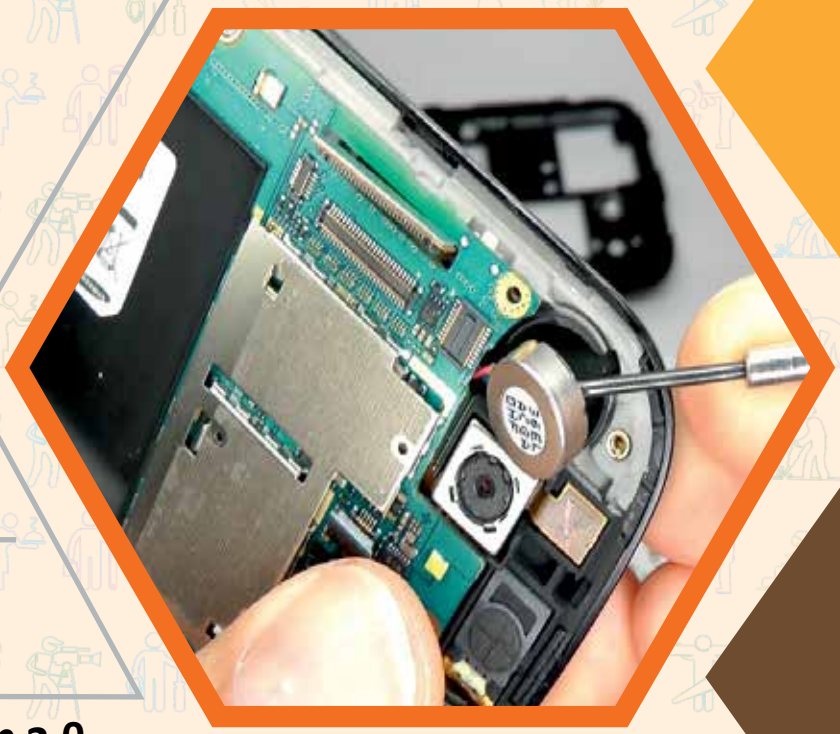
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Participant Handbook



Sector
Electronics

Sub - Sector
Communication & Broadcasting

Occupation
After sales service

Reference ID : **ELE/Q8104, Version 3.0**
NSQF Level 4

Mobile Phone Hardware Repair Technician

Published by

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QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

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ELECTRONICS SECTOR SKILLS COUNCIL OF INDIA

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/Qualification Pack **"Mobile Phone Hardware Repair Technician"**
QP No.**"ELE/Q8104, NSQF Level 4"**

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Authorized Signatory
Electronics Sector Skills Council of India

Acknowledgement

The need for having a standard curriculum for the Job Role based Qualification Packs under the National Skills Qualification Framework was felt necessary for achieving a uniform skill based training manual in the form of a participant handbook.

I would like to express my gratitude to the Sunrise Computer Software Pvt. Ltd. team for working hard and coming up with a participant Handbook for the Mobile Hardware Repair Technician Job role. The handbook is the result of tireless pursuit to develop an effective tool for imparting the Skill Based training in the most effective manner. I wish them all the best for their future endeavor in similar pursuits.

CEO
Electronics Sector Skills Council of India

About this Guide

India is currently the world's second-largest telecommunications market and has registered strong growth in the past decade and half. The Indian mobile economy is growing rapidly and is expected to contribute substantially to India's Gross Domestic Product (GDP). The Indian telecommunication services market is likely grow by 10.3 per cent year-on-year. Mobile Phone subscription in India is expected to increase four-fold to 810 million users by 2021, while the total Mobile Phone traffic is expected to grow 15-fold to 4.5 exabytes (EB) per month by 2021. According to Telecom Regulatory Authority of India (TRAI), the total telecom subscriber base in December 2015 stood at 1.04 billion, out of which 1.01 billion were mobile subscribers and 25.52 million were wireline subscribers. In line with the rapid technological advancement in this field, there are exciting prospects for a fulfilling career in this industry.

This book is designed to enable a candidate to acquire skills that are required for employment. The content of this book is completely aligned to the National Occupation Standards QP/NOS and conform to the National Skills Qualification Framework (NSQF).

The Qualification pack of Mobile Phone Hardware Repair Technician, Level-4 includes the following NOS's which have all been covered across the units:

- Introduction
- Integrate electrical subsystem (ELE/N6301)
- Communicate and coordinate effectively with others (ELE/N9972)
- Work effectively, sustainably and safely (ELE/N1003)
- Employability and Entrepreneurship Skills

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS. The symbols used in this book are described below.

Happy Learning !!

Symbols Used


Learning Outcomes


Steps


Time


Tips


Notes


Objectives


Exercise


Activity

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1. Introduction and Fundamentals

Unit 1.1- Roles and Responsibilities

Unit 1.2- Introduction - Mobile Phone

Unit 1.3- Basic of Mobile Phone Hardware

Unit 1.4- Tools, Equipments and Consumables

Unit 1.5- Mobile Phone Terminologies

Unit 1.6- 5 S



Key Learning Outcomes

At the end of this module, you will be able to:

1. Define the role and responsibilities of a mobile phone hardware repair technician
2. Identify the basic electronic components involved in the hardware
3. List different hardware modules in a mobile phone such as battery, SD card, screen and so on
4. Differentiate the Smartphones according to their types, models, features and specifications
5. List different accessories available for smartphones, their purpose and specifications
6. Identify the software and applications related to a Smartphone
7. Identify the tools and techniques required for electronic repairing and reworking
8. Interpret the terminologies mentioned in repair manual
9. Implement the components 5S to achieve quality and productivity

UNIT 1.1: Roles and Responsibilities

Unit Objectives

At the end of this unit, you will be able to:

1. Explain the scope of work for mobile hardware repair technician
2. Explain role and Job description for mobile hardware repair technician
3. Define personal attribute for mobile hardware repair technician

Qualifications Pack

Mobile Phone Repairs Technician

Level 4

Scope

SECTOR	Electronics
SUB-SECTOR	Communication & Broadcasting
OCCUPATION	After Sales Service
JOB ROLE	Mobile Phone Repair Technician
REFERENCE ID	ELE / Q 8104
ALIGNED TO	NCO-2004/NIL

Role and Job Description

Brief Job Description: Responsible for rectifying faults in the mobile phone brought in by the customer. Receive the faulty mobile phone, diagnose the problems, perform front end or hardware level repair as required, resolve software issues and ensures effective functioning before delivering back to customer

Mobile Phone Repair Technician Role: The Mobile Phone Repair Technician diagnoses problems and repairs the faulty module of the mobile phone

Personal Attribute

Job Role	Mobile Phone Repair Technician
Role Description	Receive the faulty mobile phone, diagnose the problem, decide on corrective action, repair the faulty mobile phone, rectify the software issues and ensure effective functioning of the mobile phone
NSQF level	4
Minimum Educational Qualifications	10th standard
Maximum Educational Qualifications	B. E.
Training	N.A.
Experience	1 year in hardware repair for 10th standard passed
Applicable National Occupational Standards (NOS)	Compulsory: Bridge Module : Introduction and Fundamentals ELE / N 8106 : Customer Interaction and Front-end Repair ELE / N 8107 : Repairing Faults in Smartphones ELE / N 9951 : Soft Skills ELE / N 9910 : Health and Safety **Optional**: N.A.
Performance Criteria	As described in the relevant OS units

1.2: Introduction - Mobile Phone

Unit Objectives

At the end of this unit, you will be able to:

1. Explain the history of mobile phone
2. Differentiate the mobile phones according to type model and specifications
3. Identify the software of Smartphone

1.2.1: What is a Mobile Phone?

Mobile phone having advance mobile operating system loaded combine certain level of computer OS along with other features useful for mobile device.

Feature combined in mobile phones is similar to other popular mobile devices such as media player, sound recorder, GPS navigation, personal digital assistant etc.

Present mobile phones are equipped with the feature like touch screen, internet access, Gorilla glass, camera front and rear, music player and other third party application to perform different set of activities.

All recent mobile phone is also compatible with 4G LTE Internet, motion sensors and other such advanced feature

1.2.2: History of Mobile Phone

Mobile phones history covers devices used for mobile communication which connect wirelessly to the PSTN (Public Switched Telephone Network).



Fig: 1.2.2.1 Mobile Phones Samples

Speech transmission by radio has been used for so long which is also known as first wireless device. Recent advancement is mobile device which is capable of connecting standard telephone network. The first such device introduced was very big in size compare to the handheld devices we are using today. Mobile phone origin history is also very interesting. It has started its journey from its huge size and heavy weight and presently available in thin and techno savvy handsets thus we can say that mobile phones have covered long way so far to reach to the size and weight we are experiencing now a days. Concept of mobile phones were started with the basic telephony.

Recent advancement has been taken place in developing more portable technology and better interconnections system where as wireless communication network and frequency of its use has also experienced drastic changes. Mobile phone has been became a global gazette and has also boosted the use of Internet via mobile broadband.

Mobile phone is actually a portable telephone instrument which works on radio frequency and capable of making and receiving calls within telephone service area. Using switching system of mobile phone operator radio frequency link establish connection to get access to the PSTN (public switched telephone network). Presently cellular network architecture is used by modern mobile phone services and due to that we are often calling mobile telephones as cell phones. Apart from the telephony facilities 20th century mobile phones also support variety of other services like SMS, MMS, e-mail, access to internet, infrared & Bluetooth communication, Games and various types of business application, digital photography, digital video and much more and also equipped with more general computing capabilities.

John F. Mitchell and Martin Cooper of Motorola demonstrated first handheld mobile phone in the year 1973. This phone was having weight around 2 kg with 30 circuit boards. Charging time of this mobile was around 10 hours which was offering around 35 minutes of talk time. User of this mobile phone was having comfortable talking experience. The first hand held commercially available mobile phone was DynaTAC 8000x which was introduced in the year 1983. From the year 1983 to 2016 onwards mobile phone users have grown to several billons penetrating 100% global population. Following are some of the top mobile manufacturers of mobile phones : Samsung, Apple, Nokia, Micromax, Lenovo etc.



Fig: 1.2.2.2 Mobile in 1973

Mobile phones have become a basic necessity of present world and have also proved themselves as one of the utmost gift for the mankind. Mobile phone has became an integral part of our lives. Few years back having a mobile phone was a sign of rich class people but due to reduction in cost and technological innovation over a period, now it is affordable to every karta of the society and thus now a days it is flooded in the market not for just catering to the needs but also as a status symbol.



Fig: 1.2.2.3 Mobile Phone

In India mobile phone market is growing rapidly with millions of unit sold in the year 2016 and cost of basic mobile phone is even dropped to Rs. 2000/- onwards.



Fig: 1.2.2.4 Mobile Phone

Considering the present scenario along with historical trends analysis of mobile handset sales, Indian market of mobile phone is growing very rapidly with more than 5% growth every previous year and will even available to bottom section of the society.

As per one of the research report average growth rate of mobile phone segment is around 32% and it is expected that with the launch of 4G it will further boost the sales adding 4G compatible mobile phones.

Summary:

- Mobile is an electronics instrument used to communicate between two or more persons.
- Mobile technology connects call between two persons in nano seconds.
- Wireless medium is used to connect mobile phones which is measured in frequency (Mhz).
- Mobile network operates on 700 MHz to 2.6 GHz waves
- Radio operates in the range of 100KHz to 110 MHz
- Mobile was invented in 1973 by Martin Kooper of Motorola Company in Chicago city of America.
- In 1983 DynaTac 8000x mobile was introduced to the world. Weight of this mobile was 2 Kg, battery backup was 20 minutes only and was costing around Rs. 5 Crore.
- First commercial automated cellular network was launched by Nippon Telegraph and Telephone (NTT) in the year 1979 in Japan. This network was later on used by all other mobile operators . This Network, known as First generation (1G) used Analogue Technology.
- In 1991, Second Generation (2G) digital cellular technology, based on GSM standard was launched by Radiolinja in Pineland.?

- Post 10 years of launching 2G, in the year 2001 Third Generation (3G) was launched by NTT DoCoMo in
- Japan based on WCDMA standard. GSM EDGE, UMTS, CDMA 2000 and DECT and WiMAX are also included in 3G. This gaveboost in mobile services by enabling feature such as Video Calls, Wireless Data, Wireless Voice Telephone etc.
- Now a days the latest technology we use is called Fourth Generation (4G), this includes WiMAX standard and LTE standard technology.
- (4G) Mobile technology was developed post 1993 and new mobiles were introduced in the market.
- In the year 2014 top manufacturers of Mobile phones were Samsung, , Apple and LG.

1.2.3: Mobile Phone Features

Most of the modern mobile phones have the following primary built in features:

- Phone and contact address book
- Texting
- Video calling (Apple FaceTime)
- Web browser
- E-mail
- Weather
- Predictive typing (see predictive text).
- Voice dictation
- Voice-activated virtual assistant
- Alarm clock, stopwatch, Timer
- Calculator
- Calendar
- Note pad
- Music player
- Photo album
- Camera (still and video)
- GPS navigation
- App store search

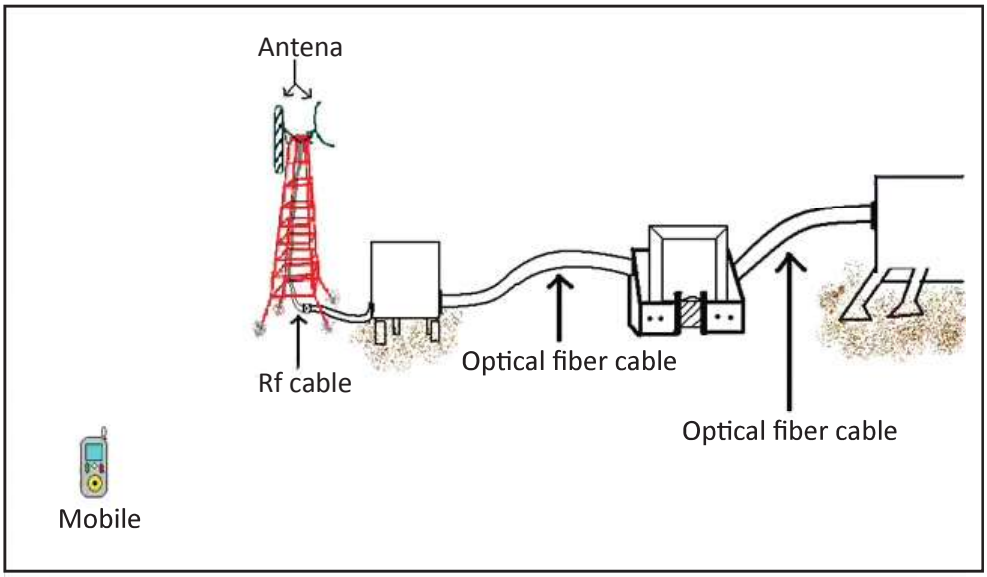
1.2.4: Most Popular Mobile Phone Brands in India

The following are the current most popular mobile phone brands in India:

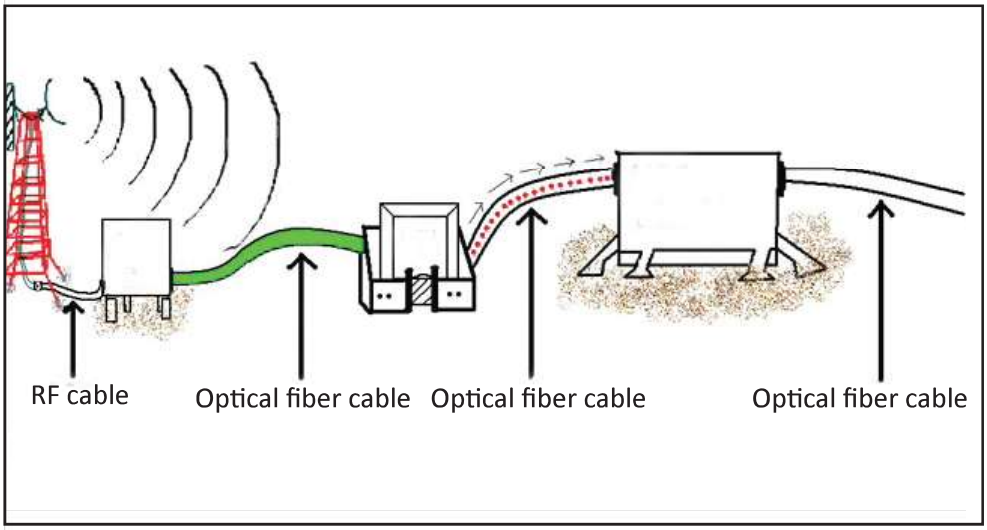
- Samsung
- Apple
- Nokia
- Micromax
- Microsoft
- Motorola
- LG
- HTC
- Sony
- Intex

1.2.5: This is Mobile Communication Diagram

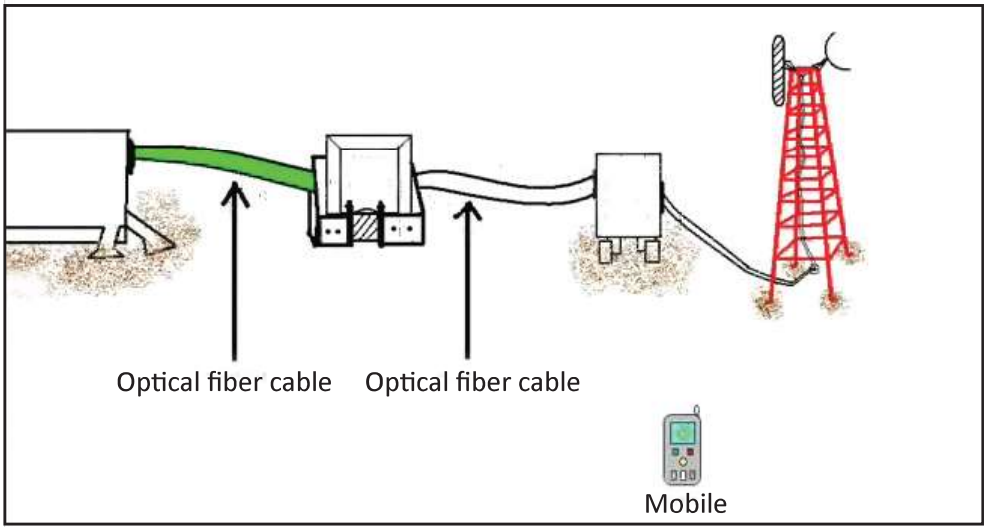
Step 1:



Step 2:



Step 3:



1.2.6: Mobile Operating System (OS)

Mobile operating System is a software similar to windows and Linux operating system and is compact in size. Mobile Operating system is installed on the mobile device which helps in operating mobile and also in operating other mobile based software and applications.

Mobile operating system integrates facilities of personal computer operating system for mobile device along with other facilities. These facilities are now mandatory requirements in modern mobile system like Touchscreen, Cellular, Bluetooth, WiFi, GPS mobile navigation, Camera, Video, Speech Recognition, Voice Recorder, Music Player, near field communication and infrared blaster etc.

Timeline:

- From 1973 to 1993 embedded system was used to control the operation of mobile phones
- In 1994 first Mobile Phone "IBM Simon" was launched with facilities such as Touch Screen, e-mail and Personal Digital Assistant.
- In 1999 Nokia officially launched first Mobile Phone Nokia S40 and Nokia 7110
- In 2002 Blackberry launched its first Mobile Phone
- In 2007 Apple launched iPhone with iOS
- In 2009 Samsung launched Samsung S8500 Mobile Phone with Bada OS
- In 2010 Windows launched its Mobile Phone with windows OS
- In 2013 Blackberry launched its new operating system Blackberry 10.
- In 2013 Google launched Android KitKat 4.4
- In 2014 Microsoft launched Windows Phone 8.1
- In 2014 Google launched Android 5.0 Lollipop
- In 2015 February Google launched Android 5.1 Lollipop and further in the month of September launched Android 6.0 Marshmallow

Types of Mobile Operating System (OS):

1) Android OS



Fig: 1.2.6.1 Operating System - Android

2) iOS



Fig: 1.2.6.2 Operating System - iOS

3) Windows OS

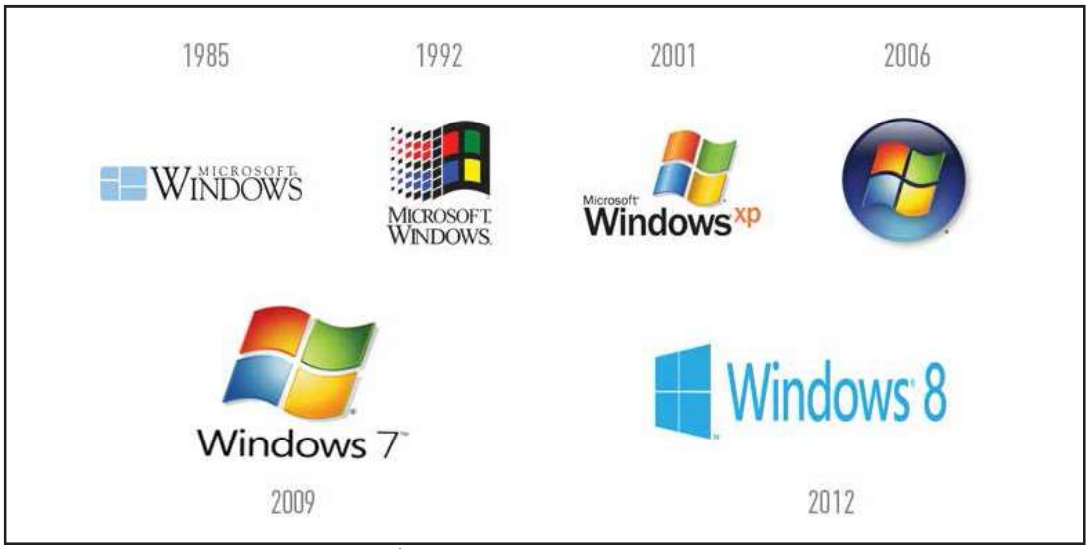


Fig: 1.2.6.3 Operating System - Windows

4) Blackberry OS

Versions of Blackberry	Release Date
1.0	January 1999
3.6	March 2002
5.0	August 2009
6.0	2010
7.0	Summer 2011
7.1	2012
10	January 2013

Tab: 1.2.6.4 Operating System - Android

5) Popular Mobile Phone Models



Fig: 1.2.6.5 Sample Mobile Phone model

Unit 1.3: Basic of Mobile Phone Hardware

Unit Objectives

At the end of this unit, you will be able to:

1. List different hardware module in mobile phone
2. List various accessories used for mobile phone

1.3.1: Mobile Phone Hardware Module

Front and Back Panel

Below image shows a typical front and back panel of mobile phone. Size and shape of front panel differs based on the brand and model of mobile phones.



Fig: 1.3.1.1 Front panel



Fig: 1.3.1.2 Back Panel

Ringer

Ringer is also known as loudspeaker of mobile phone, used to play loud sound and music.

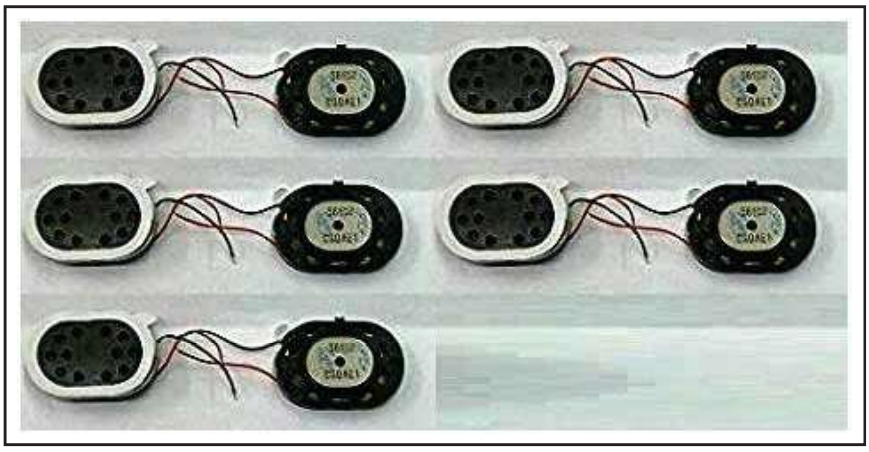


Fig: 1.3.1.3 Ringer

Speaker

Speaker is known as earpiece of mobile phone and help in listening sound during phone call.

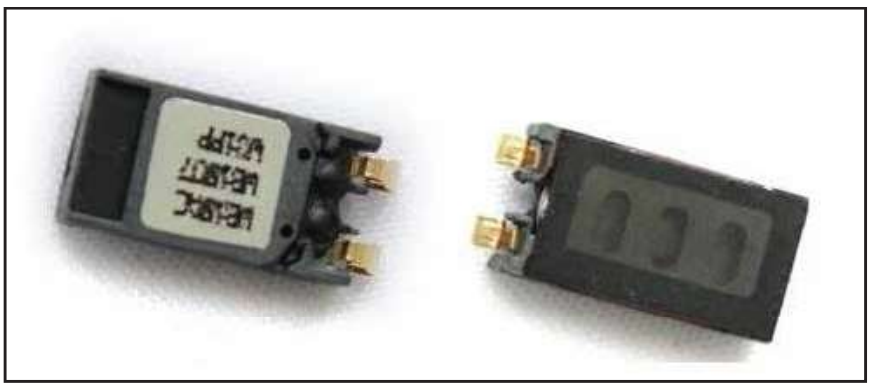


Fig: 1.3.1.4 Speaker

Microphone

Usually we call is Mic. It helps to transmit voice of speaker during phone call and also record sound in mobile phone.

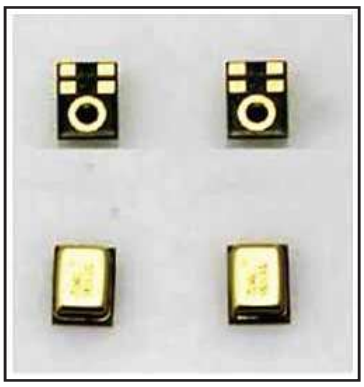


Fig: 1.3.1.5 Microphone

Vibrator

Vibrator is also known as vibrator motor. It generates vibration in the mobile phone.



Fig: 1.3.1.6 Vibrator

Charging Connector / Data Cable Connector

It is also for dual purpose i.e. charging mobile phone battery and also connecting mobile phone to computer for data transfer.

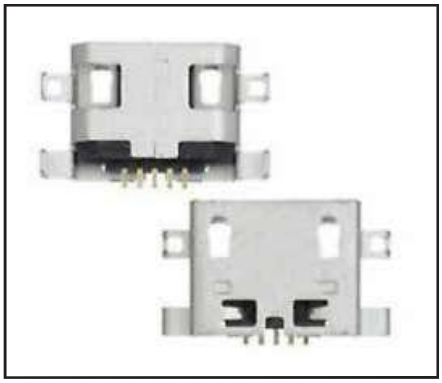


Fig: 1.3.1.7 Charging Connector / Data Cable Connector

Headphone Connector

Use to connect earphone to mobile phone using jack.



Fig: 1.3.1.8 Headphone Connector

Battery

Supply power to mobile phone.



Fig: 1.3.1.9 Battery

Camera

It is used to capture image or record video in mobile phone. Quality of camera is mainly measured in mega pixels. IN most of the latest mobile phone it is built-in component on PCB.



Fig: 1.3.1.10 Camera

Display

It displays Application and data on screen.



Fig: 1.3.1.11 Display

PCB

This is called Printed Circuit Board (PCB). Size, shape and feature of PCB depends on Manufacturer and model of mobile phone.

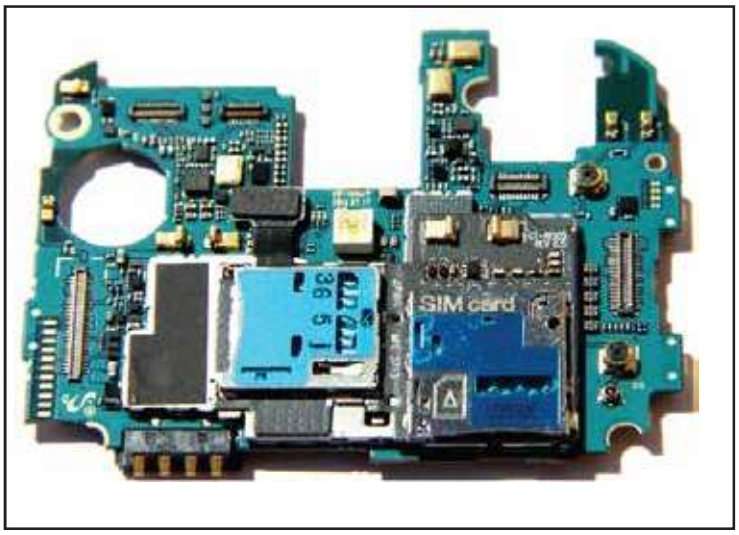


Fig: 1.3.1.12 Sample PCB

1.3.2 Mobile Phone Assessories

Phone Case

It is used for protection from minor diamage like scratches, accident and water spills. It is available in various shapes, colour and style to suite different model of mobile phone.



Fig: 1.3.2.1 Phone Case

Phone Cover

Is is used to protect mobile phone from dust, scratches and also during minor accident. Various types of phone covers are available depend on make amd model of mobile phone.



Fig: 1.3.2.2 Phone Cover

Tempered Glass

Tempered glass acts as scratch resistant and absorve shock when phone is dropped thus protecting display screen.



Fig: 1.3.2.3 Tempered Glass

Headphone

It provides passive noise refuction for quality mode voice conversation in a noisy environment.



Fig: 1.3.2.4 Headphone

Data Cable

It is used for charging of mobile phone and also for data transfer.



Fig: 1.3.2.5 USB Data Cable



Fig: 1.3.2.6 USB Multipurpose Data Cable

Charger

Used for mobile phone charging. Depends on the make and model of phone it is available in various rating from 1 ampere to 3 ampeare.



Fig: 1.3.2.7 Mobile Charger

Powerbank

Power banks is a potable device, used to charge the mobile phone battery. It is very helpful during travel when the battery is going down. It is having battery inside which needs to be charges first before using it to charge the mobile phone. Depends on make and model of mobile phone it is available in various ratings to meet the requirement.

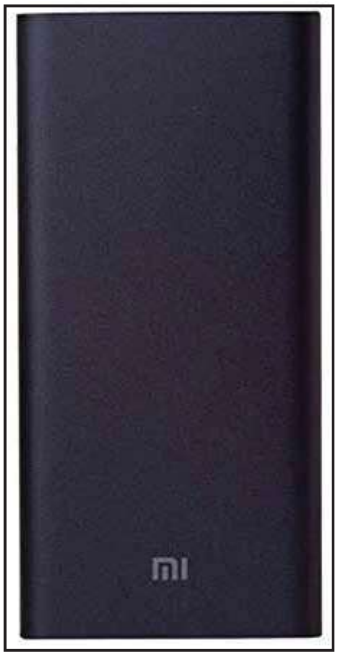


Fig: 1.3.2.8 Powerbank

SD Card

SD (Secure Digital) card is a flash memory card available in very small size. It is also called memeory card and available in various storage capacity like 16Gb, 32Gb, 64Gb and 128Gb.



Fig: 1.3.2.9 Powerbank

Unit 1.4: Tools Equipments and Consumables

Unit Objectives

At the end of this unit, you will be able to:

1. Identify various types of tools used for mobile phone repairing and reworking
2. Identify various types of Equipments used for mobile phone repairing and reworking
3. Identify various consumables used for mobile phone repairing and reworking

1.4.1: Solder Gun

This is one of the important tool used in mobile repairing. As you can see this is a micro solder gun. Bit of solder gun is very sharp which helps us to do the soldering at very small level. We should always purchase good quality micro solder gun so that we can use it efficiently for a longer period. It works on 12 Volt DC. It helps us in repairing process and also soldering of small components. In 90% of mobile repairing works, we need to use micro solder gun.



Fig: 1.4.1 Solder Gun

1.4.2: Solder Wire

While doing any type of soldering we need soldering wire along with soldering gun. Solder wire is made-up of lead and tin, used for soldering and sometime also used for jumpering. Solder wire is easily available in the market costing around Rs. 20 to 25 . We need soldering wire during mobile repairing process on a regular basis.



Fig: 1.4.2 Solder Wire

1.4.3: Soldering Paste

During soldering process we need soldering paste along with solder iron. It helps in giving good finishing while soldering. Variety of soldering paste are available in the market, but we should always purchase best quality soldering paste as shown here.



Fig: 1.4.3 Soldering paste

1.4.4: PCB Stand

PCB stand is also known as PCB holder. It is used during repairing, to hold the motherboard. If PCB is getting over heated we can place it on holder and can do soldering or de-soldering process easily.



Fig: 1.4.4 PCB Stand

1.4.5: PCB Cleaner

You can see two liquid bottles. These are PCB cleaners. One of these liquid looks like water called I.P (I.P.A) liquid and another one is pink coloured called "Elmaa". We use both of these liquid to clean the motherboard. It helps to wash the motherboard which also helps in solving other minor problems on the motherboard.



Fig: 1.4.5 PCB Cleaner

1.4.6: Ultrasonic Cleaner

Used to clean PCB of a mobile phone and electronic components



Fig: 1.4.6 Ultrasonic Cleaner

1.4.7: ESD Brush

It is an antistatic brush used to clean the motherboard and also used in washing motherboard with I.P and Elmaa liquid.



Fig: 1.4.7 ESD Brush

1.4.8: Cutter Blade Set

This is a cutter blade set and have various typ blades used for different purposes. It is mainly in locating display strip track, Motherboard cutting of jumper wire etc...



Fig: 1.4.8 Cutter Blade Set

1.4.9: Opener

It is made-up of plastic and helps in opening mobile phone.



Fig: 1.4.9 Opener

1.4.10: Multimeter

Multimeters are of two types – Analog Multimeter and Digital Multimeter. How to use Multimeter to check voltage, Ohms, battery, continuity etc is more or less the same. The only difference is that a digital Multimeter has a digital display of all the readings. An analog Multimeter has a needle-type pointer that moves to a reading while testing any device or electronic component. Digital multimeter is widely used in service and repair work.

Digital Multimer:

Digital multimeter provide following :

- Function and Range Switch: This switch is used to select the function and desired range as well as to turn the instrument. In order to extend the life of the battery of the Multimeter, this switch must be kept in the "OFF" position when the instrument is not in use.
- Display or LCD: To display all the readings.
- Common Jack: Plug in connector for black (negative) test lead or probe.
- V ? mA Jack: Plug in connector for red (positive) test lead or probe for all voltage, resistance and current (except 10A) measurements.
- 10A Jack: Plug in connector for red (positive) test lead or probe for current measurement.



Fig: 1.4.10.1 Digital Multimeter

Analog Multimeter:

It is one of the very useful tool for repairing the mobile. Just like it is important for a doctor to always carry stethoscope with them, a mobile service technician should always keep multimeter with them. It is very useful in testing the mobile phone. With the help of multimeter we can test mobile phone in different angle and can say mobile is live or dead. Incase mobile is dead then also it helps to identify the cause. With the help of multimeter we can test all components of mobile and battery. It helps in finding Voltage, continuity and resistance very efficiently which plays very important role during repairing. Always purchase good quality Multimeter as it will give you accurate reading.



Fig: 1.4.10.2 Analog Multimeter

1.4.11: Screwdriver Kit

It has several screwdrivers of different shapes and sizes to dissemble and assemble a mobile phone. Aven Tools is a world renowned manufacturer, exporter and supplier of all kinds of tools and tool kits.

T6 Screwdriver

This type of screw driver is mainly used to open Nokia and other old types of mobile phones.

Star Screw Driver

This type of screw drivers are mainly used to open latest Mobile Phone.



Fig: 1.4.11 Screwdriver Kit

1.4.12: Power Supply

It is used to boost the power of battery of a mobile phone



Fig: 1.4.12 Power Supply

1.4.13: Magnifying Lamp

It is used to see the magnified view of the PCB of a mobile phone. Most magnifying lamps also have light. Magnifying lamps are available in different magnification such as 3x, 4x, 5x, 10x, 50x etc.



Fig: 1.4.13 Power Supply

1.4.14: Multi Charger

Multi charger is a device used to charge various brands and models mobile phone.



Fig: 1.4.14 Multi charger

1.4.15: DC Power Supply

Regulated DC (Direct Current) power supply is used to supply DC current to a mobile phone. Most repair person used DC power supply to switch ON a mobile phone without battery.



Fig: 1.4.15 DC Power Supply

1.4.16: Antistatic Mat

It is laid or placed on the table or workbench where mobile repairing is done. The mat is grounded using a grounding cord or normal grounding wire. This also prevents damage from static electricity.



Fig: 1.4.16 Antistatic Mat

1.4.17: Antistatic Hand Gloves

It is important to wear ESD-Safe hand gloves while repaiing a mobile phone to prevent PCB and electronic components from static charge.



Fig: 1.4.17 Antistatic Hand Gloves

1.4.18: Wrist Strap

It is work in the wrist of the person who is repairing a mobile phone. It helps to discharge or ground static charge thuspreventing the PCB or electronic components from any damage

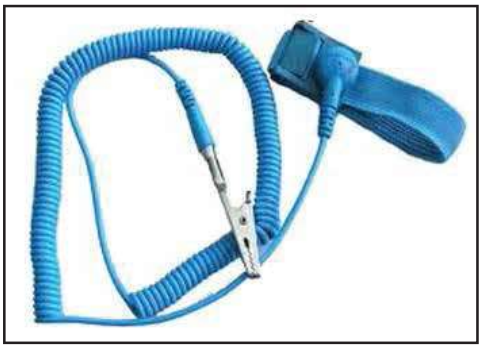


Fig: 1.4.18 Wrist Wrap

1.4.19: BGA Kit

BGA Kit or BGA Reballing Kit is used for reballing the solder balls of a BGA IC (Ball Grid Array). There are several BGA Reballing kit and BGA rework stations available in the market. Most repairing professionals generally start with a starter BGA Reballing kit and gradually shift to latest universal kits and stations.



Fig: 1.4.19 BGA Kit

How to Use a BGA Reballing Kit

- Desolder and remove the BGA IC from the PCB.
- Now clean the solder from the bottom of the IC and the PCB where the IC was soldered. Use a soldering iron and desoldering wire or wick.
- Now select the right size of the IC depending on the number of balls from the stencil supplied with the kit.
- Place the IC on the stencil and tightly hold it with the stencil using clip or tape.
- Now apply solder Paste from the other side of the stencil. Solder paste will stick to the IC through the
- tiny holes in the stencil.

  Now apply hot air using SMD rework station. This will solidify the solder paste and it will form solder
- balls that will stick to the IC.

  Now clean the IC with Acetone or IPA solution and remove it from the stencil.

Unit 1.5: Mobile Phone Terminologies

Unit Objectives

At the end of this unit, you will be able to:

1. Interpret terminologies used in repair manual

1.5.1: Mobile Phone Terminologies

- BC - Battery Connector
- DC - Display Connector
- HF - Headphone Connector
- SPK - Speaker
- RIN - Ringer
- M/C - Microphone
- CC - Charging Connector
- MM - Multimeter
- HW - Hardware
- SW - Software
- USB - Universal Serial Bus
- GND - Ground
- VB - Vibrator Motor
- IC - Integrated Circuit
- PW - Power On / Off
- IMEI - International Mobile Equipment Identity
- CDMA - Code Division Multiple Access
- GSM - Global System for Mobile
- MMC - Multimedia Memory Card
- PUK - Pin Unlock Key
- SMS - Short Message Service
- MMS - Multimedia Message Service
- E-Mail - Electronic Message
- LCD - Light Cystal Display
- LED - Light Emitting Display
- RX - Receiver
- TX - Transmit

- UI - User Interface
- VBAT - Voltage for Battery Connector
- VCHA - Voltage for Charging
- SIM - Subscriber Identity Module
- HDMI - High Definition Multimedia Interface
- BSI - Battery Status for Information
- MHz - Mega Hertz (Fer)
- IPS - In-Plane Switching
- TRAI - Telecom Regularity Authority of India
- VAS - Value Added Services
- TVC - Total Video Convertor
- PIN - Personal Identification Number
- GPRS - General Packet Radio Service
- UIM - User Identity Module
- UFS - Universal Flashing Software
- WAP - Wireless Application Protocol
- FDMA - Frequency Division Multiple Access
- Wi-Fi - Wireless Fidelity
- IR - Infra Red
- GPS - Global Positioning System
- TDMA - Time Division Multiple Access
- MIN - Mobile Identification
- RF - Radio Frequency
- IMSI - International Mobile Subscriber Identity
- PUC - Personal Unlock Code
- RBS - Radio Base Station
- BTS - Base Transmitting Station
- BSC - Base Transmitting or Transceiver Station
- MSC - Mobile Service Switching Center
- ITU - International Telecommunication Union
- UMTS - Universal Mobile Telecommunication System
- ISD - International Subscriber Dialing
- PCO - Public Call Office
- DSP - Digital Signal Processor
- DCS - Digital Cellular Service
- LAI - Location Area of Identity
- PCBA - Printed Circuit Board Assembly
- MMM - Multimedia Mode
- HSDPA - High Speed Downlink Protocol Access
- WCDMA - Wideband Code Division Multiple Access

Unit 1.6: 5S

Unit Objectives

At the end of this unit, you will be able to:

1. Implement 5S components to achieve quality and productivity

1.6.1: What is 5s



Fig: 1.6.1.1 5S

- Seiri – Sort (housekeeping)
- Seition – Systematic Arrangement
- Seiso – Shine (Cleanup)
- Seiketsu – Standerdize
- Shitsuke – Sustain (Self Discipline)

1. Sort – All unneeded tools, parts, and supplies are removed from the area
2. Set in order – A place for everything and everything in its place
3. Shine – The area is cleaned as the work is performed
4. Standardize – Cleaning and identification methods are consistently applied
5. Sustain – 5S is a habit and is continually improved

Also - Work areas are safe and free of hazardous / dangerous conditions

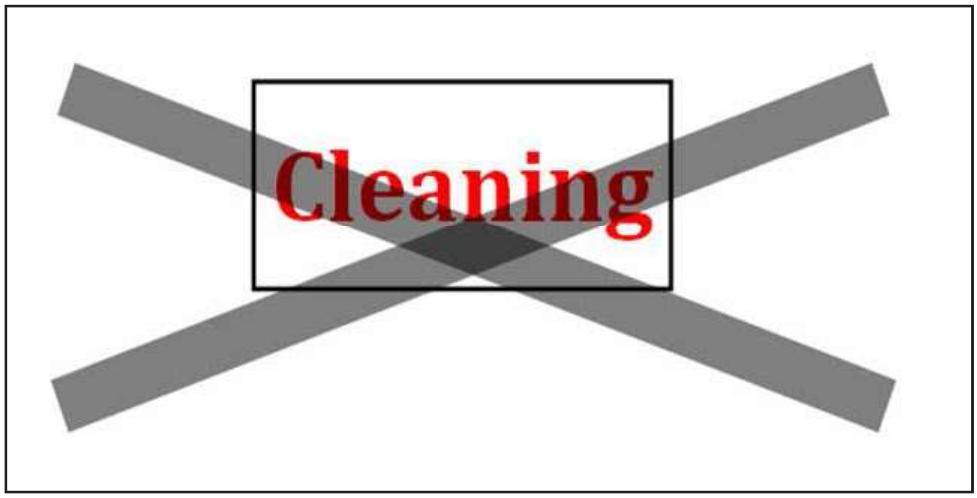


Fig: 1.6.1.2 Cleaning

5S represents 5 disciplines for maintaining a visual workplace (visual controls and information systems). These are fundamentals to Kaizen (continuous improvement) and a manufacturing strategy based "Lean Manufacturing" concepts (waste removing)

5S is one of the activities that will help ensure any company's survival

1.6.2: Whys 5 'S'

Way of Life for Work Place Improvement to:

- Achieve
- Safe work practices for Delivering time bound
- Quality out-put as per Customer's requirement at competitive cost by eliminating waste in a sustained cheerful atmosphere by involving everyone, through development of Team Work

Why we want to do it?

