



# iMac Pro Teardown

We dropped \$4,999 to get our hands on the hot...

Written By: Jeff Suovanen



# INTRODUCTION

We dropped \$4,999 to get our hands on the hot new space gray Magic Mouse and Magic Keyboard—and Apple was generous enough to throw in a brand-new iMac Pro for no extra charge! Let's take it apart and see what makes it tick.

Know before you pro—follow us on [Facebook](#), [Instagram](#) and [Twitter](#) for the latest teardown news.

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## TOOLS:

- [T5 Torx Screwdriver](#) (1)
- [TR8 Torx Security Screwdriver](#) (1)
- [TR10 Torx Security Screwdriver](#) (1)
- [Phillips #00 Screwdriver](#) (1)
- [Phillips #1 Screwdriver](#) (1)
- [iMac Opening Wheel](#) (1)
- [iMac Service Wedge](#) (1)
- [iOpener](#) (1)
- [Spudger](#) (1)
- [Plastic Cards](#) (1)
- [Tweezers](#) (1)
- [T3 Torx Screwdriver](#) (1)

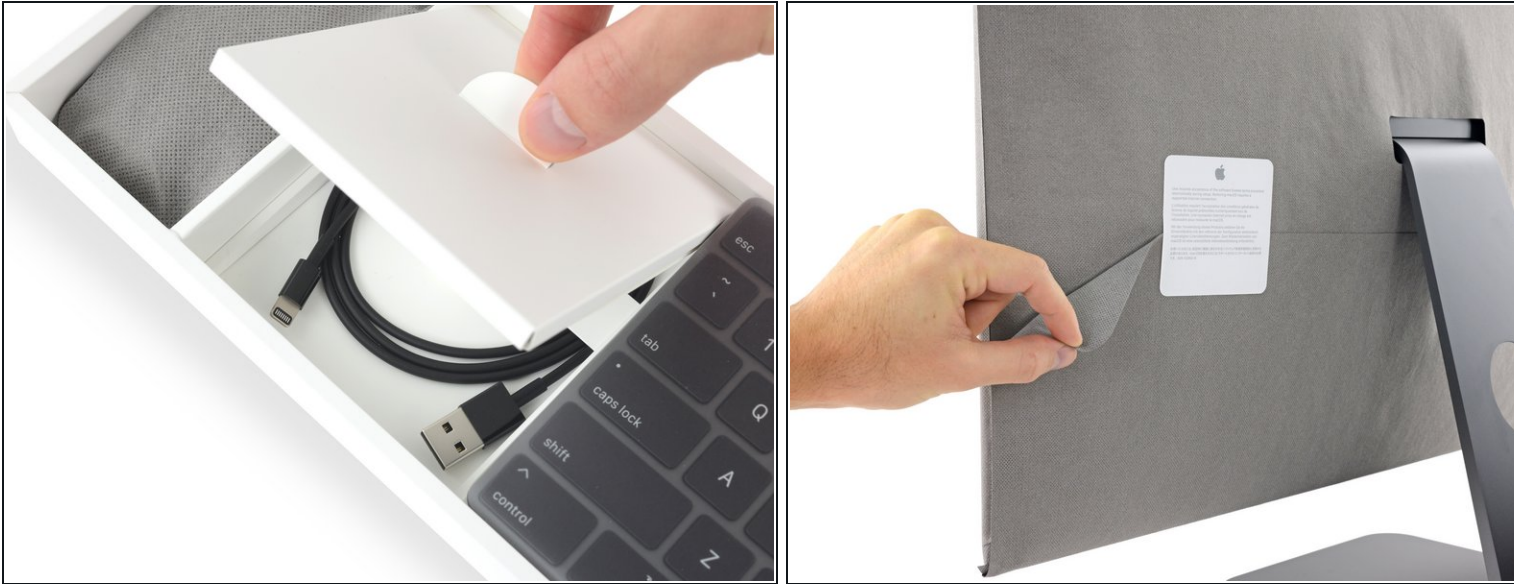
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## Step 1 — iMac Pro Teardown



