

**PC Server 704 - Type 8650
Models 4BW, 4M0, 5M0, 6MM, 7AX**

**Hardware Maintenance
Manual Supplement**

May 1997

**Use this manual with the
PS Servers Hardware
Maintenance Manual**

**We Want Your Comments!
(Please see page 187)**



Note

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

First Edition (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 704-Type 8650.

This supplement should be used with the related service information in the *IBM PC Servers Hardware Maintenance Manual* (part number 70H0751, form number S30H-2501-01).

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 176.

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
PC Servers	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, 560, 760, SelectaDock)	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/G Series) (July 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)

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General Checkout (QAPlus/PRO)

This general checkout procedure is for computers that are supported by the QAPlus/PRO Diagnostics test.

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 9.)

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. If multiple error codes are displayed, diagnose the first error code displayed.
2. If the computer hangs with a POST error, go to the "Symptom-to-FRU Index" on page 157.
3. If the computer hangs and no error is displayed, go to "Undetermined Problems" on page 165.
4. If a device cannot be selected from the Module Test menu, that device may be defective.
5. For Microprocessor Option installation instructions, see "Microprocessor Option Installation Instructions" on page 33.
6. For Mylex RAID adapter error codes, see "Mylex RAID Adapter Error Codes" on page 163. For information on the RAID adapter messages, and for other information on troubleshooting a disk-array, see the *Mylex booklets* that were shipped with the server.
7. For PC ServeRAID Adapter (FRU No. 06H9334) error codes, error messages, and troubleshooting information, see "PC ServeRAID Adapter (FRU No. 06H9334)" on page 109.

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.
- Power-on the computer.
- Check for the following responses:
 1. One beep.
 2. Readable instructions or the Main Menu.

(Step **001** continues)

001 (continued)

DID YOU RECEIVE THE CORRECT RESPONSES?

Yes No

002

Find the failure symptom in “Symptom-to-FRU Index” on page 157.

003

Run the Advanced Diagnostics Test. If necessary, refer to “Diagnostics (QAPLus/PRO).”

If you receive an error, go to “Symptom-to-FRU Index” on page 157.

Diagnostics (QAPLus/PRO)

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

- Power-on self-test (POST)
- POST beep codes
- Test programs
- Error messages
- Diagnostics Diskette

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
- Detects and initializes ISA devices
- Detects and configures EISA devices
- Detects and configures PCI devices
- Verifies that the diskette drive, hard disk drive, and other installed devices are working

Check the indicator lights on the front of the server and the back of the power supplies. Verify that all server devices are operating properly. If a device is not operating properly, ensure that it is not defective and is installed correctly. Replace defective devices and reinstall any device that is not installed correctly.

If POST finishes without detecting any problems, a single beep sounds and the first screen of the operating system or application program appears. If no operating system is installed, the system prompts you to insert a startable diskette.

If POST detects a problem, an error message appears on the screen. A single problem can cause several error

messages to appear. When you correct the cause of the first error message, the other error messages probably will not appear on the screen the next time you power-on the system.

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.

Test Programs

The QAPLus/PRO test programs, developed by DiagSoft for IBM, are the primary method of testing the PC Server. 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: <ul style="list-style-type: none">• System board• Hard disk drives• Diskette drives• CD-ROM drives• RAM• Serial and parallel ports• Video adapter• Printer• Keyboard• Mouse
Flexible Test Control	Allows you to: <ul style="list-style-type: none">• Run groups of tests in batch• Specify parameters to use for each test (for example, video modes, disk cylinders, port addresses, and so on)• 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, device drivers, and so on.)• Select System Utilities• Format a diskette

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
- Diagnostic error messages
- POST beep codes
- 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 <i>first</i> error message displayed.

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 that the device passed its test.
1	Indicated that the device failed its test.
2 or greater	Indicates that the test stopped or was aborted.

Using the Test Programs

The test programs provide advanced functions and utilities for power 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
F10	Local menu
+	Next logical unit number (for example, LUN 1, LUN 2, and so on)
-	Previous logical unit number

Command Line Options: The following Command Line Options allow you to define specific conditions for running the diagnostic programs at startup time.

At the operating system prompt, type QAPRO /XXX (where /XXX represents one of the following commands); then press **Enter**:

Command	Action																								
/B&W	The /B&W option forces the program to load in black and white (monochrome) mode.																								
/LOG= <i>file</i>	The /LOG=<i>file</i> option directs the test programs to start using a specified Error Log file.																								
/INT10	The /INT10 option forces the test programs to use the Basic Input/Output System (BIOS) for screen writes.																								
/OXXX	The /OXXX option, where XXX=test group, omits the designated test group from testing. (See /IXXX for a list of valid test groups.)																								
/OALL	The /OALL option omits all test groups from testing. (See /IXXX for more information.)																								
/IXXX	<p>The /IXXX option, where XXX=test group, includes the designated test group. When used in conjunction with the /OALL option, you can specify the tests that you want to include. These options are helpful if you have insufficient memory available to load all of the test programs simultaneously, or if you want to test specific test groups.</p> <p>The valid test groups are:</p> <table> <tr> <td>LPT</td> <td>Parallel port</td> </tr> <tr> <td>COM</td> <td>Serial ports</td> </tr> <tr> <td>HDU</td> <td>Hard disk (IDE only)</td> </tr> <tr> <td>FDU</td> <td>Diskette drive</td> </tr> <tr> <td>VID</td> <td>Video</td> </tr> <tr> <td>MBD</td> <td>System board</td> </tr> <tr> <td>KBD</td> <td>Keyboard</td> </tr> <tr> <td>PDV</td> <td>Pointing device or mouse</td> </tr> <tr> <td>MEM</td> <td>Memory</td> </tr> <tr> <td>SCU</td> <td>SCSI</td> </tr> <tr> <td>CDR</td> <td>CD-ROM</td> </tr> <tr> <td>SYS</td> <td>System information/Utilities</td> </tr> </table> <p>You can include this option multiple times. For example, to run the keyboard, SCSI, and CD-ROM test groups, type:</p> <p>QAPRO.EXE /OALL /IKBD /ISCU /ICDR</p>	LPT	Parallel port	COM	Serial ports	HDU	Hard disk (IDE only)	FDU	Diskette drive	VID	Video	MBD	System board	KBD	Keyboard	PDV	Pointing device or mouse	MEM	Memory	SCU	SCSI	CDR	CD-ROM	SYS	System information/Utilities
LPT	Parallel port																								
COM	Serial ports																								
HDU	Hard disk (IDE only)																								
FDU	Diskette drive																								
VID	Video																								
MBD	System board																								
KBD	Keyboard																								
PDV	Pointing device or mouse																								
MEM	Memory																								
SCU	SCSI																								
CDR	CD-ROM																								
SYS	System information/Utilities																								
/USRCONFIG= <i>file</i>	The /USERCONFIG=<i>file</i> option tells the test programs to look for a user diagnostic configuration file other than the default USERDIAG.CFG.																								

Command	Action
<code>/SCRIPT=file[,R]</code>	The <code>/SCRIPT=file[,R]</code> option with the <code>[,R]</code> runs the selected script. 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 diamond “◆” 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 10, 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 QAPLus/PRO Diagnostics Diskette

1. Insert the diagnostics diskette into drive A.
2. Power-on the computer.
3. When the **Main Menu** is displayed, select Diagnostics; then, press **Enter**.
4. Follow the instructions that appear on your screen. If an error is displayed, go to “Symptom-to-FRU Index” on page 157.

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 QAPLus/PRO 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.

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

Control Keys	When Used	Diagnostics Response
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).

Features

The features in the server vary according to the model. The following is a summary of the features that are available with the PC Server 704 - Type 8650.

Note

The diskettes required to service this product are listed in the Parts Listing

Microprocessors

- Intel® Pentium® Pro with:
 - Level-1 cache, 16 KB
 - Level-2 cache, 512 KB
- Expandable to four Pentium Pro microprocessors

Memory

- Expandable to 2 GB
- Industry standard, 60 ns, parity
- Sixteen memory sockets
- Two- and four-way interleaved
- Error correcting code support

Diskette Drive

- Standard: One 3.5-inch, 1.44 MB (MB = 1 000 000 bytes)

CD-ROM Drive:

- SCSI-2 CD-ROM (Models 4BW, 4M0, 7AX)
- IDE CD-ROM (Models 5M0, 6MM)

Keyboard

- Standard: 101-key or 102-key

Mouse

- Standard: IBM Mouse

Upgradable POST and BIOS

- Flash ROMs on the system board

Information Panel

- Two 16-character lines
- LCD display of status information

Expansion Slots and Bays

- Ten expansion slots:
 - Six 32-bit PCI slots
 - Four 32-bit EISA/ISA slots
- Seventeen expansion bays:
 - Twelve hot-swap hard disk drive bays
 - Four removable-media drive bays
 - One dedicated, 3.5-inch diskette drive bay

Video

- SVGA controller
- Video memory, 512 KB, expandable to 1 MB
- Compatibility:
 - Color graphics adapter (CGA)
 - Enhanced graphics adapter (EGA)
 - Video graphics array (VGA)
 - Hercules graphics

Hard Disk Drives

- Number of drives and drive capacities are model dependent
- Can support up to 12 hot-swap hard disk drives

Security Features

- Door lock
- Padlock loops

Integrated Functions

- LED usability support
- SVGA video connector
- Two serial connectors
- Parallel connector
- Mouse connector
- Keyboard connector
- Battery-backed clock and time/date calendar
- Two Fast/Wide SCSI-2 connectors

Power Supplies

- Two 420-watt supplies standard with:
 - Automatic range voltage selection (115–230 V ac)
 - Built-in overload and surge protection
- For redundant power, an optional 420-watt supply with:
 - Automatic range voltage selection
 - Built-in overload and surge protection

SCSI-2 Controller

- Two built-in bus-master SCSI-2 Fast/Wide controllers (Models 4BW, 4M0, 7AX)
- Two built-in bus-master UltraSCSI controllers (Models 5M0, 6MM)
- Mylex PCI RAID Adapter (disk-array models only)

Network Interface

- IBM 100/10 PCI Ethernet Adapter (Network models only)

Additional Service Information

The following additional service information supports the PC Server 704 - Type 8650.

- “Configuration” on page 19
- “Configuring ISA, EISA, and PCI Adapters” on page 20
- “Configuring ISA or EISA Features and Options” on page 21
- “Configuration Conflicts” on page 23
- “Ethernet Adapter Configuration (100/10 PCI)” on page 25
- “Ethernet Adapter Troubleshooting (100/10 PCI)” on page 30
- “Ethernet Adapter Troubleshooting Chart (100/10 PCI)” on page 31
- “Installing Additional Test Programs” on page 32
- “Memory Configurations” on page 95
- “Microprocessor Option Installation Instructions” on page 33
- “Option Diskettes” on page 36
- “Power Supply Checkout (LED Status Descriptions)” on page 37
- “SCSISelect Utility Program” on page 37
- “SCSI Drives” on page 42
- “Security” on page 46
- “Setting the Selectable Drive-Startup Sequence” on page 49
- “Setup Program” on page 51
- “Software-Generated Error Messages” on page 53
- “Specifications (Environmental)” on page 54
- “Specifications (Power Supply to Power Distribution Board Interface)” on page 55
- “Specifications (Power Supply)” on page 58
- “System BIOS” on page 59
- “System Configuration Utility Program” on page 60
- “System Configuration Utility Default Settings” on page 66

Configuration

The PC Server 704 - Type 8650 supports adapters and devices that comply with any of the following standards:

- Peripheral Component Interconnect (PCI)
- Extended Industry Standard Architecture (EISA)
- Industry Standard Architecture (ISA)

Four hardware configuration utility programs are shipped with the server. Use the built-in Setup program to define the system date and time, and control access to the diskette drive.

The System Configuration Utility (SCU) program is the main tool for configuring the system. Use it to define most configuration settings. The values you enter in the System Configuration Utility program override the entries in the Setup program. See "System Configuration Utility Program" on page 60.

For non-disk-array models, see "SCSISelect Utility Program" on page 37 and the SCSI Product Guide for information on using the SCSI-2 utility programs to configure the SCSI devices that are attached to the SCSI controller on the system board.

For disk-array models, refer to the *Mylex booklets* for information on using the programs that are provided on the RAID Adapter Option Diskette.

Note

The PCI RAID controller (FRU number 75H9011) is shipped with the backup battery option set to disable. The Mylex Configuration Program must be used to set the backup batter to enabled. Refer to the Mylex booklets that were shipped with the system.

Configuration switches and jumpers reside on the system board. The switches define some configuration settings. See "System Board" on page 104.

Use the Ethernet Configuration and Drivers program to configure and test the PC Server 100/10 PCI Ethernet Adapter. The program automatically installs device drivers, tests the adapter, and displays a help file with installation instructions for network operating system drivers.

Configuring ISA, EISA, and PCI Adapters

Before installing a new device or program, read the documentation that came with it. Reading the instructions helps you to determine the steps required for installation and configuration. The following list provides a preview of the actions that might be required to configure the server.

When installing different types of adapters at the same time, install and configure them in the following sequence:

1. ISA
2. EISA
3. PCI

Notes

During POST, the server automatically configures ISA Plug and Play, EISA, and PCI devices.

Some models require additional steps to configure a PCI adapter. See "PCI Installation Tips" on page 22 for more information.

Run the System Configuration Utility program when you first set up and configure the system, if you added or removed any hardware options, or if an error message is displayed instructing you to do so.

1. Start the System Configuration Utility program and:
 - a. Record the current configuration settings.
See "Starting the System Configuration Utility Program" on page 62.
 - b. Install the configuration files (.CFG).

Note

If the .CFG files didn't come with the adapter, see "Configuration Files" on page 21.

See "Recording the SCU Program Settings" on page 65 and "Starting the System Configuration Utility Program" on page 62.

2. Set the jumpers or switches on the system board.
See "System Board" on page 104.
3. Set the jumpers or switches on the device.
See the instructions that came with the adapter.
4. Install the adapter in the server.
5. Install software programs.
See the installation instructions that came with the software.
6. Resolve configuration conflicts.
See "Configuration Conflicts" on page 23.

Configuring ISA or EISA Features and Options

Some ISA and most EISA devices come with option diskettes. These diskettes can contain any or all of the following types of information:

- Configuration files (.CFG)
- Diagnostic files
- Device drivers
- Sample applications (mini-applications)

Configuration Files:

The server requires a configuration file to configure the server for ISA or EISA adapters. This configuration file, which has a file-name extension of .CFG, must be copied from the device diskette to the System Configuration Utility program diskette before installing the device in the server.

The configuration file reserves the system resources that the adapter needs to function properly. Some ISA adapters come with a diskette that contains the .CFG file for the adapter. If you want to install ISA adapters that did not come with their own .CFG files, use the System Configuration Utility program to create a unique .CFG file for each adapter.

Note

The unique .CFG files are slot sensitive. They should not be used to configure identical adapters in multiple systems unless you install the adapters in the same expansion slots within each system.

To create a unique .CFG file for an ISA adapter do the following.

1. At the System Configuration Utility program Main Menu screen, select **Add and Remove Boards**.
2. Press **F6** (Define ISA).
3. At the ISA Definition screen, type in the adapter manufacturer and description (for example, IBM Token Ring).

Refer to the adapter documentation for information about specific configuration parameters (such as IRQ or DMA channel) required for the adapter. Then, follow the instructions on the screen to enter the appropriate parameters.

4. After you type in all of the appropriate parameters, press **F10** to save the data.
5. At the Main Menu screen, select **Save Configuration**.

Note

PCI devices do *not* require .CFG files.

Diagnostic Files:

The Diagnostic program that was shipped with the server is the primary method of testing the server. Some optional devices and adapters come with option-specific diagnostic files. These files provide a more specialized test of the option. "Option Diskettes" on page 36 provides additional information about installing and using diagnostic files. Refer to the option documentation for information on installing and running option-specific diagnostics.

Device Drivers:

Device drivers are programs designed to support a specific type of hardware device. They provide instructions that enable the computer to interact with the device, or to take advantage of a device's special feature. The device driver might ship with the operating system, the application program, or on an option diskette. Not all devices require device drivers. Refer to the option documentation for additional information.

Sample Applications:

Some optional devices provide small applications or sampler files. These applications demonstrate the capabilities of the device and serve as software examples for programming the device. Refer to the option documentation for additional information.

PCI Installation Tips:

If needed, perform the following additional steps to configure a PCI adapter.

- Reserve interrupts (IRQs), memory addresses, or both for ISA adapters.
- Enable the PCI slot and assign an IRQ.
- Configure the slot for level-triggered interrupts.

The slot the adapter is using must be configured for level-triggered interrupts rather than edge-triggered interrupts. Check the Setup program.

The following are sample Setup program parameters:

Parameter	Definition
PCI Slot #	Slot where the adapter is installed
Master	ENABLED
Subordinate	ENABLED
Latency Timer	40
Interrupt	Select any one of several settings that the BIOS Setup provides
Edge-Level	Level

The exact wording of these parameters varies with server.

Configuration Conflicts

The resources used by the server consist of interrupt request levels (IRQs), direct memory access channels (DMAs), I/O ports (for example, serial and parallel), and memory. This information is useful when a resource configuration conflict occurs.

Conflicts in the configuration occur if:

- An installed device requires the same resource as another device. (For example, if you install an ISA network adapter and an EISA network adapter, both requesting *IRQ 5*, you can configure only one of the adapters.)
- A device resource is changed (for example, changing jumper settings).
- A device function is changed (for example, assigning *COM 1* to two different serial ports).
- An installed software program requires the same resource as a hardware device.

The steps required to resolve a configuration error depends on the number and variety of hardware devices and software programs that install. If a hardware configuration error is detected, a *configuration error* message appears after the server completes POST, but before the operating system starts. You can bypass the error or start one of the configuration utility programs. Press **Esc** to bypass the error and load the operating system. Press **F1** to start the Setup program. To start the SCU program, insert the diskette in the diskette drive and press **F1**. If the System Configuration Utility program resides on a hard disk drive, type SCU from the DOS prompt for the appropriate drive.

The Setup program and the System Configuration Utility program only configure the system hardware. These programs do not consider the requirements of the operating system or the application programs. See "Resolving Software Configuration Conflicts" on page 24 for additional information.

Resolving Hardware Configuration Conflicts:

Use the following information to help resolve hardware configuration conflicts:

1. Run the System Configuration Utility program to view and change the resources that are used by the system board functions. Record the current settings before making any changes. (See "Starting the System Configuration Utility Program" on page 62 for instructions.)
2. Determine which adapter or device is causing the error. Use the System Configuration Utility program

Change Configuration Settings selection to update system configuration information (.CFG) files. (See “Step 3: Change Configuration Settings” on page 63 for instructions.)

3. Change configuration resource allocations. Use the System Configuration Utility program Change Configuration Settings selection to view or change system board resource allocations. (See “Step 3: Change Configuration Settings” on page 63 for instructions.)

Jumpers and switches define the system resources that a device can use. If the settings are incorrect or set to use a resource that cannot be shared, a conflict occurs and the device remains deactivated. Use the System Configuration Utility program Switch/Jumper Settings selection to verify switches (see “Step 5: Switch/Jumper Settings” on page 64). If a change is required, see “System Board” on page 104. In addition, read the documentation that came with the device.

4. Change system board jumpers or switches. If a change is required, see “System Board” on page 104.
5. Remove the device or adapter. Some configurations are not supported (for example, you cannot operate the server with two ISA SVGA adapters installed).

Resolving Software Configuration Conflicts:

The memory-address space and interrupt levels (IRQs) used by some hardware options might conflict with addresses defined for use through application programs.

If there is a conflict, one or more of the following conditions might exist:

- The system cannot load the operating system.
- The system does not work.
- An application program does not operate, or it returns an error.
- Screen messages indicate a conflict exists.

You can resolve conflicts by changing either the software or the hardware configuration.

Note

Use the System Configuration Utility program Change Configuration Settings selection to view the addresses used by the system board functions and adapters. (See “Step 3: Change Configuration Settings” on page 63 for instructions.)

Changing the Software Configuration:

If a device driver is causing a memory-address conflict, refer to the operating-system documentation or the documentation supplied with the device drivers.

Ethernet Adapter Configuration (100/10 PCI)

The PC Server 704 - Type 8650 might come with an Ethernet adapter preinstalled as a standard feature. The adapter contains three LEDs visible from the back of the server that show the status of the connection, monitor read and write activity, and indicate a 100 Mbps connection. Refer to "Ethernet Adapter Troubleshooting (100/10 PCI)" on page 30 for more information.

During POST, the server automatically configures the Ethernet adapter.

The Ethernet Configuration and Drivers program comes with the system.

Note

You must use Category 5 cabling when operating the Ethernet adapter at 100 Mbps.

The Ethernet Configuration and Drivers program supports the following operating systems:

- OS/2 LAN Server
- DOS
- Windows 3.1
- Windows NT Server 3.51
- Novell NetWare 3.x and 4.1

Use the Ethernet Configuration and Drivers program each time you install an adapter. You can also use the program to isolate problems during troubleshooting.

Installing Multiple Adapters:

Repeat the configuration procedures for each adapter that you want to install. Even though the Ethernet Configuration and Drivers program can detect all the PCI adapters in your server, you must perform the installation process before you can use the adapter.

Testing the Adapter with a Responder on the Network:

The Ethernet Configuration and Drivers program can test the network more thoroughly if you have a responder on the network while running the tests.

1. Locate another workstation on the network with an Ethernet adapter installed.

2. Run the Ethernet Configuration and Drivers program for the adapter and set up the adapter as a responder.
3. Return to the server you want to test. Start the Ethernet Configuration and Drivers program and test the adapter.

Troubleshooting:

- Make sure that you are using the drivers that come with the adapter.
- If you are upgrading an existing adapter, make sure that the load and bind statements for a Novell Netware client are:
LINK DRIVER IBMFEODI.
- Make sure that you are using Category 5 cabling when operating at 100 Mbps.
- Check with the LAN administrator.

Configuring for Windows NT Server 3.51:

To configure the Ethernet adapter for the Windows NT Server 3.51 operating system:

1. Double-click the Network icon in the Control Panel.
2. Click the **Add Adapter** button.
3. Scroll to the end of the list and select **<Other> Requires disk from manufacturer.**
4. Insert the Ethernet Configuration and Drivers diskette in drive A and click **OK.**

The Ethernet Configuration and Drivers program automatically scans server resources and determines what resources were assigned to the adapter.

5. Click **Test.**

If you just added the adapter, the network driver will not be active and the diagnostics will test the adapter and its connection to the network.

If you are testing an adapter that has already been installed, the network driver will probably be active and the diagnostics will test the driver. This diagnostic tracks the actual network activity of the driver.

6. Click **OK** to accept the configuration.
7. Click **OK** in the Network Settings dialog and, when prompted, restart Windows NT Server 3.51.

Troubleshooting:

- Make sure that you are using the drivers that came with this adapter.
- Make sure that the driver is loaded and the protocols are bound. See the Network Bindings dialog box in Windows NT Server 3.51 to verify this.
- Make sure that you are using Category 5 cabling when operating at 100 Mbps.

- Test the adapter using the instructions in “Configuring for Windows NT Server 3.51.”
- Check with the LAN administrator.

Configuring for Other Operating Systems:

Refer to the help files on the Ethernet Configuration and Drivers program for instructions on configuring for other operating systems.

To view the help files, insert the Ethernet Configuration and Drivers diskette in drive A, and switch to that drive. At the operating-system prompt, type `SETUP \README`. Then, press **Enter**.

Select **Installing 100/10 PCI Ethernet adapter drivers**.

Duplexing:

Duplexing is a performance option that lets you choose how the adapter sends and receives packets over the network.

There are three duplex modes:

Full duplex The adapter sends and receives packets at the same time, increasing adapter performance. This mode requires a full-duplex hub.

Half duplex The adapter performs one operation at a time: it either sends or receives packets.

Auto-negotiate The adapter negotiates with the hub how to send and receive packets, either full or half duplex.

Configuring for Full-Duplex: If you have a hub that does not support auto-negotiation, manually configure the adapter for full-duplex support. Configuration is specific to the driver you are loading for your network operating system. Refer to Table 1 on page 28.

Note

You must set the adapter speed when configuring for full-duplex support. Do not leave the speed set to auto-negotiate.

Driver	How To Set Duplex Mode
Windows NT Server 3.51	Define the Setup program: <ol style="list-style-type: none"> 1. Click Network on the Control Panel 2. Click Configure. The Setup program runs. 3. Click Change. Set the speed to 100 Mbps or 10 Mbps. 4. Click Advanced. Set Duplex to Full.
Other Network Operating Systems	See the README file. To view the README files, insert the Ethernet Configuration and Drivers diskette, and type <code>SETUP \README</code> at the DOS prompt. Then, press Enter .

Table 1. Setting Duplex Mode

Fast Ethernet Cabling:

The 100BASE-TX specifications support 100 Mbps transmission over two or four pairs of twisted-pair Ethernet cabling. In two pair cabling, one pair of cables is used for transmission, and the second is used for reception and collision detection.

Because a 125 MHz frequency is used on the wire, 100BASE-TX uses Category 5 cabling.

Segment lengths are limited to 100 meters (328 feet) with 100BASE-TX for signal timing reasons.

Fast Ethernet Hubs:

New hubs are available to support a variety of Fast Ethernet LAN configurations. These hubs can be divided into two basic types: shared and switched. 100/10 PCI Ethernet adapters can be used with either type of hub for 10 Mbps or 100 Mbps operations.

Shared Hubs:

In a shared network environment, servers are connected to hubs. A repeater is built into each port of the hub. All ports of the repeater hub share a fixed amount of bandwidth, or data capacity. A 100 Mbps shared hub means that all nodes on the hub must share the 100 Mbps or bandwidth. As stations are added to the hub, the effective bandwidth available to any individual station becomes smaller.

All nodes must operate at the same speed, either 10 Mbps or 100 Mbps. Fast Ethernet repeaters provide 100 Mbps of available bandwidth, ten times more than what is available with a 10 BASE-T repeater.

Repeaters use a well-established, uncomplicated design, making them highly cost-effective for connecting workstations in a workgroup.

Switched Hubs:

In a switched network environment, each port uses a fixed, dedicated amount of bandwidth. Network bandwidth is not shared among all stations. Each new station added to the hub receives access to the full bandwidth of the network. Data is sent only to the port that leads to the correct workstation.

If a new workstation is added to a 100 Mbps switching hub, the new workstation receives its own dedicated, 100 Mbps link that does not affect the 100 Mbps bandwidth of other workstations. Switching hubs can effectively increase the overall bandwidth available on the network, significantly improving performance.

Ethernet Adapter Troubleshooting (100/10 PCI)

The following troubleshooting information is for problems that might occur when the Ethernet adapter is installed in the server.

Network Connection Problems:

If the adapter cannot connect to the network, check the following:

- Make sure the cable is installed correctly.
The network cable must be securely attached at all connections. If the cable is attached but the problem persists, try a different cable.
If you set the Ethernet adapter to operate at 100 Mbps, you must use Category 5 cabling.
If you directly connect two workstations (no hub), use a crossover cable.
- Check the LEDs on the rear of the Ethernet adapter.
The Ethernet adapter has three diagnostic LEDs beside the cable connector. These lights help indicate whether a problem exists with the connector, cable, or hub.
 - The LNK LED illuminates when the adapter receives a LNK pulse from the hub. If the LED is OFF, there might be a bad connector or cable, or a problem with the hub. The LNK LED is also OFF when you run the diagnostic tests in the Setup program.
 - The ACT LED illuminates when the adapter detects read or write activity on the network, even when there is no activity on the adapter. If the ACT LED is not on, make sure that the hub and network are operating and that the correct drivers are loaded.
 - The 100 LED illuminates when a 100 Mbps connection is established.
- Make sure that you are using the correct drivers.
- Check for operating system-specific causes for the problem.
- Test the adapter.

Select **Test adapter** from the Main Menu on the Ethernet adapter Configuration and Drivers diskette. How you test the adapter depends on which operating system is being used. (see "Ethernet Adapter Configuration (100/10 PCI)" on page 25).

Ethernet Adapter Troubleshooting Chart (100/10 PCI)

You can use the following troubleshooting chart to find solutions to problems that have definite symptoms.

Adapter Problem	Action
The Setup program reports the adapter's interrupt as "0" or "255."	The PCI BIOS is not configuring the adapter correctly.
The Setup program reports "No PCI Bus."	The PCI BIOS is not configuring the adapter correctly.
Workstation stops running when loading drivers	Change the PCI BIOS interrupt settings.
LNK LED does not light	Check the following: <ul style="list-style-type: none">• Make sure you have loaded the network drivers.• Check all connections at the adapter and the hub.• Use another port on the hub.• If you forced the duplex mode, make sure that you also force the speed to either 10 or 100.• Make sure that the hub port is configured for the correct speed (10 Mbps or 100 Mbps).• If you manually configured the duplex mode, make sure that you manually configure the speed also. See "Installing Multiple Adapters" on page 25 for more information.
The ACT LED does not light.	Check the following: <ul style="list-style-type: none">• Make sure that you have loaded the network drivers.• The network might be idle. Try sending data from this workstation.• Use another Ethernet adapter.
Data is corrupted or sporadic.	Make sure that you are using Category 5 cabling when operating at 100 Mbps.

Adapter Problem	Action
The Ethernet adapter stopped working when another adapter was added to the server.	Check the following: <ul style="list-style-type: none"> • Make sure that the cable is connected to the Ethernet adapter. • Make sure that your PCI system BIOS is current. • Reseat the adapter.
The adapter stopped working without apparent cause.	Check the following: <ul style="list-style-type: none"> • Reseat the Ethernet adapter or try a different connector. • Reinstall the drivers. • Use a different Ethernet adapter.

Installing Additional Test Programs

You can add other test programs to the Diagnostic Diskette. These other programs are usually provided on the diskette that comes with a device. After you add the programs to the Diagnostic Diskette, you can include information from the programs in the Test Log.

