7 PC Troubleshooting Maintenance

Diagnostics Software

Several types of diagnostic software are available for PCs.
Some diagnostic functions are integrated into the PC hardware or into peripheral devices, such as expansion cards, whereas others take the form of operating system utilities or separate software products.
This software, some of which is included with the system when purchased, assists users in identifying many problems that can occur with a computer's components.
In many cases, these programs can do most of the work in determining which PC component is defective or malfunctioning.
The types of diagnostic software are as follows:

- POST. The power on self test operates whenever any PC is powered up (switched on).

- **Manufacturer-supplied diagnostics software:** QAPlus, Norton Utilities, PCtools and so on.

Hardware tools for PC Troubleshooting

- Analog Oscilloscope
- Digital Oscilloscope
- Logic Analyzer
- Logic Probe

Software tools for PC Troubleshooting

- Microsoft diagnostics DOS MSD command.
- Norton utilities.
- CHECKIT.
- Quick analysis (QA+).
- ATDIAGS
- POST

POST (Power On Self Test)

- The PC has built – in test programs which do their jobs as soon as the PC is powered on (switched on).
- These routines are contained within the motherboard ROM as well as ROMs on expansion cards.
- **Applications:**
- The POST is a series of simple programs designed to test and catch faults in different hardware components and circuits.
- If the tests are successful, the POST arranges for loading the operating system from a disk.
- If any hardware error is noticed, the POST indicates the fault to the user in different ways:

1. Beep method (Audio Error codes) : The POST causes different tones (Long & Short) at the speaker.

2.Error Code : An error code is displayed on the CRT.

3. Error Message: The POST displays a detailed error message which identifies the problem area.

Beep Codes

POST	Beep Code Meaning
1 short beep	Normal POST system is OK
No beep	Fuse blown, Power supply, system board problem, disconnected CPU or disconnected speaker
Continuous beep	Improper output voltages from SMPS, Power supply, system board, or may be RAM problem, keyboard problem
2 short beeps	POST error – error code shown on screen

POST Sequence

- **Give the test sequence of post. (4Marks for correct sequence)**

1. CPU test
2. BIOS ROM Checksum test
3. Timer 1 test
4. DMA controller test
5. 16 KB DRAM test
6. Interrupt controller initialization
7. Interrupt controller test
8. Timer 0 initialization
9. CRT controller test
10. DRAM after 16 KB test
11. Keyboard test
12. Disk drive test

Preventive Maintenance

Preventive maintenance is the key to obtaining years of trouble-free service from your computer system.

The two types of preventive maintenance procedures are active and passive.

An active preventive maintenance program includes procedures that promote a longer, trouble-free life for your PC.
This type of preventive maintenance primarily involves the periodic cleaning of the system and its components.
The active preventive maintenance procedures include cleaning and lubricating all major components, reseating chips and connectors, and reformatting hard disks.

Active Preventive Maintenance Procedures Tools

- Contact cleaning solution
- Canned air
- A small brush
- Lint-free foam cleaning swabs
- Antistatic wrist-grounding strap
- Foam tape
- Computer vacuum cleaner
- Chemicals

Passive Preventive Maintenance

Passive preventive maintenance includes steps you can take to protect a system from the environment, such as

i) Using power-protection devices;
ii) Ensuring a clean, temperature-controlled environment; and
iii) Preventing excessive vibration.

In other words, passive preventive maintenance means treating your system well.

Passive Preventive Maintenance Procedures

Passive preventive maintenance involves taking care of the system by providing the best possible environment—both physical and electrical—for the system. Physical concerns are conditions such as

a) Ambient temperature,
b) Thermal stress from power cycling,

c) Dust and smoke contamination, and
d) Disturbances such as shock and vibration.

Preventive Maintenance of Keyboard:

i) Do not spill liquids on the keyboard.

ii) Periodically clean interior of keyboard with vacuum cleaner
iii) Press the keys gently without applying force.

iv) Use dust cover for keyboard when not used.

Preventive Maintenance of HDD:

i) Defragment hard disk at least once a month to maintain disk efficiency and speed.

ii) Delete all temporary files such as *.temp,~*.*,*.chk and web browser history and temporary internet files.

iii) Make periodic backup of your data and critical areas such as boot sectors, FAT and directory structure on disk.

Preventive Maintenance of FDD

i) Clean read/ write head sensitivity using special diagnostic diskettes.

ii) Check rotating speed of drive if it must be constant.

iii) Clean & lubricate the mechanical part of drive iv) Clean read/write head using a head cleaning disk or clean head manually.

