

7) PC Troubleshooting, Maintenance & Tools

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Troubleshooting: verifying a real problem, analysing symptoms and isolating and correcting a failure in the PC is known as troubleshooting. It is a form of problem solving. It is the systematic procedure for the source of problem so that it can be solved easily. (Read further information for informative purpose)

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POST of pentium: The POST (Power On Self Test) is a collection of test programs. The functions of these programs are testing the various functional units in the PC and verifying whether they are working perfectly or not. POST programs are automatically executed by the PC whenever the PC is started or reset.

The fault to the user is given in four different ways:

- (1) Check points
- (3) Error code displays
- (2) Beeps
- (4) Detailed error messages

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Post sequence:

- 1) Determine density and type of SIMMs.
- 2) shadow system BIOS (System BIOS on the flash is copied to main memory).
- 3) Initialize interrupt controllers and chip sets.
- 4) Test CPU registers.
- 5) Size L2 cache.
- 6) Test CMOS.
- 7) Test and initialize CMOS.
- 8) Test DMA channels.
- 9) Verify if refresh is running.
- 10) Test 64K of memory.
- 11) Determine total memory size.
- 12) Initialize keyboard controller.
- 13) Detect presence of external Video controllers.

- 14) Configure PCI video, set monitor refresh rates and size video memory.
- 15) Display banner.
- 16) Reset keyboard.
- 17) Test memory above 64K, base and extended (memory count).
- 18) Flush and enable L2 cache. (A bad cache card should not affect system POST until this stage.)
- 19) Initialize serial and parallel bus controllers.
- 20) Initialize floppy controller and seek for floppy drives specified in the CMOS.
- 21) Reset mouse.
- 22) Initialize hard disk subsystem. Determine type and size of IDE drives.
- 23) Run plug and play code.
- 24) Beep signifying end of the post.
- 25) Boot to OS on bootable medium.

5-14 S-15 Beep codes: short beep, two short beeps, no beep, continuous beep.

Error indication	Failing sub system	Fault clues
1) Short beep	POST error	Normal post, system OK
2) 2 Short beeps	POST error	Error code shown on screen
3) No beep	Power supply	Fuse blown, loose connections, no output
	System board	Processor, ROM, Northbridge, Southbridge, etc.
	DRAM DIMM on motherboard	DIMM is not properly inserted in the slot.
	Speakers	Disconnected speaker
4) Continuous beep	Power supply, resistor, System board	Impaired output voltages of SMPS, DIMM fails, clean & reset the DIMM and check keyboard problem in keyboard connection

Error indication	Failing subsystem	Fault diagnosis (P)
5) Repeating short beeps	Power supply or system board or keyboard problem	Check power supply connection and output voltages. System board connections and keyboard connections
6) 1 long, 1 short beep	Motherboard problem	Motherboard (8)
7) 1 long, 2 short beeps	Display adapter problem (MDA or CGA) or video buffer RAM, I/O port logic in display adapter card	6845 in display adapter, video buffer RAM, I/O port logic in display adapter card
8) 1 long, 3 short beeps	Enhanced Graphics Adapter (EGA) 24 bit board failure	Check EGA adapter
9) 3 long beeps	Keyboard problem	Check 3270-Keyboard card

Visual Display codes (Error codes):

The POST displays some codes before codes that codes are called as visual display codes. The last two digit pin-out the exact fault in subsystem and the most significant digits identify the failing subsystem.

(Refer textbook table 7.2 for details).

③ Preventive Maintenance:

It is also called as periodic maintenance. Preventive maintenance is the key of obtaining years of trouble-free service from your computer system. It is one of the most ignored aspects of PC ownership.

Importance of preventive maintenance :

- 1] Preventive maintenance saves money
- 2] Preventive maintenance saves time
- 3] Preventive maintenance helps to safeguard your data
- 4] Preventive maintenance improves performance
- 5] Preventive maintenance gives reliable operation and long life to PC and peripheral devices.

6] Preventive maintenance can increase your system's resale value because it will look and run better than most others.

7] It will avoid remedial problems that occur in the future.

