Contents

Finding Information in This Online User's Guide

The following topics are covered in this *Online User's Guide*. Click on the topic you want to read:

Chapter 1. Using Your Computer Outside Your Home Count

This chapter provides necessary information if you are using the computer outside the country where you purchased it.

Changing the Date and Time

You need to change the date and time settings if you go to a different time zone.

1. In the Windows 98 desktop, click on **Start** and move the cursor to **Settings** and then click on **Control Panel**.
2. Double-click on **Date/Time**
3. Set the current date and time.
4. Click on the **Time Zone** tab.

   Click on  , and select the region closest to your location from the list. Press **Enter**.

   Note: If you do *not* want the clock to be automatically adjusted for daylight saving time, remove the check mark from the check box.
5. Click on **OK**.

Power Cord Requirements

To use the AC Adapter outside the country where you purchased your computer, you need an ac power cord that is certified for the country you are visiting. You can purchase one through an IBM authorized reseller or IBM marketing representative in that country.

Attention

The use of an improper power cord might cause severe damage to your computer.

For 2-pin power cords:

Part Number	Used in These Countries
13H5264	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, Thailand, Trinidad (West Indies), United States of America, Venezuela
13H5267	Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, India, Ireland, Kenya, Kuwait, Macao, Malaysia, Nigeria, Oman, People's Republic of China (including Hong Kong), Qatar, Singapore, United Kingdom
13H5270	Austria, Bosnia-Herzogovina, Belgium, Bulgaria, Chile, Croatia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Israel, Italy, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Yugoslavia
13H5273	Japan
13H5276	Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay
13H5279	Bangladesh, Pakistan, South Africa, Sri Lanka

For 3-pin power cords:

Part Number	Used in These Countries
02K0539	People's Republic of China (other than Hong Kong)
76H3514	Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay
76H3516	Aruba, Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Curacao, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Thailand, Trinidad (West Indies), United States of America, Venezuela
76H3518	Austria, Belgium, Bosnia-Herzogovina, Bulgaria, Croatia, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Macao, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, Yugoslavia
76H3520	Denmark
76H3522	Bangladesh, Myanmar, Pakistan, South Africa, Sri Lanka
76H3524	Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, Hong Kong, India, Ireland, Kenya, Kuwait, Malaysia, Nigeria, Oman, Qatar, Singapore, United Kingdom
76H3528	Switzerland, Liechtenstein
76H3530	Chile, Ethiopia, Italy, Libya
76H3532	Israel
76H3535	Korea

Selecting the Country for the Internal ThinkPad Modem

To use the internal ThinkPad modem outside the country where you purchased the computer, you must change the country name.

1 In the Windows 98 desktop, click on **Start**.

2 Move the cursor to **Programs** and **ThinkPad Modem**. Then click on **Country Selection Utility**.

The following window appears:

Put the required information in the window.

3 Click on **OK**.

Note: Check the IBM Web site for the latest information. When updates become available, they are posted on:

http://www.ibm.com/thinkpad

Chapter 2. Using Audio, Modem, Capture, and DVD Feature

This chapter provides necessary information if you are using the various feature of your ThinkPad computer.

Using the Audio Features

Your computer is equipped with the following:

A -inch (3.5-mm) diameter external stereo line-in or monaural microphone/line-in jack.

Note: To use the input jack for an external stereo line-in device, you need to disable the microphone function with the software on your operating system. For example in Windows 98, you can disable the function by putting a check mark in the check box of **Mute** for MIC in the "Master Out" window. To use the jack for a manual microphone, disable the line-in function with the software.

A -inch (3.5-mm) diameter stereo headphone or an external-powered speaker jack.

A MIDI/joystick port on the docking station. To use a MIDI device, you should first connect your computer to the docking station; then connect an external MIDI device to the replicator. After docking your computer in the replicator, you should enable this port using the ThinkPad Configuration program.

Your computer also has an audio chip that enables you to enjoy various multimedia audio features. This audio chip provides the following features:

Recording and playing back of PCM and WAV files in 8-bit or 16-bit format.

Sampling of various rates from 8 KHz to 44 KHz for the WAV file.

Playback of MIDI files through an FM synthesizer.

Recording from various sound sources, such as an integrated microphone, an external microphone, or an audio device attached to a line-in jack.

DOS game compatibility. You should select Sound Blaster Pro** for the audio adapter in the sound setup of the game.

A 3D Effects function, compensating for flat, two-dimensional sound image limitations by reestablishing the necessary

information that allows the human ear to hear in three dimensions.

Using the 3D Effects Function

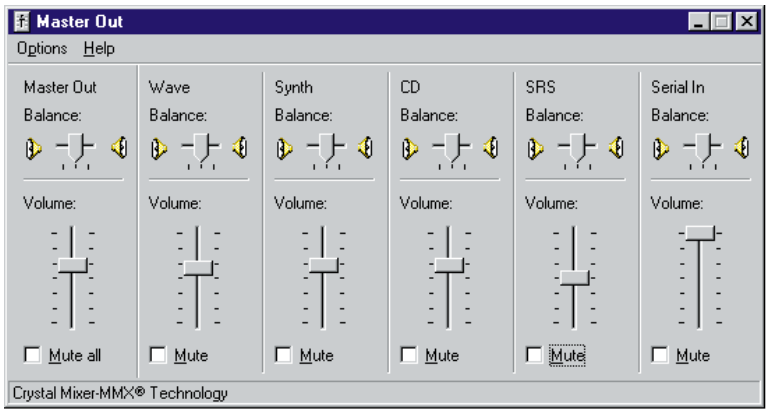
To use the 3D Effects function, do the following:

1 Double-click on the small speaker icon ( ) at the bottom right of the Windows desktop.

or

Click on the **Start** button, and then select **Programs**, **Accessories**, **Entertainment**, and **Volume Control**.

A “Master Out” window similar to the following appears:



2 Make sure that the **3D Effects** column is displayed and the **Mute** check box is unchecked.

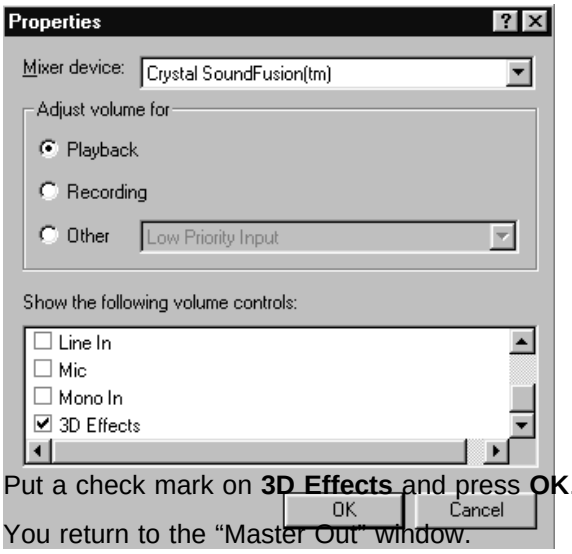
If the column is displayed and the check box is not checked, exit the window. You can use the 3D Effects function; skip the remaining steps.

If the column is not displayed, go to the next step.

3 Select **Options** on the upper left corner of the window.

4 Select **Properties**.

The “Properties” window appears:

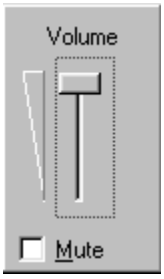


5. Put a check mark on **3D Effects** and press **OK**.
   You return to the “Master Out” window.
6. Make sure that there is no check mark in the **Mute** check box in the **3D Effects** column.
7. Exit the “Master Out” window.

Now you can use the 3D Effects function.

Setting the Speaker Volume

You can customize the volume in a “volume control” window. When you click on the small speaker icon ( ) on the task bar, the following window appears:



Your computer might provide volume control as part of its hardware function. You can control the volume with the volume control knob. If your computer does not have a volume control knob, however, you control volume by pressing the **PgUp** (🔊▲) or **PgDn** (🔊▼) key.

Note: The value you set with the volume control knob or **Fn** + **PgUp** or **PgDn** key combination is the maximum or minimum value of the volume.

Using the Modem Features

The ThinkPad modem enables you to send or receive data, faxes, and voice over the telephone line. This modem uses a digital signal processor (DSP) and its software can be upgraded, allowing great flexibility. It enables you to enhance the modem capability to support ITU-T V.90 protocols with data rates of 56 Kbps.

You can use the ThinkPad modem only on a public-switched telephone network (PSTN). You cannot use a private branch exchange (PBX) or some other type of digital telephone extension line. If you connect the modem to a line other than PSTN, an error message appears, preventing you from using the line. If you are not sure which kind of phone line you are using, contact your telephone company.

Attention for Use Overseas

In many countries, you cannot use the ThinkPad modem function until IBM has received approval from the proper authorities.

Your ThinkPad modem is a worldwide modem and can be used in any country where Postal Telegraph and Telephone (PTT) type approval has been obtained. If the country you want is not on the Country Selection listing, see **http://www.ibm.com/thinkpad** on the Internet, and download the newest Country Selection list.

If you are a non-U.S. user, run the Country Selection program in the **ThinkPad Modem** folder after you complete the ThinkPad modem installation. The "Country Selection" window enables you to change the country name to that of the country in which you are actually going to use the ThinkPad modem telephony function in. Click on **ThinkPad Modem** in your operating system; then click on **Country Selection**. Confirm whether the selection matches the country name in the **Dialing Properties** listing (for Windows 98 and Windows 95).

For more information on the use of the internal modem in a specific country, contact the IBM customer support center in that country. You can look up the phone number by referring to the international service information booklet that came with 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.

To use the ThinkPad modem, connect one end of the telephone cable to the modem connector; then connect the other end to the telephone outlet on the wall.

For Windows 98, Windows 95 and Windows NT
When you start Windows, the ThinkPad modem automatically starts and is ready for use.

Using the 56-Kbps Modem

To take advantage of your modem's 56-Kbps U.S. Robotics 56k Technology**, you must first make sure that your Internet service provider (ISP) supports a 56-Kbps modem protocol.

1. Contact your ISP and determine which 56-Kbps modem protocol it uses.
2. Determine which 56-Kbps modem protocol your modem supports. To view your modem's supported protocol, do the following:
   a) Click on **Start**, move the cursor to **Programs**, and then click on **ThinkPad Modem**.
   b) Choose **Options** from the “Modem Status” window; then choose **Settings**.

      The available transfer speeds are displayed. The 56-Kbps protocol your modem supports is listed in parentheses following the 56-Kbps transfer setting. Be sure to select the 56-Kbps transfer setting to use it.

Your modem and your ISP must support the same 56-Kbps protocol, or your maximum connection speed is limited to V.34 technology.

Significantly higher Internet modem connection speeds up to 56 Kbps require all-digital transmission connections from your ISP to the line card in the central office to which your phone line is connected. The higher speeds at which this modem is capable of operating on a specific network implementation is only one of many ways to deliver high-quality voice telephony to customers. Failure of the modem to operate at high speed should not be reported as a fault, unless ordinary voice telephone calls are substandard.

In the U.S., current FCC regulations limit the maximum speed for downstream communication to 56 Kbps. Even though your modem contains 56-Kbps technology, the connect rate in the receive direction might be significantly less than 56 Kbps.

Currently, the 56-Kbps capability is in the receive direction only (from the ISP to your local modem). The transmit or send direction (from your local modem to the ISP) uses V.34 technology.

Notes:

1. 56-Kbps transfer rates are not available in all locations or countries. You must check with your ISP to determine if your area is capable of 56-Kbps transfer rates.
2. Your modem can be upgraded to support the 56-Kbps standard protocol (ITU-T V.90). For more information on upgrading, refer to **http://www.ibm.com/thinkpad**.

Telephony Features

The ThinkPad modem, with the associated software, provides the following telephony features:

- Industry standard modem support up to 56 Kbps
- Industry standard fax support up to 14.4 Kbps
- Computer telephony function support
  - DTMF and pulse dialing
  - Detecting DTMF digits received from the phone line
  - Call progress monitoring
  - An auto-dialing feature
  - Telephony API (TAPI) support through Windows 98 and Windows 95 Unimodem V (Windows 98 and Windows 95 only)
- Telephone answering machine support (Windows 98 and Windows 95 only)
  - Recording and playback of messages and greetings
  - Answering device with caller ID
  - Modem class-8 AT commands for TAPI calls
- Full-duplex speaker phone support (Windows 98 and Windows 95 only)
  - Acoustic echo cancellation
- Other
  - DOS box operation for 56-Kbps data and 14.4-Kbps fax
  - System-level and device-level power management

Setting the RingCentral Application for New Zealand

The RingCentral** program allows you to set the number of rings for incoming messages before the call is answered.

You can set the value by selecting **Options**, **Answering**, and then **Ring Options** from the RingCentral menu.

The values *x* and *y* in the following fields must be between 2 and 5:

Answer after *x* **rings if there are new messages.**
Answer after *y* **rings if there are no new messages.**

Caller ID Support

The section on the Telephony Features mentions the support of the “answering device with caller ID” function. This function can be used only where caller ID services is available. Currently, this service is available only in the U.S. and Canada.

Using the Capture Function

Note: The capture function is available if you install the DVD and Enhanced Video Adapter, supplied as an option, in your computer.

If you install the optional DVD and Enhanced Video Adapter in your computer, you can use the capture applications supported by Video for Windows. You can also overlay motion video from the video-in port by using applications supported by the MCI (Media Control Interface) overlay.

Notes:

Only one capture window can be open at a time.
When you use video capture with the overlay screen on, the captured screen might appear distorted. However, the data is correctly captured.

To capture motion video, do the following:

1. Power off the computer.
2. Connect the video in-out cable to the video-in connector (⇦) on the computer; then connect your video equipment.

   Notes:

   If you are using video equipment with an S-video output, connect the S-video connector of the video in-out cable to the S-video-out connector of your video equipment for better picture quality.
   If you are ***not*** using video equipment with an S-video output, connect the video in-out cable to the video-out connector of your video equipment.
3. Connect the audio cable to the microphone jack on the computer; then connect the cable to the audio-output connectors of your video equipment. If your video equipment has only one audio-output connector, use the left-audio connector of the audio cable.
4. Check the Enhanced Video status as follows:

a) Click on the **Start**, move the cursor to **Settings**, and then click on **Control Panel**.
b) Double-click on **System**.
c) Click on the **Device Manager** tab.
d) Click on **Sound, video and game controllers**.
e) Click on **IBM VCAP, WDM Video Capture**.
f) Click on the **Properties** button.

5 Start the video capture application program.

If you are going to use a Digital Video Producer (DVP) program, see the online help included in the application.

Watching a DVD Movie

DVD Regional Codes:

Regional coding is part of the protection strategy for DVD content. The world is divided into six regions. Specific content can be viewed in a specific region. For example, Region 1 (U.S. and Canada) content should be viewed only in Region 1. The DVD Movie Player Program application is also region-specific.

For Windows 98 installations, you select a region as part of the Windows 98 setup procedure. You must select a region to play DVD content. After you select the region, you can play content only for that region. Be sure to select your correct region.

The Windows 95 user need to install the region code program using the ThinkPad Customization CD. Make sure that region code program matches the region code number on the DVD movie. You can not play a DVD movie if these codes do not match. Refer to the following table for region code.

Country	Region Code
U.S, Canada	1
Europe, Middle East, South Africa, Japan	2
Southeast Asia, Taiwan, Korea	3
Latin America, Australia, New Zealand	4
Former Soviet Union, the rest of Africa, India	5
People's Republic of China	6

For Windows 98, the system will lock to the region of the first encrypted DVD played. Make sure the first DVD content played is from the appropriate region. You can verify the region code of the content by looking at the region code symbol on the back of the content packaging.

If the first DVD played is from a region other than the region you selected during the set up procedure outline just explained, your system will no longer play DVD content. Contact the computer manufacturer.

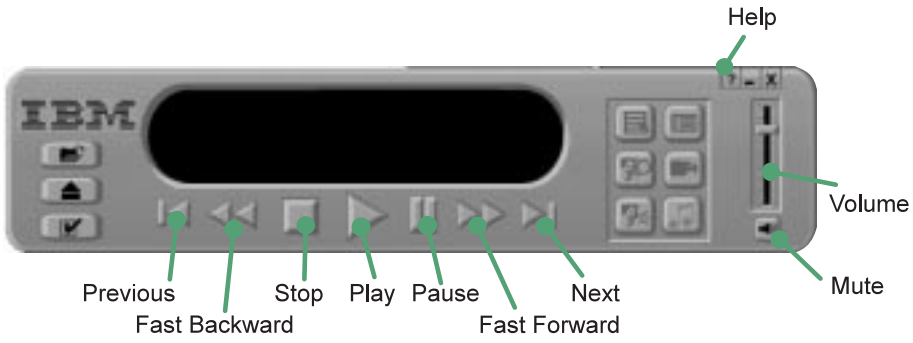
Your computer has been configured to provide the highest quality audio and video playback based on the available system resources. You may alter the default settings by changing the video resolution setting within the **Control Panel** of Windows 95 or Windows 98.

Note: Some systems do not have enough resources to provide full quality audio and video playback at all resolution settings. If you experience poor playback performance, adjust the resolution setting to a lower setting.

Watch a DVD movie as follows:

1. Insert the DVD title into a DVD drive.
2. Select **Start**, move the cursor to **Programs** and **Mediamatics DVD Express**, and then click on **Mediamatics DVD Player**.

   The DVD express operation window appears:



3. Click on the **Play** button. The playback window appears.
4. Follow the instructions on the screen.

   For more information, click on the **Help** button on the operating window.

Using the DVD and Enhanced Video Adapter

The DVD and Enhanced Video Adapter, available as an option, enables advanced performance and clear output by reducing processor overhead for viewing DVDs with video content, such as a business presentation or a DVD movie. It also enables you to use the video overlay and capture functions as well as the MPEG function when you connect a television or home video equipment to the video-in/out ports. The MPEG function enables you to view MPEG-1 and MPEG-2 videos.

The DVD and Enhanced Video Adapter allows you to take advantage of the following:

DVD and MPEG playback: With the MPEG playback feature, you can play many available video CDs, and DVD titles. No DOS/CD-i game titles are currently supported.

Video-in:

- You can capture still images or motion video from such video equipment as a video cassette recorder (VCR).
- You can overlay motion video from video equipment.

Video-out: You can attach a television (NTSC or PAL) to your computer and display computer output on it.

Digital audio output: You can send digital output from your computer to a Dolby digital processor.

You will need to install the optional DVD drive to play DVD titles.

To attach a DVD and Enhanced Video Adapter, refer to a manual shipped with it.

If you attach your computer to the television, you can view a DVD movie on your TV screen either as an MPEG full-screen or as a computer-overlay screen. To enable this screen-switching function, select **Enable** for the **Video out port (TV out)** in the “Enhanced Video/MPEG” window of the ThinkPad Configuration program. In summary, you can view a DVD movie on the following:

LCD Screen	External Monitor	TV Screen
MPEG on Graphics	Not applicable	MPEG full screen (when you play MPEG)
No image	Not applicable	Computer overlay screen (no image if the movie is copyright-protected)

You cannot use this screen-switching function if you selected **Disable** for the **Video out port (TV out)** in the "Enhanced Video/MPEG" window of the ThinkPad Configuration program. In this case, you can see a DVD movie only as an MPEG full-screen image on your TV. In summary, you can view a DVD movie as follows:

LCD Screen	External Monitor	TV Screen
MPEG on Graphics	Same as LCD screen	MPEG full screen (when you play MPEG)

Warning

For the ThinkPad computer with the DVD and Enhanced Video Adapter Only: Copyright-protected DVD movies can be viewed only as a full-screen image on the TV, not as a computer-overlay screen image. If you are viewing this type of movie in full TV screen mode and you try to switch to the computer-overlay screen mode using the **Fn**+**F7** keys, your screen will turn black. Press these keys again to return to the full TV screen mode.

Copyright-protected DVD movies contain copy-protect signals that prevent them from being copied. These images, played back on the VCR, are distorted.

Chapter 3. Protecting Your Computer

This chapter provides overall information about how to protect your ThinkPad computer.

Protecting Your Computer

To protect your computer from theft or unauthorized use, you can use:

Passwords
The Personalization Editor
A mechanical lock

For more details, see the *User's Reference*.

The password-setting feature prevents your computer from being used by others.

Using Passwords

Once you set a password, a prompt appears on the screen each time you turn on the computer. You must enter your password at the prompt. You will not be able to use the computer unless you type the correct password. You can set the following passwords on your computer:

The **power-on password** protects your computer from being used by unauthorized persons.

The **hard disk password** protects the data on your hard disk from being accessed by unauthorized persons.

The **supervisor password** protects the system information stored in Easy-Setup so that without knowing the password, nobody can change the configuration of the computer.

To use the different passwords, refer to the *User's Reference*.

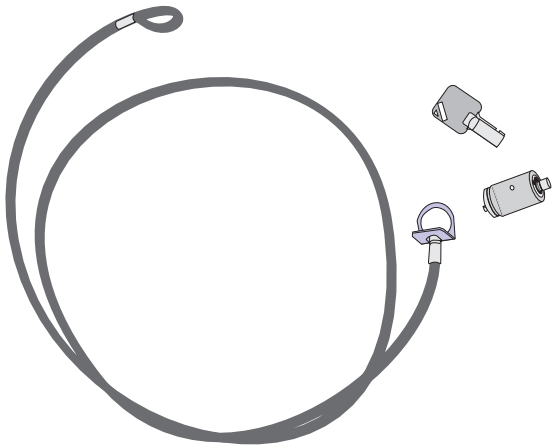
Using the Personalization Editor

With the Personalization Editor, you can display such personal information as your name and address on the screen each time you power on your computer. This feature helps you to identify your computer when identical computers are being used in your location, or to deter theft.

To set the Personalization Editor, refer to the *User's Reference*.

Using Mechanical Locks

You can attach a mechanical lock to your computer, to prevent it from being removed without your permission.



Attach a mechanical lock to the keyhole on the left side of the computer; then secure the chain on the lock to a secure stationary object.

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.

Chapter 4. Using Your Computer with a Battery Pack

This chapter provides necessary information if you are using a battery pack.

Using the Battery Pack

If you use your ThinkPad computer with the battery pack, you need to conserve the power for long operation. The ThinkPad computer is provided with power management for saving battery power, and it always indicates the battery status. This chapter describes the functions for battery operation.

Charging the Battery Pack

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

When you purchase a new battery pack
If the battery status indicator starts blinking
If the battery pack has not been used for a long time

Notes:

1. Before you charge the battery pack, ensure that its temperature is at least 10°C (50°F).
2. If the battery pack has not been used for a long time, it will not be fully charged with only a single charging. You will have to completely discharge it; then recharge it three to six times to maximize battery operating time.

Monitoring the Battery Status

Using the Battery Status Indicator

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

Compare the battery status indicator with the following table to determine the condition of your battery:

Status	Condition
Green	Enough power remains for operation.
Orange	The battery pack is being charged.
Blinking orange	The battery pack needs charging. If the indicator starts blinking orange, the computer beeps three times.
Off	The battery pack is not installed. The computer is turned off or is in suspend mode when the AC Adapter is not connected.

Attention

You should take corrective actions when the battery status indicator is *blinking orange*, and your computer sounds three consecutive beeps. (If your computer enters suspend mode because of a low-battery condition, data in memory might be lost.)

Immediately connect the AC Adapter to the computer.

Then take either of the following actions:

To continue your work with the AC Adapter, press the **Fn** key.

or:

To continue your work with a fully charged battery pack, do the following:

1. Replace the battery pack with a fully charged one. (See the *User's Reference*.)
2. Press the **Fn** key.
3. Disconnect the AC Adapter from the computer.

If you do not take corrective actions within about 30 seconds, the computer will enter suspend mode.

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

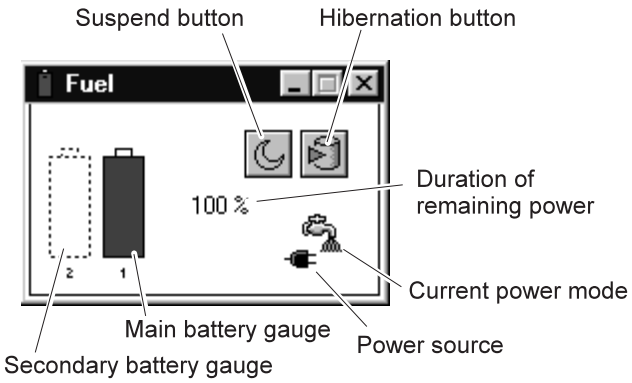
Using the Fuel-Gauge Program

You can display the battery status and power mode (High Performance, Automatic, or Customized) by using the Fuel-Gauge program.

If you are using the secondary battery, you can see the secondary battery status by the Fuel-Gauge program. In the Fuel-Gauge program window are with two gauges: **1** is for main battery status and **2** is for secondary battery. The computer uses secondary battery first. When you are charging batteries, the computer charges the main battery first.

You also can select suspend or hibernation mode.

To start the Fuel-Gauge program, click on **Start**, move the cursor to **Program** and **ThinkPad**, and then click on the **Fuel-Gauge**. The following window appears:



Notes:

1. The “Current Power Mode” icon depends on the power mode.
2. The “Power Source” icon depends on the power source. (is for the AC Adapter and is for battery pack.)
3. The “Duration of Remaining Power” indicator does not appear when the AC Adapter is connected.