- Our teardown iMac Pro sports these "entry-level" specs:
    - 8-core, 3.2 GHz Intel Xeon W processor with Turbo Boost up to 4.2 GHz
    - 32 GB (4 × 8 GB) of 2,666 MHz DDR4 ECC
    - AMD Radeon Pro Vega 56 GPU with 8 GB of HBM2 memory
    - 27" display with 5120 × 2880 resolution and support for one billion colors (P3 color gamut)
    - 1 TB SSD
  - Higher-end configurations with up to 18 processor cores will be available in a few weeks' time —if you're looking to spend \$13,000 USD or more, that is.
- ☐ We're prepared to sacrifice this unit in the name of science... but we're sure hoping not to. Fingers crossed that it goes back together in one piece!

## Step 2



- We can hardly contain our excitement as we unbox the magnificent Space Gray accessories—Magic Mouse, Magic Keyboard, and \*gasp\*
- ... a **black** Lightning-to-USB cable.
- We'll be back to continue the teardown after we recover from shock and peek out the window for signs of [airborne ungulates](#).
- Weirdly, there is still absolutely no provision—dongle or otherwise—for using the Lightning EarPods you get with your iPhone 7, 8, or X on your iMac Pro. Does it seem odd that these incompatible products are coming from, of all places, Apple?
- Let's peel back the iMac Pro's fancy fabric wrapping and check the port situation ... just to be sure.

## Step 3



- Here's the connectivity sitrep:
  - 3.5 mm headphone jack
  - SDXC card slot
  - Four USB 3 ports
  - Four Thunderbolt 3 (USB-C) ports
  - 10 Gb ethernet port
- In case you were wondering, this here is Apple model number **A1862**.
- [We tried sticking RAM in these slots on the back](#). It didn't work.

## Step 4



- We're betting the opening procedure will be the same as it was on the [iMac 5K](#)—which is to say, if you can use a pizza cutter, you can open an iMac Pro.
- With all that glass out of the way, we have a perfect view of the iMac Pro's pristine interior. Say, wouldn't this make a lovely wallpaper for someone?

## Step 5



- The first component out is the *enormous* dual-fan cooler.
- Looks like Apple sacrificed the 5K's [full-size desktop hard drive](#) (not that you'd want that in a pro machine) to make some room here.
- Also sacrificed to the cooling gods: the external RAM access hatch. Sad face.
- In exchange, we get a big rear vent and an 80% increase in cooling capacity.

