## MOTOR AGE

**AUGUST 2022** 

VOL. 141, NO. 7

PROFIT MOTIVE
HOW TO INCREASE YOUR

**AVERAGE REPAIR ORDER** 

ESS NOT Capitalize on the fact that EVs will become

more prevalent as time passes. The necessary training can even assist techs working on ICEs.

26 THE HUMAN SIDE OF ROBOT CARS

Whether you calibrate or not, you need to have some degree of ADAS knowledge.

(1) INSTALL AN EV CHARGING STATION

Capture new customers with an EV charging station in your shop.







#### FULL LINE SUPPLIER OF CLIMATE CONTROL COVERAGE

Every new Murray and Import Direct compressor design is put through rigorous durability testing before being approved for production.

- Meets or exceeds OE specifications
- Designed for long life and dependable service
- 100% pressure, vacuum, and submersion tested





### Talk Shop Anytime AUGUST 2022 VOL. 141, NO. 7 //

Talk Shop Anytime f 💆 🛗 in 👩







VEHICLESERVICEPROS.COM

#### **OPERATIONS**

#### PROFIT MOTIVE

#### 10 HOW TO INCREASE YOUR AVERAGE **REPAIR ORDER**

As you build relationships with customers and educate them, you add value...and your profits will naturally increase.

**BRIAN HUNNICUTT** 

#### **GROWING PAINS: SHOP EXPANSION**

If you're looking to expand your shop, there are many factors to first consider.

**RICK WHITE** 

#### 14 MAKE A DECISION TO BREAK FREE FROM **OUTDATED PROCESSES**

The old-school way of running your shop is easier and feels better but doesn't lead to meaningful or lasting change.

**DAVID ROGERS** 













#### TECHNICAL

#### **DIGITAL INSPECTIONS AND WEAR HISTORY**

With the time and mileage that passes between extended service intervals, shops have to be more diligent in inspecting the vehicle. JOHN BURKHAUSER

#### **BIG PICTURE DIAGNOSTICS**

Finding a defective component or seeing a newly installed part should raise the question, 'Why did this go bad?'

**ROY DENNIS RIPPLE** 

#### THE HUMAN SIDE OF ROBOT CARS PART 2

Whether or not the shop has taken the plunge and purchased OEM or quality aftermarket ADAS static (in-shop) calibration equipment, everyone in the business needs to have some degree of ADAS knowledge.

**DAVE HOBBS** 

#### COVER STORY

#### 34 EVS ARE NOT GOING AWAY

Capitalize on the fact that EVs will become more prevalent as time passes. The necessary training can even assist techs working on ICE vehicles.

MICHEAL SMYTH

#### **40** A LOOK AT THERMAL MANAGEMENT IN **ELECTRIC VEHICLES**

R-1234yf is dominating the EV space as the preferred refrigerant for heat pumps.

ADAM KIMMEL

#### **EV CHARGING STATIONS**

Capture new customers with an EV charging station in your shop. TRACY MARTIN

#### IN EVERY ISSUE



#### 4 INDUSTRY NEWS

RIGHT TO REPAIR COURT CASE DELAYED ONCE AGAIN
ADVANCE AUTO PARTS FURTHER EXPANDS INTO WEST WITH
LOS ANGELES STORES

NEW VEHICLE QUALITY HITS ALL-TIME LOW, J.D. POWER STUDY REPORTS

REPAIRIFY ACQUIRES AUTOMOTIVE TRAINING GROUP
AAPEX NOW ACCEPTING NOMINATIONS FOR SERVICE AND
REPAIR AWARDS

U.S. FORD DEALERSHIPS GAIN ACCESS TO NEW HEADSET DIAGNOSTIC TOOL

#### **46** AUTOMOTIVE PRODUCT GUIDE

#### **47** MARKETPLACE

#### 47 AD INDEX



VIDEO

#### DIAGNOSING P0420/ P0430 DTCS

The Catalyst Efficiency DTCs are the most common DTCs techs face in the shop. How do you approach this repair?



Diagnosing P0420/P0430

DTCs - Initial Checks

#### **WEB EXCLUSIVES**





A full day of in-person technical training is coming your way this fall in Rosemont, Ill.,



#### MOTOR AGE

#### VEHICLESERVICEPROS.COM

Endeavor Business Media, LLC 1233 Janesville Avenue, Fort Atkinson, WI 53538. Phone: 920-563-6388

#### **EDITORIAL STAFF**

#### AMANDA SILLIKER

EDITORIAL DIRECTOR asilliker@endeavorb2b.com

#### JAY SICHT

MANAGING EDITOR jsicht@endeavorb2b.com

#### PETE MEIER ASE

DIRECTOR OF TRAINING pmeier@endeavorb2b.com

#### BRANDON STECKLER

TECHNICAL EDITOR bhsteckler@gmail.com

#### RHONDA COUSIN

ART DIRECTOR

#### CONTRIBUTORS

JOHN BURKHAUSER

DAVE HOBBS

**BRIAN HUNNICUTT** 

ADAM KIMMEL

TRACY MARTIN

ROY DENNIS RIPPLE

DAVID ROGERS

MICHEAL SMYTH

PRINTED IN U.S.A.

#### SUBMISSIONS:

Motor Age welcomes unsolicited articles manuscripts, photographs, illustrations and other materials but cannot be held responsible for their safekeeping or return.



MEMBER OF:







#### **ENDEAVOR BUSINESS MEDIA**

CEO - CHRIS FERRELL CRO/CMO - JUNE GRIFFIN COO - PATRICK RAINS

CHIEF ADMINISTRATIVE AND LEGAL OFFICER -

#### TRACY KANE

EVP, TRANSPORTATION — REGGIE LAWRENCE VP, TECHNOLOGY — GLENN SCHEITHAUER VP, ACCOUNTING — ANGELA MITCHELL VP, FINANCE — JESSICA KLUG

VP. DIGITAL BUSINESS DEVELOPMENT -

#### MONIQUE LEIJA

VP, PRODUCTION OPERATIONS —  $\mathbf{CURT}$  PORDES

#### BUSINESS STAFF KYLIE HIRKO

VP/GROUP PUBLISHER

#### MICHAEL WILLINS

BUSINESS DEVELOPMENT DIRECTOR, MOTOR AGE TRAINING

#### LESLIE BROWN

CUSTOMER MARKETING MANAGER

#### SHEILA WARD

PRODUCTION MANAGER

MELISSA MENG

AD SERVICES MANAGER

TRACY SKALLMAN

AUDIENCE DEVELOPMENT MANAGER

#### JILLENE WILLIAMS

SALES COORDINATOR

#### SALES STAFF

#### LISA MEND

Imend@endeavorb2b.com

#### MICHAEL PARRA

mparra@endeavorb2b.com
PAUL ROPSKI

#### propski@endeavorb2b.com

CORTNI JONES

#### cjones@endeavorb2b.com

DIANE BRADEN

#### dbraden@endeavorb2b.com

MATTIE GORMAN mgorman@endeavorb2b.com

#### JAMES HWANG

Inside Sales & Brand Manager, ASE Study Guides jhwang@endeavorb2b.com

#### REPRINT SERVICES

reprints@endeavorb2b.com

#### CUSTOMER SERVICE

Subscription Customer Service MotorAge@omeda.com (877)-382-9187

Motor Age (USPS 925660) (Print ISSN: 1520-9385, Digital ISSN: 1559-2892) is published 10 times per year, by Endeavor Business Media, LLC, 1233 Janesville Avenue, Fort Atkinson, WI 53538. Periodicals postage paid at Fort Atkinson, WI 53538 and additional mailing offices. Subscription prices: U.S. one year, ST7: U.S. two year, 5185; one year Canada, 5117; two year Canada, 5215; one year international, 5117; two year international, 5216, PDSTMASTER. Send address changes to Motor Age, P.O. Box 3257, Northbrook, IL 60065-3257. Please address subscription mail to Motor Age, P.O. Box 3257, Northbrook, IL 60065-3257. Canadian 6.1.5 number: R-742/13133/8T001.

© 2022 Endeavor Business Media All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical including by photocopy, recording, or information storage and retireval without permission in writing from the publisher. Authorization to photocopy items for internal / educational or personal use, or the internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal internal / educational or personal use, or the internal / educational or personal use, or the internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal / educational or personal use of specific clients is granted by Endeavor Business Readia for Internal / educational or personal use of specific clients is written and the internal / educational or personal use of specific clients is written and the internal / educational or personal use of specific clients is written and the internal / educational or personal use of specific clients is written and the internal / educational or personal use of specific clients is written and the internal / educational or p

Endeavor Business Media provides certain customer contact data (such as customers' names, addresses, phone numbers, and e-mail addresses) to third parties who wish to promote relevant products, services, and other opportunities that may be of interest to you. If you do not want Endeavor Business Media to make your contact information available to third parties for marketing purposes, simply call toll-free 877-382-9187 or email MotorAge;Qomeda.com and a customer service representative will assist you in removing your name from Endeavor Business Media's lists.

Motor Age does not verify any claims or other information appearing in any of the advertisements contained in the publication, and cannot take responsibility for any losses or other damages incurred by readers in reliance of such content. While every precaution is taken to ensure the accuracy of the ad index, its correctness cannot be guaranteed, and the publisher waives all responsibility for errors and omissions

AD DEADLINES: Insertion orders-1st of month preceding issue date. Ad materials-5th of month preceding issue date.



## -431 ADAS PRO PLUS UPDATED | FASTER | PRECISE



#### INDUSTRY NEWS



STORE EXPANSION

## ADVANCE AUTO PARTS FURTHER EXPANDS INTO WEST WITH LOS ANGELES STORES

Advance Auto Parts has opened 22 new stores in the Los Angeles market, broadening its strategic expansion into the Western United States, according to a company press release. Advance first announced its plan in spring 2021 to expand into California by leasing 109 Pep Boys stores and converting them to Advance stores, more than half of which are in the Los Angeles area.

"We estimate that 70% of our customers in Los Angeles fit the profile of the classic do-it-yourselfer. Pairing that with the more than 7.6 million registered vehicles in Los Angeles' unique car culture, this is a tremendous opportunity for Advance to bring Care and Speed to motorists through expert advice and best-in-class products and services," said Tom Greco, president and chief executive officer of Advance. "Our timing couldn't be better as the average vehicle age increases while used car and gasoline prices are rising, resulting in greater demand for vehicle maintenance."

Vehicle owners in Los Angeles and other parts of the west will gain access to everything Advance stores offer with Care and Speed, such as free curbside and in-store pickup within 30 minutes of ordering online, as well as some of the most trusted automotive brands

in the world, including DieHard. In response to the emerging popularity of hybrid and electric cars, Advance last month introduced the DieHard EV battery – the first-to-market 12-volt battery designed specifically for hybrid and electric vehicles and sold exclusively at Advance.

Advance will also support local communities and professional industry technicians across California by employing approximately 1,850 team members in the state when all 109 stores are converted, including staffing the company's newly opened 45,000-square-foot "super hub" flagship location, centrally located at 1200 W. Washington Blvd., off the 10 and 110 freeways in the Pico Union neighborhood near downtown Los Angeles.

With a growing need to service the approximate 14 million registered vehicles in California, including an increased number of electric and hybrid vehicles, Advance also brings the ability for professional repair partners to expand their technical knowledge with virtual and in-person training opportunities, available through Carquest Technical Institute and Worldpac Training Institute, which are developed and taught by factory-trained instructors and available to automotive technicians nationwide. ZZ

LEGISLATION



#### RIGHT TO REPAIR COURT CASE DELAYED ONCE AGAIN

The highly-anticipated Massachusetts' Right to Repair court case verdict has been delayed once again, now for the sixth time.

It has been over a year since the initial trial, which took place in June 2021.

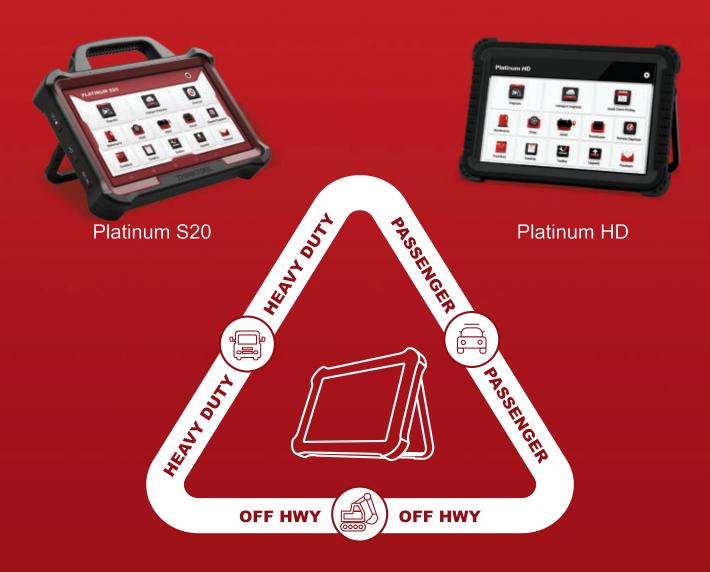
According to a news release from the Auto Care Association, U.S. District Judge Douglas Woodlock cited "the need to consider fully the implications of the long-anticipated decision" and "unforeseen and unforeseeable scheduling complications encountered in the past several weeks coming upon the extended holiday weekend" as the reasons for the delay.

The delay is expected to be short, the release noted.

Massachusetts voters approved the Right to Repair legislation back in November 2020 with an overwhelming 75-25 percent margin. The law would require manufacturers to provide vehicle owners both access and control of the diagnostic and repair data generated by their vehicles.

Shortly after the vote, the Alliance for Automotive Innovation, an organization comprised of automakers, filed an lawsuit to overturn the data access ballot question based on a number of allegations including "cybersecurity concerns, insufficient time to comply with the new data access requirements, and their contention that the ballot initiative is preempted by federal law," said the news release. **ZZ** 

## BIG OR One Tool for All



- Car (OBD I & II), HD & select offhighway coverage
- Online programming (S20 only)
- CAN-FD support
- Full System access
- 35 service resets (28-Platinum HD)
- Bi-directional communication
- ADAS Calibration





Enter to win a signed Richard Petty commemorative Thinkcheck M43

2022 All Petty marks used under license from Petty IP,LLC

SURVEYS

### NEW VEHICLE QUALITY HITS ALL-TIME LOW, J.D. POWER STUDY REPORTS

Disruptions caused by the pandemic led vehicle quality to hit a 36-year low, reported J.D. Power.

