Fairphone 2 Teardown

We disassembled the Fairphone 2 in November of 2015.

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INTRODUCTION

You may have heard a lot about the new Fairphone 2—the small Dutch company has been making waves with its affordable, modular, conflict-free cell phone, and once again, we're one of the first to get our hands on their latest device. When we tore down the original Fairphone, we were pleased by its modularity and easy access. Today, we're excited to see what this second-generation, responsibly-designed device has in store for us. Join us as we *join the movement!*

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🔧 TOOLS:

- T5 Torx Screwdriver (1)
- Phillips #0 Screwdriver (1)

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Step 1 — Fairphone 2 Teardown

- Here we have the second generation of the Fairphone. It's grown in size *and* in style:

  - 5" 1080p LCD display (446 ppi) with Gorilla Glass 3 protection

  - Qualcomm Snapdragon 801

  - 2 GB LPDDR3 RAM

  - 32 GB internal storage with expandable storage via MicroSD slot

  - 2420 mAh *user-removable* lithium-ion battery

  - 8 MP rear camera

  - Android 5.1 Lollipop

Step 2

- Measuring in at 143 × 73 × 11 mm, the Fairphone 2 is definitely a size up from the 1st generation.

  - At 168 g (20 grams of which is the case) the Fairphone 2 is only 6 grams heavier than the 1st gen.

- We can already spot two SIM slots underneath the see-through case. Hooray flexibility!

  - ⓘ The whole phone snaps snugly into this (easily removable) case, no tricks here.

- What's that? A five pin connector that seemingly connects to nothing? We'll be looking into that later...

- This phone is lovingly labeled "Designed to open." Music to our ears!

Step 3

- The first item on our agenda is the translucent rear case. It's snug and secure, but snaps off with no tools required.
  - Where's all the adhesive? Is this a dream? *Slap.* No, definitely not a dream.
- "Remove battery before releasing screen" Is this a disassembly tip *on the battery*?
  - Nothing makes us happier than when manufacturers include repair instructions with their device, let alone *on* their device.
- We're not superstitious, but surely these are signs of even more good things to come.

Step 4

- The lack of visible screws had us a little worried, but not for long thanks to these handily-labeled clips.

- Removing the display assembly is simply a matter of flipping the switches and sliding the panel out.

  - 📌 For those keeping score thus far, removing the front panel keeps us at a grand total of *zero* tools required.

- On the midframe we find an array of [pogo pins](#), their counter parts are on the back of the display assembly.

- Immediately below the contact pads on the display assembly we take off the metal shield and see where the display connects to the breakout board.

