MacBook Pro 13" Function Keys Late 2016 Teardown

Teardown of the updated entry-level MacBook Pro (two Thunderbolt 3 ports, without Touch Bar) on November 1, 2016.

Written By: Jeff Suovanen

This document was generated on 2019-09-17 07:56:04 AM (MST).

INTRODUCTION

The first of the long-awaited updates to Apple's pro-level laptops is on our teardown table, but what the heck is it? MacBook Pro Without Touch Bar? MacBook Pro With Function Keys? MacBook Pro With Two Thunderbolt 3 Ports? No one quite knows what to call it—but we know exactly what to do with it. Read on for our teardown of the MacBook Pro Late 2016 (Escape Edition).

Follow along on [Facebook](), [Instagram](), or [Twitter]() for the latest news from the repair world.

[video: https://www.youtube.com/watch?v=Bcdg5NrQRPc]

TOOLS:

- 64 Bit Driver Kit (1)
- Suction Handle (1)
- Spudger (1)
- Plastic Cards (1)
- iFixit Opening Picks set of 6 (1)
- Tweezers (1)
- iOpener (1)

This document was generated on 2019-09-17 07:56:04 AM (MST).

Step 1 — MacBook Pro 13" Function Keys Late 2016 Teardown

- We've waited many a full moon for an update to the MacBook Pro. What will we find? We know the basics:

  - 13.3" LED-backlit IPS "Retina" display with 2560 × 1600 resolution (227 dpi), P3 color gamut

  - 2.0 GHz "Skylake" dual-core Intel Core i5 (Turbo Boost up to 3.1 GHz) with integrated Intel Iris Graphics 540

  - 8 GB of 1866 MHz LPDDR3 onboard memory (16 GB configuration available)

  - 256 GB, 512 GB, or 1 TB PCIe-based SSD

  - Two Thunderbolt 3 (USB-C) ports supporting charging, DisplayPort, Thunderbolt, USB 3.1 Gen 2

- (i) This model features **function keys** instead of that newfangled Touch Bar. If that's what you're interested in, stay tuned! We'll be back in a few weeks with a teardown of the new Touch Bar MacBook Pro.

Step 2

- Two Thunderbolt 3 ports populate the left side of this laptop... and that's all.

  - ⓘ The USB-C form factor is versatile, but you'll likely need a [fistful of adapters](#) to interface with your existing hardware.

- On the right side, a lone 3.5 mm headphone jack.

  - ⚠ Wait, what?

  - After all the hubbub about how the headphone jack is antiquated hardware that doesn't deserve a space on the iPhone 7, this seems... odd.

  - But hey, who are we to judge? It's a widely used standard and we're 100% on board with that. Just know that you can't plug in your iPhone 7's Lightning EarPods, as [the necessary dongle doesn't exist.](#)

- Completing our inspection of the outer case, we note the new model number: **A1708**.

www.iFixit.com

Step 3
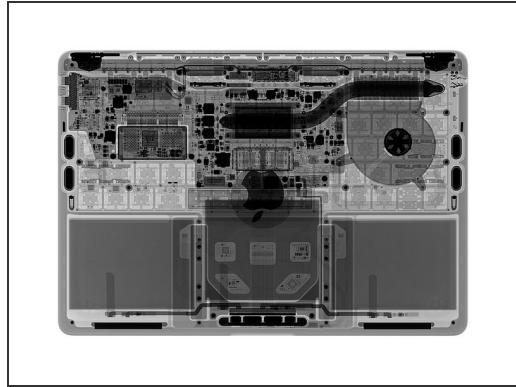
- Although we're dying to send emojis with a tap of the Touch Bar, this 'Book is missing the headlining feature of the 2016 MacBook Pro series—it sports physical function keys instead.

- However, we *do* spy an XL (extra-long) escape key that sets this row of function keys apart.

- (i) Taking a pause before diving deep into the belly of the beast, we pull out our old rose-gold friend, the Retina MacBook 2016 for comparison.

