Federal-TVED BUREAU

Basic Electronics Communication and Multimedia Equipment Servicing

Level - II

Learning Guide #24

Unit of Competence: Service and Repair mobile phones

Module Title: Servicing and repairing mobile phones

MO Code: EEL BEC2 M07 10 19

TTLM Code: EEL BEC2 TTLM 1019 V1

LO3: Service/repair cellular phone unit

Instruction Sheet	Service/repair cellular phone unit

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

- OH&S procedures
- application software
- Defective parts/components are replaced
- Solder/ mount Repaired or replaced parts/components

This guide will also assist you to attain the learning outcome stated in the above. Specifically, upon completion of this Learning Guide, you will be able to –

- Replacing defective parts or components with correct soldering techniques and procedures with application of OHS.
- Installing application software.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” in each information sheets.
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets and LAP Tests if any”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity.
7. After you accomplish Operation sheets and LAP Tests, ensure you have a formative assessment and get a satisfactory result;
8. Then proceed to the next Learning guide.

Information Sheet #1	Using personal protective equipment's in accordance with Occupational Health and Safety practices

1.1 PPE Safety

Personal Protective Equipment (PPE) is clothing or equipment designed to protect workers from physical hazards when on a worksite. PPE should only be considered as a last line of defence between a hazard and the worker. Attempts to control workplace risks and hazards should always be addressed first.

Workplace safety should begin with a hazard assessment. Once the hazards and risks have been identified, a plan can be put forward to prioritize and reduce risk of injury. Useful systems and tools to perform hazard assessments include performing a Risk Assessment and a Job Safety Analysis.

1.1.1Workplace Hazards and Risks Involved

Workplace hazards caused 5,190 workplace deaths in 2016 according to the US Bureau of Labor Statistics, which is an average of 99 weekly deaths or more than 14 fatalities per day. Employers, managers, and safety officials can help prevent these deaths by establishing adequate safety protocols, hazard identification procedures, and conducting regular hazard assessments in the workplace.

- **What are Common Workplace Hazards?**

OSHA identifies the 6 most common hazards in the workplace as follows:

1. Safety hazards
2. Biological hazards
3. Chemical and dust hazards
4. Ergonomic hazards
5. Work organization hazards
6. Physical hazards

1.1.2What is a JSA and Why is it Important?

Job Safety Analysis (JSA) also known as Job Hazard Analysis (JHA) is a process of looking at a work task and considering what is the safest way to complete it. The process typically involves 1) Breaking a job down into smaller tasks and observing a worker performing it, 2) Identifying the potential hazards for each task and, 3) Determining preventive measures and controls to overcome these hazards.

Dangerous jobs benefit the most from a JSA because it can reduce or eliminate hazards that cause serious injuries or fatalities. A JSA increases job knowledge, establishes teamwork, serves as a health and safety standard and teaching aid, and supports accident investigations at work. A JSA template is used when performing a JSA procedure and is used to generate a safety and recommendation report.

- **What Jobs are Appropriate for a JSA?**

A JSA can be conducted on many jobs in your workplace but priority should go to the types of jobs that have:

1. Highest injury or illness rates;
2. Potential to cause severe or disabling injuries or illness, even if there is no history of previous accidents;
3. Simple human error which could lead to a severe accident or injury;
4. Undergone changes in processes and procedures; and
5. Complexity enough to require written instructions

1.1.3 What is a Risk Assessment?

A risk assessment is a systematic examination of your workplace to: 1) identify significant hazards; 2) assess injury severity and likelihood; and 3) implement control measures to reduce workplace risks

Beyond complying with legislative requirements, the purpose of risk assessments are to improve the overall health and safety of your workers.

Risk assessments are often confused with a Job Safety Analysis (JSA) or Job Hazard Analysis (JHA). The key difference between a risk assessment and a JSA is scope. Risk assessments assess safety hazards across the entire workplace and are oftentimes accompanied with a risk matrix to prioritize hazards and controls. Whereas a JSA focuses on job-specific risks and are typically performed for a single task, assessing each step of the job.

- **How to Perform a Risk Assessment?**

Competent persons who are experienced in assessing hazard injury severity, likelihood and control measures should carry out risk assessments. A new risk assessment should be carried out when there are new machines, substances and procedures which could lead to new hazards. They should be reviewed regularly and kept up to date.

Here are 5 steps to follow when performing a risk assessment in your workplace:

1. Identify hazards: Survey the workplace and look at what could reasonably be expected to cause harm. Identify common workplace hazards. Check manufacturers or suppliers instructions or data sheets for any obvious hazards. Review previous accident and near-miss reports.
2. Decide who might be harmed and how: Identify which group and demographic of workers might be harmed. Ask workers if they can think of anyone else who could be harmed by the hazard.
3. Evaluate the risks and decide on control measures: Look for existing controls in place. Follow the hierarchy of controls in prioritizing implementation of controls.
4. Record your findings and implement them: Use a risk assessment template to document your findings. Get started with iAuditor's free risk assessment templates that you can use on your mobile device while on-site. Share your report and findings with key parties who can implement changes.
5. Review your assessment and update if necessary: Follow up with your assessments to check if controls have been put in place or if any new hazards have resulted

1.1.4 Basic Types of PPE

However, even the strictest controls will not necessarily eliminate all the risks associated with most job tasks and this is where the need for PPE must be evaluated. A hazard assessment can help identify which specialized PPE will be required. However, the following basic types of PPE should be made available in every worksite.

1. **Head Protection**

PPE includes hard hats and headgears and should be required for tasks than can cause any force or object falling to the head. When performing head protection safety checks, ensure that there are no dents or deformities on the shell and connections are tightened inside. Do not store in direct sunlight and always replace a hard hat if it was used for any kind of impact, even if damage is unnoticeable.

2. **Face and Eye Protection**

PPE includes safety goggles and face shields and should be used for tasks that can cause loss of vision and an eye, burns, splashes, sprays of toxic liquids etc. When conducting equipment safety checks, ensure that there are no cracks or deformities on the lenses, ensure the strap is in good working order and is firmly sealed to the cheek and forehead.

3. **Foot Protection**

PPE includes knee pads and safety boots and should be used for tasks that can cause serious foot and leg injuries from falling or rolling objects, hot substances, electrical hazards and

slippery surfaces. Use boots with slip-resistant soles that protect against compression and impact.

4. Hands Protection

PPE includes safety gloves and should be used for tasks that can cause hand and skin burns, absorption of harmful substances, cuts, fractures or amputations. When inspecting hand protection equipment, ensure that they fit perfectly with no spaces and are free from cuts, burns and chemical residue. Always replace them if any sign of contamination was observed.

5. Body Protection

PPE includes safety vests and suits and should be used for tasks that can cause body injuries from extreme temperatures, flames and sparks, toxic chemicals, insect bites and radiation. Ensure that they are clean and free from cuts and burns. Always get a good fit to ensure full body protection.

6. Hearing Protection

PPE includes ear muffs and plugs and should be used for tasks than can cause hearing problems and loss of hearing. When ensuring hearing safety, the equipment must fit the ear canal perfectly. Recommended types include formable earplugs to fit on different sizes of ear canals.

7. Fall Protection

PPE includes safety harnesses and lanyards and should be strictly used for task that can cause falling from heights and serious injury or death. When inspecting equipment, ensure that the straps are free from tears, deformities and burn marks and buckles are connected securely and tightly. It is very important to dispose them if used after a falling incident.

8. Respiratory Protection

PPE includes respirators and should be used for task that can cause inhalation of harmful materials to enter the body. When conducting respiratory protection safety, ensure that the equipment is fit-tested and the employee has undergone proper training before wearing one.

1.1.5 PPE Safety Checklists

Safety officials and supervisors to help identify tasks that require PPE, ensure staff is using the right equipment and reduce overall harm use personal Protective Equipment (PPE) Safety Checklists. This

page features the most downloaded PPE checklists from OSHA and other best practice checklists. Use iAuditor, the most powerful inspection app, to conduct regular PPE self-inspections, identify tasks that require PPE and ensure staff is using the right equipment. Get started with these free customizable PPE checklists to find out how you can prevent accidents at work.

➢ What are PPE Safety Checklists?

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Follow these 5 steps to start performing mobile inspections

1. Create a free I Auditor account to get started
2. Download a template above and modify it for your workplace or browse other checklist topics
3. Install the iAuditor app on your mobile or tablet and perform an inspection
4. Take photos, create actions and generate reports on your device
5. Invite your teammates. Save time, save lives

➢ Top 3 PPE Safety Checklists

PPE Safety Checklist

Managers and safety officials to select the appropriate equipment to reduce hazards identified at work can use this free PPE checklist. Start by recording nature of work and potential hazards that may be in contact with body parts. The template then prompts the inspector to describe the hazard, state the required PPE and check the condition of the PPE by capturing photo evidence. Lastly, it summarizes the inspection by providing recommendations. Use iAuditor to perform more efficient PPE inspections by taking photos of defects and generate quality reports on-site.

What are the 4 types of PPE?

Types of personal protective equipment

- Respiratory protection - for example, disposable, cartridge, air line, half or full face.
- Eye protection – for example, spectacles/goggles, shields, visors.
- Hearing protection – for example, ear muffs and plugs.

- Hand protection – for example, gloves and barrier creams.

Why is PPE used?

The Importance of **Personal Protective Equipment**. ... **PPE** is equipment that will protect workers against health or safety risks on the job. The purpose is to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective to reduce these risks to acceptable levels.

1.1.16 Tips on Cell Phone Safety and Privacy

As cell phones become smarter, they're more like mini computers that contain lots of personal information about us. Here are 12 easy steps to take to manage your privacy and safety when using your cell phone.

1. Put a passcode on your phone.

The easiest thing for you to do is to put a passcode on your phone. Having a passcode will make it harder for someone to pick up your phone to scroll through, access your accounts, or install something malicious. In the event that your phone gets stolen or you lose it, it'll make it a bit harder for others to get into your phone. Most phones just ask for a 4-digit passcode, but some phones will allow you to use a more complex passcode.

2. Turn off location sharing.

Most phones have a GPS that can pinpoint your general or exact location. With this capability, many applications may collect and share your location information. However, many smartphones give you the option of managing your location sharing under the "settings." You can pick and choose which applications may access your location or you can opt to turn off the location setting altogether. Minimizing the location access can also help increase the battery life on your phone. If your phone doesn't offer specific location-sharing settings, choose carefully when downloading new apps so you're not sharing your location unknowingly.

3. Turn off Bluetooth when not using.

Bluetooth allows your phone to communicate with other devices, such as the hands-free option in your car or your printer. If accessed by someone else though, they could misuse it to access your information or intercept your calls. Turn off the Bluetooth on your phone and turn it on only when you need to connect with other device. Many phones also allow users to

set passcodes or additional security levels on their Bluetooth as well. Use all available options to increase your privacy.

4. Check your privacy & security settings.

Most smartphones have settings that will help you manage your privacy and safety. You can find these controls through the settings on your phone or through the settings of a specific app. These settings may allow you to limit an application's access to the data on your phone, including access to your location, pictures, contacts, notes, etc. You may even be able to block cookies and limit what data your mobile browser collects.

5. What online accounts are you automatically logged into?

One of the convenient features of having a smartphone is to quickly access email or social media accounts with just a tap of a finger. However, this also means that you are always connected to accounts that may contain sensitive information. Consider logging out of certain accounts if you can so that others can't access those accounts if they are using your phone. Keep in mind that depending on the type of phone you have, you might not be able to log out of some accounts, such as email accounts, but may have to remove the entire account from your phone. In this case, make your decision based on your own privacy and safety risk. While it may be inconvenient to access the account through the browser instead, it may be safer.

6. Review the apps you download.

Know the apps that are on your phone, and if you have an unfamiliar app, delete it. Apps are easy to download and easy to forget, but depending on the app, it could be accessing private information or could be a monitoring program that someone surreptitiously installed.

7. Put a password on your wireless carrier account to keep others from accessing your account.

If you're worried that someone might be contacting your wireless carrier to obtain information about you and your account, you can ask your wireless carrier to put additional security on your account, such as a password. Only someone with this password will be allowed to make changes to your account.

8. Lock down your online phone account.

Keep in mind that even if someone doesn't have access to your phone, it might be possible for them to access your online account. Online accounts can include your wireless carrier

account, call logs, your email or social media accounts, your Google Play/Apple AppStore, or iCloud account. Update the passwords and security questions for those accounts to ensure someone else can't get access.

9. Use virtual phone numbers (such as Google Voice) to keep your number private.

To further maximize your privacy, consider using a virtual number, such as Google Voice or a throw away number, so you don't have to give out your actual phone number. A virtual phone number will also allow you to screen calls and make calls/send texts from the virtual number.

10. Try not to store sensitive information on your phone.

Finally, although it may be tempting to store information such as passwords, account numbers, or personal information on your phone, the less sensitive information you have, the less likely someone else can access it. You might even want to consider deleting sensitive text messages or voicemails so they're not stored on your phone.

11. Use anti-virus and anti-spyware software on your phone.

After years of warnings, we are fairly used to ensuring we have anti-spyware, anti-malware, and anti-virus programs on our computers. This software should also be used on our smartphones as well. Search for programs in the app stores and discuss them with your wireless provider. Some phones come with built-in software that you won't want to override.

12. Take care when using safety apps.

There are many "personal safety apps" available for download that offer to increase the users' personal safety – immediately connecting them with 911 or select trusted individuals. Several of these apps are designed and marketed specifically to survivors of violence. Before relying on any safety app in an emergency, be sure to test it out with friends and family to be sure that it works correctly for you. Your trusted friend may not receive your location with your emergency call or may not receive your call for help at all. Always know the quickest way to access 911 on your phone in case of an emergency. Many phones have a quick emergency call button that you can even dial without entering the phone's passcode.

Self-Check #1	Written Test

Name: _____Date: _____

Time Start: _____Time Finish: _____

1. _____clothing or equipment design to protect workers

   A. Safety
   B. PPE
   C. DMM
   D. All

2. Which one of the following is not common workplace hazard?

   A. PPE
   B. Biological hazard
   C. Ergonomic hazard
   D. All

Answer score

1_____

2_____

3_____

Information sheet 2	Following electro-static discharge (ESD) procedure in accordance with industry standards

2.1 ESD (Electrostatic Discharge) – Static Electricity and Anti Static Protection

2.1.1What is ESD Electrostatic Discharge?

ESD Electrostatic Discharge or Static electricity is an electrical charge that is at rest. This is mainly created by an imbalance of electrons that stay on a specific surface, or in the environmental air. The imbalance of electrons (in all cases, is caused by absence or surplus of electrons) thus causes an electrical field that is capable of influencing other objects at a distance.

https://www.youtube.com/watch?v=y5FswkQ4bi0

The level of charge is affected by material type, speed of contact and separation, humidity, and several other factors. The ESD effect can be seen easily in everyday life, while it could always been hardly detected. The electronics industry is badly affected by ESD or Electrostatic Discharge. Let us discuss ESD in detail.

fig 2.1symbol of esd

Static charge is an unbalanced electrical charge at rest. Typically, it is created by insulator surfaces rubbing together or pulling apart. One surface gains electrons, while the other surface loses electrons.This results in an unbalanced electrical condition known as static charge. When a static charge moves from one surface to another, it becomes ESD. ESD is a miniature lightning bolt of charge that movesbetween two surfaces that have different potentials. It can occur only when the voltage differential between the two surfaces is sufficiently high to break down the dielectric strength of the medium separating the two surfaces. When a static charge moves, it becomes a current that damages or destroys gate oxide, metallization, and junctions. ESD can occur in any one of four different ways: a charged body can touch an IC, a charged IC can touch

a grounded surface, a charged machine can touch an IC, or an electrostatic field can induce a voltage across a dielectric sufficient to break it down.

2.1.1ESD Stress Models

ESD can have serious detrimental effects on all semiconductor ICs and the system that contains them. Standards are developed to enhance the quality and reliability of ICs by ensuring all devices employed have undergone proper ESD design and testing, thereby, minimizing the detrimental effects of ESD. Three major stress methods are widely used in the industry today to describe uniform methods for establishing ESD withstand thresholds (highest passing level).

2.1.2Human Body Model (HBM)

The HBM is a component level stress developed to simulate the action of a human body discharging
accumulated static charge through a device to ground, and employs a series RC network consisting of a
100 pF capacitor and a 1500 Ω resistor.

2.1 .3Charged Device Model (CDM)

The CDM is a component level stress that simulates charging and discharging events that occur in production equipment and processes. Potential for CDM ESD events occur when there is metal-to-metal contact in manufacturing. One of many examples is a device sliding down a shipping tube and hitting ametal surface. The CDM addresses the possibility that charge may reside on a lead frame or package (for example, from shipping) and discharge through a pin that subsequently is grounded, causing damage to sensitive devices in the path. The discharge current is limited only by the parasitic impedance and capacitance of the device. CDM testing consists of charging a package to a specified voltage, then this voltage through the relevant package leads. At TI, the CDM testing is conducted using a field-induced CDM (FCDM) simulator.

2.1.4 System Level ESD (International Electrotechnical Commission - IEC)

The IEC system level ESD is a widely accepted European standard which defines an ESD event that is meant to be tested on actual end equipment to simulate a charged person or object discharging into electronic systems. The IEC standard defines an ESD stress that is much stronger than the component level ESD stresses defined by HBM and CDM.

2.1.5 What are the common sources of static electricity?

The following table shows a sample list of sources of static electricity

Object or process	*Material or activity*
Work surfaces	Waxed, painted or plastic surfaces.
Floors	Waxed, common vinyl tiles, sealed concrete
Clothes	Common smocks, non-conductive shoes, synthetic materials (e.g. nylon)
Chairs	Vinyl, fiber-glass, finished wood
Packaging	Common plastic bags, foam, trays, tote boxes
Assembly area	Spray cleaners, heat guns, blowers, plastic tools (e.g. solder suckers, brushes) cathode ray tubes.

