iPad 2 Smart Cover Teardown

Tearing down the iPad 2's Smart Cover

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INTRODUCTION

A significant portion of the hullabaloo over Apple's iPad 2 is the mysterious Smart Cover. How does it work? Where does it attach? What does it do? How can something so simple be so multi-functional?

Join us as we figure out just how smart the Smart Cover really is.

TOOLS:

- Precision Utility Knife (1)
- Magnetic Pickup Tool (1)
- Phillips #00 Screwdriver (1)

Step 1 — iPad 2 Smart Cover Teardown

- When Apple announced the iPad 2, Steve Jobs noted that this accessory was developed alongside the iPad 2 ("...think of them as one device"), and made it out to be an absolute necessity.
- We played around with it and it seems to function very nicely with the new iPad 2. But "how does it work?" we wondered...
- We were also curious to see if Apple used magnets with special properties -- such as the awesome correlated magnets developed by CMR -- for the Smart Cover. Correlated magnets have multiple poles that could be contributing to the unique functionality of this cover.

Step 2



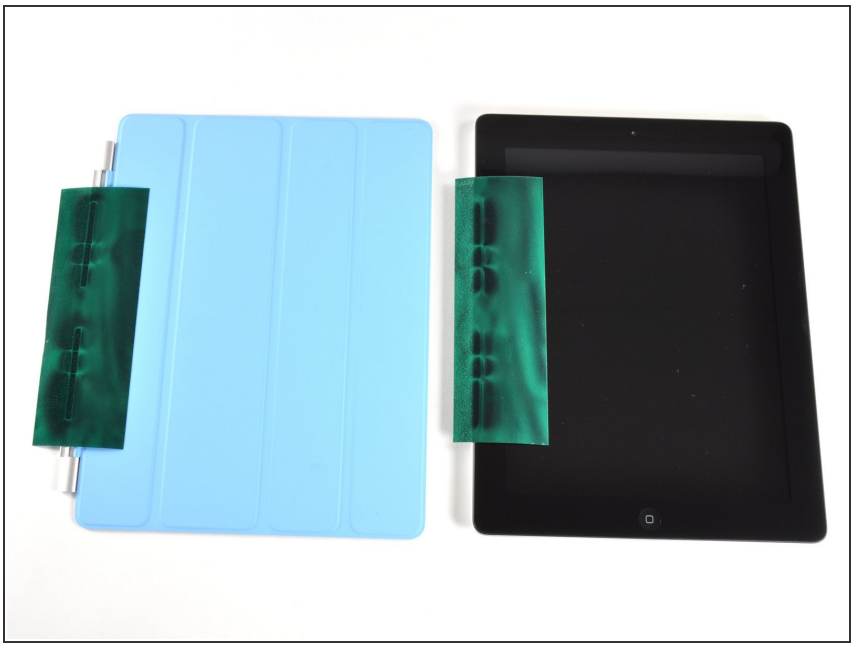
- A bit of magnetic viewing film works wonders in revealing the magnets hidden beneath the Smart Cover and iPad 2.

Magnetic viewing film has special properties that allow it to react to a magnet's poles.

- The Smart Cover has one magnet that turns off the iPad 2's screen. The rest are used to either clamp to the iPad on the right side (the far-right column of magnets), or to form the triangular shape used to create a stand for the iPad 2.

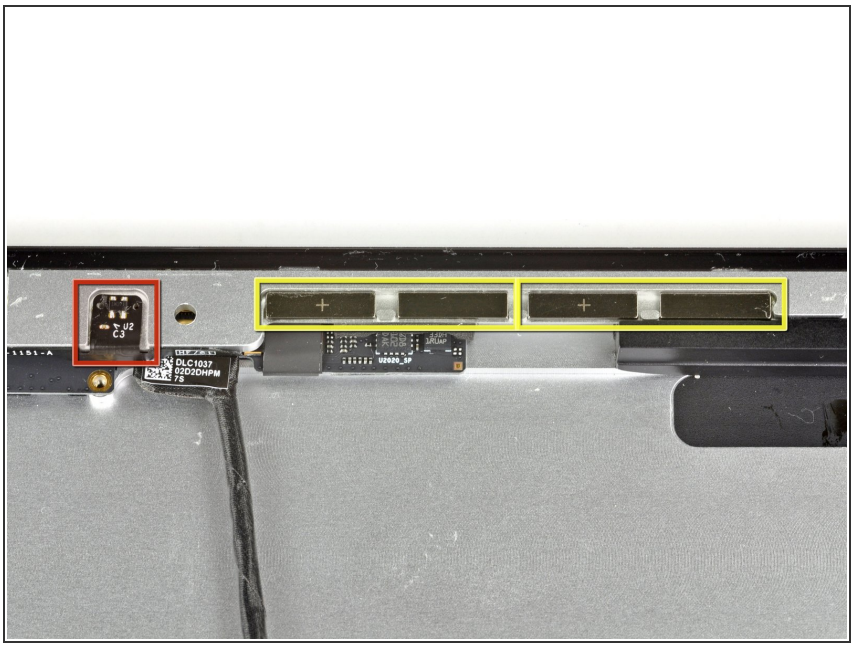
In fact, you don't need the Smart Cover to turn your iPad 2's screen on or off. We used iFixit's handy-dandy magnetic pickup tool to activate the sleep sensor on the iPad 2.