According to J.D. Power's 2022 U.S. Initial Quality Study (IQS) that was released this week, the industry experienced an 11 percent increase in problems since last year per 100 vehicles (PP100), which is 18 PP100 worse, resulting in an industry average of 180 PP100. A lower score reflects higher vehicle quality.

The annual study serves as the industry benchmark for new vehicle quality measured at 90 days of ownership. It examines 223 problems, which are organized into nine categories ranging from climate and driving assistance to powertrain and features/controls/displays (FCD).

This year, 84,165 purchasers and lessees of new 2022 model-year vehicles were surveyed.

"Given the many challenges automakers and their dealers had to face in the past year, it's somewhat surprising that initial quality didn't fall even more dramatically," said David Amodeo, director of global automotive at J.D. Power, in a press release from J.D. Power.

Key findings of the 2022 study:

• Both all-new and continuing models increase in problems this year, though all-new models worsen the most.



- Owners of BEVs and PHEVs cite more problems with their vehicles than do owners of vehicles with internal combustion engines.
- Problems with ADAS declined in 2021 but have increased in 2022.
- $\bullet$  Tesla Motors is included in the industry calculation for the first time, with a score of 226 PP100.
- Buick is the highest-ranking brand in overall initial quality. Dodge ranks second and Chevrolet ranks third.
- Among premium brands, Genesis ranks highest, and ranks fourth overall. Lexus ranks second and Cadillac ranks third.

MERGERS AND ACQUISITIONS

#### REPAIRIFY ACQUIRES AUTOMOTIVE TRAINING GROUP

Repairify recently acquired Automotive Training Group (ATG), a technical training company for automotive professionals worldwide.

Backed by technical information and trainer experience, ATG offers both live and virtual highly-technical classes across the states and internationally. "ATG is known across the automotive technical training world for the superior quality of its curriculum and trainers, and we believe they are representative of the excellence we strive for every day," said Cris Hollingsworth, president of Repairify Holdings, Inc. "As we continue our growth trajectory, building out training and development muscle to benefit customers and our large network of technicians will be a key success factor."

'WE ARE CONFIDENT
OUR AUTOMOTIVE
TRAINING EXPERTISE
WILL SIGNIFICANTLY
ADVANCE REPAIRIFY'S
GOAL OF BECOMING A ONESTOP RESOURCE IN THE
AFTERMARKET.'

Founded in 2004, ATG has developed its curriculum with a diagnostic approach, integrating OEM support information with real-world technician experience using actual case studies whenever possible.

"ATG is thrilled to be joining the Re-



pairify family of brands, and we look forward to becoming a global center of excellence," said Tim Flannery, CEO of ATG. "We are confident our automotive training expertise will significantly advance Repairify's goal of becoming a one-stop resource in the aftermarket." **ZZ** 



YOUR REPUTATION RIDES ON TWO THINGS.

## YOUR SKILLS & THE PARTS YOU USE



You need 100% confidence in the parts you install. So go with the parts with the OE pedigree - Continental aftermarket parts. We're OE on tens of millions of vehicles on the road today. That means our aftermarket parts are engineered for perfect fit, form and function. It's a skill very few can match.

Learn more at continental-engineparts.com/na

RECOGNITION

#### AAPEX NOW ACCEPTING NOMINATIONS FOR SERVICE AND REPAIR AWARDS

AAPEX is now accepting nominations for its third annual Service and Repair Awards. The awards recognize and honor service and repair professionals who have gone above and beyond in 2022 and who demonstrate a commitment to training, as well as community, charitable, and industry involvement.

#### The awards include:

- Shop Owner of the Year
- Service Advisor of the Year
- Technician of the Year

Nominations are due by Aug. 31. To submit a nomination, go to bit.ly/3v1C8Bv.

Judging will be conducted by an independent panel of shop owners. The selected recipients will be recognized at



AAPEX during the Keynote Session that will take place on Tuesday, Nov. 1.

#### 2021 award recipients:

- Shop Owner of the year Jamie and Eric Carlson, co-owners of Ervine's Auto Repair and Grand Rapids Hybrid and EV, Grand Rapids, Mich.
- Technician of the Year Matt Fanslow, lead diagnostician and shop manager, Riverside Automotive, Red Wing, Minn.
- Service Advisor of the Year Brittany Schindler, service manager, Rod's Japanese Auto Care, Bellingham, Wash.

AAPEX 2022 will take place Tues., Nov. 1 through Thurs., Nov. 3 at The Venetian Expo in Las Vegas. **Z** 

TECHNOLOGY

#### U.S. FORD DEALERSHIPS GAIN ACCESS TO NEW HEADSET DIAGNOSTIC TOOL

Now making its way to the states, Ford's two-way, handsfree electronic headset, known as See What I See (SWIS), is available to all Ford dealer technicians to help get customers back on the road faster.

Currently being used in Canada, South Africa, UK, Puerto Rico, Taiwan, and Australia, the SWIS is a global program that uses remote viewing technology to allow for both visual and audio communication between the dealership technicians and team members at the Ford Technical Assistance Center (TAC) in Dearborn, Mich.

According to a press release from Ford, the technology uses remote assistance software that allows the technical assistance team to see what the dealership tech is seeing while they work



on the vehicle in real time. SWIS's augmented reality capability allows TAC team members to display modified or enhanced images on the headset for the dealer technicians to view.

"The remote technology is designed to assist the technicians as they're working on vehicles – with the goal of increasing efficiency and decreasing downtime for customers," said David Green, Ford general service equipment program specialist, in the press release. "This technology modernizes and simplifies our operations, benefiting everyone involved."

## 'THE REMOTE TECHNOLOGY IS DESIGNED TO ASSIST THE TECHNICIANS AS THEY'RE WORKING ON VEHICLES – WITH THE GOAL OF INCREASING EFFICIENCY AND DECREASING DOWNTIME FOR CUSTOMERS.'

SWIS is at-present designed for diagnostic assistance. However, Ford is working to expand its services such as for specific use cases (e.g., HVAC concerns), mobile services, remote training opportunities, and more.

So far 1,200 headsets have been activated in the U.S. with reports of over 350 SWIS calls already to TAC in the last 90 days, Ford stated. The company is expecting all U.S.-based dealers to have SWIS by Nov. 2022.

### HARNESS THE POWER

INTRODUCING THE MOST
INTELLIGENT YET AFFORDABLE
DIAGNOSTIC TOOLS EVER UNLEASHED!



#### **OTOFIX IM1**

- KEY PROGRAMMER
- DIAGNOSTICS TABLET
- SERVICE RESETS

#### OTOFIX D1

- BIDIRECTIONAL FUNCTIONALITY
- O DIAGNOSTICS TABLET
- SERVICE RESETS

#### **OTOFIX BT1**

- BATTERY TESTING
- ELECTRICAL SYSTEM ANALYSIS
- DIAGNOSTICS & SERVICE RESETS

OTOFIX

WWW.OTOFIXTECH.US • @OTOFIXTOOLS





### How to increase your average repair order

As you build relationships with customers and educate them, you add value... and your profits will naturally increase.

BY BRIAN HUNNICUTT // Contributing Editor

common question I receive when talking to my auto repair shop owners is why their average repair order is so small. Of course, there are many answers to this question. Understanding how to find the average repair order cost is one step in the right direction. But just like with any business, one of the most important factors in increasing the average repair order for your business is to take good care of your customers.

#### How to find the average repair order cost

So, I asked a shop owner how big the estimated average was and he told me it was below \$750. I knew that we were not asking for enough. If your estimated average is not tall enough, you will never get the

correct average repair order. The rule of thumb is it will cost \$100 for every 10,000 miles until you reach 75,000 miles. Then you include shocks and struts into the mix and the estimated average goes way up from there.

If the average mileage of the vehicle your shop works on is over 100,000 miles, what should the estimated average be? Consider as well shocks, struts, fluid exchanges, filters, belts, hoses, timing belts, spark plugs, balance, alignments, and battery services added to the safety and repairs. At this point, why not stop reading and open a work order and build a maintenance estimate only with the items mentioned above on it. Then, if you have not been recommending these items, you can add the estimated average that you have been running with repair and safety to it. I bet the number will blow your mind.

#### Take care of your customers

If you have not been selling a substantial number of these, then are you taking care of the customer? Are you doing what is right to make their car last as long as it should, or are you starting to act like the dealers? The reason the automotive aftermarket even exists is that some car dealers treated customers badly. They had the wrong mindset. What is your mindset? Are you too busy to take care of the customer? Are you controlling the sales process or being controlled?

There are a few reasons why shops choose not to sell maintenance, but none of these reasons make sense once you investigate. If you Google "Five monkeys in a cage," you will find that the moral to that story is the excuse, "It has always been that way around here." If we are not changing with the times, we

might plateau. So, we might need a new way of thinking.

According to Edmunds.com, the cost per mile on repair and maintenance is about 15 cents, and the cost of an average new car (if you can find one right now) is around 75 cents per mile for the first 75,000 miles. A normal five-yearold used vehicle is around 50 cents. Try doing the math for your customers. It makes selling maintenance a lot easier.

#### How to control the sales process

One of the main reasons we want a bigger average repair order is to keep the tech and writer on the car longer. This means less "churn and burn." But the main reason is to take care of the customer while taking control of the sales process. Let's walk through the sales process with a typical new client:

- Set the appointment
- Meet and greet the customer
- Build a relationship with and educate the customer
- Write them up on the computer
- Do the digital visual inspection or what we used to call the "courtesy check."
- Build the estimate and source the parts
- Call the customer and present the estimate
- · Cash the customer out even if they did not buy anything extra

Time is of the essence when taking control of the sales process. Let's say it takes a technician 30 minutes to complete a digital vehicle inspection (DVI). Done properly, DVIs will take every minute of that time. A tech who works on four cars per day loses two hours per day in productivity time, and the shop did not make any money. So, 10 to 15 hours were wasted in a 40-hour workweek. Then, we must try to make up this time so that the tech's billed hours that we collect money for is at least 90 percent.

#### **Embrace maintenance**

We must find ways to get and keep employees who do not churn and burn cars. We can take care of the customer both externally and internally by embracing maintenance.

What percentage of maintenance do you think your shop is selling as a percent to repairs right now? I started asking this question to shop owners and the average response was 40 to 50 percent. Most people did not even ask what the right percent would be to begin with.

After more research, other people confidently stated 60 percent maintenance to 40 percent repairs. Let me tell you — this is incorrect. These numbers are not proven anywhere, based on anything, nor are they tracked! Most shop owners only track percentages when asked.

The real answer is that it depends on your belief. I want my shops to get 50 percent maintenance compared to repair without the repair going down. Do the math on that one day. Say you are generating \$20,000 per week, and you are only spending 10 percent on maintenance. This is the average that most shops start at once technicians figure out how to track it. Tracking is simple in most systems, with either maintenance as a group or putting the list in as menu items. Don't forget to add oil changes and maintenance to the list.

Let's consider \$20,000 in sales per week with 10 percent maintenance (that's \$18,000 in repairs and \$2,000 in maintenance). So, getting to the "Promised Land" would be 50/50 without going down on repairs. This way, you would gain an additional \$16,000 in sales without needing any more cars - all while the phone rings more often.

**Try This:** \$36,000 in sales divided by the same car count would increase your average repair order by how much?

As long as we build great relationships with and educate our customers, our profits naturally increase because they will feel like we are adding value. So, if you are not going to educate the customers, then don't ask for more money. You don't want to be seen as one of those shops that are just after the money.

Let me leave you with these questions: What takes the most time in your shop's life? Is it anything from the list above? Or is it simply not going after enough or not doing a good enough job which causes us not to make the sale? Z

Get ATI's Exceptional Customer Service Checklist, which helps you own the customer sales process and identify areas for improvement for each customer you serve. To receive your copy, go to www.ationlinetraining. com/2022-06 for a limited time.



#### **BRIAN HUNNICUTT.** CEC, PFP, has been in the automotive industry since 1978 and is an executive

coach for the Automotive

Training Institute (ATI). Often called in as a troubleshooter, Hunnicutt is an innovative thinker with a history of reviving failing stores, consistently breaking sales records and exceeding expectations. He helps auto shop owners effectively apply successful, practical methods and systems, rather than theoretical techniques. ATI's 34 full-time, certified coaches have helped ATI's members earn over \$2.5 billion in return on their coaching investment since ATI was founded.



#### **OPERATIONS**

### **Growing pains**

If you're looking to expand your shop, there are many factors to first consider. BY RICK WHITE // Contributing Editor

he shop has been pretty crazy during the last year and a half or so, hasn't it? You're booked out for three weeks and just can't get another vehicle onto your schedule due to the limited size of your shop. Like a lobster shedding its shell because it's too small, you realize that you've reached the capacity of your current location. Then you have a brilliant idea: you'll expand your shop!

In order to make a well-thought-out decision, let's consider as many factors as possible.

#### The options

Rent a bigger facility: You're renting now and almost finished with your lease, so it makes sense to find a bigger place to rent. Why rent? It could be that you don't have the funds for a down payment or the real estate market is crazy, and it doesn't make sense financially for you to purchase anything right now. All your profit would be going toward the mortgage payment. The pros to renting a bigger facility are it will have a lower investment than buying and it's move-in ready. The cons are you need to find a properly zoned property that isn't too far away from your current location. You could lose upward of 25 percent of your client base, depending on how far away you move.

**Buy a bigger facility:** You currently own your shop but it's just too small. You've ruled out adding on to your current building, so now you're on the hunt for a bigger one. The pros of buying a bigger building are you don't have to deal with a landlord, and it's easier to make improvements. Just like renting, the cons are finding a properly zoned property that isn't too far from your current location.

**Build an addition:** You love where your shop is and you have the room to add onto the building. The pros to an addition are you're staying at your current location, so you won't lose any of your clients. You can also build your addition to your specifications, keeping everyone in the shop happy. The cons are you must deal with your municipality for zoning and permits. We're seeing building costs running between \$80 and \$400 per square foot. You also must put up with the project taking longer than quoted and the price being much higher due to unforeseen circumstances.

**Build a new building:** For some reason, an addition isn't an option. The pros to building your own building are you can build it to meet your needs and specifications. And just like building an addition, the cons are you must deal with your municipality for zoning and permits. You also must put up with the project taking



longer than quoted and the price is much higher due to unforeseen circumstances.