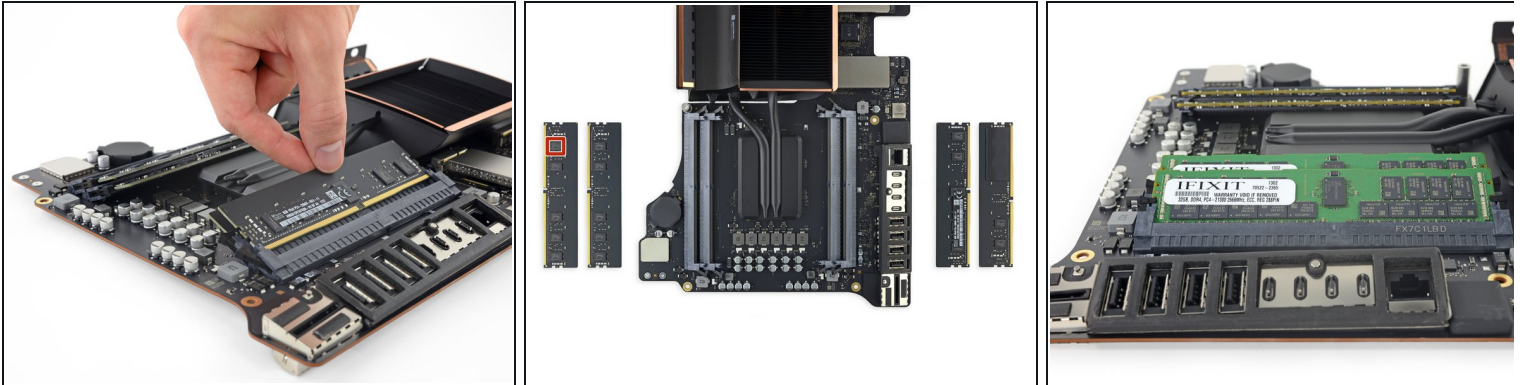


## Step 6



- AirPort card functions are consolidated onto the main board—for some unknown reason, Apple ditched the modularity from the 5K model. But we did pick up this funky new retaining clip for the coax cables.
- The power supply connects to the logic board by way of not one, not two, but *four* shiny terminals secured with Torx screws.
- ① This design is much closer to [what we saw on the 2013 Mac Pro](#) than the plasticky connectors we're used to [ripping out of the iMac 5K](#).
- It also makes accessing logic board components (apart from the RAM of course) much, much easier. With the power supply tucked back into the rear shell, we can remove the board right away. Let's do that!

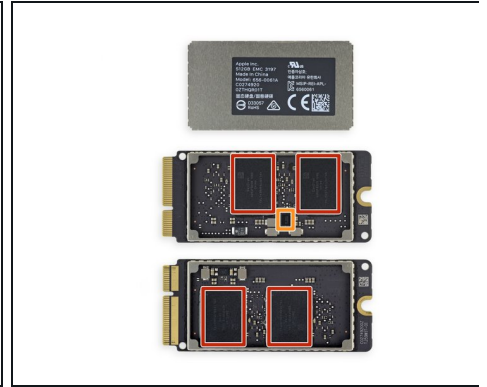
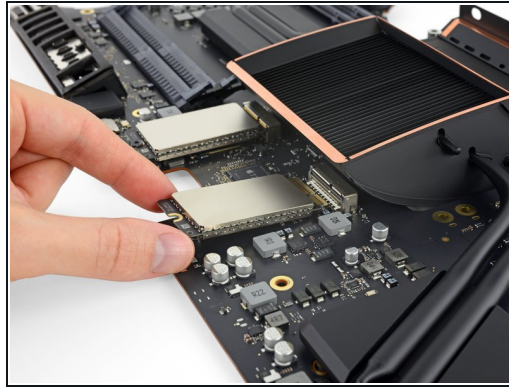
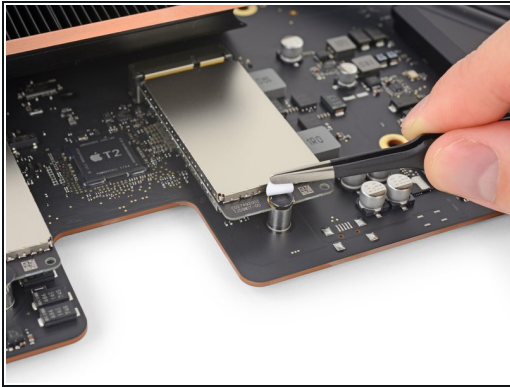
## Step 7



- With the board out, the first order of business is inspecting the RAM.
- There's no way around it: getting here was a major undertaking compared with the [dead-simple RAM access hatch](#) on the back of all previous 27" iMacs.
- That said, we have a spot of good news: these are standard 288-pin DDR4 ECC RAM sticks, with standard chips on board:
  - SKhynix [H5AN8G8NAFR-VKC](#) 2,666 MHz DDR4
- We waste no time in testing a little upgrade: How does four 32 GB modules for a "Maxxed" total of 128 GB sound?
- After speedily reassembling everything, we're pleased to report that [the result is epic](#). If you want to try it at home, pick up a [Memory Maxxer RAM Upgrade kit](#).