Types of preventive maintenance

1] Active preventive maintenance.

2] Passive preventive maintenance.

→ 1] Active preventive maintenance: Active preventive

maintenance includes several steps that promote a longer, trouble-free life for your PC. When you perform active preventive maintenance, it depends

on the system's environment. If your system is in a dirty environment, you might need to clean your system every three months or less. For normal office environments,

cleaning a system every few months to a year is usually fine.

(A) Cleaning a system: A regular cleaning of the system removes

any layer of dust and benefits the system in the long run.

The dust acts as a thermal insulator, which prevents the proper system cooling. Excessive heat shortens life of

component. The proper cleaning of the internal components,

its peripherals and the board inside the system, use the

following cleaning tools and cleaning solution as per

requirements. (Refer textbook for details).

(B) Preventive maintenance of system: The following are

weekly maintenance check list for system:

① Backing up any data or important files.

② Deleting all temporary files.

③ Empty the recycle bin.

④ Check for and install antivirus software updates.

⑤ Run a defragmentation program.

The following are same monthly maintenance procedure:

- ① Create an operating system startup disk.
- ② Check for and install any updated drivers for video cards, sound cards, modems and other devices.
- ③ Check for and install any operating system updates.
- ④ Clean the system, including the monitor screen, keyboard, CD/DVD drives, floppy drives, mouse and so on.
- ⑤ Check that all system fans are operating properly, including the CPU heat sink's power supply, and any chassis fans.

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2] Passive Preventive Maintenance: Passive preventive

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maintenance includes steps you can take to protect a system from the environment, such as power protection devices; ensuring a clean, temperature controlled environment; and preventing excessive vibration.

Passive preventive maintenance involves taking care of the system from physical environment and electrical problems.

Physical contributions to system failure:

1] Dust & Pollutants

2] Excessive temperature: Hot & Cold environment

3] Corrosion: Direct oxidation, Atmospheric oxidation,

Galvanic oxidation

4] Magnetic effect.

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Difference between Active and Passive preventive maintenance:

Active always off (off) ①

Passive always on (on) ②

Active off, not running off a power ③

Active Preventive Maintenance

- ① An active preventive maintenance includes several steps that promote a longer trouble-free life for your PC board. ➔ giving board
- ② Tools are used for active preventive maintenance. ➔ digital multimeter, room temperature and humidity sensor, lamp, air blower, eraser, canned air, small brushes, vacuum cleaner, duct blower, foam tape
- ③ Requires specialized person to do this. ➔ Eg: - Periodic cleaning of works system and its components

Passive Preventive Maintenance

- ① Passive preventive maintenance includes steps you can take to protect a system from the environment. ➔ ② Tools used are Digital Multimeter, Room temperature and humidity sensor, lamp, which work anti static switch, gizmos
- ② Anyone can do this! ➔ Eg: Power protection devices; ensuring a clean temperature controlled environment; and preventing excessive vibration

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Preventive Maintenance of peripherals of PCs

- ↳ (i) Preventive maintenance of HDD: ➔ HDD preventive maintenance includes:
- ① Making periodic backup of your data and critical areas such as boot sectors, file allocation tables (FAT) and directory structure on the disk. ➔ formatting, partitioning, etc.
- ② You should defragment hard disk at least once a month to maintain disk efficiency and speed. ➔ * Temp, ~ * * , * .chk, web browser history and all temporary internet files.
- ③ Delete all temporary files such as * .Temp, ~ * * , * .chk, web browser history and all temporary internet files.
- ④ Take backup and format HDD at least once a year and reinstall all the software to maintain disk efficiency and speed. ➔ formatting, hard disk software, etc.
- Read further for informative purpose. ➔ Read further for informative purpose.

Preventive maintenance of FDD (Floppy Disk Drive)

- ① Periodically check alignment of drive using alignment software.
- ② Check periodically head sensitivity using special diagnostic diskettes.
- ③ Clean read/write head using a head cleaning disk or clean head manually.
- ④ Check hysteresis of read/write head. If drive has hysteresis problems, it cannot be corrected. It should be replaced with the new drive.
- ⑤ Check hub centring of drive, it is also non-replaceable so replace drive.
- ⑥ Check rotation speed of the drive. It must be constant.
- ⑦ Clean and lubricate mechanical part of the drive.

