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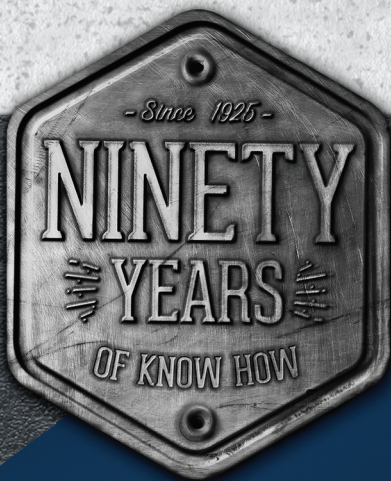
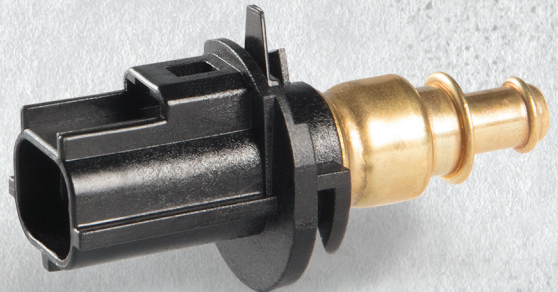
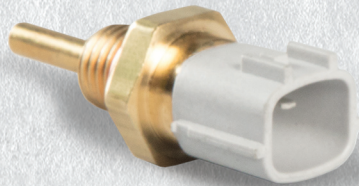
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HERE WE COME!

NACE Automechanika 2017 is this month and focuses on training for techs, shop owners and educators

ADD-ON TELEMATICS CHALLENGES

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OBD ports were designed for diagnostics, not continued use with telematics units

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It's an exciting time to be in the industry as telematics and autonomy evolve

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NACE AUTOMECHANIKA // TRAINING

WHY ALTERNATIVE FUEL VEHICLE TRAINING IS IMPORTANT FOR SHOP PERSONNEL, FLEET MANAGERS AND OTHER ADMINISTRATORS

Everyone involved in the maintenance of AFVs needs to understand how to safely and accurately deal with these vehicles that are a little different than conventional vehicles. That includes performing the work, preparing the shop, and a host of other considerations. AFVs are as safe as gasoline or diesel vehicles, just a little different. This session, presented by Bill Davis, director of the National Alternative Fuels Training Consortium, at NACE Automechanika 2017 will include information that will allow fleets, repair facilities and others to begin the safe transition to alternative fuel vehicles. Register now with code NATF2017.

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Small But Mighty

Developers, designers and engineers are finding ways to do more with less, shrinking the size while helping to increase the capability of innovations that can make daily life more efficient.



But not all downsizing is manufactured. And some of these examples illustrate the fascinating and productive relationship among man, machine and nature.

1. TARDIGRADES

One of the world's smallest animals is also one of its strongest. Microscopic tardigrades, often called "water bears" on account of their grizzly-like shape, can survive both freezing and boiling temperatures, space atmosphere and radiation, curling into a ball when life gets too rough, and reanimating in a quick water bath when things settle down.



3. ANTS

Researchers have discovered that a field ant can withstand up to 5,000 times its body weight, significantly higher than the 1,000 times predicted. A microstructure of bumps and folds in the neck joints of field ants could be what allows them to manage impressively large loads.

4. BEARINGS

When an airplane lands, its entire weight rests on just a few square inches supported by a small but mighty wheel bearing. Made out of high-strength ceramic formulas for modern planes, wheel bearings withstand both physical pressure and the intense heat of accelerating 0 to 2000 rpm in 1 second.



2. LASERS

Would you believe there's a laser prototype that can burn through the hood of a truck? From more than a mile away? Designed for military use, the 30-kilowatt fiber laser currently in development actually combines the strength of multiple lasers in a single beam, so that any individual failure won't disrupt overall strength.

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BREAKING NEWS

TECHNICIAN TRAINING

TACKLE DRIVABILITY, ELECTRICAL ISSUES

PETE MEIER //
Technical Editor

➔ With such an outstanding list of instructors conducting training at NACE Automechanika 2017, it's hard to pick out just a few to write about. Every one of them is committed to helping technicians and shop owners succeed and most of them came up through the ranks, so they understand the challenges you face.

Some, like Eric Ziegler, are still in the fight — shop owners, technicians or (as is the case for Eric) mobile diagnosticians on the road helping shops. Eric is the owner of EZ Diagnostic Solutions and offers diagnostic and reprogramming services to both the mechanical repair shops and collision shops in his area. His experiences are put to use not only in helping them, but helping us too, as he applies the lessons he learns to his second life as a contract trainer for Automotive Semi-

>> **NAMC CONTINUES ON PAGE 8**

>> **ERIC CONTINUES ON PAGE 8**

TRAINING EVENT

NACE AUTOMECHANIKA 2017 COMMITTED TO TRAINING

➔ NACE Automechanika Chicago, the largest U.S. trade show dedicated to high-end technical and management-related training for automotive collision and service repair shops, is pleased to present one of the largest offerings of in-depth, practical automotive training July 26-29, 2017 at McCormick Place, Chicago.

As a part of the Automotive Service and Collision Repair Week, NACE Automechanika opens with a host of educational opportunities. The event brings together live demonstrations of the lat-

est automotive technologies from more than 500 exhibitors, show floor training and roundtable discussions from co-located groups and the opportunity to learn from Original Equipment Manufacturers (OEMs). Courses feature a variety of CEU credits, including those from the Inter-Industry Conference on Auto Collision Repair (I-CAR) and Automotive Management Institute (AMi). NACE Automechanika Chicago is the perfect forum to experience cutting-edge technology, develop your career,

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Bob Greenwood will teach a session on striving for continuous improvement in service and practice and using math to measure service results at NACE Automechanika 2017 in Chicago.

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LEARN TO TACKLE TOUGH TRANSMISSIONS

Wayne Colonna with Automatic Transmission Service Group will teach two NACE Automechanika 2017 sessions to help techs become more competent in diagnosing transmission issues.

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>> **NAMC CONTINUED FROM PAGE 6**

build the reputation of your shop and gain customer confidence.

"This year's training lineup covers the current topics automotive professionals are seeking out, including a number of collision-focused trends like vehicle scanning and shop efficiencies," said Jeff Peevy, president, AMi. "I also am thrilled to have more than 40 courses offering AMi credits that meet in-person elective training requirements for our various certificates and professional designations."

Participate in the forums that matter across all three sectors of the industry including Collision Repair, Distribution and Service/Mechanical Repair. NACE Automechanika Chicago is currently the only known trade show in the industry to offer free Service/Mechanical Repair training.

If you only have one educational experience in 2017, make it NACE Automechanika Chicago where professionals and educators can prepare for future automotive advancements and

earn certificates for training. In addition, students can visit the career fair, attend trainings for free, and network at the 'Tailgate Party' on July 28, which is designated Student Day. Schools are also welcome to take advantage of this event as a platform to recruit professionals looking for a continuing education program.

With an anticipated 10,000 attendees, NACE Automechanika Chicago is set to lead the industry in education and training covering the entire spectrum of the automotive aftermarket industry. **TL**

>> **ERIC CONTINUED FROM PAGE 6**

nars and The Driveability Guys.

Eric will be teaching two sessions at the NACE Automechanika training event in Chicago, July 26-29. During the afternoon on Friday, July 28, he'll lead a session on "Using Current Probes To Diagnose Drivability Dilemmas" and in the morning on Saturday, July 29, he'll be sharing his tips on "Essential Diagnostics — The Steps You Need To Take In Tackling Every Driveability and Electrical Concern."

Eric shared with me his thoughts on

what makes his classes unique and told me, "I think my classes are unique in that the case studies are real-world and the class isn't necessarily on just one OE or one vehicle system. Both are a 'method and techniques' class that help students make the complex easier to understand." No matter which session you choose, Eric will help you "learn new time saving techniques to streamline the diagnostic process."

I've had the privilege of knowing Eric for a few years now. He's a regular contributor to the pages of this maga-

zine as well as having been a featured instructor at our first event back in 2015. He's been teaching for the last 7 or 8 years but he'll be the first to tell you he's as much of a student today as he's ever been.

Yeah, I know — there are way too many choices for sessions you can take at our Chicago event, and I sympathize with you, I really do. But if you find yourself torn in making your choice for either of these time slots, I assure you that spending that time with Eric will not be disappointing. **TL**

IBM COGNITIVE TECHNOLOGY HELPING CARS LEARN

BRIAN ALBRIGHT // Contributing Editor

Analytics have become a critical part of the supply chain. Companies in every sector are applying big data analysis to improve forecasting.

In the auto parts sector, this type of analytics is critical — but it's only the first step. Cognitive technology solutions and machine learning can be combined to automate much of the traditional supply chain analysis that occurs, both improving efficiency and accuracy of the results. It can even help cars become smarter — collecting data and even diagnosing problems and alerting owners

and repairers automatically.

"Cognitive is the ability for machines to understand, reason, learn and engage, and that's different from what we've traditionally done with analytics, which was centered around building predictive models or mining data and extending human capability," says Dan Ricci, global automotive industry cognitive solutions leader at IBM Cognitive Solutions. "A machine can read infinite amounts of information. We've taught the machine to read that information, understand it and help bring that information to an expert who can use it."

Ricci will serve as a featured speaker

at the NACE Automechanika Business Outlook Conference for shop managers and owners, distributors and suppliers. In his session — "Big Data and Analytics Impacting the Automotive Sector" — he will explain how IBM is using its cognitive technology and famous Watson computer system to help solve specific business challenges.

The presentation is scheduled for 9:50 a.m. on July 27. Ricci will discuss how automakers and suppliers are using cognitive solutions in their operations and inside vehicles. The technology could improve everything from manufacturing processes to auto sales. **TL**

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MASS EXODUS

How is the technician shortage impacting your business?

W. SCOTT WHEELER //
Contributing Editor

The year is 1977. I had recently taken a job as an entry-level service repair technician after completing a high school program. While the program gave me the basic fundamentals, the true learning began with my foray into actual work as a “mechanic,” as we were labeled back then.

I witnessed first hand many changes all around me. The Federal Clean Air Act was amended by Congress in 1977 to include the I/M Program by states held in non-compliance. My personal recollection was that the last of the killer high-horsepower engines were produced in 1970-1972. Manufacturer’s warranties were something like 24-months or 24,000

miles. Certainly, nothing as significant as the warranties provided in 2017.

The other mechanics in the shop were venting openly about the added complexity of electronic and vacuum-based emission controls. Our shop had an older Sun Engine Analyzer, but I was the only mechanic who took an interest in using the Sun Scope to assist me in diagnosing engine performance complaints. Even though there would not be formal emissions testing for many years to come, the writing was on the wall. There seemed to be an inevitable fallout of mechanics, who lamented that it was easier to swing a hammer or work as a plumber rather than “learn all that junk” under the hood of cars coming into our shop. Thus, began the exodus of mechanics from our industry. And it

has continued unabated throughout the years since that time.

What is the impact?

Today the shortage of qualified and well-trained, well-equipped technicians continues. Many of the seasoned veterans are retiring or taking other positions in automotive service and repair that do not require 8-10 hours a day bent over the fender of a late-model car complete with the complexities of electronic computer-controlled everything!

Exacerbating this shortage is the fact that all the technical schools combined are simply not turning out sufficient numbers of graduates to fill this ever-widening gap. According to the *Automotive News Fixed Ops Journal*, Feb. 15, 2016, “The numbers are staggering,”

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says Mark Davis, automotive programs manager at Seminole State College of Florida. The college's Associate in Applied Science degree program is a national curriculum leader that graduates about 100 technicians a year. There are Ford- and General Motors-certified tracks, as well as a generic import-brand track. Davis says Ford and GM estimate a need for a total of 15,000 new technicians for their U.S. dealerships over the next five years. Davis estimates the North American shortfall at more than 25,000 in that same time period.

"I don't think there are enough training institutions in the U.S. to keep up with the shortage," says Davis.

In the same publication, "industry analyst Harry Hollenberg concurs that the technician shortage is big and unlikely to change soon. Hollenberg is a founding partner at Carlisle & Co., a Concord, Mass., firm that collects and analyzes data for automakers.

Carlisle's most recent report on service technicians and advisors, released in 2014, found that an ongoing industry churn sees 20 percent of luxury-brand mechanics and 25 percent of volume-brand mechanics leave their jobs each year.

They may be leaving to go to another dealership, to an independent shop or

even to a non-automotive job. Every departure is an expensive disruption.

My company, Automotive Consultants Group, Inc. (ACGI), has been involved in sourcing not only technicians, but every other type of job within automotive and truck service and repair. This means we have first-hand experience in sourcing and securing these positions. The reality? Finding a good, qualified, well-trained and well-equipped technician can be a daunting and lengthy process!

How can you keep your highly valued technicians?

In theory, this should be simple — find out what they want, then find a way to give it to them. However, in practical application, it is far from simple.

According to Jeanine Hein, who lives and breathes the auto industry as the general manager of Serpentine Chevrolet in Strongsville, Ohio, "the shortage is real, and it's a real problem," and so, she says, she must invest in her staff to ensure they don't look elsewhere for a better opportunity.

"It's extremely difficult to find technicians, which is why you want to hold on to them," she said. "We have a good core of technicians, and we have very little turnover, which is unusual in the industry. I credit that to the fact that we pay extremely well and we incentivize them."

But what, exactly, do the technicians want?

Wish list for technicians

U.S. technicians were asked to select two changes that would have the biggest impact on ensuring "quality, efficient repairs." See the results in the sidebar (left). About one third of the 12,000 respondents identified communication with service advisors as an area that needs fixing.

What does this mean to you?

It's safe to assume that the fact you're reading this article puts you in close

MORE RESOURCES

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proximity to the technician shortage in some way, shape or form. Even consumers who have their vehicle serviced or repaired are not immune to this problem. If higher compensation or benefits for technicians are one way to keep your staff, simple math would dictate the need to pass on at least part of this added expense to the end consumer — your customers. If not, then the gross profit margins associated with about one half of your revenue stream (labor) will suffer, and further decrease your already tight net operating profits.

Strategies to find techs

Here at ACGI, we've refined some techniques and strategies that have proven effective. They can be as simple as networking (complete with incentives to those you choose to network with), advertising (including radio spots), job boards (industry specific) and good old fashioned word of mouth. While none of these strategies are ground breaking, when done properly, they can help you to fill your staffing needs. It should be noted that an attractive compensation package is simply the starting point. Thought must be given to your company culture and employee development. Remember — you're competing with every other reputable shop in town. One piece of advice is to think outside the box, i.e. if you were a tech, why would you want to work for your company? This cannot be overlooked. A steady paycheck is just the starting point.

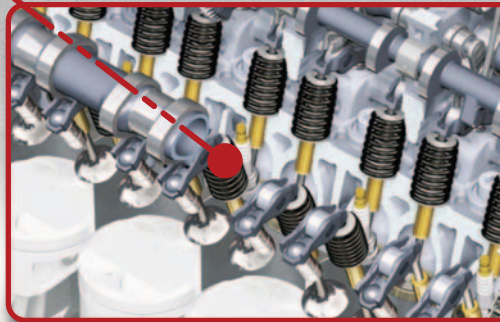
TECH WISH LIST

Technician-service adviser communication	33%
Parts issues	29%
Tech training	24%
Service information	21%
Diagnostic scan tools	18%
Special tools/equipment	17%
Access to technology (e.g., tablet apps)	12%
Phone/online tech support	10%
Field tech support	8%
New model support	6%

Source: Carlisle Technician Survey, 2014



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professionals, not the auto shops.”

Why does ASE exist? “To protect the automotive service consumer, shop owner and the automotive technician. We test and certify automotive professionals so that shop owners and service customers can better gauge a technician’s level of expertise before contracting the technician’s services. We certify

the automotive technician professional so they can offer tangible proof of their technical knowledge. ASE Certification testing means peace of mind for auto service managers, customers.”

The National Automotive Technicians Education Foundation (NATEF) — also from its website — exists “to help educators recruit, mentor and train tomorrow’s technicians; the National Automotive Technician’s Education Foundation (NATEF) offers accreditation for automotive technician training programs. By utilizing standards established by industry, NATEF examines the structure, resources and quality of training programs with the goal to improve the quality of training offered at secondary and post-secondary, public and proprietary schools.

Conclusions

The current existing technician shortage is real. Our first-hand experience has proven this to be true. Sourcing, hiring and retaining qualified personnel to assist you in turning out quality repairs is certainly no small task. And, as has been covered here, it will only get more difficult with each passing day. Using basic numbers, it will take three technicians working at a productivity level of about 105 percent to produce the billable hours needed for a shop to sell \$1M in revenue. Much care and consideration must be exercised if you hope to hit your shop’s sales targets. Again, we’re here to help answer any questions or provide some feedback to your current efforts. www.skf.com



W. SCOTT WHEELER

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HOLDING STAFF ACCOUNTABLE

Personal accountability is the foundation of a positive business culture

JEFF PEEVY // Contributing Editor

For small business owners, the whole conversation about business culture is a difficult one. Most feel they don't have time to get that "deep" into their business thinking, due to the day-to-day grind. However, once one understands the culture within their business, how it came to be, where it needs to go and ultimately how to get it there, they will be able to take their business to a level of performance never thought possible. The culture that exists in your

business produces its results.

In past articles, we've explored the role culture plays in business success and failure, reviewed ways to identify strengths and weaknesses within your business and then discussed the various elements within company cultures. I have spent the past six years studying the subject of repair shop culture, and as my understanding grows, I realize personal accountability is the very foundation of positive business culture. So let's look deeper at defining and improving your company's culture through the eyes of accountability.

Every type of culture imaginable within a business starts with leadership. There are no exceptions, so the first step is to take personal responsibility as a leader and personal accountability for your leadership results. It is here that understanding the difference between accountability and responsibility really helps put things into perspective. When you accept responsibility, you have been given a task or role. When you are accountable, you answer for the outcome of those tasks or role. So, you may have the responsibility for leading an organization as part of management,

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but until you seriously accept personal accountability for the outcome of your leadership influence, you are not truly fulfilling your role through actions associated with it. This can be true for any role. Those who have a title and may even verbally accept responsibility, but then fail to be personally accountable for the successful output of that role, bring businesses down. They simply are going through the motions but are not sincere enough to care. When a business culture is made up of that type of thinking, the company struggles in every way and typically blames everyone else for it.

In small businesses, a lack of accountability is often an issue. Attitudes that scream, “this is my business and I will run it however I please” or “no one can tell me how to run my business” are often an indication of serious operational and cultural weaknesses. Granted, as an owner, this type of thinking in one sense is true, yet rarely produces positive results. The point is, everyone needs someone to hold them accountable. This is one area that larger corporations have over smaller businesses, simply because a chain of accountability exists. It is important that every leader be held accountable, as openness of accountability to employees can build respect and increase levels of performance across the board. This is because employees tend to follow what they see from leadership.

