iPhone 13 Pro Teardown

The iPhone 13 might look like an incremental...

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INTRODUCTION

The iPhone 13 might look like an incremental update from the outside, but we've got a feeling there's more lurking beneath the surface. We took a quick peek inside during our 13 Pro livestream, but let's spelunk a bit deeper into the iPhone 13 Pro to see what secrets we can uncover.

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TOOLS:

Heat Gun (1)
Suction Handle (1)
iFixit Opening Picks (Set of 6) (1)
Spudger (1)
Tweezers (1)
Moray Driver Kit (1)

Step 1 — iPhone 13 Pro Teardown



- While the regular and mini get some of the cool new tech for this generation, the iPhone 13 Pro gets it *all*. Here's what's on the menu:
  - A15 Bionic SoC with a new 5-core GPU, 6-core CPU, and 16-core Neural Engine
  - 6.1-inch (2532 × 1170 pixels) Super Retina XDR OLED display with ProMotion
  - 12 MP triple camera system with an ultra-wide angle (ƒ/1.8), wide angle (ƒ/1.5), and 3x telephoto (ƒ/2.8) cameras, plus a LiDAR module.
  - 6 GB of RAM and 128 GB of storage (configurable up to 1 TB)
  - Sub-6 GHz 5G (and mmWave on the US models), 4x4 MIMO LTE, 2x2 MIMO 802.11ax Wi-Fi 6, Bluetooth 5.0, Ultra Wideband, and NFC
  - MagSafe 15 W wireless charging
  - IP68 water-resistance rating

Step 2







- Compared to the 13 Pro Max, this lil' Pro is *just right* for our teardown. But it's not the size that counts, it's the insides!

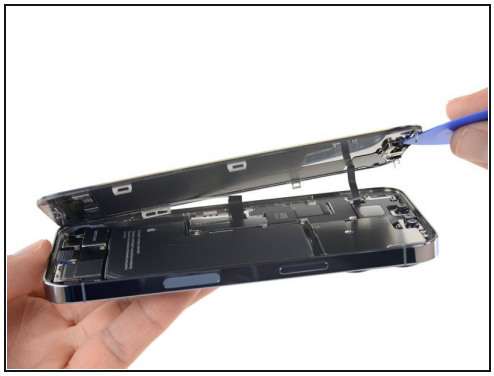
It's not that far-fetched to believe future iPhones will have built-in X-ray capabilities as one of their, say, 14 cameras. For now, we call upon our good friends at Creative Electron.

- You can see a double dose of L-shaped battery, claiming every millimeter of space they can. We first saw these back when iPhones had letters for names.
  - We also see stabilizing magnets for the image sensors, tiny logic boards, and some potentially smaller Taptic Engines?

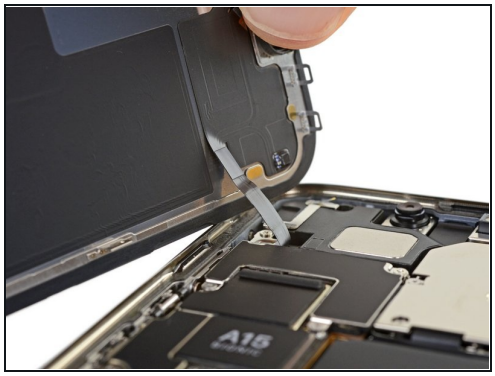
- From the outside, this lucky number 13 looks a little swollen compared to last year's model. The camera bump has bumped up so much that the phone doesn't lay flush on a flat surface! Not that the 12 did either, though. *Sigh.*

Hopefully the micrometers of extra focal length will help justify this Carolina Squat. We'll have to wait and see!

Step 3







- Good thing we've been practicing opening and closing our 12 Pro for weeks! The 13 Pro thankfully inherits one of our favorite smartphone opening procedures. The display comes off first, like opening a book. A ... slightly sticky book.

- Inside, we immediately spot some surprises—and some handsome labeling! It's almost like they were expecting us.

  But we thought this phone wasn't supposed to be opened?

- For starters, the digitizer and display cables seem to have joined forces. The upper sensor cable is off on its own near the top (and is scary thin and way too short).

- The Taptic Engine appears smaller than the 12 Pro's shaker, but it's actually bulked up, clocking in at 6.3 grams and 869.4 mm^3, versus the 12 Pro's 4.8 grams and 764.27 mm^3.

