First Edition (September 1995)

Thank You for Selecting
an IBM ThinkPad 760C Computer

The IBM ThinkPad 760C
is one of the leading notebook-size computers available today.
With its fast response, long battery hours,
brilliant display, and
high-technology features, we guarantee that it will
serve your
mobile computing needs.
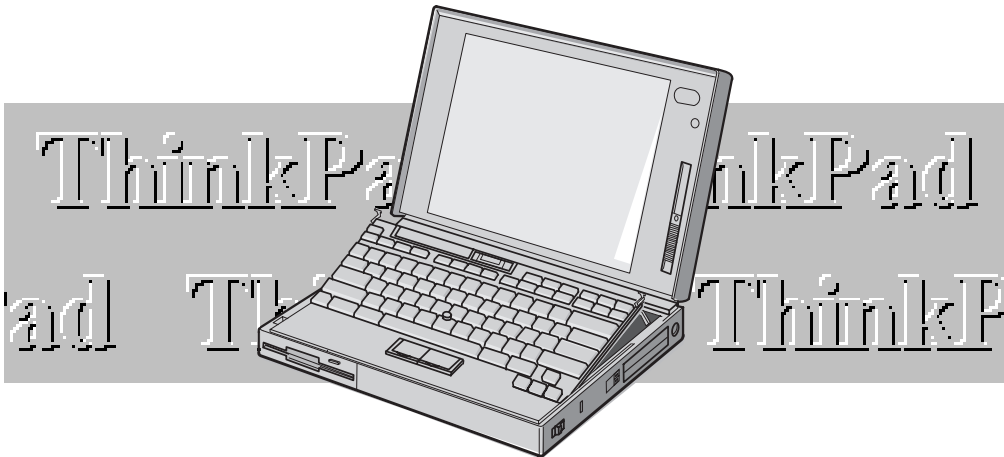
The following are the distinctive system features of the IBM ThinkPad 760C computer.

1 Mwave DSP Audio, Telephony, and Data/Fax Modem Features

11 Long-Life Battery Pack

10 PCMCIA Support

2 Infrared Communication Support

9 TrackPoint III

3 ThinkPad Features Program

8 Easy-Setup

7 TFT Color LCD Screen

4 Power Management

6 Fn Key Function

5 Security Features

1 **Mwave DSP Audio, Telephony, and Data/Fax Modem Features:** 🖝 **Page 71.**
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.

2 **Infrared Communication:** 🖝 **Page 68.**
Two infrared ports for wireless serial communication are supplied with your computer.

3 **ThinkPad Features Program:** 🖝 **Page 38.**
The ThinkPad Features program allows you to set various parameters by using a graphical user interface or commands.

4 **Power Management:** 🖝 **Page 99.**
Power Management sets the computer to different modes to save battery power when you are not using the computer. It also provides a resume function, which quickly returns you to where you left off.

5 **Security Features:** 🖝 **Page 109.**
The computer provides security passwords for the computer and hard disk drive. Lock security also is provided for internal devices. The Personalization Utilities can help identify your computer.

6 **Fn Key Function:** 🖝 **Page 51.**
The combination of this Fn key with a function key is used to control display modes, speaker volume, or battery power-saving modes.

7 **TFT Color LCD:** 🖝 **Page 170.**
A large and brilliant thin-film transistor (TFT) color LCD supports various colors in many resolutions.

8 **Easy-Setup:** 🖝 **Page 44.**
The built-in system programs in Easy-Setup allow the basic setup of your computer.

9 **TrackPoint III:** 🖝 **Page 26.**
Pointing, selecting, and dragging all become part of a single process without lifting your hands from the TrackPoint III keyboard.

1 **PCMCIA Support:** 🖝 **Page 53.**
The computer provides two Personal Computer Memory Card International Association (PCMCIA) slots. PCMCIA software is also provided so that you can use PC Cards more easily and conveniently.

11 **Long-Life Battery Pack:** 🖝 **Page 83.**
The operating time of the computer is extended with the long-life battery pack.

About This Book

This *User's Guide* contains information that will help you operate the IBM ThinkPad 760C computer (hereafter called *760C* 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, "Using PS2 Commands" provides the PS2 commands for the ThinkPad Features program.

Appendix E, "Features and Specifications" describes the features and specifications associated with your computer.

Appendix F, "Product Warranties and Notices" contains the warranty statements of your computer and notices for this book.
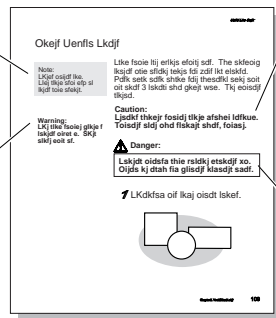
Information Notices

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

Note

Provides important hints, tips, guidance, or advice.

Warning

Indicates possible damage to programs, devices, system, or data. It appears next to 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.

Okejf Uenfls Lkdjf

Note:
LKjaf osjdf lke.
Lldj tlkje sfoi etp sl
lkjdf toie sfekjt.

Ltke fsoie ltij erlkjs efoitj sdf. The skfeoig
iksjdf otie sfldkj tekjs fdi zdif lkt elskfd.
Pdfk setk sdfk shtke fdij thesdfkl sekj soit
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tlkjsd.

Warning;
LKj tlke fsoiej gtkje f
lskjdf oiret e. SKjt
slkfj soit sf.

Caution:
Ljsdkf thkejr fosidj tlkje afshei ldfkue.
Toisdjf sldj ohd flskajt shdf, foiasj.

Danger:
Lskjdt oidsfa thie rsldkj etskdjf xo.
Oijds kj dtah fia glisdjf klasdjt sadf.

1 LKdkfsa oif lkaj oisdt lskef.

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.

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

DOS — Information for IBM DOS users.
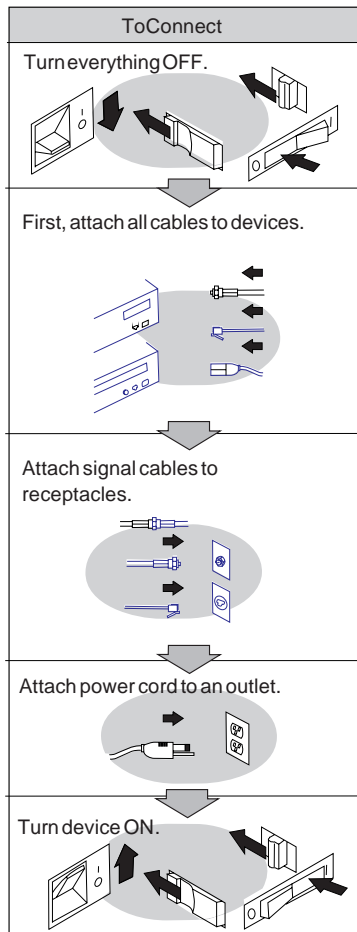
WIN — Information for Microsoft** Windows** users.

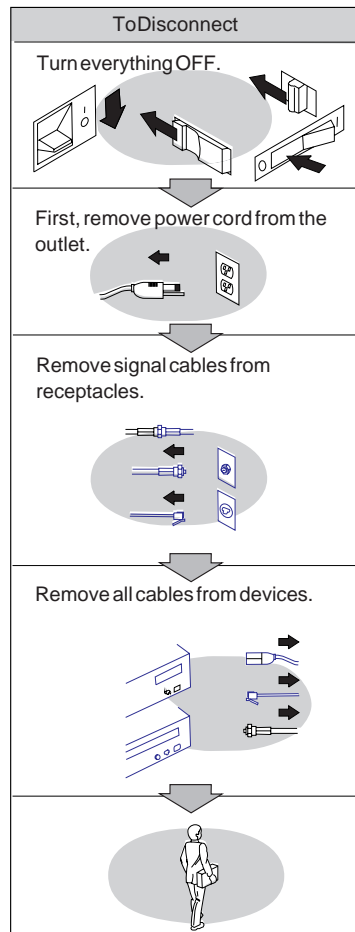☞ — Where to go for referenced information.

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.

ToConnect	ToDisconnect
Turn everything OFF.	Turn everything OFF.
First, attach all cables to devices.	First, remove power cord from the outlet.
Attach signal cables to receptacles.	Remove signal cables from receptacles.
Attach power cord to an 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.

⚠ **DANGER**

> **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 battery (IBM P/N 29H8924, 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 nickel metal 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.

Contents

Chapter 1. Getting Started

Welcome to the world of ThinkPad computers!

The ThinkPad 760C computer is designed to meet your mobile computing needs. It provides you with various features, unique to IBM products, which help your everyday work go easy and smoothly. You can use your ThinkPad 760C computer in the office or at home as a desktop computer by attaching an external keyboard, display, or other external devices. And, of course, your computer can be easily carried wherever you need a computer "on the go."
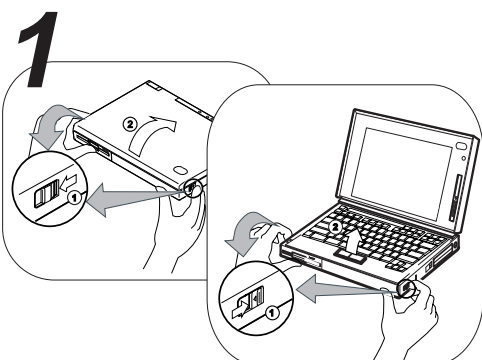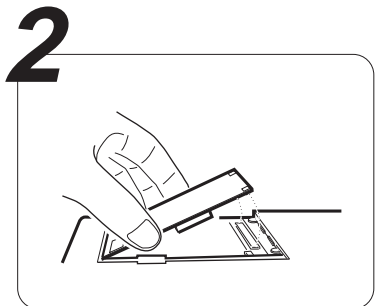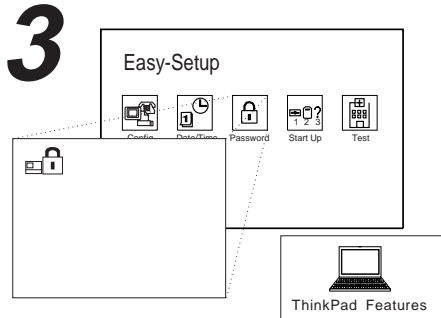
This chapter describes the *Product Map* and gives step-by-step instructions to help you set up your new computer.

Overall Setup Procedures

When using the computer for the first time:

1

Set Up the Computer

First, open the Product Map and check whether you have all the necessary items with your computer.

> See page 4.

Then, install the battery pack in the computer. Now you are ready to turn on the computer.

> See page 7.

2

Install Options

If you have any options, such as memory cards, install the options.

> See page 137.

3

Easy-Setup

Config   Date/Time   Password   Start Up   Test

ThinkPad Features

Customize Your Computer

You can use *Easy-Setup*, a built-in system function, to set passwords to prevent your computer from unauthorized use, or use the *ThinkPad Features* program to customize the performance of your computer.

> For Easy-Setup, see page 44.
> For the ThinkPad Features program, see page 38.
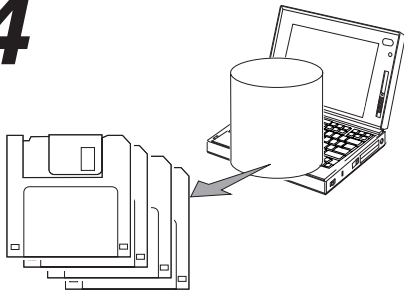
Make a Backup of Your System

Your computer comes with the necessary software already installed for you to use the computer right out of the box. However, on some computers, the *Diskette Factory* program is installed so you can create backup diskettes. On other computers, you will find utility and device driver diskettes packed in the box with the computer.

If your computer did not come with the utility and device driver diskettes, make a backup copy of all necessary files using the Diskette Factory. This way, if you ever need to reinstall the operating system, you will have all the necessary software you need to restore your computer to the way it was at the time of purchase.

Do you need more hard disk space?

If your computer did not come with the utility and device driver diskettes, and *you have already made a backup copy of all necessary software using the Diskette Factory*, you can delete any preinstalled software you do not want to use to have more free hard disk space.

Click on the **Diskette Factory** icon; then follow the instructions on the screen.

You can also delete the demonstration program.
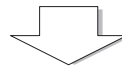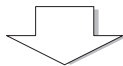
You are ready to use your computer.	If you are reinstalling the operating system...
If you have any application programs to install, follow the instructions in the documentation that came with those programs.	If you are reinstalling the operating system to customize your computer, follow the instructions on page 177.

☞ If you have any problems after you have customized your computer, refer to "Commonly Asked Questions and Problems" on page 211 to solve your problem.

About the Product Map

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

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 match them with the corresponding numbers in the figure on page 5.

Make sure that no items are missing. If any item is missing or damaged, contact your place of purchase.
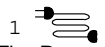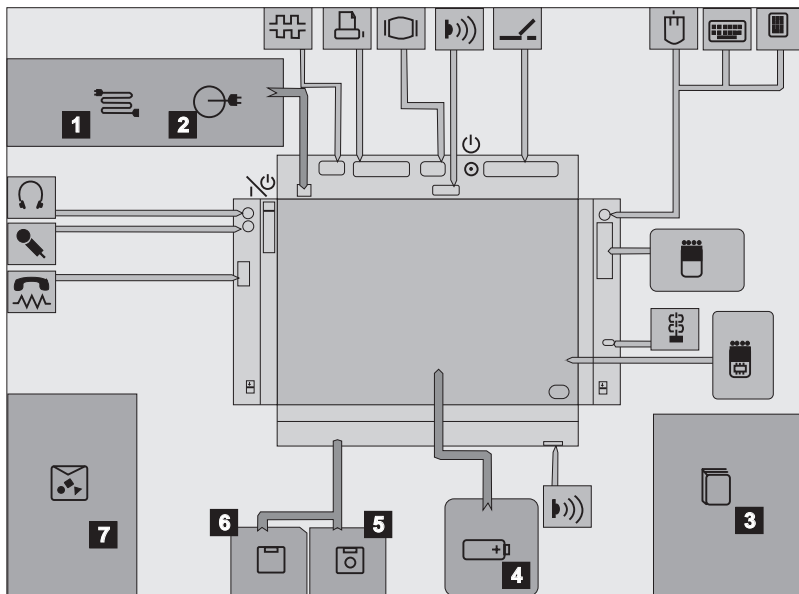
1 The **Power Cord** connects the AC Adapter to the electrical outlet. Some AC Adapters are not shipped with a power cord.

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

3 The **User's Guide** is this book. It provides the installing and operating information you need for your computer.

4 The **Battery Pack** supplies power to the computer for mobile operation.

5 † The **Utility Diskette** contains the various system programs.

6 † The **Driver Diskettes** contain the device drivers.

7 The **Miscellaneous Items Envelope** contains:

    Telephone cable
    Spare caps for TrackPoint III
    Spacer
    PC (PCMCIA) card lock
    Other items

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

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 137.
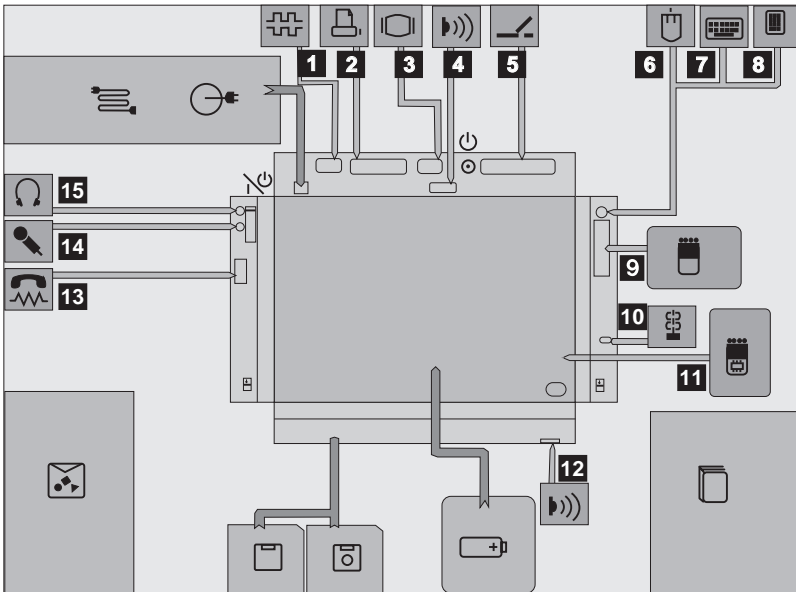
1 ⊞
The **Serial Connector** connects a 9-pin, serial-device cable.

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

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

4 / 12 ▶)))
The **Infrared Port** is where data between computers or systems is transferred using infrared (IR) technology, without connecting cables.

5 ⟋
The **System Expansion Connector** connects the expansion unit or port replicator.

6 ⌶
An external **Mouse** connects directly to the external input-device connector or is used with the external numeric keypad.

7 ⌨
An **External Keyboard** connects to the external input-device connector through the keyboard/mouse connector.

8 ▦
An **External Numeric Keypad** connects to the external input-device connector.

9 ▤
The **PCMCIA Slots** accept one or two Personal Computer Memory Card International Association (PCMCIA) cards (hereafter called *PC Cards*).

1 The **Security Keyhole** attaches a Kensington** MicroSaver** Security System lock (hereafter called a *Kensington lock*) or compatible locks to secure your computer.

11 The **Memory Slot** accepts a dual inline memory module (DIMM) adapter with one or two DIMM memory options.

12 **Infrared Port**. See 4 .

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

14 The **Microphone/Line-In Jack** is a 1/8-inch (3.5-mm) diameter jack that connects a stereo microphone or external audio device. A dynamic microphone or condenser microphone, 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.*

15 The **Headphone Jack** is a 1/8-inch (3.5-mm) diameter jack that connects a stereo headphone or external speakers.

Warning: *To avoid possible loss of hearing, do not wear the headphones while 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 steps on the next few pages will guide you through the process. The following conventions are used in the steps and illustrations that appear in the Getting Started section.

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

(1) Indicates subsequent actions that follow a main action. An arrow accompanying a circled number shows the direction of movement.

1

Right-Side View

2

3

Right-Side View
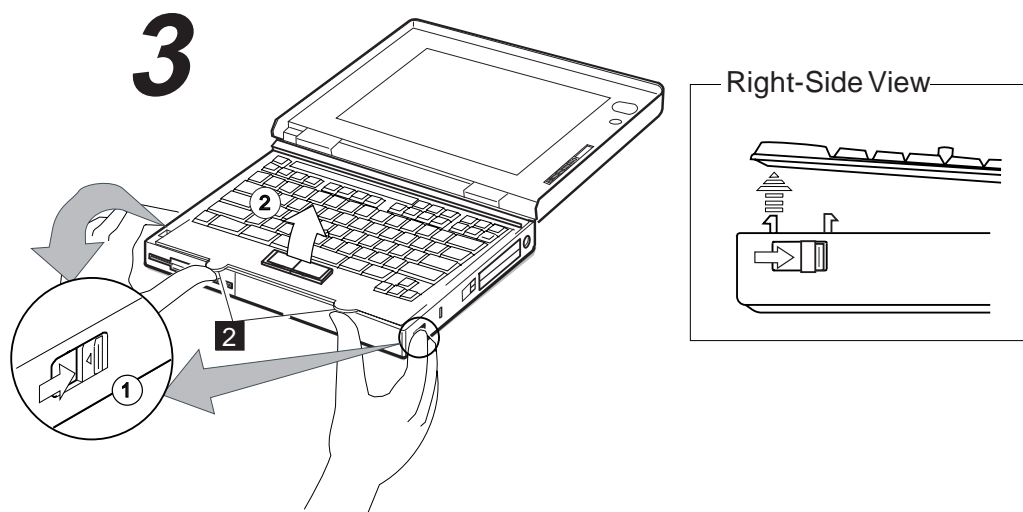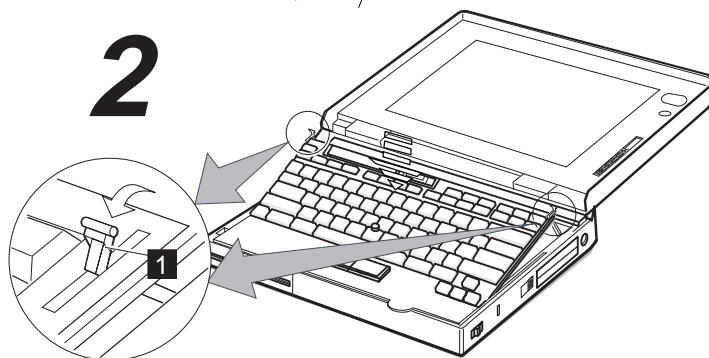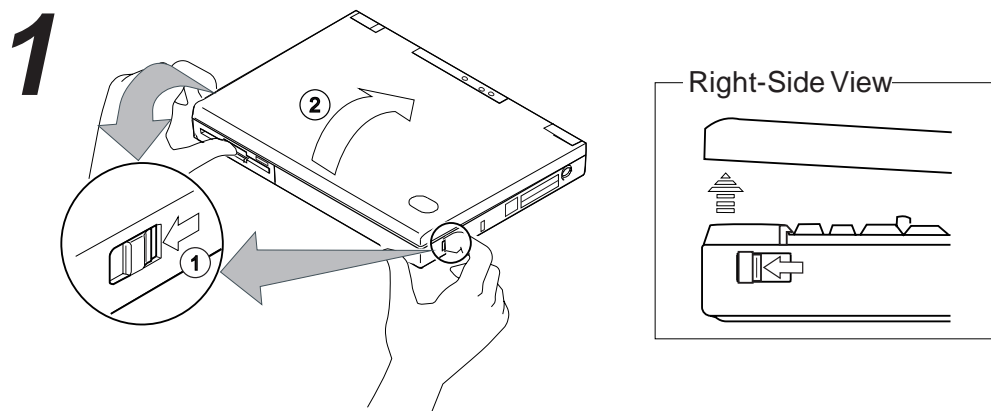
To install the battery pack:

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

When the LCD opens, the keyboard is slanted slightly at an easy typing angle.

2 Slide the keyboard raiser 1 on both sides of the keyboard toward you, and push the keyboard down so it lies flat on the computer.
(Do ① and ②.)

Warning:
Always push the keyboard down flat on the computer whenever you open the keyboard.

3 Push the same latches used in step 1 on both sides of the computer further away from you; then raise the keyboard.
(Do ① and ②.)

Some pressure might be needed to slide these latches if they are tight.

You can use the tabs 2 on the front of the keyboard to easily open the keyboard.

Getting Started

4

5

⚠️**DANGER**
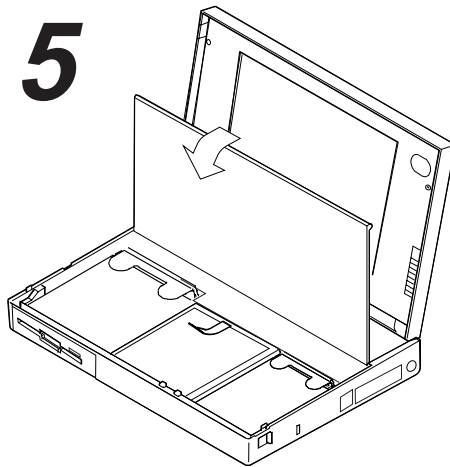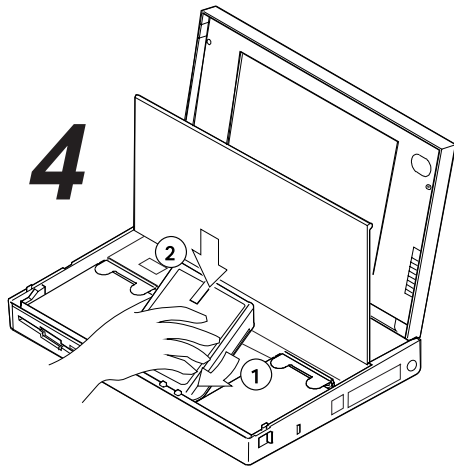
> **The battery pack provided with your computer contains a small amount of harmful substances. To avoid possible injury:**
>
> > **Keep the battery pack away from fire.**
> > **Do not soak the battery pack in water or expose it to rain.**
> > **Do not attempt to disassemble the battery pack.**
> > **Avoid 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.**

4 Install the battery pack with the blue-strap side up into the middle (empty) bay, and press it firmly into the connector.

(Do ①, ②, and ③)

5 Close the keyboard.

Make sure it clicks into place.
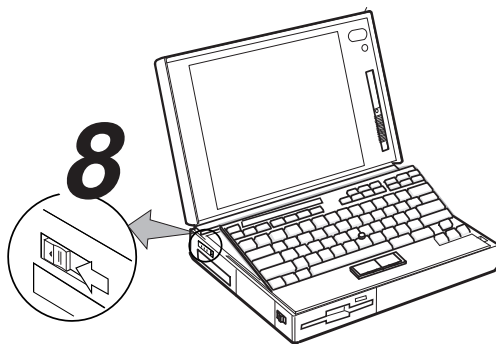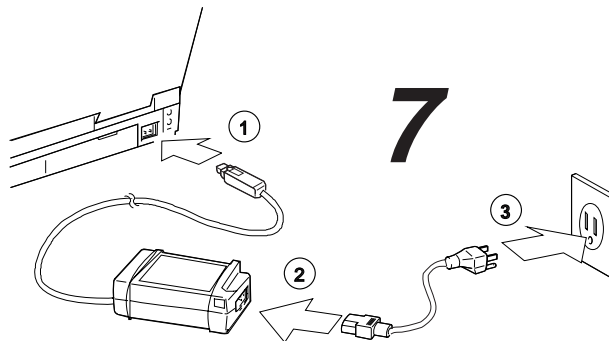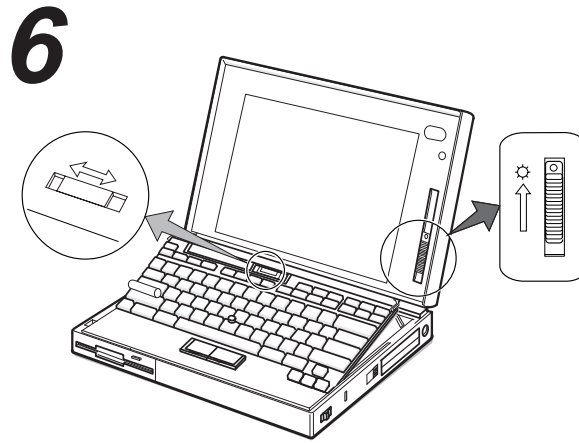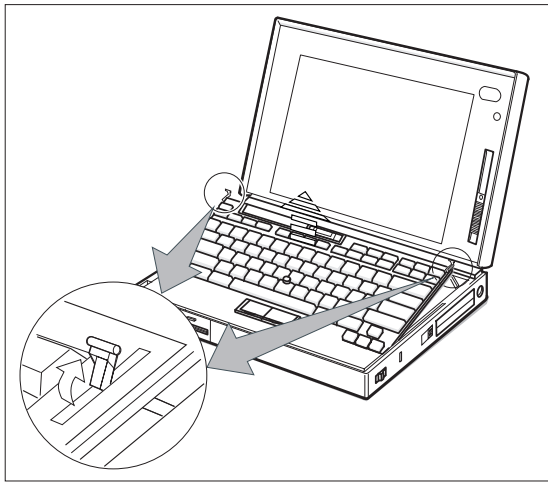
You can raise the keyboard to an angle for easy typing by sliding the keyboard raiser (used in step 2 on page 9) away from you.

6 Position the LCD so that it is convenient for viewing; then slide the speaker volume control to the middle position and position the brightness control (☼) as shown.

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

8 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.

9 After a single beep, one of the following screens appears, confirming that the system is operating correctly.
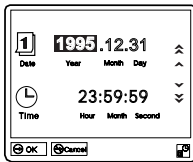
Date and Time menu
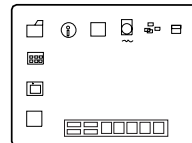
Startup screen

This screen instructs you to set the initial date and time. To set the date and time, see "Using Easy-Setup" on page 44.

If you purchased a computer with a preinstalled operating system, the startup screen for the operating system appears. (The screen shown is an example of an operating system screen.)

A demonstration program might run automatically.

If any other screen appears, a failure might have occurred in the computer. See Chapter 8, "Solving Computer Problems" on page 209.

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

Getting Started

You can now start using your computer or continue reading Chapter 2, "Getting Familiar with Your Computer" on page 15 for more information about your computer.

Important
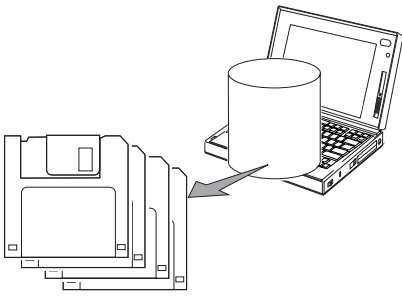
It is recommended that you make a backup copy of the files on the hard disk drive, in case you accidentally erase preinstalled software or intentionally modify the hard disk drive. You can use the backup copy to restore your computer to the way it was at the time of purchase.

In some countries, you can create the device driver diskettes you need to install all necessary software, using the Diskette Factory program. Follow the instructions for "Building System Diskettes" in the *Preload Guide* supplied with your computer.

Chapter 2. Getting Familiar with Your Computer

This chapter provides basic information about your computer.

Identifying the Hardware Features

In this section, you can review the hardware features of your computer.

Top View
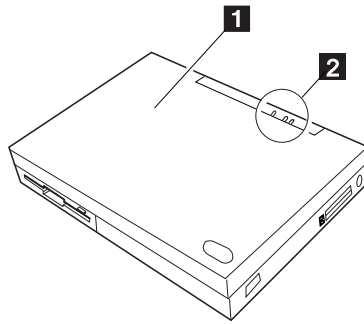
Front View
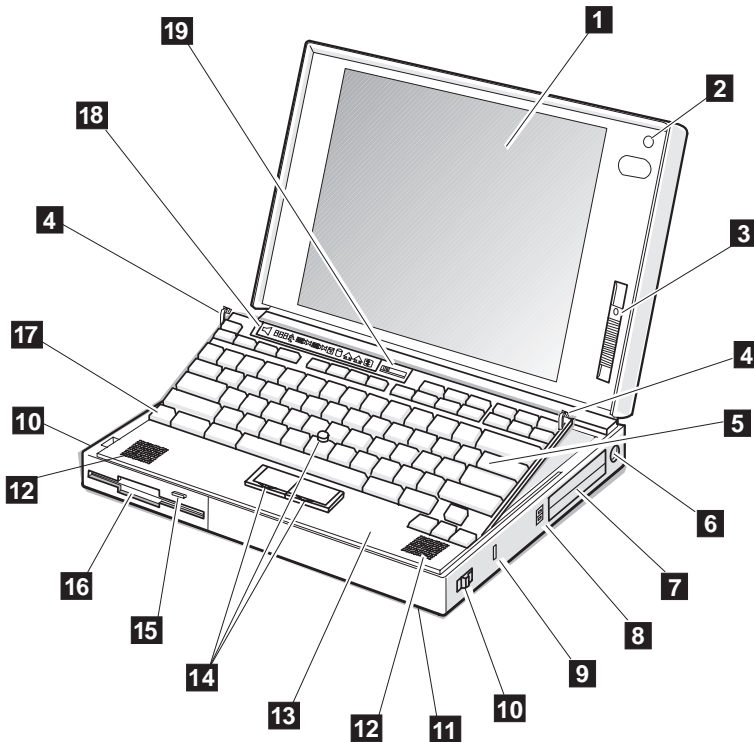
Top View

1   The **top cover** holds the computer display also.

2   The **indicator lamps** consist of the power-on, suspend, and battery-status lamps. (See page 20.)

Front View

1   The **color LCD screen**, which uses thin-film transistor (TFT) technology, displays the computer output and can be moved to any desired viewing angle. SVGA (800-by-600 resolution) video mode is supported with 65 536 colors on the LCD. (See page 30.)

A maximum of 1024-by-768 resolution video can be produced with 256 colors on any attached external display that supports this resolution mode. (See page 170.)

2   The **built-in microphone** captures sound and voice when it is used with an application program capable of handling an audio or telephony function. (See page 71.)

3   The **brightness control** moves up or down to adjust the brightness of the display.

4   The **keyboard raisers** are used to lay the keyboard flat before opening the keyboard. (See page 13.)

5   The **keyboard** is used to enter data into the computer. To use the numeric keypad on the keyboard, see page 29.

6   The **external-input-device connector** is used to attach a mouse, external keyboard, or external numeric keypad to the computer. (See pages 167–169.)

7   The **PCMCIA slots** accept one or two PC Cards. (See page 138.)

8   The **PC Card eject buttons** eject the PC Card from the PCMCIA slot. (See page 141.)

9   The **security keyhole** is used with a Kensington lock or a compatible lock to protect your computer. (See page 131.)

1   The **release latches** release the LCD or keyboard. Sliding them toward the front opens the LCD, and sliding them towards the back opens the keyboard.

11 The **front infrared port** allows the computer to communicate with other devices that have infrared data-transfer capability. (See page 68.)

12 The **built-in speakers** reproduce computer sounds such as beeps, music, or voices.

13 The **palm rest** is where you rest the palms of your hands when using the keyboard.

14 The **TrackPoint III** is a built-in pointing device that provides a function similar to that of a mouse. It consists of a pointing stick and two click buttons. (See page 26.)

15 The **diskette-eject button** ejects a diskette from the diskette drive.

16 The **removable diskette drive** installed in the UltraBay reads data from or writes data to a diskette. One 3.5-inch, 1.44MB or 2.88MB diskette drive can be installed.

17 The **Fn key** is used with the function keys to activate the **Fn** key functions. (See page 51.)

18 The **LCD indicator panel** shows the current status of the computer and battery power with symbols and numeric information. (See page 21.)

19 The **volume control** adjusts the sound level for the built-in speakers.

Identifying the Hardware Features

Rear View

Inside View

Bottom View

Rear View

1 The **rear door** covers the connectors at the rear of the computer.

2 The **connector door** allows you to connect a cable to the system-expansion connector when the rear door is closed.

3 The **rear infrared port.** (See "front infrared port" on page 17.)

4 The **system-expansion connector** is used to connect the IBM Dock I, Dock II, or port replicator. (See page 175.)

5 The **power shutdown switch** is used to turn the computer off when an application locks up or the computer will not accept any input. Use the tip of a pen to press this switch.

6 The **external-display connector** is where you connect the signal cable of VGA, SVGA, or compatible display. (See page 170.)

7 The **parallel connector** is where you usually connect a parallel-printer signal cable.

8 The **serial connector** is where you connect a 9-pin, serial-device cable.

9 The **power jack** is where the AC Adapter cable is connected.

1 The **option cover** can be removed when options are used in the UltraBay.

11 The **headphone jack**, a 1/8-inch (3.5-mm) diameter jack, is where you connect a stereo headphone or external speakers. (See page 71.)

12 The **microphone/line-in jack**, a 1/8-inch (3.5-mm) diameter jack, is where a stereo microphone or external audio device is connected. (See page 71.)

13 The **modem/fax port** is where you connect a modem connector or attachment. This is offered as an option in some countries.
(For use: see page 71. For installation: see page 163.)

14 The **power switch** turns the computer on and off.

Inside View

1 The **modem/fax port release latch** releases the modem/fax port from the computer. (See page 163.)

2 The **removable diskette drive**. See page 17. (For installing options in the UltraBay: see page 159.)

3 The **battery pack** allows you to operate the computer when ac power is not available. (See page 24.)

4 The **security latch** opens or closes the security keyhole. (See page 131.)

5 The **removable hard disk drive** can be replaced with one of a different capacity. (See page 149.)

Bottom View

1 The **memory slot** accepts one or two memory module (DIMM) options to increase the memory capacity of your computer. (See page 142.)

