IBM

4mm Tape Drive
Installation Guide

Note

Before using this information and the product it supports, be sure to read the general information under "Product Warranties and Notices" included with your system unit.

Second Edition (November 1996)

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Contents

Safety Information

DANGER

> An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.
>
> Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.
>
> When adding or removing any additional devices to or from the system, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
>
> Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.
>
> During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.

About This Book

This book (when used with your system unit documentation) helps you install the 4mm Tape Drive.

Related Publications

This book refers to the documentation that came with your computer.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

Trademarks

AIX is a registered trademark of International Business Machines Corporation.

PowerPC is trademark of International Business Machines Corporation.

Windows NT is a trademark of Microsoft Corporation.

Chapter 1. Overview

The 4mm Tape Drive is a streaming tape drive that uses a 4mm data cartridge. Data compression is available, effectively increasing the cartridge capacity and data transfer rate. Communications on the SCSI bus may be either asynchronous or synchronous. The drive is primarily used for save/restore operations, archiving, software and document distribution. The 4mm tape drive conforms to the American National Standards Institute (ANSI) SCSI-2 standard.

The 4mm Tape Drive features the following:

- Compression capability effectively doubles the native capacity and data rate.

- Half-high 5.25 inch form factor.

Drive Preparation

Attention:

- If the tape drive is moved from a colder or warmer environment than the room it is being installed in, keep the drive in its packing and allow the package to reach room temperature. This avoids data loss or damage to the tape drive. Allow one hour of acclimation for each 10 degrees C (18 degrees F) difference between the ship/store temperature and the room temperature.

- Handle the drive carefully and by its external metal chassis. Keep hands away from the printed circuit boards, components, and printed circuit (flex) cables.

- Use a cushioned work surface if possible and do not drop the tape drive onto the work surface.

4-mm Tape (Front View)
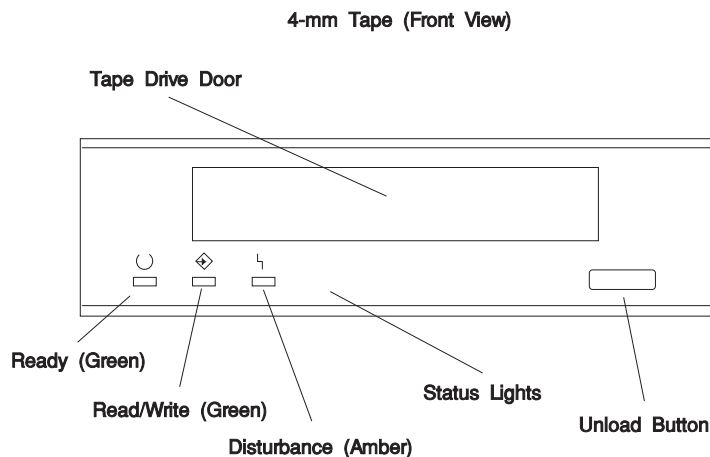
Handling the Tape Drive

Attention: Static electricity can damage your equipment. Leave the tape drive in its static-protective bag until you are ready to configure or install it in your computer.

Additional Information for the 4mm Tape Drive

The 4mm Tape Drive is a streaming tape drive that is used to:

- Save and restore system data files.
- Archive important records.
- Distribute operating system software upgrades.

The 4mm Tape Drive can be attached to any system using a single-ended interface meeting the Small Computer System Interface-2 (SCSI-2) Standard ANSI X3.131-199X Rev. 10h.

The 4mm Tape Drive has the following features:

- 8 GB is typical with data compression and with DDS2 data cartridges.

  The actual capacity per cartridge varies depending on the application and the type of data cartridge being used.
- Data transfer rate is 400 KBps. 800 KBps is typical with data compression.

  Note: Data compression "activated" is the default setting from the factory. Data compression is usually controlled by the application software.
- Read and write of DDS tape cartridges in 2.0 GB per cartridge format.
- A status light that indicates when it is time to clean the tape path.
- Internal diagnostics that are activated when the 4mm diagnostic cartridge is inserted and loaded into the drive.
- Media recognition system: only data grade media can be used with this tape drive.

