You Paid $1,000 for an iPhone, but Apple Still Controls It

The company codes its devices with software that complicates repairs by triggering safety warnings and malfunctions.

By Tripp Mickle, Ella Koeze and Brian X. Chen

Tripp Mickle, Ella Koeze and Brian X. Chen spoke to people with years of experience repairing iPhones.

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For a decade, it was easy to get help repairing an iPhone. Cracked screens could be replaced in minutes, and broken cameras could be exchanged without a hitch.

But since 2017, iPhone repairs have been a minefield. New batteries can trigger warning messages, replacement screens can disable a phone's brightness settings, and substitute selfie cameras can malfunction.

The breakdowns are an outgrowth of Apple's practice of writing software that gives it control over iPhones even after someone has bought one. Unlike cars, which can be repaired with generic parts by auto shops and do-it-yourself mechanics, new iPhones are coded to recognize the serial numbers for original components and may malfunction if the parts are changed.

This year, seven iPhone parts can trigger issues during repairs, up from three in 2017, when the company introduced a facial recognition system to unlock the device, according to iFixit, a company that analyzes iPhone components and sells parts for do-it-yourself repairs. The rate at which parts can cause breakdowns has been rising about 20 percent a year since 2016, when only one repair caused a problem.

In a series of tests, iFixit determines which parts cause issues when swapped between working iPhones of the same model. The results reveal that the number of malfunctions has increased with later iPhone generations.

Parts-pairing issues are more common in newer iPhones

⚠ Part doesn't work as expected when swapped with the same working part from an identical, new iPhone.

⚠ Sometimes stops working as expected when swapped, sometimes fine.

⚠ Persistent alerts after swap.

YEAR	IPHONE	Face ID or Touch ID sensor	Display	Battery	Front facing camera	Taptic Engine (vibration)	Rear camera	LIDAR (distance sensor)
2023	**15**		⚠	⚠			⚠	
2022	14		⚠	⚠			⚠	
2022	SE (v3)		⚠	⚠			⚠	
2021	13		⚠	⚠			⚠	
2020	12		⚠	⚠				
2020	SE (v2)		⚠	⚠				
2019	11		⚠	⚠				
2018	XS/XR			⚠				
2017	X							
2017	8							
2016	7							
2016	SE							
2015	6s							
2014	6							
2013	5s							
2012	5							

Note: Data reflects the iOS update 17.1; tested on Oct. 29, 2023. For the iPhone 15, only the Pro Max version has been tested. LIDAR is available only in the Pro and Pro Max versions of each applicable phone. • Source: iFixit

The software phenomenon, which is known as parts pairing, has encouraged Apple customers to turn to its stores or authorized repair centers, which charge higher prices for parts and labor. In recent years, only approved parts and sanctioned

repairs have avoided the problems. Replacing a shattered screen typically costs nearly $300, about $100 more than work done by an independent shop using a third-party screen.

To put it another way: The cost of replacing a cracked screen on a year-old iPhone 14 is nearly equivalent to the phone's value, which Apple appraises at $430 in trade-in credit.

Apple's grip on the repairs creates an incentive for customers to spend up to $200 on device insurance, known as AppleCare, which provides free battery replacements and screen repairs. Apple collects an estimated $9 billion annually for the service.

It has also spurred questions about Apple's commitment to sustainability, with independent repair advocates saying the company could more effectively meet its goals of reducing carbon emissions by lowering repair costs to encourage people to maintain devices rather than buy new ones.

An Apple spokesman said the company supported a customer's right to repair a device and had created a self-service repair program to help. "We have been innovating to offer our customers the best choice and options when their product needs service," he said.

State lawmakers from New York to California have responded with laws that aim to make repairs easier. The Biden administration has encouraged the Federal Trade Commission to advance rules that would stop smartphone makers from restricting independent repairs. But most of the regulations don't include explicit restrictions on parts pairing.

Source: iFixit | Note: Phones are not shown to scale. The iPhone 15 shown is a Pro Max. The Taptic Eng sometimes stops working when replaced and sometimes does not.

The iPhone 7, released in 2016, has been lauded as the last easily

repairable model.

