



# Chapter 8

## Troubleshooting Fundamentals

# You Will Learn...

8

- How to protect yourself, your hardware, and your software while solving computer problems
- What tools are needed to support personal computers
- How to isolate computer problems and devise a course of action

continued

# You Will Learn...

8

- The importance of good recordkeeping
- How to take a computer apart and put it back together

# Troubleshooting Perspectives

8

- PC support technician
  - Works on-site
  - Closely interacts with users
  - Is responsible for the PCs
- PC service technician
  - Goes to customer site in response to a service call

continued

# Troubleshooting Perspectives

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- Bench technician

- Works in a lab environment
- May/may not interact with the PC user
- Is not permanently responsible for this PC

- Help-desk technician

- Provides telephone support

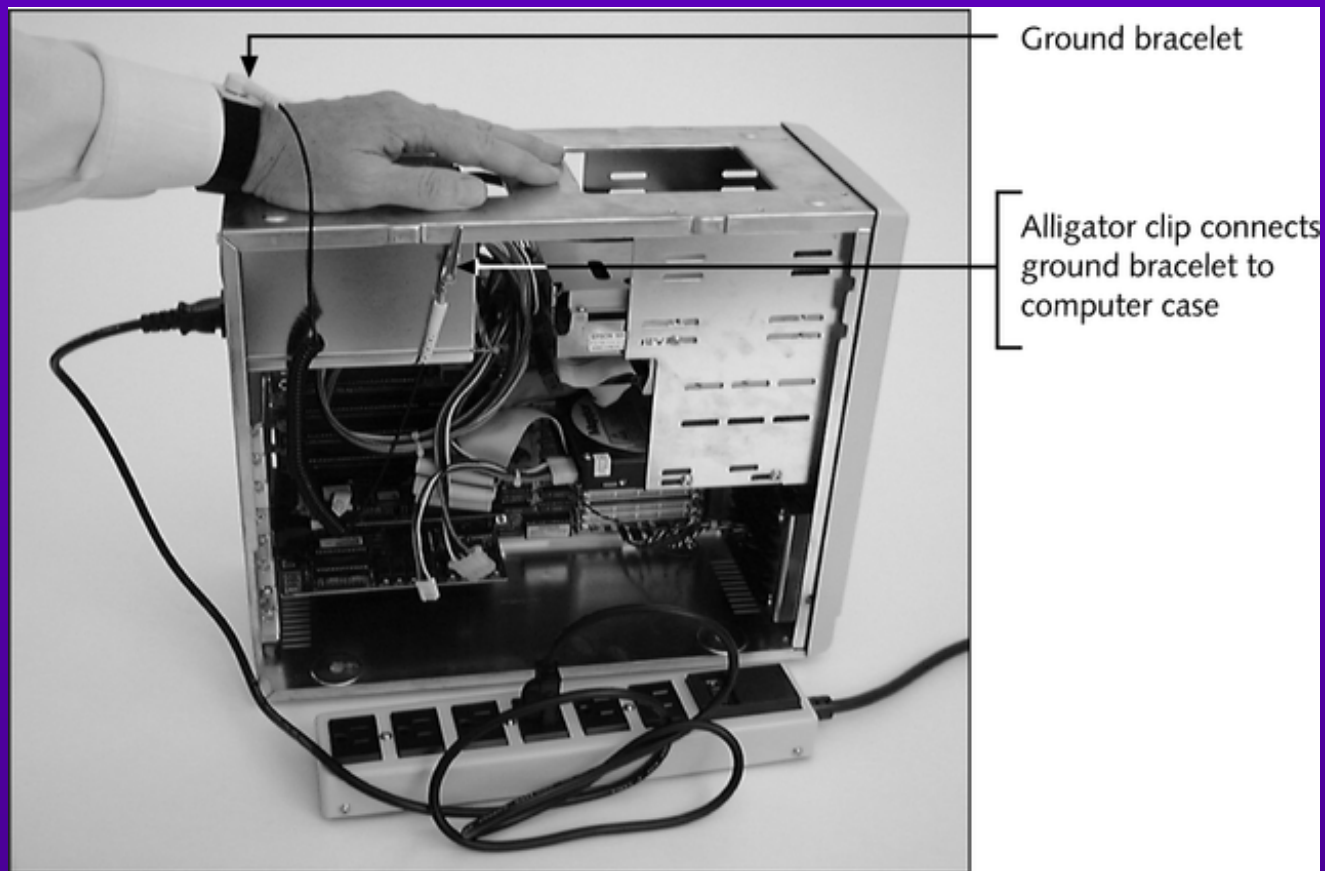
# Protect Yourself, the Hardware, and the Software