Add a second shift: Finally, you really don't want to go through the expense and inevitable hassles that moving or building entails, so you've made the decision to add a second shift to the business. The pros to adding a second shift are you won't have to move, and your expenses will stay relatively the same. The cons are getting the help to make up the second shift, dealing with parts availability after hours, and storing the extra toolboxes, due to two technicians working in the same bays.

Now that all your options are out in the open, let's talk about some issues you need to deal with before moving forward.

#### The issues

Decision: What's driving your decision to expand? Are you stressed out and overwhelmed? Is the drive to get a bigger facility coming from your emotions? It's important to realize that emotional decisions are always reactions and dangerous. Instead, step out of your emotions and look at your situation logically. Have you maximized your technicians' output? If you're only getting three to five hours billed per tech per day, your energy should be directed toward increasing the productivity and efficiency of your team. If you are not efficient with the space you have, more space won't translate to higher revenue. By improving the output of your team, you could double your business without increasing staffing or the facility.

Cost: If you're renting, you'll need the first month's and last month's rent and security deposit set aside. Then there's the price increase in the rent you'll be paying. A good rule of thumb for what your rent should cost is eight to 10 percent of your target sales minus your advertising. The reason I include advertising in this calculation is that you'll pay more for rent or the purchase of a building on a major road and you won't need to advertise as much. However, choosing a location off the beaten path will be cheaper and you'll need to advertise more. If you'd like a calculator that will show you how much more in sales you must increase to cover the monthly rent or mortgage, go to www.180biz.com/expand and download the Excel spreadsheet.

**Local ordinances:** As we all know, dealing with the local gov-



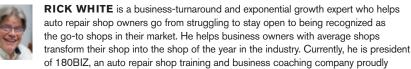


ernment bodies for zoning and other issues can be very trying. I know you've heard of at least one nightmare story of another shop owner dealing with it. If you're in the process of creating your own story, remember to expect the best, don your patience hat, and stay pleasant. You will catch far more flies with sugar than with vinegar.

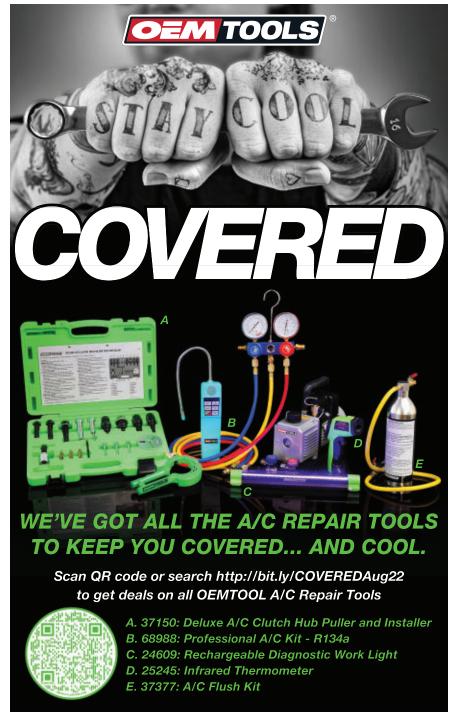
**Profitability:** One of the most dangerous things you can ever do with your business is trying to grow to profitability. This is where you're overstaffed and typically have a facility that's bigger than you need. Your mindset is that you'll grow to profitability. Please hear me! You need to be profitable all the time. Growth does not equal profit. Maximize your profit and then grow.

Help: The last issue I want to bring to your attention is finding and acquiring the proper help to round out your team in the new facility. It doesn't do you any good to expand your facility if you don't have the people who can help you take advantage of the extra space. Line up the help you're going to need to man the new facility before moving forward with the move. When the facility is complete, you will have a team that's trained and ready to make a difference.

Growing the size of your facility can be a very exciting time. Not only will your shop grow, but so will you! Just be sure that the proposed expansion is never a reaction to what you're not getting. That's a recipe for disaster. Instead, first maximize what your team is producing and then look for expansion due to an overabundance of work available for you. **ZZ** 



serving the independent auto and truck repair shop owner since 2006. He has also owned multiple successful auto repair shops over the years. White has taught at some of the biggest conferences in the industry across North America, including classes at AAPEX, VISION, ASTE, ATSE, ASA National, and AASP National. Beyond associations, he has conducted training classes for WorldPac and BG. He has been published many times over the years for multiple automotive repair industry publications. Contact him at rick@180biz.com or visit his website at www.180biz.com.





The old-school way of running your shop is easier and feels better but doesn't lead to meaningful or lasting change.

BY DAVID ROGERS // Contributing Editor

here are around 45,000 fewer service bays than there were five years ago, according to a recent report from Lang Aftermarket iReport, even though there are more cars on the road than ever before.

That means that shops are having to deal with more vehicles per bay at a time when the worsening tech shortage is making it harder than ever to hire a team to service all those vehicles.

It's no wonder that so many shop owners are being forced to work as an employee for the business. If the choice is between turning wrenches or letting customers slip away to your competition because you can't get to them soon enough, the decision is obvious.

#### That's not the choice, though.

More than that, pretending like it's the only choice to be made is playing the victim card. It's making yourself, your family, and your happiness a slave to your circumstances instead of finding what you can control and then getting to work to control those things.

You deserve so much better than that. Your family deserves so much better.

The only way forward is to make your business work for you. You must set aside

the old way of thinking and take control. Once you do, you'll be able to get back to enjoying owning your own shop and being your own boss.

#### Job one is breaking the victim mindset.

The temptation is to say things like "I don't have time to train these people," or "I can't find the help I need; nobody wants to work anymore."

No, the problem is that nobody wants to work for you. There's no point in sugarcoating it. If your team isn't helping you succeed, if your employees don't want to stick with you until you retire, if you're constantly fixing other people's problems to make sure things get done right... The only solution starts with a long, hard look in the mirror.

And if you hate me for saying as much, that's okay! Nobody wants to hear that they need to change, I get that.

But I've worked with thousands of shops and delivered assessments on hundreds of those shops. I'll be as honest and open with you as I am with my coaching and consulting clients: there are a lot of shop owners who are stuck on the idea that the old way is the right way, and they refuse to adopt new technology, embrace new processes and ways of thinking that can help them break free.

The times, as the song goes, they are a changin. Those old ways of measuring shops, of operating, of hiring and paying, of managing, they are rapidly eroding under the weight of today's standards. They do not work in this new post-COVID world. The sooner you leave them behind, the sooner you can get back to making your business work for you.

#### Consider training. How many group training sessions are you making mandatory each week?

There's a reason why I ask. The old way of thinking sees training as a thing you send your employees off to do at a conference or trade show. The new way of thinking understands the power of remote learning — and the whole team learning and growing together. In this one example, we can see the difference between shop owners and managers who want to be successful and those who want to pretend to be successful. Not coincidentally, it's the same breakdown between shops that are growing and shops that are struggling to keep up.

To put a finer point to what I'm saying: the old-school way of running your shop is easier and feels better but doesn't lead to any meaningful or lasting change. If training doesn't disturb your routine and if it makes your employees feel excited but never results in any improvements, then there's no point to it. It is an exercise in feel-good futility.

From this, we can draw a much larger and more critical point: if you're trusting your money, time, and attention to experts and gurus who are telling you what you want to hear, nothing will ever change. You want to know why so many shop owners are working for their business? Here's your answer: they surround themselves with solutions and experts who offer an easy way out — which never changes anything.

And shop owners pay for the chance to remain in these shackles!

But not you. You're ready to stop playing the victim, ready to take control and stop listening to the lie that things have always been like this, and nothing will ever change.

Ready for training that actually leads to improvement? Every time you pick up a wrench, stop and grab everyone who could have been handling that responsibility and bring them with you to learn — the what, how, and why. Doing this every time will help you fix things rapidly.

This applies to everything in your operation! There's no secret conspiracy preventing some shop owners from being successful while lifting others up. It's the constant daily choice to see a problem happening (or even approaching) and taking action to train the team, document the process, and hold everyone accountable.

And for goodness' sake, stop paying people because they make you feel comfortable. Change is uncomfortable! There are times when growth only comes from hard conversations and deep reflection.

#### But there's joy and happiness to be found in change, too!

Change is what's going to allow you to take control of your business so that you solve problems instead of living with them. It's how you empower your team to help you control sales and profits. It's how you get back to owning a business that works

for you instead of the other way around.

The beautiful thing is, it's entirely your choice. You can take control of your shop and your destiny the moment you're ready.

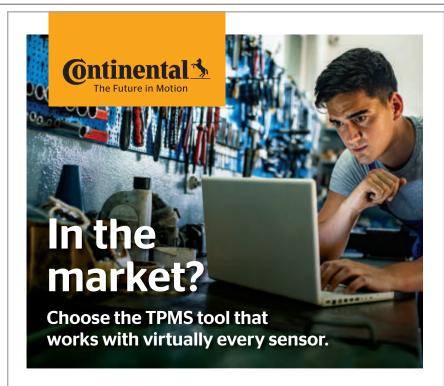
There are no prerequisites or subscriptions, just a decision, made confidently, to improve things for good.

Make that day today. Z



**DAVID ROGERS** is COO of Keller Bros in Littleton, Colo., and president of Auto Profit Masters. If you believe in operating on these principles but you're struggling to operate successfully, you don't have to endure that struggle alone. Rogers' mission in life is to help owners exactly like you find sustainable success and do the right thing for their own shop, employees, and customers.

Reach out to him directly at coaching@autoprofitmasters.com.



Get the ability to perform TPMS service with virtually any OE or aftermarket TPMS sensor along with best-in-class vehicle coverage. Don't settle for a TPMS tool that locks you into one brand of aftermarket sensor. Choose the enhanced features of the Autodiagnos™ TPMS D Tool or the efficient Autodiagnos™ TPMS SE Tool, and get Continental's OE TPMS systems experience.



**Autodiagnos TPMS SE Tool** Full-featured TPMS service.



**Autodiagnos TPMS D Tool**Diagnostics, TPMS service and tire service in one unit.

Learn more: www.AutodiagnosTPMS.com



#### KEEP NEEDED WORK ON TOP OF CUSTOMERS' MINDS

WITH THE TIME AND MILEAGE THAT PASSES BETWEEN EXTENDED SERVICE INTERVALS, SHOPS HAVE TO BE MORE DILIGENT IN INSPECTING THE VEHICLE.

BY JOHN BURKHAUSER // Contributing Editor

hen I started in the field in the early 1980s, vehicles needed to be serviced basically every three months or 3,000 miles. These regular visits to the shop kept the vehicle care at the forefront of the driver's consciousness. They also resulted in vehicle wear items being monitored and regularly reported on a few times each year.

With today's vehicles using sealed batteries and cooling systems, fuel injection, and other advances, they may be legitimately seen only once a year, though recent statistics also show that Americans drive an average of 14,000 miles a year. Based on this and some standard OEM recommendations, this may possibly bring a vehicle into a shop twice a year to be checked.

These extended intervals present both customers and shops with a number of challenges. For customers, out of sight means out of mind. Trying to remember to get their oil changed maybe once or twice a year is not something that they're constantly thinking about, let alone are they thinking about other items such as brakes and tires that are wearing all along at the same time. So, what happens is that drivers get a rude reminder that service is due in the form of a reminder from a

maintenance light going on or hearing the grinding of the brakes every time they come to a stop.

For shops, these extended intervals make it more important to have a notification system in place that automatically reminds busy customers, via text message, that they have a service coming due soon. And with the time and mileage that passes between each service, shops have to be more diligent in performing the required work and inspecting the vehicle. Documenting the vehicle's condition during inspection is now a must to help prevent possible liability in the future.

Using digital inspections to document the vehicle's condition every time it's in will help solve many of the concerns listed above. Digital inspections take documentation a step further with the use of pictures and videos that show the condition of an item when it was inspected. Many digital inspections also allow a technician to mark up pictures, further defining exactly what they found. Videos can be used to document movement on items that should otherwise be tight, such as ball joints. Sound in the videos can also be used to document unusual noises like a belt squeak found during inspection.

Once the inspection is completed by the technician and then edited by the



MEASURE TIRES ACROSS THE TREAD and write the measurement in 32nds in chalk on the tread. Each subsequent inspection will show the number(s) going down, counting down till "retirement."

advisor for grammar and clarity, it then should be sent to the customer via text or email, whichever the customer prefers. Many inspection programs will send a message back to the shop when the customer opens the inspection. This allows the advisor to set aside time to reach out to the customer and discuss what was found on the vehicle.

When received, the customer just taps on a link on his or her digital device, and the inspection opens. The inspection is made up of a series of points, and each point may represent a vehicle system or a specific part of the vehicle.

Points provide four critical pieces of information about the item that was checked. First, there is a *Note*. This describes the condition that was found, whether the item is good or needs to be addressed. Next, there's a *Recommendation*, which is where the technician tells the driver what is needed to address the found issue. On many digital inspections, both of these items may have canned descriptions that the tech just taps on, selects, and enters. In many cases, the technician can also use speech-to-text to enter what he or she found.

The color swatch on each point indicates the urgency of what was found:

Green means good

#### TECHNICAL

**DIGITAL INSPECTIONS TAKE DOCUMENTATION** a step further with the use of pictures and videos that show exactly what the condition of an item was when it was inspected.

- Yellow means caution, and the issue should be addressed soon, since it is not safety-related.
- Red indicates the item has completely failed or is safety-related and must be addressed immediately.

The last part of the point is the picture or video illustrates what has been described by the three other parts of the point. Pictures should be taken so customers understand what is being indicated. Being able to mark up pictures makes it even easier for them to see the "why".

With all this information, the inspections can be used to build what is called a "wear history." A wear history will show how an item is wearing over a number of different inspections. For example, tires are measured across the tread with the reading written in chalk right on that tread. If the reading was 8/32 or 8mm, the number 8 would be written on the tread. Each inspection after that will show the number going down. Basically, the photo counts down till it's time for "retirement".

For the wear history to be effective, it requires the customer to return for regular service and inspections. This benefits the shop by getting that customer to return. Returning customers purchase more. And with the wear history in place, customers are more prepared for upcoming work that is due, so they will be more likely to get it done.

