

HELP YOUR TEAM GROW.

CTI®+WTI® offers the most comprehensive technical and business training available. Help your whole team grow their skills at any stage of their career.



Start Today at www.ctionline.com.



32 HELD CAPTIVE BY A CAPTIVA

Misfires are common. GDI misfires add new dimensions to this common malady.

48 PARTS AUTHORITY

Using salvaged parts to repair customers' cars? Only if the car lets you!

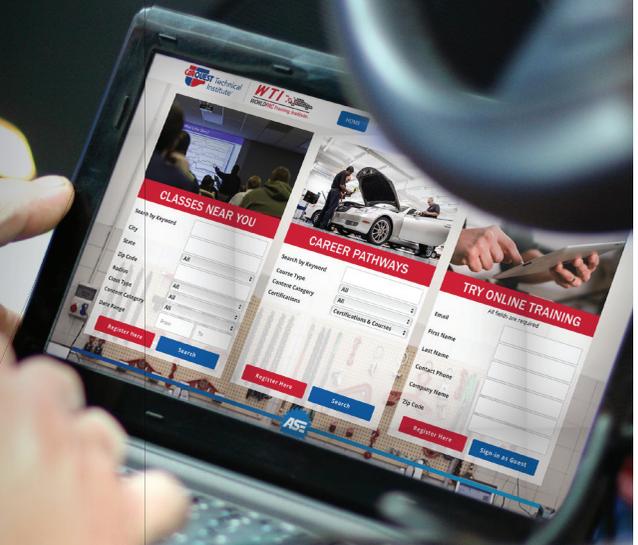
56

THE TRAINER:
THE ONE SKILL
YOU NEED TO
MASTER



NEW TRAINING ON US!

Register as a guest at ctionline.com
to try a free online course.



Register Now at www.ctionline.com.





32 HELD CAPTIVE BY A CAPTIVA

Misfires are common. GDI misfires add new dimensions to this common malady.

48 PARTS AUTHORITY

Using salvaged parts to repair customers' cars? Only if the car lets you!

56

**THE TRAINER:
THE ONE SKILL
YOU NEED TO
MASTER**



**THE
VENDOR
SAID THEY
WOULD STAND
BEHIND THEIR
PARTS.
BUT ONLY
THOSE BIG
ENOUGH
TO HIDE
BEHIND.**



OMNICRAFT™ GETS IT. FORD BACKS IT.

Premium Omnicraft parts come with a warranty* that includes labor and has no commercial exceptions. Trust Omnicraft for your non-Ford vehicle repairs. OmicraftAutoParts.com

*Limited labor costs. See seller for limited-warranty details.
Omicraft™ is a trademark of Ford Motor Company.



Backed by Ford Motor Company

OPERATIONS

PROFIT MOTIVE

12 IDENTIFY TRIALS IN YOUR SHOP AND GET THROUGH THEM

There are three benefits to facing hardships and overcoming
CHRIS "CHUBBY" FREDERICK // Contributing Editor

14 FILL YOUR SLOW DAYS

Innovative digital technology can help drive customers to your shop during lags in business

TIM ROSS // Contributing Editor

FINANCIAL FIGURES

18 HR, TECHNOLOGY THE BIGGEST ISSUES IN BUSINESS TODAY

Without a clear focus, you have an inefficient, unprofitable and stressed shop

BOB GREENWOOD // Contributing Editor

20 BE EXCELLENT TO EACH OTHER

A peer-to-peer networking structure can bring endless benefits to your business

MANDEE BRADSHAW // Contributing Editor

ASA INSIGHT

24 IS CASH FOR CLUNKERS 2.0 ON THE HORIZON?

U.S. Senator Schumer proposes Clean Car Initiative

ROBERT REDDING // Contributing Editor

26 MEASURE TO SUCCEED

Set targets for success, track your progress and make adjustments as needed

JOHN BURKHAUSER // Contributing Editor



TECHNICAL

32 HELD CAPTIVE BY A CAPTIVA

Misfires are among the most common drivability issues we deal with. GDI misfires, though, add new dimensions to this common malady.

SCOT MANNA // Contributing Editor

36 TACKLING THE TOUGH ONES

Some scary diagnostic challenges often turn out to be easy to handle. And the "easy" ones often turn out to be the toughest!

G. JERRY TRUGLIA // Contributing Editor

42 UTILIZING NON-INTRUSIVE TESTS FOR DRIVABILITY

Making the judgement on a high-dollar repair requires being accurate the first time

TIM JONES // Contributing Editor

48 PARTS AUTHORITY

Using salvaged parts to repair customers' cars?

Only if the car lets you!

JOHN ANELLO // Contributing Editor

56 THE ONE SKILL YOU NEED TO MASTER

Every day, the modern automobile becomes more electrified. This demands that you master the skills needed to be an effective electrical troubleshooter.

PETE MEIER // Technical Editor

IN EVERY ISSUE



4 INDUSTRY NEWS

MAHLE AFTERMARKET GIFTS PETTY'S GARAGE CHALLENGER

ENDEAVOR ACQUIRES AUTOMOTIVE GROUP FROM INFORMA

BOLT ON TECHNOLOGY, SIRIUSXM PARTNER

53 AUTOMOTIVE PRODUCTS GUIDE

54 AD INDEX



WATCH NOW

**MEASURE AND
CREATE BIG
RESULTS FROM
YOUR MARKETING**



Watch at MotorAge.com/BigResults

WEB EXCLUSIVES // MOTORAGE.COM



THE MPA TECHNICAL SUPPORT DIFFERENCE

Technicians demand the latest technical information for vehicles on the road today. Motorcar Parts of America now offers innovative technical repair information that covers vehicle specific system issues, general installation best practices and tech articles from ASE certified Master Technicians.

MOTORAGE.COM/MPA



GOING SOCIAL: WHERE YOU HAVE TO APPEAR

This is your chance to get a fresh look at social media with industry experts from the automotive segment and the social marketing arena. Watch "Improving Your Social Standing" now to get answers to business-changing questions!

MOTORAGE.COM/GOINGSOCIAL



MotorAge

MOTORAGE.COM

1100 Superior Ave. Suite 800 // Cleveland, OH 44114

Phone: (216) 696-7000

EDITORIAL STAFF

MICHAEL WILLINS
GROUP CONTENT DIRECTOR
michael.willins@ubm.com
(440) 891-2604

KRISTA MCNAMARA
CONTENT CHANNEL DIRECTOR
krista.mcnamara@ubm.com
(440) 891-2646

CHELSEA FREY
SENIOR ASSOCIATE EDITOR
chelsea.frey@ubm.com
(440) 891-2645

PETE MEIER ASE
TECHNICAL EDITOR
pete.meier@ubm.com

STEPH BENTZ
ART DIRECTOR

STALIN ANNADURAI
SENIOR DESIGNER

JAMES HWANG
EDITORIAL DIRECTOR, ASE STUDY GUIDES
james.hwang@ubm.com
(714) 513-8473

CONTRIBUTORS

ROBERT BRAVENDER
CHRIS CHESNEY
CHRIS FREDERICK
DAVE HOBBS
JOHN D. KELLY
TONY MARTIN
DAVE MACHOLZ
SCOT MANNA
RICHARD MCCUISTIAN
MIKE MILLER
ALBIN MOORE
ERIC OBROCHTA
SCOTT SHOTTON
BERNIE THOMPSON
G. JERRY TRUGLIA

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:



BUSINESS STAFF

JIM SAVAS
VICE PRESIDENT/GENERAL MANAGER

TERRI MCNAMIN
GROUP PUBLISHER
terri.mcnamin@ubm.com
(610) 397-1667

DAVID PASQUILL
COMMERCIAL FINANCE PARTNER

SOFIA RENTERIA
BUSINESS ANALYST

JILLENE WILLIAMS
SALES COORDINATOR

KAREN LENZEN
SR. PRODUCTION MANAGER
(218) 740-6371

TRACY SKALLMAN
AUDIENCE DEVELOPMENT MANAGER
(218) 740-7204

TSCHANEN BRANDYBERRY
SPECIAL PROJECTS EDITOR

DOMESTIC SALES

MIDWEST & WESTERN STATES,

CLASSIFIED SALES

MICHAEL PARRA
michael.parra@ubm.com
(704) 919-1931

ILLINOIS, EASTERN & SOUTHERN STATES

PAUL ROPSKI
paul.ropski@ubm.com
(312) 566-9885
Fax: (312) 566-9884

OHIO, MICHIGAN & CALIFORNIA

LISA MEND
lisa.mend@ubm.com
(773) 866-1514

REPRINT SERVICES

Licensing and Reuse of Content
Contact Wright's Media at
informa@wrightsmedia.com
or call 877-652-5295
for more information.

CUSTOMER SERVICE

For Subscription Inquires or Changes
Email – passthease@ubm.com
or Call 800-240-1968

Motor Age (Print ISSN: 1520-9385, Digital ISSN: 1558-2892) is published monthly, by UBM LLC, 325 W. 1st Street, STE 300 Duluth, MN 55802. Periodicals postage paid at Duluth, MN 55806 and additional mailing offices. POSTMASTER: Send address changes to Motor Age, P.O. Box 6019, Duluth, MN 55806-6019. Please address subscription mail to Motor Age, P.O. Box 6019, Duluth, MN 55806-6019, Canadian G.T.S. number: R-124213133RT001. One-year rates for non-qualified subscriptions: U.S. \$70.00; Canada/Mexico \$106.00; International surface \$106.00.

©2019 UBM. 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 retrieval 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 UBM for libraries and other users registered with the Copyright Clearance Center, 222 Rosewood Dr. Danvers, MA 01923, 978-750-8400 fax 978-646-8700 or visit <http://www.copyright.com> online. For uses beyond those listed above, please direct your written request to Permission Dept. fax 732-847-1104.

UBM 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 UBM to make your contact information available to third parties for marketing purposes, simply call toll-free 800-240-1968 or email passthease@ubm.com and a customer service representative will assist you in removing your name from UBM'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.

GLOBAL LEADER

IN AUTOMOTIVE DIAGNOSTIC TOOLS

**LAUNCH
TECH USA**

**PRO-LINE
SOLUTIONS**



X-431 Throttle

- IP65 Waterproof & Dustproof
- Cover ADAS Calibration Systems
- Support HDIII Heavy Duty Module
- Tech 2 Tech Remote Diagnosis
- OE Level Vehicle Coverage
- Bi-directional Capabilities



10.1" in Display
(1920 x 1200)



CPU: 8 Core
2.0 GHz



4 GB
64 GB Slot



Android™ 7.1
System



8 MP Front
13 MP Rear



Dual Wi-Fi



Product
Kickstand



9,360 mAh
Quick Charge

GOOD

X-431 Torque



Experience the Ease,
Feel the Power!

BETTER

X-431 PAD II AE



IP65 Waterproof and
Dustproof!

BEST

X-431 Throttle



Drive the Throttle,
Launch the Power!

LAUNCH

www.LaunchTechUSA.com

[LaunchTechUSA](https://www.facebook.com/LaunchTechUSA)

1-877-528-6249



GIVEAWAY

MAHLE AFTERMARKET GIFTS PETTY'S GARAGE CHALLENGER

MOTOR AGE WIRE REPORTS //

➔ Jim Pickles, a technician at J and J Automotive, Inc. in Rhinebeck, NY, was the Grand Prize winner of the 2019 MAHLE "Drive With the Original" promotion. He was awarded a Petty's Garage supercharged Dodge Challenger on the first day of this year's Automotive Aftermarket Product Expo (AAPEX) in Las Vegas.

Motorsports legend Richard Petty was on hand to present each of the four finalists with the opportunity to draw

a key fob from his signature Charlie One Horse cowboy hat — one of which unlocked the doors of the 1,100-horsepower Challenger.

"I was on pins and needles when it was my turn to pick the fob from Richard Petty's hat," said Pickles. "When I approached the car and pressed down on the fob, I never believed it would actually work. I've never won anything like this in my life!"

"On behalf of the entire MAHLE family, I want to congratulate Jim for being

>> GIFT CONTINUES ON PAGE 5

BREAKING NEWS

ACQUISITION

ENDEAVOR ACQUIRES AUTOMOTIVE GROUP FROM INFORMA

➔ Endeavor Business Media, the publisher of vehicle services publications including PTEN, has purchased Informa's Automotive Group — comprised of *Motor Age*, *ABRN* and *Aftermarket Business World*.

Informa's Industry & Infrastructure group was also included in the acquisition.

With a committed focus on delivering exceptional content and business opportunities, these Informa brands will join Endeavor's complementary portfolio of brands and events to create new multi-channel platforms for its audience and advertisers.

Endeavor's Vehicle Services Group includes *PTEN*, *Fleet Maintenance*, *Professional Distributor* and *VehicleServicePros.com*, all complimentary to the Informa Automotive Group's titles.

>> BUY CONTINUES ON PAGE 5

TRENDING

MUDLICK MARKETING MAKES LEADERSHIP CHANGES

Zenon Olbrys has been named Chief Executive Officer and Nelson Rodenmayer was promoted to Senior Vice President of Sales. Tim Ross will serve as president.

MOTORAGE.COM/CHANGES

BOSCH MAKES MAJOR UPDATES IN 4.0 SOFTWARE

Bosch announced a new software release for its ADS 325 and ADS 625 that includes many new and improved features, including faster scanning, enhanced coverage and access.

MOTORAGE.COM/4.0

NRS BRAKES LAUNCHES NEW BRAKE PAD LINE

NRS Brakes has released NRS Galvanized Brake Pads, which will become the gold standard in brake pads, resulting in the greatest ROI for both commercial and consumer applications

MOTORAGE.COM/NRS

ZF AFTERMARKET, ASE NAME TECH OF THE YEAR

ZF Aftermarket has named Thomas TJ Anderson, a tech of more than 40 years, from BLVD Autoworks, as the ZF/ASE Aftermarket Master Automobile Technician of the Year.

MOTORAGE.COM/ZFASE

CLOYES EARNS BEST NEW PRODUCT AT AAPEX

The Cloyes Variable Valve Timing Chain Kit has earned the Best New Product Award in the Hard Parts category of the New Product Showcase at AAPEX 2019.

MOTORAGE.COM/CLOYES

>> GIFT CONTINUED FROM PAGE 4

the Grand Prize winner of this awesome car!" said Jon Douglas, President, MAHLE Aftermarket North America. "I had the opportunity to drive this machine, and I didn't want to get out! We also want to thank the other three finalists, as well as the thousands of technicians around the country, for supporting the 'Drive With the Original' promotion and placing their trust in the MAHLE brand."

The four finalists were randomly selected from entries submitted since

the launch of the promotion earlier this year in March.

The four finalists each received a trip to Las Vegas to participate in the special grand prize ceremony held at the MAHLE Aftermarket exhibit on the opening day of AAPEX 2019.

Pickles is still in disbelief that he is the Grand Prize winner of this one-of-a-kind, customized vehicle from Petty's Garage. Being able to meet "The King" himself in person in Vegas was a bonus. "I cannot wait to bring the Dodge Chal-

lenger home to show it off to all my friends and family, and especially my co-workers," said Pickles. "I think I can safely say that Christmas came a little early for me this year, and I am forever grateful to MAHLE for sponsoring this once-in-a-lifetime promotion!"

In addition to the grand prize, hundreds of instant win prizes were awarded in the promotion, including Richard Petty Driving Experiences, Richard Petty-autographed Charlie One Horse cowboy hats, and No. 43 diecast model cars. **TL**

>> BUY CONTINUED FROM PAGE 4

"Endeavor is very excited about bringing the Industry & Infrastructure Intelligence and Auto Aftermarket media brands into the business to expand what we are already offering in these growing markets. We look forward to investing in these brands to take them to the next level for long-term sustainable success, leveraging Endeavor's platform-wide strengths in print, digital, events and marketing solutions," said Chris Ferrell, CEO of Endeavor Business Media.

"We are confident that the alignment of Informa and Endeavor's brands in these markets will provide greater scale and innovative new opportunities for clients and audiences alike. Endeavor's culture and organizational structure based in a data-informed, customer-first philosophy will create a compelling market advantage and new opportunities for the whole portfolio. With Endeavor's investment in new and

cutting-edge products and services, this opportunity to bring aligned marketing services capabilities and talent from Informa to Endeavor will be a great fit for all," commented Sue Boehlke, President at Informa Intelligence. Informa was advised by JEGI (www.jegi.com), a leading independent investment bank focused on media, marketing, information and technology.

With this acquisition Endeavor Business Media now has 600 employees that produce 80+ brands, 59 live events and 50+ innovative marketing solutions that drive awareness and conversion.

The acquisition of these top brands advances the company's initiative of actively growing and investing in high quality B2B media brands that deliver excellent content and uniquely valuable experiences for its audiences and partners. **TL**

PRESIDENT BUSH SPEAKS AT AAPEX 2019

MOTOR AGE WIRE REPORTS //

George W. Bush, 43rd President of the United States and founder of the George W. Bush Presidential Center, joined AAPEX 2019, offering his thoughts on eight years in the Oval Office, the challenges facing the nation in the 21st century, and the power of freedom.

Bill Rhodes, chairman, president and CEO, Customer Satisfaction, AutoZone, joined the president in his conversation with the AAPEX audience. Throughout their discussion, President

Bush emphasized the importance of the principles that defined his presidency: freedom, opportunity, responsibility and compassion.

President Bush was sworn into office on Jan. 20, 2001, and served as Commander in Chief for two consecutive terms. Before his presidency, he served for six years as Governor of the State of Texas.

As Commander in Chief, he worked to expand freedom, opportunity and security at home and abroad. His Administration reformed America's education system, restored robust private-sector

economic growth and job creation, protected the environment, and pursued a strategy to keep America safe after the terrorist attacks on Sept. 11, 2001.

Since leaving office, President Bush and former First Lady Laura Bush have focused on developing the George W. Bush Presidential Center at Southern Methodist University in Dallas, Texas. The Bush Center is home to the George W. Bush Presidential Library and Museum and the George W. Bush Institute, a nonpartisan public policy and leadership development. **TL**

ARE WOMEN IN THE INDUSTRY “THERE” YET?

ALAN SEGAL // Contributing Editor

For women across the aftermarket, has this industry lived up to its promise as a welcoming environment? A tiny sampling of them representing installer services spoke candidly about lower barriers to entry and upward mobility. While male influencers figure in and overt sexism is ebbing, these professionals credit Women in the Auto Care (WiAC), a vibrant community within the Auto Care Association trade organization.

Each backstory is encouraging. But more evidence is needed to validate the nagging concern of whether this industry is hospitable to women at every level all the way up to the manufacturers.

