

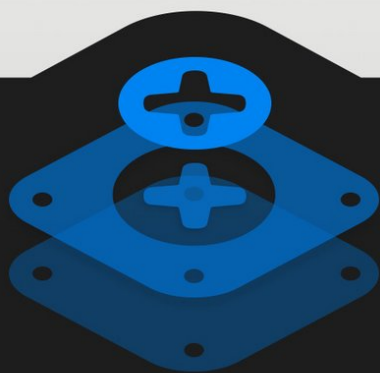


# Sony a7R II Teardown

Teardown of the Sony a7R II on August 18, 2015.

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# Sony A7R II



# TEARDOWN

## INTRODUCTION

The a7R II is Sony's second shot at a professional-grade mirrorless interchangeable-lens camera, but this time, Sony claims it can keep up with any Canon DSLR. While trial by fire may be the best way to judge a camera, trial by teardown is our specialty. With a \$3,199 price tag and no reflex system, we hope this mostly-solid-state camera comes with an equally hefty repairability score.

Curious about what drives these new devices? Let us shed some light on them! Follow us on [Facebook](#), [Instagram](#), or [Twitter](#) to focus on the latest teardown news!



### TOOLS:

- [JIS Driver Set](#) (1)
  - [Tweezers](#) (1)
  - [Spudger](#) (1)
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## Step 1 — Sony a7R II Teardown



- The a7R II has landed! Sony's much-ballyhooed second go at a pro-grade, mirrorless, interchangeable-lens camera has our full attention. Let's see what new tech makes this camera shine:
  - 42.4 MP Exmor R CMOS back-illuminated sensor
  - BIONZ X image processor
  - 5-axis in-body optical image stabilization
  - 4K video recording
  - Fast hybrid AF system with 399 focus points
  - NFC and Wi-Fi connectivity
- The specs alone are enough to give us itchy shutter fingers—but, first things first. It's teardown time.

## Step 2



- The rear of the camera is adorned with an articulating 3 inch LCD. This is a TFT LCD display with 1,228,800 dots. Dots? What are dots? [TIL a dot is \(usually\) a third of a pixel.](#)
- ① Since nobody lists a measurement other than 3 inches for this display, we busted out the calipers and calculator. At 2.5 " x 1.75", and converting from dots to pixels, we came up with around 270 ppi.
- In short, less than an iPhone (326 for the iPhone 6), but certainly high-density. And that's good, considering that no mirror means no optical viewfinding.
- The left side of the camera body houses plenty of I/O options—an HDMI micro connector, 3.5 mm stereo microphone and headphone terminals, and a micro-USB connector.

## Step 3



- With the body cap off, we catch our first glimpse of the world's first full-frame back-illuminated sensor (BIS) and noiseless shutter.
  - ① Smile for the lensless camera! We got the basic package, which unfortunately meant no lens included.
- Despite being a part of the "Alpha" series, the a7R II uses an E-mount system.
  - ① With an adapter, this alpha can stay true to its alliterative A-mount lenses.

## Step 4




- We find the same NP-FW50 7.2 V, 1020 mAh swappable battery pack as the original a7R and the rest of the Sony Alpha lineup—good news for anyone building a fleet of flagship mirrorless cams.
- ❗ Sony advertises a 290-photo battery life (up to 340 without the electronic viewfinder), a minor increase from the 270-photo limit of last year's model.
- Sony kindly included not one but two batteries. You can also charge the battery [inside](#) the camera (USB adapter included), and even power the camera entirely via USB.



## Step 5



- We *turn* our attention to the JIS screws securing the bottom plate, mouths watering in anticipation of the smörgåsbord of tech beneath...
    - ...And find the tripod mount plate.
  - It may not be glamorous, but the tripod mount slides out with ease, great news repairability. Tripod-happy owners can rest easy.
-  For those of you who were wondering, yes, the a7R II is FCC compliant.

