★ *CSWT PROJECT*

★ **Topic: Assembling and Disassembling the PC back to Woking Condition.**

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Computer Assembly

1. Open the case
2. Install the power supply
3. Attach the components to the motherboard
4. Install the motherboard
5. Install internal drives
6. Install drives in external bays
7. Install adapter cards
8. Connect all internal cables
9. Re-attach the side panels
10. Connect external cables to the computer
11. Boot the computer for the first time

Introduction

- Computer assembly is a large part of a technician's job.

- Work in a logical, methodical manner when working with computer components

- Improve computer assembly skills dramatically with practice

Open the Case

- Prepare the workspace before opening the computer case:

    - Adequate lighting

    - Good ventilation

    - Comfortable room temperature

    - Workbench accessible from all sides

    - Avoid cluttering workbench

    - An antistatic mat on the table

    - Small containers to hold screws and other small parts

- There are different methods for opening cases.

    - To learn how, consult the user manual or manufacturer's website.

Install the Power Supply

Power supply installation steps include the following:

1. Insert the power supply into the case

2. Align the holes in the power supply with the holes in the case

3. Secure the power supply to the case using the proper screws

Attach Components to the Motherboard

- As part of an upgrade or repair, a technician may need

  - to attach components to the motherboard, and then

  - install the motherboard.
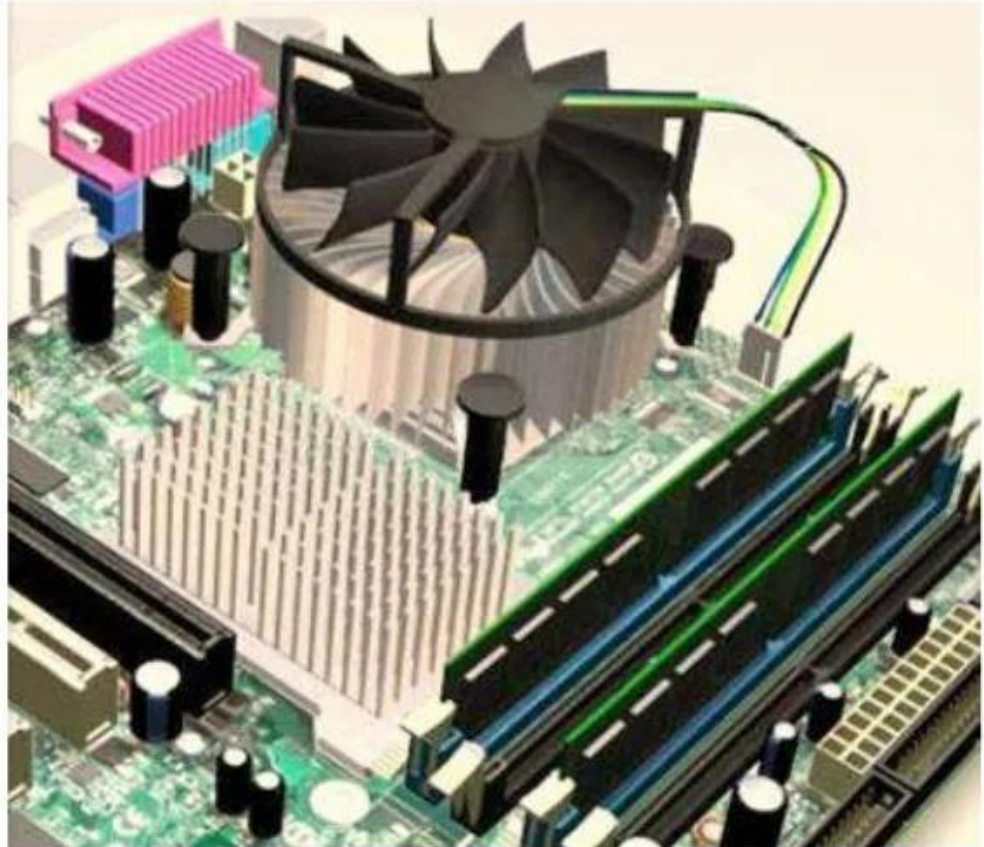
CPU on Motherboard

