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MOBILE PHONE TECHNICIAN

LEARNER GUIDE

National Vocational Certificate Level 3

Version 1 - November, 2019

NAVTTC

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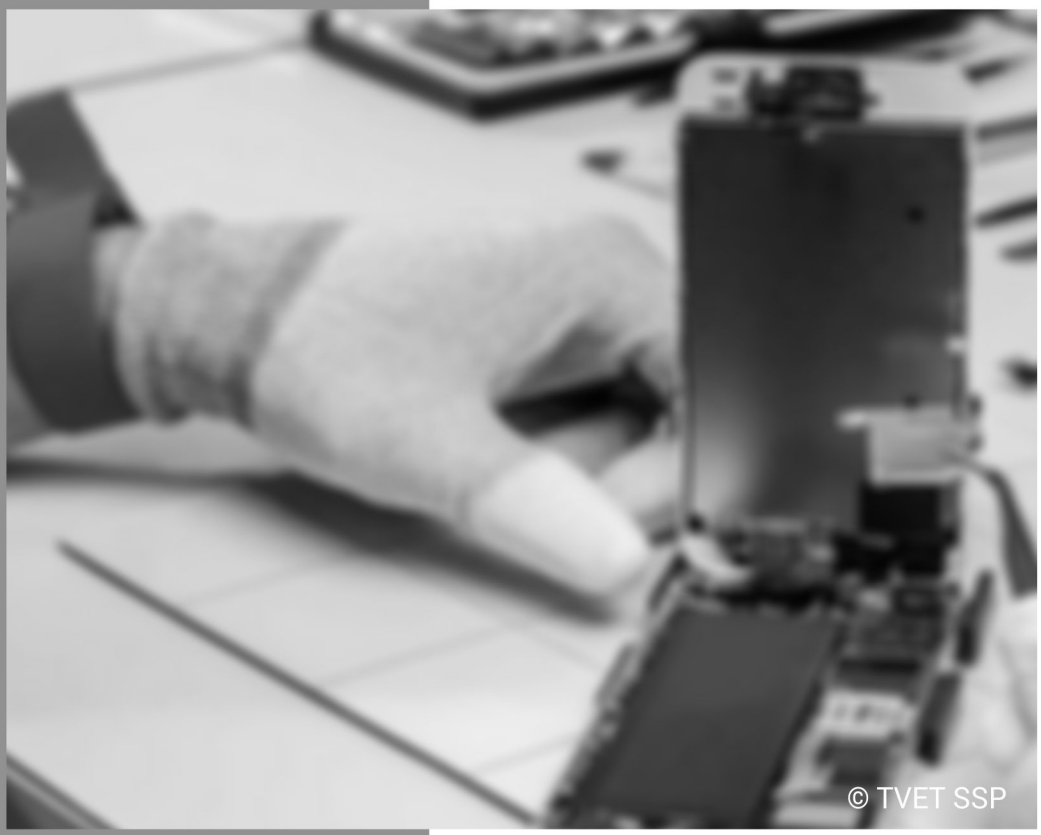

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Contents

Introduction

Welcome to your Learner's Guide for the ***Mobile Phone Technician*** Program. It will lead you towards successful completion of the program and to keep on further study or go straight into employment.

The ***Mobile Phone Technician*** program is to engage young people with a program of development that will provide them with the knowledge, skills and ability to start their career in Pakistan or seek their job across the borders. The program has been developed to address specific issues, such as the national, regional and local cultures, the manpower availability within the country, and meeting and exceeding the needs and expectations of their customers.

The main elements of your learner's guide are:

- **Introduction:**
  - This includes a brief description of your guide and guidelines for you to use it effectively
- **Modules:**
  - The modules form the sections in your learner's guide
- **Learning Units**:
  - Learning Units/Tasks are the main sections within each module
- **Learning outcomes**:
  - Learning outcomes of each learning units are taken from the curriculum document
- **Learning Elements:**
  - This is the main content of your learner's guide with detail of the knowledge and skills (practical activities, projects, assignments, practices etc.) you will require to achieve learning outcomes stated in the curriculum
  - This section will include examples, photographs and illustrations relating to each learning outcome
- **Summary of modules**:

  The summary of modules contains all the modules, clustered together in the qualification level (level 1—4), along with their learning units, aims and time frame

  Frequently asked questions:
  - These have been added to provide further explanation and clarity on some of the difficult concepts and areas and general information regarding the nature, duration, way of assessment, vertical and horizontal progression and future prospects of the training. This further helps you in preparing for your assessment.

- **Multiple choice questions for self-test**:
  - These are provided as an exercise at the end of your learner's guide to help you in preparing for your assessment.sessment.

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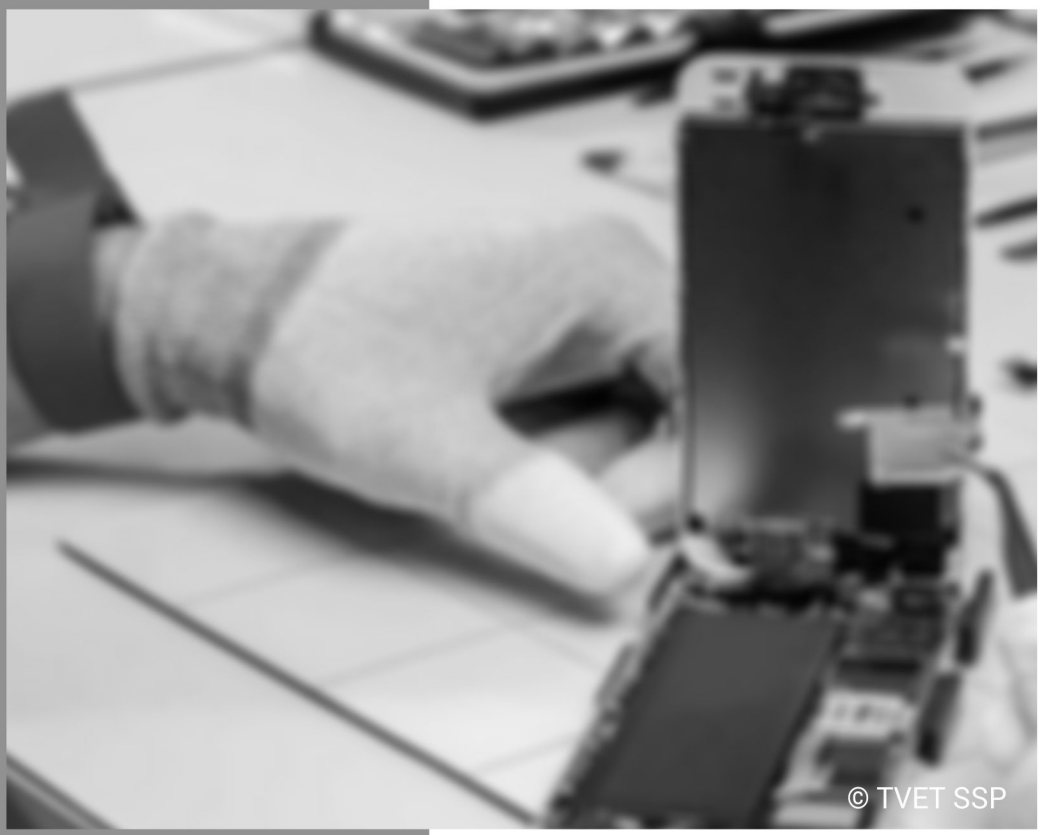

Module-H

LEARNER GUIDE

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Module H: Diagnose fault in Data Section

Objective: This module covers the skills and knowledge required to Diagnose fault nature Check Key Pad Connector, Check Key Pad IC, Check SIM Connector, Check SIM IC, Check camera, Check memory Card Connector, Check RAM, ROM, and CPU.

Duration: 70 Hours **Theory: 14 Hours** **Practice: 56 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
LU1. Diagnose fault's nature	**The trainee must be able to:** • Check mobile phone for software fault • Check mobile phone for hardware fault	A cell phone can get various faults and problems when using it. So cell phone repair technicians should know what are all the faults they have to repair and fix when they open a repair center. They should know how to diagnose and troubleshoot them easily. Basically there are 3 types of faults in cell phones 1. Settings Faults 2. Software Faults 3. Hardware Faults The list of all faults in cell phone are: Software faults: • Dead set • Not Charging • Test Mode • Contact Service • No Signal • Auto Restart	Nil

		• Some Applications not work • When you send SMS or MMS phone will restart • Camera Not work • Booting Problems • Sim not valid or Insert correct sim Setting faults: • Call Divert • No network • Only incoming call • Auto Restart • Battery empty • Stuck your phone • Phone is slow • When make a call phone will restart or off • Sim Lock • Unable to send SMS • Some Application not work properly • Security Code problems • Black list problems Hardware faults: 1. Dead: If a phone doesn’t switch-on, it is called a dead phone. 2. Insert Sim Card: In this fault, the SIM card does not get detected. 3. Hanging Problem: In this fault, the handset freezes frequently.	

		4. Network Problem: No signal and network or low network 5. Microphone Problem: No out-going sound. 6. Ringer Problem: No ring tone, music and loud speaker will not work. 7. Speaker Problem: No incoming sound. 8. Vibrator Problem: No vibration. 9. Display Problem: No graphics on LCD or broken LCD. 10. Auto Switch Off: Phone switches off automatically even if not switched-off. 11. Restart Problem: Phone restarts automatically. 12. Call Cut Off: Call gets disconnected or cuts off. 13. Charging Problem: No charging or very slow charging. 14. Keypad Problem: Keypad doesn't work or some keys do not function. Home button or volume buttons do not work. 15: Touch Problem: Touch doesn't work or slow touch. 16. Battery Discharge Problem: Battery gets drained very fast even when fully charged. 17. Bluetooth Problem: Bluetooth does not work.	