Step 4



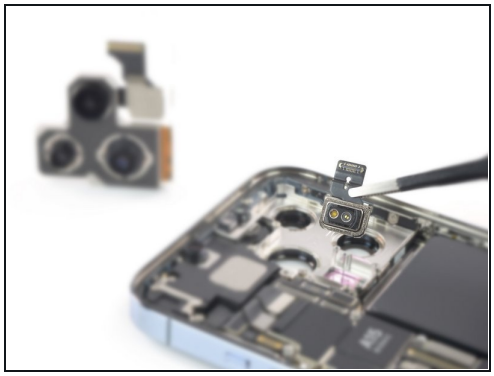
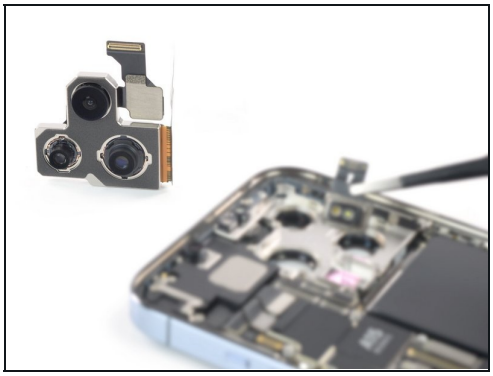
- Let's spot the differences between the 13 Pro (shown left) and 12 Pro (right) shall we? First off: no more display-mounted earpiece speaker! Easier display replacements, but irksome earpiece replacements (more on that later!)

- And second, a missing cable (one we didn't notice was also missing in the 12 Pro Max as a matter of fact!)

  Thanks to some expert knowledge from our new friends at Instrumental, we think the iPhones 13 are using "touch-integrated OLED panels", which, like their name suggests, combine the touch and OLED layers of a display—reducing cost, materials, thickness, and the number of cables you can accidentally tear. Neat!

- The Notch™ is 20 percent narrower on the 13 Pro compared to the 12 Pro, thanks to Face ID's flood illuminator and dot projector merging into a single module! (Also more on that later! Noticing a pattern?)

Step 5


- Look Apple, we can rack focus, too! Our cinematic prowess stars the LiDAR module glancing suspiciously at the hefty camera trifecta.

- Unlike the vanilla iPhone, this year's Pro camera arrangement looks the same (and noticeably beefier than the 12 Pro's array). How will people know you've upgraded now?! Maybe you should just… not?

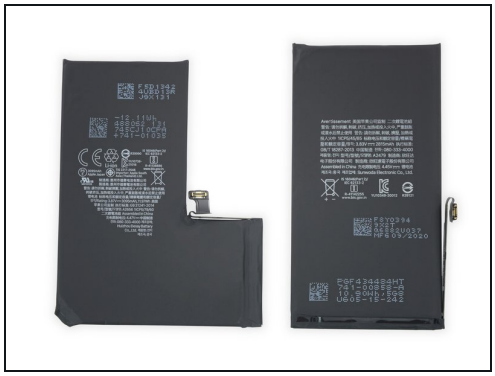
  For those of us still holding onto iPhones, iPads, and Macs of yesteryear (go us!) maybe snag some discounted repair kits—use the code **SKIP20** to get 20% off Apple Fix Kits. Refresh your worn battery or replace that cracked screen while saving money and the planet!

- No wonder that bump is bumpin'. These camera lenses are reaching for the stars to gather as much light as possible!!

Step 6







- We bust out the loudspeaker and Taptic Engine to get at the battery, thanks to the Moray driver kit!

- The clean, minimalist printing mimics the clean, minimalist removal procedure. We can't praise stretch-release adhesive more highly, though we'd love easier access to the tabs...

- This beefy L caps out at an expected 11.97 Wh compared to the 10.78 Wh obelisk found in the iPhone 12 Pro (and non-Pro), but loses out to the standard's 12.54 Wh rectangular cell.

  ⓘ The fancy new Pro screens let them sip battery, leading to better battery life.