- The CPU and **motherboard** are sensitive to electrostatic discharge
  - use a grounded antistatic mat and
  - wear an antistatic wrist strap.
- **CAUTION**:
  - When handling a CPU, do not touch the CPU contacts.
- The CPU is secured to the **socket** on the motherboard with a **locking assembly**.
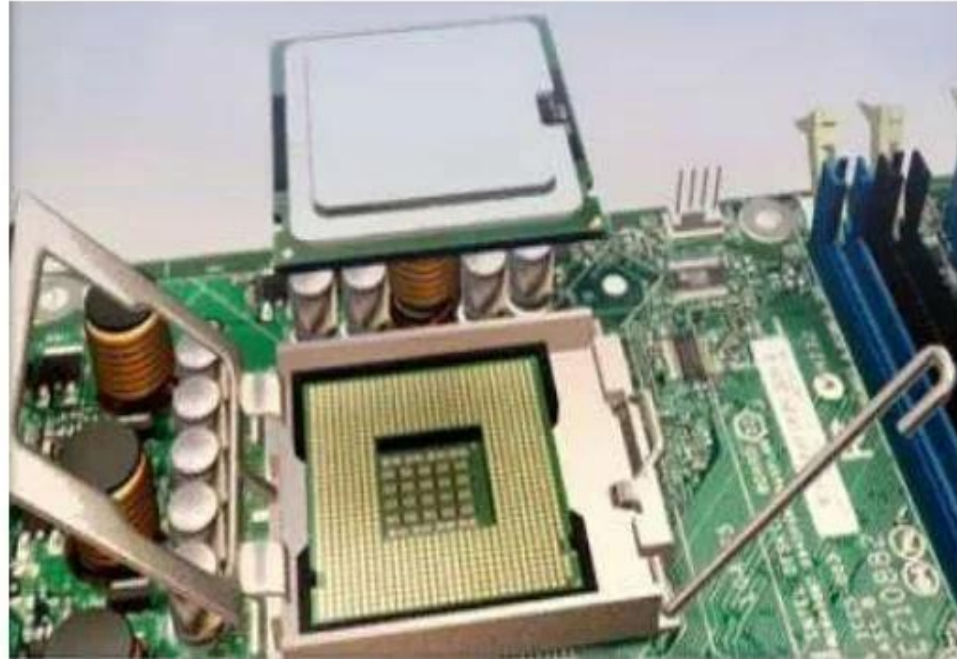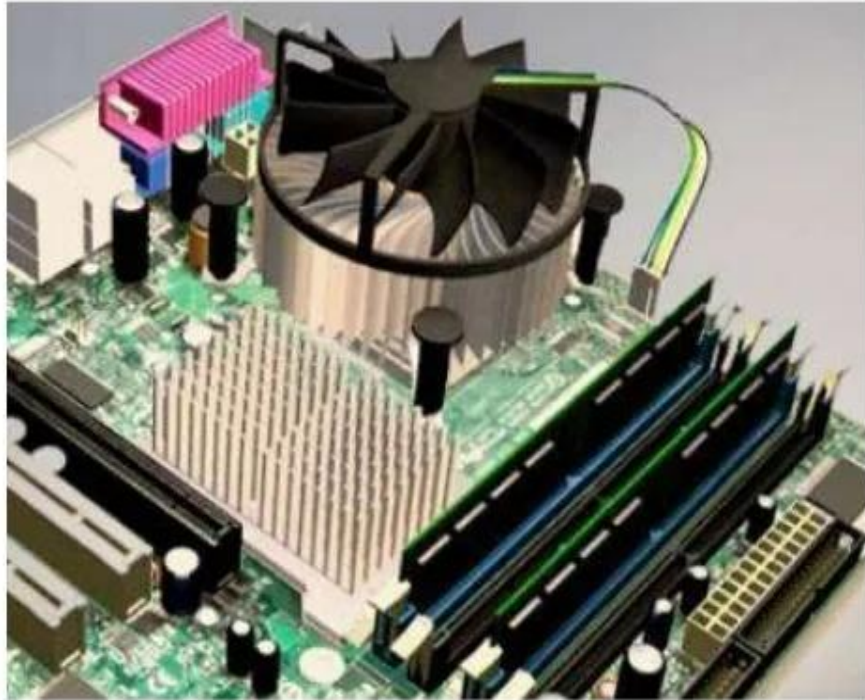
Thermal Compound

- **Thermal compound** helps to keep the CPU cool.

