



20/40 GB, DDS/4 4mm Internal Tape Drive

User's Guide

OPTIONS
by IBM

Note: Before using this information and the product it supports, be sure to read the information under Appendix E, "Product warranties and notices" on page 2-6.

First Edition (September 1999)

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Safety: Read first



Before installing this product, read the Safety Information.

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

在安装本产品之前，请仔细阅读 **Safety Information** (安全信息)。

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).

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」。

Product registration

Thank you for purchasing OPTIONS by IBM . Please take a few moments to register your product and provide us with information that will help IBM to better serve you in the future. Your feedback is valuable to us in developing products and services that are important to you, as well as in developing better ways to communicate with you. Register your option on the IBM Web site at:

<http://www.ibm.com/pc/register>

IBM will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

About this book

This book contains instructions for installing and using the IBM 20/40 GB, DDS/4 4 mm Internal Tape Drive. The manual is divided into the following parts:

Part 1: Installation and user's guide

This section contains the product description, installation instructions, and operating information in the following languages:

- English
- German
- French
- Spanish
- Italian
- Brazilian Portuguese
- Japanese

Part 2: Appendixes

This section contains information on cartridge-format compatibility, product specifications, problem solving, help and service, warranties, and notices.

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

Part 1: Installation and user's guide

This section contains the product description, installation instructions, and operating information.

Product description

The IBM 20/40 GB¹, DDS/4 4-mm Internal Tape Drive is an Ultra-2 SCSI (low voltage differential) tape drive that uses IBM tape cartridges (part number 59H4458) or equivalent IBM-approved tape cartridges to back up and restore data and to archive files. Each tape cartridge can store up to 20 GB of data (uncompressed), or up to 40 GB of data (compressed), assuming a 2:1 compression ratio.

In addition to this book, the option package contains:

- 20/40 GB, DDS/4 4-mm Internal Tape Drive, with a black half-high (HH) 5.25-inch faceplate
- Data cartridge
- Cleaning cartridge
- Four M3 x 0.5 x 6 mm mounting screws
- Black 3.5-inch faceplate
- Trial backup and software CDs
- Safety information manual

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.

Software description

The tape drive comes with CDs that contain trial versions of backup-and-restore applications. These CDs contain popular backup-and-restore applications for Microsoft Windows NT Server, Novell NetWare, and other operating systems. You can install an application for your operating system by following the installation instructions that come with the CD that you use. However, the application expires after 30 or 90 days.

You can use the 30-day or 90-day trial period to determine the best application for your specific computer configuration. For information on purchasing a permanent installation copy of the desired tape-drive backup-and-restore application, go to the IBM tape drive Web site at <http://www.ibm.com/pc/us/solutions/accessories/tapedrives.html>

¹ GB equals approximately 1 000 000 000 bytes.

and follow the software links. You can also contact the manufacturer of the application for information about buying the application.

The CDs also contain backup applications that are used with other products but are not applicable to the tape drive. Supported tape drive configurations can be found on the IBM Netfinity Server Compatibility Web page at <http://www.ibm.com/pc/compat>

Installation requirements

To install this drive, you must have the following:

- Low voltage differential-compatible SCSI adapter meeting the Ultra-2 SCSI standards

Note: This drive works with some non-LVD or single-ended controllers, but at a lower performance rate.

- Documentation for your computer, SCSI adapter, or external enclosure

- Screwdriver for the mounting screws

- Needle-nose pliers to remove and set jumpers (optional)

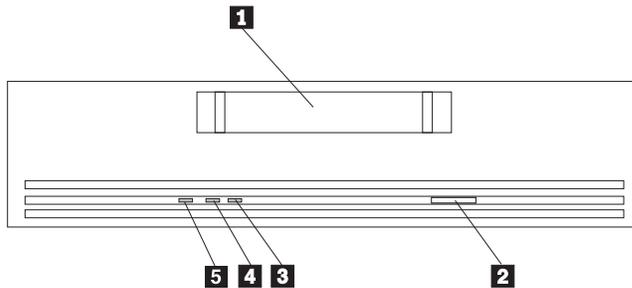
- Backup and restore software, if you do not use the trial software that comes with the drive

- Device drivers, if you use backup and restore software that does not include device drivers

Before you begin

Before you install the tape drive, read the information in this section on the drive controls and connectors.

Using the drive controls



1 Tape drive door

This door is where you insert a tape cartridge.

2 Unload button

This button, when pressed, unloads a tape cartridge from the drive.

3 Tape-drive activity indicator

This light comes on when the drive reads from or writes to a tape cartridge.

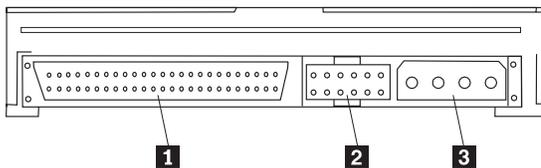
4 Cartridge presence indicator

This light comes on when you insert a cartridge into the drive.

5 Cleaning status indicator

This light comes on when cleaning is required.

Using the drive connectors



1 SCSI connector

This connects the tape drive to the computer SCSI cable.

2 Jumper block

Place jumpers on this block to set the tape-drive SCSI ID, enable parity, or enable termination.

3 Power connector

This connects the tape drive to the computer power cord.

Installing the drive

Follow these steps to install the tape drive.