		18. Camera Problem: Camera does not work. 19. FM Radio: Radio does not work or no tuning. 20. LED Problem: Not light on LCD. 21. Memory Card Problem: MMC does not get detected. 22. No Internet 23 WiFi Problem: WiFi does not function	
LU2. Check Key Pad Connector	**The trainee must be able to:** • Check physical condition of key pad connector for damage • Check physical condition of key pad circuit for damage • Check metallic plate tags for discontinuity	• when a cell phone's keypad is not working properly it could be one of three different reasons: 1- Due to shock from a drop, circuitry is damaged thus no matter how hard you press you will never get the phone to register it. This issue is one that a certified technician would have to take care of and is nothing that we can fix here as it would be time consuming and expensive. 2- Because of moisture or heat, again, the circuitry could be damaged. Nothing to be done here really. The only thing to try best for a phone that's been subjected to moisture is to place it in a sealed container with rice. The rice will draw out the moisture and if there was not too much damage the phone should work fine. T 3- The phone's keypad membrane is broken or dented. This is where we come in and fix the	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires

		problem. Now keep in mind, the keypad membrane and the keypad itself are two different components; this is true for most models of cell phones, though there are exceptions. While the actual keypad is comprised of the buttons you press, the keypad membrane is what allows the keypad to register a touch to the circuit board (it is basically a thin, white, plasticated film with small metal sections of a hemisphere that act like mini • in order to repair keypad we want to now take the following and separate them from each other in order to finish the job: (1) The metal speaker housing. (2) The clear, plastic screen housing. (3) The actual screen itself. (4) The keypad membrane. • After you have put all those components aside take that keypad membrane and set it down with the metal Pogs facing you. This is the reason your keys weren't working. The way the little metal Pogs work is that they sit on top of the little golden circles corresponding to each key. They are slightly larger so they don't make a connection. When you press a key, what happens is that the little bump in the actual keypad	

		push the Pogs on the mebrane down. This creates a connection between the metal in the circuit board and the Pog that registers as a touch. When these little Pogs are dented as you can see here, you can press all you want but it won't make a proper connection an thus you won't be able to register a touch for that particular key. • 1-Reshape the pog so that springs back whenever you press one it. To test this once you're done reshaping it. Put it back on the hard surface face down and press the corresponding Pog. In order to reshape it use a small metal screwdriver or something hard and just go around and flatten the middle but raise the sides of the individual Pog. 2- If the membrane is beyond repairing you will need to either buy one or makeshift one. This will be a really hard and precise task so if you don't want to put in that much time and effort I suggest you either get a new membrane or send it back to the company. If anything it might even be cheaper to buy a cell phone at any local Pawn shop.	
LU3. Check Key Pad IC	**The trainee must be able to:** • Check physical condition of key pad IC for damage	• First of all observe keenly the physical condition of key pad IC if it swell or rusty change it with heat gun if not swell or rusty then check wither it heat up when mobile is trun on if so change it also	• Multi-meter • Hot air gun • CTC • Tuser • Power supply

	• Check physical condition of key pad IC prints on PCB for worn out	observe then pads and PCB print while changing it rebole new IC properly and fit it	• Logic prob • Jumper wires • Oscilloscope • Solder paste • Logic analyzer
LU4. Check SIM Connector	**The trainee must be able to:** • Check physical condition of SIM connector for damage • Check physical condition of SIM connector on PCB for connectivity	• range of SIM card connector products for Nano (4ff), Micro (3ff) and Mini (2ff) SIM cards conform to GSM11.11 standards **Nano SIM Connector** • Nano (4FF) is the smallest option for SIM connector designs. This is particularly useful for compact devices or when trying to minimise space used on a PCB. GCT's Nano SIM connectors are available in push-pull and hinged format with six contacts. With great features such as card detection and full metal variants for enhanced EMI and heat resistance, GCT Nano SIM card have profile heights consisting of 1.35mm or 1.43mm and all feature card stop functionality. **Micro SIM connector** • Micro SIM card connectors are available in push-pull and push-push card eject styles. The sockets allow the use of the 15 x 12mm Micro SIM card, the reduced size card offers the same contact footprint as the full size 'Mini' SIM card while offering approximately 50% card space saving. GCT Micro SIM connectors are available in 6 & 8 contacts. The card insertion cycles are 1,500 in push-push and 5,000 in push-pull. **Dual SIM Connector** • Dual SIM slots allow plugging of two SIM cards into one connector, saving you PCB space and	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire

		cutting the cost of PCB placement. This enables applications using two GSM accounts in one device. For example, in the vehicle tracking market the connector allows the option of switching between mobile networks when crossing country borders or when a alternative network offers a price or signal quality advantage. **Push Push SIM connector** Push Push SIM card connectors for Micro and Mini SIM cards. This card insertion and ejection style includes a mechanism to push out the SIM card, this is perfect for applications where the end user is required to insert and extract the card equipment via a panel cutout. All options come with a built in SIM card detection switch, shielded metallic case minimizes EMI/EMC interference, gold plated contacts allow for 1,500 or 5,000 card insertion cycles depending on connector design.	
LU5. Check SIM IC	**The trainee must be able to:** • Check physical condition of SIM IC for damage • Check physical condition of PCB SIM connector for connectivity	• Observe the sim card connector for any broken part and loose contact if find repair it. If sim card is ok then check the ic related to sim card contactor. If it heat up or swell or broken Replace it with heat gun.	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40

			• Cleaning cloth •
LU6. Check camera	**The trainee must be able to:** • Check physical condition of camera for damage • Check camera lens and focus for proper function • Check Camera Connector for connectivity	• There are many typses of camera with contector are there in mobile phone industry. Cameras of mobile phone are ratted in maga pixels. Normally high maga pixel camera have good result of picture and videos as compare to low maga pixel. • **Camera Replacement:** It's rare for camera hardware to break outside of a cracked lens, however internally, camera sensors are relatively easy to replace (once again depending on how easy the handset is to open). The unit is usually attached by a single cable, but if the glass is cracked you can sometimes replace the exterior glass without actually removing the camera from the motherboard • if you are getting a "Camera failed" error message, first open Camera app from the Application manager and select "Clear data," then restart the phone. If this doesn't solve the issue, try a factory reset of the phone (be sure to back up your data beforehand). If these options still don't help, try reinstalling Android OS, otherwise you will need to replace the hardware itself.	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth •
LU7. Check memory Card Connector and slot	**The trainee must be able to:** • Check physical condition of memory card slot for damage • Check memory card IC for damage	• Types of memory card connector Turn off the device and open the SD slot cover. On a laptop, this will likely be located on the side of the unit. On a phone it will be located on the side or bottom of the unit.	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires

		nspect the slot for any dirt or debris that may have accumulated inside. If there is any dirt or debris, clean it out with the end of a swab. Inspect the slot for any metal connector terminals that may have become bent out of position and are sticking straight up. If there are any connectors sticking up, use the tip of a small screwdriver to press them back down. Use a can of compressed air to spray in the slot to be sure all dust and dirt is removed from inside. Try the SD card again. Make sure the contacts on the card are clean as well.	• Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth •
LU8. Check RAM, ROM and CPU	**The trainee must be able to:** • Check RAM, ROM and CPU-IC for physical damage • Check RAM, ROM and CPU-IC pin connections for continuity with PCB	**Phone's memory** Phone's memory includes RAM and ROM. RAM equals the memory (or memory bar) of the mobile phone, while ROM is the device's internal storage, equaling the hard disk of the mobile phone. The bigger the RAM, the more software the phone runs smoothly; While the bigger the ROM, the more data it can store. Usually, a phone with big RAM is not easy to get stuck. So far, the RAM of the smartphones generally reaches above 2G, the major phones are equipped with 3GB / 4GB, 6GB and 8GB 32GB even 128GB this year. • With the help of multi-meter that is set on continuity mode we can check proper connection of these IC with PCB	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth

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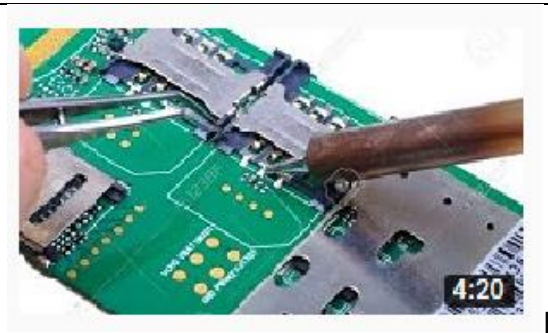

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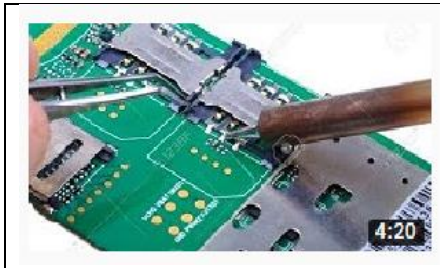

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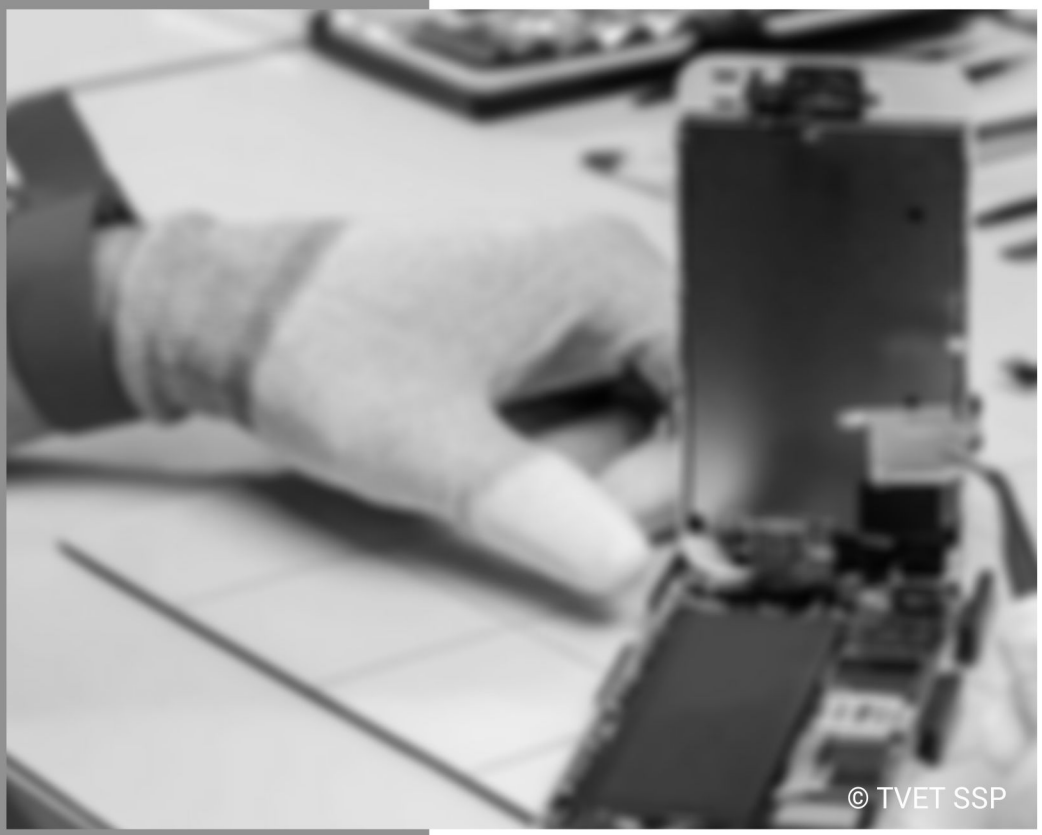

Module-I

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Module I: Detect fault in Network Section

Objective: This module covers the skills and knowledge required to check voltage, Antenna, Network filter, Power Amplifier and Blue Tooth & Wi Fi section.