  - The Pro looks like a giant beside its pink sibling, sporting a significantly larger trackpad.

  - Also, the speaker grilles have migrated down from the upper edge of the keyboard to flank it on the left and right sides, now possible due to the Pro's extra half-inch of depth.

- Here's one last X-ray preview of the internals. Time to get our hands dirty!

Step 4

- After six years of removing proprietary pentalobe screws from MacBook laptops, we can remove the six of them from the back of this laptop with our eyes closed.

  - We also happen to sell the prettiest pentalobe screwdriver you'll ever see, useful for all of your MacBook opening needs.

- Six screws! That's the fewest we've seen on a unibody MacBook of any vintage, with 8 on the 2015 MacBook and 10 on most MacBooks Pro.

Step 5

- Well, this is new. We're momentarily stumped by the new, extra-secure lower case, before we crack the code to remove it.

- A suction cup helps lift the lower edge enough to get an opening pick in, to pop hidden clips on each side. After that, you slide the entire lower case down and you're home free.

This document was generated on 2019-09-17 07:56:04 AM (MST).

(i) All of the extra clips and hooks help the lower case serve as case-stiffener, in lieu of the normal amount of screws.

Step 6
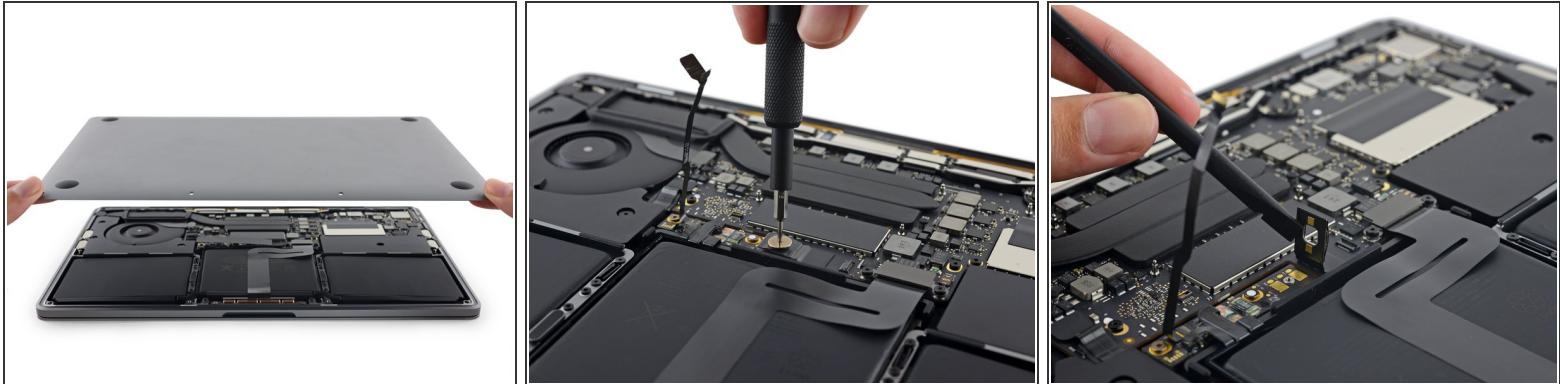
- Code cracked and panel removed, we move on to disconnect the battery and realize things are [strange](#).

- This wide-headed T5 screw serves as a super-secure press connector for the battery.

- Folding the connector back reveals some copper pads. Two large ones for positive and ground from the battery, and several smaller points. Perhaps... *Test Points*?

  (i) A [test point](#) is an exposed metal pad that allows for electronic circuit diagnostics. Think of it as a portal to the circuit, revealing continuity, allowing for test signals, and providing additional spots to short the board.

This document was generated on 2019-09-17 07:56:04 AM (MST).

Step 7

- Following our intuition, we try for the trackpad next, and are pleasantly surprised at the ease of its removal.

  - This represents a huge improvement over the previous 13" MacBook Pro, where the trackpad was trapped under the battery.

