10/20 GB TR-5 IDE Tape Drive

User's Guide

OPTIONS
by IBM

Note: If you are using this product in the United States, Canada, or Puerto Rico, be sure to read the information under Appendix C, "Product warranty and notices" on page 3-8 before using this information and the product it supports.

For all other countries, the warranty terms and conditions applicable in the country of purchase are available from IBM or your reseller.

First Edition (January 1999)

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Contents

Registering your option iv

About this book iv

Part 1: Quick Installation Guide 1-1

Part 2: User's Guide 2-1

Product description 2-1
Before you begin 2-3
Installing the Enhanced IDE drive 2-3
Installing the software 2-7
Using the tape drive 2-8
Loading and unloading tape cartridges 2-8
Setting the write-protect switch 2-9
Reviewing performance considerations 2-9
Maintenance 2-10
Caring for tape cartridges 2-10
Cleaning the tape head 2-10

Part 3: Appendixes 3-1

Appendix A. 10/20 GB TR-5 IDE Tape Drive specifications 3-1
Appendix B. Help and service information 3-6
Step 1: Troubleshooting 3-6
Step 2: Preparing for the call 3-7
Step 3: Placing the call to IBM 3-7
Appendix C. Product warranty and notices 3-8
Notices 3-10
Trademarks 3-11
Electronic emission notices 3-11

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Registering your option

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http://www.pc.ibm.com/support

About this book

This manual contains information on the 10/20 GB TR-5 IDE Tape Drive. It is divided into the following parts:

Part 1: Quick installation instructions, in the following languages:

English
German
French
Spanish
Italian
Brazilian Portuguese
Japanese

Part 2: Product description, with detailed installation and usage instructions

Part 3: Product specifications, problem solving, help and service information, warranty, and notices

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

Part 1: Quick Installation Guide

This guide contains installation instructions in an abbreviated form. If you are knowledgeable about IDE products and experienced in installing options, use these instructions to quickly install your tape drive. For a description of the tape drive and more detailed installation instructions, go to “Part 2: User's Guide” on page 2-1.

In addition to this manual, this option package contains:

- Internal model of the tape drive
- 5.25-inch mounting kit
- One Imation or IBM TR-5 formatted data cartridge
- Tape software CD
- Mounting screws
- Various bezels
- IDE cable
- Safety Information

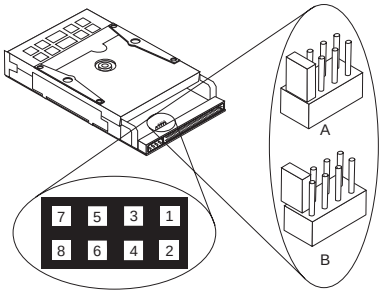
Contact your place of purchase if any item is missing or damaged.

Important: Be sure to retain your proof of purchase because it might be required to receive warranty service.

Installing the Enhanced IDE drive

Follow these instructions to install the Enhanced IDE tape drive:

1. Turn off the computer and unplug the power cables from the power outlet for the computer and all attached peripherals.
2. Open the computer.
3. Touch the static-protective bag containing the tape drive to an unpainted metal surface on the computer for at least 2 seconds. Remove the drive from the static-protective bag, holding the drive by the edges, and place it on the bag.
4. Refer to the bottom view of the tape drive to locate the IDE configuration block and how to set a position ON (**A**) or OFF (**B**).



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The IDE configuration block pin assignments are:

7 and **8**: Reserved
5 and **6**: **MS**
3 and **4**: **SL**
1 and **2**: **CS**

5. Set the IDE jumper ON for the setting that applies to your IDE configuration. The tape drive is preset at the factory to slave (**SL**).

   If your computer has one hard disk drive and one IDE controller, configure the tape drive as a slave (**SL**) by placing a jumper over vertical pins **3** and **4** (ON). Some hard disk drives might require you to change its jumper setting (master to master with a slave attached) if you attach a second device to the IDE controller.

   If your computer has two IDE controllers:

   Place the hard disk drives on the primary IDE controller and place the other storage devices (tape drive or CD-ROM drive) on the secondary IDE controller.
   If the tape drive is the only device on the secondary IDE controller, configure it as a master (**MS**) by placing a jumper over vertical pins **5** and **6**.
   If the tape drive is sharing the IDE controller with another device, configure it as slave (**SL**) by placing a jumper over vertical pins **3** and **4**.

   Refer to your computer documentation to see if your computer supports the cable select (**CS**) setting. Most computers do not use this feature.

6. Locate an available bay or space in your computer to mount the tape drive. The drive can be mounted in either a horizontal or vertical position. The drive fits in a 3.5-inch (1-inch high) standard bay. You can also mount the drive in a 5.25-inch (1.6-inch high) bay using the 5.25-inch mounting kit provided. The installation instructions are located on the mounting kit packaging.

