

BladeCenter Management Module



Installation Guide

BladeCenter Management Module



Installation Guide

Note:

Before using this information and the product it supports, read the general information in Appendix B, "Warranty information", on page 31 and Appendix C, "Notices", on page 45.

First Edition (June 2003)

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安裝本產品之前，請仔細閱讀 **Safety Information**
(安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφαλείας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Statement 1:



DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 2:



CAUTION:

When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

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

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

Statement 3:



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

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



Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



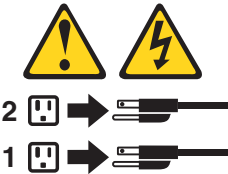
≥ 55 kg (121.2 lb)

CAUTION:
Use safe practices when lifting.

Statement 5:



CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 6:



CAUTION:

If you install a strain-relief bracket option over the end of the power cord that is connected to the device, you must connect the other end of the power cord to an easily accessible power source.

Statement 8:



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Statement 13:



DANGER

Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.*

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. *Lávese las manos después de usar el producto.*

Chapter 1. Introducing the IBM BladeCenter Management Module

This IBM® BladeCenter® Management Module Installation Guide contains information about:

- Installing your management module
- Configuring your management module

Note: The illustrations in this document might differ slightly from your hardware.

For installation details, see Chapter 2, “Installing and removing a management module”, on page 7. For additional information, see the instructions in your BladeCenter publications.

Your management module is one of two management modules that can be installed in the IBM eServer BladeCenter Type 8677 enclosure.

Note: Only one management module can be active; the second management module, if present, provides redundancy.

You can obtain up-to-date information about your management module and other IBM server products at <http://www.ibm.com/eserver/xseries/>

Record information about the management module in the following table.

Product name	IBM BladeCenter Management Module
Serial number	_____
Media access control (MAC) address	_____

The product name, machine type and serial number are located on the identification label on the side of the BladeCenter Management Module. You will need this information when you register your BladeCenter Management Module with IBM. The media access control (MAC) address also is located on the identification label. See “Overview of the management module” on page 5 for an illustration that shows the location of the identification label.

Note: The MAC address is also located on a separate label on the bottom front of the management module.

The management module functions as a service processor and a keyboard/video/mouse (KVM) multiplexor for the multiple blade servers in a BladeCenter unit. You configure the BladeCenter unit and modules through the management module, configuring information such as the management module and switch module¹ IP addresses. The management module provides the following external connections: keyboard, mouse, and video for use by a local console, and one RJ-45 connector for a 10/100 Mbps Ethernet remote management connection.

The service processor in the management module communicates with the service processor in each blade server for functions such as:

- Blade server power-on requests
- Blade server error and event reporting
- Blade server requests for keyboard, mouse, and video
- Blade server requests for diskette drive, CD-ROM drive, and USB port

The management module also communicates with the switch modules, power modules, blower modules, and blade servers in the BladeCenter unit to detect their presence or absence and any error conditions, sending alerts when required.

Related publications

This *Installation Guide* contains setup and installation instructions for the IBM BladeCenter Management Module. This publication also provides general information about your management module, including information about getting started, first-time connection to the management module, how to configure your management module, and how to get help.

The following related documentation comes with your BladeCenter unit:

- *BladeCenter Management Module User's Guide*

This publication is provided in Portable Document Format (PDF) on the *IBM BladeCenter Documentation* CD that comes with your BladeCenter unit. This publication provides general information about your management module, including information about features, how to configure your BladeCenter Management Module, and how to get help.

- *Rack Installation Instructions*

This publication contains the instructions to install your BladeCenter unit in a rack.

1. In this publication, the term *switch module* refers to a supported Ethernet switch module, Fibre Channel switch module, or pass-thru module.

- *Safety Information*

This multilingual publication is provided in Portable Document Format (PDF) on the *IBM BladeCenter Documentation CD*. It contains translated caution and danger statements. Each caution and danger statement has a number, which you can use to locate the corresponding statement in your language in the *Safety Information* book.

- *@server BladeCenter Type 8677 Installation and User's Guide*

This publication is provided in PDF on the *IBM BladeCenter Documentation CD*. It provides general information about your BladeCenter unit, including:

- Information about features
- How to set up, cable, and start your BladeCenter unit
- How to install options in your BladeCenter unit
- How to configure your BladeCenter unit
- How to perform basic troubleshooting of your BladeCenter unit
- How to get help

- *BladeCenter HS20 Installation and User's Guide* for each blade server type

These publications are provided in PDF on the *IBM BladeCenter Documentation CD*. Each provides general information about a blade server, including:

- Information about features
- How to set up and start your blade server
- How to install options in your blade server
- How to configure your blade server
- How to install an operating system on your blade server
- How to perform basic troubleshooting of your blade server
- How to get help

- *Hardware Maintenance Manual and Troubleshooting Guides*

The BladeCenter unit and the BladeCenter HS20 Type 8678 product each have a customized *Hardware Maintenance Manual and Troubleshooting Guide*. These publications are provided in PDF on the *IBM BladeCenter Documentation CD*. They contain information to help you solve the problem yourself or to provide helpful information to a service technician.

Depending on your blade server model, additional publications might be included on the *IBM BladeCenter Documentation CD*.

In addition to reviewing the publications in this library, be sure to review the *IBM BladeCenter Planning and Installation Guide* located at <http://www.ibm.com/pc/eserver/bladecenter/> for information to help you prepare for system installation and configuration.

Notices and statements used in this book

The caution and danger statements that appear in this book are also in the multilingual *Safety Information* book, which is on the *IBM BladeCenter Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* book.

