Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 291.

First Edition (October 1994)

Thank You for Selecting
an IBM ThinkPad 755CD Computer

The IBM* ThinkPad* 755CD
is one of the most advanced notebook-size computer available today.
With a built-in CD-ROM, brilliant display, and
various features, we hope it
serves your multimedia and mobile computing needs.

The following are the distinctive system features of the IBM ThinkPad 755CD computer.

Audio, Telephone, and
Data/Fax Modem Features

ThinkPad Features

Easy Setup

Fn Key Function

Power Management

PCMCIA** Support

TrackPoint III*

Infrared Communication

Video Features

Removable Hard Disk and CD-ROM Drive

Security Features
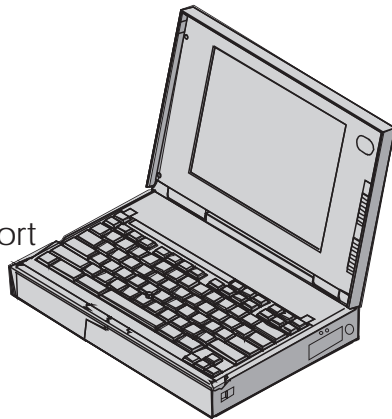
TrackPoint III: ☞ **Page 24.**
Pointing, selecting, and dragging all become part of a single process without lifting your hands from the keyboard with the TrackPoint III.

Fn Key Function: ☞ **Page 46.**
The combination of this Fn key with a function key is used to control display modes, speaker volume, or battery power-saving modes.

PCMCIA Support: ☞ **Page 65.**
The computer provides two Personal Computer Memory Card International Association (PCMCIA) slots. PCMCIA software also is provided so that you can use PC Cards more easily and conveniently.

Infrared Communication: ☞ **Page 75.**
Wireless serial communication with two infrared ports is supplied with your computer.

Removable Hard Disk and CD-ROM Drive: ☞ **Chapter 6.**
The computer provides a removable hard disk drive so multiple hard disk drives can be used and a removable CD-ROM drive so the internal diskette drive or options can be installed.

Audio, Telephone, and Modem Features: ☞ **Page 78.**
A 16-bit high-quality, audio, telephone, and fax machine functions are provided with a built-in speaker and microphone to complete the multimedia computing solution.

Security Features: ☞ **Chapter 5.**
The computer provides security passwords for the computer and hard disk drive. Lock security also is provided for internal devices. Personalization Utilities are also provided to identify your computer.

Power Management: ☞ **Page 55.**
Power Management sets the computer to different modes to save battery power when you are not using the computer. If also provides a resume function, which quickly returns you to where you left off.

ThinkPad Features Program: ☞ **Page 36.**
The ThinkPad Features program allows you to set various parameters by using a graphical user interface or commands.

Easy-Setup: ☞ **Page 48.**
The built-in system programs in Easy-setup allow basic set up of your computer.

Enhanced Video Features: ☞ **Page 99.**
The Enhanced Video Features let you capture video clips or make video presentations by using the in/out video ports.

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*   Trademark of the IBM Corporation.

**   Trademark of the Personal Computer Memory Card International Association.

About This Book

This *User's Guide* contains information that will help you operate the IBM ThinkPad 755CD computer (hereafter called *755CD* or *computer*).

Chapter 1, "Getting Started" provides information about the *Product Map* and the procedure to set up your computer.

Chapter 2, "Getting Familiar with Your Computer" acquaints you with the features of your computer.

Chapter 3, "Operating Your Computer" provides information on using your computer with its different features.

Chapter 4, "Using Battery Power" provides battery information and describes how to operate your computer with the battery pack.

Chapter 5, "Protecting Your Computer" provides information for protecting your computer and internal devices against unauthorized use.

Chapter 6, "Installing and Removing Options" describes how to install or remove IBM options.

Chapter 7, "Installing Software" provides procedures for installing operating systems and device drivers in your computer.

Chapter 8, "Solving Computer Problems" describes what to do when you have a computer problem.

Appendix A, "Avoiding Hardware Conflicts" lists some steps you can take to avoid problems when you add or remove options.
Appendix B, "Advanced Information for PC Cards" provides additional information when using PC Cards.
Appendix C, "Additional Information for Mwave DSP Features" provides additional information when using the Mwave functions.
Appendix D, "Features and Specifications" describes the features and specifications associated with your computer.
Appendix E, "Product Warranties and Notices" contains the warranty statements of your computer and notices for this book.
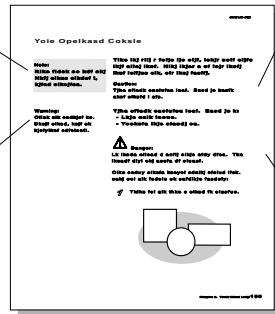
Information Notices

This *User's Guide* contains notices that relate to specific information or text.

Notes

Provides important hints, tips, guidance, or advice.

Warning

Indicates possible damage to programs, devices, system, or data. It appears before the related instruction or situation in which possible damage could occur.

Caution

Indicates situations that are potentially hazardous to you. It appears in text before the instruction or situation that could be hazardous.

Danger

Indicates situations that are potentially lethal or extremely hazardous to you. It is indicated by the

symbol (⚠) and appears in text before the instruction or situation that could be dangerous.

Treatment of Icons

This *User's Guide* contains the following icons (symbols) representing procedures or information unique to the operating system installed in your computer, and to referenced information.

Information for IBM Operating System/2* (OS/2*) users.

Information for IBM DOS users.

Information for Microsoft** Windows** users.

Where to go for referenced information.

Electrical Safety Notice

⚠ DANGER:
Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving or opening the covers of this product or attached devices. The power cord must be used with a properly-grounded outlet.

To Connect	To Disconnect
Turn everything OFF.	Turn everything OFF.
First, attach all cables to devices.	First, remove power cord from outlet.
Attach signal cables to receptacles.	Remove signal cables from receptacles.
Attach power cord to outlet.	Remove all cables from devices.
Turn device ON.	
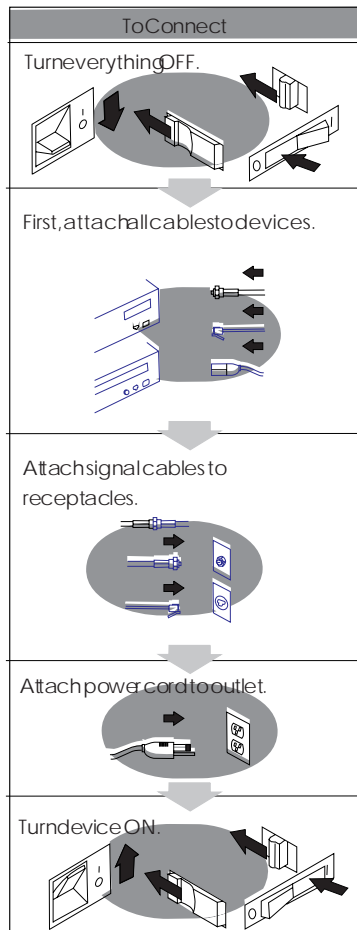
Note: In the U.K., by law, the telephone line cable must be connected after the power cord.
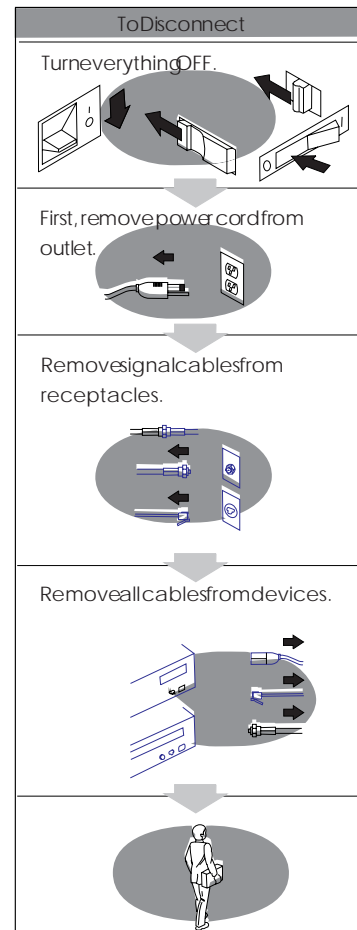
Note: In the U.K., by law, the power cord must be disconnected after the telephone line cable.

CAUTION:
Do not disassemble, incinerate, or short-circuit the rechargeable battery pack. Do not put it in trash that is disposed of in landfills. Dispose of it as required by local ordinances or regulations.

CAUTION:
The lithium rechargeable battery (IBM P/N 84G6426, UL recognized component—File No. MH12210), can only be replaced by your dealer or an IBM service representative. It contains lithium and can explode if not properly used, handled, or disposed of. Do not: (1) throw or immerse into water, (2) heat to more than 100°C (212°F), or (3) repair, or disassemble. Dispose of it as required by local ordinances or regulations.

CAUTION:
The NiMH (nickel metalic hydride) rechargeable battery can only be replaced by your dealer or an IBM service representative. Do not disassemble, incinerate, or short-circuit it. The battery can cause burns or release toxic chemicals. Do not put it in trash that is disposed of in landfills. Dispose of it as required by local ordinances and regulations.

CAUTION:
The fluorescent lamp in the liquid crystal display (LCD) contains mercury. Do not put it in trash that is disposed of in landfills. Dispose of it as required by local ordinances or regulations.

The LCD is made of glass, and rough handling or dropping the computer can cause the LCD to break. If the LCD breaks and the internal fluid gets into your eyes or on your hands, immediately wash the affected areas with water for at least 15 minutes; then get medical care if any symptoms are present after washing.

Laser Compliance Statement

The CD-ROM drive in the IBM ThinkPad 755CD is a laser product. The CD-ROM drive's classification label (shown below) is located on the top of the drive.

>   CLASS 1 LASER PRODUCT
>   LASER KLASSE 1
>   LUOKAN 1 LASERLAITE
>   APPAREIL A LASER DE CLASSE 1
>   KLASS 1 LASER APPARAT

The CD-ROM drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class I laser products.

In other countries, the drive is certified to conform to the requirements of EN60825.

CAUTION:
Do not open the drive; no user adjustments or serviceable parts are inside.

Use of controls, adjustments or the performance of procedures other than those specified may result in hazardous radiation exposure.

Class I (1) laser products are not considered to be hazardous. The CD-ROM drive has an internal, Class I (1), 0.5-milliwatt, aluminum gallium-arsenide laser that operates at a wavelength of 760 to 810 nanometers. The design of the laser system and the CD-ROM drive ensures that there is no exposure to laser radiation above a Class I (1) level during normal operation, user maintenance, or servicing conditions.

Contents

Chapter 1. Getting Started

Welcome to the world of ThinkPad computers!

The 755CD is designed to meet your multimedia and mobile computing needs. It can be used both inside or outside your office area for enjoying the various multimedia features to achieve your business needs.

This chapter describes the *Product Map* and gives step by step instructions to help you set up your new computer.

About the Product Map

The Product Map is a fold-out diagram that you will see first when you unpack the computer. When you physically place the shipping items and options on the Map, you will see an overview of the computer.

Checking Your Items

Start checking the shipped items by using the Product Map.

1 Remove the Product Map from the box and spread it on a desk or flat surface.

2 Remove the items from the box, one by one, and place them on the Map in the positions indicated by the numbers in the following figure.

Make sure that no items are missing. If any item is missing or damaged, contact your place of purchase.
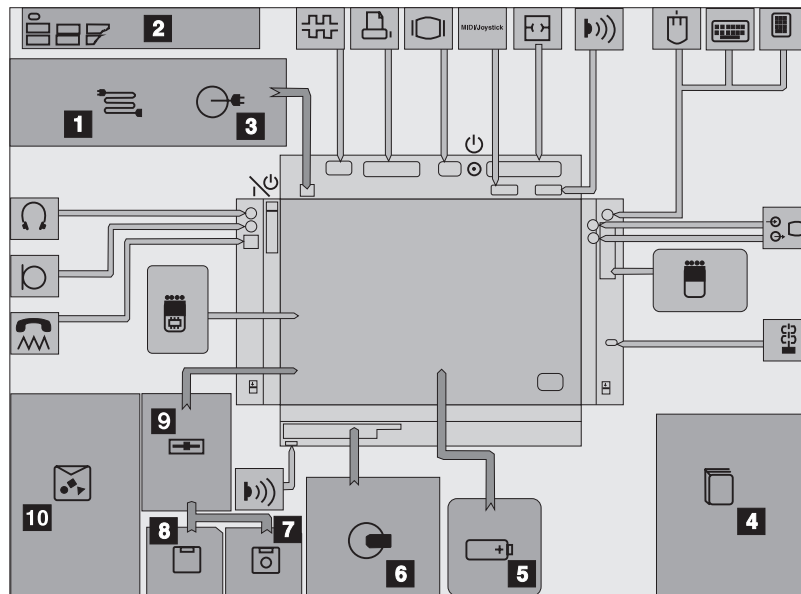
1

Power Cord connects the AC Adapter to the electrical outlet. Some AC Adapters are not shipped with a power cord.

2

Keyboard Template shows function-key assignments when you place it on the keyboard.

3

AC Adapter plugs into an electrical outlet and supplies power to the computer.

4

User's Guide is this book. It provides the installing and operating information about your computer.

5

Battery Pack supplies power to the computer for mobile operation.

6

ThinkPad Media Library contains a sample CD-ROM including audio and video clips.

7 †

Utility Diskette contains the various system programs.

8 †

Driver Diskettes contain the device drivers.

9

Internal Diskette Drive reads data from or writes data to a diskette. It is installed in the CD-ROM/diskette drive compartment when the CD-ROM drive is removed.

1

Miscellaneous Items are supplied in an envelope containing:

    MIDI/Joystick cable
    Two video In/out cables
    Wallet for telephone cable
    Spare caps
    PCMCIA slot cover with cable opening
    PC (PCMCIA) card lock
    Adhesive strap
    CD-ROM eject pin
    Others

---

† In some countries, the diskettes should be created using the Diskette Factory program when the computer power is turned on for the first time. Follow the instructions on "Building System Diskettes" in the *Preload Guide*.

Other Symbols On the Product Map

This section describes the slots, connectors, and options that are shown on the Product Map. To install options, refer to Chapter 6, "Installing and Removing Options" on page 155.
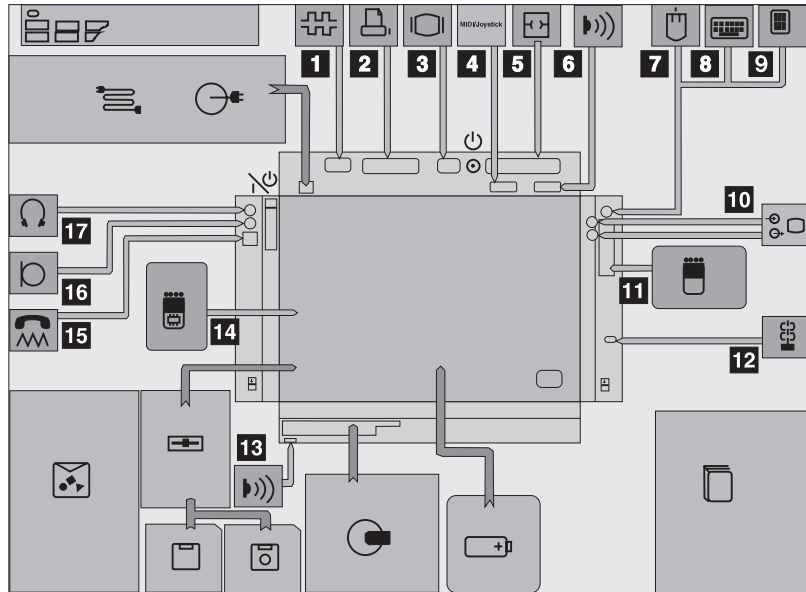
1 **Serial Connector** connects a 9-pin, serial-device cable.

2 **Parallel Connector** usually connects a parallel-printer signal cable.

3 **External-Display Connector** connects the signal cable of a video graphics array (VGA), super video graphics array (SVGA), or compatible display.

4 **MIDI/Joystick**
MIDI/Joystick Port connects the MIDI/Joystick cable (supplied with the computer) or MIDI cables (purchase separately) when using a Joystick or MIDI equipment.

5 **System Expansion Connector** connects the expansion unit or port replicator.
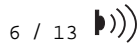
6 / 13 **Infrared Port** is where Infrared Radiation (IR) transfers or receives data between computers or systems without connecting cables.

7 **Mouse** connects directly to the external input-device connector or is used with the external numeric keypad.

8 **External Keyboard** connects to the external input-device connector through the keyboard/mouse connector.

9 **External Numeric Keypad** connects to the external input-device connector.

1 Video In/Out Ports transfers data from or to video equipment. The ports receive or accept signal formats for composite video and S-video.

11 **PCMCIA Slots** accept one or two Personal Computer Memory Card International Association (PCMCIA) cards (hereafter called *PC Cards*).

12 **Locking Device Keyhole** attaches a Kensington** MicroSaver** Security System (hereafter called Kensington lock) or its compatible locks to secure your computer.

13 **Infrared Port**. See 6 .

14 **Memory Slot** accepts an integrated-circuit dynamic random access memory (IC DRAM) card or a dual inline memory module (DIMM) adapter with one or two DIMM memory options.

15 **Modem/Fax Port** connects a telephone or fax cable. (Available as an option in some countries.)

16 **Microphone/Line-In Jack**, 1/8-inch (3.5-mm) diameter jack, connects a stereo microphone or external audio device. A dynamic microphone or condenser microphone, which is operated by an external power source, or an equivalent audio device can be used. *The built-in microphone is disabled when you use this jack.*

17 **Headphone Jack**, 1/8-inch (3.5-mm) diameter jack, connects a stereo headphone or external speakers.

Warning: *To avoid possible loss of hearing, do not put on the headphones when you turn on the computer or connect the headphones to this jack.*

Setting Up Your Computer

You are now ready to assemble and start your computer. The following steps will guide you through the process. The following conventions are used in the illustrations that appear in the Getting Started section.

1 Indicates a main sequence of actions. This refers to the same number in the figure.

(1) Indicates a sub-sequence of actions in a main action. An arrow accompanying such a number shows direction of movement.

** Trademarks of the Kensington Microware, Inc..

Getting Started

1

2

Right Side View

3
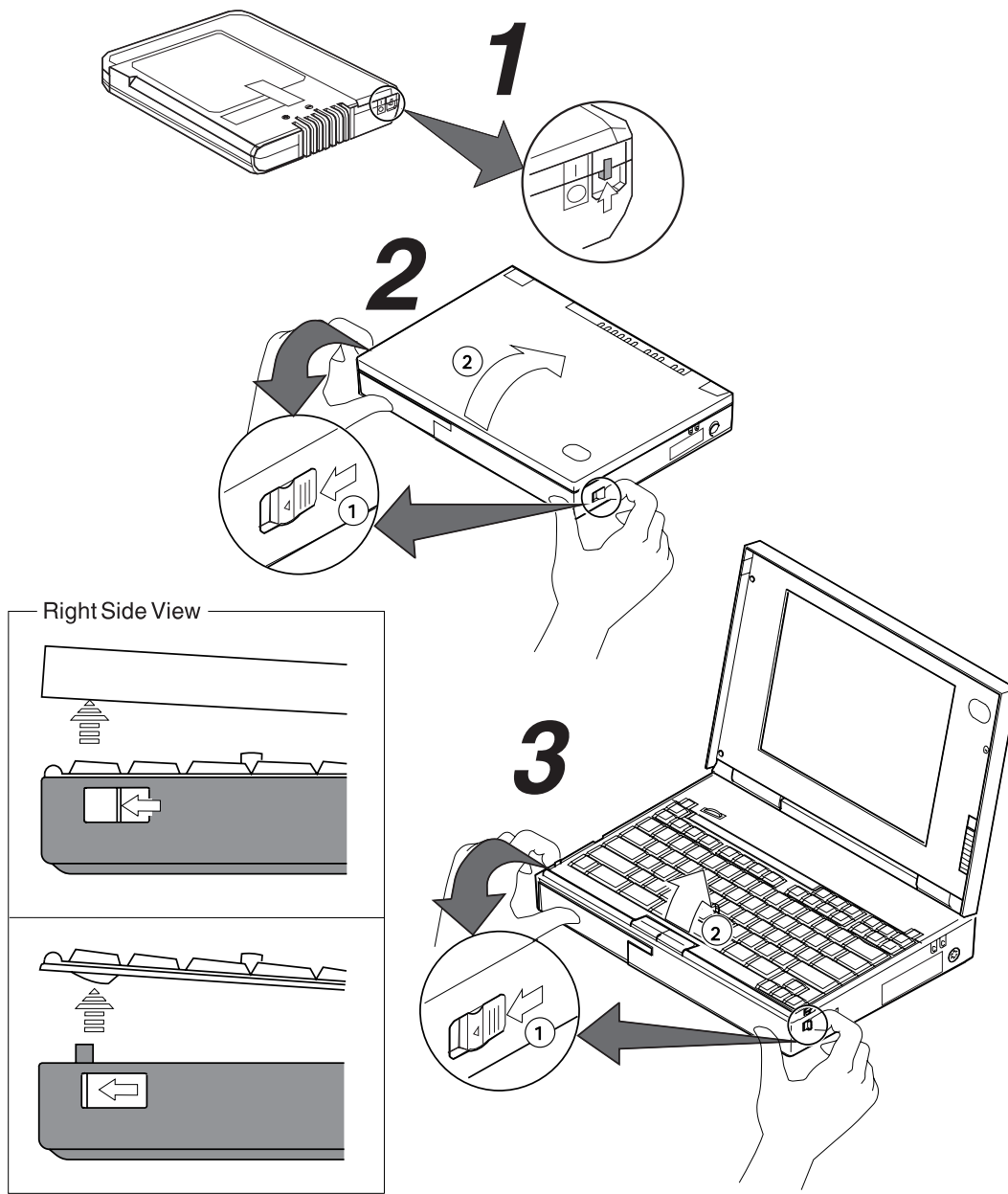
1 Set the switch on the battery pack to the on (|) position using the tip of a pen.

2 Slide the latches on the sides of the computer half way toward the front, and open the liquid crystal display (LCD).
(Do ①and ②.)

3 Slide the same two latches forward again all the way toward the front; then raise the keyboard.
(Do ① and ②.)

Some pressure might be needed to slide these latches if they are tight.
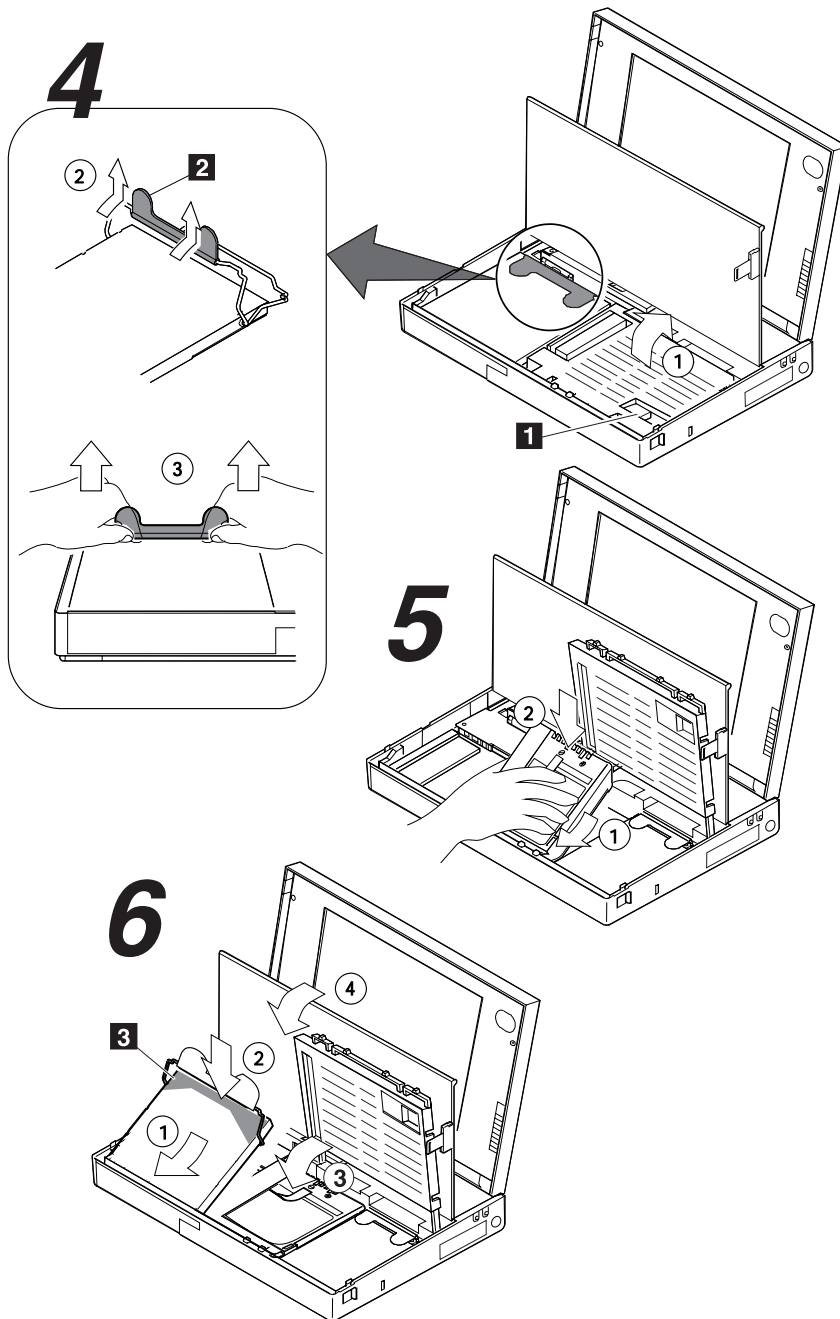
4 Hold the opening 1 and open the keyboard spacer; then lift the CD-ROM handle with the plastic tape 2 and remove the CD-ROM drive from the computer.
(Do ①, ② and ③.)

CAUTION:
The battery pack provided with your computer contains a small amount of harmful substances. To avoid possible injury:

Keep the battery pack away from fire.
Do not soak the battery pack in water or expose it to rain.
Do not attempt to disassemble the battery pack.
Avoid mechanical shocks to the battery.
Always use battery packs recommended by IBM.
Keep the battery pack away from children.

When disposing of the battery, comply with local regulations or your company's safety standards.

5 Install the battery pack with the blue-strap side up and press it firmly into the connector.
(Do ① and ②.)

Warning:
When installing the CD-ROM drive, press the upper part of the CD-ROM drive. Do not press the middle part of the drive.

6 Install the CD-ROM drive into its compartment and press the upper part of it (shaded area 3) firmly into the connector; then close the keyboard spacer and keyboard.
(Do ①, ②, ③ , and ④.)

Getting Started

7

3

For some countries

8

9
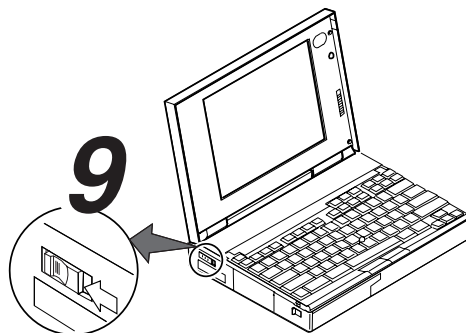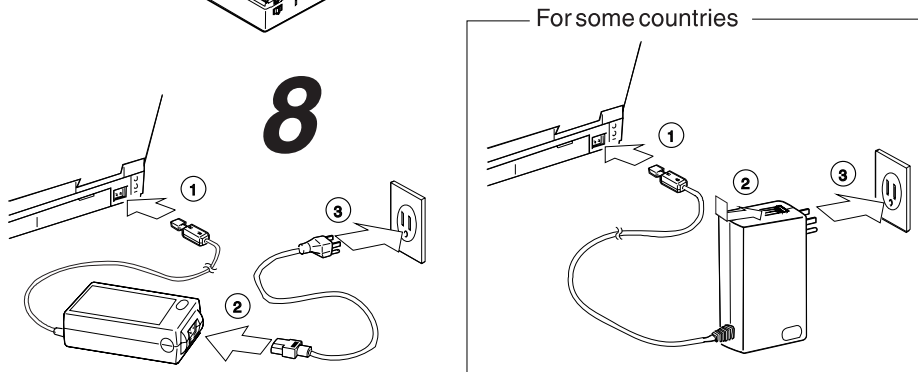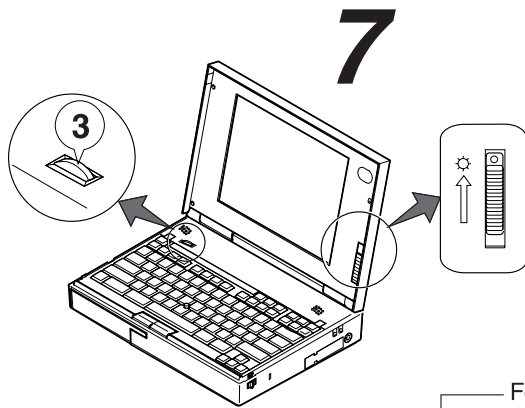
7 Slide the brightness control ($\bigcirc$) to its *upper* position as shown; then set the speaker volume control to "3".

8 Connect the AC Adapter as shown.
(Do (1), (2), and (3).)

9 Push and release the power switch to turn on the computer.

The power switch automatically returns to its original position after you push and release it.

10 After a single beep, one of the following screens appears, confirming that the system is operating correctly.

(For U.S. users, the demonstration program runs automatically and its associated screen appears.) If any other screen appears, a failure might have occurred in the computer. See Chapter 8, "Solving Computer Problems" on page 223.
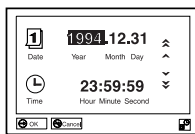
Date and Time menu
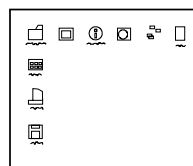
Startup screen

This screen instructs you to set the initial date and time. ☞ To set the date and time, see "Using Easy-Setup" on page 48.	If you purchased a computer with a pre-installed operating system, the startup screen of the operating system appears. (The screen shown is an example of an operating system screen.) ☞ Install your application programs by following the instructions in the documentation that came with those programs.

Congratulations. You have successfully completed the basic setup of your computer.

You can now start computer operation or continue reading Chapter 2, "Getting Familiar with Your Computer" on page 13 for more information about your computer.

Chapter 2. Getting Familiar with Your Computer

This section provides general information for getting acquainted with your computer.

Locations

This section describes the additional features for your computer that are not shown on page 4.

Front View

9 To attach mouse:
☞ Page 181.

To attach keyboard:
☞ Page 185.

1 To install PCMCIA cards:
☞ Page 156.

16 To use Fn functions:
☞ Page 46.

17 To use TrackPoint III:
☞ Page 24.
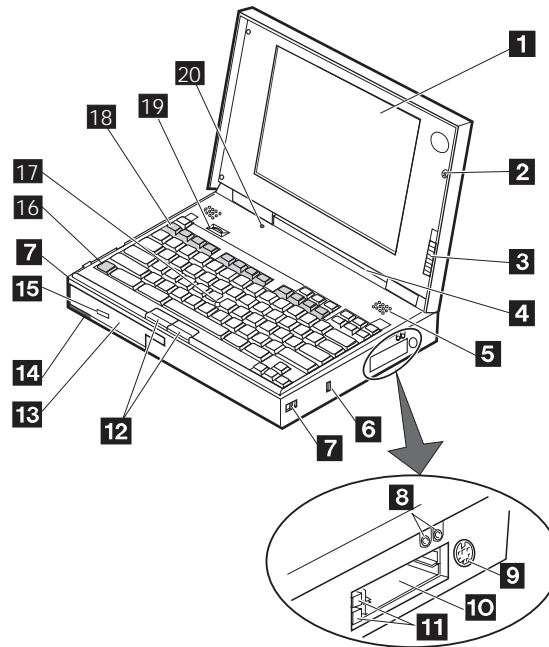
1 **Color LCD Screen**, which uses thin film transistor (TFT), displays the computer output in up to 65 536 colors with 640 by 480 resolution. Although the LCD does not support high-resolution video (800 by 600 and 1024 by 768) in SVGA mode, the high-resolution video can be produced on any attached external display that supports the SVGA video mode.

2 **Built-in Microphone** provides audio capturing capability when it is used with an application program capable of handling an audio function.

3 **Brightness Control** moves up or down to adjust the brightness of the display.

4 **Indicator Panel** consists of the system status indicators and their related symbols. These indicators show the current status of the computer.

5 **Speakers** provide stereo sound for your application programs.

6 **Locking Device Keyhole** See page 4.

7 **Release Latches** release the LCD or keyboard so they can be opened.

8 **Video In/Out Ports** See page 4.

9 **External Input-Device Connector** is where a mouse, an external numeric keypad, or the keyboard/mouse connector is plugged in. Through the keyboard/mouse connector, an external keyboard can also be connected.

1 **PCMCIA Slots** See page 4.

11 **PC Card Eject Buttons** eject the PC Card from the upper or lower PCMCIA slots.

12 **Click Buttons** are used with the TrackPoint III.

13 **CD-ROM Drive** See page 4.

14 **Infrared (IR) Port** See page 4.

15 **CD-ROM-Eject Button** ejects the CD-ROM tray from the CD-ROM drive.

16 **Fn Key**, used with a function key, is used to activate the Fn Key functions.

17 **TrackPoint III** is a built-in pointing device that provides a function similar to that of a mouse.

18 **Function Keys**, used with the Fn key, are used to activate the Fn key functions.

19 **Speaker Volume Control** adjusts the speaker volume from 0 (no volume) to 5 (Max).

2 **LCD Suspend Switch** sets the computer to enter suspend mode when the LCD is closed. **Do not press this switch at any time.**

Locations

Inside View

1 To replace modem port:
☞ Page 176.

3 Using CD-ROMs:
☞ Page 106.

4 To replace battery:
☞ Page 112.

5 To remove HDD:
☞ Page 171.

6 To secure computer:
☞ Page 145.
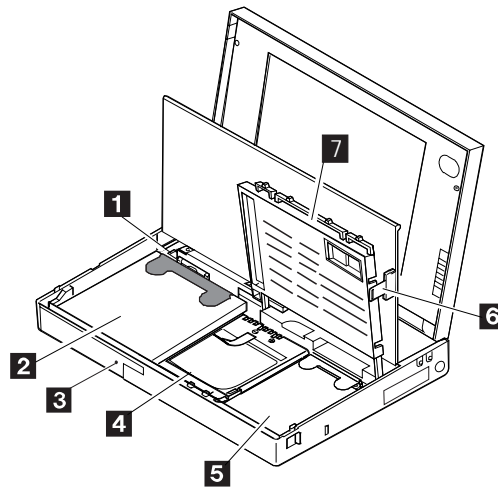
1 **Modem/Fax-Port-Eject Button** releases the Modem/Fax port from the computer for replacement.

2 **Removable CD-ROM Drive** reads data from a 5.25-inch CD-ROM.

3 **CD-ROM emergency eject** ejects the CD-ROM tray when it does not open with the CD-ROM-eject button. Insert the CD-ROM eject pin supplied with the computer, to eject the CD-ROM tray.

4 **Battery Pack** allows you to operate the computer when ac power is not available.

5 **Hard Disk Drive** can be replaced with one of different capacity.

6 **Keyboard Lock** prevents the keyboard from opening, when it is used with the hard disk drive lock.

7 **Keyboard Spacer** covers the space between the keyboard and internal devices when the keyboard is closed. It also opens to cover the space between the diskette drive or other internal devices and keyboard when the CD-ROM is removed.

Bottom View

1   To use lock:
☞   Page 145.
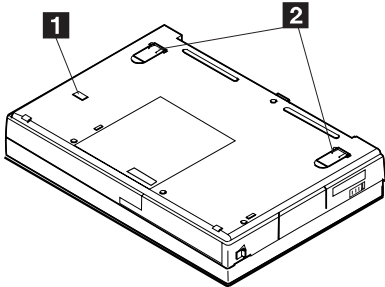
1   **Locking Lever** is used with a chain to lock and prevent the keyboard from opening. It secures your internal devices under the keyboard.

2   **Legs** are used to adjust the keyboard angle.

Locations

Rear View

1 **Rear Door** covers the connectors on the rear of the computer.

2 **Connector Door** allows connection of a cable to the system expansion connector when the rear door is closed.

3 **Infrared (IR) Port**
See page 4.

4 **MIDI/Joystick Port**
See page 4.

5 **System Expansion Connector**
See page 4.

6 **Power Shutdown Switch** is used to turn the computer off when the application "hangs" or the computer will not accept any input. Use the tip of a pen to press this switch.

7 **External Display Connector**
See page 4.

8 **Parallel Connector**
See page 4.

9 **Serial Connector**
See page 4.

1 **Power Jack** is where the AC Adapter cable is connected.

11 **Option Cover** can be removed when options are used in the CD-ROM/diskette drive compartment.

12 **Headphone Jack**
See page 4.

13 **Microphone/Line-in Jack**
See page 4.

14 **Modem/Fax Port**
See page 4.

15 **Power Switch** turns the computer on and off.

System Status Indicators

The system status indicators show the current status of your computer by their on/off states or colors (green, yellow, and orange). Each indicator is identified with a symbol.

The following figure and table show the location of each symbol and the meaning of each indicator.

Symbol	Color	Meaning
1 Speaker	Blinking green	When enabled by the ThinkPad Features program, this indicator blinks when the speaker sounds. It turns off when any key is pressed. (To enable this indicator see "Using the ThinkPad Features Program" on page 36.)
2 Battery Power Status	Green	Shows the condition of the battery pack.
	Yellow	**Green/Yellow** Enough power remains for operation.
	Orange	**Orange** Some power remains for operation.
	Blinking orange	**Blinking orange** The battery pack needs charging.
3 Battery Charging	Green	Indicates that the battery pack is charging. When the indicator turns off, the battery pack is fully charged.
	Blinking Green	Indicates that the battery pack is discharging. This indicator turns on (green); then charging starts automatically after discharging is complete.
4 PC Card In-Use	Orange	Turns on when power is supplied to the PCMCIA slot. Refer to the PC Card manual to see if the PC Card can be removed without turning the computer off.
5 Diskette Drive In-Use	Orange	Turns on when data is read from a diskette (when the diskette drive is installed.) Do not enter suspend mode or eject the diskette when this indicator is on.

System Status Indicators

Symbol	Color	Meaning
6 Hard Disk In-Use	Orange	Turns on when data is read from or written to the hard disk. Do not enter suspend mode or turn off the computer when this indicator is on.
7 Numeric Lock	Green	When on, indicates the numeric keypad on the keyboard is enabled. You enable and disable the keypad by pressing and holding the Shift key; then press the NumLk key. For more information about the numeric keypad, see "Operating the Numeric Keypad" on page 27.
8 Caps Lock	Green	When on, indicates the Caps Lock mode is enabled. All alphabetic characters (A-Z) are entered in capital letters without pressing the Shift key. You enable and disable Caps Lock mode by pressing the Caps Lock key.
9 Scroll Lock	Green	Alternately turns on and off each time the Scroll Lock key is pressed. While this indicator is on, the Arrow keys are used as screen-scroll function keys. In this state, the cursor cannot be moved with the Arrow keys. Not all application programs support this function.
1 Suspend Mode	Green	When on, indicates the computer is in suspend mode. See page 55 for more information about suspend mode.
	Blinking green	Indicates the computer is entering suspend or hibernation mode, or is resuming normal operation.
11 Power On	Green	Shows that the computer is operational. This indicator turns on when the computer is turned on and the computer is not in suspend mode.
12 CD-ROM Drive In-Use	Green	Turns on when data is read from a CD-ROM in the CD-ROM drive. Do not enter suspend mode or eject the CD-ROM when this indicator is on.

Providing Power

Your computer can be used both inside and outside your office area. Different power sources for the computer are available for different conditions: the AC Adapter, battery pack, or Car Battery Adapter. When you are using the computer as a desktop computer, you can use the AC Adapter which provides continuous power. When traveling outside your office area, you can use the charged battery pack. A Car Battery Adapter is available (an option) for you to charge the battery pack in your car when it is low in power.

AC Adapter

Warning:
Always use the AC Adapter certified by IBM in the country where you will be using the computer. Operating the computer with an incorrect AC Adapter can cause damage to the battery pack and to the computer.

The AC Adapter is an alternating current (ac) to direct current (dc) converter that supplies power for the computer. The AC Adapter also charges the battery pack when it is installed in the computer.
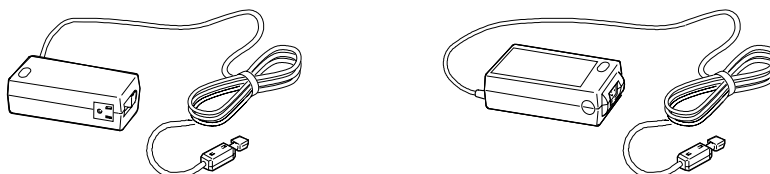
The input voltage is 100–240 V ac, 50/60 Hz or 100–125 V ac, 50/60 Hz. Refer to the label on your AC Adapter for the input voltage, and make sure you use the AC Adapter with the stated input voltage.

CAUTION:
Do not attempt to open the AC Adapter case. The AC Adapter is permanently sealed and cannot be repaired.

If you turn on the computer when the battery pack is installed, you will hear a short beep when you connect or disconnect the AC adapter from the computer. This short beep means that the power source has been changed.

When you disconnect the AC Adapter from the computer with a battery pack installed, the LCD brightness becomes slightly dimmer to conserve battery power.
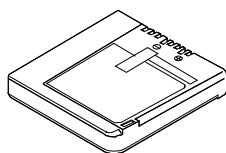
Battery Pack

The battery pack is an internal power source for the computer when the AC Adapter is not available. The battery pack is rechargeable with the AC Adapter or the Quick Charger (an option).

The following table shows the operating time, in hours, of the computer with a fully-charged battery pack. *The operating time depends on the applications and the configuration of the system. The actual battery operating hours might be shorter or longer than the time indicated, especially when using the CD-ROM drive.*

Operating Time (Hours)	**3.0** to **9.0**

Battery packs shipped from the factory are in an almost discharged state, so you **must charge** them before use.

An internal microprocessor in the battery pack sends battery status to the computer. The *storage switch* 1 on the battery pack sets this microprocessor to on (|) or off (O).