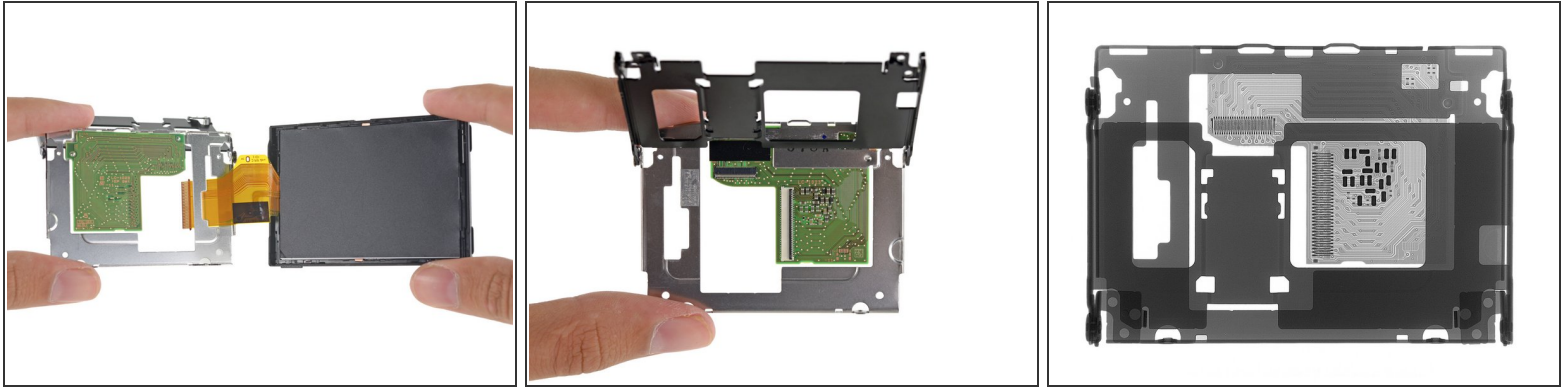
## Step 6



- The bottom panel was a bit of a red herring so we investigate the LCD arm for weak spots.
- The rear LCD panel is connected by a thin ribbon cable that disappears into the back of the camera body. We'll probably have to deal with that before we can crack open this camera...
- Luckily, a small door on the back of the display assembly opens the way to a tiny ZIF securing the cable.
- We allow ourselves a brief detour to investigate the display before delving into the camera body.



## Step 7



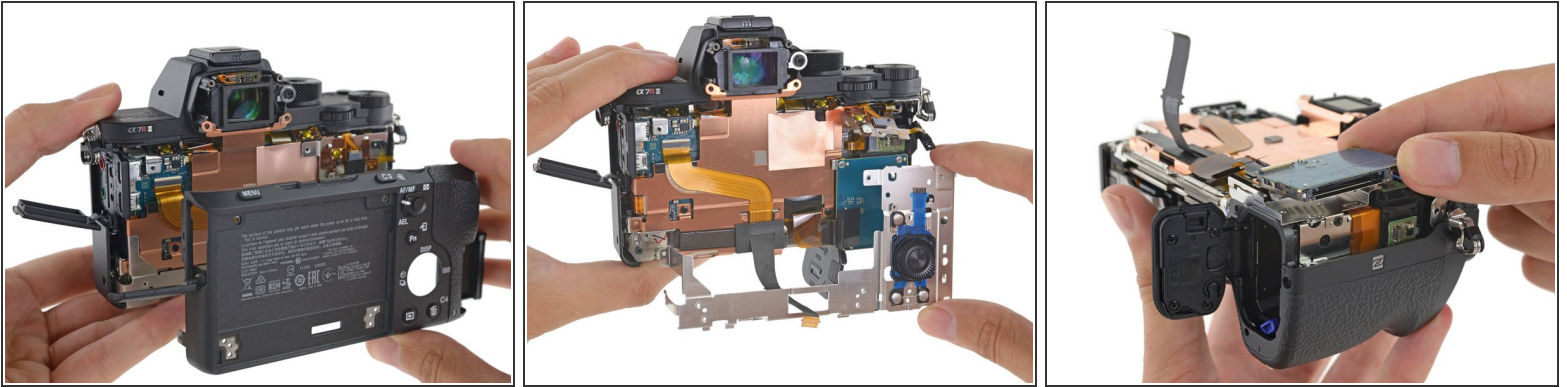
- Peeling the LCD from the articulating bracket reveals a PCB packed with passives.
- This little circuit board is probably a breakout board for the LCD, allowing for a thinner cable from the camera.
  - The capacitors probably reduce noise in the display; they're clearly visible as a little cluster of dark spots in this X-ray image, courtesy of our buds at [Creative Electron](#).
- Display technology is finally close to passing its Turing test: being indistinguishable from the mirror views in high-end cameras. This leap in tech has allowed for the viability of mirrorless cameras like the A7 series.
- ① Apple bills these as Retina displays, but since a camera's display has to be much closer to your eye, the pixels have to be that much smaller to seem invisible.

