

DDS Gen 5 Tape Drive



User's Guide

Important: Please review the maintenance information in Chapter 3, "Using the tape drive", on page 15 as periodic maintenance (cleaning, firmware updates, etc.) is not covered by the IBM warranty. Repairs or exchanges resulting from improper maintenance may result in billable service charges.

DDS Gen 5 Tape Drive



User's Guide

First Edition (August 2003)

Note: Before using this information and the product it supports, be sure to read the information under Appendix C, "IBM Statement of Limited Warranty - Z125-4753-07 - 11/2002", on page 31 and Appendix C, "IBM Statement of Limited Warranty - Z125-4753-07 - 11/2002", on page 31.

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Safety: Read first

Before installing this product, read the Safety Information.

مج، يجب قراءة دات السلامة

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

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

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 ασφάλειας (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.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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.

安裝本產品之前，請先閱讀「安全資訊」。

Contents

Safety: Read first iii

About this book vii

Chapter 1. Introduction 1

Product description 1

Chapter 2. Installation. 3

Unpacking 3

Pre-installation requirements 3

 Avoiding electrostatic damage 3

 Reviewing drive default settings. 4

 SCSI ID settings 5

 Parity checking 5

 Terminating power 5

 Data compression. 6

 Power-on self test. 6

 Host operating system 6

 Vendor ID 7

 Tape Drive Components 8

Opening the computer 8

Installing the drive 9

 Installing the drive in IBM servers 9

 General installation instructions 9

Completing your installation 13

Chapter 3. Using the tape drive 15

Using the appropriate media 15

Handling cartridges 15

Loading a cartridge. 15

Initializing a blank cartridge. 16

Unloading a cartridge 16

Write-protecting a DDS cartridge 17

Cleaning the tape heads 18

Updating firmware. 18

Chapter 4. Understanding the drive

LEDs 19

Front panel LEDs 19

LED summary 19

Clean LED. 20

Media LED 20

Drive LED. 21

Chapter 5. Troubleshooting 23

SCSI ID problems 23

SCSI termination problems 23

Mounting hardware problems 23

Drive does not work 23

Power-On Self-Test fails 23

Computer does not boot 23

Computer does not recognize drive 24

Backup program does not recognize drive 24

Write error 24

Hardware error 24

Appendix A. Specifications 25

Data capacities 25

Size and weight 25

Power specifications 26

Drive performance specifications 27

Environmental requirements. 28

Reliability 28

Appendix B. Service and Support . . . 29

Online technical support 29

Telephone technical support. 29

Appendix C. IBM Statement of Limited

Warranty - Z125-4753-07 - 11/2002 . . . 31

Part 2 - Country-unique Terms. 34

Part 3 - Warranty Information 45

Appendix D. Notices 49

Federal Communications Commission (FCC)

statement 50

Trademarks 53

About this book

This manual contains instructions for installing, configuring, and troubleshooting the IBM DDS Gen 5 Drive. The manual is divided into the following sections:

- Installation and user's guide

This guide contains the product description and installation instructions in the following languages:

- English
- French
- German
- Italian
- Japanese
- Korean
- Simplified Chinese
- Spanish
- Traditional Chinese

- Appendixes

The appendixes contain device-driver special configuration settings and help and service information. They also contain the product warranties and notices.

Note: The illustrations in this manual might be slightly different from your hardware.

Chapter 1. Introduction

Designed for computer environments that require high-performance, high-capacity data storage, the DDS Gen 5 drive is the latest offering in the popular DDS technology roadmap.

This SCSI tape drive is capable of storing up to 36 GB per data cartridge and transferring data at a sustained rate of up to 3.5 MB per second. Both capacity and transfer rate are further enhanced by its onboard data compression feature.

In addition to this User's Guide, provided on the *User's Guide and Software CD*, the option package contains:

- IBM DDS Gen 5 Internal Tape Drive
- mounting screws
- cleaning cartridge
- 3.5" drive bezel
- *Quick Start Guide*
- SCSI cable
- device drivers (in **Drivers** folder on User's Guide CD)

Contact your place of purchase if an item is missing or damaged. Be sure to retain your proof of purchase. It might be required to receive warranty service. See Appendix C, "IBM Statement of Limited Warranty - Z125-4753-07 - 11/2002", on page 31 for warranty information.

Product description

This section provides information on the product features.

Features

- Supports DDS-3, DDS-4, and DDS 5th Generation recording formats.
- LVD / Ultra Wide SCSI connection
- 3.5-inch half-height drive factory-installed with 5.25-inch mounting rails and bezel for installation in a 5.25-inch half-height space
- Support for various native data-storage capacities
- High-speed transfer rates for fast backups
- Advanced onboard DDS-DC hardware using Lempel-Ziv (DCLZ) data-compression, doubling the drive's uncompressed capacity (e.g., a 36 GB uncompressed drive can be up to 72 GB with compression).
- High-performance SCSI burst transfer rates
- Three levels of error-correction code (ECC) and four-head design for read-after-write (RAW) error detection and correction (uncorrectable error rate of less than 1 in 1015 bits)
- "Flying" preamplifier for greater signal-to-noise ratio
- Flash memory to store setup parameters and enable field firmware upgrades
- Automatic power-on self-test
- State-of-the-art sealed drive mechanism and tape handling components for improved immunity to airborne contaminants and extended media life

Chapter 2. Installation

This chapter describes how to install the internal DDS Gen 5 drive.

Unpacking

Before you unpack the contents of your drive package, inspect the shipping containers for damage. If you spot damage to the container, notify your carrier immediately.

When you unpack the package, compare the items received with those on the packing list. If any item is missing or damaged, please contact your place of purchase immediately.

Pre-installation requirements

In addition to the contents included with your internal tape drive, you need the following items to install your internal tape drive.

- A SCSI host bus adapter that is properly installed and configured in a host computer
- A 3.5-inch or 5.25-inch half-height bay
- Backup application software that supports the internal tape drive.
- Phillips screwdriver
- Flatblade screwdriver, if your computer uses flathead screws
- Torx screwdriver, if your computer uses torx screws

Avoiding electrostatic damage

Your internal tape drive has very sensitive components that are prone to damage from electrostatic discharge (ESD). Use extreme care when handling the drive, as it can be damaged by ESD.

Before handling the drive, read these ESD instructions to prevent damage to the drive.

- Wear an ESD-preventive grounding wrist strap or observe similar ESD precautions when working with the drive. Be sure the wrist strap makes good skin contact. Do not remove the wrist strap until you finish working with the drive.
- Avoid contact between the drive, other equipment, and clothing. The wrist strap only protects the equipment from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- When the drive is not being used, keep it in its antistatic bag.
- Before you remove the drive from the antistatic bag, touch a metal or grounded surface to discharge any static electricity buildup from your body.
- Hold the drive by its edges only. Avoid touching any exposed parts on the printed circuit board.
- Always place the drive on top of or inside the antistatic bag to reduce the chance of ESD damage.

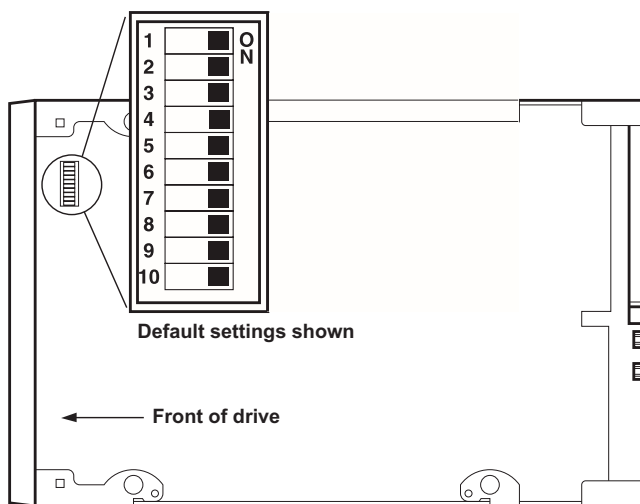
Reviewing drive default settings

Your internal tape drive comes with various default settings. These settings are configured using jumpers and switches.

- The jumpers are located on the back of the drive, between the SCSI interface and power connectors (refer to the diagram in “General installation instructions” on page 9).
- The switches are located on the underside of the drive. If you change a switch setting, you must turn the drive off and then on to have the new setting take effect (see Figure below).

You may need to change these settings to suit your requirements. Review the default settings shown below to determine whether they suit your requirements or need to be changed.

Parameters	Default Settings	Jumper Pins/Switches	See...
SCSI ID	6	Jumper pins 1–2, 3–4, 5–6, 7–8	“SCSI ID settings” on page 5
Parity checking	enabled	Jumper pins 9–10	“Parity checking” on page 5
Terminator powered	disabled	Jumper pins 11-12	“Terminating power” on page 5
Data compression	enabled	Switches 1 and 2	“Data compression” on page 6
Power-On Self-Test diagnostic	enabled	Switch 4	“Power-on self test” on page 6
Host operating system	Microsoft Windows 98/NT/2000/2003 Server	Switches 5-8	“Host operating system” on page 6
Vendor ID	IBM DDS Gen5	Switch 10	“Vendor ID” on page 7



Switch	Default setting
1	Data compression (DC)
2	SCSI DC control

Switch	Default setting
3	Media recognition
4	Self test
5	Operating-system configuration switches
6	
7	
8	
9	Wide/narrow SCSI
10	Inquiry string support

SCSI ID settings

Jumper Pins:	1-2, 3-4, 5-6, 7-8
Default Settings:	SCSI ID 6

Each SCSI device on the bus must have its own unique ID. Your internal tape drive is shipped with a default SCSI ID of 6. If another SCSI device in the SCSI chain is already using this ID, use jumper pins 1–2, 3–4, 5–6, and 7–8 to change the drive’s SCSI ID.