- To install a used CPU,

- clean the base of the heat sink with isopropyl alcohol to remove the old thermal compound.

- Follow manufacturer's recommendations about applying the thermal compound.

Heat Sink/Fan Assembly

The **Heat Sink/Fan Assembly** is a two-part cooling device.

1. The heat sink draws heat away from the CPU.

2. The fan moves the heat away from the heat sink.

▪ The heat sink/fan assembly usually has a 3-pin power connector.

Install CPU and Heat Sink/Fan Assembly

1. Align the CPU so that the Connection 1 indicator is lined up with Pin 1 on the CPU socket.

2. Place the CPU gently into the socket.

3. Close the CPU load plate and secure it by closing the load lever and moving it under the load lever retention tab.

4. Apply a small amount of thermal compound to the CPU and spread it evenly.

5. Line up the heat sink/fan assembly retainers to the holes on the motherboard.

6. Place the heat sink/fan assembly onto the CPU socket, being careful not to pinch the CPU fan wires.

7. Tighten the heat sink/fan assembly retainers to secure the assembly in place.

8. Connect the heat sink/fan assembly power cable to the header on the motherboard.
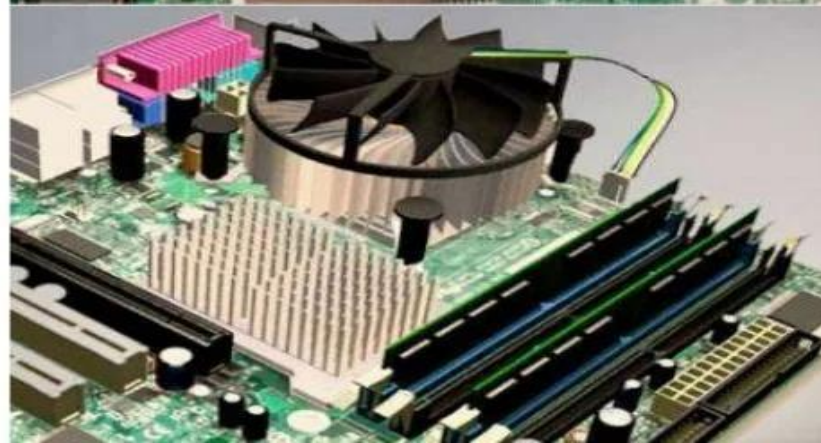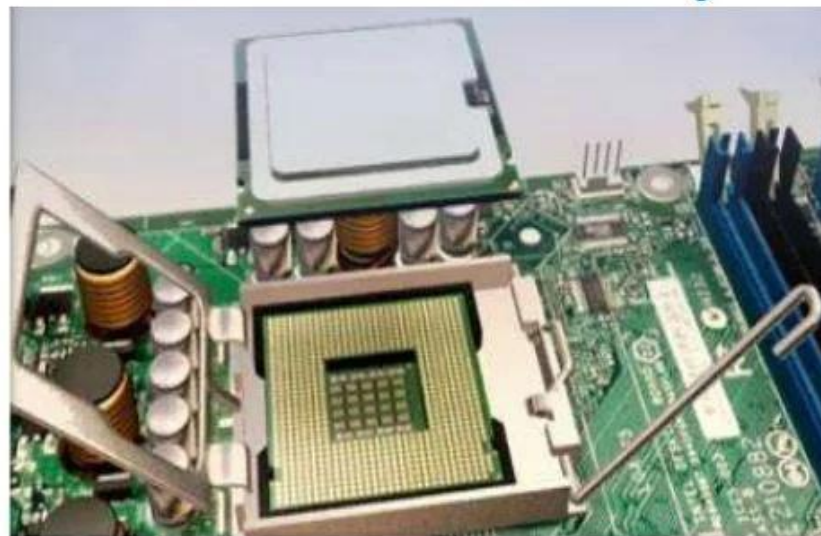
Install RAM

- **RAM** provides temporary data storage for the CPU while the computer is operating.