Do not slide the storage switch to the off position (O) after you set it to the on position at the time of purchase. If you set the switch to the off position by mistake, slide the switch to the on position (|); then recharge and discharge it to prevent incorrect battery status from being sent to the computer.
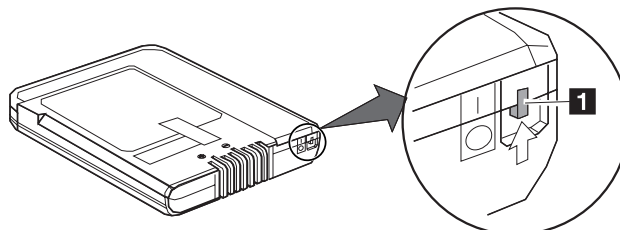
Standby Battery

Your computer has another rechargeable battery, called the *standby battery*. It supplies the necessary power to save data when a battery pack is replaced during suspend mode. The standby battery can be replaced only by your dealer or an IBM service representative. To charge the standby battery, connect the AC Adapter to the computer. When using the computer for the first time, let the battery charge for at least eight hours to allow it to become fully charged.

Car Battery Adapter
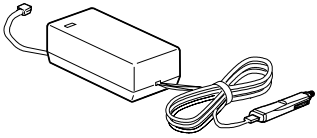
The Car Battery Adapter, available as an option, plugs into the car's cigarette-lighter socket and supplies power to your computer.

When using the Car Battery Adapter, the battery status indicator turns red. Operational charging of the battery pack is disabled when the Car Battery Adapter is used.

If you are new to the TrackPoint III, these instructions will help you get started.

Note:
Remember that the stick does not move.

1 Place your hands in the typing position and press gently with either index finger in the direction in which you want the cursor to move.

Pressing the stick away from you moves the cursor up the screen; pressing it toward you moves the cursor down the screen.

Note:
Either thumb can be used.

2 Use the click buttons to select and drag as required by your software, in the same way as for any other pointing device.

You can easily drag an item across the screen without having to continually press the click buttons of the TrackPoint III. To drag-and-drop an item, press; then slide the click button toward the front of the computer. The click button locks into place so you can drag an item across the screen using the TrackPoint III without holding down the click button.
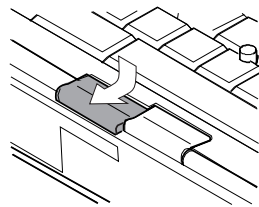
To release the latch, press the side of the click button.
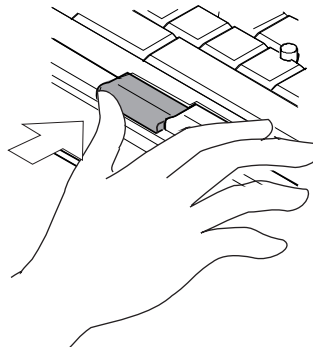
Cleaning the Cap

The cap 1 on the end of the TrackPoint III is removable. You can replace it with one of the spares shipped with your computer when the cap is worn out.

To maintain a smooth pointing operation, occasionally clean the cap with a soft cloth moistened with non-alkaline detergent.
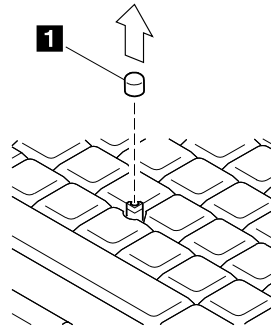
Operating the Numeric Keypad

The keyboard has some keys that, when enabled, work as a 10-key numeric keypad. (The numeric keypad on the keyboard is not active when the external numeric keypad is attached to the computer.)

To enable the numeric keypad, press and hold **Shift** and **NumLk**.
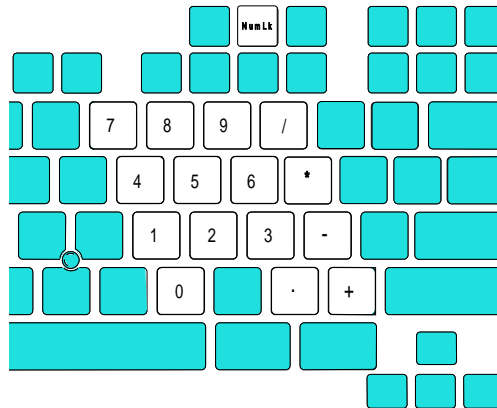
While in this mode, press and hold **Shift** to temporarily use the cursor and screen control keys.
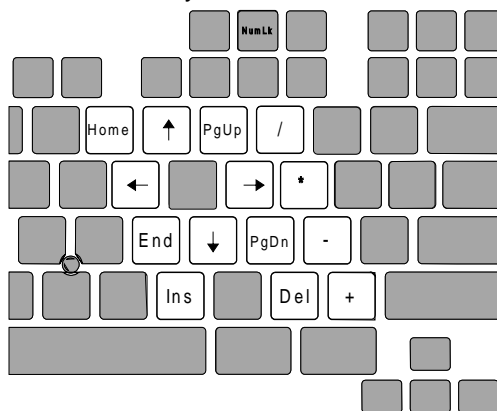
To disable the numeric keypad, press and hold **Shift**; then press **NumLk** again.

Using the Online Book

Note:
The online book is available in some countries. The online book is not available on diskettes.

The online book provides a helpful way of quickly retrieving needed information when you travel or when hardcopy manuals are not available. Even when using the computer, you can use the online book to easily search for information.

The way you start the online book depends on the operating system installed in your computer.

Starting for OS/2 or Windows

To start the online book, select the Online Book icon on the screen.

Starting for DOS

1 Type **CD\READIBM** at the command prompt and press **Enter**.

2 Type **READIBM** and press **Enter**.

The menu for the online book appears. Choose any subject from the menu.

Keeping the Computer from Being Damaged

Your computer is a delicate device that requires careful handling. To keep it from being damaged, keep these precautions in mind:

Do not place anything heavy on your computer.
Do not scratch, twist, hit, or press the surface of the LCD.
Keep the computer at least 13 cm (5 in.) away from any electrical appliance that generates a strong magnetic field such as magnets, motor, TV, refrigerator, or large audio speakers.
Use your computer when temperatures are between 5°C to 35°C (41°F to 95°F).
Remove the battery pack and keep it in a cool place if you do not use the computer for a long period of time.
Do not disassemble the computer.
Do not leave any objects (especially metal objects) in the computer.
Do not pour liquid into the computer.
Do not apply shock to your computer.

The removable hard disk drive, CD-ROM drive, and diskette drive are very delicate devices that need careful handling. To avoid damage, do not press on, drop, or apply any shock to them when they are removed from the computer.

Do not press on the middle part of the CD-ROM drive or the diskette drive at any time.

Do not touch the lens on the CD-ROM tray.

Do not use benzene, thinners, or other cleaners to clean the lens on the CD-ROM tray. Use a CD-ROM cleaner kit.

Do not place more than one diskette label on a diskette. Two or more labels can cause a label to tear apart inside the drive and cause damage to the diskette drive.

Insert a diskette straight into the diskette drive. Inserting it at an angle can damage the front of the diskette drive.

Occasionally clean your computer as follows:

Use a soft cloth moistened with non-alkaline detergent to wipe the exterior of the computer.

Gently wipe the LCD with a dry, soft cloth. Avoid using alcohol or detergent to clean the LCD.

Carrying the Computer

When carrying your computer, follow these instructions to prevent possible damage to your computer and data.

1 Remove any CD-ROM from the CD-ROM drive or any diskette from the diskette drive.

2 Turn off all attached devices.

3 Turn off the computer and close the LCD.

4 Unplug all external cables and cords connected to the computer.

5 Make sure all computer doors and covers are closed.

For Your Information

1. You should occasionally back up data from the hard disk to diskettes or tapes.

2. To use the AC Adapter outside your home country, you need an ac power cord that is certified for the country you are visiting. You can purchase one through IBM or an IBM authorized dealer in that country. For more information about the power cords, see "IBM Power Cords" on page 283.

3. The internal modem/fax can only be used in the country in which you have purchased the computer.

4. A carrying case is available from IBM or an IBM authorized dealer.

Chapter 3. Operating Your Computer

This chapter provides information about using your computer.

What Happens When Power Is Turned On?

One of the following prompts appears when the computer is turned on.

	This screen appears when an operating system is installed. (The screen shown is an example of an operating system screen. The actual screen may differ according to your operating system.)
	This screen appears when an operating system is not found. It instructs you to insert a self-starting diskette into the diskette drive and press F1 to start the diskette. The order in which the computer checks the drives for an operating system is set in the drive-startup sequence. See "Using the Selectable Drive-Startup Sequence" on page 54 for more information.
	This screen instructs you to set the date and time for the first time. Enter the date and time (see page 50) and press **Enter**.
	This screen indicates that a failure occurred during the power-on self-test (POST). See page 231 for the necessary actions.
	This icon appears when password protection is used. To start the computer, enter the correct password.
	This icon appears when the hard disk drive password protection is used. To unlock the hard disk drive, enter the correct password.

Using the ThinkPad Features Program

Note:
When installing an operating system, you must install the ThinkPad Features program to use it.

To install the ThinkPad Features program:
☞ page 202.

Fuel-Gauge program:
☞ Page 117.

Personalization Editor program:
☞ Page 149.

ThinkPad Features is a program that allows you to select various features for your computer such as:

Power management

– Power mode
– Power for devices
– Suspend and hibernation options
– Resume options

Alarm

– Speaker indicator setting
– Alarm setting

Display

– Display device
– External monitor settings
– Device Driver settings

Fuel-Gauge program

– Remaining power percentage
– Current power mode
– Discharge options

Docking Control

For information on how to dock or undock the computer using this feature, refer to the documents supplied with the Dock II.

ThinkPad Setup

– Keyboard/pointing device settings
– Port settings
– Option device settings

Personalization Utilities

– Personalization Editor
– Update Utility

The following shows the structure of the ThinkPad Features program.
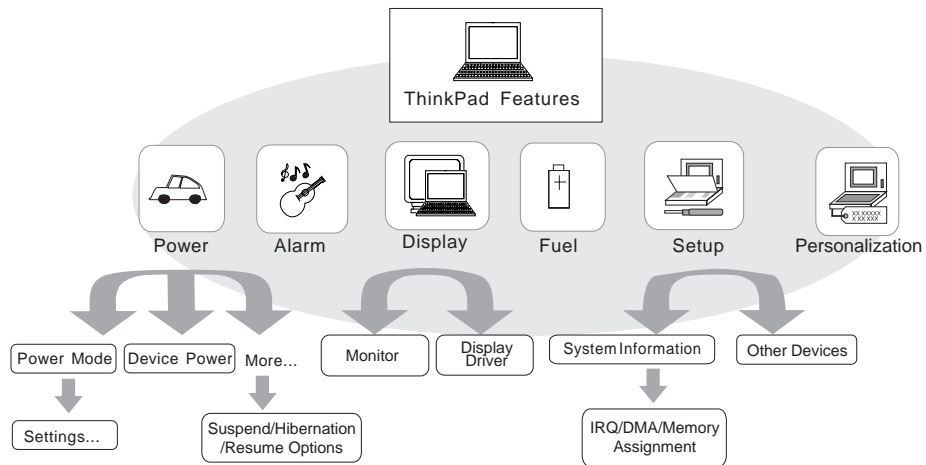
Starting the ThinkPad Features Program

The way you start the ThinkPad Features program depends on what operating system is installed.

Starting the Program for OS/2 and Microsoft Windows

If you are using OS/2 or Windows, you can use the ThinkPad Features program with the graphical user interface. You can also specify features by entering the appropriate commands at the command prompt (see page 44).

Note:
This screen might look different from the actual one.
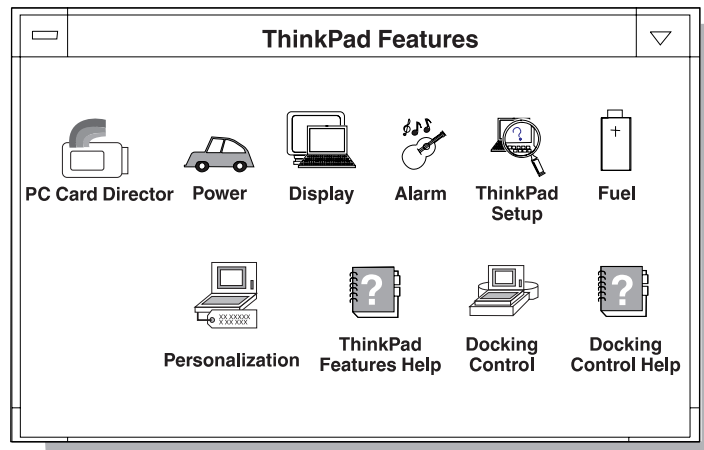
The ThinkPad Features program contains the following menus.

```
  ┌─ For your information ──────────────────────────┐
  │                                                 │
  │  A Help button is available on most menu screens.  For additional  │
  │  information on each menu item, click on this button.  │
  │                                                 │
  └─────────────────────────────────────────────────┘
```

Power Menu

The power menu allows you to set power modes for battery or ac operation, or set power for devices. System timers and suspend or hibernation mode options can also be set.

Power Mode

You can select one of the following power modes when using the battery pack or AC Adapter:

– High Performance

Select this mode to use the full performance of your computer while saving power. This mode is suitable for ac power operation. *You cannot change the settings for this mode.*

– Automatic

Select this mode to have the computer set the processor speed or timers for saving of power. This mode is suitable for battery operation. *You cannot change the settings for this mode.*

– Customized

Select this mode to set the timers or processor speed of your choice.

Customizing power mode

To customize the power mode, click on **Settings...** You then can select and set power-saving options, such as timers or processor speed. You can select **Automatic clock control** to automate the processor speed. This will automatically use minimum processor speed when the computer is not operating or use maximum speed when performing tasks.

Power for devices

When using the PCMCIA slots, external serial device, internal options in the CD-ROM/diskette drive compartment, Enhanced Video features, or infrared ports that require power, click on the appropriate check box in the Power for devices field of the Power menu.

More...

You can set suspend or hibernation mode options, or resume options by clicking on **More...**

Alarm Menu

The alarm menu allows you to enable or disable the speaker. You can set the speaker to sound when the power status or the power mode is changed, or when battery power is low. The speaker indicator can also be enabled or disabled when the speaker sounds.

Display Menu

The display menu allows you to select the display used with your computer.

Display device

You can select the LCD, an external display, or both as the output device. When using both the LCD and external display, the LCD brightness becomes slightly dimmer to conserve battery energy.

Using the ThinkPad Features Program

Using Enhanced Video:

Device Driver

You can select the display resolution and the number of colors for the LCD and external display (up to 65 536 colors). Parameters for the video in/out ports and Enhanced Video features can also be set. You can set smooth playback or select the country color standards, NTSC (National Television Standards Committee) or PAL (phase alternation by line), for a television connected to the video-out port.

If you are using OS/2 or Windows, you can set the LCD as if it is using high resolution mode (800 by 600 or 1024 by 768). Use the pointer to scroll up or down, left to right to see information outside the displayed area.

1024x768

640x480
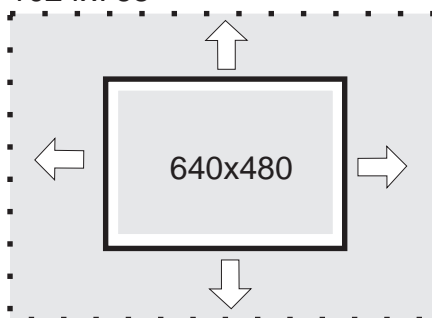
External Monitors settings

You can select the type of the external display you are using to set up appropriate resolutions and refresh rates.

Fuel-Gauge Program

The Fuel-Gauge program allows you to view battery-power information as an icon on the screen. Double-click this icon to display the window of this program. Suspend mode or hibernation mode can be set, or you can discharge the battery pack by pressing the corresponding buttons in the window.
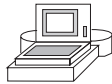
Docking Control Menu

The Docking Control utility allows you to dock or undock the Dock II to the computer. Refer to the documents supplied with the Dock II for more information.

Using the ThinkPad Features Program

ThinkPad Setup Menu

The ThinkPad setup menu allows you to view or set the following:

System Information

This shows you the system information and assigned resources (interrupt levels (IRQ), DMA channels, and memory assignments) in the system.

Keyboard/Pointing Device

This allows you to select the repeat-action speed of the keyboard or to enable the TrackPoint III. It also enables the Sticky Fn key function, so Fn key functions are entered without pressing and holding the Fn key.

If you are using Windows: You can also choose to have a trailing cursor or select the shape and color of the pointing cursor.

Parallel

This allows you to enable the parallel port, select the port address (LPT1–LPT3), or set the direction of transfer and operating mode.

Serial

This allows you to enable the serial port, select the port address (COM1–COM4), and view the interrupt levels. You cannot use more than two serial devices at a time. Serial devices include a device connected to the serial port, a modem in the CD-ROM/diskette drive compartment, the infrared ports, the internal modem/fax (available as an option in some countries), and PCMCIA modem cards.

Mwave functions:

DSP

This allows you to enable the DSP device for the Mwave functions, or set the I/O address, IRQ level, or DMA channel.

Infrared communication:

Infrared

This allows you to enable the infrared ports or set the communication speed.

Video

This allows you to set the memory address for the video BIOS. You can also select the IRQ levels for the Enhanced Video controller.

Option Devices

This allows you to set the I/O address, IRQ level, DMA channel, and memory address of the adapter in the expansion unit or other options.

Personalization Editor

The Personalization Editor allows you to create your customized screen with personal information, such as your name or address. With the personalization update utility, your data will be stored in the non-volatile memory in the system. Your screen appears with the password prompt every time the computer is turned on.

See page 149 for more information on how to create your personal screen.

Using the ThinkPad Features Program

Starting the Program for DOS

To start the program, type **PS2 ?** at the DOS prompt. The ThinkPad Features menu screen appears.

Notes:

1. You can use the PS2 commands from the DOS command prompt of OS/2 or Windows.

2. This screen might look different from the actual one.

```
C:\> PS2 ?

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   US Government Users Restricted Rights - Use, duplication
   or disclosure restricted by GSA ADP Schedule Contract
   with IBM Corp.

Command Syntax: PS2  [Parameter1] [Parameter2] [Parameter3]

Following are available [Parameter1].
For the complete command syntax, type 'PS2 ? [Parameter]'.

1.Power Management related

  PMode,   SErial,  DDC,       CARD,
  IR,      EVIDEO,  POwer,     LCd,       DISK,
  SPeed,   STandby, DISCHARGE, DEFAULT,  Cover,
```

You can select an item from the menu and follow the instructions on the screen to set any of the features.

The ThinkPad Features program for DOS is a command line interface so you can specify features by entering appropriate commands or create a batch file to instantly set your unique operational environment.

Note:

Refer to the manuals supplied with the operating system for more information on batch files.

The following example batch file allows you to make an operational environment that is suitable for traveling, which can result in a longer battery operation time.

```
@Echo Off

Rem  SAMPLE: Set the parameters to provide maximum power utilization.
Rem  =================================================================

          PS2 PMode Custom                > Nul
          PS2 LCd 3 minutes               > Nul
          PS2 DISK 3 minutes              > Nul
          PS2 POwer 5 minutes             > Nul
          PS2 SPeed Fixed MIN             > Nul
          PS2 STandby 3 minutes            > Nul
          PS2 IR OFf                      > Nul
          PS2 CARD OFf                    > Nul
          PS2 DDC OFf                     > Nul
          PS2 SErial OFf                   > Nul
```

Using the Fn Key Function

The Fn key 1 and the function keys (F1–F12) 2 allow you to instantly change operational features.
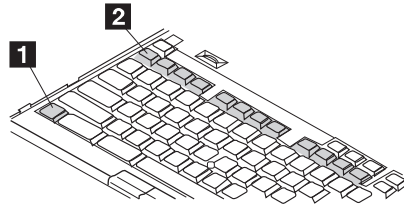
Use the following combinations of the Fn key and function keys.

Key Combination	Feature	Meaning
Fn + F1	Reserved.	—
Fn + F2	Fuel-Gauge program display on/off	The Fuel-Gauge program must be activated before this key combination can be used. *If you are using OS/2 or Windows:* The window for the battery-power status appears or disappears. Parameters for power status can be set. *If you are using DOS:* Power status information appears or disappears at the top-right corner of the screen.
Fn + F3	Standby mode	Places the computer in standby mode. See page 57 for more details about standby mode.
Fn + F4	Suspend mode	Places the computer in suspend mode. See page 58 for more details about suspend mode.
Fn + F5	Reserved.	—
Fn + F6	Reserved.	—

Fn + F7	LCD/external display switching	Displays the computer output in the following order if an external display is attached.
		
		    External LCD
		    Display
		
		          Both

Fn + F8	Reserved	—
Fn + F9	Reserved	—

Key Combination	Feature	Meaning
Fn + F10	Reserved	—

Fn + F11	Power mode switching	When the Fn+F11 key combination is pressed during battery-power operation, the power-management (power-saving) mode is changed as follows. (See page 38.)
		
		`High      Auto`
		
		`   Customize`
		
		The Fuel-Gauge program displays the current-power option.

Fn + F12	Hibernation mode	Places the computer in hibernation mode. See "Hibernation Mode" on page 62 for more information.

When using the computer with the IBM ThinkPad Dock I (an option):

Key Combination	Feature	Meaning
Fn + PgUp	Dock I sound increase	Each time this combination is pressed, the sound level for the Dock I increases.
Fn + PgDn	Dock I sound decrease	Each time this combination is pressed, the sound level for the Dock I decreases.

Using Easy-Setup

Warning:
Do *not* enter suspend mode when using Easy-Setup.

Note:
If Initialize in the Config menu, Password or Start up functions cannot be selected, a supervisor password has been set. You must enter the supervisor password to use these functions. See "Considerations when Using Easy-Setup" on page 138.

The computer has a built-in system setup function called *Easy-Setup*. Easy-Setup allows you to set date and time, passwords, startup sequence of the drives, and various hardware configurations, such as keyboard speed, serial and parallel port addresses. Easy-Setup also runs the diagnostics.

Easy-Setup

Config   Date/Time   Password   Start up   Test

Restart
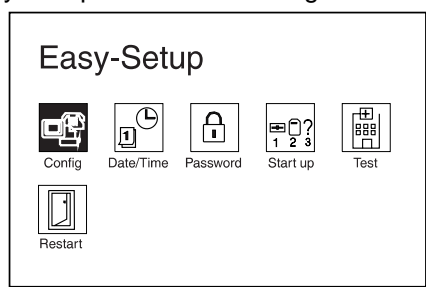
Starting Easy-Setup

To start Easy-Setup, do the following:

1 Turn off the computer.

2 Remove any CD-ROM from the CD-ROM drive or diskette from the diskette drive.

3 Press and hold F1; then turn on the computer. Hold F1 until the Easy-Setup menu appears.

To select an item from the Easy-Setup menu, move the pointer with a pointing device to the item and click on the click button or use the keyboard as follows:

Arrow keys (↑↓←→): Highlight the item from the menu.
Spacebar: Selects the item.
Enter key: Enters the next menu, or saves the changes and exits the menu.
Esc key: Returns to the previous menu, or cancels the changes.

Hints and Tips

You can change the screen color of the Easy-Setup menu with
Ctrl+**Page Up** or **Ctrl**+**Page Down**. Use **Ctrl**+**Home** to restore the
original screen color.
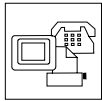
Config contains the following:

Config
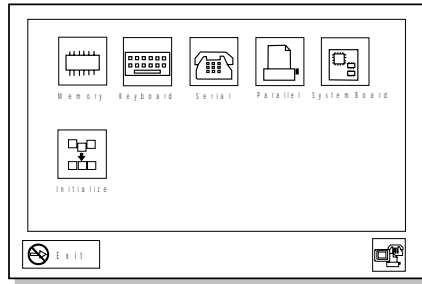
Memory shows the amount of installed memory and the available
remaining memory. If **Disable** is selected, the parity check is
disabled when non-parity memory cards are used.

Memory

Keyboard sets the repeat-action speed and enables or disables the
TrackPoint III, so other pointing devices can be used.

Keyboard

Serial selects the port address for a serial device connected to the
serial port, or for the internal serial device in the CD-ROM/diskette
drive compartment.

Serial

Parallel selects the port address for a device, such as a printer, that
is connected to the parallel connector. When you select
Bi-directional, the data transfer between the selected port and the
device is in both directions. When you select **Uni-directional**, the
data transfer is only in one direction; from the computer to the
device.

Parallel

SystemBoard provides information about the installed system
board.

SystemBoard

Initialize sets all items in the Config menu to their original values.

After verifying the selections, click on **OK** or press **Enter**. To cancel the selections, press **Esc**.

Initialize
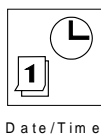
Date/Time is used to set the current date and time.

Date/Time
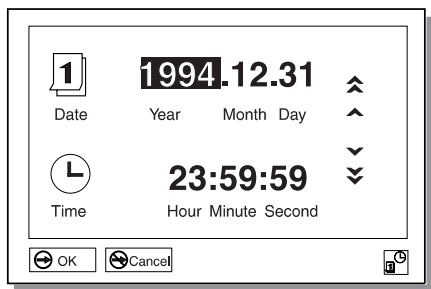
Select any field (year, month, date, hour, minute, or second) with the arrow key or pointing device; then type or click on the ⋀ or ⋁ icon to change setting. Clicking on the ⋀ or ⋁ icon changes the setting more quickly.

After verifying the selection, click on **OK** or press **Enter**. To cancel the setting, click on **Cancel** or press **Esc**.

Password

Password is used to set the following passwords:

    Power-On Password
    Hard-Disk Password
    Supervisor Password
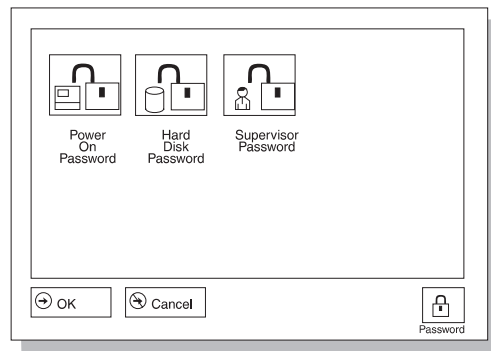
For more information about the passwords and how to set, change, or remove them, see Chapter 5, "Protecting Your Computer" on page 129.
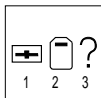
Using Easy-Setup

Start up is used to change the startup sequence of your computer.
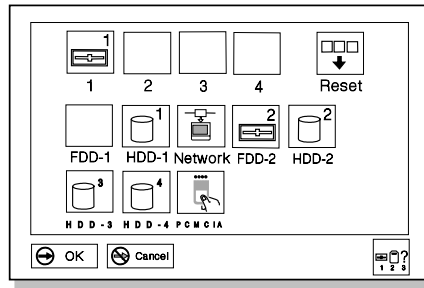
The **HDD-1** icon represents the internal hard disk drive of the computer. The other numbered HDD icons are the hard disk drives of external devices. The **FDD-1** icon represents the first diskette drive that is found during system startup. When no diskette drive is installed and the attached expansion unit (such as the Dock I or Dock II) has a diskette drive, the diskette drive in the expansion unit will be the first drive.

For more information about the startup sequence and how to change it, see "Using the Selectable Drive-Startup Sequence" on page 54.
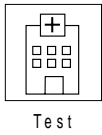
Test

Test is used to test the computer hardware.
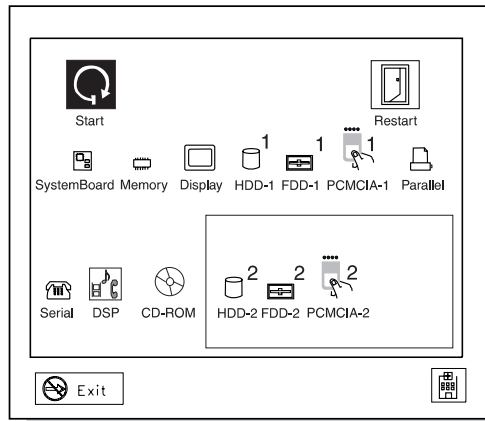
Click on the **Start** icon to start the test. If an error is detected, the character X appears at the left of the affected device and an error code appears below it. Record the error code and have the computer serviced.
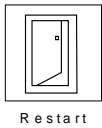
Restart

Restart is used to restart the computer after selections have been made. To restart the computer, press **Enter** or click on **OK**.
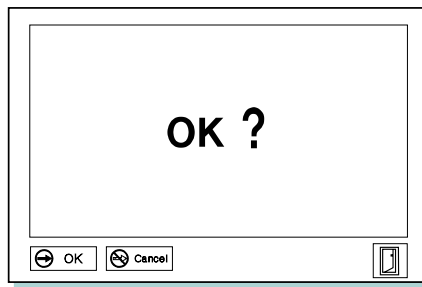
Using the Selectable Drive-Startup Sequence

Warning:
If you change your startup sequence, you must be extremely careful when you do write operations (such as copying, saving, or formatting). Your data or programs can be overwritten if you select the wrong drive.

Selectable drive-startup (*selectable boot*) allows you to control the startup sequence of the drives in your computer. The order in which the computer searches the drives for your operating system is the *drive-startup sequence*. If you are working with multiple operating systems, you might want to change the drive-startup sequence to load the operating system from the hard disk or the PC Card without checking the diskette drive, or do a remote program load (RPL).

Changing the Startup Sequence

To change the startup sequence, do the following:

1 Start Easy-Setup and select the **Start up** icon.

Note:
The sequence is reset, and all available device icons appear at the bottom of the screen.

2 Move the cursor to the **Reset** icon; then press the **Spacebar**.

Note:
You cannot set any hard disk drive before the PC Card in the startup sequence.

3 Move the cursor to the icon of the first device for the startup sequence; then press the **Spacebar**.

Repeat this step to set the other devices for the startup sequence. Up to four devices can be set.

4 Click on **OK** or press **Enter** to save the change.

Using Power Management

Your computer has the following built-in battery power-saving functions to save power when you use the battery pack or AC Adapter:

Operational Modes

The operational modes set the computer to control the processor speed or to set timers for saving power.

Power-Saving Modes

The power-saving modes set the computer to stop all tasks when the computer is not used for a specified time to save power.

When resuming normal operation from one of the modes, the **resume function** sets the computer to return to where it was when it entered that mode. Because the operating system is already loaded, the resume function is faster than power-on.

For more information about the operational modes, see page 38.

The following are the three power-saving modes:

Standby Mode   Enter standby mode for short idle times.

Suspend Mode   Enter suspend mode for short times away from your desk.

Hibernation Mode Enter hibernation mode when you leave your office for the day.

It takes more time to return to normal operation from hibernation mode than from suspend or standby mode, but the computer does not use any power during hibernation mode. On the other hand, it takes only a short time to return from standby mode, but the amount of power saved in standby mode is less than in suspend or hibernation mode.

A comparison of the power conserved and the time required to return to operational mode is shown in the following figure.

Key Element	Power Saving Mode		
	Standby	Suspend	Hibernation
Time required to return to normal operation.			
Amount of power consumption.			

The following figure shows the operations required when the computer moves from a power-off condition to operational mode, and vice versa. The battery shows the amount of battery power used in each stage. (See page 36 to set the timers.)
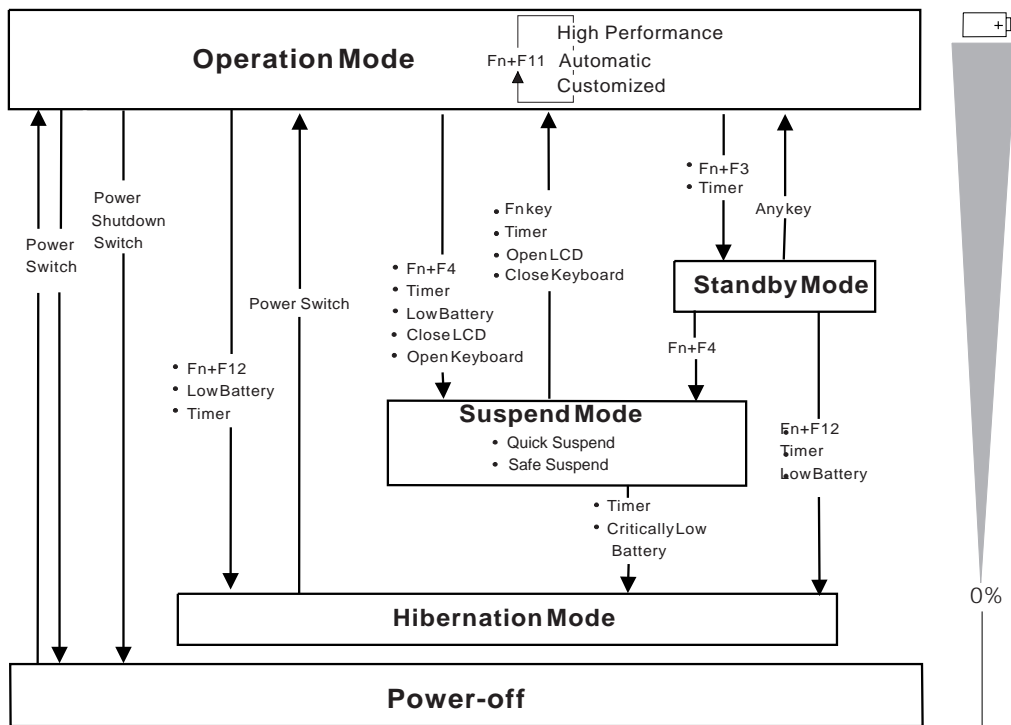
Standby Mode

In standby mode, the hard disk drive stops and the LCD turns off. When any key is pressed, the computer immediately resumes normal operation.

The following shows what causes the computer to enter standby mode and resume normal operation.
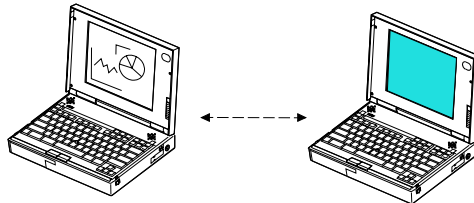
Fn Key Function:
☞ page 46.

To Standby Mode
Fn+F3 key combination is pressed.
The standby timer is set in the ThinkPad Features program.

To Normal Operation
Any key is pressed.
Pointing device activity occurs.

Auto Standby Mode

You can set the computer to enter standby mode automatically when the computer is inactive for a specified period of time.

To set the timer for standby mode in OS/2 or Windows, do the following:

1. Select the **Power** icon from the ThinkPad Features program.

2. Select **Customized** for either the battery or AC Adapter.

3. Click on **Settings...**

4. Set the minutes for the Standby timer; then click on **Save** to save the changes.

To set the timer for standby mode in DOS, type **PS2 ?** at the command prompt; then press **Enter** for more information.

Suspend Modes

The computer provides two types of suspend modes for you to save power.

Suspend mode

In suspend mode, all tasks are stopped and stored in memory to save power. When the computer resumes normal operation, the tasks are automatically restored.

Safe suspend mode

In safe suspend mode, all tasks are stopped, and memory data and the status of the computer are stored on the hard disk drive. This prevents accidental lose of data during suspend mode. If all battery power is used and the computer turns off during safe suspend mode, install a fully-charged battery pack or connect the AC Adapter; then press the power switch to resume operation. All tasks are restored. *Create the hibernation file before using this mode.* (See "Creating the Hibernation File" on page 63.)

To enter safe suspend mode, do the following:

If you are using OS/2 or Windows:

1. Start the ThinkPad Features program.
2. Select the **Power** icon; then click on **More...**
3. If a hibernation file has not been created, click on **Enable hibernation and create the file on the hard disk drive.**.
4. Click on the check box next to **Safe suspend**. (A mark appears in the check box when safe suspend is selected.)
5. Click on the **OK** button.

If you are using DOS:

Type **PS2 ?** at the command prompt; then press **Enter** for more information on creating the hibernation file (if not created) and enabling the safe suspend mode.

The following shows what causes the computer to enter suspend mode and to resume normal operation.
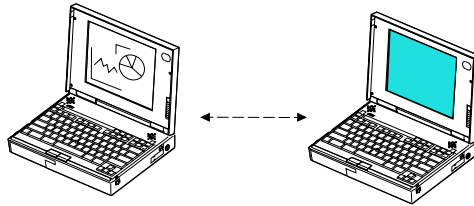
Fn Key Function:
☞ page 46.

ThinkPad Features:
☞ page 36 .

To Suspend Mode

The Fn+F4 key combination is pressed.

The LCD is closed.

If you are using OS/2 or Windows: The suspend button is pressed in the Fuel-Gauge program.

If you are using DOS: The command for entering suspend mode is entered.

No activity occurs during the time specified by the suspend timer.

A low-battery condition is detected.

The keyboard is opened.

To Normal Operation

The Fn key is pressed.

The LCD is opened.

If you are using OS/2 or Windows: The **Resume on timer** option is set in the ThinkPad Features program.

If you are using DOS: The command to resume from suspend mode is set.

The ring indicator is received through the communication interface.

For safe suspend mode: The power switch is pressed.

Any key on the external keyboard is pressed. (Only when using the AC Adapter.)

The keyboard is closed.

The current status of the computer is shown by the following indicators:

Current Status	Indicators	
	⬡ **Suspend Mode**	⬡ **Power-On**
In Suspend Mode	Green	Off
Entering or Resuming Suspend	Blinking green	Off
Normal Operation	Off	Green

Considerations for Suspend Mode

Consider the following before using suspend mode:

The computer can enter suspend mode when used with the following operating systems:

– PC DOS Version 6.3 or later
– OS/2 Version 2.11 or later
– Microsoft Windows Version 3.1 with DOS Version 6.3 or later

---
Important

When you use Windows Version 3.1, ensure that Advanced Power Management (APM) is installed according to the instructions in "Microsoft Windows Version 3.1 or Later" on page 197.

Approximately 1.2 hours are needed to recharge the battery in suspend mode.

Attached devices, such as a printer or serial device, stop running when the computer enters suspend mode. When normal operation is resumed, the output can differ from what you expect, because the device might be reset or lose its configuration settings.

Sometimes you might want to use the computer with the LCD closed, for example when an external display and keyboard are used. In such case, turn on the computer with the LCD closed or set the computer to not enter suspend mode when the LCD is closed using the ThinkPad Features program.

When a power-on or hard-disk password is set, you need to enter your password to resume normal operation.

Standby mode:
☞ Page 57.

When the computer is powered with ac power and is using one of the following IBM PC Cards, it enters standby mode.

– IBM 3270 Emulation Credit Card Adapter
– IBM Token-Ring 16/4 Credit Card Adapter
– IBM Credit Card Adapter for Ethernet
– IBM 5250 Emulation Credit Card Adapter

When other PC Cards are used, all application programs stop, and for some of these PC Cards the power to the PC Cards might also turn off.

Note:
If the communication is still not reestablish, remove; then reinstall the PC Card before restarting the system or application program.

When the computer is powered with battery power, the computer turns power off to the PC Card, so the duration of suspend mode is longer. When resuming normal operation, if the PC Card or computer does not operate, restart the application or computer.

When the computer is using one of the following IBM modem cards and detects an incoming call while in suspend mode, it automatically resumes normal operation.

– IBM PCMCIA Data/FAX Modem
– IBM High Speed PCMCIA Data/FAX Modem

While the communication link is active, the computer will not enter suspend mode.

Hibernation Mode

Notes:

1. Before using hibernation mode, you must create a hibernation file. (See page 63.)

2. Using an expansion unit or a particular PC Card disables the hibernation mode.

3. With a base memory of 8MB, it takes approximately 10 seconds to enter hibernation mode and 18 seconds to resume normal operation. (The time to enter or exit hibernation mode depends on the computer memory size.)

During hibernation mode, all tasks are stopped and memory data and the current status of the computer are stored on the hard disk drive; then the power is turned off. No battery power is used. When power is turned on again, the computer automatically restores the tasks and resumes normal operation. When the computer is entering hibernation mode, you will hear one short beep. A graphical message appears and the suspend indicator blinks; then a short beep sounds again to inform you that the computer has entered hibernation mode.

The following shows what causes the computer to enter hibernation mode and to resume normal operation.
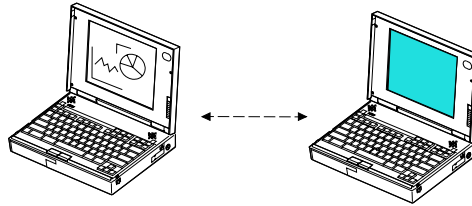
Fn Key Function:

To Hibernation Mode

The Fn+F12 key combination is pressed.

If you are using OS/2 or Windows: The hibernation button is pressed in the Fuel-Gauge program.

If you are using DOS: The command to enter hibernation mode is entered.

The hibernation options are specified in the ThinkPad Features program.

A low-battery condition is detected.

To Normal Operation

The power switch is pressed.

Creating the Hibernation File

Warning:
The hibernation file must not be created in a compressed data area of the hard disk or external drive.

When installing an operating system or if you have expanded computer memory, you must create a hibernation file on the hard disk drive to use the hibernation mode.

The size of the hibernation file will be greater than total memory. For example, if base memory is 8MB and you have installed an optional 4MB IC DRAM card, the hibernation file is 13MB: (4MB plus 8MB) plus 1MB.

The following describes how to create a hibernation file for your operating system.

If you are using OS/2 or Windows:

1 Turn on the computer and start the ThinkPad Features program.

2 Select **Power**; then press the **More...** button.

3 Press the **Enable Hibernation** button in the Suspend Options menu.

4 Make sure the hard disk drive in the computer is selected; then press the OK button to create the hibernation file.

The computer can now enter hibernation mode.

If you are using DOS:

Type **PS2 ?** at the command prompt; then press **Enter** for more information.

Considerations for Hibernation Mode

Consider the following before using hibernation mode.

Do not run any tasks while the hibernation file is being created.

Create the hibernation file only on the hard disk drive installed in the computer.

The hibernation file is hidden and cannot be accessed.

The computer uses battery power to enter hibernation mode. Therefore, it reserves some battery power when it is set to enter hibernation mode at a low-battery condition. This can cause the battery operating time to be shorter than the time shown on page 22.

When you enter hibernation mode while playing musical compact discs or multisession Photo CDs, you will not return to where you left off after resuming normal operation.

When the computer is powered with ac power and is using one of the following IBM PC Cards, it does not enter hibernation mode.

- – IBM PCMCIA Data/FAX Modem
- – IBM High Speed PCMCIA Data/FAX Modem
- – IBM 3270 Emulation Credit Card Adapter
- – IBM Token-Ring 16/4 Credit Card Adapter
- – IBM Credit Card Adapter for Ethernet
- – IBM 5250 Emulation Credit Card Adapter

This prevents possible problems from occurring with communication application programs after the computer returns to normal operation.

Note:
If the communication is still not reestablish, remove; then reinstall the PC Card before restarting the system or application program.

