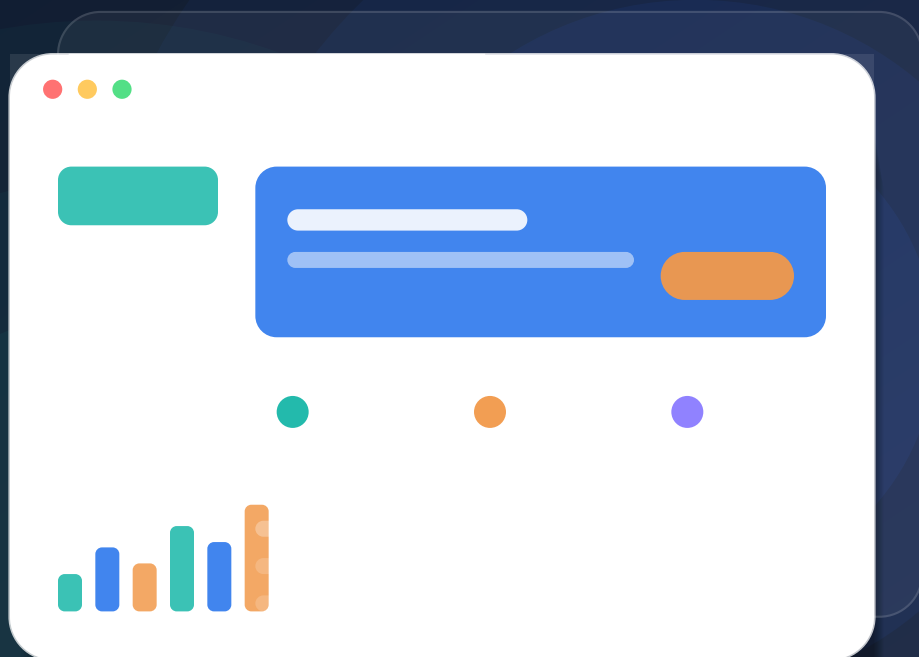


FIX YOUR PHONE

A PRACTICAL REPAIR MANUAL



**A Practical Guide to
Phone Hardware Repair**

DIAGNOSE • DISASSEMBLE • REPAIR • TEST

Fix Your Phone

A Practical Guide to Phone Hardware Repair

This guide is provided for general information. Phone designs differ widely, so always follow a model-specific repair guide. Repairs can void warranties, damage devices and cause injury, particularly where lithium-ion batteries are involved. Work carefully and use a professional if you are unsure.

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Introduction

A cracked screen, a battery that dies by lunchtime, a charging port that only works at a certain angle: phone hardware problems are among the most common and most frustrating technology troubles. The good news is that many of them are repairable at home, for a fraction of the price of a new phone.

This book shows you how to work out what is wrong, decide whether to fix it yourself, and carry out the most common repairs safely. It also tells you plainly when a repair is beyond what a careful beginner should attempt, because a good repairer knows where to stop.

Phones differ widely between makers and models, so this book teaches the **general method and principles** that apply to nearly all of them. For step-by-step instructions on your exact model, pair it with a model-specific guide, such as the manufacturer's official repair manual or a reputable community repair guide.

How to use this book

- **Not sure what is wrong?** Start with Chapter 4, which matches symptoms to likely causes.
- **Ready to open a phone?** Read Chapters 1 to 3 first. They cover the decision to repair, the tools, and safety.
- **Have a specific fault?** Go to Chapters 5 to 9: screens, batteries, charging, water damage, and audio, cameras and buttons.
- **Finished a repair?** Chapter 10 and Appendix A cover testing and reassembly.

WARNING

Opening a phone carries real risks: cutting yourself on glass, damaging the device, losing its water resistance, voiding a warranty, and, most seriously, damaging the lithium-ion battery, which can overheat or catch fire. Read Chapter 3 before you start, work carefully, and stop if you are unsure.

Should You Fix It Yourself?

Not every phone problem is worth fixing, and not every fix is right for a beginner. A few honest questions at the start can save money, time and heartbreak.

Step 1: Rule out software

Many apparent hardware faults are really software problems: a frozen screen, rapid battery drain, a phone that will not charge, or poor reception. Chapter 4 covers how to check. Always do this before spending money on parts.

Step 2: Check your warranty and options

- **Manufacturer warranty.** Opening the phone yourself may void it. If the phone is under warranty, use it.
- **Insurance or protection plans.** Many cover screens and water damage. Check before you pay for parts.
- **Official self-repair programmes.** Several manufacturers now sell genuine parts, tools and guides to the public. This is the safest route for a first repair, so check whether yours does.
- **Mail-in and in-store repair.** Often quick and fairly priced for common faults.
- **Independent repair shops.** Frequently cheaper and faster than the manufacturer, but quality varies, so check reviews and ask about their warranty on parts and labour.