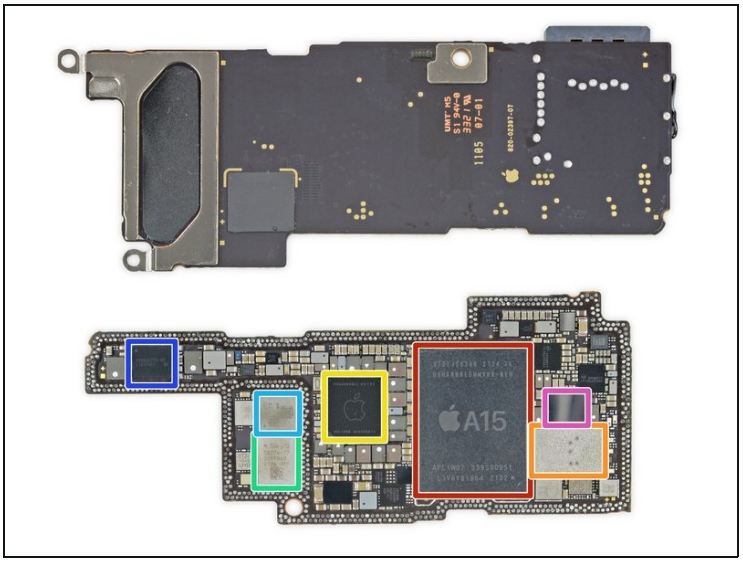
  - None of these three hold a candle to the 17.8 Wh behemoth in the Xiaomi Mi 11, not to mention Samsung...

- We can finally let out the breath we've been holding: after some rumors that battery swaps wouldn't be possible this year, we're happy to report that **our early battery swap tests were all successful**!

  - Apple hasn't given up its scare tactics, so you'll still get a warning notification. Be brave and keep fixing!

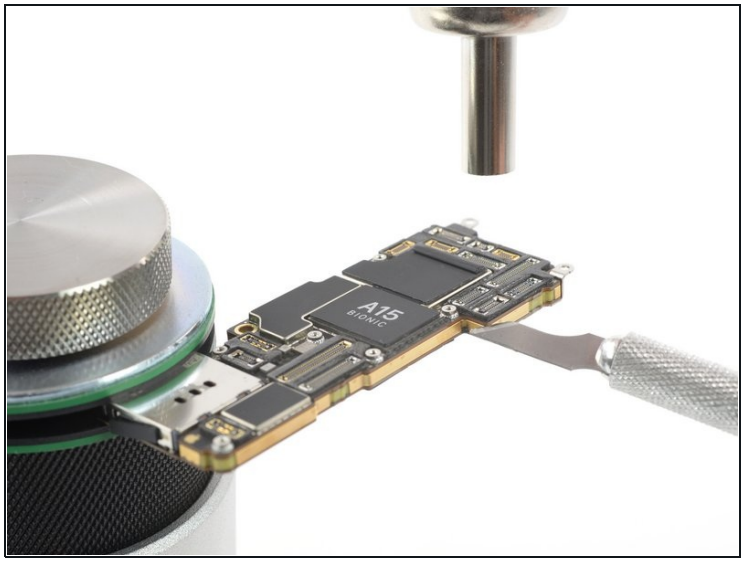
Step 7

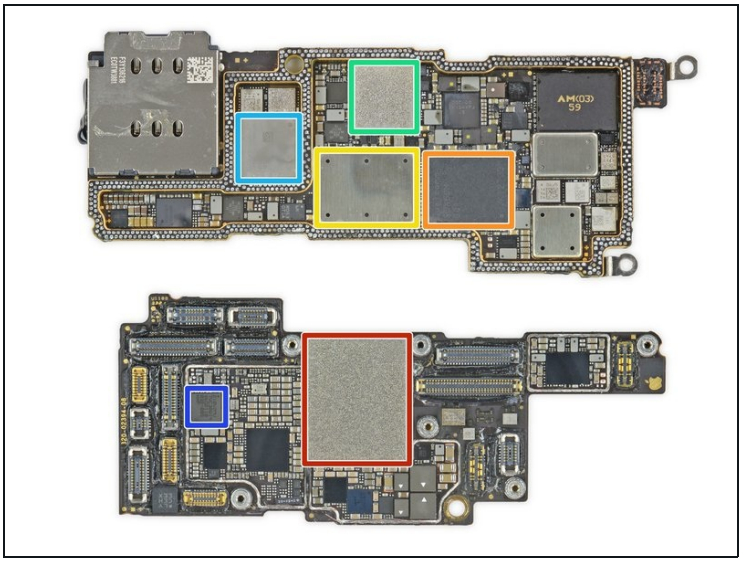




- The layered logic board is even teensier this year, and unfortunately the SIM card reader is now baked onto the board (booo!). In any case, let's see what chips are lying on the surface:
  - Apple APL1W07 A15 Bionic SoC layered with what's most likely 6 GB of SK Hynix LPDDR4X SDRAM
  - Apple/USI U1 ultra-wideband chip
  - Apple APL1098 power management IC
  - Skyworks SKY58276-17 front-end module
  - Skyworks SKY58271-19 front-end module
  - Apple 338S00770-B0 power management IC
  - STMicroelectronics STB601A05 power management IC

