with Heat Sink (Models 0Z0, 0ZT MZT) See“Processor Upgrades and FRUs” on page 35 .	**06H6063**
	P54C 66/133 Chip with Heat Sink (Models 0D0, 0DT, MDT) See“Processor Upgrades and FRUs” on page 35 .	**06H9891**
	P54C 166 Chip with Heat Sink (Models 0E0, 0EV) See“Processor Upgrades and FRUs” on page 35 .	**07H0971**
	P54C 200 Chip with Heat Sink (Models 0E0, 0E4, 0E5, 0EV) See“Processor Upgrades and FRUs” on page 35 .	**75H9575**
	Power Cord see“Power Cords” on page 107	
	Power Switch with Cable (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**60G2258**
	Power Switch with Cable (Models 0E0, 0E4, 0E5, 0EV)	**06H3863**

Index	System (Server 310 - Type 8639)	FRU No.
	Rear I/O Panel Assembly (Models 0D0, 0DT, 0Z0, 0ZT, 0XT)	**06H1786**
	Rear I/O Panel Assembly (Models 0E0, 0E4, 0E5, 0EV)	**60H7818**
	Rear I/O Panel Assembly (Models MDT, MZT, MXT)	**06H1787**
	Rear Panel (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H1785**
	Rear Panel (Models 0E0, 0E4, 0E5, 0EV)	**06H9407**
	SCSI PCI Card Assembly (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**60H5715**
	SCSI Ultra/Wide Adaptec Card (PCI) (Models 0E0, 0E4, 0E5, 0EV)	**60H7823**
	Speaker (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**92F0421**

DASD (Server 310 - Type 8639)

DASD (Server 310 - Type 8639)	FRU No.
1.44MB Diskette Drive (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**93F2361**
Diskette Drive Bracket (Models 0E0, 0E4, 0E5, 0EV)	**06H9408**
1GB Fast/Wide Hard Disk Drive (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H9079**
2GB Fast Hard Disk Drive (Models 0E4, 0EV)	**07H1132**
Hard Drive Bracket (Models 0E0, 0E4, 0E5, 0EV)	**06H9409**
Diskette Drive Cable (Models 0D0, 0DT, 0E0, 0E4, 0E5, 0EV, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H6325**
Hard Disk Drive Cable (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H6326**
LED and Cable (Hard Disk Drive) (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**93F2388**
LED and Cable (Hard Disk Drive) (Models 0E0, 0E4, 0E5, 0EV)	**60H7796**
MKE CR-504 4X CD-ROM DR (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**88G4921**
MKE CR-504 4X CD-ROM DR (Models 0E0, 0EV)	**73H1513**
MKE CR-504 8X CD-ROM DR (Models 0E0, 0E4, 0E5)	**73H2601**

DASD (Server 310 - Type 8639)	FRU No.
SCSI Hard Disk Drive Cable (PCI-5X5) (Models 0D0, 0DT, 0Z0, 0ZT, 0XT, MDT, MXT, MZT)	**06H6062**
SCSI Hard Disk Drive Cable (PCI-5X5) (Models 0E0, 0E4, 0E5, 0EV)	**60H7790**
SCSI Hard Disk Drive Cable with Terminator (Models 0E4, 0E5)	**60H9758**

Keyboards (101/102 Key - RD)

Keyboards (101.102 - RD)	FRU No.
Arabic	**71G4617**
Belgium-French	**71G4618**
Belgium-Dutch	**71G4639**
Bulgarian	**71G4619**
Czech	**71G4620**
Danish	**71G4621**
Dutch	**71G4622**
French	**71G4624**
French/Canadian	**06H2963**
German	**71G4625**
Greek	**71G4626**
Hebrew	**71G4627**
Hungarian	**71G4628**
Iceland	**71G4629**
Italy	**71G4630**
Latin/Spanish	**82G3291**
Norwegian	**71G4631**
Polish	**71G4632**
Portuguese	**71G4633**
Romanian	**71G4634**
Russian/Cyrillic	**71G4635**
Serbian/Cyrillic	**71G4636**
Slovak	**71G4637**
Spanish	**71G4638**
Swedish/Finnish	**71G4623**
Swiss-French/German	**71G4640**
Turkish	**71G4642**
Turkish	**82G3255**
UK English	**71G4643**
US English	**71G4646**
U.S. English (Models 0E0, 0EV)	**75H9505**
US English (E/ME/A use only)	**71G4644**
Yugoslavian/Latin American	**71G4647**

Enhanced Keyboards (101/102 Key - BS)

