

UNIT 2

Microcomputer Troubleshooting

Troubleshooting of microcomputer is a challenging task. This is due to the fact that computer is a very high-precision and complex system consisting of a number of different components. A particular problem may be caused by a number of reasons. This unit describes the general approach of troubleshooting. It explores the major components of a computer. Before you start the troubleshooting you must have a number of tools or devices. They are also summarized here.

Lesson 1: Troubleshooting Approach, Components of a Computer

1.1 Learning Objectives

Upon completion of this lesson of the Unit you will be able to:

- Understand basics of troubleshooting approaches.
- Know about the different components of a computer.
- Know the tools used for hardware troubleshooting.
- Understand sources of heat for a computer and the cooling methods.



1.2 Troubleshooting Approaches

In today's world of automation if a computer does not function properly, entire system is suspended. In personal level the user can not do his/her daily

important jobs. For instance, if the Server of the result processing system of a university becomes non-functioning all students' results should be suspended until the system is restored again.

Hence, in order to troubleshoot a microcomputer it is important to understand the present situation, diagnose the problem and finally find a suitable solution to the issue. A step-by-step methodical approach is always better than some random guess to the underlying problem.

Followings are the standard six step for microcomputer troubleshooting:

- **Step 1:** Problem Identification. This is the first step and success of the entire process depends on how clearly the problem is identified. Exhaustive questions to the user of the computer about the problem is an effective tool. It is important to take the important backups at this stage.
- **Step 2:** Establish a theory of probable cause. To establish the theory the user experience or responses to questions at Step 1 can be used. Additional questions may be asked in this case.
- **Step 3:** Test the theory to determine cause. Use different cases to identify the root cause of the problem.
- **Step 4:** Act for the solution. Establish a plan of action to resolve the problem and implement the solution.
- **Step 5:** Test and prevent. Verify full system functionality and implement preventative measures
- **Step 6:** Report. Findings, actions, and outcomes should be clearly documented with proper explanation and time-line. This document is very useful for troubleshooting similar type of problem in the near future.

1.3 Components of a Microcomputer

Major objective of this section is to make the reader familiar with the internal and external components of a typical microcomputer. Details of each component will be discussed in more details in the subsequent chapters.

The next part of these notes will explore different hardware components of a typical computer.

It is strongly advisable to finish this lesson in presence of a computer so that you can readily map the instruction to the corresponding component.

1.3.1 Central Processing Unit (CPU)

The CPU is also called micro-processor or simply a processor. It is located inside the computer case on the motherboard. It is termed as *brain of the computer* because it is one of the most important parts of any computer. The primary job of processor is to carry out the instructions. Whenever you run any application such as Microsoft Word or Power Point Presentation you are actually sending instructions to the processor.

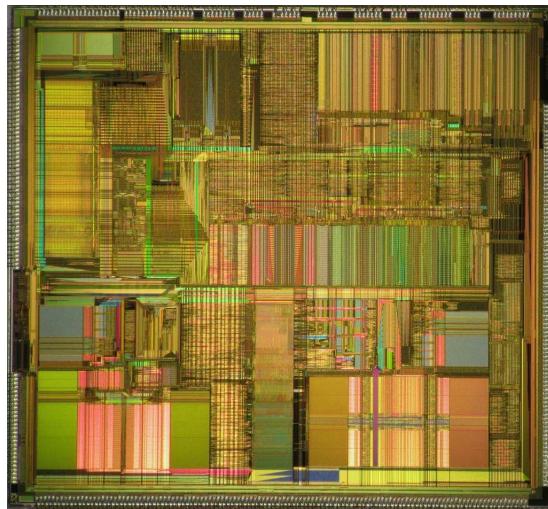


Figure 2 .1: Floor Plan of Intel Pentium P54C Processor

The processor is very small in size. A typical processor is a two-inch ceramic square with a silicon chip located inside. The chip is normally about the size of a thumbnail. The processor fits into the motherboard's processor socket (also called CPU socket). Each socket is covered by the heat sink to absorb heat from the processor.

The speed of a processor is measured in megahertz (MHz), or millions of instructions per second; and gigahertz (GHz), or billions of instructions per second. A faster processor takes less time to execute instructions. However, the actual speed of the computer depends on the speed of many different components of computer system.

There are many processor manufacturers for personal computers, but the most well-known ones are **Intel** and **AMD**.



1.3.2 Motherboard

The motherboard is the main circuit board. It holds the CPU, memory, hard drive connectors, expansion cards to the video and audio, and connections to

other ports (such as USB ports).