S-10 Preventive maintenance of Monitors:

- ① Switch off the monitor, before switching off mains.
- ② Before switching on mains ensure that power switch of monitor is in off position.
- ③ Use dust cover for monitor when monitor is off.
- ④ Do not put monitor near to a strong magnetic field, which may cause improper deflection in screen.
- ⑤ Clean the display screen so that it is dust free.
- ⑥ Clean monitor exterior with mild detergent solution without allowing the water drip inside the monitor.
- ⑦ Provide proper ventilation such as cooling fan for heat dissipation to avoid intermittent failures.
- ⑧ Do not put papers or anything on top of monitor.

W-08 S-12 Preventive maintenance of keyboard

- ① Handle the key board gently and carefully.
- ② Press the keys gently without applying force; avoid resting hands on keyboard.

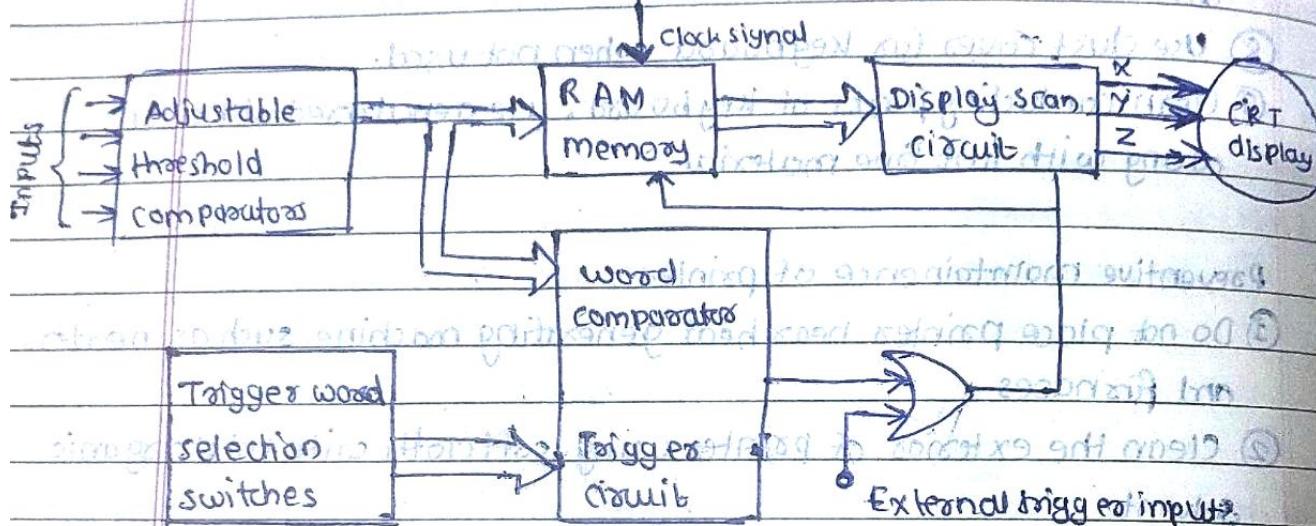
- ③ Do not spill liquids on keyboard.
- ④ Do not keep anything on keyboard.
- ⑤ Do not play with the keyboard after powering off system.
- ⑥ Make sure that cable of keyboard is not subjected to high stress.
This will cut signal wires inside keyboard.
- ⑦ Periodically clean interior of keyboard with a miniature vacuum cleaner or turn it upside down to blow out accumulated dirt.
- ⑧ Use dust covers for keyboard when not used.
- ⑨ Clean conducting parts of keyboard, use denatured alcohol along with lint free material.