For starters, let's rejoice in everybody's gains. Never confuse empowerment with male bashing, many say. They view empowerment strictly by attitude — that is by “doing the job right,” said Jacquie Hower and her mother, Judy, joint operators of a full-service repair facility in Mechanicsburg, Pa. Judy Zimmerman insists on an egalitarian culture where women should be encouraged at the earliest age to embrace their potential rather than bend to societal expectations. A handful of people praised TechForce, a non-profit foundation that opens vocational training opportunities to youngsters contemplating the technician career track.

Negativity about one's personal callings can inflict self-destructive habits. Over a social media video narrated by Christina, who found herself attracted to the mechanical workings of car engines, but lacking a grounded role model in high school, the lure of recreational drugs swept her into prison rehab. Given a second chance, Christina's passion for car restoration landed her into an automotive trades school. With support from her current employer, a high-end Euro-

pean facility in nearby Temecula, Calif., servicing cars is now Christina's haven for nourishing her ambition to earn the Automotive Service Excellence (ASE) certification. From there, Christina has set her sights on electric propulsion technologies.

Amy Mattinat, a Vermont-based shop owner who guided WiAC's transformation, has given the members the resources to forward their careers. Early on when Auto Care Association president Bill Hanvey endorsed this growing movement, a positive multiplier effect was set in motion.

A mentor introduced Christina to WiAC. They spotted her budding talents that resulted in scholarship funding. Everyone at Zimmerman Automotive benefited from WiAC, contends Jacquie Hower. Together on regular brainstorming sessions with fellow shop owners and corporate executives, she brought home best practices ranging from service marketing to employee relations. Even at AutoCraftmen in Montpelier, Vt., Mattinat accompanied her service writer to WiAC conferences, and continues to reinvest in education for her ASE-trained technicians. When it comes to rolling out the welcome mat in developing women into the aftermarket, there's plenty to cheer about.

Almost.

Here's what you should know about the occupational earnings gap. The aggregate female to male spread totals one-third, writes *The Economist*. As for finding employment, male graduates in math and science have a higher likelihood, and even if women do accept a position, they're apt to leave sooner. Male-dominated environments make fertile hazing grounds versus those in roughly equal numbers.

Perhaps not for long. Catalyst, a non-profit think tank on women in the

workplace, concludes that females now make up 27 percent of jobs across the automotive and industrial manufacturing spaces. By next year, one expert predicts that they will surpass the one-third mark.

This industry lacks specific data along the lines of *Catalyst* and *The Economist*. One way to zero in on causes that matter is to launch a gender sentiment index. Established hard data will help validate the questions on happiness in the industry that addresses equal pay, harassment and integration. Actionable benchmarks will help prioritize what needs to be done to recruit and retain the sisterhood, and next focus on more pressing issues like education and training.

The Auto Care Association annually publishes a statistical abstract. Already in place are many capable people who can gain an understanding of members' attitudes and opinions on key issues. A gender sentiment index survey would provide a means of incorporating anecdotal measures into a quantifiable one that allows comparing one result against another from a previous period. By having access to publicly available information, company managers would be able to gauge attitudinal expectations and probable trends or future behaviors. In short, a key issues impact survey will judge the level of optimism or pessimism by the survey respondents.

Converting scattered opinions into one can catalyze an engaged discourse about more female involvement into roles they deserve. WiAC has shown their value in boosting their bottom lines and keeping independent automotive services profitable. All it takes is for active collaboration between the stakeholders to push for a womens' sentiment index. This is an inclusive culture we can easily afford. **ZZ**

Raybestos® Element3™ Line Enhanced for Ultimate Performance

An innovative offering with upgraded product attributes for increased performance and a longer life, the ultra-premium Element3™ brake line includes a full selection of components for complete braking system coverage.



ELEMENT 3

TM

driving
the **FUTURE**
of STOPPING



Raybestos
The best in brakes®

www.raybestos.com

AUTO VALUE AND BUMPER TO BUMPER NAME TECHNICIAN OF THE YEAR

MOTOR AGE WIRE REPORTS //

Auto Value and Bumper to Bumper's own Jason Jackson was honored along with 52 other top technicians from around the country at the ASE Technician Awards Reception in Scottsdale, Ariz. Nov. 13.

Jason Jackson, the Auto Value and Bumper to Bumper 2019 United States Technician of the Year, was flown out to Arizona with his wife Claudia and his parts supplier Pat Winters, vice president of sales and marketing at Warren Distributing, Inc., for two days of fun and recognition.

"It was an honor to stand on stage and award the 2019 ASE Technician Award to Auto Value and Bumper to Bumper Technician of the Year Jason Jackson of Seal Beach, California," Winters said. "There were 53 winners who got awards on the stage, all with the same goal of being the best they could be and furthering our industry through talent and hard work.

The many backstories on how they got to this point were heartwarming and very impressive. Congratulations to the techs and thank you to ASE for their hard work in helping the industry recognize the best of the best."

Jackson, his wife, and Winters were welcomed to Scottsdale with an opening reception Tuesday and closed out the trip with the awards banquet Wednesday evening.

"ASE has honored extraordinary industry professionals from across the nation for more than 40 years," said Tim Zilke, ASE President & CEO. "This is made possible by the support of our many award sponsors, whose ranks include some of the best-known names in the industry. We are proud to partner with Auto Value and Bumper to Bumper to recognize Jason's commitment to excellence in providing the very best in auto repair. This dedication is reflected in the talented professionals we recog-

nize each year, and Jason represents the best of the best."

While all 53 winners were ASE-certified, Jackson distinguished himself even further as an ASE master technician with A1-A8 and L1 certifications. He is also nationally recognized as a Kia master certified technician who came in second in the Kia World Skills Cup in 2018. He earned his AAS degree in automotive technology from Salt Lake Community College, and he continues to further his education with various after-market training classes.

He has been working as a technician for five years. Earlier this year, Jackson earned the highest score on a custom ASE test at Auto Value and Bumper to Bumper's Technician of the Year finalist trip in Detroit, Mich., which was sponsored by DRiV. As a result, he won the program group's Technician of the Year designation and was honored at a banquet during the trip. **TZ**

ASA HIRES NEW MEMBER SERVICES DIRECTOR

MOTOR AGE WIRE REPORTS //

The Automotive Service Association announced the hiring of Blair Calvo as its new director of membership.

Calvo will be responsible for overseeing member services, including addressing the needs of current members and leading efforts to recruit new members.

She comes to ASA with extensive association management experience.

"There were a field of candidates who applied for this position. I knew that when I interviewed Blair she was 'the one,'" said Ray Fisher, ASA's execu-

tive director. "Blair's resume was impressive, her references commending, but it was her interview that sold me. She had a clear understanding about member services and affiliate relationships. Having Blair on our team just raised the value of our staffing asset account!"

During her first couple of weeks, Calvo will be immersed in ASA's database management system, benefit provider portfolios and reviewing existing departmental policies.

Her association management experience includes her most recent member

service role at the Dallas County Dental Society. Prior to that, she served as director of membership for the Dallas Builders Association.

In addition, she held a variety of membership roles as association liaison, advocacy and member outreach manager, as well as association executive for various associations.

"I am thrilled to be part of the ASA team," Calvo said. "My entire career has been spent in the association industry, and I look forward to continuing that tradition by providing member solutions to ASA's current and future members." **TZ**

PARTNERSHIP

BOLT ON TECHNOLOGY, SIRIUSXM PARTNERSHIP GIVES SHOPS OPPORTUNITY TO INCREASE CUSTOMER LOYALTY

At AAPEX 2019, BOLT ON TECHNOLOGY announced a new collaboration with SiriusXM, the world's largest audio entertainment company, that gives repair shops using BOLT ON TECHNOLOGY's digital communication software an opportunity to enhance customer service and relationships with customers.

Repair shops using BOLT ON TECHNOLOGY's software can enroll in the SiriusXM Service Lane for Shops program and offer their eligible customers a complimentary three-month SiriusXM All Access subscription.

Gail Berger, Vice President and General Manager, Automotive Remarketing at SiriusXM, spoke to the companies' partnership. "There was a natural opportunity to work together. BOLT ON's already providing a lot of value for shops through technology and services, and SiriusXM can become part of that package to give shops yet another tool to offer their customers."

Mike Risich, BOLT ON TECHNOLOGY's founder and CEO, shares, "The program allows repair shops to have a perk—something they can offer vehicle owners that they're not getting anywhere else. The program was just launched this morning [November 6], and an hour later we had multiple shops that had signed up. It's a very exciting opportunity."

BOLT ON has been focused on the vehicle owner experience since 2014. While workflow automation technology is still the backbone of what BOLT ON offers, the company altered its marketing angle to be more vehicle owner-specific.

This change in focus is helping to improve the public's negative perception of repair shops and automotive service, which

has been a consistent challenge for the industry. Risich states that offers like the new SiriusXM program can help build trust between customers and repair shops. He explains, "How do we help change the popular opinion of automotive repair—that we're all being taken for a ride? Vehicle owners put a lot of trust in the transaction with repair shops and technicians. A lot of times technicians don't get the credit they deserve from customers and the general public. That's where BOLT ON is really trying to help with that vehicle owner experience. Repair shop customers can fully understand the value that's exchanged with their dollars."

Berger added, "SiriusXM can be something that the repair shop offers as a thank you to customers and to help increase customer allegiance and retention. In addition, new customers may come to the shops offering this program after learning about it through friends or family." 

TRAINING EVENTS

FEBRUARY 19-22, 2020

MACS 2020

Nashville, Tennessee

MARCH 5-8

VISION Hi-Tech Training & Expo

Kansas City, Missouri

MARCH 21

TST Big Event

Tarrytown, New York

MARCH 27-29

ASA Northwest ATE 2020

SeaTac, Washington

AMI AUTOMOTIVE
MANAGEMENT
INSTITUTE

Management & Administrative

- Training
- Education
- Career Paths
- Certificates
- Professional Designations
- Learning Support

Convenient,
effective, online
courses and
advanced
instructor-led
classes.

*The knowledge
you need for the
business you
want.*

amionline.org



BRAKES THAT WON'T
STOP
YOUR



SHOP.



Don't let brake jobs slow you down. Motorcraft® brake calipers arrive ready for installation. All you do is add Motorcraft pads. Plus, they're coated to help prevent corrosion. Keep your shop moving with Motorcraft calipers. See your local dealer or distributor for all the details.



Motorcraft®

Right part. Priced right.

Motorcraft® is a registered trademark of Ford Motor Company.

Identify trials in your shop and get through them

There are three benefits to facing hardships and overcoming

Have you ever gone through a very difficult period or time at the shop? You know, that time when nothing seems to go right — customers are upset, employees are disgruntled, sales aren't where they're supposed to be, and so on? It's very possible that you could have been going through a trial. Let's listen to Head Coach Mike Haley explain how we help ATI members implement action steps to overcome trials successfully.

Trials are various difficulties, hardships or problems, especially those that test one's courage, endurance or resolve. How do you handle trials, disappointments, hardships and curveballs? Are you aware you are in a trial? Do you ignore them? We all deal with different types of trials, sometimes many at once. There are relationship trials, marriage trials, physical trials, financial trials, business trials and so on. I believe you're always in one of three stages of trials: coming out of a trial, currently in a trial or getting ready to go through a trial.

Nobody likes trials, and nobody invites trials, but there is definitely a pur-

pose for them. Most are due to decisions we made that differ from our values, or in other words, poor decisions. These trials cause a lot of pain and heartache. They sometimes appear out of nowhere, and believe it or not, are not caused by us directly. But we are all going to have trials, and we need to face them head on and not bury our heads in the sand.

WE ARE ALL GOING TO HAVE TRIALS, AND WE NEED TO FACE THEM HEAD ON AND NOT BURY OUR HEADS IN THE SAND.

We've got this weird love/hate relationship with trials. We love to watch other people go through trials, but we hate to go through trials ourselves. Think about how often we watch people go through trials all the time on TV. Netflix has all kinds of series on people going through different kinds of trials. We even have the show "Naked and Afraid" — about couples who are dropped off in the middle of the jungle naked and we

watch them try to survive! In this case, naked isn't a good thing. Then, there's Facebook. Someone submits a juicy or controversial post. You read it, then go and get a bowl of popcorn, and just sit back and watch all the comments firing back. We like watching trials because we know it produces something. It produces a winner or a loser — a person who either meets our expectations or exceeds our expectations or falls below our expectations. You'll find out if their character stands true, or are they all show and no go?

When it's our turn, we want nothing to do with trials. But we need to understand that there's a purpose in the trial. If you don't first see the purpose, you're never going to motivate yourself through it. To help you out, I'm going to give you the three primary purposes of a trial.

1. Trials bring revelation

A trial will prove to yourself and others that what you believe is truly in you and not just something you say. For example: when an engineer builds a motor, he will test that motor to ensure it can fulfill its purpose. He will put that motor on a stand and hook it up to a dynamometer. He doesn't just break it in; he pushes that motor to its limit and beyond to ensure that it will deliver what's promised. Afterwards, the engineer can state with confidence that his company sells motors that are built to last. Likewise, the trials that we go through prove to us that we are too.

2. Trials bring refinement

Think of refinement like a trainer. I wish we could get bigger, faster and stronger



UNCOVER HIDDEN PROFIT IN YOUR SHOP

ATI

JOIN OUR **AUTO SHOP OWNER EVENTS!**

REGISTER NEARBY OR ONLINE AT WWW.ATIEVENT.COM

by just wishing it. I would love to get all my vitamins and minerals by just looking at a picture of vegetables. I wish I could go to the gym and sit on a bench and yuk it up with the guys and then leave 15 minutes later all “swolled” up. It just doesn’t work that way. A few years ago, I went to a trainer. He was a handsome man who was positive and energetic and who motivated me that I could change, so I signed up with him. I remember feeling excited that I was going to lose weight and get stronger. I remember going home and telling my wife that I have found the guy who is going to take me to the promised land. The next morning after my first workout I was discouraged and defeated after he put me through the paces. I found out quickly I was never going to get the results without doing the work. You must put in the work and break a sweat. Trials are a process and you must go through them. It’s also done to course-correct us.

3. Trials bring reward

So now that your beliefs are tried and true, you get to enjoy the rewards of being a trial survivor. As I was writing this article, a show on Navy Seal training was playing in the background on the History channel. Ironically, the timing was perfect in proving my point. The sole purpose for Navy Seal training is to find the top one percent of service men and women who can serve within this elite special operations force. So many soldiers think they can go through these trials to become a Navy Seal. The trials are designed to test whether they can do the physical, mental, and emotional work to endure the toughest circumstances. All the while, the instructors are trying to get them to surrender and ring the bell. They tell them: “Just ring the bell and we’ll get you a warm shower, a hot meal, and a comfortable bed . . . Just ring the bell and it will all be over.” The soldiers who truly believe that they are meant to be a Seal try to push themselves past their full potential. The soldiers next to them, while doing the drills, are saying “Don’t you dare ring that bell . . . you can do it; you have what it takes.” Finally, soldiers who don’t ring the bell get the rewards. They are now the best of the best. They know they received the best training in the world and gain instant respect and gratitude in the world because they are a Navy Seal.

Hopefully this advice helps with clarifying why it’s important for you and your business to go through trials and that they shouldn’t be ignored. Recognize that there are reasons for the trials and, if identified correctly, there’s a reward at the end. Remember, our instinct is to ignore or deflect them, but doing so won’t help your employees or customers, nor will it make you the best repair shop around, or a true leader that people will follow. You must truly believe that what you are going through is for the very best. It’s only when you test and refine your beliefs that you can build confidence and gain a sense of peace. You can then rest your head on the pillow at night knowing you have done the work necessary and feel

good about the trial you just went through.

When it comes to going through trials or hard times in general, do you face them head on or rather try to ignore or deflect them? If your answer is the latter, you’re missing out on an opportunity for growth. If you want to simplify going through trials, just go to www.ationlinetraining.com/2019-12 and download the worksheet to find out how to embrace trials as a learning experience and come out better for it. It will give you a new perspective by helping you identify:

- The primary purpose of your trial
- What you will learn from your trial
- Action steps needed to overcome your trial successfully
- Potential rewards from overcoming your trial **TL**



CHRIS “CHUBBY” FREDERICK is the CEO and founder of the Automotive Training Institute. ATI’s 130 full-time associates train and coach more than 1,700 shop owners every week to drive profits and dreams home to their families. Our full-time coaches have helped our members earn over 1 BILLION DOLLARS in a return on

their coaching investment since ATI was founded. This month’s article was written with the help of Head Coach Mike Haley.

chubby@autotraining.net

Solera | **iATN**

Have a Technical Question?
ASK 80,000 OF YOUR PEERS

GET STARTED FOR FREE!

IATN.NET



FILL YOUR SLOW DAYS

Innovative digital technology can help drive customers to your shop during lags in business

TIM ROSS // Contributing Editor

Imagine this scenario: You walk into your shop Monday morning to find the phone ringing off the hook, a line of customers dropping off cars and a car or two in your parking lot, towed in over the weekend. Just two days later, however, the phones are dead, and your lobby has turned into a ghost town.

For many shop owners, this sequence plays out every week. Many shops start and end the week strong but suffer through slow days in between. Consumer behavior dictates this pattern. If a customer's car breaks down on a Sunday, they'll naturally want to get it

addressed first thing Monday. Likewise, if a customer is planning a weekend road trip, they'll want to schedule maintenance on a Friday or even a Saturday before they leave. Customers also tend to prefer wrapping up maintenance at the end of the work week even if they aren't traveling.

Although old habits are hard to break, there are things you can do to help shift behavior and generate more business on those slow days. Increasing your marketing is a good start. New digital platforms provide the ability to deliver your offers to target audiences fairly quickly, giving you more flexibility

to drive traffic to your shop on the days you need it most. In contrast, traditional advertising channels, like broadcast and print ads, can take weeks or even months to produce. The chart on page 16 is one we often use with our clients to show how long it takes to launch specific types of ads in the market. As you can see, social media provides the fastest turnaround, while a shared mail campaign (which features several different ads in one mailed package) takes the longest.

Digital advertising also provides the ability to change your promotions easily if they're not yielding the results



***KEEP YOUR CAR
RUNNING FOR
THE ENTIRE
FAMILY.***



**Order engine parts online
at www.partsology.com**

**Free next day delivery
if you order by 4pm.**

Questions? Toll free 1-844-800-6866

Average Time To Market



*Time to market represents the average number of days once a creative is finalized until the ad is live in market.

you want. Of course, while speed and flexibility are important, targeting is also key. And digital offers advantages in that area as well, allowing shop owners to target potential customers much more strategically than a radio or television ad, which is often seen or heard by consumers who would never visit your shop because it's not conveniently located to where they work or live.

