

# Windows 2000 Professional for IBM ThinkPad Notebooks Setup and Technical Guide

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## Introduction

This document describes the steps for installing or upgrading to Microsoft® Windows® 2000 Professional operating system; and updating the system BIOS; and provides helpful hints and tips for ThinkPad computer users who use this operating system.

### Considerations:

**NOTE:** IBM does not warrant that every function and operation described in the IBM or Microsoft, documentation will work or be free from limitations when the Windows 2000 Upgrade is used with your ThinkPad computer. This document contains a list of hints, tips, and limitations that IBM is aware of on specific ThinkPad models with the Windows 2000 Upgrade installed. If you have not already installed Windows 2000 please follow the ThinkPad Windows 2000 Upgrade or Installation instructions available below.

Before proceeding farther into the guide, the following chart illustrates what steps should be completed before, while, and after installing or upgrading to Windows 2000 Professional. Use this chart as quick reference when preparing to install or upgrade to Windows 2000 Professional:

<b>START</b>	<b>New Install</b>	<b>Upgrade Install</b>
<p style="text-align: center;">?</p> <p style="text-align: center;"><b>Preparation</b></p>	<ul style="list-style-type: none"> <li>• Read this document and the Windows 2000 Release Notes for Setup (\SETUPTXT\PRO1.TXT and PRO2.TXT)</li> <li>• Determine if your ThinkPad computer meets all the minimum hardware requirements for running Windows 2000 Professional.</li> <li>• Review the Hardware Compatibility List (HCL) to determine if your devices are supported while running Windows 2000.</li> <li>• Decide to upgrade or clean install Windows 2000 Professional.</li> <li>• Does your ThinkPad support Advanced Power Management (A PM) or Advanced Configuration and Power Interface (ACPI) while running Windows 2000 Professional.</li> </ul>	
<p style="text-align: center;">?</p> <p style="text-align: center;"><b>“Update” computer</b></p>	<ul style="list-style-type: none"> <li>• Build the System Program Service (BIOS) Diskette and update the system BIOS.</li> <li>• Update the CD-ROM or DVD-ROM drive firmware, if applicable.</li> <li>• Install at least 64 megabytes (MB) of system memory on your ThinkPad computer.</li> <li>• For ThinkPad model 760XD and 765D/L, download from the IBM Web site, the Mwave® DSP Audio and Telephony device drivers for Windows 2000. Also, download the Mwave MIDI samples from the IBM Web site.</li> </ul>	
<p style="text-align: center;">?</p> <p style="text-align: center;"><b>Pre-setup</b></p>	<ul style="list-style-type: none"> <li>• Back-up all data files and information on the computer before starting clean install.</li> <li>• Decide if dual -startup configuration is desired.</li> <li>• Create Startup diskettes for non-bootable CD-ROM drives or external CD-ROM drives.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify space on hard disk drive               <ul style="list-style-type: none"> <li>○ Partition is at least 2 GB in size.</li> <li>○ At least 650 MB of free space. If not, clean install instead.</li> <li>○ Verify the OS/2 Boot Manager is not installed.</li> </ul> </li> <li>• Back-up all data files and information on the computer before upgrading.</li> <li>• Uninstall all unsupported applications and utilities.</li> </ul>
<p style="text-align: center;">?</p> <p style="text-align: center;"><b>Installing or upgrading to Windows 2000</b></p>	<p><b>Install Windows 2000 Professional :</b></p> <ul style="list-style-type: none"> <li>• Computer with bootable CD-ROM.</li> <li>• Computer with non-bootable CD-ROM .</li> <li>• Computer with external CD-ROM .</li> </ul>	<p><b>Upgrade to Windows 2000 Professional</b></p>
<p style="text-align: center;">?</p> <p style="text-align: center;"><b>Post-setup</b></p>	<ul style="list-style-type: none"> <li>• <b>Post-install or upgrade to Windows 2000 Professional</b> <ul style="list-style-type: none"> <li>○ Setting LCD display resolution and color depth, if applicable.</li> <li>○ Installing Advanced Power Management, if applicable.</li> <li>○ Installing IBM device drivers for Windows 2000.</li> <li>○ Installing software applications for Windows 2000.</li> </ul> </li> </ul>	
<p style="text-align: center;">?</p> <p style="text-align: center;"><b>FINISH</b></p>	<ul style="list-style-type: none"> <li>• <b>General Technical Information</b> <ul style="list-style-type: none"> <li>○ Docking and undocking support for docking stations and port replicators.</li> <li>○ Hot and warm-swapping support for ACPI-supported computers.</li> <li>○ ACPI ThinkPad device support under Windows 2000.</li> </ul> </li> <li>• <b>Windows 2000 hints and tips</b></li> </ul>	

## Supported Windows 2000 Professional ThinkPad Models

IBM has tested a number of ThinkPad models and has determined that they support Windows 2000. Customers' computers must meet all the minimum hardware requirements in order for Windows 2000 to operate properly. Running Windows 2000 without the minimum hardware requirements might cause unpredictable results. Customers' computers must also meet the minimum recommended memory size of 64 megabytes (MB). Running Windows 2000 without the minimum recommended memory might cause unpredictable results. If the computer memory is less than the recommended 64 MB, Windows 2000 will not perform properly. On some ThinkPad models without the recommended hardware and memory, Windows 2000 will take significant time to complete. For more information on whether your ThinkPad model meets the minimum hardware requirements for installing or upgrading to Windows 2000, please refer to the \SETUPTXT\*PRO1.TXT* and *PRO2.TXT* readmes included on the Windows 2000 Professional CD.

Windows 2000 supports two types of Power Management:

- **Advanced Power Management (APM)**
- **Advanced Configuration and Power Interface (ACPI)**

Each ThinkPad model will be designated as either an APM or ACPI-supported computer under Windows 2000. The type of power management your ThinkPad model supports will determine the overall power consumption controls and Plug-and-Play capabilities your computer and operating system will offer while running Windows 2000 Professional.

The following ThinkPad models have been tested and designated as either APM or ACPI - supported systems running Windows 2000 Professional:

### ThinkPad 240 Series models

ThinkPad Model	Advanced Power Management	Advanced Configuration and Power Interface
240		X

### ThinkPad 380 Series models

ThinkPad Model	Advanced Power Management	Advanced Configuration and Power Interface
380E, 380ED, 380X, 380XD	X	
385X, 385XD	X	
380Z		X

### ThinkPad 390 Series models

ThinkPad Model	Advanced Power Management	Advanced Configuration and Power Interface
390, 390E, 390X		X

### ThinkPad 560 Series models

ThinkPad Model	Advanced Power Management	Advanced Configuration and Power Interface
560E, 560X	X	
560Z		X

**ThinkPad 570 Series models**

<b>ThinkPad Model</b>	<b>Advanced Power Management</b>	<b>Advanced Configuration and Power Interface</b>
570, 570E		X

**ThinkPad 600 Series models**

<b>ThinkPad Model</b>	<b>Advanced Power Management</b>	<b>Advanced Configuration and Power Interface</b>
600, 600E, 600X		X

**ThinkPad 760/765 Series models**

<b>ThinkPad Model</b>	<b>Advanced Power Management</b>	<b>Advanced Configuration and Power Interface</b>
760XD, 760XL	X	
765D, 765L	X	

**ThinkPad 770 Series models**

<b>ThinkPad Model</b>	<b>Advanced Power Management</b>	<b>Advanced Configuration and Power Interface</b>
770	X	
770E/ED, 770X, 770Z		X

**ThinkPad i Series 26xx models**

<b>ThinkPad Model</b>	<b>Advanced Power Management</b>	<b>Advanced Configuration and Power Interface</b>
2611	X	
2621		X

**APM-supported ThinkPad models:**

Windows 2000 supports “legacy” computer hardware for features such as APM power management (e.g., Standby, Resume, and Hibernation), Plug-and-Play PC Card, CardBus, and Universal Serial Bus (USB) functionality. However, this support does not include dynamic Plug-and-Play support for docking stations or port replicators. Docking station and port replicator use under Windows 2000 will offer the same limitations as those found with Windows NT 4.0.

In addition, APM functionality with Windows 2000 is very limited in terms of overall power management and Plug-and-Play capability. This includes the following:

- Wake-up from Standby mode with Wake-On-Ring and Wake-On-LAN® is not supported -- please see note below.
- Wakeup from scheduled tasks set by the scheduler is not supported -- please see note below.
- Dynamic Plug-and-Play support is limited. Dynamic Plug-and-Play for PC Cards, CardBus, and USB devices are supported. “Hot” and “warm” device swapping for swappable bay devices, are not supported. Only “cold” swapping is supported for devices that use the swappable bay – the system must be completely powered down before inserting or removing a device from the swappable bay.
- Dynamic docking station and port replicator use is not supported. Only “cold” docking and undocking is supported for APM systems – the system must first be completely powered off before docking or undocking the system-unit.

**Note:** If you install the IBM ThinkPad Configuration Utility under Windows 2000, Wake-On-Ring and Wakeup from scheduled task on your computer can be enabled.

**ACPI-supported ThinkPad models:**

An ACPI ThinkPad computer can fully exploit the advantages of Windows 2000 power management and Plug-and-Play support. ACPI power management features include various power saving-modes, such as CPU throttling with thermal zone control, dynamic Plug-and-Play configuration of docking station and port replicator use, ThinkPad UltraBay IDE device hot and warm swapping, and dynamic device detection, and configuration for Plug-and-Play display and monitor devices. ACPI functionality and support under Windows 2000 is highly integrated with the system BIOS version used on your ThinkPad model. In order to take full advantage of Windows 2000 power management and Plug-and-Play support, you must first update the system BIOS on your ThinkPad before upgrading or installing Windows 2000.

**Important Note:**

**The System BIOS on your ThinkPad system must be updated before Windows 2000 is installed or upgraded on your system. This is required for ACPI to function with Windows 2000 on your ThinkPad computer.**

## Updating the ThinkPad system BIOS for Windows 2000

Before you install or upgrade your system to Windows 2000, you **must update the computer (basic input/output system) BIOS on your ThinkPad computer.** To take full advantage of all the features offered by Windows 2000, such as ACPI support, it is strongly recommended that you update your ThinkPad's system BIOS. If you do not update the system BIOS before installing Windows 2000, you will encounter problems with the Setup utility and Windows 2000 will not operate properly on computers with an outdated BIOS.

The following is the list of system BIOS versions that are supported by Windows2000 Professional:

### APM-supported ThinkPad models:

ThinkPad Model	BIOS Name	Version	BIOS Date
380E, 380ED, 385E		I1ET49WW	12/03/99
380X (233/266 MHz)		ICET31WW	12/03/99
385X, 385XD (300 MHz)		IFET19WW	12/06/99
560E		HRET22WW	12/01/99
560X		I8ET35WW	12/17/99
760XD, 765D (9385 XGA)		HXET60WW	12/09/99
765D, 765L		HXET60WW	12/09/99
770		IDET36WW	09/17/99
i Series 2611-4x0/4x1	IKB120WW	V1.08	10/29/99
i Series 2611-4x2/5x2	IQB120WW	R01-A3e	10/29/99

### ACPI-supported ThinkPad models:

ThinkPad Model	BIOS Name	Version	BIOS Date
240	IRET54WW	3.05.00	11/26/99
380Z		IGET30WW	09/04/99
390	IJB103WW	R01-G1	11/01/99
390E	ILB093WW	R01_B8	11/11/99
390X	ISB041WW		11/24/99
560Z		IEET29WW	09/23/99
570		IMET57WW	11/02/99
600		IBET45WW	09/18/99
600E (266/300 MHz)		IHET40WW	09/11/99
600E (366 MHz or greater)		INET28WW	11/20/99
770E/ED		IDET36WW	09/17/99
770X		I1ET40WW	09/10/99
770Z		IOET21WW	09/10/99
i Series 2621-4x0/5x0/4x1/5x1	IXB128WW	R01-A21	12/11/99

### How to Update the System BIOS:

The following steps are required to update the system BIOS for your ThinkPad computer. The latest Flash BIOS update disk file can be obtained from the IBM ThinkPad support Web site:

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

Click **Notebooks and PC companions**. Select your ThinkPad family, or model, then click **Downloadable files**. Look for a listing similar to this: "BIOS Update (System Program Service Diskette)."

### **Building the System Program Service Diskette**

To build the System Program Service Diskette that will update the computer BIOS:

1. Create a temporary directory on your computer hard drive.
2. From the ThinkPad support Web site, download the appropriate BIOS file to the temporary directory on your computer hard drive.
3. Insert a blank formatted disk into the diskette drive.
4. Open the temporary directory.
5. In the temporary directory, run the file by double-clicking it.
6. Follow the instructions on the screen to create the service diskette.

### **Section 1: Using the System Program Service Diskette**

**Note:** The following instructions do not apply to the following ThinkPad models:

- ThinkPad 240
- ThinkPad 390, 390E, 390X
- ThinkPad 570, 570E
- ThinkPad i Series 2611
- ThinkPad i Series 2621

For the ThinkPad models listed above, go to the model-specific sections on how to update your ThinkPad BIOS.

After creating the System Program Service Diskette, follow the instructions listed below:

**Note:** You need an AC adapter and a fully charged battery pack to update the BIOS. If your computer is attached to a *port replicator*, *docking station*, or *PC Card Enabler*, turn off your computer and detach it before proceeding.

**Warning:** Do not turn off or suspend your computer until the update has completed. **IF YOU TURN OFF OR SUSPEND YOUR COMPUTER WHILE THE UPDATE IS IN PROGRESS, THE SYSTEM BOARD MIGHT HAVE TO BE REPLACED.**

1. It is recommended to print the instructions that accompany the System Program Service Diskette.
2. Firmly connect the AC adapter to the computer.
3. Insert the **System Program Service Diskette** into the diskette drive and then turn on the computer.
4. Select "Read this first..." from the menu and carefully read the information that appears.
5. Press the Esc key to return to the menu.
6. Select "Update system program" by using the arrow down key and press 'ENTER'.
7. Follow the instructions on the screen.

After the BIOS update, perform the following steps to make the changes effective:

8. When prompted, remove the System Program Service Diskette from the diskette drive and turn-off the computer.

9. Turn on the computer; then press and hold the 'F1' key until the "Easy-Setup" menu appears.
10. If the computer presents a password prompt type in the correct password.
11. Select 'Config' then select 'Initialize'.
12. Select 'OK' to initialize the system. Then click 'Exit'.
13. Select 'Restart', and then select 'OK' to restart your computer.

## **Section 2: Using the System Program Service Diskette for ThinkPad 390, 390E, 390X models**

After creating the System Program Service Diskette, please follow these instructions:

Note: You need an AC adapter and a fully charged battery pack to update the computer BIOS.

1. Firmly connect the AC adapter to the computer.
2. Insert the System Program Service Diskette into the diskette drive, and then turn on the computer.
3. Press '1' to update your computer BIOS.
4. When the computer displays this message "System program has been updated successfully.", remove the System Program Service Diskette from the diskette drive then turn off and restart your computer.

**Warning:** Do not turn off your computer until the update has completed. IF YOU TURN OFF YOUR COMPUTER WHILE THE UPDATE IS IN PROGRESS, THE SYSTEM BOARD MIGHT HAVE TO BE REPLACED.

After the BIOS update, perform the following steps to make the changes effective:

5. Turn on your computer and press 'F1' to enter the "IBM BIOS Setup Utility".
6. If the computer presents a password prompt, type in the correct password.
7. Press the 'F9' key. Select [Yes] in the "Setup Confirmation" window to load the default configuration.
8. Press the 'F10' key. Select [Yes] in the "Setup Confirmation" window to save configuration changes and exit the "IBM BIOS Setup Utility".

## **Section 3: Using the System Program Service Diskette for ThinkPad i Series models**

After creating the System Program Service Diskette, please follow these instructions:

Note: You need an AC adapter and a fully charged battery pack to update the computer BIOS.