Note: If you change the drive’s default SCSI ID, avoid using SCSI IDs 0 and 1 (which typically are assigned to a boot drive) and SCSI ID 7 (which typically is assigned to SCSI controllers or host bus adapters).

Parity checking

Jumper Pins 9-10:	Pins 9-10 shunted: Enable parity checking (default)
	Pins 9-10 open: Disable parity checking

By default, parity checking is enabled on the internal tape drive. To disable parity checking, remove the jumper from pins 9 and 10.

Note: If you disable parity checking, the drive still generates a parity bit.

Terminating power

Jumper Pins 11-12:	Pins 11-12 shunted: Enable terminator power
	Pins 11-12 open: Disable terminator power (default)

By default, terminator power is disabled on the internal tape drive. To enable terminator power, place a jumper across pins 11 and 12.

Note: If you enable terminator power, be careful not to short the TERMPWR signal to ground (for example, by attaching the SCSI cable upside down). If a short

occurs, terminator power to the bus is interrupted. After the short is removed, a fuse in the drive is automatically reset, restoring terminator power.

Data compression

Settings:	<p>Switch 1 ON = Enable hardware data compression (default)</p> <p>Switch 1 OFF = Disable hardware data compression</p>
	<p>Switch 2 OFF = Recognize SCSI data compression commands (default)</p> <p>Switch 2 ON = Ignore SCSI data compression commands</p>

The internal tape drive provides two switches for controlling data compression.

Switch 1 determines whether hardware data compression is enable or disabled. By default, switch 1 is set to ON, enabling hardware data compression. To disable hardware data compression, set switch 1 to the OFF position.

Switch 2 controls whether SCSI commands are recognized for enabling or disabling hardware data compression. By default, switch 2 is set to ON, allowing SCSI commands to be used to enable or disable hardware data compression. To prevent SCSI commands from enabling or disabling hardware data compression, set switch 2 to the OFF position.

When data compression is enabled, the drive compresses all data written to tape and decompresses all compressed data read from tape. The degree of compression varies due to the type of data being processed.

- Data with a high degree of redundancy, such as structured database files or graphics files, are compressed most efficiently, often at a ratio of 2:1 or more.
- Data with little redundancy, such as executable programs, are compressed the least.

Power-on self test

Settings:	Switch 4 ON = Drive performs Power-On Self Test (default)
	Switch 4 OFF = Drive does not perform Power-On Self Test

Switch 4 enables or disables the Power-On Self-Test diagnostics that the drive performs when powered on. By default, the drive responds to SCSI commands only after it successfully completes the Power-On Self-Test (about 5 seconds). To prevent the drive from performing the Power-On Self-Test when powered-up, set switch 4 to the OFF position.

Host operating system

Switches:	5,6,7,8
Default Settings:	Microsoft Windows

Switches 5 through 8 configure the internal tape drive for a host operating system. By default, these switches are all ON. This setting configures the drive for a Microsoft® Windows® operating system.

To use the internal tape drive with a different operating system, set switches 5 through 8 to select the appropriate settings.

The following table shows the supported operating systems and their corresponding settings.

Host Operating Systems	Driver	Switches				
		SW5	SW6	SW7	SW8	SW10
Windows	IBMDAT5	ON	ON	ON	ON	ON
Windows	4MMDAT	ON	ON	ON	ON	OFF
Novell 5.x	NWTAPE (pre 11/03/99)	OFF	ON	ON	OFF	---
Novell 5.x	NWTAPE (post 11/03/99)	ON	ON	ON	ON	---
DEC UNIX	--	OFF	ON	ON	ON	---
Sun Unix	--	ON	OFF	ON	ON	---
SGI	--	ON	ON	ON	ON	---
HP-UX	--	ON	ON	OFF	ON	---
IBM AIX	--	ON	OFF	ON	OFF	---
Linux	--	ON	ON	ON	ON	---
SCO	--	OFF	ON	ON	OFF	---
SCO UnixWare 7.x	--	ON	ON	ON	ON	---

Vendor ID

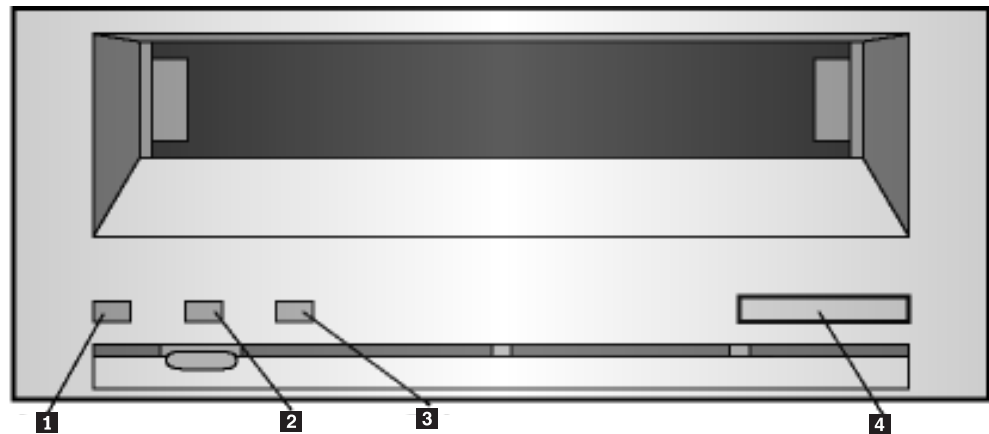
Settings:	Switch 10 ON = Vendor ID is "IBM DDS Gen5" (default)
	Switch 10 OFF = Vendor ID is "Archive PYTHON"

Switch 10 determines the vendor ID that the internal tape drive returns when it receives a SCSI "Inquiry" command. By default, the drive returns "IBM DDS Gen5".

Setting switch 10 to the OFF position configures the drive to return "Archive Python".

Tape Drive Components

The following describes the major components of the tape drives.



- 1** Clean LED (green)
- 2** Media LED (green)
- 3** (Drive LED (amber)
- 4** Eject button

For more information on LEDs, see “Front panel LEDs” on page 19.

Opening the computer

To open the computer:

1. Shut down the computer as you would normally. Then turn off the computer and all peripherals connected to it.
2. Remove the computer’s power cord from the computer connector.
3. Remove the computer cover. For more information, refer to the documentation that came with your computer.

Note: If you have to disconnect cables to gain access to the mounting bay, note which cables were removed. You can then refer to this information when you reconnect the cables at the end of this procedure.

4. Select an available 3.5-inch or 5.25-inch mounting bay, depending the internal tape drive you want to install.

Note: The internal tape drive can be mounted horizontally or vertically (on its side).

5. If the mounting bay has a “filler panel,” remove it according to the instructions in your computer’s documentation. Place the screws aside, You will need them to secure the drive in the bay.
6. If the computer does not have a SCSI host adapter, install one.

Installing the drive

This section contains information on installing the tape drive in IBM servers and other computers.

Installing the drive in IBM servers

The IBM DDS Gen 5 Tape Drive can be installed in several IBM xSeries servers. The most current list of supported servers can be found at www.pc.ibm.com/us/compat/storage/matrix.html. Refer to the documentation that comes with the server for instructions on installing the tape drive or follow the general instructions below.

General installation instructions

Follow these steps to install the tape drive.

Step 1. Selecting a SCSI ID

Each device on a SCSI bus must have a unique SCSI ID. Select a SCSI ID from 0 to 15 for the tape drive. The SCSI ID must be supported by your SCSI adapter. Refer to your SCSI adapter documentation for the range and relative priority of the IDs supported. The tape drive is shipped with the SCSI ID preset to 6.

Follow these guidelines to select a SCSI ID:

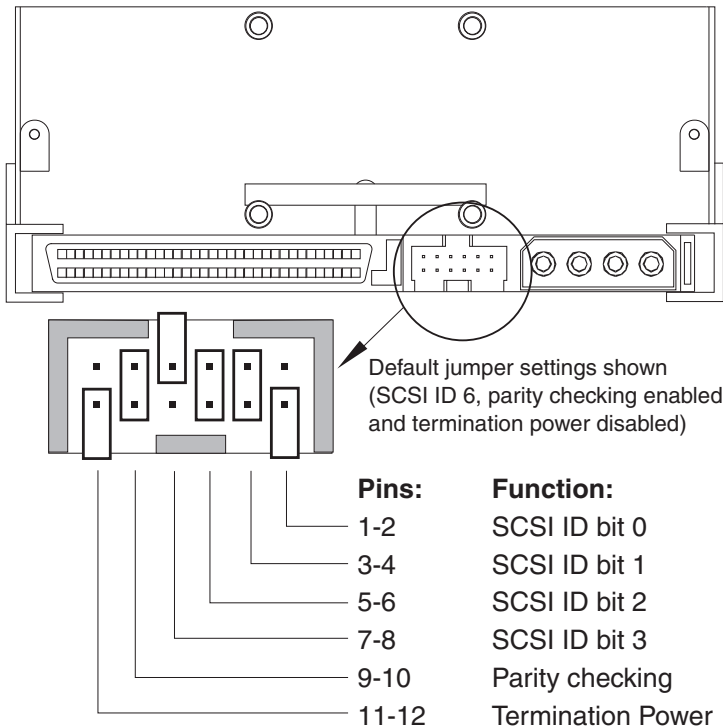
- Assign the tape drive to one of the higher priority IDs available (0–6).
- Assign the lower priority ID numbers (8-15) to those devices that are most often used or are faster than other devices in the chain.
- Do not assign an ID of 7, because this is usually used as the SCSI adapter ID.