- RAM should be installed in the motherboard before the motherboard is placed in the computer case.

- RAM installation steps:

    1. Align the notches on the RAM module to the keys in the slot and press down until the side tabs click into place.

    2. Make sure that the side tabs have locked the RAM module and visually check for exposed contacts.

The Motherboard

- The motherboard is now ready to install in the computer case.

- Plastic and metal **standoffs** are used to mount the motherboard and to prevent it from touching the metal portions of the case.

- Install only the standoffs that align with the holes in the motherboard.

- Installing any additional standoffs may prevent the motherboard from being seated properly in the computer case.

Install Motherboard
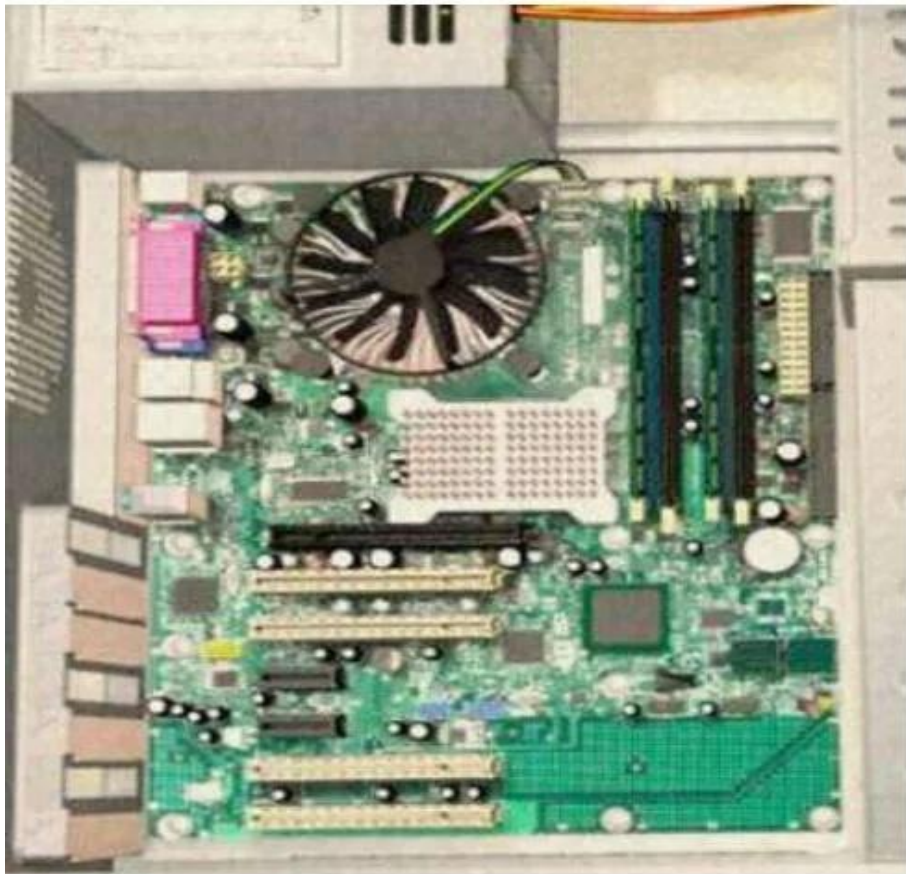
1. Install standoffs in the computer case.

2. Align the I/O connectors on the back of the motherboard with the openings in the back of the case.

3. Align the screw holes of the motherboard with the standoffs.

4. Insert all of the motherboard screws.

5. Tighten all of the motherboard screws.

Install Internal Drives

■ Drives that are installed in internal bays are called internal drives.