The 4mm Tape Drive uses a 4mm data cartridge for saving and restoring your system data. The 4mm Tape Drive uses only 4mm Digital Data Storage (DDS) cartridges.

Recommendations

Attention: Tape cartridges that do not carry the proper DDS symbol cannot be written to, and their use causes the 4mm Tape Drive to report an error.

- Use only 4mm Digital Data Storage (DDS) cartridges.

- Clean the tape path by using the recommended cleaning cartridge. Follow the instructions on the cartridge.

  Attention: Use of other than recommended cleaning cartridges can damage your tape drive and voids the drive warranty.

- Back up and then discard any tape cartridge that repeatedly produces error messages. The error information is in the system error log.

- Do not open the door on the data cartridge that covers the tape. This door protects the magnetic tape material from dirt, dust, and damage.

- Do not operate in a dusty environment.

- Do not touch the tape material. Any substance transferred to the tape by touching it could cause loss of data.

Types of 4mm Tape Cartridges

The 4mm Tape Drive is shipped with three 4mm cartridges to help start your tape operations immediately.

4mm Data Cartridge Use this non-labeled cartridge for saving or restoring your programs or data. Additional data cartridges can be ordered.

4mm Diagnostic Cartridge Use this specially labeled cartridge to perform diagnostics on the drive. Do not use it to save or restore programs or data.

Cleaning Cartridge Use this cartridge for cleaning the 4mm tape path. For more information, see "Cleaning the Tape Path on the 4mm Tape Drive" on page 4-4.

Tape Cartridge Compatibility

The 4mm Tape Drive is compatible with existing 4mm tape subsystems that are designed to operate with Digital Data Storage approved media, which meet the following standards:

- For DDS

- American National Standard (ANSI) standard, X3.203-191, Helical-scan Digital Computer Tape Cartridge, 3.81mm.

- European Computer Manufacturers Association (EMCA) standard, EMCA-150 , 3.81mm Wide Magnetic Tape Cartridge and DDS format.

• For DDS2

- European Computer Manufacturers Association (EMCA) standard, EMCA/TC17/93/20, 3.81mm Wide Magnetic Tape Cartridge for Information Interchange Helical Scan Recording, DDS2 format.

You cannot change the density setting of the drive because the device reconfigures itself automatically, depending on the media type installed, as follows:

Media Type	Device Configuration
DDS	Read-only.
DDS	Read/write in 2.0GB mode only.
DDS2	Read in either density.
Non-DDS	Not supported. The cartridge is ejected from the drive.

Setting the Write-Protect Tab on 4mm Tape Cartridges

The window on the tape cartridge controls write-protection. When the write-protect tab of a tape cartridge is set (window open), information can be read from the tape, but cannot be written to it. When the write-protect tab of a tape cartridge is not set (window closed), information can be both written to and read from the tape. Trying to write to a 4mm data cartridge with the window open causes an error.

Write-Protect Tab Not Set

Window Closed

Write-Protect Tab Set

Window Opened
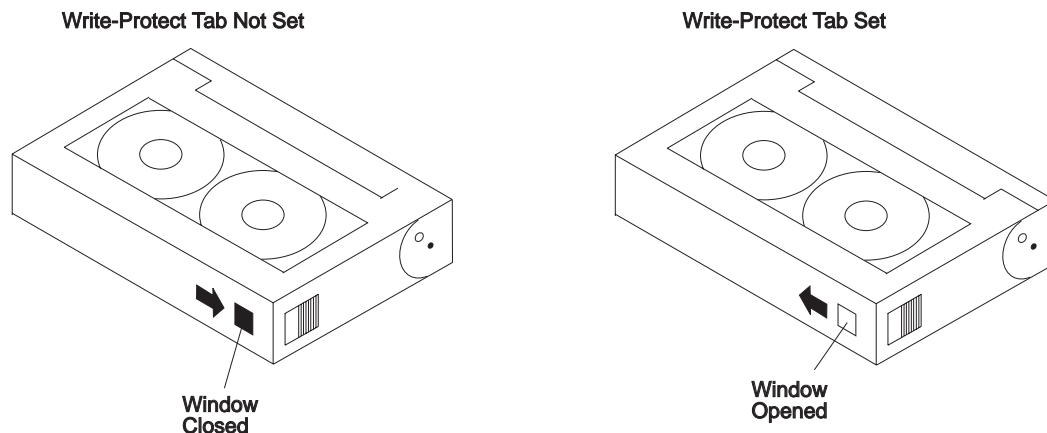
Environmental Considerations for 4mm Data Cartridges

Information in this section describes operating and storage conditions including temperature, relative humidity, and maximum wet bulb data.