Even with the benefits that digital channels provide, it's important to select the digital tactic that is going to be most effective in achieving your goal, which in this case, is luring customers to your shop when business is normally slow. Messaging is also key and must align with whatever your objective is. Some shops simply want to increase their car count, so they don't have technicians sitting around on slow days with nothing to do. In that case, discounted oil changes or tire rotations are great specials to promote because even though they're low-cost services, they keep techs busy and could lead to other services in the future. On the other hand, if a shop wants to focus on increasing sales, offering discounts on bigger ticket repairs or

10 percent off parts and labor might make more sense.

With that in mind, here's a look at the digital channels we recommend utilizing to help boost your business during those slow days.

Email marketing

Email campaigns might be the cheapest and simplest way to drive business to your shop. This low-cost approach also provides a good opportunity to reconnect with existing customers since they're the group most likely to receive your email. They're also more likely to respond to your offers than a new customer since they're already familiar with your shop and services. Most email marketing programs include templates that can be easily customized to feature whatever promotion makes the most sense for you. One option, for example, is a Wild Wednesday coupon with offers good for that day only. You can then program your campaigns to automatically send an email every Tuesday night or Wednesday morning. The other nice thing about email marketing is that you can readily track open rates and click-throughs to gauge effectiveness.

Pay-per-click

What makes pay-per-click (or PPC) particularly attractive is the flexibility it provides, allowing advertisers to easily adjust the budget they allocate for paid search on short notice. For those unfamiliar with PPC, it basically refers to the model advertisers use to capture attention when consumers search for certain keywords on the internet. Businesses place ads based on specific terms and if a consumer clicks their ad when performing a search, that business is charged for that click. The keywords most in demand fetch the highest prices. So, if you notice that sales are down on certain days, you can easily increase your spend to potentially capture more attention on those days or you can change the keywords you're paying for if they're not producing the results you expected. Likewise, you can also decrease your budget if your shop is already busy and you don't want to generate more demand. The main thing to keep in mind is that there is a finite amount of people searching for auto repair in your area on a daily basis. I recommend working closely with your pay-per-click provider to determine the search bandwidth in your area to avoid overspending.

Mobile geofencing

Mobile geofencing is the practice of sending advertising content to a user's mobile device when they enter a specific geographic zone. This strategy is becoming more and more popular because it enables advertisers to reach customers by location when they are searching through a browser or using an app, increasing the chance that smartphone users will see their ad. Through mobile geofencing, you can target businesses and residences surrounding your shop, giving you the chance to connect with customers when they're at home or at work. In my view, this approach is crucial to driving business on slow days because you're targeting the customers who can conveniently take advantage of your offers. Just be sure to stick to a two or three-mile radius of your shop since that's typically where your target market is.

Targeted display ads

Targeted display ads are the banner ads you see pop up on websites when you're searching the web. They might seem a bit annoying, but it's hard to deny that they draw your attention. Targeted display ads offer a lot of options — you can target people who have visited your site, by keyword, by zip code or by website. This means that if your goal on a slow day is to increase sales by focusing on luring high-ticket repairs, you could target people who have searched on the term "broken transmission" or have visited competitors' sites who specialize in those types of jobs. You can then deliver an ad for discounted transmission repair services to those shoppers. The

variety of targeting available through this type of display ad increases the odds that your promotions will attract the right people and increase traffic when you need it most.

There's no doubt that digital platforms provide new opportunities to connect with your customers and boost business on the slower days of the week.

But when adopting any new marketing strategy, you might find that you'll have to endure a bit of trial and error before landing on the right mix of tactics for your shop. Just be sure to track and measure whatever strategy you employ so you can accurately evaluate how well that approach has worked in helping you achieve your goals. **TL**

Continental 
The Future in Motion

You know us for world class tires...

Now you can say the same
for our **wipers.**

NEW



ClearContact™ premium beam wiper blades.
No adapters. Faster installation. OE fit and quality.

CLEARCONTACT™

Continental-ClearContact.com

ClearContact - A Trademark of the Continental Corporation



TIM ROSS is president of Mudlick Mail, a provider of direct mail services for the automotive service industry. He has been with Mudlick Mail since 2008.

info@mudlick.com

HR, technology the biggest issues in business today

Without a clear focus, you have an inefficient, unprofitable and stressed shop

Everyone is talking about the lack of personnel within the industry and wondering how next year is going to go. Shops are also wondering what type of equipment they should be looking at, and also thinking to themselves, "I can't afford that."

There is not a real human resource shortage; there is a human resource competency shortage. On top of that, there is a technology shortage in the shop as well. We estimate that the average shop is approximately \$150,000 behind in necessary equipment and training, including the addition of up-to-date computer technology that is required today to professionally and efficiently serve the customers coming through the door.

Marry the HR issue and the technology issue, and you have an inefficient, unprofitable and stressed-out shop. Now what?

An understaffed shop cannot be productive enough to drive the necessary bottom line so the shop has the dollars to move forward with required future investments. One issue is that shop management perceives that staff are a cost to the business; therefore, they have put the shop in a position where they are two to three people understaffed. Incompetent staff is a cost to the business; competent staff is prepared to be accountable and will make a company money.

To change this, management must first take an inventory of current staff competencies. Is the current staff trained to the level they need? If not, does each individual have a true desire to be the best that they can be? If they don't have that desire, you have the wrong person

in the shop. Second, does your shop have a physical and business environment where competent people would love to work? If not, fix it. Third, look at what training you need to invest in with current and new staff. Make a detailed list and then introduce to the individual a proper training bond. This protects a shop from making the investment in training and then the individual turns around and leaves. Career-orientated people are starting to understand this necessary step. Job-seeking people will walk away. Fourth, be prepared to pay for competency. The shop must adjust

TODAY'S BUSINESS IS A CHALLENGE TO SAY THE LEAST, BUT SLOW DOWN AND PLAN PROPERLY AND THE BUSINESS WILL CONTINUE TO IMPROVE.

the labor rates to reflect the competency within the shop. Do the math; the right door rate is not a huge increase to the average consumer, yet it goes a long way to moving the bottom line to the right level. Fifth, look to other cities and even countries to attract and recruit the right talent. Too many shop owners stick to their own community thinking and expecting the resources to be available. In many regions of the country, that is not so. Sixth, management must always be on the lookout for good staff. It is a seven-day-a-week, 365-days-a-year mindset. Do not start looking for people only when the occasion arises. The stress factor will keep you up at night.

The second issue is technology. Gone are the days where basic equipment lasts 7-10 years. Constant re-investment will be required to service the technology in today's and tomorrow's vehicles. Technology not only covers equipment in the bays — it also must be examined as to what is required for the individual technician to perform his/her duties efficiently. Technology must be examined for the front counter to ensure the service consultant is effective in completing their tasks and also to educate the consumer on their vehicle. Technology must also be examined for the office to not only complete the book-keeping and accounting accurately but also to be able to follow up with clients, ensuring their experience was a good one for them at your shop. The ability to keep good notes on clients, book future appointments and develop solid relationships is a necessity today, and in many cases, these functions are carried out in the back office so the right technology is required for this as well.

Today's business is a challenge to say the least. Slow down and plan properly and the business will continue to improve. It is a process. *TZ*



BOB GREENWOOD, AMAM, is president and CEO of Automotive Aftermarket E-Learning Centre Ltd. (AAEC),

which provides business management resources for the automotive aftermarket. Bob has more than 36 years of business management experience and is one of 150 worldwide AMI-approved instructors.

greenwood@aaec.ca

Expect More. Expect TYC.

TYC[®]

PREMIUM MIRRORS FOR THE DISCERNING USER

- Designed and tested to meet FMVSS 111, the Federal safety requirement for automotive mirrors
- Similar to OE specifications, down to the connectors, for plug-and-play installation
- Covering the most popular late-model applications



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.org.

For more information about TYC™ replacement automotive parts, consult your local TYC™ parts distributor or look up parts online at www.TYCUSA.com



A peer-to-peer networking structure can bring endless benefits to your business

MANDEE BRADSHAW // Contributing Editor

That's what it's all about right? Supporting the people around you. That's what Bill & Ted did in 1988 in the movie *Bill & Ted's Excellent Adventure*. They were in a spot. They needed to graduate and they relied on one another and they got it done. Maybe a few bumps along the way, but they did it.

To get things done, to move forward, to have a profitable and productive business, relying on your peers is the most important tool a business owner will develop. These relationships and friendships will produce benefits for

your shop — and for you personally — for years to come. In many industries, including the automotive aftermarket, a 20 group is a terrific peer-to-peer networking structure. The shop owners referenced here are members of the DRIVE TOP 20 group.

To have a productive program of networking, here are a few key elements that are crucial.

Trust

Everyone in the group must trust one another. Because they will be exchanging ideas that could be confidential,

trust is imperative. Without the building blocks of trust, any peer-to-peer group won't work. If this group is to function properly, all members will be exchanging ideas, talking about personnel issues, even sharing each other's P&L and KPIs. To get the most out of the group, each member must hold these meetings and conversations in confidence. It's the only way it will work. If trust isn't part of each person's reason for joining, the group will fall apart.

"The relationships you build are instrumental in trusting the person giving you the feedback," said Daniel Antonelli

Made in Germany.
Made for you.

**LIQUI
MOLY**



RUBEN

CORONA AUTOWERKS
HUNTINGTON BEACH

Ruben Corona
I use it!



"LIQUI MOLY makes specific oils
for Asian vehicles like mine."

*Ruben Corona
Corona Autowerks
Huntington Beach, CA*

TRUE STORIES
TRUE BENEFITS. TRUE PASSION.

Instagram Facebook #iuseit

See the whole success story:

www.iuseit.us

For further information or technical support please call 1-888-MOLYOIL (665-9645)

of Antonelli's Advanced Automotive, Grand Junction, Colo.

Structure and rules

Ground rules need to be set. What are the qualifications to be a member? Do the members rotate in and out? A regular schedule of group calls and face-to-face meetings needs to be established. Is there an outside objective and neutral facilitator to keep topics, meetings and members on the right path? These are important initial questions that need to be addressed and solved.

Some groups will start organically. No structure or ground rules. This is a terrific start, but for the group to grow, some organization is needed.

In addition to structure, be sure to set the guidelines. Is there a term limit for each member, the required level of participation? A group needs members eager to participate. Business owners who don't speak up, don't offer solutions and don't participate in calls and meetings should not be part of a peer-to-peer group.

Social media

Social media platforms and networking groups are a natural pairing. For DRIVE, a technology and one-on-one business consultancy firm, the robust participation in the TOP 20 Facebook group is invaluable. This private platform is a daily check-in for many of the TOP 20 members, even a few times a day. The exchange of issues — both big and small — in an environment that all members know is confidential, is invaluable to developing the deep relationships needed for a successful group.

Different perspectives

It's easy to get stuck in your own view of things and your way of doing things in the shop. Maybe there's a different and more productive procedure that you haven't thought of. Being able to access a

network of your peers is great for bringing new or fresh ideas to your business.

"I recommend to anyone who is serious about improving their shop that they need to network and learn from others," said Gabe Christian of Import Performance USA, Bend, Ore.

Transfer of knowledge

Basically, this means don't keep it to yourself. If you have a proven process that has increased profits, why not tell your peers? The concept of sharing is what networking is at its most successful. So if you discovered a great way to onboard a new employee, share it with your group.

"When we get to help another shop owner with an issue, it empowers and inspires us," said Phil Webster of Webster Tire & Auto, Teutopolis, Ill.

Face-to-face

While phone calls, emails and social media connections are great, having face-to-face meetings on a regular basis is key. It will elevate any group to a level of productivity and comradeship that otherwise will not be realized. A top 20 group should meet quarterly and in the auto aftermarket business, the meetings should take place at a member's shop. Nothing can replace the experience of meeting the business owners you have talked to or have exchanged posts on Facebook.

"It's fun and beneficial to travel and visit with other shops. It's very valuable seeing their shops and using some of their ideas. And hopefully, helping them institute some of my own ideas to make their shops better. This situation is nearly impossible to replicate in any other way," said Antonelli.

Encouragement

The most successful shop has its own ups and downs. After all, that's why you keep your eye on your KPIs. If you start to see an issue, that's the time to address it and not ignore it. Being proactive is the sign

of a first-rate shop owner. If you're lucky enough to be a part of a group you know and trust, this is a great resource for those instances when you need a bit of encouragement. Are you making the right decision? If not, they'll be straight with you and give their unvarnished opinion.

"Running a successful shop is hard work and having a team of shop owners to lean on when big issues arise is like having the greatest and most supportive parent on your side. We push each other to make decisions we have been putting off," Webster said.

Marketing

The tools of marketing are ever evolving in terms of new software, new platforms and new opportunities for a business owner. Your peer-to-peer group is the place where you can talk through if something is valuable. Have other members used it and what did they think? Have other members researched similar tools that they think are better? Your networking group is the place to talk through the benefits and costs of any new initiative.

If you don't have access to a networking group, start your own. Start small with clear and simple objectives. Having a group of peers that you can talk to and maybe even vent a bit to, will prove to be one of your most successful tools for a prosperous and enduring business.

"Networking for me has been without a doubt, the single most important thing that I do consistently that keeps me successful," said Christian. *MZ*



MANDEE BRADSHAW

is the Vice President of Marketing & Business Development for DRIVE. Her diverse background in business and 10 years

of experience in the in the automotive aftermarket contributes to her unique skill set, focused on communications, relationship management, marketing and leadership.

mbradshaw@driveshops.com

CHANGE THE WAY YOU CHANGE TIRES



Touchless Demounting Head

Joy Stick & Edge Back Button

Multi Tool

47" Tire Capacity

MRP \$8,220
FREE SHIPPING!



Upper / Lower
Bead Braker Rollers

Ranger's **RV1 Wheel Guardian** is the revolutionary **touchless** tire changer of the future. This tire machine breaks beads and swaps tires faster than virtually any other design on the market. Eliminate the manual hassle of changing tires when you go **touchless**!



1-800-253-2363 ■ bendpak.com/touchless

*Free shipping to direct shipping points within the 48 contiguous United States only.
© 2019 BendPak Inc. Ranger Products is a registered trademark of BendPak.

R Ranger

Is Cash for Clunkers 2.0 on the horizon?

U.S. Senator Schumer proposes Clean Car Initiative

In a recent *New York Times* op-ed, U.S. Senate Minority Leader Chuck Schumer (D-NY) revisited the latest version of “Cash for Clunkers,” previously known as the Car Allowance Rebate System (CARS), a vehicle retirement program implemented by the Obama Administration in June 2009. Originally sold to the public as an “eco-friendly stimulus” initiative whereby the government buys up older, high-polluting vehicles, post-clunker White House reports clearly indicated that the program was about selling vehicles and not necessarily related to improving the environment. More on this later; back to Sen. Schumer’s efforts.

Sen. Schumer has proposed “to rapidly phase out gas-powered vehicles and replace them with zero-emission, or “clean,” vehicles like electric cars. The goal of the plan, which also aims to spur a transformation in American manufacturing, is that by 2040 all vehicles on the road should be clean.” Sen. Schumer went further and described how this initiative would unite labor, automakers and environmental groups. Missing from this list, similar to their exclusion in the 2009 Obama objective, is the U.S. automotive aftermarket. By the Senator’s own estimates, this project will cost \$454 billion over 10 years.

Although legislation has not been introduced to date, U.S. Sen. John Barrasso (R-WY) countered with his own op-ed: “He wants to get every gas-powered car off the road and to resurrect President Barack Obama’s disastrous “Cash for Clunkers” program that wasted \$3 billion of taxpayer money giving subsidies. Even environmentalists admitted that it had “slim if any environmental benefits.” Mr. Schumer’s “new” plan is 100 times more expensive. He wants to spend \$392 billion of taxpayer money to subsidize cars only wealthy Americans can afford.

“The median price for electric vehicles is roughly \$20,000 more than that of gas-powered cars. Sold as stimulus, the first program was actually a drag on the economy. While the effect on taxpayers



THE AUTOMOTIVE SERVICE ASSOCIATION IS THE LEADING TRADE ASSOCIATION FOR INDEPENDENT AUTOMOTIVE SERVICE PROFESSIONALS.

JOIN AT

ASAshop.org

was significant, the effect on the air was minimal. Mr. Schumer’s plan doubles down on failure.”

The concept of retiring older vehicles has been around for some time. Princeton University’s Dr. Allen Blinder profiled the issue in a 2008 *New York Times* editorial. Dr. Blinder described Cash for Clunkers as a trifecta: a cleaner environment, more equal income distribution, and an effective economic stimulus.

A less emphasized result of Dr. Blinder’s proposal was more new vehicle sales, which would impact an ailing automotive economy. What was left out was the aftermarket. The 2009 Cash for Clunkers program cost independent repairers lost sales and fewer parts purchased for older vehicles taken out of the marketplace, impacting both distributors and aftermarket manufacturers.

In the Obama Administration’s analysis of their Cash for Clunkers program, they focused on the increase in sales of new vehicles. According to the analysis, “Many of the CARS sales were to the kinds of thrifty people who can afford to buy a new car but normally wait until the old one is thoroughly worn out. Stimulating spending by such people is very nearly the best

possible countercyclical fiscal policy in an economy suffering from temporarily low aggregate demand.” Where was the analysis of the impact on the automotive aftermarket?

The Automotive Service Association opposes Cash for Clunkers, but does highlight options for the Administration to consider: include a vehicle repair option for consumers; programs should be administered by the states; vehicle participation should be tied to emissions and improving air quality; and repair cost allowances should be sufficient to address emissions repairs. Cash for Clunkers is a bad idea. It did not succeed during the Obama Administration and should not be considered by the 116th Congress. **ZZ**

ROBERT REDDING is the Automotive Service Association’s Washington, D.C. representative. He has served as a member of several federal and state advisory committees involved in the automotive industry. rredding@reddingfirm.com

FVP[®]

VERIFIED. PROVEN.[®]

REACH FOR WHAT WORKS.[™]



PLATINUM AUTOMOTIVE BATTERIES

The FVP Platinum Battery lineup:

- Engineered to meet exact OE fitment specs
- Backed by nationwide free replacement warranty
- Distributed by Factory Motor Parts

Visit FVPparts.com for more!