Step 3: Weigh repair against replacement

As a rough guide, a repair is worth it if it costs less than about half the price of a comparable replacement and the phone is otherwise in good condition and still receiving software updates. An old phone with no more updates, a failing motherboard and a cracked screen is usually better recycled or traded in.

Step 4: Gauge the difficulty honestly

Repair	Typical difficulty	Main risk
Screen protector or case	Very easy	Bubbles, poor fit
SIM tray, cleaning ports	Easy	Scratching or pushing dirt in
Battery replacement	Moderate	Battery damage, adhesive
Screen replacement	Moderate to hard	Cracked new screen, torn cables
Charging port or speaker	Moderate	Small parts, ribbon cables
Camera module, buttons	Moderate	Dust, alignment
Water damage cleaning	Hard	Corrosion may keep spreading
Motherboard or chip repair	Expert only	Needs micro-soldering

Step 5: Protect your data and accounts

Before anything else, back up the phone if it still works, and make sure you know your account passwords. A repair can fail or wipe a phone, and a replacement part can trigger security checks.

1. **Back up** photos, messages and files to cloud storage or a computer.

2. **Note your passwords** and any two-factor codes for your main accounts.
3. **Understand locks.** Anti-theft features such as Find My (Apple) and Factory Reset Protection (Android) can lock a phone after a reset. Keep your account details to hand.
4. **Remove the SIM and memory card** before opening the phone.

TIP

Make your first repair a cheap, low-risk one on an old spare phone. You will learn the feel of adhesive, screws and ribbon cables without risking your daily phone.

Tools and Workspace

The right tools make phone repair safe and almost pleasant. The wrong ones, such as kitchen knives and metal screwdrivers, scratch components, tear cables and cause injuries. A basic kit is inexpensive, and most are sold together in repair kits.

The basic toolkit

Tool	What it is for
Precision screwdriver set	Tiny screws. Common heads: Phillips (PH000), Torx, pentalobe and tri-point, depending on the model
Plastic spudgers and opening picks	Prying parts apart and lifting connectors without scratching or shorting anything
Suction handle	Lifting a glued screen or back panel slightly so a pick can slide in
Heat source	A heating pad, adjustable heat gun or hair dryer on low to soften adhesive. Gentle heat only
Fine-tipped tweezers	Handling tiny screws, stickers and connectors. Plastic ones are safest near batteries
Isopropyl alcohol, 90 percent or higher	Cleaning adhesive, residue and dirty contacts, and loosening battery adhesive
Lint-free cloths and cotton swabs	Cleaning without leaving fibres
Magnetic mat or sorted tray	Keeping screws organised by where they came from
Replacement adhesive strips or tape	Resealing the screen or back; also helps restore water resistance
Anti-static wrist strap	Preventing static damage to circuits

Tool	What it is for
Good light and a magnifier	Seeing small connectors and ribbon cables

Useful extras

- **Multimeter**, to test whether a charger, cable or battery voltage is reasonable.
- **Smartphone or small camera**, to photograph every step.
- **Eye protection** and thin gloves, especially when working with cracked glass.
- **A small, non-flammable container** for a damaged battery (see Chapter 3).

Choosing replacement parts

- Prefer **genuine or high-quality parts** from reputable sellers. Very cheap parts often have dim screens, weak touch response or batteries with short life.
- Match the **exact model number** (found in Settings > About, or printed on the phone's back or SIM tray).
- Buy parts **with adhesive and tools included** where possible, which suits beginners.
- Check the seller's return policy before ordering.

Setting up your workspace

- Use a **clean, flat, well-lit table** with a light-coloured surface, so dropped screws are easy to see.
- Work on a **soft mat or towel** so the screen does not get scratched.
- Keep **food, drinks and pets away**.
- Allow **plenty of time**. Rushing is the biggest cause of broken cables and lost screws.

- Keep a bowl or tray **nearby but not on the work surface** for parts you are removing.

Keeping track of screws

Phones use several screw lengths, and putting a long screw in the wrong place can crack a circuit board. Draw a simple outline of the phone on paper, or use a magnetic mat marked into sections, and place each screw where it came out. Take photos as you go.

TIP

Photograph every layer before you remove it. Your photos become a reassembly guide that is exactly right for your phone.

Safety First

Phone repair is safe when you respect a few risks. Most injuries and disasters come from the same handful of mistakes, all of which are avoidable.