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Duration: 70 Hours **Theory: 14 Hours** **Practice: 56 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
LU1. Check voltage	**The trainee must be able to:** • Check physical condition of network-section components for damage • Check rated Voltage at network-section with multi-meter	**What is Network Section in a Mobile Cell Phone?** Before we proceed to Learn How to Fix and Solve Mobile Phone Network Not Available Problem, we must understand the Network Section of Mobile Phone PCB. Network Section in a Mobile Phone (*Android, iPhone, feature Phone*) is the section that controls the incoming and outgoing calls. In a cell phone the Network Section is controlled by the Network IC, PFO and the Antenna. The network section is divided into following 2 parts: • **RX** – Receiving Section • **TX** Transmitting Section.	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth
LU2. Check Antenna	**The trainee must be able to:** • Check antenna connection for	**Cell Phone Antenna Replacement & Repair**	• Multi-meter • Hot air gun • CTC

	signals • Check antenna wire for connectivity • Check antenna IC switch for networking	**Antenna Switch** It is found in the Network Section of a mobile phone and is made up of metal and non-metal. In GSM sets it is found in white color and in CDMA sets it is found in golden metal. **Work / Function**: It searches network and passes forward after tuning. **Cell Phone Antenna Problems** Although most new phones have the antenna built into the protective casing, they are still breakable. Frequent drops or jostling could be the culprit for a faulty cell phone antenna. This can cause several problems, including static, poor reception, dropped calls, slow downloads, and low wireless signals. However, you do want to make sure that it isn't a simpler issue. There are some things that you can do to troubleshoot the problem before seeking a cell phone antenna repair. **Troubleshooting Cell Phone Antenna Problems** Make sure your problem isn't localized to the area from which you are attempting to call. You could be far away from a cell tower, or you could be in a building with certain materials that tend to block cell phone signals. Before assuming that you have a faulty antenna, try your phone signal in multiple locations. If your	• Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth

		problem is localized, you can often solve it with a cell phone booster kit to amplify your signal and get past the interference. You should also make sure that your phone is fully charged. Sometimes a low battery can cause similar reception problems. If the location and the battery are not the problems, you can also backup your data and then reset the phone.	
LU3. Check Network filters	**The trainee must be able to:** • Check burn out components of Rx/Tx filters • Check filter components with LCR meter / Oscilloscope for proper function • Check Power Frequency Oscillator for network signals	**TX Filter** It is found in the Network Section of a Mobile Phone. **Work / Function**: It filters frequency during outgoing calls. **Faults**: If it is faulty then there will network problem during outgoing calls. **RX Filter** It is found in the Network Section of a Mobile Phone. **Work / Function**: It filters frequency during incoming calls. **Faults**: If it is faulty then there will network problem during incoming calls. **Types of Problem with Network in**	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth

		Mobile Phone • There is no network at all in the phone. • There is less or weak network signal. • Sometimes there is signal and sometimes there is no network signal. • There is network signal for some time and then there is no signal at all. **Mobile Phone Network Not Available Problem and Solution** 1. Manually search for network. If there is NO Network then there is problem in the Antenna Switch. Repair or Replace the Antenna Switch to solve the problem. 2. If there is Network after Manual Search but the Home Network could not be selected then there is problem in the PFO. Repair or change the PFO. 3. If the Network gets disconnected during phone call then repair or change the Network IC. 4. Clean the Antenna Tips and Antenna Point. 5. If there is still Network Problem then Heat or Change the 26 MHz Crystal Oscillator. 6. If the problem is not solved then Heat or Change the Antenna Switch. You can also jumper if Antenna Switch is not available. 7. Heat, Change or Jumper the PFO if the problem still persists. 8. Heat, Reball or Change the Network IC. 9. Heat, Reball or Change the Power IC. 10. Heat, Reball or Change the CPU.	

		Important Note • If there is Low Network then Jumper the Antenna Socket. Refer to correct diagram to jumper. • Check BSI of the Battery. • If the problem is not solved by Hardware then Reload PM File in the Mobile Phone using the Software Box. • In China Phones, if there is SOS Call, then copy SOS File from another similar phone and reload it in the cell phone with Network Problem **How to Solve and Fix No Network Signal in Mobile Phone and Call Drop Problem** 1. Check the SIM Card. See if the SIM is OK or not. Insert the SIM Card in other mobile phone and see it the Network Problem and Call Drop Problem is still there or not. I have personally observed that sometimes the SIM card itself gets faulty for some reason and needs to be replaced with a new one. I have myself replaced my Airtel SIM card two times to solve this problem. 2. Also try to insert another SIM Card in the Same Mobile Phone which is giving the problem. 3. If there is problem with the SIM Card then try to change or replace it. 4. If the problem is still not solved then upgrade the Software / Operating System (OS) to the latest version. Also Rewrite the IMEI Number of the Mobile Cell Phone. 5. If the problem is not solved then you	

		may have to change the Mobile Phone PCB.	
LU4. Check Power Amplifier / PFO	**The trainee must be able to:** • Check burn out components at amplifier section • Check burn out components of Power Frequency Oscillator (PFO) / Power Amplifier for rated output • Check Baseband IC for damage • Check Voltage Controlled Oscillator (VCO) for rated signals	• **. P.F.O** It is found near the Antenna Switch in the Network Section of the PCB of Mobile Phone. It is also called P.A (*Power Amplifier*) and **B**and **P**ass **F**ilter. **Work / Function**: It filters and amplifies network frequency and selects the home network. **Faults**: If the PFO is faulty then there will be no network in the mobile phone. If it gets short then the mobile phone will get dead. •	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth
LU5. Check Bluetooth & Wi Fi section	**The trainee must be able to:** • Check Bluetooth and Wifi antenna for signals • Check Bluetooth and Wifi connectors for continuity • Check Bluetooth and Wifi circuit section for signals	• Bluetooth is a wireless technology standard that is used to exchange data over short distances (less than 30 feet), usually between personal mobile devices. This means that a Bluetooth-enabled device such as a smartphone is able to communicate with other Bluetooth devices, such as a wireless headset or printer. Bluetooth, therefore, acts much like a cord	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol

		between the two devices by creating a secure, wireless personal area network in which these devices can communicate. • Wi-Fi has some similar applications to Bluetooth, such as setting up a network or printing and transferring files. It is also a wireless standard, but rather than being designed to communicate between devices, it serves to wirelessly connect devices to the internet or Ethernet networks such as a corporate local area network (LAN). Its range is quite a bit larger than the very short range within which Bluetooth devices communicate, as a Wi-Fi signal can be accessed up to 300 feet away. This means that a Wi-Fi-enabled device, such as a PC or smartphone, can connect to the internet wirelessly when in a Wi-Fi "hotspot," or area in which a Wi-Fi signal may be accessed. (For more on the different types of Wi-Fi out there, **How to Solve and Fix WiFi Wireless Internet Connection Problem in Mobile Phone** 1. Enable Wi-Fi and check if it is working or not. Make sure you are connected to a	• WD-40 • Cleaning cloth

		wireless Wi-Fi Network. Make sure the password is correct. 2. If the Wi-Fi cannot be enabled and you are not able to use or access internet then there could be problem with the Mobile Phone PCB or the WiFi Controller IC. You may have to replace the IC or the PCB itself. 3. If the Wi-Fi can be enabled then there is no problem with the PCB. Just upgrade the software / operating system (OS) of the mobile phone or smartphone to the latest version. This should solve the problem. • • Knowledge of Bluetooth and Wi-Fi signals range	

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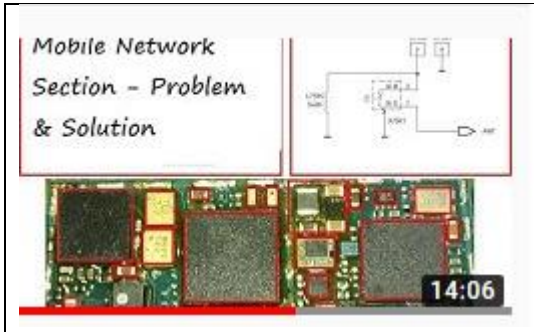