   The following table lists the available bays for IBM PC IntelliStation professional workstation and desktop PC models. Some of these computer systems require an additional cosmetic bezel (included) when installing a removable media device such as a tape drive. Some workstations also might have a lockable door covering the drive bays. **If you are installing the tape drive into any server with a lockable door, you might not be able to close this door whenever the data cartridge is inserted.**

Model	Bays Available
IntelliStation M Pro	both sizes[1]
IntelliStation Z Pro	both sizes[1]
PC 300 PL	5.25 in. only
PC 300 GL	5.25 in. only

[1] *When installing in the available 3.5-inch bay in the tower model, no additional bezel is available at this time.*

7. Remove the bay cover, if necessary. Slide the tape drive into the bay, and secure it with the mounting screws provided in the option package. **Do not use any other screws to secure the drive.** Using screws that are too long might damage the drive.
8. Locate the IDE bus cable (usually a 50-pin ribbon cable) that is inside your computer, and attach one of the connectors on the cable to the tape drive. Ensure that pin 1 of the cable (usually color-coded) aligns with pin 1 of the IDE connector on the tape drive. If your computer system does not have connectors on the drive, you might need to use the IDE cable included with the option.
9. Locate an available power cable inside your computer, and connect it to the four-pin power connector on the tape drive.
10. Replace the computer cover, and secure it in place.
11. Reconnect the ac power cord and any other signal cables to the outside of your computer, and plug the power cord into an available power outlet. Turn on all attached devices; then turn on the computer.
12. Install the software using the instructions given by the README file on the tape software CD. The CD contains tape backup and restore applications for most desktop operating systems.

    To install the backup software for native Windows NT 4.0 support:

    a. From the Windows NT desktop, select **Start**, **Settings**, **Control Panel**, **Tape Device**.
    b. Windows NT detects a "New SCSI Tape Device" and prompts you to install the IDE (QIC-157) device driver.
    c. Click **OK**.
    d. Insert the **Windows NT Workstation** CD and click **OK**.
    e. Windows NT will display the location of the needed files, directory **i386**, on the CD drive. If the correct drive is not shown on the "Copy files from:" list, click the down-arrow button and select the correct CD drive for the computer.
    f. Click **OK**.
    g. Windows NT will now complete the device driver installation.

    To verify that the driver is correctly loaded, go to the desktop and select **Start**, **Settings**, **Control Panel**, **Tape Devices**.
    h. Start Windows NT Backup by selecting **Programs**, **Administrative Tools**, **Backup**.
    i. The software installation is now completed.

To install the additional Seagate backup software for Windows 98, Windows 95 or Windows NT:

a. Place the **Seagate Backup Exec** CD in your CD-ROM.
b. If your operating system is configured for autoplay, the setup program will run automatically. If the setup program does not run automatically, select **Run** from the **Start** menu. Then type *x*:\setup, where *x* is the drive letter for your CD-ROM, and press Enter.
c. Follow the on-screen instructions.
d. Restart Windows to complete software installation.

To install the additional Seagate backup software for Windows 3.1:

a. From Program Manager, select **File**, **Run**.
b. Type *x*:\setup, where *x* is the drive letter for your CD-ROM, and press Enter.
c. Follow the on-screen instructions.
d. Restart Windows to complete software installation.

Quick Installation Guide (Translate)

This guide contains installation instructions in an abbreviated form. If you are knowledgeable about IDE products and experienced in installing options, use these instructions to quickly install your tape drive.

In addition to this manual, this option package contains:

- Internal model of the tape drive
- 5.25-inch mounting kit
- One Imation or IBM TR-5 formatted data cartridge
- Tape software CD
- Mounting screws
- Various bezels
- IDE cable
- Safety Information

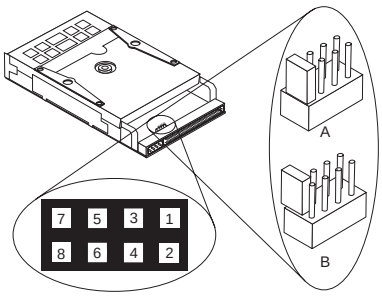
Contact your place of purchase if any item is missing or damaged.

Important: Be sure to retain your proof of purchase because it might be required to receive warranty service.

Installing the Enhanced IDE drive

Follow these instructions to install the Enhanced IDE tape drive:

1. Turn off the computer and unplug the power cables from the power outlet for the computer and all attached peripherals.
2. Open the computer.
3. Touch the static-protective bag containing the tape drive to an unpainted metal surface on the computer for at least 2 seconds. Remove the drive from the static-protective bag, holding the drive by the edges, and place it on the bag.
4. Refer to the bottom view of the tape drive to locate the IDE configuration block and how to set a position ON (**A**) or OFF (**B**).



The IDE configuration block pin assignments are:

7 and **8**: Reserved
5 and **6**: **MS**
3 and **4**: **SL**
1 and **2**: **CS**

5. Set the IDE jumper ON for the setting that applies to your IDE configuration. The tape drive is preset at the factory to slave (**SL**).

   If your computer has one hard disk drive and one IDE controller, configure the tape drive as a slave (**SL**) by placing a jumper over vertical pins **3** and **4** (ON). Some hard disk drives might require you to change its jumper setting (master to master with a slave attached) if you attach a second device to the IDE controller.

   If your computer has two IDE controllers:

   Place the hard disk drives on the primary IDE controller and place the other storage devices (tape drive or CD-ROM drive) on the secondary IDE controller.
   If the tape drive is the only device on the secondary IDE controller, configure it as a master (**MS**) by placing a jumper over vertical pins **5** and **6**.
   If the tape drive is sharing the IDE controller with another device, configure it as slave (**SL**) by placing a jumper over vertical pins **3** and **4**.

   Refer to your computer documentation to see if your computer supports the cable select (**CS**) setting. Most computers do not use this feature.