Depending on your computer, there are several ways to view your current SCSI ID settings:

- For many IBM computers, press F1 during the startup after the memory check completes. Other adapters show SCSI settings when you press Ctrl A. Check the documentation that comes with your computer or SCSI adapter for information on how to view configuration information.
- Use SCSI adapter utility programs, if available.
- Inspect the installed SCSI devices to see how the jumpers that determine the IDs are set.

Step 2. Setting the SCSI ID

Refer to the following diagram when setting the SCSI ID.



SCSI ID=0	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=1	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=2	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=3	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=4	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=5	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=6	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=7	■ ■ ■ ■ ■ ■ ■ ■

SCSI ID=8	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=9	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=10	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=11	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=12	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=13	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=14	■ ■ ■ ■ ■ ■ ■ ■
SCSI ID=15	■ ■ ■ ■ ■ ■ ■ ■
Parity enable	■ ■ ■ ■ ■ ■ ■ ■
Term. power	■ ■ ■ ■ ■ ■ ■ ■

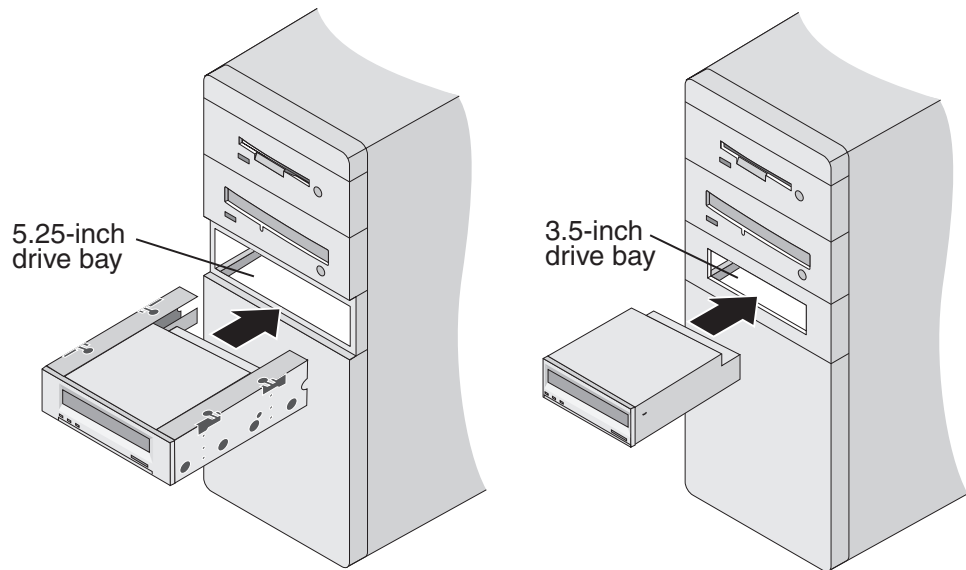
Note: When setting the SCSI ID, use the jumpers that come with the tape drive. If your enclosure uses a remote SCSI ID switch, remove the jumpers from the jumper pins on the tape drive and connect the remote switch.

1. Find the jumper pin setting that corresponds to the SCSI ID number you choose; then place jumper pins on the SCSI ID blocks as shown. You can use a pair of flat-nose pliers to place the jumpers on the jumper pins.

Step 3. Mounting the drive

Mount the tape drive; then attach the SCSI and power cables to it. If there is insufficient working space to attach the connectors after mounting the drive, attach the cables first. To mount the drive, follow these steps:

1. Locate an available 5.25-inch bay or space in your computer to mount the tape drive. Remove the cover plate from the bay selected. Install the drive horizontally or vertically, depending on the bay.
2. Remove drive mounting rails from the drive for the 3.5" installation.



3. Align the drive-bay screw holes with the threaded holes in the drive housing. When you mount the tape drive, follow these guidelines:
 - Ensure that no objects such as screw heads, cables, or adjacent devices are pressing against the frame.
 - Ensure that nothing blocks the ventilation slots on the bottom and rear of the tape drive.

Attention: Use only the screws that come with the tape drive. Other screws might be too long and might damage the drive.
4. Insert a screw through each of the drive-bay holes into the threaded holes in the drive and tighten the screws with a screwdriver.

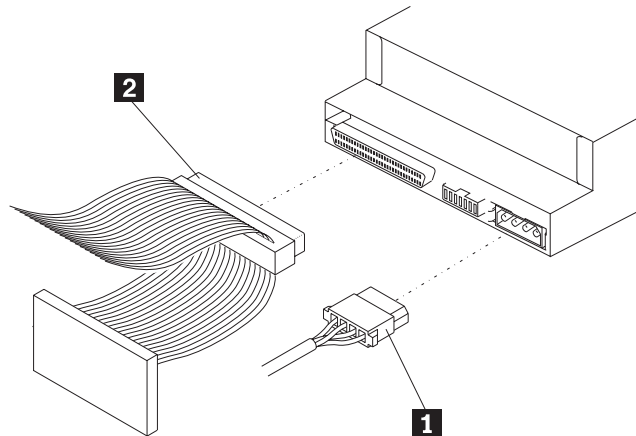
Step 4. Attaching cables

To attach the SCSI and power cables to the tape drive:

1. Locate the SCSI cable that was included in your package and attach it according to the following diagram.

Note: The SCSI adapter might be part of the computer system board or might be an adapter installed in an expansion slot.

2. Connect the power cable connector to the four-pin connector on the tape drive as shown in the illustration.



Attention: Do not force the power cable into the tape drive power connector. If the power cable is upside down and you force the connection, you might damage the drive.

If all the power cables are in use, purchase a dc Y-splitter cable, which is available at most electronics stores. Split a cable to make a connection available for the tape drive.

Step 5. Completing the installation

Check your work before closing the computer.

1. Be sure that the power and SCSI connectors are securely attached. Be sure that the cables are neatly routed.
2. Replace the computer cover and secure it in place.
3. Reconnect the cables and then reconnect the power cords.

Step 6. Turning on the device

Turn on all the attached devices; then turn on your computer. If the internal tape drive is configured to perform its Power-On Self-Test (see "Power-on self test" on page 6), it performs the test for about five seconds. When the drive passes the test, all three front-panel LEDs should be OFF.

Step 8. Updating the configuration

For most computers, the configuration-setup utility program automatically recognizes the new tape drive. However, you might have to provide information about your system changes after you restart your computer.

Ensure that the appropriate advanced SCSI programming interface (ASPI) device drivers are installed to support the tape drive. Device drivers are usually provided with the SCSI adapter.

If your computer does not recognize the tape drive after startup or if you receive startup errors, run the configuration-setup utility program as described in the documentation that comes with your computer. If all the indicators on either side of the tape drive blink in unison, there is a problem with the tape drive. Press the

Unload button on the right side of the drive front panel to eject any tape that might be inserted and to reset the drive. If the problem persists, turn off the computer; then turn it back on.

Step 9. Installing backup and restore software

To use the drive, you must install an appropriate backup and restore application for your computer operating system. If you are using your own software, follow the directions that come with your software.

Step 10. Using Windows native tape utility

If you are trying to use this drive with the native tape utility of Windows NT or Windows 2000, please refer to the instructions under the device folder of the User's Guide CD.

Completing your installation

To complete and test your internal tape drive installation:

1. Gently insert a tape cartridge into the internal tape drive's slot (see "Loading a cartridge" on page 15). Slide the cartridge into the slot until the drive accepts the cartridge and loads it. A brief delay occurs while the drive identifies the cartridge type and state, and moves the tape to the data area. Then the green Media LED goes ON.
2. Use your backup software application to perform a sample backup-and-restore operation. The amber Drive LED goes ON as data is written to and/or read from the tape.
3. At the end of the operation, press the Eject button on the front of the internal tape drive to eject the cartridge from the drive (see "Unloading a cartridge" on page 16).

If you encountered any problems during this procedure, see Chapter 5, "Troubleshooting", on page 23.

Chapter 3. Using the tape drive

This chapter describes how to operate your tape drive.

Using the appropriate media

The IBM DDS Gen 5 drive uses data-grade DDS cartridges, which comply with ANSI specifications listed in the “3.81 mm Helical-Scan Digital Computer Tape Cartridge for Information Interchange,” ANSI X3B5/89-156 standard.

For optimum performance and maximum storage capacity, use only IBM recommended data and cleaning cartridges. Other cartridges have not been tested by IBM. The latest IBM recommended list can be found by going to www-3.ibm.com/pc/support and searching for “MIGR-39931”.

Handling cartridges

DDS cartridges are fragile. To protect your data cartridges and the information on them, observe the guidelines below.

Guidelines to follow	Pitfalls to avoid
Use DDS cartridges at temperatures from 5° C (40° F) to 40° C (113° F). Cartridges can be stored at temperatures down to -40° C (-40° F).	Do not expose cartridges to direct sunlight, moisture, excessively dry or humid places, extreme changes in temperature or humidity, or X-rays. a maximum of 24 hours).
Handle cartridges gently.	Do not treat cartridges roughly or drop them.
Keep cartridges in plastic cases when they are not in use.	Do not try to clean the tape guides or tape path inside the cartridge.
Apply just one label to the designated area on the cartridge. Affixing more labels can jam the drive.	Never touch the exposed tape media with your fingers.
If your data is important, consider reading data off of tapes and rewriting to new and perhaps more modern tapes every few years.	Never leave cartridges close to magnetic fields, such as near a monitor or telephone handset.
If cartridges are exposed to temperatures or humidities outside the specified operating environment, expose them to the operating environment for a time equal to the period that the cartridges were exposed to the out-of-specification environment (up to a maximum of 24 hours).	Do not read from or write to cartridges when a temperature change of 10° C per hour is occurring.