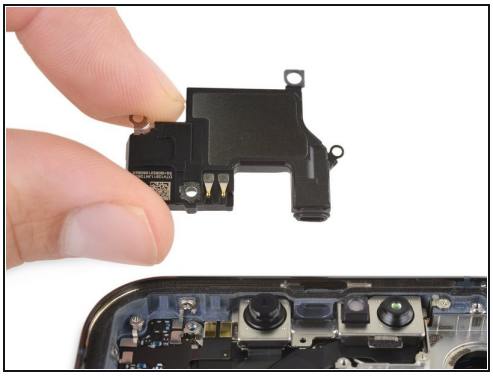
Step 8

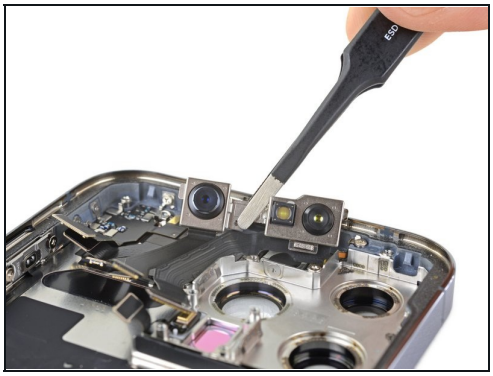




- This is one time where blowing hot air is beneficial. Here's what we find inside this silicon sandwich:
  - 128 GB of Kioxia NAND flash memory
  - Qualcomm SDX60M 5G modem
  - Most likely a Qualcomm SDR868 5G RF transceiver
  - USI 339S00761 WiFi/Bluetooth module
  - Broadcom AFEM-8215 front-end module
  - NXP Semiconductor SN210V NFC controller with secure element
- If this doesn't satiate your chip ID appetite, check out our full roundup of iPhone 13 Pro chip ID to quench your thirst.

Step 9





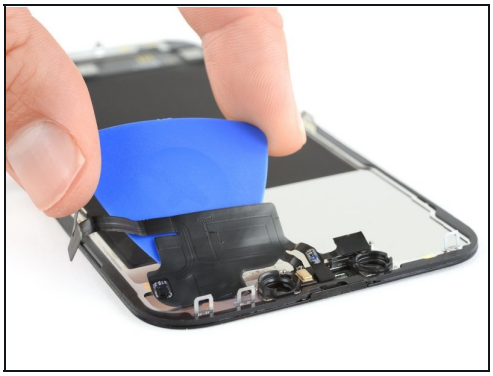
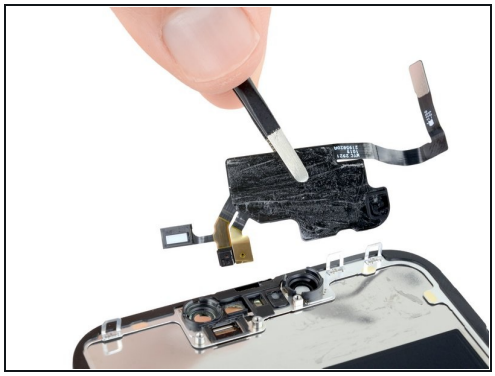


- Up top we find the relocated earpiece speaker, complete with a cute little snoot. That snoot lives between the front-facing camera and Face ID hardware, and connects to a channel that directs sound out the top of the display.
  - While we love simple spring contacts, one of this speaker's standoff screws is trapped under the logic board, meaning you'll have to remove the board to swap the speaker! These layers are quite the repair ogre …

- With its cables running underneath said earpiece speaker (which, again, is *underneath* the logic board) the front-facing camera hardware—enabler of the new, shrunken Notch™—is not exactly a piece of cake to access. But, at last, we have arrived!

- After pulling out all the big-name bits, we spy something with its very own cut-out in the case metal. Our guess is that it's an Ultra Wideband antenna. Say hi, Find My!

Step 10

- About that front-facing camera: the dot projector has moved from the edge to the center of the module this year, but it also holds a little secret.
  - The flood illuminator, previously a part of the display—and a necessary component of Face ID—has been integrated into this new dual-purpose module.

- With the display assembly now independent from Face ID hardware, you might be thinking *display and Face ID swaps are easier than ever now!* Right? Well, hold that thought.