Before the test programs can find these programs to run as the User Diags test group, information about them must be included in a file called USERDIAG.CFG. This is an ASCII text file. It must include the following three items for each test to run:

- Program Name (.COM and .EXE files only)
- Test Description of the test to be run
- Command-line parameters to be passed to the program identified in the first item of this list

Notes:

1. All of the information for a given test must be on a single line, and a semicolon (;) must separate the items on the line.
2. Make sure you press **Enter** at the end of each line of text in the USERDIAG.CFG file. This creates a carriage return line feed (CR LF) which is necessary for the User Diagnostics to be found and executed.
3. If the program executable file is in a directory other than the QA directory (or other directory you have designated to contain the QA files), that directory must be listed in the PATH= section of the AUTOEXEC.BAT.
4. You can use a .CFG file other than USERDIAG.CFG if you use the command line "USRCONFIG=*filename*," when running the diagnostic programs. For example, you might use: QAPLPRO /USRCONFIG=MYTESTS.CFG.

USERDIAG.CFG Example:

An example USERDIAG.CFG file might look like the following:

Program Name	Test Description	Command-Line Parameter
BBSMODEM.EXE;	9600 Baud 5 Line Modem;	5
TEST1.EXE;	Generic 1;	
TEST2.EXE;	Generic 2;	
TESTALL.EXE;	CMD 1;	1
TESTALL.EXE;	CMD 2;	2
TESTALL.EXE;	CMD 3;	3

Note: You can have more than one command-line parameter for any given test.

When you view these tests on the Test Group window for the User Diag test group, they appear as follows:

- (◆) 9600 Baud 5 Line Modem
- (◆) Generic 1
- (◆) Generic 2
- (◆) CMD 1
- (◆) CMD 2
- (◆) CMD 3

The diagnostic program automatically assigns a test number to each test. The test numbers start at 201 and continue upward as needed. The numbers for the tests listed above are as follows:

- 202 9600 Baud 5 Line Modem
- 203 Generic 1
- 204 Generic 2
- 205 CMD 1
- 206 CMD 2
- 207 CMD 3

Microprocessor Option Installation Instructions

Complete the following four steps install this option.

Step 1. Updating the System BIOS

- a. Shut down the operating system.
- b. Press **Ctrl+Alt+Del** to restart the system. The system BIOS level is displayed on the system front panel during the power-on self-test (POST) for about 30 seconds. An example of the system BIOS that is displayed is 1.00.05CD0.

Important

If the system BIOS is at the same level or higher than the BIOS update diskette that comes with the option (check the version number on the diskette), you *do not* need to update the system BIOS. Go to “Step 2. Installing the Plug-In Module” on page 34.

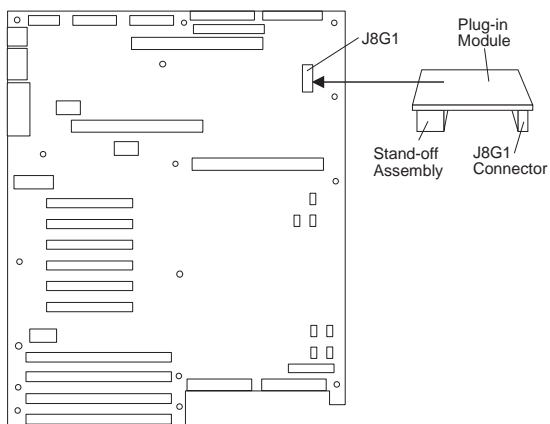
If the system BIOS is at a lower level than the BIOS update diskette that comes with the option, continue with step 1c.

Do not install a system BIOS that is at a lower level than your system BIOS.

- c. Insert the *PC Server 704 BIOS Update Diskette* that comes with the option into diskette drive A.
- d. Press **Ctrl+Alt+Del** to restart the system. Follow the on-screen prompts to update the system BIOS.
- e. When the system BIOS update is complete, remove the diskette from the diskette drive, and go to “Step 2. Installing the Plug-In Module.”

Step 2. Installing the Plug-In Module

- a. Shut down the operating system and power-off the server.
- b. Unplug the system power cords.
- c. Disconnect all external system cables and connectors.
- d. Remove the side cover.
- e. Remove the internal board-support panel.
- f. Locate connector J8G1 on the system board. (Refer to the following illustration.)



If there is a plug-in module already installed in connector J8G1, go to “Step 3. Installing the Microprocessor” on page 35.

If the plug-in module has not been installed, continue with step 2 g.

- g. Remove the memory board.
- h. Remove the secondary processor board.
- i. Remove the primary processor board (if you are adding, replacing, or upgrading a microprocessor on the primary processor board).
- j. *Do not* remove the adhesive backing from the stand-off assembly yet. Using light pressure, insert the plug-in module into connector J8G1 with the stand-off assembly towards the rear of the system.
- k. While the plug-in module is temporarily installed, note the area of the system board contacted by the stand-off assembly.
- l. Remove the plug-in module from connector J8G1. Use a lint-free, soft, dry cloth to clean all dust from the area where the stand-off assembly contacts the system board.
- m. Remove the adhesive backing from the bottom of the stand-off assembly and reinstall the plug-in module into connector J8G1.
- n. Using both thumbs, apply pressure evenly to the plug-in module for about 5 seconds.
- o. Go to “Step 3. Installing the Microprocessor.”

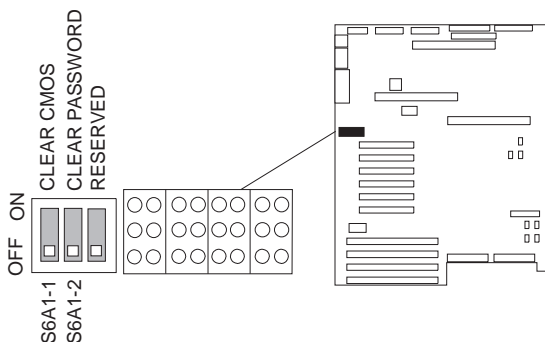
Step 3. Installing the Microprocessor

- a. If you have not already done so, perform steps 2 a through 2 i, then return here.
- b. Install the microprocessor on the processor board.
- c. Reinstall the primary processor board (if removed).
- d. Reinstall the secondary processor board.
- e. Reinstall the memory board.
- f. Reinstall the internal board-support panel.
- g. If you updated the system BIOS, go to “Step 4. Clearing CMOS” on page 36.
If you did not update your system BIOS, continue with step 3 h.
- h. Reinstall the side cover.
- i. Reconnect the system power cords.
- j. Reconnect all external system cables and connectors.
- k. Power-on the server.

The option installation is complete.

Step 4. Clearing CMOS: If you updated the system BIOS in “Step 1. Updating the System BIOS” on page 33, you must complete the following steps to clear CMOS.

- a. Locate the configuration switches on the system board.



- b. Slide switch S6A1-1 to On.
- c. Reinstall the side cover.
- d. Connect the power cords to the system.
- e. Power-on the server, then wait for POST to complete.

The POST error message

NVRAM cleared by jumper

shows POST is complete and CMOS is cleared.

- f. Power-off the server.
- g. Disconnect the power cords from the system.
- h. Remove the side cover.
- i. Slide switch S6A1-1 to Off.
- j. Reinstall the side cover.
- k. Reconnect the system power cords.
- l. Reconnect all external system cables and connectors.
- m. Run the system configuration utility program to restore the system configuration. See “Configuration” on page 19.

The option installation is complete.

Option Diskettes

An optional device or adapter might come with a diskette. Option Diskettes usually contain diagnostic files or configuration files that the system needs to recognize and activate the option.

If the optional device or adapter was shipped with an Option Diskette, you might need to install some configuration (.CFG) files or diagnostic files (.EXE or .COM). See “System Configuration Utility Program” on page 60 for instructions on installing the configuration or

see “Installing Additional Test Programs” on page 32 for installing diagnostic files.

Power Supply Checkout (LED Status Descriptions)

After powering-on the server, check the power supply indicators to verify that the power supplies are working correctly. The following table describes these indicators and shows how they work together to highlight the possible power supply conditions that the server might generate.

Power supply OK	Power supply current OK	Power Supply Status Indicator Descriptions
On	On	Power on and OK.
Off	On	Power supply failure.
Off	Off	Power supply failure due to an overload condition.
On	Off	The power supply current is low. The server load is too light for the load balance failure circuitry to operate.

For additional power supply information see “Specifications (Power Supply to Power Distribution Board Interface)” on page 55.

SCSISelect Utility Program

Note

For disk-array models, use the Configuration diskettes that came with the RAID adapter to view or change SCSI settings for attached devices.

The SCSI controllers have built-in menu-driven configuration utility programs that allow you to view and change SCSI settings.

You can use the SCSISelect Utility programs to:

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

This section gives an overview of the SCSISelect Utility program. Refer to the *Server SCSI Software User's Guide* for more information.

Starting the SCSISelect Utility Program:

You can access this program when you start the server. During system startup, the IBM PC Server screen appears briefly and then disappears. The following prompt is displayed:

<<< Press <CTRL><A> for SCSISelect™ Utility!
>>>

Press **Ctrl+A** when you see this prompt.

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 **F5** to switch between color and monochrome modes (if your monitor permits). To change the current settings of the items displayed in the menus, follow the directions on the screen.

SCSISelect Utility Main Menu: This menu allows you to select the SCSI channel (A or B) on which you want to configure or view devices. Refer to the following table for a description of the choices on this menu.

Option	Description
Bus:0Bh	Select this option to configure the SCSI devices on SCSI Channel A.
Bus:0Ch	Select this option to configure the SCSI devices on SCSI Channel B.

SCSISelect Utility Bus:Device Options

Menu: To view or change the SCSI controller settings, select **Configure/View Host Adapter Settings**. Refer to “Configure/View Host Adapter Settings” on page 40 for information about the Configuration menu.

To see the IDs assigned to each SCSI device or to format a drive connected to one of the built-in SCSI controllers, select **SCSI Disk Utilities**. Refer to “SCSI Disk Utilities” on page 41 for information about the SCSI disk utilities.

Refer to the following table for information on the choices on this menu.

Option	Description
Configure/View Host Adapter Settings	Select this option to display the Configuration menu.
SCSI Disk Utilities	Select this option to display the SCSI Disk Utilities menu.

Configure/View Host Adapter Settings: To view or change the SCSI controller settings, select **Configure/View Host Adapter Settings** from the Bus:Device Options menu and follow the directions on the screen. Refer to the following table for a description of the choices on this menu.

Option	Description
SCSI Bus Interface Definitions	
Host Adapter SCSI ID	Changes the SCSI ID of the SCSI controller from its default value of 7.
SCSI Parity Checking	Enables or disables parity checking on the SCSI controller. The default value is <i>Enabled</i> .
Host Adapter SCSI Termination	Configures SCSI controller termination. The default value is <i>Low ON/High ON</i> .
Additional Options	
Boot Device Options	<p>Displays the Boot Device Configuration menu, which allows you to select a Boot Target ID and a Boot LUN Number.</p> <p>The default boot device is at SCSI ID 0 with logical unit number (LUN) 0. To specify a different boot device, choose a different SCSI ID (0–7 for 8-bit adapters or 0–15 for 16-bit adapters).</p> <p>If the boot device has multiple logical units, also specify the boot LUN. It can be 0–7 for 8-bit or 16-bit.</p> <p>If you disable Multiple LUN Support in the Advanced Configuration menu, specifying a number for Boot LUN Number has no effect.</p>

Option	Description
SCSI Device Configuration	Displays the Configuration menu to allow you 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	Displays the Advanced Configuration Options menu from which you can enable or disable options such as BIOS Support for Bootable CD-ROM, BIOS Support for Int13 Extensions, Support for UltraSCSI Speed, and Multiple LUN Support.

SCSI Disk Utilities: To see the IDs assigned to each SCSI device or to format a drive connected to one of the built-in SCSI controllers, select **SCSI Disk Utilities** from the Bus:Device Options 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: If the server did not come with a RAID adapter preinstalled, you can format the hard disks 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.

Note

If the server came with a RAID adapter preinstalled, refer to the RAID adapter documentation for instructions to format the hard disk drives.

When To Use the Low-Level Format Program:

Use the Low-Level Format program:

- When you are installing software that requires a low-level format
- When you get 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 up all of the files, see the operating-system documentation.

Starting the Low-Level Format Program

Attention:

The low-level format programs provided with the server erase all data from the hard disk drive. Before you run a low-level format program, be sure to back up the data.

Note

Refer to the RAID adapter documentation for instructions for performing a low-level format on a hard disk drive attached to the PCI RAID adapter.

1. If the hard disk is working, make a backup copy of all the files and programs on the hard disk.
2. Select **SCSI Disk Utilities**.
3. Select the disk drive that you want to format; then, press **Enter**.
4. Select **Format disk**; 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, have the system serviced.

5. To install an operating system, refer to the information provided with the ServerGuide package and with the operating system.

SCSI Drives

Some drives have a special design called *small computer system interface*, or “SCSI.” This design allows you to attach multiple drives to a single SCSI-2 connector.

Note

Any information about SCSI drives also applies to other SCSI devices, such as scanners and printers.

The non-disk-array models come with two integrated SCSI-2 controllers on the system board. Each SCSI-2 controller supports a SCSI-2 connector on the system board. The server comes with a 16-bit cable attached to each of the SCSI-2 connectors; each cable connects to the 16-bit, wide connector on one of the SCSI backplanes. The non-disk-array models come with a 3-drop, SCSI

narrow cable that has two connectors available for attaching additional devices.

The SCSI CD-ROM drive that comes with the server connects to the 8-bit SCSI narrow connector on the upper SCSI backplane.

The disk-array models come with a RAID adapter, which provides two additional SCSI-2 connectors. The number of preinstalled SCSI hard disk drives might vary according to model. The disk-array models come with two integrated SCSI-2 controllers on the system board. Each SCSI-2 controller supports a SCSI-2 connector on the system board. The server comes with a 16-bit cable attached to each of the SCSI-2 connectors on the RAID controller; each cable connects to the 16-bit, wide connector on one of the SCSI backplanes. Also, disk-array models come with a 4-drop, SCSI narrow cable, which is already attached to the CD-ROM drive and the integrated SCSI-2 controller on the system board. This cable has three connectors available for attaching additional devices.

SCSI IDs:

Each SCSI device that is connected to the integrated SCSI-2 controllers needs a unique identification (ID) so that the controllers can identify the devices and ensure that different devices do not attempt to transfer data at the same time. To set IDs for SCSI devices, refer to the instructions that come with those devices.

The SCSI ID for the preinstalled CD-ROM drive is set to 5. The SCSI ID for the backplane is set to 6. The SCSI ID for the SCSI-2 controller is set to 7. The server automatically sets SCSI IDs for hot-swap drives, according to the jumper settings on the SCSI-2 backplanes. If you need to set SCSI IDs for SCSI devices, refer to the instructions that come with these devices.

The server uses the SCSI IDs to send status information to the indicator lights above each hot-swap bay.

Jumpers on each backplane control the SCSI IDs for the bays. To resolve any SCSI ID conflict that might occur, you can change the default ID addresses of the drives by changing the jumper settings on the SCSI backplane. Each SCSI ID must be unique for each drive that you connect to a given backplane.

Each of the two SCSI backplanes in the server supports six of the hot-swap bays. The top six hot-swap drives connect to the upper backplane. The lower six drives connect to the lower backplane. In each set of two rows, the drives are numbered 1 to 6.

Table 2 on page 44 shows the SCSI IDs that you can use for hot-swap drives.

Table 2. SCSI IDs for Hot-Swap Drives

J3	J4	HD1	HD2	HD3	HD4	HD5	HD6
1-2	1-2	0	1	10	3	4	13
1-2 ¹	2-3 ¹	0	1	2	3	4	5
2-3	2-3	8	9	2	11	12	5
2-3 ²	1-2 ²	8	9	10	11	12	13

¹ Factory default setting for ARRAY models.
² Factory default setting for Non-ARRAY models

The processing sequence for SCSI devices is set through the SCSISelect Utility program (refer to the *Server SCSI Software User's Guide* for more information). The sequence proceeds from the lowest SCSI ID to the highest (0 to 6, then 8 to 15).

Termination (Internal SCSI Devices):

The devices at both ends of the SCSI bus must be terminated. If you attach SCSI devices (internal or external), you must terminate the last device in the chain.

Note

All of the preinstalled hot-swap drives in the server have automatic termination.

If you attach internal SCSI devices to one of the SCSI-2 internal connectors in a non-disk-array model, you must terminate the last internal device on the bus (cable) and disable the termination on the other devices connected to the internal SCSI controller. The SCSI-2 controller is already terminated.

Refer to the instructions that came with the SCSI device for more information about termination. Refer to the *User's Reference* for additional information about the server's SCSI subsystem.

SCSI Drive Status Indicator Descriptions (LEDs):

You can locate a faulty hot-swap hard disk drive by checking the status indicators above each of the 12 drive bays. Refer to the following table.

SCSI drive present, power on green LED	SCSI drive active green LED	SCSI drive faulty amber LED	Description and required action (if necessary)
On	Off	Off	The drive is present with power.

SCSI drive present, power on green LED	SCSI drive active green LED	SCSI drive faulty amber LED	Description and required action (if necessary)
On	Blinking	Off	The drive is present with power, and is being accessed.
Off	Off	On	You might need to replace the drive. A steady SCSI drive faulty indicator means that the drive has a problem. The drive has no power.
On	Off	Slow blinking	Do <i>not</i> replace the drive. A slowly blinking SCSI drive faulty indicator means that the drive has just been replaced and is in recovery mode (that is, the disk array is being rebuilt). The drive has power.
Off	Off	Off	There is no drive installed in the bay. If a drive is installed but the LEDs are off, check the cable connections to the backplane.

Termination (Internal SCSI Devices):

The devices at both ends of the SCSI bus must be terminated. If you attach SCSI devices (internal or external), you must terminate the last device in the chain.

Note

All of the preinstalled hot-swap drives in your server have automatic termination.

If you attach internal SCSI devices to one of the SCSI-2 internal connectors in a non-disk-array model, you must terminate the last internal device on the bus (cable) and disable the termination on the other devices connected to the internal SCSI controller. The SCSI-2 controller is already terminated.

Notes

- A 16-bit cable connects the backplane to the SCSI-2 controller.
- A 16-bit to 8-bit SCSI Internal Converter is used to connect the CD-ROM drive to the 16-bit cable.
- The external SCSI-2 connector requires a 68-pin external cable connector.
- A CD-ROM drive is installed in bay A2. In non-disk-array models the CD-ROM drive is terminated.

Refer to the instructions that come with the SCSI device for more information about termination.

Security

Several security measures described in the *User's Reference* to control access to the server can be implemented, including password protection.

Passwords: Two types of passwords are available with the PC Server 704. These are the administrator and user passwords. Both passwords can be set using the Setup program and the System Configuration Utility program.

Enter Password appears on the screen to prompt you. (The passwords do not appear on the screen as you type them.) If you enter the wrong password, Enter Password appears again. After three incorrect attempts, you must Power-off the server and start again.

Note

Any combination of up to seven characters (A–Z, a–z, and 0–9) can be for your administrator password. For additional security, the user and administrator passwords should not be the same.

The following table summarizes the levels of security with the different levels of password protection.

Type of Password	Results
No password set	<ul style="list-style-type: none">• No password required to start system.• No password required to access the System Configuration Utility program and Setup program.• User can access all System Configuration Utility program functions.• Secure mode is not functional.

Type of Password	Results
User password only	<ul style="list-style-type: none"> • User must enter password to complete the system startup. • Password required to access the System Configuration Utility program, Setup program, and disable secure mode. • User can access all System Configuration Utility program functions.
Administrator password only	<ul style="list-style-type: none"> • No password required to start system. • Password required to access Setup program. • User can access the System Configuration Utility program, but password is required to access sensitive SCU functions. • Secure mode is not operational.
Administrator <i>and</i> user passwords	<p>User must enter either password to complete the system startup.</p> <ul style="list-style-type: none"> • User must enter either password to access System Configuration Utility program, or Setup program. • Administrator password required to access sensitive SCU functions. • User password required to disable secure mode.

The administrator password can be set in the Setup program before the system is configured. This will help secure the configuration data by restricting access to some System Configuration Utility program functions. The following explains how to define the administrator password.

Administrator Password:

If an administrator password is set, it must be entered to use System Configuration Utility functions that allow you to change configuration data. Before setting an administrator password, you must first set the selectable drive-startup sequence, as described in “Setting the Selectable Drive-Startup Sequence” on page 49.

If an administrator password is set and then forgotten, the password can be cleared from memory using a system board configuration switch. Refer to “Clearing All Passwords (Switch S6A1-2)” on page 49 for more information.

To set an administrator password in the Setup program, do the following.

1. Start the Setup program.
2. Select **Set Administrator Password** from the Security Menu screen.

The **Set Administrator Password** screen appears.

3. Type a password in the **Enter New Password** data field.

Note

To remove an administrator password, press **Enter** when the **Enter New Password** data field is blank.

4. Press **Enter**.

The cursor moves to the **Confirm New Password** data field.

5. To verify that you typed the correct password, type the password in the **Confirm New Password** data field. If you did not type the correct password, you must re-enter the password in the **Enter New Password** data field. Return to step 3.
6. If you typed the correct password, press **Enter** to save it.

The password becomes effective immediately after you save it.

User Password:

A user password is not required but helps to protect the information that is stored in the server and allows you to enable secure mode. It also allows you to write-protect the boot sector of a hard disk drive. Write-protecting the boot sector is a form of virus protection.

If a user password is set and then forgotten, it can be cleared from memory using a system board configuration switch. Refer to "Clearing All Passwords (Switch S6A1-2)" on page 49 for more information.

To set a user password in the Setup program, do the following.

1. Start the Setup program.
2. Select **Set User Password** on the Security Menu screen.

The **Set User Password** screen appears.

3. Type the password in the **Enter New Password** data field.
4. Press **Enter**.

The cursor moves to the **Confirm New Password** data field.

5. To verify that you typed the new password correctly, type the password in the **Confirm New Password** data field. If you did not type the correct password, you must re-enter the password in the **Enter New Password** data field. Return to step 3.
6. If you typed the correct password, press **Enter** to save it.

The password becomes effective immediately after you save it.

Clearing All Passwords (Switch S6A1-2):

Setting the password switch to On clears the administrator and user passwords.

When the password switch is set to Off, the default, you can enter an administrator or user password, or both.

To clear the administrator and user passwords, do the following.

1. Power-off the system.
2. Remove the bottom processor board.
3. Locate the configuration switches on the system board.
4. Slide switch S6A1-2 to On.
5. Replace the bottom processor board.
6. Connect the power cords to the server and the monitor.
7. Power-on the server and the monitor; then, wait for POST to complete. This automatically clears the administrator password.
8. Power-off the server and the monitor.
9. Disconnect the power cord from the server and monitor.
10. Remove the bottom processor board.
11. Slide switch S6A1-2 to Off.
12. Replace the bottom processor board.
13. Complete the installation.
14. Run the System Configuration Utility to specify a new administrator password, user password, or both (see "Security" on page 46).

Setting the Selectable Drive-Startup Sequence

Selectable drive startup (accessed from the **Boot Options** selection on the Main Menu screen) allows you to control the startup sequence of the drives in the server. Each time the server is powered-on, it checks the drives as it looks for the operating system. The order in which the system checks the drives is the drive-startup sequence.

The default drive-startup sequence first checks the primary diskette drive for a self-starting (bootable) diskette. If one is present, the operating system or program is loaded from the diskette. If not, the system then checks the primary hard disk drive for an operating system. If one is present, it loads the operating system from that hard disk drive.

If the system is started from a diskette, the drive that contains the diskette becomes drive A, regardless of the defined sequence, and the first hard disk drive that you select in the startup sequence becomes drive C.

To switch the startup sequence of the diskette drives, use the **Floppy Options** selection in the System Configuration Utility program Main Menu screen.

To change the startup sequence, do the following.

1. Start the System Configuration Utility program.
2. Select **Change Configuration Settings**.
3. Scroll through the settings and locate the Boot Subsystem Group; then, follow the instructions on the screen.

Secure Mode:

Secure mode secures the system against unauthorized use. In secure mode, keyboard and mouse input is inhibited if the keyboard and mouse remain inactive for a predetermined amount of time. Also, the **Num Lock**, **Caps Lock**, and **Scroll Lock** indicator lights blink. The user password must be entered to gain access to the system.

Note

A user password must be set before secure mode can be enable

Refer to the following table for information on the options available for the secure mode.

Options	Description
Hot Key Option	Specify a set of keyboard commands that will place the system immediately into secure mode.
Lockout Timer	Specify a keyboard and mouse inactivity time-out period of 1 to 128 minutes (in one minute increments). If the timer is enabled, and no keyboard or mouse activity occurs for the specified period, keyboard and mouse input is inhibited.
Secure Boot Mode	When this option is enabled, it disables the keyboard and mouse after POST completes and the operating system has loaded. Enter the user password to unlock the keyboard and mouse.
Video Blanking	Specify if secure mode will cause the monitor to blank out.
Floppy Writes	Specify if writing to a diskette when the system is in secure mode is enabled or disabled.

Setup Program

The Setup program stores configuration values in nonvolatile random-access memory (NVRAM) and in the battery-backed memory of the real-time clock. Entries made in the System Configuration Utility program overwrite the entries in the Setup program.

Much of the system configuration is performed through the System Configuration Utility program, not the Setup program. Because the System Configuration Utility program resides on diskette, you must enable the diskette drive before using the System Configuration Utility. After configuring the system, the configuration can be secured against casual or unauthorized access by running the Setup program to disable the diskette drive.

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

Review this section and the information that came with the device before making changes. Also, record the current settings before making any changes.

Changing Settings:

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 advance through the items on the screen. Change selections by first advancing to the item that you want to change; then, use the plus key (+) or minus key (-) to make the change.

To access menu-bar selections within the Setup program, use the Right Arrow (→) or Left Arrow (←) keys.

The Setup program consists of the following menu bar selections:

Main	Set system Time and Date or change configuration settings for diskette drives.
Advanced	View the settings of integrated peripherals, and identify the type and speed of the processors.
Security	Set passwords
Help	Scroll to any screen choice, the Item Specific Help panel is displayed. General help information is available by pressing F1 .

Starting the Setup Program:

To access the Setup program:

1. Remove all diskettes from the server.
2. Power-on the server and watch the screen. Be ready to act quickly.

3. Immediately after the system initialization procedure begins and before the IBM logo screen appears, the system prompts you to Press <F1> if you want to run SETUP. As soon as you see that prompt, press **F1**. If the Setup program screen does not appear, restart the system and try again.

Note

If a configuration error occurs, a prompt appears before the operating system starts (see "Configuration Conflicts" on page 23).

4. If a user or administrator password is set, the system prompts you to enter it. If both passwords are set, you can enter either one.
5. Follow the instructions on the screen to view or change the configuration.
You must *correctly* exit from the Setup program to save the configuration information.
6. Press **Esc** or move the cursor to the **Exit** option on the menu bar.
7. Select **Exit** from the menu bar.
8. Select **Exit Saving Changes**.

Recording and Restoring Default Settings:

If a printer is attached to the server, you can use the **Print Screen** key to print the configuration settings. The default settings are helpful when installing additional options. Also, record the new settings each time that you make changes. Have the customer record the current configuration settings in the 'Device Record' of the customer's *PC Server 704 User's Handbook*. Default settings are easily restored using the Setup program.

To restore default settings, do the following.

1. Power-on the server.
2. Press **F1** to enter the Setup program.
3. Select **Exit** from the menu bar.
4. Select **Load Setup Defaults**.

Disabling the Diskette Drive:

To disable the diskette drive do the following.

1. Power-on the server.
2. Press **F1** to enter the Setup program.
3. Select **Main** from the menu bar.
4. Select **Floppy Options**.
5. Select the drive you want to disable.
6. Press **Esc** or move the cursor to the **Exit** option on the menu bar.
7. Select **Exit** from the menu bar.
8. Select **Exit Saving Changes**.

Software-Generated Error Messages

These 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 software package information that was shipped with the server.

Specifications (Environmental)

- Temperature
 - System on: +5° to +35° C (+41° to +95° F); derated 0.5° for every 1000 ft (305 m) above sea level
 - System off: -40° to +70° C (-40° to +157° F)
- Humidity
 - System on: 85% noncondensing at +40° C <33° wetbulb (at 40° C ambient) (no peripherals)
 - System off: 95%, noncondensing at 55° C (131° F)
- Thermal shock
 - System-off: -40° to 70° C (-40° to 158° F)
- Random vibration
 - System off:
 - 7 to 8 Hz, 0.001 to 0.01 G² per Hz
 - 28 to 500 Hz, 0.01 G² per Hz Random input, 0.01 g²/Hz at 5 Hz, sloping to 0.02 g²/Hz from 20 Hz to 500 Hz.
- Mechanical shock
 - System off: 30.0 G (with cosmetic damage)
 - System on: 2.0 G with 11 msec duration, 1/2 sine wave 50 g, 11 ms, 1/2 sine Not applicable
- Altitude
 - System off: 0 to 50,000 ft (15,240 m)
 - System on: 0 to 50,000 ft (15,240 m)
- Electrostatic discharge
 - System on: Tested to 20 KV
- Acoustic noise
 - Less than 45 dBA at +65° to =75° F
- Safety
 - UL 1950
 - CSA 22.2 No. 950 by TUV
 - IEC 950 by TUV
 - EN 60950 and Nordic deviations by NEMKO
- Electromagnetic emissions
 - Certified to FCC 47 Class B; Test's, CISPR 22/85 Class B, EN 55022: Registered with VCCI
- Immunity
 - Verified to comply with EN 50082-2

Specifications (Power Supply to Power Distribution Board Interface)

DC Power Connectors from Power Supply to J9A, J9B, J9C on Backplane

Pin Position	Description
1, 6	Ground
7	+3.3 Vdc
8	+12 Vdc
9	-12 Vdc
10	-5 Vdc
11, 12	+5.1 Vdc
13, 17	Ground
18, 19	+3.3 Vdc
20, 21	+12 Vdc
22, 24	+5.1 Vdc

Power Control and Status Signals from Power Supply to J8A, J8B, J8C on Backplane

Pin Position	Description
1	+5.1 Vdc remote sense (+)
2	+ 12 Vdc remote sense (+)
3	+3.3 Vdc remote sense (+)
4	Ground remote sense (-)
5	+5 Vdc load share
6	+12 Vdc load share
7	+3.3 Vdc load share
8	PON
9	Vbias
10	+5 V standby
11	FAULT
12	Ground
13	Power-Good
14, 15	Not connected

Power Backplane (J6 and J7), Power to System Board:

J9 and J10 have identical pinouts, and their connection to the baseboard is interchangeable.