1. Firmly connect the AC adapter to the computer.
2. Insert the System Program Service Diskette into the diskette drive, and then turn on the computer.
3. Press '1' to update your computer BIOS. Follow the instructions on the screen.
4. Remove the System Program Service Diskette disk from the diskette drive, turn off, and restart your computer.

**Warning:** Do not turn off your computer until the update has completed. IF YOU TURN OFF YOUR COMPUTER WHILE THE UPDATE IS IN PROGRESS, THE SYSTEM BOARD MIGHT HAVE TO BE REPLACED.

After the BIOS update, perform these steps to make the changes effective:

5. Turn on your computer, and then press and hold the 'F1' key until the "BIOS Utility" menu appears.
6. If the computer presents a password prompt type in the correct password.
7. Select 'Load Default Settings' and then press "Enter".
7. Select 'Yes' and then press "Enter".
8. Press "Esc", then select 'Yes'. Press "Enter" to restart computer.

#### **Section 4: Using the System Program Service Diskette for ThinkPad 240, 570, and 570E models**

After creating the System Program Service Diskette, please follow these instructions:

1. It is recommended to print the instructions that accompany the System Program Service Diskette.
2. Firmly connect the AC adapter to the computer.
3. Insert the *System Program Service Diskette* into the diskette drive, then turn on the computer.
4. Select "Read this first..." from the menu and carefully read the information that appears.
5. Press "Esc" to return to the menu.
6. Select "Update system program" by using the arrow key and press "ENTER". Follow the instructions on the screen.

**Warning:** Do not turn off your computer until the update has completed. IF YOU TURN OFF YOUR COMPUTER WHILE THE UPDATE IS STILL IN PROGRESS, THE SYSTEM BOARD MIGHT HAVE TO BE REPLACED.

After the BIOS update, perform these steps to make the changes effective:

7. Turn on your computer, then press the 'F1' key to enter the "IBM BIOS Setup Utility".
8. If the computer presents a password prompt, type in the correct password.
9. Press the 'F9' key. Select [Yes] in the "Setup Confirmation" screen to load the default configuration.
10. Press the 'F10' key. Select [Yes] in the "Setup Confirmation" screen to save configuration changes then exit the "IBM BIOS Setup Utility".

## Updating the CD-ROM drive firmware for Windows 2000

Some ThinkPad models with a CD-ROM drive require updated firmware for the CD-ROM drive before installing or upgrading to Windows 2000. If the firmware for these drives is not updated, the Windows 2000 Setup program will fail during installation or the drive will not function properly.

Currently, the following CD-ROM drives are known to be incompatible with Windows 2000:

- LG CRN-8241B
- Sanyo CRD-S372B
- Sanyo CRD-S372BV
- Sanyo CRD-S372BVA

Here's a list of ThinkPad models that are known to use the above CD-ROM drive:

- ThinkPad 390, 390E, and 390X
- ThinkPad 570 and 570E
- ThinkPad 600 and 600E
- ThinkPad 770 Series models
- ThinkPad i Series 2611 and 2621

### Building the CD-ROM drive firmware update diskette

To build the CD-ROM drive firmware diskette that will update the firmware on your CD-ROM drive:

1. Create a temporary directory on your computer hard drive.
2. From the ThinkPad support Web site, download the CD-ROM firmware update file to the temporary directory on your computer hard drive.
3. Insert a blank formatted disk into the diskette drive.
4. Click: **Start ? Run.**
5. Type `C:[temp_directory]\LOADSKF.EXE cdfwdec28.dsk A:`, where `C:[temp_directory]` is the location of where downloaded the update file from the Web, and `A` is the drive letter assigned to your computer's diskette drive.
6. Follow the instructions on the screen to create the firmware update diskette.

### Using the CD-ROM drive firmware update diskette

After creating the CD-ROM drive firmware diskette follow the instructions listed below:

1. Connect the CD-ROM drive to your computer.
2. Insert the CD-ROM drive firmware update disk into the diskette drive, then turn on your computer.
3. Press 1, "Read this first...", at the menu screen and carefully read the information that appears.
4. Press 2, "Update drive firmware", at the menu screen to begin the firmware updated.
5. Follow the instructions on the screen.
6. After the updated has completed, remove any disk from the diskette drive and restart you computer.

7. Your computer with its CD-ROM will now be ready to upgrade or install Windows 2000.

## Installing or upgrading to Windows 2000 Professional

### Installing Windows 2000 Professional

This section provides information on how to install Windows 2000 Professional on your ThinkPad. This information applies to the following situations:

- Installing Windows 2000 on a blank hard drive.
- Replacing an existing Windows operating system with Windows 2000.
- Creating a dual-startup configuration to run Windows 2000 with an existing Windows operating system.

If you choose to install Windows 2000 Professional on hard disk that contains application and personal files, back up all important data files before beginning the installation. If you do not have a Recovery CD or Backup CD with a CD-ROM drive, use a diskette backup program to create recovery diskettes of the preinstalled Windows operating system, device drivers, and applications.

For more information about installing Windows 2000 on your ThinkPad computer, please refer to the \SETUPTXT *PRO1.TXT* and *PRO2.TXT* readmes included on the Windows 2000 Professional CD.

#### **ThinkPad model with Bootable CD/DVD-ROM drive**

If your computer has an internal CD-ROM or DVD-ROM drive, simply start the computer with the Windows 2000 Professional CD in the drive then follow the instructions provided by the Setup program.

#### **ThinkPad model without Bootable CD/DVD-ROM drive**

If your computer does not support a bootable CD-ROM or DVD-ROM drive, you will need to use a startup diskette to begin the installation. You need to create the Setup start-up disks from the boot disk image files included on the Windows 2000 Professional CD. You will need four blank, formatted, high-density diskettes. To create the Setup boot diskettes, follow these instructions:

1. Turn on your computer and begin a DOS Command prompt session.
2. Insert the Windows 2000 Professional CD into the CD or DVD-ROM drive.
3. At the DOS prompt, type *D:\BOOTDISK\MAKEBOOT.EXE*, where D is the drive letter assigned to the CD or DVD-ROM drive.
4. Follow the instructions on the screen.
5. After the Setup disks have been created, insert Boot disk 1 into the diskette drive and insert the Windows 2000 Professional CD into the CD or DVD-ROM drive.
6. Restart your computer. Windows 2000 Setup will begin the installation.

#### **ThinkPad model with External CD-ROM**

Windows 2000 Professional supports the IBM PCMCIA 20X-8X Portable CD-ROM drive as a drive from which you can install the new operating system. If your computer does not have an internal CD or DVD-ROM drive, you can install Windows 2000 using the external IBM 20X-8X PCMCIA Portable CD-ROM drive. To install Windows 2000 from the external IBM PCMCIA CD-ROM drive, follow the instructions provide below:

1. Create the Setup Boot disks as described above.
2. Connect your IBM 20X-8X PCMCIA Portable CD-ROM drive to your computer, then insert the Windows 2000 Professional CD into the CD-ROM drive.
3. Insert Boot disk1 into the diskette drive, then turn on your computer.
4. Follow the instructions on the screen.

Note that IBM has tested the Sony CD-ROM Discman with an Adaptec SlimSCSI 1460C PCMCIA adapter as a supported external CD-ROM drive for Windows 2000. If your external CD-ROM drive is not supported as a drive for Windows 2000, please contact the manufacture of the CD-ROM drive device to obtain a supported Windows 2000 device driver.

### **ThinkPad unattended mode installation**

You can also install Windows 2000 Professional in unattended mode installation. For more information on unattended installs, refer to the Setup information included on Windows 2000 Professional CD -- <\SETUPTXT\PRO1.TXT and PRO2.TXT>.

Again, for additional help and information on how to install Windows 2000 on your ThinkPad computer, please refer to the "Release Notes for Setup" included on the Windows 2000 Professional CD.

## **Upgrading to Windows 2000 Professional**

Windows 2000 Professional supports upgrading from Windows 95 (all releases), Windows 98 (all releases), Windows NT 3.51 Workstation, and Windows NT 4.0 Workstation (including operating systems updated by service packs).

Note that the following requirements are necessary in order to upgrade to the Windows 2000 Professional:

- Hard disk drive partition where the current Windows operating system resides should be at least 2 Gigabytes (GB).
- At least 650 MB of free space on the partition where the current Windows operating system resides.
- The OS/2 Boot Manager is not installed. (Currently, the OS/2 Boot Manager is not supported under Windows 2000.)

If your computer does not meet these requirements, you will not be able to upgrade to Windows 2000 Professional. You will need to re-configure your hard disk drive and install Windows 2000 Professional.

**Caution:** If you are planning to upgrade to Windows 2000 Professional be cautious of the fact that if the Setup fails during any portion of the Windows 2000 upgrade you will not be able to recover the previously installed operating system. Anytime you upgrade the computer's operating system, there's always a risk that the upgrade will fail. Should the upgrade fail, you will lose the entire previously install operating system along with all user data. Therefore, if you are planning to upgrade to Windows 2000, it is strongly recommended that you back -up all important data and system files beforehand. If the upgrade fails, you will have to install Windows 2000 from scratch. To reduce the risk of an upgrade failure and loss of all user data, it's recommended to install Windows 2000 Professional from scratch by creating a dual-boot configuration. You must make the decision to upgrade versus create a dual-boot configuration before proceeding. For more information please refer to the \SETUPTXT\PRO1.TXT README file included on the Windows 2000 Professional CD.

Also note, that during the upgrade, Windows 2000 will replace all existing Windows Operating System files. It will also attempt to preserve your existing user settings and preferences and applications. However, most Windows 95, Windows 98, and Windows

**NT 4.0 applications that were designed specifically to run on ThinkPad hardware may function properly after you upgrade to Windows 2000 Professional.**

For more information about upgrading your ThinkPad computer to Windows 2000, please refer to the \SETUPTXT\PRO1.TXT and PRO2.TXT README files included on the Windows 2000 Professional CD.

The following device drivers and utility programs will no longer be required on Windows 2000 because their equivalent will be included in the new operating system. The following is a list of known device drivers and utilities designed specifically for your ThinkPad computers that will no longer function once you have upgraded to Windows 2000:

- ThinkPad UltraBay Hot/Warm Swap Driver
- IBM Utility Features for Windows 95/98 and Windows NT 4.0
- IBM ThinkPad Configuration Program
- IBM Fuel Gauge Program
- IBM Personalization Editor for Windows 95/98 and Windows NT 4.0
- SystemSoft CardWorks for Windows95
- SystemSoft CardWizard for Windows NT 4.0
- IBM Power Management System
- Notebook Manager for Windows 98
- SafeOFF for Windows 98
- SleepManager for Windows 98
- Modem Ring for Windows 98
- AudioRack for Windows 98
- Y-Station for Windows 98
- Swap Master driver for Windows 95/98
- Combo Bay (Warm Swap) driver for Windows 95/98
- APM Support Diskette for Windows NT 4.0

Also, some preloaded applications that came with the IBM ThinkPad computer and Windows 95, Windows 98, and Windows NT 4.0 will not work with Windows 2000. It's suggested that you contact the application's software vendor to receive an updated release designed for Windows 2000.

**Mediamatics DVDEExpress users**

Note that if your ThinkPad computer has a version of Mediamatics DVDEExpress software installed for Windows 98, in order to install the upgrade version of DVDEExpress for Windows 2000, **do not uninstall the Windows 98 version before upgrading**. If you uninstall the Windows 98 version, then upgrade to Windows 2000, you will not be able to install the upgrade package.

**Applications that must be uninstalled**

Before upgrading to Windows 2000 Professional, you should uninstall the following applications to prevent any upgrade problems from occurring:

- Access ThinkPad
- All anti-virus software
- Universal Management Agent

**Unsupported Applications for Windows 2000**

The following is a list of known applications that will no longer function once you have upgraded to Windows 2000 Professional:

- Access ThinkPad, versions 1.0, 1.1, 3.0, 4.0
- AOL, version 4.0
- Audio Station, versions 2.00.48, 2.00.59
- ConfigSafe, version 2.0.02
- Cossession, versions 6.0b3, 7.0b
- Directory, versions 1.6.719, 7.11
- DVP, versions 3.0c, 4.0, 5.0
- Earth link, version 2.1
- FaxWorks, version 300g058
- GolfPro, version 1.1
- IBM Antivirus, versions 2.5.1, 2.5.2, 3.0, 3.02.689
- IBM Internet Connect, version 2.0
- IBM Marketing Screen Saver, version 1.0
- IBM owner Privileges, version 1.1
- IBM Secure VPN
- IBM Update Connector, versions 2.01, 3.05
- IntelliLink, version 1.8
- IntelliSync and IntelliSync97
- Intel Video Phone, versions 2.0, 3.0, SK2112RO, TS1110RO
- LAN Desk, versions 3.0, 3.1
- LCF, version 3.1
- Mediamatics DVExpress, versions 4000183, 4.00.009, 4.00.018.1.4, 4.00.018.2.3, 4.00.121, 5000012, 5.01.0545E
- MS Office2000 MBE
- National Golf Course, versions 10, 52297, 1.00
- Net Meeting, versions 2.0, 2.1
- Netfinity®, versions 3.0, 4.0, 5.0, 5.10
- Netscape Communicator, version 5.01.05431
- Norton Mobile Essentials, versions 0.95, 2.0
- Norton AntiVirus, versions 5.0, 5.01.00, 5.01, NAV98
- Lotus Organizer, versions 2.1, 2.11
- PC Data Vaulting, version 3.0
- PC-Doctor DOS, version 2.0x
- PCN, versions 1.6.719, 2.0.1737
- Prodigy, version 14505
- Quicken, version 2000
- RealPlayer G2, versions 4.40.147, 6.0.6.33
- Ring Central, versions 4.10.78, 4.10.97
- Ring Central Fax, versions 44088, 44094, 4.40.102, 4.40.121, 4.40.141, 4.40.147
- RSA Secure PC, version 2.0
- Lotus SmartSuite 98
- SoftDVD, versions 1.12, 3.98
- Software Selections, version 1.0
- ThinkPad on the Net, versions 1.1, 1.2, 1.3, 1.3A
- Tranxit, versions 2.1001, 2.1004, 3.00.05, 3.00.11, 3.00.21
- Trip Maker, versions 1997SE, 1.1B
- Universal Management Agent, versions 1.0, 1.1, 1.101
- UMS, versions 1.1, 2.0
- UMS / Web, version 2.0
- Via Voice Mic Patch, version micp770
- Wall St Money, version 1.5

- WinCim, versions 3.0, 3.0.2, OS version
- World Book, version 2.0

Because these applications will not be supported under Windows 2000 Professional, it's suggested that you uninstall these applications before upgrading to Windows 2000 Professional. For the retail applications, please refer the application notes section of README.DOC in the Windows 2000 Professional CD.

If you are upgrading from Windows NT 4.0, the Windows 2000 Setup wizard will automatically detect all unsupported Windows NT 4.0 device drivers. During the initial portion of the upgrade, the Windows 2000 Setup wizard will generate a report listing all of the unsupported software applications and incompatible device drivers currently installed on your computer. Before proceeding with the upgrade, follow the instructions provided by the Setup wizard on how to remove or uninstall device drivers and applications. If you choose not to uninstall the listed device drivers, they will be automatically disabled by the Windows 2000 Setup program during the upgrade process.

To upgrade your computer from Windows 95, Windows 98, or Windows NT 4.0, follow these instructions:

1. Turn on your computer and logon into the current Windows operating system with an internal or external CD-ROM or DVD-ROM drive installed.
2. Insert the Windows 2000 Professional CD into the CD-ROM or DVD-ROM drive. If Windows automatically detects the CD, the Windows 2000 Setup wizard will begin the upgrade process. Otherwise do the following:
  - a. Click: **Start ? Run.**
  - b. Type *D:\i386\winnt32.exe* in the 'Open' field, where the letter D is the drive letter designation for your computer's CD or DVD-ROM drive.
  - c. Press "Enter".
  - d. Follow the instructions presented by the Windows 2000 Setup wizard.