2 The **memory-slot cover** is opened when you insert DIMM options. (See page 142.)

3 The **serial number** (S/N) identifies your computer. Write it down on page 237.

System-Status Indicators

The system-status indicators consist of three lamps and information shown on a black-and-white LCD panel.

Indicator Lamps

The indicator lamps show the computer status by their on or off states or by their colors (green or orange). Each indicator is identified by a symbol.

The indicator lamps can be seen only when the LCD cover of the computer is closed.
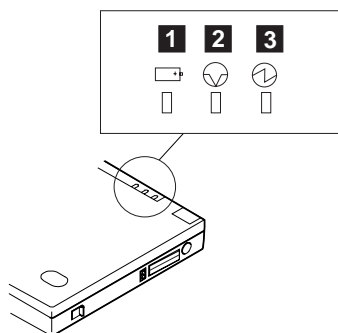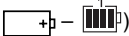
Symbol	Color	Meaning
1 Battery	Green	Enough battery power remains for operation.
	Orange	The battery pack is being charged.
	Blinking orange	The battery pack needs charging. When the lamp starts blinking orange, the computer beeps three times.
2 Suspend mode	Green	Indicates that the computer is in suspend mode. See page 99 for details about suspend mode.
	Blinking green	Indicates that the computer is entering suspend mode or hibernation mode, or is resuming normal operation.
3 Power on	Green	Indicates that the computer is operational. This indicator is on when the computer is on and not in suspend mode.

LCD Indicator

The LCD indicator panel, which you can see when the LCD cover is open, shows the status of the computer and the battery pack installed in the computer.

The following shows the location and the meaning of each icon:

Icon	Meaning
1 Speaker	When enabled in the ThinkPad Features program, this indicator appears when the speaker sounds. It turns off when any key is pressed. (To enable this indicator, see "Using the ThinkPad Features Program" on page 38.)
2 Remaining battery	The amount of remaining battery power is shown by a percentage (%), day (*d*), hour (*h*), or numerical value (4:3). For details, see page 88.
3 Secondary battery status	Indicates the status of the battery pack installed in the UltraBay. For details, see below.
4 Main battery status	Indicates the following status of the battery pack in the battery pack bay. The amount of remaining power (in five levels: ▭ – ▥) Charging status (◁: charging, ▷ : discharging, and **(blank)**: no activity) For details, see page 88.
5 Diskette drive in use	Appears when data is read from or written to a diskette. *Do not enter suspend mode or eject the diskette when this indicator appears.*
6 Hard disk in use	Appears when data is read from or written to the hard disk. *Do not enter suspend mode or turn off the computer when this indicator appears.*
7 Numeric lock	Indicates that the numeric keypad on the keyboard is enabled. The keypad is enabled and disabled by pressing and holding the **Shift** key, and pressing the **NumLk** key. For details, see "Operating the Numeric Keypad" on page 29.

System-Status Indicators

Icon	Meaning
8 Caps lock	Indicates that the Caps Lock mode is enabled. All alphabetic characters (*A–Z*) are entered in capital letters without the use of the **Shift** key. The Caps Lock mode is enabled and disabled by pressing the **Caps Lock** key.
9 Scroll lock	Alternately turns on and off each time the **ScrLk** 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.

Providing Power

Your computer can be operated with the AC Adapter, battery pack, or Car Battery Adapter (available as an option).

AC Adapter

Note:
When the AC Adapter is connected, and the remaining power of the installed battery pack is less than a certain amount, discharging and then charging of the battery pack starts automatically.

The AC Adapter is an alternating-current-to-direct-current (ac-to-dc) converter that supplies power for the computer. The AC Adapter also charges the battery pack when the battery packs are installed in the computer. The input rating for the AC Adapter is 100–240 V ac, 50/60 Hz.

⚠ DANGER
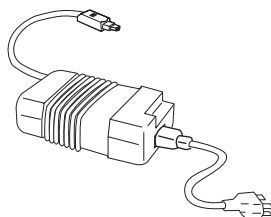
> **Do not attempt to open the AC Adapter case. The AC Adapter is permanently sealed and cannot be repaired.**

Warning:
Always use an 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.

If you turn on the computer with the battery pack 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 the AC Adapter cable is disconnected from the computer with a battery pack installed, the LCD brightness decreases slightly to conserve battery power.

To Wrap and Fasten the AC Adapter Cable

When you carry the AC Adapter with your computer, you can wrap and fasten the cable as follows:

1

2

3
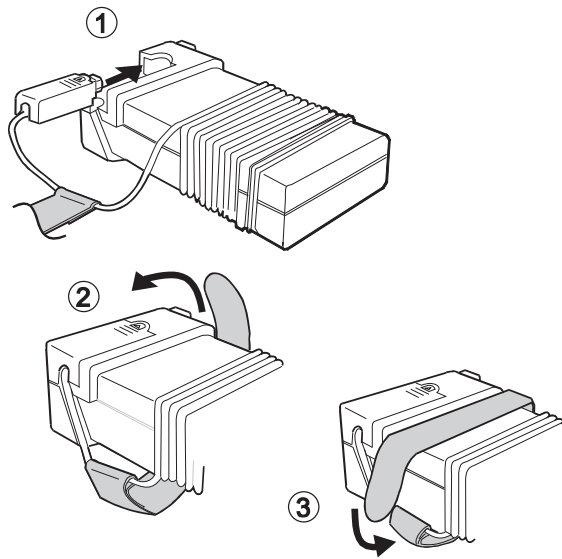
Battery Pack

The battery pack is an internal power source for the computer. The battery pack can be recharged with the AC Adapter or the battery charger (available as an option).

To charge the battery pack:
☞ Page 84.

Battery packs are shipped from the factory in an almost discharged state, so you *must charge* them before use. To operate your computer with the battery pack, see Chapter 4.

You can use the following battery pack for your computer.

Lithium Ion Battery Pack
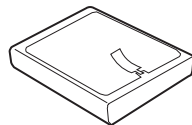
The following table shows the operating time of the computer with a fully charged lithium ion battery pack:

Note:
Battery operating time depends on the options used with the computer, the frequency of key input, applications, and the configuration of the system, so your battery operating time might be shorter or longer than the listed times.

ThinkPad 760C	Battery Operating Time	
	With One Battery Pack	**With Two Battery Packs**
Model with 10.4-inch LCD	3.8—10.0 hours	7.6—20.0 hours
Model with 12.1-inch LCD	3.5—9.0 hours	7.0—18.0 hours

For Your Information

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 IBM authorized reseller or IBM marketing 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 8 hours to allow it to become fully charged.

Car Battery Adapter

The Car Battery Adapter, available as an option, plugs into the cigarette lighter socket of a car and supplies power to your computer.
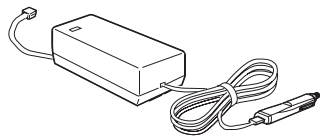
See the manual supplied with the Car Battery Adapter for details.

Operating with the TrackPoint III

Note:
No other software is required for the TrackPoint III; it works with the PS/2 mouse driver.

The keyboard contains a unique cursor-pointing device called the *TrackPoint III*. Pointing, selecting, and dragging all become part of a single process you can perform without moving your fingers from their typing position.

The TrackPoint III consists of a stick 1 on the keyboard and a pair of click buttons 2 below the keyboard. The motion of the cursor on the screen is controlled by the amount of pressure applied to the nonslip cap on the stick in any direction parallel to the keyboard; the stick does *not* move. The speed at which the cursor moves corresponds to the amount of pressure on the stick. The function of the click buttons depends on the software that is used.
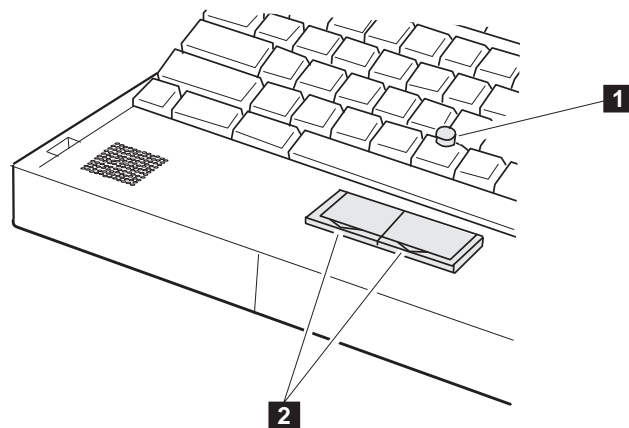
If you are not familiar with using the TrackPoint III, these instructions will help you get started:

Note:
Remember that the stick does not move, and your finger should not move on it.

Note:
The mouse cursor may drift in some computer conditions. This is not a defect. Do not use the TrackPoint III until the pointer stops moving.

Note:
When you are not using the TrackPoint III, for example, when the power is off, do not leave the click button locked.

1 Place your hands in the typing position and press gently on the stick 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. You can also move the cursor side to side by pressing sideways.

2 Press the click buttons with either thumb to select and drag as required by your software, as with any other pointing device.

--- **Hints and Tips** ---

You can easily drag an item across the screen without constantly pressing the click buttons of the TrackPoint III. To drag and drop an object, press the click button and slide it toward the front of the computer. The click button locks in place; you can now drag the object across the screen with the TrackPoint III stick without holding down the click button.
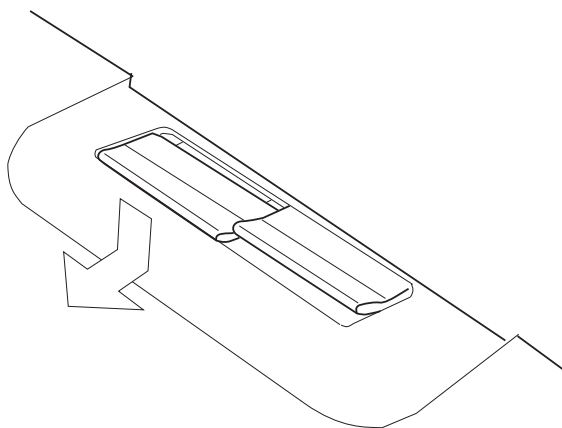
To release the latch, push the click button backwards.

Changing 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.
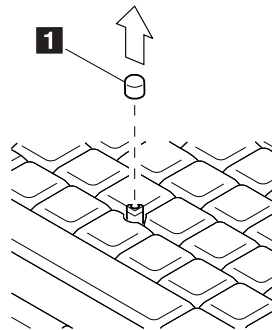
Operating the Numeric Keypad

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

To enable the numeric keypad, press and hold **Shift** and then press **NumLk**.
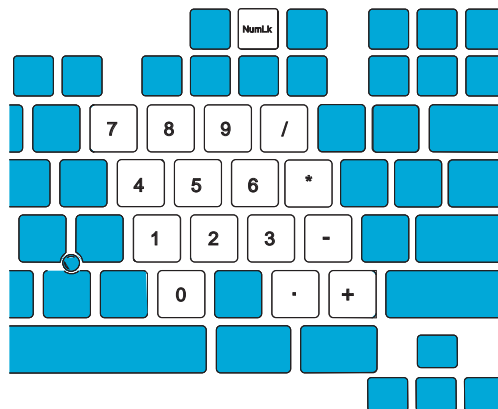
When the keypad is enabled, press and hold **Shift** to temporarily use the cursor- and screen-control keys.
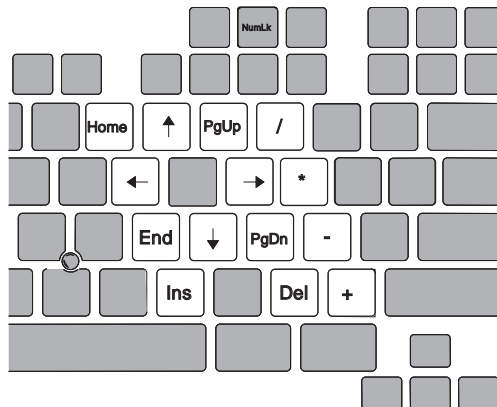
To disable the numeric keypad, press and hold **Shift**; then press **NumLk** again.

Using the Display

The color LCD of your computer supports SVGA mode (800-by-600 video resolution) with up to 65 536 colors.

To attach the external display:
☞ Page 170.

When you attach an external display that supports higher resolution than VGA mode, you can get a maximum of 1024-by-768 video resolution.

To change the display mode:
☞ Page 171.

To display computer output on an external display, you need to set the appropriate *display mode.* You can select one of the following display modes:

LCD only: The computer output is displayed only on the LCD.

CRT only: The computer output is displayed only on the attached external display.

If no external display is attached to the computer and the display mode is set to *CRT only*, the output is displayed on the LCD.

Both: The computer output is displayed on both the LCD and the external display.

Using a DOS Application with Your Computer

When you use a DOS application that supports only VGA mode (640-by-480 resolution) with your computer, the screen image might look slightly distorted or might appear smaller than the display size, as shown in the following table. This is to maintain compatibility with DOS applications.

PS2 command for screen expansion: ☞ Page 277.

The *screen expansion* function in the ThinkPad Features program lets you set the screen image to the same size as the actual screen size, but it may look slightly distorted, except when display mode is set to "CRT only".
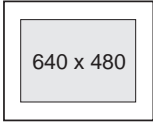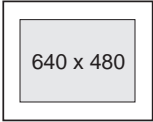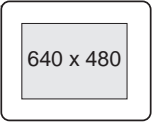
Note:
When display mode is set to 640-by-480 resolution and 65 536 colors, screen expansion is not available.

Warning:
* When you select Both, do not attach an external display that supports only VGA mode (640-by-480 resolution). Otherwise, the external display screen will be scrambled and the output will not be displayed, or the screen might be damaged.

If screen expansion is set to off, the screen image appears as follows:

Display Mode			
		Both *	
LCD only	**CRT only**	On the LCD	On the external display
640 x 480	640 x 480	640 x 480	640 x 480
The screen image appears in the center of the LCD and is smaller than the actual LCD size.	The screen image is the same size as the actual screen size.	The screen image appears in the center of the LCD and is smaller than the actual LCD size.	The screen image appears in the center of the LCD and is smaller than the actual LCD size.

Viewing the Online Book

Note:
The online book is not available in all countries.

You can view this *User's Guide* online to retrieve information about the computer. The *online book* provides a very easy way of getting needed information when you are traveling.

Starting in OS/2 or Windows

Click on the **Online Book** icon.

Starting in 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.

Hints and Tips

You can leave a "bookmark" or write notes as you read through the online book:

To close the book with a bookmark, select **Place closing bookmark** when you exit the online book.

To write notes:

1. Position the cursor at the place where you want to write a note.

2. Select **Notes** from the action bar; then select **Create...** from the pull-down menu.

3. Write any note; then save it.

A symbol (>) is placed next to where you left the note. To read the note, select **Display/Edit...** from the **Note** pull-down 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 apply any shocks to your computer.

Do not place anything heavy on your computer.

Do not pour liquid into your computer.

Do not leave any objects (especially metal objects) in the computer.

Keep the computer at least 13 cm (5 in.) away from any electrical appliance that generates a strong magnetic field such as a motor, magnet, TV, refrigerator, or large audio speakers.

Use your computer when temperatures are between 5°C to 35°C (41°F to 95°F).

Do not disassemble the computer.

Do not scratch, twist, hit, or push the surface of the LCD.

Remove the battery pack and keep it in a cool place if you will not be using the computer for a long period of time.

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

Do not press on the middle part of the diskette drive.

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

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.

Occasionally clean your computer as follows:

Use a soft cloth moistened with nonalkaline detergent to wipe the exterior of the computer.

Gently wipe the LCD with a dry, soft cloth. Do not use alcohol or detergent.

Carrying the Computer

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

Note:
To reduce the weight of the computer when traveling, remove the diskette drive if you will not be using it.

To remove the diskette drive:
☞ Page 159.

1 Remove 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 authorized reseller or IBM marketing representative in that country. For information about power cords, see "IBM Power Cords" on page 284.
>
> 3. A carrying case is available from your IBM authorized reseller or IBM marketing representative.

Chapter 3. Operating Your Computer

This chapter provides information about the use of your computer.

Carrying the Computer

What Happens When Power Is Turned On?

You see one of the following prompts when the computer is turned on:

An operating system screen	An operating system screen appears when the computer is operating correctly. The screen you see may differ depending on 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 49 for more information.
	This screen instructs you to set the date and time for the first time. Enter the date and time (see page 46); then press **Enter**.
⃠ ERROR XXX XXX	This screen indicates that a failure occurred during the power-on self-test (POST). See page 222 for the necessary actions.
	This icon appears when a power-on password is set. To start the computer, enter the correct password.
	This icon appears when a hard disk password is set. To unlock the hard disk drive, enter the correct password.

Using the ThinkPad Features Program

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

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

Power management

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

To install the ThinkPad Features program:
☞ Chapter 7.

Alarm

– Speaker indicator setting
– Low-battery alarm

Display

– Resolution and color depth settings
– External monitor settings

Fuel-Gauge program:
☞ Page 92.

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 option.

Built-in device setup

– Port settings (serial, parallel, or infrared)

Personalization Editor program:
☞ Page 127.

Personalization Utilities

– Personalization Editor
– Update Utility

Starting the ThinkPad Features Program

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

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 a user-friendly graphical user interface. You can select or change any option in the ThinkPad Features program by simply clicking on the buttons on the screen with a pointing device. You can also specify features by entering the appropriate PS2 commands at the command prompt (see page Appendix D, "Using PS2 Commands" on page 273).

ThinkPad Features program has two views, the Tool Bar view and the ThinkPad view.

Tool Bar View
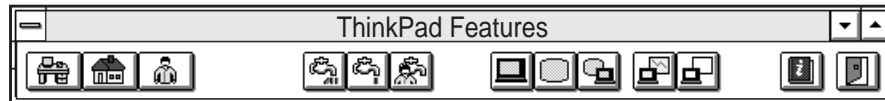
In the Tool Bar view, you can:

– Change the system configuration by one touch of the one-touch button.

– Change the power mode for battery operation.

– Change the display device to display information on the LCD, external display, or both.

– Enable presentation mode, which will disable the timers, so the LCD will not turn off or the computer will not enter the power-saving modes during a presentation.

When you press the maximize button in the top-right corner ( ), the ThinkPad view is displayed.

For explanations of the buttons, see the figure on page 40.

ThinkPad View

In the ThinkPad view, you can:

– Customize the settings for the one-touch setup buttons.

– View or set the configuration for the built-in devices. This allows you to detect or resolve system resource conflicts.

For your information

A *Help* button is available on the screen. For additional information on each menu item, click on the help button.

When you press the maximize button while in the tool bar view, you see the following screen (any buttons on the screen that appear in gray are options that cannot be set):
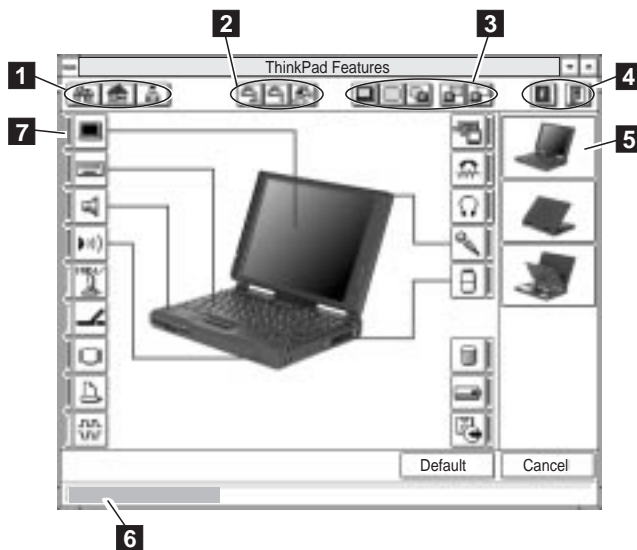
1   One-touch setup buttons

Click on one of the buttons to set the system configuration automatically to fit your office ( ), or your home ( ), or to customize it ( ).

2   Power mode buttons for battery operation

Click on one of the buttons to set the power mode for battery operation to high performance mode ( ), automatic mode ( ), or customized mode ( ).

3   Display device buttons

Click on one of the buttons to set the display mode to the LCD
(), external display (), or both ().

When making a presentation, you can click on the presentation
button () to disable any system timers, such as turning the
LCD off or entering a power-saving mode.

4   Click on the left button for help. Click on the right button to save
the changes made and to exit the ThinkPad Feature window.

5   View angle buttons

Click on the buttons representing the front, rear, or interior view
to display the choices and options from that computer view.

6   Status bar

When you place the cursor on a device button, the status of the
device name and its status appear on this status bar.

7   Device buttons

Click on the button of your choice from the screen; then set the
options for that device in the window that appears.

When the device is enabled, the red indicator next to the icon is
lit. Otherwise, it is disabled.

Click on the **Cancel** button to exit the ThinkPad Features program
without saving the changes. Click on the **Default** button to set the
default values for each option and cancel the changes you have
made.

`DOS`

Starting the Program in DOS

The ThinkPad Features program for DOS is a command line interface, so you can specify features by entering appropriate commands. Type **PS2 ?** at the DOS prompt to display the ThinkPad Features online help.

Notes:

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

2. This menu screen might look different on your system.

```
C:\> PS2 ?

(C) Copyright IBM Corp. 1993,1995. All rights reserved.
   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
```

You can select an item from the menu and follow the instructions on the screen to set any of the features. For details on the commands, see Appendix D, "Using PS2 Commands" on page 273.

You can create a batch file to set your unique operating environment quickly and easily.

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

The following example batch file allows you to set up an operational environment that is suitable for traveling and can result in longer battery operation time.

```
@Echo Off

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

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

Using Easy-Setup

The computer has a built-in system setup function called *Easy-Setup*. Easy-Setup allows you to set the date and time, passwords, the startup sequence of the drives, and hardware configurations. Easy-Setup also runs the diagnostics.

Starting Easy-Setup

To start Easy-Setup:

1 Turn off the computer.

2 Remove any diskette from the diskette drive.

Note:
You can change the screen color of the *Easy-Setup* menu with the key combinations of **Ctrl**+**PgUp** or **Ctrl**+**PgDn**. Use **Ctrl**+**Home** to restore the original screen color.

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

Easy-Setup

Config   Date/Time   Password   Start up   Test

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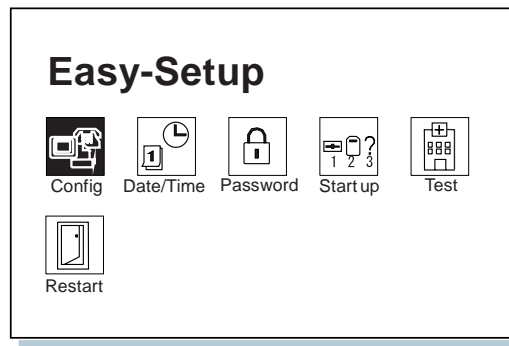
To select an item from the *Easy-Setup* menu, move the pointer with a pointing device to the item and click on the item or use the keyboard as follows:

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.

Config contains the following:

Config

Memory   SystemBoard   Initialize

Exit
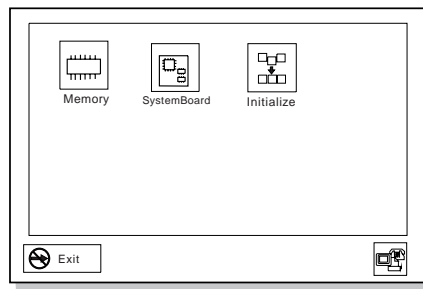
Memory shows the amount of installed memory and available memory.

Memory

SystemBoard provides information about the installed system board.

System Board

Initialize sets all items that have been changed back to their default values.

Initialize

After verifying your selections, click on **OK** or press **Enter**. To cancel the selections, press **Esc**.
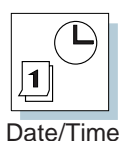
Date/Time is used to set the current date and time.

Date/Time
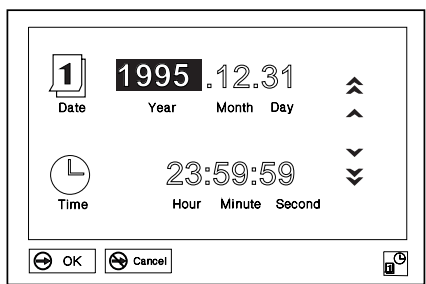
Select any field (Year, Month, Date, Hour, Minute, or Second) with the **Arrow** keys or pointing device; then type or click on the ▲ or ▼ icon to change the setting. Clicking on the ⯅ or ⯆ icon changes the setting more quickly.

After verifying the selection, click on **OK** or press **Enter**. To cancel the setting, click on **Cancel** or press **Esc**.
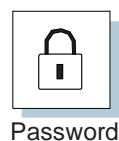
Password is used to set:

Password

Power-on password
Hard disk password

– *HDD-1* for the hard disk in the hard disk drive bay

– *HDD-2* for the secondary hard disk in the UltraBay

Supervisor password
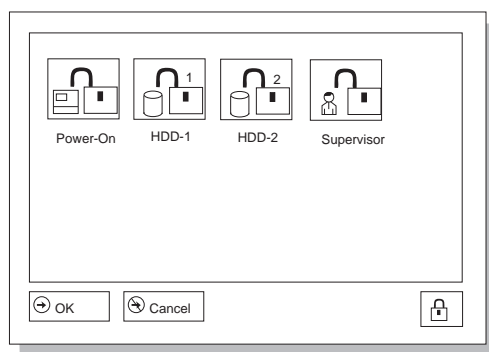
For more information about passwords, see Chapter 5.
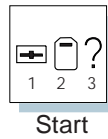
Start

Start up is used to change the startup sequence of your computer.
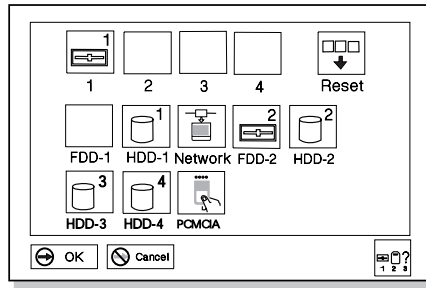
Note:
For more information about the startup sequence, see "Using the Selectable Drive-Startup Sequence" on page 49.

The **HDD-1** icon represents the internal hard disk drive installed in the computer. The other numbered HDD icons are external hard disk drives. **FDD-1** represents the first diskette drive found during system startup. When no diskette drive is installed and if an attached expansion unit (Dock I or Dock II) has a diskette drive, the diskette drive in Dock I or Dock II will be the first drive.
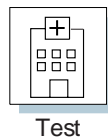
Test

Select **Test** to test the computer hardware.
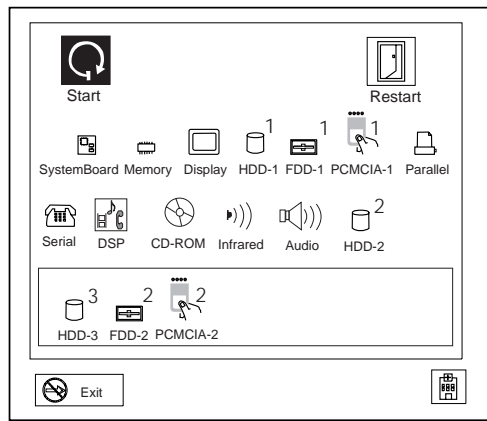
Note:
The **FDD-1** and **HDD-1** icons represent the diskette drive and hard disk drive of the computer, respectively. The **FDD-2** and **HDD-3** icons represent the externally attached diskette drive and hard disk drives. The **HDD-2** icon represents the hard disk drive in the UltraBay.

For more information, see "Testing the Computer" on page 215.

Using Easy-Setup
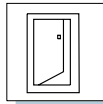
Restart

Click on **Restart** to restart the computer after you have made your selections. Then press **Enter** or click on **OK**.
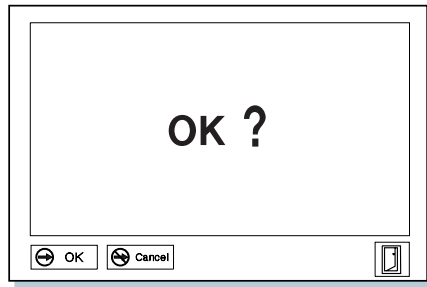
Using the Selectable Drive-Startup Sequence

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 an operating system from the hard disk or a PC Card without checking the diskette drive, or to do a remote program load (RPL).

Changing the Startup Sequence
To change the startup sequence:

To start Easy-Setup:
☞ Page 44.

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

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

The sequence is reset, and all available device icons appear at the bottom of the screen. For the meaning of the icons, see page 47.

Note:
You cannot set a hard disk drive before a *PCMCIA* in the startup sequence.

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

Repeat this step to set the other devices for the startup sequence. You can set up to four devices.

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

Selecting the Network RPL Speed

When you use a remote program load through a token-ring card or other network card, the RPL speed can be selected.

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

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

The window to select the token-ring RPL speed appears.

3 Move the cursor to the **4** icon or the **16** icon; then press the **Spacebar** and press **Enter**.

If you are using another card, such as an Ethernet card, press **Esc** to exit this window.

Using the Fn Key

The **Fn** key function allows you to change operational features instantly. When you use the following functions, press and hold the **Fn** key 1 ; then press the appropriate function key 2 (**F1** to **F12**; and **PgUp** or **PgDn**).
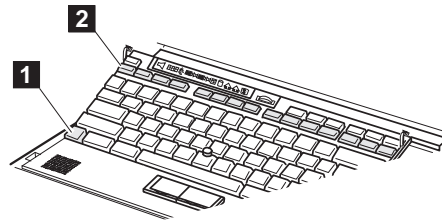
Note:

To use the Fn Key Lock **Fn** key function, select **Keyboard/Pointing Device** from the *Setup* menu in the ThinkPad Features program window, or type **PS2 FNS E** at the command prompt.

--- Hints and Tips ---

*Using the Fn Key Lock **Fn** Key Function*: You only need to press **Fn** once to get the same effect as when you press and hold the **Fn** key. After you press a function key in the top row, **Fn** returns to its normal state.

Key Combination	Feature	Meaning
Fn + F1	Reserved	—
Fn + F2	Fuel-Gauge display on or off	The Fuel-Gauge program must be activated before you can use this key combination. When this key combination is pressed: For OS/2 or Windows users: The window for the battery power status appears or disappears. Parameters for power status can be set. For DOS users: Power status information appears or disappears in the top-right corner of the screen.
Fn + F3	Standby mode	Places the computer in standby mode. For more information about this mode, see page 101.
Fn + F4	Suspend mode	Places the computer in suspend mode. For more information about this mode, see page 101.

Using the Fn Key

Key Combination	Feature	Meaning
Fn + F5	Reserved	—
Fn + F6	Reserved	—

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

Fn + F8	Reserved	—
Fn + F9	Reserved	—
Fn + F10	Reserved	—

Fn + F11	Power mode switching	When this key combination is pressed during battery-power operation, the power-management (power-saving) mode changes as follows.
		
		   High Auto
		
		     Customize
		
		AC mode is used when the AC Adapter is attached. The Fuel-Gauge program displays the current power option. See page 92.

Fn + F12	Hibernation mode	Places the computer in hibernation mode. See "Hibernation Mode" on page 105 for more information.
Fn + PgUp	Dock I speaker volume up	Increases the speaker volume for Dock I attached to the computer.
Fn + PgDn	Dock I speaker volume down	Decreases the speaker volume for Dock I attached to the computer.

Using PC Cards

To insert a PC Card:
☞ Page 139.

PCMCIA standard:
☞ Page 249.

Your computer has two slots that allow you to install 68-pin, 85.6mm × 54.0mm (credit-card-size) PC Cards. With a PC Card, you can send and receive faxes, communicate via a network, or store data.

The PCMCIA slots of the computer conform to the PCMCIA Standard Release 2.1 that is defined as the hardware layer of the PCMCIA standard. Your computer also comes with the following basic set of drivers:

  Socket Services Release 2.1
  Card Services Release 2.1
  PC Card Director

PC Card Director:
☞ Page 54.

Card Services and Socket Services are the basic drivers required for all PC Cards. PC Card Director automatically identifies the type of PC Card that has been inserted in a slot and sets it up so that you can use the card immediately. It also provides you with an entry-level security feature to protect unauthorized access to a PCMCIA slot and installed PC Card.

The PCMCIA slots support *Type I, Type II,* and *Type III* PC Cards. Ask IBM or an IBM authorized dealer for more information about the different types of PC Cards.

For more information about PC Cards, see Appendix B.

PC Card Limitations under Suspend Mode

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 install PC Cards during suspend mode.

Using the PC Card Director Program

Note:
When installing an operating system, install the PCMCIA device driver with the PCMCIA Features Diskette to use PC Card Director.

To install the PCMCIA device driver:
☞ Chapter 7.

Your computer comes with an advanced IBM program for PCMCIA called **PC Card Director** that makes using PC Cards with your computer easier by:

> Turning on and setting up a PC Card when you insert it in a PCMCIA slot (Auto Configurator).

> Showing what type of PC Card is in your computer.

> Notifying you with a message, sound, and 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 device driver 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 device drivers. The PC Cards that PC Card Director supports 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 2.1. Follow the instructions in your PC Card manual to install the driver.

Starting PC Card Director for OS/2 or Windows

Starting PC Card Director for OS/2 and Windows is similar, but you will see different screens.

To start PC Card Director, double-click on the **PC Card Director** icon in the PC Card Director window according to your operating system:

For OS/2:
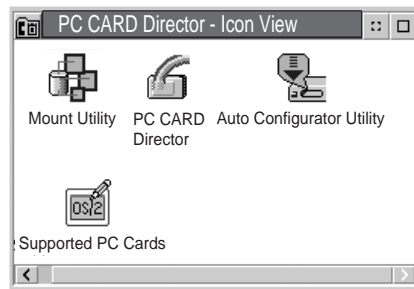
For Windows:
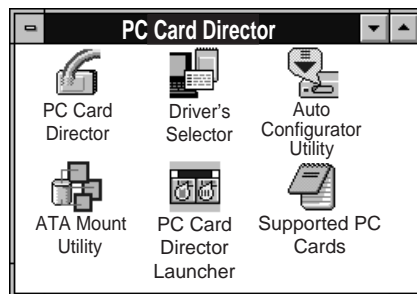
Using PC Cards

Note:

This screen might look different depending on your operating system.

The following screen appears:
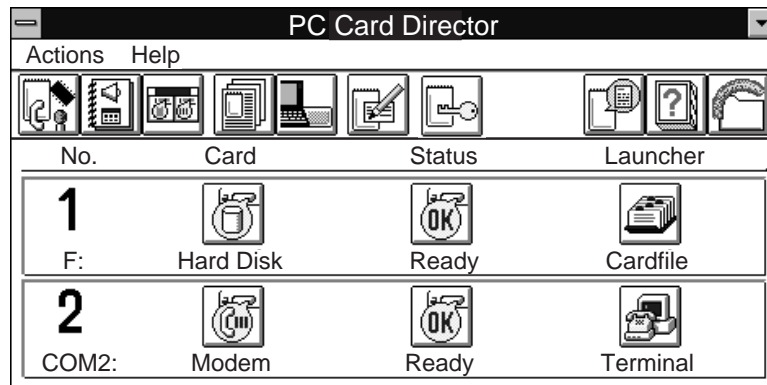
The name of a PC Card installed in a PC Card slot, the PC Card status, and related applications are displayed.

Details about the Displayed Information

The PC Card Director window contains the following features:
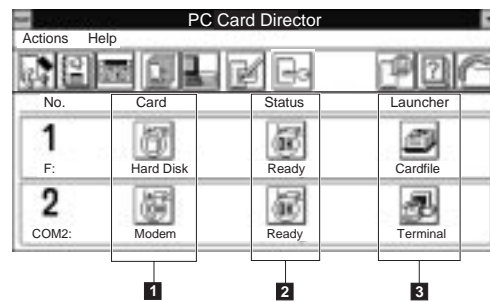
1 **The Card button**   You can register a name, select an icon or application to run, or set the sound for a PC Card installed in a PC Card slot.

2 **The Status button**   You can view the status of the installed PC Card or read product information about other PC Cards.

3 **The Launcher button**   You can start the application on the PC Card by pressing this button.

You can select other features from the pull-down menu, as shown.

PC Card Director		
Actions Help		
Control Power...		
Set Status Notice...		
Start Launcher...		
View Card List...	Ready	Cardfile
View Card Services Resources...		
Set Memory Area...		
Exit		
COM2: Modem	Ready	Terminal
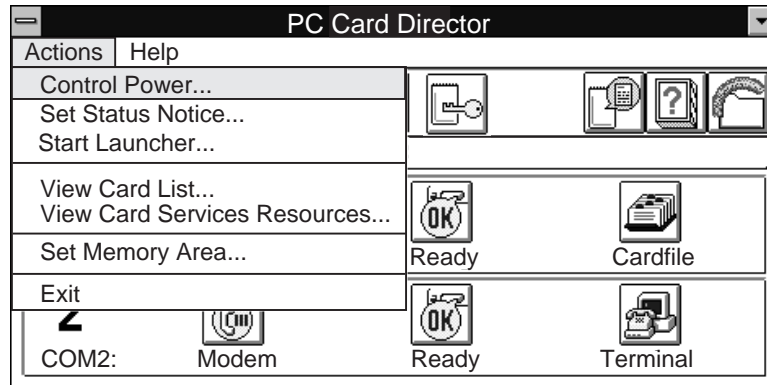
You can also select the same features by pressing the buttons on the tools bar. To view a description of each button on the tools bar, press the right mouse button.

PC Card Director			
Actions Help			
Control Power	Card	Status	Launcher
1 F: Hard Disk		Ready	Cardfile
2 COM2: Modem		Ready	Terminal
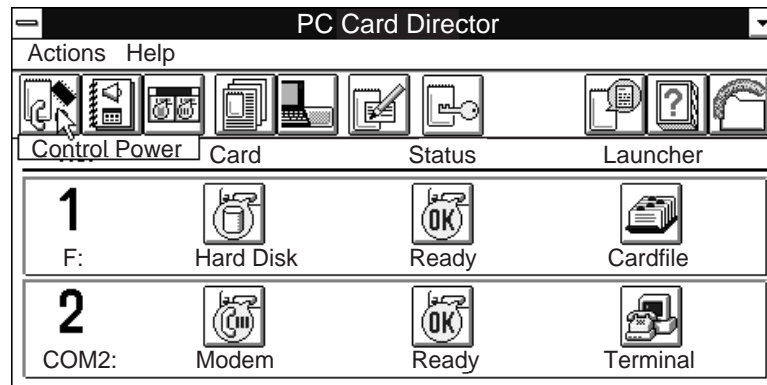
Using PC Cards

These are the descriptions of each feature you can choose from the pull-down menu or tools-bar buttons.

To control power:

 Page 59.

Control Power
You can turn the power on for a PC Card installed in a PC Card slot, or you can turn it off, without removing the PC Card from the slot.

Set Status Notice
You can choose how you are to be notified when a PC Card is removed from or installed in a PC Card slot.

Note:
This option is only for OS/2.

Open PC Card Director Folder
Opens the PC Card Director folder.

Note:
This option is only for Windows.

Start Launcher
Runs the PC Card Director Launcher.

To start launcher:

 Page 60.

To view card list:

 Page 62.

View Card List
Displays a list of the PC Cards registered in PC Card Director.

View Card Services Resources
Displays the resource information controlled by Card Services (for example, the IRQ level or memory) or the release version notice for Card Services.

Note:
This option is only for Windows.

Set Memory Area...
Sets the memory area for Card Services, PC Card, or Upper Memory Block (UMB).

To set memory area:

 Page 63.

Supported PC Card Information
Displays the list of the PC Cards that are ready to be used by PC Card Director.

Change View
Switches between displaying the PC Card information and displaying it in icons.

Security
Sets the security feature to on or off. You can also set the security options and password, which control access to the PCMCIA slot and installed PC Card.

Setting the Power for a PC Card
You can turn the power on or off for a PC Card installed in a PC Card slot, without removing the PC Card from its slot. Controlling the power for the PC Card helps conserve battery power.

Select **Control Power...** from the Actions pull-down menu, or click on the left-most icon in the tools bar. The Control Power window appears:

Note:
"No. 1" is the upper PC Card slot, and "No. 2" is the lower PC Card slot.

No.	Card Name	Power
1	Hard Disk	On
2	Modem	Off

Control Power

Current Status :

[Select All]

[On] [Off] [Exit] [Help]
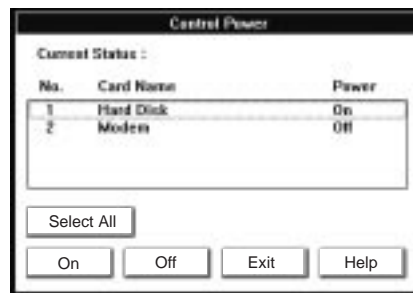
To turn off the power to a PC Card:

Note:
Finish and close the application program that the PC Card is using before turning off the power to that PC Card.

1. Open the **Control Power** window.
2. Select the PC Card for which you want to turn power off.
3. Click on the **Off** button.

To turn on the power to a PC Card:

1. Open the **Control Power** window.
2. Select the PC Card for which you want to turn power on.
3. Click on the **On** button.

Starting the PC Card Director Launcher

A launcher is installed with PC Card Director for Windows. By launching (registering) an application often used by the PC Card, you can run the application with a click of a button.

To register an application to run automatically:

Note:
OS/2 Warp Version 3 includes a LaunchPad. Refer to the manuals supplied with the operating system.

1 Start PC Card Director Launcher.

Select **Start Launcher...** from the Actions pull-down menu, click on the tools button, or click on the **PC Card Director Launcher** icon.

2 Select the **Launcher Settings** button (the right-most button) in the PC Card Director Launcher window.

3 Select **New** from the Launcher List of the Launcher Settings window.
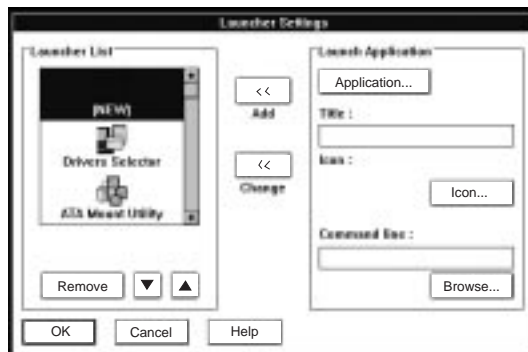
4 Click on the **Application...** button in the Launch Application box.

You can also fill in the information for Title, Icon, and Command Line.

5 Select an application in the Select Application window; then click on **Select**.
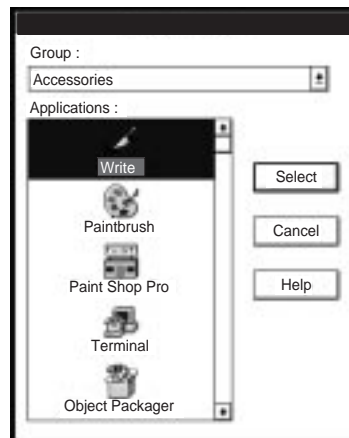
6 Click on the Add (>>) button.

The application is added to the Launcher list.

7 Click on the **OK** button.

You have registered the application. Refer to the Help menu for more information.

Displaying a List of Registered PC Cards
To view a PC Card name and its product information once it is registered, select **View Card List...** from the Actions pull-down menu of the PC Card Director window, or click on the tools button.
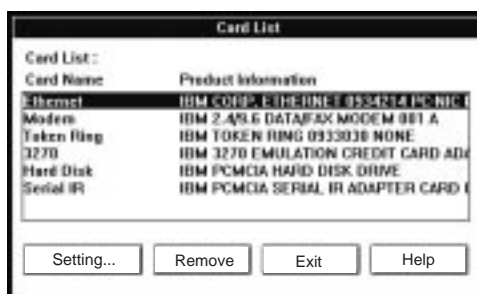
Setting... Displays the following information about a PC Card:

– Name of the PC Card
– Product information
– Icon of the PC Card type
– Applications registered to run automatically
– WAV files registered to play automatically

Remove Deletes the selected PC Card from PC Card Director.

Setting the Memory Area for Windows
If you are using Windows, you can set the memory area used by the PC Card and Card Services.

The PC Card and Card Services use a memory area called the *UMB (upper memory block)*. The UMB is used by various devices or programs, and as an result, memory area conflicts often occur. With PC Card Director, you can avoid these conflicts by easily setting the UMB for the PC Card and Card Services.

To set the memory area used for the PC Card and Card Services, do the following:

1 Select **Set Memory Area...** from the Actions pull-down menu of the PC Card Director window or click on the tools button for it.
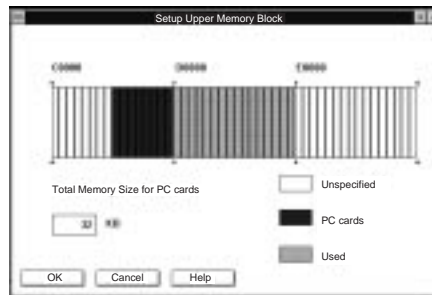
2 Plan carefully which memory area to use for the PC Card and Card Services from the displayed information.

3 Using the mouse, click on the desired memory area for the PC Card and Card Services.

4 Click on the **OK** button.

5 Restart the system.

Changing the PC Card Director View

You can display the information in PC Card Director in detail or using icons. The following is an example of what you see when PC Card Director is displayed in icons:

If you are using OS/2:

> To display information in icons, click on the **Change View** button from the tools bar, or select **Change View** from the Actions pull-down menu.

> To display information in detail, click on the minimized PC Card Director icon with the right-mouse button; then select **Change View**.

> To set the options for the displayed information when PC Card Director is displayed in an icon, click on the minimized PC Card Director icon with the right-mouse button; then select **Display Change in Status**.

If you are using Windows:

> To display information using icons, click on the minimize button ( ) in the upper-right corner of the window.

> To display information in detail, click on the maximize button ( ).

ATA Card Mount Utility

PCMCIA AT Attachment (ATA) cards can have a number of partitions. The ATA Card Mount Utility assigns or removes a drive letter to these partitions.

Note:
For the ATA Card Mount Utility for DOS, see page 67.

For more information:
☞ Page 249.

The main panel displays the information about the logical drives (partitions) that are ready to be mounted or dismounted. This is an example of a Windows ATA Card Mount Utility screen:

Select the logical drive with the arrow keys (↑ or ↓) or with the mouse; then mount or dismount it by clicking on the **MOUNT** or **DISMOUNT** button, or by selecting the choices from the pull-down menu.

MOUNT   Assigns a drive letter to the selected logical drive. Select a drive letter in the dialog box. Then the drive letter is mounted to the logical drive.

DISMOUNT   Releases the drive letter from the selected logical drive.

The Option pull-down menu contains the following:

Refresh   Refreshes the list. Use this choice when you have inserted or removed a PCMCIA ATA card in the PC Card slot.

Exit/Quit   Ends the program.

The Auto Configurator Utility

The Auto Configurator has prepared a script file for configuring each PC Card. These script files contain steps for enabling the PC Card and the resource information for its I/O interrupt level or memory. The Auto Configurator Utility is a utility that edits these script files, transforms them into binary data, and records them in Auto Configurator. Then Auto Configurator enables each PC Card, based on the data in the card's script file.

For more information on how to use the Auto Configurator, see Appendix B.

Note:
Refer to the PCMCIA.CRD file for a list of PC Cards that Auto Configurator can enable.

|DOS| ## Starting PC Card Director for DOS

To start PC Card Director for DOS:

1 Go to the DOS command prompt.

C:\>

Note:
C:\THINKPAD is the directory where PC Card Director is installed. If you have installed it in a different directory, type that directory name instead.

2 Type C:\>C:\THINKPAD\EZPLAY at the command prompt; then press **Enter**.

The following screen appears:

Note:
Some PC Cards might not display any information in PC Card Director.