You can minimize the window to an icon by clicking on the icon () at the top of the window. You can toggle between the Fuel-Gauge window and its icon by pressing the **Fn**+**F2** key combination.

Saving Battery Power

Your battery pack should be useful for approximately 3 years, or 300 charge-discharge cycles. The number of years or charge-discharge cycles might vary depending on how efficiently you use your computer. This section describes the following:

How to use the power management modes
How to use other battery-saving methods

Using the Power Management Modes

You can run your computer on battery power for a considerable time by using the power management modes (standby mode, suspend mode, and hibernation mode). :

Note: Even if you don't set the low-battery alarm, the charge indicator will let you know when the battery is low, and then your computer will automatically enter the power-saving mode. This default low-battery behavior is independent of the operating system, so the computer might behave differently from your setting if you set the low-battery alarm. The computer chooses appropriately between your setting and the default setting.

Attention

Do not enter suspend or hibernation mode when your computer is doing any of the following:

Playing or recording audio
Playing a movie
Playing a game
Running any other multimedia application

Stop these applications before entering suspend or hibernation mode.

Standby mode

For Windows 98 Users:
The LCD and external monitor turn off. Also the audio is muted. If no application program is running in the background, the hard disk stops turning.

For Windows 95 Users:
The LCD turns off. 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.

You can **enter standby mode** by:

– Pressing the **Fn**+**F3** keys.

You can **return to normal operation** by:

– Pressing any key or moving the TrackPoint.

Suspend mode
Your computer stops all tasks and stores all data in memory.

You can **enter suspend mode** by:

– Pressing the **Fn**+**F4** keys.

– Closing the cover.
If you put a check mark in the **Will not suspend even if LCD is closed** check box in the “Power Management Properties” window, the computer does not enter suspend mode when the LCD is closed. Only the LCD turns off.

– Selecting the **Suspend** button () in the Fuel-Gauge program.

– ***For Windows 98 users:***
Click on **Start** and **Shut Down..**, and then select **Stand by** by clicking on the radio button.

Note: The term **Stand by** on the Windows 98 screen has a different meaning from the term **standby** in the user's manuals.

Your computer automatically enters suspend mode when:

– The preset timeout is reached.

Note:
For Windows 98 users:
You can set the **System standby timer** in the “Power Management Properties” window.

For Windows 95 users:
You can set the **Suspend Timer** in the “Power Properties” window.

– Battery is low.

Note:
For Windows 98 users:
You can set the alarm action by specifying **Standby** for the prompt **When the alarm goes off, the computer will:**

For Windows 95 users:
If you put a check mark in the **Hibernate when battery becomes low** check box in the “Power Management Properties” window, the computer enters hibernation mode when the battery is low.

You can **return to normal operation** by:

– Pressing the **Fn** key.
– Opening the LCD.
– Turning the power switch on.

Your computer automatically returns to normal operation when:

– The preset timeout for the resume timer is reached.

Note:
For Windows 98 users:
You can set the timer in the **Scheduled Tasks**.

For Windows 95 users:
You can set the timeout with the **resume on timer** specification in the “Power Properties” window.

RediSafe:

To prevent loss of data during suspend mode when the battery is critically low, your ThinkPad computer has a **RediSafe** function. Once you set this function, the hibernation file is activated each time the computer enters suspend mode, and is ready to enter hibernation mode from suspend mode whenever the battery is low.

Set **RediSafe** as following:

From Windows 95 or Windows 98:

1. Start the ThinkPad Configuration program.
2. Click on the **Power Management** button ().
3. Select the **Hibernation** tab.
4. Enable hibernation mode if it is disabled.
   a) Click on the **Enable Hibernation..** button.
   b) Click on **Create Now**; then **Close**.
5. Select **RediSafe**.
6. Click on **OK**.

From Windows NT, Windows 3.1, or OS/2:

1. Start the ThinkPad Configuration program.
2. Click on the **Power Management** button ().
3. Select the **Suspend/Hibernation/Resume Options** button ().
4. Enable hibernation mode if it is disabled.
   a) Click on the **Enable Hibernation..** button.
   b) Click on **OK**.
5. Select **RediSafe**.
6. Click on **OK**.

Hibernation mode

Your computer stops all tasks and stores all data in the hard disk; then it powers off. Set your computer to this mode if you want to maintain the present operating condition until the next day, for instance.

To use this mode, you have to create a hibernation file with the ThinkPad Configuration program. (See Enabling Hibernation Mode.)

You can **enter hibernation mode** by:

- Pressing the **Fn**+**F12** keys.
- Selecting the **Hibernation** button () in the Fuel-Gauge program.
- Turning the power switch off.
  You can enable this option by putting a check mark in the **Hibernate by power switch** check box in the “Hibernation” subwindow of the “Power Management Properties” window.

Your computer automatically enters hibernation mode when:

- The preset timeout is reached. (Windows 95 user only)
  If you put a check mark in the **Hibernate by timer** check box in the “Hibernation” subwindow and set **Suspend timer** in the “Power Mode” subwindow, your computer enters hibernation mode when it reaches timeout.
- The battery is low.

Note:
For Windows 98 users:
You can set the alarm action by specifying **Hibernate** for the prompt **When the alarm goes off, the computer will:**

For Windows 95 users:
If you put a check mark in the **Hibernate when battery becomes low** check box, your computer enters hibernation mode when the battery is low.

You can **return to normal operation** by turning the power on.

For Windows NT users:
You cannot create a hibernation file in a Windows NT system that uses the NTFS file format, the Windows NT default. If you want to use hibernation mode, you should reinstall Windows NT with the FAT file format.

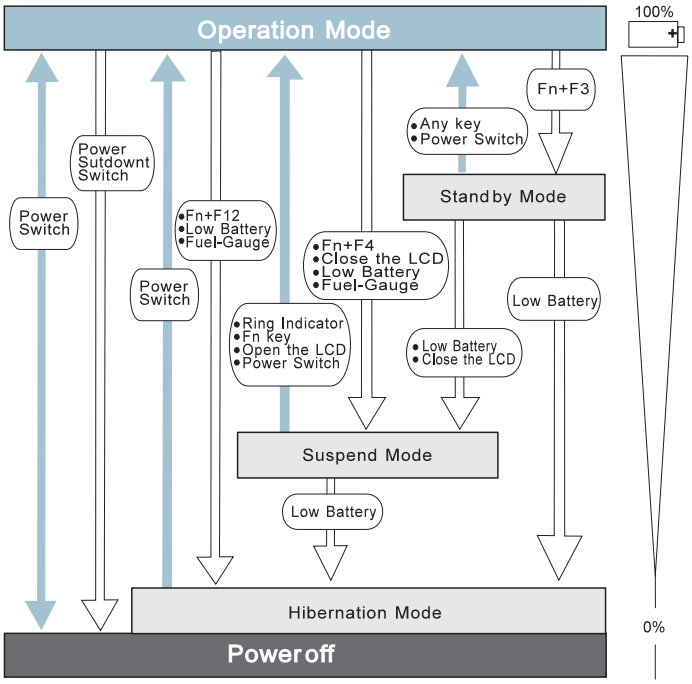
Notes:

1. Windows 95 users cannot enter hibernation mode when you are using the communication network.
2. Hibernation mode might end if you connect your computer to a port replicator or if you use a particular PC Card.

The following table shows how the indicator behaves in each power management mode:

Current Status	Indicator	
	Suspend Mode	Power-On
Normal operation or standby mode	Off	Green
Suspend mode	Green	Off
Entering or resuming from suspend mode	Blinking green	Green
Power off or hibernation mode	Off	Off

The following figure shows the relationship between different power management modes, how to switch between them, and battery power consumption:


Operation Mode
100%
Fn+F3
•Any key
•Power Switch
Power
Sutdownt
Switch
Power
Switch
Stand by Mode
•Fn+F12
•Low Battery
•Fuel-Gauge
•Fn+F4
•Close the LCD
•Low Battery
•Fuel-Gauge
Power
Switch
Low Battery
•Ring Indicator
•Fn key
•Open the LCD
•Power Switch
•Low Battery
•Close the LCD
Suspend Mode
Low Battery
Hibernation Mode
0%
Poweroff

Customizing Power Management

This section describes how to customize power management so that you are using the power management mode appropriate to your operation.

Setting the Suspend Timer

To set the suspend timer, do the following:

For Windows 98:

1. Start the ThinkPad Configuration program.
2. Click on the **Power Management** () button.

   The “Power Management Properties” window appears.
3. Select the **Power Schemes** tab.

   The “Power Schemes” window appears.
4. Set the length of time for the suspend timer at **System standby timers** under **Settings for Portable/Laptop power scheme**.

   Note: You can also set the **LCD off timers** and **Hard disk off timers**.
5. Click on **OK**.

For Windows 95:

1. Start the ThinkPad Configuration program.
2. Click on the **Power Management** () button.

   The “Power Properties” window appears.
3. Select the **Power Mode** tab.

   The “Power Mode” window appears.
4. Select **Customized**.

The bottom gray portion is displayed in black, and you can specify the timeout value in minutes in the **Suspend Timer** box.

5. Click on **OK**.

For Windows NT, Windows 3.1, or OS/2:

1. Start the ThinkPad Configuration program.
2. Click on the **Power Management** () button.

   Three buttons appear on the right.
3. Click on the **Power Mode Settings** () button.

   The “Power Mode Settings” window appears.
4. Specify the timeout value in minutes in the **Suspend Timer** box.
5. Click on **OK**.

Enabling Hibernation Mode

To enable hibernation mode, do the following:

For Windows 98 and Windows 95:

1. Start the ThinkPad Configuration program.
2. Click on the **Power Management** () button.

   The “Power Properties” window appears.
3. Select the **Hibernation** tab.

   The “Hibernation” subwindow appears.
4. Click on **Enable Hibernation**. (If you have already created a hibernation file, this button appears in gray and you cannot click on it.)

   The “Enable Hibernation” subwindow appears.
5. Click on **Create Now**.
6. Click on **Close**; then **OK**.

For Windows NT, Windows 3.1, or OS/2:

1. Start the ThinkPad Configuration program.
2. Click on the **Power Management** () button.
3. Click on the **Suspend/Resume Options** () button.

   The “Suspend/Resume Options” window appears.
4. Click on the **Enable Hibernation..** button.
5. Click on **OK**.

Considerations When Using a Power Management Mode

When you use a power management mode, you need to consider a few points, especially if you are using the network.

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
- OS/2 Warp Version 4
- Microsoft Windows Version 3.11 with DOS Version 7.0
- Microsoft Windows 95
- Microsoft Windows 98
- Microsoft Windows NT Version 4.0

Important

If you use Windows 3.1, ensure that Advanced Power Management (APM) is installed according to the instructions in Notes for Reinstalling or Installing the Operating System.

Before playing audio, it is better to turn off any automatic timers that put the computer into suspend or hibernation mode. In addition, it is better to stop playing audio before entering suspend or hibernation mode. If the computer enters suspend or hibernation mode, data from a running audio program might be lost.

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 monitor and keyboard are used. In such a case, turn on the computer with the LCD closed, or use the ThinkPad Configuration program to set the computer not to enter suspend mode when the LCD is closed.

If the computer resumes normal operation by reaching the ThinkPad Configuration timer setting or because of an incoming

call, only a blank screen is displayed. To display a power-on password prompt, press any key or move your pointing device.

If you are using some communication cards and the computer is powered with ac power, your computer enters standby mode rather than suspend mode.

If you are using other PC Cards and the computer enters suspend mode, all application programs stop. For some PC Cards, power to the PC Cards might also turn off.

If 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 normal operation resumes, 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.

Even if you are using a communication card with a ring-resume function, some cards cannot detect an incoming call.

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

If you put a check mark in the **Disable in the hardware profile** check box under the **Device usage** of the **General** tab in the **Advanced Power Management Support** area of the “System Properties” window, your computer does not enter suspend mode.

Note:
You must set the **Resume on incoming call** option in the ThinkPad Configuration program so the computer automatically resumes normal operation.

For Windows 95 and Windows 98:

1. Click on the **Power Management** () button.
2. Click on the **Suspend/Resume options** tab.
3. Select the **Resume on incoming call** option.

For Windows NT, Windows 3.1, or OS/2:

1. Click on the **Battery** () button.
2. Click on the **Suspend/Hibernation/Resume options** () button; then select the **Resume on incoming call** option.

For DOS: Enter `PS2 RI E`

Considerations for Hibernation Mode

Consider the following before using hibernation mode:

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

The computer uses battery power to enter hibernation mode. Therefore, it reserves some battery power if 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 publicly stated.

Do not add or remove memory during hibernation mode. If you do, the computer resumes from hibernation mode without recognizing the changed memory size. To ensure that the computer recognizes the correct memory size, shut down; then restart your operating system.

If the computer is powered with battery power, it turns power off to the PC Card when entering hibernation mode. When normal operation resumes, if the PC Card or computer does not operate, restart the application or computer.

If you are using some communication cards and your computer is powered with ac power, the computer does not enter hibernation mode. This prevents possible problems from

occurring with communication application programs after the computer returns to normal operation.

Note: If the communication links are still not reestablished, remove and then reinstall the PC Card before restarting the system or application program.

Notes for Reinstalling or Installing the Operating System

Install your operating system with Advanced Power Management (APM), and install the ThinkPad Configuration program with the Utility Diskette to use power management mode.

Note: To install the software → Installing a New Operating System and Its Device Drivers .

If you are using Windows 98, Windows 95, or OS/2, APM is automatically installed in your computer.

If you are using DOS, APM is automatically installed in your computer. To verify that the computer has installed APM 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
```

If you are using Windows 3.1, do the following to check and install APM for Windows:

1. Start the computer.

   Make sure that the current directory is Windows (usually C:\WINDOWS>).

2 Type SETUP at the command prompt and press **Enter**.

The “Windows Setup” appears.

Note: The following window is a sample of the “Windows Setup” window. Yours might be different.

```
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:       IBM ThinkPad (Cyber 9397DVD) 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. Otherwise, go on to step 3.

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:

```
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:       IBM ThinkPad (Cyber 9397DVD) 256 small font
   Mouse:         Microsoft, or IBM PS/2
```

If not, return to step 3.

6 Press **Enter** to install APM.

7 Restart the system to make APM effective.

Using Other Battery-Saving Methods

Another battery-saving method is to decrease the LCD brightness. You can use the ThinkPad Configuration program to decrease the brightness of the LCD by clicking on the **LCD** () button and selecting **Normal** for **Brightness (battery operation)** in the window that appears.

Chapter 5. Using Your Computer with a PC Card

This chapter provides necessary information if you are using the computer with a PC Card.

Using a PC Card

This chapter explains PC Card functions and interfaces. It describes PC Card support software and explains how to use your PC Card in the operating system that you have installed.

A PC Card enables you to send and receive faxes, communicate through a network, store data, and use other functions. PC Cards can be distinguished by their functions:

Storage cards
Modem cards
Network cards
SCSI cards
Other PC Cards

A PC Card is also distinguished by the interface that supports it. Before you use a PC Card, you need to make sure that your computer supports it.

16-bit PC Card
CardBus Card[1]
Zoomed Video Cardfnref[2] (ZV Card)

PC Card Types

Storage Cards

An **Advanced Technology Attach (ATA) card** functions as a hard disk with the Integrated Drive Electronics (IDE) interface. You can transfer data between devices by inserting a card in a PC Card slot just as you would with a diskette in a diskette drive. There are two types of ATA card:

- The **ATA hard disk card** has a large capacity; you can use the card as you would an external hard disk.
- The **ATA Flash disk card** acts as a memory card; you can use the card to back up your data.

---

1 CardBus allows PC Cards and your computer to use 32-bit busmastering and to operate at speeds up to 33 MHz.

2 Zoomed Video (ZV) is a connection between a PC Card and your computer that allows the card to write video data directly to the graphics controller. The data is transferred with no buffering requirements, because it is transferred over a ZV port rather than the system bus.

A **memory card** is used to read or write moderate amounts of data. There are three types of memory card:

- A **static-random-access-memory (SRAM) card** backs up computer memory. The card has its own battery.
- A **read-only-memory (ROM) card** is used for reading data only.
- A **Flash memory card** is a writeable and readable card. No battery is needed.

Modem Cards

A **fax modem card** is used for communication through a telephone line; ac power is not needed. You can use this card to access the PC network or the Internet, or to send a fax.

Network Cards

A **LAN/Network card** physically connects PCs in a LAN or Network. The following LAN-or-Network cards are available:

- An **Ethernet card** is for constructing a small area network.
- A **TokenRing card** is for constructing a global area network.
- An **IBM 3270 card** and an **IBM 5250 card** are also available.

An **integrated services digital network (ISDN) card** is used to connect your computer to the ISDN network.

SCSI Cards

A **small computer system interface (SCSI) card** connects a SCSI device to your computer. For example, it enables you to use a SCSI disk drive that cannot fit in a small notebook PC.

Other PC Cards

A **sound card** enables your computer to play music and other sounds. It typically has an audio and a MIDI in/out connector.

A **video capture card** captures signals from video devices, enabling you to use the data in your computer.

There are also multi-function PC Cards, such as the Combo Card and the Multi Function Card.

PC Card Interface

16-Bit PC Cards

Most PC Cards are 16-bit PC Cards (PCMCIA 2.0 or 2.1), providing ISA device performance.

CardBus Cards

The CardBus Card is connected as a PCI device and provides higher performance than the 16-bit PC Card.

ZV Cards

The Zoomed Video port interface provides the connection for the ZV Card. The ZV Card enables you to write video data directly to an input port of the graphics controller. The following video-related cards are considered ZV Cards:

Video capture card
MPEG card

The ZV Card cannot be used without a PC Card device driver and a display device driver.

Attention

When you use PC Cards, be aware of the following restrictions:

Although you can insert or remove some PC Cards without turning off the computer (refer to the instructions that came with the PC Card), you *cannot* remove or install PC Cards during suspend or hibernation mode.

Before removing storage PC Cards from the PC Card slot, ***you must power off*** the computer. Otherwise, data in the PC Card might be corrupted or lost.

Note: According to the operating system, you can stop the PC Card with the PC Card support software and remove it without powering off the computer. (See the PC Card support software section of the each operating system to see how to stop the PC Card.)

PC Card Support Software

ThinkPad PC Card support software enables you to use a PC Card as soon as you insert it into the ThinkPad computer.

Each operating system needs its own ThinkPad PC Card support software, as follows:

Windows 98: You can use the PC Card without the PC Card support software; the PC Card support function is included within the operating system.

Windows 95 (OSR2.1): CardWorks for Windows 95.

Windows NT 4.0: CardWizard for Windows NT.

Windows 3.1: CardWizard for Windows 3.1.

OS/2: PC Card Director.

DOS: CardSoft for DOS.

To install the PC Card software → Installing a New Operating System and Its Device Drivers.

The following table shows the PC Cards supported by Windows 98 and the different PC Cards support software:

	Windows 98	**CardWorks (Windows 95[2])**	**CardWizard (Windows NT 4.0)**	**CardWizard (Windows 3.1)**	**PC Card Director (OS/2)**	**CardSoft (DOS)**
16-bit PC Card	Supported	Supported	Supported[3]	Supported	Supported	Supported
CardBus Card	Supported	Supported	Not supported	Not supported	Not supported	Not supported
ZV Card	Note[1]	Supported	Not Supported	Supported	Not Supported	Not Supported

Notes:

[1]Check the Web site of the card vendor:
[2]The PC Card support software is supported by OEM Service Release Version 2 (OSR2) or later version.
[3]Windows NT does not support the SRAM card and the Multifunction PC Card. See the Microsoft Web site: **http://www.microsoft.com**

When you insert the PC Card into your ThinkPad computer:

The PC Card support software detects the card and reads the information about it.

The PC Card support software searches for the corresponding card service device driver.

The device driver requests the PC Card support software to allocate such system resources as memory space, I/O port, and IRQ. If these resources are available, the support software recognizes the PC Card and you can use it.

If there is a resource conflict, you need to change either the resources or the system configuration:

Either:

- **Change the requested resources of the PC Card:** You can allocate the available resources by using each operating system or PC Card support software function.

Or:

- **Change the system configuration:** You can change the system configuration with your operating system or with the ThinkPad Configuration program.

Note: If the PC Card device driver is the PC Card point enabler, you cannot use the PC Card with ThinkPad PC Card support software. If you cannot set up the PC Card with PC Card support software, check with the card vendor whether the device driver is a client device driver or a point enabler.

Power Management

Depending on the function of the PC Card, changing from one power management mode to another might cause your ThinkPad computer to hang. PC Card support software prevents this occurrence through special handling during power state transition.

The following table approximately indicates the supported power management function depending on the type of PC Card. If you need a power management function, make sure that your PC Card supports the function.

Note: This table shows the power management functions that are supported by the PC Card support software. Since Windows 98 does not support the PC Card support software, this table does not apply to Windows 98.

Card Type	Suspend Request (Fn+F4)		Hibernation Request (Fn+F12)	
	ac Power	**Battery Power**	**ac Power**	**Battery Power**
Modem or Network	Supported	Supported	Not Supported	Supported
Other	Supported	Supported	Supported	Supported
Note: Standby mode is always accepted.				

For more information about the PC Card support software, go to the appropriate section.

Using a PC Card in Windows 95 (with CardWorks)

You can make your PC Card easy to use with the PC Card support software called CardWorks. It is supported only by the Windows 95 OEM Service Release Version 2.1 (OSR2.1).

CardWorks minimizes user intervention in configuring many PC Cards. CardWorks with CardWizard provides the following:

Self-Check

If you have a problem, refer to this section.

PC Card Properties

CardWorks provides various information about your PC Card.

Stopping the PC Card

If you remove the PC Card from your computer, sometimes you need to stop the PC Card.

Help

You can get help for most of the windows.

CardWorks provides two modes for using a PC Card:

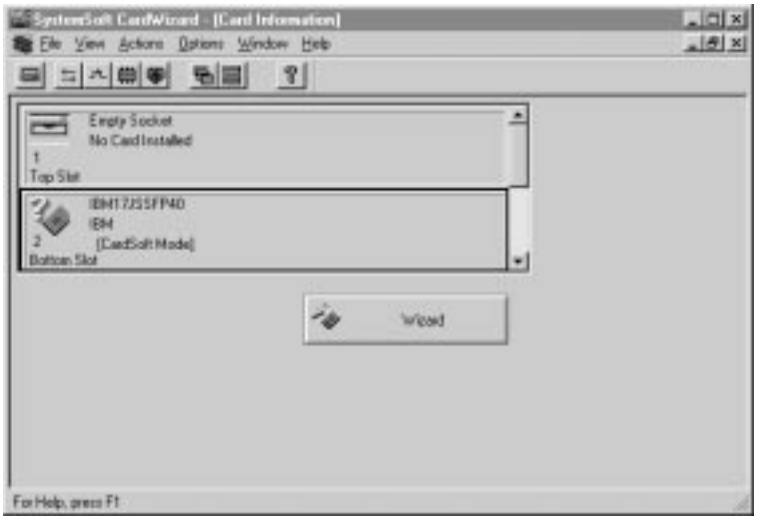
Plug and Play mode:
You can use the PC Card in this mode when the device driver of the card is supported by Windows 95.

CardSoft mode:
You can use the PC Card in this mode when the device driver of the PC Card is for Windows 3.1.

To start CardWizard, do as follows:

1. Click on **Start**.
2. Move the cursor to **Programs** and **CardWorks**. Then click on **CardWizard**.

   The CardWizard window appears:



This information panel displays up-to-date information about the PC Cards and PC Card slots being used in your computer.

It also displays up to three lines of card information, which it reads directly from the card:

The first line shows the card name.
The second line shows the manufacturer.
The third line shows the card's function or type.

Self-Check

CardWorks has a self-check function that solves such problems as incorrect or missing PC Card device drivers, system resource conflicts (IRQ, memory, or I/O ports), and unconfigured PC Cards, as well as memory conflicts.

If there are any problems, click on **Wizard**. Each time you click on the **Wizard** button, a series of self-checks is run to assure that all necessary components are installed and working properly. CardWizard then analyzes the computer to verify that there are resources available for PC Card configuration.

Even if CardWizard cannot automatically solve a problem, it can pinpoint the problem exactly so that you or a technical support engineer can fix the problem more easily.