Attention: The manufacturer has specified a set of temperature and humidity ranges in which the 4mm data cartridge can operate with ease. Only regular cleaning procedures, as described in "Cleaning the Tape Path on the 4mm Tape Drive" on page 4-4 are required when operating the cartridge within this range. The risk of possible data loss is increased if 4mm tape cartridges are operated, stored, or shipped outside the temperature or humidity ranges shown in the following table.

Before using a cartridge, always let it adjust (acclimate) to the operating environment. Do this by placing the cartridge with its container in the operating environment for as long as it has been away from this environment or for 24 hours, whichever is less.

Acclimation is necessary for any data cartridge that has been exposed to a different humidity environment or a temperature change of 11°C or 20°F or more.

	Operating Ranges	Storage	Shipping
Temperature	16°C to 32°C (60°F to 90°F)	5°C to 32°C (40°F to 90°F)	-40°C to 52°C (-40°F to 125°F)
Relative Humidity (non-condensing)	20 to 80%	20 to 80%	5 to 80%
Maximum Wet Bulb	26°C (79°F)	26°C (79°F)	26°C (79°F)

Operating in Harsh Environments

The 4mm Tape Drive is ideally suited to streaming operations, as opposed to tape movement operations involving multiple stop/starts and random searches. When the tape is used for frequent stop and start operations, streaming movement is beneficial and should be used whenever possible.

Any tape that has been used outside the ranges specified in the previous table for an extended period of time (50 passes in 40 hours of nonstop operation) should not be used as an archival tape. Exposure to the environment deteriorates the magnetic and physical strength of the tape. Do not store important data on a tape that has been used outside the specified ranges; transfer the data to a new tape for reliable archiving.

4mm Data Cartridge Erasure

Most bulk eraser devices do not have the capability to erase 4mm data cartridges. To properly erase an 4mm data cartridge with a bulk eraser device, the erasure rating must be at least 2000 oersted.

The 4mm Tape Drive erases residual data before writing new data on the data tape.

Tape Cartridge Data Capacity

The 4mm tape cartridge capacity is defined as the amount of data that can be stored on the cartridge. The following variables affect the amount of data that can be stored on a tape cartridge:

- Size of the data file
- Number of file marks per file
- Compatibility mode (2GB or 4GB)
- Media rewrites.
- Nature of the data being stored. Text files are usually stored with greater compression than binary files.

Chapter 2. Preparing for Installation

The installation process consists of:

- Taking an inventory of all pieces necessary for installation
- Planning your SCSI device layout
- Setting the SCSI address of your SCSI tape drive
- Installing the SCSI tape drive
- Installing device drivers for your specific SCSI tape drive (if needed).

Inventory

To install the 4mm Tape Drive you need:

- The tape drive
- The documentation that came with your computer
- The documentation that came with your SCSI tape drive
- A flat-blade screwdriver.

You also need a 16-bit to 8-bit SCSI internal converter if you are connecting the tape drive to a 16-bit SCSI cable.

Planning your SCSI Device Layout

SCSI devices are attached to a SCSI adapter in a chain. Devices in the chain can be internal (inside your system unit) or external (connected outside your system unit).

If you are connecting more than one SCSI device, it is important that you plan the layout of your SCSI chain.

Note: At each end of the SCSI chain, a terminator is required.

Software Requirements

- AIX 4.1.4 or later
- Windows NT (PowerPC Edition) 4.0 or later

Please ensure your operating system supports this tape drive before you install it. Contact your support representative for assistance.

Planning SCSI Addresses

Make sure no two SCSI devices have the same address, and that no device uses the SCSI address 7, which is used by the SCSI adapter. If the system and adapter supports the Wide (16 data bit, 68 conductor cable) SCSI interface, you may see addresses in the range of 0 through 15.

