## Short Comment Regarding a Proposed Exemption
## Under 17 U.S.C. 1201

*Submitted by:*
iFixit
Kyle Wiens, Co-founder
1330 Monterey St.
San Luis Obispo, CA 93401
1.866.613.4948
kyle@ifixit.com

## Item 1. Commenter Information

iFixit is an international, open-source, online repair manual for everything. Our mission is to provide people with the knowledge to make their things work for as long as possible. Because we believe that repair saves money, fosters independence, and protects the planet.

iFixit is global community of makers, hardware hackers, fixers, tinkerers, and repair professionals. In 2014, the iFixit community taught repair to over 40 million people from almost every country in the world. The strongly collaborative group has published over 10,000 crowd-sourced repair guides on iFixit.com. This massive, free resource has helped people fix everything from mobile phones to game consoles, toys to musical instruments. iFixit also stands firm in its support of the tinkerers and independent repair professionals in our community. We believe that owners should have the right to repair, modify, and hack the things that they own.

## Item 2. Proposed Class Addressed

Proposed Class 21: Vehicle software – diagnosis, repair, or modification

## Item 3. Statement Regarding Proposed Exemption

A couple months ago, I tried to repair a John Deere tractor. Things didn't going as planned.

I'm a computer programmer by training, and a repairman by trade. Ten years ago, I started iFixit, an online, DIY community that teaches people to repair what they own—even technical stuff, like smartphones and iPads. Repair is what I do, and that I was being rebuffed by a tractor was incredibly frustrating.

The conventional tools of my trade—wrenches and screwdrivers—had no power here. This job called for something different. Armed with wire, alligator clips, a handful of connectors, and a CANbus reader, I launched myself back into the cab of the tractor. Once more into the breach, dear friends!

The owner of this tractor—a friend and a family farmer on the Central Coast of California—wanted a better way to fix a minor hydraulic sensor. Every time the sensor blew, the onboard computer would shut the tractor down. It takes a technician at least two days to order the part, get out to the farm, and swap out the sensor. So for two days, Dave's tractor lies fallow. And so do his fields.

Dave asked me if there was some way to bypass a bum sensor while waiting for the repairman to show up. But fixing Dave's sensor problem required fiddling around in the tractor's highly proprietary computer system—the tractor's engine control unit (tECU): the brains behind the agricultural beast.

One hour later, I hopped back out of the cab of the tractor. Defeated. I was unable to breach the wall of proprietary defenses that protected the tECU like a fortress. I couldn't even connect to the computer. Because John Deere says I can't.

Like most farmers, Dave is a DIY kind of guy. When I first pulled up next to the barn, I found him changing the oil on the same tractor (all eight gallons of it!). But Dave would like to do more than just change the oil. He'd like to be able to modify the engine timing. He'd like to be able to harvest the information that his tractor collects to learn more about how his crops grow. He'd like to troubleshoot error codes. Most of all, he'd like to be able to repair his equipment himself—because it's what he's been doing all his life.

In the tech industry, we tend to talk about the exploding Maker Movement as if tinkering is something new. In fact, it's as old as dirt: farmers have been making, building, re-building, hacking, and tinkering with their equipment since chickens were feral. I've seen farmers do with rusty harvesters and old welders what modern Makers do with Raspberry Pis and breadboards. There's even a crowdsourced magazine, *Farm Show*, that's catalogued thousands of clever farming inventions over the past three decades.

Of course, the world is changing—and that's especially true in the world of agriculture. Most problems can't be solved with duct tape and baling wire anymore. Regulations are stricter, agribusiness is more consolidated, resources are more scarce, and equipment is infinitely more complicated and proprietary. Small family farmers like Dave face challenges that even the most industrious Maker would find hard to "hack."

What used to be done by hand is now managed at scale by giant machines—massive tractors, transplanters, and harvesters. And that equipment is expensive—like the price of a small house (Dave's mid-ranged tractor is worth over $100,000). New, elaborate computer systems afford the kind of precision and predictability that farmers 20 years ago couldn't have even imagined. But they've also introduced new problems.

Aside from using it, there's not much you can do with modern ag equipment. When the equipment breaks or needs maintenance, farmers are dependent on dealers and manufacturer technicians—a hard pill to swallow for farmers, who have been maintaining their own equipment since the plow.

"[DIY repair] is cheaper than calling out the technician. But that information is just not out there," Dave explained to me.

The cost and hassle of repairing modern tractors has soured a lot of farmers on computerized systems altogether. In a September issue of *Farm Journal*, farm auction expert Greg Peterson—who goes by the moniker "Machinery Pete"—noted that demand for newer, second-hand tractors was falling. Tellingly, the price of and demand for older tractors (without all the digital bells and whistles) has picked up. "As for the simplicity, you've all heard the chatter," Machinery Pete wrote. "There's an

increasing number of farmers placing greater value on acquiring older simpler machines that don't require a computer to fix."

The problem is that farmers are essentially driving around a giant black box outfitted with harvesting blades. Only manufacturers have the keys to those boxes. Different connectors are needed from brand to brand, sometimes even from model to model—just to talk to the tECU. Modifications and troubleshooting require diagnostic software that farmers can't have. Even if a farmer managed to get the right software, calibrations to the tECU sometimes require a factory password. No password, no changes—not without the permission of the manufacturer.

John Deere, in particular, has been incredibly effective at limiting access to its diagnostic software. Which is why I wouldn't have been able to tweak the programming on Dave's tractor, even if I had been able to hack together the right interface. John Deere doesn't want me to. The dealer-repair game is just too lucrative for manufacturers to cede any control back to farmers.

After a second swear-word-inducing attempt to monkey around in the code that fuels Dave's computer, I started wondering how other farmers were dealing with the increasingly cloaked and proprietary nature of modern farming. After all, farmers are archetypically resourceful—and they're fiercely independent.

My failure with Dave's tractor got me fired up. I started lurking in ag forums, talking to my farmer friends, and hanging out in diesel repair shops. I found out that farmers aren't necessarily taking the limitations lying down. There's a thriving grey-market for diagnostic equipment and proprietary connectors. Some farmers have even managed to get their hands on the software they need to re-calibrate and repair equipment on their own—a laptop purchased from some nameless friend-of-a-friend with the software already loaded on it. There are even ways to get around the factory passwords that block access to the tECU to effect repairs.

It's just that, under [modern copyright laws](), that kind of "repairing" is legally questionable. Manufacturers have every legal right to put a password or an encryption over the tECU. Owners, on the other hand, don't have the legal right to break the digital lock over their own equipment. So, it's entirely

possible that changing the engine timing on his own tractor makes a farmer a criminal. And I don't think that's fair.

When it comes to modifying existing equipment—like Dave's tractor—long-held notions of ownership are being contested. Dave paid for the tractor; he owns what's tangible: the wheels, the metal chassis, the gears and pistons in the engine. But John Deere owns everything else: the programming that propels the tractor, the software that calibrates the engine, the information necessary to fix it. So, who really owns that tractor?

Even if he could, would it be legal for Dave to fix his machine? Right now, we don't know; and that ambiguity is disturbing. So, we're looking to the Copyright Office for an answer—and we are urging the office to grant an exemption to farmers who want to modify and repair their equipment.

Until then, Dave's tractor remains a locked box—and neither Dave nor I are allowed to pry it open.