FACTORYMOTORPARTS[™]

WE SUPPLY YOUR SUCCESS.[®]



MEASURE TO SUCCEED

Set targets for success, track your progress and make adjustments as needed

JOHN BURKHAUSER // Contributing Editor

The ultimate goal of any business is to provide a service or a product that customers want. Once that is decided on, the next step is to monetize the idea, allowing the business to become profitable and grow, eventually providing a comfortable living for the employees and owners of the business while they do the things they like to do.

The perfect way to start a business would be with the guidance of a small business program such as the

one offered at the University of Pennsylvania Wharton School of Business. They will guide you through a process that, though it doesn't guarantee you will succeed, gives you a much better chance of doing so. Matter of fact, the building of a complete business plan eliminates many wanting to be entrepreneurs just by the sheer scope of creating a business on paper.

Yet, many shops come into existence just because someone liked to fix cars and trucks in their garage while

having people pay them for their services. Some continue to operate like this forever, while others start to grow, getting more customers. so they rent, lease or buy a building and hang their name on it. Other times it can be a technician who doesn't want to work for someone else, so they open their own shop to be their own boss.

These shops grow despite the steep learning curve, and owners find out what they need to know to run a business through the school of hard knocks. Even-

tually, they get to that point where they realize how hard they are working just to survive. They are too busy to consider alternative ways of running the business. Still, they want more. They want to stop working so hard and wish to live life more comfortably.

Instead of driving themselves crazy just trying to keep up and letting what happens happen, these shops need to stop, take a deep breath and see where they are. They need to know how much money is coming in and going out, what supplies they are using, what kind of profit they are making, whether they are charging enough for the work that they are doing and so on. They need to measure the multiple facets of their business.

Measuring your business will give you an idea of where you stand. Knowledge is power, since you can now make changes and measure the results to see if they were effective. You can find and eliminate the places that your shop is losing money. Doing this will make your shop more efficient and that in and of itself will help you succeed.

Once you get your shop functions under control, through measuring and keeping tabs on everything, you can now start to make the plans that will allow your shop to grow. You can begin to set goals for this growth. Instead of just hoping for the best, you now can aim for the targets that you set because you can watch them and make adjustments along the way.

Your shop management system is one of the tools that you will use to measure your shop's functions. It's the point of sale program that you write up customers in and provide them with invoices from. Shops use them every day. All major shop management systems (SMS) have reports and other functions that can be used for measuring your shop functions in many ways. Unfortunately, in many cases, the reports are probably going to be inaccurate.

The reasons for this ineffective situation vary from shop to shop. In my experience, one of the main causes of this is that your shop received very little help in setting up the SMS and had a limited amount of training showing how to use the system when you first bought it. Some shop managers and owners tell me that they have not seen their SMS representative for years since they installed the SMS at their shop. I've also heard that the training was very quick and rushed.

Making matters worse, the shop, in trying to keep the flow of cash and work going, figures out their own way of using the software getting it to do just the basics that they need and continue using it that way for years. Many important functions that would benefit the shop are not used because no one knows about them. Because of this, the

data given by most of the reports will be inaccurate.

The bottom line is that you need to get your management system fixed, and you need to learn all that it offers you. I recommend that you reach out to your software provider to properly set up the software and then get the training you need to use it correctly.

Properly setting up the software will include getting all your vendor accounts' input, shop data, tables and descriptions. Of course, some of this may already be done; you just need to be sure it is done correctly.

Some shop management systems have items such as categories that need to be set up. The initial install may have some basic categories in place, but it is best that you build on what is provided, since categories will help you sort out much of what you do in the management



2019
TECHFORCE FOUNDATION
FUTURETECHS
ROCK
AWARDS

**Celebrating the Nation's
Most Promising Up-and-Coming
Transportation Technicians!**

Submit a Nomination at:

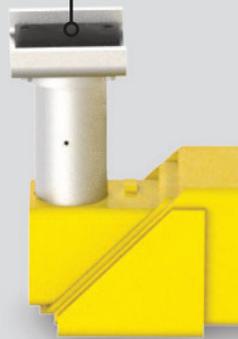
TechForceFoundation.org/FutureTechsRock

WHEN BALANCING SAFETY AN BENDPAK GOES THE

LONG-REACH ARMS PROVIDE BETTER CENTER-OF-GRAVITY LOADING

When servicing trucks and vans with extremely long wheelbases, longer-reach arms deliver a more stable lifting solution. The lengthy triple-telescoping arms on BendPak's new **ALI Certified XPR-12CL-LTA** extend to 72" long – that's six feet in length and over one foot longer than almost any other lift or brand in its class. And with rugged BendPak dependability combined with a 16-piece adapter set, you'll realize that balancing safety* and worker productivity has never been so perfectly matched. For more information visit www.bendpak.com/LTA or call **1-800-253-2363**.

Frame Cradle Pads
come standard



XPR-12CL-LTA
MSRP \$5,930

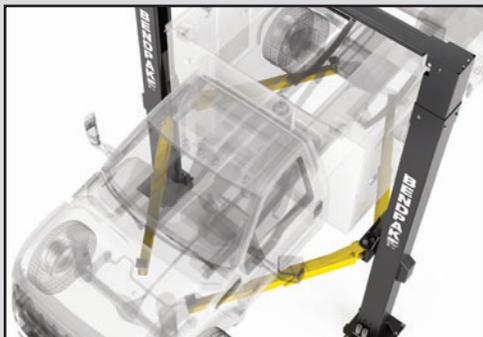
Stackable adapters
come standard



36" - 72" arm reach

www.bendpak.com/LTA ■ 1-800-253-2363

D PRODUCTIVITY, DISTANCE.



- 12,000-lb. lifting capacity
- Dual direct-drive hydraulic cylinders
- Oversized 53" tall carriage for superior strength and durability



3-stage long-reach telescoping arms

Oversized A36 steel base plates

Zinc-plated arm restraints and connecting pins

*Always read and follow all safety warnings that accompanied your lifting equipment at the time of purchase. More information regarding vehicle lift safety is available directly from BendPak or from the Automotive Lift Institute.



system. They help in writing estimates, organizing parts and labor, in addition to making reports more meaningful.

Taking advantage of the different options that SMS offer will help you in the long run. Many have estimating windows in which you can build estimates with parts and labor. Others allow you to list recommendations for referring to and keeping the customer informed. Realize that using the basic functions of the management system will also allow you to run reports measuring things such as sales of recommended work, missed appointments, referrals and much more.

This information will come from the reports that you can now run and get accurate information from. There are different reports in different management systems, so you will have to learn what your SMS offers you. Now I'll review a few generic report types that you can run giving you the information you need.

In Mitchell 1, you will find a report that will show you how well you are using your categories. Run the Category Profit Summary. This report will list all the categories you have and how much money is coming in with each. If you find you have a Miscellaneous Category with lots of money in it, you probably are dumping many unrelated jobs and services in here. Because they are mixed up, you have no way of accurately seeing what your money makers are. It's time to clean up your categories if this is the case.

Most management systems allow you to run a report that is a summary of your sales and can help you measure your shop's growth daily, monthly and yearly. Watching your sales is one of the best barometers you can have. See how any advertising you may have affects your sales to determine the effectiveness of each campaign. Know when the slow season comes and put a plan into place to get more vehicles in at that time.

DISCIPLINED FINANCIAL MEASURING IS A NECESSITY FOR YOUR SHOP'S SUCCESS

As a shop owner, do you spend all your time working "in" the business or "on" the business? One method is well known as working hard, and the other method is known as working smart.

Each month, a good operator will sit in his/her office and really analyze their business. This time spent will make the shop money if the information is prepared in a fashion so that the owner/manager can compare the operation to targets set to maximize the net profit of the shop.

The question many ask is what should I be measuring in order to ensure I am maximizing productivity and profits of my shop? Times have

changed and measurements have changed. The new aftermarket requires specific measurements that allow management to focus in on the right area to grow the business and build net income.

The following is a start to an up-to-date list of items for consideration to be measured each week in some cases and definitely every month. Keep in mind: if you can't measure it, you can't manage it. Get focused, measure your business properly so you can make competent management decisions to move forward and achieve what you want to achieve. Keep reading at MotorAge.com/MeasureNow.

Checking your ARO (Average Repair Order in dollars) will show you how effective your shop is in selling and servicing vehicles. A low ARO can mean that you are working much harder than you need to as you move many vehicles through your shop and get very little return. A higher ARO shows that your shop is efficient in finding and selling more items per vehicle. This also helps keep you from over working your staff since they are moving less vehicles in and out of your bays.

Another report to consider running would be measuring your technicians' efficiency. Realize that the techs are the main drivers of your shop's success. Keeping them working in the bay with as few interruptions as possible and making sure parts are there when they are needed are just a couple of things that affect the tech's productivity. Tweaking the system and measuring the results is a good way

of increasing your techs' efficiency because you will have hard numbers to show it happening.

These are just a few ideas for you to consider. Your management system is your foundation. Once set up and used properly, the management system can become your measuring tool. You now can look over the different facets of your business and see where you can make adjustments and aim for the targets that will make your shop more successful. *TZ*

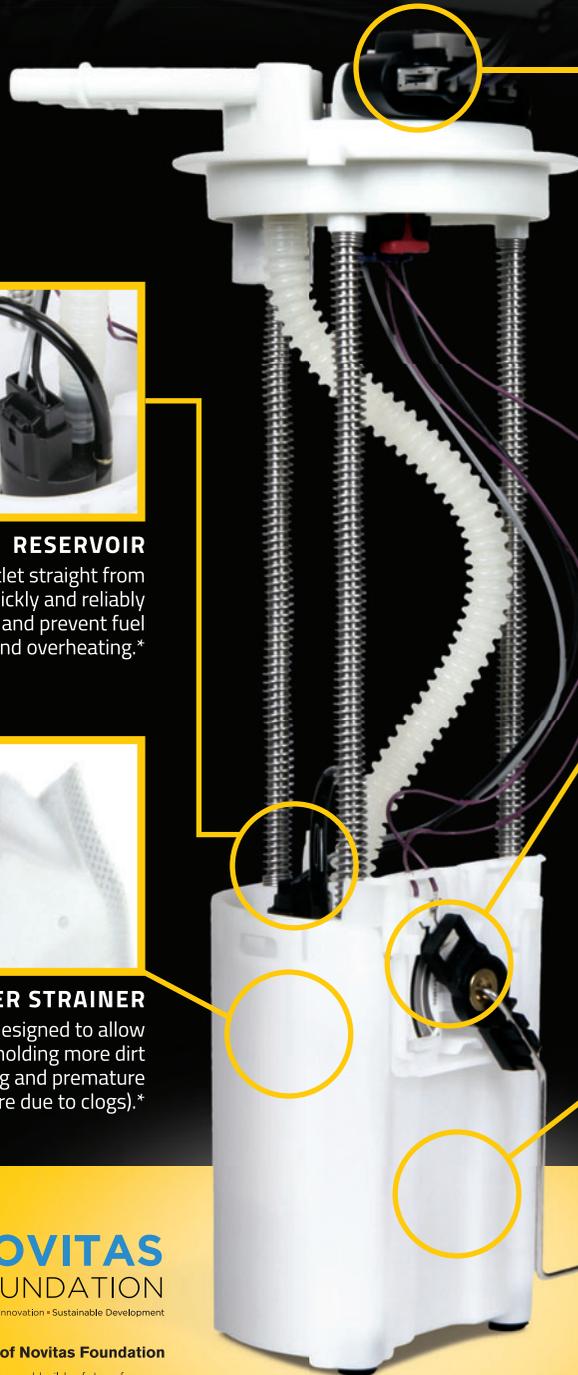


JOHN BURKHAUSER is an auto repair specialist with more than 30 years of experience. As the Director of Education at BOLT ON TECHNOLOGY, John

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. jburkhauser@boltontechnology.com



Expect More. Expect TYC.



WIRING HARNESS

Included to replace old existing, worn out vehicle harness, for better connection and power delivery.*



SENDING UNIT

Features an enhanced "fingered" contact design for maximum contact surface regardless of dirty fuel, sharp turns, or bumpy roads.*



FUEL PUMP

Increased flow rate and efficiency from enhanced internal components.*



RESERVOIR

Secondary fuel outlet straight from the pump to quickly and reliably fill the reservoir and prevent fuel shortage and overheating.*



MULTI-LAYER STRAINER

Multi-layer strainer designed to allow fuel through while holding more dirt (prevents overheating and premature failure due to clogs).*



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.org.

***Available for select applications**

For more information about TYC™ replacement automotive parts, consult your local TYC™ parts distributor, or look up parts online at www.TYCUSA.com

HELD CAPTIVE BY A CAPTIVA

MISFIRES ARE AMONG THE MOST COMMON DRIVABILITY ISSUES WE DEAL WITH. GDI MISFIRES, THOUGH, ADD NEW DIMENSIONS TO THIS COMMON MALADY.

SCOT MANNA // Contributing Editor

I have had many conversations with both technicians and trainers about the issue of misfires caused by intake tract deposits on Gasoline Direct Injected engines and what causes the misfire. There are several schools of thought, from compression loss across the intake valve seat from deposits, to

intake valves sticking in their guides from carbon, to airflow disruption in the combustion chamber. Whatever is causing the misfire, many technicians have encountered this problem and corrected the misfires through intake tract and valve cleaning.

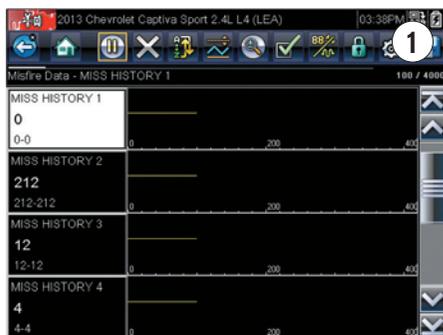
It is this problem that I was contemplating when a 2013 Chevrolet Captiva showed up at my shop. The customer was another shop that had worked on the vehicle and decided to get a second opinion concerning a misfire on cylinder #2. The shop stated the engine misfired during warm-up and had a noise from the engine. They replaced the ignition coil and spark plug with no improvement and were confused by the symptoms the engine exhibited. This compact SUV has a 2.4-liter GDI, naturally aspirated engine with only 45,000 miles. The most

interesting symptom was a sharp popping noise that seemed to come from the intake system and could be clearly heard around the air intake throttle body. The noise accompanied the misfire and made me believe there was a mechanical problem with the engine, such as a valve

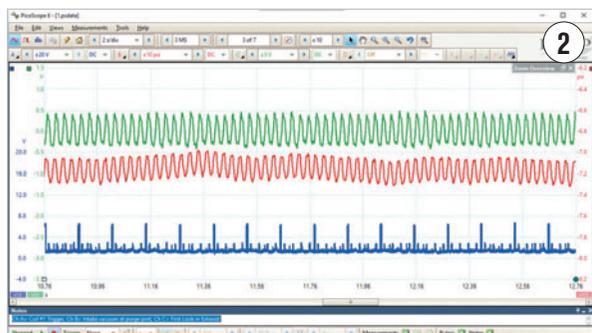
sticking due to intake deposits. I recorded the noise with my cell phone when the engine ran but unfortunately, cannot include it in the article. But trust me — it was there and very apparent. The scan tool confirmed the problem and can be seen in **Figure 1**.

My diagnostic plan was simple: I wanted to perform a running vacuum test with a pressure transducer in the intake manifold and a transducer in the exhaust to confirm a sticking valve on cylinder #2. I would then sell the shop on pulling the intake and cleaning the valves — sounded simple to me, anyway. The results were not what I expected. With the scope set on a slow timebase, I ran the engine at idle and waited to see a disturbance in the pattern. Both a running vacuum waveform and a tailpipe pressure waveform should be a series of similar pulses with four pulses for each 4-stroke cycle. With my Pico scope connected to the cylinder #1 ignition coil trigger signal, the Pico WPS500 pressure transducer connected to the intake manifold and a Sen-X Technologies 1st Look transducer in the tailpipe I should see a pattern like the one in **Figure 2** when no misfire is present. I will note here that there is software filtering applied to both pressure transducer channels to make the pattern easier to view.

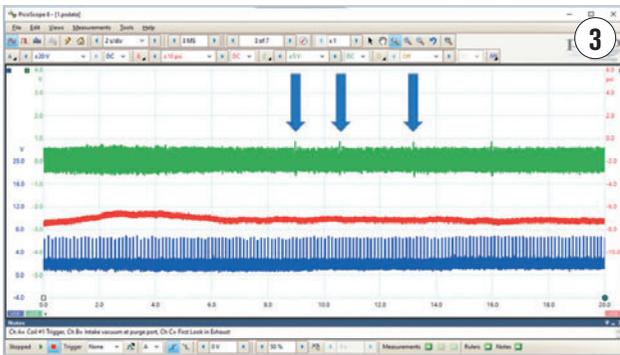
Soon I began to see irregularities in



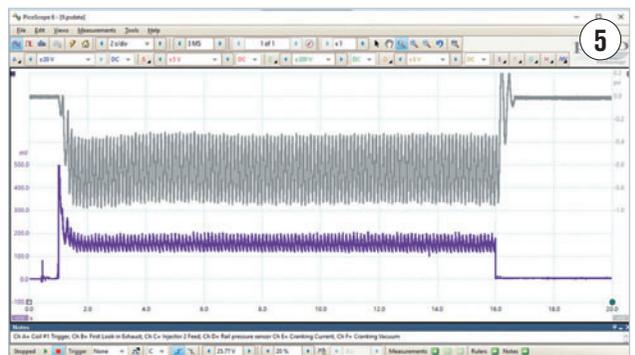
SCAN TOOL CAPTURE showing greatest misfire counts on cylinder 2.



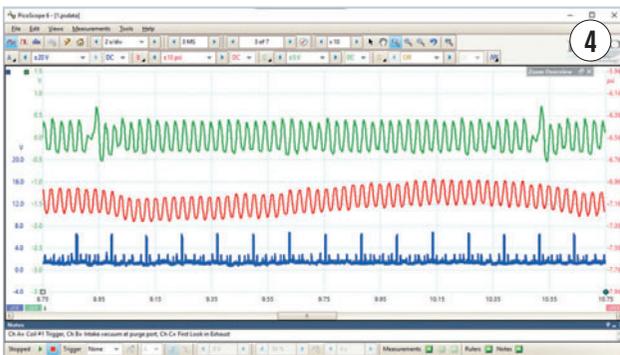
PICO SCOPE PATTERN with engine idling and no misfire present. The middle waveform is intake vacuum and the top waveform is exhaust pressure pulses.