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Preventive maintenance of printer

- ① Do not place printer near heat generating machine such as heaters and furnaces.
- ② Clean the exterior of printer using soft cloth with mild organic solvent.
- ③ Periodically clean out dust, paper fragments, and dirt from its mechanism using soft brush.
- ④ Use quality ribbon to avoid damage to print head.
- ⑤ Denatured alcohol can be used for cleaning the inner parts such as stepper motor, print head, etc.
- ⑥ Verify insulation resistance of about $10 M\Omega$ between AC power line and printer chassis.
- ⑦ Use the dust covers for printer when not used.
- ⑧ Check the paper feed path is free of obstructions.
- ⑨ Clear paper feed path, platen and ribbon part with soft cloth.
- ⑩ Lubricate mechanical parts.
- ⑪ Clean printer-head slides & axles using non-oily lubrication such as WD-40.

4

Diagnostic Tools : Logic Analysers and logic ProbesS-09 W-09
S-10 W-10Logic Analyser : Used for capturing and analysing digital signalsFrom internal asynchronous circuit (clock input 1)From external circuit input (clock input 2)Function RAM Display Scan Circuit CRT display

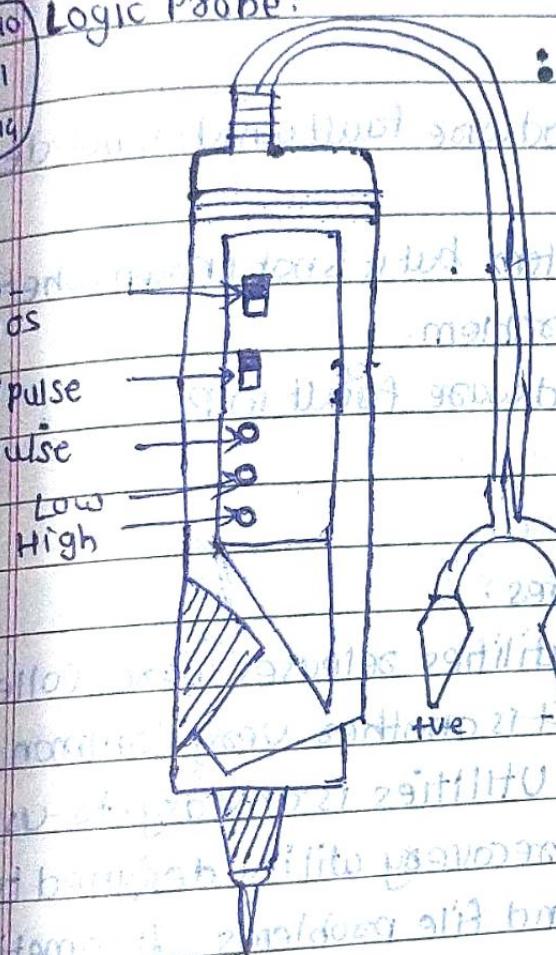
A logic analyser is an electronic instrument that displays signals in the digital circuits that are too fast to be observed and presents it to the user so that the user can more easily check correct operation of digital systems.

Working: of function working method of logic analyser

- ① All the input signals are applied to the adjustable threshold comparators one for each channel.
 - ② The logic analysers take a sample of each input signal from comparators whenever clock signal is applied to memory and stores into memory.
- The clock input may be from:
- Internal asynchronous clock input
 - External clock input

- ③ When trigger is applied to memory, memory displays these stored samples; Word comparators, External trigger input.
- ④ After applying trigger to memory, then it can be sent to display scan circuit. The display scan circuits then construct the original wave form and displays it on the CRT screen.

Logic Probe:



A logic probe is a handheld device.

Analysing and troubleshooting the logical states (Boolean 0 or 1) of

monitoring a computer board and peripheral

It is usually powered

by the circuit under test (some devices use batteries).

It can be used on either

TTL or CMOS integrated circuit

devices. In a digital circuit, a

signal is represented as either

high (+5V) or low (0V). Because

these signals are present only for

a short time or oscillate rapidly, a simple voltmeter is useless.

A logic probe is designed to display these signal conditions easily.

There are generally three different coloured LEDs on the

probe's chassis; Two LED's are for High/Low states and third

LED is for Pulse (a single occurring event). Logic probes are

especially useful for troubleshooting a dead system. By using the

probe, you can determine the basic clock circuitry is operating

and other signals are present in system. The limitation of

logic probe is the inability to monitor more than one line.

