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**VIA E-MAIL ONLY (2015ADMAT@LOC.GOV)**

Jacqueline C. Charlesworth  
General Counsel and Associate Register of  
Copyrights  
U.S. Copyright Office  
Library of Congress  
101 Independence Ave SE  
Washington, DC 20559-6000

**Re: Docket No. 2014-7, Exemptions to Prohibition Against Circumvention of  
Technological Protection Measures Protecting Copyrighted Works, Class 21**

Dear Ms. Charlesworth:

On behalf of the Alliance of Automobile Manufacturers (“Auto Alliance”), attached please find the response of the Auto Alliance to your letter of June 3, 2015 regarding Proposed Class 21 – Vehicle Software – diagnosis, repair or modification.

Thank you for this opportunity to respond to these questions, and please let me know if we can provide any further information.

Sincerely,

Steven J. Metalitz

MITCHELL SILBERBERG & KNUPP LLP

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## Post-Hearing Questions, Class #21

### Responses of Alliance of Automobile Manufacturers (Auto Alliance)

**1. Please explain whether the requested exemption would or could impact non-software copyrighted content that is offered through vehicle telemetry and/or entertainment systems. Could an exemption be crafted that would preserve protection of such content?**

Yes, the requested exemption could impact such content. Although there are an increasing number of such systems in the vehicles manufactured by Auto Alliance members, each with its own proprietary structure and architecture, we offer a few general observations.

Vehicle systems provide access to a range of non-software copyrighted content, including informational and entertainment products and services, such as news, weather, sports, stocks, traffic, music, movies, and videogames, accessed through entertainment systems for streaming to the vehicle. While vehicle owners are generally licensed to access some of this material as part of their subscriptions to these services, removing the prohibition on circumvention of access controls on vehicle software could enable unauthorized access to value-added services without any payment, or could allow continued access to premium content even after any free trial period included with the vehicle purchase has expired. Indeed, the circumvention of access controls could enable vehicle owners to cancel their subscriptions altogether and rely upon unauthorized access facilitated by circumvention.

For the reasons stated in our submissions and testimony, Auto Alliance does not believe that the record supports the recognition of any exemption in this area. Even limiting or narrowing the phrasing of the exemption is problematic because practically speaking, these systems are often intertwined. A person bypassing protective measures to access the system could gain access to all of the system content, even non-software copyrighted content, such as music and videos. Thus, this content would be unprotected.

**2. Please explain whether and/or how the purchaser of a used vehicle would be able to identify and assess modifications to vehicle software by the previous owner. What would be the process, as well as the cost and burden, of identifying such changes? What type of equipment would be necessary?**

It is virtually impossible for a used vehicle purchaser to detect if any software on any electronic control module (ECU) has been modified by a previous owner. Proponents suggest that manufacturers (OEMs) could incorporate a “checksum” into the ECUs to verify vehicle software. They testified that “the ability to run a check sum if the systems are accessible is one way to be assured of the trustworthiness of the software.”<sup>1</sup> However, developing a system to track, store, and make available every ECU software version and checksum for every ECU on every vehicle would be a massive undertaking. Moreover, that effort would be for naught; even

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<sup>1</sup> Class 21 Hearing Testimony, at 247 (May 19, 2015). Interestingly, proponents’ sole reference to checksum techniques prior to the May 19 hearing is the statement by one independent security researcher that he has publicly disclosed “how to circumvent this checksum and install arbitrary firmware from a USB stick” onto an ECU. Statement of Charlie Miller, EFF Class 21 Initial Comment, Appendix B, p. 2, paragraph 6 (Feb. 6, 2015).

a moderately sophisticated hacker could determine the correct checksum and then simply hardcode the ECU to report that checksum value and hide any evidence of tampering.

A good case-study of the use of checksums involves On-Board Diagnostic (OBD) system emission related software. Most states have pollution inspection and maintenance programs to prevent excess pollution from vehicles. Each of these states uses the OBD system to verify that the OBD system has not detected any faults and the vehicle is not producing excessive pollution. Software controls the OBD system, so tampering with the software could allow a vehicle with an unrepaired fault or unauthorized modifications to pass a test despite producing excess emissions. In 1996, the California Air Resources Board (CARB), the agency that regulates OBD systems for vehicles in the U.S., decided that each ECU in the OBD system should report a calibration identification, or software version (Cal-ID) and an encrypted checksum (called "Calibration Verification Number" or CVN). The goal was to allow state pollution inspection stations to read the Cal-ID and CVN, and compare it to a database of approved Cal-IDs and CVNs to detect tampering.