■ A hard disk drive (**HDD**) is an example of an internal drive.

HDD installation steps:

1. Position the HDD so that it aligns with the 3.5-inch drive bay.

2. Insert the HDD into the drive bay so that the screw holes in the drive line up with the screw holes in the case.

3. Secure the HDD to the case using the proper screws.

Install Drives in External Bays

- Drives, such as **optical** drives (**CD** and **DVD**) and **floppy** drives, are installed in drive bays that are accessed from the front of the case.

- Optical drives and floppy drives store data on removable media.

- Drives in **external bays** allow access to the media without opening the case.

Install Optical Drive

- An **optical drive** is a storage device that reads and writes information to CDs or DVDs.


- Optical drive installation steps:

    1. Position the optical drive to align with the 5.25 inch drive bay.

    2. Insert the optical drive into the drive bay so that the optical drive screw holes align with the screw holes in the case.

    3. Secure the optical drive to the case using the proper screws.

Install Adapter Cards

- Adapter cards are installed to add functionality to a computer.
- Adapter cards must be compatible with the expansion slot.
- Some adapter cards:

  - PCIe x1 NIC

  - PCI Wireless NIC

  - PCIe x16 video adapter card

Wireless NIC

NIC   Video Adapter Card
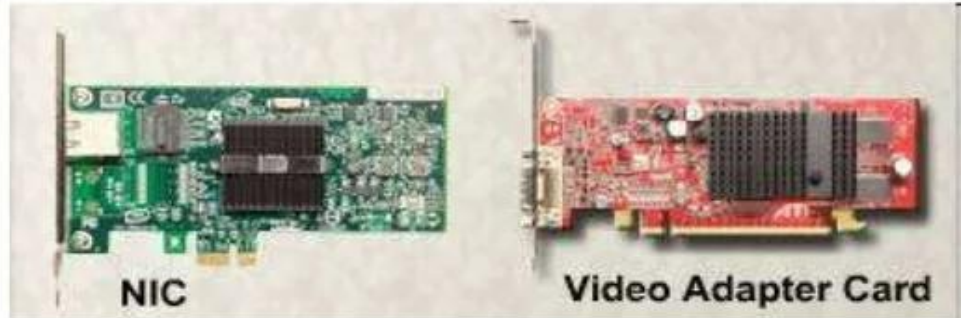
Install the Network Interface Card (NIC)

- A NIC enables a computer to connect to a network.

- NICs use **PCI** and **PCIe** expansion slots on the motherboard.

- NIC installation steps:

  1. Align the NIC to the appropriate slot on the motherboard.

  2. Press down gently on the NIC until the card is seated.

  3. Secure the NIC PC mounting bracket to the case with the appropriate screw.

Install the Video Adapter Card

- A video adapter card is the interface between a computer and a display monitor.

- An upgraded video adapter card can provide better graphic capabilities for games and graphic programs.

- Video adapter card installation steps:

  1. Align the video adapter card to the appropriate expansion slot on the motherboard.

  2. Press down gently on the video adapter card until the card is fully seated.

  3. Secure the video adapter card PC mounting bracket to the case with the appropriate screw.

Connect Internal Cables
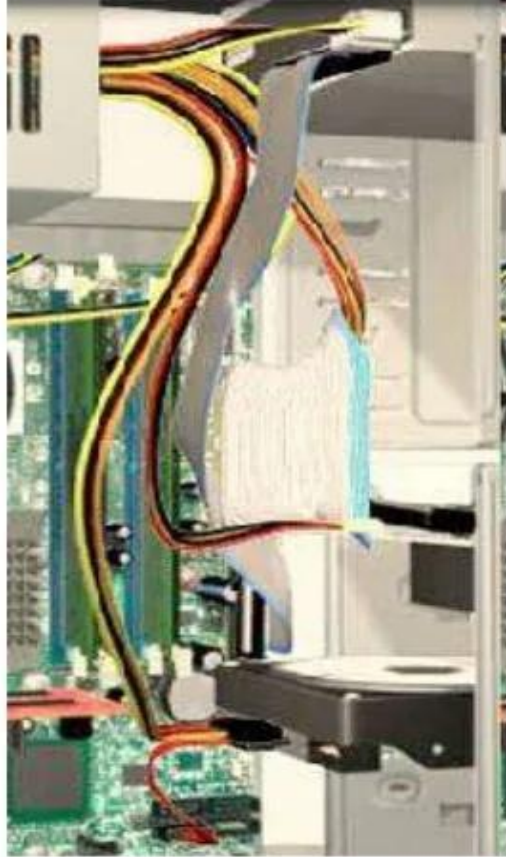
- **Power cables** are used to distribute electricity from the power supply to the motherboard and other components.