When the computer is powered with battery power, the computer turns power off to the PC Card. When resuming normal operation, if the PC Card or computer does not operate, restart the application or computer.

---

‡ When the computer returns to normal operation, remove the PC Card from the computer and reinstall it. Communication returns automatically.

Using PC Cards

Your computer has two slots that allow you to plug in credit-card size PCMCIA cards (hereafter called *PC Cards*) that support PCMCIA Standard Release 2.0 or 2.1 or later. With PC Cards, you can connect to electronic bulletin board services, send and receive fax, store data, or log on to a mainframe computer or local area network.

About PC Cards

To insert PC Card:

☞ Page 156.

PC Cards are compact and are easy to insert and remove. They also have low power requirements. However, unlike the built-in serial port or ordinary AT* bus adapters, PC Cards need additional software (drivers) to turn them on and set them up for your application programs. Your computer comes with the following set of drivers:

> Card Services
> Socket Services
> PC Card Director

Card Services and Socket Services are the basic drivers required for all PC Cards. The drivers supplied with your computer support Socket Services Release 2.0 or 2.1 and Card Services Release 2.0 or 2.1 that comply with the PCMCIA standard. *PC Card Director* sets up the PC Card for you so the PC Card is ready to be used as soon as you insert it into the PCMCIA slot of the computer. The two PCMCIA slots can be used for either two Type I or Type II PC Cards, or one Type III PC Card. Ask IBM or an IBM authorized dealer for more information about the different types of PC Cards.

---

* Trademark of the IBM Corporation.

Limitations of Operation under Suspend and Hibernation Modes

Some PC Cards can be inserted or removed without turning off the computer (refer to the instructions that came with the PC Card), but you **cannot** remove or insert PC Cards during suspend mode. Some card types do not support hibernation mode.

Using the PC Card Director Program

Note:
When installing an operating system, you must install the PCMCIA device driver to use PC Card Director. PC Card Director requires the Socket Services and Card Services drivers.

To install the PCMCIA device driver:
☞ Page 205.

PC Card Director is an advanced IBM software that makes it easy to use PC Cards by:

Turning on and setting up a PC Card when you plug it in (Auto Configurator).
Showing what types of PC Cards are in your computer.
Notifying you with a pop-up message, beep sound, and/or graphical indicators (icons) whenever a card is inserted or removed.
Allowing you to register an application program for a particular PC Card and starting the program automatically when the card is inserted.

Note:
The PCMCIA.CRD file does not always list the latest PC Cards. If your PC Card is not listed, try using it with PC Card Director anyway.

Some PC Cards come with their own drivers that will set them up just like PC Card Director does. However, if these cards are supported by PC Card Director, you will not need their drivers. The supported PC Cards are listed in the **PCMCIA.CRD** file on the Utility Diskette.

If your PC Card is not supported by PC Card Director, you must install the driver that came with your card. The card driver must be compatible with the PCMCIA Card Services standard, Release 2.0 or 2.1. Follow the instructions in your card driver's manual to install the driver.
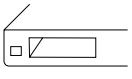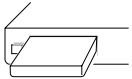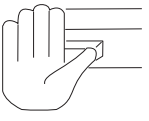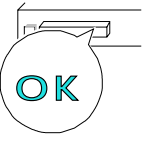
Understanding the Meaning of Icons
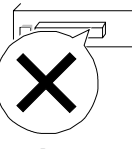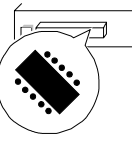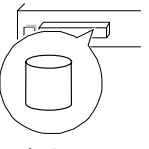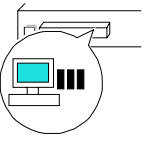
PC Card Director uses various icons (for OS/2 or Windows) or wording (for DOS) for information about the installed PC Cards and the PCMCIA slots.

For your information
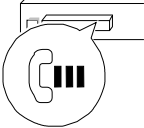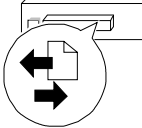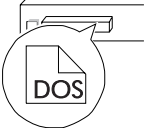
Help button is available on most PC Card Director menu screens. To obtain additional information for each screen, click on this button.

The following shows the icon and the DOS wording on the top row, and the meaning of the icon on the bottom row.

Empty	(card inserting)	Non removable	OK Ready
No PC Card is installed in the slot.	A PC Card is installed. This appears only as the PC Card is being inserted.	The installed PC Card cannot be removed.	The PC Card in the slot is ready to be used.

X Not Ready	Memory	Hard Disk	LAN
The PC Card is not ready and cannot be used.	Memory card.	Hard disk card.	Communication card.

`Modem`	(Depends on the card type.)	`Boot`	—
Modem card.	I/O card.	DOS was booted from the installed PC Card.	OS/2 was booted from the installed PC Card.

Starting PC Card Director for OS/2

To start PC Card Director, double-click the PC Card Director icon on the OS/2 desktop.

PC Card Director

The following screen appears. "No. 1" is for the upper PC Card slot, and "No. 2" is for the lower slot.

Descriptions of the icons:
☞ Page 67.

PC Card Director

View   Options   Help

PCMCIA Socket - Detail View

No.	Status	Card Type	Card Information
1			
2	OK		X: XXXXX XXXXX, XXX XX-XX-XX XX
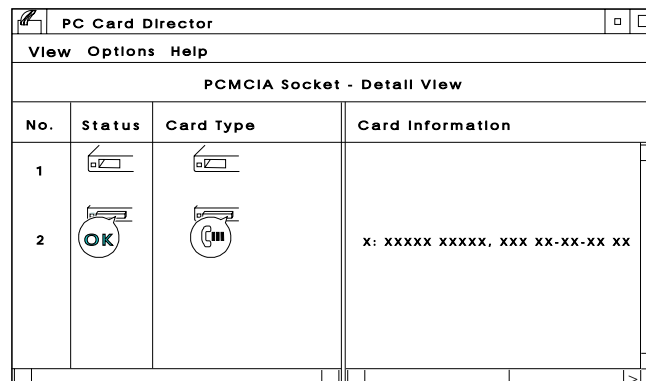
Use the Arrow keys (↑, ↓) or pointing device to highlight one of the slot numbers; then press **Enter** or click on it to view the details about the PC Card in the slot.

When your installed PC Card is classified as unknown, you can register the PC card type by selecting a Card type from the pull-down list.
Register, update, or delete the PCMCIA application program for the inserted PC Card.

An application program can run automatically according to the type of PC Card, if the "Automatically as card is inserted" option is specified. If you register more than one application program for each type of PC Card, select the application program to run from the list that appears when the PC Card is inserted.

```
┌─────────────────────────────────────────────────────────┐
│ [V]    Register Object                                   │
│ ┌─Select a card type ──────────────┐       ┌────────┐    │
│ │                                  │       │   OK   │    │
│ │  Memory                       [V]│       └────────┘    │
│ │                                  │       ┌────────┐    │
│ └──────────────────────────────────┘       │  Help  │    │
│ ┌─Object List ─────────────────────┐       └────────┘    │
│ │   Drag and drop Workplace objects│                     │
│ │   below.                         │                     │
│ │   ┌─────────────────────────┐ ▢  │       ┌────────┐    │
│ │   │ IBM AntiVirus/2         │    │       │ Launch │    │
│ │   │ Program                 │    │       └────────┘    │
│ │   │                         │    │                     │
│ │   │                         │    │       ┌────────┐    │
│ │   └─────────────────────────┘ ▢  │       │ Remove │    │
│ └──────────────────────────────────┘       └────────┘    │
│ ┌─Launch... ───────────────────────┐                     │
│ │  ○ Automatically as card is inserted,                  │
│ │  ○ Automatically as card is ready.                     │
│ │  ● By manual operation.                                │
│ └──────────────────────────────────┘                     │
└─────────────────────────────────────────────────────────┘
```
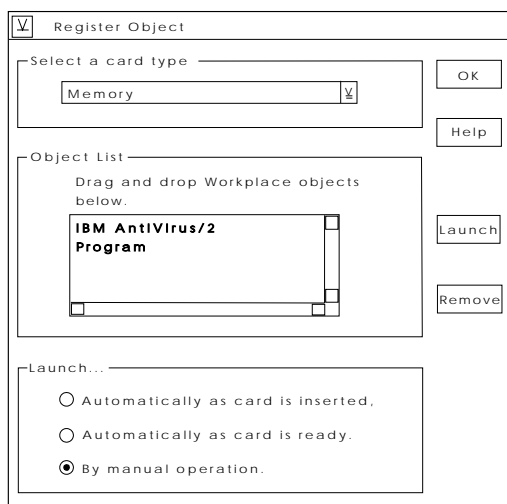
To register a PCMCIA application program, do the following:

1. Select the type of PC Card on which the application program is to run.

2. Type the application name in the **Object List** box or *drag and drop* the icon of a program in the workplace of the Object List as shown.
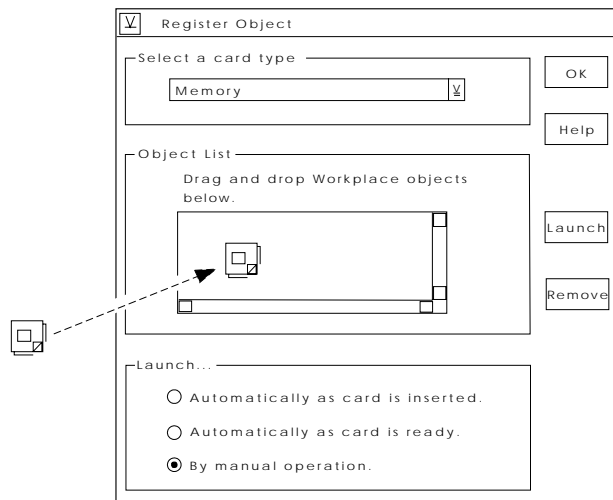
3. Select from the **Launch...** box to run the application program automatically or manually.

DOS

Starting PC Card Director for DOS

To start PC Card Director, type **C:\THINKPAD\EZPLAY** at the DOS prompt and press **Enter**. The following screen appears. "Socket 1" is for the upper PC Card slot, and "Socket 2" is for the lower one.

```
                        PC Card Director
              (c) Copyright IBM Corp. 199X, Version X.XX

Card Services  DOS Card Services Driver, Version X.XX PCMCIA Card Services

            Release   X.XX        Revision   X.XX

Socket Information

Socket     Status       Card Type        Card Information

     1     Empty

 ->  2     Ready        Memory        X:XXXX XXXX, XXX XX-XX-XX XX
```

To view more information about an installed PC Card, highlight the item with the Arrow keys (↑, ↓) and press **Enter**.

Starting PC Card Director for Windows

Select **PC Card Director** in the ThinkPad window.

Notes:

1. PC Card Director for Windows runs only in Enhanced mode of Windows 3.1 or later version.

2. This screen might look different from the actual one.

ThinkPad Features

PC Card Director Power Display Alarm ThinkPad Setup Fuel

Personalization ThinkPad Features Help Docking Control Docking Control Help
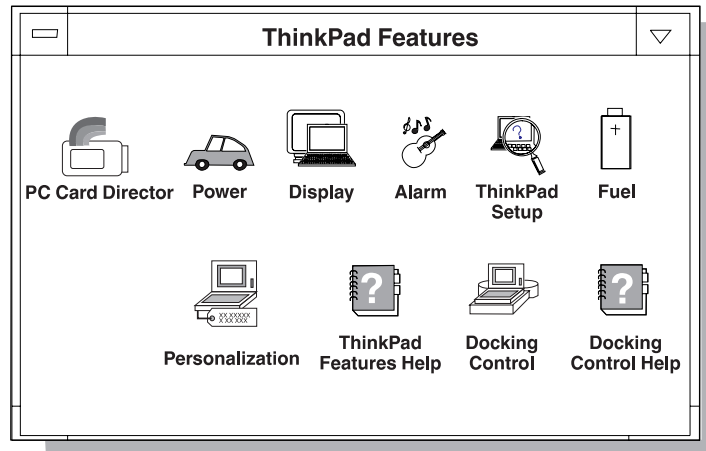
The following screen appears. "No. 1" is for the upper PC Card slot, and "No. 2" is for the lower one.

Descriptions of the icons:

Page 67.

PC Card Director

Options   Help

PC Cards Summary

No.   Status   Card Type   Card Information

1   Empty

2   Ready   Memory   X: XXXXX XXXXX, XXX XX-XX-XX XX

Card Info...   Appl. Register...   PC Card Director
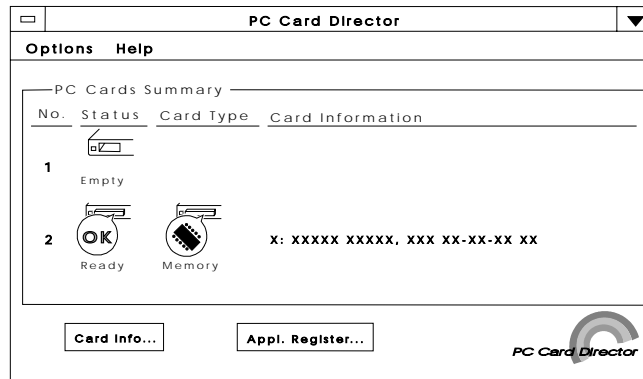
Card Info... Shows details of a PC Card installed in a PC Card slot. To view information about a PC Card, highlight the item with the Arrow keys ($\uparrow$, $\downarrow$) or pointing device; then click on this button. You also can register a PC Card type, when a card type appears as unknown.

Appl. Register... Used to register, change, or delete a PCMCIA application program. An application program can run automatically according to the type of the PC Card, if the "Run Automatic" option is

specified. If you register more than one application program for each type of PC Card, select the application program you want to run from the list that appears when the PC Card is installed.

If you select **Options** on the menu bar, the following choices appear:

Customize... Used to set beeps on or off, or to activate pop-up windows, when the details of an installed PC Card change. It also sets whether a single icon or multiple icons are used when the PC Card Director screen is minimized. The following shows the two types of minimized PC Card Director icons.

Single icon

PC Card Director

This icon temporarily changes when a PC Card is removed or installed if the Pop up Main Window option is not specified.

Multiple icons

PC Card Director
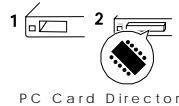
These icons show the card status of both PC Cards installed in the slots.

The icon for each slot temporarily changes when a PC Card is removed or inserted if the Pop up Main Window option is not specified.

Register...   Used to do the following:

Register Applications is used to register, change delete an application program according to the PC Card type, even when a PC Card is not installed in the slots.

Change Card Type is used to change a registered PC Card type to another card type.

Using the Infrared Communication

Note:
When installing an operating system, you must install the infrared device driver to use the ThinkPad mode.

To install IR device driver:
☞ Page 215.

Your computer is equipped with an infrared (IR) communication feature that allows point-to-point communication with other ThinkPad computers or systems equipped with an infrared port. There are two IR ports, one in the front of the computer below the CD-ROM drive and the other on the rear of the computer.

The IR feature supports three different modes with the following communication speed in bits per second (bps):

ThinkPad (1.15 Mbps)

> This mode is used when communicating with another 755 series computer with an infrared port or other systems supporting ThinkPad mode.

Generic (up to 115 Kbps)

> This mode is used when communicating with other IBM ThinkPad computers, a Hewlett Packard** 100LX**, Omnibook**, or other systems with infrared ports supporting Generic mode.

Sharp (9600 bps)

> This mode is used when communicating with the Sharp** Wizard** or other systems with infrared ports supporting Sharp mode.

The ThinkPad Features program contains a utility program that enables the front or rear IR port and the communication speed.

> *If you are using OS/2 or Windows:* See page 42.
> *If you are using DOS:* Type **PS2 ?** at the command prompt; then press **Enter** for more information.

** Hewlett Packard, 100LX, and Omnibook are trademarks of the Hewlett Packard Corporation. Sharp and Wizard are trademarks of the Sharp Corporation.

Communicating with IR

When communicating with rear IR ports, the IR ports must face directly with each other at a communicating distance.
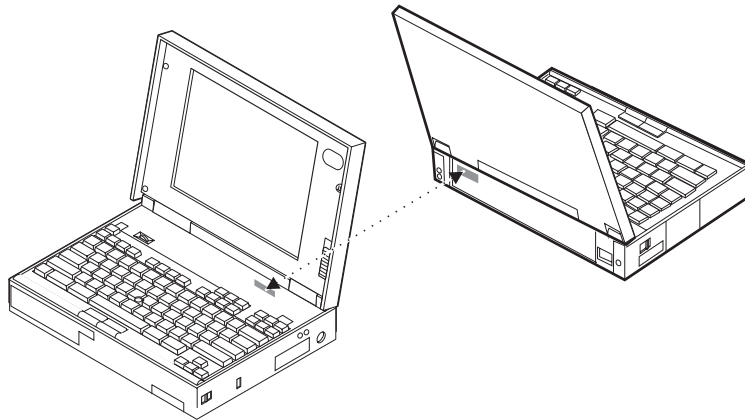
It is recommended that the communicating ThinkPad computers use their rear infrared port to communicate with each other.

When communicating between a front IR port and an IR port on another computer, the IR ports on the computers must face directly with each other at a communicating distance.
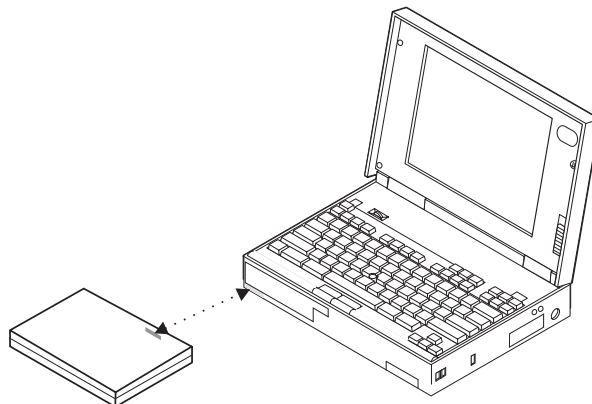
Communication can be affected by the light from the LCD of the computer. To avoid this, open the LCD of the computer to a wide angle.
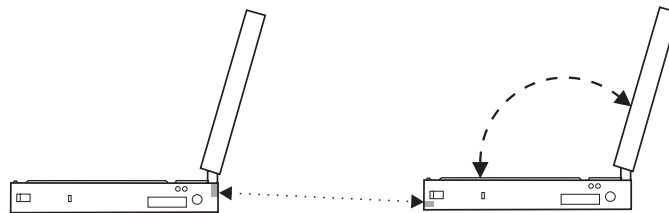
[Viewed from the sides of the computers.]

Considerations for Communication

Consider the following when communicating with the IR ports.

ThinkPad Features program:
☞ Page 36.

You need to run the same communication application to communicate between your computer and the other computer or device. Refer to the application manuals for more information.

Run only one application at a time to communicate with the IR ports.

When using applications that use a conventional serial port and serial cable to exchange data, your computer IR ports are used as a replacement for the serial port and cable. In this case, the ThinkPad mode cannot be used.

The communicating distance might be shorter if:

– The other system is not the same model as your computer.
– There is interference from the ambient light. It is recommended not to use IR communication during bright sunshine or artificial light conditions.
– The IR port is not directly facing the other communicating port.

Using the Mwave DSP Features

Note:
In some countries, the Mwave telephony functions are available after the DAA/Telephony Kit option is installed.

Note:
For more information on MIDI, see"Mwave MIDI Overview" on page 272 .

The computer provides an Mwave system, which is based on the Digital Signal Processor (DSP). It gives you the best performance when you use it for audio and telephony functions, and it supports a more natural way of communicating with your computer.

The Mwave DSP system supports a full complement of audio and telephony functions including the following:

Audio Functions

– Supports the wave audio record and playback up to 16-bit, stereo and 44 kHz sampling.

– Provides a high quality MIDI wave table synthesizer with 128 instruments and up to 32 voices.

– Supports DOS games by using the Sound Blaster[**] interface.

Telephony Functions

– Supports data modem up to 14 400 bps.

– Supports fax modem up to 14 400 bps.

– Supports the speaker phone function.

– Supports the telephone answering machine function.

[**] Trademark of Creative Lab, Inc.

Using Mwave DSP Audio Features

Note:
In some countries, the Mwave telephony functions are available after the DAA/Telephony Kit option is installed.

The following shows the connection between the computer and the external cables or devices:

When the DAA/Telephony Kit is installed:
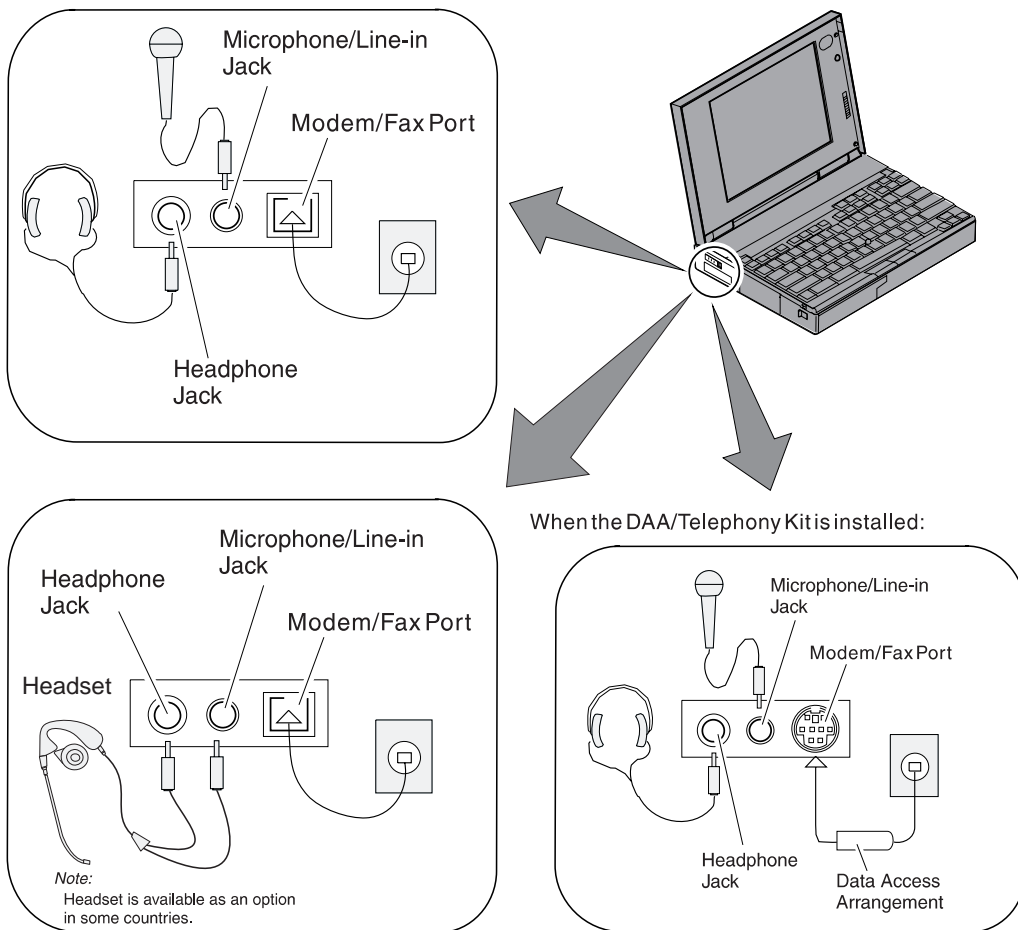
Using Mwave DSP Audio Features

The Mwave DSP supports the following functions for each operating system.

For OS/2:

– Wave audio record and playback
– MIDI synthesizer
– Sound Blaster support in the DOS session
– Data modem

For DOS:

– Sound Blaster support
– Data modem

For Windows:

– Wave audio record and playback
– MIDI synthesizer
– Sound Blaster support in the DOS session
– Data modem
– Fax modem
– Speaker phone
– Telephone answering machine

Using the Audio Function

Use the Mwave audio functions according to your operating system.

Using the Function for OS/2

Mwave supports the audio function in the OS/2 environment through Multimedia Presentation Manager/2* (MMPM/2*). To use the Mwave audio functions with OS/2, refer to the MMPM/2 manuals.

For Your Information

When you play the wave audio files, select the **DIGITAL AUDIO** icon.

When you play the MIDI sequencer files, select the **MIDI** icon.

Considerations for WIN-OS/2 Environment

Note:
When you use the WIN-OS/2 environment, see"Using for Windows or WIN-OS/2" on page 83 .

The following are considerations when playing MIDI files in the WIN-OS/2 environment.

To play MIDI files in the WIN-OS/2 environment from the OS/2 desktop, the Audio Mode in the Mwave Audio Options menu must be set to **Normal** (not **Audio/Image Synch**).

The MWS.EXE program must be running in the same session as the program that runs the MIDI file. If you use multiple WIN-OS/2 sessions, MWS.EXE must be started in each session. To run MWS.EXE, migrate it to the OS/2 desktop and start it before starting the MIDI application programs. To migrate MWS.EXE to the OS/2 desktop, refer to the OS/2 manuals.

---

* Trademark of the IBM Corporation.

DOS *Using the Function for DOS*
The Mwave supports the audio for DOS games through the *Sound Blaster* support.

To enable Sound Blaster support for DOS games:

Type **MWGAMES ON** at the DOS prompt; then press **Enter**.

To disable the Sound Blaster support for DOS games:

Type **MWGAMES OFF** at the DOS prompt; then press **Enter**.

Note:
If you have exited Windows and returned to DOS, you might have to run **MWGAMES ON** again to enable the Sound Blaster support.

Creating a Boot Diskette

To have enough memory for your games, it is recommended to make a *boot diskette* before starting the DOS games. To make a boot diskette, do the following:

 1. Turn on the computer and start DOS.

 2. Insert a blank diskette into the diskette drive.

 3. Type **MAKEBOOT** at the DOS prompt; then press **Enter**.

   A boot diskette starts to be created. Before starting your games, insert this boot diskette into the diskette drive and restart your computer.

Some sample files, such as CONFIG.SYS file, will be created on the boot diskette. You might need to modify these files by referring to the manuals that came with your games.

Default Values for DOS Games Audio

Most games automatically determine the I/O address, interrupt level (IRQ), and DMA channel settings for the audio in DOS games. If the game asks for this information, specify the default settings of the Sound Blaster as follows:

I/O Address	220
Interrupt Level (IRQ)	7
DMA Channel	1

If you need to change the above settings, do the following:

If you are using OS/2 and Windows, select **DSP** from the ThinkPad Setup window.

If you are using DOS, type **PS2 SB ?**at the command prompt; then press **Enter** for more information.

Using for Windows or WIN-OS/2

Note:
To use the Mwave audio features in WIN-OS/2, install the Mwave DSP support software for Windows in the full screen WIN-OS/2 session.

To install the Mwave support software:

☞ Page 213.

To use Mwave audio functions in Windows or WIN-OS/2, double-click on the **Mwave ThinkPad** icon in the Windows Program Manager.

A window similar to the following, appears:

Record and Playback Wave Audio Files

Recorder

When you double-click on the **Recorder** icon, the following window appears:

```
┌──────────────────────────────────────────┐
│ □        Mwave Recorder                   │
├──────────────────────────────────────────┤
│ File    Edit    Options    Help           │
│ ──────────────────────────────────────    │
│ Mono    11.025 kHz   8 Bit       0 bytes  │
│ ──────────────────────────────────────    │
│ Position:  00:00.00      Length:  00:00.00│
│                                           │
│ [Marker A]  [Clear A]   [Marker B] [Clear B]│
│ [←][  |                              ][→]  │
│                                           │
│ Record  Play  Rewind  Fast-F  Stop        │
│ [ ● ]  [ ► ]  [ ►► ]  [ ◄◄ ]  [ ■ ]       │
└──────────────────────────────────────────┘
```
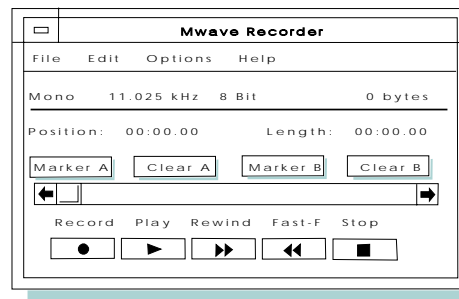
This window allows you to record and playback wave audio files. This window is similar to the *Windows Sound Recorder*, which provides wave recording and playback functions, however, this window has additional features for controlling the record quality and file size.

Audio Control

Audio Control

When you double-click on the **Audio Control** icon, the following window appears:

```
┌──────────────────────────────────────────────────────────┐
│ □           M w a v e   A u d i o   C o n t r o l    [▼][▲]│
├──────────────────────────────────────────────────────────┤
│  ┌─ Record Control ─┐ ┌──────── Output Control ────────┐ │
│  Source    Level      Aux   MIDI Synth Wave Audio Master │
│  [ Mic ]                                                  │
│  [ Line ]                                                 │
│  [CD+Line]                                                │
│  [ Audio ]                                                │
│  [Options]  L  R    L  R    L  R     L  R     L  R        │
│            [Mute]  [Mute]  [Mute]  [Mute]  [Mute]        │
│  [←][                                            ][→]     │
└──────────────────────────────────────────────────────────┘
```
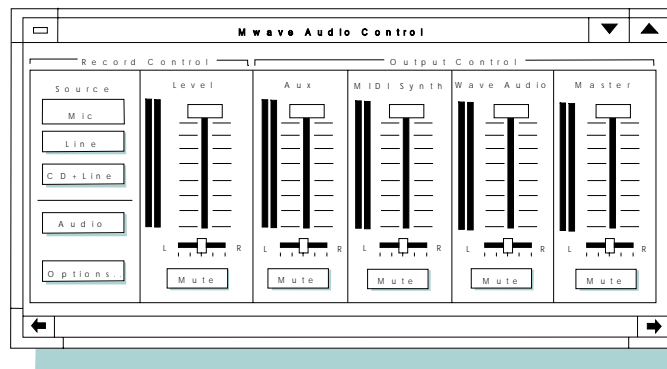
This window allows you to control the audio volume as follows:

Record Control

This section enables you to select which source you want to use, adjust the record level, monitor the input signal, and select an options menu for additional control.

Output Control

This section allows you to adjust the balance and sound levels, and control the mute. And, it can be considered a stereo amplifier with three input signals, controls to mix the input signals, and a volume control for the output.

Audio Button

This is used to enable the following audio features:

– Audio/Image Synch in the Options menu

– Aux Source

Important

Disable the **Audio** button before you use a speaker phone application.

If the Audio button is enabled, the speaker phone application does not operate correctly and displays an error message on the screen.

Note:
Selecting the **Audio/Image Synch** on the Options menu improves the response speed, however, the increase in DSP resources can effect your ability to concurrently use some Mwave applications.

Note:
If you enable **Aux Source**, the computer will consume more battery power. Disable it when you do not use the Aux Source.

Options Button

– Audio Mode

If you are using some applications with sounds and animation (for example, games or screen saver programs), try this option to make the application work more quickly.

– Aux Source

Select the source you want to listen to by the computer speaker or headphones.

To listen to the internal CD, you need to select **Line**; then enable **Audio** in the Audio Control screen.

Playing the MIDI Sequencer Files

To play the MIDI sequencer files in Windows, use the Windows Media Player as follows:

1 Start Windows; then open the **Accessories** group.

2 Double-click on the **Media Player** icon.

3 When the Media Player window appears, select the **Device** on the menu bar; then select **MIDI Sequencer...** from the pull-down menu.
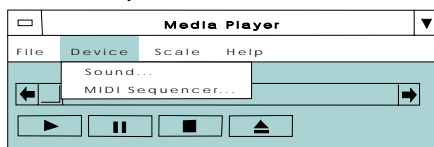
4 Click on **File** on the menu bar; then select **Open...** from the pull-down menu.

5 Highlight your favorite MIDI file with your pointing device; then click on **OK**.

6 To begin playing the MIDI file, click on the ▶ button.

Select Synthesizer

Note:
When you use wave audio and *Aux* at the same time, select 24 (the default value).

When you select the icon in the Mwave ThinkPad window, you can change the number of voices supported by the MIDI synthesizer.

Sound Blaster support

Note:
Volume of the Sound Blaster sound can be controlled by using the following key combinations: CTRL+ALT+U (volume up) and CTRL+ALT+D (volume down).

If you are using Windows, Mwave supports the Sound Blaster support in a DOS session. It is not necessary to type **MWGAMES ON** to enable the support, this is done automatically. Simply open a DOS session and start the game.

Using the Telephony Function

In some countries, the Mwave telephony functions are available after the DAA/Telephony Kit option is installed. To install DAA/Telephony Kit on the computer, see "Installing the DAA/Telephony Kit" on page 176 and the documentation that came with the option.

Connecting the Telephone Cable

To use the telephony functions, you need to connect a telephone line to your computer.

DANGER

> ⚠️ **To avoid shock hazard, do not connect the telephone cable to or disconnect from the telephone outlet on the wall during electrical storms.**

Note:
If you use both the computer and a telephone with one telephone cable, use the wallet supplied with your computer.

Note:
When you use the DAA/Telephony Kit (available as an option), see page 179.

When your computer has a modem/fax port with a square receptacle, connect the connector 1 of the ferrite-core end of the telephone cable to the modem/fax port; then connect the other end 2 to the telephone outlet on the wall.

Core
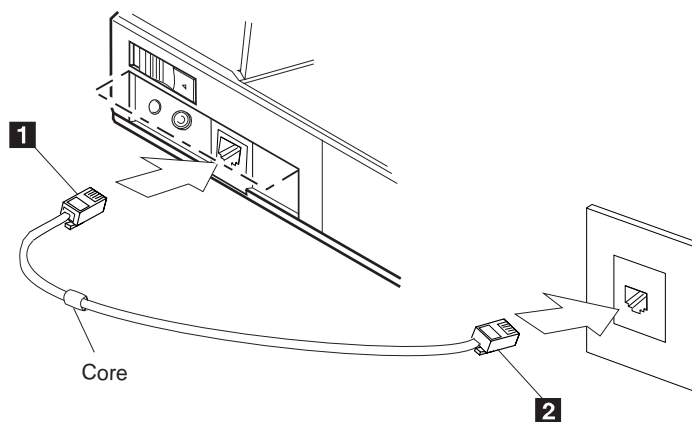
Using the Mwave Modem

The Mwave data modem can be used with the Windows terminal emulator to access your favorite bulletin board or online system (Prodigy[**], Compuserve[**], America Online[**], or other online systems).

Important

Before you start the communication by using your communication program, start the Mwave modem.

Using for OS/2 and Windows

To start the Mwave modem, do the following:

1 Select the following according to your operating system:

If you are using OS/2, select the **Mwave for OS/2** folder on the OS/2 desktop.

If you are using Windows, select the **Mwave ThinkPad** window.

The following screen appears:
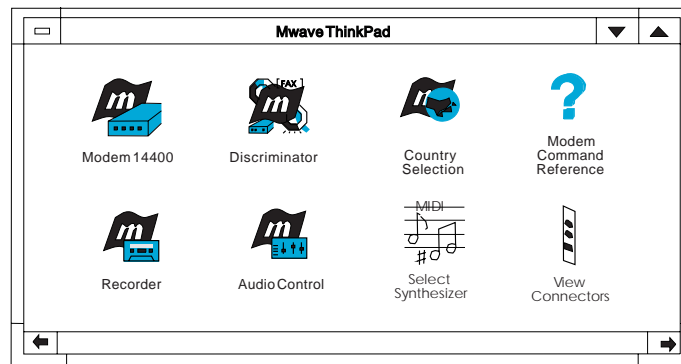
[**] Trademarks of PRODIGY Services, Inc., Compuserve, Inc., and America Online, Inc..

2 Double-click on the **Modem 14400** icon.

The Mwave modem starts automatically and the following modem window appears:

```
 ┌──┬─────────────────────────────────┬──┐
 │ ▭│      M w a v e  M o d e m  1 4 4 0 0      │ ▼│
 ├──┴─────────────────────────────────┴──┤
 │ A c t i o n s    H e l p                          │
 │                          R e a d y              │
 │  ▌▌wave                                        │
 │                                                 │
 │  MR   DTR   SD   RD   OH   CD   AA    HS         │
 │  ■    ■    ■    ■    ■    ■    ■     ■          │
 └──────────────────────────────────────┘
```
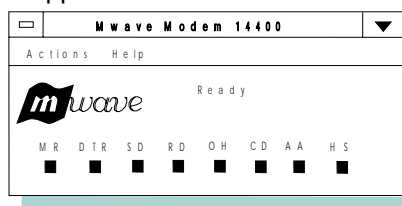
3 Start your communication program.

Stopping the Modem

When you finish using the communication programs, turn off the modem to free the Mwave DSP resources for other functions. To turn off the modem, do the following:

1 If the modem window is minimized, double-click on the icon to maximize it.

2 Select **Close** from the window pull-down menu.

| DOS |

Using for DOS

To start the Mwave modem, do the following:

Type **MWMODEM ON** at the DOS prompt; then press **Enter**.

Stopping the Modem

When you finish using the communication programs, turn off the modem to free the Mwave DSP resources for other functions. To turn off the modem:

Type **MWMODEM OFF** at the DOS prompt; then press **Enter**.

Mwave Data Modem

Modem 14400

The Mwave telephony features support direct attachment to the public switched telephone network. The Mwave data modem supports the standard COM port interface and can be used with the communication application programs that use the Hayes[**] AT command set.

The Mwave data modem provides the following features:

Standard asynchronous COM port interface (NS16550A UART compatible) operation

Bell-103/212A,CCITT-V.21/V.22, V.22bis protocols with data from 50 to 2400 bps

CCITT-V.32 protocols with data rates of 4800, 9600 uncoded, and 9600 bps Trellis coded (optional)

CCITT-V.32bis protocols with data rates of 4800, 7200, 9600, 12 000, and 14 400 bps (optional)

Hayes AT command set compatibility

Call progress monitor

Autodial

DTMF and Pulse dialing

Asynchronous error recovery protocol

Error correction via Microcom Network Protocol (MNP[**]) classes 1-4

MNP class 5 for up to 2x data compression

Functional upgrades via software

CCITT V.42bis for up to 4x data compression

[**] Trademark of Hayes Corporation.

[**] Trademark of the Microcom Corporation.

Using Mwave DSP Telephony Features

Using the Country Selection

Country Selection

> **Important**
>
> Each country has restrictions to communicate when using
> telephone lines. Use this window whenever you travel to other
> countries.

Note:

In some countries, the Mwave
modem functions are available after
the DAA/Telephony Kit is installed.

The **Country Selection** window allows you to change the country
name currently supported by the Mwave telephony features. When
you travel to other countries and use the Mwave telephony function,
you need to change the country name from the country list in this
window.

Mwave Call Discriminator

Discriminator

The Mwave Call Discriminator provides voice and fax discrimination
by monitoring incoming calls for fax signal characteristics. This
feature automatically starts a fax, speaker phone, or answering
machine application programs.

Mwave Fax Modem

The Mwave telephony features offer you the following fax functions:

Call progress monitor

Autodial feature

Support a Windows MCI[**] FAX application interface

Uses DMA instead of a COM port to increase performance

DTMF and pulse dialing

G3 transfers

T.4/T.30 operations

V.27ter — 2400/4800 bps send/receive

V.29 — 7200/9600 bps send/receive

V.17 — 14400/14400 bps send/receive

[**] Trademark of Microsoft Corporation.

Mwave Telephone Answering Machine

Note:
When you use the telephone answering machine function, refer to the manual that came with the application program package.

The Mwave telephony features allow you to use the computer as a telephone answering machine as follows:

Recording greetings and messages through microphone

Playback greetings and messages through speaker or headphones

Playback greetings and messages to remote telephone with password

Provide a full-duplex speaker phone capability using the microphone and speaker

Record multiple greetings

Log both incoming and outgoing phone calls

Beep to alert user to start recording greeting

Beep to alert caller to start recording message

Place phone on/off hook and dial phone numbers

Redial from message log and from keyboard

Support tone (DTMF) and pulse dialing from keyboard

Maintain a log of incoming/outgoing phone calls and messages

Support voice compression to minimize disk space for stored greetings and messages

Support a Windows MCI Telephony Application Programmer Interface

Use a high performance DMA interface

Support ability to speed up and slow down played messages without affecting their pitch (TDHS)

Detect DTMF digits received from phone line

Using the Diskette Drive

The CD-ROM drive can be removed and be replaced with the internal diskette drive supplied with the computer. Replace the CD-ROM drive with the diskette drive when installing software or device drivers from diskettes.

To install the diskette drive, do the following:

Note:
If you are using DOS or Windows, the CD-ROM drive can be removed without turning off the computer. However, refer to the documents supplied with your operating systems if the CD-ROM drive or diskette drive can be removed without turning off the computer.

Warning:
Make sure the locking lever on the hard disk drive or any locking device is unlocked.

The CD-ROM and diskette drive are very delicate devices that need careful handling. Do not press on, drop, or apply any shock to the drives when they are removed from the computer.

1 Stop any CD-ROM applications and make sure the CD-ROM tray is closed.

2 Open the LCD; then open the keyboard.
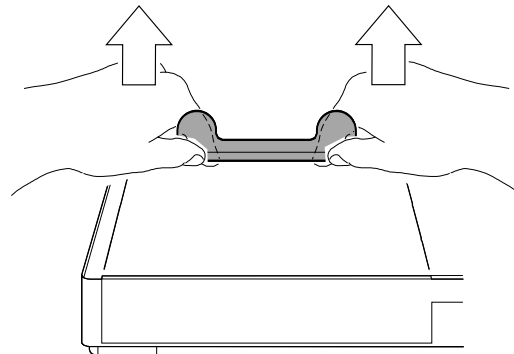
3 Lift the handle on the CD-ROM drive with the plastic tape, and remove the CD-ROM drive.

4 Insert the lower part of the diskette-drive bezel 1 into
the cut 2 from the *inner side* of the computer; then
insert the lower portion of the diskette-drive bezel firmly
into the computer.

