CARMAKERS WANT TO USE COPYRIGHT LAW TO MAKE WORKING ON YOUR CAR ILLEGAL

Jason Torchinsky

You know what a pain those plastic engine covers are? How they get in the way and hide your own car’s engine from you? Well, consider that black piece of molded plastic a metaphor for something much worse: the Digital Millennium Copyright Act. Automakers are trying to use the DMCA to say you can’t work on or modify your own car.

UPDATE: We just received a statement from the Automakers’ Alliance. It will be covered at the end of this article.

We all know that working on and tinkering with a modern car is a very different undertaking than it has been previously. It’s no longer just about putting on a new manifold and dual carbs, modern cars involve many, many computers, and working on your car usually means working with and talking to the computers embedded in the car.

There’s nothing inherently wrong with all the computers in cars, and they allow for safety, convenience, and efficiency levels in our vehicles far beyond what we’ve been able to achieve before. But that doesn’t mean they can’t be repaired or tinkered with by the owner — it just takes a new set of skills and tools. It’s not like rejetting a carburetor was something just anyone could do, anyway — this is really no different.

Well, it is different in one very important way: because so much of how modern cars work involves computers and software code, cars can now fall under the aegis of bills like the Digital Millennium Copyright Act, and automakers can use this act to try and restrict what an owner can do to the car that they bought.

Automakers are considering cars “mobile computing devices” and as such would fall under the DMCA’s pretty draconian protections. Really — here’s how they describe their reasoning in the Auto Alliance’s (a group of automakers including BMW Group, FCA US LLC, Ford Motor Company, General Motors Company, Jaguar Land Rover, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche, Toyota, Volkswagen Group of America and Volvo Cars North America) statement against a proposed exemption to allow people to work on their own cars:

Automobiles are inherently mobile, and increasingly they contain equipment that would commonly be considered computing devices... Many of the ECU’s embodied in today’s motor vehicles are carefully calibrated to satisfy federal or state regulatory requirements with respect to emissions control, fuel economy, or vehicle safety. Allowing vehicle owners to add and remove programs at whim is highly likely to take vehicles out of compliance with these requirements, rendering the operation or resale of the vehicle legally problematic. The decision to employ access controls to hinder unauthorized “tinkering” with these vital computer programs is necessary in order to protect the safety and security of drivers and passengers and to reduce the level of noncompliance with regulatory standards. We urge the Copyright Office to give full consideration to the impacts on critical national energy and environmental goals, as well as motor vehicle safety, in its decision on this proposed exemption. Since the record on this proposal contains no evidence regarding its applicability to or impact on motor vehicles, cars and trucks should be specifically excluded from any exemption that is recommended in this area.

Now, it’s not like they don’t have any points — there could be safety implications (though not likely enough to make the car any less safe than, say, a roadlegal vintage car), but locking out key safety features while leaving other components open to repair or modification is certainly possible. This isn’t an all or none kind of situation.

This means if you want to modify your car by getting your ECU flashed to make changes to, say, increase horsepower, change throttle response, or whatever, you’re violating the law, even if you don’t touch any of the safety or security code in the car’s computers.

The lengths automakers (and, as you’ll see, tractor and farm equipment makers) are going to justify the idea that you can’t modify a product you paid money for and own is absurd. The car makers don’t want you to be able to even look at any of the code in the vehicle you own and entrust your safety to, citing worst-case scenarios like you might try to use that code to change the odometer reading to defraud someone or you’ll use it to find ways to break into other people’s cars.

— continued on page 13
KRIPLI’S CORNER
WASHINGTON, D.C.

As you can see by the picture, I was on Capitol Hill last month at the request of the United States Trade Commission. The discussion centered upon trade between China and the United States. Pressing the discussion was the visit of the Chinese Emperor coming in September of this year and the opportunity to get certain issues in front of the Chinese delegation. The topic mostly centered around intellectual property. What was most interesting to me was the other industries represented at the forum. There was APRA and MEMA, but in addition to us there was the Music Industry, Farming Association, Pharmaceutical Organizations, Off-Highway Organizations (John Deere), and Nike.

It was interesting to see that intellectual property as well as counterfeiting is a big topic not just for the automotive industry but for a number of industries – the music industry was complaining because you can download music in China for $0.10 cents, farming is upset that China has reduced the chickens you can download music in China for $0.10 cents, farming is upset that China has reduced the chickens you can download music in China for $0.10 cents, farming is upset that China has reduced the chickens purchased from the USA as well as the chicken being imported to Japan and the fertilizer used in the feed by the Chinese. Pharmaceuticals are upset as well as Nike with counterfeiting, we understand the Nike issue but could you imagine getting some medicine that is copied and just doesn’t work, we are talking life and death at this point.

For the automotive industry we focused on the copying of IP (software) and the fact that they are not using the latest software version. The example I gave them was a counterfeit or copied ABS unit coming from China might fit and function but without the correct software the product functions as an older unit to a point where if you have to stop on ice, the old software stopped in a distance of 90 feet at a certain speed and the newer software stops in 60 feet on ice, this is a huge difference between colliding with a vehicle or collision avoidance.

In addition, I have great concerns for when these Chinese units come back as cores and because of the stack up of tolerances, the components (housings, bearings, seals, etc.) don’t fit exactly right and make remanufacturing a nightmare as well as a quality risk for our businesses.

So APRA continues the fight on Capitol Hill for our members. I hope to see some of you at the Rematec 2015 Show in Amsterdam June 14-16 or the World Remanufacturing Summit June 17-18.

Remember, this is YOUR Association! Please send me your comments and suggestions.

I always welcome response or rebuttle to my comments at kripli@apra.org

Respectfully,
Joe Kripli

THE APRA GLOBAL CONNECTION

Technical, Management and Association News from the Automotive Parts Remanufacturers Association

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WELCOME NEW MEMBERS

APRA Welcomes New Member, John B. Reece, Jr. of Atlantic Automotive Enterprises, pictured with Ewoud Barink of RAI (Booth Sales Manager for BigR / ReMaTecUSA Show)

During the recent 2015 Automechanika Chicago, APRA signed up Atlantic Automotive Enterprises as an APRA New Member. Atlantic Automotive Enterprises is a remanufacturer located in Tabor City, North Carolina, who rebuilds hydraulic rack and pinion, hydraulic power steering pumps, electric rack and pinion, reman components, seals and hard parts. Their CEO, John B. Reece, Jr. stopped by the APRA booth and signed up as a new member and a new exhibitor in the upcoming 2015 BigR / ReMaTecUSA Show.

The 2015 BigR / ReMaTecUSA Show will be held October 31 – November 2 at the Rio Hotel and Suites in Las Vegas, Nevada.

To sign up for a booth, email Ewoud Barink at e.barink@rai.nl. For more information on this show, go to www.bigremanetcusa.com

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**WHAT IS MECHATRONICS?**

The name Mechatronics stems from mechanical and electronics and is a relatively new approach to product design and development, merging the principles of electrical, mechanical, computer and industrial engineering. It addresses the four interconnected disciplines used for all complex modern devices. Mechatronic systems are typically composed of traditional mechanical and electrical components but are referred to as “smart” devices or systems because of the incorporation of sensors, actuators and computer control systems. Over the years, the term “mechatronics” has come to mean the integrated methodology for designing products that exhibit fast, precise performance.

Mechatronics is an emerging field of engineering that integrates electrical engineering, mechanical engineering, computer science, control engineering and information technology. In layman’s terms, mechatronics combines these areas of engineering to allow the design, development and application of “smart devices” in an integrated, cross-disciplinary manner. The mechatronics concept establishes basic principles for a contemporary engineering design methodology. In this methodology, engineering products and processes have components that require manipulation and control of dynamic (moving) constructions to the required high degree of accuracy. Also, the design process requires integrating enabling technologies such as information technology and control engineering. A key factor for the design process involves integrating modern microelectronics and the engineering of software into mechanical and electromechanical systems.

**Why Study Mechatronics?**

Mechatronics has been popular in Japan and Europe for many years but has been slow to gain industrial and academic acceptance as a field and practice in Great Britain and the United States. In the past, machine and product design has been the domain of mechanical engineers. After the machine was designed by mechanical engineers, solutions to control and programming problems were added by software and computer engineers. This sequential-engineering approach usually resulted in less-than-optimal designs and is now recognized as less than optimal itself.