Every step of growth toward a better, more productive, safer and happier business culture is made possible by accountability. For many years, I spoke about the need for our industry to adopt a culture of learning. The challenges this adoption faced was around the lack of accountability. If shop owners, technicians or administrative staff failed to be accountable within their role, they rarely see the need to train and educate themselves and do not make it a priority. It is not until accountability increases individually and then begins to spread to hold

one another accountable that the higher-achieving culture begins to take shape.

In a business culture that does not accept and encourage consistent and open accountability, it is common to see it used only when something goes wrong. Accountability that only rears its head in these situations never works. It fosters blame, back biting and resentment within the ranks of staff, typically against each other, but especially against leadership. It should also be noted that this type of cultural environment doesn't make itself obvious, but it normally lives in the shadows and in the side conversations within small groups who blame everyone else for everything believed to be less than ideal. This type of culture, like all cultures within a business, feels normal to most everyone who has worked there for more than a couple of years.

As leadership accountability begins to show up openly to employees and then employees begin to hold themselves and each other accountable for their contributions and actions, you will always have some individuals who just can't accept the change to personal accountability. These individuals must be identified, coached and encouraged initially, but then if the shift to accountability can't be embraced, they must be let go or allowed to move. Otherwise, they will interfere with progress.

It must always be kept in mind that culture produces results, good or bad, and can unleash potential or limit it. The foundation for all positive cultures within a business is accountability. Accountability takes responsibility for actions and results. A good test for accountability is willingness and eagerness to learn. Personal accountability creates a thirst for knowledge and expertise, because a repair without it will not be a correct, safe and quality one. I would offer to the reader that no owner or technician who holds themselves personally accountable for the quality

and safety of the work they produce believes it can be done without ongoing learning. When someone takes personal responsibility for a role and then holds themselves accountable for the outcome of their actions, powerful and positive things begin to happen. Failing businesses turn around and become successful. Individuals find successful careers and balance it with a solid home life. Good things just begin to happen.

As the business culture grows more positive and accountability begins to become accepted, it defines the very nature of the relationships within the business in a very different way. Individuals begin to help one another, look out for one another and more importantly, they look out for the customer's vehicle. Accountability drives caring — caring about everything and everyone around them, including leadership. Respect for leadership grows because openly taking personal responsibility for the role of leadership and taking personal accountability for the business's output as leadership creates the ideal environment. This is when we see true servant leaders becoming admired and everyone embracing a company vision into a positive future. Learning and championing change becomes the norm and everyone takes ownership. There is a higher level of trust, transparency, communication and openness. When mistakes are made, instead of being hidden, they become opportunities to learn and lessons from mistakes are shared so they are eliminated in the future.

The moment we realize accountability is the foundation of a positive business culture and that a positive culture produces incredible results, we can begin the journey to extraordinary. **ZZ**



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How to attract your ideal customer

Look at everything as if you were seeing it either for the first or last time

Very few shop owners are in a position of having too many customers. The majority of us have to fight for every customer. Last week I overheard a conversation between ATI Coach Eric Twiggs and a shop owner on attracting your ideal customer. Eric's story began like this:

Several weeks ago I took my car to a local tire retailer to resolve a slow leak. As soon as I arrived at the service counter, it became obvious that "Jeff," the service writer, didn't want my business.

He didn't smile, didn't greet me, but he did say the following: "Sir, I need you to step to the other side of the counter because I'm with a customer." After several minutes it was my turn and I made him aware of my tire situation.

"Sir, I won't be able to get to it today. We're backed up with other work." To which I replied: "But it's 5:55 p.m. and your sign says you close at 7:00!" He became more insistent: "I can't get to it. My guys are loaded up, so there's nothing I can do."

Jeff was clear on what he couldn't

do. What he didn't know was that "Glen," the district manager for the location, and I were friends. I decided this would be a great time to give him a call to catch up.

YOU NEVER KNOW WHO WILL WALK THROUGH YOUR DOORS. THE KEY TO ATTRACTING YOUR IDEAL CUSTOMER IS TO ASSUME THAT EVERYONE IS A VIP.

I told Glen that I was at his shop and Jeff couldn't look at my tire. He advised me to go back to the counter and give Jeff my phone. The look on Jeff's face was priceless as I handed him my cell and said: "Glen Franklin would like to speak with you!" I don't know what Glen said, but Jeff suddenly became a different person. "Mr. Twiggs, my apologies, I'll have my guys stay late, and we'll get you taken care of!"

His team worked on my car with the speed of a NASCAR pit crew! He treated

me like a VIP. As I left the shop, I wrestled with the following question: What if Jeff treated every customer like they were close friends with his boss?

Here's the big takeaway: You never know who will walk through your doors. The lady with the old car may have new money. That irate fellow you just spoke with may have an Instagram following. The key to attracting your ideal customer is to assume that everyone is a VIP.

This is important because VIPs associate with others who are like them, and studies show that the customer who's "wowed" is three times as likely to refer you as one who's merely satisfied.

Stay with me to learn two specific strategies to help attract your ideal customer.

Tailored recognition

Discretionary effort is that extra level of effort that's not required but can be given by employees if they really want to. In his book, *Bringing Out the Best in People*, Aubrey Daniels reports on an employee engagement survey conducted on a sampling of employees working in small businesses.

Only 23 percent of the participants said they were working to their fullest potential. Forty-four percent of respondents admitted to only doing what was required and nothing more. So what can be done to get your people to go the extra mile?

A tailored recognition program is a great place to start, because you will get more of whatever behavior you reward. If you want to create a culture

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Chris "Chubby" Frederick, CEO

where everyone goes the extra mile, then implement a recognition program that rewards those who do. The key is to tailor the recognition you provide to the interests of your employee.

Is your writer a football fan? Then recognize her raving customer testimonial by giving her tickets to the Ravens game. Is your technician motivated by time off? Surprise him with a day off with pay for staying after hours to help a stranded customer.

Formal CSI program

In a previous article, “The secret to keeping good people” (MotorAge.com/secret), I wrote about the importance of being self-aware, as it relates to keeping good employees. When it comes to providing VIP level service, the shop owner who is self-aware has the ability to look at his shop through the lens of his customer. Having a system in place to get feedback from your customers on their experience is critical.

Do you have a formal CSI (Customer Satisfaction Index) program in place? Many of the shops I work with pay an outside company to contact customers and ask them to rate their experience in several areas. The numbers are averaged to come up with an overall CSI score, which is a key indicator of whether or not your customers are being treated like VIPs.

If you prefer to do it yourself, you can make random CSI calls, or you can also use Survey Monkey to create CSI questions that you email out to your

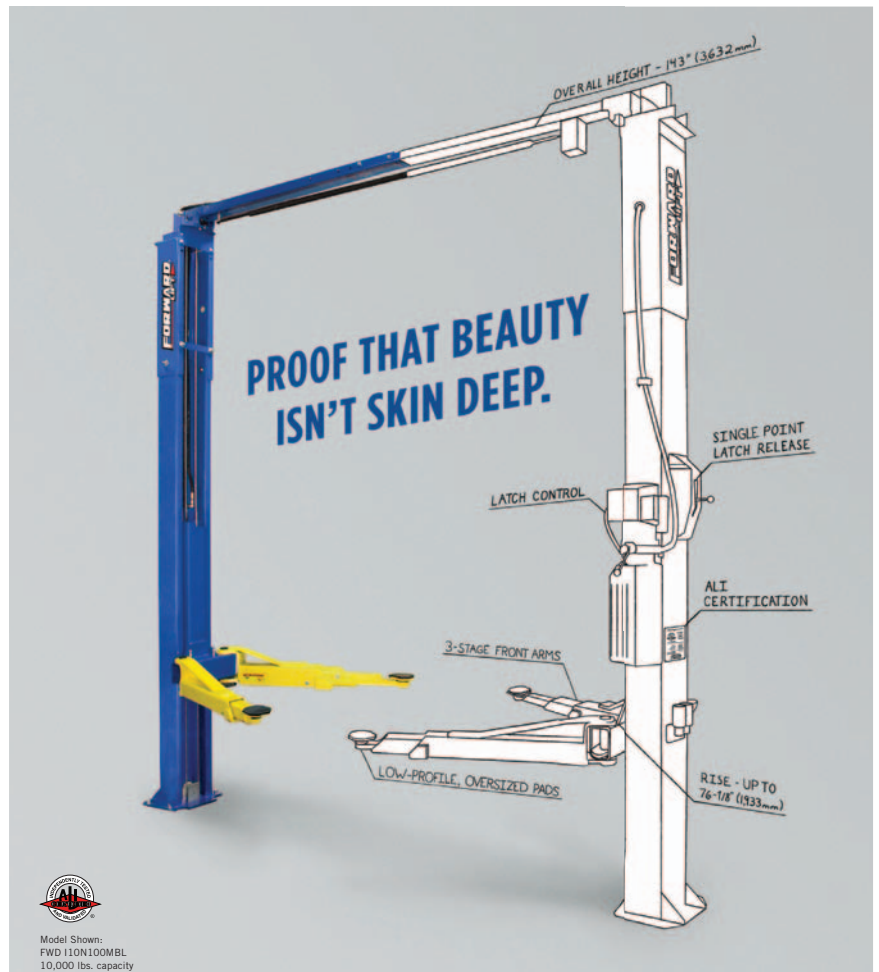
customers. Generally, the customers who respond without any prompting are either extremely happy or extremely dissatisfied, so offering an incentive will help you to get feedback from those who aren’t in one of the extreme groups.

CSI questions to ask

If you commit to a tailored recognition

and formal CSI program, your people will be motivated to treat your customers as if they were the boss.

If you are interested in creating your own CSI program but don’t know where to start, you should go to www.ationlinetraining.com/2017-07 to receive a list of questions to ask your customers when you or the survey company you choose calls. **TL**




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CHRIS “CHUBBY” FREDERICK is the CEO and founder of the Automotive Training Institute. ATI’s 115 associates train and coach more than 1,400 shop owners every week

across North America to drive profits and dreams home to their families. This month’s article was written with the help of Coach Eric Twiggs. chubby@autotraining.net

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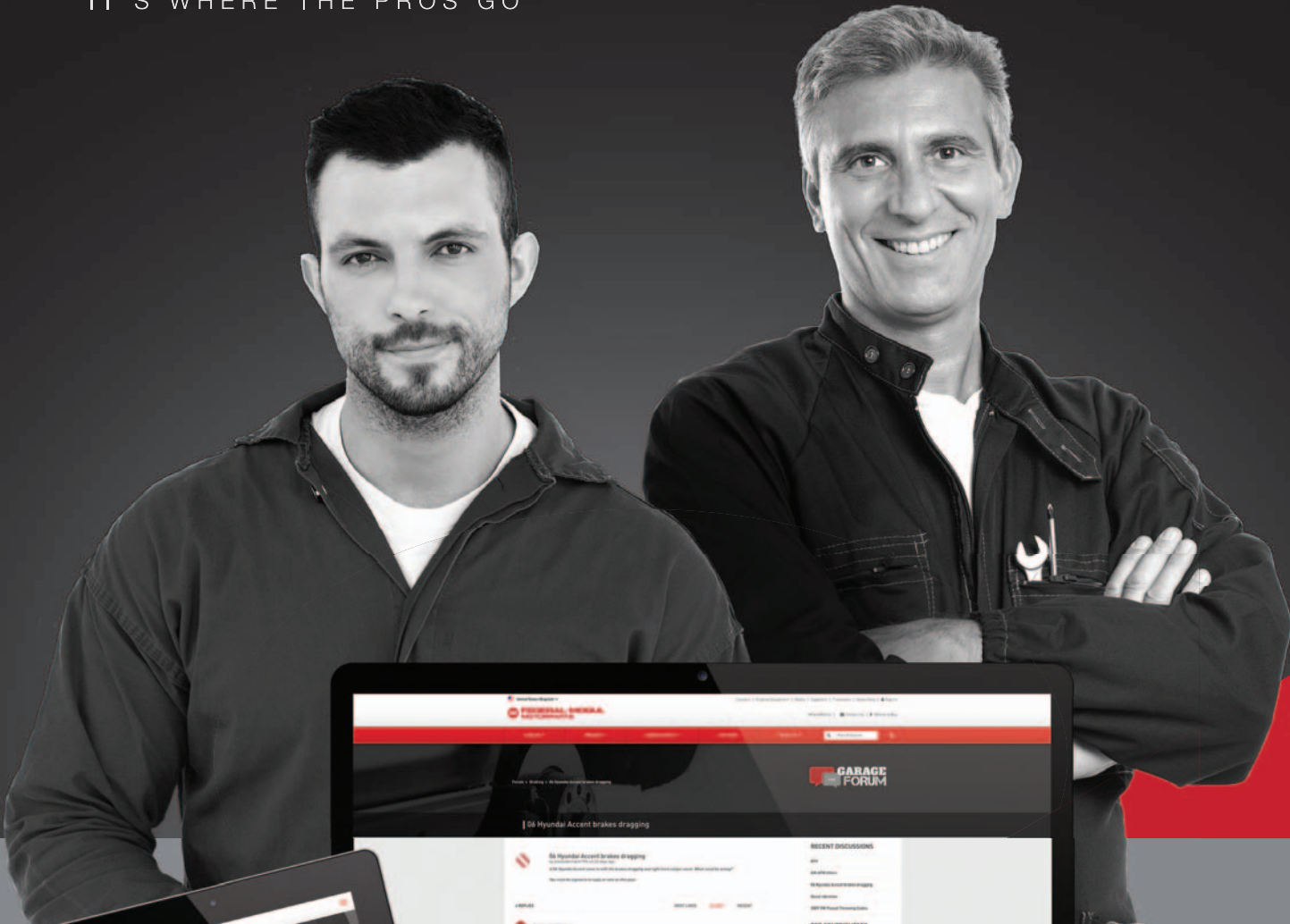
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You are paid for what you know, not for what you do

What separates successful shops from others is knowledge

There is no doubt about it that the automotive aftermarket service industry has changed drastically. Vehicles on the road now are more sophisticated than ever, and that sophistication will continue to grow until all vehicles become a high-end computer on four (or more) wheels. Think about what technology is coming into our industry, from electric and hybrid vehicles to the autonomous vehicle. It is very critical to recognize the new aftermarket service business that comes with this change. Too many shops still promote what they do, when in fact what separates the progressive shops from the old regime is knowledge.

The client is looking for solutions to their vehicle issues. They want the right answer that addresses their needs, not a sales presentation. As a progressive and professional shop, you provide just that because you have the right ongoing training throughout the business at every level that provides and maintains the depth of knowledge required to educate the client, counselling them and resolving their concerns.

Consider the required knowledge depth today in each position of the business from the manager/owner to the front counter service advisor to the technician, to the back parts person to the receptionist to administration. Anyone can pretty much say they do one of those positions, but what is the quality and depth of their knowledge to execute it to the top of the industry?

Understanding and embracing the title of this article is critical to developing your long-term business culture and executing your ultimate professionalism. This truly is how a career is built. The entire team in the shop understands this, has embraced it and takes accountability for their tasks in executing the end result to the client.

You know this is the right way to proceed, but there is



EACH STAFF MEMBER'S DEPTH OF KNOWLEDGE IN THEIR SPECIFIC POSITION PLAYS AN IMPORTANT ROLE THAT COMPLETES THE SERVICE CIRCLE IN MANAGING A CLIENT'S VEHICLE FOR SAFETY AND RELIABILITY.

still a lot of work to be done starting with ongoing, in-depth conversations. Take the time to have this discussion with your team. Do they clearly understand the difference and importance from what they do to what they know? Embracing this paradigm shift in thinking will allow each person to execute to the very best of their ability because they understand their education will forever be ongoing while connected with your company. They recognize that their depth of knowledge in their specific position plays an important role that completes the service circle, allowing the entire shop to embrace their professional responsibility to the client in managing their vehicle for safety and reliability.

Embrace the concept of daily "scrum" meetings (5 to 8 minutes long, at the most), reporting to the entire staff the progress at the client service level. This is reflected mathematically in the average billed hours per RO and the site efficiency measurement. As you progress toward an average of 2.5 billed hours per RO for basic consumer vehicle service and consistently obtain between 75 percent and 80 percent site efficiency, you know that the entire shop's knowledge base has grown to where it

must be maintained.

The next five years are going to be very exciting times for the aftermarket at every level. Once understood, the opportunities are immense, but truthfully, they will only be for the select few who get it. Push yourself to embrace the new aftermarket and enjoy this exciting business. **ZZ**

BOB GREENWOOD, AAM, is president and CEO of Automotive Aftermarket E-Learning Centre Ltd. (AAEC), which provides business management resources for the automotive aftermarket. Bob has more than 36 years of business management experience and is one of 150 worldwide AMI-approved instructors. greenwood@aaec.ca



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Upward mobility

What started as a mobile business has since grown roots

ROBERT BRAVENDER // Contributing Editor

➔ Mobile service is something that trends in various industries; for instance food trucks are right now providing a moveable feast in town squares across the country. Tomorrow something else might gain traction in this trundled trade: laundromats, physical therapy, plastic recycling — who knows?

However, Rod Reisdorf of Grand Island, NY, can report with some certainty that auto repair is one industry that doesn't lend itself completely or easily to mobile service. "There were only certain things I could do," he reports, "and some days I couldn't even work because it was raining out or snowing really bad."

Because unlike the mobile food industry, customers didn't come to him; Reisdorf had to go to them. Still, there were some advantages for a young technician going out on his own in 1985. "Your overhead is not that much, just the (transportation) and tools. I started out part time, working out of my trunk fixing peoples' cars in their driveways," he recalls.

And his wife came up with a catchy name: Mr. Best Wrench — two steps better than being merely good. Ironically a Google search yields another Mr. Best Wrench in Florida, but this is just a coincidence, not a franchise. "I actually thought about starting a franchise at one time," Reisdorf remarks, "but I just had too much to do at the time."

He quickly graduated to a van, in which he went to abodes and businesses "doing all sorts of repairs, whether it was an engine job, exhaust or brakes," Reisdorf explains. "I used to have a full Sun scope in the back of one of my vans and used that for tune ups, power balancing and testing cylinders. I probably went through three different vans during that period."

Reisdorf even expanded briefly into another mobile service — oil changes and light maintenance for fleets, which he did on weekends — but found himself a bit overwhelmed. "I couldn't run both businesses at the same time working seven days a week; it just wasn't fun anymore," he concedes.

"If I'm at someone's location and I'm working on my back with jack stands, it's much harder work," Reisdorf explains. "You can only do so many of those jobs per day, plus you have to go after parts; and you need to do one or two jobs a day because you're running around so much. But if you're doing an engine or cylinder heads, that's a couple days right there at one location."

The change he needed to make ultimately came down to him either buying a bigger vehicle or finally committing to a brick-and-mortar shop. After playing around with the idea of



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Rod and Adam Reisdorf
Owners

6
No. of bays

1
No. of shops

\$1,000
Average weekly restoration ticket

32
Years in business

25
No. of customer vehicles per week

2
No. of employees

\$300,000
Annual gross revenue

6,000
Total square footage of shop

getting into the quick oil change business, Reisdorf bought a building in 1998 and proceeded to fashion himself a facility. "I put a lot of money into this," he states. "Driveway, roof — it was an old factory so there was nothing in here when I moved in."