Step 1. Selecting a SCSI ID

Each device on a SCSI bus must have its own SCSI ID. You can select a SCSI ID for the tape drive in the range of 0 to 15. The SCSI ID must be one that is supported by your SCSI adapter. Refer to your SCSI adapter documentation for the range and the relative priority of the IDs supported. The tape drive comes with the SCSI ID preset to 6.

Follow these guidelines to select a SCSI ID:

- Assign the tape drive to one of the lower priority ID numbers available (0–6).
- Assign the higher 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 reserved for the SCSI adapter.

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

- For most IBM computers, press F1 during the startup after the memory check completes. Other adapters display 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 the SCSI adapter utility programs, if available.
- Inspect the installed SCSI devices to see how the jumpers that determine the IDs are set.

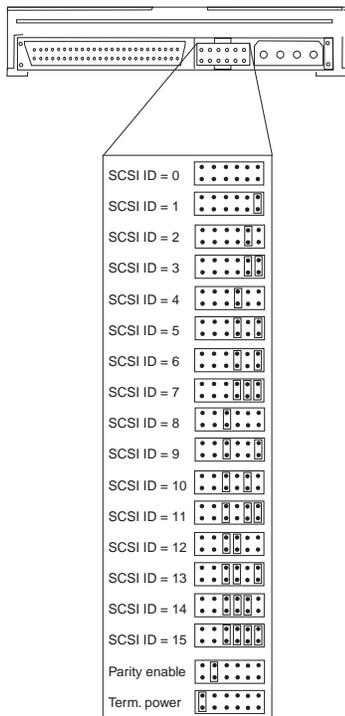
Step 2. Preparing for installation

To prepare for installation:

1. Turn off all attached devices. Turn off the computer. Unplug the power cords for the computer and all attached devices; then open the computer. For specific information on opening your computer, refer to the documentation that comes with your computer.
2. Before opening the static-protective bag containing the tape drive, touch the bag to an unpainted metal surface on the computer for at least two seconds. Be sure to touch a metal surface before touching the drive, to ground any accumulated static energy. Remove the drive from the static-protective bag. If you must put the drive down, place the drive on the static-protective bag.

Step 3. Setting the SCSI ID, termination, and parity

Use the following illustration to locate the jumper pins for SCSI ID settings, termination, and parity.



If you choose the default SCSI address of 6, go to Step 4. If you need to change the SCSI address, refer to the SCSI ID settings shown in the illustration. Remove and reposition the jumpers that come with your tape drive to set the ID. If necessary, use a pair of needle-nose pliers to remove the jumpers.

If the tape drive is the last device on the SCSI device chain, the chain must be terminated at the drive. Some SCSI cables provide self-termination and do not require SCSI terminators. If your computer SCSI cable does not provide self-termination, attach a SCSI terminator (not provided) to the drive connector before attaching the SCSI cable.

Most SCSI adapters provide termination power. However, if your SCSI adapter does not provide termination power, you will need to place a jumper on the **Term. power** jumper pins as shown in the illustration. For more information, refer to the documentation that comes with your computer or SCSI adapter.

If you install the device in an external storage enclosure and the device is at the end of the SCSI chain, refer to your enclosure documentation for information on termination. The enclosure might have a SCSI terminator on a connector outside the enclosure.

Review the information that comes with your computer regarding parity generation. To generate parity, place a jumper on the **parity enable** jumper pins as shown in the illustration.

Attention: There are additional micro switch settings on the bottom of the drive. **DO NOT ADJUST THESE SETTINGS UNLESS YOU ARE BEING ASSISTED BY A TRAINED SERVICE PERSON.** Adjusting the settings without assistance from a service person might void the drive warranty.

Step 4. Mounting the drive

Note: You can use the mounting hardware that comes with this tape drive to install the drive in most PCs and servers. However, some PCs or servers might require additional mounting rails or faceplates. For more information on mounting requirements and on obtaining sources for any required parts, refer to the documentation that comes with your PC or server.

You can mount the drive in a 3.5-inch drive bay or a 5.25-inch drive bay.

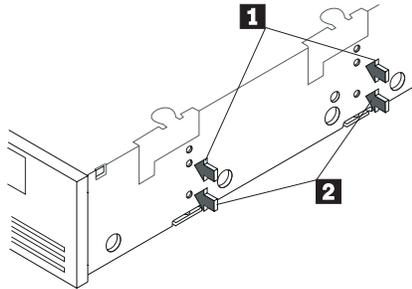
Attention: Be sure to use the mounting screws that come with your drive. You might damage your drive if you use mounting screws that are too long.

To mount the drive in a 3.5-inch drive bay:

1. Carefully remove the 5.25-inch faceplate from the drive.
2. Remove the screws from the mounting rails on the drive.
3. Remove the mounting rails from the drive.
4. Attach the included 3.5-inch faceplate to the drive.
5. Remove the cover plate from an available 3.5-inch drive bay.
6. Slide the drive into the 3.5-inch drive bay.
7. Use the mounting screws that come with your computer system to secure the drive in the peripheral cage.

To mount the drive in a 5.25-inch drive bay:

1. Remove the cover plate from an available 5.25-inch drive bay; then place the drive in the bay. You can install the drive horizontally or vertically.



2. Align the top set 1 or the bottom set 2 of screw holes on the drive mounting rails with the drive-bay screw holes.

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 the rear of the tape drive.

3. Thread a screw through each drive-bay screw hole into each mounting-rail screw hole; then tighten the screws with a screwdriver.

