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MacBook Pro 15" Touch Bar Teardown

Teardown of the MacBook Pro 15" Late 2016 featuring Apple's new Touch Bar, performed on Thursday November 17, 2016.

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INTRODUCTION

Apple announced a trio of new laptops, and boy are they keeping our teardown table busy. We started with the entry-level MacBook Pro "Escape Edition," and today we've reached the top of the line. With twice the fans, over a million more pixels, and the new Touch Bar that attempts to replace our tried-and-true function keys, it can only mean one thing: it's time to tear down the new 15" MacBook Pro with Touch Bar.

Can't get enough of our teardowns? Follow along on Facebook, Instagram, or Twitter to keep in touch with the latest and greatest hardware teardowns and repair news!
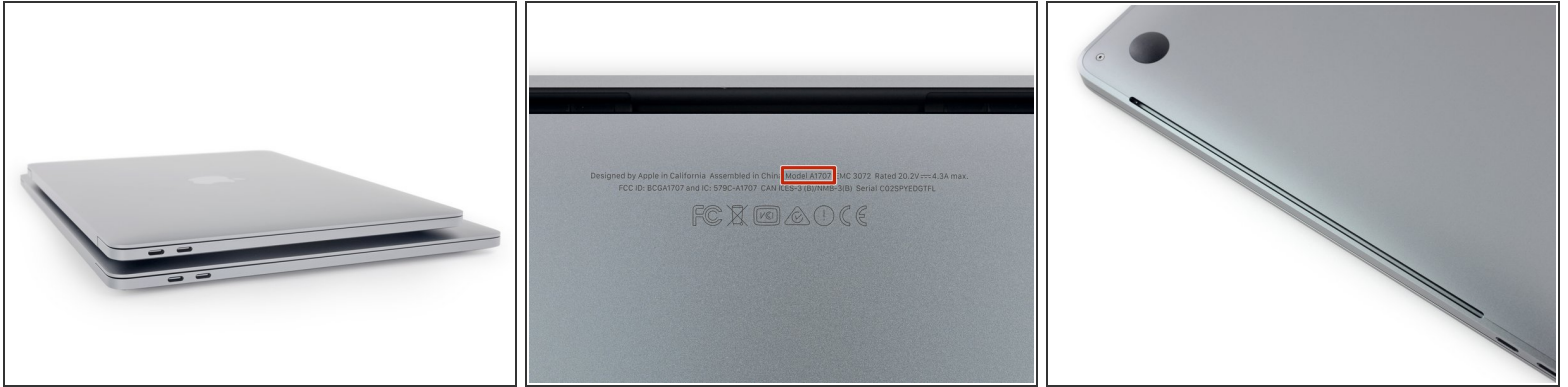
🔧 TOOLS:

- 64 Bit Driver Kit (1)
- Suction Handle (1)
- Tweezers (1)
- Spudger (1)
- iOpener Kit (1)

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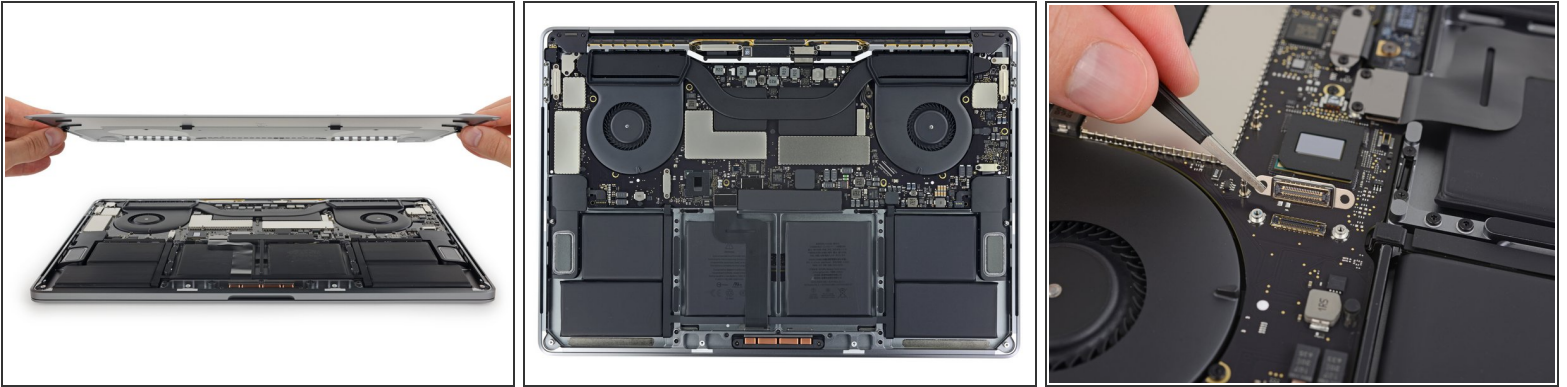## Step 1 — MacBook Pro 15" Touch Bar Teardown

