Before the
U.S. COPYRIGHT OFFICE, LIBRARY OF CONGRESS

LONG COMMENT REGARDING A PROPOSED EXEMPTION UNDER 17 U.S.C. 1201

Item 1. Commenter Information

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Item 2. Proposed Class Addressed

The proposed exemption that this comment addresses is Proposed Class 21: Vehicle software – diagnosis, repair or modification.

Item 3. Overview

These comments are limited to the effect of permitting modification of software in Eaton's transmissions. There is a risk of injury to Eaton if the exemption is granted.

Item 4. Technological Protection Measure(s) and Method(s) of Circumvention

Eaton initially installs its transmission control software ("Eaton Software") at its facilities. The only authorized means of updating Eaton Software after the initial installation is to use Eaton's ServiceRanger™ software tool, available at Eaton-authorized service facilities. Such updating is limited to installing updates of Eaton Software, and setting certain selected parameters within pre-selected ranges.

The current version of the ServiceRanger software is installed in the following manner. The ServiceRanger software is downloaded to the licensee's computer by the prospective licensee. The licensee must establish an account with Eaton by registering through an e-commerce site,

providing certain requested information such as licensee's name, company name and location. The licensee then pays for a license to the Service Ranger software, enabling the activation of certain pre-determined features depending on the type or class of license being purchased. During check-out, the licensee is provided with a code to be used in activating the ServiceRanger software. A computer on the Eaton side of the exchange determines, based on the registration information provided, what level of license the licensee is eligible for. The most basic level of license is available to all registrants. Higher level licenses, permitting use of more of the capabilities of the ServiceRanger software, are available to original equipment dealers known to the Eaton computer. After receiving the code, the licensee opens the already-downloaded copy of the ServiceRanger software. The ServiceRanger software asks the licensee to answer several questions covering at least some of the same information provided for registration, and asks for the code. The ServiceRanger software causes the answers to be sent to the Eaton computer. After the information is confirmed as correct by the Eaton computer, a message is sent to the licensee's computer from Eaton's computer. The message allows the licensee's computer to activate the functional portion of the ServiceRanger software. The code can only be used with a single computer. Additionally, if the ServiceRanger software on the licensee's computer does not connect with the Eaton computer for 45 days, the ServiceRanger software will cease to be able to provide certain of its functions, including updating Eaton Software.

Item 5. Asserted Noninfringing use(s)

Proponents of the proposed exemption claim that modification of the software embedded in vehicle software does not result in any loss of sales to customers. However, presuming that a party seeking to modify Eaton Software will need to make a copy of ServiceRanger, the claim of no lost sales is not correct. Eaton is engaged in the sale of copies of ServiceRanger. Permitting the copying of ServiceRanger software, or development of a substitute based on the decompiling of Eaton Software or ServiceRanger software, deprives Eaton of the sale of ServiceRanger software and the benefits associated therewith.

Item 6. Assert Adverse Effects

The Eaton Software controls the shifting and clutch actuation of its associated transmission. Variations of the Eaton Software are used with each of Eaton's automated transmission products, including the Eaton UltraShift *PLUS*™ transmission, the Procision® transmission and Eaton's Electric Hybrid transmission. The following will discuss the operation of the Eaton UltraShift *PLUS* transmission as an example. The Eaton UltraShift *PLUS* transmission is much like a manual transmission, but in place of a manual shift lever, a pair of electric motors or actuators perform the shifting responsive to instructions from the Eaton Software. Clutch actuation is performed by a third electric motor or actuator which also responds to Eaton

Software Instructions. No clutch pedal is needed (or found) in the truck cab. The Eaton UltraShift *PLUS* transmission is designed for use in commercial vehicles – trucks and buses – and may have up to 18 gears to select between.

The Eaton Software has been developed by Eaton over approximately the last 20 years, and continues to be improved by Eaton's engineers. Decisions made by the software include selection of an appropriate gear for launching the vehicle from start, selection of a target gear for the transmission to shift into when the vehicle is in motion, whether or not to apply the vehicle brakes to prevent the vehicle from rolling back when launching, modulation of engine speed to facilitate shifting, selective application of an inertia brake to facilitate performance shifting, selecting between an open clutch shift and a closed clutch shift (float shift), and, for open clutch shifts, modulation of the clutch engagement and disengagement to enable smooth shifting. The system also controls and modulates engine torque and speed for specific phases of the shift process.

