**EXPERIMENT ONE**

**TITLE:** MOTHERBOARD AND ITS COMPONENTS

**AIM:** TO DEMONSTRATE ABILITY TO IDENTIFY/INSTALL A COMPUTER SYSTEM MOTHERBOARD

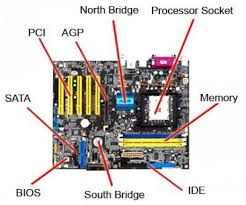
**OBJECTIVE:**

1. At the end of the workshop, students are expected to differentiate types of motherboard.
2. Identify the CPU/CPU socket and ability to install and install CPU on the board.
3. Identify DIMMS/SIMMS memory slots and ability to insert memory (RAM) into their appropriate slots.
4. Identify other motherboard expansion slots for different expansion card.

**SIGNIFICANCE:**

Computer system motherboard is the hub to connect all other various hardware. Hence, the need for students to identify different types of board, install and uninstall computer system motherboard.

**DIAGRAM**

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**Fig. 2 Computer System Motherboard**

**STEPS/PROCEDURE:**

**STEP 1: Heat Sink/fan Assembly**

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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.

Tighten all of the motherboard screws.

**STEP 2: Install CPU**

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1. Align the CPU so that the connection 1 indicator is lined up with pin 1 on the CPU socket.
2. Place the CPU gentle 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 thermal compound to the CPU and spread it evenly. Follow the application instructions provided by the manufacturer.
5. Line up the heat sink/fan assembly retainers to secure 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 board.

***NOTE:*** To install a used CPU, clean it and the base of the heat sink with isopropyl alchohol to remove the old thermal compound.

**Install RAM**



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.

**PRECAUTION:**

1. Handle the motherboard carefully by holding it at the edges.
2. Guide against static charges by wearing anti-static wrist strap.
3. Ensure ZIF (zero insertion force) while inserting the CPU into its socket.

**CONCLUSION:**

Write and submit your conclusion.

**EXERCISE**

1 Draw a well labeled diagram of ATX motherboard.

2 List all the component of modern motherboard.

3 Describe the characteristics of different expansion bus architecture, including ISA, PCI, AGP, USB, VESA and PC card specification.

4. What is the function of the heat sink and fan to the processor?

5. in the absence of heat sink and fan on the processor: what is likely to happen?

**EXPERIMENT TWO**

**TITLE:**  Measurement of Electrical Quantities.

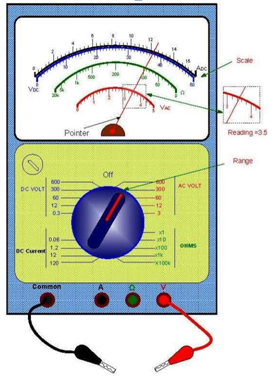
**AIM**: Introduce students to the analogue and digital electrical measuring instruments

**OBJECTIVE:** At the end of this experiment, student should know different kinds of measuring instrument used for various electrical quantities.

**SIGNIFICANCE**: To use the knowledge acquired to determine the instrument used for measuring basic electrical quantities.

**THEORY:**

It is necessary knowing how to measure voltage, current, and resistance. Special types of instruments are used to measure these basic electrical quantities. The instrument used to measure voltages is a voltmeter, the instrument used to measure current is a ammeter, and the instrument used to measure resistance is a ohmmeter. Commonly, all three instruments are combined into a single instrument such as a multimeter or AVO meter (Ampere-Volt-Ohmmeter), in which you can choose what specific quantity to measure by selecting the switch setting. Figure1.1 shows typical portable multimeters, part (a) from figure shows analog multimeter with pointer, and part (b) shows a digital multimeter with digital screen.



Multimeter

Figure shows a typical multimeter. This device can measures the three electric quantities. The following step shows how to obtain readings from a multimeter.