6. Locate an available bay or space in your computer to mount the tape drive. The drive can be mounted in either a horizontal or vertical position. The drive fits in a 3.5-inch (1-inch high) standard bay. You can also mount the drive in a 5.25-inch (1.6-inch high) bay using the 5.25-inch mounting kit provided. The installation instructions are located on the mounting kit packaging.

   The following table lists the available bays for IBM PC IntelliStation professional workstation and desktop PC models. Some of these computer systems require an additional cosmetic bezel (included) when installing a removable media device such as a tape drive. Some workstations also might have a lockable door covering the drive bays. **If you are installing the tape drive into any server with a lockable door, you might not be able to close this door whenever the data cartridge is inserted.**

Model	Bays Available
IntelliStation M Pro	both sizes[2]
IntelliStation Z Pro	both sizes[2]
PC 300 PL	5.25 in. only
PC 300 GL	5.25 in. only

[2] *When installing in the available 3.5-inch bay in the tower model, no additional bezel is available at this time.*

7. Remove the bay cover, if necessary. Slide the tape drive into the bay, and secure it with the mounting screws provided in the option package. **Do not use any other screws to secure the drive.** Using screws that are too long might damage the drive.
8. Locate the IDE bus cable (usually a 50-pin ribbon cable) that is inside your computer, and attach one of the connectors on the cable to the tape drive. Ensure that pin 1 of the cable (usually color-coded) aligns with pin 1 of the IDE connector on the tape drive. If your computer system does not have connectors on the drive, you might need to use the IDE cable included with the option.
9. Locate an available power cable inside your computer, and connect it to the four-pin power connector on the tape drive.
10. Replace the computer cover, and secure it in place.
11. Reconnect the ac power cord and any other signal cables to the outside of your computer, and plug the power cord into an available power outlet. Turn on all attached devices; then turn on the computer.
12. Install the software using the instructions given by the README file on the tape software CD. The CD contains tape backup and restore applications for most desktop operating systems.

    To install the backup software for native Windows NT 4.0 support:

    a. From the Windows NT desktop, select **Start**, **Settings**, **Control Panel**, **Tape Device**.
    b. Windows NT detects a "New SCSI Tape Device" and prompts you to install the IDE (QIC-157) device driver.
    c. Click **OK**.
    d. Insert the **Windows NT Workstation** CD and click **OK**.
    e. Windows NT will display the location of the needed files, directory **i386**, on the CD drive. If the correct drive is not shown on the "Copy files from:" list, click the down-arrow button and select the correct CD drive for the computer.
    f. Click **OK**.
    g. Windows NT will now complete the device driver installation.

       To verify that the driver is correctly loaded, go to the desktop and select **Start**, **Settings**, **Control Panel**, **Tape Devices**.
    h. Start Windows NT Backup by selecting **Programs**, **Administrative Tools**, **Backup**.
    i. The software installation is now completed.

    To install the additional Seagate backup software for Windows 98, Windows 95 or Windows NT:

    a. Place the **Seagate Backup Exec** CD in your CD-ROM.
    b. If your operating system is configured for autoplay, the setup program will run automatically. If the setup program does not run automatically, select **Run** from the **Start** menu. Then type *x*:\setup, where *x* is the drive letter for your CD-ROM, and press Enter.
    c. Follow the on-screen instructions.
    d. Restart Windows to complete software installation.

To install the additional Seagate backup software for Windows 3.1:

a. From Program Manager, select **File**, **Run**.
b. Type *x*:\setup, where *x* is the drive letter for your CD-ROM, and press Enter.
c. Follow the on-screen instructions.
d. Restart Windows to complete software installation.

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.pc.ibm.com/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: User's Guide

Product description

The IBM tape option allows you to save and restore data files. The tape drive has the following features:

Tape capacity

Provides capacity to 20 GB[3] per cartridge when using the TR-5 Tape Cartridges and the software compression features of the included software application. The actual capacity per cartridge varies depending on various factors, which include the type of backup data, the data cartridge type, and the condition of the media. The 20 GB value assumes a 2:1 compression ratio.

High speed data transfer

Maximizes data transfer to 2 MB per second when using the software compression features of the drive. If your computer is not capable of supporting this data transfer rate, the drive will automatically adjust tape speed to maintain streaming.

Streaming-tape intelligence

Provides a continuous tape motion for an uninterrupted precisely coordinated flow of data to and from the tape cartridge. This *streaming* motion, combined with the *serpentine* recording method contributes to the increased storage capacity, efficiency, and speed of this cartridge technology.

Serpentine recording method

Uses the *serpentine* recording method, which decreases read time by reading or writing data in both the forward and reverse directions. With this method, the tape is not rewound at the end of a track. Instead, the drive heads are logically or mechanically switched to a different position on the tape and another track is written or read in the reverse direction. The individual tracks are sequential to minimize the amount of head motion as the heads change position for each track.

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3 *The formatted capacity of 1 GB is approximately 1 000 000 000 bytes of data.*

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Installation flexibility

Installs in a standard 5.25-inch half-high or a 3.5-inch slim bay. Can also be installed into a one-third height bay, using a special rail kit which is included.

Backward compatibility

Provides read compatibility with IBM TR4 IDE tape options (IBM part number 06H9720).
Note: This drive does not provide read or write compatibility with any other travan format.