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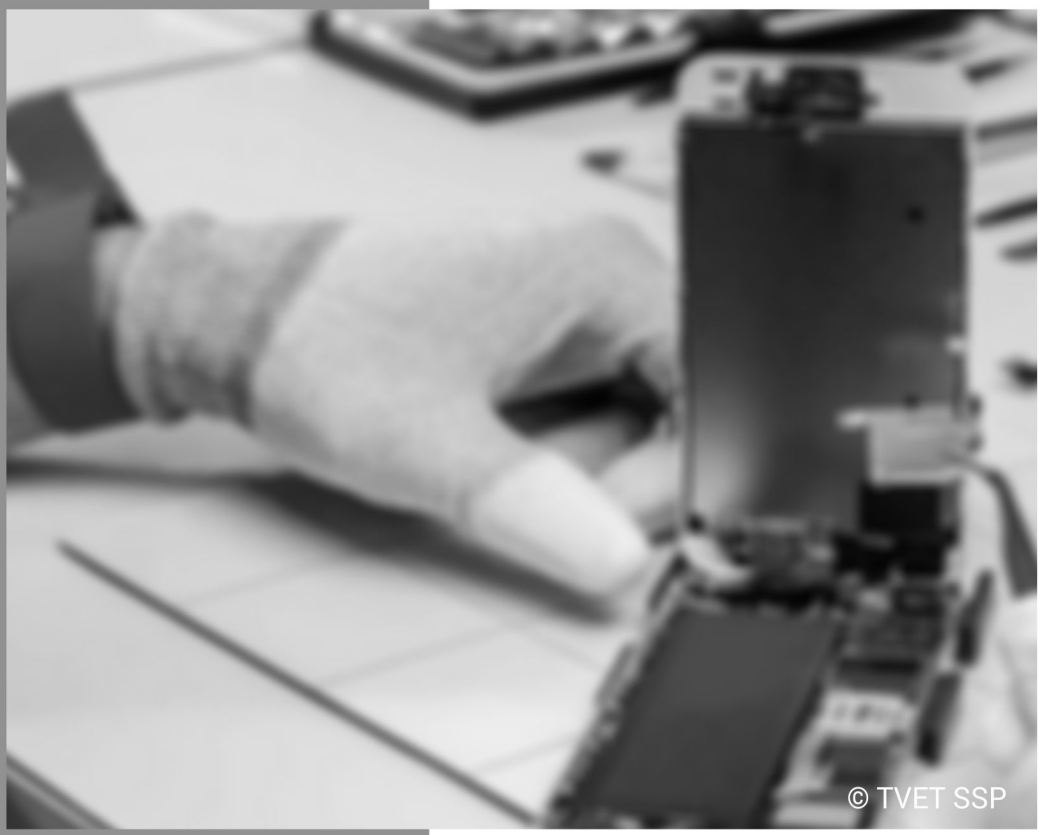

Module-J

LEARNER GUIDE

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Module J: Diagnose fault in Audio Section

Objective: This module covers the skills and knowledge required to Check Ear Piece, Check Micro Phone, Check Speaker (Ringer), Check Hand free Section, Check Vibrator and Check Audio IC

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
LU1. Check Ear Piece	**The trainee must be able to:** • Check dust for blockage • Check Ear piece terminals for continuity • Check Ear piece coil for rated resistance	**What is Earpiece or Speaker in a Mobile Cell Phone?** Earpiece or Speaker in a mobile cell phone is an electronic component or part that helps to listen to sound during phone call. It is also called Speaker or Ear Speaker. Earpiece is controlled by Audio IC or Power IC (*UEM*). **Types of Faults or Mobile Phone Earpiece Problem Problems** • No sound during phone call. • Less sound during phone call. • Sound with interruption. **How to Solve and Fix Earpiece or Speaker Fault in Android Smartphone and iPhone**	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth •

		Check Speaker Volume during Phone Call. •If speaker volume is OK the Check Earpiece / Speaker using a Multimeter. •Keep the Multimeter in Buzzer Mode. Value must be **25~35** Ohms. If the Value is **NOT** between 25~35 Ohms then change the Earpiece / Speaker. • If the problem is not solved then Check Circuit Track of Earpiece Section. Do Jumper Wherever required. • If the problem is not solved then Heat, Reball or Change the UEM / Audio IC. • If the problem is still not solved then Heat, Reball or Change the CPU.	
LU2. Check Micro Phone	**The trainee must be able to:** • Check dust for blockage • Check Micro Phone terminals for continuity • Check Micro Phone for rated resistance	• A microphone is a device that captures audio by converting sound waves into an electrical signal. This signal can be amplified as an analog signal or may be converted to a digital signal, which can be processed by a computer or other digital audio device. **The three most common types are described below** **(1) Dynamic** - Dynamic microphones	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner

		are the most widely used microphones. They have a simple design that includes a magnet wrapped by a metal coil. A thin sheet called a diaphragm is placed on the front end of the magnet and transmits vibrations from sound waves to the coil. **(2) Condenser** - Condenser microphones are commonly used for audio recording purposes. They are known for their sensitivity and flat frequency response. Each condenser microphone includes a front plate (the diaphragm) and a back plate that is parallel to the front plate. When sound waves hit the diaphragm, it vibrates and alters the distance between the two plates. This change is transmitted as an electrical signal. Unlike dynamic microphones, condensers require electrical power. **(3) Ribbon** - Ribbon microphones are also known for their high fidelity. They contain a thin ribbon made of a aluminum, duraluminum, or nanofilm,	• Petrol • WD-40 • Cleaning cloth •

		which is suspended in a magnetic field. Incoming sound waves make the ribbon vibrate, generating voltage proportional to the velocity of the vibration. This voltage is transmitted as an electrical signal. While early ribbon microphones required a transformer to increase the output voltage, modern ribbon mics have improved magnets that provide a stronger signal – in some cases even stronger than dynamic microphones. Though ribbon mics have been largely replaced by condensers, several models are still manufactured and used today. **Problems if Mobile Phone Microphone Not Working** • No sound or Less Sound during phone call. • The other Person cannot hear your Voice / Sound. • Sound with interruption or Changed sound. **Mobile Phone Microphone Working – Mic Problem and Solution** • Check Microphone settings. •If all settings are OK then, Check and clean	

		Microphone Tips and Connector. •If the problem is not solved then Check Microphone by Using a Multimeter. •Keep the Multimeter in Buzzer Mode. Value must be 600~1800 Ohms. If the Value is not between 600~1800 Ohms then change the Microphone.NOTE: Only one side of the Mic will give value. The other side will not give any value. •If the problem is not solved then Check Track of Microphone Section. Do Jumper Wherever required. • If the problem is not solved then Heat or Change Microphone IC. •If the problem is not solved then Heat Reball or Change the UEM / Audio IC / Power IC. •If the problem is still not solved then Heat, Reball or Change CPU. • Knowledge to check continuity of micro phone terminals using multi-meter • Knowledge to find rated resistance of Micro phone using multi-meter as per specification	

LU3. Check Speaker (Ringer)	**The trainee must be able to:** • Check dust for blockage • Check Speaker terminals for continuity • Check Speaker coil for rated resistance	• Speakers are one of the most common output devices used with mobile phone. Some speakers are designed to work specifically with mobilephone, while others can be hooked up to any type of sound system. Regardless of their design, the purpose of speakers is to produce audio output that can be heard by the listener. **What is Ringer in a Mobile Cell Phone?** Ringer is a type of card level part of a mobile phone or smartphone that rings or plays loud sound. It is also called by several other names like – I.H.F Speaker, Buzzer, Loud Speaker, and Melody etc **Types of Faults or Problems in Mobile Phone Ringer** There can be several types of faults or problems in the ringer of a mobile cell phone: • Ringer / Loud Speaker not working • Less sound from the Ringer • Sound coming from Ringer but with interruption • Sound not clear • Cannot Play Music or No Sound from Video • Android Phone Not Ringing • Android Smartphone or Apple iPhone Vibrate but won't ring	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth •

Mobile Phone Ringer Problem and Solution

How to Solve Ringer / Loud Speaker Not Working Fault in any Mobile Cell Phone

1. Check ringer settings in mobile phone. Check Ringer Volume and Silent Mode. Adjust or change volume and / or mode if required.
2. If the problem is not solved then disassemble the mobile phone and clean point and connector of the ringer / loud speaker.
3. If the problem is not solved then check ringer using a multimeter. Keep the multimeter in buzzer mode. Value must be **8~10 Ohms**. If the Value is not between 8~10 Ohms then change the Ringer.
4. If the problem is not solved then check track of ringer section. Do jumper wherever required.
5. If the problem is not solved then check Ringer IC. Give Heat using Hot Air Blower or change the IC if required.
6. If the problem is not solved then heat, reball (BGA) or change UEM / Logic IC.
7. If the problem is still not solved then heat, reball or change the CPU.

How to Solve and Fix No Sound in Mobile Phone Speaker Problem

1. Check the volume setting first. Check if the mobile phone is on silent or vibrator mode. Change the mode if required.
2. Make a phone call to someone or customer care of your network provider and check the

		volume. Increase volume if required. 3. Check if the No Sound from Speaker problem happens always or during certain condition. Do functionality test by dialing the code – ***#0*#** to verify if there is any parts problem or not. 4. If the sound problem happens always then check the speaker and the mic. If any of them is damaged then replace immediately. 5. If the speaker sound problem happens on certain conditions or situation then upgrade the Software / Operating System (OS) to the latest version. 6. For the earphone sound problem, check for any dust in ear-jack. Remove all dust and make sure it is clean and free from dust.	
LU4. Check Hands free Section	**The trainee must be able to:** • Check dust for blockage • Check Hands free terminals for continuity	• **Hands-free** is an adjective describing equipment that can be used without the use of hands (for example via voice commands) or, in a wider sense, equipment which needs only limited use of hands, or for which the controls are positioned so that the hands are able to occupy themselves with another task (such as driving) without needing to hunt far afield for the controls **types of Faults or Problems with Headphone in any Mobile Cell Phone** • No sound from Headphone or sound from only one side of the Headphone.	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth •

		• Sound does no go from the Mic of the Headphone. **Mobile Phone Headphone Not Working Problem and Solution** 1. Change the Headphone and Check. •If the problem is not solved then Clean Headphone Jack and Connector. •If the problem is not solved then Resolder or Change the Headphone Connector. • If the problem is still not solved then Check Track of Headphone Section. Do Jumper Wherever required. •If the problem is not solved then Heat or Change the Headphone IC. •If the problem is not solved then Heat, Reball of Change the UEM / Audio IC / Power IC. •If the problem is still not solved then Heat, Reball or Change the CPU. • Techniques for Cleaning hands free section • If there is symbol of Headphone without inserting the Headphone then there is problem with the setting or software update or the CPU. To solve the problem, clean or change the Headphone Connector OR Short the Headphone Connector	

