Chapter 1: Introduction to Computer Repair

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

- Good qualities of a computer technician
- Important computer parts
- What connects to different ports of a computer
- Basic computer terms
801-1.2: Differentiate between motherboard components, their purposes, and properties.
801-1.5: Install and configure storage devices and use appropriate media.
801-1.7: Compare and contrast various connection interfaces and explain their purpose.
801-1.10: Given a scenario, evaluate types and features of display devices.
801-1.11: Identify connector types and associated cables.
801-1.12: Install and configure various peripheral devices.
801-3.1: Install and configure laptop hardware and components.
801-3.3: Compare and contrast laptop features.
801-5.3: Given a scenario, demonstrate proper communication and professionalism.
802-3.2: Establish basic network connectivity and configure email.
802-3.4: Compare and contrast hardware differences in regards to tablets and laptops.
802-4.8: Given a scenario, troubleshoot and repair common laptop issues while adhering to the appropriate procedures.
New computer technicians should be aware of the CompTIA A+ Certification.

Technicians who have successfully passed the CompTIA A+ Certification exams have proven their higher level of computer and basic networking knowledge.

The CompTIA A+ Certification consists of two exams: CompTIA A+ 220-801 and 220-802.

This course covers all of the CompTIA A+ Certification exam objectives.

http://certification.comptia.org/getCertified/certifications/a.aspx
Basic Computer Parts

- Hardware
- Software
- Firmware
- Operating System
- Device Driver
Basic Computer Parts

- **Hardware**: Physical components
- **Firmware**: Software built into hardware (chips)
- **Software**: One or more programs
  - **Operating System (OS)**:
    - Runs the hardware.
    - Controls the interaction between hardware and application software.
  - **Device Driver**:
    - Software that enables the OS to communicate with hardware devices
Personal Computer Hardware

- Power Supply
  - Purpose?
- Hard Drive
  - How does this record?
- Optical Drive
  - How does this record?
- Motherboard?
- Adapter?
- Memory?
- Riser board?

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Fig. 1.11 Pg. 11
Personal Computer Hardware

- Power Supply: Convert AC voltage to DC voltage
- Hard Drive: Magnetic external storage
- Optical Drive: Optical external storage
- Motherboard: Main circuit board
- Adapter: Circuit boards (cards) used to expand the ability of a computer
- Memory: Internal storage
- Riser board: Allows horizontal installation of adapter cards in small desktop computers
Memory
- RAM: Random Access Memory
  - Volatile
  - SIMM: Single In-line Memory Module
  - DIMM: Dual In-line Memory Module
- ROM: Read Only Memory
  - Non-volatile
  - BIOS: Basic Input Output System
  - Flash memory
Personal Computer Hardware

- Ports
- Mice: Mechanical vs. Optical
- Keyboards: Mechanical vs. Capacitive
- Video Ports
  - Video Graphics Adapter (VGA)
  - Super Video (S-video)
  - Composite Out
  - Digital Visual Interface (DVI): four types (see page 20)
  - High Definition Multimedia Interface (HDMI)
Wireless Connectivity

- Infrared (IR): Short distance (e.g. TV Remote)
- Radio Frequency (RF): Longer distances
- Bluetooth (RF):
  - Typical range: 10 meters (32.8 feet)
  - Other classes:
    - 6 meters (? Feet)
    - 22 meters (? Feet)
    - 100 meters (? Feet)
External Integrated Ports

- Mouse
- Keyboard
- Video
- USB
- Parallel
- Serial
- Audio
- FireWire
- eSata
- Network
- Modem
External Integrated Ports

• Mouse & Keyboard:
  • USB: Universal Serial Bus
  • mini-DIN (Deutsches Institut für Normung: German Institute for Standardization)

• Video
  • RCA
  • DVI: Digital Visual Interface (see pg. 20)
    • Single link vs. Dual link
    • DVI-I: digital and analog
    • DVI-D: digital only
  • HDMI: High Definition Multimedia Interface
    • A,B,C & D connectors (see pg. 21)
External Integrated Ports

• USB (pg. 22)
  • 127 devices
  • 1.0 : up to 12 Mbs, max cable length: 3 meters
  • 2.0 : up to 480 Mbs, max cable length: 5 meters
  • 3.0 : up to 5 Gbs, max cable length: 3 meters, can transmit data two directions at a time
• Charging
  • Power to run and charge devices
• Sleep and Charge
  • Power to charge devices even when computer is off
• Upstream port (“A” connector) heads toward computer
• Downstream port (“B” connector) heads toward hubs and peripheral devices
External Integrated Ports

• IEEE 1394 (Institute of Electrical and Electronic Engineers)
  • Apple Firewire
  • Sony i.Link
  • Texas Instruments Lynx
  • Supports Asynchronous & Isochronous data transfer
    • Asynchronous: not timed by system clock. Uses extra bits to mark data endpoints.
    • Isochronous: usually for streaming video/audio
  • Speeds: 100 – 3200 Mbps
    • Usually included in name, e.g. Firewire 400
  • 4, 6 & 9-pin cables: 9-pin provide power
  • IEEE 1394c uses RJ-45 connector
  • IEEE 1394d uses fiber optic connector
External Integrated Ports

• Parallel and Serial
  • used on older computers
  • Obsolete, replaced by USB

• Audio
  • S/PDIF: Sony/Phillips Digital Interface
    • RCA jacks
    • Fiber optic
External Integrated Ports

- **eSATA**
  - external Serial Advanced Technology Attachment
  - Used for external storage devices
  - Max 2 meter cable length
- **eSATAp**
  - Combination eSATA & USB
  - Provides “p”ower
- **Network**
  - Ethernet most common
  - RJ-45 connector
- **Modem**
  - Connects to phone line with RJ-11 connector
Employers seek computer technicians with good "soft skills," as well as good computer skills.

Soft skills include good communication skills, a positive attitude, and the ability to work with people in a professional manner.

Active listening, a good attitude, and a thorough understanding of computer terminology with the ability to communicate with people at a level they will understand.
Get a good night’s rest the night before the exam.

Make 3x5 cards with ports you have a hard time remembering. Put a picture of the port on one side and the term on the other. Take the cards with you wherever you go the week before the exam.
Chapter Summary

• Computer technicians should actively listen, have a positive attitude, refrain from using technical acronyms and terminology when speaking with nontechnical people, and be culturally sensitive.

• Easily identify important computer parts installed in a computer and as standalone parts: case, keyboard, mouse, motherboard, monitor, power supply, hard drive, optical drive, adapter, riser board, and memory.

• Easily identify various ports to determine what device attaches to them: VGA, DVI, HDMI, DisplayPort, USB, IEEE 1394, 3.5mm sound jack, PS/2, RJ-45, eSATA, parallel, serial, and RJ-11.

• The most popular method for adding functionality to desktops, laptops, and tablets is to use a USB port.
Chapter Summary

• USB 3.0 ports will accept 3.0 and older devices and provide more power. You can add additional ports by connecting a USB module to motherboard pins. This module takes an expansion space (but not a slot). A PCI/PCIe adapter can also be installed to provide additional ports.
• Up to five USB hubs can be daisy-chained to one port. Upstream ports connect to the computer or another USB port. Devices connect to downstream ports.
• USB hubs can be self-powered or bus powered.
• IEEE 1394 devices do not have to have a computer port and can be cabled to each other; otherwise, an IEEE 1394 device can be cabled to a port or a hub.
• USB and IEEE 1394 troubleshooting issues commonly relate to power, drivers, or system resources.