For additional help and information on how to upgrade to Windows 2000, refer to the "Release Notes for Setup" included on the Windows 2000 Professional CD.

## After installing or upgrade to Windows 2000 Professional

### Setting LCD display resolution and color depth on APM-supported ThinkPad models

After installing or upgrading to Windows 2000 Professional on your APM-supported ThinkPad computer, the system LCD display resolution and color depth will not be set to optimized settings. The Windows 2000 Setup program will not automatically set this for you. In order to display the user desktop across the entire screen at full resolution and color depth, you will need to manually adjust these settings for the LCD screen. This requirement applies to the following APM ThinkPad models:

- ThinkPad 560E, 560X
- ThinkPad 380E, 380ED, 385E, 380X, 385X, 385XD
- ThinkPad 760XD, 760XL
- ThinkPad 765D, 765L
- ThinkPad 770
- ThinkPad i Series 2611

To set your computer LCD display resolution and color depth to its optimized settings, follow these instructions:

1. Turn on your computer, and then logon to Windows 2000.
2. Click: **Start ? Settings ? Control Panel**
3. Double-click the **Display** applet. After the “Display Properties” window opens, click the ‘Settings’ tab.
4. Adjust the **Screen area** to set your screen size preference. Click [Apply].
5. Click [OK] to apply the new desktop settings.
6. Click [Yes] to save the new desktop settings.

## Installing Advanced Power Management under Windows 2000

On some ThinkPad models, Advanced Power Management (APM) support is not automatically enabled under Windows 2000 Professional. On these models, APM needs to be manually enabled to allow the system to support Standby and Hibernation.

For the following ThinkPad models, APM support needs to be manually enabled under Windows 2000:

- ThinkPad 560E
- ThinkPad 380E, 380ED, 380XD(Pentium® 300 and 333 MHz)
- ThinkPad i Series 2611

To enable APM support, follow these instructions:

1. Insert a charged battery into the battery slot.
2. Turn on your computer, and then logon to Windows2000 Professional with an Administrator user account.
3. Click: **Start ? Settings ? Control Panel**
4. Double-click on the **Power Options** applet. After the "Power Options Properties" window opens, click on the 'APM' tab.
5. Check the "Enable Advanced Power Management support" checkbox, then click [Apply].
6. After the "Found New Hardware" wizard has detected the "Microsoft APM Legacy Battery" and related devices, click [OK].
7. If you are asked to restart the computer in order for the changes to take effect, click [Yes].

To customize the "Power Management" settings on your computer, follow these instructions provide below:

1. Click: **Start ? Settings ? Control Panel**.
2. Double-click on the **Power Options** applet in Control Panel.
3. Customize your power management settings according to the various tabs.

## Installing TrackPoint® device driver for Windows 2000 (ThinkPad APM model only)

On the ThinkPad 770 and i-Series 2611 APM-supported models, the IBM TrackPoint® driver will not be automatically installed by the Windows 2000 Professional Setup program. In order to provide your ThinkPad with additional pointing device support and functionality under Windows 2000, you will need to install this device driver on your system. With this driver you can use the features with the TrackPoint® pointing device: *Magnifying Glass*, *Press-to-Select*, and *Scrolling* capabilities.

To install the TrackPoint® driver on your ThinkPad, follow the instructions provided below:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Click: **Start ? Settings ? Control Panel**.
3. Double-click the **Mouse** applet, then click on the 'Hardware' tab.
4. Highlight "Microsoft PS/2 Mouse" under 'Devices', and click [Properties]. This will open the 'Microsoft PS/2 Mouse Properties' window.
5. Click the 'Driver' tab, and then click [Update Driver...].
6. Click [Next] at the welcome screen.
7. Select "Display a list of the known drivers..." option, and then click [Next].
8. Click "Show all hardware...".
9. In the 'Manufactures:' box, select "IBM Corporation".
10. Highlight "IBM PS/2 TrackPoint" under 'Models', then click [Next].
11. Click [Yes] in the "Update Driver Warning" window, then click [Next].
12. When the "Confirm Driver Install" window opens, click [Yes] to install the device.
13. After the files are copied to your system and the device is properly configured, click [Finish].
14. Click [Close] in the 'Microsoft PS/2 Mouse' window, then click [Yes] to restart your computer for the changes to take effect.
15. After the system restarts, click on the "Mouse" applet located in Control Panel and then select the 'TrackPoint' tab to customize the TrackPoint® pointing device features.

## Installing IBM device drivers for Windows 2000

When you install or upgrade to Windows 2000, all of the “basic” device drivers will be installed automatically by the Windows 2000 Setup program. Under most circumstances, you will not need to install additional device drivers on your computer. Windows 2000 includes many of the built in device drivers that have been extensively tested on ThinkPad computers. Such devices include video, audio, built-in internal modem, and other standard input/output (I/O) devices (mouse, keyboard, IBM TrackPoint, storage devices). However, under certain conditions when additional support unique to the IBM ThinkPad computer is needed, you will need to install these drivers. These “optional” device drivers are available to download from the IBM Web site:

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

Click **Notebooks and PC companions**. Select your ThinkPad family, or model, then click **Downloadable files**. Look for device driver listings.

Below is a list of “optional” device drivers and utilities that can be installed on your computer that is running Windows 2000. Note that each device driver and utility is model-specific:

- IBM ThinkPad Configuration Utility for Win95/98/2000 (ThinkPad 380, 560, 570, 600, 760, 765, and 770 Series models)
- Utility for Windows 2000 (ThinkPad 390 Series models)
- Utility for Win95/98/2000 (ThinkPad model 240)
- Notebook Manager for Win2000 (ThinkPad i Series models)
- IBM ThinkPad Easy Launch Buttons (ThinkPad i Series models)
- IBM Hardware DVD/MPEG-2 decoder for Windows 2000 (ThinkPad 770, 770E/ED, 770X, and 770Z models only)
- IBM Mwave DSP Audio and Modem for Windows 2000 (ThinkPad 760XD and 765D models only)
- ThinkPad LT Modem II for Windows 2000 update (ThinkPad 570, 570E, and 600X models only)
- ThinkPad ESS AudioRack32 (ThinkPad 2621 model only)
- IBM ThinkPad internal ACP Modem Update (ThinkPad 600, 600E, and 770 Series models only)

## IBM ThinkPad Configuration Utility and Notebook Manager

### Installing the IBM ThinkPad Utility for Windows 2000

The ThinkPad Configuration Utility and the Notebook Manager provide easy-to-use software application for changing ThinkPad device settings and features under Windows 2000. Such features include power management, the Personalization Editor, alarms and actions, and others. However, in order for your ThinkPad computer to utilize these features fully, you will need to install this software on your computer after installing or upgrading to Windows 2000.

**Note:** Do not perform these following procedures on ThinkPad 240, 390, 390E, 390X, or on i Series models. Refer to the proceeding sections on how to install the Configuration Utility or Notebook Manager for Windows 2000 on these systems.

To download the following files, visit this IBM Web page: <http://www.ibm.com/pc/support>

- The Utility Setup Diskette for Windows 2000
- The Utility Data Diskette I, II, and III
- The Utility Diskette for DOS, Personalization,

Follow these instructions to install the ThinkPad Configuration Utility on your computer:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Locate the downloaded ThinkPad Utility for Windows 2000 package and double-click it to begin the extracting process to your system's hard drive.
3. Click: **Start ? Run.**
4. Type *C:[default\_subdirectory]\SETUP.EXE* in the "Open" field, where C is the letter of the drive where the files were extracted and default\_subdirectory is the subdirectory where you extracted the files.
5. Press "ENTER" after providing the correct path.
6. Click [Next] at the Welcome screen. The "ThinkPad Configuration Utility" will automatically be installed to the *C:\ThinkPad* folder. For best results, accept the default folder for the installation.
7. Click [Next] in the next three windows. For the best results, accept the default settings that Setup provides.
8. When prompted, insert the required "**ThinkPad Utility Data**" diskette. The *ThinkPad Utility Data* diskette is model specific; be sure to use the correct one:
  - ThinkPad Utility Data I for Windows 2000 – ThinkPad models 760/765, 600, and 770.
  - ThinkPad Utility Data II for Windows 2000 – ThinkPad 380 Series models
  - ThinkPad Utility Data III for Windows 2000 – ThinkPad 560 and 570 Series models
9. Click [OK].
10. If the volume control on your ThinkPad is adjusted by pressing the "Fn" key, when prompted insert the diskette labelled, "*On Screen Display for Windows 2000*," and then click [OK].

**Note:** This is required for ThinkPad 570 and 600 systems.

11. When prompted insert the diskette labelled, "*Personalization Editor*". Click on [OK].

12. After the required files have been copied to your system, remove any disk from the diskette drive and click [Finish] to restart your computer. You must restart your computer in order for the changes to take effect.

**Note:** If you upgraded to Windows 2000 from a Windows NT 4.0 operating system that IBM preinstalled, you might experience a problem installing the ThinkPad Utility. If you encounter the message, "Error – cannot run on this system," while installing the application, follow the instructions below:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Click: **Start ? Run**.
3. Insert the disk labelled "*ThinkPad Configuration Utility Setup Fix*" into the diskette drive.
4. Type **A:\RMREG.EXE** in the 'Open' field. Press "Enter".
5. While the diskette drive is active, two data items in your system's Registry that prevented the installation will be deleted.
6. After the LED on the diskette drive turns off, remove the disk from the diskette drive.
7. Restart the ThinkPad Configuration Utility Setup program. This time, the Error message will not appear and Setup will continue without any problems.

### **Installing the IBM ThinkPad Utility on the ThinkPad 390, 390E, 390X**

If your ThinkPad model is a 390, 390E, or 390X, follow the instructions below to install the ThinkPad Configuration Utility under Windows 2000:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Locate the downloaded ThinkPad Configuration Utility for Windows 2000 package and double-click it to extract the setup files to your system hard drive.
3. Click: **Start ? Run**.
4. Type **C:[default\_subdirectory]\SETUP.EXE** in the "Open" field, where *C:[default\_subdirectory]* is the path to the files extracted in the previous step.
5. Press "ENTER" after providing the correct path.
6. Click [Next] at the Welcome screen. The "ThinkPad Configuration Utility" will automatically be installed in the '*C:\Program Files\Configuration Utility*' folder. For the best results, accept the default folder for the files.
7. Click [Next] to start copying the files to your computer.
8. After the installation completes, click [OK].
9. Click [Finish] to restart your computer now in order for changes to take affect.

**Note:** If you upgraded your ThinkPad to Windows 2000 Professional, you may encounter a problem installing the ThinkPad Configuration Utility. If you upgrade to Windows 2000 without uninstalling the ThinkPad Configuration beforehand, you may encounter the following error messages:

Error: Shared dll -> \system32\myclapp.cpl is in use.

or

Warning: Please close the Configuration Utility program before you start the setup utility.

If this occurs, follow the instructions below:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.

2. If the 'ThinkPad Configuration' icon is visible in the desktop Taskbar, disable it by right-click the icon and click 'Disable'.
3. Click: **Start ? Settings ? Control Panel**.
4. Double-click **Add/Remove Programs** applet. Highlight "Configuration Utility" and then click [Change/Remove].
5. Click [Yes] to remove the 'Configuration Utility' and all of its components.
6. If a prompt asking, "Remove Shared File?" is presented, click [Yes To All], then click [Yes] to proceed removing all shared components.
7. Click [OK] to close the "Remove Programs..." window.
8. Click [Close] to close the "Add/Remove Programs".
9. Turn off and restart the computer.
10. Start the computer and logon to Windows 2000 Professional with an Administrator user account.
11. Run the ThinkPad Configuration Utility Setup program again. This time the Setup will complete without interruptions.

### **Installing the IBM ThinkPad Notebook Manager on ThinkPad i Series models**

If your ThinkPad is an i Series model, follow the instructions below to install the ThinkPad Notebook Manager for Windows 2000:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Locate the downloaded ThinkPad Configuration Utility for Windows 2000 package and double-click it to extract the setup files to your hard drive.
3. Click: **Start ? Run**.
4. Type **C:\default\_subdirectory\SETUP.EXE** in the "Open" field, where *C:\default\_subdirectory* is the path to the files your extracted in the previous step.
5. Press "ENTER" after providing the correct path.
6. Click [Next] at the Welcome screen. The "Notebook Manager" will be automatically installed to the '*C:\Program Files\Notebook Manager*' folder. For best results, accept the default folder for the files to be copied to.
7. Click [Next] to start copying files to your system.
8. After all files have been copied to your computer, click [OK]. The installation has completed.
9. Click [Finish] to restart your computer now in order for changes to take affect.

### **Installing the IBM ThinkPad Configuration Utility on the ThinkPad 240**

If your computer is a ThinkPad model 240, follow the instructions below to install the ThinkPad Configuration Utility for Windows 2000:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Locate the downloaded ThinkPad Configuration Utility for Windows 2000 package and double-click it to extract the setup files to your hard drive.
3. Click: **Start ? Run**.
4. Type **C:\default\_subdirectory\SETUP.EXE** in the "Open" field, where *C:\default\_subdirectory* is the path to the files you extracted in the previous step.
5. Press "ENTER" after providing the correct path.
6. Click [Next] at the Welcome screen. The "Configuration Utility" will be installed to the '*C:\ThinkPad*' folder.

7. After all files have been copied, click [OK] to restart your computer in order for the new settings to take effect.

### **Installing the IBM Easy Launch Buttons for Windows 2000 (ThinkPad i Series models)**

By installing the IBM Easy Launch buttons Customization Utility for Windows 2000, you will be able to launch specific programs or open Web sites with a click of a button. The Easy Launch buttons utility allows you to quick access favorite or frequently used software applications and or favorite Web addresses.

Note that the Easy Launch Buttons for Windows 2000 utility is model specific. When downloading the utility for the Web, verify that you are using the correct version for your ThinkPad i Series model.

If your ThinkPad is an i Series model, follow the instruction below to install the ThinkPad Easy Buttons Utility for Windows 2000:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Locate the downloaded Easy Launch Buttons for Windows 2000 package and double-click to extract the setup files to your hard drive.
3. Click: **Start ? Run**.
4. Type *C:\default\_subdirectory\SETUP.EXE* in the "Open" field, where *C:\default\_subdirectory* is the path to the files you extracted in the previous step.
5. Press "ENTER" after providing the correct path.
6. Click [Next] at the Welcome screen. The "Easy Launch Buttons" will be installed to the '*C:\...\ThinkPad\Easy Launch buttons*' folder. For best results, accept the default folder for the files to be copied.
7. Click [Next] to start copying files to your system.
8. After all files have been copied, click on [OK]. The installation has completed.
9. Click [Finish] to restart your computer now in order for the new settings to take effect.

## Installing ThinkPad LT Modem update for Windows 2000 (ThinkPad models 570, 570E, and 600X)

The driver for the internal LT Modem is included on the Windows 2000 Professional CD and will be automatically installed by the Windows 2000 Setup program. This built-in driver provides the "standard" modem support for your ThinkPad computer. In most circumstances, you will not need to update this driver. However, if you need to run an application program that requires Wake-On Ring capability from an incoming modem call while the system is in Standby mode, the standard driver will not support this. By using the Wake-On-Ring feature and the updated device driver, your computer can resume from Standby and receive an incoming fax.

To install the ThinkPad LT Modem driver on your ThinkPad, follow the instructions provided below:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Click: **Start ? Settings ? Control Panel**
3. Double-click **System** applet, then click the 'Hardware' tab.
4. Click [Device Manager...].
5. Click on [+] to the left of "Modems" and open the Properties window for the "Lucent Win Modem".
6. Click the 'Driver' tab, and then click [Update Driver...].
7. Click [Next].
8. Select the "Search for a suitable driver..." option then click [Next].
9. Check the "Specify a location" checkbox and select [Next].
10. In the "Copy manufacture's file from:" box, type in the location of the drivers.
11. Check "Install one of the other drivers", and then click [Next].
12. Select the "Lucent Win Modem" device provided by 'Lucent'; then click [Next].
13. The "Digital Signature Not Found" window will open for the "Lucent Win Modem". Click [Yes] to continue the installation.
14. After the files are copied to your hard drive and Windows has finished installing the device, click [Finish].
15. Click [Close] on the Properties window for the "Lucent Win Modem". The driver is now installed.