Lithium-ion batteries

Every modern phone contains a lithium-ion battery. It stores a lot of energy in a small space, and if it is punctured, crushed, bent, overheated or shorted, it can vent smoke, ignite and burn fiercely. Treat it with respect:

- **Never puncture, bend or crush a battery.** Do not use metal tools to pry under it.
- **Let the battery run down** to below about 25 percent before opening the phone. A less charged battery is less dangerous if something goes wrong.
- **Disconnect the battery first** before touching anything else inside the phone, and reconnect it last.
- **Keep heat gentle.** Never apply a hot air gun directly to a battery, and do not overheat the area.
- **Do not charge or use a damaged battery.**
- **Dispose of old batteries properly** at a recycling point, never in household waste.

Swollen batteries

A battery that has swelled with gas can push the screen or back panel outwards, lift the phone off the table, or make the case bulge. It is a warning sign of a failing cell.

WARNING

If your battery is swollen, stop using and charging the phone. Do not press on it or try to flatten it. Keep the phone away from heat and flammable materials, and replace the battery as soon as possible, or take it to a professional. Do not travel with it or leave it charging unattended.

If you do replace a swollen battery yourself, work slowly, avoid sharp tools, keep the phone away from anything flammable, and have a non-flammable container nearby, such as a metal tray or a bucket of sand. If it starts to smoke or heat up, move away and call emergency services rather than trying to fight a lithium fire yourself.

Glass and sharp edges

- Cover a cracked screen with **clear packing tape** before you start, to hold the glass together and reduce shards.
- Wear **eye protection**, since glass fragments can fly when you pry.
- Handle broken glass with care and dispose of it wrapped and labelled.

Static electricity

Static discharge can damage tiny electronic components without any visible sign. Touch a bare metal object, such as a radiator or computer case, before you start, and use an anti-static strap if you have one. Avoid synthetic clothing and carpet.

Chemicals and ventilation

- Isopropyl alcohol is flammable. Use it in small amounts, away from heat, flames and sparks, and in a ventilated space.
- Let alcohol evaporate completely before reconnecting a battery or powering the phone.

- Keep adhesives, solvents and cleaners away from children and pets.

Protect yourself and the phone

- **Switch the phone off** completely before opening it.
- **Never force** a part. If something does not move, stop and look for a hidden screw, clip or adhesive.
- Use only **plastic tools** inside the phone.
- Keep your **fingers off connectors and contact points**.
- Work on a **non-conductive surface**, not on metal.

TIP

If anything feels wrong, such as a hissing sound, a chemical smell, unusual warmth or visible smoke, stop immediately, move the phone onto a non-flammable surface outdoors if you safely can, and keep your distance.

Diagnosing the Problem

Before buying a part, work out what is actually wrong. Good diagnosis separates the cheap fix from the expensive one, and prevents you replacing parts that were never broken.

Step 1: Try the software fixes first

1. **Restart the phone.** Hold the power and volume buttons if needed (the exact combination varies by model) for a forced restart.
2. **Update** the operating system and apps.
3. **Free up storage.** A nearly full phone can lag, crash and drain the battery.
4. **Boot in Safe Mode** (Android) to see whether a downloaded app is causing the trouble.
5. **Check your charger and cable.** Try a different one before blaming the phone.
6. **Back up, then do a factory reset** as a last software test. If the fault persists on a clean phone, it is almost certainly hardware.

Step 2: Use built-in diagnostics

- **Battery health.** iPhones show a maximum capacity percentage in Settings > Battery > Battery Health. Many Android phones offer similar information in their battery or device care settings.
- **Hardware test menus.** Many phones have a hidden diagnostics menu or a manufacturer app that tests the screen, touch, speakers, microphones, cameras and sensors. Search for your model and brand to learn how to open it.
- **Manufacturer support tools** can run remote diagnostics for free.

Step 3: Match the symptom to the cause

Symptom	Likely hardware cause
Cracked glass but display works	Damaged cover glass; screen replacement
Black screen, phone vibrates or rings	Damaged display or loose display cable
Lines, flicker or colour patches	Damaged display panel
Touch does not respond in an area	Damaged digitiser or display
Phone dies at 20 to 40 percent	Worn-out battery
Phone shuts down in the cold	Ageing battery
Back panel or screen bulging	Swollen battery. Act urgently
Charges only at an angle, or not at all	Dirty or damaged charging port, or bad cable
Will not charge wirelessly	Case in the way, bad charger, or coil fault
Other people cannot hear you	Blocked or faulty microphone
Crackly, quiet or silent speaker	Dirt in the grille or damaged speaker
Blurry photos or black camera image	Dirty lens, damaged camera or stabiliser
Phone hot and battery drains fast	Battery fault, or software; check both
Water exposure then odd behaviour	Liquid damage and corrosion (Chapter 8)
Stuck on logo or restarts in a loop	Software, battery or motherboard
No power at all, even on charge	Battery, charge circuit or motherboard

Step 4: Inspect without opening

- Shine a bright light into the **charging port**, **speaker grilles** and **microphone holes** and look for lint and dirt.
- Look for **gaps or bulges** at the edge of the screen or back.
- Check for **colour change** on the liquid contact indicators (small stickers or patches visible in the SIM slot or port on many phones).
- Look and listen for **unusual heat, smell or noise**.

