Microsoft Surface Pro 6 Teardown

Teardown of the Microsoft Surface Pro 6, performed on October 16, 2018.

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INTRODUCTION

Microsoft has decided once again to grace their laptops tablets Surfaces with numbers. This year’s Surface Pro 6 comes with a sleek new black paint job and the first-ever quad-core processor in a Surface device! What else will we find inside? Only one way to find out—let’s tear it down!

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TOOLS:
- iOpener (1)
- Suction Handle (1)
- iFixit Opening Picks set of 6 (1)
- T3 Torx Screwdriver (1)
- T5 Torx Screwdriver (1)
- Tweezers (1)
- Spudger (1)
New Surface, new specs (sorta):

- 12.3" PixelSense display with 2736 × 1824 resolution (267 ppi)
- 8th-Gen (Kaby Lake R) quad-core Intel Core i5 processor with Intel UHD Graphics 620
- 8 GB RAM (16 GB optional)
- 128 GB solid-state storage (256 GB, 512 GB, and 1 TB configurations optional)
- 8 MP rear-facing camera with 1080p video, and 5 MP / 1080p front-facing Windows Hello camera
- USB 3.0, microSDXC, Mini DisplayPort, SurfaceConnect, and 3.5 mm audio ports
- 802.11a/b/g/n/ac Wi-Fi, Bluetooth 4.1
Step 2

- Looks like we have an extra Surface Pro 6—err, wait, one of those is last year's Surface Pro.

- Well, on the outside not much has changed from last year. Still the same case, hinge, and relatively healthy number of ports.

  Noticeably absent for 2018, however, is the ever-popular USB-C port that found its way onto the Surface Go.

- We have to look pretty close to tell these Surfaces apart. Even the model number under the kickstand is the same as last year: 1796.
The Surface Pro series has a few different configurations, and they all come standard with upgraded adhesive.

Fortunately, we've got a tried-and-true recipe for Surface screen separation success:

- Step 1: apply iOpener liberally.
- Step 2: grab an Opening Pick and a Suction Handle, and fight for dear life through Microsoft's gauntlet of adhesive.
- Step 3 (optional): get impatient, break screen.

Luckily, we don't run into any surprises as we free the display—everything's pretty much the same as before, save for an extra display cable compared to the Surface Go.
Step 4

- We interrupt this disassembly to bring you display chips!
  - Microsoft X904169, possibly N-Trig's Surface Pen controller and X904163 (likely touchscreen line driver)
  - Analogix ANX2604, possibly a DisplayPort converter.
  - Macronix MX25U1635F 16 Mb serial NOR flash memory
  - Silicon Works SW5077 power management
  - Likely Silicon Mitus SM4063B programmable gamma buffer
  - LG makes this display, which seems suspiciously similar to the one we found on the Surface Pro 5.

ℹ️ Could they be cross-compatible? Yes they could—we dropped last year's display into our Surface Pro 6, and it worked almost like someone planned it that way.
Step 5

- With the display out of the way, we can get to the good stuff.

- It seems Microsoft has been meddling with their passive cooler a bit—it looks like last year's, but with an extra little pipe down the left side—plus some funky heat-spreading pads.

  It's impressive to see Microsoft continue to bump up processing power without much additional heat management. It will be interesting to see how well this new setup handles the heat under load.

- Looking south, the similarities continue, with a quad-cell battery taking up most of the case.

- On the plus side, all the screws so far are standard Torx. Let's get to twirling them out!
Searching for the gold at the end of the heatsink, we peel back some ... things. The Surface Pro 4 had a copper heat spreader, but these look like graphite.

Looking under those heat spreaders didn't lead to any gold, but we're free to remove the heatsink now.