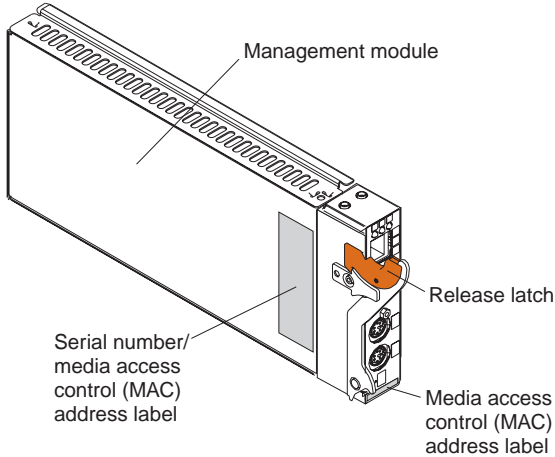
The following types of notices and statements are used in this book:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Overview of the management module

The following illustration shows the management module.

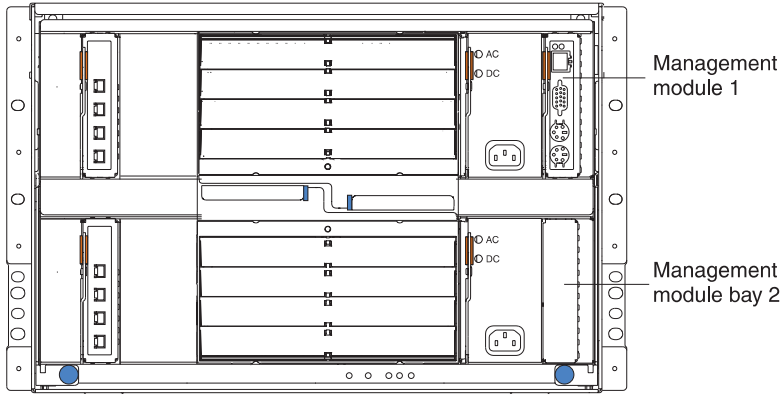
Note: The illustrations in this document might differ slightly from your hardware.



For information about the indicators and ports on the front of the management module, see Chapter 3, “Management module LEDs and external ports”, on page 17. For more information about the MAC address, see the *BladeCenter Management Module User’s Guide* provided on the *IBM BladeCenter Documentation CD*.

Chapter 2. Installing and removing a management module

The following illustration shows the management-module bay locations.



Attention: To maintain proper system cooling, each module bay must contain either a module or a filler module; each blade bay must contain either a blade or a filler blade.

Installation guidelines

Before you begin to install the management module in your BladeCenter unit, read the following information:

- Become familiar with the safety and handling guidelines specified under “Safety” on page v and “Handling static-sensitive devices” on page 8, and read the safety statements in the BladeCenter unit option publications.
- The orange color on components and labels in your BladeCenter unit identifies hot-swap components. You can install or remove hot-swap modules and, with some restrictions, hot-swap blade servers while the BladeCenter unit is running. For complete details about installing or removing a management module, see the detailed information in this chapter.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on. You do not need to disconnect the BladeCenter unit from power to install or replace any of the hot-swap modules on the rear of the BladeCenter unit. You need to shut down the operating system and turn off a hot-swap blade server on the front of the BladeCenter unit before removing the blade server, but you do not need to shut down the BladeCenter unit itself.

- For a list of supported options for your BladeCenter unit, go to <http://www.ibm.com/pc/compat/> on the World Wide Web.

System reliability considerations

Attention: To help ensure proper BladeCenter cooling and system reliability, make sure that:

- Each of the module bays on the rear of the BladeCenter unit has either a module or filler module installed.
- Each of the blade bays on the front of the BladeCenter unit has either a blade server or filler blade installed.
- Each of the drive bays in a blade server storage expansion option has either a hot-swap drive or a filler panel installed.
- A removed hot-swap module, blade server, or drive is replaced within 1 minute of removal.
- Cables for the option modules are routed according to the illustrations and instructions in this document.
- A failed blower is replaced as soon as possible, to restore cooling redundancy.

Failure to replace a blade server or module with another blade server, module, filler blade or filler module within one minute can affect system performance in the blade servers.

Handling static-sensitive devices

Attention: Static electricity can damage electronic devices and your BladeCenter unit. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the BladeCenter chassis or any unpainted surface on any other grounded rack component for at least two seconds. (This drains static electricity from the package and from your body).
- Remove the device from its package and install it directly into your BladeCenter unit without setting it down. If it is necessary to set down the

device, put it back into its static-protective package. Do not place the device on your BladeCenter chassis or on a metal surface.

- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Preparing for management module redundancy

Management module redundancy requires specific minimum levels of firmware. If you intend to install a second management module in the BladeCenter unit, you need to make sure that you have downloaded and applied the latest level of firmware from the IBM Support Web site.

Complete the following steps to prepare your management modules for redundancy:

1. Go to the IBM Support Web site at <http://www.ibm.com/pc/support/> to check for technical information, hints, tips, and the latest firmware.
2. Download the latest management module firmware and use the management module Web interface to apply it to your current management module (see “Using the management and configuration program” on page 25 for instructions about logging in to the Web interface).
 - a. In the MM Control section in the navigation pane, click **Firmware Update**.
 - b. Click **Browse** to locate the firmware file you downloaded; then, click **Update**. Follow the instructions on the screen
3. Install the second management module in the available management-module bay (see “Installing a management module” on page 10 for instructions).
4. Wait approximately 2 minutes while the primary management module transfers configuration information to the second management module.
5. Update the firmware on the second management module to the same level as on the primary management module by updating the firmware on the primary management module again:
 - a. Log in to the management module Web interface again.
 - b. In the MM Control section in the navigation pane, click **Firmware Update**.
 - c. Make sure that the **Automatically update firmware on redundant MM** check box is selected.
 - d. Click **Browse** to locate the firmware file you downloaded; then, click **Update**. Follow the instructions on the screen.

The management modules are now prepared for redundancy.

Notes:

1. Whenever power is restored to a BladeCenter unit that has two functional management modules installed, the management module in bay 1 is automatically the active management module, even if the module in bay 2 was the active module before power was removed.
2. See the IBM Support Web site at <http://www.ibm.com/pc/support/> for the version of IBM Director software that you can use to manage redundant management modules.