- **Data cables** transmit data between the motherboard and storage devices, such as hard drives.

- Additional cables connect the buttons and link lights on the front of the computer case to the motherboard.

Connect Power Cables

Motherboard Power Connections

- The Advanced Technology Extended (**ATX**) main power connector has either 20 or 24 pins.
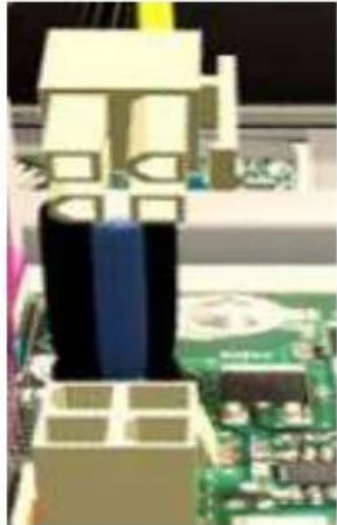
- The power supply may also have a 4-pin or 6-pin Auxiliary (**AUX**) power connector that connects to the motherboard.

- A 20-pin connector will work in a motherboard with a 24-pin socket.

Connect Power Cables

SATA
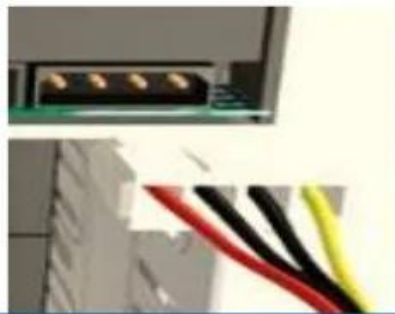
Molex

Berg

- **SATA** Power Connectors use a 15-pin connector to connect to hard disk drives, optical drives, or any devices that have a SATA power socket.

- **Molex** Power Connectors are used by hard disk drives and optical drives that do not have SATA power sockets.

- **CAUTION:** Do not use a Molex connector and a SATA power connector on the same drive at the same time.

- 4-pin **Berg** Power Connector supplies power to a floppy drive.

SATA Cables

- The **SATA** data cable has a 7-pin connector.

    - One end of the cable is connected to the motherboard.

    - The other end is connected to any drive that has a SATA data connector.

Install Data Cables

1. Plug the motherboard end of the PATA cable into the motherboard socket.

2. Plug the connector at the far end of the PATA cable into the optical drive.

3. Plug one end of the SATA cable into the motherboard socket.

4. Plug the other end of the SATA cable into the HDD.

5. Plug the motherboard end of the FDD cable into the motherboard socket.

6. Plug the connector at the far end of the FDD cable into the floppy drive.

Re-attach Panels, Connect External Cables

- Now that all the internal components have been installed and connected to the motherboard and power supply,

- The side panels are re-attached to the computer case.

- The next step is to connect the cables for all computer peripherals and the power cable.

Re-attach Side Panels

- Most computer cases have two panels, one on each side.

- Once the cover is in place, make sure that it is secured at all screw locations.

- Refer to the documentation or manufacturer's website if you are unsure about how to remove or replace your computer case.

- **CAUTION:** Handle case parts with care. Some computer case covers have sharp or jagged edges.

Connect External Cables

- After the case panels have been re-attached, connect the external cables to the back of the computer.