Enhanced Keyboards (101/102 Key - BS)	FRU No.
Arabic	8125417
Belgium-French	8125418
Belgium-Dutch	8125439
Bulgarian	8125419
Czech	8125420
Danish	81G5421
Dutch	8125422
Finnish	8125423
French	8125424
French/Canadian	82G3280
German	8125425
Greek	8125426
Hebrew	8125427
Hungarian	8125428
Iceland	8125429
Italy	8125430
Latin/Spanish	82G3294
Norwegian	8125431
Polish	8125432
Portuguese	8125433
Romanian	8125434
Russian/Cyrillic	8125435
Serbian/Cyrillic	8125436
Slovak	8125437
South African	8125441
Spanish	8125438
Swedish	8125423
Swiss - French/German	8125440
Turkish	8125442
UK English	8125443
US English	75H9505
US English (E/ME/A use only)	1396790
Yugoslavian/Latin American	8125447

Power Cords

Power Cords	FRU No.
Arabic	14F0033
Belgium	1339520
Bulgaria	1339520
Czech Republic	1339520
Denmark	13F9997
Finland	1339520
France	1339520
Germany	1339520
Hungary	1339520
Israel	14F0087
Italy	14F0069
Latvia	1339520
Netherlands	1339520
Norway	1339520
Poland	1339520
Portugal	1339520
Serbia	1339520
Slovakia	1339520
South Africa	14F0015
Spain	1339520
Switzerland	1339520
Switzerland (French/German)	14F0051
U.S. English	93F2364
U.K./Ireland	14F0033
Yugoslavia	1339520

Related Service Information

Important

The service procedures are designed to help you isolate problems. They are written with the assumption that you have model-specific training on all computers, or that are familiar with the computers, functions, terminology, and service information provided in this supplement and the PS Servers Hardware Maintenance Manual (part number 70H0751, form number S30H-2501-01). Refer to the PS Servers Hardware Maintenance Manual (part number 70H0751, form number S30H-2501-01) for additional related service information.

Safety Information

The following section contains the safety information that you need to be familiar with before servicing 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: 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.

Electrical Safety

Observe the following rules when working on electrical equipment.

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.

- 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 *with the power on* when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators

  and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  - **Use caution; do not become a victim yourself.**
  - **Switch off power.**
  - **Send another person to get medical aid.**

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 checks with the power off, and the power cord disconnected.

Checklist:

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:
   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.

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.

Notes:

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.

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.
- 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.
- 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.

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.

Battery Notice

CAUTION

Pour éviter tout risque d'explosion, remplacez la pile selon les instructions du fabricant qui en définit les équivalences. Ne cherchez pas à la démonter ou à la recharger. Ne l'exposez ni au feu, ni à l'eau. Ne la mettez pas en court-circuit. Pour le reyclage ou la mise au rebut des piles usagées, conformez-vous à la réglementation en vigueur.

Die Batterie kann bei unsachgemäßem Austauschen explodieren. Eine verbrauchte Batterie nur durch eine gleichwertige, vom Hersteller empfohlene Batterie ersetzen. Die Batterie nicht zerlegen, wiederaufladen oder kurzschließen. Die Batterie vor Feuer und Nässe schützen. Bei der Entsorgung der aufladbaren Batterie die örtlichen Richtlinien für Sondermüll sowie die allgemeinen Sicherheitsbestimmungen beachten.

Se la batteria è sostituita in modo non corretto potrebbe esserci pericolo di esplosione. Si raccomanda di sostituirla con una batteria dello stesso tipo o equivalente. Non smontarla, ricaricarla, gettarla nell'acqua o nel fuoco, o cortocircuitarla. Smaltire la batteria secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali).

Hay peligro de explosión si la batería se sustituye incorrectamente. No la desmonte, recargue, eche al fuego o al agua, ni la cortocircuite. Deseche la batería tal y como disponga la normativa local.

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer's instructions. Do not disassemble it, recharge it, throw it into fire or water, or short-circuit it. Dispose of the battery as required by local ordinances or regulations.

Laser Compliance Statement

Some IBM Personal Computer models are equipped from the factory with a CD-ROM drive. CD-ROM drives are also sold separately as options. The CD-ROM drive is a laser product. The CD-ROM drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

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

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

Opening the CD-ROM drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive. **Do not open.**

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

DANGER

> **Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

Send Us Your Comments!

We want to know your opinion about this manual (part number 84H7201). Your input will help us to improve our publications.

Please photocopy this survey, complete it, and then fax it to **IBM HMM Survey** at **919-543-8167 (USA)**.

Name _____

Phone Number _____

1. Do you like this manual?
   □ Yes □ No

   _____

   _____

2. What would you like to see added, changed, or deleted in this manual?

   _____

   _____

3. What is your service experience level?
   □ Less than five years
   □ More than five years

   _____

   _____

4. Which Servers do you service most?

   _____

   _____

   _____

   _____

Thanks in advance for your response!

Problem Determination Tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type and model
- Processor or hard disk upgrades
- Failure symptom
  - 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?
- Reference/Diagnostics Diskette Version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

Important

To eliminate confusion, identical systems are considered *identical* only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same Reference/Diagnostics Diskette (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software set-up between “working and non-working” systems will often lead to problem resolution.