Enabling unauthorized modifications to the Eaton Software can have safety consequences, not just for the vehicle operator, but for others on the road. Modifications to either increase performance by making shifts at higher engine speeds, or to increase fuel economy by making shifts at lower engine speeds, without considering the full range of factors taken into consideration by Eaton engineers and accommodated by the factory software, is highly likely to result in unintended consequences. Selection of an incorrect gear can result in stalling of the vehicle. Incorrect gear selection can alternatively result in engine overspeeding. Improper brake applications can result in a stalled vehicle, or unintended vehicle roll-back. While somewhat unlikely, ill-considered software changes and certain operating circumstances could conspire to result in a run-away vehicle on an extended downhill.

Circumvention of technological measures would also have commercial consequences. Modifications to the Eaton Software could have a negative impact on the durability performance of the transmission and the engine. The Eaton Software incorporates performance restrictions that are intended to avoid driveline damage due to excessive torque transmission. Software modifications could result in damage to driveline components including the driveshaft between the transmission and the axle. Operating at elevated engine speeds will likely result in a loss of fuel economy and premature engine durability concerns and transmission durability concerns. Selecting shifts that cause the engine to operate at lower than expected speeds is also a concern. Operating at low engine speeds (less than 1000 rpm) will cause driveline damage due to torsional pulses from the engine firing frequency imparting vibrational energy to the vehicle structure, in turn exciting components having a natural harmonic frequency in the same range. The secondary market for commercial vehicles will be affected by an increased uncertainty over the condition of used vehicles having what would

presently be considered to be a modest number of miles if it was known that vehicle owners could make unauthorized software changes.

The likely negative impact of the circumvention of Eaton's technological measures on Eaton's transmissions makes it seem probable that such circumvention will negatively impact the perception of the durability and performance of Eaton's products. This impact may extend to both purchasers of new vehicles and to secondary purchasers. Secondary purchasers may be especially concerned to the point where they would discount the price of vehicles having Eaton transmission out of concern that unauthorized changes made to the transmissions may have compromised the remaining life of the vehicle more than the odometer would suggest.

Another risk to Eaton is that such circumvention, if not detected and not identified by Eaton as causally contributing to the basis of a claim against Eaton, could unfairly increase Eaton's liability risk in the event of such a claim.

Item 7. Statutory Factors

(i) The availability for use of copyrighted works.
Without the exemption, the Eaton Software will be available in its tested form from Eaton to owners of Eaton transmissions. Access to Eaton's ServiceRanger software will be available to owners of Eaton transmissions through authorized service centers. The proposed exemption would permit potentially dangerous derivatives of the Eaton Software to enter the commercial market.

(ii) The availability for use of works for non-profit archival, preservation.
Access for use of Eaton Software for non-profit archival, preservation purposes will be unaffected by whether or not the proposed exemption is enacted, as such use is consistent with fair use in Eaton's view without the proposed exemption.

(iii) The impact that the prohibition on the circumvention of technological measures applied to copyrighted works has on criticism, comment, news reporting, teaching, scholarship or research.
The prohibition of the circumvention of technological measures, with respect to the Eaton Software, has little impact on the listed categories. Criticism, comment and news reporting on Eaton's transmissions incorporating the Eaton Software is only meaningfully done with the Eaton Software in its design-intent condition. Teaching, scholarship and research by non-profit institutions are similarly unaffected, as such purposes are consistent with fair use in Eaton's view without the proposed exemption.

(iv) The effect of circumvention of technological measures on the market for or value of copyrighted works.

Aside from the above identified uses characterized as fair uses, circumvention of technological measures will have a negative impact on the market for Eaton's ServiceRanger software, and, if such circumvention of technological measures has the anticipated negative impact on vehicle performance, will result in the diminished reputation of Eaton products and decrease the sale of such products.

Item 8. Documentary Evidence

As Eaton is unaware of any infringements of the latest version of ServiceRanger software consistent with the proposed exemption that has occurred to date, it does not have direct documentary evidence of the realization of the anticipated risks and damages described above.