P: 5S increases Production

Q: 5S improves Quality

C: 5S reduces cost

D: 5S makes Delivery on time

S: 5S improves Safety

M: 5S improves Moral

To produce good quality products

1.6.3: 5S Principles

- Enhance safety
- Elimination of waste like waiting, walking etc.
- Responsibility with everybody
- Team work

1.6.4: 5S Objectives

- Maintain and Improve housekeeping
- Everybody is responsible for housekeeping
- Better work environment
- Productivity improvement by eliminating / reducing time waste

1.6.5: 5S Pledge

Before start of work let us take this pledge everyday

- I shall not keep unwanted things
- I shall keep the things in place
- I shall keep the things clean
- I shall follow the Procedures and work instructions
- I shall keep my workplace neat and clean everyday

Exercise-1: Fill in the Blanks

1. PSTN stands for .....

A. Public switched telephone network

B. Public system telephone network

C. Public switched telecom network

D. Public system telecom network

2. Most modern mobile telephone services use ..... network architecture

A. Broadband

B. Baseband

C. Cellular

D. None

3. The first handheld mobile phone was demonstrated by John F. Mitchell and Martin Cooper of Motorola in .....

A. 1973 B. 1975 C. 1982 D. 1985

4. ..... was the first commercially available handheld mobile phone

A. DynaTAC 8000x B. DynaTAC 6000x C. DynaTAC 4000x D. DynaTAC 2000x

5. The mobile phone market in India is expected to grow by ..... in 2016

A. 6% B. 4% C. 8% D. 10%

Exercise-2 Answer the Following Questions

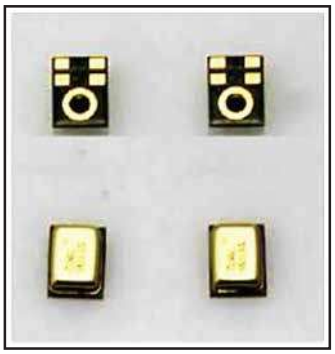
1. List any 10 feature of mobile phone
2. List any 5 popular mobile phone brand in India
3. List various types of operating system used in mobile phone

Exercise-3: Identify the components

a. .....



b. .....



c. .....



d. .....



Exercise-4: Identify the accessories

a. .....



b. .....



c. .....



d. .....



e. .....



Exercise-5: Fill in the blank

1. Soldering iron works on .....

A. 12V DC B. 12V AC C. 15V DC

2. Solder wire is made-up of lead and .....

A. Aluminium B. Copper C. Tin

3. Cutter blade is mainly used in locating

A. Wire B. Track C. Small Components

4. There are mainly ..... types of multimeter.

A. 2 B. 3 C. 4 D. 5

5. BGA kit is sued for

A. Soldering B. Reballing C. De-soldering

Exercise -6 : Assignment

1. List various accessories of mobile phone
2. Identify and practice various tools used in diagnosis of mobile phone fault
3. Identify and practice various tools used in repair process of mobile phone
4. Explain the feature of BGA Kit
5. Explain what is 5S
6. List principles and Objectives of 5S

QR Code

Scan the QR code below to access the ebook

https://www.youtube.com/watch?v=SXi87kfaONM
1.1. Roles and Responsibilities

https://www.youtube.com/watch?v=MMyMB4zm9so
1.2.6 Mobile Opearting Systems OS

https://www.youtube.com/watch?v=fjU6kY4gTuc
1.3.1. Mobile Phone Hardware Module

https://www.youtube.com/watch?v=AcJe9M9Drhk
1.3.2. Mobile Phone Accessories

https://www.youtube.com/watch?v=4Spxz7IKyKI
1.4.2. Solder Wire

https://www.youtube.com/watch?v=rb57D-5VJmE
1.4.3. Soldering Paste

https://www.youtube.com/watch?v=qDJPD9YOS0c
1.4.4. PCB Stand

https://www.youtube.com/watch?v=gehA_qMF5o4
1.4.5. PCB Cleaner

https://www.youtube.com/watch?v=kBtMCRsdpho
1.4.6. Ultrasonic Cleaner

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Corporation
Transforming the skill landscape

2. Customer Interaction and Front-end Repair

Unit 2.1- Role and Job Description

Unit 2.2- Customer Interaction

Unit 2.3- Front - end Repair

Unit 2.4- Software and Applications



Key Learning Outcomes

At the end of this module, you will be able to:

- Identify the requirement of the customer by interacting with them
- Assess the level of complaint such as front-end repair or hardware repair
- Identify the cause of the problem by asking questions
- Prepare related documents for the repair and hand over them to the customers informing them the estimated cost and time
- Use the ERP system to acquire the relevant details of the smartphone, enter the customer requirement details, prepare invoice and so on
- Perform front-end repair such as replacing batteries, cleaning inner parts and so on
- Install licensed and brand approved applications as per customer requirement and suggest them about other compatible software
- Demonstrate the functionalities of the smartphone after the repair, educating the customer about effective usage of smartphone
- Perform a demo on the replaced parts and accessories to check their functionality and provide necessary details to the customer
- Perform documentation of the completed work for future references and report issues and work status to the superior
- Maintain quality and productivity ensuring customer satisfaction

UNIT 2.1: Role and Job Description

Unit Objectives

At the end of this unit, you will be able to:

1. Explain the role mobile hardware repair technician for customer interactions
2. Explain the role of mobile hardware repair technician for front end repairs
3. Explain the performance criteria for front end operations

2.1.1: Performance Criteria for Front end Operations

Role: Interact with customer & perform front end repair

Job description: Interact with customers, understand their requirement / problems faced, by them, in the mobile phones and perform front end repair, without dismantling. This may include installing or uninstalling software application, performing reset operation, replacing battery, applying temper proof glass, installing SIM card or memory card etc.

Engage with Customers

- Receive the customers and greet them as per company's norms
- Follow behavioural etiquettes while interacting with customers
- Ensure the customers are comfortable in the store
- Communicate in the language which the customers are comfortable with
- Understand the requirements of the customers and offer service accordingly
- Inform about repair charges and warranty applicable
- In case the handset is beyond warranty, explain the terms & repair charges

Understand the Complaint

- Interact with customers to understand the customer's purpose of visit such as repair of phone, purchase of accessories, software upload, collection of repaired phone
- Listen to customers and understand the customer level complaint such as display not working, not switching on
- Interrogate the customers to assess the cause of problem such as physical damage, uploading of any unauthorised software or application

- Decide on the action to be performed, i.e., front end repair or hardware level repair is required
- Inform customers about the time taken
- In case the handset is beyond warranty, inform the customer the delivery time & the estimated cost of repairs
- Provide document to customers for collecting the device after repair 9Mobile Phone Hardware Repair Technician

Document on Computer

- Use the system to identify the warranty coverage of the mobile phone and other terms and condi-tions
- Understand the customer relationship management policy of the mobile brand and inform custom-ers about them
- Log into customer portal and enter the details of the customer and other details such as phone model, complaints, warranty coverage
- Understand and use the interactive ERP system of the company and enter appropriate details
- Use the system to prepare invoice, stock management, order placement, accessories availabil-ity, etc.

Perform Front end Repair

- Identify problem and decide the action to be taken
- Upload only licensed and brand approved applications as per customer requirement using system
- Understand the application and software compatibility with the mobile phone and suggest to customers accordingly
- Check the accessories and perform a demo with the customer to ensure their functionality (chargers, SD card, etc)
- Open the panel of the mobile phone without damaging them
- Replace the parts such as battery and clean the inner parts of the phone
- Ensure the functionality of the replaced part
- Provide necessary details on the warranty, terms and conditions of the replaced parts
- Educate customers on effective usage of mobile phone to save battery and to avoid any repeat problem

Interact with Superior & Meet Targets

- Understand the work requirement from superior, periodically
- Report to superior on the work completed
- Seek technical assistance from superior whenever required
- Document the work completed

UNIT 2.2: Customer Interaction

Unit Objectives

At the end of this unit, you will be able to:

1. Explain the organizational context for mobile hardware repair
2. Apply best practices for customer interaction
3. Handle different types of customer

2.2.1: Organizational Context - Knowledge of the Company

Organization and its processes :

Understand and learn the following :

- Company's policies on: incentives, delivery standards, and personnel management
- Company's sales and after sales support policy
- Importance of the individual's role in the workflow
- Reporting structure
- Company's policy on product's warranty and other terms and conditions
- Company's line of business and product portfolio
- Company's service level agreement (SLA) with the brand



Fig: 2.2.1 Organization Context

2.2.2: Customer Interaction

Customer is King:

Customer is king is an old yet valid quote as no business can flourish if it does not have customers to buy their offerings. In the olden days guests were welcomed with flowers, perfumed spray of water droplets and sweets in India. Even today we have a great affection to treat our guests with lots of love. The customers are like guests who are satisfied by the company's product/service.

A customer satisfied with the product or service spreads the benefits to their circle of family, friends, relatives and colleagues. So if one of their family members were planning to buy the similar product they will chose the same brand over others. A satisfied customer is actually a brand ambassador of the organization.



Fig: 2.2.2.1 Make Customers Happy



Fig: 2.2.2.2 Customer is King

Is it that difficult to make the customers happy? If the service offered to the customer is good then why won't customer buy? Customers are no living beings from Jupiter. They are humans too. Like the way we want to be treated they expect the same. Who holds the responsibility to make them happy? It is the employees of the organization. People make an organization successful or failure. Therefore the employ-ees are the face of the organization,

Every employee in an organization is responsible, though the frontend employ-ees have the higher portion of responsibility.

Greet the Customer:

The steps involved in the process of are :

- Welcome the customer (The way we do for our guests at home)
- Ensure comfort zone for the Customer
- Creating Confidence
- Making Customer feel important

STEP 1: Welcome the Customer

Welcoming the customer involves the following things:

- Greet the customer: As per the timings greet the customer Good Morning/Evening/Afternoon
- Offer a handshake or say Namaste by folding your hands
- Introduce yourself with your name. Example: My name is XYZ.
- Last step is the first step to start a conversation "How may I Assist you?"

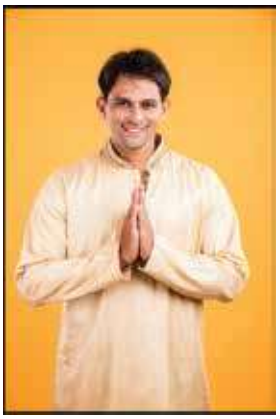


Fig: 2.2.2.3 Welcome the Customer

STEP 2: Ensure comfort zone for the Customer:

Anyone who is coming from outside environment may have gone through either physical stress or mental stress.(Example physical stress- extreme heat in mid noon, may be unwell, have gastric/ headache etc. It can be any condition that is bringing the customer into stress and tiredness. Mental Stress- stress to overcome heavy traffic, upset probably due to fight with boss, stress due to a clash during parking the car. Again it could be anything that may put off the customer's mood in bad way.)



Fig: 2.2.2.4 Bring them to comfort zone

A warm welcome ensures that some part of the stress is relieved with a bright smile and warm greetings. A small talk about how are you? It is very hot today. Let me arrange some cooling refreshments and water for you.

STEP 3: Create Confidence:

A person becomes interactive once he/she is confident to talk to the person in front of them. A villager may hesitate to talk to a person in city who is talking in a sophisticated manner over phone. Once the city person keeps the phone down and asks the villager in the language or style known to the villager. A villager can say his concerns with more confidence. You need to adjust your behaviour (does not mean to incorporate split personality) as per the customer.

Some of the key points to note during this conversation to create confidence are:

- Steady eye-contact
- A calm face
- Straight body posture
- Natural gestures
- Try to match your communication style to that of customers.

A comfortable eye contact shows that your are listening to the customer. This also shows a sense of responsibility and value to customer



Fig: 2.2.2.5 Create Confidence

STEP 4: Making Customer Feel Important:

Treat the customers like they own the brand. Give them undivided attention. Keep away from all the distractions like mobile, talking with colleagues etc.



Fig: 2.2.2.6 Making Customer Feel Important

Enquire and Understand Customer Queries:

Collecting customer information is very important to maintain records of purchase, services, repairs etc. There are various ways to collect information, but the best is by getting a form filled. Assist the customer to fill the form. Basic information includes:

Name
Age
Address
Contact number
Mobile phone brand/model
Customer complain

If the customer has visited for the first time a complete information is required. This is done for the new customers. Usually existing customers are given customer ID or any identification number.

2.2.3: Customer Types

Characteristics of Different Customers:

Different customers can have similar characteristics, such as interests, appearance, shopping behavior, etc. So, we can divide them into "types of customers".

You may broadly deal with three different customer types:
- Social
- Dominant
- Detached

Here are the personality traits of each customer type:



Fig: 2.2.3.1 Social

- Affectionate
- Understanding
- Flexible
- Easy going
- Social active



Fig: 2.2.3.2 Dominant

- Aggressive
- Competitive
- Very ambitious
- Success driven

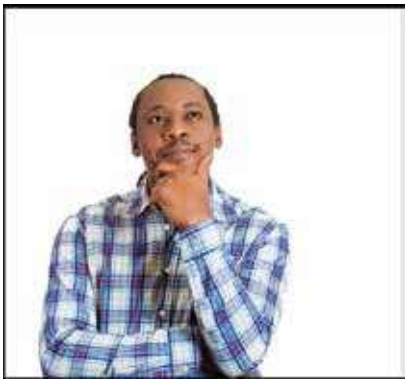


Fig: 2.2.3.3 Detached

- Attention to detail
- Less expressive
- Reserved
- Silent

Handling Different Customers:

Let's now learn about some tricks to deal with different customer types and win them forever.

Social:

The effective ways to deal with the Social types of customers are to:
- Let the customer talk
- Touch emotions
- Use personal references
- Ask for feedback

Socializers love to receive and give compliments. However, they tend to be self-centered. They want to go to a store where they are made to feel important. Use compliments often with these customers. Do whatever you have to do to remember the names of these customers. Do remember although they look at the shopping experience as a fun, your goal is still to sell them your product.

Dominant:

The effective ways to deal with the Dominant types of customers are to:

- Make them feel important
- Let them see that you understand their viewpoint, and you are on their side
- Be quick in answering their queries
- Show latest versions of the products
- Avoid giving excuses and do not talk too much
- Give simple answers
- Have real solutions to what the customer wants
- Show seriousness, efficiency and interest for them and for what they need

You must show a genuine interest to them. Listen carefully to their complaints and resolving them as soon as possible.

An effective way to deal with this type of customer is by offering an excellent customer service.

Detached:

To deal with the detached types of customers,

- Don't get personal
- Focus on real situations
- Highlight value for money
- Let them speak at their own pace
- Spend more time with them than other customers
- Inspire confidence in them

These types of customers usually have trouble deciding their purchases, so you must try to give them time to choose the right product.

Also, they usually have difficult in communicating clearly what they are looking for. Therefore, you must pose the right questions to help them communicate better.

UNIT 2.3: Front-end Repair

Unit Objectives

At the end of this unit, you will be able to:

1. Identify customer requirement
2. Identify problem cause and type
3. Use ERP system
4. Perform front end repair by replacing parts or accessories

Mobile Phone Features



Fig: 2.3.1 Mobile Phone Features

- Educate the customer about the feature of mobile phone
- Explain the operating process of mobile phone
- Check the functioning of components/unit with disassembling the mobile phone
- In case feature is not functioning properly ensure whether it is hardware or software issue
- For hardware issue suggest for hardware repair process

Mobile Phone Accessories



Fig: 2.3.2 Mobile Phone Accessories

- Explain to customer about screen protection mechanism and safety of mobile phone
- Suggest for protection mechanism like screen guard, case or cover
- Check and replace accessories requested by customer
- Explain salient feature of accessories replaced

ERP & Front End Repair Procedures

- Company's ERP system and operational procedure
- Awareness about implementation of engineering change order process
- Procedures of replacing accessories such as battery, SD card
- Licensed and authorised software compatible for Mobile Phones and the downloading procedure
- Specifications of accessories such as chargers, battery
- Service level agreement with the brand on parameters such as turn around time (TAT), repair procedure, warranty

UNIT 2.4: Software and Applications

Unit Objectives

At the end of this unit, you will be able to:

1. Demonstrate effective use of mobile phone
2. Perform software repairing process
3. Install licensed and brand approve application on customer request
4. Maintain quality and productivity
5. Customize mobile phone software as per customer requirement

2.4.1: How to Repair a Mobile Phone Software

Many problems in the Mobile Phone's software may arise, if it gets corrupted.
For ex. slow functioning, frequent freezing (hanging), booting related problems, apps malfunctioning, switching off automatically, restarting, etc.



Fig: 2.4.1.1 Mobile Phone - Software

In a mobile phone 3 very important ICs ensure proper functioning of the software which is called as Flash IC, CPU and the RAM. The display which appears on the LCD screen is the software called as operating system (OS) of mobile phones. This OS is stored in the flash memory of mobile phone, job of CPU is to carry out all the processing work where as RAM is used to store all temporary and virtual data.

Mobile phone operating system can get corrupted any time very easily without any specific reason. The most common reason due to which OS is mostly getting corrupted is virus infection either through use of internet or file sharing. Installing antivirus program can prevent these issues up to certain instant. Thus it is highly recommended to install antivirus program on mobile phone and also keep it updated periodically.



Fig: 2.4.1.2 Mobile Phone - Software Corrupt

If your Mobile Phone's software is corrupt follow the process mentioned below :

1.Perform the Reset Process : This is the basic process to bring the Mobile Phone to the original factory default setting. To start the process go to settings menu, in this menu you will find option like reset / restore / original/factory settings. Select the option and to move further it will ask for the security code. Enter the security code and your phone will be back to original settings. If you do not know default security code of your phone try to get it from internet. If default security code is not accepted by mobile phone it means it is has been changed in your mobile and now the only option to solve this issue is to reset it through software program. If the fault is minor in nature or some setting related issues it will be resolved.

2. Format the Mobile Phone: The next step to resolve software related issues is formatting your mobile phone. Caution – Formatting will delete all the data you have downloaded or stored in you're your mobile phone after purchase. Thus it becomes extremely important to backup all important data before formatting. To start the formatting process go to setting menu and select reset setting option as explained earlier. You will find 2 options i.e. Reset setting only & Reset all / master reset. Select option master reset and give the code, this will start the formatting process. After finishing the process it is advisable to format the memory card also. This will resolve the issues related to virus.

3. Flash the Mobile Phone: In case all the above solution does not then the last step is to flash the mobile phone to fix the problem. Flashing process reinstalls operating system in mobile phone to solve the issues arising due to a corrupt OS.

If the problem is not resolved even after flashing the mobile OS it should not be considered as software related problem, problem is possibly with the hardware

Quality Standards for Recurrence Prevention

Strictly follow the Quality Standards so that the complaints do not recur.



Fig: 2.4.1.3 Quality Standard

2.4.2: Call Setting

Blacklist

If you do not want to receive call from some-body then put that number in the blacklist (Unwanted Call)

Process –



Fig: 2.4.2.1 Call Setting Process-1

Note : - In-case blacklist is on and we have not added any number to the blacklist then in such case all incoming calls will be restricted.

Select Blocking mode



Fig: 2.4.2.2 Call Setting Process-2

Go to Add to blacklist and add contact for blocking



Fig: 2.4.2.3 Call Setting Process-3

White List

In case you want to receive call then turn that contact into white list

Select option “Add to White List”

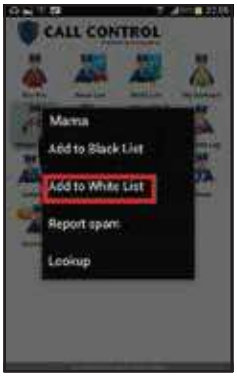


Fig: 2.4.2.4 White list Contact

Blacklist

"Hide ID" option is used to restrict outgoing call

It gives following five types of errors : -

1) Call Failed
2) Check Operator Service
3) Check Network Setting
4) Show ID
5) Call Rejected

Process of opening "Hide ID" option

Got to : - Menu – Setting – Call Setting – Advance Setting

You will get three options

- Send by network
- Yes/On/Show ID
- No/Off/Hide ID



Fig: 2.4.2.5 Hide ID Process

1) If first two options i.e. Send by network & Yes/On/Show ID are selected then outgoing call work properly
2) If No/Off/Hide ID option is selected then outgoing calls will be restricted.

Call Conferencing

Call conferencing is used to connect call to multiple mobile simultaneously

How to do conference call

A. Call one of the participant in the conference call Go to your contact list, or simply use the keypad to dial the number. When that call is established, tap Add Call. The first caller is placed on hold

B. Call the second Participant Again, you can use your contact list, or just dial the number to connect another participant

C. Tap on Merge Call

This will add second participant to the call

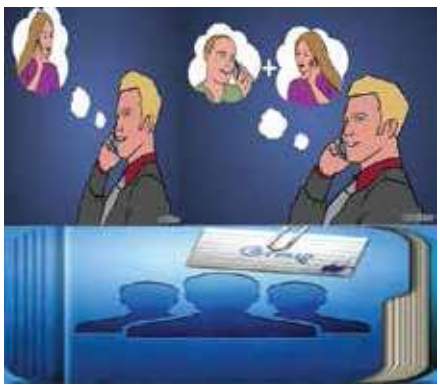


Fig:2.4.2.6 Call Conferencing

Call Divert

Using this option we can divert incoming call to another number Procedure :-

Go to Menu – Setting – Call Setting – Call Divert

All Voice Calls

A) Active
- Add Voice Mail
- Add Voice Numbe

A) Cancel

B) Check Status
- Active
- Deactive



Fig: 2.4.2.7 Call Divert

When call will get diverted

1. If Busy
2. If Not answer
3. If Not reach
4. If not available
5. Cancel all Divert Calls

1) If Busy – In this option, if phone is busy then call will be diverted to another number
2) If not Answer – In this option if incoming call will not be responded then call will be diverted to another number
3) If not Reach – In this option if phone is outside of network coverage area then call will be diverted to another number.
4) If Not Available – In this option if phone is switched Off then call will be diverted to another number.
5) Cancel all Divert Calls – In this option all diverted call will be canceled

Call Barring

Call barring feature allows user to block certain incoming or outgoing calls

When Call barring is required ?

- Use barring if your employees are making too many personal calls
- To prevent employees from making international calls during regular business hours.
- After a case in which someone was harassed by an ex lover or friend with phone calls or visits, police typically recommend call barring that person to help diffuse the situation.



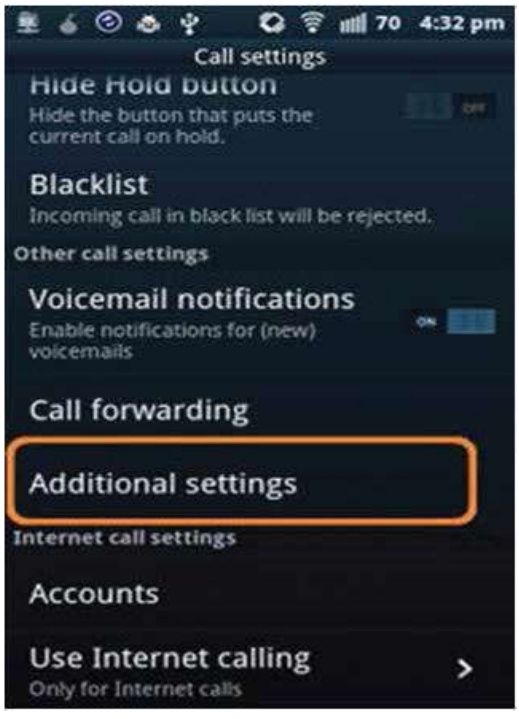
Fig: 2.4.2.8 Call Barring

Call Barring Steps

Step 1: **Go to Call Settings**



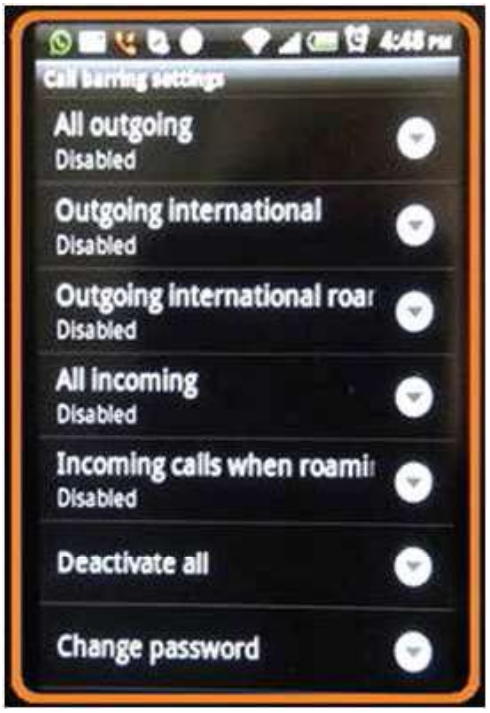
Step 2: **Go to Additional Settings**



Step 3: Go to Call Barring Settings



Step 4: Now Choose Option



Call Barring using Blocking Mode

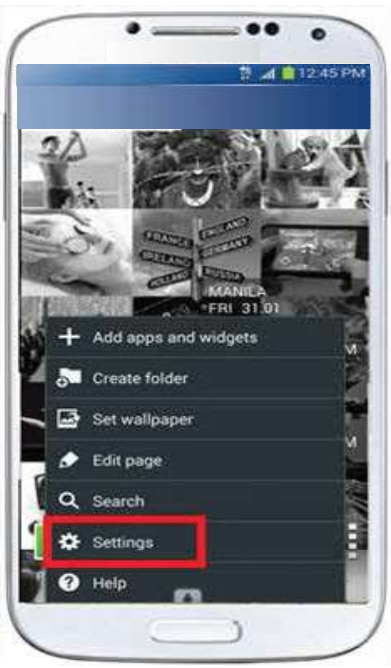
Step 1



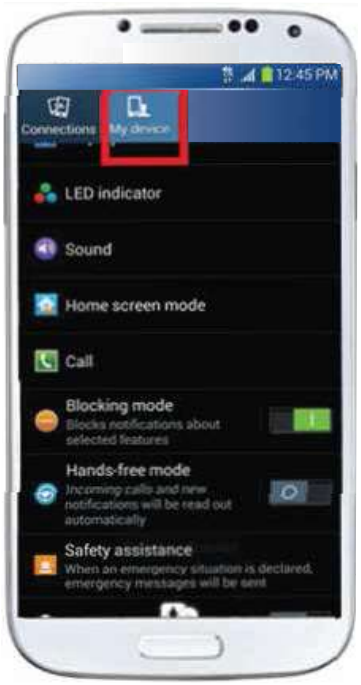
Step 2



Step 3



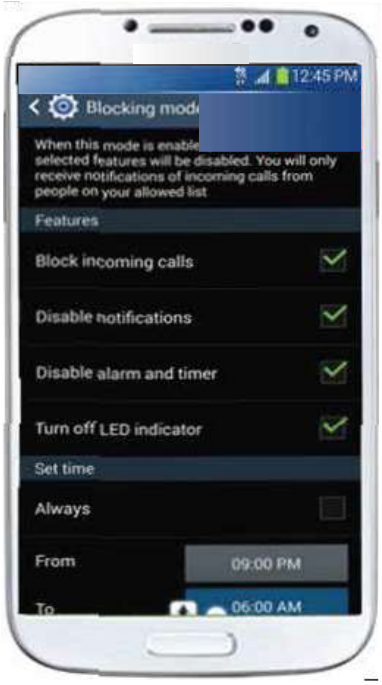
Step 4



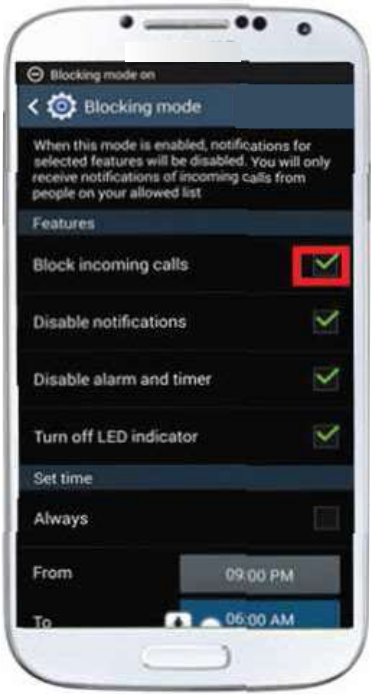
Step 5



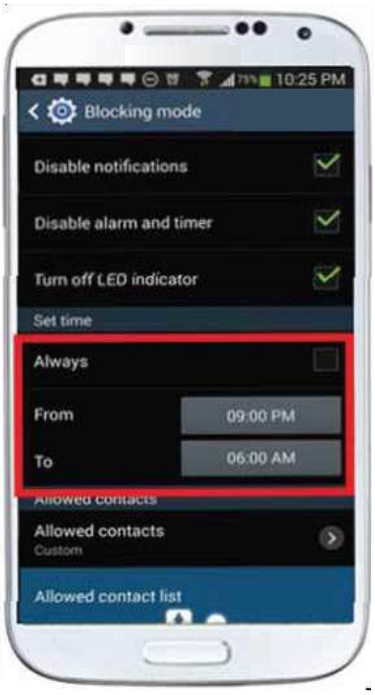
Step 6



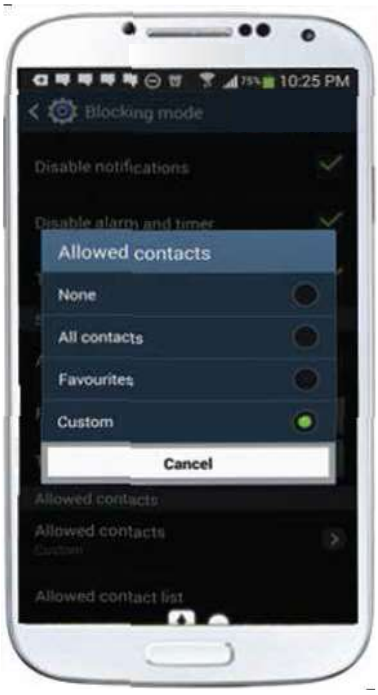
Step 7



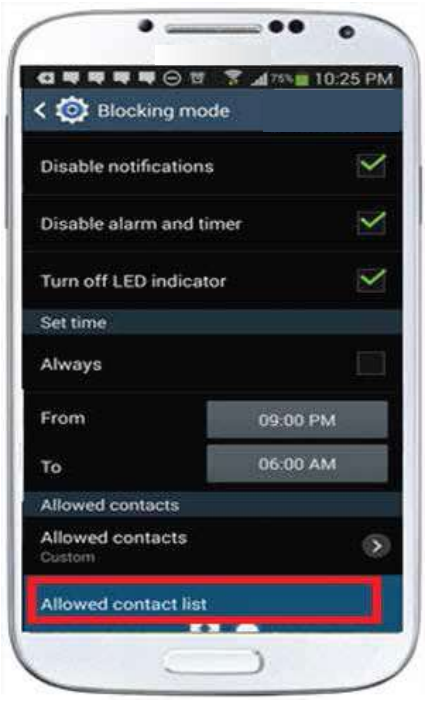
Step 8



Step 9



Step 10



No Screening Call

- It means that when the person you put in the screened list will make a call to you You won't get any alerts from that number
- You can see the incoming number on display but you can't hear the ringtone or vibration for that number

How to add Number in Screen List

- Menu
- Phonebook
- Contact list
- Choose contact Settings
- Screened option

2.4.3: Lock Setting

This lock is used for protecting mobile phone and also to avoid misuse of our mobile phone

How to set Password?

For Android Phone – Menu – Setting – Security – Change Screen Lock

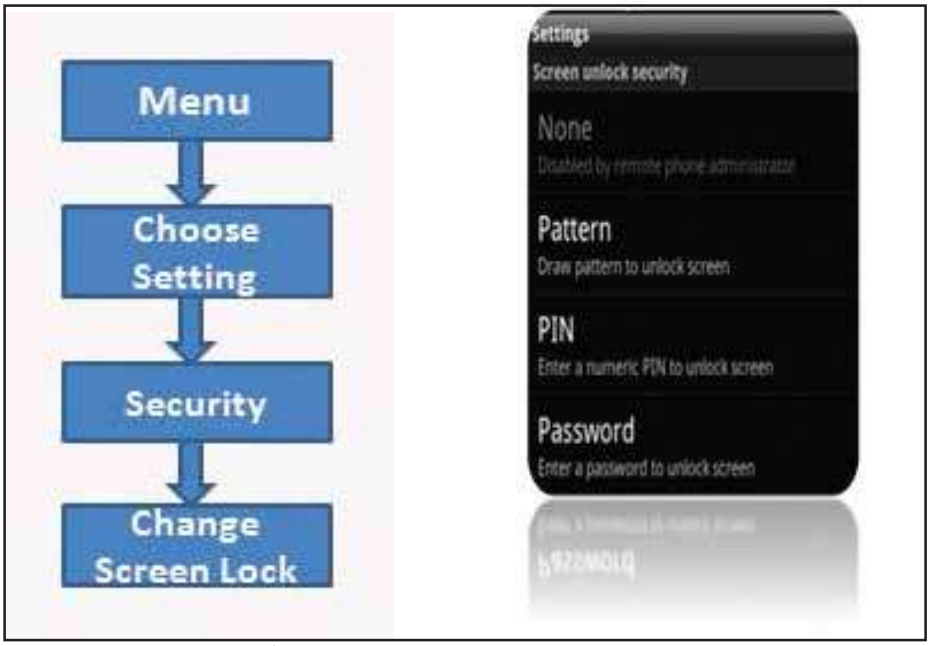


Fig: 2.4.3.1 Lock Setting for Android

For iPhone – Menu – Setting – Change Passcode – Set Passcode

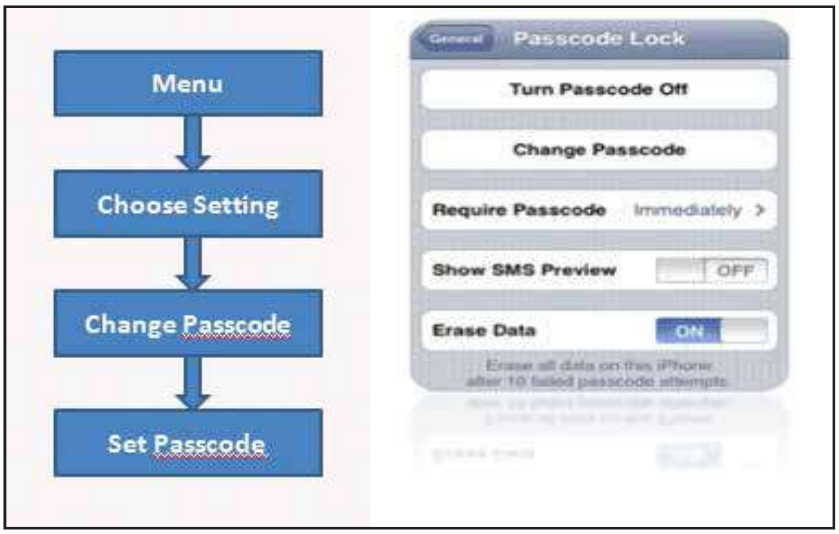


Fig: 2.4.3.2 Lock Setting for iPhone

SIM Lock

This lock is used for protection of SIM card.

After applying SIM lock ,If you put this SIM card in another mobile then this SIM card does not work until and unless you put the SIM pin on which it was locked. Pin is nothing but the password.

Procedure of SIM Lock

Go to Settings

Tap Security option

Tap Set up SIM card lock

Tap Lock SIM card

Enter the SIM PIN to lock the SIM card

Tap OK

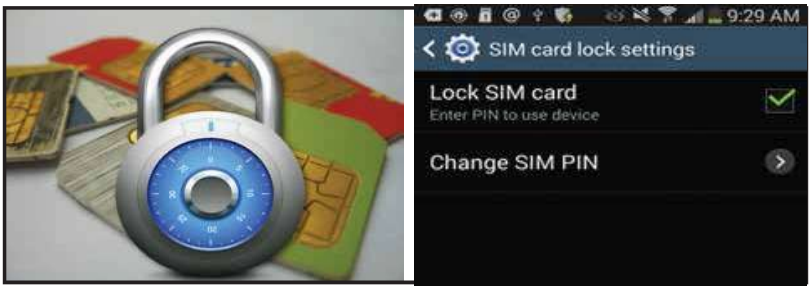


Fig: 2.4.3.3 SIM Lock

Privacy Lock

This lock is used to lock private menu like SIM, Call history, Image, Video

PUK (Pin Unlock Key)

This lock is used to lock private menu like SIM, Call history, Image, Video

This lock is used to protect SIM owner. If the lock is ON then incoming and outgoing calls are stops or on display it displays PUK code

Procedure of setting PUK

Go to – Menu – Setting – Security – PIN

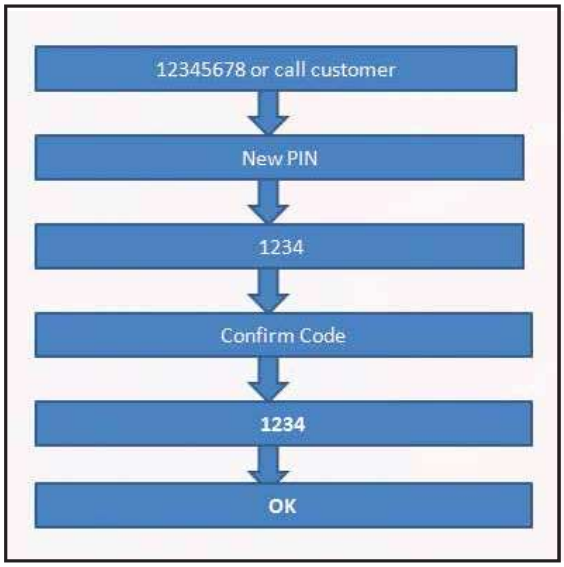


Fig: 2.4.3.4 Pin Unlock Key

Security Lock

Security lock is for the safety and security of mobile phone. If security lock is activated in the security settings, the phone will ask it while booting it every time or when the phone is locked and needs to unlock the keypad.

Default security code for various brand and model of Cell phones : -

0000 / 00 00 00 / 00 00 00 00

12345

0000 / 1234

1122 / 0000 / 1234 / 4321

Pattern Lock

This lock is used to protect the mobile from any other person except the owner of mobile.

Procedure of Pattern Lock

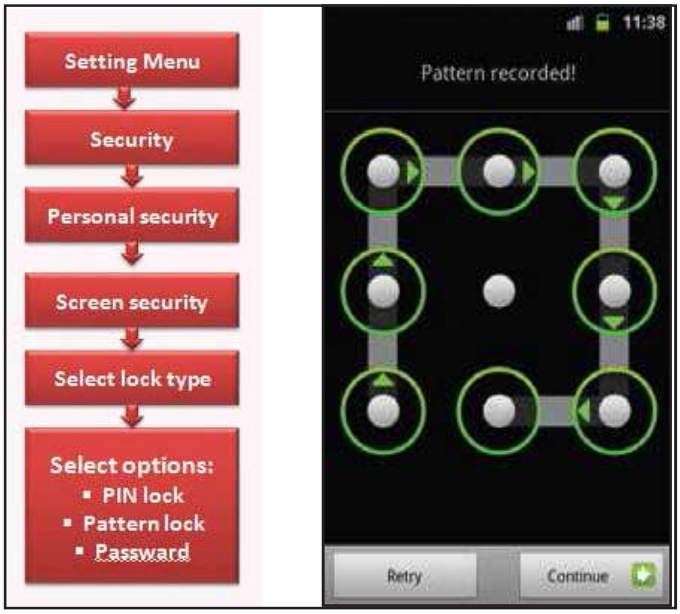


Fig: 2.4.3.5 Pattern Lock Process

Finger Lock for iPhone

How to set figure lock ?

Tap Settings

Touch ID & Passcode,

Enter your passcode.

Tap Add a Fingerprint and hold your device as you normally do when touching the Home button. Touch your finger to the Home button—but don't press. Hold it there until you feel a quick vibration, or until you're asked to lift your finger.

Mobile Tracker

Mobile tracker is a software used in mobile phone to locate the location of mobile phone

If mobile is lost then this software helps in locating mobile phone

How to activate Mobile Tracer Software in Mobile Phone ?

Menu	Add No. 1
Settings	Add No. 2
Mobile Tracker	Message
Enter Password	Save
Open Form	Close
On/Off	

Why Mobile Tracker ?

Once the mobile tracker is active on mobile phone and then if someone put another SIM card in it then because of mobile tracker you get to know that who is using your mobile phone.

2.4.4: Hard Reset (Only Android)

What is Hard Reset ?

A hard reset, also known as a factory reset or master reset, is the restoration of a device to the state it was in when it left the factory without opening the mobile phone or connecting to computer. All settings, applications and data added by the user are removed during hard reset.

When to do Hard Reset ?

- When mobile takes more time to open any apps on mobile
- Mobile gets hang very frequently
- Mobile not working properly
- Mobile is infected by the Virus
- Mobile restarts automatically.
- Stops at Logo
- To break Phone Lock, Privacy Lock, mobile tracker, Pattern Lock
- To delete phone memory

How to do Hard Reset in Android Phone

Step 1: Power down your device

(If device is frozen, you can pull the battery out to turn it off.)

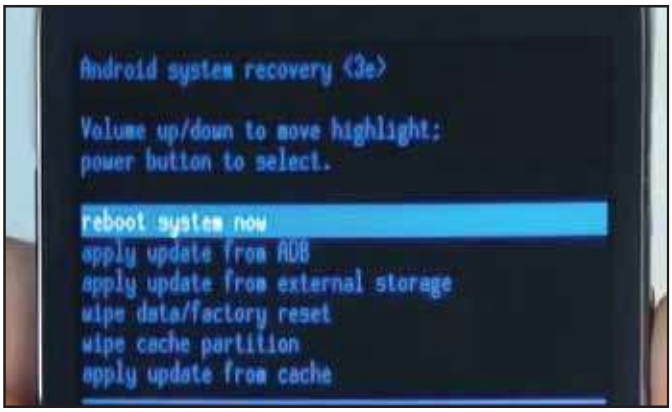


Step 2: Press the combination buttons simultaneously. For different brand and model it differs

Volume Up + Home +Power

Volume Down + Power

Home + Power

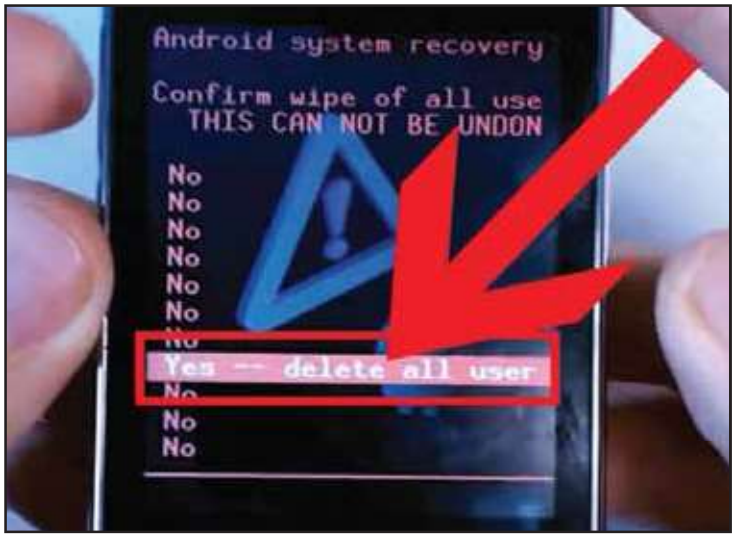


Step 3: Select Factory reset

(use up/down button to select factory reset)



Step 4: You will be asked for the confirmation to do the factory reset



Step 5: Once confirmed you will get this screen

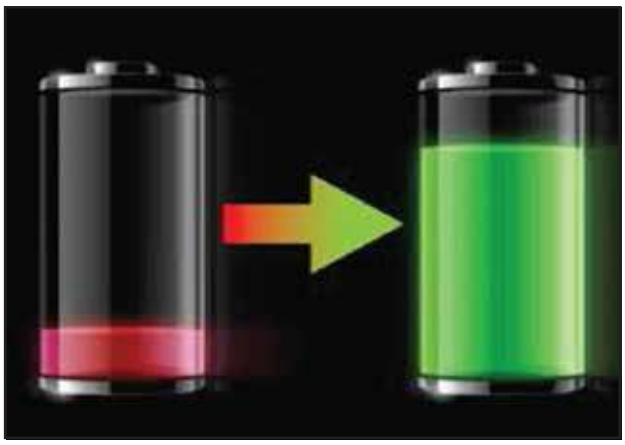


Wait for the restore process to complete

Now your hard reset process is over and you can power On the mobile

2.4.5: How to do Hard Reset for Windows Phone

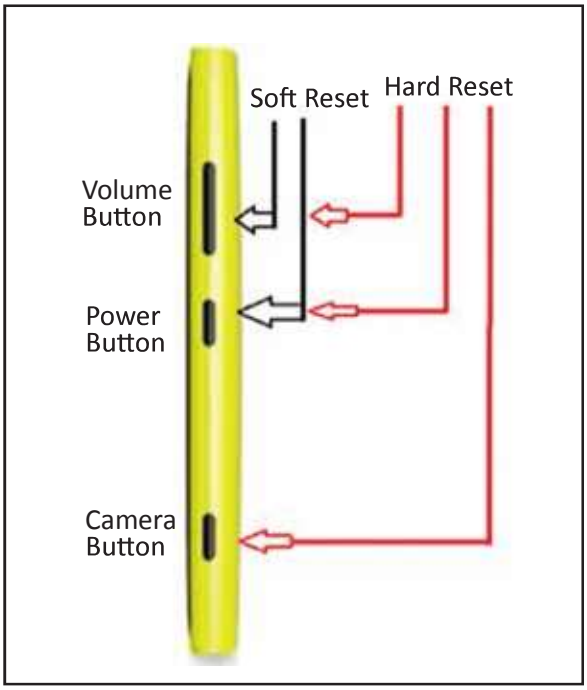
Step 1: Before doing the hard reset make sure you phone battery is fully charged



Step 2: Turn off the phone by pressing the power button and holding it for a few seconds then scroll down



Step 3: Press the Volume Down Key + Power Key to turn on the unit



Step 4: Wait for the startup screen booting with an exclamation mark " ! " then release the volume down key



Step 5: Press the following buttons in the following order:

1. Press the volume up (high volume key)
2. Press volume key down (low volume key)
3. Press the power key
4. Press volume down key.
5. Wait a moment and look at the screen, a message such as loading new software will start the hard reset process.