Note: For addresses in the range of 0 through 7, priority is assigned in descending address order. Refer to Table 2-1 for the priority associated with each SCSI address.

Table 2-1. Data Access Priorities for SCSI Addresses		
Highest Priority	7	Adapter
|	6	
|	5	
|	4	
|	3	
|	2	
|	1	
|	0	
|	15	
|	14	
|	13	
|	12	
|	11	
|	10	
v	9	
Lowest Priority	8	

Setting the SCSI Address

Do not change any of the other switches and jumpers that were set at the factory.

Note: Prior to installing the SCSI media device into the media bay, the address of the device must be set to any of the available SCSI addresses. If the system is currently not running, find the documentation listing the SCSI addresses already assigned.

1. Determine what SCSI addresses are in use and what addresses are available by entering the following command:

   ```
   lsdev -Cs scsi
   ```

   This command returns the following information:

   ```
   Column 1: device name (for example, scsi0)
   Column 2: device status (for example, Available)
   Column 3: SCSI location code (the format is: nn-nn-nn-a,l)
   Column 4: device type (for example, CD-ROM drive, 2.3GB tape drive, etc.)
   ```

The `a` in the `nn-nn-nn-a`,1 string returned in Column 3 is the SCSI address of the associated device. The 1 is the LUN.

Record the names and SCSI addresses of your installed SCSI devices in Table 2-1. Then choose the highest-priority unused SCSI address for your new tape drive.

2. Set the SCSI address by using switches 1 through 3 on a dip switch or jumpers across the appropriate rightmost pins, located on the rear panel or the drive, depending on your device. Refer to Figure 2-1, Figure 2-2, Figure 2-3 on page 2-4, and Figure 2-4 on page 2-4 to match your device type with the appropriate figure and set the switches appropriately.

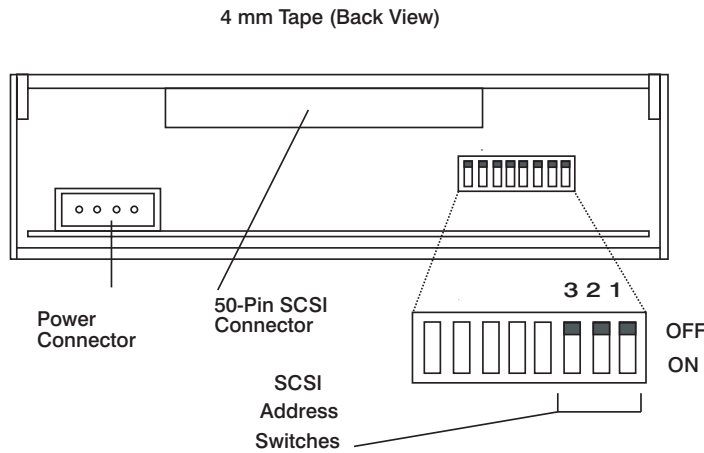3. Set the switches to the SCSI address you selected in step 1 above.

4 mm Tape (Back View)

Figure   2-1. 4mm Tape Drive Type A

Address	Switch 3	Switch 2	Switch 1
0	Off	Off	Off
1	Off	Off	On
2	Off	On	Off
3	Off	On	On
4	On	Off	Off
5	On	Off	On
6	On	On	Off

Figure   2-2. Switch Settings Type A

4-mm Tape (Back View)

15   1
16   2

50-Pin SCSI Connector   5 3 1   Power Connector

SCSI Address Jumpers

6 4 2
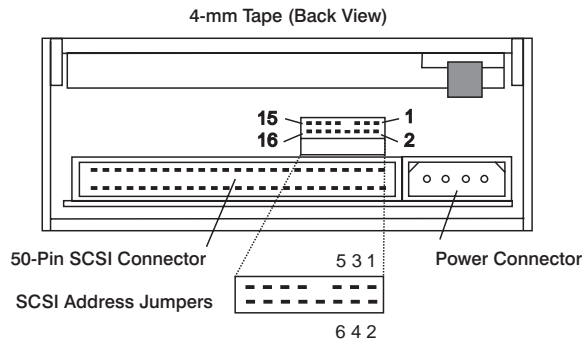
Figure   2-3.   4mm Tape Drive Type B Rear View

Address	Jumper 5-6	Jumper 3-4	Jumper 1-2
0	Off	Off	Off
1	Off	Off	On
2	Off	On	Off
3	Off	On	On
4	On	Off	Off
5	On	Off	On
6	On	On	Off

Figure   2-4.   Switch Settings Type B

Chapter 3. Installing the Tape Drive

Remove Covers

Refer to the documentation that came with your system unit for directions on shutting down your system and removing the system unit covers.