The prime role of mechatronics is one of initiation and integration throughout the whole of the design process, with the mechatronics engineer as the leader. Experts in the interdisciplinary mechatronics field must acquire general knowledge of various techniques and be able to master the entire design process. They must be able to use the special knowledge resources of other people and the particular blend of technologies that will provide the most economic, innovative, elegant and appropriate solution to the problem at hand. Industry needs mechatronics engineers to continue to rapidly develop innovative products with performance, quality and low cost.

**Where do Mechatronic Engineers work?**

Mechatronic devices or “smart” devices have become common in our technologically advanced society. Mechatronics engineers can work in any company that develops, designs or manufactures and markets “smart” devices. Opportunities exist in manufacturing, sales and as well as research. Mechatronic devices have crept into everyday life.

**Examples include:**
- Robots
- Anti-lock brakes
  - A sophisticated control system takes over the braking function when the sensors recognize one or more wheels are locking up.
- Photocopiers
- Computer disk drives
- Humidity sensitive clothes dryers and windshield wipers
  - How do these devices “know” if clothes are still damp or drizzle is hitting the windshield?
- Sensors, that’s how.

Mechatronic devices can be found in medicine and surgery, agriculture, buildings, homes, automobiles, the toy and entertainment industry, intelligent aids for the elderly and disabled.

*From NC State University (www.engr.ncsu.edu)*

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**INDUSTRY CALENDAR 2015**

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<td>PAACE</td>
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<td>ADS (Association of Diesel Specialists)</td>
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<td>APRA Electrical and Steering Clinic</td>
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<td>Remanufacturing, Refurbishing and Equipment Remarketing Exhibition 2015</td>
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<td>Automechanika Shanghai</td>
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**ADs (Association of Diesel Specialists)**

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Thanks to the progress in computer programs and their ability to search, this has become a godsend for instances where there is no parts breakdown, but searching a service part or a unit by certain known criteria can narrow the fields of options and actually locate the needed part. Here is a case in point: 17940 is a rather rare Mitsubishi starter used on 2005 and 2006 Jeep Liberty with a 2.8L Diesel engine. We had one recently to rebuild which needed a drive and solenoid. I rebuild the solenoids in-house, so that was not an issue but to the best of my knowledge, and as far as I could search, there was no breakdown for the drive, and could not find a replacement in any application software that I have access to.

After making a few measurements for gear size, inside diameter, length...etc, I plugged those into the appropriate search box provided on the J&N website, and lo and behold, it showed a 220-48068 could be what we needed, as its measurement precisely equaled the one I had. So a couple were ordered, one to use and one to spare! (Figure-1)

This is one of the valuable features of J&N’s site that allows a search to find a unit, a service part, or any and all sort of stuff where there is no clear cut answer or available part number on hand. You can simply make some measurements, type it into the appropriate search box, find the options that appear, and select what you need.

Lester KwikFinder also has such search feature that is very helpful in identifying a unit by its specifications or finding certain parts. Regardless of what system you have and use, having the ability to search by certain measurements or unit’s characteristics is a big help in everyday rebuilding routine that can save a lot of time and frustration.

LR630 alternators, Thermistors and Choices!

Over 3 years ago I wrote a part about a 1999 Cadillac Sedan Deville that the owner wanted an estimate for the alternator change. The reason for that was that the alternator light was on and a few other shops that he had taken the car had suggested changing the alternator. Since the vehicle has a more expensive alternator (8236 water-cooled LR-630 alternator) and the R&R time is quite high, nearly all the estimates were around $1,000 and some even higher at the dealership. He wanted to see if we could save him some money by rebuilding his own alternator.

Checking the system indicated it was indeed charging but the charging system light was glowing along with a warning. A little review about this system may shed some light on the problem.

The LR-630 that showed up in late 90’s up to very early 2000’s was used on Cadillac and other applications in two different configurations. The difference was mainly in their regulators. The early version regulator (19009733 or Taditel’s T-733) needed a battery temperature sensor or “Thermistor” to work (Figure-2). The thermistor is attached to the battery’s positive post, located under the rear seat. This thermistor provides the temperature information to the regulator’s “S” terminal that in turn adjusts the regulator’s set point.

The catch is, if the line to “S” terminal was open, regulator would go into a default setting with the alternator still charging, but the warning light on, as was indeed the case with this vehicle. Of course reaching the alternator, pulling out the regulator plug and pinpoint testing is nearly impossible due to cramped compartment and the alternator location, but the thermistor is of course accessible. Once we removed the rear seat, we saw a little puddle of water there and the thermistor plug that had floated in the water, corroded, and one of its two wires had separated from the connector. Connecting the wire temporarily turned the alternator light off, and that was basically all was needed. (Figure-3) Of course I made sure our estimate and eventual charges reflected our knowledge about the system and the know-how to get this car going. After all, the owner could have spent upward of $1000 at any of those shops that prepared estimate for him, and would still have the same problem.

The later version of this alternator (8294) is equipped with 19009751 regulators (Taditel’s T-751) that do not need a thermistor. The two wires leading to the thermistor are simply cut and connected together to provide a +B to “S” terminal, and the regulator which has a higher setting and a special Temperature Compensation Curve (TCC) will do the rest.

Given the thermistor are hard to find (NLA at GM dealerships) and the old ones might be out of spec thus causing under or over-charging condition, I think using a T751 without a thermistor to be a much more reliable option for this or similar applications. This is what I have decided to do from now on, and provide thermistor bypass instruction to my service customers. As for the DIY crowd, I doubt there is one able to do an intact R&R on this alternator under a shade tree...so the subject is moot!

Due to very high R&R time, I recommend that rebuilders take special precaution in rebuilding these units and make sure the finished product is in tip-top shape before delivery or installation. In above case a caveat was put on the invoice stating out work has nothing to do with the longevity of the alternator, which may require a rebuild in some near future."

Since then we had more examples of this alternator which we have changed to 8284 to provide a reliable operation without the use of the thermistor that are by now completely disappeared from GM supply system.

Trailblazer’s Ignition Switch

The ignition switch saga and the resulting vast recall by GM that has been all over the news can be hardly missed, but when example of it shows up in the shop with intermittent or unusual problem, it makes the subject a little more personal that relates directly to our business.

A 2004 Trailblazer was brought in for a blower problem. Usually the resistor/relay block and its connector are the major sources of problem in GM as well as other vehicles, but after initial inspection we found this was not the case in this application. Further testing of the system showed there was actually no power getting to the HVAC control module.

The ignition feed to the HVAC module is via fuses 39 and 44 that come directly from the ignition switch. Connecting a test light to either fuse would light up, but as soon as the blower was turned on, even on low speed, the light would go off. So we had a problem with the ignition switch in the form of a bad or burned contact.

Since feeding the circuit directly restored the blower operation, the ignition switch was confirmed to be defective and was replaced. For the sake of curiosity, the old ignition switch was torn apart and it was
clear how the burn points in one set of the contacts and the heated/melted plastic in the switch was affecting the circuit.

Had this circuit been the one feeding the fuel pump, ignition, or injectors, you can imagine how this could have contributed to the sudden vehicle stop and unpredictable operation that you see and hear about it in the media. Figure 4 may somehow paint a picture to the GM ignition switch story that you hear a lot about.

Battery Drain…?!
The numbers for units rebuilt or sold are certainly dropping these days, I think is all across the board, resulting in a little or a lot of drop in business for many in the field of rotating electrical. That said, calls for vehicles for electrical problems are steady and perhaps a tad more than usual. So we try to capitalize on that to recoup shortcoming of the other side.

We usually (with some exceptions) get these vehicles when their battery, starter, and alternator have already been replaced by their owners or mechanics in the hope that throwing enough parts at the vehicle may fix it! This 1994 GMC K-series pick-up truck was no exception, where it had a new battery, reman starter, and a used but functional alternator already installed on it. The problem?...The battery would go down overnight, no matter what unit they replaced on the vehicle.

By a thorough search of the system and some diagnostic work, we traced the problem to a shorted out oil pressure switch! If this sounds odd, let me explain how the system was laid out in those vintage GM vehicles.

The fuel pump relay is an ECM activated item which energizes the fuel pump for about a 2-second period after the ignition switch is turned on. Once the fuel line is primed and pressurized, the ECM shuts the relay down. That is the only time that the fuel pump relay is active,...2 seconds after each ignition switch cycle...that’s all.

Once the engine starts, the oil pressure will close a set of contacts in the oil pressure sensor/switch, which in turn is wired up to feed the fuel pump. This a safety measure that has been built into the system that if the oil pressure drops way low, shutting off the fuel will stop the engine from running and preventing a major engine melt-down due to lack of oil or oil pressure. (Figure-5)

The oil pressure sensor/switch has a direct feed from the battery though a fusible link. Thus for tracing the battery drain in this switch, no amount of fuse pulling will stop the amp draw!