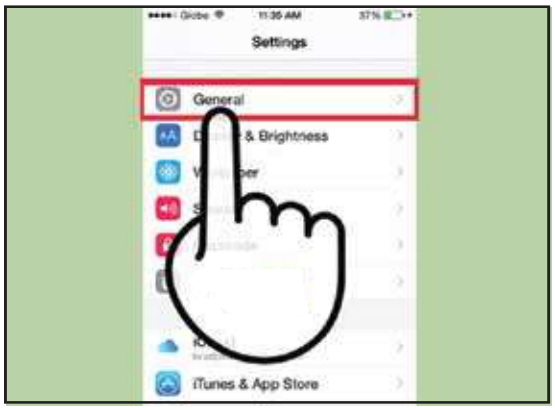


2.4.6: How to do hard Reset of iPhone

Step 1: Go to setting



Step 2: Select General



Step 3: Scroll down and select Reset

Step 4: Here you will get various options like

Reset all settings

Reset Network settings

Erase all content and settings

Step 5: Select Option - Erase all content and settings



2.4.7: How to do Soft Reset of Android Phone

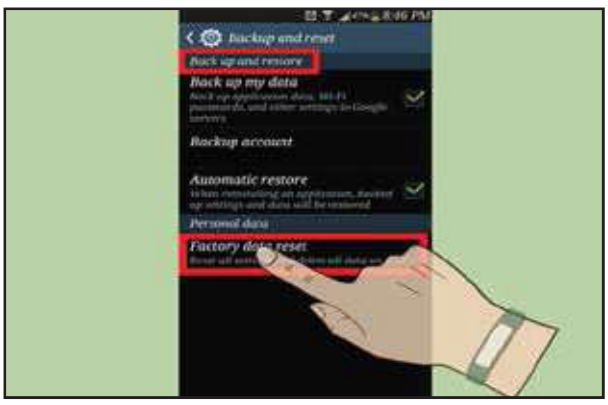
Step 1: Go to the setting option of Mobile



Step 2: Select Backup and Reset in Personal Section

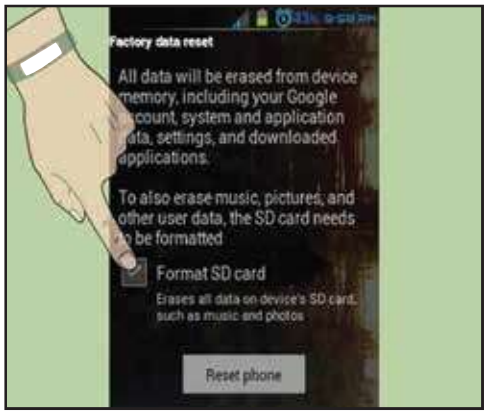


Step 3: Select Factory Data Reset

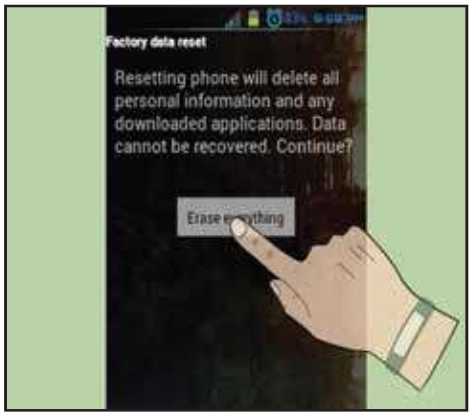


Step 4: Select Reset Phone to delete all data and restore your device factory settings

Step 5: Now tick on the "format SD card" and then reset phone



Step 6: Confirm the process by selecting "Erase everything



2.4.8: How to do Soft Reset of Windows Phone

Step 1: Open the terminal (removing the box as necessary)

Step 2: Remove the battery to let the phone without power

Step 3: Wait a few seconds for the phone fully discharged

Step 4: Replace the battery and the corresponding case

Step 5: Boot the phone normally

2.4.9: How to do Soft Reset of iPhone

Step 1: Press and hold the home button(big circle below the screen)and the sleep/wake(on the top of the i-phone)simultaneously.



Step 2: Continue holding both buttons until the iphone shuts off and begins to restart



Step 3: You may let go when you see the silver apple logo.

Step 4: Now you have completed soft reset successfully.



2.4.10: Security Code (Secret Code)

What is security code:

1. This is a type of code which are used to solve many types of problem related to mobile
2. When we use secret code there is no requirement to connect mobile to computer

Why we use security Code ?

1. Mobile Hang
2. Virus comes
3. Automatically get restart When go in any menu
4. To break Phone Lock, SIM Lock, Privacy Lock, Mobile Tracker, Pattern Lock
5. Hang at Logo during startup.??
6. To delete Phone Memory

2.4.11: International Mobile Equipment Identity Code (IMEI Code)

a. This number is unique for each mobile.
b. This number is of 15 digits.
c. It is usually found printed on the phones back panel under the battery.
d. This number starts with 35 or 91.
e. If there are 15 zero's or blank spaces appear then the IMEI number of that mobile is either lost or there is no IMEI number in the mobile phone

How to see IMEI number of Mobile Phone
Dial *#06# to see IMEI number

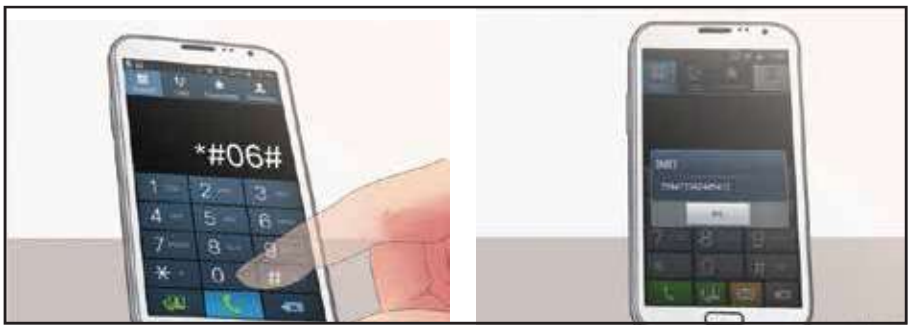


Fig: 2.4.11 IMEI Code

2.4.12: USB debugging

The primary function of USB debugging mode is to facilitate a connection between an Android device and a computer with Android SDK (Software Development Kit). USB Debugging Mode, in some versions of Android, is also called Developer Mode.

USB debugging required while rooting, backing-up, custom ROM installation, taking screenshot from computer using ADB.

It is best for you to keep USB Debugging Mode disabled and only enable it when you really need it. Leaving it enabled all the time is kind of a security risk for that this mode grants you high-level access to your device.

How to Enable USB debugging Mode in Android

a. Android 2.0 – 2.3 X

Setting – Applications – Development – USB Debugging

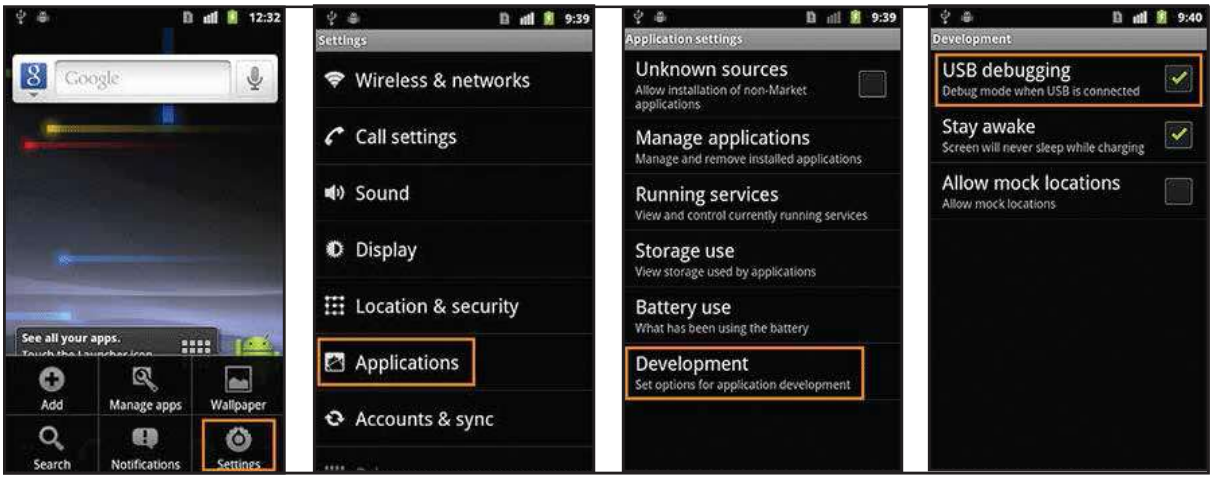


Fig: 2.4.12.1 USB Debugging Mode -Android 2.0 - 2.3X

b. Android 3.0 – 4.1 X

Setting – Development – USB Debugging

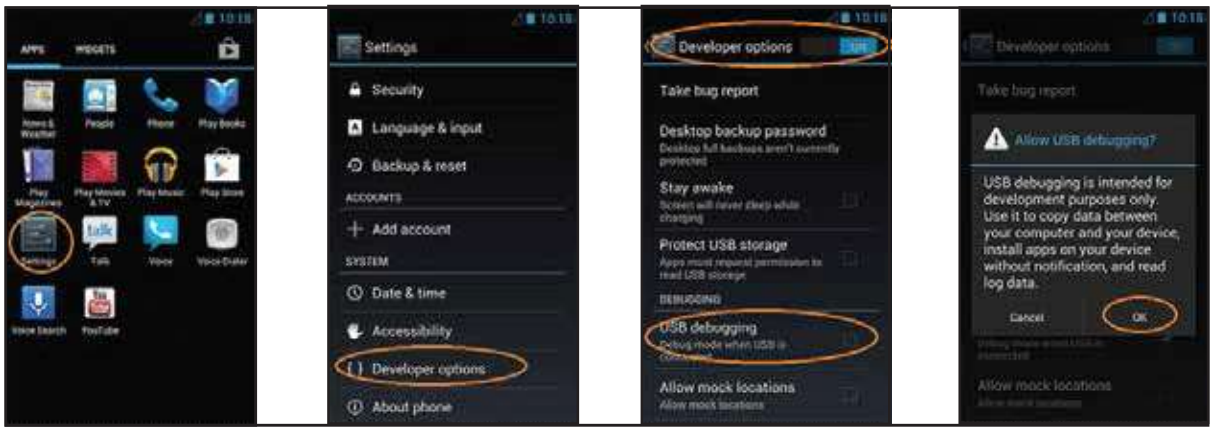


Fig: 2.4.12.2 USB Debugging Mode -Android 3.0 - 4.1 X

c. Android 4.2 X and higher

Setting – Development – USB Debugging

In Android 4.2 and higher versions, the Developer Options menu and USB Debugging option have been hidden. In former 4.X versions of Android, USB Debugging option is under Developer Options menu.

First, you need to enable "Developer Options Menu".



Fig: 2.4.12.3 USB Debugging Mode -Android 4.2

- Go to "Settings".
- Scroll down to the bottom and tap "About phone" or "About tablet",
- Scroll down to the bottom of the "About phone" and locate the "Build Number" field.
- Tap the Build number field seven times to enable Developer Options. Tap a few times and you'll see a countdown that reads "You are now 3 steps away from being a developer."
- When you are done, you'll see the message "You are now a developer!".
- Tap the Back button and you'll see the Developer options menu under System on your Settings screen

Now, you can enable USB Debugging mode.

• Go to Settings>Developer Options>USB Debugging. Tap the USB Debugging checkbox.



Fig: 2.4.12.4 USB Debugging Mode -Android 3.0 - 4.1 X

d. Android 5.0 Lollipop

To enable USB Debugging on Android 5.0 Lollipop is the same as Android 4.2.x.

1. Settings > About Phone > Build number > Tap it 7 times to become developer

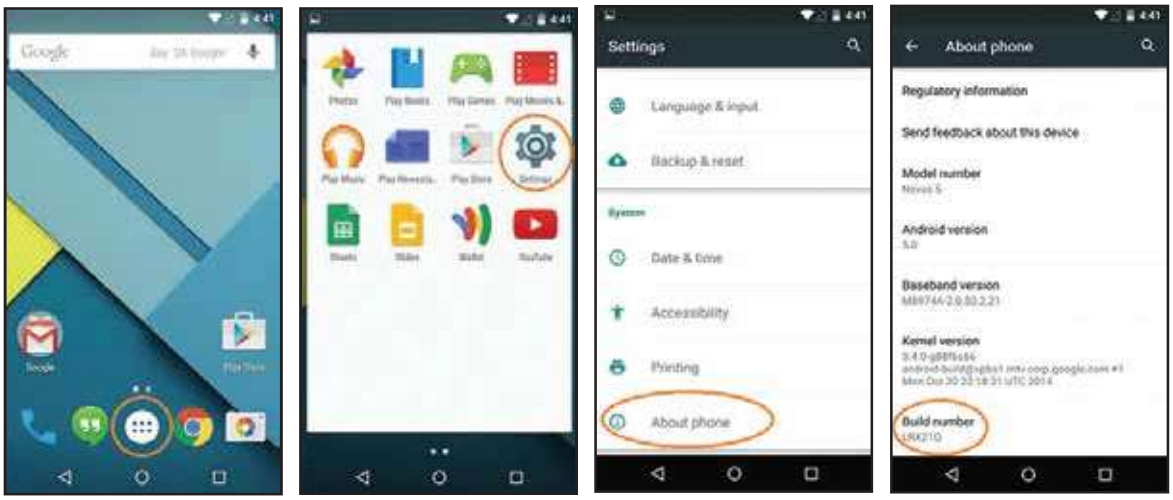


Fig: 2.4.12.5 USB Debugging Mode -Android Lollipop

2. Settings > Developer Options > USB Debugging

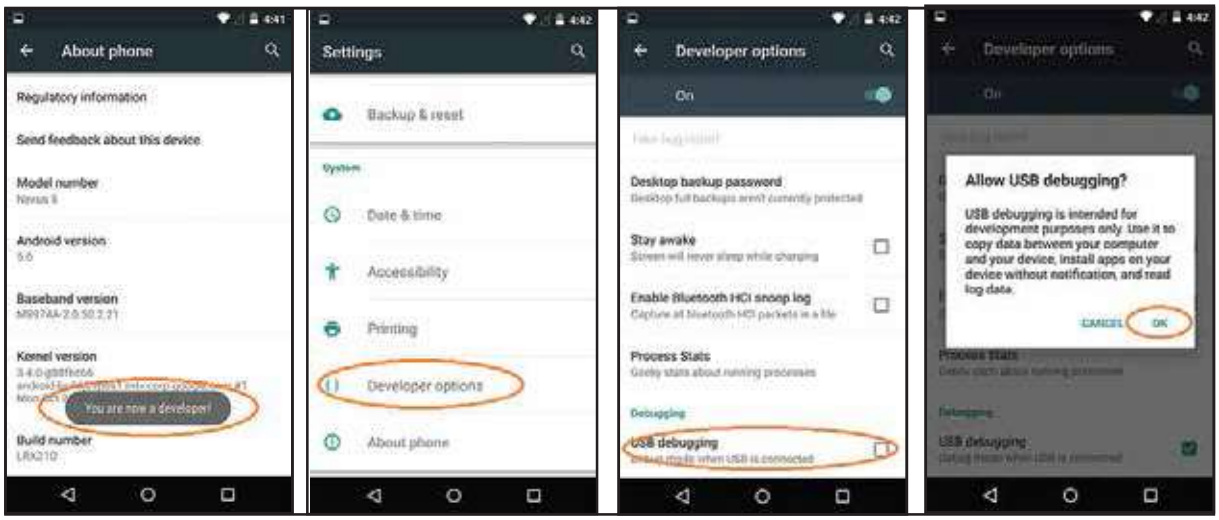


Fig: 2.4.12.6 USB Debugging

Before touching motherboard or any component of Mobile phone make sure you have grounded yourself for ESD and have also take necessary action for ESD like use of Antistatic Mat / Hand Gloves / Wrist Strap to prevent any damage to components of mobile phone.

Notes

Exercise-1: Fill in the Blanks

1. In case the handset is beyond warranty, you need to .....

A. Start repair work B. Explain the terms & repair charges

2. Document to be provided to customer for collecting the device.....

A. Before repair B. After repair C. None of above

3. Operating System used in i Phone is ----------

A. Android B. iOs C. Symbian

4. The customers are like .....

A. Friend B. Family member C. Guest

5. You need to adjust your behaviour as per the.....

A. Company policy B. Manager Instruction C. Customer

6. Socialisers are .....

A. Self-centered B. Aggressive C. Polite

7. An effective way to deal with dominant customer is by offering an excellent .....

A. Solution B. Customer service C. Greeting

8. Detached customer have difficult in .....

A. Reading B. Writing C. Communicating

9. Dominant customers are .....

A. Aggressive B. Flexible C. Silent

10. Social customers are .....

A. Aggressive B. Flexible C. Silent

Exercise-2: Answer the Following Questions

1. What are the steps involved in customer interaction?

_____

_____

_____

_____

2. What are the characteristics of different customers?

_____

_____

_____

_____

Exercise-3: Fill in the Blanks

1. There are manly ..... ICs which ensure proper functioning of the software in mobile phone

A. 4 B. 3 C. 2 D. 5

2. The software of the mobile phone is stored in its .....

A. Flash memory B. Memory card C. RAM

3. Frequent freezing (hanging) problem in mobile phone arise due to.....

A. Network Problem B. Hardware Problem C. Software problem

4. The software of the mobile phone is stored in its.....

A. Flash memory B. CPU C. RAM.

5. Most of the time mobile operating system is get corrupted due to .....

A. Physical Damage B. Virus C. Mishandling

6. All the temporary and virtual data is stored in the .....

A. RAM B. ROM C. Flash IC

7. .....refers to the use of sounds and language to convey a message

A. Written Communication B. Non-Verbal communication C. Verbal communication

8. Before formatting always take a backup of.....

A. Operating system B. Data C. Both

9. If you are sure about your efforts and the hard work, you gain ..... in whatever you do

A. Respect B. Revenue C. Confidence

10. The body language reflects the ..... of a human being

A. Quality B. Personality C. Entrepreneurship

Exercise-3: Fill in the Blanks

1. What are the process to reset the mobile phone settings?

_____

_____

_____

_____

2. What kind of skill required in Computer and Software to repair Mobile Phone?

_____

_____

3. Write a brief note on IMEI Code

_____

_____

_____



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3. Repairing Faults in Smartphones

Unit 3.1 - Role & Job Description - Repair & Rectify Mobile Phones

Unit 3.2 - Repairing and Rectifying Mobile Phones



Key Learning Outcomes

At the end of this module, you will be able to:

- Execute the steps to disassemble and assemble a mobile phone
- Identify the cause of the problem by following standard diagnostic procedure recommended by the smartphone brand
- Implement standard diagnosis process using the self-diagnostic tools such as POST cards and check the functionality and compatibility of various software
- Perform uninstallation of the incompatible software and install the licensed and authorised software
- Execute the steps for repairing a faulty component or module as per the scope of component level of repair as suggested by the brand
- Estimate the cost of repair and decide whether to repair a module or replace it
- Comply with the standard procedures as documented by the smartphone brand to maintain zero material defect
- Comply with safety standards while repairing and handling hazardous tools
- Identify an unresolved fault and seek assistance from the engineers or superiors
- Perform a quality check after repairing to ensure that rework is not required
- Record spares movement note and activities performed on the company ERP software for tracking and future references
- Prepare the post-installation documents and records such as Engineering Change Order (ECO) and report about job completion

UNIT 3.1: Role & Job Description - Repair & Rectify Mobile Phones

Unit Objectives

At the end of this unit, you will be able to:

1. Explain role of Mobile phone repair technician in repairing & rectifying mobile phone fault
2. Explain job description in repairing & rectifying mobile phone

3.1.1: Performance Criteria for Repairing and Rectifying Mobile Phones

Role : Repair and rectify the faults in mobile phone

Job Description : Repairing the faulty module in the hardware and checking for effective functioning. Also, check software issues and rectify

Follow Standard Repair Procedure

The following points are important for on the job performance:

- Follow the standard procedure as documented by the mobile phone brand for each model
- Take anti static precautions before work and wear ESD wrist straps or aprons
- Follow standard operating procedure while handling hardware modules such as handling PCB with ESD standards
- Use recommended tools for specific operation suggested by the brand
- Maintain zero-material defect during material handling by following standard operating procedure

Assembling & Disassembling Mobile Phone

- Open the outer panel of the mobile phone using metal / plastic case opening tools
- Use the brand recommended screwdrivers to remove the screws to open the inner casing
- Locate the connectors and release them to remove the motherboard from the device
- Use hot air gun and other devices to remove the LCD screen from the panel
- Follow similar process and use appropriate tools to assemble the mobile phone

Diagnose Problem

- Understand the customer level complaint and confirm the issue
- Take preventive measures and identify if there are any other issues in the mobile phone
- Use the self diagnostic tools (similar to power on self test (POST) card) to perform standard diagnosis process and ensure functionality of different parts of the device
- Follow the standard diagnostic procedure as documented by the mobile phone brand for each model
- Check the recently installed application or software and verify the compatability of the software with the mobile phone

Fix Software

- Check the recently installed application or software and verify the compatibility of the software with the mobile phone
- Uninstall the applications that is not compatible or creating issues in the mobile phone
- Install the licensed and authorised software to resolve issues and suiting the customer's requirement

Repair the Component or Module

- Understand the scope of component level of repair as suggested by the brand
- Estimate the cost of repair and verify if it is within Beyond Economic Repair (BER)
- Heat the singled out component using hot air gun to melt the solder joints and remove from PCB
- Clean the board by melting the old solder and removing
- Place the new component precisely on the board at specified location
- Solder the component on the PCB using soldering stations
- Ensure the soldering is proper and the component is fixed as per the specification
- Operate automated BGA (ball grid array) work station to precisely remove the chip from the board and repair them
- Perform re-balling function by dismantling, heating the chip to be removed from the board, remove the solder remains, put new solder balls, place the chip and solder them with the PCB
- Check for functioning of the hardware after repairing
- Ensure that there is no damage of PCB while removal and fixing of SMD components
- Ensure other components are not damaged while using hot air gun for removal of a component which could cause damage
- Ensure adequate soldering for fixing the component and no further rework is required

Replace Faulty Component

- Receive spare module / component from stores
- Identify and decide on replacing the module or component as the appropriate solution
- Take adequate measures and follow procedures when replacing expensive or delicate components such as LCD
- Ensure that cost of replacing is justified as the repair cost is beyond economic repair (BER)
- Ensure that replaced module or component is working and no further rework is required

Use of Equipment

- Identify and use appropriate tools and manuals for repairing the specific issue
- Prevent any accidents while handling hazardous tools
- Achieve results using appropriate tools for specific rework activity
- Maintain zero material defect during material handling by following standard operating procedure for tools handling

Seek Assistance on Unresolved Faults

- Seek technical assistance from engineer on faults that cannot be fixed
- Receive instruction from engineers on use of specific tools or new repair processes
- Discuss with superior if the cost estimate is found to be Beyond Economic repair (BER) and take recommended action
- Coordinate with superior for performing quality check on the repaired module

Report and Achieve Productivity Target

- Report on the work load and completion status
- Submit the appropriate documentation on completion of task assigned
- Document the work completed on the company ERP software for tracking and future references
- Achieve 100% daily and weekly target of number of repairs
- Meet the target of quality as per the Service Level Agreement (SLA) of the brand and avoid rework Repair within the turnaround time (TAT) and deliver them

UNIT 3.2: Repairing and Rectifying Mobile Phones

Unit Objectives

At the end of this unit, you will be able to:

1. Take preventive measure to safeguard components from ESD
2. Operate various tools and equipment required for the diagnosis of mobile phone
3. Operate various tools and equipments required to carry out repair work of mobile phone
4. Explain the SOP : Standard operating procedures for mobile phone repair
5. Practice dismantling and assembly process of mobile phone
6. Diagnose the defect and performance issues in various components of mobile phone
7. Diagnose faults, root cause and repair requirements in the mobile phone
8. Carryout repair work of components and micro-component of mobile phone
9. Carryout service and maintenance requirements of the mobile phone
10. Explain ESD preventive measures

3.2.1: Organizational Context : Knowledge of the Company / Organization and its Processes

Understand and learn the following:

- Company's policies on: incentives, delivery standards, and personnel management
- Company's after sales support policy
- Importance of the individual's role in the workflow
- Reporting structure
- Company's policy on product's warranty and other terms and conditions
- Company's line of business and product portfolio
- Company's repair and stores policy
- Documentation procedure followed in the company
- Company's policy on repair time, turnaround time, production targets, working hours

3.2.2: ESD and Preventive Measure

Mobile Phone components assembled on motherboard are sensitive to electrostatic discharge. It is possible for electronic devices to be damaged by ESD that is hardly noticeable to the human body. These components or devices can be damaged by common static charges which build up on people, tools, and other non-conductors or semiconductors. Humidity also has a significant effect on ESD.

Common electrostatic-sensitive devices

- MOSFET transistors, used to make integrated circuits (ICs)
- CMOS ICs (chips), integrated circuits built with MOSFETs.
- TTL chips
- Laser diodes
- Blue light-emitting diodes (LEDs)
- High precision resistors

How does damage from ESD happen?

When a statically-charged person or object touches an electrostatic discharge sensitive device, there is a possibility that the electrostatic charge could be drained through sensitive circuitry in the device. If the electrostatic discharge possesses sufficient energy, damage could occur in the device due to localized overheating

What damage does ESD cause in an electronic

There are basically two categories of damage from ESD:

Catastrophic damage – the electronic device is rendered inoperable immediately after the ESD event. A semiconductor junction or a connecting metallization could have been damaged by the electrostatic discharge.

Latent damage – the electronic device appears to be working fine following the ESD event. However, the sensitive circuitry has been damaged and could fail to operate properly at some time in the future

A recent investigation found the human body and its clothing capable of storing between 500V and 2,500V electrostatic during the normal workday this is far above the level that damages circuits.

In order to prevent damage, while working with sensitive components, technician should use a grounding mat or other grounding tool. A technician may also need to wear antistatic wristband strap or an antistatic apron.

ESD Voltage range classification :

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 IMMUNITY CLASSIFICATION FOR HBM	
Class	**Voltage Range**
Class 0	<250 V (fails for ESD pulse of 250 V)
Class 1A	250 V to <500 V (passes 250 V and fails 500 V)
Class 1B	500 V to <1000 V (passes 500 V and fails 1000 V)
Class 1C	1000 V to <2000 V (passes 1000 V and fails 2000 V)
Class 2	2000 V to <4000 V (passes 3000 V and fails 4000 V)
Class 3A	4000 V to <8000 V (passes 4000 V and fails 8000 V)
Class 3B	≥8000 V (passes 8000 V or above)

Tab: 3.2.2 ESD Immunity Classification for HBM (Human Body Model)

How to minimize ESD?

Sensitive components need to be protected during and after manufacture, during shipping and device assembly, and in the finished device.

Grounding is especially important for effective ESD control. It should be clearly defined, and regularly evaluated.

Sensitive devices need to be protected during shipping, handling, and storage. The buildup and discharge of static can be minimized by controlling the surface resistance and volume resistivity of packaging materials.

3.2.3: Dismantling Mobile Phone

In this section we are going to learn mobile phone disassembly. In disassembly process we will open the mobile phone and dismantle all the parts.

3.2.3.1: Back Cover

First of all by using opener, we need to take out back cover of mobile phone carefully. To take out back cover we need to push slots carefully by the opener and then remove the back cover. Now place the back cover properly so that it should not get any scratches.

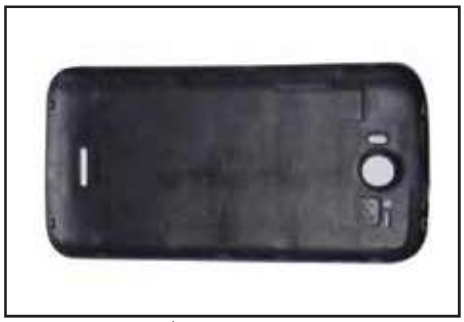


Fig: 3.2.3.1 Back Cover

3.2.3.2: Battery

Now we need to remove battery from mobile phone. To remove battery, push the battery carefully inside using opener and slightly lift it.



Fig: 3.2.3.2 Battery

3.2.3.3: Removal of Screws

After removing battery, we need to remove this back panel. To remove the back cover we need to remove all these screws. During removal of screws, we need to be very careful as if one screws goes missing it will be difficult to locate it. We need to use proper screw driver to remove these screws. Hold the screw driver as shown. Tip of this screw driver has magnetic property, which helps in lifting and removing the screws from the slot.



Fig: 3.2.3.3 Body Screw

During disassembly process of mobile, make sure to use good quality tools because ordinary tools may damage the top thread of screws.

Now we will remove all the screws of middle portion one by one. It will be better to keep white paper or cloth while disassembling so that small parts will not get lost.

Now we will remove screws from lower portion. In case, if any screw get stuck in such case we can remove it carefully using tweezers. Now we will inspect this mobile to make sure none of the screw is stuck on the body slot and ensure that all are removed.

3.2.3.4: Middle Panel

Now we will remove this middle panel using opener. Make sure not to apply extra force otherwise this panel my break also. Now you can see this volume switch which is attached with the panel and post removal of the middle panel it will also come out. Keep all the parts carefully so that we can find it easily. Now slowly remove this panel, once the panel is removed, then On/Off switch will also come out.

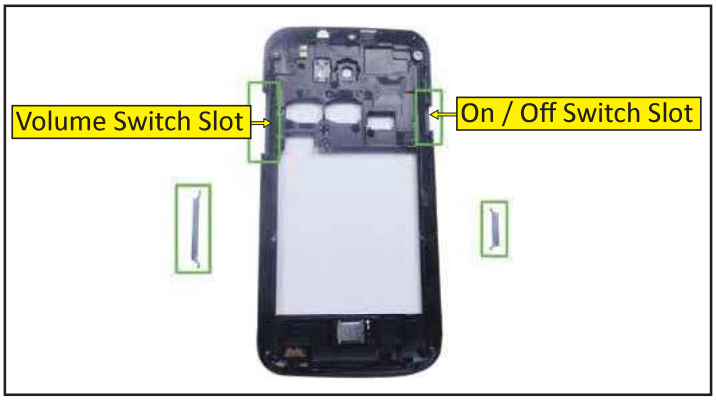


Fig: 3.2.3.4 Middle panel

3.2.3.5: Camera Strip

Now we can see the motherboard which is also called PCB (Printed Circuit Board). All connection of mobile phone are made thru this PCB. Now we will remove all the plastic strips very carefully.

First of all we will remove camera strip. To remove camera strip, hold the strip using tweezers and carefully pull it outside.

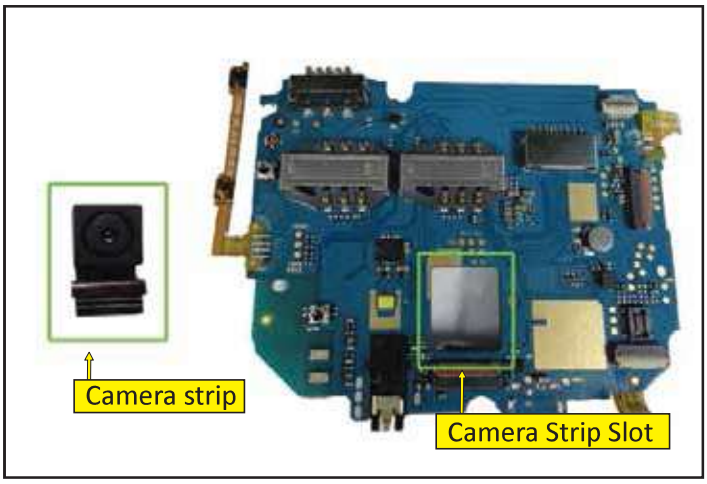


Fig: 3.2.3.5 Camera Strip

3.2.3.6: Touchpad Strip

Now we will remove touchpad strip carefully using tweezers. We need to be very careful in removal of strip as these strips are very sensitive and may even get damage by tweezers tip also. IF it gets damaged touchpad will stop working.

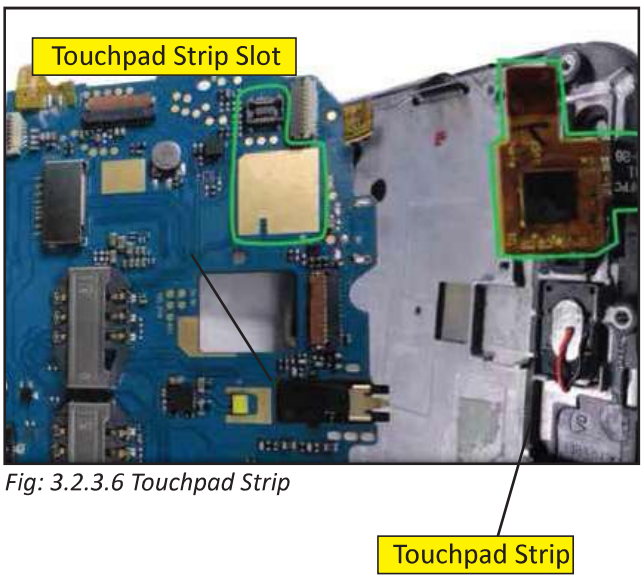


Fig: 3.2.3.6 Touchpad Strip

3.2.3.7: Front Module Camera

Now we will remove front module camera strip. We need to remove this strip very carefully without applying force otherwise it may also get damaged.

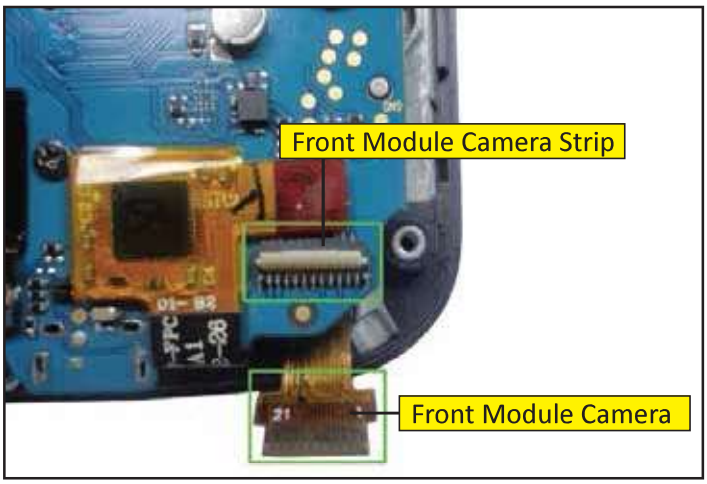


Fig: 3.2.3.7 Front Module Camera

3.2.3.8: Display Strip

Now we will remove display strip. This is very important strip. To remove display strip lift the lock of strip using tweezers and then open the lock and now remove the strip carefully from motherboard.

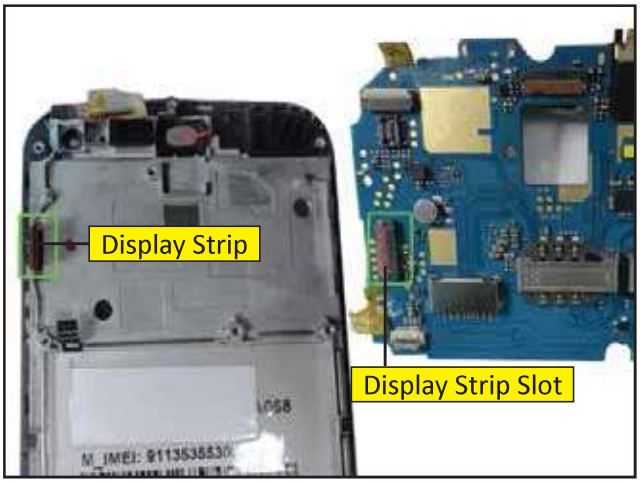


Fig: 3.2.3.8 Display Strip

3.2.3.9: Power Supply Strip

Now we are going to remove the strip from motherboard which connects parts like Mic and Vibrator with motherboard and also connects motherboard with lower-board.

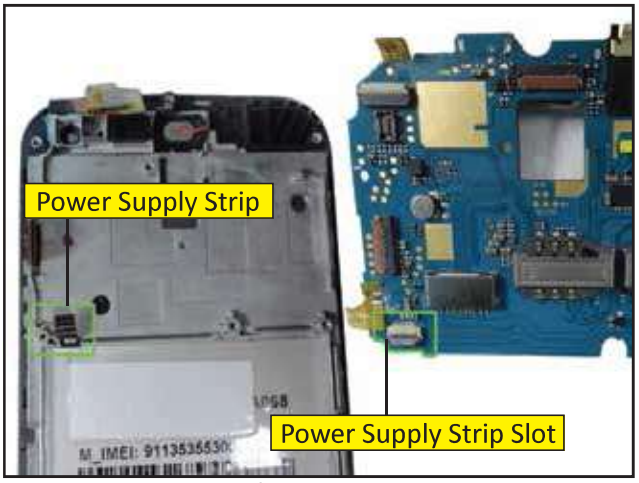


Fig: 3.2.3.9 Power Supply Strip

3.2.3.10: Antenna Wire

Once all the strips are removed, we will also remove this antenna wire from motherboard.

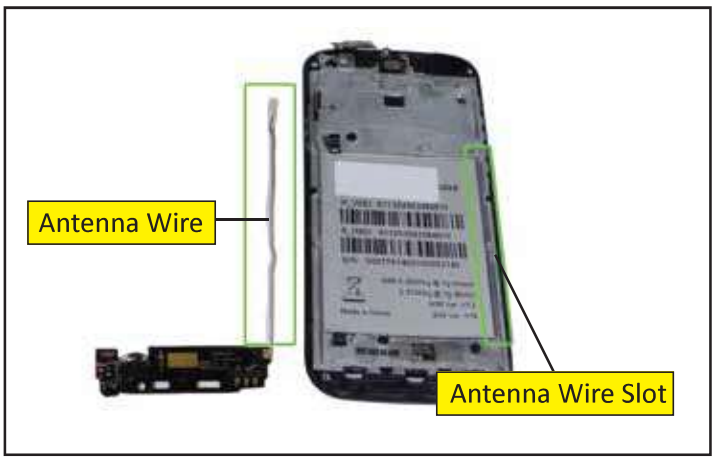


Fig: 3.2.3.10 Antenna Wire

3.2.3.11: Motherboard

Now we will remove motherboard carefully using hand and keep it carefully. Now we can see upper portion of mobile is fully dismantled.

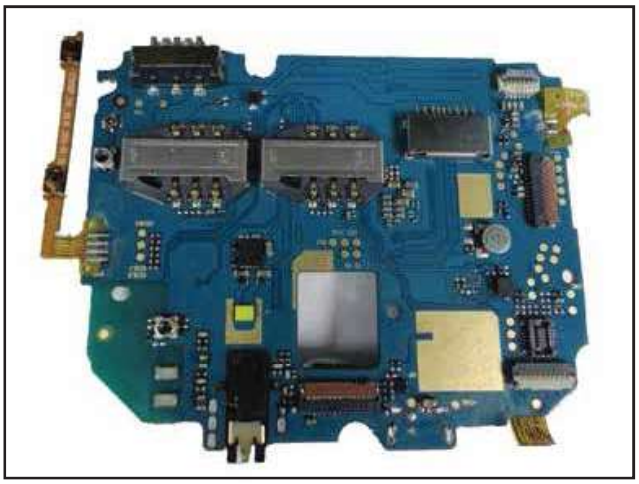


Fig: 3.2.3.11 Motherboard

3.2.3.12: Ground Pannel

Now we will dismantle lower portion which is also called ground panel. This section has no screw. To remove ground panel we need to pull it slightly upwards and then open the lock using tweezers. Now ground panel is also removed, keep it carefully in safe place.

Disassembly process of Smartphone is over now. We need to be very careful during disassembling process as a minor mistake may permanently damage mobile phone.

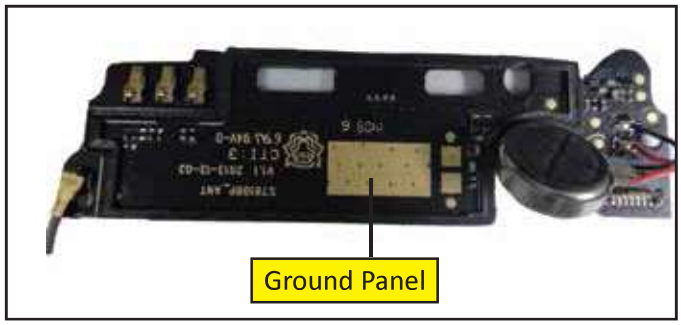


Fig: 3.2.3.12 Ground Panel

3.2.4: Android Smartphone Assembly

In this portion we are going to learn how to assemble android Smartphone. Assembling process is areverse process of disassembling. During disassembling the part which was dismantled last will be used first during assembling process.

3.2.4.1: Ground Panel

This is the ground panel which we dismantled at the end. We will first connect the ground panel in the same way we removed it.

Place the ground panel at lower end on the slot and carefully lock it. Now place the vibrator in it's slot properly.

Lower portion of the Smartphone is assembled, now we will place the antenna wire properly in it's slot.

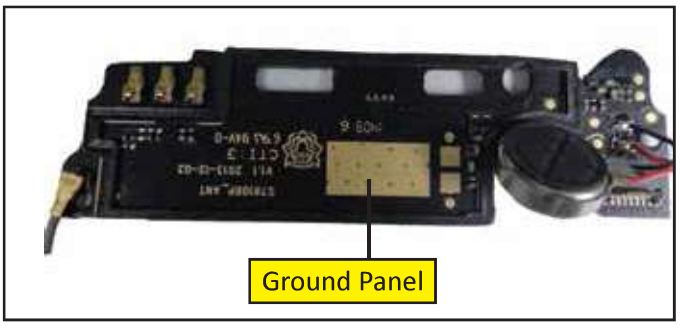


Fig: 3.2.4.1 Ground Panel

3.2.4.2: Camera Strip

Place the camera properly in the camera slot and then place the camera strip carefully in camera strip slot. Before placing the camera strip in the strip slot make sure, line on camera strip is straight so that it can be place properly in the slot otherwise camera may not work properly.

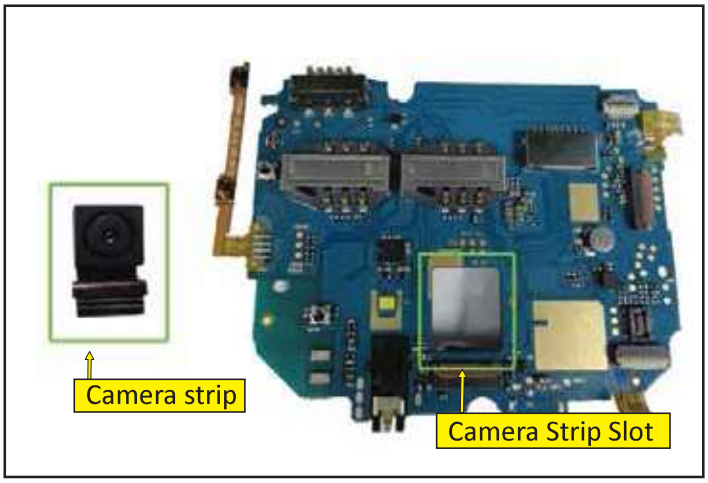


Fig: 3.2.4.2 Camera Strip

3.2.4.3: Motherboard

Now place the motherboard in it's slot. While placing the motherboard never apply force to adjust in the slot. Place it slowly and carefully in the slot.