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- Most common threat to hardware: electrostatic discharge (ESD)
- Best protections against ESD
  - Ground strap
  - Ground mat
  - Static shielding bags

# A Ground Bracelet

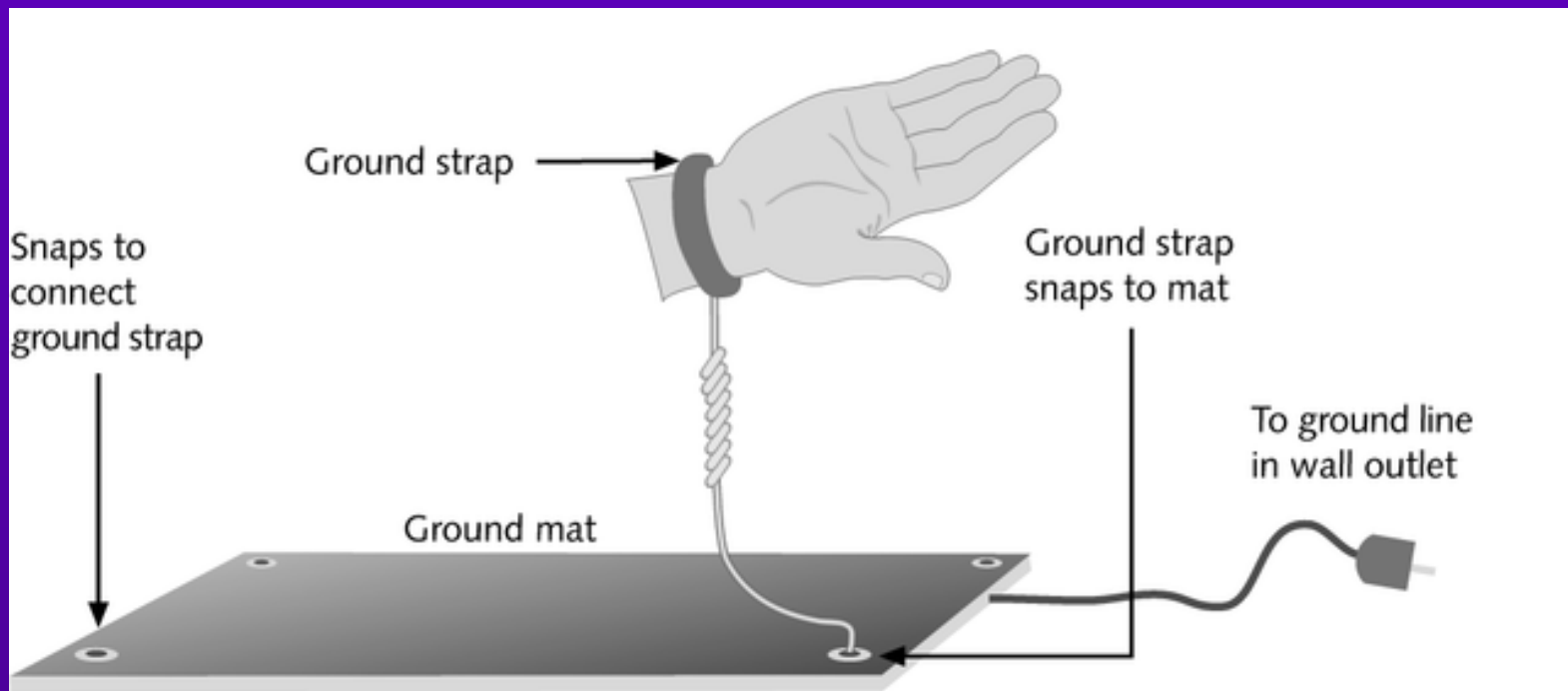
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**Figure 8-1** A ground bracelet, which protects against ESD, can clip to the side of the computer case and eliminates ESD between you and the case

# A Ground Mat

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**Figure 8-2** A ground bracelet can be connected to a ground mat, which is grounded by the wall outlet