To enable Wake-On-Ring for the LT Modem, follow these instructions:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Click: **Start ? Settings ? Control Panel**
3. Double-click the **System** applet, then click the 'Hardware' tab.
4. Click [Device Manager...].
5. Click on [+] to the left of "Modems" and open the Properties window for the "Lucent Win Modem".
6. Click 'Power Management' tab. Verify that the "Allow this device to bring the computer out of Standby" option is checked. If not, click this option.
7. Click [OK] when finished.

## Installing the IBM Mwave DSP Audio and Telephony for Windows 2000 (ThinkPad 760XD and 765D models)

After installing or upgrading your ThinkPad model 760XD or 765D to Windows 2000 Professional, the Mwave DSP Audio and Telephone features will be disabled. All audio features and the modem/fax will not function. In order to enable these capabilities on your computer, you will need to install the updated Windows 2000 Mwave DSP Audio and Telephony device drivers on your computer. Because the internal Mwave modem will be disabled on Windows 2000, you will not be able to access the Internet using this device. You must download the new Windows 2000 device driver before installing or upgrading.

To install the ThinkPad Mwave DSP Audio and Telephony device for Windows 2000, please following the instructions provided below:

1. Turn on you computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Locate the downloaded IBM Mwave DSP Audio and Telephony for Windows 2000 package and double-click it to extract the setup files to your hard drive.
3. Click: **Start ? Run**.
4. Type *C:[subdirectory]SETUP.EXE* in the "Open" field, where *C:[subdirectory]* is the path where you extracted the files in step #2.
5. Press 'ENTER' after typing the correct path.
6. When prompted, click [OK] to restart your computer.
7. Turn on your computer and logon to Windows 2000 Professional with an Administrator user account.
8. The "Found New Hardware Wizard" window will open.
9. Click [Next].
10. Click "Search for a suitable driver for my device (recommended)" option; and then click [Next].
11. Select "Specify a location", then click [Next].
12. Type *C:[subdirectory]* in the "Copy manufacture's files from" field, where *C:[subdirectory]* is the path where you extracted the files in step #2.
13. Press "ENTER" after typing the correct path.
14. When Windows finds the driver for the device and are prompted to continue, click [Next]. Files will begin to be copied to your hard drive.
15. Click [Finish] after the wizard has installed the Mwave Digital Signal Processor.
16. The "Found New Hardware Wizard" will begin to detect other related devices. When the "Digital Signature Not Found" window opens for the **ThinkPad Data Fax Modem**, click [Yes] to continue the installation.
17. When the "Found New Hardware Wizard" completes detecting new hardware, restart your computer for the new settings to take effect.
18. The next time you start your computer, your ThinkPad Audio and Telephony features will function under Windows 2000.

## **FAQs about the Mwave Data/FAX Modem for the ThinkPad 760XD and 765D models**

Q: What Fax protocols are supported by the IBM ThinkPad Data/Fax Modem under Windows 2000?

A: Class 1 and Class 2 protocols are supported in USA, Canada, and Japan. For the other supported countries, the Fax support is Class 2 only.

Q: Does the IBM ThinkPad Data/Fax Modem support any telephone answering machine or speakerphone functions?

A: The ThinkPad Data/Fax Modem does not support telephone answering machine or speakerphone functions under Windows 2000.

Q: Does my installed FaxWorks application work under Windows 2000?

A: No. The FaxWorks application will not function with the ThinkPad Data/Fax Modem for Windows 2000. Windows 2000 includes a Fax application that supports Class 1 and Class 2 faxes and will work with the ThinkPad Data/Fax Modem.

## Installing the Mwave DSP MIDI software for Windows 2000 (ThinkPad models 760XD and 765D)

To use the Mwave MIDI Synthesizer under Windows 2000, you will need to install the Mwave MIDI sample software and its sound data. If you no longer have the MIDI samples installed on your ThinkPad, you will need to download them from the IBM ThinkPad PC Support page. To install the Mwave MIDI software, follow these instructions below:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Insert the disk labeled "Mwave MIDI Sample Diskette 1" into the diskette drive.
3. Click: **Start ? Run.**
4. Type **A:\Setup.exe** in the "Open" field, where A is the drive letter assigned to your diskette drive.
5. Press "Enter".
6. Follow the instructions on the screen.
7. When the MIDI installation completes, set the 'preferred device' for "MIDI Music Playback" to the **Mwave MIDI Synthesizer**. To set the preferred follow these steps:
  - a. Click: **Start ? Settings ? Control Panel.**
  - b. Double-click the **Sounds and Multimedia** applet, then click the 'Audio' tab.
  - c. Verify that the **Mwave MIDI Synthesizer** appears under "Preferred device:" for "MIDI Music Playback". If not, select the **Mwave MIDI Synthesizer** entry in the list box, then click [OK].
8. Restart Windows 2000 on your computer in order for the changes to take effect.

## **Installing the IBM DVD hardware decoder device driver for Windows 2000 (ThinkPad 770, 770ED, 770X, and 770Z models)**

To install the DVD hardware decoder device driver for Windows 2000, it is required that the IBM ThinkPad 770 DVD and Enhanced Video Adapter (P/N 10L1228) be installed.

The DVD hardware decoder enables you to play DVDs on the ThinkPad models 770, 770E, 770X, and 770Z under Windows 2000 Professional. However, the DVD decoder device driver is not included with Windows 2000. After this device driver is installed in your computer, you can enjoy smooth DVD playback on the above computer models. The standard Windows 2000 DVD player application can be used in combination with the IBM DVD hardware decoder to play DVDs on your ThinkPad computer.

**Note that the Mediamatics DVExpress DVD Player application is not compatible with the IBM DVD hardware decoder device while running Windows 2000.** This combination is not supported under Windows 2000. To play DVDs through the IBM DVD hardware decoder, use the Microsoft standard DVD player application (DVDPLAY.EXE) included in Windows 2000 Professional.

To install this device driver, follow these instructions below:

1. Verify that the IBM ThinkPad 770 DVD and Enhanced Video Adapter is installed on your computer.
2. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
3. Click: **Start ? Settings ? Control Panel**
4. Double-click the **System** applet. After the "System Properties" windows opens click the 'Hardware' tab.
5. Click [Device Manager...].
6. Under "Other devices", double-click 'Multimedia Controller" device. This will open the Properties window for the device.
7. Click the 'Driver' tab; then click [Update Driver...].
8. Click [Next].
9. Select "Search for a suitable driver..." option; then click [Next].
10. Select "Specify a location," and then click [Next].
11. Insert the disk labelled "*MPEG-2 decoder for Windows 2000*" into the diskette drive.
12. Type: A:\ in the "Copy manufacture's file from:" box, where A is the drive letter assigned to the diskette drive.
13. Click [OK].
14. Click [Next] when the "Device Driver Wizard" has found a suitable driver for the device.
15. The "Digital Signature Not Found" window will open. Click [Yes] to continue the installation. During the install, you might be asked to insert the Windows 2000 Professional CD to copy additional files. Do so when prompted.
16. After the files are copied to your computer and the device driver is installed, click [Finish].
17. Click [Close] in the Properties window for the **IBM DVD decoder card** device. The device driver is now installed.
18. To verify device driver installation, open Device Manager and under "Sound, video, and game controllers", the **IBM DVD decoder card** will be listed. If it is not, follow steps 1 through 15.

For the best results while playing back DVDs under Windows 2000, the transfer mode for the DVD-ROM drive should be set to DMA mode. To enable DMA mode for your computer's DVD-ROM drive, following these instructions below:

1. Verify that the DVD-ROM drive is installed on your ThinkPad computer.
2. Click: **Start ? Settings ? Control Panel**.
3. Double-click the **System** applet. After the "System Properties" window opens, click the "Hardware" tab.
4. Click [Device Manager...]. Expand the [+] next to "IDE ATA/ATAPI controllers".
5. Highlight the "Secondary IDE Channel" device and double-click it to open its Properties window.
6. Click the "Advanced Settings" tab.
7. Under "Device 0", locate the "Transfer Mode:" list box; and then select the "DMA if available".
8. Click [OK].
9. Click [Yes] to allow the operating system to automatically restart your computer.
10. When Windows restarts your computer, your DVD-ROM drive will run in DMA mode.

## Installing ThinkPad ACP Modem update for Windows 2000 (ThinkPad 600, 600E, and 770 Series models)

The internal ACP Modem is included on the Windows 2000 Professional CD and will be automatically installed by the Windows 2000 Setup program. This native built-in driver provides the "standard" modem support on your ThinkPad. Under most circumstances, the user will not need to update this driver. However, if you need to run an application program that requires the use of wake-up (Wake-On Ring) capability from an incoming modem call while the system is in Standby mode, the standard native driver will not support this. For example, Windows 2000 Professional provides the capability to send and receive fax to/from your computer. By using the Wake-On-Ring feature, you can receive an incoming FAX when the computer is in Standby mode when this updated device driver is installed. In order for your ThinkPad to support WOR, you will need to install this updated ACP Modem driver.

To install the ThinkPad ACP Modem driver on your ThinkPad, follow the instructions provided below:

1. Boot and logon to Windows 2000 Professional with an Administrator user account.
2. Click: **Start ? Settings ? Control Panel**
3. Double-click the **System** applet, then click the 'Hardware' tab.
4. Click on [Device Manager...].
5. Click on [+] to the left of "IBM Digital Signal Processors" and open the Properties window for the "ThinkPad Digital Signal Processor".
6. Click on the 'Driver' tab, then click [Update Driver...]. Click [Next]. Select the "Display a list of the known..." option then click [Next].
7. Click on "Have Disk..." and at the "Copy manufacture's file from:" box, type in the location of where the drivers are located. Click [OK].
8. Select the "ThinkPad Digital Signal Processor" device and click [Next].
9. Click [Next] to start the installation.
10. The "Digital Signature Not Found" window will appear on your screen. Click [Yes] to any of these messages to continue the installation.
11. After the files are copied to your system and Windows has finished installing the device, click on [Finish].
12. Restart your computer when prompted to complete the upgrade.

To enable Wake-On-Ring (WOR) for the ThinkPad ACP Modem on ACPI-supported ThinkPad models, follow these instructions:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Click: **Start ? Settings ? Control Panel**
3. Double-click the **System** applet, then click the 'Hardware' tab.
4. Click [Device Manager...].
5. Click on [+] to the left of "Modems" and open the Properties window for the "ThinkPad Modem".
6. Click 'Power Management' tab. Verify that the "Allow this device to bring the computer out of Standby" option is checked. If not, click this option.
7. Click [OK] when finished.

To enable Wake-On-Ring (WOR) for the ThinkPad ACP Modem on APM-supported ThinkPad models, refer to item 1.6 of the "Windows 2000 Hints and Tips" section.

## ThinkPad Windows 2000 application software

### Mediamatics DVExpress DVD Player upgrade for Windows 2000

DVExpress is a DVD player software application supported by Windows 2000 Professional. IBM has supplied this software with some Windows 98 systems with DVD drives. The DVExpress upgrade software is available to licensed users currently using a version for Windows 98. IBM will release an upgrade version only to those customers who already have the application installed on Windows 98. This version of DVExpress for Windows 2000 is strictly an upgrade package. In order to install this upgrade on Windows 2000, you must first have a previous version of the DVExpress installed on Windows 98, then upgrade to Windows 2000. After upgrading to Windows 2000, you will then be able to install the DVExpress upgrade package.

With this DVExpress version, all DVD decoding is done by software. Getting the best frame rate for playback requires a high CPU processor speed in order to process the MPEG-2 packets for real-time decoding. For best results, use this application with a Pentium®-II class processor (or later) with a minimum speed of 450 MHz or higher. Playback performance depends on processor speed and system configuration. If a processor speed less than the recommend 450 MHz is used, expect decreased performance. Even with this processor speed, playing back DVDs requires almost 100% percent of the processor time. If any critical timing software is used concurrently with the DVExpress software, response time will be degraded noticeably.

IBM has verified that the following ThinkPad models are capable of running the DVExpress application under Windows 2000 at a processor speed less than 450 MHz without any noticeable performance degradation:

ThinkPad Model	Processor Speed
390X	Celeron™ 400 MHz or greater
570	Pentium® -II 300 MHz or greater
600E	Pentium® -II 300 MHz or greater
i Series 2611	Celeron™ 366 MHz or greater

If you notice a significant performance degradation while running the DVExpress application, try adjusting the LCD screen color depth to a minimum of 256 colors and set the screen area (resolution) to 800 by 600 pixels.

### Installing DVExpress on your ThinkPad for Windows 2000

1. Verify that the DVD-ROM drive is inserted into your computer's swappable bay slot. If the DVD drive is not installed, install it before continuing
2. Exit all windows programs before running the DVExpress Setup program.
3. Insert the System Solution CD into the DVD-ROM drive.
4. Click: **Start ? Run.**
5. Type in **E:\Setup.EXE** in the 'Open' field, where E is the drive letter designed for your computer's DVD-ROM drive.
6. Press "Enter".
7. The DVExpress Player installation program will start. Click [Next] in the Welcome screen.
8. The Software License Agreement window will open.

Note: Before continuing with the installation, make certain you have read through and agree to all the terms of the license agreement.

9. Click [Yes] to continue.
10. To install DVDEExpress in the default folder, click [Next].
11. The Setup program will begin copying files to your system.
12. After all files are copied to your computer, click [Finish] to automatically restart your computer for the changes to take effect.
13. When your computer restarts, the DVDEExpress DVD player is installed and ready to be used for Windows 2000.

For the best results while playing back DVDs under Windows 2000, the transfer mode for the DVD-ROM drive should be to be set to DMA mode. To enable DMA mode for your computer's DVD-ROM drive, following these instructions below:

1. Verify that the DVD-ROM drive is installed on your ThinkPad computer.
2. Click: **Start ? Settings ? Control Panel**.
3. Double-click the **System** applet. After the "System Properties" window opens, click the "Hardware" tab.
4. Click [Device Manager...]. Expand the [+] next to "IDE ATA/ATAPI controllers".
5. Highlight the "Secondary IDE Channel" device and double-click it to open its Properties window.
6. Click the "Advanced Settings" tab.
7. Under "Device 0", locate the "Transfer Mode:" list box; and then select the "DMA if available".
8. Click [OK].
9. Click [Yes] to allow the operating system to automatically restart your computer.
10. When Windows restarts your computer, your DVD-ROM drive will run in DMA mode.

## Installing the ThinkPad AudioRack32 for Windows 2000 (ThinkPad i Series 2126 model)

The AudioRack32 enables you to take full advantage of your computer's audio capabilities under Windows 2000. The application will allow you to play CDs, wave files, and MIDI files. You can also use the AudioRack to record and mix music on Windows 2000. To install the AudioRack32 application on your computer, follow these instructions:

13. Start your computer, and then logon to Windows 2000 Professional with an Administrator user account.
14. Locate the downloaded Easy Launch Buttons for Windows 2000 package and double-click to extract the setup files to your hard drive.
15. Click: **Start ? Run.**
16. Type *C:\[subdirectory]\SETUP.EXE* in the "Open" field, where *C:\[subdirectory]* is the path where you extracted the files in the previous step.
17. Press 'ENTER' after typing the correct path.
18. Click [Next] at the Welcome screen. .
19. The "ThinkPad AudioRack32" will be installed to the '*C:\Program Files\AudioRack*' folder. For best results, accept the default folder for the files to be copied.
20. Click [Next] on the next two windows. Files will be copied to your hard drive.
21. Click [Yes] to make the AudioRack CD Player as the default CD player.
22. Click [OK] on the Information window after setup has completed.

## General Technical Information

The purpose of this section is to provide the user with some more in-depth technical information on how to use Windows 2000 Professional on specific IBM ThinkPad computer environments.