Any recommendations that are the result of the current inspection can automatically be put on the current invoice as reminders for the customer to know when he or she will need to get them done in the future. Additionally, some inspection software can even set the next appointment and schedule an automatic reminder text message to get those customers back in when it's time.

Over time, if a customer were to ask any questions about some service that's due, the shop will be able to pull up all the previous inspections and show the customer exactly how the wear occurred. Because of this transparency and flexibility, digital inspections build customer trust **ZZ** 



**JOHN BURKHAUSER** is an auto repair specialist with over 30 years of experience. He has expertise ranging from A Level and ASE Certified Master Technician to shop foreman, advisor and shop manager, to automotive trade school instructor and writer. Currently, he is the director of

education at BOLT ON TECHNOLOGY, where he coaches independent and franchise repair facilities on how to grow their business using simple best practices and everyday technology, resulting in increased car count, repair order revenue, and customer trust.





Built on our pioneering technology and OE expertise, our full-service aftermarket fuel solution offers premium parts, leading vehicle coverage, training and technical support, to help ensure vehicles drive cleaner, better and further right through their lives.





Delphi Technologies is a brand of BorgWarner Inc.



## BIG PICTURE DIAGNOSTICS

FINDING A DEFECTIVE COMPONENT OR SEEING A NEWLY INSTALLED PART SHOULD RAISE THE QUESTION, 'WHY DID THIS GO BAD?'

BY ROY DENNIS RIPPLE // Contributing Editor

n automobile is a compilation of many systems that work together to make a single get-up-and-go and stop-when-you-need-to vehicle. It's almost biological. In the same way the nervous system depends on the cardiovascular system, and the cardiovascular system is useless without the respiratory system, the drivetrain depends on the engine, and the engine is useless without the fuel delivery system. When a system includes several different components, each component relies on the others. Every vehicle is different, even when they're the same make and model year, and they need to be treated accordingly. A 2010 F150 with 150.000 miles used on construction sites is a different truck than a 2010 F150 with 60,000 miles that carries home groceries every Sunday.

#### Seeing the big picture

"Big Picture Diagnosis" is the practice of scrutinizing the vehicle, taking in what it is. *It's not just make, model, and year, but condition, use, and abuse*. Finding a defective component

or seeing a newly installed part should raise the question, "Why did this go bad?" A new bumper bracket could mean a crash. One new tire or wheel might mean a curb-hit or an encounter with a pothole. High-flow exhaust or an aftermarket air intake system is a good sign that a performance tune may have been installed in the engine control module. Every vehicle has a history to reveal, from the rubber remnants of past burnouts on the quarter panel to uneven front tire wear on a pickup suggesting payload overload. Factors like rust, usage, and maintenance schedule determine the plan of attack when diagnosing and servicing a vehicle. Familiarizing yourself with the entire vehicle aids with the diagnosis and helps find the factors that could prevent your repair from coming back.

Finding the failed part is rarely the end of the diagnosis. That broken rear stabilizer link may be the cause of the customer's complaint, but if you don't replace those leaking, rebounding rear shocks, your repair might have a short shelf life. Sometimes, the component causing all the racket isn't defective at all; it's only reacting to an actual failure.

A noisy variable cam timing actuator could result from a lack of oil supply to the solenoid. The lack of oil supply could be due to a blockage, and the blockage might be pieces of filter media detached from a cheap oil filter. The root cause of failure: oil filter. I watched this scenario play out; it wasn't pretty.

Besides looking deeply into the diagnosis to verify the cause of the failure, we also need to notice those things that could mimic the symptom we repaired or create an "ever since you worked on my car" situation. This article consists of automotive service scenarios that happened. Every story is true and demonstrates the importance of looking past the obvious and seeing the big picture.

#### Lincoln coolant leak

A Lincoln come into our shop with an overheating concern and small green antifreeze drops on the customer's driveway. The coolant was almost empty, and the technician found a leaking heater hose at the rear of the engine. He completed the repair, checked for engine damage (from the overheating), and shipped the job. The next day, the

## RAPID INSTALL WITH RAPID FIT®

WATER PUMPS

#### Zinc Coated, Axirad®\*-held Mounting Bolts

- · Ready to install, similar to OE assembly line
- · Zinc coating for superior corrosion resistance

#### Weep Reservoir -

- Large reservoir for naturally occurring coolant seepage
- Prevents coolant "spots" and engine odors

#### Premium Seal -

- Latest OE grade seal technology
- Premium seal ensures maximum sealing and durability

# n resistance

#### THE CARTER DIFFERENCE



Limited lifetime warranty to provide peace of mind





#### Polished Housing -

- · Enhances original pump look
- · Removes any casting burrs and edges

#### High Heat Mounting Gasket -

- Mounted to casting for no-fuss installation
- · Hi-temp gasket or silicon material

#### OE Matched Impeller -

- Impeller design and material matches OE
- Ensures proper coolant flow for all driving conditions



**ALWAYS NEW, NEVER RE-MANUFACTURED** 



\*Axi-Rad® is a GM patented thermoplastic retainer manufactured by Forest City Technologies.



#### TECHNICAL

customer returned, claiming that she still saw green drops in her driveway. My first thought was residual antifreeze left over from the repair. I gave the keys to the tech and asked him to check it out. The refrigerant leak detection dye is green. Enough said. This repeat repair was only a repeat repair because the technician serviced a system (in this case, the cooling system), rather than the entire vehicle (**Figure 1**).

#### It's not the brakes, but it's broke

Here's another example of constricted vision causing unrestricted customer dissatisfaction. A vehicle pulled into our service drive with an unmistakable, strong, burning brake smell. The repair order said, "Customer states that he smells something burning." The technician replaced the sticking right front caliper, right front rotor, and front brake

pads. Two days later, the customer returned, claiming that he still smelled something burning. I drove the vehicle, and there was an obvious oil-burning smell at idle.

Further investigation revealed that the all-wheel-drive power takeoff unit was dumping oil all over the exhaust pipe behind the catalytic converter (Figure 2). Ask this question: "What else could cause a symptom similar to the concern I'm repairing?" In this case, the two components are in entirely different systems and have very little in common. Yet to the customer, a burning smell is a burning smell.

New parts on a vehicle always have a story to tell, especially if the previous repair is related to the concern you're diagnosing. New coils and spark plugs most likely mean that someone was trying to fix a misfire. EGR valves and MAF sensors seem to be popular parts fired from the diag-cannon when the do-it-vourselfer takes a shot at the repair. The average person doesn't understand the importance of using good quality parts, and there are a lot of bad parts out there. Don't assume that because a part is new, it's functioning correctly. You can save yourself a lot of time by scrutinizing the last person's repair.



LEAKAGE FROM A PTU that caused a burning smell from the exhaust system after the technician repaired a burning smell from the brakes.

**LEAKING REFRIG-**

for antifreeze and the

technician missed dur-

ing his cooling system

diagnosis.

**ERANT DYE** that the customer mistook





# ARTS .com Master Engine Rebuild Kit

For application listings with part numbers, please refer to our online catalog



\*FREE NEXT-DAY DELIVERY on orders over \$75. Orders placed Monday-Friday (excluding holidays) before 3pm local time. U.S. territories Only.

www.partsology.com



#### Exploring the Ford Explorer's lack of heat

A 4.0L Ford Explorer came into our shop with no heat. The engine wasn't reaching operating temperature, and the coolant level was full, with no leaks. The technician suggested replacing the thermostat. While looking around under the hood, we saw new hardware attaching the upper thermostat housing to the lower thermostat housing (Figure 3). So, now it's reasonable to assume that someone either replaced the thermostat or left it out entirely. Since we knew that the cooling system had been opened, there was also a very good possibility that the lack of heat was due to air intrusion. We decided to vacuum-bleed the cooling system before proceeding with further diagnosis. The coolant level dropped about a pint after bleeding the system. The engine reached operating temperature, and the heat worked fine. The new hardware on the thermostat housing was our clue to suspect an air pocket, saving an unnecessary thermostat replacement. Sometimes, it's not the things you find that are causing problems today, but it's the "okay today, bite you in the wallet tomorrow" things that make it worth the time to look just a little bit harder.

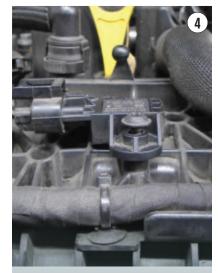
#### Fixing a 'comeback' before it ever left

Our technician diagnosed a canister vent valve as the cause of a P0455 ("EVAP large leak"), which illuminated the check engine light. It was a good diagnosis. After replacing the part, the EVAP system passed the performance test with flying colors. While giving the engine compartment one more quick look-over and before installing the engine cover, he found that the MAP sensor hold-down bolt was backed out of the intake manifold about halfway (Figure 4). The sensor was still sitting flush on the manifold, but probably not for long, especially since it was a turbocharged engine. It would have taken only a tiny amount of air to bypass the MAP sensor for the check engine light to pop on with a "system lean" DTC. The customer doesn't know EVAP from MAP and doesn't care. The check engine light coming back on is all that matters.

#### A misfire's missed opportunity

Another example of "finding it now or finding it later" is a 4-cylinder Ford Escape that received a new torque converter (due to an intermittent shudder when accelerating at highway speeds). When engine load and throt-

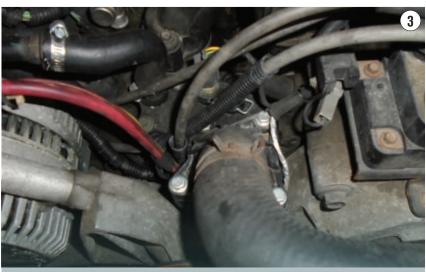
tle position were just right, the torque converter clutch would slip, causing a vibration. After the technician performed the repair, I road-tested the vehicle and found the shudder was gone. After a post-repair road test, I always open the hood and poke around. I found a puddle of new engine oil in the valve cover valley alongside the ignition coils (**Figure 5**). The oil came straight from the filler and was spilled



**THE MAP SENSOR HOLD-DOWN SCREW** was backed out far enough to cause the check engine light to illuminate soon.



**ENGINE OIL SPILLED** on the valve cover, possibly entering the spark plugs wells, causing a misfire.



**NEW HARDWARE** indicating that the cooling system had been opened during a previous repair attempt, suggesting that the cooling system could be air-bound.



during a recent oil change. It was impossible to tell how much oil had gotten into #3 and #4 spark plug wells without removing the coils. We've all seen how a spark plug well full of motor oil can turn coil boots to mush, causing a misfire. We also know how similar a misfire can feel to a torque converter shudder when accelerating on the highway. It's all about customer perception. When seeing the big picture, it's important to question what you see. Clues are everywhere if you see them for what they are.

#### Short circuits can lead to long days

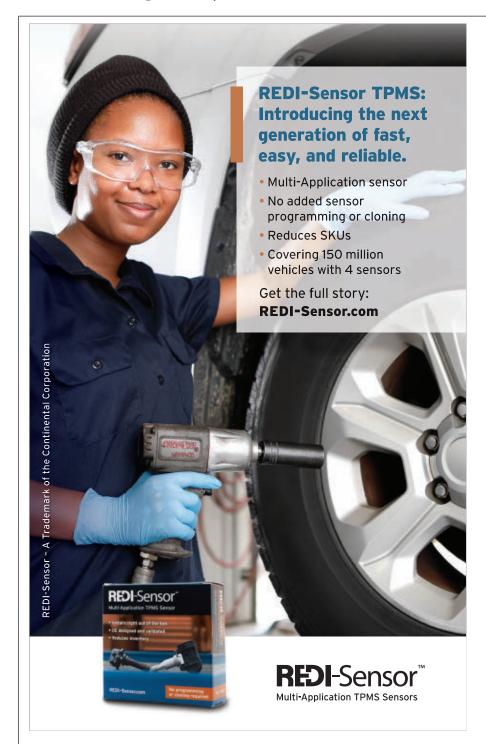
I was handed a 2017 Ford Explorer that was blowing the interior lamp fuse. Cargo lamps, courtesy lamps, glove box lamps, puddle lamps, vanity mirrors, and other illuminated components were on that same fused circuit. After checking the obvious and easily accessible, I noticed in the wir-

THIS GLASS WAS FOUND under the

right-side rocker interior trim panel, indicating that at one time, the passenger window had been broken.

ing schematic that part of the harness ran under the right-side rocker panel interior trim. The area under a rocker panel trim is commonplace for a wire rub-through to ground. The area tends to ingest water from doors open during a rainstorm, and the constant foot traffic isn't very healthy for a wire harness. So, if the harness goes that way, I always check it. What I found under the rocker trim was broken glass, the kind of glass you'd expect to find if the passenger window had been broken (Figure 6).

A busted-out door window could mean water inside the door. The harness for the right-side puddle lamp (which is on the shorted circuit), runs





through the door, so I removed the right front door panel. The circuit splice was corroded and leaning against the window track, creating a short to the ground. If I had ignored the glass, I could have spent an entire day, or more, trying to find the short to ground. Don't ignore the clues. Just another example of why it's essential to ask, "Why did this go bad?"

#### An unclosed door reveals an open opportunity

A Lincoln SUV came into the shop with a rattle in the rear over bumps. It didn't take much of a road test to realize that the rattle was coming from the liftgate. Further inspection revealed that the liftgate wasn't properly closing. The gaps on the sides of the liftgate showed that the liftgate was out of adjustment. The liftgate opened and closed smoothly, and the hinges were tight. The workshop manual showed that the liftgate hinges are adjustable. But why would a liftgate lose its adjustment, especially when the hinges are in good condition?

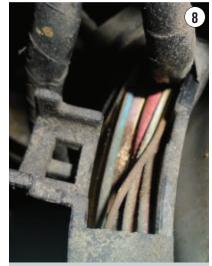
We put the vehicle up on the lift and found that the right rear corner of the body (behind the bumper) was crunched (**Figure 7**). There was a hole in the body at a seam. The damage twisted that section of the unibody just enough to tweak the liftgate position without causing any visible damage on the outside of the vehicle. We sent it to the body shop.

#### A silent killer

Here's something else to look for. When diagnosing or repairing an electrical concern, check the battery for leakage and battery terminals for corrosion. Battery acid is a silent killer. A slowly leaking battery will destroy any wires that dare be in its path (Figure 8). The wire repair you performed today on the right rear of the vehicle could go bad tomorrow due to battery acid leaking in the left front of the engine compartment. If you see a dirty, leaking, corroded battery (or terminal), make that repair a part of your entire electrical repair. Clean the area under the battery before rogue electrolyte fouls up your repair.