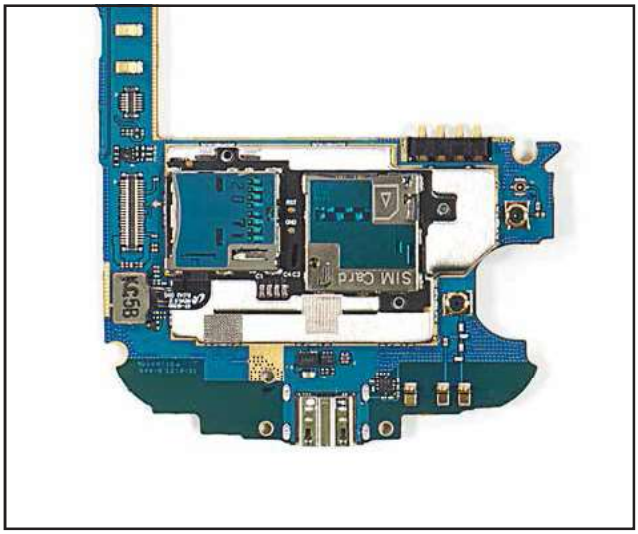


Fig: 3.2.4.3 Motherboard

3.2.4.4: Antenna Wire

Place the Antenna wire properly and carefully using tweezers in it's slot

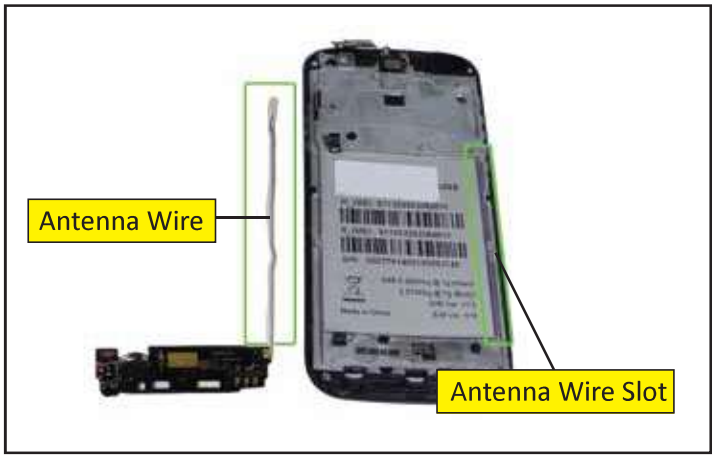


Fig: 3.2.4.4 Antenna Wire

3.2.4.5: Power Supply Strip

First we will place the strip which gives supply to lower portion of the phone. Place the strip inside slot by holding it using tweezers and push it inside strip slot carefully and then lock it.

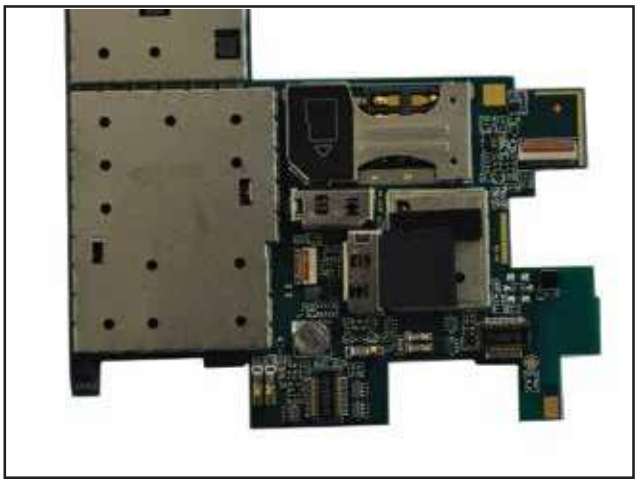


Fig: 3.2.4.5 Power Supply Strip

3.2.4.6: Display Strip

Now we are going to place display strip which is an important strip. Hold the display strip using tweezers and push it inside the strip slot carefully while doing it make sure camera strip line should be straight. Now lock the strip.

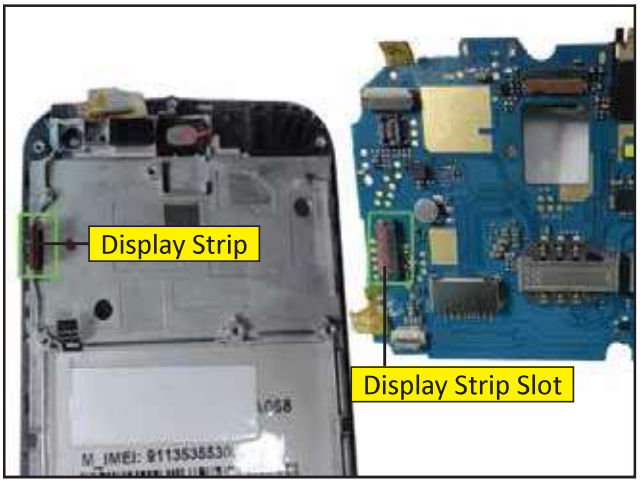


Fig: 3.2.4.6 Display Strip

3.2.4.7: Front-end Module Camera

Now we are going to connect front module camera. Hold the front module camera strip using tweezers and push it inside strip slot carefully while doing it make sure camera strip line should be straight.

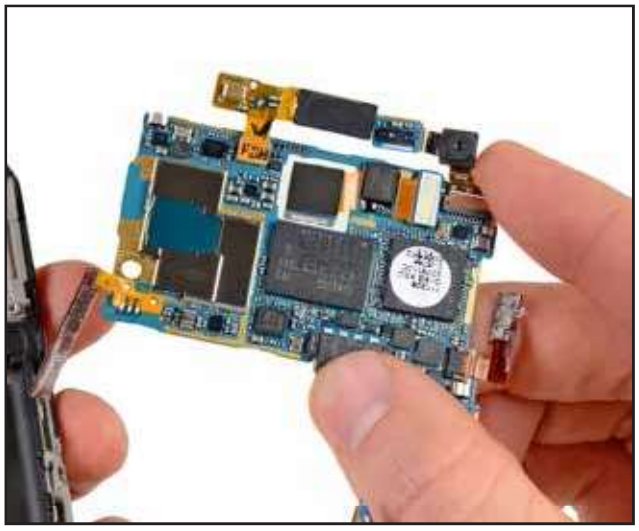


Fig: 3.2.4.7 Front Module Camera

3.2.4.8: Touchpad Strip

Now we are going to place touchpad strip which was removed as the first strip during disassembly process and this is going to be the last strip during assembly process.Now we have place all the strips properly on the motherboard.

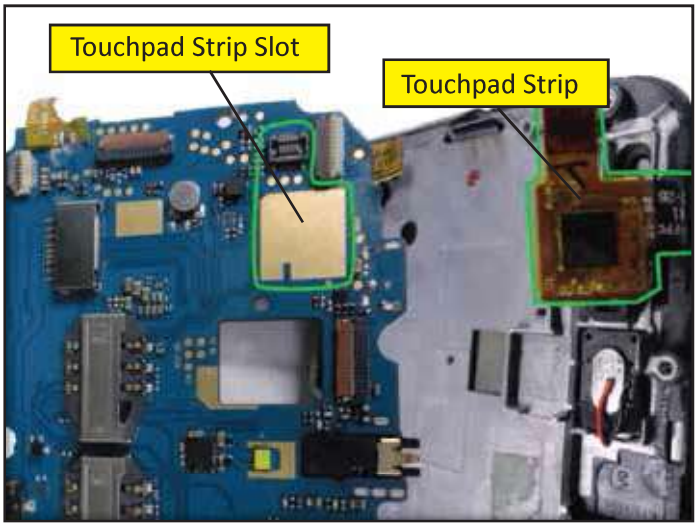


Fig: 3.2.4.8 Touchpad Strip

Now we going to tighten the screw on motherboard using suitable screw driver. Make sure volume and On/Off switch is in its place and should not get disturbed because during fitting when we will press the body if strip will come on body panel, it may get damaged also.

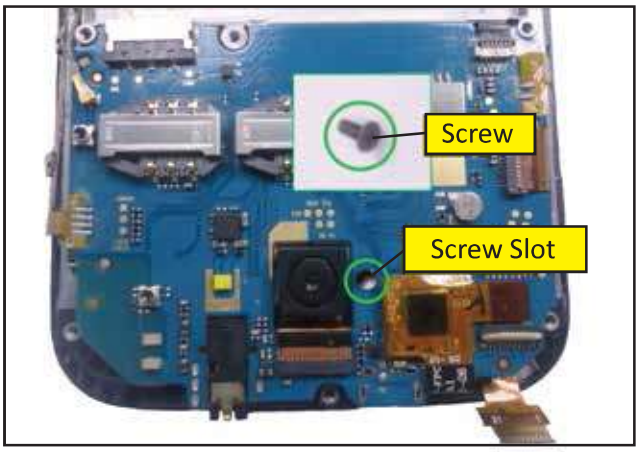


Fig: 3.2.4.9 Screw Slot

Now we will place antenna wire properly in its slot. If antenna wire will not get properly locked, it may give network problem in mobile. We need to place it the way it is being demonstrated.

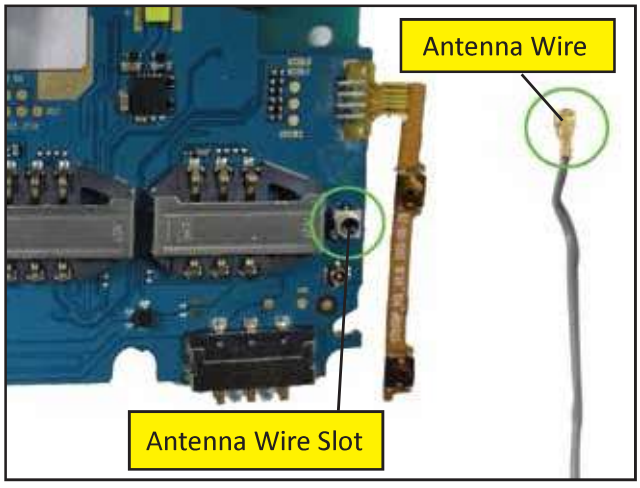


Fig: 3.2.4.10 Antenna Wire Slot

3.2.4.9: Middle Panel

Now we are going to fit middle panel. First press the top portion so that it should be placed properly in the slot, we will also observe sound while we press it.

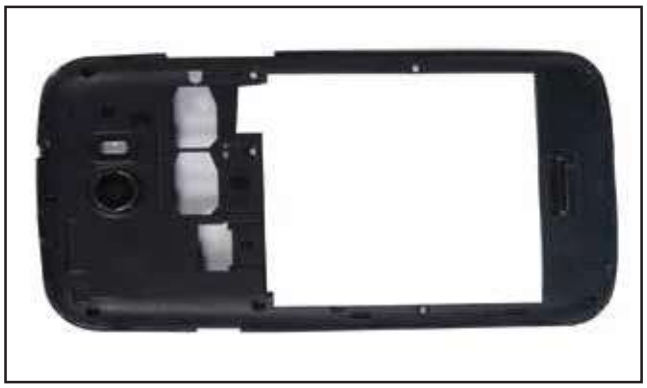


Fig: 3.2.4.11 Middle Panel

Now place the On/Off switch in it's slot properly using tweezers and press it slightly. Now we will place volume key in it's slot.

Make sure strip should be in proper place otherwise we cannot place volume key in it's location.

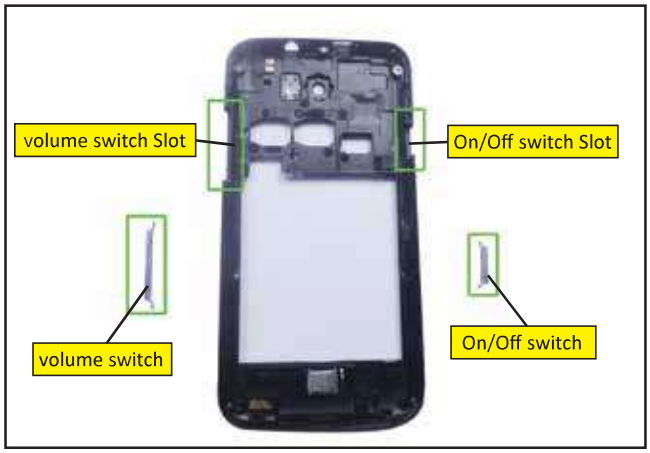


Fig: 3.2.4.12 On/Off Switch

3.2.4.10: Screw Fitting

Now we are going to tighten all screws. First we will place screws on the lower end using magnetic screwdriver and tighten it. Then after we will place the screw on upper end and tighten it. Now we will place screw in middle section and tighten it and finally we will place top 2 screws which is very important and tighten them.

During tightening the screw hold the screw driver like this, do not hold the screw driver like this. Now we have tightened all the screws.

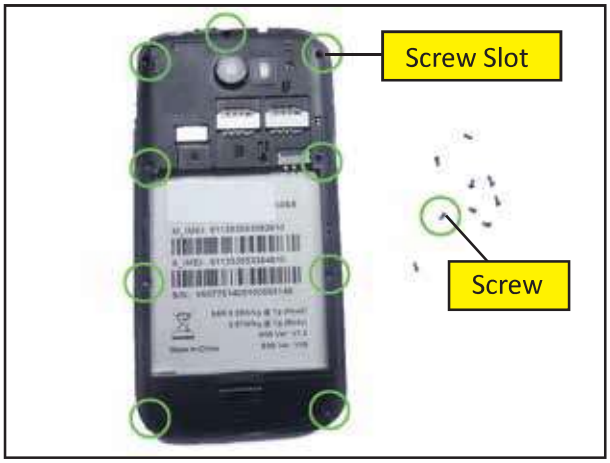


Fig: 3.2.4.13 Screw Assembly

3.2.4.11: Battery

Now we are going to place battery. Place the battery properly in it's slot and then press it slightly.

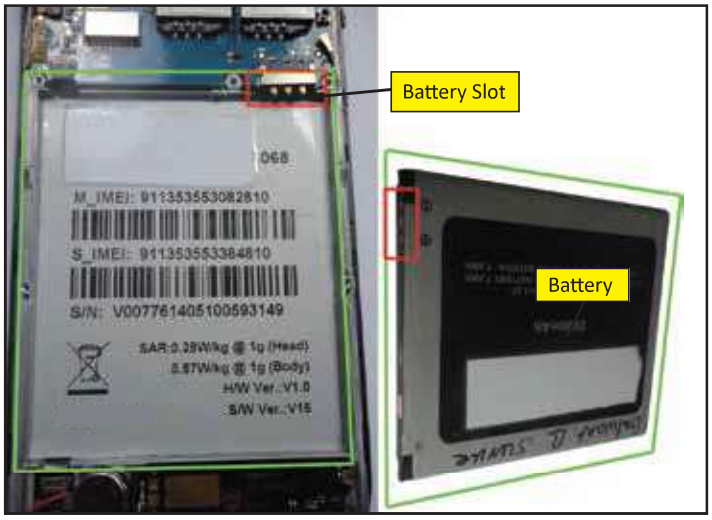


Fig: 3.2.4.14 Battery

3.2.4.12: Back Cover

Now we are fitting the back cover. Press all sides of back cover properly . Make sure there is no gap between two panels. Now test the mobile properly to make sure all the jobs has been done properly. Post testing the assembly process of Android Smartphone, assembly process is completed.



Fig: 3.2.4.15 Back Cover

3.2.5: Removing and Soldering Components

Before touching motherboard or any component of Mobile phone make sure you have grounded yourself for ESD and have also taken necessary action for ESD like use of Antistatic Mat / Hand Gloves / Wrist Strap to prevent any damage to components of mobile phone.

3.2.5.1: Charging Connector

In this section we will see how to connect charging connector. As you can see this is a mobile PCM board. First place the board on PCB stand and make sure charging connector is in open area.

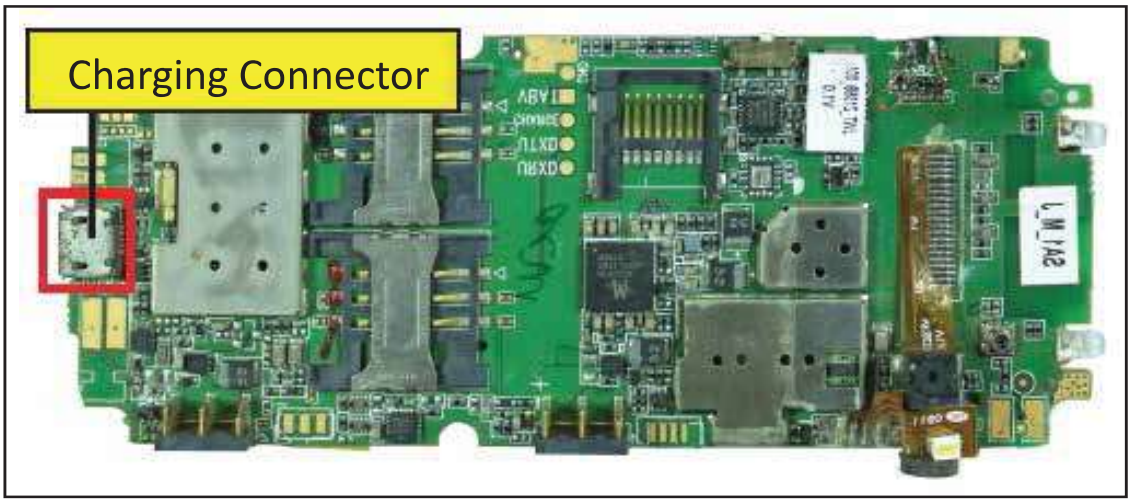


Fig: 3.2.5.1 Motherboard - Charging Connector

Now we will apply soldering flux on charging connector and hold the connecter using tweezers. Now apply hot air gun on charging connector and slowly remove the charging connector.



Fig: 3.2.5.2 Soldering Flux on Charging Connector

As you can see we have remove the charging connector. Now we have to remove charging connector track without damage. As you can see holes are now not properly visible on board. We have to make it proper so that base of charging connector should go smoothly in the holes to connect the charging connector on the board.

Now we can see four bases which need to be soldered using soldering wire. Once the soldering of base is over, turn it over. Now we need to do the soldering of the track on the backside. To perform this process we need soldering gun with small bit. First clean the bit by filing, now apply flux on the track and then press the track from bottom to top area

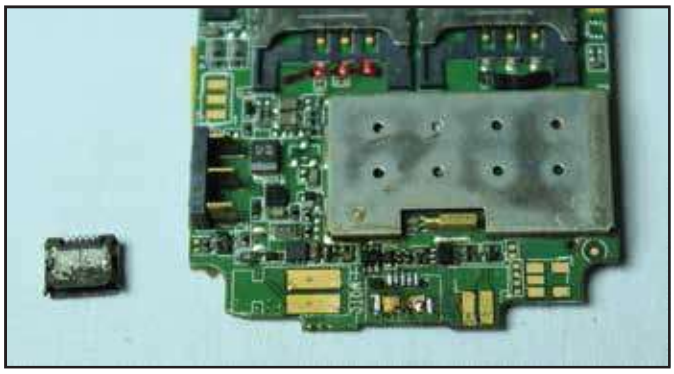


Fig: 3.2.5.3 Charging Connector and Slot



Fig: 3.2.5.4 Charging Connector Soldering - Step 1



Fig: 3.2.5.5 Charging Connector Soldering - Step 2

Now you can see charging connector is connected. Now we will remove the holes on the back-side using soldering gun it will give further strength to the connector base.

3.2.5.2: Battery Connector

This is battery connector of mobile phone. Apply flux on the track and hold the connector using tweezers now with the help of hot air gun remove it slowly. Now apply flux on track and clean it then after connect the battery connector back on its track through soldering process.

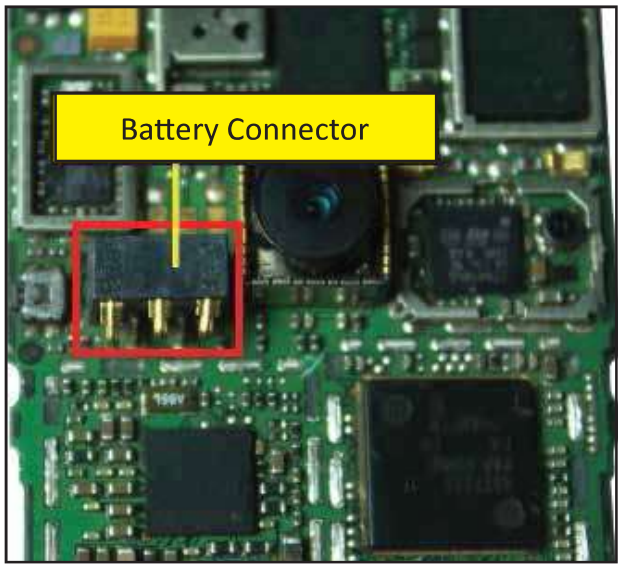


Fig: 3.2.5.6 Battery Connector

3.2.5.3: Headphone Connector

In this section we will see how to remove and connect the headphone connector. Headphone connector is more or less common in different types of mobile phones.

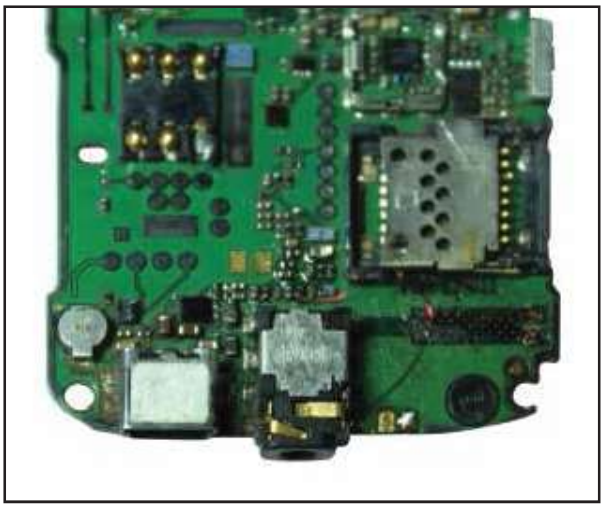


Fig: 3.2.5.7 Headphone Connector

Apply flux on the headphone connector track and hold it properly with tweezers and now apply hot air gun and slowly remove it.

To connect It back clean the track by applying flux. Now create hole on the board using hot air gun and tweezers.



Fig: 3.2.5.8 Headphone Connector Soldering - Step 1

Now place the headphone connector properly on the hole and do the soldering process using soldering iron and soldering wire.



Fig: 3.2.5.9 Headphone Connector Soldering - Step 2

3.2.5.4: SIM Tray

In this section, we will learn how to remove and connect back SIM tray. Process involved in removal and connecting back of SIM tray and Memory tray in mobile phone is identical. Apply flux on connecting point of SIM tray, hold it with tweezers and then apply hot air gun and slowly SIM tray will be de-soldered and can be removed. Post removal of SIM tray, apply flux on the SIM tray track and clean it. The SIM tray we have removed as a part of demonstration has six soldering points. Place the SIM tray back on the same points and solder it back using solder gun and solder wire.

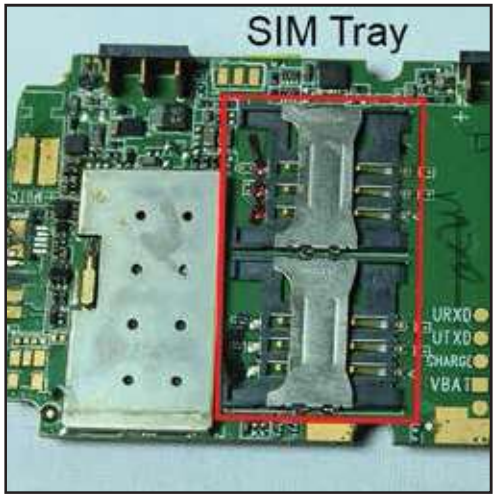


Fig: 3.2.5.10 SIM Tray

3.2.5.5: Memory Tray

In this section, we will learn how to remove and connect back memory tray. Process involved in removal and connecting back of SIM tray and Memory tray in mobile phone is identical. Apply flux on connecting point of memory tray, hold it with tweezers and then apply hot air gun and slowly memory tray will be de-soldered and can be removed. Post removal of memory tray, apply flux on the memory tray track and clean it. The memory tray we have removed as a part of demonstration has eight soldering points. Place the memory tray back on the same points and solder it back using solder gun and solder wire.

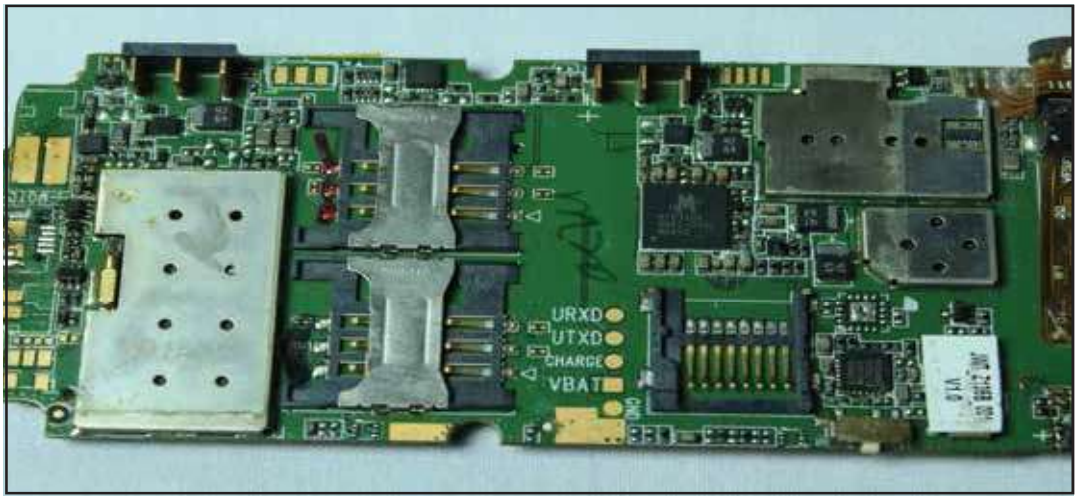


Fig: 3.2.5.11 Memory Tray

3.2.5.6: Speaker

In this section we will see how to remove and connect speaker. Speaker is used in mobile phone for listening the voice. On speaker you will find one red mark (+) and one black mark (-)

To remove speaker we will use soldering flux. Apply flux on both points of the speaker and with the help of soldering iron de-solder both the wires. We can connect it back by re-soldering.



Fig: 3.2.5.12 Speaker

3.2.5.7: Ringer

This is PCB board and this component on PCB board is called ringer. This is used for ringtone in mobile phone. On ringer you can see + sign for red wire and – sign for black wire. To remove ringer first

apply flux on both the point and de-solder the wire using soldering iron. Now we will see how to connect ringer. As per the indication given, solder red wire on "+" point and black wire on "-" point.



Fig: 3.2.5.13 Ringer

3.2.5.8: Mic (Microphone)

Mic. is used to record our voice and pass it on to the network to be delivered to the recipient. Mic. Also has red wire with "+" sign and black wire with "-" sign. By applying flux on Microphone Point we can de-solder Microphone. To solder it back we need to solder red wire on "+" point and black wire on "-" point.



Fig: 3.2.5.14 Microphone

3.2.5.9: Display

In this section we will learn how to remove display and connect it back. Display problem is very common in mobile phones. There are three types of displays. Lock Display – Most of the Smart phones are using lock display. In this type of display, just by removing lock on the display strip we can remove the display.



Fig: 3.2.5.15 Display Strip

Soldering Display - To remove this type of display we need to apply soldering/de-soldering flux on display track. Hold the display strip and apply hot air gun on soldering point and slowly remove it without pulling. Never pull display strip as it may cause track to break and the strip will get damaged and will be difficult to solder it back. Now we have removed the display strip. To connect it back first clean the track of display strip using solder gun. Post cleaning, see it carefully and you will observe two holes on both the sides and we can see similar holes on the PCB board. To connect the display we need to match the holes and then do the initial soldering just to hold it and then solder it properly. As you can see we have soldered the display strip. Plug Display – In this type of display we need to just unplug it to take it out and to put it back just plug it back.



Fig: 3.2.5.16 Display Strip Assembly

3.2.5.10: Display Connector

This is display connector of mobile. To remove connector, first apply flux on the track and remove it with the help of hot air gun. We cannot simply connect the connector back as it gets burnt during the process. Now clean the track. Now you can see small track. Now we need to match these tracks with the PCB track. Once matched apply flux and with the help of soldering gun press it slightly, make sure while pressing tracks should not connect with each others. Using this process we can connect charging connector.

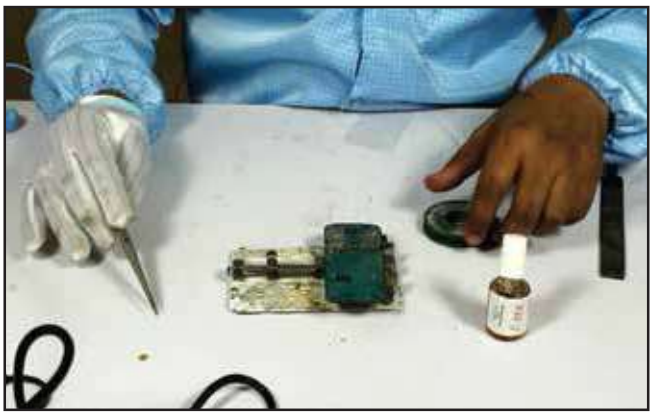


Fig: 3.2.5.17 Display Connector

3.2.5.11: On/OFF Switch & Battery Connector

Now we are going to learn how to remove On/Off switch and battery connector and place it back. First of all apply flux on the track of the component then hold it with the help of tweezers and apply hot air gun on the component and slowly remove it with pulling it. To connect it back first apply flux on the track and clean it after cleaning place the component properly on track and do the soldering process.



Fig: 3.2.5.18 Battery Connector

3.2.6: PCB Board

This section deal with the components of motherboard

3.2.6.1: Mobile Phone Antenna

Mobile phone antenna is used to receive and transmit radio frequency in mobile phone and is available in each and every mobile phone.

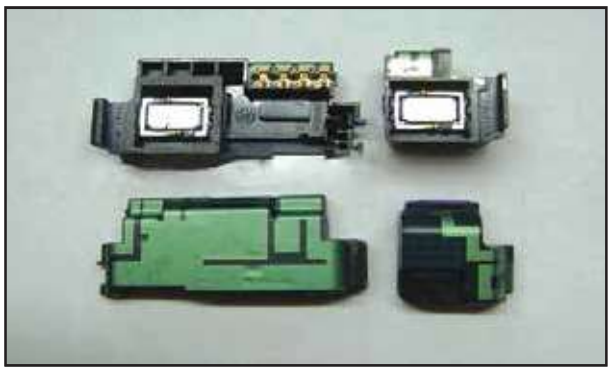


Fig: 3.2.6.1 Mobile phone Antenna -1

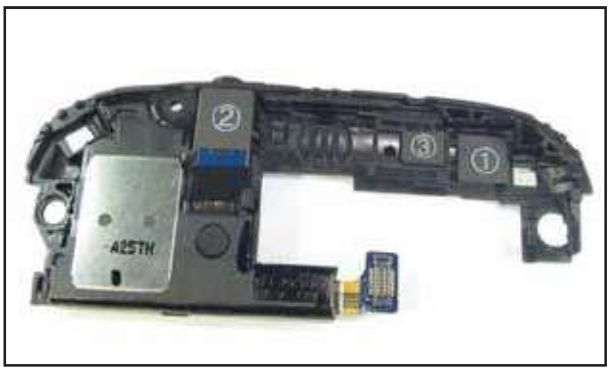


Fig: 3.2.6.2 Mobile phone Antenna -2

3.2.6.2: Ear Speaker

Ear phone speaker is used to receive the call voice in normal mode.

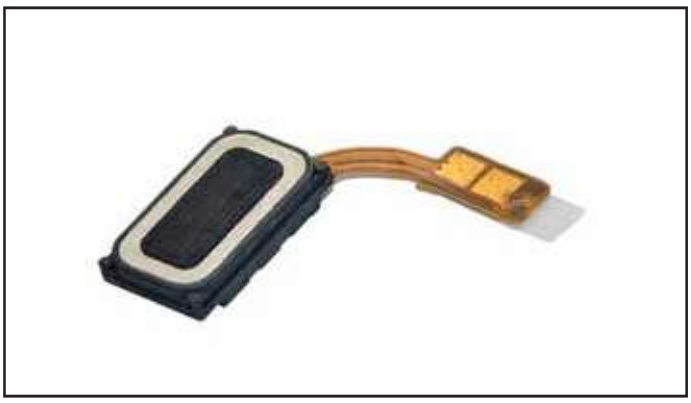


Fig: 3.2.6.3 Ear Speaker

3.2.6.3: Ringer or Loud Speaker

Ringer or loud speaker is used to listen to the ringtone and also listen to the voice in speaker mode.

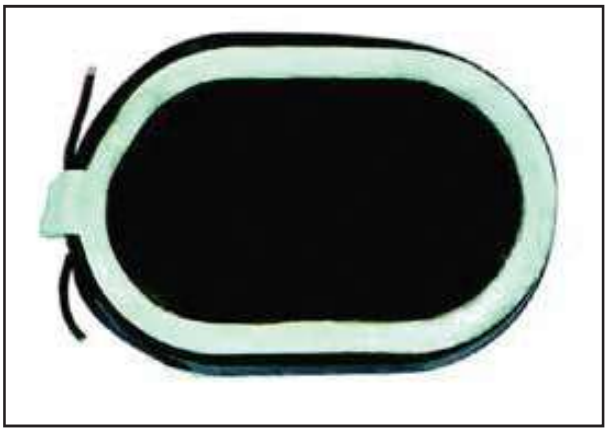


Fig: 3.2.6.4 Ringer / Loud Speaker

3.2.6.4: Vibrator Motor

Vibrator motor is used in mobile phone for vibration alert

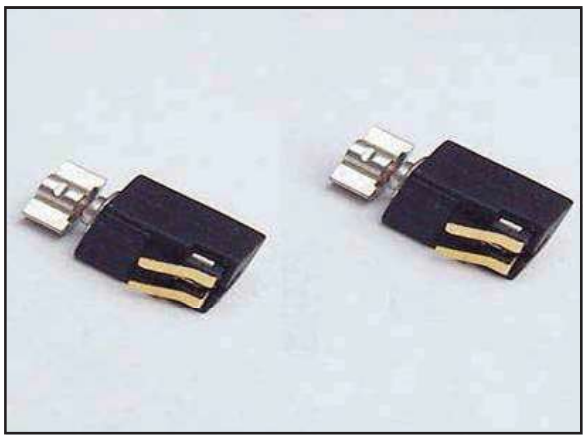


Fig: 3.2.6.4 Vibrator Motor - 1

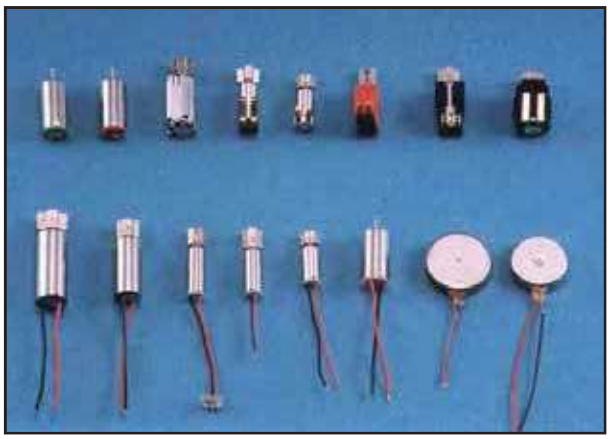


Fig: 3.2.6.5 Vibrator Motor 2

3.2.6.5: MiC (Microphone)

Mic is used in mobile phone to transmit voice message

1) Universal MIC



Fig: 3.2.6.6 Universal Mic.

2) Box or Cristal MIC



Fig: 3.2.6.7 Crystal Mic.

3.2.6.6: LED (Backlight)

LED are used along with LCD



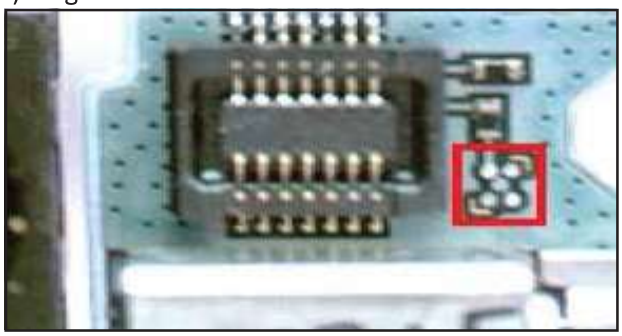
Fig: 3.2.6.8 Backlight LED

3.2.6.7: Display Connector

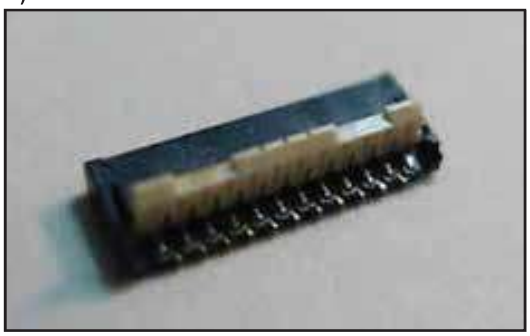
Display connector is used to connect display unit of mobile phone with PCB board.

Types of display connector

1) Plug



2) Lock



3) Soldering



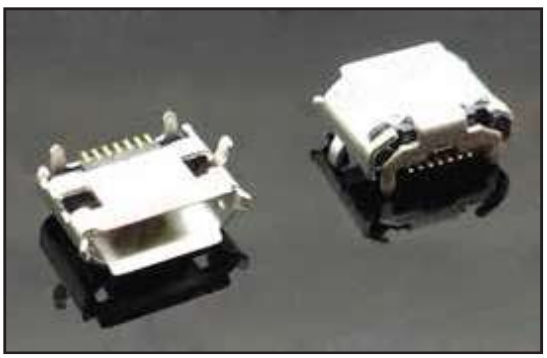
Fig: 3.2.6.9 Display Connector Type

3.2.6.8: Charger Connector

Charger connector is used to connect mobile phone with external power source for charging and also used to connect to the computer by using USB cable.

Types of charger connector

1) Soldering



2) Plug



Fig: 3.2.6.10 Charger Connector Type

3.2.6.9: SIM Card

SIM is short form of Subscriber Identity Module. It is used in all types of GSM phone. SIM card is having a microchip inside which stores certain information about phone and also certain data. a smart card inside a mobile phone, carrying an identification number unique to the owner



Fig: 3.2.6.11 SIM Card

3.2.6.10: SIM Card Socket

SIM card socket is used to place the SIM card in Mobile phone and send information to CPU for processing. CPU processes the information and passes it to the base station for registration. SIM card socket acts as SIM reader or writer.

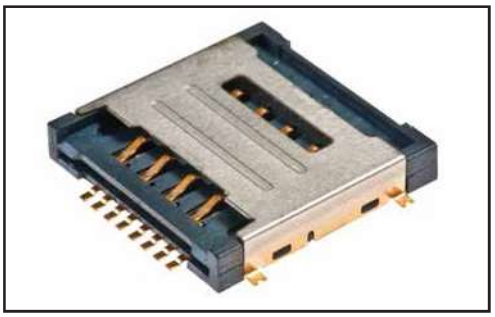


Fig: 3.2.6.12 SIM Card Socket

3.2.6.11: Memory Card Socket

Memory card socket is used to place memory card in the mobile phone. Memory card socket is used to read or write information on the memory card.