Starting with the bare minimum — at least what he had in his van — Reisdorf didn't have equipment like a tire machine or a balancer; for this he used another mobile service. "But then I just decided to buy my own stuff and make more money that way," i.e., tire sales. Today he has four lifts in his shop and recently replaced his alignment machine with a far better one. He still subs out transmission work and some body work — yes, body work, but more on that in a bit.

Reisdorf also discovered how profitable the New York state inspection program could be. Initially he assumed he had more than enough business, "but then I realized everyone was doing

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it and the kind of money they were getting for brake and suspension work," he notes. "I decided I had to get into it, and good thing too, because right now there's a waiting list to become an inspection station. I've heard of people in the state selling their license and machinery for thousands because other people want it."

And the body work? That's the best part of Mr. Best Wrench — collector cars. "We've worked on everything from Lotus to Jaguar, Mercedes to BMWs, older muscle cars to race cars," recites Reisdorf. "We work on cars for drifting, auto crossing, track days — that's something I'm involved with too, since I'm an instructor for the local BMW group when we go to Watkins Glen.

"We don't do any major restorations or painting," notes Reisdorf. "We mainly do maintenance and repairs; some performance upgrades, like aftermarket

exhaust or a different carburetor. We've also got a Cadillac in here now that we've lowered and a BMW we're getting ready for the racetrack with coil-over suspension all the way around; we handle everything from the tires on up."

They also offer winter storage. "I always stored about 12 cars in the back portion of the shop," Reisdorf explains, "but since I have about an acre and a half of land here, I put up a storage building two years ago. I rent out about a third of it to a guy who buys and sells Jeep Wranglers, but the rest of it currently holds about 32 cars."

Nothing beats word of mouth for marketing, and Reisdorf's connections to the collector car market provide a firm foundation. Himself a collector of performance cars, with memberships to three local car clubs and all the meetings and events these entail, he also partici-

pates in numerous motorsports events, sometimes as an official. He is thoroughly plugged into Grand Island's car community and as he notes, "we get a pretty good following and some business from it."

And while he used to pursue clients, the fact that they now come to him isn't lost on Reisdorf. "I enjoy talking to the customers about their cars or things that they are doing; it helps to build their trust in me, and I feel that this is very important in operating a shop." *TZ*



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WHAT GETS MEASURED AND TRACKED GETS MANAGED

MIKE JONES // Contributing Editor

Now that we are coming out of Q2, let's look back and see how we are doing with our New Year's resolutions.

Research has proven that New Year's resolutions do not work; however, setting and writing down your outcomes will produce greater success for you. When you focus on what you want and write it down, your chances of being successful is increased by more than 50 percent.

During most of my 1:1 coaching sessions, I have learned that most people do not write down their outcomes. Instead, they drift through life waiting for purpose, health, financial security, a great marriage, incredible children and significance to "just happen."

Writing down your outcomes is not the end game, however, I have found that what gets measured, gets managed.

The secret to accomplishing more of your outcomes and being more successful will be to commit your outcomes to written form. I believe this is critically important for six reasons:

1. Writing down your outcomes will force you to clarify what you want. Imagine setting out on a trip with no destination in mind. How do you pack? What roads do you take? How do you know when you have arrived? You start by picking a destination. The same is true with the outcomes in your life.

2. Writing down your outcomes will motivate you to take action now. Writing your outcomes down is only the beginning; you must deliberately take the first step to overcome the inertia. I have found that writing down my outcomes and reviewing them regularly provokes me to take the next appropriate step to make my outcome a reality.

3. Writing down your outcomes will provide a filter for other opportunities. The more successful you become, the more you will see additional unintended opportunities. These new opportunities can quickly become distractions that pull you off course. Maintain a list of the unintended opportunities that emerge from your written outcomes.

4. Writing down your outcomes will help you overcome resistance. The way to overcome the resistance is to focus on

your outcome, so what you focus on will then expand.

5. Writing down your outcomes will enable you to see — and celebrate — your progress. Written outcomes are like mile markers on a highway. They enable you to see how far you have come and how far you need to go. They also provide an opportunity for celebration along your journey.

6. Writing down your outcomes will enable you to celebrate every success. When you celebrate every success along the way, you are energizing yourself to take the next step in an even more powerful, positive, deliberate, confident manner.

Remember, what gets measured, gets managed. When you follow this process you will have greater success. Game on!



MIKE JONES is the founder and president of Discover Leadership Training, a next-level leadership development solutions company in

Houston, Texas. He encourages others to create a better version of themselves by realizing their untapped potential.

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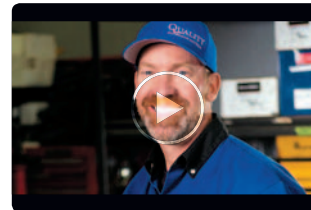
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CONNECTING HUMANS TO TECHNOLOGY

OUR CARS ARE BECOMING EXTENSIONS OF OURSELVES

EDWIN HAZZARD // Contributing Editor

If you ever get the chance to see a good car movie, then check out the movie *American Graffiti*. Many of you who grew up in that era may remember what it was like to drive your car while listening to your human machine interface (HMI). Sometimes it's referred to as "HIM" or Human Interface Module. OK, I know what you're



thinking. He must be talking about the radio or he's gone off the deep end. So let's have a brief history lesson so I can make some sense of this crazy nonsense.

The beginning

Back in 1930, the Galvin Brothers installed the first commercially successful car radio in the Model A for an expensive option of \$540. It was the first product to wear the Motorola name. Since then, motor vehicles have evolved with the changes in technology as the years have progressed. In 1952 the FM radio was introduced, and in 1953 many manufacturers offered an upscale radio with both AM and FM.

In 1955, the first music "on demand" was offered by Chrysler in the form of



a turntable installed in the vehicle. It played seven-inch records while driving down the road! Naturally, it was a bust. In 1965 the first 8-track players were



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in production; 1970 saw the release of the cassette player, and finally in 1985 we saw the advent of the CD player. In 30 years the car radio has evolved into a sophisticated, computerized central intelligence module that the driver uses to incorporate his or her entertainment and/or infotainment choices while driving. The term “HMI” means the interaction of the human being to make a change or selection to the module that controls our entertainment.

Way back in the day, nobody referred to the car radio as an HMI or HIM, but we as humans did interact with the radio in the fact that when we wanted a change, we adjusted the knob to select another station or we changed that cassette tape if we wanted to hear a different song. It's the same kind of principal



today as it was back then, only today there are a lot more electronics and technological changes that take place that we as vehicle owners are not aware of. So let's fast forward to 2017 and look at some of the electronics that play a part in our entertainment and our infotainment systems. We will focus on the 2017 Chevrolet Silverado (Figure 1) as our vehicle in this discussion.

Entertainment vs. infotainment

Entertainment is designed to give pleasure like listening to music. Infotainment is the programming that gives information, which then in turn gives entertainment. Take, for example, a Global Positioning System (GPS). Some of the electronics in a modern-day entertainment or infotainment system consist of a stereo radio, a navigation system, a universal serial bus (USB) system, a cellular phone system, speech recognition system, Bluetooth systems and others (Figures 2, 3). These different systems work on a data bus line known as the MOST (Media Oriented Systems Transport) network. It is a high-speed network that communicates with the GMLAN network. The radio in this system is considered the bus master or gateway as its sometimes referred to. Let's take a closer look.

The HMI is the component that is responsible for the video in the display screen. It's called an HMI because it is a video touch screen display that works as the interface between human and system (hence the name) (Figure 4). The HMI works in conjunction with the instrument panel cluster (IPC) and the radio. The HMI module communicates with the infotainment display module via the Local Interconnect Network (LIN) bus network for control communications, touch communications and the dimming or brightness of the display itself. The LIN network is a single wire used to transmit information between a module master and other smart devices. Digital data



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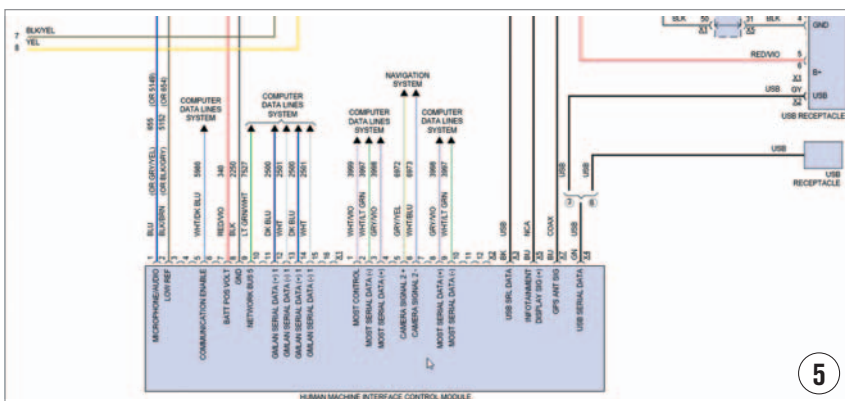


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that's in the form of a video is sent on a dedicated video cable.

So, how does all this work? Your radio is in constant communication with your HMI module and is ready to interact with your touch commands, voice commands, Bluetooth communications and even a USB memory card reader — yes, the same as one that's in your home PC. The HMI actually has three different networking systems that connect to it: the GMLAN, or GM local area network, the MOST network and the LIN bus network. That is why it's called the bus master (Figure 5).



When things go wrong

Go about your diagnosis just like you would any other network problem. The important thing to remember is to make sure you know what players are involved in the system you're working on. There are a lot of different combinations that are offered for this vehicle and some of the options might not be there. A service information system along with a GM option code index

are a couple of the essential tools you will need.

Other essential requirements are needed to properly repair this system. As I mentioned earlier, the entertainment/infotainment systems in this vehicle offers a USB receptacle(s), memory card reader, speech recognition for voice-actuated commands and the use of Bluetooth for all Bluetooth devices. These features are all part of this system, and they are programmable. The way this system is programmed is very similar to the way you program a normal ECM or BCM in a GM vehicle. The service programming system (SPS) is a subscription-based service offered by GM. However, here's the difference: Some components are programmed through SPS and some are programmed using a USB flash drive. Some require both. Programming the infotainment systems involves using the SPS system to download the latest calibration files for the particular make and model you're working on. The calibrations that are downloaded are used to upgrade the vehicle's firmware to accommodate the types of infotainment components that are used in that specific vehicle. This is done just like any of the other systems on a GM vehicle. The other type of programming also involves using the SPS procedure, but the difference is that you will be downloading the calibration files to a USB flash drive. The flash drive has to be a 2.0 compatible drive or higher to accommodate the transfer speeds of the data. The minimum size requirement for flashing with a USB drive is 4GB. Flashing using a USB drive is for updating the infotainment system's software that's programmed in the various components of the entertainment system in the vehicle. One thing to note: If the wrong software is used to program the system, the HMI unit could be damaged. Be sure to select Human Machine Interface control module USB copy/USB file transfer in the SPS programming program. This is VIN specific and using an incorrect VIN is where the HMI could be damaged.

When programming this system, performing a USB flash event is done before the typical SPS procedure is carried out. When programming some radios, the vehicle's modules must go to sleep for five minutes after programming. If not, the ve-

The advertisement features the Bartec USA logo and icons for a warning sign, a wrench, a battery, a car, and a test tool. The text reads: "Solutions for better vehicle service". A starburst graphic says "Ideal for Collision and General Repair Shops!". The product is shown as a handheld device with a screen and buttons. Callouts point to "Position Tool Next to Sensor" and "Use Remote Lead and Work from in the Vehicle". A large blue banner at the bottom says "Parking Sensor Test Tool". Below this, it states "Another market first tool from the industry leaders at Bartec!". A checklist of features is provided: "Visual indication of sensor output", "Measures the most common frequencies", "Easy, single technician operation", "Remote test lead included", "Fast way to verify sensor function", and "Easily validate sensor condition". A red box with a starburst says "NEW PRODUCT!". The contact information is "NACE Automechanika Chicago BOOTH #2105". The bottom of the ad includes "hartecusa.com", social media icons for Facebook, Twitter, and YouTube, and the phone number "18551 877-9732".

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hicle might not have sound, could have a blank screen or it could not have any touch screen response. It could also have an incorrect screen as well. If any of these symptoms appear, then turn off the vehicle and wait the required five minutes before trying to attempt the programming sequence again. Anytime you have to do a programming repair on one of these systems it is usually done because of a component failure and the component needs replacement or a calibration update as instructed by a technical service bulletin (TSB). It works the same as any other computer problem that you are probably already familiar with.

Evolution

The HMI has evolved along with technology, just like any other component on today's automobile. It started out

with version 1.0 in 2013 to version 2.5 in 2017. The processor speeds have changed considerably to be able to handle the increased data and memory that is needed in today's media requirements. Most people today have a smartphone that's either an Apple or an Android device. Both companies have developed software that is compatible with the GM My Link software (Figure 6) that's used in GM vehicles today. Downloading the Apple app "Apple Car Play" or the Android app "Android Auto," and connecting the phone to the vehicle by using a USB cable will allow the phone to be displayed on the touch screen of the vehicle's digital display. So using the Google Maps app on the phone will allow the use of a navigational map being displayed on the display of the vehicle (Figure 7). Pretty cool, right? This surely beats using the old navigation method

of having to update the software in the older systems, as it constantly seemed like it was inaccurate and out of date. This system is a lot less expensive as well, and the program is free on your cell phone.

As far as diagnostics on these vehicles are concerned, the use of a compatible scan tool is necessary to be able to properly repair this system. The GM Global Diagnostic System, or GDS2, is required to do some of the bidirectional steps in testing the HMI system. One thing that I have noticed



is when a new vehicle has had the entertainment system altered with a non-factory component, all sorts of problems can crop up if a component is installed that really shouldn't be there or if the installation is done incorrectly. These newer entertainment systems are pretty sophisticated and a lot could and can go wrong. Besides, who wants the malfunction indicator lamp to be on because something is on the network that shouldn't be there or is missing and should be there?

So what to do about HIM? There are a lot of service opportunities that can be addressed because the radio in a vehicle isn't operating correctly. Unless these vehicles are still under the factory warranty, then there are plenty of service options available. No need to send the vehicle away. Just understand how the system works and who the players are. It is my understanding that other than the color of the vehicle, the two most important features on a vehicle to the majority of most customers is the air conditioning system and the entertainment system. People like to stay comfortable, and most will pay to stay that way. *ZZ*



EDWIN HAZZARD has more than 30 years' experience in the automotive industry as a technician, service consultant and mobile diagnostic tech. He is the owner of a successful

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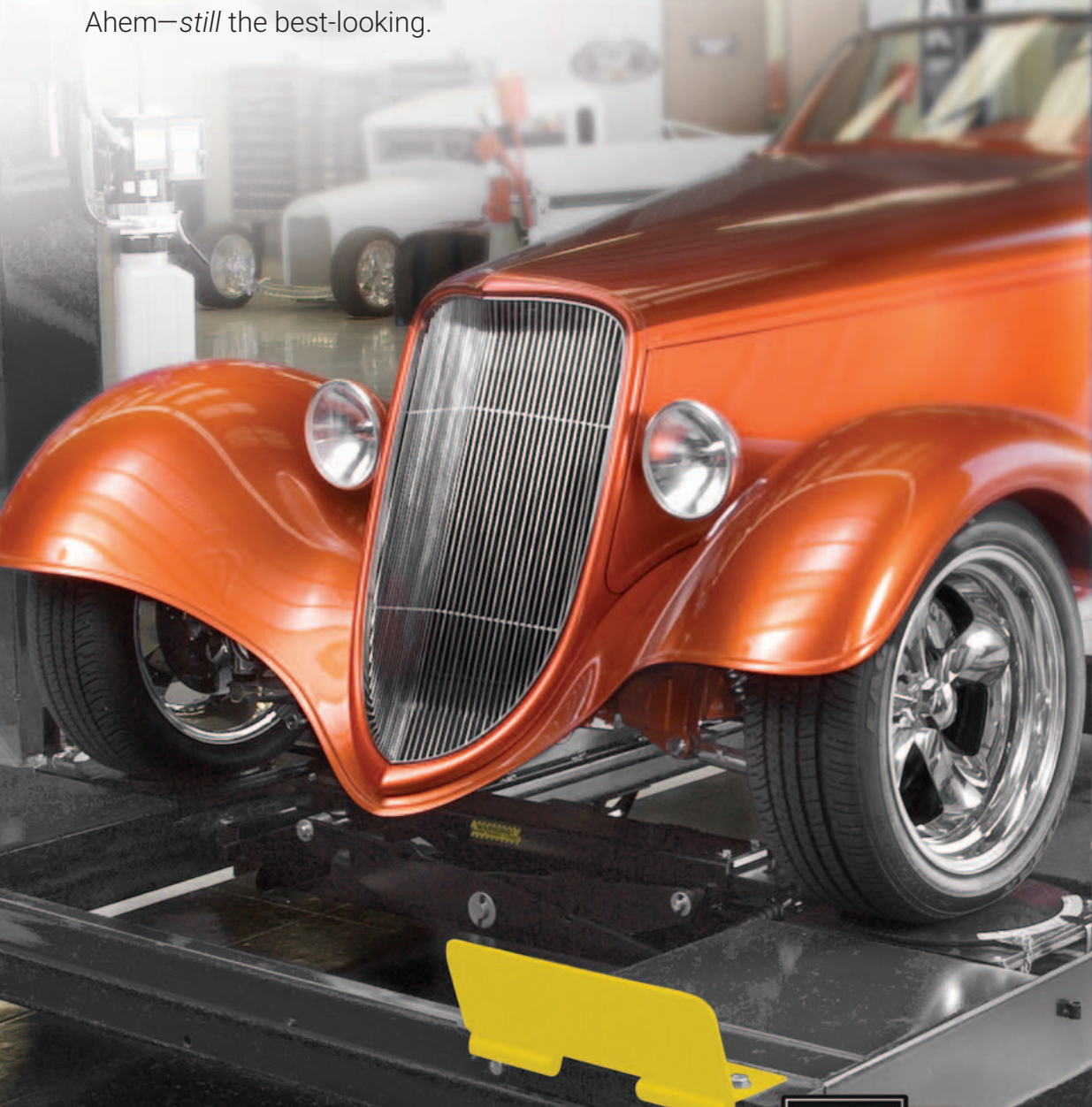


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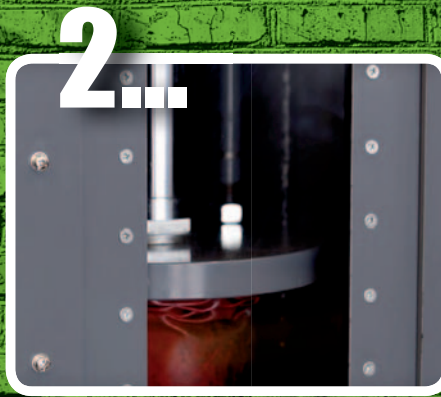
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AN IPHONE MOMENT?