- External cable connections include:

  Monitor

  Keyboard Power

  Mouse

  Ethernet

  USB

- **CAUTION**: When attaching cables, never force a connection.

- **NOTE**: Plug in the power cable after you have connected all other cables.

Connect External Cables

1. Attach the monitor cable to the video port.

2. Secure the cable by tightening the screws on the connector.

3. Plug the keyboard cable into the PS/2 keyboard port.

4. Plug the mouse cable into the PS/2 mouse port.

5. Plug the USB cable into a USB port.

6. Plug the network cable into the network port.

7. Connect the wireless antenna to the antenna connector.

8. Plug the power cable into the power supply.

Boot Computer for the First Time

- The BIOS is a set of instructions stored in a **nonvolatile** memory chip.

- When the computer is booted, the basic input/output system (**BIOS**) will perform a power-on self test (**POST**) to check on all of the internal components.

- A special key or combination of keys on the keyboard is used to enter the **BIOS setup** program.

- The BIOS setup program displays information about all of the components in the computer.

```
Copyright 1996-2002

SWV25.86B.0094.P01.0211111021
SWV2 Production BIOS Version 1.00
BIOS Build 0094

2 X Intel(R) Xeon(TM) CPU 2.00GHz
Testing system memory, memory size=1024MB
1024MB Extended Memory Passed
512K L2 Cache SRAM Passed




USB Legacy ......... Enabled
```

Identify Beep Codes

- POST checks to see that all of the hardware in the computer is operating correctly.

- If a device is malfunctioning, an error or a beep code alerts the technician that there is a problem.

- Typically, a single beep denotes that the computer is functioning properly.

- If there is a hardware problem, the computer may emit a series of beeps.

- Each BIOS manufacturer uses different codes to indicate hardware problems.

- Consult the motherboard documentation to view beep codes for your computer.

BIOS Setup

- The BIOS contains a setup program used to configure settings for hardware devices.

- The configuration data is saved to a special memory chip called a complementary metal-oxide semiconductor (**CMOS**).

- CMOS is maintained by the battery in the computer.

- If this battery dies, all BIOS setup configuration data will be lost.

- Replace the battery and reconfigure the BIOS settings.

BIOS Configuration

- **Technicians use the BIOS information to learn about installed components:**
  - **CPU –** Manufacturer and speed
  - **RAM** - Manufacturer and speed
  - **Hard Drive** - Manufacturer, size, and type
  - **Optical Drive -** manufacturer and type
- **Technicians use BIOS to:**
  - Set Time and Date
  - Disable Devices
  - Set Boot Order
  - Adjust Clock Speed
  - Enable Virtualization

BIOS Setup Program

BIOS settings are configured in the BIOS setup program.

```
                        ROM PCI/ISA BIOS
                          SETUP UTILITY

      STANDARD CMOS SETUP          INTEGRATED PERIPHERALS

      BIOS FEATURES SETUP          SUPERVISOR PASSWORD

      CHIPSET FEATURES SETUP       USER PASSWORD

      POWER MANAGEMENT SETUP       IDE HDD AUTO DETECTION

      PNP/PCI CONFIGURATION        SAVE & EXIT SETUP

      LOAD BIOS DEFAULTS           EXIT WITHOUT SAVING

      LOAD PERFORMANCE DEFAULTS

    Esc : Quit                  ↑ ↓ → ←  : Select Item
    F10 : Save & Exit Setup     (Shift) F2 : Change Color


                Time, Date, Hard Disk Type...
```

Summary

Computer Assembly

- Installation of all computer components
- Connection of all cables
- Description of BIOS
- Description of POST

Computer Disassembly

1. Power off the system
2. Unplug power cables
3. Disconnect external cables from the computer
4. Detach the side panels /open the case
5. Disconnect all internal cables
6. Uninstall adapter cards
7. Uninstall drives from external bays
8. Uninstall internal drives
9. Uninstall the motherboard
10. Uninstall/detach the components from the motherboard
11. Uninstall the power supply