

*Note: Please submit a separate comment for each proposed class.*

*This is a Word document that allows users to type into the spaces below. The comment should be no more than one page in length (which may be single-spaced but should be in at least 12-point type). The italicized instructions on this template may be deleted.*

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

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### **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**

Cars have a profound legacy of tinkering. Hobbyists have always modded them, rearranged their guts, and reframed their exteriors. Which is why it's

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mind-boggling to iFixit that we have to [ask permission from the Copyright Office](#) for this exemption at all.

Modern cars aren't merely mechanical creatures; there's more to them than engines and gearboxes. They house [incredibly complex, high-functioning computers](#): a labyrinthine network of sensors and wires and software that is constantly measuring, communicating, and making adjustments to the engine, drivetrain, and suspension. A single car contains as many as [50 different ECUs](#)—computer units that govern functions like acceleration and braking.

You can buy a car, but you don't own the software in its computers. That's proprietary; it's copyrighted; and it belongs to its manufacturers. But if people buy a car, they own it. They should be able to modify the software or tweak parameters as they see fit—to crawl into that ECU and take control of it. To twist the programming into new shapes and make the engine perform to a set of parameters not authorized by the manufacturer. To make the car faster. Or more fuel efficient. Or more powerful.

This is the new age of digital tinkering: you can “hack” your car better.

“Manufacturers frown on the practice, of course—it will void your warranty—but not everyone can resist the urge to reverse-engineer code and make a few changes,” [writes Ben Wojdyla of Popular Mechanics](#).

They can't resist, and they don't. And if car owners are willing to accept the risk that comes along with any DIY task—like voided warranties or bricked cars—then they should have the right to digitally tinker with their own cars. And they should have the right to publish their projects on the Internet without fear of some carmaker brandishing a DMCA stick in their direction.

The Internet is rife with tutorials and forums dedicated to car hacking. Most are relatively simple Arduino-based projects that add another layer of functionality to the car. But look a little harder, and you'll find the hardcore hobbyists thrusting both hands into the brains of the beast. There are modders, like the creators of [RomRaider](#) and [OpenECU](#), who have built their own open source software to tweak settings in their cars' ECUs. And there are hobbyists, like the folks behind [CanBusHack](#), who have figured

out ways to reverse engineer their cars' communication network and raid it for data. There are even people [reverse engineering Mazdas](#).

Such tinkering isn't just for modification, it also helps owners understand how modern cars operate.

"The automotive industry has churned out some amazing vehicles, but has released little information on what makes them work," [writes Craig Smith](#), a security researcher at [Theia Labs](#) and a proponent of hacking your own car.

Craig's literally written the book on DIY car hacking. "As vehicles have evolved, they have become less mechanical and more electronic," [Craig explains](#) in the [Car Hacker's Handbook](#). "Unfortunately these systems are typically closed off to mechanics. While dealerships have access to more information than you can typically get, the auto manufacturers themselves outsource parts and require proprietary tools to diagnose problems. Learning how your vehicle's electronics work can help you bypass this barrier"—something that could be incredibly helpful if, say, the ECU itself breaks down.

It's important to point out that it's not just homebrewed tinkerers who are playing with the central nervous system in their cars. An entire professional network has sprung up around ECU modding, reflashing, and reprogramming. There's a [new breed of automotive garages](#) that aren't staffed by traditional gearheads. Instead, they're full of software engineers and developers—adept tech nerds that find their way into a car's proprietary nervous system. Then they modify the engine specs for better performance: more speed, better fuel efficiency—whatever the car owner wants.

But this new brand of [digital tinkering](#) has given rise to a new tension: manufacturers aren't fond of people running amok in their walled, wheeled gardens. So, a few years ago, a handful of carmakers started putting up roadblocks—protection measures, like encryption—over the ECU. Locks, in short, to keep the over-curious out.

But any lock can be unlocked; you just need to find the right key. And that's exactly what chip tuners do.

In 2008, Cobb Tuning made a splash when they were the first to [crack encryption on the Nissan GT-R](#). In 2010, Audi [started integrating anti-tuning measures](#) into many ECUs; tuning companies figured a way around them. More recently, BMW deployed encryption so robust on the M5's ECU that (for the first time ever) Dinan—a tuning company—[couldn't break it](#). That didn't stop them, though: Dinan just designed its own chip to soup up the M5, replacing the stock one.

Eventually, though, someone will find a way through the M5's defenses. Someone will crack encryption. Because that's what people do—especially tinkerers obsessed with building the perfect car. None of this has anything to do with copyright. And there is no piracy involved here. The act of breaking the lock is enough to land tinkerers, hobbyists, hackers, tuners, and even security researchers in a contested, legal gray-zone. And iFixit doesn't think that's an acceptable application of copyright law.

No one has yet been prosecuted for hacking their own car—but they could. And as locks become more prevalent, [iFixit](#) is willing to bet that, eventually, some carmaker will bring the DMCA hammer down on a hobbyist's head.

Without this exemption, we risk losing the spirit of exploration that has always accompanied the automotive industry. And we could lose out on the insights, improvements, and inventions of the millions of Americans who enjoy digging around under the hoods of their own cars.

I certainly hope the Copyright Office agrees, because we'd hate to see a future where tinkering with a car makes people into criminals.