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FREE EBOOK

HARDWARE, NETWORKING AND REPAIR

Mobile Phone Repair: Tools and Fault Finding

The tools, safety habits and step-by-step checks of a mobile technician

INSIDE THIS BOOK

- Setting up a safe workbench
- Hand tools
- Power and test tools
- Opening a phone safely
- ...and 7 more chapters, practice questions and a glossary

Beginner

Mobile repairing students

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Mobile Phone Repair: Tools and Fault Finding

Set up a safe, static-free workbench and learn what every tool on it does, from screwdrivers and opening picks to the hot air station, DC power supply, multimeter and microscope. Then open a phone safely, handle batteries with care, find common faults step by step, deal with software problems, protect customer data, fill in a job card and understand why an IMEI must never be changed.

WHO IT IS FOR	Mobile repairing students
LEVEL	Beginner
SUBJECT AREA	Hardware, networking and repair
WHAT IS INSIDE	11 chapters, practice questions with answers, and a glossary

HOW TO USE IT

Read one chapter at a time and try the examples as you go: on a computer, at your workbench or in your notebook. The boxes give tips, safety points and short activities. When you finish, test yourself with the practice questions and check your answers at the end. Words you may not know are explained in the glossary.



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Setting up a safe workbench

A mobile technician works with tiny screws, thin cables, hot tools and batteries full of energy. A well-planned bench keeps you, the customer's phone and your tools safe. It also makes you faster, because everything has its place.

What a good bench needs

- **A firm table** at a height where you can sit straight, with your elbows resting comfortably.
- **Bright, white light** from above and a movable lamp, so you can see small parts without shadows.
- **An antistatic mat** covering the work area (explained below).
- **A screw tray or magnetic mat** with sections, so screws from each step stay together.
- **A fan or fume extractor** to carry soldering smoke away from your face.
- **A clear space** for hot tools, with heat-proof stands, away from paper, plastic and chemicals.
- **No food or drink** on the bench. A spilt cup of chai can finish a phone.

Static electricity and ESD

When you walk on a floor or take off a sweater, your body can collect a charge of **static electricity**. When you touch metal, it jumps across as a spark. A sudden flow of static like this is called **ESD** (electrostatic discharge). A spark far too small for you to feel can still damage the tiny parts inside a phone's chips. The damage may not show at once; the phone may fail weeks later.

To stop ESD:

1. Work on an **antistatic mat**. It is made of a special material that lets charge drain away slowly and safely. Its cord is joined to a proper earth point, which the shop's electrician sets up.

2. Wear an **antistatic wrist strap**, clipped to the mat. Its cord has a built-in resistor (usually 1 megaohm) so that charge drains slowly and you are protected.
3. Use **ESD-safe tweezers and tools**, and keep plastic bags, foam and sweaters off the bench.
4. Keep loose boards and spare parts in **antistatic bags** (the silvery or pink ones).

SAFETY

Never connect a wrist strap or a mat to a socket yourself, and never work on the shop's mains wiring. Leave earthing to a qualified electrician.

REMEMBER

Static is invisible. Wear your wrist strap every time, even for "just a quick check".

Fire safety and first aid

Know where the fire extinguisher and the first-aid box are kept. Keep a metal tin with sand on the bench for a battery that starts smoking (see the battery chapter). Learn the emergency number 112 and the fire service number 101.

EXAMPLE

Imran set up his bench at home in Lucknow. He fixed a lamp on the left, put his soldering station on the right with its stand, laid the antistatic mat in the middle, and kept a sand tin under the table. His trainer checked it and suggested moving the chemical bottles off the shelf above the hot tools.

CHAPTER 2

Hand tools

Screwdrivers

Phones use very small screws with different heads. A good precision set has interchangeable bits and a handle that turns smoothly.

Bit	Head shape	Where you meet it
Phillips (cross), sizes 000 and 00	a plus sign	most Android phones, inside and out
Pentalobe P2	a five-pointed star	the two bottom screws of many iPhones
Tri-point Y000	a "Y"	inside many recent iPhones
Torx, small sizes	a six-pointed star	inside some phones and laptops
Flat	a straight line	prying gently on plastic only

Always choose the bit that fits snugly. A wrong or worn bit **strips** the screw head (wears away its shape), and a stripped screw can turn a ten-minute job into an hour of trouble.