Step 5: Narrow it down by swapping

If you have a spare, known-good charger, cable or SIM card, try them. Move the SIM to another phone to test reception problems. Test the faulty feature in different conditions. Each simple test removes a possible cause.

TIP

Write down the symptom, when it started, and what happened just before. Include whether the phone was dropped, wet, updated or charged with a different adapter. These notes often point straight to the cause.

Cracked Screens and Display Faults

A broken screen is the most common phone repair, and one of the most worthwhile, since the display is usually the most expensive single component to replace through a shop. It is also one of the harder DIY repairs, so be realistic about it.

What kind of damage do you have?

- **Cracked glass only.** The picture and touch still work. The glass is damaged, but the screen assembly beneath it may be fine. On most modern phones, the glass is bonded to the display, so you replace them together.
- **Display damage.** Black patches, lines, colour bleeding or a dead screen mean the display panel itself has failed.
- **Touch problems.** Areas that do not respond or that touch themselves ("ghost touches") point to the digitiser layer or a faulty connection.

OLED displays are common on higher-end phones. They are expensive to replace but look excellent. **LCD** displays are generally cheaper. Do not mix them; always buy the type that matches your model.

Before you begin

- Order a replacement screen assembly for your **exact model**, preferably with adhesive and tools.
- Back up the phone and power it off. Let the battery run low.
- Cover the cracked glass with clear packing tape.
- Read Chapter 3 on safety.

- Find a **model-specific guide**. The order of screws, cables and shields differs for every phone.

The general method

1. **Power off** the phone and remove the SIM tray.
2. **Remove external screws.** These are often small screws on the bottom edge of the phone.
3. **Soften the adhesive.** Apply gentle, even heat to the edges of the screen for a minute or two, using a heating pad or low heat. The glass should be warm, not hot.
4. **Lift the edge.** Place a suction cup on the screen (near the bottom edge) and pull gently while sliding a thin plastic pick into the gap. Never pry deeply, since cables run near the edges and sensors sit near the top.
5. **Cut around the edge** with picks, reheating when the adhesive resists. Go slowly.
6. **Open the screen like a book**, without pulling it away. The display is still attached by ribbon cables.
7. **Disconnect the battery connector first.** Remove its cover plate and lift the connector with a plastic tool.
8. **Disconnect the display and touch connectors** by lifting them straight up. Do not pull on the cables.
9. **Move parts over** if the new screen does not include them: earpiece speaker, proximity sensor, front camera, metal brackets or dust mesh. Photograph before moving.
10. **Connect the new screen** and the battery temporarily, and **test** before sealing: display, touch across the whole screen, brightness, and sensors.
11. **Power off, disconnect the battery** again, then fit adhesive, align the screen and press it into place.

12. **Reassemble**, replace all screws, and clamp or press the screen for the time the adhesive instructions suggest.

Common problems

Problem	Likely cause and fix
New screen does not light	A loose or half-seated connector. Reseat the display cable
Touch works only partly	Connector not fully seated, or the adhesive strip is pressing wrongly
Screen has a green or pink tint	Faulty or low-quality display. Check the seller's warranty
Fingerprint reader or face unlock stops working	These are often paired with the original parts. See below
Screen does not sit flat	Adhesive misaligned or a cable is pinched underneath
Auto-brightness or true-tone features missing	A sensor was not transferred, or the phone needs a feature calibration

Security features and paired parts

On many phones, parts such as fingerprint sensors, face-recognition modules and some displays are cryptographically paired to the phone's main board for security. A replacement from another phone may not work, or may trigger a notice in settings. Official repair programmes include a software step that pairs new parts correctly. Check how your model behaves before ordering.

Protect your next screen

- Fit a **tempered glass screen protector** and a **case with a raised lip**.
- Avoid carrying the phone loose in a pocket with keys and coins.

- Avoid dropping onto hard surfaces, and keep it away from heat in cars.

WARNING

If the screen has a deep crack, a bulge, a swollen battery underneath, or pressure marks from inside, have it repaired by a professional. Pressing on a failing battery or a screen with embedded glass is dangerous.

Battery Problems and Replacement

A phone battery is a consumable part. Like a car tyre, it wears out with use, and replacing it can make an old phone feel almost new. It is one of the best value repairs there is.