Pin Position	Signal
1	+5V
2	Ground
3	+5V
4	Ground
5	+5V
6	Ground
7	+5V
8	Ground
9	+5V
10	Ground
11	+12V
12	Ground
13	+12V
14	Ground
15	+3.3V
16	Ground
17	+3.3V
18	Ground
19	+3.3V
20	Ground

Power Backplane (J11), Power Control Signal to System Board

Pin Position	Signal
1	-12 Vdc
2	-5 Vdc
3	Power-on
4	I ² C_SDA
5	I ² C_SCL
6	+5V remote sense (+)
7	+12V remote sense (+)
8	+5V standby
9	Ground
10	Power-good
11	Ground
12	I ² C_PRES
13	+3.3V remote sense (+)
14	Ground remote sense (-)

Power Backplane (J1, J2), to SCSI Drive Backplane (J10)

Pin Position	Description
1, 3	+12 Vdc
4, 9	Ground
10, 12	+5 Vdc

Power Backplane, I²C Input Definitions:

The power supply backplane has a single I²C device to detect status and presence from each power supply. The device is connected through the power control signal connectors J11 and J10 to the I²C circuit on the system board and the SCSI hard drive backplane. The address of the device is 44h.

Power Backplane (J3, J4, J5), Power to System Peripherals

Pin Position	Description
1	+12 Vdc
2, 3	Ground
4	+5.1 Vdc

Power Backplane Fan Connections (J12, J13)

Pin Position	Description
1	Ground
2	+12 Vdc Channel B
3	Fan fail

Specifications (Power Supply)

Description	Specification
DC power	+3.5 V @ 15 A +5.1 V @ 32 A +12 V @ 16 A -5 V @ 0.25 A -12 V @ 1 A 5 V standby @ 100 mA
AC line voltage (autoranging)	100-120 V ac 200-240 V ac

Current Sharing Maximum Output per Voltage

Number of supplies	+3.3V	+5V	+12V	-5V	-12V
1	15 A	32 A	16 A	0.25 A	1 A
2	28 A	60 A	30 A	0.25 A	1 A
3 (redundant)	28 A	60 A	60 A	0.25 A	1 A

System BIOS

The system BIOS is stored in nonvolatile memory (NVRAM) in a flash EPROM device. You can easily update the BIOS without replacing the device. The two procedures are:

- “System BIOS Normal Update Procedure”
- “System BIOS Recovery Procedure”

A BIOS update always updates Setup, the onboard Video BIOS, and the SCSI BIOS. Language files will be overwritten by a BIOS update. If a custom language file has been created for the system, you must flash in the custom file again after updating the BIOS. The user binary area is untouched by a system BIOS update.

System BIOS Normal Update Procedure: To update the system BIOS, do the following.

1. Copy the files from the BIOS Update diskette to a bootable DOS diskette.
2. Insert the bootable BIOS Update diskette into drive A; then, reboot the system. The update process starts automatically after the system reboots.
3. Follow the displayed prompts, including a final reboot.

Note

Updating the BIOS does not clear CMOS. You must clear CMOS and reset nonvolatile memory to the factory defaults, see “Configuration Switches” on page 106.

System BIOS Recovery Procedure: The recovery operation automatically updates the main system BIOS only. Video is not initialized, and the keyboard is disabled. Because there is not screen display, you will need to listen for the following audible status signals.

Audible Beeps	Description
1	Signals beginning of recovery process; process takes 2 to 4 minutes.
2	Signals successful completion of recovery process with no errors.
4	System could not boot from the diskette. Diskette may not be bootable.

Audible Beeps	Description
Continuous series of low beeps (like a buzz)	<p>Any or all of the following causes:</p> <ul style="list-style-type: none"> • The wrong BIOS recovery files are being used • Configuration switch allowing BIOS Recovery mode is in the wrong position. • Configuration switch allowing BIOS Write to flash memory is in the wrong position. • One or more system BIOS FMUP files are corrupt or missing.

Note

If the BIOS of an add-in board is mapped to any part of the E0000H range, you must either map it to another area before beginning a recovery procedure or physically remove the board from the system.

To run the BIOS recovery procedure, do the following.

1. If you have not already done so, copy the BIOS Update diskette files to a bootable DOS diskette.
2. Power-off the system.
3. On the system board, move the J6A1 BIOS Recovery jumper from pins 1 and 2 to pins 2 and 3. See “BIOS Recovery Jumper (J6A1)” on page 107.
4. Insert the Flash Memory Update diskette (the bootable DOS diskette you copied the update files to) in drive A; then, power-on the system. You will hear a single initial beep that is part of the normal system start-up process.
5. You will hear two beeps when the process is successfully completed. If the process is not successful, you will hear a different beep pattern. Refer to the preceding table.
6. Make sure the diskette drive activity light is off. Power-off the system.
7. At J6A1, remove the BIOS Recovery jumper from pins 2 and 3, and place it back on pins 1 and 2.
8. Remove the FMUP diskette from drive A.
9. Power-on the system and check the BIOS version number against what you intended to flash in.

System Configuration Utility Program

The System Configuration Utility program provides a convenient method to configure various system settings. This program automatically configures system adapters and maintains system parameters. Because the System Configuration Utility program assigns system resources, conflicts between adapters are less likely to occur. In most cases, the server operates using the configuration default settings.

If a conflict does occur, see “Configuration Conflicts” on page 23.

You must use the System Configuration Utility program anytime you want to change resource allocations, such as:

- Adding, deleting, or moving ISA or EISA devices
- Resolving conflicts
- Maintaining security functions
- Adding or removing memory

The System Configuration Utility program automatically configures PCI devices, Plug and Play devices, and system memory.

Each time you use the System Configuration Utility program to configure the server, the configuration information is saved to the nonvolatile random-access memory (NVRAM) and in a backup file (with an extension of *.CMS*). Only devices that are installed and configure correctly appear on the System Configuration Utility program screens.

Review this section and the information included with the devices you are adding before making changes. Also, record the current settings (see “Recording the SCU Program Settings” on page 65) before making any changes. The values you enter using the System Configuration Utility program override the entries in the Setup program.

A screen similar to the following appears when you start the SCU program.

```
SYSTEM CONFIGURATION UTILITY, Release x.xx

      Step 1: About System Configuration
      Step 2: Add and Remove Boards
      Step 3: Change Configuration Settings
      Step 4: Save Configuration
      Step 5: View Switch/Jumper Settings
      Step 6: Exit
```

```
[Select=ENTER] [Exit=ESC] [Help=F1]
[Utilities=F9]
```

In most cases, the server will operate using the default settings, and you need to change the settings only to resolve configuration conflicts or to enable or change device function (for example, define the drive startup sequence).

Use the following commands to navigate through the screens and make selections:

Action	Press Key	Use Mouse
Change between major menus	← or →	Click on menu items
Highlight an item	↑ or ↓	Point to an item
Select an item	Enter	Double-click left mouse button
End activity without changing configuration	ESC	Click on Exit
Get help	F1	

Backing Up the SCU Program Diskette:

Use an operating system command, such as the DOS DISKCOPY command, to make a *complete* backup copy of the System Configuration Utility program diskette. Using the backup copy can prevent damage to the original diskette. The operating system documentation provides information on backing up diskettes.

Starting the System Configuration Utility Program:

To access the System Configuration Utility program, do the following.

1. Insert the backup copy of the System Configuration Utility program diskette into the diskette drive a and reboot the server.

The system begins the power-on self test. If the user password is set, the system prompts you to enter it.

Notes

If a user password is set, you *must* enter it to access the System Configuration Utility program. If a user and administrator passwords are set, you can enter either one.

If a configuration error occurs, a prompt appears before the operating system starts (see “Configuration Conflicts” on page 23).

2. Press **Enter** when the SCU title screen appears.
3. Follow the instructions on the Main Menu screen to view or change the configuration. Refer to “Utilities” on page 64 for information on the SCU utilities accessible from this screen.

Step 1: About System Configuration:

Select **About System Configuration** for an overview of the program. You can select from a menu for specific information about each function.

You can also press **F1** for on-line Help information while performing a configuration function.

Step 2: Add and Remove Boards

Note

If the administrator password entry prompt appears, you *must* enter it to access the selection.

Select **Add and Remove Boards** to add, remove, or move any adapter. The System Configuration Utility program automatically detects and adds most adapters. This step provides a list of all correctly configured devices. Press **F6** to add ISA devices to the configuration.

The server requires configuration files to correctly configure ISA and EISA adapters. You *must* copy the configuration file, which has a file-name extension of *.CFG*, from the device diskette to the System Configuration Utility program diskette before installing the device in the server.

If administrator password is set, the system prompts you to enter it.

If an administrator password is not set, the system prompts to set an administrator password. You can press **Esc** to continue using the System Configuration Utility program without setting an administrator password.

Step 3: Change Configuration Settings

Note

If the administrator password entry prompt appears, you *must* enter it to access the selection.

After adding adapters, select this choice to change the configuration, if necessary. If you change a setting in this step, you might need to change a switch or jumper setting on the system board or on a device. See "System Configuration Utility Default Settings" on page 66 for a listing of the default values.

All settings will remain in the default position if you do not use this selection to change the configuration.

If an administrator password is not set, the system prompts you to set an administrator password. You can press **Esc** to continue using the System Configuration Utility program without setting an administrator password.

Advanced Options:

Press **F9** to display the Advanced Options Menu screen. This screen provides options to display configuration data. You can select the following choices:

Option	Description
Global Resource Map	Lists allocated resources.
Board Details	Provides details on the adapter highlighted on the Change Configuration Settings screen.
System Details	Displays configuration data on the entire system and its present state of configuration.
Physical Board ID	Lists the identifiers of adapters physically installed in the system.

Step 4: Save Configuration

Note

If the administrator password entry prompt appears, you *must* enter it to access the selection.

This choice saves the configuration settings to nonvolatile random-access memory (NVRAM) and in a backup file (with an extension of *.CMS*).

Note: Be certain you want to save this configuration data, because once you select this choice, the save process begins immediately.

If you set an administrator password and you have not used the Add and Remove Boards, or Change Configuration Settings choices during this session, the system prompts you to enter it.

If an administrator password is not set, the system prompts to set an administrator password. You can press **Esc** to continue using the System Configuration Utility program without setting an administrator password.

Step 5: Switch/Jumper Settings:

Select **View Switch/Jumper Settings** to display the current settings of switches and jumpers on any adapter that is switch or jumper configurable.

Utilities:

The **Utilities** choice controls some aspects of how the system generates configuration data. For example, you can have the System Configuration Utility program prompt the user to manually add boards. Press **F9** from the Main Menu screen to access the Utilities screen.

Press the **space bar** to select an option. Refer to the following table for information on the choices on this menu.

Options	Description
Remote Mode	Configure a computer other than the computer you are using.
Advanced/Dealer Mode	Maintain settings not typically set by an average user.
Force New Configuration	Generate all new configuration data for PCI devices. If not selected, the system uses the existing configuration settings.
Load CFG Files Manually from Directory List	Prompt the user to add boards manually.
Ignore ID Mismatches	Select to have the System Configuration Utility program load configuration data for all adapters, even adapters physically present during the last configuration but not now present.

Step 6: Exit: This choice exits the System Configuration Utility. If you have changed configuration settings, you can optionally press **F10** to restart the system so that the new settings take effect. Otherwise, press **Enter** to exit the System Configuration Utility program.

Recording the SCU Program Settings: The configuration settings should be recorded for future reference. If a printer is attached to the server, you can use the **Print Screen** key to print these settings. Also the new settings should be recorded each time you make changes. Have the customer record the configuration settings in the tables in 'Device Record' of the customers *PC Server 704 User's Handbook*.

System Configuration Utility Default Settings

The following are the System Configuration Utility program settings at the time it was shipped. The settings may have been changed by the customer.

Menu Options	Default Value
System Group	
System Identification and Version Information	
System Identification String	None
Config and Overlay Version	
BIOS Version String	
MP Sec. Version	1.1
System Processor Status	
1st Processor Status, Module 1	No Failures detected
2nd Processor Status, Module 1	No failures detected
3rd Processor Status, Module 2	No failures detected
4th Processor Status, Module 2	No failures detected
System Performance	
Power-on Speed	Fast
Secondary IOAPIC control	Disable
Memory Subsystem	
Base Memory Option	640 KB
Shadowing ISA ROMs Options	(Menu)
Extended Memory Options	(Menu)
Peripheral Configuration Group	
Automatic Configuration	Enable
Onboard Disk Controllers	
Onboard Floppy Controller	Enable
Onboard Communications Devices	
Serial Port 1 Configuration	Serial Port 1 Address and IRQ
Serial Port 2 Configuration	Serial Port 2 Address and IRQ
Parallel Port Configuration	Parallel Port Address and IRQ
Parallel Port Mode	Parallel port mode
Parallel Port DMA	Valid only with ECP mode
Floppy Subsystem Group	
Floppy drive A Options	Size and capacity
Floppy drive B Options	Size and capacity
Language Support Group	
Language Support options	Languages supported
Keyboard/Mouse Subsystem Group	
NumLock Options	Off at Boot
Typematic Speed	Auto
Mouse Control Option	Autodetected
Console Redirection	
COM port for redirection	Disable
Baud rate	115.2k
Hardware Flow Control	None
Terminal Type	ANSI
Security Subsystem	
Administrator Password	Disable
User Password	Disable
Hot-Key Option	Disable
Lockout Timer	10 min.
Secure Boot Mode	Disable

Menu Options	Default Value
Video Blanking	Disable
Boot Subsystem Group	
First Startup Drive	Diskette Drive
Second Startup Drive	Hard Disk 0
Third Startup Drive	Boot disabled
Fourth Startup Drive	Boot Network
Display "<F1> for Setup" message during POST	Enable
Require user interaction on POST errors	Disable
SCSI ROM BIOS Options Group	
SCSI A ROM scan	Enable
SCSI B ROM scan	Enable
LCD	
LCD	Enable
LC Display String Before OS Boot	Default
Management Subsystem	
Temperature/Voltage Limit Control	(Menu)
A to D Channel Enable Switch	(Menu)
Speaker Options	Enable
Scan user flash area	Disable
System Management Options	
System Management Mode	Disable
SMM time stamp Source	POST capture
Event Logging	Disable
Reserve VGA resources	Reserve VGA memory

Options	Default Value
Flash EEPROM Revision Level	_____
System Board Identifier	_____
System Serial Number	_____
BIOS Date	_____
Video Setup	
Video Controller	SVGA
Video Memory	512 KB

The following table shows the defaults for system memory and extended memory that was shipped with the system.

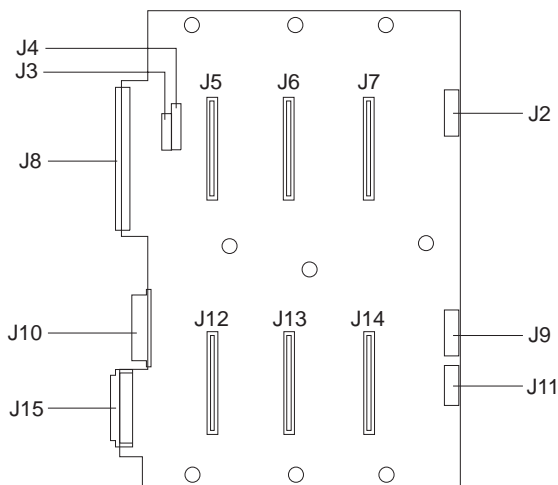
Option	Default Value
System Memory	640KB
Extended Memory	360KB
Bank 1 socket 1	16MB (Non RAID and Disk Array models) 32MB (Open bay models)
Bank 1 socket 2	16MB (Non RAID and Disk Array models) 32MB (Open bay models)
Bank 1 socket 3	16MB (Non RAID and Disk Array models) 32MB (Open bay models)
Bank 1 socket 4	16MB (Non RAID and Disk Array models) 32MB (Open bay models)
Bank 1 socket 5	16MB (Disk Array models)
Bank 1 socket 6	16MB (Disk Array models)
Bank 1 socket 7	16MB (Disk Array models)
Bank 1 socket 8	16MB (Disk Array models)
Bank 2 socket 1	
Bank 2 socket 2	
Bank 2 socket 3	
Bank 2 socket 4	
Bank 2 socket 5	
Bank 2 socket 6	
Bank 2 socket 7	
Bank 2 socket 8	

Locations

The following information supports the PC Server 704 - Type 8650.

- “Backplane Connectors” on page 70.
- “Backplane Configuration Jumpers” on page 71.
- “Bays” on page 74.
- “Board Support Panel” on page 75.
- “Controls (Front)” on page 76.
- “Controls and Features (Back)” on page 76.
- “Cover (Front Bezel)” on page 77
- “Cover (Side)” on page 78.
- “Cover (Top)” on page 79.
- “Diskette Drive (3.5-Inch)” on page 80.
- “Diskette Drive Tray” on page 80.
- “Drive (SCSI-2)” on page 81.
- “Drive Tray (5.25-Inch)” on page 83.
- “Drive Tray (Hard Disk)” on page 83.
- “EMI Shield and Filler Panels (5.25-Inch Drive Bays)” on page 84.
- “Fans” on page 86.
- “Front Panel Control Board” on page 89.
- “Front Panel Control Board Interface” on page 90.
- “Indicator Lights (Front)” on page 91.
- “Intrusion Alarm Switch and Cable” on page 92.
- “Liquid Crystal Display” on page 93.
- “Memory Board” on page 94.
- “Memory Configurations” on page 95.
- “Memory SIMM” on page 95.
- “Power Supply” on page 96.
- “Power Supply to Power Distribution Board Interface” on page 97.
- “Power Supplies and Pad Locks” on page 99.
- “Processor Assembly” on page 99.
- “Processor Boards” on page 100.
- “System Board” on page 104.

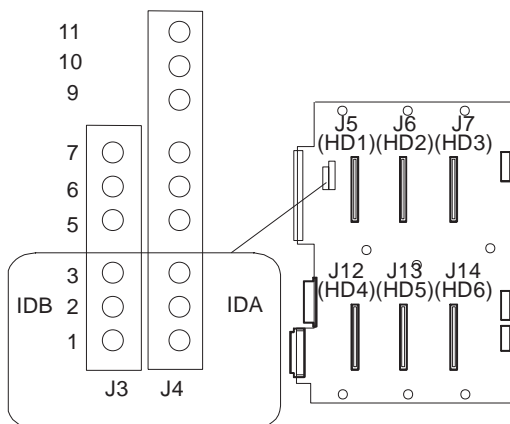
Backplane Connectors



- J2** LED cable connector for drives 1, 2, 3
- J3, J4** Drive ID and configuration jumper blocks
- J5** Wide SCSI bay drive 1
- J6** Wide SCSI bay drive 2
- J7** Wide SCSI bay drive 3
- J8** Narrow SCSI cable, output
- J9** LED cable connector for drives 4, 5, 6
- J10** Power and ground from power distribution board and power supply
- J11** I²C bus connector
- J12** Wide SCSI drive bay 4
- J13** Wide SCSI drive bay 5
- J14** Wide SCSI drive bay 6
- J15** Wide SCSI cable connector, input from channel A or B

Backplane Configuration Jumpers

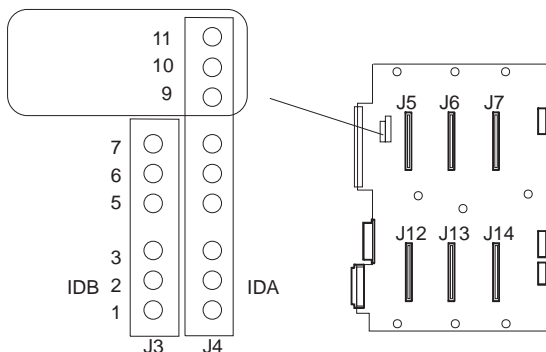
SCSI Drive ID, J3 and J4



Jumper Pins		SCSI ID of Drive					
J3, IDA	J4, IDB	HD 1	HD 2	HD 3	HD 4	HD 5	HD 6
1-2	1-2	0	1	10	3	4	13
1-2 ¹	2-3 ¹	0	1	2	3	4	5
2-3	2-3	8	9	2	11	12	5
2-3 ²	1-2 ²	8	9	10	11	12	13

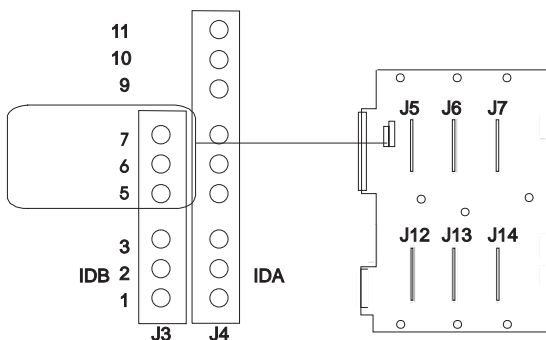
¹ Factory default setting for ARRAY models.
² Factory default setting for Non-ARRAY models

SCSI Flash Update Jumper, J4



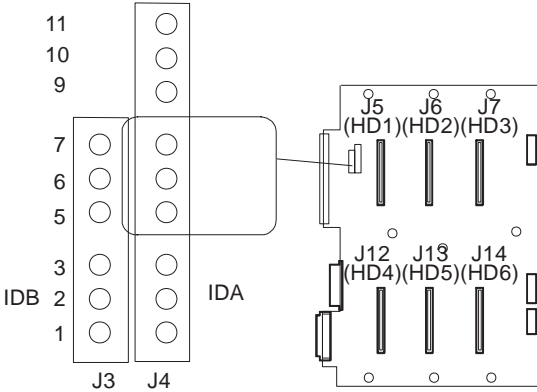
Jumper Pins	Description
10-11	Reserved
9-10 ¹	Normal
¹ Factory default setting.	

External Backplane Jumper



Jumper Pins	Description
6-7	Reserved
5-6 ¹	Internal backplane (backplane is installed in the server)
¹ Factory default setting.	

Secondary Jumper, J4

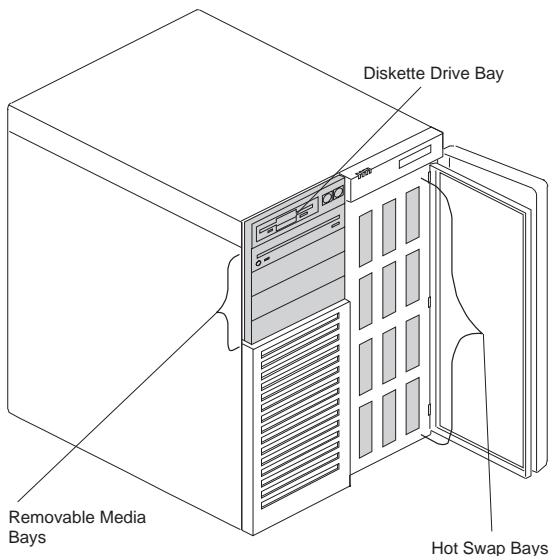


Note

When more than one backplane is installed in the server, the backplane in the upper position is jumpered as primary and the backplane in the lower position is jumpered as secondary.

Jumper Pins	Description
6-7	Secondary
5-6 ¹	Primary
¹ Factory default setting.	

Bays



The server comes with one 3.5-inch, 1.44 MB Diskette drive, and a SCSI CD-ROM drive. (1 MB equals approximately 1 000 000 bytes.) The number of preinstalled hard disk drives in the server varies according to the model.

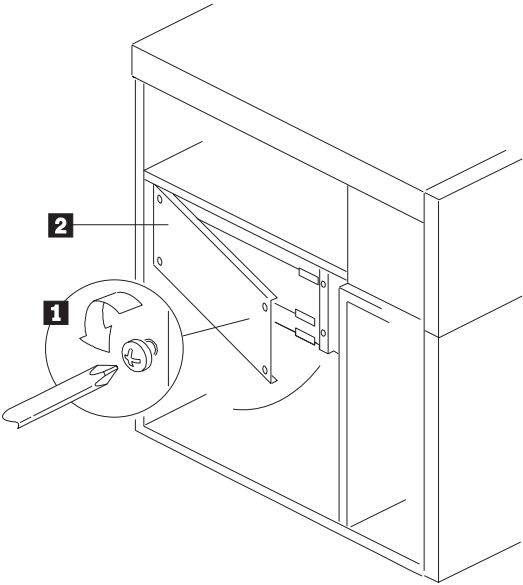
CD-ROM Drive: All models come with a SCSI-2 CD-ROM drive.

Diskette Drive: The 3.5-inch, 1.44 MB diskette drive uses 1 MB and 2 MB diskettes.

Open Bays: Accommodates up to 12 hot-swap, 3.5-inch hard disk drives. There is additional open space in the top left bay for three removable-media drives, such as diskette or tape backup.

Hard Disk Drive: The number, capacity, and location of the hard disk drives vary, depending on your model.

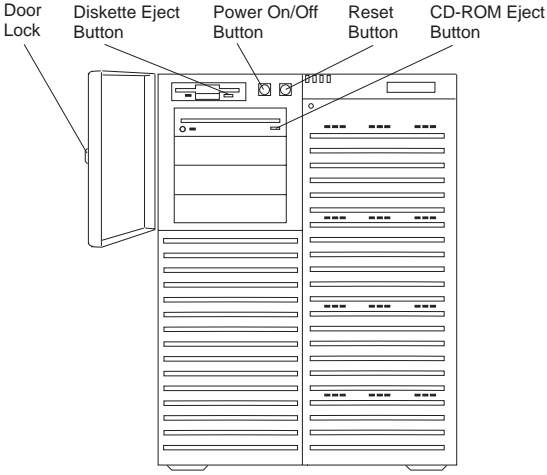
Board Support Panel



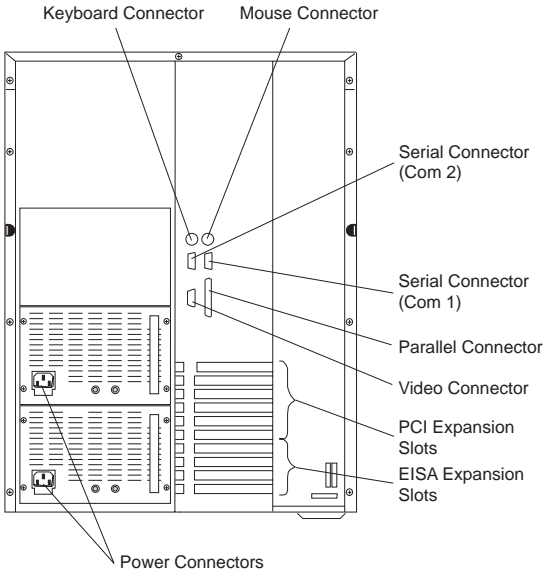
- 1**
- 2**

Screws
Support panel

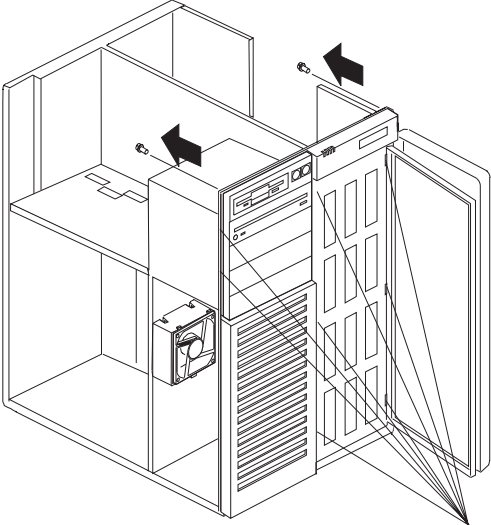
Controls (Front)



Controls and Features (Back)



Cover (Front Bezel)

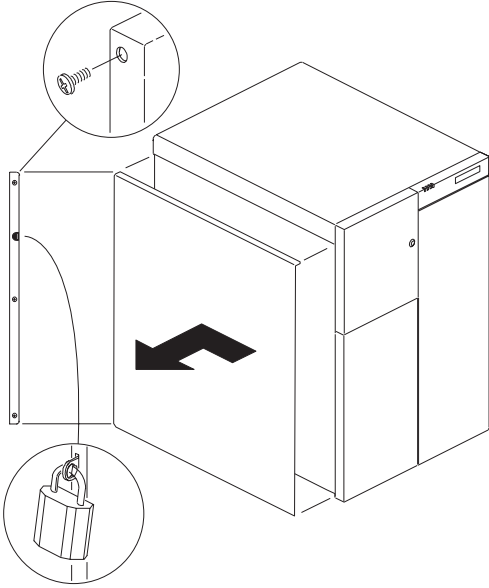


Depress Clips (8 Places)

Cover (Side)

Attention

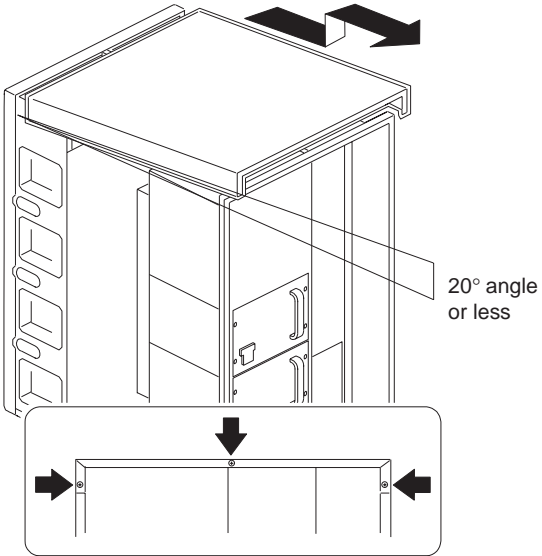
- For proper cooling and airflow, always replace the side covers before powering-on the system.
- The procedure for both side covers are the same.