IT'S AN EXCITING TIME TO BE IN THE AUTOMOTIVE INDUSTRY AS TELEMATICS AND AUTONOMY EVOLVE.

PETE MEIER // Technical Editor

As I write this article, a number of images are dancing around inside my head. First is the picture of Arnold Schwarzenegger in his 1990 movie, *Total Recall*, jumping into his “Johnny Cab”, the autonomous electric taxi piloted by a half robot. Another comes from an old James Bond movie, featuring Pierce Brosnan as Bond, piloting his spy car with his smart phone as he hunkers down in the back seat, bad guys shooting at him from every angle. These are followed by more recent, and more realistic, automotive commercials featuring safety technologies that are becoming commonplace — active cruise control, lane departure control and collision avoidance to name a few.

We are in the heart of a radical change to an industry many of us have devoted much of our lives to. My own first experiences involved tuning carburetors and adjusting ignition point gap, and now I do all I can to keep up with new computer network diagnostic methods using diagnostic platforms based in something you young guns refer to as the “cloud.” I am beginning to relate to the older techs I knew when I first started who ran for the hills when electronic ignitions and the first engine “controllers” were being introduced.

But don't worry — I'm not running anywhere. I look forward to the challenges our future is going to bring to us, and the inevitable evolution of the automobile and the redefinition of “per-

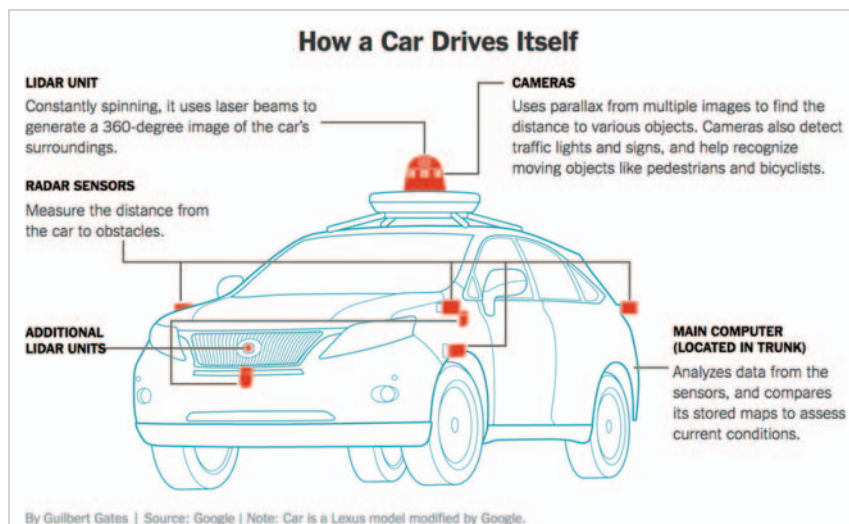


PHOTO: GUILBERT GATES, GOOGLE

A LOT OF TECHNOLOGY goes into making an autonomous car safe. Advances in LIDAR technology may help usher in these cars, at least in the ride-share segment, much sooner than later.

sonal transportation.” Let's peer into the crystal ball together and see what the future may hold for all of us.

A truly mobile network

The first device that could be truly called a “smartphone” was the IBM “Simon Personal Communicator”, marketed by Bell-South to consumers in 1994. In addition to placing and receiving cellular calls, Simon could send and receive faxes and emails and included an address book, calendar, appointment scheduler, calculator, world time clock and notepad, utilizing its touch screen display. At about the same time, GM (and partner firms Electronic Data Systems and Hughes Electronics Corporation) were bringing a unique service to certain GM model lines — OnStar.

In early 2007, Apple Inc. introduced

the iPhone, one of the first smartphones to use a multi-touch interface. The iPhone was notable for its use of a large touchscreen for direct finger input as its main means of interaction, instead of a stylus, keyboard or keypad typical for smartphones at the time. In October 2008, the first phone to use the Android operating system was released. Android is an open-source platform founded by Andy Rubin and now owned by Google. Although Android's adoption was relatively slow at first, it started to gain widespread popularity in 2010, and in early 2012 dominated the smartphone market share worldwide, which continues to this day.

It also marked the beginning of a new way of connecting to the world around us. By this time, most of us were used to the Internet and browsing the

web on our desktops and laptops. But now, the power of computing was in the palm of our hands. Not only were we able to access our email and world news on our mobile phones, we also began connecting with one another in new ways via a variety of social media platforms. The world was, indeed, getting to be a lot smaller, at least in terms of staying connected to those around us professionally and personally.

Today, major players in the telecom industry (Apple, Google and Microsoft come to mind) are looking to turn your car into one big smartphone and they aren't too far off from making that happen. Cellular services are now directly connected to the car, allowing you to listen to your favorite music on Pandora or find your way to your destination via Google Maps. You can link your phone to your infotainment system or use the onboard cellular connection to make and receive phone calls, and in some cases, exchange text messages with your contacts.

But don't think for a minute that these companies are doing it for you. Companies like Google, Amazon and Facebook are all considering the economic bottom line that opens to them if they can farm all that data you're providing while in your car. Imagine, they can use these connections to

learn where you are going, how often you are going there, and what route you are using. They can learn what music you are listening to and who you are communicating with. And this is just a tip of the information iceberg they are interested in collecting.

Why?

Because they can sell that information to other companies who want to sell stuff to you.

Of course, the automakers are somewhat in tune with the idea of information harvesting, too. But they have a narrower focus, interested in keeping you as a loyal customer and using you as a rolling R&D department. Bob Chabot, in a recent *Motor* article, interviewed John Ellis of Ellis and Associates for a story called "Zero Dollar Cars: Closer Than You Think?" that was very enlightening. Imagine purchasing a new car and having companies like the ones mentioned paying you for the right to farm your personal data, offsetting the cost of that new car. The money they would pay you for the rights would be far less than the money they know they'll make selling that data in marketable "packets," tailored to specific industries. So much so, that new car may actually cost you nothing by the time you're done reviewing and accepting all the offers.



PHOTO: IBM

THIS IS THE IBM SIMON Personal Communications device, the first real "smartphone," even though that term hadn't been coined yet.

Connecting the "connected" car

One major question that is still in play is how to move all that data. Are you familiar with the term "IoT" yet? It stands for the "Internet of Things" and it refers to the connectivity of everyone and everything in one giant pool of information. The growth of mobile smartphones is just a small, but fast-growing, segment of the IoT. Connected systems on the vehicle, like OnStar and similar services, are another. Providers of services you use on those phones and in your car is yet another. And we are still only scratching the surface of all the users using all the different devices and machines accessing the global network.

One answer that is being supported as the best solution is the development of 5G. Think of a cellular-based service that doesn't rely on any particular infrastructure (relying instead on a device-to-device concept sharing the "cloud"). It could allow for billions of simultaneous users, and all of them able to access that data at a rate of 10GB/second with near zero latency? That's the concept of 5G, and it could potentially play an important role in bringing the idea of autonomous cars to life.

To clarify, there is a difference between a "connected" car and a connected car, a nuance in terminology if you will. People are intimately connected to the global data network and each other via their smart devices

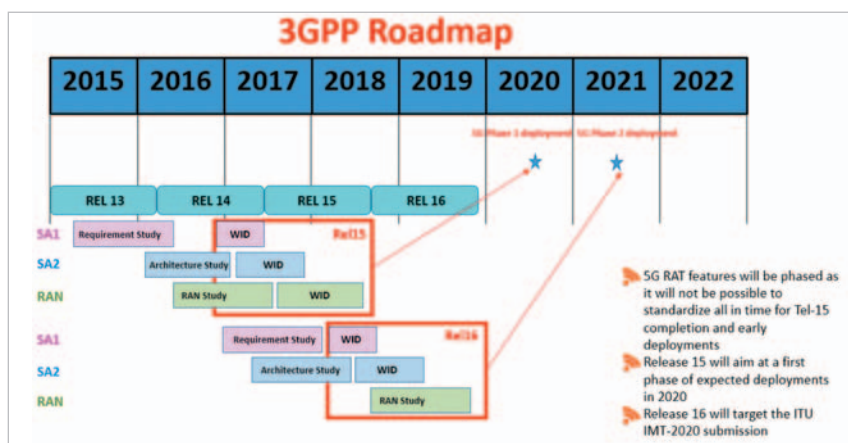


PHOTO: 5GAA

THE CONCEPT OF 5G MEANS a device-to-device network able to serve billions of users at speeds fast enough to stream a movie, but it's still a few years off from becoming a reality.



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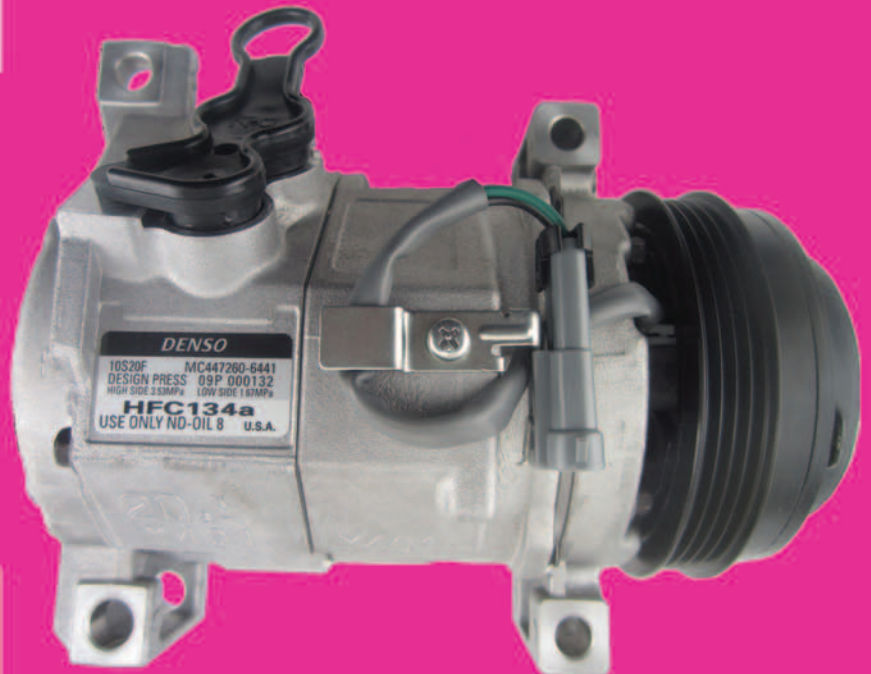
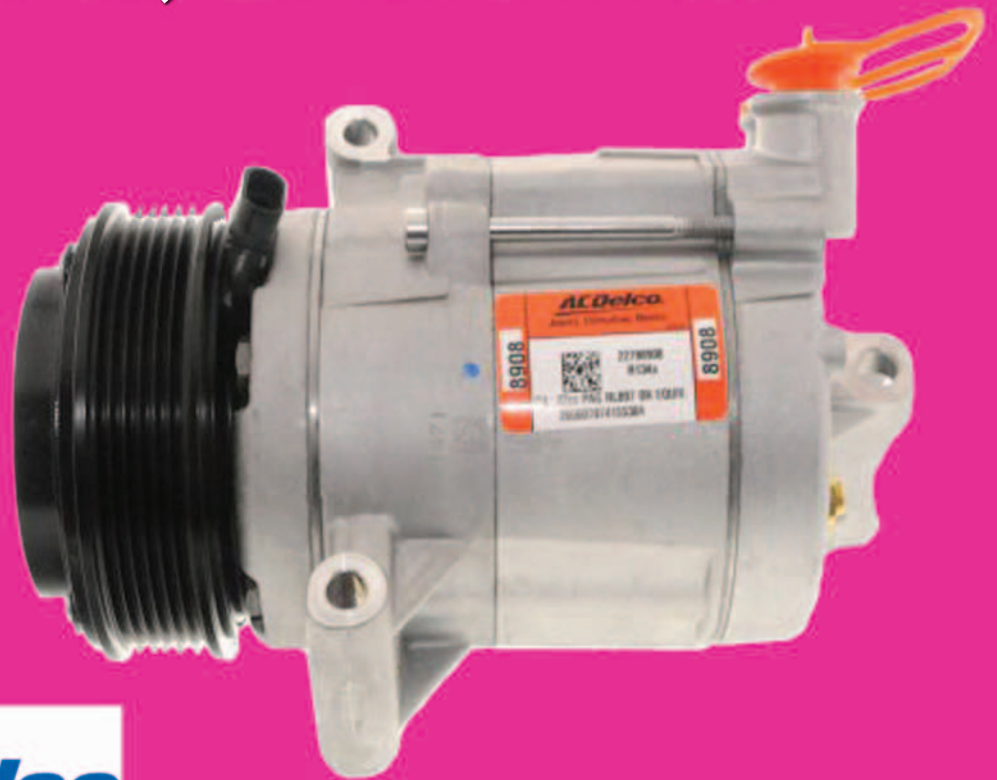
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today. You've seen it — couples talking to each other by texting, even when they're sitting at the same table! Very few, I think, could truly cope without their phones — even those of us who grew up with the rotary dial landline.

And we don't just want to be able to communicate, we want all of the conveniences our phones offer us. We want to keep up with our friends on Facebook, Instagram and SnapChat. We want to listen to our streaming music, or watch our streaming movies and TV shows. And we want it all the time. That is the "connected" car, the rolling mobile smartphone/tablet/laptop that brings our world with us when we travel. 5G would certainly enable all those things we want and then some.

The connected car, on the other hand, is the one that is connected to other cars. It is one of the pillars of the potential for autonomous cars. Right now, systems using Dedicated Short Range Communications systems (DSRC) are the reality, as 5G is still an unrealized (but anxiously anticipated) dream. DSRC is a WiFi-type of device that allows for the transmission and reception of vehicle speeds, location and direction of travel in a variety of con-

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/Deceleration	Monitoring of Driving Environment	Fallback Performance of Dynamic Driving Task	System Capability (Driving Modes)
Human driver monitors the driving environment						
0	No Automation	the full-time performance by the <i>human driver</i> of all aspects of the <i>dynamic driving task</i> , even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Driver Assistance	the <i>driving mode</i> -specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	the <i>driving mode</i> -specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>	System	Human driver	Human driver	Some driving modes
Automated driving system ("system") monitors the driving environment						
3	Conditional Automation	the <i>driving mode</i> -specific performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> with the expectation that the <i>human driver</i> will respond appropriately to a <i>request to intervene</i>	System	System	Human driver	Some driving modes
4	High Automation	the <i>driving mode</i> -specific performance by an automated driving system of all aspects of the <i>dynamic driving task</i> , even if a <i>human driver</i> does not respond appropriately to a <i>request to intervene</i>	System	System	System	Some driving modes
5	Full Automation	the full-time performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> under all roadway and environmental conditions that can be managed by a <i>human driver</i>	System	System	System	All driving modes

THE SAE HAS DIFFERENT CLASSIFICATIONS of "autonomy," based on how much the driver does and how much the car does.

ditions with high data transfer speeds and minimal latency.

"It's like the Twitter of automotive wireless technologies," says Geoff Waters, a digital networking engineer at NXP, which makes DSRC modules that use the company's RoadLINK platform.

Proponents of DSRC point out that it can accommodate all necessary vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2X) communications in modules that are already commercially

available. Regulators in Europe and the U.S. have embraced DSRC, with the U.S. Department of Transportation considering making the installation of DSRC modules mandatory in all new vehicles.

But there is growing support for 5G as an alternative and many are encouraging automakers and the government to delay implementation of any formal standards. Those who favor 5G point out several advantages, including the use of cars as roving "hot spots" that others could use to access the global network. With increasing demands for services requiring high data rates and lots of bandwidth, this could be one solution to the growing need.

Whether 5G or DSRC, the experts do agree on one thing: We are still at least a decade away from either making any real difference. Some OEMs are already installing DSRC modules, but the data they are "chirping" into the airwaves is being heard by no one. A few opine that once we do start seeing large-scale use of DSRC, we may find that the signals are actually interfering with one another but by that time, 5G should be on the scene and manufacturers will be in a position to make the transition.



PHOTO: LUMINAR

THIS LIDAR UNIT is manufactured by Luminar. The company is working on extending the range from its current 120 meters to 200 meters.

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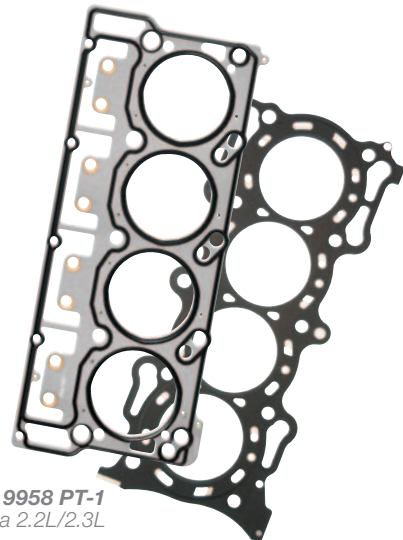
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In the end, we may see V2V communications as a mix and match of the two, and as Waters observes, “[it’s] the difference between an autonomous car that will drive you smoothly through the city versus the autonomous car that’s going to spill your coffee.”

“Seeing” with LIDAR

The idea of when we may see true autonomous cars on our highways varies quite a bit. Some say it will be decades away, while others aren’t so sure, convinced they will be common within the next 10 years. One breakthrough that may make the latter happen is “LIDAR,” or Light Detection and Ranging, a technology that uses near-infrared light to detect the shape of objects around it.

In a May 2017 *New York Times* article, reporter John R. Quain writes that “the technology is the centerpiece of an intense court fight in California between Uber and Waymo, the self-driving business operated by Google’s parent, Alphabet. In the case, Waymo accuses a former Google engineer, Anthony Levandowski, of stealing trade secrets about the company’s LIDAR designs for his own autonomous driving start-up — which he sold to Uber for nearly \$700 million.” Other companies are in a rush to develop versions of the technology of their own and some state that the technology will be the factor that makes

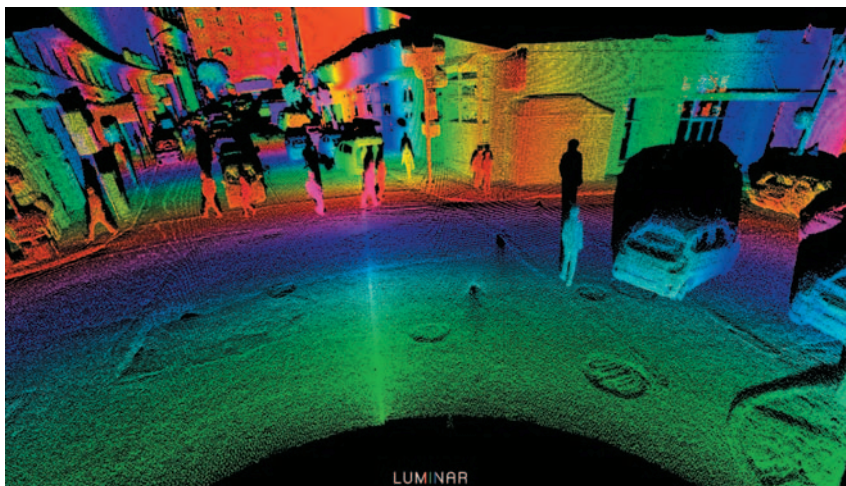


PHOTO: LUMINAR

THIS IS A SINGLE FRAME CAPTURE of what LIDAR “sees.” The advantages to LIDAR are several, including the technology’s ability to paint a 3D image that is not affected by weather or lighting.

autonomous cars 100 percent safe.