Connecting Internal Devices

Refer to the documentation provided with your system unit to install an internal device.

1. Install the tape drive and attach the appropriate narrow or wide (8-bit or 16-bit) cable to the device.

2. If you are using the 16-bit cable, you need to attach the tape drive to this cable through the 16-bit to 8-bit SCSI internal converter.

3. Ensure there is a SCSI terminator on the end of the cable or that a terminator is supplied by the last SCSI device on the internal chain.

After the tape drive is installed, replace your system unit covers as described in the system unit documentation.

Device Driver Information

Device driver software is provided in AIX, Windows NT (PowerPC Edition), and other operating systems that support this tape drive. After you install the 4mm Tape Drive, reboot your system unit. Your operating system should recognize the drive and automatically update your system unit configuration.

Diagnostics

Diagnostics may be supplied with your device driver, or may be found in a separate package. Refer to your system unit documentation for more information about running diagnostics.

Verifying Installation

To verify that your newly installed 4mm Tape Drive is available for use, follow the steps below:

1. At the prompt, type the following and press Enter.

   `lsdev -Cs scsi`

2. A list of SCSI devices displays. Verify that the 4mm Tape Drive is in `Available` mode.

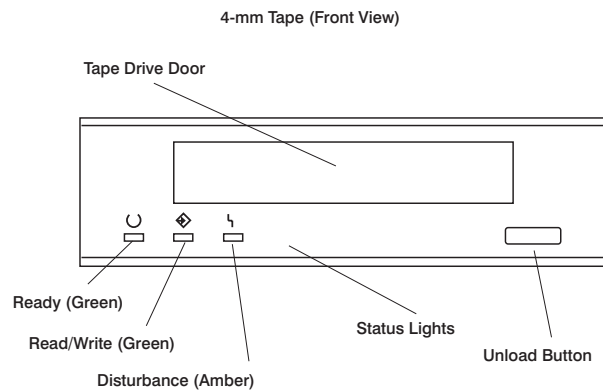If the 4mm Tape Drive is `Available`, your installation is ready to use.

Chapter 4. Using the 4mm Tape Drive

The optional 4mm Tape Drive is a half-high device.

Status Lights

The 4mm Tape Drive has two green status lights and one amber status light. The on and off combinations of the status lights indicate the conditions of the 4mm Tape Drive.

Each of the International Organization for Standards (ISO) symbols located next to a status light indicates a specific condition of the tape drive as follows:

4-mm Tape (Front View)

Tape Drive Door

Ready (Green)

Read/Write (Green)

Disturbance (Amber)

Status Lights

Unload Button

Status Light States

The following tables explain the meaning of the green and amber status lights.

	Ready (green)	**Read-Write (green)**	**Disturbance (amber)**
Off	No cartridge installed or error condition	No cartridge or no activity	No error condition
Steady	Cartridge installed or loading/unloading		Cleaning required or worn media
Flashing	Power-on self- test in progress	Cartridge activity	Error condition

| Status Lights on the 4mm Tape Drive			
Status	**Ready (green)**	**Read-Write (green)**	**Disturbance (amber)**
LED test.	On 2 seconds at power on	On 2 seconds at power on	On 2 seconds at power on
The power-on self-test (POST) is running or the diagnostic cartridge is running.	Flashing	Off	Off
One of the following has occurred: • The power is off. • The POST has completed successfully, but no tape cartridge has been loaded.	Off	Off	Off
A tape cartridge has been inserted and the 4mm Tape Drive is ready to receive commands from the system.	On	Off	Off
The tape is in motion and the 4mm Tape Drive is running a device operation or cleaning.	On	Flashing	Off
The 4mm Tape Drive has detected an internal error that requires corrective action such as tape cartridge failure, high humidity, or no SCSI terminator. Refer to the service guide or contact your service representative. (See note below.)	Off	Off	Flashing
The tape path requires cleaning, or a poor quality tape cartridge is being used. See "Cleaning the Tape Path on the 4mm Tape Drive" on page 4-4.	Off or On	Off or Flashing	On

Note: If an error condition occurs, first try to recover by pressing the unload button.