- The MacBook Pro 15" packs a million pixels over the 13-inch models we've already torn down. Here's a preview of the tech we're expecting to find inside *today*:

  - 15.4" LED-backlit Retina display with 2880 × 1800 resolution (220 dpi), P3 color gamut

  - 2.6 GHz Skylake quad-core Intel Core i7 (Turbo Boost up to 3.5 GHz) with integrated Radeon Pro 450 with 2GB of GDDR5 memory

  - 16 GB of 2133 MHz LPDDR3 onboard memory

  - 256 GB PCIe-based onboard SSD (Configurable to 512 GB, 1 TB, or 2 TB SSD)

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

  - Touch Bar with integrated Touch ID sensor

  - Force Touch trackpad

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Step 2

- Stack them if you have them. Here we have the MacBook Pro 13" layered on top of today's main attraction, the MacBook Pro 15"—and apart from the size difference, they appear near identical. We're itching to see how similar (or not) they are inside.

- The MacBook Pro 15" identifies as model **A1707**, which fits nicely between the [A1706](#) and [A1708](#) from our previous two teardowns.

- 📌 In case you forgot, this laptop was *Designed by Apple in California* and *Assembled in China*.

- Just like the [previous MBP line](#), there are long air intake vents under the left and right sides. If this computer is anything like its [little brother](#), these vents should serve double-duty as speaker outlets.

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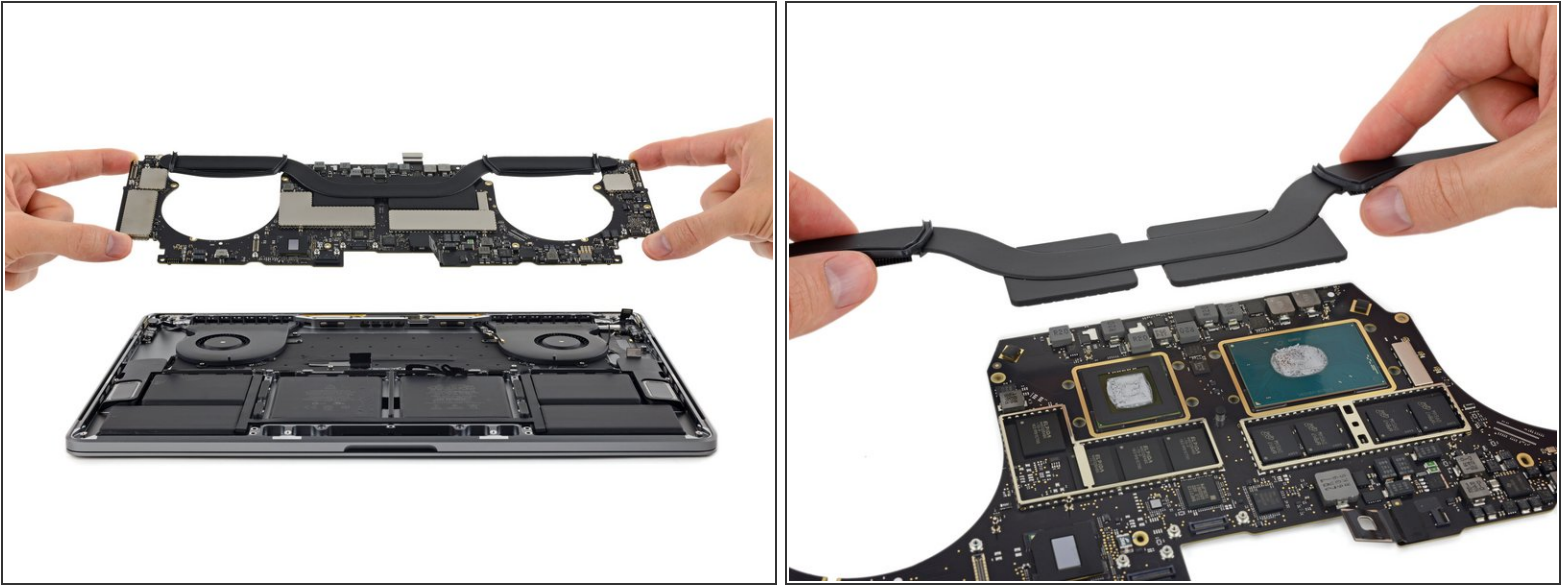
Step 3