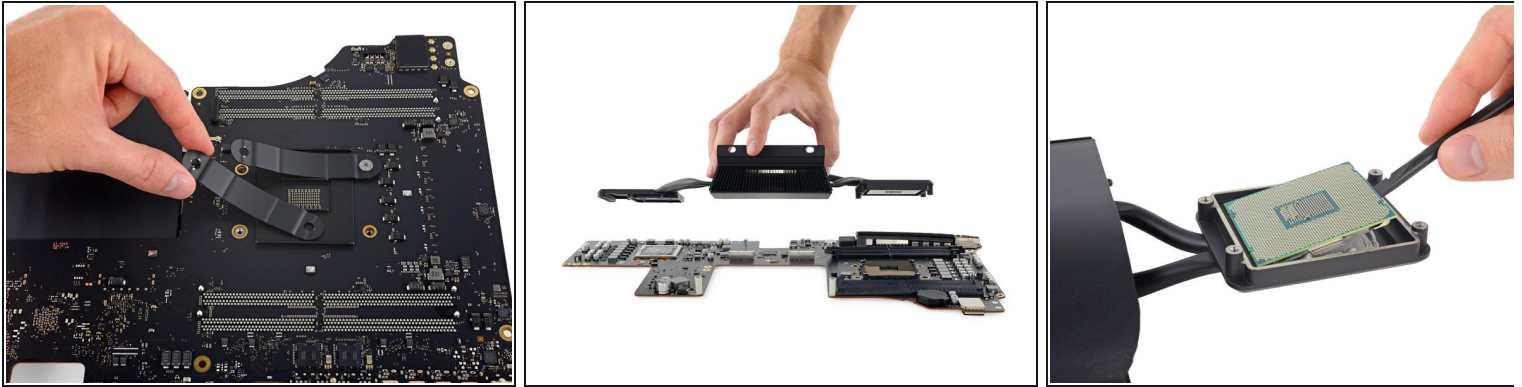


## Step 8



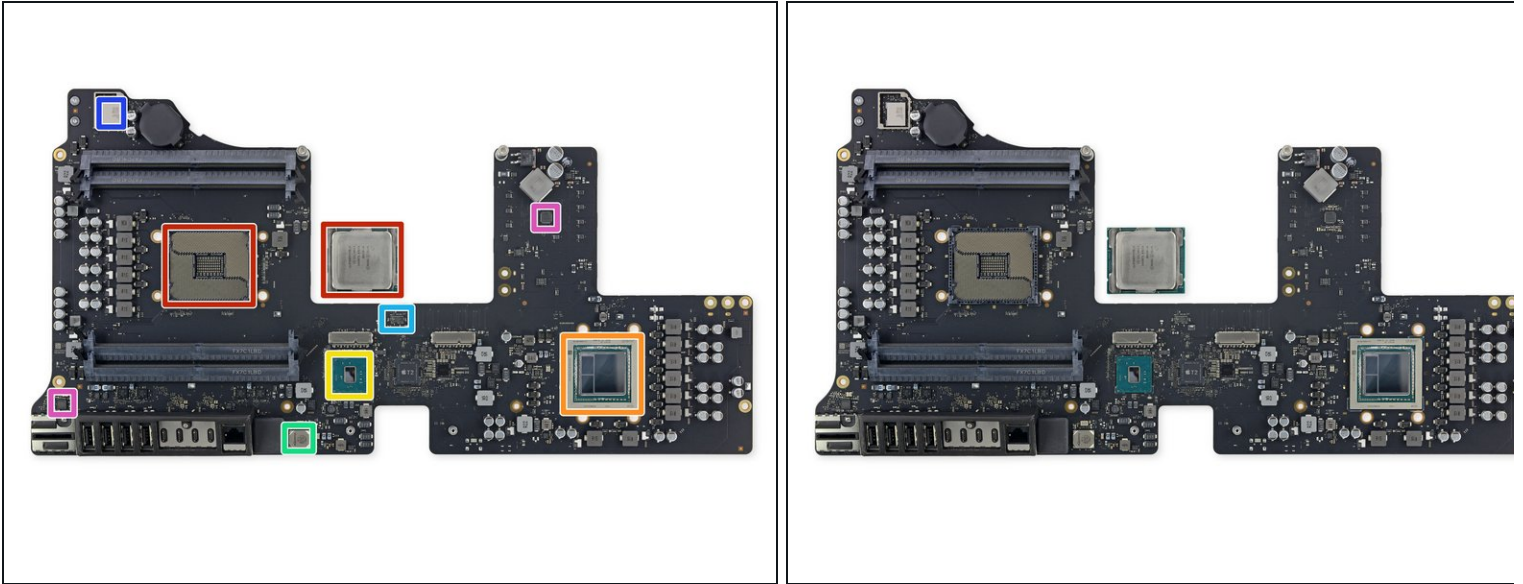
- Back to the business of taking things apart: next up are these twin "SSDs".
  - Unlike a standard SSD, which has the controller logic onboard, these raw flash modules only have an interface buffer—the PCIe/NVMe controller lies elsewhere. More on that in a bit.
- Under a couple stickers we find some Torx screws. Off they go!
- Each blade is designated Apple EMC 3197, model 656-0061A.
- Popping the shields off, we encounter some chips:
  - SanDisk SDRQF8DC8-128G (four per card, two top and two bottom, for a total of  $512\text{ GB} \times 2 = 1024\text{ GB}$ )
  - Apple 338S00285 power management IC (likely)