Installing a management module

Statement 8:



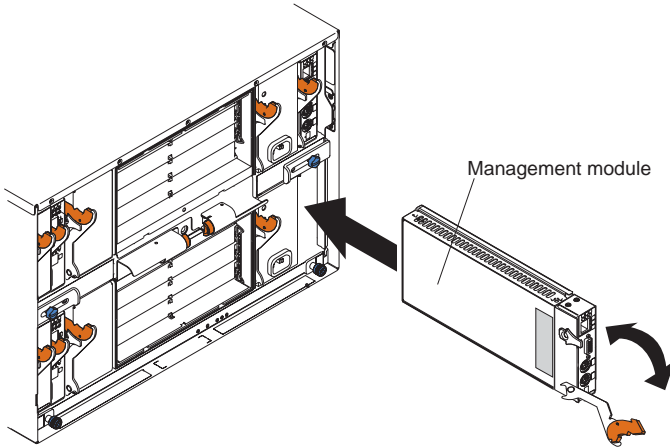
CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



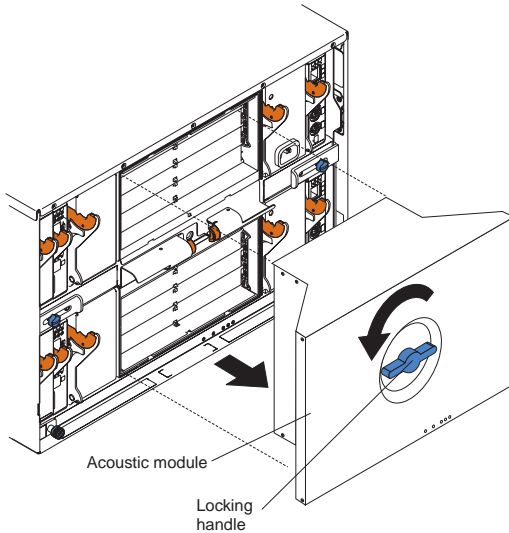
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

The following illustration shows how to install a management module in the rear of the BladeCenter unit.



Complete the following steps to install a management module.

1. Read the safety information beginning on page v and “Installation guidelines” on page 7 through “Handling static-sensitive devices” on page 8.
2. If you are installing a second management module, read “Preparing for management module redundancy” on page 9.
3. Remove the acoustic attenuation module, if one is installed, from the rear of the BladeCenter unit.



Note: If you are replacing the only management module in the BladeCenter unit, and the management module is functional, you might want to save the configuration file to another medium before you proceed; you will be able to apply the saved configuration file to the replacement management module. See “Restoring a saved configuration file” on page 27 for information about applying a saved configuration file.

4. If you are replacing a management module, remove the current module from the bay (see “Removing a management module” on page 14). If you are adding a management module, remove the filler module from the selected management module bay and store the filler module for future use.
5. If you have not already done so, touch the static-protective package that contains the management module to an unpainted metal part of the BladeCenter unit or any unpainted surface on any other grounded rack component for at least 2 seconds.
6. Remove the management module from its static-protective package.

7. Ensure that the release latch on the management module is in the open position (perpendicular to the module).
8. Slide the management module into the selected management-module bay until it stops.
9. Push the release latch on the front of the management module to the closed position.
10. Make sure that the OK LED on each management module is lit, indicating that the management modules are operating correctly.
11. Connect the necessary cables to the management module. See “Cabling the management modules” on page 15 for more information.
12. Replace the acoustic attenuation module, if you removed it in step 3 on page 12.
13. If this is the only management module in the BladeCenter unit, configure the new management module. See Chapter 4, “Configuring the management module”, on page 21 for more information. If this is the secondary management module, and you followed the instructions in “Preparing for management module redundancy” on page 9, no configuring is necessary. The secondary management module receives the configuration and status information automatically from the primary management module when necessary. However, you need to apply the latest level firmware from the IBM Support Web site to ensure smooth changeovers; return to “Preparing for management module redundancy” on page 9 for instructions.

Note: Do not initiate any management module changeover for approximately 2 minutes after installing the secondary management module; the secondary management module needs the time to receive initial status information.

Removing a management module

Statement 8:



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

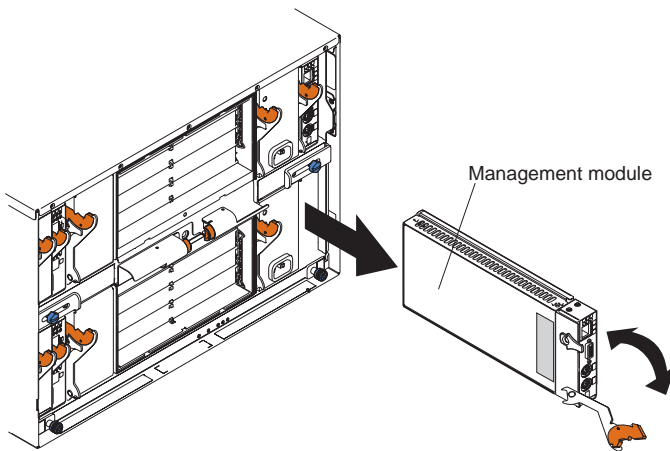
Complete the following steps to remove a management module.

Note:

- These instructions assume the BladeCenter unit is connected to power.
- If you are removing the only management module in the BladeCenter unit, you might prefer to stop all management-module local and remote sessions before proceeding, to avoid unexpected termination of sessions.
- If you are replacing the only management module in the BladeCenter unit, and the management module is functional, you might want to save the configuration file to another medium before you proceed (under the MM Control section in the navigation pane, click **Configuration File** and follow the instructions under **Save MM Configuration**); you will be able to restore the saved configuration file to the replacement management module. See “Restoring a saved configuration file” on page 27 for more information about applying a saved configuration file.
- If you have just installed a second management module in the BladeCenter unit, do not remove the first (primary) management

module for approximately 2 minutes; the second (secondary) management module needs the time to receive initial status information.