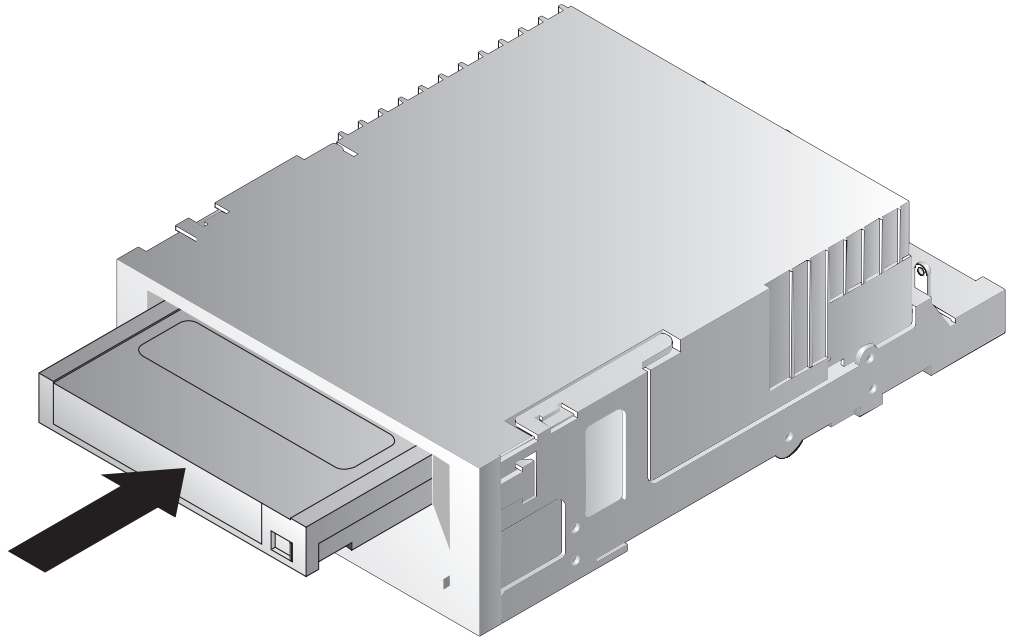
Loading a cartridge

Your DDS Gen 5 drive has a front-loading cartridge bay for easy operation. To load a cartridge:

1. Hold the cartridge so the label is facing up and the exposed media is facing the drive.

2. Gently insert the cartridge into the drive. The drive-bay door opens automatically when a cartridge is inserted.

After you insert the cartridge, there is a brief delay while the drive identifies the cartridge type and state, and moves the tape to the data area. Then the Media LED goes ON.



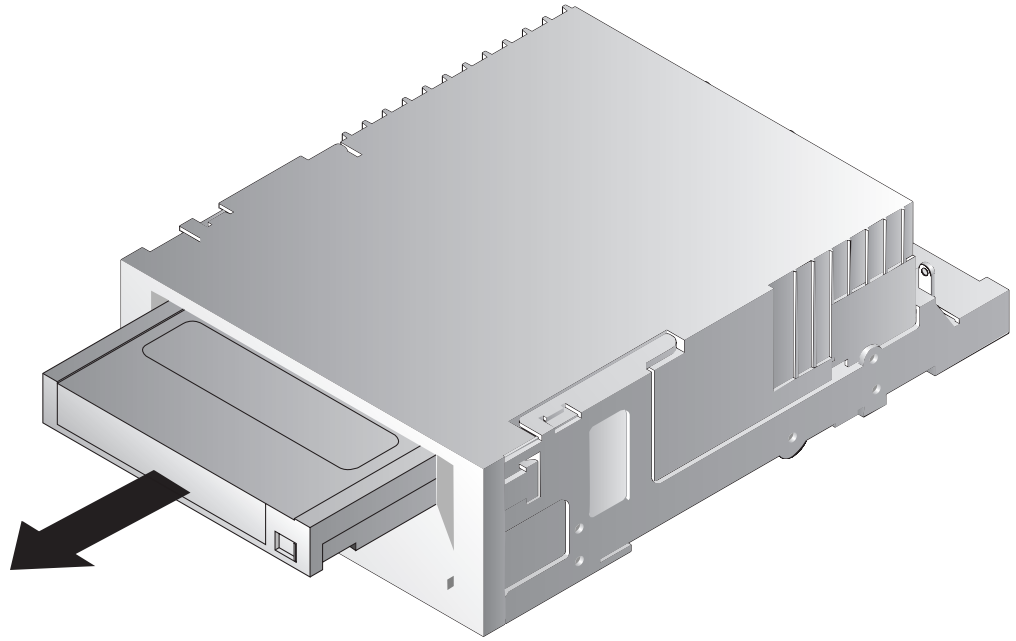
Initializing a blank cartridge

When you insert a blank cartridge into the drive for the first time, the drive takes from 10 to 12 seconds to determine that the tape is blank. The drive automatically initializes the tape as soon as it receives a SCSI “Write” command from the host computer. Initializing a blank tape takes about 30 seconds.

Unloading a cartridge

To unload a cartridge:

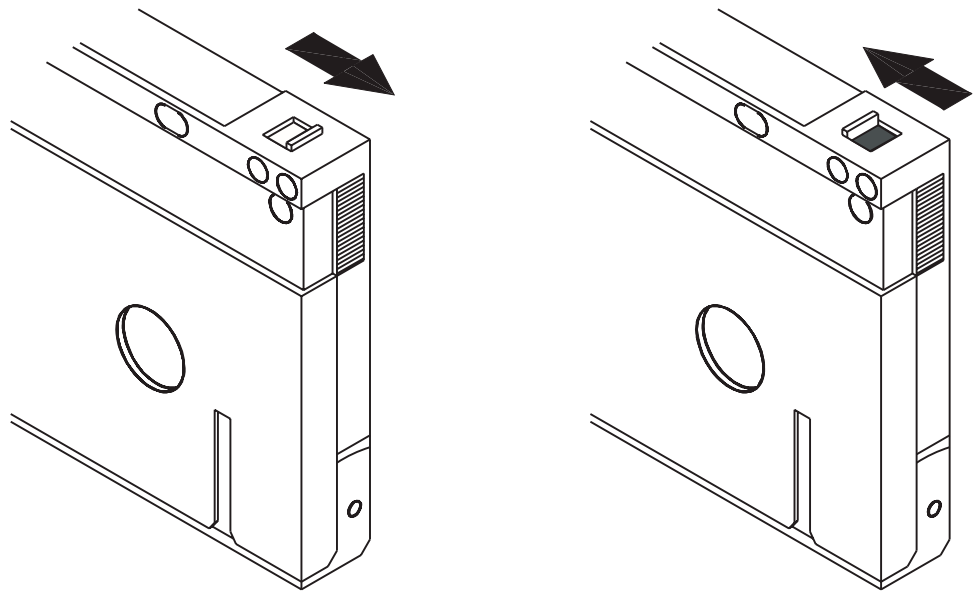
1. Be sure the Drive LED is OFF.
Attention: To ensure integrity of your backups and restores, do not press the Eject button when the Drive LED is ON.
2. Press the Eject button on the front panel of the drive to unload the cartridge. The drive automatically flushes the drive buffer to tape, rewinds the cartridge, updates the system log, and ejects the cartridge. This may take up to three minutes. Do not power-down the tape drive or host computer during this time.



Write-protecting a DDS cartridge

Write-protecting a DDS cartridge protects the data on the cartridge from being changed, overwritten, or deleted. To write-protect a cartridge, slide the write-protect tab on the back of the cartridge to the open position. To write-enable the cartridge, slide the write-protect tab so the hole is closed.

Attention: Write-protecting a cartridge does not protect the data on the cartridge from bulk-erasure or degaussing. Do not bulk erase DDS cartridges; otherwise, the pre-recorded servo information will be deleted, rendering the cartridge useless.



Tab in write enabled position and tab in write protected position

Cleaning the tape heads

If excessive dust or debris collects at the tape heads, your drive may not be able to read from or write to tape. To avoid this situation, clean the drive's tape heads:

1. After every 30 hours of tape motion
2. If the Clean LED goes ON or flashes
3. If your applications software or system management software asks you to

To clean tape heads, use only IBM recommended cleaning cartridges. The latest IBM recommended list can be found by going to www-3.ibm.com/pc/support and searching for "MIGR-39931".

Note: Do not use an audio DAT cleaning cartridge, as the drive cannot recognize it. Also, avoid liquids, swabs, and other methods other than those recommended in this section.

To clean the tape heads:

1. Insert a cleaning cartridge into the drive. The drive loads and runs the cleaning cartridge for about 30 seconds.

Note: If the cleaning cartridge runs for less than 30 seconds and the Clean LED is flashing, the cartridge has expired. Replace the cleaning cartridge with a new one and repeat step 1.

2. When the cleaning cartridge finishes cleaning the heads, the drive ejects the cartridge automatically.
3. Remove the cleaning cartridge from the drive and store the cartridge in a safe place.

Most cleaning cartridges are good for roughly 30 cleaning cycles. When the cleaning cartridge needs to be replaced, the entire tape is used up. In this case, the Clean LED will flash rapidly and the cleaning cartridge should be replaced.

Updating firmware

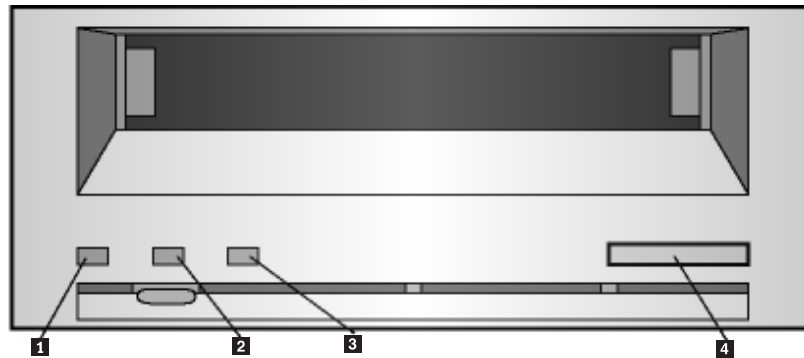
IBM periodically releases new firmware to fix problems or provide additional enhancements. The latest firmware, as well as instructions on how to load it, can be found by going to www-3.ibm.com/pc/support and searching for "tapetool".