Opening tools

- **Suction cup:** sticks to the glass and lifts a small gap at the edge.
- **Opening picks:** thin plastic triangles that slide into the gap and cut through adhesive.
- **Spudger:** a plastic or nylon stick with a flat end, used to prise up connectors and parts. It does not conduct electricity, so it will not short anything.
- **Opening pliers:** two suction cups on a pliers handle, for screens that are stuck hard.
- **Metal prying tools:** very thin and strong, but only for experienced hands, and never near the battery.

Tweezers, brushes and cleaning

- **ESD-safe tweezers:** straight ones for picking up screws, curved ones for reaching under parts.
- **Soft anti-static brushes:** to sweep away dust and dry dirt.
- **Isopropyl alcohol (IPA)** of high purity, such as 99%: dissolves grime and flux and dries quickly without leaving water behind. It is flammable, so keep it away from hot tools and flames.
- **Lint-free cloths** and **cotton buds** for screens and contacts.

TIP

Lay out a piece of paper and draw the phone's outline. Put each screw on the drawing exactly where it came from. This is called a **screw map**, and it saves you from putting a long screw into a short hole.

DID YOU KNOW

A long screw driven into a short screw hole can punch through the main board beneath it and destroy the phone. Technicians call this "long screw damage", and a screw map prevents it.

CHAPTER 3

Power and test tools

The soldering station

A **soldering station** heats a pointed metal tip to melt **solder**, a soft metal alloy used to join parts electrically. A station lets you set the tip temperature. Many technicians work at about 300 to 350 °C with ordinary leaded solder; lead-free solder melts at a higher temperature and needs a hotter tip. **Flux** helps solder flow and stick.

SAFETY

The tip is hot enough to burn skin instantly. Always return it to its stand. Keep the smoke away from your face with a fan or extractor, and wash your hands after handling solder, especially leaded solder. Younger students solder only with an adult supervising.

The hot air station

A **hot air station** blows heated air through a nozzle. You set both the temperature and the airflow. It is used to remove and refit small chips and connectors, and to soften glue. Too much heat or too strong a flow can blow away tiny parts nearby or melt plastic connectors, so technicians protect nearby parts with heat-resistant tape or small metal shields. Never point hot air at a battery; remove the battery first.

Many stations keep the fan running after you switch off, until the nozzle has cooled. Let it finish before unplugging it.

The DC power supply

A **DC power supply** (bench supply) gives a voltage you set, and shows how much current the phone is drawing. Technicians connect it to the phone's battery connector with a special cable, in place of the battery, to test a phone that will not switch on.

1. Set the voltage close to the battery's **nominal voltage**, printed on its label (often between 3.7 V and 3.9 V).
2. Set the **current limit** low at first. If something is shorted, the supply will hold the current down instead of burning the board.
3. Check the polarity (red is +, black is -) before connecting. Reversed polarity can destroy a board in a moment.
4. Press the power button and watch the current reading.

What the meter shows	What it suggests
No current at all, even when the power button is pressed	an open circuit: a power button, connector or power-section fault
A large current at once, before pressing anything	a short circuit on a power line
A current that rises, flickers up and down, and settles	the phone is trying to start normally

The multimeter

A **multimeter** measures voltage, resistance and continuity. Its main uses on the bench:

- **DC voltage:** is the battery charged? Is the charger giving about 5 V?
- **Continuity** (it beeps): is a flex cable or track broken?
- **Diode mode:** technicians compare readings on connector pins with the same pins on a known-good board. A very different reading points to a fault.

The microscope

A **stereo microscope** shows a magnified, three-dimensional view, often with a zoom of roughly 7 to 45 times. It is the best way to see corrosion, broken connector pins and cracked solder joints. A ring light around the lens lights the board evenly.

The ultrasonic cleaner

An **ultrasonic cleaner** is a small tank of cleaning liquid that vibrates far faster than you can hear. Millions of tiny bubbles form and collapse against the board, scrubbing away corrosion from under chips. It is used mainly for water-damaged boards.

Before cleaning, remove the battery, the screen, cameras, speakers and every part that can be unplugged. Some parts soldered on the board, such as tiny microphones, can also be harmed, so learn from your trainer which boards are safe to clean. Use only the liquid the cleaner's manual allows: many cleaners must never be filled with a flammable liquid such as alcohol. Dry the board fully afterwards.

REMEMBER

A **USB tester** is a small, cheap meter that fits between a charger and a cable. It shows the volts and amps actually flowing, which makes it the quickest check for charging problems.

