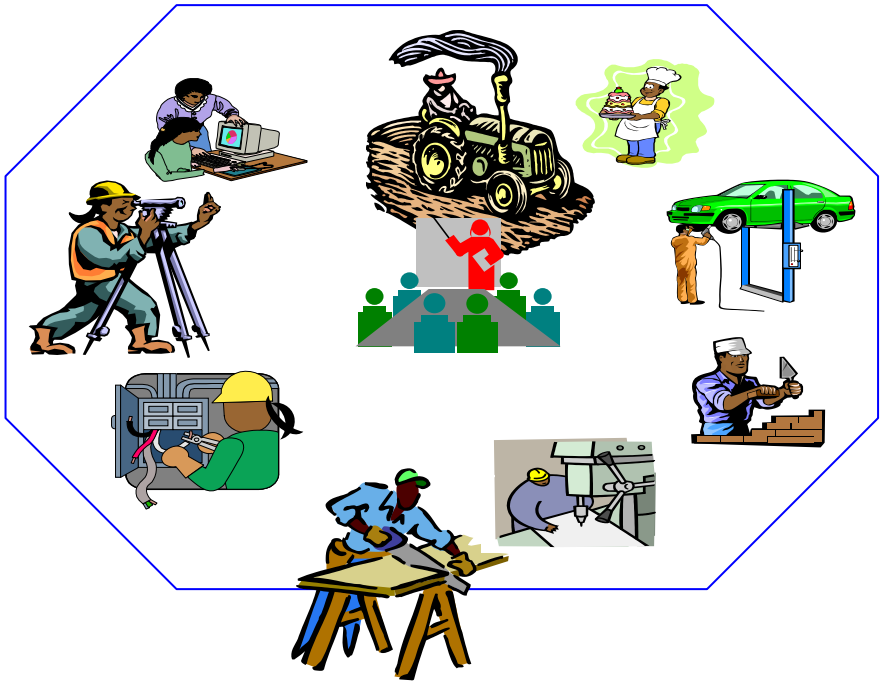
Intermediate Communication & Multimedia Equipment Servicing Level III

Based on May, 2011 V2 OS and Dec, 2020 V1 Curriculum



Module Title: Performing Maintenance of Communication and Multimedia equipment

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Contents

L #22	LO #1. Prepare unit, tools and workstation

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Conducting Complete check-up of advanced level Communication and Multimedia equipment
- Identifying , verifying and documenting defects against customer description
- Verifying repair/maintenance history
- Acquiring Service manuals and service information
- setting/preparing workstation for repair job
- Preparing necessary tools, test instruments and personal protective equipment

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Conduct Complete check-up of advanced level Communication and Multimedia equipment
- Identify , verify and document defects against customer description
- Verify repair/maintenance history
- Acquire Service manuals and service information
- set/prepare workstation for repair job
- Prepare necessary tools, test instruments and personal protective equipment

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.

2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them

3. Accomplish the “Self-checks” which are placed following all information sheets.

4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks.

5. If you earned a satisfactory evaluation proceed to “Operation sheets

6.Perform “the Learning activity performance test” which is placed following “Operation sheets ” ,

7.If your performance is satisfactory proceed to the next learning guide,

8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information sheet 1: Conducting complete check-up of Communication & Multimedia equipment

1.1 Conducting complete check-up of advanced level Communication

Introduction

Before you start troubleshooting any kind of electronic equipment, you have to first understand how it works. As a technician, you must develop the right level of understanding required to repair the equipment efficiently. Most beginners assume that this means you must understand every parts or function of a circuit. This kind of detailed knowledge is helpful, of course, but it is not necessary.

As a technician, you normally won't have to deal with all the details of a circuits functioning. You don't have to design the equipment, but all you need to do is to ensure that it is functioning. Any piece of faulty equipment was once working; as such you can assume that all of the complex design problems have been taken care of by the engineers. All you must do is to bring the equipment back to life. Once you have fully understood the circuit function, it is easy for you to breakdown each and every section of a circuit and use the right tools and test equipment to pinpoint the faulty components within a very short period of time. For example, if a customer tells you the Monitor color is out i.e. yellow display, your knowledge will prompt to you that the power supply (vertical and horizontal section) is working fine. The problem may lie somewhere within the signal cable, CRT board or even CRT. This can narrow down the problem and save your troubleshooting time.

Steps In Troubleshooting

Knowledge of the right troubleshooting procedure and its intelligent application is essential for correct and quick diagnosis of the fault. Fault diagnosis is the acquired skill in being able to locate a fault quickly within any circuit or system. Regardless of how complex your particular circuit or system may be, **a reliable troubleshooting procedure can be broken down into four basic steps.**

Step 1: Determining failure symptoms.

Step 2: Identify and isolate the location of the problem.

Step 3 repairs and replace the suspected component.

Step 4: Test the equipment thoroughly after repair in order to make sure you have solved

the problem and that no other problem shall arise.

If the problem is not solved, you may try again starting from step 1. This is a universal troubleshooting procedure and you can use this procedure to troubleshoot any kind of electronic equipment.

Determining failure symptoms

The determination symptoms of failure systems does not mean that you go straight to the toolbox and soldering tool, nor does the steps mean that test equipment should be used extensively. Instead, the steps mean that you must know what the equipment is supposed to do when operating normally and, more important, you must be able to recognize when the normal job is not being done. Regardless, before you open your toolbox, you must have a firm understanding of the symptoms. Think about the symptoms carefully.

Many faults are identified through display on video screen or sound from speaker. For example, in a TV receiver, if the picture is normal, but there is no sound, the common sections up to video detector stage are normal and the fault lies in the sound section. In a stereo amplifier, one channel is working normally, but the other is not, the defect is obviously in the other channel. Ask yourself what is happening. If the stereo amplifier is a new installation, perhaps the audio cable in the speaker box was not fixed. If you have not been using your stereo for a while, do you remember the last time you switched on the stereo? Does the sound slowly fades away or completely does not have sound? By recognizing and understanding the symptoms, you definitely know that something is wrong and have a fair idea of what is faulty, but you probably do not know just which area or location of the equipment is faulty. This is established in the next step of troubleshoLoting(i.e read information sheet 2 bellow)

Self-Check 1	choose

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: choose the correct answer from the following alternatives and write your answer on the answer sheet

1. ___what is the advantage of understanding the equipment to be troubleshooting.

A. to guess the area of defect. B. to troubleshoot in short period C. not to touch unnecessary place D all

2. _____ A reliable troubleshooting procedure can be broken down into_____ basic steps.

A. 1 B. 2 C. 3 D. 4

3. If you see the symptom of fouler what do you do?

A. straight to the toolbox B. solder tool C. open the case D. none

Note: Satisfactory rating - 3 Unsatisfactory - below 3 points

Answer sheet

Score = _____

Rating: _____

Information Sheet 2 : Identifying , verify and documenting defects against customer description

2.1. Identifying, verify and documenting defects.

Before you try to isolate a problem within the equipment, be sure that the equipment is, in fact, causing the problem. For example, if a Monitor has a missing red color, do not charge into the set with the screwdriver and soldering tool. Be sure that the Monitor is the cause of the problem by comparing a known good Monitor or testing the faulty Monitor in another PC. Sometimes a defective video card in your PC also can caused the missing-red-color symptom. When you are confident that the equipment is faulty, you can begin to identify possible problem areas.

Most electronic equipment can be subdivided into sections that have a definite purpose or function. The term function is used here to denote an operation in a specific section of the equipment. For example, in a color Monitor, the function can be divided into video, picture tube, horizontal, vertical, high voltage, monitor controls, microprocessor and power supply circuits. Say, if the problem is the missing red color, the only section you need to check is the video circuit, signal cable and picture tube.

Identification of the faulty section eliminates the need of checking all the stages or circuits. This expedites troubleshooting. Once you have identified the faulty section, concentrate on the circuits and ignore the remaining sections. You can begin the actual repairing process and, hopefully, track the fault to the component level.

2.1.1. Television

Television is an electronics device that used to transmit and receive both audio and video signals from the space. Tele is a Greek word means distance or at a distance. Vision is a Latin word means seeing or something seen. So television means seeing from the distance. The purpose of a television system is to extend the sense of sight beyond its natural limits. TV system is a method of transmitting and receiving visual information associated with sound by means of radio broad casting.

Television system consists of both transmitter and receiver.

There are two types of TV:

a. Cathode ray tube (CRT)

b. Flat (LED & LCD)

a. Cathode ray tube (CRT)

Solving Problems and failure in Switch Mode Power Supply(SMPS)

The power supply repair is one of the most challenging tasks for an electronic repairer and once you have mastered the circuit and repair technique, to troubleshoot other types of circuit such as the color section, vertical section, audio section, high voltage and so forth will be faster.

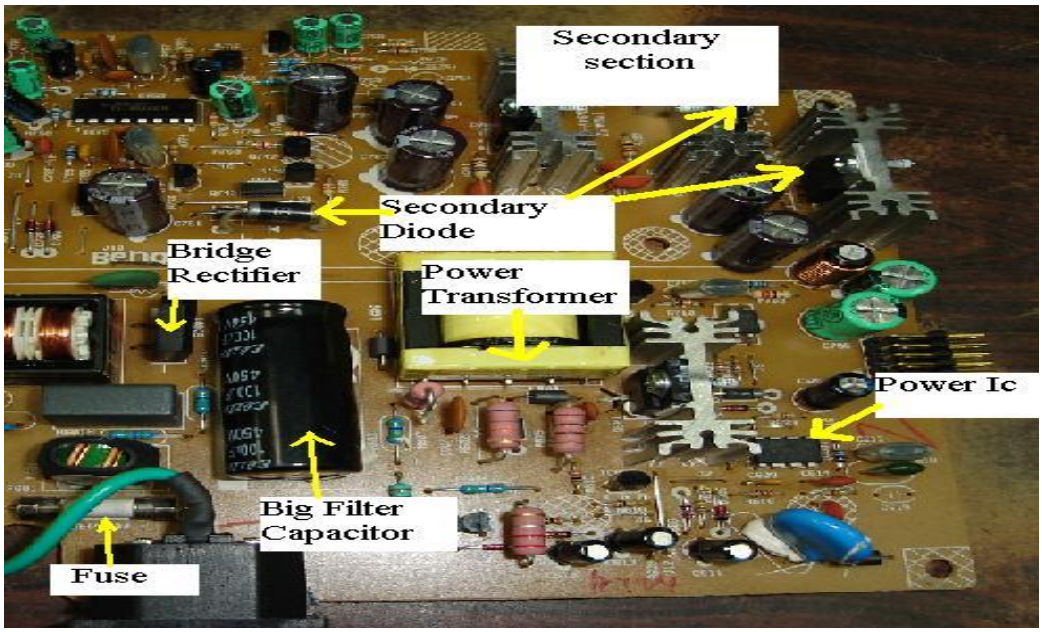


Fig 2.1 SMPS of CRT

Power supply problems can happen in the primary or secondary section. Even if there are some problems in the furthest part of an equipment circuit such as a shorted IC or transistor in a Monitor color circuit board, the power supply may not work or just blink. There are many methods of troubleshooting a power supply; I will explain one of my ways on how to repair it. Whenever a power supply sent for repair whether it is a Monitor switching power supply or computer Atx power supply will test the power supply first before open up the case.

Power supply problems can be categorize into no power, low output power, power supply cut-off after sometimes or once switch on, power blink and higher output voltage.

Whatever the problems are I will use a standard procedure method to test it.

Check the on/off switch, fuse and discharge the large filter capacitor-if the fuse burnt into dark color then expect heavy short circuit in the power supply section. It could be a shorted

bridge rectifier, a shorted power transistor or even a shorted power IC. Don't under estimate that a shorted primary winding in the switch mode power transformer can occurred. If the fuse is just a slight torn, may be the fuse spoilt by itself because fuse have lifespan too. Most of the time, replacing only the fuse will solve the no power supply symptoms.

Make sure all secondary diodes are working. Either you can remove one of the diodes lead to accurately check it or you can use a fly back tester as describe in this article.

Check horizontal output transistor, B+ FET and fly back transformer. Whenever you repair a Monitor, any time, if either one of these components has failure, it will affect the power supply functions. Testing FET and fly back transformer can be read by clicking on the blue link.

Check all electrolytic capacitors with easer tester in the primary and secondary section- if there are some electrolytic capacitor failures in the power supply section (either primary or secondary area) the power supply will blink, produced low output power or totally no power at all!

Test the primary winding of switch mode power transformer with fly back tester. Check also the fly back primary winding, b+ coil winding and horizontal yoke coil if you repair monitor. One of these coils shorted can cause power to shut down, blink, and no power.

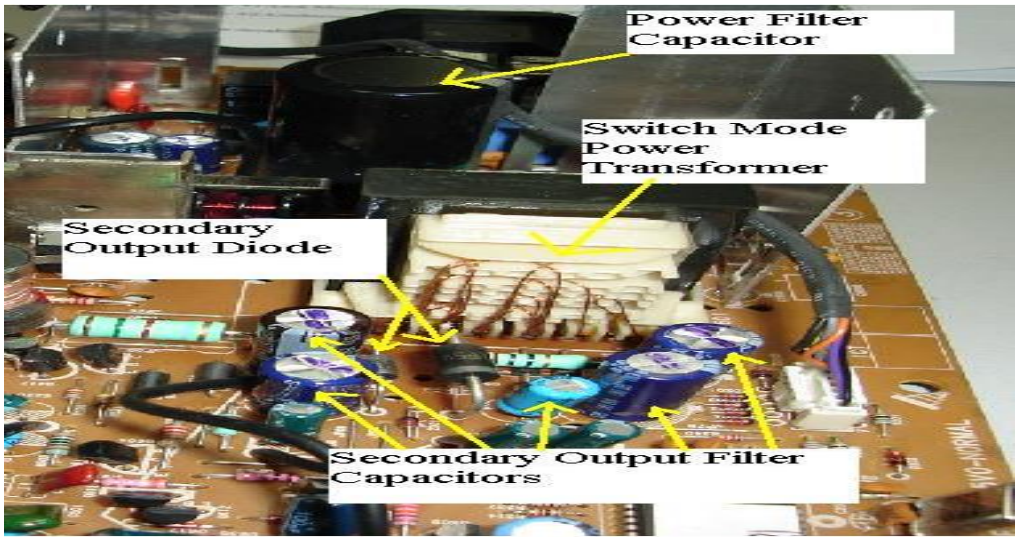


Fig 2.2 secondary SMPS

If you have confirmed that the secondary side of power supply components is working then what you need to do is to test the components in the primary side and test all the components in it. This is where your real troubleshooting skill is needed. Understanding and know how to test basic electronic components is very important otherwise you will be facing

difficulty in finding the fault.

If the bulb lights very bright and won't go off even after couples of minutes then there are still problems in the power supply. If the bulb goes dim or went off, you know that the shorts had been taken care and you now can switch on the power supply confidently and won't blow the fuse again.

If you want to be an expert in power supply repair, you have to practice, read and fully understand how basic electronic components and power supply work. With all these knowledge in your mind and hand, believe there will be no power supply problems that are too difficult for you to repair. All the best to you.

If there is No Power in CRT TV

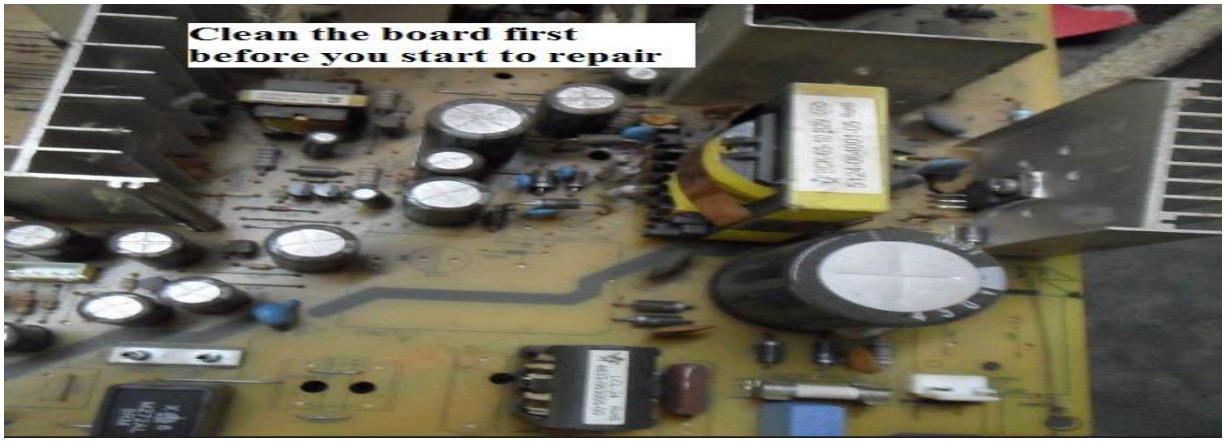


Fig *2*.3 cleaning of SMPS

After cleaning up the circuit board take out your digital multi meter and set to buzzer range and measured the main fuse. It was opened circuit because there was no reading registered in your multi meter.

Did not stop there as proceeded to check on the corresponding components especially the 4 bridge diodes. You find two of the 4 diodes were shorted and this is the cause why the main fuse was opened circuit.

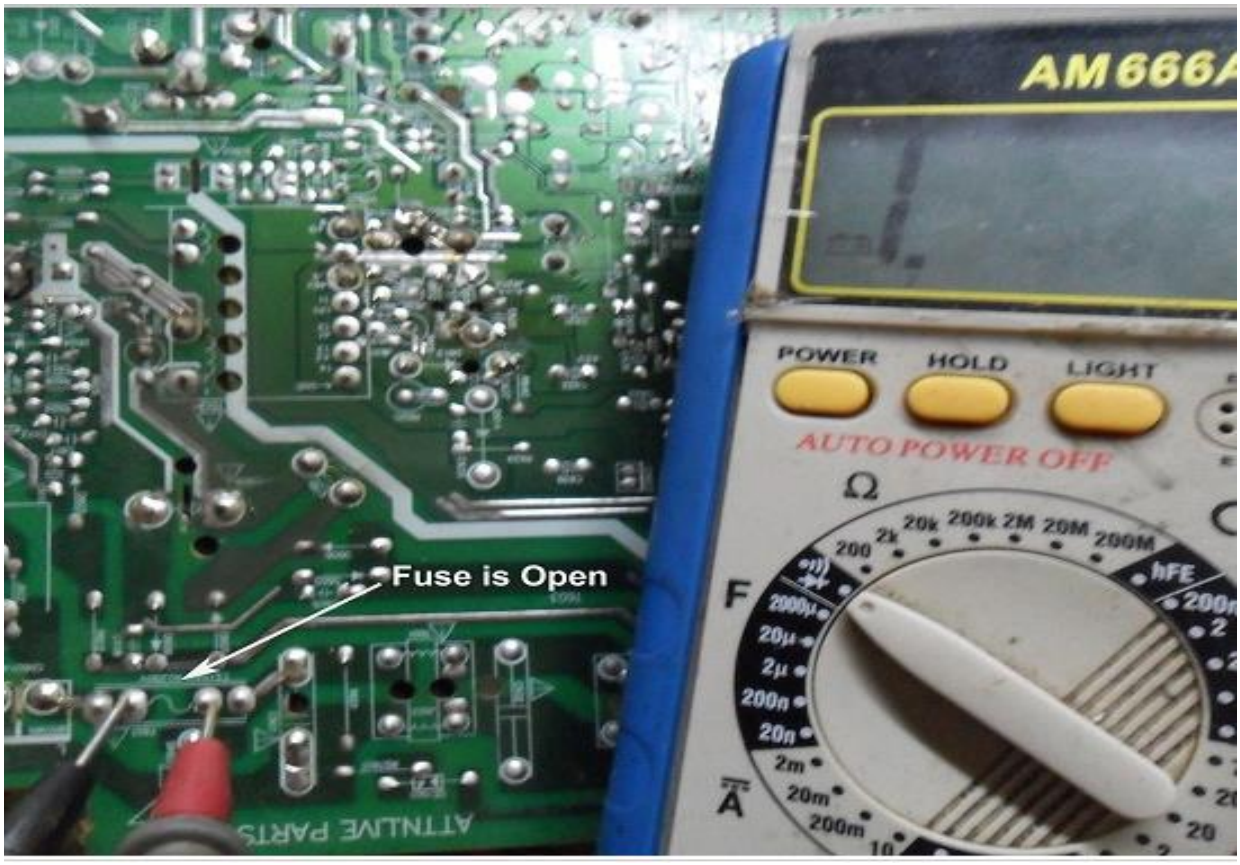


Fig 2.4 open circuit

Fig 2.5 short circuit test

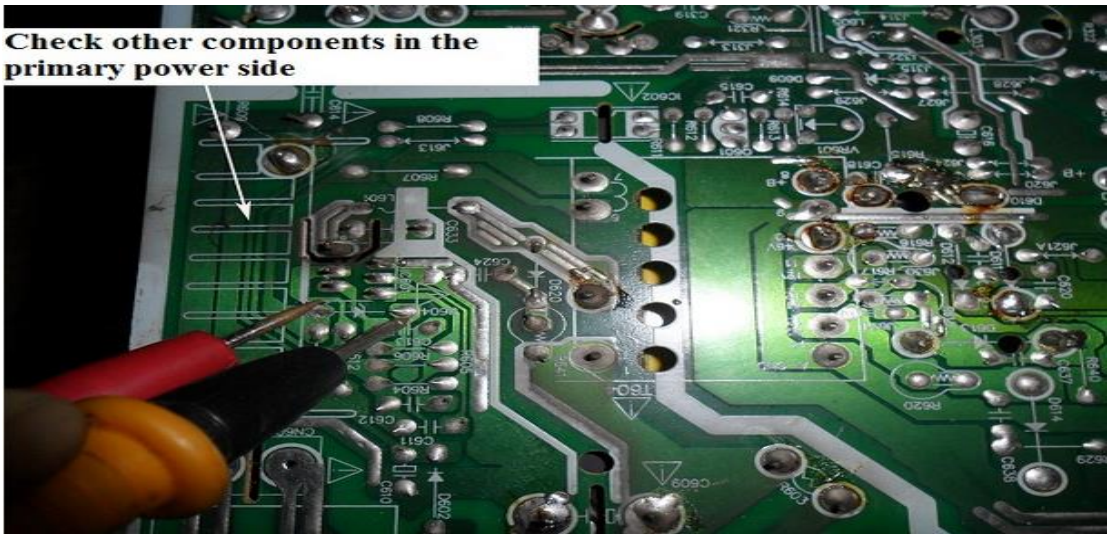


Fig 2.6 how to check primary power side

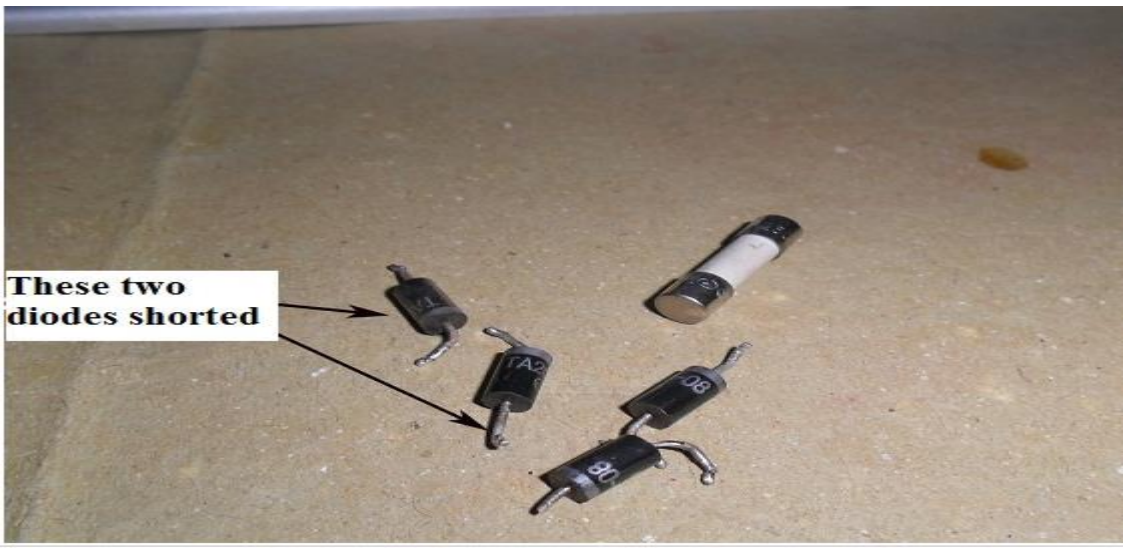


Fig 2.7 defective components

If one or two bride diodes were shorted the best is to replace all the other diodes. If you replace only the two faulty diodes, the other two diodes will get shorted later. Directly replace the 4 diodes even if you found only one shorted to prevent repeat call from the customer.