```
                        PC Card Director
                (C) Copyright IBM Corp. 1993,1995, Version 3.


   Card Services DOS Card Services Driver, Version 2.1  PCMCIA Card Services


                  Release  2.1          Revision  2.1

      Slot Information

      No.      Status     Card Type    Card Information

      -> 1      Ready       Memory     F: IBM 1MB SRAM  933152  933151



   Enter      F1=Help      F3=End      F9=Resources   F1 =Client
```

ATA Card Mount Utility

For more information:
☞ Page 249.

PCMCIA ATA cards can have a number of partitions. The ATA Card Mount utility assigns (mounts) or removes (dismounts) a drive letter to these partitions.

C:\THINKPAD is the directory where PC Card Director is installed. If you have installed it in a different directory, type that directory name instead.

Using the Infrared Communication Feature

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

To install the infrared device driver:
☞ For OS/2: , and for Windows: .

Note:
Mbps: Mega bits per second

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. The computer has two infrared ports, one in the front of the computer below the hard disk drive compartment and another on the rear of the computer.

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

ThinkPad mode (IrDA High Speed extension) (1.15 Mbps)

This mode is used when communicating with another 755 or 760 series IBM ThinkPad computer with an infrared port or other systems supporting ThinkPad mode.

Generic (IrDA 1.0) (up to 115 000 bps)

This mode is used when communicating with other IBM ThinkPad computers, Hewlett-Packard** 100LX**, 200LX**, Omnibook**, or other systems with infrared ports supporting Generic mode.

Sharp (ASK) (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 infrared port and sets the communication speed.

If you are using OS/2 or Windows, see .

PS2 command:
☞

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

During communication with rear infrared ports, the infrared ports must face each other directly at a communicating distance.
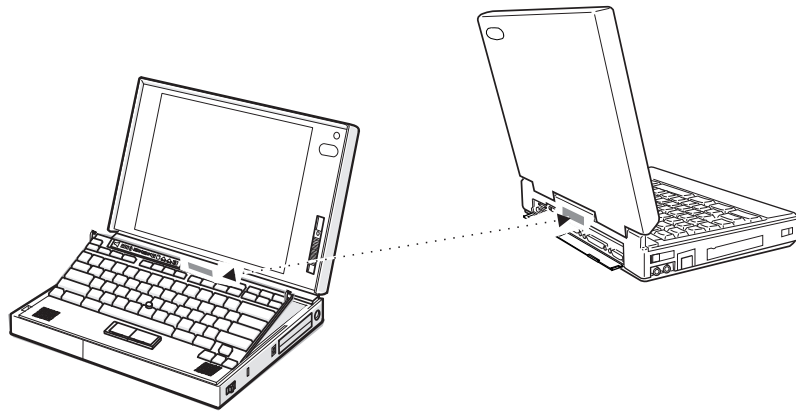
It is recommended that you use the rear infrared port for communicating between ThinkPad computers.

When communicating between a front infrared port and an infrared port on another computer, the infrared ports on the computers must face each other directly at a communicating distance.

Communication can be affected by the light from the LCD on the computer. To avoid this, open the LCD to a wide angle:

[Side view]
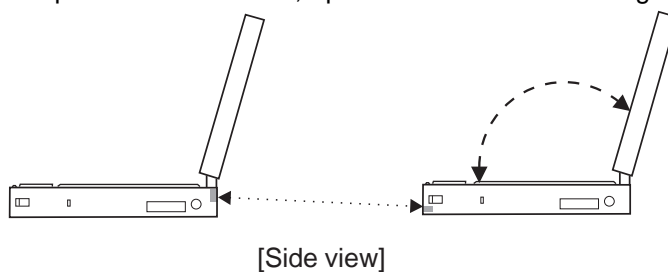
Considerations for Communication

Consider the following points when communicating with the infrared ports:

You need to run the same communication application on both computers to communicate between your computer and another computer device. Refer to the application manuals for more information.

Run only one communication application at a time that uses the infrared ports.

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

The communicating distance might need to be less if:

– The other system is not the same model as your computer.

– There is interference from ambient light. It is recommended that you do not use infrared communication in bright sunshine or artificial light conditions.

– The infrared port is not directly facing the other communicating port.

Headphones may interfere with infrared communications. You might hear noise through the headphones, or the computer might not be able to communicate with other devices through the infrared port.

Using the Mwave DSP Features

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

Note:
For more information on MIDI, see "Mwave MIDI Overview" on page 268.

The computer provides the *Media Processor (Mwave DSP)* feature, which is based on the *digital signal processor* (DSP). It gives you high performance 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

– Supports wave audio recording and playback of up to 16 bits, stereo, and 44 kHz sampling
– Provides a high-quality MIDI wave table synthesizer with 128 instruments and up to 32 voices
– Supports DOS games using the Sound Blaster** interface

Telephony

– Supports data modems at up to 14 400 bps
– Supports fax modems at up to 14 400 bps
– Supports the speaker phone function
– Supports the telephone answering machine function

Using Mwave DSP Audio Features

This illustration shows the connections between the computer and external cables or devices:

Note:

When installing an operating system, you must install the Mwave DSP support software to use the Mwave DSP features.

To install the Mwave DSP support software:

☞ Chapter 7.

The Mwave DSP feature supports the following functions for each operating system:

For OS/2:

– Wave audio recording and playback
– MIDI synthesizer
– Sound Blaster support in the DOS session
– Data modem
– Class II Fax
– MPEG Audio

For DOS:

– Sound Blaster support
– Data modem

For Windows:

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

Using the Audio Function

Use the Mwave audio functions according to your operating system.

Using the Function for OS/2

The Mwave feature supports audio 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.

Note:
Do not enter suspend mode when using the audio functions.

For Your Information

When you play audio files in the MMPM/2 environment, refer to the following:

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

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

Using the Function for DOS

The Mwave feature supports audio for DOS games through *Sound Blaster* support.

To enable Sound Blaster support for DOS games:

1 Type FASTCFG at the command prompt; then press **Enter**.

The FASTCFG utility opens.

2 Select **Games**; then select **OK**.

Creating a Boot Diskette

If you do not have enough memory for your games, you should 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 is created. Before starting your games, restart the computer with this boot diskette inserted in the diskette drive.

Some sample files, such as the CONFIG.SYS file, are 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 for DOS games. If the game asks for this information, specify the default settings for Sound Blaster as follows:

I/O Address	220
IRQ	5
DMA Channel	1

If you need to change these settings:

> Use the `PS2 AU`dio command to set the features for the audio (see Appendix D, "Using PS2 Commands" on page 273 for more details.)

> Select **DSP** from the ThinkPad Setup window and set features for the audio.

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

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.

A window similar to the following appears:

To install the Mwave DSP support
software:

☞ Chapter 7.
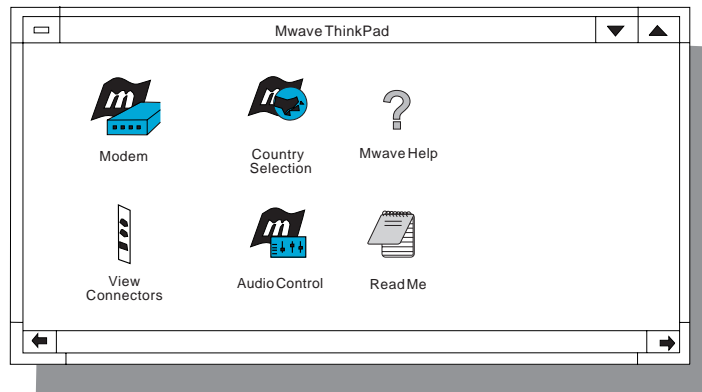
 Audio Control When you double-click on the **Audio Control** icon,
the following window appears:
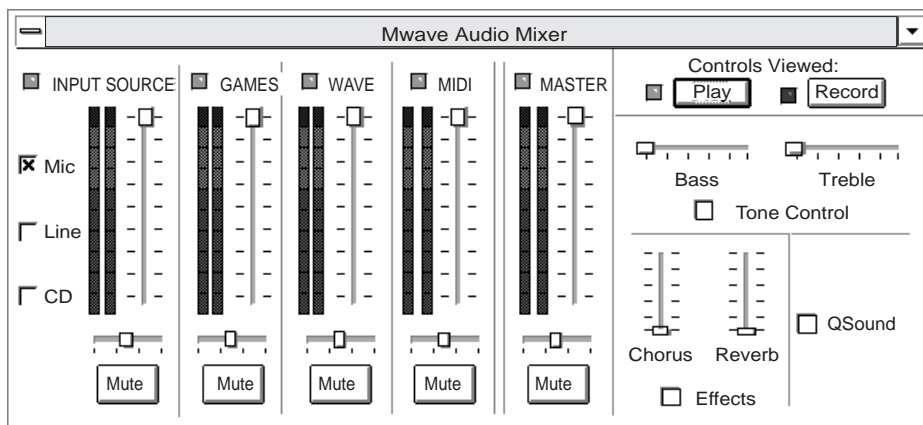
This window allows you to control the audio volume:

Record

Enables you to select which source you want to use, to adjust the record level, or to monitor the input signal.

Output

Allows you to adjust the balance and sound levels and to control the mute option. It can be considered a stereo amplifier with three input signals, controls to mix the input signals, and a volume control for the output.

Playing the MIDI Sequencer Files

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

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

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

3 When the Media Player window appears, select **Device** on the menu bar; then select **MIDI Sequencer...** from the pull-down menu.
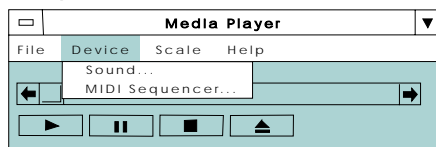
4 Highlight your favorite MIDI file with your pointing device; then click on **OK**.

5 To begin playing the MIDI file, click on the **Play** (▶) button.

Using the Telephony Function

Note:
In some countries, the Mwave telephony functions are only available with the DAA/Telephony Kit option installed. To install a DAA/Telephony Kit on the computer, see "Installing the DAA/Telephony Kit" on page 163 and the documentation that came with the option.

The computer is equipped with a modem/fax port on its side that connects a telephone cable. This section describes how to connect the cable to the computer, and describes the various telephony features that can be used for communication.

CAUTION:
You computer can only use a public-switched telephone network (PSTN). Do not use a PBX (private branch exchange) or other digital phone lines. Use of phone lines other than PSTN can damage your modem. If you are not sure which kind of phone line you are using, contact your telephone company.

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 cable to or disconnect the cable 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 telephone cable supplied with your computer.

When you use the DAA/Telephony Kit (available as an option), see page 165.

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

Important

Make sure you use the correct telephone line so your modem operates correctly. When you are:

At home: Use an *analog* line; a standard household telephone.

In your office: Use a line connected to a fax machine or another modem.

In a hotel: Request a room with a data or normal telephone line.

Your RJ11 jack must be wired for an analog line. If you are not sure what type of line you are connecting, check with the telephone company.

`DOS` *Using for the Modem DOS*

To start the Mwave modem for DOS, do the following:

1 Type `FASTCFG` at the DOS prompt; then press **Enter**.

The FASTCFG utility opens.

2 Select **Advanced Modem**; then select **OK**.

Using Mwave DSP Telephony Features

Mwave Data Modem
The Mwave telephony features support direct attachment to a public-switched telephone network (PSTN). The Mwave data modem supports the standard communication port interface and can be used with the communications programs that use the Hayes[**] AT command set.

The Mwave data modem provides the following features:

Standard asynchronous communications port interface (NS16550A UART compatible) operation

Bell[**]-103/212A, ITU-T V.32bis protocols with data from 50 to 2400 bps

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

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

Hayes AT command set compatibility

Call progress monitoring

Automatic dialing

Dual-tone modulation frequency (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

ITU-T V.42bis error correction

Using Country Selection

┌─ **Important** ──────────────────────────────┐
│   │
│ Each country has restrictions on communications that use │
│ telephone lines. Use this window whenever you travel to other │
│ countries.   │
│   │
└───┘

Note:
In some countries, the Mwave modem functions are only available with the DAA/Telephony Kit option 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 select the country name from the list of countries in this window.

Mwave Fax Modem

The Mwave telephony features offer you the following fax functions:

Call progress monitoring

Automatic dialing

Support for a Windows MCI** FAX application interface

Use of direct memory access (DMA) instead of a communications 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

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 by:

Recording greetings and messages through the microphone

Playing back greetings and messages through the speaker or headphones

Playing back greetings and messages to a remote telephone

Recording messages from a remote telephone

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

Supporting both tone (DTMF) and pulse dialing

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

Using a Windows MCI Telephony application program interface

Using a high-performance DMA interface

Speeding up or slowing down played messages without affecting their pitch (TDHS)

Detecting DTMF digits received from phone line

Chapter 4. Using Battery Power

This chapter describes battery pack operations.

Charging the Battery Pack

Note:
When you charge the lithium ion battery pack, the battery pack temperature must be at least 10°C (50°F).

You can charge the battery pack when the AC Adapter is connected to the computer and the battery pack is installed. You must charge the battery pack in any of the following conditions:

When a new battery pack is purchased.
When the battery status indicator starts blinking ( ).

Hints and Tips

You can use an optional battery pack and install it in the UltraBay and have two battery packs for long battery-powered operation.

When you have two battery packs installed in the computer and start charging, charging starts on the battery pack in the battery pack bay. When it is fully charged, charging starts on the battery pack installed in the UltraBay.

Charging with the AC Adapter

Note:
When carrying your computer without the AC Adapter, carry with you a fully charged battery pack for maximum operating hours. You can also have an optional battery pack and use two battery packs for operation.

When the AC Adapter is connected and the power remaining in the installed battery pack is less than a certain amount, discharging and then charging of the battery pack starts automatically. The discharge LCD indicator appears .

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

Conditions	Charging Time
Operational Charging	1.7 hours
Power-off Charging	1.5 hours
Suspend-mode Charging	1.5 hours

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

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

1 Make sure the computer is turned off, and a new or discharged battery pack is installed in the computer.

2 Connect the AC Adapter to the computer.

The system status indicators show the following:

Indicator	Meaning
🔋◀	The battery pack is being charged. The charge indicator (◀) turns off when the battery is fully charged.

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.

The LCD indicator panel shows the following when using the Quick Charger with the computer power on or off:

When power is on	When power is off
🔋◀	🔋◀
—	70%

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.

1 Open the LCD so it lies flat; then slide the keyboard raiser on the side of the computer toward you so the keyboard lies flat on the computer.
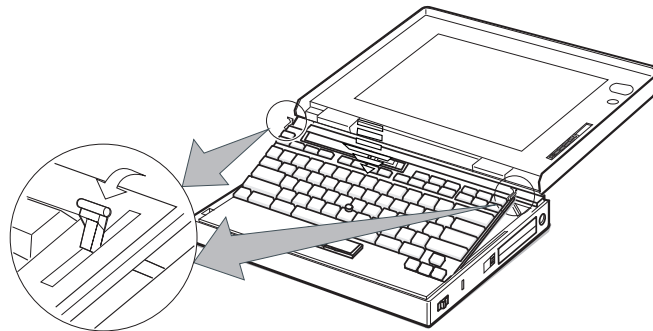
2 Open the keyboard.

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

3 Pull the battery pack toward the front of the computer; then quickly remove the battery pack and replace it with a fully charged spare.
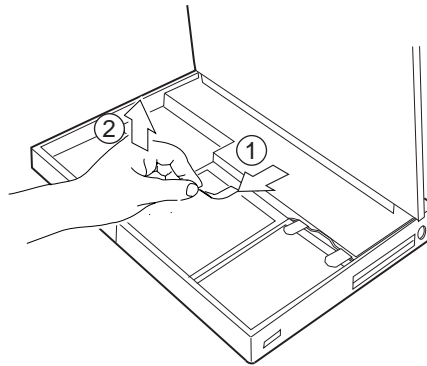
4 Close the keyboard. The computer resumes normal operation.

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

Monitoring the Battery Status

Battery power conditions can be determined through the battery status indicator and the Fuel-Gauge program.

Using the Battery Status Indicator

The main battery status indicator shows the current status of the battery pack (only when the battery is installed).

Battery Status Indicator

Observe the main battery status indicator and compare it with the status list below to determine the battery condition.

Indicator	Remaining Power (Percentage)	Status/Action Required
	100%–75%	The battery pack is fully charged.
	75%–50%	Enough power remains for computer operation.
	50%–25%	
	Less than 25 %	

Note:

When the AC Adapter is connected and the power remaining in the installed battery pack is less than a certain amount, discharging and then charging of the battery pack starts automatically.

Indicator	Remaining Power (Percentage)	Status/Action Required
☐ ⊞ (Blinking)	Approximately 10 minutes remains for operation.	The battery pack is almost discharged and is about to enter the low-battery condition (see page 90). You will hear three beeps when this indicator turns on. Take either of the following actions immediately: 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 86).
▥¹◀	Percentage of charging completed. (Up to 100%)	(Only appears when the AC Adapter is connected.) The battery pack is being charged. See page 85 for more information.
▥¹▶	Percentage of discharging completed. (Down to 0%)	The battery pack is being discharged (or is being used). See page 95 for more information.
Off (Not displayed)	—	The battery pack is not installed. The computer is turned off.

When using a secondary battery pack...

When you are using a secondary battery pack (available as an option) in the UltraBay, the battery status indicator appears for *both* battery packs installed in the computer.

▥² ▥¹

The main battery-status indicator (☐ ⊞) is for the battery pack installed in the battery-pack bay, and the secondary

battery-status indicator (▥²) is for the secondary battery pack installed in the UltraBay.

Using the Battery Status Indicator

Low-Battery Condition

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

For necessary actions:
☞ Page 89.

When the battery pack is low in power, the remaining battery indicators start to blink. Ten seconds after the indicators start to blink, the computer sounds three consecutive beeps and the last rectangle in the battery status indicator starts to blink (☐ +). The battery pack needs to be charged immediately. If corrective actions are not taken within 10 minutes, the computer will enter suspend mode.

Remaining Battery Indicator

The remaining battery indicator shows the remaining battery status in digits. This includes the overall power remaining for the battery pack in the battery-pack bay (and the battery pack in the UltraBay, if installed).

Refer to the following table to determine the remaining battery power:

Indicator	Meaning
2^d	The remaining power is displayed in days. In this example, battery power remaining is 2 days.
2:50	The remaining power is displayed in hours and minutes. When the remaining power is more than 10 hours, an "h" suffix appears besides the number (for example, 12^h). In this example, battery power remaining is 2 hours and 50 minutes.

Indicator	Meaning
77%	The remaining power is displayed in percentage. When the charge symbol (◀) appears next to a battery status indicator, it shows what percentage is complete. In this example, battery pack charging (indicated with the charge symbol), is 70% complete, or 70% of battery power remains. When using a secondary battery, the percentage indicates the total remaining power for both battery packs, up to 100%.

To change how to display the remaining power between the hours and percent, select **Option...** from the pull-down menu of the Fuel-Gauge program; then click on your choice to display the remaining power.

▭ Fuel ▼
Restore
Move
Size
Minimize
Maximize
Option...
Close
Switch To...
About...
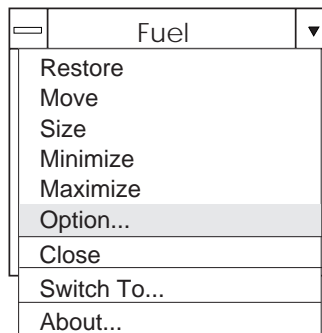
Using the Fuel-Gauge Program

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

To install the ThinkPad Features program:
☞ Chapter 7.

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 following battery-pack conditions on the screen:

Power mode
Battery status
Suspend or hibernation options
Discharge option

The Fuel-Gauge program is available in OS/2 or Windows. When you click on the Fuel-Gauge icon in the ThinkPad Features window, the Fuel-Gauge program appears. When you minimize the program to an icon, every time you press the **Fn**+**F2** key combination, the Fuel-Gauge icon appears or disappears alternately from the screen.

Refer to the following descriptions and illustrations, which depend on the power source, of the Fuel-Gauge program.
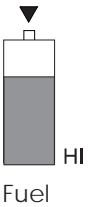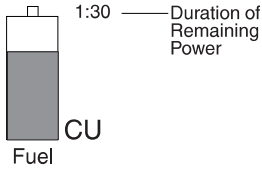
Maximized Fuel-Gauge program:
– The "Duration of Remaining Power" does not appear when the AC Adapter is connected.

AC Adapter Connected	Battery Operation
Charge-In-Progress Suspend Button Fuel ▼ 70% Hibernation Button Percentage of Remaining Power Current Power Mode (AC/High) Gauge Discharge Button	Fuel ▼ 70% [1:30] Duration of Remaining Power

Minimized (to an icon) Fuel-Gauge program:

– The power source (AC Adapter or battery) and power mode alternately appear:

- **Power source**

  AC AC Adapter
  BT Battery

- **Power mode**

  HI High Performance
  AU Automatic
  CU Customized

AC Adapter connected	Battery operation
Fuel HI	1:30 — Duration of Remaining Power CU Fuel

Using the Fuel-Gauge Program

When you have a secondary battery pack in the UltraBay, the following figure is displayed for the Fuel-Gauge program.

Maximized Fuel-Gauge program:

– When you double-click on the power remaining percentage, the percentage for the main battery pack (displayed with a "1" in front), secondary battery pack (displayed with a "2" in front), and the average of the two battery packs alternately appear.

For example:

```
1 35%     2 49%     42%
```

AC Adapter connected	Battery operation

Minimized (to an icon) Fuel-Gauge program:

AC Adapter connected	Battery operation
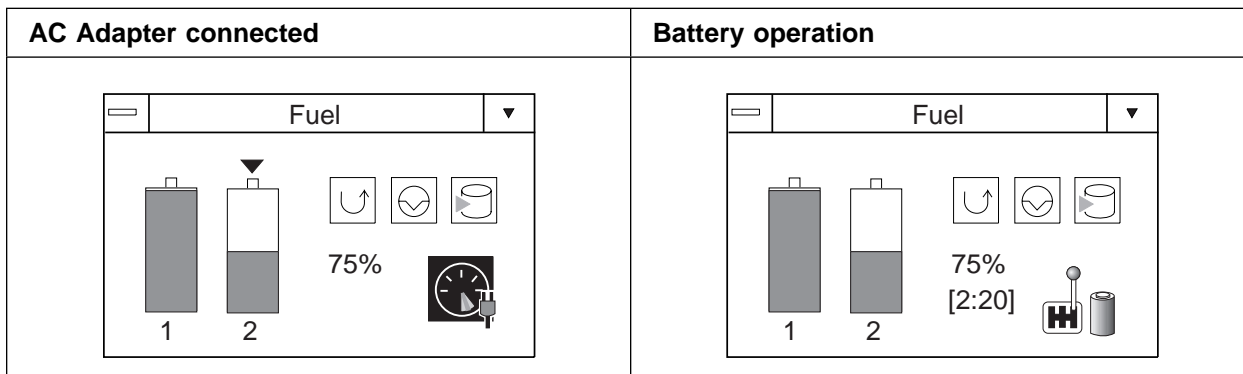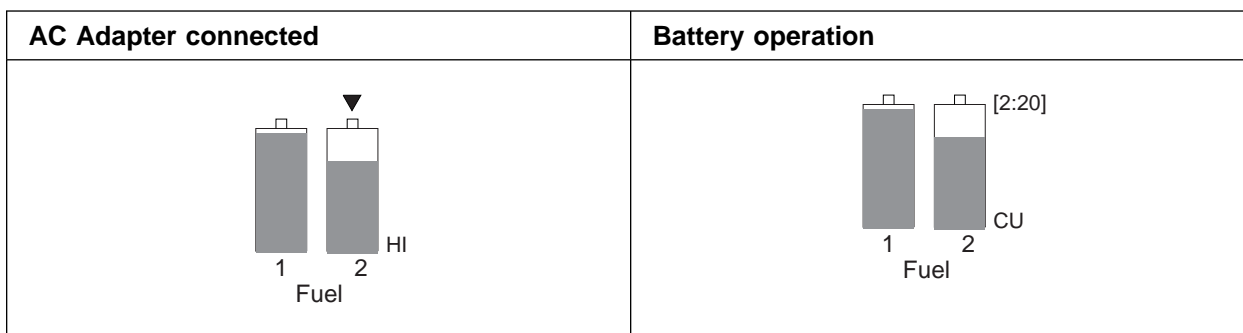
Discharging the Battery Pack for OS/2 and Windows

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 click on the discharge button (⤴) on the Fuel-Gauge program.

When the power remaining for the installed battery pack is less than a certain amount, discharging and then charging of the battery pack starts automatically.

The discharge-in-progress (⤴) appears above the gauge symbol, and the charge button (▼) appears in place of the Discharge button.

On the system indicator panel, the indicator showing that the battery pack is being discharged appears:

<div align="center">▥▶</div>

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.

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

To cancel discharging, click on the charge icon (▼).

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 the battery pack 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:

Use Advanced Power Management (APM)
Decrease the LCD brightness
Use the Battery Power-Management function

Using Advanced Power Management

Note:
If you have purchased the computer with a preinstalled operating system, 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 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, APM is automatically installed when the installation program detects that the power-management function is installed on your computer.

DOS *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, follow these instructions to check and install APM for Windows:

1. Start the system. Make sure that the current directory is 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:        Cyber932  8  ×6   256 small font
      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:        Cyber932  8  ×6   256 small font
      Mouse:          Microsoft, or IBM PS/2
```

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

7. Restart the system to make APM effective.

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 the Battery Power-Management Function

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

Operation modes. The operation modes control the processor speed or set timers for saving power. For more information about the operation modes, see   2   on page 40.