CHAPTER 4

Opening a phone safely

Every phone model opens differently. Before opening an unfamiliar model, study a trusted repair guide or ask your trainer. These steps apply to most phones.

Before you open

1. Fill in the job card and note every scratch, crack and dent with the customer (see the last chapter).
2. Switch the phone off.
3. Remove the SIM tray and memory card, and hand them back to the customer.

4. Find out how this model opens. Many Android phones have a glued glass back. Many iPhones open from the screen side, after removing two screws at the bottom edge. Some budget phones have a plastic back held by clips.

Lifting a glued back or screen

1. **Warm the edge** with a heat pad or a hot air station on a low setting, moving it all the time. The edge should become quite warm, never too hot to touch. Warmth softens the adhesive.
2. **Lift a gap** with a suction cup near one edge, pulling gently and steadily.
3. **Slide in a pick** a few millimetres and run it along the edge to cut the adhesive. Leave a pick in each cut side so the glue does not stick again.
4. **Go slowly near cables.** Fingerprint sensors, charging coils or the display may be joined to the body by a thin **flex cable**. Push the pick in only a little near them.
5. **Open like a book**, not all the way. Look for any cable still joining the two halves before you separate them.

Inside the phone

1. Remove the screws holding the metal shield over the battery connector, placing them on your screw map.
2. **Disconnect the battery first**, before touching anything else, using a plastic spudger. Lift the connector straight up.
3. Take a photo at every step. It is your guide for putting everything back.
4. Unplug connectors by lifting them straight up; never pull on the cable itself.

Closing up

1. Reconnect every connector except the battery, then reconnect the battery last.
2. **Test before sealing:** power on and check the screen, touch, cameras, speakers, charging and signal.
3. Clean off old adhesive and fit fresh adhesive of the right type, then press the back or screen firmly and evenly.

EXAMPLE

Kavita in Indore cracked a customer's display cable because she opened the screen like a box lid instead of like a book. Now she always looks for the cable before lifting, and leaves the screen leaning against a support while she works.

SAFETY

Glass from a cracked screen or back is sharp. Cover cracked glass with clear packing tape before you start, and wear safety glasses while prising.

CHAPTER 5

Battery safety

Almost every phone runs on a **lithium-ion** battery, usually a flat pouch type called lithium-polymer. It stores a lot of energy in a small space. Treated well, it is safe. Damaged, punctured, short-circuited or overheated, it can catch fire very quickly and burn fiercely.

Know your battery

The label shows the **nominal voltage** (often 3.7 V to 3.9 V), the **capacity** in mAh (milliampere-hours: how much charge it holds) and sometimes the highest charging voltage. Always fit a replacement made for the exact model, from a trusted supplier.

The swollen battery

As a battery ages or is damaged, gas can build up inside the pouch and make it **swell** (puff up). Signs to look for:

- The screen or back cover is lifting at an edge.
- The phone rocks when laid flat on a table.
- The body has a new bulge, or a gap has opened along the frame.

What to do with a swollen battery:

1. Stop charging it, and switch the phone off.
2. Do **not** press, squeeze, bend or puncture it, and never heat it with hot air.

3. Tell the customer, and record it on the job card.
4. Remove it slowly, with plastic tools only, and only with your trainer beside you. Use the battery's pull tabs if it has them, or the adhesive remover your trainer approves, so the battery is never bent.
5. Place it in a metal tin with sand, away from anything that burns, until it goes to an e-waste collector.

SAFETY

If a battery hisses, smokes or gives off a strange chemical smell, step back and warn everyone. Do not breathe the smoke. If it is safe, drop it with long tongs into the sand tin and move the tin outdoors. Follow the shop's fire plan, and call 101 if a fire starts. Never throw a battery in a household dustbin.

Everyday battery habits

- Never short a battery's terminals with tweezers or a screwdriver.
- Never puncture or bend a battery while removing it. A puncture can start a fire within seconds.
- Store spare batteries in a cool, dry box, partly charged, with terminals covered by tape.
- Give old and damaged batteries to an authorised e-waste collector.

DID YOU KNOW

Lithium-ion batteries wear out slowly with every charge cycle. A phone that once lasted all day may last only a few hours after some years. Many phones show the battery's health in their settings.

REMEMBER

A swollen battery is a danger, not a repair job. Remove it carefully and store it safely.

A method for fault finding

Good technicians do not guess. They follow a method, and the method finds most faults quickly.