1. Read the safety information beginning on page v and “Installation guidelines” on page 7 through “Handling static-sensitive devices” on page 8.
2. Remove the acoustic attenuation module, if installed, from the rear of the BladeCenter unit (see step 3 on page 12 for location).
3. Disconnect any cables from the selected management module.
4. Pull the release latch all the way toward the bottom of the management module until it stops, as shown in the illustration. The module moves out of the bay approximately 0.6 cm (0.25 inch).



5. Slide the module out of the bay and set it aside. Within 1 minute, place either another module of the same type or a filler module in the bay.
6. If you placed another management module in the bay, reconnect any cables that you disconnected in step 3; then, verify that the OK LED on the management module is lit.
7. If you have not already done so, configure the replacement management module. See Chapter 4, “Configuring the management module”, on page 21 for more information.
8. Replace the acoustic attenuation module option, if you removed it in step 2.

Cabling the management modules

When two management modules are installed in an IBM BladeCenter unit, only one management module is active; the second management module, if present, provides redundancy. The active management module is the primary module; the redundant management module is the secondary module. If the

primary management module fails, or if you request a changeover through the Web interface, the secondary management module becomes active and primary.

Given this information, decide how you want the keyboard, video, and mouse at the BladeCenter unit to be handled when changeover occurs, and cable the management modules accordingly.

Complete the following steps to cable the management modules in an IBM BladeCenter unit:

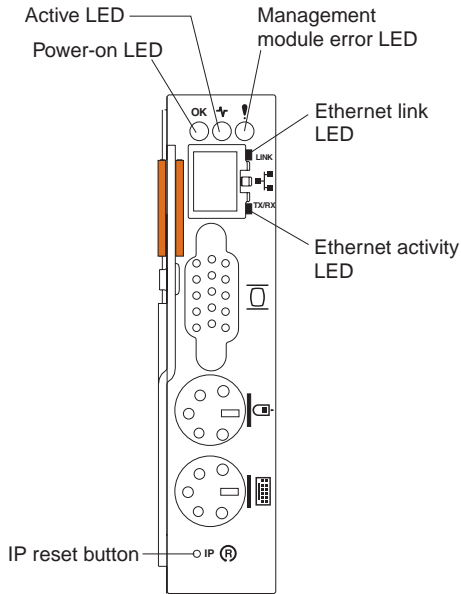
1. Connect the Ethernet port on each management module to your Ethernet network. When changeover occurs between the management modules, you will be able to communicate with the new primary management module without additional intervention, such as switching a single Ethernet cable between the management modules.
2. To be able to use the local keyboard, video, and mouse after changeover occurs, connect these devices to the management modules in one of the following ways (see “Management module input/output connectors” on page 18 for the location of each connector):
 - **Use an external keyboard, video, and mouse (KVM) switch.** Cable the keyboard, video, and mouse connectors on both management modules to the KVM switch, and connect the KVM switch to the local keyboard, monitor, and mouse. When changeover occurs, the new primary management module automatically controls the local keyboard, monitor, and mouse.
 - **Cable only to the active management module.** When management module changeover occurs, you can move the keyboard, monitor, and mouse cables to the new active management module.
 - **Use a duplicate keyboard, monitor, and mouse for the second management module.** With a second keyboard, monitor, and mouse always connected to the second management module, no switching or recabling is required when changeover occurs.

If you always use a remote session to communicate with the blade servers in the BladeCenter unit, you do not need to connect a local keyboard, monitor, and mouse to either management module.

Chapter 3. Management module LEDs and external ports

This chapter describes the LEDs and controls on the IBM BladeCenter Management Module. This chapter also identifies the external ports on the management module.

Management module controls and indicators



Management module LEDs: These LEDs provide status information about the management module and remote management connection. For additional information, see the “Light Path Diagnostics” section in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM BladeCenter Documentation CD.

- **Power-on:** When this green LED is lit, it indicates that the management module has power.
- **Active:** When this green LED is lit, it indicates that the management module is actively controlling the BladeCenter unit.

Note: Only one management module actively controls the BladeCenter unit. If there are two management modules installed in the BladeCenter unit, this LED is lit on only one.

- **Management-module error:** When this amber LED is lit, it indicates that an error has been detected somewhere on the management module. When this LED is lit, the system error LED on each of the BladeCenter system LED panels is also lit.
- **Ethernet link:** When this green LED is lit, there is an active connection through the port to the network.
- **Ethernet activity:** When this green LED is flashing, it indicates that there is activity through the port over the network link.

Management module IP reset button: Do not press this button unless you intend to erase your configured IP addresses for the management module and lose connection with the remote management station, the switch modules, and the blade servers. If you press this button, you will need to reconfigure the management module settings (see the information beginning with “Setting up the remote connection” on page 23 for instructions).

Press this recessed button to reset the IP configuration of the management module network interfaces (Ethernet 1, Ethernet 2, gateway address, and so on) to the factory defaults and then restart the management module.

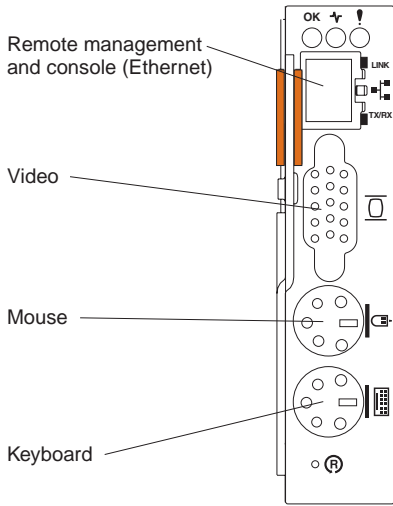
Use a straightened paper clip to press the button.