Loading the 4mm Tape Cartridge

Before loading the tape cartridge, make sure the power is on and the write-protect switch on the tape cartridge is properly set. Refer to "Setting the Write-Protect Tab on 4mm Tape Cartridges" on page 1-4. The tape drive loads the tape from the cartridge and prepares it for reading and writing.

To load the 4mm tape cartridge, do the following:

1. Grasp the edges of the 4mm tape cartridge with the write-protect tab towards you and the window side of the cartridge facing up.

2. Slide the tape cartridge into the opening on the front of the 4mm tape drive until the loading mechanism pulls the cartridge into the drive and the drive door closes. The ready status light (green) goes on if the load operation was successful.
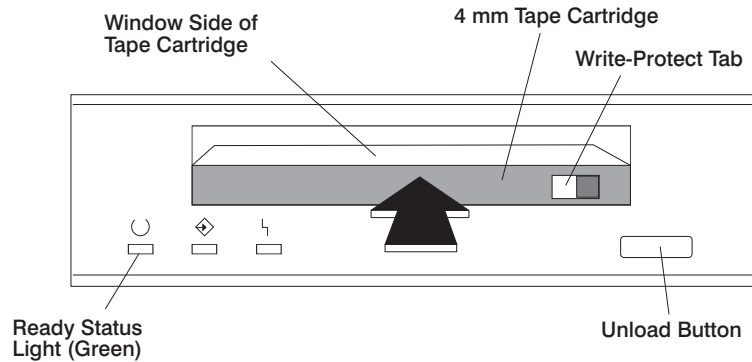
The 4mm Tape Drive is ready for data operations when the tape cartridge is inserted. After the cartridge is inserted into the tape drive, the tape takes about 15 seconds to load.
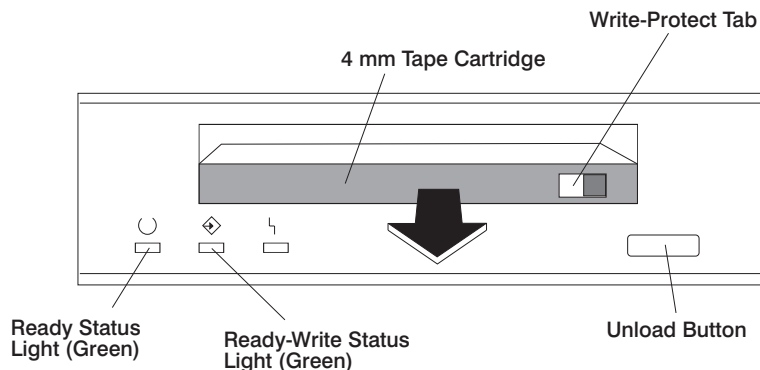
Unloading the 4mm Tape Cartridge

Before performing the unload operation, make sure the power to the system unit is on.

To unload and eject the tape cartridge, press the unload button. The 4mm Tape Drive rewinds the tape and then ejects the tape cartridge from the tape drive.

After pressing the unload button, the following occurs:

1. The Read-Write status light flashes during the unload operation.

2. The Ready status light and the Read-Write status light turns off when the cartridge is ejected from the tape drive.

The time required for a tape to rewind and unload is between 10 seconds and 1.5 minutes, depending on the position of the tape when the unload button is pushed.

If the tape cartridge cannot unload and has to be removed manually from the drive, contact your service representative.

Cleaning the Tape Path on the 4mm Tape Drive

The 4mm tape path should be cleaned either approximately every 30 hours of tape motion or once a month, whichever occurs first. The 4mm tape drive monitors the recording quality of the tape cartridge and indicates that the tape path requires cleaning when the disturbance status light (amber) is on.