Chapter 4. Understanding the drive LEDs

This chapter describes the LEDs on the front panel of the DDS Gen 5 drive. These LEDs provide information about both normal and error conditions.

Front panel LEDs

This figure shows an example of the LEDs on the drive front panel of the DDS Gen 5 drive.



- 1** Clean LED (green)
- 2** Media LED (green)
- 3** Drive LED (amber)
- 4** Eject button

LED summary

The following table summarizes the actions of the front-panel LEDs.

LED	Color	Action	Description
Clean 1	Green	ON (Lit)	Cleaning is required
		Slow flashing	Internal error rate threshold has been exceeded and cleaning is required.
		Flashing	Cleaning cartridge in the drive has exceeded its useful life. Replace the old cleaning cartridge with a new one.
Media 2	Green	ON (Lit)	An inserted cartridge is operating properly.

LED	Color	Action	Description
		Flashing	Drive could not write the tape correctly (write error). Use a DDS cleaning cartridge to clean the drive.
Drive 3	Amber	ON (Lit)	Drive is reading or writing the tape normally.
		Rapid flashing	A hardware fault has occurred.

Clean LED

The Clean LED indicates whether a drive needs to be cleaned.

LED Status	Description
ON continuously	Drive requires cleaning. Use only an approved DDS cleaning cartridge.
Flashing slowly (approximately ON 2 seconds, OFF 1 second)	Tape cartridge in use has exceeded a predefined soft-error threshold. This signal is a warning only and does not indicate that data has been compromised. Remove the tape and clean the drive using an approved DDS cleaning cartridge. If the Clean LED still flashes after cleaning and reinserting the original data cartridge, use a new cartridge for future backups.
Flashing rapidly	Cleaning cartridge has exceeded its useful life has been inserted into the drive. Replace the cleaning cartridge with a new approved DDS cleaning cartridge.

Media LED

The Media LED indicates whether a DDS cartridge is operating normally.

LED status	Description
ON continuously	A DDS cartridge has been inserted and the drive is operating normally.
Flashing rapidly	Drive could not write the tape correctly (maximum rewrite count exceeded) and the write operation failed. Clean the drive heads using an approved DDS cleaning cartridge. If you reinsert the original data cartridge and the LED continues flashing, insert a new data cartridge and retry the operation.

Note: As routine maintenance, clean the drive heads after every 30 hours of operation.

Drive LED

The amber Drive LED lets you know when data is being read from or written to tape. It also informs you when a hardware fault occurs.

LED status	Description
ON continuously	The drive is reading or writing the tape (SCSI or tape movement is present).
Flashing rapidly	<p>A hardware fault occurred. If the fault occurs immediately after powering on the drive, the Power-On Self-Test switch (switch 4) is enabled and a Power-On Self-Test has failed. If the front panel LEDs are flashing together, contact IBM Technical Support.</p> <p>If the Drive LED is flashing rapidly during drive operation, press the Eject button to remove the tape. If the tape does not eject within 2 minutes, press and hold the Eject button for more than 5 seconds. The tape should eject within 40 seconds. Contact IBM Technical Support for more information.</p>

Note: If your backup software issues a SCSI “Prevent Media Removal” command, the Drive LED remains ON and the Eject button is disabled, so that the tape cannot be ejected accidentally. To eject the tape, use your backup software’s Eject command.

Chapter 5. Troubleshooting

This chapter provides suggestions for troubleshooting your drives in the unlikely event you encounter a problem with them.

SCSI ID problems

Each SCSI device on the same SCSI bus must have a unique SCSI ID. The default SCSI ID for internal and external drives is 6. You should leave this default SCSI ID unchanged unless another device on the SCSI bus is already using this ID.

If the default SCSI ID is already in use, you can change the default SCSI ID on the drive using either jumpers on the back of the internal tape drives or the SCSI ID Selector switch on the back of the external SCSI drives.

SCSI termination problems

The DDS Gen 5 drive does not provide SCSI termination. Termination is provided by the included SCSI cable.

Mounting hardware problems

The internal drives are designed to install in most servers using the hardware accompanying the drives, without requiring additional items. However, if your server requires additional items to install the internal drives, or if any original server components are damaged or lost, contact IBM Technical Support.

Drive does not work

If the internal tape drive does not work:

1. Check the power connection to the drive.
2. If the connection is secure, replace the power cable with one that is known to work.
3. If the drive still does not work, contact IBM Technical Support

Power-On Self-Test fails

If the drive fails its Power-On Self-Test:

1. Check for a cartridge in the drive. If you find one, eject it.
2. Power-down the drive and power it up again.
3. If the drive still fails its Power-On Self-Test, contact IBM Technical Support.

Computer does not boot

If the computer does not boot after you install the drive:

1. You forgot to reattach the computer's power cable, which you removed when you installed the drive. Be sure all cables are connected properly to the computer.

2. Be sure the computer's power cable is connected to a power outlet that is known to work. Plug into the outlet another appliance, such as a lamp, that you know to work. If the appliance does not work, the problem is with the outlet.
3. The power outlet connected to the computer is controlled by a wall outlet that is removing power from the outlet. Either switch outlets or set the wall switch so that power is applied to the outlet.
4. The computer has a second SCSI host adapter whose resources are conflicting with another adapter installed in the computer. Remove the conflicting device or consult the documentation that came with the device for suggestions about resolving the problem.

Computer does not recognize drive

If your computer does not recognize the drive:

1. Verify that the SCSI and power cables to the drive are installed properly.
2. The drive may be using a SCSI ID assigned to another SCSI device on the SCSI bus. If so, reassign a unique SCSI ID to the drive or to the conflicting device.
3. Check that the SCSI bus is terminated properly. Note that the internal drive does not provide SCSI termination.

Backup program does not recognize drive

If your backup application program does not recognize the drive, use another application (such as Microsoft Windows Explorer, for example) to whether the drive is recognized.

If the other applications recognizes the drive, check the documentation that came with your backup program to determine whether the program needs a particular driver to be installed.

If the other application does not recognize the drive, the drive may not be installed or configured properly. Check your drive installation and configuration.

Write error

If the Media LED is flashing, a write error has occurred.

1. Use an IBM recommended cleaning cartridge to clean the tape heads (see "Cleaning the tape heads" on page 18).
2. Try to use the drive.
3. If the Media LED continues to flash, contact IBM Technical Support.

Hardware error

If the Drive LED is flashing rapidly, a hardware error has occurred. If the fault occurs immediately after powering on the drive, the Power-On Self Test switch (switch 4) is enabled and a Power-On Self-Test has failed. If the front panel LEDs are flashing together, contact IBM Technical Support.

If the Drive LED is flashing rapidly during drive operation:

1. Press the Eject button to remove the tape.
2. If the tape does not eject within 2 minutes, press and hold the Eject button for more than 5 seconds. The tape should eject within 40 seconds.

Appendix A. Specifications

This appendix provides specifications for the DDS Gen 5 Tape Drive.

Data capacities

This table lists the data capacities for the cartridges that can be used in the IBM DDS Gen 5 drive.

Cartridge type	Tape length	Capacity ^a , native	Capacity ^a , compressed ^b
DAT72	170 meters	36 GB ^c	72 GB
DDS/4	150 meters	20 GB	40 GB
DDS/3	125 meters	12 GB	24 GB

^a Maximum capacity: assumes the host computer keeps the drive streaming.

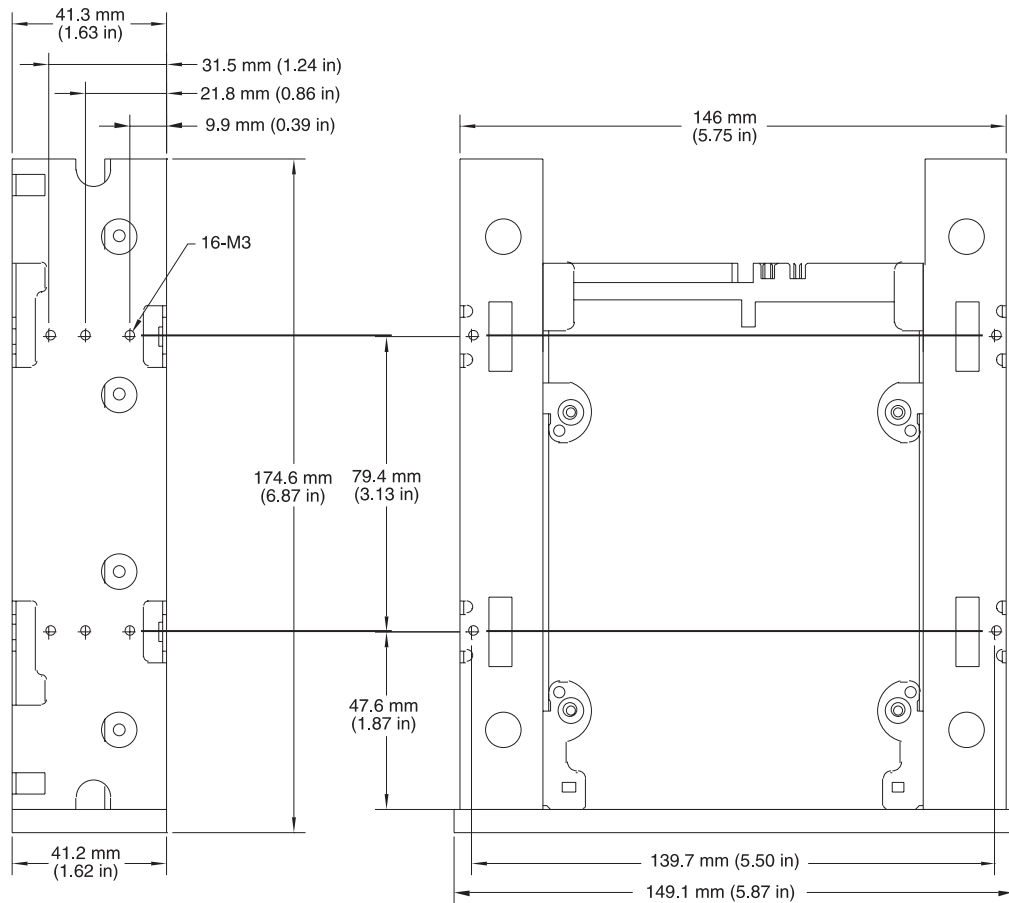
^b Assumes a 2:1 compression ratio. Actual compressed capacity varies depending on the type of data being recorded. The tape drive uses the ALDC (Adaptive Lossless Data Compression) algorithm and integrated circuit chip. The ALDC algorithm is compliant with the European Computer Manufacturers Association (ECMA) standard. Data compression is controlled by the software application.