It has only one function — Touch ID — that stops working when the home button of the phone is replaced in a non-Apple-authorized

repair.

The release of the iPhone X in 2017 represented a significant shift in the design of iPhones. Parts pairing increased, and more parts, including the front display and the front-facing camera, stopped

working correctly when replaced.

Apple's latest phone, the iPhone 15, has more features and, with

them, more parts pairing.

Using software to control repairs has become commonplace across electronics, appliances and heavy machinery as faster chips and cheaper memory turn everyday products into miniature computers. HP has used a similar practice to encourage people to buy its ink cartridges over lower-priced alternatives. Tesla has incorporated it into many cars. And John Deere has put it in farm equipment, disabling machines that aren't fixed by company repair workers.

Apple and other companies have defended the practice by saying it protects customers' safety and the company's brand. Shoddy parts, like a faulty face scanner, could compromise the phone's security, and if an independent shop messes up a repair, the customer often blames Apple instead of the shop, the company has said. The practice also allows Apple to create a record of parts in the device, which can be helpful to buyers of secondhand phones.

But the increase of pairing parts with software has animated a movement that wants to make repairs cheaper and easier. Proponents, which include iFixit, say it would be better for the environment and customers' wallets to extend the life of devices. They have urged lawmakers to simplify repairs, asking: "Who owns the device after it's been purchased? The customer or the manufacturer?"

"You basically have to ask permission before doing a repair," said Nathan Proctor, who has lobbied states for repair legislation on behalf of U.S. PIRG, a nonprofit largely funded by small donors.

When Apple expanded its software limits in 2017, it upended repair businesses. Shakeel Taiyab said iPhone repairs at his independent shop in South San Francisco had decreased about 15 percent this year. Some customers with issues like cracked screens keep using the phones because they find repairing or replacing it unaffordable.

Free Geek, a nonprofit based in Portland, Ore., that donates repaired computers and smartphones to underprivileged people, decided that Apple's software made iPhones too difficult to service, said Amber Brink, Free Geek's director of technology.

Last year, Free Geek received thousands of donated iPhones but repurposed only 280, Ms. Brink said. "It's a headache," she added.

Consumers who opt against paying top dollar for an Apple-authorized repair may suffer the consequences. In February, after Gio Grimaldi, a 15-year-old in New Hampshire, shattered the screen of his iPhone SE on a snowboarding trip, he took it to a nearby repair shop.

He said the closest Apple Store was 90 minutes away and had quoted $130 for replacing the screen — 40 percent higher than the independent store. When he took the phone home, it worked fine but was lacking True Tone, a software feature that adjusts the screen's brightness and color to match the ambient lighting.

"That's just plain stupid," he said. "I always love Apple as a company, but they're really stuck up about third-party repairs."

Over the past year, New York, Minnesota and California passed bills requiring that electronics manufacturers provide parts, tools and manuals to third parties.

After years of lobbying against such rules, Apple signed on to support California's law and honor it across the United States. It has also encouraged the federal government to adopt similar rules, said Brian Naumann, the head of Apple's repair service efforts, who spoke about the right to repairs during a White House event last month.

"Apple has taken significant steps to expand options for consumers to repair their devices, which we know is good for consumers' budgets and good for the environment," Mr. Naumann said.

But the California legislation failed to directly address Apple's practice of using software to control the repair process. In Oregon, State Senator Janeen Sollman, a Democrat representing an area outside Portland, is part of a group of lawmakers aiming to pass a state law that would prohibit Apple and others from having restrictions on repairs.

As the Oregon legislation has progressed, Apple has encouraged lawmakers to scale it back. Apple paid for a half dozen legislators to visit its Silicon Valley headquarters this year, and tried to impress on them how important security and safety were to repairs, Ms. Sollman said.

She left California unpersuaded. "I said, 'You're making it more accessible, but it's not a true right to repair if you have ultimate control,'" Ms. Sollman said.

Tripp Mickle reports on Apple and Silicon Valley for The Times and is based in San Francisco. His focus on Apple includes product launches, manufacturing issues and political challenges. He also writes about trends across the tech industry, including layoffs, generative A.I. and robot taxis.

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