With the heatsink dispatched, we have access to the heat generators—all that silicon!
New chips and stale chips (mostly the latter):

- Intel Core i5-8250U processor
- Samsung K4E6E304EB-EGCF 2GB LPDDR3 DRAM (4 chips for 8 GB total)
- SK Hynix HFB1M8M0331A (BC501) 128 GB NVMe SSD
- Winbond 25Q128JVPQ 128Mb serial flash memory
- Marvell W8897 802.11ac, NFC, and Bluetooth SoC
- Nuvoton NPCT650SBCWX Trusted Platform Module
- Realtek RTS5343 microSD card reader controller
Step 8

- On the flip side:
  - Freescale/NXP M22J9VDC Kinetis K22F 512KB 120 MHz ARM Cortex-M4 based MCU
  - Texas Instruments BQ25700A battery buck-boost charge controller
  - Realtek ALC3269 audio codec
Step 9

IC Identification, pt. 2:

- Monolithic Power Systems MP2949А tri-loop digital multi-phase controller w/ PMBus interface
- Monolithic Power Systems NB681 6 A synchronous buck converter
- Monolithic Power Systems NB679A and NB680GD 8 A synchronous buck converter
- Monolithic Power Systems NB685A 12 A synchronous buck converter
- Monolithic Power Systems MP86901-A and MP86902-B power phase
- Texas Instruments CSD87334Q3D 20 A power block
- Texas Instruments TLV62085 3 A step-down converter
**IC Identification, pt. 3:**

- Texas Instruments **TPS62140** 2 A step-down converter
- Texas Instruments **TPS62175** 0.5 A step down converter
- Monolithic Power Systems **MP3376A** 8-ch. WLED driver
- Monolithic Power Systems **MP2370DGT** white LED driver
- Texas Instruments **TPS70933** 150 mA LDO regulator
- Texas Instruments **TPS3700** 18 V voltage detector
- Texas Instruments **TLV3011** comparator w/ voltage reference
Step 11

- **IC Identification, pt. 4:**
  - Bosch Sensortec BMI160 3-axis accelerometer/gyroscope
  - Bosch Sensortec BMA254 accelerometer (likely)
  - ON Semiconductor CAT24C16 16 Kb serial EEPROM memory and Winbond W25X40CL 4 Mb serial NOR flash memory
  - Texas Instruments SN74AVC2T245 dual-supply bus transceiver
  - Texas Instruments TS3USB30E high-speed USB 2.0 1:2 mux/demux switch
  - Nexperia (formerly NXP Semiconductor) 74LVC125A 3-state quad buffer/line driver
  - Nexperia (formerly NXP Semiconductor) 74AUP1G32 2-input OR-gate
Step 12

- We've once again come to that inevitable junction in any Surface teardown: take out the heavily-glued battery, or leave it be?
- Considering there are no stretch release battery tabs, and we've had our fill of prying, we opt to let the beast slumber for now.
- This battery weighs in at 45 Wh (7.57 V x 5940 mAh), exactly the same as last year.
- That's expectedly larger than its more mobile sibling, and even a little larger than the most recent iPad.
Really scraping the bottom of the barrel case, hoping for something new, we pull out the speakers and cameras.

- The cameras are still hidden under the bracket holding the antennas (which are incredibly easy to mangle upon opening).

- The speakers are still corner mounted triangles for that surround sound feel.

- I guess there's not much this tablet could do to raise its repairability score at this point.... But a fixer can dream...
Here's a shucked Surface for your viewing pleasure! In theory this is a tablet, but in our reality it was a pain in the butt!

The Surface Pro 6 brings more processing power (and heat) without changing its cooling solution much. Will the new thermal spreaders on the heat sink be enough to handle the power boost? Only time will tell.

After hearing rumors of a modular Studio, we were hoping this generation of Surface Pro would steer that direction. Alas, it's just as un-upgradable and un-repairable as ever, and it doesn't even get a USB-C port.
Microsoft's Surface Pro 6 earns a 1 out of 10 on our repairability scale (10 is the easiest to repair):

- To the extent that screws are used, they are all standard Torx fasteners.

- This tablet still has a headphone jack, which is modular and replaceable, if you can get to it.

- All repairs require first removing the display assembly—which is stubbornly glued in place, expensive, and prone to shattering.

- The battery is firmly glued in place, with its connector pinned under the motherboard—requiring near-total disassembly for service.

- Once upon a time, Surface Pro storage was removable—but not in this version.

- Complex construction makes all disassembly and reassembly tedious in comparison to other tablets.