LIDAR offers distinct advantages to the camera and radar systems being used today. LIDAR is capable of imaging a three-dimensional map of its surroundings and cannot be fooled by weather, shadows or direct sunlight. The reason it’s not being used today? One, of course, is cost.

The LIDAR unit on the Google car costs \$75,000. Even with advances in design, the cost still remains high, just short of \$10,000 today. And that’s still too high for automakers, who’d like to see at least another zero shaved off of the end of that number. Quain includes in his report this quote from Jeffrey Owens, chief technology officer for Delphi, “In five years, for ride-sharing cars, it could be an \$8,000 option.” Delphi recently announced it was working with Intel, BMW and Mobileye on an autonomous driving platform. “In 2025, it could be \$5,000.”

Another reason is compatibility. Today, LIDAR units made by different manufactur-

ers paint slightly different pictures of the world; that means installing a replacement unit made by a different company than the one who originally supplied the OEM could cause problems. Do you wear glasses? Think of wearing someone else’s prescription — that’s the same idea.

A few years ago, I wrote a story on the Anaheim autonomous test that was being conducted by the National Highway Traffic and Safety Administration, in partnership with several OEMs and notable aftermarket giants. In that article, I commented that I believed that by the time my oldest granddaughter was ready to drive, she wouldn’t have to. I’ll modify that today. She may still need to learn how to operate the car on her own, but I’m still willing to bet my youngest grandchild (who is three years old) just may not.

I look forward to being around long enough to see. How about you? **TM**



PETE MEIER is an ASE certified Master Technician and sponsoring member of iATN. He has over 35 years practical experience as a technician and educator,

covering a wide variety of makes and models. His primary goal is to bring working techs the information they need.

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PHOTO: FORD MOTOR CO.

DECADES AWAY OR YEARS AWAY? The experts disagree on just when we’ll see autonomous cars on the production line, but I’m betting it’s sooner than later.

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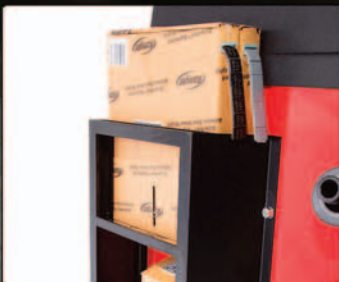
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WILL ADD-ON TELEMATICS DELIVER?

OBD PORTS WERE DESIGNED FOR DIAGNOSTICS, NOT CONTINUED USE WITH TELEMATICS UNITS

JEFF MINTER // Contributing Editor

Telematics seems to have become a buzz word the last several years in the automotive aftermarket. Telematics really aren't new to the automotive world, but the technology has progressed to the point where aftermarket options have become available. As with any technology, there are both positive and potentially negative ramifications. So let's take a deeper look at telematics, the options available today and the potential future for telematics systems.

What is telematics?

The definition of telematics listed in Wikipedia is pretty long and involved. It states, "Telematics is an interdisciplinary field that encompasses telecommunications, vehicular technologies, road transportation, road safety, electrical engineering (sensors, instrumentation, wireless communications, etc.), and computer science (multimedia, internet, etc.)." For this article, I'll focus on the telematics system's ability to access the vehicle's onboard diagnostic data and relay that information. It's important to note that all systems are not created equal in their ability to relay data. Don't mistakenly assume that remote diagnostic systems can necessarily access all of the information you could get if connected directly to the vehicle with a diagnostic tool either, as this can

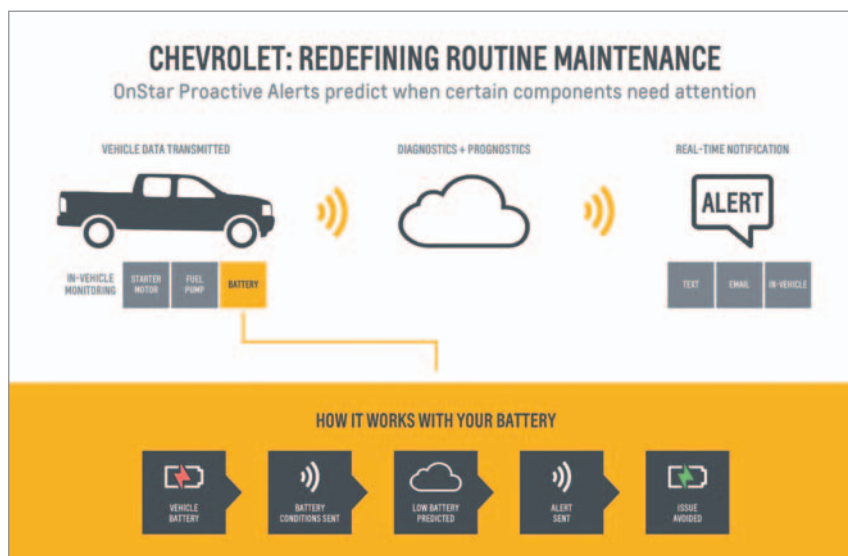


PHOTO: CHEVROLET

FACTORY SYSTEMS is one way the OEM is trying to keep the consumer in the fold.

be far from the truth.

As I mentioned, telematics systems are not new to the automotive industry. In fact, General Motors introduced the first version of OnStar on some model year 1997 Cadillac vehicles and Mercedes-Benz introduced their first telematics system in model year 2000 as Tele Aid (later called mbrace, and now mbrace2). Those early systems were a far cry from what we see on vehicles today. Their features were primarily focused on safety, possibly some remote guidance and some limited communications. Fast forward to 2017, and oh, how things have changed. OEM systems are now providing communications that could've only been dreamt

of in the past. The safety and guidance functions have been expanded, and communication functions have virtually exploded. Systems are now able to provide automated diagnostic reports, maintenance reminders, in-vehicle internet hot spots, and on and on and on. In fact, remote updating of the onboard control modules (known as over-the-air updates) is even starting to get close to becoming a reality.

The main question that comes to my mind with these systems is: How can they be leveraged by aftermarket shops to better service their customers? The reality is that the systems likely have all been set up with defaults to try to drive customers to the dealerships for ser-

vice. Typically, when a customer has an active subscription, any trouble code notifications that are sent to the customer will also be sent to the dealer closest to the customer's address on record with the telematics provider. Of course, the customer likely has the right to deny that automated dealer notification, but if that's even an option in the contract, it's unlikely the customer knows. Does that mean you need to offer the customer an aftermarket option on top of their existing OEM system to be able to have that same access? Fortunately, the answer is likely almost always going to be no. If you choose

to start pursuing these vehicles, there are a few options I'd recommend considering. Keep in mind, even though your customers may be bringing in older vehicles for service, it doesn't mean they don't

also have newer vehicles at home that may be equipped with telematics. In other words, if you are going to go after this market, you should advertise it to all of your customers.

The first and simplest option is to just offer your assistance in interpreting the information that is already being sent to them. Make the customers aware that you are willing and able to review any notifications they may receive from the OEM. To make it convenient for the customer, provide them with an email address they can forward the reports and/or notifications to. Of course, you need to be prepared to actually follow up on any items sent, which could get time consuming, so be sure you are prepared for the volume you may receive.

The second option is slightly more invasive on the front end, but would be more convenient for the customer in the long run and could really differentiate your level of customer service. Most of the OEM telematics systems can be set up to send notifications to more than one email address. You could provide your customers with a dedicated email address they can add to their account, which would direct those notifications directly to your shop. The key again would be follow-up. If you receive notifications but don't act on them, it could backfire. If handled correctly, however, it could give you an opportunity to go above and beyond your customer's expectations and help them proactively manage their vehicle concerns.

Aftermarket options

In addition to the various original equipment telematics options, there are a growing number of aftermarket options. I think of these "add-on" systems as primarily falling into one of two large categories based on their primary function. The categories I group them into are systems designed primarily for safety purposes and systems designed primarily for remote diagnostic purposes.

General Motors introduced OnStar FMV (For My Vehicle) in 2011. This was one of the earlier add-on systems that I would classify as having a safety focus. The system had some of the core OnStar features, but don't mistakenly think the OnStar name means it could do everything the OEM version did. It had the ability to be used on a wide variety of makes/models outside of GM; however, it was not really an embedded system like



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TELEMATICS MAY BE a relatively new term, but the systems have been around for a long time now.



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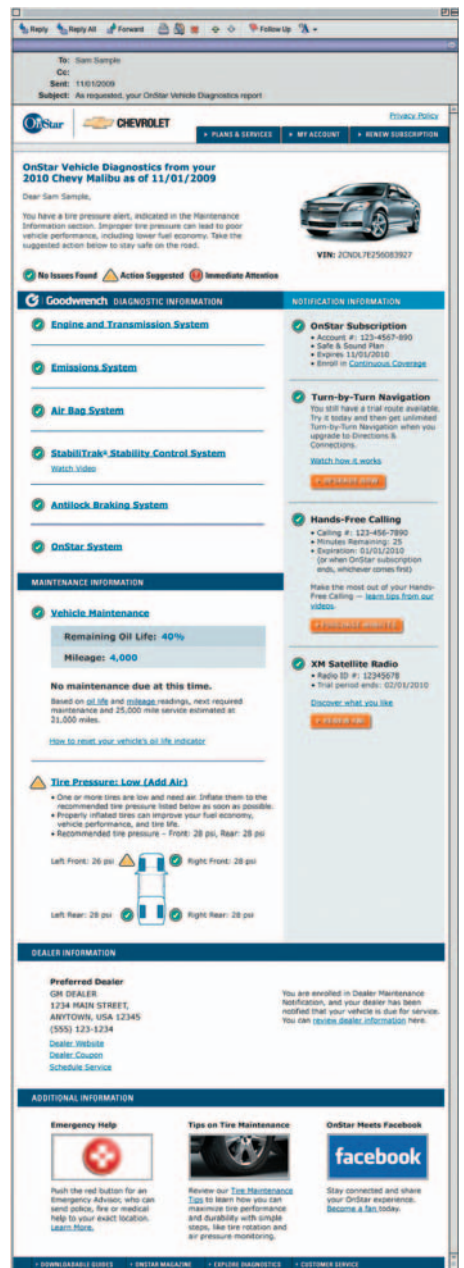
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the OE version. In other words, features such as remote diagnostics and diagnostic reports were not available. Those features required a more embedded system than the FMV. That left it with primarily safety features such as automatic crash response, navigation (audio), stolen vehicle assistance, emergency assistance and hands-free calling. General Motors ended production of the FMV around 2014. Since then, safety-related add-on systems have moved more toward monitoring the drivers' safety habits rather than automated crash response. Most have the ability to provide driving style/habit reports to help encourage improved behavior. Some of them even have video cameras that will capture unsafe behavior. Lytx DriveCam is one example of an advanced camera-based system. This system has both inward- and outward-facing cameras to record what's happening any time the vehicle is moving. While the camera is constantly "rolling," it doesn't save the footage until

an incident triggers it. The driving conditions that trigger a recording can be somewhat customized by the local administrator of the system. This system is so advanced that it can even record videos and send real-time alerts when the driver is exhibiting potentially unsafe behavior while driving. These behaviors can include things such as eating, using a handheld cellular phone, etc. Insurance companies have recognized the value of the safety-monitoring type telematics. In fact, most of the major insurance companies have some type of system available currently and offer discounts to their drivers who use them. The theory is that drivers will improve their safety (thereby reducing the risk to the insurance company) if they are reminded when they are doing something unsafe. Some of these devices are simply apps that can be installed on cellular phones such as the Allstate Drivewise system. Others, such as the Progressive system called Snapshot, require an adapter that plugs into the onboard diagnostic port. Those adapters then connect wirelessly to your cellular phone so the captured data can be uploaded to the insurance company.

For add-on remote diagnostics, two units immediately come to my mind for the automotive market — the Delphi Connect and the Golo from Launch Tech USA. Both of these devices plug into the OBD port on the vehicle and both tap into the onboard controllers, but beyond that they work very differently.

The Delphi Connect unit is available from various cellular providers. As you would likely expect, since it's distributed by cellular providers, it connects directly to the cellular network. Because it interfaces with the OBD port, it is able to access information related



ONSTAR Vehicle Health Status Reports

to trouble codes, etc. and provide a vehicle health report similar to some of the OEM systems. The cellular connection also allows it to provide vehicle tracking, geo fencing, automated alerts and notifications and many other features. There are even models available that provide 4G LTE hot spot functionality for the vehicle. This unit is obviously very consumer-focused, which means it also comes with features that, as a shop



TELEMATICS-BASED KEY fob prevents lockouts

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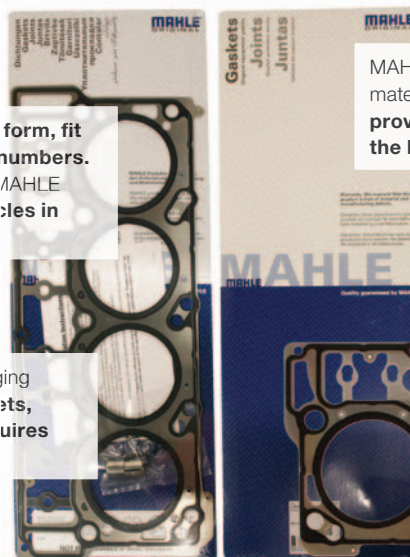
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owner, may not be as helpful as you'd like. For instance, Verizon advertises the benefit of "Know Before You Go," suggesting the vehicle owner can know what their vehicle needs before taking it to a repair facility. Obviously that can lead to customers questioning the cost of diagnostics, which can already be challenging enough.

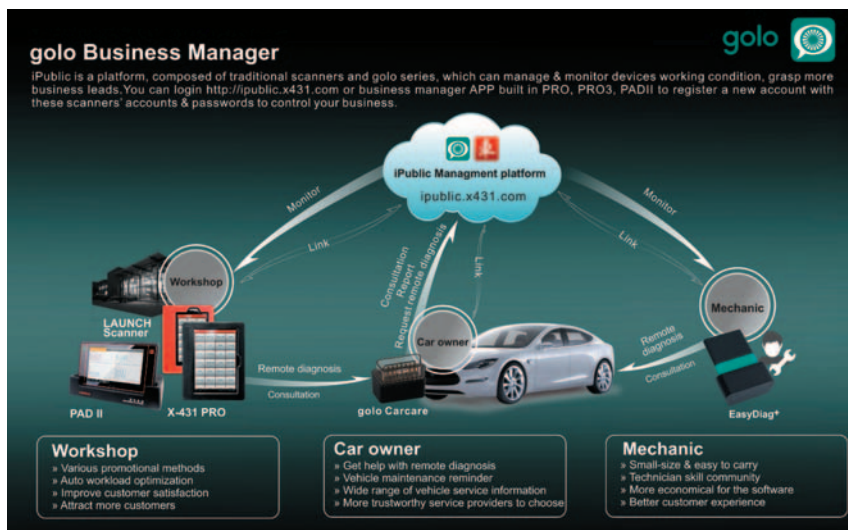
The Golo from Launch Tech USA is a much different concept. This unit doesn't have its own cellular connection. Instead, the adapter connects to the OBD port of the vehicle and then connects to a smartphone (Android or Apple) to send data. The differences, however, don't stop there. Golo isn't really designed as a "do-it-yourself" diagnostic tool. Instead, it provides the ability for a technician to be able to access the vehicle remotely, using the same scan tool they would use if the car was in the shop. This concept provides a great option to support your customers. If a customer of yours with a Golo installed in their car experiences a check engine light, the basic scenario would be:

- Check engine light comes on
- Customer activates the Golo app on their phone
- Customer contacts your shop (which can even be done through the app)
- Your technician connects to the customer's vehicle using a Launch Tech scan tool
- Your technician can read codes, view live data, and even clear codes if needed

This gives shops the ability to assist the customer even if they aren't near your shop. It also gives you the ability to gain more data that can help with scheduling of that vehicle by answering questions such as does the car need to come in right away or can it wait for a few days? Or how much time should you block off of the schedule initially?

An exciting future

With all of the potential benefits of



GOLO ALLOWS remote vehicle access from the Launch Tech scan tool.

telematics, it's easy to forget about the potential downside to these systems. While the OBD port seems perfect for both powering up and providing data to the telematics interface, it's important to remember what the OBD port was designed for — diagnostics. In other words, when anything is plugged into that port, it's entirely possible the vehicle controllers will recognize that and go into a diagnostic mode. That could result in communication differences among onboard controllers due to signal prioritization changes, etc. In fact, General Motors has a Technical Service Bulletin out from several years ago (#08-08-46-004A) related to issues with the OnStar automated reporting if any other devices are left plugged into the OBD port. I would highly recommend utilizing your service information system to research any TSBs such as this before installing or recommending an OBD connector-interfaced unit for any of your customers.

The future of telematics and/or remote diagnostics is certain to be exciting. It's highly likely both OEM and aftermarket solutions will continue to develop with additional functionality. While I don't know exactly where this technology will be in 3-5 years, I

wouldn't be surprised if the onboard system becomes somewhat more "open." That would allow non-OEM applications to significantly expand their functionality. While the OEMs may not like the idea of opening up their systems, I think consumer pressure will overcome that. In the commercial vehicle industry that network openness has been increasing for years (and is continuing to evolve). The network on those vehicles is actually designed to allow the third-party interfaces to connect without negative ramifications (within limits obviously). No matter how much further the systems develop, one thing is almost definite. If you can help your customers leverage a telematics system (OEM or aftermarket) to improve their ownership experience, save time and feel safer driving their vehicles, you'll likely see a gain in your local market share along with increased customer loyalty. *TM*



JEFF MINTER is currently serving as the service director for a group of dealerships in the heavy duty vehicle industry. He is an ASE certified Master/L1/L3/F1 technician with OEM training from numerous manufacturers.

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WHEN IT GOES WRONG

PROGRAMMING MODULES HAS GOTTEN MORE “USER FRIENDLY,” BUT THERE ARE STILL TIMES WHEN THINGS DON’T GO AS PLANNED

G. JERRY TRUGLIA //

Contributing Editor

Sometimes no matter how experienced you are, programming and reprogramming is not just plug and play. There are a few things that rather than making your day will totally break your day. My intention in this article is not to scare you, but rather make you aware of some of the things that you need to know rather than wasting time.