The six steps

1. **Listen.** Ask the customer: what happens? Since when? Was the phone dropped, wet, updated or repaired before?
2. **Check the simple things.** Charger, cable, SIM card, settings, case or screen protector.
3. **Look.** Inspect the outside, then the inside, for cracks, bends, corrosion and missing screws.
4. **Reproduce.** See the fault happen yourself before you change anything.
5. **Test with a known-good part.** Connect a working display or battery without fitting it. If the fault goes away, you have found the faulty part.
6. **Write it down.** Note each finding on the job card.

TIP

Change one thing at a time. If you change three parts at once and the phone works, you will never know which part was faulty, and the customer pays for three.

No power

1. Charge the phone with a known-good charger and cable for at least half an hour. A deeply drained battery may show nothing at first.
2. Try a **forced restart**: on most phones you hold a button combination for several seconds. The combination differs by maker, so check the maker's help page.
3. Open the phone, disconnect the battery and measure its voltage with a multimeter. A reading far below the nominal voltage suggests a dead or deeply drained battery.
4. Test with a known-good battery, or with the DC power supply, and read the current pattern.
5. Check the power button flex for continuity.

If the supply shows a short circuit, the fault is on the board. Finding the shorted part is a skilled job; learn it under your trainer.

Charging problems

1. Try a known-good charger and cable. Many "charging faults" are a worn-out cable.
2. Use a USB tester to see whether current is flowing.
3. Look into the charging port with a light. Pocket lint packs into ports. Switch the phone off and clean the port gently with a wooden or plastic toothpick and a soft brush. Never use a pin or a needle; metal scratches and can short the contacts.
4. If the port is loose or damaged, replace it. On many phones it sits on a small separate board; on others it is soldered to the main board.
5. A phone that charges very slowly may simply have an old, worn battery.

EXAMPLE

Mr Sharma from Meerut brought a phone that "does not charge". Ravi shone a torch into the port, found it packed with lint, and cleaned it with a wooden toothpick in two minutes. He charged nothing for the repair but wrote it on the job card, and Mr Sharma has sent three customers since.

CHAPTER 7

Display, touch, speaker and microphone faults

Display faults

Phones use two main kinds of display. An **LCD** needs a **backlight** behind it. An **OLED** (or AMOLED) has pixels that make their own light, so it has no backlight.

What you see	Likely cause	Check
Black screen, but the phone rings or vibrates	display, its connector or the backlight	reseat the connector; test a known-good display
Faint picture visible only with a torch at an angle (LCD)	backlight fault	test a known-good display before repairing the board

What you see	Likely cause	Check
Lines, colour patches or black ink-blot spots	damaged display panel	replace the display
Cracked glass, picture fine	broken top glass	usually replace the full display assembly

Touch faults

Ghost touch means the phone acts as if someone is touching it. **Dead zones** are areas that do not respond.

1. Remove the screen protector and clean the screen. Dirt, water or a badly fitted protector cause many touch faults.
2. Unplug the charger and test again. A poor-quality charger can make touch behave strangely.
3. Restart the phone, then test in safe mode (see the software chapter) to rule out an app.
4. Draw slow lines across the whole screen in a drawing app, to find dead zones.
5. On most modern phones, touch is built into the display assembly, so a hardware touch fault usually means a new display.

Speaker and microphone faults

A phone has a **loudspeaker** (usually at the bottom), an **earpiece** (at the top, for calls) and one or more **microphones**.

1. Check that the phone is not connected to Bluetooth earphones, which take over the sound.
2. Play music to test the loudspeaker; make a call to test the earpiece.
3. Record a voice note and play it back to test the main microphone.
4. Clean speaker and microphone holes gently with a soft brush. Never push a pin into them; it can pierce the parts inside.
5. If cleaning does not help, check the part's connector or spring contacts, then test with a known-good speaker.

DID YOU KNOW

Many phones have a second microphone near the top. It hears background noise so the phone can remove it from your voice during calls.

CHAPTER 8

Network, camera and water damage

Network faults

1. Test the SIM card in another phone, and another SIM in this phone. This tells you at once whether the SIM or the phone is at fault.
2. Turn airplane mode on and off. Check that mobile data and the preferred network type are set correctly.
3. Reset the network settings. Warn the customer first: this removes saved Wi-Fi passwords and paired Bluetooth devices.
4. Dial `*#06#` to show the IMEI. If it shows nothing or an invalid number, the fault is serious and needs a qualified board-level technician, and the IMEI must never be changed (see the last chapter).
5. After a drop or an earlier repair, check that the small antenna cables and contacts are connected.

