

Chapter 3

Computer Assembly

Introduction

This chapter addresses the process of the computer assembly process. The ability to successfully assemble a computer is a milestone for the PC Technician. It builds confidence and helps to demystify computer components. Although the process of assembling a computer is not dangerous, safety procedures must be followed in order to avoid hazardous situations. Review the safety precautions in Appendix C. Also, make sure the following important items are taken into account during the assembly process:

- Keep the work area free of clutter and clean.
- Food and drinks are not allowed in the work area.
- Remove all jewelry and watches.
- Make sure the power is off and the power plug has been removed when working inside the computer,
- Never look into a laser beam. Lasers are found in computer-related equipment.
- Make sure that the fire extinguisher and first aid kit is available.
- Cover sharp edges with tape when working inside the computer case.
- Monitors are out of the scope of this course. They can store up to 25,000 voltsDo not open or work on the monitor.

ESD Precautions

Electrostatic discharge (ESD) is more commonly referred to as static electricity. Static charges can build up in the body just by walking across the room. It might not be apparent, but it is usually enough to damage computer components if they are touched. A static charge of 2000 volts is enough for a person to notice – this may have been experienced when walking across a room and touching a doorknob or other metal surface. A static charge of only 200 volts is sufficient to damage a computer component. Be aware that damage can be done to a component through ESD without even realizing it.

ESD is probably the greatest enemy when unwrapping newly purchased computer parts and components and are ready to assemble the computer. List six precautions to take in the assembly process that will help prevent ESD related damage:

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

Creating a Computer Inventory

The first step in the computer assembly process is to get organized. A sample Inventory Checklist is provided in Appendix C. Besides the checklist, it is important to save all the documentation that comes with the components. Store original documentation in zip lock type bags and paper work in three-ring binders. Also, keep a notebook in which web sites can be referenced with useful information related to components such as devices drivers, and so on.

Describe a scenario where the inventory and related documentation would come in handy:

Computer Components

There are two types of computer cases: desktop and tower. Tower cases include mini, mid-size, and full-size. List the factors that should be considered when determining the type of computer case to use:

The power supply unit provides electrical power for every component inside the system unit. In the past, it also supplied alternating current (AC) to the display monitor. The computer power supply plays the critical role of converting commercial electrical power received from a 120-volts AC, 60-Hz (or 220-volts AC, 50-Hz outside the U.S.) outlet into other levels required by the components of the computer. The power supply unit also provides the system's ground.

There are two basic types of power supplies. List them:

1. _____
2. _____

A motherboard location map shows where the major components and hardware is located on the motherboard. A motherboard map can be found in the documentation that comes with the motherboard.

Why is it important to study the motherboard location map before proceeding with the installation?

Configuring the motherboard is one of the most important tasks to accomplish when preparing the motherboard for installation of the various components.

The motherboard must be configured for the frequency of the _____

Hardware settings are made through the use of mini jumper connectors on the motherboard. Jumpers are devices that bridge pins on circuit boards. Closing or opening the circuits establishes logic levels to select functions for the operation of the board. (Data generally does not travel through these circuits.) On current technology motherboards, most of the jumpers relate to the central processing unit (CPU).

How are jumpers set and where is the information used to set the jumpers found?

Several other jumper settings might have to be set along with the general motherboard configurations. Describe what each one is used for:

Basic Input/Output System (BIOS) recovery

Clear Complementary Metal Oxide Semiconductor (CMOS)

Password clear

BIOS setup access

Processor voltage

Configuring the motherboard typically means the following:

- Installing the CPU.

List the two main types of CPU interfaces:

_____ and _____

What happens if the proper voltage is not set? _____

- Installing the heat sink and fan. What is a “boxed processor”?

- Installing RAM. Two common types of memory modules are used on most PCs. List them and explain the difference.

Why should exact combinations be used when installing memory? _____

- Connecting the power supply cables to the motherboard power connectors and connecting miscellaneous connectors to the correct switches and status lights on the front case panel is completed after the motherboard has been installed in the computer case. Most modern connections are keyed. What does this mean?

Describe the steps to follow when installing a floppy drive.

1. _____
2. _____
3. _____
4. _____
5. _____

The steps to install a hard drive and CD-ROM drive are similar. Prior to installing these drives, the jumper settings must be set. The designation of a hard drive or CD-ROM drive as either master or slave is generally determined by the jumper configuration, not by the order in which the drive is daisy-chained to the other drive. What is the only exception?

Briefly summarize the differences between the floppy drive and hard drive ribbon cables:

The video card is the only expansion card that must be installed before booting the PC for the first time. Why?

Final Steps

Use the Assembly Checklist in Appendix C to ensure that all items have been completed before closing the computer case. The final steps include connecting the keyboard, mouse, and the monitor. Plug the AC power cord into the back of the power supply and into the wall socket. The computer can now be turned on.

Booting the System for the First Time

What does BIOS stand for?

What is the function of BIOS?

Where is the BIOS and the information required to configure it stored?

What does POST stand for and what does it do?

It is especially important to get the BIOS set up right the first time the PC is booted up. Because the BIOS scans the system at boot time and compares what it finds against settings in CMOS, it must be properly configured to avoid errors.

Explain how to enter the BIOS setup.

List the fields that are available for editing on the Standard CMOS setup screen:

1. _____
2. _____
3. _____
4. _____
5. _____

Discuss an advanced feature that can be set up in the BIOS Features setup screen.

The Chipset Features setup screen allows the fine-tuning of the control parameters for the main system chipset. This chipset controls the following:

1. _____
2. _____
3. _____
4. _____

The Power Management setup screen controls the computer's optional power management for devices. When enabled, devices can be controlled to go into sleep or suspend mode. Why is it recommended that these features be disabled?