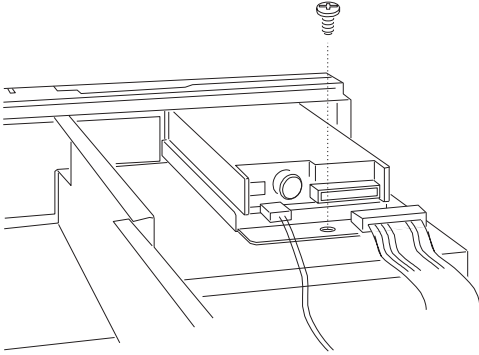
Cover (Top)

Attention

You must remove both side covers before you can remove the top cover.

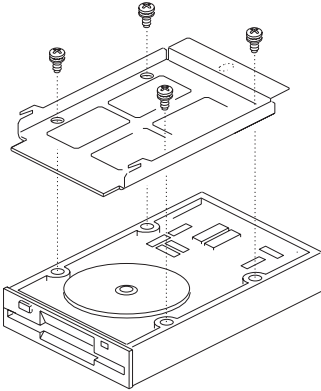


Diskette Drive (3.5-Inch)

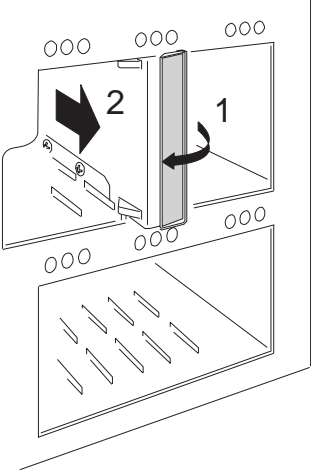


Diskette Drive Tray

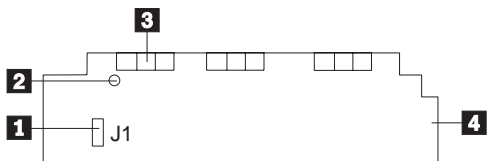
(Bottom View)



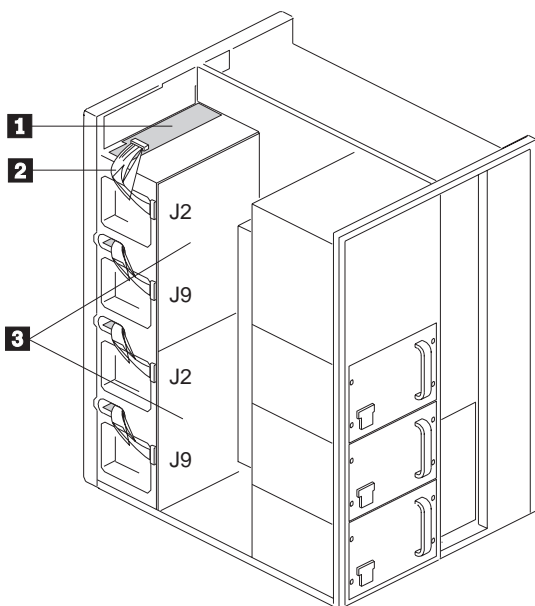
Drive (SCSI-2)



SCSI Drive Status LED Board

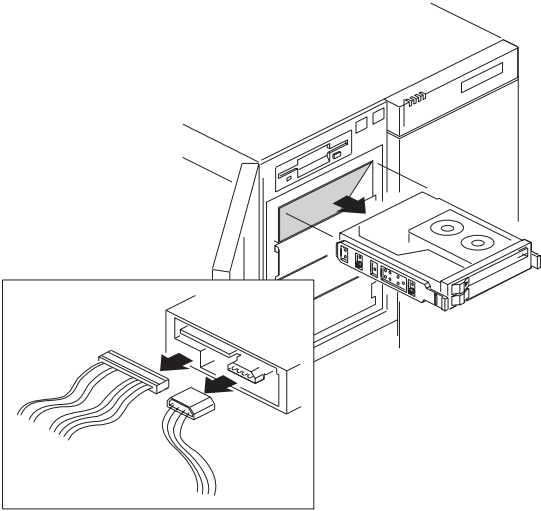


- 1** J1, cable to SCSI backplane
- 2** Hole for standoff
- 3** Status LEDs (three sets of three); insert board so these appear in slots in front EMI panel
- 4** End facing slot in center divider



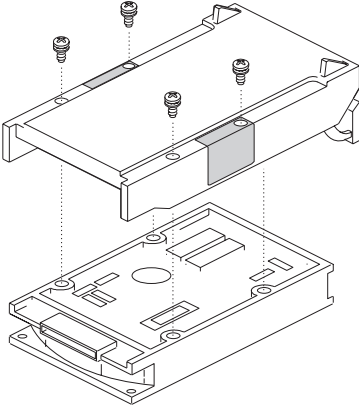
- 1** Status LED board (one board over each row of SCSI drives)
- 2** Cable from J1 on status LED board to J2 or J9 on SCSI backplane (one for each board)
- 3** SCSI backplanes, upper and lower

Drive Tray (5.25-Inch)



Drive Tray (Hard Disk)

(Bottom View)

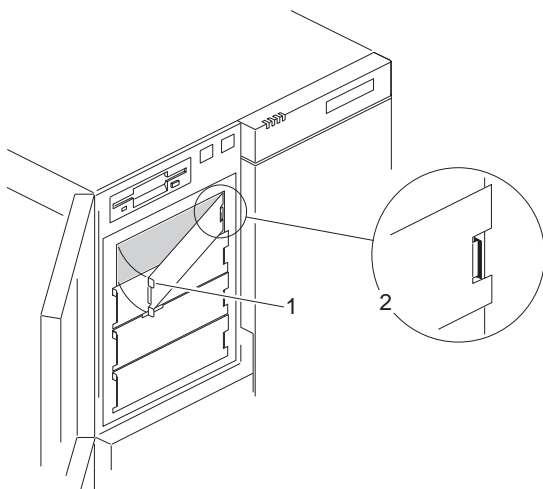


EMI Shield and Filler Panels (5.25-Inch Drive Bays)

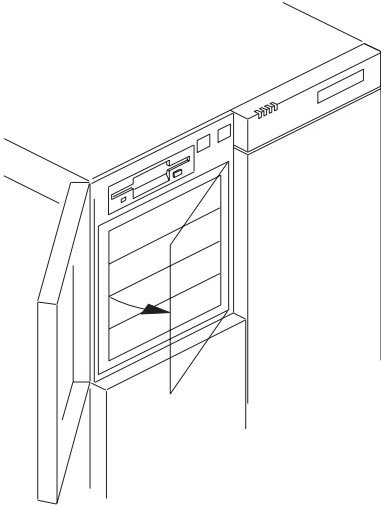
Note

System EMI integrity and cooling are both protected by having drives installed in the bays or filler panels and EMI shields covering the bays. When drives are installed in the 5.25-inch drive bays, the filler panels and EMI shields should be saved in case the drives are later removed.

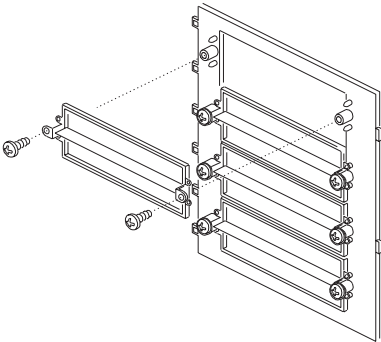
EMI Shield



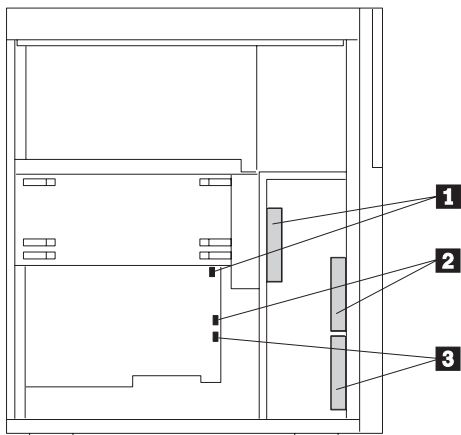
Filler Panel Frame



Filler Panel



Fans



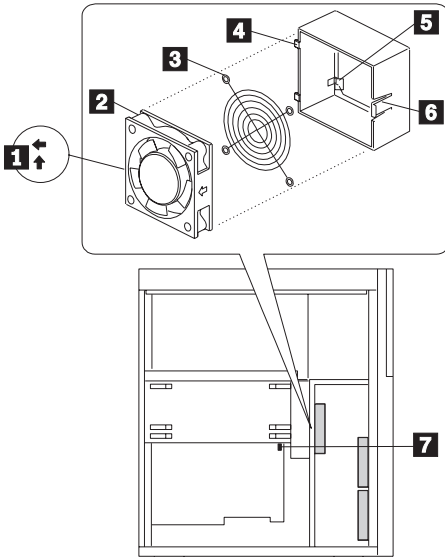
- 1** Inner chassis fan, connects to Fan 2 header on system board.
- 2** Outer chassis fan (upper), connects to Fan 3 header on system board
- 3** Outer chassis fan (lower), connects to Fan 4 header on system board

Inner Chassis Fan

Note

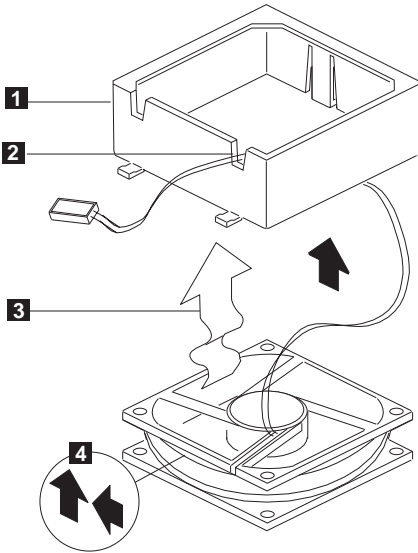
The fan bracket assembly is not held together with screws. As you remove the assembly from the chassis, do not let the parts fall.

1. Press the release tabs on the side of fan bracket. Rotate the assembly outward from until the tabs on the opposite side of the bracket clear the slots in the chassis.
2. Lift the fan out of the bracket, pulling up the cable around the grill.



- 1** Airflow direction arrows on side of fan, center label on fan facing back of chassis
- 2** Inner chassis fan
- 3** Protective grill
- 4** Hinge tabs on inner edge of bracket
- 5** Slot in bracket for routing power cable (and through grommets hole, not shown, beyond inner edge of bracket)
- 6** Bracket release tab
- 7** Fan 2 header on system board

Outer Chassis Fan

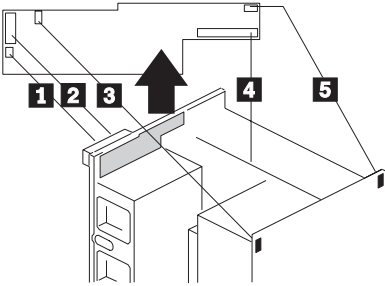


- 1**
- 2**
- 3**
- 4**

Bracket oriented as shown
Power cable routed through slot
Wavy arrow indicates airflow direction
Airflow direction arrows embossed on side of fan

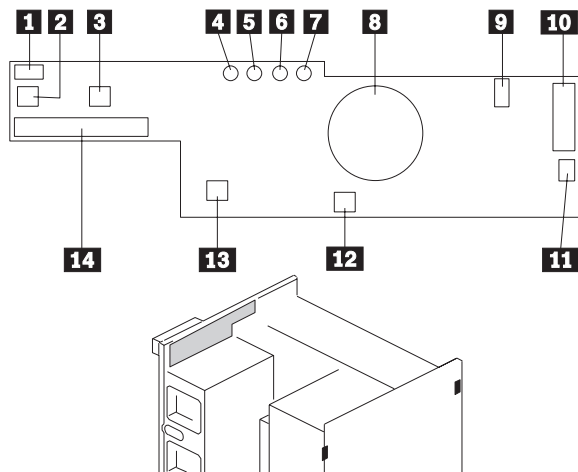
Front Panel Control Board

1. Remove the two screws. The board is now held in place by a pop-on/off snap.
2. Hold the board by the top edge or upper corners. Pull it slightly toward the back of the chassis to release the snaps. Carefully lift it up and out of the chassis.



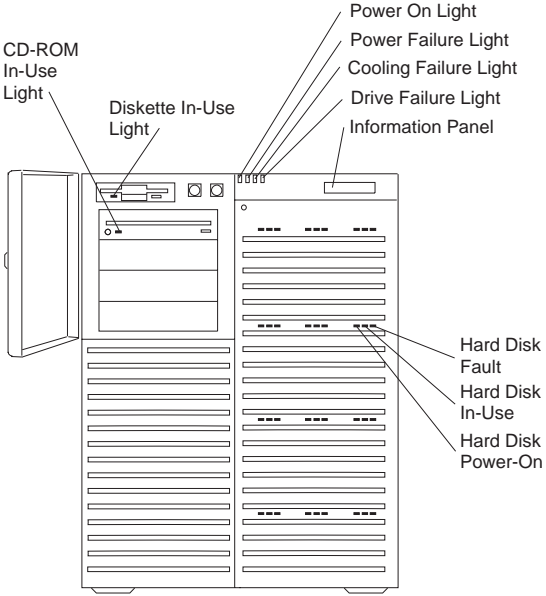
- 1** J14, power cable to the liquid crystal display (LCD), 3-pin connector
- 2** J12, signal cable to the LCD 14-pin connector
- 3** J5, signal cable to intrusion switch at back corner above the power supplies, 3-pin connector
- 4** J11, signal cable to system board, 40-pin connector (pin 17 removed)
- 5** J2, signal cable to intrusion switch at back corner above board cage area, 3-pin connector

Front Panel Control Board Interface



- 1** Signal from C2 switch at back edge near card cage (3-pin right-angle latching-style connector)
- 2** Power switch
- 3** Reset switch
- 4** Power-on LED, green
- 5** Power-fail LED, amber
- 6** Cooling-fail LED, amber
- 7** Drive-fault LED, amber
- 8** Speaker
- 9** Signal from intrusion switch at back edge near power supplies (3-pin right-angle latching-style connector)
- 10** Signal interface to the LCD
14-pin straight-head connector
- 11** Power to the LCD (3-pin straight-head connector latching-style connector)
- 12** Hard drive bay C2 switch
- 13** NMI switch
- 14** Signal interface to system board
40-pin straight-head connector (pin 17 removed)

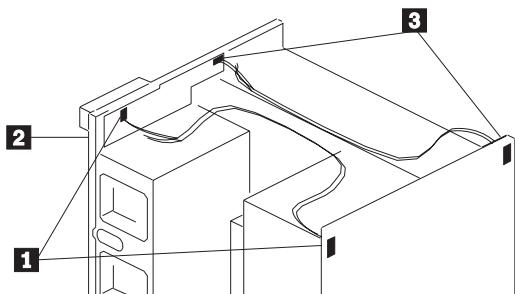
Indicator Lights (Front)



Intrusion Alarm Switch and Cable

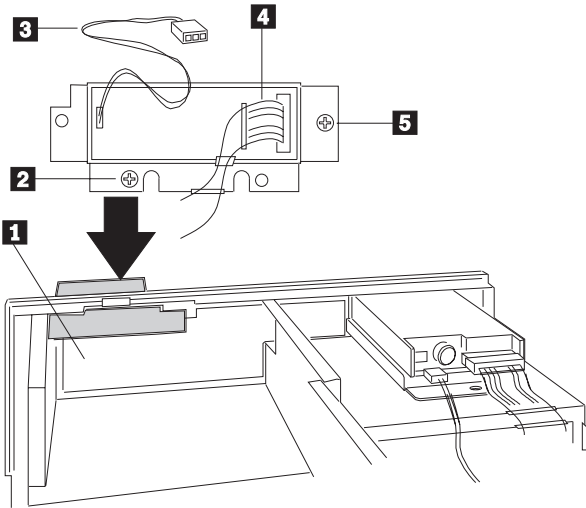
Note

Cables are on the front-facing side of the front panel control board.



- 1** Connector J5 on the front panel control board; switch located at the back near the power supply.
- 2** Connector J2 on the front panel control board; switch located at the back above the board cage area.
- 3** EMI door switch location (not shown); direct contact no cable.

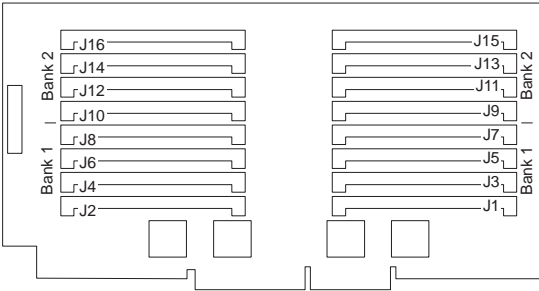
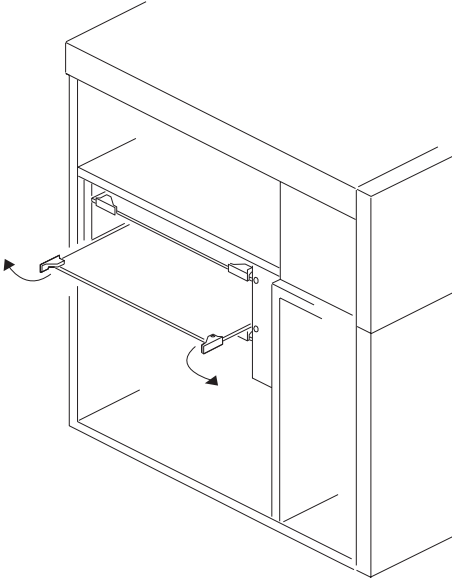
Liquid Crystal Display



- 1** Front panel control board
- 2** Two screws on LCD carrier
- 3** Backlight power connector from LCD to control board
- 4** Signal connector from LCD to control board
- 5** Mounting Screw

1. Remove screws that secure the liquid crystal display (LCD) to the chassis.
2. From inside the chassis, pull the carrier back out of opening.
3. To remove the LCD from the carrier, pry out the four plastic rivets that secure the display board to the carrier.
4. Put the replacement LCD on the carrier, and secure the carrier with four plastic rivets.
5. From inside the chassis, place the carrier assembly back in the chassis opening. Make sure the carrier flanges make good contact with the chassis around the opening. (You may need to spread the flanges out a little.)
6. Reinstall the two screws to secure the carrier to the chassis.

Memory Board

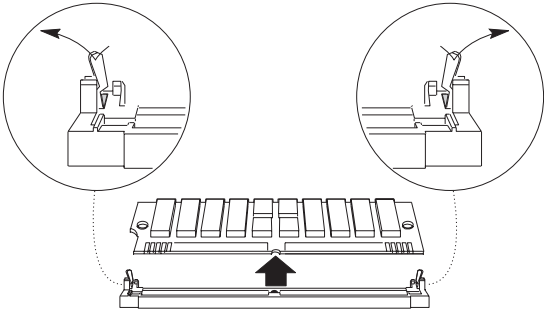


Memory Configurations

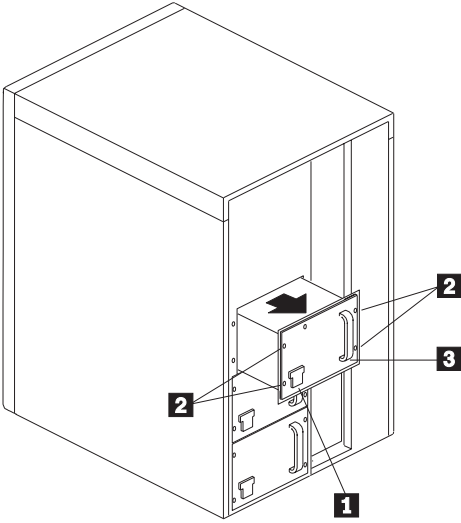
The PC Server 704 - Type 8650 supports the following memory configurations.

Bank 0	Bank 1
16MB SIMM X 4	No memory installed
16MB SIMM X 8	No memory installed
16MB SIMM X 8	16MB SIMM X 8
16MB SIMM X 8	32MB SIMM X 8
32MB SIMM X 4	No memory installed
32MB SIMM X 8	No memory installed
32MB SIMM X 8	16MB SIMM X 8
32MB SIMM X 8	32MB SIMM X 8
64MB SIMM X 4	No memory installed
64MB SIMM X 8	No memory installed
64MB SIMM X 8	64MB SIMM X 8
64MB SIMM X 8	128MB SIMM X 8
128MB SIMM X 4	None
128MB SIMM X 8	None
128MB SIMM X 8	128MB SIMM X 8

Memory SIMM



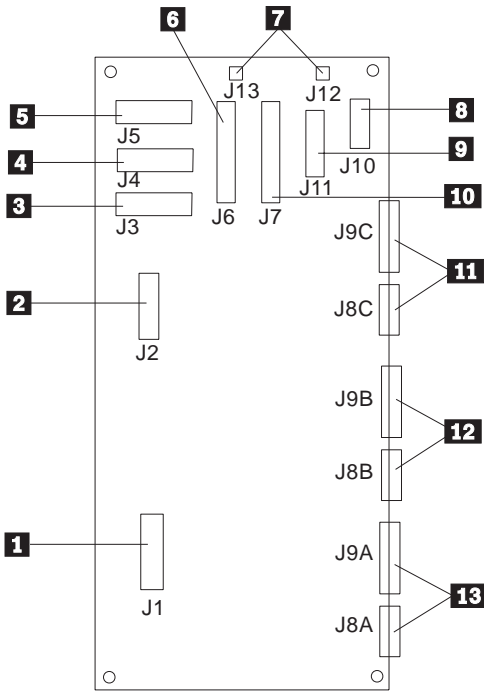
Power Supply



- 1**
- 2**
- 3**

AC power cord receptacle
Screws
Power supply handle

Power Supply to Power Distribution Board Interface



- 1** J1, power to lower SCSI hard drive backplane
- 2** J2, power to upper SCSI hard drive backplane
- 3** J3, +5.1 Vdc and +12 Vdc power to system peripherals
- 4** J4, +5.1 Vdc and +12 Vdc power to system peripherals
- 5** J5, +5.1 Vdc and +12 Vdc power to diskette drives
- 6** J6, power to J9 on system board
- 7** J12 and 13, fan connectors
- 8** J10, I²C connector
- 9** J11, power control signal to J11 system on system board
- 10** J7, power to J10 on system board

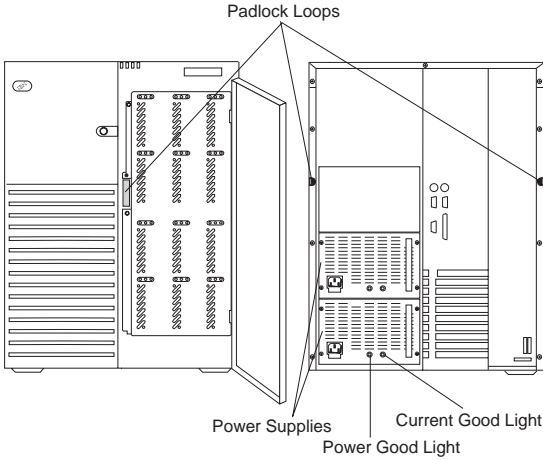
11, 12, 13 J9A, J9B, J9C, DC power connections from supply

Pin Position	Description
1, 6	Ground
7	+3.3 Vdc
8	+12 Vdc
9	-12 Vdc
10	-5 Vdc
11, 12	+5.1 Vdc
13, 17	Ground
18, 19	+3.3 Vdc
20, 21	+12 Vdc
22, 24	+5.1 Vdc

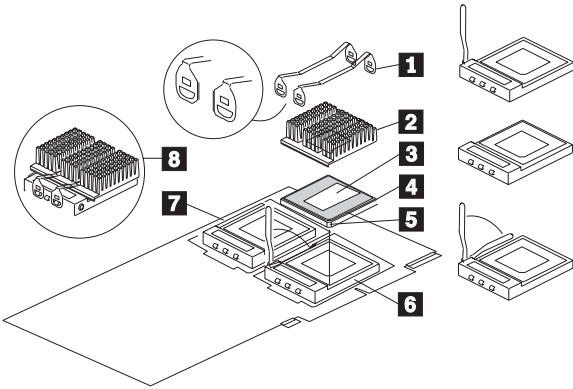
11, 12, 13 J8A, J8B, J8C, Power control and status signals from supply

Pin Position	Description
1	+5 Vdc remote sense (+)
2	+12 Vdc remote sense (+)
3	+3.3 Vdc remote sense (+)
4	Ground remote sense (-)
5	+5 Vdc load share
6	+12 Vdc load share
7	+3.3 Vdc load share
8	PON
9	Vbias
10	+5 V standby
11	FAULT
12	Ground
13	Power good
14, 15	NC

Power Supplies and Pad Locks



Processor Assembly



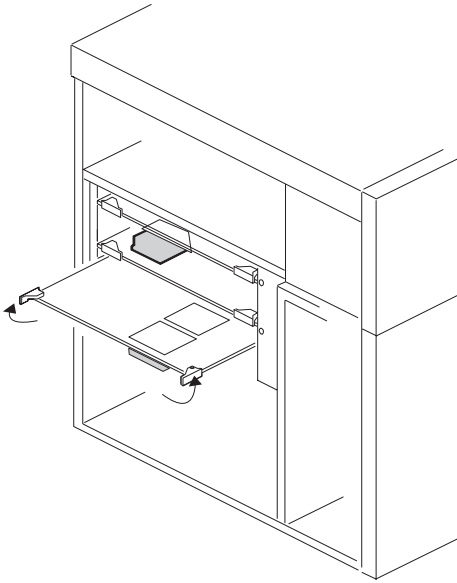
- 1** Heat sink retention clips
- 2** Heat sink
- 3** Thermal grease
- 4** Processor
- 5** Pin 1 location
- 6** Lower processor socket with lever in open position
- 7** Upper processor socket with lever in closed/locked position
- 8** Complete assembly

Processor Boards

1st Processor Board

Note

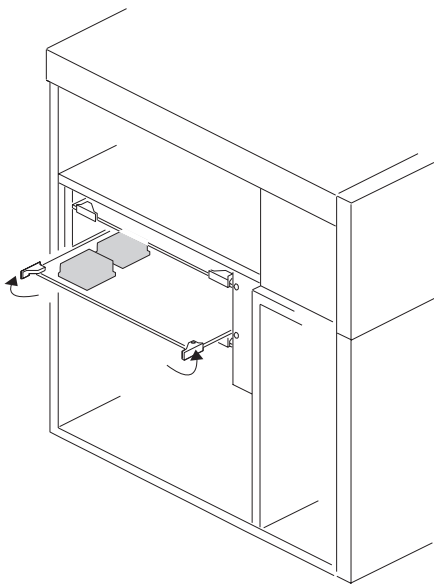
The 1st processor board (primary connectors) must be installed with the component-side down.



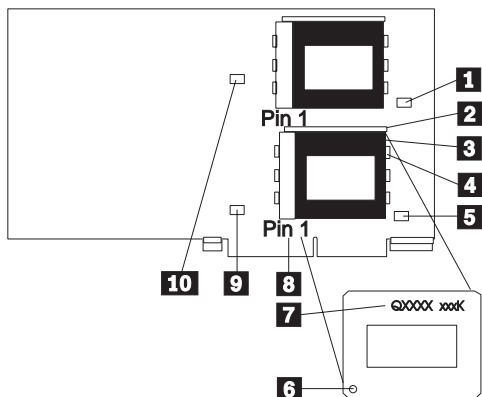
2nd Processor Board

Note

The 2nd processor board (secondary connectors) must be installed with the component-side up.

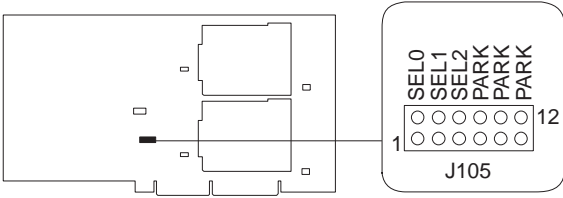


Jumpers



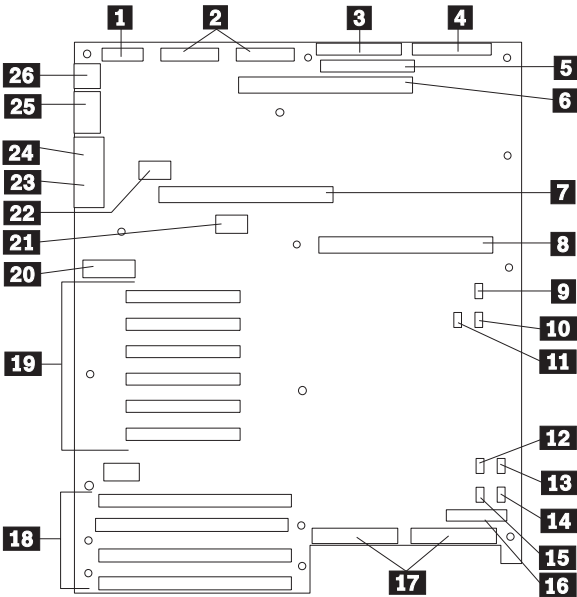
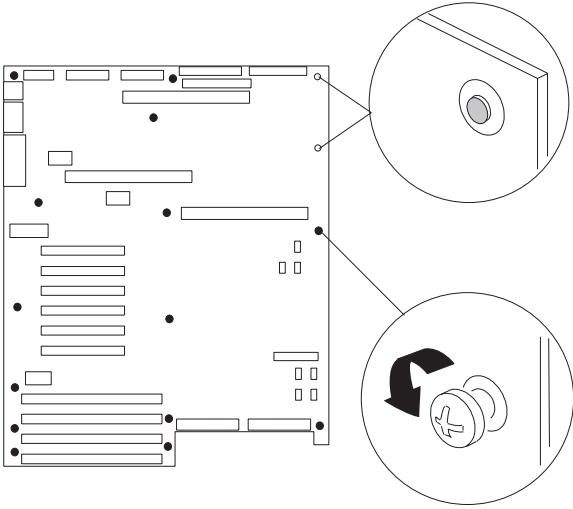
- 1** J102, (reserved)
- 2** Processor Lever
- 3** Processor socket
- 4** Processor chip
- 5** J107, (reserved)
- 6** Pin-1 on processor chip
- 7** Processor identification
- 8** Pin-1 on processor socket
- 9** J106, (reserved)
- 10** J101, (reserved)

Frequency Select Jumper (J105)



Frequency	SEL0	SEL1	SEL2
150/60MHz	No Jumper	No Jumper	No Jumper
180/60MHz	Jumper	No Jumper	No Jumper
210/60MHz	No Jumper	Jumper	No Jumper
240/60MHz	Jumper	Jumper	No Jumper
166/66MHz ¹	No Jumper	No Jumper	Jumper
200/66MHz	Jumper	No Jumper	Jumper
233/66MHz	No Jumper	Jumper	Jumper
266/66MHz	Jumper	Jumper	Jumper
¹ Factory default setting.			