- (i) We find some familiar digital hardware piggybacking on the trackpad:

  - ST Microelectronics STM32F103VB ARM Cortex-M3 MCU

  - Broadcom BCM5976C1KUFBG Touch Controller

- We *also* find the Taptic Engine, AKA the ~~magic~~ electromagnet behind Force Touch, to be simply secured with screws and spring contacts.

Step 8

- Emboldened by our trackpad success, we tackle the battery next.

- Our confidence is quickly crushed by tenacious adhesive. Bring on the frustration and flashbacks.

- Good thing we're armed to deal with tacky-battery warfare at iFixit. We charge into battle with heat and plastic cards.

  - Also a good thing, with the trackpad out first we're finally able to pry at that super-annoying center cell, a common source of repair annoyance.

- Through perseverance we liberate the battery. Let us continue the good fight!

Step 9

- At 54.5 Wh, this battery doles out ~27% less power between charges than last year's edition— although with just three cells instead of six, it might be a tad easier to remove.

  - That said, this Pro actually packs more oomph than its Touch Bar-equipped sibling, whose battery clocks in at 49.2 Wh.

  - (i) Plus, Apple claims this battery's good for 10 hours of wireless web browsing, equivalent to both last year's 13" MacBook Pro and the 41.4 Wh Retina MacBook 2016.

- Up top, we find this battery control board which — unlike the impeccably manicured components surrounding it — is coated in thick epoxy à la Apple's Lightning-to-headphone dongle.

Step 10
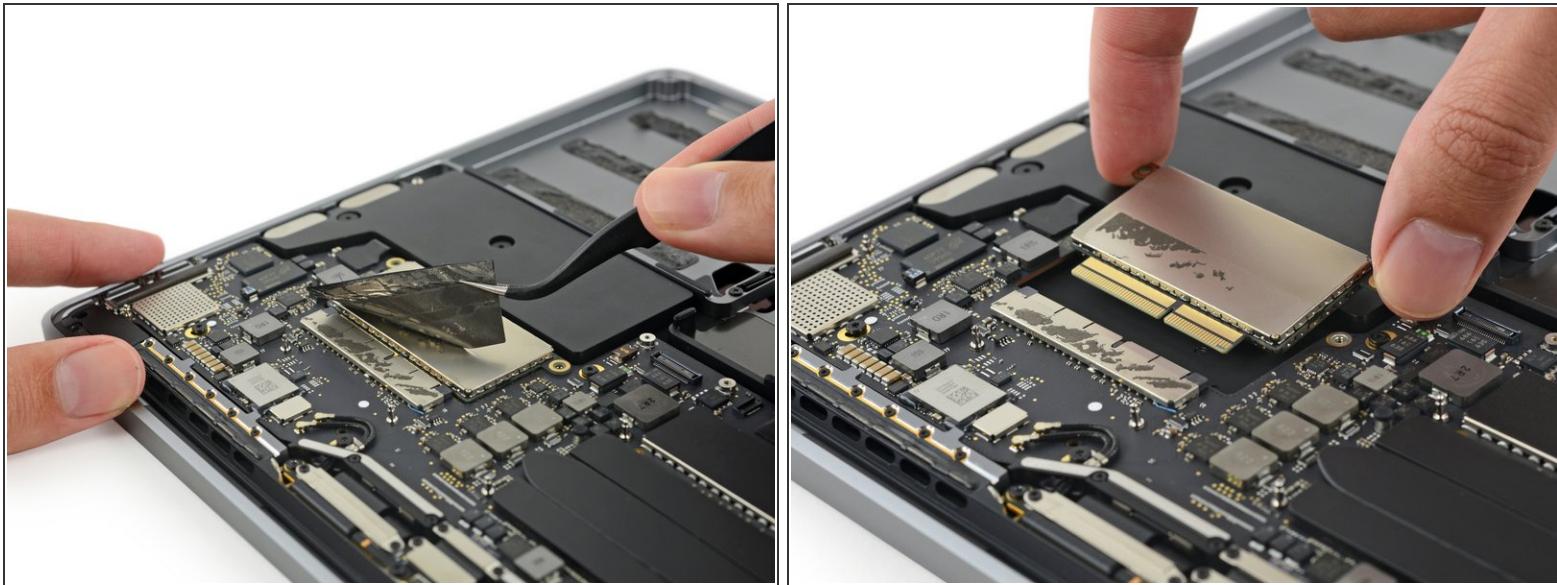
- Turning our attention to the *very* well-shielded SSD, we start by peeling up this massive patch of protective tape.

