Chapter 4: Disassembly and Power

Complete CompTIA A+ Guide to PCs, 6e
Chapter Objectives

- How to prevent static electricity, RFI, and EMI from harming or interfering with a computer
- The tools needed to work on computers
- How to take apart a computer and put it back together
- How to perform basic voltage and continuity checks
- How to upgrade or replace a power supply
- Different power-saving techniques
- What type of power devices can be used to protect computers
- Tips for good written communication
CompTIA A+ Exam Objectives Covered in This Chapter

801-1.2: Differentiate between motherboard components, their purposes, and properties.
801-1.8: Install an appropriate power supply based on a given scenario.
801-3.1: Install and configure laptop hardware and components.
801-5.1: Given a scenario, use appropriate safety procedures.
801-5.2: Explain environmental impacts and the purpose of environmental controls.
801-5.3: Given a scenario, demonstrate proper communication and professionalism.
802-1.4: Given a scenario, use appropriate operating system features and tools.
802-1.5: Given a scenario, use Control Panel utilities.
802-4.2: Given a scenario, troubleshoot common problems related to motherboards, RAM, CPU, and power with appropriate tools.
802-4.8: Given a scenario, troubleshoot, and repair common laptop issues while adhering to the appropriate procedures.
Disassembly

✓ Do not remove the motherboard battery, or the configuration information in CMOS will be lost.
✓ Use proper grounding procedures to prevent ESD damage.
✓ Keep paper, a pen, a phone, and a digital camera nearby for note taking, diagramming, and photo taking. Even if you have taken apart computers for years, you might find something unique or different inside this one.
✓ Have ample flat and clean workspace.
✓ When removing adapters, do not stack the adapters on top of one another.
✓ If possible, place removed adapters inside a special ESD protective bag.
✓ Handle each adapter, motherboard, or processor on the side edges. Avoid touching the gold contacts on the bottom of adapters. Sweat, oil, and dirt cause problems.
✓ Remember that hard drives require careful handling. A very small jolt can cause damage to stored data.
✓ You can remove a power supply, but do not disassemble a CRT-style monitor or power supply without proper training and tools.
✓ Document screw and cable locations. Label them if possible.
Precautions

Electrostatic Discharge (ESD)
Electromagnetic Interference (EMI)
Radio Frequency Interference (RFI)
Tools

- Small and medium flat-tipped screwdrivers
- #0, #1, and #2 Phillips screwdrivers
- 1/4- and 3/16-inch hex nut drivers
- Small diagonal cutters
- Needlenose pliers
When connecting cables to a motherboard or internal components, ensure that each cable is connected tightly, evenly, and securely.
Hard drives must be handled with care when disassembling a computer. Inside traditional hard drives are hard platters with tiny read/write heads located just millimeters above the platters. A small jolt can make the read/write heads drop down and touch the platter, causing damage to the platter and/or the read/write heads.
Some computer cases have plastic or metal (commonly brass) standoffs that allow the motherboard to be screwed into the case without the motherboard solder joints touching and grounding to the computer case. Do not remove these types of standoffs but just leave them attached and slide the motherboard out of the slots.
Basic Electronics

- AC (alternating current)
- DC (direct current)
- Voltage
- Current
- Power
- Resistance
Power Supplies

Convert AC to DC

Provide DC voltage to the motherboard, adapters, and peripheral devices

Provide cooling and facilitate air flow through the case

The motherboard form factor and the power supply form factor must fit in the case and work together. For optimum performance, research what connectors and form factors are supported by both components.
With ACPI, the user can control how the power switch operates and when power to specific devices, such as the hard drive and monitor, is lowered.
Windows Power Management

Define power buttons and turn on password protection

Choose the power settings that you want for your computer. The changes you make to the settings on this page apply to all of your power plans.

Power and sleep buttons and lid settings

<table>
<thead>
<tr>
<th>On battery</th>
<th>Plugged in</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I press the power button:</td>
<td>Sleep</td>
</tr>
<tr>
<td>When I press the sleep button:</td>
<td>Sleep</td>
</tr>
<tr>
<td>When I close the lid:</td>
<td>Sleep</td>
</tr>
</tbody>
</table>

Password protection on wakeup

Change settings that are currently unavailable

- Require a password (recommended)
  When your computer wakes from sleep, no one can access your data without entering the correct password to unlock the computer. [Create or change your user account password](#)

- Don’t require a password
  When your computer wakes from sleep, anyone can access your data because the computer isn’t locked.
Replacing or Upgrading a Power Supply

- Watts
- Dual Rail Power Supply
- Auto Switching
- Component Power Requirements
Do not disassemble a power supply!