### Using docking stations and port replicators with ACPI-supported ThinkPad models

One of the advantages of an ACPI-based ThinkPad computer running Windows 2000, is that the user can eject or re-dock their computer to a docking station or port replicator without turning off and restarting the computer.

Depending on the type of ACPI supported ThinkPad model, this capability is categorized as follows:

- **Hot docking and undocking**  
Under Windows 2000, hot docking and undocking enables you to physically attach or detach your computer from a docking station or port replicator while the system is “running”. If your ThinkPad model supports hot docking and undocking, it will also support warm docking and undocking.
- **Warm docking and undocking**  
Under Windows 2000, warm docking and undocking enables you to physically attach and detach your computer from a docking station or port replicator while in Standby mode. To dock or undock the computer to a docking station or port replicator, the system itself must be in Standby mode. Once in Standby mode, the computer can then either be docked or undocked.  
  
When the system-unit is docked and in Standby mode, the user can initiate warm undocking by pressing the hardware eject button or turning a hardware switch. Windows 2000 will wake the system from Standby and then “eject” the computer. After the operating system has “ejected” the computer, you can physically undock the system from the docking station or port replicator.
- **Cold docking and undocking**  
Under Windows 2000, cold docking and undocking enables you to physically attach or detach the computer from a docking station or port replicator while the computer is turned off. When the system is off, the user can attach and detach the system-unit as well as add-on devices to and from the docking station or port replicator. All ACPI-supported ThinkPad models support cold docking.

The following table lists the Windows 2000 ACPI-supported ThinkPad models and the docking and undocking methods each supports with various IBM docking stations and port replicators.

	<b>ThinkPad 600, 600E, 600X, 770E, 770X, 770Z,</b>	<b>ThinkPad 380Z, 390, 390E, 390X, 560Z</b>	<b>ThinkPad 570, 570E</b>
<b>SelectaDock -II, SelectaDock -III</b>	Hot docking and undock	-	-
<b>PC Card Enabler, PC Card Enabler with Advanced EtherJet Port</b>	Hot docking and undock	-	-

<b>IBM Port Replicator with Advanced EtherJet Port</b>	-	Warm docking and undock	Hot docking and undocking with the ThinkPad UltraBase
<b>ThinkPad UltraBase</b>	-	-	Hot docking and undock

Under Windows 2000, different ThinkPad models will support different docking capabilities. The support will differ depending on the docking station; and port replicators that are used, and on the PC Card enablers installed. The following tables illustrate the type of docking device support for ACPI-supported ThinkPad models that run Windows 2000:

	<b>ThinkPad 770E/ED, 770X, 770Z</b>			<b>ThinkPad 600 Series</b>		
	<b>Hot Dock</b>	<b>Warm Dock</b>	<b>Cold Dock</b>	<b>Hot Dock</b>	<b>Warm Dock</b>	<b>Cold Dock</b>
<b>SelectaDock -II</b>						
IDE device <sup>*1</sup>	✓	✓	✓	✓	✓	✓
ISA card <sup>*2</sup> (ISA Plug-and-Play, only on startup or restart)	No support	No support	✓	No support	No support	✓
16-bit PC Card	✓	✓	✓	✓	✓	✓
CardBus PC Card	No support	No support	No support	No support	No support	No support
PCI card	✓	✓	✓	✓	✓	✓
Gameport <sup>*3</sup>	✓	✓	✓	✓	✓	✓
SCSI device	✓	✓	✓	✓	✓	✓
<b>SelectaDock -III</b>						
IDE device <sup>*1</sup>	✓	✓	✓	✓	✓	✓
ISA card <sup>*2</sup> (ISA Plug-and-Play, only on startup or restart)	No support	No support	✓	No support	No support	✓
16-bit PC Card	✓	✓	✓	✓	✓	✓
CardBus PC Card	✓	✓	✓	✓	✓	✓
PCI card	✓	✓	✓	✓	✓	✓
USB device	✓	✓	✓	✓	✓	✓
Game port <sup>*3</sup>	✓	✓	✓	✓	✓	✓
SCSI device	✓	✓	✓	✓	✓	✓
<b>PC Card Enabler</b>						
16-bit PC Card	✓	✓	✓	✓	✓	✓
CardBus PC Card	✓	✓	✓	✓	✓	✓
<b>PC Card Enabler with Advanced EtherJet Port</b>						
16-bit PC Card	✓	✓	✓	✓	✓	✓
CardBus PC Card	✓	✓	✓	✓	✓	✓
Ethernet port	✓	✓	✓	✓	✓	✓

\*1 Only as a subordinate device in an IDE system (The 2nd IDE device in system must be reassigned to Primary-Slave). Refer to item 2.3 of the Windows 2000 Hit and Tips section of the guide.

\*2 Plug-and-Play ISA cards only

\*3 Game port resource in the system unit side will be disabled.

**ThinkPad 380Z, 390, 390E,  
390X, 560Z, 570, and 570E**

	<b>Hot Dock (570 models only)</b>	<b>Warm Dock</b>	<b>Cold Dock</b>
<b>Port Replicator with Advanced EtherJet Port</b>			
16-bit PC Card	✓	✓	✓
CardBus PC Card	✓	✓	✓
Ethernet port	✓	✓	✓

### **Tips for docking station support on ACPI ThinkPad computers:**

Here are some helpful tips to follow for docking station and port replicator use while running Windows 2000 on your ACPI ThinkPad computers:

- If you attempt to undock your computer while some data files are being used or “open” by a device located on the docking station or port replicator, Windows 2000 will display a warning message indicating that you need to close the application or files before undocking. If another warning message appears while attempting to undock the system-unit, such as “a device about to be undocked can not be stopped,” follow the instructions before completing the undocking.
- If you undock your computer while it is in Hibernation mode and then wake it in a standalone configuration, computer performance afterwards will be unpredictable. This occurs because the operating system assumes that the computer is still attached to the docking station or port replicator. Windows 2000 will attempt to detect and configure the devices that are located on the docking station or port replicator. Because ThinkPad docking stations and port replicators do not have a mechanism to prevent an undocking while the computer is in Hibernation, you must be aware when the docked system is in Hibernation mode.

When the computer is in Hibernation mode but not docked, if the computer is then docked and awoken from Hibernation, the operating system will detect the docking hardware and reconfigure to the appropriate docking profile or configuration. This is a supported feature while running Windows 2000.

- If devices are removed from your docked ThinkPad while either in Standby or Hibernation mode, Windows 2000 will report a “Device Surprise Removal” warning message indicating what device was unexpectedly removed and was not properly stopped and removed by the operating system.
- On the ThinkPad 570 and 570E, Windows 2000 offers docking support and configuration in three ways:
  1. If the computer is attached to the UltraBase unit, undocking can be initiated either by clicking the “Eject PC” option in the Start menu or by pressing the eject request button in the front of the UltraBase unit.
  2. If the computer is attached to the UltraBase unit and the IBM Port Replicator with Advanced EtherJet port, Windows 2000 interprets this configuration as a two-tier docking system. Under Windows 2000, the user can easily dock and undock the system to and from the UltraBase connected to the IBM Advanced Port Replicator. When the system-unit is docked to the UltraBase unit, the operating system will automatically connect and detect the IBM Advanced Port Replicator. Undocking the system-unit from UltraBase unit will automatically result in disconnecting it from both the UltraBase as well as the IBM Advanced Port Replicator. This can be accomplished by pressing the eject request button located on UltraBase unit.
  3. If you want to undock the computer from the IBM Advanced Port Replicator but still have the computer attached to the UltraBase, you must press the eject request button marked with a “1” located on the port replicator or by clicking the “Eject PC” option in the Start menu. If you press this button or select the “Eject PC” option, only the IBM Advanced Port Replicator will be undocked,

leaving the computer and the UltraBase unit still connected by Windows 2000.

- If an ISA or Plug-and-Play-ISA adapter card is installed on an IBM SelectaDock-II or SelectaDock-III docking station, Windows 2000 will not support dynamic docking and undocking. ISA add-on devices in the docking station will only work when you perform a cold dock. This is a design limitation of Windows 2000. Non Plug-and-Play-ISA add-on devices will not be supported under Windows 2000.

Also, if an ISA or Plug-and-Play-ISA add-on adapter is installed on an IBM SelectaDock-II or SelectaDock-III docking station, Windows 2000 will not support Standby and Hibernation. When the computer returns either from Standby or Hibernation while docked, the ISA add-on device installed in the docking station will not function afterwards.

- CardBus devices inserted into the PC Card slots on the SelectaDock-II docking station will not be supported under Windows 2000. When a ThinkPad 600 or ThinkPad 770 Series computer is docked to a SelectaDock-II, no CardBus devices installed on the docking side will function. This is due to a hardware design limitation of the SelectaDock-II. The PCI interrupt routing for CardBus devices for this docking station is unavailable for this hardware, so the operating system cannot process the PCI interrupt from the CardBus card. This is a permanent limitation due to docking hardware design. No such limitation exists on the SelectaDock-III docking station when running Windows 2000.
- If you dock your ThinkPad to a SelectaDock-II or SelectaDock-III docking station, the "Crystal WDM Game Port" device will be marked with a yellow exclamation point in the Device Manager menu. Windows 2000 does this by design, because there is only one game port resource available to the system. When the computer is docked, the system BIOS configures this resource to the game port device located on the docking station rather than the one on the system-unit. You can still attach a game port device to the docking station.
- When an IDE device, such as a hard disk drive, or CD-ROM or DVD-ROM drive, needs to be used in the SelectaDock-III docking station with a ThinkPad 600 or 770 Series model, the I/O resource and IRQ for the IDE device must be assigned to the legacy secondary IDE channel: I/O=170h-17fh,;IRQ=15. This requirement is by design of the IDE controller located in the docking station. After you configure the IDE device used to the secondary IDE mode, devices located in the swappable bay must be reconfigured as the primary slave. The ThinkPad Configuration Utility program provides a menu option for setting the resources of the IDE devices on the docking station. Please refer to the Windows 2000 Hints and Tips section of this document for information on how to enable an IDE device on the docking station.

## Using docking stations or port replicators with APM-supported ThinkPad models

On APM-supported ThinkPad models, Windows 2000 does not support dynamic docking or undocking with docking stations or port replicators. Most of the devices located in the docking station or port replicator can only be configured when the computer is turned on or restarted. PC Card, CardBus, and USB devices are exceptions to this restriction. Hot insertion and removal of these devices in the docking station or port replicator are supported.

The following tables illustrate the type of docking device support on Windows 2000 Professional for APM-supported ThinkPad models:

		ThinkPad 760Xx and 765D/L			ThinkPad 770		
		Hot Dock	Warm Dock	Cold Dock	Hot Dock	Warm Dock	Cold Dock
<b>SelectaDock-II</b>							
	IDE device	-	-	✓	-	-	✓
	ISA card (ISA Plug-and-Play, only on startup or restart)	-	-	✓	-	-	✓
	16-bit PC Card	-	-	✓	-	-	✓
	CardBus PC Card	-	-	No support	-	-	No support
	PCI card	-	-	✓	-	-	✓
	GamePort	-	-	✓	-	-	✓
	SCSI device	-	-	✓	-	-	✓
<b>SelectaDock-III</b>							
	IDE device	-	-	✓	-	-	✓
	ISA (ISA Plug-and-Play, only on startup or restart)	-	-	✓	-	-	✓
	16-bit PC Card	-	-	No support	-	-	✓
	CardBus PC Card	-	-	✓	-	-	✓
	PCI device	-	-	✓	-	-	✓
	USB device	-	-	✓	-	-	✓
	Game port	-	-	✓	-	-	✓
	SCSI device	-	-	✓	-	-	✓
<b>PC Card Enabler</b>							
	16-bit PC Card	-	-	No support	-	-	✓
	CardBus PC Card	-	-	✓	-	-	✓
<b>PC Card Enabler with Advanced EtherJet Port</b>							
	16-bit PC Card	-	-	-	-	-	✓
	CardBus PC Card	-	-	-	-	-	✓
	Ethernet port	-	-	-	-	-	✓

ThinkPad 380E, 380X, 560E, and 560X			
	Hot Dock	Warm Dock	Cold Dock
<b>Enhanced Port Replicator</b>			
16-bit PC Card	-	-	✓

CardBus PC Card		-	-	✓
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**Tips for docking station and port replicator support on APM-supported ThinkPad computers:**

Here are some helpful tips to follow for using a docking station or port replicator while running Windows 2000 on your APM-supported ThinkPad computers:

- For the ThinkPad models 760XD and 760XL and ThinkPad models 765D and 765L, Windows 2000 offers limited support for the PC Card slots located on the SelectaDock-II, SelectaDock-III, and PC Card Enablers. This is due to IBM's unique design of the PCI-to-PCI bridge chip in the system-unit and the unique design of the PC Card interrupt line handling implemented by the hardware. Windows 2000 cannot handle this unique hardware implementation, and therefore offers limited support for PC Card devices.
- CardBus devices inserted into the PC Card slots located on the SelectaDock-II docking station will not be supported under Windows 2000. When a ThinkPad 770 computer is docked to a SelectaDock-II, no CardBus devices installed on the docking station will function. This is a hardware limitation on the SelectaDock-II. The PCI interrupt routing for CardBus devices in this docking station is not handled by the operating system. However, no such limitation exists on the SelectaDock-III docking station for CardBus device use when running Windows 2000.
- All APM-supported ThinkPad computers support docking and undocking when the system-unit turned off. Undocking or docking the computer from a docking station or port replicator while in Hibernation mode will produce unpredictable behavior when the system wakes-up. As with ACPI-supported ThinkPad computers, these unpredictable problems occur because the operating system assumes that the machine waking from Hibernation mode is still attached to the docking station or port replicator. Windows 2000 will then attempt to detect and configure the devices located on the docking station. If you need to undock the computer, first properly shutdown the operating system and then undock the computer. If you need to dock the your computer, first shutdown the operating system and turn off the computer before attaching it to the docking station.
- When an IDE device, such as a hard disk drive, or CD-ROM or DVD-ROM drive, needs to be used in the SelectaDock-III docking station with a ThinkPad 600 or 770 Series model, the I/O resource and IRQ for the IDE device must be assigned to the legacy secondary IDE channel: I/O=170h-17fh,;IRQ=15. This requirement is by design of the IDE controller located in the docking station. After you configure the IDE device used to the secondary IDE mode, devices located in the swappable bay must be reconfigured as the primary slave. The ThinkPad Configuration Utility program provides a menu option for setting the resources of the IDE devices on the docking station. Please refer to the Windows 2000 Hints and Tips section of this document for information on how to enable an IDE device on the docking station.

## Hot and Warm swapping support for ACPI-supported ThinkPad models

One of the advantages that an ACPI-based portable computer offers while running Windows 2000 is full Plug-and-Play support for devices located in the UltraBay II or UltralimBay slot of your ThinkPad computer. Such devices include the following:

- IDE hard drive
- LS-120 Super Disk drive
- ZIP 100 drive
- IDE CD-ROM and DVD-ROM drive
- Secondary battery pack
- Diskette drive

Each device can be dynamically inserted and removed from the swappable bay slot without having to completely turn off the computer. The type of Plug-and-Play support and functionality for the swappable bay is very similar to PC Card, CardBus, and USB devices being inserted into their respectable slots. Depending on your type of ACPI-supported ThinkPad computer, Windows 2000 supports two types of swapping: Hot and Warm.

### Warm swapping:

Under Windows 2000, you can perform warm swap after the computer is placed into Standby mode. Just before the system enters Standby mode, Windows 2000 will properly “stop” the device in the swappable bay slot. After the computer enters Standby, the user can safely remove the device from the computer. In order for warm swapping to function properly under Windows 2000, this operation **must** be initiated using the “**Unplug or eject hardware**” icon in the desktop Taskbar.