- **What are typical examples of static charge inducing situations? Does humidity have any effect on the induced static charge?**

The following table shows some typical situations. Please note that humidity has a significant effect on the induced charge. It is not recommended to have relative humidity (RH) that is too low, say, below 30%. ESD control becomes especially challenging at low RH levels. A relative humidity between 40% to 60% is recommended for the typical assembly area.

Means of static generation	*RH 10-20%*	*RH 65-90%*
Walking across a carpet	35,000 V	1,500 V
Walking on a vinyl tile floor	12,000 V	250 V
Vinyl envelopes for work instructions	7,000 V	600 V
Worker at bench	6,000 V	100 V

2.1.6How does damage from ESD happen?

When a statically charged person or object touches an electrostatic discharge sensitive (ESDS) 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. Generally, devices with finer geometries are more susceptible to damage from ESD. The modes in which ESD damage occurs are:

(a) Discharge to the device
(b) Discharge from the device
(c) Field-induced discharge.

2.1.7The Prevention and Control ofElectrostatic Discharge (ESD)

what damage does ESD cause in an electronic device?

There are basically two categories of damage from ESD:

(a) 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.

(b) 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.

What are the classifications of ESD sensitivity? Electrostatic discharge sensitive (ESDS) parts are commonly characterized to three defined models:

• Human Body Model (HBM)
• Machine Model (MM)
• Charged Device Model (CDM) Based on the models used, the ESDS parts can be classified in accordance with the following table (per MIL-STD-1686C, with HBM subgroups per ESD STM5.1-2001). It should be noted that the HBM, MM and CDM voltage levels do not correlate with each other.

ESD Model	ESD Classification	Voltage Range
Human Body Model (HBM)	0	0V – 249V
	1A	250V – 499V
	1B	500V – 1999V
	1C	1000 – 1999V
	2	2000 – 3999V
	3A	4000 – 7999V
	3B	>= 8000V
Machine Model (MM)	M1	0V – 100V
	M2	101V – 200V
	M3	201V – 400V
	M4	401V – 800V
	M5	>800V
Charged Device Model (CDM)	C1	0V – 124V
	C2	125V – 249V
	C3	250V – 499V
	C4	500V – 999V
	C5	1,000V – 1,499V
	C6	1,500V – 2,999V
	C7	>= 3,000V

2.1.8Causes / Sources of Electrostatic Discharge or Static Electricity

1. Triboelectric Charging (Primary Cause)

Triboelectric charging occurs when two materials are separated after coming into contact with each other or any rubbing activities. The charging thus takes place during the transfer of electrons from one material to another. Triboelectric charging can happen between any materials such as solids, liquids and air particles.

2. Field Induction

Whenever an object is electrostatically charged, an electrical field associated with that charge is created around it. Once an ungrounded sensitive device enters the electrical field, a charge is induced on the device, causing a surging transfer of charges between the two bodies. This transfer of charges thus results in catastrophic failures, which leaves the device destroyed permanently.

2.1.9Damage Caused by ESD Electrostatic Discharge

Electrostatic discharge can change, degrade or destroy the electrical characteristics of electronic devices such as integrated circuits and electronic components, mainly SMD Electronic Components and even Different Types of PCB. Therefore effective static control and protection / prevention is crucial, in order to protect products from undesirable damages.

In mobile cell phone manufacturing and repairing industry, ESD-Safety is a must because SMD Electronic Components used in Mobile Phones are very sensitive to static charge and can get easily damaged if they come in contact with static electricity.

2.2ESD Electrostatic Discharge Protection / Prevention

On many instances, people at work are one of the key generators of static electricity. The simple act of walking or repairing a Printed Circuit Assembly is sufficient to generate thousands volts on the body. It is obvious that personal grounding is the first step to effective static control. Following ESD Protection Materials can be used.

1. Anti-Static Packaging Material for ESD Protection

Packaging materials such as Static Shielding bags, Conductive bags, ESD containers and boxes / bins provide direct protection to devices and components from electrostatic discharge. The principal use of these packaging materials is to protect the product when it leaves the ESD protected facility.The main function of these ESD packaging materials is to eliminate or minimize the possible impact of electrostatic discharge created from triboelectric charging, direct discharge, and electrostatic induction fields.

https://www.youtube.com/watch?v=imdtXcnywb8

fig 2.2 Anti-Static Packaging Material for ESD Protection

2. ESD Safe Wrist Strap and Heal Strap for ESD Protection

When properly worn and grounded, a functioning wrist strap and heal strap keeps the human body near ground potential, thus preventing hazardous discharge between bodies and objects. Wrist straps and heal straps allow safe dissipation of charges from the body to ground.

fig 2.3 esd strap

3. ESD Safe Flooring and ESD-Safe Footwear

A good combination of ESD floor materials (ESD Mat or ESD Tiles or ESD Paint) and proper footwear provides a grounding path for dissipating electrostatic charges generated during

walking.The use of ESD floor materials is particularly appropriate in those areas where increased personnel mobility is essential.

Fig2.4 ESD-Safe Footwear

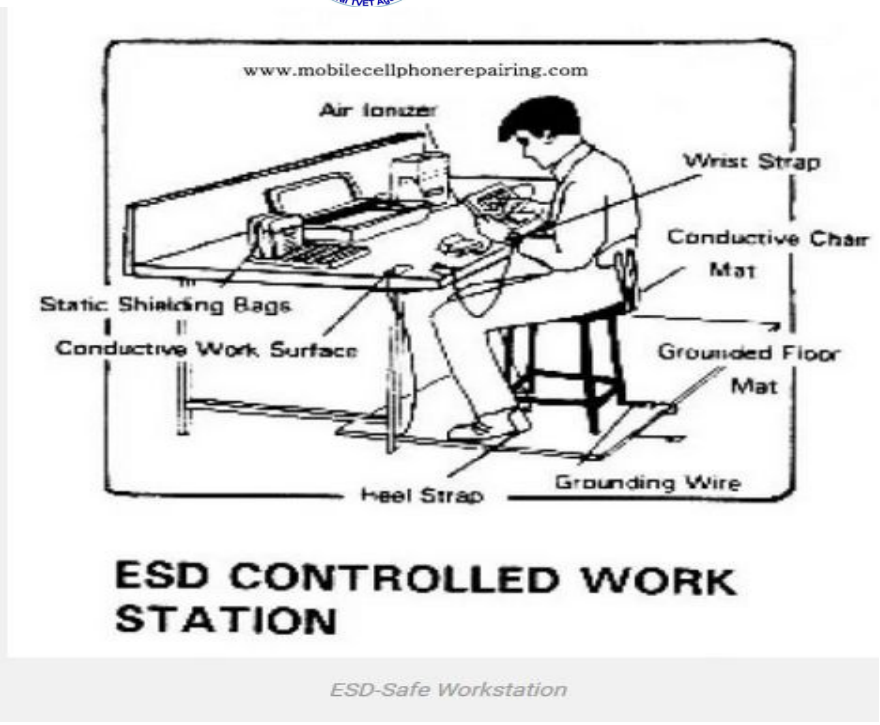
4. ESD-Safe Garments

Anti-Static Clothing such as ESD Apron is an important consideration in most ESD protective areas, particularly in dry environments. Grounded static control garments are recommended to minimize the effects of electrostatic fields or charges that may exist on a person's clothing.

ESD-Safe Apron fig2,5

5. ESD-Safe Workstation

Proper ground of workstation plays an important role in protecting devices from electrostatically induced damages. ESD tablemats, grounding cords and awareness signs are key elements in an electrostatic protective workstation.



ESD-Safe Workstation fig2.6

6. Ionizers

Air ionization can neutralize the static charges on insulated and isolated objects by charging the molecules of the gases in the surrounding air. Static charges that exist on any surface can be neutralized by attracting opposite polarity charges from the air.

Ionizer fig2.7

- **An example of a static-safe workbench (at Electrical Test).**

The picture below shows an example of a static-safe workbench. It is vitally important that the wrist-strap and the tablemat are securely grounded (through the 1 Meg-ohm safety resistor). In

addition, all other materials with which the products come into contact must also be static-safe. The use of an antistatic floor further enhances the protective capabilities of a static-safe work environment. The worker should also wear an antistatic smock.

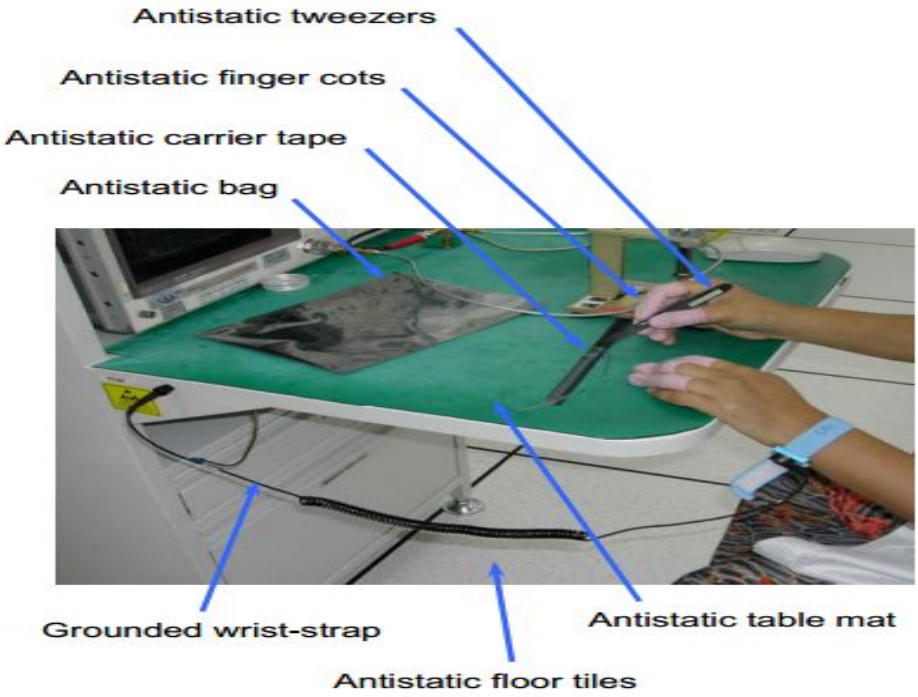


fig2.8

- **Static-safe work bench.**

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

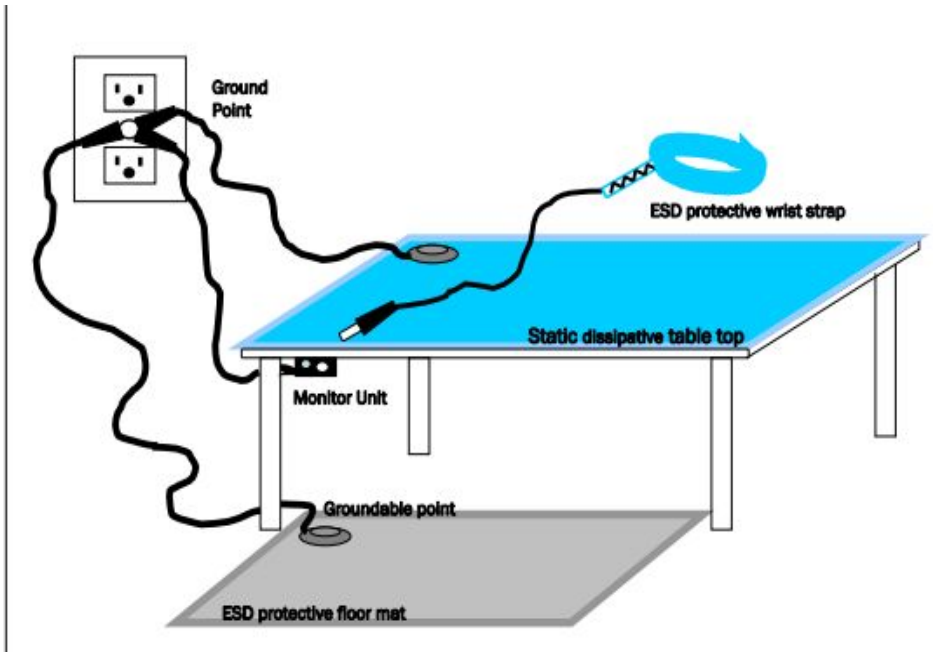
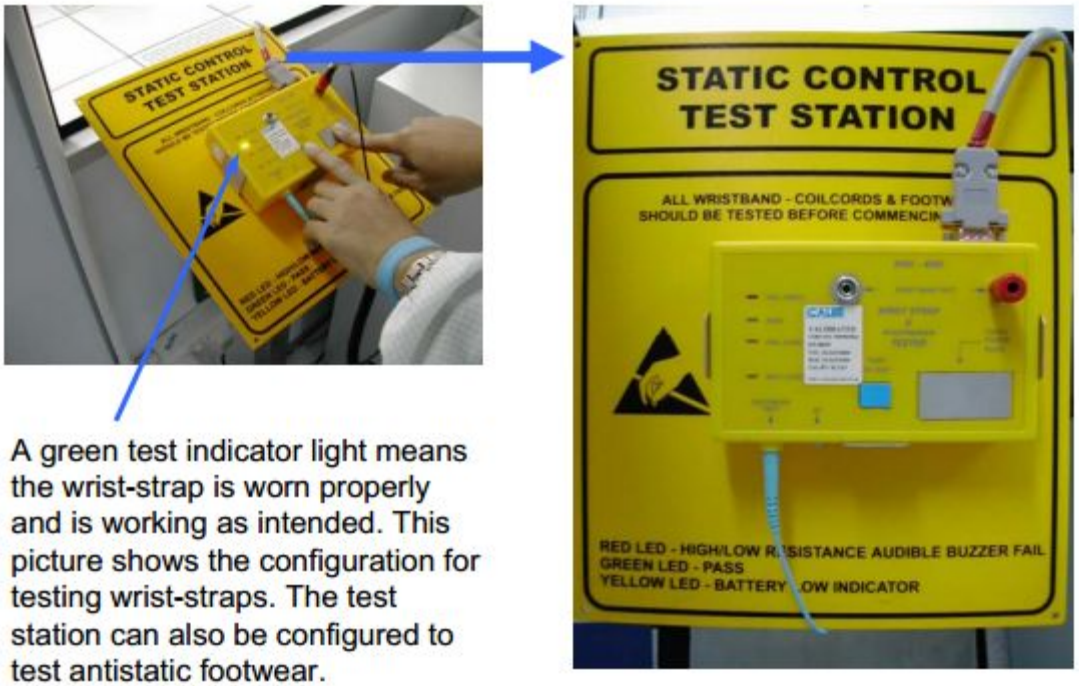


fig2.9

An example of a Static Control Test Station.

The picture shows an example of a test station used to determine whether antistatic wrist-straps or antistatic shoes are working properly



A green test indicator light means the wrist-strap is worn properly and is working as intended. This picture shows the configuration for testing wrist-straps. The test station can also be configured to test antistatic footwear.

Antistatic footwear.

Where a wrist-strap is impractical, e.g. the job requires the worker to walk from one location to another, it is recommended that antistatic footwear such as antistatic shoes or heel-straps are worn. The picture on the right shows an example of an antistatic heel-strap with the grounding cord running into the socks to make contact with the skin. It is also necessary to use an antistatic floor (e.g. conductive floor tiles) to work together with the antistatic footwear.

Labels to identify electrostatic discharge sensitive (ESDS) devices.

The following labels are commonly used on containers and packaging to alert anyone who handles the ESDS devices on the need to use static-safe procedures before handling the devices. The one on the left is preferred.

The following verbiage should be placed beside the label:

CAUTION
Contains parts and assemblies susceptible to damage by Electrostatic Discharge (ESD)

Self cheak	Written/choose

Name: _____Date: _____

Time Start: _____Time Finish: _____

1._____ is an important consideration in most ESD protective areas, particularly in dry environments.

A. CMD

B. SMD

C. ESD

D. None

2._____the electronic device id rendered in operable immediately after the esd evenet

A. Catastrophic damage

B. Latent damage

C. Human body model

D. all

Information sheet 3	Replacing or swap defective parts or components with original part

3.1 Replacing or swap defective parts or components with original part

3.1.1 Service/repair cellular phone unit

When learning how to repair a mobile cell phone, it is important to identify parts of a mobile phone. There are hundreds of parts and electronic components in mobile phone. These parts and components can be classified into different groups such as card level parts, big parts and small parts. In this article, I will explain and teach you about card level parts of a mobile phone. Big parts, small parts, and electronic components will be covered in future articles.

3.1.2Card Level Parts of a Mobile Cell Phone

- **Front Facial or Facial**:

This is the front cover or housing of any mobile phone. These are of different shapes and sizes depending upon brand and model.

Fig.3.1. Shows Mobile Phone Front Facia

- **Back Facia or Facial**:

This is the Back cover or housing of any mobile phone. These are of different shapes and sizes depending upon brand and model.

fig.3.2 Shows Mobile Phone Back Facia

- **Internal Facia or Facial**:

This is the internal skeleton of a mobile phone.

Fig.3.3 Shows Internal Facia or Skeleton of a Mobile Phone

 Ringer: This part of component in a mobile phone is also called loudspeaker. It plays loud sound and music in mobile phone.

Fig.3.4 Shows Mobile Phone Ringer

 Speaker: This part or component is also called earpiece. It helps to listen to sound during phone call when the loudspeaker or headphone is NOT ON.

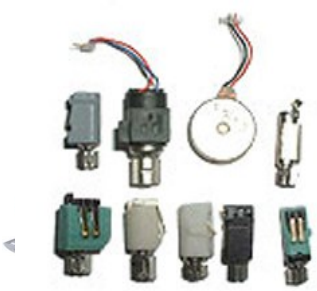
Fig.3.5 Shows Mobile Phone Speaker

 Microphone: It is also called Mic in short. It transmits sound of the speaker during phone call. It also helps to record sound in a mobile phone. It other words, microphone is a sound input device.

