

Petition for Proposed Exemption Under 17 U.S.C. § 1201

Item 1. Submitter and Contact Information

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Item 2. Brief Overview of Proposed Exemption

Original Equipment Manufacturers (“OEMs”) often prevent farmers from **modifying** their own agricultural machinery (e.g., tractors, transplanter, etc.) to improve efficiency and/or functionality by employing technological protection measures (“TPMs”) that restrict access to embedded software in the machinery. OEMs restrict access to embedded software (also known as “firmware”) using: (1) computer memory modifications; (2) passwords; and (3) other cryptographic functions and keys.

The proposed exemption allows farmers to circumvent these TPMs for the purpose of modifying their own agricultural machinery to improve efficiency and/or functionality.

Item 3. Copyrighted Works Sought to be Accessed

Farmers seek to access the copyrighted software that controls their agricultural machinery. The Copyright Act arguably protects such embedded software as a literary work. *See* 17 U.S.C. § 102.

More specifically, farmers seek to access the embedded software that resides in the memory of small computers in agricultural machinery known as electronic control units (“ECUs”), which usually consist of a single integrated circuit. Farmers typically require access to these ECUs to make any significant modifications to the efficiency and/or functionality of in their increasingly sophisticated agricultural machinery.

Item 4. Technological Protection Measures

The proposed exemption applies to three categories of TPMs.

Item 4.1 Computer Memory Modifications

OEMs often restrict access to the embedded software on ECUs by modifying computer memory on the ECU itself. OEMs can do this in at least one of two ways.

First, OEMs can modify the ECU's "volatile" (rewritable) memory to prevent a farmer from utilizing an industry standard computer port known as Joint Test Action Group ("JTAG"). Specifically, OEMs modify the ECU's memory to enable a particular "bit" that disables JTAG each time a farmer powers on the affected machinery. OEMs do this to restrict a farmer's ability to access the embedded software.

Second, OEMs can modify the ECU's "non-volatile" (read only) memory to restrict access. When OEMs modify non-volatile memory, however, OEMs restrict access until a farmer disables the bit manually, since non-volatile memory persists even after an ECU loses power.

Item 4.2 Passwords that Lock the Embedded Software

OEMs often prevent farmers from accessing an ECU's embedded software using passwords, including "factory passwords," and "consumer passwords."

OEMs often use "factory passwords" to prevent farmers from (1) accessing locked functionality (often diagnostic tools and engine performance settings); (2) programming a new ECU (e.g., necessary to replace a malfunctioning ECU); (3) recovering "consumer passwords" necessary to change important parameters; and (4) clearing diagnostic codes.

OEMs lock other important settings in embedded software with unique "customer passwords" given to farmers purchasing new farm machinery. If the OEM does not give this password to the farmers at the point of first sale, they can prevent farmers from changing important parameters because it may be difficult or impossible for farmers to obtain this password later. When OEMs fail to provide this password, they also restrict subsequent purchasers from changing important parameters.

Item 4.3 Other Cryptographic Keys and Functions That Restrict Access to Diagnostic Codes

OEMs equip most modern agricultural machinery with multiple ECUs, each controlling a different electrical system, that coordinate their behavior over an intra-engine network. OEMs use this network to send messages to ECUs requesting diagnostic information. Typically, OEMs equip these ECUs with proprietary cryptographic functions and keys, which differ from simple passwords because they generate a unique password for every diagnostic request. Since only OEMs possess the cryptographic keys needed to access certain information, they alone can communicate over the network. OEMs do not provide cryptographic functions and keys to farmers, so farmers cannot access relevant diagnostic information.

Item 5. Noninfringing Uses

The proposed exemption allows farmers to access embedded software on ECUs for the purpose of modifying it to improve efficiency and/or functionality. Such uses qualify as non-infringing under 17 U.S.C. §§ 117 and 107.