Step 3



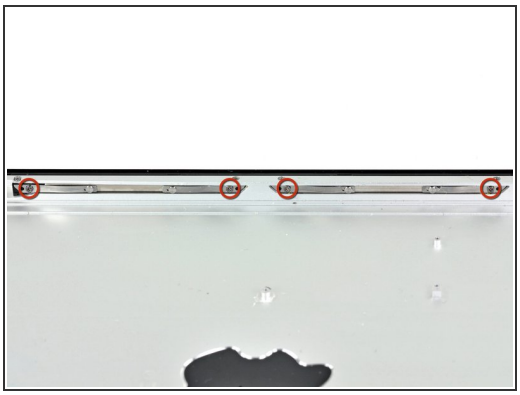
- There's also a row of magnets on the left side of both products. The iPad 2's magnets are actually encased into the side of the device, and are used to securely clamp the iPad 2 to the Smart Cover.
- The geometry of these magnet arrays seems odd: two sets of a long magnet adjacent to two short magnets. (Hint: we'll explain more later...)

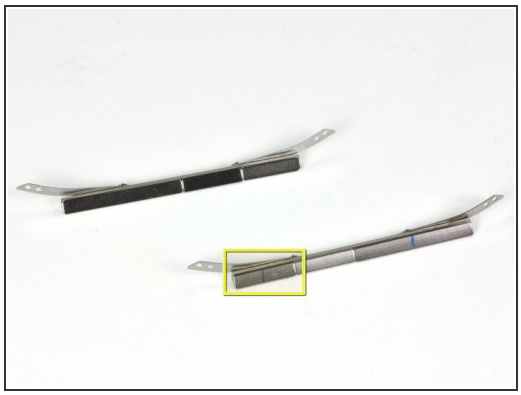
Step 4

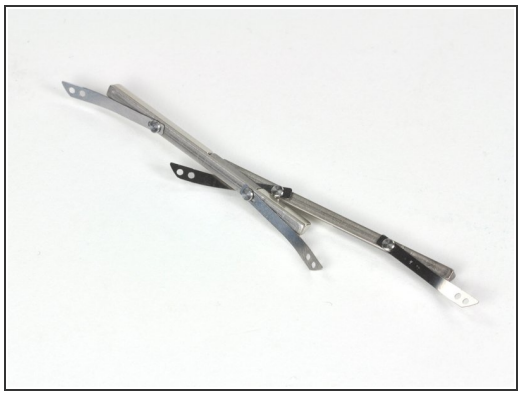


- We already took apart the iPad during the teardown, so here's a peek of all the fun stuff from the inside...
- The sleep sensor. This is the little sensor that reacts to the Smart Cover's round magnet for turning on/off the iPad 2's screen.
- This row of magnets clamps the Smart Cover tightly to the iPad 2 (on the right side). Note that the magnets have their polarity displayed, and that they alternate in polarity: + - + - .
  - The alternating polarity of the magnets in the iPad 2 is complemented by the opposite alternating polarity of the magnets in the Smart Cover (- + - +), ensuring that the Smart Cover always sits in the same orientation.

Step 5



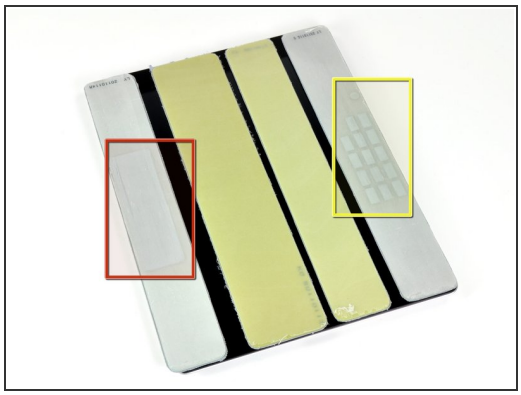




- These are the magnets on the left side of the iPad 2 -- the ones that attract the Smart Cover's frame. They're integrated into the iPad 2's back cover, and held in place with four #00 Phillips screws.
- These magnets form the same rounded contour as the exterior of the iPad 2's aluminum case. This allows for the best possible connection between the magnets in the iPad 2 and those in the Smart Cover's frame.
- Interestingly, these magnets' polarities were manually marked -- a blue dash written with a marker -- instead of having a machine stamp/engrave the polarity into them.

About 10 seconds after we took the second picture, the magnets naturally gravitated towards one another and fused together -- they're very strong!