# Summary of Tips

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- Don't touch chips of edge connectors on boards unless absolutely necessary
- Don't stack boards
- Don't touch chips with a magnetized screwdriver
- Don't use a graphite pencil to change DIP switch settings
- Don't put cards on top of/next to the monitor

continued

# Summary of Tips

8

- Lay components down on a grounded mat or static shielding bag
- Always turn off the PC before moving it to protect the hard drive
- When working inside a monitor, be careful *not* to ground yourself
- When unpacking hardware or software, remove packing tape from work area ASAP

continued

# Summary of Tips

8

- Don't place a PC on the floor where it might get kicked
- Keep disks away from magnetic fields, heat, and extreme cold
- Don't open a disk's shuttle window or touch the surface of a disk
- Using a circuit tester, always verify that the ground plug in an outlet is physically grounded

# Essential Troubleshooting Tools

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- Bootable rescue disk
- Flat-head screwdriver
- Phillips-head screwdriver
- Torx screwdriver
- Tweezers
- Chip extractor
- Extractor

# Convenient Troubleshooting Tools

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- Multimeter
- Needle-nose pliers
- Flashlight
- Ground bracelet and/or ground mat
- Small cups or bags
- Antistatic bags
- Pen and paper
- Bootable rescue disks
- Diagnostic cards and diagnostic software
- Utility software
- Virus detection software on disks

# Bootable Rescue Disk

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- Allows you to boot the PC even when hard drive fails
- Assures a “clean” boot
- Bootable disk for DOS
  - Must have the two hidden system files IO.SYS and MSDOS.SYS, and also COMMAND.COM
- Rescue disk for Windows 9x

# Diagnostic Cards and Software

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- POST diagnostic cards
  - Used to discover and report computer errors and conflicts at POST
- Diagnostic software
  - Used to identify hardware problems
  - Examples
    - ◆ PC-Technician (Windsor Technologies, Inc.)
    - ◆ PC-Diagnosys (Windsor Technologies, Inc.)

# Utility Software for Updates and Fixes

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- Designed to repair and/or maintain the software on a PC
- Requires OS to work
- Examples
  - First Aid 2000 (McAfee)
  - Oil Change (McAfee)



# General Purpose Utility Software

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- Used to manage a hard drive, monitor system resources, recover lost data, and secure a system
- Examples
  - Nuts & Bolts (Network Associates)
  - Norton Utilities (Symantec)
  - CheckIt98 Diagnostic Suite (Touchstone Software)

# Virus Detection Software

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- F-Protect (F-PROT)
  - High-quality antivirus product with excellent scanning and removal ability
- McAfee Virus Scan (SCAN)
  - Best-known
- Norton AntiVirus (NAV)
  - Popular because of its ease of use and graphical interface

# Reducing the Threat of a Virus

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- Write-protect original software disks and backup copies
- Boot from your hard disk or a write-protected disk only
- Avoid downloading from the Internet or a bulletin board, or always use a virus scan program when you do
- Use a scan utility on a regular basis

# Fundamental Rules for Isolating Computer Problems

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- Approach the problem systematically
- Divide and conquer
- Don't overlook the obvious
- Check the simple things first
- Make no assumptions
- Become a researcher

continued

# Fundamental Rules for Isolating Computer Problems

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- Write things down
- Reboot and start over
- Establish your priorities
- Keep your cool
- Don't assume the worst
- Know your starting point