Camera faults

1. Open the camera app and switch between the front and back cameras. If one works, the app and software are probably fine.
2. Restart the phone, and clear the camera app's cache.
3. Clean the camera glass. A blurry picture is often just a fingerprint or a scratched cover glass.
4. If the picture is black, check the camera's connector, then test with a known-good camera module.

Water damage

Water can short-circuit a phone that is switched on, but the slower enemy is **corrosion**: the minerals and salts left behind attack the metal and create new short circuits, even days after the phone has dried.

What the customer should do at once:

- Switch the phone off and do not charge it.
- Do not keep pressing its buttons, blow hot air on it or put it in rice. Rice does not dry the inside properly or stop corrosion; it only wastes time.
- Bring it to the shop quickly.

What the technician does:

1. Note on the job card that the phone is water-damaged and may not survive the repair.
2. Open the phone and **disconnect the battery first**.
3. Check the **liquid contact indicators**: small stickers inside many phones that turn red or pink when wet.
4. Remove shields where possible and inspect the board under the microscope for white or green deposits.
5. Clean with isopropyl alcohol and a soft brush, or in the ultrasonic cleaner, following its rules.
6. Dry the board fully, then reassemble and test every function.

EXAMPLE

Neha's phone in Guwahati fell into a bucket during the monsoon. Her technician, Deepak, opened it within the hour, disconnected the battery, cleaned the corrosion that had already begun near the charging port, and dried the board. It worked, but he advised her to back up her photos at once, because water damage can cause faults later.

REMEMBER

Sea water and sugary drinks such as tea and cold drinks cause far worse corrosion than clean tap water. Ask the customer what the liquid was.

Software problems and safe flashing basics

Many faults are not in the hardware at all. Software problems include a phone that hangs, runs slowly, crashes apps, restarts again and again (a **boot loop**) or stays stuck on the logo.

Try the simple steps first

1. **Restart** the phone.
2. **Free storage space.** A phone with full storage runs slowly and apps crash.
3. **Update** the system and the apps from the phone's settings and app store.
4. **Safe mode** starts the phone with only its built-in apps. If the fault disappears, a downloaded app is the cause. How to enter safe mode differs by maker.
5. **Clear an app's cache** if one app keeps crashing.
6. **Factory reset** returns the phone to how it left the factory and **erases everything**. Do it only with the customer's written permission and after they have backed up their data.

Recovery mode

Recovery mode is a special start-up menu, reached by holding a button combination while the phone starts. It offers choices such as wiping data or installing an official update. The combination differs by maker.

Locks that protect the owner

After a factory reset, many Android phones ask for the Google account that was on the phone before. This is **Factory Reset Protection** (FRP). iPhones have a similar **Activation Lock**. These locks exist so that a stolen phone is useless to a thief. The owner simply signs in. A technician must never try to bypass them. If a customer cannot sign in and cannot show the purchase bill, politely refuse the job.

Safe flashing basics

Flashing means installing the phone's **firmware** (its operating system and built-in software) afresh. It can cure a boot loop or a badly failed update. Done wrongly, it can leave the phone completely dead, which technicians call **bricked**.

1. Find the **exact model number** in the phone's settings or on its label. Phones with the same name can have different models.
2. Use only **official firmware** made for that exact model, through the maker's official tool or service.
3. Explain to the customer that flashing usually **erases all data**, and get written permission.
4. Charge the battery to more than half.
5. Use a good cable and a laptop that will not switch off midway, connected to a reliable power supply.
6. **Never interrupt** flashing once it has started.
7. Record what you did on the job card.

SAFETY

Never download firmware or "unlocking" tools from unknown websites. They may contain malware that steals customers' data, and some tools are made for illegal work such as changing IMEI numbers.

TIP

Before any software repair, ask whether the customer has a backup of their photos and contacts. A two-minute question can save years of memories.

CHAPTER 10

Customer data privacy

A phone holds a person's whole life: photos, chats, contacts, banking apps, payment apps and the OTP messages that protect their money. A customer who hands you their phone is trusting you with all of it. Keeping that trust is part of being a professional.