### Hot swapping:

Under Windows 2000, you can perform a hot swap while the computer is “running”. You can remove or insert an device from the swappable bay without turning off or placing the computer into Standby. The user can safely swap in and out different devices from the swappable bay slot by clicking the “Unplug or Eject Hardware” icon in the desktop Taskbar or pressing the eject request button.

**Note:** The above swapping capability is only supported on ACPI ThinkPad models. On APM models, only cold swapping is supported.

Although Windows 2000 and your ThinkPad computer BIOS support these features, some applications, such as anti-virus software, do not always support IDE storage-device swapping. If such an application has access to these devices, the application software will permit or prohibit removing a device when the user requests device ejection. Please consult with your application vendor for information your application and storage-device swapping.

The following table lists the UltraBay II and UltralimBay swapping capabilities and support under Windows 2000:

	ThinkPad 770E, 770X, 770Z	ThinkPad 600, 600E, 600X	ThinkPad 570, 570E	ThinkPad 390, 390E, 390X
Secondary hard disk	Hot and warm- swapping	Warm-swapping only	Hot-undocking and swapping	Warm- swapping
Secondary Battery	Hot-swapping	Warm-swapping	Hot-	Warm-

		only	undocking and swapping	swapping
<b>CD-ROM and DVD-ROM drive</b>	Hot and warm-swapping	Warm-swapping only	Hot-undocking and swapping	-
<b>Zip100 drive</b>	Hot and warm-swapping	Warm-swapping only	Hot-undocking and swapping	-
<b>Diskette drive</b>	Hot-swapping	Warm-swapping only	Hot-undocking and swapping	-
<b>LS-120 Super Disk</b>	Hot-swapping	Warm-swapping only	Hot-undocking and swapping	-
<b>CD-ROM or DVD-ROM with diskette drive (UltraBay FX)</b>	-	-	-	Warm-swapping

#### **UltraBay II Device swapping on ThinkPad 770E, 770X, & 770Z:**

- Most devices designed for the UltraBay II slot can be hot-swapped while Windows 2000 is running. To eject a device in the UltraBay II slot, do one of the following:
  - Push the eject request button located on the front of the system-unit.
  - Click the “Unplug or Eject Hardware” icon located on the desktop TaskBar.

Either action will generate a request to the operating system to eject the device; then Windows 2000 will “grant” this request and begin unloading the necessary device drivers. When the device ejection is complete, Windows 2000 displays a “Safe to Remove Hardware” window. After this window appears, the user can safely remove the device physically from the UltraBay II slot. Another indicator that the device ejection completed successfully is the LED indicator next to the eject lever. This LED will turn from a flashing green to off when the operating system has completed the device ejection.

To insert a device, simply place the device into the UltraBay II slot, and then close the release lever on the front side of the system-unit. After the lever is closed, Windows 2000 will detect the device insertion, load the necessary device drivers, and properly configure the device.

- Depending on the configuration of the hard drive IDE channel, a secondary IDE hard drive can be hot or warm-swapped under Windows 2000. The default configuration for the secondary IDE channel is assigned to the “swappable bay” slot. In this case, the user is hot-swapped a hard disk drive similar to other IDE devices previously listed. If the IDE hard disk drive device is configured as the primary slave device, and the primary IDE channel is shared between the primary hard drive (the startup disk drive) and the secondary hard drive, inserting and removing a device from the UltraBay II slot requires warm swapping. If you press the eject request button or click the “Unplug or Eject Hardware” icon in the desktop TaskBar, the computer will enter Standby mode after stopping the IDE device to be removed. After the machine has entered Standby, the user can physically remove the device from the UltraBay II slot.
- If a diskette drive is inserted into the UltraBay II slot, the drive letter B will always be assigned to this diskette drive while Windows 2000 is running. Because these

ThinkPad models can also support an external diskette drive, the drive letter for the external diskette will always be assigned A.

- “Surprise” removal of a device installed in the UltraBay II slot is not supported under Windows 2000. This means, you should not swap out a device while the computer is in Standby or Hibernation mode without first properly stopping the device through the operating system. Also, if you do not allow Windows 2000 to properly stop the device in the UltraBay II slot while the system is running or before the system enters Standby or Hibernation, this is a surprise removal. If this occurs, the computer will respond unpredictably.

#### **UltraslimBay device swapping with ThinkPad models 600, 600E, & 600X:**

- Swapping the UltraslimBay device under Windows 2000 is enabled only while the computer is in Standby mode. In order to remove or insert a device designed for the UltraslimBay, you must stop the device by clicking the “Unplug or Eject Hardware” icon in the desktop TaskBar. By doing this, the operating system can properly stop the device and unload the necessary drivers before placing the computer into Standby mode. When the system enters Standby, you can then physically remove the device and insert another device, if desired.
- The characteristics and limitations for the UltraslimBay slot are the same as for UltraBay II slot located on the ACPI-supported ThinkPad model 770 Series.

#### **Ultraslim Bay device swapping with ThinkPad 570 and 570E:**

- On ThinkPad models 570 and 570E, the UltraslimBay slot is located in the UltraBase unit. To swap a device from the UltraslimBay under Windows 2000, you must first physically undock the UltraBase from the system-unit. This is due to the mechanical design of the system. To undock the computer from the UltraBase, click the “Eject PC” option located in the Start menu or press the eject-request button located on the front side of the UltraBase unit. After the system-unit has been successfully undocked from the UltraBase by the operating system, physically undock the system-unit from the UltraBase, and then swap in or out a device from the UltraslimBay slot. After the device has been swapped, re-dock the system-unit again so that the operating system can configure and install the drivers for the newly added device.
- With the ThinkPad 570 Series models, Windows 2000 assumes a diskette drive is present regardless of whether one is physical attached or not. The drive letter A is fixed and assigned to this diskette drive device. If the floppy diskette device is not physically attached on the computer while Windows 2000 is running, the drive letter A will still be present in Explorer. This is a design limitation on this system.
- A secondary battery pack located in the UltraBase unit can be hot-swapped at any time. For a secondary battery, Windows 2000 does not provide a mechanism to eject or insert this device. In order to swap in or out a secondary battery, simply hot or warm undock the UltraBase unit from the system-unit (as you would for a device located in the UltraslimBay), then insert or remove the secondary battery pack from the diskette-drive/battery slot. After the secondary battery has been inserted, re-dock the system-unit to the UltraBase and allow the operating system to configure and install the necessary device drivers.

#### **UltraBay FX device swapping with ThinkPad models 390, 390E, & 390X:**

- The UltraBay FX slot holds the diskette and CD-ROM combination drive unit. You can swap a diskette and CD-ROM (or diskette and DVD-ROM) combination drive with a secondary IDE hard disk drive, or a secondary battery pack. Because of the hardware design for all ThinkPad 390 Series computers, only warm-swapping can be performed under Windows 2000. In order to swap out a device from the UltraBay FX slot, you must stop the device by clicking the “Unplug or Eject Hardware” icon located on the desktop TaskBar. By doing this, the operating system can properly stop the device and unload the necessary drivers before placing the machine into Standby mode. After the system enters Standby, the user can then physically remove the device and insert another, if desired. This also applies when warm swapping and IDE hard disk drive.
- A secondary battery pack located in the UltraBay FX slot can be warm swapped at any time. For a secondary battery, Windows 2000 does not offer a similar mechanism to eject the battery through the operating system as there is for a CD-ROM and diskette combination drive device. In order to “swap” a secondary battery, simply place the computer into Standby, then remove or insert the secondary battery from the UltraBay FX slot.
- With the ThinkPad 390 Series models, Windows 2000 assumes a diskette drive is present regardless of whether one is physical attached or not. The drive letter A is fixed and assigned to this diskette drive device. If the floppy diskette device is not physically attached on the computer while Windows 2000 is running, the drive letter A will still appear in Explorer. This is a design limitation on this system.

## ACPI ThinkPad Device Support under Windows 2000

The purpose of this section is to provide the user with more in-depth technical information about some important aspects of Plug-and-Play and Power Management on ACPI-supported ThinkPad models running windows 2000 Professional.

### Power-saving modes and system indicators

While running Windows 2000 Professional on ACPI-supported ThinkPad models, various power-saving “sleep” states can be enabled. The following table lists the supported “sleep” states on ACPI-supported ThinkPad models and how to identify when the computer has entered each “sleep” state:

Sleep State	Sleep State definitions on ThinkPad models	System Indicator
S1 (Standby)	<ul style="list-style-type: none"><li>• Lowest power saving-mode</li><li>• Fastest wake-up latency</li></ul>	Suspend mode indicator: on Power on indicator: on
S3 (Default- Standby)	<ul style="list-style-type: none"><li>• Low power saving-mode</li><li>• Fast wake-up latency</li></ul>	Suspend mode indicator: on Power on indicator: off
S4 (Hibernation)	<ul style="list-style-type: none"><li>• Highest power saving-mode</li><li>• Slowest wake-up latency</li></ul>	Suspend mode indicator: off Power on indicator: off

### PC Card and CardBus devices, Plug-and-Play and Power Management support

Windows 2000 Professional supports most commonly used PC Card and CardBus devices with their device drivers included in the operating system. This includes 16-bit and 32-bit modem card, modem/LAN combination cards, LAN cards, ATA cards, and so on. If the card is properly recognized and configured when inserted into the computer, its driver will be loaded automatically by the operating system and you will not need to install another device driver. If the card is recognized by Windows 2000 as an “unknown device”, you will need to obtain a Windows 2000-supported device driver from the device’s hardware manufacturer. Check with the Windows 2000 Hardware Compatibility List (HCL) to determine whether your device is supported by the operating system. If not, contact the PC Card or CardBus manufacturer to receive an updated Windows 2000-supported driver.

Here are some helpful tips when using PC Card and CardBus devices on your ThinkPad computer while running Windows 2000 Professional:

- When using some PC Card modems under Windows 2000, you may notice a power management setting for the device listed in Device Manager. The Wake-On-Ring feature might not work properly even if enabled. Because the operating system does not support wakeup capability from Standby mode for an incoming call, this is a current limitation for this release of Windows 2000.
- Some CardBus LAN cards under Windows 2000 may report under its ‘Power Management’ settings to ability to “bring the system out of Standby.” This refers to Wake-On-LAN®. Regardless of this statement however, wakeup from Standby using a CardBus LAN device is not supported by Windows 2000. Planned support for this capability is expected in future releases of Windows 2000.

## Network device support and power management

Windows 2000 has a built-in mechanism that enables the system to wake up from a sleep mode and to detect a wakeup signal from a PCI LAN card. This capability is referred to as Wake-On-LAN (WOL). WOL depends on the type of LAN device used, the supported device driver, and the computer ACPI BIOS in use. Under Windows 2000, some ACPI-supported ThinkPad models feature WOL capability. For the current release of Windows 2000, the following ThinkPad models support WOL capability through their ACPI system BIOS:

- ThinkPad models 390, 390E, and 390X
- ThinkPad models 570 and 570E
- ThinkPad models 600, 600E, and 600X
- ThinkPad models 770E, 770X, and 770Z

Even though the above ThinkPad models support WOL capability through their system BIOS, the type of network interface card (NIC) can determine WOL capability. For the above mentioned ThinkPad 600 Series models and 770 Series models, WOL is supported on Windows 2000, if the computer docked to the IBM PC Card Enabler with Advanced EtherJet Port. For the ThinkPad 390 Series models and 570 Series models, WOL is supported when the computer is docked to the IBM Enhanced Port Replicator with Advanced EtherJet Port. For the ThinkPad 390 and 570 Series models, WOL is supported for Standby (S1 and S3 states) and Hibernation (S4 state) modes.

Other NICs installed in docking stations, and their supported device drivers under Windows 2000 will determine whether the NIC can “bring the computer out of Standby”. If enabled for WOL through the Device Manager, the maximum global sleep state that the system BIOS can be set to is S1 state. When network activity is detected while the system is in a S1 sleep state, Windows 2000 will wake the system from its sleep mode. The S1 sleep state is categorized as the lowest level of Standby: the processor is in power saving mode, but the remaining devices on the system are either active or in a minimum device sleep state. For the above mentioned ThinkPad models, WOL capability from other sleeps states, such as S3 (Standby) or S4 (Hibernation), are not supported under Windows 2000.

The following PCI NICs support WOL from the S1 state when a ThinkPad 600 Series model or 770 Series model ACPI-supported computer is docked to an IBM SelectaDock-III docking station:

- IBM PCI Netfinity 10/100 Ethernet Adapter 2
- IBM EtherJet PCI Management Adapter
- IBM EtherJet PCI Adapter
- IBM EtherJet PCI 100/10 Adapter with Wake on LAN
- IBM 16/4 Token-Ring PCI Adapter 2

Note that for the ThinkPad 600 and 770 Series ACPI-supported models, when the maximum global sleep state for the system is set to S1 and WOL is enabled, the warm-swapping feature on ThinkPad computers running Windows 2000 will be disabled. As described in a previous section of this document, “*Hot and Warm swapping support for ACPI-supported ThinkPad models*”, some ACPI-supported ThinkPad models support warm-swapping in the swappable bay slot. The warm-swapping feature requires the global system sleep state be set to S3 state as defined by the system BIOS and operating system. If WOL is enabled on the system, the maximum global system sleep state will be set to S1, thus preventing the system from entering the S3 sleep state. Because the computer cannot enter S3 sleep state, the user will be unable to warm-swap the swappable bay device when WOL is enabled. The users’ request to eject the device from the swappable bay slot will be “rejected” by the operating system. This is a current ACPI design limitation and currently no workaround exists. If this

should happens with your ThinkPad computer, disable the WOL feature of the NIC. Then warm-swapping will execute as expected.

## USB device support and power management

USB devices are recently developed technology that enable full Plug-and-Play capability and easy installation and user configuration. Windows 2000 supports various USB devices ranging from Human Input Devices (HID's) to streaming media devices (digital video cameras and scanners). Some of the more popular USB device drivers are included in Windows 2000. Refer to the Windows 2000 Hardware Compatibility List (HCL) to determine whether your USB device is supported by the operating system. In addition to full Plug-and-Play capability for USB devices under Windows 2000, some USB HID's will support system wakeup, such as some USB keyboards and pointing devices. System wakeup depends on your ACPI BIOS, the type of USB device, and the supported device driver included in Windows 2000. For most ACPI-supported ThinkPad models, the wakeup capability from a USB input device will be supported under Windows 2000. However, there are several key items that must be considered:

- System wakeup by a USB input device is made possible by the supported device driver for Windows 2000 and the system ACPI BIOS. Depending on the USB device, system wakeup might not be supported. This is device-driver dependent. If your USB device has the capability to "bring the computer out of Standby" under its "Power Management" settings listed in Device Manager, then this device is capable of waking up the system when activity from it is detected. In the case of ACPI-supported ThinkPad models, when the USB wakeup feature is enabled, the maximum global system sleep state is set to S1 state. The S1 sleep state is the minimum level of Standby in which the processor is in power saving mode, but the remaining devices on the system are either active or in a minimum device sleep state. USB wakeup capability from other sleep states, such as S3 (Standby) or S4 (Hibernation), is not supported under Windows 2000.

As described in the previous section, "*Network device support and Power management*", similar situations and limitations can exist when the global system sleep state is set to S1 when USB wakeup is enabled on ACPI-supported ThinkPad models. If USB wakeup is enabled on a docking station configuration that supports warm-undocking or that supports warm-swapping from the swappable bay slot, the undocking process and swappable bay device removal will be rejected by the operating system, because the computer will be prevented from entering the S3 (Standby) mode.

When USB wakeup is enabled, the maximum global system sleep state is set to S1. For warm-undocking, the maximum global system sleep state must be set to S3. If the user attempts to warm undock the ThinkPad computer while USB wakeup is enabled, the request will be denied or rejected by Windows 2000.

In order for a device located in the swappable bay slot to be warm-swapped, the maximum global system sleep state must be set to S3. However, when USB wakeup is enabled, the global sleep state is set to S1. If the user attempts to warm-swap a device located in the swappable bay slot, the request will be denied or rejected by Windows 2000. This can occur on the ThinkPad 390 and 600 Series models, because these computers support only warm-swapping while running Windows 2000.