Step 5. Attaching cables

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

1. Locate the SCSI cable on your computer (a 68-pin (wide) ribbon cable with one end connected to the SCSI adapter) and find an available connector that will reach the tape drive.

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

2. Attach the SCSI cable from your computer to the tape drive 68-pin SCSI connector. The SCSI cable connector attaches to the drive only one way. Do not force the cable onto the drive.

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.

3. Connect the power-cable connector to the four-pin connector on the tape drive. If all the power cables are in use, purchase a power-splitter, which is available at most electronics stores, and split a connection to make a connection available for the tape drive.

Step 6. 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. Be sure that the air vents to the power supply are not blocked.
2. Replace the computer cover and secure it in place. Reconnect the power cords and cables.

Step 7. Turning on the device

Turn on all attached devices; then turn on the computer. The tape drive performs a power-on self-test (POST) within 15 seconds and then performs a drive reset.

Step 8. Updating the configuration

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

If your computer does not recognize the tape drive after startup or you receive startup errors, run the configuration-setup utility program as described in the documentation that comes with 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.

Step 9. Installing backup-and-restore software

To use the tape drive, you must install a backup-and-restore application for your computer operating system. If you are using software not included in the option package, follow the installation instructions that come with your software. If you are using the trial software that comes with the option, insert a trial-application CD into the CD-ROM drive and follow the on-screen installation and operating instructions. See "Software description" on page 1-1 for more information.

Using the drive

This section provides information on understanding the drive indicators, loading and unloading tape cartridges, cleaning the drive, and packing the drive.

Understanding the drive indicators

The following table describes the indicator actions during operation of the tape drive.

Indicator	Action	Action message
Cleaning status (green) Left LED	Lights steadily	NOTICE The drive requires cleaning because it has operated for 25 hours. Use the included cleaning cartridge to clean the tape drive. For more information on cleaning the tape drive, see "Cleaning the drive" on page 1-11.
Cleaning status (green) Left LED	Flashes slowly	ERROR The drive requires cleaning because an internal error rate has occurred. Use the included cleaning cartridge to clean the tape drive. For more information on cleaning the tape drive, see "Cleaning the drive" on page 1-11.
Cartridge presence (green) Middle LED	Lights steadily	NORMAL A tape cartridge inserted in the tape drive is ready to use.
Tape-drive presence (green) Middle LED	Flashes slowly	WARNING A tape cartridge inserted in the tape drive is generating errors. <ol style="list-style-type: none">1. Use the included cleaning cartridge to clean the tape drive. For more information on cleaning the tape drive, see "Cleaning the drive" on page 1-11.2. Replace the tape cartridge if it continues to generate errors after you clean the tape drive.

Indicator	Action	Action message
Tape-drive presence (green) Middle LED	Flashes rapidly	ERROR The tape drive could not correctly write to the tape. 1. Use the included cleaning cartridge to clean the tape drive. 2. If the tape drive still cannot correctly write to the tape after you clean the tape drive, replace the data cartridge.
Tape-drive activity (amber) Right LED	Lights steadily	NORMAL The tape drive is reading from or writing to the tape.
Tape-drive activity (amber) Right LED	Flashes rapidly	ERROR A hardware fault occurred. For information on obtaining help, go to Appendix D, "Help and service information" on page 2-5.

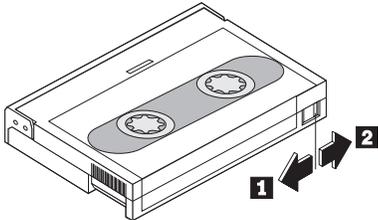
Loading and unloading tape cartridges

Notes:

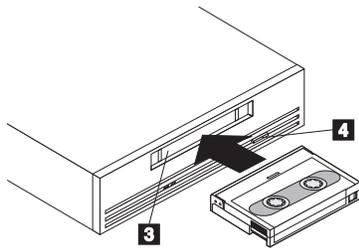
1. Use only IBM tape cartridges (part number 59H4458) or equivalent IBM-approved tape cartridges. For more information on cartridge-format compatibility, see Appendix A, "Cartridge format compatibility" on page 2-1.
2. Do not load a tape cartridge if the tape drive is still performing a power-on self-test (POST) or if all indicators are lit.

To load a tape cartridge:

1. On the rear of the tape cartridge, set the switch to the left for write-enable 1 or to the right for write-protect 2, as shown.



2. Insert the tape cartridge into the tape drive door 3 , as shown.



The tape drive loads the tape in approximately 20 seconds. When the tape-drive presence (green) indicator lights steadily, the tape drive is ready for read and write operations.

To unload a tape cartridge, press the unload button 4 . When you unload a tape cartridge, the tape drive performs the following actions:

- Completes any command in process
- Writes any buffered information to tape
- Rewinds the tape to the beginning
- Unloads the tape and ejects the cartridge

Note: It might take up to 15 minutes for the tape drive to eject the tape cartridge after you press the unload button. Do not turn off your computer until the tape ejects. When you load a new (blank) cartridge for the first time, the drive takes approximately 12–15 seconds to recognize the data cartridge as blank, and then another 30 seconds to initialize the cartridge after it receives the first write command during a back up.

Cleaning the drive

When the tape-drive presence (green) indicator flashes, the tape drive requires cleaning. Clean the drive as soon as possible after the indicator turns on.