Rules every technician follows

1. **Ask for the screen lock only when a test really needs it.** If possible, let the customer unlock the phone and watch while you test, and note it on the job card.
2. **Never open** photos, chats, emails, social media, or banking and payment apps.
3. **Never copy, forward or photograph** anything from a customer's phone.
4. **Never ask for an OTP, a UPI PIN or a banking password.** No repair ever needs them.
5. **Return the SIM card and memory card** before the repair, and write it on the job card.
6. **Clean up after testing:** delete any test photo, recording or call log entry you made, and sign out of any account you added.
7. **Lock phones away** at the end of the day, and keep job cards where only staff can see them.
8. **Never share** a customer's number, address or details with anyone.

Looking through or misusing someone's personal data without permission is a serious breach of trust, and it can be a crime under Indian law.

EXAMPLE

A customer in Jalandhar, Mrs Kaur, asked Aman why he wanted her phone unlocked. He explained that he needed to test the earpiece with a call, then asked her to unlock it and make the call herself while he listened. She left the shop trusting him completely.

REMEMBER

Treat every customer's phone as you would want your own phone, or your mother's, to be treated.

Job cards, estimates and the IMEI law

The job card

A **job card** is the written record of each repair. It protects the customer and the shop, and it reminds you of every detail.

Field	What to write
Job number and date	a unique number, and the date and time received
Customer	name and mobile number
Phone	brand, model, colour
IMEI	from *#06# , or from the box or bill if the phone is dead
Condition	every scratch, crack, dent and missing screw, noted with the customer
Items received	phone only? case? SIM and memory card returned?
Fault reported	in the customer's own words
Findings	what you found after checking
Estimate	parts and labour, with total, advance and balance
Approval	customer's signature before work starts
Delivery	"to be confirmed after checking", then the actual date
Terms	data may be lost; water-damaged phones may not survive repair

Making an estimate

Check the phone first, then give a clear estimate. Explain the choices, such as an original part or a cheaper compatible one, and how they differ in quality.

EXAMPLE

Sunita Verma brings a phone with a cracked display and a battery that lasts only two hours. The shop's example prices are: display assembly ! 2,400, battery ! 900, labour ! 400. Total = 2,400 + 900 + 400 = ! 3,700. She pays an advance of ! 1,000, so the balance on delivery is 3,700 - 1,000 = ! 2,700. (Real prices vary by model, part quality and shop.)

If you find another fault during the repair, stop and call the customer. Explain it and get approval before doing extra work. Never add charges the customer did not agree to.

The IMEI and the law

The **IMEI** (International Mobile Equipment Identity) is a 15-digit number that identifies one particular phone. A dual-SIM phone usually has two. Mobile networks use it to recognise the handset, and police use it to trace stolen phones. Dial *#06# to see it.

- **Changing, altering or tampering with an IMEI is a crime in India**, and it can lead to prison and a heavy fine. Never do it, never use a tool made for it, and never accept a job that asks for it, whatever the customer offers.
- An owner whose phone is lost or stolen can have it blocked by its IMEI through the government's Sanchar Saathi portal. Never try to "unblock" such a phone.
- When a phone comes with its box or bill, check that the IMEI on the phone matches it. If something does not match, or the customer cannot explain whose phone it is, politely refuse the job and tell the shop owner.

SAFETY

Your honesty is your most valuable tool. A technician known for refusing illegal work earns the trust of customers, shop owners and the police.

TIP

Write the IMEI on every job card. If a phone is ever lost, mixed up or questioned, the IMEI proves exactly which phone you received and returned.

Practice questions

1. Name five things a good repair bench needs.
2. What is ESD, and why is it dangerous for phones?
3. Why does an antistatic wrist strap's cord contain a resistor?
4. Which screwdriver bit fits the two bottom screws of many iPhones?
5. What happens when you use a wrong or worn screwdriver bit?
6. Why is a spudger made of plastic or nylon?
7. What is a screw map, and what damage does it prevent?
8. Why should hot air never be pointed at a battery?
9. When testing a phone with a DC power supply, what does a large current before pressing any button suggest?
10. Why should the current limit of a DC supply be set low at first?
11. Which parts must be removed before a board goes into an ultrasonic cleaner?
12. Why should you open a phone like a book, not lift it straight off?
13. What is the first thing to disconnect after opening a phone, and why?
14. Give three signs of a swollen battery.
15. List four things you must not do to a swollen battery.
16. What are the six steps of the fault-finding method?
17. A phone shows a faint picture only when you shine a torch on it at an angle. What is the likely fault?
18. Give three checks for a touch screen that behaves strangely.
19. What does resetting network settings remove?
20. Why is putting a wet phone in rice a bad idea?
21. What is Factory Reset Protection, and why must a technician never bypass it?