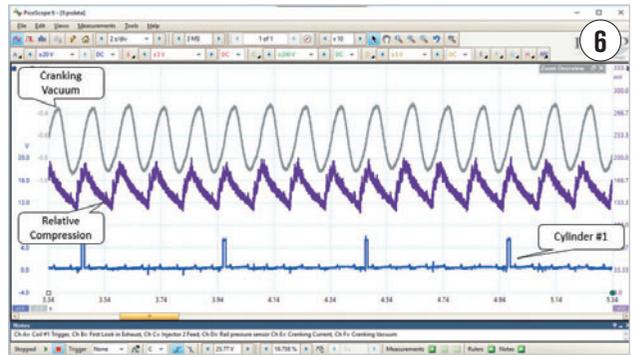
THE UPPER EXHAUST PRESSURE WAVEFORM that shows an issue at the areas with the arrows present.



THIS 15 SECOND CRANKING CURRENT and vacuum test is textbook perfect. No problems are present.



THERE IS A DISTURBANCE/PULSE SEEN in the exhaust pattern, but no problem seen in the intake vacuum pattern, which seems to eliminate a sticking intake valve. The popping noise was heard during this capture.

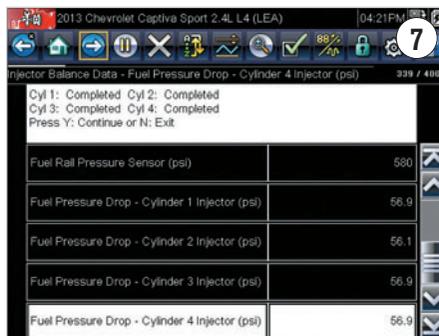


THIS ZOOMED IN VIEW SHOWS very consistent vacuum pulls and compression peaks in each waveform.

the exhaust pattern, as seen in **Figure 3**. The arrows indicate where the pattern will be zoomed into for a closer look in **Figure 4**. While the exhaust pattern indicates a misfire, there is no upward pulse in the vacuum pattern that would indicate pressure pushing back into the intake manifold if the intake valve stuck open or the valve leaked across its seat.

While my initial theory does not seem to hold water at this point, the noise from the engine was driving my diagnostics toward a mechanical problem. I continued to perform many more engine mechanical tests, including cranking current and vacuum waveforms and some in-cylinder tests on cylinders #2 and #3. One cranking test is seen in **Figures 5** and **6**, both the whole test and a zoomed-in portion. After careful analysis of many waveform captures, I did not uncover a single problem on any waveforms other than the misfire indication in the exhaust waveforms. At this point, all I can say for sure is that the engine appears to be mechanically sound.

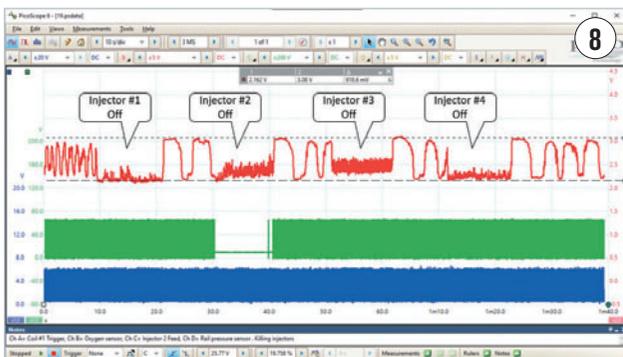
After deciding the problem is not mechanical in nature, I began to shift my focus to other potential problems. The scan tool can perform two different fuel injector tests: an au-



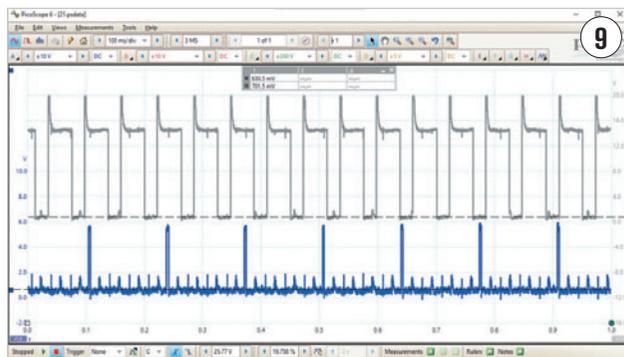
THIS IS A SCREENSHOT FROM A SNAP-ON ETHOS of the automated injector balance test. The displayed pressure drops are very even. I have not seen printed specs for pressure variation for this test but over 2PSI would be suspect in my opinion.

tomated pressure balance test and a user-controlled injector kill test. The automated test actually increases each injectors on-time and the ECM measures the rail pressure change with the rail pressure sensor. The engine will misfire during this test due to an over-rich mixture in the cylinder. This test produced consistent normal results as seen in **Figure 7**.

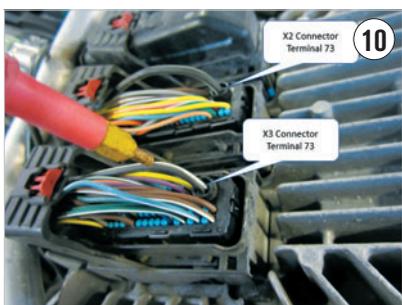
After seeing very even injector pressure drops, I began to wonder if the spray pattern from these GDI injectors could be a problem. Using the scope and scan tool, I decided to scope upstream oxygen sensor operation while I used the scan tool to shut off each injector. I expected each time I turned off one



SCOPE CAPTURE OF OXYGEN SENSOR VOLTAGE while turning off each injector. The scope time-base is very slow, 10 seconds per division. The green pattern is the #2 injector control side voltage so you can see when that injector was turned off.



THIS SCOPE CAPTURE OF THE #1 COIL TRIGGER SIGNAL and charcoal canister purge solenoid show the offset of the ground signal measured with scope cursors. The canister purge solenoid ground level is 700 millivolts above battery ground.



ECM CONNECTORS X2 AND X3 with the ground wires identified.



THE SEALER FOR THE WIRE SHRINK WRAP can be seen on the ring terminal of G109. This was cleaned off and the bolt tightened securely.

injector to see a flat-line on the oxygen sensor voltage. The actual test results were not quite what I expected to see. The scope capture is seen in **Figure 8**. As the callouts show, when the injectors for cylinders #1 and #4 are turned off, the oxygen sensor voltage flatlines low confirming no fuel was delivered to the cylinder. But when cylinder #2

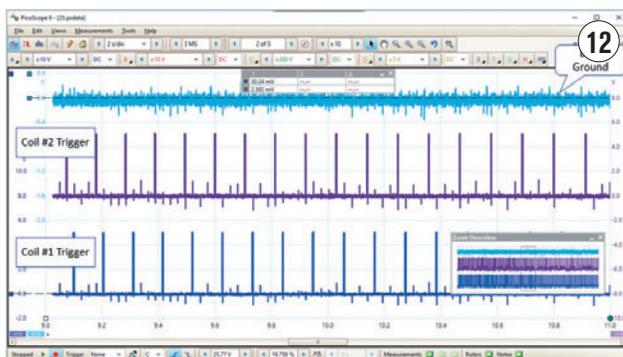
injector is off, there is greater voltage from the oxygen sensor and cylinder #3 is even higher. I was not sure how this could be and wondered if there was some leakage from the injectors or if there is residual fuel reaching the intake manifold from possibly the purge control solenoid. I decided to tell the shop I would like to replace all four injectors, and they said it was OK to do so.

Because a complete set of injectors were not in stock at any of my suppliers, there would be a delay in proceeding with the repair. This gave me time to ponder the tests I had done so far and to look at each test in deeper detail. While I looked at this scope capture I noticed something unusual. This engine uses a conventional oxygen sensor, not an air/fuel sensor, and while the range of sensor voltage output is normal at about 900 millivolts, the sensor voltage is switching between 2.1 to 3.1 volts, which is a large offset from ground. I was not aware if GM was supplying a bias voltage to the oxygen sensor signal, but after doing some research after the repair was completed, I found out that the oxygen sensor signal is offset from ground on this computer by 1 volt. I will pay more attention to this in the future. When I looked back at some of my earlier captures, I also

noticed the #1 coil trigger signal was offset from ground on my scope.

I decided to scope a computer controlled, 12-volt solenoid to see if there was a voltage drop on the ground side of the computer. I scoped the canister purge solenoid and #1 coil trigger and saw both signals were offset 600 – 700 millivolts off ground as seen in **Figure 9**. There has to be a ground problem on this vehicle!

After consulting a wiring diagram, I saw the engine computer was grounded through both the X2 and X3 connectors with a black/white wire at terminal 73 in each connector, terminating at ground location G109. Both Mitchell and ALLDATA service information showed G109 located at the rear of the cylinder head towards the driver's side. After cleaning this ground, I performed another test but the ground offset remained. I realized the ground wires at the terminal I cleaned did not have a white trace and knew there must be another ground location. After looking the vehicle up on the General Motors service information website, I found the correct G109 location. The ground I had cleaned was G112, ground G109 is on the front of the block behind the A/C compressor. **Figure 10** shows the two ECM connectors, and **Figure 11** shows

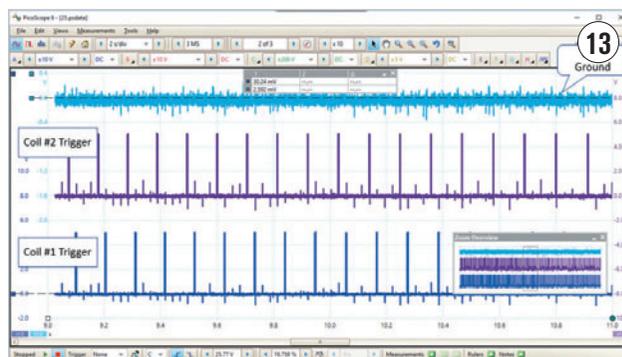


THIS SCOPE CAPTURE SHOWS all three waveforms have under 50 millivolt ground offsets.

the GM service information ground location illustration.

When I accessed the G109 ground, I noticed first of all that the bolt was not very tight and also some sort of shrink wrap sealer had oozed out onto the ring terminal. **Figure 12** shows what the ground looked like before cleaning.

After cleaning and tightening the ground wire, the scope test was repeated and of course the ground offset was gone. **Figure 13** shows the ground levels for both cylinder #1 and #2 coil trigger signals and the ECM ground wire terminal 73 on the X3 connector. All ground levels are below 50 millivolts.



SCOPE CAPTURE SHOWING OXYGEN SENSOR during injector shut-off. The green trace is injector #1 control signal. Injectors were turned off in order, 1, 2, 3 then 4. The purple trace in the background is coil #2 trigger signal.

The more amazing fact is that the misfire and the popping noise are gone as well!

I decided to repeat the injector kill test while monitoring the oxygen sensor voltage and found the results were quite different from the first time. This time the oxygen sensor flat-lined each time the injector was turned off and the oxygen sensor swung between 1-2 volts.

The vehicle is fixed and not a single part was replaced. The order I placed for the injectors was cancelled and the shop informed that the Captiva was repaired. There were some other items I noticed after the repair that were now looking more normal. I had noticed that the load PID on the scan tool was about 47 percent at idle before the ground repair and the load now showed 23 percent at idle. I had graphed spark timing during the initial scan test and the timing moved between 1 degree BTDC to 6 degrees ATDC, which I thought was odd at the time. The timing now stayed around 11 degrees BTDC. The ground problem clearly seemed to cause the ECM to incorrectly control or calculate several functions for engine control. Although I am not totally clear on what caused the engine to misfire and why the popping sound occurred, I do know for sure the Captiva is fixed. This vehicle was a really important lesson on just how important good power and ground circuits are to late-model engine control systems. This case study also reinforced the fact that I cannot make a car have a problem that I want it to have; you must trust your tests and follow a logical diagnostic process to flush out the “weird” problems. Keep an open mind and try not to fall into the rabbit hole during a tough diagnosis. **ZZ**

DON'T MISS THE MISFIRE

ERIC ZIEGLER // Contributing Editor

Misfire diagnosis can be fairly straightforward, but far too often one misses (pun intended) a crucial piece of information and ends up down the rabbit hole. This article's purpose is to look at the different causes of misfires and how to identify or eliminate the potential causes to come to an accurate diagnosis. I believe a solid plan of action (POA) is required to stay on task and avoid wasting time and money by missing the misfire.

There are some things we need to take into account: pattern failures, TSBs, vehicle history and customer descriptions. We need to examine the misfire conditions like load, humidity, ambient temperature and engine temperature. Is the misfire a single cylinder or multiple cylinder problem? Is the misfire on the same bank, on adjacent cylinders or on sister cylinders? All these are critical pieces of the misfire diagnostic process. The who, what, when, where and how questions need to start at the service counter. The “why” is our job as techs to identify. Keep reading at **MotorAge.com/misfires**.



SCOT MANNA is the owner of MB Automotive Inc. He is a contract trainer for the State of Illinois Emission Program, WORLDPAAC and Autowares. He is ASE Master Certified with L-1 and L-2.

scotmanna@sbcglobal.net



TACKLING THE TOUGH ONES

SOME SCARY DIAGNOSTIC CHALLENGES OFTEN TURN OUT TO BE EASY TO HANDLE. AND THE “EASY” ONES OFTEN TURN OUT TO BE THE TOUGHEST!

G. JERRY TRUGLIA // Contributing Editor

A 2010 Mercedes Benz E350 4matic with 64K on the clock came in with a complaint of the right front headlight and blinker not working. We informed the Benz owner that it can be as simple as replacing the light bulb or clearing codes and in some cases, a module that controls the lighting may have to be coded, programmed or replaced. Now that the vehicle owner had a better understanding of why there was a diagnostic fee, we were able to begin our diagnosis.

If you're not familiar with dealing with Mercedes-Benz vehicles, you need an understanding of what we had to diagnose to get the lights working again. Let's start with the SAM (Signal Acquisition Module), and what it does, so if an MB comes into your shop you know what you are dealing with. The SAM module receives data from sensors, switches and controllers, then sends a command to activate components such as a light bulb. On this Benz, there are three SAM modules: two in the front, left and right along with another in the

AUTEL MAXISYS

**WORK
SMARTER
NOT HARDER**



DIAGNOSTIC INTELLIGENCE

AUTEL UPDATES PROVIDE LATEST OE-LEVEL COVERAGE FOR US/ASIAN/EUROPEAN VEHICLES (1996+) INCLUDING SUPERCARS



COLLISION
AFFORDABLE DIAGNOSTICS
+ COMPLETE TPMS + SERVICE

ADAS
CALIBRATION + DIAGNOSTICS
+ MAINTENANCE SERVICE

ADVANCED ANALYSIS
DIAGNOSTICS + PROGRAMMING

KEY PROGRAM
IMMO + KEY PROGRAMMING
+ SERVICE

HEAVY DUTY
BI-DIRECTIONAL DIAGNOSTICS
+ PROGRAMMING + SERVICE

MAXISYS MS906TS 8"

- Bi-Directional Control
- **Most Affordable Pre/PostSCAN**
- **Complete TPMS Service**
- 1YR FREE Software/1YR Warranty

MAXISYS MS908S 9.7"

- Bi-Directional Control
- Advanced Coding & Adaptations
- **64G On-Board Memory**
- 1YR FREE Software/1YR Warranty

MAXISYS ELITE 9.7"

- Bi-Directional Control
- Advanced Coding & Adaptations
- Docking/Charging Station
- **2YR FREE Software/2YR Warranty**

MAXIIM IM608 10.1"

- Bi-Directional Control
- Advanced Coding/ECU Coding
- **XP400 Key Programmer**
- **MaxiFlash JVC/ECU Programmer**
- 64G On-Board Memory
- 1YR FREE Software/1YR Warranty

MAXISYS MS908CV 9.7"

- Bi-Directional Control
- Advanced Coding & Adaptations
- J2534 MaxiFlash Elite
- New Deutsch 6-Pin & 9-Pin Probe Set
- **Heavy Duty Class 1 - Class 9**
- 1YR FREE Software/1YR Warranty

8" 1024x768 LED Touchscreen	1.3GHz - 1.7GHz Processor	32G Memory 2G RAM
10,000mAh Ultra-capacitor	8MP Camera	4.4.2 Android OS

9.7" 1024x768 LED Touchscreen	1.3GHz - 1.7GHz Processor	64G Memory 2G RAM
11,000mAh Ultra-capacitor	8MP Camera	4.4.2 Android OS

9.7" 2848x1536 LED Touchscreen	1.8GHz Processor	32G Memory 2G RAM
13,600mAh Ultra-capacitor	8MP Camera	4.4.4 Android OS

10.1" 1920x1200 LED Touchscreen	1.3GHz - 1.7GHz Processor	64G Memory 2G RAM
15,000mAh Ultra-capacitor	8MP Camera	4.4.2 Android OS

9.7" 1024x768 LED Touchscreen	1.4GHz Processor	32G Memory 2G RAM
11,000mAh Ultra-capacitor	5MP Camera	4.0.4 Android OS



Phone: (855) 288-3587 • USSUPPORT@AUTEL.COM
 AUTEL.COM • MAXITPMS.COM • MAXISYSADAS.COM
 © 2019 Autel Intelligent Technology Corp., Ltd., All Rights Reserved



Follow Us @AutelTools
 f t o YouTube

AUTEL



rear that controls different components. On this E350 the one we were concerned with is located at the right front footwell area next to the fuse box. The SAM module operates on a CAN B slower speed (Controller Area Network) BUS that exchanges information from switches, relays, horns, lights, heated seats, cooling circulation pump and more. Just like any other network on today's vehicles, if you change a component you may have to either code or program it on the BUS if you want it to work. Remember, it's not a matter of just replacing light bulbs anymore, in this case, the SAM module had codes in it that were preventing the new bulbs from illuminating and operating as designed. The procedure entailed connecting a suitable scan tool that has the capabilities to clear and reset the SAM module. We decided to connect our AutoLogic scan tool to diagnose the problem and clear the codes for the lights to operate. Once the procedure was completed, the lights worked and the message on the central display module on the dash was cleared.



Another lighting issue

On other Benzs we have come across, the brake lights stayed on or were inoperative due to a defective rear SAM module. The fix on most of those MBs was ordering a new SAM, replacing it, followed by carrying out the SCN coding (programming) procedure. So remember, if you come across a headlight, taillight, directional light, mirror or other component that does not operate after you replaced it, you most likely have to connect your scan tool and check for codes, along with checking if the module needs to be coded or programmed. I suggest consulting service information such as Identifix, ALLDATA, ProDemand or MotoLogic so you can check for the most common issues and read up on system descriptions to prevent wasting time and replacing parts that are not defective. Another good tip that I would like to share is what I do on any component that does not operate.