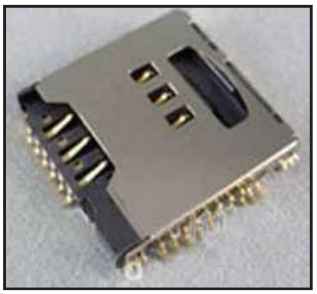


Fig: 3.2.6.13 Memory Card Socket

3.2.6.12: Display

Display is an integral part of mobile. There are three Types of Displays

1) Lock



2) Plug

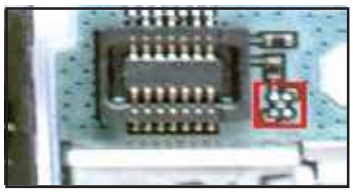


Fig: 3.2.6.14 Display Type

3) Soldering



Fig: 3.2.6.15 Display Type

3.2.6.13: PCB Board

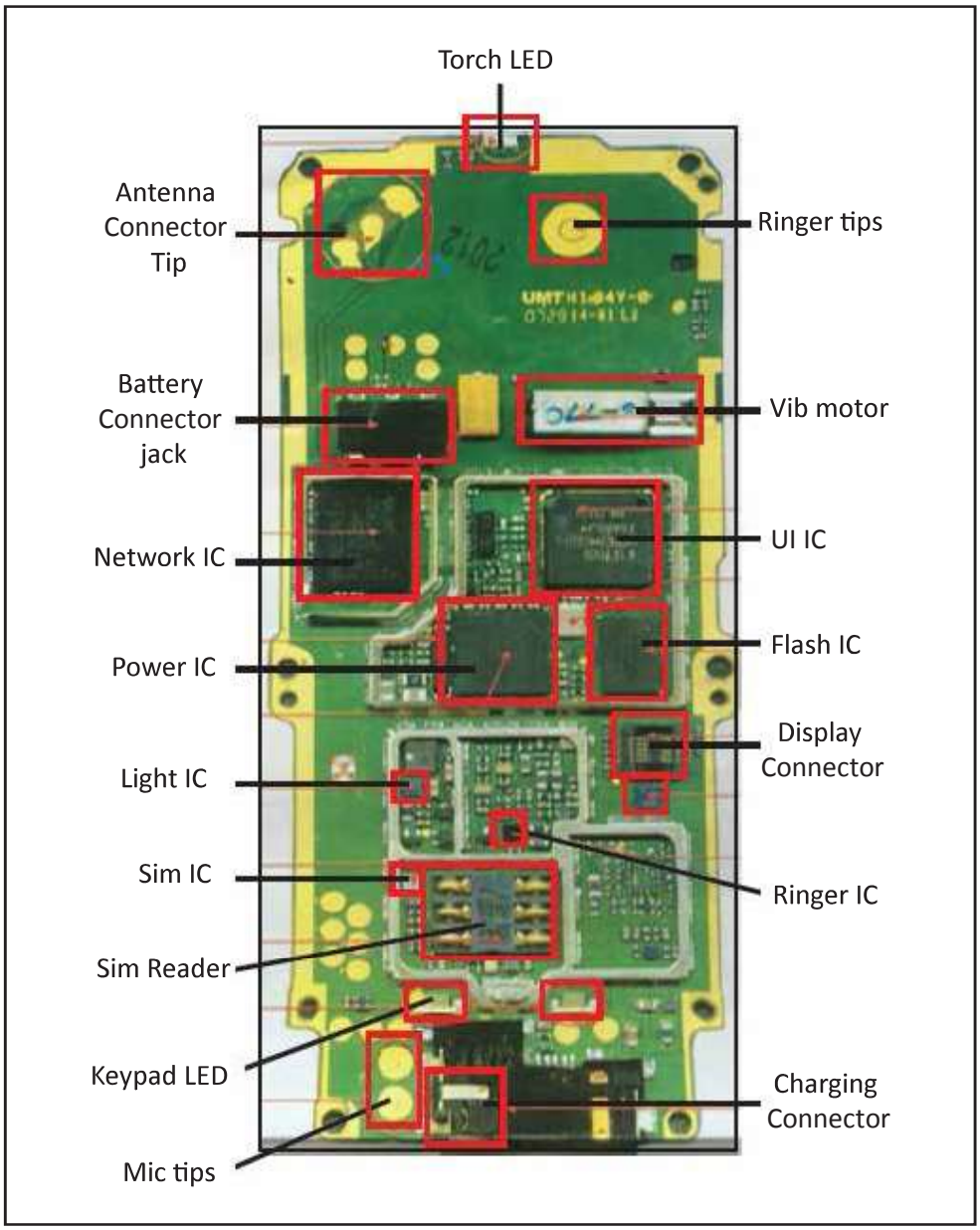


Fig: 3.2.6.16 PCB Backside

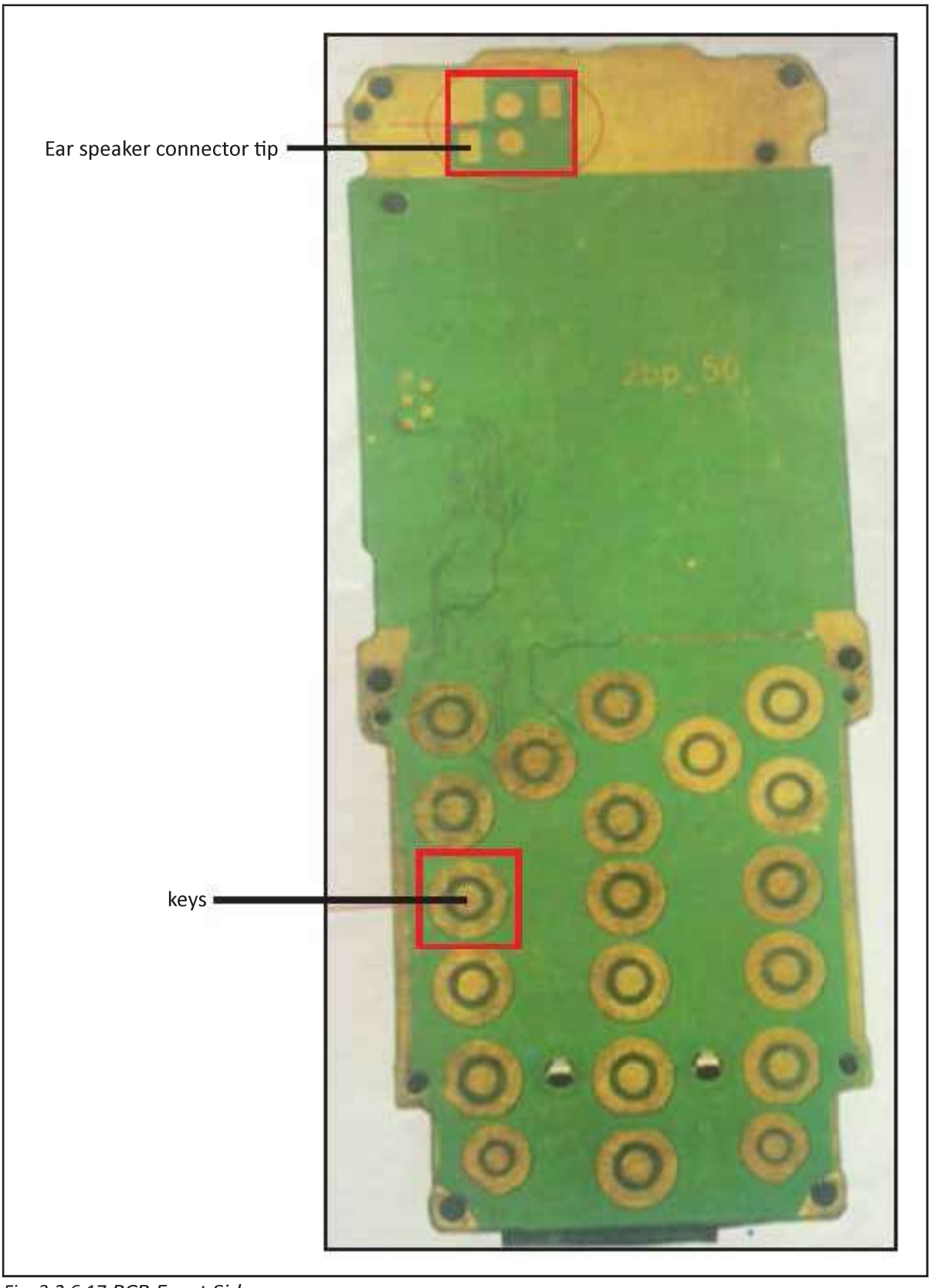


Fig: 3.2.6.17 PCB Front Side

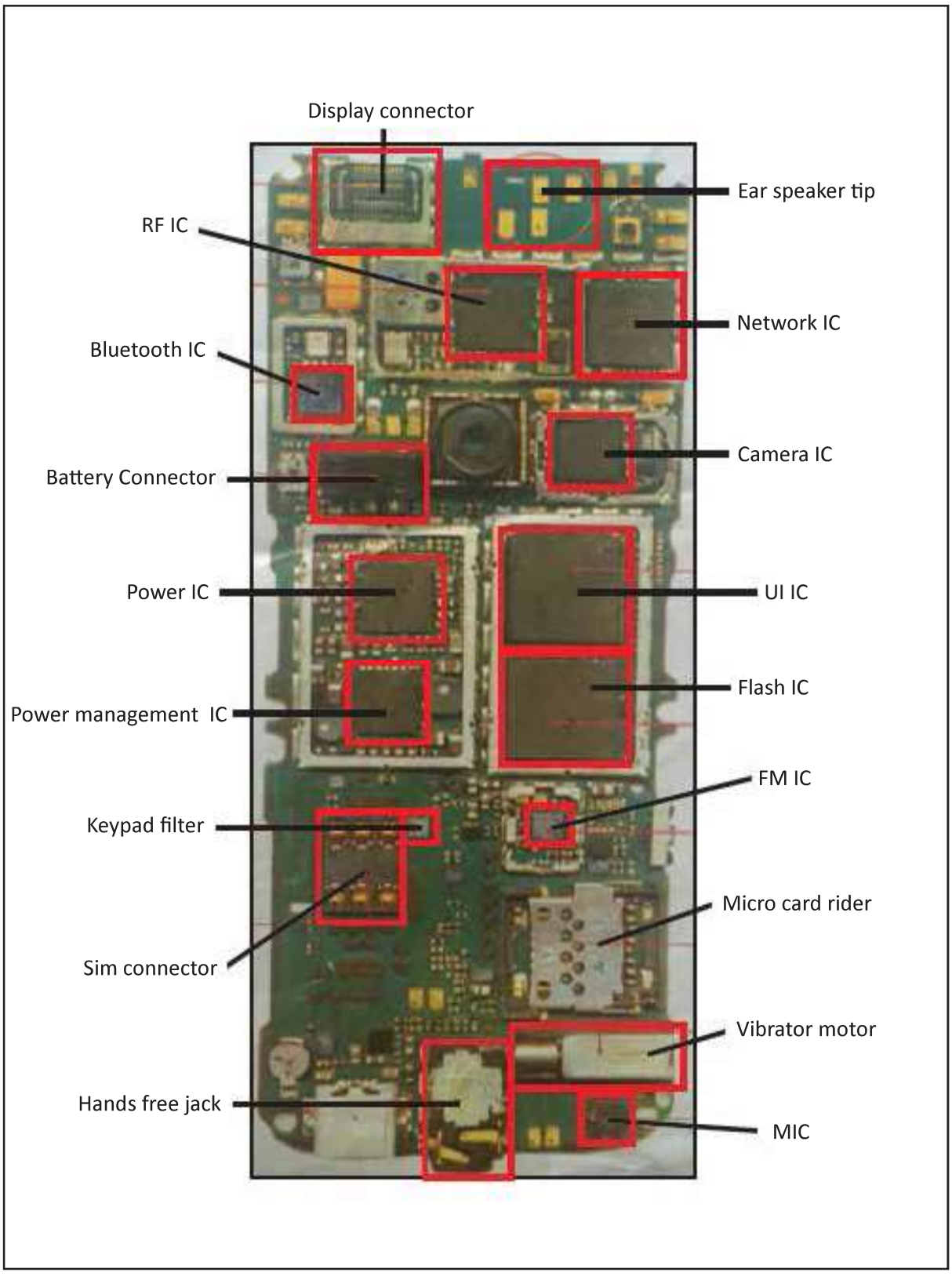


Fig: 3.2.6.18 Multimedia PCB Back Side



Fig: 3.2.6.19 Multimedia PCB Front Side

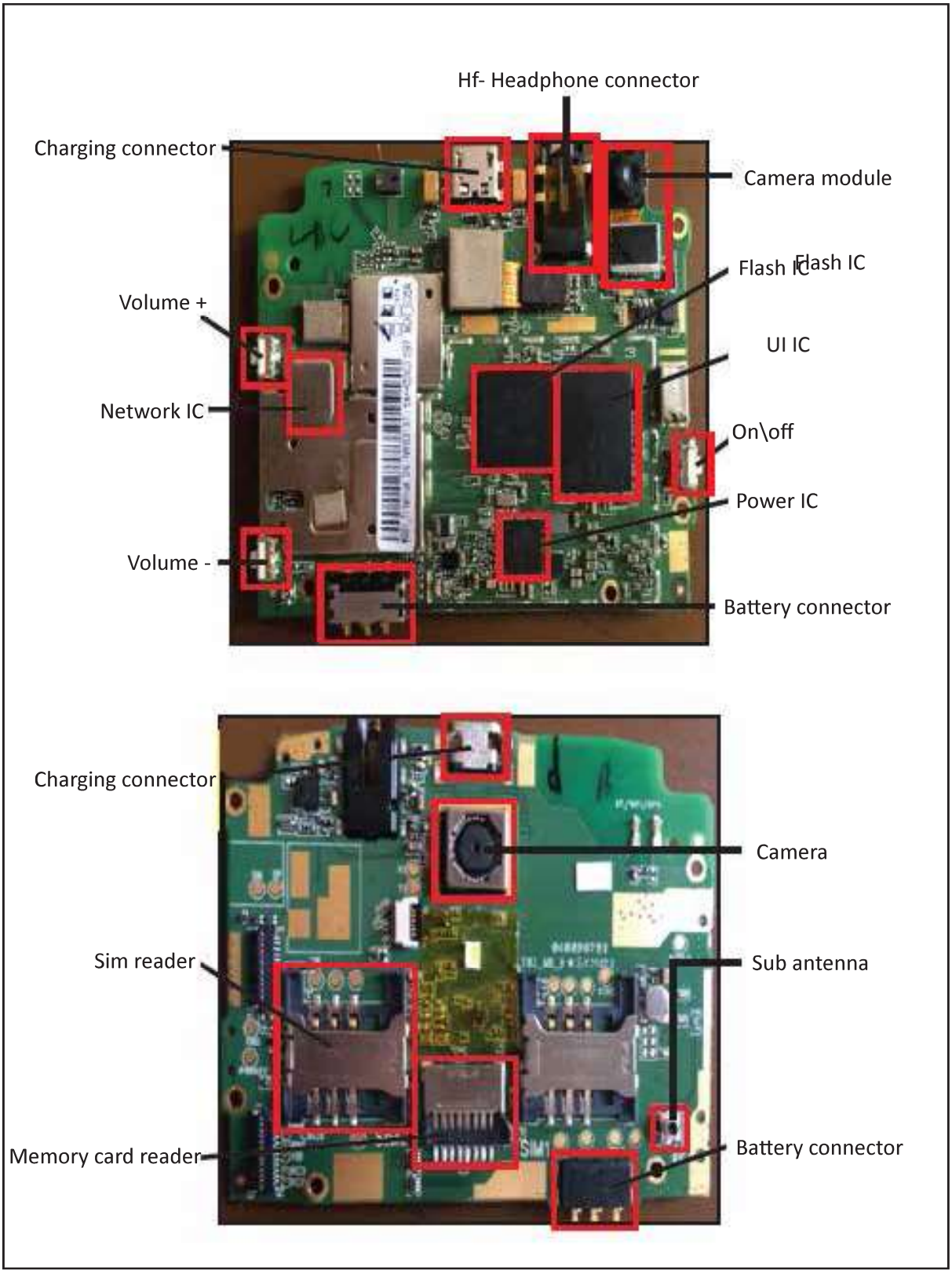


Fig: 3.2.6.20 Android Board

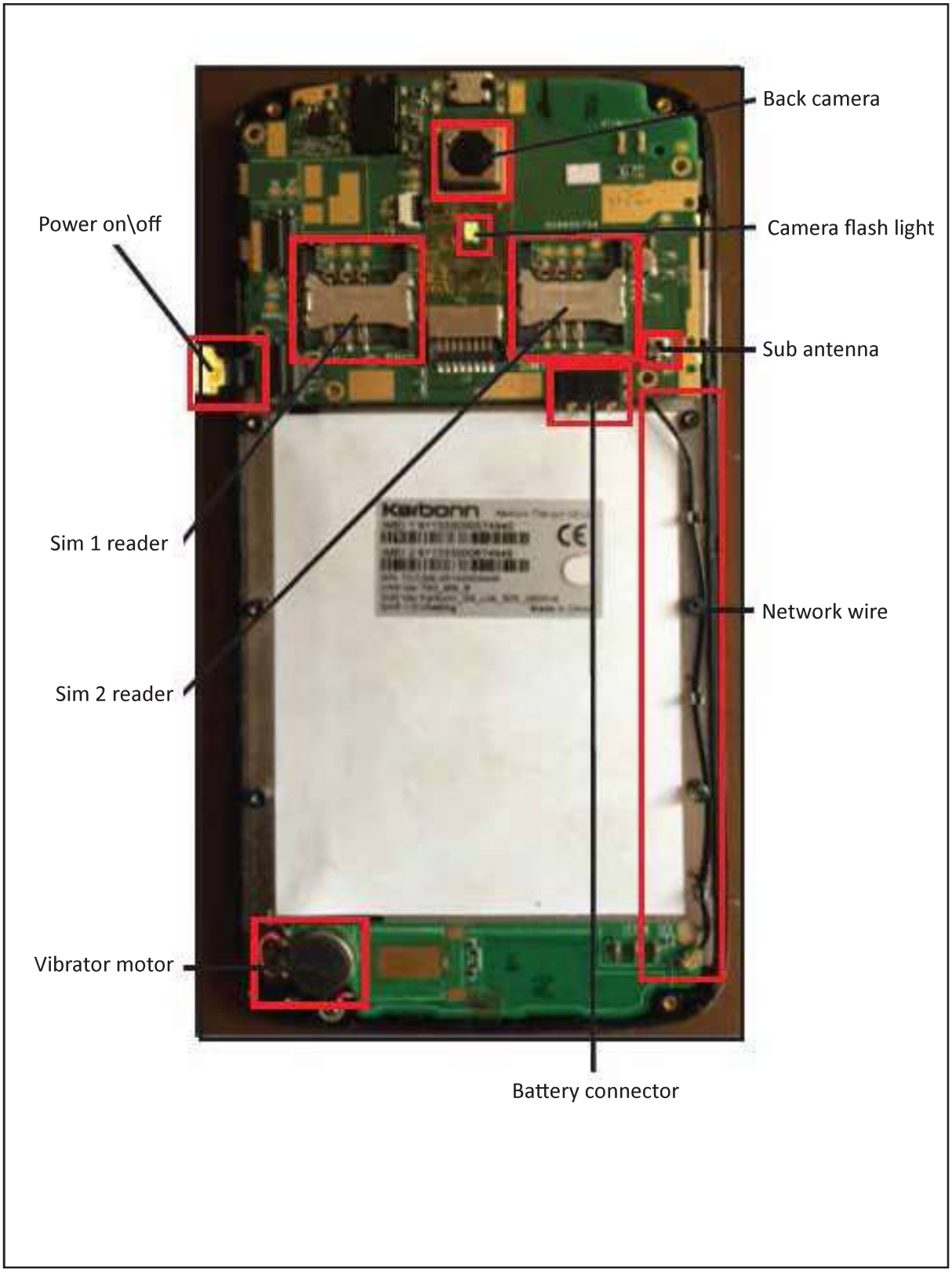


Fig: 3.2.6.21 Android PCB Board

Tablet PCB

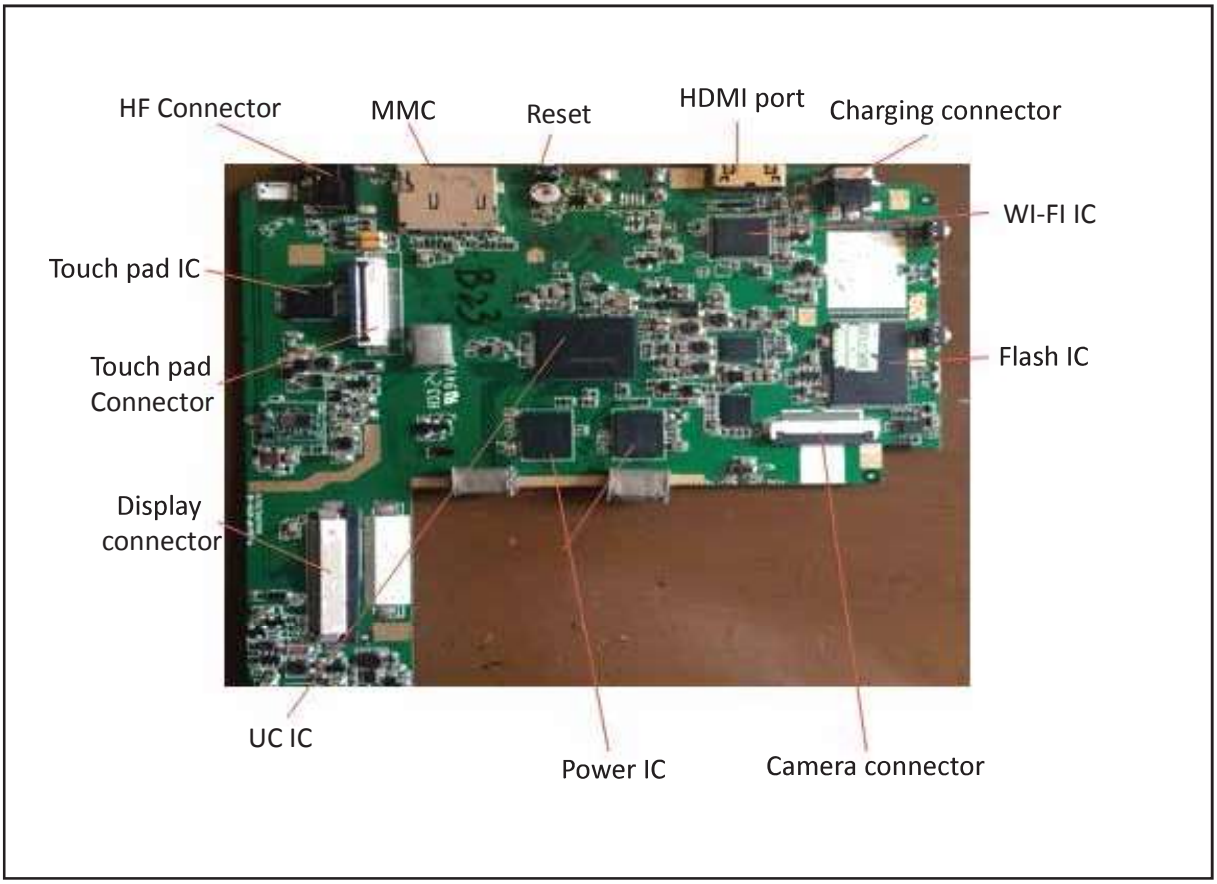


Fig: 3.2.6.22 Tablet PCB

3.2.6.14: Sample PCB of Various Brands & Models

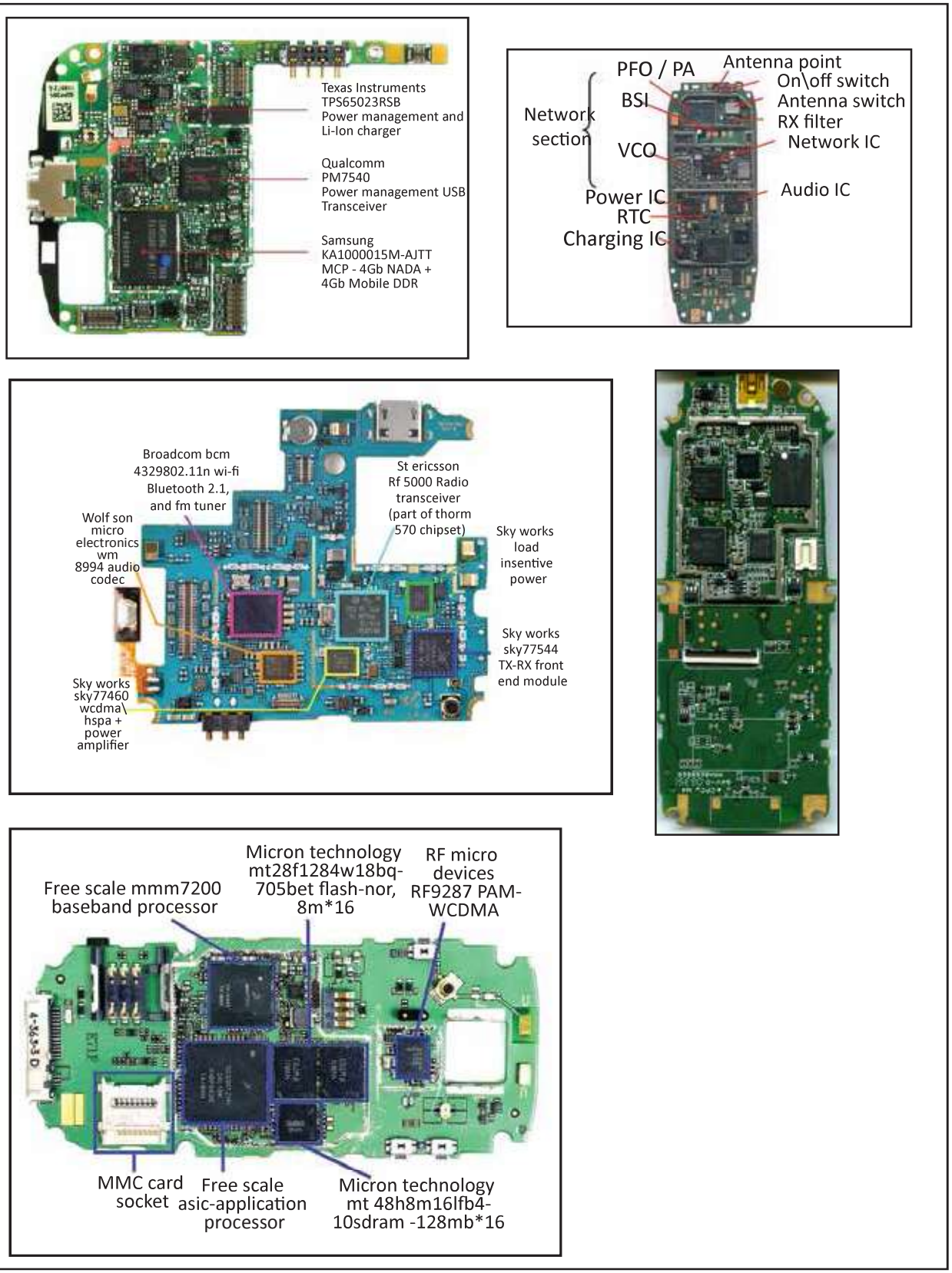


Fig: 3.2.6.23 Sample PCB

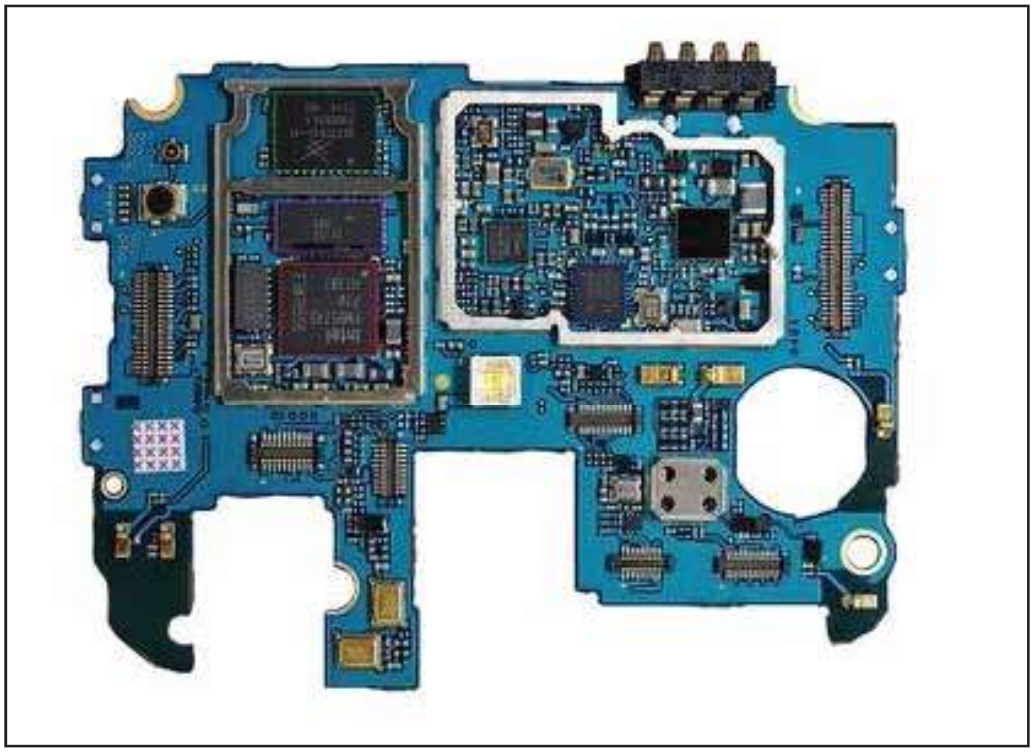


Fig: 3.2.6.24 Sample PCB - 1

3.2.7: Mobile Strips

1) Cable used to connect the front board and the back board is called Strip.

2) What if strip is damaged ?

- Button on front board will not work
- White, Indigo, Black & Zig Zag display
- Malfunctioning of Speaker, Ringer, Call drop
- Touchpad not working even after replacing
- Back board will show light but no display on front board

3.2.7.1: Types of Strips

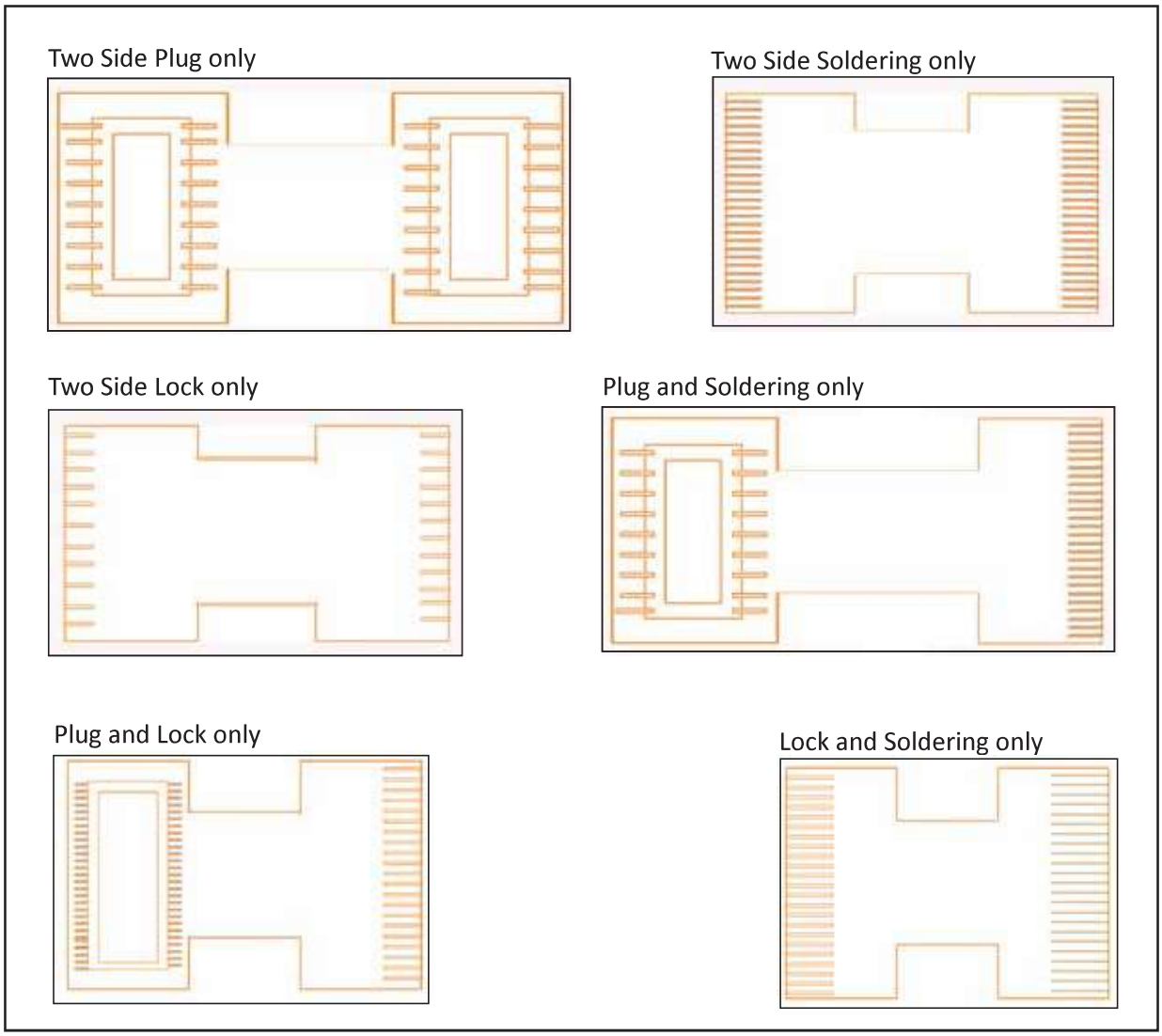


Fig: 3.2.7.1 Types of Mobile Strips

3.2.8: How to Test Components using Multimeter

Multimeter has three units namely:

1) Display
2) Section Nob
3) Port

Use of Multimeter

- To measure voltage and current
- To measure resistance
- To check continuity

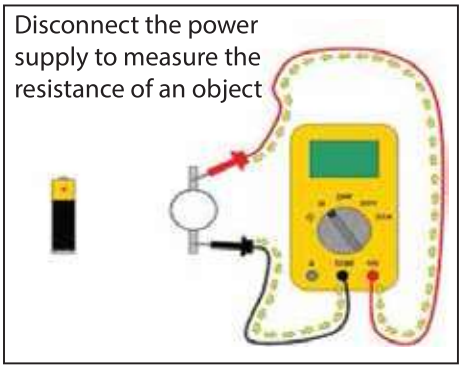


Fig: 3.2.8.1 Measuring Resistance

- It helps in testing and diagnosing problems in mobile phone. To make sure whether circuit as well as all switches are working or not.

3.2.8.1: Battery

- Battery supplys power to the mobile phone
- Earlier we were using Nikil-Cadmium battery. Size and weight of this battery was big and heavy
- Now days we are using Lithium Ion battery
- If your battery is showing full charge in relatively short time and also shows voltage more than or equal to 4.3 V in open of charging then it indicates that your battery may be faulty



Fig: 3.2.8.2 Sample Battery

3.2.8.2: Ear Speaker

- Ear speaker is used to listen to the voice communication over phone.
- How we can check ear speaker ?
- Select Resistance (Ohm) on multimeter

  Place both the probe of multimeter on both the point of speaker

  We can check it by two different methods



Fig: 3.2.8.3 Ear Speaker

Method-1 : Post placing probe resistance range between 25-30 Ohm. If multimeter is showing range infinity then speaker is faulty

Method-2 : Turn the multimeter knob in beep mode. If you can listen to the beep then speaker is working fine.

3.2.8.3: Ringer

- Ringer is used for listening to the ringer tone.
- Ringer is like speaker except that its resistance range is 8-10 Ohm.
- In some of the mobile phone ringer is also acting as speaker, in such cases, resistance range of the speaker is 8-9 ohm.

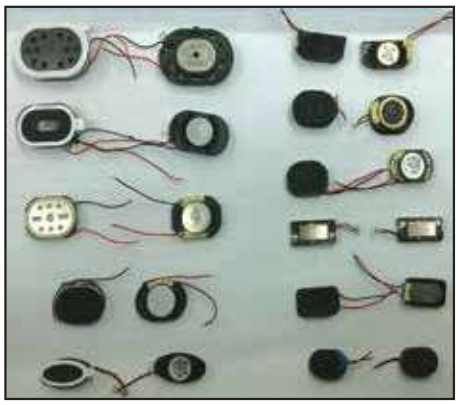


Fig: 3.2.8.4 Ringer

3.2.8.4: Mic



Fig: 3.2.8.5 Mic.



Fig: 3.2.8.6 Testing of Mic.

3.2.8.5: Vibration Motor

- Vibration motor is used by mobile phone for vibration alert.
- How to check vibration motor
- Change the knob of multimeter in Ohm range
- Touch both the end of vibration motor with multimeter probe. If reading is showing 15 Ohm or 35 Ohm or 39 Ohm, it means it is working. In-case it shows reading "0" ohm it means vibration motor is not working.



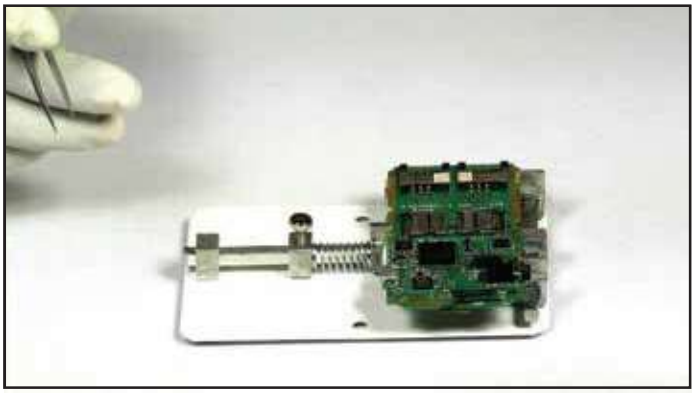
Fig: 3.2.8.7 Vibrator Motor

3.2.9: Soldering and De-Soldering Process

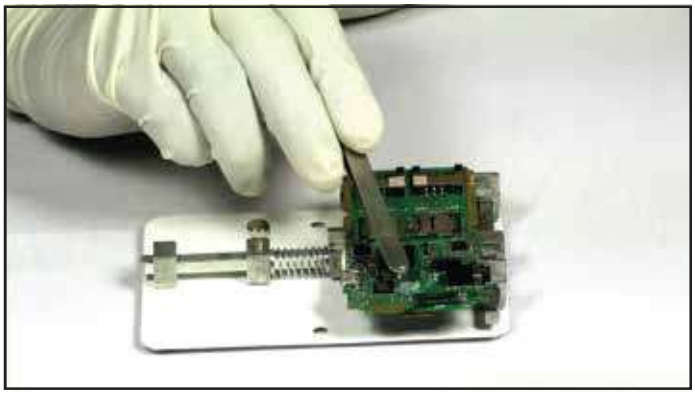
This section deals with soldering and de-soldering of micro component on PCB

3.2.9.1: Process of Soldering and De-Soldering of Micro Component on PCB

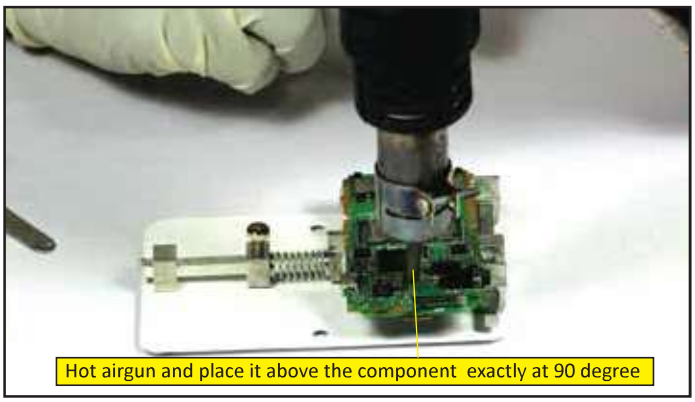
Step 1: In this section we are going learn how do the soldering and de-soldering processes of micro component on PCB like Ceramic capacitor, Resistor or coil.



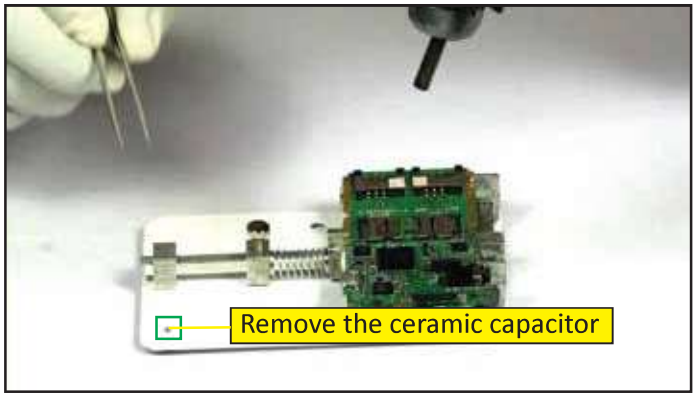
Step 2: It is simple to remove these types of components from motherboard if we follow systematic process and we can also solder it back easily.



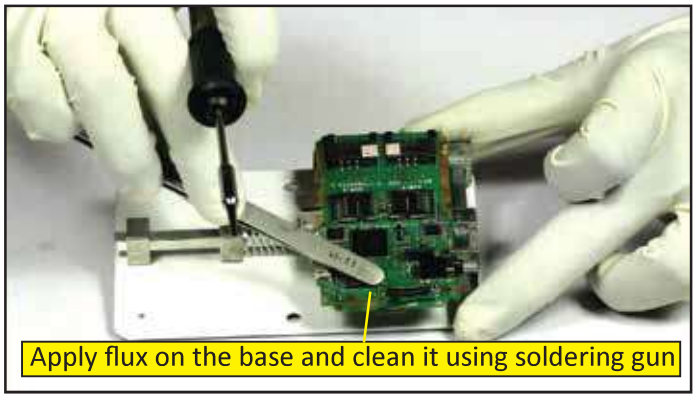
Step 3: Fisrt apply flux using tweezers on the component we need to remove. Now switch On hot airgun and place it above the component exactly at 90 degree. Now we can see this component can be separated easily from the motherboard. Remove the ceramic capacitor and keep it in safe place. Now Switch Off the hot air gun.



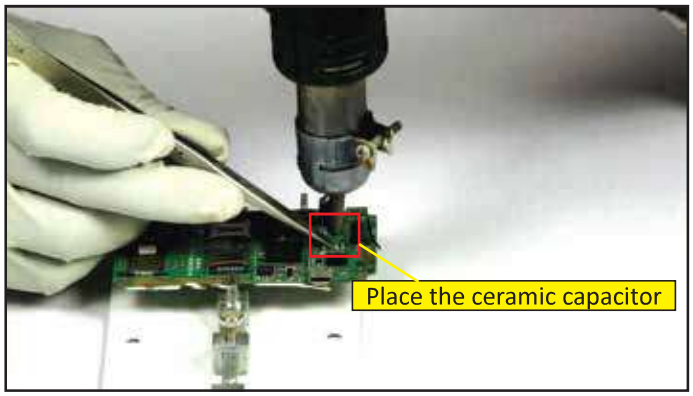
Step 4: To resolve the problem of battery discharge or battery blown or auto switch Off, we will use IP and Elmaa liquid to wash the motherboard. After drying the board using hot air gun we will assemble it back properly and after that switch it On.



Step 5: This is the base from where we can remove ceramic capacitor, apply flux on the base and clean it using soldering gun. Now we have to place the ceramic capacitor back to it's location. Point the hot air gun to the location where we have to place the ceramic capacitor.

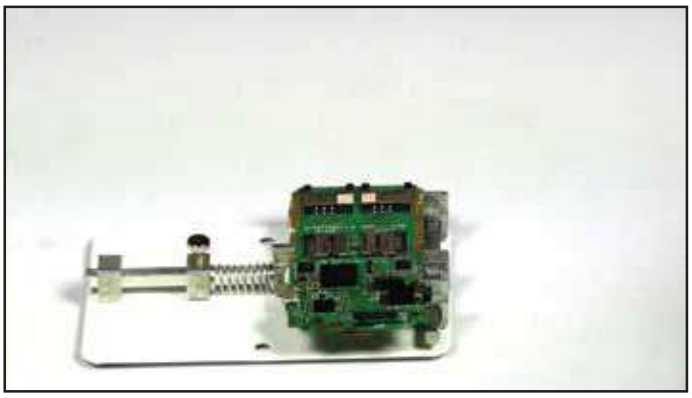


Step 6: Now we have assembled ceramic capacitor properly to its location using hot air gun. This is called soldering and De-soldering process.



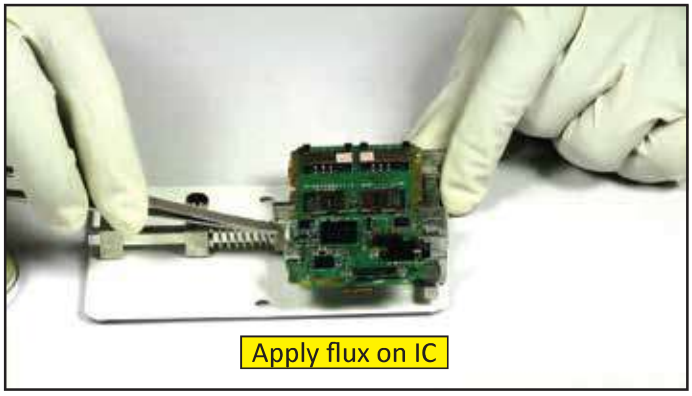
3.2.9.2: How to Remove and Place IC on PCB

Step 1: Now we are going to learn how to remove and place IC on PCB.

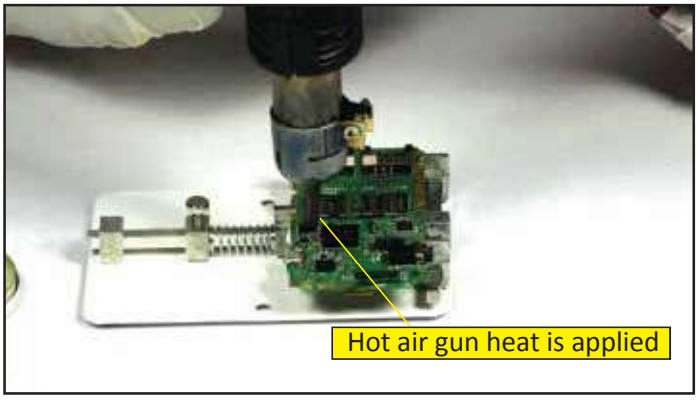


Step 2: The process we are demonstrating on this PCB can be done on any types of PCB.

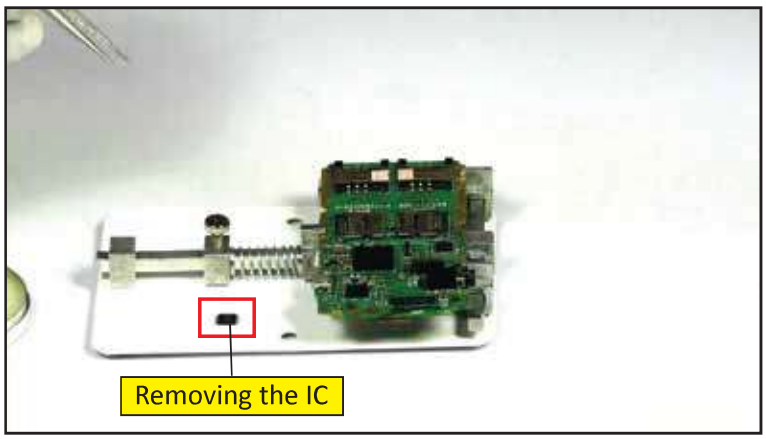
We need to be very careful while holding the gun it should be straight on top of IC or any other component in 90 degree angle and have to use good quality of tweezers which can helps us to lift any small components easily. Solder gun should also be of good quality so that we can perform soldering and de-soldering process easily with good finishing.



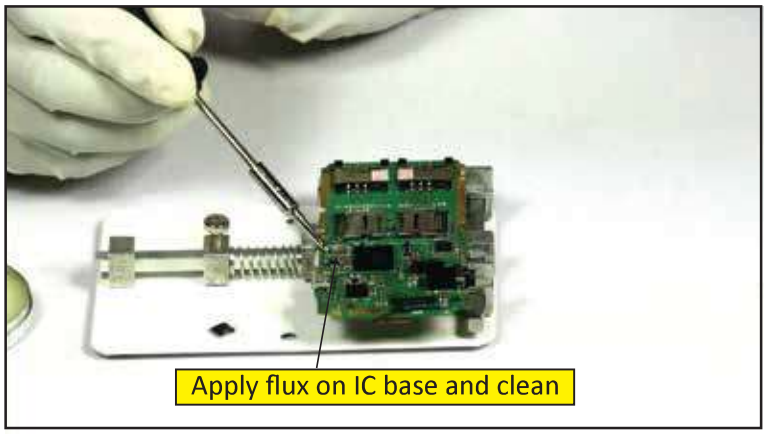
Step 3: Now we will remove this IC using hot air gun. As you can see I have hold the hot air gun at 90 degree angle on top of the IC. Now rotate the hot air gun in anticlockwise direction on top of the IC to make sure heat is applied on all sides of IC so that it will become easy to remove it. You can see I have removed this IC and kept it aside.



Step 4: While removing the IC always mind the (.) Dot mark which is on top of IC, it help us to show right direction. While removing observe the (.)Dot and while placing it back make sure (.)dot is on same location. If IC is placed in a wrong way on PCB it will cause shorting on the mobile and it may lead to permanent damage to the PCB.

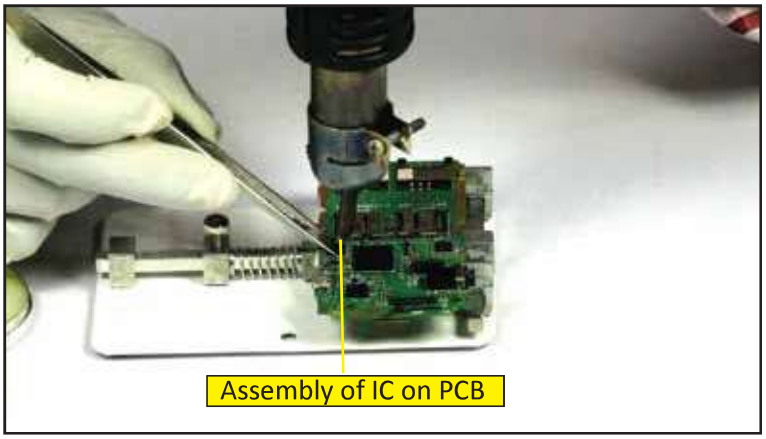


Step 5: Now inorder to place the IC back, we will apply flux and with the help of soldering gun try to do the re-soldering. At first we will clean all the legs then after apply flux on IC base and clean it properly.