- *Houston, we have lift-off!* This teardown has achieved first stage separation.

- On initial inspection, the 15" MBP looks ... like a scaled up version of the 13" model. We do notice a difference in the battery layout, but overall it's like looking at twins.

- Look who we ran into again! The connector to nowhere.

  - (i) Scuttlebutt in the comments on our last teardown is that Apple may have included this to access the soldered-in SSD for data recovery.

- We'd still rather see a removable/upgradeable SSD, particularly in a machine targeted at *pros*—but this way if your logic board bites the dust, there might at least be a chance of recovering your data with Apple's help. Keep making those backups though.
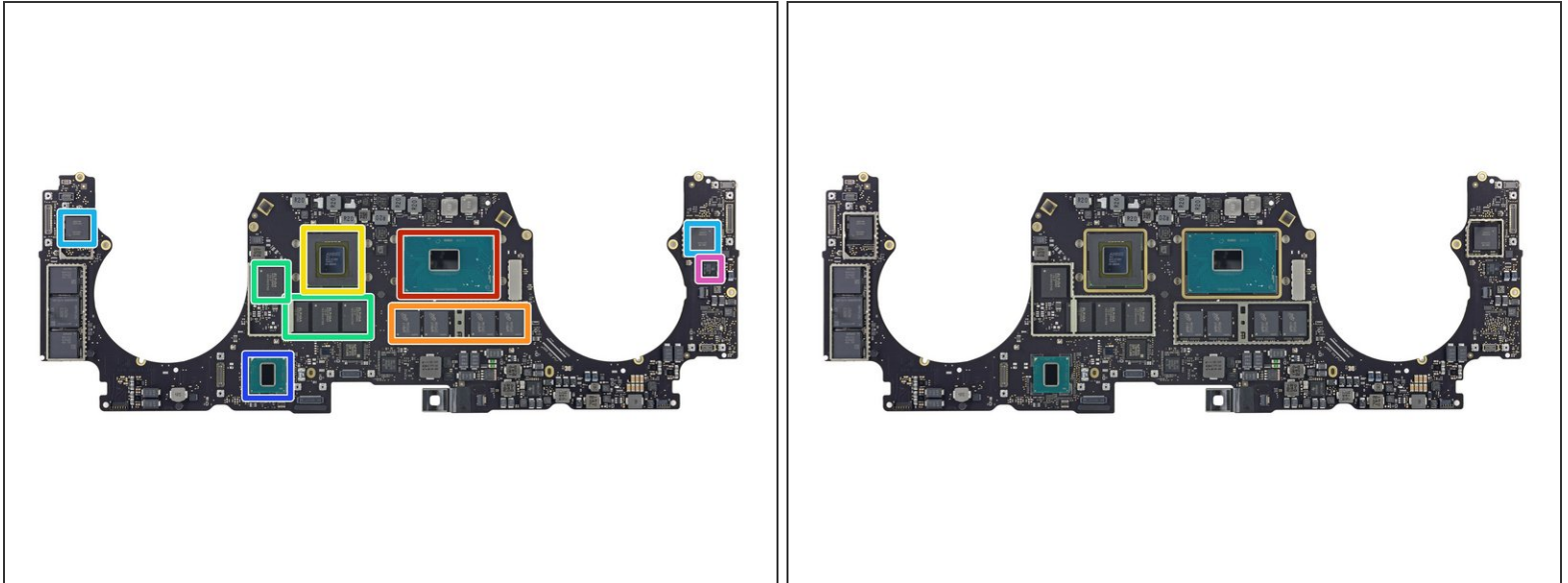
Step 4