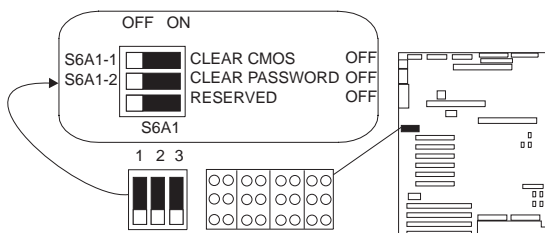
System Board



Connectors

- 1** Cable: Power control and status (PS3)
- 2** Cable: +5V, +12V, and +3.3V power connector (PS1 and PS2) (identical)
- 3** Cable: Diskette drive connector
- 4** Cable: Front panel connector
- 5** Not used
- 6** Memory board connector
- 7** Secondary processor board connector
- 8** Primary processor board connector
- 9** Fan 1 connector (not used)
- 10** Fan 2 connector (inner chassis fan)
- 11** Hard disk drive LED 1 connector
- 12** I²C connector (not used)
- 13** Fan 3 connector (upper outer chassis fan)
- 14** Fan 4 connector (lower outer chassis fan)
- 15** Hard drive LED 2 connector (not used)
- 16** Connector for optional Server Management Module (not used)
- 17** SCSI bus connectors: Channel A to the right, Channel B to the left
- 18** EISA slots 1-4 for add-in boards (slot 1 toward top, 4 toward bottom)
- 19** PCI slots 1-6 for add-in boards (slot 1 toward top, 6 toward bottom: Bus 0 = slots 1 - 3; Bus 1 = slots 4 - 6)
- 20** Configuration switches and jumpers
- 21** Real-time clock
- 22** Video DRAM expansion socket
- 23** VGA monitor connector
- 24** Parallel port connector
- 25** Serial port connectors A (COM1) and B (COM2)
- 26** PS/2-compatible keyboard and mouse connectors

Configuration Switches



Switch	Position	Function
S6A1-1	On Off ¹	Clear CMOS Normal operation
S6A1-2	On Off ¹	Clear password Normal operation
S6A1-3	Off ¹	Reserved

¹ Factory default setting.

Notes

1. This is the factory default.
2. Do not change the settings for switches S6A1-4, S6A1-5, S6A1-6, or S6A1-8. These switch settings should remain as set at the factory.

Resetting NVRAM and the RTC (Switch

S6A1-1): Setting the CMOS switch to On clears the current values of NVRAM and the RTC when the server is reset. This returns NVRAM and the RTC to the factory default.

When the CMOS switch is set to Off, the default, the current settings are preserved during system reset.

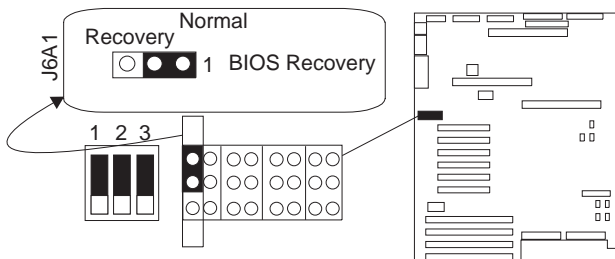
To reset the server's NVRAM and RTC settings to the factory default values, do the following steps:

1. Power-off the server and monitor.
2. Locate the configuration switches on the system board.
3. If necessary to access the configuration switches, remove the processor board.
4. Slide switch S6A1-1 to On.
5. If removed, replace the processor board.
6. Power-on the monitor and server; then, wait for POST to complete. This automatically reprograms the NVRAM and RTC to their factory settings.

7. Power-off the server and the monitor.
8. If necessary to access the configuration switches, remove the processor board.
9. Slide switch S6A1-1 to Off.
10. If removed, replace the bottom processor board.
11. Run the System Configuration Utility to restore the configuration settings.

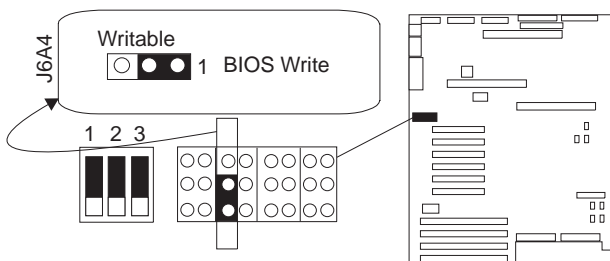
Jumpers

BIOS Recovery Jumper (J6A1)



Jumpers	Function
1-2 ¹	Normal BIOS boot block
2-3	Recovery BIOS boot block
¹ Factory default setting.	

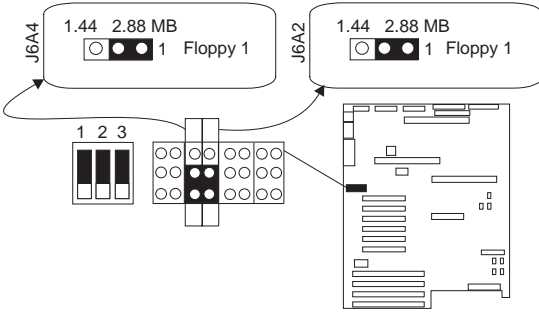
BIOS Write Jumper J6A4



Jumpers	Function
1-2	Disables BIOS update of flash memory
2-3 ¹	Enables BIOS update of flash memory with special utility

Jumpers	Function
¹ Factory default setting.	

Floppy 0 Jumper at J6A4
Floppy 1 Jumper at J6A2



Jumpers	Function
1-2	For 2.88 MB diskette drive, enable automatic size detection.
2-3 ¹	For 1.44 MB diskette drive, disable automatic size detection.
¹ Factory default setting.	

PC ServeRAID Adapter (FRU No. 06H9334)

The following configuration information and procedures apply only to servers that have a PC ServeRAID adapter installed.

Note

You can use the Administration and Monitoring program or the ServeRAID configuration program for the following tasks. By using the Administration and Monitoring program from the active operating system desktop, you do not have to restart the server. Refer to the README file on the Administration and Monitoring program for instructions for the operating system.

- “Device Drivers” on page 110.
- “Administration and Monitoring Utilities” on page 110.
- “RAID Technology” on page 111.
- “Starting the ServeRAID Configuration Program” on page 115.
- “Viewing the ServeRAID Configuration” on page 117.
- “Performing Common Tasks” on page 118.
- “Resetting the Adapter Configuration” on page 138.
- “Running RAID Subsystem Diagnostic Tests” on page 140.
- “Additional Disk-Array Tasks” on page 141.
- “Restoring the Disk-Array Configuration” on page 142.
- “Changing the Write Policy” on page 142.
- “Formatting Drives” on page 144.
- “Changing the RAID Parameters” on page 145.
- “Changing the ServeRAID Adapter Parameters” on page 147.
- “Using the Mini-Configuration Program” on page 149.
- “&sraid. Adapter Messages” on page 151.

Device Drivers

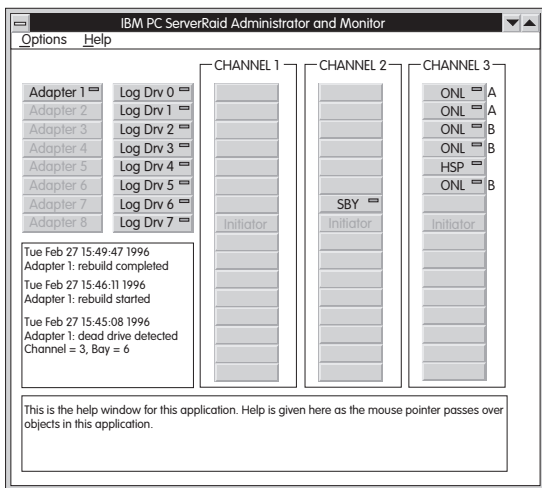
The ServeRAID adapter requires the installation of device drivers. See the README file on the Device Driver/Administration and Monitoring diskette for detailed instructions.

If the operating system is installed from the ServerGuide CD, the device drivers will be installed automatically. However, if the operating system is installed from diskettes, the device drivers must be installed. See the README file on the Device Driver/Administration and Monitoring diskette for installation instructions.

Administration and Monitoring Utilities

The Administration and Monitoring program contains RAID monitoring utility programs for several operating systems that the ServeRAID adapter supports. You can monitor the ServeRAID configuration program in the local and remote systems by using these programs.

The following is an example of an Administration and Monitoring program screen.



Monitoring the Adapter Status in a Local System:

The Device Driver/Administration Monitoring Program diskette provides monitoring programs that you can use to perform disk-array maintenance tasks. Because the monitoring programs reside on top of the operating system, you do not need to restart the server. Instead, you can perform tasks such as the following from the active operating system desktop:

- Select the adapter that you want to monitor.

- View information about drives connected to the adapter, and change the drive state.
- Reassign a drive to replace a defunct drive.

Some operating systems provide additional features, such as adding and deleting a logical drive. Refer to the README file on the Administration and Monitoring program for specific information and installation instructions.

Monitoring Adapter Status from a Remote System:

The ServeRAID Administration and Monitoring programs support the Client/Server environment using TCP/IP on a variety of platforms. The server programs run on the system containing a ServeRAID adapter and is supported on a number of operating systems. See the README file on the Administration and Monitoring program for more information. The Client program runs in various Windows environments:

- Windows NT Server Version 3.51
- Windows NT Workstation Version 3.51
- Windows 95

The Client program includes many of the functions contained in the ServeRAID configuration program. Because it resides on top of the operating system, you do not need to restart the server to add and remove capacity dynamically when creating or deleting an array. You can start the Administration and Monitoring program from the active operating system desktop.

This monitoring program allows you to:

- View the ServeRAID configuration and associated devices
- Reassign a drive to replace a defunct drive
- Create a logical drive
- Create an array
- Delete an array

In addition, in an array that contains only one logical drive, and the total number of logical drives in all arrays is less than 7, you can change the logical drive RAID level from level 0 to level 5 (or level 5 to level 0).

See the README file on the Administration and Monitoring program for instructions on installing and using this monitoring utility.

RAID Technology

RAID is the technology of grouping several hard disk drives in a server into an *array* that can be defined as a single logical drive. This *logical* drive then appears to the operating system as a single *physical* drive. This grouping

technique greatly enhances logical-drive capacity and performance. In addition, if one of the hard-disk drives fails (becomes defunct) the system continues to run, with no operator intervention required, at reduced performance. You can replace the defunct drive without powering off the server (*hot-swap*). For more information about hot-swappable hard disk drives, refer to the internal drive installation information (Internal Drives, Internal Drive Bays, or Installing internal Drives) in your *IBM PC Server Hardware Maintenance Manual (form number S30H-2501-01)*

Hard Disk Drive Capacities:

The drives in the disk array can be of different capacities (for example, 1 GB or 2 GB); however, they are treated in the disk array configuration as if they all have the capacity of the smallest disk drive. Therefore, if you have four drives of 1 GB, 1 GB, 1 GB, and 2 GB grouped in one disk array, the total capacity of the array is 1 GB times 4, or 4 GB (instead of the 5 GB physically available).

Notes

1. The total capacity of the array without protection would be 4 GB. With RAID level 5, the usable data capacity would be 3 GB.
2. When referring to hard-disk-drive capacity, GB means 1 000 000 000 bytes; total user-accessible capacity may vary depending on operating environment.

Additional Storage Capacity:

With the Administration and Monitoring program Remote Monitor, you can dynamically add capacity to the server by defining additional arrays and logical drives (when the operating system supports this). When you use the Remote Monitor, you do not have to restart the server to create an array.

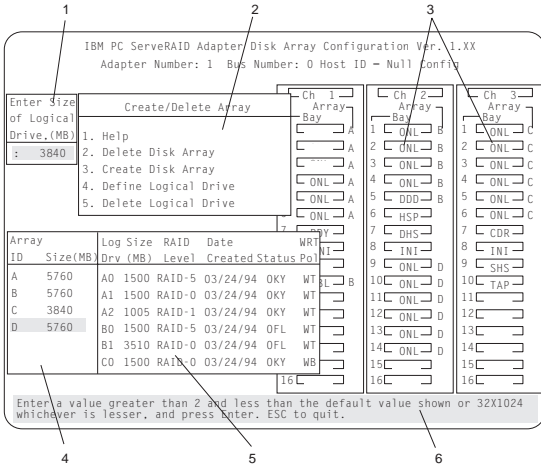
When hard disk drives are added to the server, a new disk array must be configured before the drives can be used. Reconfigure the existing disk array to include the capacity offered with the added drives, or group the added drives into their own array (see "Creating a Disk Array" on page 118).

Note

An array can be created with only one drive.

The ServeRAID Configuration Program Screens:

Use the IBM ServeRAID configuration program on the Array Configuration (also called the ServeRAID Configuration) diskette to configure or view the disk array. The following example screen is a compilation of many of the IBM ServeRAID Controller Disk Array Configuration (also called the ServeRAID configuration program) screens. The list that follows example explains the numbered areas of the example.



1. This area displays pop-ups that apply to the current menu. For example, a pop-up allows you to select the logical drive size by entering the size in megabytes; or, to accept the default value shown. Another pop-up allows you to select the RAID level you want to assign to the logical drive you are defining. When you need to confirm an action, the Confirm pop-up appears in this area.
2. You can select any of the choices that appear on the menus.
3. The Bay/Array selection list shows 15 bays for each of the adapter's three channels. For each bay that contains a drive, the list indicates the state of the physical drive and the array in which the drive is grouped. For example, in the illustration, the drive in Channel 2, Bay 1, has a drive status of **ONL** and is a part of Array B. Selections are made from this list to determine which bays (hard disk drives) are in the arrays.

Notes

1. The Bay/Array area on the screen does not reflect the physical configuration of the server. In the server, the default numbering for the hard disk drive bays in each bank is 1 through 6 (from left to right).
2. The IDs for the hot-swap drives are set by the backplanes. This allows you to define the IDs as low (0 to 5) or high (8 to 13). Refer to the backplane information in the *PC Server Hardware Maintenance Manual* for the system you are servicing.
3. One channel on the RAID adapter can support two daisy-chained banks of bays. The SCSI ID jumpers on the backplanes must be set to avoid SCSI ID conflicts.
4. The Bay Number corresponds to the SCSI ID of the device plus 1. When the SCSI IDs are set to high, the hard disk drive with SCSI ID 8 is installed in the leftmost bay; its status displays in Bay Number 9.

4. The Array list indicates the array ID and the size (in megabytes) of the array. When a drive is being rebuilt, this area, along with the Logical Drive list area, shows the progression of the rebuilding process.
5. The Logical Drive list identifies the logical drive (for example, A1), including its size, the RAID level, date of creation, and its write policy.

The status of the logical drive also is shown.

- OKY** No problem conditions are associated with the drive.
- CRT** Replace the defunct drive and do a rebuild operation. (You will have received a message telling you what has happened to the drive.)
- OFL** The logical drive is irrecoverable; the data in that drive is lost.

When a drive is being rebuilt, this area, along with the Array list area, shows the progression of the rebuilding process.

During an initialization process, the Write Policy area displays the percent initialized; during a synchronization process, it displays the percent synchronized.

6. The information area tells you the action you can perform on this screen or pop-up.

Starting the ServeRAID Configuration Program

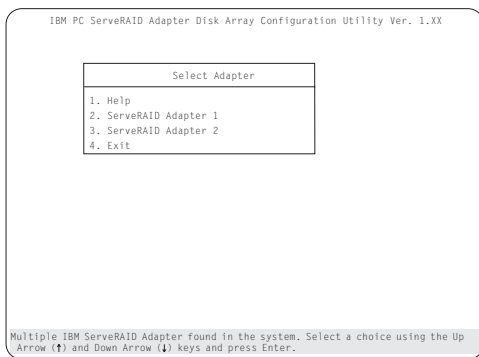
To start the ServeRAID configuration program from the configuration program, insert the diskette into the primary diskette drive and power-on the system. If the system is already powered on, press **Ctrl+Alt+Del**.

During the power-on self test (POST), the RAID adapter checks the configuration information on the adapter and on the hard disk drives connected to it.

- If POST does not detect problems or changes, the Main Menu appears. See “The ServeRAID Adapter Main Menu.”
- If POST detects any change in the adapter configuration, a configuration error message is displayed. See “&sraid. Adapter POST and Setup Messages” on page 151.
- If POST detects an adapter hardware problem, an error message is displayed. See “&sraid. Adapter Status and Error Messages” on page 154.

The ServeRAID Adapter Main Menu:

If more than one RAID adapter is installed in the server, you will get an adapter selection screen similar to the following before the Main Menu appears.



Note

1. The version numbers on the screens might be different. Some menus might differ slightly, depending on the version that was shipped with the server.
2. The primary diskette drive is the first diskette drive that the system tries to start from.

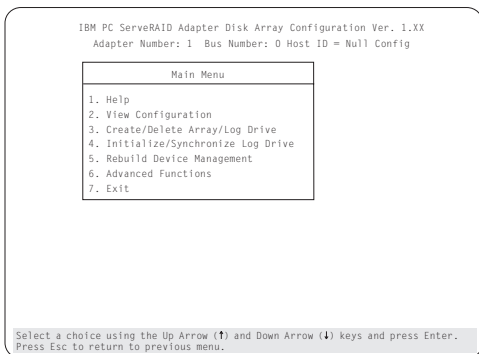
Menu Navigation Keys

Note

You can select **Help** from any menu.

↑ key / ↓ key To select a menu item, use these keys to highlight the item or press the number of the item then **Enter**.

Esc key Returns you to the previous screen or to the previous work area of a screen.



The Main Menu contains the following choices:

- **Help:** Provides additional information.
- **View Configuration:** Displays the existing disk array configuration.
- **Create/Delete Array/Log Drive:** Allows you to select the drives to create an array, or to delete an existing array. It also allows you to define and delete a logical drive.

Whenever you make changes to the disk-array configuration and select **Exit**, the Confirm pop-up window will appear. You must select **Yes** to save and activate the changes.

- **Initialize/Synchronize Log Drive:** Select this choice after creating an array:
 - **Initialize Logical Drive:** You *must* select this choice to set the logical drive to a predetermined value. Any data existing on the drive is overwritten with zeros.

You can choose to initialize more than one logical drive at a time. You can interrupt the initialization process at any time by pressing **Esc**. Then, you can either restart the initialization process by pressing **Enter**, or you can end the process by pressing **Esc** again.

- **Synchronize Logical Drive:** You *must* select this choice to recompute and rewrite the parity data on the selected drive for RAID level 5

before storing data. This selection does not alter data on the drive.

- **Rebuild/Device Management:** Select to rebuild logical drives. The rebuild operation is supported only for RAID levels 1 and 5. You also use this option to define or change the state of a drive, display drive information, and clear the device error table.
- **Advanced Functions:** Select this choice to change the write policy (the way data is written to the drive), to save the configuration information to a diskette, to restore it from a diskette, or to change ServeRAID parameters. This choice also allows you to perform a low-level format on a hard disk and run the RAID subsystems diagnostics. You can initialize the adapter configuration, which resets the configuration values to the factory defaults. You can also synchronize the primary and backup copies of the adapter configuration information.
- **Exit:** Select this choice to leave the Main Menu.

Viewing the ServeRAID Configuration

Before creating or changing a disk array, you can look at the current configuration with the Administration and Monitoring program or the ServeRAID configuration program.

To view the disk-array configuration from the ServeRAID configuration program:

1. Start the server using the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **View Configuration**. The current disk-array configuration information appears on the screen.
3. Press **Enter** to see the stripe order in the Bay/Array list. In the following example, data for the A array is striped across Channel 1, from bay 1, then bay 2, and so on, through bay 6.

IBM PC ServeRAID Adapter Disk Array Configuration Ver. 1.XX
 Adapter Number: 1 Bus Number: 0 Host ID = Null Config

View Configuration					Ch 1 Array Bay			Ch 2 Array Bay			Ch 3 Array Bay			
1	ONL	A			1	ONL	B			1	ONL	C		
2	ONL	A			2	ONL	B			2	ONL	C		
3	ONL	A			3	ONL	B			3	ONL	C		
4	ONL	A			4	ONL	B			4	ONL	C		
5	ONL	A			5	DDD	B			5	ONL	C		
6	ONL	A			6	HSP				6	ONL	C		
7	RDY				7	DHS				7	CDR			
8					8					8				
9					9					9	SHS			
10					10					10	TAP			
11					11					11				
12					12					12				
13					13					13				
14					14					14				
15					15					15				

Array ID	Size	Log Drv	RAID Level	Date Created	Status
A	4300	A0	500 RAID-0	12/12/95 OKY	WT
B	4300	B0	500 RAID-0	12/12/95 OFL	WT
C	4300	C0	500 RAID-0	12/12/95 OKY	WT

Press Esc to return to main menu. Select array using cursor keys and press Enter to view the stripe order.

4. Press any key to return to the View Configuration screen.

- Press **Esc** to return to the Main Menu.

Performing Common Tasks

The Create/Delete Array menu of the ServeRAID configuration program contains the more common tasks for configuring disk arrays. Use the following procedures to complete these tasks.

- “Creating a Disk Array”
- “Defining Logical Drives” on page 119
- “Defining a Hot-Spare Drive” on page 123
- “Deleting a Disk Array” on page 124
- “Deleting a Logical Drive” on page 125
- “Redefining Space in an Array” on page 126
- “Defining the State of a Drive” on page 131

Creating a Disk Array:

To create a disk array using the ServeRAID configuration program:

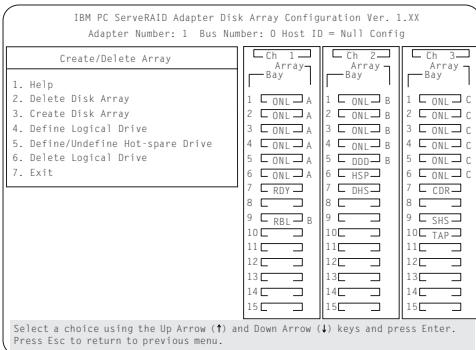
- Start the server using the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).

Note

To create an array using hard disks in an existing array, see “Redefining Space in an Array” on page 126.

- Select **Create/Delete Array/Log Drive** from the Main Menu.
- Select **Create Disk Array** from the Create/Delete Array menu.

The cursor becomes active in the Bay/Array selection list.



Note

Carefully determine which drives to include in the array before beginning the selection process. If you change your mind after selecting the drives for an array, you can delete the array (by selecting **Delete Disk Array** from the Create/Delete Array menu) and then begin again.

4. Select each drive you want in the array by using the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the drive and then pressing **Enter**. As you select each drive, the status will change from **RDY** (Ready) to **ONL** (Online).
5. When you have selected all the drives you want to include in the array, press **Esc**. The cursor will become active in the menu.

Notes

- When the stripe unit size is 8 K or 16 K, the maximum number of drives in an array is 16.
 - When the stripe unit size is 32 K or 64 K, the maximum number of drives in an array is 8.
6. If you have drives you did not use in this array and you want to create another array, you can do one of the following:
 - Define the logical drive or drives for this array; then create another array and its logical drives. See “Defining Logical Drives.”
 - Create another array now by repeating steps 2 through 5 in this procedure; then define logical drives for both arrays.

Note

You must define at least one logical drive for each array created before you can exit from the ServeRAID configuration program.

Defining Logical Drives:

After you have created an array, you must define a logical drive. You can use the Administration and Monitoring program or the ServeRAID configuration program. When you use the Administration and Monitoring program from the active operating system desktop, you do not have to restart the server. Refer to the README file on the Administration and Monitoring program for instructions for the operating system. (You cannot leave the ServeRAID configuration program until you define the logical drives for any arrays created.)

To define a logical drive:

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Define Logical Drive** from the Create/Delete Array menu. The following screen appears; the cursor is active in the Bay/Array list.

IBM PC ServeRAID Adapter Disk Array Configuration Ver. 1.XX
Adapter Number: 1 Bus Number: 0 Host ID - Null Config

Enter Size of Logical Drive.(MB) : 3840	Create/Delete Array	Ch 1 Array Bay	Ch 2 Array Bay	Ch 3 Array Bay	
	1. Help 2. Delete Disk Array 3. Create Disk Array 4. Define Logical Drive 5. Define/Undefine Hot-spare Drive 6. Delete Logical Drive	1 ONL A 2 ONL A 3 ONL A 4 ONL A 5 ONL A 6 ONL A 7 8 9 ONL D 10 ONL D 11 ONL D 12 ONL D 13 ONL D 14 ONL D 15	1 ONL B 2 ONL B 3 ONL B 4 ONL B 5 DDD B 6 HSP B 7 DHS 8 9 ONL D 10 ONL D 11 ONL D 12 ONL D 13 ONL D 14 ONL D 15	1 ONL C 2 ONL C 3 ONL C 4 ONL C 5 ONL C 6 ONL C 7 CDR 8 9 SHS 10 TAP 11 12 13 14 15	
Array ID	Size(MB)	Log Size	RAID	Date	WRT
A	5760	A0	1500 RAID-5	03/24/94	OKY WT
B	5760	A1	1500 RAID-0	03/24/94	OKY WT
C	3840	A2	1005 RAID-1	03/24/94	OKY WT
D	5760	B0	1500 RAID-5	03/24/94	OFL WT
		B1	3510 RAID-0	03/24/94	OFL WT
		C0	1500 RAID-0	03/24/94	OKY WB
		C1	1170 RAID-1	03/24/94	OKY WT

Enter a value greater than 2 and less than the default value shown or 32X1024 whichever is lesser, and press Enter. ESC to quit.

3. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the array you want to define; then press **Enter**. The Select RAID Level pop-up window appears, and the cursor is active in the window.

Note

The system automatically assigns RAID level 0 to any logical drives defined in an array containing only one hard disk drive. When this is the case, the Select RAID Level pop-up window will not appear.

If only two hard disk drives are in the array, the Select RAID Level pop-up window appears, but RAID level 5 is not selectable because you need at least three hard disk drives in an array to assign RAID level 5 to one of the logical drives. More than one logical drive can be defined in the array. The maximum number of logical drives you can define is eight; the maximum number of physical drives in an array is 8 or 16, depending on the stripe unit size.

Notes

1. If you are planning to change RAID levels using the Administration and Monitoring program, the maximum number of logical drives that can be defined is 7. The RAID conversion procedure requires one free logical drive.
2. When the stripe unit size is 8 K or 16 K, the maximum number of drives in an array is 16. When the stripe unit size is 32 K or 64 K, the maximum number of drives in an array is 8.

4. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the RAID level you want to assign to these logical drives; then press **Enter**.

Note

Because the level you assign can influence the space needed for the drive, you must assign a RAID level before you enter the size of the logical drive.

The Logical Drive list contains the logical drive ID, the size of each logical drive, the RAID level you assigned to that logical drive, and the date that the logical drive was created.

The status of the logical drive also is shown.

- OKY** means that all is well with the drive.
- CRT** means that you must replace the hard disk drive or rebuild the logical drive. (You will have received a message during system startup telling you what has happened to the drive.)
- OFL** means that the logical drive is irrecoverable; the data on that drive is lost.

If this is the first logical drive to be defined, the Logical Drive Size pop-up window shows the space in the array that is available for logical drives.

If other logical drives have been defined, the Allocation Table appears, showing the logical drive sizes already created, and the amount of free space available.

5. Type the size, in megabytes, that you want for the logical drive; then press **Enter**. A pop-up window appears, asking you to confirm your action.

Information about the new logical drive appears in the Logical Drive list.

Note

The size appearing in the Logical Drive list might be different from the size you typed. The size of a logical drive is determined by a number of factors, but basically the size must be divisible by the number of drives in the array.

Consider the following scenarios:

Scenario 1:

The array consists of three 1 GB drives. You assign RAID level 0 (which uses all the drives in the array with no parity storage), and type 1000MB. The number in the Size (MB) field will be 999, which is the number closest to and lower than 1000 that is divisible by 3.

Scenario 2:

The array consists of three 1 GB drives. You assign RAID level 1, which provides a disk mirroring that stripes data across all drives in the array. Because the data is mirrored, the capacity of the logical drive is 50 per cent of the physical capacity of the hard disk drives grouped in the array. Type 1000MB; the number in the Size (MB) field will be 999. The physical capacity used is 2000 MB, twice that of the logical drive size. The number that is closest to or lower than 2000 and is divisible by 3 is 1998. The logical drive size is 999, which is 50% of the physical capacity.

Scenario 3:

The array consists of three 1 GB drives, and you assign RAID level 5. Data is striped across all three drives in the array, but the space equivalent to that of one drive is used for redundant storage. Therefore, if you type 1000MB, the number in the Size (MB) field remains 1000 because it is divisible by 2 (drives), which is the space available for data.

If you do not use the entire array for this logical drive, you can create another by assigning either the same or a different RAID level for an additional logical drive. You can have as many as eight logical drives among eight disk arrays.

- To return to the Create/Delete Array menu, press **Esc**. To define more logical drives, repeat steps 1 through 5 of this procedure.
- To leave this screen, select **Exit** or press **Esc**. A pop-up window appears asking you to confirm your action.
- To save the changes, select **Yes**. To maintain the disk-array configuration that was in place before you made changes, select **No**.
- To ensure that the server operates correctly, you must select **Initialize Logical Drive**. This sets

the drive to a predetermined state. The initialization process overwrites any data on the drive with zeros.