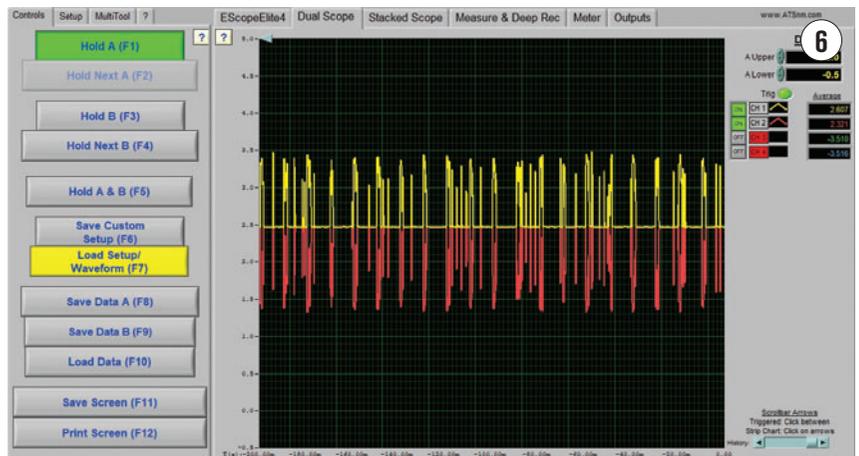
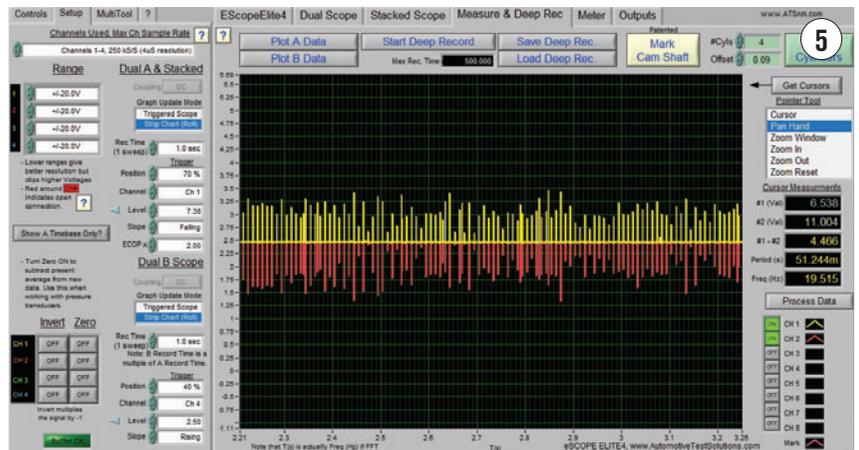
First, I connect a Power Probe to the battery and confirm that I have a good connection by taking the ground wire clip that is connected to the probe's body and connect it to the tip. With the wire connected to the tip, the green led should be illuminated, confirming you have continuity, but wait — you're not done testing that connection. Next, depress the power button and see if the 8-amp breaker pops. If the breaker pops, you have confirmed that you have a good power and ground connection. Now you can proceed to the next step of making sure you have power and ground to the component. With the key or power button in the off position, disconnect the wire connector from the component you want to test, then turn the power back on, and check what side of the connector has power. The reason for the previous step is to make sure you connect the Power Probe's power and ground to the correct side of the component that you want to check. If you don't perform this step, you may just burn out the component due to a diode that is installed in the component. Now it's time to replace the headlight, making sure the correct wattage bulb is used for the replacement. Volts times amps equal watts — why is this important? If you install the wrong wattage bulb such as a headlight, you can melt or burn up the headlight socket, wiring or lens housing.

To get the light operating again on this Benz E350, it was not simply replacing light bulbs or checking voltage and components, but using information learned or looked up in service information along with using a capable scan tool that was able to read and clear codes in the SAM module.

A GMC that refuses to start

Our next tough one was a 2014 GMC Acadia 3.6L with 49K (**Figure 1**) that was towed in as a no-start, no-crank. After speaking to and questioning the vehicle owner, we found out that there was nothing recently done to the vehicle and the same gas was in the vehicle as when it started before the no-start condition. During our questioning, we asked her if the vehicle had any dash lights illuminated or messages displayed at any time before this no-start condition. She relayed that there was a message on her dash lights illuminated or messages displayed at any time before this no-start condition. She relayed that there was a message on her dash display. After a few minutes of thinking, she replied that the message displayed on her dash stated something like “Service Side Detection System” now and then, but thought nothing of it.

Well, that information was a good key to unlocking the no-start condition on this vehicle. Now, I can tell you if you're thinking the no crank/start is due to a battery, starter, fuel, spark, air or mechanical condition, you're dead wrong. Newer vehicles that we work on are different than vehicles of yesteryear. This vehicle is not your father's Oldsmobile, Pontiac, Plymouth, Saturn or any other vehicle that is out of business; you'll be out of business if you use the same old diagnostic approach. So, as you can gather from the previous sentence, you know that the problem is not related to any of the old normal systems or components. This is where using your brain, eyes and hands comes in to play by using a scan tool to check for DTCs followed by looking up information on Identifix, iATN or other information systems.



The next step before replacing any component is to read a system description to help you get a better understanding of the system. We uncovered additional information on Google that stated there were problems with the Object Detection Module on many GMCs that the owner complained about. After reading that on Google, we went back into Identifix and found a no-start condition from the left side detection module listed. Even though it was not an exact match for our B094C Right Side Object Detection Module, it was close enough.

Our next step was to make sure that there was no mud, snow, ice or other obstructions preventing the system from operating as designed. Checking for debris on the unit is an important step, since this system uses a radar signal that is sent out to check for any ob-

structions. With no obstructions found, we followed what Identifix had in its information about the system.

The system operates on the GM LAN low-speed CAN system that communicates on the BUS. After checking for communication on the BUS, we found that there was no signal and had to continue checking the system. The next step entailed locating the splice pack for the system, which allows for module removal via the splice pack comb. When the comb is removed, the modules no longer communicate on the BUS since they are disconnected. With the comb removed, the vehicle communication returned, so we knew something was taking the BUS down.

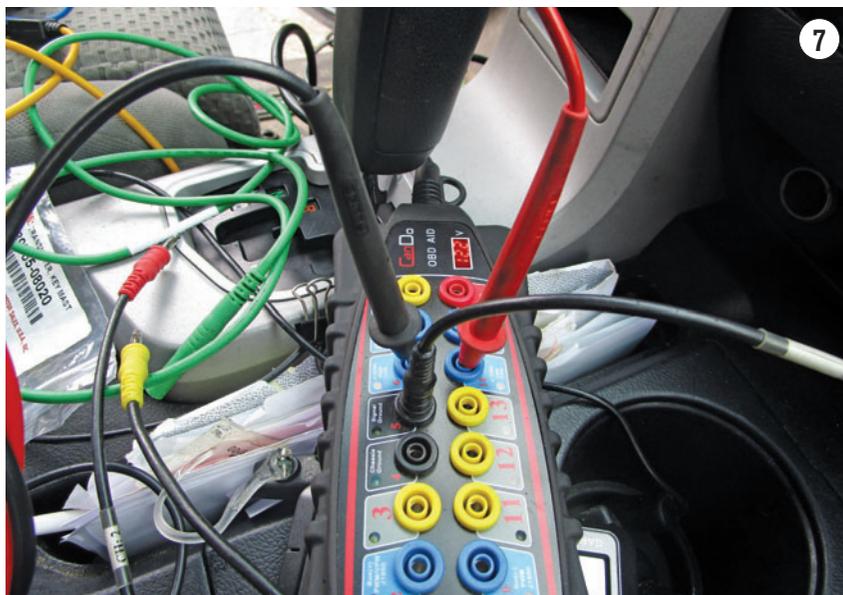
When communication returned, it confirmed that the other modules that we disconnected one at a time were

good and that there were no shorted wires. The only module that failed was the Right Side Object Detection Module, so we called the dealer and ordered a new one. After installing the new module, we programmed it so the BUS could be functional again. We followed all the regular procedures for programming that we have used many times before, such as using a battery maintainer and making sure that all the accessories were turned off along with doors, hood and rear deck closed.

Once the module was programmed, the vehicle started up, but the radio would not work. This was something that we don't normally encounter as a problem. After we entered the radio data via the scan tool, we found that the VIN was not present and that the radio power mode was not switched to normal in the configuration information. We typed in the VIN and changed the configuration to normal and the radio came back to life. The customer asked us to program in all her AM, FM and Sirius channels (**Figure 2**), which we did and then returned a running GMC to her.

A misplaced shift?

A 2005 Chrysler Town and Country 3.3L with 90K came in with a P0305 Cylinder Misfire, P0700 Transmission Fault and P1776 Solenoid Switch Valve Latched in LR Position. We did our due diligence and found a TSB 21-001-13 that deals with a solenoid that is located in the valve body and not in the solenoid pack where all the others are located. The issue deals with the manual valve in the transmission not in the OD position that sets the DTC. The TSB suggests that the shifter adjustment be checked and adjusted if needed. We also checked to make sure that there was no debris in the transmission fluid. Our next step was to follow the TSB and recommend that the transmission controller be reprogrammed with the updated file that Chrysler suggested

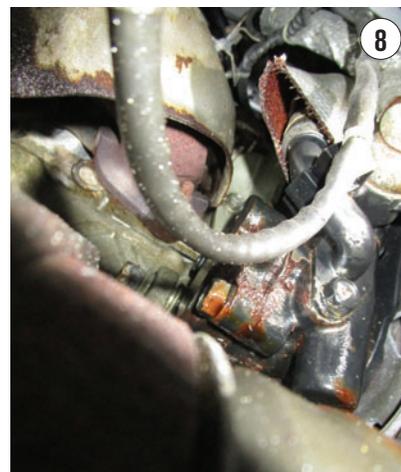


7

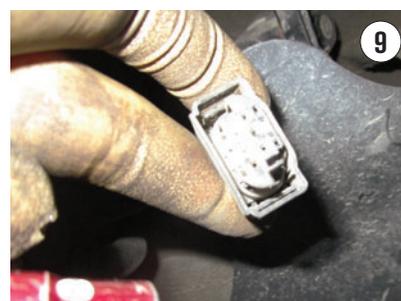
for this DTC. Since this vehicle owner was on the fence about keeping this vehicle, he decided not to perform any repairs and traded the vehicle in. The takeaway from this vehicle is if we did not check TSBs, we would have not known there was an update and possibly suggested a different path of repair.

Does it need a “flash?”

A 2007 Toyota Tundra 5.7L with 159K (**Figure 3**) was towed in from a used car dealer with a no-start complaint. Anytime we get a vehicle from this particular used car dealer they always think that reprogramming is the issue that is going to fix the problem. As we proceeded to check the vehicle out, we noticed that the VSV and Traction Control lights on the dash were illuminated. We had seen this before on another Tundra that was running that had the same dash lights illuminated and was stuck in low gear. This Toyota was a no-start, but the two Tundras may have something in common. We called the used car dealer and told them that reprogramming was not going to solve the no-start condition on the Tundra. We requested two hours of diagnostic time to locate the no-start issue on this vehicle.

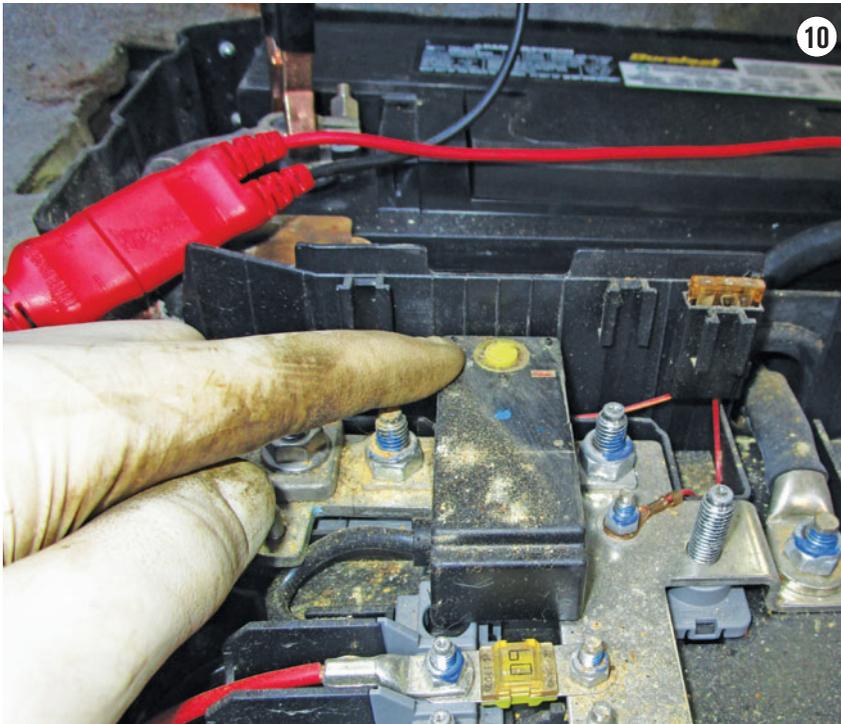


8



9

One they approved the two hours, we connected the Toyota Techstream scan tool and received a message that stated “waiting for an acknowledgment.” As we started to check the vehicle out, we found a communication issue, so we performed a CAN ohm meter test that



to leave it unplugged and sell the vehicle as-is. You can't fix stupid!

Finishing up with a Porsche

Our last problem vehicle is a 2004 Porsche Cayenne with a 4.5L V8 with 145K on the clock that was towed in as a no-start. Our starting line on this vehicle was speaking to the vehicle owner who was not forthcoming with any helpful information.

We started with the heart of the electrical system and found that the battery only had 4 volts present. Bill proceeded to charge the battery up, then checked for voltage at the battery jump start post only to find a reading of 0 volts. Bill then moved on to check if there was any voltage at the fuses under the hood, once again only to find the same results of no voltage.

Researching in Identifix and iATN came up empty, so we had to follow the electrical trail that leads to the battery and a reset circuit breaker. Bill continued to check the vehicle out and found that the left front height sensor that is located on the control arm (**Figure 9**) had a broken connector and corroded connecting pins. The owner refused to repair this issue and just wanted the vehicle to start. We installed a new battery and reset the circuit breaker (**Figure 10**), checked the charging system and invoiced the customer.

I hope these case studies help you get a better understanding of some of the systems allowing you to check them and helps you diagnose and repair them faster. *TJ*



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

Training and a nationally recognized trainer/author. He founded TST to bring affordable training to fellow techs and owners.

gtruglia@tstseminars.org

provides a 63 Ohm reading (**Figure 4**) that indicated no problem.

The next step was connecting a labscope to diagnose and check for communication packets on the BUS. We made sure power and ground were good, then moved on to checking the 5-volt reference signal. The results of that test displayed no 5-volt reference, so we started unplugging all 5-volt reference signals to see if the communication would restart, but no luck (**Figure 5, 6, and 7**). This meant that something else was pulling down the 5-volt reference, which indicated something had to be shorted.

We located a comb for the BUS that was under the glove box that allowed us to disconnect modules. My technician Bill decided to unplug each connection one by one to see if there was any change. Unfortunately, nothing did. Bill called me out to the parking lot where the truck was parked and asked me to check the vehicle with him. As Bill proceeded to show me all the tests he performed, I remembered that I had encountered an-

other Toyota that had a similar problem. I made mention at the beginning of this case study that the other Toyota also had the same lights illuminated on the dash, but that truck started. I recalled what the issues were on that truck, which led me to go out under the hood and locate the AIR system.

My next step was to disconnect the 12-volt wire (**Figure 8**) that goes to the solenoid, then have Bill crank it over. Bingo, the engine started right up, and the 5-volt signal returned along with all the other systems up and running. But what caused the solenoid to short out?

Well, this is nothing new to me or anyone who has worked on AIR emission systems. Usually, the problem is that the check valve diaphragm is burnt out, causing hot exhaust gases to get through to the solenoid, melting it and causing it to short out. This was indeed the cause of the no-start and the 5-volt being pulled to ground. We suggested that both check valves on the system be replaced, along with the Bank 2 shorted solenoid. The used car guy decided just

USING AN IN-CYLINDER PRESSURE TRANSDUCER

allows you to “see” changes in combustion chamber pressure and help isolate the reason for the loss.

UTILIZING NON-INTRUSIVE TESTING FOR DRIVABILITY

MAKING THE JUDGEMENT ON A HIGH-DOLLAR REPAIR REQUIRES BEING ACCURATE THE FIRST TIME

TIM JONES // Contributing Editor

During the initial diagnosis of this customer's concern, the original technician could hear compression leaking from the vehicle when the engine was running. At first, he suspected an injector seal to be leaking, creating a density misfire. A smoke machine was used in the cylinder to identify a potential compression leak external to the cylinder. After the smoke machine was hooked up, smoke was present in the intake manifold on TDC compression. A mechanical problem was now suspected

but being a GDI engine, this test was not conclusive enough to rule out a carbon build-up issue. The customer authorized the shop to tear the intake manifold off to identify the potential problem. Before the tear down was done, I suggested we prove another way what the other technician was seeing with the smoke machine. These tests and analysis were performed in order to prove what was wrong with this vehicle before expensive tear down was done.

Get a routine, follow it and back your diagnosis

As a technician who works on a lot of ve-

hicles that have been to multiple shops, I have to stay centered on my diagnostic routine. Being centered on a routine first means we need to have one. As I have grown stronger in my diagnostic strategies, it has helped me funnel my testing in a way that is logical and produces results. Earlier in my career I simply started with eliminating possibilities until the answer was found.

While deductive logic is the foundation of how we all work, it should not be the sole method. Strategy-based diagnostics start with the scan tool more often than not. This article isn't based on scan data strategy, but that is where

LIFT TRAINING AT YOUR FINGERTIPS



BendPak endorses **Lifting It Right**, the ONLY training program developed by industry safety watchdog Automotive Lift Institute (ALI) and based on more than 70 years of experience in protecting technicians. One-time enrollment with auto-renewal means you "set it and forget it!"



*\$240 annual pass gets you:

- Unlimited access to **Lifting it Right**
- Full participation for your entire team
- Official ALI safety training
- Significant cost savings
- Online record storage
- Easy compliance with training requirements

Order now at www.autolift.org/ALI-STORE

ONE EASY PAYMENT!

*Subscription per facility

AVAILABLE IN SPANISH

LIFT IT RIGHT OR DON'T LIFT IT AT ALL!