Management module input/output connectors

The management module has the following I/O connectors:

- One video
- One PS/2[®] keyboard
- One PS/2 mouse
- One 10/100 Mbps Ethernet for remote console and management

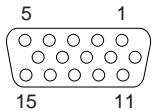
The following illustration shows the I/O connectors on the management module.



Video connector

Your BladeCenter management module contains one standard video connector. The integrated video controller on each blade server is compatible with SVGA and VGA and communicates through this video port.

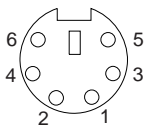
Use this connector to connect a video monitor to the BladeCenter unit.



Keyboard connector

Your BladeCenter management module contains one PS/2-style keyboard connector.

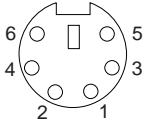
Use this connector to connect a PS/2 keyboard to the BladeCenter unit.



Mouse connector

Your BladeCenter management module contains one PS/2-style mouse connector.

Use this connector to connect a PS/2 mouse to the BladeCenter unit.



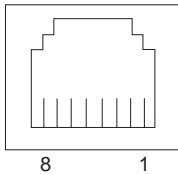
Remote management and console Ethernet connector

Your BladeCenter management module contains one 10/100 Mb Ethernet connector that provides the remote connection to the network management station on the network.

Use this port for remote management and remote console.

The network management station, through this port, can access control functions running in the service processor on each blade server or within each switch module. However, it cannot use this port to communicate with application programs running in the blade servers. The network management station must direct those communications through a network connected to the external ports in the switch modules in the BladeCenter unit.

The following illustration shows the Ethernet connector that is on the management module.



Chapter 4. Configuring the management module

Important

If the management module that you installed is the second management module in the BladeCenter unit, you do not configure it. The secondary management module receives the configuration and status information automatically from the primary (active) management module when necessary. The information in this chapter about configuring a management module applies to the primary or only management module in the BladeCenter unit.

If the management module that you installed is a replacement for the only management module in the BladeCenter unit, and you saved the configuration file before replacing the management module, you can apply the saved configuration file to the replacement management module using the management module Web interface. See “Restoring a saved configuration file” on page 27 for information about applying a saved configuration file.

When the BladeCenter unit is started initially, it automatically configures the remote management port on the active (primary) management module, so that you can configure and manage the BladeCenter unit and blade servers. You configure and manage the BladeCenter unit remotely, through the active management module, using the Web-based user interface.

If the management module that you installed is a replacement for the only management module in the BladeCenter unit, and you saved the configuration file before replacing the management module, you can restore the saved configuration file to the replacement management module using the management module Web interface.

For the active management module to communicate with the switch modules in the BladeCenter unit, you will need to configure the IP addresses for the following internal and external ports:

- The external Ethernet (remote management) port on the management module (see “Configuring the ports” on page 26 for details). The initial management module autoconfiguration enables the network management station to connect to the management module to configure the port completely and to configure the rest of the BladeCenter unit.
- The internal Ethernet port on the management module for communication with the Ethernet switch modules (see “Configuring the ports” on page 26 for details).

- The management port on each switch module, for communication between the management module and the switch module. You configure this port by configuring the IP address for the switch module (see “Configuring the ports” on page 26 for details).

Note: A pass-thru module has no management port.

To communicate with the blade servers for functions such as deploying an operating system or application program, you also will need to configure at least one external (in-band) port on an Ethernet switch module. See the *IBM @server BladeCenter Type 8677 Installation and User's Guide* for information about configuring external ports on Ethernet switch modules.

The management module supports the following Web browsers for remote access. The Web browser that you use must be Java-enabled, must support JavaScript 1.2 or later, and must have the Java 1.4 Plug-In installed.

- Microsoft® Internet Explorer 4.0 (with Service Pack 1), or later
- Netscape Navigator 4.72, or later (version 6.0 is not supported)

Notes:

1. For best results when using the Web browser, set the resolution on your monitor to 800 x 600 pixels or higher and 256 colors.
2. The Web interface does not support the double-byte character set (DBCS) languages.

The Web-based user interface communicates with the management and configuration program that is part of the firmware that comes with the management module. You can use this program to perform tasks such as:

- Defining the login IDs and passwords
- Selecting recipients for alert notification of specific events
- Monitoring the status of the BladeCenter unit and blade servers
- Controlling the BladeCenter unit and blade servers
- Accessing the switch modules to configure them
- Changing the drive startup sequence in a blade server
- Setting the date and time
- Using a remote console for the blade servers
- Changing ownership of the keyboard, video, and mouse
- Changing ownership of the CD-ROM drive, diskette drive, and USB port

Note: The IBM Director program is a system-management product that comes with the BladeCenter unit. To configure the remote alert recipients for IBM Director over LAN, the remote alert recipient must be an IBM Director-enabled server.

You also can use the management and configuration program to view some of the blade server configuration settings. See “Using the management and configuration program” on page 25 for more information.

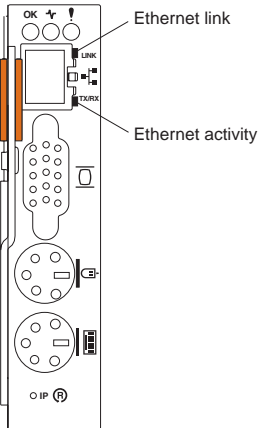
Setting up the remote connection

To configure and manage the BladeCenter unit and blade servers, you must first set up the remote connection through the Ethernet port on the management module.

Cabling the Ethernet port

Complete the following steps to connect the Ethernet cable to the management module:

1. Connect one end of a Category 5 or higher Ethernet cable to the Ethernet port on the management module. Connect the other end of the Ethernet cable to the network.
2. Check the Ethernet LEDs to ensure that the network connection is working. The following illustration shows the locations of the Ethernet LEDs.



Ethernet link LED

When this green LED is lit, there is an active connection through the port to the network.

Ethernet activity LED

When this green LED is flashing, it indicates that there is activity through the port over the network link.