The following figure shows the computer as seen from the
inner side of the computer.
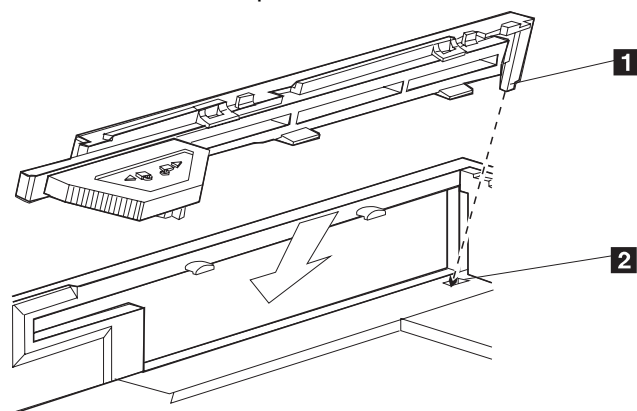
5 Push the upper portion of the bezel into the computer
until it snaps into place.
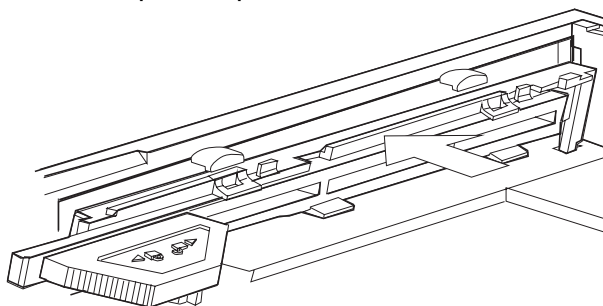
6 Slide the lever 3 on the diskette-drive bezel as shown.
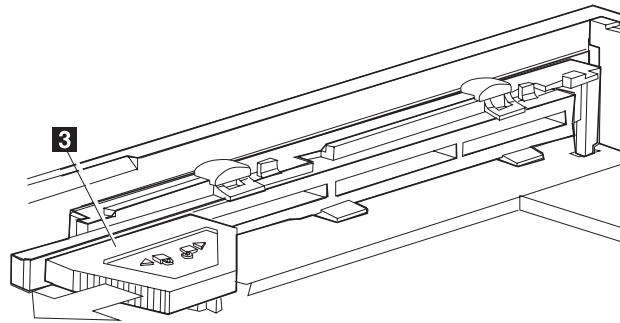
Warning:
The diskette drive is a very delicate device. Do not press on the middle part of the drive.

7 Install the diskette drive. Press the area 1 until it snaps into the connector.
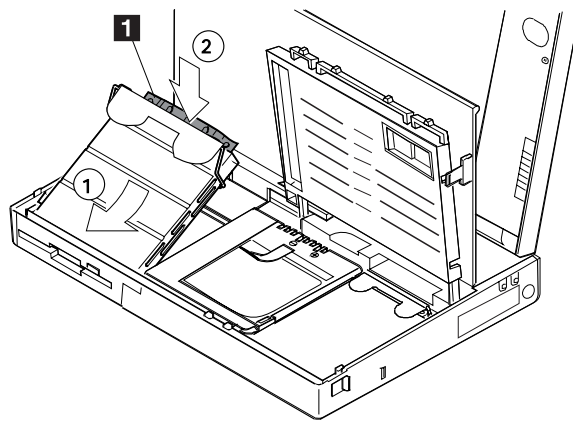
8 Open the upper part of the keyboard spacer on top of the diskette drive.
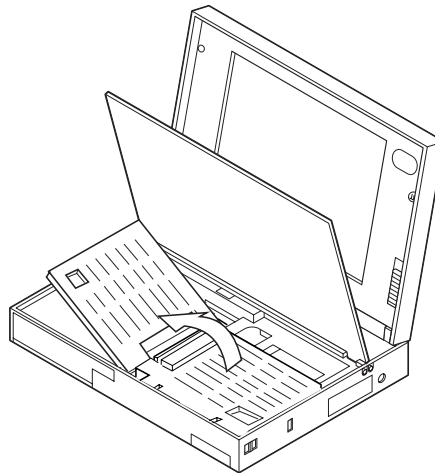
9 Close the keyboard; then reconnect all cables.

You have completed the installation of the diskette drive.

Using the Enhanced Video Features

Note:
When installing an operating system, you must install the Enhanced Video device driver to use the enhanced video features.

The 755CD provides Enhanced Video features and video in/out ports on the side of the computer to attach your home video equipment. With the Enhanced Video features, you can do the following:

Smooth Playback

Playback motion video with a smooth picture.

Video-In (Video Capture)

– Attach video equipment, such as a video camera, and use the computer screen as a monitor.
– Capture still images or motion video from the video-in port.

Video-Out

Use a NTSC (National Television Standards Committee) or a PAL (phase alternation by line) television to display information from the computer.

Important

When using the Enhanced Video features, use the 640 by 480 resolution mode.

Two video in/out cables are supplied with the computer to connect a television, video cassette recorder (VCR), or other video equipment. You can receive or send video signals through the video ports in different signal formats using these cables. Use the composite video port 1 when using the composite video signal format. This combines the color and brightness into one signal. For better picture quality, use the S-video port 2 . This port separates the color and brightness into two signals to improve the quality of the picture.
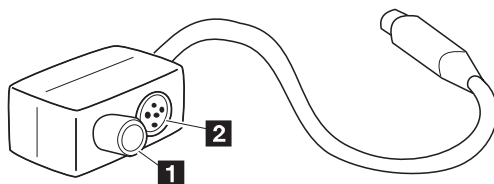
Using Smooth Playback

The Enhanced Video features enable smooth playback under playback application programs supported by Video for Windows** and your 755CD. With smooth playback:

Your motion video can run at a faster speed, giving you a smooth picture.
A clear picture is shown even when the video clip is enlarged.

To enable smooth playback, do the following:

1. Open the ThinkPad Features program.
2. Select the **Display** icon.
3. Click on **Device Driver**.
4. Click on **Video out**.
5. Click on **Smooth playback**.

** Trademark of the Microsoft Corporation.

┌─ **Important** ──────────────────────────────────────┐

If a television is attached to the computer while using smooth
playback:

   Video playback on the LCD of the computer and external
   display is disabled.
   If the video image is enlarged, some characters or pictures
   outside the playback window may be unreadable or distorted.

└──┘

Using the Video-In Feature and Video Capture

You can capture still images or motion video using video capturing application programs and the video-in port of the computer. If you are using Windows, you can use capturing applications supported by Video for Windows and your 755CD.

Important

While using the video capture function, the video-out port is disabled.

To capture motion video, do the following:

1 Turn off the computer.

2 Connect the video in/out cable 2 to the video-in port 1 of the computer; then connect your video equipment.

Cables, except for the video in/out cables 2 , are not supplied with the computer.

If you are using video equipment with S-video output, connect the S-video port of the video in/out cable to the S-video-out connector of your video equipment (A) for better picture quality.

If you are *not* using video equipment with S-video output, connect the composite video port of the video in/out cable and the video-out port of your video equipment (B).

If your video equipment has only one audio output connector, use the left-audio connector on the audio cable for connection.
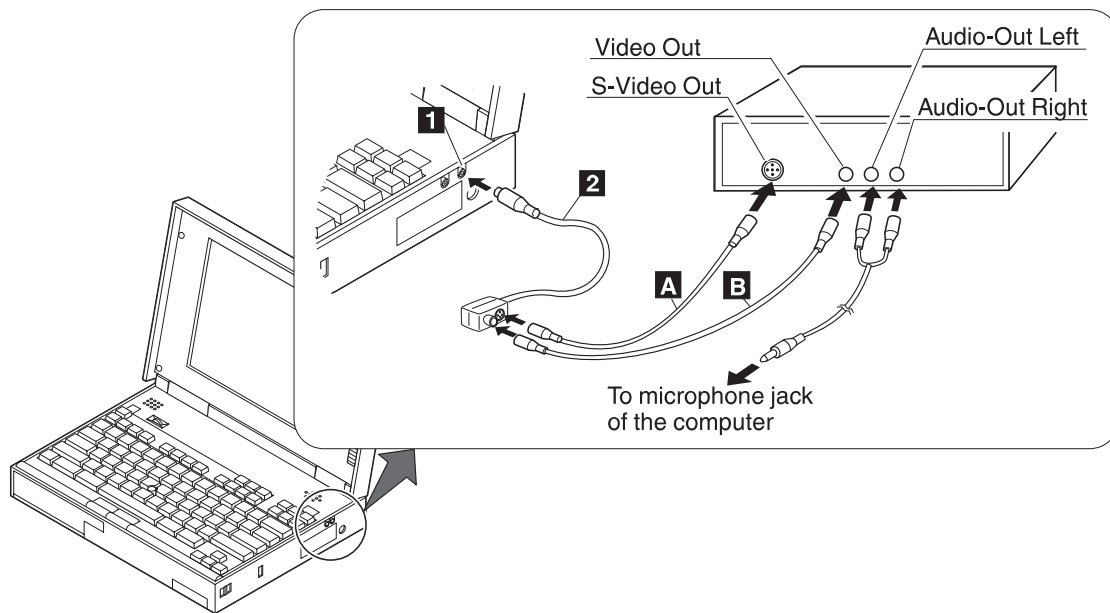
3 Set the video-in port to on.

    a) Open the ThinkPad Features program.
    b) Select the **Display** icon.
    c) Click on **Device Driver**.
    d) Click on **Video in**.

4 Start the video capturing application program.

Using the Video-Out Feature

To use the video-out port for connecting a television, do the following:

_1_ Turn off the computer.

_2_ Connect the video in/out cable `2` to the video-out port `3` of the computer; then connect your video equipment.

Cables, except for the video in/out cables `2` , are not supplied with the computer.

If you are using video equipment with S-video input, connect the S-video port of the video in/out cable to the S-video-in connector of your video equipment (`A`) for better picture quality.

If you are **_not_** using video equipment with S-video input, connect the composite video port of the video in/out cable and the video-in connector of your video equipment (`B`).

If your video equipment has only one audio input connector, use the left-audio connector on the audio cable for connection.
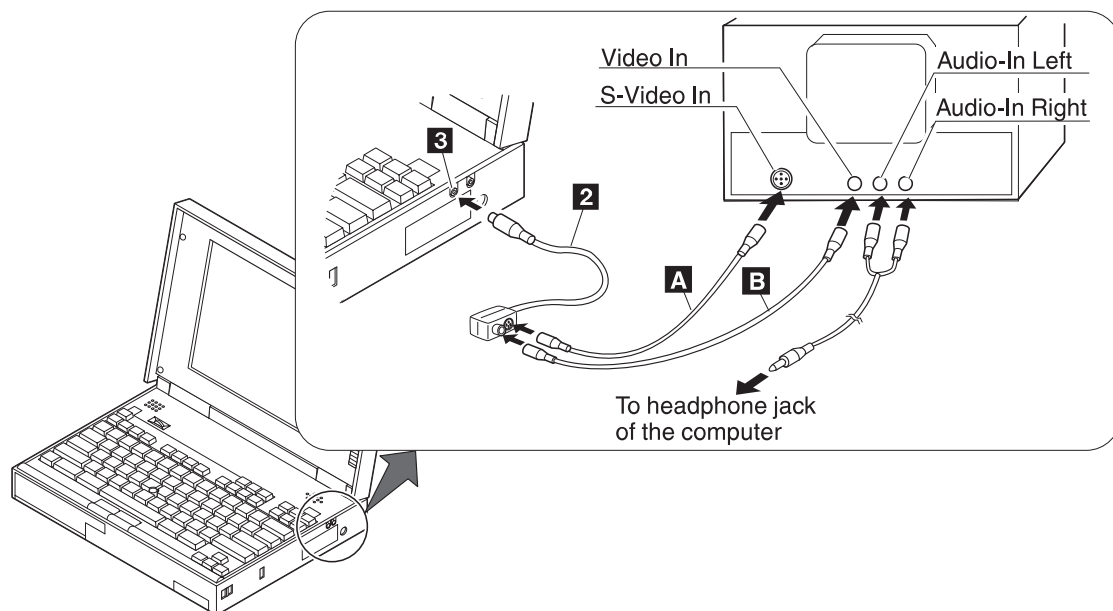
3 Set the color standards, NTSC or PAL, according to your country.

    a) Open the ThinkPad Features program.

    b) Select the **Display** icon.

    c) Click on **Device Driver**.

    d) Click on **Video out**; then click on **NTSC** or **PAL** according to the color standards of your country.

       Click on the Help button in the Device Drivers Setting menu to check the color standards of your country.

Using the CD-ROM Drive

Warning:
Do not touch the lens on the CD-ROM tray.

The 755CD comes with a 5.25-inch CD-ROM drive so you can use compact discs. The CD-ROM drive can also be removed so that the internal diskette drive or IBM options can be installed (see "Installing Options in the CD-ROM Drive Compartment" on page 173.)

The following CDs are supported by the computer:

> Music CDs
> Photo-CDs
> CD-ROM or CD-ROM XA

To use the CD-ROM, do the following:

1 Turn on the computer.

2 Push the CD-ROM eject button 1 on the front of the computer; then pull out the CD-ROM tray.
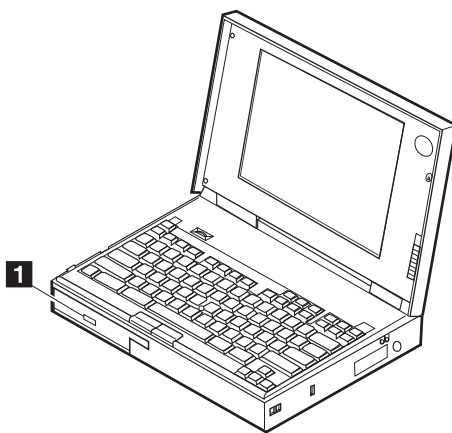
Warning:
Hold the compact disc by the edges. Do not touch the surface of the compact disc.

3 Carefully insert your CD-ROM onto the CD-ROM tray; then push the tray into the computer until it fully closes.

Handling Compact Discs

Note:
Make sure you read page 30 for handling instructions of the CD-ROM drive.

Compact discs are high density media that must be handled with care and kept clean to ensure that they remain readable. Keep in mind the following to ensure their reliability.

1. Hold the compact disc by the edges. Do not touch the surface of the compact disc.

Warning:
Wiping the compact disc in a circular direction can cause loss of data.

2. To remove dust or fingerprints, wipe the compact disc from the center to the outside of the disc.

3. Do not write on the surface.

4. Do not store or place the compact disc in direct sunlight.

5. Do not use benzene, thinners, or other cleaners to clean the compact disc. Use a CD-ROM cleaner kit.

6. Do not flex or bend the compact disc.

Using the MIDI/Joystick Port

The 755CD provides a MIDI/Joystick port on the rear of the computer for MIDI (musical instrument digital interface) equipment or a joystick for playing games. A MIDI/Joystick cable is supplied with the computer to connect a joystick. When connecting MIDI equipment, *you have to purchase a MIDI connector to connect the musical instruments with MIDI ports.*

Turn off the computer; then connect the MIDI/Joystick cable to the computer as shown:
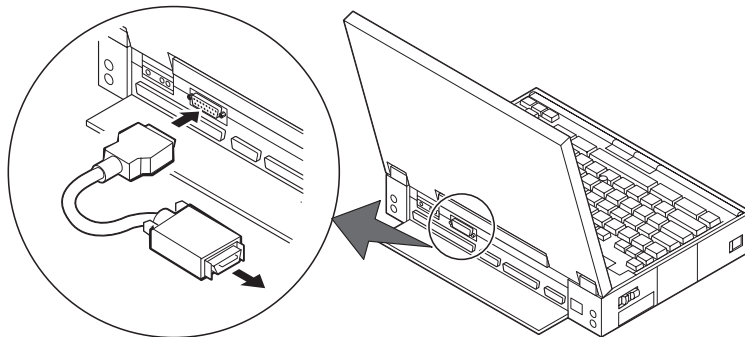
Connect the other side of the cable to a MINI-DIN cable or a connector that connects to your MIDI equipment or joystick.

Chapter 4. Using Battery Power

This chapter describes the battery-pack operations.

Charging the Battery Pack

The battery pack can be charged with either the AC Adapter or the Quick Charger (an option). You must charge the battery pack when you have any of the following conditions:

During setup of your computer.

A new battery pack was purchased.

The battery status indicator ☐₊ (orange) stays on.

The battery status indicator ☐₊ (orange) blinks for less than one minute, then the suspend mode indicator ⬡ turns on.

Charging with the AC Adapter

The following table shows the approximate charging times for the battery pack.

Conditions	Charging Time
Operational charging	1.7 hours
Power-off charging	1.2 hours
Suspend-mode charging	1.2 hours

To discharge battery:

If the battery pack is new or has not been used for a long period of time, it will not reach full charge with only one charging. You will have to discharge and recharge it three to six times to maximize battery operating time.

The following procedure describes how to recharge the battery pack with the AC Adapter when the computer is turned off.

Warning:
Make sure the locking lever for the hard disk drive or any device lock is unlocked.

1 Turn off the computer and open the keyboard.

2 Make sure the storage switch is set to the on position (|); then install the new or discharged battery pack into the computer.

3 Connect the AC Adapter to the computer.

The system status indicators show the following:

Indicator	Color	Meaning
◁	On (green)	The battery pack is being charged. This indicator turns off when the battery is fully charged.
	Blinking (green)	The battery pack is being discharged. This indicator turns on (green); then charging starts automatically after discharging is complete.
+◻	On (yellow)	The battery pack is being charged.
Other indicators	Off (blank)	—

Charging with the Quick Charger

The Quick Charger is available to charge the battery packs. For the charging procedure, refer to the instructions supplied with the Quick Charger.

Replacing the Battery Pack

A spare battery pack is available as an option. Replace the current battery pack when it is low in power.

The battery pack can be replaced with computer power on or off. To replace the battery pack without turning off the computer, follow these instructions.

Important

If you are using PC Cards, either connect the AC Adapter or stop the PC Card application and remove the PC Card before doing the following.

Warning:
Make sure the locking lever for the hard disk drive or any locking device is unlocked.

1 Open the LCD; then open the keyboard.

The computer automatically enters suspend mode. Wait for the beep, which indicates that the computer has completely entered suspend mode.

2 Open the keyboard spacer by holding the opening 1 .
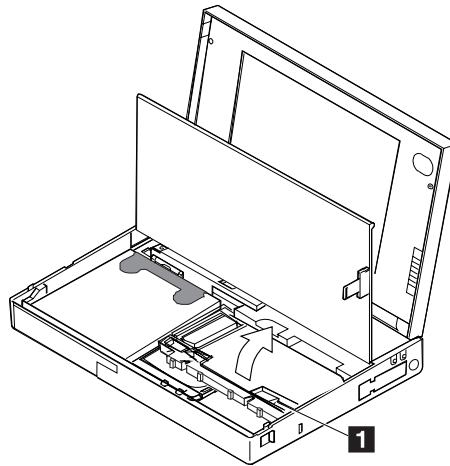
Warning:
Make sure the CD-ROM tray is
closed and no CD is in the
CD-ROM drive.

3 Lift the handle on the CD-ROM drive with the plastic
tape, and remove the CD-ROM drive.
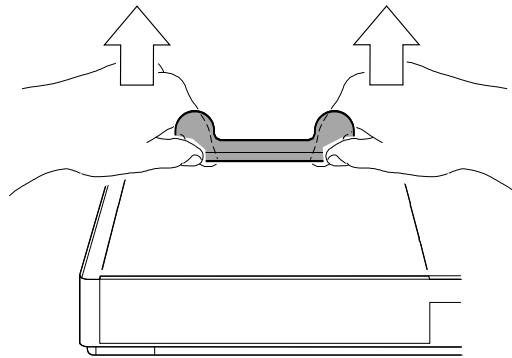
4 Pull the battery pack toward the front of the computer;
then quickly remove the battery pack and replace it with
a fully-charged spare.
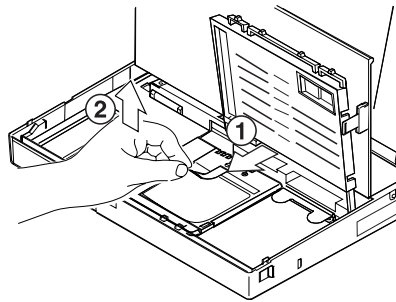
Warning:
Do not press on the middle part of the CD-ROM drive.

5 Reinstall the CD-ROM drive.

6 Close the keyboard spacer.
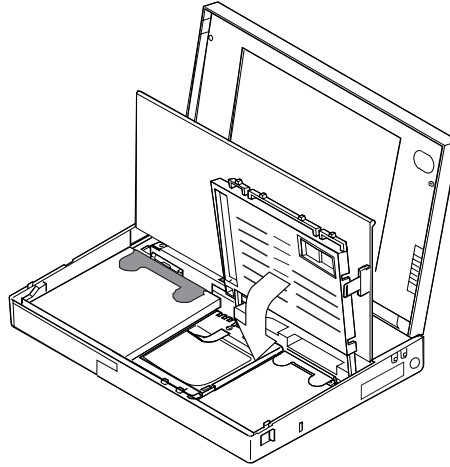
7 Close the keyboard. The computer resumes normal operation.

If the computer does not resume normal operation, press the Fn key.

Monitoring the Battery-Power Status

The battery condition can be determined through the battery-power status indicator and the Fuel-Gauge program.

Using the Battery-Power Status Indicator

The battery-power-status indicator shows the current status of the battery pack.

Observe the battery-power status indicator ☐⊣ and compare it with the status list below to determine the battery condition.

Status	Condition	Action Required
Green	Fully charged.	Continue your work.
Yellow	Usable.	
Orange	Some power remains. You will hear three beeps when the indicator turns orange.	The AC Adapter should be connected to the computer to charge the battery pack.
Blinking orange	Almost discharged (low-battery). See "Low-Battery Condition" on page 116.	Take either of the following actions within one minute: Connect the AC Adapter to the computer; leave the battery pack installed. Replace the battery pack with a fully charged spare (see "Replacing the Battery Pack" on page 112).

Using the Battery-Power Status Indicator

Status	Condition	Action Required
Off	The battery pack is not installed. The computer is turned off. The computer is in suspend mode when the AC Adapter is not connected.	You should take the necessary actions when the *blinking orange* condition occurs, before the computer enters suspend mode because of a low-battery condition. If suspend mode is caused by a low-battery condition, data in memory can be lost. Take either of the following actions immediately. To continue your work with the AC Adapter: 1. Connect the AC Adapter to the computer. 2. Press the Fn key. To continue your work with a fully charged battery pack: 1. Connect the AC Adapter to the computer. 2. Replace the battery pack with a fully charged one. 3. Press the Fn key. 4. Disconnect the AC Adapter from the computer.

Low-Battery Condition

Warning:
Do not leave the computer in this condition for an extended period of time. Data in memory will be lost.

When the battery pack is low in power, the computer sounds three consecutive beeps and the battery-power status indicator starts blinking. The battery pack needs to be charged immediately. If corrective actions are not taken within one minute, the computer will enter suspend mode.

For necessary actions:

☞ page 115.

Using the Fuel-Gauge Program

Note:
When you install an operating system, you must also install the ThinkPad Features program by using the Utility Diskette before the Fuel-Gauge program can be used.

To install the ThinkPad Features program:
☞ page 202.

Note:
Repeatedly charging a battery pack that has not been completely discharged shortens the battery operating time. To preserve battery operating time, discharge the battery pack completely, then recharge it.

The Fuel-Gauge program displays the battery-pack condition on the screen.

The Fuel-Gauge program appears on the screen with the following information about the battery pack:

Power mode
Battery status
Suspend or hibernation options
Discharge option

Refer to the Fuel-Gauge program instructions that are appropriate for your operating system.

Using the Fuel-Gauge Program

Fuel-Gauge Program for OS/2 and Windows

When you press the Fn+F2 key combination with OS/2 or Windows, the Fuel-Gauge program appears as shown in the following illustrations.

AC Adapter connected:

Battery operation:
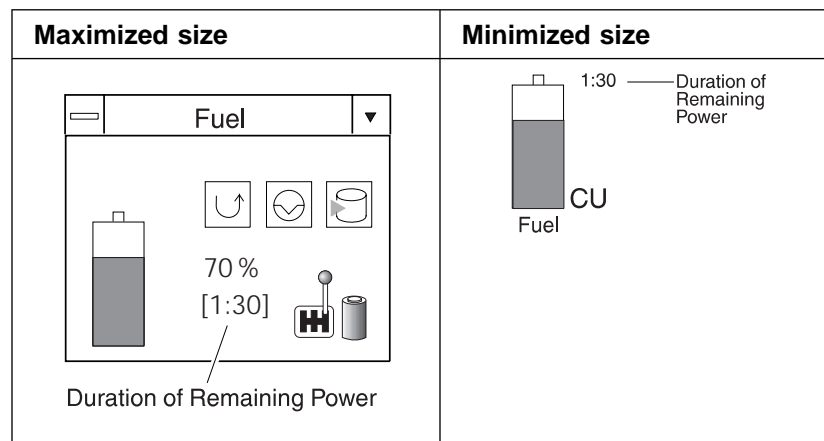
Discharging the Battery Pack for OS/2 and Windows

Note:
The battery charging indicator starts blinking when discharging starts.

When the battery pack needs to be discharged, the computer prompts you with a message. To discharge the battery, connect the AC Adapter to the computer and press the discharge button (⟳) on the Fuel-Gauge program screen. The discharge-in-progress (↑) appears above the gauge symbol, and the charge button (▼) appears in place of the Discharge button.

You can use the computer while the battery pack is discharging; however, do not enter suspend mode or turn off the computer until the discharge is complete.

Power-on password:
☞ page 130.

```
┌─ Hints and Tips ──────────────────────────────────┐
│                                                    │
│  If you have to leave the computer during the      │
│  discharge, you can use the power-on password to   │
│  secure the computer.  Close the LCD; then open    │
│  it and leave the computer at the power-on         │
│  password prompt while you are away.               │
│                                                    │
└────────────────────────────────────────────────────┘
```

When the battery pack is completely discharged, charging starts automatically.

To cancel discharging, press the charge icon (▼).

`DOS` *Fuel-Gauge Program for DOS*
When you press the Fn+F2 key combination with DOS, the
Fuel-Gauge program appears at the top-right corner of the screen as
shown in the following.

AC Adapter connected:

When the AC Adapter is connected to the computer, the following
messages alternately appear:

Power source
 – `AC Charge`: charging
   battery pack.
 – `AC Discharge`:
   discharging battery
   pack.
 – `AC`: battery pack is fully
   charged. (Neither
   charging nor
   discharging.)

```
                            AC Charge
```

Power mode
 – `High Performance`
 – `Automatic`
 – `Customized`

```
                               High
```

Percentage of charging
completed

```
                               6 %
```

Battery operation:

When the computer is operating with battery power, the following messages alternately appear:

Power mode:

☞ page 38.

Power mode

— High Performance
— Automatic
— Customized

Remaining Power

— Percentage of remaining power
— Duration of remaining power

```
                                    Custom
```

```
                                  5 % (1:4 )
```

Discharging the Battery Pack for DOS

Note:
The battery charging indicator starts blinking when discharging starts.

When the AC Adapter is being used and the battery pack needs to be discharged, the computer prompts you with an asterisk (*) next to the fuel-gauge message.

```
                      AC Charge
```

When you see the above message, type the following command to discharge the battery pack:

```
    PS2 DISCHARGE E
```

The battery pack starts to discharge. When the discharge is complete, recharging starts automatically.

To cancel discharging, type PS2 DISCHARGE D.

Preserving Battery-Pack Life

To preserve the life of the battery pack:

Warning:
Make sure the battery pack power is completely used before you recharge it. Recharging a battery pack that is not completely discharged can shorten battery life.

Do not charge it until all of its power is used.

Once you have started charging the battery pack, do not use it until it is fully charged.

Discharge the battery pack occasionally by using the Fuel-Gauge program.

Turn off the computer whenever it is not in use.

Maximizing Battery-Powered Operation

To save battery power effectively:

Use Advanced Power Management (APM)
Decrease the LCD brightness
Use power-saving modes
Use power-saving options

Using Advanced Power Management

Note:
If you have purchased the computer with a pre-installed operating system, the APM is already installed correctly.

The computer has power-management functions built in. No special power-management drivers have to be installed before you use the computer. However, the computer is able to conserve more power when the APM is used.

APM allows you to reduce power consumption when your applications and devices are idle. Each operating system comes with its own APM.

If you are using OS/2 2.1 or later, APM is automatically installed when the installation program detects that the power-management function is installed on your computer.

If you are using DOS, APM is automatically installed when the installation program detects that the power-management function is installed on your computer. To verify that the computer has APM installed correctly, type **power** at the command prompt and press **Enter**. If a screen similar to the following appears, APM is successfully installed.

```
Power Management Status
-----------------------
 Setting =  ADV: REG
 CPU: idle 32% of time.

 AC Line Status : OFFLINE

 Battery status : High
```

If not, add the following line to your CONFIG.SYS file, using a text editor such as the DOS Editor.

DEVICE=C:\DOS\POWER.EXE

Maximizing Battery-Powered Operation

If you are using Windows 3.1 or later, follow these instructions to check and install APM for Windows:

1. Start the system. Make sure that the current directory has Windows (usually C:\WINDOWS>).

2. Type **SETUP** at the command prompt and press **Enter**. The following screen appears.

```
 Windows Setup
 ===============

   If your computer or network appears on the Hardware Compatibility List
   with an asterisk next to it, press F1 before continuing.

   System Information
      Computer:       MS-DOS System
      Display:        SVGA (WD9 C24) 64 x48  256 colors large fonts
      Mouse:          Microsoft, or IBM PS/2
```

Note:
If "MS-DOS System with APM" appears for the item "Computer:", APM is already installed. Press F3 to exit the setup.

3. Using the Arrow keys (↑, ↓), position the highlighted cursor over **MS-DOS** [**] **System** and press **Enter**.

4. Position the highlighted cursor over **MS-DOS System with APM** and press **Enter**.

5. Verify that the item "Computer" has changed to **MS-DOS System with APM** on the screen. If not, return to step 3.

```
 Windows Setup
 ===============

   If your computer or network appears on the Hardware Compatibility List
   with an asterisk next to it, press F1 before continuing.

   System Information
      Computer:       MS-DOS System with APM
      Display:        SVGA (WD9 C24) 64 x48  256 colors large fonts
      Mouse:          Microsoft, or IBM PS/2
```

6. Press **Enter** to install APM.

7. Restart the system to make APM effective.

[**] Trademark of the Microsoft Corporation.

Decreasing LCD Brightness

Adjust the brightness control on the LCD to the lowest level possible that allows you to comfortably view the screen. This is an effective way of conserving battery power.

Using Power-Saving Modes

Whenever you do not use the computer, enter one of the Power Management modes; *standby, suspend*, or *hibernation* mode, to conserve battery power.

For more information about the three modes, see "Using Power Management" on page 55.

Using Power-Saving Options

Note:
When you install an operating system, you must also install the ThinkPad Features program by using the Utility Diskette.

To install the ThinkPad Features program:
☞ page 202.

The power-saving options; *High, Automatic*, or *Customized*, specified in each power mode save battery power and make it possible to use the battery pack longer before another recharge is needed.

Select **Automatic** when you travel, because it is preset by the computer for a long battery operating time. You can also set your own power management settings using **Customized**.

Each mode consists of values or a timer for the following:

> Entering standby mode
> Entering suspend mode
> Turning off the LCD
> Stopping the hard disk drive
> Specifying the processor speed

To specify your the values or timer of your choice, do the following:

Maximizing Battery-Powered Operation

If you are using OS/2 or Windows, do the following:

1. Start the ThinkPad Features program and select the **Power** icon.

2. Click on **Customized** in the Power Mode field.

3. Click on **Settings...** and set the values on the screen.

4. Press the **Save** button to save the changes.

For more information see "Starting the Program for OS/2 and Microsoft Windows" on page 37.

If you are using DOS, you can change the values by using the following PS2 commands.

> `STandby`: specifies the timer to enter standby mode.
> `POwer`: specifies the timer to enter suspend mode.
> `LCd`: specifies the timer to turn off the LCD.
> `DISK`: specifies the timer to stop the hard disk drive.
> `SPeed`: specifies the processor speed.

For more information see "Starting the Program for DOS" on page 44.

The figure below helps you determine how much power is normally required for each computer feature, and how much is required when the feature is controlled by the power-management function.

Legend:

100%

Require Power in
No Power-Saving Mode

Saving Power

Amount of Required Power

LCD Off

Processor

Maximum

Medium

Slow

Minimum

Brightness at Minimum

External Serial Off

Internal Serial Off

Power-Saving Mode

Suspend Mode

Standby Mode

Mwave DSP Off

Hard Disk Off

Infrared Off
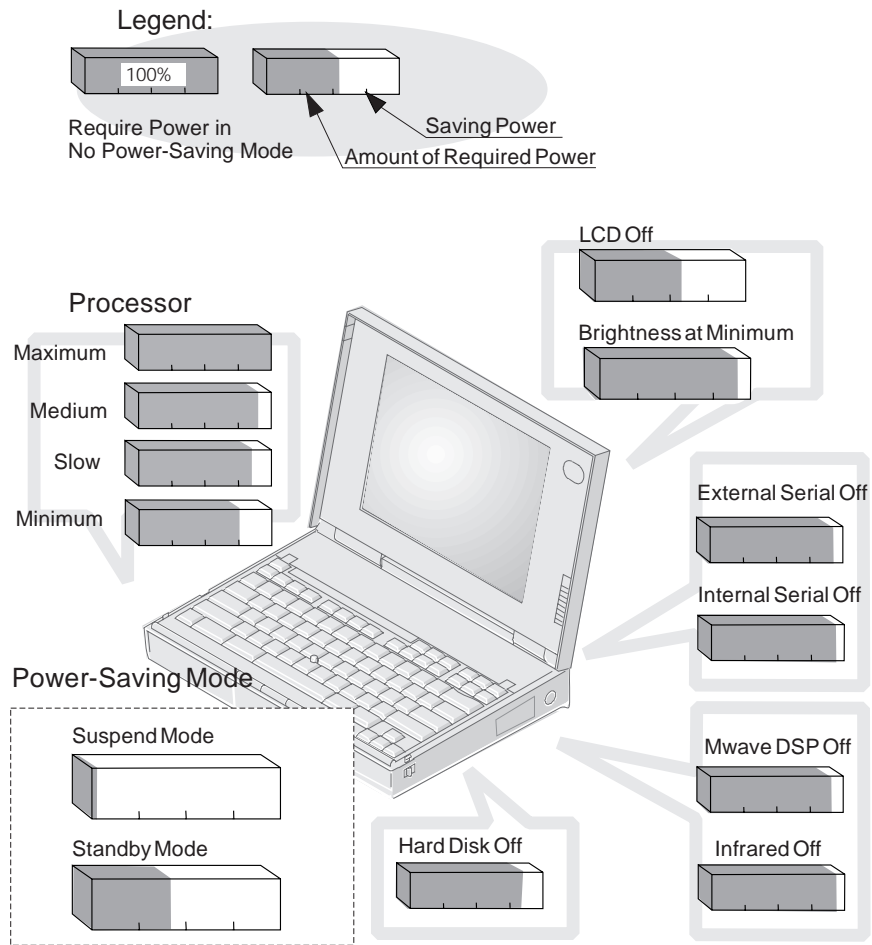
Maximizing Battery-Powered Operation

Chapter 5. Protecting Your Computer

This chapter provides information on how to protect the computer and its internal devices.

Using Passwords

There are three types of passwords you can use to protect your computer and the removable hard disk drive.

The **Power-On Password** protects your computer from being used by unauthorized persons.

The **Hard-Disk Password** protects the data on your removable hard disk drive from being accessed by unauthorized persons.

The **Supervisor Password** protects the system information in Easy-Setup and your removable hard disk drive from being used by unauthorized persons.

Power-On Password
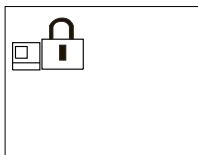
The power-on password helps protect your computer from being used by unauthorized persons.

If a power-on password is set, the password prompt (⊞🔒) reminds you to enter the password each time you turn on the computer. The password prompt also appears when you open the LCD or you press the Fn key to return to normal operation from suspend mode. When the password is entered correctly, **OK** appears.

Note:
Do *not* press the Spacebar after you enter the password; this action removes the password.

Note:
If Default in the Config menu, Password, or Start up functions cannot be selected when using Easy-Setup, a supervisor password has been set. You must enter the supervisor password instead of the power-on password to use all Easy-Setup functions.

When you enter the password incorrectly, **X** appears. If you fail to enter the password correctly after three tries, you must turn the computer off, wait at least 5 seconds; then turn it on to try again. When typing your password, release each key quickly. If you hold a key down too long, the same letter can be entered repeatedly.

If the return to normal operation is caused by the timer or an incoming call through the modem, the password prompt does not appear. Type the correct password on the blank screen.

Setting a Power-On Password

To set the power-on password, use Easy-Setup and do the following:

To start Easy-Setup:
☞ page 48.

1 Start Easy-Setup and select the **Password** icon.

2 Select the **Power-On Password** icon (🔒).

3 Type your desired power-on password and press **Enter**.

You can use any combination of up to 7 characters (A to Z and 0 to 9).

4 Type your power-on password again to verify the password; then press **Enter**.

┌─ **Do Not Forget Your Power-On Password** ──────────────┐

If you forget your power-on password, you cannot reset it. You have to take the computer to IBM or an IBM authorized dealer to have the password canceled. Proof of purchase is required, and an additional charge might be required for the service.

└──┘

Once you set the password, you cannot change or remove it from Easy-Setup. See "Changing a Power-On Password" on page 132 or "Removing a Power-On Password" on page 133.

Changing a Power-On Password

You must change your power-on password at the password prompt. You cannot change the power-on password after normal operation is resumed. To change a power-on password, do the following:

Important

Do *not* press **Enter** until you have finished all of the steps to change the power-on password.

---

1 Turn off the computer and wait at least 5 seconds; then turn it on.

2 When the password prompt (⊞) appears, type your *current* power-on password and press the **Spacebar**.

3 Type the *new* password and press the **Spacebar**.

Use no more than seven characters.

4 Type the *new* password again to verify it; then press **Enter**.

Do Not Forget Your Power-On Password

If you forget your power-on password, you cannot reset it. You have to take the computer to IBM or an IBM authorized dealer to have the password canceled. Proof of purchase is required, and an additional charge might be required for the service.

Removing a Power-On Password

You must remove your power-on password at the password prompt. You cannot remove it after normal operation is resumed. To remove a power-on password, do the following:

1 Turn off the computer and wait at least 5 seconds; then turn it on.

2 When the password prompt (⌨🔒) appears, type your current password and press the **Spacebar**.

3 Press **Enter**.
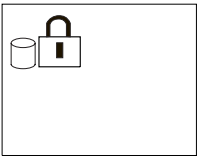
Hard-Disk Password

The hard-disk password helps protect the information stored on your removable hard disk drive. By setting this password, the information stored on your hard disk drive cannot be accessed without it.

Note:
Do *not* press the Spacebar after you enter the password; this action removes the password.

If a hard-disk password is set, the hard-disk password prompt (🔒) appears:

When the computer is turned on.
When entering Easy-Setup (with no supervisor password set).
When returning to normal operation from suspend or hibernation mode.

When the password is entered correctly, **OK** appears.

When you enter the password incorrectly, **X** appears. If you fail to enter the password correctly after three tries, you must turn the computer off, wait at least 5 seconds and turn it on to try again. When typing your password, release each key quickly. If you hold a key down too long, the same letter can be entered repeatedly.

Setting a Hard-Disk Password

To set the hard-disk password, use Easy-Setup and do the following:

1 Start Easy-Setup and select the **Password** icon.

2 Select **Hard-Disk Password** icon (🔒).

3 Type your desired hard-disk password and press **Enter**.

You can use any combination of up to 7 characters (A to Z and 0 to 9).

4 Type your hard-disk password again for verification; then press **Enter**.

Do Not Forget Your Hard-Disk Password

Note the password and keep it in a safe place.

If you forget your hard-disk password, there is no way to reset it or recover data from the hard disk. Neither IBM nor an IBM authorized dealer can make the hard disk drive usable.

Once you set the password, you cannot change or remove it from Easy-Setup. See "Changing a Hard-Disk Password" on page 136 or "Removing a Hard-Disk Password" on page 137.

Changing a Hard-Disk Password

The procedure to change a hard-disk password depends on whether or not it is set the same as the power-on password.

When the hard-disk password is set the same as the power-on password:

– To make the hard-disk password the *same* as the power-on password, you must change the power-on password, see "Changing a Power-On Password" on page 132.
– To change the hard-disk password to one that is *different* from the power-on password, remove both passwords by following "Removing a Power-On Password" on page 133; then set the hard-disk password. If the power-on password is needed, reset it also.

When the hard-disk password and the power-on password are different, or the power-on password has not been set:

1 Turn off the computer, and wait at least 5 seconds; then turn it on.

2 If you have set a power-on password, type it and press **Enter**.

3 When the hard-disk password prompt (🔒) appears, type your *current* hard-disk password and press the **Spacebar**.

4 Type the *new* password and press the **Spacebar**.

Use no more than 7 characters.

5 Type the *new* password again for verification; then press **Enter**.

```
┌─ Do Not Forget Your Hard-Disk Password ──────────────────┐
│                                                           │
│  Note the password and keep it in a safe place.           │
│                                                           │
│  If you forget your hard-disk password, there is no way to reset │
│  the password or recover data in the hard disk drive.  Neither IBM │
│  nor an IBM authorized dealer can make the hard disk drive │
│  usable.                                                  │
│                                                           │
└───────────────────────────────────────────────────────────┘
```

Removing a Hard-Disk Password

The procedure to remove a hard-disk password depends on whether or not it is set the same as the power-on password.

> ***When the hard-disk password is set the same as the power-on password***, remove the hard-disk password by following the steps in "Removing a Power-On Password" on page 133. The hard-disk password is removed when you remove the power-on password. If the power-on password is needed, reset it.

> ***When the hard-disk password and the power-on password are different, or a power-on password is not set:***

1 Turn off the computer and wait at least 5 seconds; then turn it on.

2 If you have set the power-on password, type it and press **Enter**.

3 When the hard-disk password prompt ( ) appears, type your current password and press the **Spacebar**.

4 Press **Enter**.

Supervisor Password
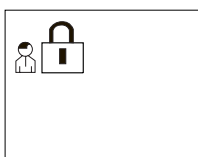
The supervisor password helps protect classified information. It:

   Secures the system information stored in Easy-Setup.

   Prohibits modification to the hardware.

   Stops the computer after a POST error to restrict access to the system information.

   Overrides the power-on password.

If a supervisor password is set, you are prompted with a power-on password icon (⌨🔒) to enter the supervisor password when entering the Easy-Setup program. When the password is entered correctly, an **OK** appears.

When you enter the password incorrectly, **X** appears. If you fail to enter the password correctly after three tries, you must turn the computer off, wait at least 5 seconds; then turn it on to try again. When typing your password, release each key quickly. If you hold a key down too long, the same letter can be entered repeatedly.