Clean the tape drive more often if you are using a lot of new tapes or if you are operating the tape drive in an environment containing a lot of dust or other particulate matter that might contaminate the magnetic tape.

To clean the tape drive, insert a cleaning cartridge (IBM part number 59H3090) into the tape drive door. When the cleaning completes, the green indicator turns off and the tape drive ejects the cleaning cartridge.

Packing the drive

If you are shipping the tape drive to another location or returning it for repair, pack the tape drive in its original shipping container and packing materials to avoid damage. If you are returning the tape drive for service, remove all cartridges, cables, and terminators from the tape drive and keep them in a safe place.

Installation and user's guide (Translate)

This section contains the product description, installation instructions, and operating information.

Product description

The IBM 20/40 GB², DDS/4 4-mm Internal Tape Drive is an Ultra-2 SCSI (low voltage differential) tape drive that uses IBM tape cartridges (part number 59H4458) or equivalent IBM-approved tape cartridges to back up and restore data and to archive files. Each tape cartridge can store up to 20 GB of data (uncompressed), or up to 40 GB of data (compressed), assuming a 2:1 compression ratio.

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To install this drive, you must have the following:

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Note: This drive works with some non-LVD or single-ended controllers, but at a lower performance rate.

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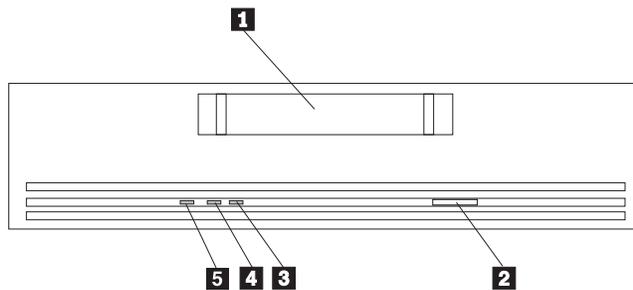
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Before you begin

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Using the drive controls



1 Tape drive door

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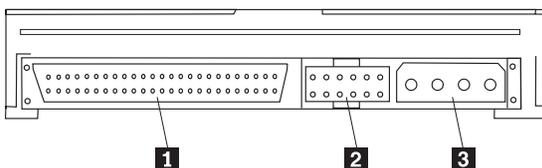
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This light comes on when you insert a cartridge into the drive.

5 Cleaning status indicator

This light comes on when cleaning is required.

Using the drive connectors



1 SCSI connector

This connects the tape drive to the computer SCSI cable.

2 Jumper block

Place jumpers on this block to set the tape-drive SCSI ID, enable parity, or enable termination.

3 Power connector

This connects the tape drive to the computer power cord.

Installing the drive

Follow these steps to install the tape drive.

Step 1. Selecting a SCSI ID

Each device on a SCSI bus must have its own SCSI ID. You can select a SCSI ID for the tape drive in the range of 0 to 15. The SCSI ID must be one that is supported by your SCSI adapter. Refer to your SCSI adapter documentation for the range and the relative priority of the IDs supported. The tape drive comes with the SCSI ID preset to 6.

Follow these guidelines to select a SCSI ID:

- Assign the tape drive to one of the lower priority ID numbers available (0–6).
- Assign the higher 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 reserved for the SCSI adapter.

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

- For most IBM computers, press F1 during the startup after the memory check completes. Other adapters display 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 the SCSI adapter utility programs, if available.
- Inspect the installed SCSI devices to see how the jumpers that determine the IDs are set.

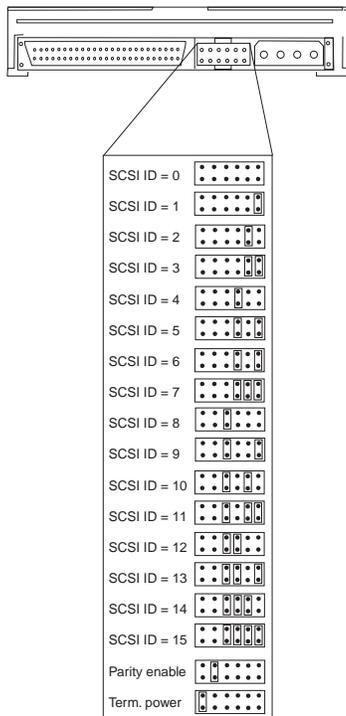
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To prepare for installation:

1. Turn off all attached devices. Turn off the computer. Unplug the power cords for the computer and all attached devices; then open the computer. For specific information on opening your computer, refer to the documentation that comes with your computer.
2. Before opening the static-protective bag containing the tape drive, touch the bag to an unpainted metal surface on the computer for at least two seconds. Be sure to touch a metal surface before touching the drive, to ground any accumulated static energy. Remove the drive from the static-protective bag. If you must put the drive down, place the drive on the static-protective bag.

Step 3. Setting the SCSI ID, termination, and parity

Use the following illustration to locate the jumper pins for SCSI ID settings, termination, and parity.



If you choose the default SCSI address of 6, go to Step 4. If you need to change the SCSI address, refer to the SCSI ID settings shown in the illustration. Remove and reposition the jumpers that come with your tape drive to set the ID. If necessary, use a pair of needle-nose pliers to remove the jumpers.

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If you install the device in an external storage enclosure and the device is at the end of the SCSI chain, refer to your enclosure documentation for information on termination. The enclosure might have a SCSI terminator on a connector outside the enclosure.