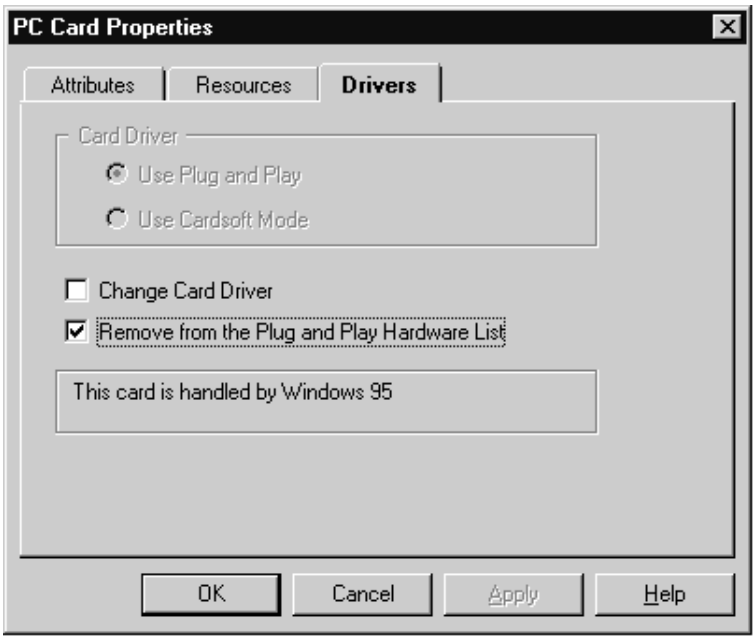
PC Card Properties

You can see the attributes, resources, drivers, and memory card utilities that are loaded for PC Card support in the “PC Card Properties” window.

To open the “PC Card Properties” window of the PC Card that you are using, do the following:

1. Select the PC Card in the CardWizard window by clicking on it.
2. Click on **View** in the menu bar of the window.
3. Click on **Properties..** in the pop-up menu.

   The “PC Card Properties” window appears:



The window provides the following information:

Attributes

Resources
Drivers

Attributes

The following information appears depending on the type of PC Card:

Slot	The slot number and assigned name for the slot. (You can change the slot name by selecting **slot management** from the options menu.)
Card	The type of this PC Card.
Manufacturer	The manufacturer of the PC Card.
Size	The storage capacity of the PC Card.
Drive	The drive letter.
Battery status	The charge status of the SRAM Card battery.
Write protect	The write protect status—either enabled or disabled.
File system	The file system used by the PC storage.
Port	The communication port used by this PC modem card. If this is not shown, click on the **Wizard** button and **Auto Correct**.

Resources

Some resource information is not relevant to all types of PC Cards. These nonrelevant resources are displayed as “Not Applicable.”

IRQ	The interrupt request being used.
I/O	The starting and ending addresses of the input/output range for the PC Card.
DMA	The DMA channel used.
Memory range	The range of physical memory.

Drivers

CardWizard determines the type of device driver being used. It also displays whether the card is configured by Windows 95 or by CardWorks.

Card driver	Indicates whether Plug-and-Play mode or CardSoft mode is used in configuring the PC Card. This field is enabled only if the **Change card driver** box is checked. You should *not* change drivers if your card has been identified and configured successfully.
Change card driver	If this item is enabled (checked), you can select either Plug and Play (if available) or the CardWorks device drivers.
Remove from the Plug-and-Play hardware list	If this item is enabled (checked), you can delete the Plug-and-Play device driver assigned to a card. This applies only if the card is handled by Windows 95 (Plug-and-Play mode). Later, when you reinsert the same PC Card, CardWorks configures the card as if it were the first insertion.
Memory Card Utility	This item appears only if you insert an SRAM card or a Flash memory card. You can format the SRAM card or Flash memory card as follows: **Note:** You can also format these card from the file system with the DOS FORMAT command. ***1.*** Open the “PC Card Properties” window. ***2.*** Select the **Memory Card Utility** tab. ***3.*** Enter a **Volume Label** (if desired). ***4.*** Click on **Format Drive/Partition**. ***5.*** Click on **Start**. This procedure enables you to completely erase an SRAM or a Flash memory card, especially a brand-new card. Make sure to save the data on the card before erasing it.

Stopping the PC Card

If you are removing a PC Card, you must first stop it. The system might freeze or data might be lost if a PC Card is removed before it is stopped.

Note: You can stop only one card at a time. After invoking stop, you cannot stop another card until the first stop has either completed or failed.

You can stop a card as follows:

1. Click on the right button on the CardWizard window.

   A pop-up menu appears.

   Note: The stop option appears in gray if you are in CardSoft mode or if the card is already stopped.

2. Click on **Stop**. The following message appears:

   ```
   The card has been stopped. You can safely remove the
   card.
   ```

Help

If you press **F1** or select the **Help** button, a glossary of terms and an index of Help items are made available.

Using a PC Card in Windows NT (with CardWizard)

You can make your PC Card easy to use with the PC Card support software called CardWizard.

CardWizard minimizes user intervention in configuring many PC Cards. CardWizard provides the following:

Self-Check

If you have a problem, refer to this section.

PC Card Properties

CardWizard provides various information about your PC Card.

Stopping the PC Card

If you remove the PC Card from your computer, sometimes you need to stop the PC Card.

Help

You can get help for most of the windows.

This section concludes with information about using ATA PC Card and power management support.

Note: SRAM card and multifunction PC Cards are not supported in CardWizard for Windows NT.

To start the CardWizard for Windows NT, do as follows:

1. Start Windows NT 4.0.
2. Click on **Start**.
3. Select **Programs**.
4. Click on **CardWizard for Windows NT**.

The menu bar for the CardWizard window includes **File, View, Actions, Options**, and **Help** options. Each option provides CardWizard functions to perform actions with cards, modify user-selected options, and obtain help.

Quick Launch

Once you have installed CardWizard for Windows NT, you can start it by clicking on the **CardWizard** icon. The **CardWizard** menu appears on the taskbar, to the left of the **CardWizard** icon. Click on the menu once with the left mouse button to start the Wizard application.

Another way to start CardWizard for Windows NT is to double-click on the system tray icon with the left mouse button.

Self-Check

If you have a problem configuring your PC Card, select the **Wizard** button in the "CardWizard for Windows NT" window.

Each time you click on the **Wizard** button, a series of self-checks is run to assure that all necessary components are installed and working properly. CardWizard then analyzes the computer to verify that there are resources available for PC Card configuration.

Click on this button to fix most PC Card problems. Even if CardWizard cannot automatically solve a problem, it can pinpoint the problem exactly so that you or a technical support engineer can fix the problem more easily.

PC Card Properties

You can see the attributes, resources, drivers, and memory card utilities that are loaded for PC Card support in the "PC Card Properties" window.

To open the "PC Card Properties" window, do the following:

1. Open the **CardWizard**.
2. Select **Properties** from the "Actions" menu.
3. From the "Card Information" panel:
   a. Press the right mouse button while the cursor is on an inserted card icon.

b Click on **Properties**.

The “Properties” windows provide information about the attributes and drivers associated with the selected PC Card.

Attributes

Slot	The slot number and assigned name for the slot.
Card	The type of this PC Card.
Manufacturer	The manufacturer of the PC Card.
IRQ	The interrupt request being used (if relevant).
Port	The I/O address associated with a communication port (if relevant).
DOS Device	The communication port used by this device (if relevant).

Name

When you select device drivers, the following information is displayed:

Driver	The full path to the driver for this PC Card.
Version	The version for the current driver.

Stopping the PC Card

If you are removing a PC Card, you must first stop it. The system might freeze or data might be lost if a PC Card is removed before it is stopped.

Note: You can stop only one card at a time. After invoking stop, you cannot stop another card until the first stop is either completed or fails.

To stop a card, select **Stop** from the “Actions” menu.

Power to the slot is turned off when a card is “stopped.” You can remove ATA cards. To prevent loss of data and other unpredictable machine behavior, make sure the stop operation is complete before you remove the cards.

Help

If you press **F1** or select the **Help** button, you can get help for most of the windows. A glossary of terms and an index of Help items are also available.

Using ATA PC Cards

This section describes how to initialize and use removable storage cards, such as ATA hard disk and ATA Flash disk cards.

An ATA PC Card can be used like most storage devices. Your new ATA card needs to be formatted just as any hard disk does.

Format the ATA Card as follows:

1. Start Windows NT 4.0.
2. Click on **Start**.
3. Click on **Programs**.
4. Click on **Administrator Tools (Common)**.
5. Click on **Disk Administrator**.
6. Select a drive that you want to format.
7. Click on **Tool**.
8. Click on **Format**.

Power Management Support

CardWizard for Windows NT provides support for power management. Power management is a function to conserve the battery life of your computer. Battery power is conserved when your computer enters suspend mode. Then, many devices are powered off and others run at lower power consumption levels. When operation is resumed (when the computer exits from suspend mode), the computer returns to the state it was before it entered suspend mode. Programs and data that were in use before suspend mode began are restored.

Suspend Mode Support

The PC Card Controller and the cards are powered off when your computer enters suspend mode. However, each card type is handled differently to prevent data loss or machine crash through the suspend-resume event. For example, all files must be closed on a storage card. LAN cards cannot avoid the risk of crashing the system when resuming. CardWizard identifies each card type and might present a dialog of instructions to avoid these potential problems. In some cases CardWizard might stop the suspend event altogether. You are expected to follow the instructions given before entering suspend mode.

There is also a *critical suspend,* where your computer is automatically suspended by the system when the battery life is about to expire. In this case, your computer might not be able to fully restore the state it was in before it entered suspend mode. When resuming from critical suspend, CardWizard analyzes the cards that were being used before the critical suspend and instructs you to save data or prevent problems such as a system crash. The instructions might recommend that you reboot your system.

Suspend Notification

You might receive messages when you attempt to suspend your computer with the following cards:

Network or SCSI cards: You tried to suspend while there is a network or SCSI card in use. Shut down your system instead of suspending it.

ATA cards: You tried to suspend before you closed all files and folders on the ATA card. Close all files and folders, and then try the suspend.

Using a PC Card in Windows 3.1 (with CardWizard)

This section describes the PC Card support software for Windows 3.1 and how to format the PC Card.

CardWizard is the PC Card support software for Windows 3.1. It increases the usability of PC Cards.

CardWizard has following features:

Self-Check

If you have a problem, refer to this section.

Help

You can get help for most of the windows.

This section concludes with information on formatting PC Cards.

To start CardWizard, do as follows:

1. Start Windows 3.1.
2. Double-click on **SystemSoft Tools** in the “Program Manager” window.
3. Double-click on **CardWizard**.

   The CardWizard window appears.

You can see up-to-date information about your computer's PC Card slots.

The first line shows the card name.
The second line shows the manufacturer.
The third line shows the card's function or type.

If you have a multifunction card installed, you will see up to two functions at a time. You can scroll to see available functions if more than one function is activated on your card. Functions are labeled by slot number followed by function number. For example:

1-2 means slot 1, function number 2.
2-1 means slot 2, function number 1.

Self-Check

CardWizard has a self-check function that solves such problems as incorrect or missing PC Card device drivers, system resource conflicts (IRQ, memory, or I/O ports), and unconfigured PC Cards, as well as memory conflicts.

If there are any problems, click on the **Wizard** button, which is in the bottom right-hand corner of the window. Each time you click on the **Wizard** button, a series of self-checks is run to assure that all necessary components are installed and working properly. CardWizard then analyzes the computer to verify that there are resources available for PC Card configuration. There are four possibilities:

Card Configured: On the left, CardWizard displays a graphical representation of the card and any available card manufacturer information. On the right, CardWizard displays all system resources that the card is using.

Card Not Configured: On the left, CardWizard shows a question mark and any available card manufacturer information. On the right, CardWizard displays a message suggesting that you click on the **Wizard** button to correct the problem.

Card Not Recognized: On the left, CardWizard shows a question mark and any available card manufacturer information. On the right, CardWizard displays a message asking you to click on the **Wizard** button to select the type of card you have inserted.

No Card Inserted: CardWizard displays a picture of an empty slot.

Even if CardWizard cannot automatically solve a problem, it can pinpoint the problem exactly so that you or a technical support engineer can fix the problem more easily.

Help

CardWizard provides extensive online help. Help is available for almost all windows (when you press **F1** or the **Help** button).

For most menu items (when you press **F1** while the menu item is selected), you can get an extensive list of CardWizard topics.

Formatting PC Cards

This section describes how to initialize and use removable storage cards, such as ATA hard disk drive, ATA Flash disk, Flash memory (non-ATA type), and SRAM cards.

Note: Before initializing removable storage cards for use, you must exit Windows 3.1 and enter DOS.

Formatting the ATA Card

You need to format ATA cards before you can use them. To format the card, you need to run the ATAINIT command from the DOS prompt. Then you need to use the standard DOS FORMAT command.

See Using the ATA Hard Disk or ATA Flash Disk Cards.

Formatting a Flash Disk Card (MCFORMAT)

You can configure and manage a (non-ATA) Flash memory card with the MCFORMAT command. MCFORMAT enables you to perform the following actions easily:

Create and format a new partition
Format an existing partition
Erase a partition
Display partition information

MCFORMAT is a DOS command, so you must exit Windows 3.1 before using it.

MCFORMAT can be used to create and format FTL partitions on a Flash memory card or PC DOS partitions on an SRAM card.

To create and format a new partition on a Flash memory card or an SRAM card:

1. Go to the CardWizard directory and type:

   ```
   MCFORMAT
   ```

2. Press **Enter**.

3. Follow the instructions on the screen.

Formatting an SRAM Card

Before using an SRAM card, you have to format it using the DOS FORMAT command. Do the following:

1. Type the following:

   ```
   FORMAT drive_letter:
   ```

   (`drive_letter` is the actual drive letter.)

2. Press **Enter**.

For more instructions on using FORMAT, see your DOS user's guide.

Memory Card Partitions and Drive Letters

MTDDRV assigns drive letters to each partition on a memory card to allow each partition to be accessed as if it were another hard disk drive.

You can display the drive letters it reserves at system boot or by entering the following at the DOS prompt from within the directory containing the CardWizard files:

```
MTDDRV /?
```

If the first available letter is F, MTDDRV reserves drive letter F for your first PC Card slot and letter G for your second PC Card slot. These drive letters are reserved whether you are actually using them for memory card partitions or not.

Note: The situation described in this example could create a problem if you are connected to a network, especially if you are mapped to numerous network drives. The system might run out of drive letters to assign before all your network drives have been properly mapped. The drive letters that MTDDRV reserves might cause all other drive letters to be reassigned (excluding drive letters for local hard disks or ATA cards).

For example, if you have a network drive that is normally drive F and you install MTDDRV, the network drive will no longer be assigned drive letter F on your system. As a result, you might

have to modify the drive letters in any network batch files that you use. For example, if you have a network batch file that loads your network login files from drive F and MTDDRV has reserved drive letters F and G for memory card partitions, you must change the drive letter in your network batch file to H (the next available letter).

Using a PC Card in OS/2 (with PC Card Director)

This section describes how to use the PC Card in OS/2.

The PC Card slots of the computer and the port replicator do not support the following PC Cards:

Integral Peripherals Model 1841PA (40 MB)
IBM 105-MB PCMCIA hard disk drive (P/N 74G8694)
8-bit or 16-bit slave DMA PC Cards

Ask IBM or an IBM authorized dealer for more information about the different types of PC Cards.

You can use a DOS object[3] in the OS/2 environment. OS/2 Virtual Card Services provides a Card Services interface and enables you to use the DOS PC Card device driver for the DOS object.

Note: Even when a PC Card is enabled with a DOS object, the device driver or the application program might not work, or their performance might not be what you expect.

To use Virtual Card Services with a DOS object, do the following:

1. Move the mouse pointer to the DOS object icon; then click the right mouse button.
2. Click on **Properties**.
3. Click on the **Session** tab.
4. Click on **DOS (WIN-OS/2) Properties**.
5. Click on **All DOS (DOS and WIN-OS/2) Settings**.
6. Set **PCMCIA_CARD_SERVICES** as On.
7. Set **PCMCIA_RELEASE_LEVEL** as `2.1`
8. Set **MEM_EXCLUDE_REGIONS** as `CC -D3FFF`

3 A *DOS object* might be a DOS program, Windows 3.1 program, DOS full-screen, DOS window, WIN-OS/2 full-screen, or WIN-OS/2 window.

9. Specify the PC Card device driver name at the **DOS_DEVICE** prompt.

PC Card Director is the PC Card support software for OS/2. It makes using PC Cards with your computer easier in the following ways:

You can use the PC Card when you insert it in a PC Card slot.

You can display what type of PC Card is in your computer.

You can register an application program for a particular PC Card and start the program automatically when the card is inserted.

Notes:

If your PC Card is not supported by PC Card Director, you must install the driver that came with your card. To see the supported PC Cards by PC Card Director, click on the **Supported PC Cards** icon in the "PC Card Director" window. Even if your PC Card is not listed, try using it with PC Card Director.

The card driver must be compatible with the PCMCIA Card Services PC Card Standard (1995) or the PCMCIA Card Services Standard Release 2.1. Follow the instructions in your PC Card manual to install the driver.

To start PC Card Director, double-click on the **PC Card Director** folder; then double-click on the **PC Card Director** icon.

Stopping the PC Card

PC Card Director has a stop function for removing the PC Card safely. Stop the PC Card as follows:

1. Open **PC Card Director**.
2. Click on the **Control Power** icon.
3. Select from the card list the storage PC Card you want to remove.
4. Click on **Off**.
5. Make sure the card status is off; then remove the storage PC Card.

Using the Auto Configurator Utility

You can delete or change a registered PC Card with the **Auto Configurator Utility**. You can find the **Auto Configurator Utility** icon in the “PC Card Director” window.

This section describes this utility.

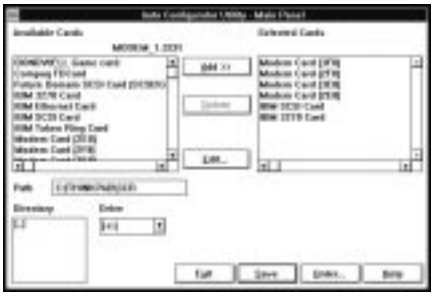
Note: PC Card Director provides the *Auto Configurator*, a program for some PC Cards, so that you do not have to install the device driver supplied with it. When you install PC Card Director, a BASEDEV= statement such as the following is added to the CONFIG.SYS file.

```
BASEDEV=AUTODRV2.SYS
```

Registering a PC Card in Auto Configurator

1 Double-click on the **Auto Configurator Utility** ( ) icon from the “PC Card Director” window.

2 Select a card from the **Available Cards** list in the “Auto Configurator Utility” window.



Select the card for which you want to assign the resources first. For example, if you want to assign COM3 (rather than COM2) to a modem card, select the setting for COM3 first.

The names in the left list box (**Available Cards**) can be registered. The names in the right list box (**Selected Cards**) are already registered in Auto Configurator.

3 Click on the **Add>>** button.

4 Click on the **Save** button.

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. Double-click on the **Auto Configurator Utility** icon in the “PC Card Director” window.
2. Select the PC Card you want to delete from **Selected Cards** in the “Auto Configurator Utility” window.
3. Click on the **Delete** button.
4. 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. Double-click on the **Auto Configurator Utility** icon from the “PC Card Director” window.
2. Click on the **Order...** button in the “Auto Configurator Utility” window. The following window appears:

3. Do as follows to change the order of the PC Cards in the list:

   When 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.

   When 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.

4 Click on the **OK** button to save the changes.

The changes are saved. To cancel the changes, click on the **Cancel** button.

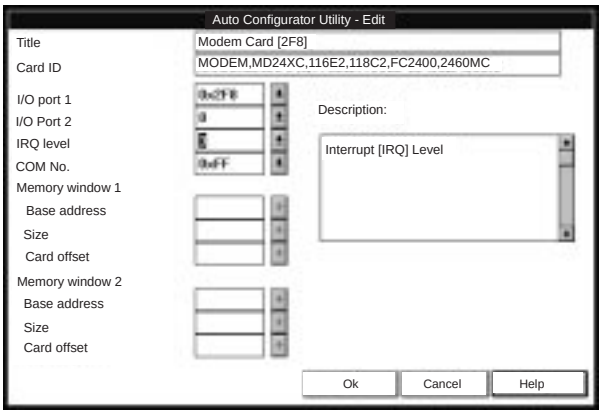
Changing the Resource Information for the PC Card

1 Double-click on the **Auto Configurator Utility** icon in the "PC Card Director" window.

2 Select the PC Card you want to change from the left list box in the "Auto Configurator Utility" window.

3 Click on the **Edit...** button.

The following window appears:



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.

4 You can change the following registered information for the PC Card. The items that can be changed differ depending on the PC Card.

Card ID
I/O port address
IRQ level
COM number of the serial port
Memory window address
Memory window size
Card offset address

5 Click on the **OK** button, and save the changes.

To cancel the changes, click on the **Cancel** button.

Updating the CONFIG.SYS File

For PC Card Director to work correctly, the PC Card device drivers 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 Installing a New Operating System and Its Device Drivers.

The following section describes the standard rules for each driver registered in the CONFIG.SYS file for your reference.

Registered Drivers and Standard Rules

The following is a sample of a CONFIG.SYS file:

```
        :
BASEDEV=PCMCIA.SYS           --→ Card Services
BASEDEV=IBM2SS14.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 and Socket Services must be listed before any other PC Card drivers.
Rule 2	The PC Card Power Management Support driver must be listed after all drivers, at the end of the CONFIG.SYS file.
Rule 3	When using storage cards, the device drivers must be installed according to the card type.

Example of 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
```

Example of 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
```

Example of 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
```

Example of 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 4	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 do not have the Power Management Support driver, the Storage Card Device Manager must be added at the end of the CONFIG.SYS file.

Parameters for the ATA Card Device Driver for OS/2

The following are the parameters and their explanations of the ATA card device driver for OS/2 statement in the CONFIG.SYS file:

```
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. If 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. If 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. If this parameter is not set, you will hear a beep every time a storage card is installed into the PC Card slot.
/B	Specifies that OS/2 has started from an ATA card. If 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. If 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). If 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 PC Card slots available for the PC Card storage devices. If this parameter is not specified, no extra drive is given to the device driver. The extra drives can be activated by the ATA Card Mount utility.
/!DM	Specifies not to use OS2DASD.DMD as the device manager. If this parameter is set, OS2PCARD.DMD is used instead.

Storage Card Device Driver

ATA cards, SRAM cards, and Flash cards are PCMCIA storage cards. This section describes the device drivers for these storage cards, available in PC Card Director.

Storage Card Device Driver for OS/2

The device drivers for each type of storage cards are:

PCM2ATA.ADD for ATA cards
PCM2SRAM.SYS for SRAM cards
PCM2FLSH.SYS for 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.

Notes:

Install PCM2ATA.ADD for all storage cards, even if you are using SRAM or Flash cards.

If using the ATA Card Mount Utility, install the PC Card storage API device driver (PCMSSDIF.SYS) for OS/2.

Formatting Storage Cards before Use

You need to format new PCMCIA storage cards before using them. For Flash cards, run the Flash Format Utility (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.

To format the card, use the FORMAT.COM program by choosing the drive icon.

Using 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 ATA Card Mount utility to assign a drive letter to it.

Storage Card Device Manager

OS2PCARD.DMD is the device manager for the storage card. Specify the /!DM parameter in the PCM2ATA.ADD line, so that 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 is not 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
```

PC Card Storage API Device Driver for OS/2

This device driver provides a communication function between PC Card Director or the mount utility and the ATA card device driver for

OS/2. As a result, a utility in the upper layer can get the drive letter or partition information for the 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 OS2 Flash card driver (PCM2FLSH.SYS).