## Step 8



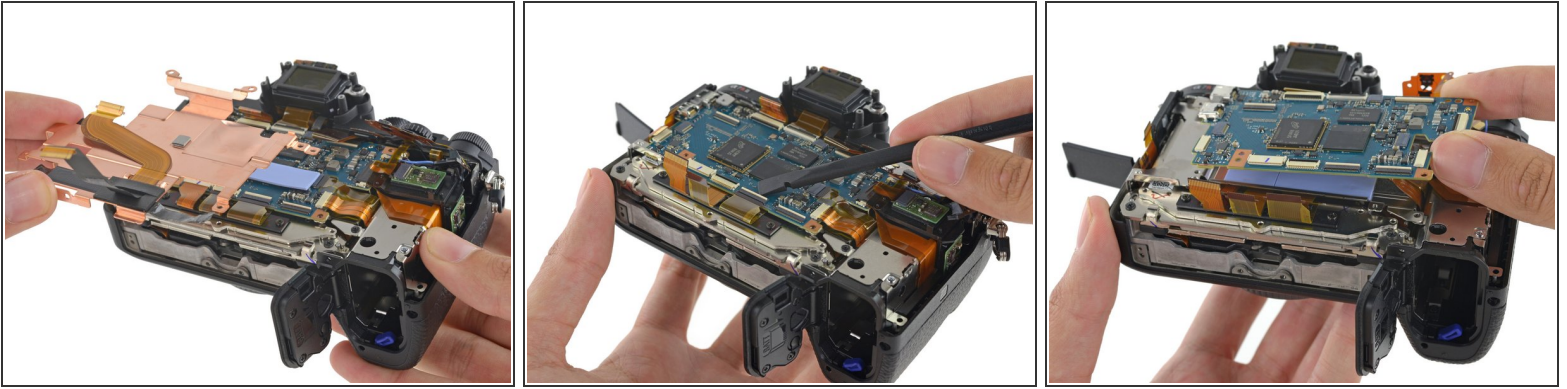
- Once we extricate the LCD and its delicate flex cable, the parts start flying.
- First up are the eyepiece and viewfinder frame. The eyepiece slides off for easy swaps; the viewfinder frame is held in place with a few screws.
- ❗ As a mirrorless camera, the a7R II doesn't have an optical viewfinder. Instead, the viewfinder uses an XGA (1024 x 768 pixels) OLED screen to provide the user with accurate previews of images.
- With some careful hunting, we find a few remaining screws hiding in the battery cavity. We're pretty stoked for a chance to use the telescoping driver handle in our [Universal Bit Kit](#).

## Step 9



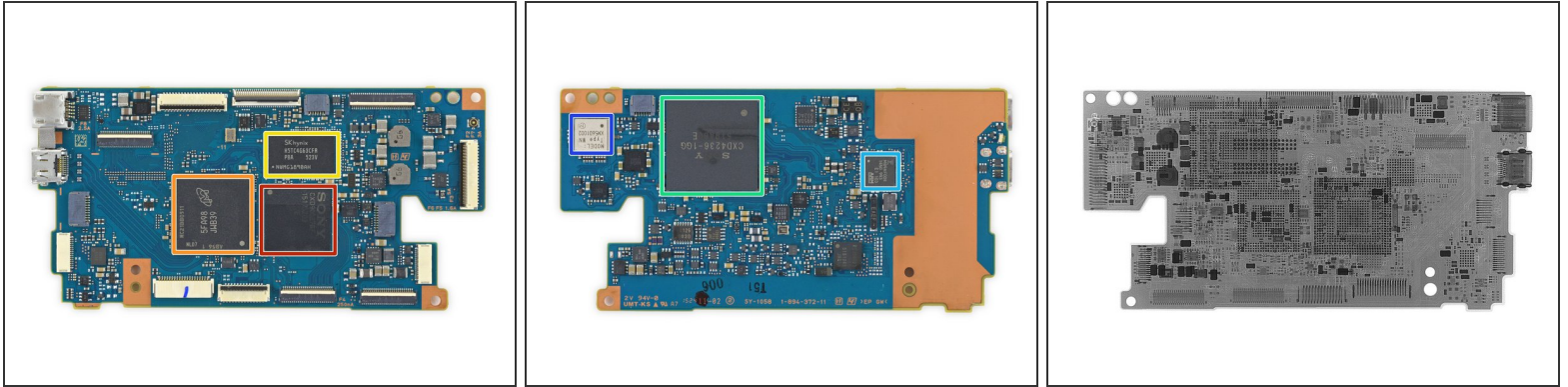
- Now that the viewfinder frame and LCD panel have been removed, the rear housing pops right off.
- All of the button's switches are mounted to internal components instead of the frame—so there aren't any delicate cables to worry about.
- After disconnecting a single cable, we tease out that very mounting frame and the rear button assembly attached to it.
- Next off is the multi-format card reader. It comes quietly.
- We're secretly hoping this camera plays [Nintendo DS](#) games.