In order to deter tampering, regulations also required each manufacturer to develop and get CARB approval for an algorithm to calculate a CVN for each software version. However, granting the vehicle software exemption in Class 21 would allow someone to circumvent TPMs and overwrite the calculated CVN with the "correct" CVN value (i.e., hardcode the correct CVN), making it impossible to detect any tampering.

The Cal-ID and CVN concept has been implemented by vehicle manufacturers since Model Year 2005 at great effort and expense. OEMs provide quarterly lists to CARB of Cal-IDs and CVNs. Anyone with a generic OBD scan tool can read the Cal-ID and CVN from the emission related ECUs, but even with Cal-ID and CVN, it has proven too difficult, costly, and time consuming for professional technicians at state pollution inspection stations to determine if the vehicle software has been modified. To date, almost 20 years after this effort started, no state routinely uses this system to make these determinations.

It is important to remember that OBD is just one system, and does not include safety systems. To develop a method to track every software modification to every ECU on every vehicle would require a massive amount of resources from the automakers and government in an ultimately futile effort, since through unauthorized circumvention of TPMs, checksum verification could easily be rendered ineffective as a way to identify modified software.

**3. The Office is interested in additional information concerning the costs and availability of manufacturing information and data to create diagnostic techniques and tools for the automobile "aftermarket," as well as the costs and availability of such information for persons who seek to create tools for individual use.**

Each automaker (OEM) provides all of the repair information, training materials, diagnostic and reprogramming tools, and tool information needed to produce aftermarket tools with the same functionality as the OEM tool. For over a decade, nationwide regulations have required automakers to provide this at a "fair and reasonable price" for emission-related components and systems (engine, transmission, catalytic converter, etc.). Automakers have voluntarily provided the same information at the same prices for non-emission-related

information (brakes, airbags, climate control, etc.). For a fair and reasonable price, every independent repair shop and every customer in the United States can use the exact same information and tools that franchised dealers use to service, diagnose, and repair 1998 and newer vehicles, and/or can acquire such tools and information in a competitive aftermarket.

### **Emission-Related: Federal and California Vehicle Service Information Regulations**

The U.S. Environmental Protection Agency (EPA) and CARB<sup>2</sup> have a vested interest in ensuring the vehicle emissions are low throughout the life of the vehicle. Because 75 percent of post-warranty repairs are performed by independent repair shops, the agencies need to ensure that these shops have all of the information and tools needed to properly diagnose and repair emission-related malfunctions in vehicles.

In 2001, CARB adopted extensive regulations (Title 13 California Code of Regulations (CCR) §1969) to ensure independent repair shops would have access to the repair (or service) information, tools, tool information, and training. In 2003, EPA adopted vehicle service information regulations largely similar to CARB's (Title 40 Code of Federal Regulations, Part 86 §86.1808-01(f)). Because prohibitively expensive service information, tools, or tool information would have the same effect as non-availability, both agencies adopted detailed requirements to ensure "fair and reasonable" prices. These requirements, summarized below, are backed up by CARB and EPA penalties that can total more than \$55,000 per day. Neither agency has ever charged any manufacturer with violating these regulations since they came into force.

Service (or Repair) Information Available: Under EPA regulations, for all vehicles 1996 and newer, automakers must "furnish... to any person engaged in the repairing or servicing of motor vehicles or motor vehicle engines...any and all information needed to make use of the on-board diagnostic system and such other information, including instructions for making emission-related diagnoses and repairs...provided (directly or indirectly) by the [automaker] to franchised dealers."<sup>3</sup> This covers everything from repair manuals and technical service bulletins to descriptions of OBD system operation.<sup>4</sup>

Third-Party Service Information Providers: EPA regulations also require each OEM to provide all of the service information described above to aftermarket service information providers, defined as "any individual or entity...who consolidates manufacturer service information and makes this information available to aftermarket service providers."<sup>5</sup> These aftermarket service information providers (e.g., Mitchell 1 ProDemand, AllData Repair, Identifix<sup>6</sup>) consolidate and

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<sup>2</sup> Under the Clean Air Act Section 177 provision, 12 states (about 36 percent of the U.S. new vehicle sales) have adopted CARB's vehicle emission regulations, including the vehicle service information requirements. The other 38 states follow EPA's vehicle emission regulations.