		•	
LU5. Check Vibrator	**The trainee must be able to:** • Check Vibrator connectivity with PCB • Check Vibrator coil for rated resistance • Check connectivity between Vibrator and Vibrator IC	• A **vibrator** is a mechanical **device** to generate vibrations. The **vibration** is often generated by an electric motor with an unbalanced mass on its driveshaft. There are many **different types** of **vibrator** **Types of Faults or Problems in Mobile Phone Ringer** There can be several types of faults or problems in the ringer of a mobile cell phone: • Vibrator not working. • Vibration with interruption. • Vibration Hangs. • Phone will ring but wont vibrate. • Mobile Phone Vibration Not working is most common in following Samsung Models – Samsung b313, Samsung j7, Samsung b313e, Samsung b310e, Samsung e1200. **Mobile Phone Vibrator Problem and Solution – How to Fix Vibration Not Working Fault in any Mobile Cell Phone** 1. Check Settings in Mobile Phone for Vibrator. Check if Vibrator is ON or OFF. 2. If the problem is not solved then disassemble the mobile cell phone and clean tips and connector of Vibrator / Motor. 3. If the problem is not solved then check vibrator using a multimeter. Keep the	• Multi-meter • Hot air gun • CTC • Tuser • Power supply • Logic prob • Jumper wires • Oscilloscope • Solder paste • Solder iron • Solder wire • Thinner • Petrol • WD-40 • Cleaning cloth •

		multimeter in Buzzer Mode. Value must be **8~16 Ohms**. If the Value is not between 8~16 Ohms then change the Vibrator / Motor. 4. If the problem is not solved then check track of vibrator section. Do jumper wherever required. 5. If the problem is not solved then heat, reball (BGA) or change the UEM / Logic IC / Power IC. 6. If the problem is still not solved then heat, reball or lastly change the CPU. •	
LU6. Check Audio IC	**The trainee will be able to:** • Check Audio IC for Physical damage • Check audio-section components for burn out • Check audio IC points connectivity with PCB	An **audio** power amplifier (or power amp) is an electronic amplifier that amplifies low-power ... players, among others), **audio** engineers and music producers who prefer tube-based amplifiers, and **what is** perceived as a "warmer" tube **sound**. Analog Input Monaural Class-D Speaker Amplifier BD5469GUL General Description BD5469GUL is a monaural Class-D speaker amplifier that has integrated ALC function suitable for mobile phones, portable type electronic devices, etc. LC filter at the speaker output is not needed. The IC forms a monaural speaker amplifier using just 3 external	•

		components. ALC, short for Automatic Level Control, is a function that automatically adjusts the level of suppression to avoid distortion (clipping) of the output waveform during excessive input. The time until the suppression of the output level is released is called the release time (or recovery time). This IC has a typical release time of 262ms/1dB which suits music play applications. Through Class-D operation, the IC can achieve high efficiency and low power consumption which makes it suitable for battery driven applications. The current consumption in shutdown mode is lowered to 0.01μA(Typ). Startup time from shutdown mode to active mode is fast and pop noise is minimized which enables it to withstand repeated active and shutdown modes. Features ν Integrated Digital ALC (Automatic Level Control) Function. ν External parts : 3 components. ν Ultra slim type package: 9 pin WL-CSP(1.7×1.7×0.55mmMax). ν Pin Compatible Specs. BD5460/61GUL (No ALC Function, Fixed Output Gain) BD5465/66/68GUL (ALC Function, Fixed Output Gain) ν ALC release (recovery) time :	

		262ms/1dB (Typ). ν Output Power Limit : 0.88W (Typ) [VDD=4.2V, RL=8Ω, THD+N ≤ 1%] : 0.9W (Typ) [VDD=3.7V, RL=6Ω, THD+N ≤ 1%] : 0.64W (Typ) [VDD=3.6V, RL=8Ω, THD+N ≤ 1%] ν Audio Analog Input (has option for either single-end input or differential input). ν No need for output LC filter ν Pop noise suppression circuit ν Shutdown Mode (used as mute at the same time) [low shutdown current = 0.01μA (Typ)] ν Built-in protection circuits: output short protection, high temperature protection, under voltage protection Applications Mobile Phones, Portable Audio Devices, PND, DSC, • Knowledge to check continuity of audio IC points with PCB using multi-meter If you are **using** a DMM (Digital **Multi Meter**), the meter will indicate if the voltage or .... Sometimes there are "**test points**" on a circuit and these are wires or loops .... its resistance increases and this **knowledge** is used to make RESISTORS. ..... of diodes built-into **IC's**(Integrated Circuits) and transistors,	

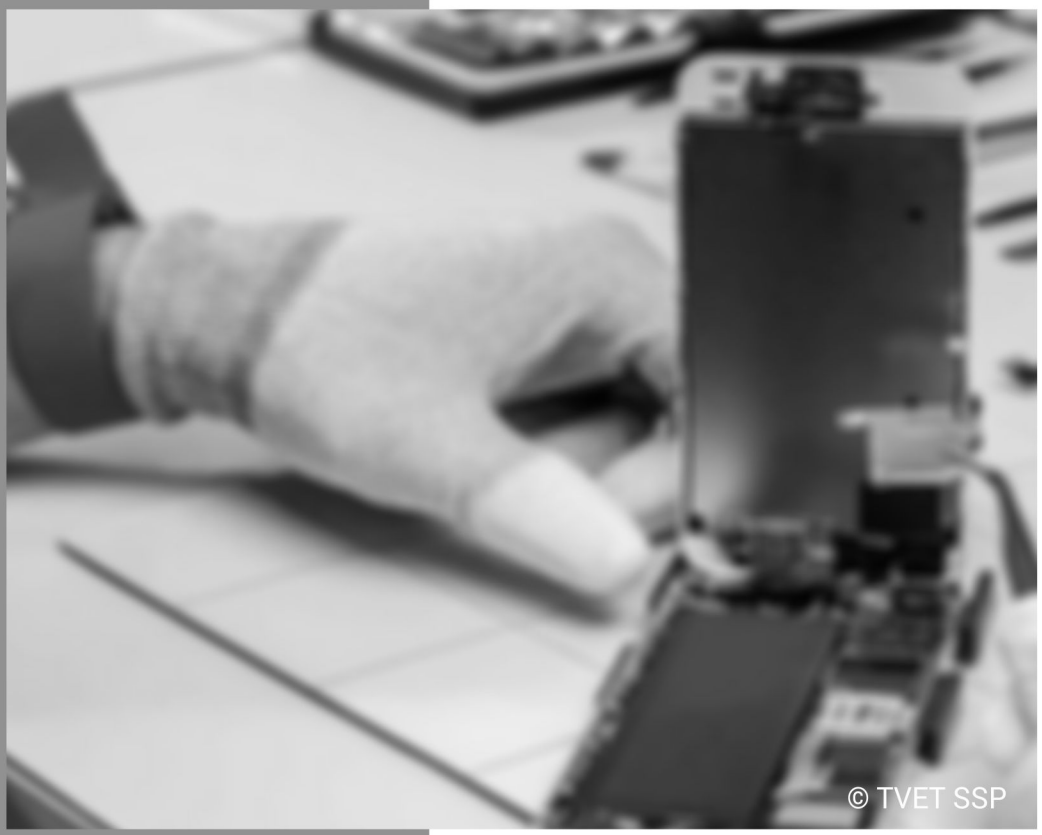
https://www.youtube.com/watch?v=vK04Eg4mfY0

https://www.youtube.com/watch?v=_BwPKGI-034

https://www.youtube.com/watch?v=vK04Eg4mfY0

https://www.youtube.com/watch?v=FTmDXHgy31w

MOBILE PHONE TECHNICIAN



Module-K
LEARNER GUIDE
National Vocational Certificate Level 3

Version 1 - November, 2019

Module K: Repair/ Replace Hard ware Parts

Objective: This module covers the skills and knowledge required to Perform chemical washing, Change Display/Glass ,Replace Fix Battery, Charging Connector/Base, , display Light IC, Key pad Connector, SIM Card Connector, Audio Components, Camera, Flash Light, Antenna Components, Blue Tooth and Wi Fi IC, Sensors, Mother Board and Housing.

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Duration: 200 Hours **Theory: 30 Hours** **Practice: 170 Hours**

Learning Unit	Learning Outcomes	Learning Elements	Materials Required
LU1. Perform chemical washing	**The trainee must be able to:** • Arrange tools for cleaning and washing • Select chemicals for washing • Clean PCB from dust and moisture • Cover microphone, sensors and remove cameras before washing • Wash PCB and its components • Dry PCB and its components	• Cleaning is an essential process within electronics manufacture and has been used for many years to remove potentially harmful contaminants during PCB manufacture. Such contaminants include flux, solder and adhesive residues, and other more general contaminants such as dust and debris present from other manufacturing processes. The purpose of cleaning, specifically within the rapidly expanding electronics industry, is to essentially improve product lifetime by ensuring good surface resistance and by preventing current leakage leading to PCB failure. This developing market sees modern and future electronics becoming smaller and smaller and the requirement for high performance and reliability is stronger than ever. In order to achieve good insulation resistance, the cleanliness of the electronic assemblies is essential. This can only be achieved by manufacturers of fluxes/adhesives, cleaning chemicals, cleaning equipment and electronics	• Carbon tetrachloride chemical(CTC) • Thinner • Petrol • WD-40 • Cleaning cloth

engineers, all working together to ensure optimal cleaning performance is reached.

How Do You Clean Circuit Boards?