  - ⓘ Fairphone modularized off-the-shelf components using breakout boards like these to foster compatibility.
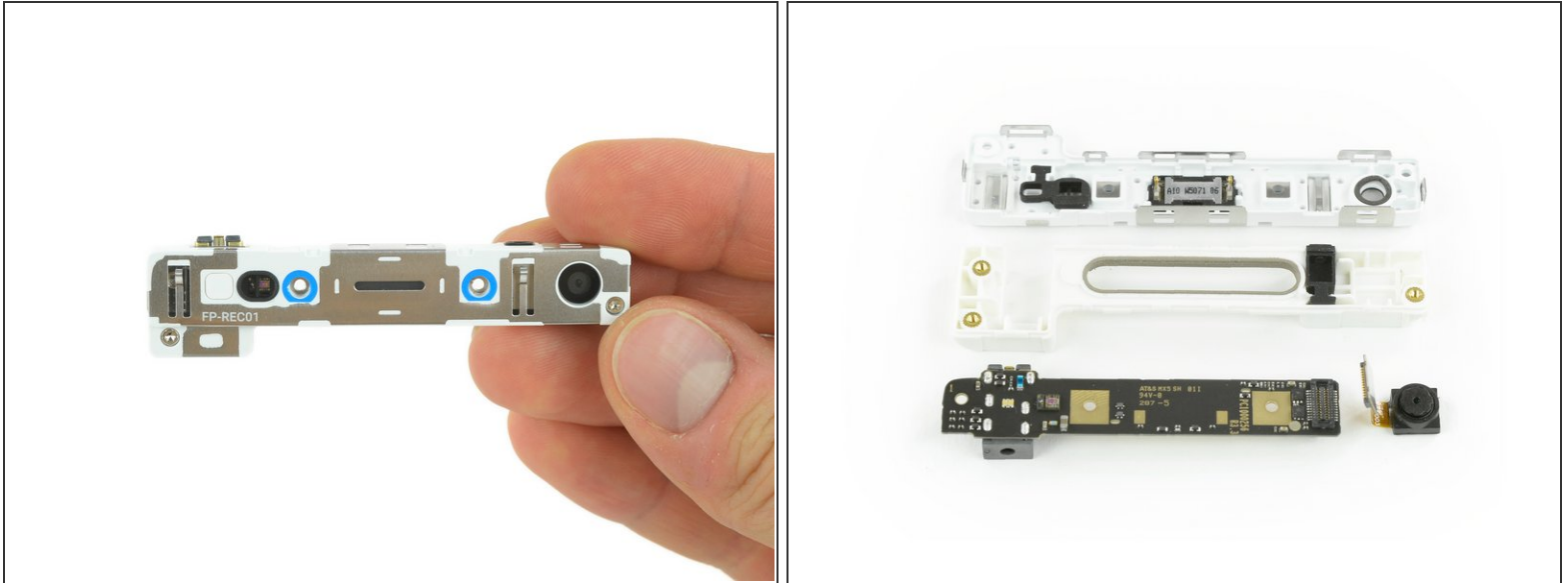
Step 5
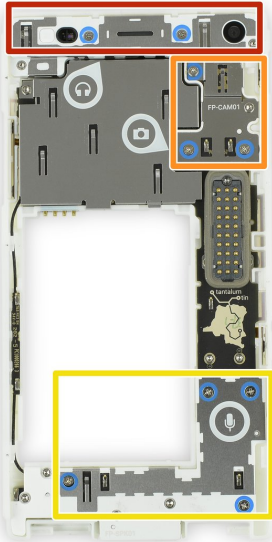
- Et voilà, we have the mainframe with three individually removable modules. Little icons next to each one indicate what they do:

  - Headphone jack, earpiece speaker, and front-facing camera module

  - Rear-facing camera module

  - Microphone module

- We also discover a proud little [map](#) showing the sources of the [conflict-free tin and tantalum](#) used in the phone.

- ⓘ Amazingly, up until this point we've only needed one tool: hands!

Step 6
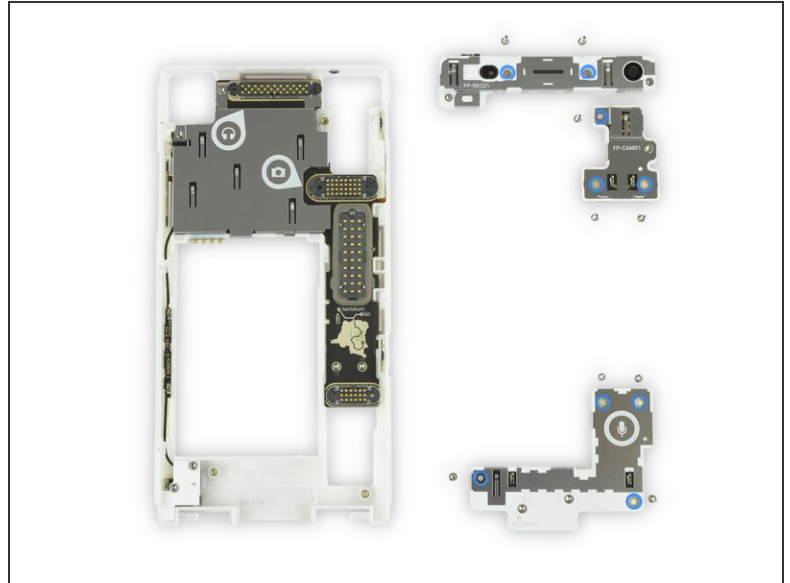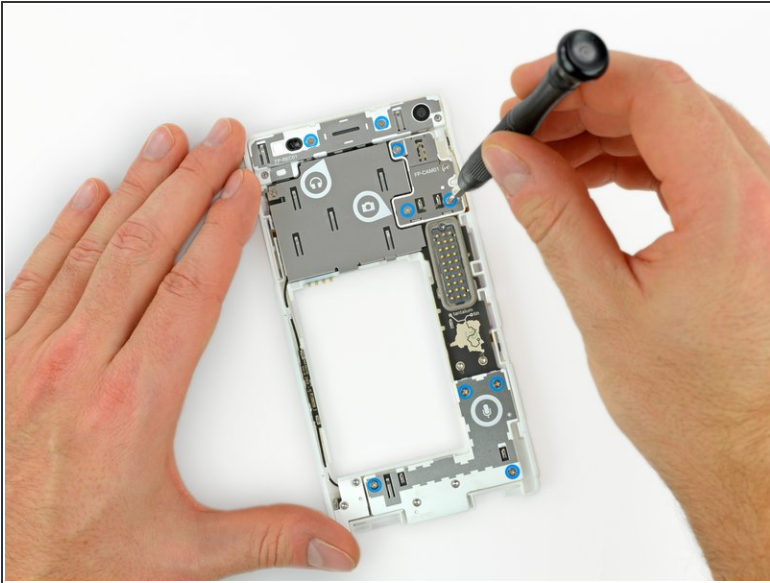
- It's time to get down to ~~brass tacks~~ screws and see just how repairable the Fairphone 2 really is.