Signs your battery is worn out

- The phone **drains much faster** than it used to.
- It **shuts down unexpectedly**, often at 20 to 40 percent, or in the cold.
- The percentage **jumps suddenly** or lies.
- The phone **slows down** or reports a battery warning.
- The battery health or capacity figure in settings is **well below 80 percent**.
- The phone becomes **unusually hot** while charging or idle.
- The back or screen is **bulging** (see Chapter 3; stop using the phone).

Rule out software first

Apps stuck running in the background, poor signal, a very bright screen and recent updates can all drain a battery. Update the phone, check Settings > Battery for apps that use the most power, and restart. If the battery health is good and drain continues, look at software before replacing hardware.

Before you replace it

- Buy a battery for your **exact model**, from a reputable supplier. Cheap, unbranded cells often have a fraction of the stated capacity and can be unsafe.
- Get a **pre-cut adhesive set** and the right screwdrivers.
- Let the old battery run down below about 25 percent.
- Read Chapter 3, including the guidance on swollen batteries.

The general method

1. **Power off** and open the phone as described for your model (screen or back, depending on design).
2. **Disconnect the battery connector first** and wait a moment.
3. **Remove other parts in the way**, such as cover plates and cables, taking note of screws.
4. **Release the battery adhesive.** Many phones use pull tabs: pull them slowly and flat along the battery, not upwards. Others use strong glued strips. Apply a few drops of isopropyl alcohol under an edge and wait, or apply gentle heat, then slide a plastic card underneath.
5. **Lift the battery out gently.** Do not bend it, pierce it or use metal tools.
6. **Clean the area** of old adhesive with alcohol and a lint-free cloth. Let it dry.
7. **Fit the new battery** with fresh adhesive, lining it up carefully.
8. **Connect the battery**, power the phone on briefly to check it starts, then power off.
9. **Reassemble** with fresh adhesive on the screen or back.

WARNING

If a battery is damaged during removal, such as punctured, kinked or leaking, stop. Place it on a non-flammable surface outdoors, away from anything flammable, and do not try to charge or reuse it. Take it to a battery recycling point or hazardous-waste facility.

After the replacement

- Charge the phone normally. Modern batteries do not need a special "break-in" or deep-cycle routine.
- On some phones the battery health display takes a few days, or shows a message about a non-genuine or unverified part. This does not necessarily mean a fault, but check the settings notes for your model.
- Dispose of the old battery at a proper recycling point. Many electronics shops accept them for free.

Make your battery last longer

- Keep the charge **between about 20 and 80 percent** when you can. Many phones have an optimised-charging or charge-limit setting.
- **Avoid heat.** Do not leave the phone in a hot car, on a heater or in direct sun, and remove thick cases when charging if it gets warm.
- Use a **good-quality charger and cable** from a reputable maker.
- Lower **screen brightness** and use auto-brightness.
- Close or restrict **apps that drain power** in the background.

TIP

A new battery will not fix a phone that is slow because it is full, out of date or old. Update, free up storage and reset if needed, then judge.

Charging Ports and Charging Faults

When a phone will not charge, the charging port is the usual suspect, but the cause is often simpler and cheaper: a dirty port, a worn cable or a faulty charger. Check them in order, from simplest to hardest.

Step 1: Test the easy things

1. **Try a different cable.** Cables wear out fastest, especially near the plug ends.
2. **Try a different charger** and a different wall socket.
3. **Try another charging method** if available, such as a computer's USB port or a wireless pad.
4. **Remove the case** in case it is stopping the plug from seating fully.
5. **Leave the phone on charge for 30 minutes** or more if the battery is completely flat. Some phones take a while to show any sign of charging.
6. **Restart the phone** while it is plugged in.

Step 2: Clean the port

Pocket lint is by far the most common cause of loose or intermittent charging. Over time, it packs into the port and stops the plug from seating fully.

1. Power the phone off.
2. Shine a bright light into the port to look for lint.
3. Gently scrape the debris out with a **wooden or plastic toothpick** or a plastic pick. Work around the edges and slide the tool along the bottom, taking care not to bend the contacts inside.

4. A short burst of **compressed air** from a distance can help. Do not use your mouth, which adds moisture.
5. Try charging again.

WARNING

Never use metal objects such as pins, paper clips or needles inside a charging port. They can short the pins, scratch the contacts and damage the phone permanently.

Step 3: Check for signs of corrosion or damage

- **Green, white or dark deposits** on the contacts suggest liquid damage (see Chapter 8).
- **Bent or missing pins** or a loose port that wobbles mean the port is physically damaged.
- A **moisture warning** on the screen means the phone has detected liquid. Let it dry fully and do not charge until the warning clears.
- A cable that gets **hot**, melts or smells burnt should be discarded immediately.