- Removing the trackpad requires as little effort as it did with other two 2016 MBP models—we simply spin out thirteen T5 screws and the trackpad is ours.

- And this one is a monster, nearly holding its own beside an iPad mini 2.
  - (i) Now we know which trackpad in the family has been taking its vitamins.

- We're not surprised to find the same ICs on this trackpad as we did in both 13" MBPs. However, with the increased size, Apple had to add a second touch controller to digitize all that extra trackpad:
  - STMicroelectronics STM32F103VB ARM Cortex-M3 MCU
  - Broadcom BCM5976C1KUFBG Touch Controller x2
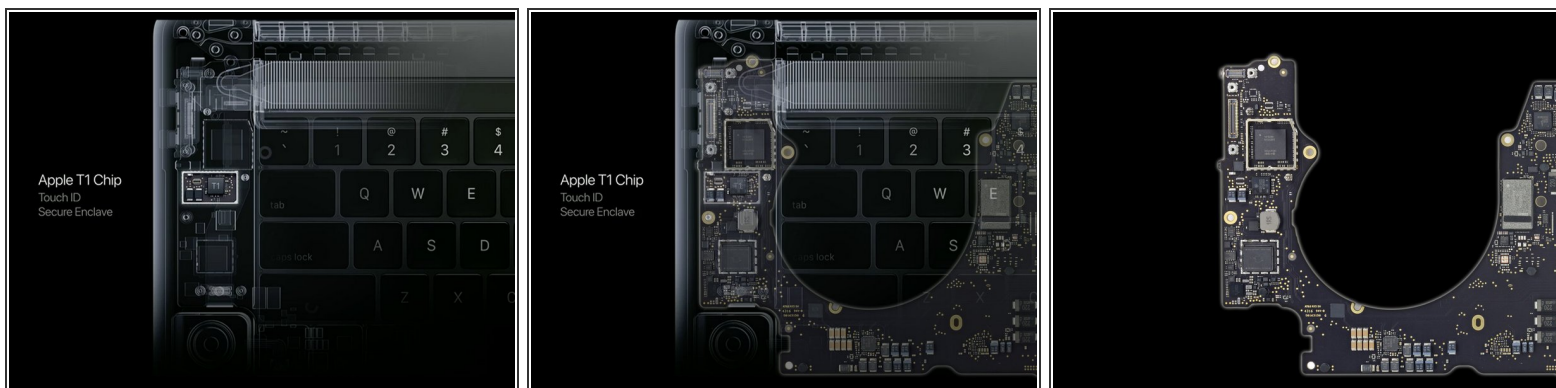 - Maxim Integrated MAX11291ENX 24-Bit, 6-Channel Delta-Sigma ADC

Step 5

- Moving right along, it's time to get this logic board out. It's a little wider in the middle, but shares the same [mustachioed symmetry](#) of its smaller sibling.