Power supplies are not normally disassembled. Manufacturers often rivet them shut. Even when a power supply can be disassembled, you should not take it apart unless you have a background in electronics.
Adverse Power Conditions

Overvoltage - Spike and Surge

Undervoltage - Brownout, Sag, and Blackout

- Surge Protectors
- Line Conditioners
- Uninterruptible Power Supply (UPS)
- Standby Power Supply (SPS)
- Phone Line Isolator
Use a Type C or a Type A-B-C fire extinguisher to put out the fire. Type C fire extinguishers are made specifically for electrical (Type C) fires.
It is important that technicians be able to communicate effectively both written and orally, be comfortable working in a team environment, and possess critical thinking skills.

Documentation should be written for others to read and understand.

Email is a common means of communication for technicians, so take the time to communicate effectively using email.

The number-one complaint about technical support staff is not their lack of technical skills but their lack of communication skills. Spend as much of your education practicing your communication skills as you do your technical skills.
Understand preventive maintenance procedures.

Power down a computer, remove the power cord/power brick/battery, and allow a laser printer to cool before performing maintenance.

Know what the +5 and +12 volts are used for in a computer.

Review a couple of videos on laptop disassembly. Know where the common parts, including the following, are located on different vendors’ products: memory, wireless antennas, mini PCI/PCIe adapters, DC power jack, and speakers.

Know what tools are commonly used: flat-tip/Phillips screwdrivers, #0 Phillips screwdriver for laptop and mobile device screws, antistatic wrist strap (don't use in a CRT monitor or inside a power supply).

Know all about static electricity, RFI, and EMI and how to prevent them.

Know the purpose of various power protection devices: surge protector, line conditioner, SPS, UPS, and modem isolator.

Know what type of fire extinguishers are used with electronic devices.

Be able to identify all motherboard, PCIe adapter, and power supply power connectors.

The following communication and professionalism skills are part of the 220-801 exam: Provide proper documentation on the services provided.

Be familiar with all the power options that can be set on a desktop and a mobile device.
• Wearing a wrist strap or staying in contact with unpainted metal keeps you and the computing device at the same electrical potential so you won't induce current into any part and weaken/damage it.
• EMI and RFI cause issues. Move the computer or the offending device and replace all slot covers/openings.
• When removing parts, have the right tools, lighting, antistatic items, and ample work space. Take notes. Don't use magnetized tools. Avoid jarring hard drives.
• Be careful installing an I/O shield and be aware of standoffs when dealing with the motherboard.
• Laptops and mobile devices frequently have compartments for memory and expansion card. These devices frequently have plastic parts that must be removed. A scribe helps with prying plastics and covers off. Laptop speakers and DC power plug frequently have cables that run along the back or sides of the device. Keep screws separated and take notes for any parts removal.
• Ribbon cables have a colored stripe indicating pin 1. Pin 1 of a cable must attach to pin 1 of a connector.
• Preventive maintenance procedures prolong the life of the computer. Vacuum before spraying compressed air.
Chapter Summary

• An MSDS describes disposal and storage procedures and contains information about toxicity and health concerns. Cities/states have specific disposal rules for chemicals, batteries, CRTs, electronics, and so on.

• AC power goes into the power supply or mobile device power brick. DC power is provided to all internal parts of the computing device. AC and DC voltage checks can be done and only with DC power does polarity matter. Use the highest meter setting possible with unknown voltage levels. Power is measured in watts.

• Continuity checks are done on cabling and a good wire shows close to 0 ohms.

• A power supply converts AC to DC, distributes DC throughout a unit, and provides cooling. The power supply must be the correct form factor and able to supply the current amount of wattage for a particular voltage level such as +5V or +12V. Multiple "rails" are commonly available for +12V since the CPU commonly needs its own connection. The number and type of connectors vary, but converters can be purchased.

• Li-ion batteries are used with mobile devices. If a device must be attached to AC power or a USB port to work, replace the battery with one of with the correct DC power jack, appropriate DC voltage level, and current (amperage) equal to or higher than the original power brick.
Chapter Summary

• Conserve mobile device power by adding more RAM, turning off wireless/Bluetooth, configuring power options, reducing screen brightness, and avoiding temperature extremes.
• You use ACPI to control power options through BIOS and the operating system. Wake on LAN and Wake on Ring are power features that allow a device to be powered up from a lowered power condition for a specific purpose.
• An AC circuit tester, multimeter, and power supply tester are tools used with power problems.
• Power issues include overvoltage conditions such as a surge or spike that can be helped with surge protectors, power conditioners, and UPSs. Power conditioners and UPSs help with undervoltage conditions such as a sag. A UPS is the only device that powers a computer when a blackout occurs.
• Ensure that a surge protector has a Class A rating and adheres to the UL 1449 standard.
• Ensure that a UPS outputs a sine wave from the battery and can output enough power for attached devices.
• Have a Type C or Type A-B-C fire extinguisher around in case of fire.
• In all communications and written documentation, be professional and effective. Use proper capitalization, grammar, punctuation, and spelling.
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