Start with the laptop

Let’s start out with the laptop that you are going to use. Do you know if it’s a 32 or 64 bit? If you’re lost already don’t panic because it’s usually easy enough to figure out. Right click on the Windows start menu at the left lower side of the screen, then a menu will appear; select System by left clicking to see your computer information. The reason that you need to know this is that some companies (such as Jaguar, Land Rover and Range Rover) all need to use a 32-bit processor in order for their SDD (Symptom Driven Diagnostics) scan tool to operate properly. I was asked by one of my students who works on those vehicle lines to set up his new laptop so he could use the SDD scan tool. Since there are functions in an OE tool that aftermarket tools do not have, he would be able to more effectively diagnose and program those vehicles.

In his case, the next step was to proceed to the NASTF.org (National Automotive Service Task Force) website, where I can access all the OEM service

sites from one place. From there, I select the Jaguar website and go to diagnosticdelivery.jlrext.com/idscentral so I can download the latest version of the software. It seemed that all was going well, including the software registering, so all I had to do was follow the screen prompts to complete the SDD install. When everything was completed, I connected the laptop to a Land Rover that I had in the shop but could not communicate with the vehicle. The first thing I did was double check the hardware installation of the Drew Tech Cardaq M interface that I was using as the SDD-approved interface. The Drew Tech software “Tool Box” allows the user to check the connection of the laptop to the Cardaq M hardware as well as checking the connection to the vehicle to ensure that the hardware is functioning properly. There are also helpful videos and other information such as pitfalls on manufacturers installs. So before installing any OE software, be sure to RTFB (Read The Frickin’ Book!) or in this case the computer screen before performing any installs.

After using the Drew Tech software to confirm if the hardware was in fact connected to the laptop and communicated with the OBD II side of the vehicle,



YOU CAN FIND ALL THE INFORMATION RESOURCES you need if you start off at the National Automotive Service Task Force’s website. Do your homework first, especially if it’s your first time.

I was able to rule out the problem with hardware. After reading the hardware requirement as it pertained to the computer carefully on the OE site, I checked the computer information as I described previously. What I found was that the laptop my student had purchased was a 64 bit, which is the more common, rather than the 32 bit required by the Jaguar group. Their computer requirements are the following; minimum PC specs: Intel® Core I5-2520M 2.5GHz processor with Turbo Boost up to 3.2GHz, 4GB SDRAM 1333MHz expandable to 8GB, 320GB (7200 RPM) HD, that must be running IE8 (Internet Explorer) and WIN7, 32Bit for SDD to operate.

I had to reinstall Windows 7 Professional and select 32 bit followed by reinstalling the Drew Tech and SDD software again so I could communicate with the Land Rover. The moral of this story is to be sure to carefully read the computer requirements and know your

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computer specifications before you install any OE software.

When normally OK turns abnormally not OK

My next example is one that recently occurred while I was teaching a reprogramming class. Now, I have been teaching this same class for years, and it usually goes well without any glitches. It was going to be a different story this time since it was the class from hell on the software side. Everything seemed to be going well until we went out to the shop and downloaded the software we needed from the GM website.

Let me explain how the class usually goes: before we get out to the shop I explain the procedure using Power Point slides in the classroom to prepare the techs on what we will be doing in the shop. I always start with GM, since they have been providing programming from the nineties and are one of the most common vehicle lines to program. Normally the process is easy for us in our shop since we use our GM GDS (Global Diagnostic Software) subscription all the time. In the class I want to make the experience as real as possible, so I use a different laptop that has no programing software on it. The laptop I decided to use was a new one that I had purchased a few months ago, so it should

be a breeze. The process should take about 20 minutes, and that includes opening a browser, going to NASTF.org, selecting GM, and paying the \$55 for the 3-day subscription. The proceeding process went fine — in fact, it went very fast on the new Windows 7 Professional, 64 bit, 1T (terabyte) hard drive with 8 gig of memory. So now it's show and tell time, right?

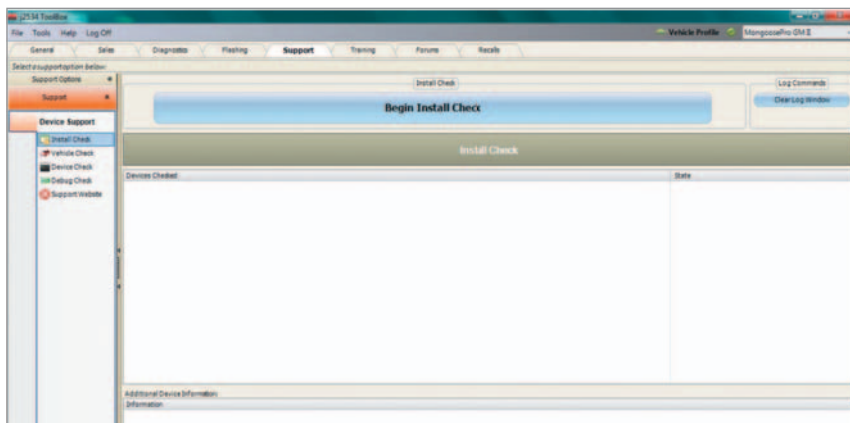
No, not really. I had the techs in the class connect to a GM vehicle that one was driving, but we could not communicate properly. At first I thought it was the vehicle, but before switching vehicles I checked the device and vehicle connection with the Drew Tech Tool Box software. The connection was fine, but we could not communicate. I tried to reinstall the GM software only to have the same non-responsive results. To make a long story short, since I was teaching a class and it was starting to get late, I had to figure out what to do next. In a way, this was a good example of what can go wrong for my students when they try this in their shop. I knew the computer was capable of running different software, since I have the



IT IS IMPORTANT TO CLOSE ANY ANTI-VIRUS SOFTWARE you have on your laptop before attempting to reprogram. You'll also want to make sure that various programs "play nice" with one another if installed on one PC.

Mazda factory software along with the EScan and a few other programs that all work fine on it. It got to the point after switching vehicles that my first thought was to switch laptops, but I decided that this is a good learning moment that we can all get something from.

I called the GM tech hotline and surprisingly someone answered. The lady tech rep asked if she could take control of my laptop and diagnose it remotely. I allowed her access while all 15 of my students and I watched her every move on the big display monitors on the wall that duplicate my laptop screen. The GM tech rep was checking the laptop specifications to make sure that they were correct along with verifying the Java scripts. After a half hour, the tech rep informed me that the problem was going to take about an hour more to straighten out. I decided that I would get the techs back into the classroom and move on with other material that I needed covered. I checked backed in a half hour when it was break time and spoke to the tech rep who informed me that there was some sort of Java conflict that she was trying to correct. What finally resolved the problem was that the tech rep had to remove all the Java scripts and reinstall them since one of them was corrupted during the install. After all that time, we



MANY OEMS ALLOW FOR J2534 REPROGRAMMING of modules related to emissions, and others even allow access to body and chassis modules. The Drew Tech Tool Box helps make any of these jobs easier.

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were ready to connect to the GM vehicle and reprogram it without a glitch. The moral of this nightmare is to make sure that your computer is compatible with the software that you are trying to use. Plan ahead and practice on a good vehicle, leaving enough time before you have to use the laptop and software on a problem vehicle.

The big fear – killing a module

Another problem that you may encounter is bricking an ECM or another computer. I remember years back in a class that I was in where the GM instructor did exactly that. The instructor had everything connected properly, the battery maintainer connected, only one key fob near the vehicle, a good internet connection and a proper connection to the vehicle. It all seemed to be going well as myself and others watched the GM instructor proceed to program the vehicle when it just suddenly stopped. The software had a warning message that it could not proceed. The instructor was surprised, as we all were, that the process had an issue since he had programmed this PCM many times before without a glitch. Unfortunately, the PCM could not be saved even though he followed all the GM recommendations of not shutting the ignition key off and trying to reprogram the PCM again, followed by turning the key off and retrying the procedure. The only way that this Corvette was going to run again was to get another PCM and start from scratch. The next day the PCM arrived, was installed and programmed over and over by all of us in the class without a problem.

One more GM example that I encountered was on a 2000 Chevy Silverado that we were trying to reprogram. The GM software gave us a reprogramming error screen. The first thing GM suggests is to make sure that the interface device (MDI/GM scan tool



WE MAY LIVE IN THE AGE OF WINDOWS 10, but that doesn't mean the OEM model you want to flash does. Be sure to check the OEM's requirements for using their software.

or J2534 device) is properly connected. This is followed by more information on not replacing the control module just yet and making sure the software is correct. GM and other OEs also suggest not turning off the ignition key before retrying the reprogramming procedure again. If that procedure fails, then turn off the ignition and retry once again before replacing the computer. On this Silverado, I reloaded the programming file and retried the procedure, and that time it completed successfully. The next procedure that needed to be performed on this vehicle was using a capable scan tool to relearn the Cam/Crank variation. This procedure requires depressing the park brake, following the scan tool screen prompts to depress the throttle pedal to the floor until the rev limiter is reached and the engine cuts in and out. If completed successfully, the scan tool will display "Cam/Crank synced." With the procedure successfully completed, the vehicle was properly reprogrammed and ready to be shipped.

Software glitches

Moving on to Toyota — using their website's sign up procedure in order to use the factory scan tool function is usually

very easy. In this example, not that easy. So, let's go through the process of signing up and downloading the Toyota Techstream and what I experienced while I was teaching a class. I have downloaded Techstream many times before successfully; this time would be a different story. Once the Techstream software is downloaded you need to register the software. The next step after selecting registration is filling in the Key number that was emailed to you. I copied and pasted as instructed. Next I made sure the registration number was correct and clicked on "Software Registration." I was not done yet, since I needed to click on the Setup tab and select the correct interface. This can be a bit confusing if you are using a laptop that has other interfaces being used on it. I selected the Drew Tech Mongoose cable that can be used for Toyota vehicles. Next you must select "North America" followed by the language, English in my case.

The last important step is making sure you select "Public User," or the Techstream will not work. What happened in the class was that the wrong selection was clicked and the tool would not work. If you follow the information I provided, the process is



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easy; it's when you don't know the procedure that it becomes difficult. The saying "practice makes perfect" applies in this case. If you decide to purchase the yearly subscription or already have the Techstream software installed but it expired, you don't have to go through these steps; the setting will already be set up on the computer. The Toyota Techstream allows the user to program the vehicle very easily by first performing a Health Check and notifying you if an update is available (the section is in red upper right side of the screen).

Inherited issues

We had a Mazda come in from another shop that had already replaced the PCM and could not get the engine to run. Well, it's not rocket science; the reason that the engine would not crank or run was due to the replacement PCM needing to be programmed. When replacing a PCM it's a good idea to keep the old PCM around until you have the new one in and programmed. The other shop thought that this was a plug-and-play process and unplugged the old one and then installed the new PCM, but the engine would still not crank or run. Well, that's not the way it works. In many instances, you need the "build as" information along with the replacement PCM so it can be programmed.

Unfortunately, the other shop had already sent back the old PCM to the part



ONCE THE PROCESS IS STARTED, do NOT let anything interrupt it. Even opening a door in mid-flash can cause problems and certainly allowing the battery voltage to drop below minimum is a no-no.

store, who had sent it back to the PCM remanufacturer. This just made my job that much harder since the built-as information was now gone. I had to look up all the Build As Data from the Motorcraft website in order to program the correct information into the replacement PCM. Mazda's software is made by the same company that makes the Ford, Honda and Jaguar group software, but they all work a bit differently. I proceeded to download the Mazda J2534 software since at that time I had not renewed my Mazda subscription. The process of downloading the software was not that difficult until I selected a user name along with other required normal information. Thinking the software would now be capable of programming the vehicle I was working on, I tried to proceed but was unable to. The software kept returning to the username and password that I selected; apparently, it did not like something. Instead of the username that I had made, it wanted the email address that I used when I registered the software. Once again, it's a matter of being familiar with the OE's process. I had to replace the username from "autoclinic" to the email address in order for the software to work like a charm.

Programming and antivirus software


One last quick tip when programming is to follow all the information provided on the OE website including computer requirements and virus protection. One of my students could not program a vehicle because he had Norton antivirus protection installed on his computer. The OEs recommend that no antivirus or firewall software be installed on the computer that is going to be used for reprogramming. The computer used for reprogramming should not be used to surf the internet; if you have to surf the internet you can install the virus software, but you need to disable it before perform-



ONE ANSWER FOR MANY SHOPS

is the Remote Assist Program offered by Drew Technologies. The kit allows Drew Tech staff to handle the actual programming remotely, freeing you up to focus on other tasks in the shop.

ing any reprogramming procedures. In most cases you can disable the virus and firewall software until start up. If you're not familiar with how to disable the virus and firewall protection, do not proceed to (re) program or you may brick the computer. I use Norton on one of my laptops that has Mazda and GM software on it; I easily disable the protection when I have to program a vehicle. The process is easy — simply go to the lower right side on the screen and locate "Norton," then right click and select "antivirus and firewall." Select "turn off antivirus and firewall until restart." That will allow you to perform a programming function without being interrupted during the process.

Be prepared and practice on a vehicle that you don't have to rush on. Practicing will help you gain confidence and experience in becoming a tech who programs vehicles. You will see it's not that hard! 



G. JERRY TRUGLIA, ASE World Class Triple Master Technician Auto, Truck & School Bus, L1, L3, F1, A9, X1 C1, is president of Technicians Service Training and a

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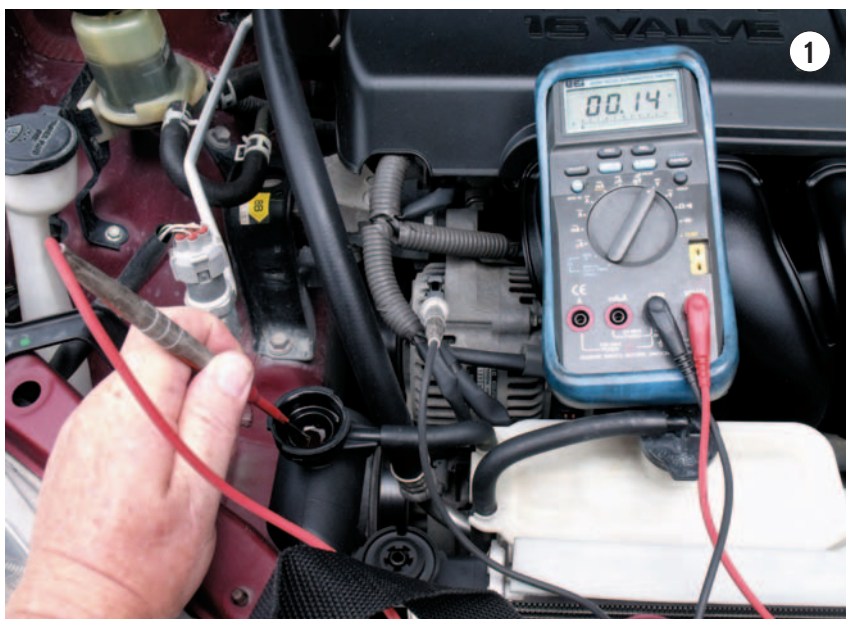
THE MOMENT I'VE BEEN WAITING FOR ALL YEAR IS FINALLY HERE!

PETE MEIER // Technical Editor

We are in the final days before the 2017 NACE Automechanika event, and judging by registration numbers, I expect I'll be seeing a whole lot of you at McCormick Place in Chicago!

And why not — this is truly the only international-class event in the United States that covers both the collision and mechanical repair segments of our industry at a truly grass roots level. The focal point of the exhibits, the special events on the show floor, and the training is on those who have their hands in it every day: the technicians, shop owners and educators. The rapidly changing driver assistance and safety technologies, as well as the advent of telematics and vehicle autonomy, is making the distinction between collision repair and mechanical repair ever more gray. Across the country, shops on both sides of our industry's "fence" are learning they need to partner and work together in order to effectively and properly return their customers' vehicles to life. What better place to celebrate that than NACE Automechanika?

Additionally, we're seeing more interest and involvement from the OEMs and their aftermarket suppliers. Both, after all, have a vested interest in seeing that repairs are done properly. It's a fact that the average consumer often faults the brand, rather than the technician, when a car's issues can't be or aren't corrected after several trips to



THIS IS BY NO MEANS a conclusive test all by itself, but it can quickly point to a cooling system that has problems.

the shop. Not only are they well represented at the Chicago event, they are also growing and expanding their own training programs, and that's just good for everyone involved.

Hopefully, this issue will find its way into your hands before the show has started. Why? Because if you haven't made plans to attend, there's still time! I promise you won't be disappointed by the experience. Now, let's get on to some tips you can use today!

Checking coolant with your DVOM

Did you know you could check the condition of coolant using a Digital Volt-Ohm Meter (DVOM)? You can, but you need to understand what you're actually seeing and why before you condemn the coolant and sell a flush to your customer.

First, have you ever measured the voltage potential in an individual battery cell by sticking your positive meter probe into the electrolyte of one cell and your negative lead in an adjacent cell? The idea here is the same. What we are looking for is a coolant that has become so acidic it is actually turning the cooling system into one gigantic galvanic cell, producing a voltage potential just like the battery cell does.

Here's the technique — attach the meter's ground lead to the negative battery post and then carefully insert the positive probe into the radiator filler neck. Do NOT let the probe touch anything metal; just submerge it in the coolant (as shown in Figure 1). Then read your meter. Anything over 0.30 volts indicates a problem. The next step to take is to use a pH coolant test strip to check

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the acidity of the coolant. If it's excessive, then the voltage is likely a result of the galvanic action I just talked about. Now the question is how did it get so acidic?

Coolant is coolant, for the most part. It's the additives that are a part of the package that tend to deteriorate and that can be seen in the pH test. The additives can drop out due to wear, of course, but other reasons are more common than you may think. The use of contaminated water, electrical current passing through the system, and combustion chamber gasses leaking into the coolant are just a few. So in addition to recommending a thorough flushing and refill of the system, be sure you investigate the underlying cause and correct it as well, or your new coolant fill will only last a short while.

Flush the system with water that meets the same specs as the water you'd use in the 50/50 refill. It makes no sense to flush the system with water that has iron or other minerals in it, now does it? Once your flush and fill is complete, repeat the DVOM test to see if there are any electrical circuits on the car trying to use the cooling system as a path to ground, and correct them as necessary.

Lifetime coolant can last a long time – if everything else is where it should be.



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YOU CAN STILL BUY THIS LOAD TESTER at your local parts house, and you may even have one buried in your toolbox somewhere. The older ones were analog, making their use for this test a little harder.

Before you replace that starter

How many times have you had a customer bring you a “no crank, no start” problem, usually on the back of a wrecker? You push the vehicle in and verify it does, indeed, have a bad starter. You replace it with a quality part but find, to your surprise, that the starter turns over slowly, if at all. What gives?