These real-life scenarios are likely nothing you haven't already seen. I teach all the young techs who are just starting in the business the concept of "Big Picture Diagnosis." The mantra of the automotive technician should be "check, check, and triple-check."

Every diagnosis of a faulty component or a shorted circuit should be immediately followed up with the question, "Why did this go bad?" Every part in every system links up



**NOTICE THE CORROSION** on the wire caused by battery acid from a corroded battery terminal. Also, notice the splatter of corrosion on the surrounding area.

with every other part in every other system, somewhere down the line. When an obstructed catalytic converter causes a hard brake pedal (due to a loss of engine vacuum), or when a leaking heater hose causes an engine to misfire (because it's leaking onto an ignition coil), a system is affected by the interference of a seemingly unrelated system. Look past the obvious and learn from it all.

E-mail me your big-picture diagnosis stories. Maybe your experience can save me a headache somewhere down the road. Learning from our own mistakes is good; learning from someone else's mistakes is even better. Keep your eyes open, and always ask, "Why did this go bad?" **Z** 



**DAMAGE UNDER THE RIGHT REAR** of a Lincoln SUV causing the liftgate to be out of alignment.



#### **ROY DENNIS RIPPLE** is a Ford Senior Master

Technician and an ASE Master Technician with more than 30 years' experience in

the automotive industry. As an automotive journalist, he is the recipient of a 2020 Azbees Award and a 2020 Tabbies Award. Ripple is currently working full-time as the shop foreman at a Ford dealership. He lives in New Jersey with his wife, three dogs, and two motorcycles. He can be reached at ripkrypton@gmail.com.

## FEEL THE CHILL

CONTROL YOUR CLIMATE. JUST ADD WATER.™







**Energy Efficient Warehouse Cooling** 



26°F Cooling\*



Easy-to-use Control Panel



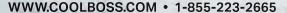
Large Cooling Area



Auto-refill

At Cool Boss, we focus on innovations that deliver incredible comfort and value. Every one of our COOLBREEZE™ and COOLBLAST™ evaporative coolers use tap water to instantly chill areas at a fraction of the cost of traditional air-cooling methods. Just plug them into a standard wall outlet, fill them with water, and instantly lower the surrounding temperature by as much as 26 degrees. It's that simple!

Learn more at COOLBOSS.COM or call 1-855-2BE-COOL



©2022 BendPak Inc. All rights reserved. BendPak® is a registered trademark, \*Your specific location may require a combination of multiple models and/or sizes to provide the most effective cooling experience.





## THE HUMAN SIDE OF ROBOT CARS-PART 2

WHETHER OR NOT THE SHOP HAS TAKEN THE PLUNGE AND PURCHASED OEM OR QUALITY AFTERMARKET ADAS STATIC (IN-SHOP) CALIBRATION EQUIPMENT, EVERYONE IN THE BUSINESS NEEDS TO HAVE SOME DEGREE OF ADAS KNOWLEDGE.

BY DAVE HOBBS // Contributing Editor

here are numerous vehicles on the road today with windshield "smart cameras" (lane keep assist, collision avoidance) and grille-mounted radar sensors (adaptive cruise control) that don't require any tools beyond a scan tool, some decent roads, and common sense to perform many ADAS calibrations.

#### **Smart ADAS drivers required**

The opposite of resistance to new technologies is the overconfidence that can result from the same root cause – lack of driver knowledge. You don't have to do much YouTube browsing to find examples of "self-driving vehicle" driver abuses.

There's a concerning newsreel from *Inside Edition* sporting a collection of dangerous stunts filmed (via "selfies") by the drivers themselves. Stunts, ranging from taking naps while driving, to riding in the passenger seat instead of being behind the wheel. As an experiment (on both a Cadillac with Super Cruise and a Ford Edge with ACC and lane centering, a step up from lane keep

assist), I gave up control of the vehicle (with my passenger ready to grab the steering wheel just in case).

On the Caddy, I simply closed my eyes for a count. *1,2,3,4, beep, beep, beep.* The car's steering column-mounted camera watching my attentiveness noticed a lack thereof and alerted me to "take the wheel," or Super Cruise would disengage **(Figure 1)**.

I took the Ford Edge to the next level by refusing to grab the wheel when instructed. The vehicle's lane-centering feature con-



GM SUPER CRUISE STEERING COLUMN-MOUNTED CAMERA ensures the hands-free driver is not also "attention" free. Close your eyes or look away for more than a few seconds and you'll hear "beep, beep beep."

PHOTO CREDIT: DREAMSTIME



#### Expect More. Expect TYC.



#### Most Extensive Aftermarket HVAC Coverage with 95%+ of Replacement Market.

- Not just lights, TYC has a full suite of premium HVAC products from Blowers, Cabin Filters, to Condensers, Evaporators and Heater Cores.
- Some blowers feature brushless motors\* that perform like their OE counterparts, for efficiency and longevity.
- Designed, engineered, produced to be OE-like for easy installation.
- Individually in line tested for reliable performance right out of the box.





TYC is a Proud Supporter of Novitas Foundation

Your gift can save lives, bring hope and build a future for a world in need go to NovitasFoundation.com.



\*(Select Applications)



tinued to track a straight line but slowed the vehicle down to a crawl (with brake lights on). I was able to speed back up and repeat the stunt once more before that vehicle's DIC displayed "feature not available." An ignition cycle was all it took to get lane centering to return.

I share these accounts to assist you in knowing what some of your customers may already be doing, especially those drivers with risk-taking abilities that exceed their driving abilities. No professional technician (or shop owner) desires to see anyone involved in an accident; it's quite the opposite. Smart ADAS techs can, however, help turn unaware ADAS customers into educated (and safe) ADAS customers.

#### **Smart ADAS techs**

Technicians working on ADAS-equipped vehicles must become SMEs (subject matter experts) to some degree. Then we must pass our knowledge of the system's operation to those behind the wheel, with proper tact and timing. A good start is to simply advise our customers that the hardware and software on today's production vehicles do not make them automated "robots" to drive us around without constant supervision and help. Tesla's Autopilot and GM's Super Cruise-equipped vehicles can operate with minimal driver interaction, under permissible road conditions, weather, and lighting.

#### What is GM's Super Cruise? Does it use lidar sensors?

The Cadillac Super Cruise ADAS option was released several years ago and is now available on several other GM models. This very high-end ADAS system uses extensive sensor fusion (advanced software that considers all ADAS sensors together), along with a very accurate road map database (that was created with lidar mapping technology). Many consumers, dealer sales reps, and even a few service techs assume the word "lidar" means GM is using lidar sensors on their Super Cruise-equipped vehicles. This is not the case, so if you have a customer with a GM vehicle using

Rotating mirror (750 rpm) Receiver unit **Heated front screen** Laser diode **NO LONGER A SPINNING CAN** on top of the vehicle, this compact Lidar sensor (used by Audi) emits ultraviolet light beams to create an image for the Connector to vehicle's ADAS FlexRay bus system. Scan angle 145°

this system, don't waste your time looking for that "lidar" sensor when something goes wrong with their Super Cruise.

#### How does lidar work?

Lidar is beginning to take off as a great technology to work in ADAS systems. Using invisible laser beams (like what the police use for speed detection) to scan the area around the vehicle, the high-frequency light (laser) beams are then reflected off objects and received back by the lidar sensor. The result is a 3-D image that (despite its ability to process 1 billion data samples per second) takes far less computing power than a camera.

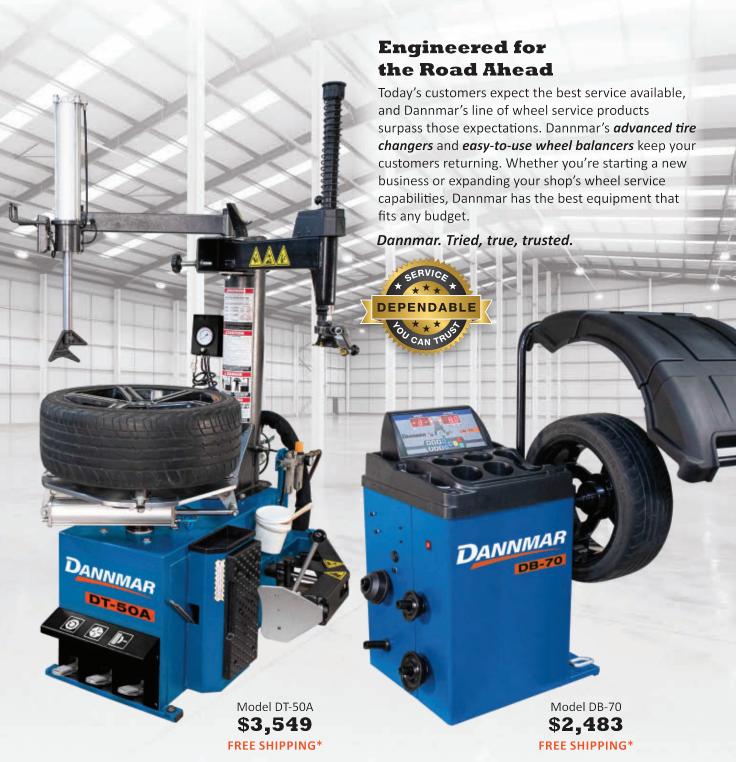
Lidar sensors are beginning to be utilized on a few newer vehicles (mainly high-end Euro models at the present) but don't look for the ADAS windshield camera or radar sensor to be eliminated anytime soon (Figure 2). Lidar is colorblind and illiterate, meaning it can't distinguish colors and read traffic signs. Cameras can determine if the traffic sign is yellow or red and read that speed limit sign. Additionally, snow and heavy rain can deflect light, causing issues with camera and lidar sensors. This makes radar the preferred technology for poor visibility conditions.

In the case of lidar mapping, the GM Super Cruise map database is compiled by light aircraft and drones equipped with lidar flying over interstate highways. Recent 3-D images of every dip, rise, and curve of the highways are then entered into the map database and updated over the air (OTA).

An active OnStar subscription is required. The DMM (digital map module) in the trunk stores the mapping information on two 8GB hard drives. Updates can be manually programmed into the DMM via a simple USB mini cable (connected to your laptop via a J2534 and a GM programming subscription). GM even provides a website to display this mapping coverage so you can plan your routes to gain the most use of hands-free driving (**Figure 3**). The 3-D map data is used, allowing the vehicle to drive hands-free within a few centimeters of the exact center of the lane. Humans struggle with that; robots make it look easy!

# GM'S SUPER CRUISE MAPPING DATABASE covers over 200,000 miles of major highways and interstates, but there are gaps, due to variables such as new road construction. This screen capture shows a very short distance (a few miles) between I-24 in Tennessee and the entrance onto I-75. The system warns the driver of the lack of Super Cruise mapping info and returns to conventional LKA and ACC.

## EXPAND YOUR CAPABILITIES





#### What are dynamic ADAS sensor calibrations?

Think about how a skillful human driver performs: Good drivers constantly scan the road in front of them.

They use their sharp "eyesight" (cameras with ADAS) and perceive the need to make directional changes when necessary.

They utilize their "sense of speed/distance" (i.e., radar sensor with ADAS) "perceive" the need to accelerate, brake, or coast, allowing the vehicle to follow other vehicles at a safe distance or apply the brakes hard in an emergency situation.

Good drivers aren't born; they're taught.

Teaching sensors (i.e., dynamic calibrations with ADAS) require various amounts of time driving the vehicle under a set of specific conditions (i.e, daylight, visible road marking lines, etc.)

#### Long-range radar and front camera dynamic calibration tips

As with static calibrations in Part 1 last year, the following (partial list) of tips carry over.

- 1. Pre-repair DTCs documented and cleared before any calibration.
- 2. Fully charged battery and operational charging system.
- 3. OEM compliant windshield that's clean.
- 4. Vehicle cargo areas are empty, tires inflated to spec, and the fuel tank full (for ride height).
- 5. 4-wheel alignment verified (thrust angle/no dog tracking).
- 6. SAS (Steering Angle Sensor) reset/relearned.
- 7. Updated scan tool capable of entering the vehicle into *dynamic* calibration mode.
- 8. Following every instruction on the scan tool screen (to the letter).
- 9. Make sure ADAS-related warning lights are off.
- 10. Documenting everything (for liability potential).

#### Additional tips unique to dynamic calibrations

- 1. Have another person drive while you operate the scan tool.
- 2. Avoid bumpy or congested roads (specific minimum/maximum speeds required for extended periods.
- 3. Select roads where instructed speeds (typically 40-50 mph) can be maintained and have visible lane markers, road signs, trees, and fences. This type of road is sometimes referred to as a "target-rich" road (camera calibrations).
- 4. Avoid rain, snow, ice, fog, heavy cloud cover, or night driving (the camera must see lane markers).
- 5. Be aware of other pedestrians, rapidly approaching vehicles, etc.
- 6. Avoid slowing down below/speeding up over instructed speeds.
- $7.\,A void \,lane\,changes\,(might\,require\,calibration\,to\,start\,over).$
- 8. Look for ADAS-related warning messages to illuminate while calibration is in progress, then go out when complete (agreeing with scan tool "completed/successful message".
- 9. Verify ACC functionality (find some traffic to drive in)

10. Verify LKA-related ADAS functionality by observing for lane marker detected icons appearing on DIC and changing as you move slightly back and forth in your lane.

#### Avoiding 'Trying to fix things that aren't broke'

Going back to customer education, we must educate ourselves beyond the complexities of static calibrations in the repair bay. The three "R's" that would apply to road test diagnostics and dynamic calibrations are:

- R Research (SI, owners' manuals, training classes, etc.)
- R Road Test (lots of known-good vehicles)
- R Road Test (customer's vehicle with ADAS concern)

**THE VEHICLE WINDOW STICKER** (or a similar printout via the OEM's dealer site) is the best indicator of the ADAS equipment on the vehicle. We see this vehicle has BLIS (Blindspot Information System) and Ford CO-PILOT 360.



#### Standards for ADAS terms? Not yet!

According to a AAA study on ADAS over three years ago, OEMs have up to 40 different names for automatic emergency braking, 20 different names for ACC (adaptive cruise control), and 19 different names for LKA (lane keep assist).