Tape software support

Option includes backup/restore applications for the following operating systems:

Microsoft Windows 3.1x
Windows 95 and 98
Windows NT 4.0 Workstation

The included CD contains installation and operating instructions for the back-up and restore applications. Choose the back-up and restore application that best suits your needs.

In addition to this manual, this option package contains:

Internal model of the tape drive
5.25-inch mounting kit
One Imation or IBM TR-5 formatted data cartridge
Tape software CD
Mounting screws
Various bezels
IDE cable
Safety Information

Contact your place of purchase if any item is missing or damaged.

Important: Be sure to retain your proof of purchase because it might be required to receive warranty service.

Before you begin

To install this drive, you must have the following:

Access to your IDE configuration information

The documentation that comes with your computer

A CD-ROM drive to use the tape backup and restore application on the CD, or another backup software application such as Seagate Backup Exec, Cheyenne ArcServe, or any other backup software that supports the TR-5 data format

You can find information on how to get help, technical support, and warranty service in Appendix B, “Help and service information” on page 3-6.

Installing the Enhanced IDE drive

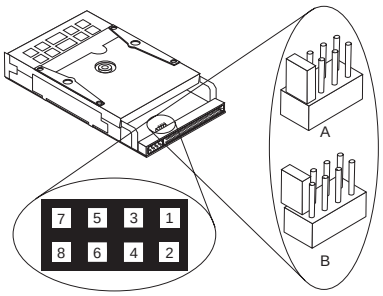
This section provides instructions for installing the Enhanced IDE tape drive.

Step 1. Preparing for installation

1. Turn off the computer and unplug the power cables from the power outlet for the computer and all attached peripherals.
2. Open the computer. For specific information on opening your computer refer to the documentation that comes with your computer. Become familiar with the computer internal components, and determine what kind of configuration you need to install.
3. Locate an available IDE connector in your computer. An IDE cable normally has two connectors for attaching IDE devices. Some IDE controllers have two IDE cables for attaching up to four devices. You can have the situation where your computer does not have an IDE connector available to attach the tape drive. Free up an IDE connector such as to install the tape drive.
4. Touch the static-protective bag containing the tape drive to an unpainted metal surface on the computer for at least 2 seconds. Remove the drive from the static-protective bag, holding the drive by the edges, and place it on the bag.

Step 2. Configuring the IDE drive

1. Refer to the bottom view of the tape drive to locate the IDE configuration block and how to set a position ON (**A**) or OFF (**B**).



The IDE configuration block pin assignments are:

7 and **8**: Reserved
5 and **6**: **MS**
3 and **4**: **SL**
1 and **2**: **CS**

Set the IDE jumper ON for the setting that applies to your IDE configuration. The tape drive is preset at the factory to slave (**SL**).

If your computer has one hard disk drive and one IDE controller, configure the tape drive as a slave (**SL**) by placing a jumper over vertical pins **3** and **4** (ON). Some hard disk drives might require you to change its jumper setting (master to master with a slave attached) if you attach a second device to the IDE controller.

Refer to the jumper settings or documentation that comes with your hard disk drive.

If your computer has two IDE controllers:

Place the hard disk drives on the primary IDE controller and place the other storage devices (tape drive or CD-ROM drive) on the secondary IDE controller. This is a good practice to avoid possible performance or compatibility limitations with your operating system.

If the tape drive is the only device on the secondary IDE controller, configure it as a master (**MS**) by placing a jumper over vertical pins **5** and **6**.

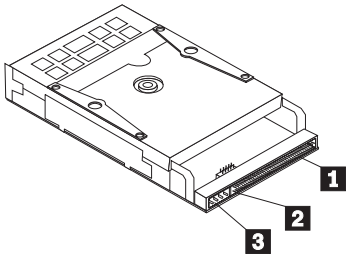
If the tape drive is sharing the IDE controller with another device, configure it as slave (**SL**) by placing a jumper over vertical pins **3** and **4**.

Refer to your computer documentation to see if your computer supports the cable select (**CS**) feature. With the cable select feature there is a special cable. The placement of the devices on the cable connectors determines whether a device is master or slave, if the devices are set to **CS**. Most computers do not use this cable feature.

Note: If your computer system has only one IDE cable with one connector, replace the cable with the two-drop cable that comes with the option.

Step 3. Attaching the cables

1. Locate the IDE 1 and power 3 connectors using the illustration of the bottom view of the tape drive.



   The tape drive connectors are:

   1 IDE connector
   2 IDE connector - pin 1
   3 Power connector

2. Locate the appropriate IDE cable and spare connector and attach it to the tape drive 1 . Use a 40-pin ribbon cable to connect the tape drive on the rear of the drive. The connector is keyed and will fit only one way. Do not force it. If it does not attach easily, turn the connector around and try it again. Ensure that line 1 of the IDE cable (usually color coded) aligns with pin 1 2 of the IDE connector.

3. Locate an unused power connector coming from the computer power supply. If all power cables are in use, purchase a dc Y-connector at your computer dealer or electronics store. Locate an available power cable and connect it to the four-pin power connector on the tape drive 3 . The cable connector is keyed and will fit properly only one way.