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

When resuming normal operation from one of the modes, use the **resume function** to return to where you were when you entered that mode. Because the operating system is already loaded, the resume function is faster than turning the power on.

The following are the three power-saving modes:

Standby Mode   You can enter standby mode for short idle times, such as when you are having a short conversation.

Suspend Mode   You can enter suspend mode for some what longer times when you are away from your computer.

Hibernation Mode

You can enter hibernation mode when you leave your office for the day.

It takes more time to return to normal operation from suspend mode than to return from standby mode, but the computer does not use as much power.

The following figure shows the operations required when the computer moves from a power-off condition to operation mode, and vice versa. The battery shows the amount of battery power used in each stage.
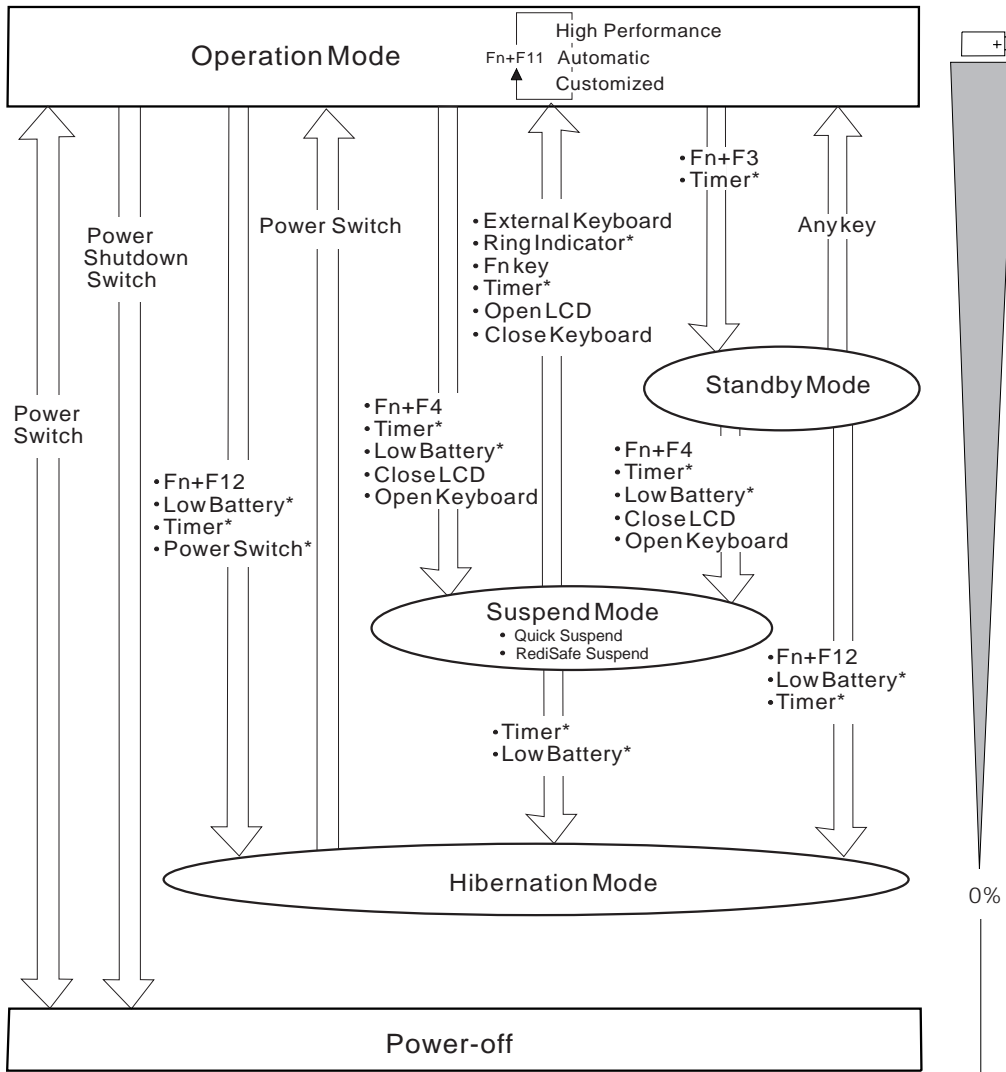
* These options are set using the ThinkPad Features program.

Standby Mode

In standby mode, the hard disk drive stops and the LCD turns off. All system tasks are interrupted when you enter standby mode. The computer immediately resumes normal operation when you press any key or use any pointing device. Also, if a power-saving monitor (Energy Star Monitor) is in use when the computer enters standby mode, the computer activates the monitor's low-power mode.

Suspend Modes

The computer provides the following two types of suspend modes for you to save power:

Suspend mode
RediSafe suspend mode

The following indicator lamps (visible when the LCD is closed) change status when using suspend mode:

Current Status	Indicator Lamps	
	Suspend Mode	Power-On
In Suspend Mode	Green	Off
Entering or Resuming Suspend	Blinking green	Off
Normal Operation	Off	Green

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.

RediSafe suspend mode

In RediSafe 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 loss of data during suspend mode. Resuming normal operation is faster in RediSafe suspend mode than it is in Hibernation mode; the computer resumes normal operation by pressing the **Fn** key in RediSafe suspend mode.

If all battery power is used and the computer turns off during RediSafe 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 105.)

To enter RediSafe suspend mode, do the following:

If you are using OS/2 or Windows:

1. Start the ThinkPad Features program; then go to the ThinkPad view.

2. Click on the battery icon ( ); then click on the

   suspend/hibernation/resume options icon ( ).

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 **RediSafe suspend**. (A mark appears in the check box when RediSafe suspend is selected.)

5. Click on the **OK** button.

If you are using DOS:

1. Type PS2 HFILE C at the command prompt; then press **Enter** to create the hibernation file on drive C (type the drive letter of your choice).
2. Type PS2 SA E at the command prompt; then press **Enter** to enable suspend mode.

Considerations for Suspend Mode

Consider the following before using suspend mode.

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

– DOS Version 7.0 or later
– OS/2 Warp Version 3 or later
– Microsoft Windows Version 3.11 with DOS Version 7.0 or later

---

Important

When you use Windows Version 3.11, ensure that Advanced Power Management (APM) is installed according to the instructions in "Installing Microsoft Windows Version 3.11 or Later" on page 198.

Approximately 1.5 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 you resume normal operation, the output might 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 a 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 password or hard disk password is set, you need to enter your password to resume normal operation from the ThinkPad Features timer or ring indicator. However, no password prompt will be displayed; only a blank screen is displayed.

Using Power Management

Standby mode:
☞ Page 101.

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 and the computer enters suspend mode, all application programs stop. Communication also stops for communication PC Cards not listed above. For some PC Cards, power to the PC Cards might also turn off.

When the computer is powered with battery power, the computer turns power off to the PC Card, and communication stops for communication PC Cards, so the duration of suspend mode is longer.

If communication for a PC Card is not reestablished after resuming normal operation, remove and then reinstall the PC Card before restarting the system or application program. For other kinds of PC Cards, if the PC Card or computer does not operate, restart the application or computer.

Note:
You must set the **Ring Indicator** option in the ThinkPad Features program so the computer automatically resumes normal operation.

For OS/2 or Windows:
1. Click on the battery icon

   ( ) in the ThinkPad view.
2. Click on the suspend/hibernation/resume

   option icon ( ); then select the ring indicator option.
For DOS: Enter PS2 RI E

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

– IBM PCMCIA Data/FAX Modem
– IBM High Speed PCMCIA Data/FAX Modem
– SRAM or ATA PC Card
– IBM Microelectronics 2.4/9.6 Data/FAX Modem
– IBM Microelectronics 14.4/14.4 Data/FAX Modem
– IBM Wireless Modem for ARDIS
– IBM Wireless Modem for Mobitex
– IBM Wireless Modem for Cellular/CDPD

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

Hibernation Mode

Notes:

1. Before using hibernation mode, you must create a hibernation file.

2. Using an expansion unit or a particular PC Card can disable 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.)

In hibernation mode, all tasks are stopped and memory data and the current status of the computer are stored on the hard disk drive; *then 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 enters hibernation mode, you hear one short beep. A graphical message appears and the suspend mode indicator lamp blinks; then a short beep sounds again to inform you that the computer has entered hibernation mode.

Creating the Hibernation File

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

When installing an operating system or installing additional computer memory, you must create a hibernation file on the hard disk drive to use the hibernation mode. (You only need to create the hibernation file once after installing an operating system or additional memory.)

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 memory module (DIMM), the hibernation file is 13MB:

```
(8MB + 4MB) + 1MB = 13MB
```

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 Go to the ThinkPad view; the click on the battery icon.

3 Click on the suspend/hibernation/resume options icon.

4 Click on the **Enable Hibernation** button in the menu.

5 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 HFILE C` at the command prompt; then press **Enter**.

The hibernation file is created on drive C.

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 when a low-battery condition occurs. This can cause the battery operating time to be shorter than the time shown on page 25.

Note:

If the communication links are still not reestablished, remove and 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 entering hibernation mode. When resuming normal operation, if the PC Card or computer does not operate, restart the application or computer.

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
– IBM Microelectronics 2.4/9.6 Data/FAX Modem
– IBM Microelectronics 14.4/14.4 Data/FAX Modem
– IBM Wireless Modem for ARDIS
– IBM Wireless Modem for Mobitex
– IBM Wireless Modem for Cellular/CDPD

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

Using Power Management

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 battery power-management function.

Legend:

100%

Require Power in
No Power-Saving Mode

Saving Power
Amount of Required Power

Processor

Maximum

Medium

Slow

Minimum

LCD Off

Brightness at Minimum

External Serial Off

Mwave DSP Off

Power-Saving Mode

Suspend Mode

Standby Mode

Hard Disk Off

Infrared Off
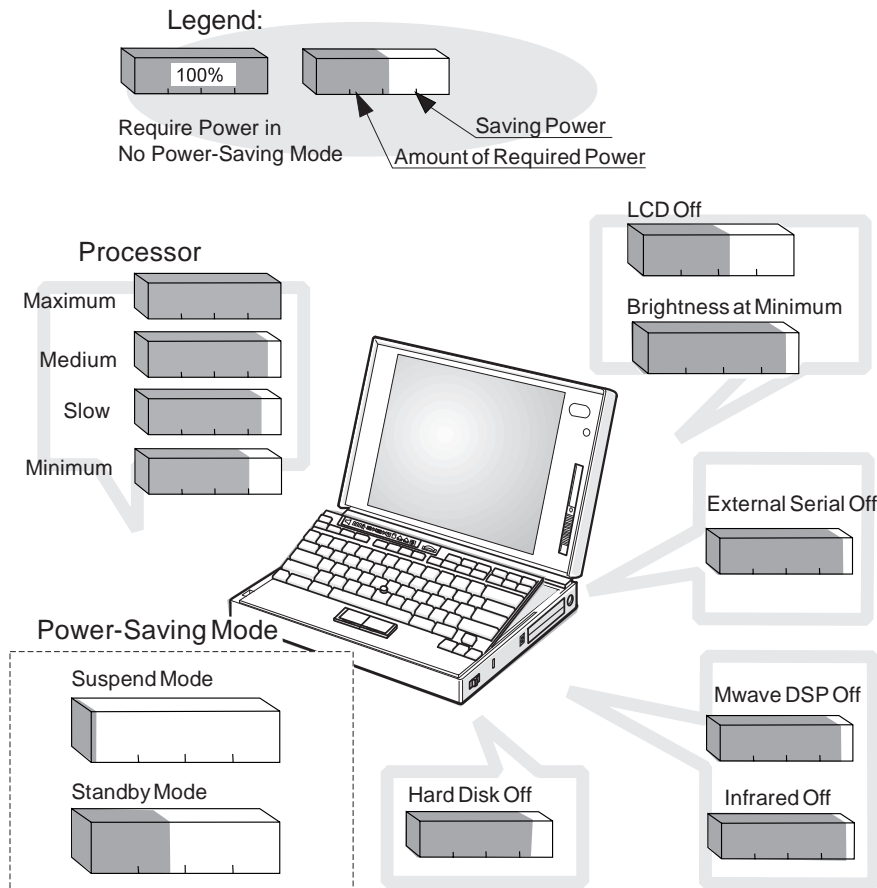
Chapter 5. Protecting Your Computer

This chapter provides information about how to protect your 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 from being modified and your removable hard disk drive from being used by unauthorized persons.

Hints and Tips

You can display your personal information, such as your name or address, on the password prompt screen. For details, see page 127.

Power-On Password
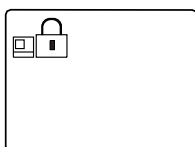
The power-on password helps protect your computer from being used by unauthorized persons. If a power-on password is set, the password prompt () appears on the screen whenever you turn on the computer and reminds you to enter the password.

Setting a Power-On Password

To set a power-on password:

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

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

To start Easy-Setup, press and hold **F1** and turn on the computer.

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

Note:
When you type a wrong key, use the **Backspace** key to erase it and then type the correct key.

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

You can use any combination of up to 7 characters. Use a combination of any letters or numbers (*A* to *Z*, *0* to *9*) in uppercase (*A*) or lowercase (*a*). Uppercase and lowercase letters (for example, *A* and *a*) are treated the same.

4 Type your power-on 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 an IBM authorized reseller or IBM marketing representative 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 in Easy-Setup; you must change or remove a password at the password prompt screen that appears when you turn on the computer. See "Changing a Power-On Password" on page 113 or "Removing a Power-On Password" on page 114.

Entering a Power-On Password

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

If a power-on password is set, the password prompt reminds you to enter the password when:

Turning on the computer.

Returning to normal operation from suspend mode.

When the password prompt appears at the top left corner on the screen, do the following:

1 Type your power-on password.

Each time you press a key, the symbol appears.

When typing your password, release each key quickly. If you hold a key down too long, the same letter can be entered repeatedly.

2 Press the **Enter** key.

When the password is entered correctly, **OK** appears and the computer starts normal operation.

When you enter the password incorrectly, **X** appears. Enter the correct password.

If you fail to enter the correct password after three tries, you must turn the computer off, wait at least 5 seconds, and turn it on to try again.

Changing a Power-On Password

You must change your power-on password at the password prompt screen that appears when you turn on the computer. You cannot change it after normal operation is resumed. To change a power-on password:

Important

Do *not* press **Enter** until you have finished all 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; then press the **Spacebar**.

3 Type the *new* password; then press the **Spacebar**.

Use no more than 7 characters.

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

All the steps can be summarized as follows:

Current(**space**)*New*(**space**)*New*(**Enter**)

The new password will be available when you turn on the computer the next time.

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 an IBM authorized reseller or IBM marketing representative 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 that appears when you turn on the computer. You cannot remove it after normal operation is resumed. To remove a 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 password; then press the **Spacebar**.

3 Press **Enter**.

The power-on password is removed.

All the steps can be summarized as follows:

Current(**space**)(**Enter**)

Hard Disk Password
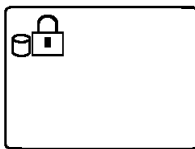
The hard disk password helps you protect the information stored on your removable hard disk drive. Even if your hard disk was removed from the computer, the information stored in your hard disk cannot be accessed without the hard disk password.

Note:
The hard disk password is stored on the hard disk drive when you set the hard disk password, while the power-on password is stored in the nonvolatile memory of the computer.

When you turn on the computer, the hard disk password prompt appears on the screen and reminds you to enter your password.

When you use a secondary hard disk drive in the UltraBay, you can set hard disk passwords for each of the hard disk drives installed.

The password prompt appears on the screen when you turn on the computer and reminds you to enter the main hard disk password; reminds you to enter the secondary hard disk password.

When a hard disk password is set, a preset timer or an incoming call do not activate the resume function.

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

To use the resume function with a hard disk password, set the same password for both the power-on password and the hard disk password.

Note

Using a Hard Disk Password with a Power-On Password:

You can use the hard disk password with the power-on password at the same time. When you turn on the computer, the power-on password prompt appears first and then the hard disk password prompt appears on the screen. Enter the correct passwords.

When you set the same hard disk password as the power-on password, only the power-on password prompt appears on the screen. Enter the correct password. The hard disk password screen does not appear.

Setting a Hard Disk Password

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

Note:
HDD-1 represents a main hard disk password and **HDD-2** represents a secondary hard disk password.

Note:
When you type a wrong key, use the **Backspace** key to erase it, and then type the correct key.

To set a hard disk password:

1 Start Easy-Setup; then select the **Password** icon.

To start Easy-Setup, press and hold **F1** and turn on the computer.

2 Select **HDD-1** (⊕⒈) or **HDD-2** (⊕⒉) according to the hard disk type you want to set.

3 Type your desired hard disk password; then press **Enter**.

You can use any combination of up to 7 characters. Use a combination of any letters or numbers (*A* to *Z*, *0* to *9*) in uppercase (*A*) or lowercase (*a*). Uppercase and lowercase letters (for example, *A* and *a*) are treated the same.

4 Type your hard disk password again to verify it; 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 your password or recover data from the hard disk.** Neither an IBM authorized reseller nor IBM marketing representative can make the hard disk drive usable.

Once you set the password, you cannot change or remove it in Easy-Setup; you must change or remove a password at the password prompt screen that appears when you turn on the computer. See "Changing a Hard Disk Password" on page 118 or "Removing a Hard Disk Password" on page 119.

Entering a Hard Disk Password

If a hard disk password is set, the hard disk password prompt appears when:

You turn on the computer.

When the computer returns to normal operation from suspend or hibernation mode.

When the password prompt appears at the top left corner on the screen:

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

1 Type the hard disk password.

Each time you press a key, the symbol   appears.

When typing your password, release each key quickly. If you hold a key down too long, the same letter can be entered repeatedly.

2 Press **Enter**.

When the password is entered correctly, **OK** appears and the computer starts normal operation.

When you enter the password incorrectly, **X** appears. Enter the correct password.

If you fail to enter the correct password after three tries, you must turn the computer off, wait at least 5 seconds, and turn it on to try again.

Changing a Hard Disk Password

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

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

1 Remove the passwords by following the steps in "Removing a Power-On Password" on page 114.

This operation removes both the hard disk password and the power-on password.

2 In Easy-Setup, set a new hard disk password. See the steps on page 116.

3 If you need a power-on password, set it in Easy-Setup.

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; then press **Enter**.

3 When the hard disk password prompt (⊟🔒) appears, type your *current* hard disk password; then press the **Spacebar**.

4 Type the *new* password; then press the **Spacebar**.

Use no more than 7 characters.

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

All the steps can be summarized as follows:

Current(**space**)*New*(**space**)*New*(**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 your password or recover data in the hard disk drive.*** Neither an IBM authorized reseller nor IBM marketing representative 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 to the same password as the power-on password.

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

1 Remove the password by following the steps in "Removing a Power-On Password" on page 114.

This operation removes both the hard disk password and the power-on password.

2 If you need a power-on password, reset it in Easy-Setup.

When the hard disk password and the power-on password are different, or a 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 the power-on password, type it; then press **Enter**.

3 When the hard disk password prompt (⊟🔒) appears, type your current password; then press the **Spacebar**.

4 Press **Enter**.

These steps can be summarized as follows:

> *Current*(**space**)(**Enter**)

Supervisor Password
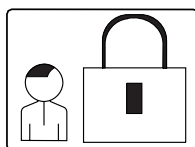
The supervisor password helps you protect classified information. A supervisor password:

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. (The supervisor password has priority over the power-on password.)

Note:
The supervisor password has priority over the power-on password. You can start the computer with the supervisor password even if you do not know the power-on password.

If a supervisor password is set, you are prompted with a **power-on** icon (🔒) to enter the supervisor password when entering the Easy-Setup program and when a POST error occurs. You can start all normal operations for the computer except Easy-Setup without the supervisor password.

> **Using Both Supervisor and Hard Disk Passwords**
>
> When a supervisor password is set, the same password is automatically set for the hard disk password.
>
> When you change or remove the supervisor password, the hard disk password also is changed or removed.

Setting a Supervisor Password

To set a supervisor password:

1 Start Easy-Setup; then select the **Password** icon.

To start Easy-Setup, press and hold **F1** and turn on the computer.

2 Select the **Supervisor** icon (⌷).

3 Type your desired supervisor password; then press **Enter**.

You can use any combination of up to 7 characters. Use a combination of any letters or numbers (*A* to *Z*, *0* to *9*) in uppercase (*A*) or lowercase (*a*). Uppercase and lowercase letters (for example, *A* and *a*) are treated the same.

4 Type your supervisor password again to verify it; 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, there is ***no way to reset your password or recover data from the hard disk.*** You have to take the computer to an IBM authorized reseller or IBM marketing representative to have the system board replaced. Proof of purchase is required, and an additional charge might be required for the service. Neither an IBM authorized reseller nor IBM marketing representative can make the hard disk drive usable.

Entering a Supervisor Password

To set your supervisor password:

1 Type your supervisor password.

Each time you press a key, the symbol   appears.

When typing your password, release each key quickly. If you hold a key down too long, the same letter can be entered repeatedly.

2 Press **Enter**.

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

When you enter the password incorrectly, **X** appears. Enter the correct password.

If you fail to enter the correct password after three tries, you must turn the computer off, wait at least 5 seconds, and turn it on to try again.

Changing a Supervisor Password

To change your supervisor password:

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

2 Start Easy-Setup.

To start Easy-Setup, press and hold **F1** and turn on the computer.

3 Type your *current* supervisor password at the power-on prompt (⊞🔒); then press **Enter**.

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

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

A window appears so you can enter a new password.

6 Type the *new* password; then press **Enter**.

7 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 an IBM authorized reseller or IBM marketing representative to have the system board replaced. Proof of purchase is required, and an additional charge might be required for the service.

If you forget your supervisor password, there is **no way to reset your password or recover data from the hard disk.** Neither an IBM authorized reseller nor IBM marketing representative can make the hard disk drive usable.

If you are using more than one hard disk drive, see page 126.

Removing a Supervisor Password

To remove the supervisor password:

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

2 Start Easy-Setup.

To start Easy-Setup, press and hold **F1** and turn on the computer.

3 When the power-on prompt (⊞) appears, type your current supervisor password; then press **Enter**.

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

5 Select the **Supervisor** icon; then type your current password and press the **Spacebar**.

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

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

When the supervisor password is removed, the lock in the **Supervisor** icon is unlocked (⊞) and you can select the **HDD-1** or **HDD-2** icon.

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 for 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 for each hard disk drive.

Setting a Supervisor Password when Using Several Hard Disk Drives

To set a supervisor password when using more than one hard disk drive on your computer:

To set a supervisor password:
☞ Page 121.

1 Set a supervisor password on your computer.

To install the hard disk drive:
☞ Page 149.

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 **Supervisor** 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.

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

To change or remove the supervisor password when using more than one hard disk drive on your computer:

To change the supervisor password:
☞ Page 122.

To remove the supervisor password:
☞ Page 124.

To install the hard disk password:
☞ Page 149.

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 in step 1, type the old supervisor password; then press the **Spacebar**.

If you changed the supervisor password in step 1, 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 change or remove the supervisor password for each hard disk drive.

Using the Personalization Feature

To set password:
☞ Page 110.

You can display personal information, such as your name or address, every time the computer is turned on and 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 your personal information is displayed and identifies the owner of the computer.

The personalization feature includes a personalization editor program to create your own image to be displayed with the text information you create, and a personalization update utility to store your personal data in the nonvolatile memory of your system.

Note:
For details about bitmap graphics, see page 297.

A personalized password-prompt screen consists of two parts: the personal data area and the background bitmap area.

The *personal data area* 1 is the box in the center of the screen that has a black-and-white bitmap.

The *background bitmap area* 2 surrounds the personal data area.
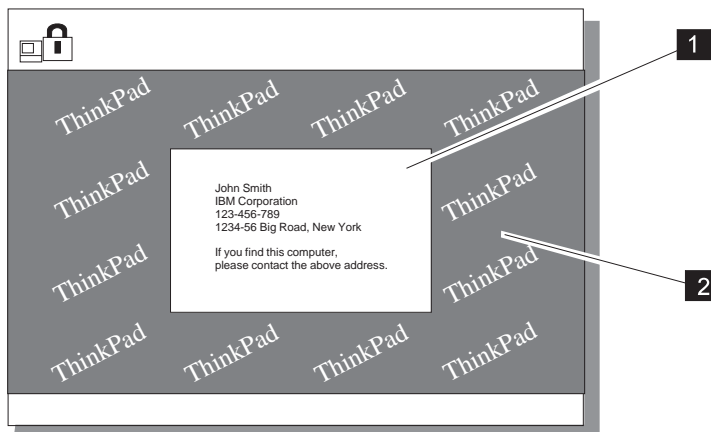
Entering the Personal Information

To enter personal information for the password-prompt screen:

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

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

3 Insert the backup copy of the Utility Diskette 2 into the diskette drive.

4 Start the ThinkPad Features program by double-clicking the **ThinkPad** icon on the screen.

5 Click on the **Personalization Editor** () icon.

The personalization editor window appears.
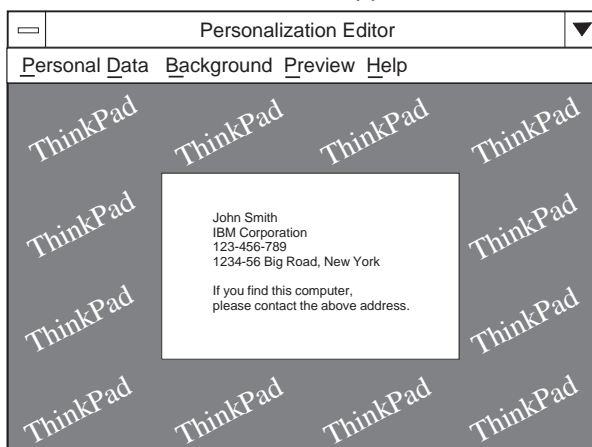
6 Select **Personal Data**.

Notes:

Use the **TAB** key to move the cursor to the next field.

You can change the color of the text background from black to white using the **Black background** option.

Note:
A sample bitmap file (`BACKSAMP.BMP`) is available on Utility Diskette 2.

7 Fill in each field with your own information at the Personal Data Entry window.

8 Select **OK**.

Next, create the background bitmap as follows:

9 Select **Background** in the Personalization Editor window.

Windows Paintbrush automatically opens.

10 Draw an image or color the background.

Your bitmap size must be *160 by 100 pels.* To change the size, select **Options** and then **Image Attributes.** Specify a **Width** of 160, a **Height** of 100, and set the **Units** to pels.

11 Select **File** and **Save As** to save and name your drawing as a *16-color bitmap* file on the backup copy of Utility Diskette 2.

12 Close Paintbrush.

13 When the opening file window appears, enter the name of your bitmap file on Utility Diskette 2 that you have just created.

14 Select **Preview** to preview the actual full-screen size of the personal information screen.

To return to the previous screen, press **Enter**.

To save your personalized screen in the nonvolatile memory in the computer:

15 Close all applications; then turn off the computer.

16 Insert the backup copy of the Utility Diskette 2 into the diskette drive; then turn on the computer.

17 Select **Update personalization data** at the menu
screen; then follow the instructions on the screen.

Your data will be copied from Utility Diskette 2 and stored in
the nonvolatile memory in the computer.

18 After the data is stored, turn off the computer.

To set password:
☞ Page 110.

19 Set your password if you have not set it.

You have created your own personalized password-prompt screen.
It will appear each time the computer is turned on.

Deleting a Personalized Screen

To delete a personalized screen from the password-prompt screen:

1 Close all applications; then turn off the computer.

2 Insert the backup copy of the Utility Diskette 2 into the
diskette drive; then turn on the computer.

3 Select **Delete personalization data** from the menu; then
follow the instructions on the screen.

4 After the data is updated, turn off the computer.

Your data has been deleted from the nonvolatile memory in
the computer.

Using Locks

Note:
You are responsible for evaluating, selecting, and implementing the locking devices and security features. IBM makes no comments, judgments, or warranties about the function, quality or performance of locking devices and security features.

You can protect your computer and its internal devices with locks.

To protect the internal devices under the keyboard and prevent the removal of your computer, you can purchase a Kensington lock or a compatible lock.

To protect PC Cards, you can use a PC Card lock.

Using the Security Lock

To prevent your computer and its internal devices from being removed without permission, purchase a Kensington lock or a compatible lock and do the following:

1 Lock the latch `1` on the right side of the computer to open the keyhole `2` .
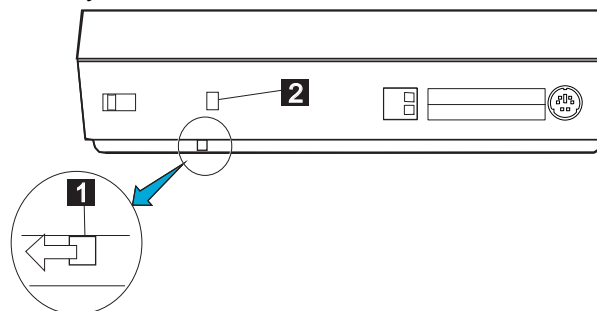
2 Attach a Kensington lock or a compatible lock to the keyhole on the side of the computer; then secure the chain on the lock to a secure stationary object.
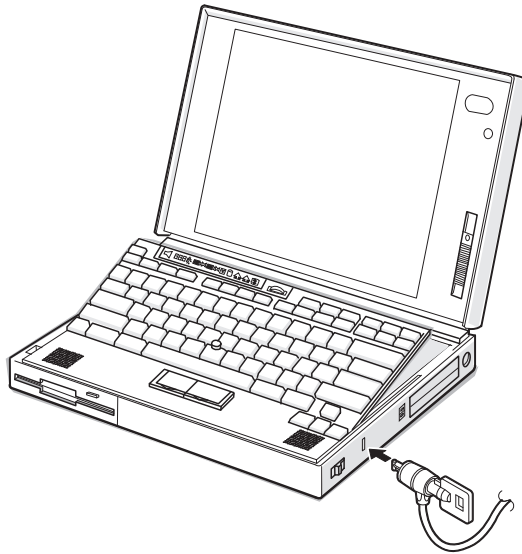
This also prevents the removal of:

Internal devices under the keyboard

Memory modules (DIMMs) in the memory slot on the bottom of the computer.

Using the PC Card Lock

To prevent PC Cards from being removed from the PCMCIA slots:

Warning:
Make sure that any locking device is unlocked.

Warning:
The hard disk drive is a very delicate device that needs careful handling. If it falls onto a hard surface, severe damage can occur.

1 Open the keyboard and remove the hard disk drive; then position the PC Card lock as shown.
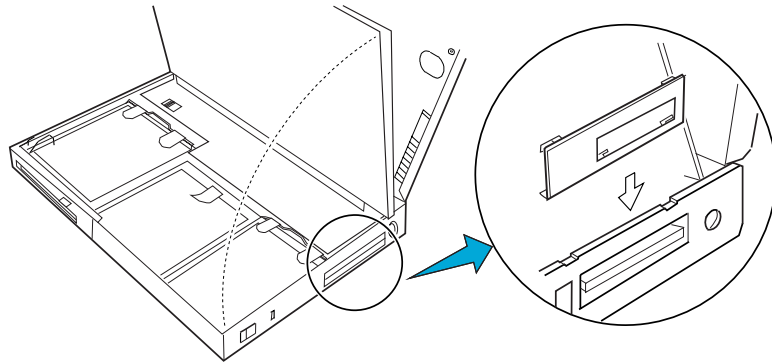
2 Fit the upper portion of the PC Card lock into the two notches 1 as shown.
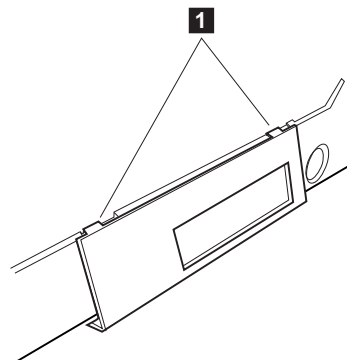
3 Insert the lower portion of the PC Card lock into the openings ⎕2⎕ on the bottom edge of the computer.
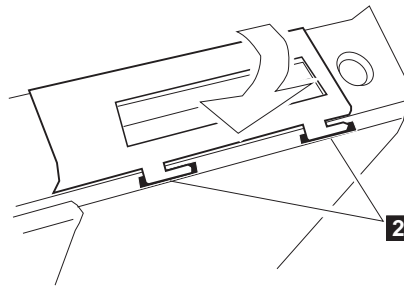
4 Slide the PC Card lock to the right.
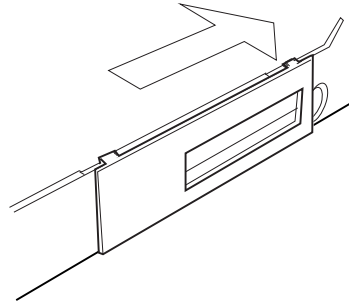
5 Insert the spacer ⎕3⎕ from the inner side of the computer as shown to stop the PC Card lock from sliding.
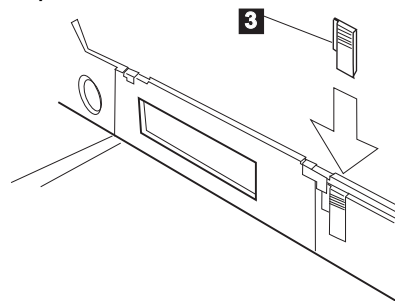
To use the security keyhole:
☞ Page 131.

6 Replace the hard disk drive and lock the keyboard using the security keyhole.

Removing the PC Card Lock

To remove the PC Card lock:

Warning:
Make sure that any locking device is unlocked.

Warning:
The hard disk drive is a very delicate device that needs careful handling. If it falls onto a hard surface, severe damage can occur.

1 Open the keyboard and remove the hard disk drive.

2 Remove the spacer from the computer.

3 Slide the PC Card lock toward the front of the computer.

4 Remove the PC Card lock first from the lower portion and then from the upper portion.

Be sure to save the PC Card lock for future use.