Review the information that comes with your computer regarding parity generation. To generate parity, place a jumper on the **parity enable** jumper pins as shown in the illustration.

Attention: There are additional micro switch settings on the bottom of the drive. **DO NOT ADJUST THESE SETTINGS UNLESS YOU ARE BEING ASSISTED BY A TRAINED SERVICE PERSON.** Adjusting the settings without assistance from a service person might void the drive warranty.

Step 4. Mounting the drive

Note: You can use the mounting hardware that comes with this tape drive to install the drive in most PCs and servers. However, some PCs or servers might require additional mounting rails or faceplates. For more information on mounting requirements and on obtaining sources for any required parts, refer to the documentation that comes with your PC or server.

You can mount the drive in a 3.5-inch drive bay or a 5.25-inch drive bay.

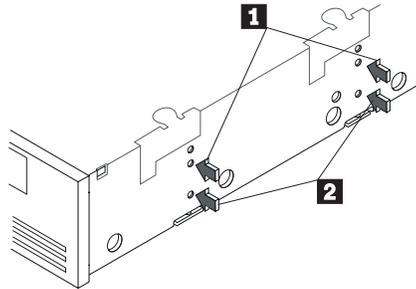
Attention: Be sure to use the mounting screws that come with your drive. You might damage your drive if you use mounting screws that are too long.

To mount the drive in a 3.5-inch drive bay:

1. Carefully remove the 5.25-inch faceplate from the drive.
2. Remove the screws from the mounting rails on the drive.
3. Remove the mounting rails from the drive.
4. Attach the included 3.5-inch faceplate to the drive.
5. Remove the cover plate from an available 3.5-inch drive bay.
6. Slide the drive into the 3.5-inch drive bay.
7. Use the mounting screws that come with your computer system to secure the drive in the peripheral cage.

To mount the drive in a 5.25-inch drive bay:

1. Remove the cover plate from an available 5.25-inch drive bay; then place the drive in the bay. You can install the drive horizontally or vertically.



2. Align the top set 1 or the bottom set 2 of screw holes on the drive mounting rails with the drive-bay screw holes.

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 the rear of the tape drive.

3. Thread a screw through each drive-bay screw hole into each mounting-rail screw hole; then tighten the screws with a screwdriver.

Step 5. Attaching cables

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

1. Locate the SCSI cable on your computer (a 68-pin (wide) ribbon cable with one end connected to the SCSI adapter) and find an available connector that will reach the tape drive.

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

2. Attach the SCSI cable from your computer to the tape drive 68-pin SCSI connector. The SCSI cable connector attaches to the drive only one way. Do not force the cable onto the drive.

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.

3. Connect the power-cable connector to the four-pin connector on the tape drive. If all the power cables are in use, purchase a power-splitter, which is available at most electronics stores, and split a connection to make a connection available for the tape drive.

Step 6. 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. Be sure that the air vents to the power supply are not blocked.
2. Replace the computer cover and secure it in place. Reconnect the power cords and cables.

Step 7. Turning on the device

Turn on all attached devices; then turn on the computer. The tape drive performs a power-on self-test (POST) within 15 seconds and then performs a drive reset.

Step 8. Updating the configuration

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

If your computer does not recognize the tape drive after startup or you receive startup errors, run the configuration-setup utility program as described in the documentation that comes with 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.

Step 9. Installing backup-and-restore software

To use the tape drive, you must install a backup-and-restore application for your computer operating system. If you are using software not included in the option package, follow the installation instructions that come with your software. If you are using the trial software that comes with the option, insert a trial-application CD into the CD-ROM drive and follow the on-screen installation and operating instructions. See “Software description” on page 1-12 for more information.

Using the drive

This section provides information on understanding the drive indicators, loading and unloading tape cartridges, cleaning the drive, and packing the drive.

Understanding the drive indicators

The following table describes the indicator actions during operation of the tape drive.

Indicator	Action	Action message
Cleaning status (green) Left LED	Lights steadily	NOTICE The drive requires cleaning because it has operated for 25 hours. Use the included cleaning cartridge to clean the tape drive. For more information on cleaning the tape drive, see "Cleaning the drive" on page 1-22.
Cleaning status (green) Left LED	Flashes slowly	ERROR The drive requires cleaning because an internal error rate has occurred. Use the included cleaning cartridge to clean the tape drive. For more information on cleaning the tape drive, see "Cleaning the drive" on page 1-22.
Cartridge presence (green) Middle LED	Lights steadily	NORMAL A tape cartridge inserted in the tape drive is ready to use.
Tape-drive presence (green) Middle LED	Flashes slowly	WARNING A tape cartridge inserted in the tape drive is generating errors. <ol style="list-style-type: none">1. Use the included cleaning cartridge to clean the tape drive. For more information on cleaning the tape drive, see "Cleaning the drive" on page 1-22.2. Replace the tape cartridge if it continues to generate errors after you clean the tape drive.