- a. Select **Initialize/Synchronize Log Drive** from the Main Menu; then select **Initialize Logical Drive**.
- b. Select the logical drives you want to initialize from the Logical Drive list by pressing the Spacebar (the selected drives will appear highlighted). To start the initialization, press **Enter**. A pop-up window appears, asking you to confirm your action.

Attention

If you select **Yes** in the Confirm pop-up window, information in the logical drive will be overwritten with zeros.

- c. Select **Yes** to confirm that you want to initialize this logical drive.

The initialization process begins, and you can see its progress in the **Pct. Int.** (Percent Initialized) column of the Logical Drive list.

- d. To stop the initialization at any time, press **Esc**. Then press **Esc** again to return to the menu, or press **Enter** to continue initializing the drive.
- e. If you defined the drive as RAID level 5, select **Initialize/Synchronize Log Drive** from the Main Menu; then, select **Synchronize Logical Drive** before storing data.

Note

To back up the disk-array configuration to diskette, you will need a 3.5-inch formatted diskette.

To back up the disk-array configuration:

- a. Select **Advanced Functions** from the Main Menu.
- b. Select **Backup config. to diskette**.

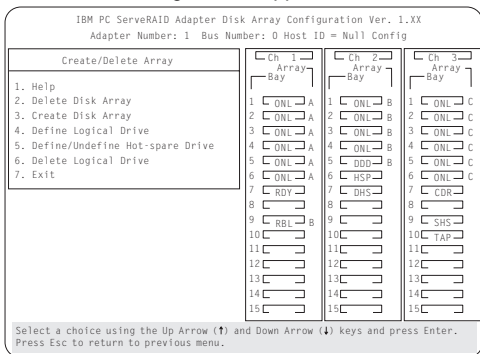
Follow the instructions on the screen. A pop-up window shows the default file name of CONFIG. You can change the file name by typing over the default. The Backup program will assign a file-name extension of *.ips*.

Defining a Hot-Spare Drive:

You can define a hot-spare drive from the Create/Delete Array/Log. Drive menu or the Rebuild/Device Management menu (see "Defining the State of a Drive" on page 131).

To define a drive as a hot-spare drive from the **Create/Delete Array/Log. Drive** menu:

1. Start the server using the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Create/Delete Array/Log. Drive** from the Main Menu. The following screen appears.



3. Select **Define/Undefine Hot-spare Drive**. The cursor will become active in the Bay/Array selection list.
4. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the **RDY** (Ready) drive you want to define as the hot spare; then press **Enter**. The **RDY** changes to **HSP** (Hot Spare). You can press **Enter** again to toggle between **HSP** and **RDY**.
5. Press **Esc** when you have finished. The cursor will become active in the **Create/Delete Array/Log. Drive**
6. If you want to create a disk array, go to “Creating a Disk Array” on page 118.
7. If you are finished:
 - a. Select **Exit** or press **Esc**. A pop-up window will appear asking you to confirm your change.

Note

The changes you make are not saved until you confirm them by selecting **Yes** in the Confirm pop-up window.

- b. Select **No** if you do not want the drive you selected to be a hot spare; select **Yes** to define it as a hot-spare drive.
- c. Back up the disk-array configuration information to diskette. See “Backing Up The Disk-Array Configuration” on page 141 for instructions.

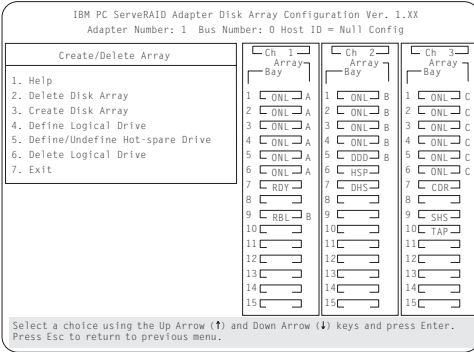
Deleting a Disk Array

Attention

All the data and programs in the array are lost during this procedure. Before proceeding, back up any data and programs that you want to save.

To delete a disk array:

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Create/Delete Array/Log Drive** from the Main Menu.
3. Select **Delete Disk Array** from the Create/Delete Array menu. The cursor will be active in the Array list.
4. Select the array that you want to delete.
5. Press **Del**. The Confirm pop-up window appears.



6. If you do not want to delete the array, select **No**. To delete the array, select **Yes**.

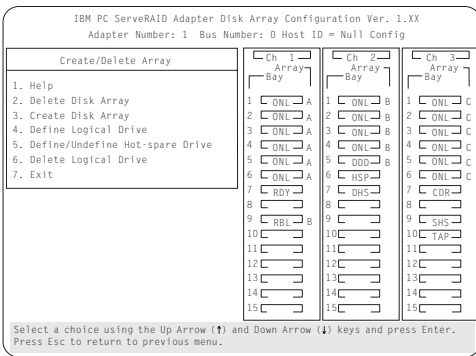
Notes

1. To use hard disks from the existing array when creating a new array, you must confirm the deletion of the existing array.
2. In some operating systems, deleting an array and associated logical drives might change the drive letters assigned to the existing drives.

If a defunct drive is still in a bay, the status shows a Defunct Hot-spare (DHS) drive. You can select **Rebuild/Device Management**, then reset the drive state by selecting **Set Device State** (see “Defining the State of a Drive” on page 131 for more information). If the drive is good, set the drive state to Hot-Spare (**HSP**); then, select the drive again and set the drive to **Ready (RDY)**. If the drive is defective, replace it with a good drive; then set the new drive state to **Ready (RDY)**.

Deleting a Logical Drive

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Create/Delete Array/Log Drive** from the Main Menu.



3. Select **Delete Logical Drive** from the Create/Delete Array menu and press **Enter**.
4. Press the Up Arrow (↑) or Down Arrow (↓) key to highlight the logical drive that you want to delete.
5. Press **Del**. The Confirm pop-up window appears.
6. If you do not want to delete the logical drive, select **No**. To delete the logical drive, select **Yes**.
7. Select **Exit** or **Esc** to return to the main menu.

Note

In some operating systems, deleting an array and associated logical drives might change the drive letters assigned to the existing drives.

Redefining Space in an Array:

You can redefine space in a disk array in a number of ways. For example, you can combine a number of small logical drives to create a larger one, or you can redefine the existing logical drive into several smaller drives. Also, you can install additional hard disk drives and create a larger logical drive than was possible with the existing storage capacity.

One method to redefine space in an array is to change the RAID level assigned to a logical drive. For example, if you assigned RAID level 1 to a logical drive and then decided you needed the capacity offered with RAID level 5, you can use this procedure to replace the existing logical drive with a logical drive assigned the new RAID level.

To redefine the space in a disk array, first you must delete the array. In all cases, when you delete an array, all the data and programs in the array are lost.

If you have data and programs that you want to save, they must be backed up and then restored. You might want to use a high-speed backup device, such as a tape drive, for that purpose.

To redefine the space in an array:

Note

You need a 3.5-inch, formatted diskette to backup the configuration file, as described in this procedure.

1. Back up all data and programs in the array.
2. If needed, install additional hard disk drives.

See “Hard Disk Drive Capacities” on page 112 for information about drive sizes.

Attention

In all cases, when you delete an array, all the data and programs in the array are lost.

3. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
4. Delete the existing array:
 - a. Select **Create/Delete Array/Log Drive** from the Main Menu.
 - b. Select **Delete Disk Array**. The cursor will be active in the Bay/Array selection list.
 - c. Select the array that you want to delete.
 - d. Press **Del**. The Confirm pop-up window appears.
 - e. If you do not want to delete the array, select **No**. To delete the array, select **Yes**.

Note

To use the hard disks from the existing array when creating a new array, you must confirm the deletion of the existing array. After you make your selection, the Confirm pop-up window will disappear, and the cursor will be active in the menu.

- If you want to define a hot spare drive, see “Defining the State of a Drive” on page 131 for step-by-step instructions.
- Create a new disk array and define logical drives.

See “Creating a Disk Array” on page 118 for instructions on creating a disk array and defining logical drives.

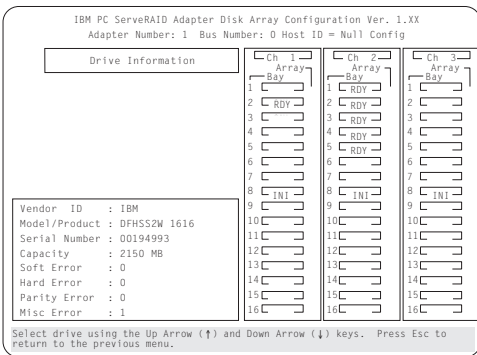
5. After you have established the new array and logical drive or drives, select **Initialize/Synchronize Log Drive** from the Main Menu; then select **Initialize Logical Drive** to prepare the drives in the array to receive data. This sets the drive to a predetermined state. Any data existing in the drive is overwritten with zeros.
6. If you defined the drive as RAID level 5, select **Initialize/Synchronize Log Drive** from the Main Menu; then, select **Synchronize Logical Drive** before storing data. Once synchronization starts, it cannot be interrupted until the operation is complete.
7. Insert a 3.5-inch formatted diskette in the primary diskette drive, select **Advanced Functions** from the Main Menu; then select **Backup config. to diskette**. Follow the instructions on the screen.
8. Exit the ServeRAID configuration program by pressing **Esc** or selecting **Exit** from the Main Menu. A pop-up window will appear asking you to confirm your action.
9. Reinstall the operating system and device drivers, then restore the data and programs.

Drive Maintenance:

The following information is about the status indicators for logical and hard disk drives, and the results of a hard disk drive failure. It also contains procedures for defining the state of a hard disk drive and replacing defunct drives.

Obtaining Drive Status: Use the following procedure to see the ID, capacity, type of errors that occurred, and other information about each of the hard disk drives attached to the RAID adapter.

1. Start the ServeRAID configuration program (see "Starting the ServeRAID Configuration Program" on page 115).
2. Select **Rebuild/Device Management** from the Main Menu.
3. Select **Display Drive Information** from the Rebuild/Device Management menu. The cursor becomes active in the Bay/Array selection list.
4. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight each of the drives in the Bay/Array selection list. As a drive is highlighted, the drive information appears.



- **Soft Errors** displays the number of SCSI Check Conditions Returned from the Drive status messages (except Unit Attention messages) since the Device Error Table was last cleared.
- **Hard Errors** displays the number of SCSI I/O processor errors or Predictive Failure Analysis (PFA errors) that occurred on the drive since the Device Error Table was last cleared.
- **Parity Errors** displays the number of parity errors that occurred on the SCSI bus since the Device Error Table was last cleared.
- **Misc Errors** displays the number of other errors (such as selection timeout, unexpected bus free, or SCSI phase error) that have occurred on the drive since the Device Error Table was last cleared.

5. Press **Esc** to return to the previous menu.

Notes

- The status of the hard disk drive determines the status of the logical drives in the array in which the hard disk is grouped.
- The device error table, located in the RAID adapter NVRAM, collects statistics on the number and type of errors that occurred on all hard disk drives attached to the RAID adapter.

After correcting a problem with the disk array, you might want to clear the table, so that any subsequent errors can be identified quickly.

Select **Erase Device Error Table** from the Rebuild/Device Management menu.

Bay/Array Selection List:

The physical devices connected to each Channel are defined in the Bay/Array selection list as follows:

Status	Meaning
CDR	A CD-ROM drive is installed.

DDD	A drive in the Online (ONL) or Rebuild (RBL) state has become defunct; it does not respond to commands.
DHS	A hot spare or standby hot spare drive enters the Defunct Hot-spare (DHS) state if it fails to respond to the adapter commands.
EMP	No device is present in the bay. This state is represented on the screen with blanks or dashes (– – –).
HSP	A hot-spare drive is a hard disk drive that is defined for automatic use when a similar drive fails. The drive capacity of the replacement HSP drive must be equal to or greater than the capacity of the drive being replaced. You must have at least four hard disk drives if you want a hot spare and RAID level 5.
ONL	The drive is online and part of an array.
RBL	The drive is being rebuilt. A physical hard drive can enter the RBL state if: <ul style="list-style-type: none"> • A good working drive replaces a defunct (DDD) drive that is part of the critical logical drive. At the end of a successful rebuild, the state of the physical drive becomes online (ONL), and the state of the corresponding logical drives changes to OKY. • An online drive that is part of a logical drive becomes defunct (DDD) and an HSP or SHS drive with the same or greater capacity is available. The state of the hot-spare drive becomes RBL during the rebuild. When the rebuild completes successfully, the state changes to ONL; the former hot-spare drive is now part of the logical drive. • A Ready (RDY) or Standby (SBY) drive replaces a defunct (DDD) drive that is part of the critical logical drives. The state of the RDY or SBY drive becomes RBL during the rebuild. At the end of a successful rebuild, the state of the drive becomes online (ONL); the drive is now part of the logical drive. <p>For more information on rebuilding a drive, see “Rebuilding a Logical Drive” on page 136.</p>
RDY	The ready drive is recognized by the adapter and is available for definition. A RDY drive becomes EMP when the drive is physically removed from the bay.
SBY	A standby drive is a hard disk drive that has been spun down. Devices such as tape drives and CD-ROM drives are considered to be in a Standby state.

SHS	A standby hot-spare is a hot spare drive that has been spun down. If a drive becomes defunct and no suitable Hot-Spare drive is available, a Standby Hot-Spare of the appropriate size spins up, and enters the Rebuild process. You must have at least four hard disk drives if you want a standby hot spare and RAID level 5.
TAP	A tape drive is installed.

Logical Drive States:

The state of the logical drive is determined by the state of the physical drives. Replacing a defunct drive with a good drive changes the state of the logical drive from offline (OFL) to critical (CRT) or good (OKY). When a defunct drive is replaced in a critical logical drive, the data is rebuilt in the replaced drive, before the state of the logical drive changes to OKY.

Status	Meaning
OKY	The drive is in a good functional state.
FRE	The drive is not defined.
OFL	The logical drive is offline and not accessible. This state occurs if one or more physical drives in a non-redundant logical drive (RAID level 0) is defunct. This state also occurs when two or more physical drives in a redundant logical drive (RAID levels 1 and 5) are defunct.
CRT	A logical drive that is defined as RAID level 1 or 5 contains a defunct physical drive. A critical (CRT) logical drive is accessible despite a physical drive failure.

Note

If the logical drive is critical, you must rebuild the defunct drive.

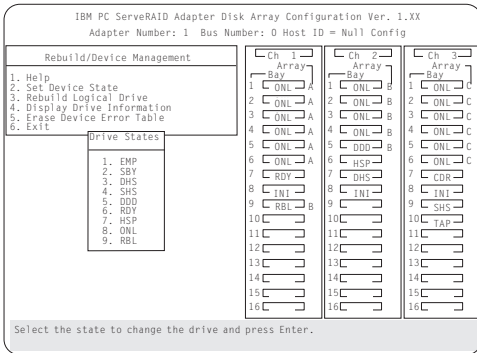
Defining the State of a Drive:

To define the state of a physical hard disk drive attached to the RAID adapter, you can use the Administration and Monitoring program or the ServeRAID configuration program. By using the Administration and Monitoring program from the active operating system desktop, you do not have to restart the server. Refer to the README file on the Administration and Monitoring program for instructions for the operating system.

To define the state of a drive from the ServeRAID configuration program:

1. Start the ServeRAID configuration program (see "Starting the ServeRAID Configuration Program" on page 115).

2. Select **Rebuild/Device Management** from the Main Menu.
3. Select **Set Device State**. The cursor will become active in the Bay/Array selection list.



4. Use the Up Arrow (↑) key or the Down Arrow (↓) key to highlight the appropriate drive; then, press **Enter**. The Drive States pop-up window appears, listing all hard disk drive states.
5. Highlight the appropriate drive state and press **Enter**. The cursor will become active in the Bay/Array selection list, and will display the new state.
The numbers shown on the left in the Bay/Array selection list area in the previous figure are the bay numbers. See “Bay/Array Selection List” on page 129 for an explanation of the bay numbers.
6. If you want to create a disk array, go to “Creating a Disk Array” on page 118.
7. If you are finished:
 - a. Select **Exit** or press **Esc**. A pop-up window will appear asking you to confirm your change.

Note

The changes you make are not saved until you confirm them by selecting **Yes** in the Confirm pop-up window.

- b. Select **No** if you do not want the drive you selected to use the new drive state. Select **Yes** to accept the new drive state.
- c. Back up the disk-array configuration information to diskette. See “Backing Up The Disk-Array Configuration” on page 141 for instructions.

Results of a Hard Disk Drive Failure:

Depending on the circumstances, a drive failure can result in several possible situations.

Scenario 1:

- Only one hard disk drive fails.

- A hot-spare drive is defined that is the same size or larger than the failed drive.

The hot spare will take over immediately.

Note

Any logical drives with RAID level 0 are blocked during the Rebuild process, and remain blocked until unblocked. The ServeRAID configuration program automatically unblocks all drives at the end of the rebuild operation.

Scenario 2:

- Only one hard disk drive fails.
- A hot-spare drive is not defined or is smaller than the failed drive.
- The logical drives in the array are assigned RAID levels 0, 1, 5, or a combination of these levels.

All data in logical drives assigned RAID level 0 will be lost. In this array, the logical drives that are assigned RAID level 1 or 5 will be in Critical (CRT) state. The logical drives assigned RAID level 0 will be in the Offline (OFL) state.

Scenario 3:

If more than one drive in an array fails, all the data is lost in all of the logical drives of the array. For this reason, it is important that you replace and rebuild a defunct drive as soon as possible.

Logical and Hard Disk Drive Status Indications:

The status of the hard disk drive determines the status of the logical drives in the array in which the hard disk is grouped.

- A single hard disk drive failure, (indicated by a **DDD** status in the Bay/Array selection list), generates a **CRT** status for the array's logical drives that are assigned levels 1 and 5. Data in logical drives with a **CRT** is not lost. You must replace the one defunct hard disk drive promptly, and perform a Rebuild operation. If two hard disk drives were to fail, all of the data in the array would be lost.

After you install a new hard disk drive, the Replace process changes the drive status from **DDD** to **RBL** if the array contains a **CRT** logical drive. After the Rebuild process, the hard disk drive status changes from **RBL** to **ONL**.

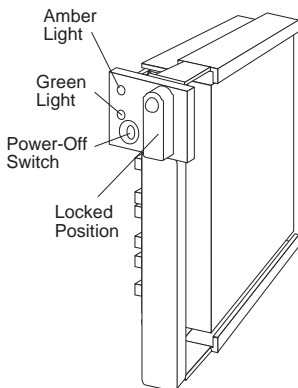
- A multiple hard disk drive failure causes logical drives in that array that to have an Offline (OFL) status. This means that data is lost in all the logical drives in

that array, regardless of which RAID level is assigned.

Replacing a Faulty Drive

Note

The LEDs on the hard disk drive tray provide information about the status of the drive.



The following is a summary of the LED states and their meanings.

Green	Amber	Description
On	Off	Drive tray is powered on; the hard disk drive is inactive; and the drive should <i>not</i> be removed.
Blinking	Off	The hard disk drive is inactive. The hot-swap drive can be removed safely.
On	On or Blinking	The hard disk drive is in use, and should <i>not</i> be removed.
Off	Off	The drive is defective, or no power is being supplied to the drive. The hot-swap drive can be removed safely.

Check the drive for damage. If the drive is not damaged, check the position of the drive. If it is not inserted correctly, reposition the drive. Verify that the drive is positioned correctly.

Use the following procedure to replace a faulty drive using the ServeRAID configuration program:

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).

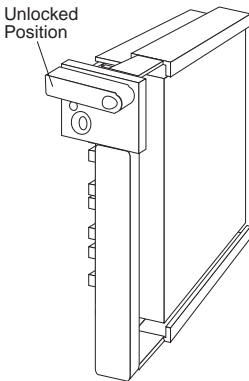
If the drive failed while the system was powered down, a message identifying the defunct drive appears the next time the system is powered on.

2. Physically replace the drive or assign a hot-spare or other appropriate drive as a replacement:

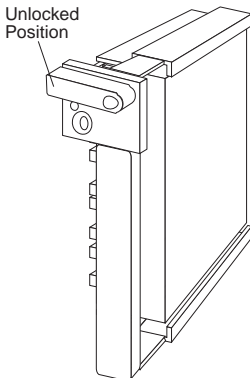
Attention

Removing the wrong hard disk drive can cause loss of all data in the array.

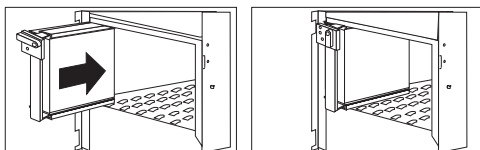
3. If you are assigning a hot-spare or another appropriate drive to replace the defunct drive, go to “Rebuilding a Logical Drive” on page 136. If you are physically replacing the hard disk drive, go to step 4.
4. Press the power-off switch on the drive tray. When the green LED begins to blink, it is safe to remove the drive.
5. Unlock the drive by turning the knob clockwise 90 degrees.



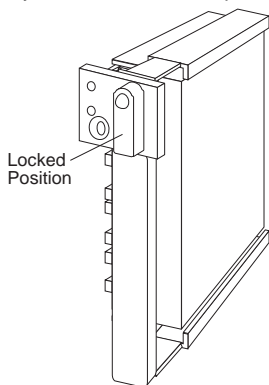
6. Disconnect the drive from the connector on the backplane, by grasping the handle on the drive tray and pulling the drive out of the server. Store the drive in a safe place.
7. Install the hard disk drive:
 - a. Move the tray knob to the unlocked position.



- b. Position the drive tray assembly vertically, with the connector facing the rear of the server.
- c. Align the side of the tray with the raised guides on the bottom of the bay. (Note the arrows pointing towards the backs of the bays.)



- d. Slide the drive tray to the rear of the bay until it connects to the backplane. Be sure it is connected properly to the backplane.
- e. Move the tray knob to the locked position.



Note

The green light on the front of the drive tray illuminates, indicating that the drive was installed correctly.

8. Go to “Rebuilding a Logical Drive.”

Rebuilding a Logical Drive:

Review the following information before you rebuild a logical drive.

- If the logical drive is critical, you must rebuild the defunct drive.
- Data in a logical drive assigned RAID level 0 is lost during a rebuild. If the drive was backed up before it failed, you can restore the data to this drive.
- If a physical drive being rebuilt contains logical drives defined as RAID level 1 or 5 and a logical drive at RAID level 0, the RAID level 0 drive is blocked to external access during the rebuild.
 - If you initiated the rebuild through the Administration and Monitoring program, you must

unblock the RAID level 0 drive when the rebuild is complete.

- If you initiated the rebuild through the ServeRAID configuration program and the rebuild was interrupted, drives with RAID Level 0 can be automatically unblocked when you restart the server.
- Only one rebuild operation can take place at a time.
- The drive being rebuilt must be the same size or larger than the failed drive.
- If multiple hot-spare drives are available, the adapter searches all bays on each channel for a hot-spare drive of the appropriate size; the first one found enters the Rebuild state.
- Under the following circumstances, a Rebuild operation can be completed quickly:
 - The defunct (DDD) drive was *not* defective.
 - The drive is in the same bay.
 - No write operations or configuration changes that require rebuilding data in the drive have occurred since the hard disk drive entered the DDD state.

If you are using one of the Administration and Monitoring programs provided with the disk-array model, you can use it to identify the defunct drive and designate a drive to replace the defunct drive without restarting the server. Refer to the README file on the Administration and Monitoring program for instructions on the operating system.

To replace a faulty drive using the ServeRAID configuration program:

1. Start the ServeRAID configuration program. When the *Following drives not responding* prompt appears, press **F5** to continue loading the ServeRAID configuration program.
2. Select **Rebuild/Device Management** from the Main Menu.
3. Select **Rebuild Drive** from the Rebuild/Device Management menu. The cursor becomes active in the Bay/Array list.
4. Select the replacement drive that you want to use for the rebuild operation. A pop-up window appears.
 - Select **Same Location** if you physically replaced a hard disk drive in the same bay.
 - Select **New Location** to assign a hard disk drive in a new location. You will be prompted to select the drive that you want.

Information and status messages about each stage of the rebuilding process appears on the screen.

5. When the rebuilding process is completed, press **Esc** to return to the Main Menu. The new configuration will be saved automatically.

6. Backup the new configuration (see “Backing Up The Disk-Array Configuration” on page 141).
7. Select **Exit** to end the ServeRAID configuration program.
8. Remove the diskette and press **Ctrl+Alt+Del** to restart the system.

Resetting the Adapter Configuration

The RAID configuration information stored in the adapter NVRAM is critical to reliable operation of the disk-array. Therefore, to protect the integrity of the configuration information, copies of the configuration information are stored in the adapter EEPROM and on each hard disk drive in a Rebuild or Online state that is defined in the adapter NVRAM configuration. Each time the configuration information is changed, all corresponding copies are updated.

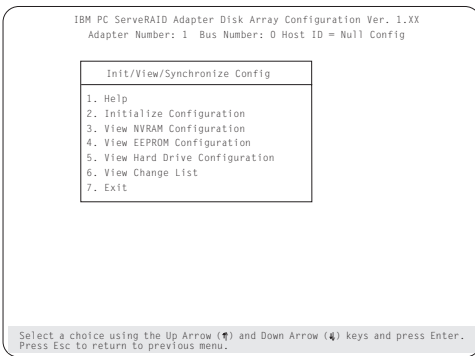
During POST, if the configuration information in the adapter NVRAM, EEPROM, and hard disk drive does not match, an error message appears. You can view each configuration to determine which you want to use.

The Init/View/Synchronize Configuration menu enables you to view or reset the following parameters:

- **Initialize Configuration** restores the factory default settings, and resets all functional, connected, hard disk drives to the Ready (RDY) state.
- **View NVRAM Configuration** displays the current configuration settings for the adapter's NVRAM.
- **View EEPROM Configuration** displays the current configuration settings for the adapter's EEPROM.
- **View Hard Drive Configuration** displays the current configuration settings for the selected hard disk drive that is in the online (ONL) or rebuild (RBL) state.
- **View Change List** displays the configuration conflicts that the ServeRAID adapter reported since the last time the server was powered on or restarted. For more information, see “Viewing Configuration Changes” on page 139.

To initialize, reset, or view the adapter configuration:

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Advanced Functions** from the Main Menu.
3. Select **Init/View/Synchronize Config**.
4. Select your choice from the next menu; then press **Enter**.



5. Follow the instructions on the screen.

Viewing Configuration Changes:

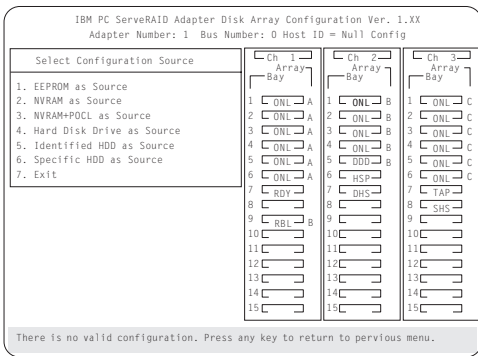
This option allows you to view the configuration changes that might have occurred since the last time the server was powered on or restarted.

- **View Power-on Change List** displays any drives that have changed states since the last time the server was powered on or restarted.
- **View Wrong SCSI ID List** provides a list of hard disk drives that were found at a different SCSI ID location than the last time the server was powered on or restarted.
- **View Unidentified Drive List** provides a list of hard disk drives that have an identifier that does not match the stored configuration information.

The identifier consists of both the configuration host ID and a time stamp. You can define the host ID as the server serial number or any string, up to 12 characters. (See “Changing the ServeRAID Adapter Parameters” on page 147 for more information.)

Synchronizing the Adapter Configuration:

When the configuration information in the adapter NVRAM, EEPROM, and hard disk drives does not match, you can select one source, and copy the selected configuration information to the other locations. This menu provides options to synchronize this configuration information.



- **EEPROM as Source** copies configuration information from the adapter EEPROM to NVRAM and to all hard disk drives in a Rebuild or Online state that are defined in the adapter EEPROM configuration.
- **NVRAM as Source** copies the configuration information from NVRAM to the adapter EEPROM and to all hard disk drives in a Rebuild or Online state defined in the NVRAM configuration.
- **NVRAM and POCL as Source** updates information from the power-on change list with the information in NVRAM. This information is then copied to the adapter EEPROM and to all hard disk drives in a Rebuild or Online state that are defined in the NVRAM configuration.
- **Hard Disk Drives as Source** retrieves configuration information from hard disk drives. The configuration information is then copied to the adapter NVRAM and EEPROM.
- **Identified HDD as Source** updates the configuration information with stored configuration information on a hard disk drive that matches the identifiers stored in the NVRAM. The updated configuration information is then copied to NVRAM, the adapter EEPROM, and the hard disk drives configured in an array.
- **Specific HDD as Source** retrieves the configuration information with stored configuration information on the hard disk drive that you select. The updated configuration information is then copied to NVRAM, EEPROM, and configured hard disk drives.

Running RAID Subsystem Diagnostic Tests

The ServeRAID Subsystem Diagnostic program provides several utility programs that allow you to test the ServeRAID adapter and the devices connected to it.

To run the RAID diagnostic utility programs, do the following steps:

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Advanced Functions** from the Main Menu.
3. Select **IBM RAID Subsystem Diagnostic**.
4. Select the diagnostic test that you want to run and press **Enter**:
 - **Run Adapter Self-test** runs diagnostic tests on the ServeRAID adapter.
 - **SCSI Device Self-test** runs diagnostic tests on the SCSI devices attached to the ServeRAID adapter.
 - **Drive Media Test** verifies that all sectors on a hard disk drive can be accessed. The drive must be in the RDY or HSP state.
 - **Format Drive** performs a low-level format on a hard disk drive. For more information, see “Formatting Drives” on page 144.
5. Follow the instructions on the screen.

Additional Disk-Array Tasks

The following procedures are for performing additional, less common, disk-array tasks. You can select several utility programs:

- Back up configuration to diskette
- Restore configuration to diskette
- Change the write policy
- Change the RAID parameters
- Format a drive
- Obtain drive status
- Change the RAID adapter parameters

Attention

Notices appear throughout the following procedures to alert you about potential loss of data. Similar messages appear on the screens for these procedures. Read these messages carefully before answering yes to the confirmation requests.