- Pulling off the new-and-improved heat sink (again, screwed through the back of the logic board), exposes the CPU and GPU.
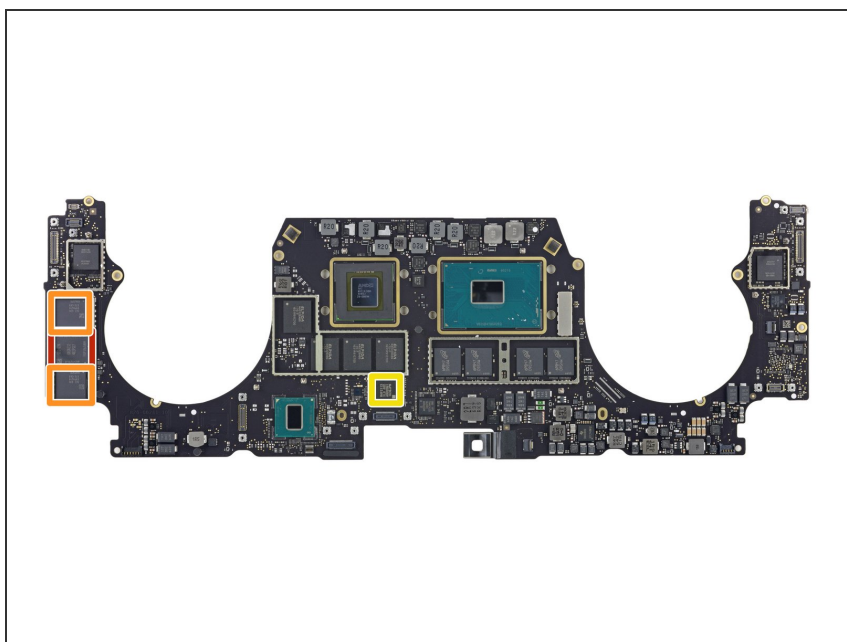
Step 6

- Time to take a gander at this ~~octopus~~ lobo and see what makes it the leader of the pack. Highlights include:

  - Intel Core i7-6700HQ 2.6 GHz (up to 3.5 GHz) quad-core processor

  - Micron MT52L1G32D4PG-093 4 GB LPDDR3 (four chips for 16 GB total)

  - AMD Radeon Pro 450

  - Elpida (Micron) EDW4032BABG-70-F 512 MB GDDR5 RAM (four chips for 2 GB total)

  - Intel JHL 6540 Thunderbolt 3 controller (one for each set of USB-C ports)

  - Intel SR2NH (likely a platform controller hub)

  - Texas Instruments CD3215C00 69AV2TW (labeled as Apple's T1 chip in their keynote)