Step 4. Mounting the drive

1. Locate an available bay or space in your computer to mount the tape drive. The drive can be mounted in either a horizontal or vertical position. The drive fits in a 3.5-inch (1-inch high) standard bay. You can also mount the drive in a 5.25-inch (1.6-inch high) bay using the 5.25-inch mounting kit provided. When you attach the brackets to the sides of the 3.5-inch tape drive, you increase the width and height of the drive. The instructions for using the 5.25-inch mounting kit are located on its packaging. Use only those parts necessary for your particular installation; some parts may not be required.

   The following table lists the available bays for IBM PC IntelliStation professional workstation and desktop PC models. Some of these computer systems require an additional cosmetic bezel (included) when installing a removable media device such as a tape drive. Some workstations also might have a lockable door covering the drive bays. If you are installing the tape drive into one of these servers or workstations, you can use the included recess bezel kit to install the tape drive. With the recess bezel kit, the tape drive sits further back in the bay, so the tape

cartridge does not stick out and keep the door from closing completely.

Model	Bays Available
IntelliStation M Pro	both sizes[4]
IntelliStation Z Pro	both sizes[4]
PC 300 PL	5.25 in. only
PC 300 GL	5.25 in. only

2. Remove the cover plate from the bay selected. Slide the drive partially into the bay. Align the drive-bay screw holes with the threaded holes in the drive housing (or bracket, if applicable).
3. Use the screws provided to secure the drive in the bay. **Using the wrong size screws can damage the drive**. Usually two screws are used on each side. Some installations use the screw holes on the bottom (circuit board side) of the drive. **Do not overtighten the screws**. Make sure that the drive is securely mounted.

Step 5. Completing the installation

Check your work before closing the computer.

1. Be sure that the power and interface connectors are securely attached.
2. Be sure that the cables are neatly routed. They must not:
   Get in the way when the cover is replaced
   Impede the power supply fan blade
   Block air flow paths
3. Replace the computer cover and secure it in place.
4. Reconnect the ac power cord and cables. Turn on all attached devices; then turn on the computer.

[4] *When installing in the available 3.5-inch bay in the tower model, no additional bezel is available at this time.*

Installing the software

Install the software using the instructions given by the README file on the tape software CD. The CD contains installation, tape backup and restore applications for most operating systems such as:

Windows 3.1x
Windows 95 and 98
Windows NT 4.0 Workstation

To install the backup software for native Windows NT 4.0 support:

1. From the Windows NT desktop, select **Start**, **Settings**,**Control Panel**,**Tape Device**.
2. Windows NT detects a "New SCSI Tape Device" and prompts you to install the IDE (QIC-157) device driver.
3. Click **OK**.
4. Insert the **Windows NT Workstation** CD and click **OK**.
5. Windows NT will display the location of the needed files, directory **i386**, on the CD drive. If the correct drive is not shown on the "Copy files from:" list, click the down-arrow button and select the correct CD drive for the computer.
6. Click **OK**
7. Windows NT will now complete the device driver installation.

   To verify that the driver is correctly loaded, go to the desktop and select **Start**, **Settings**, **Control Panel**, **Tape Devices**.
8. Start Windows NT Backup by selecting **Programs**, **Administrative Tools**, **Backup**
9. The software installation is now completed.

To install the additional Seagate backup software for Windows 98, Windows 95 or Windows NT:

1. Place the **Seagate Backup Exec** CD in your CD-ROM.
2. If your operating system is configured for autoplay, the setup program will run automatically. If the setup program does not run automatically, select **Run** from the **Start** menu. Then type *x*:\setup, where *x* is the drive letter for your CD-ROM, and press Enter.
3. Follow the on-screen instructions.
4. Restart Windows to complete software installation.

To install the additional Seagate backup software for Windows 3.1:

1. From Program Manager, select **File**, **Run**.
2. Type *x*:\setup, where *x* is the drive letter for your CD-ROM, and press Enter.
3. Follow the on-screen instructions.
4. Restart Windows to complete software installation.

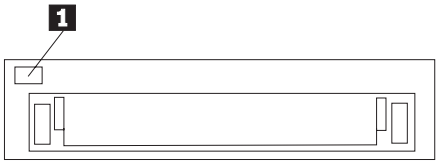
This tape option is also compatible with many other backup and restore applications not included on the tape software CD. Contact the supplier of your favorite backup and restore software to see if they support the Travan 5 class of tape drives. Follow the instructions provided with your software to install and configure the tape drive.

Using the tape drive

This section provides information on using the features of the tape drive.

Loading and unloading tape cartridges

The illustration shows the front panel of the tape drive.

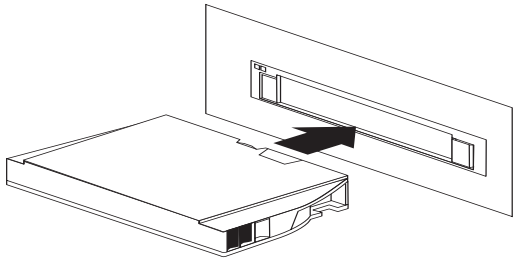


The front panel of the tape drive contains the cartridge opening and one round, green light 1 . This green light indicates drive activity. When the green light is OFF, the drive is not active.

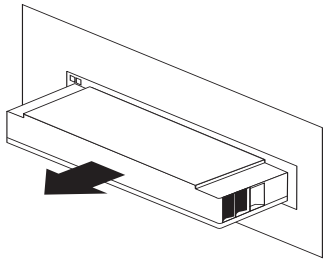
Your tape drive has a flip-up door that covers the cartridge opening when you do not have a tape cartridge in the drive. Once you insert a cartridge, the tape drive holds it in place using a positive locking mechanism.