Indicator	Action	Action message
Tape-drive presence (green) Middle LED	Flashes rapidly	<p>ERROR</p> <p>The tape drive could not correctly write to the tape.</p> <ol style="list-style-type: none"> 1. Use the included cleaning cartridge to clean the tape drive. 2. If the tape drive still cannot correctly write to the tape after you clean the tape drive, replace the data cartridge.
Tape-drive activity (amber) Right LED	Lights steadily	<p>NORMAL</p> <p>The tape drive is reading from or writing to the tape.</p>
Tape-drive activity (amber) Right LED	Flashes rapidly	<p>ERROR</p> <p>A hardware fault occurred. For information on obtaining help, go to Appendix D, "Help and service information" on page 2-5.</p>

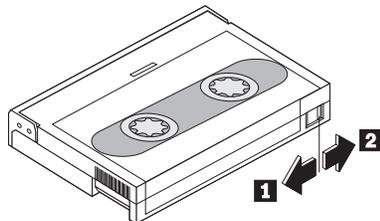
Loading and unloading tape cartridges

Notes:

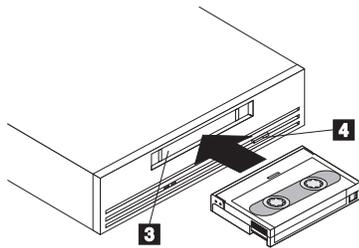
1. Use only IBM tape cartridges (part number 59H4458) or equivalent IBM-approved tape cartridges. For more information on cartridge-format compatibility, see Appendix A, "Cartridge format compatibility" on page 2-1.
2. Do not load a tape cartridge if the tape drive is still performing a power-on self-test (POST) or if all indicators are lit.

To load a tape cartridge:

1. On the rear of the tape cartridge, set the switch to the left for write-enable 1 or to the right for write-protect 2, as shown.



2. Insert the tape cartridge into the tape drive door 3, as shown.



The tape drive loads the tape in approximately 20 seconds. When the tape-drive presence (green) indicator lights steadily, the tape drive is ready for read and write operations.

To unload a tape cartridge, press the unload button 4. When you unload a tape cartridge, the tape drive performs the following actions:

- Completes any command in process
- Writes any buffered information to tape
- Rewinds the tape to the beginning
- Unloads the tape and ejects the cartridge

Note: It might take up to 15 minutes for the tape drive to eject the tape cartridge after you press the unload button. Do not turn off your computer until the tape ejects. When you load a new (blank) cartridge for the first time, the drive takes approximately 12–15 seconds to recognize the data cartridge as blank, and then another 30 seconds to initialize the cartridge after it receives the first write command during a back up.

Cleaning the drive

When the tape-drive presence (green) indicator flashes, the tape drive requires cleaning. Clean the drive as soon as possible after the indicator turns on.

Clean the tape drive more often if you are using a lot of new tapes or if you are operating the tape drive in an environment containing a lot of dust or other particulate matter that might contaminate the magnetic tape.

To clean the tape drive, insert a cleaning cartridge (IBM part number 59H3090) into the tape drive door. When the cleaning completes, the green indicator turns off and the tape drive ejects the cleaning cartridge.

Packing the drive

If you are shipping the tape drive to another location or returning it for repair, pack the tape drive in its original shipping container and packing materials to avoid damage.

If you are returning the tape drive for service, remove all cartridges, cables, and terminators from the tape drive and keep them in a safe place.

Product registration

Thank you for purchasing OPTIONS by IBM . Please take a few moments to register your product and provide us with information that will help IBM to better serve you in the future. Your feedback is valuable to us in developing products and services that are important to you, as well as in developing better ways to communicate with you. Register your option on the IBM Web site at:

<http://www.ibm.com/pc/register>

IBM will send you information and updates on your registered product unless you indicate on the Web site questionnaire that you do not want to receive further information.

Product service and warranty information

For technical support, support hours, and warranty terms and conditions, see the enclosed inserts, or contact your IBM reseller or IBM marketing representative.

Part 2: Appendixes

This section contains information on cartridge-format compatibility, product specifications, problem solving, product service, product warranties, and notices.

Appendix A. Cartridge format compatibility

You can use tape cartridges from other tape drives with the 20/40 GB, DDS/4 4-mm Internal Tape Drive if the cartridge format is compatible. The following table lists compatible cartridge formats.

<i>Cartridge format</i>	<i>Type of compatibility</i>
DDS-4 (150 m)	Read and write
DDS-3 (125 m)	Read and write
DDS-2 (120 m)	Read and write
DDS (90 m)	Read and write
DDS (60 m)	Read and write

Use only media recognition system (MRS) tape cartridges with the tape drive. The tape drive might become unreliable if you use non-MRS metal particle (MP) tape cartridges.

Appendix B. Product specifications

This appendix includes the following specifications and requirements:

Typical data capacity Environmental specifications
Power specifications SCSI cable specifications
Typical data-transfer rates

<i>Typical data capacity</i>		
Cartridge format	Uncompressed data	Compressed data³
DDS-4 (150 m)	20 GB	40 GB
DDS-3 (125 m)	12 GB	24 GB
DDS-2 (120 m)	4 GB	8 GB
DDS (90 m)	2 GB	4 GB
DDS (60 m)	1.3 GB	2.6 GB

³ Assumes a 2:1 compression ratio; actual compression ratio depends on data type.