Since the system is so interconnected, various modes of failures of the oil pressure sensor/switch cause various problems, which the engine not starting (actually start but dying immediately) is the main one. But in our case, the failure was unique, as the engine would start and run, but the fuel pump never shut off.

Replacing the oil pressure sensor fixed the battery drain, but I cannot tell how the customer felt after replacing all of those parts without helping him in any way.

Well...that’s all for this issue. Until I see you again, keep up the good work.

Mohammad Samii can be reached via email to: samii@BuyReman.com, or his website at: sammysautoelectric.com
To be compliant with the Patient Protection and Affordable Care Act (ACA), health care plans must cover, without cost-sharing, the full range of Food and Drug Administration (FDA)-approved methods for contraception, according to recently-released frequently asked questions from the Departments of Labor, Health and Human Services and the Treasury (the Departments). The FAQs specified that there are currently 18 distinct methods of contraception for women and all must be made available without cost-sharing. Health plans are allowed to use reasonable medical management techniques and impose cost-sharing to encourage the use of specific services or FDA-approved items within the chosen contraceptive method, the Departments noted. For example, a plan may discourage use of brand name pharmacy items over generic pharmacy items through the imposition of cost sharing. The FAQs also touch briefly on the coverage of several other preventive care services such as breast cancer susceptibility, and preventive colonoscopy.

More than one third of employers less likely to interview applicants they can’t find online, survey shows:

Avoiding a professional online presence may be hurting your chances of finding a new job. More than one third of employers (35 percent) say they are less likely to interview job candidates if they are unable to find information about that person online, according to CareerBuilder’s annual social media recruitment survey. The national survey was conducted on behalf of CareerBuilder by Harris Poll between February 11 and March 6, 2015 and included a representative sample of more than 2,000 full-time, U.S. hiring and Human Resources managers across industries and company sizes. Social media recruitment is definitely on the rise with 52 percent of employers using social networking sites to research job candidates. This represents a 9 percent increase over 2014, and 13 percent over the 2013 data. “Researching candidates via social media and other online sources has transformed from an emerging trend to a staple of online recruitment,” said Rosemary Haefner, chief human resources officer at CareerBuilder. “In a competitive job market, recruiters are looking for all the information they can find that might help them make decisions. Rather than go off the grid, job seekers should make their professional persona visible online, and ensure any information that could dissuade prospective employers is made private or removed.”

ACA forcing employers to change business practices and health care benefits

The Affordable Care Act (ACA) is challenging employers by increasing the costs of providing health care coverage and restricting the ability to offer benefits that best meet the needs of employees, the Society for Human Resource Management (SHRM) told a U.S. House subcommittee on April 14. Sally Roberts, SHRM-SCP, speaking on behalf of SHRM addressed a U.S. House Education & the Workforce Subcommittee on Health, Employment, Labor and Pensions hearing, saying, “Effective health care reform should expand access to affordable coverage, but organizations should not have to change business practices and benefits in order to afford the required changes.” Five years after the enactment of ACA, administrative challenges continue because of the complexity of the law, delays in effective dates of certain provisions, and coverage requirements. As a result, some employers have had to absorb the costs of employing insurance brokers to navigate the law and to ease the burden of reporting requirements. Roberts quoted results of SHRM’s recent Health Care Reform Survey, which showed that 21 percent of respondents said their health care benefits decreased this year.

SESCO Management Consultants is a full-service human resource and employee relations consulting firm. APRA Members can contact SESCO for a consultation at no charge. SESCO is proud to be dedicated to personal communication, so please contact us today if you’d like a one-on-one with one of our consultants.
We buy and sell all types of inventories, and sell at Surplus pricing. As much as 80% off. E-mail or call us to have access to our new Surplus Parts website. SurplusExport@me.com (561) 699-0697 Sales

Alternators and Starter Cores Ford Motorcraft 2600, ECM’s GM/CMC New Reman Boxed OEM 600, VW-Audi Hi Pressure Fuel Pumps 5000, New Transmissions GM, Ford 03-07 200, Bosch Electric Fuel Pumps 1,000, Van & Truck Assorted parts Original Boxes 4500, ABS Control Unit New 04-05 Durango 100 pc.

One Trailer load 53’ FRAM HD Truck Filters 80% off Airtex Fuel Pumps 10,000, Visteon Alternators Starters 200, New Ford Alternators 09-11Van 125 & 195 AMP 50, Axle Shafts GM/CMC & F150 OE 1200, AC Delco Fuel Pumps 5,000, Brake Booster w/Master Cyl. Mustang 09-13 200, Federal Mogul Brake Pads 10,000, OE assorted Brake pads 20,000, Brake Shoes Bendix R481 500, Nissan Ignition Coils 22448-AL615 374, GM Blower Motors 1500 $1.95 CV Joint Kits in WONH Box 2000 $1.50 OSC Boxed Radiators 100 $20, Diesel Pumps 50, New Engines Ford Car Truck Van 20, Allison Trans Factory Reman 50

Fuel Injection Diagnostic Actron/SPX Test Kits Master cases 200, EDU Diesel Fuel Injection Module 6.6L LB7 400, Assorted New Fuel Injectors, Fuel Pump, Ignition Coils, Saginaw Steering parts • AXOD Neutral Safety switch 1000, 02 Sensors 10,000, Grand Prix Throttle Bodies, Chrysler Window lift motors 900, Jeep Wiper Motor Pulse Boards 1500, Cadillac XLR Window Lift complete 85 pc.

Raybestos Powertrain Recognizes TCRA’s 2015 Innovation Award Winners

Last weekend at the Torque Converter Builders Association (TCRA) seminar in Greenville, SC, Raybestos Powertrain (Raybestos) honored the 2015 Innovation Award winner and runners-up. The three top competitors received a cash prize and plaque.

Raybestos, in conjunction with TCRA, created the Innovation Award in 2014 to encourage innovation and information sharing within the torque converter rebuilding industry. Each year, business owners and technicians enter their own solutions for anonymous evaluation and scoring by TCRA board members in a competition for cash awards. This second year of the Innovation Award was highly competitive, mere points separated the winner and first runner-up.

This year’s 2015 Innovation Award winners:

- **Winner:** Rob Hans of Norfolk Transmission (Norfolk, NE)
- **1st Runner-Up:** Stuart Miller of Certified Transmission (Mishawaka, IN)
- **2nd Runner-Up:** Frank Kuperman of RevMax Performance (Charlotte, NC)

“This year’s Innovation Award submissions provided creative, productive solutions that could help other torque converter rebuilders improve their own processes and achieve greater success – and that’s what this program is all about,” said Andy Mayfield, vice president of aftermarket sales for Raybestos. “These innovators inspire others to develop solutions and share ideas across the industry.”

To learn more about Raybestos Powertrain and the Innovation Award, visit RaybestosPowertrain.com. Raybestos Powertrain is a leading, national manufacturer and supplier of premium OE and aftermarket transmission parts, providing innovative solutions to domestic and international customers. Located in Sullivan, Crawfordsville and Tipton, Ind.
ATP Automotive Celebrates 60th Anniversary

ATP Automotive (ATP), a leading supplier of automotive products to the traditional aftermarket, is celebrating its 60th anniversary. The company has created a special 60th Anniversary logo to commemorate this milestone.

“We have had a long history of success at ATP thanks to the dedication and excellence of our employees, both past and present, and the loyalty of our customers throughout the years,” said Roy Lipner, president and CEO of ATP, Inc. “Building on that solid foundation, we have made many positive changes recently to ensure that ATP remains a leading parts supplier to the auto care industry for the next 60 years.”

Among the many recent transformations at ATP include a contemporary new logo and a redesigned, user-friendly website. New products have been introduced and packaging has been updated to better reflect the high quality products the company supplies. AT-205 Re-Seal, the industry’s premier resealer, also features a new look and new bottle.

“This is a very special year at ATP as we celebrate our 60th anniversary,” said Gary Rogak, chairman of the board of ATP, Inc. “For 60 years, we have been dedicated to providing our customers with high quality automotive products. While we have made many changes recently, we remain unwavering in our dedication to supporting our customers and helping them grow their businesses.”

Founded on July 1, 1955, ATP was historically known as a transmission products supplier. Over the years, the ATP product line has expanded to include automatic transmission filter kits, repair kits, exhaust manifold kits, harmonic balancers, timing covers, cables, flywheel and ring gears, interior vent filters and chemicals. ATP started out in a 2,000 square foot facility in Chicago and is now located in a 92,000 square foot building in Elk Grove Village, Ill., a suburb of Chicago.