Is the ACC on your customer's vehicle designed to bring the vehicle to a complete stop (when the vehicle they are following stops), or just slow their vehicle down (to 20 mph) and alert them to finish the complete stop? The complete-stop

version is called "stop and go ACC" by some OEMs. There are even variations within the "complete stop" family. "Full speed range" ACC can bring you to a full stop, but you must apply the accelerator to take off again. ACC with "stop & go" will stop your car completely and reseume speed when traffic allows.

How do you know exactly what your customer's vehicle is supposed to do? Your customer "may" know, and the owner's manual "may" be helpful, but the real test is the new car window sticker (Figure 4) compared to NHTSA's VIN decoder (Figure 5).

Group Name	Element	Value
Active Safety System/ Backing up and Parking	Rear Automatic Emergency Braking	
Active Safety System / Forward Collision Prevention	Crash Imminent Braking (CIB)	
Active Safety System / Forward Collision Prevention	Forward Collision Warning (FCW)	Standard
Active Safety System / Forward Collision Prevention	Dynamic Brake Support (DBS)	
Active Safety System / Forward Collision Prevention	Pedestrian Automatic Emergency Braking (PAEB)	Standard
Active Safety System / Lane and Side Assist	Blind Spot Warning (BSW)	Standard
Active Safety System / Lane and Side Assist	Lane Departure Warning (LDW)	Standard
Active Safety System / Lane and Side Assist	Lane Keeping Assistance (LKA)	Standard
Active Safety System / Lane and Side Assist	Blind Spot Intervention (BSI)	
Active Safety System / Lane and Side Assist	Lane Centering Assistance	

NHTSA (National Highway Traffic Safety Administration) has a free VIN decoder. Titles of ADAS features are highlighted in red. From this document, we can determine that the vehicle has a camera to carry out numerous Lane Keep Assist and Automatic Braking safety functions. The BSW (Blind Spot Warning) standard equipment feature means rear-mounted radar sensors.

#### < INTRODUCING >

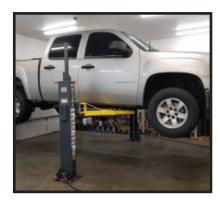
### The All New MaxJax® Portable Car Lift



The MaxJax portable two-post lift is one of the most versatile DIY tools ever invented. Its patented design allows you to get full-sized lift advantages in spaces with limited ceiling heights. Best of all, MaxJax is completely portable and can be setup virtually anywhere. For more info call **1-844-629-5291** or visit **www.MaxJax.com**.







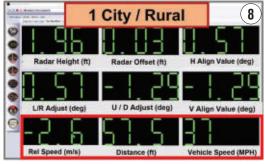




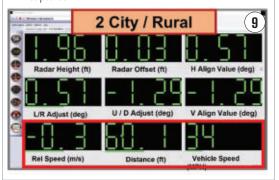


**2021 NISSAN MAXIMA** with no DTCs or customer complaints, using Adaptive Cruise Control, first (above) and second (below) captures.





**ON NISSAN**, when Relative Speed changes on a road test (following other vehicles in traffic with ACC engaged) the distance of the target car should be close/believable, first (above) and second (below) captures.



NHTSA uses more generic terms for ADAS. But when it says "optional" as opposed to "standard," you're still going to need an OEM VIN inquiry, RPO code label, or the new car window sticker.

Dash and steering wheel buttons can be a help in determining ADAS content details, but several OEMs (Ford, Volvo, etc.,) bury lane change-related ADAS controls (front camera), and blind-spot warning ADAS controls (side radar) in their touch screen DIC. Baselining the vehicle with an OEM scan tool (pre and post-scan) can be helpful to verify ADAS options that are present. However, some OEM scan tools display modules that aren't really on the vehicle.

#### Critical thinking skills for ADAS road test scan data

For each screen capture (different parts of a road test) the top two rows of adaptive cruise control data PIDs on this Auto Enginuity scan tool are related to static calibration values: that's normal (Figures 6+7). On our road test, the only PIDs that changed were "vehicle speed" (self-explanatory), "rel speed" (the difference in speeds between your vehicle and the vehicle you're following), and "distance" (the number of feet between your vehicle and the vehicle you're following).

On the two examples of highway driving at 68 mph, both events were within a second or two from each other. The relative speed (your speed compared to the followed car's speed) remains constant. How can the radar "see" the distance (often referred to as a gap) being 275', then one second later only being 4' away? Did the vehicle we were following suddenly slam on its brakes? No, it didn't.

The same scenario as with the two highway speed captures (Figures 8+9). Notice our vehicle's speed changed a little (dropped 3 mph)

and the relative speed, and distance following changed slightly too. Is something malfunctioning? No... Nissan's unique way of displaying the distance between two vehicles is this: If the radar has "locked onto" a target in front of the vehicle, this PID will change in a manner that makes sense. i.e., "That car in front of mine looks like it's about 60' (four car lengths) away."

When you see the "relative speed" PID holds steady, and the "distance" jumps around erratically, it might seem to indicate a problem. In Nissan's case, however, it indicates the radar sensor's way of saying "the distance is... I don't have clue," as it throws numbers around like a boxer swinging in the dark. It would be nice if engineers would have a cool-sounding PID title that sounds like a fighter pilot jargon... "radar locked on target!"

Toyota does just the opposite. When its Long-Range Radar sensors "are locked on to a target" the distance value is as plausible as the two Nissan screen captures (for city/rural driving). When its radar is not locked onto another moving vehicle, the distance is a steady default value (i.e., a steady 837'). **Z** 



#### **DAVE HOBBS** is

a senior technical trainer and curriculum developer for Delphi Technologies Aftermarket

at BorgWarner Inc. He's Master ASEcertified with L1 (advanced engine performance) & L3 (hybrid) specialist certifications. He has extensive OEM service and field engineering expertise, with more than 30 years of experience in troubleshooting vehicle systems electronics, with 15 of those years in the independent aftermarket repair business. He has 20 years of experience in training engineers (worldwide) and service technicians in both the OEM and aftermarket arenas, as well as experience in working with postsecondary vocational / community college students as an adjunct instructor.



### A MOTOR AGE TRAINING EVENT

#### **2022 TRAINERS**



SCOTT BROWN
Session: ENGINE CONTROLLER CALIBRATIONS:
Developing New Perspectives for Drivability Technicians



PETE MEIER
Session: ELECTRICAL CHALLENGES:
Three Steps to Successful Electrical Troubleshooting



**BRANDON STECKLER**Session: SCAN TOOL ANALYSIS 101:
Gaining Diagnostic Direction From The Driver's Seat



**G. JERRY TRUGLIA**Session: HYBRIDS & EVS: Understanding and Diagnosing Hybrid / Electric Vehicles

REGISTER TODAY AT WWW.ACCELERATE-CONFERENCE.COM





SIGNATURE SPONSOR:







CAPITALIZE ON THE FACT THAT EVS WILL BECOME MORE PREVALENT AS TIME PASSES. THE NECESSARY TRAINING CAN EVEN ASSIST TECHS WORKING ON ICE VEHICLES.

BY MICHEAL SMYTH // Contributing Editor

n late March of this year, Canada announced a light-duty vehicle mandate that states that by 2035, 100 percent of all light-duty vehicles sold in the Great White North (a Bob and Doug McKenzie Canadian reference for you young folks) be zero-emission vehicles (ZEVs), otherwise known as electric and hydrogen fuel cell vehicles. That is a mere 13 years in the future.

This announcement isn't unique, only the most recent. Thirteen states representing over one-third of total new car sales in the U.S. have also announced ZEV mandates. In addition, many countries, especially in western Europe, have passed even stricter legislation on the internal combustion engine.

Our industry is arguably in the midst of its most significant and broadest-reaching

change ever, resulting in unprecedented challenges to everyone associated with the transportation network. As a result, we all have new skills to learn.

This refocus shouldn't be a surprise. Since the early 2000s when the Prius hit the U.S. market, we've all been aware that EVs would become a growing part of the automotive landscape and have had ample time to prepare for their growth, driven by legislation, OEM rollouts, and consumer demand.

So why is it then that we are not only short on qualified EV technicians but also on the availability of talented service personnel overall? By 2005 or 2006, a betting man with the foresight to see the continuing growth of EV sales would have wagered on our ability (as a diagnostic and repair community) to evaluate and

prepare for the future. This isn't the case, at least in my neck of the woods.

#### A personal anecdote

My family has had an electric vehicle in our arsenal since 2007, and our current one is a 2014 plug-in Prius. This car now has almost 200,000 miles and has been surprisingly trouble-free. Other than front suspension work we had completed this year and an electric steering rack a few years back, only standard maintenance like tires, brakes, and sealed leadacid battery (SLA) replacement have been necessary.

It's good that the vehicle has been so reliable, as our local dealership has constantly struggled with supplying goodquality and consistent service for our hybrid vehicles. Their service and repair

# ALL THE TOOLS YOU NEED IN ONE PLACE!





or visit www.wrenchers.com

**Shop Equipment | Automotive Tools | Car Lifts | Wheel Service** 

Ask about our price promise guarantee.





personnel are great folks and try hard to meet our needs, but it seems like they have a revolving door of "the guy" who works on hybrids. Sometimes their tech appears to know his stuff; other times, not really. This lack of consistent personnel can't be from lack of work, as we live in a college town, and hybrids are almost as prevalent as the popular go-to-school vehicle, the Jeep Wrangler.

However, late last year, we found an independent shop that doesn't have a trained electric vehicle tech, but they're willing to learn. They see an opportunity to grow their business and are eager to invest the time and money in training and the tools needed to service EVs. Again, we've been lucky that we've had no significant issues, but inevitably one will surface, and I have some hope that we will have a local shop to meet our needs.

So, what's the answer? So far, the repair community has been pretty good at playing ostrich by burying our heads, but that will soon no longer be an option. EV sales are growing, the vehicles are going out of warranty, and the need for OEM and independent technicians to correctly diagnose and repair EVs is becoming more paramount.

#### Training and skills development

Unlike other automotive disciplines, the importance of EV technician training is crucial for customer satisfaction and, more importantly, the safety standpoint. Electric and hybrid-electric vehicles are no more challenging to diagnose and repair than internal combustion engine-powered vehicles, just different. Technicians who think they can just "wing it" are placing themselves and the client (entrusting



ELECTRIC LINEMAN'S HIGH VOLT-AGE gloves are a key piece of safety equipment for the EV technician.

them to correctly repair their vehicle) in a dangerous position by not understanding EV design and operation basics.

There are many options for affordable technician training on electric vehicle repair, but before investing dollars in it, ask yourself if you have a sufficient understanding of electrical theory. Having a digital multimeter is a start, but knowing how to use it is even smarter. Do you truly understand circuits, voltage, resistance, and current? What about Ohm's law, voltage drops, series, and parallel circuits? Do you know how to use your meter, the correct leads for each situation, or how to make sure the fuse isn't blown?

Surprisingly, according to many industry folks with way more experience and knowledge than I'll ever have, the lack of understanding of basic fundamental electrical skills and correct meter usage is one of the largest challenges we face. Unfortunately, many experienced mechanics have just "gotten by" with knowledge gleaned on the job and sometimes struggle because of their lack of formal training.

There are many options out there for EV training, but not as many for foundational electrical skills. An alternative I've become familiar with is with ATech Training out of Kentucky. They have a newly designed system for the shop owner, supplying equipment and courseware to teach foundational electric skills on the job at your own pace. This isn't an endorsement of this product, but it is the one that allows a shop owner to train their techs on-site when they have some free time. Even if you aren't interested in moving into the EV field, truly understanding electrical diagnostics is well worth the effort for almost every vehicle that comes through your door.

For continuity, let's assume that your shop is up to speed on electrical diagnostics, can set up and use its meters effectively, and has assured its meters are fully functional. How do we move into EV repair? Let's outline what a good electric vehicle course will teach you.



**AN ELECTRIC MOTOR** from a Toyota Prius. The Prius has two electric motor/generators and a gasoline engine.

#### Safety

Before that first Nissan Leaf or Chevrolet Bolt crosses your doorstep, proper safety equipment, tools, and personal protective equipment must be purchased. Items such as high-voltage gloves, insulated hand tools, suitable high voltage meters and leads, and other various items are a good start. What you may not know that is almost as important as the tools is a researched and documented standard operating procedure for electric vehicles.

Remember when we spoke about how these cars are different? Well, their inclusion in your repair flow should be different, too. Although some EVs are easily recognizable by their body lines or badging, many aren't as quickly identifiable at a glance. Prius on the shop floor? Pretty much everyone will recognize it for what it is. How about a new Ford F150 Lightning or the upcoming Chevrolet Electric Silverado? I'll bet at a glance you would assume they're just an ICE (internal combustion engine)-driven vehicle that you've worked on hundreds of times before. Identifying the car in the shop can be as



**AN EV TECHNICIAN SERVICING** a high voltage battery.

# **GEAR UP FOR**

TUESDAY, NOVEMBER 1 - THURSDAY, NOVEMBER 3, 2022

# THE FUTURE

THE VENETIAN EXPO | LAS VEGAS, NV | #AAPEX22



In an industry that is constantly changing, you need to stay up to date on the latest developments to ensure your business succeeds. At the automotive aftermarket's premier event, you'll find:

- Innovative Products
- Groundbreaking Technology
- · Hands-on Training
- Endless Networking Opportunities

Join your community this fall to take advantage of everything the industry has to offer, all in one place.

**LEARN MORE** ) aapexshow.com



#### *TECHNICAL*



THE TECHNICIAN SERVICE-**DISCONNECT** on a Prius V.

important as having the correct tools and training to work on it.

I like the idea of labeling an EV as soon as it enters the facility with a bright tag that says "EV" under the wiper. Having your service department make this a standard part of the vehicle acceptance process can help make sure these vehicles with new diagnostic challenges are identified quickly and accurately by everyone in your shop. Other items to be added to your "SOP" should be orange traffic cones.

Although I've never been an employed technician, I grew up around several shops. My father was a career parts manager for various GM, Jeep, Mitsubishi, Chevrolet, and other OEM brands, and I've witnessed first-hand the hijinks that can occur between employees. It's all in good fun, and everyone enjoys a good laugh. But giving someone a good goose on the backside while he's elbow deep in 800V is something we all need to avoid. Marking the area where an EV is under active diagnosis with a few cones can help move that wet willie you owe "Benny" to a safer time and place.