17 U.S.C. § 117

The Copyright Act permits a farmer to modify embedded software for the purpose of improving efficiency and/or functionality as an essential step in utilizing it in conjunction with the farmer's machinery. 17 U.S.C. § 117(a)(1); *Krause v. Titleserv, Inc.*, 402 F.3d 119, 126 (2d Cir. 2005) (finding that a business' "addition of new features" in computer software it lawfully owned a copy of qualified as exempt under 17 USC § 117(a)(1)).

17 U.S.C. § 107

Farmers can also modify embedded software on ECUs for improving efficiency and/or functionality as a "fair use" under 17 U.S.C. § 107. As just one example,¹ fair use would allow a disabled farmer to modify embedded software on his or her own agricultural machinery to make accessibility enhancements for improved personal use. *See Authors Guild, Inc. v. HathiTrust*, 755 F.3d 87, 102 (2d Cir. 2014) ("The House Committee Report that accompanied codification of the fair use doctrine in the Copyright Act of 1976 expressly stated that making copies accessible 'for the use of blind persons' posed a 'special instance illustrating the application of the fair use doctrine....'"); *see also*, 42 U.S.C. § 12101(7) ("the Nation's proper goals regarding individuals with disabilities are to assure equality of opportunity, full participation, independent living, and economic self-sufficiency for such individuals.")

Item 6. Adverse Effects

The foregoing TPMs harm farmers in at least three ways.

Item 6.1 Without an Exemption, OEMs Can Prevent Farmers From Improving Accessibility for Persons with Disabilities

Farmers need an exemption so that they can easily modify their machinery to improve accessibility for persons with disabilities. Farmers with arthritis, amputations, balance difficulties, impaired sensory perception, etc., may have difficulty operating agricultural machinery effectively without effective modifications.² While farmers can fix some

¹ Different types of modifications necessarily involve different uses. We intend to submit a more complete discussion of fair use covering a wider variety of uses at the appropriate time.

² *See, e.g., Tractor Modifications for Saving Lives*, WEST VIRGINIA AGRABILITY PROJECT, CENTER FOR EXCELLENCE IN DISABILITIES, <http://wvats.cedwvu.org/factsheets/tractorfact.pdf> (discussing the need to modify tractors for individuals with arthritis, amputations, or balance difficulties; providing modification examples); Timothy Prather, *Adaptive Controls for Tractors and Machinery*, AGRABILITY PROJECT, <http://fyi.uwex.edu/agrability/files/2010/02/adaptivecontrols.pdf> (same).

accessibility issues through physical modifications (e.g., adding safety steps, handholds, additional mirrors, etc.), other accessibility features and adaptive controls (e.g., achieving vibration reduction, installation of fingertip airbrake systems, etc.) may require modification of embedded software on ECUs.

Item 6.2 Without an Exemption, OEMs Can Prevent Farmers from Increasing Engine Power

Farmers need an exemption so that they can increase the engine power of their agricultural machines. Farmers (particularly small, family farmers) often need to operate their agricultural machinery for **non-designed uses** due to the machinery's high capital cost. For example, a small, family farmer may need to use a tractor to both pull a manure spreader (a designed use), but also for timber harvest (a non-designed use). Farmers often cannot operate safely and effectively for such non-designed uses without making significant modifications to the embedded software in their machines. Moreover, farmers often need to modify their agricultural machinery even for **designed uses** because many OEMs intentionally design agricultural machinery to perform at artificially restricted power settings to (a) engage in price discrimination; and/or (b) to lower their taxes. In other words, farmers sometimes need to modify agricultural machinery where an OEM has intentionally designed the product to be less than optimally efficient.

Item 6.3 Without an Exemption, OEMs Can Prevent Farmers from Increasing Environmental Efficiency

Farmers need an exemption so that they can increase the environmental efficiency of their machines. When farmers increase the efficiency of their machines, they pay less money for fuel and reduce their environmental impact. Without the ability to modify default factory engine settings, farmers cannot increase such efficiency. They cannot participate in communities that exist to promote the exchange of information enabling farmers to increase their own machine's efficiency,³ and they cannot access independent shops that assist with such modifications.

³ See e.g., ECOMODDER.COM, <http://ecomodder.com/>; EKOTUNING.COM <http://www.ekotuning.com/>.