Fig.3.6 Shows Mobile Phone Microphone **Fig.3.7 Shows Vibrator of Mobile Phone**

 Vibrator: It is also called motor.

It creates vibration in a cell phone when vibration mode setting is turned ON.



Vibrator

it is made of a tiny motor that conduct vibration when in active mode. It has been attach an unbalance tiny metal on its tip that is why it creates vibration when the motor rotates. . It creates vibration in a cell phone when Vibration mode setting is turned ON**Fig.3.8 Shows Buzzers and Ringers**

Also these speakers can generate high audible sound louder than Earpiece speakers can. It amplifies the ringtones, voice, or music more audibly.

 LED: Light Emitting Diode. These components

Produce light in a mobile cell phone.

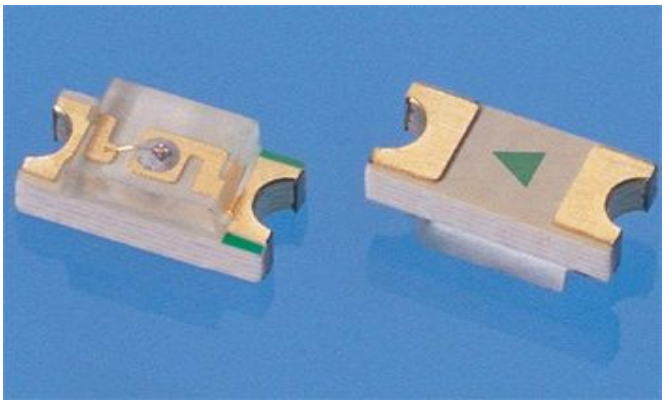
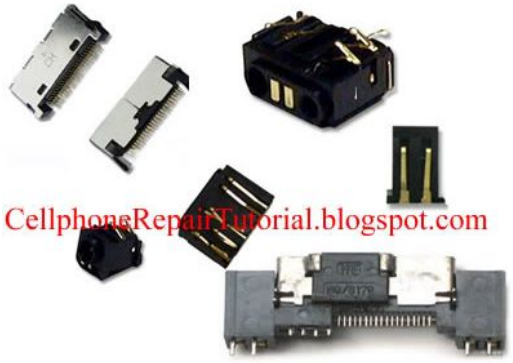


Fig.3.9 Shows LED of Mobile Phone

3.1.3Plug-in Connectors

Plug in connectors is interfaces used in charging or by charger plugging, USB and data cables. Various mobile products also have different plug-in connector's designs.



 Charging Connector: It helps to connect the charger to the PCB of a mobile phone to charge or recharge the battery.

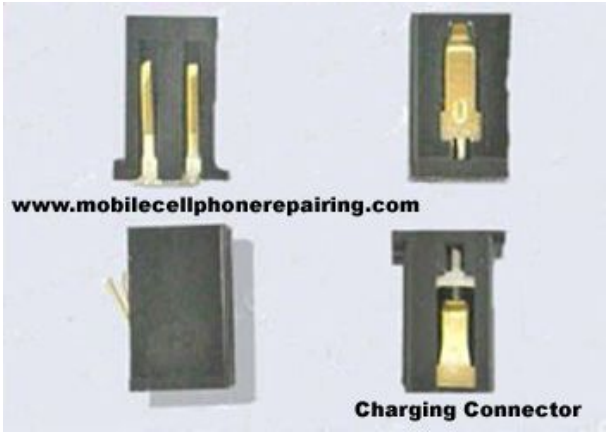


Fig.3.10 Shows Mobile Phone Charging Connector

 Headphone Connector: It is also called Earphone Connector. It helps to connect the headphone to the mobile phone via jack.

Fig.3.11 Shows Mobile Phone Headphone Connector

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

Fig.3.12 Shows Data Cable Connector of Mobile Phone

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

Fig.3.13 Shows Battery of Mobile Phone

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

Fig.3.14 Shows Mobile Phone Battery Connector

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

Fig.3.15 Shows SIM Card

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

Fig.3.16 Shows SIM Connector

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

Fig.3.16 Shows Memory Card

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

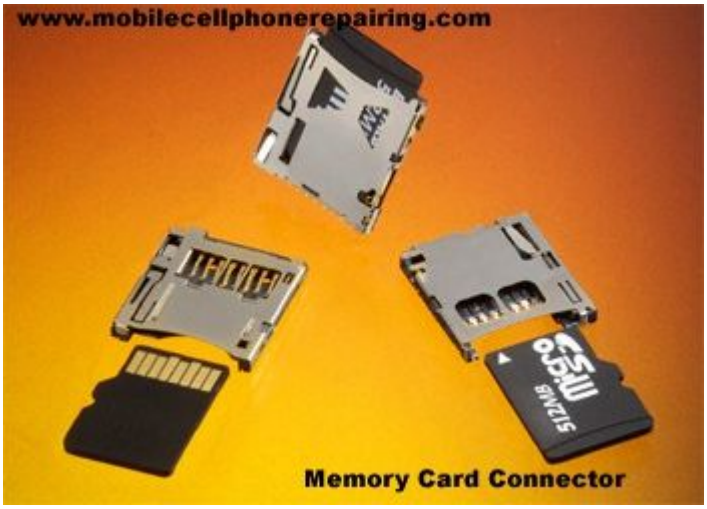


Fig.3.17 Shows Mobile Phone Memory Card Connector

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

Fig.3.18 Shows Camera of Mobile Phone

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

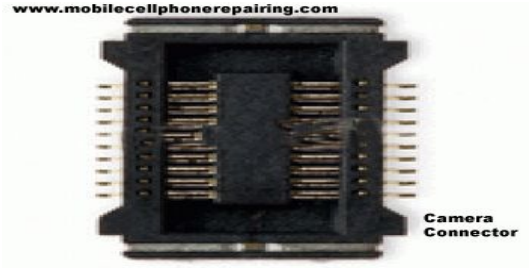


Fig.3.19 Shows Mobile Phone Camera Connector

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

Fig.3.20 Shows Mobile Phone Keypad

 Keypad Carbon: It is present in between keypad button and the PCB. It connects the keypad buttons to the PCB of a mobile phone.

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

- **Keypads Membrane**

This are made of tiny round metals that acts as a switch in a row of letters and numbers characters on keypads mattress.

Fig.3.21 Shows Mobile Phone Keypad Connector

ON and OFF Switch

It is made of tiny metal that conducts connectivity when press. It is being used as a power on and off, Volume control switch and camera shutter switch on various mobile phones.

 Display: It is screen of the mobile phone.

Fig.3.22 Shows Mobile Phone ON-OFF Switch

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

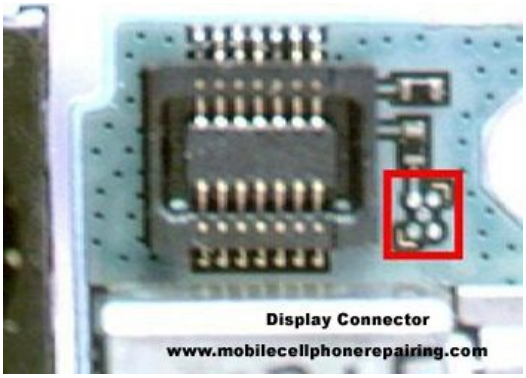


Fig.3.23 Shows Mobile Phone Display Connector

 Internal Antenna: It helps to capture network frequency.

Fig.3.24 Shows Internal Antenna of Mobile Phone

- **PCB**: Printed Circuit Board of the Mobile Phone.

Fig.3.25 Shows Mobile Phone PCB

- **PDA**: Display or Screen of a touch screen mobile phone.


MESSAGES
www.mobilecellphonerepairing.com
CREATE
BACK
PDA

fig 3.26

Self Check	matching

Name: _____Date: _____

Time Start: _____Time Finish: _____

Instruction: Answer all the questions provided correctly, if you have some clarification regarding the test just raise your hand and ask the assistance of the teacher

A	**B**
1. Display or Screen of a touch screen mobile phone	A. camera
2. Capture still images or record videos.	B. Internal Antenna
3. It helps to capture network frequency.	C, PDA
4. It connects the keypad to the PCB of the cell phone.	D. Keypad Connector

Answer score

1. _____
2. _____
3. _____
4. _____

4.1Replacing or swap defective parts

a.Surface Mount Device (SMD)

Surface Mount Device (SMD) are Chip-Type electronic components for SMT. Surface Mount Device do not have leads like thru-hole. They are mounted on the PCB

Surface Mount Device (SMD) are Chip-Type electronic components for SMT. Surface Mount Device do not have leads like thru-hole. They are mounted directly on the PCB. Learn all about Surface Mount Device (SMD).

Fig3.27

- **Surface Mount Device (SMD)**

Circuit of a mobile phone looks like general circuit but the parts in printed circuit boards (PCB) of mobile phone are different from normal thru-hole electronic components. These electronic components are known as surface mount device or surface mount electronic components.

These SMD electronic components on the PCB of a mobile cell phone generally do not have any leads. Components that have leads are bent in a manner that they can be mounted only on the surface of the PCB and hence the name “Surface Mount Device”. Most of the electronic components on the PCB of a Mobile Cell Phone are BGA or Ball grid Array Packages. The whole technology is called Surface Mount Technology (SMT)

SMD Components of Mobile Phone PCB

Fig3.28

- **What is SMD or Surface Mount Device or Surface Mount Electronic Component?**

Surface mount devices of SMD are electronic components that are easily soldered or mountable on the surface on the PCB. Most of these PCBs are multilayered PCB which means these PCB have more than one layer. The technique of soldering or utilizing SMD components is called SMT (Surface Mount Technology).

- **What are Advantages of SMD?**

SMD type electronic components offer many advantages. The main advantage is that they are space saving. The size of mobile phones has been significantly reduced because of the use of SMD components. SMD components use less electricity and voltage loss is also very less.

- **Uses of SMD Electronic Components?**

Presently SMD of Surface Mount Devices are used in ultra-modern electronic equipment's like mobile phones, smartphone, computers, laptops tablets etc. all the components used in Surface Mount Technology are mostly in the form of chips or IC (Integrated Circuit). These chips or ICs are classified into different categories depending of the type of legs or leads they have and their function. These components are mounted directly at the specified location on the copper track of the Printed Circuit Board using Surface Mount Soldering Technology.

b.Surface Mount Transistor in Mobile Phone and Their Function

Surface Mount Transistor in Mobile Phone – SMT Transistor is SMD part made of semiconductors like silicon or germanium. Types of SMD Transistors: NPN, PNPSurface Mount

Transistor or SMT Transistor is an SMD electronic component made up of semiconductor material like silicon or germanium. There are 2 types of Surface Mount Transistors:

1. NPN Type
2. PNP Type

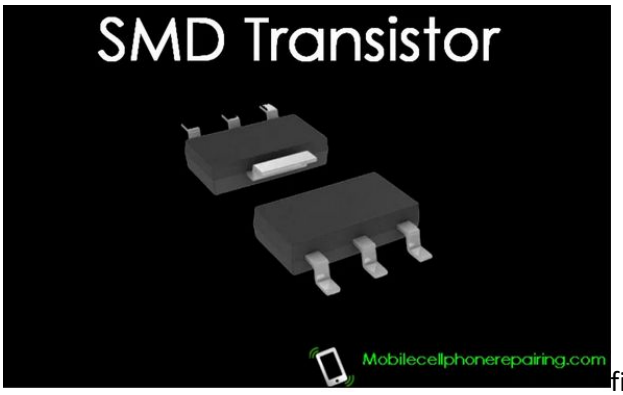


fig3.29

- **Terminals of a Transistor**

There are three terminals of a surface mount transistor or thru-hole transistor:

1. **Ammeter (E)** – Flows current on receipt of forward bias. Electrons are emitted in NPN transistors whereas PNP transistors emit 'holes'.
2. **Collector (C)** – The terminal of the transistor which receives the emitted electrons or holes. Collector always works or reverse bias mode.
3. **Base (B)** – The layer between ammeter and collector is called base. Base displays the property of showing low resistance in ammeter junction forward bias and high in collector junction reverse bias.

Facts about Transistor

1. **Indicating Character**: Q or V, TR
2. **Function**: Switching, Amplification, Regulating Voltage.
3. **Unit**: Transistors are identified according to the code.

Digital Surface Mount Transistor

In digital transistor, resistance in built in the base and ammeter. This transistor is also called RET (Resistance Equipped Transistor). This type of transistor is used in mobile phones for reducing the current consumption.

Field Effect Transistor (FET)

This type of transistor is controlled by voltage instead of current. Flow of working current through a semiconductor channel is switched and regulated by the effect of electrical charge in the area near channel, which is called gate. This is called unipolar transistor. FET can be P-Channel type or N-Channel Type.

Metal Oxide Semiconductor (MOSFET)

MOSFET is active semiconductor components. MOSFET has 3 terminals – source, drain and gate. There are 2 types of MOSFET:

1. P-Channel MOSFET (*PMOS*)
2. N-Channel MOSFET (*NMOS*)

How to Read SMD Transistor Code

All SMD Transistors are Marked with Codes to denote the type of semiconductor used and use of transistor.

Here I explain How to Read SMD Transistor Code:

First Alphabet:

- **A**= Germanium
- **B** = Silicon
- **C** = Gallium Arsenide
- **D** = Indium Antimide

Second Alphabet:

- **C** = Audio Frequency Amplifier
- **D** = Audio Frequency Power Amplifier
- **F** = Low Power Radio Frequency Amplifier
- **P** = High Power Radio Frequency Amplifier

Therefore, Identification of a Transistor Marked with the Code – BC486 will be:

- B = Silicon
- C = Audio Frequency Amplifier
- The Transistor = Silicon Audio Frequency Amplifier

More Examples:

- BD 187 = B for Silicon, D for Audio Frequency Power Amplifier

- AD 486 = A for Germanium, D for Audio Frequency Power Amplifier
- AC 140 = A for Germanium, C for Audio Frequency Amplifie

3.3Mobile Phone Dead Problem and Solution

Mobile Phone Dead Problem and Solution –How to Repair a Dead Mobile Cell Phone. These problem and solution apply to all brands and make of Android Smartphone or Feature Mobile Phone including Nokia, Samsung, iPhone, China Mobile Phones, Motorola, HTC, Sony, Blackberry, Alcatel, Apple, AudioVox, Benefone, Danger, FIC, Hagenuk, Palm, Kyocera, LG, Xiaomi, Huawei, Oppo, Panasonic, Huawei, ZTE, Spice, Lava, Sony Ericsson, Micromax etc.

Mobile Phone Dead fig3.30

What is a Dead Mobile Phone?

A Dead Mobile Phone is a Cell Phone that does not get switched ON. It won't turn ON and won't Charge.

How a Mobile Cell Phone Does Gets Dead?

A mobile phone can get dead for several reasons:

1. If the mobile phone gets dropped down on the floor or on some hard surface.
2. If the mobile phone gets wet or is dropped in rain or water.
3. If there is any kind of short (in **+** and **–**) or shorting in the Mobile Phone PCB

3.3.1Mobile Phone Dead Problem and Solution – How to Repair a Dead Mobile Cell Phone

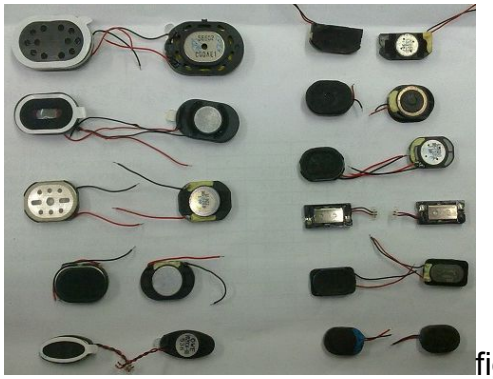
1. Remove the battery and see if it gets charged or not. Check voltage using a Multimeter. Voltage must be 3.7-4.2 Volt DC. Use a Battery Booster to Boost the Power of the Battery and Charge it again.
2. Check Battery Point and Battery Connector. Clean Battery Point and Battery Connector to remove any carbon deposits.
3. Resold or change the Battery Connector.
4. Insert charger and se if the "*Battery Charging*" appears or not. If there is icon of "*Battery Charging*" but the mobile phone does not gets switched ON then check ON / OFF Switch. Voltage of ON / OFF Switch must be 2.5 to 3.5 Volt (*DC*). Clean or change the ON / OFF Switch. Check track of ON / OFF Switch and Jumper if required.
5. If the charging icon is not there then check voltage of ON / OFF Switch. If the voltage is between 2.5 to 3.7 Volts DC, then RELOAD Software in the Phone (*Software Flashing*).
6. If the phone won't get switched ON even after reloading software then Heat the C.P.U, Power IC and Flash IC.
7. If there is no voltage on the ON / OFF Switch then check track of the ON / OFF Switch. Jumper if required.
8. If the problem is not solved then heat, Reball or change the Power IC and CPU to fix the problem.
9. Keep the Multimeter on Buzzer Mode and Check **+** and **–** of the Battery Connector. If there is Buzzer Sound then the Phone is short. If there is short at the Battery Connector then clean the PCB with thinner. Apply Flux and Heat the PCB.
10. If this does not fix the Mobile Phone Dead problem then remove the PFO and check for short. If there is short then replace the PFO.
11. Remove the charging connector and check for shorting. If there is short then change the connector.
12. Remove the charging IC and check for shorting. Change if required.
13. Remove the Bluetooth IC and check for shorting. Replace if required.
14. Remove the Power IC and check for shorting. Replace with a new one if required.
15. Remove the CPU and check for shorting. Replace if required.
16. Remove all the Big Electrolytic Capacitors and check one by one. Replace capacitors if required.