Providing safe and innovative lifts for over three decades

BP BendPak

this diagnosis started. Currently I am funneling my testing methods so every test is justified by the previous test's results. My very first tests are going to start with the easiest and least time consuming to rule out the most possibilities. When it comes to a misfire, the scan tool can offer a big funnel when it comes to weeding out fuel, ignition or mechanical issues.

Once I have made a conclusion that this is likely a mechanical problem, I will stop testing for ignition and fuel and focus on what the data has led me to believe so far.

Starting my routine

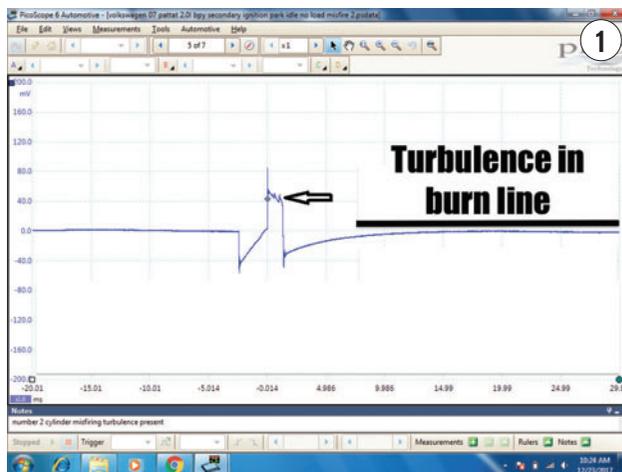
I'm constantly learning new techniques to better understand/diagnose the systems that I'm working with. Luckily for misfire concerns, I think there is a fundamental first test that we all should think about using to gain a direction as to what our next test should be. This first test for me is secondary or primary ignition analysis. Secondary and primary ignition analysis has not changed much since scopes were first used on the internal combustion gasoline engine. Certainly obtaining these waveforms has gotten a little more difficult over the years with the invention of the COP coil and transistorized coil packs.

However, the fundamentals of how ignition systems work is the same. Power and ground is provided to a primary coil with few windings. Once the ground side is released, the collapsing magnetic field surrounding the primary coil is induced into the secondary windings. Since there are more windings in the secondary coil, voltage is increased significantly. Now a high voltage in the secondary winding follows the easiest path to ground, which we all hope is in the combustion chamber near TDC compression.

Utilizing ignition waveforms allows a technician to look at compression spark and fuel all in the same test. This gives us the quickest and best diagnostic direction for additional tests. I say direction, because like I stated earlier in the article, I'm not willing to condemn any one part/parts off of one test. I'm going to use my results from the secondary pattern to make a hypothesis on what is going on and what my next test should be. So I grab my newly purchased COP wand and start looking at this misfiring vehicle. As I go down the line of coils, the pattern on cylinder 2 has a repeatable event in the waveform at park idle no load (**Figure 1**).

Making a hypothesis to funnel future tests

Performing secondary analysis is tricky sometimes. You really have to trust your equipment and hope what you're seeing isn't noise from a multitude of other contributors. One of the best ways to trust your pattern is to get primary ignition. With primary ignition, you are essentially hard wired into the primary circuit. You can trust that what you're seeing is



TESTING RUNNING CRANKCASE VACUUM is best if you can access a centrally located vacuum source.

true. However, we don't always have the time or ability to get there with transistorized cop designs. If we are going to use secondary for analysis, get to know the good cylinders first before going after the one you suspect to be bad.

As we look at the pattern, we see the point of primary turn on. We see some coil oscillations and then a rise in voltage in a triangular shape to the point where primary turns off. When the primary driver is released, that is where the secondary current flow begins. We have a firing line and then a burn line. As voltage continues across the plug we see little blips/rises in voltage. This can happen because of the presence of turbulence.

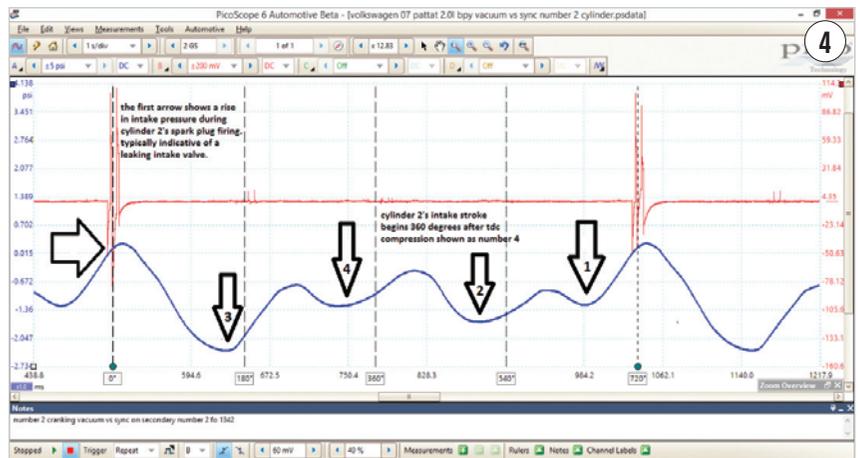
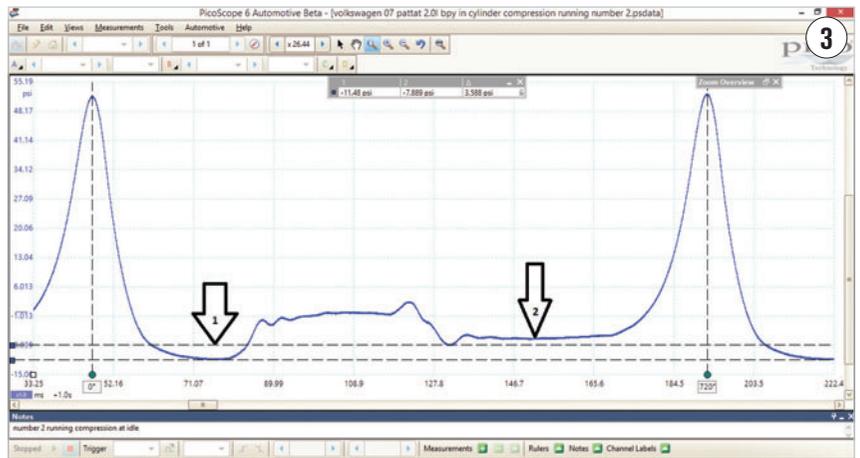
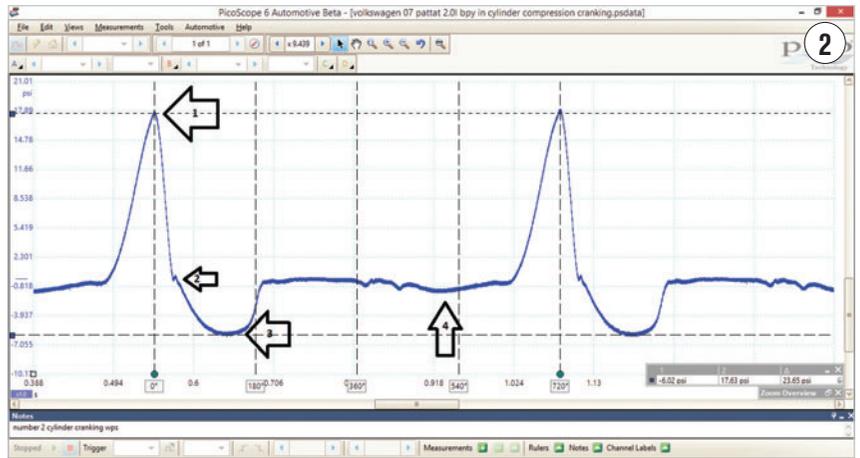
When at idle, the combustion chamber is rather stabilized compared to high load/high cylinder volumes. When we see this sort of behavior at idle we can draw some conclusions as to where our next testing should go. In order to make these oscillations in the burn line there needs to be movement or airflow across the spark plug. When a cylin-

der is sealed, the volume is being condensed, but it is not blasting past the spark plug because it has nowhere to flow. When you have an existing path for the movement of air, such as a leak, then it can interact with the electron field and create higher resistance for the path of ground momentarily. If the voltage goes up and down like this, it means that the energy to cross the gap is going up and down. The spark is quite literally getting blown apart. This type of analysis needs to be done at park idle no load. It also should be a repeatable pattern with a dead misfire like I have. As of right now, I'm starting to suspect a sealing issue with the valve train. This test does not identify what is leaking in the cylinder, but it does provide me with a direction for additional testing.

Backing up my hypothesis another way

I think at this point, my number two cylinder has a problem with the inability to seal compression due to an audible noise and a secondary ignition pattern. But I still do not know what or where the leak is with definitive results. One of the ways I can back up my leak hypothesis a second way is to perform an in-cylinder cranking and running compression test with an in-cylinder pressure transducer. So I remove the number two spark plug and crank the engine over with fuel disabled (**Figure 2**).

In this waveform, we can see very low compression of the vertical column to the left. Arrow #1 indicates about 18psi of cranking compression. We see a leaning tower and non-symmetrical expansion stroke. Arrow #2 provides us with a blip on the expansion stroke. I have seen abnormalities in the expansion stroke multiple times when there is a problem in the valve train such as a broken spring or loose rocker. Arrow #3 shows a very deep ex-



pansion pocket. The deep expansion pocket tells me there is likely a leak in the cylinder.

So as we see in the waveform, we have low compression because it leaked out. We also draw a deep vacuum because there is less volume in the cylin-

der than when we started the stroke. At arrow #4, we see on the intake stroke two brief pulses down and a consistent curve downwards on the intake stroke. The curve shape indicates a cylinder's inability to fill. The short pulses down indicate potentially a late intake valve

opening or a restriction to fill the combustion chamber on the intake side.

Proving where the leak is

I know beyond a reasonable doubt there is leak in the cylinder. I can show this to the customer visually two different ways and back up my previous hypothesis. I believe that there is something going on with the intake valve leaking and potentially not opening. Another way to prove where the leak is located is to perform a running compression test. This test does not always yield the results I need, but in this case it did. During a running compression test and depending on where the leak is, I may have to manipulate the rpms, doing a snap WOT test or a decel from higher rpms.

This leak was present in the waveform at park idle no load (**Figure 3**).

Arrows #1 and #2 in **Figure 3** show the expansion pocket and intake pocket. There is substantial difference in the level of vacuum on both sides. On most engines, these pockets should be similar in the level of vacuum, if not identical. These pockets can differ from engine design and variable valve lift. However, on this engine they should match. But what does this difference in level of vacuum indicate?

One way I was taught to analyze this difference is by thinking about what is attached to each port of the engine. On the exhaust side, atmospheric pressure is present, but on the intake side, manifold vacuum is

present. When the piston is stroking downwards in the cylinder and a leak is present on the exhaust valve, this can siphon atmospheric pressure into the cylinder and create a less deep expansion pocket. What we see here is almost 23inHg on the expansion pocket. This value is above normal vacuum on the expansion pocket. What we can infer from this level is that the intake valve is likely leaking. If a piston is on its way down and an intake valve leaks, we can add expansion pocket vacuum and intake manifold vacuum together, which creates a more deep pocket. Adding this running compression waveform into my strategy helps me solidify that the intake valve is compromised.



GETTING A PATTERN ON A COP COIL can be a challenge. A COP paddle probe helps!

My final hypothesis of an intake valve leak

My final test is a harder test on this engine unless you have made some special tools. Additionally, intake waveform analysis is quite tricky without the use of overlays and a lot of training. I performed this test in a way that makes it the easiest for me to understand.

When performing a cranking vacuum test, you want to position the transducer in a central vacuum port. The design of the intake, and exhaust for that matter, can alter your data. The next best test to verify a grossly leaking intake valve is to perform a cranking vacuum test with an ignition sync. In the next test, I gain access to a central port on the intake manifold, disable fuel and sync up to an ignition event and analyze the vacuum pulls in the manifold (**Figure 4**).

I have identified each intake pull with arrows corresponding to each intake stroke. We find cylinder 2's intake stroke 360 degrees and to the right of the 360-degree ruler. After that point, we can input the firing order and follow each pull. The most significant analysis that can quickly be made is by looking at what happens near TDC compression on cylinder 2. Since the ignition event is close to TDC and we have chosen to sync on our affected cylinder, a rise in intake manifold pressure near TDC confirms that there is compression leaking into the intake manifold. Typically, when doing this analysis it is helpful to also have a relative compression test in the same capture. This allows the user to focus on which cylinder is low on compression and compare it to the intake pulls. Typically, a sync is chosen off cylinder 1, but it isn't necessary. Picking the sync off of the cylinder that has the problem quickly identified where the leak was. Since we already know what cylinder is low on compression,



DOES THIS VEHICLE NEED AN ENGINE? Non-intrusive testing may provide a quick and easy answer.

a relative compression capture wasn't necessary to identify the fault.

Summary of analysis

The first test with the secondary ignition analysis matched what I found with the last test — that there is a leak. The last test and the second to last test accurately identified which valve was leaking and backed each other up accordingly. The tear down on the intake ultimately identifies why we see what we see.

The tear down

The technician working on the vehicle removed the intake manifold and the engine was cranked over. As compression blew past my face from the stuck open intake valve, I knew we found the problem. Only one of the intake valves is opening and the other one is seized in the head and has a broken valve spring and the rocker is off the valve and lifter. I imagine the intake valve stuck due to carbon build up, overworking the valve spring until it broke. The piston probably hammered the intake valve into the head and therefore

probably caused substantial damage to the valve seat. Weirdly enough, after the valve cover was also removed, the intake rocker is missing entirely from the engine. We managed to find most of the valve spring and one keeper still laying in the head. Does this need an engine? Maybe we can get away with a cylinder head, but who knows what happened to the piston and cylinder walls. The customer declined to fix this vehicle. We were able to give him visual test results that confirm that the high dollar repair is needed. If you structure your tests to give you the best value out of your time, you can find the problem faster, easier and more accurately more times than not. *TJ*



TIMOTHY JONES has been in the automotive business for seven years. He currently holds a Master ASE certification including A9 and considers himself a humble technician that embraces continuous education, helping others, with the goal to become an instructor in the near future.

tim@finetuneauto.com

PARTS AUTHORITY

USING SALVAGED PARTS TO REPAIR CUSTOMERS' CARS? ONLY IF THE CAR LETS YOU!

JOHN ANELLO // Contributing Editor

Growing up as a teenager in the '70s, I learned that my parents were not in a position to buy me a new car. I quickly conditioned myself to work hard for something I wanted and went on a mission to cut many lawns, deliver newspapers, provide grocery valet service in the ShopRite parking lot and even sell seeds door to door. This is what we did as teenagers to have the revenue to purchase what we wanted. I saved up enough money to buy myself a 1953 Dodge pickup with a straight L-6 engine and a 3-speed manual transmission. This truck was fully serviceable and just about anything on that truck was rebuildable. I soon learned that a nearby antique “junkyard” was my best friend to keep operating costs low to perform any repairs I needed. It was the way of life growing up to earn, save and spend wisely.

Many things have changed over the years and now these “junkyards” are considered a gold mine for parts that are needed. These yards are now labeled as “salvage yard” or “recycled parts,” and we dare not use the word “junk” anymore. Many collision shops are now being given the option to purchase used parts to keep operating costs low on insurance claims after an accident. There are also customers at repair shops who ask for an option to put used parts in the vehicle, and it all boils down to the costs of repairs. There is nothing wrong with this operation, because you're putting in the same manufacturer parts that still meet the quality of the vehicle, but the



buyer must be aware that the parts they buy may not be the correct ones at times and that they may be compromised by a prior accident or ruined by weather conditions.

Saving money or asking for trouble?

A homeowner was looking to save some money on purchasing a newer vehicle, so he decided to buy a 2016 Audi S7 “Salvage Vehicle” for a very good price, but it had a few underlying issues that he was aware of when he agreed to the price of the vehicle (**Figure 1**). These salvage cars can sometimes be a trainwreck, or you can get lucky. It's a buyer beware deal, and you need to know what you're purchasing and what issues the car has that



might create deep pockets on your behalf. The one issue that was known with this Audi was that the transmission case was cracked and leaking fluid from a prior accident and it was never addressed. The only fix was to replace the entire transmission assembly. If purchased new or rebuilt, this might have been a

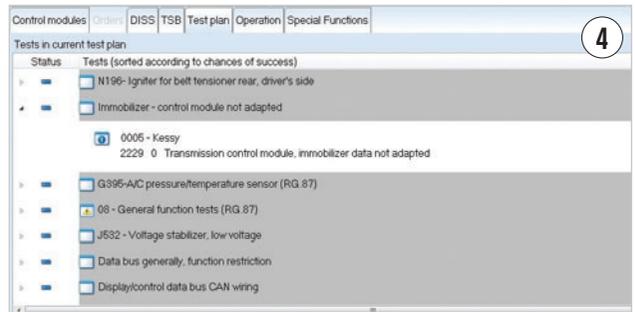
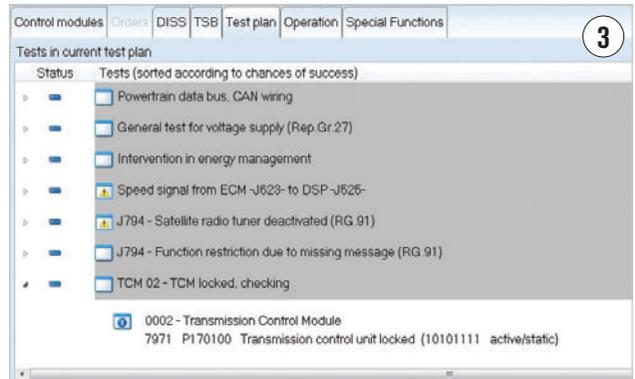
very expensive venture, so the owner of the vehicle opted to find a salvage transmission and hire out a transmission shop to install it for him.