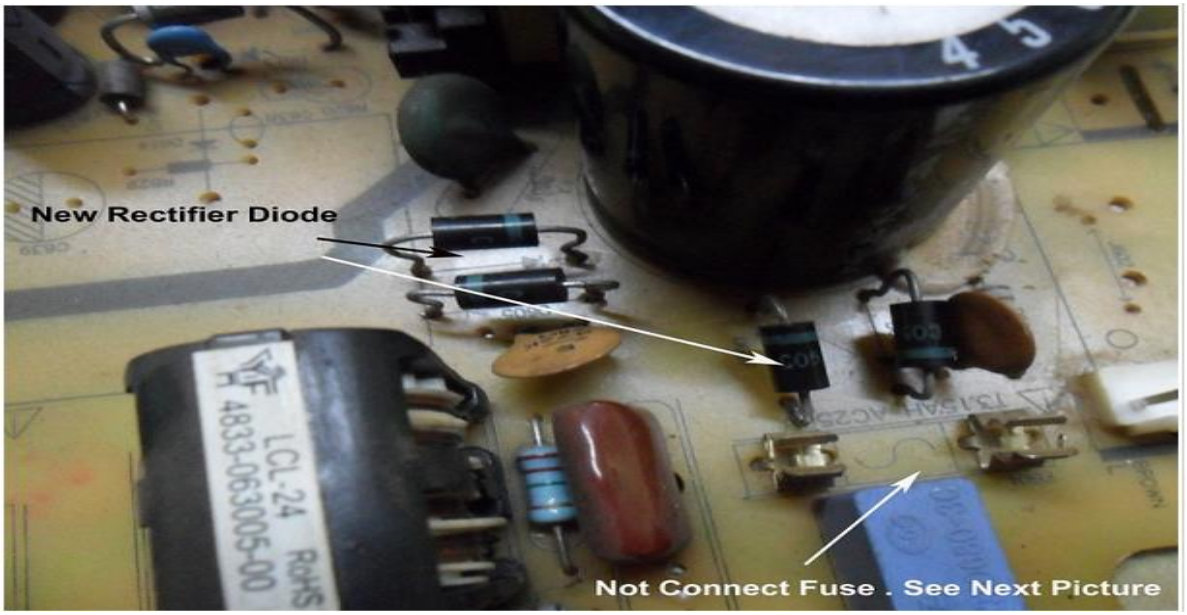


Fig 2.8 diffective diode is replaced

Did not connect the fuse after the replacement of the 4 diodes. Connect a 40 watt bulb to check if there is any other short circuit in the board.

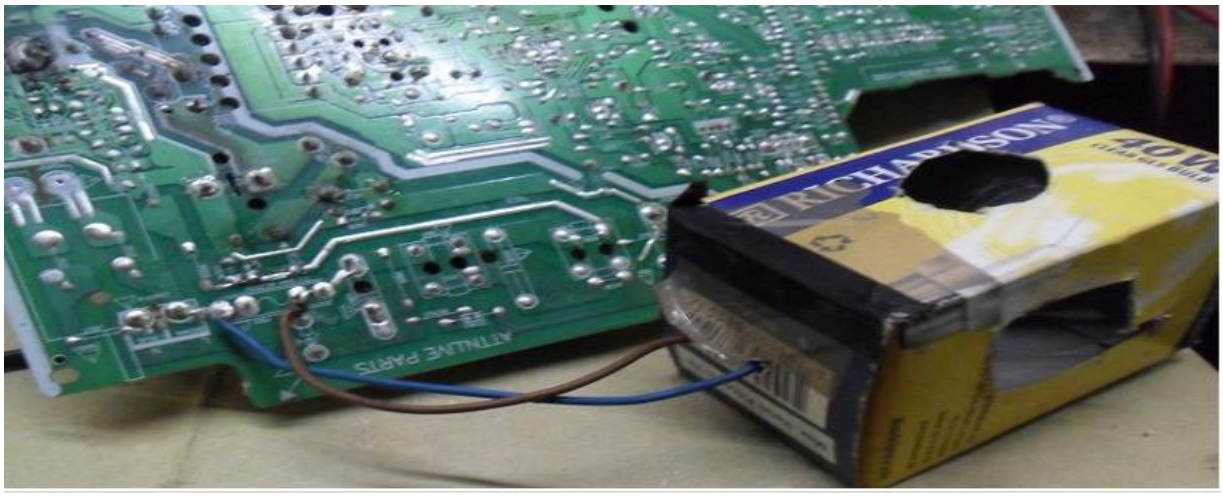


Fig 2.9 using bulb

The bulb lighted up for a while and then went off which indicates there is no longer short circuit in the circuit board and I can connect back the main fuse and power On the TV. The TV in fact was working fine once the power was switched.

b. Flat (LED & LCD)

How to Repair No Power Symptom in LED TV

The circuit boards are contains the power supply board, main board and the T-con board-see the photo below:

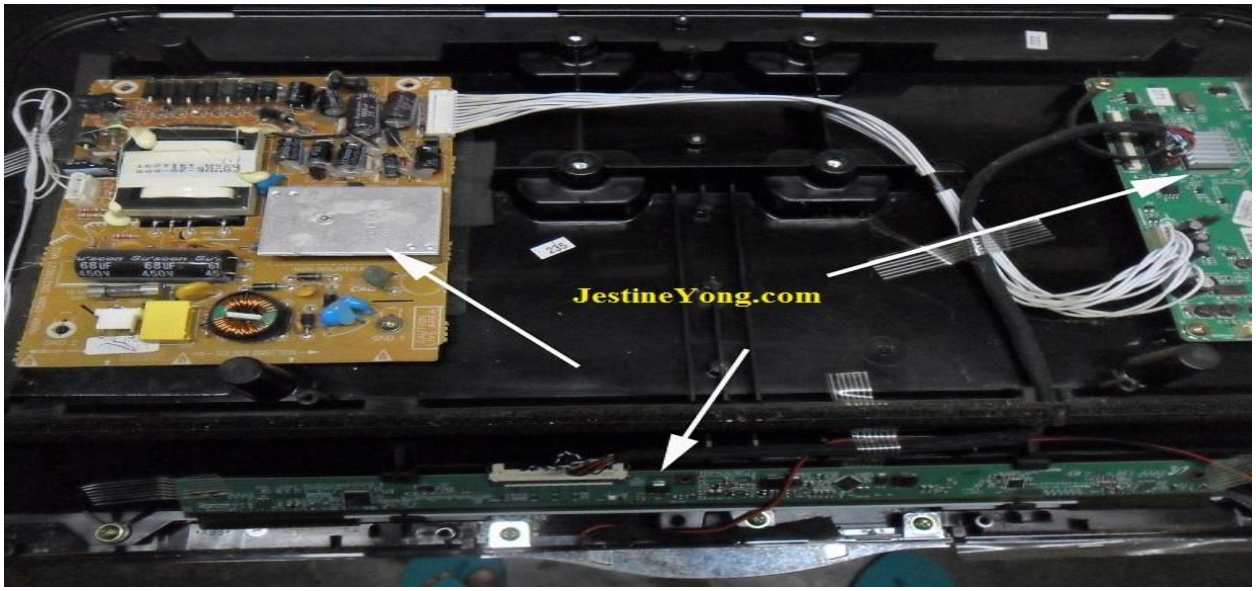


Fig 2.10 internal parts of LED TV

Since the complaint was no power so the first thing to check was the main fuse. From visual inspection it was very clear that the main fuse was severely blown-see the white arrow in the photo below. This indicated a direct short circuit in component that had caused a large current drawn that had blown the fuse

Fig 1.11 power supply of LED TV

Next, checked on the main power FET and it was shorted too- see the two photos below

Fig 2.12 FET of LED TV

Further testing of components corresponding to the power FET did not yield any bad components. Then replaced the bad components with new one (except the main fuse) and soldered a light bulb across the fuse holder to check and make sure no more shorted components.

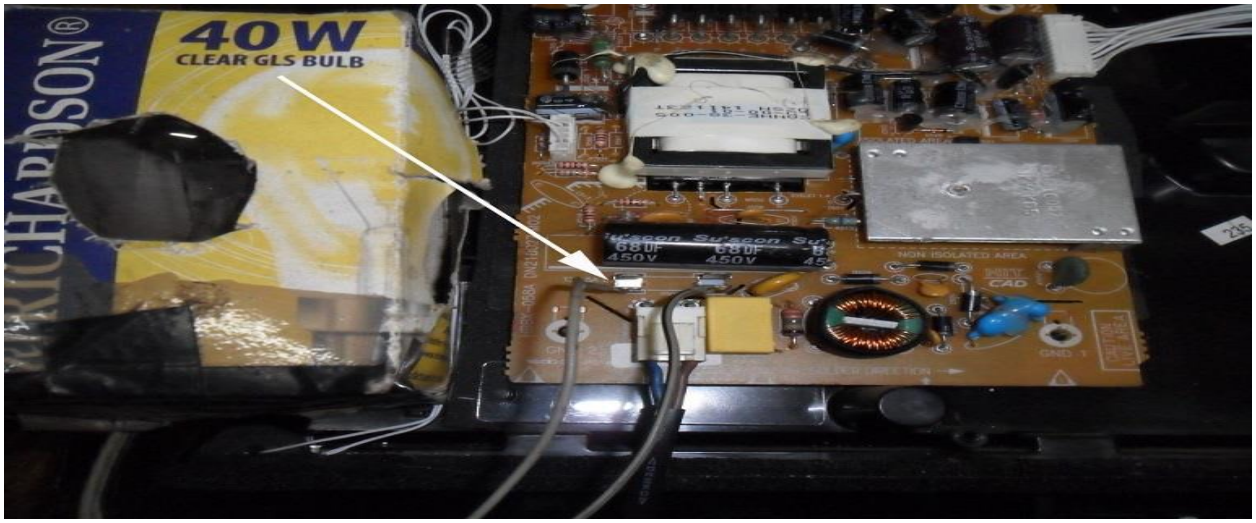


Fig 2.13 how to check more shorted components.

2.1.2. DVD Player

Is A device That Plays DVD Discs /CD produced under both The DVD video and DVD Audio.

DVD the expand form of Digital Video Disc /Digital Versatile Disk.

CD Is the Expand Form of Compact Disk.

Both DVD and CD are used for data storage i.e. video, audio, photo, text etc.

Fig 2.14 Overview of DVD Player

DVD player divides in to two Parts

External part:-includes two panels such as front panel and back panel.

Front panel includes USB slot, SD slot, system controller, power on/off key and MIC input.

Back panel includes scart slot, Game slot, Audio Amplifier output, VGA (monitor connected),Jack(Red & White output of sound and Yellow output of video),speaker o/p connector ,Switch selector, S-video, Optical light.

Internal part includes power supply, Main Board, Mechanical, Display unit, Audio amplifier, Fun, Radio section.

. Section of DVD player

In general DVD player have three major sections they are:

Power supply section

A switched-mode power supply (SMPS) is an electronic circuit that converts power using switching devices that are turned on and off at high frequencies, and storage components such as inductors or capacitors to supply power when the switching device is in its non-conduction state.

Switching IC (Device)-it is switching purpose and generate 16Khz frequency

Chopper transformer –is used to produce constant voltage output

Opt coupler IC- is used to give feedback to copper transformer and the combination of LED &photo diode. If it is functional that read one direction up to 600 Ω on continuity.

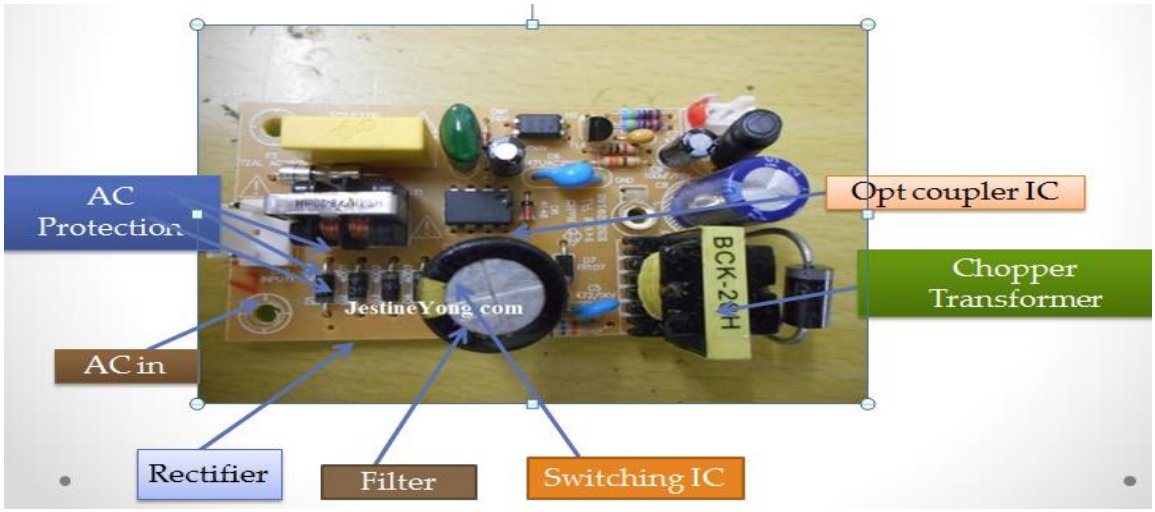


Fig 2.15 power supply of DVD player

Main board

The motherboard is a printed circuit board and foundation of a DVD that is the biggest board in a DVD chassis. It allocates power and allows communication to and between the CPU, RAM, and all other DVD hardware components

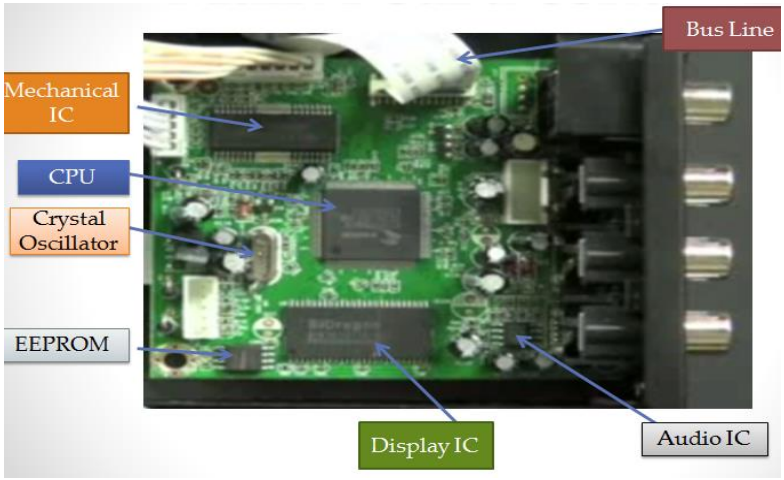


Fig 2.6 main boards of DVD player

Mounting system (mechanical part)

Mechanical - dirt, lubrication, wear, deteriorated rubber parts, dirty/bad limit switches, physical damage. A dirty lens (coated with dust, tobacco smoke residue, or condensed cooking grease) - easily remedied - is probably the number one cause of many common problems: discs not being recognized, seek failure, audible noise, and erratic tracking, sticking, or skipping.

There are three

Loading motor

This is one part of mounting system used to in and out the disc holder.

Spindle motor

It is one part of the mounting system used to rotate the disc 360°.

It receives command/signal from the main board.

Slid motor

It is used to move the optical head in and out to the spindle motor with in steps.

It receive signal from Ham switch/controlled by ham switch through the main board.

Ham switch (control switch)

It is found in the mounting section and, used to control both the spindle and sled motors.

Optical head (lens)

It is used to read the data from the disc by using optical (light) system.

It sends & receive signal from the main board by using 24 pin data connectors/pass line/.

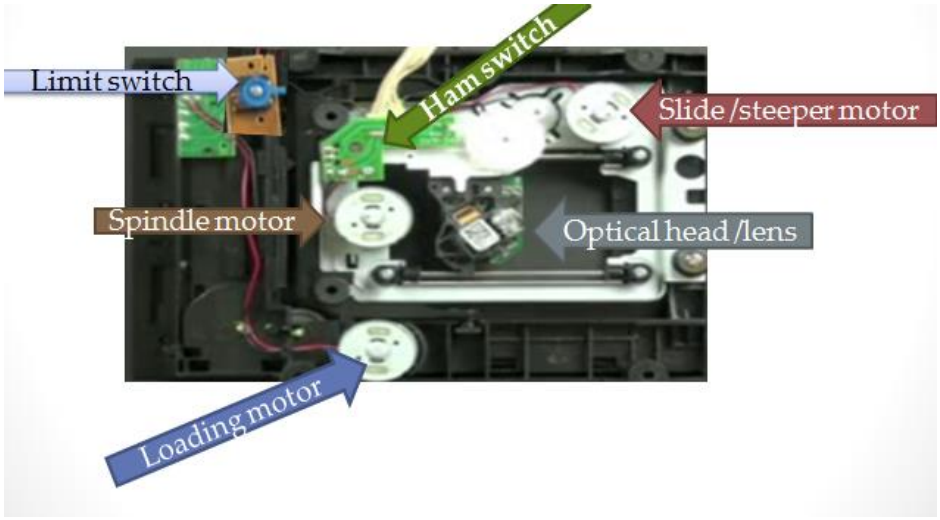


Fig 2.17 mechanical section

2.1.3. Cellular phone

Hard ware

A printed circuit board (PCB) of a mobile phone showing the different internal parts. As you can see from this diagram the PCB is divided into two parts, the network section and the power section. The network section controls the incoming and outgoing phone calls, while the power section controls the memory and power related functions of the phone.

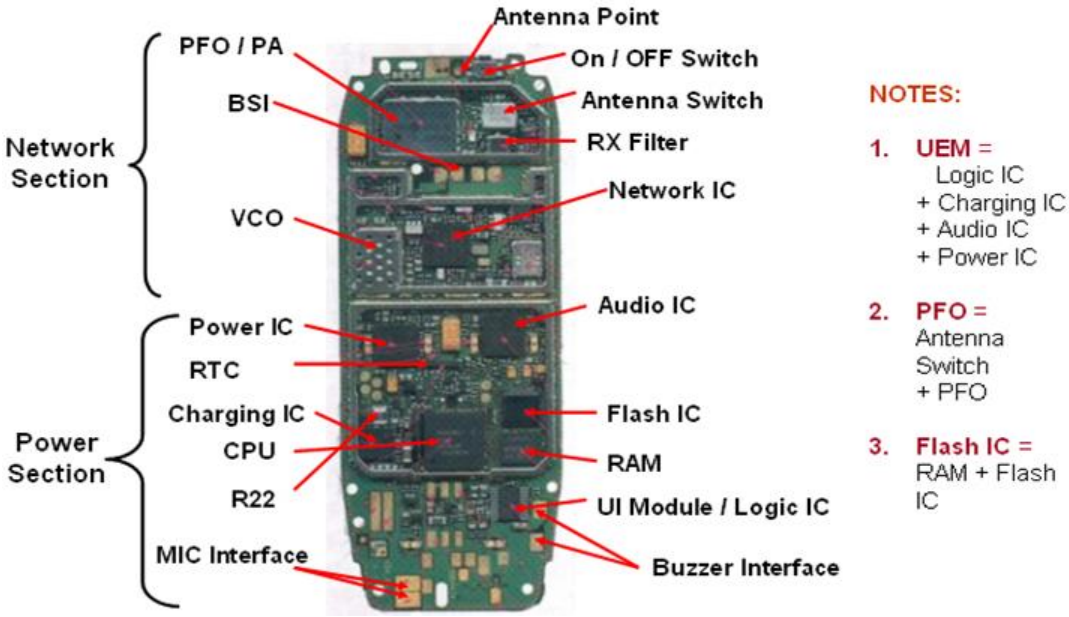


Fig 2.18 hard ware parts of mobile phone

2.1. Big Parts of a Mobile Cell Phone and Their Function

Antenna Switch

It is found in the Network Section of a mobile phone and is made up of metal and non-metal.

In GSM sets it is found in white color and in CDMA sets it is found in golden metal.

Work / Function: It searches network and passes forward after tuning.

Faults: If the Antenna Switch is faulty then there will be no network in the mobile phone

Fig 2.19 Antena switch

It is found near the Antenna Switch in the Network Section of the PCB of Mobile Phone. It is also called P.A (Power Amplifier) and Band Pass Filter.

Work / Function: It filters and amplifies network frequency and selects the home network.

Faults: If the PFO is faulty then there will be no network in the mobile phone. If it gets short

then the mobile phone will get dead.

Fig 2.20 PFO

RF IC / Hagar / Network IC

This electronic component found near the PFO in the Network Section of a Mobile Phone. It is also called RF signal processor

Work / Function: It works as transmitter and receiver of audio and radio waves according to the instruction from the CPU.

Faults: If the RF IC is faulty then there will be problem with network in the mobile phone. Sometime s the mobile phone can even get dead.

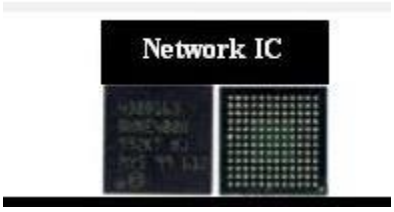


Fig 2.21 Net work

4. 26 MHz Crystal Oscillator

It found near the PFO in the Network Section of a Mobile Phone. It also called Network Crystal. It made up of metal.