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

- Compressed air
- Baking soda
- Isopropyl alcohol
- Distilled water
- Household cleaners

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

Using Compressed Air to Clean PCBs

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

Using Baking Soda to Clean PCBs

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

		and neutralizes the acidic qualities of the residue. **Using Isopropyl Alcohol to Clean PCBs** Isopropyl alcohol is a great PCB cleaner because it is inexpensive and evaporates quickly. Compared to other cleaners used for similar purposes, alcohol contains fewer chemicals. It is important that isopropyl alcohol used to clean your circuit board is 90% or better. High-percentage isopropyl alcohol can cause adverse effects in contact with the body, so be sure to handle it with care and use latex gloves and goggles. **Using Distilled Water to Clean PCBs** Distilled water triumphs over any other form of liquid when mixing your cleaning solution due to the absence of ions conductive to electric devices. Pure distilled water will not degrade electronic devices, as it is a very poor conductor. It also can become contaminated quickly by dirt found on your hands or in the air, so seal your reserve of distilled water when not in use and to avoid contact with your bare hands. **Using Household Cleaners to Clean PCBs** A phosphate-free household cleaner should also be in your arsenal. While phosphates can be an effective chemical to protect against corrosion and possess other helpful cleaning properties, phosphorous pollution in lakes has become a real concern for the United States since the 1970s and many manufacturers have	

		moved away from including them in cleaning products. Since then, companies have adapted to create phosphate-free cleaners that do the job just fine. **Tools for Cleaning Printed Circuit Boards** our choice of brush is also important in the cleaning process. Selecting a brush that has soft bristles and is small enough to reach small places is the best pick. A toothbrush or paintbrush are the best choices if your company does not have some sort of specialized scrubbing tool. Cutting a paintbrush diagonally is a good strategy so you can reach difficult angles with the long side while scrubbing with the short side. Lint-free towels like microfiber cloths should be handy to rub down and dry off your delicate circuit boards. Even with extensive use, this type of cloth does not shed debris, which would be counterproductive as your goal is to remove the unwanted material from inside the affected devices. You can also utilize household appliances such as the oven to accelerate the speed of drying. An oven actively heating should never be used to dry electronics, but after the appliance is shut off, the heated environment is a great place to dehydrate any excess moisture after cleaning. Substituting a blow drier or desk lamp in place of an oven as the catalyst for drying is fine too. Take similar steps no matter what material has dirtied your circuit board. The device should be removed from the environment it has been soiled in, disassembled and scrubbed with various cleaners appropriate for each job.	

		How to Clean Corrosion From a Circuit Board The tools needed while handling a corroded device include common household items, and your company can use careful tactics that should not prove to be difficult for those in the electronics field. Things you will need include: • Baking soda • Distilled or deionized water • Soft-bristled brush • Phosphate-free household cleaner • Lint-free towel • Household oven Modern way of cleaning **Ultrasonic cleaning** is a process that uses ultrasound (usually from 20–40 kHz) to agitate a fluid. The ultrasound can be used with just water, but use of a solvent appropriate for the item to be cleaned and the type of soiling present enhances the effect. Cleaning normally lasts between three and six minutes, but can also exceed 20 minutes, depending on the object to be cleaned	
LU2. Replace Fixed Battery	**The trainee must be able to:** • Disassemble mobile phone without damage • Replace fix Battery Connectors if required • Replace fix battery as per requirement	• Types of fixed batteries **Damaged Battery Connector solution** **Step 1: Find the damaged connectors**. Find which connectors were damaged, you need to take the battery out and inspect its connectors. More often, batteries would have pushed in connectors. If they look fine, then check the ones on your phone; they could be pushed in or broken. **Step 2: Clean the connectors**. Using a clean, soft cloth, gently clean the connectors on both the phone and the	• Adhesive removing liquid/spray

		battery to eliminate the possibility of corrosion. More often dirt decreases conduction, which would result to temporary power failure on the device. **Step 3: Straighten pushed in connectors**. In case the phone has pushed in connectors, take tweezers and attempt to straighten them. Be gentle when you do so because applying too much force would result to further damage. With connectors already straighten, test the device if it turns on or charges. If it does, then the problem is solved.	
LU3. Replace Charging Connector / Base / NFC	**The trainee must be able to:** • Remove existing charging port / base without damage of PCB • Replace new charging port / base as per standard • Replace Near Field Communication (NFC) antenna and its connectors • Check rated voltage as per specification	• **Near-field communication** (**NFC**) is a set of communication protocols that enable two electronic devices, one of which is usually a portable device such as a smartphone, to establish communication by bringing them within 4 cm (1½ in) of each other	• Charging base/port • Soldering wire • Flux paste • Thinner • NFC antenna • CTC • Cleaning cloth
LU4. Replace Display / Glass	**The trainee must be able to:** • Arrange tools and equipment as per requirement • Remove glass without damaging display • Remove display • Install display / glass as per standard	**Removing your old tempered glass screen protector** There are a few ways to remove your busted tempered glass screen protector, and the one you use will depend on just how well-attached the protector is to your screen. **Method 1** Before getting out your toolkit and working on your smart phone like it's one of Frankenstein's creations, try removing the screen protector with your fingernail.	• Display • Glass • Polarizer paper • OCA paper • Ultraviolet (UV) gum • CTC cleaner • Double tap • Adhesive glue • Cleaning cloth

		1. Start by trying to lift the screen protector up from each corner. One of them'sgotta give! 2. Once it starts coming up, stop pulling from just the corner and move further along the protector as it starts to peel off. This will help prevent it from falling to pieces before you can get it all the way off. 3. Pull slowly and evenly; otherwise, you'll have a jigsaw puzzle of tempered glass pieces to clean up. **Method 2** 1. Try using a toothpick to pry up one of the corners. Make sure you point the sharp end up toward the screen protector as you do this and not down toward the screen. 2. Once you can get a corner up, pull with your fingers, once again pulling slowly and evenly. 3. If you can, slide a credit card into the gap and slowly push it along to lift the screen protector. **Method 3** Try some duct tape! 1. Roll a piece of duct tape around two of your fingers with the sticky side out. 2. Start in a corner and press the duct tape onto it, rolling away from a corner slowly. Hopefully, the duct tape will adhere to the screen protector, and you'll be able to pull it up and off. **Method 4** Heat the glass with a hair dryer on a low setting for 15	

seconds**.** The heat loosens the adhesive behind the glass, making it easier to remove. However, tempered glass should be heated briefly and only with low heat to avoid damaging any components behind it. Get the glass nice and toasty but not hot to the touch.

- If a hair dryer isn't available, you can try another heat source. Leaving it near a hot stove, open flame, furnace, or in a steamy bathroom may encourage the adhesive to melt

Dry mounting

This method is for tempered glass screen protectors that did not come with a bottle of solution.

1. Clean your phone's screen with an **alcohol pad** if the protector came with one. Otherwise, use a **lint-free microfiber cloth**.
2. Hold the screen protector and peel off the film on its **sticky side**.
3. Very carefully align the **screen protector** with your iPhone or iPad's**screen**, making sure you line up the Home button, earpiece, and camera holes.
4. Slowly place the **screen protector** onto your screen, starting from one end and carefully working your way to the other.
    - Use a credit card or any application tools that were included with your protector to ensure that it goes on evenly and without bubbles.
5. Smooth out any **bubbles** with a credit card or the installation card that came with your screen protector.
    - Starting in the center, push bubbles out toward the edges of your screen with short movements. If you try long pushes, you'll

		just spread the bubble out under the screen protector. You can also use a microfiber cloth to do this. 6. Remove the **film** from on top of your screen protector. This should reveal a completely clean screen protector. **Wet mounting** This method is for tempered glass screen protectors that come with a bottle of spray solution (usually alcohol) to aid in installation. Some folks prefer applying screen protectors this way since it cuts down on static and helps prevent dust and hair from sneaking under your screen protector. 1. Clean your **smart Phone screen** using the spray and a soft cleaning cloth. 2. Spray both the front and back of the **screen protector**, being generous with the spray. This will prevent it from drying up during installation. 3. Carefully place the **screen protector** onto your smart phone screen. o Balance one end on the screen and slowly apply it from one end to the other, using a credit card or the flat of your hand. 4. Use the **squeegee** that comes with wet-mounted tempered glass screen protectors to squeeze the excess solution out from under the screen protector. o Start in the center and gently push it out toward the edges, making sure to hold onto the protector, so it doesn't shift around. 5. Leave it to dry for at least half an hour. If you're putting a case on your iPhone or iPad, wait at least a couple hours. This will prevent the screen protector from shifting around and will allow it to	

		fully adhere to your screen. Keep in mind that during installation, you may have to remoisten the screen protector. It can be rather tedious to line everything up properly and you may have to reapply the spray a few times. Just be patient and careful. Always remember that if there's any pits or cracks in your tempered glass screen protector, you should replace it, even if they're minor. Glass has a habit of turning minor cracks and pits into *major* defects.	
LU5. Replace display Light IC	**The trainee must be able to:** • Remove faulty display light IC without damaging other components on PCB • Install new display light IC as per standard	• Mobile Phone Display Not Working or Touch Screen Not Working or Screen is Black / Blank but Phone is ON – No Problem. Learn How to Fix the Problem. These problem and solution apply to all brands and make of mobile phones including Nokia, Samsung, iPhone, China Mobile Phones, Motorola, HTC, Sony, Blackberry, Alcatel, Apple, AudioVox, Benefone, Danger, FIC, Hagenuk, Palm, Kyocera, LG, Panasonic, Huawei, ZTE, Spice, Lava, Sony Ericsson, Micromax etc. Old Feature Phone used to have Small Display with No Touch Screen. Later they started to come with Touch Screen and Keypad. Modern Android Smartphone and Apple iPhone either have Separate Display and Touch Screen Combined Together by Loca Glueor they Come as a Combo Set where the Main LCD Display and the Touch Screen Cannot be Separated by a LCD Screen Separator	• Soldering wire • Display light IC • Flux paste • Jumper wire • CTC cleaner • heat resistance tape • Cleaning cloth • Solder paste

		Machine. **Types of Faults or Problems if Mobile Phone Display Not Working** • Mobile Phone Display Not Working • Nothing shows on the Display or Display is Black / Blank • Only Half Display Working • Display Broken or Crack • Sometimes Display Works and Sometimes it doesn't work • There is only light in the Display and nothing else • Touch Screen Not Working • Phone is ON but the Screen is Black • You Dropped Your Phone and the Screen is Black • Part of the Mobile Phone Screen doesn't work **Tools Needed to Replace LCD Display Screen** You will need following Mobile Phone Repairing Tools and Equipments to Replace LCD Display Screen of Mobile Phone: 1. Liquid Flux. 2. Soldering Iron 3. Desoldering Wire. 4. Solder wire. 5. Tweezers. 6. Precision screwdriver. 7. Mobile Phone Opener. **How to fix Black or Blank Display of Feature Phone** 1. Clean Display Tips and Display Connector. 2. Resold the Display Connector.	