To learn more about ATP and its products, contact your ATP sales representative or call Steve Horn, senior vice president of sales, at 847-597-9174.

A division of ATP, Inc., ATP Automotive provides top quality products and outstanding service to its valued customers. The company first supplied automatic transmission replacement parts and, over the years, has expanded its product offering to include automatic transmission filter kits, repair kits, exhaust manifold kits, harmonic balancers, timing covers, cables, flywheel and ring gears, interior vent filters and chemicals. For more information, visit www.atpautomotive.com.
ReMaTec2015, the world’s largest international remanufacturing trade show has updated its entrance policy to facilitate the increased size and popularity of the show.

The show, taking place from 14–16 June, features 10,000 m2 of gross exhibition floor space and 225 exhibitors from all over the world.

Visitors are encouraged to register early, and will be able to register for free tickets until 5 June 2015. Registration after this date will incur a fee. Visitors with an invitation from an exhibitor will still be able to register for free entrance at all times.

“Early registration is encouraged as it gives us a clear view of the show’s attendance and allows us to cater for this accordingly,” explains Show Manager Niels Klarenbeek. “The online pre-registration also enables us to keep visitors informed on the latest news and developments and we use it as a channel to provide all the tools to help them get the most out of their visit.” More details on the new entrance policy can be found on the ReMaTec2015 website.

**NEW ENTRANCE POLICY**
**AT REMATEC2015**

Visitors registering online before 5 June 2015 will attend the show for free. Registration between 6–13 June 2015 will be charged at EUR 40 and visitors that register during the show, either online or at the door, will be charged EUR 70.

Exhibitors are able to invite their guests and relations to the show, so anyone with an invitation from an exhibitor will still be able to attend free of charge.

For more information, please see the detailed table on entrance fees: rematec.com/amsterdam/exhibition-info/about-the-exhibition/

### REMATEC2015 ENTRY FEES:

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For registration visit www.remansummit.com
1. Vehicle software that operates motor vehicles is functionally integrated with and, as a practical matter, inseparable from physical engine parts. The software in the proposed class is designed for and performs a purely functional purpose. It controls the operation of the vehicle’s hardware components in a manner that is inseparable from the physical components. Mechanical functions historically performed exclusively by parts such as switches, knobs, valves, relays, regulators, and meters, now are controlled and implemented partially in software and hardware. Whereas in the past a repair shop or car owner could fix or improve vehicle performance solely by mechanical adjustments, today they require access to the vehicle’s control software using laptop computers or specialized diagnostic tools. In short, the software functions as vehicle parts, and repair shops access that software only to access and adjust vehicle functionality—not copyrightable expression.

2. The technological protection measures applied to vehicle software serve no purpose cognizable under copyright law. Inasmuch as the software performs purely mechanical purposes rather than expressive purposes, it follows that the technological protection measures applied to restrict access to vehicle software are not intended to protect the copyrightable expression of the software. Notably, even the comments from the Auto Alliance and General Motors concede that the TPMs are not intended to preserve any value of the software. Rather, they cite the purposes of the technological protection measures as security, security, reputation and infringement, functional integrity, and manufacturer reputation and brand value. Nowhere do the commenters suggest that the purpose of the TPMs is to protect copyrightable expression against infringement of a right protected under Title 17. To the extent those purposes do not implicate copyright, and are governed by other federal and state laws, circumvention is not prohibited by or remedied under Section 1201.

There is an additional purpose to the TPMs that the opponents’ comments neglect to mention, and it is likely the purpose primus inter pares: to restrain competition for aftermarket sales of parts and services. Overall domestic aftermarket sales of automotive products totaled $328 billion in 2014. The motor vehicle aftermarket industry, encompassing parts and services purchased for light, medium and heavy duty vehicles after the original sale, employs more than four million people in the United States; and more than 5,000 companies in the United States manufacture motor vehicle parts.

Inasmuch as the MOU on its face permits individual car owners also to purchase diagnostic and repair tools, and provides incentives for these businesses to innovate new aftermarket features and services not offered by the manufacturers. The TPM measures manufacturers deploy have pernicious effects on competition. They hinder access to the software that is necessary to perform car repair and improvement; they prevent innovative competitors from adding new software functionality that interoperates with the existing software; and they wall off access to non-copyrightable parameters and functions that must be altered in order to improve or optimize vehicle performance.

Congress intended Section 1201 as a means to protect expressive copyrighted works and applications in digital format, not as a lever to restrain competition in markets other than for the copyright-protected works themselves. As the Sixth Circuit observed, “companies … cannot use the DMCA in conjunction with copyright law to create monopolies of manufactured goods for themselves.” Lexmark Intern., Inc. v. Static Control Components, Inc., 387 F.3d 522, 551-552 (6th Cir. 2004). There is no suggestion from the opponents’ comments that the TPMs are being applied to protect the expressive content of the copyrightable software itself. Rather, the TPMs are the instrument to suppress otherwise lawful and beneficial aftermarket competition from independent repair shops and consumers, and to maintain and increase manufacturer and dealer market share in the service and repair market. In such a case, it could be argued that no exemption is needed or appropriate. The Register could resolve the petition by clarifying that Section 1201 is not violated by circumventing technological protection measures that protect software embedded in vehicles for the purpose of repairing, modifying, or augmenting the hardware functions that the software controls.

3. The MOU does not resolve the full scope of issues raised by the petition. The ability of independent repair facilities and car owners to augment, adjust, or restore the performance of a vehicle frequently depends on the ability to access vehicle system software. As others such as the Auto Alliance and General Motors have commented, the MOU provides an independent repair facility and car owner with the right to purchase the same diagnostic and repair information systems as the car manufacturer makes available to its dealers. That agreement, though relatively recent, does address several of the concerns implicated by the petition, but not all. The MOU addresses diagnostic and repair information and tools, but it does not address the ability to access the software to improve vehicle performance or to add functionality. Moreover, the costs involved in acquiring these hardware and software tools may be prohibitively expensive for many smaller shops. Until 2018, these costs are exacerbated by the need to acquire specialized proprietary tools from the manufacturer to effectuate the repairs, and such costs may not prove economical for a large repair shop; and may not be affordable for more than one make of automobile. Although the agreement on its face permits individual car owners also to purchase these diagnostic and repair tools, it is improbable that the average car owner with an interest in car repair or customization could afford them. Further, in the absence of competition to develop alternative tools and diagnostic software, manufacturers will continue to charge supracompative prices to sell access to software and repair tools.

Thus, while Auto Care supports the MOU, it is clear that the MOU does not address or resolve all issues presented in the petition.

4. The TPMs prevent access to non-copyrightable factual elements, data, and metadata that are not protectable by copyright. Repairing or optimizing vehicle performance often involves adjusting parameters in the software. These parameters consist of numerical values derived from analysis and observation of the effect on performance of vehicle parts and systems. See Auto Alliance at 8. These numerical values are not themselves protectable by copyright on several grounds. Such parameters reflect empirical observation as to the functional behavior of particular automobile parts rather than original authorship, and therefore not eligible for protection as copyrightable elements. Moreover, these elements merit no protection under the short phrases and de minimis doctrines. See 37 C.F.R. § 202.1(a); Feist Publ’ns, Inc. v. Rural Tel.

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### NEW PRODUCTS

#### KOTEK

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<td>Inner Tie Rod</td>
<td>TR-1355: 11-14 CHEVY Cruze, 12-13 CHEVY Orlando, 11-14 CHEVY Volt</td>
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<td>Inner Tie Rod</td>
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**For more Information, Tel: 1-949-863-3126, Fax: 949-752-7706, E-Mail: sales@kotek.com, kotek.com**

#### WAI GLOBAL

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Serv. Co., 499 U.S. 340, 344 (1991); Sega Enters. v. Accolade, Inc., 977 F.2d 1510, 1524 n.7 (9th Cir. 1992). Even an arbitrary selection of numbers would require only de minimis “creative effort” and could not “evidence enough originality to distinguish authorship.” Mitel, Inc. v. Iqtel, Inc., 124 F.3d 1366, 1373-74 (10th Cir.1997). Similarly, vehicle control software will incorporate numerous elements that are not protectable by copyright, such as code that is constrained by external factors, such as the functionality of the hardware, the language in which the code is written, and programming standards and efficiency. See Computer Assocs. Intl, Inc. v. Altai, Inc., 38 F.3d 1366, 1373-74 (10th Cir.1997). The Register's Electronic Control Unit, and have a right to information that a consumer has not voluntarily shared.