Step 4: Check wireless charging

If wired charging fails but wireless works, the port is the likely fault. If neither works, the battery, charging circuit or software may be to blame. If only wireless fails, check the pad, the case and the alignment between the phone and the pad.

Replacing a charging port

How hard this is depends heavily on the model:

- On some phones, the port is part of a **separate small board or cable assembly** that can be unscrewed and swapped. This is a moderate repair that most careful beginners can handle.

- On others, the port is **soldered directly to the main board**. Replacing it needs micro-soldering skills and equipment, and is best left to a specialist.

If it is a swap-in part, the general steps are: power off, open the phone, disconnect the battery, remove shields and cables in the way, unscrew and lift the old port assembly, fit the new one, reconnect everything, test charging and data before sealing, and reseal the phone.

Protect your charging port

- Plug and unplug **straight**, without levering or tugging by the cable.
- Use **good-quality cables** and replace frayed ones.
- Do not charge with **wet hands or a wet phone**.
- Consider a **magnetic or right-angle adapter** or a wireless charger to reduce wear on the port.

TIP

A cable that works with another phone but not yours points to the port. A port that works with one cable but not another points to the cable.

Water and Liquid Damage

Dropping a phone in water is a common disaster, and what you do in the first few minutes makes a big difference. Many phones survive if they are treated correctly, and quickly.

What to do immediately

1. **Get it out of the liquid** as fast as you safely can.
2. **Power it off** immediately and do not try to turn it on to "check if it works". Power running through wet circuits is what causes the worst damage.
3. **Do not plug it in** to charge.
4. **Remove the case, SIM tray and any memory card.**
5. **Wipe the outside** dry with a soft cloth and gently shake out excess water from ports. Do not blow into it or use compressed air at close range, which can push water deeper.
6. **Act quickly:** corrosion starts within hours, especially after salt water, juice, tea, coffee or soapy water.

What not to do

- **Do not use a hot hair dryer or put it in an oven or microwave.** Heat can warp parts and damage the battery.
- **Do not shake it hard** or press buttons repeatedly.
- **Do not rely on rice.** It is not effective and can leave dust and starch in the ports. Manufacturers advise against it.
- **Do not charge it** or switch it on until you are certain it is fully dry.

Drying it properly

Leave the phone in a dry, well-ventilated, room-temperature place for at least 24 to 48 hours, standing up with the charging port facing down. Placing it near a fan, or in a sealed container with silica gel sachets (the small packets found in shoe boxes and packaging), can help draw out moisture. Be patient: many phones that appear dry still hold moisture inside.

Fresh water versus other liquids

Liquid	How serious	What to do
Clean fresh water	Moderate	Power off and dry carefully; may recover
Salt water or sea water	Severe	Salt corrodes fast. Get it cleaned by a professional promptly
Sugary or milky drinks	Severe	Residue sticks and corrodes. Professional cleaning advised
Soapy or chemical liquids	Severe	Do not power on. Seek professional help

Opening and cleaning (advanced)

If you are comfortable opening the phone, cleaning the inside is the best way to prevent long-term corrosion:

1. Open the phone and **disconnect the battery** straight away.
2. Look for **moisture, residue and corrosion**: green, white or blue crust on connectors and the board.
3. Remove the main parts you can, such as the screen connector and cables, to expose the board.
4. Gently clean affected areas with **high-purity isopropyl alcohol**, 90 percent or above, using a soft brush or lint-free swab. The alcohol displaces water and carries away residue.

5. Let everything **dry completely** for several hours before reassembling.
6. Replace damaged parts and reconnect, then test.

Liquid contact indicators

Most phones contain small stickers or patches that change colour (often white or silver to red or pink) when wet. They are typically visible in the SIM slot, charging port or inside the case. Manufacturers and shops use them to check for liquid damage.

Water resistance after repair

Phones rated IP67 or IP68 resist water thanks to factory seals and adhesive. Once a phone has been opened, those seals are broken. Fresh adhesive helps, but you should not assume the original rating still applies. Water resistance also weakens with age and drops. Treat any previously opened phone as splash-resistant at best.

WARNING

If the phone was submerged in salt water, was charging when it got wet, or shows signs of corrosion, do not keep trying to power it on. Each attempt can cause more damage. Take it to a repair shop as soon as possible, and tell them exactly what happened.

Audio, Cameras, Buttons and Vibration

Smaller parts fail in smaller, odd ways. Fortunately, they are often cheap to fix, and many problems turn out to be dirt rather than damage.