Considerations when Using Easy-Setup

When the supervisor password is set, the correct supervisor password must be entered to use all Easy-Setup functions. When accessing Easy-Setup, if **Enter** is pressed without entering the supervisor password or if the power-on password is entered instead, Default in the Config menu, Password, and Start up functions cannot be used. To use these functions, you must enter the correct supervisor password at the password prompt.

Setting a Supervisor Password

Follow these instructions to set a supervisor password.

To start Easy-Setup:
☞ page 48.

1 Start Easy-Setup and select the **Password** icon.

2 Select the **Supervisor Password** icon (⌸).

3 Type your desired supervisor password and press **Enter**.

You can use any combination of up to seven characters (A to Z and 0 to 9).

Note:
If you are using more than one hard disk drive, see page 143.

4 Type your supervisor password again for verification; then press **Enter**.

```
┌─ Do Not Forget Your Supervisor Password ────────────┐
│                                                      │
│  Note the password and keep it in a safe place.      │
│                                                      │
│  If you forget your supervisor password, you have to take the
│  computer to IBM or an IBM authorized dealer to have the system
│  board replaced.  Proof of purchase is required, and an additional
│  charge might be required for the service.           │
│                                                      │
│  There is no way to reset the password or recover data from the
│  hard disk.  Neither IBM nor an IBM authorized dealer can make
│  the hard disk drive usable.                         │
│                                                      │
└──────────────────────────────────────────────────────┘
```

Changing a Supervisor Password

Follow these instructions to change your supervisor password.

1 Turn off the computer and wait at least 5 seconds; then turn it on.

2 Start Easy-Setup. Type your *current* supervisor password at the power-on prompt (⊞); then press **Enter**.

3 Select the **Password** icon from the Easy-Setup menu.

4 Select the **Supervisor Password** icon; then type your *current* supervisor password and press the **Spacebar.**

A window appears to enter the new password.

Note:
If you are using more than one hard disk drive, see page 144.

5 Type the *new* password and press **Enter**.

6 Type the *new* password again for verification; then press **Enter**.

Do Not Forget Your Supervisor Password

Note the password and keep it in a safe place.

If you forget your supervisor password, you have to take the computer to IBM or an IBM authorized dealer to have the system board replaced. Proof of purchase is required, and an additional charge might be required for the service.

There is no way to reset the password or recover data from the hard disk. Neither IBM nor an IBM authorized dealer can make the hard disk drive usable.

Removing a Supervisor Password

Follow these instructions to remove the supervisor password.

1 Turn off the computer and wait at least 5 seconds; then turn it on.

To start Easy-Setup:
☞ page 48.

2 Start Easy-Setup. When the power-on prompt (⊞🔒) appears, type your current supervisor password and press **Enter**.

3 Select the **Password** icon from the Easy-Setup menu.

4 Select the **Supervisor Password** icon.

5 Type your current password and press the **Spacebar**.

6 Press **Enter** at the blank box.

Note:
If you are using more than one hard disk drive, see page 144.

7 Press **Enter** again at the verification screen.

When the supervisor password is removed, the lock in the Supervisor Password icon is unlocked (🔓⊞) and the Hard-Disk Password icon can be selected.

Using the Hard-Disk and Power-On Passwords

You can use the hard-disk password with the power-on password. When you turn on the computer, you are prompted to enter the power-on password, then the hard-disk password.

The hard-disk password can be the same as the power-on password. If both passwords are the same, you are prompted only once with the power-on password prompt. Both passwords are changed or removed at the power-on password prompt.

When the hard-disk password is set the same as the power-on password, the password prompt appears when normal operation from suspend mode is caused by the timer or an incoming call through the PC modem card.

Using the Supervisor and Hard-Disk Passwords

When the supervisor password is set, it automatically sets the same password for the hard-disk password. Before setting a supervisor password, make sure that you have not set a hard-disk password or have removed it.

When you change or remove the supervisor password, the hard-disk password also is changed or removed. Even though a hard-disk password is set by the supervisor password, you are not prompted to enter the hard-disk password when the computer is turned on; you cannot change or remove the hard-disk password set by the supervisor password.

Using Several Hard Disk Drives with the Supervisor Password

Because the supervisor password automatically sets a hard-disk password, you must set a supervisor password on each hard disk drive you are using.

To change or remove a supervisor password when you are using several hard disk drives, you must change or remove the hard-disk password on each hard disk drive.

Setting a Supervisor Password when Using Several Hard Disk Drives

Follow these instructions to set a supervisor password when you are using more than one hard disk drive on your computer.

To set a supervisor password:
☞ page 139.

To install the hard disk drive:
☞ page 171.

1 Set a supervisor password on your computer.

2 Install the hard disk drive in which you want to set the supervisor password.

3 Turn on the computer. A 158 error appears.

4 Press **Enter**.

5 Type your supervisor password at the power-on password prompt and start Easy-Setup.

6 Select the **Password** icon.

7 Select the **Hard-Disk Password** icon; then press **Enter**.

The supervisor password sets the hard-disk password on the hard disk drive.

8 Turn off the computer. Repeat steps 2 through 8 to set the supervisor password for each hard disk drive.

Using Passwords

Changing or Remove the Supervisor Password when Using Several Hard Disk Drives

Follow these instructions to change or remove the supervisor password when using more than one hard disk drive on your computer.

To change the supervisor password:
☞ page 140.

To remove the supervisor password:
☞ page 141.

To install the hard disk password:
☞ page 171.

1 Change or remove your supervisor password on your computer.

2 Install the hard disk drive with the old supervisor password set.

3 Turn on the computer. The hard-disk password prompt appears.

4 Do one of the following:

   If you removed the supervisor password, type the old supervisor password and press the **Spacebar**.

   If you changed the supervisor password, change the old password on the hard disk drive to the new supervisor password by typing:

   Old (space) *New* (space) *New*

5 Press **Enter**.

6 Turn off the computer. Repeat steps 2 through 5 to set the supervisor password for each hard disk drive.

Using Locks

Note:
You are responsible for the evaluation, selection, and implementation for the locking devices and security features. IBM makes no comments, judgments or warranties about the functions, quality, or performance regarding locking devices and security features.

You can protect your computer by attaching locks or a chain, so it cannot be removed without your permission. You can use the lock on the hard disk drive of the computer or purchase a locking device, such as a Kensington lock. Both locks protect your computer from being removed and also protect the internal devices under the keyboard by locking the keyboard to prevent it from being opened.

Using the Hard Disk Drive Locking Lever

The hard disk drive locking lever, located on the bottom of the computer, protects your computer and its internal devices from being removed. The PC Cards installed in your computer can also be protected by using the PC Card lock with the hard disk drive locking lever. When using the hard disk drive locking lever, make sure that you:

Unlock the locking lever when opening the keyboard.

Remove the PC Card lock when removing the PC Cards.

Protecting Your Devices under the Keyboard

To protect your computer and the hard disk drive or other internal devices from being removed from the computer:

Slide the *locking lever* ⒈ as shown; then attach a chain or cable that has been secured to a stationary object to the lever.
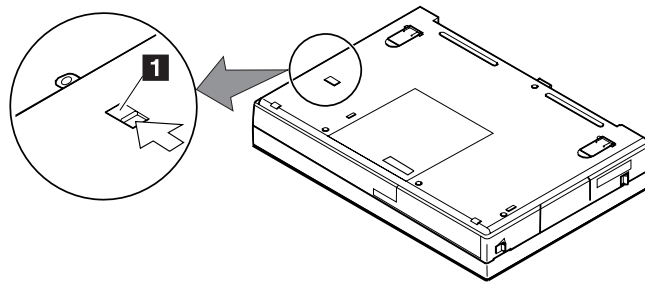
The locking lever slides through the lock on the back of the keyboard ⒉ which prevents the keyboard from opening.
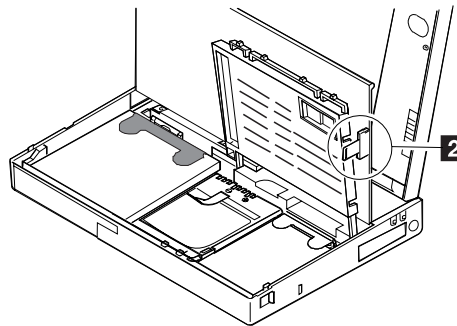
Protecting Your PC Card

To protect the PC Cards from being removed from the PCMCIA slots, do the following.

Warning:
Make sure the locking lever for the hard disk drive or any locking device is unlocked.

1 Open the keyboard and insert the PC card lock 1 as shown.
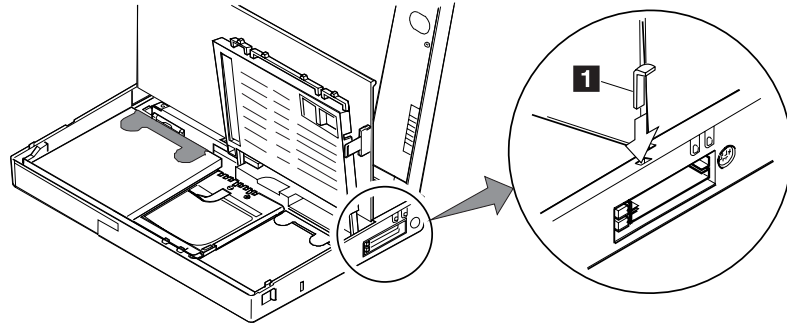
To lock the keyboard:
☞ page 146.

2 Lock the keyboard.

To remove the PC Card lock, open the keyboard and insert the tip of a pen in the opening 2 from the *inner side* of the computer; then push the lock up.
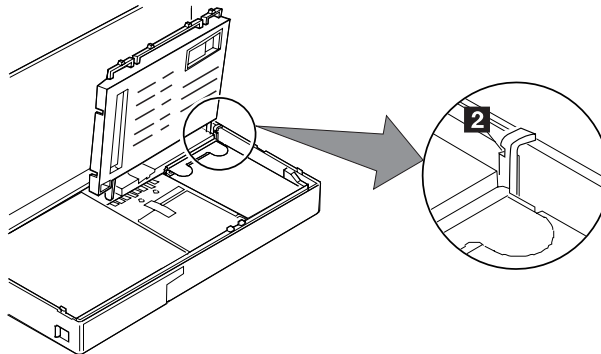
Using Locking Devices

To protect your computer from being removed without permission, attach a Kensington lock or its compatible lock to the keyhole on the side of the computer; then secure the chain on the lock to a stationary object.
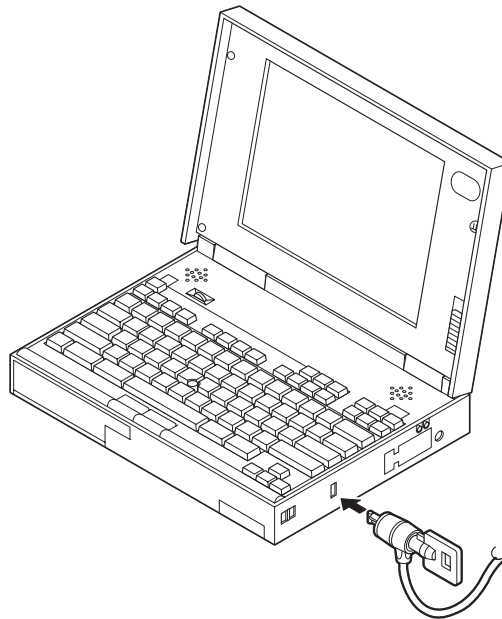
By attaching a lock to the locking device keyhole, the keyboard is also prevented from being opened, which secures the internal devices under the keyboard.

Using the Personalization Utilities

You can display personal information, such as your name or address, every time the computer is turned on when a power-on or hard-disk password is set. This can help you when you misplace your computer. Because the password is set, your data is secured and cannot be accessed, but the personal information is displayed and identifies the owner of the computer. The Personalization Utilities include the Personalization editor to create your own image to be displayed with the text information you create, and the personalization update utility to store your personal data in the non-volatile memory of your system.

```
XXXX:     XXX XXXXX
XXXXXX:  XXXXX XXX.
XXX:       (XXX)XXX-XXXX

XXX XXX XXXXX.  XXX XXXX
XXX XX X XX XX XXXXXXX.
```
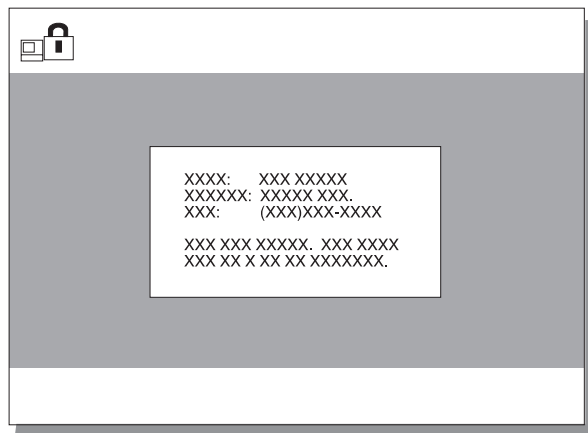
To create your personal data, first edit the text and convert it into a bitmap file; then imbed it onto the password-prompt screen by using the Personalization editor. To create your personal data, do the following:

1 Turn on the computer and start Windows or OS/2.

2 Make a backup copy of the Utility Diskette using your operating system's diskcopy command.

3 Insert the backup copy of the Utility Diskette into the diskette drive.

Notes:

1. Do not use the tab key when typing your information. Use the Spacebar instead to insert space between text.

2. You can use any type of font or font size.

3. A sample file (`PERSSAMP.WRI`) is available on the Utility Diskette.

4 Create your text information using Write and Paintbrush of Windows.

a) Double-click on the **Write** icon in the Accessories window; then type your personal information.

b) Double-click on the **Paintbrush** icon in the Accessories window.

c) Select **Options**; then select **Image Attributes...** from the pull-down menu.

```
┌─────────────────────┐
│ Options   Help      │
├─────────────────────┤
│ Image Attributes... │
│ Brush Shapes...     │
│ Edit Colors...      │
└─────────────────────┘
```
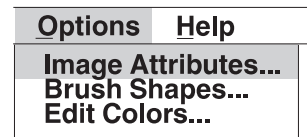
d) Specify the size of the image as 320 (width) by 200 (height) pels; then set the colors as **Black and White**.

```
┌──────────────────────────────────────────────┐
│ ▭              Image Attributes               │
│                                               │
│                 ┌─Units─┐   ┌──────────────┐  │
│                 │       │   │     OK       │  │
│   Width:  320   │ ○ in  │   └──────────────┘  │
│                 │ ○ cm  │                     │
│                 │       │   ┌──────────────┐  │
│   Height: 200   │ ● pels│   │   Cancel     │  │
│                 └───────┘   └──────────────┘  │
│                                               │
│                             ┌──────────────┐  │
│                             │   Default    │  │
│   ┌─Colors──────────────┐   └──────────────┘  │
│   │  ● Black and White  │                     │
│   │                     │                     │
│   │  ○ Colors           │                     │
│   └─────────────────────┘                     │
└──────────────────────────────────────────────┘
```

Note:
When closing the Write window, you can save the text for future use.

Note:
A cursor (|) appears indicating where the text will be placed.
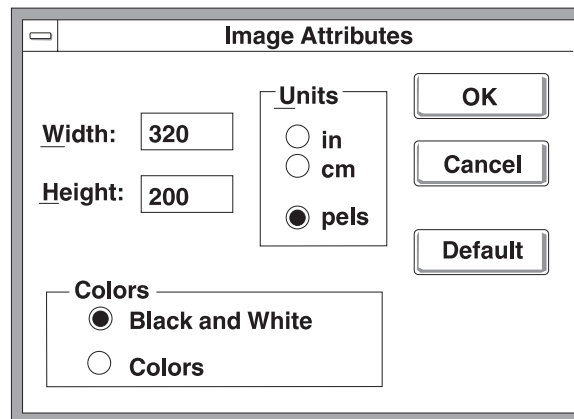
e) Go to the Write window. Save the text using cut-and-paste; then return to the Paintbrush window.

f) Click on the text tool ($\boxed{\text{abc}}$); then click where the text is to be placed on the specified area.

g) Paste the text using cut-and-paste; then save it as a bitmap file on the backup copy of the Utility Diskette.

5 Create the screen background using Paintbrush.

   a) Select **Options**; then **Image Attributes...** from the pull-down menu.

   b) Specify the size of the image as 160 (width) by 100 (height) pels; then set the colors as **Colors**.

Image Attributes
Width: 160
Height: 100
Units
○ in
○ cm
◉ pels
OK
Cancel
Default
Colors
○ Black and White
◉ Colors
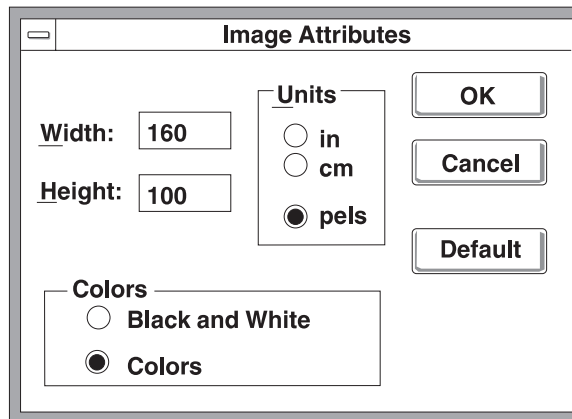
   c) Draw an image or color the background of the screen; then save the background as a **16 color bitmap** file on the backup copy of the Utility Diskette.

Save As
File Name:
Directories: a:\
📂 a:\
OK
Cancel
Info...
Save File as Type: 16 Color bitmap (*.BMP)
Drives: 💾 a:
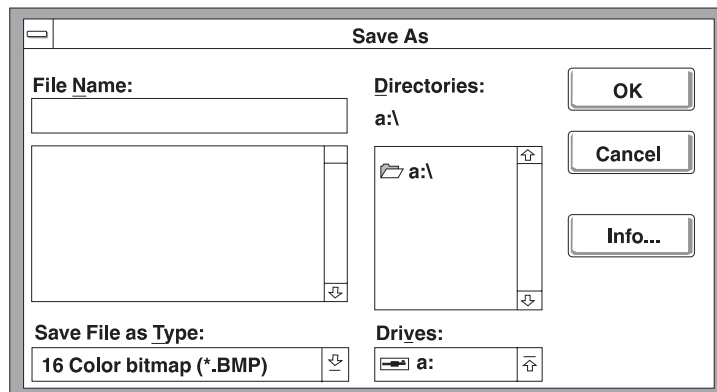
The screen background will contain 16 of your images and the text information in the middle will cover four of the images.

6 Save your data using the Personalization editor in the
ThinkPad Features program.

a) Select the **Personalization** icon ( ) in the
ThinkPad Features program.
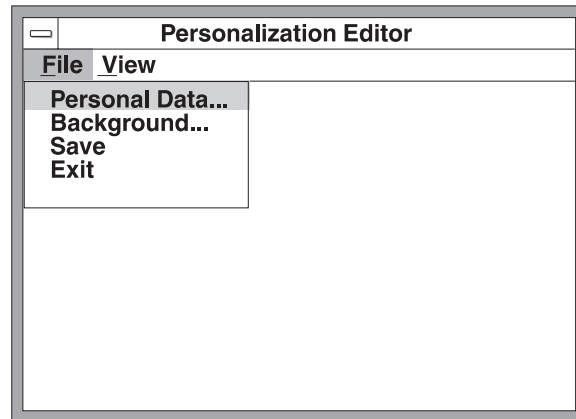
b) Select **File** from the Personalization Utility window; then
select **Personal Data** from the pull-down menu.

c) Select the bitmap file with the saved text; then click on OK
or press **Enter**.

d) Select **File**; then select **Save** from the pull-down menu.

Your data is saved on the Utility Diskette for future use.

e) Select **File**; then select **Background** from the pull-down
menu.

f) Select the bitmap file with the saved background; then
click on OK or press **Enter**.

g) Select **File**; then select **Save** from the pull-down menu.

Your data is saved on the Utility Diskette for future use.

Note:
Press the Spacebar to return to the
Personalization editor window.

h) To see a preview of your screen, select **View**; then select
Preview from the pull-down menu.

To change the screen, repeat the above steps.

i) Exit the Personalization Utility window.

7 Close all applications; then turn off the computer.

8 Insert the backup copy of the Utility Diskette into the diskette drive; then turn on the computer.

9 Select **Update personalization data**; then follow the instructions on the screen.

Your data will be stored in the non-volatile memory in the system.

You have completed creating your personal screen. Your screen is displayed when the password prompt appears. When recreating your screen, follow the same instructions to rewrite the old version.

Identifying Your Computer

Chapter 6. Installing and Removing Options

This chapter provides information on how to install or remove external or internal devices and IBM options.

Installing and Removing PC Cards

Warning:
Do not insert IC DRAM cards into the PCMCIA slot.

This section explains how to install and remove a PC Card (PCMCIA card). To operate the computer with the PC Card, refer to "Using PC Cards" on page 65.

Inserting the PC Card

1 Insert the tip of a ballpoint pen into the end-cut of the blank cover `1` ; then remove the cover from the PCMCIA slot.

2 Insert the PC Card into a slot appropriate for its type.

> If you are using a **Type I** or **Type II** PC Card, insert it into either the upper slot　2　or the lower slot　3　as shown. Then press it firmly into the connector.

> If you want to use another PC Card, insert it into the other slot in the same way.

> If you are using a **Type III** PC Card, insert the card into the *lower* slot　3　as shown. Then press it firmly into the connector.

3 Install the cover with the cable opening 4 .

If you have an adapter cable, connect it to the PC card.
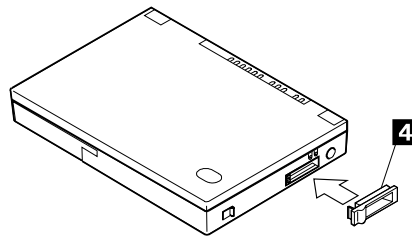
You have completed the installation of the PC Card. Refer to the following sections before you use the PC Card:

"Using PC Cards" on page 65.
"Considerations for Suspend Mode" on page 60.
"Considerations for Hibernation Mode" on page 64.
"Protecting Your PC Card" on page 147.

Removing the PC Card

1 Press the PC-card eject button `1` or `2` for the PC Card you want to remove.
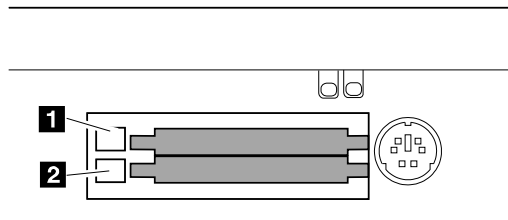
2 If you are not going to use the PCMCIA slot, remove the cover with the cable opening; then install the blank cover.
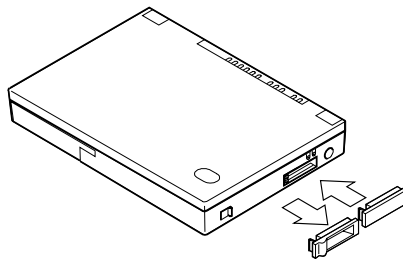
Increasing Memory Capacity

Warning:
Do not insert PCMCIA Cards into the memory slot.
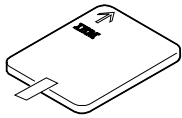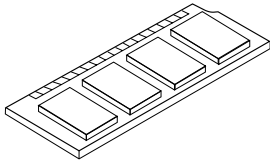
Increasing memory capacity is an effective way to make programs run faster. You can increase the amount of memory in your computer by installing either an *IC DRAM card* or a *memory module* (hereafter called DIMM). *Because the computer has only one slot for a memory card, you cannot use both an IC DRAM card and a DIMM at the same time.*

IC DRAM Card

The computer has one slot that directly accepts an IC DRAM card with any of five different capacities: 2MB, 4MB, 8MB, 16MB, and 32MB. Because your computer comes with 8MB of memory, the maximum capacity becomes 40MB if a 32MB IC DRAM card is installed.

Memory Module (DIMM)

You might want to install more memory to maximize the computer's capability. Instead of using IC DRAM cards, you can install the DIMM adapter, with one or two DIMMs, in the same slot you would install the IC DRAM card. The memory capacity can be expanded up to 36MB. The DIMM adapter has two sockets for future expansion. Three different capacities of DIMMs (4MB, 8MB, and 16MB) and the DIMM adapter are available as options.

Installing an IC DRAM Card and Memory Module

1 Stop any running application; then turn off the computer and disconnect the AC Adapter and all cables from the computer.

Warning:
Make sure the locking lever for the hard disk drive or any locking device is unlocked.

2 Open the LCD; then open the keyboard.

Warning:
The CD-ROM drive is a very delicate device that needs careful handling. Do not press on, drop, or apply any shock to the CD-ROM drive when it is removed from the computer.

3 Lift the handle on the CD-ROM drive by pulling the plastic tape 1 .

Warning:
Make sure the CD-ROM tray is closed.
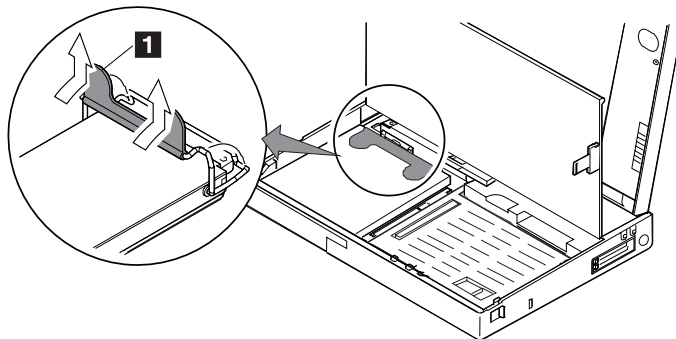
4 Remove the CD-ROM drive.
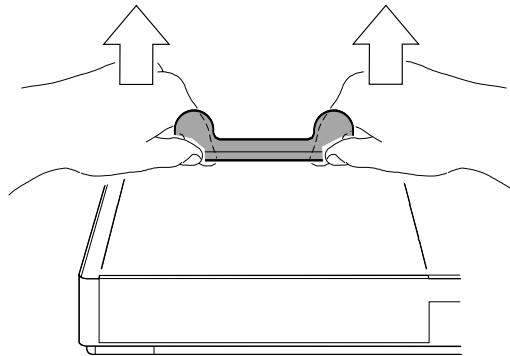
5 Which type of memory are you installing?

    IC DRAM card   Go to the next step.

    DIMM   Go to step 9 on page 163.

6 Place the adhesive strap 2 on the card as shown.
This strap is used to remove the card.
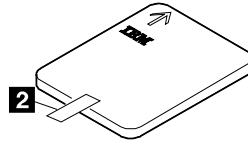
7 Insert the IC DRAM card as shown. Press the card
firmly into the connector.
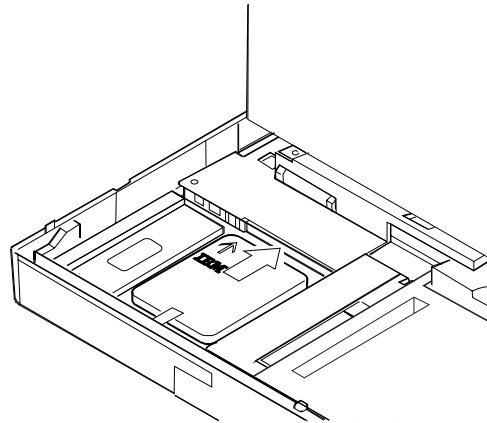
8 Go to step 12 on page 165.

Note:
Be sure to save the base plate for future use.

9 Pinch the levers ⎡3⎤ on the left side of the base plate ⎡4⎤ and pull the plate slightly toward the front; then raise the rear portion of the plate and remove it.
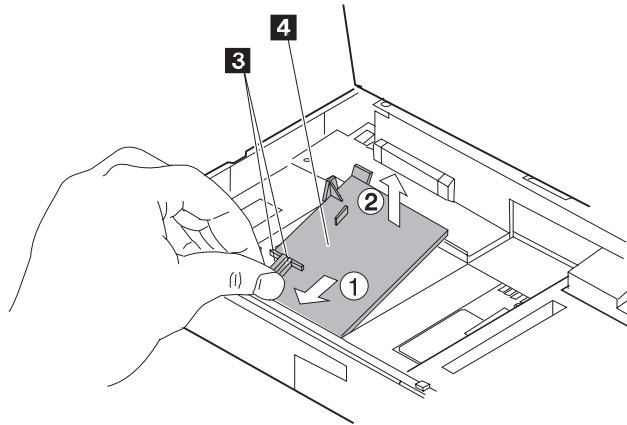
10 Insert the DIMM adapter ⎡5⎤ into the connector by pressing on both edges as shown.
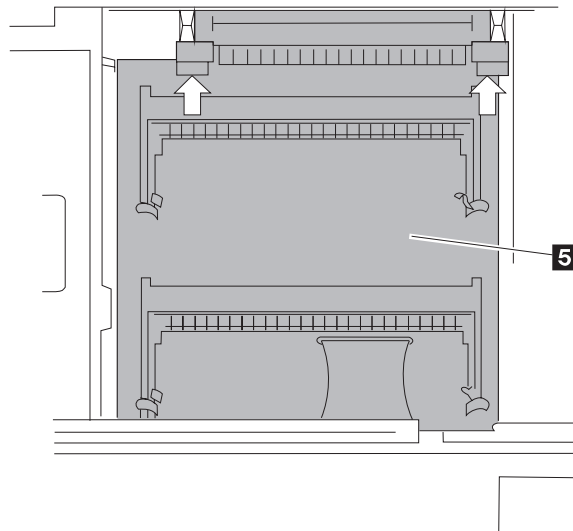
Warning:
To avoid damaging the DIMM, do
not touch the contact edge of the
DIMM.

11 Insert the DIMM into either of the connectors on the
DIMM adapter:

    a) Locate the notched end 6 of the DIMM.

    b) With the notched end toward the right side of the socket,
       insert the DIMM into the socket at an angle (approximately
       35 degrees).

    c) Press the DIMM firmly in; then pivot the DIMM until it
       snaps into place.

If you have another DIMM to install, insert it into the other
socket in the same way.

Warning:
The CD-ROM drive is a very
delicate device. Do not press on
the middle part of the drive.

12 Reinstall the CD-ROM drive. Press on the upper area of the CD-ROM drive until the drive snaps into the connector.
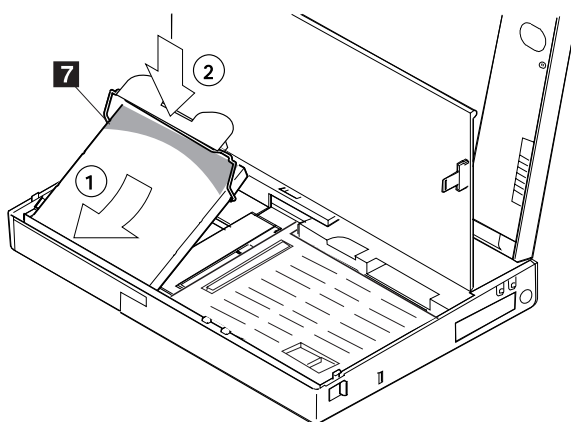
13 Close the keyboard; then reconnect all cables.

You have completed the installation of the IC DRAM card or DIMMs. If you plan to use the hibernation mode, see "Creating the Hibernation File" on page 63.

Removing the IC DRAM Card and DIMMs

1 Stop any running applications; then make sure the CD-ROM drive is closed.

2 Turn off the computer; then disconnect the AC Adapter and all cables from the computer.

Warning:
Make sure the locking lever for the hard disk drive or any locking device is unlocked.

3 Open the LCD; then open the keyboard.

Warning:
The CD-ROM drive is a very delicate device that needs careful handling. Do not press on, drop, or apply any shock to the CD-ROM drive when it is removed from the computer.

4 Lift the handle on the CD-ROM drive by pulling the plastic tape ⬛1 .
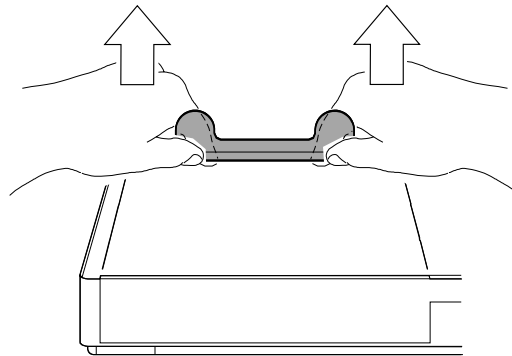
Warning:
Make sure the CD-ROM tray is closed.

5 Remove the CD-ROM drive.

6 Which type of memory are you removing?

    IC DRAM card   Go to the next step.

    DIMM   Go to step 9 on page 168.

7 Remove the IC DRAM card by pulling the adhesive strap
   2 .
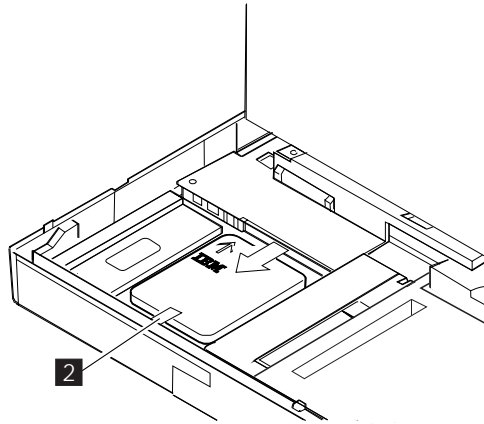
8 Go to step 13 on page 170.

Warning:
To avoid damaging the DIMM, do not touch the contact edge of the DIMM.

9 Press the locks at the same time on both edges of the socket and remove the DIMM.
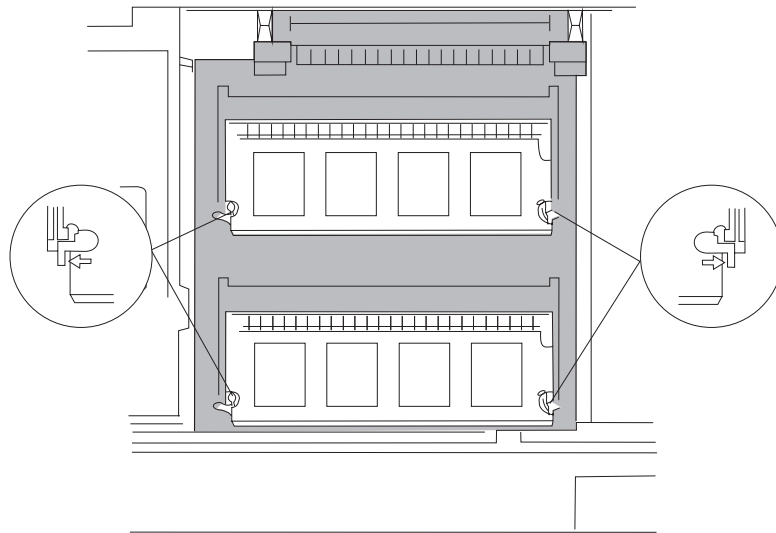
10 While holding the strap 3, pull the DIMM adapter toward the front to remove it.
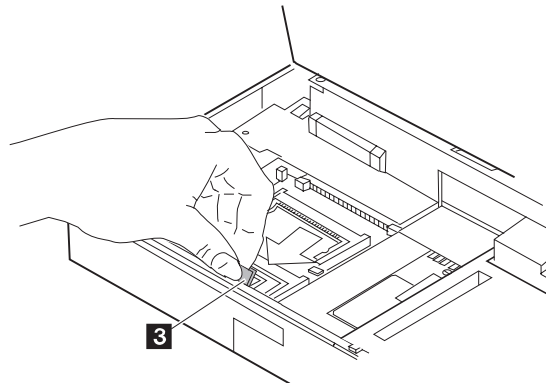
11 Pinch the levers 4 on the left side of the base plate and install the plate as shown.
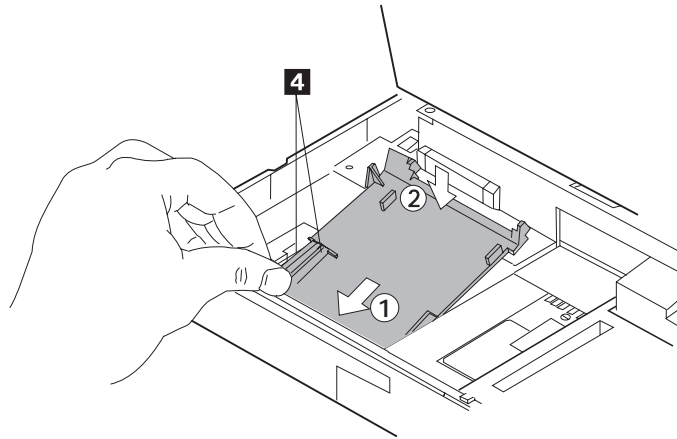
12 Push the base plate forward and click it into place.
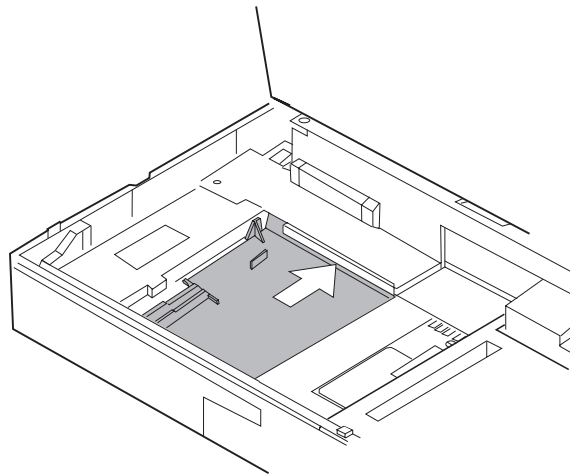
Increasing Memory Capacity

Warning:
The CD-ROM drive is a very delicate device. Do not press on the middle part of the drive.

13 Reinstall the CD-ROM drive. Press on the shaded area 5 as shown until the drive snaps into the connector.
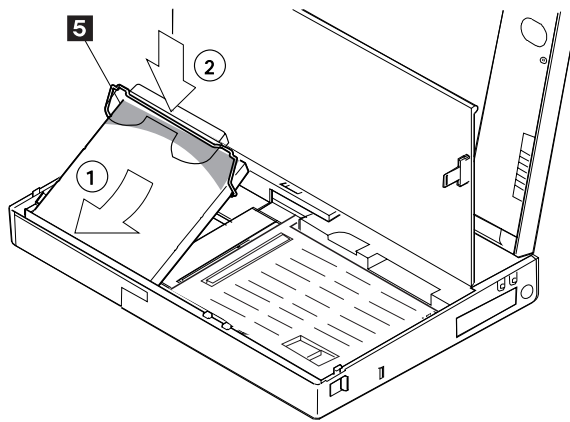
14 Close the keyboard spacer and keyboard; then reconnect all cables.

Replacing the Hard Disk Drive

The capacity of the hard disk can be expanded by replacing the original hard disk drive with an option. This option can be purchased through IBM or an IBM authorized dealer.

1 Turn off the computer; then disconnect the AC Adapter and all cables from the computer.

Warning:
Make sure the locking lever for the hard disk drive or any locking device is unlocked.
The hard disk drive is a very delicate device that needs careful handling. If it falls onto a hard surface, severe damage can occur.

2 Open the LCD; then open the keyboard and keyboard spacer.

3 Lift the handle on the hard disk drive by pulling the plastic tape `1` .

Note:
The bottom of the hard disk drive might become hot, but it is not a defect.

4 Remove the hard disk drive.

Be careful that you hold the drive as it comes out of the compartment. Gently place it on a flat surface. After removing the drive, keep it in the carrying case that contained the replacement drive.

5 Insert the replacement drive. Press on the shaded area
   2 as shown until the drive snaps into the connector;
   then close the keyboard spacer and keyboard.
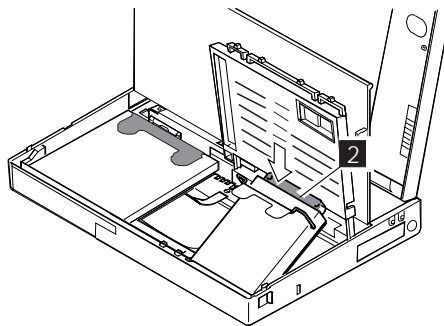
6 Connect the AC Adapter to the computer; then turn on
   the computer.

7 Install your operating system by following the instructions
   in Chapter 7, "Installing Software" on page 193.

You have completed the replacement of the hard disk drive.

Installing Options in the CD-ROM Drive Compartment

The CD-ROM drive can be removed to install options in its place. Some options may require you to remove the option cover from the computer.

Removing the Option Cover

To remove the option cover, do the following:

Warning:
The CD-ROM drive is a very delicate device that needs careful handling. Do not press on, drop, or apply any shock to the CD-ROM drive when it is removed from the computer.

1 Stop any running applications; then make sure the CD-ROM tray is closed.

2 Turn off the computer; then disconnect the AC Adapter and all cables from the computer.

3 Open the LCD; then open the keyboard and keyboard spacer.

4 Lift the handle on the CD-ROM drive with the plastic tape, and remove the CD-ROM drive.
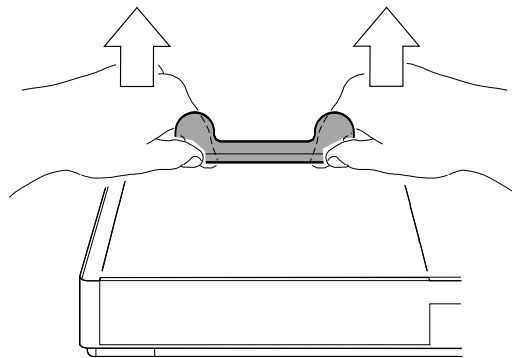
5 Insert a coin between the option cover and computer as shown.
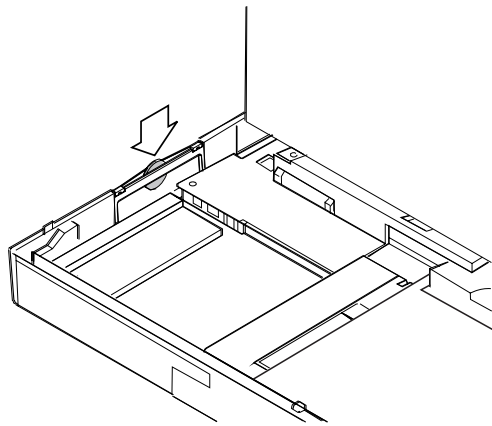
6 Push the option cover from the bottom of the computer as shown and remove it.
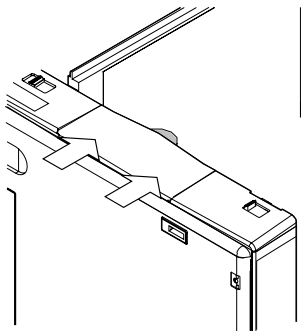
7 Refer to the manual that came with the option to install it.