5. Consumers own their cars, including the copy of vehicle operation software embedded in the car’s Electronic Control Unit, and have a right or privacy to control distribution of their personal data over telematics software. Auto Care rejects any suggestion by the manufacturers and manufacturer associations that consumers do not own every part of the vehicle they purchase, including the copy of the software that regulates vehicle operation and the information generated by the use of the vehicle (including telematics data). Consumers purchase a fully operational vehicle. To the extent that any parts comprising that vehicle are implemented in a combination of software and hardware, the consumer has obtained rights of ownership over those parts.

The opponents’ arguments do not satisfy the three-part test set out in the principal case they rely upon, Vernor v. Autodesk, Inc., 621 F.3d 1102, 1111 (9th Cir. 2010). They provide no evidence that all of the operational software in the vehicle is subject to license; consumers may freely resell their vehicles, with no evidence of any restrictions on the right to transfer the car in its entirety to a subsequent buyer; and there is no evidence of any explicit use restrictions imposed by the manufacturer on the purchaser. To the contrary, typical car owner manuals neither prohibit alteration of the software under license or contract, nor alert the consumer to possible copyright infringement liability and damages. Rather, the manuals only warn that modifications may affect vehicle operability or warranty. Copyright law may limit the use the car owners can make of their copy, but they own it as part and parcel of the vehicle.

Similarly, manufacturers have no right of ownership over data concerning vehicle usage and driving habits of car purchasers. Manufacturers are capable of building capabilities into vehicles that communicate to the manufacturer or dealer, information concerning the driver’s location, itinerary, speed, and driving habits. Consumers may voluntarily share this data in return for some benefit, such as driving directions, locations of nearby businesses, or roadside assistance. However, that data belongs to the consumer. No copyright interest appears to be implicated by altering the software of a vehicle so as to limit access by a manufacturer or dealer to information that a consumer has not voluntarily determined to share.

6. The opposition’s fair use analysis is flawed. A disturbing consequence of the positions taken by the opponents of the exemption would be its implicit presumption that any effort to alter a vehicle’s mechanical performance by repairing or customizing its software “parts” necessarily constitutes copyright infringement. Although the opponents’ position has been fodder for discussion, criticism, even ridicule, in the online policy and technology press, for Auto Care members this is a real concern. The prospect that engaging in vehicle repair outside of the MOU constitutes copyright infringement, or could subject repair shops to legal injunctions, statutory damages, or enhanced damages, is untenable.

Auto Care therefore explains, briefly, its view as to why auto repair involving changes to vehicle software constitutes a fair use. Under Factor 1, the nature and character of the use at issue here is to repair or improve the functions of a car owner’s vehicle. The fact that the part being repaired is implemented in or controlled by software is purely incidental to the purpose of fixing a vehicle’s mechanical functions. While the opponents believe this use is not “transformative,” copyright law never required transformation under factor one, and the Supreme Court has found fair use from copying of works in their entirety without transformation. Moreover, in many cases the purpose of the use is to get at, and in some cases to alter, software elements that are not protectable by copyright, as noted above. In such cases, factor one implicates no copyright interest at all.

Under Factor 2, the nature of the copyrighted work, it is highly relevant that the work at issue is software embedded in a device that enables or controls the physical operations of motor vehicles. The Register previously has concluded that factor two weighs decisively in favor of fair use where the works at issue are such highly functional works that control operation of physical goods. 2012 Recommendations at 73, 2010 Recommendations at 96.

Factor 3, concerning the amount of the work to be copied, is at best a wash. Car owners and repair shops generally will need to copy the entirety of the software to locate and analyze the particular elements of code that must be revised.

Finally, the opponents’ comments misconstrue Factor 4, which focuses on the market for the copyrighted work itself, not the market for vehicles generally or for aftermarket services. See Lexmark Intern. v. Static Control Components, 387 F.3d at 544-545. Here, there is no separate market for ECU software. To the extent that TPMs make it impossible to use an ECU without matching software, that is a result of anticompetitive marketing strategies by manufacturers, and not an inherent attribute of the copyrighted work. Indeed, the nature of the harm alleged by the opponents—disruption to the market for vehicle repairs or to the “brand value” of the manufacturer and its cars—only reinforces that the TPMs are being applied for reasons unrelated to protection of a cognizable copyright interest and, therefore, beyond the scope of Section 1201.

In any event, any of the non-copyright harms feared by the manufacturers are remediable under other statutes and regulations. Vehicular speed limits, inspection requirements, and emission controls all remain subject to regulation by state and federal governments. But none of these is a concern of the Copyright Act or the Digital Millennium Copyright Act.

Auto Care thanks the Register and the Copyright Office for considering these points. Please contact the undersigned if there are any questions or if additional information would assist the Register’s analysis of Proposed Exemption 21.
Every 2 years the Australian automotive aftermarket industry gathers at the Australian auto aftermarket expo to show case new and existing products to the world.

Hosted by the AAAA (Australian Automotive Aftermarket Association), the event was held in Melbourne during April and visited by over 12,000 overseas and interstate guests.

The event also includes the presentation of the highly regarded industry recognition awards. Presented before 1000 industry colleagues, there was one company that not only won 2 awards, but received 3—First place, gold awards.

This company was IM Group (Innovative Mechatronics Group P/L), based in Hallam, Victoria. IM Group specialise in wholesaling automotive electronic parts. They supply the industry - New OEM, new aftermarket, remanufactured and also repaired products, all related to Electronic and Mechatronic components. They supply both the Aftermarket as well as providing ongoing supply solutions for Vehicle manufactures.

IM Group – distributes the respected brands: Injectronics (Remanufactured electronics), RAE (Ignition & Sensors), MAP (key remote fobs and parts), DAT (Test Equipment) and their newest brand Genuine OEM Parts. The IM Group offers a total solution to the industries engine management and mechatronic needs. As a market leader, they have earned a highly respected reputation in the automotive industry for quality, innovation and customer service.

This was highlighted and endorsed by the three Gold awards they received from the AAAA. Rex Vandenberg (Managing director) said he was proud of his team’s effort in winning 3 Gold awards and their ability to keep coming up with new and innovative products and supply solutions.

The three winning categories:

Gold Award Most Innovative New Aftermarket Product (Parts)

The Gold for this category was awarded to the MAP Complete Remote Keys & DIY Programming tool. This programming tool was designed totally in-house by IM Groups R&D team. The KF200 DIY Programming tool is used in conjunction with the KF208 and KF209 complete Remote keys (GM Holden Commodore (Pontiac GTO)). It enables the customer to program the key in less than 3 minutes. This tool saves the customer getting their remote key programmed by expensive specialist equipment, saving time and money. The programming tool can also be used when an exchange remanufactured product, (Such as an ECM or Body control Module) needs to be programmed to a vehicle, as the correct software can be loaded to this programming tool.

Gold Award Excellence in Manufacturing

Injectronics ‘Remanufactured Automotive Electronics’

Injectronics test, validate, repair and remanufacture automotive electronic components. Benefiting from over 30 years of experience in the automotive industry and backed by ISO9001:2008 quality accreditation, their customers have come to expect exceptional service and a quality product. Together with their in-house R&D department, they have been developing test equipment and products for customers all over the world both for the Aftermarket and the vehicle manufacturers. It is this experience and customer focus that helped them win the GOLD award for Excellence in Manufacturing.

Gold Award — Terry Mahoney Excellence in Marketing

IM Group (MAP)

The MAP brand (owned and distributed by IM Group) has been embraced by nearly every Major automotive parts store in Australia, and sales have exceeded all expectations. MAP products consist of car remote parts such as rubber buttons and remote plastic shells, and by scanning the QR code on the back of the packaging the installer can view the simple fitting instructions.

During the last 12 months, MAP have released a range of complete replacement Key remote FOBS to the Australian and New Zealand market, which involved a considerable amount of time and investment from their Marketing and R&D teams. Map have also released the KF200 DIY Programming tool, to enable the installer to program a GM Holden Commodore (Pontiac GTO) key Remote to their vehicle without the use of expensive programming equipment.

IM Group distributes their products through the leading Automotive parts stores, and further details can be found at im-group.com.au or by calling 03 87926999
Even better, in this EFF article about the DMCA restrictions, they cite John Deere’s wildly bonkers justification for keeping people from tinkering with its products.

John Deere even argued that allowing people modify car computer systems will result in them pirating music through the onboard entertainment system. (And the exemption process doesn’t authorize copyright infringement, anyway.)