<i>Power specifications</i>	
Voltage tolerance	± 10% (+12 v dc) ± 7% (+5 v dc)
Operational current (maximum)	250 milliamps (+12 v dc) 600 milliamps (+5 v dc)
Peak	600 milliamps (+12 v dc) 800 milliamps (+5 v dc)
Operating power dissipation (maximum)	< 5.5 watts (+12 v dc) < 5.5 watts (+5 v dc)

<i>Typical sustained data-transfer rates</i>	
Compressed data	2.75 MB ⁴ per second
Uncompressed data	5.5 MB per second

<i>Environmental specifications</i>	
Temperature range Operating Nonoperating	+5°C (+41°F) to +45°C (+113°F) -40°C (-40°F) to +65°C (+149°F)
Relative humidity (noncondensing) Operating Nonoperating	20% to 80% 0% to 90%
Maximum wet bulb temperature Operating Nonoperating	26°C (78.8°F) maximum No condensation
Altitude Operating Nonoperating	100 m (330 ft) below sea level to 4575 m (15 000 ft) above sea level 300 m (985 ft) below sea level to 15 200 m (49 900 ft) above sea level

⁴ MB equals approximately 1 000 000 bytes.

Appendix C. Solving problems

Computer problems can be caused by hardware, software, or user error. Using the information in this section, you might be able to solve problems yourself or gather helpful information you can pass on to a service technician.

Review the following list for any problem descriptions that might fit your situation.

The software does not recognize the tape drive.

Take the following actions:

1. Check for proper termination of the SCSI bus. The SCSI bus must be terminated at both ends, and only at the ends.
2. Check for conflicting SCSI ID settings. Each SCSI ID must be unique on the SCSI chain.
3. Ensure that the appropriate Advanced SCSI Programming Interface (ASPI) device drivers are installed to support the tape drive. Device drivers usually come with the SCSI host adapter.

The tape operation is unreliable or inconsistent.

Tape drive failures are often caused by contamination in the tape path or by using poor quality media.

IBM has very high quality standards for its storage tape and prices it accordingly. To be able to support tape products, IBM needs to constantly test and evaluate. However, IBM does not test and evaluate non-IBM products on an ongoing basis. IBM cannot support any product it does not test. IBM can only support tapes sold by IBM. If IBM service personnel analysis indicates a problem with non-IBM media, including cleaning cartridges, it might be necessary for the customer to replace the suspect media or cleaning cartridge with the supported media or cleaning cartridge. When you need to restore data from tape, you need to know that you can count on it being readable. Any savings incurred by using low cost tape is of no value when you cannot access the data reliably.

Tape handling and storage

Most tape is supplied in a sealed cartridge. Tape is provided this way so that the tape will remain in a clean environment. Opening the cartridge allows dirt and airborne particles to enter and then become a source of contamination. The cartridge must only be opened by the tape drive and not by an operator. The tape is also held under proper tension inside the cartridge. If the cartridge is dropped, this tension is relaxed. Inserting a dropped cartridge into a tape drive can often cause a mis-load that results in a jam. The jam ruins the tape and can cause physical damage if the cartridge is not removed properly. When the tapes are stored, they must be reinstalled into their protective containers and stored on their ends. You must store the tapes in a clean, dry area with normal room temperature, and away from magnetic fields.

Environmental issues

The operating environment might adversely affect tape drive operation. The tape drive is designed to operate in a clean environment. When tape is installed in a tape drive, the clearance between the heads and the tape is measured in microns. Even particles of smoke are larger than the space available between the tape and the heads. Other environmental factors that adversely affect tape drive operation are dirt, dust, fibers, and airborne particles. To address the difficult problem of airborne particles, you must use an IBM filter enclosure (not included). When you place the tape drive in a filter enclosure, the enclosure draws air through a filter and supplies the tape with clean air. If the operating environment is dirty, move the tape drive to a clean area or purchase a filter enclosure.

Tape drive cleaning

Even if the operating environment is clean, dirt might build up on the heads of any tape drive. Every time tape motion occurs, some of the media surface comes off on the heads. Over time, this material builds up and causing the tape head clearance to increase. The increased tape head clearance produces reading and writing errors. Most tape drives today have a built-in cleaning indicator to notify you when the tape needs cleaning.

Do not use any non-IBM cleaning cartridges with these tape drives. You can only use cleaning cartridges for a limited number of times. A cleaning cartridge is expired after it has been used for the maximum number of times. When a cleaning cartridge is expired, you must replace it. Never reuse an expired cleaning cartridge. If you continue to use an expired cleaning cartridge, you will reintroduce previously removed dirt to the tape drive and you will not clean the drive. To make sure that you know when your cleaning cartridge expires, make a notation on the cleaning cartridge each time you clean the tape drive.

The tape-drive activity (amber) indicator flashes and the drive does not work.

A hardware fault has occurred. Go to Appendix D, "Help and service information" on page 2-5 for information on contacting the IBM HelpCenter .

Appendix D. Help and service information

See Appendix C, "Solving problems" on page 2-3 before requesting help or service. This section contains information on how to obtain online and telephone technical support.

Online technical support

Online technical support is available during the life of your product. Online assistance can be obtained through the Personal Computing Support Web site, the PSG Electronic Bulletin Board System, and the IBM Automated Fax System.

<i>Online technical support</i>	
IBM Personal Computing Support Web Site	http://www.ibm.com/pc/support
IBM PSG BBS	1-919-517-0001
IBM Automated Fax System	1-800-426-3395 1-800-465-3299 (in Canada)

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

Marketing, installation, and configuration support through the 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:

1. Option name
2. Option number
3. Proof of purchase
4. Computer manufacturer, model, serial number (if IBM), and manual
5. Exact wording of the error message (if any)
6. Description of the problem
7. 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 or to the enclosed technical support insert. If the number is not provided, contact your IBM reseller or IBM marketing representative. Response time may vary depending on the number and nature of the calls received.