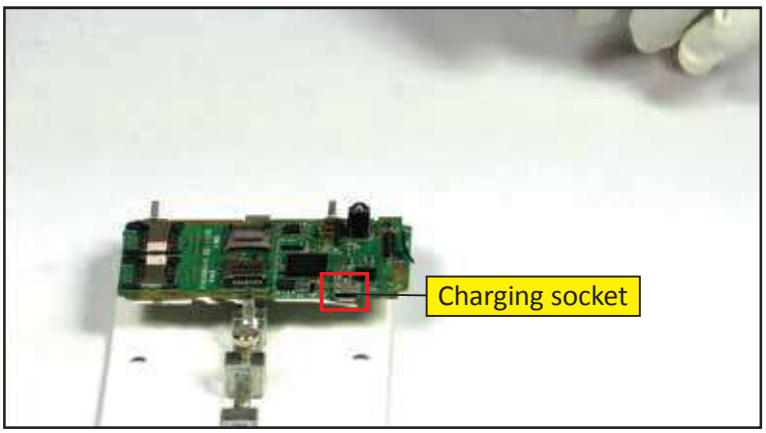
Step 6: We will assemble the IC back to its location from where it was removed. Apply heat at base of IC using hot air gun so that base will become thin. It will help us to do the assembly of IC on PCB.

Now we have assembled this "leg type IC"

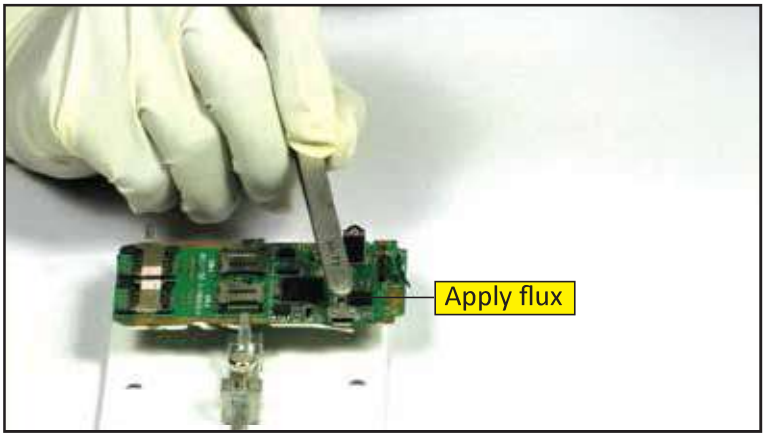


3.2.9.3: Charging Socket Soldering and De-Soldering on PCB

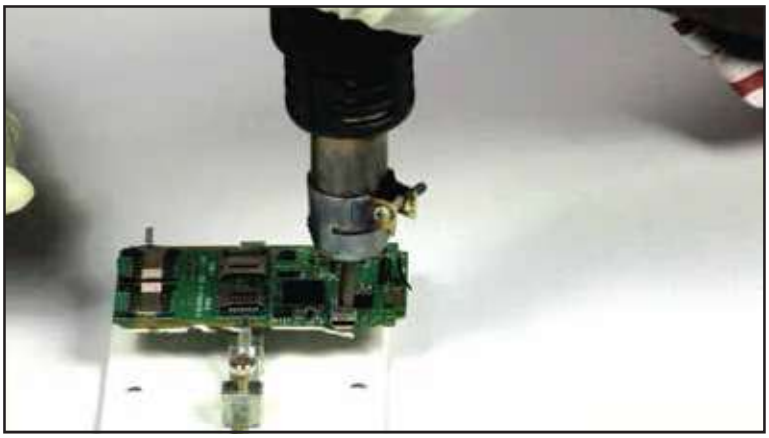
Step 1: Now we will learn how to remove and assemble charging base which is also called charging connector or charging socket and how to do soldering and de-soldering process.



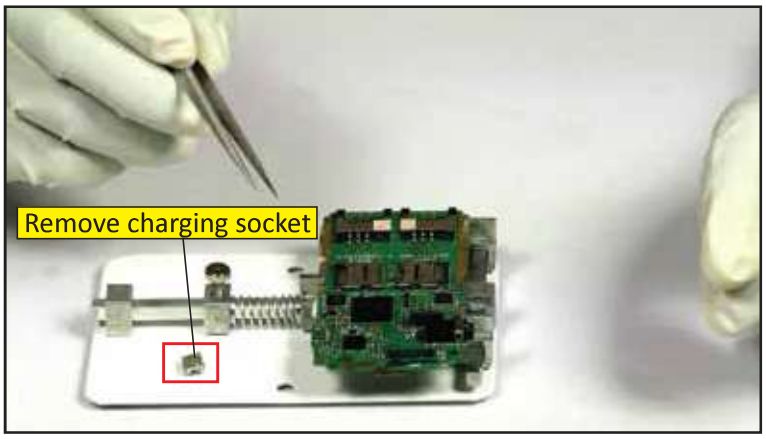
Step 2: Now we will see how to use hot air gun in this process. Switch On the hot air gun and place it on top of component we have to remove and apply flux on base so that component can be removed easily.



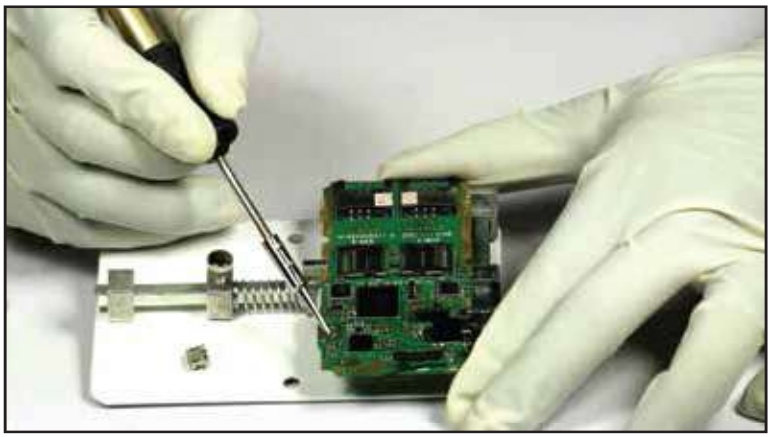
Step 3: Now we will rotate the hot air gun close to charging socket in half circle. Make sure air should be less while doing this process as it may damage other small components in the surrounding area on the Mother board.



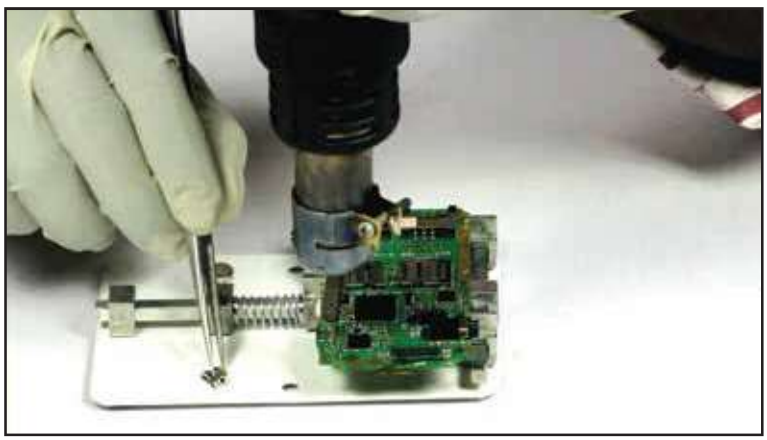
Step 4: Now you can see we have remove this charging socket from PCB. This is the lower portion of charging base where it is getting soldered.



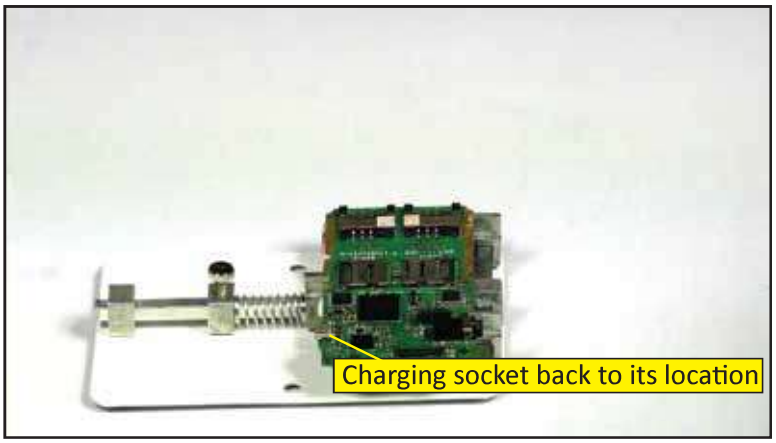
Step 5: Now apply flux on base and clean it properly using soldering gun. Even we are assembling new IC on board, we should first apply flux and clean the base so that it will become easy to assemble it using hot air gun.



Step 6: Now we will apply heat on the base using hot air gun so that solder will melt and become thin. Once it melts we will place the charging socket back to its location.



Step 7: Now we have assembled the charging base and as you can how easily it is assembled.



3.2.10: Process to Test Dead Mobile Phone

Today we are going to learn testing process of a dead android mobile phone. First of all we will open the dead mobile phone and take the PCB out. Now you can see this is PCB. We will test the motherboard with the help of multimeter and try to identify and resolve the problem in mobile phone.

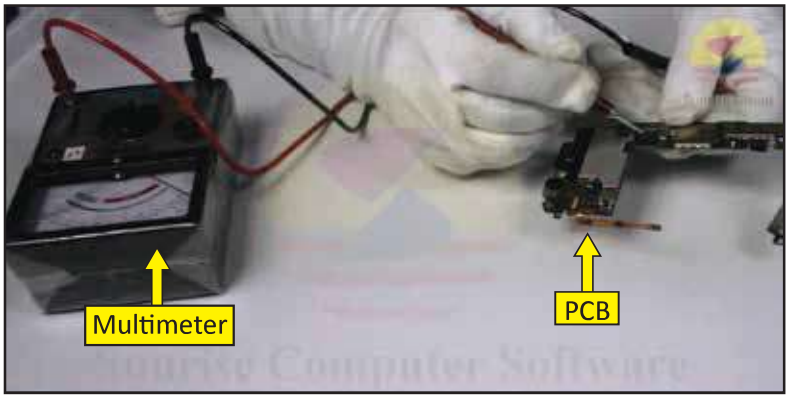
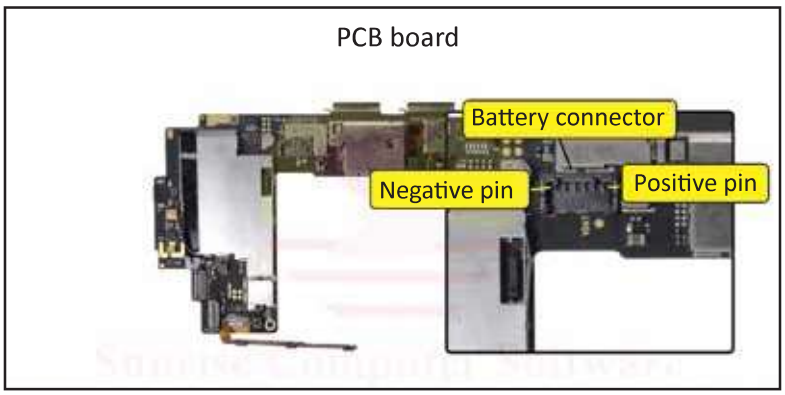


Fig: 3.2.10 Testing of Dead Mobile Phone

3.2.10.1: Systematic Process to Test Dead Mobile Phone

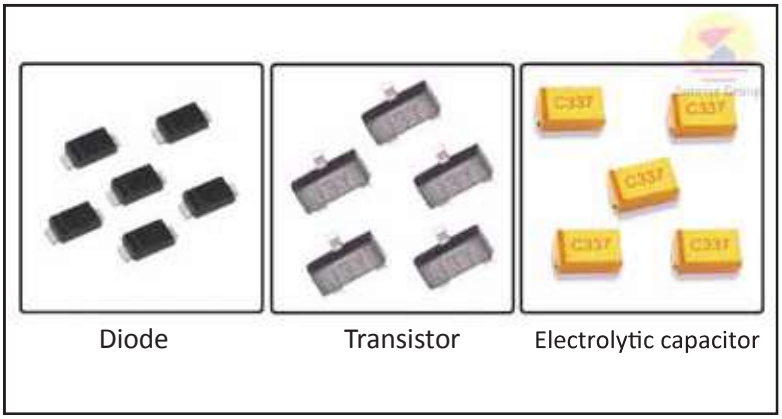
Step 1: First check the continuity of battery connector of motherboard. This helps us to identify whether the problem in mobile phone is related to hardware or software. We are going to test battery connecter continuity on the battery connector's pin. This mobile is having 2 pins for positive (+) and two pins for negative (-).



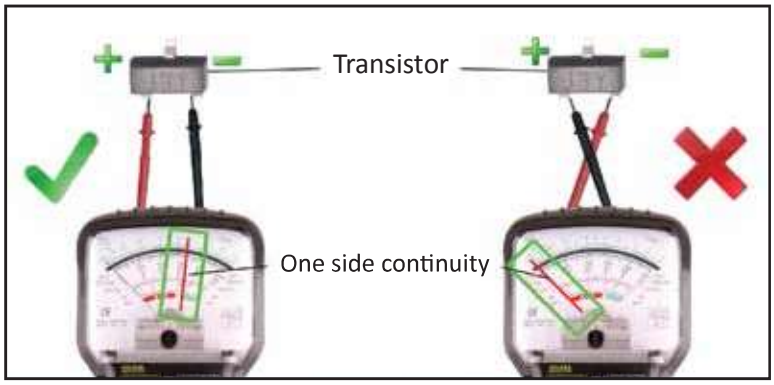
On multimeter it is showing continuity as it is showing multimeter pointer moving forward, it means supply is going from positive to negative. If we change the multimeter probe in reverse direction, multimeter pointer will not move forward. In case pointer is moving forward, it means mobile is having some hardware problem.

As you have seen we have checked battery connector pin by reversing the multimeter probe and multimeter pointer was not moving, this clearly indicates mobile is not having any hardware problem and also there is no shorting in any components of the mobile phone.

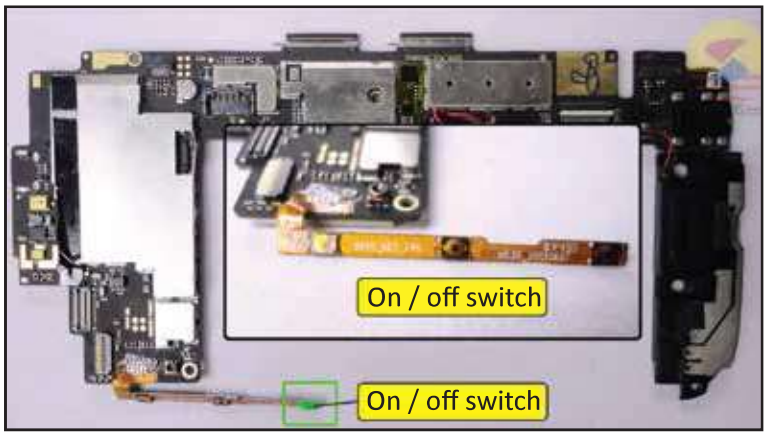
Step 2: Now we will do physical inspection of PCB to make sure any of the components is not looking black or burnt out.



Step 3: Now we will test components like Diode, Transistor, Regulator Module, Electrolytic Capacitor etc.. weather it is working or not. Diode, Transistor, Regulator Module, Electrolytic Capacitor are the generic components and available in types and brand of mobile phone.



Step 4: We will test the continuity of these components; all these components during test process will show one side continuity. In case any of these components are showing both side continuity this means that particular component is faulty and we need to replace it. After replacing the component probably problem will be resolved and we can turn dead mobile to working mobile phone.



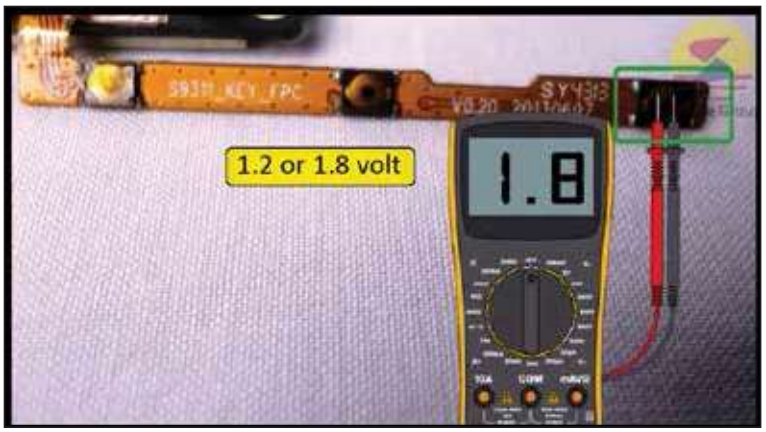
Now as we can see battery connector of this mobile phone is proper, board is also proper as there is no mark of repairing or burnt component thus we can say we are giving proper service to this mobile and we can make it operational.

This mobile battery is showing voltage and also not receiving charge. This means due to reduce Ampere capacity battery is not in a position to accept voltage capacity thus not getting charged.

Now we will place new battery in the phone and will try to switch it ON. After that only we can do the power testing because for power testing we need charged battery connected to the mobile phone. We will test the On/Off switch.

Step 5: Remove the plastic cover which is on top of ON/OFF switch and inside the plastic cover we can see the power supply point. We can test this point with the help of multimeter to ensure battery supply on the point.

IF we test On/OFF switch point, it will show 1.2 or 1.8 volt. If power switch point is showing power supply we can switch On the mobile phone.



Step 6: As we can see there are dust particles in the mobile. Headphone and Microphone areas are also having dust particles. Antenna socket and speaker is also having some spots. This visual inspection tells us there is a high level of dust and humidity in the mobile phone.



In such case we need to do the servicing of the mobile. We have to use Elmaa and IP liquid used to wash the PCB. First we need to remove all metal cover and then start washing the PCB.

Step 7: Now we have to reassemble all the parts of mobile phone.

Once all the parts are reassembled we can switch it on and test it again. In more than 90% cases mobile will start working



3.2.11: Servicing Mobile Phone Having Water Inside

Step 1: When mobile phone falls in water, take it out immediately and shake it so that water should come out. Make sure not to press any of the buttons on the mobile phone.

Step 2: Then remove back panel (back cover) of the mobile phone.

Step 3: Now remove battery of the mobile phone so that mobile get's switched Off immediately. It is necessary because when battery is connected it gives supply to the mobile phone and in such situation in case

"ON" button will be pressed, it can cause shorting on the motherboard especially to the areas having presence of the water particles and can cause permanent damage also.

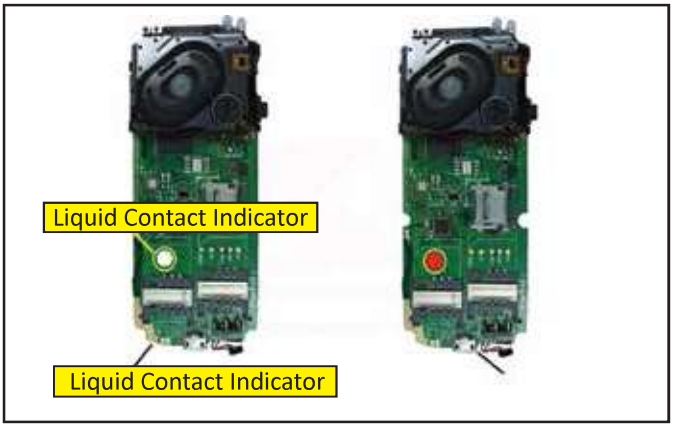


Step 4: Now remove SIM card from the mobile phone.

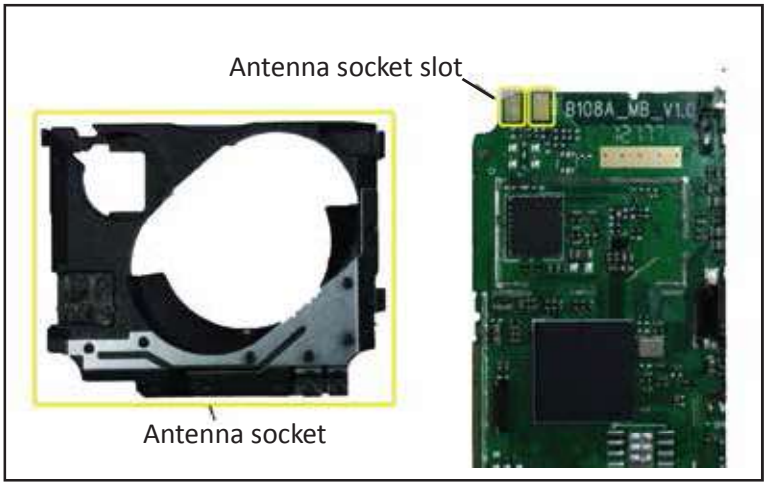
Step 5: Now remove all screws from the body of the mobile phone and open it slowly to remove the front panel. Once the mobile is open we can see the presence of water particle on the display, front panel and speaker areas.



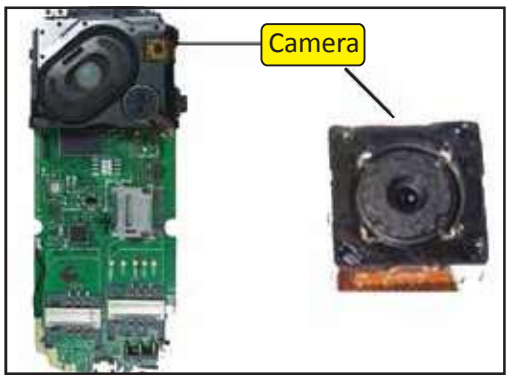
Step 6: Now remove motherboard from the middle body. Motherboard of all brands and model mobile phones having one white paper called "Liquid Contact Indicator" paper. Once it comes in water contact, its colour change to Red. This helps to detect problems due to water at the service centre.



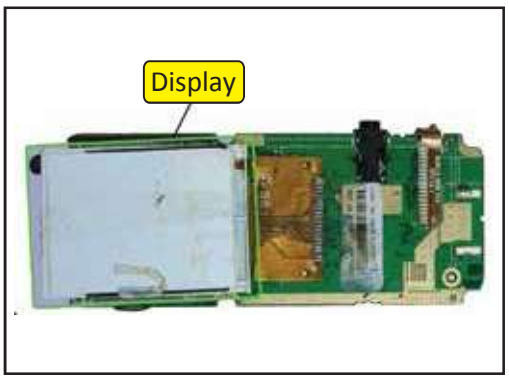
Step 7: Now remove antenna socket which is at back side of the mobile phone.



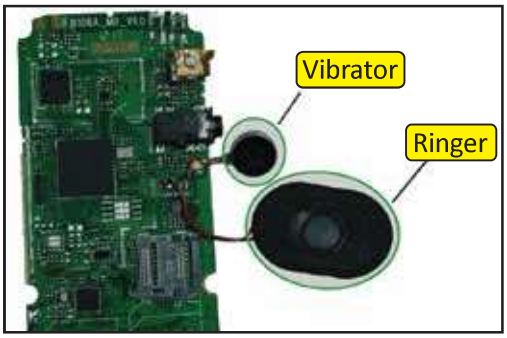
Step 8: Now remove camera



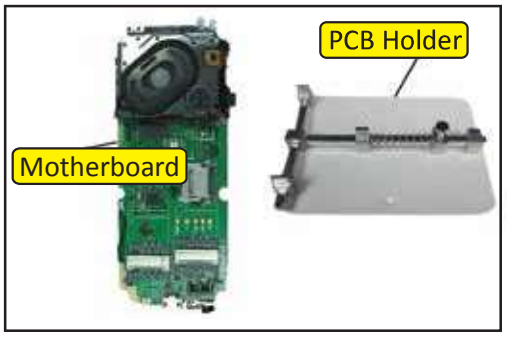
Step 9: Now slowly lift the display



Step 10: Now we have to remove ringer and vibrator from PCB



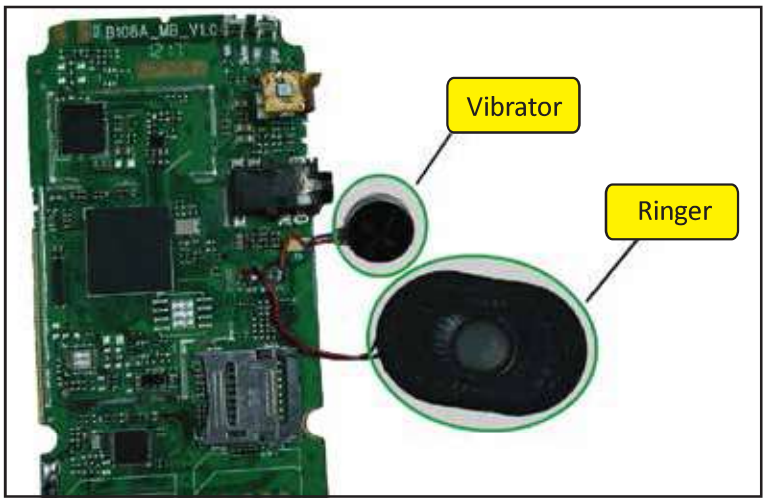
Step 11: To remove parts from mother-board set the motherboard on PCB holder



Step 12: Now remove speaker and ringer form motherboard. First remove vibrator using hot air gun and same way we will remove vibrator



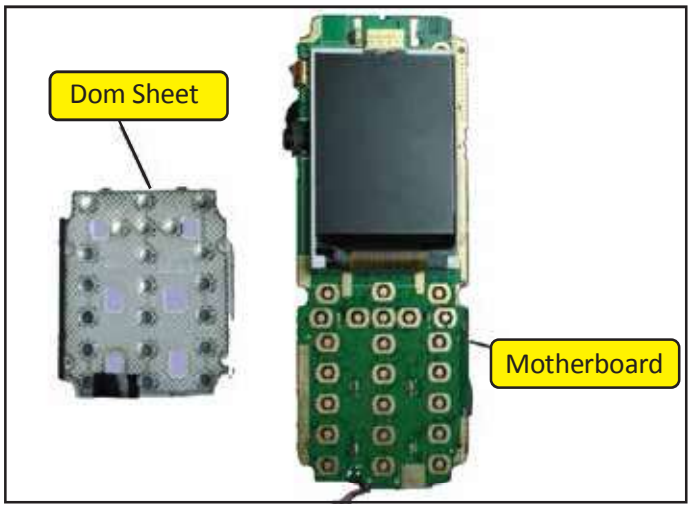
Hot Air Gun

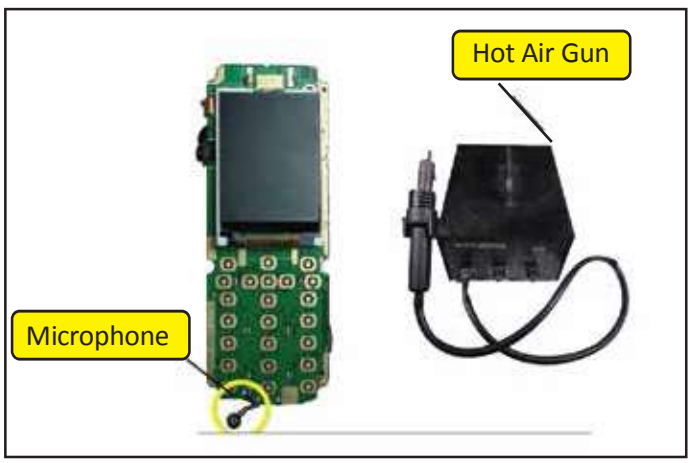


Step 13: Now remove motherboard from PCB holder and remove middle keypad (Dome Sheet) using tweezers

Step 14: Now we have to remove Mic. And display using hot air gun. Lower end of display is connected on to the mother-board. Pull the display slightly upwards as it helps to remove display using hot air gun. Be-careful while doing this process and do not apply any force. Now place the moth-erboard back on the PCB holder.

Step 15: To remove MIC apply soldering paste on Mic. using tweezers and using hot air gun remove Mic.





Step 16: Now we have to remove display very carefully as display solder is very fragile. Never apply pressure while putting or removing Display. Apply heat using hot air gun and very slowly remove it. Before using hot air gun we should apply soldering paste at display solder location. Post applying soldering paste, hold the display and apply heat from one corner to another corner. Due to the effect of the heat display will slowly detach from soldering point. Post removal of display, we can see all the pins on display strip and motherboard are intact.



Step 17 : Now remove motherboard from holder

Step 18: Now we have to service motherboard using I.P.A and Elmaa liquid.

Step 19: First apply Elmaa liquid on the motherboard and clean the board using brush. It helps to clean dust and moisture from the motherboard.



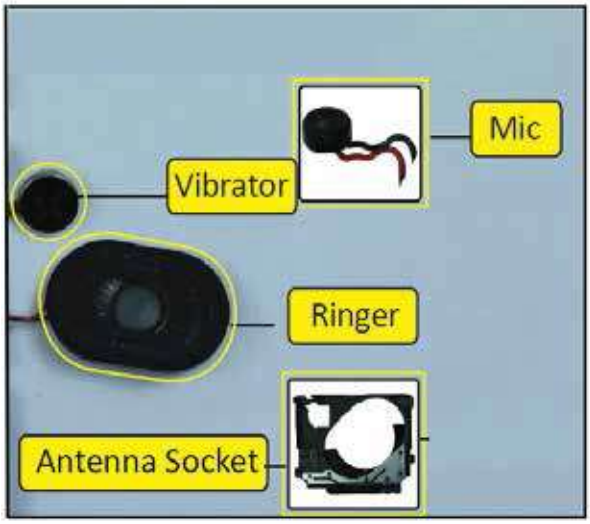
Step 20: Now turn the motherboard and repeat the process with Elmaa liquid on back side of motherboard also.

Step 21: Now wash both side of the motherboard properly using I.P.A liquid

Step 22: Now dry the motherboard properly by applying heat using hot air gun. Once front side is dry turn the motherboard and dry the back side also. Post drying process check the motherboard very carefully to make sure it is not wet at any point on either side. In-case we find wet spot dry it back using hot air gun.

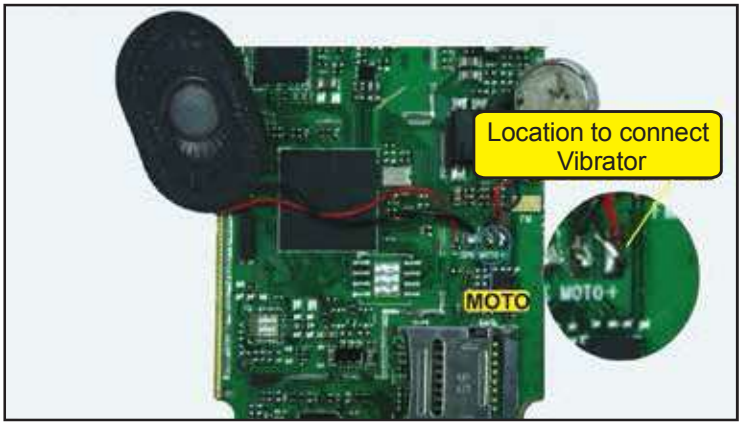


Step 23: Now we have to do the fitting of all parts which were removed, one by one and for that again place the motherboard on motherboard holder

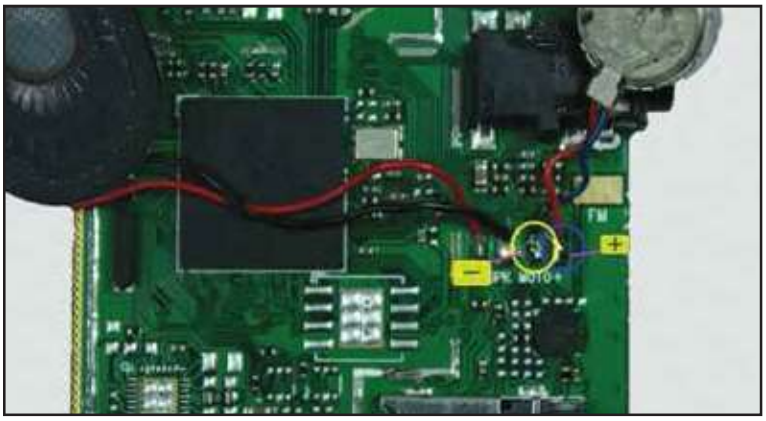


Step 24: Now we will connect speaker. Location from which speaker was taken out having text marking SPK which indicates speaker location next to that location we can see text MOTO, it means Motor Vibrator. This indicates place to connect Vibrator. Text marking helps us to locate part's location on the motherboard. Now we will place both the parts at their respective locations.





Step 25: Be careful while soldering the wire, always connect positive wire with positive pin and negative wire with negative pin. Location for positive is marked with "+" where as negative is marked with "-" sign.

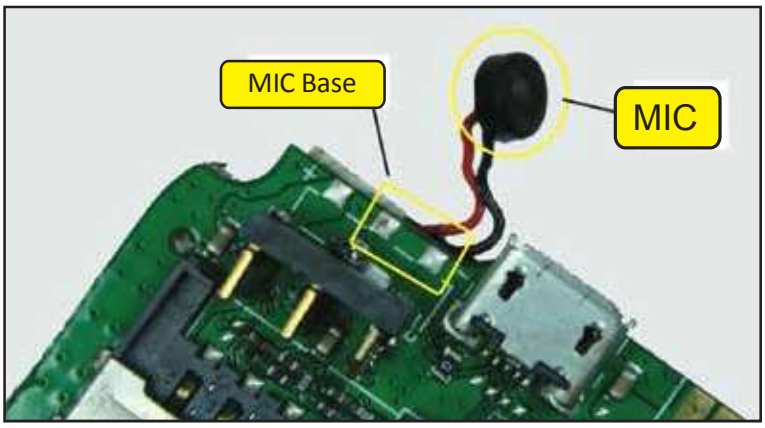


Step 26: Before soldering the wire apply small amount of soldering paste on its base. Then do the soldering of negative wire first and then after positive wire. Make sure to use good quality of soldering iron for better result.

Step 27: Now we have to do soldering process for Vibrator and Ringer.

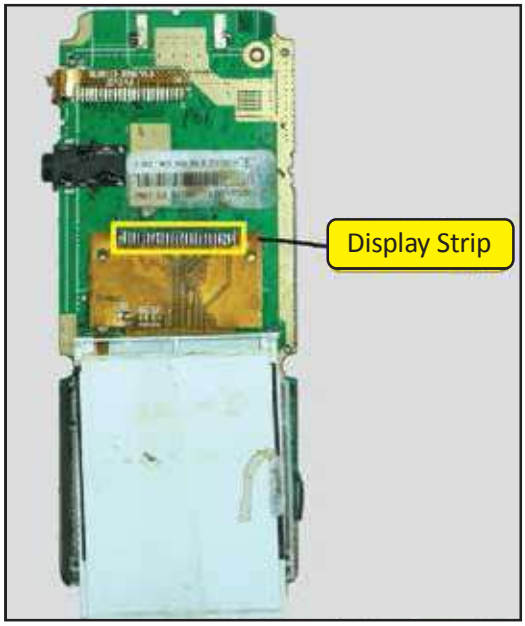
Step 28: Now we have to connect MIC. MIC is getting connected at front end module and for that we need to turn the motherboard and place it PCB holder.

Step 29: This is the base of MIC and it is an universal MIC which can be connected in many types of mobile phone. First apply small amount of soldering paste on the base and then with the help of soldering gun connect the MIC with the board.

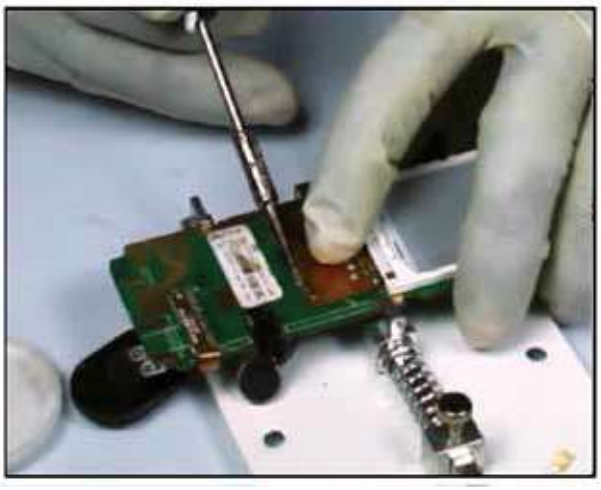


Step 30: Now we have to connect display and for that first we apply soldering paste on the base and clean the base using soldering iron so that we can do the soldering without any difficulty. Now we have to apply soldering paste on motherboard display pins and clean it using solder gun.

Step 31: Now we will do the soldering process of display pins. Initially We need to do the soldering of first pin and then last pin and then after we have to do the soldering of all pin one by one. We will again do the soldering of first and last pin, if we are not getting better solder result then clean the pin and apply little bit solder wire so that soldering can be done easily. Now apply soldering paste on rest of the pins so that we can do the soldering easily in small time. Benefits of applying soldering paste is that it doesn't allow the pins to be soldered together thus before soldering it is must to apply soldering paste. Now with the help of solder gun we wil do the fitting of display strip on motherboard.



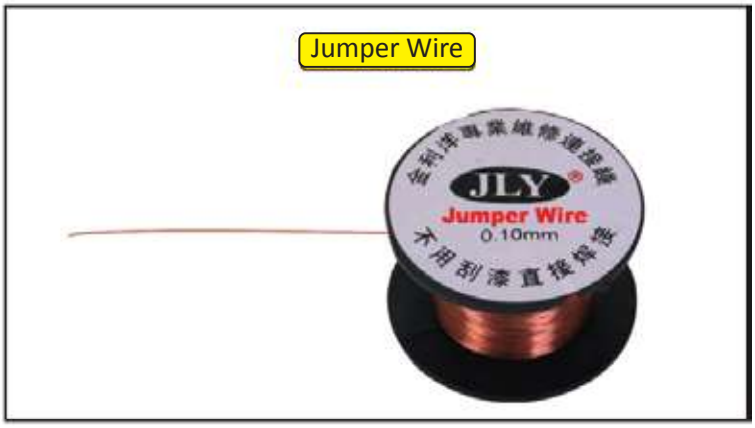
Step 32: Remove motherboard from holder. We have to now check whether post servicing and assembling this mobile is working properly or not and for that we will do the fitting of the middle keypad (Dom Sheet). Now connect battery in the mobile and try to switch it ON. As we can see the mobile is switched On this means we did the servicing of this mobile successfully. Now we will press the keypad button to make sure key pad buttons are working. Now this mobile is working properly.



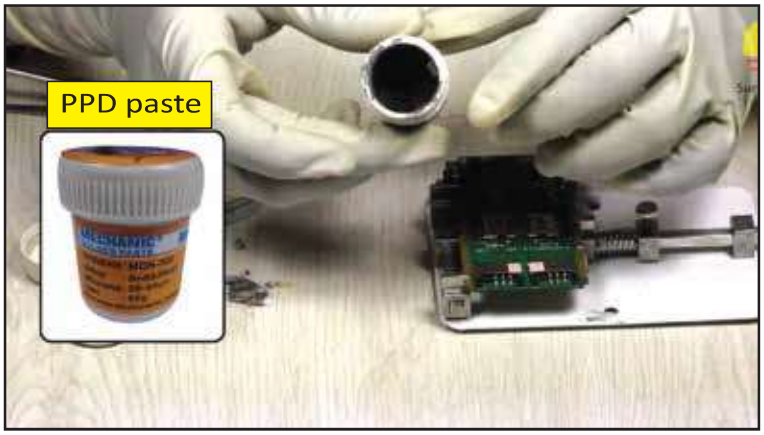
3.2.12: Jumpering Process

Step 1: During repair process of mobile phone we may need to do the jumpering process. In this section we are going to learn how to do the jumpering process.

When any track is broken in the mobile phone and need to connect it back, we need to do the jumpering process to connect the track and it is called jumper wire track. We are going to learn the process to reconnect the track.



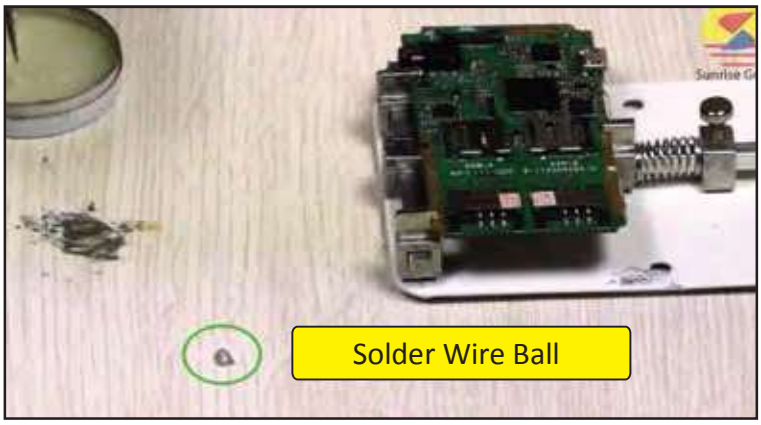
Step 2: Now we are going to learn how to do the jumpering process. As we have already discussed when any track in the mobile is broken and needs to reconnected we need to do the jumpering. The wire used in in jumpering process is a copper wire and called Jumper wire. Now we are going to do the jumpering process using copper wire.



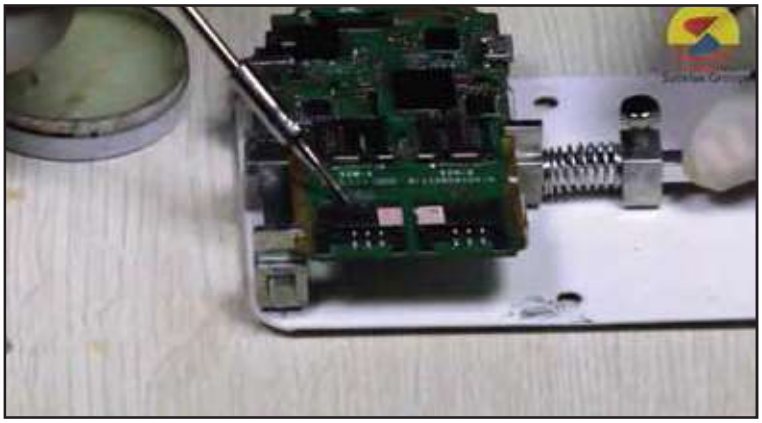
First of full we have to make soldering ball using PPD paste. In case we do not have PPD paste we can also make soldering ball using soldering wire.

Now apply little bit flux on the jumper wire and also on soldering ball we have made. Keep the jumper wire inside soldering ball so that plastic coating on jumper wire will be removed and it will be coated with silver solder. Now we can see the silver coating on one end of jumper wire.

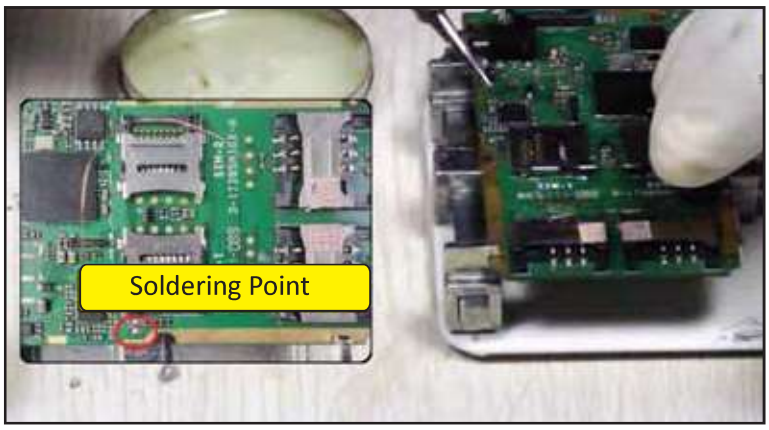
Step 3: Now we will apply PPD paste on another corner of the jumper wire and after that apply flux. After that put it inside PPD paste ball and now we can see this corner of the solder wire is also coated with silver coating. Now this jumper wire is ready for the jumpering process.



Step 4: Apply flux on the location where jumpering is to be done on the motherboard. Now we will apply flux on SIM tray. Then with the help of solder gun apply flux on the base of SIM tray to achieve better soldering result. Now we will do the soldering of one end of jumper wire. Hold the wire using tweezers and do the soldering process. Hold the wire for few seconds on SIM tray base for better result and then leave it.



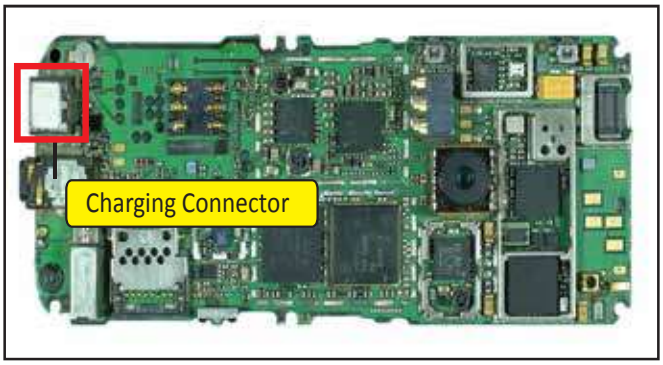
Step 5: Now we will use another end of jumpering wire to connect broken track. You can see silver base on this track. We will clean the base with the help of solder gun and then apply flux to do the soldering of another end of the jumpering wire. Here we can see we how we did the jumpering from SIM tray pin to base of track. This process is called jumpering



Mobile phone may face various problems like Ringer, Speaker, Network, charging etc.. In these types of problem if the track is broken, we can connect it back using jumpering process and resolve the problem.