Important Note

- Some mobile phone gets dead if the RTC (*Real Time Clock*) is faulty. This happens mostly in China Mobile Phones. Change the RTC to fix the problem.
- If the mobile phone gets hang after reloading software then change the RTC.
- If the phone is still dead then check by replacing the 26 MHz Crystal Oscillator.

Ringer Problem

A Ringer is any type of electronic component that rings or plays a loud sound. It is also called the I.H.F Speaker, buzzer, melody, etc. Figure 28 shows a picture of a ringer.

 fig 3.31

- ***How to Solve Ringer Faults***

1. Check the ringer settings in the mobile phone. Check Ringer volume and silent mode. Adjust or change the volume and /or mode if required.
2. If the problem is not solved then open the mobile phone and clean the ringer point and ringer connector.
3. If the problem is not solved then check the ringer by keeping the multimeter in buzzer mode. The value must be between 8 ~ 10 Ohm. If the value is not between 8~10 Ohm then change the Ringer.
4. If the problem is not solved then check the track of ringer section. Do jumper wherever required.
5. If the problem is not solved then check the Ringer IC. Heat or change the IC.
6. If the problem is not solved then heat, reball or change the UEM / Logic IC.
7. If the problem is still not solved then heat, reball or change the CPU.

Display Not Working

This part displays information in a mobile phone. The CPU controls it. In some cell phones there is an Interface IC called the Display IC situated between the Display and the CPU.

The following are the common types of problems associated with the display:

- Display is blank.
- Display not working properly.
- Only half the display works.
- White display.
- Display is upside down.

- Display is broken.
- When the mobile phone is switched ON, the Logo appears and then the display disappears

How to Solve Display Faults in a Mobile Cell Phone

1. Clean the display tips and display connector.
2. Resold the display connector
3. Change the display
4. Check the display Track.
5. Resold or change the display IC.
6. Heat, reball or change the CPU.

Phone Touch Screen (PDA) fault

A Touch Screen (PDA) is an electronic component that allows you to input data or control your mobile phone by touching the screen. It normally has 4 Points namely:

- (+),
- (-),
- (RX),
- (TX).

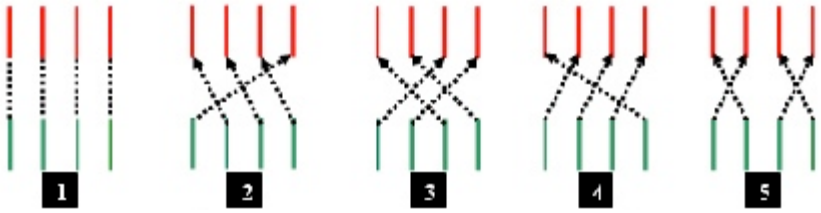
The CPU normally controls the touch screen. In some mobile phones there is an Interface IC called PDA IC or Screen Touch IC.

The following are the faults associated with the Touch Screen

- Touch Screen not working.
- Only half the Touch Screen works.
- When one key is pressed, another key works.

How to Solve Touch Screen (PDA) Faults

1. Check the settings if the mobile phone has both a keypad and a touch screen.
2. Clean and resold the PDA Tips and PDA connector.
3. Change the PDA.
4. Check the Track of the PDA section and Jumper if required.
5. Heat or change the PDA IC
6. Heat, reball or change the CPU



5 Types of PDA jumper solution

3.4How to Solder

How to Solder with Flux and Solder Wire – Learn how to solder circuit boards and wires to metal.

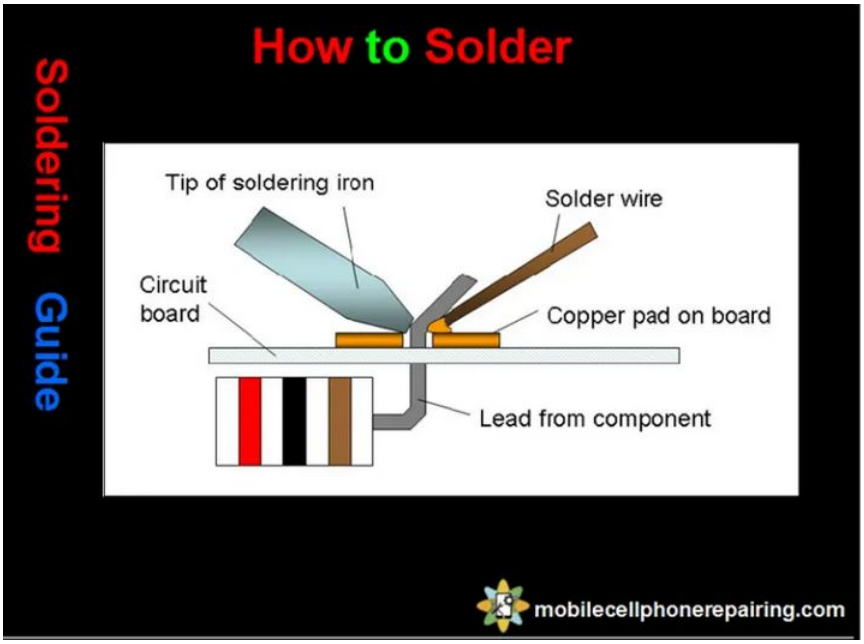


fig3.32

What is Hand Soldering?

Soldering electronic components by hand is a very important part of mobile phone repairing or repairing and rework of any PCB (Printed Circuit Board). Good soldering can increase the life and performance of any PCB. Poor soldering can lead to failure of the PCB. This basic hand soldering guide is a tutorial on how to do hand soldering like a professional.

https://youtu.be/OLdh4OrCI9c

fig3.33

Tools and Consumables Needed for Hand Soldering

You will need following tools and equipment:

1. Soldering Iron – Always try to buy a good ESD-Safe soldering iron. A 50 watt soldering iron is good for soldering any electronic component to a PCB.
2. Soldering Station – If you are a professional, try to get a good quality branded ESD-Safe soldering station. It will have a separate unit (*Station*) to control temperature and a soldering iron plugged into the station. Goot Soldering Station is One of the Best.
3. Flux Cored Solder Wire: It is always better to use flux cored solder wire. Flux will help to remove any oxide and contamination from the surface of the PCB and leads of the electronic components. This will help better soldering. Cookson Solder Wire is One of the Best.
4. No Clean Liquid Solder Flux: This will help to remove any oxide from the surface of the Board and the Leads of electronic components.
5. Other consumables that may be needed are Desoldering wick, desoldering pump, PCB holder, conductive pen, flux pen, cleaning sponge etc.

Self Check	choose

Name: _____Date: _____

Time Start: _____Time Finish: _____

Instruction: Answer all the questions provided correctly, if you have some clarification regarding the test just raise your hand and ask the assistance of the teacher.

Part I. Choose the best answer for the following question

1---------Is made of a tiny motor that conduct vibration when in active mode.

A. Vibrator C. Ringer

B. Microphone D. Back Facial

2. ------- Is connects the battery to the internal circuit tracks of the PCB of a mobile phone.

A. SIM Card C. SIM Card Connector

B. Memory Card D. Battery Connector

3.--------Is connects the SIM card to the Circuit or PCB of a mobile phone.

A. SIM Card Connector C. Ringer

B. Microphone D. Back Facial

4.--------Is connected to the keypad carbon to enter numbers to make phone calls and other data.

A. Display C. Camera Connector

B. Keypad Button D. Memory Card

5.--------Is connects display of screen to the PCB of a Mobile Phone

A. Display Connector C. Camera Connector

B. Keypad Button D. Memory Card

Note: **Satisfactory rating –5 points** **Unsatisfactory - below 5 points**

Answer Sheet **Scored Poin** ____

Part I

1. _____
2. _____
3. _____
4. _____
5. _____

Operation Sheet #1	Practical Demonstration (Re-solder SMD)

OPERATION TITLE: Perform Re-soldering SMD in cell phone.

PURPOSE:- To Re-solder SMD Cell phone properly and without damage the cell phone board.

CONDITIONS OR SITUATIONS FOR THE OPERATIONS:-Clean, safe working area and equipped workshop with sufficient electrical/electronic components & measuring instrument

Equipment and Tools for cell phone Re-solder SMD.

Tools	Equipment
Flat and Philips screwdriver kit **Soldering Iron, Soldering Station equipments, PCB holder, PCB Cleaner,** **Tweezers, Hot Air Blower,** side cutting plier	Digital Multi-meter Faulted cell phone PPEs Clean and ESD free work bench

PROCEDURE:-

Follow the following steps to Re -solder the cellp hone SMD.

Step1 .Select the required cell phone to Re solder.

Step2 Paint the Paste Flux to the surface.

Step3 Heat up Hot Air Blower

Step 4 Adjust the balance of the temperature

Step5. Use Tweezers to avoid the movement of the parts

PRECAUTIONS:-You should not forget to wear your PPEs. You should take care of not to contact any bare part of your body whenever you Re solder cell phone parts . Use instruments properly according to manufacturer specification.

QUALITY CRITERIA:-

Not use more power to your cell phone because of the cell phone components are very sensitive apply proper heat.

Information sheet 4	Flashing or repair unit using appropriate application software based on manufacturers' requirement

4.1Software Faults

A software is a set of programs, routines and symbolic language that control thefunctions of hardware and directs its operations.

The common software problems are:

- Display problems
- No signal message
- Dead phone set
- Phone on test mode

Phone not charging

- Phone has message to contact service provider
- Phone hangs, goes off, freezes or has slow processing

How to solve these problem:

1. Check the downloaded applications and note when the problem happened.
2. Note whether the problem is happening when a certain application is running.
3. Remove the application that is causing the problem
4. If the problem is still not solved then reset the factory settings of the mobile phone and update the software.

You have now come to the end of our topic on common mobile phone problems or faults. Before you move on, do the following activity to evaluate your understanding of this section.

4.1.1What is the software for flashing phone?

Here are the best flash tools almost for all phones: Samsung- Odin, Kies,Smart switch. Mediatek based phones -like Huawei, Lenovo, Xiaomi, Karbonn, Lava,Gionee,Micromax,ZTE etc- Sp flash tool. Sony- Sony pc companion, Xperia flash tool (by androxyde

4.1.2What is mobile phone flashing?

Flashing a cell phone means reprogramming the cell phone to work with a carrier other than the intended provider. One advantage of flashing a cell phone is that you need not to invest in a brand new phone.

4.1.3What is a flasher box?

Flasher boxes are also known as flashers or clips and they are mobile phone service devices used by mobile phone service providers and shops. They are mainly used to recover user data from dead or faulty mobile phones that otherwise will not provide access to data stored on their internal memory

4.2How to flash a phone with a computer

If you want to use your smartphone with a new data storage, you will have to flash it first. Flashing means the same as reprogramming. You can choose to take the gadget to an authorized phone dealer and have a flashing procedure done. However, this will not be free. You may want to learn how to flash a phone by yourself! Read the article to know how to do it for Android and IPhone. Read more: https://www.legit.ng/1140556-how-flash-a-phone-a-computer.html

4.2.1How to flash Android phone from PC with USB cable?

First, you have to ensure you have at least 50% level of battery. Check your firmware compatibility as well. The Stock Firmware or Custom ROM can be downloaded from appropriate websites. Systematic guide: Upload an Android USB Driver into the Hard Drive Disc of your computer. If you already have one, just skip this step. Remove your phone battery. Google and download Stock ROM or Custom ROM that need to be flashed on your device. Extract the installation files on your PC. Download and install the Smartphone Flash software to your PC. Start the installed program. After you open it, you will see this interface: Read more: https://www.legit.ng/1140556-how-flash-a-phone-a-computer.html

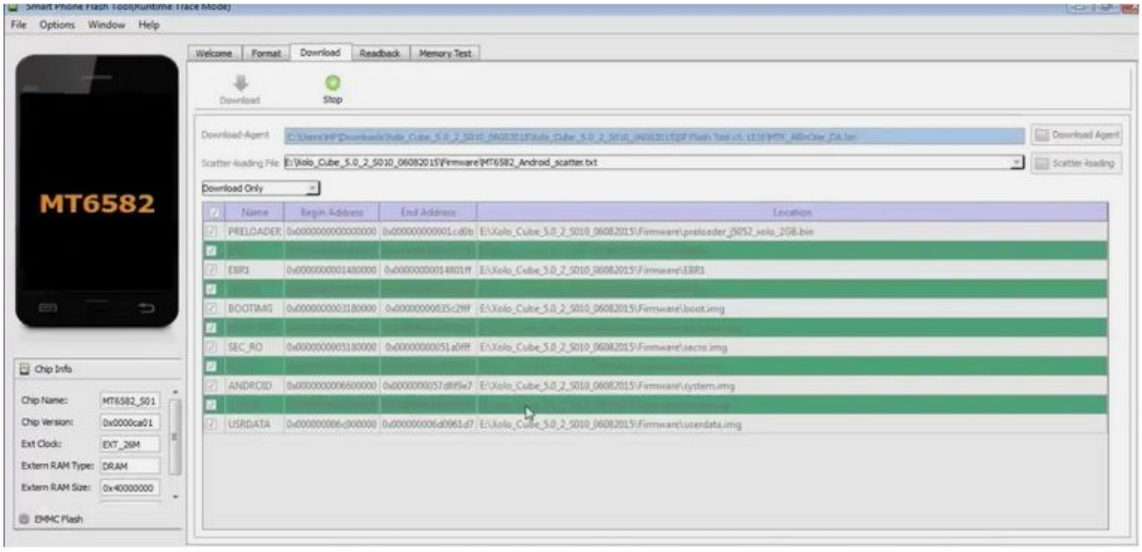


Fig 4.1 flasher software

When all the required firmware programes are downloaded,
You can start the second stage of the flashing process. As soon as you launch your Smart Phone Flash Software, you can start Download. Afterwards click on the Scatter-Loading icon. Search for the Scatter File. It will be stored in the extracted Stock ROM folder. Start the Download process by clicking on the corresponding button. It will launch Flashing procedure as well. Connect your Android phone to PC with USB cord (if the battery is portable, you need to remove it). After you connect both devices, press Volume Down or Up button. It will help your PC to automatically identify your smartphone. As soon as flashing process is done, you will see a Green Ring on your screen. Now you can close the Flashing software and disconnect your phone. Read more: https://www.legit.ng/1140556-how-flash-a-phone-a-computer.html

Everything is ready! Now your Android device is operating on the Stock ROM basis you uploaded in it. Read more: https://www.legit.ng/1140556-how-flash-a-phone-a-computer.html

4.2.2How to flash an iPhone?

The process here is very similar to the Android method. It involves the update of the firmware just like in the above. Basically, all you have to do is to upload the newer version of the device system. You will find a lot of new features of the OS that increase the iPhone's performance and level of compatibility. This process will also require attaching

your device to PC and starting iTunes device management program. Read more: https://www.legit.ng/

Fig4.2 iPhone flashing

Tutorial:

1. Connect your iPhone to PC.
2. Start iTunes.
3. Click on the icon with name of your device.
4. Choose “Check for Updates” option. If there are any updating softwares to be installed to your device, you will get a notice about it. However, if there are no updates available, it will not be possible to flash your smartphone for now.
5. Choose “Download and Install” option in the section of available updates in iTunes. Please, do not use your smartphone when the update is being performed. Also, do not try to disconnect your device from the PC, as it will ruin all the updating installation. All the required firmware updates will be downloaded to one of your PC folders from iTunes. That means you will be ready to flash your device.
6. Flashing will erase the firmware that was already installed to your iPhone. Do not worry! The new one will take its place instead. All the data and files from the phone’s memory stock will synchronize with the device as soon as flashing is completed. Read more: https://www.legit.ng/1140556-how-flash-a-phone-a-computer.html

4.3How to Flash IMEI Number in Android Mobile Phone

Learn How to Flash IMEI Number in Android Mobile Phone / Smartphone & Fix Invalid IMEI Number Problem. You will need to flash IMEI Number in your Android Mobile Phone after flashing Stock ROM (Firmware). You have to flash the Stock ROM (Firmware) in your Android Mobile Phone for any of the following reasons:

- Your mobile phone gets hanged too often.
- Your phone is hanged at company logo and doesn’t boot.
- You want to update the latest software / operating system in your phone.
- You have forgotten the lock pattern or password and want to unlock the phone.
- Your Android Mobile phone or tablet is dead because of software issues.

After you flash the Stock ROM, you will also have to Flash the IMEI Number and Restore it back. Otherwise, you may get following error messages: Invalid IMEI Number ☹

So, in order to fix this Invalid IMEI Problem and Restore the IMEI Number on Android Smartphone you have to Flash IMEI Number in you Android Mobile Phone.

💡 PS: This tutorial to flash IMEI Number on Android Mobile Phone works on most Brands including – Alcatel, BLU, Celkon, Coolpad, FLY, Gionee, Huawei, Intex, Carbonn, LAVA, Lenovo, Micromax, Oppo, Panasonic, Samsung, Vivo, Xiaomi, ZTE, etc.

4.4Software and Hardware Needed to Flash IMEI Number in Android Mobile Phone

You will need following Software and hardware to flash or Rewrite IMEI Number on Android Mobile Phone and Tablet:

Hardware Needed

1. The Android Phone to Flash the IMEI Number.
2. A USB Data Cable to Connect Your Phone to the Computer or Laptop.

Software Needed

1. Stock ROM / Firmware: of the Model of the Phone in which Flashing of IMEI Number is to be done. *(*Why is this needed will be clear later in this Tutorial*)*
2. SN Write Tool: SN Write Tool allows you to read and write IMEI on any Mediatek Feature Phone, Android Smartphone and Tablets.
3. AP BP Base for SN Write Tool: in .zip file *(*You need this if you do not have the *.zip file* of the Stock ROM*)*
4. Read&Write Tool: Read&Write Tool allows you to read and write IMEI on any Qualcomm, MTK or SpreadTrum Smartphone and Tablet
5. AP BP Base for Read&Write Tool: in .zip *file (*You need this if you do not have the *.zip file* of the Stock ROM*)*
6. IMEI Number of your Phone: You will also find the IMEI Number of your Phone at the Back after you remove the Back Cover and on the Packet of the Phone.