22. List four rules for safe flashing.
23. Why must a technician never ask a customer for an OTP or UPI PIN?
24. A customer pays ₹ 1,500 advance on a ₹ 4,200 repair. What is the balance?
25. What is an IMEI, and what does the law say about changing it?

ANSWER KEY

Answers

1. Any five of: a firm table, bright light, an antistatic mat, a screw tray or magnetic mat, a fan or fume extractor, heat-proof stands, and no food or drink.
2. Electrostatic discharge: a sudden flow of static electricity. Even a spark too small to feel can damage a phone's chips, sometimes so that they fail later.
3. So that charge drains away slowly and the wearer is protected.
4. Pentalobe P2.
5. It strips the screw head, making the screw very hard to remove.
6. It does not conduct electricity, so it cannot short anything on the board.
7. A paper drawing of the phone on which each screw is placed where it came from. It prevents putting a long screw in a short hole, which can punch through the board.
8. Heat can make a lithium-ion battery swell, leak or catch fire.
9. A short circuit on a power line.
10. So that if something is shorted, the supply holds the current down instead of burning the board.
11. The battery, the screen, cameras, speakers and every part that can be unplugged; and some boards with sensitive parts such as tiny microphones should not be cleaned this way at all.
12. A flex cable may still join the two halves; opening like a book lets you see it before it tears.
13. The battery, so that no part is powered while you work and nothing can be shorted by accident.
14. Any three of: the screen or back lifting at an edge, the phone rocking on a flat table, a new bulge, or a gap opening along the frame.
15. Do not charge it, press it, bend it, puncture it, or heat it with hot air.
16. Listen, check the simple things, look, reproduce the fault, test with a known-good part, and write it down.
17. A backlight fault in an LCD display.

18. Any three of: remove the protector and clean the screen, unplug the charger, restart and test in safe mode, draw lines to find dead zones, try a known-good display.
19. Saved Wi-Fi passwords and paired Bluetooth devices, along with other network settings.
20. Rice does not dry the inside properly or stop corrosion; it only wastes time while corrosion spreads.
21. A lock that asks for the previous Google account after a factory reset. It makes stolen phones useless to thieves, so bypassing it could help a thief.
22. Any four of: use the exact model number, use only official firmware, get written permission because data is erased, charge the battery above half, use a good cable and a reliable power supply, and never interrupt flashing.
23. No repair needs them, and anyone who has them can take the customer's money.
24. 4,200 - 1,500 = ! 2,700.
25. A 15-digit number that identifies one particular phone. Changing or tampering with it is a crime in India that can lead to prison and a heavy fine.

WORD LIST

Glossary

Activation Lock

an iPhone lock that asks for the owner's account after a reset.

Antistatic mat

a bench mat that drains static charge away slowly and safely.

Backlight

the light behind an LCD screen that makes the picture visible.

Boot loop

a fault in which a phone keeps restarting without finishing start-up.

Bricked

so badly damaged by a failed software change that the phone will not start at all.

Corrosion

a slow chemical attack that eats metal, often after water damage.

DC power supply

a bench unit that gives a set voltage and shows the current drawn.

ESD

electrostatic discharge, a sudden flow of static electricity that can damage chips.

Factory Reset Protection

an Android lock that asks for the previous Google account after a reset.

Firmware

the operating system and built-in software stored in a phone.

Flashing

installing a phone's firmware afresh.

Flex cable

a thin, flat, bendable cable joining parts inside a phone.

Flux

a paste or liquid that helps solder flow and stick.

IMEI

a 15-digit number that identifies one particular phone; it must never be changed.

Isopropyl alcohol

a fast-drying alcohol used to clean boards and contacts.

Job card

the written record of a repair, from receiving the phone to delivery.

Liquid contact indicator

a small sticker inside a phone that changes colour when wet.

Lithium-ion battery

the rechargeable battery type used in phones.

Nominal voltage

the typical working voltage printed on a battery's label.

OLED

a display whose pixels make their own light, with no backlight.

Safe mode

a way of starting a phone with only its built-in apps.

Screw map

a drawing on which screws are placed where they came from.

Spudger

a plastic or nylon tool for prising connectors and parts.

Swollen battery

a battery puffed up by gas inside; it is dangerous.



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