Note: Do not remove the tape cartridge while the drive is operating. Complete any tape operation and wait until the green activity light is OFF before removing the cartridge.

To load a cartridge, insert it with the metal base plate down and the tape access door facing the drive. The following illustration shows loading of a cartridge.



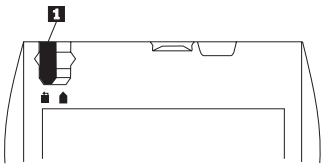
To unload a cartridge, wait until the drive activity light is OFF and then pull the cartridge straight out. The following figure illustrates unloading a cartridge.



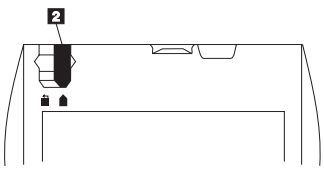
Setting the write-protect switch

Tape cartridges feature a write-protect switch located in the upper-left corner of the cartridge. You can set the switch to keep data from being written on the tape. Use this switch when you want to make sure that important data on the tape will not be overwritten.

The illustration below shows the cartridge with the switch 1 in the nonprotected (read and write) or unlocked position.



The following illustration shows the switch 2 in the protected (read only) or locked position.



To return a cartridge to the unprotected write state, push the switch towards the end of the cartridge or unlocked position.

Reviewing performance considerations

The tape option is ideally suited to streaming operations, as opposed to multiple-start-and-stop tape movement. Frequent start-and-stop operations are often the result of data underruns. Start-and-stop operation can also increase the stress on both the drive and the media.

Your backup application and other system characteristics can also affect performance. Alternative operating systems, file system structures and backup applications might give significantly different performance results. If you need to improve the performance of the tape backup application, consider one or more of the following:

- Disable data compression (if used) using your backup application software.
- Reduce the number of other applications that might be running simultaneously with the backup application.

Maintenance

You need to perform minimal maintenance to ensure that your tape drive operates in peak condition. This section explains how to care for the tape cartridges and how to clean the drive head.

Caring for tape cartridges

The following points are guidelines for storing and using the cartridges:

- Do not open the tape access door of the cartridge or touch the tape itself.
- Keep cartridges away from sources of electromagnetic fields, such as telephones, dictation equipment, mechanical or printing calculators, motors, and bulk erasers. Do not place the cartridges on the computer monitor or on the base unit of the computer.
- Keep cartridges away from direct sunlight and heat sources, such as radiators or warm air ducts.
- Keep cartridges free of moisture. Do not wet or submerge cartridges in any liquid.
- Do not expose cartridges to temperature extremes.
- Retension tape cartridges that have not been used for more than a month before restoring or backing up data. Retensioning is the winding and rewinding of a tape cartridge. This action restores the proper tape tension to the media. The back-up application software provides a function to retension a tape cartridge.

Cleaning the tape head

To properly maintain the drive, periodically clean the tape head. You do not need to perform any other periodic maintenance. Use a dry process cleaning cartridge such as IBM PN 16G8583 or Imation 0-5122-12132-6 to clean the tape head once a month, or after each eight hours of continuous read/write operations, whichever occurs first. The dry process cleaning cartridges can be obtained through your local computer supplies dealer. You also need to clean the drive two hours after you first use a new data cartridge.

Once the cleaning cartridge is inserted into the tape drive, the cleaning process is automatic. The entire process takes only a few seconds and is completed when the drive activity light stops flashing. The cleaning cartridge is good for 30 cleaning operations.

Part 3: Appendixes

Appendix A. 10/20 GB TR-5 IDE Tape Drive specifications

TR-5 1/4-inch tape cartridge technology offers fast, efficient, high capacity storage in a compact, easy-to-remove hard-shell package. This mass-storage technology evolved from the original reel-to-reel 1/2-inch tape storage medium. Storage capacities increased from 60 MB[5] on 9 tracks (QIC-24, 1982) to the 20 GB[6] capacity achievable with the tape option data cartridge, when using software data compression.

This appendix includes the the following specifications and requirements:

- Physical specifications
- Drive performance
- Environmental requirements
- Power requirements
- Tape cartridge specifications and capacities
- Regulatory compliance

Physical specifications

The tape option physical specifications[7] are listed in the following table.

Physical Specifications:			
Type drive	**3.5-Inch Mount**	**5.25-Inch Mount**	**External Drive**
Height	25 mm (1.0 in.)	42 mm (1.6 in.)	51 mm (2.0 in.)
Width	102 mm (4.0 in.)	147 mm (5.8 in.)	155 mm (6.1 in.)
Length	163 mm (6.4 in.)	163 mm (6.4 in.)	234 mm (9.2 in.)
Weight	0.5 kg (1.0 lb)	0.7 kg (1.5 lb)	1.4 kg (3.0 lb)

5 *The formatted capacity of 1 MB is approximately 1 000 000 bytes of data.*

6 *The formatted capacity of 1 GB is approximately 1 000 000 000 bytes of data.*

7 *Product-description data represents IBM's design objectives and is provided for comparative purposes; actual results might vary, based on a variety of factors. This product data does not constitute a warranty. Data is subject to change without notice.*

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Drive-performance specifications

The following table lists the performance specifications for the tape drive.

