



Topic 6: _____

Diagnosing and Repairing Mobile Phone Faults

The correct diagnosis of mobile cell phone faults is the key to successful and cost effective repair of the phone. Let us start by looking at the skills that you need to have to be able to diagnose and repair a mobile phone.

Skills Needed to Diagnose and Repair a Mobile Phone

Before you can diagnose and repair a phone, there are some skills that you need to learn. These skills are:

- Soldering
- Desoldering
- Testing using a multimeter
- Jumper setting

Let us briefly discuss each skill in turn.

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.

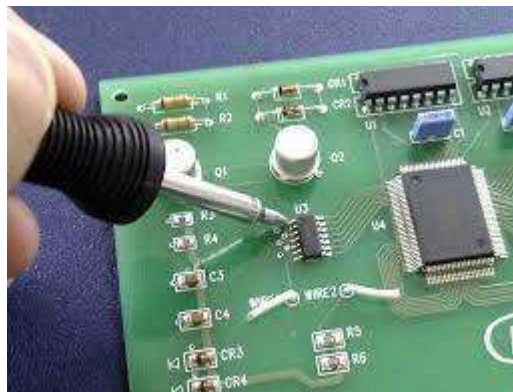


Figure 27: Picture showing A technician Soldering

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.

Desoldering

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

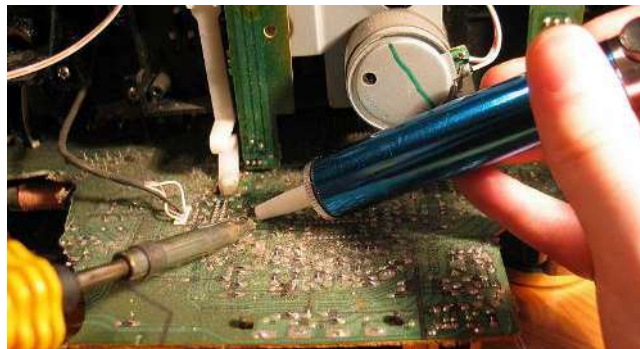


Figure 28: Desoldering

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.

Testing 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



Figure 29: Parts of a multimeter

We shall now discuss how to measure resistance, voltage and current using a multimeter.

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.
4. Check the resistor value on the display.



Figure 30: Using a Multimeter



Take Note: Always turn off the power supply to your circuit before measuring resistance.

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 $V\sim$ (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.

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 31 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.

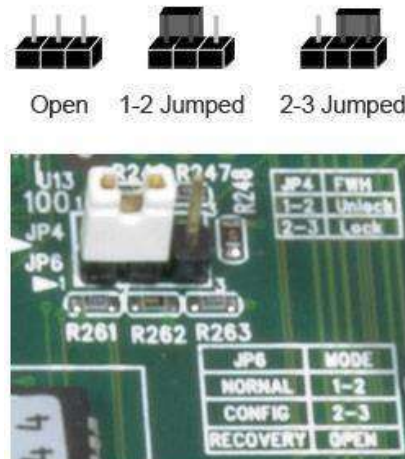


Figure 31: Jumper Setting

You now know the skills that you need in order to diagnose and repair a mobile phone. Let us now learn how to diagnose and repair mobile phones.

Mobile Phone Diagnosis

There are two methods that you can use to find out faulty or damaged components in a mobile phone. These are:

- The cold testing method
- The hot testing method

The Cold Testing Method:

Cold testing is when we use a multimeter to check the value of resistance at the time of repairing a fault in a mobile phone. During cold testing do not power the phone from any equipment. Use the diode range and beep sound from the multimeter to find fault in the mobile phone. During cold testing, you should connect the RED probe of the multimeter to the ground of the mobile phone PCB, and use the BLACK probe to touch the testing points of the mobile phone. During the fault-finding and repairing process of each part, component or section, you should receive the following correct values:

1. Ear Phone Connector Tip (+, -): .500 to .700
2. Loud Speaker / Ringer Connector Tip (+,-): .300 to .600
3. Battery Connector Tip (+): .400 to .500

4. Battery Connector Tip (Sense): above .800
5. Display Connector Supply Pins: .250 to .400
6. Display Connector Signal Pins: .500 to .800
7. Camera Connector Supply Pins: .250 to .400
8. Camera Connector Signal Pins: .600 to .900
9. Key Tip (Row and Column): .400 to .800
10. Charger Connector Tip: .600 to .700
11. Vibrator Motor Connector: .40 to .500
12. Power ON / OFF Switch Point (+): .600 to .900
13. MIC Connector Tip (Analog MIC) (+,-): .700 to .900
14. Battery Charging Out Point (+,-): .300 to .400
15. SIM Card Connector Pin 1 (VSim): .500 to .700
16. SIM Card Connector Pin 2,3,6: .400 to .800
17. SIM Card Connector Pin 4 (GND): .00 (Beep)
18. Micro SD Card Connector Pin 4: .500 to .600
19. Micro Card Connector Pin 6 (GND): .00 (Beep)
20. Micro Card Connector Pin 1,2,3,5,7,8: .600 to .800
21. RTC: .400 to .500
22. Data RX and TX Pins: .600 to .700

Hot Testing:

The hot testing method is adopted when the fault cannot be found or when the cell phone cannot be repaired using the cold testing method. In this method, the VOLTAGE of the damaged part or component is checked. The fault is found by powering the mobile phone with a battery which has a DC power supply. Once you power the phone, you should select the DCV (DC Volt) range of the Multimeter. Then you should connect the BLACK probe of the Multimeter to the ground of the phone's PCB and ensure the RED Probe touches the Testing Points. During hot testing, the voltage of different part or sections should be as follows (all values in Volt):

1. Ear Phone Connector Tip (+, -) when working: .0 to 2.5
 2. Loud Speaker / Ringer Connector Tip (+,-) when working: .0 to 2.5
 3. Battery Connector Tip (+): 3.7
 4. Display Connector Supply Pins: 1.8 to 2.9
 5. Display Connector Signal Pins when working: .0 to 1.8
 6. Camera Connector Supply Pins: 1.8 to 2.9
 7. Camera Connector Signal Pins when working: .0 to 1.8
 8. Key Tip (Row and Column) One Side: 1.8 to 2.8
 9. Charger Connector Tip: 5 to 6
 10. Vibrator Motor Connector Tip when Working: 1.9 to 3.6
 11. Power ON / OFF Switch Point (+): 3 to 3.6
 12. MIC Connector Tip (Analog MIC) (+,-): 1.8 to 3.0
-

13. Battery Charging Out Point (+,-): 3.7 to 4.2
14. SIM Card Connector Pin 1 (VSim) when SIM Connected: 1.8 to 3.0
15. SIM Card Connector Pin 2,3,6 when working: 0 to 2.8
16. Micro SD Card Connector Pin: 2.8
17. Micro Card Connector Pin 1,2,3,5,7,8: 0 to 2.8
18. Data RX and TX Pins: 1.8 to 2.8



Activity 6:

Mobile phone diagnosis (8 minutes).

The following statements describe either the cold testing or hot testing methods used for diagnosing mobile phone problems. Write the correct diagnosis method against the statement that best describes it.

Description of diagnosis method	Name of Diagnosis method
1. Checks the value of resistance using a multimeter to diagnose a problem	
2. Checks the voltage of damaged part by giving power to the mobile phone using a batter of DC power.	
3. The phone is not powered during testing	
4. Fault is found by powering the mobile phone with a battery	

Compare your answer with what you read in the following section.

You now know how to diagnose a fault in a mobile phone using the hot and cold testing method. In the next section we shall learn about the common mobile phone faults.