Right, that makes sense! What’s the best way to burn a copy of a friend’s CD? With a tractor! Or, bettepe... r yet, a combine! Hell, those things are basically just big motorized music pirating machines that just so happen to be able to harvest millet and sorghum.

This whole thing is wrong in so many ways, and if the automakers are allowed to restrict owner access to their own cars — whether they themselves tinkor or repair them or not — a cascade of unfortunate effects will follow. Independent repair shops will have it especially rough, becoming vulnerable to manufacturer lawsuits if they attempt to repair a car by accessing the ‘restricted’ code or even just connecting to the ECU.

Aftermarket companies could become illegal, since technically, even something as basic as changing the wheel size on a car can affect the ECU’s ability to compute speed and make adjustments accordingly — and a manufacturer could decide that’s tampering with the inputs to the ECU or something. Maybe that’s a stretch, but maybe not — this law could make that possible.

I’m a firm believer that if you can’t open it, you don’t really own it. I believe in things like Mister Jalopy’s Maker’s Bill of Rights, and I firmly believe that everyone who owns a car has the right to work on their car.

If a manufacturer wants to void a warranty, fine. That’s the risk we take. If they want to make safety and emissions modifications harder to do — but still accessible for independent repair shops to work with — okay. If they want to stop selling cars entirely and just lease cars with the understanding that the driver doesn’t truly own the vehicle, they’re free to do that, too.

But if I buy a car, I should always be free to fix or modify that car, even if it’s a terrible idea that gets me 20 HP and 11 MPG. It doesn’t matter — it’s my car.

Besides, how would this be enforced, anyway? If you were pulled over, could a cop plug into your OBD port and read some checksum or something to see if the car has been modified? Would used cars be checked by some agency to insure compliance? It seems like a lot of waste and expense for something that’s just feeding a potential automaker repair and aftermarket monopoly.

The EFF is circulating a petition to add an exemption to the DMCA to allow people and independent shops to work with — okay. That starts off well — an agreement to allow an after-market parts industry and independent repair shops to continue is certainly a positive, and not surprising, since those are both industries with money to throw around to make sure their livelihood isn’t threatened.

The individual mechanic/tinkerer/explorer, though, isn’t so lucky, as they stick to the line that: “vehicles are so intertwined that they shouldn’t (for security and safety and environmental reasons) be allowed to be tinkered with.”

...which, of course, I still have a problem with.

Also, when I read through their rebuttal to the EFF’s requests for exemptions, I found that one of their major arguments centered around this idea:

How a FREE 60 Minute Consultation Can Help You Avoid a Reman Project Disaster 3-5 Years Down The Road

Reman projects can be very profitable. But make a mistake in the early planning stages and you can see your investment and your profits go up in smoke.

Denny Hornsberger, President and CEO of Line Logic Solutions.

My name is Denny Hornsberger, President and CEO of Line Logic Solutions. And, if you'll let me, I can help you navigate potential obstacles in your next Reman project while delivering the opportunities and profits you envision. In fact, I'm currently offering a FREE 60 minute consultation that covers the six biggest Reman mistakes I see and how you can avoid them.

Why am I making this offer? Well to begin with I find that an open dialogue with market leaders is a great way to stay on point in terms of what's really happening in our industry. The way I see it - the more I know about the issues that are out there - the more I can use that knowledge to craft solutions that are valuable to my clientele.

And yes, I freely admit that once in a while, I do pick up a client or two as a result of these conversations. I like to listen. And I was taught a long time ago that you can learn a lot more from being interested than you can be interesting. So also think of this opportunity as a way to “sound board” your thoughts with someone outside the boardroom. It goes without saying that anything we discuss will be held in strict confidence.

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- Denny Hornsberger, President, Line Logic Solutions.
Reverse Logistics Challenges in Remanufacturing of Automotive Mechatronics and Electronic Systems

Erik Sundin and Otto Dunback / Linkoping University

Abstract
The remanufacturing industry as a whole and the automotive sector in particular have, over the years, proven to be beneficial to the environment and economically lucrative to the companies involved as well as to their customers. However, remanufacturing is associated with complicating characteristics, not least to mention the process of core acquisition.

The automotive industry is one of the earliest adapters of remanufacturing. Parts like engines, brake calipers and servo pumps are common targets for remanufacturing. Modern cars also have several embedded computers, often referred to as electronic control units that communicate, share information and verify each other over a Controller Area Network (CAN) bus. Due to their high value and an increasing trend in the amount of CAN bus mechatronic devices, interest in their remanufacture is growing.

Previous research has shown that it is preferable that the remanufacturer is an original equipment manufacturer (OEM), or has a close relation to the OEM, in order to achieve a well-performing remanufacturing business. In the automotive industry, there are many small and medium-sized enterprises (SMEs) that perform remanufacturing; for these enterprises, the challenges to have a profitable business are even harder. This is because the OEMs will not release any information on the communication parameters and therefore will not support the independent remanufacturing business. As a consequence, the independent remanufacturers, often SMEs, have to perform substantial reverse engineering.

This paper presents a qualitative research study, based on interviews at SMEs regarding challenges linked to the reverse logistics of SMEs remanufacturing and trading used automotive mechatronic devices, to identify specific challenges concerning the collection phase of automotive mechatronic remanufacturing. Challenges previously identified by researchers are confirmed, additional challenges within the collection phase are recognized, and challenges expected to arise when remanufacturing and trading automotive electronic CAN bus mechatronic devices are identified. The major concern for the involved companies when commencing future challenges is the handling, transportation and storing of cores. Even though the cores today mainly consist of mechanical devices, these challenges are still present; they are expected, however, to become even more crucial when cores contain a higher degree of mechatronic devices.

Keywords: Reverse logistics, Remanufacturing, Mechatronics, Electronics, CAN bus, Automotive, CAN REMAN, SME

Background
Remanufacturing is considered the ultimate form of recycling [1] and is sometimes referred to as a ‘win-win win’ situation compared to traditional manufacturing since the customer pays less, the remanufacturing companies earn more and the environment benefits from less usage of raw materials and energy [2]. The benefits of remanufacturing have been put into figures by Giutini and Gaudette [3], who found that remanufactured products cost 40 to 65% less to produce than new products, are typically 30 to 40% cheaper for the customer to buy, and save globally the energy equivalent of 16 millions of barrels of crude oil annually. In a study by Sundin and Lee [4], it was noted that 11 of 12 environmental research studies found remanufacturing as a preferable option, at least in comparison to new manufacturing.

The remanufacturing industry has grown recently, and to date, close to 4,000 establishments are confirmed in the USA alone, with more than 110 known product areas [5]. The automotive part remanufacturing industry is roughly estimated to be a $85 to $100 billion dollar industry worldwide, where the value of the remanufactured parts was estimated to be $40 billion in the USA in 2009 [6].

A fairly new and interesting area within remanufacturing in the automotive industry concerns mechatronics (e.g. power steering systems, central locking systems and anti-lock braking systems) and electronic systems (e.g. engine control units and distance control units) communicating via a Controller Area Network (CAN) bus. Developed by Bosch in 1983, CAN is a serial communication bus designed to provide robust, simple and efficient communication for in-vehicle networks [7]. The rapid growth in complexity of automotive electronics in the following decades made traditional point-to-point wiring increasingly expensive to manufacture, install and maintain; hence, CAN soon became adopted by all car manufacturers, resulting in a sales growth of CAN nodes from merely 50 million in 1999 to more than 340 million in 2003 [7]. Given the many CAN nodes in a modern vehicle and the high costs associated with replacing a malfunctioning device, ranging between 200 and 3,000 €, there is an economic incentive for remanufacturing such devices and an opportunity not yet exploited [8].

This research was part of a research project called CAN REMAN; with the target to develop innovative diagnosis methods and technologies for automotive mechatronics and electronic remanufacturing. The project, funded by the European Union, was conducted by Bayreuth University (Germany), Linkoping University (Sweden), the University of Applied Sciences Coburg (Germany), Fraunhofer Project Group Process Innovation (Germany) and eight European small and medium-sized enterprises (SMEs). The aim of this paper is to identify previously unknown, and verify known, reverse logistics challenges experienced by SMEs that are about to remanufacture or trade automotive mechatronics and electronic systems communicating through the CAN bus system.

Reverse Logistics Challenges — in Theory
Remanufacturing differs from traditional one-way manufacturing in several ways. These differences are also associated with manufacturing challenges and are necessities to realize a successful remanufacturing system (i.e. core acquisition, remanufacturing process and redistribution [9]). These challenges have been recognized by researchers, e.g. [8–12], but also have been summarized by Lundmark et al. [13], who also categorized them according to where and when in the remanufacturing system they occur.