# Devising a Course of Action

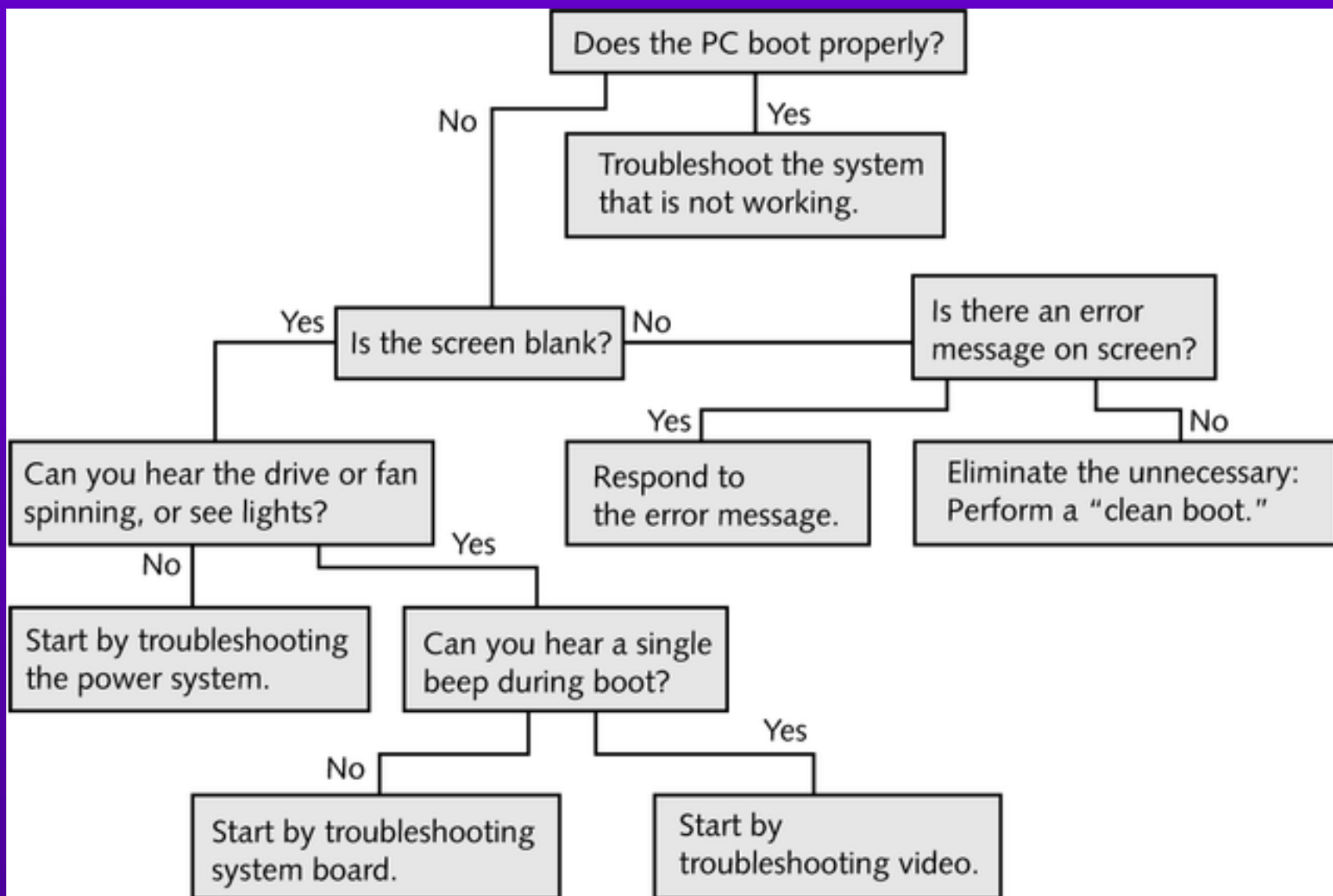
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- Interact with the user
- Isolate the problem
  - Eliminate the unnecessary
  - Trade good for suspected bad
- Follow established guidelines toward a solution

# Troubleshooting Guidelines

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- Isolate the problem into one of two categories
  - Problems that prevent the PC from booting
  - Problems that occur after a successful boot