Wor or Function: It creates frequency during outgoing calls.

Faults: If this crystal is faulty then there will be no outgoing call and no network in the mobile phone.

Fig 2.22 MHz Crystal Oscillator

It is founds near the Network IC in the Network Section of a Mobile Phone

Work / Function: It sends time, date and voltage to the RF IC / Hager and the CPU. It also creates frequency after taking command from the CPU.

Faults: If it is faulty, then there will be no network in the mobile phone and it will display “Call End” or “Call Failed”.

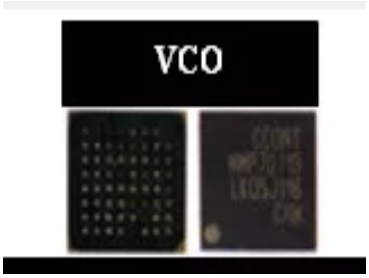


Fig 2.23 VCO

RX Filter

It found in the Network Section of a Mobile Phone

Work / Function: It filters frequency during incoming calls.

Faults: If it is faulty then there will network problem during incoming calls.

Fig 2.24 RX Filter

7 TX Filter

It is found in the Network Section of a Mobile Phone

Work / Function: It filters frequency during outgoing calls.

Faults: If it is faulty then there will network problem during outgoing calls.

Fig 1.25 TX Filter

ROM

It is found in the Power Section of a Mobile Phone.

Work / Function: It loads current operating program in a Mobile Phone.

Faults: If ROM is faulty then there will software problem in the mobile phone and the set will get dead.

Fig 2.26 ROM

RAM

It is found in the Power Section of a Mobile Phone.

Work / Function: It sends and receives commands of the operating program in a mobile phone.

Faults: If RAM is faulty then there will be software problem in the mobile phone and it will get frequently get hanged and the set can even get dead.

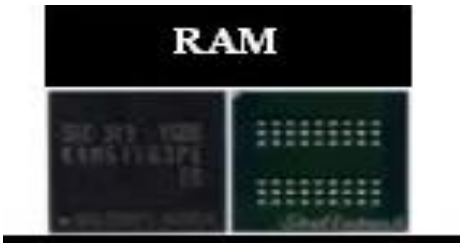


Fig 2.27 RAM

Flash IC

It is found in the Power Section of a Mobile Phone. It is also called EEPROM IC, Memory IC, RAM IC and ROM IC.

Work / Function: Software and IMEI Number of the mobile phone is installed in the Flash IC.

Faults: If Flash IC is faulty then the mobile phone will not work properly and it can even get dead.

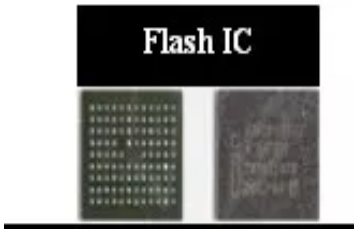


Fig 2.28 Flash IC

. Power IC

It is found in the Power Section of a Mobile Phone. There are many small components mainly SMD capacitor around this IC. RTC is near the Power IC .

Work / Function: It takes power from the battery and supplies to all other parts of a mobile phone.

Faults: If Power IC is faulty then the set will get dead.

Fig1.29 Power IC

Charging IC

It is found in the Power Section near R22.

Work / Function: It takes current from the charger and charges the battery.

Faults: If Charging IC is faulty then there will be battery not charging problem and the set will not get charged. If the Charging IC is short then the set will get dead.

Fig 2.30 Charging IC

1 RTC (Simple Silicon Crystal)

It is Real Time Clock and is found in the Power Section near Power IC. It is made up of either metal or non-metal. It is of long shape

Work / Function: It helps to run the date and time in a mobile phone.

Faults: If RTC is faulty then there will be no date or time in the mobile phone and the set can even get dead.

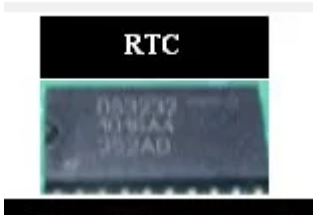


Fig 2.31 RTC

CPU

It is Central Procession Unit of the Phone and is found in the Power Section. It is also called MAD IC, RAP IC and UPP. It is the largest IC on the PCB of a Mobile Phone and it looks different from all other ICs

Work / Function: It controls all sections of a mobile phone.

Faults: If CPU is faulty then the mobile phone will get dead

Fig 2.32 CPU

Logic IC / UI IC

It is found in any section of a mobile phone. It has 20 pins or legs. It is also called UI IC and Interface IC

Work / Function: It controls Ringer, Vibrator and LED of a mobile phone.

Faults: If Logic IC / UI IC is faulty then Ringer, Vibrator and LED of mobile phone will nor work properly.

Fig 2.33 Logic IC / UI IC

Audio IC

It is found in Power Section of a mobile phone. It is also called Cobba IC and Melody IC.

Work / Function: It controls Speaker and Microphone of a mobile phone.

Faults: If Audio IC is faulty then Speaker and Microphone of a mobile phone will not work and the set can even get dead.

Fig 2.34 Audio IC

Ringer / Loudspeaker

Type of component that rings or plays loud sound is called Ringer. It is also called by several other names like – I.H.F Speaker, Buzzer, and Melody etc.

Faults:

Ringer not working.

Less sound from the Ringer.

Sound coming from Ringer but with interruption.

Sound not clear.

Solution:

1. Check Ringer Settings in Mobile Phone. Check Ringer Volume and Silent Mode.
2. Open Mobile Phone and Clean Ringer Point and Ringer Connector. (See Video)
3. Check Ringer by Keeping the Millimeter in Buzzer Mode. Value must be 8--10Ohm. If the Value is not between 8~10 Ohm then changes the Ringer.
4. Check Track of Ringer Section. Do Jumper Wherever required. (See Video)
5. Check Ringer IC. Heat or Change if Required. (See Video)
6. UEM / Logic IC: Heat, Re ball or Change. (See Video)
7. CPU: Heat, Re ball or Change. (See Video)

NOTES:

1. If there is less sound from the Ringer then change the Ringer.
2. If the problem is not solved then heat or change the Ringer IC.

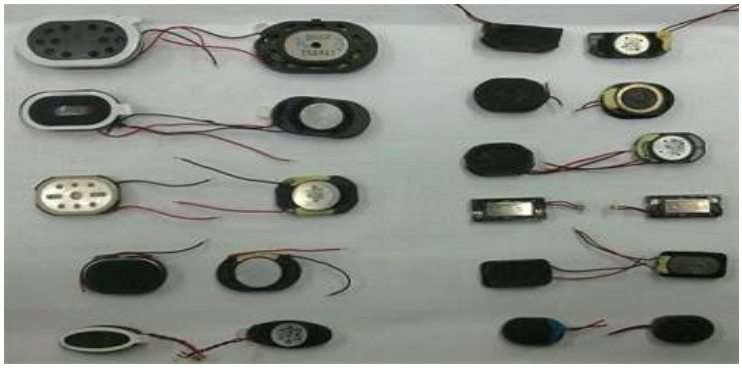


Fig2.35 Ringer / Loudspeaker

Speaker / Earpiece

Earpiece: Type of component that helps to listen to sound during phone call. It is also called Speaker or Ear Speaker. Earpiece is controlled by Audio IC or Power IC (UEM).

Faults:

1. No sound during phone call.
2. Less sound during phone call.
3. Sound with interruption.

Solution:

1. Check Speaker Volume during Phone Call.
2. Check Earpiece / Speaker by Keeping the Multimeter in Buzzer Mode. Value must be 25~35 Ohm. If the Value is not between 25~35 Ohm then change the Earpiece / Speaker.
3. Check Track of Earpiece Section. Do Jumper Wherever required.
4. UEM / Audio IC: Heat, Reball or Change.
5. CPU: Heat, Reball or Change.

Note:

1. If there is less sound or sound is not clear during phone call then change the speaker

Fig 2.36 Speaker / Earpiece

Mic / Microphone:- Type of component that helps to transmit sound from one mobile phone to another during phone call.

Faults:

1. No sound or Less Sound during phone call.
2. Sound with interruption or Changed sound.

Solution:-

1. Check Microphone settings.
2. Check and clean Microphone Tips and Connector.
3. Check Microphone by Keeping the Millimeter in Buzzer Mode. Value must be 600~1800 Ohm. If the Value is not between 600~1800 Ohm then changes the Microphone. NOTE: Only one side will give value. The other side will not give any value.
4. Check Track of Microphone Section. Do Jumper Wherever required.
5. Microphone IC: Heat or Change.
6. UEM / Audio IC / Power IC: Heat, Reball or Change.
7. CPU: Heat, Reball or Change.

Note:-

1. If there is less sound or sound is not clear during phone call then change the Microphone

Fig 2.37 Microphone

Vibrator / Motor: - Type of component that vibrates. It is also called Motor. Vibrator is controlled by Logic IC or Power IC.

Faults:-

Vibrator not working.

Vibration with interruption.

Vibration Hangs.

Solution:-

Check Vibrator Settings in Mobile Phone. Check if Vibrator is ON or OFF.

Open Mobile Phone and Clean Vibrator Tips Connector.

Check Vibrator by Keeping the Millimeter in Buzzer Mode. Value must be 8~16 Ohm. If the Value is not between 8~16 Ohm then changes the Vibrator / Motor.

Check Track of Vibrator Section. Do Jumper Wherever required.

UEM / Logic IC / Power IC: Heat, Reball or Change.

CPU: Heat, Reball or Change.

Fig 2.38 Vibrator / Motor

LED:-Type of component that generates light in the Mobile Phone. These are generally LED or Light Emitting Diode.

Faults:

No Light.

Light in only Keypad or Display.

Some lights not working

Solution:

Check Light Settings.

Resold all LED. There are 2 types of connection in the Light Section of a Mobile Phone: (i) Series Connection; and (ii) Parallel Connection.

Change Display and Check.

Keep Millimeter in Buzzer Mode and Check LED. If LED is good then it will Glow. If LED is Faulty then it will Not Glow.

Change LED or Jumper.

Check Track and Jumper if Required.

Check Boosting Coil and Change if Required.

Light IC: Heat or Change.

Power IC: Hear, Re ball of Change.

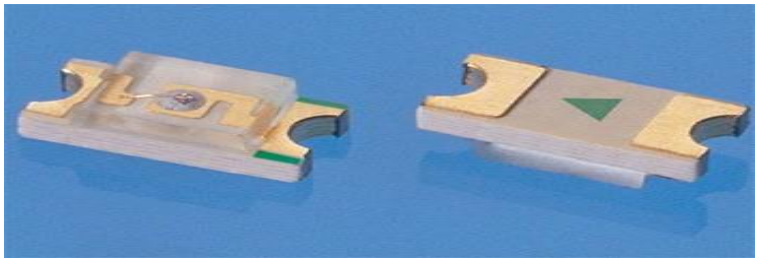


Fig 2.39 LED

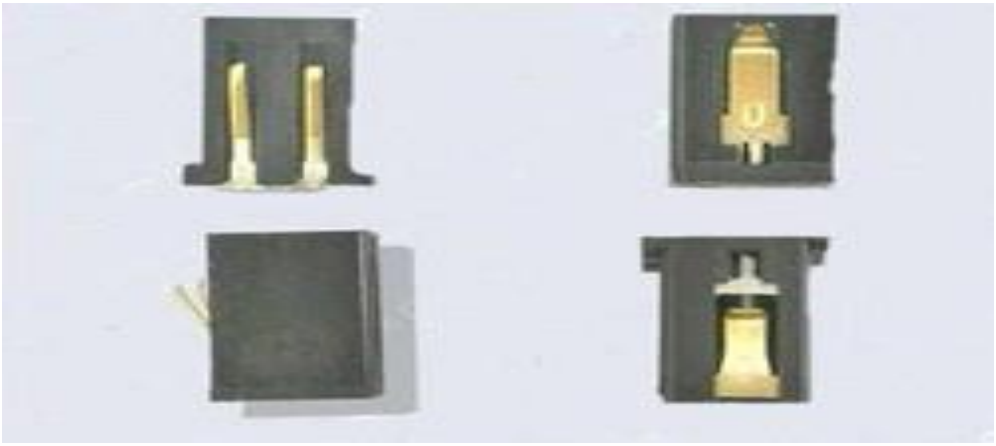


Fig 2.40 Charging Connector

Headphone / Earphone Connector: - Type of component that does the job of Mic and Speaker separately. When we insert Headphone, then Speaker and Microphone of the Mobile Phone Gets Disconnected. Headphone is control by C.P.U.

Faults:-

No sound from Headphone or sound from only one side of the Headphone.

Sound does no go from the Mic of the Headphone.

Solution:

1. Change the Headphone and Check.
2. Clean Headphone Jack and Connector.
3. Re solders or Change the Headphone Connector.
4. Check Track of Headphone Section. Do Jumper Wherever required.
5. Headphone IC: Heat or Change.
6. UEM / Audio IC / Power IC: Heat, Reball or Change.
7. CPU: Heat, Reball or Change.

Note: If there is symbol of Headphone without inserting the Headphone then there is problem with the CPU. To solve the problem, clean or change the Headphone Connector OR Short the Headphone Connector.

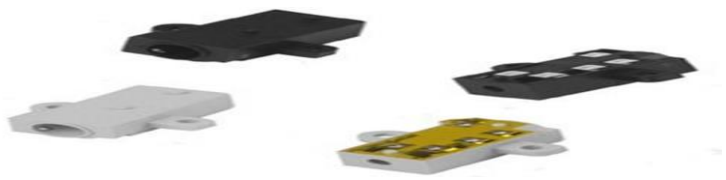


Fig 2.41 Headphone / Earphone Connector

Data Cable Connector:- It helps to connect the mobile to another device such as a computer, laptop, table etc. using a data cable..

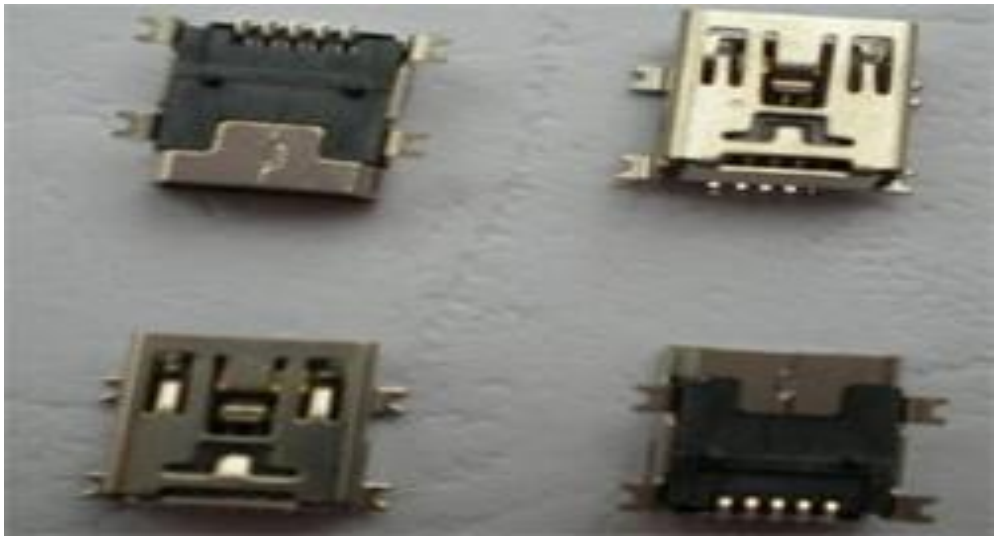


Fig 1.42 Data Cable Connector

Battery:- It supplies power or DC current to the mobile phone.

Fig 1.43 Battery

Battery Connector: - It connects the battery to the internal circuit tracks of the PCB of a mobile phone.

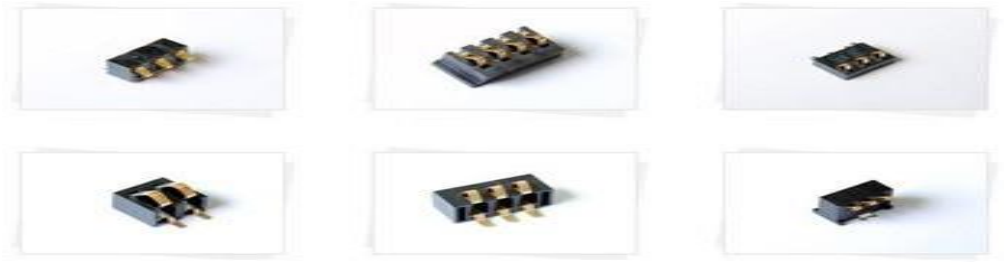


Fig 2.44 Battery Connector

SIM Card: - Subscriber Identification Module. This is a small rectangular chip with circuit and information of user of the card. A SIM card is necessary to make or receive phone calls with a mobile phone.

Fig 2.45 SIM Card

SIM Card Connector:- It connects the SIM card to the Circuit or PCB of a mobile phone

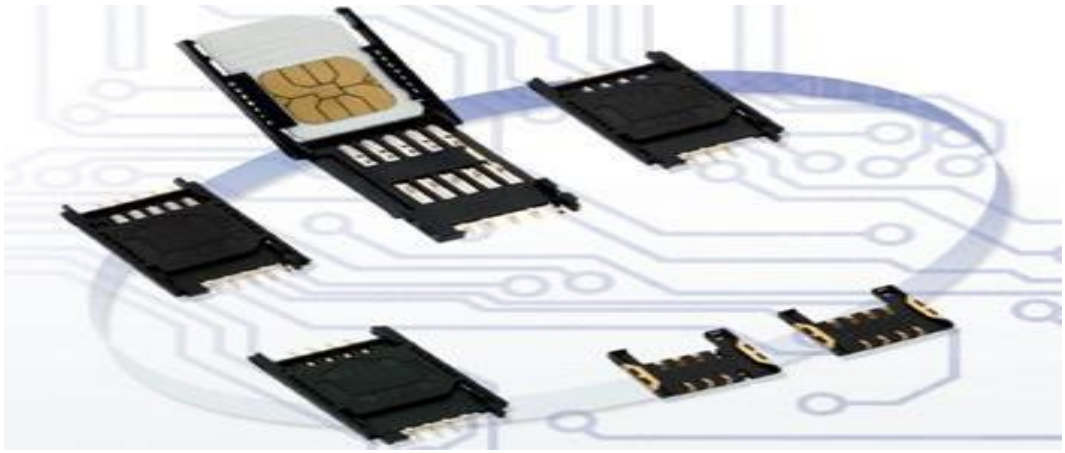


Fig 2.45 SIM Card Connector

Memory Card: - It is use to store data like document, music, videos etc. These are available in different capacities like 1GB, 2GB, 4GB, 8GB, 16GB, 32 GB etc

Fig 2.46 Memory Card

Memory Card Connector:- It connects the memory card to the PCB of a mobile phone.

Fig 2.47 Memory Card Connector

Camera: - It is used to capture still images or record videos. These are available in different megapixel.

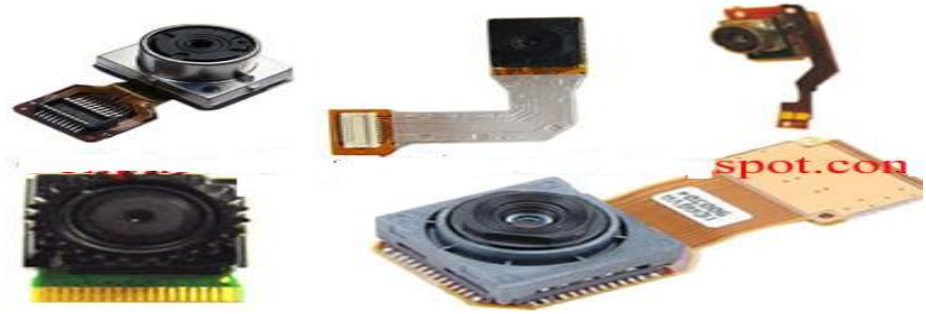


Fig 2.48 Camera

Camera Connector:- It connects the camera to the PCB of the mobile phone.

Fig 2.49 Camera Connector

Keypad Button:- It is connected to the keypad carbon to enter numbers to make phone calls and other data.

Fig 2.50 Keypad Button

Keypad:-Type of component that helps to operate a mobile phone. Some mobile phones are screen touch and are operated by PDA.

Faults:-

1. No Key Working or only Some Key Working.
2. Keys need more pressure to work. Or when pressed a key works continuously.
3. One key is pressed and some other key works OR when one key is pressed, some other key works simultaneously.

Solution:

1. Check Facial of the Keypad.
2. Clean Keypad Tikli and Keypad Points.
3. Keep Multimeter in Buzzer Mode and Check Row and Column of the Keypad. If there is Beep Sound then Pad is OK.
4. Keypad IC / Interface IC: Heat or Change.

5. CPU: Heat, Reball or Change.

Note:

1. In a Mobile Phone, when we press a Key and it works very slow then Reload Software to Solve the Problem.
2. In all Nokia Mobile Phones, if only some key works or none of the keys are working then change the Keypad IC to solve the Problem.
3. If Keypad problem is not solved by Hardware, then Reload Software in the Mobile Phone to Solve the Problem.

Fig 2.51 Keypad Carbon / Tickly

Keypad Connector:- It connects the keypad to the PCB of the cell phone

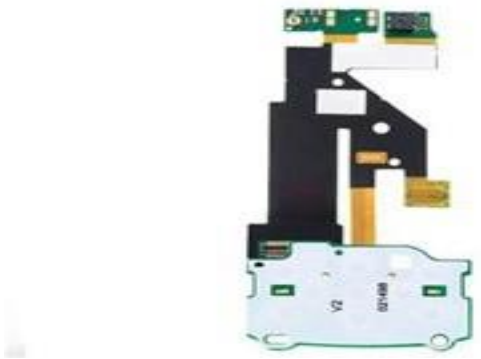


Fig 2.52 Keypad Connector

ON / OFF Switch: - It is made of tiny metal that conducts connectivity when press. It is being used as a power on and off, Volume control switch and camera shutter switch on various

mobile phones.

Fig 2.53 ON / OFF Switch

Display:-The Display Section of a Mobile Phone is controlled by the CPU. In some Mobile Phones, there is an Interface IC called Display IC between the Display and the CPU.

Faults:

1. Nothing shows on the Display or Display is Blank.
2. Only Half Display Working.
3. Display Broken or Crack.
4. Sometimes Display Works and Sometimes it doesn't work.
5. There is only light in the Display and nothing else.

Solution:-

1. Clean Display Tips and Display Connector and Reset the Display.
2. Resold the Display Connector.
3. Change the Display.
4. Check Display Track.
5. Resold or Change Display IC.
6. C.P.U: Heat, Reball or Change.