<i>Support 24 hours a day, 7 days a week</i>	
Canada	1-800-565-3344
U.S.A./Puerto Rico	1-800-772-2227

<i>Technical Support for PaperPort and scanner drivers</i>	
U.S.A. and Canada	1-800-787-0866 (toll free)
Europe	31 20 5864 614 (toll call)

Appendix E. Product warranties and notices

Warranty Statements

The warranty statements consist of two parts: Part 1 and Part 2. Part 1 varies by country. Part 2 is the same for both statements. Be sure to read both the Part 1 that applies to your country and Part 2.

United States, Puerto Rico, and Canada (Z125-4753-05 11/97)

(Part 1 - General Terms on page 2-6)

Worldwide except Canada, Puerto Rico, Turkey, and United States (Z125-5697-01 11/97)

(Part 1 - General Terms on page 2-9)

Worldwide Country-Unique Terms

(Part 2 - Country-Unique Terms on page 2-12)

IBM Statement of Limited Warranty for United States, Puerto Rico, and Canada (Part 1 - General Terms)

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

Machine - 20/40 GB, DDS/4 4-mm Internal Tape Drive

Warranty Period* - Three Years

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

The IBM Warranty for Machines

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

During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

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

Extent of Warranty

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

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

Items Not Covered by Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

Unless specified otherwise, IBM provides non-IBM machines **WITHOUT WARRANTIES OF ANY KIND.**

Any technical or other support provided for a Machine under warranty, such as assistance via telephone with "how-to" questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

Warranty Service

To obtain warranty service for the Machine, contact your reseller or IBM. In the United States, call IBM at 1-800-772-2227. In Canada, call IBM at 1-800-565-3344. You may be required to present proof of purchase.

IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. IBM may repair the failing Machine or exchange it at its discretion.

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

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

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

You also agree to

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

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

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

Production Status

Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), 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 greater of U.S. \$100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

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

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

IBM Statement of Warranty Worldwide except Canada, Puerto Rico, Turkey, United States (Part 1 - General Terms)

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

Machine - 20/40 GB, DDS/4 4-mm Internal Tape Drive

Warranty Period* - Three Years

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

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During the warranty period IBM or your reseller, if approved by IBM to provide warranty service, will provide repair and exchange service for the Machine, without charge, under the type

of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

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

Extent of Warranty

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

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

Items Not Covered by Warranty

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IBM or your reseller provides certain types of repair and exchange service, either at your location or at a service center, to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. IBM may repair the failing Machine or exchange it at its discretion.

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

Any feature, conversion, or upgrade IBM or your reseller services must be installed on a Machine which is 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

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

You also agree to

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

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

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

Production Status

Each IBM Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's appropriate warranty terms apply.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), 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 greater of U.S. \$100,000 (or equivalent in local currency) or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

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

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC

CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

Part 2 - Worldwide Country-Unique Terms

ASIA PACIFIC

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

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

Extent of Warranty: The following replaces the first and second sentences of this Section:

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, operation in other than the Specified Operating Environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible.

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, 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.

PEOPLE'S REPUBLIC OF CHINA: Governing Law: The following is added to this Statement:

The laws of the State of New York govern this Statement.

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

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

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

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

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

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

EUROPE, MIDDLE EAST, AFRICA (EMEA)

The following terms apply to all EMEA countries.

The terms of this Statement of Warranty apply to Machines purchased from an IBM reseller. If you purchased this Machine from IBM, the terms and conditions of the applicable IBM agreement prevail over this warranty statement.

Warranty Service

If you purchased an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

If you purchased an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

The applicable laws, Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided. However, the laws of Austria govern this Statement if the warranty service is provided in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Federal Republic of Yugoslavia, Georgia, Hungary, Kazakhstan, Kirghizia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, and Ukraine.

The following terms apply to the country specified:

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

2. 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.

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

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

The following paragraphs are added to this Section:

The minimum warranty period for Machines is six months.

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

Extent of Warranty: The second paragraph does not apply.

Warranty Service: The following is added to this Section:

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

Production Status: The following paragraph replaces this Section:
Each Machine is newly manufactured. It may incorporate in addition to new parts, re-used parts as well.

Limitation of Liability: The following is added to this Section:
The limitations and exclusions specified in the Statement of Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

In item 2, replace "U.S. \$100,000" with "1.000.000 DEM."

The following sentence is added to the end of the first paragraph of item 2:
IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

IRELAND: Extent of Warranty: The following is added to this Section:
Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

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

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and 2. the amount of any other actual direct damages, up to the greater of Irish Pounds 75,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section:
IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY: Limitation of Liability: The following replaces the second sentence in the first paragraph:
In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than: (item 1 unchanged) 2) as to any other actual damage arising in all situations involving non-performance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim.

Applicability of suppliers and resellers (unchanged).

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

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND: Limitation of Liability: The following is added to this Section:
IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

TURKIYE: Production Status: The following replaces this Section:

IBM fulfils customer orders for IBM Machines as newly manufactured in accordance with IBM's production standards.

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

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to the greater of Pounds Sterling 150,000 or 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

The following item is added to this paragraph:

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

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section:

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

NORTH AMERICA

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

To obtain warranty service from IBM, call **1-800-565-3344**.

UNITED STATES OF AMERICA: Warranty Service: The following is added to this Section:

To obtain warranty service from IBM, call **1-800-772-2227**.

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