3.2.12.1: Charging Connector Jumpering

Step 1: We are now going to learn charging connector jumpering. Usually charging problem in mobile is similar to other problems like phone not charging, not showing charging, even after charging battery get discharged very fast. We will first check charging points. There are two types of charging ??tender. First type is plug which is having tips



connected and another type is soldering which is using soldering process. Plug is having one (+) plus and another (-)minus point. We need to check the continuity of these points. To check it we need to use multimeter. Keep the black wire on ground and check with red wire. If this point is getting beep sound this means it is minus where as on another point it is showing reading that means it is plus point. If beep and reading both are observed that means charging connector is working fine.



Step 2: In case either of reading is not coming then for (-) minus part we can do the jumpering from any ground point. Minus (-) signs are visible on board at various locations but for plus point we need to search for its fuse first. Fuse is mainly located above the connector.

This is fuse. This fuse helps to restrict electricity flow inside and also protects from high power flow inside. In-case of mobile blast, first its fuse gets blasted thus protecting us from any damage. First check the reading on fuse point, mostly we will find reading at this point. If we find reading then for (+) plus point we need to do the jumpering from fuse (+) plus point. Apply flux on tips and fuse point . Cut the jumpering wire as per requirements. Rub the tip of one side of the jumpering point and do the soldering at the (+) plus point of the fuse.

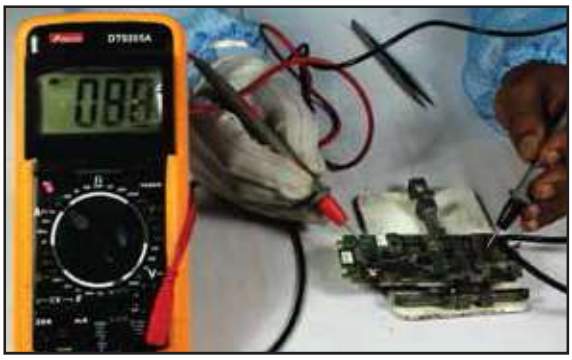


Step 3: Now check the reading from another end of jumpering wire, if it is showing reading then solder has been done properly. In case you will observe beep that means solder is not done properly. An we need to do proper soldering at this point. We have finished the soldering on fuse (+) plus point now do the soldering of another point of jumper wire at the tip of charging connector (+) plus point. Once the soldering is done test it out for proper connectivity.

By doing this process we can resolve mobile charging problem.

3.2.12.2: Jumpering of Speaker, Ringer and Mic





Step 1: In this section we are going to learn jumpering process of Speaker, Ringer and Mic. This is mobile ringer and you can see Mic on the lower side of the ringer.

First we will do the jumpering of the Ringer. This is (+) plus and (-) minus point of ringer. When we remove ringer and during removal process if track is broken or there is no supply on track, then we need to give supply on backward registration point. We have to search reading for (+) plus and beep for (-) minus. As we can see at this point it is showing reading and at this point it is showing beep thus we from here we can give connection to (+) plus and (-) minus.

We need to apply flux on the point then cut the required length of the jumpering wire. Then do the soldering of one end at (+)Plus and another end at (+) plus point. As you can see we, finshed the soldering of (+) plus.



Step 2: Now we are going to do the jumpering of (-) minus. Apply flux on (-) minus point cut the jumper wire as per required length. Connect one end of jumpering wire on (-) minus and another end on (-) minus point by proper soldering. Now we have given connection of (+) plus from (+) plus and (-) minus from (-) minus. Now place the ringer back to its designated location.

We can do the same process for Mic. As it is also having one (+) plus and (-) minus point. If we do not observe reading then we can give the connection of (+) plus and (-) minus from upward registration to get the reading.

For speaker also we have to do the same process as it is also having one (+) plus and one (-) minus point and we can given connection using same process from upward registration.

3.2.12.3: Headphone Connector Jumpering

In this section we are going to learn headphone connector jumpering process. Before doing the jumpering of headphone first we need to understand the problem.

Step 1: Headphone jack connector may be damaged – This problem can be resolved by replacing head phone jack. If even after changing the headphone jack in which headphone connector is getting connected is showing headphone sign but still not properly working then we need to do further testing to resolve the issue.



Step 2: Headphone track is broken – If the track of headphone is broken then we need to do the jumpering of headphone connector.

Step 3: Even after removing headphone jack mobile stay back in headphone mode in such a situation we need to do the jumpering of headphone connector.



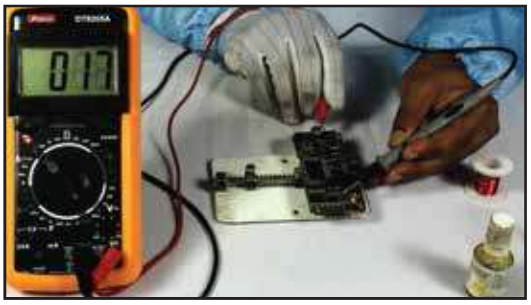
Step 4: Usually there are eight tracks of headphone connector, some headphones are having 6 tracks also. Out of these tracks there are two main tracks. We need to test this track using multimeter. While testing we need to observe reading on multimeter. This track is (+) plus and the track giving beep is (-) minus. This means in main track this is (+) plus and this is (-) minus.

If even after changing headphone connector we are not getting (+) plus and (-) minus track then we need to connect these track together.

In this headphone jack we can see the reading. This point is showing reading, it means it is (+) plus and on this point it is showing beep this means it is (-) minus. If beep is not coming from (-) minus point then we can give supply to this point from any ground point available on the board.

This is a ground point, from this track top second and second from the bottom are ground points. All these First, second, third and forth points are (+) plus points. Without doing anything with ground we have to give supply to (+) plus. We have to give supply to (+) plus from these registrations. We need to search (+) plus point from this number 2 registration. This is registration (+) plus . We need to do jumpering from this registration (+) plus point.

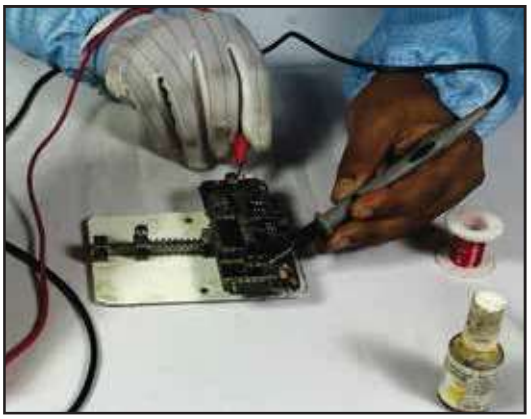
Step 5: In order to do the jumpering first we need flux. Cut the jumper wire using cutter and rub the end to remove plastic coating now cut the jumper wire as per required length. This (+) plus point needs to be connected to number 2 point. This is the solution for the first problem.



Step 6: In-case even after changing headphone connector, left side and right side is not working or sometimes left side is working whereas sometimes right side is working in these situation we need to check these two tracks, 2nd from top and 2nd from bottom. If left or right side is not working then we need to check these tracks.



Step 7: We are going to check these two tracks. From this point we can see the reading and also from number 2 we will see the reading. Now we need to give connection to these points. From the point of first register of charging IC to number 2 point and from registration first point to this number 2 point



connection will be made through jumpering. Exactly the same way we need to give connection from this point to that point and again for this point to that point we need to do the jumepring for connectivity. This is the solution we can do if even after replacing headphone connecter left side or right side is not working.

Now for the 3rd problem we need to connect these track with each other, this will resolve headphone mode marking from display and headphone will work properly.

3.2.13: IC jumpering

This section deals with types of IC jumpering in the mobile phone

3.2.13.1: Charging IC

This IC consist of 4 balls. Charging IC is always placed on top of charging connector. We cannot replace it but can do the jumpering process if required.

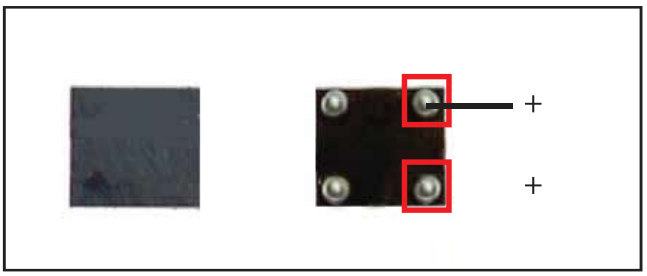


Fig: 3.2.13.1 Charging IC

3.2.13.2: Headphone IC

This IC is consist of 5 balls. Headphone IC is always placed on top of headphone connector. We cannot replace it but can do the jumpering process if required.



Fig: 3.2.13.2 Headphone IC

3.2.13.3: Light IC

This IC consist of 8 balls. IF there is no light in Display and Keypad, we need to change this IC as we can not do jumpering for this IC. This IC is located next to LED coil.

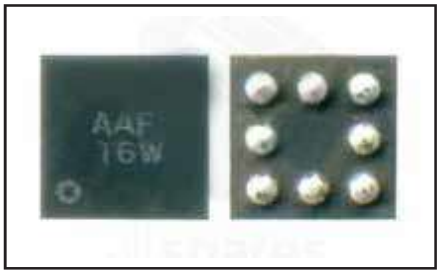


Fig: 3.2.13.3 Light IC

3.2.13.4: MIC IC

This IC consist of 8 balls. This can be changed and we can also do jumpering for this IC.

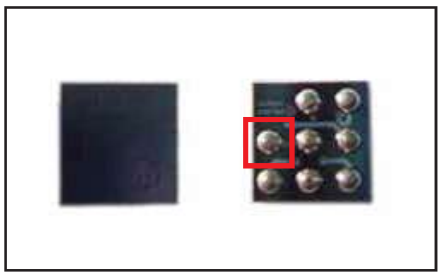


Fig: 3.2.13.4 Mic. IC

3.2.13.5: Ringer IC

This IC consist of 9 balls. This can be changed and we can also do jumpering for this IC. This IC is located on top of Ringer.

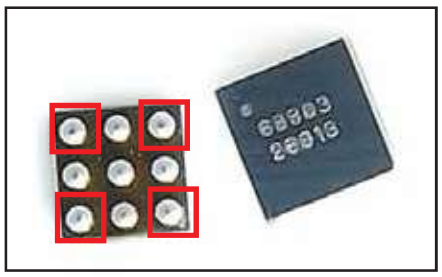


Fig: 3.2.13.5 Ringer IC

3.2.13.6: SIM IC

This IC consist of 8 balls. This can be changed and we can also do jumpering for this IC. This IC is located on top of SIM reader.

3.2.13.7: MMC IC

Types of MMC IC

Silver MMC IC

This IC consist of 11 balls. This is located next to SIM tray. This can be changed and we can also do jumpering for this IC.

Black MMC IC

This IC consist of 16 balls and located next to silver IC. This can be changed and we can also do jumpering for this IC.

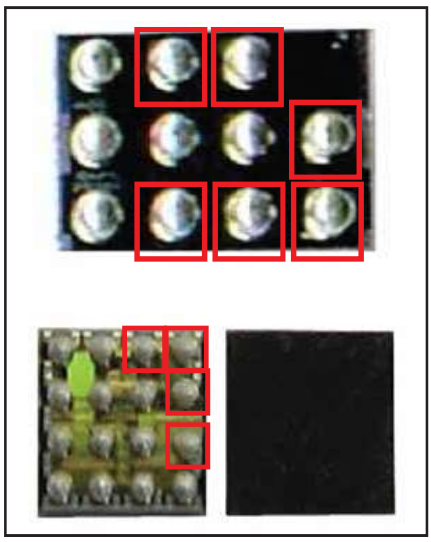


Fig: 3.2.13.6 MMC IC

3.2.13.8: Keypad IC

In case buttons are spoiled in a single line then this IC can give problem.

Normal Keypad IC

This IC consist of 24 balls and it is one of the basic component of mobile. This can be changed or we can also do jumpering for this IC

Regular Keypad IC

This IC consist of 24 balls. This can be changed or we can also do jumpering for this IC

Multimedia Keypad IC

This IC consist of 18 balls and this can be changed or we also can do the jumpering for this IC.

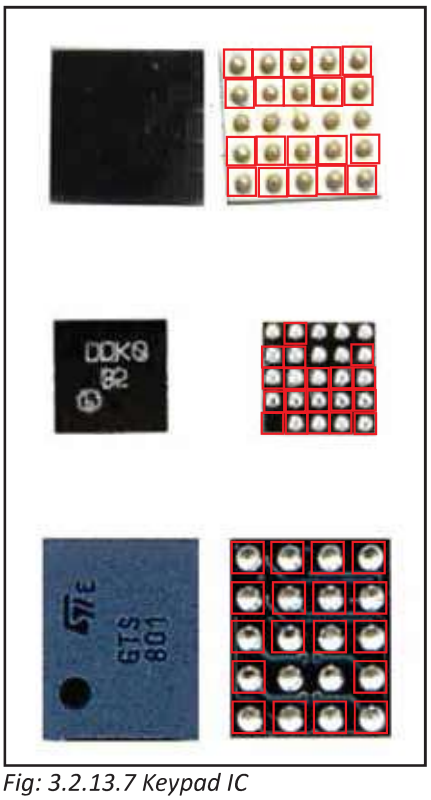


Fig: 3.2.13.7 Keypad IC

3.2.13.9: Display IC

Regular Display IC

This IC is normally available in old multimedia mobile phone. This IC consist of 24 balls and this can be changed or we can also do jumpering for this IC.

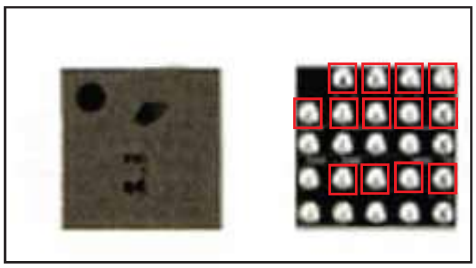


Fig: 3.2.13.8 Display IC

3.2.13.10: Certain Rules for Placing IC on Board

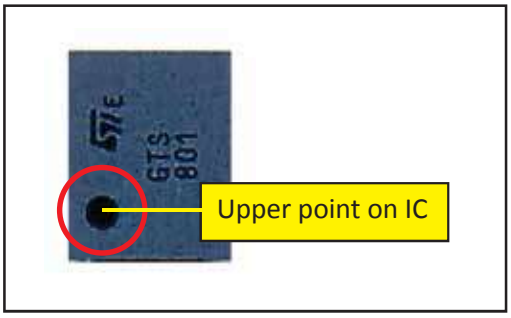
Step 1: We need to search the IC on mother-board and for that we can take help from any internet search engine. Search by model name and IC name and click on image result.



For E.g. If we have to search for SIM IC the go to internet search engine and in search bar type 3110 SIM IC type and search for the result.

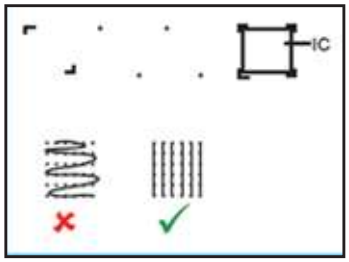


Step 2: Do not remove IC until and unless we understand the reason behind damage.

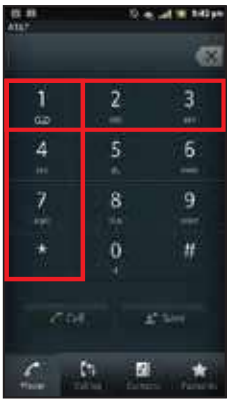


Step 3: Before removing IC, it is necessary to observe the upper point on IC as it will help to place it back.

Step 4: During placing IC on board next to IC you will observe that identification marks are inside IC

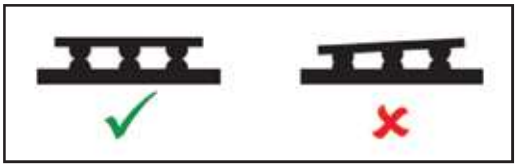


Step 5: If all buttons in the straight line are not working this means IC is faulty



Step 6: Make sure while removing IC surrounding components should not get damaged and to protect those components we can place thermal observant sheet on surrounding component

Step 7: Post removal of IC, we should clean the track of PCB board in one level otherwise IC may not work properly.



Step 8: While placing IC on board keep the heat / temperature of hot air gun at 350 degree Centigrade and to protect the IC from getting burnt, keep air off.

Step 9: If IC is not placed properly it may not work. Therefore before placing it we should clean it properly.

Step 10. While placing the iC give heat from hot air gun as per the requirements and also at right interval.

3.2.14: Types of Sensor

In this session we will are going to learn different types of sensors used in mobile phone.

Proximity Sensor – This sends infrared rays to identify whether mobile phone is with user or not.



Gesture Sensor – This type of sensor mainly reads the movement of body parts and works accordingly like Eyes, Hand etc...



Fig: 3.2.14.1 Gesture Sensor

RGB Light Sensor – This sensor measures the colour intensity of light like Red, Green, White etc... It is used in camera for light adjustment

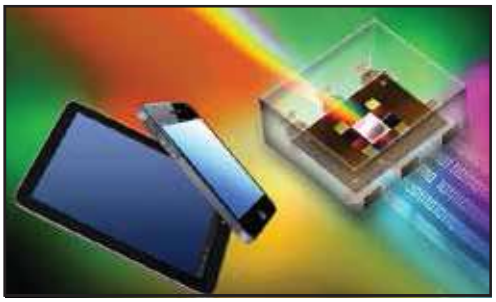


Fig: 3.2.14.2 RGB Light Sensor

Gyro Sensor – This sensor is used to sense the rotation of mobile in three different direction.



Fig: 3.2.14.3 Gyro Sensor

Accelerometer – This sensor helps in identifying orientation of mobile phone in three different angles. This sensor is widely used in most of the portable gadgets.



Fig: 3.2.14.4 Accelerometer

Geomagnetic Sensor - This sensor is used to identify magnetic field intensity in maps and search the direction.



Fig: 3.2.14.5 Geomagnetic Sensor

Temperature / Humidity sensor – This sensor is used to check temperature and humidity level.



Fig: 3.2.14.6 Temperature / Humidity sensor

Barometer – This sensor is used to check atmospheric pressure of users location.

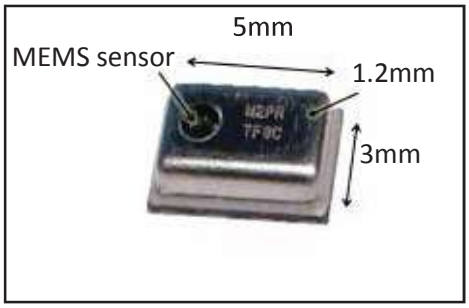


Fig: 3.2.14.7 Barometer

Hall Sensor – This sensor is used to identify whether cover is open or closed.

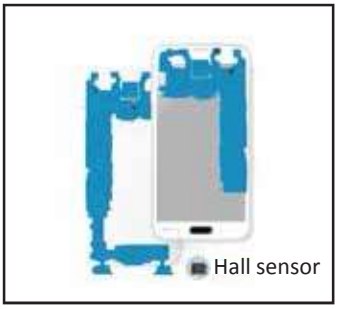


Fig: 3.2.14.8 Hall Sensor

Motion Sensor – This sensor check motion in phone specially in gaming and opening phone lock



Fig: 3.2.14.9 Motion Sensor

Ambient Light Sensor – This sensor is used to check light intensity in outer atmosphere and accordingly adjust brightness of display.



Fig: 3.2.14.10 Ambient Light Sensor

Gravity Sensor – This is a kind of accelerometer, having some weight or a tube inside. When the weight moves it tell us whether phone is moving to left or right or upwards or downwards. It is mainly used in gaming.

3.2.15: BGA Rework Stations

BGA is a ball grid array type of surface-mount packaging (a chip carrier) used for integrated circuits. BGA packages are used to permanently mount devices such as microprocessors. Rework stations are designed for quick BGA repairs.

3.2.16: : Documentation of the Repairs

All the repair works should be clearly documented as per the company's procedures.

The following points are important and should be noted carefully :

- New product specifications and their spares and repair details
- Document the spares movement note and capture activity performed
- Handling procedure of display systems in mobile phone (LCD and LED)
- Terminologies and procedures mentioned in repair manual
- Software and operating system related to mobile phone
- Applications including games that can be installed in mobile phone and the authentic source to download them
- Licensed versions of software and application, its terms and conditions associated with it
- Estimate cost of repair and verify Beyond Economic Repair (BER) value
- Service level agreement (SLA) and conditions associated with it
- Documentation procedure to record customer, mobile phone and repair details
- Check and test various electronic components on their functionality

Notes

Exercise-1: Fill in the Blanks

1. Open the outer panel of the smart phone using …….. opening tools

A. Screw driver B. Metal / plastic case. C. Hot air gun

2. Use hot air gun to remove the ……

A. LCD screen B. Outer Panel C. Inner Panel

3. From 1973 to 1993 …… system was used to control the operation of mobile phones

A. Hardware B. Embedded C. Operating

4. In …… first mobile phone "IBM Simon" was launched

A. 1994 B. 1995 C. 1996 D. 1997

5. Google launched Android 5.0 Lollipop

A. 2012 B. 2014 C. 2015 D. 2011

6. Solder the component on the PCB using……

A. Soldering Stations B. Hot Air Gun C. Soldering iron

7. Mobile network operates on…….. waves

A. 300 MHz to 1.6 GHz B. 900 MHz to 3.6 GHz C. 700 MHz to 2.6 GHz.

8. In …… Apple launched iPhone with iOS

A. 2004 B. 2007 C. 2008

9. In…… Windows launched its mobile phone with windows OS

A. 2010 B. 2012 C. 2009

10. In ……Google launched Android KitKat 4.4

A. 2012 B. 2013 C. 2011

Exercise-2: Fill in the Blanks

1. IMEI stand for .....

A. International Mobile Equipment Identity B. Non-Internal Mobile Equipment Identity

C. Indian Mobile Equipment Identity

2. PCB stand for.....

A. Phone Circuit Board B. Personal Circuit Board C. Printed Circuit Board

3. Soldering Gun works on .....Volt Dc

A. 10 B. 12 C. 14

4. ..... device used to measure voltage, Ohms, battery, continuity

A. Multi Meter B. Micro Meter C. Alti Meter

5. ..... Connector is used to connect mobile phone with external power source.

A. Battery Connector B. Charging Connector C. Display Connector

6. .....connector is used to connect display unit of mobile phone with PCB board

A. Battery Connector B. Charging Connector C. Display Connector

7. Ringer resistance range is .....Ohm

A. 8-10 B. 4-8 C. 12-14

8. In-case it shows reading .....ohm it means vibration motor is not working

A. 15 B. 0 C. 6

9. Wire used in jumpering process is a .....wire

A. Silver B. copper C. aluminum

10. Charging IC consist of .....balls

A. 8 B . 5 C. 4

Exercise-3: Fill in the Blanks

1. Head phone IC consist of .....balls

A. 8 B . 5 C. 4

2. Ringer IC consist of .....balls

A. 8 B . 9 C. 4

3. Silver MMC IC consist of .....balls

A. 8 B . 5 C. 11

4. Black MMC IC consist of .....balls

A. 16 B . 5 C. 4

5. Normal Keypad IC consist of .....balls

A. 18 B . 15 C. 24

6. .....Sensor is used to identify magnetic field intensity in maps and search the direction

A. Gyro Sensor B . Geomagnetic C. Accelerometer

7. PUK stand for.....

A. Phone Unlock key B . Password Unlock key C. Pin Unlock Key

8. SIM is acronym of.....

A. Subscriber identity module B. System identity module C. Subscriber information module

9. Soldering paste gives good ..... while soldering

A. Connectivity B. Finishing C. Clearnity

Exercise-4: Answer the Following Questions

1. How to use soldering Gun?

_____

_____

_____

_____

2. What is multimeter and explain the different type of multimeter :

_____

_____

_____

3. How to Use BGA Reballing Kit?

_____

_____

4. Define the process of soldering and de-soldering Battery Connector?

_____

_____

5. Explain the mobile strips and type of strips ?

_____

_____

6. How to test component using multimeter ?

_____

_____

_____

7. Define type of IC ?

_____

_____

_____

Assignments

1. Identify and locate major components of mobile phone
2. Dismantle given mobile phone
3. Assemble given mobile phone
4. Practice soldering process using soldering iron
5. Practice soldering process using soldering station
6. Practice removal and soldering process of charging connector and other major connectors like head-phone connector, Battery connector on mobile phone PCB
7. Practice removal and soldering process of micro component on PCB
8. Practice removal and soldering process of ICs on pcb
9. Practice jumpering process for speaker, ringer & Mic.

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4. Soft Skills and Work Ethics

Unit 4.1 – Effective Communication and Coordination at Work

Unit 4.2 – Working Effectively and Maintaining Discipline at Work

Unit 4.3 – Maintaining Social Diversity at Work



ELE/N9905

Key Learning Outcomes

By the end of this unit, participants will be able to:

1. State the importance of work ethics and workplace etiquette
2. State the importance of effective communication and interpersonal skills
3. Explain ways to maintain discipline in the workplace
4. Discuss the common reasons for interpersonal conflict and ways of managing them effectively.

UNIT 4.1: Effective Communication and Coordination at Work

Unit Objectives

By the end of this unit, participants will be able to:

1. Work efffectely at the workplace.
2. Demonstrate practicesrelated to gender and PwD sensitazation.

4.1.1 Importance of Work Ethics and Workplace Etiquette

Workplace ethics are a set of moral and legal guidelines that organizations follow. These guidelines influence the way customers and employees interact with an organization. Workplace ethics essentially guide how an organization serves its clients and treats its employees.

For example, if a company seeks to fulfil the promises it makes, it may develop processes and set up a robust support system to address this policy and build customer/client loyalty. To achieve this goal, the company may implement specific incentive programs for employees to encourage them to produce high-quality work and ensure the organization fulfils the promises it makes to its clients/ customers.

Many organizations, often the large ones, set detailed ethical codes to guide their operations and control how the organizational processes impact the stakeholders. These ethics usually help organizations maintain certain standards of responsibility, accountability, professionalism and among others, as they navigate through different challenges and day-to-day circumstances. By following these guidelines, organizations often experience several benefits that improve the lives of stakeholders, such as customers, employees, leaders, etc.

Examples of Common Workplace Ethics



Fig. 4.1.1 Examples of Common Workplace Ethics

Workplace ethics are essential for a successful organization with a satisfied and loyal team. High ethical standards help in ensuring all stakeholders, such as customers, investors, employees, and other individuals involved in the workplace operations, feel the organization is safeguarding their interests. By creating and implementing ethical guidelines, organizations can keep the best interests of their employees in mind while maintaining a positive influence on those they impact through their processes.

As a result, employees maintain the organization's best interests by being ethical in their daily work duties. For example, fairly-treated employees of an organization who understand the organization's commitments to environmental sustainability are usually less likely to behave in a manner that causes harm to the environment. Thus, they help maintain a positive public image of the organization. It means that workplace ethics help in maintaining reciprocal relationships that benefit organizations at large and the individuals associated with and influenced by the organizational policies.

Benefits of Workplace Ethics

There are various benefits of implementing workplace ethics. When organizations hold themselves to high ethical standards, leaders, stakeholders, and the general public can experience significant improvements. Following are some of the key benefits of employing ethics in the workplace:



Fig. 4.1.2 Benefits of Workplace Ethics

4.1.2 Interpersonal Communication

Interpersonal communication is a process that involves sharing ideas and emotions with another person, both - verbally and non-verbally. It is essential to interact effectively with others in both personal and professional lives. In professional life or the workplace, strong interpersonal skills play a crucial role in achieving effective collaboration with colleagues.

Interpersonal Skills

Interpersonal skills, in other terms, are known as people skills, which are used to communicate and interact with others effectively. These are soft skills one uses to communicate with others and understand them. One uses these skills in daily life while interacting with people

Examples of Interpersonal Skills



Fig 4.1.3 Examples of Interpersonal Skills

Numerous interpersonal skills involve communication. Communication can be verbal, such as persuasion or tone of voice — or non-verbal, such as listening and body language.

Importance of Interpersonal Skills

Interpersonal skills are essential for communicating and collaborating with groups and individuals in both personal and professional life. People with strong interpersonal skills often are able to build good relationships and also tend to work well with others. Most people often enjoy working with co-workers who have good interpersonal skills.

Among other benefits of good interpersonal skills is the ability to solve problems and make the best decisions. One can use the ability to understand others and good interpersonal communication skills to find the best solution or make the best decisions in the interest of everyone involved. Strong interpersonal skills help individuals work well in teams and collaborate effectively. Usually, people who possess good interpersonal skills also tend to be good leaders, owing to their ability to communicate well with others and motivate the people around them.

Interpersonal communicationis the key to working in a team environment and working ccollectely to achieve shared goals. Following are the interperso

Verbal Communication

The ability to speak clearly, appropriately and confidently can help one communicate effectively with others. It is vital to select the appropriate vocabulary and tone for the target audience.

For example – one should speak formally and professionally in the work environment, while informal language is acceptable in an intimate environment with close friends and family. Also, one should avoid using complex or technical language while communicating with an audience that may not be familiar with it. Using simple language in a courteous tone helps achieve better communication, irrespective of the audience.

Active Listening

Active listening is defined as the ability to pay complete or undivided attention to someone when they speak and understand what they are saying. It is important for effective communication because without understanding what the speaker is saying, it becomes difficult to carry forward a conversation. One should ensure to use appropriate verbal and non-verbal responses, e.g. eye contact, nodding, or smiling, to show interest in what the speaker says. Active listening is also about paying attention to the speaker's body language and visual cues. Asking and answering questions is one of the best ways to demonstrate an interest in conversing with the other person.

Active listening is critical for communicating effectively without ambiguity. It helps one understand the information or instructions being shared. It may also encourage co-workers to share their ideas, which ultimately helps achieve collaboration.

Body Language

One's expression, posture, and gestures are as important as verbal communication. One should practice open body language to encourage positivity and trust while communicating. Open body language includes - maintaining eye contact, nodding, smiling and being comfortable. On the other hand, one should avoid closed body language, e.g. crossed arms, shifting eyes and restless behaviour.

Empathy

Empathy is the ability to understand the emotions, ideas and needs of others from their point of view. Empathy is also known as emotional intelligence. Empathetic people are good at being aware of others' emotions and compassionate when communicating with them. Being empathetic in the workplace can be good to boost the morale of employees and improve productivity. By showing empathy, one can gain the trust and respect of others.

Conflict Resolution

One can use interpersonal communication skills to help resolve disagreements and conflicts in the workplace. This involves the application of negotiation and persuasion skills to resolve arguments between conflicting parties. It is also important to evaluate and understand both sides of the argument by listening closely to everyone involved and finding an amicable solution acceptable to all.

Good conflict resolution skills can help one contribute to creating a collaborative and positive work environment. With the ability to resolve conflicts, one can earn the trust and respect of co-workers.nal communicationskills that vital for success at work:

Teamwork

Employees who communicate and work well in a team often have better chances of achieving success and common goals. Being a team player can help one avoid conflicts and improve productivity. One can do this by offering to help co-workers when required and asking for their feedback and ideas. When team members give their opinions or advice, one should positively receive and react to the opinions/advice. One should be optimistic and encouraging when working in groups.

Improving Interpersonal Skills

One can develop interpersonal skills by practising good communication and setting goals for improvement. One should consider the following tips to improve their interpersonal skills:

- One should ask for feedback from co-workers, managers, family or friends to figure out what needs improvement concerning their interpersonal skills.
- One can identify the areas of interpersonal communication to strengthen by watching others.
- One can learn and improve interpersonal skills by observing co-workers, company leaders and professionals who possess good interpersonal skills. This includes watching and listening to them to note how they communicate and the body language used by them. It is vital to note their speed of speaking, tone of voice, and the way they engage with others. One should practice and apply such traits in their own interactions and relationships.
- One should learn to control their emotions. If stressed or upset, one should wait until being calm to have a conversation. One is more likely to communicate effectively and confidently when not under stress.
- One can reflect on their personal and professional conversations to identify the scope of improvement and learn how to handle conversations better or communicate more clearly. It helps to consider whether one could have reacted differently in a particular situation or used specific words or positive body language more effectively. It is also vital to note the successful and positive interactions to understand why they are successful.
- One should practice interpersonal skills by putting oneself in positions where one can build relationships and use interpersonal skills. For example, one can join groups that have organized meetings or social events. These could be industry-specific groups or groups with members who share an interest or hobby.
- Paying attention to family, friends and co-workers and making efforts to interact with them helps a lot. One should complement their family, friends and co-workers on their good ideas, hard work and achievements. Trying to understand someone's interests and showing interest in knowing them can help one build strong interpersonal skills. Offering to help someone, especially in difficult situations, helps build stronger and positive workplace relationships.
- One should avoid distractions, such as a mobile phone, while interacting with someone. Giving someone full attention while avoiding distractions helps achieve a clear exchange of ideas. By listening with focus, one can understand and respond effectively.

- One can attend appropriate courses on interpersonal skills or sign up for workshops at work to improve interpersonal skills. One can find many resources online also, such as online videos.
- For personal mentoring, one can approach a trusted family member, friend, co-worker, or current/ former employer. A person one looks up to with respect and admires is often a good choice to be selected as a mentor. One can even hire a professional career or communication coach.

Interpersonal communication skills often help one boost their morale, be more productive in the workplace, complete team projects smoothly and build positive and strong relationships with co-workers.

Notes

UNIT 4.2: Working Efffectely and Maintaining Discipline at Work

Unit Objectives

By the end of this unit, participants will be able to:

- Discuss the importance of following organizational guidelines for dress code, time schedules, language usage and other behavioural aspects
- Explain the importance of working as per the workflow of the organization to receive instructions and report problems
- Explain the importance of conveying information/instructions as per defined protocols to the authorised persons/team members
- Explain the common workplace guidelines and legal requirements on non-disclosure and confidentiality of business-sensitive information
- Describe the process of reporting grievances and unethical conduct such as data breaches, sexual harassment at the workplace, etc.
- Discuss ways of dealing with heightened emotions of self and others.

4.2.1 Discipline at Work

Discipline is essential for organizational success. It helps improve productivity, reduce conflict and prevent misconduct in the workplace. It is important to have rules concerning workplace discipline and ensure that all employees comply with them. In the absence of discipline, a workplace may experience conflicts, bullying, unethical behaviour and poor employee performance. An efficient workplace disciplinary process helps create transparency in the organization. Benefits of disciplinary standards:

All employees follow the same rules which helps establish uniformity and equality in the workplace

Managers and supervisors have defined guidelines on what accon to take while initi atg disciplinary y aon

With well-defined and enforced disciplinary rules, an organiizaon can avoid various safety, security, rupati nal risks

Fig 4.2.1 Benefits of Disciplinary Standards

Maintaining an organized and cohesive workforce requires maintaining discipline in both personal and professional behaviour. It is important to follow the appropriate measures to keep employees in line without affecting their morale.

Defining Discipline

The first and crucial step in maintaining workplace discipline is to define what is meant by discipline. It helps to evaluate common discipline problems and devise guidelines for handling them effectively.

Among a number of areas, discipline usually covers:

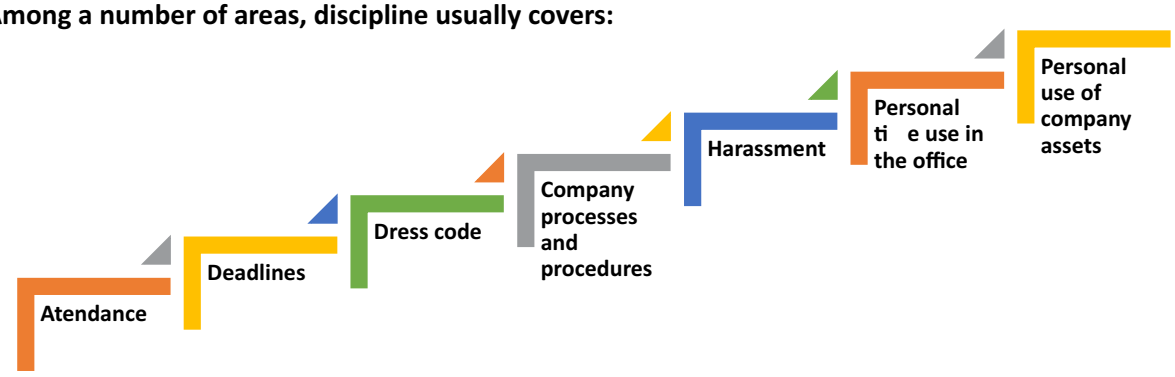


Fig 4.2.2 Examples of Workplace Discipline

According to demography and local issues, it may also include substance use and related issues.

It is vital for a workplace to have an employee handbook or company policy guide, to serve as a rulebook for employees to follow. The employee handbook/ company policy guide should be reviewed and updated periodically according to any issues or areas, or concerns identified concerning workplace discipline. Such manuals should also cover all the laws and regulations governing workplace behaviour.

Defining and documenting workplace rules aids in their implementation, ensuring little or no ambiguity. All employees in a workplace should also have easy access to the workplace guidelines so that they can refer to them to get clarity whenever required. To maintain discipline at work, it is also critical to ensure uniform application of workplace guidelines to all employees without exception.

4.2.2 Employee Code of Conduct

The employee code of conduct manual serves as a guide for employees to inform them regarding the behaviour expected from them at work. It helps create a good work environment with consistent behaviour from employees. The manual should list examples of acceptable and not acceptable behaviours at work. The code of conduct should be discussed with employees so that they have the clarifications required.

For example, an organization may create guidelines concerning the conduct with clients to ensure no contact is made with them except for business purposes, also prescribing the use of appropriate means of communication.

Employees should have a clear understanding concerning their job responsibilities and the behaviour expected from them with all stakeholders, e.g. company personnel, clients and associated third parties. It is critical to have documented guidelines for employees to follow concerning all aspects of work. It should also document the disciplinary action to be followed in case of non-compliance, e.g. verbal and

then written warning, temporary suspension or eventual termination of service in case of repeated non-compliance with the employee code of conduct. Employees should know what the company rules are and what will happen if they break the rules. However, disciplinary action should be initiated only when reasonably required to avoid its misuse for employee harassment.

There should also be an effective mechanism for employees to raise their concerns/ grievances and have them addressed while maintaining privacy, as required, e.g. raising concerns regarding the behaviour of a co-worker.

The employee code of conduct manual must be duly reviewed and approved by the concerned stakeholders, such as the Human Resources (HR) department and company executives.

4.2.3 Interpersonal Conflicts

Interpersonal conflict is any type of conflict between two or more people. These are found in both - personal and professional relationships - among friends, family, and co-workers. In the workplace, interpersonal conflict is often observed when a person or group of people interfere with another person's attempts at completing assignments and achieving goals. It is critical to resolve conflicts in the workplace to boost the morale of employees, repair working relationships among them, and improve customer satisfaction.

Reasons for Workplace Conflicts

Workplace conflicts are often observed when two or more people have different points of view. This can happen between managers, co-workers, or clients and customers. In general, interpersonal conflicts are caused by a lack of communication or unclear communication.

Some of the leading reasons for workplace conflicts are:

- Difference in values
- Personality clashes
- Poor communication

Example of poor communication – if a manager reassigns a task to another employee without communicating with the employee to whom it was originally assigned, interpersonal conflict can arise among them. This may potentially make the first employee, i.e. who was originally assigned the task, feel slighted and mistrusted by the manager. It may even cause animosity in the first employee toward the employee who has now been assigned the task.

Types of Interpersonal Conflict

Following are the four types of interpersonal conflicts:

a. Policy-related interpersonal conflict

When a conflict relates to a decision or situation that involves both parties, it can be called a policy-related interpersonal conflict. Example – two people or groups working on the same project, trying to adopt different approaches. To resolve policy-related interpersonal conflicts, the parties involved should try to look for a win-win situation or make a compromise. This is especially critical to resolve trivial issues so that work is not affected and common goals are achieved.

b. Pseudo-conflicts

Pseudo-conflict arises when two people or groups want different things and cannot reach an agreement. Pseudo-conflicts usually involve trivial disagreements that tend to hide the root of the issue.

c. Ego-related interpersonal conflicts

In ego conflicts, losing the argument may hurt or damage a person's pride. Sometimes ego conflicts arise when a number of small conflicts pile up on being left unresolved. To resolve ego-related conflicts, it's best to find the root of the issue and work towards a resolution.

d. Value-related interpersonal conflicts

Sometimes conflicts may occur between people when they have different value systems. Such conflicts can be difficult to identify initially, making the people involved think the other party is being disagreeable or stubborn, wherein they just have different values. Some co-workers may highly value their personal/ family time after office that they may be unreachable to clients during non-office hours, while others may place a high value on client satisfaction and may still be available for clients during non-office hours. Conflict may arise among such people when they may be required to coordinate to help a client during after-office hours. Value-related interpersonal conflicts are often difficult to settle since neither party likes to compromise.

Resolving Interpersonal Conflicts

Conflicts are usually likely in the workplace; they can, however, be prevented. Often resolving interpersonal conflicts through open communication helps build a stronger relationship, paving the way for effective coordination and success. Some ways to resolve interpersonal conflict:

- **Communication -** A great way to resolve interpersonal conflicts is for the opposing parties to listen to one another's opinions and understand their viewpoints. Meeting in person and keeping the conversation goal-oriented is important. One can have effective communication by following some measures, e.g. staying on the topic, listening actively, being mindful of the body language, maintaining eye contact, etc.

- **Active Listening -** One should patiently listen to what the other person is saying without interrupting or talking over them. It helps one display empathy and get to the root of the issue. Asking questions to seek clarification when required helps in clear communication and conveys to the other person that one is listening to them. Practising active listening is a great way to improve one's communication skills.
- **Displaying Empathy -** Listening attentively and identifying the anxieties/ issues of co-workers is a great way to show empathy and concern. It is essential to understand their feelings and actions to encourage honesty and avoid future conflict.
- **Not Holding Grudges -** With different types of people and personalities in a workplace, it is common for co-workers to have conflicts. It is best to accept the difference in opinions and move on. Being forgiving and letting go of grudges allows one to focus on the positive side of things and perform better at work.

Work-related interpersonal conflicts can be complicated because different people have different leadership styles, personality characteristics, job responsibilities and ways in which they interact. One should learn to look above interpersonal conflicts, resolving them to ensure work goals and environment are not affected.

4.2.4 Importance of Following Organizational Guidelines

Policies and procedures or organizational guidelines are essential for any organization. These provide a road map for the operations of the organization. These are also critical in ensuring compliance with the applicable laws and regulations by guiding the decision-making process and business operations.

Organizational guidelines help bring uniformity to the operations of an organization, which helps reduce the risk of unwanted and unexpected events. These determine how employees are supposed to behave at work, which ultimately helps the business achieve its objectives efficiently.

However, organizational guidelines are ineffective and fail to serve their purpose if they are not followed. Many people don't like the idea of following and abiding by specific guidelines. Such people should be made to understand the benefits of following the organizational guidelines. Some of the key benefits are given below:

With well-defined organizational guidelines in place, no individual can act arbitrarily, irrespective of their position in the organization. All individuals will know the pros and cons of taking certain actions and what to expect in case of unacceptable behaviour. Benefits of following organizational guidelines:

- Consistent processes and structures - Organization guidelines help maintain consistency in operations, avoiding any disorder. When all employees follow the organizational guidelines, an organization can run smoothly. These ensure that people in different job roles operate as they are supposed to, knowing what they are responsible for, what is expected of them, and what they can expect from their supervisors and co-workers. With clarity in mind, they can do their jobs with confidence and excellence. With every person working the way intended, it's easy to minimise errors.

  With all the staff following organizational guidelines, the organization has a better scope of using time and resources more effectively and efficiently. This allows the organization to grow and achieve its objectives.
- **Better quality service -** By following organizational guidelines, employees perform their duties correctly as per the defined job responsibilities. It helps enhance the quality of the organization's products and services, helping improve the organization's reputation. Working with a reputable organization, employees can take pride in their work and know they are contributing to the reputation.
- **A safer workplace -** When all employees follow organizational guidelines, it becomes easy to minimise workplace incidents and accidents. It reduces the liabilities associated with risks for the organization and limits the interruptions in operations. Employees also feel comfortable and safe in the workplace, knowing their co-workers are ensuring safety at work by following the applicable guidelines.

Different organizations may have different guidelines on dress code, time schedules, language usage, etc. For example – certain organizations in a client-dealing business requiring employees to meet clients personally follow a strict dress code asking their employees to wear formal business attire. Similarly, organizations operating in specific regions may require their employees to use the dominant regional language of the particular region to build rapport with customers and serve them better. Certain organizations, such as banks, often give preference to candidates with knowledge of the regional language during hiring.

Working hours may also differ from one organization to another, with some requiring employees to work extra compared to others. One should follow the organizational guidelines concerning all the aspects of the employment to ensure a cohesive work environment.

4.2.5 Workflow

Workflow is the order of steps from the beginning to the end of a task or work process. In other words, it is the way a particular type of work is organised or the order of stages in a particular work process.