- We grab our trusty Phillips #0 screwdriver and easily remove all three modules.

- Beneath them we find another level of spring contacts—not a flex cable or press connector in sight.

- ⓘ All these Phillips screws are created equal. Don't worry if you mix them up, they are all 5.5 mm.

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Step 7

ⓘ And with that, we're done with the first level of user repairs. The Fairphone is designed to be easily separated into modular components, but what if you want to fix an individual module?

● The modules are held together with Torx T5 screws—presumably to deter the casual user from delving too deep—but are still easy to open up.

 ● We start with the top module: the front-facing camera pops right off thanks to a simple flex cable connector.

 ● Spring contacts power the earpiece speaker, making for easy replacement of that as well.

 ● The headphone jack, the final component, is soldered to the board. Fortunately, nothing major remains, so a replacement board should be pretty cheap.

Step 8
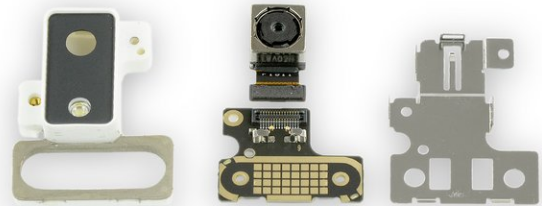
- Up next, the rear camera module.

  - Hopefully this unit could be upgraded in later years, à la [Project Ara](). Fingers crossed.

- The camera itself is an 8 megapixel CMOS camera with a 1/3.2 inch sensor and an aperture of *ƒ*/2.2.

- This module is built just like the others: a plastic case around an off-the-shelf component, connected to a pogo interface board via flex cable and connector.

  - ⓘ Fairphone hasn't quite removed cables or connectors, they have moved them a bit farther from DIY fixers—greatly simplifying component swap repairs.

Step 9
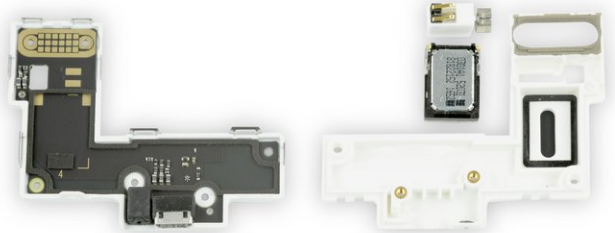
- One last module to crack open—while it's only marked with a microphone icon, there are actually quite a few components in here.

- The vibration motor and loudspeaker are connected by spring contacts—more easily removed parts, yay!

- The USB port and microphone are soldered to the board—not necessarily a bad thing, as a USB port requires some extra rigidity, and has significantly more pins than a speaker.