The following is a line from the CONFIG.SYS file that describes the Flash Card Memory Technology driver:

```
DEVICE =[drive:] [directory] FLSH2MTD.SYS
           --→ Memory Technology driver
DEVICE =[drive:] [directory] PCM2FLSH.SYS
           --→  Storage 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.

Problems

The resource was already reserved by another device.
Configuration files were not set up correctly.

Actions

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 that you want to use for 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 to the PC Card by changing the parameters in the PC Card enabler, or you can change the settings in the configuration file of the PC Card. For more information, refer to the manuals supplied with your PC Card.

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 Using the Auto Configurator Utility.

If you are using modem cards, you should know that 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 ThinkPad Modem.) Error messages are displayed to tell you that the I/O port address 3F8 or 2F8, or IRQ level 3 or 4, were not allocated.

If this is the case, use the ThinkPad Setup Utility in the ThinkPad Configuration program to disable the devices using COM1 or COM2; then restart the system.

Avoiding PC Card Resource Conflicts

PC Card Director checks the resources for most devices used by the system to avoid resource conflicts, but it does not recognize all option devices used. Especially if you are using the docking station, there is a possibility that the I/O port address or IRQ level might conflict with the PC Card.

Check the status of the PC Card by using PC Card Director. If 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 do not conflict 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, you can check the assigned system resources using RMVIEW.EXE.

If there is a conflict:

If you are using OS/2 Warp, 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 README file of PC Card Director.

If you are using Auto Configurator, change the enabling order or resource information using the Auto Configurator Utility.  Using the Auto Configurator Utility.

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 for the network cards, refer to the manuals or README files of the PC Cards or network drivers.

Using a PC Card in DOS (with CardSoft)

This section describes CardSoft for DOS and how to use it.

CardSoft enables you to use your PC Cards in the DOS environment. It increases the usability of PC Cards by simplifying their installation and configuration.

CardSoft provides some DOS commands. You can see the following information on the PC Card with these commands:

PC Card type
The resources assigned to the current PC Card
Any resource conflict with the current PC Card
The drive letter of the storage or memory card
Whether the PC Cart is turned on or off
CardSoft information

Note: These commands are active in the directory where CardSoft resides.

CARDINFO

CARDINFO scans the PC Card slots on your computer and shows information about them. It also shows any warnings or error messages that might have occurred when CardSoft configured these cards.

You use CARDINFO command if:

You need to know the types of cards that are currently inserted in your PC Card slots.

You need to know the I/O ports, IRQs, and memory areas that are being used by your PC Card. This information might be needed if you are installing other components on your system.

You need to know if there is a conflict between the new component and a PC Card is use—that is, if the new component and a PC Card are trying to use the same resource, such as an IRQ interrupt. If this happens, either the PC Card or the new component must be reconfigured for other resources to be used.

You want to turn off (or turn on) power to a PC Card slot that contains the PC Card.

You want to display manufacturer and product information about your PC Cards.

You need to know the drive letter for your ATA hard disk or ATA Flash disk card.

You need to know the latest error that occurred for an inserted card.

Running CARDINFO

To run CARDINFO, type the commands with one of the following commands and press **Enter**:

`CARDINFO` Displays the card information. Information similar to the following is displayed:

```
Slot 1 Function  :

      Manufacturer = TDK
      Product Name = DF2814 DATA/FAX MODEM
      Device Type = Modem (COM 3)

Slot 2 Function

      Manufacturer = IBM
      Product Name = IBM17JSSFP
      Device Type = ATA Disk
      Device Type = F:

Slot 3 Function

      Slot 3 is empty

Slot 4 Function

      Slot 4 is empty
```

`CARDINFO /V` Displays more extensive information about the PC Card slots in your computer.

`CARDINFO /C` Provides the following additional Card Services information:

- Card Service release number
- Vendor revision number
- Number of slots
- Number of functions per slot
- Vendor copyright information

`CARDINFO /OFF[:S,F]` Turns off power to all PC Card slots.

Note: S is the parameter that specifies the slot. You can turn off the power to only the specified slot with this parameter. F is the parameter that specifies the function. You can turn off the power to only the specified function with this parameter.

`CARDINFO /ON[:S,F]` Turns on power to all PC Card slots.

Note: S is the parameter that specifies the slot. You can turn on power to only the specified slot with this parameter. F is the parameter that specifies the function. You can turn on power to only the specified function with this parameter.

`CARDINFO /?` Displays information about CARDINFO switches.

Using the Configuration Utility

The Configuration utility (CONFIG.EXE) modifies the CARDID.INI and CSALLOC.INI files. You need to run this utility if you are having difficulty using the PC Card, or if you are customizing your system. Whenever you finish using this utility, restart your system so that your changes take effect.

The Configuration utility can be used for the following purposes:

Setting or changing the IRQs and COM port assignment order for your fax/modem cards.

Setting or changing the I/O port address, IRQ, and memory areas that your network cards will use.

Selecting the address (primary, secondary, or any) that your ATA cards will be using to communicate with the system.

Selecting the type of video display (color, monochrome, or LCD).

Online Help

Online help is available for many of the Configuration utility fields. To access online help for a particular field, position the cursor in the field (or highlight the field) and then press **F1** (or click on the **Help** button, if it is available).

Running the Configuration Utility

From the DOS prompt (C:\), type `CONFIG` and press **Enter**.

The following menus are available from this window:

File	Edit Configuration Save Configuration Exit
Utility	Resource Allocation
Display	Color Monochrome LCD

To access a pull-down menu, click the left mouse button on the menu name, or press **Alt**+**the highlighted letter** in the menu name. For example, to access the “File” menu, click on the word **File** or press **Alt**+**F**. When the pull-down menu appears, select a menu item by:

Clicking on it.

Pressing the **Down arrow** key to highlight the item and then press **Enter**.

Pressing a key that corresponds to the highlighted letter.

Using Storage PC Cards

This section describes how to use the storage cards.

Using the ATA Hard Disk or ATA Flash Disk Cards

For you to use ATA hard disk or ATA Flash disk cards on your system, your CONFIG.SYS file must contain the following line. The standard device drivers are always required:

```
DEVICEHIGH=C:\CARDSOFT\ATADRV.EXE
DEVICEHIGH=C:\CARDSOFT\MTDDRV.EXE
```

Formatting or Initializing a Card

Attention

Make sure you are using the correct drive letter when formatting or initializing your ATA card, because any information on the specified drive is erased.

Formatting an ATA Card

To format an ATA card:

1. Type the following command

   `FORMAT drive_letter /U`

   Note: `drive_letter` is the drive letter assigned to the card. For example, if the card has been assigned to drive D, type `format D: /U`

2. Press **Enter**.

Initializing an ATA Card

To initialize an ATA card, run the ATAINIT command from the DOS prompt, and then use the standard DOS format command to format the ATA card.

Note: ATAINIT works only with ATA cards that are supported by the ATADRV driver. If you cannot use your ATA card, it might be an unsupported card. Check with the manuals that came with the card.

ATAINIT.EXE is a disk-partitioning utility that must be used to initialize any ATA cards supported by ATADRV. When a new ATA card is inserted into a PC Card slot, you need to initialize the card by using ATAINIT. ATAINIT finds the physical parameters (number of

sectors, cylinders, and so on) to use, and then initializes the card. To initialize the card, do as follows:

1. Type the following command:

   ```
   ATAINIT drive_letter:
   ```

   Note: `drive_letter` is the actual drive letter. For example, if your ATA card has been assigned drive letter D, you should type: `ATAINIT D:`

2. Press **Enter** to accept the displayed information. If you want to specify a drive parameter, type `P` and press **Enter**. Then follow the instructions in the window.

Using Memory Cards

For you to use memory cards on your system, your CONFIG.SYS file must contain the following lines (in addition to the standard drivers that are always required):

```
DEVICEHIGH=C:\CARDSOFT\MTSRAM.EXE
DEVICEHIGH=C:\CARDSOFT\MTDDRV.EXE
```

Drive Letters

You need to know which drive letter to use to access the memory card.

Note: Drive letters are shared by memory and Flash memory cards. If you insert a memory card in slot 1, it will be assigned drive E; if you insert a Flash memory card in slot 2, it will use drive F.

If you remove the memory card from slot 1, and insert a second Flash memory card in slot 1, it will be assigned drive E, because that is the drive letter assigned to slot 1 for memory and Flash memory cards.

Type the following and press **Enter**:

```
MTDDRV /?
```

Information similar to the following is displayed:

```
Drive E is partition number    for slot number  1.
Drive F is partition number    for slot number  2.
Drive G is partition number    for slot number  3.
Drive H is partition number    for slot number  4.
```

This example shows a system with four PC Card slots, configured for one partition per card. You can use the memory card in your first PC Card slot (slot 1 in this example) as drive letter E.

The number of drive letters listed depends on the number of PC Card slots in your computer, and whether MTDDRV is configured for multiple partitions.

Formatting Memory Cards

Attention

Make sure you are using the correct drive letter when formatting a memory card, because any information on the specified drive is erased. Refer to the previous section if you need to know which drive letter to use.

To format your memory card, type the following and press **Enter**:

```
FORMAT drive_letter:
```

(`drive_letter` is the actual drive letter.)

For more instructions on using FORMAT, see your DOS user's guide.

Chapter 6. Resolving System Resource Conflicts

This chapter describes the default system resources and how to share an IRQ between two devices.

Sharing an IRQ between ThinkPad Modem Devices

Note: This chapter is only for the ThinkPad with a built-in modem and with the Windows 98 or Windows 95 operating system installed.

In most cases, your computer automatically assigns the system resources when you install a new device. For example, your computer assigns such resources as the *interrupt request (IRQ)* level and the *input/output (I/O)* ports when you install a PC Card modem. Other devices might need such system resources as *direct memory access (DMA)* and *memory*. The IRQ for each system resource can have a value of 0 to 15. That is, there are 16 values that can be assigned for IRQs.

Sometimes Windows 98 or Windows 95 does not allocate the resources correctly, because the resource might already be allocated to another device. This is called a system resource ***conflict***, or ***contention***. In this case, you can free one IRQ by sharing an IRQ between two devices.

When doing this, you need to know about the system resources available and their IRQs.

This chapter describes how to solve resource conflicts by sharing an IRQ.

The ThinkPad Modem function is supported by a digital signal processor (DSP) called the IBM Advanced Communications Processor. The ThinkPad Modem usually uses two IRQs to handle the DSP interrupt and the modem interrupt. However, by sharing an IRQ between these two devices, you can free one IRQ so that you can use it for another device.

Notes:

1. Do not have your computer set in an IRQ-shared status when installing the ThinkPad Modem. If your computer is already in a sharing status, disable the status before you start the installation.
2. An IRQ can be shared in Windows 98 and Windows 95. You must disable the status before you start rebooting another operating system.

The default resources are as follows:

```
I/O 13 -13F
I/O 2F8-2FF
IRQ 3
IRQ 1
DMA 7
```

Attention

An IRQ can be shared in Windows 98 and Windows 95. If you have a multipartitioned hard disk drive or have multiple hard disk drives, and reboot another operating system or install another operating system, the CMOS status and the hardware settings might not remain consistent and the devices sharing an IRQ might become unusable. It is recommended that you use the system in its default IRQ status, unless you must have the IRQ shared—for example, because you are using multiple PC Cards and the docking station simultaneously.

To share an IRQ, do the following:

1. Click on **Start, Programs**, and **ThinkPad Configuration**.
2. Double-click on the **Internal Modem** icon.
3. Click on the **Device Manager** button.
4. Double-click on **IBM Digital Signal Processor**.
5. Double-click on **ThinkPad Digital Signal Processor**.
6. Put a check mark in the **Disable in this hardware profile** check box by clicking on it; then click on **OK**.
7. Double-click on **ThinkPad Digital Signal Processor**.
8. Click on the **Resources** tab.
9. Make sure the check mark is removed in the **Automatic Settings** check box.
10. Select **Basic Configuration 0005**.

    Make sure the list is as follows:

```
I/O 13 -13F
I/O 2F8-2FF
IRQ 3
DMA 7
```

Note: If DMA is not 7, double-click on **Direct Memory Access** and specify “07” for **Value**; then click on **OK**.

11 Click on the **General** tab.

12 Remove the check mark in the **Disable in this hardware profile** check box by clicking on it; then click on **OK**.

13 Restart your computer.

To disable sharing an IRQ, do the following:

1 Click on **Start, Programs, ThinkPad,** and **ThinkPad Configuration**.

2 Click on the **Internal Modem** icon.

3 Click on the **Device manager** button.

4 Double-click on **IBM Digital Signal Processor**.

5 Double-click on **ThinkPad Digital Signal Processor**.

6 Click on the **Resources** tab.

7 Click on the **Automatic Settings** and remove the check mark.

8 Select **Basic Configuration 0001**.

9 Scroll the **Resource Settings** list box. Locate and double-click on the second IRQ 3 resource in the “Resource Type” column.

10 Specify 10 for **Value** and click on **OK**.

11 Make sure that there are no conflicting devices indicated in the **Conflicting Device** list.

Default IRQ Assignments

The following table shows the default system resource assigned for each IRQ:

IRQ Value	Assignment
0	Timer
1	Keyboard
2	Cascade
3	ThinkPad Modem
4	Infrared
5	Audio
6	Diskette
7	Parallel port
8	Real-time clock
9	Not used
10	ThinkPad Modem
11	PCI
12	Auxiliary device
13	Math co-processor
14	Primary IDE
15	Secondary IDE

System Resources and IRQs

The following table shows the available system resources for your computer and the docking stations. The values in parentheses are alternate values that are selectable from the ThinkPad Configuration program or from an application program. The default values are highlighted.

System Resources	IRQ	I/O Address (Hex)	Memory Address (Hex)	DMA Channel
Audio control base	None	**0538–053F**, 0D38–0D3F, 0E88–0E8F, or 0FF0–0FF7	None	None
CD-ROM and DVD drive in UltraBay II	**15**, 14	**0170–0177**, **0376**, 01F0–01F7, or 03F6	None	None
Diskette controller	6	03F0–03F7	None	2
Enhanced Video/MPEG	**11**, 3, 4, 5, 7, 9, 10, 15, or disabled	None	(Automatically set by the system)[1]	None
Hard disk drive	14	01F0–01F7 and 03F6	None	None
IDE hard disk drive or the IDE CD-ROM drive in the docking station	**15**, 10, 11	0170–0177 and 0376, 01E0–01E7 and 03E6, 01E8–01EF and 03EE, or 0168–016F and 036E	None	None
Infrared port	**4**, 3, or disabled	**03F8–03FF**, 02F8–02FF, 02E8–02EF, or 03E8–03EF	None	**3**, 0, 1, or disabled
ISA adapter card (option card) in the docking station	(Refer to the manual shipped with the adapter card.)			
Joystick port	None	0201	None	None
Keyboard	1	0060 and 0064	None	None
Math co-processor exception	13	None	None	None
MIDI	5, 7, 10, 11, or **disabled**	**0330–0333**, 0310–0313, 0320–0323, or 0300–0303	None	None
Modem (Refer to Sharing an IRQ between ThinkPad Modem Devices.)	**10**, 5, 7, 11, 15, disabled –or– **3** 4 4 3	**0130–013F**, 0350–035F, 0770–077F, or 0DB0–0DBF –or– 02F8–02FF, 03F8–03FF, 03E8–03EF, or 02E8–02EF	None	**7**, 0, 1, or 6

System Resources	IRQ	I/O Address (Hex)	Memory Address (Hex)	DMA Channel
Parallel port	**7**	**03BC–03BE** (and **07BC–07BE**[2])	None	0, 1, 3, or disabled[3]
	7	0378–037F (and 0778–077A[2])		
	5	0278–027F (and 0678–067A[2])		
	Disabled	Disabled		
PC Card	(Dependent on the PC Card type)	(Dependent on the PC Card type)	(Dependent on the PC Card type)	None
PCI adapter card (option card) in the docking station	**11**, 3, 4, 5, 7, 9, 10, 15, or disabled	(Refer to the manual shipped with the adapter card.)		
PCMCIA controller	11	03E0–03E1[4] (The PC Card slot in the docking station: 03E2–03E3)	None	None
Real time clock	8	0070–0071	None	None
SCSI controller in the docking station	**11**, 3, 4, 5, 7, 9, 10, 15, or disabled	(Automatically set by the system)	None	None
Serial port	**Disabled**	**Disabled**	None	None
	4	03F8–03FF		
	3	02F8–02FF		
	4	03E8–03EF		
	3	02E8–02EF		
Sound Blaster	None	**0220–0233**, 0240–0253, 260–273, or 280–293	None	None
Timer	0	0040–0043	None	None
TrackPoint or mouse	12	0060 and 0064	None	None
Video controller	None	03BA, 03B4–03B5, 03C0–03CF, 03D4–03D5, 03D8–03D9, 03DA, 2100–21FF, 2200–2203, 2300–2323	A0000–BFFFF C0000–C9FFF Automatically set by the system	None

System Resources	IRQ	I/O Address (Hex)	Memory Address (Hex)	DMA Channel
WSS codec base	**5**, 7, 9, 10, 11, 15, or disabled	**0530–0537**, 0604–060B, 0E80–0E87, or 0F40–0F47	None	**0, 1**, 3, or disabled

Note:

[1] A memory address higher than the system memory will automatically be set by the system.
[2] The I/O addresses in parentheses are used also when ECP is enabled as the printer operating mode from the ThinkPad Configuration program.
[3] When you enable ECP as the printer operating mode from the ThinkPad Configuration program, you must select one value from the four selections (including “disabled”).
[4] When you use Windows 95 OSR2, do not assign this I/O addresses.

Chapter 7. Frequently Asked Questions

Frequently Asked Questions

This section addresses frequently asked questions. Go to the page indicated in the following chart and do the specified action.

To solve the problems discussed in this section, you need to use the ThinkPad Configuration program. To start the ThinkPad Configuration program, find the ThinkPad icon on the taskbar; then double-click on the icon.

Note: You can also open the ThinkPad Configuration program as follows:

1. Click on **Start**.
2. Move the cursor to **Programs** and **ThinkPad**; then click on **ThinkPad Configuration**.

For more information to start the ThinkPad Configuration program

→ *User's Reference*.

My screen keeps blanking when I do not want it to. How can I stop this?

You can disable any system timers, such as the LCD turnoff timer or the system standby timer, with the ThinkPad Configuration program.

1. Start the ThinkPad Configuration program.
2. Click on the **Power Management** button; then click on the **Power Schemes** tab.

   You can disable the system timers by selecting **never** rather than a specific time.

How can I use my infrared port as a communication port?

If the infrared port is disabled, you must enable it before you can use it again. To enable your infrared port, do as follows:

1. Save your work and quit any program you are using.
2. Start the ThinkPad Configuration program.
3. Click on the **Infrared** button.
4. Select **Enable** from the **Infrared** list box.

   A “Warning” might appear that the hardware resource is being used by another communication device.

5. Click on **Disable Device**.

   Another “Warning” window prompts you to restart your computer.

6. Click on **OK**. The computer restarts.

Notes:

1. If you check your infrared port and it is already enabled, you can use it immediately without changing any settings.
2. You can disable your computer's serial connector to free resources for another communication device, such as the infrared port.

After your infrared port is enabled, you can use it as a communication port. If it does not work properly, you might have a problem with your communication software or the device that you are trying to communicate with. Check the online help for your communication software if the other device appears to be working properly.

How can I use my serial connector as a communication port?

If the serial connector is disabled, you must enable it before you can use it again. To enable your serial connector, do as follows:

1. Save your work and any program you are using.
2. Start the ThinkPad Configuration program.
3. Click on the **Serial Port** button.
4. Select **Enable** from the **Serial port** list box.

   A “Warning” might appear that the hardware resource is being used by another communication device.

5. Click on **Disable Device**.

   Another “Warning” window prompts you to restart your computer.

6. Click on **OK**. The computer restarts.

Notes:

1. If you check your serial connector and it is already enabled, you can use it immediately without changing any settings.
2. You can disable your computer's infrared port to free resources for another communication device, such as the serial connector.

After your serial connector is enabled, you can use it as a communication port. If it does not work properly, you might have a problem with the communication software application or the cable or device attached to the serial connector. Check the online help system for your communication software if the cable and attached device appear to be working properly.

How can I use an external mouse when I am at my desk, but then use the TrackPoint when I am away from my desk?

The TrackPoint has an “auto disable” setting that disables it when you power on or restart the computer with an external mouse attached. When you want to enable the TrackPoint, remove the external mouse; then restart the computer.

Note: You can set up the TrackPoint manually with the ThinkPad Configuration program as follows:

1. Start the ThinkPad Configuration program.
2. Click on the **TrackPoint** button.
3. Select **enable**, **disable**, or **auto disable** from the **TrackPoint** list box.
4. Click on **OK**.

Why do I not get the highest possible resolution out of my external monitor when I am using the LCD and external monitor at the same time?

You can set any resolution for either the ThinkPad LCD or the external monitor. When you use both at the same time, the resolution of both is the same. If you set a higher resolution for the ThinkPad LCD, you can see only part of

the screen at a time. You can see other parts by moving the image with the TrackPoint or other pointing device. You can change the display output type to the LCD, external monitor (CRT), or both with the **Display Device** buttons of the ThinkPad Configuration program or with **Fn**+**F7**.

You can set up the external monitor as follows:

1. Double-click on **My Computer**, **Control Panel**, and then **Display**.

   The "Display Properties" window appears.
2. Click on the **Settings** tab.
3. Click on the **Advanced...** button.
4. Click on the **Monitor** tab.
5. Click on the **Change...** button.

   The "Update Device Driver Wizard" window appears.
6. Select the **Next** button, and follow the instructions on the screen by selecting **Display a list of all the drivers in a specific location, so you can select the driver you want**; and then **Show all hardware**.
7. Select **Manufacturers** and **Models** for your monitor, and follow the instructions on the screen.
8. Click on **OK** to close the "Properties" window after updating the driver.
9. Set **Colors** and **Screen area** in the "Display Properties" window.
10. Click on the **OK** button.

How can I set up the external monitor if the Windows plug-and-play feature does not detect it?

Do as follows:

1. Make sure you are using a D-Sub (Subminiature-D) connector cable.
2. Double-click on **My Computer**, **Control Panel**, and then **Display**.

   The "Display Properties" window appears.

3. Click on the **Settings** tab.
4. Click on the **Advanced...** button.
5. Click on the **Monitor** tab.
6. Make sure there is a check mark in the **Automatically detect Plug & Play monitors** check box.

   If not, put a check mark in the check box by clicking on it, and click on **OK** to close the window. Restart the computer; then make sure the plug-and-play feature detects the monitor.
7. If your monitor is still not recognized, click on the **Change...** button. The "Update Device Driver Wizard" window appears.
8. Check if the display driver information in the window is correct. If necessary, install the display driver by following the instructions on the screen.
9. Click on the **OK** button.

How can I maximize battery life?

To maximize battery life, do the following:

Use the battery until the charge is completely depleted (until the battery and power LEDs flash in unison).

Recharge the battery completely before using (the battery is fully charged when the AC Adapter is plugged in and the battery LED is green).

For a new battery or a battery that you have not used recently:

1. Recharge completely before using (the battery is fully charged when the AC Adapter is plugged in and the battery LED is green).
2. Use the battery until the charge is completely depleted (until the battery and power LEDs flash in unison).

Always use power management features such as power modes, standby, suspend, and hibernation.

For more detailed information about power management features → "Using the Battery Pack" on page 28.

How can I load a different operating system on my computer?
–Or–
Where can I get ThinkPad device drivers for this operating system?

See Installing a New Operating System and Its Device Drivers for information on installing a new operating system and device drivers. You can get the ThinkPad device drivers by using the Diskette Factory. Before installing a new operating system, do the following:

1. Print the software installation section of Installing a New Operating System and Its Device Drivers.
2. Make backup diskettes of the device drivers and applications for your new operating system with the Diskette Factory. For more information → *User's Reference*.
3. Make a DOS system diskette that has the DOS FDISK.COM and FORMAT.COM utilities and the CD-ROM device driver for DOS.

How can I use the Recovery CD to reload my factory-installed ThinkPad operating system and applications?

→ *User's Reference*.

Chapter 8. Installing Software

This chapter provides procedures for installing an operating system and the necessary software.

Installing a New Operating System and Its Device Drivers

If you want to install a new operating system in your computer, you need to install the ThinkPad device drivers for it at the same time.

This chapter describes how to install a supported operating system and corresponding device drivers. You should make a printout of the sections you will be using before you reinstall the operating system. Go to appropriate section depending on the operating system you are using.

Installing Software for Windows 98

This section describes the installation procedures for Windows 98 and its software for your computer.

Note: You can install Windows 98 by restoring the original preloaded image from the Recovery CD. Refer to the *User's Reference* for how to use the Recovery CD.

Overall Procedure

1. Have the Windows 98 installation package in hand.
2. Back up your software and personal data files on the hard disk.
3. Create the Windows 98 Supplement File Diskette using the Diskette Factory preloaded on the hard disk.
4. Create the diskettes of the device drivers using the Diskette Factory. You need to create at least the following device driver diskettes:

Device Driver	Diskette Name
ThinkPad Configuration program	Utility Diskette for Windows 98 Utility Data Diskette I for Windows 98 Utility Diskette for DOS, Personalization
Display driver	Video Features Diskette IV (TR9397D) for Windows 95/98
Audio device driver	Audio Features Diskette for Windows 95/98
TrackPoint driver	TrackPoint Driver Diskette for Windows 95/98/NT
ThinkPad modem driver	ThinkPad Modem for Windows 95/98/NT
Video capture driver	Video Capture Driver for Windows 95/98
UltraBay II hot swap driver	Utility Driver Diskette for Windows 95
Note: For UltraBay II hot swap driver, Windows 95 driver is available for Windows 98.	

5. Install Windows 98 and the software.

Installing Microsoft Windows 98

If you are installing Windows 98 on a drive other than the C drive, more than 25 MB is required on the C drive.

1. Install the Windows 98 CD-ROM into the CD-ROM drive.
2. Search for SETUP.EXE in the CD-ROM, and run the SETUP.EXE. Enter the following:

   ```
   src_cd:\tgt_dir\SETUP.EXE
   ```

   where `src_cd` is the drive letter of the CD-ROM drive (D, E...) and `tgt_dir` is the directory that SETUP.EXE is in.

   For more information, refer to the SETUP.TXT in the Windows 98 CD-ROM.

3. After Windows 98 is installed, insert the Windows 98 Supplement File Diskette into the diskette drive.
4. Click on **Start.**.
5. Click on **Run...**
6. Type `A:\PIXX4\APM2APM\APM2APM.REG` and click on **OK**.
7. Follow the instructions on the screen.
8. After the installation has finished, remove the Windows 98 Supplement File Diskette from the diskette drive and restart the computer.

Note: Depending on the optional applications you install with Windows 98, your required disk space varies. The following information applies to installing only Windows 98 in your computer:

Full install on a FAT 16 drive:
About 225 MB disk space is required. Depending on your system configuration and the options you select, the required space ranges from 165 MB to 355 MB.

Full install on a FAT 32 drive:
About 175 MB disk space is required. Depending on your system configuration and the options you select, the required space ranges from 140 MB to 225 MB.

Installing the ThinkPad Configuration Program for Windows 98

To install the ThinkPad Configuration program for Windows 98:

1. Start Windows 98.
2. Insert the Utility Diskette for Windows 98 into the diskette drive.
3. Click on **Start**.
4. Click on **Run...**.
5. Type `A:\SETUP` and click on **OK**.

   Follow the instructions on the screen. After the installation is finished, restart the system.

Installing the Display Driver for Windows 98

To install the ThinkPad display driver for Windows 98:

1. Start Windows 98.
2. Click on **Start**.
3. Move the cursor to **Settings**; then click on **Control Panel**.
4. Double-click on the **Display** icon; then click on the **Settings** tab.
5. Click on **Advanced...**.
6. Click on the **Adapter** tab.
7. Click on **Change...**.

   The “Update Device Driver Wizard” runs.
8. Click on **Next**.

9. Select **Search for a better driver than the one your device is using now. (Recommended)** by clicking on it. Then click on **Next**.

10. Put a check mark in the **Floppy disk drives** check box by clicking on it.

11. Insert the Video Features Diskette IV (TR9397D) for Windows 95/98 into the diskette drive, and click on **Next**.

12. When a message appears that Windows has found **IBM ThinkPad (Cyber 9397DVD)**, click on **Next**.

    If you prompt the source directory, type `A:\`

13. Click on **Finish**.

14. Remove the Video Features Diskette IV (TR9397D) for Windows 95/98 from the diskette drive, and click on **Yes** to restart the computer.

15. When the computer start, select screen parameters from the color palette, desktop area, and font size; then click on **Close**.

16. Click on **Start**.

17. Move the cursor to **Settings**; then click on **Control Panel**.

18. Double-click on the **Display** icon.

19. Click on the **Setting** tab.

20. Set the Colors and Screen area in the “Display Properties.”

21. Click on **OK** to close the window.

Installing the Audio Device Driver for Windows 98

To install the audio device driver for Windows 98:

1. Start Windows 98.

2. Insert the Audio Features Diskette for Windows 95/98 into the diskette drive.

3. Click on **Start**.
4. Click on **Run...**.
5. Type `A:\SETUP` and click on **OK**.
6. Click on **Uninstall Crystal Drivers**.
7. When Windows 98 detects “Unknown Device”, insert the Audio Features Diskette for Windows 95/98 Disk 1 into the diskette drive and click on **Next**.
8. When the message “Search for best driver for your device” appears, click on **Next**.
9. Make sure that there is a check mark is in the **Floppy disk drives** check box in the next window, and click on **Next**.

   Windows 98 identifies the device as a **Crystal PnP Audio System CODEC** and the driver directory as `A:\CWDAUDIO.INF`
10. Click on **Next**.

    The file copy starts.
11. When the file copy has completed, click on **Finish**.

    Windows 98 detects the PCI Multimedia Audio device.
12. Click on **Next**.
13. When the message “Search for best driver for your device” appears, click on **Next**.
14. Make sure that there is a check mark is in the **Floppy disk drives** check box in the next window, and click on **Next**.

    Windows 98 identifies the device as a **Crystal SoundFusion**(TM)**PCI Audio Accelerator** and the driver directory as `A:\CWDAUDIO.INF`.
15. Click on **Next**.

    The file copy starts.

16. When you are prompted to insert the Crystal SoundFusion(TM) Driver Disk 2 into the diskette drive, insert the Audio Features Diskette for Windows 95/98 Disk 2 in to the drive, and then click on **OK**.

    The file copy starts.

17. When you are prompted to insert the Crystal SoundFusion(TM) Driver Disk 3 into the diskette drive, insert the Audio Features Diskette for Windows 95/98 Disk 3 into the drive, and click on **OK**.

18. When the file copy has completed, click on **Finish**.

Note: The MIDI connector is available if the computer is attached to the docking station (option). The MIDI connector capability is disabled as a default, so you need to enable the function with the ThinkPad Configuration program.

Installing the IBM TrackPoint Driver for Windows 98

To install the TrackPoint driver for Windows 98:

1. Start Windows 98.
2. Insert the TrackPoint Driver Diskette for Windows 95/98/NT into the diskette drive.
3. Click on **Start**.
4. Move the cursor to **Settings**; then click on **Control Panel**.
5. Double-click on the **System** icon.
6. Click on the **Device Manager** tab at the top of the “System Properties” window.
7. Double-click on the **Mouse** icon.
8. Double-click on either **PS/2 Compatible Mouse Port** or **PS/2 TrackPoint** whichever choice appears in the list.
9. Click on the **Driver** tab.
10. Click on **Update Driver...**.

The “Update Device Driver Wizard” runs.

11 Click on **Next**.

12 Click on **Display a list of all the drivers in a specific location**.

13 Click on **Next**.

14 Click on **Have Disk**.

15 Make sure that the source drive is `A:\` and click on **OK**.

16 Click on **PS/2 TrackPoint** in the list.

17 Click on **Next**.

18 Click on **Next**.

19 Click on **Finish**. “Update Device Driver Wizard” window.

20 Remove the TrackPoint Driver Diskette for Windows 95/98/NT from the diskette drive, and restart your computer to make the new settings effective.

Installing the ThinkPad Modem Software for Windows 98

The modem function of your computer is supported by a digital signal processor (DSP) called the IBM Advanced Communications Processor. You must install the ThinkPad Modem driver for Windows 98 to use the modem function.

To install the ThinkPad Modem driver for Windows 98:

1 Start Windows 98.

2 Insert the ThinkPad Modem for Windows 95/98/NT Disk 1 into the diskette drive.

3 Click on **Start**, and then **Run...**.

4 Type `A:\SETUP` and press **Enter**.

If the previous version of the driver is installed, the ThinkPad Modem setup program displays a message. Remove the previous version of the driver by using the uninstall tool

provided in the ThinkPad DSP program. If the previous version of the driver is not installed, a message saying that Windows has found an unknown device appears. Insert the ThinkPad Modem for Windows 95/98/NT diskette into the diskette drive.

Follow the instructions on the screen.

Note: You need to set the dialing properties when using the ThinkPad Modem functions. Click on **Control Panel**, **Modems**, and then the **Dialing Properties** button.

For IRQ-sharing information, refer to Sharing an IRQ between ThinkPad Modem Devices.

Installing the Video Capture Driver for Windows 98

To install the video capture driver for Windows:

1. Start Windows 98
2. Insert the Video Capture Driver for Windows 95/98 into the diskette drive.
3. Click on **Start** and **Run...**.
4. Type `A:\SETUP` ane click on **Enter**.
5. Follow the instructions on the screen.

Installing the UltraBay II Hot Swap Driver for Windows 98

To install the UltraBay II hot swap driver for Windows 98:

1. Start Windows 98.
2. Insert the Utility Driver Diskette for Windows 95 into the diskette drive.
3. Click on **Start** and **Run...**
4. Type `A:\INSTALL` then click on **OK**.

   Follow the instructions on the screen.

Installing Software for Windows 95

This section describes the installation procedures for Windows 95 and its software for your ThinkPad computer.

The following versions of Windows 95 are available for your computer:

Service Pack Version 1 (OSR1)
OEM Service Release Version 2.1 (OSR2.1)

The OSR1 can be downloaded from the Microsoft Internet home page (`http://www.microsoft.com`).

Your Version of Windows 95:

You can check which version of Windows 95 you are using by clicking on **Start** and moving the cursor to **Settings** and **Control Panel**, and then double-clicking on **Control Panel** and **System**.

The following window appears:

You can check the version in this window. Read the numbers under “System.”

4.00.950a means that it is Windows 95 OSR1

4.00.950B means that it is Windows 95 OSR2.1

Overall Procedure

1. Have the Windows 95 installation package in hand.
2. Back up your software and personal data files on the hard disk.
3. Go to the ThinkPad Web site and download the latest hardware driver diskettes. You need to create at least the following device driver diskettes:

Device Driver	Diskette Name
ThinkPad Configuration program	Utility Diskette for Windows 95 Utility Diskette for DOS, Personalization Utility Data Diskette I
Display driver	Video Features Diskette IV (TR9397D) for Windows 95/98
PC Card support software	CardWorks for Windows 95
Audio device driver	Audio Features Diskette for Windows 95/98
TrackPoint driver	TrackPoint Driver Diskette for Windows 95/98/NT
ThinkPad Modem driver	ThinkPad Modem for Windows 95/98/NT
Video capture driver	Video Capture Driver for Windows 95/98
ThinkPad UltraBay II hot swap driver	Hot Swap Diskette for Windows 95/98

4. Install Windows 95 and the software.

Note: To use the CD-ROM drive to install Windows 95, create the DOS boot diskette that enables you to use the CD-ROM drive. Then boot the system with the diskette.

Installing Microsoft Windows 95

Some new files must be incorporated at the time of installation.

Installing Windows 95 OSR1

1. Create a Windows 95 supplementary diskette using the Diskette Factory program (refer to the *User's Reference*).
2. Make sure there is enough space in the hard disk to store the cabinet files and the installation programs (the required space

might vary depending on the national language supported by your version of Windows 95).

3 Make a temporary directory.

For example, enter at the DOS prompt:

```
MD c:\win95
```

4 Insert the Windows 95 CD-ROM into the CD-ROM drive.

5 Copy all the cabinet (.CAB) files and the installation programs from the `\WIN95` directory of the Windows 95 CD-ROM to the temporary directory.

For example, enter at the DOS prompt:

```
COPY src_cd:\WIN95\ . . c:\win95
```

where `src_cd` is the drive letter of the CD-ROM drive (D, E,...), `c` is the drive letter of your hard disk drive, and `win95` is the temporary directory that you made in step 3.

6 Insert the Windows 95 supplementary diskette you created in step 3 into the diskette drive.

7 Copy the updated files from the Windows 95 supplementary diskette to the temporary directory.

For example, enter at the DOS prompt:

```
COPY A:\OSR INF\ .  c:\win95
```

where `c` is the drive letter, and `win95` is the temporary directory that you made in step 3.

8 Install the operating system by entering `SETUP.EXE` at the temporary directory prompt.

9 Refer to the Windows 95 documentation and the instructions that appear on the screen to complete the installation.

10 If required, install the Service Pack Version 1, available from the Microsoft Internet home page.

11 Remove all the files in the temporary directory and then remove the directory itself after you complete the installation, to free the space on the hard disk.

Installing Windows 95 OSR2.1

If you have a CD-ROM version of the Windows 95 OSR2.1, do the following:

1 Create a Windows 95 supplementary diskette using the Diskette Factory program (refer to the *User's Reference*).

2 Make sure there is enough space in the hard disk to store the cabinet files and the installation programs (the required space might vary depending on the language supported by your version of Windows 95).

3 Make a temporary directory.

For example, enter at the DOS prompt:

```
MD c:\win95
```

4 Insert the Windows 95 CD-ROM into the CD-ROM drive.

5 Copy all the cabinet (.CAB) files and the installation programs from the \WIN95 directory of the Windows 95 CD-ROM disk to the temporary directory.

For example, enter at the DOS prompt:

```
COPY src_cd:\WIN95\ .  c:\win95
```

where `src_cd` is the drive letter of the CD-ROM drive (D, E,..), `c` is the drive letter of your hard disk drive, and `win95` is the temporary directory that you made in step 3.

6 Insert the Windows 95 supplementary diskette you created in step 1 into the diskette drive.

7 Copy the updated files in the Windows 95 supplementary diskette to the temporary directory.

For example, enter the following at the DOS prompt:

```
COPY A:\OSR2INF\ . . c:\win95
COPY A:\CARDBUS\ .  c:\win95
```

where c is the drive letter, and `win95` is the temporary directory that you made in step 3.

8 Install the operating system by entering `SETUP.EXE` at the temporary directory prompt.

9 Refer to the Windows 95 documentation and the instructions that appear on the screen to complete the installation.

10 Change the current drive letter to the CD-ROM drive letter, and run `\USBSUPP.EXE` in the `\OTHERS` directory of the CD-ROM.

11 Change the drive letter at the DOS prompt to `A`, and run `\QFE444\PCCARDUP.EXE`

12 Reboot the system.

13 To replace the Unimodem drivers to support the Intel Video Phone application, from the DOS prompt, go to `C:\WINDOWS\SYSTEM` (or the `SYSTEM` subdirectory where Windows 95 is installed).

14 Rename the `UNIMODEM.VXD` and `UNIMDM.TSP` files by entering:

```
REN UNIMODEM.VXD UNIMODEM.BAK
REN UNIMDM.TSP UNIMDM.BAK
```

15 Copy the new files by entering `COPY A:\UNIMODEM\ .`

16 Refer to the documentation shipped with this version to finish the installation.

Installing the ThinkPad Configuration Program for Windows 95

The ThinkPad Configuration program is supported by Windows 95 OSR2.0 and later.

Note: You can assign the directory in which the ThinkPad Configuration program is installed. The ThinkPad Configuration program installer does not support the use of a long name for the directory in which the program is installed.

To install the ThinkPad Configuration program for Windows 95:

1. Start Windows 95.
2. Insert the Utility Diskette for Windows 95 into the diskette drive.
3. Click on **Start**.
4. Click on **Run...**
5. Type `A:\SETUP` and click on **OK**.

   Follow the instructions on the screen. After installation has finished, restart the system.

Installing the Display Driver for Windows 95

To install the display driver for Windows 95:

For Windows 95 OSR1:

1. Start Windows 95.
2. Click on **Start**.
3. Move the cursor to **Settings**; then click on **Control Panel**.
4. Double-click on **Display**; then click on the **Settings** tab.
5. Click on **Change Display Type...**.

   The “Change Display Type” window appears.
6. Click on **Change...** under “Adapter Type.”
7. Click on **Have Disk...**
8. Insert the Video Features Diskette IV (TR9397D) for Windows 95/98 into the diskette drive, and click on **OK**.
9. Click on **IBM ThinkPad (Cyber 9397DVD)**; then click on **OK**.
10. Click on **Close**.
11. Select your screen parameters from the color palette, desktop area, and font size; then click on **Apply**.

12 When the message “If you have not specified what type of monitor you want to use. Your new settings may not work correctly.” appears, click on **Yes**.

13 Remove the diskette from the diskette drive and restart the computer.

14 Specify the type of monitor as follows. (If you do not specify the type of monitor you want to use, your new settings might not function correctly.)

a) Open the “Display Properties” window.

b) Click on the **Settings** tab.

c) Click on **Change Display Type...**.

d) Click on **Change...** under **Monitor Type**.

e) Click on **Show all devices**.

f) Specify **Manufacturers** and **Models** in the next window.

For example,

If you are using the LCD:

Manufacturers: (Standard monitor types)
Models: Laptop Display Panel (1024x768)

If you are using the external monitor:

Manufacturers: (Standard monitor types)
Models: Plug and Play Monitor (VESA DDC)

g) Click on **OK**.

h) Close all windows.

15 Follow the instructions on the screen.

Windows 95 prompts you to restart Windows 95 to make the display driver change effective.

For Windows 95 OSR2.1:

1 Start Windows 95.

2 Click on **Start**.

3. Move the cursor to **Settings**; then click on **Control Panel**.
4. Double-click on **Display**; then click on the **Settings** tab.
5. Click on **Advanced Properties**.
6. Click on the **Adapter** tab; then click on **Change...**.
7. Click on **Have Disk...**
8. Insert the Video Features Diskette IV (TR9397D) for Windows 95/98 into the diskette drive, and click on **OK**.
9. Click on **IBM ThinkPad (Cyber 9397DVD)**; then click on **OK**.
10. Click on **Close**.
11. Remove the diskette from the diskette drive.
12. Select your screen parameters from the color palette, desktop area, and font size; then click on **Close**.
13. Specify the type of monitor as follows. (If you do not specify the type of monitor you want to use, your new settings might not function correctly.)
    a) Open the “Display Properties” window.
    b) Click on the **Settings** tab.
    c) Click on **Advanced Properties**.
    d) In the “Advanced Display Properties” window, click on the **Monitor** tab.
    e) Click on **Change...**.
    f) Click on **Show all devices**.
    g) Specify **Manufacturers** and **Models** in the next window.

       For example,

       If you are using the LCD:

       Manufacturers: (Standard monitor types)
       Models: Laptop Display Panel (1024x768)

       If you are using the external monitor:

Manufacturers: (Standard monitor types)
Models: Plug and Play Monitor

h) Click on **OK**.

i) Close all windows.

14 Follow the instructions on the screen.

Windows 95 prompts you to restart Windows 95 to make the display driver change effective.

Installing PC Card Support Software for Windows 95

Notes:

Windows 95 OSR1 does not support the PC Card support software.
If you are going to use a docking station with your computer, you need to uninstall CardWizard first, dock your computer to the docking station, and then reinstall it.

To install the PC Card support software for Windows 95:

1 Start Windows 95.

2 Remove any PC Cards from the computer.

Note: Push the PC Card eject button; the eject button pops out. Push the button again; the PC Card pops out.

3 Insert the CardWorks for Windows 95 Diskette into the diskette drive.

4 Click on **Start**.

5 Click on **Run...**

6 Make sure the window shows `A:\SETUP`; then click on **OK**.

Follow the instructions on the screen.

Installing the Audio Device Driver for Windows 95

For Windows 95 OSR1:

Note: You need to install the Direct X5 or later program before installing the audio device driver. You can get the Direct X5

program from the Microsoft Web site:
`http://www.microsoft.com`

To install the audio device driver for Windows 95:

1. Start Windows 95.
2. Insert the Audio Features Diskette for Windows 95/98 into the diskette drive.
3. Click on **Start**.
4. Click on **Run...**
5. Type `A:\SETUP` and click on **OK**.
6. Click on **Uninstall Crystal Drivers**.
7. Click on **Shut Down**.
8. Remove the diskette from the diskette drive and restart the computer.
9. When Windows 95 detects “Unknown Device”, insert the Audio Features Diskette for Windows 95/98 Disk 1 into the diskette drive and click on **Next**.
10. Select the `Driver from disk provided the hardware manufactures` and click on **OK**.
11. Follow the instructions on the screen.
12. When you are prompted to install the Windows 95 diskette, type `C:\WIN95` and click on **OK**.
13. Select the `Driver from disk provided the hardware manufactures` and click on **OK**.
14. When you are prompt to insert Disk 2, insert the Audio Features Diskette for Windows 95/98 Disk 2 into the diskette drive and click on **OK**.
15. When you are prompt to insert Disk 3, insert the Audio Features Diskette for Windows 95/98 Disk 3 into the diskette drive and click on **OK**.

For Windows 95 OSR2:

To install the audio device driver for Windows 95:

1. Start Windows 95.
2. Insert the Audio Features Diskette for Windows 95/98 into the diskette drive.
3. Click on **Start**.
4. Click on **Run...**
5. Type `A:\SETUP` and click on **OK**.
6. Click on **Uninstall Crystal Drivers**.
7. Click on **Shut Down**.
8. Remove the diskette from the diskette drive and restart the computer.
9. When Windows 95 detects “Unknown Device”, insert the Audio Features Diskette for Windows 95/98 Disk 1 into the diskette drive and click on **Next**.
10. When Windows 95 identifies the device as a “Crystal PnP Audio System CODEC”, click on **Finish**.
11. Click on **OK** in the next window.
12. When you are prompted to the location of the disk, type `A:` and click on **OK**.

    The file copy starts.
13. When Windows 95 detects the device as a **Crystal SoundFusion**(TM) **PCI Audio Accelerator**, click on **Finish**.
14. When you are prompt to insert Disk 2, insert the Audio Features Diskette for Windows 95/98 Disk 2 into the diskette drive and click on **OK**.

15. When you are prompt to insert Disk 3, insert the Audio Features Diskette for Windows 95/98 Disk 3 into the diskette drive and click on **OK**.

Note: The MIDI connector is available if the computer is attached to a docking station (option). The MIDI connector capability is disabled as a default, so you need to enable the function with the ThinkPad Configuration program.

Installing the IBM TrackPoint Driver for Windows 95

To install the TrackPoint driver for Windows 95:

1. Start Windows 95.
2. Insert the TrackPoint Driver Diskette for Windows 95/98/NT into the diskette drive.
3. Click on **Start**.
4. Move the cursor to **Settings**; then click on **Control Panel**.
5. Double-click on the **Mouse** icon.
6. Click on the **General** tab at the top of the “Mouse Properties” window.
7. Click on **Change**.
8. Click on **Have Disk...**
9. Make sure that the source drive is `A:\` and click on **OK**.
10. Click on **PS/2 TrackPoint** in the list.
11. Click on **OK**.
12. Click on **Close** in the “Mouse Properties” window.
13. Remove the TrackPoint Driver Diskette for Windows 95/98/NT from the diskette drive, and restart your computer to make the new settings effective.

Installing the ThinkPad Modem Software for Windows 95

The modem function of your computer is supported by a digital signal processor (DSP) called the IBM Advanced Communications Processor. You must install the ThinkPad Modem driver for Windows 95 to use the modem function.

To install the ThinkPad Modem driver for Windows 95:

1. Start Windows 95.
2. Insert the ThinkPad Modem for Windows 95/98/NT Disk 1 into the diskette drive.
3. Click on **Start**, and then **Run...**.
4. Type `A:\SETUP` and press **Enter**.

   If the previous version of the driver is installed, the ThinkPad Modem setup program displays a message. Remove the previous version of the driver by using the uninstall tool provided in the ThinkPad DSP program. If the previous version of the driver is not installed, a message saying that Windows has found an unknown device appears. Insert the ThinkPad Modem for Windows 95/98/NT diskette into the diskette drive.

   Follow the instructions on the screen.

Note: You need to set the dialing properties when using the ThinkPad Modem functions. Click on **Control Panel**, **Modems**, and then the **Dialing Properties** button.

For IRQ-sharing information, refer to Sharing an IRQ between ThinkPad Modem Devices.

Diabling the Unnecessary CD-ROM Device Drivers for Windows 95

This section describes how to disable the unnecessary DOS and Windows CD-ROM device drivers.

If you installed Windows 95 on a blank hard disk drive without DOS and Windows, Windows 95 has automatically installed a generic ATAPI CD-ROM device driver for your ThinkPad's CD-ROM drive. You do not need to do the following procedure.

If you installed Windows 95 in a computer on which DOS and Windows had been already installed, you need to disable the DOS and Windows CD-ROM device drivers to use the correct Windows 95 generic ATAPI CD-ROM device driver.

To disable the DOS and Windows CD-ROM device drivers:

1. Start Windows 95 and go to the MS-DOS command prompt.
2. Open the CONFIG.SYS file with your text editor; then find the following line:

   ```
   DEVICE=C:\xxxxxx\IBMTPCD.SYS /R
   ```

   Note: *xxxxxx* is the subdirectory where you have installed the CD-ROM device driver. The default subdirectory for C:*xxxxxx* is C:\CDROM.

   If you cannot find the line, quit the file and go to step 4.
3. Comment out the line to change it as follows:

   ```
   REM DEVICE=C:\xxxxxx\IBMTPCD.SYS /R
   ```

   If the line is already commented out, quit the file and go to the next step.
4. Open the AUTOEXEC.BAT file; then find the following line:

   ```
   C:\xxxxxx\MSCDEX.EXE /D:TPCD  1 /M:15
   ```

   xxxxxx is the subdirectory where you have installed the CD-ROM device driver. If you cannot find the line, quit the file and go to step 6.
5. Comment out the line to change it as follows:

   ```
   REM C:\xxxxxx\MSCDEX.EXE /D:TPCD  1 /M:15
   ```

   If the line is already commented out, quit the file and go to the next step.
6. Exit the DOS command prompt; then reboot the system.

Installing the Video Capture Driver for Windows 95

Note: Before installing the video capture driver, you need to install the audio device driver.

To install the video capture driver for Windows:

1. Start Windows 95.
2. Insert the Video Capture Driver for Windows 95/98 diskette into the diskette drive.
3. Click on **Start**.
4. Click on **Run...**.
5. Type `A:\SETUP` and click on **OK**.

   Follow the instructions on the screen.

Installing the UltraBay II Hot Swap Driver for Windows 95

To install the UltraBay II hot swap driver for Windows 95:

1. Start Windows 95.
2. Insert the Utility Driver Diskette for Windows 95 into the diskette drive.
3. Click on **Start** and **Run...**
4. Type `A:\INSTALL` then click on **OK**.

   Follow the instructions on the screen.

Installing Software for Windows NT

This section describes the installation procedures for Windows NT Version 4.0 and its device drivers.

Overall Procedure

1. Have the Windows NT installation package in hand.
2. Back up your software and personal data files on the hard disk.
3. Create the diskettes of the device drivers using the Diskette Factory program preloaded on the hard disk. You need to create at least the following device driver diskettes:

Device Driver	Diskette Name
ThinkPad Configuration program	Utility Diskette for Windows NT Utility Diskette for DOS, Personalization Utility Data Diskette I
Display driver	Video Features Diskette IV (TR9397D) for Windows NT 4.0
PC Card support software	CardWizard for Windows NT
Audio device driver	Audio Features Diskette for Windows NT
Infrared device driver	Infrared Driver for Windows NT 4.0
TrackPoint driver	TrackPoint Driver Diskette for Windows 95/98/NT
IDE driver	IDE Driver Diskette
ThinkPad Modem software	ThinkPad Modem for Windows 95/98/NT
Video capture driver	Videp Capture Driver III for Windows NT 4.0
MPEG features	MPEG Feature Diskette for Windows NT

4. Install Windows NT and the device drivers.

Installing Microsoft Windows NT

Before installing Windows NT, do the following:

Read the Windows NT installation guide.

If you plan to use OS/2 Warp with Windows NT, you need to use the OS/2 Warp Boot Manager. For more information, see the Web site. → `http://www.ibm.com/thinkpad`

To install Windows NT using an external CD-ROM drive, do the following

Note: If you have an external CD-ROM drive that connects under a DOS environment, you can install Windows NT in DOS.

1. Insert the Windows NT CD-ROM into the external CD-ROM drive.
2. Go to the CD-ROM drive; then go to the `\I386` directory.

   For example, if your CD-ROM drive letter is D, go to `D:\I386`
3. At the command prompt, type `WINNT`; then press **Enter**.

   For example, `D:\I386>WINNT`

   Follow the instructions on the screen.

If your computer does not have a CD-ROM drive, use a network server, you can install Windows NT on multiple computers by first copying the Windows NT master source files to a shared drive on a network server. After connecting your computer to a network, such as with the DOS LAN requester, you can install the files from the network server to your computer at the DOS command prompt.

For more information, refer to the Windows NT installation guide.

Installing the ThinkPad Configuration Program for Windows NT

Note: You can assign the directory in which the ThinkPad Configuration program is installed. The ThinkPad Configuration program installer does not support the use of a long name for the directory in which the program is installed.

To install the ThinkPad Configuration program for Windows NT:

1. Start Windows NT, and log on with the user ID authorized as an administrator.
2. Click on **Start**.
3. Click on **Run..**

4. Insert the Utility Diskette for Windows NT into the diskette drive.

5. Type `A:\SETUP` and press **Enter**.

   Follow the instructions on the screen.

Installing the Display Driver for Windows NT

To install the display driver for Windows NT:

1. Start Windows NT, and log on with the user ID authorized as an administrator.

2. Click on **Start**.

3. Move the cursor to **Settings**; then click on **Control Panel**

4. Double-click on the **Display** icon.

5. In the “Display Properties” window, click on the **Settings** tab.

6. Click on **Display Type...**.

7. In the “Adapter Type” window, click on **Change**.

8. Click on **Have Disk...**.

9. Insert the Video Features Diskette IV (TR9397D) for Windows NT 4.0 into the diskette drive; then click on **OK**.

   A selection list appears.

10. From the display devices in the selection list, click on **Trident Video Accelerator 3D Cyber 9397DVD**, and click on **OK**.

    The message “You are about to install a third-party driver” appears on the screen.

11. Click on **Yes** to continue the installation.

12. When you are prompted to restart the computer, click on **OK** and remove the diskette from the diskette drive.

13. Click on **Close**.

14. Click on **Close**.

15 Click on **Yes** and restart Windows NT to make the change effective.

After you restart Windows NT, the display resolution is set to 640x480 with 256 colors as a default. If necessary, change the resolution and refresh rate as follows:

16 When the “Invalid Display Settings” message appears, click on **OK**.

17 The “Display Properties” windows appears. Select your screen parameters from the color palette, desktop area, and refresh frequency.

18 Click on **Test** and make sure the selected mode is displayed correctly on the screen.

19 Click on **OK** in the “Display Properties” window.

Hint

If you are installing the ThinkPad Configuration program for Windows NT, you can switch between display output types—external display only, LCD only, or both—using the ThinkPad Configuration program.

Installing PC Card Support Software for Windows NT

Important

If you are going to use an docking station with your computer, do the following:

1. If your system is connected to a network, log off before starting the installation.
2. You need to uninstall PC Card support software (CardWizard).
3. Dock your computer to the docking station.
4. If you want to install the Windows NT Service Pack, install it before you install the PC Card support software.
5. Reinstall the PC Card support software.

1. Start Windows NT, and log on with the user ID authorized as an administrator.
2. Remove any PC Cards that are in the slot.
3. Insert the CardWizard for Windows NT Diskette into the diskette drive.
4. Be sure to read the README file before you start installation. Apply any relevant information from that file.
5. Click on **Start**.
6. Click on **Run**
7. Type `A:\SETUP` and click on **OK**.
8. Follow the instructions on the screen.

Installing the Audio Device Driver for Windows NT

To install the audio device driver for Windows NT:

1. Start Windows NT, and log on with the user ID authorized as an administrator.

2. Insert the Audio Features Diskette for Windows NT into the diskette drive.
3. Click on **Start**.
4. Move the cursor to **Settings**; then click on **Control Panel**.
5. Double-click on the **Multimedia** icon.
   The “Multimedia Properties” window appears.
6. Click on the **Devices** tab and then on **Add**.
7. Click on **Unlisted** or **Updated Driver**.
   A window appears, prompting for the path of the drivers to be installed.
8. Type `A:\`
   The audio driver is displayed on the window.
9. Click on the audio driver and click on **OK**. When the installation program prompts you for existing files or new files, click on **new**.
10. Press **OK** in the “CrystalWare Configuration” panel. When the installation program prompts you, restart Windows NT to make the change effective.

Installing the IBM TrackPoint Driver for Windows NT

To install the TrackPoint driver for Windows NT:

1. Start Windows NT.
2. Insert the TrackPoint Driver Diskette for Windows 95/98/NT into the diskette drive.
3. Click on **Start**.
4. Move the cursor to **Settings**; then click on **Control Panel**.
5. Double-click on the **Mouse** icon.
6. Click on the **General** tab at the top of the “Mouse Properties” window.

7. Click on **Change**.
8. Click on **Have Disk...**.
9. Make sure that the source drive is `A:\` and click on **OK**.
10. Click on **PS/2 TrackPoint** in the list.
11. Click on **OK**.
12. Click on **Close** in the “Mouse Properties” window.
13. Remove the TrackPoint Driver Diskette for Windows 95/98/NT from the diskette drive, and restart your computer to make the new settings effective.

Installing the Infrared Device Driver for Windows NT

You can use infrared features using Windows NT dial-up networking. The Windows NT infrared device driver provides you IrDA 1.0 compliant functions, enabling infrared communication up to 115 Kbps.

To install the infrared device driver for Windows NT:

1. Start Windows NT, and log on with the user ID authorized as an administrator.
2. Click on **Start** and **Run...**
3. Insert the Infrared Driver for Windows NT 4.0 into the diskette drive.
4. Type `A:\INSTALL` and press **Enter**.

   Follow the instructions on the screen.
5. Restart the computer.

After the installation, COM 1, IRQ 4, and I/O address `X'3F8'` are assigned for the infrared port.

To enable the infrared port as COM 1, use the ThinkPad Configuration program.

You have finished the entire procedure.

If you want to change the COM port for the infrared communication, go on to Assigning a COM Port for the Infrared Port.

If you want to configure the infrared port for dial-up networking, go on to Configuring the Infrared Port for Dial-Up Networking.

Assigning a COM Port for the Infrared Port

Setting COM 1: If you want to assign a COM port other than the default value (COM 1), you need to run the ThinkPad Configuration program.

Setting COM 2:

1. Click on the **Infrared Port** icon in the ThinkPad Configuration program.
2. Click on **Advanced...**; then click on **COM2** for COM Port. Make sure that **Enable** is selected for “Infrared.”
3. Shut down and restart your computer.

After you modify the registry key or value, restart the computer. The infrared port is configured as COM2.

Configuring the Infrared Port for Dial-Up Networking

To use dial-up networking with the infrared port, you need to configure the null-modem setting in the “Windows NT RAS setup” window.

To set up infrared communication for dial-up networking:

1. Double-click on the **Network** icon in the **Control Panel**.
2. Click on the **Services** tab; then click on **Add...**.
3. If you have not installed Remote Access Service, click on **Remote Access Service**, and click on **OK**.

4. In “Install New Modem Setup,” click on **Dial-Up Networking Serial Cable between 2 PCs**, and follow the instructions on the screen.
5. Make sure this serial cable COM port is already assigned for your infrared port.
6. Restart the computer when the RAS setup is completed.

You can connect your computer to the RAS server using the infrared port if your RAS server is also configured for using an infrared device.

Installing the ThinkPad Modem Software for Windows NT

To install the ThinkPad Modem software for Windows NT:

1. Start Windows NT and insert the ThinkPad Modem for Windows 95/98/NT Disk 1 in the diskette drive.
2. Select **Run** from the **Start** menu.
3. Type `A:\SETUP` in the window.
4. Click on **OK** and follow the instructions on the screen.

Note: Non-U.S. users must run the Country Selection program in the ThinkPad Modem window after the ThinkPad Modem installation is complete. Restart the computer after you run Country Selection.

If you want to configure the ThinkPad Modem: → Configuring the ThinkPad Modem for Windows NT

Configuring the ThinkPad Modem for Windows NT

After installing the ThinkPad Modem software, assign a communication port (COM port) for the ThinkPad Modem:

1. In Windows NT, select **Programs**, **ThinkPad**, and **ThinkPad Configuration.**
2. Click on **Modem**.
3. Specify the necessary settings in the window.

4. Click on **OK**.

5. Restart the computer to make the new settings effective.

Next, add `ThinkPad Modem` in the Control Panel so that you can use communication applications that use the Unimodem facility of Windows NT, such as HyperTerminal or Dial-Up Networking:

1. In Windows NT, click on **Start**, select **Settings**; and then select **Control Panel**.

2. Double-click on the **Modems** icon.

3. Do the following:

   If you do not already have a modem installed, you immediately see the “Install New Modem” window.

   If you already have a modem installed, click on **Add** to open the “Install New Modem” window.

4. Click on **Next**.

   Windows NT searches for the modem.

   If successful, Windows NT reports that it has found a modem of type “ThinkPad Data Fax Modem.” If Windows NT fails to detect a modem, verify that your communication port was configured. Remember that the changes you make do not take effect until you restart Windows NT.

5. Click on **Next** and follow the instructions on the screen.

You can now use your ThinkPad Modem with all the modem communication applications supported by Windows NT.

Installing the IDE Driver for Windows NT

Install the ThinkPad PIIX4 IDE driver as follows:

1. Start Windows NT and log on with the user ID authorized as an administrator.

2. Insert the IDE Driver Diskette into the diskette drive.

3. Click on **Start**.

4. Click on **Settings** and **Control Panel**.
5. Double-click on **SCSI Adapters**.
6. Click on the **Drivers** tab.
7. If `Intel PIIX PCI Bus Master IDE Controller` is listed, remove it.
8. If `IDE CD-ROM (Atapi 1.2)/Dual Channel PCI IDE` is listed, remove it.
9. Click on **Add**.
10. Click on **Have Disk...**.
11. Click on **OK** after confirming that the installation path is correct (usually it points to `A:\`).
12. Select **ThinkPad PIIX4 IDE Driver**; then click on **OK**.
13. If you are prompted the full path to the IDE driver, type `A:`; then click on **Enter**.
14. If you are prompted to restart your computer, remove the diskette from the diskette drive and click on **Yes**.

Installing the Video Capture Driver for Windows NT

Notes:

1. Before installing the video capture driver, you need to install the audio device driver.
2. Before the installation, ensure that all applications that use the IBM MPEG-2 devices are closed. If you run Media Player, close the application.

To install the driver from the installation diskette:

1. Start Windows NT.
2. Click on **Start** and move the cursor to **Settings** and **Control Panel**. Then double-click on the **Multimedia** icon.

   "Multimedia Properties" window appears.

3. Click on the **Devices** tab.
4. Click on **Add**.

   The “Add” window appears.
5. From the list of drivers, select **Unlisted or Updated Driver**.
6. Click on **OK**.

   The “Install Driver” window appears.
7. Enter the drive letter—for example, `A:`— corresponding to the diskette drive containing the installation diskette.

   The “Add Unlisted or Updated Driver” window appears and the following device is in the window:
   `9397 Video Capture`
8. Click on **OK**.

   The installation starts. After a few seconds, the “About Video Capture Driver” window appears.
9. Click on **OK**.

   The window disappears and the “Multimedia Properties” window reappears again.
10. Click on **OK**.

Installing the MPEG-2 Driver for Windows NT

The IBM MPEG-2 Multimedia Driver for Windows NT 4.0 enables playback for MPEG motion videos on your computer by using the Windows NT Media Player.

Note: Before installing the MPEG-2 Driver, you need to install the video feature driver, audio feature, and ThinkPad Configuration program.

First, you need to uninstall any existing MPEG-2 drivers:

1. Start Windows NT.
2. Click on **Start**, move the cursor to **Settings**, and then click on **Control Panel**.

3. Double-click on the **Multimedia** icon.
4. Click on **Device** tab.
5. From the list of the drivers, click on the plus icon next to **Media Control Devices**.
6. Select **(MIC) IBM MPEG-2 Deoder**, and click on **Remove**.
7. Click on **Yes**.

   The video capture driver is removed.

To install the IBM MPEG-2 Multimedia Driver for Windows NT 4.0:

1. Start Windows NT.
2. Close “Media Player” and video capture applications if they are open.
3. Uninstall the existing MPEG driver if present.
4. Insert the MPEG Feature Diskette for Windows NT into the diskette drive.
5. Make sure the following five files are on the diskette:

   a) `MPEG32.DLL` (the MPEG user mode driver)
   b) `MPEGCD1.SYS` (the MPEG kernel mode driver)
   c) `DLL_STD.TXT` (Microcode file for MPEG drivers)
   d) `YUVARB.SYS` (YUV Bus arbitrator driver)
   e) `OEMSETUP.INF` (configuration file for MPEG and YUV driver installation)
6. Click on **Start**, move the cursor to **Settings**, and click on **Control Panel**.
7. Double-click on the **Multimedia** icon.

   The “Multimedia Properties” window appears.
8. Click on the **Devices** tab.
9. Click on **Add**.

   The “Add” window appears.

10 From the list of drivers, select **Unlisted or Updated Driver** by double clicking on it.

11 Click on **OK**.

The “Install Driver” window appears.

12 Enter the drive letter—for example, `A:`—corresponding to the diskette drive containing the installation diskette.

13 Click on **OK**.

“Add Unlisted or Updated Driver” window appears and the following device is in the window:
`(MCI) IBM MPEG-2 Decoder`

14 Click on **OK**.

The installation starts. After a few seconds, the “Installation” window appears.

15 Click on **OK**.

The window disappears and the “Multimedia Properties” window reappears.

16 Click on **OK**.

Installing Software for Windows Version 3.1

This section describes the installation procedures for Windows Version 3.11 and its device drivers.

Overall Procedure

1. Have the installation packages for DOS and Windows 3.1 in hand.
2. Back up your software and personal data files on the hard disk.
3. Go to the ThinkPad Web site and download the latest hardware driver diskettes. You need to create at least the following device driver diskettes:

Device Driver	Diskette Name
ThinkPad Configuration program	Utility Diskette for Windows 3.1 Utility Diskette for DOS, Personalization Utility Data Diskette I
Display driver	Video Features Diskette IV for Windows 3.1
PC Card support software	CardWizard for Windows 3.1
Audio device driver	Audio Features Diskette for DOS/Windows 3.1
Infrared device driver	Infrared Features Diskette II
ThinkPad Modem driver	ThinkPad Modem for DOS/Windows 3.1

4. Install DOS and its device drivers. →Installing Software for PC-DOS 7.0 or MS-DOS 6.2

   Note: Do not install CardSoft for DOS.

5. Install Windows 3.1 (with Advanced Power Management) and the device drivers.

Installing Microsoft Windows Version 3.1

Important

During installation, do the following so that Windows can operate correctly:

When the Windows Setup program asks you to select either **Express Setup** or **Custom Setup**, select `C` for **Custom Setup**.

Install Windows 3.1 with the default VGA display driver that came with Windows. After you complete the installation of Windows, install the ThinkPad display driver.

If you have installed more than 256 MB of memory, check the `[386Enh]` section of the SYSTEM.INI file and do one of the following:

- If the `PageOverCommit` line is in the file, make sure its value is 3. (If not, change it to 3.)
- If the `PageOverCommit` line is not in the file, add `PageOverCommit=3`

Note: The `PageOverCommit` value could be 2 or 1.

After you change or add the value, shut down Windows 3.1 and power off the computer; then power it on again after 5 seconds.

For more information on the `PageOverCommit` value see the Windows 3.1 manuals.

Do the following to install Windows 3.1:

1. Start the installation as specified in the Windows manual.
2. When the Windows Setup program asks you to select **Express Setup** or **Custom Setup**, type `C` for **Custom Setup**.
3. Continue installing Windows 3.1 until the following window 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
```

4. Using the **Up Arrow** key, highlight **MS-DOS System** and press **Enter**.

5. Click on **MS-DOS System with APM** from the list and press **Enter**.

   Verify that **Computer** has changed to **MS-DOS System with APM**. If the item has not changed, return to step 4.

6. Make sure the **Display:** choice is set to **VGA**. (Do not change this choice.)

7. When you have completed the installation of Windows, edit the AUTOEXEC.BAT file so that the computer will use the correct mouse driver:

   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. Find the line that includes `SHARE.EXE` and delete that line.

   e. Save the file and restart the computer.

8. After installing Windows, you should check the creation date of the following drivers in the DOS subdirectory, the Windows subdirectory, and the CDROM subdirectory:

   EMM386.EXE (loaded by CONFIG.SYS)
   HIMEM.SYS (loaded by CONFIG.SYS)
   SMARTDRV.EXE (loaded by AUTOEXEC.BAT)
   MSCDEX.EXE (loaded by AUTOEXEC.BAT)

Then use the newest program among the ones for the DOS, Windows, and CDROM directories for each drivers.

You can easily use the newer one by changing the subdirectory name in the CONFIG.SYS or AUTOEXEC.BAT. For example, if the ones in DOS were the newest, you would change:

```
C:\WINDOWS\SMARTDRV.EXE
```

to:

```
C:\DOS\SMARTDRV.EXE
```

If 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.

Installing the ThinkPad Configuration Program for Windows 3.1

If you are going to use Windows, install the ThinkPad Configuration program for DOS first. → Installing the ThinkPad Configuration Program for DOS.

Then do the following to install the ThinkPad Configuration program for Windows 3.1:

1. Start Windows.
2. Click on **File** from the “Program Manager” window; then click on **Run...** from the pull-down menu.
3. Insert the Utility Diskette for Windows 3.1 into the diskette drive; then type `A:\INSTALLW` and press **Enter**.
4. Follow the instructions on the screen.

   Default choices are already selected in the “Installation Options” window.

Installing the Display Driver for Windows 3.1

Do the following to install the display driver for Windows 3.1 so that you can get a correct display setting and better performance:

1. Start DOS; then go to the WINDOWS subdirectory.

2. Type SETUP and press **Enter** to start the Windows setup program.

3. Using the **Up Arrow** key, highlight **Display** and press **Enter**.

4. Select **Other (Requires disk...)** from the list.

5. Insert the Video Features Diskette IV for Windows 3.1 into the diskette drive.

6. Make sure the resource directory is `A:` and press **Enter**.

7. Select your desired resolution, color depth, and font from the menu, and press **Enter**.

   Verify that **Display** has changed to your desired resolution type (an example is shown in the following window). If the item has not changed, return to step 3.

```
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:     IBM ThinkPad (Cyber 9397DVD) 256 small font
   Mouse:      Microsoft, or IBM PS/2
```

8. Press **Enter** to continue the installation.

9. After installation has finished, remove the diskette from the diskette drive.

Installing PC Card Support Software for Windows 3.1

If you are going to use a docking station with your computer, you need to uninstall the PC Card support software (CardWizard) first, dock your computer to the docking station, and then reinstall it.

To install the PC Card support software for Windows 3.1:

1. Start Windows.

2. Click on **File** from the “Program Manager” window; then click on **Run...** from the pull-down menu.
3. Insert the CardWizard for Windows 3.1 Diskette into the diskette drive.
4. Type `A:\SETUP` in the “Run” window that appears on the screen.
5. Click on **OK**.

   Follow the instructions on the screen.

Installing the Audio Device Driver for Windows 3.1

To install the audio device driver for Windows 3.1 do the following:

1. Start Windows 3.1.
2. Click on **File** from the “Program Manager” window; then click on **Run...** from the pull-down menu.
3. Insert the Audio Features Diskette for DOS/Windows 3.1 into the diskette drive; then type `A:\SETUP` and press **Enter**.

   Follow the instructions on the screen.

The MIDI connector is available if the computer is attached to a docking station. The MIDI connector capability is disabled as a default, so you need to enable the function in the ThinkPad Configuration program.

You need to install **MPU401 Support Software** from the Windows 3.1 installation disk. Select and install the **Roland MPU401** device driver in the control panel.

Installing the Voyetra AudioStation for Windows 3.1

To install the Voyetra AudioStation software, do the following:

1. Start Windows 3.1.
2. Click on **File** from the “Program Manager” window; then click on **Run...** from the pull-down menu.
3. Insert the Voyetra AudioStation Diskette for Windows 3.1 into the diskette drive; then type `A:\SETUP` and press **Enter**.

Follow the instructions on the screen.

Installing the Infrared Device Driver for Windows 3.1

The infrared device driver supports networking with such software as IBM Internet Connection for Windows, Windows for Workgroups 3.1, or Netware DOS client. This driver is included in the Infrared Features Diskette II and is installed as an NDIS2-compliant network adapter driver or as an ODI-compliant network adapter driver when you install the respective networking software.

Refer to the respective networking software publication for installation procedures. The README file on the Infrared Features Diskette II contains additional information.

Installing the ThinkPad Modem Software for Windows 3.1

The ThinkPad modem function is supported by a digital signal processor (DSP) called the IBM Advanced Communications Processor. You must install ThinkPad Modem software to set up the Advanced Communications Processor.

Attention

Before you install the ThinkPad Modem software, close all open applications.

If you are going to reinstall the ThinkPad Modem software, you need to uninstall it first; then install it according to the following instructions.

To install the ThinkPad Modem software for Windows 3.1:

1. Start Windows.
2. Select **File** from the Program Manager window; then select **Run...** from the pull-down menu.
3. Insert the ThinkPad Modem for DOS/Windows 3.1 Diskette into the diskette drive; then type `A:\SETUP` and press **Enter**.
4. Follow the instructions on the screen.

   Default choices are already highlighted in the choice windows.

5 After the installation is complete, remove any diskette from the diskette drive and restart the computer.

Installing Software for OS/2 Warp 4

This section describes how to install OS/2 with DOS and Windows 3.1, as well as the OS/2 ThinkPad device drivers.

Overall Procedure

1. Have the DOS, Windows 3.1, and OS/2 installation packages in hand.
2. Back up your software and personal data files on the hard disk.
3. Download the device driver diskettes for DOS, Windows 3.1, and OS/2 and install them. See the Web site for installation of the each operating system.
4. Go to the ThinkPad Web site and download the latest hardware driver diskettes. You need to create at least the following device driver diskettes.

Device Driver	Diskette Name
ThinkPad Configuration program	Utility Diskette for OS/2 Utility Diskette for DOS, Personalization Utility Data Diskette I
PC Card support software	PC Card Director for OS/2
Audio device driver	Audio Features Diskette for OS/2
Infrared device driver	Infrared Features Diskette II
TrackPoint driver	TrackPoint Driver Diskette for OS/2
Display driver	Video Features Diskette IV for OS/2
ThinkPad Modem driver	ThinkPad Modem for OS/2

5. Install OS/2 and the software.

Installing IBM OS/2 Warp

Preparing for the Installation of OS/2

1. Create OS/2 Warp Version 4 Install Diskette 1 Update and OS/2 Warp Version 4 Install Diskette 2 Update using the Diskette Factory Program (refer to the *User's Reference*.).

2 When you are prompted to insert Disk 1, use the new diskette created in step 1.

3 When you are prompted to insert Disk 2, use the new diskette created in step 1.

4 Go to the next section to install OS/2 Warp Version 4.

Installing OS/2

Your installation of OS/2 depends on whether you use the *Dual Boot* or the *Boot Manager* for switching between OS/2 and DOS/Windows 3.1.

If you use the Dual Boot, go to the next step.

If you use the Boot Manager, install the Boot Manager first. Then go to the next step. (Refer to the OS/2 documentation for information on installing Boot Manager.)

1 Install DOS, Windows, and the ThinkPad Configuration program before installing OS/2.

Notes:

1. To install the ThinkPad Configuration for DOS → Installing the ThinkPad Configuration Program for DOS .
2. To install the ThinkPad Configuration for Windows 3.1 → Installing the ThinkPad Configuration Program for Windows 3.1 .

2 Install OS/2 by referring to the OS/2 documentation.

Pay attention to the following when you install OS/2:

In the “System Configuration” window, click on **VGA** as the **Primary Display**.

In the “System Configuration” window, click on **No Support Installed** at **PCMCIA Feature**.

(For using the CD-ROM drive:) In the “System Configuration” window, click on **Non-Listed IDE CD-ROM or IDE CD-ROM**.

After OS/2 has been successfully installed, restart the computer.

Installing the ThinkPad Configuration Program for OS/2

To install the ThinkPad Configuration program for OS/2:

1. Start OS/2; then insert the Utility Diskette for OS/2 into the diskette drive.
2. Install the ThinkPad System Management device driver:
   a. Open **OS/2 System**, **System Setup**, and then **Install/Remove**.
   b. Click on **Device Driver Install** and click on the **Install...** button.
   c. Click on **ThinkPad System Management Device Driver**; then click on **OK**.
3. Open the OS/2 screen command prompt.
4. Type `A:\INSTALL2` and press **Enter**.