## Step 9



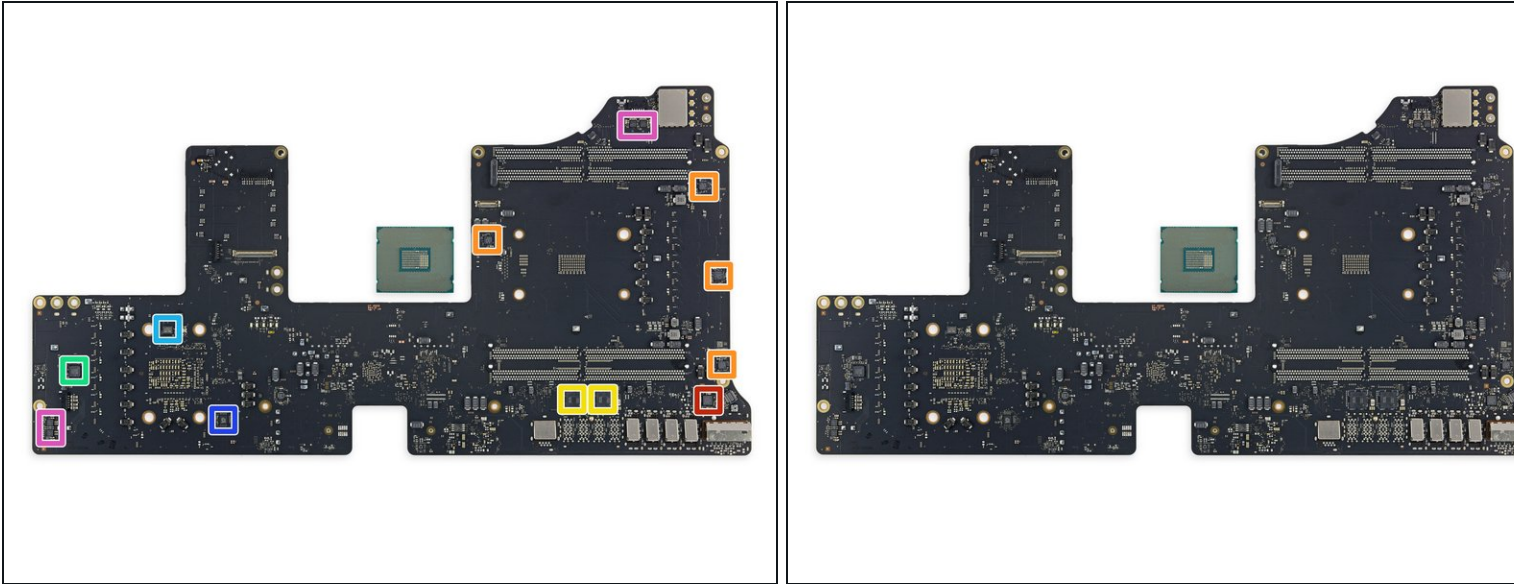
- Do you want to know what's hiding under this enormous heat sink? So do we. After twirling away a few more Torx screws and tossing aside the mounting springs, we have an answer:
- One GPU, which sadly is BGA-soldered in place. And at the opposite side, one workstation-class Xeon processor—*not* soldered in place.
- ★ It's too early to say how feasible a CPU upgrade might be—the chip appears to be custom-made for Apple by Intel. But upgrades seem at least theoretically possible.
- It might be nice if your \$5,000+ workstation could get an upgrade once in a while, rather than a full replacement... right?