		3. Replace the Display. 4. Check Display Track. 5. Resold or Change the Display IC. 6. Heat, Reball or Change the CPU. **How to Fix if Display of Android Mobile Phone is Not Working** • If your Android Smartphone is ON but the Display is Black, then Most Probably you will have to Replace the Display. Follow these Steps: •Disassemble the Mobile Phone • Get to the PCB of the Mobile Phone •Using IPA Solution Clean the PCB and all the Small Parts. This will Remove any Moisture and Dirt. •Apply Flux all over the PCB and Give Heat Using a Hot Air Blower from some Distance. This will Fix any Dry Solder. •Now check if the Display is Working or Not. •If Working then Fine. 3 Cheers for You. • If Not, then Bad Luck for You. You have No Option but to Replace the Old Display with New One •	
LU6. Replace Key-pad / Connector	**The trainee must be able to:** • Remove key-pad / connector / ribbon as per requirement • Install new key-pad / connector / ribbon as per standard	• Normally to replace key pad conector we use hot air gun • First we install soldering past around the corner of connecter then fire hot air on it first we adjunct the flow rate of air as well as temperature of air then	• Soldering wire • Key-pad connectors • Flux paste • CTC cleaner • Cleaning cloth

		gently focus air on target use the tuser to gently remove connecter but first waite a bit so that the connector when feel to soft then remove it •	
LU7. Replace SIM Card Connector / Slot	**The trainee must be able to:** • Remove Sim Card slot / Connector as per requirement • Install new Sim Card slot / Connector as per standard	• First of all observe if there is any loses contact of sim slot with PCB it there repair it and check it if it is in working. If still not working and finally necessary to replace it then apply past on sim card and after adjusting temperature and air flow foucs hot air on slot and with the help of tuser remove it clean the pad of sim card slot and apply past and place new on and apply hot air check all the connection of slot with PCB with the help of multi-meter	• Soldering wire • SIM card connectors • Flux paste • CTC cleaner • Heat resistance tape • Cleaning cloth
LU8. Replace Audio Components	**The trainee must be able to:** • Remove Ear Piece / Microphone / Ringer / Head phone Jack / Vibrator as per requirement • Install new /Ear Piece / Microphone / Ringer / Head phone Jack / Vibrator as per standard	• Check Settings in Mobile Phone for Vibrator. Check if Vibrator is ON or OFF. • If the problem is not solved then disassemble the mobile cell phone and clean tips and connector of Vibrator / Motor. • If the problem is not solved then check vibrator using a multimeter. Keep the multimeter in Buzzer Mode. Value must be **8~16 Ohms**. If the Value is not between 8~16 Ohms then change the Vibrator / Motor. • If the problem is not solved then check track of vibrator section. Do jumper wherever required. • If the problem is not solved then heat, reball (BGA) or change the UEM / Logic IC / Power IC. • If the problem is still not solved then heat, reball or lastly change the CPU.	• Soldering wire • Ringer • Head phones jack • Vibrator • Micro phone • Ear piece • Flux paste • CTC cleaner • Heat resistance tape • Cleaning cloth

		How to Solve and Fix Earpiece or Speaker Fault in Android Smartphone and iPhone 1. Check Speaker Volume during Phone Call • If speaker volume is OK the Check Earpiece / Speaker using a Multi-meter. • Keep the Multi-meter in Buzzer Mode. Value must be **25~35** Ohms. If the Value is **NOT** between 25~35 Ohms then change the Earpiece / Speaker. • If the problem is not solved then Check Circuit Track of Earpiece Section. Do Jumper Wherever required. • If the problem is not solved then Heat, Reball or Change the UEM / Audio IC. • • If the problem is still not solved then Heat, Reball or Change the • CPU **Mobile Phone Microphone Working – Mic Problem and Solution** 1. Check Microphone settings. • If all settings are OK then, Check and clean Microphone Tips and Connector. • If the problem is not solved then Check Microphone by Using a Multimeter. • Keep the Multimeter in Buzzer Mode. Value must be 600~1800 Ohms. If the Value is not between	

		600~1800 Ohms then change the Microphone. NOTE: Only one side of the Mic will give value. The other side will not give any value. •If the problem is not solved then Check Track of Microphone Section. Do Jumper Wherever required. •If the problem is not solved then Heat or Change Microphone IC. •If the problem is not solved then Heat Reball or Change the UEM / Audio IC / Power IC. •If the problem is still not solved then Heat, Reball or Change CPU.	
LU9. Replace Camera	**The trainee must be able to:** • Remove Camera as per requirement • Remove camera-connector if required • Install camera / connector as per standard	• In many mobile phone camera are come in modular form the replacement of such camera is not hard job but first we have to disassemble mobile phone then if camera is in modular form replace it during this process it is important to take care of camera connector and camera ranbin	• Soldering wire • Cameras • Camera • CTC cleaner • Heat resistance tape • Flux paste • Cleaning cloth
LU10. Replace Flash Light	**The trainee must be able to:** • Remove Flash light as per requirement • Install new flash light as per standard	• LED is light emitting diode are normally used use to produce light inside the mobile phone of outside mobile. It is one of the important part of mobile phone. Normally these leds are in SMD form and to replace it we use hot air gun • First check it wither the LED is out of working order if so then apply soldering past around the corner of LED and focus hit air of heat gun on it with the help of tuser remove it from the PCB • Clean remaining pads of LED and replace it with good LED	• Soldering wire • Flash light • CTC cleaner • Heat resistance tape • Flux paste • Cleaning cloth

LU11. Replace Antenna Components	**The trainee must be able to:** • Remove Antenna / Cable / Connector as per requirement • Install Antenna / Cable / Connector as per standard	**Troubleshooting Cell Phone Antenna Problems** Make sure your problem isn't localized to the area from which you are attempting to call. You could be far away from a cell tower, or you could be in a building with certain materials that tend to block cell phone signals. Before assuming that you have a faulty antenna, try your phone signal in multiple locations. If your problem is localized, you can often solve it with a cell phone booster kit to amplify your signal and get past the interference. You should also make sure that your phone is fully charged. Sometimes a low battery can cause similar reception problems. If the location and the battery are not the problems, you can also backup your data and then reset the phone. • To replace antenna first of all locate it in phone. Normally GSM antenna come in mobile phone in such a way that it can be replace without the use of soldering iron of heat gun. Pull out it bases from its connectors and replace it	• Soldering wire • Antenna • Antenna cables • Antenna connector • CTC cleaner • Heat resistance tape • Flux paste • Cleaning cloth
LU12. Replace Blue-Tooth and Wi-Fi IC	**The trainee must be able to:** • Remove Blue-Tooth / Wi-Fi IC as per requirement • Install Blue-Tooth / Wi-Fi IC as per standard	• Enable Wi-Fi and check if it is working or not. Make sure you are connected to a wireless Wi-Fi Network. Make sure the password is correct. • If the Wi-Fi cannot be enabled and you are not able to use or access internet then there could be problem with the Mobile Phone PCB or the WiFi Controller IC. You may have to replace the IC or the PCB itself. • If the Wi-Fi can be enabled then there is no problem with the PCB. Just upgrade the software / operating system (OS) of the mobile phone or smartphone to the latest version. This should solve the problem	• Soldering wire • Blue-tooth/Wi-Fi IC • CTC cleaner • Heat resistance tape • Flux paste • Cleaning cloth

LU13. Replace Sensors.	**The trainee must be able to:** • Remove light sensor / sound sensor / proximity sensor / Finger Print sensor as per requirement • Install light sensor / sound sensor / proximity sensor / Finger Print sensor as per standard	• Following sensors are normally used in to day modern smart phone **1. Microphone** (Decibel, Frequency, Noise cancellation) **2. Camera/Image sensor** (Scanner, Barcode , Colour temperature-Kelvin) **3. Proximity sensor** (Obstrucle detection/Like Leaser Mouse Operation-Infrared) **4. Ambient light sensor** (Light Intensity-Luminance/lux) **5. Motion sensor**(Can be used by Accelerometer) **6. Gyroscope**(orientation, Constellation degree-Google sky map) **7. Accelerometer sensor** (Acceleration, Gravity, Speed) **8. Digital compass / Magnetometer** **9. Magnetic field sensor**(xyz wise-micro tesla) **10. Hall sensor** **11. Temperature** **12. Humidity** **13. Barometer**(Air pressuer , Altimeter) **14.Battery temperature**	• Soldering wire • Different types of sensor • CTC cleaner • Heat resistance tape • Flux paste • Cleaning cloth

		15. Fingerprint scanner(Ultrasonic or Optical Scanner) **16. Iris Scanner**(Retina scanner-can be used by front camera) 17. Pedometer or Step counter(mostly used by Accelerometer) **18. Heart rate Monitor** (Samsung Galaxy S5, Lenovo ZUK Z2 Pro) **19. Pulse oxymeter** (Samsung Galaxy S5, Lenovo ZUK Z2 Pro) **20. Geiger Counter**(Harmful Radiation level detector-Sharp Pantone 5 injapan) **21. NFC** (Type of radio frequency tag scanner, Connectivity) **22. Infrared Blaster**(For using TV remote data connection etc) **23. Laser**(Auto focus,Distance Measurement, Also one type of laser bar-code scanner available-Panasonic Toughpad FZ-F1 Mobile) **24. Touch screen** (Conductivity or by pressure) **25. Air Gesture**(by using front camera) **26. 3D Air gesture & 3D scanning**(use multiple camera 2 to 5- Takee 3D mobile) **27. GNSS (Global Navigation Satellite System- GPS**, GLONASS, BeiDuo-BDS, IRNSS-Indian Navigation	

		Satellite system- Global position , Elevation or altitude, Speed, Time easurment, Distencemeasurment, Satellite scanning) **28. Other signal receiver spectrum and band width**(1G,2G,3G,4G,5G,WiFi,Bluetooth,FM radio, Telivision) **29. LiFi** (Data connectivity by Visible spectrum light) **30. Clock**(Normal and Atomic clock-Distencemeasurment and Satellite positioning) **31. Molecular/ Material sensing**(SCio sensor based on Near Infrared or FTIR type Raman Spectroscopy detector to identify material like Mango Fruit, Gold, Body fat or anything Changhong H2 Mobile) To replace sensor	
LU14. Repair / Replace Mother Board	**The trainee must be able to:** • Repair Motherboard for connectivity • Replace new Motherboard as per standard if required	• When mobile phone is completely dead after trying long troubleshooting then it is recommended to change whole mother board	• Soldering wire • Thinner • Petrol • Jumper wire • WD-40 • Mother board • CTC cleaner • Heat resistance tape • Flux paste • Double tape • Cleaning cloth