^c One gigabyte equals 1,000,000,000 bytes.

Size and weight

This table shows the dimensions and weight for the tape drive. The tape drive is a 5.25-inch form factor drive for integration into an enclosure.

Specification	Tape drive
Height	41.2 mm (1.6 in)
Depth	146.0 mm (5.7 in)
Width	101.6 mm (4.0 in)
Weight	0.62 kg (1.4 lbs)



Mounting the Internal Tape Drive--Side and Bottom View

Power specifications

The following table lists the power specifications for the internal DDS Gen 5 drive.

Specification	+12 VDC supply	+5 VDC supply
Voltage tolerance	+ or - 10% operating	+ or - 7% operating
Operational current	250 milliamps max	1.35 Amps max
Standby current	15 milliamps max	1.2 Amps max
Surge (peak)	600 milliamps max	1.5 Amps max
Ripple (peak-to-peak)	≤ 100 mV (peak-to-peak)	≤ 100 mV (peak-to-peak)

Total power consumption is as follows:

Standby power	6.5 watts max
Operating power	8.7 watts typical, 10.0 watts max
Surge (start up)	20.0 watts max (instantaneous peak)
Note: When measured over a 20-msec period, the maximum surge power is 14.0 watts.	

The following table lists pin assignments of the power connector.

Pin	Assignment
1	+12 VDC
2	+12 return
3	+5 return
4	+5 VDC

Note: The drive employs a power-sensing circuit that automatically detects a loss of supply voltage from the host. Temporary loss of supply voltage, or voltage spikes, might result in the drive electronics being reset to their initialized state, but shall under no circumstances result in a loss of recorded data.

Drive performance specifications

The following table lists the specifications for the DDS Gen 5 tape drive.

Specification	Value
Capacity <ul style="list-style-type: none"> • 125m MP++ • 150 m MP+++ • 170 m MP++++ 	<ul style="list-style-type: none"> • 24.0 Gbytes • 40.0 Gbytes • 72.0 Gbytes
Error recovery	Read-after-write (RAW) Reed Solomon ECC (C3 - 3 levels)
Track density	TBD 4704 tracks per inch (TPI)
Recording unrecoverable errors	<1 in 10 ¹⁵ data bits
Tape drive type	Computer-grade 4DD mechanism
Head configuration	2 read reels, 2 write heads
Recording format	DDS 5th generation
Recording method	Helical scan
Cartridge	73.66 mm x 53.34 mm x 10.16 mm
Transfer rate (sustained)	7.700 Kbytes per sec (DC ON)
Synchronous transfer rate (burst)	80 Mbytes per sec max
Asynchronous transfer rate (burst)	10 Mbytes per sec max
Search speed (max)	200x normal (3260 mm per sec)
Drum rotation speed	10,000 revolutions per minute (RPMs)
Tape speed	2 meters per second
Head-to-head speed	TBD

Environmental requirements

The following table lists the environmental specifications for the DDS Gen 5 drive. The internal drive should meet these standards if mounted either vertically (on its side) or horizontally (right side up).

Specifications	Operational	Nonoperational
Temperature	+41° to +113°F ¹ (+5° to +45°C)	-40° to +149°F ²
Thermal gradient	2°C per minute (no condensation)	Below condensation
Relative humidity	20% to 80% noncondensing ¹	0% to 90% noncondensing ²
Maximum wet bulb temperature	82.4°F (28°C)	No condensation
Altitude	-100 to +4,575 meters	-300 to +15,200 meters (power on)
Vibration	1.20 mm peak-to-peak	1.5 g (5 to 500 Hz)
Sweep test	(5-17 HZ) 0.73 G peak (17 to 150 Hz) 0.50 G peak (150-500 Hz) (sweep rate 8 decades per hour)	- - -
Acoustic level idling (A-wt sum)	47 dBA maximum	0
Acoustic level operational (A-wt sum)	53 dBA maximum	0
Shock (1/2 sine wave)	10 Gs peak, 11 msec	100 Gs peak, 11 msec
¹ Mechanism and media		
² Mechanism		

Reliability

The DDS Gen 5 drive is designed for maximum reliability and data integrity. The following table summarizes the reliability specifications.

Specification	Value
Nonrecoverable error rate	< 1 in 10 ¹⁵ bits
Error recovery and control	Error-correction code techniques (C1, C2, & C3 ECC) Read-after-write (RAW) N-group writing
Mean time between failures (MTBF)	412,000 hr at 20% duty cycle
Mean time to repair (MTTR)	Less than 0.5 hour

Appendix B. Service and Support

The following information describes the technical support that is available for your product, during the warranty period or throughout the life of the product. Refer to your IBM Statement of Limited Warranty for a full explanation of IBM warranty terms.

Online technical support

Online technical support is available during the life of your product through the Personal Computing Support Web site at www-3.ibm.com/pc/support/site.wss/.

During the warranty period, assistance for replacement or exchange of defective components is available. In addition, if your IBM option is installed in an IBM computer, you might be entitled to service at your location. Your technical support representative can help you determine the best alternative.

Telephone technical support

Installation and configuration support through the IBM HelpCenter[®] will be withdrawn or made available for a fee, at IBM's discretion, 90 days after the option has been withdrawn from marketing. Additional support offerings, including step-by-step installation assistance, are available for a nominal fee.

To assist the technical support representative, have available as much of the following information as possible:

- Option name
- Option number
- Proof of purchase
- Computer manufacturer, model, serial number (if IBM), and manual
- Exact wording of the error message (if any)
- Description of the problem
- Hardware and software configuration information for your system

If possible, be at your computer. Your technical support representative might want to walk you through the problem during the call.

For the support telephone number and support hours by country, refer to the following table. If the number for your country or region is not listed, contact your IBM reseller or IBM marketing representative. Response time may vary depending on the number and nature of the calls received.

Phone numbers are subject to change without notice. For the latest phone number list, go to www-3.ibm.com/pc/support/site.wss/ and click **Support Phone List**.

Country or Region	Telephone Number	Country or Region	Telephone Number
Argentina	0800-666-0011	Malaysia	03-7727-7800
Australia	1300-130-426	Mexico	001-866-434-2080
Austria	01-24592-5901	Netherlands	020-514-5770

Country or Region	Telephone Number	Country or Region	Telephone Number
Belgium	Dutch 02-210-9820	New Zealand	0800-446-149
	French 02-210-9800		
Bolivia	0800-0189	Norway	66 81 11 00
Brazil	55-11-3889-8986	Peru	0-800-50-866
Canada	1-800-565-3344	Philippines	632-995-2225
	Toronto 416-383-3344		
Chile	800-224-488	Portugal	21-791 51 47
China (PRC)	800-810-1818	Russia	095-940-2000
China (Hong Kong S.A.R.)	852-2825-7799	Singapore	1800-840-9911
Columbia	980-912-3021	Spain	91-662 49 16
Denmark	45 20 82 00	Sweden	08-477 4420
Ecuador	1-800-426911 (option #4)	Switzerland	058-333-09-00
Finland	09-459 69 60	Taiwan	886-2-2725-9799
France	02 38 55 74 50	Thailand	66-2-273-4000
Germany	07032-1549 201	Turkey	00-800-446-32-041
Indonesia	021-523-8535	United Kingdom	0-1475-555 055
Ireland	01-815-9202	United States	1-800-426-7378
Italy	02-7031-6101	Uruguay	000-411-005-6649
Japan	Consumer customers 0120-887-870	Venezuela	0-800-100-2011
	Business customers 0120-887-874		
Luxembourg	298-977 5063	Vietnam	848-8295-160

Appendix C. IBM Statement of Limited Warranty - Z125-4753-07 - 11/2002

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms, Part 2 - Country-unique Terms, and Part 3 - Warranty Information. 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. 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. Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract.

What this Warranty Covers

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications") which are available on request. The warranty period for the Machine starts on the original Date of Installation and is specified in Part 3 - Warranty Information. The date on your invoice or sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise. 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. Unless IBM specifies otherwise, these warranties apply only in the country or region in which you purchased the Machine.

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. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

What this Warranty Does not Cover

This warranty does not cover the following:

- any software programs, whether pre-loaded or shipped with the Machine, or installed subsequently;
- failure resulting from misuse (including but not limited to use of any Machine capacity or capability, other than that authorized by IBM in writing), accident, modification, unsuitable physical or operating environment, or improper maintenance by you;
- failure caused by a product for which IBM is not responsible; and

- any non-IBM products, including those that IBM may procure and provide with or integrate into an IBM Machine at your request.