Figure 2 .2: Motherboard

1.3.3 Power Supply

The power supply is located at the back of the computer, where the power cord is connected. It transforms the 240 Volt AC main power supply into the various DC voltages required by the machine. This is why you will notice a number of power cables coming out of the power supply and going to various parts of the computer.

The power supply is the ultimate energy supplier to the computer, so it runs as long as the machine is on. To prevent overheating damage each power supply includes a *fan* that circulates air through the case.

Be careful to open the computer case. You must unplug the computer first and before touching the inside you should touch a grounded metal object to discharge any static charge.



1.3.4 Random Access Memory (RAM)

In order to process information the computer requires to store partial or pre-computed information. And the access to these information should be very fast. For this purpose, a special memory chip called Random Access Memory (RAM) is used. It is also called *primary storage*.

RAM is termed as *short-term memory* or *volatile memory* because the contents of RAM are lost whenever the computer is turned off or rebooted.

RAM Slots: The RAM area of the system board contains a number of



Figure 2 .3: Computer Power Supply



Figure 2 .4: Random Access Memory (RAM)

memory slots rather like expansion slots, but they dont have to be along the back of the case. Depending on how much memory your computer has, some of the slots may be empty.

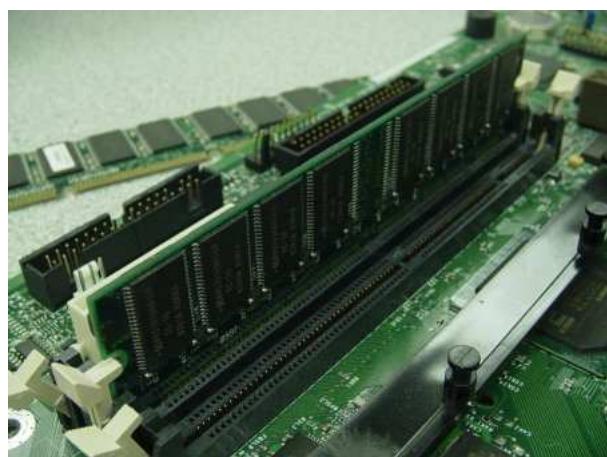


Figure 2 .5: RAM slot inside the Motherboard

How much RAM? RAM is measured in megabytes (MB) or gigabytes (GB). The computer can finish more tasks in less time if it has higher RAM. On the other hand, computer without enough RAM often gets sluggish especially when multiple tasks are run in parallel. In today's desktop and laptop computer, RAM ranges from 4 GB to 16 GB. Additional RAM normally improves performance of the computer.

1.3.5 Hard Drive

Inside the case, you will notice a solid and heavy rectangular metal box as shown in figure 2 .6. This is called hard drive where data are stored permanently and programs are installed. Hard Drive is called *permanent storage* or *long-term storage*. Since the data stored in hard drive are not lost if the computer is turned off or rebooted.

When a particular program (e.g. Word Processor) is executed or a file is opened, some relevant portion of data is copied from the hard disk to the RAM. This is why computer with faster hard drive can start up and load program quickly.



Figure 2 .6: Hard Drive

Hard Drive Manufacturer: Major manufacturers of hard drive today are: Western Digital, Seagate, and Toshiba.

1.3.6 Expansion Slots

Additional hardware can be connected to the computer through the *expansion slots*. These hardwares come as *expansion cards* that properly fit into their designated *expansion slots*. Following are some common types of expansion cards:

- **Video Card:** It is responsible for the visual display of your computer monitor. Now-a-days, most computers do not have dedicated video card, instead its motherboard has a GPU (graphics processing unit) built into it.
- **Sound Card:** The sound card is responsible for all sorts of audio sound in your computer. Most motherboards, in recent days, have their built-in audio card.
- **Network Card:** This card facilitates to communicate with other computers on the same network. It is also responsible for the access to the Internet.

1.4 Exercise

1.4.1 Multiple Choice Question

1. In hardware troubleshooting the success depends mainly on:
 - (a) Establish the theory
 - (b) Problem Identification
 - (c) Report Generation
 - (d) Test the theory
2. Find out the component of a computer which is very smaller in size but very important in capability:
 - a) RAM
 - b) Power Supply
 - c) Motherboard
 - d) Processor

1.4.2 Analytical Question

1. What is the purpose of troubleshooting? Describe the steps of troubleshooting.
2. Discuss the different components of a computer inside the case.