**Figure 8-3** Begin PC problem solving by asking the question, "Does the PC boot up properly?"



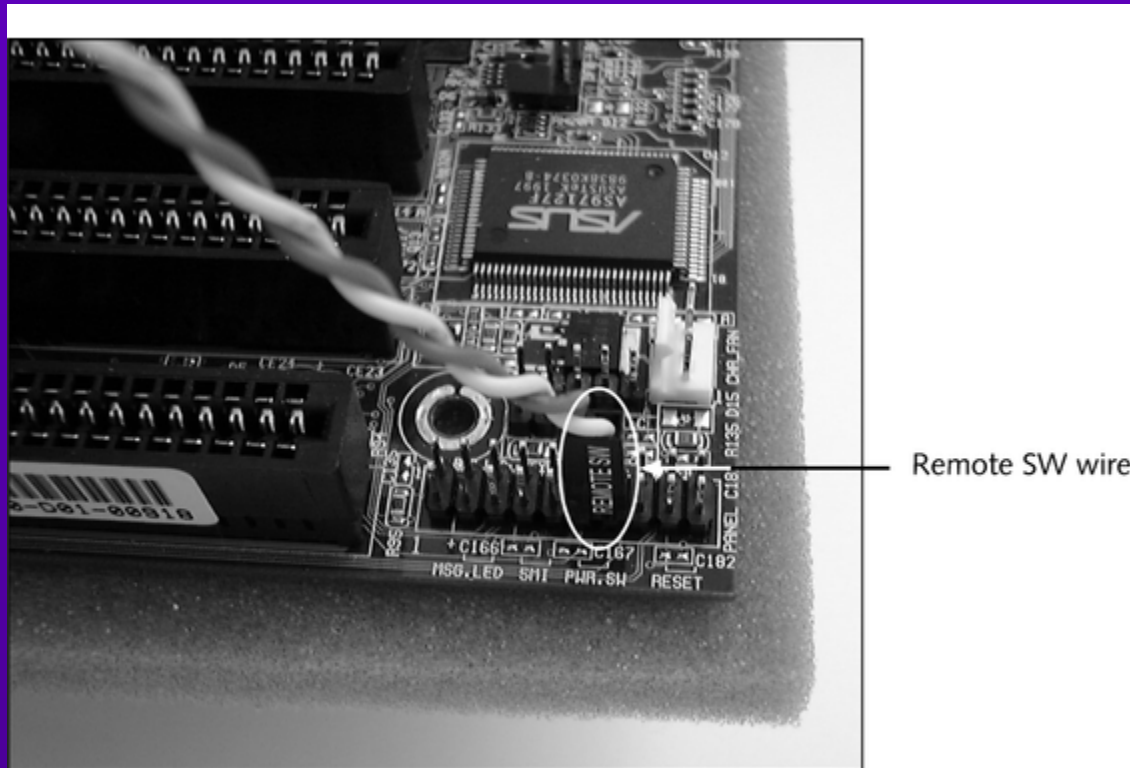
# Troubleshooting the Power System

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- Any burnt parts or odors?
- Everything connected/turned on? Any loose cable connections? Computer plugged in?
- All switches turned on? Wall outlet good?
- If fan is not running, turn off computer, open case, check connections to the power supply. Are they secure? All cards securely seated?

# Troubleshooting the Power System

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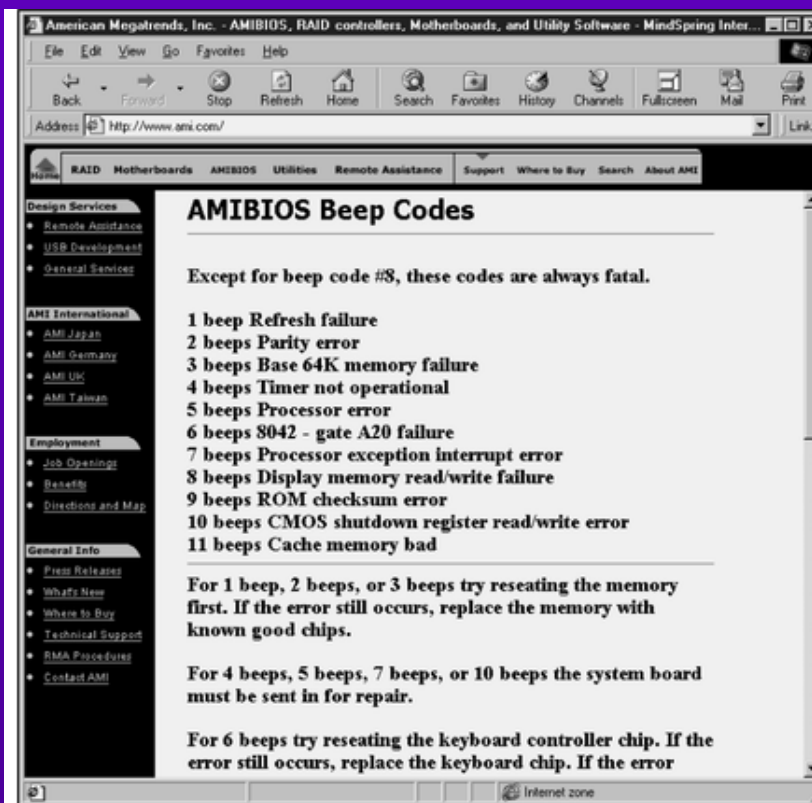


**Figure 8-4** For an ATX power supply, the remote switch wire must be connected to the system board before power will come on

# Troubleshooting the System Board

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- POST reports errors as beep codes



**Figure 8-5** The ROM BIOS manufacturer's Web site is a good source of information about beep codes

# Troubleshooting the Operating System and Hard Drive

8

- Try a hard boot
- Use the Windows 9x Startup Menu

1. Normal
2. Logged (\BOOTLOG.TXT)
3. Safe Mode
4. Safe Mode with network support
5. Step-by-step confirmation
6. Command prompt only
7. Safe Mode command prompt only
8. Previous version of MS-DOS
Enter a Choice: 1