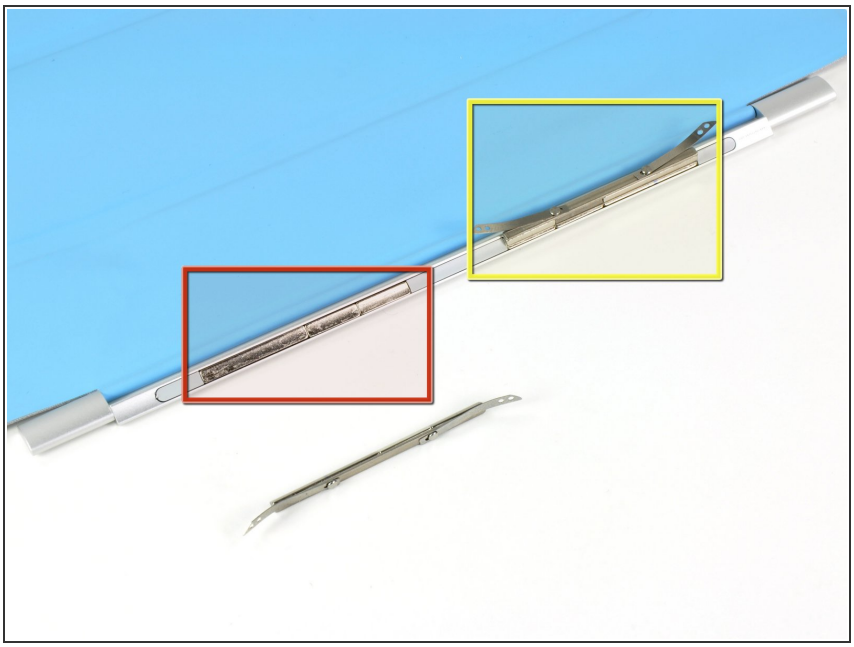
Step 6


- So that concludes the iPad's side of things. But what about the Smart Cover? Only one way to find out -- have it go under the scalpel.
- Inside the Smart cover we found the following:
  - A large metal plate encased in plastic that adheres to the magnets to form the stand.
  - Two yellow all-plastic plates in the middle that exist purely for structural support.
  - The stack of magnets we found earlier using our magnetic viewing film.
- We were curious earlier why Apple decided to use so many magnets on the right side of the Smart Cover. They needed at least four to complement those in the iPad 2, but why the other ten?
  - They used a steel-to-magnet bond (which is weaker than a magnet-to-magnet bond) to form the triangular stand, and so they needed lots more magnets to prevent the case from literally falling apart during use.

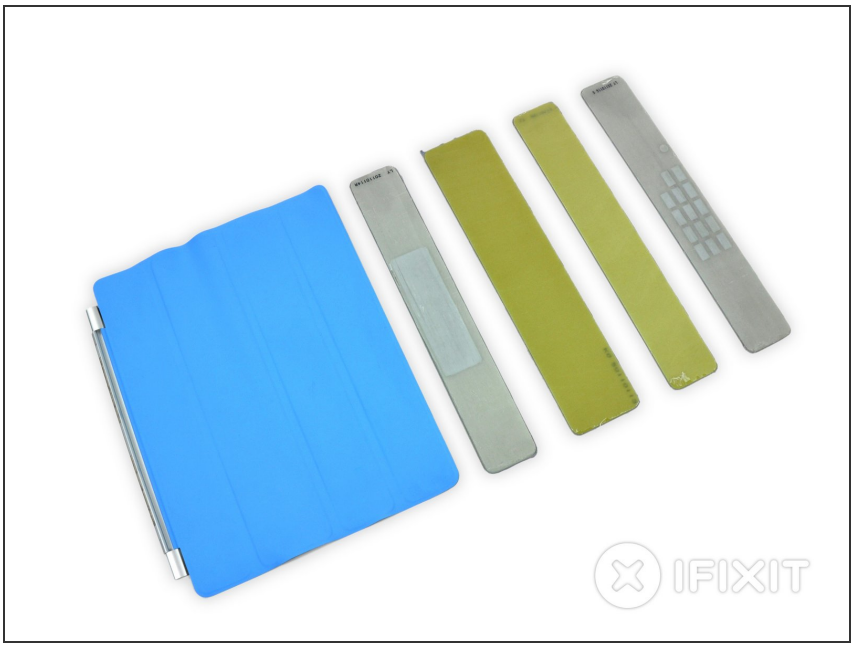
ⓘ It turns out that the cover doesn't work nearly as well once you take out the magnets, steel plate, and plastic structural supports.

Step 7



- The left frame of the Smart Cover contains a total of six magnets -- two large and four smaller units.
- We just can't keep these things off of one another! The iPad 2's frame magnets made a solid two inch leap across the table by the time we took the shot. Their attraction for one another is amazing!
- Notice the complementary shape and polarity. These magnet arrays are specifically designed to attach to only one other array, making it quite difficult to attach the Smart Cover improperly (upside down, offset by a couple of inches, etc.).

Step 8



- iPad 2's Smart Cover Repairability Score: **0 out of 10** (10 is easiest to repair)
- There's very little to repair inside this device. Apple clearly didn't consider repair at all when designing it.
- Once you cut it up, there's no going back -- you can't reassemble it again.
- No correlated magnets were found inside. Apple chose to use the boring, standard two-pole magnets inside the iPad 2 and Smart Cover.

We're completely joking with the Repairability Score, of course.

To reassemble your device, follow these instructions in reverse order.