Phone Numbers, U.S. and Canada

Note

EMEA customers should contact their Dealer or IBM Service organization.

Before you place a call to the Support Center, refer to "Problem Determination Tips" on page 118.

Authorized Dealers or Servicers

Number	Information
919-517-0001	Bulletin Board Service - PC Company
800-528-7705	Bulletin Board Service - TSS Only
800-937-3737	IBM Business Partner Education
800-426-2472	IBM Customer Engineer Technical Support
800-IBM-DEAL	IBM Dealer Support Center
800-342-6672	IBM Direct Desktop Software Sales
303-924-4015	IBM Part Number ID and Look Up
800-426-7763	IBM PC HelpCenter
800-237-5511	IBM Software Defect Support (CSDs)
800-327-5711	IBM Software Ordering (Publications)
800-426-1484	IBM Supplies Technical Hotline
800-388-7080	IBM Warranty Parts Claims Center

U.S. Customers and Helpware Subscribers

Number	Information
919-517-0001	Bulletin Board Service - PC Company
800-426-8322	Customer Education Business Unit
800-999-0052	Customized Operational Services
800-237-4824	EduQuest (Educational Computers)
800-964-8523	End User HelpDesk Support
800-742-2493	IBM Anti-Virus Services
800-447-4700	IBM Authorized Dealer Referrals
800-426-2468	IBM Dealer Referral
800-426-3333	IBM Information Referral Service
800-IBM-SERV	IBM Service
800-772-2227	IBM PC HelpCenter and HelpDesk
800-426-7282	IBM Technical Manuals
800-426-9402 (Ext. 150)	Multimedia Information Center
800-241-1620	Multimedia HelpCenter
800-342-6672	OS/2 Information Line
800-237-5511	OS/2 Support Services
800-284-5933	Prodigy
914-962-0310	Prodigy User Questions
800-547-1283	Technical Coordinator Program SystemXtra for Personal Systems LAN Automated Distribution/2 OS/2 Bulletin Board OS/2 Application Assistance Center
800-551-2832	Technical Solutions Magazine

IBM Canada Customer and Servicer Support

Number	Information
800-661-PSMT	Business Partner Marketing Support
905-316-5556	Business Partner Marketing Support - Toronto
514-938-6048	Business Partner Marketing Support - French
800-465-6600	Customer Relations
905-316-6666	Customer Relations - Toronto
800-465-6666	Customer Service Dispatch
800-263-2769	Customer Service Parts
800-465-2222	Customer Support Center (ISC)
416-443-5701	Customer Service Repair Centre
800-465-7999	HelpClub Registration
800-465-7999	IBM Direct
905-513-3367	IBM Certification Administrator
905-316-2683	IBM Certification Coordinator Mail to: 50 Acadia Drive Markham, Ontario L3R 0B3
800-465-3299	IBM HelpFax
905-316-3299	IBM HelpFax - Toronto
800-565-3344	IBM HelpPC
800-268-3100	IBM Information Network Support
800-268-3100	IBM Information Network Support - Toronto
800-387-8343	IBM PC Service Partners
800-663-7662	Lexmark Product Information
800-263-2769	Parts Orders, Exchange or Emergency
416-443-5808 (Fax)	Parts Regular Orders, Exchange
416-443-5755	Parts Orders, Inquiries
514-938-3022	PC Co Bulletin Board - Montreal
905-316-4255	PC Co Bulletin Board - Toronto
604-664-6464	PC Co Bulletin Board - Vancouver
204-934-2735	PC Co Bulletin Board - Winnepeg
800-661-7768	PS Marketing Support (PSMT)
800-465-1234	Publications Ordering
905-316-4148	Service Management Support
905-316-4100 (Fax)	Service Management Support
905-316-4150	Service Manager
905-316-4100 (Fax)	Service Manager
905-316-4872	Service Quality Programs
905-316-4100 (Fax)	Service Quality Programs
800-661-2131	Skill Dynamics (Education)
800-565-3344	PS/1 Warranty Customer Helpline
800-387-8483	PS/1 Warranty Service (DOAs)
416-443-5835 (Fax)	Warranty Claim Fulfillment
905-316-2445	Warranty Claim Reimbursement
905-316-3515 (Fax)	Warranty Claim Reimbursement
416-443-5778	Warranty Claim Parts Inquiry
800-505-1855	Warranty Provider Support Hotline
800-267-7472	Warranty Service, ThinkPad

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NetFinity	OS/2
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PS/1	PS/2
PS/ValuePoint	Skill Dynamics
SystemXtra	ThinkPad
VoiceType	

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Adaptec	Adaptec, Inc.
Lexmark	Lexmark International, Inc.
PCMCIA	Personal Computer Memory Card International Association
Pentium	Intel Corporation
QAPlus	DiagSoft, Inc.
SCSISelect	Adaptec, Inc.
VESA	Video Electronics Standards Association
Wizard	Sharp Corporation

Windows is a trademark of Microsoft Corporation.

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