➞ PS: In this tutorial, I will explain how to use SN Write Tool to Flash IMEI Number in any Android Smartphone or Tablet having Mediatek Chipset. If you want to flash IMEI Number in any Qualcomm, MTK or SpreadTrum device then download and use Read&Write Tool ➞ []. Process is very similar for BOTH and you will not face any difficulty.

4.4.1How to Flash IMEI Number in Android Mobile Phone and Restore IMEI Number and Fix Invalid IMEI Number Problem

Step-1

Download SN Write Tool on your computer from Here ➞ [https://snwritetool.com/download/sn-write-tool-v1-1828]. Extract the .zip File. You will see following files in the Extracted Folder.

Step-2

In the Extracted Folder, you will find – ***SN Writer.exe*** File. Open this .exe file (Double Click or Right Click and Run as Administrator)

Refer lo2……

Step-3

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

Refer lo2……

Step-4

Now select System Config Button.

Step-5

Once you click onto the Config Button, you will see the following Screen. Select Following Options – IMEI, BT Address and WiFi Address. You also get the Option to select Dual IMEI, 3 IMEI and 4 IMEI. Select the Required Option.

Under Database File Option, select the Path of MD1_DB and AP_DB. Remember that BOTH these Files come with the ***.zip*** File of the Custom ROM Firmware. Otherwise, you have to download the AP BP Base for SN Write Tool (➞ https://androiddatahost.com/yhaz9*)*

Select all the Required Options and Click **SAVE**

Step-6

Now click **Start** Button on the Next Screen.

Step-7

Under Scan Data, Enter the 15 Digit IMEI Number. You will also find the IMEI Number of your Phone at the Back after you remove the Back Cover and on the Packet of the Phone.Once you have entered all the required Data, SWITCH OFF your Phone and Take out the Battery. If there is Non-Removable Battery then just switch OFF the Phone and Connect the Phone to your Computer with USB Data Cable. Now Click **OK**.The Process will take just few minutes. Once the IMEI Number writing is Done, you will see **Green Pass** Message.

4.5ABOUT FLASHERS AND THEIR MOBILE SERVICE USES

Flasher boxes are also known as flashers or clips and they are mobile phone service devices used by mobile phone service providers and shops. They are mainly used to recover user data from dead or faulty mobile phones that otherwise will not provide access to data stored on their internal memory. They can also be used to update or replace software that is stored in the mobile phone's Read Only Memory (ROM). This software is commonly referred to as "firmware" and is usually pre-installed on phones by either the manufacturer of the phone such as Nokia and Sony-Ericsson or phone service providers such as Three Mobile or Telstra. Flashers are also used to add language support and set regional settings for mobile phones. Changing regionalsettings can enable a user that bought a mobile phone device from Australia with Telstra-based firmware for example and did not have Arabic language support by default in the firmware to re-flash it with an Arabicsupported firmware supplied by Nokia in the Middle East. Therefore, he or she will have a mobile phone that now supports the Arabic language and will therefore be able to send and receive Arabic Short Message Service(SMS) messages Other uses for flasher boxes include removing or changing carrier settings and unlocking SIM restrictions or carrier based locks or call restrictions. Even though Subscriber Identity Module (SIM) unlocking is legal insome countries such as Australia, it can be illegal in some other countries.

4.5.1IMEI AND THE ILLEGAL USE OF FLASHERS

International Mobile Equipment Identity (IMEI) is a unique 15 digit international serial number used to identify a mobile phone handset to a mobile phone network. This number can used to identify illegal mobile phone handsets. Each time a mobile phone is switched on or a call is made on it, the network provider checks the IMEI number of the handset, then it cross references it with a blacklist register such as the Central Equipment Identity Register (CIER) used in the United Kingdom. If it is on the blacklist then the network will either refuse to send a signal to the phone or will supply a signal but will not allow any outgoing or incoming calls (UnlockMe 2007). Flashers can be illegally used to change the

IMEI number of some mobile phone devices. This in effect enables criminals to illegally re-enable stolen or lost mobile phones that won't be otherwise usable on a certain mobile phone network Figure below is a screen shot of the flasher software for UFS3 by SarasSoft that shows the option to change
(rebuild) the IMEI number of the mobile device under the Aux features box within the DCTL group of devices
options for the Nokia mobile phone brand flashing. It is worth noting that for Nokia, only DCT3 and DCTL
group of devices allow for IMEI modification. Newer Nokia mobile phone devices embed the IMEI number in a
non-re-writable chip and therefore are not subject to IMEI rebuilding.

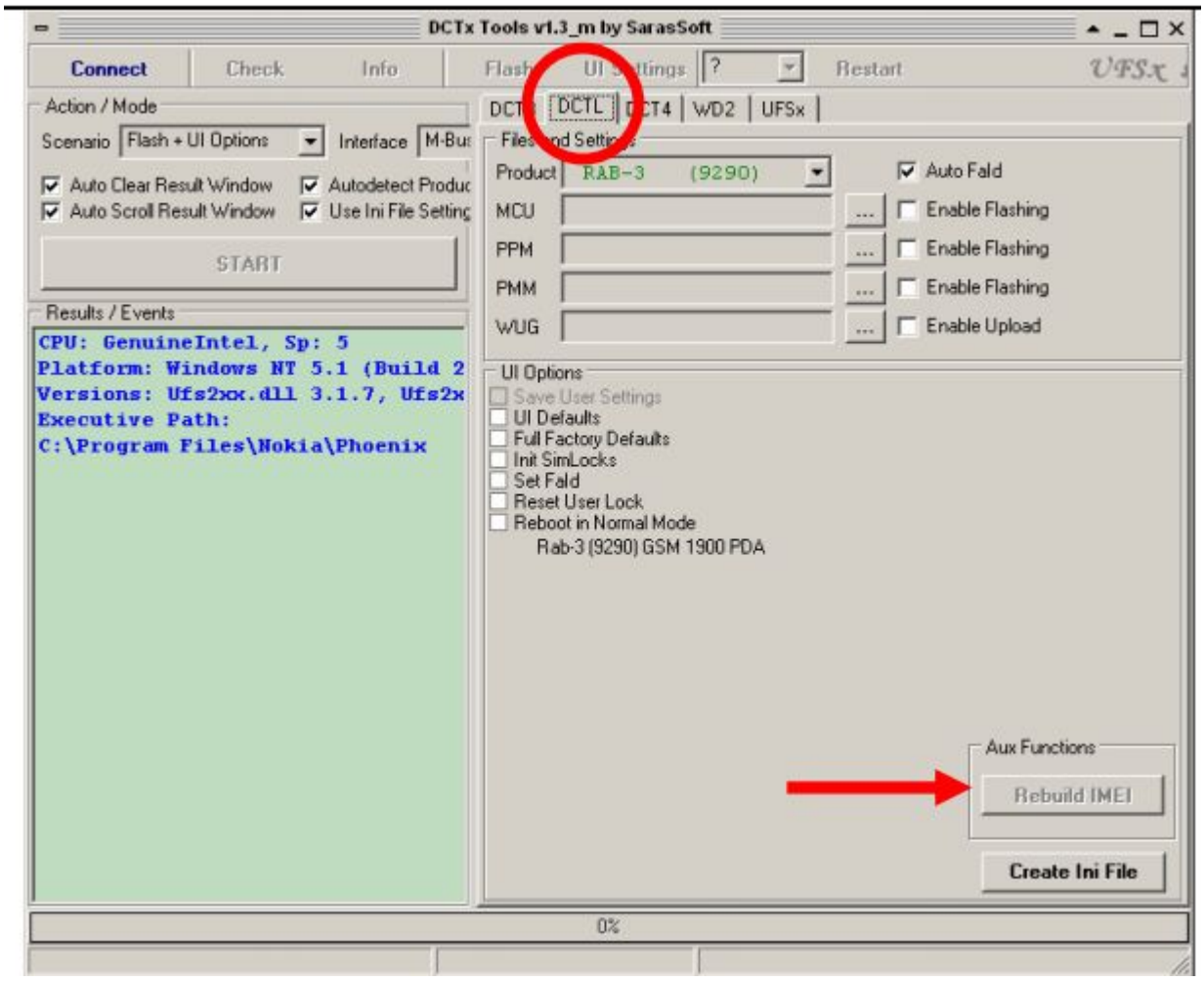


Fig 4.3 Rebuild IMEI option for DCTL range of Nokia mobile phones

` FLASHER BOX COMPONENTS AND VARIETIES

Flashers are a combination of software, hardware and drivers. There are many varieties of flasher boxes covering a wide variety of mobile phones. Therefore, choosing the correct box for a type of mobile phone
device or phone model or mobile phone manufacturer can be a daunting task. There are two main categories offlasher boxes:

• Branded Boxes. The features of which include:
• They are more expensive than their proprietary counterparts.
• They have well-known names and model numbers.
• They have unique serial numbers.
• Some boxes need activation. Software, updates and support is provided for these boxes. The level of support varies depending on manufacturer of box.
• They are widely used by service technicians.
• They are sold by recognized suppliers and an "approved supplier list" is often found on the manufacturer's website.
• Easier to get support for them in forums and on other support websites.
• Some boxes come with a large amount of cables and can cover both GSM and CDMA phones.
• They do not usually require an external power supply to function. They rely on the USB interface as a power source.
• Unbranded (Proprietary) Boxes:
• Much cheaper than branded boxes
• Sometimes match the original flasher boxes in components and functionality.
• Sometimes combine the functionality and phone support of more than one branded flasher box.
• Sometimes support the addition of a smartcard from branded flasher boxes.
• Do not usually come with any software and/or drivers and put the onus on the buyer to come up with the software from other Internet sources.
• Some boxes come with phone flashing/servicing cables while others do not.
• Some require an external power supply that is not usually provided with the purchase (IPMart 2007).

Fig4.4I-Smart2 In 1 Flasher Box With Smart Card Holder (IPMart 2007)

It is worth mentioning that none of the flasher boxes, branded or unbranded, are supported or indorsed by the manufacturers of mobile phones such as Nokia, Sony-Ericsson and others. The top selling branded boxes for the Nokia brand of mobile phone devices include:

• Universal box (UniversalBox 2007).
• JAF box (Odeon 2007).
• MT-Box for Nokia. There is a separate MT-Box for Sony-Ericsson. Even though both boxes are
exactly the same and come with a 10 uses trial for the opposite brand (MT-Box 2007).
• UFS 3 tornado: The original flasher box and most widely recommended and used (UFSxSupport 2007).

Fig4.5 UFS 3 Tornado Flasher Box

Widely used flasher boxes with support for multiple brands of mobile phones include:

• Smart Clip: Motorola, Sendo and others (Smart-Clip 2007).
• GTS Box: Nokia, Motorola, Samsung, Sharp, LG, Sony Ericsson and Siemens (GTS 2007).
• Vygis: LG, Sharp, Sanyo, NEC, BenQ, Alcatel, and Toshiba (Vygis 2007).

There are paid service sites and free phone repair communities that provide the following:

• Video tutorials on setup and use of boxes (FoneFunShop 2007).
• Constantly updated raw ROM images and language packs to flash mobile phone memory with.
• Service manuals and updates for software to cover a wide variety of mobile phones and flasher boxes.

USB flasher dongles that can be used for mobile phone servicing often offer less functionality than USB flasher
boxes but may offer other added services such as:

• Remote unlocking and de-branding of phones.
• Credit points that can be used to do things such as IMEI change or unlocking of devices from

a service provider.
An example of a product that needs pre-paid credit to unlock and de-brand mobile phones is the JAF device for
Windows Mobile Phones (GSMServer 2007). It should be noted however that the JAF device will not work with all phone models running Windows Mobile software. While it supports some phones made by the Taiwanese HTC manufacturer, the do not support devices made by Palm which run Windows Mobile software.

Fig 4.6 *JAF WM software and USB Dongle (Polyphone 2006)*

4.6ISSUES WITH COMMAND BASED FORENSICS SOFTWARE TOOLS

There are a wide range of software applications and mobile forensic toolkits that claim to acquire data from mobile phones in a forensically sound manner without altering any content in the mobile phone's memory. Such claims however cannot be verified. The basic flaw in these forensic software tools is in the way they gain access to data in the phone's memory. They usecommand and response protocols that provide indirect access to memory (McCarthy 2005). Command and response protocols such as AT Commands (AT is short for attention) are commands that were originally developed to control modems to do things like dial, hang up, switch modes, and other modem commands. These commands are utilized by current command based forensic software to communicate with the mobile phone and query it about certain data held in the phone's memory. This means that the forensic software
does not have direct access or low level access to data within the phone's memory and in effect treats every mobile phone as a black box. This also means that the software is dependant on

the phone's operating system based command to retrieve data in the phone's memory. This could also mean that by querying the operating system, the device could be creating changes to the memory of the device. Because of this dependency on the operating system, such forensic toolkits cannot recover data from dead or faulty mobile phones.Another flaw with these forensic software applications is that they cannot recover deleted data. This is because they access data at a high level or logical level which means that when a file is deleted, the pointer to that file within the operating system is erased which means that the file is no longer accessible by the operating system or visible to the phone's software. In addition, some mobile phone devices do not respond to AT commands making acquiring them with command based tools impossible (Purdue 2007). Some command based mobile forensics software were not originally developed for forensic purposes and therefore they could unexpectedly write to the mobile phone device's memory (Horenbeeck 2007). Some forensic software suits such as MOBILedit Forensic 2.2 sometimes require the investigator to install additional software on the target mobile device (MOBILedit 2007). This is in direct violation of the principles of electronic mevidence as published by the United Kingdom's Association of Chief Police Officers (ACPO) Good Practice Guide for Computer based Electronic Evidence (ACPO 2003). The guide states the following: "No action taken by law enforcement agencies or their agents should change data held on a computer or storage media which may subsequently be relied upon in court."
It is also in violation of the Guidelines for Best Practice in the Forensic Examination of Digital Technology published by the European Network of Forensic Science Institutes (ENFSI) which states (ENFSI 2006): "Upon seizing digital evidence, actions taken should not change that evidence." and "Wherever possible no actions taken during the seizing of any evidential material should cause that material to be changed and this is of particular importance when dealing with digital evidence which could be seen as prone to accidental 'tampering'. Where actions have been taken that change the data, this should be fully documented." Therefore, new ways to gain direct access to data held on mobile phones without resorting to the operating system software or hardware command and response protocols must be utilized in mobile phone forensics. Flasher boxes can provide this direct low-level access and therefore they can be considered as a future pathway on the quest for a more optimal acquisition of mobile phones.

Moreover, flasher software present the user with both the memory reading and writing buttons on the same screen which can lead to accidental pressing or the wrong button on the flasher software which could lead to the total loss of evidence from the phone's memory. Figure 6 below shows some of the dangerous buttons that should be avoided by forensic investigators:

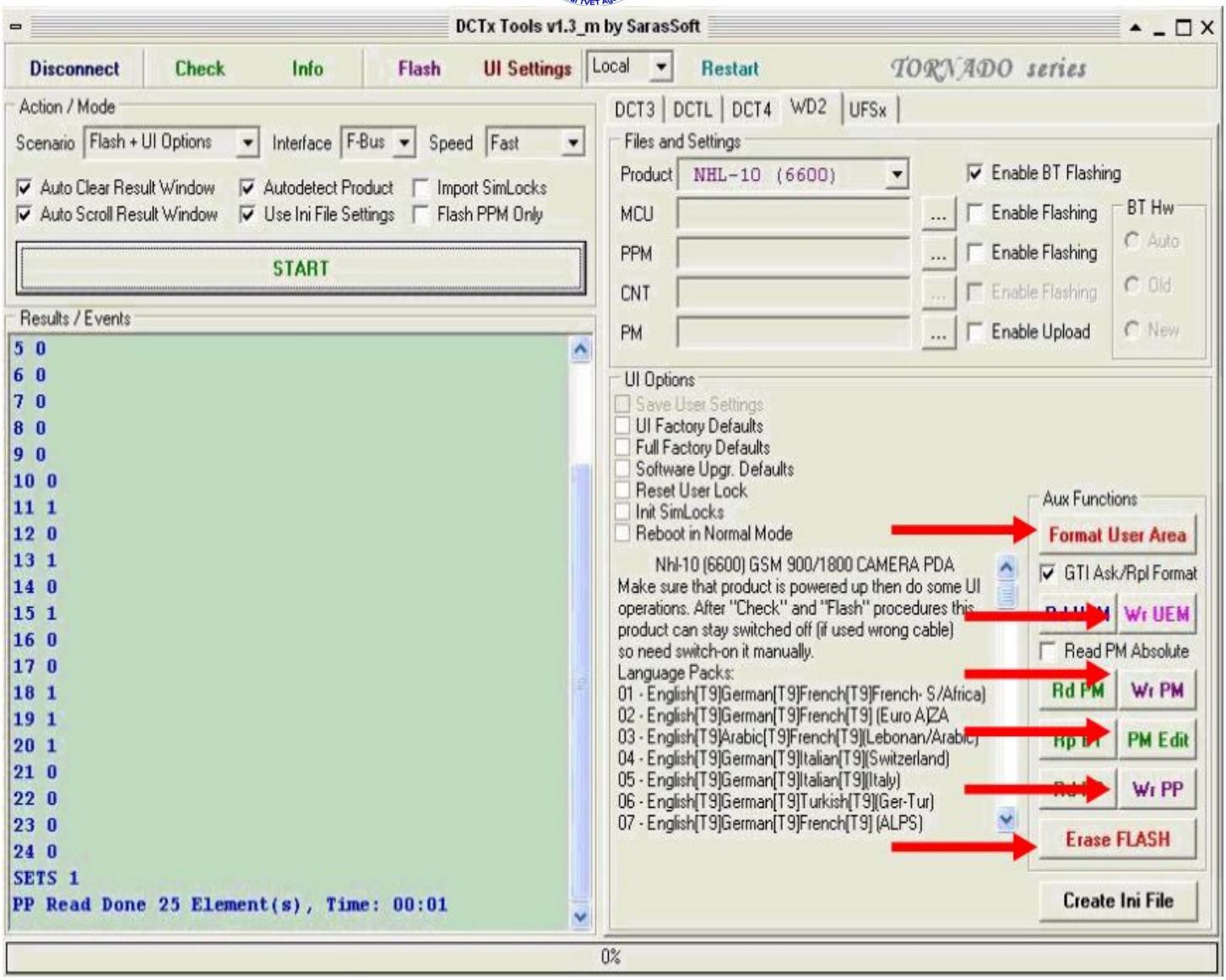


Fig 4.7*Some of the buttons that should be avoided.*

4.7FLASHER CABLES AND INTERFACES

The flasher box typically connects to the mobile device via a special cable made for that phone model. One side of the cable is the RJ-45 standard Ethernet networking cable interface. The other side usually contains a number of pins that contact the mobile phone's service ports through the Joint Test Action Group (JTAG) connection or the Mbus/Fbus connections (Harrington 2007). Figure 7 below shows a Nokia 6600 cable for the UFS3 Tornado Box.