It could be you're suffering from a bad voltage drop in the starter circuit. Heck, that may have even caused the starter failure! But if you know anything about voltage drop testing, you know that simply loading the cables with a headlight or something is a far cry from the normal loads those cables have to carry — and an insufficient test of their condition. And if you wait to test them until after you've sold the starter? Well, you know how customers love to get that second phone call and your “revised” estimate!

Here's a way of testing the circuit path before you replace anything. All it takes is a DVOM and a load tester, like the one made by OTC (shown in Figure 2). This load tester uses a digital voltage display and is capable of putting a 130-amp load on the cables. That's more like it!

Here's how to perform the test. Attach your DVOM to the battery as you would when you measure its Open Circuit Voltage (OCV). Make sure the battery itself is up to spec before you proceed. Now, activate the MIN/MAX feature of your meter. What we want to record is the minimum voltage your meter “sees” when we put the load on it.

Now, go to the starter motor and carefully place the load tester positive lead on the positive starter cable (disconnect it if you need to — just don't let anything arc to anything else!)

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and the negative tester lead to the starter housing so you can test the entire path between the battery and the starter. Hit the load switch for a second or two and note the voltage reading on the tool's digital display.

Let the vehicle back down and check the MIN voltage your DVOM recorded. The difference between the two readings is the amount of total voltage drop in the cables! If it's excessive, you can isolate which cable is the problem child by attaching the load tester leads directly to the battery (as appropriate).

Two birds, one stone

Doesn't troubleshooting EVAP purge and vent solenoid problems drive you crazy? Electrical failures in most solenoids occur either all out, or only after they've gotten hot. And with pulse width controls on many solenoids, they are constantly being turned on and off. How can I simulate that condition and tell if it's failing?

Use the ammeter function of your DVOM, and use the DVOM as the control for the solenoid. I learned this lesson a few years ago, and it works great. The technique can be applied to nearly any solenoid device.

First, check the method of operation for the solenoid you

DEVELOP A DIAGNOSTIC GAME PLAN

"Diagnostic Strategies," to be presented on July 29, will walk attendees through real-world case studies collected over the past decade by presenter John Anello, owner of Auto Tech on Wheels. They will cover different operating systems of the vehicle and not just on one subject.

The class will give students a wide spectrum of vehicle problems to help them better understand that a good diagnostic game plan can be applied to each and every system by simply knowing and

understanding the foundation of on-board computers. Each case study will provide a strategy of approach to resolve each issue and will be coupled with theory of operation to help the students better understand how a system works when building a plan of attack.

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want to test. Most receive power all the time and are controlled on the ground side. For these circuits, carefully back-probe the ground side of the connector with your meter's positive lead. Be sure that the meter leads are in the proper jacks for making a maximum current measurement, or meter damage will result. Use the meter's ground lead to control the solenoid by momentarily touching it to the battery's ground post. The solenoid will overheat if you leave this connection too long, so only a second or two please.

The solenoid will operate, and your meter will measure the current flow through it. If current is low, you can adjust your meter to a lower scale for more accuracy. Now you can repeatedly operate the solenoid while monitoring current. If it is failing electrically after repeated operation, you'll see it in the meter readings. Do a little math using Ohm's Law, and you can determine the solenoid's resistance for comparison against specifications. For purge/vent solenoids, you can also check for intermittent mechanical failure by checking air flow through them as you turn them on and off. *TM*



PETE MEIER is an ASE certified Master Technician and sponsoring member of iATN. He has over 35 years practical experience as a technician and educator, covering a wide variety of makes and models. His primary goal is to bring working techs the information they need.
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Summer travel season is here and well trained technicians are key to success

ACDelco recommends technicians participate in at least two web-based training courses before travel season is in full swing

The summer travel season is underway and projections already say more people will be hitting the road. And ACDelco, the true original equipment parts brand for General Motors, is recommending shops get their technicians up to speed on the latest training before the bays start filling up.

According to AAA, 80 percent of family travelers are planning a road trip this year, which is up by 10 percent over last year.

And with that increase comes a rise in emergency repairs, as AAA expects to rescue 7 million drivers stranded on the road this summer, with more than 3 million of those individuals requiring a tow to a repair facility.

courses and video tutorials don't require a big time investment. The payoff comes from having a deep bench of well-trained technicians who can work as efficiently as possible from check-in to check-out."

Latner suggests technicians go through at least two online training courses each month. He specifically recommends brushing up on diagnostics skills, as identifying vehicle issues will be critical to keep vehicles moving through the shop.

"It's important to stay up to date on the latest training because today's cars, trucks and crossovers are the most technologically-advanced vehicles ever built," Latner said. "As a trusted partner, we want to make sure technicians and shops



Because of these increases, shops can expect to be running at high capacity for most of the summer, making a well-trained technician staff crucial to managing the wave of repairs needed to get customers back on the road in a timely fashion.

"Over the summer months, many shops will see a rush of customers, including traveling families with car trouble who are anxious to get back on the road," said John Latner, ACDelco technical training manager. "It can be tempting to cut back on training during the summer, but ACDelco's online

have the latest information to give customers the best possible service experience, so we are continually updating and expanding ACDelcotraining.com. We've just added 20 new courses in the past four months alone."

In addition to training, shops should make sure they are stocked up on batteries, A/C compressors and fuel pumps, as this time of year is when many motorists will need replacements for these specific parts due to the summer heat and increased travel.

START(ER) RESEARCHING

“NO STARTS” ARE USUALLY EASY TO ISOLATE AND REPAIR – BUT NOT IN THIS CASE!

BRANDON STECKLER // Contributing Editor

Recently I was asked to meet a kind, older gentleman in our parking lot at the shop. This patient, old man wanted to speak with me regarding his 2008 Chrysler Town and Country. It seems he’s been disappointed with the vehicle, as it has left him stranded several times here of late. I waited patiently as he told me quite a lengthy story regarding the entire history of this quirky failure.

What I managed to extract from him is that, very intermittently, the vehicle fails to start. I asked him what he meant when he says “won’t start.” He made it perfectly clear that when the key was turned to the “START” position, the starter would engage momentarily and quit shortly thereafter. On many occasions, the battle to start the van would be on for well over an hour before the starter would remain engaged long enough to get the engine idling. He summoned me to the parking lot to demonstrate the issue for me. Unfortunately, the issue could not be reproduced, and this was the root cause of his frustration. This van has suffered from this erratic malfunction for well over a year. He informed me that the starter has been replaced twice as well as six ignition keys, two ignition switches and even two batteries! In fact, this malfunction occurred so erratically, any previous repair attempt



AFTER I REPLACED THE TIPM, I ran some basic tests again to make sure all worked as designed.

would seem to fix the vehicle, but a few weeks later, the strange symptom reoccurred to his dismay. I assured him that if I could reproduce the concern while performing a series of tests, I should be able to isolate the malfunction and rectify the issue. Little did I realize how elusive this gremlin was going to be.

Start with a full system scan

I began my investigation with a DTC scan of the entire vehicle. To my surprise, there were absolutely none stored. After many attempts to reproduce the issue, I was disappointed to find that it cranked, started and ran each and every time I turned the ignition key to the “START” position. I inspected the vehicle for aftermarket components with no suspects to condemn. I then chose to re-

search TSBs and search Identifix for any similar failures (I like to go this route, especially when I have issues duplicating a complaint). Unfortunately, there were no offerings for me in either inquiry. What to do next? I never feel comfortable pursuing an electrical issue unless I can reproduce a symptom of some sort, but basic tests like load testing of the battery and starting system are a must, especially in this case. Ruling out what isn’t wrong with the vehicle — early on in the diagnostic process — is just as valuable as finding the cause of the symptom the customer is experiencing. Both the battery and starter circuitry showed no signs of failure or of any contribution to the peculiar malfunction this kind fellow was experiencing for such a long period of time. As the afternoon

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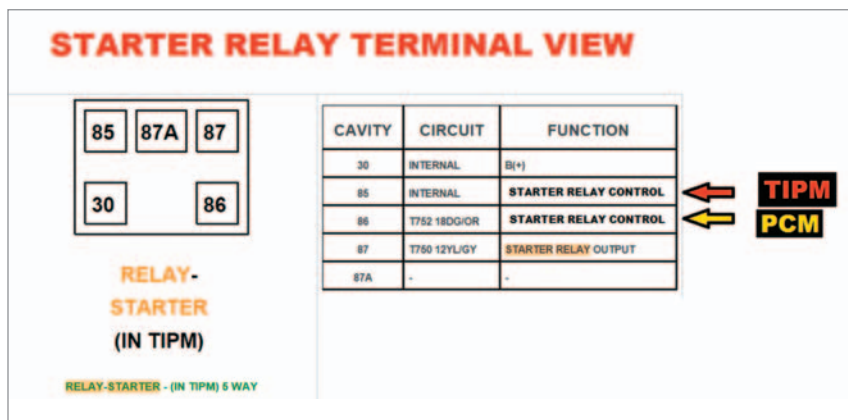
WTI 
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came to a close, the gentleman assured me I could have the vehicle as long as I needed, so long as he could have it back with a confirmed fix. Tomorrow would be another opportunity.

I arrived at the shop Wednesday morning before 7 a.m. Typically, vehicles with issues like the one will be evaluated after the morning rush. I turned the key to remove the vehicle from the workshop and to my surprise, the vehicle cranked for about 500ms before the starter ceased! I returned the key to the “Off” position and reattempted to start. The failure finally showed its ugly face.

Because the issue was so elusive, I thought the best course of action may be to capture the actual fault right at the source (the starter circuit, because it quits working) and work my way out of the hole. Looking at the wiring diagram, it’s easy to see that the starter relay is controlled by both the Totally Integrated Power Module (TIPM) and the PCM. It’s time to do some research. I have to educate myself on the functionality of this starting system as to avoid yet another misdiagnosis. To start troubleshooting at this point may prove to be a premature, costly mistake. It’s easy to feel unproductive if we aren’t hands-on working on the vehicle. Experience will show you that taking the time to devise a game plan and executing it will get you to the cause a lot more efficiently than rushing in without a plan of attack.

The TIPM energizes the starter relay coil by applying voltage to terminal No. 85. The PCM creates a ground path for the starter relay coil by driving the low side at terminal No. 86. Makes perfect sense. Two computers control the starter relay, one at either end, but how do the respective ECUs know what to do and when to do it? Surely, we aren’t done researching yet. We still don’t have enough information to determine the total system functionality. This required research of each



I ALWAYS WANT TO KNOW exactly how a system is supposed to work before I try to figure out why it isn’t working. Here, I learned that there were two modules in charge of the relay.

individual component. Unfortunately, the description/operation of the starting system as a whole was non-existent. Careful research was critical to solve this issue once and for all and without unnecessary part replacement.

Know what’s supposed to happen first

Not being familiar with this ‘08 Town and Country’s total starting system functionality, I had to start researching at the beginning — at the turn of the key. The ignition switch is where I went. After all, I still couldn’t be sure if I was dealing with normal system operation during a security breach. Perhaps it was a “normal characteristic” to cancel starter operation?

As it turns out, the ignition switch is a lot more than just a switch. It’s contained in another node known as a WIN module (or Wireless Ignition Node). This unit not only contains the ignition switch, but also stores info for the tire pressure monitoring system and queries the ignition key for the security system. The WIN has a self-contained ignition switch, which is simply an input to the WIN. When the WIN sees the ignition switch turned to the “Start” position and the key is valid, it will communicate the start “request” on the CAN bus to the TIPM. The TIPM will then output a voltage signal to the

starter relay and simultaneously send a start request on the same CAN bus to the PCM. The PCM will respond and supply a ground path for the starter relay! WOW — that is one busy system!

So now it’s time to build a game plan. I still want to begin my analysis at the high current side of the system (starter relay) where the work is performed. Although some may not agree with my initial test location, I know I experienced the starter energizing momentarily. The method to my madness is to capture what is “disappearing” when the starter ceases its operation. I will, at that time, determine which direction to head in from there. I want simple access to the circuit so I can gain a bunch of info for a small investment of time.

I removed the relay and wrapped the individual terminals with very thin wire. The idea is to allow me to test the relay in its normal location. By leaving the relay in this position, I’ve eliminated the chance of poor terminal contact in the fuse box eluding my capture of the failure.

Now, take a glance at Figure 1 (page 78). The red trace is located at terminal No. 85 of the relay (the TIPM side) and the yellow trace is located at terminal No. 86 of the relay (the PCM side). As you can see, there are three distinct events on either trace. The first displays

Pre- and post-repair scans

The debate that is currently preoccupying the collision industry is pre- and post-repair scans. OEMs have written position statements that state they do not endorse any scan tool that isn't their own because OEMs simply don't have any interest in becoming a validation process for aftermarket tools. So just to be clear, what the OEMs are saying is that they know their own scan tools work, and other tools that license their data may also; however, they aren't the ones to ask if they are capable.

When we talk with our large collision and insurance customers, we talk about three things: 1) cost; 2) extent of coverage; and 3) depth of coverage.

Cost

Cost is always where the aftermarket tools will win. Those in favor of OEM-only tools are skirting the fact that most manufacturers today require multiple scan tools. For example, GM requires a customer to have both the TechWIN for non-Global A and GDS-I for Global A vehicles. Chrysler requires both the WITech and DRBIII emulator. With an aftermarket tool that offers coverage for these makes, it's a one-stop shop.

Extent of coverage

For this, the OEM-only tool supporters have some merit. That argument is that late-model coverage is always a year or less behind the vehicle production for aftermarket tools.

Getting the coverage results from OEMs working with tool makers and ETI. As a tool maker, I am glad to see OEMs are providing their data and in a timely fashion. Those that do have healthy aftermarket tools capable of

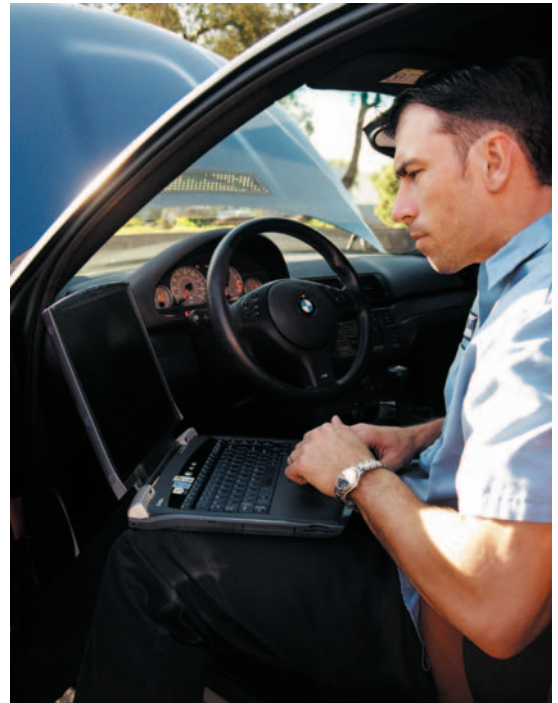
servicing all their customers. At AutoEnginuity, we are starting the next model year the second the models are released. If it's a new car, we are processing the new controllers immediately. If it's a carryover model, then we can validate against last year's coverage. By the spring, we have seen every single model for all car makers and all their respective data stream has been input and checked. We take several months to release because we sell into 85 countries and all those have specific models that need validation, too.

Those making the OEM-only argument for late-model coverage side step the fact that most tools have severely limited year coverage. At the body shops I frequent, the issue isn't last month's model that will stop your production — it's the bulk of cars prior.

Depth of coverage

Aftermarket tools have made huge inroads to being very competitive to the OEM tools. Competition forced all tool makers to do more and sooner; that's a good thing. This is why OEM vs Aftermarket should never end, either.

Our goal is to cover everything that is required for any service — not just what's easy to add. At AutoEnginuity, we do our testing at a body shop that does 100 cars a month. That's enough testing for us to figure out whether we are servicing our customers effectively. What does stop our repair is not the scan tool coverage, but technician knowledge and



equipment. That's the real issue — do you have the specialty tools and training to use scan tools properly?

Solving the argument

What plagues our industry isn't Aftermarket vs OEM. A fully-qualified aftermarket tool can do the work that the OEM tool can in the bulk of the cases. But the relationship between the two is not an adversarial one — it's more of a marriage. We work together to serve our customers more effectively.

What do you call a solution that could do pre- and post-repair scans for vehicles spanning 1994-2016 and is affordable for small and medium-sized shops? AutoEnginuity's Giotto.



a proper crank and start of the engine. I then shut the key off and a few seconds later, I cranked and the engine starts once again, without a hitch. If you look at the traces and imagine what is occurring, keeping in mind our test location and how the system operates, you can clearly see that the TIPM is supplying the voltage (red trace) and the PCM is supplying the ground (yellow trace).

The third attempt looks a bit different. The yellow trace and the red trace have both been interrupted; the ground side of the circuit (yellow trace) has clearly risen/is no longer being pulled low, and the voltage supply-side (red trace) drops off almost simultaneously.

Of course a failure on either side wouldn't promote current flow through the relay coil windings and as a result, the starter would cease to operate. Could this be it? Could the failure be due to a problem on the PCM side of the system? Perhaps, but remember, the PCM only does what it is told to do. It may have a failed driver or perhaps a poor B+/Ign/Ground feed. If that were the case, how do we explain a loss of supply voltage from the TIPM? There is

also a possibility that the TIPM is telling the PCM to stop doing its job, too.