8 Close the keyboard spacer and keyboard; then reconnect all cables.

Reinstalling the Option Cover

To reinstall the option cover, do the following:

1 Insert the upper portion of the option cover into the computer; then insert the lower portion.

The following figure shows the computer as seen from its front side.
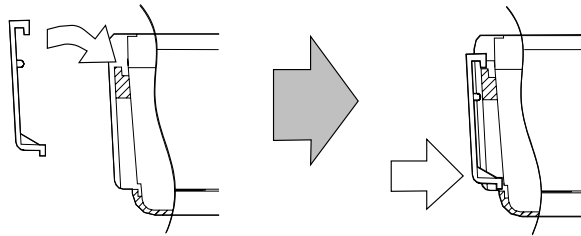
2 Push the upper portion of the option cover into the computer until the cover snaps into place.
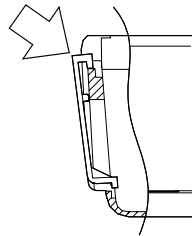
Installing the DAA/Telephony Kit

Note:
In some countries, the Mwave telephony functions are available after the DAA/Telephony Kit option is installed.

If the telephone plug on the left side of your computer is one with a square receptacle, the computer can be used for telephone or modem/fax functions without any changes. However, if a dummy connector plug is attached, you need to install the DAA/Telephony Kit into your computer to use the Mwave telephony functions.

To attach the DAA/Telephony Kit, do the following:

1 Turn off the computer; then open the cover on the left side of the computer.
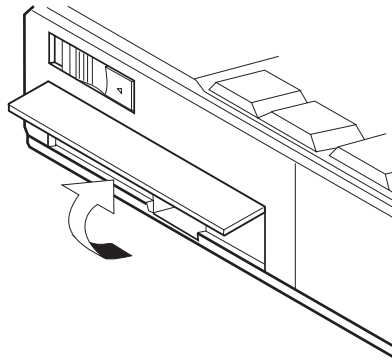
Warning:
Make sure the locking lever for the hard disk drive is unlocked.

2 Open the keyboard.

3 Slide the latch ⌊1⌋ to the left-most position as shown and release the dummy plug.
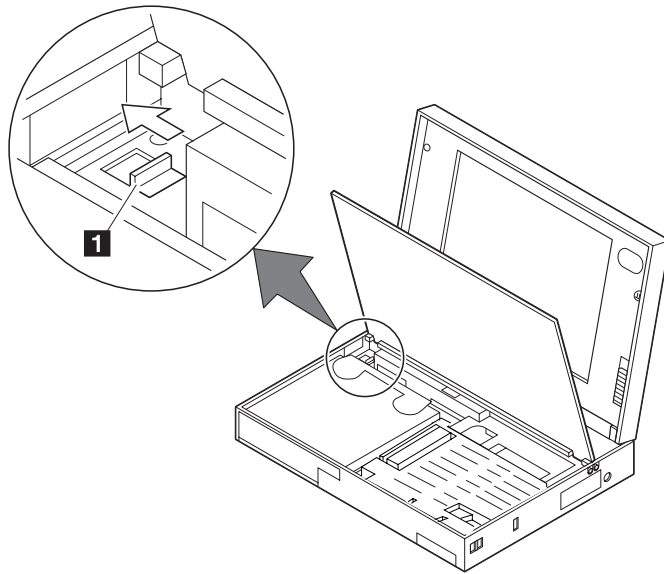
4 Remove the dummy plug ⌊2⌋ from the computer.

5 Make sure the latch is at the left-most position; then install the new plug with the round receptacle and firmly press it into the connector.
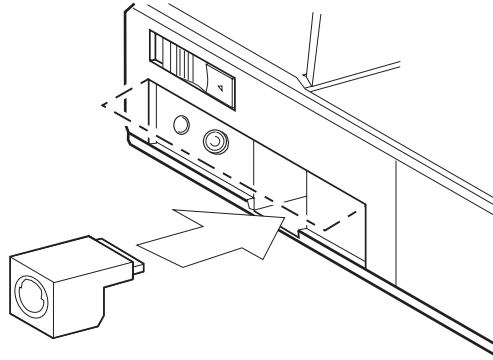
Warning:
Do not leave the lever in the its middle position. Otherwise, you cannot close the keyboard.

6 Slide the lever to its right-most position until it clicks into place; then close the keyboard.

7 Connect the cables as shown:

DANGER

⚠ **To avoid shock hazard, do not connect the telephone cable to or disconnect it from the computer during electrical storms.**

Note:
Both ends of the DAA interface cable are identical.

a) Connect one end of the DAA interface cable   1   to the connector plug with the round receptacle.

b) Connect the other end of the DAA interface cable   2   to the round receptacle of the DAA.

c) Connect the connector   3   of the ferrite-core end of the telephone cable to the square receptacle of the DAA.

d) Connect the other end of the telephone cable to the telephone outlet   4   on the wall.
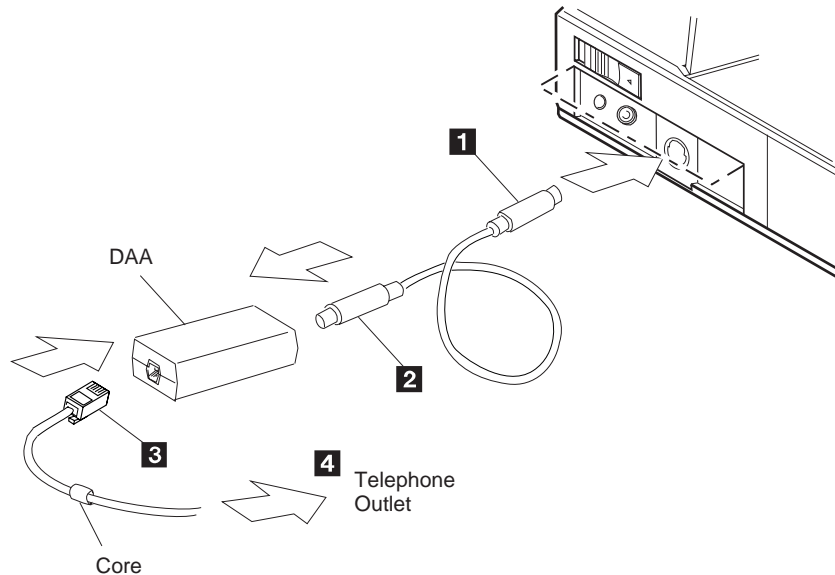
Installing DAA/Telephony Kit

After you have completed attaching the modem/fax port, install the necessary software by referring to the manual that came with the option package.

Refer to "Using the Mwave DSP Features" on page 78 for information about how to use the Mwave telephony features.

Attaching an External Numeric Keypad or a Mouse

Warning:
When connecting a mouse other than the IBM PS/2 Miniature Mouse to the computer, turn off the computer.

An external numeric keypad or a mouse can be attached directly to the connector on the right side of the computer.
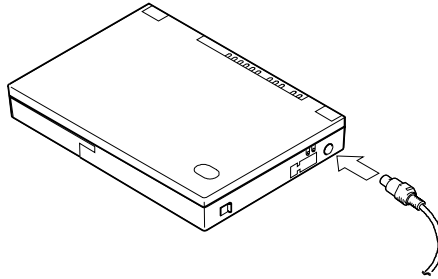
Note:
The keypad cover 1 can be removed and used as a stand for the keypad.

If you want to use the external numeric keypad and mouse at the same time, first connect the keypad cable to the computer; then connect the mouse cable to the connector 2 at the rear of the keypad.
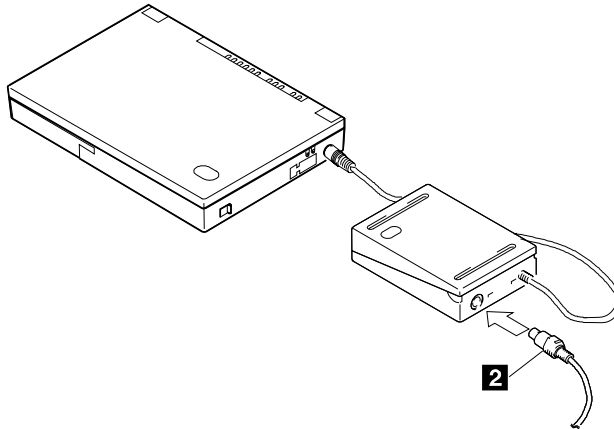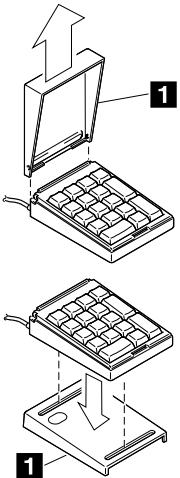
Using the Mouse and Other Pointing Devices

To attach mouse:
☞ page 181.

You can use both the IBM PS/2 Mouse and the TrackPoint III. The mouse is plugged into the external input-device connector of the computer and functions normally when the TrackPoint III is not actually moving the cursor.

If you have a serial mouse, connect it to the serial connector. You might also have a device other than the PS/2 Mouse that you will connect to the external input-device connector. In either case, you must *disable* the TrackPoint III. Do the following:

Note:
The appropriate software also must have been loaded already.

1 Open the ThinkPad Features program.

2 Select the **ThinkPad Setup** icon.

3 Select the **Keyboard/Pointing Device** icon.

4 Disable the TrackPoint III by clicking on **Disable**; then click on **Save**.

5 Restart the computer.

Using a Mouse on the IBM ThinkPad Space Saver Keyboard

You can use the IBM ThinkPad Space Saver Keyboard instead of the keyboard of your computer. When you connect a mouse to the Space Saver Keyboard, you must disable the TrackPoint III of your computer. To disable the TrackPoint III, do either of the following:

Use the ThinkPad Features program

1 Open the ThinkPad Features program.

2 Select the **ThinkPad Setup** icon.

3 Select the **Keyboard/Pointing Device** icon.

4 Disable the TrackPoint III by clicking on **Disable**; then click on **Save**.

5 Restart the computer.

Note:
Do not install the device driver that is supplied with the Space Saver Keyboard.

Use the Utility Diskette supplied with your computer to install the device driver.

When the Space Saver Keyboard is used, the device driver of the Utility Diskette supplied with the computer automatically disables or enables the TrackPoint III of the computer when computer power is turned on. To install the device driver, do the following:

1 Turn off the computer.

To install the diskette drive:

2 Replace the CD-ROM drive with the diskette drive.

3 Turn on the computer and start the operating system; then insert the Utility Diskette into the diskette drive.

4 At the command prompt, type **A:UINSTALL** and press
Enter.

The following screen appears:

```
                    Installation Options

                  Installation Source Drive

 Type the SOURCE drive letter (A-Z).  When you install a program, the
 SOURCE drive letter is the location you are installing FROM.

 Source Drive ... [ A ]


 Enter  F1=Help   F3=Exit
```
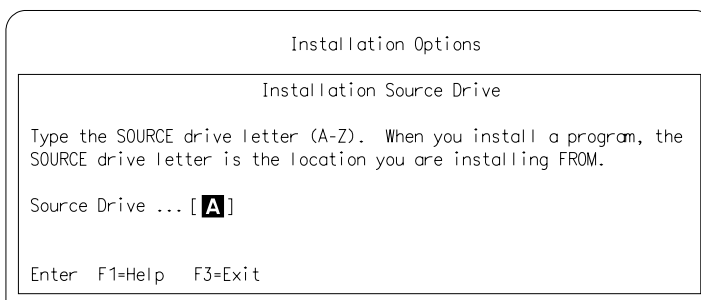
5 Press **Enter** and follow the instructions on the screen
until the Installation Options menu appears.

6 Select the following according to your operating system:

If you are using OS/2, select **Install IBM ThinkPad Space
Saver Keyboard Driver for OS/2**.
If you are using DOS or Windows, select **Install IBM
ThinkPad Space Saver Keyboard Driver for DOS**.

7 Follow the instructions on the screen.

8 After the installation has been successfully completed,
close all applications and remove the Utility Diskette.

Warning:
**The diskette drive is a very
delicate device. Do not press on
the middle part of the drive.**

To install the CD-ROM drive:

☞ Page 95.

9 Turn off the computer; then replace the CD-ROM drive
with the diskette drive.

10 Restart the system.

Attaching an External Keyboard

The computer can be operated with a PS/2 keyboard that is externally attached to the keyboard/mouse connector (separately available as an option).

ThinkPad Features program: ☞ page 36.

The computer enters suspend mode when the LCD is closed. If you want to use the computer with the LCD closed, set the suspend option in the ThinkPad Features program so the computer does not enter suspend mode when the LCD is closed.

Note:
When using a mouse on the IBM Space Saver Keyboard, see "Using a Mouse on the IBM ThinkPad Space Saver Keyboard" on page 183.

When an external keyboard is used:

It must be connected through the keyboard/mouse connector. The external keyboard does not work when it is connected directly to the computer.

An external numeric keypad and the numeric keypad on the computer cannot be used when the external keyboard is connected.

Turn off the computer and attach the external keyboard as shown.
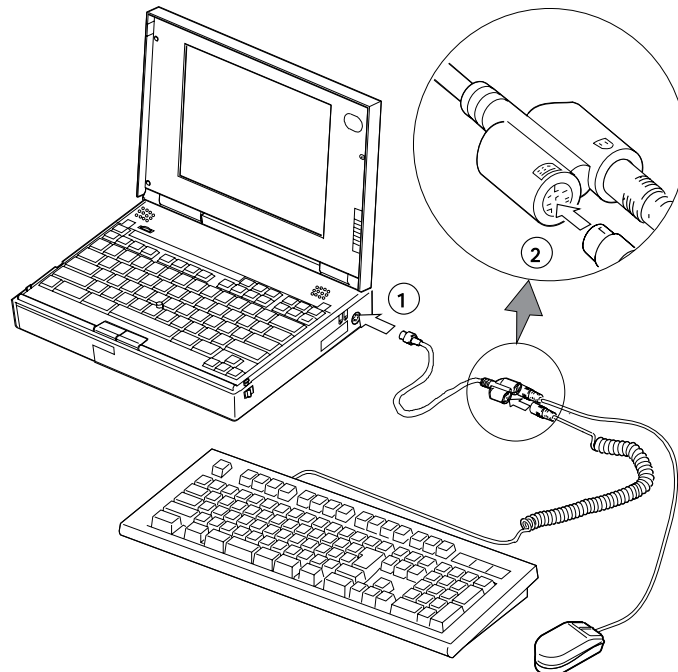
Attaching a Printer

Any parallel printer with the standard Centronics interface can be attached to the 25-pin, parallel connector at the rear of the computer.

1 Turn off the computer and attach the printer as shown.
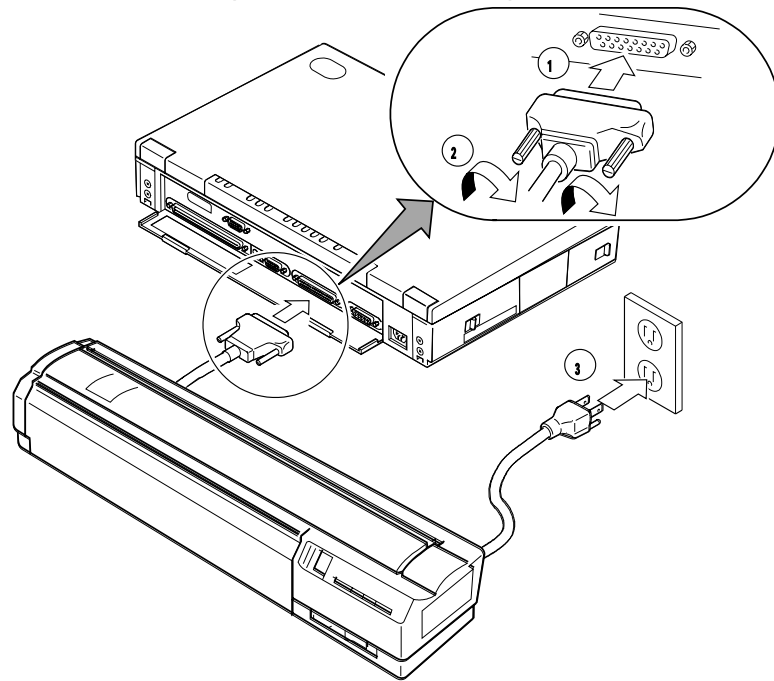
2 Turn on the computer and the printer.

Attaching an External Display

Note:
When installing an operating system, you must install the display driver before using an external display.

To install display driver:
☞ Page 218.

The computer can display information not only on the LCD, but also on VGA- or SVGA-compatible displays that are externally attached to the computer.

To use an external display, do the following:

1. Change the display mode to **CRT** or **Both** by using the ThinkPad Features program. (See "Changing the Display Mode.")

2. Set the monitor type and display device driver. (See "Setting the Monitor Type and Display Driver" on page 188.)

3. Attach the external display to the computer. (See "Connecting the External Display" on page 190.)

When you disconnect the external display; then turn on the computer, information is displayed on the LCD with 640 by 480 resolution, not in the resolution you have specified on the external display.

Changing the Display Mode

You can display information on the LCD, the external display, or both by doing the following:

Using the Fn-Key function.

Press and hold **Fn**; then press **F7**. Each time you press this key combination, the computer output sequentially appears as follows:

```
External Display       LCD        Both
```

Using the ThinkPad Features program

1 Start the ThinkPad Features program and select the **Display** icon.

2 Select where to display the information; then click on OK.

Entering a PS2 command from the command prompt

Type **PS2 ?** at the command prompt; then press **Enter** for more information.

Setting the Monitor Type and Display Driver

Set the monitor type and device driver type for the external display by doing the following:

Note:
You can also use the PS2 commands. Type **PS2 ?** at the command prompt for more information.

Note:
Refer to the documents supplied with the external display for its supporting screen resolution.

Note:
Refer to the specifications of your display about the supported resolution and refresh rate.

1 Start the ThinkPad Features program.

2 Select the **Setup** icon; then select **Display**.

3 Change the monitor setting.

   a) Select **Monitor**.

   b) Select your display type from the Monitor Selection list, or click on the new resolution and V-Sync (refresh rate) from the Resolution list.

   c) Click on **OK**.

4 Change the device driver setting.

   a) Click on **Device Driver** in the Display window.

   b) Click on the new resolution and color depth.

   c) Click on **OK**.

5 Restart the system to make the changes effective.

Virtual screen option:

☞ Page 39.

> **Important**
>
> When you display information on an external display with high resolution (800 by 600 or 1024 by 768); then enter suspend mode and disconnect the external display, the LCD of the computer remains blank when you resume normal operation. When you select the external display for displaying information, make sure the external display is attached to the computer or do the following:
>
> *If you are using OS/2:* Use either the external display with 640 by 480 resolution or use the virtual screen option in the ThinkPad Features program.
>
> *If you are using DOS:* Use the external display with 640 by 480 resolution.
>
> *If you are using Windows:* Use the virtual screen option in the ThinkPad Features program.

Connecting the External Display

Turn off the computer and attach the external display as shown; then turn on the computer and the display.
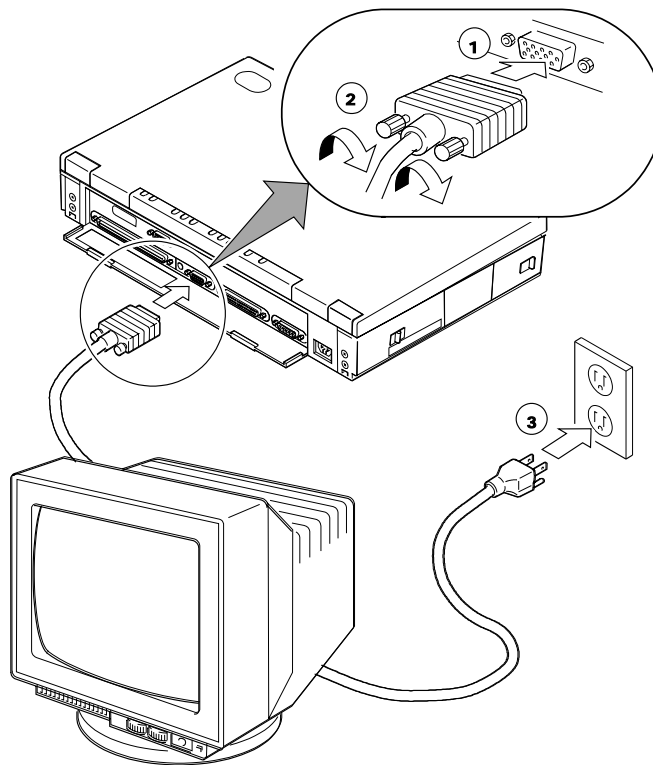
Changing the Screen Resolution and Color Depth

To change the screen resolution or color depth of the external display, do the following:

1 Start the ThinkPad Features program.

2 Select the **Display** icon.

3 Click on **Device Driver**.

4 Click on the new resolution and color depth; then click on **OK**.

5 Restart the computer to make the changes effective.

Using the SVGA Video Mode

The LCD screen only supports a VGA-compatible video mode (640 by 480 resolution). However, you can display information in SVGA, high-resolution mode (800 by 600 or 1024 by 768), by attaching an external display that supports high-resolution mode to the external display connector. When installing an operating system, you must install the display driver supplied with the computer to use SVGA mode.

When using the high-resolution mode, select **CRT** in the Display menu of the ThinkPad Features program.

The following is the resolution and color combinations you can choose for your external display.

If you are using OS/2

Resolution	Colors
256 colors	640 by 480 800 by 600 1024 by 768

If you are using Windows

Colors	Resolution
64 gray shades or 256 colors	640 by 480 800 by 600 1024 by 768
32 768 or 65 536 colors	640 by 480

Attaching the IBM ThinkPad Dock I or Dock II

Note:
Do not use the diskettes supplied with the expansion unit.

The computer can be used with either the IBM ThinkPad Dock I or Dock II to expand your computer capability or multimedia features. By attaching either to the computer, you will be able to use the CD-ROM drive of the Dock I or Dock II and install the diskette drive in the computer CD-ROM/diskette drive compartment. You can also use full speaker sounds from the speakers or have adapter slots for various adapter cards.

To use the Dock I or Dock II, refer to their *User's Guide*s.
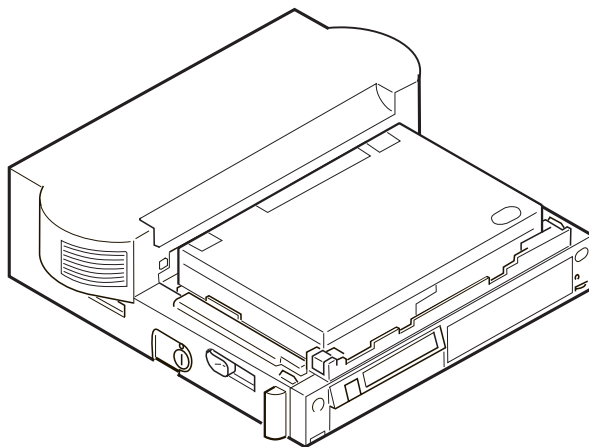
When using the Dock I, you can adjust the sound with the computer. Use the following key combinations to adjust the sound.

Key Combination	Meaning
Fn + ◀█▶▲	Each time this combination is pressed, the sound volume increases.
Fn + ◀█▶▼	Each time this combination is pressed, the sound volume decreases.

Chapter 7. Installing Software

This chapter provides information about the software installed in your computer and the procedures for installing the necessary device drivers when the reinstalling an operating system.

What You Need for Your Computer

Your computer comes with the following software already installed in the computer:

Mwave Device Driver
IR Device Driver
PCMCIA device driver
PC Card Director program
ThinkPad Features program
ThinkPad display driver
CD-ROM device driver
Enhanced Video device driver
Online book

When reinstalling an operating system, you must install an operating system and the software listed above for your computer to operate as it did at the time of purchase. The online book, however, is available only at the time of purchase and no diskettes are available for reinstallation.

The PC Card client device driver is not part of the pre-installed software. Refer to the manual that came with the PC Card to install the device driver.

If you are using DOS and do not use the PC Cards and need more application memory area, see "Releasing the PCMCIA Memory Area" on page 268.

Before you begin installing software with diskettes, you must replace the CD-ROM drive with the diskette drive to use. See "Using the Diskette Drive" on page 95.

Some software are shipped in CD-ROM media with a diskette. Some of these software require that the CD-ROM drive and diskette drive are attached to the computer at the same time. If this is the case, use the IBM Port Replicator, Dock I, or Dock II to attach a diskette drive externally. Otherwise, you need to obtain the diskette version of your software.

The following shows you what must be installed for each operating system before you begin computer operation.

Page numbers:

For OS/2

1	Page 196.
2	Page 202.
3	Page 207.
4	Page 210.
5	Page 215.
6	Page 219.

For DOS

7	Page 197.
8	Page 201.
9	Page 203.
1	Page 208.
11	Page 212.

For Windows

12	Page 197.
13	Page 201.
14	Page 203.
15	Page 197.
16	Page 204.
17	Page 209.
18	Page 213.
19	Page 216.
2	Page 217.

OS/2 Version 2.11 or later

1 Install OS/2 with MMPM/2

2 Install ThinkPad Features Program

3 Install PCMCIA device driver

4 Install Mwave Support Software

5 Install Infrared device driver

6 Install ThinkPad display driver

PC DOS Version 6.3 or later

7 Install DOS

8 Install CD-ROM device driver

9 Install ThinkPad Features Program

10 Install PCMCIA device driver

11 Install Mwave Support Software

Microsoft Windows Version 3.1 or later

12 Install DOS

13 Install CD-ROM device driver

14 Install ThinkPad Features for DOS

15 Install Microsoft Windows
- Install with Advanced Power Management
- Install ThinkPad display driver

16 Install ThinkPad Features for Windows

17 Install PCMCIA device driver

18 Install Mwave Support Software

19 Install Infrared device driver

20 Install Enhanced Video device driver

Start Computer Operation

Installing Operating Systems

The operating systems supported by your computer are:

IBM Operating System/2 (OS/2) Version 2.11 or later
IBM PC DOS Version 6.3 or later
IBM DOS Version J6.3/V or later
Microsoft Windows 3.1 or later

Important

If you will be installing Windows 3.1 or later, you **must** first do the following for Windows to operate correctly:

Install the ThinkPad display driver instead of the default device drivers that came with Windows.

When the Windows Setup program asks you to select either **Express Setup** or **Custom Setup**, select **C** for Custom Setup.

Refer to the appropriate section in the following to install your operating system.

IBM OS/2 Version 2.11 or Later

Follow the instructions in the operating-system documentation. Install the Multimedia Presentation Manager/2 (MMPM/2) also with OS/2. After OS/2 has been successfully installed, go to "Installing the ThinkPad Features Program" on page 202.

Note:
You cannot install the CD-ROM version of OS/2. The installation requires that a CD-ROM drive **and** a diskette drive are attached to the computer. If installing OS/2 using CD-ROMs, use the IBM Port Replicator, Dock I, or Dock II to attach a diskette drive externally. Otherwise, you need to obtain the diskette version of OS/2.

Important

When installing the operating system, select the choices so that PCMCIA is supported. PCMCIA will not be supported if you select **Install Preselected Features**.

`DOS` **IBM PC DOS Version 6.3 or Later**

Follow the instructions in the operating-system documentation. If you also are installing Microsoft Windows 3.1 or later, go to "Microsoft Windows Version 3.1 or Later." Otherwise, go to "Installing the CD-ROM Device Driver" on page 201.

`WIN` **Microsoft Windows Version 3.1 or Later**

Windows operates in a DOS environment. Install the following before installing Windows.

DOS Version 6.3 or later (see your DOS manuals)
CD-ROM Device Driver for DOS and Windows (see page 201.)
ThinkPad Features for DOS (see page 203)

Important

Before you install Windows Version 3.1 or later, you **must** do the following for Windows to operate correctly:

When the Windows Setup program asks you to select either **Express Setup** or **Custom Setup**, select **C** for Custom Setup.

Install the ThinkPad display driver instead of the default device drivers that came with Windows.

Do the following to install Windows Version 3.1 or later with Advanced Power Management (APM) and the ThinkPad display driver.

1 Turn on the computer.

2 Install Windows Version 3.1 or later *with* the APM option:

Important

When the Windows Setup program asks you to select *Express Setup* or *Custom Setup*, type **C** for **Custom Setup**.

---

a) Start the installation as specified in the Windows manual.

Note:
If you have installed OS/2, the path to install Windows may have changed to C:\OS2\MDOS\WINOS2 (C is the drive on which you installed OS/2). If so, change the path to:

C:\WINDOWS

b) When the Windows Setup program asks you to select *Express Setup* or *Custom Setup*, type **C** for **Custom Setup**.

c) Continue installing Windows Version 3.1 until the following screen appears.

```
 Windows Setup
 ===============

  Setup has determined that your system includes the following hardware
  and software components. If your computer or network appears on the
  Hardware Compatibility List with an asterisk, press F1 for Help.

      Computer:      MS-DOS System
      Display:       VGA
      Mouse:         Microsoft, or IBM PS/2
```

d) Using the Up Arrow (↑), highlight **MS-DOS System** and press **Enter**.

e) Using the Down Arrow (↓), highlight **MS-DOS System with APM** and press **Enter**.

Verify that **Computer** has changed to **MS-DOS System with APM** as shown below. If the item has not changed, return to step 2d.

```
Windows Setup
===============

  Setup has determined that your system includes the following hardware
  and software components. If your computer or network appears on the
  Hardware Compatibility List with an asterisk, press F1 for Help.

     Computer:      MS-DOS System with APM
     Display:       VGA
     Mouse:         Microsoft, or IBM PS/2
```

Note:
You can change the display resolution type by using the ThinkPad Features program after completing the installation.

3 Select your display resolution type:

a) Using the Up Arrow (↑), highlight **Display** and press **Enter**.

b) Select **Other (Requires disk...)** from the menu.

c) Insert the Video Features Diskette for Windows into the diskette drive; then type **A:** and press **Enter**.

d) Select your desired resolution from the menu and press **Enter**.

Verify that **Display** has changed to your desired resolution type as shown in the following. If the item has not changed, return to step 3a.

```
Windows Setup
===============

  Setup has determined that your system includes the following hardware
  and software components. If your computer or network appears on the
  Hardware Compatibility List with an asterisk, press F1 for Help.

     Computer:      MS-DOS System with APM
     Display:       SVGA(WD9 C24) 64 ×48  256 colors small fonts
     Mouse:         Microsoft, or IBM PS/2
```

    e) Press **Enter** to continue the installation.

4 When you have completed the installation of Windows
Version 3.1, edit the AUTOEXEC.BAT file so that the
computer will use the correct mouse driver.

When Windows Version 3.1 is installed, the computer is
automatically configured to use the MOUSE.COM driver
provided by Windows Version 3.1. However, for correct
operation, your computer must use the MOUSE.COM driver
that came with DOS.

    a) At the DOS command prompt (usually C:\>), type
E\AUTOEXEC.BAT and press **Enter**.

    b) Find the line: C:\WINDOWS\MOUSE.COM /Y

    c) Change it to: **C:\DOS\MOUSE.COM /Y**

    d) Save the file and restart the system.

When you start Windows from the DOS prompt, do not close the
LCD while the program is loading; if you do, the computer will stop
running.

Go to "Installing the ThinkPad Features Program" on page 202.

Installing the CD-ROM Device Driver

This section describes the installation of the CD-ROM device driver for DOS and Windows.

DOS WIN Installing for DOS and Windows

If you are using Windows, install the CD-ROM device driver using DOS.

1 Turn on the computer; then go to the DOS prompt.

2 Insert the CD-ROM Device Driver Diskette into the diskette drive.

3 Type **A:**; then type **UINSTALL**.

4 Follow the instructions on the screen to complete the installation.

When you are prompted for the directories of the source file and destination, make sure the source directory is A: and the destination is C:.

5 After the installation, remove any diskette from the diskette drive and restart the system.

Installing the ThinkPad Features Program

If your computer did not have a pre-installed operating system, install the ThinkPad Features program that is on Utility Diskette to set up the programs used with your computer. Follow the instructions for your operating system:

For OS/2, see "Installing for OS/2."

For DOS, see "Installing for DOS" on page 203

For Microsoft Windows, see "Installing for Windows" on page 204.

Installing for OS/2

1 Turn on the computer and start OS/2.

2 Open the OS/2 full screen.

3 Insert Utility Diskette into the diskette drive.

4 Go to the A: prompt and type **INSTALL2**; then press **Enter**.

5 Install the DOS ThinkPad Features to use the PS2 commands.

a) Exit the OS/2 full screen; then open the DOS full screen.

b) Follow the instructions in "Installing for DOS" on page 203.

After the installation, go to "Installing the PCMCIA Device Driver" on page 205 to install the necessary software for the PC Cards.

Note:
To open the OS/2 full screen:

1. Select **OS/2 System**.
2. Select **Command Prompts**; then select **OS/2 Full Screen**.

Note:
To open the DOS full screen:

1. Select **OS/2 System**.
2. Select **Command Prompts**; then select **DOS Full Screen**.

| DOS | # Installing for DOS |

1 Turn on the computer and start the operating system.

2 Insert Utility Diskette into the diskette drive; then type **A:UINSTALL** at the DOS prompt and press **Enter**.

The following screen appears:

```
                  Installation Options

                Installation Source Drive

Type the SOURCE drive letter (A-Z).  When you install a program, the
SOURCE drive letter is the location you are installing FROM.

Source Drive ... [A]


Enter  F1=Help   F3=Exit
```
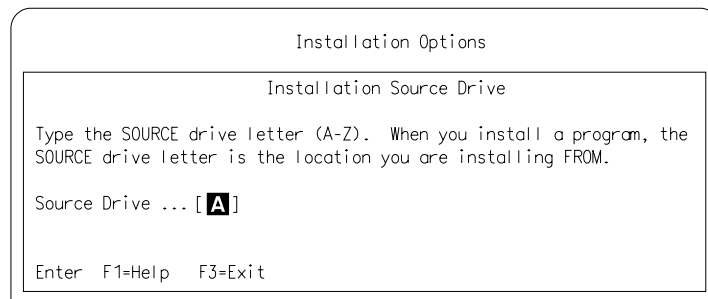
3 Press **Enter**.

4 Select **Install DOS ThinkPad Features and Fuel-Gauge Program** from the Installation Options menu; then follow the instructions on the screen.

You have completed the installation of the ThinkPad Features program.

Go to "Installing the PCMCIA Device Driver" on page 205 to install the necessary software for the PC Cards.

Installing for Windows

If you are going to use Windows, install the ThinkPad Features program for DOS first (see page 203); then do the following to install the ThinkPad Features program for Windows:

1 Turn on the computer and start Windows.

2 Select **File** from the Program Manager window; then select **Run...** from the pull-down menu.

```
┌──────────────────────────────────────────────────┐
│ ▭                            Program Manager       │
├──────────────────────────────────────────────────┤
│ File   Options    Windows    Help                  │
│ ┌─────────────────────────────┐                    │
│ │ New...                       │                    │
│ │ Open            Enter        │                    │
│ │ Move...         F7           │                    │
│ │ Copy...         F8           │                    │
│ │ Delete...       Del          │                    │
│ │ Properties...   Alt+Enter    │                    │
│ ├─────────────────────────────┤                    │
│ │ Run...                       │                    │
│ ├─────────────────────────────┤                    │
│ │ Exit Windows...              │                    │
│ └─────────────────────────────┘                    │
```
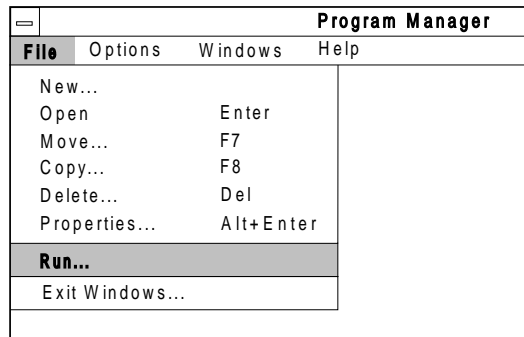
3 Insert Utility Diskette into the diskette drive.

4 Type **A:\INSTALLW** and press **Enter**.

You have completed the installation of the ThinkPad Features program.

Go to "Installing the PCMCIA Device Driver" on page 205 to install the necessary software for the PC Cards.

Installing the PCMCIA Device Driver

Note:
Do not install the Phoenix** PCMCIA support in IBM PC DOS 6.3.

If your computer did not have a pre-installed operating system, you must install the following device drivers and software associated with PCMCIA before you can use the PC Cards:

> Card Services
> Socket Services
> Resource Map utility
> Power Management utility
> PC Card Director program
> PC Card client device drivers (only when PC Card Director does not support the PC Card)

Use the following tables to determine the appropriate installation instructions for the different operating systems.

For IBM OS/2 2.11:

Description	File Name	How To Install
Card Services	PCMCIA.SYS	Go to "Installing for OS/2" on page 207.
Socket Services	IBM2SS01.SYS	
Resource Map Utility	ICRMU01.SYS	
Power Management Utility	$ICPMOS2.SYS	
PC Card Director	AUTODRV2.INI AUTODRV2.SYS EZPLAY2.DLL EZPLAY2.HLP	
PC Card Client Device Drivers	Varies among PC Cards.	Refer to the manual that came with the PC Card.

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Installing the PCMCIA Device Driver

For IBM PC DOS 6.3:

Description	File Name	How To Install
Card Services	IBMDOSCS.SYS	If your system has Windows installed, go to "Installing for Windows" on page 209. Otherwise, go to "Installing for DOS" on page 208.
Socket Services	IBMDSS01.SYS	
Resource Map Utility	DICRMU01.SYS	
Power Management Utility	$ICPMDOS.SYS	
PC Card Director	AUTODRV.INI AUTODRV.SYS EZPLAY.EXE EZPLAYW.EXE EZPLAYW.HLP IBMVCD.386 DISKDRV.SYS	
PC Card Client Device Drivers	Varies among PC Cards.	Refer to the manual that came with the PC Card.
Only for DOS system Only for Windows system		

Installing for OS/2

PC Card Director for OS/2 is automatically installed with the PCMCIA device driver.

1 Turn on the computer and start OS/2.

Note:
To open the OS/2 full screen:

1. Select **OS/2 System**.
2. Select **Command Prompts**; then select **OS/2 Full Screen**.

2 Open the OS/2 full screen.

3 Insert the PCMCIA Features Diskette into the diskette drive.

4 Type **A:PCMINST2** at the command prompt and press **Enter**.

5 Follow the instructions on the screen.

Note:
To shut down OS/2:

1. Move the mouse pointer to a blank part of your OS/2 desktop.
2. Press the right mouse button.
3. Select **Shut down**.

6 After the installation, shut down OS/2, remove any diskette from the diskette drive; then restart the system.

You have completed the installation of the PCMCIA device driver for OS/2.

Go to "Installing the Mwave Support Software" on page 210 to install the necessary software for the Mwave features.

|DOS| Installing for DOS

PC Card Director for DOS is automatically installed with the PCMCIA device driver.

1 Turn on the computer and start DOS; then insert the PCMCIA Features Diskette into the diskette drive.

2 Type **A:UINSTALL** at the command prompt and press **Enter**.

The following screen appears:

```
                        Installation Options

                      Installation Source Drive

    Type the SOURCE drive letter (A-Z).  When you install a program, the
    SOURCE drive letter is the location you are installing FROM.

    Source Drive ... [ A ]


    Enter  F1=Help   F3=Exit
```
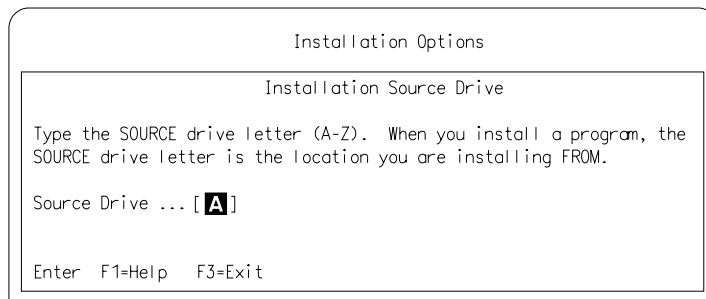
3 Press **Enter**.

4 Select **Install DOS PCMCIA Device Drivers** from the Installation Options menu; then follow the instructions on the screen.

5 After the installation has been successfully completed, close all applications, remove any diskette from the diskette drive, and restart the system.

If you are using a software EMS driver, such as EMM386.EXE, go to page 262.

Go to "Installing the Mwave Support Software" on page 210 to install the necessary software for the Mwave features.

Installing for Windows

PC Card Director for Windows 3.1 is automatically installed with the PCMCIA device driver.

1 Turn on the computer and start Windows.

2 Select **File** from the Program Manager window; then select **Run...** from the pull-down menu.

```
┌─────────────────────────────────────────────────┐
│ ▭                   Program Manager              │
├─────────────────────────────────────────────────┤
│ File    Options    Windows      Help             │
├──────────────────────────────┐                   │
│  New...                       │                   │
│  Open            Enter        │                   │
│  Move...         F7           │                   │
│  Copy...         F8           │                   │
│  Delete...       Del          │                   │
│  Properties...   Alt+Enter    │                   │
│ ─────────────────────────────│                   │
│  Run...                       │                   │
│ ─────────────────────────────│                   │
│  Exit Windows...              │                   │
└──────────────────────────────┘                   │
```
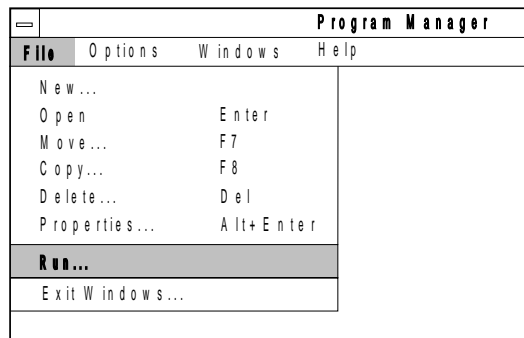
3 Insert the PCMCIA Features Diskette into the diskette drive.

4 Type **A:PCMINSTW** and press **Enter**.

5 Follow the instructions on the screen to complete the installation.

After you have completed the installation:

Installing the Mwave Support Software

Note:
When installing an operating system, you need to install the Mwave support software.

Note:
If you have multiple operating systems, you might need to install multiple versions of the Mwave support software. For example, to enable DOS and Windows applications for Mwave functions, two separate Mwave support software installations are required: one for DOS and one for Windows.

The Mwave support software is supplied in the Mwave DSP Features Diskettes or in the hard disk drive of your computer.