The warranty is voided by removal or alteration of identification labels on the Machine or its parts.

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, is provided **WITHOUT WARRANTIES OF ANY KIND**.

How to Obtain Warranty Service

If the Machine does not function as warranted during the warranty period, contact IBM or your reseller to obtain warranty service. If you do not register the Machine with IBM, you may be required to present proof of purchase as evidence of your entitlement to warranty service.

What IBM Will Do to Correct Problems

When you call for service, you must follow the problem determination and resolution procedures that IBM specifies. A technician will attempt to make an initial diagnosis of your problem and help you resolve it over the telephone.

The type of warranty service applicable to your Machine is specified in Part 3 - Warranty Information.

You are responsible for downloading and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM Machine) and other software updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

If your problem can be resolved with a Customer Replaceable Unit ("CRU") (e.g., keyboard, mouse, speaker, memory, hard disk drive and other easily replaceable parts), IBM will ship these parts to you for replacement by you.

If the Machine does not function as warranted during the warranty period and your problem cannot be resolved over the telephone, through your application of Machine Code or software updates, or with a CRU, IBM or your reseller, if approved by IBM to provide warranty service, will either, at its discretion, 1) repair it to make it function as warranted, or 2) replace it with one that is at least functionally equivalent. If IBM is unable to do either, you may return the Machine to your place of purchase and your money will be refunded.

IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Exchange of a Machine or Part

When the 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.

Your Additional Responsibilities

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 service request procedures that IBM or your reseller provides;
 - b. backup or secure all programs, data, and funds contained in the Machine;
 - c. IBM or your reseller with sufficient, free, and safe access to your facilities to permit IBM to fulfill its obligations; and
 - d. inform IBM or your reseller of changes in the Machine's location.
4. (a) ensure all information about identified or identifiable individuals (Personal Data) is deleted from the Machine (to the extent technically possible), (b) allow IBM, your reseller or an IBM supplier to process on your behalf any remaining Personal Data as IBM or your reseller considers necessary to fulfill its obligations under this Statement of Limited Warranty (which may include shipping the Machine for such processing to other IBM service locations around the world), and (c) ensure that such processing complies with any laws applicable to such Personal Data.

Limitation of Liability

IBM is responsible for loss of, or damage to, your Machine only 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 are responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM for any reason. You should remove all such information from the Machine prior to its return.

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 ("LIC").

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, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION 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 Statement of Limited Warranty, without regard to conflict of law principles.

THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE OR JURISDICTION TO JURISDICTION.

Jurisdiction

All of our rights, duties, and obligations are subject to the courts of the country in which you acquired the Machine.

Part 2 - Country-unique Terms

AMERICAS

ARGENTINA

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

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Ordinary Commercial Court of the city of Buenos Aires.

BRAZIL

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

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the court of Rio de Janeiro, RJ.

Peru

Limitation of Liability: *The following is added at the end of this section:*

In accordance with Article 1328 of the Peruvian Civil Code the limitations and exclusions specified in this section will not apply to damages caused by IBM's willful misconduct ("dolo") or gross negligence ("culpa inexcusable").

NORTH AMERICA

How to Obtain 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

Limitation of Liability: *The following replaces item 1 of this section:*

1. damages for bodily injury (including death) or physical harm to real property and tangible personal property caused by IBM's negligence; and

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

What this Warranty Covers: *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, United States of America.

CAMBODIA, INDONESIA, LAOS, AND VIETNAM

Arbitration: The following is added under this heading:

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Singapore in accordance with the Arbitration Rules of Singapore International Arbitration Center ("SIAC Rules") then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

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 who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the SIAC. 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.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

HONG KONG S.A.R. OF CHINA AND MACAU S.A.R. OF CHINA

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 of China.

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; and
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, , the charge paid by you for the individual Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Arbitration: *The following is added under this heading :*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Bangalore, India in accordance with the laws of India then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

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 who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Bar Council of India. 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.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

JAPAN

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

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

MALAYSIA

Limitation of Liability: *The word "SPECIAL" in item 3 of the fifth paragraph is deleted.*

NEW ZEALAND

What this Warranty Covers: *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 "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York, United States of America (except when local law requires otherwise).

PHILIPPINES

Limitation of Liability: *Item 3 in the fifth paragraph is replaced by the following:*

SPECIAL (INCLUDING NOMINAL AND EXEMPLARY DAMAGES), MORAL, INCIDENTAL, OR INDIRECT DAMAGES FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR

Arbitration: The following is added under this heading

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Metro Manila, Philippines in accordance with the laws of the Philippines then in effect. The

arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

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 who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Philippine Dispute Resolution Center, Inc.. 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.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

SINGAPORE

Limitation of Liability: The words "SPECIAL" and "ECONOMIC" in item 3 in the fifth paragraph are deleted.

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.

Hot to Obtain Warranty Service: If you purchase a Machine in Austria, Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, Norway, Portugal, Spain, San Marino, Sweden, Switzerland, United Kingdom or Vatican State, 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, provided the Machine has been announced and made available by IBM in the country in which you wish to obtain service. If you purchased a Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, 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 a 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 approved service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM approved service provider.

*Add the following paragraph in **Western Europe** (Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Portugal, Spain, San Marino, Sweden, Switzerland, United Kingdom, Vatican State):*

The warranty for Machines acquired in Western Europe shall be valid and applicable in all Western Europe countries provided the Machines have been announced and made available in such countries.

Governing Law:

The phrase "the laws of the country in which you acquired the Machine" is replaced by:

1) "the laws of Austria" in **Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia;** 2) "the laws of France" in **Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna;** 3) "the laws of Finland" in **Estonia, Latvia, and Lithuania;** 4) "the laws of England" in **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, the United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe;** and 5) "the laws of South Africa" in **South Africa, Namibia, Lesotho and Swaziland.**

Jurisdiction: *The following exceptions are added to this section:*

1) In **Austria** the choice of jurisdiction for all disputes arising out of this Statement of Limited Warranty and relating thereto, including its existence, will be the competent court of law in Vienna, Austria (Inner-City); 2) in **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, West Bank/Gaza, Yemen, Zambia, and Zimbabwe** all disputes arising out of this Statement of Limited Warranty or related to its execution, including summary proceedings, will be submitted to the exclusive jurisdiction of the English courts; 3) in **Belgium and Luxembourg**, all disputes arising out of this Statement of Limited Warranty or related to its interpretation or its execution, the law, and the courts of the capital city, of the country of your registered office and/or commercial site location only are competent; 4) in **France, Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna** all disputes arising out of this Statement of Limited Warranty or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 5) in **Russia**, all disputes arising out of or in relation to the interpretation, the violation, the termination, the

nullity of the execution of this Statement of Limited Warranty shall be settled by Arbitration Court of Moscow; 6) **in South Africa, Namibia, Lesotho and Swaziland**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the High Court in Johannesburg; 7) **in Turkey** all disputes arising out of or in connection with this Statement of Limited Warranty shall be resolved by the Istanbul Central (Sultanahmet) Courts and Execution Directorates of Istanbul, the Republic of Turkey; 8) in each of the following specified countries, any legal claim arising out of this Statement of Limited Warranty will be brought before, and settled exclusively by, the competent court of a) Athens for **Greece**, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e) Madrid for **Spain**; and 9) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

Arbitration: *The following is added under this heading:*

In Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and FR Yugoslavia all disputes arising out of this Statement of Limited Warranty or related to its violation, termination or nullity will be finally settled under the Rules of Arbitration and Conciliation of the International Arbitral Center of the Federal Economic Chamber in Vienna (Vienna Rules) by three arbitrators appointed in accordance with these rules. The arbitration will be held in Vienna, Austria, and the official language of the proceedings will be English. The decision of the arbitrators will be final and binding upon both parties. Therefore, pursuant to paragraph 598 (2) of the Austrian Code of Civil Procedure, the parties expressly waive the application of paragraph 595 (1) figure 7 of the Code. IBM may, however, institute proceedings in a competent court in the country of installation.

In Estonia, Latvia and Lithuania all disputes arising in connection with this Statement of Limited Warranty will be finally settled in arbitration that will be held in Helsinki, Finland in accordance with the arbitration laws of Finland then in effect. Each party will appoint one arbitrator. The arbitrators will then jointly appoint the chairman. If arbitrators cannot agree on the chairman, then the Central Chamber of Commerce in Helsinki will appoint the chairman.

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

Consumers have legal rights under applicable national legislation governing the sale of consumer goods. Such rights are not affected by the warranties provided in this Statement of Limited Warranty.

How to Obtain Warranty Service: *The following is added to this section:*

To obtain warranty service from IBM in EU countries, see the telephone listing in Part 3 - Warranty Information.

You may contact IBM at the following address:

IBM Warranty & Service Quality Dept.

PO Box 30

Spango Valley

Greenock

Scotland PA 16 OAH

**AUSTRIA, DENMARK, FINLAND, GREECE, ITALY, NETHERLANDS,
PORTUGAL, SPAIN, SWEDEN AND SWITZERLAND**

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:

1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty or due to any other cause related to this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault) or of such cause, for a maximum amount equal to the charges you paid for the Machine. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

FRANCE AND BELGIUM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:

1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault), for a maximum amount equal to the charges you paid for the Machine that has caused the damages. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE**

CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES;
OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED
SAVINGS.

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA

What this Warranty Covers: *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 12 months from the date of delivery. . The limitation period for consumers in action for breach of warranty is the statutory period as a minimum. 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.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *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 (LIC).

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).*

GERMANY

What this Warranty Covers: *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 twelve 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.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *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.