## Step 10



- We've cleared the board, and it's time for a rundown of the silicon:
  - Intel Xeon W-2140B (Skylake, 14 nm—likely an underclocked [W-2145](#) to keep the temps in check), 3.2 GHz CPU with Turbo Boost up to 4.2 GHz, paired with what could well be a standard [LGA 2066](#) socket
  - AMD S5J68 1747 GPEW0333S3 SS63HBN181747US40104 [Radeon Pro Vega 56](#) GPU with integrated 8 GB of HBM2 memory (on-package)
  - Intel X723D733 E1 05780 (SR3PV?) - likely platform controller hub
  - AQUANTIA AQtion [AQC107-B1-C](#) PCIe to multi-gigabit ethernet controller
  - Pericom Semiconductors [PI3PCIE3412AZHE](#) PCIe 3.0 mux/demux switch
  - Apple/Universal Scientific Industrial (USI) 339S00428 00012021 Wi-Fi/Bluetooth module
  - Genesys Logic [GL3227A](#) SD 4.0 memory card controller, and Texas Instruments LP8565A13 (likely LED backlight driver)

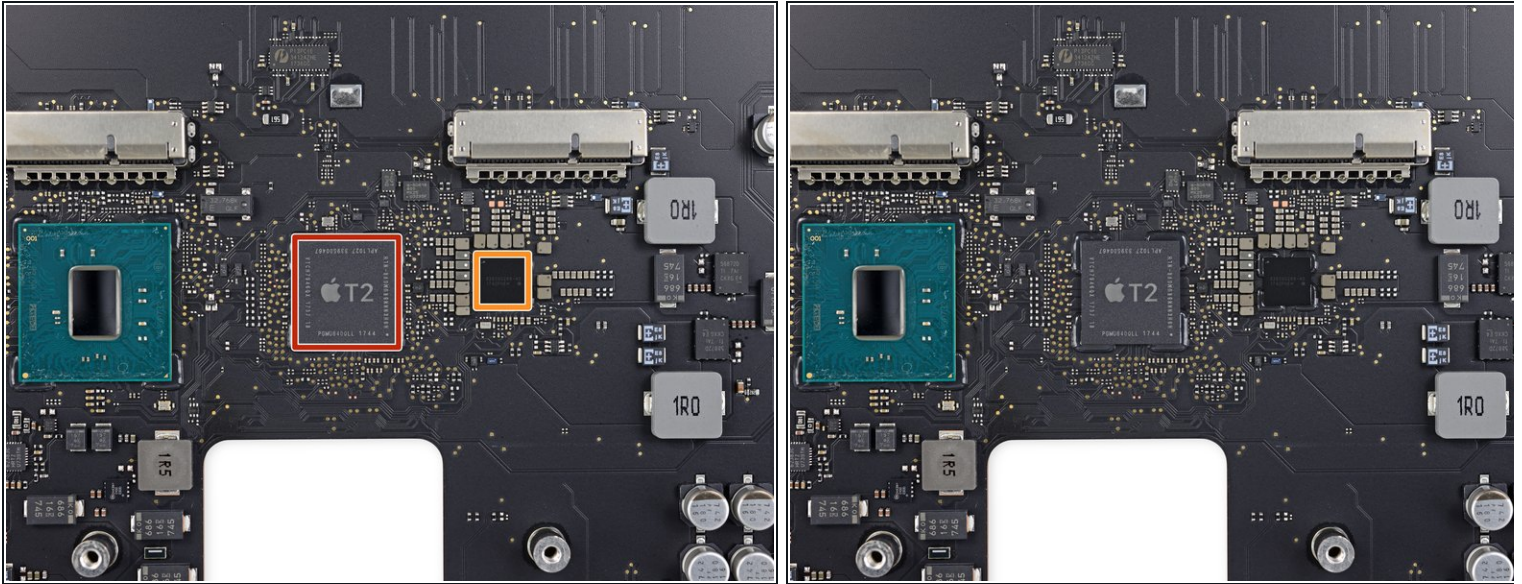
## Step 11



- Flip side:

- Cirrus Logic CS42L83 audio/DAC
- 3x Infineon (formerly Primarion) [PXE1110CDM](#) and PXE1610CDN multiphase digital controllers
- 2x Intel [JHL6540](#) Thunderbolt 3 controller
- International Rectifiers IR35217 power stage controller
- Macronix MXIC [MX25L4006EZNI](#) CMOS serial flash memory
- NXP [PCAL6524](#) I/O expander
- 4x Texas Instruments TAS5764L audio amplifiers

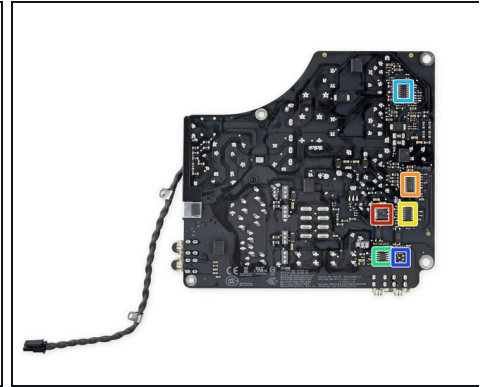
## Step 12



- Last but far from least, hovering near the SSD slots, we have two custom Apple chips:
  - Apple T2 339S00467 layered over SK Hynix [H9HKNNNBRUMUVR](#)-NLH LPDDR4
  - Apple 338S00268—this chip's a bit of a mystery. In our initial excitement we thought it was the [rumored A10 Fusion coprocessor](#), first seen in the [iPhone 7](#), but the package size is too small (roughly 7.4 mm each side). Best guess: this is an Apple/Dialog Semi power management IC.
- ⓘ The successor to the T1 chip introduced in 2016's MacBook Pro with Touch Bar, the T2 is tasked here with all the functions of the [SMC](#), image signal processing for the camera, audio control, and SSD controller, and Secure Enclave, *and* a hardware encryption engine. Whew!
- The downside to all this added functionality and security is [a major headache if your iMac Pro ever has to be restored](#).



## Step 13



- With the logic board out of the way, we can extract the 500 Watt power supply.
- Manufactured by AcBel Polytech Inc., it accepts 100-240 Volts AC, and packs a little silicon of its own:
  - STMicroelectronics [STD4N80K5](#) 3 A N-channel MOSFET
  - STMicroelectronics [L6599A](#) high-voltage resonant controller
  - ON Semiconductor [NCP1336B](#) current mode controller
  - Diodes Incorporated [AP4310A](#) dual operational amplifier w/ voltage reference
  - ON Semiconductor [NCP1631](#) 2-phase power factor controller
  - Diodes Incorporated [AP2125K-4.2TRG1](#) 300 mA LDO regulator