Step 10
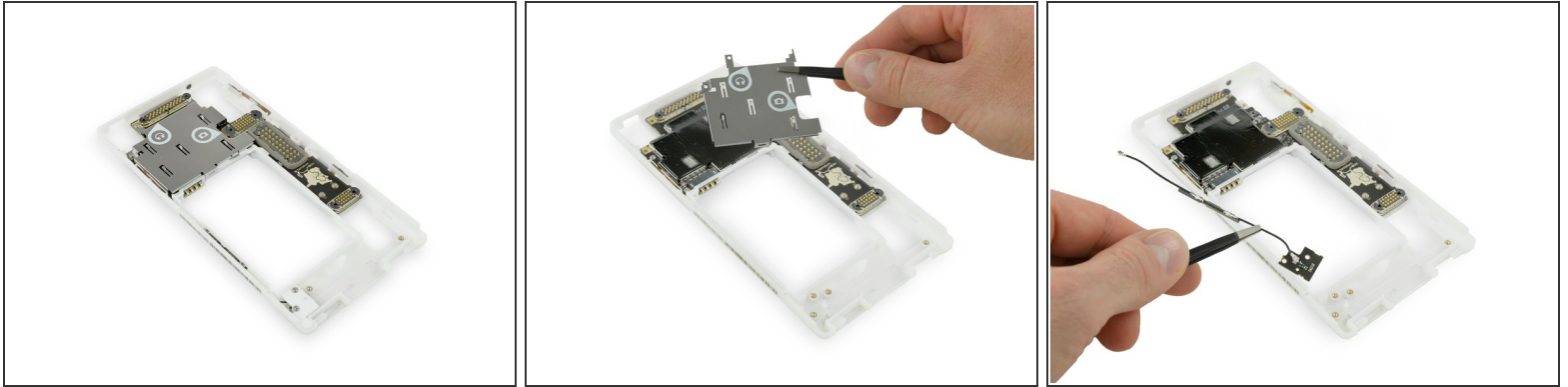
- The time has come to delve deep into the heart of the Fairphone 2.

- The metal shield plate, replete with useful icons, comes off first, revealing a heat spreader still hiding the exciting bits.

  - (i) Since this heat spreader rips when being peeled off, Fairphone will have it available as separate spare part.

- Along the way, we find an RF cable, that sends the radio signal along the side of the frame to the main antenna, and pluck it free.

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Step 11
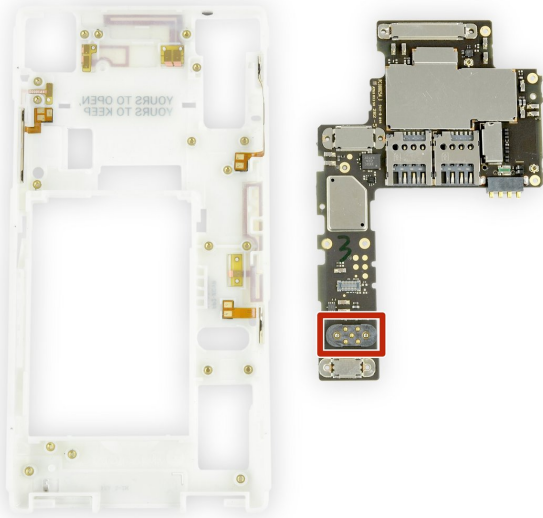
- Well isn't this a beauty? We're really digging the translucent plastic frame, showing off all of its embedded antennas and buttons—all of which connect to the motherboard by spring contacts.

- And down on the tail there are those five pogo pins we saw earlier. This is actually a USB 2.0 device interface, with power input—ready for future expansions and fancier cases.

  - ⓘ Possible future upgrades include NFC-embedded cases for quick and easy payments.

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Step 12
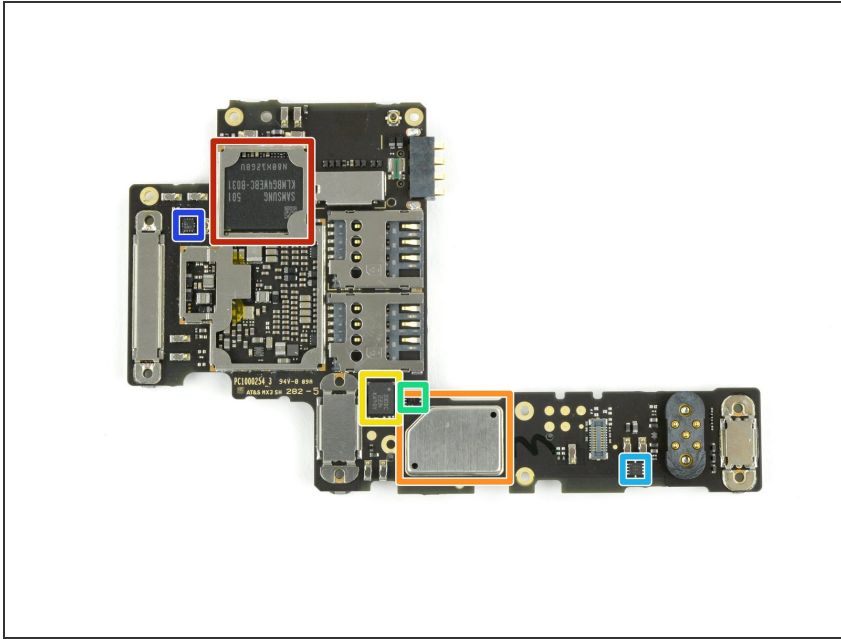
- And now for the tech section.