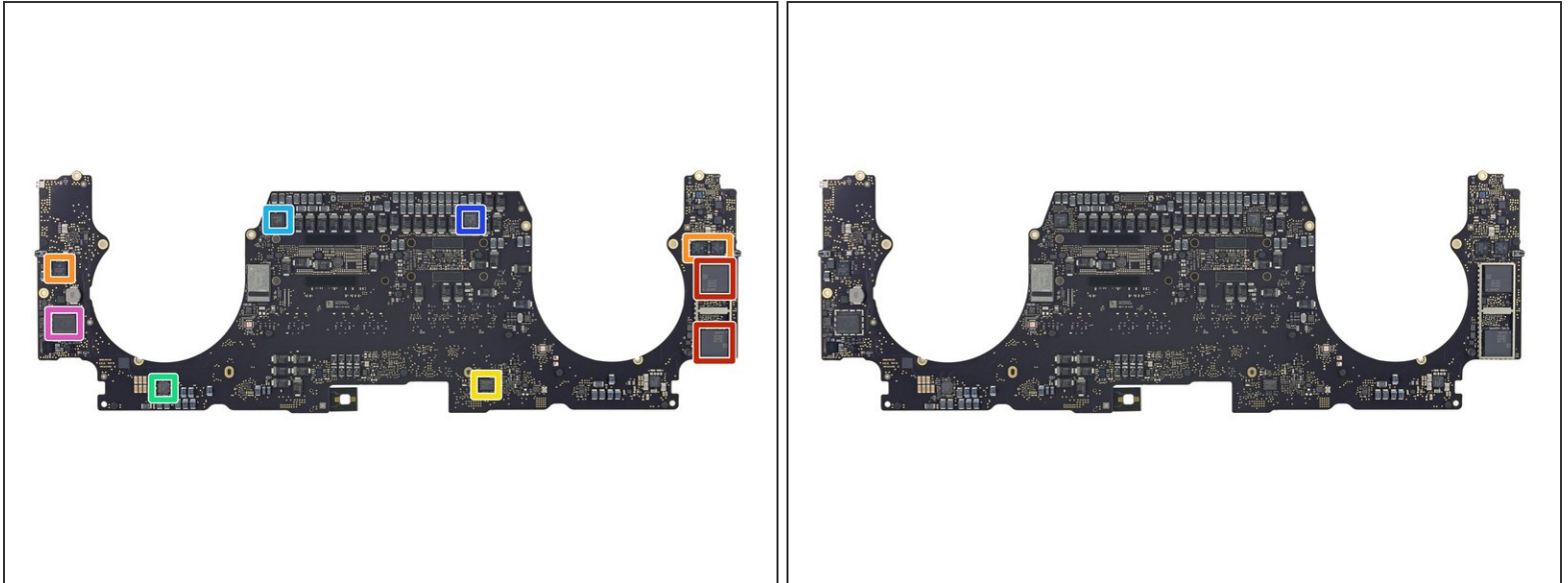This document was generated on 2019-09-17 07:54:20 AM (MST).

Step 7

- Here's a close up of that T1, er, [TI chip](#)?
  - Texas Instruments CD3215C00 69AV2TW

- We can't ID this guy, but it's in the same spot that Apple claim their T1 chip that powers the Touch Bar is.
  - ⓘ That's kind of a surprise, considering there's three similar ICs peppered over the rest of this logic board, and a pair of them in the [Function Keys model](#).
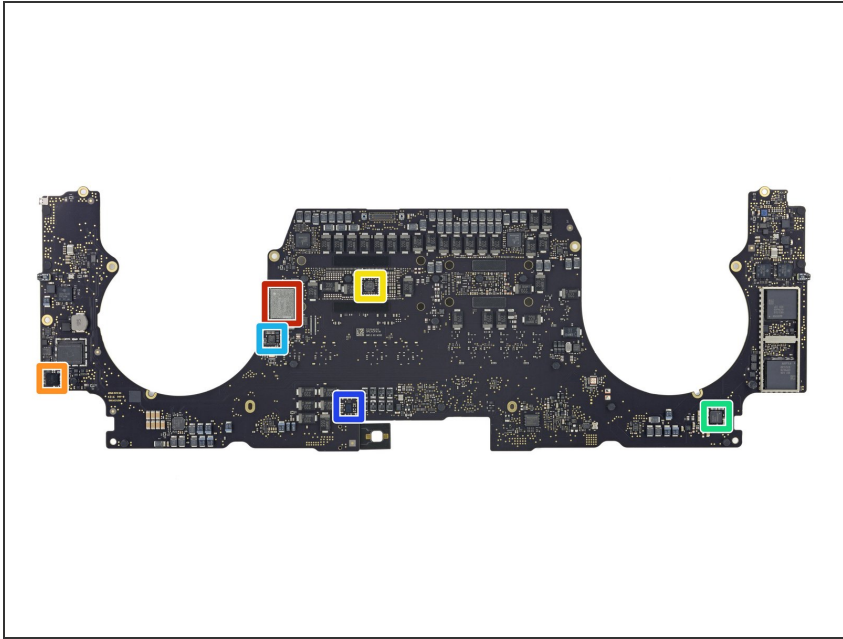
Step 8