Fig4.8 Connectors on the UFS3 cable for Nokia 6600

4.8Software Installation Precautions

The appropriate software for each type of flasher box is usually made available through the official support site for the flasher box manufacturer. A username and password are given to each customer once they purchase a flasher box. Each flasher box is has a unique serial number that is displayed in the software's dialog box after it's installed. Choosing the right driver for the type of mobile device can be confusing at times. This is because the support sites usually update the drivers frequently. Sometimes an older version of a USB driver and software bundle will run perfectly with some mobile phone models while a newer USB driver and software bundle will not work withthe same device. Information about the best version of driver for each type of device or device range can be found in phone service forums as well as the support site itself. USB drivers for the flasher box hardware in addition to the phone servicing software should always be installed3BEFORE connecting the USB cable to the flasher box. If a certain version of software does not work properly with a mobile phone model or phone range then both the flasher servicing software and the USB drivers associated with it should be completely uninstalled. After restarting the machine after the un-

installation, the investigator can try another USB driver and software bundle until the appropriate driver and software combination is found. The following section of the paper describes some further considerations when using
flasher boxes

➢ CONSIDERATIONS WHEN USING FLASHER BOXES

Some phones are accessible through service ports located on the bottom of the phone as with some Nokia models such as the 3220 shown below:

Fig 4.9*Nokia 3220 Fbus connections (Harrington 2007)*

Some phones such as the Nokia N95 require an external 9V battery to be connected to the cable to power the phone while operating it with the flasher box. The investigators must always make sure that the battery is fully charged to insure consistent operation and results. One of the biggest concerns when it comes to acquisitions through the use of flashers is the loss of volatile data. This is because, in the some cases, the phone needs to be turned off and the battery for the phone needs to be removed to allow for access to the phone's service ports which are pin contact points on the back of the phone that enable the acquisition of the mobile phone device. These points can be located under the battery of the phone, underneath the SIM card or just below the phone itself without the need to remove the battery of the phone. The location of the service ports is highly dependent on the model of the mobile phone. Investigators should be careful when they deal with mobile phones with service ports under the SIM card. This is because when SIM cards are removed, some phones tend to loose information associated with them and this information might not be recoverable again. The pictures below show a connection cable with contact pins, a mobile phone with the pin contact points under the battery but not under the SIM card, and another mobile phone where the contact points are located beneath the SIM card (Nokia 6600).

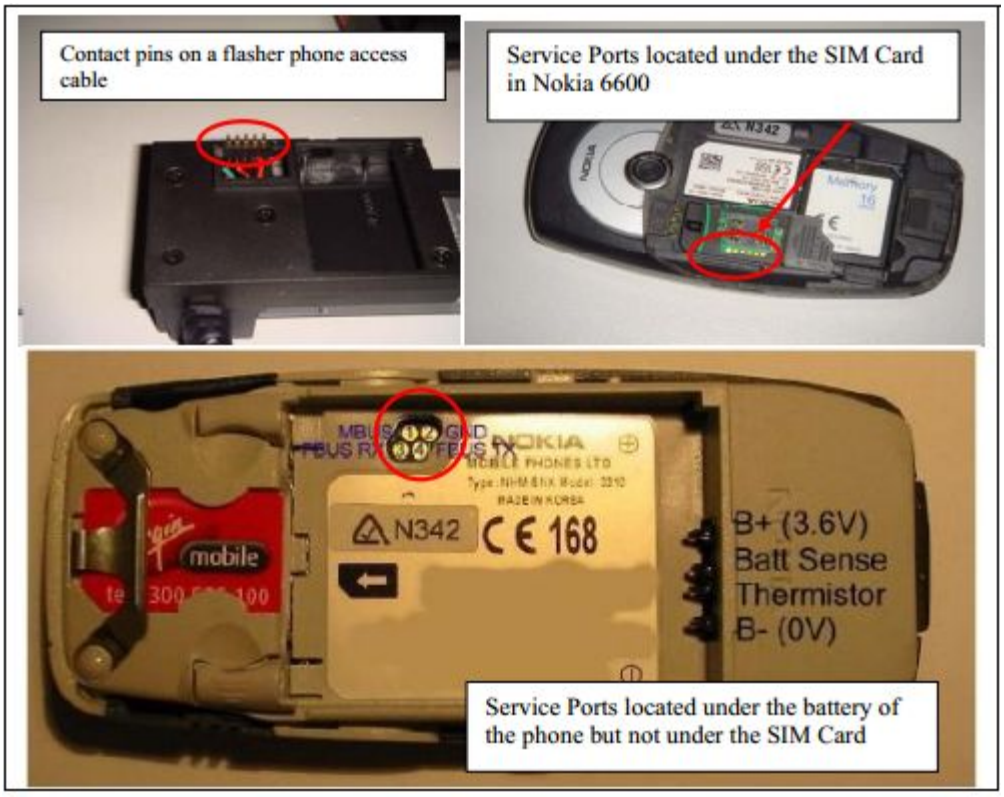


Fig4.10*Contact pins that the cable from the flasher device connects to can be either under the SIM card or not depending on the device model (Embed Tronics 2005).*

On the other hand, if a phone to be investigated has no SIM card inserted in its SIM card slot, it is recommended that a flasher box is used before any other command based tools. This is because if another SIM card is inserted in the phone, or if the phone is powered up normally without a SIM card inserted, it might lose important information about the SIM card previously inserted into it. Some mobile phones require a SIM card to be inserted into them before allowing access to the phone, this means that command based software will not be able to acquire the phone without a SIM card present. Therefore, through testing of flasher boxes with each phone model is essential before using them for the forensic acquisition of mobile phones. Scenarios such as the ones described above, with and without SIM cards with AT commands first then flashers and vice versa should also be tested. Additional in depth testing considerations andsuggestions are listed hereafter.

5.9TESTING AND VERIFYING FLASHER ACQUISITIONS

One of the ways to verify the functionality of flasher boxes it to disassemble the flasher's code and track its behaviour with a logical analyser to understand its effect on the handset. This is not always easy to do and sometimes not possible at all and depends on the competence of the investigators and their knowledge in the practical use of logical analysers (Gratzer and Naccache 2007)

Another way to verify the use of the flasher device is to test it with a large number of mobile phone devices ofthe same model investigated in a particular case. One study into the use of flashers in mobile forensics suggests that some of these devices be used to develop an experimental protocol or acquisition procedure (Breeuwsma et al. 2007). The protocol is then fine-tuned and made more stable and the procedures modified until they produce desired results. The device investigated is then examined using the tested procedure. Another study takes this further and suggests that the finalized protocol should not be applied to the investigated device after testing the protocols or procedures but rather it should be tested on another set of mobile phones and the occurrences of the following six possible outcomes are then calculated: {information extracted, information not extracted} X {device unaltered, device altered, device destroyed}. This is then carefully documented and all the results are presented to the investigating judge to make a decision on whether to allow the use of flashers in the investigation (Gratzer and Naccache 2007).

5.9.1PHYSICAL IMAGE ANALYSIS TOOLS

There are many tools that have surfaced in the last couple of years that address the need for the analysis of physical memory dumps from mobile phone devices. The tools range from easy to use tools to tools that require extensive forensics and hex editing and decoding expertise. The following is a rundown some of the tools and their features.

• FTS Hex: The first forensic tool that was developed for the purpose of low level examination of hex dumps from mobile phone memory. It is very basic and mainly sold to law enforcement officers (Knijff 2007, FTS 2007).

• BK forensics' Cell Phone Analyzer: The tool is a simple to use Windows based program that cananalyse physical dumps from the following phone manufacturer devices: Sony-Ericsson, Nokia, Blackberry, Motorola and Samsung. The tool does not give the investigator great flexibility to examine the raw data in the dumped image but rather attempts to decode and display phone records, SMS data, pictures and other forms of data to the examiner. An evaluation copy is available to investigators for evaluation purposes from the developer's website (Forensics 2007).

• Pandora's Box: A new tool developed by Mike Harrington. It recently passed beta testing and is now available in a full retail version. This tool is a very affordable alternative to BK Forensics' Cell Phone Analyzer and offers the investigator with more control over the hex decoding process. It can retrieve data such as power down time and date on Series 30 Nokia phones (MFC 2007).

• Neutrino: A mobile phone acquisition device by Guidance Software to be used with Encase version 6. Extracted mobile device data is stored in an Encase® Logical Evidence File (LEF) format and can be examined via EnCase v6 only (Guidance Software 2007).
Conventional hex editors, decoder software and file comparison tools can also be used to examine the physical
dump image and provide the investigator with more flexibility in examining the hex dump but require good
knowledge in hex editing, some decoding skills and an eye for recognizing patterns and oddities

Self Check #1	

Name: _____Date: _____

Time Start: _____Time Finish: _____

1._____set of program, routine and symbolic language that control the function of hardware and direct its operation

A. flash b. Software

C. IC d. volcano box

2_____are also known as flasher box

A.charger C. Flasher box

B. transistor D .all

3, flasher box typically connect to mobile device via a special cable

A.RJ_45 B .fiber optics

B. Coax cable D. all

Answer score

1_____

2_____

3_____

Operation sheet 2	Flash IMEI Number in Android Mobile

Purpose: How to Flash IMEI Number in Android Mobile

Procedures: first try to check your safety

Step-1

Download SN Write Tool on your computer from Here ➞ [https://snwritetool.com/download/sn-write-tool-v1-1828]. Extract the .zip File. You will see following files in the Extracted Folder.

Step-2

In the Extracted Folder, you will find – ***SN Writer.exe*** File. Open this .exe file (Double Click or Right Click and Run as Administrator

Step-3

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

Step-4

Now select System Config Button.

Step-5

Once you click onto the Config Button, you will see the following Screen. Select Following Options – IMEI, BT Address and WiFi Address. You also get the Option to select Dual IMEI, 3 IMEI and 4 IMEI. Select the Required Option.

Under Database File Option, select the Path of MD1_DB and AP_DB. Remember that BOTH these Files come with the ***.zip*** File of the Custom ROM Firmware. Otherwise, you have to download the AP BP Base for SN Write Tool (➞ https://androiddatahost.com/yhaz9) Select all the Required Options and Click **SAVE**

Step-6 Now click **Start** Button on the Next Screen.

Step-7 Under Scan Data, Enter the 15 Digit IMEI Number. You will also find the IMEI Number of your Phone at the Back after you remove the Back Cover and on the Packet of the Phone.Once you have entered all the required Data, SWITCH OFF your Phone and Take out the Battery. If there is Non-Removable Battery then just switch OFF the Phone and Connect the Phone to your Computer with USB Data Cable. Now Click **OK**.The Process will take just few minutes. Once the IMEI Number writing is Done, you will see **Green Pass** Message.

Information sheet 5	Soldering or mounting repaired, replaced parts or components

5.1Soldering /DEsoldering techniques

a.Soldering

Soldering is a process in which two or more metal items are joined together by melting and flowing a filler metal into the joint. The filler metal has a relatively lower melting point.

Fig5.1 *Picture showing A technician Soldering*

Steps In Soldering

1. Prepare the following materials:
   - Soldering Iron,
   - Solder paste
   - Long Nose Pliers,
   - PCB holder,
   - Electronic Components (Resistors, Diode etc.)
2. Plug and pre-heat the soldering iron.

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

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

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

b.Desoldering

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

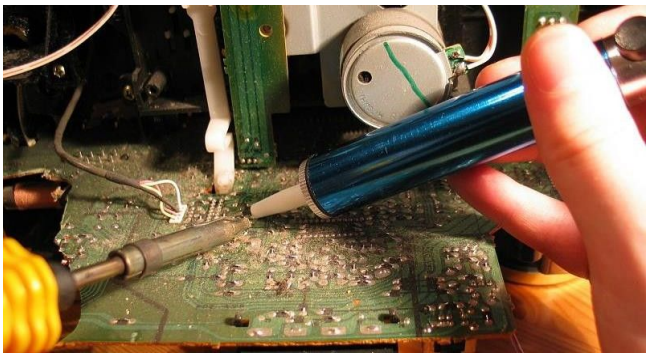


Fig 5. *2.desoldering*

Steps in desoldering

1. Use a solder wick (finely braided copper) to wick away excess solder from a de- soldered connection.

2. Apply the solder wick and use the soldering iron to the de-soldered connection. The solder wick will draw the excess solder off the PCB pad.

5.2Testing a phone using a multimeter

We hope you still remember that a multimeter is a device that is used to measure the voltage, current and resistance of various components of a mobile phone. Figure 29 below shows the various parts of a multimeter

Fig5.3

a) Measuring Resistance

To measure resistance follow these steps:

1. Plug your red and black probes into the appropriate sockets on your multimeter.
2. Choose the appropriate resistance measurement setting on your millimeter's
3. Hold the probes against the resistor.

Check the resistor value on the display.

Fig5.4

b) Measuring voltage

Testing for proper supply voltage is usually the first step when troubleshooting a circuit. To measure voltage you should follow these steps:

1. Select V~ (ac) or V (dc), as desired.
2. Plug the black test probe into the COM input jack. Plug the red test probe into the V input jack.
3. If the DMM has a manual range only, select the highest range so as not to overload the input.
4. Touch the circuit with the tips of the probes
5. Read the number in the display window and take note of the unit of measurement.

c) Measuring Current

1. Turn off power to the circuit.
2. Cut or unsolder the circuit, creating a place where the meter probes can be inserted.
3. Select A~ (ac) or A (dc) as desired.
4. Plug the black test probe into the COM input jack. Plug the red test probe into the amp or milliamp input jack, depending on the expected value of the reading.
5. Connect the probe tips to the circuit across the break so that all current will flow through the DMM (a series connection).
6. Turn the circuit power back on.

d. Jumper setting

Jumpering means to temporarily complete a circuit or to bypass a break in a circuit by making a connection from one point to another.A good conductor wire is used to make a jumper which by-passes the components and passes on a signal or supply line for further uses. When wire is used as a jumper, it must have some special specifications as required. These jumper wires can mainly be of two types i.e. insulated and non-insulated. In the mobile phone, insulated wires are used for jumpers. The length of a jumper depends on the two points connected in between.

Why do Jumpering

While repairing mobile phones, we find that certain faulty components are very difficult to get from the market. To repair such mobile phones the only immediate option is the use of jumpers. By use of jumpers, we will bypass the faulty components specifically.

How to Jumper

1. Disassemble mobile phone and place it on a PCB holder.
2. Using a multimeter, check track and find the fault or the missing track that need jumper.
3. Apply liquid soldering flux to the points where you need to solder jumper wire.
4. Cut jumper wire to desired length and remove its lamination using blade cutter.
5. Hold one end of the jumper wire and solder it to one point of the faulty circuit track. Use a good quality tweezers to hold the wire and good quality of soldering iron and solder wire to solder.

6. Now hold the other end of the jumper wire and solder to the other point of the track
7. Using a multimeter check the jumper.

The **Figure 5.5** Below shows jumper settings in of the jumpers may look like on your motherboard. In this example, the jumper is the white block covering two of the three gold pins. Also, next to the pins is a silkscreen description of what the pins do, in this case when pins 1-2 are jumped the computer is operating normal, when 2-3 are jumped it is set into configuration mode, and when open the computer will be in recovery mode.

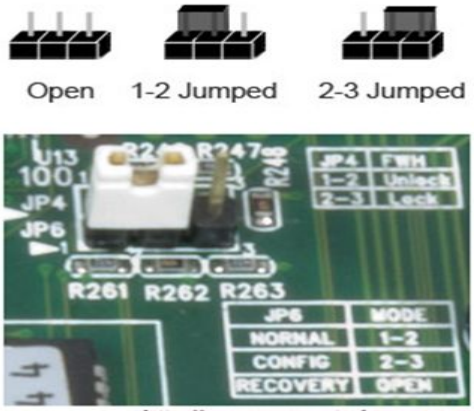


fig 5.5

Why is SMT used in industry?

SMT has several important benefits over though hole technology. They are :

- Faster for automatic machines to place
- Have a smaller physical size for the same electrical function
- Less parasitic (unwanted) effect
- Cheaper in terms of raw material cost

SMT: It is a type of electronic component
package. Most electronic components can be divided into two categories - through hole (TH) and surface mount (SM). Through-hole components have been used for many years and are designed to be loaded on one side of a printed circuit board (PCB) and soldered on the other. SM components are designed to be loaded and soldered on the same side of the PCB.