**Figure 8-6** Windows 9x Startup Menu is displayed when you press F8 during startup

# Problems after the Computer Boots

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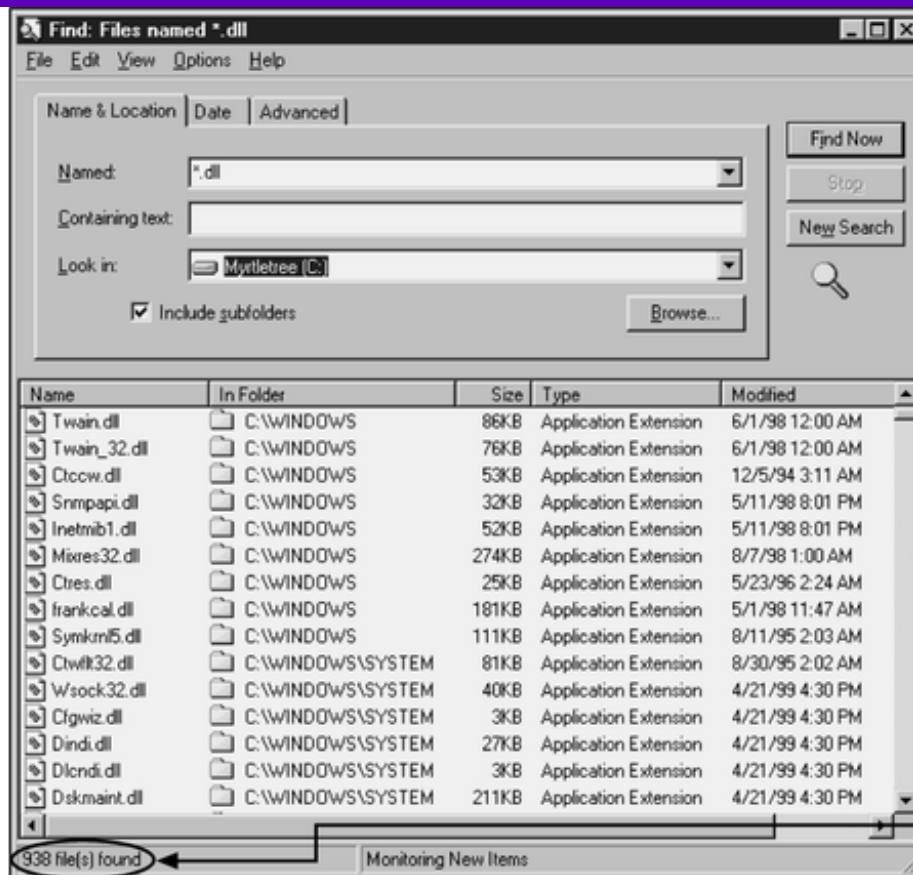
## ■ Software

- Try diagnostic software
- Consider reinstalling software
- Problems caused by other software

## ■ Hardware

- Isolate the problem
- Check the voltage output and power supply
- Check jumpers, DIP switches, CMOS settings
- Suspect a corrupted device driver

# Software Problems after the Computer Boots



938 files found

**Figure 8-7** DLL files can be shared by several applications, which can be a source of problems with software

# Problems with the Keyboard

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- A few keys don't work
- The keyboard does not work at all
- Key continues to repeat after being released
- Keys produce wrong characters
- Major spills on the keyboard

# Problems with the Monitor

8

- Power light (LED) does not go on, no picture
- Power LED light is on, no picture on power-up
- Power on, but monitor displays wrong characters
- Monitor flickers and/or has wavy lines

continued



# Problems with the Monitor

8

- No graphics display or screen goes blank when loading certain programs
- Screen goes blank 30 seconds or one minute after keyboard is left untouched
- Poor quality color display
- Picture out of focus or out of adjustment
- Crackling sound

# Troubleshooting Problems with the Monitor

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- Configure or change monitor settings and drivers in Windows 9x
- Change video driver configuration
- Return to standard VGA settings

# Changing the Video Driver Configuration

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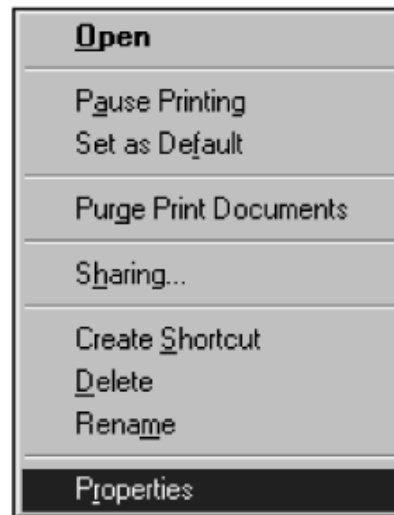