In the literature about challenges within the collection phase of the remanufacturing system, there is a lot of emphasis on a lack of control regarding quantity, quality and timing of the returned products. This lack of control is recognized by, for example, [10,12,14–17] and is caused by:

- Product life cycle stage and the rate of technological change [11,16]
- The dispose behaviour, which results in a stochastic return pattern [14,16]

The lack of control regarding quantity, quality and timing of the returned products (cores) is described as the major difference between a traditional production distribution network and a product recovery network [18]. The handling of these control issues is stated as the key for creating profitable remanufacturing by Giutini and Van Wassenhove [19]. In addition, there is also uncertainty regarding the demand of the remanufactured products. This uncertainty is caused by the following:

- The rate of technical development. The demand for a product might suddenly drop due to the technical development [16].
- Detailed forecasting is not possible to perform due to uncertainties regarding timing and quantities of the returned products [16].

In order to maximize profit, a remanufacturer must be able to balance the return of cores with the demand from customers for remanufactured products. If not, the remanufacturer faces the risk of building up excessive amounts of inventory (when returns exceed demand) or low levels of customer service (when demand exceeds supply) [11]. The uncertainties in supply and demand make it hard for many remanufacturing companies to balance supply and demand [11]. All companies do not try to balance the supply with demand since the uncertainties in supply and demand makes inventory management and control functions more complicated [11]. The kind of motivation for returns could also affect the situation for the remanufacturing company since a take-back obligation might give the remanufacturing company an abundance of used products [12]. A survey conducted with 48 remanufacturing companies by Guide [11] showed that more than half of the companies had no control over the timing or the quantity of the returns. The remanufacturing companies that do not try to balance supply with demand instead dispose excess used products on a regular basis [11]. Excess used products might cost a lot of money, and the disposal cost might be high [11,15]. The storage area needed to store the excess used products is also often expensive [15]. Another challenge is that a remanufacturing firm typically has a large number of sources which means that a remanufacturing firm has to bring together a large number of small volume flows which increases the complexity [14].

According to Lundmark et al. [13], the uncertainties regarding quantity, quality and timing of the returned products are the main challenges for the collection phase of the remanufacturing system. The uncertainty in timing and quantity of the returned products also make the remanufacturing process less predictable than an ordinary manufacturing process [19]. This uncertainty makes production planning
Reverse logistics challenges — in CAN REMAN

Reverse logistics in CAN REMAN

Reverse supply chains comprise the activities, routes, intermediaries, etc. when transporting products in the opposite way compared to forward supply chains, i.e. from the customer or end user, via possible intermediaries to the remanufacturer, as can be seen in Figure 1.

Intermediaries can, for instance, be retailers and repair shops in the forward supply chain and core brokers and scrap yards in the reverse supply chain. How the reverse supply chains are designed, i.e. how used products are brought back to the remanufacturer, plays an essential part in the remanufacturing system as a whole since it is of most importance to receive the right cores in the right quantities at the right time in order to be able to perform successful and profitable remanufacturing.

The designing of reverse supply chains is a delicate procedure with many variables and aspects to take into consideration, and there exists no general optimal supply chain. The number and type of cores (material, value, size, weight, etc.) that are to be transported highly influence the design of the reverse supply chain. In addition, types of core suppliers, types of core acquisition and relationship between remanufacturer and supplier/customer have a great impact.

Core Acquisition

A remanufacturer of automotive components normally has the possibility to choose from several core suppliers, as can be seen in the next section. The choice of supplier does not, however, automatically set the guidelines and rules on how the core acquisition is made but may enforce a certain acquisition type or open up for multiple choices. It is common that remanufacturers’ ways to acquire cores vary between different types of core suppliers, but even the acquisitions within the same type may differ:

- **Direct-order**: in this situation, the supplier who also is the customer gives an order for the remanufacturing of a used product. The supplier/customer sends the core to the remanufacturer, which, after being remanufactured, is sent back to the supplier/customer. Within the scope of this research, there is a tendency that this type of acquisition is common when remanufacturing relatively complex products such as engines and more likely towards end users. In addition, it is common that the customer/supplier is responsible for the transportation to the remanufacturer.

- **Reman-contract**: this type of transaction is somewhat similar to direct-order since the supplier, which also is the customer, gives an order for remanufacturing. Also, the ownership of the core and the remanufactured product remains at the customer. However, this type is guided by a contract and spans over a longer time, with closer collaboration between remanufacturer and customer/supplier and also involves greater quantities. While direct-order is common towards end users, reman-contracts are more commonly used in collaborations with original equipment manufacturers (OEMs).

- **Deposit-based**: this means that when the customer buys a remanufactured product, the customer is obligated to return a similar used product. This type of transaction is frequent within automotive remanufacturing and in particular concerning components that are cheap and often exchanged at services (e.g. brake calipers).

- **Credit-based**: the customer receives credits for returning a core, which can be used as a discount when buying a remanufactured product. The supplier is also a customer in this case.

Types of Core Suppliers

This section describes the different core supplier types that have been identified within this research. It is a somewhat simplified picture given since a classification is necessary in order to get a uniform view. It is noteworthy to observe that the reverse supply chains depicted are sources of used automotive components (cores), not virgin spare parts, etc. In a sense, end users normally supply all cores, but in this report, the categorisation and the type of suppliers derive from the supplier closest down in the supply chain. The identified core suppliers are end users, scrap yards, core brokers, OEMs and independent aftermarket distributors (IAMDs).

Reverse Supply Chains in the CAN REMAN Project

This paper presents a qualitative study of six SMEs, of which their primary, if not solely, business segments are the remanufacturing of, or trading with, automotive mechatronic devices. Four of the companies studied are German remanufacturers (companies A to D). The remaining two are Swedish (companies E and F), where the latter is a core broker and hence not conducting any remanufacturing but is still an important factor in the reverse supply chain. An overview of the participating companies can be seen in Table 1. In a parallel CAN REMAN research study on inter-organisational relationships, companies A to E are studied further with the same notation [20, 21].

The following sections present reverse logistics challenges identified and verified during interviews within the CAN REMAN project. An overview of the challenges experienced by the interviewed companies can be seen in Table 2. An empty space in the

### Table 1 General characteristics of the participating companies

<table>
<thead>
<tr>
<th>Company</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products</td>
<td>Automotive, marine, heavy-duty and industrial engines and parts</td>
<td>Alternators, starters and marine and heavy-duty engines</td>
<td>Engines, gear boxes and differential gears</td>
<td>Car engines and diesel injection parts</td>
<td>Brake calipers, DPFs, hydraulic servo pumps, water pumps, EGR valves</td>
<td>Wide range of automotive parts</td>
</tr>
<tr>
<td>Company size (employees)</td>
<td>Medium (100)</td>
<td>Small (24)</td>
<td>Medium (80)</td>
<td>Medium (80)</td>
<td>Medium (50 + 110)</td>
<td>Small (6)</td>
</tr>
<tr>
<td>Annual turnover (million €)</td>
<td>14</td>
<td>1.6</td>
<td>4</td>
<td>12 to 13</td>
<td>7</td>
<td>0.8</td>
</tr>
<tr>
<td>Number of variants</td>
<td>650 cylinder heads, hundreds of engines</td>
<td>2,500 internal variants</td>
<td>Hundreds of variants per product</td>
<td>200 variants of engines, uncountable variants of diesel injectors</td>
<td>2,800 variants of brake calipers, 3,000 in total</td>
<td>10,000 to 20,000</td>
</tr>
<tr>
<td>Core suppliers</td>
<td>End users, İAMDs, OEMs, scrap yards, core brokers</td>
<td>End users, İAMDs, OEMs, scrap yards, core brokers</td>
<td>İAMDs, OEMs, and users</td>
<td>OEMs, scrap yards, core brokers, end users</td>
<td>OEMs, core brokers, scrap yards, İAMDs</td>
<td>Scrap yards, core brokers, İAMDs</td>
</tr>
<tr>
<td>Relation to OEM</td>
<td>Independent, contracted</td>
<td>Independent, contracted</td>
<td>Independent, contracted</td>
<td>Contracted, independent</td>
<td>Contracted, independent</td>
<td>Independent</td>
</tr>
</tbody>
</table>

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Company F considers the lack of control of the cores’ quality as a challenge, but in contrast to the remanufacturers, 90% of the cores are visually inspected before they are bought, making the degree of control higher in this case.