Using Locks

Chapter 6. Installing and Removing Options

This chapter provides information about how to install or remove external or internal devices and IBM options.

Installing and Removing PC Cards

This section explains how to install and remove a PC Card. For information about operating the computer with PC Cards, refer to "Using PC Cards" on page 53.

Note:
When installing an operating system, install the PCMCIA device driver that is on the PCMCIA Device Driver Diskette for DOS/Windows before using PC Cards.

The computer has two PCMCIA slots (upper slot 1 and lower slot 2), and you can install two *Type I* or *Type II* PC Cards (one in each slot), or a single *Type III* PC Card (in the lower slot).

To install the PCMCIA device driver:
☞ Page 179.
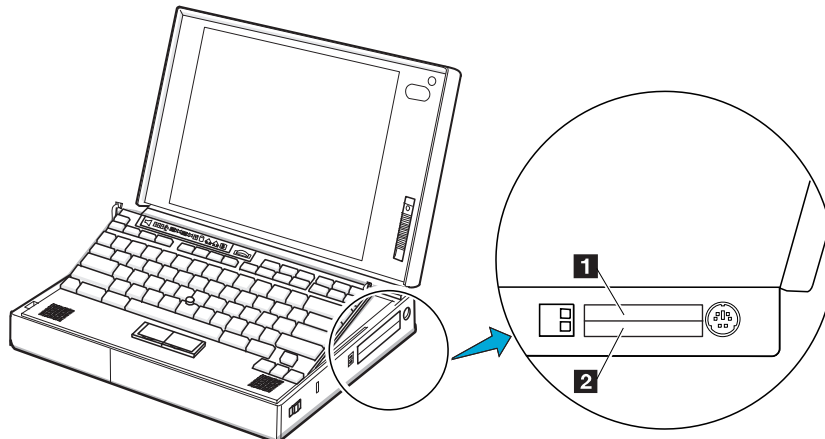
Inserting the PC Card

1 Find the notched edge 1   of the PC Card as shown.
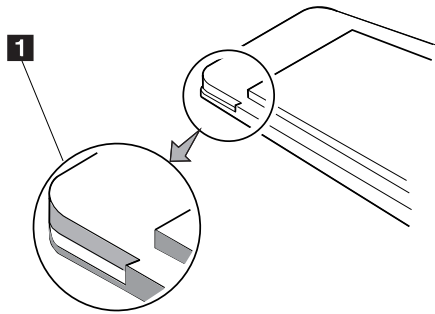
2 Insert the PC Card into an appropriate slot according to
your PC Card type. Slot covers open to the inside when
you insert the PC Card.

If you are using a Type I or Type II PC Card, insert it into
either the upper slot 1   or the lower slot 2 .

If you are using a Type III PC Card, insert the card into the
lower slot 2 .

3 Press the PC Card firmly into the connector until the eject button 1 pops out. Then, pull the eject button out slightly and fold it to the left.
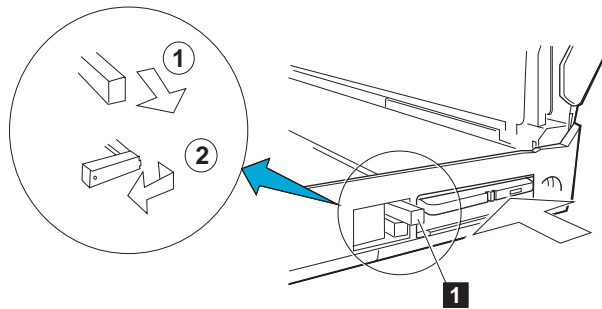
You have completed the installation of the PC Card. Refer to the following sections:

To use PC Cards, see "Using PC Cards" on page 53.

To use PC Cards with power-saving functions, see:

– "Considerations for Suspend Mode" on page 103.
– "Considerations for Hibernation Mode" on page 107.

To secure your PC Card with a lock, see "Using the PC Card Lock" on page 133.

Removing the PC Card

Warning:
Make sure the PC Card lock is removed.

To remove PC Card lock:

☞ Page 134.

Raise the PC Card eject button 1 for the PC Card you want to remove. Then, press the PC Card eject button and remove the PC Card.
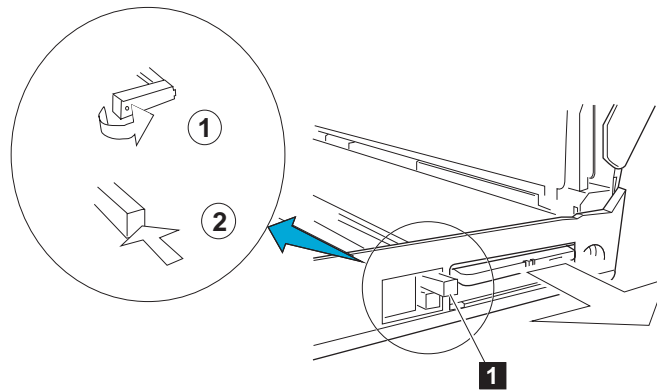
Increasing Memory Capacity

Note:
IC DRAM cards cannot be used with the 760C computer.

Increasing memory capacity is an effective way to make programs run faster. You can increase the amount of memory in your computer by installing dual inline memory modules (*DIMMs*), available as an option.
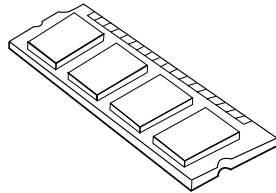
DIMM   DIMM adapter
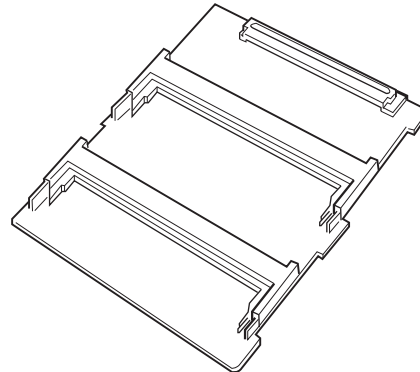
Three different capacities of DIMM (4MB, 8MB, and 16MB) are available. To use a DIMM, you need to install it on the memory module adapter (DIMM adapter) in the memory slot on the bottom of the computer. The DIMM adapter has two sockets for DIMM expansion. The memory capacity can be expanded up to 40MB when you install two 16MB DIMMs in addition to the standard memory (8MB).

Installing and Removing the DIMM

1 Turn off the computer; then disconnect the AC Adapter and all cables from the computer.

Warning:
Make sure that any locking device is unlocked.

2 If you are using any locking device with a security keyhole, remove it.

3 Unlock the latch 1 on the right side of the computer.
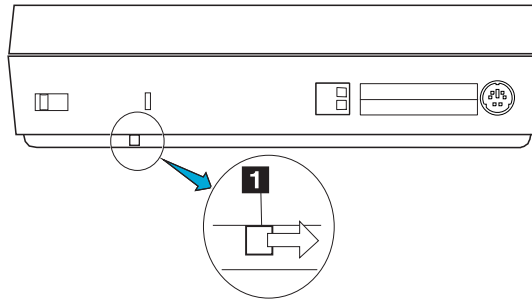
4 Turn over the computer; then slide the memory slot
cover 1 and remove it.
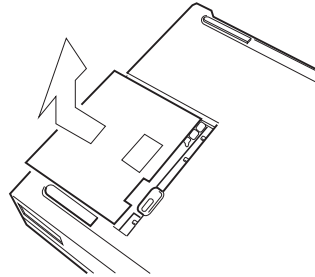
Warning:
To avoid damaging the DIMM, do
not touch its contact edge.

5 Remove the DIMM adapter by lifting up the edge 1
from the computer, and place it on a flat surface.
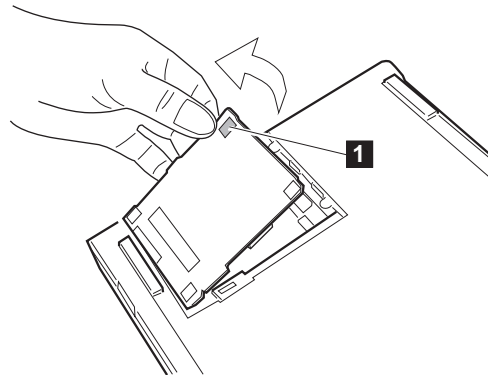
6 Which are you going to do?

Install a DIMM   Go to the next step.

Remove a DIMM   Go to step 9 on page 145.

7 Insert the DIMM (available as an option) into either of the sockets on the DIMM adapter.

   a) Find the notch   1   on the side of the DIMM.

   b) With the notched end of the DIMM toward the right side of the socket   2 , insert the DIMM, at an angle of approximately 20°, into the socket; then press it firmly.

   c) 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.
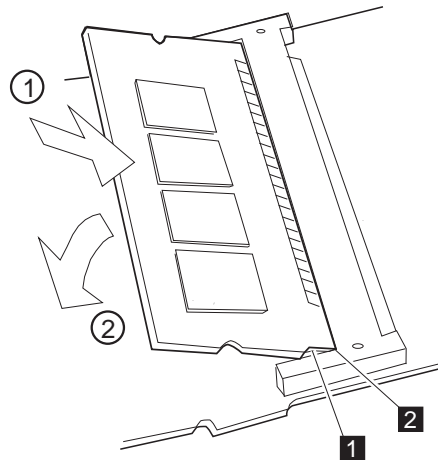
Side View
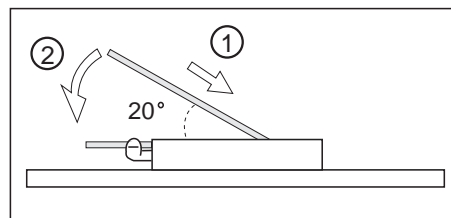
8 Go to step 10 on page 145.

Warning:
To avoid damaging the DIMM, do
not touch its contact edge.

9 Press out on the latches on both edges of the socket at the same time and remove the DIMM.
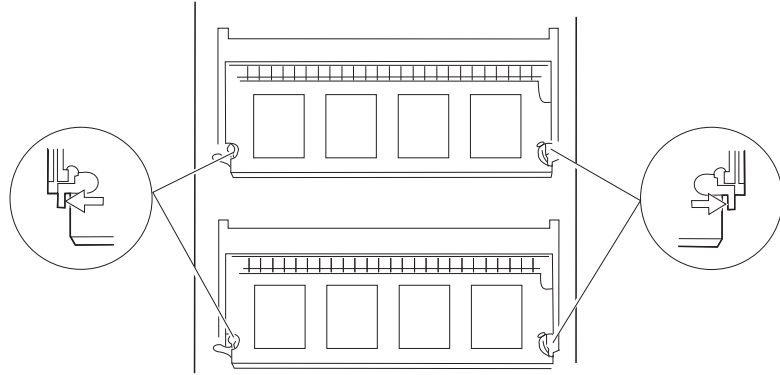
Be sure to save the DIMM for future use.

10 Attach the DIMM adapter to the computer.

a) Turn over the DIMM adapter.

b) Place it into the memory slot and then align the connectors of the DIMM adapter ┃1┃ and the memory slot ┃2┃ .
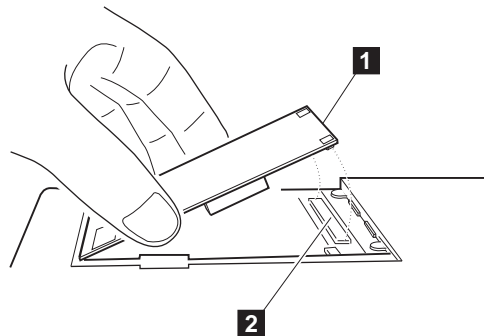
c) Press on the shaded area 1 until the DIMM adapter snaps into the memory slot connector.

Press on three points (both sides and center) of the shaded area.
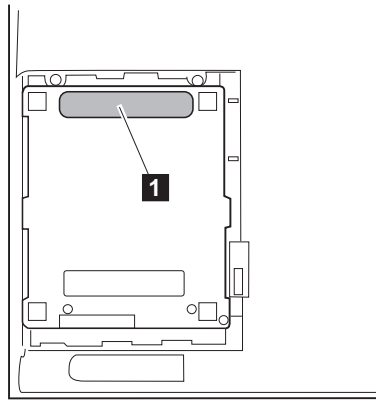
d) Make sure the DIMM adapter is firmly connected.

11 Align the matching ( ) marks on the memory slot cover and the bottom of the computer; then slide in the memory slot cover.
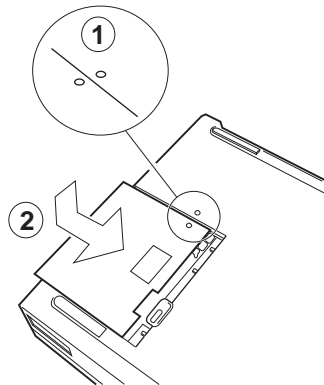
12 To confirm that the DIMM adapter is correctly attached
to the computer, do the following:

a) Calculate your total memory size by adding the DIMM
memory size to the base memory size (7808KB).

For example, if you installed two 16MB DIMMs, the total
memory size can be calculated as follows:

```
16(MB) x 2 x 1 24(KB) + 78 8(KB) = 4 576(KB)
```

b) Start Easy-Setup and confirm the memory size count at
the upper left corner of the screen as shown:

```
4 576 KB OK
```

If a `2 1` error code appears under the memory count, turn
off the computer and go to page 142 to reinstall the DIMM.

```
 78 8 KB OK

2 1
```

c) Is the total memory size the same as the value you
calculated in step 12a?

Yes   Go to the next step.

No   Turn off the computer and go to page 142 to
reinstall the DIMM.

Increasing Memory Capacity

Note:
It may take some time to complete the memory test.

d) Select **Test** from the main menu of Easy-Setup; then select **Memory**.

The memory test starts.

e) Does an `OK` message now appear under the **Memory** icon?

Yes You have installed the DIMM and DIMM adapter correctly. Exit Easy-Setup and go to next step.

No You need to reinstall the DIMM adapter. Go to page 142 and reinstall the DIMM adapter.

13 Slide the latch 1 to lock the memory slot cover.
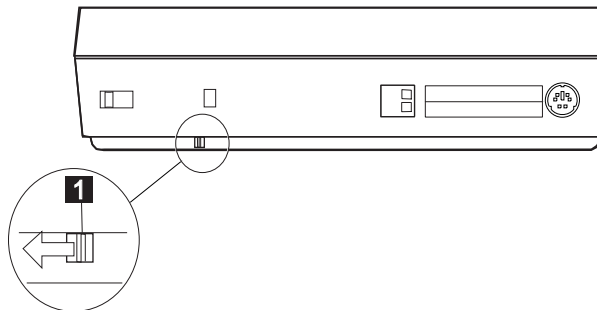
To prevent the installed DIMMs from being removed from the computer, attach a lock to the security keyhole. See page 131.

14 Close the keyboard and reconnect all cables.

You have completed the installation or removal of the DIMM.

Note:
If you changed the memory installed in the computer, you need to create a new hibernation file.

If you plan to use hibernation mode, see "Creating the Hibernation File" on page 105.

Replacing the Hard Disk Drive

The capacity of the hard disk can be increased by replacing the original hard disk drive with an optional one. This option can be purchased through your IBM authorized reseller or IBM marketing representative.

1 Turn off the computer; then disconnect the AC Adapter and all cables from the computer.

Warning:
Make sure that any locking device is unlocked.

2 Open the LCD; then open the keyboard.

Warning:
The hard disk drive is a very delicate device that needs careful handling. If it falls onto a hard surface, severe damage can occur.

3 Remove the battery pack.
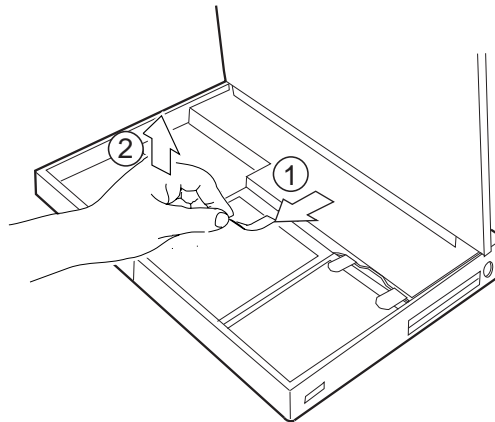
Replacing the Hard Disk Drive

4 Lift the hard disk drive handle by pulling the plastic tape
     `1` .
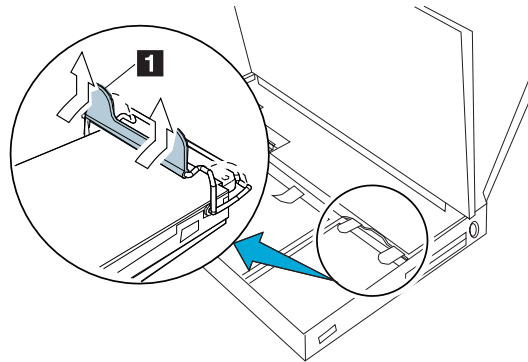
5 Remove the hard disk drive.

Be careful to hold the drive as it comes out of the bay. Gently
place it on a flat surface. After removing the drive, keep it in
the carrying case that contained the replacement drive.
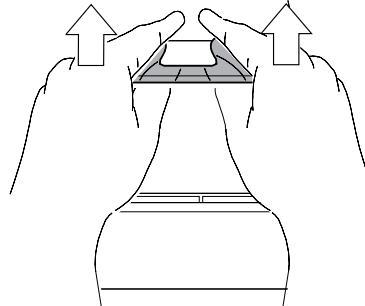
6 Insert the replacement drive. Press on the shaded area
     1   as shown until the drive snaps into the connector
  and then replace the hard disk drive handle.
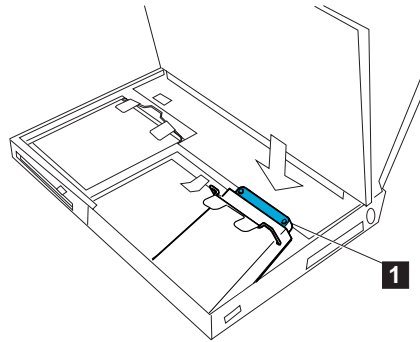
7 Replace the battery pack and then close the keyboard.

8 Connect the AC Adapter to the computer; then turn on
  the computer.

You have completed the replacement of the hard disk drive. To
install your operating system and other necessary software, see
"What You Need for Your Computer" on page 178.

Installing a Secondary Battery Pack in the UltraBay

You can extend battery operation time by using two battery packs installed in the computer at the same time. A secondary battery pack is available as an option. Before installing a secondary battery pack, remove the diskette drive from the UltraBay.

Warning:
To prevent damage to the diskette drive, make sure the AC Adapter is disconnected from the computer.

The diskette drive is a very delicate device that needs careful handling. Do not press on, drop, or apply any shock to the diskette drive while it is removed from the computer.

1 Turn off the computer; then disconnect the AC Adapter and all cables from the computer.

2 Open the LCD; then open the keyboard.

3 Make sure that no diskette is in the drive.

4 Lift the drive handle with the plastic tape, and remove the diskette drive.
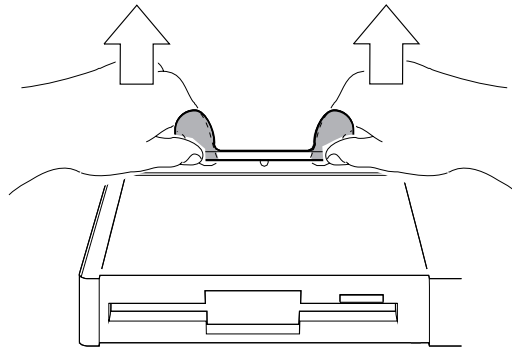
5 Pinch together both holes and remove the spacer by lifting it up slightly.
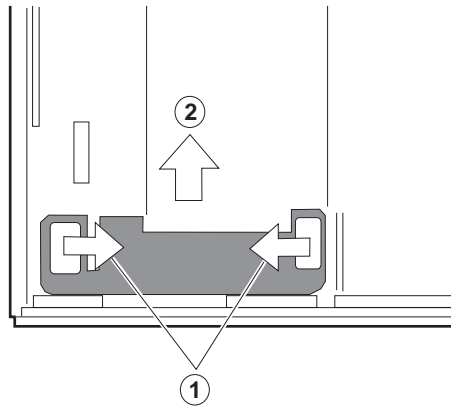
6 Place the spacer to cover the diskette drive connector.

a) Make sure the projected end 1   fits into the opening 2 .
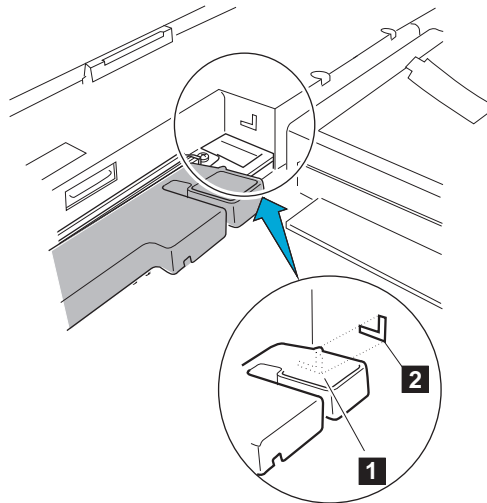
Installing a Secondary Battery Pack in the UltraBay

b) Place the spacer onto the connector and then open the battery connector cover.
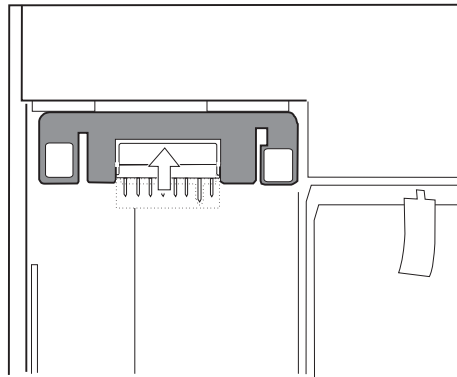
7 Slide the diskette drive bezel slightly to the left and remove it by pulling toward the front.
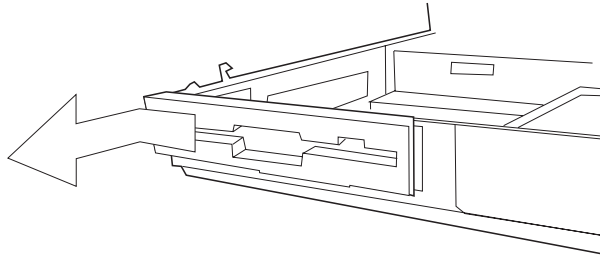
8 Place the blank bezel at the position 1 as shown and slide it to the right.
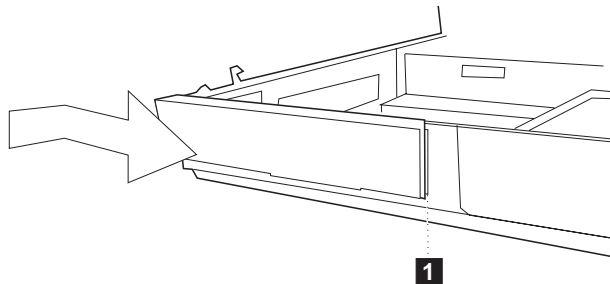
9 Insert the secondary battery pack into the UltraBay.
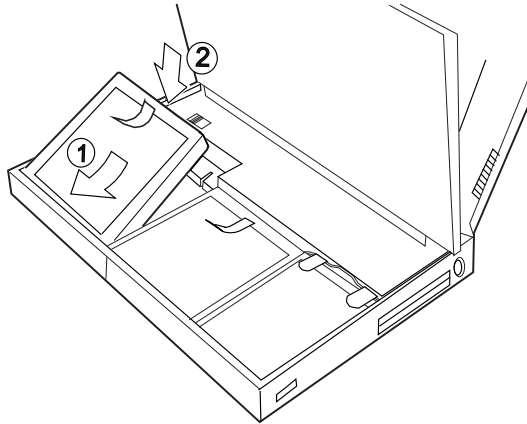
10 Close the keyboard and reconnect all cables.

You have completed the installation of the secondary battery pack. To use the secondary battery pack, see page 88.

When Replacing the Diskette Drive

Before you replace the diskette drive in the UltraBay:

1. Cover the battery connector with its cover.

2. Move the spacer back to its original position (shown in step 5 on page 153).

Installing a Secondary Hard Disk Drive in the UltraBay

You can use two hard disk drives at the same time by installing a secondary hard disk in the UltraBay. To use the secondary hard disk, you need to purchase another hard disk drive and a hard disk holder. Before installing the secondary hard disk, remove the diskette drive.

Warning:
The hard disk drive is a very delicate device that needs careful handling. Do not press on, drop, or apply any shock to the hard disk drive.

1 Attach the secondary hard disk drive to the hard disk holder.

   a) Insert the hard disk drive in the hard disk holder so that the slot 1 on the hard disk drive fits into the projection on the hard disk drive.

   b) Press the shaded area 2 until the hard disk firmly snaps into the hard disk holder; then replace the hard disk drive handle 3 .
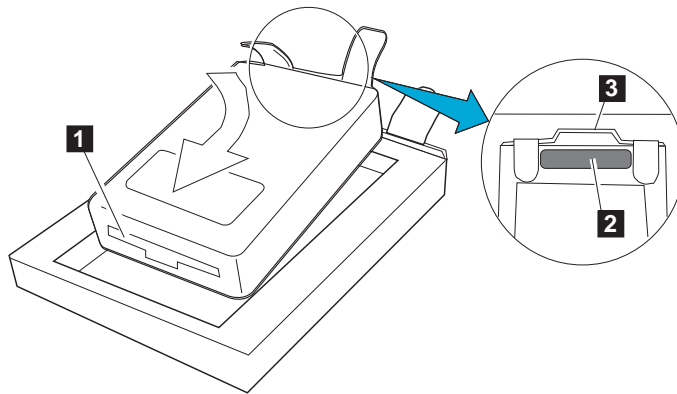
2 Close any running applications on the computer and make sure that no diskette is in the drive.

Warning:
To prevent damage to the diskette drive, make sure the AC Adapter is disconnected from the computer.

The diskette drive is a very delicate device that needs careful handling. Do not press on, drop, or apply any shock to the diskette drive while it is removed from the computer.

3 Turn off the computer; then disconnect the AC Adapter and all cables from the computer.

4 Open the LCD; then open the keyboard.

5 Remove the battery pack.
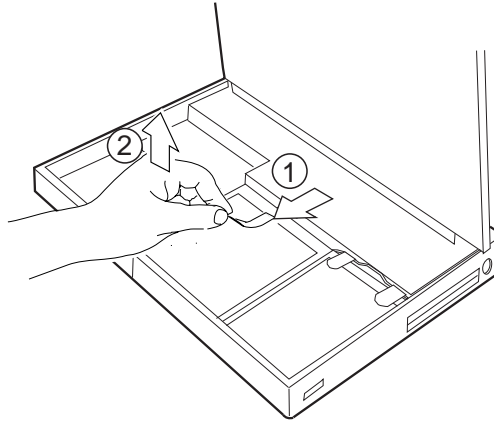
6 Lift the drive handle with the plastic tape, and remove the diskette drive.
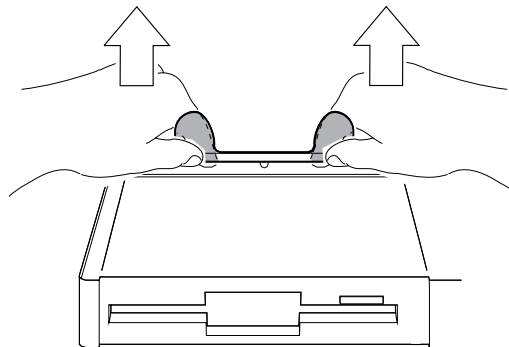
Installing a Secondary Hard Disk Drive in the UltraBay

Note:
You can see the lamp on the secondary hard disk, which turns on when data in the secondary hard disk drive is accessed, through the diskette drive bezel.

7 Place the hard disk holder (with the hard disk drive attached) into the UltraBay. Press on the shaded area 1 as shown until the drive snaps into the connector; then replace the drive handle 2 .
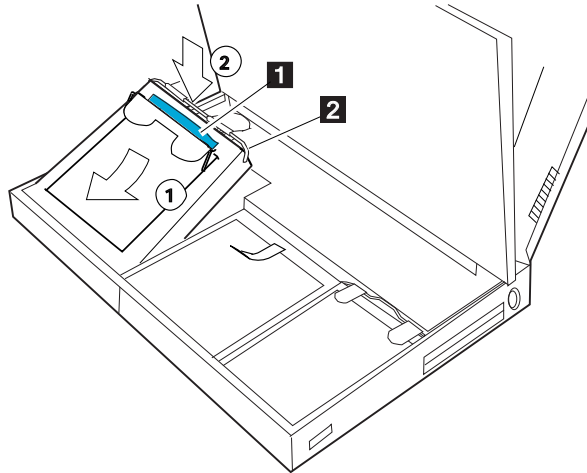
8 Replace the battery pack.

9 Close the keyboard; then reconnect all cables.

You have completed the installation of the secondary hard disk drive.

Installing an Option in the UltraBay

The diskette drive and the bezel (on the front of the computer) can be removed to install options in its place. Some options may require you to remove the option cover from the left side of the computer.

Warning:
To prevent damage to the diskette drive, make sure the AC Adapter is disconnected from the computer.

The diskette drive is a very delicate device that needs careful handling. Do not press on, drop, or apply any shock to the diskette drive while it is removed from the computer.

1 Turn off the computer; then disconnect the AC Adapter and all cables from the computer.

2 Open the LCD; then open the keyboard.

3 Remove the battery pack.
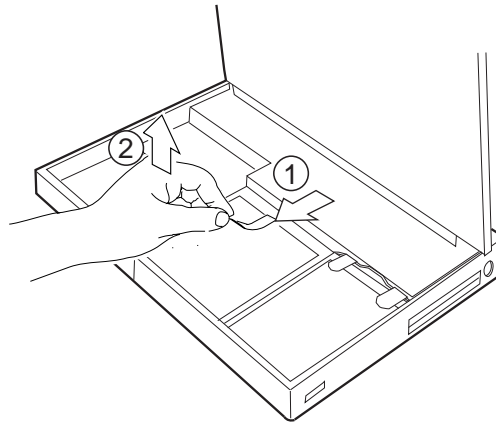
4 Make sure that no diskette is in the drive.

5 Lift the drive handle with the plastic tape, and remove the diskette drive.
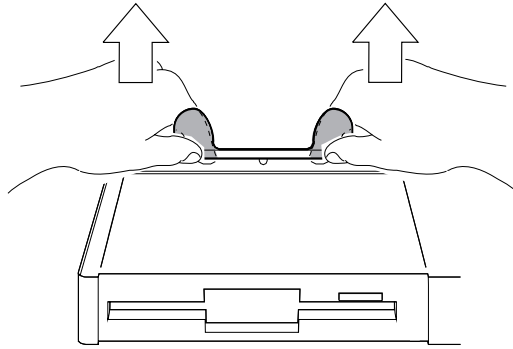
6 If the option you are installing has an option cover to be attached at the left side of the computer, do the following:

a) Push the option cover ⬛1 from the *inner side* of the computer to remove the option cover.
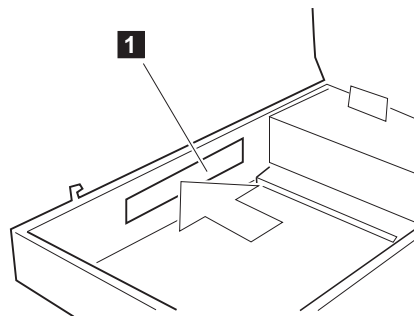
b) Attach the *new* option cover that came with your option to the side of the computer.
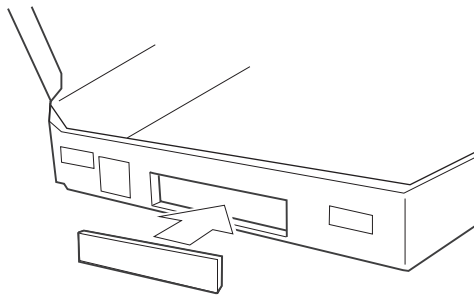
Note:
Keep the diskette drive bezel for future use.

7 If the option you are installing has a front bezel, do the following:

a) Slide the diskette drive bezel slightly to the left and remove it by pulling toward the front.
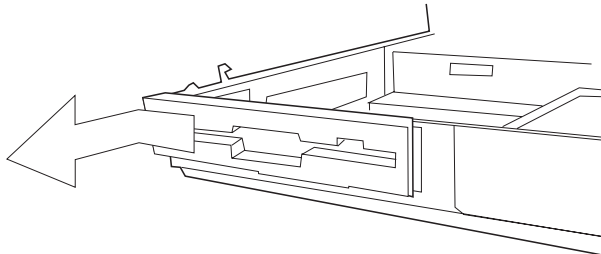
b) Place the *new* front bezel that came with your option at the position 1 as shown and slide it to the right.

1
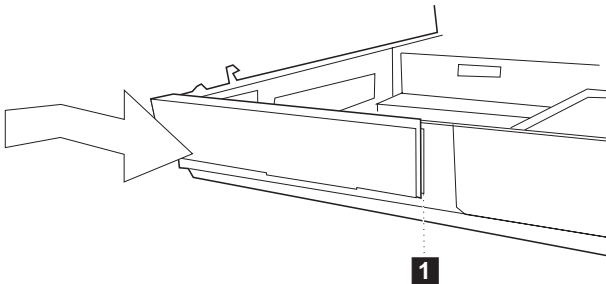
Installing an Option in the UltraBay

8 Refer to the manual that came with the option to install your option in the UltraBay.

9 Replace the battery pack.

10 Close the keyboard and reconnect all cables.

11 If the option in the UltraBay requires power, turn power on in the ThinkPad Features program.

If you are using OS/2 or Windows:

1 Start the ThinkPad Features program.

2 Click on the **UltraBay** icon ( ) in the ThinkPad view; then set the power for the UltraBay.

If you are using DOS, type `PS2 IDE2 E` at the command prompt.

Installing the DAA/Telephony Kit

Note:

In some countries, the Mwave telephony functions are only available when the DAA/Telephony Kit option is installed.

If the telephone connector on the left side of your computer is one with a square receptacle, the computer can be used for telephony or modem/fax functions without any changes. However, if a blank port cover and port cover are attached, you need to install the DAA/Telephony Kit option to use the Mwave telephony functions.

To attach the DAA/Telephony Kit:

1 Turn off the computer and open the keyboard.

2 Remove the metal port cover lock.
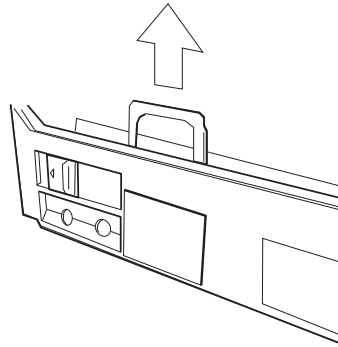
3 Remove the blank port cover on the left side of the computer from the lower portion.
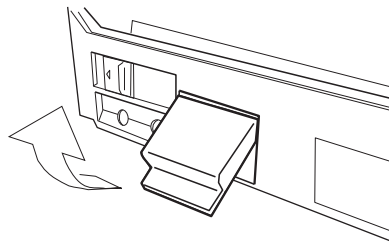
Installing the DAA/Telephony Kit

4 Install the plug with the round receptacle that came with
your option kit. Firmly press it into the connector.
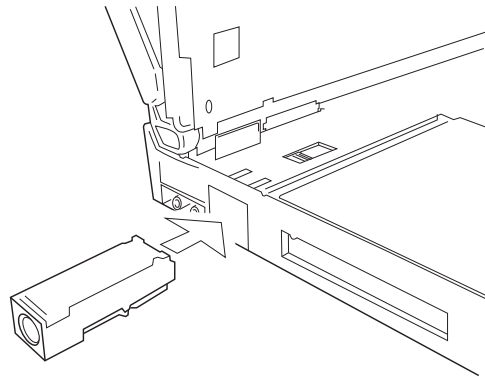
5 On the left side of the computer, install the port cover
with the round opening that came with your option kit.
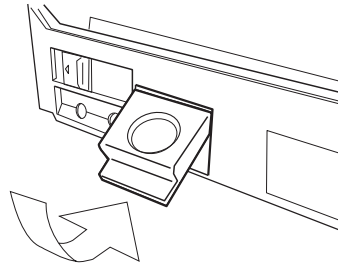
6 Install the metal port cover lock.
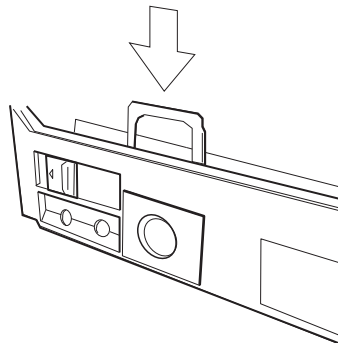
7 Close the keyboard.