Both of the above restrictions are currently Windows 2000 design limitations and there exists no workaround for the problem. To warm-swap devices or warm-undock, disable the USB wakeup capability.

- When any USB device is physically connected to the system, processor power saving mode is highly limited. Because the operating system constantly "polls" the USB device, the system is always "busy," which prevents the processor from entering into

its deepest power-saving mode (C3 state). When a portable computer runs on battery power, this can be a serious drain on the system battery life. In the initial release of Windows 2000, this is known issue and no work around exists. If USB devices are connected to your computer, but not being used, unplug the USB devices from the system in order to conserve battery power. This issue will be addressed in the future releases of Windows 2000.

- USB wakeup is not supported on the IBM SelectaDock-III docking station if the USB device is attached to the USB port located on the docking station. If the USB device is attached to the USB port located on the system-unit under this same physical docking configuration, USB wakeup is supported. USB wakeup is also supported if a USB device is attached to the USB port located on the Advanced Port Replicator with Advanced EtherJet Port. The same capability exists when the USB device is connected to the USB port located on the system-unit under this same physical docking configuration.

## Using the multi-monitor feature of ThinkPad computers under Windows 2000

Multi-monitor support is a new feature to Windows 2000 Professional. It provides the users the enhanced viewing capability that the desktop computers in office environments offer. However, this capability depends on whether the display or video card adapter supports this feature as well as its device driver under Windows 2000. Refer to the Windows 2000 Hardware Compatibility List (HCL) to determine whether your video display adapter supports multi-monitor capability under this operating system.

Some ACPI ThinkPad models support the multi-monitor capability when an add-on PCI video adapter is installed in the IBM SelectaDock-III docking station. Any ACPI-supported ThinkPad model that can dock onto this docking station can use a supported PCI video adapter to configure the multi-monitor feature under Windows 2000. Here are some tips on how to configure multi-monitor support:

- Verify that you can disable VGA mode on your PCI display adapter card. If your display adapter card enables VGA mode by the default, disable this feature. On some display adapter cards, you can either disable VGA mode by setting a hardware jumper or use a software configuration program.

Because the multi-monitor feature works only when the add-on video card is set as the secondary display adapter, VGA resource needs to be disabled. The ThinkPad built-in display device must be configured as the primary display adapter in order for multi-monitoring to function properly.

- You will also need to set a BIOS setting on your ThinkPad computer to enable the multi-monitor feature support. This setting will set the internal display on your ThinkPad computer as the primary display adapter. In order for the multi-monitor feature to function properly, this BIOS setting must be enabled. To enable the multi-monitor feature, follow these steps:
  1. Turn on your computer, then press and hold the 'F1' key until the **Easy-Setup** menu appears on your screen.
  2. Select **Config ? Display ? Multiple**.
  3. Click [OK] to save the settings, and then click [Exit]. Click 'Restart'; then exit the "Easy-Setup" menu.
  4. Dock your computer to the SelectaDock-III docking station with the multi-monitor PCI video adapter installed.
  5. Start your computer, and then logon to Windows 2000 Professional with an Administrator user account.
  6. Windows 2000 will start and will configure your docking profile, if it does not already exist. At this time, the LCD screen only will be activated.
- After Windows 2000 restarts with an add-on PCI display adapter installed on the docking station, follow the instructions below to enable and adjust your desktop settings for multi-monitor support:
  1. Click: **Start ? Settings ? Control Panel**.
  2. Double-click on the **Display** applet. After the "Display Properties" window opens, click the 'Settings' tab.
  3. Two monitor icons will be displayed in the "Display Properties" window:
    - Your ThinkPad's LCD display
    - Your PCI multi-monitor display device (which will be initially be unavailable as a selection)

4. Click **Display 2**, then check the **Extend my Window desktop onto this monitor** checkbox.
5. Set the 'Colors' depth and 'Screen Area' (resolution) to your preferred settings for **Display 2**. Click [Apply] when finished.
6. Click [OK] to apply your new desktop settings.
7. Click [Yes] to keep the new desktop settings.
8. Your desktop will now extend across both the LCD monitor as well as the secondary display adapter. You now have multi-monitor support under Windows 2000.
9. Click [OK] to exit the "Display Properties" window.

When using the multi-monitor feature on your ThinkPad computer, there are several key considerations:

- For this release of Windows 2000, the number of display adapter cards that can support multi-monitor capability will be limited. Because the ThinkPad computer's internal display needs to be configured as the primary display device, any PCI multi-monitor card that has VGA mode must be disabled. As of this writing, few display manufacturers have video cards on which you can disable the VGA capability with a hardware jumper setting or with a firmware utility.
- The current implementation of multi-monitor support is very limited in Plug-and-Play capabilities. When a multi-monitor PCI display adapter is installed in your docking station, no hot or warm undocking will be allowed under Windows 2000. Only cold-undocking is possible at this time. This is a known limitation of Windows 2000 and may be addressed by Microsoft in the future.

## Windows 2000 Hints and Tips

### 1 Power Management

#### 1.1 TrackPoint<sup>®</sup> / Mouse activity does not turn-on LCD monitor when “Turn Off Monitor” is set

<b>Models:</b>	ThinkPad models 380 and 380E
<b>Issue:</b>	The LCD screen does not turn on from “Turn off monitor” power scheme when user moves TrackPoint <sup>®</sup> pointer or PS/2 mouse device.
<b>Cause:</b>	This is a hardware limitation.
<b>Resolution:</b>	Press any keyboard key to turn-on the LCD display monitor.

#### 1.2 Excessive keyboard or TrackPoint<sup>®</sup> pointer or PS/2 mouse activity while system is returning from Standby will cause pointing devices to malfunction

<b>Models:</b>	All ThinkPad models
<b>Issue:</b>	Excessive keyboard or mouse movement while system returns from Standby will cause pointing device to malfunction.
<b>Cause:</b>	Continuous movement and activity with the TrackPoint <sup>®</sup> device or keyboard while the system resumes from Standby produces incorrect responses when the pointing device is reset.
<b>Resolution:</b>	Do not touch the keyboard or TrackPoint <sup>®</sup> device while system is returning from Standby. If the keyboard or pointing device does malfunction, place the computer back into Standby, and then wake up the computer to recover.

#### 1.3 When system resumes from RTC wakeup with Prompt for Password enabled, keyboard or mouse does not function afterwards

<b>Models:</b>	ThinkPad 380E and ThinkPad 760 Series models
<b>Issue:</b>	When system resumes from RTC (configured by ThinkPad Configuration Utility) with BIOS “Power on Password” enabled, the pointing device and keyboard do not function afterwards.
<b>Cause:</b>	
<b>Resolution:</b>	Do not set the BIOS “Power on Password” setting under Windows 2000 when RTC is enabled. Instead, use the operating system “Prompt for Password” protection when RTC is enabled.

#### 1.4 System resumes from S1 sleep mode when attaching or detaching the AC adapter

<b>Models:</b>	ThinkPad models 390, 390E and 390X
<b>Issue:</b>	When the system enters S1 state such as waking system from Standby using USB input device, the system wakes up when attaching or detaching the AC adapter.
<b>Cause:</b>	This is a hardware limitation.
<b>Resolution:</b>	Do not attach or detach the AC adapter while the system is in S1 sleep state.

## 1.5 Wake on LAN<sup>®</sup> from Power Off state (IBM WOL feature) does not function after a Windows 2000 shutdown

<b>Models:</b>	ThinkPad model 390
<b>Issue:</b>	After Windows 2000 shuts down, the system cannot not wakeup from power off state by Magic Packet(IBM WOL).
<b>Cause:</b>	This is a hardware limitation.
<b>Resolution:</b>	After Windows 2000 properly shuts down with IBM WOL enabled, you must manually power on and off your computer in order to get IBM WOL functioning.

## 1.6 Wake-On-Ring (WOR) does not function on APM-supported ThinkPad model running Windows 2000

<b>Models:</b>	ThinkPad models 760XD, 765D, and 770 with internal modems
<b>Issue:</b>	Cannot wake up the computer from an incoming call when in Standby mode.
<b>Cause:</b>	On APM-supported ThinkPad models with an internal modem, WOR is not enabled by default through the BIOS settings. This capability can be enabled by installing the ThinkPad Configuration Utility.
<b>Resolution:</b>	To enable WOR on your APM-supported ThinkPad system, follow these instructions: <ol style="list-style-type: none"><li>1. Install the ThinkPad Configuration Utility for Windows 2000.</li><li>2. After installing the utility, click: <b>Start ? Settings ? Control Panel.</b></li><li>3. Double-click the <b>Power Options</b> applet. After the "Power Options Properties" window opens, click the "Suspend/Resume Options" tab.</li><li>4. Verify the "Resume on incoming call" is checked. If not, click this option.</li><li>5. Click [Apply].</li></ol>

## 1.7 When the computer wakes up from Standby by Wake-On-Ring, Wake-On-LAN<sup>®</sup>, or RTC resume the LCD display does not turn on

<b>Models:</b>	All ACPI-supported ThinkPad models
<b>Issue:</b>	When the computer wakes up from Standby by Wake-On-Ring, Wake-On-LAN, or RTC resume, the LCD display does not turn on.
<b>Cause:</b>	This is by design of Windows 2000 for an unattended wake up.
<b>Resolution:</b>	After the system wakes up from WOR, WOL <sup>®</sup> , or RTC press the keyboard or move the pointing device to turn on the LCD display.

## 1.8 The LCD monitor does not turn on when the computer returns from Standby

<b>Models:</b>	ThinkPad model 390
<b>Issue:</b>	When the computer resumes from Standby, the LCD monitor might not turn on.
<b>Cause:</b>	This is a current design limitation of the system BIOS.
<b>Resolution:</b>	Press any key or move the pointer device to turn on the LCD monitor.

## 1.9 After computer returns from Hibernation mode, both the CRT and LCD monitor are active-- cannot keep the previous display condition.

<b>Models:</b>	ThinkPad model 240
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**Issue:** After the computer returns from Hibernation, both the CRT and LCD monitor are active. When the computer resumes, the display condition before entering Hibernation was not saved.

**Cause:** This is a current design limitation in the system BIOS.

**Resolution:** IBM plans to eventually update the BIOS to address this issue.

#### **1.10 Remaining battery capacity appears as “unknown” after removing and re-inserting battery device**

**Models:** ThinkPad models 570

**Issue:** After the primary battery device is removed and then re-inserted, the remaining battery capacity registers as “unknown”.

**Cause:** This is a current design limitation in the system BIOS.

**Resolution:** IBM plans to eventually update the BIOS to address this issue.

## 2 Docking Station and Power Management

### 2.1 Cannot use password protected hard drive if hard disk drive is located in the docking station

<b>Models:</b>	All ThinkPad 600 and 770 Series models
<b>Issue:</b>	When an IDE hard disk drive located in the docking station is protected by a HDD password, the user will not be able to access it under Windows 2000.
<b>Cause:</b>	Windows 2000 does not support the IBM implemented HDD security for hard drives located in the docking station.
<b>Resolution:</b>	Since IBM's HDD security is not supported for hard drives located in the docking station, IBM recommends that you use the built-in Windows 2000 file security such as NTFS, Prompt for Password, setting user permissions, auditing, etc.

### 2.2 ISA add-on device installed on docking station may not function after system returns from Standby

<b>Models:</b>	All ThinkPad 600 and 770 Series models
<b>Issue:</b>	If an ISA add-on device is installed on a docking station when system returns from Standby, the ISA add-on device may not function afterwards.
<b>Cause:</b>	When Windows 2000 returns from Standby, the OS has no means to identify and detect ISA devices since this type of device architecture does not support full Plug-and-Play.
<b>Resolution:</b>	Do not place the docked ThinkPad into Standby mode if an ISA add-on device is installed.

### 2.3 An IDE device installed on the docking station is not detected under Windows 2000

<b>Models:</b>	All ThinkPad 600 and ThinkPad 770 Series models
<b>Issue:</b>	An IDE device installed on the docking station is not detected when your ThinkPad computer is docked to a SelectaDock-III.
<b>Cause:</b>	Configuration problem set by the system BIOS.
<b>Resolution:</b>	To enable an IDE device on a SelectaDock-III docking station, follow these instructions below:

1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.
2. Install the ThinkPad Configuration Utility for Windows 2000.
3. After the installation completes and you restart your computer, open the ThinkPad Configuration Utility for Windows 2000.
4. Click [Docking Station] button to view docking station properties.
5. Click the 'IDE Device' tab. Set the "IDE device in docking station" option to 'Enable'.
6. Click [Apply]. A warning message will next appear on your screen indicating that the bay device is already using the desired resource. Click [Disable Device(s)]. (Note that the device located in the swappable bay will still function afterwards.)
7. Click [Yes] to automatically restart your computer in order for new setting to take effect.
8. The computer will then ask you to power off and on your computer.
9. The next time you restart your computer in a docked configuration with an IDE device installed in the docking bay, the IDE device will be detected and function as expected under Windows 2000.

## 2.4 APM-supported ThinkPad does not enter Standby or Hibernation when computer is docked

<b>Models:</b>	ThinkPad models 760XD, 765D/L, and 770
<b>Issue:</b>	When the computer is docked to a docking station, system will not enter Standby or Hibernation.
<b>Cause:</b>	Configuration problem set by the system BIOS.
<b>Resolution:</b>	To allow the computer to enter Standby or Hibernation while docked, follow these instructions: <ol style="list-style-type: none"><li>1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.</li><li>2. Install the ThinkPad Configuration Utility for Windows 2000.</li><li>3. After installing the utility and restarting your computer, click: <b>Start ? Settings ? Control Panel</b>.</li><li>4. Double-click the <b>Power Options</b> applet. After the "Power Options Properties" window opens, click the 'Suspend/Hibernation Options' tab.</li><li>5. Verify the "Suspend/hibernate while docked" checkbox is set. If not, click the option.</li><li>6. Click [Apply].</li></ol>

## 2.5 After undocking the ThinkPad computer from a docking station or port replicator, the TrackPoint<sup>®</sup> does not function if external pointer device is attached to docking station

<b>Models:</b>	All ACPI-supported ThinkPad models
<b>Issue:</b>	After hot or warm-undocking my ThinkPad computer from a docking station or port replicator, the TrackPoint <sup>®</sup> pointer device does not function
<b>Cause:</b>	This is by design of the computer hardware. If the ThinkPad computer is turned-on with an external pointer device attached to the docking station and the BIOS setting for the TrackPoint <sup>®</sup> pointer device is enabled as "auto-disabled", undocking the computer without the external pointing device results in the TrackPoint <sup>®</sup> device being disabled. The "auto-disable" setting automatically disables the TrackPoint <sup>®</sup> device if a pointer device is connected to the external-input-device connector when the computer starts.
<b>Resolution:</b>	To allow the TrackPoint <sup>®</sup> pointer device to function after undocking, without having an external pointer device attached, follow these instructions: <ol style="list-style-type: none"><li>1. Turn on your computer, and then logon to Windows 2000 Professional with an Administrator user account.</li><li>2. Install the ThinkPad Configuration Utility for Windows 2000.</li><li>3. After installing the utility and restarting your computer, open the ThinkPad Configuration Utility.</li><li>4. Click [TrackPoint] and set the 'TrackPoint' box to "Enable".</li><li>5. Click [Apply].</li><li>6. Close the ThinkPad Configuration Utility and restart your computer.</li></ol>

When the TrackPoint device is enabled to "Enable", after undocking the computer, the TrackPoint device will function as expected even if an external pointing device is not attached to the system.

## 2.6 Printer device connected to parallel port does not function after docking or undocking computer

**Models:** ThinkPad model 570  
**Issue:** After docking or undocking computer, the printer device connected to the computer's parallel port does not function.  
**Cause:** This problem is a known system BIOS issue.  
**Resolution:** IBM plans to eventually update the BIOS to address this issue.