Backing Up The Disk-Array Configuration:

The RAID adapter maintains a record of the disk-array configuration information in its nonvolatile RAM (NVRAM) and electrically erasable programmable read-only memory (EEPROM) module. The disk-array configuration is *vital information*. To protect this information, back up the information to diskette as soon as you have completed your tasks.

To back up the disk-array configuration information to diskette:

Note

You need a blank, formatted, 3.5-inch diskette.

1. Label a blank diskette "Disk Array Configuration Backup," and date it.
2. Start the ServeRAID configuration program (see "Starting the ServeRAID Configuration Program" on page 115).
3. Select **Advanced Functions** from the Main Menu.
4. Select **Backup config. to diskette**.
5. Remove the configuration program from the drive and insert the blank diskette.
6. Follow the instructions on the screen.

Restoring the Disk-Array Configuration

To restore the disk-array configuration information in the ServeRAID adapter, use the configuration program and an up-to-date Disk Array Configuration Backup diskette.

Note

Because dynamic changes in the configuration of the disk array occur due to hot-spare drive replacement or other drive maintenance activity, the configuration backup information on the diskette might be different from that in the adapter. It is important that you back up the disk-array configuration information frequently, to keep the backup information on the diskette current.

To restore the ServeRAID configuration information:

1. Start the ServeRAID configuration program (see "Starting the ServeRAID Configuration Program" on page 115).
2. Select **Advanced Functions** from the Main Menu.
3. Select **Restore config. from diskette**.
4. Follow the instructions on the screen.

Changing the Write Policy

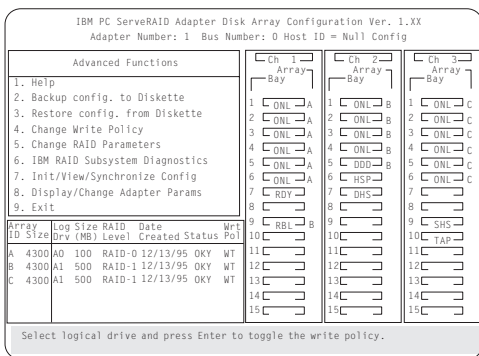
When you configure a logical drive, the RAID adapter automatically sets the write policy to *write-through* (WT) mode, where the completion status is sent *after* the data is written to the hard disk drive. Under certain workloads, you can improve performance by changing this write policy to *write-back* (WB) mode, where the completion status is sent *after* the data is copied to adapter cache memory, but *before* the data is actually written to the hard disk drive.

Although you gain performance with write-back mode, it creates a greater risk of losing data due to a power failure. This is because the system gets a completion status message when the data reaches adapter cache memory, but *before* data is actually written to the hard disk drive.

If you change the write policy to write-back, wait at least 10 seconds after your last operation before you power-off the server. It takes that long for the system to move the data from the adapter cache memory to the hard disk drive. Failure to follow this practice can result in lost data.

To change the write policy:

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Advanced Functions** from the Main Menu.
3. Select **Change Write Policy** from the Advanced Functions menu. The cursor will be active in the Logical Drive list.
4. Select the logical drive whose write policy you want to change. A screen similar to the following appears:



Note

The information might be different from that shown in this screen.

The Logical Drive list contains the logical drive ID, the size in megabytes of each logical drive, the RAID level you assigned to that logical drive, and the date you created it.

The status of the logical drive is also shown. **OKY** means that no problem conditions are associated with the drive; **CRT** means that you must replace the hard disk drive and rebuild the logical drive. (You will have received a message telling you what has happened to the drive.) **OFL** means that the logical drive is irrecoverable; the data in that drive is lost.

5. Locate the **Wrt pol** (Write Policy) field in the Logical Drive list.

The write policy is shown as either **WT** (write-through, which is the default setting) or **WB** (write-back).

6. Select the logical drive whose write policy you want to change.

Attention:

If you change the write policy to write-back, wait at least 10 seconds after your last operation before you power-off the server. It takes that long for the system to move the data from the cache memory to the storage device. Failure to follow this practice can result in lost data.

7. Press **Enter** to change the write policy.
Notice that **WT** changes to **WB**. You can press **Enter** to alternate between **WT** and **WB**.
8. When you have made your choice, press **Esc** to return to the Advanced Functions menu.
9. Select **Exit**. The Confirm pop-up window appears asking you to confirm your action.
10. To return the setting to its original state, select **No**. To save your changes, select **Yes**.
11. Back up the disk-array configuration information to diskette. See “Backing Up The Disk-Array Configuration” on page 141 for more information.

Formatting Drives

You can perform a low-level format on drives with **RDY** (Ready), **EMP** (Empty), **SBY** (Standby), **SHS** (Standby Hot-Spare), or **HSP** (Hot-spare) state.

Note

The **Format Drive** choice on the IBM RAID Subsystems Diagnostics menu provides a low-level format. If you install a new hard disk drive that requires a standard format, use the Format command provided by the operating system.

The ServeRAID configuration program provides the Format program so that you can perform a low-level format on a drive controlled by the RAID adapter.

To perform a low-level format:

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Advanced Functions** from the Main Menu.
3. Select **IBM RAID Subsystems Diagnostics** from the Advanced Functions menu.

Attention

A low-level format erases all data and programs from the hard disk drive. Before proceeding, back up any data and programs that you want to save.

4. Select **Format Drive**. The low-level format program starts.

- Follow the instructions on the screen.

You can perform a low-level format on one drive at a time.

Note

If formatting is interrupted, the drive being formatted might display as an Empty state (- -) or blank in the Bay/Array selection list. Select the drive, and format it again.

Changing the RAID Parameters

To change the RAID parameters:

- Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
- Select **Advanced Functions** from the Main Menu.
- Select **Change RAID Parameters**.

IBM PC ServeRAID Adapter Disk Array Configuration Ver. 1.XX
Adapter Number: 1 Bus Number: 0 Host ID = Null Config

Advanced Functions				Ch 1 Array Bay	Ch 2 Array Bay	Ch 3 Array Bay
1. Help	1. ONL	1. ONL	1. ONL	1. ONL	1. ONL	1. ONL
2. Backup config. to Diskette	2. ONL	2. ONL	2. ONL	2. ONL	2. ONL	2. ONL
3. Restore config. from Diskette	3. ONL	3. ONL	3. ONL	3. ONL	3. ONL	3. ONL
4. Change Write Policy	4. ONL	4. ONL	4. ONL	4. ONL	4. ONL	4. ONL
5. Change RAID Parameters	5. ONL	5. DDD	5. ONL	5. ONL	5. ONL	5. ONL
6. IBM RAID Subsystem Diagnostics	6. ONL	6. HSP	6. ONL	6. ONL	6. ONL	6. ONL
7. Init/View/Synchronize Config	7. RDY	7. DHS	7. TAP	7. TAP	7. TAP	7. TAP
8. Display/Change Adapter Params	8. []	8. []	8. []	8. []	8. []	8. []
9. Exit	9. RBL	9. []	9. SHS	9. SHS	9. SHS	9. SHS
Stripe Unit Size	Rebuild Priority	Unattended	Read Ahead	10. []	10. []	10. []
1. 8K	1. Medium	1. On	1. On	11. []	11. []	11. []
2. 16K	2. High	2. Off	2. Off	12. []	12. []	12. []
3. 32K	3. Low			13. []	13. []	13. []
4. 64K				14. []	14. []	14. []
				15. []	15. []	15. []

Select a choice using the Up Arrow, (↑) Down Arrow, (↓) Left Arrow (←) and Right Arrow (→) keys.
Press Enter to change parameter. Press Esc to return to main menu.

The default settings are:

- Stripe unit size — 8K

Attention:

Once the stripe unit is chosen and data is stored in the logical drives, the stripe unit cannot be changed without destroying data in the logical drives.

The stripe unit size is the amount of data written on a given disk before writing on the next disk. To maximize the overall performance, choose the stripe unit such that the stripe-unit size is close to the size of the system I/O request. The default is set to 8 K data bytes.

Note

When the stripe unit size is 8 K or 16 K, the maximum number of drives in an array is 16. When the stripe unit size is 32 K or 64 K, the maximum number of drives in an array is 8.

- **Rebuild Priority — High**

Rebuild priority can be set to high, medium, or low. When the rebuild request is set to high, the rebuild I/O request gets high priority in the execution order.

When the rebuild request is set to medium in a heavily loaded system (with a medium rate of system I/O requests), the medium-priority rebuild can reduce the disk rebuild time at the expense of degraded handling of I/O requests.

When the rebuild priority is set to low, in a moderate to heavily loaded system, low rebuild priority will increase the disk rebuild time but provides better system performance.

Note

Rebuild priority can be changed without affecting data in the logical drives.

- **Unattended Mode — Off**

You can enable the adapter to accept changes in the configuration without user input. Unattended mode is useful when the server operates remotely. See “Unattended Mode of Operation” on page 147 for more information.

When Unattended Mode is On, and a hard disk drive is found in a location other than the one defined in the adapter configuration, the program pauses briefly for user input, then, automatically rearranges the configuration information to correct the logical drive configuration. Unattended mode also clears any blocked drives.

When Unattended Mode is Off, the program waits for user input.

- **Read ahead — On**

Normally, the RAID adapter transfers data from disk to its local cache in steps of stripe-unit size. This provides excellent overall performance when workloads tend to be sequential. However, if the workload is random and system I/O requests are smaller than stripe-unit size, reading ahead to the end of the stripe unit will result in a wasted SCSI bus bandwidth and wasted disk utilization. When read-ahead is set to Off, the size of data transfer from the disk to local cache is equal to the system I/O

request size, and no read-ahead to the end of the stripe unit is performed.

Notes

1. The read-ahead setting can be changed without destroying data in a logical drive.
2. When the configuration is saved on a diskette, the RAID parameters are saved also.

Unattended Mode of Operation:

You can enable the adapter to accept changes in the configuration without user input. When this mode is enabled (see "Changing the RAID Parameters" on page 145 for information), the adapter pauses briefly to permit a user to override the default action; then the adapter rearranges the configuration information. Unattended mode also clears any blocked logical drives. This mode is useful when the server operates remotely.

The adapter "chooses" an action that is equivalent to pressing one of the following function key:

F5: The server continues the startup operation after identifying the drive that is defunct. For example, an HSP drive failed to respond during POST. Startup continues without the HSP drive; its drive state will display as DHS.

F6: When a drive has been removed from the server, for example, for maintenance or security, and was returned, but in a different bay, the adapter adjusts the configuration to the drive's new location.

F7: An adapter with stored configuration information that does not match that of the configured drives present, imports the configuration information from the drives.

The RAID adapter assigns the following priorities to the function keys:

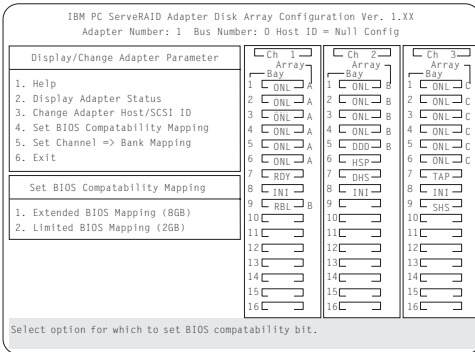
If this action/key is available	Priority of actions
F7	F7, F6, F5
F6	F6, F5
F5	F5

Changing the ServeRAID Adapter Parameters

Display/Change Adapter Parameters allows you to view and change the adapter's configuration parameters.

To display or change the adapter parameters:

1. Start the ServeRAID configuration program (see “Starting the ServeRAID Configuration Program” on page 115).
2. Select **Advanced Functions** from the Main Menu.
3. Select **Display/Change Adapter Params** and press **Enter**. The following screen appears.



- **Display/Adapter Status** allows you to view the status of the adapter.
- **Change Adapter Host/SCSI ID** allows you to change the adapter SCSI ID and the SCSI transfer rate. You can also define the host configuration ID as any 12 characters. In addition, you can change the number of drives in a group that will startup simultaneously, and set the start-up delay in seconds between groups of drives.
- **Set BIOS Compatibility Mapping** allows you to set the BIOS mapping to 2 GB or 8 GB.
- **Set Channel => Bank Mapping** allows you to specify which bank is connected to each of the internal Channels on the RAID adapter. The following table shows the default mapping.

Bank	Default Connection
C	Channel 3
D	Channel 2
E	Channel 1

You can also specify the setting of the SCSI ID backplane jumper. This mapping is critical for the correct operation of the Administration and Monitoring program, which uses the settings to identify drives, control power to specific drives, and operate the SCSI LEDs.

For example, suppose you daisy-chained banks D and E, connecting the input connector on bank D to Channel 2 on the adapter. The SCSI ID backplane jumper on bank E is set to HI. Refer to the backplane information in the *PC Server Hardware Maintenance Manual* for the system

you are servicing. In this configuration, Channel 1 is available for external devices. Set the Bank Mapping as shown:

Channel	Low ID	High ID
Channel 1	External devices	External devices
Channel 2	D	E
Channel 3	C	

4. Follow the instructions on the screen.

Using the Mini-Configuration Program

The &short7. is a quick way to display the adapter settings, and to perform a limited set of the configuration functions without using the RAID Adapter Option Diskette.

To access the RAID adapter &short7.:

1. Power-on the server, or, if the system is on, press **Ctrl+Alt+Del**.
2. Press **Ctrl+I** immediately when the Mini-Configuration prompt appears on the screen.
3. Press **Enter**.

If you have more than one RAID adapter installed, you will get an adapter selection screen; otherwise, the Main Menu appears.

- **View Adapter Status** displays the current status of the RAID adapter. (See “Viewing the Adapter Status” for information.)
 - **View Configuration** shows the current configuration information for the RAID adapter. (See “Viewing Configuration Information” on page 150 for information.)
 - **Advanced Functions** resets the adapter, initializes the configuration, and imports the configuration from drives. (See “Using Advanced Configuration Functions” on page 150 for information.)
4. Select a menu item, press the number of the item or use the Up Arrow (↑) key or Down Arrow (↓) key to highlight the item, then press **Enter**.
 5. Follow the instructions on the screen.
 6. Select **Exit** to leave the Main Menu.

Viewing the Adapter Status:

The **View Adapter Status** choice allows you to view the status of the adapter's disk array.

The menu contains the following fields:

- **Unattend** displays the on/off state of Unattended Mode.
- **Boot Block Version** displays the current version number of the Boot Block.

- **Code Block Version** displays the current version number of the firmware on the adapter.
- **Rebuild Rate** displays the speed of rebuild. (See “Changing the RAID Parameters” on page 145.)
- **No. of DDD Drv.** displays the number of defunct drives.
- **No. of OFL Drv.** displays the number of offline logical drives.
- **No. of CRT Drv.** displays the number of critical logical drives.
- **Cfg. Updates** displays the number of times that the configuration has been updated.
- **Flash Pgms** displays the number of times that the firmware flash/EEPROM has been updated.
- **Logical Drive with Bad/Blocked Stripe** identifies any logical drive that has bad stripes, as well as logical drives that are in the blocked state.

Viewing Configuration Information:

The **View Configuration** choice allows you to view the number and size of logical drives installed. It also displays the RAID level, current state, stripe size, write policy, read ahead status, and the creation date for each logical drive.

IBM PC ServeRAID Adapter Disk Array Mini-Configuration Ver. 1.XX

View Adapter Configuration Information
No: 1 Bus: 0 Slot: 14

Logical Drive	Size (MB)	RAID Level	Current State	Stripe Size	Wrt Pol	Read Ahead	Date Created mm/dd/xx
0	100	5	OKY	8K	WT	NO	01/18/96
1	100	5	OKY	8K	WT	NO	01/18/96
2	100	5	OKY	8K	WT	NO	01/18/96
3	100	5	OKY	8K	WB	NO	01/18/96
4	100	5	OKY	8K	WB	NO	01/18/96
5	99	1	OKY	8K	WT	NO	01/18/96
6	200	5	OKY	8K	WT	NO	01/18/96
7	300	1	OKY	8K	WT	NO	01/18/96

Press any key to continue

Using Advanced Configuration Functions:

The **Advanced Functions** choice allows you to reset the RAID adapter, initialize the configuration, and import the configuration from drives.

- **Reset the Adapter** resets the adapter configuration values to the factory defaults.
- **Initialize Configuration** restores the factory default settings and sets all functional, connected hard disk drive states to the Ready (RDY) state.
- **Import Configuration from Drives** reads the configuration information from the drives and copies it to NVRAM and the EEPROM modules on the adapter.

&sraid. Adapter Messages

the following information contains the &sraid. diagnostic and run-time error messages that might appear during startup of a PC Server disk-array model.

The RAID adapter contains a device-error table that collects statistics on the number and type of errors that occur on a selected hard disk drive. After correcting a problem with the disk array, you should clear the table so that you can identify any subsequent errors quickly. For more information, see "Obtaining Drive Status" on page 128.

All hard disk drives contain unique identifiers, such as the drive serial number and manufacturer. During configuration, the RAID adapter stores this information.

The RAID adapter also adds an additional unique identifier, called the host ID, to each hard disk drive that is part of a logical drive. The host ID is a user-defined 12-character string. (See "Changing the ServeRAID Adapter Parameters" on page 147 for information on assigning a host ID.)

&sraid. Adapter POST and Setup Messages:

During POST, the RAID adapter compares the stored configuration information to the configuration that is actually present. If a discrepancy exists, one or more status messages appear after POST completes, but before the operating system loads. When the RAID adapter requires your input, a list of function keys will appear below the message.

New Drive Installed: When the RAID adapter detects a new drive that is not part of the current configuration, the following message appears:

(old state: new state ch: bay)

This is an information message. No action is required.

Configured Drives are Missing: When the RAID adapter detects that a previously configured drive is missing, the following message appears:

old state: new state: ch: bay

where *old state* is the configured state of the drive, *new state* is the state that the RAID adapter will assign to the drive, *ch* and *bay* are the channel and bay where the drive was located previously.

Examples of the possible state changes include:

(ONL: DDD x: y)
(RDY: EMP x: y)
(SBY: EMP x: y)
(RBL: DDD x: y)
(HSP: DHS x: y)
(SHS: DHS x: y)

Two choices will follow this message:

F4 Retry. Select this key after correcting a problem. For example, select retry after you turn on the external storage enclosure that contains the hard disk drive.

F5 Select this key to accept the new state that the RAID adapter will assign to the drive. For example, the adapter will assign the drive a state of defunct or empty.

You can also select F5 when you must remove a drive, RAID level 1 and RAID level 5 logical drives are present, and performance in a degraded mode is acceptable. The RAID adapter will assign the drive a state of defunct, but the server can complete startup. However, the array will remain in Critical mode and the potential for data loss will exist until you replace and rebuild the defunct drive. To prevent the loss of data, replace and rebuild the defunct drive in a timely manner.

Configured Drives Are Not in the Configured

Location: When the RAID adapter detects that a previously configured drive is present, but the drive is in a new location, the following message appears:

(old ch: old bay: > new ch: new bay)

where *old channel* is the channel that matches the existing drive configuration information, *old bay* is the bay that matches the existing drive configuration information, *new ch* is the channel where the drive is now located, and *new bay* is the bay where the drive is now located.

For example:

(1 :6 > 2:14)
(2 :5 > 2: 6)

In this example, the message indicates that the drive from Channel 1, Bay 6 is now located at Channel 2, Bay 14, and the drive from Channel 2, Bay 5 is now located at Channel 2, Bay 6. The drive might have been physically moved to the new bay.

Three choices will follow this message:

F4 Retry. Select this key after correcting a problem. For example, select retry after you move the hard disk drive to its previously assigned location.

F5 Select this key to accept the new state that the RAID adapter will assign to the drive. For example, the adapter will assign the drive a state of defunct.

F6 Select this key to modify the configuration to match the current drive location.

You might remove the hot-swap drives from the server for security reasons. If you replace the drives but install them in different bays, you can press **F6** to accept the new locations, and the RAID adapter will update the configuration.

New Adapter Installed in a Configured Server:

When the RAID adapter detects that the identifiers of the drives do not match the adapter configuration information, the following message appears:

```
host id: old ch: old bay: new ch:new bay
```

where *host ID* is the adapter identification, *old channel* is the channel that matches the drive configuration information, and *old bay* is the bay that matches the drive configuration information. *New ch* is the channel where the drive is now located, and *new bay* is the bay where the drive is now located.

For example:

```
(My Machine : 1:6 > 2:10)
```

In this example, the message indicates that the drive from Channel 1, Bay 6 is now located at Channel 2, Bay 10. The drive might have been physically moved to the new bay.

Two choices will follow this message:

F4 Retry. Select this key after correcting the problem. For example, select retry after you move the hard disk drive to its previously assigned location, or after you install the original RAID adapter.

F7 Select this key to import the configuration information from the drive and to update the configuration information on the RAID adapter. This choice is useful when you

replace the RAID adapter in an existing disk-array model.

You also might select F7 if you replace a whole set of drives with drives that were configured in another server with a RAID adapter.

Note

When you install drives in a server that has no logical drives defined, the F7 choice will not appear. This can occur when you replace the RAID adapter itself. The adapter does not contain any logical drives in its factory configuration. Therefore, F7 will not appear. In this case, restart the server and press **Ctrl+I** to enter the Mini-Configuration (see “Using the Mini-Configuration Program” on page 149); then, select **Advanced Functions**. From that menu, select **Import Configuration from Drives to Adapter**.

&sraid. Adapter Status and Error Messages:

This table lists, in alphabetic order, messages associated with the IBM PC Server SCSI-2 Fast/Wide PCI-Bus RAID Adapter.

Where the “Action” information tells you to start the IBM RAID configuration program, insert the RAID Adapter Option Diskette in the primary diskette drive (usually drive A); then, press **Ctrl+Alt+Del**. The action column also provides general information about the message.

Where *m* or *n* appears in these messages, a number will appear in the actual message.

RAID Adapter Message	Action
<i>n</i> logical drives are installed.	<i>n</i> represents the number of defined logical drives. This is an information message. No action is required.
Controller is not responding to commands. No logical drives are installed.	The RAID adapter is not operational. Make sure that the adapter is fully seated. If the problem persists, have the system serviced.

RAID Adapter Message	Action
Error: Cannot disable this adapter BIOS.	<p>The adapter was unable to prevent an extra copy of the adapter BIOS from being stored on the server. This condition occurs when the server contains multiple RAID adapters.</p> <p>When the prompt to disable extra copies of the adapter BIOS appears, type N (No).</p>
Following drives not responding. (old state: new state ch: bay)	<p>One or more drives did not respond to the adapter. For example, the adapter detected a new drive in an unconfigured bay, and the drive is not part of the current configuration. This might also occur if the adapter detected that a configured drive is missing.</p> <p>Select F5 to accept the new state that the RAID adapter will assign to the drive. For example, the adapter will assign the drive a state of defunct or empty.</p>
Following new drives found. (old state: new state ch: bay)	<p>One or more drives were found in an unconfigured bay. For each drive listed, a new state of Ready (RDY) appears.</p> <p>This is an information message. No action is required.</p>
Following drives found in new location (old ch: old bay > new ch: new bay)	<p>POST found that the location of one or more drives does not match the stored configuration information. (See "Configured Drives Are Not in the Configured Location" on page 152 for more information.)</p>
Installation stopped.	<p>The server cannot access the RAID adapter.</p> <p>This is a follow-on message to a preceding message. Follow the "Action" instructions for the preceding message to resolve the problem.</p>

RAID Adapter Message	Action
Recoverable configuration error; run Configuration program.	<p>The configuration data stored on the adapter NVRAM does not match the configuration data stored in the adapter EEPROM.</p> <p>Insert the IBM RAID Adapter Option Diskette; then, press Ctrl+Alt+Del to restart the system. Select Advanced Functions and synchronize the adapter configuration. See "Resetting the Adapter Configuration" on page 138 for more information.</p>
&sraid. firmware version xx.yy	<p>This is the version level of the RAID adapter's firmware.</p> <p>This is an information message. No action is required.</p>
WARNING: <i>n</i> logical drives are critical; <i>n</i> logical drives are offline.	<p>One or more drives have failed.</p> <p>Replace the defunct drives as soon as possible to prevent data loss.</p>
The server has an error due to a Blocked Logical Drive.	<p>One or more logical drives are in a blocked state.</p> <p>Press F4 to unblock the logical drive, or press F5 to continue without any changes.</p>

Symptom-to-FRU Index

This index supports PC Server 704 - Type 8650 computers.

Note

Always start with "General Checkout (QAPLus/PRO)" on page 6.

The Symptom-to-FRU lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this Symptom-to-FRU Index to help you decide which FRUs to have available when servicing the computer. The POST BIOS displaying POST error codes and messages on the screen.

Note

For IBM devices not supported by index, refer to the manual for that device.

Beep Codes

Beep Code	FRU/Action
1 Beep (Refresh failure)	<ol style="list-style-type: none">1. Check memory in J1, J22. Memory SIMMs3. Memory Board
2 Beeps (Parity can't be reset)	<ol style="list-style-type: none">1. Check memory2. Memory SIMMs3. Memory Board
3 Beeps (First 64KB memory failure)	<ol style="list-style-type: none">1. Check memory2. Memory SIMMs3. Memory Board
4 Beeps (Timer not operational)	<ol style="list-style-type: none">1. Check processor board2. Check System Board3. System Board
5 Beeps (Processor failure)	<ol style="list-style-type: none">1. Reseat processor module2. Processor Board3. System Board
6 Beeps (8042 gate a20 is off v_mode)	<ol style="list-style-type: none">1. Reseat processor module2. System Board3. Processor Board
7 Beeps (Exception interrupt error)	<ol style="list-style-type: none">1. Check cables2. Processor Board3. System Board
8 Beeps (Display memory read/write error)	<ol style="list-style-type: none">1. Check/Install Video RAM2. System Board
9 Beeps (ROM checksum error)	<ol style="list-style-type: none">1. Update BIOS2. System Board

Beep Code	FRU/Action
10 Beeps (Shutdown register read/write error)	1. System Board

Error Codes

Error Code	FRU/Action
0002 (Primary boot device not found)	1. Cables 2. Primary Boot Device
0010 (Cache memory failure, do not enable cache)	1. Processor Module 2. Processor Board
0015 (Primary output device not found)	1. Primary Output Device
0016 (Primary input device not found)	1. Primary Input Device
0041 (EISA ID mismatch for slot)	1. Reseat EISA Adapter 2. Run SCU program 3. EISA Adapter
0043 (EISA invalid configuration for slot)	1. Reseat EISA Adapter 2. Run SCU program
0044 EISA configuration not assured)	1. Reseat EISA Adapter 2. Run SCU program
0045 (EISA expansion board not ready in slot)	1. Reseat EISA Adapter 2. EISA Adapter 3. System Board
0047 (EISA CMOS configuration not set)	1. Run SCU program 2. EISA Adapter 3. System Board
0048 (EISA CMOS checksum failure)	1. Run SCU program 2. System Board
0049 (EISA NVRAM invalid)	1. Run SCU program 2. System Board
0060 (Keyboard is locked - please unlock it)	1. Unlock keyboard 2. Keyboard 3. System Board
0070 (CMOS time and date not set)	1. Set time and date 2. Real-Time Clock Module
0080 (Option ROM has bad checksum)	1. Reseat adapter 2. Adapter
0083 (Shadow of PCI ROM failed)	1. Reseat adapter 2. Adapter

Error Code	FRU/Action
0084 (Shadow of EISA ROM failed)	<ol style="list-style-type: none"> 1. Reseat adapter 2. Adapter
0085 (Shadow of ISA ROM failed)	<ol style="list-style-type: none"> 1. Reseat adapter 2. Remove adapter
0131 (Floppy Drive A:)	<ol style="list-style-type: none"> 1. Cable 2. Drive
0132 (Floppy Drive B:)	<ol style="list-style-type: none"> 1. Cable 2. Drive
0135 (Floppy disk controller failed)	<ol style="list-style-type: none"> 1. System Board
0140 (Shadow of system BIOS failed)	<ol style="list-style-type: none"> 1. Reboot system 2. System Board
0175 (CPU modules are incompatible)	<ol style="list-style-type: none"> 1. Use compatible processor modules
0176 (CPU failure - Slot 1, CPU # 1)	<ol style="list-style-type: none"> 1. Reseat processor module 2. Processor Module 3. Processor Board
0177 (CPU failure - Slot 1, CPU # 2)	<ol style="list-style-type: none"> 1. Reseat processor module 2. Processor Module 3. Processor Board
0178 (CPU failure - Slot 2, CPU # 1)	<ol style="list-style-type: none"> 1. Reseat processor module 2. Processor Module 3. Processor Board
0179 (CPU failure - Slot 2, CPU # 2)	<ol style="list-style-type: none"> 1. Reseat processor module 2. Processor Module 3. Processor Board
0180 (Attempting to boot with failed CPU)	<ol style="list-style-type: none"> 1. Processor Module
0191 (CMOS battery failed)	<ol style="list-style-type: none"> 1. Real-Time Clock Module 2. System Board
0195 (CMOS system options not set)	<ol style="list-style-type: none"> 1. Run SCU program
0198 (CMOS checksum invalid)	<ol style="list-style-type: none"> 1. Run SCU program
0289 (System memory size mismatch)	<ol style="list-style-type: none"> 1. Run System Setup 2. Memory SIMM 3. Memory Board
0295 (Address line short detected)	<ol style="list-style-type: none"> 1. Memory SIMM 2. Memory Board

Error Code	FRU/Action
0297 (Memory size decreased)	<ol style="list-style-type: none"> 1. Run System Setup 2. Memory SIMM 3. Memory Board
0299 (ECC error correction failure)	<ol style="list-style-type: none"> 1. Reseat memory and memory board 2. Memory Board 3. System Board
0301 (ECC single bit correction failed, correction disabled)	<ol style="list-style-type: none"> 1. Reseat memory and memory board 2. Memory Board 3. System Board
0302 (ECC double bit error)	<ol style="list-style-type: none"> 1. Reseat memory and memory board 2. Memory Board 3. System Board
0310 (ECC address failure)	<ol style="list-style-type: none"> 1. Reseat memory and memory board 2. Memory Board 3. System Board
0370 (Keyboard controller error)	<ol style="list-style-type: none"> 1. Reboot system 2. System Board
0373 (Keyboard stuck key detected)	<ol style="list-style-type: none"> 1. Ensure nothing is resting on the keyboard 2. Keyboard
0375 (Keyboard and mouse swapped)	<ol style="list-style-type: none"> 1. Swap keyboard and mouse
0380 (ECC SIMM failure, board is in slot 1)	<ol style="list-style-type: none"> 1. Replace memory as indicated
0392 (ECC SIMM failure, board is in slot 2)	<ol style="list-style-type: none"> 1. Replace memory as indicated
0430 (Timer channel 2 failure)	<ol style="list-style-type: none"> 1. System Board
0440 (Gate-A20 failure)	<ol style="list-style-type: none"> 1. System Board
0441 (Unexpected interrupted in protected mode)	<ol style="list-style-type: none"> 1. Use correct device driver
0445 (Master interrupt controller error)	<ol style="list-style-type: none"> 1. System Board
0446 (Slave interrupt controller error)	<ol style="list-style-type: none"> 1. System Board
0450 (Master DMA controller error)	<ol style="list-style-type: none"> 1. System Board

Error Code	FRU/Action
0451 (Slave DMA controller error)	1. System Board
0460 (Fail-safe timer NMI failure)	1. Adapter 2. System Board
0461 (Software port NMI failure)	1. Check software/device driver
0465 (Bus timeout NMI in slot)	1. Check adapter 2. Adapter 3. System Board
0467 (Expansion board NMI in slot)	1. Check adapter 2. Adapter
0501 (PCI system error)	1. System Board 2. Adapter
0510 (PCI parity error)	1. PCI device 2. System Board
0710 (System board device resource conflict)	1. Run SCU program
0711 (Static device resource conflict)	1. Run SCU program
0800 (PCI I/O port conflict)	1. Run SCU program
0801 (PCI memory conflict)	1. Run SCU program
0802 (PCI IRQ conflict)	1. Run SCU program
0803 (PCI error log is full, the log will be cleared automatically)	1. Rerun diagnostics
0810 (Floppy disk controller resource conflict)	1. Run SCU program
0811	1. Check cables 2. System Board
0812	1. Check cables 2. System Board
0815 (Parallel port resource conflict)	1. Run SCU program
0816 (Serial port 1 resource conflict)	1. Run SCU program
0817 (Serial port 2 resource conflict)	1. Run SCU program

Error Code	FRU/Action
0820 (Expansion board disabled in slot)	<ol style="list-style-type: none"> 1. Run SCU program 2. Adapter 3. System Board
0900 (NVRAM checksum error, NVRAM cleared)	<ol style="list-style-type: none"> 1. Run SCU program
0903 (NVRAM DATA invalid, NVRAM cleared)	<ol style="list-style-type: none"> 1. Run SCU program
0905 (NVRAM cleared by jumper)	<ol style="list-style-type: none"> 1. Run SCU program
0982 (I/O expansion board NMI in slot)	<ol style="list-style-type: none"> 1. Adapter 2. System Board
0984 (Expansion board disabled in slot)	<ol style="list-style-type: none"> 1. Run SCU program 2. Adapter 3. System Board
0985 (Fail-safe timer NMI)	<ol style="list-style-type: none"> 1. Adapter 2. System Board
0986 (System reset caused by Watchdog Timer)	<ol style="list-style-type: none"> 1. Adapter 2. System Board
0987 (Bus timeout NMI in slot)	<ol style="list-style-type: none"> 1. Adapter 2. System Board

Mylex RAID Adapter Error Codes

The following is a listing of the Mylex RAID adapter error codes. For configuration and diagnostic information, refer to the Mylex booklets that were shipped with the system.