- Per Apple, we know the SSD itself uses a high-speed PCIe-based interface—but this form factor and pin configuration look new.

- Time to pry those shields off and see exactly what Apple [cook](#)ed up here...

  - ⓘ It's nice that Apple has kept their removable SSDs a first-out component, simplifying upgrades.

Step 11
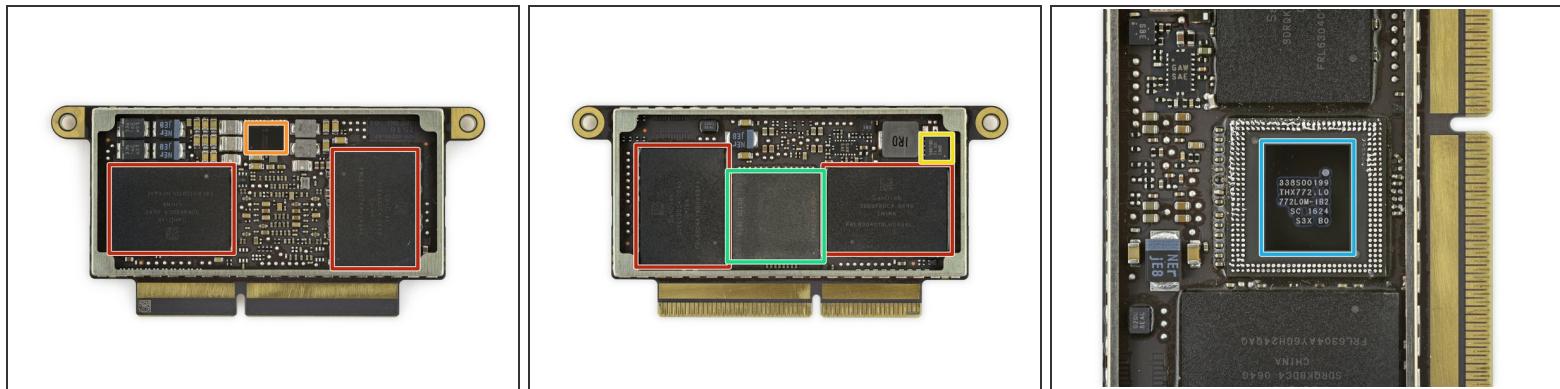
- Let's take a look at what's powering this sideways storage slate:

  - SanDisk SDRQKBDC4 064G 64 GB NAND flash memory (x4 for a total of 256 GB).

  - Apple 338S00227

  - Texas Instruments 58879D MOSFET

  - F4432ACPE-GD-F likely Micron 512 MB DDR2 RAM

    - ⓘ On a [hunch](#), we hunted under this chip.

  - Success! A reflow revealed: Apple 338S00199 SSD controller

    - ⓘ This marks the first time we've seen Apple's super-custom SSD controller in a removable PCIe SSD. Let's hope these suckers will be available for future upgrades!

Step 12

- We stumble upon another familiarity in this MacBook as we begin speaker extraction: vibration dampening screw gaskets, similar to those found in the iMac.

  - These speakers supposedly deliver more oomph than previous gens', and clearly need a more robust mounting system to keep from shaking your laptop off your lap.

- One speaker, two speaker, black speaker, black speaker. This teardown is starting to have a nice rhyme to it.