Fig 2.54 Display

Display Connector:- It connects display of screen to the PCB of a Mobile Phone

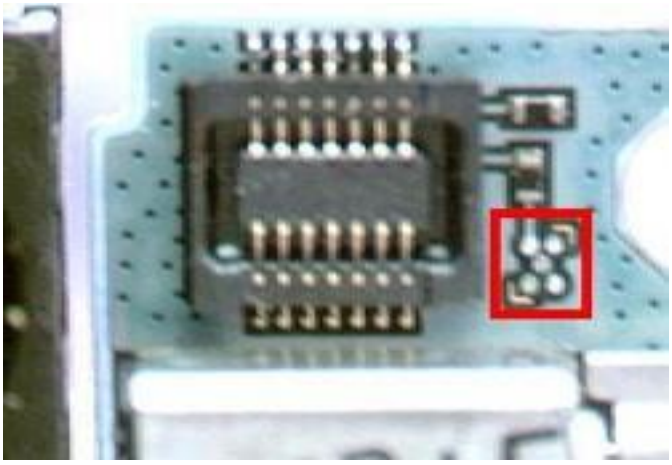


fig 2.55 Display Connector

Antenna:- It helps to capture **network frequency**.

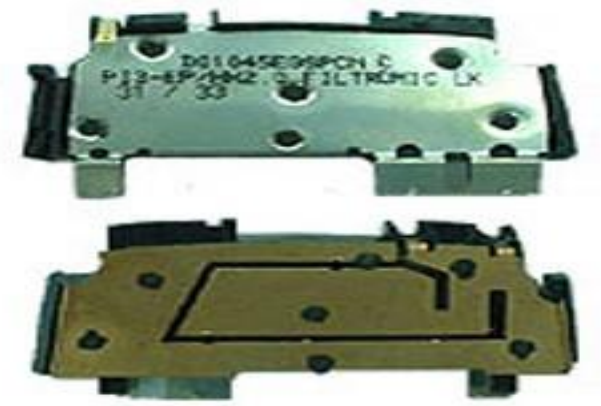


Fig 2.56 Antenna

Screen Touch: Type of component that helps to operate a mobile phone by touching the screen. Touch Screen is available in different sizes. It normally has 4 Points namely: - (+), (-), (RX), (TX). Screen Touch is also called PDA. It is controlled by the CPU. In some Mobile Phones there is an Interface IC called PDA IC or Screen Touch IC.

Faults:-

1. Screen Touch not working.
2. Only Half Screen Touch Works.
3. One key is pressed and some other key works.

Solution:-

1. Check Settings if the Mobile Phone has Both Keypad and Touch Screen.
2. Clean and Resold PDA Tips and PDA Connector.

3. Change PDA.

4. Check Track of the PDA Section and Jumper if Required.
5. PDA IC: Heat or Change.
6. CPU: Heat, Reball or Change.

Note:

Mobile software

If the PDA Problem is not solved by Hardware Then Reload Software to Solve the Problem.

Software Tools for Mobile Phone Repairing :-With These Software Tools for Mobile Phone Repairing, you can Flash Software of all Android Smartphone and iPhone. You Can Flash ROM (OS), IMEI, Unlock Forgotten Lock Pattern or Password, Repair Smartphone that Hangs at Logo.

Here are all the Software Tools for Mobile Phone Repairing. With these Software Tools you can do fix all software relates problems of all iPhone and Android Smartphone's of any Brand and Model including – Samsung, Apple iPhone, All China Mobile Phone (*Vivo, Oppo, Honor, Huawei, Xiaomi, Meizu, OnePlus, Lenovo, Qiku 360, Smartisan*), Micromax, Lava etc.

No flashing Box is needed for to use this software. Just download to your PC and start using with its easy software flashing GUI. It is universal mobile phone flashing software for all China made android mobile phones.

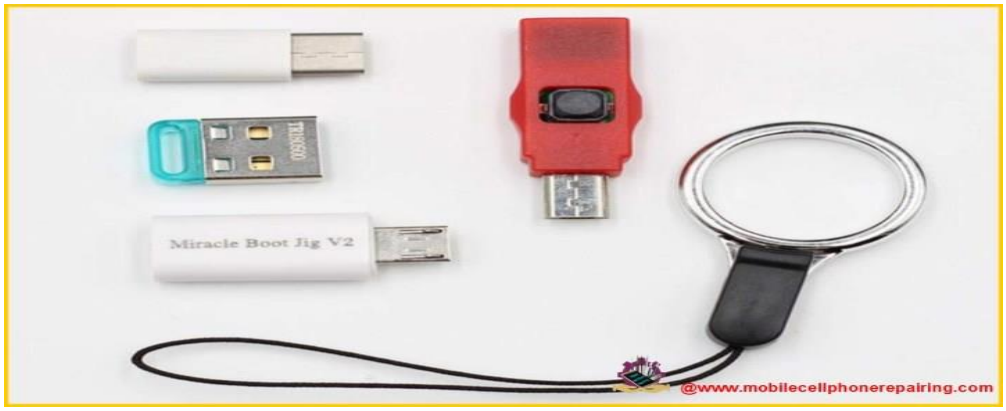


Fig 2.57 sp flash tool

SP Flash Tool (*Smart Phone Flash Tool*) is small-sized Easy to Use Software to flash Stock ROM, Custom recovery, upgrade or downgrade firmware version, unlock forgotten lock

pattern or password and for fixing all software related Issues of android smartphones using MTK (*Mediatek*) processor.

Requirements to use SP flash tool

Laptop of Desktop PC

USB Data Cable to Connect Smartphone with the PC

MediaTek USB-VCOM Drivers (Available as a Bundle with the Software when you download. No need to Download Separately)

Scatter File

Software Files to be Flashed (Download Here)

Other Software Tools for Mobile Phone Repairing

Tale 2.1 Flash IMEI Number in Android Mobile Phone

Processor	Software Tool
SpreadTrum	SPD Flash Tool
Qualcomm	QFlash Tool
Samsung	Odin Flash Tool
Apple iPhone	iTune Tool

Flash IMEI Number in Android Mobile Phone

Your mobile phone gets hanged too often.

Your phone gets hanged at company logo and doesn't boot.

You want to update the latest software / operating system in your phone.

You have forgotten the lock pattern or password and want to unlock the phone.

Your Android Mobile phone or tablet is dead because of software issues.

Hardware Needed

The android phone to flash the IMEI number.

An usb data cable to connect your phone to the computer or laptop.

Software Needed

Stock ROM / Firmware:

SN Write Tool.

AP BP Base for SN Write Tool

Read & Write Tool

AP BP Base for Read& Write Tool

IMEI Number of your Phone

How to Flash IMEI Number in Android Mobile Phone and Restore IMEI Number and Fix Invalid IMEI Number Problem

Step-1.Download SN Write Tool on your computer

Step-2.In the Extracted Folder, you will find – SN Writer.exe

Step-3Now you will see following screen. Click on Comport and Select USB VCOM. In the "*Target Type*" you will get Options to Select Feature Phone, Smartphone and Other Android Devices. Select Smartphone if you are flashing the IMEI Number to an Android Phone.

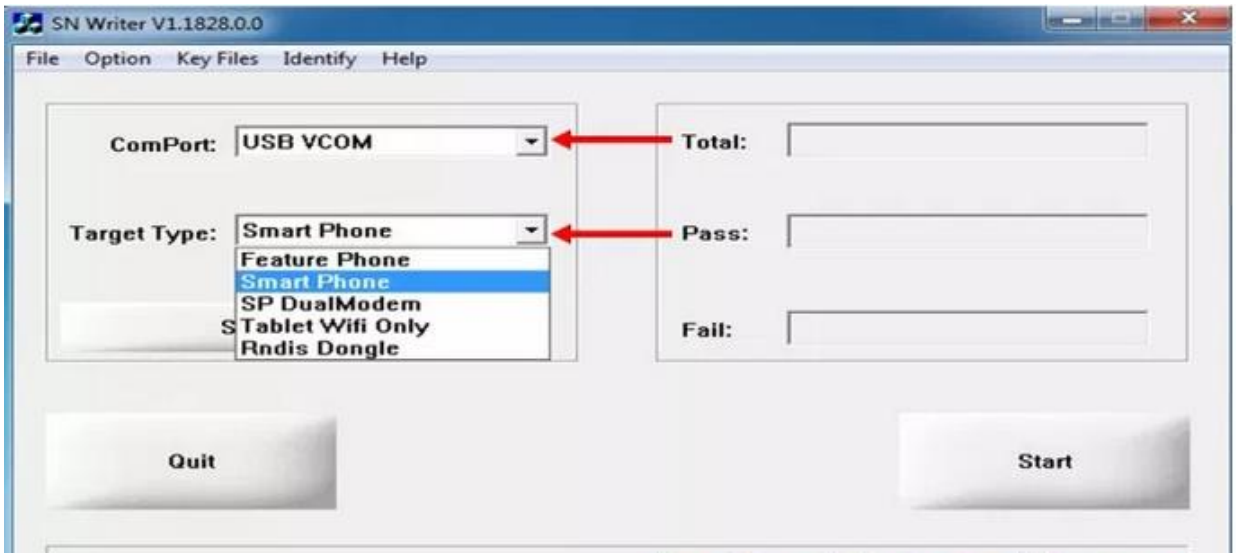


Fig 2.58 a install software

Step-4

Now select System Config Button.

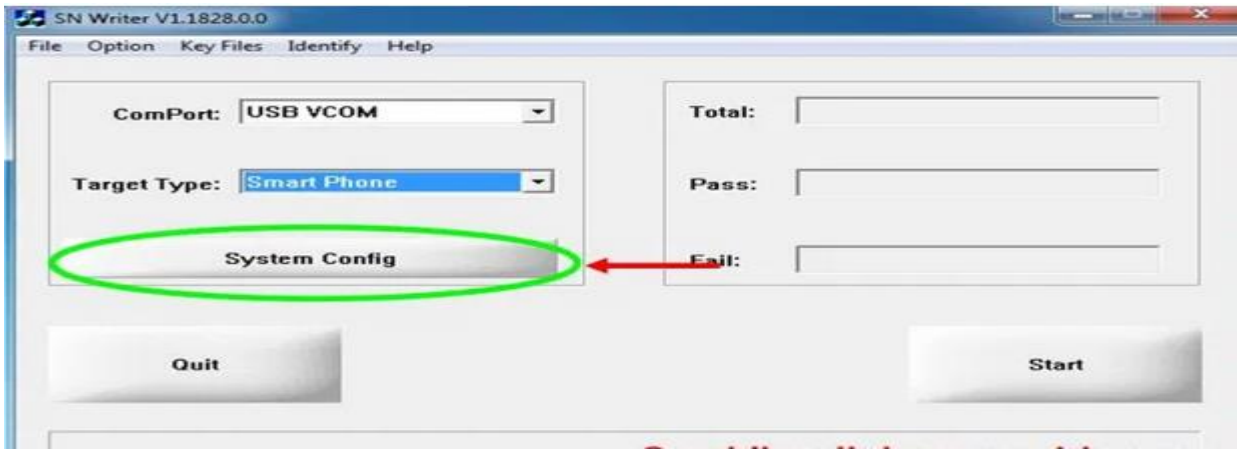


Fig 2.59 installs software

Step-5.Once you click onto the Config Button, you will see the following Screen. Select Following Options – IMEI, BT Address and Wi-Fi Address. You also get the Option to select Dual IMEI, 3 IMEI and 4 IMEI. Select the Required Option.Under Database File Option select the Path of MD1_DB and AP_DB. Remember that BOTH these Files come with the *.zip* File of the Custom ROM Firmware. Otherwise, you have to download the AP BP Base for SN Write Tool (➞ *https://androiddatahost.com/yhaz9*)

Step-6.Now clicks Start Button on the Next Screen.

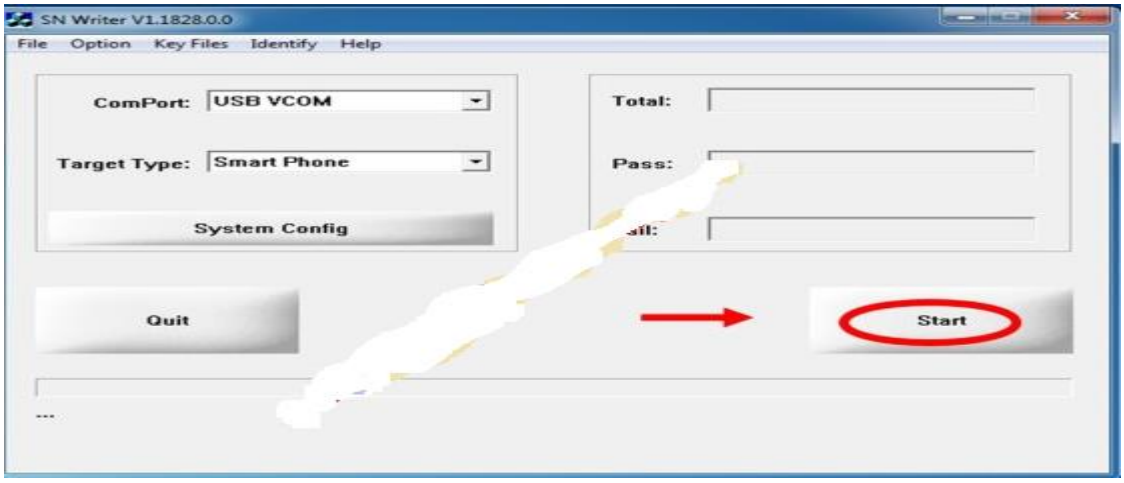


Fig 2.60 installs software

Step-7

Under Scan Data, Enter the 15 Digit IMEI Number. Once you have entered all the required Data, SWITCH OFF your Phone and Take out the Battery. Once the IMEI Number writing is done, you will see Green Pass Message.

Documenting defects against customer description

Defines recording as “the process of putting in writing and keeping on file relevant information about the client, the problem, the prognosis, the intervention plan, the progress of treatment and the procedures for termination or referral Documentation is a key to ensure that practice decisions are well considered. Good documentation establishes accountability and evidence of the services provided. The process of preparing documentation focuses the assessment and understanding of the client’s goals.

Having a specific defects classification for requirements is important to analyze the root causes of problems, build checklists that support requirements reviews and to reduce risks associated with requirements problems.

Complete, thorough, and current documentation is essential to an effective maintenance

program. Whether you are performing preventive, predictive, or reliability-centered maintenance, keeping track of equipment condition and maintenance performed or planned is critical.

Self-Check 1.2	Written Test

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: I. say true if the statement is correct or false if the statement is incorrect

1. _____Television is an electronics device that used to transmit and receive only video signals from the space

2._____ Connect/disconnect any test leads with the equipment under unpowered and unplugged condition

Directions: II. Chooses the correct Answer from the following questions and writes your answer on the space provided.

1. ____ is control the image produced by controlling the position that the electrons hit the screen.

A. Audio section B. Deflection section C. Tuner section D. all

2.____ which one of the following is different from the others

A. screw driver B. Soldering lead C. Multi-tester D. Goggle

3. ____ move the optical head in and out to the spindle motor with in steps.

A. spindle C. loading

B. slide D. switch

4.____ Convert the AC in put into another AC output of different voltages

A. IC regulator B. Transformer C. Chopper transformer D. Bridge rectifier

5.____ which section of TV is used to provide selectivity, there by rejecting the interference /unwanted signal A. Video section B. Tuner section C. Deflection section D. Chroma section

Note: Satisfactory rating 5 and above Unsatisfactory - below 4 points

You can ask you teacher for the copy of the correct answers.

Information sheet 3: Verifying repair/maintenance history

3.1 Verifying repair/maintenance history

Every company, no matter which industry it belongs to, relies on the health of its equipment in one way or the other. The downtime or unavailability of equipment leads to time wastage and potentially lost sales. This is why taking good care of the equipment you own should be a top priority.

However, it can be quite a struggle to ensure that all these important assets are maintained and inspected as often as needed. It is crucial to maintain an equipment maintenance log for many reasons. For starters, it helps ensure that the revenue-generating operations are constantly progressing as required without any disruptions in the form of unexpected downtime.

Moreover, keeping track of equipment maintenance can also help decrease the risk of injuries at the job sites. It is believed that equipment failures have an immense effect on the severity and number of accidents in different industries.

What is an equipment maintenance log?

The equipment maintenance log is a simple document that contains a list of all actions that have been performed on a certain piece of equipment. It helps keep track of the maintenance history. It generally contains the following two different sections, each containing different types of information:

1. **General information**

The first section has to do with general information. This information is used to identify the piece of equipment. It most commonly includes:

Name of equipment

Model or manufacturer

Serial number

Location

Person responsible for equipment

Some equipment maintenance logs also include the Purchase date and Purchase price in this section.

2. **List of maintenance actions**

The second section lists all the maintenance actions performed on the equipment. It commonly includes the following fields:

Date when the action was performed

Description of the action itself

Name of the person performing the actions

Lastly, some logs also include a Remarks section. This section is useful in case the person performing the maintenance might have any special notes to add for future reference.

What does an Equipment Maintenance Log include?			
Name of equipment		Location	
Serial number		Manufacturer/Model	
Purchase date		Person responsible for equipment	
Date in service	**Description of maintenance**	**Maintenance performed by**	**Additional Notes**

Fig 3.1 Equipment maintenance Log

Shortcomings of the traditional equipment maintenance log

The traditional equipment maintenance log takes us back to the pen and paper era. It goes without saying; filling out a maintenance blog manually with a pen takes up an excruciatingly long amount of time. Furthermore, there is also an increase in mistakes. Human errors become quite commonplace when everything has to be written down manually.

Apart from these, there are several other problems with the traditional paper-based maintenance log. There is limited flexibility and the data on there is not that easily accessible when needed. Lastly, paper can easily get lost, burnt, destroyed, spilled on the list goes on and on. If something of that sort happens, you're going to lost precious data.

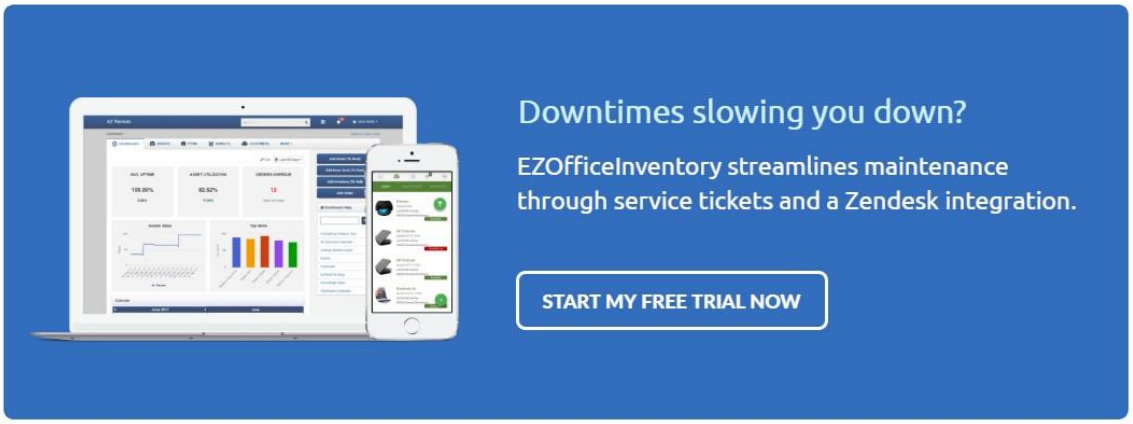
Instead, you can choose to move forward with the times and consider software that automates such manual processes for you. Such software will help save precious time and effort that can be better used elsewhere.

Equipment maintenance log and tracking software

Maintenance tracking software eases and simplifies the process of dealing with maintenance issues of your equipment via equipment maintenance log. It records each and every maintenance issue that arises in each of your equipment, thereby leaving a trail of maintenance history. This history can then be utilized by technicians or key personnel who are responsible for fixing the equipment.

Proper maintenance records help to:

- Minimize the number of expensive repairs
- Identify inventory trends
- Increase operator safety
- Pitifully impact resale value
- Enhance the health visibility of each piece of equipment



A robust equipment maintenance feature comes with a scheduler that automatically sends inspection, repair and maintenance alerts to key personnel in case a problem arises. This enables you to take an action to quickly repair or fix the equipment and make it operational again.

Furthermore, the automation of processes ensures monthly and annual maintenance along with timely inspections and required checks.

Recording accurate equipment maintenance logs drive awareness about an item's maintenance. They also narrow down what elements and parts of your equipment are resulting in performance issues. Several problems in equipment are exposed with the help of maintenance logs.

The equipment tracking solution also helps you save money. It tracks the maintenance history of each asset. Then it actively warns you if certain equipment is costing you more to

maintain as compared to the amount of revenue it is generating.

The use of equipment maintenance log

- It increases resale value of equipment

Proper maintenance and tracking of the equipment maintenance log help your equipment to run in optimal condition. Record keeping also proves to be useful when you decide to replace your current equipment with newer versions.

What directly influences the resale decision for a buyer knows about the care put into the equipment by the previous owner. Maintaining records of repairs and maintenance helps to sketch a clearer picture for the buyer about the attention given to the asset to keep it in the best possible condition.

Keeping an updated equipment maintenance history may sound complicated. However, equipment tracking software makes it simple and easy. It keeps adding details of each and everything your equipment goes through, thereby keeping the maintenance records up to date at all times.

Moreover, well-documented maintenance increases the worth of the used equipment as compared to other used equipment that has no maintenance records. To maximize resale value, a complete and consistent record of everything, including repair schedules, usage logs, and maintenance records, is very important. Such records help boost the buyer's confidence in the seller's assets.

- It saves the upfront costs

Having a complete equipment maintenance log lets you know when the time is right to replace equipment. This, in turn, helps you save money. The data that is gathered over time unveils patterns of failure, expenditure, and repair.

Let's assume a piece of equipment tends to break down every two weeks. It costs $2500 per year to repair. Instead of throwing money away on its maintenance, it will be much more cost-effective to simply replace that machine for $4000. Not to mention, buying a new machine will come with equipment upgrades and a new warranty, thereby minimizing costs and equipment breakdowns.

On the other hand, with equipment maintenance software you might also discover that maintenance is a lot cheaper than actually replacing the whole equipment. The absence of proper maintenance records can lead to frequent unexpected downtimes. These downtimes are going to inevitably result in missing deadlines, halting the production lines and keeping

employees idle.

On top of all that, you even have to pay technicians overtime for such unexpected failure plus the extra money for urgent delivery of parts.

- It identifies trends across makes, models, or components

The equipment maintenance log throws light on the common trends in your equipment across models, components, makes, operators and more. The data on equipment maintenance log tracked by a maintenance management solution highlights which models and makes of certain equipment incur the lowest cost per hour of ownership.

On the flip side, there can be a certain part of the same model of a machine that requires consistent replacement after a comparable number of hours or mileage. This way you can predict that replacement or repairs are going to be required at the same interval for the same model of equipment approaching its benchmark.

Such insight can help companies know the parts that are needed to be in stock and to perform replacement and repairs before any equipment failure.