**Figure 8-8** Changing the video card type in Windows 95 or Windows 98

# Troubleshooting Laser Printer Problems

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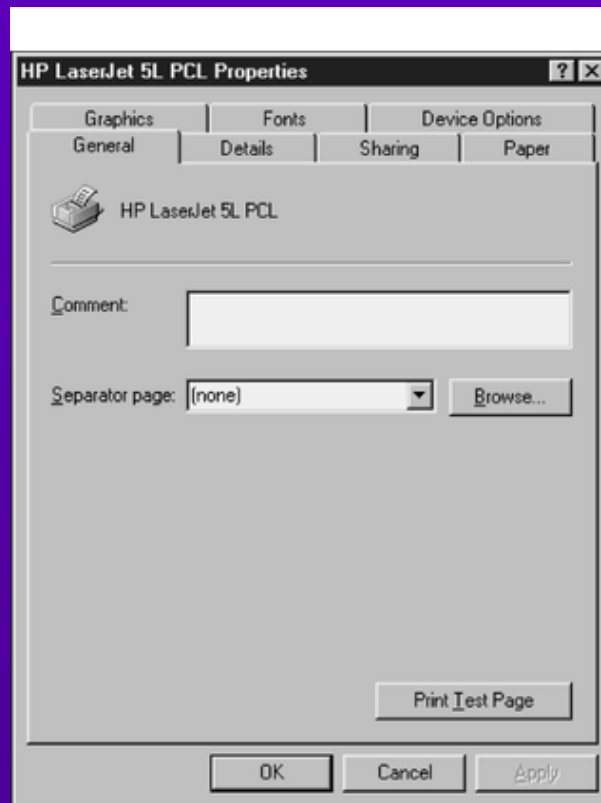
- Print manufacturer's test page
- Control menu



**Figure 8-9** Control menu for an installed printer

# Troubleshooting Laser Printer Problems

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**Figure 8-10** The properties box for an installed printer allows you to print a test page

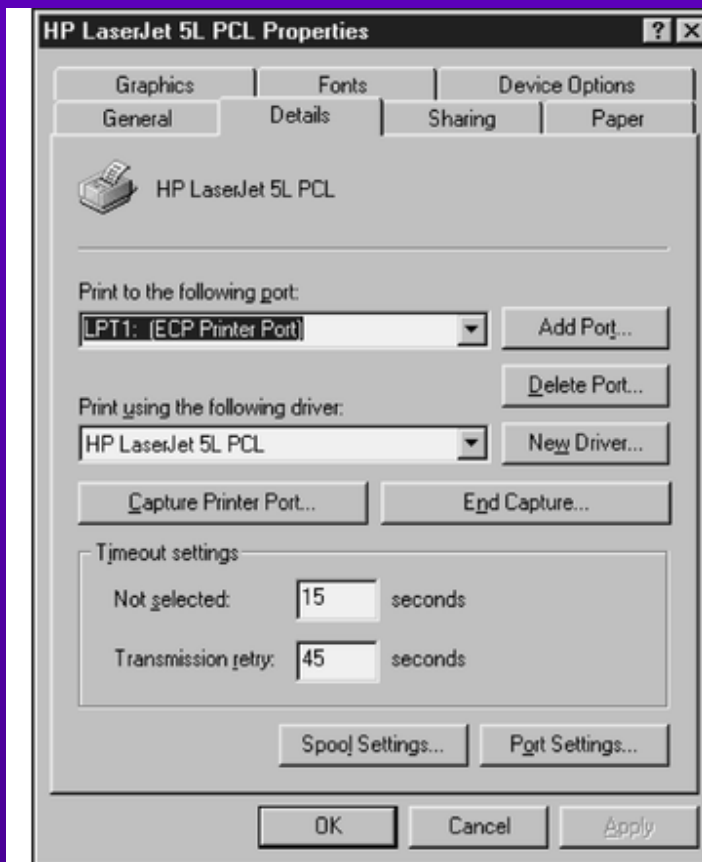
# Laser Printer Problems

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- Printer never leaves warm-up mode
- Paper Out message
- Toner Low message, or print is irregular or light
- Paper Jam message
- White streaks appear in the print
- Print appears speckled
- Printed images are distorted

# Laser Printer Problems

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**Figure 8-11** Verify that print data is being sent to the correct parallel port

# Dot Matrix Printer Problems

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- Print quality is poor
- Printer self-test works, but printing from a computer application does not work
- Print head moves back and forth, but nothing prints