Configuring the management module for remote access

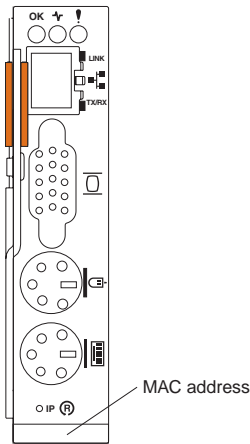
After you connect the management module to the network, the Ethernet port connection is configured in one of the following ways:

- If you have an accessible, active, and configured dynamic host configuration protocol (DHCP) server on the network, the host name, IP address, gateway address, subnet mask, and DNS server IP address are set automatically.
- If the DHCP server does not respond within 2 minutes after the port is connected, the management module uses the static IP address and subnet address.

Either of these actions enables the Ethernet connection.

Make sure your computer is on the same subnet as the management module, and use your Web browser to connect to the management module (see “Starting the management and configuration program” on page 25 for more information). In the browser **Address** field, specify the IP address the management module is using:

- If the IP address was assigned through a DHCP server, get the IP address from your network administrator. The network administrator can use the MAC address of the management module network interface to find out what IP address and host name are assigned.
- The factory-defined static IP address is 192.168.70.125, the default subnet address is 255.255.255.0, and the default host name is MMxxxxxxxxxxx, where xxxxxxxxxxxx is the burned-in medium access control (MAC) address. The MAC address is on a label on the management module, below the IP reset button.



If you do not want to keep the factory-defined static values, you can configure the static IP address, host name, and subnet mask for the management module through the Web interface.

Using the management and configuration program

This section provides instructions for using the management and configuration program in the active management module.

Starting the management and configuration program

Complete the following steps to start the management and configuration program:

1. Open a Web browser. In the address or URL field, type the IP address or host name defined for the management module remote connection (see “Configuring the management module for remote access” on page 23 for more details).

The Enter Network Password window opens.

2. Type your user name and password. If you are logging in to the management module for the first time, you can obtain your user name and password from your system administrator. All login attempts are documented in the event log.

Note: The initial user ID and password for the management module are:

- User ID: USERID (all capital letters)
- Password: PASSWORD (note the zero, not O, in PASSWORD)

3. Follow the instructions that appear on the screen. Be sure to set the timeout value you want for your Web session.

The BladeCenter management and configuration window opens.

The screenshot displays the BladeCenter Management Module web interface. The top header includes the IBM logo, the title "BladeCenter Management Module", and the "server" logo. A navigation sidebar on the left lists various system components like Monitors, Blade Tasks, Switch Tasks, and MM Control. The main content area shows a "Warnings and System Events" section with a single warning: "System Running Nonredundant Power". Below this, there are links to view the status of different components: Blade Servers, Switch and Concentrator Modules, Management Modules, Power Modules, Blowers, and Front Panel. The "Blade Servers" section is active, showing a table of server details. The table has columns for Bay, Status, Name, Pwr, Owner (KVM and MT), Network, WOL, Local Control (Pwr, KVM, MT), and BSE. Bay 1 shows "No blade present", Bay 2 has a server with SN#J1P4A296152, Bay 3 has SN#J1P4A28Y19B, and Bay 4 has SN#J1P4A28Y199.

Bay	Status	Name	Pwr	Owner**		Network	WOL'	Local Control			BSE'
				KVM	MT'			Pwr	KVM	MT'	
1		No blade present									
2	●	SN#J1P4A296152	On	X		Eth	On	X	X	X	
3	●	SN#J1P4A28Y19B	Off			Eth	On	X	X	X	
4	●	SN#J1P4A28Y199	Off		X	Eth	On	X	X	X	

The navigation pane (on the left side of the management module window) contains navigational links that you use to manage your BladeCenter unit and check the status of the components (modules and blade servers).

Configuring the ports

Complete the following steps to configure the management module internal and external ports:

1. Under **MM Control** in the navigation pane, click **Network Interfaces**.
2. Configure the two Ethernet interfaces: external (remote management and console), and internal (communication with the switch modules).

Note: For switch communication with a remote management station, such as the IBM Director server, through the management module external Ethernet port, the switch module internal network interface and the management module internal and external interfaces must be on the same subnet.

- **External Network Interface (eth0)** - This is the interface for the remote management and console port.
 - **Interface** - Select **Enabled** (the default) to use the Ethernet connection.
 - **DHCP** - Select one of the following choices:
 - **DHCP with rollover to static** (this is the default).
 - **DHCP only**
 - **Static only**
 - **Hostname** - (Optional) This is the IP host name you want to use for the management module (maximum of 63 characters).
 - **Static IP configuration** - You need to configure this information only if DHCP is disabled.
 - **IP address** - The IP address for the management module. The IP address must contain four integers from 0 to 255, separated by periods, with no spaces or consecutive periods. The default setting is 192.168.70.125.
 - **Subnet mask** - The subnet mask must contain four integers from 0 to 255, separated by periods, with no spaces. The default setting is 255.255.255.0
 - **Gateway address** - The IP address for your network gateway router. The gateway address must contain four integers from 0 to 255, separated by periods, with no spaces.
- **Internal Network Interface (eth1)** - This interface communicates with the switch module.
 - Specify the IP address to use for this interface. The subnet mask must be the same as the subnet mask in the external network interface (eth0).

- View the data rate, duplex mode, maximum transmission unit (MTU), locally-administered MAC address, and burned-in MAC address for this interface. You can configure the locally-administered MAC address; the other fields are read-only.
3. Configure the internal Ethernet management port on each switch module in the BladeCenter unit.
 - a. Under **MM Control** in the navigation pane, click **Network Interfaces**.
 - b. Click **Switch Module 1**.
 - c. From this page, click **Advanced Switch Management** → **Advanced Setup** and enable the following items:
 - Switch module external ports
 - External management for the external ports
- Note:** The initial user ID and password for the switch module firmware are:
- User ID: USERID (all capital letters)
 - Password: PASSWORD (note the zero, not O, in PASSWORD)
- d. Specify the IP configuration of the switch module.