<sup>3</sup> Title 40 Code of Federal Regulations, Part 86 §86.1808-01(f)(2)(i).

<sup>4</sup> See <http://www.nastf.org/i4a/pages/index.cfm?pageid=3291>;  
<http://www.nastf.org/i4a/pages/index.cfm?pageid=3292>

<sup>5</sup> Title 40 Code of Federal Regulations, Part 86 §86.1808-01(f)(2)(ii)(L).

<sup>6</sup> See, e.g., <http://mitchell1.com/main/prodemand-home/>; <http://www.alldata.com/repair>;  
[http://www.identifix.com/oem\\_direct.html?tab=1](http://www.identifix.com/oem_direct.html?tab=1)

sell service information from multiple automakers. For example, for \$169 per month,<sup>7</sup> AllData provides “instant access to a single source of accurate, up-to-date [automaker]-direct diagnosis, repair, and maintenance information. Available online 24/7 and automatically updated, our huge database offers you information covering more than 33,000 engine-specific vehicles. Repair procedures, diagrams and TSBs are specific to each vehicle for fast, factory-correct repairs.” For at-home do-it-yourself (DIY) repairers, AllData provides a 1-year subscription for a single vehicle for \$26.95.<sup>8</sup> While this information is also available online directly from automaker websites, most independent repair shops use the consolidated aftermarket service information instead.

Automaker Tool Availability: Both EPA and CARB require automakers to make available their specific diagnostic scan tools at a fair and reasonable price, a criterion that specifically includes “the ability of aftermarket technicians and shops to afford the tools.”<sup>9</sup> For example, the Ford diagnostic tool is \$1,599<sup>10</sup>.

Tool Information: In addition to making available the OEM-specific tools that franchised dealers use, both agencies require OEMs to make available enhanced data stream<sup>11</sup> and bi-directional control<sup>12</sup> information to aftermarket tool companies. This allows the production of an aftermarket tool with the same functionality as the automaker’s tool. As a result there is a competitive marketplace in aftermarket tools capable of working with multiple automaker lines, thereby reducing the cost to independent repair shops. For example, Drew Tech sells Mongoose tools for \$495 for a single automaker<sup>13</sup> or the CarDAQ-Plus that works on multiple automakers for \$1,680. AutoEnginuity offers bundles for U.S. or Asian automakers for \$799 or European automakers for \$1,199.<sup>14</sup> Finally, Amazon lists over 3,000 “automotive diagnostic scan tools” priced from under \$10 to over \$4,000.<sup>15</sup>

This information is distributed through clearinghouses such as the Equipment and Tool Institute (ETI), which represents almost 100 aftermarket tool and equipment manufacturers. Most OEMs provide the tool information to ETI either free or for a nominal licensing fee. ETI then

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<sup>7</sup> See <https://orders.alldata.com/mechanical/>

<sup>8</sup> See <http://alldatadiy.com/buy/>

<sup>9</sup> See <http://scantoolresource.com/> for links to all OEM tools.

<sup>10</sup> See <https://rotunda.service-solutions.com/en-US/Pages/ItemDetail.aspx?SKU=164-R9807>; see also “Toyota Diagnostic Scan Tool Pricing Schedule,”

[https://techinfo.toyota.com/techInfoPortal/appmanager/t3/ti:TISESSIONID=NJpJVQsLkn9BIfBLJThn56TtZsjLCF5SZ6xc0wq9yqjr27Lk1f8D!-630061502?\\_pageLabel=ti\\_whats\\_tis&\\_nfpb=true](https://techinfo.toyota.com/techInfoPortal/appmanager/t3/ti:TISESSIONID=NJpJVQsLkn9BIfBLJThn56TtZsjLCF5SZ6xc0wq9yqjr27Lk1f8D!-630061502?_pageLabel=ti_whats_tis&_nfpb=true), listing subscription fees of \$15 to \$1095 for various levels of information.