Why should you care about Surface Mount Technology?
"Black Box Operators" aside, SMT is increasingly effecting people involved in the repair, modification or development of electronics. Through hole components are being replaced by their SMT equivalents at a rapid rate as manufacturers increase their investment in SMT production equipment to cash in on the benefits.

Whilst there are exceptions, it is rare to see the use of leaded resistors, capacitors, transistors or integrated circuits in modern consumer electronics. Since the demand for these types of leaded parts is low and decreasing, their cost will rise over the next few years and sourcing them will become difficult. Eventually, supplies will dry up and leaded components will join the domain of valves. Those of you who doubt these warnings should spend some time and have a look at modern mobile phone, computer motherboard or amateur radio. An alert observer will note is mainly because connectors often rely on their leads for mechanical strength and electrolytic capacitors have a shape that does not lend itself towards easy implementation as a surface mount device (SMD). Eventually the solutions to these problems will become cheaper and they too will disappear from electronic equipment in their leaded form.

- **SMT Myths**

  Many new facets of amateur radio and experimentation with electronics in general are hampered by the myths that surround them. Some of these myths are :

  SMT needs special and expensive equipment
  SMT components are hard to find
  SMT requires professional PCBs
  SMT requires special training and skill

- To use SMT and not get too stressed about it does require the following :

  To have a steady hand
  To practice your technique
  To be invest in a good pair of tweezers
  To have reasonable eyesight or use magnification

  Unfortunately, there is not much you can do about the steadiness of your hand, but all the other obstacles can be easily overcome. The main emphasis of this article, is to explain how you can work with SMT with the smallest possible investment of special equipment

Common SMT Packages

There are three popular package styles used for most passive components. Their names refer to their size (in thousands of an inch or just thou). They are :

- 0603 (60 thou long, 30 thou wide)
- 0805 (80 thou long, 50 thou wide)
- 1206 (120 thou long, 60 thou wide)

Fig 5.6 - Common discrete SMT components

The common discrete SMT packages. Diodes, Transistors and IC's all use the SOT package and often measurement with a multi-meter and the two or three character marking on the top of the package is the only way to guess what the component is. Some IC's use larger packages as shown in Fig 2. Several good web sites exist for determining SMT parts from their markings and these are detailed on the VK3EM website.

- Common SOIC package

Fig 5.7

For the purposes of illustration, only a very small selection of SMT packages have been shown in this article. A more detailed listing including colour pictures can be found on the VK3EM website (See end of article). This may be useful for those who you who recycle parts from junk equipment that uses SMT.

How can SMT help you?

SMT has many benefits over leaded components.

These are:

1. Where component value tweaking (i.e. : small changes) are needed. SMT capacitors and resistors are easy to parallel together and quick to solder and de-solder. The chances of "lifting" circuit board tracks are reduced and so is the frustration of trying to work on both sides of a PCB at the same time.

2. Where RF signals are being used. Unwanted (ie:parasitic) effects in SMT parts are smaller when compared to leaded parts, which results in better predictability of component characteristics. Leaded packages do no lend themselves to microwave use. However, there are exceptions.
3. A significant number of modern components are only available in SMT form. If you want to play with them, then you have no choice but to use SMT!
4. Where space is limited. This is dependent on the circuit type and layout, but SMT parts like decoupling capacitors and pull up resistors can be used to reduce the space required on the PCB. SMT parts fit neatly across the gaps on VERO board and can be mixed with designs using leaded parts.
5. Where drilling holes is a problem. Anyone who has made a PCB understands the frustration of trying to work on two sides at once. SMT simplifies this because you load and solder all on the same side. Components can be used on both sides of the PCB without interference, or a solid ground plane can be used on one side with holes drilled only for ground connections.
6. Where a preexisting circuit needs modification. Forgot to add that series capacitor, diode or resistor. Cut the track, insert a SMT. the solution is simple, small, and tidy (no holes)!

Self cheak	Written/choose

Name: _____Date: _____

Time Start: _____Time Finish: _____

1_____ means to temporarily complete a circuit or to bypass a break in a circuit by making a connection from one point to another

A. Fleshing
B. PpE
C. Jumpring
D. Sucker

2_____ It is a type of electronic component package. Most electronic components can be divided into two categories - through hole (TH)and surface mount

A. SMT
B. Smd
C. PPE
D. All

Answer **score**

1_____

2_____

Operation sheet 3	Measuring Current

Purpose: Measuring Current

Procedure: first try to check your safet

Step1: Turn off power to the circuit.

Step2: Cut or unsolder the circuit, creating a place where the meter probes can be inserted.

Step3: Select A~ (ac) or A (dc) as desired.

Step4: Plug the black test probe into the COM input jack. Plug the red test probe into the amp or milliamp input jack, depending on the expected value of the reading.

Step5: Connect the probe tips to the circuit across the break so that all current will flow through the DMM (a series connection).

Step6 Turn the circuit power back on.

Information sheet 6	Performing repair activity within required timeframe

6.1What is maintenance schedule?

Maintenances schedule

Planned or scheduled maintenance is a list of predetermined maintenance actions carried out at regular time intervals that are aimed at the prevention of breakdowns. ... The primary goal of scheduled maintenance is to prevent equipment failure before it actually occurs.

What is maintenance effectiveness?

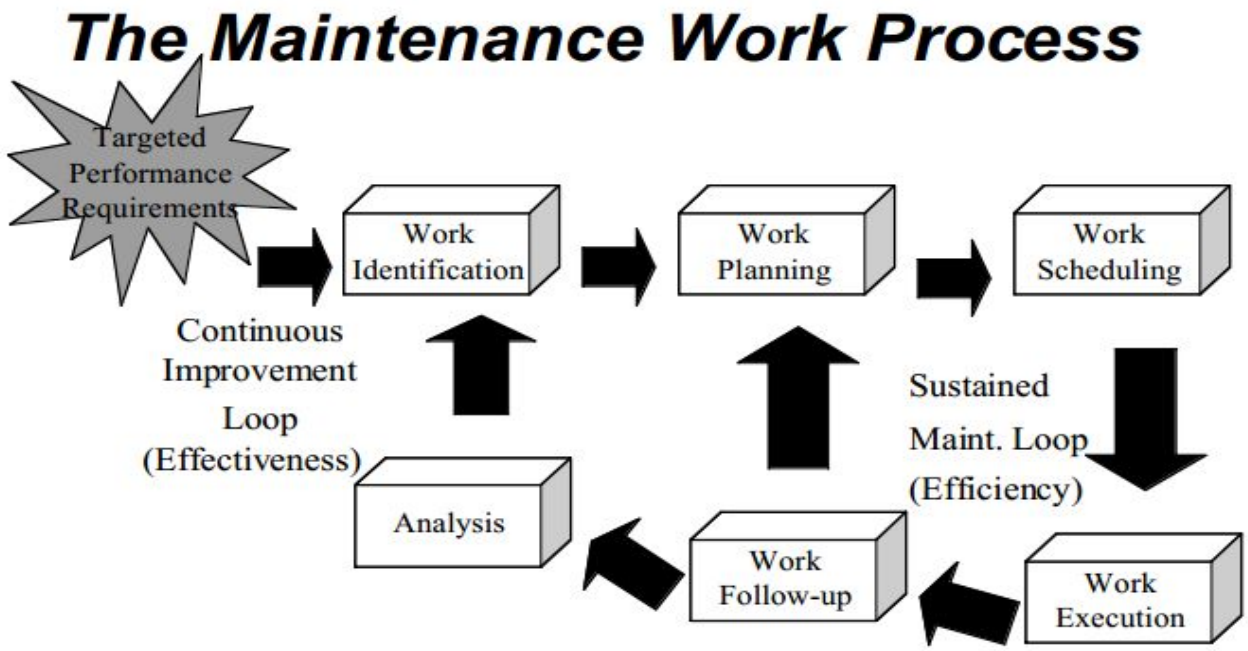
They are the higher-level indicators of long-term success when maintenance is viewed as a business. The maintenance manager must remember to: Emphasize the need to manage maintenance incrementally. Watch those things that constitute the end result that is used to judge maintenance effectiveness

How do you prepare a preventive maintenance schedule?

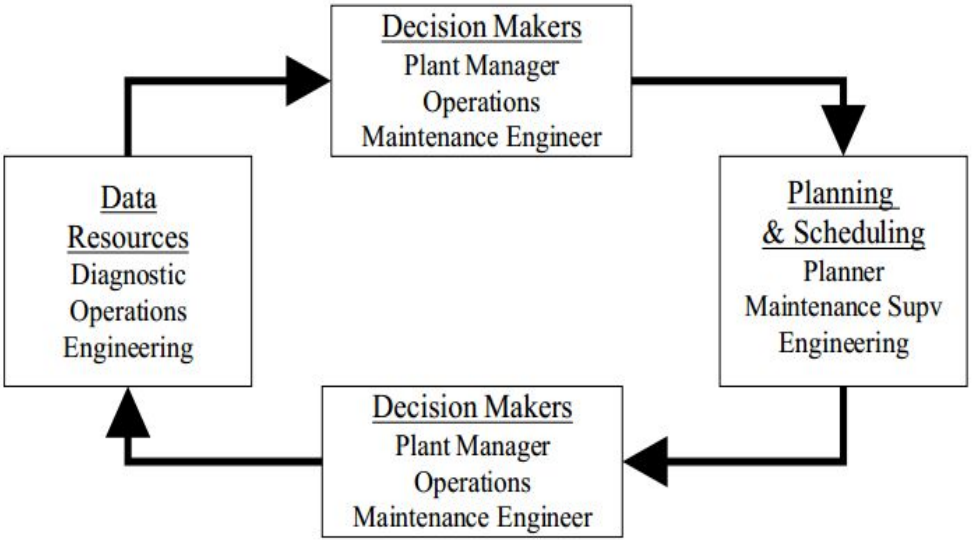
Here are the steps in creating an effective preventative equipment maintenance plan:

1. Step 1: Create a Plan. ..
2. Step 2: Inventory Facility Equipment/Assets. ...
3. Step 3: Create Preventive Maintenance Procedures. ...
4. Step 4: Create Preventive Maintenance Schedules. ...
5. Step 5: Train Your Maintenance Team.

6.1.2Maintenance work process



Work Flow



6.2Elements of a Planned Maintenance System

• A work order system to make assignments to craftsmen/technicians and to accumulate maintenance data

• Maintenance personnel dedicated to the task of planned and scheduled maintenance including preventive and predictive activities

• Methods of formal planning and scheduling that achieve the following:

– Effective allocation of maintenance resources

– Prioritized work tasks

– Effective supply of materials

– Positive impact on equipment availability/reliability

Measurement of planning and scheduling results (performance measurements should deal with level of planned work, scheduling effectiveness, level of unscheduled work, backlog, etc.)

• A means of sharing/planning and scheduling information with production personnel.

• Regulated inspections and repairs. Documentation of feedback from regulated repairs and inspections should be formalized.

• Systematic review, revision and refinement of the planned maintenance system

6.3 Maintenance Planning

• Scope of the job

– What job is to be done? - What is the scope of the work?

What is the priority of this job? - What are the work steps?

– Is engineering required?

• Details have to be ironed out about each of the five elements:

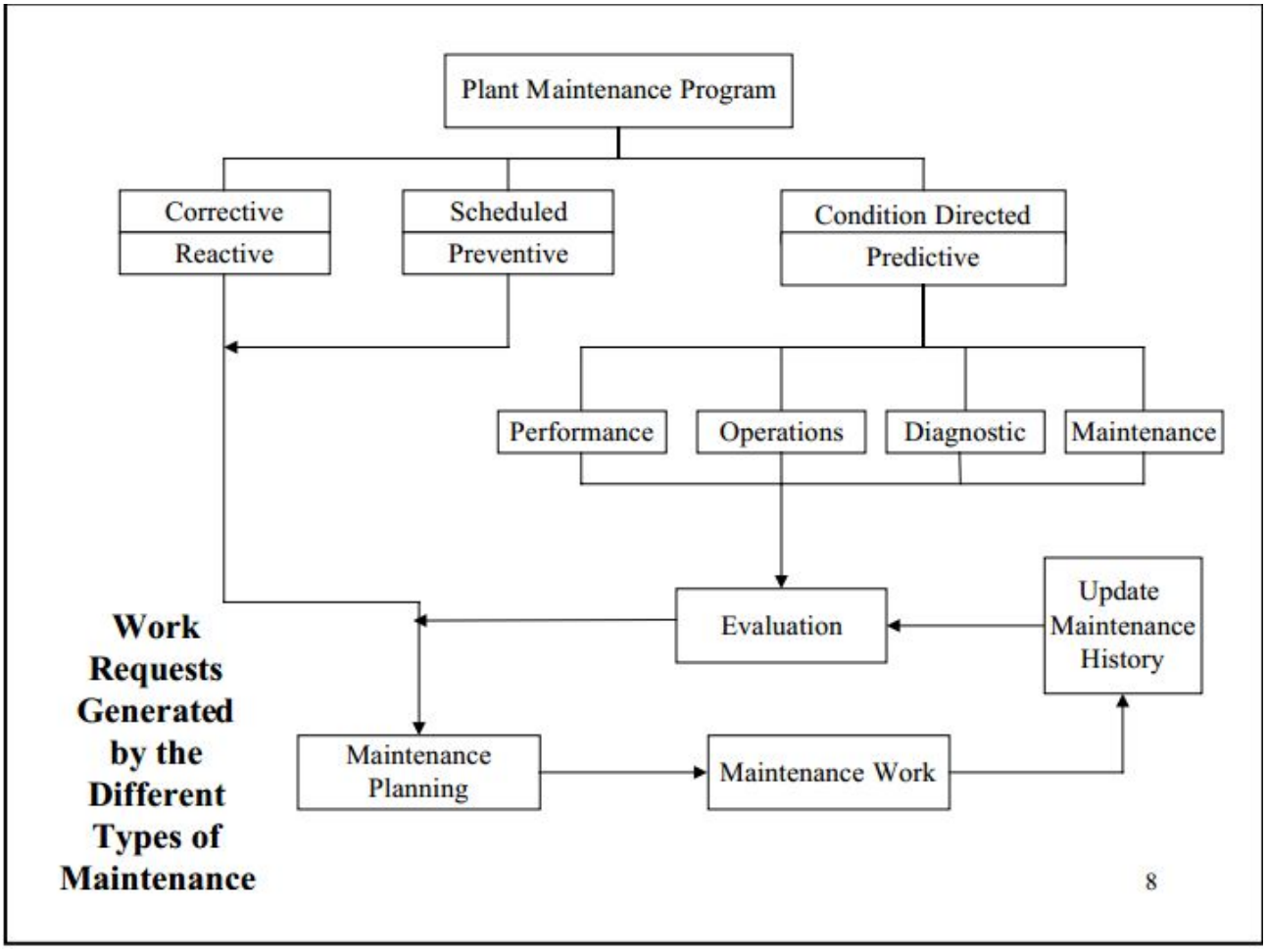
– Mechanic(s), Techs, helper: What skills, how much craft coordination, time per step, crew size, contractor needed, back-up plan if scope of work isn't adequate and job doubles in size.

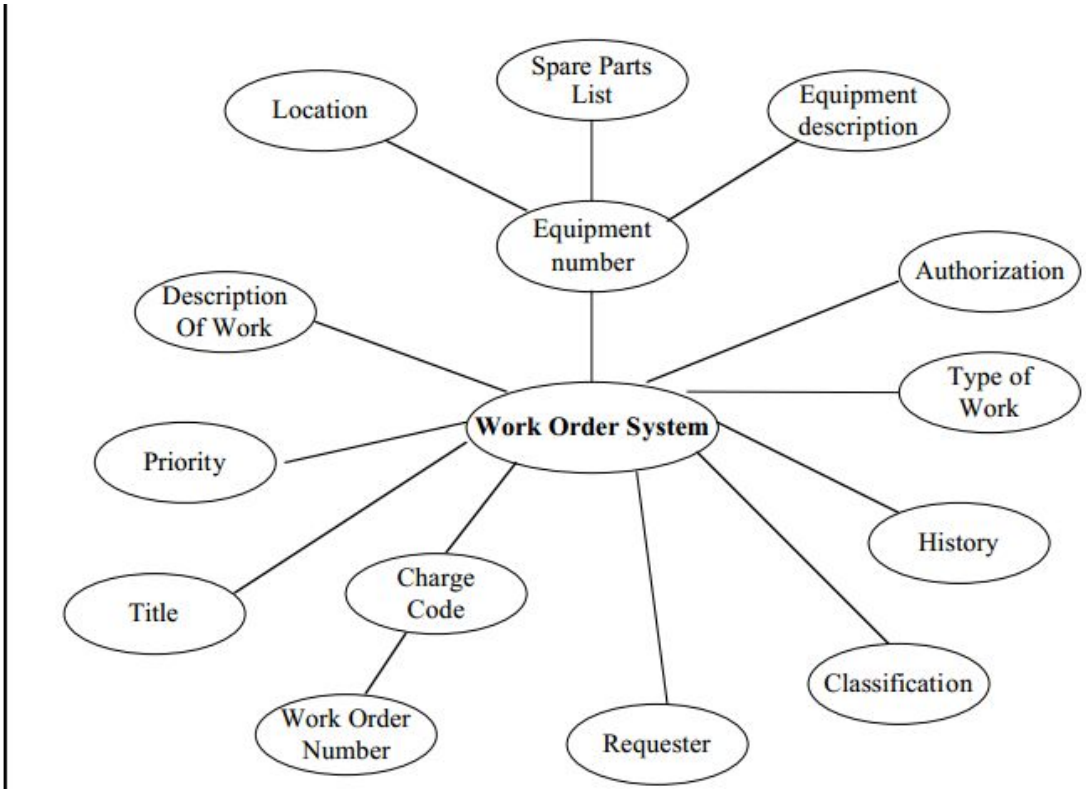
– Tools: What tools, where to procure, how to ensure availability.