If the Mwave DSP Features Diskettes were not supplied with your computer, the support software is contained on the hard disk drive. See the READ.ME file in the root directory of the hard disk to install the Mwave support software.

If the Mwave DSP Features Diskettes were supplied with your computer, install the Mwave support software as follows:

- For OS/2, see "Installing for OS/2."
- For DOS, see "Installing for DOS" on page 212.
- For Windows, see "Installing for Windows" on page 213.

Installing for OS/2

Before installing the Mwave support software for OS/2, install the Multimedia Presentation Manager/2 (MMPM/2), which comes with OS/2 2.11. Refer to the *OS/2 2.11 Installation Guide* for instructions.

To install the Mwave support software for OS/2, do the following:

1 Turn on the computer; then start OS/2.

Note:
To open the OS/2 full screen:

1. Select **OS/2 System**.
2. Select **Command Prompts**; then select **OS/2 Full Screen**.

2 Open the OS/2 full screen.

3 Insert the "Mwave DSP Features Diskette 1 for OS/2" into the diskette drive.

4 Type **A:SETUP**; then press **Enter**.

The installation window appears on the screen.

5 Follow the instructions on the screen.

Note:
To shut down OS/2:

1. Move the mouse pointer to a blank part of your OS/2 desktop.
2. Press the right click button.
3. Select **Shut down**.

6 Restart OS/2 to make the Mwave features effective.

7 Install Mwave MMPM audio support software as follows:

a) Insert the "Mwave DSP Features Diskette for OS/2 Audio" into the diskette drive.

b) Type **A:SETUP** at the command prompt; then press **Enter**.

c) Follow the instructions on the screen.

8 After the installation is complete, remove any diskette from the diskette drive; then restart OS/2 to activate the Mwave support software.

You have completed the installation of the Mwave support software for OS/2.

When You Use the WIN-OS/2 Environment

If you use the Mwave functions in the WIN-OS/2 environment, do the following:

1. Install the Mwave support software for Windows in a full-screen WIN-OS/2 environment with the procedure on page 213.

2. Check your **WIN-OS/2 Settings** and modify them as follows, referring to your OS/2 manuals:

   WIN_RUN_MODE: 3.1 Enhanced Compatibility
   HW_TIMER: ON
   INT_DURING_IO: ON
   DOS_BACKGROUND_EXECUTION: ON

---

the necessary software for the infrared features.

DOS **Installing for DOS**

To install the Mwave support software for DOS, do the following:

1 Turn on the computer.

2 Insert the "Mwave DSP Features Diskette 1 for DOS" into the diskette drive.

3 At the command prompt, type **A:INSTALL**; then press **Enter**.

The following screen, which enables you to specify the directory location of Mwave support software, appears:

```
Please specify the directory for the

installation of Mwave products.

Destination Path
c:\MWD

      OK              Cancel
```
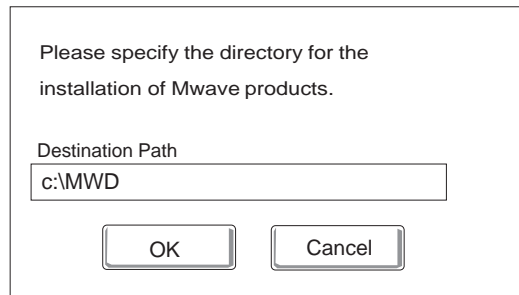
4 If this directory is acceptable, press **Enter**. Otherwise, type the directory name; then press **Enter**.

5 Follow the instructions on the screen.

6 After the installation is complete, remove any diskette from the diskette drive; then restart DOS to activate the Mwave support software.

You have completed the installation of the Mwave support software for DOS.

 Installing for Windows

Warning:
Before you install the Mwave
support software, close all open
applications.

To install the Mwave support software for Windows, do the following:

1 Turn on the computer; then start Windows.

2 Select **File** from the Program Manager window; then select **Run...** from the pull-down menu.

3 Insert the "Mwave DSP Features Diskette 1 for Windows" into the diskette drive.

4 Type **A:SETUP**; then press **Enter**.

The following screen, which enables you to specify the directory location of Mwave support software, appears:
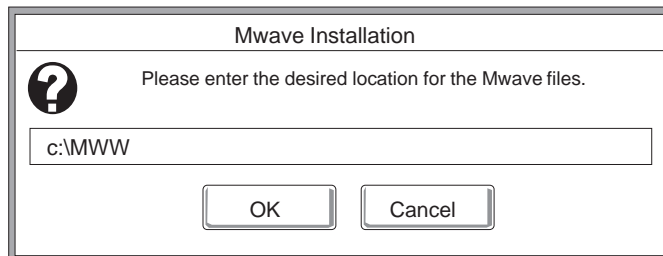
5 If this directory is acceptable, press **Enter**. Otherwise, type the directory name; then press **Enter**.

6 Follow the instructions on the screen.

7 After the installation is complete, remove any diskette from the diskette drive; then restart Windows to activate the Mwave support software.

If you are using MIDI equipment, go to "Installing MIDI Port Device Driver for Windows" on page 214. Otherwise, go to "Installing the Infrared Device Driver" on page 215 to install the necessary software for the infrared features.

Installing MIDI Port Device Driver for Windows

The computer has a MIDI port feature to connect a MIDI keyboard device or external synthesizer. To use the MIDI port, install the Mwave MIDI Port device driver as follows:

1. Select the **Main** window from the Windows Program Manager.

2. Select **Control Panel**; then select **Driver**.

3. Select **Add**; then select **Unlisted or Updated Driver**.

4. Select **OK**.

5. Type **C:\MWW\MIDIPORT**.

   Type the subdirectory name where you have installed the Mwave software.

6. Select **Mwave MIDI Port Driver**; then select **OK**.

You have completed the installation of the Mwave Windows support software.

Go to "Installing the Infrared Device Driver" on page 215 to install the necessary software for the infrared features.

Installing the Infrared Device Driver

This section describes the installation of the IR (infrared) device driver.

Follow the instructions for your operating system.

1. For OS/2, see "Installing for OS/2."
2. For Windows, see "Installing for Windows" on page 216.

Installing for OS/2

1 Turn on the computer and start OS/2.

2 If you have not installed "DOS and Win-OS2 support for OS/2", install it by referring to your operating system documents.

Note:
To go to the DOS command prompt:

1. Select **OS/2 System**.
2. Select **Command Prompts**; then select **DOS Full Screen**.

3 Go to the DOS command prompt.

4 Insert the Infrared Features diskette into the diskette drive.

5 Type **A:UINSTALL** and press **Enter**.

The following screen appears:

```
                    Installation Options

                  Installation Source Drive

  Type the SOURCE drive letter (A-Z).  When you install a program, the
  SOURCE drive letter is the location you are installing FROM.

  Source Drive ... [A]


  Enter  F1=Help   F3=Exit
```

6 Press **Enter**; then follow the instructions on the screen.

Go to "Installing the ThinkPad Display Driver" on page 218.

Installing for Windows

1 Turn on the computer; then go to the DOS command
prompt.

2 Insert the Infrared Features diskette into the diskette
drive.

3 Type **A:UINSTALL** and press **Enter**.

The following screen appears:

```
                         Installation Options

                       Installation Source Drive

  Type the SOURCE drive letter (A-Z).  When you install a program, the
  SOURCE drive letter is the location you are installing FROM.

  Source Drive ... [A]


  Enter  F1=Help   F3=Exit
```
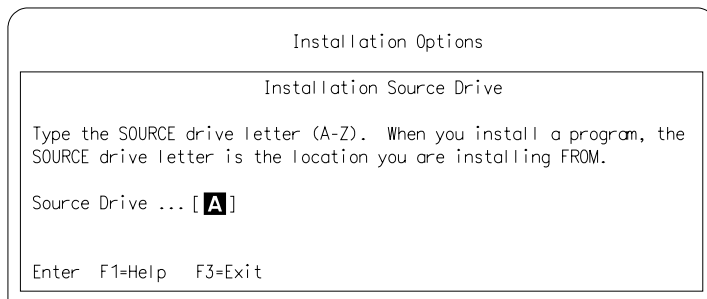
4 Press **Enter**; then follow the instructions on the screen.

Go to "Installing the Enhanced Video Device Driver" on page 217.

Installing the Enhanced Video Device Driver

This section describes the installation of the Enhanced Video device driver for Windows, which enables the video in/out ports and smooth playback on Video for Windows or compatible software.

Installing for Windows

1 Turn on the computer and start Windows.

2 Select **File** from the Program Manager window; then select **Run...** from the pull-down menu.

```
┌──────────────────────────────────────────────────────┐
│ ▭                                    Program Manager  │
├──────────────────────────────────────────────────────┤
│ File   Options    Windows    Help                     │
├──────────────────────────────┐                        │
│ New...                        │                        │
│ Open              Enter       │                        │
│ Move...           F7          │                        │
│ Copy...           F8          │                        │
│ Delete...         Del         │                        │
│ Properties...     Alt+Enter   │                        │
│ ▓Run...▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓  │                        │
│ Exit Windows...               │                        │
└──────────────────────────────┘                        
```
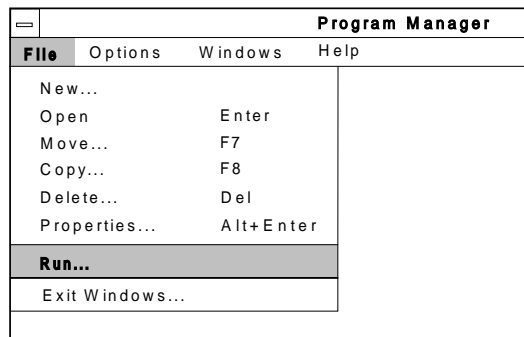
3 Insert the Enhanced Video Device Drivers Diskette into the diskette driver.

4 Type **A:EVSETUP**; then press **Enter** and follow the instructions on the screen.

5 After the installation is successfully completed, remove any diskette and restart the system to activate the Enhanced Video Device Driver.

You have completed the installation of the Enhanced Video device drivers for Windows. To run the Video Capture and Playback functions, refer to the manuals of Video for Windows or the compatible software.

Installing the ThinkPad Display Driver

The display driver enables you to have resolutions from 640 by 480 to 1024 by 768 and colors from 64 gray shades to 65 536 colors for the LCD and external display. (See page 191 for possible combinations of resolution and color.)

The display driver has the advantage of using video capability for OS/2 or Windows users.

Install the display driver according to your operating system:

For OS/2 users: See "Installing for OS/2" on page 219 to install OS/2 display driver including Win-OS/2* device drivers.

For DOS users: The display driver is already installed in the ROM (read only memory) of the computer.

For Windows users: If you did not install the display driver when installing Windows, see "Installing for Windows" on page 222 to install display driver.

---

* Trademark of the IBM Corporation.

Installing for OS/2

You must do the following before you install the display driver:

To install ThinkPad Features:
☞ page 202.

ThinkPad Features:
☞ page 36.

Before you begin

Using the ThinkPad Features program, set the display device mode to *LCD*; select the **Display** icon; then **LCD**. Or, at the command prompt, type **PS2 SC LCD** and press **Enter**.

Make sure you have the installation package for OS/2 2.11. If you are installing the Special Edition for Use with Windows 3.1 (OS/2 for Windows), you also need the installation package for Windows 3.1.

If you have installed OS/2 from CD-ROM, create display driver diskette 1 and 2 by LOADDSKF.EXE before installing the ThinkPad Display Driver.

1. Insert a blank diskette into the diskette drive; then type:
     X:\DISKIMGS\LOADDSKF *X*:\DISKIMGS\OS2\35\DISP1.DSK
     A:
2. Insert another blank diskette into the diskette drive; then type:
     X:\DISKIMGS\LOADDSKF *X*:\DISKIMGS\OS2\35\DISP2.DSK
     A:

   X is the driver letter for the CD-ROM drive.
3. Refer to the README.TXT file on the Video Features Diskette for information about the device driver.

Note:
To open the OS/2 full screen:

1. Select **OS/2 System**.
2. Select **Command Prompts**; then select **OS/2 Full Screen**.

Note:
All necessary files are copied to your hard disk drive in the following subdirectory names: \OS2, \OS2\DLL, \OS2\MDOS, and \OS2\MDOS\WINOS2\SYSTEM.

1 Start OS/2 and open the OS/2 full screen.

2 Insert the Video Features Diskette for OS/2 into the diskette drive.

3 At the command prompt, type **A:** and press **Enter**.

4 Type **INSTALL C** and press **Enter**; then follow the instructions on the screen.

C is the drive on which the device driver is to be installed; it can be something different.

Installing the ThinkPad Display Driver

5 Remove the diskette from the diskette drive and shut down OS/2; then restart the system.

6 Are you installing the OS/2 Special Edition for Use with Windows 3.1 (OS/2 for Windows)?

Yes Open **Selective Install** in the System Setup folder:

    a) Select **OS/2 System**.
    b) Select **System Setup**.
    c) Select **Selective Install**.
    d) Select **Primary Display**; then click on **Install**.
    e) Go to the next step.

No Open the OS/2 Full Screen, type **DSPINSTL** and press **Enter**.

** Trademark of the Western Digital Corporation.

7 Follow the instructions on the screen.

  When you are asked to enter the source directory, do the
  following:

  – If OS/2 has been pre-installed on your computer, use
    the default directory on the screen. Do not change it.

  – If OS/2 has *not* been pre-installed on your computer,
    type **A:**.

  When you are asked to select the display type, select
  **Primary Display – Super Video Graphics Array
  (Western Digital**``); then select **Western Digital
  WD90C24, 24A on ThinkPad** for the LCD of the
  computer.

  When you are asked to overwrite the target file, select
  Yes.

8 After the installation has been successfully completed,
  remove the diskette; then shut down OS/2 and restart
  the computer.

You have completed the installation of the display driver for OS/2.

Installing for Windows

If you did not install the display driver when Windows was installed (by following the procedures on page 197), do the following:

1 Turn on the computer.

2 If Windows is running on your computer, exit Windows and switch to the DOS prompt.

3 Go to the Windows subdirectory and type **SETUP**; then press **Enter**.

4 Select **Display** from the Windows Setup menu; then select **Other (Requires disk...)**.

5 Insert the Video Features Diskette into the diskette drive; then type **A:** and press **Enter**.

6 Select your desired resolution from the menu and press **Enter**. Follow the instructions on the screen.

You have completed the installation of the display driver for Windows.

Note:
To exit Windows:

1. Double-click the Control-menu box in the upper left corner of the Program Manager window.
2. Press the OK button to exit Windows.

Chapter 8. Solving Computer Problems

Computer problems can be caused by software, hardware, or both. Many problems can be diagnosed and solved with the assistance of self-tests and system programs. If a hardware problem is detected by the self-tests, an error message is displayed. The system programs can identify a problem or provide information for the service representative. Make a note of all error codes and give them to the service representative when you call for service. If the system programs cannot be loaded, the troubleshooting charts and other information will help you determine what corrective action to take.

Use this chapter to test only *IBM* products. Non-IBM products can cause misleading error information or incorrect computer responses. When testing non-IBM products, refer to the instructions supplied with those products.

Commonly Asked Problem Questions and Answers

This section provides a list of possible common problems that you might have with their corresponding actions.

Q: A memory shortage or memory error occurs.

A: Do one of the following:

Unload any unnecessary drivers from the CONFIG.SYS file.
If you are using DOS, use the multiple configuration setup of DOS (refer to the documents supplied with the DOS operating system).

Q: The external display screen is blank.

A: Do the following:

1. Make sure the display device parameter of the ThinkPad Features program is correctly specified to use the external display.
2. Set the computer not to enter suspend mode when the LCD is closed by using the ThinkPad Features program.

Q: The computer will not operate resume from suspend mode, or the suspend indicator stays on and the computer does not work.

A: The computer automatically enters suspend or hibernation mode when the battery pack is empty. Do one of the following:

Replace the battery pack with a fully charged one.
Connect the AC Adapter to the computer and charge the battery pack.

Q: When using Windows 3.1, the cursor does not move after normal operation is resumed from one of the power-saving modes.

A: Make sure you have installed Windows with the APM option by following the procedures on page 198.

Q: The computer will not enter suspend or hibernation mode.

A: Do one of the following:

If the computer is attached to the Dock I, suspend mode is disabled.
If the AC Adapter is used and the computer is communicating, suspend and hibernation modes are disabled.

Q: The PC Card modem will not work.

A: Do the following:

1. Start the PC Card Director and check the serial port name (COM1–COM4) assigned to the modem card.
2. Open your PC Card application; then assign the serial port name for the modem.

Q: The battery pack loses power too soon.

A: Repeat the complete discharging and charging procedure two to three times. See "Preserving Battery-Pack Life" on page 122 for more information.

Q: The battery status indicator blinks.

A: Slide the switch on the battery pack to the on position (|) with a ball point pen.

Q: Error 2XX appears (memory error).

A: Do the following:

1. Make sure your memory card is correctly installed.
2. If you are using non-parity memory cards, disable the parity check by using Easy-Setup.

Testing the Computer

1 Turn on the computer.

The power-on self-test (POST) runs automatically. If the test goes to completion without detecting an error, one of the following occurs:

A password prompt appears on the screen if one has been set already. Type the correct password and press **Enter**.

The Diskette and F1 prompts (shown below) appear.
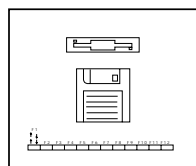
This means no operating system is installed in your computer. Install it now.

The operating system or application screen appears.

Did one of these screens appear?

Yes Turn off the computer and continue with step 2.

No Go to page 228.

2 Press and hold **F1**; then turn on the computer to start Easy-Setup. Hold F1 until the Easy-Setup Menu (shown on the next page) appears.

3 Did the Easy-Setup Menu appear on the screen?

Yes The computer has successfully completed the POST (internal tests), and the system programs have been loaded. To start the test programs, select the **Test** icon; then select the **Start** icon or press **Enter**.
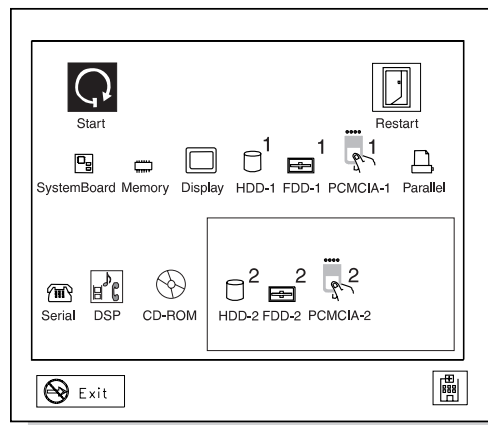
If the computer did not beep, the speaker is not working correctly. Have the computer serviced. If you are not sure about the beep, turn off the computer; then turn it on again and repeat step 2 on page 226.

If you cannot go beyond the first screen, have the computer serviced.

If the computer stops during the test and does not continue, have the computer serviced.

If the test does not find a problem but one still exists, find the problem in the troubleshooting charts on page 228.

No   Return to step 2 on page 226 and start Easy-Setup again. If you still cannot start the system programs, find the problem in the troubleshooting charts on page 228.

Troubleshooting Charts

In the charts, X can be any character.
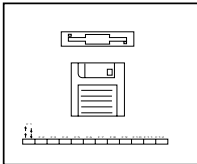
LCD Problems

Problem	Action
Blank screen and no beeps. **Note:** If you are not sure about the beeps, turn the computer off; then turn it on again, and listen for the beep.	Verify that: 1. The battery pack is correctly installed. 2. The AC Adapter is connected to the computer and the power cord is plugged into a working electrical outlet. 3. The computer power switch is turned on. If the above items are correct and the screen remains blank, have the computer serviced.
Blank screen plus one beep. **Note:** If you are using an external display, go to "External Display Problems" on page 239.	If a power-on password is set, enter the password. Verify that: 1. The brightness control on the computer is correctly adjusted. 2. The *Display device* parameter of the ThinkPad Features program is correctly specified. If the above items are correct and the screen remains blank, have the computer serviced.
Blank screen plus a continuous beep, or two or more beeps.	Have the computer serviced.
Only the cursor appears.	Have the computer serviced.
XXXXX KB OK appears and the computer halts.	Have the computer serviced.
Screen is unreadable or distorted.	Verify that the ThinkPad display driver was installed correctly (see page 218). Verify that **Display** in the Windows Setup screen is set to your display resolution type (see page 198). If the above is correct, test the computer. If the test ends without an error, have the computer serviced.
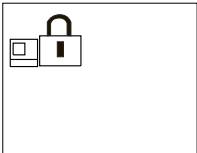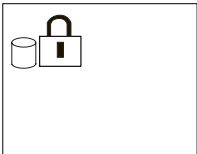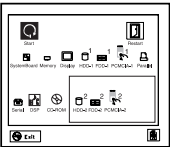
Problem	Action
Incorrect characters appear on the screen.	Verify that operating systems and application programs have been installed and configured correctly. If so, have the computer serviced.
The screen stays on although the power switch is turned off.	Have the computer serviced.
The computer goes into suspend mode immediately after the POST. (The suspend mode indicator turns on.)	Verify that the battery pack is charged. (The battery power status indicator is green or yellow.) If the above item is correct, have the computer serviced.
Error **190** appears and the computer immediately turns off.	The battery pack is low in power. Connect the AC Adapter to the computer, or replace the battery pack with a fully charged one.
Missing, discolored, or lighted dots appear on the screen at all times.	The LCD contains over 921 000 thin film transistors (TFTs). A small number of missing, discolored, or lighted dots on the screen is an intrinsic characteristic of TFT LCD technology and is not a LCD defect.
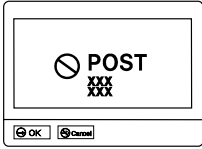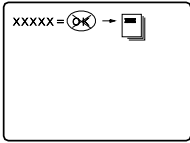
Screen Messages

Message	Action
Diskette and F1 prompts. 	Verify that the self-starting diskette is inserted correctly (with the label up and metal-shutter end first) in the diskette drive. If so, press F1. If both prompts remain, have the computer serviced.

What If Your Computer Does Not Work?

Message	Action
Error **163** appears with the date and time screen. The date and time screen appears when neither the date nor the time is set in the computer.	Set the date and time by typing or clicking on the ▲ or ▼ to set the numbers; then press the OK button.
Power-on password prompt.	A power-on password or a supervisor password was set. To use the computer, type the correct password and press **Enter** (see page 130). If the power-on-password is not accepted, a supervisor password might have been set. Type the supervisor password and press **Enter**. If there is still a problem, have the computer serviced.
Hard-disk password prompt.	A hard-disk password was set. To use the computer, type the correct password and press **Enter** (see page 130). If there is still a problem, have the computer serviced.
Test menu.	Select the **Start** icon and follow the instructions to test your system. *If you cannot go beyond the first screen*, have the computer serviced. *If the computer stops during testing and does not continue*, have the computer serviced. *If testing does not find a problem but one still exists*, find the problem in "What If Testing Cannot Find the Problem?" on page 236.

Message	Action
POST error prompt. ⃠ POST XXX XXX ⊖ OK ⊗ Cancel	An error was found during the POST. Press **Enter**; then select **Start** from the test menu to run the test. If the test ends with an error, write down the error code (`Err`) and have the computer serviced.
Error prompt. xxxxx = ⊗K → ▯	Turn off the computer and start Easy-Setup; then select **Test** to test the computer. You can start the operating system by pressing **F1** instead and ignore the error.
A screen or message that is not listed.	Turn off the computer and start Easy-Setup; then select **Test** to test the computer. If you cannot start Easy-Setup, have the computer serviced.

Error Codes

Screen Message	Action

I9990301
I9990302
I9990305
 	
Note: Incorrect connection of the hard disk drive can cause these error codes to appear.
	The computer cannot find the startup drive.
	
	Action:
	
	1. Turn off the computer.
	2. Press and hold F1; then turn on the computer to start Easy-Setup. Hold F1 until the Main Menu appears.
	3. Select the **Start up** icon. If you are unable to set the startup sequence, have the computer serviced.
	4. Check the list of devices on the Set Startup Sequence screen. Is the default drive in the startup sequence?
	
	    Yes Exit this screen, and turn off the computer.
	
	    No Select the **Reset** icon.
	
	5. Is an operating system installed?
	
	    Yes Go to step 7.
	
	    No Install the operating system in your computer.
	
	6. After the operating system is installed, turn off the computer.
	7. Turn on the computer.
	
	If the same screen message appears, have the computer serviced.

I99XXXXX	Have the computer serviced.
111	If you are using a port replicator or an expansion unit, disconnect it; then reconnect it. If there is still a problem, have the computer serviced.

Screen Message	Action
158	A hard disk drive without a hard-disk password is installed when a supervisor password is set. **Action:** 1. Press **Enter**. The password menu in Easy-Setup appears. 2. Select the **Hard-Disk Password** icon. 3. Press **Enter**. The same password as the supervisor password is set for the hard-disk password on the hard disk drive.
159	The hard-disk password differs from the supervisor password. **Action:** 1. Turn off the computer; then turn it on again. 2. Change the hard-disk password to the supervisor password at the hard-disk password prompt.
16X or 17X	Follow the instructions on the screen.
174	There is a device configuration error. Check that the hard disk drive and the diskette drive are installed firmly in the connectors.
184	The entered password is invalid. Turn off the computer and wait at least 5 seconds; then turn it on again and type the correct password.
190	The computer turns off the power because of a critically low-battery condition. Connect the AC Adapter to the computer and charge the battery pack.
195	The system configuration before and after hibernation mode differs, and the computer cannot resume normal operation. **Action:** Change the system configuration to what it was before entering hibernation mode. If the memory size is changed, re-create the hibernation file (see page 63).

What If Your Computer Does Not Work?

Screen Message	Action
196	The computer cannot read the hibernation file. Have the computer serviced.
2XX	Turn the computer off; then turn it on. If there is still a problem, have the computer serviced.
30X	Turn off the computer and all attached devices. Turn on the computer first; then turn on the attached devices. If the computer has an external keyboard connected, verify that: 1. The external keyboard is connected to the correct side of the keyboard/mouse connector (see page 185). 2. The keyboard/mouse connector is correctly connected to the computer. If the above items are correct, disconnect the keyboard/mouse connector from the computer and verify that the operation of the system keyboard is correct. If the system keyboard works correctly, have the keyboard/mouse connector or the external keyboard serviced. Test the computer by selecting the **Start** icon. – *If the computer stops during testing and does not continue*, have the computer serviced. – *If the tests do not find a problem but one still exists*, find the problem in "What If Testing Cannot Find the Problem?" on page 236.

General Problems

Problem	Action
The keyboard will not open.	Make sure the locking lever for the hard disk driver or any locking device is unlocked.
Problems such as a broken key lock or an indicator not working.	Have the computer serviced.
The computer does not turn off with the power switch.	Press the Power Shutdown switch on the rear of the computer with the tip of a pen to turn off the computer.
The application "hangs," or the computer does not accept any input.	Press the power shutdown switch on the rear of the computer with the tip of a pen to turn off the computer; then turn the computer on again.
The computer does not start from a diskette.	Check that the startup sequence is set to start the computer from the diskette drive (see page 54).

What If Testing Cannot Find the Problem?

If the test programs do not find the problem, use the following troubleshooting charts.

Diskette Drive Problems

Problem	Action
Diskette drive in-use indicator stays on.	If there is a diskette in the drive, verify that: 1. There is nothing wrong with the diskette. Try a backup copy if you have one. 2. The diskette is inserted correctly (label up and metal-shutter end first) in the diskette drive. 3. The diskette contains the necessary files to start the system. 4. There is nothing wrong with your application program (see page 241). If the above items are correct, have the computer serviced. If there is no diskette in the drive, have the computer serviced.

Printer Problems

Problem	Action
The printer does not work.	Verify that: 1. The printer is turned on and ready to print. 2. The printer signal cable is connected to the correct connector on the computer. (For the location of the printer connector, see "parallel connector" on page 4.) If the above items are correct and the printer still does not work, run the tests described in the printer manual. If the tests show that the printer is OK, have the computer serviced.

Keyboard, External Numeric Keypad, and Pointing Device Problems

Problem	Action
All or some keys on the system keyboard do not work.	If the problem occurs immediately after the computer returns to normal operation from suspend mode, enter the power-on password. If a power-on password is set, you must enter the password.
	If the external keyboard is connected, the numeric keypad on the computer keyboard will not work.
	If the external numeric keypad or the mouse is connected:
	1. Turn off the computer. 2. Remove the external numeric keypad or the mouse. 3. Turn on the computer and try the keyboard operation again.
	If the keyboard problem is resolved, check the connection of the external numeric keypad, external keyboard, or the mouse. If there is still a problem, have the computer serviced.
The pointer drifts when the computer is turned on, or after resuming normal operation. —or— During computer operation, the pointer drifts when not using the TrackPoint III.	Drifting is a characteristic of the TrackPoint III and is not a defect. The drifting occurs under the following conditions:
	When the computer is turned on. When resuming normal operation. When the TrackPoint III is pressed for a long period of time. When the environmental temperature changes.
	Do not use the TrackPoint III until the pointer stops moving.

What If Your Computer Does Not Work?

Problem	Action
The mouse or pointing device does not work.	Verify that the mouse or pointing-device cable is securely connected to the computer. Try to operate the TrackPoint III. If the TrackPoint III works, suspect the externally attached pointing device. If you use a mouse that is not compatible with the IBM PS/2 Mouse, disable the TrackPoint III: 1. Start the ThinkPad Features program. 2. Select the **ThinkPad Setup** icon. 3. Select the **Keyboard/Pointing Device** icon. 4. Click on **Disable** for the TrackPoint III. 5. Press the OK button to save the change. 6. Restart the computer.
All or some keys on the external numeric keypad do not work.	Verify that the external numeric keypad is correctly connected to the computer.
All or some keys on the external keyboard do not work.	Verify that: 1. The keyboard connector is connected to the correct side of the keyboard/mouse connector. 2. The keyboard/mouse connector is correctly connected to the computer. If the above items are correct, disconnect the keyboard/mouse connector from the computer and verify that the operation of the system keyboard is correct. If the system keyboard works, have the keyboard/mouse connector or the external keyboard serviced.
A number appears when you type an alphabetic character.	The Numeric Lock indicator is on. Press and hold **Shift**; then press **NumLk**.

External Display Problems

Problem	Action
Screen is blank.	Verify that: 1. The power cord for the external display is plugged into a working electrical outlet and into the external display. 2. The external display is turned on and the brightness control is turned up. 3. The signal cable for the external display is plugged into the external-display connector on the computer. Some signal cables might not fit into the external-display connector because of the connector type. 4. The external display (CRT) is selected as the display device using the Fn key function (see page 46) or the ThinkPad Features program (see page 36). 5. Turn off the computer; then turn it on. If the above items are correct and the screen of the external display remains blank, run the display tests described in the instructions supplied with the external display. If the tests show the external display is OK, have the computer serviced.
Screen is unreadable or distorted.	Verify that: 1. The ThinkPad display driver is installed correctly (see page 218). 2. The **Display** in the Windows Setup screen is set to your display resolution type (see page 198). If the above is correct, run the tests described in the instructions supplied with the external display. If the tests show the external display is OK, have the computer serviced.
Wrong characters appear on the screen.	Verify that operating systems and application programs have been installed and configured correctly. If so, have the computer serviced.

Option Problems

Problem	Action
An IBM option that was just installed does not work.	Verify that: 1. The option is designed for the computer. 2. The option has been installed correctly by following the instructions supplied with the option. 3. Other installed options or cables are not loose. 4. No I/O address or interrupt level conflict has occurred. Use the **System Information** of the ThinkPad Features program. If the test programs for the option did not find the problem, have the computer and option serviced.
An IBM option that used to work does not work.	Verify that: 1. All of the option hardware and cable connections are securely connected. 2. If the option came with its own test instructions, use those instructions to test the option. If the above items are correct and the test programs did not find the problem, have the computer and option serviced.
The serial port does not work.	Ensure that **Serial port** is set to **COM_1**, **COM_2**, **COM_3**, or **COM_4** in Easy-Setup.
The PC Card does not work.	Verify that: 1. The serial addresses for the serial devices (serial Port A, B, infrared port, and telephony function under DSP device) do not conflict with each other. Check them in the ThinkPad Setup menu of the ThinkPad Features program. 2. A serial address is reserved for the PC Card. 3. The PC Card is designed for the computer. 4. The software is suitable for use with the PC Card. See the instructions that came with the PC Card. If the PC Card has its own diagnostic instructions, use those instructions to test it.

Software Problems

Problem	Action
An application program does not work correctly.	To determine if a problem is caused by the software, verify that: 1. Your computer has the minimum memory required to use the software. Refer to the manuals supplied with the software to verify this. 2. The software is designed to operate with your computer. 3. Other software works correctly with your computer. 4. The software you are using works correctly with another computer. If you have received any error messages when using the application program, refer to the manuals supplied with the software for a description of the messages and a solution to the problem. If the above items are correct and there is still a problem, contact your place of purchase or service representative for help.

Intermittent Problems

Problem	Action
The computer has an intermittent problem.	An intermittent problem can be difficult to find. Check that all cables and cords are securely connected to the rear of the computer and to the attached options. If the problem occurs only when the computer is powered by a battery pack, replace the battery pack with a fully-charged one. If the above items are correct and there is still a problem, write down the problem and what the computer was doing when the problem occurred. Then contact your place of purchase or service representative for help.

Battery Power Problems

Problem	Action
A pop-up screen saying "Please discharge battery" appears when using OS/2 or Windows.	Discharge the battery pack using the discharge button in the Fuel Gauge program (see page 118).
The computer does not operate with a fully-charged battery pack.	Discharge the battery pack; then recharge it (see page 117). If there is still a problem, have the computer serviced.
A fully-charged battery pack discharges too soon.	The battery pack is either old or its operation time has been shortened by repeatedly charging it when it was not completely discharged. **Action:** 1. Check if the battery pack you are using has been charged for more than 1.5 hours by the power-off charging method. 2. Repeat the complete discharging and charging procedure three to six times (see page 117). **Note:** A fully-charged battery gradually loses its power when not used for a long period of time. When the battery pack is not used for a long period of time, or it is new, the battery will not reach full charge with only one charging. 3. If the battery pack still discharges too soon after repeated discharging and charging, replace the battery pack with a new one. If there is still a problem, have the computer serviced.
The battery-power status indicator has turned off although a fully-charged battery pack is installed in the computer.	The over-current protection device inside the battery pack has been activated. Wait for several hours and try to use it again. If there is still a problem, replace the battery pack or have the computer serviced.

Problem	Action
The battery pack cannot be fully-charged in 3 hours by the power-off charging method.	The battery pack is over-discharged. **Action:** 1. Turn off the computer. 2. Make sure that the over-discharged battery pack is in the computer. 3. Connect the AC Adapter to the computer and let it charge for approximately 7 hours. If the Quick Charger is available, charge the over-discharged battery pack.
The battery-charging indicator is on, and the battery-power status indicator is blinking.	A problem has occurred during the charging of the battery pack. Check to see if the AC Adapter is correct for your computer. Take the battery pack out of the compartment and let it cool for a while; then charge it again. If there is still a problem, have the computer serviced.
The battery-power status indicator blinks green, yellow, orange, and then back to green again.	No data is coming from the battery pack. Check that the storage switch on the battery pack is set to the on position (|). If it is set to the off position (O), slide it to on and repeat the discharging and charging procedure several times (see page 117). If the storage switch is set to the on position, take the battery pack out of the compartment and let it cool for a while; then charge it again. If the problem still occurs, slide the storage switch to the off position (O) and then to the on position (|). Repeat the discharging and charging procedure several times (see page 117). **Note:** Do *not* slide the switch to the off position (O) in daily operation. Otherwise, incorrect battery-power status will be reported. If there is still a problem, have the computer serviced.

CD-ROM Drive Problems

Problem	Cause and action
CD-ROM will not operate and the indicator does not light.	Verify that: 1. The computer power is turned on. 2. The device driver has been installed correctly. (See page 201.) 3. The compact disc is placed in the tray with the label side up.
The device driver will not load or cannot be found.	1. Check the system configuration file. See the READ.ME file on the diskette. 2. Verify that the device driver and support software have been copied to the correct directory on the hard disk. 3. If you are using DOS, refer to your DOS documentation and check the LASTDRIVE statement in your CONFIG.SYS file.
The compact disc cannot be read.	Verify that: 1. The compact disc is not dirty. Clean it with a CD-ROM cleaner kit. 2. The compact disc is not defective. Try another compact disc. 3. The compact disc is not ISO-9660/High Sierra Standard.

Mwave (DSP) Problems

Problem	Cause and action
Sound Blaster support cannot be enabled.	It is probably because Mwave is being used for other functions, such as the modem. Try disabling another function; then type **MWGAMES ON MIN**. The "MIN" option will enable Sound Blaster support using the minimum possible amount of Mwave resources.

Problem	Cause and action
DOS games works slowly in a Windows session.	Some DOS games run slower in a Windows DOS session than in native DOS. Check the documentation of your game for special instructions about improving performance. Configure Windows to use the VGA display driver rather than a higher resolution or less efficient driver. Determine if your game allows you to turn off "background music" and only play special effects.
Modem does not work correctly.	Verify that: The modem/fax port is securely installed. The modem is correctly identified in your communications program. This is often caused by a conflict of the communication port address and/or interrupt assignments.
Windows error message states that no MIDI device is available.	This is often because of the DSP resources have been used up. Try stopping some application that is using the DSP, and retrying the failing function.
Windows error message states that no WAV device is available.	This is often because of the DSP resources have been used up. Try stopping some application that is using the DSP, and retrying the failing function.
Modem error occurred.	Refer to the command reference in the Mwave ThinkPad window.
Modem application is not working.	Verify that you have started your modem. Make sure you did not close it instead of minimizing it. Verify that it was set to support the speed you are trying to use.
Speaker phone application does not work.	Verify that you disabled the **Audio** button in the Audio Control.

Problem	Cause and action
Other problems.	The following is a list of failures that can cause other problems. A compatibility problem exists between the Mwave feature and one or more other adapters in the system. To isolate a compatibility problem, remove other adapters from your system and re-run the diagnostics while these adapters are removed. The phone cabling configuration is not correct for your application. The phone cabling is defective. The phone is defective. The audio cabling configuration is not correct for your application. The audio cabling is defective. The audio equipment is defective.

Infrared Port Problems

Problem	Action
The computer cannot communicate with other devices using the infrared port on the computer.	Verify that: The infrared function is enabled and other choices are set correctly in the ThinkPad Setup menu of the ThinkPad Features program (see page 42). The communicating device is using an equivalent communication speed. The infrared ports are cleaned and no spotty area exist. There is no cable or electrical device in between the computer and the communicating device. The distance and angle between the computer and the communicating device are correct (see page 75).

Problem	Action
Incorrect data is sent between the computer and device.	Verify that: The distance and angle between the devices are correct (see page 75). The communicating device is using an equivalent communication speed. There is no device radiating infrared rays, such as remote-controlled devices or wireless headphones, near the computer or device. Direct sunlight or fluorescent lamps are not near the computer or device.

Listing Installed Options

When getting service, you might need to know what options you
have in your system. Check the names of your options below.

IC DRAM Card   External Numeric Keypad
 (2MB, 4MB, 8MB, or 16MB)

Miniature Mouse   _____MB Hard Disk Drive

DIMM (4MB and/or 16MB)   PC Cards

DIMM Adapter

Recording Identification Numbers

The following information is needed when obtaining repair services.

IBM Product Name	IBM ThinkPad 755CD
Machine Type	_____
Serial Number	_____

The machine type and serial number 1 are located on the bottom of the computer.

The machine type has a prefix of **Type**.

The serial number has a prefix of **S/N**.
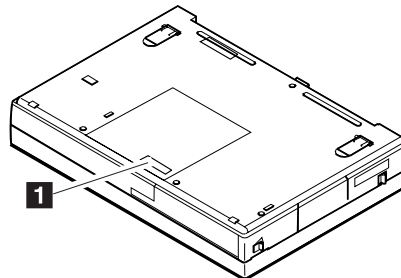
Getting Service

If you need further assistance, call IBM or your place of purchase.

When requesting service, describe the error message or problem to the service representative. Error messages can help identify what service action is required and help the service representative provide quick and efficient service.

Important

During the warranty period, you may be responsible for repair costs if the product damage was due to misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance.

For your convenience, write the service phone numbers here.

_____

_____

_____

_____

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Luxembourg	02/542 5360
Nederland	020 513 4700
Norge	66 99 95 95
Österreich	222 21145 7575
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Switzerland	155 46 46
UK	0628 895222

For other countries, contact your local IBM office for service information.

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† Helpware and the HelpClub offer are subject to continued availability and may vary or may not be offered in some countries. Check with your local IBM office for details.

Getting Service

Appendix A. Avoiding Hardware Conflicts

When options such as the AT adapter or application programs are installed, the system might not operate correctly because of conflicts in IRQ (interrupt level), I/O addresses, DMA channel, and memory addresses.

To avoid these conflicts, you must know the hardware requirements, such as IRQ and I/O addresses, for each option and program as shown in their manuals. Then you must check the current resource allocations for the 755CD and the Dock I or Dock II, and select the available resource values by doing the following:

1. Start the ThinkPad Features program.

2. Select the **ThinkPad Setup** icon.

3. Select **System Info** and click on **IRQ**, **DMA**, or **Memory** to check the assigned resources.

4. Return to the ThinkPad Setup menu; then select the device to assign the resources.

The following table summarizes the available system resources for the 755CD and the ThinkPad Dock II. Values in parentheses are alternative values that are selectable in **ThinkPad Features** or **Easy-Setup** or application programs.