LU15. Replace Housing	• Remove Housing as per requirement • Install new Housing as per standard	• Types of housing Today there are two synthetic substances in use of **phone** housings manufacturers: Acrylonitrile butadiene styrene (ABS) and Polycarbonate (PC). If you are curious, what **kind** of material is used in your **phone housing**, just look under the back cover of your **phone**. • The method shown in the video	• Housing • CTC cleaner • Double tape • Adhesive removing liquid • Glue • Cleaning cloth

https://www.youtube.com/watch?v=EajlliEVl1A

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

https://www.youtube.com/watch?v=Lb0csrFYh1k&pbjreload=10

https://www.youtube.com/watch?v=9BOAu4QfAXE

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

https://www.youtube.com/watch?v=I12GbMmhS1U

https://www.youtube.com/watch?v=PkZc15pa6m8&t=2s

https://www.youtube.com/watch?v=a6nIITvmoLM

https://www.youtube.com/watch?v=4DxlSudKsVo

Summary of the Modules:

Module Title and Aim	Learning Units	Timeframe of modules
Module H: Diagnose fault in Data Section Aim: **The aim of this module is to develop basic knowledge, skills and understanding of working and repair of different sections of mobile so that students are able to understand the repairing technics that is use in mobile repairing market**	**LU1:** Knowledge of mobile phone software Knowledge of mobile phone hardware **LU2:** Understanding of key-pad, key-pad connector. Checking procedure for connectivity of metallic plate tags **LU3:**know about Keypad IC **LU4:**discuss about SIM Card slot problem **LU5:** knowledge of SIM card IC and its working **LU6:** Camera replacement and repair are discuss in this module **LU7:** This module discuss major problem of memory card section **LU8:** Knowledge of RAM, ROM, and CPU of mobile phone	60 hours

Module Title and Aim	Learning Units	Timeframe of modules
Module I: Detect fault in Network Section **Aim: it is important to know network section of mobile phone. On the completion of this module students are able to Know about network section its basic function and repair**	**LU1:** Introduction to network section of mobile phone **LU2:** Checking of antenna and its working **LU3:** Network filter and its working and repair **LU4:** Know about power amplifier **LU5:** know about Wifi Bluetooth.	120 hours
Module J: Diagnose fault in Audio Section Aim: This module discuss about basic repair techniques of audio section. Students also familiar with different components like vibrator ringer MIC etc of audio section	**LU1:**Checking of ear piece its working and repair **LU2:** Introduction to micro phone its working and repair **LU3:** Checking and repair of speaker and ringer **LU4:**Checking and repair of hand free section **LU5:**Check vibrator and its repair and replacement **LU6:** Types of camera, camera connectors **LU7:** Types of memory card connector **LU8:** Types and uses RAM, ROM and CPU	60 hours

Module Title and Aim	Learning Unite	Timeframe of modules
Module K: Repair/ Replace Hard ware Parts **Aim: This module discuss about basic repair and replacement techniques used in mobile phone. Many important sections of mobile phone is in modular form which is completely replace in case of faults in that section. This module is all about repair as well as replacement of these modular sections**	**LU1:**Perform cleaning and washing of mobile phone with different chemicals **LU2:** Replacement of fixed battery of mobile phone **LU3:** Repair and replacement of charging connector and NFC **LU4:** Replacements of display and display glass **LU5:** Replacement of display light IC and repair in display section **LU6:** Replacement of key pad connector **LU7:** Replacement and repair SIM card connector **LU8:** Repair of audio section **LU9:** Replacement of camera **LU10:** Repair of flash lights of mobile phone **LU11:**Replacement of antenna **LU12:** Replacement and repair of WIFI and Bluetooth **LU13:** Introduction to different sensor use in smart phone **LU14:** Replacing of mother board of mobile phone	

Frequently Asked Questions

1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes?	Competency-based training (CBT) is an approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Compared to conventional programs, the competency based training is not primarily content based; it rather focuses on the competence requirement of the envisaged job role. The whole qualification refers to certain industry standard criterion and is modularized in nature rather than being course oriented.
2. What is the passing criterion for CBT certificate?	You shall be required to be declared “Competent” in the summative assessment to attain the certificate.
3. What are the entry requirements for this course?	The entry requirement for this course is 10 th Grade or equivalent.
4. How can I progress in my educational career after attaining this certificate?	You shall be eligible to take admission in the National Vocational Certificate Level-3 in Mobile phone technician program. You shall be able to progress further to National Vocational Certificate Level-4 in Mobile phone technician program; and take admission in a level-5, DAE or equivalent course. In certain case, you may be required to attain an equivalence certificate from The Inter Board Committee of Chairmen (IBCC).
5. If I have the experience and skills mentioned in the competency standards, do I still need to attend the course to attain this certificate?	You can opt to take part in the Recognition of Prior Learning (RPL) program by contacting the relevant training institute and getting assessed by providing the required evidences.
6. What is the entry requirement for Recognition of Prior Learning program (RPL)?	There is no general entry requirement. The institute shall assess you, identify your competence gaps and offer you courses to cover the gaps; after which you can take up the final assessment.
7. Is there any age restriction for entry in this course or Recognition of Prior Learning program (RPL)?	There are no age restrictions to enter this course or take up the Recognition of Prior Learning program

8. What is the duration of this course?	The duration of the course work is 6 Month.
9. What are the class timings?	The classes are normally offered 25 days a month from 08:00am to 01:30pm. These may vary according to the practices of certain institutes.
10. What is equivalence of this certificate with other qualifications?	As per the national vocational qualifications framework, the level-4 certificate is equivalent to Matriculation. The equivalence certificate can be obtained from The Inter Board Committee of Chairmen (IBCC).
11. What is the importance of this certificate in National and International job market?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTC website.
12. Which jobs can I get after attaining this certificate? Are there job for this certificate in public sector as well?	You shall be able to take up jobs in Mobile phone technician industries ,workshops and you can start business in Mobile phones in house or internationally.
13. What are possible career progressions in industry after attaining this certificate?	You shall be able to progress up to the level of supervisor after attaining sufficient experience, knowledge and skills during the job. Attaining additional relevant qualifications may aid your career advancement to even higher levels.
14. Is this certificate recognized by any competent authority in Pakistan?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). The official certificates shall be awarded by the relevant certificate awarding body.
15. Is on-the-job training mandatory for this certificate? If yes, what is the duration of on-the-job training?	On-the-job training is not a requirement for final / summative assessment of this certificate. However, taking up on-the-job training after or during the course work may add your chances to get a job afterwards.
16. How much salary can I get on job after attaining this certificate?	The minimum wages announced by the Government of Pakistan in 2019 are PKR 17,500. This may vary in subsequent years and different regions of the country. Progressive employers may pay more than the mentioned amount.
17. Are there any alternative certificates which I can take up?	There are some short courses offered by some training institutes on this subject. Some institutes may still be offering conventional certificate courses in the field.

18. What is the teaching language of this course?	The leaching language of this course is Urdu and English.
19. Is it possible to switch to other certificate programs during the course?	There are some short courses offered by some training institutes on this subject. Some institutes may still be offering conventional certificate courses in the field.
20. What is the examination / assessment system in this program?	Competency based assessments are organized by training institutes during the course which serve the purpose of assessing the progress and preparedness of each student. Final / summative assessments are organized by the relevant qualification awarding bodies at the end of the certificate program. You shall be required to be declared “Competent” in the summative assessment to attain the certificate.
21. Does this certificate enable me to work as freelancer?	You can start your small business of stitching leather garments, gloves of other products. You may need additional skills on entrepreneurship to support your initiative.

Test Yourself (Multiple Choice Questions)

MODULE 1

Please mark the correct one from the given options.

QNO1: advance procedure of cleaning of mobile phone is ?

A. Comprass air flow
C. Wash through water
B. ultrasonic waves cleaning
D. Wash through chemicals

QNO2: No network is?

A. Hardware problem
C. Setting problem
B. Software problem
D. ALL (A,B,C)

QNO3: difference in LCD and LED is?

A. Source of lights
C. Source of voltage
B. Source of light
D. None of them

QNO4: normally the insertion cycles of SIM in SIM card slot of mobile phone are?

A. 5000 C. 3000

B. 2000 D. 1500

QNO5: PFO is stand for :

A. power factor observe C. Power frequency oscillator

C. Power factor oscillator D. Both A&C

QNO6: power amplifier is use for amplify the power of?

A. in coming signals C. Both A&B

B. outgoing signals D. None of them

QNO7: If there is Network after Manual Search but the Home Network could not be selected then there is problem in

A. PFO C. antenna

B. network switch D. PA

QNO8: the resistance if speaker is in range of?

A. 20ohms to 30 ohm B. 25ohms to 35ohms

C. 10ohms to 15ohms D. None of them

QNO9: NFC is work with in?

a. 10cm b. 4cm

c. 15cm d. None of them

QNO10: For which actions is the risk of accident the highest?

a. 12ohm to 30ohm b. 12ohm to 50ohm.

c. 20ohm to 30ohm d. 8ohm to 10ohm

QNO11:voltage rang for led or lcd display in mobile phone

A. 15 to 30V C. 10 to 15 volts

B. 5 to 10 volts D. none of them

QNO12:Voltage is boost in display light section by

A. Solenoid C. diode
B. resistor D. capacitor

QNO13: Ear piece is control by

A. power IC C. none of them
B. UEM IC D. both A&B

QNO14: UEM is stand for

A. All of them C. universal electronic machine
B. universal energy management D. universal energy module

QNO15: Retina scanner-can be used by

a) back camera
b) sensors
c) cpu
d) front camera

Answers Key

Number	Correct Answer
1	B
2	D
3	A
4	A
5	C
6	B
7	A
8	A
9	B
10	A
11	A
12	D

13	C
14	B
15	D

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