## Step 10



- With the rear housing and button assembly removed, the motherboard shield comes out with very little resistance.
  - Getting our first clear view of the motherboard, we set to work disconnecting *every ribbon cable created since the [dawn of time](#)*.
- i** Process note: We managed to get the motherboard out at this point, but we're pretty sure that's not as Sony intended. Had they deigned to give us a manual we would have known to skip ahead a few steps.

## Step 11



- We hoist the motherboard out for inspection, finding:
  - Sony CXD90027GF SoC
  - Micron Technology [5FA98 JWB39](#) eMCP
  - SK Hynix [H5TC4G63CFR](#) 4 Gb DDR3L SDRAM
- And on the reverse side:
  - Sony CXD4236-1GG, likely a newer version of the [CXD4236GG](#) image processor
  - Fujitsu [MB9AF004](#) 32-bit ARM Cortex-M3 processor
  - Murata KM5601002



## Step 12



- This is the part where we get a grip, a camera grip that is.
- An access port allows us to remove the final screw securing the front grip to the body.
- Camera brand-fans live and die by their adjustment wheels. The grip features the forward spinner and shutter button, as well as the Wi-Fi antenna.

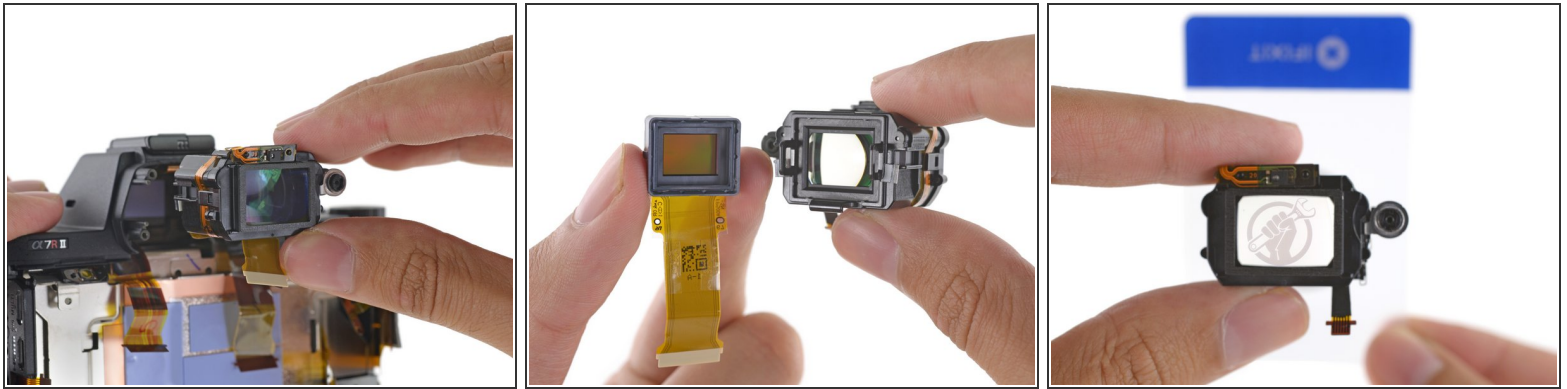
## Step 13



- We find a trio of boards hiding behind the grip, supporting a couple of chips and what looks like an NFC antenna.
- Perfect for Sony's Playmemories Mobile application, the NFC chip will allow interactions between smartphones the a7R II when Wi-Fi is not an option.
- ❗ Funny how our smartphones are becoming more like cameras and our cameras are becoming more like smartphones, huh?