Drive Performance:	
Feature	**Specification**
Capacity	2 GB, 900 Oe[8] 400 feet 1/4-inch cartridge - QIC 3095 format 4 GB, 900 Oe 740 feet Travan cartridge - QIC 3095 format 10 GB, 900 Oe 740 feet Travan Cartridge - QIC 3220 format (All capacities increased, typically by two, using software data compression)
Effective back-up rate	30 MB per minute typical (uncompressed)
Data transfer rate	489/733/1000 KB per second
Tape speed for Read/Write and Search/Rewind	46, 70, or 94 ips
Recording method	Serpentine
Recording format	QIC 3220MC
Recording code	1,7 RLL
Error recovery	Reed Solomon ECC

Drive Performance:	
Feature	**Specification**
Recording unrecoverable errors	Less than 1 in 10 data Mb
Head configuration	Wide write/narrow read
Recording media	900 Oe 400 feet 1/4-inch 900 Oe 740 feet Travan
Cartridge size	3.2 in. x 2.4 in. x 0.4 in. (81 mm x 61 mm x 10.2 mm)
Data density	60 000 bpi
Tracks	60 on 1/4-inch media 77 on QIC Wide media
Synchronous transfer rate (burst)	5 MB per second maximum
Asynchronous transfer rate (burst)	5 MB per second maximum

8 *Oersted (Oe)*

Environmental requirements

The following table lists the environmental specifications for the tape drive. You can mount the drive either vertically or horizontally.

Environmental Requirements:		
Specification	**Operational**	**Nonoperational**
Temperature	+41° to +113° F[9] (+5° to +45°C)	−40° to +149° F[10] (−40° to +65°C)
Thermal gradient	1° C per minute (no condensation)	20° C per hour
Relative humidity	20% to 80% noncondensing[9]	5% to 95% noncondensing[10]
Max wet bulb temperature	78.8°F (26° C)	No condensation
Altitude	−1000 to +15 000 feet	−1000 to +50 000 feet
Vibration Peak to peak displacement Peak acceleration	 0.005 in. max (5 to 44.3 Hz) 0.50 g max (44.3 to 500 Hz)	 0.1 in. max (5 to 17 Hz) 1.5 g max (17 to 500 Hz)

Environmental Requirements:		
Specification	**Operational**	**Nonoperational**
Acoustic level operational (a-wt sum)	55 dBA maximum (measured in suitable enclosure at 3-ft distance and operator height)	—
Shock (1/2 sine wave)	2.5 g peak 11 millisecond	100 g peak 11 millisecond

9 *Mechanism and media*

10 *Mechanism*

Power requirements

The following table lists the power specifications by voltage level for the tape drive. The power specifications are measured at the tape-drive power connector and are nominal values.

Power Specifications:		
Voltage	**+12 V dc**	**+5 V dc**
Voltage tolerance	+ or −10 %	+ or −5 %
Operational current	1.8 amps	1.0 amps (max.)
Ripple (peak-to-peak)	100 mV	100 mV
Power use (nominal) Power use (maximum)	8 watts 27 watts	8 watts 27 watts

Tape cartridge specifications and capacities

The tape drive uses prewritten cartridges. The following cartridges are recommended.

Compatible Tapes:		
Description	**Sony**	**3M**
Travan (740 feet) 10 GB capacity 20 GB capacity with data compression	N/A	TR-5
Standard 900 Oe (400 feet) 2 GB capacity 4 GB capacity with data compression	QD 3080XLF	3080
Travan (740 feet) 4 GB capacity 8 GB capacity with data compression	N/A	TR-4

The following table gives the capacities for the drive.

Tape Capacities and Formats:		
Type of tape	**QIC 3220MC**	**QIC 3095MC**
1/4-inch 400 feet	N/A	2 GB
8 mm 740 feet (QIC 3095)	N/A	4 GB
8 mm 740 feet (QIC 3220)	10 GB	N/A

The tape drive reads and writes to the QIC 3220MC format and reads only to the QIC 3095MC format.

Regulatory compliance

The tape drive complies with the regulations listed in the following table.

Regulatory Compliance:	
Agency	**Regulation**
CSA	C22.2, No. 950-M89
TUV & IEC-RHEINLAND	EN 60 950/IEC 950
UL	1950
Canadian Dept of Communications	Class B
VDE	Class B
FCC	Class B, Part 15

Use the tape drive only in equipment where the combination has been determined to be suitable by an appropriate certification organization (for example, Underwriters Laboratories Inc. of the Canadian Standards Association in North America). Consider the following safety points:

Install the drive in an enclosure that limits the user's access to live parts, gives adequate system stability, and provides the necessary grounding for the drive.

Provide the correct voltages (+5 V dc and +12 V dc) based on the regulation applied — Extra Low Voltage (SEC) for UL and CSA and Safety Extra Low Voltage for BSI and VDE (if applicable).

Appendix B. Help and service information

If you have questions about your new Options by IBM product, or require technical assistance, visit the IBM Personal Computing Support Web site at http://www.pc.ibm.com/support. For information about IBM, IBM PC products, or Options by IBM visit the IBM Personal Computing Web site at http://www.pc.ibm.com. Additionally, you can receive information from the IBM Automated Fax system at 1-800-426-3395 (in Canada, 1-800-465-3299), or from the Personal Systems Group Bulletin Board System (PSG BBS) at 1-919-517-0001. You can also get help and information through the IBM PC HelpCenter, 24 hours a day, seven days a week. Response time may vary depending on the number and nature of the calls received.