**PROCEDURE**

1. Set the range of the desired quantity to be measured to the highest value.

2. Connect the leads to the right terminals at the meter

3. Switch on the circuit if necessary.

4. Adjust the range until you get clear readings.

5. Apply the following formula to obtain the measured quantity.

Re*ading* ~~~~*Full~~~~**Scale*

~~~~

*Range*

For example, referring to figure (1.3), the reading was 3.5 from a full-scale value of 5V, as shown in the small box. The range was set to X300V.So the measured voltage is

**EXERCISE**

1. Use a multimeter to read a current from a 9V battery
2. Use a multimeter to read a current from 220V power supply battery

**CONCLUSION**

Write a summary on the use of multimeter

**EXPERIMENT THREE**

**TITLE**: Understand the Circuit Component (Color Code Resistor)

**OBJECTIVE**: Objectives of this experiment include;

1. To learn the electronic industries color code of a Resistor.

2. To gain practice in the use of the OHMMETER.

**THEORY**

The unit of resistance is the Ohm. The body of a fixed carbon resistor is a color coded to specify its Ohmic value and tolerance. The first three bands on the resistor designated its resistance. The fourth bands on the resistor designate its tolerance. High wattage, wire wound resistors are not color but have the resistance and wattage value printed on their bodies.

**EQUIPMENT AND COMPONENTS**:

• Ohmmeter.

• Four resistors of different values.

**PROCEDURE**:

1. Determine the value of each resistor supplied from its color code. Fill in the information required in table (1).

2. Zero the ohmmeter. Measure each resistor with the ohmmeter. Fill in the results in the table (1). See the difference between the colors coded value and measured value.

3. Complete table (1).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Resistor | 1st color | 2nd color | 3rd color | 4th color | Color coded value | Measured Value |
| R1 |  |  |  |  |  |  |
| R2 |  |  |  |  |  |  |
| R3 |  |  |  |  |  |  |
| R4 |  |  |  |  |  |  |
| R5 |  |  |  |  |  |  |

**EXERCISE**

What is the value of each type of the following resistor color coded?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Resistor | 1st color | 2nd color | 3rd color | 4th color | Value |
| A | Red | Violet | Brown | Silver |  |
| B | Orange | Blue | Yellow | Gold |  |
| C | Brown | Red | Red | No color |  |

**CONCLUSION**

Write and submit your conclusion

**EXPERIMENT FOUR**

**TITLE**: Identification and troubleshooting computer power supply faults

**AIMS AND OBJECTIVE**: At the end of this workshop, the students should be able to:

1. Identified various PC power connectors
2. Identified various fault of computer power supply;
3. Trouble shooting/Diagnosing various fault of computer power supply

**SIGNIFICANCE:** It helps to identify and be able to troubleshoot any power- on or system start up related failures or lockups

**EQUIPMENT:** Multimeters, sets screw driver, long nose pliers, soldering iron, pair of cutters lead sucker

**PROCEDURES:**

**STEP1:**  Unplug the PC to avoid electric shock

**STEP2:** Remove the screws holding the cover on the PC to remove the power supply with appropriate tools.

**STEP3:** Remove the screws at the back of the power supply to gain access inside.

**STEP4:**  Determine the various stages of the power supply

**STEP5:** Define the problem of the PC power supply

**STEP6:** Identify and isolate the faulty stages/components of the power supply

**STEP7:** Repair the faulty stages/components of the power supply

**STEP8:** Plug in the power supply to the AC power (220V) and test the output voltage of the various connectors

**STEP9:**  If the problem still persists, repeat step 5 & step 8

**STEP10:** If the problem solved, coupled the power pack and make it ready for re- use

**OBSERVATION**:

List any three (3) observations associated with this practical

**PRECAUTION:**

State any four (4) precautions you ensured during the practical

**CONCLUSION:**

Write and submit your conclusion

**WORKSHOP EXERCISE:**

1. State three (3) safety precautions taken while troubleshooting/diagnosing the PC power supply
2. Draw the circuit diagram of PC power supply and explain the various stages of the power supply
3. Identify the various components in the power supply.

**EXPERIMENT FIVE**

**TITLE:** Troubleshooting a faulty Random access memory

**AIMS AND OBJECTIVE:** at the end of this workshop, the students should be able to :

1. Recognized POST error message/code during the boot up of a computer system
2. Troubleshooting the memory problem in a computer system