- It increases the safety of operators

All sorts of machinery that you use is prone to wear and tear. Routine inspections let you see into repair issues and small damages before they turn into bigger problems. Even documenting these small repairs and inspections goes a long way in tracking all maintenance tasks that your equipment goes through.

Yet another benefit of documenting maintenance records is being able to find self-inflicted damage. Self-inflicted damage means damage as a result of the negligence of operators and employees that interact with that particular piece of equipment. If you have records about such damage, you can keep an eye on those operators who don't take good care of your equipment and those who do.

Many accidents that take place in industries are because of unplanned equipment failures. Timely repairs, routine checks, and scheduled maintenance help to make sure that your equipment is safe to operate and to eliminate the risk of such accidents. It also increases the general safety of your business landscape.

Routine inspections, such as checking friction material, lubricating gears, and conducting periodic scans, help to improve the overall health of the machines you own. With a well-documented equipment maintenance log, you can make sure that the equipment is safe to

work with.

An equipment tracking system allows you to schedule inspections when required so as to maintain the operator's safety. It also holds the operator accountable for performing required inspections and reduces the chances of accidents or incidents due to faulty machinery.

You will also be able to print analysis reports whenever you need them and save yourself countless hours of manual reporting. You'll have all the equipment maintenance information is right at your fingertips. This easy-to-use software solution saves you a ton of time and frees you from the clutches of stress.

EZ Office Inventory comes with numerous features to optimize equipment maintenance. You can easily schedule future maintenance, either by date or hours/miles. Moreover, other helpful features include monitoring operating costs and automating your preventive maintenance system with ease.

Self-Check 3	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: choose the correct answer from the following alternatives and write your answer on the answer sheet

1. ___The downtime or unavailability of equipment leads to time
   A.Wastage B. potentially lost sales C.A &B D. all
2. _____ the advantage of an equipment maintenance log has is?
   A.the revenue increase B. decrease the risk

   C disruptions in the form of unexpected downtime. D. all

3._____ not in **list** of maintenance actions

A. Date when the action was performed B. name the teacher

C. Name of the person performing the actions. D. Description of the action itself

Note: Satisfactory rating - 3 Unsatisfactory - below 3 points

Answer sheet

Information Sheet 4: Acquiring Service manuals and service information

4.1. Acquiring Service manuals and service information

Service manuals are the manuals provided by manufacturers, which cover the servicing, maintenance and repair of their products. They were not originally offer to the public as they were developing for the dealerships so that their mechanics were able to fix their own products.

If you have a maintenance manual, using it to make repairs or do maintenance on equipment can make the job much easier and more efficient. Most manuals are self-explanatory, but here are some tips on getting more out of yours.

When we use the service manual, the following steps will be following

Make sure you have the right manual in front of you.

Look for specific sections detailing the type of service or repair you are going to perform.

Read the section, which describes the task you are undertaking before you actually

Start. This will help you understand what is involved and what tools you'll need to have on hand.

Follow instructions carefully when performing any maintenance until you are familiar with the procedure.

Look for specific warnings.

Look for references to specific tools, gauges, or other specialized equipment required to perform your maintenance or repair.

Schematic diagram: is a drawing showing all significant components, parts, or tasks (and their interconnections) of a circuit, device, flow, process, or project by means of standard symbols. Schematic diagrams for a project may also be use for preparing preliminary cost estimates. Schematic diagrams may also be used to explain the general way that an electronic functions without detailing the hardware or software used in the actual electronic.

Parts list:

Parts list is known as a bill of materials (BOM) is a tabular list of the items used to make an assembly. Parts list is usually combined with the assembly drawing, but it is a separate and

individual document, can be, and provides a complete list of all parts needed to build the complete project.

The four elements listed below is the most common items and placed in the assembly drawing. The information associated with the parts list generally includes:

Item number: are based on the assembly structure, that is, the order in which parts are displayed in assembly.

Part number: is a reference back to the detail drawing.

Description: is usually a part name or a complete description of purchase part or stock specification, including size and dimensions.

Quantity: The number of that particular part used on this assembly.

Operating instructions/User's/Owner's manual

User documentation, be it called a user manual, user guide, or other, is usually provided to customers once they buy a product or services. The User Manual contains all essential information for the user to make full use of the information system. This manual includes a description of the system functions and capabilities, contingencies and alternate modes of operation, and step-by-step procedures for system access and use. An owner's manual is an instructional book or booklet that is supplied with almost all technologically advanced consumers.

Information contained in the owner's manual typically includes:

Safety instructions; for liability reasons these can be extensive, often including

Assembly instructions; for products that arrive in pieces for easier shipping.

Installation instructions; for products that need to be installed in a home or workplace.

Setup instructions; for devices that keep track of time or which maintain user accessible state.

Instructions for normal or intended operations.

- **Maintenance instructions.**

Troubleshooting instructions; for when the product does not work as expected.

Service locations; for when the product requires repair by a factory authorized technician.

Regulatory code compliance information; for example with respect to safety or electromagnetic interference.

- **Product technical specifications**.

Warranty information; sometimes provided as a separate sheet.

Service Information was a regular program used to give out technical information for the technician. Service information includes the following basic points:

Job report sheets: is blank quantity for the worker to fill up during or after performing the job.

A bill of materials (BOM) provides a list of all the raw materials or components, sub-components, assemblies, and sub-assemblies required to build or repair a product or service. It is a comprehensive list of parts, items, assemblies and other materials required to create a product, as well as instructions required for gathering and using the required materials. The bill of materials explains what, how, and where to buy required materials, and includes instructions for how to assemble the product from the various parts ordered.

Customer index is a measure of how products and services supplied by a company meet or surpass customer expectation. Customer satisfaction is defined as "the number of customers, or percentage of total customers, whose reported experience with a firm, its products, or its services (ratings) exceeds specified satisfaction goals."

Customer Index is an economic indicator that measures the satisfaction of consumers across the country. The four crucial things a customer needs are: Fair price. Good service. Good product.

Service Flowchart is a kind of diagram showing how steps in a process fit together, through which you can build a step-by-step picture of the process for analysis, discussion, or communication. A flowchart is a formalized graphic representation of a logic sequence, work or manufacturing process, organization chart, or similar formalized structure..

Stock deals with products that are sold as part of the business's daily operation, inventory includes sale products and the goods and materials used to produce them.

A material requisition form lists the items to be picked from inventory and used in the production process or in the provision of a service to a customer, usually for a specific job. The form usually has three purposes: To pick items from stock. To relieve the inventory records in the amount of the items picked. Requisition slip is a form for ordering material to be used for certain purpose.

Supplier Index is a leading indicator and predictor of future growth or contraction. A rising Supplier Deliveries Index over time usually signals future supply problems. A decreasing Supplier Deliveries Index usually signals increased supply availability — and possibly decreased economic activity.

Self-Check 4	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: choose the correct answer from the following alternatives and write your answer on the answer sheet

1. ___is provided by manufacturers which cover the servicing, maintenance and repair of their products.

   A. Information B. Schematic diagram C. Customer index D. Service manual

2. _____is used to measure how products and services supplied by a company meet customer expectation

   A. Customer index B. Stock C. Material requisition form D. Bill of materials

3. Which one of the following is showing all significant components, parts, or tasks of a circuit,/device

   A. Customer index B. Bill of materials C. Schematic diagram D. Supplier Index

4._____ Information contained in the owner's manual typically includes

   A. Safety instructions C. Troubleshooting instruction

   B. Installation instructions D. Service location E. All

5. Which one of the following are **not** the steps of service manual

A. Make sure you have the right manual in front of you.

B. Look for specific sections.

C. Read the section which describes the task you are undertaking before you actually start.

D.Look for general warnings

Note: Satisfactory rating - 5 Unsatisfactory - below 5 points

Information sheet 5: Setting or preparing workstation for repair job

5.1. Setting/preparing workstation for repair job

Work stations are must prepared in accordance with the maintenance strategy, and policies.

The first group of examples deals with arrangements at individual workstations. These arrangements are important as efficiency at work is greatly affected by how a workplace is designed. This is particularly true when similar operations are repeated at a workstation. If work can be done effectively and easily, productivity will be higher and quality will be better.

A workstation is a place which a worker occupies when performing a job. It may be occupied all the time or only occasionally. A workstation often contains a work stand or work table for machine operation, assembly or inspection

Safety is process of protecting employees from work related illness and injury. It starts by the development of a company Environmental, Safety and Health Policy statement and implementation of a work place safety plan and program.

Each employee is expecting to consider the prevention of injury to self and co-workers. Involvement and thinking of all people in the safety process is valued and expected.

- **Safety guidelines**

These guidelines are to protect you from potentially deadly electrical shock hazards as well as the equipment from accidental damage.

The purpose of this set of guidelines is not to frighten you but rather to make you aware of the appropriate precautions. Repair of TVs, monitors, microwave ovens, and other consumer and industrial equipment can be both rewarding and economical. Just be sure that it is also safe!

Set up your work area away from possible grounds that you may accidentally contact.

If circuit boards need to be removed from their mountings, put insulating material between the boards and anything they may short to. Hold them in place with string or electrical tape. Prop them up with insulation sticks - plastic or wood

If you need to probe, solder, or otherwise touch circuits with power off, discharge (across) large power supply filter capacitors with a 2 W(e.g., for a 200 V capacitor, use a 20K to 100K ohm resistor).

- **Safe Work Areas**

Conducive Environment i.e. well ventilated areas

Areas with available accessory components, tools, equipments

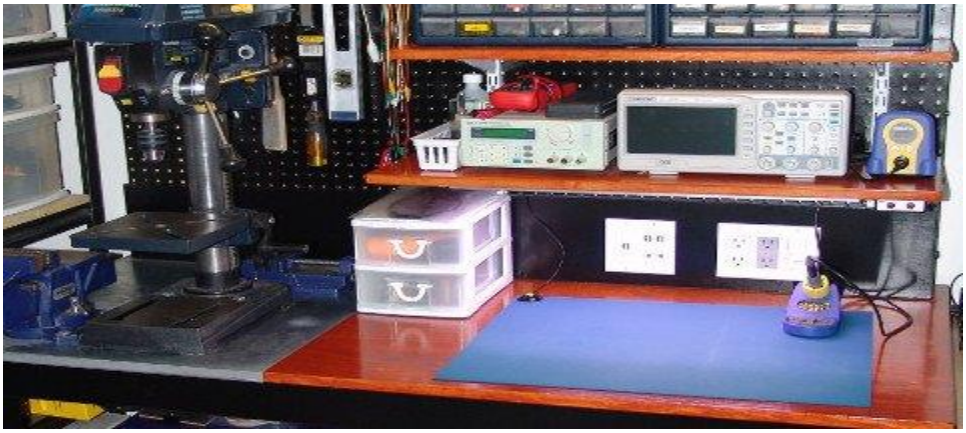
Appropriate areas to organize materials under maintenance/troubleshooting

Free from oils and inflammable materials

Appropriate personal protective Equipments (PPE)

a. Eye glass *b. Safety cloth* *c. Shoes* *d. Glove*

Fig1.1.2 protective device



. Fig 5.1workstation

Self-Check 5	Written

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: choose the correct answer from the following alternatives and write your answer on the answer sheet

1. If work station done effectively and easily, productivity will be

A. increase B. decrease C. quality will be less D. All

2. Which one is different from the others

A. Oscilloscope B. Volt meter C. screw driver D. multi meter

3. Safety guidelines procedures are **not** protect equipments from accidental damage

A. True B. False

Note: Satisfactory rating – 3 and above satisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Information sheet 6 : Preparing necessary tools, test instruments and personal protective equipment

6.1Preparing necessary tools, test instruments and personal protective equipment

Tools and Test Equipment

The tools and test equipment needed for electronic troubleshooting. You will need an assortment of tools and test equipment ranging from simple tool such as the screwdriver to sophisticated equipment like the Digital oscilloscope. Some simple fault of electronic equipment can be repaired by using only basic tools and test equipment. But if you are repairing electronic equipment for a living or you want to be ready to repair all kinds of electronic problems that come your way, you will need to invest in some specialized equipment. You can then be ready to move quickly when trouble strikes!!

Tools

Tools are the basic requirement of a service technician or engineer. Without tools, one cannot even open the cabinet and have access to the circuits.

- Soldering Irons

Overheating can easily destroy transistor and ICs. For this reason, you must choose carefully when you select a soldering iron for use with digital circuit like CMOS IC. Use a low- powered iron, with a rating of about 30 watts. Do not use a high-powered iron, because it can easily overheat an IC or other parts. If you overheat a trace on a circuit board, the heat can cause the trace to lift from the board. Soldering tips can be manufactured in a wide range of shapes and sizes. Before you select the best tip for the job, you must understand the ideal soldering conditions. Remember to turn off the equipment before you make any solder repairs.

- **Sponges**

Always keep a damp sponge near your soldering station, and wipe the tip of the hot iron frequently while you're soldering. This will keep the tip clean and shinny for maximum heat transfer.

- **Soldering Iron Holders**

If you have a soldering iron with no switch, (some soldering irons have a switch, where each press will increase the power from 30w to 120w), it will remain hot all the time when it is plugged in. Sometimes the solder iron becomes too hot and it melts the plastic case of the soldering iron. The

holder is often formed into a spiral, with lots of air space to radiate the heat from the iron and also to prevent the soldering tip from touching other parts which can sometimes cause fire.

- **Solder**

Solder is related by the proportion of lead to tin. For example, “60/40” solder is 60% tin and 40% lead. The diameter of the solder that I usually used is 0.8mm. Most solders are manufactured with a hollow center that contains “flux”. As a solder melts, the flux cleans the parts and prevents oxidation to ensure a good connection. Always use resin-core solder and under no circumstances should you use paste flux containing acids or solvents or use solder containing acid flux. Harsh solvents destroy delicate components leads and circuit traces.

- **Heat guns**

You can often use temperature as a diagnostic tool. Many intermittent are thermal. That is, they appear at one extreme temperature or another. If the problem shows up only at a high temperature, it may be very difficult to find with the cover removed. With the cover removed, the circuits usually run much cooler, and a thermal intermittent will not show. In this case, it may be necessary to use a little heat to identify the problem. A home hair dryer works well if you use the lowest possible heat setting. Be careful not to overheat the circuits. Certain plastic materials can be easily damaged.

- **Freeze Sprays**

Freeze sprays or spray coolers are available for tracing thermal intermittent. They use chemicals such as Freon to rapidly cool circuit components. A spray tube is included to control the application closely. Thus, it is easy to confine the spray to a specific component at one time. Be very careful not to use just any spray coolant. Some can generate static charges in the thousands of volts when they are used. Sensitive devices can be damaged by static discharges, so buy a brand that is specified as “anti-static”.

- **Dental Mirrors**

A small, adjustable dental mirror is helpful when you need to look into out-of-the-way places especially if the components are located under the belly of the CRT.

- **Screwdrivers**

Screws are made in different sizes, and they’re designed to be turned by screwdrivers of the corresponding sizes. You will need a good set of screwdrivers with both Philips and flat slotted heads. Many people have the habit of trying to turn a screw with whichever screwdriver they have. Most screws can be turned easily if you use a screwdriver of the right size.

A power screwdriver is also useful in electronic servicing because some equipment have numerous screws, that your hand will get tired unscrewing them.

- **Long-Nose Pliers**

A long-nose plier is needed to remove components once they are desoldered from the PCB board. They are very useful for reaching into tight spaces inside the equipment. For example, components located under the belly of the CRT are very difficult to remove without pliers.

- **Wire Cutters**

Wire cutters are useful for cutting wires, wire ties, and lead on large parts, such as resistors and capacitors.

- **Wire Strippers**

Before you can make connections with a piece of wire, you must “strip” away the plastic insulation on a wire. Resist the temptation to strip insulation using wire cutters. Even if insulation should be removed successfully, wire cutters often leave a nick or pinch in the conductor, which later might fatigue and break.

- **Magnifying Lamp**

A magnifying lamp not only provides light, but also makes it easier to read component marking especially the surface mounted components (SMD) and small resistor color code. A magnifying lamp also can be use to check for cracks, broken solder joints or burnt components in a PCB board.

- **Spray Cleaner**

The wiper at a variable resistor might accumulate dust after operating for a certain amount of time. This can result in all types of erratic or intermittent circuit problem. A spray cleaner can be used to solve this kind of problem. However if symptom persists, replace the variable resistor.

Toothbrush

You may use a toothbrush to look for intermittent or bad connection in a PCB board. Simply run the toothbrush over the PCB board until you push the bad connection into working. Most of the time you can locate the fault using this way.

In addition to the above listed tools, some tools like table vice, hammer with nail extractor and drill machine are also used in workshops especially for installation and dismantling work.

Test Instrument

In this section, we highlighted general equipment for electronic servicing. Some equipment, such as a multimeter, is an absolute necessity for the test bench. Other equipment, such as a transistor tester, is useful but not imperative to have. In any case, the more equipment you have, the more prepared you will be to troubleshoot all kinds of electronic equipment problems.

Multimeters

There are two types of multimeters in the market, one is the analog while the other is digital. Some people call them multimeters or just meters, while other might refer to them as volt ohm meters (VOMs) or multitesters. Regardless of which name you choose to call them, multimeters are the handiest and most versatile piece of test equipment that you will ever use.

The analog meter can measure ac and dc voltage, current, and resistance, and uses a meter to read out the test results. A digital multimeter (DMM) performs the same functions, but it produces a digital display. DMM are ranked by the number of digits they display. A “3½ digit” DMM will indicate three numbers for each reading. The “half digit” is reserved for character like “+1” or “-1”. The more sophisticated meters automatically choose the correct voltage or resistance range. This feature is called “auto-ranging”. DMM are easier to read, more tolerant of operator error, and more precise than their analog multimeters.

A good DMM also include features like a capacitance checker, frequency meter, continuity checker and transistor checker. The diode setting is used for checking all solid-state devices such as ICs, diodes, transistors, SCRs and so forth.

Oscilloscope

Oscilloscopes offer a tremendous advantage over multimeters. An oscilloscope or “scope” can give you a “picture” of a changing electronic signal. Instead of reading signals in numbers or lighted indicators, an oscilloscope will show voltage versus time on a graphical display. Not only can you observe ac and dc voltages, but is also very helpful for checking the “shape” of an electronic signal.

If you know what kind of signal to expect, and the scope shows you a different signal, you know something is wrong. The scope may be used to check the operating characteristics of parts like transistors and capacitors. Oscilloscopes have been used for many years to troubleshoot power supply, amplifiers, and other analog devices.

Don't get the idea that you will need an oscilloscope for every repair. For example, you need to check the presence of horizontal and vertical signal in the input and output of a microprocessor IC. It is also useful in checking the proper Red, Green and Blue (RGB) signal in the video circuit. Without an oscilloscope, it is difficult or almost impossible to trace the problem. The better the scope, the higher the frequency of the signals that it can display and much more expensive. Analog scope with 40 to 60 megahertz (MHz) bandwidth will serve you well. Some "dual trace" scopes can display two signals at once. This allows to you check the timing relationship of two related signal. If you have used an oscilloscope, then you probably know just how useful they can be.

DC Power Supply

In your servicing work, you will sometimes need to provide power to parts of a circuit board, without using the equipment output supply for troubleshooting purposes. The output of the power supply should be regulated so that the output voltage doesn't change as the power supply is loaded. I use a digital type of DC power supply, which is a regulated power supply. It has a voltage range of between 0 and 30 volts and current range from 0 to 5A. The adjustable current that limits of up to 5A amps, protects both the power supply and the device under test from damage.

A power supply is useful in troubleshooting; for example, when you suspect that the microprocessor causes the Monitor cannot be turned on. You can always place a +5 volts to its VCC input pin of the microprocessor and check if the outputs are producing any signals. The power supply can be used with other circuits, such as circuit in power section, video drivers, oscillators and etc.

Capacitance Meter

Without a capacitance meter, it is sometimes difficult to determine a capacitor's value. Choose a capacitance meter that accurately measures the value of any capacitor between 0.1PF to 20,000UF. Capacitance meter will usually display capacitance in microfarad (uf), nanofarad (nf) or picofarad (pf). As long as your reading is within the tolerance of the capacitor's marked value, you know the part is good. It is best used to check fixed capacitor (ceramic, mylar, etc). For electrolytic type of

capacitor, an ESR meter is preferred. Some DMM is also equipped with a built-in capacitor checker. Always discharge a capacitor before testing.

Inductance Meter

Most inductance meter comes together with the resistance and capacitance measurement/range. It is also called the LCR meter. Inductance meter is required to determine a coil or a winding value. Winding's value in Flyback, power transformer, horizontal and vertical yoke coil can be checked with the inductance meter. An inductance meter will usually display inductance value directly in Henry (H), milihenry (MH) or microhenry (µH).

.

Specialized Test Equipment

In this section we highlight specialized equipment for repairing certain types of electronic equipment. These test equipments are specially designed to tackle only on certain type of circuit or component. Some repairs cannot be attempted without the help from the equipments. The required specialized test equipment depends upon which part of the electronic repairing field the technician or engineer wants to specialize in.

Self-Check 6	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Write the correct Answer on the space provided sheet

1. Write the necessary tools for identification of the electronic communication and multimedia
2. Write the necessary test instruments for identification of the electronic and multimedia
3. the necessary test personal protective for identification of the electronic and

Note: Satisfactory rating - 3 Unsatisfactory - below 3 points

Answer sheet

1._____

2._____

3._____

Score = _____

Rating: _____

Operation sheet 1: Conducting Complete check-up Unit

Purpose: To Conducting Complete check-up Unit

PROCEDURE:-

Step1. Follow safety procedure and rule

Step2. Make your working area free from dust and unwanted objects

Step3. Select the appropriate tools and testing instrument

Step4. Use repair history of the unit

Step 5 use the right service manual

Step 6 Check your device using visual inspection

Step7. Prepare to identify defect part

PRECAUTIONS:-

You should not forget to wear your PPEs.

QUALITY CRITERIA:-

- Set each tools on safe areas
- The project must be functional
- Finish on time

LAP TEST - 1

Name----------date----------

Time start---------- time finished----------

Task 1 Conducting Complete check-up Unit

Operation sheet 2: Identifying , verifying and documenting defects

PURPOSE: - to Identifying, verifying and documenting defects

PROCEDURE:-

Step1. Follow safety procedure and rule

Step2. Make your working area free from dust and unwanted objects

Step3. Select the appropriate tools and testing instrument

Step4. Use repair history of the unit

Step 5 use the right service manual

Step 6 Check your device using visual inspection

Step7. Prepare to identify defect part

PRECAUTIONS:-

You should not forget to wear your PPEs.