- Other chips jockeying for position on this side of the board:
  - Samsung [K4E4E32](#) 512 MB LPDDR3 DRAM, likely with a [custom Apple-made SSD controller](#) layered beneath
  - Samsung K9PHGY8 flash storage (two 64 GB chips for 128 GB on this side)
  - Renesas [R4F2113XLG](#) H8S/2113 family microcontroller

Step 9

- Taking a look at the flip-side of the logic board, we find:

  - Samsung K9PHGY8 flash storage (two more 64 GB chips for 128 GB on this side and 256 GB total)

  - Texas Instruments CD32 15C00 69C2HQW

  - WinBond SpiFlash 25Q64FVIQ 64 Mb serial flash memory

  - Texas Instruments TPS51980A synchronous buck controller

  - Intersil 95828 HRTZ X630MSW

  - Intersil 6277A HRZ W630DWW

  - Apple APL1023 343S00137 (the same chip appeared in our teardown of the MBP 13" Touch Bar, and is very likely the T1 controller that runs the Touch Bar)

Step 10

- And the IC party continues:
  - Murata/Apple 339S00056 Wi-Fi Module (very similar to this Murata chip)
  - Apple 338S00193-A1 16348HIP
  - Texas Instruments TMP513A PMIC
  - S2FPS04X01 A1632
  - 969A0 TI67J P6EH
  - 9239HI B632E7

Step 11

- Anxious to get a peek at the third take on Apple's reengineered thermal architecture, we free the fans from the four T3 screws securing them to the rear case.

  - And they come out hassle-free. No glue on this puppy!

- ⓘ On the outside that is. Opening up this fan (right) takes some seriously aggressive prying against clips and adhesive compared to the screw-centric construction we saw in the 13" models (left).

- This fan is also sporting completely different blades from the ones we previously encountered.

  - 📌 And for those of you keeping score, they're marginally larger than their counterparts from the 13" model, measuring in at 46.6 mm compared to 42.3 mm.

Step 12

- After recently struggling to free the strongly adhered battery in the 13" MacBook Pro with Touch Bar, we decided to let this battery remain glued in its home.

  - ⓘ Does that make us lazy? Maybe... But we were still able to determine that this six cell battery offers a total of 11.40 V, and has a power rating of 76.0 Wh.

- This 15" MacBook Pro has a similar speaker grille when compared to its smaller 13" counterpart. Most of the grille doesn't include full through-holes, prompting us to question *why the dimples, Apple*?

  - Survey says: weight savers so it goes faster when you put wheels on it.

Step 13

📌 *Touch Bar: Take 2.*

- After once again accidentally separating the digitizer from the OLED panel, we turn our tools to the LED display.

- Two teardown engineers, an opening pick, X-Acto knife, isopropyl alcohol, a heat gun, and an iOpener all came to this OLED teardown party, but Apple's adhesive was *still* too much for our glue separation squad.

ⓘ Thwarted by the monstrous amount of adhesive holding the OLED panel in place, we resign to flecking away shards of glass and reminiscing.

Step 14

- Layout for the win!

Step 15 — Final Thoughts

REPAIRABILITY SCORE:

1 OUT OF 10

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- The MacBook Pro 15" with Touch Bar earns a **1 out of 10** on our repairability scale (10 is the easiest to repair):
  - The trackpad is easy to access and straightforward to replace.
  - Use of proprietary pentalobe screws makes servicing and repair unnecessarily difficult.
  - The entire battery assembly is strongly glued into the case, complicating replacement.
  - The processor, RAM, *and* flash memory are soldered to the logic board.
  - The Touch Bar adds a second, difficult-to-replace screen to damage.
  - The Touch ID sensor doubles as the power switch, and is paired with the T1 chip on the logic board. Fixing a broken power switch may require help from Apple, or a new logic board.

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