Step 13
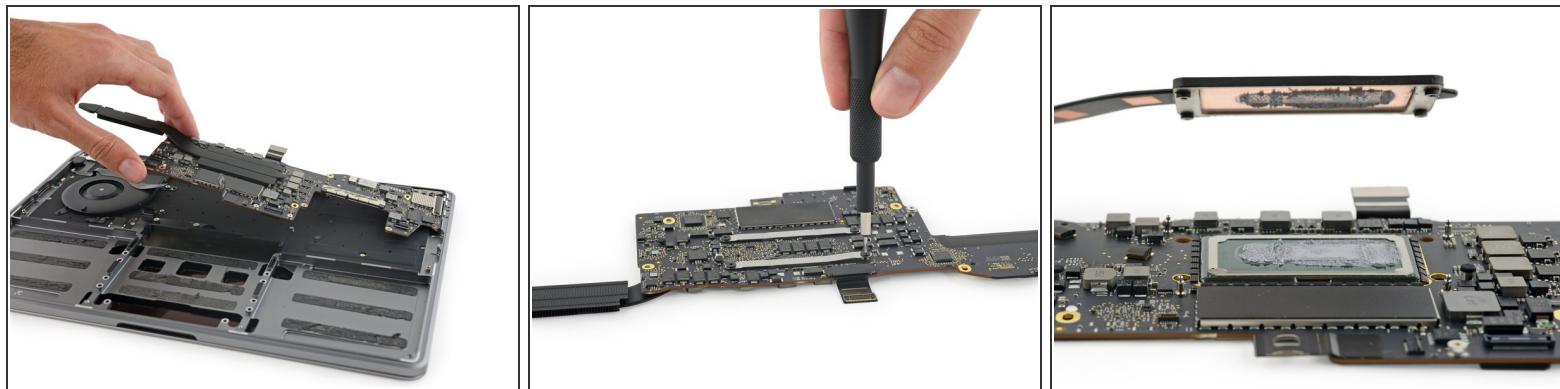
- Given our excitement surrounding the logic board removal (and the amount of ornaments and wrapping paper just unleashed in stores everywhere), you might think Christmas came 54 days early.

- We begin to look for the "advanced thermal architecture" Apple boasted in its press release the way a child might rifle through her stocking on Christmas morning.

- ...We're a little disappointed that *advanced architecture* really meant "relocation of the heat sink screws to the backside of the logic board."

  - 📌 That claim was a little ~~bold~~ courageous if you ask us.

Step 14
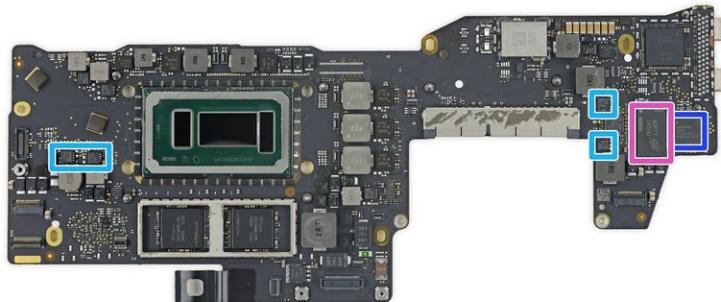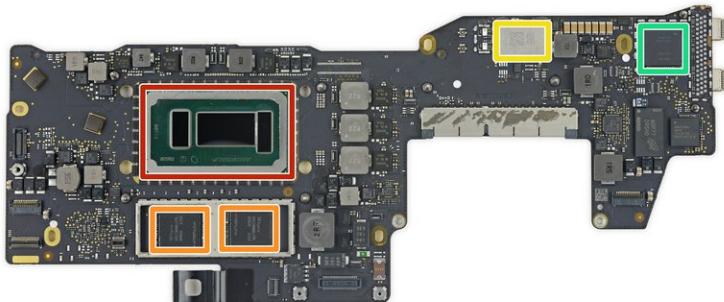
- We tackle the front side of the logic board:

  - Intel Core i5-6360U processor with Intel Iris Graphics 540

  - SKhynix H9CCNNNBJTML LPDDR3 high-speed synchronous DRAM

  - Universal Scientific Industrial 339S025 Wi-Fi Module

  - Intel JHL6540 Thunderbolt 3 controller

  - Texas Instruments 58873D Synchronous Buck NexFET Power Block MOSFET Pair

  - Broadcom BCM15700A2 camera processor

  - Micron MT41K256M16TW-107 512 MB DDR3L SDRAM

Step 15
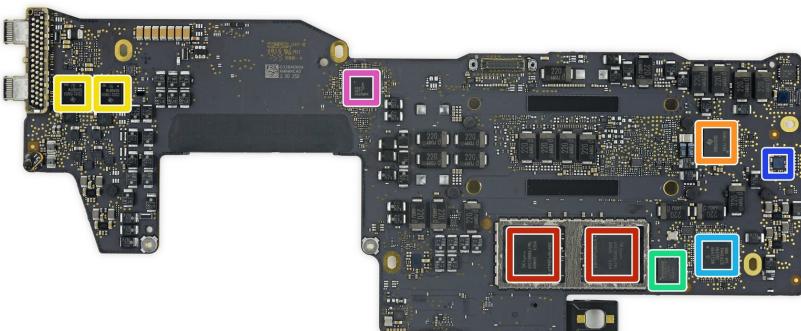
- We flip the logic board over to the reverse side and keep scouring:

  - Making a second appearance, SKhynix H9CCNNNBJTML LPDDR3 high-speed synchronous DRAM

  - Texas Instruments SN650839 66AL7XWGI (as seen in the 2016 Retina MacBook)

  - 2x Texas Instruments CD3215B03 66AQ8YW G1

  - Winbond SpiFlash W25Q64FV 64 Mb serial flash memory

  - Texas Instruments TM4EA231 H6ZXRI system management controller

  - Cirrus Logic CS42L63A Audio Codec

 - Intersil 95828 HRTZ X630MRR

Step 16

- Given Apple's renowned port-removing *courage*, it wasn't unreasonable to think the headphone jack would find itself getting voted off the island prior to this round of MacBook Pros.

- Miraculously, the headphone jack survived... but given that it's a single modular unit (with two attached microphones) taped to the bottom of the fan, it could easily be dropped in favor of a Lightning or USB-C connector at the next ~~Tribal Council~~ MacBook release.

- Next, we take a closer look at the speaker grilles: Most of the holes are actually just dents *posing* as holes. The only through-holes are dedicated to the four speaker drivers and the two microphones.

Step 17

- Before we hit Retina, we scrape out a *fan*cy fan. These blades are supposedly super quiet due to their asymmetrically spaced blades.

  - ★ Interestingly enough, while Jony Ive was jazzed about "thinner, variably spaced fan blades," this tech has been included in certain MacBook Pro models since 2012.

- There's also a significant amount of space not taken up by blades—that's probably another sick thermal system feature. Plus it looks nice in the video.