**SIGNIFICANCE:** Restore memory to normal operational standard having and to show how to protect a memory module from heat or electrical surges.

**EQUIPMENTS:** personal computer, set of screw driver, writ strap, compressed air or a PC vacuum, flux off or Alcohol etc

**PROCEDURES:**

**STEP 1:** Unplug the PC from the power source

**STEP 2:** Gain access to the PC by removing the screw at the back of the computer casing

**STEP 3:** Check your hardware and system configurations to be sure that the memory modules are compatible with the system board and that they are installed in the correct slots

**STEP 4:** Reinstall the computer memory modules by removing the memory modules from the system board, examine them for damage, and examine the system board for damages

**STEP 5:** While the modules are removed, use a soft cloth to clean the contacts of the module using a cleaner called ‘FLU X OFF’ or alcohol. Use compressed air or a PC vacuum to remove dust from the memory socket. Then reinsert the modules.

**STEP 6:** If the problem still occurs, swap or replace the computer memory modules by swapping the position of the memory modules on the system board, reinstalling identical computer memory or installing modules in another identical system to determine whether it is a bad module or socket.

**STEP 7:** Run updated antivirus software to check if it is a virus and resolve it.

**PRECAUTION:**

State any four (4) precautions you ensured during the practical

**CONCLUSION**

Write your conclusion and submit.

**EXERCISE**

1. State three (3) precautions taken while handling memory modules
2. With a well labelled diagram differentiate between DIMM and SIMM

**EXPERIMENT SIX**

**TITLE:** Troubleshooting computer keyboard failure

**AIMS AND OBJECTIVE:** at the end of the workshop, the students should be able to troubleshoot keyboard problems in a computer system

**EQUIPMENT:** Personal computer system, set of screw drivers.

**SIGNIFICANCE:** It helps to restore normal operation of the hanging or malfunctioning keyboard

**PROCEDURES:**

**STEP 1:** Before turn off the computer, first check the windows keyboard setting in device manager found in control panel to see if the keyboard is detected

**STEP 2:** After that, turn off the computer and disconnect the keyboard and verify if there are no bent, burnt or broken pin on the keyboard connector or pin on the back of the computer.

**STEP 3:** Remove the back cover from the faulty keyboard and check for the presence of a fuse in the +5VDC supply and check it for continuity

**STEP 4:** Clean inside the keyboard

**STEP 5:** Try a different keyboard if you are having trouble with keys recognized or if cleaning the key does not help

**STEP 6:** Try a different keyboard controller chip on the motherboard and examine it. See if it is damaged in anyway, if it is, then it needs to be replaced (either that or the motherboard)

**STEP 7:** If the controller chip is socketed; check to see if it is fully in the socket. Gently or firmly push down on the chip.

**STEP 8:** Switch the keyboard with another one and see if the second works.

**PRECAUTION:**

State any four (4) precautions you ensured during the practical

**CONCLUSION**

Write and submit your conclusion.

**EXERCISE**

Draw a well labelled diagram of a computer keyboard.

**EXPERIMENT SEVEN**

**TITLE:** Troubleshooting computer hard disk drive failure

**AIMS AND OBJECTIVE:** at the end of this workshop, the students should be able to troubleshoot computer hard disk drive (HDD) problem in a computer system

**SIGIFICANCE**: It helps in restoring bad hard disk drive HDD for a PC

**EQUIPMENT:** Personal Computer System, set of screw multimeters

**PROCEDURES:**

**STEP 1:** Firstly check CMOS set up for hard disk detection. Then,

**STEP 2:** Turn off the computer remove the screw to open the case in order to gain access to the computer

**STEP 3:** Verify that power cable runs to the suspected hard disk drive and test the voltage output of the power lead to the disk drive, be sure that the 12V for the mechanical parts and the 5V

**STEP 4:** Verify that the data ribbon cables (IDE Cable) are firmly attached and that the cable is inserted correctly with the thin redline on the cable next to the first pin of the hard disk drive connector

**STEP 5:** If you experienced a problem immediately after installing a disk drive to the computer verify before installing a new disk drive that it is compatible with the motherboard.

**STEP 6:** Verify the jumper setting on the hard disk drive is properly set.

**STEP 7:** Also verify that the HDD is detected in the CMOS set up after installation

**PRECAUTION:**

State any four (4) precautions you ensured during the practical

**CONCLUSION**

Write and submit your conclusion

**EXERCISES**

1. Draw a well labelled diagram of a hard disk drive
2. Draw the pin out connection of a hard disk drive power connection