8 Connect the cables:

⚠️ **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 on the DAA.

c) Connect the ferrite-core end connector ‫3‬ of the telephone cable to the square receptacle on the DAA.

d) Connect the other end of the telephone cable to the telephone outlet ‫4‬ on the wall.

DAA

‫1‬

‫2‬

‫3‬

‫4‬ Telephone Outlet

Core
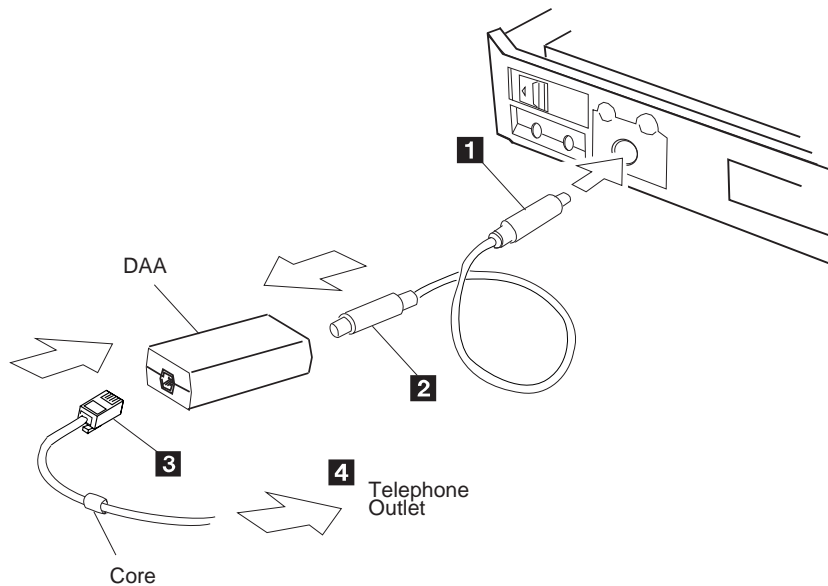
Installing the DAA/Telephony Kit

After you have finished attaching the modem/fax port, install the necessary software by referring to the manual that came with the option kit.

Refer to "Using the Telephony Function" on page 78 for information about how to use the Mwave telephony features.

Attaching an External Numeric Keypad or a Mouse

Warning:
When you connect a mouse other than an IBM PS/2 Miniature Mouse, 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. You can use both the IBM PS/2 Mouse and TrackPoint III as the pointing device.
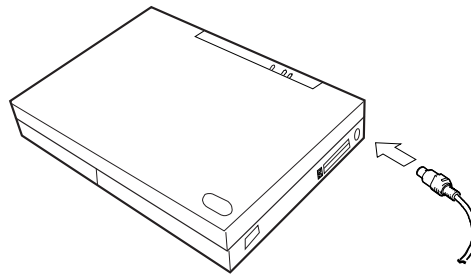
Note:
You can remove the keypad cover 1 and use it as a stand for the keypad.

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 1 to the connector at the rear of the keypad.
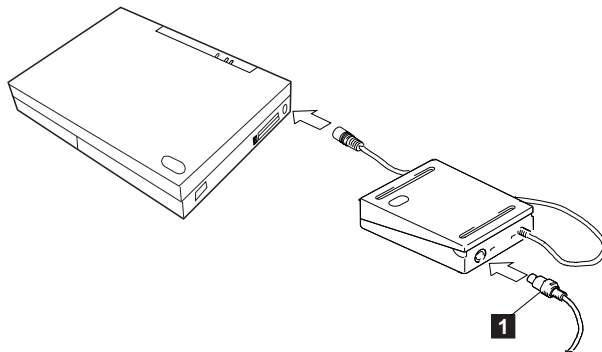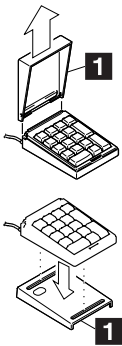
Using the Mouse and Other Pointing Devices

Note:
The appropriate software must have be installed already.

A serial mouse connected to the serial port or a device that is not compatible with the PS/2 Mouse can be connected to the external input-device connector. Some mouse types require the TrackPoint III to be disabled before you can use them. To disable the TrackPoint III:

With OS/2 or Windows:

1 Start the ThinkPad Features program.

2 Select **Setup**.

3 Select **Keyboard/Pointing Device**.

4 Find the TrackPoint; then click on **Disable** to disable the TrackPoint III.

These changes become effective when computer power is turned off and then on again.

Using the IBM ThinkPad Space Saver Keyboard

When using the IBM ThinkPad Space Saver Keyboard, *do not* install the device driver supplied with the Space Saver Keyboard. When the Space Saver Keyboard is used, the device driver on the computer's Utility Diskette automatically enables or disables the TrackPoint III of the computer when power is turned on.

Attaching an External Keyboard

You can connect an external keyboard to your computer through the keyboard/mouse connector 1 (available separately as an option).

Note:

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.

ThinkPad Features program:

Page 38.

The external keyboard must be connected through the keyboard/mouse connector. It will not work if it is connected directly to the computer.

When the external keyboard is attached, the following keys are not available:

Numeric keypad on the system keyboard
External numeric keypad

When you attach the external keyboard, turn off the computer and then attach the keyboard/mouse connector and the external keyboard.
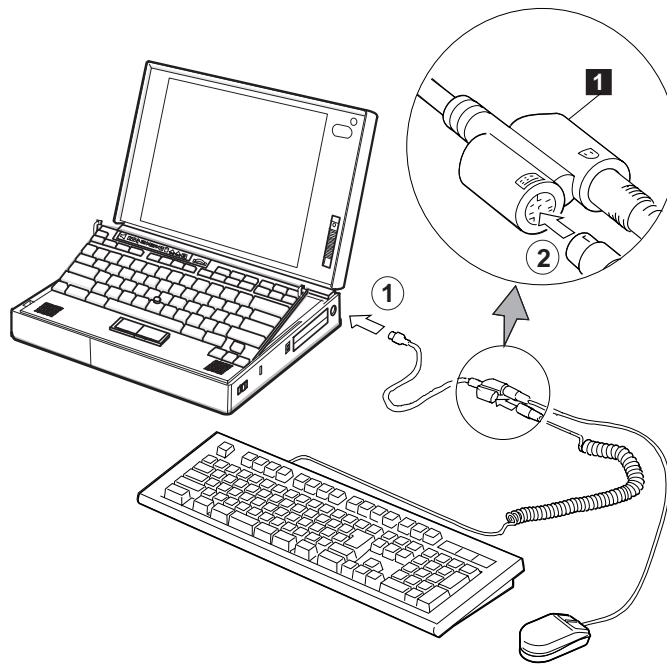
Attaching an External Display

Note:
When installing an operating system, you must install the display driver before you can use an external display.

The LCD of the computer can display information in SVGA mode (800-by-600 resolution) in 65 536 colors.

A maximum of 1024-by-768 resolution can be produced on any attached external display that supports the resolution mode.

To install the display driver:
☞ Page 179.

Warning:
When you select Both, do not attach an external display that supports only VGA mode (640-by-480 resolution). Otherwise, the external display screen will be scrambled and the output will not be displayed, or the screen might be damaged.

To attach an external display:

1 Change the display mode to **CRT** or **Both**.
(See "Changing the Display Mode" on page 171.)

2 Set your monitor type and display device driver.
(See "Setting the Monitor Type and the Display Driver" on page 172.)

3 Attach the external display to the computer.
(See "Connecting an External Display to the Computer" on page 173.)

Changing the Display Mode

You can display information on the LCD, the external display, or both by using the following commands:

Using the **Fn** key function:

Press and hold the **Fn** key; then press the **F7** key. The output is displayed sequentially as follows:

```
    External      Both
    Display

          LCD
```

Entering a PS2 command from the command prompt:

– Type `PS2 SC BOTH` to display information on both the LCD and external display.

– Type `PS2 SC CRT` to display information on the external display.

– Type `PS2 SC LCD` to display information on the LCD.

Using the ThinkPad Features program:

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

2. Select:

    – **Both** to display information on both the LCD and external display.

    – **CRT** to display information on the external display.

    – **LCD** to display information on the LCD.

3. Click on the **OK** button.

Setting the Monitor Type and the Display Driver

Before attaching the external display to your computer, set the appropriate monitor type and device driver type as follows:

1 Start the ThinkPad Features program.

2 Select the **Display** icon.

3 Select the **Monitor**.

Note:
Refer to the specification of your external display about supported resolution and VSYNC.

4 Select your display type from the Monitor Selection list, or click on the new resolution and VSYNC (refresh rate) from the list.

5 Click on **OK**.

6 Select **Device Driver**.

7 Click on the new resolution and colors; then click on **OK**.

8 Restart OS/2 or Windows to make the changes effective.

> ── **Hints and Tips** ──────────
>
> When you are using OS/2 or Windows, the *virtual screen* function is available with the ThinkPad Features program. It is used to display a part of the high-resolution screen image that is produced by the computer. Other parts can be seen by moving the screen with the TrackPoint III or other pointing device.

Connecting an External Display to the Computer

Warning:
Do not disconnect the external display while the computer is in suspend mode or hibernation mode. If no external display is attached when the computer resumes, the LCD will remain blank and the output will not be displayed. It does not depend on the resolution value.

To attach an external display to the computer:

1 Turn off the computer.

2 Attach the external display to the external display connector ( ) and to the electrical outlet.

3 Turn on the external display and the computer.

Changing the Screen Resolution or Color Depth

To change the screen resolution or color depth of an external display:

For OS/2 or Windows:

1 Start the ThinkPad Features program.

2 Select the **Display** icon.

3 Select **Device Driver**.

4 Click on the new resolution and color depth; then click on **OK**.

5 Restart OS/2 or Windows to make the changes effective.

Attaching and Replacing an External Display

The computer supports the following color depth and resolution on an attached SVGA display:

Color	Resolution
256 colors	640 by 480
	800 by 600
	1024 by 768
65 536 colors	640 by 480
	800 by 600
16 777 216 colors *	640 by 480

Note:
* To use 16 777 216 colors, set the display mode to **CRT** only.

Attaching an IBM Dock I or Dock II Expansion Unit

Warning:
Do not use the Utility Diskette that came with the IBM Dock II.

Note:
Before you dock the IBM Dock I or Dock II to the computer, see *Dock I User's Guide* or *Dock II User's Guide*.

Warning:
When setting up the Dock I or Dock II, avoid any hardware conflicts.

To avoid hardware conflicts:
☞ Page 243.

To expand your computer, you can use an IBM ThinkPad Dock I or Dock II expansion unit. Either unit offers you a portable multimedia environment: CD-ROM drive bay, stereo speakers, and adapter slots for various adapter cards.

The illustration shows the computer attached to the Dock II.
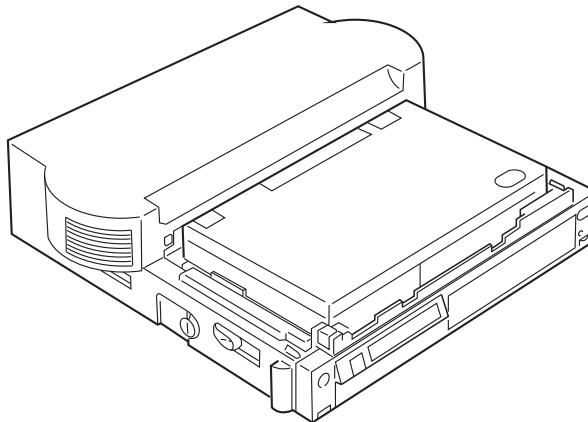
Hints and Tips

When an IBM Dock I expansion unit is attached to the computer, you can adjust the sound volume by using the following key combinations:

When you press and hold **Fn** and then press **PgUp** (⬛▲), the sound volume increases.

When you press and hold **Fn** and then press **PgDn** (⬛▼), the sound volume decreases.

Attaching an IBM Dock I or Dock II Expansion Unit

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 reinstalling an operating system.

What You Need for Your Computer

Your computer comes with the following software already installed:

Mwave Device Driver
IR Device Driver
PCMCIA device driver
PC Card Director program
ThinkPad Features program
ThinkPad display 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 preinstalled software. Refer to the manual that came with the PC Card to install the device driver.

Page numbers:

For OS/2:

For DOS:

For Windows:

The following shows you what must be installed for each operating system before you can begin computer operation.

OS/2 Warp Version 3 or later

1   Install OS/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 7.0 or later

7   Install DOS

8   Install ThinkPad Features Program

9   Install PCMCIA device driver

10   Install Mwave Support Software

Microsoft Windows Version 3.11 or later

11   Install DOS

12   Install ThinkPad Features for DOS

13   Install Microsoft Windows
- Install with Advanced Power Management
- Install ThinkPad display driver

14   Install ThinkPad Features for Windows

15   Install PCMCIA device driver

16   Install Mwave Support Software

17   Install Infrared device driver

Start Computer Operation

Installing the Operating System

The operating systems supported by your computer are:

IBM Operating System/2 (OS/2) Warp Version 3 or later
IBM PC DOS Version 7.0 or later
Microsoft Windows 3.11 or later

Important

If you will be installing Windows 3.11 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 to install your operating system and
its device drivers:

If you are installing OS/2: go to "Installing Software for OS/2"
on page 181.

If you are installing DOS: go to "Installing Software for DOS" on
page 191.

If you are installing Windows: go to "Installing Software for
Windows" on page 197.

Installing Software for OS/2

This section describes the installation procedures for OS/2 Warp Version 3 or later and its device drivers for your ThinkPad.

Your computer comes with the following software already installed at the time of purchase. When reinstalling OS/2 Warp Version 3 or later, install this software for your computer to work as it did:

> OS/2 Warp Version 3 or later
> ThinkPad Features program
> PCMCIA device driver
> Mwave DSP support software
> Infrared device driver
> ThinkPad display driver

Installing IBM OS/2 Warp Version 3 or Later

Your installation of OS/2 Warp will differ, depending on whether you use the *Dual Boot* or the *Boot Manager* for switching between OS/2 Warp and DOS.

Which type are you going to use?

Dual Boot   Go to "Installing OS/2 Warp with Dual Boot" on page 182.

Boot Manager   Go to "Installing OS/2 Warp with the Boot Manager" on page 183.

Installing OS/2 Warp with Dual Boot

When you install OS/2 Warp with Dual Boot, do the following before actually installing OS/2:

To install the DOS ThinkPad Features program:
☞ Page 192.

If DOS and Windows are not installed in the computer, install DOS and Windows, and the ThinkPad Features program for both DOS and Windows.

To install the Windows ThinkPad Features program:
☞ Page 202.

Install OS/2 Warp by referring to the documentation.

Note:
If you have the OS/2 Warp 3.0 FixPak WFP_ (XR0W005), install it after you complete the installation of OS/2 Warp. Follow the instructions in the README.1ST file in diskette 1 of that FixPak.

Be sure to pay attention to the following during installation:

Select **VGA** as the **Primary Display** in the **System Configuration** screen.

Do not select the **PCMCIA Feature** in the **System Configuration** screen. Leave it as **No Support Installed**.

If you want to continue to install all device drivers, continue with "Installing the ThinkPad Features Program for OS/2" on page 184.

Installing OS/2 Warp with the Boot Manager

When you install OS/2 Warp with the Boot Manager:

1 Install the Boot Manager, referring to the OS/2 Warp documentation.

2 Install DOS and Windows, and the ThinkPad Features programs for both DOS and Windows.

To install the DOS ThinkPad Features program:

☞ Page 192.

To install the Windows ThinkPad Features program:

☞ Page 202.

3 Install OS/2 Warp by referring to the documentation.

Be sure to pay attention to the following during installation:

Select **VGA** as the **Primary Display** at the **System Configuration** screen.

Do not select the **PCMCIA Feature** at the **System Configuration** screen. Leave it as **No Support Installed**.

After OS/2 has been successfully installed, make sure you restart the computer.

Note:

If you have the OS/2 Warp 3.0 FixPak WFP_ (XR0W005), install it after you complete the installation of OS/2 Warp. Follow the instructions in the README.1ST file in diskette 1 of that FixPak.

If you want to continue to install all device drivers, continue with "Installing the ThinkPad Features Program for OS/2" on page 184.

Installing the ThinkPad Features Program for OS/2

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

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**.

To install the ThinkPad Features program:

1 Turn on the computer and start OS/2.

2 Insert the Utility Diskette into the diskette drive.

3 Install the ThinkPad System Management device driver.

    a) Open the System Setup folder in the OS/2 System folder.

    b) Select **Device Driver Install**.

    c) Click on the **Install...** button.

    d) Click on **ThinkPad System Management Device Driver**; then click on **OK**.

4 Open the OS/2 full screen command prompt.

5 Go to the A: prompt and type **INSTALL2**; then press **Enter**.

6 Install the DOS ThinkPad Features program to use the PS2 commands.

    a) Exit the OS/2 full screen; then open the DOS full screen.

    b) Follow the instructions in "Installing the ThinkPad Features Program for DOS" on page 192.

You have completed the installation of the ThinkPad Features program.

If you want to continue to install all device drivers, continue with "Installing the PCMCIA Device Driver for OS/2" on page 185.

Installing the PCMCIA Device Driver for OS/2

When installing an operating system, you need to install the following device drivers and software associated with PCMCIA before you can use the PC Cards:

PC Card Director:
☞ Page 54.

Card Services device driver
Socket Services device driver
Resource Map Utility device driver
PC Card Power Management device driver
PC Card Director Utility
PC Card client device drivers (only when PC Card Director does not support the PC Card)

To install the PCMCIA device driver:

1 Turn on the computer and start the operating system.

2 Insert the PC Card Director for OS/2 diskette into the diskette drive.

3 Open the OS/2 full screen command prompt.

4 Type `C:\>A:\PCMINST2` on the command line; then press **Enter**.

5 Follow the instructions on the screen.

6 Click on **OK** when you have completed the installation.

7 After the installation is complete, close all applications, remove the diskette from the diskette drive, and restart the system.

Note:
Whenever you update the CONFIG.SYS file, refer to "Adding to the CONFIG.SYS File" on page 253.

You have completed the installation of the PCMCIA device driver for OS/2.

Installing the Mwave DSP Support Software for OS/2

Note:
When installing an operating system, you need to install the Mwave DSP support software.

If you have multiple operating systems, you might need to install multiple versions of the Mwave DSP support software. For example, to enable OS/2 and Windows applications for Mwave functions, two separate Mwave DSP support software installations are required: one for OS/2 and one for Windows.

The Mwave DSP 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 DSP support software.

If the Mwave DSP Features Diskettes were supplied with your computer, install the Mwave DSP support software as follows:

1 Turn on the computer; then start OS/2.

2 Open the OS/2 full screen command prompt.

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.

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 DSP support software.

You have completed the installation of the Mwave DSP support software for OS/2.

When You Use the WIN-OS/2 Environment

If you use the Mwave functions in WIN-OS/2:

1. Install the Mwave DSP support software for Windows in a full screen WIN-OS/2 environment with the procedure on page 205.

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

You have completed the installation of the Mwave DSP support software.

If you want to continue to install all device drivers, continue with "Installing the Infrared Device Driver for OS/2" on page 188.

Installing the Infrared Device Driver for OS/2

Note:
When installing an operating system, you need to install the Infrared device driver.

To install the infrared device driver:

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.

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
```
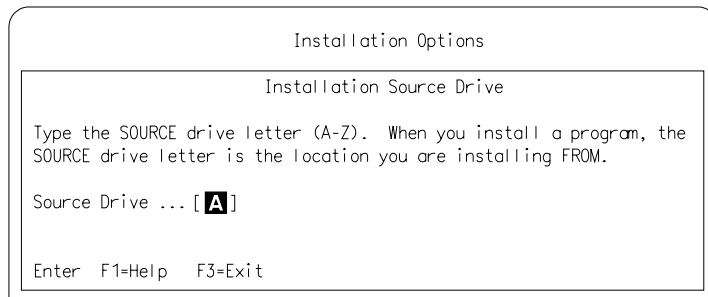
6 Press **Enter**; then follow the instructions on the screen.

Select **Install WIN-OS/2 ThinkPad Infrared Driver** when you are asked.

You have completed the installation of the Infrared device driver.

Starting TranXit or Other Infrared Applications

If you are going to start TranXit or any other infrared applications that use the ThinkPad infrared device driver from:

The Program Manager window, do the following:

1. Click on the Program Manager object in the **Windows Programs** folder or the **WIN-OS2** (full screen or window) object in the **Command Prompts** folder with the right mouse button.

2. Select **Settings**, **Session**, and then **WIN-OS/2 Settings.**

3. Modify the following setting as shown:

   COM_DIRECT_ACCESS   ON

A separate object that you have created for the infrared application, do the following:

1. Click on the object with the right mouse button.

2. Select **Settings**, **Session**, and then check **Separate Session.**

3. Select **WIN-OS/2 Settings** and modify the following setting as shown:

   COM_DIRECT_ACCESS   ON

If you want to continue to install all device drivers, continue installation with "Installing the ThinkPad Display Device Driver for OS/2" on page 190.

Installing the ThinkPad Display Device Driver for OS/2

Note:
When installing an operating system, you need to install the ThinkPad display device driver.

ThinkPad Features:
☞ Page 38.

The display driver enables you to use screen resolutions from 640 by 480 to 1024 by 768 and colors from 256 to 16 million for the LCD and external display. (See page 173 for possible combinations of resolution and color.) The display driver also takes advantage of the computer's video capability.

Before Installation

Before you begin installing the display driver, set the display device mode to *LCD*: select the **Display** icon and then **LCD** in the ThinkPad Features program; or at the command prompt, type **PS2 SC LCD** and press **Enter**.

To install the ThinkPad display device driver:

1 Start OS/2.

2 Insert the ThinkPad Video Features Diskette for OS/2 into the diskette drive.

3 Open the OS/2 full screen or OS/2 window.

4 Go to the `A:` prompt; then type `INSTALL` and press **Enter**.

```
A:>INSTALL
```

5 Follow the instructions on the screen.

6 After the installation is complete, remove the diskette, shut down OS/2, and restart the system.

You have completed the installation of the display driver for OS/2.

DOS

Installing Software for DOS

This section describes the installation procedures for DOS Version 7.0 or later and its device drivers for your ThinkPad.

Your computer comes with the following software already installed at the time of purchase. When reinstalling DOS Version 7.0 or later, install this software for your computer to work as it did:

DOS Version 7.0 or later
ThinkPad Features program
PCMCIA device driver
Mwave support software

Installing IBM PC DOS Version 7.0 or Later

Follow the instructions in the operating-system documentation. If you also are installing Microsoft Windows 3.11 or later, go to "Installing Microsoft Windows Version 3.11 or Later" on page 198. Otherwise, if you want to continue to install all device drivers, continue with the ThinkPad Features program.

Installing the ThinkPad Features Program for DOS

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

Do the following to install the ThinkPad Features program:

1 Turn on the computer.

2 Insert the 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
```
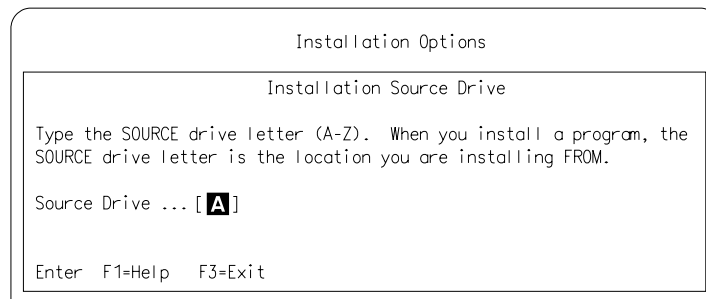
3 Press **Enter**.

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.

If you want to continue to install all device drivers, continue with the PCMCIA device driver.

Installing the PCMCIA Device Driver for DOS

Note:
Do not install Phoenix** PCMCIA support in IBM PC DOS 7.0.

PC Card Director:
☞ Page 54.

When installing an operating system, you need to install the following device drivers and software associated with PCMCIA before you can use the PC Cards:

> Card Services device driver
> Socket Services device driver
> Resource Map Utility device driver
> PC Card Power Management device driver
> PC Card Director Utility
> PC Card client device drivers (only when PC Card Director does not support the PC Card)

To install the PCMCIA device driver:

1 Turn on the computer and start the operating system; then insert the PC Card Director for DOS/Windows diskette into the diskette drive.

2 Type `C:\>A:`; then press **Enter** to go to the A: prompt.

3 Type `A:\>PCMCINSTD`; then press **Enter**.

The following screen appears:

```
              Installation Options

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**.

5 Press **Enter** again when the confirmation message appears.

The Installation Options menu appears.

6 Follow the instructions on the screen.

Note:
Whenever you update the
CONFIG.SYS file, see page 253.

7 After the installation is complete, close all applications and remove the diskette from the diskette drive.

You have completed the installation of the PCMCIA device driver for DOS.

If you want to continue to install all device drivers, continue with the Mwave DSP support software.

Installing the Mwave DSP Support Software for DOS

Note:
When installing an operating system, you need to install the Mwave DSP support software.

If you have multiple operating systems, you might need to install the Mwave DSP support software for each operating system. For example, to enable DOS and Windows applications for Mwave functions, two separate Mwave DSP support software installations are required: one for DOS and one for Windows.

The Mwave DSP support software is supplied in the Mwave DSP Features Diskettes or on 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 DSP support software.

If the Mwave DSP Features Diskettes were supplied with your computer, install the Mwave DSP support software as follows:

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 DSP 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 DSP support software.

You have completed the installation of the Mwave DSP support software for DOS.

Installing Software for Windows

This section describes the installation procedures for Windows Version 3.11 or later and its device drivers for your ThinkPad.

Your computer comes with the following software already installed at the time of purchase. When reinstalling Windows Version 3.11 or later, install this software for your computer to work as it did:

    DOS Version 7.0 or later
    ThinkPad Features program for DOS
    Windows Version 3.11 or later
    ThinkPad display driver
    ThinkPad Features program
    PCMCIA device driver
    Mwave support software
    Infrared device driver

Important

If you will be installing Windows 3.11 or later, you **must** first 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.

Installing Microsoft Windows Version 3.11 or Later

Windows operates in a DOS environment. Install the following before installing Windows:

DOS Version 7.0 or later (see your DOS manuals)
ThinkPad Features for DOS (see page 192)

Important

Before you install Windows Version 3.11 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 3.11 or later with Advanced Power Management (APM) and the ThinkPad display driver.

1 Turn on the computer.

2 Install Windows Version 3.11 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.

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 3.11 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
```

3 When you have completed the installation of Windows Version 3.11, edit the AUTOEXEC.BAT file so that the computer will use the correct mouse driver.

When Windows Version 3.11 is installed, the computer is automatically configured to use the MOUSE.COM driver provided by Windows Version 3.11. 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.

Note:
You can change the display resolution type by using the ThinkPad Features program after completing the installation.

4 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 3.1 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 (an example is shown in the following screen). If the item has not changed, return to step 4a.

```
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:        Cyber932  8  ×6    256 small font
      Mouse:          Microsoft, or IBM PS/2
```

     e) Press **Enter** to continue the installation.

     f) 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.

If you want to continue to install all device drivers, continue with
"Installing the ThinkPad Features Program for Windows" on
page 202.

Installing the ThinkPad Features Program for Windows

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

If you are going to use Windows, install the ThinkPad Features program for DOS first (see page 192); 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...			
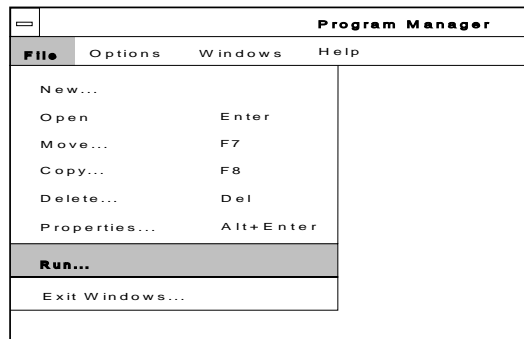
3 Insert the Utility Diskette into the diskette drive.

4 Type A:\INSTALLW and press **Enter**.

You have completed the installation of the ThinkPad Features program.

If you want to continue to install all device drivers, continue with "Installing the PCMCIA Features for Windows" on page 203.

Installing the PCMCIA Features for Windows

Note:

When installing an operating system, you need to install the PCMCIA device driver.

The PCMCIA device driver for Windows must be installed with Windows 3.11 or a later version with enhanced mode. Otherwise, it cannot be installed.

PC Card Director:

☞ Page 54.

You must install the following device drivers and software associated with PCMCIA before you can use the PC Cards:

Card Services device driver
Socket Services device driver
Resource Map Utility device driver
PC Card Power Management device driver
PC Card Director Utility
PC Card client device drivers (only when PC Card Director does not support the PC Card)

To install the PCMCIA device driver:

1 Turn on the computer and start the operating system.

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...                                  |
| |                                                 |
```
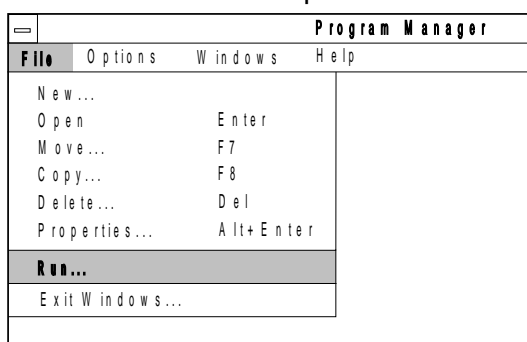
3 Insert the PC Card Director for DOS/Windows diskette into the diskette drive.

4 Type A:PCMINSTW and press **Enter**.

When the dialog box for the installation program appears, click on **OK**.

5 Follow the instructions on the screen to complete the installation.

6 After the installation is complete, remove the diskette
from the diskette drive; then restart the computer.

You have completed the installation of the PCMCIA device driver for
Windows.

If you want to continue to install all device drivers, continue with
"Installing the Mwave DSP Support Software for Windows" on
page 205.

Installing Mwave DSP Support Software for Windows

Installing the Mwave DSP Support Software for Windows

Note:
When installing an operating system, you need to install the Mwave DSP support software.

If you have multiple operating systems, you might need to install the Mwave DSP support software for each operating system. For example, to enable DOS and Windows applications for Mwave functions, two separate Mwave DSP support software installations are required: one for DOS and one for Windows.

The Mwave DSP support software is supplied in the Mwave DSP Features Diskettes or on 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 DSP support software.
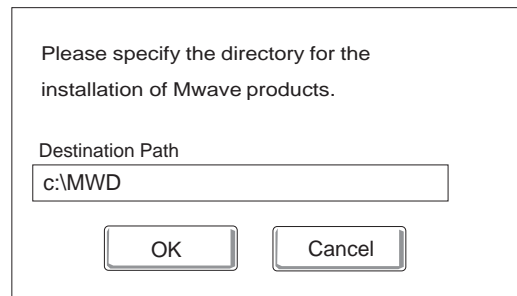
If the Mwave DSP Features Diskettes were supplied with your computer, install the Mwave DSP support software and MIDI sample files (if this is your first installation) as follows:

Warning:
Before you install the Mwave DSP support software, close all open applications.

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 DSP support software, appears:

```
Mwave Installation

 ?   Please enter the desired location for the Mwave files.

c:\MWW

       OK          Cancel
```

5 If the 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 DSP support software.

If this is your first time to install the Mwave DSP Support Software, also install the MIDI sample files as follows:

8 Follow the same procedures from step 2 to step 7 on page 206; however, this time use the Mwave DSP Features Diskette 1 for MIDI (for Windows) instead of the Mwave DSP Features Diskette 1 for Windows.

You have completed the installation of the Mwave DSP support software for Windows.

Installing the Infrared Device Driver for Windows

Note:
When installing an operating system, you need to install the Infrared device driver.

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
```
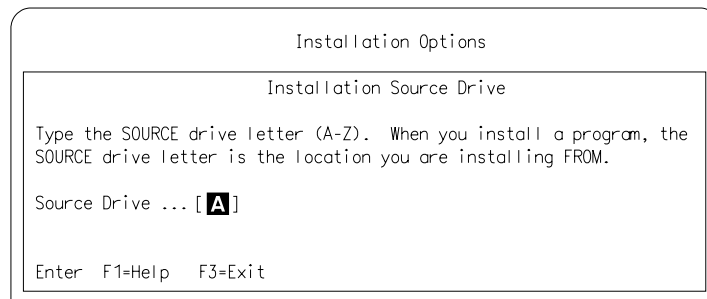
4 Press **Enter**; then follow the instructions on the screen.

Select **Install Windows ThinkPad Infrared Driver** when you are asked.

You have completed the installation of the Infrared device driver for Windows.

Installing the ThinkPad Display Driver for Windows

If you did not install the display driver when Windows was installed (by following the procedures on page 198), you must install the ThinkPad display device driver. The display driver enables you to use screen resolutions from 640 by 480 to 1024 by 768 and colors from 256 to 16 million for the LCD and external display. (See page 173 for possible combinations of resolution and color.)

The display driver also takes advantage of the computer's video capability.

Before installation

Before you begin installing the display driver, set the display device mode to *LCD*: select the **Display** icon and then **LCD** in the ThinkPad Features program; or at the command prompt, type **PS2 SC LCD** and press **Enter**.

To install the ThinkPad device driver:

1 Turn on the computer.

Note:
To exit Windows:

1. Double-click the Control Menu box in the upper left corner of the Program Manager window.
2. Click on the OK button to exit Windows.

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 for Windows 3.1 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.

Chapter 8. Solving Computer Problems

Computer problems can be caused by software, hardware, or both.
You can diagnose and solve many problems with the assistance of
the self-tests and system programs contained in *Easy-Setup*. 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.

Important

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.

What If Your Computer Does Not Work?

Commonly Asked Questions and Problems

This section provides:

Common problems and their corresponding actions.
Frequently asked questions and their answers.

Common Problems and Actions

Problems	Actions
My **modem** application does not work with the Mwave modem.	Verify that: Your application is using **COM2** as a communication port. COM2 is assigned to the Mwave modem as a default. Your application's **modem type** is set to one of the following: – Mwave modem – Generic Hayes-type modem – Hayes SmartModem 2400 – Hayes modem – Hayes-compatible modem For more information: – *For OS/2 or Windows,* double-click on the **Read me** icon. – *For DOS,* see the README.TXT file in the MWD subdirectory.

My **modem** application does not work with the PC Card modem.	If the PC Card Director shows the PC Card modem status "Ready," add the following option switch in the CONFIG.SYS file:
	
	For DOS:
	
	`    IBMDSS 1.SYS /IO =x  (or /IO1=x)`
	
	For OS/2:
	
	`    IBM2SS 1.SYS /IO =x  (or /IO1=x)`
	
	Note: *x* shows the PCMCIA slot number (1, 2, or 12) on the computer and "/IO1=" shows the slot number on a Dock I, Dock II, or port replicator that is attached to the computer.