QUALITY CRITERIA:-

- Set each tools on safe areas
- The project must be functional
- Finish on time

LAP TEST – 2

Name----------date----------

Time start---------- time finished----------

Task 1 Identify, verify and document defects parts

LG# 23	**LO #2 Diagnose faults**

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Observing systematic pre-testing procedure
- Identifying system defects/fault symptoms
- Using test instruments
- Checking and isolating circuits
- Explaining Identified defects and faults to the responsible person
- Checking Control settings/adjustments
- Documenting results of diagnosis and testing
- Advising / informing customers about the status of the unit

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Observer systematic pre-testing procedure
- Identify system defects/fault symptoms
- Use test instruments
- Check and isolating circuits
- Explain Identified defects and faults to the responsible person
- Check Control settings/adjustments
- Document results of diagnosis and testing
- Advise / inform customers about the status of the unit

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information sheet 1: Systematic pre-testing procedure is observed

1.1. Systematic pre-testing procedure is observed

There are several approaches that troubleshooters use. They may have different steps or processes but they have the following in common: They all approach problems systematically and logically thus minimizing the steps and ruling out trial and error.

- Visual Inspection

Observe most faults provide clues as to their cause. There could be visual clues such as signs of damage or improper operation. Don't forget to use your other senses; sounds and smells can also provide valuable clues. Through careful observation and a some reasoning, most faults can be identified to the actual component with very little testing.

Define Problem Area At this stage you apply logic and reasoning to your observations to determine the problem area of the malfunctioning equipment.

Identify Possible Causes Once you have the problem area(s) defined it is necessary to identify all the possible causes of the malfunction.

Determine Most Probable Cause Once the list of possible causes has been made it is necessary to prioritize the items as to the possibility of them being the actual cause of the malfunction.

Test and Repair Once you have determined the most probable cause, you must test it to prove it to be the problem or not. Understand how to use tools such as prints, diagrams and test instruments to identify defective components. Let's first look at prints and diagrams. Some of the key things you should be able to determine from these are:

- how the circuit should operate
- what kind of features the circuit has
- what voltages you should expect at various points on the circuit
- where components are physically located
- how the components are actually wired together

Practice! Troubleshooting, like any skill, requires practice to become proficient. Practice can be difficult to get. Depending on your job, you may not have the opportunity for enough

troubleshooting practice. And even if you do, your employer may not want you to practice troubleshooting on equipment they depend on. Until you become reasonably competent, it is best to practice troubleshooting in a controlled environment.
One option is to build or purchase equipment that can be used for troubleshooting. This equipment is designed with the ability to apply faults to it. Here you can practice your skills in a very realistic environment without affecting equipment in use.

- Interview of customer repair history of unit

  Interview of the customer about the component to to be repaired is for important as it helps you to identify the defected area of the unit. The customer may give you the clue what was happed during the fault occurred. What he/she see, smell, and heard and so on. Again he/she may tell you the maintenance history of the unit if it has.

- Operate the unit according to manual to confirm defects

Using the right service manual is mandatory for the to maintain the unit in the given time frame and safety of the unit to be maintained/repair

Self-Check 1	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Say true if the statement is true and false if the statement is false

1. Observe most faults provide clues as to their cause.
2. sense organs are also used in electronic fault detect.

Note: Satisfactory rating - 2 Unsatisfactory - below 2 points

Answer sheet

1._____True__

2._____True

Score = _____

Rating: _____

Information sheet 2: Identifying system defects/fault symptoms

2.1. Identifying system defects/fault symptoms with unit

Fault detection and diagnosis is a key component of many operations in electronic fault detection systems.

A “fault” is another word for a problem. A “root cause” fault is a fundamental, underlying problem that may lead to other problems and observable symptoms. (It might not be directly observable). A root cause is also generally associated with procedures for repair.

A "fault" or "problem does not have to be the result of a complete failure of a piece of equipment, or even involve specific hardware. For instance, a problem might be defined as non-optimal operation or off-spec product. In a process plant, root causes of non-optimal operation might be hardware failures, but problems might also be caused by poor choice of operating targets, poor feedstock quality, poor controller tuning. A symptom is an observed event or variable value, needed to detect and isolate faults. If a symptom is the response to a question or an on-demand data request (when actively testing a system instead of just passively monitoring it), it is referred to as a test or test result.

Fault detection is recognizing that a problem has occurred, even if you don't yet know the root cause. Faults may be detected by a variety of quantitative or qualitative means. This includes many of the multivariable, model-based approaches discussed later. It also includes simple, traditional techniques for single variables, such as communication and multimedia equipments and other electronics.

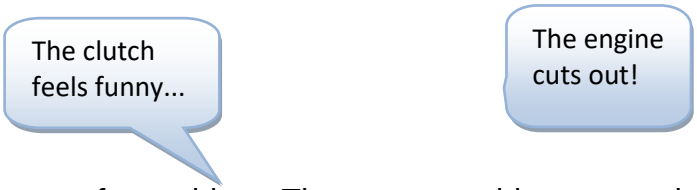
Fault diagnosis is pinpointing one or more root causes of problems, to the point where corrective action can be taken. This is also referred to as “fault isolation”, especially when emphasizing the distinction from fault detection. In common, casual usage, "fault diagnosis" often includes fault detection, so “fault isolation” emphasizes the distinction. Symptoms, faults and causes

Symptoms

When we diagnose a problem, we look at the symptoms of the fault and try to find the cause of them. What do these words mean?

A symptom is a clue that something is wrong.

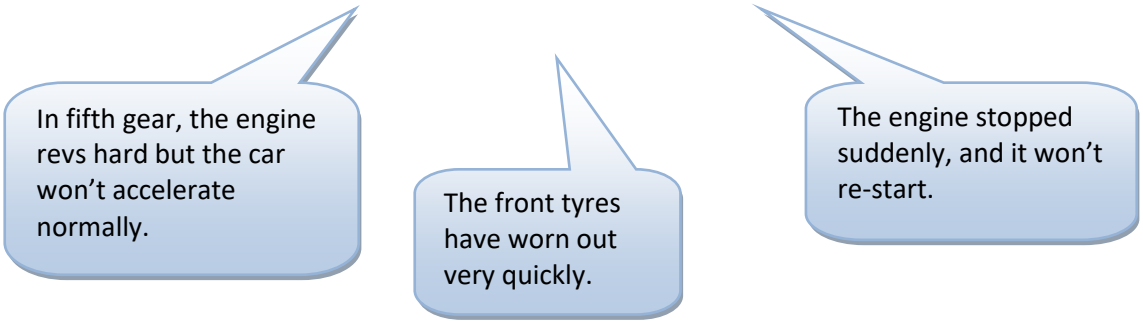
It is a noticeable change - we might see, hear, smell or feel something different.



These are both symptoms of a problem. The owner or driver recognises them as abnormal. They won't know what the *fault* is, but will know that something about the car is different.

A problem or *fault* in a vehicle is usually first noticed by the regular driver of the vehicle, because they are most familiar with the way it normally operates, and spend a lot of time behind the wheel.

It is the technician's job to look at the symptom and work out what fault has caused it.



These symptoms are the *abnormal* things that the driver has noticed about the performance of her/his vehicle. They all point to some problem which has produced the symptom. The common symptom for the system units selected for this UC is discussed in the information sheet above 1 above. Refer for more information.

Fault

A fault is an abnormal condition in a system or component. Something has gone wrong which we need to identify and repair.

Faults may be:

Hardware faults - Physical faults that we can observe or measure, such as parts which are broken, worn, out-of-specification, damaged, incorrectly adjusted or assembled.

Software faults - May not be directly observable, such as faulty, incorrect or corrupted programs in electronic modules.

Self-Check 2	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Write the correct Answer on the space provided sheet

1. Fault detection and diagnosis is not a key component of many operations in electronic fault detection systems
2. A “fault” is another word for a problem
3. Fault detection is recognizing that a problem has occurred, even if you don't yet know the root cause

When we diagnose a problem, we look at the symptoms of the fault and try to find the cause of them.

Note: Satisfactory rating - 3 Unsatisfactory - below 3 points

Answer sheet

Score = _____

Rating: _____

Information sheet 3: Use testing instruments

1.1. Using testing instruments

Test instrument

Test instrument needed for electronic troubleshooting. You will need an assortment of tools and test instrument ranging from simple tool such as the screwdriver to sophisticated equipment like the Digital oscilloscope. Some simple fault of electronic equipment can be repaired by using only basic tools and test equipment. But if you are repairing electronic equipment for a living or you want to be ready to repair all kinds of electronic problems that come your way, you will need to invest in some specialized equipment. You can then be ready to move quickly when trouble strikes!!

n be use to check for cracks, broken solder joints or burnt components in a PCB board.

.In this section, we highlighted general equipment for electronic servicing. Some equipment, such as a multi meter, is an absolute necessity for the test bench. Other equipment, such as a transistor tester, is useful but not imperative to have. In any case, the more equipment you have, the more prepared you will be to troubleshoot all kinds of electronic equipment problems.

Multi meters

There are two types of multi meters in the market, one is the analog while the other is digital. Some people call them multi meters or just meters, while other might refer to them as volt ohm meters (VOMs) or multi testers. Regardless of which name you choose to call them, multi meters are the handiest and most versatile piece of test equipment that you will ever use.

The analog meter can measure ac and dc voltage, current, and resistance, and uses a meter to read out the test results

Oscilloscope

Oscilloscopes offer a tremendous advantage over multimeters. An oscilloscope or “scope” can give you a “picture” of a changing electronic signal. Instead of reading signals in numbers or lighted indicators, an oscilloscope will show voltage versus time on a graphical display. Not only can you observe ac and dc voltages, but is also very helpful for checking the “shape” of an electronic signal. If you know what kind of signal to expect, and the scope shows you a

different signal, you know something is wrong. The scope may be used to check the operating characteristics of parts like.

Transistors Tester

You can make some simple tests on transistors using just a DMM. However, you can test transistors much more easily using a special “transistor tester”. A transistor tester does a more thorough job at checking transistors than you can do with just a DMM. Many different types are available in the market. Transistor tester allows you to make an in-circuit test, without removing the transistor from the circuit board. The tester indicates whether the transistor is working, and it also allows you to measure the “gain” or output of the part. Most transistor tester can also measure diodes.

DC Power Supply

In your servicing work, you will sometimes need to provide power to parts of a circuit board, without using the equipment output supply for troubleshooting purposes. The output of the power supply should be regulated so that the output voltage doesn’t change as the power supply is loaded

Capacitance Meter

Without a capacitance meter, it is sometimes difficult to determine a capacitor’s value. Choose a capacitance meter that accurately measures the value of any capacitor between 0.1PF to 20,000UF. Capacitance meter will usually display capacitance in microfarad (uf), nanofarad (nf) or pico farad (pf). As long as your reading is within the tolerance of the capacitor’s marked value, you know the part is good. It is best used to check fixed capacitor (ceramic, mylar, etc). For electrolytic type of capacitor, an ESR meter is preferred. Some DMM is also equipped with a built-in capacitor checker. Always discharge a capacitor before testing.

Inductance Meter

Most inductance meter comes together with the resistance and capacitance measurement/range. It is also called the LCR meter. Inductance meter is required to determine a coil or a winding value. Winding’s value in Flyback, power transformer, horizontal and vertical yoke coil can be checked with the inductance meter. An inductance meter will usually display inductance value directly in Henry (H), mili henry (MH) or micro henry (UH).

ESR Meter

Almost all electrolytic capacitor failures are due to high ESR (Equivalent Series Resistance). The high internal resistance reduces the capacitor's rate of charge and discharge, effectively making it an "open" capacitor. High ESR is usually as a result of dehydration of the electrolyte due to equipment heat, old age, corrosion, defective rubber seal and high ripple current.

High ESR in electrolytic causes various problems. In a monitor vertical section, they can cause over/under scan problems. In power section, they cause no power and power blink. In the color or video circuits, they cause intermittent or missing colors. In high voltage section, they cause horizontal output transistor (HOT) to blow several minutes after it is replaced.

Self-Check 3	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Write the correct Answer on the space provided sheet

1. Transistors can be measured by

   A. transistors tester B. by millimeter C. A&B D voltmeter

2. _____ measures both voltage and frequency

   A. voltmeter B. Multi meter C. Frequency meter D. Oscilloscope

3. A Winding's value in Fly back can be check with

   A capacitor meter B. Inductor meter C multi meter D all

Note: Satisfactory rating - 3 Unsatisfactory - below 3 points

Answer sheet

Score = _____

Rating: _____

Information sheet 4: Checking and isolating Circuits

4.1. Checking and isolating Circuits

An electrical isolation test is a Direct current (DC) or Alternating current (AC) resistance test that is performed between sub-circuit common and subsystem chassis to verify that a specified level of isolation resistance is met. Isolation testing may also be conducted between one or more electrical circuits of the same subsystem. The test often reveals problems that occurred during assembly, such as defective/wrong component, improper component placement/orientation and wire insulation or insulator defects that may cause inadvertent shorting or grounding to chassis, in turn, compromising electrical circuit quality and product safety.

Isolation resistance measurements may be achieved using a high input impedance ohmmeter, digital multi meter (DMM) or current-limited test instrument. The selected equipment should not over stress sensitive electronic components comprising the subsystem. The test limits should also consider semiconductor components within the subsystem that may be activated by the potentials imposed by each type of test instrumentation. A minimum acceptable resistance value is usually specified (typically in the mega ohm (MΩ) range per circuit tested). Multiple circuits having a common return may be tested simultaneously, provided the minimum allowable resistance value is based on the number of circuits in parallel.

Five basic isolation test configurations exist.

Single Un-referenced End-Circuit – isolation between one input signal and circuit chassis/common ground.

Multiple Un-referenced End-Circuits with a single return – isolation between several input signals and circuit chassis/common ground.

Subsystem with Isolated Common – isolation between signal input and common ground.

Common Chassis Ground – isolation between circuit common and chassis (chassis grounded).

Isolated Circuit Common – isolation between circuit common and chassis (chassis floating).

Isolation measurements are made with the assembly or subsystem unpowered and disconnected from any support equipment.

NOTE: The following 12-step isolation procedure for live installations is not meant to replace a full risk assessment, but rather be a helpful guide for safely isolating circuits and equipment.

Step 1: Determine with relevant individuals that it is acceptable to isolate the circuit.

Step 2: Identify the type of supply system:

TN-S (double-pole main switch)

TN-C-S (double-pole main switch)

TT-DP isolation (all circuits and equipment)

Step 3: Identify which equipment needs to be isolated.

Step 4: Select an approved voltage indicator device.

Step 5: Use a voltage and continuity tester to verify equipment. (If a circuit is operational, dead testing might be required to verify the circuit.)

Step 6: Identify methods of isolation.

Step 7: Isolate the equipment by switching off the double pole/three-phase isolator, circuit breakers and withdrawing fuse.

Step 8: It is recommended that you fit an appropriate lock-off device and locks in accordance with local requirements.

Step 9: Attach a warning label for isolation and identified work.

Step 10: Verify the equipment is isolated by using a voltage and continuity tester to verify the circuit is dead.

Step 11: Recheck the approved voltage indicator device is still functional on the same known supply.

Step 12: It should be safe to carry out circuit work, but always check and recheck to verify this.

Remember, it should never be assumed that equipment is dead just because a particular isolation device has been switched to

Self-Check 4	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Write the the advantage of the following circuit

1 Single Un-referenced End-Circuit

.

2. Multiple Un-referenced End-Circuits with a single return –
3. Subsystem with Isolated Common –
4. Common Chassis Ground –
5. Isolated Circuit Common –

Note: Satisfactory rating - 5 Unsatisfactory - below 5 points

Information sheet 5: Explaining identified defects and Faults to responsible person

5.1. Explaining identified defects and Faults to responsible person

This Topic describes the procedure for solving problems in the workplace. The procedure recommends direct communication with your supervisor to resolve problems. A formal communication process has also been established for instances where informal communication is not possible or practical. You and your supervisor are encouraged to resolve on-the-job complaints in an atmosphere of mutual respect. You should bring any work-related problems to the attention of your immediate supervisor as soon as possible so the problem may be resolved. Your supervisor should discuss those concerns with you in an effort to resolve the problem in a timely fashion. If you wish, you and/or your supervisor may seek assistance from the technician.

Formal communication

. The formal process allows you to file a written defect/fault with your supervisor, provides for management review of your supervisor's decision, and provides for final review in an appeal process. Each defects/Fault filed must be made in the name of an individual system unit.

When your supervisor renders a decision in writing regarding the defect, he or

She must provide a written decision to you. Your supervisor will retain a copy of the decision.

If you are dissatisfied with your supervisor's decision, you may request a manager.

Self-Check 5	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Write the correct answer

1. Formal communication
2. Informal

Note: Satisfactory rating - 32 Unsatisfactory - below 2 points

Answer

1. formal process allows you to file a written defect/fault with your supervisor/manager
2. informal communication without written or file

Information sheet 6: check set/adjustment control

5.1. Check set/adjustment control

Troubleshooting steps for common TV problems

These are some of the most common issues on TVs we are asked about, along with the likely solutions. Please take a look and see if your issue is addressed here, and whether the recommended fixes work, before submitting a question to us.

Try the first listed step before moving on to any others. Once you have solved your problem, do not perform any further steps.

Picture settings

Can't find your recommended settings

Check to see if the model was reviewed.

Click the 'Settings' tab at top of the review page.

If we did not review your model, visit our calibration page.

Screen is too dark

Increase 'Backlight' setting ('Brightness' on Sony TVs).

Colors don't pop

Increase 'Backlight' ('Brightness' on Sony TVs)

Change 'Color Temperature' to something colder.

Increase the 'Color' setting.

Use the 'Dynamic' or 'Vivid' picture mode.

Picture skips/jumps

Disable motion interpolation.

Try different playback software/device.

Try different video file/disc.

Ball/puck disappears when watching sports People/objects are moving too fast Motion is blocky

Disable motion interpolation.

White objects/clouds too yellow or blue

Reset white balance & color space to default.

Change color tone.

Colors look wrong Skin tones look wrong

Reset white balance and color space adjustments to default.

Use different color tone/temperature.

Use different picture mode.

Blacks look gray

Reset the ‘Brightness’ setting (‘Black level’ on Sony TVs).

Make sure the source and TV RGB settings match.

Enable local dimming.

Note: If IPS LED TV, blacks will always look gray.

Note: All LED TVs have lighter blacks than plasma and OLED.

Brighter spots in dark scenes

Gently massage the affected area with a soft cloth to improve.

Note: This is a common issue, so if there is no improvement, only make a return if it is so bad that it ruins your viewing experience.

TV not displaying maximum resolution

In the source menu, set output to your TV’s maximum resolution (if available).

Note: No other fix. This is just the signal resolution.

Dark portions are pixelated

Enable noise removal settings.

Improve connection (if streaming) or source quality (if low-quality).

If neither works or is possible, you will need to cope with the issue. This is a common problem with low-quality media.

Grain on the picture

Note: Normal for movies.

For other content, enable noise removal settings.

Improve connection (if streaming) or source quality (if low-quality).

Reset color space and white balance settings.

Try different HDMI cable and different HDMI input on the TV.

Picture looks out of focus

Disable motion interpolation.

Increase ‘Sharpness.’

This makes the picture a bit less accurate.

Adjust the aspect ratio setting.

Note: Low-quality media often looks fuzzy, so if those first steps don’t help, the only solution is to watch higher-quality video.

Sparkles/banding appearing on screen after calibration

Reset white balance and color space adjustments to default.

Try a new HDMI cable.

Try different picture mode.

Return, or contact manufacturer support.

Stuck pixels on screen

Connect PC to TV, use this tool to try and unstuck.

Try applying gentle pressure on the stuck pixel. Turn the TV on, and then off, then check.

No other fix. If many stuck pixels, return, or contact manufacturer support.;

Temporary Image retention

Watch regular content for a few minutes.

Permanent burn-in

No fix. Return, or contact manufacturer support.

Sound

TV not outputting sound

Make sure HDMI or audio cable(s) are securely connected to both TV and receiver/headphones.

Make sure TV is set to output audio to your source device (sound settings).

Make sure source device is outputting compatible sound (PCM, DTS, Dolby Digital are safe bets).

Try different audio cable.

See if other devices can play on the receiver.

If the receiver does not work for anything, contact the receiver manufacturer’s support.

If the receiver does work for other devices, contact TV manufacturer’s support.

Sound is delayed

If using external speakers, try ‘lip sync’ or ‘audio delay’ feature on the receiver.

If using TV’s speakers, try ‘lip sync’ or ‘audio delay’ on TV.

Set input to PC mode.

Apps & WiFi

Can't stream 4k video on 4k TV

Make sure service/subscription allows 4k streaming.

Make sure wireless network and internet connection have sufficient bandwidth (usually at least 25 Mbps).

Contact manufacturer support.

Video won't stream in TV's browser

No direct fix. TV doesn’t support Flash video.

Workaround: Connect PC to TV and watch the video with that.

Can’t connect TV to WiFi

Connect TV to the router via Ethernet and install updates, then try again.

Contact manufacturer support.

Can’t find/download app

No fix. App is likely not available for your TV.

Cable, Satellite, & OTA

Can't find/change channels

Run the programming feature to let TV detect channels, and then try again.

If OTA, try repositioning antenna for better reception.

Contact manufacturer support.

TV channels look fuzzy

Make sure source device is outputting at least 720p.

Enable noise removal features.

Increase sharpness a bit.

power button on remote (if stuck).

Remove batteries from This makes the picture a bit less accurate.

Note: It’s normal for TV channels to look a bit fuzzy/blurry since they’re low-quality.

Remote and Power

TV turns off randomly

Disable CEC.

Unstick remote (to determine whether remote is responsible).

Otherwise, find pattern for powering off, if one exists.

Reset or replace the device that is responsible.

If no pattern, perform a factory reset of TV.

Contact manufacturer support.

Remote doesn't work properly

Try pointing remote at all corners; see if one works/works better.

Move objects away from the front of TV (soundbar, Kinect, etc).

Move cable/satellite box farther from TV.

Re-pair the remote with the TV (if possible).

Replace remote batteries.

Contact manufacturer support

How to find the code that operates your TV, DVD Player, Blu-Ray Player or VCR

Turn on the device.

On the remote control, press the corresponding device button - "TV**", "**DVD**" or "**AUX."

Press and hold the "RCU SETUP" button until the device key blinks twice.

Press "9**" "**9**" "**0" using the number pad on the remote. The device button will blink twice.

To obtain the first digit of the code press "**1**" on the remote number pad and then count the number of times the device button blinks. If it blinks twice, the first number in the code is 2. If the device button does not blink, the first number of the code is 0. For the second digit of the code press "**2**" on the remote number pad and then count the number of times the device button blinks. Continue this process to obtain the remaining digits of the code.

To learn the codes for other devices, simply repeat the steps above but substitute the device button with the appropriate one for the device you are checking.

Self-Check 6	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: What type set/adjust you take during

1. Screen is too dark
2. Colors don’t pop
3. Picture skips/jumps

Note: Satisfactory rating - 3 Unsatisfactory - below 3 points

Answer

1. Increase ‘Backlight’ setting (‘Brightness’ on Sony TVs).
2. Increase ‘Backlight’ (‘Brightness’ on Sony TVs)
   Change 'Color Temperature' to something colder.
   Increase the ‘Color’ setting.
   Use the ‘Dynamic’ or ‘Vivid’ picture mode.
3. Disable motion interpolation.
   Try different playback software/device.
   Try different video file/disc.