Speaker and earpiece problems

- **Quiet or muffled sound** is usually dirt in the speaker grille. Switch off the phone and clean it gently with a soft, dry brush such as an unused toothbrush, or a piece of putty-like adhesive that lifts debris. Do not poke into the mesh.
- **Crackling or distortion** may mean a damaged speaker, or water in it. Let it dry fully, then test.
- **No sound at all**: check volume, silent mode, Bluetooth connections and the sound output setting first.
- **Earpiece faults** (you cannot hear callers unless on speaker) are often dirt or a failed earpiece module.
- Speakers are generally **moderate** repairs, usually a small module held by a few screws and connected by a spring contact or small cable.

Microphone problems

- Phones have **several microphones**, such as bottom, top and rear. Test each by using a voice recorder, a video recording and a call.
- Remove the **case and any screen protector** that might cover the holes.
- Clean the tiny holes gently with a dry brush. Never use a pin.

- If one microphone fails, the fix is often a replacement **charging port assembly** (on some phones the bottom microphone sits on the same part) or a small microphone module.

Camera problems

Symptom	Likely cause and fix
Blurry or hazy photos	Smudged lens or protector. Clean with a microfibre cloth
Dark spots in all photos	Dust or a crack inside or on the lens
Cracked back camera glass	Replace the lens cover glass. A cheap, moderate repair
Black screen when opening the camera	App problem, restart; otherwise failed module or loose connector
Shaky or rattling camera	Damaged stabiliser, often from a drop or from a strong magnet
Autofocus that hunts or fails	Damaged lens mechanism, often needs a new module

A camera module is usually held by a few screws and one ribbon cable, which makes replacement a moderate repair. Handle the module by the edges and avoid touching the lens. Dust inside the lens is a common problem, so work in a clean area.

TIP

Avoid attaching strong magnetic accessories directly over camera modules that use optical stabilisation, unless the maker says they are safe.

Buttons and switches

- **Sticky or unresponsive buttons** may be dirt or a worn flex cable. Clean around them with a little alcohol on a swab.
- **Volume and power buttons** are usually connected to flex cables that can be replaced.
- **Fingerprint sensors and home buttons** are often paired to the phone. Replacing them may disable the feature unless the repair is done with the manufacturer's tools.
- A button that **feels loose** or has fallen into the phone usually needs the phone opened.

Vibration motor

If the phone no longer vibrates, check that vibration is switched on in settings and not blocked by a do-not-disturb mode. If it still fails, the vibration motor (haptic engine) may be dead. It is a small module held by screws and connectors, and is usually a moderate and inexpensive repair.

Back glass, frame and cosmetic damage

- A **cracked back panel** can be replaced on many phones. On some, it is glued strongly and can require careful heating.
- A **bent frame** may cause display or battery problems. Do not try to straighten it by force; a professional should assess it.
- Use a **case and screen protector** to guard against more damage.

SIM and signal problems

- Remove and reseal the **SIM card**, and try it in another phone.
- Clean the SIM contacts gently with a dry, lint-free cloth.
- Check for **airplane mode**, carrier settings and software updates.
- A phone that never finds signal even with a good SIM may have a damaged antenna or board fault, and needs a professional.

Reassembly, Testing and Knowing When to Stop

A repair is only finished when everything works and the phone is sealed safely. Careful reassembly and testing prevent the heartbreak of closing a phone and then finding a problem.

Reassembly principles

- Work in **reverse order**, using your photos and screw map.
- **Reconnect the battery last** among internal parts, once everything else is seated.
- **Line up each connector** and press it straight down, gently. A connector that needs force is misaligned.
- Check that **no cable is pinched** or sitting under a bracket, and that no screws are left over.
- **Test before final sealing** when the design allows it. It is much easier to fix a fault before the adhesive goes on.
- Use **fresh adhesive** rather than reusing old, and press it firmly for the recommended time.

Testing checklist

After the repair, check the whole phone, not just the part you replaced:

- Power on, restart and shut down properly.
- Display: brightness, colours, dead pixels, and touch over the whole screen, including corners.
- Face or fingerprint unlock, if fitted.
- Charging by cable, and wirelessly if supported. Watch for unusual heat.

- Speaker, earpiece and every microphone.
- Front and rear cameras, flash and video.
- Volume, power and other buttons, and vibration.
- Wi-Fi, Bluetooth, mobile signal and GPS.
- Sensors: auto-rotate, proximity (screen goes off during a call) and auto-brightness.

Settle in and watch

For the first few days, keep an eye on the phone. Check the battery temperature while charging, and watch for any swelling, odd smells or fast battery drain. If anything seems wrong, stop using the phone and investigate.