System Resources	IRQ	Memory Address (Hex)	I/O Address (Hex)	DMA Channel
Timer	0	none	0040–0043	none
Keyboard	1	none	0060, 0064	none
Serial Port 1	4 (or disabled)	none	03F8–03FF (or 02F8–02FF)	none
Serial Port 2	3 (or disabled)	none	02F8–02FF (or 03F8–03FF)	none
Serial Port 3	4 (or disabled)	none	03E8–03EE (or 02F8–02FF)	none
Serial Port 4	3 (or disabled)	none	02E8–02EF (or 03F8–03FF)	none
Parallel Port 1	7 (or disabled)	none	03BC–03BE	none
Parallel Port 2	7 (or disabled)	none	0378–037A	none
Parallel Port 3	7 (or disabled)	none	0278–027A	none
Infrared Port	4 (or 3, 5, 10, 11, 15, disabled)	none	01A0–01A7 (or 01B0–01B7, 01C0–01C7, 01D0–01D7) 02E8–02EF (or 03F8–03FF, 02F8–02FF, 03E8–03EF)	0 and 3 or disable
Diskette Controller	6	none	03F0–03F7	2
Video Controller	9	A0000–BFFFF	03B4–03B5, 03BA, 03C0–03C9, 03CA, 03CC, 03CE–03CF, 03D4–03D5, 03DA 23C0–23C7 (reserved)	none
Enhanced Video	9 (or 3, 4, 5, 6, 7, 10, 11, 15, disabled)	none	0E09, 0E20–0E2E, 0E30, 0E40–0E48, 0E4C, 0E4D, 0E60–0E62, 0E90, 0E92–0EAC, 0EAE–0EB1, 0EB4–0EB6, 0EB8, 0EB9, 0EBC, 0EBE, 0EBF, 0EF0–0EFC, 0EFE, 0EFF, FEE8	none
Mwave DSP Device	5 (or 7, 10, 11, 15, disabled)	none	0030, 4E30, BE30, CE30	0 (or 1, 6, 7)

System Resources	IRQ	Memory Address (Hex)	I/O Address (Hex)	DMA Channel
Sound Blaster	7 (or 5, 10, 11, disabled)	none	0220, 0240	0 (or 1, 6, 7)
MIDI	none	none	0300, 0330	none
Modem	3, 4, disabled	none	03F8, 02F8, 03E8, 02E8	none
Hard Disk Drive	14	none	01F0–01F7, 03F6–03F7	none
CD-ROM drive	15 (or 3, 4, 5, 6, 7, 10, 11, 15)	none	0170–0177, 0376–0377	none
PCMCIA Controller	none	none	03E0–03E3	none
PC Card	15 (or 3, 5, 7, 10, 11, 12, 14)	C0000–DFFFF	none	none
Real Time Clock	8	none	0070–0071	none
TrackPoint III or Mouse	12	none	0060, 0064	none
Math Coprocessor Exception	13	none	none	none
Options in Dock I or Dock II SCSI Controller	2, 3, 4, 5, 7, 9, 10, 11, 15	CA000–CBFFF C8000–C9FFF CE000–CFFFF DE000–DFFFF	(Depends on the installed option device)	0, 1, 2, 3, 5, 6, 7
AD/VC Adapter	none	none	92E9	none

Notes:

Selected values are assigned to a serial port and a parallel port of the computer.
Selectable in the ThinkPad Feature program or PS2.EXE.
VL-Bus master is used.
The IRQ for PC Card depends on the PC Card type.
Selectable in the Resource MAP Utility. See "Software Considerations for DOS" on page 262.
Select an IRQ and the memory addresses with a jumper and switch on the Main Board of Dock I/Dock II.
See "Using SCSI Controller and Support Software" in the *Dock I User's Guide* or *Dock II User's Guide*. Do not select **Disabled** when OS/2 is used.

Appendix B. Advanced Information for PC Cards

This appendix describes the Auto Configurator program, which automatically enables the PC Card without installing the device driver supplied with your PC Card. It also describes the operational considerations when using your PC Card.

Auto Configurator for PC Card Director

When installing an operating system, install the PCMCIA device driver that is on the PCMCIA Features Diskette to use the Auto Configurator.

The 755CD provides the *Auto Configurator*, a program for some PC Cards, so that you do not have to install the device driver supplied with the card to use it.

When the Auto Configurator is installed, the following line is added to the CONFIG.SYS file:

For OS/2:

```
DEVICE=[DRIVE][PATH]AUTODRV2.SYS [DRIVE][PATH]AUTODRV2.INI
```

For DOS or Windows:

```
DEVICE=[DRIVE][PATH]AUTODRV.SYS [DRIVE][PATH]AUTODRV.INI
```

The basic structure of the data file for the Auto Configurator, AUTODRV2.INI for OS/2 or AUTODRV.INI for DOS or Windows, is as follows:

```
[Card name]
CardID=card name
Keyword1=data1,Keyword2=data2,...
Keyword1=data1,Keyword2=data2,...
Keyword1=data1,Keyword2=data2,...
Keyword1=data1,Keyword2=data2,...
```

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Example When a Modem Card Is Used

When a modem card is installed in the PC Card slot, the Auto
Configurator assigns interrupt request levels and I/O window from the
information in the following data file and tuple data of the modem
card.

```
[MODEM]
CardID=MODEM,MD24X
Port1=3F8,IRQ=4
Port1=2F8,IRQ=3
Port1=3E8,IRQ=3
Port1=2E8,IRQ=3
```

Starting from the first "Port1" line, the Auto Configurator tries to
assign the resources from I/O window 3F8H and interrupt request
level 4 for the modem. If the Auto Configurator finds resources that
are not occupied by the system, it assigns them to the modem.
Suppose I/O port address 3F8H is already occupied by the system
serial port, Auto Configurator will not be able to assign the first
"Port1" line ([Port1=3F8,IRQ=4]) to the modem. It would then try to
assign the next "Port1" line ([Port1=2F8,IRQ=3]) to the modem.

The CardID parameter is used to identify the modem card which
does not contain enough tuple data. If the Auto Configurator cannot
recognize the modem card installed into the PC Card slot, you must
add the modem card identification which is indicated in the level 1
version/product information tuple. The identification must be written
using up to five uppercase ASCII characters. If you want to display
this character string, use the DOS PC Card Utility (EZPLAY.EXE),
Windows PC Card Utility (EZPLAY.EXE), or OS/2 PC Card Utility
(EZPLAY2.EXE). The above example identifies the modem card as
"MD24X." Make sure that you include the character strings, following
"MODEM." When you use OS/2, you can include up to five character
strings, following "MODEM." The Windows PC Card Utility allows
you to automatically register the character string by selecting the
Register button on the Card Information screen.

Example When the Auto Configurator Is Not Used

When you do not need to use the Auto Configurator, add the
following line after the "CardID" parameter.

```
                   Option=Ignore
```

The Auto Configurator will not assign resources to the PC Card when this line is added.

Example of the Memory Area for the Card Services and 3270

The following is an example of the memory area specified by the Card Services memory area and 3270 data file.

A Resource Map Utility statement

```
DEVICE=C:\EZPLAY\DICRMU 1.SYS /MA=D   -D7FF
```

Lines from the 3270 data file

```
[327 ]
CardID=327
Port1=2D ,IRQ=9,Memory1=CE
Port1=6D ,IRQ=9,Memory1=D
```

The keywords, "Memory1" is specified by the base address of the memory window given as a hexadecimal segment address. Memory window 1 must be within the range of the memory area reserved for Card Services. The Card Services memory area is specified using the Resource Map Utility.

In the above example, the memory area for Card Services is from D000H to D7FFH and the 3270 memory area is specified by "Memory1" of the data file. The memory area (CE00H) for "Memory1" in the first "Port1" line is not within the area ("MA=" parameter) specified for the Card Services memory. As a result, the Auto Configurator will not be able to assing the 3270. It will attempt to assign the 3270 from details of the secord "Port1" line.

Carefully check each application program you use so that the memory area is specified by the "MA=" parameter.

Operational Considerations for PCMCIA

Consider the following according to your operating system.

Software Considerations for OS/2

The following is a sample of the CONFIG.SYS file for OS/2.

```
    :
DEVICE=C:\OS2\APM.SYS
    :
BASEDEV=PCMCIA.SYS /P
BASEDEV=ICRMU 1.SYS
BASEDEV=IBM2SS 1.SYS /D
DEVICE=C:\OS2\MDOS\VPCMCIA.SYS
DEVICE=C:\THINKPAD\COM.SYS
DEVICE=C:\THINKPAD\AUTODRV2.SYS C:\THINKPAD\AUTODRV2.INI
    :
DEVICE=PC_Card_Client_Device_Driver
    :
DEVICE=C:\THINKPAD\$ICPMOS2.SYS
```

You may need to update the CONFIG.SYS file after you have installed the PCMCIA software. If you make any changes to your CONFIG.SYS file, keep in mind the following rules for PCMCIA software.

Rule 1 The Advanced Power Management Driver (APM.SYS) must be listed before any other PCMCIA drivers. This driver is installed with the IBM OS/2 2.11.

Rule 2 The Card Services Driver (PCMCIA.SYS) must be listed before any other PCMCIA drivers. This driver is installed with the IBM OS/2 2.11.

Rule 3 The Socket Services Driver (IBM2SS01.SYS), and Resource Map Utility (ICRMU01.SYS) must be listed in this order. These modules must be listed after the Card Services Driver.

Rule 4 The PC Card Client Device Drivers must be listed after the Card Services and before the Power Management Utility ($ICPMOS2.SYS).

Rule 5 The Power Management Utility should be listed at the end of the CONFIG.SYS file.

DOS Software Considerations for DOS

Keep in mind the following considerations when using PC Cards.

Using a Software EMS with the PC Card

To use a software EMS without the expansion unit:

During the installation of the PCMCIA device driver, your system automatically sets up the memory space so that you can use EMS with a PC Card.

To use a software EMS with an adapter card in the expansion unit:

You can specify a memory area in your CONFIG.SYS file so that the memory areas for the PC Card, adapter, and EMS do not conflict with one another. To determine the required-memory space of the PC Card, refer to the manual that came with the PC Card. It is recommended that you allocate at least 4 KB of memory space to the DOS Card Services (IBMDOSCS.SYS).

The hardware interrupt level of the PC Card and the adapter must be assigned exclusively. To avoid a conflict, use the resource map utility (DICRMU01.SYS) with the following parameters:

DEVICE= [*drive*:] [*path*] DICRMU01.SYS
[[/MA=*mmmm-mmmm*[,*mmmm*]] [/IX=IRQ level[,IRQ level]]]

/MA=   Specifies the segment address range that is allocated to the memory window for a PC Card.

mmmm-mmmm
Address range of the PC Card. The range can be specified from C000h to DFFFh. One or more address ranges can be specified with a comma (,) to separate the address ranges.

/IX=IRQ level
Specifies the interrupt request level that *cannot* be used by the PC Card. You can specify levels 3, 4, 5, 7, 9,

10, 11, 12, 14, and 15. One or more of these levels can be specified with a single DEVICE command.

The following example shows the procedure for memory allocation when an adapter that requires 32KB of memory is installed (the required-memory space of the adapter cards may vary from one card to another).

1. Open your CONFIG.SYS file using a text editor such as the DOS editor.

2. Find the DEVICE statement containing "EMM386.EXE".

3. Change the statement to:

```
 DEVICE=C:\DOS\EMM386.EXE 1 24 FRAME=D    X=C   -C7FF
    X=C8  -CFFF
```

4. Find: DEVICE=C:\DICRMU01.SYS

5. Change this statement to:

```
  DEVICE=C:\DICRMU 1.SYS /MA=C8  -CFFF /IX=11
```

6. Save the changes in your CONFIG.SYS file; then restart the system.

Interrupt request level 11 cannot be used by the PC Card. After you complete these steps, the memory map will be as follows:

C000H	Adapter In Expansion Unit	32KB
C800H	PCMCIA Drivers	32KB
D000H		
D800H	EMS	64KB
E000H		
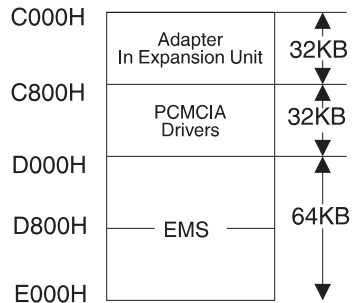
Examples of Hardware Configurations

The following examples show memory allocations and notices for using various PC Cards.

Using PC Cards and SCSI adapter installed in the Dock I

Modify your CONFIG.SYS file as follows:

```
              :
 DEVICE=C:\DOS\EMM386.EXE NOEMS X=C   -CFFF
              :
              :
 DEVICE=C:\THINKPAD\DICRMU 1.SYS /MA=C   -C9FF,CC  -CFFF
```

This will maximize the memory address range that is allocated for the PC Cards and SCSI adapter in the Dock I. This assumes the Dock I SCSI adapter is at the default allocation (CA000h—CBFFF) (refer to the Dock I *User's Guide* Chapter 5).

Using serveral PC Cards

Modify the configuration file as the following example (IBM Token Ring Card + IBM Ethernet Card + IBM 3270 Card + Modem + EMM386):

```
< CONFIG.SYS >
                    :
 DEVICE=C:\DOS\EMM386.EXE NOEMS X=C3  -CFFF ←modified
                    :
 DEVICE=C:\THINKPAD\IBMDSS 1.SYS
 DEVICE=C:\THINKPAD\IBMDOSCS.SYS
 DEVICE=C:\THINKPAD\DICRMU 1.SYS /MA=C3  -CFFF ←modified
 DEVICE=C:\THINKPAD\$ICPMDOS.SYS
 DEVICE=C:\DOS\POWER.EXE
 DEVICE=C:\THINKPAD\AUTODRV.SYS C:\THINKPAD\AUTODRV.INI
 DEVICE=C:\THINKPAD\DISKDRV.SYS
                    :
                    :
 DEVICE=C:\LSP\PROTMAN.DOC /I:C:\LSP ←LSP adds this line
 DEVICE=C:\LSP\PCMNICCS.DOC        ←LSP adds this line
 DEVICE=C:\LSP\IBMTOKCS.DOC        ←LSP adds this line
 DEVICE=C:\LSP\DXMA MOD.SYS   1    ←LSP adds this line
 DEVICE=C:\LSP\DXME MOD.SYS        ←LSP adds this line
 DEVICE=C:\LSP\DXMT MOD.SYS O=N    ←LSP adds this line
                    :
                         (LSP: Lan Support Program)
< PROTOCOL.INI (C:\LSP\PROTOCOL.INI) >

[IBMTOKCS_NIF]
          :
     RAM =  Xc4     ←modified
     RAMSIZE = 16
          :
     MMIO =  Xcc     ←modified
[PCMNICCS_NIF]
          :
     RAM =  Xc8     ←modified
          :
```

In this case the memory map will be as follows:

Address	Region
C000:0	EMS Memory
C300:0	IBM Card Service
C400:0	Token Ring Shared RAM
C800:0	Ethernet Shared RAM
CC00:0	Token Ring Memory Mapped I/O
CE00:0	3270 Shared RAM
D000:0	EMS Memory
E000:0	

Updating the CONFIG.SYS File

The following is a sample of the CONFIG.SYS file for DOS.

```
     :
DEVICE=C:\DOS\EMM386.EXE 1 24 frame=D    X=C8  -CFFF
     :
DEVICE=C:\THINKPAD\IBMDSS 1.SYS /D
DEVICE=C:\THINKPAD\IBMDOSCS.SYS
DEVICE=C:\THINKPAD\DICRMU 1.SYS /MA=C8  -CFFF
DEVICE=C:\THINKPAD\$ICPMDOS.SYS
DEVICE=C:\THINKPAD\AUTODRV.SYS C:\THINKPAD\AUTODRV.INI
DEVICE=C:\THINKPAD\DISKDRV.SYS
DEVICE=C:\DOS\POWER.EXE
     :
DEVICE=PC_Card_Client_Device_Driver
```

You may need to update the CONFIG.SYS file after you have installed the PCMCIA software. If you make any changes to your CONFIG.SYS file, keep in mind the following rules for PCMCIA software.

Rule 1 To use the Software EMS Driver (EMM386.EXE) with the PCMCIA drivers, the "X=" parameter must be specified for the EMM386.EXE. This parameter specifies the memory range that is used by the PCMCIA drivers. (For more information see "Using a Software EMS with the PC Card" on page 262.)

Rule 2 The Socket Services Driver (IBMDSS01.SYS), Card Services Driver (IBMDOSCS.SYS), Resource Map Utility (DICRMU01.SYS), and Power Management Utility ($ICPMDOS.SYS) must be listed in this order.

Rule 3 The Advanced Power Management Driver (POWER.EXE) must be specified in the CONFIG.SYS file. This is installed with DOS.

Rule 4 The PC Card Client Device Drivers must be listed after all other PCMCIA drivers.

If you do not use the PC Card and need more application memory area, see "Releasing the PCMCIA Memory Area" on page 268.

Releasing the PCMCIA Memory Area

If you are using DOS 6.3 or later but not using the PC Card, you can use the PCMCIA memory area as your application program memory area. There are two ways to make this available for application programs.

Use the PCMCIAOF command.
Use the DOS Multiple Configuration Function.

Using the PCMCIAOF command

Type **PCMCIAOF** at the command prompt (usually C:>). This converts the PCMCIA DEVICE statements to comments.

The CONFIG.SYS file will now look like this:

```
DEVICE=C:\DOS\EMM386.EXE 1 24 frame=D    X=C8  -CFFF
  :
REM DEVICE=C:\THINKPAD\ IBMDSS 1.SYS /D
REM DEVICE=C:\THINKPAD\IBMDOSCS.SYS
REM DEVICE=C:\THINKPAD\DICRMU 1.SYS /MA=C8  -CFFF
REM DEVICE=C:\THINKPAD\$ICPMDOS.SYS
REM DEVICE=C:\THINKPAD\AUTODRV.SYS C:\THINKPAD\AUTODRV.INI
REM DEVICE=C:\THINKPAD\DISKDRV.SYS
REM DEVICE=C:\DOS\POWER.EXE
  :
DEVICE=PC_Card_Client_Device_Driver
```

If you want to reset the PCMCIA memory area so you can use a PC Card, type **PCMCIAON** at the command prompt.

Note:

See the *DOS User Guide*, Part 1 "Using the DOS Operating System" and Part 2 "Configuring Your System, Using Multiple Configurations" for more information about the DOS Multiple Configuration Function.

Using the DOS Multiple Configuration Function

Use the DOS Multiple Configuration Function to change the CONFIG.SYS file and add the choice of loading the PCMCIA device driver.

The CONFIG.SYS file will look like this:

```
[MENU]
MENUITEM=DLS, Load DOS LAN Services Client
MENUITEM=INTLNK, Load InterLnk Client
MENUITEM=CPSW, Load Code Page Switching
MENUITEM=PCMCIA, Load IBM PCMCIA Drivers
MENUCOLOR=7,1
MENUDEFAULT=DLS,2
   :
   :
[DLS]
DEVICEHIGH=C:\NET\protman.dos /i:C:\NET
DEVICEHIGH=C:\NET\dlshep.sys
DEVICEHIGH=C:\NET\ibmtok.dos

[INTLNK]
DEVICEHIGH=C:\DOS\INTERLNK.EXE

[PCMCIA]
DEVICE=C:\THINKPAD\IBMDSS 1.SYS /D
DEVICE=C:\THINKPAD\IBMDOSCS.SYS
DEVICE=C:\THINKPAD\DICRMU 1.SYS /MA=C8  -CFFF
DEVICE=C:\THINKPAD\$ICPMDOS.SYS
DEVICE=C:\THINKPAD\AUTODRV.SYS C:\THINKPAD\AUTODRV.INI
DEVICE=C:\THINKPAD\DISKDRV.SYS

[COMMON]
DEVICEHIGH=C:\DOS\ANSI.SYS
SHELL=C:\DOS\COMMAND.COM /P /E:512
   :
```

Software Considerations for Windows

If you are using Windows, specify the memory area for Windows so it does not conflict with the memory area for the PCMCIA drivers. After completing the installation for Windows, update your SYSTEM.INI file as follows:

1. Open your CONFIG.SYS file using a text editor.

2. Find: DEVICE= [*drive*:] [*path*] DICRMU01.SYS /MA=*mmmm-mmmm*

3. Note the address range of the PCMCIA drivers (*mmmm-mmmm*); then close the CONFIG.SYS file and open the SYSTEM.INI file of Windows.

4. Add the following line to the [386Enh] section of the SYSTEM.INI file: EMMEXCLUDE=*mmmm-mmmm*

   The parameters for "/MA" and "EMMEXCLUDE" must be the same.

5. Close the SYSTEM.INI file.

Appendix C. Additional Information for Mwave DSP Feature

This appendix provides detailed information about the ThinkPad Mwave DSP Features.

Audio Information

This section provides information about the ThinkPad Audio Features.

Sound

The Mwave DSP feature includes a standard 1/8-inch jack which can be used for stereo/mono line inputs or for stereo/mono microphone input. A second standard 1/8-inch jack can be used for stereo/mono line output, or for stereo/mono headphones. An internal connector allows you connect an internal CD-ROM player so that audio CDs can be played through the card. WAV files can be played through the stereo headphone/line output jack or recorded from the microphone/line input jack or internal CD-ROM for subsequent playback as part of a multimedia presentation. Audio can also be mixed from multiple sources for either playback or recording. Mwave provides support for Windows 3.1 audio applications that comply with the Windows MultiMedia Extensions (MME) for audio, for example, Windows Sound Recorder and Windows Media Player that are shipped with Windows 3.1.

Through the use of the DSP hardware and software, various levels of audio recording and playback performance can be achieved. In general, recording audio music and speech at higher quality requires more disk storage. This table shows some typical values for various sampling rates:

Advanced Information for Audio Function

Sample Rate	Sample Size	Frequency Range	Signal/Noise Ratio	Remarks
44.1 KHz	16 bits	20 Hz - 20 KHz	80 dB	CD quality
22.05 KHz	16 bits	20 Hz - 10 KHz	80 dB	< CD quality
11 KHz	16 bits	20 Hz - 5 KHz	80 dB	AM quality
9.6 KHz	14 bits	200 Hz - 4 kHz	60 dB	Toll quality
8.0 KHz	8 bits	200 Hz - 4 kHz	60 dB	Toll quality

Digitized audio input can be played through the system speaker/stereo headphone/audio output jack or stored on a fixed disk for subsequent playback as part of a multimedia presentation.

Mwave MIDI Overview

Mwave MIDI Synthesizer Overview

The Mwave feature can be a music synthesizer, creating realistic instrument sounds from a sequence of MIDI commands played on a MIDI keyboard or read from a *.MID file on your PC. The MIDI standard defines a very compact representation for music. MIDI is composed of a sequence of commands representing musical events, such as a key press on a music keyboard.

The Mwave Windows Audio Device Driver provides a sampled sound MIDI synthesizer that exceeds the Base Multitimbral requirements of the MPC 1 and MPC 2 specifications.

The Mwave synthesizer is enhanced with a QSound[**] process. QSound is a signal processing technique used to deceive the acoustic response system (hearing) of a listener. Audio from a stereo speaker system that has been processed by QSound can give

---

[**] Trademark of QSound, Inc.

the listener the perception that the speakers are displaced much further to the listener's left and right than they actually are.

This is particularly useful for a personal computer system, in which table space is limited, and a small set of speakers are located immediately adjacent to the computer. The angular displacement of the speakers to the listener's left and right is not sufficient to give a decent stereo effect. But with QSound processing, the listener can perceive sound coming from a variety of directions, some of which are significantly further to the left and right than the actual location of the speakers. The net result is a significantly improved stereo effect.

To optimize the QSound effect, sit directly in front of the computer with the speakers equally distant from both sides of the computer.

Understanding the MIDI Mapper

The MIDI Mapper is a program included with Microsoft Windows that interacts with the Mwave Windows Synthesizer Device Driver to control the way sounds are created on your Mwave feature and on external MIDI devices like keyboards. In Windows MIDI applications allowing you to specify a MIDI output device, select the Windows MIDI Mapper as the output device rather than outputting to the Mwave driver directly.

The MIDI Mapper controls which of the 32 MIDI channels to send to the Mwave feature for playback. The MPC audio specification describes two types of synthesizers. A BASE Multitimbral synthesizer transmits data on MIDI channels 13–16 and supports 32 simultaneous voices (32 notes at once, each of which can come from a different instrument). An EXTENDED Multitimbral synthesizer transmits data on MIDI channels 1–10 and supports 32 simultaneous voices.

The Mwave feature supplies the following MIDI Mappers for selecting which MIDI format to use for Mwave:

Mwave EXT GM   for Mwave MIDI synthesizer channels   1–10

Mwave Base GM   for Mwave MIDI synthesizer channels 13–16

Advanced Information for Audio Function

The Mwave Windows 32 voice synthesizer usually sounds best when the Mwave EXT GM setup is selected in the MIDI Mapper. Songs requiring more than 32 simultaneous voices might sound odd. If a 33th simultaneous note is played, the "oldest" note ends prematurely. The Mwave 32-voice synthesizer usually sounds best when the Mwave Base GM setup is selected in the MIDI Mapper.

The MPC standard requires authors to provide two versions of every MIDI composition stored in the same file. Channels 1–10 hold the version written for Extended Multitimbral synthesizers, while channels 13–16 hold the version written for Base Multitimbral synthesizers. Most MIDI files included with Windows applications follow this standard of containing two versions of each composition. This is why the Mwave MIDI synthesizer comes with both Base and Extended MIDI Mapper setups. If all channels were played at once, both versions of a MIDI composition would play at the same time.

If you have a MIDI file that is not producing sound on your Mwave feature, it could be because MIDI commands are being sent on a set of channels the MIDI Mapper is not responding to. Try using the Windows MIDI Mapper to switch the setup between Mwave Base and Mwave Extended Multitimbral modes. This lets you see if the MIDI commands in the file are provided for only one of the two modes.

hp2.Communicating with an External MIDI Device

If you have an external MIDI device attached to the computer, you can use the Windows MIDI Mapper to select the MIDI Port. This MIDI Mapper allows you to send and receive data from an external device on channels 1 - 16. If you need a different setup, you can edit this MIDI MAP for the setup that you want, or you can create a new one.

The Mwave feature supplies the following MIDI Mapper for selecting external/port devices: **Mwave Port** for Mwave MIDI Port channels 1 - 16.

To play/record a MIDI file to/from an external synthesizer, refer to the synthesizer's user's manual and use your favorite MIDI sequencer

program. You can also use the Windows Media Player to play a MIDI file to this device.

Other MIDI Controls

The Mwave feature's MIDI synthesizer recognizes several types of control information in the MIDI data stream.

Key Velocity   The harder the key is pressed, the louder the note sounds.

Main Volume   This is usually controlled by a knob on a MIDI keyboard. It is received on control number 7.

Pitch Bend   This can be used to mimic the sound of a whammy bar on a guitar and is usually controlled by a thumb wheel on a MIDI keyboard. Note pitch can be varied +/- 2 semi-tones.

Pan   The Mwave feature's MIDI synthesizer uses QSound to implement Pan. By using QSound, the position of each channel's instrument is not limited by the position of the speakers. It is received on control number 10.

Vibrato   Also referred to as modulation, this control produces rapid, small changes in the pitch of a note and is usually controlled by a thumb wheel on a MIDI keyboard. Vibrato depth can be varied +/- 2 semi-tones. It is received on control number 1.

Sustain   Each note of an instrument has an envelope that describes the loudness of the note during attack, decay, sustain, and release periods. Some MIDI keyboards can be used with a piano-like sustain pedal that prolongs the sustain period to mimic holding a note. It is received on control number 64.

Advanced Information for Audio Function

Mwave MIDI Synth Base and Mwave MIDI Synth Full Options

The Mwave MIDI synthesizer includes a set of MIDI patches
(instrument sounds) using sampled sounds provided by Prosonus[**] a
leader in music synthesis technology. These patches are created
from actual recordings of real instruments to achieve the best
possible sound fidelity. Mwave MIDI Synth Full provides a full set of
General MIDI patches. Mwave MIDI Synth Base provides a subset
of these patches. The Base set is General MIDI compatible but
requires less disk storage.

[**] Trademark of Prosonus, Inc.

Telephony Information

This section provides additional information about the ThinkPad telephony features.

United States Telephone Consumer Protection Act of 1991 (Facsimile Devices)

The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device to send any message via a telephone facsimile machine unless such message clearly contains, in a margin at the top or bottom of each transmitted page or on the first page of the transmission, the date and time it is sent and an identification of the business, other entity, or individual sending the message and the telephone number of the sending machine or such business, other entity, or individual.

In order to program this information into your facsimile, you should refer to the accompanying FAX software package.

Appendix D. Features and Specifications

This appendix describes the features and specifications for the IBM ThinkPad 755CD. For more information, refer to the *Technical Reference* manual.

Features

Microprocessor

IntelDX4[**] 100-/33-MHz

Memory

Onboard (built-in): 8MB RAM
Optional:
– 2MB, 4MB, 8MB, and 16MB IC DRAM cards
– 4MB, 8MB, and 16MB DIMMs with DIMM adapter

Storage devices

2.5-inch removable hard disk drive
3.5-inch removable diskette drive
5.25-inch removable CD-ROM double-speed drive

Display

TFT color LCD, supporting from 256 up to 65 536 colors from a palette of 262 144 colors
VGA (640 by 480 resolution), SVGA (800 by 600 or 1024 by 768 resolution)
Brightness control

Keyboard

84-key, 85-key, or 89-key
TrackPoint III
Fn key function

[**] Trademark of the Intel Corporation.

External interface

Infrared ports
MIDI/Joystick port
Serial connector (EIA-RS232D)
Parallel connector (Centronics)
External input-device connector
External-display connector
PCMCIA slots (accepts two Type I or Type II PC Cards, or one
Type III PC Card)
Modem/Fax port (optional in some countries)
Video In/Out ports
Headphone jack
Microphone/Line-in jack (supports a dynamic microphone or a
self-battery-powered condenser microphone)

System bus

240-pin, 16-bit AT bus connector

Specifications

Size

Width: 297 mm (11.7 in.)
Depth: 210 mm (8.3 in.)
Height: 57 mm (2.2 in.)

Weight

Minimum configuration with battery pack:
– Approximately 3.3 kg (7.3 lb)

Environment

Temperature (under altitudes of 2438 m (8000 ft)):
– Operating[3] 5° to 35°C (41° to 95°F)
– Operating[4] 10° to 35°C (50° to 95°F)
– Non-operating: 5° to 43°C (41° to 109°F)
Relative Humidity:
– Operating[3] 8% to 95%
– Operating[4] 8% to 80%
Maximum altitude: 3048 m (10 000 ft)[5]
– Maximum temperature at 3048 m (10 000 ft): 31.3°C
   (88° F)

Heat Output

Approximately 136.5 British Thermal Units (BTUs) per hour (40.0 watts)

Audio Output

1/8-inch mini-jack headphone
Maximum headphone speaker output: 1.5 mW (32)
Maximum output level: 1.9 V peak-to-peak
Output impedance: 75
Sample rate: 5.5–48 kHz

Audio Inputs

Built-in microphone
Software programmable 1/8-inch mini-jack microphone or line input
Sample rate: 5.5–48 kHz
Microphone gain: minimum 32 dB, maximum 54.5 dB
Maximum input level:
– Microphone: 64 mV peak-to-peak
– Line: 5.3 V peak-to-peak
Input Impedance:

---

[3] With no diskette in drive.

[4] With diskette in drive.

[5] With no pressurized condition.

– Microphone: 9 k
  – Line: 8 k

Electrical (AC Adapter)

Sine-wave input, at 50 to 60 Hz, is required

  100–125 V ac
  100–125 V ac

Battery Pack

Output voltage: 9.6 V dc
Maximum current: 3300 mAH

IBM Power Cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriters Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (in the U.S.): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug rated 15 amperes (minimum), 250 volts. The cord set should be marked <HAR> and have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country are usually available only in that country:

IBM Power Cord Part Number	Used in These Countries
13F9940	Argentina, Paraguay, Uruguay, Australia, New Guinea, New Zealand, Papua
13F9959	Bahamas, Barbados, Bermuda, Bolivia, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Korea (South), Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela
1838574	Thailand
13F9979	Austria, Belgium, Bulgaria, Czechoslovakia, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Turkey, Yugoslavia
13F9997	Denmark
14F0015	Bangladesh, Pakistan, South Africa, Sri Lanka
14F0033	Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, Hong Kong, India, Ireland, Kenya, Kuwait, Macao, Malaysia, Nigeria, Oman, People's Republic of China, Qatar, Singapore, United Kingdom
14F0051	Switzerland
14F0069	Chile, Italy
14F0087	Israel
65F0031	Japan (3-pin)
6454377	Japan (2-pin)

Diskette Standards

To get the best performance from your diskette drives, use high-quality diskettes (such as IBM diskettes) that meet or exceed the following standards:

1MB, 3.5-inch, unformatted diskette:

ANSI (American National Standard Institute) X3.137
ISO (International Standards Organization) 8860
ECMA (European Computer Manufacturers' Association) 100

2MB, 3.5-inch, unformatted diskette:

ANSI X3.171
ISO 9529
ECMA 125

4MB, 3.5-inch, unformatted diskette:

ANSI Standard (under proposal at the time of printing)
ISO 10994 (Type 303)
ECMA 147

Appendix E. Product Warranties and Notices

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 an IBM authorized reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. Machines are subject to these terms only if purchased in the United States or Puerto Rico, or Canada, and located in the country of purchase. If you have any questions, contact IBM or your reseller.

Machine: IBM ThinkPad 755CD except the Battery Pack

Warranty Period*: Three Years

*Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.

Production Status
Each Machine is manufactured from new parts, or new and serviceable used parts (which perform like new 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
IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. IBM calculates the expiration of the warranty period from the Machine's 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 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. IBM or your reseller will specify the type of service.

For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net-Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

Replacement parts assume the remaining warranty of the parts they replace.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair or replace it (with a Machine that is at least functionally equivalent) without charge. If IBM or your reseller is unable to do so, 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.

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.

Depending on the Machine, the service may be 1) a "Repair" service at your location (called "On-site") or at one of IBM's or a reseller's service locations (called "Carry-in") or 2) an "Exchange" service, either On-site or Carry-in.

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. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced.

It is your responsibility to:

1. obtain authorization from the owner (for example, your lessor) to have IBM or your reseller service a Machine that you do not own;
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,
    c) inform IBM or your reseller of changes in a Machine's location, and
    d) for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

Extent of Warranty

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

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible may void the warranties.

THESE WARRANTIES REPLACE ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. HOWEVER, SOME LAWS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES. IF THESE LAWS APPLY, THEN ALL EXPRESS AND IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

In Canada, warranties include both warranties and conditions.

Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part (including fundamental breach) or other liability (including negligence and misrepresentation), you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages, IBM is liable only for:

1. bodily injury (including death), and damage to real property and tangible personal property; and
2. the amount of any other actual loss or damage, up to the greater of $100,000 or the charge for the Machine that is the subject of the claim.

Under no circumstances is IBM liable for any of the following:

1. third-party claims against you for losses or damages (other than those under the first item listed above);
2. loss of, or damage to, your records or data; or
3. economic consequential damages (including lost profits or savings) or incidental damages, even if IBM 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. This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

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Machine: Battery Pack

Warranty Period*: One Year

Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.

Production Status
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For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net-Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

Replacement parts assume the remaining warranty of the parts they replace.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair or replace it (with a Machine that is at least functionally equivalent) without charge. If IBM or your reseller is unable to do so, you may return it to your place of purchase and your money will be refunded.

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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,
    c) inform IBM or your reseller of changes in a Machine's location, and
    d) for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

Extent of Warranty

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

Misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible may void the warranties.

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In Canada, warranties include both warranties and conditions.

Some jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part (including fundamental breach) or other liability (including negligence and misrepresentation), you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages, IBM is liable only for:

1. bodily injury (including death), and damage to real property and tangible personal property; and
2. the amount of any other actual loss or damage, up to the greater of $100,000 or the charge for the Machine that is the subject of the claim.

Under no circumstances is IBM liable for any of the following:

1. third-party claims against you for losses or damages (other than those under the first item listed above);
2. loss of, or damage to, your records or data; or
3. economic consequential damages (including lost profits or savings) or incidental damages, even if IBM is informed of their possibility.

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Video for Windows	Microsoft Corporation
Western Digital	Western Digital Corporation
Windows	Microsoft Corporation
Wizard	Sharp Corporation
386MAX	Qualitas, Inc.
100LX	Hewlett Packard Corporation

Electronic Emission Notice

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.

Canadian Department of Communications Compliance Statement

This equipment does not exceed Class B limits per radio noise emissions for digital apparatus, set out in the Radio Interference Regulation of the Canadian Department of Communications.

Avis de conformité aux normes du ministère des Communications du Canada

Cet équipement ne dépasse pas les limites de Classe B d'émission de bruits radioélectriques pour les appareils numériques, telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le ministère des Communications du Canada.

European Community Directive Conformance Statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electro-magnetic compatibility.

A declaration of Conformity with the requirements of the Directive has been signed by IBM United Kingdom Limited, PO BOX 30 Spango Valley Greenock Scotland PA160AH.
This product satisfies the Class B limits of EN 55022.

Glossary

This glossary includes terms and definitions from the *IBM Dictionary of Computing*, New York: McGraw-Hill, 1994.

AC (ac). Alternating current.

ac power. Power that is supplied to the computer through an electrical outlet.

ANSI. American National Standards Institute.

application program. Performs specific tasks on your computer, such as word processing or creating spreadsheets.

advanced power management (APM). APM consists of one or more layers of software that support power management in computers with power manageable hardware. The APM software interface allows applications, operating systems, device drivers, and the APM BIOS to work together to reduce power consumption, without reducing system performance.

ASCII. American National Standard Code for Information Interchange.

ATA PC Card. A PC Card with an AT Attachment interface, similar to a hard disk drive or other storage devices. drive.

AUTOEXEC.BAT. A file that contains a startup procedure of DOS. Each time you start your system, DOS performs the commands that are stored in this file.

backup copy. A copy, usually of a file or group of files, that is kept in case the original file or files are unintentionally changed or destroyed.

batch. A process method in which a program or programs records with little or no operator action.

BIOS (Basic Input/Output System). Microcode that contains basic hardware operations such as interactions with diskette drives, hard disk drives, and the keyboard.

boot. To prepare a computer system for operation by loading an operating system.

bus. A facility for transferring data between several devices located between two end points, only one device being able to transmit at a given moment.

cache memory. A special memory, smaller and faster than main memory, that is used to hold a copy of instructions and data in main memory that are likely to be needed next by the processor, and that have been obtained automatically from main memory.

combination keys. Keys that have specific functions when you hold them down at the same time.

component video. In multimedia applications, a video signal using three signals, one of which is luminance, and the other two of which are the color vectors.

composite video. A signal signal composed of chroma, luminance, and sync.

configuration. (1) The manner in which the hardware and software of an information processing system are organized and interconnected. (2) The physical and logical arrangement of devices and programs that make up a data processing system. (3) The devices and programs that make up a system, subsystem, or network.

CONFIG.SYS. A file that contains a group of commands to load installable device drivers and reserve space in

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system memory for information processing. This file is referred to by DOS during system startup.

CRT. Cathode ray tube display.

device driver. A file that contains the code needed to attach and use a device. Operating system loads device drivers for screens, keyboards, printers, diskette drives, hard disk drives, and auxiliary devices. The user can replace these or add other devices by coding and loading a device driver.

DIMM. Dual inline memory module.

directory. A type of file containing the names and controlling information for other files or other directories.

DMA. Direct memory access. The transfer of data between memory and input/output units without processor intervention.

double-click. To rapidly press and release the click button twice on the TrackPoint III, mouse, or in a graphical window menu.

DRAM. Dynamic random access memory.

EGA. Enhanced graphics adapter.

EIA. Electronics Industries Association.

EIA-232D. An EIA interface standard that defines the physical, electronic, and functional characteristics of an interface line that connects a communication device and associated workstation. It uses a 25-pin connector and an unbalanced line voltage.

EMS. Expanded memory.

fax. Facsimile machine or transmitted document.

fixed disk. In personal computing, fixed disk is synonymous with *hard disk*.

flash memory. A rewritable storage that is used to contain BIOS instructions and POST routines.

folder. A file used to store and organize documents.

fuel-gauge. An indicator on the screen that constantly shows the current power status of the battery pack.

hibernation. One of the power-saving methods that stores data and applications running in the computer's memory on the hard disk; then the computer is automatically turned off to save power. When power is turned on, the computer immediately restores the same data and applications as when hibernation started, without restarting the operating system.

high-performance mode. A method of increasing the access time of video memories for STN LCDs, to produce high-quality video on an external display (CRT).

high-resolution mode. Video resolutions that are greater than 640 by 480 pels.

icon. A graphic symbol, displayed on a screen, that a user can point to with a device such as a mouse to select a particular function or software application.

ISA. Industry Standard Architecture.

ISO. International Organization for Standardization.

JEIDA. Japan Electronics Industry Development Association.

kilobyte (KB). 1024 bytes.

LAN. Local area network.

megabyte (MB).   About one million bytes.

memory.   Often referred to as random-access memory (RAM), measured in kilobytes (KB) or megabytes (MB) of information.

MHz.   Megahertz.

microcode.   One or more microinstructions used in a product as an alternative to hard-wired circuitry to implement functions of a processor or other system component.

MIDI.   Musical Instrument Digital Interface.

modem.   A device that connects your computer to a telephone line, allowing it to communicate with another computer at another location.

parallel port.   A port used to attach devices such as dot-matrix printers and input/output units; it transmits data one byte at a time.

parity check.   A redundancy check by which a recalculated parity bit is compared to the pregiven parity bit.

partial suspend mode.   A kind of suspend mode where only a part of the system components uses power.

password.   A series of letters or numbers that you designate to restrict access to your computer.

PC Card.   PCMCIA card.

PCMCIA.   Personal Computer Memory Card International Association.

pel.   Picture element.

picture element.   In computer graphics, the smallest element of a display surface that can be independently assigned color and intensity.

pixel.   Picture element.

pointing device.   An instrument, such as a mouse, TrackPoint III, or joystick, that is used to move a pointer on the screen.

POST.   Power-on self-test.

pop-up menu.   On the display screen, a menu that emerges in an upward direction from a particular point or line on a display screen.

prompt.   A visual or audible message sent by a program to request the user's response.

pull-down menu.   On the display screen, a menu that emerges in a downward direction from a point or line at or near the top of the screen.

reboot.   Restart all operations of the computer as if the power were just turned on.

resume.   To begin computer operations again from suspend mode.

serial port.   A port used to attach devices such as display devices, letter-quality printers, modems, plotters, and pointing devices such as light pens and mice; it transmits data one bit at a time.

suspend.   Stops all operations of the computer to reduce power drain and restrict access to the files.

SVGA.   Super video graphics array. Video mode that produces up to 1024-by-768 resolution.

S-video.   A signal system using a color-image-encoding scheme that

separates luminance (Y) from phase encoded chroma (C).

STN.   Super twisted nematic.

TSRs.   Terminate-and-stay-resident programs. Memory-resident programs that are loaded into memory and stay there so you can conveniently access them whenever you need.

vertical expansion.   A video display technique in character-display mode to fit video images on the whole LCD screen by adjusting the number of character dots vertically.

VESA.   Video Electronics Standards Association.

VGA.   Video graphics array. Video mode that produces up to 640-by-480 resolution.

XMS.   Extended memory.

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