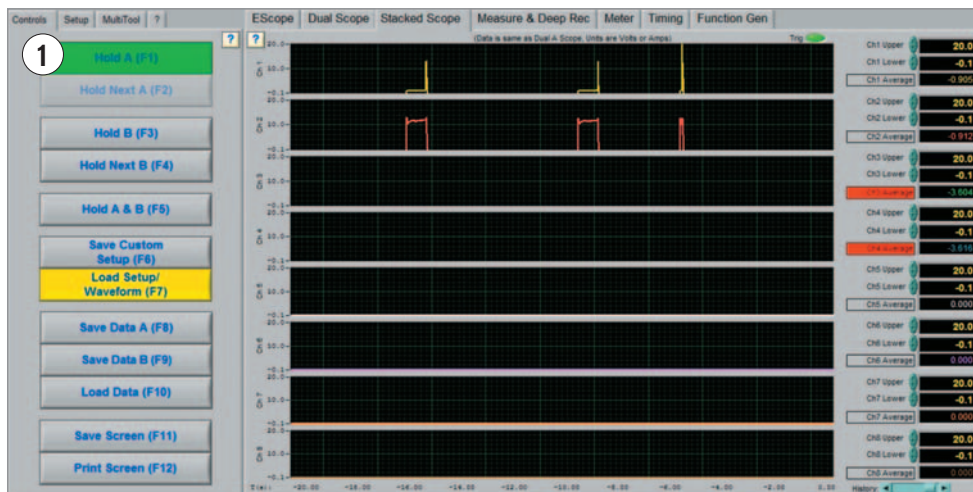
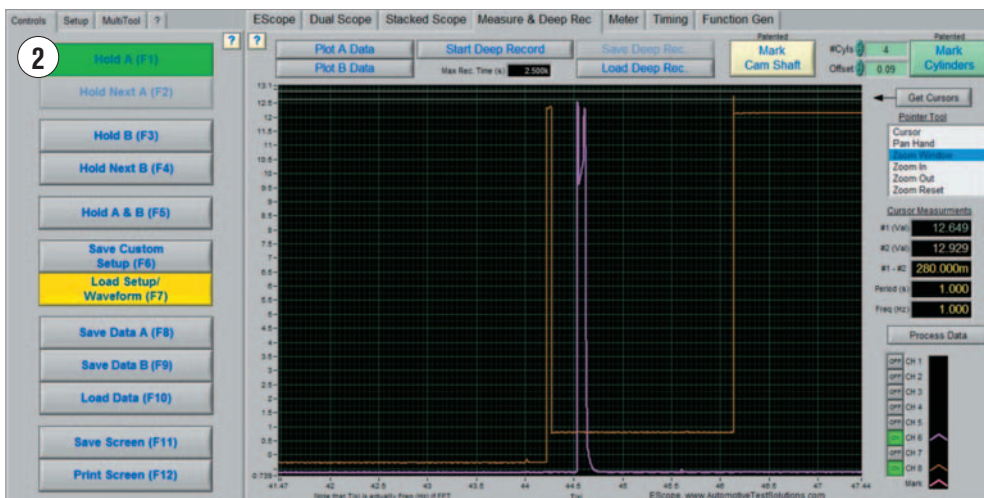
Now I have some ideas on where to look

Now, I have witnessed the failure through the eyes of a 2-trace labscope and have determined that both sides of the circuit seem to be experiencing a failure. It's time to take a step back and do what is easiest. Because we've performed our due diligence and we are aware that this system functions via the CAN bus, I've interfaced my scan tool and selected to watch the TIPM for the request for "Start" from the WIN. During the time the failure was exhibited, the TIPM showed the crank request from the WIN the entire time I held the

key in the "Start" position. Logic is telling me that the WIN is not the cause of the erratic starter operation, because the TIPM never lost the command from the WIN. The PCM, however, may not be receiving the request from the TIPM during the failure. Unfortunately, after many attempts to monitor the PCM PID for crank-request, the failure just wouldn't occur while I was watching (just my luck). I wasn't ready to quit yet, though!

I chose to pinpoint my testing further than just at the relay terminals. I've elected to monitor the entire starter-circuit at multiple points utilizing my 8-trace labscope from Automotive Test Solutions. Some call it overkill but I think *Motor Age* contributor John Anello said it best: "It's like fishing with a net instead of a hook."

I have a lot of time into this diagnosis because the erratic failure is so infrequent. I would hate to have to test different sections of these circuits individually and take the chance of having the failure not show its ugly face when I needed it to most! I want to show you a zoom of the failure-event. In Figure 2, and you'll see the brown trace (PCM) is being pulled low, shortly



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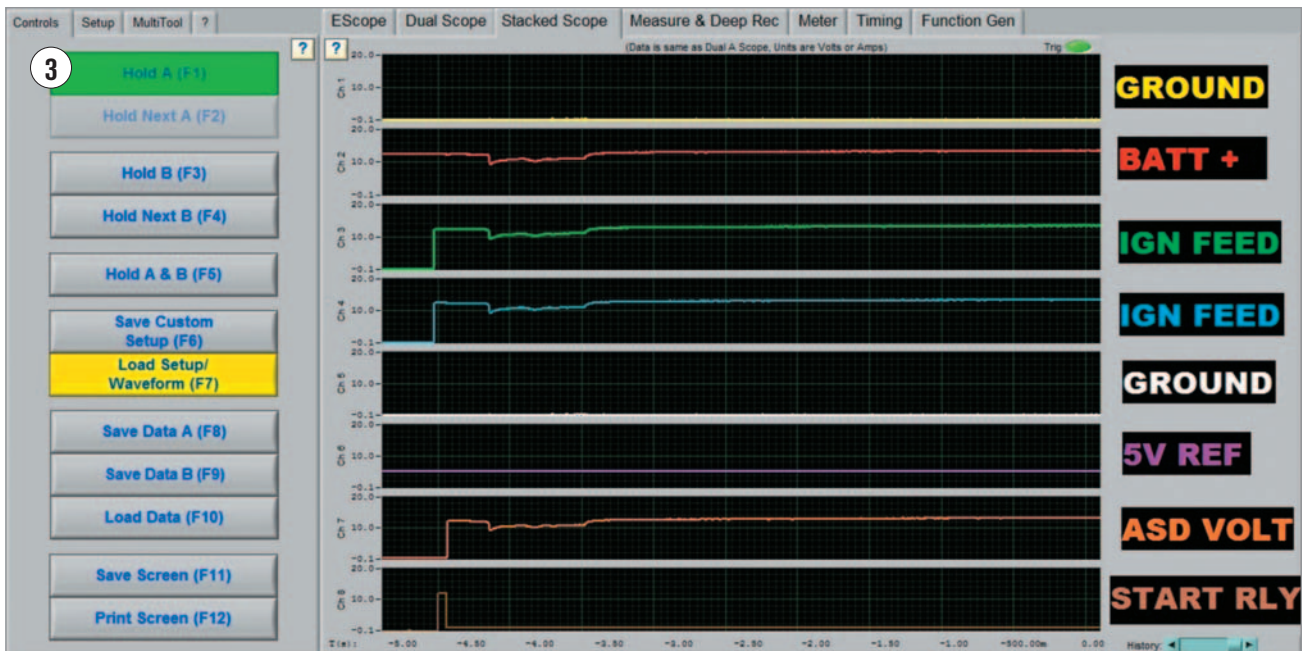


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after key-up, providing the ground path for the starter relay coil. About 250ms later, the purple trace is being driven high (TIPM), supplying the voltage to the relay coil. At that moment, you can see that the starter began to operate by the (CEMF) counter electromotive-force acting upon the circuit. Voltage is hovering around 10 volts (fairly normal to what type of load a typical operating starter places on a battery). As you can see by the time of the scope sweep, this starter operation lasted approximately 100ms before the TIPM ceased to energize the relay. What's more is during this failure event, the PCM remained "low" and continued to do its job. So, in summary, the symptom of the failure remains the same (starter interruption) but the way the circuit failed is different from what we experienced earlier in Figure 1. It certainly appears now that the TIPM may be the cause of the issue.

How can I attribute the TIPM being at fault? A combination of my actual test results and my newly attained knowledge of the system's configuration (the "players" involved in making the starter function). In Figure 1, both

the TIPM and the PCM quit simultaneously. In Figure 2, the PCM remained functional. We know from the research we performed earlier that the TIPM instructs the PCM to function. Knowing that information, it's logical that the PCM quit because the TIPM told it to. On the subsequent failure the TIPM was the only guy to throw in the towel. In both cases, the TIPM is the culprit.

Module Or "PIG?"

Now, before I condemn any computer, I must first check on the "PIGs" (Power/Ignition/ground feeds). That is an abbreviation I used in the past to remind myself that a computer needs all three of these to function, just as I need water, food and oxygen to survive. Figure 3 shows a cranking event during failure, while monitoring the PIGs at the PCM. The PCM has everything it needs to perform its duties. I've just ruled out a supply issue of any kind for the PCM. The TIPM was much easier to test. Because the logic/computer is located inside the TIPM (internal to the fuse box), voltage supply is sourced internally. Ground supply to the TIPM was sourced from five differ-

ent terminals on three of the connectors, none of which lifted when the engine was cranking. A new TIPM was installed and the customer's concern was corrected.

Not all diagnoses are a walk in the park. Some take lots of research and much patience. Most can be deciphered fairly quickly with a combination of proper education, tooling, logic, information and a well carried-out interrogation process. If all of these key ingredients are utilized, there are very few malfunctions that will eat your lunch. I take tough finds like this one with me forever because these are the building blocks to proficiency and efficiency. Jobs like this one remind me why I love what I do so much and why my employer keeps me on the payroll. *ZZ*



BRANDON STECKLER is a technician at Advanced Automotive Diagnostics and Repair in Whiteland, Ind. He holds ASE certifications A1-A9, X1, L1, L2 and L3. He is also a Honda factory

certified master technician and specializes in drivability and diagnostics. theboywonder13@comcast.net

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shop owners have access to information they won't find in any other system. Direct-Hit offers over 1,000,000 confirmed fixes and shortcut tests gathered from real-world technicians through our live Repair Hotline. Direct-Hit delivers genuine OEM information on more than 35 vehicle makes, domestic and imported, and also includes vintage Chilton data back to 1960. Through a single solution, you get quick access to R&R procedures, pin-out and color wiring diagrams, specifications and more so you can finish the job with speed, accuracy and confidence.

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Whether you're considering a shop management system (SMS) for the first time or simply looking to upgrade, Direct-Shop offers small and mid-sized repair shops a cutting-edge solution for managing core business processes. Based in the cloud, Direct-Shop deploys quickly and provides a streamlined set of services so you don't have to pay for extra features you don't need and won't use.

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- GM
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- European
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We are committed to providing our customers with the practical tips and diagnostic information needed to get the job done right the first time. Whether through tradeshow demonstrations, regional REXPPERT events, or customized training clinics, Schaeffler offers in-person technical and diagnostic training to the North American automotive aftermarket through REXPPERT.

Service portals: www.repxpert.us and www.repxpert.mx

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is a user-friendly, modular-based system designed to enable users to quickly and easily locate detailed product information, vehicle system training offerings, proper installation methods, diagnostics, as well as tips/tricks and best practices that will help users improve work efficiencies, reduce bay time and get the job right the first time. The website includes over nine (9) new training courses and more than 75 new diagnostic and installation materials introduced since 2015. Registration is free!

Industry trade shows and customer events

The integration of REXPPERT into the Schaeffler tradeshow and event booth puts increased focus on the service repair facilities and installers. Our technical and product experts conduct training and demonstrations throughout the event. In-booth activities include:

- New innovative products and technology
- General and application specific technical tips
- Hands-on demonstrations
- In-depth technical training
- Failure diagnosis
- Best practices installation education
- Interactive discussions

Training clinics

A standard technical training includes interactive seminars and hands-on demonstrations designed to reduce



bay-time, improve repair processes and increase customer satisfaction.

Schaeffler REXPPERT technical training curriculums are developed for the service professional at both the intermediate and advanced levels. Product and sales training is available for automotive sales teams including distributor, store and jobber sales personnel. Our curriculums focus on providing valuable solutions to real-world tasks to reduce warranty claims, product returns, and repair times.

Training seminars are conducted by experienced ASE-certified mechanics and feature a blend of in-class

training and hands-on demonstrations. Training events are developed with a modular, target

group-oriented structure for custom content adapted to the individual needs of the participants.

For more information about any of our REXPPERT training offerings, please contact our team at 1.800.274.5001.

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Knowledge is power, especially with diagnostics

Let's face it; cars are complicated. Sometimes finding the root cause of a problem can challenge even the most experienced technician.

Is your diagnostic strategy working for you – as quickly and efficiently as you'd like? Having access to good automotive repair information can help significantly, especially when it comes with tips from other automotive professionals.

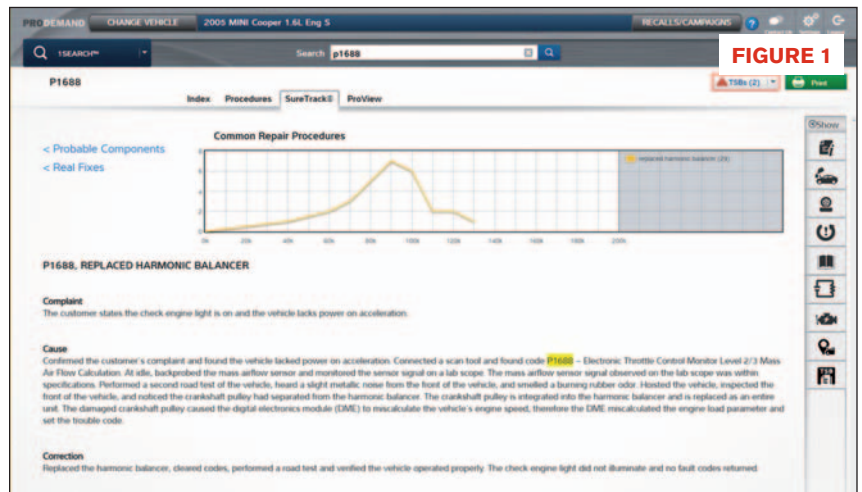
Here are five steps to consider in your diagnostic and repair process:

1. Verify the symptom or complaint and determine if there are any related symptoms
2. Analyze the symptoms
3. Isolate the fault through testing
4. Correct the problem (apply a fix)
5. Check for proper operation

One way to be more efficient is to focus on Step 2. Not every problem is easily solved with OEM information alone. Often it is necessary to ask others, look at forums or search the web. But this can be time consuming, and the information you get may not be reliable. That is why it's important to have an auto information resource that allows you to not only access OEM information but also real-world knowledge from other professional technicians.

There are many tools on the market, but one of the leading and most inclusive automotive software programs is ProDemand from Mitchell 1. In a quick lookup, the software delivers OEM information and real-world fixes based on millions of actual repairs. ProDemand's SureTrack Real Fixes are made up of three parts:

- **Complaint:** The symptom or code that led to the vehicle being brought



into the shop.

- **Cause:** Details the diagnostic analysis and testing that went into solving this problem. This is where all of the specific diagnostics steps and key insights are contained.

- **Correction:** The fix that was applied to the situation. The heading for the Real Fix will also contain the component that was replaced (or cleaned, etc.) to solve the original complaint.

Let's put it all together with this real-world example from ProDemand:

A 2005 MINI Cooper 1.6L S pulls into your shop with the check engine light on. Upon reading the code, you find a P1688 – electronic throttle control monitor level versus mass airflow calculation. The code set condition is because the flow of air going through the Mass Airflow Sensor (MAF) is different from the ECU's perceived engine load. If we look at the OEM data, it leads us to test the MAF Sensor.

Where to start? Well, common sense

and experience might lead you to diagnose the MAF, suspecting a faulty sensor. First, let's take a quick look at the SureTrack data in ProDemand. In the Common Repair Procedures Graph in figure 1, you can see that real experience in the aftermarket shows that the harmonic balancer is much more likely to be the main culprit.

Next, look at the corresponding Real Fix for more specific information about why the harmonic balancer would cause the p1688 in this case. You can see the crankshaft pulley separating from the harmonic balancer was the main culprit, causing the electronics module to miscalculate engine speed and ultimately cause the p1688. You can also see that the Real Fix gives you just the right amount of details to correctly diagnose this condition, but not too much information to bog you down.

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How to Troubleshoot Integrated Brake Controllers

Technological advancements are constantly outpacing diagnostic solutions in the automotive industry causing frustration for shops and customers alike. The Integrated Trailer Brake Controllers (ITBC) now found on virtually all pickups and SUVs with a tow package must detect the presence of a trailer to activate lights and brakes. The purpose of this article is to better explain these new systems and the tools needed to work on them.

When working properly, ITBCs provide a superior towing experience by modulating the power and timing to the trailer brakes based upon inputs from vehicle brake pressure and speed sensors. They also have built-in diagnostics via load detection through the trailer electric brake circuit. If the CORRECT load is sensed, power will be sent to the trailer circuit when the brake pedal is pressed. If there's no load or the wrong load signature is detected, no power is sent or it's removed.

But not all ITBCs are created equal. Each manufacturer has their own process for determining connectivity. Understanding how the various systems work makes all the difference for a successful repair and positive customer experience.

The following are a few examples of useful information for anyone servicing these vehicles.

#1: Several makes of vehicles automatically limit the output gain if the vehicle is parked, regardless of the user input settings. This is indicated when the technician puts the output all the way up, then checks the voltage at the pin and still gets a low voltage reading. This "False Failure" often leads to



REAL-TIME BRAKE FORCE Output Gain and Timing

trucks being mislabeled as faulty due to a false assumption.

#2: Some vehicles run a continuous discovery pulse to the brake circuit to determine brake connection status. This can be both helpful and dangerous. For instance, while driving, if the vehicle detects the trailer is no longer connected, the ITBC could disconnect power to the brakes. The problem may be the truck, pin connection, faulty brake magnet or an intermittent ground loss. It's also important to note that not all makes and models use the same discovery protocol.

#3: Some manufacturers use trailer detection technology on circuits other than the electric brake circuit, such as 12V aux, left/right turn signals, etc. To verify proper operation and troubleshoot problems, you need the right tools to activate these circuits.

With all the differences and lack of suitable tools in the industry, old methods are no longer adequate. A simple resistor, such as an incandescent bulb, can't be used to simulate a trailer connection on most systems. Hanging a brake magnet off the truck or even using a trailer only adds additional uncertainty and potential failure points to the troubleshooting process while providing



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little to no diagnostic value or feedback.

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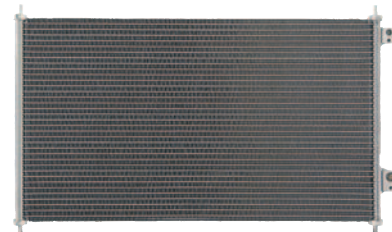
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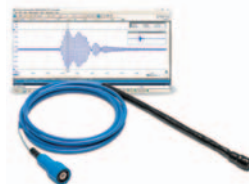
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WHEN TRIMS WON'T TRIM

RETURNING TO OUR DISCUSSION ON FUEL TRIMS – DIAGNOSING SYSTEM LEAN/RICH DTCS

PETE MEIER //

Technical Editor

In the May edition of “The Trainer,” we explored how the Engine Control Module (ECM) maintains fuel control. We also talked a bit about the factors that can cause fuel control to get out of whack.

This month, we focus on what to do when it does get out of whack. System Lean DTCs are among the top 10 Diagnostic Trouble Codes technicians face in the shop and can be a challenge to correct. System

Rich codes, while not quite as common, can often be even more difficult to isolate. It's not hard to understand why the ECM sets these codes. That, of itself, is pretty simple. If Total Fuel Trim numbers exceed a programmed threshold, plus or minus, the ECM will turn on the Check Engine light. It's the reason the trim drops or skyrockets that we have to figure out.

Most of us start by looking at the amount of air getting in and the amount

of fuel being added, don't we? After all, if it's too “lean,” it must be too much air or too little fuel. The opposite is true for a “rich” condition, or so you would think. What if the code is set for only one bank? What then?

The ECM has to know how much air (by weight) is coming in and then calculates the amount of fuel (by weight) to add. It doesn't do this intuitively — it has to be told, either by inputs from a vari-

ety of sensors or by its internal programming. Sensors that are misreporting may make the ECM “think” that the mixture is rich or lean, when it really isn't. Even the software may be incorrect, at least under certain operating conditions, and a reflash may be the fix.

We'll cover all of those variables and talk about efficient ways to check for, and isolate, the REAL cause of these DTCs. Be sure to watch! **TMZ**



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