   Follow the instructions on the screen.

Installing the PC Card Support Software for OS/2

To use PC Cards, you need to install the following device drivers and software associated with PC Cards:

PC Card support program (PC Card Director):

- Card Services device driver
- Socket Services 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 PC Card support software for OS/2:

1. Start OS/2; then open the OS/2 full-screen command prompt.

2. Insert the PC Card Director for OS/2 Diskette into the diskette drive; then type `A:\PCMINST2` and press **Enter**.

   Follow the instructions on the screen.

3. Click on **OK** when you have completed the installation.

4. Close all applications, remove the diskette from the diskette drive, and restart the computer.

Installing the Audio Device Driver for OS/2

To install the audio device driver for OS/2:

1. Start OS/2.

2. Insert the Audio Features Diskette for OS/2 into the diskette drive.

3. Open the OS/2 command prompt and type `MINSTALL`; then press **Enter**.

4. Select the source drive as `A:` (the drive name for the diskette drive of your computer).

   The installation program shows `Crystal Audio (Pre-Selected)` and `hp2.IBM OPL3 FM MIDI Synthesis (Pre-Selected)`.

   A check mark appears next to the selected items.

5. Click on **Install**; then follow the instructions on the screen.

6. When you have completed the installation, restart the computer.

Installing the IBM TrackPoint Driver for OS/2

The TrackPoint Driver Diskette for OS/2 is intended to be used with IBM PS/2 TrackPoint Version 4.0 or later.

To install the TrackPoint driver for OS/2:

1. Start OS/2.

2. Insert the TrackPoint Driver Diskette for OS/2 into the diskette drive.

3. Go to the OS/2 command prompt. Type `A:\INSTALL` and press **Enter**.

   Follow the instructions on the screen.

4. If you are prompted for a location to install the files, select the drive where OS/2 is installed.

5. Remove the TrackPoint Driver Diskette for OS/2 from the diskette drive, and restart your computer to make the new settings effective.

Installing the Infrared Device Driver for OS/2

To install the infrared device driver for OS/2:

1. Start OS/2.

2. Go to the OS/2 command prompt and install the Infrared Features Diskette II into the diskette drive.

3. Type as follows and press **Enter**.

   ```
   A:\INSTALL2 /S:A:\ /T:x:tgt_dir /B:y
   ```

   where `x` is the target drive, `tgt_dir` is the target directory, and `y` is the boot drive where CONFIG.SYS resides.

Installing the Display Driver for OS/2

The display driver enables you to use various screen resolutions and colors for the LCD and external monitor. The display driver also takes advantage of the computer's video capability.

To install the ThinkPad display driver for OS/2:

1. Start OS/2.

2. Insert the Video Features Diskette IV for OS/2 into the diskette drive:

3. Open the OS/2 full screen or OS/2 window and go to the A: prompt.

4. Type `INSTALL` and press **Enter**.

Follow the instructions on the screen.

5. Remove the diskette from the diskette drive, and restart the computer.

6. Set the resolution and color depth in the ThinkPad Configuration program.

7. Shut down OS/2, and restart the computer.

Installing the ThinkPad Modem Driver for OS/2

The modem function of your computer is supported by a digital signal processor (DSP) called the IBM Advanced Communication Processor. You must install the ThinkPad Modem software for OS/2 to use the modem function.

If you have multiple operating systems, you might need to install the ThinkPad Modem software for each operating system. For example, to enable OS/2 and Windows applications for ThinkPad Modem functions, install the ThinkPad Modem software for both OS/2 ***and*** Windows.

To install the ThinkPad Modem software for OS/2:

1. Start OS/2; then open the OS/2 screen command prompt.

2. Insert the ThinkPad Modem for OS/2 Diskette into the diskette drive; then type `A:\SETUP` and press **Enter**.

   The installation window appears on the screen.

3. Follow the instructions on the screen to complete the installation.

4. Restart OS/2 to make the ThinkPad Modem function effective.

   For detailed information about the installation, see the README file in the ThinkPad Modem for OS/2 Diskette.

Note: Non-U.S. users must run the Country Selection program in the ThinkPad Modem window after the ThinkPad Modem installation is complete. Restart the computer after you run Country Selection.

If You Use the WIN-OS/2 Environment

If you use the ThinkPad Modem functions in WIN-OS/2:

1. Install the ThinkPad Modem software for Windows in a full-screen WIN-OS/2 environment according to the procedure in Installing the ThinkPad Modem Software for Windows 3.1.

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

Installing Software for PC-DOS 7.0 or MS-DOS 6.2

This section describes the installation procedures for PC-DOS Version 7.0 and MS-DOS Version 6.2 and their device drivers.

Overall Procedure

1. Have the DOS installation package in hand.
2. Back up your software and personal data files on the hard disk.
3. Go to the ThinkPad Web site and download the latest hardware drive diskettes. You need to create at least the following device driver diskettes:

Device Driver	Diskette Name
ThinkPad Configuration program	Utility Diskette for DOS, Personalization
PC Card support software	CardSoft for DOS
Audio device driver	Audio Features Diskette for DOS/Windows 3.1
CD-ROM	CD-ROM Driver Diskette

4. Install DOS and the device drivers.

Installing IBM PC DOS Version 7.0 or MS-DOS Version 6.2

To install DOS, follow the instructions in the DOS installation manuals.

Installing the ThinkPad Configuration Program for DOS

To install the ThinkPad Configuration program:

1. Start DOS.
2. Insert the Utility Diskette for DOS, Personalization into the diskette drive; then type `A:\UINSTALL` and press **Enter**.
3. Press **Enter**.
4. Click on **Install DOS ThinkPad Configuration** in the "Installation Options" window; then follow the instructions on the screen.

Installing PC Card Support Software for DOS

Notes:

If you are going to use a docking station with your computer, you need to uninstall CardSoft for DOS first, dock your computer to the docking station, and then reinstall it.

If you are going to use the PC Card support software for Windows 3.1 (CardWizard), do not install that for DOS (CardSoft).

| To install the PC Card support software, you need to add the
| following lines at the top of the CONFIG.SYS file.

```
DOS=HIGH,UMB
DEVICE=C:\DOS\MIMEM.SYS
```

To install the PC Card support software for DOS:

1. Insert the CardWizard for Windows 3.1 Diskette into the diskette drive.
2. At the DOS command prompt, type `A:\INSTALL` and press **Enter**.

   The installation window appears.
3. Follow the instructions on the screen.

   During installation, use the **Arrow** keys to highlight your selection; then press **Enter**.
4. After the installation is complete, remove any diskette from the diskette drive and restart the computer.

Installing the Audio Device Driver for DOS

To install the audio device driver:

1. Start DOS.
2. Insert the Audio Features Diskette for DOS/Windows 3.1 into the diskette drive.
3. Type `A:\INSTALL` and press **Enter**.

Installing the CD-ROM Device Driver for DOS

To install the CD-ROM device driver for DOS:

1. Start DOS.
2. Insert the CD-ROM Driver Diskette into the diskette drive; then type `A:\UINSTALL` and press **Enter**.
3. Select **Install IBM ThinkPad CD-ROM Driver for DOS/Windows** in the "Installation Options" window; then follow the instructions on the screen.
4. After the installation is complete, remove any diskette from the diskette drive and restart the computer.

Hints and Tips

For details about software parameters related to the DOS CD-ROM device driver in the CONFIG.SYS file, go to Software Parameters in CONFIG.SYS.

Software Parameters in CONFIG.SYS

When the CD-ROM device driver is installed in your computer, the installation program (UINSTALL.EXE) automatically modifies the CONFIG.SYS file and AUTOEXEC.BAT file. The following are the parameters for the CD-ROM device driver for CONFIG.SYS:

```
DEVICE=[drive:][path]IBMTPCD.SYS /R [/C] [/S]
```

The CD-ROM device driver is IBMTPCD.SYS. Make sure this line is inserted after the EMM386 statement.

[/C]	Sets the cache size in the XMS memory. If this parameter is specified, the cache size in the XMS memory is 512 sectors. If it is not specified, the default is 0.
[/S]	Sets the power-saving mode to OFF. If you are using DOS with another operating system (for example, with OS/2 in dual boot), set the power-saving mode to OFF using this parameter.

Notes:

1. For the software parameter in the AUTOEXEC.BAT file, refer to the README in the CD-ROM Driver Diskette.
2. If you are using DOS SMARTDRV caches and planning to use a photo CD or multisession discs, you have to add the `/U` parameter to the SMARTDRV line in the AUTOEXEC.BAT file, because photo CDs or multisession discs are not compatible with the SMARTDRV caches.
3. To be able to play CD-i movies in Windows 3.1, do not cache the CD-ROM drive with SMARTDRV Version 5.0 or 5.1, which is supplied with PC DOS Version 7.0.

Chapter 9. Using System Management

This chapter describes the system management features of your computer.

Using System Management

This chapter is intended primarily for network administrators.

Your computer is designed for manageability, so that you can redirect more of your resources to better meet your business objectives. This manageability, or "Total Cost of Ownership" (TCO), enables you or your network administrator to remotely power on your computer, format the hard disk drive, install the software of your choice (for example, Windows 98, Windows 95, or Windows NT with user and system-management applications), and have the computer start up and function in the same way as an ordinary desktop PC. Once the computer is configured and operational, you can achieve ongoing management through software and manageability features already integrated into the client system and the network.

This chapter describes:

The system management features of your computer
How to set up the system management features

Intel WfM1.1a Full Support

Your computer supports not only the *required* functions of the (Wired for Management (WfM) 1.1a but also *recommended* functions of the WfM1.1a.

Those functions are:

Instrumentation (*required function*)
Remote new system setup (*recommended function*)
Remote Wake on LAN (*recommended function*)
Power management–ACPI compliance (*required function*)

System-Management Features

This section describes the system-management features provided by your computer.

Your computer has features that make it possible for a network administrator to manage and control it remotely over a network from a management console when it is connected to the docking station installed.

These features are:

- Desktop Management Interface (DMI)
  - Desktop Management BIOS (DMI BIOS) Version 2.0
  - Desktop Management Interface (DMI) Version 2.0 defined by the Desktop Management Task Force
- Remote program load (RPL)
- PreBoot eXecutition Environment (PXE)
- Wake on LAN
- Waking up from suspend mode by incoming call
- Universal Management Agent (UMA)
- Asset ID EEPROM

The following sections tell you more about the functions and the software that provides these functions.

Your computer supports the DMI function using the Desktop Management BIOS (DMI BIOS).

Desktop Management Interface (DMI)

Desktop Management Interface (DMI)[4] is an interface for managing computers in a network. Using DMI, a system administrator can easily make an inventories of all the software and hardware of the computers on a network. DMI can be used to remotely track many types of information about networked computers, including serial numbers, memory attributes, product-specific characteristics of installed devices, and operating system configuration information.

Desktop Management BIOS (DMI BIOS) Version 2.0

The basic input/output system (BIOS) of your computer supports an interface called the Desktop Management BIOS (DMI BIOS). The DMI BIOS provides some of the hardware component information. It is the responsibility of the BIOS to supply this database with information about itself and the devices on the system board. The DMI BIOS Specification documents the standards for accessing this BIOS information.

4 DMI is a standard defined by the Desktop Management Task Force (DMTF) for gathering information about the hardware and software in your computer so that network administrators can remotely monitor and control it.

Remote Program Load (RPL)

The remote program load (RPL) enables a network administrator to remotely control your computer. RPL enables your computer to start directly from a server over a LAN that has been configured for RPL. Network-management software, such as IBM LANClient Control Manager (LCCM), is required to take advantage of RPL.

If you use RPL with LCCM software, you can use the *Hybrid RPL* feature. With Hybrid RPL you install hybrid images (or files) on the hard disk. Each time the computer starts from the network, LCCM recognizes your computer as a Hybrid RPL client, and a *bootstrap* program is downloaded to your computer. This bootstrap program is small and helps prevent network congestion. Working from the hybrid images, the bootstrap program starts the startup process from the hard disk drive of your computer. One of the advantages of Hybrid RPL is that the network load associated with standard RPL is avoided.

PreBoot eXecution Environment (PXE)

PreBoot eXecution Environment (PXE) technology enhances your PC's manageability by providing the capability to boot (load an operating system or another executable image) from a server. Your computer supports the PC functions that PXE requires. For example, your computer can be booted from the PXE server if it is attached to a docking station with a PXE-enabled LAN card.

Wake on LAN

Wake on LAN can be used by a network administrator to turn on your computer from a management console. When Wake on LAN is used with such network management software as LANClient Control Manager (LCCM) and NetFinity, many types of functions, such as data transfer, software updates, and Flash (POST/BIOS) updates can be performed remotely without remote attendance. This updating can be done after normal working hours and on weekends, which saves time and increases productivity. Users are not interrupted during normal working hours, and LAN traffic is kept to a minimum.

If you dock your computer to a docking station that has a LAN card with the Wake on LAN function, you can use the Wake on LAN function.

The Wake on LAN function is valid only when both your computer and docking station are powered off and APM mode is used.

If your computer is powered on by the Wake on LAN function, the **Automatic Power On Startup Sequence** is used. For more information, see Automatic Power-On Startup Sequence.

Waking Up from Suspend Mode by Incoming Call

If your computer is connected to a telephone line and **Resume on incoming call** has been selected, your computer will resume from suspend mode when there is an incoming (telephone) call. The system administrator can resume operation on your computer and communicate remotely through a modem.

To enable your computer to wake up from suspend mode, do the following from Windows 98 or Windows 95:

1. Open the **ThinkPad Configuration** program.
2. Click on **Power Management**, and then **Resume option**.
3. Put a check mark in the **Resume on incoming** check box.

Universal Management Agent

Your computer supports IBM Universal Management Agent (UMA), which. consists of three main components:

Universal Management Agent—a common client management agent based on LANDesk Client Manager and NetFinity Manager services technologies. Tivoli-ready, UMA natively integrates into other management applications (such as Microsoft's SMS and Intel's LANDesk Management Suite) that will run on IBM desktops, mobile systems and servers, as well as other manufacturers' PCs. The UMA is a network-management program controlled from the network administrator's console or a peer workstation on the network. UMA provides the necessary software to take advantage of the network-management features built into the ThinkPad computer.

The UMA converts PFA alerts by SMART drives into useful responses, such as E-mail messages, alphanumeric and numeric pages, screen messages, automated backup routines, audio messages, or the execution of some other program.

Netfinity Service—Using the Netfinity Service, the system administrator does not need to stop his task to watch and control the system, because it can be done remotely. When the Netfinity Service runs in the background, the tasks running on your system do not need to be halted. The network administrator, at the same time, can monitor the network, so any problems can be avoided before they become severe. The remote workstation control function of Netfinity Service allows help desk personnel to remotely connect to a user's system and take control of the PC to diagnose and repair system problems.

Universal Management plug-ins—applications or solutions that provide additional management capabilities throughout the life cycle of networked system hardware with the goal of reducing TCO.

Asset ID EEPROM

The essential component of Asset ID is a radio-frequency interface within each PC that is linked with a system EEPROM. The Asset ID antenna enables communication between the PC and an industry–standard radio–frequency enabled device.

The Asset ID EEPROM contains information about the system including its configuration and the serial numbers of key components. It also includes a number of blank fields you can record with your choice of end user information.

Setting Up System-Management Features

This section describes how to configure the network interface in your computer. You can change the settings of system-management features in Easy-Setup. Easy-Setup contains the following functions:

Enabling or disabling Wake on LAN
Automatic power-on startup sequence
Enabling or disabling Flash (POST/BIOS) update from the network

If the administrator's password (supervisor password) is set, but you did not specify it when you started Easy-Setup, you cannot use these functions.

Enabling or Disabling Wake on LAN

This setting is used to enable or disable the Wake on LAN feature, which enables your computer to be powered on remotely by a network administrator from a management console. Remote network-management software, such as LCCM and NetFinity, must be used to support Wake on LAN.

Notes:

1. This feature is valid only when a LAN adapter card with Wake on LAN is installed in the docking station, and its signal line and auxiliary power line are connected to the adapter. The enable or disable setting in your computer is independent of what is set for the docking station.
2. When the Wake on LAN cables are connected to the docking station correctly and the Wake on LAN function of your computer is “disabled” in Easy-Setup, your computer is switched on when the server sends a “wake” signal to it. Your computer's POST (Power On Self Test) recognizes the Wake on LAN status of your computer and switches off a few seconds after switching on. This is not an error; however, the network administrator should not set Wake on LAN for LAN cards of the docking station systems connected to ThinkPad computers in which Wake on LAN is disabled.

Setting Up in Easy-Setup

You can enable or disable Wake on LAN from the Easy-Setup menu. When Wake on LAN is enabled, the network administrator can power on remote machines connected on a LAN by using remote network-management software. Disable the function when your computer is not under the network administrator's system management.

To set this function, do either of the following:

1 Go to the Easy-Setup menu.

2 Click on the **CONFIG** icon.

The “Configuration” window appears.

3. Click on the **Network** icon.

   The “Network” window appears.

4. Select either the **Enable** or the **Disable** button beside “Wake.”

5. Click on **OK**.

or

1. Go to the Easy-Setup menu.

2. Click on the **Startup** icon.

   The “Startup” window appears.

3. Click on the **Network** icon.

   The “Automatic Power On Startup Sequence” window appears.

4. Select either the **Enable** or the **Disable** button beside “Wake.”

5. Click on **OK**.

Setting Up for NetFinity Service

If you have NetFinity Service 5.0 installed in the network and wish to use the Wake on LAN function, do the following:

For Windows 95 systems:

Add the following line in the AUTOEXEC.BAT file in the root directory of the boot drive:

```
SET NFWAKEONLAN=YES
```

For Windows NT systems:

1. Log on to the system with administrator privilege.

2. Double-click on the **System** icon in the **Control Panel** window.

3. Click on the **Environment** tab.

4. Click on one of the system variables.

5. Change the variable name to “NFWAKEONLAN” and value to “YES,” and click on the **Set** button.
6. To save the new settings, click on **OK**.
7. Restart the system.

Automatic Power-On Startup Sequence

The Automatic Power-On Startup Sequence settings determine the order in which devices in or attached to your computer will start when your computer is turned on remotely.

To define a sequence:

1. Go to the Easy-Setup menu.
2. Click on the **CONFIG** icon.

   The “Configuration” window appears.
3. Click on the **Network** icon.

   The “Network” window appears.
4. Click on the **Startup** icon.

   The “Automatic Power On Startup Sequence” window appears.
5. Define a sequence by clicking on the devices in the order you want them to start.

   The devices you choose appear in boxes 1 to 4.
6. Click on **OK**.

or

1. Go to the Easy-Setup menu.
2. Click on the **Startup** icon.

   The “Startup” window appears.
3. Click on the **Network** icon.

   The “Automatic Power on Startup Sequence” window appears.

4. Define a sequence by clicking on the devices in the order you want them to start.

   The devices you choose appear in boxes 1 to 4.

5. Click on **OK**.

Note: If you want to change the settings, click on **Reset** and make the settings again.

Enabling or Disabling a Flash (POST/BIOS) Update from the Network

When a Flash (POST/BIOS) update from the network is enabled, the system programs in your computer can be updated remotely by a network administrator from a management console. The following requirements must be met, however:

- Update Flash from network must also be enabled. (See the following steps.)
- Your computer must be started over the LAN.
- Your computer must be engaged in a remote program load.
- Network-management software is required in the remote administrator's computer.

To enable or disable the Flash (POST/BIOS) update from the network setting, do the following:

1. Go to the Easy-Setup menu.
2. Click on the **CONFIG** icon.

   The “Configuration” window appears.
3. Click on the **Network** icon.

   The “Network” window appears.
4. Select either the **Enable** or the **Disable** button beside “Flash.”
5. Click on **OK**.

System Programs:

System programs are the basic layer of software built into every IBM computer. They include the power-on self test (POST), the basic input/output system (BIOS) code, and the Configuration/Setup Utility program. POST is a set of tests and procedures performed every time you switch on your computer. The BIOS is a layer of software that translates instructions from other layers of software into electrical signals that the computer hardware can understand.

In the past, the system programs were stored in a read-only memory (ROM) module on the system board. Generally, the contents of ROM modules cannot be modified once they have been originally programmed. However, a type of nonvolatile memory referred to as electrically erasable programmable ROM (EEPROM) can be reprogrammed while it is in the computer, and has replaced the ROM module on the system board in ThinkPad computers. System programs are stored in a type of EEPROM module referred to as Flash memory. The contents of Flash memory can be easily updated with an update (Flash) diskette. The process of updating system programs is often referred to as "flashing the BIOS."

As part of its continuous efforts to improve quality, IBM might make changes and enhancements to the system programs. When updates are released, they will be made available on the World Wide Web (http://www.ibm.com/thinkpad). Instructions for using the system program updates will be available in a README file included in the downloaded files.

If your computer is docked to a docking station in which either IBM 100/10 EtherJet PCI Adapter with Wake on LAN or IBM Auto Wake Token Ring ISA Adapter is installed, the system programs can also be updated remotely when the computer is unattended.

Appendix A. Using PS2 Commands

Using PS2 Command

This section describes PS commands in general. Depending on the features of your computer, some commands might not apply. Please note that the 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 command options from the DOS command prompts on DOS, Windows 3.1, Windows NT, Windows 95, Windows 98, and OS/2 to set the features for your computer. When entering a command, enter it in the following syntax:

PS2 [*Parameter1*] [*Parameter2*] [*Parameter3*]

Note: You cannot use the following PS2 commands in the Windows 98 environment:

PRESENtation	**HT**imer	**PO**wer	**DISK**
LCd	**ON**	**TI**mer	**DEFAULT**

Syntax Rules

Refer to these notes 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 within the specified range for the following: XX: 0–20 HH: 0–23 MM: 0–59 SS: 0–59 **Note:** The MM (minutes) and SS (seconds) parameters are optional. The default values are 0.
lowercase	Command elements in lowercase are optional. For example, entering PS2 SE OF and PS2 SErial OFf gives the same results.

PS2 Commands

The following is a list of commonly used PS2 commands. The descriptions have the following format:

Description of the command

Parameter1	Parameter2	Parameter3

—Or—

Parameter1	Parameter2	Parameter3	Parameter4

Alarm (Sound) Command

Set the computer to beep in certain conditions:

BEEP	**ON** | **OF**f	**A**larm | **S**ystem | **W**arn

Audio Features Commands

Set the features for the ESS AudioDrive chip:

AUdio	**E**nable | **D**isable **ADD**ress **DMA** **IRQ** **SB**address	— **530** | **604** | **E80** | **F490** **0** | **1** | **3** **5** | **7** | **9** | **10** | **11** | **15** **220** | **240** | **260** | **280**

Set the features for the audio control function:

AUDIOCTRL	**E**nable | **D**isable **ADD**ress	— **530** | **D38** | **E88** | **FF0**

CD-ROM Speed

Set the CD-ROM speed

Note: The default is Normal.

CDSPeed	**H**igh | **N**ormal | **S**ilent	—

Configuration Commands

Display the interrupt level assignments:

? IRQ	—	—

Reserve the IRQ for PCI devices:

PCIIRQ	**D**isable	**3** | **4** | **5** | **7** | **9** | **10** | **11** | **15**

Set the startup screen when the computer is powered on:

STARTup	**E**nable | **D**isable	—

Set the A: drive to the external diskette drive:

FDD	**E**xternal | **I**nternal	—

Display the DMA channel assignments:

? DMA	—	—

CPU Speed

Set the processor speed:
AC: Specifies CPU speed when the AC Adapter is connected.
DC: Specifies CPU speed when using battery power.

Note: If the AC or DC option is not specified, this command is effective on the current power management mode set by the PM commands.

SPeed	**F**ixed | **A**uto	**MAX** | **M**edium | **S**low	[**AC** | **DC**]

Display Commands

Set the screen expansion:

HVEXPansion	**ON** | **OF**f	—

Disable the screen blanking function, and the standby and suspend timers:

PRESENtation	**E**nable | **D**isable	—

Set the brightness control of the LCD:

BRightness	**H**igh | **N**ormal	—

Set where to display information:

SCreen	**LCD** | **CRT** | **BOTH**	—

Infrared Features Command

Set the features for the infrared port (IR):

IR	**E**nable | **D**isable **ADD**ress **DMA** **IRQ** **COMADD**ress	— **1** | **2** | **3** | **4** **0** | **1** | **3** | **D**isable **3** | **4** | **5** | **7** **3F8** | **2F8** | **3E8** | **2E8**

Joystick Connector Command

Set the joystick connector:

JStick	**E**nable | **D**isable	—

Keyboard Function Commands

Set the **Fn** key lock function:

FNSticky	**E**nable | **D**isable	—

Set the HVEXPansion command to on or off with the **Fn**+**F8** key combination:

F8	**E**nable | **D**isable	—

Set the keyboard typematic speed:

KRate	**N**ormal | **F**ast	—

Set the TrackPoint:

TPOint	**E**nable | **D**isable | **AUTOD**isable	—

MIDI Function Command

Set the features for the MIDI function:

MIDIport	**E**nable | **D**isable **ADD**ress **IRQ**	— **300** | **310** | **320** | **330** **5** | **7** | **9** | **10** | **11** | **15**

Parallel Connector Command

Set the features for the parallel connector:

PARallel	**E**nable | **D**isable **ADD**ress **MO**de **DMA** **IRQ**	— **1** | **2** | **3** **U**ni | **B**i | **EPP** | **ECP** **0** | **1** | **3** | **D**isable **E**nable | **D**isable

Port Replicator or Docking Station Command

Enable or disable suspend mode when you are attaching a port replicator or a docking station to your computer:

DOCK	**N**osuspend | **S**uspend	—

Power Management Commands

Enter hibernation mode:

Note: Create the hibernation file using the `HFILE` command before using this command.