More frequent cleaning may be required if the drive is operated in a dusty environment or in humid conditions. If the dust is allowed to accumulate, the drive has to perform more reads and writes. This can cause data loss, and may be prevented by regularly scheduled cleaning of the drive.

The cleaning cartridge cleans the 4mm Tape Drive 50 times before it needs to be discarded. If you attempt to use a 4mm cleaning cartridge more than 50 times, the tape drive automatically detects the error and ejects the cleaning cartridge with the disturbance status light (amber) remaining on.

Before loading the cleaning cartridge, make sure the power to the system unit is on.

To load the 4mm cleaning cartridge, do the following:

1. Grasp the edges of the 4mm cleaning cartridge with the window side of the cartridge facing up.

2. Slide the cleaning cartridge into the opening on the front of the 4mm tape drive until the loading mechanism pulls the cartridge into the drive.
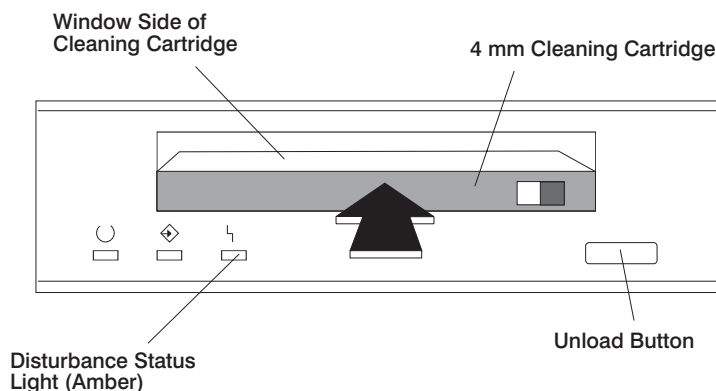
After the 4mm cleaning cartridge has been fully inserted into the 4mm Tape Drive, the following cleaning operations are performed automatically:

1. The cleaning tape is loaded into the tape path.

   The cleaning cycle lasts approximately 30 seconds.

2. The tape is unloaded and the cleaning cartridge is ejected from the tape drive when the cleaning operation is complete.

3. A successful cleaning operation is indicated when the disturbance status light (amber) goes off (if it was activated before the cleaning operation).

Appendix A. Communications Statements

The following statement applies to this product. The statement for other products intended for use with this product appears in their accompanying documentation.

Federal Communications Commission (FCC) Statement

Note: The &typemod. 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 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 authorized dealers. Neither the provider nor the manufacturer are 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, New York 10504
   Telephone: (919) 543-2193

FC Tested to Comply
        With FCC Standards

FOR HOME OR OFFICE USE

European Union (EU) Statement

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. The manufacturer cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards supplied by third parties. Consult with your dealer or sales representative for details on your specific hardware.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / 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.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

United Kingdom Telecommunications Safety Requirements

This equipment is manufactured to the International Safety Standard EN60950 and as such is approved in the UK under the General Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunication network.

The network adapter interfaces housed within this equipment are approved separately, each one having its own independent approval number. These interface adapters, supplied by the manufacturer, do not use or contain excessive voltages. An excessive voltage is one which exceeds 70.7 V peak ac or 120 V dc. They interface with this equipment using Safe Extra Low Voltages only. In order to

maintain the separate (independent) approval of the manufacturer's adapters, it is essential that other optional cards, not supplied by the manufacturer, do not use main voltages or any other excessive voltages. Seek advice from a competent engineer before installing other adapters not supplied by the manufacturer.

Avis de conformité aux normes du ministère des Communications du Canada

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

Canadian Department of Communications Compliance Statement

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

VCCI Statement

```
　この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的
としていますが、この装置がラジオやテレビジョン受信機に近接して使用される
と、受信障害を引き起こすことがあります。
　取扱説明書に従って正しい取り扱いをして下さい。
```

The following is a summary of the VCCI Japanese statement in the box above.

This product is a Class B Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). This product is aimed to be used in a domestic environment. When used near a radio or TV receiver, it may become the cause of radio interference. Read the instructions for correct handling.

Radio Protection for Germany

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG–Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM Germany.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

IBM®

Part Number: 93H3605

93H3605