HUNGARY

Limitation of Liability: *The following is added at the end of this section:*

The limitation and exclusion specified herein shall not apply to liability for a breach of contract damaging life, physical well-being, or health that has been caused intentionally, by gross negligence, or by a criminal act.

The parties accept the limitations of liability as valid provisions and state that the Section 314.(2) of the Hungarian Civil Code applies as the acquisition price as well as other advantages arising out of the present Statement of Limited Warranty balance this limitation of liability.

IRELAND

What this Warranty Covers: *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 the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default occurring on the date of occurrence of the last such Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.

1. IBM will accept unlimited liability for death or personal injury caused by the negligence of IBM.
2. Subject always to the Items for Which IBM is Not Liable below, IBM will accept unlimited liability for physical damage to your tangible property resulting from the negligence of IBM.
3. Except as provided in items 1 and 2 above, IBM's entire liability for actual damages for any one Default will not in any event exceed the greater of 1) EUR 125,000, or 2) 125% of the amount you paid for the Machine directly relating to the Default.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM, its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:

1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

SLOVAKIA

Limitation of Liability: *The following is added to the end of the last paragraph:*

The limitations apply to the extent they are not prohibited under §§ 373-386 of the Slovak Commercial Code.

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 the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally

liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.

1. IBM will accept unlimited liability for:
 - a. death or personal injury caused by the negligence of IBM; and
 - b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.
2. IBM will accept unlimited liability, subject always to the Items for Which IBM is Not Liable below, for physical damage to your tangible property resulting from the negligence of IBM.
3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

These limits also apply to IBM's suppliers and resellers. They state the maximum for which IBM and such suppliers and resellers are collectively responsible.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM or any of its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:

1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

Part 3 - Warranty Information

This Part 3 provides information regarding the warranty applicable to your Machine, including the warranty period and type of warranty service IBM provides.

Warranty Period

The warranty period may vary by country or region and is specified in the table below. NOTE: "Region" means either Hong Kong or Macau Special Administrative Region of China.

Microportable Projector

Country or Region of Purchase	Warranty Period	Type of Warranty Service
Worldwide	3 years	1

A warranty period of 1 year on parts and 1 year on labor means that IBM provides warranty service without charge for parts and labor during the 1 year warranty period.

Types of Warranty Service

If required, IBM provides repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described below. Warranty service may be provided by your reseller if approved by IBM to perform warranty service. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside IBM's normal service area, contact your local IBM representative or your reseller for country and location specific information.

1. Customer Replaceable Unit ("CRU") Service

IBM will ship CRU parts to you for your replacement. If IBM instructs you to return the replaced CRU, you are responsible for returning it to IBM in accordance with IBM's instructions. If you do not return the defective CRU, if IBM so instructs, within 30 days of your receipt of the replacement CRU, IBM may charge you for the replacement.

2. On-site Service

IBM or your reseller will either repair or exchange the failing Machine at your location and verify its operation. You must provide suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well lit and suitable for the purpose. **For some Machines, certain repairs may require sending the Machine to an IBM service center.**

3. Courier or Depot Service¹

You will disconnect the failing Machine for collection arranged by IBM. IBM will provide you with a shipping container for you to return your Machine to a designated service center. A courier will pick up your Machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the Machine to your location. You are responsible for its installation and verification.

4. Customer Carry-In or Mail-In Service

You will deliver or mail as IBM specifies (prepaid unless IBM specifies otherwise) the failing Machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the Machine, IBM will make it available for your collection or, for Mail-in Service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation and verification of the Machine.

The IBM Machine Warranty worldwide web site at http://www.ibm.com/servers/support/machine_warranties/ provides a worldwide overview of IBM's Limited Warranty for Machines, a Glossary of IBM

1. This type of service is called ThinkPad EasyServ or EasyServ in some countries.

definitions, Frequently Asked Questions (FAQs) and Support by Product (Machine) with links to Product Support pages. **The IBM Statement of Limited Warranty is also available on this site in 29 languages.**

To obtain warranty service contact IBM or your IBM reseller. In Canada or the United States, call 1-800-IBM-SERV (426-7378). For other countries, see the telephone numbers below.

Phone numbers are subject to change without notice. For the latest phone number list, go to www-3.ibm.com/pc/support/site.wss/ and click **Support Phone List**.

Country or Region	Telephone Number	Country or Region	Telephone Number
Argentina	0800-666-0011	Malaysia	03-7727-7800
Australia	1300-130-426	Mexico	001-866-434-2080
Austria	01-24592-5901	Netherlands	020-514-5770
Belgium	Dutch 02-210-9820 French 02-210-9800	New Zealand	0800-446-149
Bolivia	0800-0189	Norway	66 81 11 00
Brazil	55-11-3889-8986	Peru	0-800-50-866
Canada	1-800-565-3344 Toronto 416-383-3344	Philippines	632-995-2225
Chile	800-224-488	Portugal	21-791 51 47
China (PRC)	800-810-1818	Russia	095-940-2000
China (Hong Kong S.A.R.)	852-2825-7799	Singapore	1800-840-9911
Columbia	980-912-3021	Spain	91-662 49 16
Denmark	45 20 82 00	Sweden	08-477 4420
Ecuador	1-800-426911 (option #4)	Switzerland	058-333-09-00
Finland	09-459 69 60	Taiwan	886-2-2725-9799
France	02 38 55 74 50	Thailand	66-2-273-4000
Germany	07032-1549 201	Turkey	00-800-446-32-041
Indonesia	021-523-8535	United Kingdom	0-1475-555 055
Ireland	01-815-9202	United States	1-800-426-7378
Italy	02-7031-6101	Uruguay	000-411-005-6649
Japan	Consumer customers 0120-887-870 Business customers 0120-887-874	Venezuela	0-800-100-2011
Luxembourg	298-977 5063	Vietnam	848-8295-160

Appendix D. Notices

IBM may not offer the products, services, or features discussed in this document in all countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

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Armonk, NY 10504-1785
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vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Federal Communications Commission (FCC) statement

ThinkPad CD-RW/DVD-ROM Combo Ultrabay Enhanced Drive

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused 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.

Responsible party:

International Business Machines Corporation
New Orchard Road
Armonk, NY 10504
Telephone: 1-919-543-2193



Tested To Comply
With FCC Standards

FOR HOME OR OFFICE USE

Industry Canada Class B emission compliance statement

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

Avis de conformité a la réglementation d'Industrie Canada

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

Deutsche EMV-Direktive (electromagnetische Verträglichkeit)

Zulassungsbeseinigunglaut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30. August 1995 (bzw. der EMC EG Richtlinie 89/336):

Dieses Gerät ist berechtigt in Übereinstimmungmit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die:

IBM Deutschland Informationssysteme GmbH, 70548 Stuttgart.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2) 2:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024:1998 und EN 55022:1998 Klasse B.
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EN 55022 Hinweis:

“Wird dieses Gerät in einer industriellen Umgebung betrieben (wie in EN 55022:B festgelegt), dann kann es dabei eventuell gestört werden. In solch einem FA11 ist der Abstand bzw. die Abschirmungzu der industriellen Störquelle zu vergrößern.”

Anmerkung:

Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den IBM Handbüchern angegeben, zu installieren und zu betreiben.

European Union - emission directive

This product is in conformity with the protection requirements of EU Council Directive 89/336/ECC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM can not accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended 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 B Information Technology Equipment according to European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

Union Européenne - Directive Conformité électromagnétique

Ce produit est conforme aux exigences de protection de la Directive 89/336/EEC du Conseil de l'UE sur le rapprochement des lois des États membres en matière de compatibilité électromagnétique.

IBM ne peut accepter aucune responsabilité pour le manquement aux exigences de protection résultant d'une modification non recommandée du produit, y compris l'installation de cartes autres que les cartes IBM.

Ce produit a été testé et il satisfait les conditions de l'équipement informatique de Classe B en vertu de Standard européen EN 55022. Les conditions pour l'équipement de Classe B ont été définies en fonction d'un contexte résidentiel ordinaire afin de fournir une protection raisonnable contre l'interférence d'appareils de communication autorisés.

Unione Europea - Directiva EMC (Conformidad electromagnética)

Este producto satisface los requisitos de protección del Consejo de la UE, Directiva 89/336/CEE en lo que a la legislatura de los Estados Miembros sobre compatibilidad electromagnética se refiere.

IBM no puede aceptar responsabilidad alguna si este producto deja de satisfacer dichos requisitos de protección como resultado de una modificación no recomendada del producto, incluyendo el ajuste de tarjetas de opción que no sean IBM.

Este producto ha sido probado y satisface los límites para Equipos Informáticos Clase B de conformidad con el Estándar Europeo EN 55022. Los límites para los equipos de Clase B se han establecido para entornos residenciales típicos a fin de proporcionar una protección razonable contra las interferencias con dispositivos de comunicación licenciados.

Union Europea - Normativa EMC

Questo prodotto è conforme alle normative di protezione ai sensi della Direttiva del Consiglio dell'Unione Europea 89/336/CEE sull'armonizzazione legislativa degli stati membri in materia di compatibilità elettromagnetica.

IBM non accetta responsabilità alcuna per la mancata conformità alle normative di protezione dovuta a modifiche non consigliate al prodotto, compresa l'installazione di schede e componenti di marca diversa da IBM.

Le prove effettuate sul presente prodotto hanno accertato che esso rientra nei limiti stabiliti per le apparecchiature di informatica Classe B ai sensi della Norma Europea EN 55022. I limiti delle apparecchiature della Classe B sono stati stabiliti al fine di fornire ragionevole protezione da interferenze mediante dispositivi di comunicazione in concessione in ambienti residenziali tipici.

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Japanese statement of compliance for products less than or equal to 20 A per phase

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