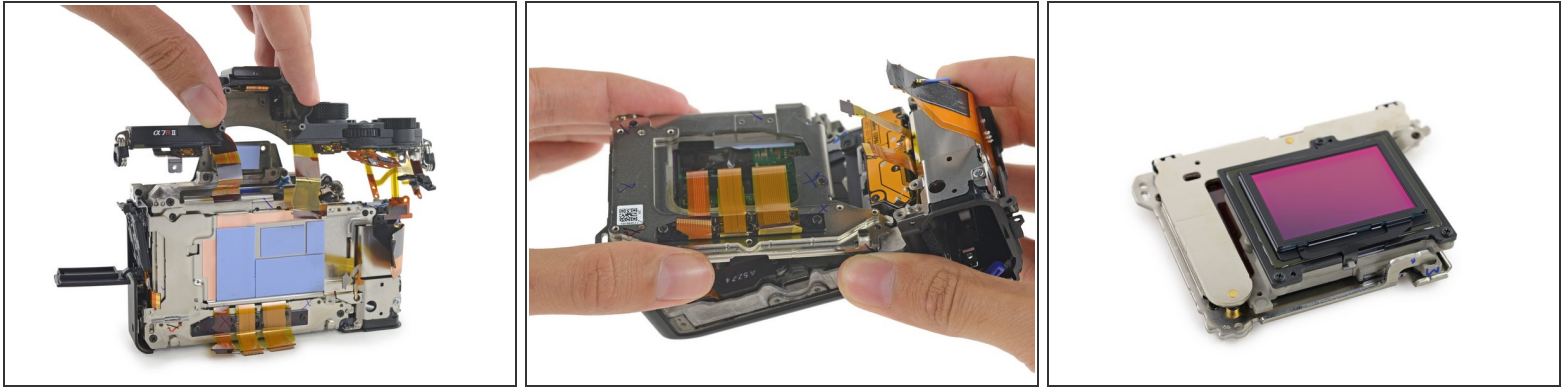


## Step 14



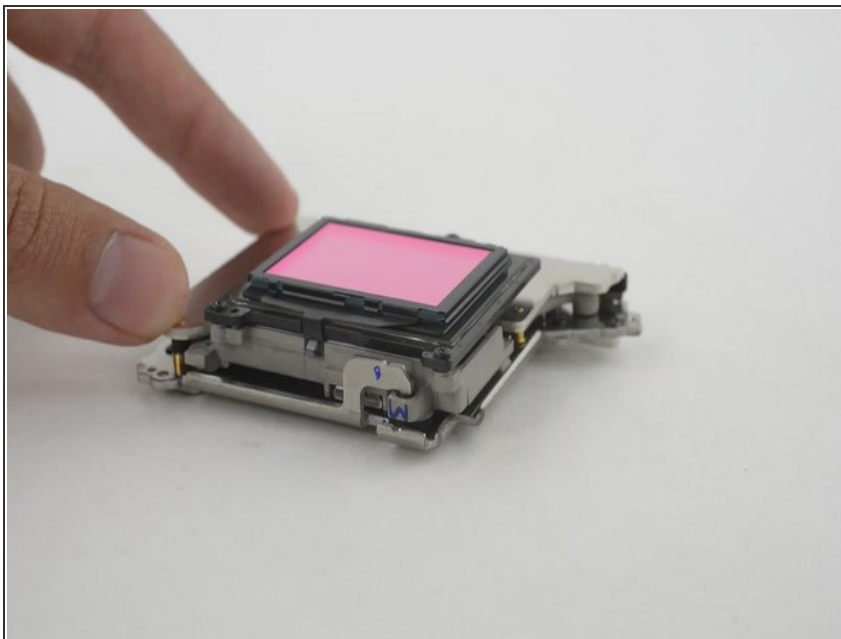
- Back to the viewfinder—turns out we can pull it straight out of its cavity. With its frame previously dispatched, it was only held in place by a gummy thermal pad.
  - Why the thermal pad? Might have something to do with the 1.3 cm XGA OLED. With 1024 x 768 pixels in half an inch, that's 2,560 ppi. Wowza.
- ⓘ After removing the OLED, we take a peek through the lens assembly. A set of [four optical lenses](#) improve the field of view while minimizing distortion.
- The lens assembly even works as a standalone upside-down-maker! Aren't [optics](#) cool? That logo sure is.

## Step 15



- Hats off to you Sony! You've got our teardown engineer tired, but not beat. The upper case assembly pops off and steps aside for a glimpse at *the goods*.
- Eager to get our first look at the new [Exmor R](#) CMOS sensor, we extricate the entire sensor assembly from the camera. The rest of the body feels like an empty husk without the hulking sensor and stabilization cradle.
- ① For more information on the a7R II's [sensor-shift](#) stabilization mechanism, continue scrolling.