Preventive Maintenance of Monitor:

i) Use dust cover for monitor when monitor is off.

ii) Do not put monitor near ti strong magnetic field which may cause improper deflection. iii) Clean the display screen so that it is dust free.

iv) Provide proper ventilation such as cooling fan for heat dissipation to avoid intermittent failures.

v) Do not put paper of anything on top of monitor.

vi) Preventive Maintenance of Monitor:

Preventive Maintenance of Printer

i) Do not place printer near heat generating machines such as heaters and furnaces

ii) Clean exterior of printer using soft cloth with mild organic solvent

iii) Periodically clean out dust, paper fragments and dirt from its mechanism using soft brush

iv) Use quality ribbon to avoid damage to print head

v) Use dust cover for printer when not used

vi) Check paper feed path is free of jam

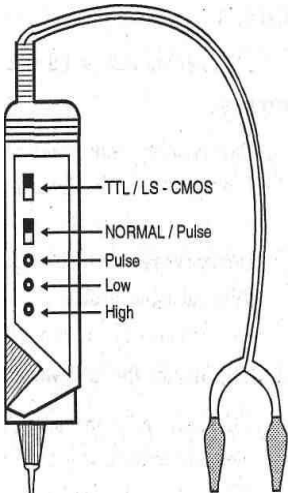
vii) Lubricate mechanical parts.

Diagnostic Tools :

1) **Logic Probe**
2) **Logic Analyser**
3) **Current Tracer**

Logic Probe:

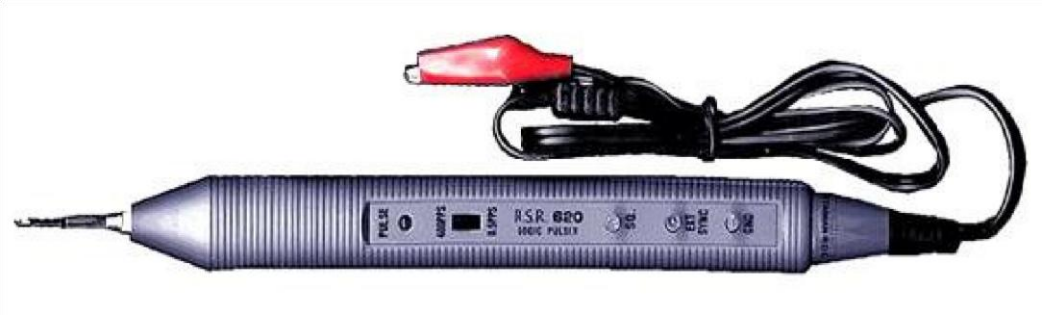
A logic probe can be useful for diagnosing problems in digital circuits.
In a digital circuit a signal is represented as either high(+5 V) or low(0 V)
Logic probes are especially useful for troubleshooting a dead system.
By using the probe , you can determine whether the basic clock circuitry is operating and whether the basic clock circuitry is operating and whether other signals necessary for system operation are present.
Logic probes can be useful for troubleshooting.



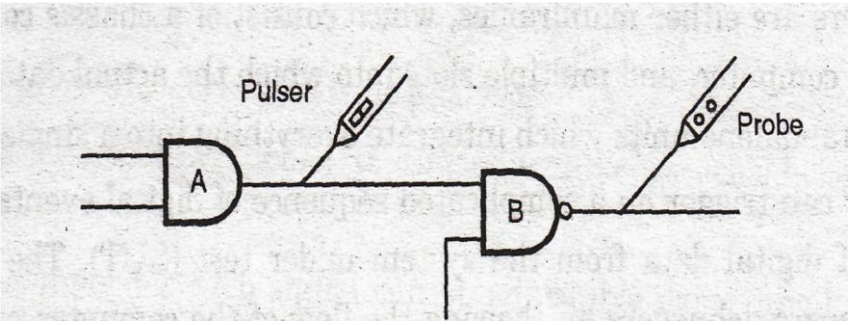
Logic Pulser

The logic pulser is a hand held tool used to inject pulses at the input of a gate under test. A single pulse or a stream of pulses at different frequencies is issued as per user's choice.

A pulser is designed to test circuit reaction by a logical high(+5V) pulse into a circuit usually lasting from 1 ½ to 10 millionth of a second. Compare the reaction with that of a known functional circuit.
It can be helpful for testing a circuit.