HIBernation	—	—

Enter the RediSafe suspend mode:

SAfe	**E**nable | **D**isable	—

Enter hibernation mode when the power switch is pressed:

Note: Create the hibernation file using the `HFILE` command before using this command.

HSWITCH	**E**nable | **D**isable	

Enter suspend mode:

OFF | **SUS**pend	—	—

Set whether to enter suspend mode when the LCD is closed:

Cover	**E**nable | **D**isable	—

Create the hibernation file:

Note: Use this command before using other hibernation commands. C – Z are the drive letters of the hibernation file is in.

HFILE	**C** – **Z** | **DEL**ete	—

Set the timer to enter hibernation mode after the specified number of minutes (*xx*):
AC: Set the timer when the AC Adapter is connected.
DC: Set the timer when using battery power.

HTimer	*xx*	[**AC** | **DC**]

Set the timer to enter hibernation mode from suspend mode after the specified number of minutes:

S2H	**30** | **60** | **90** | **D**isable	—

Set the timer to enter suspend mode after the specified number of minutes (*xx*):
AC: Set the timer when the AC Adapter is connected.
DC: Set the timer when using battery power.

Note: If the AC or DC option is not specified, this command is effective on the current power management mode set by the PM command.

POwer	*xx*	[**AC** | **DC**]

Set the hard disk drive power management timer for the specified number of minutes (*xx*):
AC: Set the timer when the AC Adapter is connected.
DC: Set the timer when using battery power.

Note: This command is effective on the current power management mode set by the `PM` commands.

DISK	*xx*	[**AC** | **DC**]

Set the LCD off timer for the specified number of minutes (*xx*):
AC: Set the timer when the AC Adapter is connected.
DC: Set the timer when using battery power.

Note: This command is effective on the current power management mode set by the `PM` command.

LCd	*xx*	[**AC** | **DC**]

Set the resume timer:

Note: *yyyy* can be set from 1980 to 2079.

ON	[yyyy/MM/DD] HH**:**MM**:**SS | **C**lear	—

Set the power management mode to enter by the automatic power-saving timer:

Note: Create the hibernation file using the `HFILE` command before using the `TI H` command.

TImer	**S**uspend | **H**ibernation	—

Set the power management mode:
AC: Set the power management mode when the AC Adapter is connected.

DC: Set the power management mode when using battery power.

PMode	**H**igh | **A**uto | **C**ustom	[**AC** | **DC**]

Set POwer, LCd, DISK, SPeed, and STandby to their original values:

Note: This command is effective on the current power management mode set by the PM command.

DEFAULT	—	—

Set the power management mode to enter when a low-battery condition occurs:

Note: Create the hibernation file using the HFILE command before using the LB H command.

LBattery	**S**uspend | **H**ibernation	—

Enable or disable an incoming call:

RI	**E**nable | **D**isable	—

Serial Connector Commands

Set the features for the serial connector:

SERA	**E**nable | **D**isable **ADD**ress	— **1** | **2** | **3** | **4**

Set power on or off for the serial device attached to the serial connector:

SErial	**ON** | **OF**f	—

Other Commands

Display the help menu:

? | **H**elp	—	—

Power off the computer:

TURN	**OFF**	—

Enable or disable the automatic CPU clock control:

CPUPower	**A**uto | **D**isable	—

Enable or disable the automatic PCI BUS clock control:

PCIBUSPower	**A**uto | **D**isable	—

Set the second IDE device in the UltraBay or docking station:

IDE2	**E**nable | **D**isable	UltraBay | Dock

Set the third IDE device in the UltraBay or docking station:

IDE3	**E**nable | **D**isable **IRQ** **ADD**ress	— **10** | **11** **168** | **1E0** | **1E8**

Enable or disable the speaker indicator:

SLed	**E**nable | **D**isable	—

Appendix B. Handling the ThinkPad

Handling Tips

By using common sense and by following these handling tips, you will get the most use and enjoyment out of your computer for a long time to come.

This appendix provides tips for handling notebook computers in general. Some descriptions might not suit your situation. Check your shipping checklist to confirm the items you get with your computer.

Notebook computers are precision machines that require a bit of careful handling. Though your computer is designed and tested to be a durable notebook computer that functions reliably in normal work environments, you need to use some common sense in handling it.

ThinkPad Don'ts

Do not subject your computer to physical punishment, such as dropping or bumping.
Do not place heavy objects on your computer.
Do not spill liquids into your computer.
Do not use your computer in or near water (to avoid the danger of electrical shock).
Do not pack your computer in a tightly packed suitcase or bag. Your LCD might be damaged.

A scratchlike marking on your LCD might be a stain transferred from the keyboard (including from the TrackPoint stick) when the cover was pressed from the outside. Wipe such a stain gently with a dry soft cloth. If the stain remains, moisten the cloth with LCD cleaner and wipe the stain again. Be sure to dry the LCD before closing it.

Do not disassemble your computer. Only an authorized IBM ThinkPad repair technician should disassemble and repair your computer.
Do not scratch, twist, hit, or push the surface of your computer display.
Do not place any objects between the display and keyboard.

Do not pick up or hold your computer by the display. When picking up your open computer, hold it by the bottom (keyboard) half.

Do not modify or tape the latches to keep the display open or closed.

Do not turn your computer over while the AC Adapter is plugged in. This could break the adapter plug.

Do not move the computer when the hard disk drive is accessing data (when the indicator is blinking).

Do not use or store your computer where the temperature is below 5° C or above 35° C (41° F and 95° F).

Do not place your computer closer than 13 cm (5 in.) from any electrical appliance that generates a strong magnetic field, such as a motor, a magnet, a TV, a refrigerator, or large audio speakers.

Do not hard-mount your computer in a vehicle or anywhere that it is subject to strong vibration. See “Ruggedized Mobile Computers” in this appendix for information on a more appropriate model for demanding applications.

Do not crush or drop the external or removable hard disk, diskette, or CD-ROM drive when it is outside your computer.

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

Do not insert a diskette at an angle. Not inserting the diskette straight into the drive can damage the drive.

Do not place more than one label on a diskette. Multiple or loose labels can detach or tear and then lodge in the drive.

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

Do not close the CD-ROM tray until you hear the CD-ROM click into the center pivot of the CD-ROM drive.

Do not touch the surface of a compact disc; handle the compact disc only by its edges.

Do not connect the modem to a PBX (private branch exchange) or other digital telephone extension line. **Your computer can use only a public-switched telephone network (PSTN)**. Use of a phone line other than PSTN can damage your modem. If you are not sure which kind of phone line you are using, contact your telephone company. Many hotels or office buildings use digital telephone extension lines, so check before connecting the telephone cable in such places.

Do not leave the base of your computer in contact with your lap or any part of your body for an extended period when the computer is functioning or when the battery is charging. Your computer dissipates some heat during normal operation. This heat is a function of the level of system activity and battery charge level.

ThinkPad Do's

Store your CD-ROM drive in the CD carrying case and the diskette drive in its enclosure.
When installing your hard disk, diskette, or CD-ROM drive, follow the instructions in this book and apply pressure only where needed on the device.
Treat your computer like a precision piece of electronic machinery.
Retain and store packing materials safely out of reach of children to prevent the risk of suffocation from plastic bags.
Register your ThinkPad products with IBM (refer to the *Setup Guide*). This can help authorities return your computer to you if it is lost or stolen. Registering your computer also enables IBM to notify you about possible upgrades.
Check the IBM Web pages at **http://www.pc.ibm.com/support** periodically to get current information about your computer.

Cleaning Your Computer

Occasionally clean your computer as follows:

Use a soft cloth moistened with nonalkaline detergent to wipe the exterior of the computer.
Don't spray cleaner directly on the display or keyboard.
Gently wipe the LCD with a dry, soft cloth.

Carrying Your Computer

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

1. Remove any media from the CD-ROM drive or diskette drive.
2. Turn off all attached devices.
3. Power off the computer, or enter suspend or hibernation mode; then close the LCD. Make sure the suspend indicator is on

when it is in suspend mode, or the power indicator is off when it is powered off or in hibernation mode.

4. Unplug all external cables and cords connected to your computer.
5. Make sure all computer doors and covers are closed.
6. Use a quality carrying case that provides adequate cushion and protection.

> Do not move the computer when the hard disk drive is accessing data (when the indicator is blinking). Make sure the indicator is off before you carry the computer.

Extending Your Computer's Battery Life

The amount of battery power consumed by your computer depends on such conditions as the usage frequency, the operating temperature, and the period in storage (if unused). The following tips can help you to extend the life of your battery:

If your battery is brand new and you are charging it for the first time, it might not become fully charged due to the characteristics of the chemicals in the cell. To maximize performance, ensure that all chemicals in the battery are fully activated by cycling the battery (fully charge, then fully discharge) three times. Also, follow this procedure if you stored the battery for a few months.

Do not charge the battery pack until all of its power is used. Recharging a battery pack that is not completely discharged can shorten battery life.

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

Whenever possible, use the ThinkPad battery power-saving modes:

- **Standby**
- **Suspend**
- **Hibernation**

  For more information → Using the Power Management Modes .

Decrease the LCD brightness.

Use Advanced Power Management (APM). Each operating system comes with its own power management.

Stop the supply of power to the internal serial devices, including the modem, the serial port, and the infrared port, if they are not in use.

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

Ruggedized Mobile Computers

Some professionals work in environments that may require special ruggedized features to protect their computers from extreme temperature, humidity, and physical punishment. Construction, public service, distribution, repair service, and utilities are some of the environmentally demanding professions that may require rugged mobile computers that can withstand stresses. For these applications, IBM offers such computers (not ThinkPad systems), especially designed for mobile professionals who need a system for managing and communicating information from the field.

For more information on these computers, consult your IBM Business Partner.

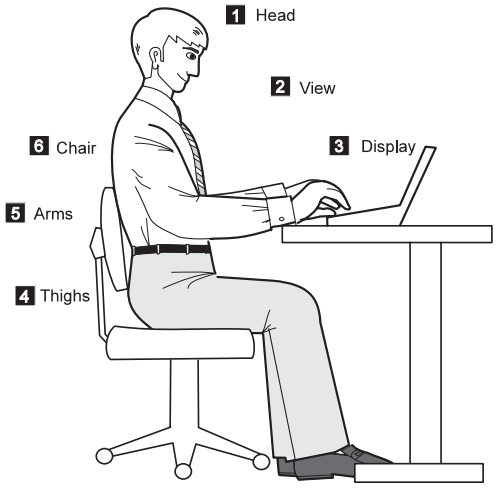
Ergonomics Information

This is important information you should read before using your computer in your “virtual office.”

Working in the virtual office might mean adapting to frequent changes in your environment. Following some simple “rules of the road” will make things easier and bring you the maximum benefits of your computer. Keeping in mind such basics as good lighting and proper seating, for example, can go a long way in helping you enhance your performance and achieve greater comfort wherever you are.

Note:

The example shown here is of someone in a traditional setting. Even when not in such a setting, you can follow many of these tips. Develop good habits, and they will serve you well.



1 **Head**
Keep your head in a comfortable and vertical position.

2 **View**
Maintain a comfortable viewing distance of 510–760 mm (20–30 in.).

3 **Display**
Position the display to avoid glare or reflections from overhead lighting or outside sources of light.

Keep the display screen clean and set the contrast and brightness to levels that allow you to see the screen clearly.

4 **Thighs**
Keep your thighs parallel to the floor and your feet flat on the floor or on a footrest.

5 **Arms**
Keep your forearms, wrists, and hands in a relaxed and neutral position. Don't pound the keys; type with a soft touch.

6 **Chair**
Use a chair that gives you good back support.

What if you are traveling?

It may not be possible to observe the best ergonomics practices when you are using your computer while on the move or in a

“casual” setting. Regardless of the setting, try to observe as many of the tips for proper usage as possible. Sitting properly and using adequate lighting, for example, will help you maintain desirable comfort and performance levels.

Questions about vision?

IBM's visual display screens are designed to meet the highest standards and to provide you with clear, crisp images and large, bright displays that are easy to see, yet easy on the eyes. Of course, any concentrated and sustained visual activity can be tiring. If you have questions on eye fatigue or visual discomfort, consult a vision care specialist for advice.

Appendix C. Getting Service

Getting Service

If you need further assistance, you can call your IBM reseller or IBM marketing representative.

You will need to know the following information when requesting repair service:

Identification number of your computer
Options installed in your system

Note: Use the record sheet in the *User's Reference*.

Error message or problem

Note: Error messages can help identify which service action is required and help the service representative provide quick and efficient service.

Use the record sheet in the *User's Reference*.

About Your Warranty:

During the warranty period, you might be responsible for repair costs if the product damage was due to misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance.

For full information on product warranties, see the *User's Reference*.

Customer Support and Service

Purchasing an IBM PC hardware product entitles you to receive support and services during the limited warranty period. If you need additional support and services, a wide variety of extended solutions that addresses most needs are available for purchase.

Help at the ThinkPad Web Site

You can get support and information at the ThinkPad Web site.

The latest information about the ThinkPad computers

→ **http://www.ibm.com/thinkpad**

Technical support information

→ **http://www.pc.ibm.com/support**

IBM may make improvements or changes to these Web sites at any time without any notice.

Help by Telephone

You can get support and information by telephone during the limited warranty period at no additional charge, through the IBM PC Help Center. Experienced technical-support representatives will be on hand to assist you in answering any questions you might have, such as:

- How to set up your computer
- How to install and set up your IBM options purchased directly from IBM or through an IBM reseller
- How to use the 30-day support for the preinstalled operating system
- How to get service
- How to get overnight shipment of customer-replaceable parts

Please have the following information ready when you call:

- Serial number of your computer and proof of purchase
- Description of the problem
- Exact wording of the error message
- Hardware and software configuration information for your system

If possible, be at your computer when you call:

- In the U.S. and Puerto Rico, call 1-800-772-2227.
- In Canada, call 1-800-565-3344.

These lines are available 24 hours a day, 7 days a week. The answering technical-support representative can also fax or mail you technical or product information, such as:

- Product brochures
- Location of IBM resellers
- Services available from IBM

ThinkPad EasyServ

ThinkPad *EasyServ* is a courier repair service for IBM mobile products whereby your ThinkPad computer is picked up, sent to IBM for repair, and then returned to the location of your choice. This service is available at no additional charge during the limited warranty period. Most computers can be repaired the day that they arrive at the IBM repair location.

Support personnel first try to solve your problem over the phone. If they are unsuccessful, you can arrange for EasyServ service by calling the PC Support Line.

If possible, you should use the original ThinkPad shipping materials that your computer came in for re-sending it to IBM. If the box is not available, the courier will deliver a shipping carton and will return later to pick it up. This service is available only in the U.S. and Canada.

Getting Help around the World

If you make frequent overseas trips or you are residing abroad, you can register with the International Warranty Service Office. The office will issue an International Warranty Service Certificate, which you can use wherever IBM or IBM resellers sell and service IBM PC products.

> For more information on registering with the International Warranty Service Office, call 1-800-497-7426 in the U.S. or Canada.

Fax Information

In the U.S. and Canada, if you have a touch-tone telephone and access to a fax machine, you can receive marketing and technical information on such topics as computer hardware, operating systems, and local area networks (LANs) by fax. You can call the IBM Automated Fax System 24 hours a day, 7 days a week. Follow the recorded instructions, and the information that you request will be sent your fax machine.

To access the IBM Automated Fax System, call:

In the U.S., 1-800-426-3395
In Canada, 1-800-465-3299

Electronic Support Services

If you have a modem, you can get help from several popular services. Bulletin boards and online information services provide assistance through question-and-answer message areas, live chat rooms, search databases, and more.

Technical information is available on a wide range of topics, such as:

Hardware setup and configuration
Preinstalled software
OS/2, DOS, and Windows
Networking
Communication
Multimedia

In addition, the latest device driver updates are available.

The IBM Bulletin Board System (BBS) can be reached 24 hours a day, 7 days a week. Modem speeds of up to 14,400 baud are supported. Long-distance telephone charges might apply.

To access the BBS, call:

In the U.S., 1-919-517-0001
For Canada, call the center closest to you:
- 514-938-3022 (Montreal)
- 905-316-4255 or 416-956-7877 (Toronto)
- 604-664-6464 (Vancouver)

Commercial online services that have information on IBM products are:

CompuServe:
Use the **GO** word **ThinkPad**.

Prodigy:
Use the **Jump** command; type `IBM` and select **PC Product Support.**

America Online:
Use the **Go to** keyword **IBM Connect**.

You can also contact us on the Internet for answers to your technical support questions. If you link to our support home page, you can search for technical tips, download update drivers, and find out about many other things. You can visit the site at the following URL:

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

Personalized Web-based PC support provides PC users easy access to online support, including a personalized IBM Web site tailored to their machine type, computing environment, and such individual interests as business applications or games. Once you set up a profile with IBM, you are thereafter greeted by name and presented targeted information selected specifically to meet your particular needs. For example, if you are a corporate ThinkPad user, you might receive information on Microsoft Windows NT and remote connectivity. You can also choose to receive proactive E-mail, alerting you to time-saving hints and tips and such product-specific updates as modem speed and BIOS files. Interactive Web-based forums are monitored around the clock by IBM specialists, complementing its support on all the major Internet service providers. You can set up your profile at:

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

Purchasing Additional Services

During and after the limited warranty period, you can purchase additional services, such as:

Support for IBM and non-IBM hardware, operating systems, and application programs

Network setup and configuration

Upgraded or extended hardware repair services

Custom installation

The availability of the service and its name might vary by country.

Enhanced PC Support Line

Enhanced PC Support is available for desktop and mobile IBM computers that are not connected to a network. Technical support is provided for IBM computers and IBM or non-IBM options, operating systems, and application programs on the supported products list.

This service includes technical support for the following:

- Installing and configuring your out-of-warranty IBM computer
- Installing and configuring non-IBM options in IBM computers
- Assistance with the preloaded operating system
- Using selected application software and games
- Tuning performance, such as memory management
- Installing device drivers remotely
- Setting up and using multimedia devices
- Identifying system problems
- Interpreting documentation

You can purchase this service for a single incident or for multiple incidents. For more information about purchasing the Enhanced PC Support → Ordering Support Line Services.

900-Number Operating System and Hardware Support Line

In the U.S., if you prefer to obtain technical support on a pay-as-you go basis, you can use the 900-number support line. This line provides support for IBM PC products whose warranty period has expired.

To access this support, call 1-900-555-CLUB (2582). You will be notified of the charge per minute.

Network and Server Support Line

Network and Server Support includes all the features of the Enhanced PC Support Line and is available for simple and complex networks made up of IBM workstations and servers using major network operating systems. This line also supports the many popular non-IBM adapters and network interface cards.

This service includes technical support for the following:

- Installing and configuring client workstations and servers
- Identifying system problems and correcting problems on the client or the server
- Using IBM and non-IBM network operating systems
- Interpreting documentation

You can purchase this service for a single incident or for multiple incidents.

For more information about purchasing Network and Server Support
→ Ordering Support Line Services.

Ordering Support Line Services

The Enhanced PC Support Line, Client Support Line, and Network and Server Support Line services are available for products on the Supported Products list.

To receive a Supported Products list,

In the U.S:

- Call 1-800-426-3395.
- Select the service for which you would like a Supported Products list:
  - For the Enhanced PC Support Line, select document 11682.
  - For the Network and Server Support Line, select document 11683.

In Canada:

- Call 1-800-465-7999 or 1-800-465-3299.

In other countries, contact your IBM reseller or IBM marketing representative.

For more information on how to purchase the Support Line Services:

In the U.S.: call 1-800-772-2227.

In Canada: call 1-800-465-7999.

In other countries, contact your IBM reseller or IBM marketing representative.

Warranty and Repair Services

You can extend your period of ThinkPad EasyServ warranty service.

For information on warranty extensions:

In the U.S., call 1-888-426-4343.

In Canada, call 1-800-465-7999.

In other countries, contact your IBM reseller or IBM marketing representative.

For more details on service offerings in the U.S., refer to the EasyServ information under “ThinkPad” at the following Web site: **http://www.pc.ibm.com/us/infobrf**

Obtaining IBM Operating System Updates

IBM provides update diskettes, called ServicePacks or corrective service diskettes (CSDs), to customers who report a DOS or an OS/2 problem for which there is or will be a corrective program.

Getting Update Diskettes

You can obtain update diskettes from:

IBM Software Solutions Center (1-800-992-4777 for the U.S. and Canada)

An IBM authorized reseller or an IBM marketing representative

Ordering Publications

Additional publications are available for purchase from IBM. For a list of publications available in your country:

In the U.S., Canada, and Puerto Rico: call 1-800-879-2755.

In other countries, contact your IBM authorized reseller or IBM marketing representative.

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Edition Notice

First Edition (August 1998)

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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.

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.

ANSI. American National Standards Institute.

APM. Advanced Power Management.

application program. A program that performs specific tasks on your computer, such as word processing or creating spreadsheets.

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.

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.

cold docking. Docking the computer to the docking station when the computer is powered off.

combination keys. Keys that have specific functions when you hold them down at the same time.

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.

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.

CRT. Cathode ray tube display.

device driver. (1) A file that contains the code needed to use an attached device. Operating system loads device drivers for screens, keyboards, printers, diskette drives, hard disk drives, and auxiliary devices. (2) A program that enables a computer to communicate with a specific peripheral device—for example, a printer, a video disc player, or a CD drive. (3) A collection of subroutines that control the interface between I/O device adapters and processors.

DIMM. Dual inline memory module.

directory. A type of file containing the names and controlling information for other files or other directories.

Diskette Factory. The preload program for creating the installation diskettes of the device drivers and the operating system.

DMA. Direct memory access. The transfer of data between memory and input/output units without processor intervention.

docking station. An option to expand the capabilities of the computer by providing additional PC Card slots and connectors.

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.

DRAM. Dynamic random access memory.

DSP. Digital signal processor.

ECP. Extended Capability Port.

EDO DRAM. Enhanced data output dynamic random access memory.

EGA. Enhanced graphics adapter.

EIA. Electronics Industries Association.

EIA-232D. An EIA interface standard that defines the physical, electronic, and functional characteristics of an interface line that connects a communication device and associated workstation. It uses a 25-pin connector and an unbalanced line voltage.

EMS. Expanded memory specification.

FAQ. Frequently asked questions.

fax. (1) Facsimile machine. (2) A transmitted document from a facsimile machine.

FDD. Floppy disk drive, or diskette drive.

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.

hot docking. Docking the computer to the docking station when the computer is powered on.

HPA. High performance addressing.

icon. A graphic symbol, displayed on a screen, that a user can point to with a pointing device such as a TrackPoint or mouse to select a particular function or software application.

IDE. Integrated device electronics.

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.

LCD. Liquid crystal display.

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.

parallel connector. A connector 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 standby mode that occurs if the computer has failed to enter suspend mode. In this mode, the console is locked if the power-on password is set.

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 PC Card standard.

PCMCIA. Personal Computer Memory Card International Association.

pel. Picture element.

Personalization Editor. A feature that helps you to identify your computer when identical computers are being used in your location, or to deter theft.

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, or joystick, that is used to move a pointer on the screen.

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.

port replicator. An option to expand the capabilities of the ThinkPad computer by providing additional connectors.

POST. Power-on self-test.

power mode. A mode of battery operation to conserve power. The ThinkPad computer has three power modes: High Performance, Automatic, and Customize.

prompt. A visual or audible message sent by a program to request the user's response.

PSTN. Public-switched telephone network.

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. To restart all operations of the computer as if the power had just been turned on.

resume. To begin computer operations again from suspend mode.

ROM. Read-only memory.

SDRAM. Static dynamic random access memory.

serial connector. A connector 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.

SRAM. Static random access memory.

suspend. To stop all operations of the computer to reduce power drain and restrict access to the files.

SVGA. Super VGA.

TFT. Thin-film transistor.

TrackPoint. The built-in pointing device of the ThinkPad computer.

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.

UltraBay II. The ThinkPad 770X bay for installing a CD-ROM drive, a diskette drive, a DVD-ROM drive, or another device.

USB. Universal serial bus.

vertical expansion. A video display technique in character-display mode to fit video images on the whole LCD screen by adjusting the number of character dots vertically.

VESA. Video Electronics Standards Association.

VGA. Video graphics array, a video mode that produces up to 640-by-480 resolution.

VSYNC. Vertical synchronization frequency.

warm docking. Docking the computer to the docking station when the computer is in suspend or hibernation mode.

XMS. Extended memory specification.

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