<sup>11</sup> “Enhanced data stream information” is defined as data stream information that is specific for an original equipment manufacturer’s brand of tools and equipment. Data stream information available to technicians through a diagnostic tool typically consists of real time data from sensors and the onboard computer regarding the operating conditions of the vehicle

<sup>12</sup> “Bidirectional controls” typically consist of commands issued by a technician using a scan tool to override normal vehicle operation in order to activate a device or computer routine for diagnostic purposes.

<sup>13</sup> See <http://www.drewtech.com/technician/products/mongoose.html>

<sup>14</sup> See <https://www.autoenginuity.com/order-online/vm-bundles.html>

<sup>15</sup> See [http://www.amazon.com/s/ref=nb\\_sb\\_noss?url=search-alias%3Dautomotive&field-keywords=automotive+diagnostic+scan+tool](http://www.amazon.com/s/ref=nb_sb_noss?url=search-alias%3Dautomotive&field-keywords=automotive+diagnostic+scan+tool)

distributes this information to its tool company members. As with service information, although the automaker-specific diagnostic scan tools are available for a fair and reasonable price, most repair shops instead use aftermarket scan tools that operate on multiple vehicle makes. The same tools are available to individuals.

Fair and Reasonable Cost: Both EPA and CARB have listed specific criteria for determining compliance with the obligation to provide all of the above information and tools at a “fair and reasonable price”; “the ability of an average covered person to afford the information” is an explicitly stated criterion<sup>16</sup>. Separately, the agencies have approved as “fair and reasonable” the prices charged for emission-related service information and tools.

### **Non-Emission-Related – 2002 Dorgan Letter, 2013 Massachusetts Law, and 2014 MOU**

While the Federal and California regulations only cover emission-related service information and tools, in 2002 automakers representing about 97% of the new vehicle market voluntarily committed, in the Dorgan letter,<sup>17</sup> to provide the same treatment for non-emissions related information and tools, for models dating back to the 1990s. Moreover, the automakers helped establish the National Automotive Service Task Force (NASTF) to identify any service or tool information that is not available to the aftermarket, so the responsible OEM could correct discrepancies.

In 2013, Massachusetts legislation,<sup>18</sup> supported by manufacturers, servicers and the aftermarket, provided an additional method to diagnose and repair vehicles through a standardized interface beginning in Model Year 2018. The 2013 MA Right to Repair law copies the “fair and reasonable price” language from the EPA regulations.<sup>19</sup>

In 2014, automakers and the aftermarket came together and signed a memorandum of understanding and annexed R2R (Right to Repair) agreement to implement the spirit of the MA R2R law on a national basis.<sup>20</sup> The agreement includes a dispute resolution provision that can be invoked by any repair facility or individual vehicle owner who believes that manufacturers have failed to provide information or tools as required by the MOU including pricing challenges. This provision has never been invoked.

Although EPA and CARB have no jurisdiction over the additional cost of non-emission-related information and tools, automakers do not charge anything extra for these items. All information, tools, and tool information is offered on the same automaker web sites, for the price that was determined fair and reasonable for emission-related material only.

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<sup>16</sup> Title 13 California Code of Regulations (CCR) §1969(d)(15)(E).

<sup>17</sup> See Auto Alliance Class 21 Comment, Exhibit B (Mar. 27, 2015).

<sup>18</sup> Chapter 165 of the Acts of 2013 (Approved Nov. 26, 2013),  
<https://malegislature.gov/Laws/SessionLaws/Acts/2013/Chapter165>

<sup>19</sup> Title 40 Code of Federal Regulations, Part 86 §86.1808-01(f), [http://www.ecfr.gov/cgi-bin/text-idx?SID=4bc662f12dd1005efa2e9aaa1364787b&node=pt40.19.86&rgn=div5#se40.19.86\\_11807\\_601](http://www.ecfr.gov/cgi-bin/text-idx?SID=4bc662f12dd1005efa2e9aaa1364787b&node=pt40.19.86&rgn=div5#se40.19.86_11807_601)

<sup>20</sup> See Auto Alliance Class 21 Comment, Exhibit A (Mar. 27, 2015).