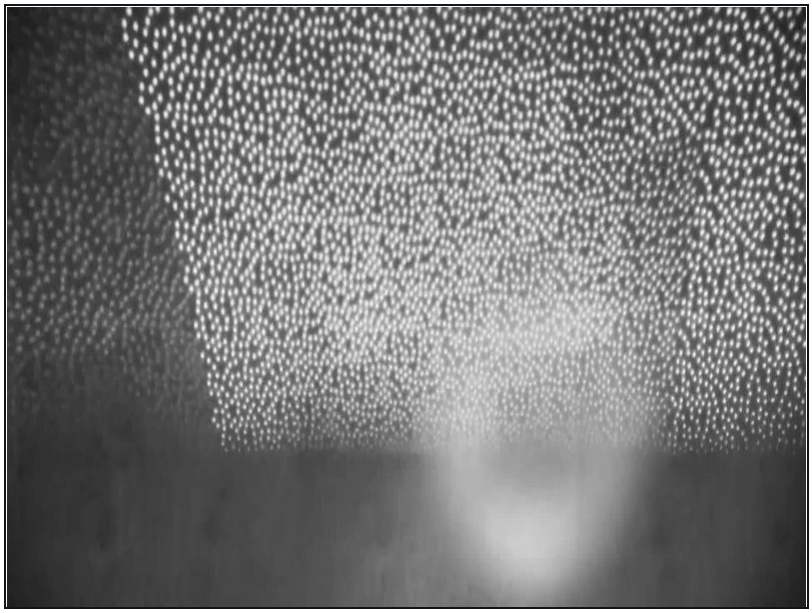
ⓘ Face ID works even when we disconnected the front sensor assembly. **However, any display replacement knocks out Face ID.*** We tried transferring the sensors along with the old display and the Face ID hardware, but no dice. Something on the display is serial-locked to the Face ID hardware.

⚠ TL;DR: Screen replacements outside Apple's authorized repair network lose all Face ID functionality.

📌 ***Update, Dec. 2021:** In iOS 15.2, Apple waved their magic wand and made this problem go away. Now anyone can replace an iPhone 13 screen without losing Face ID.

- Though you'll still get a not-so-friendly *Important Display Message,* and the new display will show up as an unknown part in the Parts and Service History.

Step 11



⚠ **Photosensitivity warning:** This video contains flashing lights and may not be suitable for photosensitive viewers.

- Wanna know how we verified our notch hunch? Here's some nifty IR footage of our Face ID sensor tests!
  - In this clip you'll see Tobias (a friend from Instrumental) individually covering the iPhone 12 Pro flood illuminator and dot projector, then attempt to do the same on a 13 Pro, only to realize they're both coming from the same spot.

Step 12



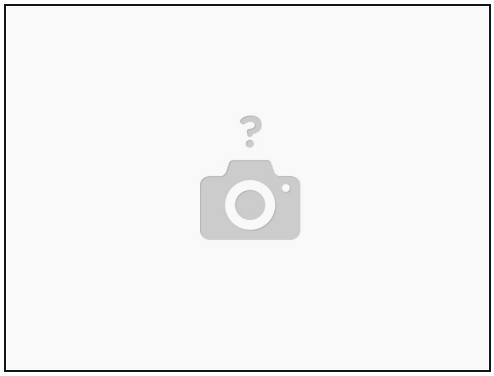
- That's as far as today's teardown goes, disassembly-wise. But if we missed anything, you're bound to find it here: check out this 360-degree X-ray view.

Step 13



- That's a lot of new things in a familiar-looking phone! So far we've seen:
  - A fancy new display, featuring not one but two upgrades: high/variable refresh rate technology, and a combination OLED+touch layer.
  - A migrated upper-speaker, further reducing the complexity of a display replacement, and making room for a smaller notch.
  - A return to the famous L-shaped battery in a non-Max-size phone.
  - A pretty devastating parts compatibility update that further violates your right to repair.
- With all that in mind, how does this Pro iPhone 13 fare on the scale that matters most?

Step 14 — Final Thoughts



- The iPhone 13 Pro earns a **6 out of 10** on our repairability scale (10 is the easiest to repair):
  - Display and battery replacements remain a priority in the new iPhones' design.
  - Most other components are modular and easy to access or replace.
  - The multitude of screw types makes repair more difficult than necessary—but at least they’re not glue.
  - Waterproofing methods complicate some repairs, but make (expensive) water damage less likely.
  - Once again, double glass means double drop damage, and despite the improvements to durability over the years, there’s still no easy way to replace the rear glass.
  - Software component pairing needlessly complicates many repairs, undermines credibility of third party repair, and reduces functionality of the device when repaired without Apple's proprietary calibration tools.