## **2.7 After undocking the computer, the Fn function key and AC/DC power generated events might not function properly**

**Models:** ThinkPad model 570  
**Issue:** After undocking the computer, the Fn function key and AC/DC power generated events might not function properly.  
**Cause:** This problem is a known system BIOS issue.  
**Resolution:** If this should occur, place the system into Standby from the Start menu, then wake-up the system to recover. IBM plans to eventually update the BIOS to address this issue.

### 3 Plug-and-Play Functionality

#### 3.1 System behaves slower just after docking or undocking

<b>Models:</b>	All ThinkPad ACPI-supported models
<b>Issue:</b>	While hot docking and undocking your computer from the UltraBase and / or Enhanced Port Replicator, Windows 2000 reports docking event completion before actual physical docking or undocking can be performed.
<b>Cause:</b>	This is the expected behavior when the operating system completes either a docking or undocking event. The operating system has to “clean up” some internal processes that are occurring in the background.
<b>Resolution:</b>	Use the LED indicators on the computer as well as operating system messages as a signal for when the docking or undocking event has actually completed. Also, listen for a “beep” sound signalling the completion of the docking or undocking event.

#### 3.2 After upgrading from Windows 95 to Windows 2000, the “Unplug or Eject Hardware” icon does not appear in the desktop Taskbar even if a PC Card / CardBus device is present

<b>Models:</b>	All ThinkPad models
<b>Issue:</b>	After upgrading from Windows 95, the “Unplug or Eject Hardware” icon is not visible in the desktop Taskbar even when a PC Card / CardBus device is installed on the system.
<b>Cause:</b>	If you turn off the PCMCIA applet in Windows 9x before upgrading to Windows 2000 the icon will be turned off by default.
<b>Resolution</b>	If the “Unplug or Eject Hardware” icon is not visible in the desktop Taskbar, follow these steps: <ol style="list-style-type: none"><li>1. Start your computer and logon to Windows 2000 Professional with an Administrator user account.</li><li>2. Click: <b>Start ? Settings ? Control Panel.</b></li><li>3. Double-click the <b>Add/Remove Hardware</b> applet. In the “Add/Remove Hardware Wizard” window, click [Next] at the welcome screen.</li><li>4. Select “Uninstall/Unplug a device” option, then click [Next].</li><li>5. Click “Unplug/Eject a device”, and then click [Next].</li><li>6. Highlight the device to be ejected. Click [Next].</li><li>7. Click [Next] to confirm ejecting the device.</li><li>8. Windows 2000 will inform you it is now safe to physically remove the device. Verify that the “Show Unplug/Eject icon on the taskbar” checkbox is set.</li><li>9. Click [Finish] to close the wizard.</li></ol>

## 4 PC Cards and Device Support

### 4.1 Dial tone from PCMCIA modem card cannot be heard

**Models:** ThinkPad i Series 2611  
**Issue:** When using PCMCIA modem card to dial-out, no dial tone can be heard.  
**Cause:** This is a hardware limitation.  
**Resolution:**

### 4.2 Removing a PC Card and CardBus device while system is in Standby mode then waking the system produces a “Surprise Device Removal” window

**Models:** All ThinkPad models  
**Issue:** Removing a PC Card or CardBus device while the computer is in Standby or Hibernation mode is not supported under Windows 2000. This type of action is referred to as “Surprise Device Removal”. If the user should accidentally remove a PC Card / CardBus device while their computer is in Standby or Hibernation mode, the operating system does have the ability to make a smooth recovery after such an event occurs. However, for some PC Card / CardBus devices surprise removal can cause the operating system to “crash”, whereby the user has not way to recover afterwards without rebooting the system.  
**Cause:** Removing a PC Card or CardBus device while the computer is in Standby or Hibernation mode is not supported under Windows 2000.  
**Resolution:** Don't remove a PC Card / CardBus device while system is in Standby mode.

## 5 Multimedia

### 5.1 Immediately after upgrading from Windows 95 to Windows 2000, the audio capability on my ThinkPad computer does not function

<b>Models:</b>	ThinkPad model 390
<b>Issue:</b>	Immediately after upgrading to Windows 2000 from Windows 95, audio capability does not function.
<b>Cause:</b>	The audio chip on the computer is not properly initialized at first boot-up after the upgrade install has completed.
<b>Resolution:</b>	Immediately after the upgrade install to Windows 2000 completes, restart the computer and audio capability will be enabled at next startup.

### 5.2 MIDI file does not play correctly when using the Microsoft GS Wavetable SW Synthesizer

<b>Models:</b>	ThinkPad i Series 2621
<b>Issue:</b>	While using the Windows 2000 Media Player to playback MIDI files, the playback speed is not constant and audio playback is degraded.
<b>Cause:</b>	
<b>Resolution:</b>	Change the 'Preferred device' setting under "MIDI Music Playback" to "FM Synthesizer": <ol style="list-style-type: none"><li>1. Click: <b>Start ? Settings ? Control Panel.</b></li><li>2. Double-click the <b>Sound and Multimedia</b> applet. After the "Sound and Multimedia Properties" window opens, click the 'Audio' tab.</li><li>3. For the 'Preferred device' setting under "MIDI Music Playback", change to "ESS Solo FM Synthesizer".</li><li>4. Click [Apply]. Click [OK] to close the "Sound and Multimedia" Properties window.</li></ol>

### 5.3 Volume control hot-key is not synchronized with Windows 2000 Master Out volume control

<b>Models:</b>	All ThinkPad models
<b>Issue:</b>	When adjusting the volume control using the computer's hot-key, the Windows 2000 Master Out volume control is not synchronized.
<b>Cause:</b>	Using the hot-key to adjust the volume control is executed through hardware which is invisible to the Master Out volume control software.
<b>Resolution:</b>	After adjusting the volume setting using the hot-key you might also have to adjust the volume using the Windows 2000 Master Out controls until the desired volume is met.

### 5.4 MPEG decoder device on ThinkPad models 760XD and 765D are marked as yellow exclamation mark on Windows 2000 Device Manager

<b>Models:</b>	ThinkPad models 760XD and 765D
<b>Issue:</b>	The Multimedia video controller device on the computer is not enabled while running Windows 2000. The device is listed under "Other device" in Device Manager.
<b>Cause:</b>	The device driver for the MPEG decoder is not supported under Windows 2000.
<b>Resolution:</b>	There will be no support for this device under Windows 2000.

## 5.5 Video capture capability is not enabled on ThinkPad models 760XD and 765D while running Windows 2000

<b>Models:</b>	ThinkPad models 760XD and 765D
<b>Issue:</b>	Video capture capability is not enabled while running Windows 2000.
<b>Cause:</b>	This device driver for the video capture feature is not supported under Windows 2000.
<b>Resolution:</b>	IBM is planning on eventually releasing updated device drivers to address this issue.

## 5.6 After recording sound using the Microsoft Sound Recorder, the sound level is very low during playback

<b>Models:</b>	All ThinkPad models
<b>Issue:</b>	While using the Sound Recorder application with the default microphone settings, the record level is very low.
<b>Cause:</b>	The audio driver does not set the proper level for recording for the onboard microphone.
<b>Resolution:</b>	Before recording, adjust the microphone record level in the Master Out Volume Control. Follow these instructions to adjust the microphone record level:

- 1 Start your computer and logon to Windows 2000 Professional with an Administrator user account.
- 2 Click: **Start ? Settings ? Control Panel.**
- 3 Double-click the **Sounds and Multimedia** applet. After the "Sounds and Multimedia Properties" window opens, click the "Audio" tab.
- 4 Under **Sound Recording** click [Volume].
- 5 In the "Recording Control" window, adjust the **Microphone Balance** setting to the desired level.
- 6 After adjusting the record level, the next time you use the Sound Recorder application, the recorded sound level will be louder.

## 5.7 While playing DVDs under Windows 2000 using the IBM DVD hardware decoder, AC3 audio is not enabled

<b>Models:</b>	ThinkPad 770 Series models
<b>Issue:</b>	The AC3 hardware audio feature does not function while playing DVDs under Windows 2000.
<b>Cause:</b>	Design limitation of the IBM DVD decoder device drivers for this current release.
<b>Resolution:</b>	IBM is planning on eventually releasing updated device drivers to address this issue.

## 6 Device Configuration and Setup

### 6.1 Some devices on APM ThinkPad systems may report resource conflicts due to default BIOS settings

<b>Models:</b>	All APM -supported ThinkPad models
<b>Issue:</b>	On A PM ThinkPad models, some devices may report firmware resource conflicts errors (yellow exclamation mark with code 29 error) in Device Manager.
<b>Cause:</b>	The auto-rebalance functionality in Windows 2000 for APM systems does not work correctly for all devices and configurations.
<b>Resolution:</b>	On APM -supported ThinkPad machines, the user can remove the errors by manually changing the resource settings for the device through the Device Manager under Windows 2000.

### 6.2 Cannot change PCI IRQ holder under Windows 2000 using ThinkPad Configuration Utility or Notebook Manager

<b>Models:</b>	All ThinkPad models
<b>Issue:</b>	The set value for PCI IRQ holding under Windows 2000 cannot be modified using the ThinkPad Configuration Utility. Even though this setting can be modified to either IRQ 10 or 11, any changes do not carry over after restarting the system.
<b>Cause:</b>	Even though there's an option to set the PCI IRQ holder to 10 or 11 through the ThinkPad Configuration Utility, Windows 2000 reset s this value to back to 9 when system reboots each time. Changing the IRQ holder intentionally is interpreted by the operating system as a meaningless operation.
<b>Resolution:</b>	No action required. The user does not need to change the PCI IRQ holder other than the one the operating system sets automatically.

### 6.3 The ThinkPad Configuration Utility does not show audio deviceas enabled on ThinkPad 760 and 765 models although audio device is functioning properly

<b>Models:</b>	All ThinkPad 760 and 765 models with Mwave Audio and Telephony functionality.
<b>Issue:</b>	The user cannot enable the audio support on their computer using the ThinkPad Configuration Utility (even though audio capability functions.)
<b>Cause:</b>	This is design limitation of the ThinkPad Configuration Utility.
<b>Resolution:</b>	No action is required if your computer's audio device is functioning properly.

## 7 Video

### 7.1 TV-Out on ThinkPad models is not supported under Windows 2000

<b>Models:</b>	ThinkPad 760, 765 and 600 Series models
<b>Issue:</b>	TV-Out capability on ThinkPad models does not work under Windows 2000.
<b>Cause:</b>	TV-Out is dependent upon your ThinkPad computer's display adapter's device driver support for this capability under Windows 2000.
<b>Resolution:</b>	Currently, this is not supported with this release of Windows 2000.

### 7.2 Incorrect display size for full-screen DOS Command Prompt Window

<b>Models:</b>	ThinkPad 560E models
<b>Issue:</b>	When opening a DOS Command prompt after upgrading from Windows 95 to Windows 2000, the full-screen option is improperly size and overlaps the LCD display.
<b>Cause:</b>	
<b>Resolution:</b>	To fix this problem, follow these instructions provided below: <ol style="list-style-type: none"><li>1. Open a DOS Command Prompt window.</li><li>2. Right-click the "DOS icon" in the upper left corner of the window.</li><li>3. Click "Properties", then on the 'Layout' tab.</li><li>4. Change the value of "Height" in "Screen Buffer Size" to 25.</li><li>5. Click [OK]. Select the "Save properties for future windows with same title" option and click [OK].</li></ol>

### 7.3 Dual-display functionality is not supported under Windows 2000

<b>Models:</b>	ThinkPad 770X, 770Z, 600E, and 600X models
<b>Issue:</b>	Dual-display capability is not supported while running Windows 2000.
<b>Cause:</b>	This is a current design limitation of Windows 2000.
<b>Resolution:</b>	This limitation may be addressed by Microsoft in the future.

### 7.4 Cannot enable multi-monitor support using my PCI display adapter while running Windows 2000

<b>Models:</b>	All ThinkPad 600 and 770 Series models
<b>Issue:</b>	Multi-monitor support is not enabled when a PCI display adapter is install on Windows 2000.
<b>Cause:</b>	Refer to the " <i>Using the multi-monitor feature of ThinkPad computers under Windows 2000</i> " section under the <b>General Technical Information</b> portion of this user's guide.
<b>Resolution:</b>	Future releases of Windows 2000 will include additional display adapters for multi-monitor.

## 8 Communication

### 8.1 After upgrading from Windows 95 or Windows 98, a Wireless connection cannot be established using the IBM Infrared device

<b>Models:</b>	All ThinkPad models
<b>Issue:</b>	After upgrading from Windows 95 or Windows 98, a Wireless connection cannot be established using the IBM Infrared device.
<b>Cause:</b>	The “Client for Microsoft Networks” component is not installed.
<b>Resolution:</b>	To create a Wireless connection using the IBM Infrared device under Windows 2000, the “Client for Microsoft Networks” component must be installed. To install this component on your computer, follow these instructions provide below:

1. Start your computer and logon to Windows 2000 Professional with an Administrator user account.
2. Click: **Start ? Settings ? Control Panel**
3. Double-click the **Network and Dialup Connections** applet. After the “Network and Dialup Connections” window opens, double-click the **Local Area Connection** icon.
4. Click [Properties], then click [Install...].
5. Highlight “Client” and then click [Add].
6. Under “Network Client:” select “Client for Microsoft Networks” then click [OK].
7. After the client has been installed click [Close].
8. Restart your computer. The next time you logon to Windows 2000, a Wireless connection can be established through the IBM infrared device.

## 9 Upgrade and installation Issues

### 9.1 While upgrading from a Windows 98 preload, the system hangs at the first restart

<b>Models:</b>	ThinkPad i Series, ThinkPad models 390, 390E, 390X, 570, and 570E
<b>Issue:</b>	While upgrading from a Windows 98 preload, the system hangs after the Windows 2000 Setup program copies the initial files to the system and restarts your machine for the first time.
<b>Cause:</b>	The Norton Anti-Virus software program is incompatible with Windows 2000.
<b>Resolution:</b>	Before upgrading to Windows 2000, uninstall the Norton Anti-Virus software from your system. If you have already started the upgrade install without uninstalling the Norton anti-virus and encounter a boot failure during the middle of Windows 2000 text mode Setup, you can still restart into your previous operating system. Restart your computer again into your previous operating system and uninstall all anti-virus software and then restart the upgrade install of Windows 2000.

## 10 Miscellaneous

### 10.1 If moving the pointing device while changing the display mode (using the Notebook Manager), the pointer cursor becomes uncontrollable

<b>Models:</b>	ThinkPad i Series 2611
<b>Issue:</b>	When using the Notebook Manager to change the display mode (LCD/CRT/BOTH) on your computer and moving the mouse pointer at the same time, the pointer device will become uncontrollable.
<b>Cause:</b>	This is caused by a timing issue. When VGA BIOS and the pointer device driver are simultaneously called, this will cause the pointer device to behave uncontrollably.
<b>Resolution:</b>	When changing the display mode using the Notebook Manager, do not move the pointer device.

### 10.2 When transferring a file using the Infrared device at 4 Mbps from a computer running Windows 2000 to a computer running Windows 98, the file transfer fails

<b>Models:</b>	All ThinkPad models
<b>Issue:</b>	When transferring a file using the Infrared device at 4 Mbps from a computer running Windows 2000 to a computer running Windows 98, the file transfer fails.
<b>Cause:</b>	This is a Windows 98 problem.
<b>Resolution:</b>	If using the Infrared device to transfer files between computers running Windows 2000 and Windows 98, set the connection rate between the communicating computers to 115 kbps.

### 10.3 The OS/2 Boot Manager does not work after restating Windows 2000 and cannot start up the computer

<b>Models:</b>	ThinkPad all models
<b>Issue:</b>	The OS/2 boot manager does not work after restarting Windows 2000.
<b>Cause:</b>	Windows 2000 problem.
<b>Resolution:</b>	Do not use the OS/2 Boot Manager while running Windows 2000. The OS/2 Boot Manager is currently not supported under Windows 2000.