The Plug and Play/Peripheral Component Interconnect (PnP/PCI) Configuration screen contains the feature settings that control the system Input/Output (I/O) bus, IRQ, and direct memory access (DMA) allocation for Integrated Services Adapter (ISA) and PCI

Labs and Worksheets

The following labs and worksheets are available in *CISCO NETWORKING ACADEMY PROGRAM IT Essentials I: PC Hardware and Software Lab Companion* and as part of the online curriculum. Labs and worksheets are an excellent tool that you can use to help reinforce the material covered in this chapter.

Labs:

- 3.3.4** The Computer Case and Power Supply
- 3.5.3** Motherboard Installation
- 3.6.4** Floppy Drive, Hard Drive, and CD-ROM Installation
- 3.7.1** Video Card Installation and System Booting

Worksheets:

- 3.3.4** Power Supplies
- 3.9.1** What is BIOS?

A+ Exam Review Questions

The following are review questions for the A+ exam. Answers are found in Appendix A.

1. What does ESD stand for?
 - a. Electronic stasis device
 - b. Electrostatic discharge
 - c. Electric surge device
 - d. Electronic system driver
2. How do you best prevent damaging a computer with static electricity?
 - a. Always use a rubber mat as a work surface
 - b. Always touch a ground point on the chassis to discharge static
 - c. Always take off your shoes before working inside a computer
 - d. Always wear an ESD strap when working inside a computer
3. To help prevent ESD, humidity levels should be kept at?
 - a. Between 20 percent and 30 percent
 - b. Exactly 50 percent
 - c. Humidity is not a factor
 - d. Above 50 percent
4. The PC power supply
 - a. Provides AC current to the system components
 - b. Converts AC power to DC power
 - c. Connects the computers components to a power source
 - d. Protects the computer components against power surges
5. The power supply voltage can be checked by measuring the P8 and P9 connections with a?
 - a. Multiprobe
 - b. Cable tester
 - c. Multimeter
 - d. Battery

6. What is a memory bank?
 - a. The cache where memory is stored
 - b. The actual slot that memory goes into
 - c. The collection of all memory
 - d. Virtual memory
7. The correct positioning when installing SIMM modules is indicated by a?
 - a. Missing pin
 - b. Red stripe
 - c. Notch on one end
 - d. Red 1
8. To install a DIMM module, you need to?
 - a. Line up straight over the socket and press in
 - b. Tilt 45 degrees and push
 - c. Press down on the lever
 - d. Line up all metal pins and slide
9. Which components reside in expansion slots on the motherboard?
 - a. CPU, RAM, and power plugs
 - b. Keyboard, mouse, and printer
 - c. Network interface, sound, and SCSI cards
 - d. CD-ROM, floppy, and hard drives
10. The purpose of expansion slots is to?
 - a. Expand the CPU
 - b. Allow the hard drive and floppy drive to communicate with the CPU
 - c. Add processing power to the computer
 - d. Allow the addition of optional components
11. Care should be taken when handling an expansion card. Do not touch the?
 - a. Metal bracket
 - b. Metal edge connectors
 - c. Corners of the card
 - d. Connector slots

12. Which type of expansion card is configured using software instead of jumpers?
 - a. Configured cards
 - b. 32-bit cards
 - c. 16-bit cards
 - d. Plug and Play cards
13. When you connect a ribbon cable, install the connector by?
 - a. Connecting the black stripe to pin #1
 - b. Connecting the black stripe to pin #2
 - c. Connecting the red stripe to pin #1
 - d. Connecting the red stripe to pin #2
14. When installing an IDE drive, which jumper settings are not a factor?
 - a. Single
 - b. Slave
 - c. Master
 - d. Secondary
15. The length of cable for an IDE/ATA hard drive is limited to?
 - a. It is not limited
 - b. 12" exactly
 - c. 18" and less
 - d. 20" or more
16. How should the jumpers be set on your IDE CD-ROM drive when it is attached to the primary IDE adapter with your hard drive?
 - a. Master
 - b. Slave
 - c. Remove the jumpers
 - d. Auto
17. Plugging in or unplugging a keyboard with the power turned on can damage the?
 - a. Hard drive
 - b. Mouse
 - c. Motherboard
 - d. Keyboard

18. A mouse plugs into a?
 - a. RJ11 port
 - b. PS/2 or USB
 - c. Parallel port
 - d. RJ45 port
19. How are PCI devices configured?
 - a. During DOS boot
 - b. The Internet
 - c. Windows setup
 - d. They are always self-configuring
20. How many pins are there in an IDE connector?
 - a. 80
 - b. 50
 - c. 68
 - d. 40
21. The length of a SCSI cable is determined by the?
 - a. Number of devices
 - b. Computer's speed
 - c. SCSI device
 - d. Thickness of the cable
22. A technique that loads the system BIOS from ROM into system RAM during the boot is?
 - a. Fault tolerance
 - b. Int19
 - c. Shadowing
 - d. Loading
23. Basic instructions for CPU and I/O device communication are located in?
 - a. CMOS
 - b. Windows configuration files
 - c. DOS
 - d. BIOS

24. Which software or firmware routine is executed first during the computer boot up procedure?
- a. BIOS
 - b. CMOS
 - c. CONFIG.SYS
 - d. WIN.INI
25. Circuit boards or devices should not be added or removed?
- a. Until software is installed
 - b. With a grounding strap on
 - c. Until the computer is not busy
 - d. With power on