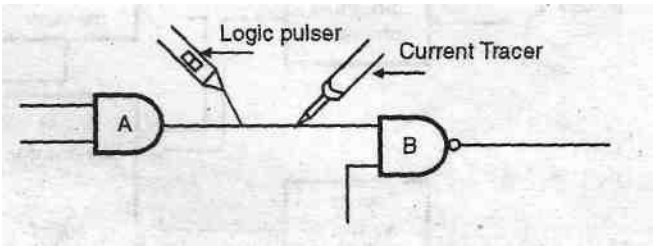


Logic Pulser



Current Tracer:

It is a hand held tool which detects current flow in electronic circuits. It is useful in locating shorted components, track shorts, solder bridges, Vcc to ground shorts etc.



Block Diagram and Working of Logic Analyser:

Logic Analyser:

- **A logic analyzer** is an electronic instrument that displays signals in a digital circuit that are too fast to be observed and presents it to a user so that the user can more easily check correct operation of the digital system

Fig. shows functional block diagram of logic analyser. A logic analyser is a device, which allows you to see the signals on 16 to 64 signal lines at once. It is also called multitrace digital oscilloscope.

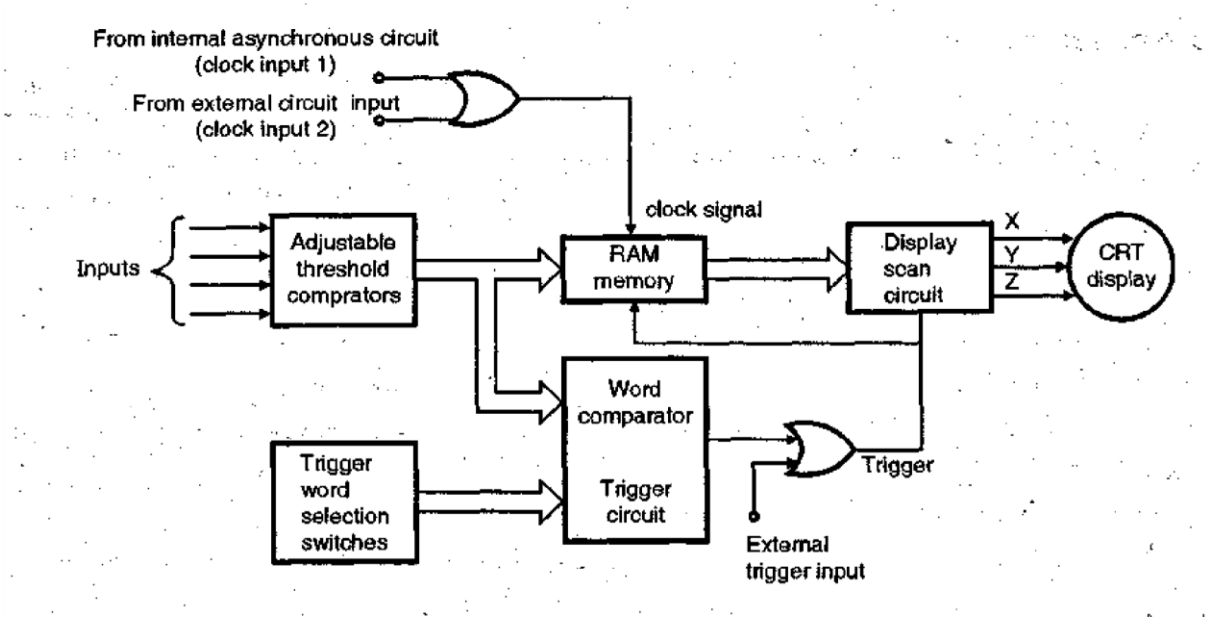


Fig. 7.5 : **Block diagram of logic analyser**

It captures and stores several digital signals, letting you view the signals simultaneously Block diagram description:

(a) **Adjustable threshold comparator** : The input signals are first applied to the adjustable threshold comparator one for each channel.

(b) **Memory** : It is usually RAM memory where samples of input signals are taken and stored and displayed when required.

(c) **Display scan circuit**: Samples of signal (around 256 to 1024 samples of each signal) which are stored in memory can be displayed.

(d) **Trigger word selection switches** : It is used to give code which we want to test with input signal applied to adjustable threshold comparator.

(e) **Word comparator and trigger circuit** : Word comparator compares input signal with binary code entered with the help of trigger selection switches or key switches.