## Step 14



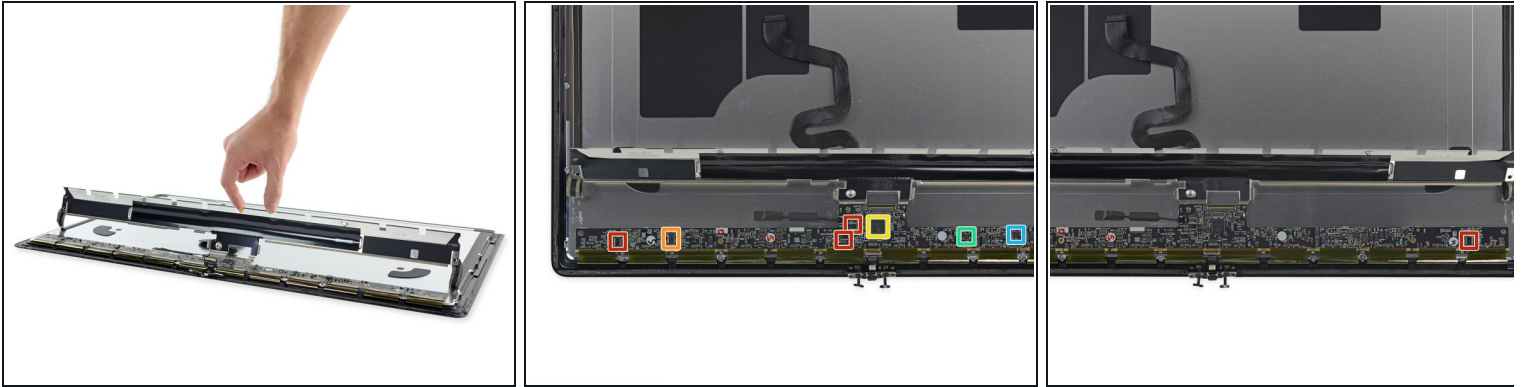
- This iMac's shell is looking a bit bare, but we're not done yet: the "enhanced stereo speakers" are next.
- Early reports are that these speakers live up to the hype: they're [the best-sounding speakers you can get on a Mac](#).
- ...until, we suspect, you can pair it with a [Homepod](#)—which should take the whole experience to the next level. We won't know for sure until the Homepod finally hits shelves sometime in 2018. (Is it just coincidence that it looks a bit like a [Mac Pro](#)?)

## Step 15



- We've scoured this chassis for parts, and there's not much left—except for the outrageously awesome spring-loaded hinge mechanism that supports the display.
- ⓘ If you opt for Apple's [VESA mount adapter kit](#), you'll get to indulge in a rare moment of Apple-sanctioned disassembly of your iMac Pro: inserting a card in the back disengages the spring, unveiling the row of Torx screws securing the stand.
- This is probably the one *and only* time Apple will sell you a screwdriver and tell you to have at it.
- Of course, if you're reading this, there's a good chance you're already [fully prepared](#).

## Step 16



- [Time to take a closer look at that display](#). Turns out it uses the same [display panel we found in the iMac 5K](#): LG Display model **LM270QQ1**.
  - ⓘ That said, the cabling arrangement and webcam hardware have been moved around—so you can't swap displays between models.
- We peel up the long strip of shielding along the bottom to reveal the chips:
  - Texas Instruments [NH245](#) 8-Bit Dual-Supply Bus Transceiver
  - Texas Instruments [BUF16821](#) Programmable Gamma-Voltage Generator and Vcom Calibrator
  - Parade Technologies DP665 LCD [Timing Controller](#)
  - Texas Instruments [TPS54320](#) 3A synchronous step-down SWIFT™ converter
  - Texas Instruments [TPS65168](#) High Resolution Fully Programmable LCD Bias IC for TV

## Step 17



- That's a wrap friends. Time to reassemble this beast with some fresh thermal paste and see how it fares as a gaming rig.
- In case you were wondering: Yes, it goes back together just fine. We'll have a step-by-step upgrade guide for you soon!



- iMac Pro Repairability Score: **3 out of 10** (10 is easiest to repair)
  - The RAM and CPU are both modular, meaning repairs and upgrades are a go—despite what Apple tells you.
  - The dual SSDs are modular, but custom-made by Apple, complicating replacement.
  - Cutting the tape to open the iMac isn't too hard (with the right tools), but it must then be replaced to complete any repair.
- Key replaceable components are buried behind the logic board, requiring a lot of disassembly for access.
- The loss of the external RAM access hatch makes for *much* more challenging upgrades compared with the 27" iMac 5K.
- The GPU is BGA-soldered in place—potentially a major drawback on a "pro" workstation. No easy graphics upgrades are possible, so choose your configuration wisely.