  - Samsung [KLMBG4WEBC](#) 32 GB eMMC NAND Flash

  - Qualcomm [WCN3680B](#) Wi-Fi 802.11ac Bluetooth Combo (Based on information from the Fairphone team!)

  - STMicroelectronics [LSM330DLC](#) 6-Axis Accelerometer + Gyroscope

  - AKM Semiconductor AKM8963C 3-axis Electronic Compass

  - Texas Instruments [DRV2603](#) Haptic Driver

  - Qorvo Antenna Switch

Step 13
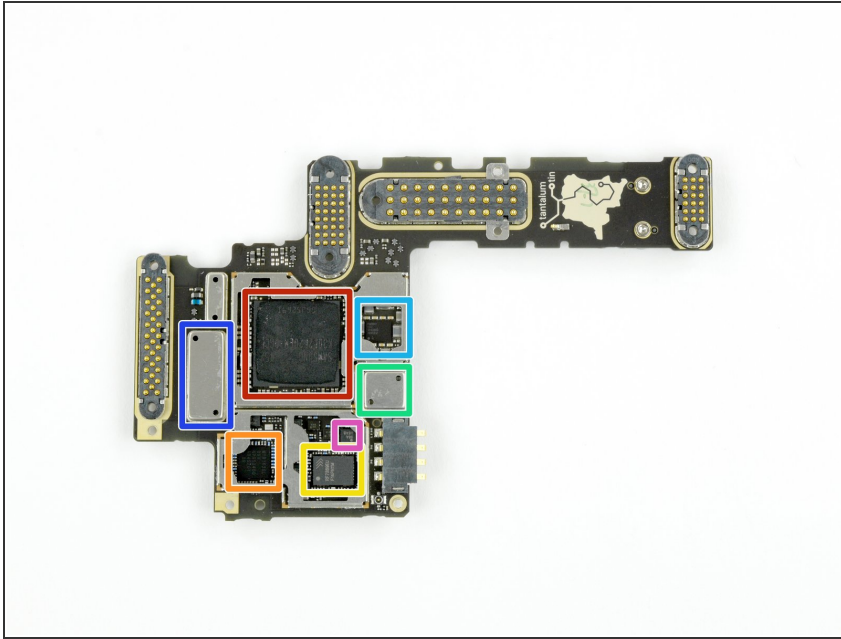
- On the backside we find a lot more:
  - Samsung K3QF2F20EM-QGCF 2 GB LPDDR3 RAM, layered on top of the Qualcomm Snapdragon 801 MSM8974AB
  - Qualcomm WTR1625L RF Receiver (similar to iPhone 6)
  - RF Micro Device RF7389EU Multimode Multiband Power Amplifier Module
  - Qualcomm QFE1100 Envelope Tracking Power Management
  - Qualcomm PM8841 PMIC
  - Qualcomm WCD9320 Audio Codec
  - Qorvo RF1496A SP12T Antenna Switch

Step 14

- Fairphone 2 Repairability Score: **10 out of 10** (10 is easiest to repair)

- The LCD and cover glass are fused, simplifying removal, but significantly increasing the cost of replacement.

- The most commonly failing components, battery and display, can be replaced without tools.

- Internal modules are secured with Phillips #0 screws and simple spring connectors.

- Individual modules can be opened, and many components can be individually replaced.

- All buttons and cables are easily accessible. Spring contacts allow for future upgrades and easy component swaps.

- In addition to the in-phone icons and instructions, the Fairphone 2 will ship with repair documentation built-in.

  - (i) Full disclosure: we are receiving funding to co-author the Fairphone's repair manual as part of the European Commission's initiatives to improve collaboration between the repair industry and manufacturers.

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