Workflows can help simplify and automate repeatable business tasks, helping improve efficiency and minimise the room for errors. With workflows in place, managers can make quick and smart decisions while employees can collaborate more productively.

Other than the order that workflows create in a business, these have several other benefits, such as:

- Identifying Redundancies - Mapping out work processes in a workflow allows one to get a clear, top-level view of a business. It allows one to identify and remove redundant or unproductive processes.

  Workflow gives greater insights into business processes. Utilizing such useful insights, one can improve work processes and the bottom line of the business. In many businesses, there are many unnecessary and redundant tasks that take place daily. Once an organization has insight into its processes while preparing workflow, it can determine which activities are really necessary.

  Identifying and eliminating redundant tasks creates value for a business. With redundant tasks and processes eliminated, an organization can focus on what's important to the business.

- Increase in Accountability and Reduction in Micromanagement - Micromanagement often causes problems in a business setting as most employees don't like being micromanaged, and even many managers don't like the practice. Micromanagement is often identified as one of the reasons why people quit their job.

  However, the need for micromanagement can be minimized by clearly mapping out the workflow. This way, every individual in a team knows what tasks need to be completed and by when and who is responsible for completing them. This makes employees more accountable also.

  With clearly defined workflow processes, managers don't have to spend much time micromanaging their employees, who don't have to approach the manager to know what the further steps are. Following a workflow, employees know what is going on and what needs to be done. This, in turn, may help increase the job satisfaction of everyone involved while improving the relationships between management and employees.

- Improved Communication - Communication at work is critical because it affects all aspects of an organization. There are instances when the main conflict in an organization originates from miscommunication, e.g. the management and employees disagreeing on an aspect, despite pursuing the same objectives. Poor communication is a common workplace issue that is often not dealt with.

- This highlights why workflow is important. Workplace communication dramatically can increase with the visibility of processes and accountability. It helps make the daily operations smoother overall.

- Better Customer Service - Customers or clients are central to a business. Therefore, it is imperative to find and improve ways to improve customer experience. Relying on outdated manual systems may cause customer requests or complaints to be overlooked, with dissatisfied customers taking their business elsewhere. However, following a well-researched and defined workflow can help improve the quality of customer service.

By automating workflows and processes, an organization can also reduce the likelihood of human error. This also helps improve the quality of products or services over time, resulting in a better customer experience.

4.2.6 Following Instructions and Reporting Problems

All organizations follow a hierarchy, with most employees reporting to a manager or supervisor. For organizational success, it is vital for employees to follow the instructions of their manager or supervisor. They should ensure they perform their duties as per the given instructions to help achieve the common objectives of the organization and deliver quality service or products. This consequently helps maintain the reputation of the organization.

It is also important to be vigilant and identify problems at work or with the organizational work processes. One should deal with the identified within their limits of authority and report out of authority problems to the manager/ supervisor or the concerned person for a prompt resolution to minimise the impact on customers/clients and business.

4.2.7 Information or D ta Sharing

Information or data is critical to all organizations. Depending on the nature of its business, an organization may hold different types of data, e.g. personal data of customers or client data concerning their business operations and contacts. It is vital to effective measures for the appropriate handling of different types of data, ensuring its protection from unauthorized access and consequent misuse.

One should access certain data only if authorised to do so. The same is applicable when sharing data which must be shared only with the people authorised to receive it to use it for a specific purpose as per their job role and organizational guidelines. For example – one should be extra cautious while sharing business data with any third parties to ensure they get access only to the limited data they need as per any agreements with them. It is also critical to monitor how the recipient of the data uses it, which should strictly be as per the organizational guidelines. It is a best practice to share appropriate instructions with the recipient of data to ensure they are aware of the purpose with which data is being shared with them and how they are supposed to use and handle it. Any misuse of data must be identified and reported promptly to the appropriate person to minimise any damage arising out of data misuse.

These days most organizations require their employees and business partners or associated third parties to sign and accept the relevant agreement on the non-disclosure of business-sensitive information. In simple terms, business-sensitive information is confidential information. It is proprietary business information collected or created during the course of conducting business, including information about the business, e.g. proposed investments, intellectual property, trade secrets, or plans for a merger and information related to its clients. Business-sensitive information may sometimes also include information regarding a business's competitors in an industry.

The release of business-sensitive information to competitors or the general public poses a risk to a business. For example, information regarding plans for a merger could be harmful to a business if a competitor gets access to it.

4.2.8 Reporting Issues at Work

Most organizations have defined guidelines on appropriate reporting processes to be followed for reporting different types of issues. For example – one can report any grievances or dissatisfaction concerning co-workers to their manager/supervisor, e.g. data breaches or unethical conduct. If the concern is not addressed, then the employee should follow the organizational guidelines and hierarchy for the escalation of such issues that are not addressed appropriately.

For example – any concern related to sexual harassment at the workplace should be escalated to the concerned spokesperson, such as Human Resources (HR) representative, and if not satisfied with the action taken, it should be reported to the senior management for their consideration and prompt action.

4.2.9 Dealing with Heightened Emotions

Humans are emotional beings. There may be occasions when one is overwhelmed by emotions and is unable to suppress them. However, there may be situations when one must manage emotions well, particularly at work.

Stress in one's personal and professional life may often cause emotional outbursts at work. Managing one's emotions well, particularly the negative ones, is often seen as a measure of one's professionalism. Anger, dislike, frustration, worry, and unhappiness are the most common negative emotions experienced at work.

Ways to manage negative emotions at work:

- **Compartmentalisation –** It's about not confining emotions to different aspects of one's life. For example, not letting negative emotions from personal life affect work-life and vice versa. One should try to leave personal matters and issues at home. One should train their mind to let go of personal matters before reaching work. Similarly, one can compartmentalise work-related stresses so that negative emotions from work don't affect one's personal life.

- **Deep breathing and relaxation –** Deep breathing helps with anxiety, worry, frustration and anger. One should take deep breaths, slowly count to ten - inhaling and exhaling until one calms down. One can also take a walk to calm down or listen to relaxing music. Talking to someone and sharing concerns also helps one calm down.

- **The 10-second rule -** This is particularly helpful in controlling anger and frustration. When one feels their temper rising, they should count to 10 to calm down and recompose. If possible, one should move away to allow temper to come down.

- **Clarify -** It is always good to clarify before reacting, as it may be a simple case of misunderstanding or miscommunication.

- **Physical activity -** Instead of losing temper, one should plan to exercise, such as running or going to the gym, to let the anger out. Exercise is also a great way to enhance mood and release any physical tension in the body.

- **Practising restraint -** One should avoid replying or making a decision when angry, not allowing anger or unhappiness to cloud one's judgement. It may be best to pause any communication while one is angry, e.g. not communicating over email when angry or upset.

- **Knowing one's triggers -** It helps when one is able to recognise what upsets or angers them. This way, one can prepare to remain calm and plan their reaction should a situation occur. One may even be able to anticipate the other party's reaction.

- **Be respectful -** One should treat their colleagues the same way one would like to be treated. If the other person is rude, one need not reciprocate. It is possible to stay gracious, firm and assertive without being aggressive. Sometimes, rude people back away when they don't get a reaction from the person they are arguing with.

- **Apologise for any emotional outburst –** Sometimes, one can get overwhelmed by emotions, reacting with an emotional outburst. In such a case, one should accept responsibility and apologise immediately to the affected persons without being defensive.

- **Doing away with negative emotions -** It is recommended to let go of anger, frustration and unhappiness at the end of every workday. Harbouring negative emotions affects one emotionally, affecting their job performance also. Engaging in enjoyable activities after work is a good stress reliever.

Notes

UNIT 4.3: Maintaining Social Diversity at Work

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the concept and importance of gender sensitivityand equality.
2. Discuss ways to create sensitivityfor different genders and Persons with h Disabiliti(PwD).

4.3.1 Gender Sensitivity

Gender sensitivity is the act of being sensitive towards people and their thoughts regarding gender. It ensures that people know the accurate meaning of gender equality, and one's gender should not be given priority over their capabilities.



Fig 4.3.1 Gender Equality

Women are an important source of labour in many sectors, yet they have limited access to resources and benefits. Women should receive the same benefits and access to resources as men. A business can improve its productivity and quality of work by providing better support and opportunities to women.

Important Terms

- **Gender Sensitivity-** Gender sensitivity is the act of being sensitive to the ways people think about gender.
- **Gender Equality -** It means persons of any gender enjoy equal opportunities, responsibilities, and rights in all areas of life.
- **Gender Discrimination –** It means treating an individual unequally or disadvantageously based on their gender, e.g. paying different wages to men and women for similar or equal job positions.

Strategies for Enhancing Gender Equity

To enhance gender equity, one should:

- Follow gender-neutral practices at all levels at work.
- Participate together in decision-making.
- Help in promoting women's participation in different forums.
- Assist women in getting exposure to relevant skills and practices.
- Assist women in capacity building by mentoring, coaching or motivating them, as appropriate.
- Assist in the formation and operation of women support groups.
- Assist in the implementation of women-centric programmes.
- Combine technical training with reproductive health and nutrition for coffee farming households.
- Assist in making a work environment that is healthy, safe, and free from discrimination.

Bridging Gender Differences

Men and women react and communicate very differently. Thus, there are some work differences as both genders have their style and method of handling a situation.

Although, understanding and maturity vary from person to person, even between these genders, based on their knowledge, education, experience, culture, age, and upbringing, as well as how one's brain functions over a thought or problem.

In order to bridge the gap, one should:

- Not categorize all men and women in one way.
- Be aware of the verbal and non-verbal styles of communication of every gender to avoid any miscommunication and work better.
- Be aware of partial behaviour and avoid it.
- Encourage co-workers of different genders to make room by providing space to others.

Ways to reduce Gender Discrimination

- Effective steps against sexual harassment by the concerned authorities and general public.
- Gender stereotypes are how society expects people to act based on their gender. This can only be reduced by adopting appropriate behaviour and the right attitude.
- Objectification of females must be abolished.

Ways to Promote Gender Sensitivity in the Workplace

Practices that promote gender diversity should be adopted and promoted.

- All genders should receive equal responsibilities, rights, and privileges.
- All genders should have equal pay for similar or the same job roles/ positions.
- Strict and effective workplace harassment policies should be developed and implemented.
- An open-minded and stress-free work environment should be available to all the employees, irrespective of their gender.
- Women should be encouraged to go ahead in every field of work and assume leadership roles.
- Follow appropriate measures for women's empowerment.
- Men should be taught to be sensitive to women and mindful of their rights.

4.3.2 PwD Sensitivity

Some individuals are born with a disability, while others may become disabled due to an accident, illness or as they get old. People with Disabilities (PwD) may have one or more areas in which their functioning is affected. A disability can affect hearing, sight, communication, breathing, understanding, mobility, balance, and concentration or may include the loss of a limb. A disability may contribute to how a person feels and affect their mental health

Important Terms

·**Persons with Disabilities (PwD) –** Persons with Disabilities means a person suffering from not less than 40% of any disability as certified by a medical authority.

·**Types of Disability:**

a. Blindness – Visually impaired
b. Low Vision
c. Leprosy Cured
d. Hearing impairment
e. Locomotor disability
f. Mental retardation
g. Mental illness

PwD Sensitivity

PwD sensitivity promotes empathy, etiquette and equal participation of individuals and organizations while working with individuals with a disability, e.g. sensory, physical or intellectual.

Ways to be PwD Sensitive

To be sensitive to PwD, one should:

- Be respectful to all Persons with Disabilities (PwD) and communicate in a way that reflects PwD sensitivity.
- Always be supportive and kind towards a PwD with their daily chores.
- Be ready to assist a PwD to help them avail of any benefit/ livelihood opportunity/ training or any kind that helps them grow.
- Encourage and try to make things easier and accessible to PwD so that they can work without or with minimum help.
- Protest where feasible and report any wrong act/behaviour against any PwD to the appropriate authority.
- Learn and follow the laws, acts, and policies relevant to PwD.

Appropriate Verbal Communication

As part of appropriate verbal communication with all genders and PwD, one should:

- Talk to all genders and PwD respectfully, maintaining a normal tone of voice with appropriate politeness. It is important to ensure one's tone of voice does not have hints of sarcasm, anger, or unwelcome affection.
- Avoid being too self-conscious concerning the words to use while also ensuring not to use words that imply one's superiority over the other.
- Make no difference between a PwD and their caretaker. Treat PwD like adults and talk to them directly.
- Ask a PwD if they need any assistance instead of assuming they need it and offering assistance spontaneously.

Appropriate Non-verbal Communication

Non-verbal communication is essentially the way someone communicates through their body language. These include:

- **Facial expressions -** The human face is quite expressive, capable of conveying many emotions without using words. Facial expressions must usually be maintained neutral and should change according to the situation, e.g. smile as a gesture of greeting.
- **Body posture and movement -** One should be mindful of how to sit, stand, walk, or hold their head. For example - one should sit and walk straight in a composed manner. The way one moves and carries self, communicates a lot to others. This type of non-verbal communication includes one's posture, bearing, stance, and subtle movements.

- **Gestures -** One should be very careful with their gestures, e.g. waving, pointing, beckoning, or using one's hands while speaking. One should use appropriate and positive gestures to maintain respect for the other person while being aware that a gesture may have different meanings in different cultures.

- **Eye contact -** Eye contact is particularly significant in non-verbal communication. The way someone looks at someone else may communicate many things, such as interest, hostility, affection or attraction. Eye contact is vital for maintaining the flow of conversation and for understanding the other person's interest and response. One should maintain appropriate eye contact, ensuring not to stare or look over the shoulders. To maintain respect, one should sit or stand at the other person's eye level to make eye contact.
- **Touch -** Touch is a very sensitive type of non-verbal communication. Examples are - handshakes, hugs, pat on the back or head, gripping the arm, etc. A firm handshake indicates interest, while a weak handshake indicates the opposite. One should be extra cautious not to touch others inappropriately and avoid touching them inadvertently by maintaining a safe distance.

Rights of PwD

PwD have the right to respect and human dignity. Irrespective of the nature and seriousness of their disabilities, PwD have the same fundamental rights as others, such as:

- Disabled persons have the same civil and political rights as other people
- Disabled persons are entitled to the measures designed to enable them to become as self-dependent as possible
- Disabled persons have the right to economic and social security
- Disabled persons have the right to live with their families or foster parents and participate in all social and creative activities.
- Disabled persons are protected against all exploitation and treatment of discriminatory and abusive nature.

Making Workplace PwD Friendly

- One should not make PwD feel uncomfortable by giving too little or too much attention
- One should use a normal tone while communicating with a PwD and treat them as all others keeping in mind their limitations and type of disability
- Any help should be provided only when asked for by a PwD
- One should help in ensuring the health and well-being of PwD.

Expected Employer Behaviour

Some of the common behavioural traits that employees expect from their employers are:

- Cooperation: No work is successful without cooperation from the employer's side. Cooperation helps to understand the job role better and complete it within the given timeline.
- Polite language: Polite language is always welcomed at work. This is a basic aspect that everybody expects.
- Positive Attitude: Employers with a positive attitude can supervise the work of the employees and act as a helping hand to accomplish the given task. A person with a positive attitude looks at the best qualities in others and helps them gain success.
- Unbiased behaviour: Employers should always remain fair towards all their employees. One should not adopt practices to favour one employee while neglecting or ignoring the other. This might create animosity among co-workers.
- Decent behaviour: The employer should never improperly present oneself before the employee. One should always respect each other's presence and behave accordingly. The employer should not speak or act in a manner that may make the employee feel uneasy, insulted, and insecure.

Exercise

1. List down three examples of workplace ethics.
2. List down three examples of interpersonal skills.
3. Identify two reasons for workplace conflicts.
4. Identify two ways of resolving interpersonal conflicts
5. List down two ways of dealing with heightened emotions at work.
6. List down two types of non-verbal communication.

Notes

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

ESSCI
Skilling India in Electronics

5. Basic Health and Safety Practices

Unit 5.1 - Workplace Hazards

Unit 5.2 - Fire Safety

Unit 5.3 - First Aid

Unit 5.4 - Waste Management



ELE/N1002

Key Learning Outcomes

By the end of this module, participa ts will be able to:

1. Discuss job-site hazards, risks and accidents
2. Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials
3. Describe how to interpret warning signs while accessing sensitive work areas
4. Explain the importance of good housekeeping
5. Describe the importance of maintaining appropriate postures while lifting heavy objects
6. List the types of fire and fire extinguishers
7. Describe the concept of waste management and methods of disposing of hazardous waste
8. List the common sources of pollution and ways to minimize them
9. Elaborate on electronic waste disposal procedures
10. Explain how the administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning and also administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock

UNIT 5.1: Workplace Hazards

Unit Objectives

By the end of this unit, participants will be able to:

- Discuss job-site hazards, risks and accidents
- Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials
- Describe how to interpret warning signs while accessing sensitive work areas
- Explain the importance of good housekeeping
- Describe the importance of maintaining appropriate postures while lifting heavy objects
- Explain safe handling of tools and Personal Protective Equipment to be used.

5.1.1 Workplace Safety

Workplace safety is important to be established for creating a safe and secure working for the workers. The workplace has to be administered as per the rules of the Occupational Safety and Health Administration (OSHA). It refers to monitoring the working environment and all hazardous factors that impact employees' safety, health, and well-being. It is important to provide a safe working environment to the employees to increase their productivity, wellness, skills, etc.

The benefits of workplace safety are:

- Employee retention increases if they are provided with a safe working environment.
- Failure to follow OSHA's laws and guidelines can result in significant legal and financial consequences.
- A safe environment enables employees to stay invested in their work and increases productivity.
- Employer branding and company reputation can both benefit from a safe working environment.

5.1.2 Workplace Hazards

5.1.2. Workplace Hazards

A workplace is a situation that has the potential to cause harm or injury to the workers and damage the tools or property of the workplace. Hazards exist in every workplace and can come from a variety of sources. Finding and removing them is an important component of making a safe workplace.

Common Workplace Hazards

The common workplace hazards are:

·Biological: The threats caused by biological agents like viruses, bacteria, animals, plants, insects and also humans, are known as biological hazards.

- **Chemical:** Chemical hazard is the hazard of inhaling various chemicals, liquids and solvents. Skin irritation, respiratory system irritation, blindness, corrosion, and explosions are all possible health and physical consequences of these dangers.
- **Mechanical:** Mechanical Hazards comprise the injuries that can be caused by the moving parts of machinery, plant or equipment.
- **Psychological:** Psychological hazards are occupational hazards caused by stress, harassment, and violence.
- **Physical:** The threats that can cause physical damage to people is called physical hazard. These include unsafe conditions that can cause injury, illness and death.
- **Ergonomic:** Ergonomic Hazards are the hazards of the workplace caused due to awkward posture, forceful motion, stationary position, direct pressure, vibration, extreme temperature, noise, work stress, etc.

Workplace Hazards Analysis

A workplace hazard analysis is a method of identifying risks before they occur by focusing on occupational tasks. It focuses on the worker's relationship with the task, the tools, and the work environment. After identifying the hazards of the workplace, organisations shall try to eliminate or minimize them to an acceptable level of risk.

Control Measures of Workplace Hazards

Control measures are actions that can be taken to reduce the risk of being exposed to the hazard. Elimination, Substitution, Engineering Controls, Administrative Controls, and Personal Protective Equipment are the five general categories of control measures.

- **Elimination:** The most successful control technique is to eliminate a specific hazard or hazardous work procedure or prevent it from entering the workplace.

- **Substitution:** Substitution is the process of replacing something harmful with something less hazardous. While substituting the hazard may not eliminate all of the risks associated with the process or activity, it will reduce the overall harm or health impacts.

- **Engineering Controls:** Engineered controls protect workers by eliminating hazardous situations or creating a barrier between the worker and the hazard, or removing the hazard from the person.

- **Administrative Controls:** To reduce exposure to hazards, administrative controls limit the length of time spent working on a hazardous task that might be used in combination with other measures of control.

- **Personal Protective Equipment:** Personal protective equipment protects users from health and safety hazards at work. It includes items like safety helmets, gloves, eye protection, etc.

5.1.3 Risk for a Drone Technician

A drone technician may require to repair the propeller, motor and its mount, battery, mainboards, processor, booms, avionics, camera, sensors, chassis, wiring and landing gear. A technician may face some risks while repairing the drones' equipment.

- The technician is susceptible to being physically harmed by propellers.
- Direct contact with exposed electrical circuits can injure the person.
- If the skin gets in touch with the heat generated from electric arcs, it burns the internal tissues.
- Major electrical injuries can occur due to poorly installed electrical equipment, faulty wiring, overloaded or overheated outlets, use of extension cables, incorrect use of replacement fuses, use of equipment with wet hands, etc.

5.1.4 Workplace Warning Signs

A Hazard sign is defined as 'information or instruction about health and safety at work on a signboard, an illuminated sign or sound signal, a verbal communication or hand signal.'

There are four different types of safety signs:

- Prohibition / Danger Alarm Signs
- Mandatory Signs
- Warning Signs
- And Emergency

1. Prohibition Signs: A "prohibition sign" is a safety sign that prohibits behaviour that is likely to endanger one's health or safety. The colour red is necessary for these health and safety signs. Only what or who is forbidden should be displayed on a restriction sign.



Fig. 5.1.1. Prohibition arning Signs

2. Mandatory Signs:

Mandatory signs give clear directions that must be followed. The icons are white circles that have been reversed out of a blue circle. On a white background, the text is black.



Fig. 5.1.2. Mandatory Signs

3. Warning Signs

Warning signs are the safety informationcommunicaatiosigns. They are shown as a 'yellow colour triangle'.

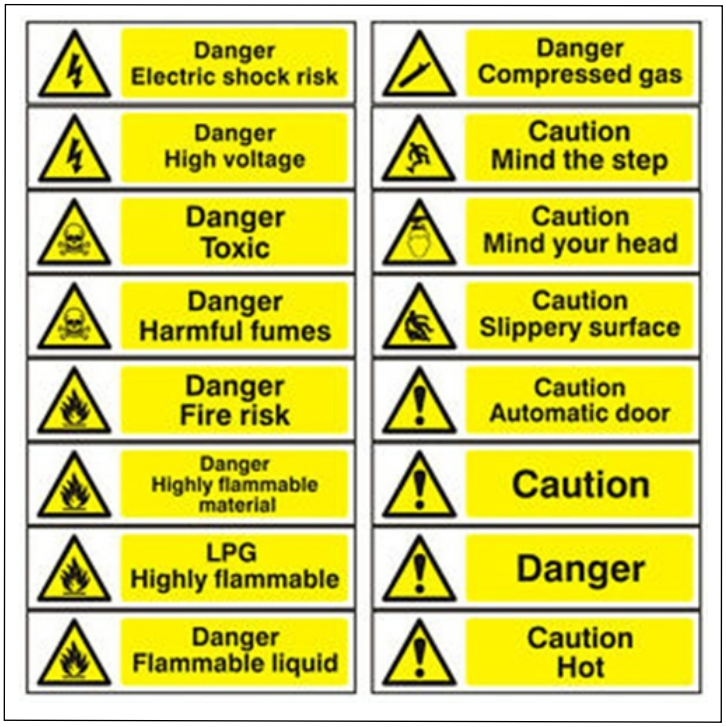


Fig. 5.1.3. Warning Signs

4. Emergency Signs

The locationor routes to emergency ffacilitieare indicated by emergency signs. These signs have a green backdrop with a white emblem or writing.These signs convey basic informaatioand frequently refer to housekeeping, company procedures, or logistics.



Fig. 5.1.4. Emergency Signs

5.1.5 Cleanliness in the Workplace

Workplace cleanliness maintenance creates a healthy, efficient and productive environment for the employees. Cleanliness at the workplace is hindered by some elements like cluttered desks, leftover food, waste paper, etc. A tidy workplace is said to improve employee professionalism and enthusiasm while also encouraging a healthy working environment.

Benefits of cleanliness in the workplace:

1. Productivity: Cleanliness in the workplace can bring a sense of belonging to the employees, also motivating and boosting the morale of the employees. This results in increasing their productivity.
2. Employee Well-being: Employee well-being can be improved by providing a clean work environment. Employees use fewer sick days in a workplace where litter and waste are properly disposed of, and surfaces are cleaned regularly, resulting in increased overall productivity.
3. Positive Impression: Cleanliness and orderliness in the workplace provide a positive impression on both employees and visitors.
4. Cost saving: By maintaining acceptable levels of cleanliness in the workplace, businesses can save money on cleaning bills and renovations, which may become necessary if the premises are not properly kept.

Reasons for Cleaning the Workplace

- Cleaning of dry floors, mostly to prevent workplace slips and falls.
- Disinfectants stop bacteria in their tracks, preventing the spread of infections and illness.
- Proper air filtration decreases hazardous substance exposures such as dust and fumes.
- Light fixture cleaning improves lighting efficiency.
- Using environmentally friendly cleaning chemicals that are safer for both personnel and the environment.
- Work environments are kept clean by properly disposing of garbage and recyclable items.

5.1.6 Lifting and Handling of Heavy Loads

Musculoskeletal Injuries (MSIs), such as sprains and strains, can occur while lifting, handling, or carrying objects at work. When bending, twisting, uncomfortable postures and lifting heavy objects are involved, the risk of injury increases. Ergonomic controls can help to lower the risk of injury and potentially prevent it.

Types of injuries caused while lifting heavy objects:

- Cuts and abrasions are caused by rough surfaces.
- Crushing of feet or hands.
- Strain to muscles and joints

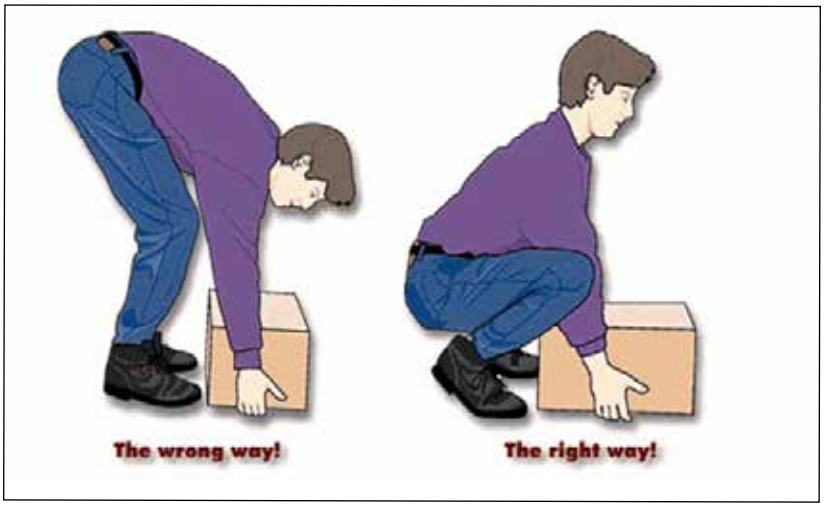


Fig. 5.1.5. Lifting loads echnique

Preparing to lift

A load that appears light enough to bear at first will grow increasingly heavier as one carries it further. The person carrying the weight should be able to see over or around it at all times.

The amount of weight a person can lift, depends on their age, physique, and health

It also depends on whether or not the person is used to lifting and moving hefty objects.

Common Causes of Back Injuries

The Most Common Causes of Back Injuries are:

1) **Inadequate Training:** The individual raising the load receives no sufficient training or guidance.
2) **Lack of awareness of technique:** The most common cause of back pain is incorrect twisting and posture, which causes back strain.
3) **Load size:** The load size to consider before lifting. If the burden is too much for one's capacity or handling, their back may be strained and damaged.
4) **Physical Strength:** Depending on their muscle power, various persons have varied physical strengths. One must be aware of their limitations.
5) **Teamwork:** The operation of a workplace is all about working together. When opposed to a single person lifting a load, two people can lift it more easily and without difficulty. If one of two people isn't lifting it properly, the other or both of them will suffer back injuries as a result of the extra strain.

Techniques for Lifting Heavy Objects

Technique	Demonstraton
1. Ensure one has a wide base of support before lifting the heavy object. Ensure one's feet are shoulder-width apart, and one foot is slightly ahead of the other at all times. This will help one maintain a good balance during the lifting of heavy objects. This is known as the Karate Stance.	
2. Squat down as near to the object as possible when one is ready to lift it, bending at the hips and knees with the buttocks out. If the object is really heavy, one may wish to place one leg on the floor and the other bent at a straight angle in front of them.	

3. Maintain proper posture as one begin to lift upward. To do so, one should keep their back straight, chest out, and shoulders back while gazing straight ahead.	
4. By straightening one's hips and knees, slowly elevate the thing (not the back). As one rises, they should extend their legs and exhale. Lift the heavy object without twisting the body or bending forward.	
5. Do not lift bending forward.	
6. Hold the load close to the body.	

7. Never lift heavy objects above the shoulder	
8. Use the feet (not the body) to change direction, taking slow, small steps.	
9. Set down the heavy object carefully, squatting with the knees and hips only.	

Table 5.1.1 Techniques for lifting he vy objects

[3]*Source:https://ww .braceability.ccom/blogs/articles/7-prop-heavavy-liftinechniques*

5.1.7 Safe Handling of Tools

Workers should be trained on how to use tools safely. When tools are misplaced or handled incorrectly by workers, they can be dangerous. The following are some suggestions from the National Safety Council for safe tool handling when they are not in use:

- Never carry tools up or down a ladder in a way that makes it difficult to grip them. Instead of being carried by the worker, tools should be lifted up and down using a bucket or strong bag.
- Tools should never be tossed but should be properly passed from one employee to the next. Pointed tools should be passed with the handles facing the receiver or in their carrier.
- When turning and moving around the workplace, workers carrying large tools or equipment on their shoulders should pay particular attention to clearances.
- Pointed tools such as chisels and screwdrivers should never be kept in a worker's pocket. They can be carried in a toolbox, pointing down in a tool belt or pocket tool bag, or in hand with the tip always held away from the body.
- Tools should always be stored while not in use. People below are put in danger when tools are left sitting around on an elevated structure, such as a scaffold. In situations when there is a lot of vibration, this risk increases.

5.1.8 Personal Protective Equipment

Personal protective equipment, or "PPE," is equipment worn to reduce exposure to risks that might result in significant occupational injuries or illnesses. Chemical, radiological, physical, electrical, mechanical, and other job dangers may cause these injuries and diseases.

PPE used for protection fom the following injuries are:

Injury Protecton	Protecton	PPE
Head Injury Protecton	Falling or flying objects, stationary objects, or contact with electrical wires can cause impact, penetration, and electrical injuries. Hard hats can protect one's head from these injuries. A common electrician's hard hat is shown in the figure below. This hard hat is made of nonconductive plastic and comes with a set of safety goggles.	
Foot and Leg Injury Protecton	In addition to foot protection and safety shoes, leggings (e.g., leather) can guard against risks such as falling or rolling objects, sharp objects, wet and slippery surfaces, molten metals, hot surfaces, and electrical hazards.	 
Eye and Face Injury Protecton	Spectacles, goggles, special helmets or shields, and spectacles with side shields and face shields can protect against the hazards of flying fragments, large chips, hot sparks, radiation, and splashes from molten metals. They also offer protection from particles, sand, dirt, mists, dust, and glare.	

Protecton against Hearing Loss	Hearing protection can be obtained by wearing earplugs or earmuffs. High noise levels can result in permanent hearing loss or damage, as well as physical and mental stress. Self-forming earplugs composed of foam, waxed cotton, or fibreglass wool usually fit well. Workers should be fitted for moulded or prefabricated earplugs by a specialist.	
Hand Injury Protecton	Hand protection will aid workers who are exposed to dangerous substances by skin absorption, serious wounds, or thermal burns. Gloves are a frequent protective clothing item. When working on electrified circuits, electricians frequently use leather gloves with rubber inserts. When stripping cable with a sharp blade, Kevlar gloves are used to prevent cuts.	
Whole Body Protecton	Workers must protect their entire bodies from risks such as heat and radiation. Rubber, leather, synthetics, and plastic are among the materials used in whole-body PPE, in addition to fire-retardant wool and cotton. Maintenance staff who operate with high-power sources such as transformer installations and motor-control centres are frequently obliged to wear fire-resistant clothes.	

Table 5.1.2. Personal protective equipment

Notes

UNIT 5.2: Fire Safety

Unit Objectives

By the end of this unit, participants will be able to:

1. List the types of fire and fire e extinguiss.

5.2.1 Fire Safety

Fire safety is a set of actions aimed at reducing the amount of damage caused by fire. Fire safety procedures include both those that are used to prevent an uncontrolled fire from starting and those that are used to minimise the spread and impact of a fire after it has started. Developing and implementing fire safety measures in the workplace is not only mandated by law but is also essential for the protection of everyone who may be present in the building during a fire emergency.

The basic Fire Safety Responsibilities are:

- To identify risks on the premises, a fire risk assessment must be carried out.
- Ascertain that fire safety measures are properly installed.
- Prepare for unexpected events.
- Fire safety instructions and training should be provided to the employees.

5.2.2 Respond to a Workplace Fire

- Workplace fire drills should be conducted on a regular basis.
- If one has a manual alarm, they should raise it.
- Close the doors and leave the fire-stricken area as soon as possible. Ensure that the evacuation is quick and painless.
- Turn off dangerous machines and don't stop to get personal items.
- Assemble at a central location. Ascertain that the assembly point is easily accessible to the employees.
- If one's clothing catches fire, one shouldn't rush about it. They should stop and descend on the ground and roll to smother the flames if their clothes catch fire.

5.2.3 Fire Extinguisher

Fire extinguishers are portable devices used to put out small flames or minimise their damage until fire-fighters arrive. These are maintained on hand in locations such as fire stations, buildings, workplaces, public transit, and so on. The types and quantity of extinguishers that are legally necessary for a given region are determined by the applicable safety standards.

Types of fire extinguishers are:

There are five main types of fire extinguishers:

1. Water.
2. Powder.
3. Foam.
4. Carbon Dioxide (CO2).
5. Wet chemical.



1. **Water:** Water fire extinguishers are one of the most common commercial and residential fire extinguishers on the market. They're meant to be used on class-A flames.



2. **Powder:** The L2 powder fire extinguisher is the most commonly recommended fire extinguisher in the Class D Specialist Powder category, and is designed to put out burning lithium metal fires.



3. **Foam:** Foam extinguishers are identified by a cream rectangle with the word "foam" printed on it. They're mostly water-based, but they also contain a foaming component that provides a quick knock-down and blanketing effect on flames. It suffocates the flames and seals the vapours, preventing re-ignition.



4. **Carbon Dioxide (CO2):** Class B and electrical fires are extinguished with carbon dioxide extinguishers, which suffocate the flames by removing oxygen from the air. They are particularly beneficial for workplaces and workshops where electrical fires may occur since, unlike conventional extinguishers, they do not leave any toxins behind and hence minimise equipment damage.

5. **Wet Chemical:** Wet chemical extinguishers are designed to put out fires that are classified as class F. They are successful because they can put out extremely high-temperature fires, such as those caused by cooking oils and fats.



Notes

UNIT 5.3: First Aid

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain how the administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning
2. Explain how to administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock.

5.3.1 First Aid

First aid is the treatment or care given to someone who has sustained an injury or disease until more advanced care can be obtained or the person recovers.

The aim of first aid is to:

- Preserve life
- Prevent the worsening of a sickness or injury
- If at all possible, relieve pain
- Encourage recovery
- Keep the unconscious safe.

First aid can help to lessen the severity of an injury or disease, and in some situations, it can even save a person's life.

5.3.2 Need for First Aid at the Workplace

- In the workplace, first aid refers to providing immediate care and life support to persons who have been injured or become unwell at work.
- Many times, first aid can help to lessen the severity of an accident or disease.
- It can also help an injured or sick person relax. In life-or-death situations, prompt and appropriate first aid can make all the difference.

5.3.2 Need for First Aid at the Workplace

In the workplace, first aid refers to providing immediate care and life support to persons who have been injured or become unwell at work.

Many times, first aid can help to lessen the severity of an accident or disease.

It can also help an injured or sick person relax. In life-or-death situations, prompt and appropriate first aid can make all the difference.

5.3.3 Treating Minor Cuts and Scapes

Steps to keep cuts clean and prevent infectionsand scars:

- **Wash Hands:** Wash hands first with soap and water to avoid introducing bacteria into the cut and causing an infection. One should use the hand sanitiser if one is on the go.
- **Stop the bleeding:** Using a gauze pad or a clean towel, apply pressure to the wound. For a few minutes, keep the pressure on.
- **Clean Wounds:** Once the bleeding has stopped, clean the wound by rinsing it under cool running water or using a saline wound wash. Use soap and a moist washcloth to clean the area around the wound. Soap should not be used on the cut since it may irritate the skin. Also, avoid using hydrogen peroxide or iodine, as these may aggravate the wound.
- **Remove Dirt:** Remove any dirt or debris from the area. Pick out any dirt, gravel, glass, or other material in the cut with a pair of tweezers cleaned with alcohol.

5.3.4 Heart Atack

When the blood flow carrying oxygen to the heart is blocked, a heart attack occurs. The heart muscle runs out of oxygen and starts to die.

Symptoms of a heart attack can vary from person to person. They may be mild or severe. Women, older adults, and people with diabetes are more likely to have subtle or unusual symptoms.

Symptoms in adults may include:

- Changes in mental status, especially in older adults.
- Chest pain that feels like pressure, squeezing, or fullness. The pain is most often in the centre of the chest. It may also be felt in the jaw, shoulder, arms, back, and stomach. It can last for more than a few minutes or come and go.
- Cold sweat.
- Light-headedness.
- Nausea (more common in women).
- Indigestion.

- Vomiting.
- Numbness, aching or tingling in the arm (usually the left arm, but the right arm may be affected alone, or along with the left).
- Shortness of breath
- Weakness or fatigue, especially in older adults and in women.

First Aid for Heart Attack

If one thinks someone is experiencing a heart attack, they should:

- Have the person sit down, rest, and try to keep calm.
- Loosen any tight clothing.
- Ask if the person takes any chest pain medicine, such as nitro-glycerine for a known heart condition, and help them take it.
- If the pain does not go away promptly with rest or within 3 minutes of taking nitro-glycerine, call for emergency medical help.
- If the person is unconscious and unresponsive, call 911 or the local emergency number, then begin CPR.
- If an infant or child is unconscious and unresponsive, perform 1 minute of CPR, then call 911 or the local emergency number.

Notes

UNIT 5.4: Waste Management

Unit Objectives

By the end of this unit, participants will be able to:

1. Describe the concept of waste management and methods of disposing of hazardous waste.
2. List the common sources of pollutionand ways to minimize them.
3. Elaborate on electronic waste disposal procedures.

5.4.1. Waste Management and Methods of Waste Disposal

The collection, disposal, monitoring, and processing of waste materials is known as waste management. These wastes affect living beings' health and the environment. For reducing their effects, they have to be managed properly. The waste is usually in solid, liquid or gaseous form.

The importance of waste management is:

Waste management is important because it decreases waste's impact on the environment, health, and other factors. It can also assist in the reuse or recycling of resources like paper, cans, and glass. The disposal of solid, liquid, gaseous, or dangerous substances is the example of waste management.

When it comes to trash management, there are numerous factors to consider, including waste disposal, recycling, waste avoidance and reduction, and garbage transportation. Treatment of solid and liquid wastes is part of the waste management process. It also provides a number of recycling options for goods that aren't classified as garbage during the process.

5.4.2 Methods of Waste Management

Non-biodegradable and toxic wastes, such as radioactive remains, can cause irreversible damage to the environment and human health if they are not properly disposed of. Waste disposal has long been a source of worry, with population increase and industrialisation being the primary causes. Here are a few garbage disposal options.

1. **Landfills:** The most common way of trash disposal today is to throw daily waste/garbage into landfills. This garbage disposal method relies on burying the material in the ground.
2. **Recycling:** Recycling is the process of transforming waste items into new products in order to reduce energy consumption and the use of fresh raw materials. Recycling reduces energy consumption, landfill volume, air and water pollution, greenhouse gas emissions, and the preservation of natural resources for future use.

3. **Composting:** Composting is a simple and natural bio-degradation process that converts organic wastes, such as plant remnants, garden garbage, and kitchen waste, into nutrient-rich food for plants.
4. **Incineration:** Incineration is the process of combusting garbage. The waste material is cooked to extremely high temperatures and turned into materials such as heat, gas, steam, and ash using this technology.

5.4.3 Recyclable, Non-Recyclable and Hazardous Waste

1. **Recyclable Waste:** The waste which can be reused or recycled further is known as recyclable waste.
2. **Non-recyclable Waste:** The waste which cannot be reused or recycled is known as non-recyclable waste. Polythene bags are a great example of non-recyclable waste.
3. **Hazardous Waste:** The waste which can create serious harm to the people and the environment is known as hazardous waste.

5.4.4 Sources of Pollution

Pollution is defined as the harm caused by the presence of a material or substances in places where they would not normally be found or at levels greater than normal. Polluting substances might be in the form of a solid, a liquid, or a gas.

- **Point source of pollution:** Pollution from a point source enters a water body at a precise location and can usually be identified. Effluent discharges from sewage treatment plants and industrial sites, power plants, landfill sites, fish farms, and oil leakage via a pipeline from industrial sites are all potential point sources of contamination.

  Point source pollution is often easy to prevent since it is feasible to identify where it originates, and once identified, individuals responsible for the pollution can take rapid corrective action or invest in longer-term treatment and control facilities.
- **Diffuse source of pollution:** As a result of land-use activities such as urban development, amenity, farming, and forestry, diffuse pollution occurs when pollutants are widely used and diffused over a large region. These activities could have occurred recently or in the past. It might be difficult to pinpoint specific sources of pollution and, as a result, take rapid action to prevent it because prevention often necessitates significant changes in land use and management methods.

Pollution Prevention

Pollution prevention entails acting at the source of pollutants to prevent or minimise their production. It saves natural resources, like water, by using materials and energy more efficiently.

Pollution prevention includes any practice that:

- Reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal;
- Reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants (these practices are known as "source reduction");
- Improved efficiency in the use of raw materials, energy, water, or other resources, or Conservation is a method of safeguarding natural resources.
- Improvements in housekeeping, maintenance, training, or inventory management; equipment or technology adjustments; process or method modifications; product reformulation or redesign; raw material substitution; or improvements in housekeeping, maintenance, training, or inventory control.

5.4.5 Electronic Waste

Lead, cadmium, beryllium, mercury, and brominated flame retardants are found in every piece of electronic waste. When gadgets and devices are disposed of illegally, these hazardous compounds are more likely to contaminate the earth, pollute the air, and leak into water bodies.

When e-waste is dumped in a landfill, it tends to leach trace metals as water runs through it. The contaminated landfill water then reaches natural groundwater with elevated toxic levels, which can be dangerous if it reaches any drinking water bodies. Despite having an environmentally benign approach, recycling generally results in international shipment and dumping of the gadgets in pits.

Some eco-friendly ways of disposing of e-waste are:

- Giving back the e-waste to the electronic companies and drop-off points
- Following guidelines issued by the government
- Selling or donating the outdated technology-based equipment
- Giving e-waste to a certified e-waste recycler

Exercise

1. Name all five types of fire extinguishers.
2. Explain PPE in brief.
3. List the common workplace hazards.
4. Fill in the blacks:
   i. A "_____ sign" is a safety sign that prohibits behaviour that is likely to endanger one's health or safety.
   ii. _____ entails acting at the source of pollutants to prevent or minimise their production.
   iii. _____ is the treatment or care given to someone who has sustained an injury or disease until more advanced care can be obtained or the person recovers.
   iv. The threats caused by biological agents like viruses, bacteria, animals, plants, insects and also humans, are known as _____.
   v. The workplace has to be administered as per the rules of the _____.

Notes



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7. Annexure



Annexure - QR Code

Chapter No.	Unit No.	Topic Name	Page No.	QR Code(s)	URL
1. Introduction and Fundamentals (Bridge Module)	1.1. Roles and Responsibilities	1.1. Roles and Responsibilities	40		https://www.youtube.com/watch?v=SXi87kfaONM
	1.2. Introduction - Mobile Phone	1.2.6 Mobile Opearting Systems OS			https://www.youtube.com/watch?v=MMyMB4zm9so
	1.3- Basic of Mobile Phone Hardware	1.3.1. Mobile Phone Hardware Module			https://www.youtube.com/watch?v=fjU6kY4gTuc
		1.3.2. Mobile Phone Accessories			https://www.youtube.com/watch?v=AcJe9M9Drhk
	1.4- Tools, Equipments and Consumables	1.4.2. Solder Wire			https://www.youtube.com/watch?v=4Spxz7IKyKI
		1.4.3. Soldering Paste			https://www.youtube.com/watch?v=rb57D-5VJmE
		1.4.4. PCB Stand			https://www.youtube.com/watch?v=qDJPD9YOS0c
		1.4.5. PCB Cleaner			https://www.youtube.com/watch?v=gehA_qMF5o4
		1.4.6. Ultrasonic Cleaner			https://www.youtube.com/watch?v=kBtMCRsdpho
6. Employability and Entrepreneurship Skills			229		https://www.skillindiadigital.gov.in/content/list



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