Signs you need a professional

- The phone **will not power on** at all, even after trying a known-good charger and battery.
- **Motherboard faults**: boot loops, no signal, no charging, or random shutdowns that remain after a new battery.
- **Serious liquid damage**, especially with salt water, or visible corrosion.
- **Swollen batteries** you are not comfortable removing.
- **Damaged frames** or bent chassis.
- Faults that need **micro-soldering**, such as replacing a charging port soldered to the board or repairing chips.
- Repairs that affect **security features** such as face recognition on your model.
- Phones still under **warranty** or covered by insurance.

Choosing a repair shop

- Look for **good reviews** and a clear **warranty** on parts and labour, often 30 to 90 days or more.
- Ask what **parts** they use (genuine, aftermarket or refurbished) and whether they tell you before fitting.
- Get a **written quote** and ask whether there is a diagnostic fee.
- Back up your data and remove locks and passcodes only if and as the shop advises, and never hand over passwords you are not comfortable sharing.
- Be cautious of shops that pressure you or quote far below everyone else.

Recycling and e-waste

Old phones, batteries and screens contain valuable materials and hazardous substances. Do not throw them into household waste. Take them to an electronics recycling point, a retailer's take-back scheme or a manufacturer recycling programme. Wipe the phone and sign out of your accounts before handing it over.

Your right to repair

In a growing number of places, laws and manufacturer programmes now give people better access to genuine parts, tools and repair information. Check what is available for your phone and in your country. Repairing and reusing phones saves money and cuts electronic waste.

TIP

Not every phone is worth saving. If the repair costs close to the price of a good replacement, or the phone no longer receives security updates, upgrading may be the smarter and safer choice.

Appendix A: Repair Checklists

Before the repair

1. **Rule out software** with a restart, update and factory reset test.
2. **Back up** photos, messages and files.
3. **Note account passwords** and know your Apple ID or Google account details.
4. **Check warranty** and insurance, and consider official repair options.
5. **Identify the exact model number** and buy matching parts.
6. **Gather tools:** precision screwdrivers, plastic picks, suction cup, heat source, tweezers, alcohol, adhesive.
7. **Read your model's repair guide** from start to finish.
8. **Let the battery drop** below about 25 percent.
9. **Prepare the workspace:** clean, bright, soft mat, screw tray.
10. **Switch off** the phone and remove the SIM tray.

During the repair

1. **Photograph** each layer before removing parts.
2. **Disconnect the battery first**, and reconnect it last.
3. **Use plastic tools only** inside the phone.
4. **Keep heat gentle** and away from the battery.
5. **Place screws** in the right spots on your map.
6. **Never force** a part or a connector.

After the repair

1. **Test everything** before sealing, where possible.
2. **Fit fresh adhesive** and seal firmly.
3. **Check no screws are left over** and no cables are pinched.
4. **Test the whole phone** again after sealing.
5. **Monitor charging and temperature** for several days.
6. **Recycle** old parts and batteries responsibly.

Appendix B: Glossary

Adhesive. The glue or tape that holds a phone's screen, back and battery in place.

Battery health. A measure of how much charge capacity a battery has left compared with when it was new.

Charging port. The socket where the charging cable plugs in, such as USB-C or Lightning.

Connector. A small plug on a circuit board that joins a ribbon cable or part to the board.

Digitiser. The touch-sensitive layer that detects your finger on the screen.

Display assembly. The screen, touch layer and usually the frame, supplied as one replaceable unit.

ESD. Electrostatic discharge: a spark of static electricity that can damage electronics.

Factory reset. Erasing a phone and returning it to its original software settings.

Flex cable (ribbon cable). A thin, flat cable that links parts inside the phone.

Haptic motor. The small motor that makes the phone vibrate.

IP rating. An ingress-protection rating, such as IP68, that describes resistance to dust and water.

Isopropyl alcohol. A cleaning liquid that evaporates quickly; 90 percent or higher is used for electronics.

Lithium-ion battery. The rechargeable battery type used in phones; it must be handled carefully.

LCD. Liquid crystal display, a common and generally cheaper screen type.

Liquid contact indicator. A sticker or patch inside a phone that changes colour when it gets wet.

Logic board (motherboard). The main circuit board that holds the processor, memory and other chips.

Micro-soldering. Expert repair of tiny electronic components using fine soldering equipment.

OLED. Organic light-emitting diode display, with deep blacks and bright colours.

Pentalobe screw. A five-pointed screw head used on some phones' outer casings.

Spudger. A plastic or nylon tool used to pry and lift parts safely.

Swollen battery. A battery that has expanded from gas buildup, a sign of failure and a safety hazard.

Torx screw. A star-shaped screw head.

Tri-point screw. A three-pointed screw head used inside some phones.

Thermal throttling. A phone slowing itself down to avoid overheating.

Part pairing. A security link between certain parts, such as sensors, and a specific phone.