Information sheet 7: documenting Results of diagnosis and testing

7.1. Documenting Results of diagnosis and testing

For any equipment hire company, your fleet is the lifeblood of your business. Keeping equipment at optimum working condition minimizes the risk of having unscheduled downtime. If maintenance is needed, it's important to keep a comprehensive record - whether scheduled or unscheduled - to help you understand the importance of your equipment's up keep works. Here we list the benefits of keeping a maintenance record. Prevent expensive repair works from happening With constant use, your equipment is prone to wear and tear. Performing routine inspections allow you to see and repair small damages before they become a big problem. Documenting these inspections and small repairs help you keep track of all the maintenance work that your equipment has undertaken, ensuring that each machine is in tip-top shape before putting them to work.

Helps you create specialized maintenance programs

Each equipment go under different working conditions and they have different limitations as well. With the help of routine check-ups, you will be able to determine and record the differences of each individual equipment with regards to maintenance works. In turn, this information will help you in creating maintenance programs specifically catering to each individual equipment on your fleet.

Prevent problems regarding warranty claims. Documenting every repair or maintenance work done on your equipment will help you process warranty claims much easier. Keep a record of the type of maintenance work done to your equipment as well as the exact time and date repairs were done as this information will help determine your rights for the warranty claims. It increases the safety of operators If a piece of plant or equipment is well maintained, the risk of accidents occurring due to malfunctioning machinery is reduced. When incidents involving faulty machinery occur, there's a big chance that the operator is the first one to be affected. Having equipment's maintenance history documented will help you keep track of your machinery's health. This enables you to schedule an inspection when needed, at the same time it ensures that your equipment are safe to work with.

Helps you track who is accountable for a piece of equipment One machine might have multiple operators. Performing a routine inspection and documenting the findings after every project will help you track down who is accountable for any damage inflicted on your machinery. Keeping these types of records will also encourage operators to take better care of the equipment.

It increases the resale value of the equipment. Keeping a detailed record of all the maintenance and repairs that a piece of equipment went through will help increase its resale value. Buyers thoroughly assess a piece of equipment before purchasing it, most especially if the machines have already been used. Presenting potential buyers a documentation of your equipment's maintenance history lets them know that the equipment they are planning to buy have been well taken care of Teamwork is one of the key drivers of maintaining a healthy fleet. Make sure to cover this topic on your next toolbox talk agenda to ensure that each member of your team is informed about the advantages of recording your equipment's maintenance history. You can use the downloadable template below to where you can list relevant topics you want to discuss with your construction team.

Self-Check 7	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Write the correct

1. Write the advantage of keeping a maintenance record

Note: Satisfactory rating - 6 Unsatisfactory - below 6 points

Information sheet 8: Advising and informing a customer

8.1. Advising and informing a customer

The world is full of businesses promoting themselves on social networks and trying to keep in touch with their customers via email. Keeping connected is great but sometimes businesses go for overkill and 'pester' their customers. With so many businesses getting it wrong you have to ask why do they do it?

The truth is that these businesses have the right idea but are not approaching the situation in the right way. They are aware of the importance of keeping customers well informed and though they go over the top sometimes, the rewards they get from people who aren't so easily frustrated outweigh the negative impact of their actions.

We believe that when carried out in moderation, keeping your customers well informed about what is going on in your business is key to a healthy relationship resulting in an increase in customer retention and a rise in business turnover.

Here's why it is a good thing to keep your customers informed*:*

1. Customers are like your social media friends, they always want to know what's going on

Your customers are every bit as nosy about your business and your life as any of your friends might be. People are curious by nature and they like to know what goes on within your company, especially if they expect to part with their money in exchange for your services. Keeping your customers informed of news, latest offers and even problems affecting your business will show them that your business is active and it will make sure they don't feel left out.

2. Informing a customer about a problem is better than them finding out on their own

It is a hard thing to admit when you're wrong or that something isn't working and it's even harder when you are admitting that to paying customers. Sometimes though, the hard thing to do and the right thing to do are the same thing. Informing your customers that you are aware of a problem and are working hard to fix it can indeed upset some and even put them off your company. It's a risk. After all, no one likes to use a product that isn't working. But by keeping your customers informed about a problem you are ***proactively*** showing them that

you are aware there's an issue, that you aren't afraid to hold your hands up to it and that you are doing something about it. For most customers, this is enough for them to give you the benefit of the doubt and they will give you the time (a limited amount at least) you need to fix the issue.

The alternative is to ignore your customers and hope they don't notice. But customers notice everything! If they find a problem and they think you have been hiding it from them, then you will get no grace period to fix the issue, they will simply start looking somewhere else.

3. People are inherently lazy

The standard setting of the human race is to follow the path of least resistance. People generally don't want to spend time and energy doing something they don't have to and because of that, you can never rely that your customers are going to search for the information that they need from you.

If you have information that your customers need to know, you can't hope that they will find that information on their own, you need to tell them about it. For example, if your business closes on a bank holiday then you need to let your customers know that you will be closed. The last thing you want is for customers to be trying to contact you and not being able to. As soon as they can't get in touch with you and they don't know why frustration will lead them to start searching for someone they ***can*** get hold of; they are going to take their business elsewhere.

4. Keeping people informed reminds customers that you are there

Not every business is one that customers will use on a daily or even weekly basis. For these businesses, customer retention can be a real problem as it is a case of 'out of sight, out of mind.' Setting up social media pages and updating them regularly, blogging and sending emails about your company can remind people that you are there and (especially if they have used you before) bring customers back for more.

5. Your priority is customer service and you put your customers first

If you run an offer that you don't actively tell your existing customers about, you run the risk of letting them find out on their own and thinking that you were trying to hide it from them. The same is true for many other aspects of your business and this leads to the key reason to keep your customers informed: you need to remind them that they come first.

Customers are needy creatures, they want to be coddled and made to feel special. By keeping them informed you are keeping the focus on them, showing them that you value them as a customer and you will do what it takes to keep them with your business. If done right, keeping your customers informed can make them feel special and they will reward your business for it.

At Switchboard FREE we like to take a variety of approaches to keep our customers up-to-date with regard to our latest offers, new services and product updates. We regularly use social media, email campaigns and banner advertising on email alerts. But there are more ways to keep your customers informed and 'in-the-loop'.

Self-Check 8	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Write the correct answer

1. Why it is a good thing to keep your customers informed?

Note: Satisfactory rating - 5 Unsatisfactory - below 5 points

Operation sheet 1: Identifying system defects/fault symptoms

Purpose: To Identifying system defects /fault symptoms

PROCEDURE:-

Step1. Follow safety procedure and rule

Step2. Make your working area free from dust and unwanted objects

Step3. Select the appropriate tools and testing instrument

Step4. Follow pre testing procedure

Step 5 use the right service manual

Step 6 check control setting /adjustment

Step7. Explain the identified component/part to responsible parson

Step 7 inform the customer

PRECAUTIONS:-

You should not forget to wear your PPEs.

QUALITY CRITERIA:-

- Set each tools on safe areas
- The project must be functional
- Finish on time

LAP TEST - 1

Name----------date----------

Time start---------- time finished----------

Task 1 Identify system defects/fault symptoms

L #24	**LO #3 Maintain/repair product**

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Reassembling Repaired units
- Subjecting reassembled units to testing and cleaning
- Compiling service completion procedures and documentations
- Disposing waste materials in accordance with environmental requirement

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Reassemble Repaired units
- Subject reassembled units to testing and cleaning
- Compile service completion procedures and documentations
- Dispose waste materials in accordance with environmental requirement

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,

7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information sheet 1: Use personal protective equipment in accordance with OHS

1.1. Personal protective equipment is used in accordance with Occupational Health and Safety practices

Whenever you're working on any electronic equipment, your own safety has to come first. Every electronic technician must always take safety precautions before he or she starts work. Electricity must be handled properly, or else it can injure or cause fatalities.

The purpose of the Health and Safety policies and procedures is to guide and direct all trainees to work safely and prevent injury, to themselves and others. All employees are encouraged to participate in developing, implementing, and enforcing Health and Safety policies and procedures.

Ex. Goggles: Goggles or safety glasses are forms of protective eyewear that usually enclose or protect the area surrounding the eye in order to prevent particulates, water or chemicals from striking the eyes.

Fig3.1.1 Goggles

Glove: is a garment covering the hand. Gloves have separate sheaths or openings for each finger and the thumb. Gloves protect and comfort hands against cold or heat, damage by friction, abrasion or chemicals, and disease; or in turn to provide a guard for what a bare hand should not touch.

Fig 3.1 Gloves

Self-Check 1	Written

Name: _____ Date: _____

Time start: - _____ Time finished:-_____

Directions: Write the short answer

1. Write the most common two personal protected equipments

Note: Satisfactory rating - 2 Unsatisfactory - below 2 points

Information sheet 2: Following electro-statics discharge (ESD) protection procedure

2.1. Following electro-statics discharge (ESD) protection procedure

Electrostatic discharge (ESD) is the sudden flow of electricity between two electrically charged objects caused by contact, an electrical short or dielectric breakdown. A buildup of static electricity can be caused by electrostatic induction.

The diagram below shows a typical static-safe work bench. The table top is covered by a static dissipative mat which is grounded through a 1 Meg-ohm resistor. This resistor is required in order to protect the users of the static-safe work bench – in the event that the ground becomes electrically live, the resistor will prevent electrical shock at the work bench. The same safety requirement holds true for the antistatic wrist-strap as well.

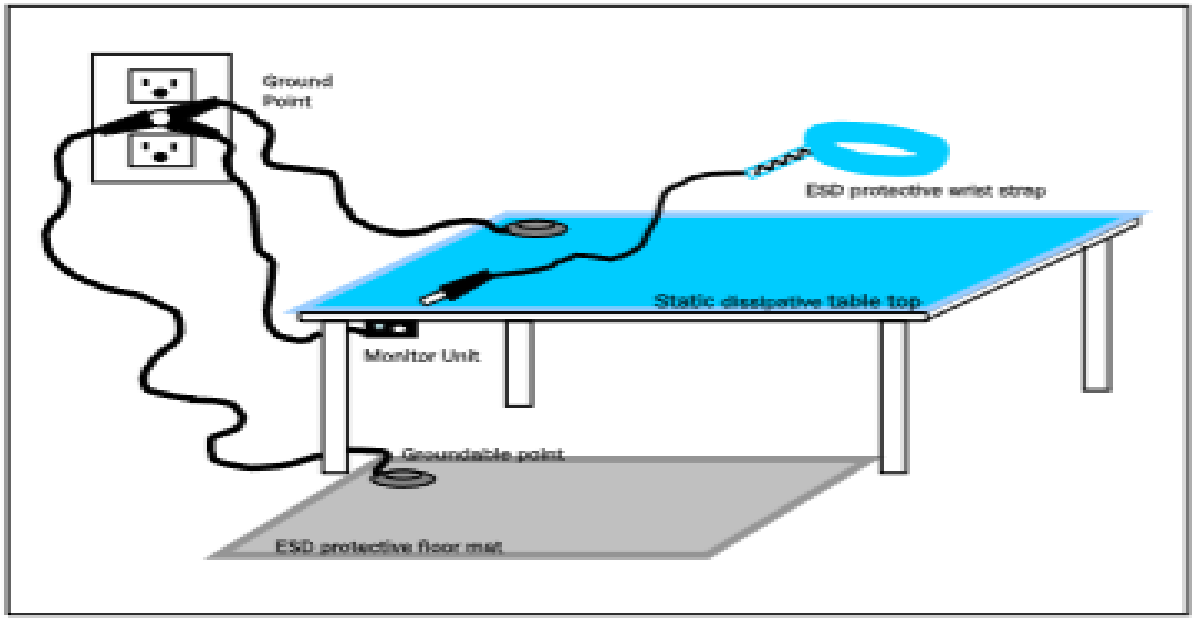


Fig 3.1 work bench

. The ESD occurs when differently-charged objects are brought close together or when the dielectric between them breaks down, often creating a visible spark.

ESD can create spectacular electric sparks (lightning, with the accompanying sound of thunder, is a large-scale ESD event), but also less dramatic forms which may be neither seen nor heard, yet still be large enough to cause damage to sensitive electronic devices.

Electric sparks require a field strength above approximately 40 kV/cm in air, as notably occurs in lightning strikes.

establish electrostatic protective areas free of static, using measures to prevent charging, such as avoiding highly charging materials and measures to remove static such as grounding human workers, providing antistatic devices, and controlling humidity.

Anti-static procedures for connector manufacturing include four elements of control.

1. Anti-Static Mats
2. Wrist Bands for Grounding
3. Storage and Handling
4. Packaging Material

1. The first control procedure is the use of anti-static mats on all work benches, tables and storage shelves throughout the production factories.

2. The second element of control is the procedure which requires all employees to wear grounding wrist bands. The grounding wrist band is attached to the employee's wrist and a cord from the wrist band attaches to a metal ground on the work bench or anti-static mat.

3. Anti-static plastic bags and trays are used to store all parts and finished goods.

4. The fourth element of ESD control is the packaging used in shipping connectors to our customer. This element of ESD control is addressed by the use of anti-static packaging material in the packaging.

To use the ESD wrist strap:

Place the elastic band around your wrist.

Connect the clip on the flexible grounding cord to an unpainted frame ground point on the rack.

Keep the strap on and connected while you touch, insert, or remove any ESD-sensitive part.

Do not open the static-protective package that contains the component until you are instructed to do so.

Limit your movement. Movement can cause static electricity to build up around you.

Always handle components carefully. Never touch any exposed circuitry, including the gold connectors along the bottom edge of the PCI adapters.

Prevent others from touching the componen

Self-Check 2	Written test

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: Give short answer

1. What is advantage of using electro-static discharge (ESD) protection procedure in your work area
2. Write four elements of control Anti-static procedures.

Note: Satisfactory rating - 1 and above unsatisfactory - below 1 points

You can ask you teacher for the copy of the correct answer

Score = _____

Rating: _____

Information sheet 3: Replace defected parts/components

1.1. Replace defected parts/components

Replace the part that has been disconnected from the circuit board. Solder the new part into position, ensuring that each terminal is making contact with the correct port in the circuit. Repair is mainly setting the device back to the condition of normal operation; Defective parts/components are replaced with identical or appropriate equivalent ratings.

Replace the part that has been disconnected from the circuit board. The old part should come out of the board easily. If it does not, make sure that all of the solder has been removed. Solder the new part into position, ensuring that each terminal is making contact with the correct port in the circuit.

Many problems that circuit boards have may be repaired by replacing defective parts.. Parts that commonly need to be replaced include capacitors, transistors and various electronic chips. If, through visual inspection or through circuit analysis, you can identify which part is defective, you can usually repair a circuit board.

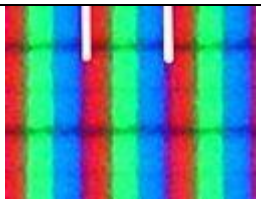
Identify which part you want to replace on your circuit board and the soldering points of the part you intend to replace. Finally replace the defective parts/components.

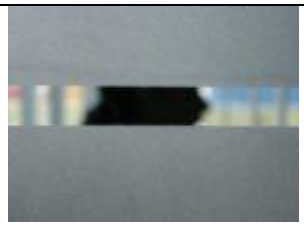
The way of replacing defective components are shown below based on their section

Table 3.1.

1.Horizontal circuit

PROBLEM	DESCRIPTION	DEFECTS	REMEDY	ILLUSTRATION
Total black-out	-	- Due to open or shorted horizontal transistor. -Defective safety capacitors or damper diode around HOT.	-Replace new horizontal transistor.	

Vertical line on the screen	-	Defective horizontal amplifier due to old aging hardware	Replace new horizontal transistor	
Lack of width	-	Defective horizontal transistor. - Due to a low voltage power supply problem, bad connection	Replace the horizontal transistor	
2.Low voltage				
Totally dead set	The voltage applied to the circuit is too low	A blown fuse or tripped circuit breaker due to some other fault, switched outlet and the switch is off, or bad cord set	Plug a lamp into the outlet to make sure it is live. If the lamp works, then the problem is the TV. It not, the outlet is defective or the fuse is blown or the circuit breaker is tripped.	
Poor filtering		Open or leaky filter capacitors, defects in rectifier circuits. .	Replace filter capacitors, check rectifier circuits	

Picture is reduced over all	A dried up main filter capacitor	Defective low voltage regulator allowing excessive ripple. The regulator IC could be bad or filter capacitor following the IC could be dried up.	Check or replace the rectifier or tube	
3 High voltage				
Totally blackout or dead set		Defective horizontal transistor or the fuse due to high voltage traveled into the circuit	Check properly and replace defective components and supply the right amount of voltage.	
Horizontal line on screen		Damaged vertical output ICdue to excessive high voltage on the circuit.	Check the fly back transformer if it is damage replaced it and also the fuse resistor if it is shorted	
4. Audio section				
.Raster and video OK but no sound	Open wire connection from volume control	Defective or open circuit speaker. - Defective audio output tuner. - Defective sound discriminator/detector tube.	Replace a quality of stranded wire for speaker connection. - Replace the audio output tube/ transistor. - Re solder the open wire to the volume	

			control.	
Reduction in sound after warm-up		Defective audio amplifier and output tubes/ transistor.	Replace new audio amplifier and output tubes/ transistor	
5.Video section				
Sound OK but no raster		Defective video output tubes/transistor.	Check and replace the video output tube/transistor	
Raster Ok but no sound or video		Defective video detector diode	Replace a new video detector diode.	

Information sheet 4: Solder replaced defective components

Soldering is a technique of melting a soft metal to join two pieces of harder metal. Tinning is a process of coating the two surfaces to be joined with a thin layer of solder to help the main mass of solder flow and melt into the joint.

Heat your soldering iron to operational temperature. Place the circuit board, with the solder side up, on a flat and well-lit surface.

Press the tip of your soldering iron against the solder point that is supporting the part you want to remove.

Suck up the liquid solder using a de-soldering device. There are several types of de-soldering devices, but they all generally work with suction. Replace the part that has been disconnected from the circuit board.

Solder the new part into position, ensuring that each terminal is making contact with the correct port in the circuit.

Fig3.1 soldering technique

Steps In Soldering

1. Prepare the following materials:

- Soldering Iron,
- Solder paste
- Long Nose Pliers,
- PCB holder,
- Electronic Components (Resistors, Diode etc.)

2. Plug and pre-heat the soldering iron.

3. Heat both items at the same time by applying the soldering iron tot he copper pad and the component lead.

4. Continue heating and apply a few millimeter o f solder. Remove the iron and all o the solder joint to cool naturally.

5. It only takes a second or to make the perfect joint ,which should appear shiny.

Disordering is the removal of solder and components from a printed circuit board for troubleshooting ,repair, replacement, and salvage.

Self-Check 4	Written test

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: Give short answer

1. Write the steps of soldering technique
2. What is disordering technique

Note: Satisfactory rating - 1 and above satisfactory - below 1 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

1. Prepare the following materials:

- Soldering Iron,
- Solder paste
- Long Nose Pliers,
- PCB holder,
- Electronic Components (Resistors, Diode etc.)

Plug and pre-heat the soldering iron.

Heat both items at the same time by applying the soldering iron to the copper pad and the component lead.

Continue heating and apply a few millimeters of solder. Remove the iron and allow the solder joint to cool naturally.

It only takes a second or two to make the perfect joint, which should appear shiny.

2. **Soldering** is a technique of melting a soft metal to join two pieces of harder metal

Information sheet 5: Perform Control settings/adjustments

5.1 Perform Control settings/adjustments

If an error is displayed when you press a remote control button that is related to network services such as YouTube™ or Netflix, check whether the TV is connected to the Internet correctly. For details about connecting to the Internet or troubleshooting,

Top tip - our quick recommended solution

Before trying any of the troubleshooting steps below, we recommend that you remove the batteries from the remote control for approximately 1 minute. Then, reinsert the batteries again according to the polarity (-/+).

Our complete troubleshooting guides

First check whether the problem is due to the TV or the remote control. If the problem is due to the remote control, you will be guided in Section by remote control type. Start checking from Section A.

- Section A**:** Check whether or not the TV is in operation
- Section B**:** Checking items of the remote control (common)
- Section C**:** Select remote control type (common)

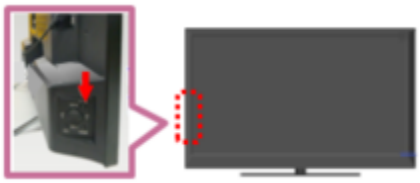
Section A

Check whether or not the TV is in operation

1. Check that TV buttons can be operated.

    - If TV buttons can be operated, proceed to
    - Section B: Checking items of the remote control.

- If TV buttons cannot be operated, proceed to Step2.



Fig

- **NOTE:** Depending on the model, the positions of TV buttons vary. Check the sides, back, front, and top of your TV.

2. Check that the lamp (power lamp/standby lamp) on the front/bottom of the TV is on.

NOTE: Depending on the model, the name, position, and shape of the lamp varies. The lamp on the diagram is an example.

- If the lamp is lit or is blinking in red, proceed to Step 3.
- If the lamp is not on, check whether or not the power cable or AC adaptor is not disconnected or loose.

  If there is no issue with the above connection, proceed to Step 3.

3. Perform a power reset on the TV.

   If it caused by an external factor, such as network service/data broadcasting/connected device, it may be improved by resetting your TV.

   - For how to reset Android TV, refer to: How to reset an Android TV?
   - For how to reset the other TV models, refer to: How to perform a power reset on a Sony television.

4. Remove external devices to confirm whether there aren't influences of external devices.

   Remove connected devices (external USB hard disk, HDMI connection device, etc.) and cables from the TV terminal.

   NOTES:

- Do not remove the TV power cable.
- If connections are complicated, take note of them, and make sure you can reassemble them before removing.
- When a specific device is connected and the TV flashes, there is a possibility there is a problem with the connected device.

The same fashion should repeated for other remote control based units

If you cannot operate after confirming the above, service may be required.

Self-Check 5	Written test

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: Give short answer

1.If the problem is due to the remote control, write the guided in section by the remote

Note: Satisfactory rating - 1 and above satisfactory - below 1 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Information sheet 6: Perform Repair activity within a required Timeframe

3.6 Perform Repair activity within a required Timeframe.

In the field of servicing, time is money. You can waste it, or you can make money out of it. The less the time you take on one job, the more number of jobs you can do and hence, the more you can earn. Anytime the technician or engineer spends over one hour on a given electronics problem without locating the faulty component, time is lost. Time can be lost due to:

- Intermittent problem
- Sometimes a fault might be intermittent. Dry solder joints,
- heating, loose connectors, etc may cause intermittent faults. Such faults are the most difficult to locate.
- Non-availability of spare parts

After spending countless hours of repair, you've been told by your supplier that the defective part that you need is no longer available in the market.