– Materials/Parts/Supplies: What parts, how many, availability, in stock, lead time, vendor.

– Availability of the unit to be serviced: Best time to do the job.

– Authorizations/Permits/Statuary Permissions: Hot permit, open line permit, tank entry, lock-out/tag-out, EPA involvement, etc.





6.4Functions of the Work Order

It is a:

• Planning and scheduling mechanism for complex jobs (also determine the resources needed and estimates the manpower and cost).

• A contract between maintenance and the equipment owner.

• Means to authorize the work and denote priority.

• Cost collection mechanism for labor, stores requisitions, purchase orders, and services to charge against a piece of equipment or production cost center.

• Way to capture delays and measure productivity

Tool to determine and manage backlogs.

• Guides supervision in execution.

• Means to register acceptance of completed work.

• Provides a means to record equipment history.

• Input data for the Management Information System.
• Means to analyze failure and effectiveness of preventive/predictiveefforts.
• Used for reporting status of jobs, costs by department and type of work,versus budget, actual versus estimated cost comparison, open work
orders, etc.

6.5Types of Work Orders

• Planned and scheduled: These work orders are requested and screened by a planner, resources are planned, work is scheduled, and the work information is entered in the computer and the work order is filed.
• Standing or blanket: Used for (1) repetitive small jobs where the cost
of processing the paperwork exceeds the cost of doing the job; (2)
Fixed or routine assignments where it is unnecessary to write a workorder.
• Emergency: Usually written after the job is performed.
• Shutdown or outage: Are for work that is going to be performed as a project or when the equipment is down for an extended period.

Sample templets

EXAMPLE OF WO

Planned and Scheduled Work Order	LOCATION:	DATE:	TIME DOWN:
		DOWNTIME? Y N	TIME BACK IN SERVICE

PRIORITY	USER:	PHONE:	DOWN HOURS:

100 DGR FIRE SFTY	80 STOP PROD	70 SAFETY OR CODE VIOLAT.	60 PM DAMAG	50 EFFIC. IMPROV.	40 COMFOR	30 COSMETIC CHG USE	OTHER PRIORITY	SPECIAL LOCK-OUT PERMIT REQUIRED CONFINED SPACE OTHER

REASON FOR WRITE-UP	SCHEDULED WORK											UNSCHEDULED					
	PM	CM	UM-P	R	RM -M	I	E	U	OTHR	CL	GN	UM	PS	DR	DU	MU	OB

SYSTEM:	REQUESTED BY:
	DATE REQUIRED:
	CHARGE-BACK ACCOUNT:

DESCRIPTION OF WORK REQUESTED:

SKILL LEVEL	UNSKILLED	MAINTENANCE PERSON	ENGINEER OR OTHER	CONTRACTOR:

TIME IN	TIME OUT	HRS	DESCRIPTION OF WORK	TOTAL PRICE	PARTS & MATERIALS DESCRIPTION/PART NO.	QUAN
TOTALS			* CHGRT( ) = +		= TOTAL THIS W/O $	

WHAT WAS FOUND: NOTES FROM MECHANIC

DATE COMPLETED:	INSPECTED BY:

13

STANDING WO

#SWO	STANDING WORK ORDER				DATE OPENED			DATE CLOSED	
	USER:				LOCATION				SPECIAL
	PHONE:								LOCK-OUT
PRIORITY:	70		60	50	40				
	SAFETY		PM	EFFIC.	COMFOR				PERMIT
	OR CODE			IMPROV					REQUIRED
	VIOLATION		DAMAG						
REASON	PM	CM	RM	UMR	CL	GN	OTHER	DOWNTIME			CONFINED
FOR								REQUIRED: Y	N		SPACE
WRITE-UP											
											OTHER
SYSTEM:					CHARGE-BACK ACCOUNT?:					REQUESTED BY:	
DESCRIPTION OF WORK REQUESTED:											
SKILL LEVEL	UNSKILLED		MAINTENANCE PERSON		LICENSED TRADES		ENGINEER OR OTHER			CONTRACTOR:	
LABOR ESTIMATE:					MATERIAL REQUIREMENTS						
ESTIMATED BY:											
DATE	INIT	TIME	DOWN TIME	MATERIAL	DATE	INIT	TIME	DOWN TIME	MATERIAL		
TOTAL DOWN TIME					TOTAL DOWNTIME						
TOTAL (HRS1			+HRS2	) *CHGRT		+ (MAT'L		MAT'L		=	

14

Repair Reasons

SCHEDULED ACTIVITY	
Code	**Description**
PM	PM (Preventive maintenance) task list activity such as inspection, lube, adjustment, and survey (an initial PM inspection)
CM	Corrective maintenance (also called Reactive Maintenance) includes scheduled maintenance known 1 - 2 days in advance, when PM worker finds a potential or impending problem.
UM-R	User maintenance ---Routine work or standing work order (known work done every week)
UM-P	User maintenance --- Project work requested by production (usually small jobs, can be planned). Larger projects are considered RM-type maintenance
RM	Rehabilitation maintenance, rebuild, capital projects from management decision
RM-M	Modernize equipment to shop spec.
RM-I	Installation of new equipment
RM-E	Efficiency improvement
RM-U	User initiated modification
CL	Cleaning machines and shop, sweeping up, etc.
GN	Grounds, including cleaning, mowing, exterior, snow removal, etc.
NONSCHEDULED ACTIVITY	
UM-B	User maintenance ---- Breakdown (requiring immediate action). UM-B could be a jam-up, slow down, leak, quality problem, immediate safety danger, etc.
PS	Personal service, errands, minor jobs around the office
D-R	Reported damage (someone made a mistake and broke something and reported it.
D-U	Unreported damage, no report, includes vandalism, sabotage
MU	Misapplied use, wrong component for job.
OB	Other breakdown, including code violation, safety audit, OSHA inspection, PM inspector finds imminent danger or breakdown (cannot be scheduled)

1'

Self cheak	Written/choose

Name: _____Date: _____

Time Start: _____Time Finish: _____

1_____ Planned or scheduled maintenance is a list of predetermined maintenance actions carried out at regular time intervals that are aimed at the prevention of breakdowns

A. Maintenance report
B. Documentation
C. Research
D. Maintenances schedule

2.draw the block diagram of work order

Information sheet 7	Following/observing care and extreme precaution in handling the unit/product as per standard procedure

7.1What does the word precaution?

A precaution is a careful action you make in advance. You might want to take the precaution of bringing lots of water and sunblock if you are going on a desert hike. Precaution means exactly what it sounds like. The prefix pre- means before, and caution means carefulness in the face of danger

7.1.1What is the difference between caution and precaution?

As nouns the difference between precaution and cautionis that precaution is previous caution or care; caution previously employed to prevent mischief or secure good; as, his life was saved by precaution while caution is precept or warning against evil or danger of any kind; exhortation to wariness; advice; injunction.

What is the safety precaution?

An action taken in advance to protect against possible danger, failure, or injury; a safeguard: followed safety precautions when using heavy machinery. 2. Caution practiced in advance; forethought or circumspection: a need for precaution when planning a vacation.

7.2Mobile Phone Repairing Safety Tips

Mobile Phone Repairing Safety Tips, Guidelines and Precautionary Measures is a must not only while repairing mobile phone but also while handling or repairing any electronic device or gadget. The parts inside a mobile phone or smartphone are very sensitive especially to ESD or Electrostatic Discharge. By adopting safety measures and maintaining precaution, you can avoid any unwanted damage to the PCB of Mobile Phone.If you are into mobile phone repairing business and follow these Mobile Phone Repairing Safety Tips, then people get to know that you are well organized and well equipped. Remember, first impression is the last impression. By being well equipped and well informed, you will always get more satisfied customers that your competitors. Modern smartphone are expensive and no one would like to hand it over for repairing to someone how is not well equipped or well organized.

fig7.1

Here are some tried and tested Mobile Phone Repairing Safety Tips for Safety and Precaution. Follow these guidelines and you will see the difference in your business very soon.

7.3Mobile Phone Repairing Safety Tips and Precaution: Guidelines and Instructions

1. Use ESD-Safe Work Station / Work Bench / Table

Yes, repairing of any brand of mobile phone, tablet, laptop or any other such electronic gadget must always be done on an ESD-Safe Workbench. An ESD-Safe work bench is nothing but a table made up of ESD-Safe material with ESD-Safe Mat on the area where actual repairing is done. The whole table including the ESD Mat and the person doing the repairing job are all grounded properly. This prevents the gadget or mobile phone from any potential damage due to static electricity.Now, static electricity is unwanted electricity or flow or electrons from one body to another. These negatively charged electrons can cause damage to sensitive electronic components mainly SMD (Surface Mount Devices). Such work stations are well equipped so that all your tools of regular use are within your arms reach and at appropriate place.

2. Use Right ESD-Safe Tools

Professionals always with professional and good quality Mobile Phone Repairing Tools. Do not use alternative tools or cheap tools. Use only professional tools for particular device you want to repair and fix.

Many technicians use their thumb nail to open the front or back cover of a mobile phone or smartphone. This is not correct. For this job, low-cost mobile opening tools made of hard plastic (ESD-Safe) are easily available.

Similarly, you will always need T4, T5 and T6 screwdrivers for such repairing jobs. T4 or Philips head screwdriver is most common. 90% of your job will get done using a Philips (+) screwdriver. So, always keep ESD-Safe Philips screwdriver near you. With such organized workstation and tools, your job will become easier and very comfortable and your customers will be highly impressed.

Check: Buy Mobile Phone Repairing Tools Online

3. ESD Safety and Protection

ESD (Electro Static Discharge) is the sudden flow of electricity between two electrically charged objects caused by any contact between them. For ESD protection, you need to wear ESD-Safe Apron, ESD-Safe Slippers, ESD-Safe Hand Gloves and Anti-static wrist strap. You must also work on a well-grounded ESD Mat.

Combination of these three will make sure that no unwanted static electricity from your body is transferred to the gadget you are repairing. Remember that ESD protection is not required for your personal safety. It is for the safety of the electronic components on the logic board or the motherboard.

PS: I am into this field for over 15 years now and I know most technicians do not use ESD protection. Most of them don't even know about ESD. I always prefer better to be on the safer side. What do you say?

Video: What is ESD and ESD Protection

https://youtu.be/PNztxW2yb0Q

4. USE ESD-Safe Tray

These are readily available and don't cost much. Whenever you disassemble any mobile phone handset, place all the part in separate compartments of the tray. This will make your life much easier when you reassemble the mobile phone because you don't have to remember where you placed the part. All of them are already well organized in different compartments of the tray. Remember smartphone and mobile phone have number of tiny screws and these are the ones that get lost most of the time. Using a tray with different compartments for different part will your life easy.

5. Handle Delicate Parts Carefully for Safety

Most of the parts in a mobile phone or smartphone are very delicate. Take care about them. For example make sure the LCD does not get any scratches. Make sure to handle connectors and connecting cables carefully as they are very delicate.

6. Handle Hot Air Blower and Soldering Iron with Care for Safety

Hot air machine and soldering iron or soldering station must be used and handled carefully. They can damage the gadget and even harm you. Hot air machine produces hot air with very high temperature. Make sure the direction of the nozzle is where it should be. Switch it OFF when not in use.

Similarly use a hot soldering iron with care. Always place the iron in a iron stand and do not put it on the table. Such repairing jobs also need use of highly inflammable liquid such as IPA. They need to be placed at the right place to avoid high heat.

7. Take Care of Customer's Data

Many times you need to perform hard reset or factory reset or reinstall the operating system or Flash IMEI in a Mobile Phone. During the process, data stored in the mobile phone memory and even external SD card might get deleted. This data can be very important for some customers. So, make sure to backup all data before performing and factory reset.

7.4 Precautions

Mobile phone is an excellent communication device. Mobile radiation defects occur only if it is used for prolonged time. Controlled use for communication purpose is always safe. Mobile

phones emitting radiation below 2 watts is completely safe. Still, precautionary measures are always good, even though there are fewer case studies in this matter. Try to consider mobile phone as a communication device and not an entertainment device. Even if you are not talking, mobile phone is emitting strong signals to keep link with the base station having strongest signal.

Consider some of the precautionary measures:

1. do not use mobile phones more than 10 minutes continuously. During conversation, mobile phone will release bursts of energy to keep link with the strongest base station.
2. Try to use the mobile phone maximum one hour per day. If you want to use it more than this, use Bluetooth or Head phones.
3. Keep mobile phone away from bed while sleeping. It may affect your sleep physiology.
4. Don't give mobile phone to children. Radiation hazard is more in children than adults are.
5. Do not attend mobile phone while driving or operating machinery. It will increase the cognitive load and reduce the reaction time leading to accidents.
6. Do not use mobile phone near petrol outlet and LPG cylinder. The static electricity in the atmosphere may explode by accepting radiation from the mobile phone. This may cause fire.
7. Do not use mobile phone when it is connected to charger. Electricity problems may cause shock hazards.
8. Do not use mobile phone when there is lightning.
9. Do not over charge, mobile battery. It may reduce its life. Charge battery only when it's charge level reduces below 40 percent.
10. Do not send unwanted images or texts through sms or mms. It is an offence

Self cheak7	True/false

Name: _____Date: _____

Time Start: _____Time Finish: _____

Part 1:Say true or false

1. A precaution is a careless action you make in advance

2. Professionals always with professional and good quality Mobile Phone Repairing Tools. Do not use alternative tools or cheap tools. Use only professional tools for particular device you want to repair and fix.

3. Use mobile phone near petrol outlet and LPG cylinder. The static electricity in the atmosphere may not explode.

Answer **score**

1_____

2_____

3_____

Information sheet 8	Performing cleaning of unit in accordance with safety standard procedures

8.1Performing cleaning of unit in accordance with safety standard procedures

With the rapid development of the era, improvements have been made, not just to people's living standards, but also to science and technology. We have increasingly frequent access to a wide variety of electronic products, such as mobile phones. However, it is important to pay attention to maintenance of such items to ensure they can be used safely and effectively. Read on to maximize your phone's potential,while maintaining its value.

Steps

Avoid exposing your mobile phone to too much sun or rain. This is especially important for smartphones with LCD screens

- If the phone was immersed in water or used in heavy rain, wipe it dry as soon as possible. Should the phone have gotten seriously wet, it is advisable not to turn it on immediately. This avoids the electrical burn out of internal parts. Instead, send for repairs as soon as possible.
- If the mobile phone has sat idle for a long time, it may need special moisture treatment. In humid areas, the internal moisture of the mobile phone could cause harm to the parts. When using your mobile phone has been idle for a reasonable amount of time, it will have attained a certain internal temperature. This can cause the accumulated water to evaporate at ordinary times. To avoid harm to the body, do not touch the antenna.

To prevent damage to your mobile phone or deteriorating the quality of phone calls, do not install modified parts.

Some useful tips to prolong the service life of your mobile phone are:

- Keep your mobile phone and its accessories in a place where children can't reach.

- Keep your mobile phone dry. Rain, moisture, and liquids all contain minerals that can corrode sensitive electronic circuit boards.
- Do not use or store your mobile phone in dusty or dirty places, as this could undermine its circuitry or essential components
- Do not store your phone where it could overheat. High temperatures can shorten the life of electronic devices by damaging batteries or melting some of the plastic parts, causing deformation. Also, when the temperature rises high enough, the moisture will form inside of your phone, and this can damage electronic circuit boards

Do not attempt to open your phone. This can cause damage and can be dangerous if you do not know much about phones and how they work.

Do not throw, knock, or shake your mobile phone. Rough handling can break internal circuit boards, or the screen.

Self-Check #8	**Written Test**

Name : _____Date: _____

Time Start: _____Time Finish: _____

Instruction: Answer all the questions provided correctly, if you have some clarification regarding the test just raise your hand and ask the assistance of the teacher.

1. List the steps on Performing cleaning of unit in accordance with safety standard procedures

Answer score

1._____
_____
_____

LAP TEST #1	Practical Demonstration (Rework BGA IC)

Name: _____Date: _____
Time started: _____ Time finished: _____

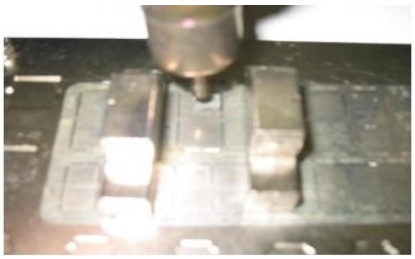
Instructions: You are required to perform the following individually with the presence of your teacher.

A. Tools & Materials

1. Nokia 3310 board or any motherboard
2. Maintenance Plate Board
3. Maintenance Plate Stand
4. Hot Air & Soldering Station
5. Tweezers
6. Soldering Flux

B. Procedure

1. Extract a BGA IC from cell phone unit board.
2. Clean terminals of BGA IC and place on the maintenance plate underside.
3. Choose a ball perform from perform sheets that matches the grid array on the BGA and apply BGA paste on the underside of the performer.
4. Place weight on the perform sheet and start hovering the hot air nozzle to melt the paste until the balls are formed on the underside of the BGA.
5. Separate the BGA IC from the perform sheet.



Has your Instructor Check your work? ☐

- *Your teacher will evaluate your output either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work. But if satisfactory, you can proceed to the next topic.*

LAP TEST #2	**Flash IMEI Number in Android Mobile**

Name: _____Date: _____
Time started: _____ Time finished: _____

Instructions: You are required to perform the following individually with the presence of your teacher.

Task 1: Flash IMEI Number in Android Mobile

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