(5)

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Diagnostic softwares: Diagnostic software is a standalone program, which are used to check proper working of different PC components and to diagnose various problems related to PC. Diagnostic software, is included in the system when purchased, assists user in identifying many problems that can occur with computer's components.

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Necessity of diagnostic software :

- ① The PC has a sophisticated hardware fault which is not detected by POST.
- ② There is a problem in the system but it is not known whether it is a hardware or software problem.
- ③ There is an intermittent hardware fault in PC.
(Read textbook for detail).

Examples of diagnostic softwares :

- ① Norton utilities: The Norton utilities releases were collection of software utilities. It is another very common data recovery utility. Norton Utilities is an easy-to-use diagnostic, repair and recovery utility designed to fix some types of diskett and file problems. It sometimes can recover deleted files and repairs some crushed or damaged floppy disks.

Features:

- ① Provide facility for undelete deleted files.
- ② Repair damaged file.
- ③ Un-format formatted disk.
- ④ Protect disk against data loss.
- ⑤ Diagnose problem with computer/hardware.
- ⑥ Secure the data from unauthorised read & write operations.
- ⑦ Protect computer from virus infections.
- ⑧ Increase computer performance by using disk cache.

② DAplus: It is a windows based diagnostic software suite for all phases of PC testing. It is a windows-based test program that isolates hardware problems for both installed and Windows device drivers components.

Features:

- ① RAM testing and IRQ detection from within windows.
- ② The capability to run a quick test or comprehensive full test.
- ③ CPU performance benchmarking tests.
- ④ RAM chip locator that helps find the position of faulty SIMMs.
- ⑤ PC-Tools: PC-Tools are very useful disk utility programs when something goes wrong with the disk.

Features:

- ① Data recovery using Disk Fix, File Fix, Unformat, etc.
- ② Unfragmenting facility using COMPRESS program.
- ③ Antivirus programs also provided.
- ④ Directory maintenance program.
- ⑤ File find operation available.
- ⑥ System information program.

⑥ BGA Re-Workstation: To work in rework station

BGA stands for Ball Grid Array. It is a type of surface mount packaging for integrated circuits. BGA packages are used to permanently mount devices such as microprocessors or CPU.

BGA has following features:

- ① Small package area.
- ② Greater functions and more pins.
- ③ Self center while PCB puddle welding, easy to put on tin.
- ④ More reliable.
- ⑤ Good conductivity and low overall cost.

BGA Rework station : Rework is the term for the re-finishing or reworking operation or repair of an electronic printed circuit board (PCB) assembly, usually involving desoldering and resoldering of surface mounted electronic components (SMD).

BGA Rework process: ~~inhibit~~ ~~from contact~~ ~~MAS~~

- 1] Component removal from site of original placement
- 2] Site cleaning and preparation for placement of probe
- 3] Ball placement and reballing of BGA component.
- 4] Component attach / re-soldering
- 5] Inspection to confirm soldering placement process

BGA Rework station installation : BGA rework station

installation should meet the following requirements.

- * Away from inflammable & explosive materials
- * Away from water & other liquids especially organic
- * Ventilated, dry place away from dust accumulation
- * Stable and flat, free from vibrations
- * Less dust.
- * No heavy objects on controlling box.

* Not affected by air flow of air conditioners, heaters or fans or ventilators.

Leave a space of 30 cm or more behind the rework station for the upper part to move and rotate.

Power supply requirement: ~~amount of power not less than 400W~~

* Use a power supply with little fluctuations in voltage.

* Fluctuation: $220V \pm 10\%$ ~~without extra cost~~

* Frequency fluctuation: $50Hz \pm 3\%$ ~~for gridless 31920~~

BGA Workstation applications:

- * It is used to replace the faulty north bridge IC or south bridge IC or Rebaling of these ICs
- * It is used to repair mobile, laptop, servers, Desktop boards.
- * It is safely removed any IC from motherboard without damaging anything.
- * It is used most of the time for upgradation of on board or motherboard functionality.