## Step 16



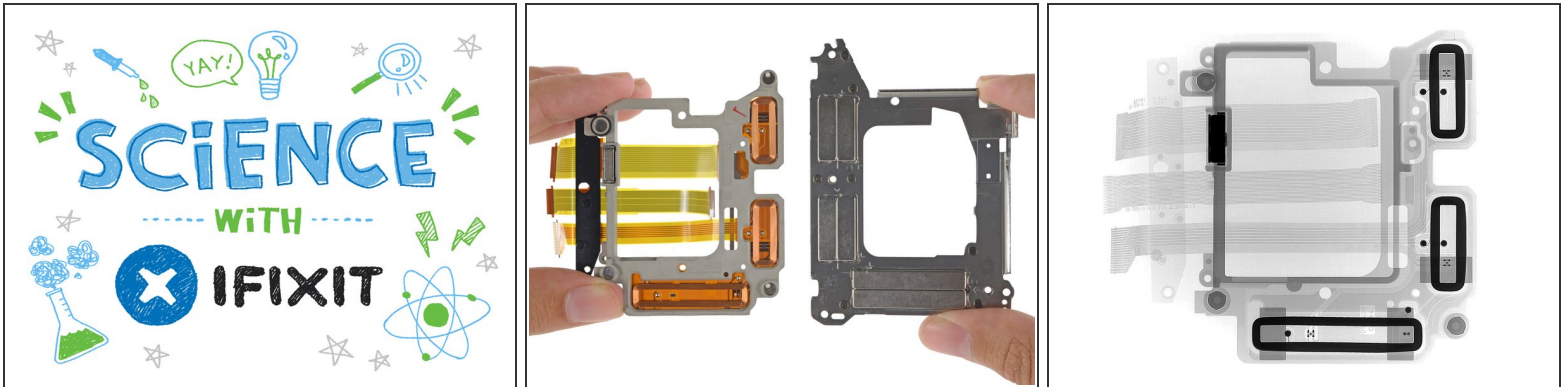
- In today's episode of *iFixit Teardown Cinema*, we see the sensor-shift stabilization mechanism in action.
- ① That's a pretty smooth action there. Probably powered by magnets. Or miracles. Most likely magic. Or unicorns. Most definitely unicorn magic.
- The CMOS sensor rests on a light tray, floating between two hefty plates.

## Step 17



- A quick detour before we proceed to the magnets: we pluck the a7R II's 42.4 MP image sensor from the stabilization system.
- With the CMOS sensor in the wild, we get a clearer view of what's been touted as the [world's first back-illuminated 35 mm full-frame sensor](#).
- ❗ According to Sony, the photodiodes on this [new sensor](#) are much closer to the on-chip lens than in previous designs, allowing it to collect light more efficiently.
- The square hole in the sensor's PCB also hints at a tricky assembly process—it's likely a cutout used to accommodate the vacuum nozzle that holds the sensor during assembly, as evidenced by the small patch of scratches at the center of the cutout. [A peek with the X-ray](#) reveals the array of solder balls that sandwiches the whole thing together when it's done.

## Step 18



- Is that a [Force Touch trackpad](#)? No, it's an exposed view of the a7R II's sensor-shift stabilization hardware. Sony's marketing team named this the 5-axis SteadyShot. Fancy.
- The central tray of the stabilizer holds the image sensor, and is home to three electromagnets, each a component of a [voice coil](#), an electromechanical device used for incredibly fine positioning.
  - ❗ Voice coils are also found in [platter hard drives](#), controlling the read/write arm.
- These coils live in the magnetic fields of their permanent magnet buddies—which means slight variations in power to the three coils generates forces in a variety of directions. Enough variety to adjust the sensor on [five distinct axes](#). Not a small feat for a full-frame camera.

## Step 19



- i** We've struck our sensor and magnet gold, and now it's time to clean up and let the teardown team get some sleep. It's been a long day!
- After removing the battery cavity, not much remains—the noiseless shutter mechanism, a few stray cables, and on the front of the body a spring contact leading to that Wi-Fi antenna we found earlier.
- i** Gazing at this once mighty feat of modern engineering, we can't help but wonder one thing: how the heck are we gonna put this thing back together? Answer: most likely unicorn magic.



## Step 20



- A7R II Repairability Score: **4 out of 10** (10 is easiest to repair).
  - The battery can be easily replaced without tools.
  - The tripod mount and viewfinder can be replaced without disassembling the camera body.
  - While very difficult, the rear LCD panel can also be removed without disassembling the camera body.
  - Accessing anything inside the camera requires removing the complex rear LCD panel first.
  - Internal components are very intricately organized; repair without a service manual would be very difficult.
- Lastly, a hearty shout-out to our friends at [Creative Electron](#) for their X-ray imaging wizardry. Thanks guys!