**Controlling Timing of Cores**

The lack of control regarding the timing of the returned cores is considered a challenge by companies E and F, but only if there is a lack of the specific core in the market. Company B controls the timing of deliveries for all supplier types except for private customers, who are harder to control. Company C lacks control of the core deliveries from OEMs, but the use of check sheets (see previous section) for private customers and car dealerships/repair shops facilitates influence over the timing of the incoming cores from those suppliers in a positive way.

**Balancing Supply and Demand**

Companies E and F experience a lack of control regarding balancing supply and demand, but their situation differs from each other. Company E usually gets a 12-month time horizon on the estimated demand from the contracted OEMs, which are core suppliers/customers that company E is contracted to perform remanufacturing for. From these forecasts, additional cores are bought if needed from other suppliers, e.g. scrap yards and core brokers. Statistics from previous years are also kept, thereby helping to distinguish trends in demand. The prerequisites are similar for company B. Company F has much shorter time horizons, usually only a week or a month ahead.

A different aspect on the issue of balancing supply and demand is how company F buys certain cores without having a concrete demand but believes it will rise in the future. The motive is twofold; cores that are bought prior to the actual demand are cheap, hence displaying large profit margins if later sold. In addition, buying pre-demand cores prevents or diminishes competition within core acquisition. However, the speculating comes with a price tag. Apart from the obvious cost associated with storing cores until demand arises, there is an imminent risk that the anticipated demand never occurs, thus making the acquired cores less worth. This situation especially concerns CAN bus mechatronic devices that have yet to be remanufactured.

**Additional Challenges Within the Collection Phase**

A challenge identified by company E concerns the identification and sorting of cores at its suppliers, which, in this case, are OEM retailers. The deliveries often contain unwanted parts and mechatronic devices (e.g. turbochargers and dashboards). This is believed to be caused by a lack of routines at the retailer where the personnel, even though having specified which parts were to be sent for remanufacturing, do not put the right parts in the right core bins. The effect on company E is that warehouse space is wasted, both to store the unsold goods as well as to store the unwanted goods before being transported away for scrapping. It is also time-consuming to perform the sorting. However, this identification issue is not considered as severe and can sometimes even provide useful information about new part numbers currently not in the remanufacturing program.

A challenge acknowledged by company F is the decreasing number of scrap yards, which are core suppliers to company F. One plausible explanation for the decrease is that insurance companies certify fewer scrap yards now than before. The consequence for company F is twofold. Firstly, fewer suppliers result in less competition among those remaining and hence higher core prices. Secondly, but not less important, the fewer larger suppliers remaining tend to focus their business on scrapping cars rather than dealing with cores.

The second challenge affecting company F is the recently increasing scrap prices, which follow the prices of raw materials, which, in this case, are metals. When scrap prices are high, scrap yards would rather sell the dismantled cars as scrap than sell the individual mechatronic devices to core brokers or remanufacturers.

A further challenge for company F is the competition from low-labour cost countries. When there are brand new spare parts available at a cost close to, or even cheaper, than a remanufactured part, the demand for remanufactured parts decreases. This is also acknowledged by companies B and E.

In addition, company F has experienced actions from OEMs where they have tried to hinder competition from core brokers and remanufacturers, either by dumping prices of new parts or by clean-sweeping the market from cores. Similar actions have been taken against company D, where OEMs refuse to sell spare parts needed to perform remanufacturing of their products. Company B experiences that OEMs delay technical information (e.g. test parameters) about the products on purpose, which, due to the effort, put into reverse engineering results in higher remanufacturing costs, which is further elaborated on in [8].

**Expected reverse logistics challenges of CAN bus mechatronic devices**

A concern for companies B, D, E and F is the handling of cores containing CAN bus mechatronic devices. Three perspectives on this matter have been brought up during the interviews. These are the following:

- Disassembly: it is important that OEM retailers and scrap yards have routines for how to remove parts without damaging them.
- Storage: cores containing electronics are sensitive to moisture; hence, it is important that CAN bus cores are stored in dry and preferably warm environments.
- Transportation: there is a concern that cores not being handled and stored properly during transportation will be damaged on their way to the remanufacturer or core broker.

A challenge company F will be facing, and is currently facing to a certain extent, is the large gap between the sales price of the remanufactured product and the cost of the core. For example, a remanufacturer buys a used ECU for $3 to $5 from the core broker which is then sold remanufactured for up to $500. For a core
broker to sell a core for $3 to $5, it has to be bought for $1 to make profit, which is scrap price. This is claimed to be caused by the lack of competition among remanufacturers of automotive electronics.

During the interview with company F, it was mentioned that dealing with electronic mechatronic devices will further complicate the supply versus demand challenge since an entirely mechanical device will surely fail during a car’s life, while the fail pattern of an electronic device is much more stochastic — it might even last the vehicle’s entire lifetime.

In addition to the findings of this paper, another paper by Freiberger et al. [8] outlines challenges, possible solutions and technological progress for the reverse engineering process of CAN bus mechatronic devices. That paper includes the reverse engineering process demonstrated on an electro-hydraulic power steering, which is a CAN bus mechatronic device used in a Volkswagen Polo [8].

Discussions
The business model that the remanufacturing company uses might have an effect on the remanufacturing system and especially the core acquisition. For example, Sundin and Bras [22] stated that functional sale reduces the uncertainty regarding returns by giving the remanufacturing company better knowledge of the timing and quantity of the return. This is also acknowledged by Thierry et al. [10] who stated that quantity and timing of the returns are easy to predict at the end of a leasing or rental contract even though the quality still can be uncertain. It is easier to have rental programs for OEMs to perform remanufacturing than for those independent remanufacturers included in this study. However, the independent remanufacturers could move towards being contracted by the OEMs in order to benefit from a functional sales (e.g. rental) business model.

How close collaboration the remanufacturing company has with the retailers and distributors also affects the possibility for a remanufacturing company to coordinate the collection of returned products [18,19]. Different relationships and the effect they have on the situation for the remanufacturing company were deeply discussed by Östlin et al. [18] and Lind et al. [20,21]. A type of relationship that also was discussed by Guido [11] and Östlin et al. [16] is when the remanufacturing company remanufactures used products (cores) that the customer sends to them. Then the challenge with balancing supply and demand does not exist, though this might add additional challenges to the production planning.

Conclusions
This paper addresses reverse logistics challenges experienced by six SMEs in the automotive remanufacturing industry. Indeed, these companies, five remanufacturers and one core broker, face challenges traditional manufacturing companies do not have to deal with. The challenges previously identified by researchers, e.g. Lundmark et al. [13], which are faced by remanufacturers in general, were also confirmed as challenges by the interviewed companies remanufacturing automotive mechatronic devices. For instance, a reflection of the uncertainties regarding the demand and the difficulties in securing core supply was given by company F, which keeps a stock of cores despite not yet having a concrete demand for remanufacturing.

Additional challenges varying in significance and frequency were identified during the interviews. One concerns the reckless handling of the cores, both during disassembly and during transport to the remanufacturer. A possible solution that seems simple to implement, at least theoretically, is to inform mechanics as well as the responsible logistics company how to handle and package cores. This issue was also discussed during the interviews, now concerning future challenges when remanufacturing CAN bus mechatronic devices. The majority of the interviewed companies believe that careful dismantling, storage and transportation of cores containing electronics will be of high importance.

This paper, along with a previous literature review by Lundmark et al. [13] and the work on inter-organisational relationships by Lind et al. [20,21], builds a foundation for the future work to design, verify and implement reverse supply chains that diminish the impact of the challenges identified in this paper and hence better suit CAN bus mechatronic device remanufacturers. In addition, remanufacturing needs to deal with more process-oriented challenges such as testing and diagnosing as described for the CAN REMAN project in Freiberger et al. [8] in order to boost and facilitate CAN bus mechatronic device remanufacturing even more.

Methods
The empirical data have been collected through semi structured [23], face-to-face interviews ranging between 2 and 3 hours and were conducted by native-speaking interviewees from both Germany and Sweden. The interviews were held at the companies’ sites in late 2009 and late 2010.

Abbreviations
CAN: Controller Area Network; DPF: diesel particulate filter; ECU: electronic control unit; OEM: original equipment manufacturer; SME: small and medium-sized enterprise.

Competing Interests
The authors declare that they have no competing interests.

Authors’ Contributions
Both authors have collaborated in writing the manuscripts of this paper. ES planned and designed the interviews together with the Ph.D. students who conducted the interviews. ES conducted the pilot interviews. OD summarized the Ph.D. students’ interview data and made the first draft of the manuscript. Both authors read and approved the final manuscript.
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