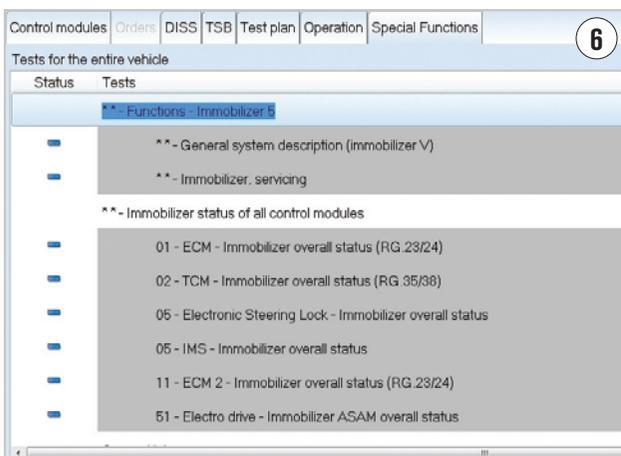
The transmission shop was not obligated to give him ANY guarantees with the job because it was a salvage transmission, and they were not taking any responsibility. The only guarantee was the installation of the unit. The owner agreed and he dropped off the vehicle on a flatbed; it drove off the flatbed without any issues and parked in the parking lot of the transmission shop. The salvage transmission was also dropped off for the shop to install (**Figure 2**). All things were now put into play, and the customer was excited to get his investment of a low-cost vehicle on the road just in time for the summer. During the week, the transmission was installed by the shop and the installation went smoothly, but once the job was completed and the fluids were topped off, the vehicle would not go into “Drive” or “Reverse.” The owner of the vehicle was soon notified and then it became a blame game. The owner stressed that the vehicle did have “Drive” and “Reverse” gear issues before the installation and the transmission came out of a good running car. It was that “drive them in/push them out” syndrome, but the transmission shop had already explained that there were no guarantees with a used unit.

Is it the tranny?

It was at this point that the owner of the vehicle Googled my service on the internet for technical assistance. I asked the owner as many questions as I could to get all the information I needed to start building my diagnostic game plan. Then I told him that

I strictly work with shops, but I would be willing to help him to get his problem resolved, but explained to him that I needed to get the shop’s authorization to work on the car there. I called the shop and explained about my services, and I had to do a second questioning process to kind of dot the ‘i’s. The shop was willing to allow me to work with them, but it was up to the owner of the vehicle to pay for my services. The shop was looking forward





to meeting me for future support on their shop vehicles so it was a win-win situation for me, but I needed to tackle this job first because I was now on proving grounds for two new parties involved with this salvage Audi.

I had the Audi/VW factory ODIS tool, so I was in good hands if I needed guided functionality. This was not just a basic scan tool, but a tool that was PC-based, online and reprogramming capable. It also had a feature where you can click on a trouble code and it would guide you to resolve issues in a step-by-step procedure. The transmission shop was very knowledgeable and they believed that the transmission had to be programmed to function, but this is a myth for most manufacturers because usually I encounter a mechanical or electrical issue for an inoperative transmission. However, I was willing to give him the benefit of the doubt.

Many transmissions have control modules within them that if not flashed with software, may not function properly and then others have external transmission control modules, but need the valve body IDs configured to the transmission module or premature failure of the transmission may be inevitable.

I placed my scan tool on the Audi and retrieved a Code P170100 for “Transmission Control Unit Locked” (**Figure 3**) in the Transmission Control Module and also a Code 2229 Transmission Control Module Immobilizer Data Not Adapted (**Figure 4**) in the Immobilizer Control Module. I did not expect these codes on this vehicle at all and this was not about reprogramming, but rather configuring the transmission control module to match the vehicle. It was the manufacturer’s way of protecting parts from another vehicle to be sold on the open market just in case they were stolen. This transmission was locked into “Neutral Mode” and had to be unlocked by the Audi server. This would now explain the “Safe Mode” indicator above the mileage on the dash that I was unfamiliar with



(**Figure 5**). Lucky for me I had the factory tool along with a Security Professional License through VW's Gecko Security system that would allow me to perform the functions needed to get this transmission to work.

Let's fix it!

I navigated to the Immobilizer Functional Procedures menu and selected the Transmission (**Figure 6**). There were many other control modules protected on this hit list so it just wasn't about protecting used transmission modules, but many others on the vehicle that were on the proprietary list. One of the prerequisites to allow the procedure to start was the possession of the car's registered key that had to be held by the key antenna insignia at the center dash panel (**Figure 7**). The key would have to be placed here until the scan tool told you it was done recognizing it. Usually, the placement of the key is with the Audi insignia facing out and in the upright position so that the key antenna can pick up the strongest reception of the key fob (**Figure 8**). Many manufacturers use this method to program new key fobs, but sometimes these antennas can be tucked away in a glove box out of view or by the cup holder so you must know exactly where to place the key fob during the learning process.

Once the procedure was performed and I cycled the key, the "Safe" indicator on the dash was no longer visible and the transmission now shifted into Reverse and Drive. I next proceeded to clear the entire vehicle and perform some parking lot maneuvers. This vehicle had no temporary plates and was not registered yet, so I was limited to fully testing the transmission so I left it up to the shop to find a way to make sure the vehicle had no shifting issues on the road. I did, however, perform a last full vehicle scan to make sure there

weren't any other underlying issues that the owner of the vehicle should be aware of. The only issue I did come across was a Code U023500 Front Distance Sensor (**Figure 9**). This would answer the question of why there was an Adaptive Cruise Control red icon on the dash in the speedometer area (**Figure 10**). I'm guessing whoever repaired the vehicle might have left the Cruise Control distance sensor out of the repair process to keep their operating cost low for the salvage vehicle sale, because it was not communicating with my scan tool when I tested it.

My job was done, and I had a happy owner of the vehicle and I forged a new relationship with another repair shop in the process. I can only tell you that technology is getting really out of hand now. A simple R&R is not as simple as it was back in the day. You now have to make sure that any electrical part you buy used is correct for the vehicle you are using it on and you need to make sure it is not one-time use. Many manufacturers will not allow an embedded VIN on a used component to be overwritten such as BMW, Mercedes, Land Rover, Jaguar and a few others, but many salvage yards may be unaware of this and sell you the part anyway. Then other manufacturers such as Audi will lock down a part and render it inoperable until their server brings it back to life with an Audi user having proper credentials to do so. My only hope is that this story has enhanced what you know or don't know. Buyer beware!! *TL*



JOHN ANELLO owns Auto Tech on Wheels in northern New Jersey, which is a mobile diagnostic service for 1,700 shops, providing technical assistance and remote programming. He is also a nationally known trainer.
atowscopeit@aol.com

DID YOU KNOW?

ASE CERTIFIED
TECHNICIANS

- ➔ **GET PAID MORE**
- ➔ **GET HIRED FIRST**
- ➔ **ADVANCE FASTER**



MOTOR AGE TRAINING

OFFERS THE MOST COMPLETE AND EXTENSIVE ASE TRAINING SERIES AVAILABLE ANYWHERE!

GET THE MATERIALS YOU NEED TO PASS ALL OF YOUR ASE CERTIFICATION TESTS - GUARANTEED!

Motor Age
TRAINING
Self-Study Guides for ASE Certification

...YOU PASS OR DON'T PAY!

**MONEY-BACK
GUARANTEE.**



www.PASSTHEASE.com

BENCH LATHE

Hunter's BL Series bench lathe is now available for order. The BL Series bench lathe adds new capabilities to the same industry-leading quality in previous generations. The BL Series lathe features patented Anti-Chatter Technology (ACT) that eliminates the buildup of vibration that can occur when machining rotors at a fixed speed. This technology provides the smoothest possible rotor finish without the use of chatter bands or other unnecessary devices.

WWW.HUNTER.COM/CONTACT-HUNTER



SIRIUSXM SERVICE LANE PROGRAM

Surprise and delight your eligible customers after their service visit with a free 3-month trial to SiriusXM. Qualified customers with SiriusXM-equipped vehicles get 3 months of All Access with 150+ channels in and out of the car, including ad-free music, plus sports, news, talk and entertainment, plus more channels, features and video content on the app. Enroll today at the below website.

SIRIUSXM.COM/MYSHOP19



CARQUEST PLATINUM PAINTED ROTORS

Carquest Platinum Painted Rotors, an exclusive line of premium rotors offered by Advance Professional and Carquest, are designed to meet professional repair facilities' need for a high-performing rotor product that is visually appealing to today's drivers. Engineered with a rust inhibiting barrier that provides more protection than non-painted rotors, Carquest Platinum Painted Rotors help decrease brake noise and increase the life of a vehicle's brake pads. For more information on quality Carquest products, call your local Advance Auto Parts or Carquest delivery location.

WWW.CARQUEST.COM



ORDER OE PARTS ONLINE

RepairLinkShop.com is your online OE parts marketplace where OEM part catalogs and illustrations make finding and ordering OE parts from your local dealers easy as clicking a button. Generate higher quality repairs while taking advantage of part discounts up to 38 percent with nine OEM-sponsored discount programs. Register for free at RepairLinkShop.com to get the right part, at the right time.

WWW.REPAIRLINKSHOP.COM



REPAIR DATA

Since 1918, Mitchell 1 has been the industry standard for quality repair data to the motor

vehicle industry. From repair information with real-world fixes to shop management software and marketing services, auto and truck repair businesses rely on Mitchell 1's integrated solutions to achieve end-to-end process efficiency and improve productivity and profitability.

WWW.MITCHELL1.COM



8 CHANNEL DIAGNOSTIC SCOPE

The new PicoScope 4823 helps you quickly diagnose vehicle faults with 8 input channels to measure a wider combination of signals.

Decode more serial busses. Monitor more components and systems at the same time. All to make faster decisions. Be more accurate, productive and profitable.

WWW.PICOAUTO.COM/PRODUCTS/PICOSCOPE-4823/8-CHANNEL-AUTOMOTIVE-OSCILLOSCOPE



TECHNICAL TRAINING

WORLD PAC Training Institute (WTI) offers carline-specific advanced technical training, business management solutions and exclusive Smart Groups designed explicitly for independent repair shop professionals. Always developed and taught by experienced instructors, WTI training keeps you ahead of the learning curve to ensure your business remains competitive and profitable. View the complete class listing at the below website.

WWW.WORLDPAC.COM/TRAINING



BRAKE DISCS

Textar engineers have utilized the know how that comes from decades of producing premium OE brake pads to develop a perfectly matched brake disc that ensures the ultimate braking performance of your vehicle. The Textar range of brake discs is manufactured to precise German specification and are application engineered for cars driven in North America. Textar brake discs, Textar brake fluids (DOT 3, 4, 5.1), Textar anti-squeal pastes and Textar brake tools are available exclusively at WORLD PAC, as well as a full range of premier Textar brake pads, e-pads and brake shoes.

WWW.TEXTAR-WORLDPAC.COM



EZ-ADAS SYSTEM

For shops to add ADAS sensor calibration to the services they offer, they must have the right equipment on hand. The new John Bean® EZ-ADAS system is the perfect solution for shops to expand their business by servicing ADAS-equipped vehicles. The EZ-ADAS system features a unique centerline setup process that is highly accurate and easy to operate, including all the required hardware and target components to cover a wide range of makes and models.

WWW.JOHNBEAN.COM



SNAP-ON SOFTWARE RELEASE

With the newest software Snap-on introduces its Secure Vehicle Gateway™ solution to unlock 2018 and newer FIAT Chrysler Automobiles (FCA) for direct access from the scan tool to the vehicle's secure gateway module. Wifi-enabled diagnostic platforms using current software now have the ability to perform reset functions and bi-directional tests that were previously inaccessible because of the secure vehicle gateway.

HTTP://DIAGNOSTICS.SNAPON.COM/SOFTWARE



COOLING SYSTEM REFILLING GUN

The cooling system refilling gun incorporates deep vacuum technology to remove airlocks when refilling the cooling system, eliminating the need for system bleeding and interchanging hoses. With universal attachment onto most radiator and header tanks, the tool allows technicians to pull air out of the coolant system easily while new coolant is added without any spills or waste.

WWW.OTCTOOLS.COM



FVP PLATINUM AGM BATTERIES

Originally developed for the military, where power, durability, reliability and safety are critical, AGM batteries are now available for passenger cars and light trucks. FVP Platinum AGM batteries are the ideal choice for vehicles equipped with an Idling Stop/Start system or with power-hungry accessories that increase the demand on the battery and charging system. Each FVP Platinum AGM Battery meets exact OE fitment specifications and is backed by a nationwide free replacement 36-month warranty.

WWW.FACTORYMOTORPARTS.COM



AD INDEX

AD INDEX

ADVERTISER	PAGE #
ADVANCE AUTO PARTS.....	CVTIP
AUTEL.....	37
AUTOMOTIVE MGMT INSTITUTE.....	9
AUTOMOTIVE SERVICE ASSOCIATION.....	OUTSERT
AUTOMOTIVE TRAINING INSTITUTE.....	12
BENDPAK INC.....	23, 28, 29, 43
CONTINENTAL.....	17
FORD MOTOR MEDIA.....	CV2, 10, 11
FVP.....	25

ADVERTISER	PAGE #
IATN.....	13
LAUNCH TECH USA INC.....	3
LIQUI MOLY USA.....	21
O'REILLY AUTO PARTS.....	CV3
PARTSOLOGY.....	15
RAYBESTOS BRAKES.....	7
TECH FORCE FOUNDATION.....	27
TYC GENERA.....	19, 31
WORLDPAK.....	CV4

PRODUCTS

ADVANCE AUTO PARTS.....	53
FMP.....	54
HUNTER ENGINEERING.....	53
JOHN BEAN.....	54
MITCHELL 1.....	53
OEC.....	53

OTC.....	54
PICO TECHNOLOGY.....	53
SIRIUSXM.....	53
SNAP-ON.....	54
WORLDPAK.....	53

Motor Age
ADVANCING THE AUTOMOTIVE SERVICE PROFESSIONAL | WWW.MOTORAGE.COM

Content Licensing for Every Marketing Strategy



Marketing solutions fit for:

- Outdoor
- Tradeshow/POP Displays
- Direct Mail
- Social Media
- Print Advertising
- Radio & Television

Logo Licensing | Reprints | Eprints | Plaques

Leverage branded content from *Motor Age* to create a more powerful and sophisticated statement about your product, service, or company in your next marketing campaign. Contact Wright's Media to find out more about how we can customize your acknowledgements and recognitions to enhance your marketing strategies.

For more information,
call Wright's Media
at 877.652.5295 or
visit our website at
www.wrightsmedia.com

TRAINING

Electrical How-to-Book

by Vince Fischelli (250 pages - 198 diagrams) **\$98.00**

"Vehicle Electrical Troubleshooting *SHORTCUTS*"

Troubleshooting Batteries, Cranking Circuits and Charging Systems on-the-vehicle with just a DMM & Current Clamp plus a lot more!



Veejer Enterprises Inc.

www.veejer.com 972-276-9642

HIT THE FAST LANE OF THE AUTOMOTIVE INDUSTRY

for Web Exclusives
and Advertising
Opportunities Go
to our Websites

www.searchautoparts.com

60 Lesson-Vehicle
Electronics Course
Now **On-Line** at this location
<http://training.veejer.com>

Print Out
Lessons
Study at your
own Pace

**LIFETIME
ACCESS
FOR
\$249.00**



Veejer Enterprises Inc.
972-276-9642 | www.veejer.com

Let Marketplace Advertising Work For You!

Generate sales leads, maintain market presence, conduct market testing, promote existing lines, introduce new products and services, or recruit the best.

**MARKETPLACE OFFER YOU AN EXCELLENT
RETURN ON INVESTMENT!**

**FOR MARKETPLACE OR
CAREER OPPORTUNITY
AD RATES/PLACEMENT:**

Call **Michael Parra** at
Ph: 704-618-6145 or
E-mail: michael.parra@ubm.com



THE ONE SKILL YOU NEED TO MASTER

EVERY DAY, THE MODERN AUTOMOBILE BECOMES MORE ELECTRIFIED. THIS DEMANDS THAT YOU MASTER THE SKILLS NEEDED TO BE AN EFFECTIVE ELECTRICAL TROUBLESHOOTER.

PETE MEIER // Technical Editor

I'm sitting in the classroom that morning, sipping coffee and finishing my second (or was it third) donut when the corporate instructor walks in and calls the class to order. He begins his presentation with, "Today's electronic vehicle systems are growing at a rapid pace. Within the next few years, you'll need the equivalence of an Associate's Degree in electrical engineering to work on them."

That was 1979.

Imagine taking a 2019 model back in time 40 years. What would that instructor make of the technologies we deal with every day today? And how many

techs of the era would run screaming for the door when faced with troubleshooting network communications issues or other, more challenging system faults?

If they had a strong foundation in electrical theory and mastered a few fundamental testing techniques, they wouldn't run away from the technologies — they'd run towards them. Why? Because they would know that the majority of their peers were frightened by the challenges and that made the skills they owned all that more valuable.

The same applies today. And one technique that many techs, new and experienced alike, lack is the practical application of voltage drop as a testing

method. Even though I've visited this subject many times in the past, it seems I still leave some of you dazed and confused at the end. In this month's episode of "The Trainer," I intend to change that trend and present you with an in-depth, easy-to-understand lesson in the mysteries of voltage drop and how to apply it to daily electrical troubleshooting.

Once mastered, this single technique will do more to elevate your electrical diagnostic ability than any other technique I can think of. And it requires nothing more than a reasonably accurate voltmeter to perform. I hope you enjoy — and learn — from this month's offering. *TM*



SIGN UP FOR YOUR SUBSCRIPTION TODAY AT [MOTORAGE.COM/MATCONNECT](https://www.motorage.com/matconnect)



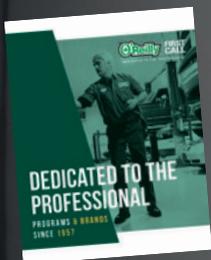
DEDICATED TO THE PROFESSIONAL

INSTALL

PREMIUM SHOCKS & STRUTS

FROM MONROE®

Let us be your Parts & Equipment Supplier



www.oreillyauto.com/professional-catalogs



MASTERPRO
UNDERCARR

MASTERPRO STRUT ASSEMBLIES

- Offers a high-quality, low cost alternative to OE replacement parts
- Built with high quality components in a fully-assembled unit
- Designed to meet or exceed OEM requirements

MONROE
SHOCKS & STRUTS

MONROE® SHOCKS & STRUTS

Monroe continues to lead the industry in developing innovative products that deliver maximum value. From entry level Monro-Matic® to premium Quick Strut® assemblies, Monroe has the replacement shocks and struts to improve handling, safety and control on most applications.



MONROE
SHOCKS & STRUTS

MONROE® QUICK-STRUT ASSEMBLIES

- Save time with one complete strut assembly "ready to install"
- New coil springs
- Restore the vehicle to original height and load carrying capacity
- New bearing plates and strut cushions



DEDICATED TO THE PROFESSIONAL

FIRSTCALLONLINE.COM

Visit our website for a complete, internet-based catalog designed exclusively for the Professional.

FIRST CALL ONLINE
MAKING IT FASTER AND EASIER
THAN EVER TO ORDER PARTS

WORLD PAC 

Wholesale Distributor of Original Equipment Automotive Parts

QUALITY NEVER GOES OUT OF STYLE



serving independent import & domestic
automotive service professionals

become a customer today

worldpac.com/quality