Repeat step 3 for each switch module in the BladeCenter unit.

To communicate with the blade servers for functions such as deploying an operating system or application program, you also will need to configure at least one external (in-band) port on an Ethernet switch module. See the *IBM @server BladeCenter Type 8677 Installation and User's Guide* for information about configuring external ports on Ethernet switch modules.

See the *BladeCenter Management Module User's Guide* for more information about the management-module Web interface.

Restoring a saved configuration file

If you have a saved configuration file, you can apply it to the primary or only management module.

1. After the primary or only management module has been installed, follow the instructions in “Setting up the remote connection” on page 23 through “Configuring the management module for remote access” on page 23.
2. Follow the instructions in “Starting the management and configuration program” on page 25.
3. In the MM Control section in the navigation pane, click **Configuration File** and follow the instructions under **Restore MM Configuration** to apply the saved configuration file.

If a second management module is installed in the BladeCenter unit (see “Preparing for management module redundancy” on page 9 for more information), the new configuration information will be transferred to the secondary management module automatically.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your IBM system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM Support Web site at <http://www.ibm.com/pc/support/> to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the publications that are provided with your system and software. The information that comes with your system also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with information that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the information for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.ibm.com/pc/support/> and follow the instructions. Also, you can

order publications through the IBM Publications Ordering System at <http://www.elink.ibm.com/public/applications/publications/cgibin/pbi.cgi>.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM products, services, and support. The address for IBM xSeries information is <http://www.ibm.com/eserver/xseries/>. The address for IBM IntelliStation® information is <http://www.ibm.com/pc/intellistation/>.

You can find service information for your IBM products, including supported options, at <http://www.ibm.com/pc/support/>.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with IBM servers, workstations, and appliances. For information about which products are supported by Support Line in your country or region, go to <http://www.ibm.com/services/sl/products/>.

For more information about Support Line and other IBM services, go to <http://www.ibm.com/services/>, or go to <http://www.ibm.com/planetwide/> for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to <http://www.ibm.com/planetwide/> for support telephone numbers, or in the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

Appendix B. Warranty information

This section contains information about your warranty period and the service and support that are provided by your warranty.

Warranty period

The warranty period varies by machine type and country or region.

Contact your place of purchase for warranty service information. Some IBM Machines are eligible for on-site warranty service depending on the country or region where service is performed.

Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician.

This paragraph applies only to products with a warranty period of 3 years on parts and 1 year on labor. A warranty period of 3 years on parts and 1 year on labor means that IBM will provide warranty service without charge for:

1. parts and labor during the first year of the warranty period
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor it provides in performance of the repair or replacement.

The IBM Machine Warranties Web site at http://www.ibm.com/servers/support/machine_warranties/ contains a worldwide overview of the IBM Statement of Limited Warranty for IBM Machines, a glossary of terms used in the Statement of Limited Warranty, Frequently Asked Questions (FAQ), and links to Product Support Web pages. The IBM Statement of Limited Warranty is available from this Web site in 29 languages in Portable Document Format (PDF).

Machine - IBM BladeCenter Management Module

Country or region	Warranty period	Service delivery method
Worldwide	Parts - 3 years, labor - 3 years	On-site

Problem determination

Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician. The service specialist will run diagnostic tests on the hardware and check the software.

Running diagnostics

The IBM service specialist will help you determine whether your equipment is functioning as specified. It might be necessary to isolate the failing IBM system; IBM component; or both from any active production environment to run diagnostics and perform defect-isolation programs. You are responsible for making the system, IBM component, or both available for running diagnostics and defect-isolation programs.

Checking software

The IBM service specialist will help you ensure that the correct BIOS code, firmware, device drivers, and other supporting IBM software are installed and correctly configured. It might be necessary to manually gather information about the relevant software levels or run IBM-approved utility programs to gather this information. It might be necessary to isolate the failing system from any active production environment to gather this information. You are responsible, with assistance from the service specialist, for gathering this information. The IBM Statement of Limited Warranty does not include on-site assistance with this activity.

Warranty service and support

With the original purchase of an IBM system, you have access to extensive service and support. During the IBM Machine warranty period, you may call IBM or your reseller for problem-determination assistance under the terms of the IBM Statement of Limited Warranty.

The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service, either on-site or at an IBM service center as determined by IBM.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been shipped from IBM. In those instances, IBM will make Engineering Changes (ECs) available that apply to your hardware.
- **Customer replaceable units (CRUs)** - Some parts of IBM systems are designated as customer replaceable units. IBM ships CRUs to you for replacement by you. CRUs include keyboards, monitors, memory, diskette drives, hard disk drives, and mice (this list is not inclusive of all CRUs).

The following items are not covered under warranty service:

- Replacement or use of non-IBM parts. All IBM parts contain a 7-character identification in the format IBM FRU XXXXXXX.

- Identification of software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of BIOS code, firmware, or device drivers that are designated as customer installable.

See the IBM Statement of Limited Warranty for a full explanation of IBM warranty terms. Be sure to retain your proof of purchase to obtain warranty service.

Please have the following information ready when you call:

- The machine type and model of your IBM hardware product (if available)
- Serial numbers of your IBM hardware products
- A description of the problem
- The exact wording of any error messages
- Hardware and software configuration information

International Warranty Service

If you travel with your IBM system or relocate it to a country or region where your system is sold and serviced by IBM or IBM resellers authorized to perform warranty service, International Warranty Service (IWS) is available during the warranty period. Eligible IBM systems are identified by their four-digit machine types.

You can obtain IWS through the service delivery method (such as depot, carry-in, or on-site) provided in the servicing country or region. Service methods and procedures vary by country or region, and some service or parts might not be available in all countries and regions. Service centers in certain countries or regions might not be able to service all models of a particular machine type. In addition, some countries or regions might have fees and restrictions that apply at the time of service.