What If Your Computer Does Not Work?

Problems	Actions
My **PC Card modem** does not work.	Your computer is equipped with a built-in Mwave modem. If you want to use the PC Card modem instead of the Mwave modem, you need to release a communications port (COM port) for the PC Card modem. Do the following: *For OS/2 or Windows,* start the **ThinkPad Setup** program and release a COM port for your PC Card modem by: – Disabling the **InfraRed Device** in the **Infrared** section. – Disabling the **Telephony Function** in the **DSP** section. – Changing the COM port for the **Telephony Function** from **COM2** to **COM1.** See page 38 to use the ThinkPad Setup program. *For DOS*, use the PS2 command to disable the telephony function or infrared port to release a COM port for the PC Card modem. For more information or the latest tips, refer to: – PC Card Problems on page 233 – READ.ME file and PCMCIA.CRD file in the THINKPAD subdirectory of the computer
I cannot use PC Cards other than the IBM ones in the OS/2 Warp environment.	If you do not have the PC Card device driver for OS/2 but you have one for DOS, your PC Card may run in the VDM (virtual DOS machine) environment. Refer to the "Virtual Card Services for OS/2" in the *OS/2 Warp User's Guide* for setting the VDM and the sample configuration files on the PCMCIA Device Driver Diskette for OS/2. (If the PCMCIA Device Driver Diskette for OS/2 did not come with the computer, create it using the Diskette Factory program.)
My computer does not show as good performance as I expected.	Performance varies depending on your hardware and software configurations such as memory size, swapper file size, or smart drive settings.
Error 2XX appears (memory error).	Make sure your memory card is correctly installed.

Problems	Actions
A **memory shortage or memory error** occurs.	*When you are using DOS,* it is recommended that you use the DOS command MEM /C to review your DOS memory usage occasionally. And then: – Unload any unnecessary drivers from the CONFIG.SYS file. (For example, unload printer drivers if you do not use a printer.) – Reconfigure the UMB (upper memory block) using the DEVICEHIGH statement. – Use the multiple configuration setup for DOS (refer to the documents supplied with DOS). *When you are using Windows:* – Try the same actions as described for DOS. – Unload any unnecessary programs from the WIN.INI file (for example, FUELWIN for AC operations, LRGPTR for large cursor, and so on.)
The **external display** screen is blank.	Do the following: Make sure the display mode parameter of the ThinkPad Features program is set to **CRT** or **Both**. In the ThinkPad Features program, set the computer not to enter suspend mode when the LCD is closed.
The computer does **not resume from suspend mode**, or the suspend lamp stays on and the computer does not work.	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.
The computer does **not enter suspend or hibernation mode.**	Verify that: If the computer is attached to Dock I, suspend mode is disabled. If the computer is attached to Dock II, open the Docking Control utility and verify suspend and hibernation are not disabled. If either is disabled, enable it. If the AC Adapter is used and the computer is communicating, suspend and hibernation modes are disabled. (See page 103.)
When using Windows, the **cursor does not move** after normal operation is resumed from one of the power-saving modes.	Make sure you have installed Windows with the APM option by following the procedures on page 198.

Frequently Asked Questions and Answers

Questions	Answers
How can I expand my hard disk space?	Most of the preloaded applications provide a way to delete and free hard disk space. Check whether or not the application you want to delete has its own delete icon.
How can I expand my memory?	See answers to memory questions on page 213.
How can I get diskettes for operating systems or device drivers?	You can create the operating systems diskettes or device driver diskettes by using the Diskette Factory program or any other backup programs. If you cannot use Diskette Factory program, do the following: In the U.S., Access the IBM PC Company BBS (see "Electronic Support Services" on page 238 to get a telephone number) to get the latest versions of device drivers diskettes. Purchase the operating systems diskettes or device drivers diskettes. Contact your IBM dealer or IBM marketing representative. (See page 238 or page 240 for IBM HelpClub information.)
How can I resolve any resource conflicts (for IRQ, COM port, and other settings) that have occurred after installing a new option or a new application?	See page 243 to get information about any hardware resources already used by devices in the computer.

Testing the Computer

The following shows a basic way to test the computer:

1 Turn on the computer.

The power-on self-test (POST) runs automatically. If the test ends without detecting an error, one of the following occurs:

The operating system or application screen appears.

A password prompt appears on the screen, if a password has been set. Type the correct password and press **Enter**.

The **Diskette** and **F1** prompts (shown below) appear.
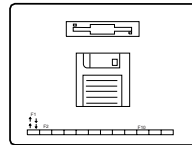
This means no operating system is installed in your computer. Install it now.

Did one of these screens appear?

Yes Turn off the computer and continue with step 2.

No Go to page 217.

2 Press and hold **F1**; then turn on the computer to start Easy-Setup. Hold **F1** until the following *Easy-Setup* menu appears.
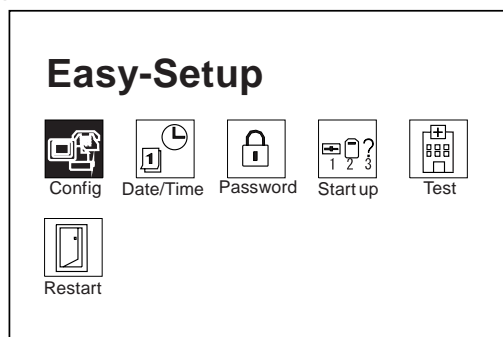
3 Did the *Easy-Setup* menu appear on the screen?

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**.
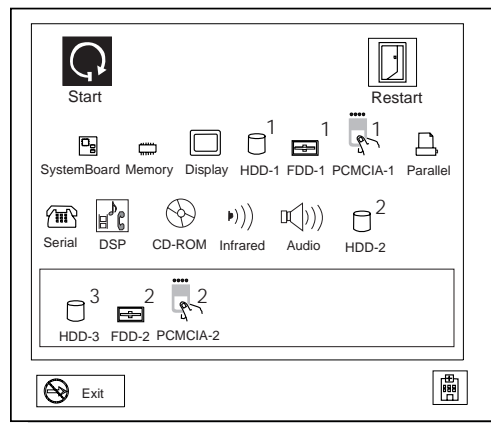
If the computer did not beep, the speaker is not working correctly. Have the computer serviced. If you are not sure about the beep, turn off the computer; then turn it on again and repeat step 2 on page 215.

If you cannot go beyond the first screen, have the computer serviced.

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.

If the test does not find a problem but one still exists, find the problem in the troubleshooting charts on page 217.

No Return to step 2 on page 215 and start Easy-Setup again. If you still cannot start Easy-Setup, find the problem in the troubleshooting charts starting on page 217.

Troubleshooting Charts

In the charts, *x* can be any character.

Error Codes

Screen Message	Action

ɪ9990301
ɪ9990302
ɪ9990305
 	
Note: Incorrect connection of the hard disk drive can cause these error codes to appear.
	The computer cannot find the startup drive.
	
	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.

ɪ99*xxxxx*	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.
158	A hard disk drive without a hard disk password is installed when a supervisor password is set. 1. Press **Enter**. The password menu in Easy-Setup appears. 2. Select the **Supervisor** icon. 3. Press **Enter**. The same password as the supervisor password is set for the hard disk password on the hard disk drive.

What If Your Computer Does Not Work?

Screen Message	Action
159	The hard disk password differs from the supervisor password. 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.
16*x* or 17*x*	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 has turned off because of a critical 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. Change the system configuration to what it was before the computer entered hibernation mode. If the memory size is changed, re-create the hibernation file (see page 105).
196	The computer cannot read the hibernation file. Have the computer serviced.
2*xx*	Verify that the DIMM option is correctly installed.

Screen Message	Action
30*x*	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 169). 2. The keyboard/mouse connector is correctly connected to the computer. If the preceding 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 224.
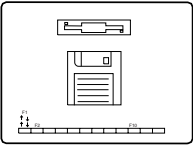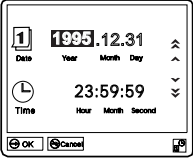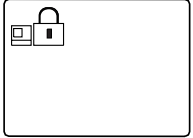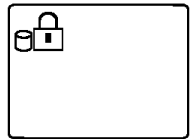
LCD Problems

Problem	Action
The screen is blank and there are no beeps. **Note:** If you are not sure about the beeps, turn the computer off; then turn it on again, and listen to the beeps.	Verify that: The battery pack is correctly installed. The AC Adapter is connected to the computer and the power cord is plugged into a working electrical outlet. The computer power switch is turned on. If the preceding items are correct and the screen remains blank, have the computer serviced.
The screen is blank and there is one beep. **Note:** If you are using an external display, go to "External Display Problems" on page 226.	If a power-on password is set, type the correct password and press **Enter** (see page 110). If a power-on password is not set, verify that the brightness control on the computer is correctly adjusted. If the preceding items are correct and the screen remains blank, have the computer serviced.
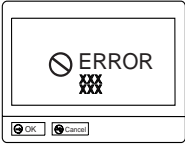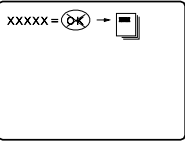
What If Your Computer Does Not Work?

Problem	Action
The screen is blank and there is 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.
The screen is unreadable or distorted.	Verify that the ThinkPad display driver was installed correctly.
	Verify that **Display** in the Windows Setup screen is set to your display resolution type (see page 198).
	If these are correct, test the computer. If the test ends without an error, have the computer serviced.
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.	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 goes into suspend mode immediately after the POST. (The suspend lamp turns on.)	Verify that:
	The battery pack is charged.
	Keyboard is firmly closed.
	When the external display is attached to the computer, the **Will not suspend even if LCD is closed** option (in the **Suspend/Resume** options of the ThinkPad Features program) is enabled.
	The environmental temperature is in an acceptable range. Refer to "Specifications" on page 283.
	If the preceding items are 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 bright dots appear on the screen at all times.	The computer LCD contains more than 1 440 000 thin-film transistors (TFTs). A small number of missing, discolored, or bright dots on the screen is an intrinsic characteristic of TFT LCD technology and is not an LCD defect.

Screen Messages

Message	Action
Diskette and **F1** prompts.	Verify that hard disk drive is correctly installed. Or, 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.
Error **163** appearing 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 click on the **OK** button.
Power-on password prompt.	A power-on or supervisor password was set. To use the computer, type the correct password and press **Enter** (see page 110). 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 110). If there is still a problem, have the computer serviced.

What If Your Computer Does Not Work?

Message	Action
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 224.
POST error prompt. 	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, make a note of the error code and have the computer serviced.
Error prompt. 	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.

Other General Problems

Problem	Cause or Action
The computer enters suspend mode automatically.	The computer enters suspend mode automatically when the processor temperature is higher than a certain degree. This is not a defect.
The computer performance is getting worse in an environment where the temperature is higher than the product specifications. (See "Specifications" on page 283.)	Processor speed may decrease if the computer is used in a high-temperature environment. This is not a defect.

Problem	Cause or Action
The computer has problems such as a broken keylock or a defective indicator lamp.	Have the computer serviced.
The computer does not turn off with the power switch.	If the suspend lamp is turned on, connect the AC Adapter or install a fully charged battery pack in the computer; then resume operations. If there is still a problem, press the **Power Shutdown** switch on the rear of the computer with the tip of a pen to turn off the computer.
An application locks up 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 49).
Keyboard cannot be opened.	Check that a Kensington lock or compatible lock is not in use.

What If Testing Cannot Find the Problem?

If the test programs do not find the problem, use these troubleshooting charts:

Battery Power Problems

Problem	Action
The battery pack starts discharging automatically, even if the AC Adapter is connected.	When the AC Adapter is connected and the remaining power in the installed battery pack is less than a certain amount, discharging and then charging of the battery pack starts automatically.
When you are using OS/2 or Windows, the message, "Please discharge battery" appears on the screen.	Discharge the battery pack; then recharge it (see page 95).
The battery status indicator has turned off although a 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.
The battery pack cannot be fully charged in 3 hours by the power-off charging method.	The battery pack might be over-discharged. 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. If the battery pack cannot be fully charged in 24 hours, use the new battery pack. If a Quick Charger (available as an option) is available, use it to charge the over-discharged battery pack.
The battery operating time indicated by the Fuel-Gauge program or the battery status indicator is much longer or shorter than actual operating time.	Repeat discharging and charging of the battery pack at least three times.
The operating time for a fully charged battery pack becomes shorter.	Repeat discharging and charging of the battery pack three to six times. If there is still a problem, use a new battery pack.

Problem	Action
The computer does not operate with a fully charged battery pack installed.	The protective function in the battery pack might be activated. Turn off the computer for 1 minute to reset the protective function, and then turn it back on again.

Diskette Drive Problems

Problem	Action
The diskette drive in use icon stays on.	If there is a diskette in the drive, verify that: – There is nothing wrong with the diskette. Try a backup copy if you have one. – The diskette is inserted correctly (label up and metal-shutter end first) in the diskette drive. – The diskette contains the necessary files to start the system. – There is nothing wrong with your application program (see page 235). If the preceding items are correct, have the computer serviced. If there is no diskette in the drive, have the computer serviced.

External Display Problems

Problem	Action
The screen is blank.	Verify that: The power cord for the external display is plugged into a working electrical outlet and into the external display. The external display is turned on and the brightness and contrast controls are adjusted. 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. The external display (CRT) is selected as the display device using the **Fn** key function (see page 51) or the ThinkPad Features program (see page 38). The suspend option to enter suspend mode when the LCD is closed is disabled. (Click on the **Battery** icon in the ThinkPad Features program; then follow the screen.) Turn off the computer; then turn it on. If the preceding 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.
The screen is unreadable or distorted.	Verify that: The ThinkPad display driver is installed correctly (see page 179). The **Device Driver** parameters in the Display setting screen are set to your display resolution and color type (see page 172). To change or set up the external display, see "Attaching an External Display" on page 170. If these are 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.

Hibernation Problems

Problem	Action
The computer does not enter hibernation mode with the **Fn**+**F12** key combination.	Did you create the hibernation file? You must create the hibernation file before entering hibernation mode. 1. Select the **Power** icon in the ThinkPad Features program. 2. Click on the **More...** button. 3. Click on the **Enable Hibernation** button. Are you using PC Cards? If you are using one of the IBM communication PC Cards listed on page 107, the computer cannot enter hibernation mode. To enter hibernation mode, stop the communication program, and then remove the PC Card or turn off the power to the PCMCIA slot using the PC Card Director.

Infrared Communication Problems

Problem	Action
The computer cannot communicate with other devices using the infrared port on the computer.	Verify that: Power is supplied to the infrared port by the ThinkPad Features program (see page 38). The infrared function is enabled and other choices are set correctly in the ThinkPad Setup menu in the ThinkPad Features program (see page 38). The communicating device is using an equivalent communication speed. The infrared ports are cleaned and do not have any spots. No cable or electrical device is between the computer and the communicating device. The distance and angle between the computer and the communicating device are correct.

What If Your Computer Does Not Work?

Problem	Action
Incorrect data is sent between the computer and device.	Verify that: The distance and angle between the devices are correct. 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.

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 system 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 using the keyboard 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 for several seconds 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 touch the TrackPoint III until the pointer stops moving.
The mouse or pointing device does not work.	Verify that the mouse or pointing-device cable is securely connected to the computer. Try using the TrackPoint III. If the TrackPoint III works, suspect the externally attached pointing device. If you are using Windows, make sure **Computer** is set as **MS-DOS System with APM**. See page 198. If you are using a mouse that is not compatible with the IBM PS/2 Mouse, disable the TrackPoint III using the ThinkPad Features program. 1. For OS/2 and Windows, see page 39. Select **Setup**, **Keyboard/Pointing Device**; then click on **Disable** for the TrackPoint III. 2. For DOS, see page 42.
All or some keys on the external numeric keypad do not work.	Verify that the external numeric keypad is correctly connected to the computer.

Problem	Action
All or some keys on the external keyboard do not work.	Verify that: The keyboard connector is connected to the correct side of the keyboard/mouse connector. The keyboard/mouse connector is correctly connected to the computer. If the preceding 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 function is on. Press and hold **Shift**; then press **NumLk**.

Mwave DSP Feature Problems

Problem	Cause and action
Sound Blaster support cannot be enabled.	This 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 enables Sound Blaster support using a minimum amount of Mwave resources.
DOS games work 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 your computer 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.
A Windows error message states that no MIDI device is available.	This is often because the DSP resources have been used up. Close an application that is using DSP, and retry the failing function.
A Windows error message states that no WAV device is available.	This is often because the DSP resources have been used up. Close an application that is using DSP, and retry the failing function.

Problem	Cause and action
The modem does not work correctly.	Verify that: The modem/fax port is securely installed. The modem is correctly identified in your communication program. This is often caused by a conflict between communication port addresses or interrupt assignments, or both. For more detail, see also modem problems on page 211.
A modem error occurred.	Refer to the command reference in the Mwave ThinkPad window.
A modem application is not working.	Verify that: You did not close the modem window instead of minimizing it. The modem is set to support the speed you are trying to use.
A speaker phone application does not work.	Verify that you disabled the **Audio** button in the Audio Control.
The computer cannot receive incoming calls from the speaker phone or the modem.	Verify that the telephone plug is correctly attached (see page 163).
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 rerun the diagnostics while these adapters are removed. The telephone cable configuration is not correct for your application. The telephone cable is defective. The telephone is defective. The audio cable configuration is not correct for your application. The audio cable is defective. The audio equipment is defective.

Option Problems

Problem	Action
An IBM option that was just installed does not work.	Verify that: The option is designed for the computer. The option has been installed correctly by following the instructions supplied with the option. Other installed options or cables are not loose. No I/O address or interrupt level conflict has occurred. Use the **System Info** 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 no longer works.	Verify that: All the option hardware and cable connections are securely connected. If the option came with its own test instructions, use those instructions to test the option. If the preceding 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 **Serial_1**, **Serial_2**, **Serial_3**, or **Serial_4** in the ThinkPad Features program.

PC Card Problems

Problem	Action
Error messages appear when loading the Socket Services or other PCMCIA device drivers.	Is the PCMCIA controller chip ready to be used? Check if the PCMCIA device is ready by using Easy-Setup or the ThinkPad Features program.

PC Card Director does not recognize your PC Card.	1. Are you using the EMS driver under DOS?
	
	    When using the EMS driver, you must set the correct value for the /MA=mmmm-nnnn parameter in the Resource Map Utility. In the EMS driver, check the UMB area used for PCMCIA under the X=mmmm-nnnn parameter; then use that range to set the /MA parameter in the Resource Map Utility.
	
	2. Does your PC Card support PCMCIA Standard Release 2.0 or later?
	
	    If not, you cannot use PC Card Director.
	
	3. Is your PC Card working?
	
	    If your PC Card has its own diagnostic instructions, use those instructions to test it.

The PC Card is recognized by PC Card Director, but does not become "Ready."	1. Is the PC Card enabler installed?
	
	    Refer to the manuals supplied with your PC Card.
	
	2. Are you using the EMS driver under DOS?
	
	    When using the EMS driver, you must set the correct value for the /MA=mmmm-nnnn parameter in the Resource Map Utility. In the EMS driver, check the UMB area used for PCMCIA under the X=mmmm-nnnn parameter; then use that range to set the /MA parameter in the Resource Map Utility. If you are using Windows, also set the value for the EMMEXCLUDE= parameter in the SYSTEM.INI file.
	
	3. Are the resources for the PC Card correctly reserved?
	
	    Refer to "Checking the Allocated Resources for the PC Card" on page 263.

What If Your Computer Does Not Work?

Problem	Action

The PC Card is shown as "Ready," but does not work correctly.	1. Make sure the resources reserved for the PC Card do not conflict with those for other system devices.
	
	    Refer to "Avoiding PC Card Resource Conflicts" on page 265.
	
	2. Make sure the resources reserved for the PC Card match the settings in the application program.
	
	    If you are using a modem card, check the COM number, I/O port address, and IRQ level. If you are using a network card, check the I/O port address, IRQ level, and memory window address. To check the resources assigned to the PC Card, click on the **Status** button in the PC Card Director program.
	
	3. If you are using an I/O PC Card:
	
	    The PC Card might work if you add the following in the CONFIG.SYS file:
	
	        `IBMDSS 1.SYS /IO =x`
	
	    Where *x* is a slot number.

Printer Problems

Problem	Action

The printer does not work.	Verify that:
	
	    The printer is turned on and ready to print.
	
	    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 6.)
	
	If the preceding 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.

Software Problems

Problem	Action
An application program does not work correctly.	To determine if a problem is caused by the software, verify that:
	Your computer has the minimum memory required to use the software. Refer to the manuals supplied with the software to verify this.
	The software is designed to operate with your computer.
	Other software works correctly with your computer.
	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 preceding items are correct and there is still a problem, contact your IBM authorized reseller or IBM marketing representative for help.

Getting Service

If you need further assistance, call your IBM authorized reseller or IBM marketing representative.

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 by you.

For your convenience, write the service phone numbers here.

_____

_____

_____

_____

_____

_____

Listing Installed Options

When requesting repair service, you might need to know which options you have in your system. Check or write the names of your options below.

DIMM   Battery Pack
  (4MB, 8MB, or 16MB)
_____MB Hard Disk Drive   Option in the UltraBay

Diskette Drive   PC Cards

_____

_____

Recording Identification Numbers

The following information is needed when requesting repair services:

IBM Product Name	ThinkPad 760C
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**.
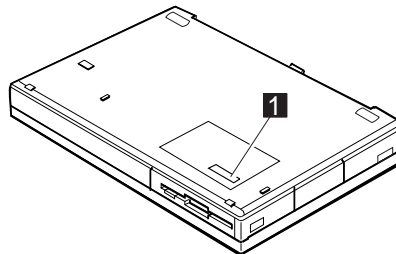
The IBM HelpClub: Another Great Choice (in the U.S.A.)

HelpWare Support Family offerings get you fast, accurate answers to questions about your IBM ThinkPad. HelpWare also provides you with access to a wide variety of other services to assist you in getting the most out of your new computer.

Voice Technical Support

We will answer your hardware and preloaded operating system questions regarding setup, usage, and problem determination. We are here when you need us, 24 hours a day, 7 days a week.

Online Housecall

An IBM technician can remotely access your ThinkPad, diagnose the problem, and make the correction quickly and easily (modem required).

ThinkPad EasyServ

A Federal Express courier will pick up your ThinkPad anywhere in the U.S., deliver it to an IBM mobile repair facility, and return the repaired machine to the location of your choice. In most cases we will have it repaired and on its way back to you within only eight hours of receipt. Courier charges in both directions are paid by IBM. Ask about our overnight repair option!

International Warranty Service

Register your ThinkPad to receive warranty service worldwide, whether you travel or relocate, wherever IBM or IBM resellers sell and service your ThinkPad products. Call to receive your International Warranty Service Certificate today.

Electronic Support Services

Online Services Check out our public messaging areas, scheduled electronic conferences, and searchable databases on Prodigy, CompuServe, and America Online. You may also find reference diskettes, software patches and fixes, device drivers, and support documentation on the Internet (site address is ftp.pcco.ibm.com).

IBM Bulletin Board Dial 1-919-517-0001 to download software options catalogs, product reference guides, shareware, and software device drivers.

IBM Automated Fax System

Product announcement letters, marketing brochures, hardware and software tips, service information, and more are available by fax. Simply choose the automated fax system option when you call.

HelpWare offers the following additional services both during and after the warranty period.

Support Line

Enhanced PC Support
Network and Server Support
Personal Computer Software Assistance

Consult Line Consulting services from IBM experts

Custom Services

LAN Startup Services
Connectivity Services

Warranty and Repair Service

Product warranty and post-warranty maintenance options available

Ordering Information

For additional HelpWare Support Family information or to purchase any of the listed services, please call us at 1-800-772-2227. To receive information by fax, just choose the automated fax system option and request document #11175.

The IBM HelpClub: Another Great Choice (for European Countries)

Yours for a free trial period:

Helpware

What's great about the HelpClub[†] is that once you're a member you get *Helpware*[†]. If you intend to use your new ThinkPad at home or for business, Helpware provides a complete range of services designed to help you get the most out of your new computer. If you work for a large company, Helpware can complement your own PC support service—for example, by providing help after your company service has closed for the day.

When you register, Helpware offers you a full range of services, including the following: **Helpline: helpful advice, day or night** First and foremost, you've got access to Helpline — IBM's customer-friendly, round-the-clock technical support and troubleshooting service, available just by picking up the phone. Complete peace of mind 24 hours a day, 7 days a week, 365 days a year.

Helpware Magazine: hints and tips for all
With your free membership in the HelpClub, you receive a free subscription to *Helpware* magazine. We like to say it's one of the best PC magazines around, and you don't have to take our word for it. It has already won two publishing awards, and 8 out of 10 HelpClub members tell us it's the only PC magazine they need to read. Helpware is attractively produced, packed with information, and written in plain English, not technical gobbledegook.

HelpClub Privileges: lots of specials for members
HelpClub is an exclusive club for IBM users. You can become a member for a free trial period to receive special offerings.

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† The Helpware and the HelpClub free offers are subject to continued availability and may vary or may not be offered in all countries. Check with your local IBM marketing representative for details.

Helpware is also a source of special deals for IBM customers, providing an exclusive collection of offers and discounts.

Join the HelpClub!

Call your country number below during office hours:

Austria	222 21145 7575
Belgium	02/542.5360
Denmark	45 93 45 45 lokal 4600
Finland	9800-6100
France	16-38 55 20 39
Germany	0231-9748-405
Italy	1678 36019
Luxembourg	02/542.5360
Netherlands	020 513 4700
Norway	66 99 95 95
Spain	(91) 563 10 01
Sweden	020-55 55 55
Switzerland	155 46 46
United Kingdom	0628 895222

In other countries, contact your local IBM office for service information.

Getting Service

Appendix A. Avoiding Hardware Conflicts

This appendix describes how to avoid system resource conflicts by
listing the default and optional hardware settings. It also describes
how to do a network remote program load and how to start the
computer from an ATA PC Card.

List of System Resources

When options such as the AT adapter or application programs are
installed, the system might not operate correctly because of
conflicting setting for IRQ (interrupt) levels, I/O addresses, DMA
channels, and memory addresses.

To avoid these conflicts, you must know the hardware requirements,
such as IRQ level and I/O addresses, for each option and program
as shown in their manuals. Then you must check the current
resource allocations for the computer and the Dock I or Dock II, and
select the available resource values by using the ThinkPad Features
program (see page 38).

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Avoiding Hardware Conflicts

The following table summarizes the available system resources for the computer and the ThinkPad Dock II. Values in parentheses are alternative values that are selectable in the **ThinkPad Features** program 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	disabled (or 3, 4)	none	03F8–03FF (or 02F8–02FF)	none
Parallel Port	disabled (or 5, 7)	none	03BC–03BE, 07BC–07BE (or 0378–037F, 0778–077A, 0278–027F, 0678–067A)	0, 1, 3, disabled
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	none	A0000–BFFFF	03B4–03B5, 03C0–03CF, 03D4–03D5, 03D8–03D9, 43C6–43C9, 46E8	none
Mwave DSP Device	10 (or 5, 7, 11, 15, disabled)	none	4E30–4E3F, 0030–003F, 8E30–8E3F, CE30–CE3F	7 (or 0, 1, 6)
Sound Blaster	5 (or 7, 10, 11, disabled)	none	0220–022F, 0240–024F	1 (or 0, 6, 7)
Modem	3 (or 4, disabled)	none	03F8–02F8, 03E8–02E8	none
Hard Disk Drive	14	none	01F0–01F7, 03F6–03F7	none
Hard Disk Drive in UltraBay	15	none	0170–0177, 0376–0377	none
PCMCIA Controller	none	none	03E0–03E3	none
PC Card	(Depends on the type of PC Card)	(Depends on the type of PC Card)	(Depends on the type of PC Card)	none
Real Time Clock	8	none	0070–0071	none
TrackPoint III or Mouse	12	none	0060, 0064	none

System Resources	IRQ	Memory Address (Hex)	I/O Address (Hex)	DMA Channel
Math Coprocessor Exception	13	none	none	none
Options in Dock I or Dock II SCSI Controller	9 (or 5, 7, 10, 11, 15)	DC000–DFFFF	340–35F	none
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 Features program or PS2.EXE.
VL-Bus master is used.
Select an IRQ and the memory addresses with a jumper and switch on the system board of the Dock I or 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.

Avoiding System Resource Conflicts When Using PC Cards

When you do a network remote program load (RPL) or start the computer from a PC Card, you must make sure that the system resources used by the PC Card do not conflict with the resources used by other devices.

Doing a Network Remote Program Load

To do a network remote program load (RPL):

1 Using the PS2 command or ThinkPad Features program, check that there is no conflict between the system resources used by the PC Card and by other devices.

The following are the system resources for a token-ring PC Card and an Ethernet PC Card:

Token-Ring PC Card

IRQ 9
I/O Address (HEX) 0A20–0A23
Memory Address (HEX) CC000–CDFFF, D8000–DBFFF

Ethernet PC Card

IRQ 5
I/O Address (HEX) 0300–031F
Memory Address (HEX) D0000–D1FFF, D4000–D7FFF

IRQ5 is the default setting used by the SoundBlaster emulation. To do an Ethernet PC Card RPL, change the IRQ for the SoundBlaster emulation or disable it with the ThinkPad Features program or the SB PS2 command (see page 279).

2 Start Easy-Setup and select the **Start Up** icon.

3 Select the **Network** icon.

A window appears at the bottom of the screen for you to select the RPL speed.

4 If you are using a token-ring card, select **4** (4Mbps) or **16** (16Mbps) for the RPL speed.

If you are using a network card other than a token-ring card, you can select either RPL speed.

5 Click on **OK** or press **Enter**; then restart the computer.

Starting the Computer from an ATA PC Card

To start the computer from an ATA PC Card:

1 Using the PS2 command or ThinkPad Features program, check that there is no conflict between the system resources used by the PC Card and by other devices.

The following is the system resources for an ATA card:

IRQ	15
I/O Address (HEX)	0170–0177

2 Start Easy-Setup and select the **Start Up** icon.

3 Select the **PCMCIA** icon.

You cannot set the PC Card (PCMCIA icon) to follow the hard disk drive of the computer (HDD-1 icon). If the **HDD-1** icon is already in the drive-startup sequence, click on the **Reset** icon; then set the sequence.

4 Click on **OK** or press **Enter**; then restart the computer.

Avoiding Hardware Conflicts

Appendix B. Advanced Information for PC Cards

This appendix describes the Auto Configurator program, which automatically enables the PC Card without the device driver supplied with your PC Card being installed. It also describes other information related to using PC Cards.

Auto Configurator for PC Card Director

Note:
When installing an operating system, install the PCMCIA device driver that is on the PC Card Director diskettes to use the Auto Configurator.

To install the PCMCIA device driver:
☞ Chapter 7.

About script files:
☞ Page 66.

The 760C computers provide 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.

The resource and configuration information for the PC Cards are written in the script files. Once the information is written, you can use the *Auto Configurator Utility* to edit these script files.

When Auto Configurator is installed, the following line is added to the CONFIG.SYS file according to your operating system:

For OS/2:

```
BASEDEV=AUTODRV2.SYS
```

For DOS and Windows:

```
DEVICE=[drive:] [directory] AUTODRV.SYS
```

Starting the Auto Configurator Utility for OS/2 or Windows

This section describes the Auto Configurator Utility for OS/2 or Windows.

To start Auto Configurator Utility for OS/2 or Windows, select the **Auto Configurator Utility** icon from the PC Card Director window.
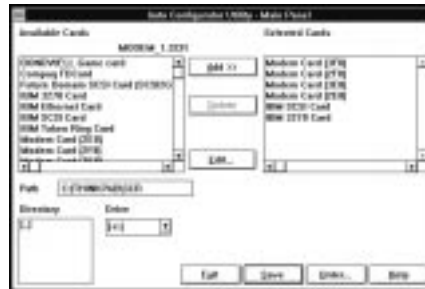
The operation for OS/2 and for Windows is the same.

Advanced Information for PC Cards

Registering a PC Card in Auto Configurator

1 Select a card from the Available Cards list in the Auto Configurator Utility main panel.

Select the card for which you want to assign the resources first. For example, when you want to assign COM 3 to a modem card, and not COM 2, select the setting for COM 3 first.

2 Click on the **Add>>** button.

3 Click on the **Save** button.

The names in the left list box (**Available Cards**) are the cards that can be registered. The names in the right list box (**Selected Cards**) are the cards that are already registered in Auto Configurator. When a PC Card is installed, Auto Configurator starts from the top of the list to assign the resources to the card.

Deleting a Registered Card

1 Select the PC Card you want to delete from **Selected Cards** in the Auto Configurator Utility main panel.

2 Click on the **Delete** button.

3 Click on the **Save** button.

Changing the Registered Order for PC Cards
To change the order of the registered PC Cards, do the following:

1 Click on the **Order...** button in the Auto Configurator
Utility main panel.

The operation for OS/2 and for Windows is the same.

2 Refer to the following to change the order of the PC
Cards in the list:

Moving a Card toward the Bottom

a) Select the PC Card you want to move.
b) Click on the **Down** button.

Every time you click on the **Down** button, the PC Card
is moved toward the bottom of the list.

Moving a Card toward the Top

a) Select the PC Card you want to move.
b) Click on the **Up** button.

Every time you click on the **Up** button, the PC Card is
moved toward the top of the list.

3 Click on the **OK** button to save the changes.

The changes are saved. To cancel the changes click on the
Cancel button.

Changing the Resource Information for the PC Card

1 Select the PC Card you want to change from the left list box in the Auto Configurator Utility main panel.

2 Click on the **Edit...** button.

The following screen is displayed:

Note:

The current resource information is set as the default and appears in the input field of each item. The number that can be set is displayed in the pull-down list box.
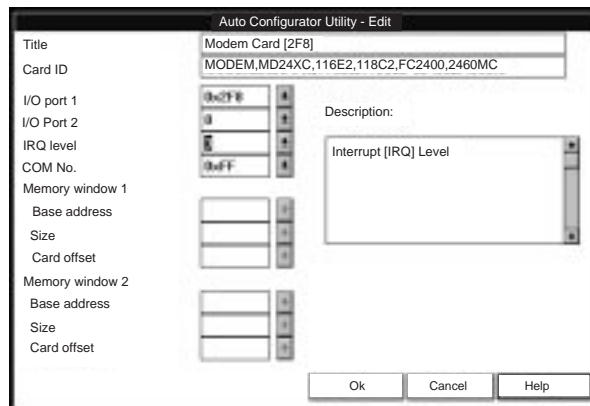
3 You can change the following registered information for the PC Card.

The items that can be changed differ among PC Cards.

Card ID
I/O port address
IRQ level
COM number of the serial port
Memory window address
Memory window size
Card offset address

4 Click on the **OK** button, and save the changes.

To cancel the changes, click on the **Cancel** button.

Starting the Auto Configurator Utility for DOS

To use the Auto Configurator Utility for DOS, do the following:

Note:
A script file contains the steps to enable the PC Card and the resource information for the I/O port, IRQ level, or memory address.

1 Create an AUTODRV.SCR file in DOS by gathering all the script files of the PC Cards you want to enable.

For information on writing a script file, refer to AUTODRV.DOC in the directory containing the script file.

2 Enter the following command at the DOS command prompt:

```
>AUTOUTL /D
```

The utility (AUTOUTL.EXE), script file (AUTODRV.SCR), and Auto Configurator itself (AUTODRV.SYS) must all be in the same directory.