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.

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.

Step 1: Troubleshooting

You might be able to solve the problem yourself. Before calling IBM, you might want to try some or all of the following troubleshooting procedures.

IDE tape drive procedures

1. If you get an IDE controller connection condition message, try changing the jumper from master (**MS**) to slave (**SL**), or slave to master. Some computers might require a different setting.
2. If you configured the tape drive as slave (**SL**) on the primary IDE controller with a hard disk drive as the master, make sure that you do not have to change the hard disk drive's jumper to *master with slave present*. Some Seagate, Western Digital, and Quantum hard disk drives require you to change this jumper setting.

General procedures

1. Remove the tape drive. Check for bent or misaligned pins and then reinstall the drive if there are no problems.
2. Check the computer documentation for instructions about the installation of upgrades. Look for a section about system setup or system configuration and follow all procedures.

Other troubleshooting procedures

1. If you are having installation or configuration problems, refer to the detailed sections on installation found in this manual, and review any README.TXT files found on the installation diskettes.
2. Visit the Personal Computing Support Web site specific to the model of option you have purchased. Updated installation instructions, hints and tips, or updated system-specific notes are often published in this section. You might find that later device drivers are available that will improve the performance and compatibility for your new option.

   If you are installing this option in an IBM computer, also visit the applicable support Web page for that computer model. These pages might also contain useful hints and tips related to installation of this option and might refer to BIOS or device-driver updates required for your computer model. If you are installing the option in a non-IBM computer, refer to the manufacturer's Web site.
3. Uninstall and then reinstall the option. During the uninstallation process, be sure to remove any files that were installed during the previous installation. Many IBM options include uninstallation programs.
4. Check all cabling to be sure that it is correct as shown in this manual. When you connect a cable to a cable connector, pay close attention to the colored stripes along the edge of the cable, and ensure that they are matched with PIN 1 on both the computer connector and the option connector.
5. If your option contains jumpers or switches, be sure their positions and orientation match the instructions in this manual.

Step 2: Preparing for the call

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.

Step 3: Placing the call to IBM

If you call 90 days or more after the date of withdrawal or after your warranty has expired, you might be charged a fee.

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.

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

Additional technical support resources

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.

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

Appendix C. Product warranty and notices

The following warranty information applies to products purchased in the United States, Canada, and Puerto Rico. For warranty terms and conditions for products purchased in other countries, see the enclosed Warranty insert, or contact your IBM reseller or IBM marketing representative.

International Business Machines Corporation Armonk, New York, 10504

Statement of Limited Warranty

The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you originally 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. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. If you have any questions, contact IBM or your reseller.

Machine: 10/20 GB TR-5 IDE Tape Drive

Warranty Period*: Three Years

**Contact your place of purchase for warranty service information.*

Production Status

Each 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 warranty terms apply.

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 receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period IBM or your reseller, if authorized by IBM, will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

For IBM or your reseller to provide warranty service for a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many of these transactions involve the removal of parts and their return to IBM. You represent that all removed parts are genuine and unaltered. A part that replaces a removed part will assume the warranty service status of the replaced part.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair it or replace it with one that is at least functionally equivalent, without charge. The replacement may not be new, but will be in good working order. If IBM or your reseller is unable to repair or replace the Machine, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user. However, for Machines which have a life-time warranty, this warranty is not transferable.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call 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 will provide certain types of repair and exchange service, either at your location or at IBM's or your reseller's service center, to restore a Machine to good working order.

When a type of 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. 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 ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange.

You agree to:

1. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
2. where applicable, before service is provided —
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
   b. secure all programs, data, and funds contained in a Machine, and
   c. 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.

Extent of Warranty

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

The warranties may be voided by misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, removal or alteration of Machine or parts identification labels, or failure caused by a product for which IBM is not responsible.

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2. the amount of any other actual direct damages or loss, up to the greater of U.S. $100,000 or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

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Electronic emission notices

10/20 GB TR-5 IDE Tape Drive

Federal Communications Commission (FCC) Statement

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

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

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

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

Responsible Party:

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

Industry Canada Class B emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Deutsche EMV-Direktive (electromagnetische Verträglichkeit)

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 UK, Greenock.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

European Union - emission directive

This product is in conformity with the protection requirements of EU Council Directive 89/366/ECC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM can not accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

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

Union Européenne - Directive Conformité électromagnétique

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

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

Ce produit a été testé et il satisfait les conditions de l'équipement informatique de Classe B en vertu de CISPR22 / Standard européen EN 55022. Les conditions pour l'équipement de Classe B ont été définies en fonction d'un contexte résidentiel ordinaire afin de fournir une protection raisonnable contre l'interférence d'appareils de communication autorisés.

Unione Europea - Directiva EMC (Conformidad électromagnética)

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

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Union Eurpea - Normativa EMC

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Le prove effettuate sul presente prodotto hanno accertato che esso rientra nei limiti stabiliti per le le apparecchiature di informatica Classe B ai sensi del CISPR 22 / Norma Europea EN 55022. I limiti delle apparecchiature della Classe B sono stati stabiliti al fine di fornire ragionevole protezione da interferenze mediante dispositivi di comunicazione in concessione in ambienti residenziali tipici.

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