# Ink-jet Printer Problems

8

- Print quality is poor
- Printing is intermittent or absent

# When a PC Is Your Permanent Responsibility

8

- Keep accurate records of configuration data
- Keep documentation
- Prepare a bootable disk
- Organize the hard drive

# Organize the Hard Drive Root Directory

8

- Store only startup files and necessary initialization files in the root directory
- Keep applications software and their data in separate directories

# Create a Boot or Rescue Disk

8

- Bootable system disk for DOS
- Rescue disk for Windows 9x

# Documentation

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- Manuals, tutorials, and Help files that provide information that a user needs in order to use a computer system or software application

# Record of Setup Data

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- Keep a record of CMOS on a floppy disk or use print screen key to print setup screens

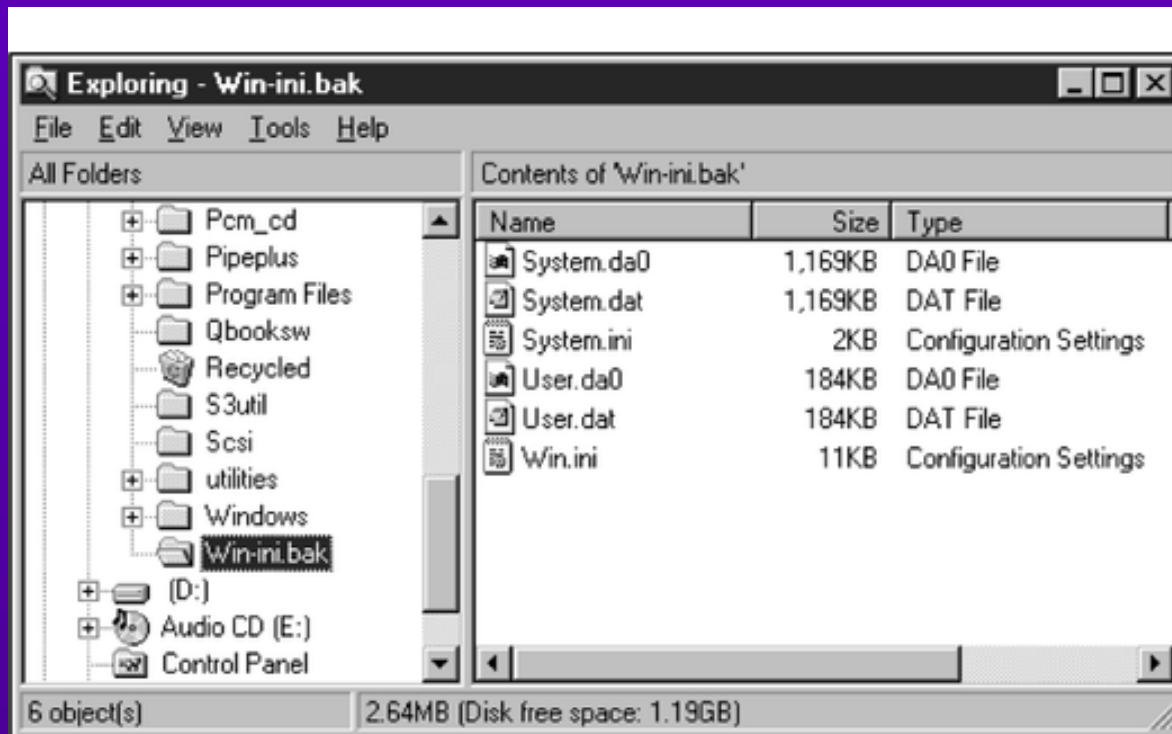
# Practical Precautions to Protect Software and Data

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- Before installing new software, back up configuration files for DOS
- Back up entire \Windows\System directory if space
- Don't compress your hard drive
- Don't store data files in same directory as the software
- Back up Windows 9x files that are likely to be altered

# Practical Precautions to Protect Software and Data

8



**Figure 8-12** Back up Windows 9x files that are likely to be altered during an installation



# Back Up Original Software

8

- Request a copy of the software on floppy disks and make a backup copy of the original disks

# Back Up Data on the Hard Drive

8

- Use utility software designed for this purpose on a regular basis

# Chapter Summary

8

- Safety precautions
- Essential troubleshooting tools
- Resolving problems after the source has been isolated
- Defensive procedures that minimize losses if hardware or software fails
  - Backing up hardware and software
  - Write-protecting application disks
  - Keeping records and documentation