Adding to the CONFIG.SYS File

For PC Card Director to work correctly, the PC Card device drivers (which make up the structured file of PC Card Director) must be registered in the CONFIG.SYS file. These drivers are automatically registered in the CONFIG.SYS file when you install PC Card Director following the instructions in Chapter 7. The following shows each driver registered in the CONFIG.SYS file and the standard rules.

Registered Drivers and Standard Rules for OS/2

The following is a sample of the CONFIG.SYS file for OS/2:

```
        :
BASEDEV=PCMCIA.SYS              ← Card Services
BASEDEV=ICRMU 1.SYS             ← Resource Map Utility
BASEDEV=IBM2SS 1.SYS            ← Socket Services
BASEDEV=AUTODRV2.SYS            ← Auto Configurator
DEVICE=C:\THINKPAD\VPCMCIA.SYS  ← Virtual Card Services
        :
DEVICE=C:\THINKPAD\xxxxxxx.SYS  ← Storage card
                               device driver
        :
REM PC_Card_Client_Device_Driver
        :
DEVICE=C:\THINKPAD\$ICPMOS2.SYS ← Power
                               Management Support driver
```

Rule 1   Card Services, Resource Map Utility, and Socket Services must be listed before any other PCMCIA drivers.

Rule 2   The Resource Map Utility is necessary only for OS/2 Version 2.1*x*.

Rule 3   The PCMCIA Power Management Support driver must be listed after all drivers, at the end of the CONFIG.SYS file.

Rule 4   When using storage cards, the device drivers must be installed according to the card type:

Using only an ATA card:

```
BASEDEV=PCM2ATA.ADD /!DM    ← ATA card device driver
DEVICE=C:\THINKPAD\PCMSSDIF.SYS ← Storage API
                               device driver
        :
BASEDEV=OS2PCARD.DMD    ← Storage Card Device Manager
```

Using an ATA card and an SRAM card:

```
BASEDEV=PCM2ATA.ADD /!DM    ← ATA card device driver
DEVICE=C:\THINKPAD\PCMSSDIF.SYS ← Storage API
                          device driver
DEVICE=C:\THINKPAD\PCM2SRAM.SYS ← SRAM card
                          device driver
      :
BASEDEV=OS2PCARD.DMD   ← Storage Card Device Manager
```

Using an ATA card and a Flash card:

```
BASEDEV=PCM2ATA.ADD /!DM   ← ATA card device driver
DEVICE=C:\THINKPAD\FLSH2MTD.SYS ← Flash Card
                           Memory Technology driver
DEVICE=C:\THINKPAD\PCMSSDIF.SYS ← Storage API
                          device driver
DEVICE=C:\THINKPAD\PCM2FLSH.SYS ← Flash card
                          device driver
      :
BASEDEV=OS2PCARD.DMD  ← Storage Card Device Manager
```

Using an ATA card, an SRAM card, and a Flash card:

```
BASEDEV=PCM2ATA.ADD /!DM   ← ATA card device driver
DEVICE=C:\THINKPAD\FLSH2MTD.SYS ← Flash Card
                           Memory Technology driver
DEVICE=C:\THINKPAD\PCMSSDIF.SYS ← Storage API
                          device driver
DEVICE=C:\THINKPAD\PCM2SRAM.SYS ← SRAM card
                          device driver
DEVICE=C:\THINKPAD\PCM2FLSH.SYS ← Flash card
                          device driver
      :
BASEDEV=OS2PCARD.DMD   ← Storage Card Device Manager
```

Rule 5   The Storage Card Device Manager (OS2PCARD.DMD) must be added after the Power Management Support driver ($ICPMOS2.SYS) in the CONFIG.SYS file. If you don't have the Power Management Support driver, the Storage Card Device Manager must be added at the end of the CONFIG.SYS file.

Registered Drivers and Standard Rules for DOS and Windows

The following is a sample of the CONFIG.SYS file for DOS and Windows:

```
        :
DEVICE=C:\DOS\EMM386.EXE FRAME=D    X=C8  -CFFF
        :
DEVICEHIGH=C:\THINKPAD\IBMDSS 1.SYS   ← Socket Services
DEVICEHIGH=C:\THINKPAD\IBMDOSCS.SYS   ← Card Services
DEVICEHIGH=C:\THINKPAD\IBMDSCSE.SYS   ← Enhanced
                         Card Services
DEVICEHIGH=C:\THINKPAD\DICRMU 1.SYS /MA=C8  -CFFF
                ↑ Resource Map Utility
DEVICEHIGH=C:\THINKPAD\$ICPMDOS.SYS   ← Power Management
                         Support driver
        :
REM PC_Card_Client_Device_Driver
        :
DEVICEHIGH=C:\THINKPAD\xxxxxxx.SYS    ← Storage card
                         device driver
DEVICEHIGH=C:\THINKPAD\AUTODRV.SYS    ← Auto Configurator
        :
```

Rule 1   When using the PCMCIA drivers with the Software EMS driver (EMM386.EXE), you must specify the X= parameter for EMM386.EXE. This is to avoid conflict in the memory area used by the PCMCIA drivers and the Software EMS driver.

Rule 2   Socket Services, Card Services, and Resource Map Utility must be listed in this order.

Rule 3   The Power Management Support driver must be listed after the Resource Map Utility.

Rule 4   The PC Card Client device driver must be listed before the Auto Configurator.

Rule 5   When using storage cards, you must install the device driver according to the card type, as listed below.

Using only an ATA card:

```
DEVICEHIGH=C:\THINKPAD\PAWATA.SYS
```

Using an ATA card and an SRAM card:

```
DEVICEHIGH=C:\THINKPAD\PAWATAS.SYS
```

Using an ATA card, an SRAM card, and a Flash card:

```
DEVICEHIGH=C:\THINKPAD\FLSHDMTD.SYS
   ↑  Flash card Memory Technology driver
DEVICEHIGH=C:\THINKPAD\PAWATASF.SYS
   ↑  ATA SRAM Flash card driver
```

Rule 6 The Enhanced Card Services (IBMDSCSE.SYS) is necessary only when you are using a Flash card.

When the total storage of the Flash cards used at the same time exceeds 10MB, you must do one of the following:

Assign the `/TSIZE:`*n* parameter in the PAWATASF.SYS file.
For example:

1. If the maximum total storage is 20MB, specify:

```
DEVICE=PAWATASF.SYS /TSIZE:6
```

2. If the maximum total storage is 40MB, specify:

```
DEVICE=PAWATASF.SYS /TSIZE:1
```

This increases the memory resident area for PAWATASF.SYS.

Assign the `/EMS` parameter in the PAWATASF.SYS file, and the `/NE` parameter in the IBMDOSCS.SYS file. This sets IBMDOSCS.SYS not to use the EMS page frame and allows PAWATASF.SYS to use it instead. (The EMS memory must be enabled.)

For example:

```
DEVICE=IBMDOSCS.SYS /NE
DEVICE=IBMDSCSE.SYS
        :
DEVICE=PAWATASF.SYS /EMS
```

Storage Card Device Driver

PCM2ATA.ADD, PCM2SRAM.SYS, and PCM2FLSH.SYS are storage card device drivers. The following section describes these storage card device drivers available in PC Card Director.

PCMCIA Storage Card Device Driver for OS/2

Note:
Install PCM2ATA.ADD for all storage cards, even when you are using SRAM or Flash cards.

PCM2ATA.ADD supports ATA cards, PCM2SRAM.SYS supports SRAM cards, and PCM2FLSH.SYS supports Flash cards.

Any PC Card installed in the slot is recognized by its device driver, so regardless of its type, you can access the card by the drive name assigned to the slot. When using the PCMCIA ATA Card Mount Utility, install the PCMCIA Storage API device driver (PCMSSDIF.SYS) for OS/2.

PCMCIA Storage Card Device Driver for DOS and Windows

ATA cards, SRAM cards, and Flash cards are PCMCIA storage cards. PAWATA.SYS supports ATA cards, PAWATAS.SYS supports ATA cards and SRAM cards, and PAWATASF.SYS supports ATA cards, SRAM cards, and Flash cards.

These device drivers assign a drive letter for each usable PCMCIA slot. These drive letters are displayed when the device drivers are initialized, and then you can use the drive letter to access the installed PCMCIA storage card. When you run FORMAT.COM against the drive letter, the SRAM card is formatted as a diskette and the ATA or Flash card is formatted as a nonremovable disk. In the File Manager under Windows, the drive letters are represented and treated as a diskette drive, regardless of the storage card type.

Before Using PCMCIA Storage Cards

Format new PCMCIA storage cards before use. For Flash cards, run the Flash Format Utility (FFORMAT.EXE/FFORMAT2.EXE); then format the Flash card. For ATA cards and SRAM cards, there is no need to run any programs before formatting the card. Format using

the FORMAT.COM program, by displaying the File Manager (for
Windows), or by choosing the drive icon (for OS/2).

Using PCMCIA ATA Cards with Multiple Partitions

The device driver assigns a drive letter only to the active (bootable)
partition of the ATA card if it holds multiple partitions. For other
primary partitions or logical drives in an extended partition, use the
PCMCIA ATA Card Mount utility to assign the drive letter to it.

Parameters for the OS/2 PCMCIA ATA Card Device Driver

The following are the parameters in the OS/2 PCMCIA ATA card
device driver and their explanations:

```
BASEDEV=PCM2ATA.ADD [/S:n] [/P:hhhh] [/EXIRQ:n]
    [/NOBEEP] [/B] [/STBTIME:n] [/MDRV:n] [/!DM]
```

/S:n   Specifies the number of PC Card slots. `/S:1` shows
that there is only one PC Card slot. When this
parameter is not set, the number of PC Card slots is
set to 2.

/P:hhhh   Specifies the lower limit for the I/O address of the
ATA card. The device driver assigns the next usable
I/O address from this lower limit to the card. When
this parameter is not set, the device driver looks for a
usable address and assigns it to the card.

/EXIRQ:n   Specifies the IRQ level that *is not* assigned to the
card. You can set more than one IRQ level.

/NOBEEP   Specifies not to beep when a storage card is
installed. When this parameter is not set, you will
hear a beep every time a storage card is installed
into the PCMCIA slot.

/B   Specifies that OS/2 has started from an ATA card.
When this parameter is set, there will be no
redundancy in assigning the logical drive to the slot
where OS/2 was booted. It depends on the ATA
card whether you can start OS/2 from it.

/STBTIME:*n*   Specifies the time (from 1 to 21 minutes) until entering standby mode. When the ATA card is not accessed for the time specified by this parameter, the ATA card enters standby mode (only when your ATA card supports standby mode). When this parameter is not specified, standby mode for the ATA card is disabled.

/MDRV:*n*   Specifies the number of extra drives that can be used in addition to the number of PCMCIA slots available for the PCMCIA storage devices. When this parameter is not specified, no extra drive is given to the device driver. The extra drives can be activated by the PCMCIA ATA Card Mount utility. For more information, see "ATA Card Mount Utility" on page 65.

/!DM   Specifies not to use OS2DASD.DMD as the device manager. When this parameter is set, OS2PCARD.DMD is used instead.

Parameters for DOS PCMCIA Storage Card Device Drivers

The following are the parameters in the DOS PCMCIA storage card device driver and their explanations:

```
DEVICE=[drive:] [directory] PAWATA.SYS [/P:hhhh] [/NOBEEP]
     [/STBTIME:n] [/MDRV:n]
DEVICE=[drive:] [directory] PAWATAS.SYS [/P:hhhh] [/NOBEEP]
     [/STBTIME:n] [/MDRV:n]
DEVICE=[drive:] [directory] PAWATASF.SYS [/P:hhhh]
     [/NOBEEP] [/STBTIME:n] [/MDRV:n] [/EMS] [/TSIZE:n]
```

/P:*hhhh*   Specifies the lower limit for the I/O address of the ATA card. The device driver assigns the next usable I/O address from this lower limit to the card. When this parameter is not set, the device driver looks for a usable address and assigns that address to the card.

/NOBEEP   Specifies not to beep when a storage card is installed. When this parameter is not set, you will hear a beep every time a storage card is installed into the PCMCIA slot.

/STBTIME:n Specifies the time (from 1 to 21 minutes) until entering standby mode. When the ATA card is not accessed for the time specified by this parameter, the ATA card enters standby mode (only when your ATA card supports standby mode). When this parameter is not specified, standby mode for the ATA card is disabled.

/MDRV:n Specifies the number of extra drives that can be used in addition to the number of PCMCIA slots available for the PCMCIA storage devices. When this parameter is not specified, no extra drive is given to the device driver. The extra drives can be activated by the PCMCIA ATA Card Mount Utility.

/EMS When this parameter is specified, the device driver uses the EMS resources if they are usable. When this parameter is not specified, the device driver does not use the EMS resources.

/TSIZE:n You can specify the size of the table for the device driver data in the resident memory area. When the EMS resources are not usable, the data tables are created in the resident memory area. When the EMS resources are usable, this parameter is ignored. The table size depends on the variable n and is calculated as follows:

$$\text{table size} = n \times 1024 \text{ bytes}$$

Specify n in a decimal number. When this parameter is not specified, the device driver creates the table with $n=4$. Select the variable n depending on the total capacity of the Flash card: The following is an example of the relationship between the variable n and the total capacity of the Flash card:

 Up to 10MB: $n=4$
 Up to 20MB: $n=6$
 Up to 40MB: $n=10$

PCMCIA Storage Card Device Manager for OS/2

OS2PCARD.DMD is the device manager for the PCMCIA storage card. Specify the /!DM parameter in the PCM2ATA.ADD line, so OS2PCARD.DMD is used instead of OS2DASD.DMD. If you do not specify /!DM, PCM2ATA.ADD uses the OS/2 standard Storage Card Device Manager (OS2DASD.DMD); however, under some conditions the format will not be correct when you use OS2DASD.DMD.

The following is a line from the CONFIG.SYS file that describes the Storage Card Device Manager:

```
BASEDEV=OS2PCARD.DMD
```

OS/2 PCMCIA Storage API Device Driver

This device driver provides a communication function between PC Card Director or the mount utility, and the OS/2 PCMCIA ATA card device driver. As a result, a utility in the upper layer can get the drive letter or partition information of the PCMCIA storage card.

The following is a line from the CONFIG.SYS file that describes the Storage API device driver:

```
DEVICE =[drive:][directory]PCMSSDIF.SYS
```

Flash Card Memory Technology Driver

This driver is used to read and write to a Flash card. It is used by the DOS storage card device driver (PAWATASF.SYS) and OS2 Flash card driver (PCM2FLSH.SYS).

The following is a line from the CONFIG.SYS file that describes the Flash Card Memory Technology driver, according to the operating system:

For OS/2:

```
DEVICE =[drive:] [directory] FLSH2MTD.SYS ← Memory
            Technology driver
DEVICE =[drive:] [directory] PCM2FLSH.SYS
            ↑  Storage card device driver
```

For DOS and Windows:

```
DEVICE=[drive:] [directory] IBMDOSCS.SYS ← Card Services
DEVICE=[drive:] [directory] IBMDSCSE.SYS
          ↑ Enhanced Card Services
DEVICE=[drive:] [directory] FLSHDMTD.SYS
          ↑ Memory Technology driver
DEVICE=[drive:] [directory] PAWATASF.SYS
          ↑ ATA SRAM Flash card device driver
```

Checking the Allocated Resources for the PC Card

If the resources for the PC Cards are not correctly allocated, you will see error messages. You can check which resources for the PC Card were not correctly allocated by using PC Card Director. To check the resources that could not be allocated, click on the **Status** button in the PC Card Director program.

The following are some reasons why the resources could not be correctly allocated, and corresponding actions you should take to solve the problem.

   The resource was already reserved by another device.
   Resource Map Utility or other configuration files were not set up correctly.

To change the resource settings for the PC Card or other devices, you can do one of the following:

   Refer to the system manual or utility program and check which device is using the resources planned to be used by the PC Card. Then, change the settings for the device by using, for example, the setup programs. For more information, refer to the manuals supplied with your computer.

   If your PC Card is enabled by a PC Card enabler, you can change the resources assigned for the PC Card by changing the parameters in the PC Card enabler, or change the settings in the configuration file of the PC Card. For more information, refer to the manuals supplied with your PC Card.

Advanced Information for PC Cards

If you are using Auto Configurator to enable your PC Card, you can change the resources assigned to the PC Card by using the Auto Configurator. Make sure the resource is not used by other devices and can be used by the PC Card and its application program. For more information, see "Starting the Auto Configurator Utility for OS/2 or Windows" on page 249.

If you are using modem cards, some modem cards use serial port COM1 or COM2 and do not have the setup information for COM3 and COM4. These modem cards cannot be enabled when other devices are using COM1 and COM2. (For example, as a default, COM1 is used by the InfraRed device and COM2 is used by the Mwave modem.) There are error messages that the I/O port address 3F8 or 2F8, or IRQ level 3 or 4, were not allocated.

In this case use the ThinkPad Setup Utility in the ThinkPad Features program to:

– For OS/2: Disable the devices using COM1 or COM2; then restart the system.

– For DOS or Windows: Reserve COM2 for the PC Card, and use COM1 for other integrated communication devices.

Avoiding PC Card Resource Conflicts

PC Card Director checks the resources for most devices used by the system to avoid resource conflicts, but does not recognize all option devices used. Especially, when you are using the Dock I or Dock II, there is a possibility that the I/O port address or IRQ level may conflict with the PC Card.

Check the status of the PC Card by using PC Card Director. When the PC Card is set to "Ready," the resources used for that PC Card are displayed. Refer to the manuals supplied with the system or option adapters to check that the resources for the devices in the system or for the option adapters are not conflicting with the resources for the IRQ level, I/O port address, or memory window of the PC Card. If you are using OS/2 Warp Version 3, you can check the assigned system resources using RMVIEW.EXE.

If there is a conflict:

Use the Resource Map Utility, so that those resources are not assigned to the PC Card. (Change the value for the `/MA=` parameter, or add the `/MX=`, `/PX=`, or `/IX=` parameter.)

If you are using OS/2 Warp Version 3, use RESERVE.SYS to register those resources in OS/2.

To set RESERVE.SYS, refer to the manuals or online help for OS/2 Warp, or refer to the READ.ME file of PC Card Director.

If you are using Auto Configurator, change the enabling order or resource information using the Auto Configurator Utility.

See "Starting the Auto Configurator Utility for DOS" on page 253 and "Starting the Auto Configurator Utility for OS/2 or Windows" on page 249.

Change the parameter for the PC Card enabler. Refer to the manuals supplied with the PC Card.

If you are using network cards, change the resource information for the PC Card stated in the PROTOCOL.INI or NET.CFG file.

To change the configuration file of the network cards, refer to the manuals or READ.ME files of the PC Cards or network drivers.

Advanced Information for PC Cards

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 features provide support for Windows Version 3.11 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 Version 3.11.

In general, recording audio music and speech at higher quality requires more disk storage. The following table shows some typical values for various sampling rates:

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

Information for Mwave DSP Features

Mwave MIDI Overview

Mwave MIDI Synthesizer Overview
The Mwave audio features can be a music synthesizer, creating realistic instrument sounds from a sequence of MIDI commands. 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 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 ordinarily not enough to produce 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. In Windows MIDI applications allowing you to specify a MIDI output

device, select the Windows MIDI Mapper as the output device rather than sending output to the Mwave driver directly.

The MIDI Mapper controls which of the 16 MIDI channels to send to the Mwave feature for playback. The MPC audio specification describes two types of synthesizers. The BASE Multitimbral synthesizer transmits data on MIDI channels 13–16 and supports 8 simultaneous voices (8 notes at once, each of which can come from a different instrument). The 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

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, whereas 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. The Mwave Windows synthesizer usually sounds best when the Mwave EXT GM setup is selected in the MIDI Mapper.

If you have a MIDI file that is not producing sound on your Mwave feature, MIDI commands may be 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.

Information for Mwave DSP Features

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 semitones.

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 semitones. 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 pianolike sustain pedal that prolongs the sustain period to mimic holding a note. It is received on control number 64.

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.

Information for Mwave DSP Features

Appendix D. Using PS2 Commands

Please note that PS2 commands are subject to change without notice. If you enter a command written in this section and receive an error, type **PS2 ?** and refer to the online help menu.

You can enter the following PS2 commands from the DOS command prompt (of OS/2 and Windows, also) to set the features for your computer. When entering a command, enter it in the following syntax.

   PS2 [*Parameter1*] [*Parameter2*] [*Parameter3*]

Syntax Rules

Follow the rules below when you enter a command.

Syntax	*Rule*
|	Select one of the options on either side of the vertical bar (|).
Highlighted	Enter the exact highlighted letters in either uppercase or lowercase.
UPPERCASE	Enter any value for the following:
	XX: 0 - 20 HH: 0 - 23
	MM: 0 - 59 SS: 0 - 59
	The MM (minutes) and SS (seconds) are optional. The default values are 0.
lowercase	Command elements in lowercase are optional. For example, **PS2 SE OF** and of **PS2 SErial OFf** gives the same results.

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Using PS2 Commands

The following is a list of commonly used PS2 commands. It is organized as follows:

Description of the command

Parameter1	Parameter2	Parameter3

Power Management Commands

Sets power on or off for the PCMCIA slots.

CARD	**ON**	**OF**f	—

Sets whether or not to enter suspend mode when the LCD is closed.

Cover	**E**nable	**D**isable	—

Note:
This command is effective on the current power mode set by the PM command.

Sets POwer, LCd, DISK, SPeed, and STandby to their original values.

DEFAULT	—	—

When to discharge:
☞ Page 95.

Discharges the battery pack.

DISCHARGE	**E**nable	**D**isable	—

When a secondary battery pack is installed:

DISCHARGE	**MAIN**	**2ND**	**E**nable	**D**isable

Note:
This command is effective on the current power mode set by the PM commands.

Sets the hard disk drive power-saving timer for the specified number of minutes (*xx*).

DISK	*xx*	—

Enters standby or suspend mode when attaching an expansion unit.

DOCK	**P**artial	**F**ull	—

Note:
Only on models with Mwave DSP installed.

Sets the features for the digital signal processor (DSP).

DSP	**E**nable | **D**isable	—
	ADDress	**0030** | **4E30** | **8E30** | **CE30**
	DMA	**0** | **1** | **6** | **7**
	IRQ	**5** | **7** | **10** | **11** | **15**

Sets the features for the infrared port (IR).

IR	**E**nable | **D**isable	—
	ON | **OF**f	—
	PORT	**F**ront | **R**ear | **B**oth
	MOde	**TP**ad | **S**harp
	COMADDress	**3F8** | **2F8** | **3E8** | **2E8**
	IRADDress	**1A0** | **1B0** | **1C0** | **1D0**
	IRQ	**3** | **4** | **5** | **10** | **11** | **15**
	DMA03	**E**nable | **D**isable

Note:
Use this command before using other hibernation commands.

Creates the hibernation file.

HFILE	**C** – **Z** | **DEL**ete	—

Note:
Create the hibernation file using the HFILE command before using this command.

Enters hibernation mode when the power switch is pressed.

HSWITCH	**E**nable | **D**isable	

Sets the timer to enter hibernation mode after the specified number of minutes (*xx*).

HTimer	*xx*	[**AC** | **DC**]

Note:
Create the hibernation file using the HFILE command before using the LB H command.

Sets the power management mode to enter when a low-battery condition occurs.
AC: Specifies battery mode when the AC Adapter is connected.
DC: Specifies ac mode when using battery power.

LBattery	**S**uspend | **H**ibernation	—

Note:
This command is effective on the current power mode set by the PM command.

Sets the LCD off when there is no computer operation after the specified number of minutes (*xx*).

LCd	*xx*	—

Using PS2 Commands

Sets the resume timer.

ON at	[yyyy/MM/DD] HH**:**MM**:**SS | **C**lear	—

Sets the power mode.

PMode	**H**igh | **A**uto | **C**ustom	[**AC** | **DC**]

Note:
When the **AC** or **DC** option is not specified, this command is effective on the current power mode set by the PM command.

Sets the timer to enter suspend mode after the specified number of minutes (*xx*).
AC: Specifies battery mode when the AC Adapter is connected.
DC: Specifies ac mode when using battery power.

POwer	*xx*	[**AC** | **DC**]

Resumes normal operation when detecting the ring indicator.

RI	**E**nable | **D**isable	—

Enters the RediSafe suspend mode.

SAfe	**E**nable | **D**isable	—

Sets power on or off for the serial device attached to the serial port.

SErial	**ON** | **OF**f	—

Note:
When the **AC** or **DC** option is not specified, this command is effective on the current power mode set by the PM commands.

Sets the processor speed.
AC: Specifies battery mode when the AC Adapter is connected.
DC: Specifies ac mode when using battery power.

SPeed	**F**ixed | **A**uto	**MAX** | **M**edium | **S**low | **MIN**	[**AC** | **DC**]

Sets the timer to enter hibernation mode from suspend mode after the specified number of minutes.

S2H	**30** | **60** | **90** | **D**isable	—

Sets the timer to enter standby mode after the specified number of minutes (*xx*).
AC: Specifies battery mode when the AC Adapter is connected.
DC: Specifies ac mode when using battery power.

STandby	*xx*	[**AC** | **DC**]

Note:
Create the hibernation file using the HFILE command before using the TI H command.

Sets the power management mode to enter by the automatic power-saving timer.

TImer	**S**uspend | **H**ibernation	—

Display Commands

Sets the screen expansion.

HVEXPansion	**ON** | **OF**f	—

Sets where to display information.

SCreen	**LCD** | **CRT** | **BOTH**	—

Sets the frequency for the external display.

VSYNC	**640**×**480** **800**×**600** **1024**×**768**	**60** | **72** | **75** **56** | **60** | **72** | **D**isable **43I** | **60** | **70** | **72** | **75** | **D**isable

Alarm (Sound) Commands

Sets the computer to beep in certain conditions.

BEEP	**ON** | **OF**f	**A**larm | **S**ystem | **W**arn

Sets the speaker LCD indicator to appear when the computer beeps.

SLed	**E**nable | **D**isable	—

Sets the balance for the attached expansion unit.

XBalance	**0 – 10**	—

Sets the volume for the attached expansion unit.

XVolume	**0 – 10**	—

System Setup Commands

Sets the IRQ level for the option in the UltraBay to 15.

IDE2	**E**nable | **D**isable	—

Displays the DMA channel assignments.

? DMA	—	—

Sets the Fn key lock function.

FNSticky	**E**nable | **D**isable	—

Sets the **HVEXP**ansion command to on or off with the Fn+F8 key combination.

F8	**E**nable | **D**isable	—

Sets the features for the internal modem/fax.

IMODEM	**E**nable | **D**isable **ADD**ress	— **1 | 2 | 3 | 4**

Displays the interrupt level assignments.

? IRQ	—	—

Sets the keyboard typematic speed.

KRate	**N**ormal | **F**ast	—

Sets the features for the parallel port.

PARallel	**E**nable | **D**isable **ADD**ress **MO**de **DMA**	— **LPT1** | **LPT2** | **LPT3** **U**ni | **B**i | **EPP** | **ECP** **0** | **1** | **3** | **D**isable

Sets the features for the serial port.

SERA	**E**nable | **D**isable **ADD**ress	— **1** | **2** | **3** | **4**

Disables the screen off, standby, and suspend timers for presentations.

PRESENtation	**E**nable | **D**isable	—

Sets the features for the Sound Blaster emulation.

SB	**E**nable | **D**isable **ADD**ress **DMA** **IRQ**	— **220** | **240** **0** | **1** | **6** | **7** **5** | **7** | **10** | **11**

Sets the startup screen when the computer power is turned on.

STARTup	**E**nable | **D**isable	—

Sets the TrackPoint III.

TPOint	**E**nable | **D**isable	—

Other Commands

Displays the help menu.

? | **H**elp	—	—

Using PS2 Commands

Sets the A drive to the internal or external diskette drive.

FDD	Internal	External	—

Enters hibernation mode.

HIBernation	—	—

Enters suspend mode.

OFF	SUSpend	—	—

Turns off the computer.

TURN	OFF	—

Appendix E. Features and Specifications

This appendix describes features and specifications for the computer. For more information, refer to the *Technical Reference* manual.

Features

Microprocessor

Intel** Pentium** Processor 90MHz or 120MHz
256KB external cache memory

Memory

Onboard (built-in): 8MB RAM
Optional: 4MB, 8MB, and 16MB DIMMs with DIMM adapter

Storage devices

2.5-inch removable hard disk drive
3.5-inch 2.88MB or 1.44MB removable diskette drive

Display

TFT color LCD, supporting up to 16 777 216 colors
12.1 inches or 10.4 inches (when measured diagonally)
Up to 800-by-600 resolution on the LCD
Up to 1024-by-768 resolution on the external display
Brightness control

Keyboard

84-key, 85-key, or 89-key
TrackPoint III
Fn key function

External interface

Serial connector (EIA-RS232D)

Parallel connector (Centronics)

External input-device connector

External-display connector

PCMCIA slots (two Type I or Type II PC Cards, or one Type III PC Card)

Features and Specifications

        Headphone jack

        Microphone/line-in jack (supports a dynamic microphone or a self-battery-powered condenser microphone)

        Fax/modem port (in some countries, available as an option)

        Infrared ports

System bus

        240-pin, 16-bit AT bus connector

Specifications

Size

Width: 297 mm (11.7 in.)
Depth: 210 mm (8.3 in.)
Height:
– Model with 10.4-inch LCD: 44.2 mm (1.74 in.)
– Model with 12.1-inch LCD: 48.7 mm (1.92 in.)

Weight

Minimum configuration with lithium ion battery pack:
Model with 10.4-inch LCD: 2.77 kg (6.10 lb.)
Model with 12.1-inch LCD: 3.07 kg (6.76 lb.)

Environment

Note:
When you charge the lithium ion battery pack, its temperature must be at least 10°C (50°F).

Temperature (at altitudes less than 2438 m (8000 ft)):
– Operating[1] 5° to 35°C (41° to 95°F)
– Operating[2] 10° to 35°C (50° to 95°F)
– Non-operating: 5° to 43°C (41° to 109°F)
Relative Humidity:
– Operating[1] 8% to 95%
– Operating[2] 8% to 80%
Maximum altitude: 3048 m (10 000 ft)[3]
– Maximum temperature at 3048 m (10 000 ft): 31.3°C (88° F)

Heat output

Approximately 30 Kcal per hour

Electrical (AC Adapter)

Sine-wave input, at 50 to 60 Hz, is required
The input rating of the AC Adapter: 100–240 V ac, 50/60 Hz.

---

[1] With no diskette in drive.

[2] With diskette in drive.

[3] In unpressurized conditions.

Lithium ion battery pack

Nominal voltage: 10.8 V dc
Capacity: 2.8 AH

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 Laboratory (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
25H2205	Argentina, Australia, New Guinea, New Zealand, Papua, Paraguay, Uruguay
25H2207	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
25H2219	Thailand
25H2209	Austria, Belgium, Bulgaria, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Turkey, former Yugoslavia
25H2211	Denmark
25H2213	Bangladesh, Pakistan, South Africa, Sri Lanka
25H2215	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
25H2221	Switzerland
25H2223	Chile, Italy
25H2225	Israel
85G6665	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 Standards 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

Note:
In some country, 4MB diskettes can be used when the diskette drive option is installed.

4MB, 3.5-inch, unformatted diskette:

ANSI Standard (under proposal at the time of printing)
ISO 10994 (Type 303)
ECMA 147

Appendix F. 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 760C 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.

Product Warranties and Notices

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
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.

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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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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
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Windows	Microsoft Corporation
Wizard	Sharp Corporation
386MAX	Qualitas, Inc.
100LX	Hewlett Packard Corporation
200LX	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.

Product Warranties and Notices

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.

Telecommunication Notice

Federal Communications Commission (FCC) and Telephone Company Requirements (Part 68 of the FCC Rules)

1. 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 fax 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 or other entity, or other 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 computer, you should be sure to follow the installation instructions for your fax software package.

2. The built-in modem is built into the ThinkPad computer. It complies with Part 68 of the FCC Rules. A label is affixed to the bottom of the computer that contains, among other things, the FCC registration number, USOC, and Ringer Equivalency Number (REN) for this equipment. If these numbers are requested, look at the label and provide this information to your telephone company.

3. The REN is useful to determine the quantity of devices you may connect to your telephone line and still have those devices ring when your number is called. In most, but not all, areas, the sum of the RENs of all devices should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the REN, you should call your local telephone company to determine the maximum REN for your calling area.

4. If the built-in modem causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But, if advance notice isn't practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.

Product Warranties and Notices

5. Your telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.

6. If you experience trouble with this built-in modem, contact your IBM Authorized Seller, or the IBM Corporation, 500 Columbus Avenue, Thornwood, NY 10594, 1-800-772-2227, for repair/warranty information. The telephone company may ask you to disconnect this equipment from the network until the problem has been corrected, or until you are sure the equipment is not malfunctioning.

7. No customer repairs are possible to the modem. If you experience trouble with this equipment, contact your Authorized Seller or the IBM Corporation for information.

8. The modem may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. Contact your state public utility commission or corporation commission for information.

9. When ordering network interface (NI) service from the Local Exchange Carrier, specify service arrangement USOC RJ11C.

Glossary

This glossary includes terms and definitions from the *IBM Dictionary of Computing* (New York: McGraw-Hill, 1994).

ac. Alternating current.

ac power. Power that is supplied to the computer through an electrical outlet.

ANSI. American National Standards Institute.

application program. A program that performs specific tasks on your computer, such as word processing or creating spreadsheets.

Advanced Power Management (APM). A facility consisting 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 hard disk drive interface such as a storage device PC Card.

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 such basic hardware operations as interactions with diskette drives, hard disk drives, and the keyboard.

bitmap graphics. (1) A form of graphics in which all points on the display are directly addressable. (2) In multimedia applications, a form of graphics in an area of computer memory or storage that can be displayed as an image.

boot. To prepare a computer system for operation by loading an operating system.

bps. Bits per second. In serial transmission, the instantaneous bit speed with which a device or channel transmits a character.

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.

CD-I. Compact disc-interactive.

combination keys. Keys that have specific functions when you hold them down at the same time.

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.

Glossary

CONFIG.SYS. A file that contains a group of commands to load installable device drivers and reserve space in 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 press and release a mouse button twice within a time frame defined by the user, without moving the pointer off the choice.

DSP. Digital signal processor.

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 specification.

fax. (1) Facsimile machine. (2) A transmitted document from a facsimile machine.

fixed disk. In personal computing, *fixed disk* is synonymous with *hard disk*.

flash memory. Electrically rewritable storage.

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.

HHR. Half-horizontal resolution.

hibernation. One of the power-saving methods that stores data and applications running in the computer's memory on the hard disk. During hibernation, the computer is automatically turned off to save power. When power is turned on again, the computer immediately restores the same data and applications as when hibernation started, without restarting the operating system.

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 pointing device such as a TrackPoint III or mouse to select a particular function or software application.

IR. Infrared.

ISA. Industry standard architecture.

ISO. International Organization for Standardization.

JEIDA. Japan Electronics Industry Development Association.

kilobyte (KB). 1024 bytes.

LAN. Local area network.

MCI. Media Control Interface

megabyte (MB). 1024 kilobytes. About 1 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.

MPEG. Moving Pictures Experts Group

parallel port. A port used to attach such devices as dot-matrix printers and input/output units; it transmits data 1 byte at a time.

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. A card that is based on the PCMCIA standard.

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.

ROM. Read-only memory.

serial port. A port used to attach such devices as display devices, letter-quality printers, modems, plotters, and such pointing devices as light pens and mice; it transmits data 1 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 adapter.

TFT. Thin film transistor.

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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 to.

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 adapter, a video mode that produces up to 640-by-480 resolution.

XMS. Extended memory specification.

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