#### Types of EVs

Yeah, there are different flavors. Just like you now work on 4, 6, and an ever-decreasing number of 8-cylinder engines, EVs have different flavors. The three most significant are battery-electric, hybrid-electric, and plug-in hybrid-electric.

Battery-electric vehicles (or BEVs) operate solely on battery power. A drivetrain generally consists of at least one electric motor, a high-voltage battery, and components that control and operate the other vehicle components. These vehicles have unique systems compared to cars with an ICE, as BEVs have no accessory belt to drive systems such as power steering pumps and AC compressors, and these components need to have their source of power to operate. Examples of BEVs would be the Nissan Leaf, Chevrolet's Bolt, and the entire Tesla line of vehicles.

Hybrid-electric vehicles (referred to as HEVs) are the most prevalent vehicle on our highways as they do not require to be plugged in to be charged. HEVs have both electric and gasoline motors. The high voltage battery is charged by capturing torque from the gasoline motor and capturing kinetic energy from braking and drifting of the vehicle. A great example of an HEV is the Toyota Prius.

The last category is the plug-in hybrid electric vehicle (or PHEV). You've probably already guessed what this vehicle is - an HEV that also allows you to plug in to charge the battery. For example, my wife's vehicle is a Prius PHEV, so she can drive it simply as a hybrid and not plug it in, or if she wishes and has access to a vehicle charging station, she can bring the battery up to full capacity.

You may have heard of a fourth category, the fuel cell electric vehicle (FCEV). Fuel cell vehicles are available in a few states and operate like a BEV; only they create electricity through a chemical process utilizing high-pressure onboard stored hydrogen. The development of this technology is still ongoing. It may become a major player in the future, but for now, there are only a few out there that are only sold or leased through dealerships that have passed significant training to support them.

As mentioned above, EVs have some

unique components that training will make you familiar with. High voltage batteries, electric motor/generators, planetary gearsets that link ICE and EV motors, and ancillary components like electric steering racks, electric A/C compressors, electricity inverters, and converters.

#### Disabling and isolating

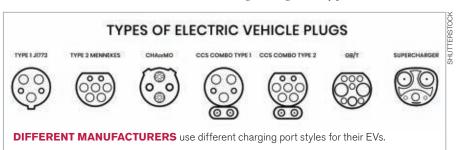
Each EV has similar components but also a unique controlling infrastructure on how they operate. Before beginning any repair work on the HV system, the vehicle will need to be disabled so that the car cannot operate and isolate the high voltage to one location - the battery.

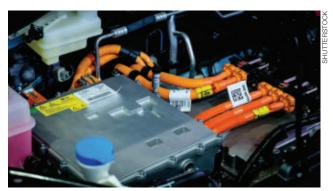
The way EVs are constructed makes it difficult to remove the HV battery or totally discharge the power it possesses. Standard industry practice is to remove what is called the vehicle's high voltage service plug. Present in all mainstream vehicles with a high voltage battery, the high voltage service plug is a gateway between the high voltage battery and the rest of the vehicle's systems. Removing it allows the technician to isolate all high voltage to the battery and renders the vehicle inoperative.

#### What else should I know?

A good EV technician class will cover the above and a whole lot more. Here is a list of things you should seek out when looking for training:

- Safety and personal protective equipment
- How to operate EVs
- Electric powertrains
- EV diagnostic information and procedures
- High-voltage battery packs





**UNDER THE HOOD OF AN EV.** Industry-standard orange color is applied to all high voltage cabling.

- High-voltage relays and charging systems
- Inverters/converters
- Motor/generators
- · Component removal and replacement
- Electric vehicle maintenance
- EV 12V systems
- ICE and the hybrid vehicle

#### A final thought

Internal combustion vehicles are going to be here for a long time. Analysts predict they will be produced and sold for years to come; and with modern vehicles' lifespan (easily reaching the 250,000-mile range), there will be a need for their maintenance and repair far into the future. This also doesn't account for ICE vehicles' medium and heavy duty categories or the enthusiast market. The skills that repair techs hold today are valuable and will continue to be critical for our vehicle infrastructure. However, in taking a realistic look at the direction that the light-duty vehicle market is moving, it is plain to see that the need for electric vehicle repair support is going to be a growth industry, and today's automotive shop and technician needs to begin planning now to be a part of that growth.

These vehicles are no more difficult or dangerous to support than the ICE vehicles we work on now; they're just different. Many of their systems and components are the same, and you will find that many of the skills and tools you currently possess will apply to them. I encourage you to seek training now to take advantage of this market and be best prepared for the future because it is a strong possibility your competitors will. **Z** 



MICHEAL SMYTH is a founding partner and director of training for AFV Educate, a not-for-profit 401(c) (3) training organization specializing in alternative fuel curriculum development and educational presentation for first and second responders and automotive technicians.

His previous positions included director of West Virginia University's National Alternative Fuels Training Consortium and director of training at Automotive Video Innovations. Smyth has over 12 years of experience working with and presenting information on AFVs.



844-765-0150 | WWW.AUTELENERGY.COM AUTELENERGY@AUTEL.COM



# THERMAL MANAGEMENT IN ELECTRIC VEHICLES

R-1234YF IS DOMINATING THE EV SPACE AS THE PREFERRED REFRIGERANT FOR HEAT PUMPS.

BY ADAM KIMMEL // Contributing Editor

space as the preferred refrigerant for heat pumps.

EVs is their overarching mission to create a healthier, more sustainable planet with low-carbon emissions. An EV's thermal management must contribute to this mission, especially since OEMs and suppliers are publicly stating sustainability goals.

R-1234YF is dominating the EV

These and other considerations have led to what, currently, are two main thermal management approaches in EV engineering. The first is the use of a positive temperature coefficient (PTC) heating element. This device draws voltage from the battery for cabin heating — which in turn lowers the vehicle range. This side effect is a key reason we're seeing fewer new EVs with electric heating coils and more with heat pump systems. Rather than generating heat, heat pumps move heat from one place to another — either absorbing heat from ambient air and transferring it into the cabin for warmth or removing heat from the cabin to cool it. Heat pumps are highly attractive for EVs because, in essence, they utilize an endless reserve of "free" source energy from outside air and transport up to three times its required operating energy load.

A heat pump's effectiveness relies heavily on its refrigerant. So, it may come as no surprise that R-1234yf — the same refrigerant quickly overtaking automotive manufacturing and the aftermarket as the refrigerant of choice for air conditioning systems in other types of vehicles—is dominating the EV space as the preferred refrigerant for heat pumps. This is due to its low boiling point. In addition to its heat pump benefits, R-1234yf offers similar cooling capacities and vapor densities as legacy refrigerants, delivering superior A/C performance.

Shops have an advantage in that they will be seeing more and more vehicles of all types, from ICEVs to EVs and hybrids, coming in for service of R-1234yf-charged systems. Now is the time to prepare by becoming familiar with this refrigerant's requirements for use and safety protocols, investing in the necessary equipment—such as an R/R/R machine for shops doing a larger volume of R-1234yf maintenance service — and ensuring they have adequate supply on hand to meet the increasing demand from their customers.  $Z\!\!\!\!\!Z$ 

hen shops consider how best to prepare for electric vehicle service, thermal management is integral to the conversation. And, like many EV topics, servicing these vehicles presents several critical differences from the air conditioning and heating systems in combustion engine vehicles (ICEVs) that the automotive aftermarket has been servicing for decades. Unlike traditional ICEVs, thermal management in EVs takes a much more holistic approach to heating and cooling the vehicle because the lack of combustion removes a substantial source of high-quality heat. Moreover, there are several factors driven by EV technology that the thermal management system must consider. One example is "range anxiety," which is a driver's need to be confident they will be able to travel the desired distance on a charge. Energy used for heating, cooling or other functions represents energy no longer available to propel the vehicle. Another differentiator with



The Automotive Management Institute (AMi) is pleased to announce the development and launch of a new professional designation focused on the technician in a leadership role: AMi Accredited Shop Foreman.

Mentors in the shop environment often receive technical training, but little in the way of training develop other skills. To be successful as a leader, they have to pick up the rest as they go. The shop foreman accreditation fills the gap with soft-skill courses from accredited industry training providers.

This new designation requires multiple categories of training, including shop management basics; coaching, mentoring, team building, and five new courses focused on the shop foreman role.

Questions or Support: supportingsuccess@amionline.org



**ADAM KIMMEL** has spent nearly 20 years as a practicing R&D engineer and technical consultant for thermal management in the areas of automotive/EV, mobile HVAC, fuel cell systems, and data centers. He has degrees in chemical and mechanical engineering and is currently a

senior principal consultant at The Chemours Company, a world leader in titanium technology, thermal and specialized solutions, advanced performance materials, and chemical solutions.



# STATIONS -

CAPTURE NEW CUSTOMERS WITH AN EV CHARGING STATION IN YOUR SHOP.

BY TRACY MARTIN // Contributing Editor

hy install an EV charging station?

There are many reasons to install an electric vehicle (EV) charging station at your shop, even if you don't currently do a lot of work on EVs. The market share of electric vehicles is rapidly increasing with EVs projected to account for 10 percent of all new vehicle sales in the U.S. over the next three years and increasing to 32 percent in 2030. Some of your customers either own or are thinking of owning an EV and investing in an EV charging station for your shop is a great way to attract new business and retain the existing customers that transition



WINNER FORD, located in Dover, Del., has EV charging stations at several locations in their parking lot. Anyone with an EV can plug in to get a free charge—a great way to attract new customers for service or to purchase a new vehicle.

to an electric vehicle. Having a charging station on your premises advertises that your business is ready for the future and services all types of vehicles.

There are several ways a charging station can fit into your business. A charger can be installed inside your shop (to charge an EV that is in for service) or located on the outside of a building (to provide charging after the vehicle is serviced). An important factor in deciding what type of charger to use is how your customers will know that you even have one. EV chargers fall into two categories, "dumb" and "smart." Dumb chargers don't have communication (network) capabilities and only your employees and a few customers will know that your shop has a charging station. A "smart" charger is different because it's connected to the Internet and advertises its location.

Anyone with a phone can download an app that will locate charging stations. For example, Sygic GPS Navigation integrates with charging station providers and shows an EV driver details about charging stations, and availability, and allows payments. Another is PlugShare, a free EV driver's app for iOS and Android, allowing users to find charging stations and leave reviews. Also, many EVs have

onboard GPS that identifies charging station locations.

ILLUSTRATION 118076113 @ TARTILASTOCK | DREAMSTIME.COM

A Blink IQ 200 networked charging station mounted on a pedestal is an effective way to attract customers to your business. With the charging station connected to the Internet, your shop will appear on numerous EV charging apps providing you an opportunity to attract new customers.

Provided you have the physical space to park an EV for charging, a network-connected charging station could make your



**THIS BLINK IQ 200 IS A LEVEL 2** charger that can be installed on a wall or pedestal mount. A 240-volt connection is required to power the charger.



shop a destination for EV owners looking for electrons to fill their car's batteries. This provides an opportunity to introduce your shop to a potential customer via signage, flyers/business cards, or in person. Because the cost per charging session is only a few dollars, offering "free" charging as an amenity will draw in EV customers to your shop, or you can set the price per kilowatt (kW) and offer a discount if the customer comes into the shop to pay.

#### Charging—Levels 1, 2, or 3?

There are three levels of EV chargers. Level 1 (L1) uses a standard household 120V outlet that draws 12 to 20 amps and outputs 1.3 to 2.4 kWs. L1 chargers are the least expensive and are slow to charge EV batteries, recovering about 20 miles of range in four hours (basically an overnight charger). L1 applications are suited for home use, long-term parking at air-



A BLINK IQ 200 NETWORKED CHARG-ING STATION mounted on a pedestal is an effective way to attract customers to your business. With the charging station connected to the Internet, your shop will appear on numerous EV charging apps providing you an opportunity to attract new customers.



**THE BLINK DCFC 50KW DC LEVEL 3 FAST CHARGER** features liquid cooling that reduces wear on internal components. It requires a 480+ volt, 3-phase connection and uses a 3G cellular, or Wi-Fi to connect to the Internet for credit card processing.

#### Three Levels of EV Charging **LEVEL 1 CHAR-GERS TAKE TOO LONG TO** Single Family Homes Level 1 2-to-5 **CHARGE**, and Level Multi-Unit Residential 120-volts Miles 3 is too expensive Condos to install, leaving Level 2 chargers the Single Family Homes Level 2 ideal choice for a Multi-Unit Residential 10-to-30 240-volts repair shop. With a Miles Workplace Fleet / Public 10-to-30-mile range per hour of charging, Level 3 Fleet Level 2 is fast enough 150-to-350+ 480+ volts (DC Fast) Public to attract customers Miles Multi-Unit Residential to your shop to top off their batteries. Range per Applications Hour of Charge

ports or hotels, and parking structures. L2 charging stations use a 240V connection, can have up to an 80-amp power rating, and deliver up to a 19.2 kW charge rateabout 60 miles of range per hour of charging—ideal for topping off an EV battery in a repair shop. L2 chargers require a dedicated electrical circuit of up to 100 amps. Level 3, often referred to as DC (direct current) fast charging, bypasses the vehicle's on-board AC-to-DC converter (used for L1 or L2 charging) and connects directly to the battery. L3 requires a 480V connection and can fill an EV battery to 80 percent capacity from 15 to 45 minutes, at a charge rate from 150 to 350 kW. L3 is expensive to install and operate and could cost \$15,000 to \$50,000. L3 chargers are typically provided by state governments along interstate highways, and because there are no standard specifications for output, not all EVs are compatible with them.

#### **Installation costs**

Like other improvements to a business, charging stations are not inexpensive and are more complex to install than just purchasing the hardware. Four components make up an EV charging station: the charger or electric vehicle supply equipment (EVSE), design, engineering, and permitting/construction.

The EVSE is the physical device that transfers electricity to charge an EV. Many manufacturers produce this equipment, such as Autel, Blink, Chargepoint, Enel X,

and others. These manufacturers provide several models of chargers, some that are basic and others with more sophistication. Depending on the manufacturer, hardware costs range from \$1,200 to \$3,500 per port. The term "per port" is used because some EVSEs have two charging ports that accommodate two vehicles at the same time.