- 1101** Network connection error.
- 1102** Fan failed.
- 1103** Power Supply failed.
- 1104** One controller failed. Can't determine which one.
- 1105** One logical drive in array has been taken off-line.
- 1106** One hard disk drive in array has failed.
- 1201** One logical drive in the array is critical.
- 1202** Failed to create the local log file.
- 1303** Fail to open communication to phone line, will not report errors to PAGER and FAX.
- 1204** Failed to create log information window.
- 1205** Event Handler error. Will not get alarm information.
- 1207** Statistics Date Event handler problem, can't start performance window.
- 1208** Error while getting the server list, the server list is not complete.
- 1209** Rebuild physical drive stopped with an error.
- 1210** Rebuild logical drive failed.
- 1211** Parity check on logical drive error.
- 1212** Parity check on logical drive failed.
- 1213** Write back error.
- 1301** Internal log structures getting full, PLEASE SHUTDOWN AND RESET THE SYSTEM IN THE NEAR FUTURE.
- 1302** Server shutdown, connection to this controller is closed. Rebuild physical drive stopped with error.
- 1303** Failed to make hot spare.
- 1304** Failed to kill drive.
- 1305** Failed to sign-on the server.
- 1306** Error while trying to sign-off form server.
- 1307** Failed to onlining drive.
- 1308** Failed to cancel parity-checking/rebuild, it will continue in background.
- 1309** Failed to start parity checking.
- 1310** Failed to start Rebuild.
- 1311** Rebuild/Parity checking already in process.

1401	Success to onlining drive.
1402	Parity checking completed.
1403	Parity checking canceled.
1404	Success on kill drive.
1405	Event handler started.
1407	An automatic rebuild is started.
1408	A manual rebuild is started.
1409	Rebuild is over.
1410	Rebuild is canceled.
1411	A parity check is started.
1412	Parity check is finished.
1413	Parity check canceled.
1414	One logical drive in the array has been put on-line.
1415	One hard disk in the array changed status.
1416	One hard disk been added as stand-by.
1417	Sign-on the server.
1418	Success on making hot spare.
1419	Server re-scan data starting.
1420	Server re-scan data ending.
1421	Rebuild complete.
1422	Rebuild canceled.

Undetermined Problems

You are here because the diagnostic tests did not identify the failure, the Devices List is incorrect, or the system is inoperative.

Note: If you suspect a software mismatch is causing failures (solid or intermittent), be sure to see “Configuration Conflicts” on page 23.

Check the power supplies LEDs to ensure the power supplies are operating correctly, see “Power Supply Checkout (LED Status Descriptions)” on page 37. If the LEDs indicate the power supplies are working correctly, return here and do the following:

1. Power-off the computer.
2. Remove or disconnect the following (one at a time) until you find the failure (power-on the computer and reconfigure each time).
 - Any external devices
 - Surge suppressor device (on the computer)
 - Modem, printer, mouse, or non-IBM devices
 - Each adapter
 - Drives
 - Memory-Module Kits

Note

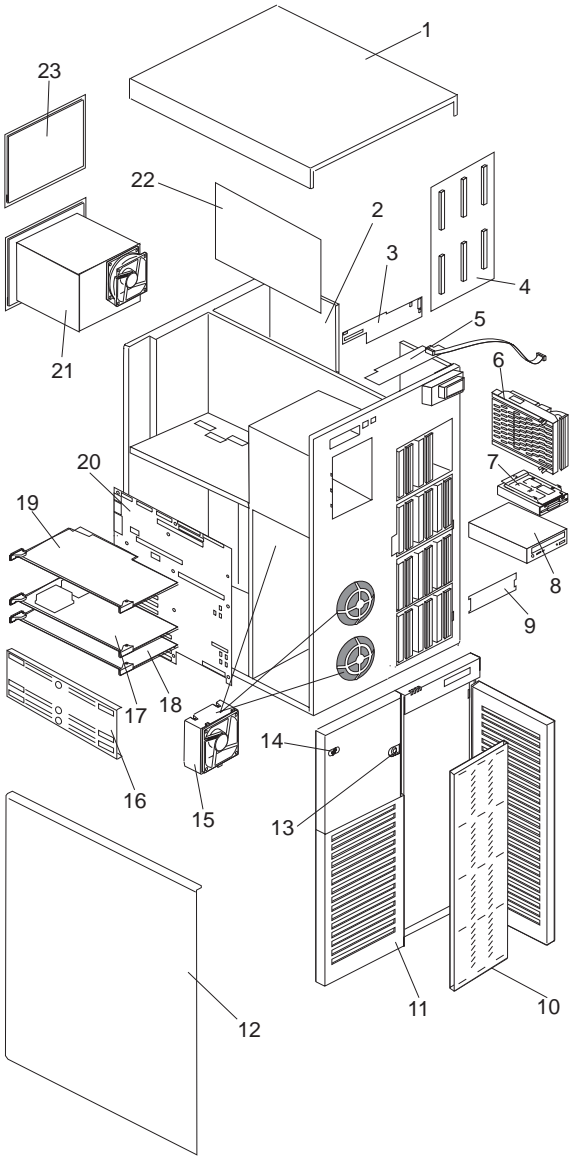
Minimum operating requirements vary for each computer. For example, an IML drive in the drive startup sequence (IML systems only).

3. Power-on the computer. If the problem remains, suspect the system board, then the processor board in that order.

Note

If the problem goes away when you remove an adapter from the system, and replacing that adapter does not correct the problem, suspect the system board then the processor board(s)

Parts Listings



System

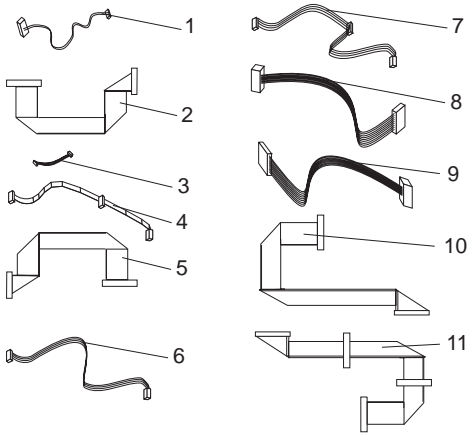
Index	System (PC Server 704 - Type 8650)	FRU No.
1	Cover Assembly, Top (Models 4BW, 4M0, 5M0, 6MM, 7AX)	75H9017
2	Chassis Assembly (Base Frame) (Models 4BW, 4M0, 5M0, 6MM, 7AX)	75H9013
3	Front Panel Control Board (Models 4BW, 4M0, 5M0, 6MM, 7AX)	75H9033
4	Hot-Swap Backplane (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9099
5	SCSI Drive Status LED Board, with cable (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9035
6	Carrier Assembly, Hard Disk Drive (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9031
7	1.44MB Diskette Drive (Models 4M0, 4BW, 7AX)	75H9037
7	1.44MB Diskette Drive (Models 5M0, 6MM)	12J3344
8	4X CD-ROM SCSI Drive (Models 4M0, 4BW, 7AX)	75H9068
8	8X IDE CD-ROM Drive (Models 5M0, 6MM)	12J3340
9	Filler, EMI Panel, for 5.25-Inch Drive Bay (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9090
10	Door, Hot-Swap Drive (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9103
11	Cover Assembly, Front Bezel (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9019
12	Cover Assembly, Side (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9015
13	Lock Assembly (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9072
14	IBM Logo (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9107
15	Fan Assembly with Cable (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9063
16	Card Guide (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9082
17	P6 166/66MHz 512K Processor Board, without Processor (Models 4BW, 7AX)	75H9005
17	P6 Processor Board, without Processor (Model 4M0)	76H4887
17	P6 Processor Board, without Processor (Model 5M0, 6MM)	12J3480 *
18	P6 166/66MHz 512K Processor Board, without Processor (Models 4BW, 7AX)	75H9005
18	P6 Processor Board, without Processor (Model 4M0)	76H4887

Index	System (PC Server 704 - Type 8650)	FRU No.
	P6 166MHz 512KB Processor (Models 4BW, 7AX)	75H9109
	P6 Heat Sink (with Clips and Grease) (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9661
	P6-200MHz Processor (Model 4M0, 5M0, 6MM)	76H4889
19	Memory Board (without memory) (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9003
20	System Board (Models 4M0, 4BW, 7AX)	75H8018
20	System Board (Models 5M0, 6MM)	12J3338
21	420W Auto-Sense Power Supply (Models 4M0, 4BW, 7AX)	75H9066
21	420W Hot-Swap Power Supply (Models 5M0, 6MM)	12J3342
22	Power Distribution Board (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9007
23	Power Supply Filler Panel Models 4M0, 4BW, 5M0, 7AX)	75H9097
	100/10 PCI Ethernet Network Adapter (Models 4BW, 7AX)	25H4383
	16MB 70NS 72-Pin DRAM SIMM (Tin Lead) (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9004
	32MB 70NS 72-Pin DRAM SIMM (Tin Lead) (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9124
	64MB 70NS 72-Pin DRAM SIMM (Tin Lead) (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9125
	128MB ECC SIMM (Model 4M0, 5M0, 6MM)	76H4896
	2.14 GB SCSI Hard Disk Drive (Models 4BW, 7AX)	75H9010
	2.17 GB SCSI Hard Disk Drive (Models 5M0, 6MM)	12J4732
	2.25 GB SCSI Hard Disk Drive (Models 5M0, 6MM)	76H7242
	4.36 GB SCSI Hard Disk Drive (Models 5M0, 6MM)	12J4734
	4.5GB SCSI Hard Disk Drive (Model 4M0)	76H4898
	4.5GB SCSI Hard Disk Drive (Model 6MM)	76H7243
	4.5GB SCSI Hard Disk Drive (Models 5M0, 6MM)	76H5817
	4.5GB Ultra SCSI Hard Disk Drive (Model 6MM)	00K7915
	4.5GB Ultra SCSI Hard Disk Drive (Model 6MM)	00K7931

Index	System (PC Server 704 - Type 8650)	FRU No.
	9.1GB SCSI Hard Disk Drive (Models 5M0, 6MM)	76H5818
	9.1GB SCSI Hard Disk Drive (Models 5M0, 6MM)	76H7244
	B1 Module Plug (Models 4M0, 4BW, 7AX)	12J4649
	Plugs into connector J8G1 on the system board.	
	Bracket, Diskette Drive (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9093
	Bracket, Extraction, Front (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9086
	Bracket, Extraction, Rear (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9088
	Cover, Power Distribution Board (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9101
	Fan Guard (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9080
	Fan Housing (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9065
	Foot, Frame (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9084
	Kit, 5.25-Inch Rails (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9070
	<ul style="list-style-type: none"> • Ground Clips • Rails (4 each) 	
	Kit, Mechanical Accessories (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9076
	<ul style="list-style-type: none"> • Fan Connector Assembly • I/O Adapter Shield • Support Module 3X • System Board Mounting Clips • System Board Support 	
	LCD Board Assembly (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9095
	Light Pipes, for Front Bezel (Models 4M0, 5M0, 6MM)	76H0985
	Mouse (Models 5M0, 6MM)	06H4595
	PCI RAID Controller Board (Models 4M0, 7AX)	75H9011
	(See "Battery Notice (Nickel Cadmium)" on page 183 Also, the controller is shipped with the backup battery jumper set to disable. The jumper must be set to enable before configuring the system. Refer to the <i>Mylex booklets</i> for instructions.)	

Index	System (PC Server 704 - Type 8650)	FRU No.
	PCI RAID Controller Board (Model 6MM) (See "Battery Notice (Nickel Cadmium)" on page 183 Also, the controller is shipped with the backup battery jumper set to disable. The jumper must be set to enable before configuring the system. Refer to the <i>Mylex booklets</i> for instructions.)	76H6875
	Real-Time Clock Module with Battery (Models 4M0, 4BW, 5M0, 6MM, 7AX) (See "Battery Notice (Lithium)" on page 181)	75H9105
	ServerRAID Adapter	06H9334

Cables



Index	Cables (PC Server 704 - Type 8650)	FRU No.
1	Alarm Cable, with Switch (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9053
2	Diskette Drive Cable (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9041
3	Front Panel Cable (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9049
4	Power Cable, connects from Power Supply Board to Hard Disk Drive Backplane (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9043
5	LCD Cable Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9021
6	Power Cable 2X, connects to CD-ROM Drive (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9061
7	Power Cable 3X, connects to Diskette Drive (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9059
8	Power Cable, 14 pin, connects from Power Supply Board to System Board (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9057
9	Power Cable, 20 pin, connects from Power Supply Board to System Board (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9055
10	SCSI Wide Cable (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9045
11	SCSI Wide-Narrow Cable 4X, connects from System Board Adaptec to CD-ROM (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9108
	CD-ROM IDE Cable (Models 5M0, 6MM)	12J3346

Index	Cables (PC Server 704 - Type 8650)	FRU No.
	External SCSI Cable, for RAID Adapter (Models 4M0, 5M0, 6MM)	76H0446
	I ² C Cable, connects from Power Supply Board to Hard Disk Drive Backplane (Models 4M0, 4BW, 5M0, 6MM, 7AX)	75H9051
	SCSI Narrow Hot-Swap Cable (Models 4M0, 4BW, 5M0, 7AX)	75H9047

Keyboards (101/102 Key)

Keyboards (101/102 Key)	FRU No.
Arabic	1391490
Belgium-Dutch	1391414
Belgium-French	1391526
Bulgarian	1399583
Czechoslovakian	1399570
Danish	1391407
Dutch	1391511
Finnish	1391411
French	1391402
German	1391403
Greek	1399046
Hebrew	1391408
Hungarian	1399581
Iceland	1391495
Italy	1393395
Latvia	1391406
Norwegian	1391409
Polish	1399580
Portuguese	1391410
Romanian	1399582
Russian-Cyrillic	1399579
Serbian-Cyrillic	1399578
Slovak	1399571
Slovenia/Croatia/Bosnia	1393669
South Africa	1396790
Spanish	1391405
Swedish	1391411
Swiss-French	1391412
Swiss-German	1391412
Turkish 179	75H9538
Turkish 440	75H9539
U.K. English	1391406
U.S. English	75H9505
U.S. English (E/ME/A use only)	1396790

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	62X1045
U.K./Ireland	14F0033
Yugoslavia	1339520

Special Tools (Information/Diskettes)

The following information and diskettes are required for servicing the PC Server 704 - Type 8650. The diskettes and information are shipped with the server.

Special Tools	FRU No.
Raid Controller Device Driver Diskettes with documentation (4BW, 4M0, 7AX)	76H0173
System Diskettes (US) (Models 4BW, 4M0, 7AX)	76H0172
<ul style="list-style-type: none">• Adaptec Device Driver Diskette• System Configuration Utilities Diskette• Video Device Driver Diskette	

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/2 Hardware Maintenance Manual (part number 83G8990, form number S52G-9971-02).

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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 (Lithium)

Caution

The lithium battery can cause a fire, explosion, or severe burn. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

A pilha de lítio representa risco de incêndio, explosão ou queimaduras graves. Não recarregue, desmonte ou exponha a pilha a temperaturas superiores a 100°C (212°F), não a incinere ou ponha o conteúdo da respectiva célula em contacto com a água nem remova o respectivo conector polarizado. Destrua a pilha de acordo com as normas ou regulamentações locais. Utilize apenas a pilha com o "part-number" indicado nas listas apropriadas. A utilização de uma pilha incorrecta pode resultar na ignição ou explosão da mesma.

锂电池可以引起火警、爆炸、或严重烧伤。请不要把它再充电，拆除两极分化的连接物，拆散、加热超过 100°C (212°F)，焚化、或把电池内含物暴露于水中。根据本地的条例或规则把电池处理。电池只可以用于名单适当的部件。不正确的使用电池可以导致电池燃烧或爆炸。

Elle présente des risques d'incendie, d'explosion ou de brûlures graves. Ne la rechargez pas, ne retirez pas son connecteur polarisé et ne la démontez pas. Ne l'exposez pas à une température supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser.

Die Systematterie ist eine Lithiumatterie. Sie kann sich entzünden, explodieren oder schwere Verbrennungen hervorrufen. Batterien dieses Typs dürfen nicht aufgeladen, zerlegt, über 100 C erhitzt oder verbrannt werden. Auch darf ihr Inhalt nicht mit Wasser in Verbindung gebracht oder der zur richtigen Polung angebrachte Verbindungsstecker entfernt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

Caution Continued

A lítium elemek tüzet, robbanást vagy komoly égési sérüléseket okozhatnak. Nem szabad újratölteni, polarizált csatlakozójával eltávolítani, szétszedni, 100°C (212°F) feletti hőmérsékletre felhevíteni, elégetni, vagy az elem cellájának tartalmát nedvesség hatására kivenni. Az elem megsemmisítésének a helyi rendelkezések és szabályzatok alapján kell történnie. Csak a tartozékok listájában meghatározott típusú elemeket használja. Nem megfelelő elem használata esetén az elem felhevülhet és szétrobbanhat.

La batteria di supporto è una batteria al litio e può incendiarsi, esplodere o procurare gravi ustioni. Evitare di ricaricarla, smontarne il connettore polarizzato, smontarla, riscaldarla ad una temperatura superiore ai 100 gradi centigradi, incendiarla o gettarla in acqua. Smaltirla secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

Литиевая батарея может вызвать пожар, взрыв или серьезный ожог. Не перезаряжайте ее, не снимайте полюсный разъем, не разбирайте ее, не нагревайте выше 100 градусов Цельсия, не поджигайте и не мочите. Использованный блок батарей можно помещать в отходы только в соответствии с национальным законодательством или нормативами. При замене блока батарей разрешается использовать только батареи, указанные в списке комплектующих. Использование несоответствующей батареи может привести к ее взрыву или загоранию.

Li batéria môže zapríčiniť požiar, výbuch alebo úžľaké popáleniny. Batériu nanabíjajte neodstráňte polarizované konektory, nerozoberajte, nezohrievajte nad 100°C (212°F), nespoločnajte ju alebo nepokladajte články batérie do vody. Zbavte sa batérie podľa požadovaných lokálnych predpisov a pravidiel. Použite iba v-robcom odporúčanú batériu. Použite nevhodnej batérie môže zapríčiniť vznietenie alebo výbuch batérie.

La batería de repuesto es una batería de litio y puede provocar incendios, explosiones o quemaduras graves. No la recargue, ni quite el conector polarizado, ni la desmonte, ni caliente por encima de los 100°C (212°F), ni la incinere ni exponga el contenido de sus celdas al agua. Deséchela tal como dispone la normativa local.

Battery Notice (Nickel Cadmium)

Caution

Some batteries contain nickel and cadmium. 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. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

Algumas pilhas contêm uma pequena quantidade de níquel e cádmio. Não desmonte, recarregue ou ponha a pilha em contacto com fogo ou água nem lhe provoque curto-circuitos. Destrua a pilha de acordo com as normas ou regulamentações locais. Utilize apenas a pilha com o "part-number" indicado nas listas apropriadas. A utilização de uma pilha incorrecta pode resultar na ignição ou explosão da mesma.

一些電池包含小量的鎳及鎘。請勿把它拆散，再充電，丟進火或水中、或把它短路。根據本地的條例或規則把電池處理。電池只可以使用於名單適當的部件。不正確的使用電池可以導致電池燃燒或爆炸。

Certaines batteries de secours contiennent du nickel et du cadmium. Ne les démontez pas, ne les rechargez pas, ne les exposez ni au feu ni à l'eau. Ne les mettez pas en court-circuit. Pour les mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la pile de sauvegarde ou celle de l'horloge temps réel, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. Une batterie ou une pile inappropriée risque de prendre feu ou d'exploser.

Die Bereitschaftsbatterie, die sich unter dem Diskettenlaufwerk befindet, kann geringe Mengen Nickel und Cadmium enthalten. Sie darf nur durch die Verkaufsstelle oder den IBM Kundendienst ausgetauscht werden. Sie darf nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Die Batterie kann schwere Verbrennungen oder Verätzungen verursachen. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Bereitschafts- oder Systematterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

Caution Continued

Az elemek egyes fajt i kis mennyiségû nikkelt és kadmiumot tartalmaznak. Nem szabad szétszedni, újratölteni, tűzbe vagy vízbe dobni illetve rövidre z rni. Az elem megsemmisítésének a helyi rendelkezések és szab lyzatok alapj n kell történnie. Csak a tartozékok list j ban meghat rozott típusú elemeket haszn lja. Nem megfelelő elem haszn lata esetén az elem felhevülhet és szétrobbanhat.

Alcune batterie di riserva contengono una piccola quantità di nichel e cadmio. Non smontarle, ricaricarle, gettarle nel fuoco o nell'acqua né cortocircuitarle. Smaltirle secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). Quando si sostituisce la batteria dell'RTC (real time clock) o la batteria di supporto, utilizzare soltanto i tipi inseriti nell'appropriato Catalogo parti. L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

В батареях может содержаться небольшое количество никеля и кадмия. Батареи нельзя разбирать, перезаряжать, бросать в воду огонь или закорачивать. И использованные батареи можно помещать в отходы только в соответствии с национальным законодательством или нормативами. Разрешается использовать только батареи, указанные в списке комплектующих. Использование несоответствующей батареи может привести к ее взрыву или загоранию.

Niektoré batérie majú malé množstvo niklu (Ni) a kadmia (Cd). Batériu nerozoberajte, nenabíjajte, neukladajte do ohňa alebo vody a neskratujte ju. Zbavte sa batérie podľa požadovaných lokálnych predpisov a pravidiel. Použite iba v-robcom odporúčanú batériu. Použitie nevhodnej batérie môže zapríčiniť vznietenie alebo v-buch batérie.

Algunas baterías de reserva contienen una pequeña cantidad de níquel y cadmio. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las cortocircuite. Deséchelas tal como dispone la normativa local. Utilice sólo baterías que se encuentren en la lista de piezas. La utilización de una batería no apropiada puede provocar la ignición o explosión de la misma.

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.

O uso de controles, ajustes ou desempenho de procedimentos diferentes daqueles aqui especificados pode resultar em perigosa exposição à radiação.

凡未在这里指明的任何控制用法、调整、行为，都会导致严重后果。

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

Werden Steuer- und Einstellelemente anders als hier festgesetzt verwendet, kann gefährliche Laserstrahlung auftreten.

Az itt előírt eljárásoktól, beállításoktól és vezérlésektől eltérni a lézersugárzás veszélye miatt kockázatos !

L'utilizzo di controlli, regolazioni o l'esecuzione di procedure diverse da quelle specificate possono provocare l'esposizione a

Использование элементов настройки и выполнение процедур иных, чем указано здесь, может привести к опасному радиационному облучению.

Použitie kontrôl, úprav alebo iných vykonaní od iných výrobcov, ako je v tomto špecifikované, mohlo by mať za následok nebezpečenstvo vystavenia sa vyžiarovaniu.

El uso de controles o ajustes o la ejecución de procedimientos distintos de los aquí especificados

puede provocar la exposición a radiaciones peligrosas.

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.

Radiação por raio laser ao abrir. Não olhe fixo no feixe de luz, não olhe diretamente por meio de instrumentos óticos e evite exposição direta com o feixe de luz.

开启时会有激光发射时，请勿盯视激光光束，请勿直接查看视觉仪器，并且避免直接接触在激光光束之中。

Rayonnement laser si carter ouvert. Évitez de fixer le faisceau, de le regarder directement avec des instruments optiques, ou de vous exposer au rayon.

Laserstrahlung bei geöffnetem Gerät. Nicht direkt oder über optische Instrumente in den Laserstrahl sehen und den Strahlungsbereich meiden.

Kinyitáskor lézersugár ! Ne nézzen bele se szabad szemmel, se optikai eszközökkel. Kerülje a sugárnyalábbal való érintkezést !

Aprendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici e evitare l'esposizione diretta al fascio.

Открывая, берегитесь лазерного излучения. Не смотрите на луч, не разглядывайте его с помощью оптических инструментов, а также избегайте прямого воздействия лазерного луча.

Keď je laserová jednotka otvorená. Vyhnite sa priamemu pohľadu a nehládte priamo s optickými nástrojmi do lúča a vyhnite sa priamemu vystaveniu lúčov.

Radiación láser al abrir. No mire fijamente ni examine con instrumental óptico el haz de luz. Evite la exposición directa al haz.

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 188.

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
800-465-4YOU	Customer Relations
800-IBM-SERV	Customer Service Dispatch
800-263-2769	Customer Service Parts
800-465-2222	Customer Support Center (ISC)
416-443-5701	Customer Service Repair Centre
800-505-1855	Dealer Support Group (DSG)
800-465-7999	HelpClub Registration / IBM Direct
800-465-3299	HelpFax
905-316-3299	HelpFax - Toronto
800-565-3344	HelpPC
905-513-3355	IBM Certification Administrator Mail to: 50 Acadia Drive Markham, Ontario L3R 0B3
800-661-2131	IBM Education (A+ Course)
800-268-3100	IBM Information Network Support
800-387-8343	IBM PC Service Partners
800-487-7426	International Warranty Registration
800-663-7662	Lexmark Product Information
800-IBM-9990	PartnerLine
800-263-2769	Parts Orders, Exchange or Emergency
416-443-5808	Parts Regular Orders, Exchange
(Fax)	
416-443-5755	Parts Orders, Inquiries
514-938-3022	PC Co Bulletin Board - Montreal
905-316-4255	PC Co Bulletin Board - Markham
604-664-6464	PC Co Bulletin Board - Vancouver
204-934-2735	PC Co Bulletin Board - Winnipeg
800-661-7768	PS Marketing Support (PSMT)
800-565-3344	PS/1 Warranty Customer Helpline
800-387-8483	PS/1 Warranty Service (DOAs)
800-465-1234	Publications Ordering
905-316-4148	Service Management Support
905-316-4100	Service Management Support
(Fax)	
905-316-4150	Service (Warranty) Manager
905-316-4100	Service (Warranty) Manager
(Fax)	
905-316-4872	Service Quality Programs
905-316-4100	Service Quality Programs
(Fax)	
800-661-2131	Skill Dynamics (Education)
800-565-3344	ThinkPad EasyServe
416-443-5835	Warranty Claim Fulfillment
(Fax)	
905-316-2445	Warranty Claim Reimbursement
905-316-3515	Warranty Claim Reimbursement
(Fax)	
416-443-5778	Warranty Claim Parts Inquiry
800-505-1855	Warranty Provider Support Hotline
800-267-7472	Warranty Service, ThinkPad

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