Step 18
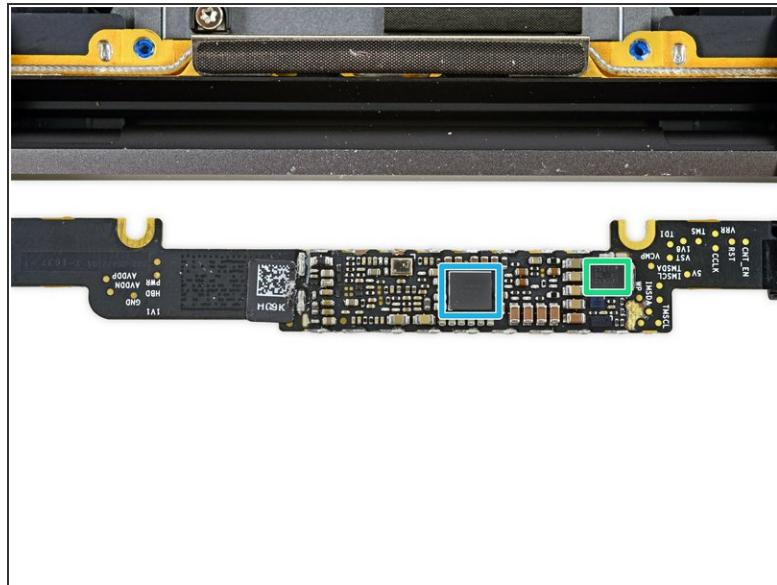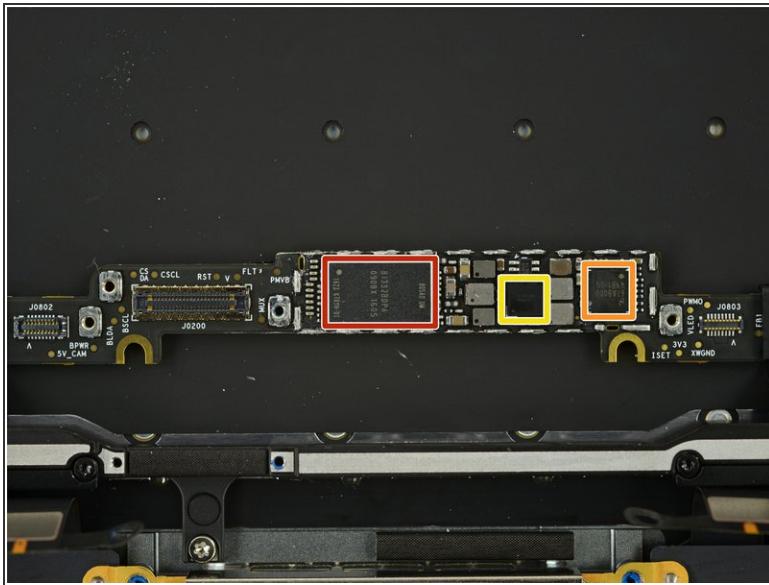
- Time to mosey on down to display town, we decap some shields and take a peek at the hardware powering those pixels:

  - B1332BDPA 090BX 1605

  - National Semiconductor 67A800U 49B1-04

  - Texas Instruments 65CLKEI TPS65157

  - NXP LPC812 ARM Cortex M0+ 32-bit MCU

  - Texas Instruments TPS65158 High Resolution LCD Bias IC for TV

This document was generated on 2019-09-17 07:56:04 AM (MST).

© iFixit — CC BY-NC-SA

www.iFixit.com

Page 19 of 24

Step 19
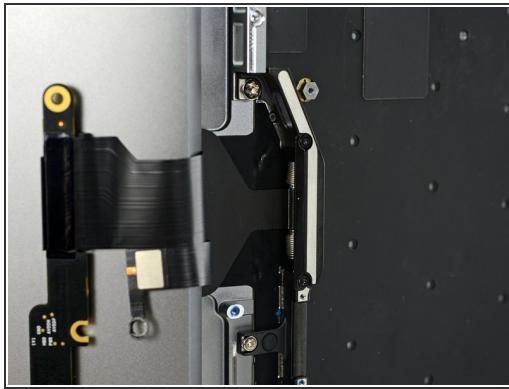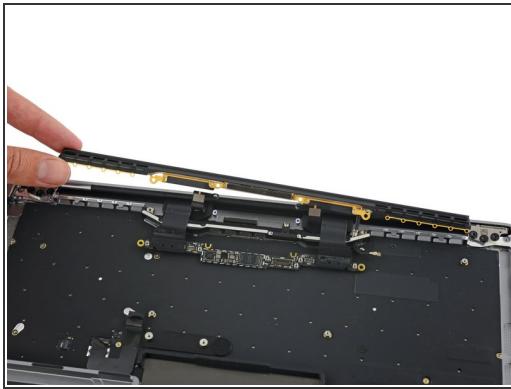
- At MacBook's edge we come across a shiny bar (held in by 12 P2 Pentalobe screws) that also serves as an antenna.