Installing EVSE in a shop's parking lot will require construction drawings and a permit. The construction drawings include the design and layout of the charging stations. If the EVSE is open to the public, an architect would design the site to comply with the Americans with Disabilities Act (ADA). These types of upgrades will directly affect the cost of construction. An electrical engineer is responsible for the load calculations and drawings. Larger projects may require a significant amount of time from a design team due to complexity compared to smaller projects. As an estimate, the cost will range from \$1,500 to \$5,000 per project.

If you are installing EVSE inside your shop, or on the outside of a building costs are lower and obtaining a permit and hiring an electrician are usually all that is required. Permit costs are minor relative to the overall project and are in the range of \$150 to \$500. Some jurisdictions have streamlined processes and reduced fees for charging station installations to encourage site owners to install them.







#### YOUR BOTTOM LINE IS OUR TOP PRIORITY

We know that business operations need to be efficient, safe, and cost-effective. That's why Autel's Commercial AC charging solutions are right for your application. Saving you time and money while generating revenue is what we're here to do.



**REVENUE GENERATOR** 



24/7 SUPPORT



**QUALITY MATERIALS** 



**WEATHER** RESISTANT

The automotive technology industry leader since 2004 AUTEL®



#### **TECHNICAL**

Construction costs encompass everything needed to install the EVSE. This can include trenching, conduit, wire, circuit breakers, panel upgrades, concrete/asphalt cutting, signage, striping, bollards, and labor. Costs vary widely because some installations are simple with easy access to electrical sources, while other projects could require transformer upgrades and more extensive electrical work. Expect to pay between \$1,200 to \$3,500 per charger, depending on these factors. The bottom line is that installing charging stations in a shop can range from \$1,500 to over \$6,000 per port. Governments and utilities may offer an array of tax credits, rebates, grants, and other incentives.

#### **Operating costs**

There are three costs associated with EV charging stations: networking, electricity, and maintenance. Open-to-the-public charging stations require networking to provide capabilities such as GPS loca-

tion, payment processing, session Software costs vary depending on

limits, and more.



AS EVS BECOME MORE COM-MON, more drivers will miscalculate the range of their cars and get stuck with no charge. Blink offers a portable emergency charger that supports 240V AC charging providing up to 9.6kW of charge (about one mile per minute of charging). The unit has a gasoline engine that powers a generator.

the features of the network and terms of service. In general, expect around \$100 to \$300 per port per year.

In 2022, the average cost for a kilowatt-hour (kWh) in the U.S. was \$0.14. Here is a typical example of the cost to charge an EV. If 40 kWh is required to recharge an EV, multiply 40 x kWh (\$0.14) for a cost of \$5.60. The cost will probably be less because it's unlikely that an EV will come into your shop with "zero" charge in its battery.

Low electricity costs can warrant a "free" charge (as loss leader advertising) to get customers into your shop. Initially, the maintenance cost will be zero because new equipment is covered under a warranty. Eventually, the connection plug/cord will require replacement. You can purchase a maintenance plan from the equipment vendor or pay-as-you-go. Either way, expect maintenance costs to be around \$200 annually.

Blink offers several innovative ways to own and operate EVSE:

- Hybrid-owned: Blink covers the cost of the EV charging equipment and administration. The host is responsible for making the site EV charger ready and shares revenue with Blink.
  - Blink as a service: Features low, upfront costs where Blink covers installation, equipment, and maintenance for a monthly fee. The host is responsible for making the site EV charger ready and keeps 100 percent of the revenue.
  - Blink-owned: Blink owns the EVSE and covers all costs sharing a portion of the revenue with the host.

Even if you don't currently do much work on EVs, a charging station is a great way to attract new customers or retain



**ELECTRIC VEHICLE SUPPORT** is installing Level 3 charging stations in the state of Washington. They are a general electrical and construction contractor that specializes in the design, permitting, installation, and service of vehicle charging stations of all types.

customers that purchase an EV. As an example, in 1986 Pat Cadam opened Pat's Garage (www.patsgarage.com) in San Francisco, which services Honda, Acura, Toyota, and Subaru, and specializes in repairing hybrid vehicles. As an early adopter of EV technology in the independent auto repair business, Cadam installed an EV charging station in 2011 and said this about his experience.

"My charging station is used nearly around the clock. Having one has several benefits. First, it makes you stand out in the crowd of shops in your area. It creates a very positive image in the community because it shows that you're interested in technology and new things. Second, it gives me a chance to get to know the drivers of the cars, and their needs and to introduce ourselves and what we do. We have people charging for as little as 30 minutes up to half a day. Many people come into our offices and sit and chat with us. That's a great opportunity to build a relationship and find a new customer." W.



TRACY MARTIN has written feature articles for the power sports industry since 1998. He is also the author of six Motorbooks Workshop Series

books published by the Quarto Publishing Group. His latest book, "How to Use Automotive Diagnostic Scanners," was published in August of 2015 and is available in book stores and online. Contact him through his website, www.tracyamartin.com.

THE AUTEL MAXICH-**ARGER AC WALLBOX COMMERCIAL.** No. MCC50AHI, is a 240V-

50A Level 2 charger compatible with all EV and hybrid plug-in vehicles and is designed to be installed indoors or outdoors.

C O M I N G SEPT. 1, 2022

# CREAT PRIZE GREAT AND A CONTRACTOR OF THE ARCHITECTURE AT A STATE OF THE ARCHITECTURE AT A

#### **ENTER TO WIN TOOLS, EQUIPMENT, AND MORE!\***

SPONSORED BY:





























**BROUGHT TO YOU BY:** 







#### APG // AUTOMOTIVE PRODUCT GUIDE

#### GENUINE OE PARTS FOR POPULAR MODELS

Continental's exclusive line of OEM Fuel Modules covers you for direct replacement on popular models from Audi, BMW, Buick, Chevrolet, Cadillac, Chrysler, Dodge, Jeep, Land Rover, Mercedes Benz, Mini, Porsche, Saturn, and Volkswagen. Formerly available as "dealer only" items, Continental Fuel Modules are the genuine OE parts manufactured by Continental in ISO/TS certified facilities. The modules provide trouble-free installation and deliver reliable performance.

VEHICLESERVICEPROS.COM/21273631





#### MIGHTY VS7: POWERFUL PRODUCTS BACKED BY A POWERFUL PROGRAM

Why Mighty VS7? Beyond the cuttingedge chemical formulations, it's the complete PROGRAM that makes the difference. VS7 features easy-to-use equipment, online and hands-on training, motivating incentives, industry-leading consumer protection plans and more – all designed to boost your business and help you BE MIGHTIER.

MIGHTYAUTOPARTS.COM

**SPONSORED** 

#### INTEGRATES BATTERY TESTING AND VEHICLE DIAGNOSIS

The BST880D Handheld Tool from

Launch Tech can test battery and charging systems in addition to OBD system access. It's equipped with AUTOVIN detect and live data monitoring, able to diagnose four systems, and supports CCA, BCI, CA, MCA, EN, JIS,



DIN, IEC, SAE, GB battery standards, gel, AGM, and lead acid battery types. It also includes six service functions: TPMS reset, oil reset, brake reset, ABS bleeding, electronic throttle relearn, and battery reset.

LAUNCHTECHUSA.COM

SPONSORED



#### COMPATIBLE WITH ALL EV AND HYBRID PLUG-IN VEHICLES

The Autel MaxiCharger AC Wallbox Commercial, No. MCC50AHI, is a 240V-50A Level 2 charger compatible with all EV and hybrid plug-in vehicles. It features a contemporary design in silver, a touchscreen LCD, and is designed to be installed indoors or outdoors. The unit offers adjustable charging up to 50A and features a 25' long universal (J1772) charging cable and hardwire installation. Wi-Fi, Bluetooth, 4G and ethernet options available.

**AUTEL.COM** 

SPONSORED

#### **ENGINEERED WITH UPGRADES**

Standard Motor Products, Inc. (SMP)'s Blue Streak ignition coil multi-pack kits include a full set of heavier-duty ignition coils in the most popular applications, with coverage for over 23 million repair opportunities. Blue Streak heavier-duty coils are engineered with upgrades, according to the company.

VEHICLESERVICEPROS.COM/21273049





#### APG // AUTOMOTIVE PRODUCT GUIDE



#### **ABLE TO LIFT EVS**

The BendPak QuickJack 6000ELX is a portable car lift that is able to lift EVs for maintenance, service, and detailing. The 6000ELX is a compact, frame-engaging scissor lift with an open-center design for complete access

to the vehicle's undercarriage, and has a lifting capacity of 6,000 lbs. Its extra-long frames provide access

to lifting points between 47-1/2" to 76". Features pendant controls for one-handed operation, dual-position automatic safety locks, and durable urethane wheels that facilitate rolling the lift where it's needed and putting it away when it's not. When not in use, the lift collapses to 3-1/2" and can hang on a wall or slide under a toolbox.

VEHICLESERVICEPROS.COM/21273848



Metrix® climate control and engine cooling products are made to do the job right the first time. With a complete line for automotive and light truck applications, Metrix provides OEM fit and quality to maintain the integrity of the vehicle and restore optimal performance. Engineered for today's higher performance cooling systems, Metrix engine cooling products are manufactured to do the job right the first time. Metrix radiators and water pumps are tested to ensure quality and performance. All Metrix products fit the same as the OE parts with no need to move fittings, drill added holes, or stretch hoses. Metrix

products are distributed exclusively by Autopart Interna-

tional and Worldpac. Metrix climate control products are engineered to deliver superior performance, extended reliability and reduced noise. Metrix provides complete climate control solutions, including compressors, receiver driers, expansion valves, heater cores and blower motor assemblies.

AUTOPARTINTL.COM, WORLDPAC.COM

SPONSORED

### TURN YOUR TOOL IDEA INTO MONEY

#### LISLE CORPORATION CURRENTLY PAYS ROYALTIES TO OVER 100 INDIVIDUALS.

Lisle has been in business for over 115 years and for over 50 years has been working with individuals on an award or royalty basis. If you

have an original tool idea which others may need, we have a procedure to evaluate your idea.



Respond now to request an idea disclosure packet, or fill out a form online: www.lislecorp.com/idea-program

P.O. Box 89 • Clarinda, IA 51632-0089 712-542-5101 • Fax 712-542-6591

# HIT THE FAST LANE OF THE AUTOMOTIVE INDUSTRY

for Web Exclusives and Advertising Opportunities Go to our Website

www.VehicleServicePros.com

# AD INDEX

#### **AD INDEX**

ADVERTISER AAPEX	<b>PAGE #</b>
ACCELERATE CONFERENCE	33
ADVANCE AUTO PARTS, INC	C3
AUTEL US INC.	9, 39, 43
AUTOMOTIVE MGMT. INSTITUTE	40
AUTOMOTIVE TRAINING INSTITUTE	11
RENDPAK	25, 29, 31

ADVERTISER CARTER	<b>PAGE #</b> 19
CONTINENTAL	7
CONTINENTAL CORP	15, 23
DELPHI TECHNOLOGIES AFTERMARKET	17
GREAT NECK SAW MFG	13
LAUNCH TECH (USA) INC	3
LISLE CORPORATION	47

ADVERTISER O'REILLY AUTO PARTS	
PARTSOLOGY	21
THINKCAR	5
TYC GENERA	27
WORLDPAC	C4
WRENCHERS	35



#### THE TRAINER #128: ARE YOU IN THE ADAS BUSINESS?

#### IS YOUR SHOP IN THE ADAS BUSINESS? YOU MAY BE — YOU JUST DON'T KNOW IT YET!

PETE MEIER // Director of Training

ADAS, or Advanced Driver Assist Systems, is an aftermarket acronym that covers a variety of vehicle systems designed to assist the driver maintain control of the vehicle and to help avoid common accident scenarios, caused primarily by driver inattention. Included in this family are systems you are certainly familiar with, like antilock braking and traction control.

But some may be systems you haven't been exposed to yet, like collision avoidance and active cruise control. At least, not that you've been aware of.

But if you perform wheel alignments or front suspension and steering system service, or even replaced a condenser that required the removal of the front fascia, you are in the ADAS business, whether you want to be or not.

Today's cars have been equipped to "see" the world around them, using cameras and a variety of radar systems. And when they leave the factory, they are calibrated to look in a very specific direction. Anything you do to your customer's vehicle that alters that direction – even a little bit – will impact how these ADAS systems function.

Take, for example, front collision avoidance. This system is designed to monitor the traffic in front of the driver and to take preemptive action should the system detect that the driver is about to impact the vehicle in front.

What would happen if the sensor thought the car was farther away than it was? Wouldn't it apply the brakes too late?

This is where every technician and shop owner should be paying attention.

The problem is that these systems are relatively still in their infancy stage, and information on these systems and how the everyday work you perform can affect them is hard to find. Calibration procedures vary, system operation varies, and even the names of the components have not yet been standardized.

And while some of the more popular service information systems are making it easier to identify what ADAS systems MAY be on the vehicle you are servicing, and pointing out when the repair you intend to make will require some form of calibration, Autel has made it even easier.



Autel is a leader in the automotive aftermarket when it comes to dealing with ADAS, offering a full spectrum of specialized equipment and technical support to shops wanting to calibrate in-house. For example, their newest solution is the new IA900WA—an all-in-one ADAS Calibration and Wheel Alignment system.

Want more info? Visit www.maxisysadas.com

And even for those who would rather send it to the local dealer or ADAS calibration specialist, the Autel MS919 makes it easy to identify exactly what systems are on the vehicle being serviced. Simply perform a full system prescan of the vehicle and open the report. Modules that are part of a related ADAS system are called out, and knowing what the car has on it makes it easier to identify what, if any, calibration steps you need to take prior to returning the vehicle to your customer.

Ignorance is no excuse, and failure to calibrate a system requiring calibration post-repair could open you and your shop to potential liability. To learn more about how Autel and its line of ADAS and diagnostic tooling can help, visit www.maxisysadas.com and www.autel.com. **ZZ** 





SCAN TO SEE THIS MONTH'S EDITION OF THE TRAINER!

SIGN UP FOR YOUR SUBSCRIPTION TODAY AT **CONNECT.MOTORAGETRAINING.COM** 







# YOU DON'T CUT CORNERS. NEITHER DO OUR PRO PARTS.

Get unmatched performance and reliability with Carquest Premium control arms. These high-quality control arms are engineered for superior performance and OE fit, form and function. Learn more about our Carquest chassis and steering products at my.advancepro.com/chassis.









## YOU'RE COVERED

Worldpac has the quality OEM brands you trust.















































