Callbacks or repeated repairs

This will usually cost the electronic technician extra money. The technician has to repair the problem without additional charge unless it is a different problem. It is advised that doing a good repair job at the beginning eliminates repeated callbacks.

Equipment that had been badly repaired someone

An inexperienced technician will usually cause more trouble than solving the original problem. Many sets come in with by missing components, cables connected to the wrong. Location, components installed in the opposite direction; unsolder tracks, wrong part numbers as substitute for the original components and etc. The technician might take extra time to locate the faults and time is loss during the repairing process. A half an hour job might take him three or more hours to solve it and at times, the equipment is beyond repair.

Understanding new

Understanding the new design of electronic circuit may take design of electronic you time. For example, a technician who is good in repairing circuit Analog Television may have difficulty in repairing Digital.

Television. He will takes a longer time to analyze the new circuit, to learn new ways of troubleshooting digital circuit problem and learn how to replace surface mount components (SMD). All these will consume his time. What about the latest technology of PLASMA TV? It may be even more time consuming to understand the new design and circuit.

New symptom which have not seen

I believe you will agreed with me that even though you have you been in the repairing field for more than 10 years, some before symptoms you might have not seen before whether you are

Servicing TV, Monitor, VCR, DVD and etc. Due to the new symptom, it will take you a long time in finding the exact location of the fault.

In order to speed up your repairing job and make additional money, you must master the correct techniques of servicing and learn the logical approach to identifying fault quickly. You must equip yourself with knowledge of the right kind of tools and test equipment in servicing field and do your best to repair it.

Self-Check 6	Written test

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: Give short answer

1. Write why the time is lost during Maintenance/repair

Note: Satisfactory rating - 1 and above satisfactory - below 1 points

You can ask you teacher for the copy of the correct answers.

Information sheet 7: Care and extreme precaution

7.1. Care and extreme precaution

Whenever you're working on any electronic equipment, your own safety has to come first. Every electronic technician must always take safety precautions before he or she starts work. Electricity must be handled properly, or else it can injure or cause fatalities. Here are some basic steps that show you how to avoid accidents from occurring.

Electrical Shock

Once you open up a set cover, you're actually exposing yourself to the threat of electric shock. Always keep in mind that safety has to come first.

A serious shock may stop your heart and if large electric current flows through your body, you will receive serious burns. Here are some rules, which should help you to avoid electricity hazards.

Always turn off the equipment and unplug it before you begin to work.

If you have to run tests while the equipment is operating, turn the equipment on, make your test carefully, and then turn the equipment off again.

Wear rubber bottom shoes or sneakers.

Try to do the work with one hand, while keeping the other in your pocket. That keeps the possible current paths away from the heart.

Don't attempt repair work when you are tired or rushed.

Always assume that all the parts in the power supply are "HOT".

Use only plastic screwdriver for shock protection during service operation.

Discharging Switch Mode Power Supply (SMPS) Capacitors

Most SMPS have a resistor to drain the charge in the main filter capacitor. But some resistors may fail and the capacitor can hold this charge even after you have turned off the equipment. This capacitor has a range of about 150uf to 330uf at 400 working voltage.

Before you start to work on a power supply, always turn off the power and discharge the capacitor. You can do this by placing a resistor across the two legs of the capacitor. The resistor value can be around 2.2 to 4.7 kilo ohms 10watt. It takes only a few seconds to fully discharge a capacitor. Double-check the capacitor with a voltmeter after every discharge.

Do not discharge capacitor with screwdriver because:

It may melt the tip of the screwdriver.

It will damage the capacitor and its terminal.

If we are too near to the point of discharge, the heavy spark generated may cause injury to our eyes.

Hot Ground Problem

Modern equipment consists of two grounds, one of which is a “hot” ground while the other is a “cold” ground. Hot ground is in the primary side of a switch mode power supply while the cold ground is the equipment ground.

Be careful when taking voltage measurements around these grounds. For example, if you want to check the primary circuit of a power supply with power on, always ground your meter or scope to the hot ground, while check the secondary side using the cold ground.

If the “Hot” ground is not used and you use only the cold ground, the voltage measurement might not be correct and it may destroy your meter. One way to prevent this is to use an “isolation transformer”.

Isolation Transformer

When servicing any electronic equipment, always use an isolation transformer to protect yourself from an electrical shock. During servicing, the isolation transformer is connected between the equipment and ac power line. An isolation transformer is a transformer that has a 1:1 turn ratio to provide the standard line voltage at the secondary outlet. This means that it does not change the voltage. The transformer still produces 240V AC at its outputs, but both sides of this AC lines are independent of ground. If you were to accidentally touch one of these outputs, you would be protected. The isolation transformer must be rated to handle the power of any equipment connected to it. Typical ratings are 250 to 500W.

Note: A variable transformer or variacs is not an isolation transformer.

Discharging The Cathode Ray Tube (CRT) Anode

The CRT of a Monitor and TV can hold a dangerous charge, even if the Monitor and TV have not been used several days. All CRT have graphite coating on the internal and external surfaces of the glass bell. These conductive graphite coatings are commonly known as aquatic coating and it forms the two plates of a high voltage filter capacitor using the glass in

between as dielectric. The external coating is always connected to the Monitor and TV chassis ground by a spring arrangement around the CRT.

This high voltage filter capacitor has very low leakage. Before removing a CRT, ensure that you discharge this capacitor in order to prevent shocks or serious injuries.

High Voltage

Monitors and TV have sections that use very high DC voltages. This high voltage is needed to be applied to the CRT to attract the electron beam to the phosphor. This high voltage could be as low as 12,000 volt in a monochrome Monitor or as high as 30,000 volt in large color Monitor. Flyback Transformer is the part that is used to generate the high voltage.

Wearing Goggles

The CRT has a complete vacuum inside. It must be handled carefully and safely. Always wear goggles, to protect the eyes from flying glass, in the event of an implosion when removing and old tube from the set and installing a replacement. Do not lift the CRT by the neck, instead hold the CRT with both hands on the heavy glass front of the tube. Also be sure to place the CRT facing downwards on a soft surface.

Electrostatic ally Sensitive Devices (ESD)

Integrated circuits (IC) & some field-effect transistors are examples of ESD devices. These components can be easily damaged by static electricity. There are several techniques, which can reduce the incidence of component damage, caused by static electricity.

Immediately before handling any ESD devices, drain the electrostatic charge from your body by touching a known earth ground.

Store ESD devices in conductive foam pad until installation in circuit.

Wear a grounding strap, attached to your wrist.

Use only a grounded tip soldering iron to solder or desolder ESD devices. (Some suggest using a battery powered soldering iron when working on ESD circuits).

Fire

Before returning the equipment to the user, every reasonable precaution is taken to avoid fire hazards. Be sure to use only direct replacements and not one that defeats some safety measure. For example, the fuses in your equipment are carefully designed. Fuses must be

replaced only with the same size, type and ratings. Should you install a fuse that is too large than the original rating, chances are that the equipment will be flammable.

Self-Check 7	Written test

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: Give short answer

1. What happed if capacitor discharges r with screwdriver because?

Note: Satisfactory rating - 1 and above satisfactory - below 1 points

Information sheet 8: Perform Cleaning of unit

8.1. Perform Cleaning of unit is

Cleaning a circuit board can seem like a difficult task to tackle, but these boards get dirty all the time. A slew of different materials are hazardous to the performance and safety of these devices. Watching out for such dangers and addressing the damage they cause can keep your work productive and the tools needed for the job functioning properly. Read on to learn how to clean your circuit boards while also maintaining your own safety standards. How Do Circuit Boards Get Dirty?

Circuit boards are found in nearly all electrical devices, including computers and industrial equipment. Over time, water, dust and grime can find their way into your company's devices and build up to a point where you must take action to prevent permanent damage to the equipment.

The fans responsible for keeping equipment's temperature at a cool environment suitable for proper functionality can draw in debris found in the air and any dirt clinging to nearby surfaces. The build-up of unwanted material leads to overheating and component failure.

A liquid such as water is not nearly as detrimental to electronics as the additives it almost always contains. Even plain drinking water contains ions such as sodium chloride and a slew of other minerals that heighten its reaction to electronic devices.

Once a liquid with good conductive qualities contacts an active device, electrical connections travel through currents to deactivated regions of the circuit board that can lead to short-circuiting. This harms a circuit and damages your device.

Prevention and Safety with Circuit Boards

To avoid dirty circuit boards, you can take preventative steps. Get in the habit of ensuring any electronics not in use are set to the "OFF" position, as the likelihood of adverse repercussions resulting from water damage significantly drop if the affected areas dry before reactivation.

Exercise caution when handling circuit boards:

Disconnect the device from its power source

Avoid standing near any water

Wear dry clothes

Disassembling hardware can be hazardous for the electronics, so make sure you understand how to properly handle the devices you work with and how to reassemble them back to their functioning state.

How Do You Clean Circuit Boards?

Cleaning a PCB (Printed Circuit Board) effectively relies on using the right methods and tools. The easiest ways will use:

Compressed air

Baking soda

Isopropyl alcohol

Distilled water

House ploy a soft brush and lint-free cloth, too, to ensure nothing gets damaged.

Using Compressed Air to Clean PCBs

For simple repairs, compressed air provides an unobtrusive way to free up any dust resting on the electronics or inside the machines and blow it out. Use short bursts to spray the air inside the ventilation ports. If you're not satisfied with the dust removed, open the device with a screwdriver and work your way around the components, carefully cleaning the circuitry with the air.

behold cleaners

Using Baking Soda to Clean PCBs

Baking soda, or sodium bicarbonate, is an effective means of removing grime with minimal risk of damaging the board. It possesses mild abrasive qualities that excel in removing corrosion or residue that will otherwise not come off with simpler means such as a brush and distilled water. Baking soda is most effective when treating corrosion, as it dissolves the troubled area and neutralizes the acidic qualities of the residue.

Using Isopropyl Alcohol to Clean PCBs

Isopropyl alcohol is a great PCB cleaner because it is inexpensive and evaporates quickly. Compared to other cleaners used for similar purposes, alcohol contains fewer chemicals. It is important that isopropyl alcohol used to clean your circuit board is 90% or better. High-percentage isopropyl alcohol can cause adverse effects in contact with the body, so be sure to handle it with care and use latex gloves and goggles.

Using Distilled Water to Clean PCBs

Distilled water triumphs over any other form of liquid. When mixing your cleaning solution due to the absence of ions conductive to electric devices. Pure distilled water will not degrade electronic devices, as it is a very poor conductor.

It also can become contaminated quickly by dirt found on your hands or in the air, so seal your reserve of distilled water when not in use and to avoid contact with your bare hands.

Using Household Cleaners to Clean PCBs

A phosphate-free household cleaner should also be in your arsenal. While phosphates can be an effective chemical to protect against corrosion and possess other helpful cleaning properties, phosphorous pollution in lakes has become a real concern for the United States since the 1970s and many manufacturers have moved away from including them in cleaning products. Since then, companies have adapted to create phosphate-free cleaners that do the job just fine.

Tools for Cleaning Printed Circuit Boards

Fig 8.1 cleaning brush

Your choice of brush is also important in the cleaning process. Selecting a brush that has soft bristles and is small enough to reach small places is the best pick. A toothbrush or paint brush are the best choices if your company does not have some sort of

specialized scrubbing tool. Cutting a paintbrush diagonally is a good strategy so you can reach difficult angles with the long side while scrubbing with the short side.

Lint-free towels like microfiber cloths should be handy to rub down and dry off your delicate circuit boards. Even with extensive use, this type of cloth does not shed debris, which would be counterproductive as your goal is to remove the unwanted material from inside the affected devices.

You can also utilize household appliances such as the oven to accelerate the speed of drying. An oven actively heating should never be used to dry electronics, but after the appliance is shut off, the heated environment is a great place to dehydrate any excess moisture after cleaning. Substituting a blow drier or desk lamp in place of an oven as the catalyst for drying is fine too.

Take similar steps no matter what material has dirtied your circuit board. The device should be removed from the environment it has been soiled in, disassembled and scrubbed with various cleaners appropriate for each job.

Self-Check 8	Written test

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: Give short answer

1. During reassembling what materials must used to clean PCB

Note: Satisfactory rating - 1 and above satisfactory - below 1 points

Operation sheet 1: Replacing defective parts/components

Purpose: To Replace defective parts/components

PROCEDURE:-

Step1. Follow safety/PPE procedure and rule

Step2. Make your working area free from dust and unwanted objects

Step3. Select the appropriate tools and testing instrument

Step4. Replace the defective part or component

Step 5 solders the replaced component or part

Step 6 perform control setting /adjustment

Step7. Perform the activity within the required time frame

Step 8 Inform the customer

Step 9 Perform maintenance and check for functionality

PRECAUTIONS:-

You should not forget to wear your PPEs.

QUALITY CRITERIA:-

- Set each tools on safe areas
- The project must be functional
- Finish on time

LAP TEST - 1

Name----------date----------

Time start---------- time finished----------

Task1. Replacing defective parts/components

L #25	LO #4Test repaired product
Instruction sheet	
This learning guide is developed to provide you the necessary information regarding the following content coverage and topics: • Reassembling Repaired units • Subjecting reassembled units to testing and cleaning • Compiling service completion procedures and documentations • Disposing waste materials in accordance with environmental requirement This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to: • Reassemble Repaired units • Subject reassembled units to testing and cleaning • Compile service completion procedures and documentations • Dispose waste materials in accordance with environmental requirement	
Learning Instructions:	

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.

2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them

3. Accomplish the “Self-checks” which are placed following all information sheets.

4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks.

5. If you earned a satisfactory evaluation proceed to “Operation sheets

6.Perform “the Learning activity performance test” which is placed following “Operation sheets ” ,

7.If your performance is satisfactory proceed to the next learning guide,

8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

information sheet 4: Reassembling Repaired units

4.1. **Repaired units are reassembled**

Reassembling is the process of putting the parts of (something) back together to assemble something again.

Steps for disassembling and reassembling Parts

When you perform repairs, you need a procedure that helps you take things apart and get them back together. The procedure here works for repairs that require you to take something apart and put back together again.

Allow yourself plenty of time. If things get rough, have some water or a cup of coffee. You may get a whole new perspective when you go back to work. Limit distractions: If the parts fit together before, they'll fit together again.

Follow these instructions, to reassemble the products:

Lay a *clean,* lint-free rag down on a flat surface, near enough to reach without having to get up or walk to it.

You'll lay each part on this rag as you remove it. Consequently, the rag shouldn't be in an area where oil or dust or anything else can fall on it and foul up the parts

As you remove each part, note (on paper, so you won't forget) where the part came from, how it was attached, and how tightly it was fastened or screwed down.

As you remove each part, lay it down on the rag in clockwise order, with each part pointing in the direction it was in before you removed it.

This is the key to the whole system. When you're ready to reassemble things, the placement and direction of each part tells you when to put it back and how it was oriented.

If you're making notes, assign each part a number indicating the order in which you removed it — Part #1, Part #2, and so on.

You can even put numbers on the parts with masking tape if you're afraid that the rag may be moved accidentally

When you're ready to reassemble everything, begin with the last part you removed, and proceed counterclockwise through the parts on the rag.

If you've numbered the parts, they should go on in reverse order

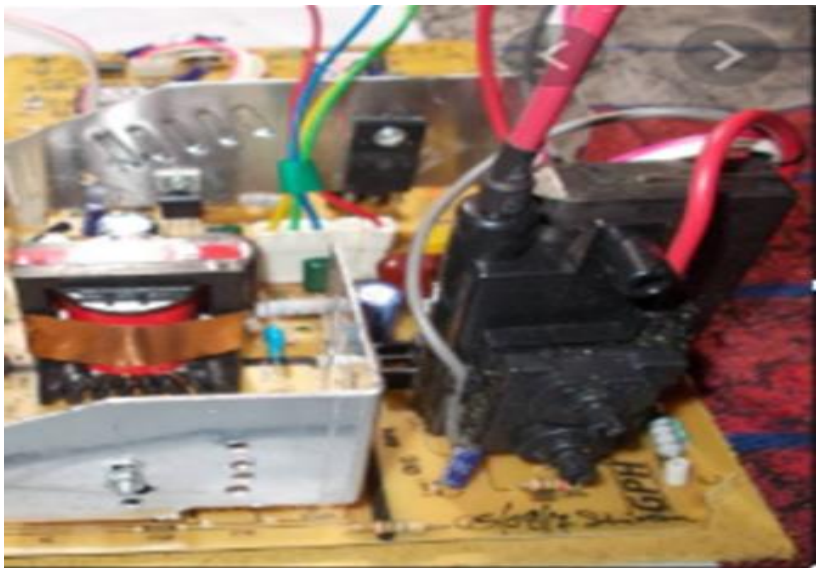


Fig 4.1 Reassembled units are subjected to final testing and

Cleaning

Test the equipment thoroughly after repair. After the equipment has been repaired, the equipment must be carefully re-assembled and tested. Run a thorough test to check the equipment and determine if the problem is solved. Thorough checking of the equipment is called 'servicing.'(Read information 3.8 above fo more information)

Do not be discouraged if the equipment still does not work. Simply walk away, clear your mind, and start again by defining your symptoms.

Self-Check 4.	Written

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: say true if the statement is true false if it is false

1. Reassembling is the process of putting the parts of (something) back together
2. Allow yourself plenty of time is same think advisable.
3. If you're making notes, assign each part a number indicating the order in which you

Satisfactory rating – 3 and above satisfactory - below 3 points

Information sheet 2: Reassemble and test repaired appliance

4.2 Reassemble and test repaired appliance

•Perform the final test for reassembled units in conformity with manufacturer's specifications service manual (information)

Reassembling and testing repaired

Reassembling Procedure:

1. After replacing the defective component of the unit, prepare the parts for reassembling. Make sure that there are no missing parts and as well as the screw/s.

2. Fix all the disassembled parts in the housing/compartment, considering the fittings/locks.

3. Wires and loose parts should be in proper place to avoid damaged due to misaligned compartment.

4. All sides of the housing should fit accordingly.

Moving parts must move as it can be moved by hand and free from obstructions.

5. Tighten screw/s accordingly.

6. Clean the unit before doing the post-testing procedure.

Post-testing Procedure:

1. Test the resistance at the AC plug to determine the continuity of the power line to the unit.

The reason is that there is a low-voltage power supply circuit that controls the functions of the appliance.

2. Energize the unit to check its functionality. Plug the AC cord to the power source. This time, the unit should operate normally. If not, review the documentation and the problem for the second time.

Testing Procedure:

1. Test the resistance at the AC plugs to determine the continuity of the power line to the AC the unit. A resistance reading must be observed.

2. Energize the unit to check its functionality.

Press button on at a time observing the behavior. This time, the unit should operate normally. If not, review the documentation and the problem for the second time.

Self-Check 2	Written

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: say true if the statement is true false if it is false

1. Perform the final test for reassembled units in conformity with manufacturer's specifications service manual is not so much important
2. After replacing the defective component of the unit, prepare the parts for reassembling and missing of small parts like screws are no problem

3. Wires and loose parts should be in proper place to avoid damaged due to misaligned compartment

Satisfactory rating – 3 and above satisfactory - below 3 points

Information sheet 3: Service completion procedures and documentations are complied

3.1. Service completion procedures and documentations are complied.

A Piece of complicated equipment without some service literature. It is possible to repair electronic equipment without the service manual, but it can be very

Time-consuming. You can lose a lot of valuable servicing time if you are without a good service manual. The service manual is a set of document prepared by the manufacturer to help the service engineers to repair or service that set of equipment. A well-written manual is the best servicing aid. It contains the following information:

Describe how a circuit works

Block diagram of the equipment Circuit diagrams

Signal and voltage test points Adjustment procedure

List of accessories

List of spare parts with the part numbers, values, tolerances and ratings

Fault diagnosis steps, generally in the form of flow charts

Preventive maintenance layout

Safety precautions to be observed while handling the equipment

And much, much more

A service manual can be very expensive, but it is worth the investment. With the help of a service manual, a service technician or engineer can:

Align, calibrate and test the equipment correctly to get the optimum output

Locate a fault quickly

Use the correct replacement part

Conduct preventive maintenance correctly

By using the right service manual, as well as with the assistance of good tools, testing equipment and your own experience, you are set to multiply your troubleshooting power!!!

Self-Check 3	Written

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: say true if the statement is true false if it is false

1. It is possible to repair electronic equipment without the service manual, with out time consuming.
2. A service manual is something cheap.

3. good tools, testing equipment are accelerate your maintenance

Satisfactory rating – 3 and above satisfactory - below 3 points

Information sheet 4: dispose Waste materials

4.1. Dispose Waste materials

It is inevitable during normal laboratory operations some chemical waste will be generated. This waste may take a number of forms including chemicals, solvents, stock solutions and items contaminated with chemicals such as paper, filters and contaminated laboratory equipment. The improper disposal of chemical waste can pose a number of potential hazards both to the environment and to the safety of staff and students.

• Strong smelling substances such as mercaptans can give off strong-smelling, unpleasant vapors that can linger in drains and pipe work moving throughout the building and escaping in other areas.

• Flammable / reactive substances can give rise to a build-up of flammable vapors in drainage systems which could lead to a risk of fire or explosion in extreme cases.

• Corrosive substances including acids and alkalis can damage pipe work and fittings as well as reacting with other chemicals released into the drainage system potentially leading to the release of harmful vapors.

• Radioactive substances can be released to drains under controlled circumstances but in the event that the licensing of this is very strictly controlled to reduce the risk of radioactive contamination.

• Unexpected reactions may occur when chemicals are released to drain, for example bleach can mix with some common drain cleaning compounds to release the toxic gas chlorine.

• Poisonous substances may enter the environment if released to drain and can either have a toxic affect on watercourses or other discharge sites, they may also introduce toxic residues into drinking water that can persist even after water treatment.

As a result discharging chemicals to foul water drains should be avoided wherever practical and only considered where there is no viable alternative or for relatively innocuous substances.

Self-Check 4	Written

Name: _____ Date: _____

Time start: _____ Time fished: _____

Directions: Write the correct Answer for the following question

1. Write forms of waste.

2. Write same the potential hazard of improper handling of waste

Satisfactory rating – 2 and above satisfactory - below 2 points

Operation sheet 1: Subjecting reassembled units to testing and cleaning

- Purpose: To Subjecting reassembled units to testing and cleaning

PROCEDURE:-

Step1. Follow safety/PPE procedure and rule

Step2. Make your working area free from dust and unwanted objects

Step3. Select the appropriate tools and testing instrument

Step4. Repaired units are reassembled

Step 5 solders the replaced component or part

Step 6 clean and test the repaired unit

Step7complied the completion procedure and documentation

Step Dispose waste material

PRECAUTIONS:-

You should not forget to wear your PPEs.

QUALITY CRITERIA:-

- Set each tools on safe areas
- The project must be functional
- Finish on time

LAP TEST - 1

Name----------date----------

Time start---------- time finished----------

Task 1 Subjecting reassembled units to testing and cleaning

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