  - 📌 That's the 6th kind of bit! Remember the days you could upgrade your RAM, double up on storage, and drop in an SSD with a Phillips driver and a free afternoon? iFixit remembers.

- Behind the antenna bracket, we spy some fancy tech along the Pro's spine.

- A spring mechanism rolls a flat cable up when the display is closed, and unravels when the display opens. This seems to make it a bit easier to close the lid.

  - ⓘ Perhaps shaving a few ounces off the display assembly meant the new MacBook Pro couldn't rely on gravity to close nicely as much as previous models have.

Step 20

- We'll skip tearing down the display itself—we've been down that road before—so how about a lovely X-ray instead? Here you can see the camera board with its long data cable, the solid metal Apple logo, and even the little magnets embedded in the lid for sleep/wake functionality.

- We gently detach the gutted shell of the keyboard/upper case from the display, and take a closer look at the fancy new hinge system.

- Sometimes seemingly standard hardware deserves an *Ooh* and an *Ahh*: These small, precision hinges are likely injection molded, allowing for thinner and more precise parts.

  - (i) More importantly, more complex parts can be produced with less waste than traditional machining, which in our book makes it a win.

Step 21

- The Butterfly 2.0 keys are indeed updated! Check this sweet MacBook/MacBook Pro (with function keys) rollover!

- The Pro's keycaps (first image) are a little taller at the edges, making keys easier to find with your fingers.

- The dome switch under the butterfly mechanism also appears to be heftier and better mated to the keycap than the ones in the MacBook (second image).

Step 22
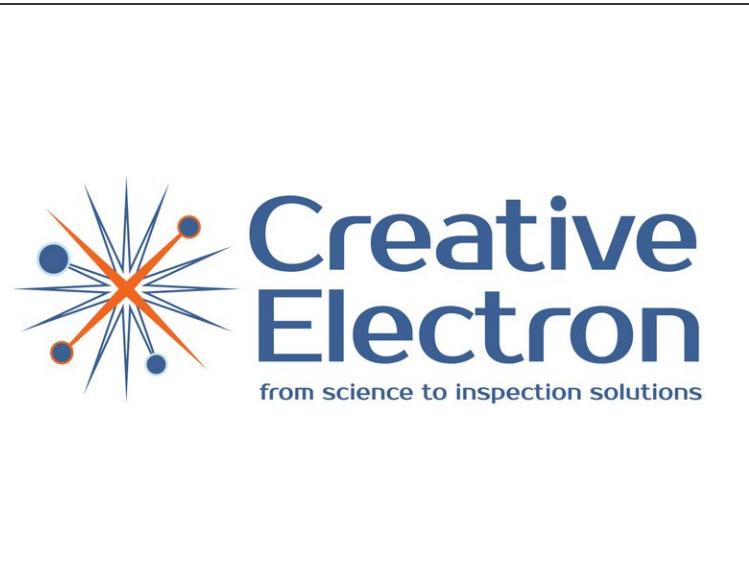
- And for the grand finale: All those beautiful bits all in one place!

- Don't forget: Apple had some slick computer-generated imagery of their new machines' internals, but we got the real thing! Today's hi-res X-ray images were brought to you by the amazing team at [Creative Electron](.).

Step 23 — Final Thoughts

REPAIRABILITY SCORE:

2 OUT OF 10

IFIXIT

- The MacBook Pro 13" with Function Keys earns a **2 out of 10** on our repairability scale (10 is the easiest to repair):
  - The trackpad can be removed without first removing the battery.
  - Proprietary pentalobe screws continue to make opening the device unnecessarily difficult.
  - The battery assembly is entirely, and very solidly, glued into the case, thus complicating replacement.
  - The RAM is soldered to the logic board. Pay for the upgrade now, or be stuck with 8 GB forever. There is no chance of upgrade.
  - The proprietary PCIe SSD still isn't a standard drive. Cross your fingers for future compatible drives; for now, you're stuck with what you've got.

This document was generated on 2019-09-17 07:56:04 AM (MST).