To determine whether your system is eligible for IWS, go to <http://www.ibm.com/pc/support/> and click **Warranty lookup**.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for IBM and non-IBM hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region.

For more information about these services, contact your IBM marketing representative.

IBM Statement of Limited Warranty Z125-4753-06 8/2000

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

The IBM Warranty for Machines: IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications"). The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded.

Extent of Warranty: The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty: IBM does not warrant uninterrupted or error-free operation of a Machine. Any technical or other support provided for a Machine under warranty, such as assistance via telephone with “how-to” questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND**.

Warranty Service: To obtain warranty service for a Machine, contact IBM or your reseller. If you do not register your Machine with IBM, you may be required to present proof of purchase.

During the warranty period, IBM or your reseller, if approved by IBM to provide warranty service, provides without charge certain types of repair and exchange service to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. At its discretion, IBM or your reseller will 1) either repair or exchange the failing Machine and 2) provide the service either at your location or a service center. IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Some parts of IBM Machines are designated as Customer Replaceable Units (called “CRUs”), e.g., keyboards, memory, or hard disk drives. IBM ships CRUs to you for replacement by you. You must return all defective CRUs to IBM within 30 days of your receipt of the replacement CRU. You are responsible for downloading designated Machine Code and Licensed Internal Code updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;

2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
 - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides;
 - b. secure all programs, data, and funds contained in a Machine;
 - c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations; and
 - d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

Limitation of Liability: Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

This limit also applies to IBM's suppliers and your reseller. It is the maximum for which IBM, its suppliers, and your reseller are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST SAVINGS, EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Governing Law: Both you and IBM consent to the application of the laws of the country in which you acquired the Machine to govern, interpret, and enforce all of your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Part 2 - Country-unique Terms

AMERICAS

BRAZIL

Governing Law: *The following is added after the first sentence:*

Any litigation arising from this Agreement will be settled exclusively by the court of Rio de Janeiro.

NORTH AMERICA

Warranty Service: *The following is added to this Section:*

To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws in the Province of Ontario.

UNITED STATES

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York.

ASIA PACIFIC

AUSTRALIA

The IBM Warranty for Machines: *The following paragraph is added to this Section:*

The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

Limitation of Liability: *The following is added to this Section:*

Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM's liability is limited to the

repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

Governing Law: *The following replaces “laws of the country in which you acquired the Machine” in the first sentence:*
laws of the State or Territory.

CAMBODIA, LAOS, AND VIETNAM

Governing Law: *The following replaces “laws of the country in which you acquired the Machine” in the first sentence:*
laws of the State of New York.

The following is added to this Section:

Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator.

The two arbitrators appointed by the parties shall appoint a third arbitrator before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

The English language version of this Agreement prevails over any other language version.

HONG KONG AND MACAU

Governing Law: *The following replaces “laws of the country in which you acquired the Machine” in the first sentence:*
laws of Hong Kong Special Administrative Region.

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this Section:*

1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM’s negligence;
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, IBM’s liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

JAPAN

Governing Law: *The following sentence is added to this Section:*

Any doubts concerning this Agreement will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

NEW ZEALAND

The IBM Warranty for Machines: *The following paragraph is added to this Section:*

The warranties specified in this Section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: *The following is added to this Section:*

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

PEOPLE’S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces this Section:*

Both you and IBM consent to the application of the laws of the State of New York (except when local law requires otherwise) to govern, interpret, and enforce all your and IBM’s rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Any disputes arising from or in connection with this Agreement will first be resolved by friendly negotiations, failing which either of us has the right to submit the dispute to the China International Economic and Trade Arbitration Commission in Beijing, the PRC, for arbitration in accordance with its arbitration rules in force at the time. The arbitration tribunal will consist of three arbitrators. The language to be used therein will be English and Chinese. An arbitral award will be final and binding on all the parties, and will be enforceable under the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958).

The arbitration fee will be borne by the losing party unless otherwise determined by the arbitral award.

During the course of arbitration, this Agreement will continue to be performed except for the part which the parties are disputing and which is undergoing arbitration.

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:

The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

Warranty Service: If you purchase an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM. If you purchase an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchase an IBM Machine in a Middle Eastern or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM authorized service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM authorized service provider.

Governing Law: The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA AND GERMANY

The IBM Warranty for Machines: *The following replaces the first sentence of the first paragraph of this Section:*

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this Section:

The minimum warranty period for Machines is six months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

Extent of Warranty: *The second paragraph does not apply.*

Warranty Service: *The following is added to this Section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this Section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

EGYPT

Limitation of Liability: *The following replaces item 2 in this Section:*

as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this Section:*

In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: *(items 1 and 2 unchanged).*

IRELAND

Extent of Warranty: *The following is added to this Section:*

Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: *The following replaces items one and two of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and
2. the amount of any other actual direct damages, up to 125 percent of the

charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY

Limitation of Liability: *The following replaces the second sentence in the first paragraph:*

In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than:

1. *(unchanged)*
2. as to any other actual damage arising in all situations involving nonperformance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

The following replaces the third paragraph of this Section:

Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: *(items 1 and 2 unchanged)* 3) indirect damages, even if IBM or your reseller is informed of their possibility.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

Limitation of Liability: *The following is added to this Section:*

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

UNITED KINGDOM

Limitation of Liability: *The following replaces items 1 and 2 of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim;

The following item is added to this paragraph:

3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:

IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

Appendix C. Notices

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Important notes

Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives available from IBM.

Maximum memory may require replacement of the standard memory with an optional memory module.

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Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

Product recycling and disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets, and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. For country-specific instructions, refer to the following Web site:
<http://www.ibm.com/ibm/environment/products/prp.shtml>.

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries, contact your local waste disposal facility.

In the United States, IBM has established a collection process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Taiwanese Class A warning statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Chinese Class A warning statement

声 明

此为 A 级产品。在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

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Part Number: 59P6564

Printed in U.S.A.

(1P) P/N: 59P6564

