

ADVERTISEMENT

Motor Age®

ADVANCING THE AUTOMOTIVE SERVICE PROFESSIONAL | www.SearchAutoParts.com

MARCH 2014



STAY ON TRACK

Install a NAPA Belts & Hose Micro-V Belt and DriveAlign Tensioner together, and you'll avoid unexpected jump off, wear and noise. That's KNOW HOW at work. Visit your local NAPA AUTO PARTS Store today.





HANDLES THE HEAT

NAPA Platinum Oil Filters were designed to endure high operating temperatures for those heavy-duty towing jobs and long idling times. In fact, we create all our oil filters with wire-backed, reinforced, fully synthetic media. Why? Because we KNOW HOW to make a filter right. Visit your local NAPA AUTO PARTS Store today.



800-LET-NAPA / NAPAonline.com



Motor Age

March 2014

Talk shop anytime



AUTOPRO WORKSHOP

Vol. 133, No. 3

Advancing the Automotive Service Professional Since 1899

COMMUNITY

BUILDING A BETTER OFFER

Don't send a customer an offer just for the sake of it. Make sure they're going to understand it and see the benefit.

PRODUCTS

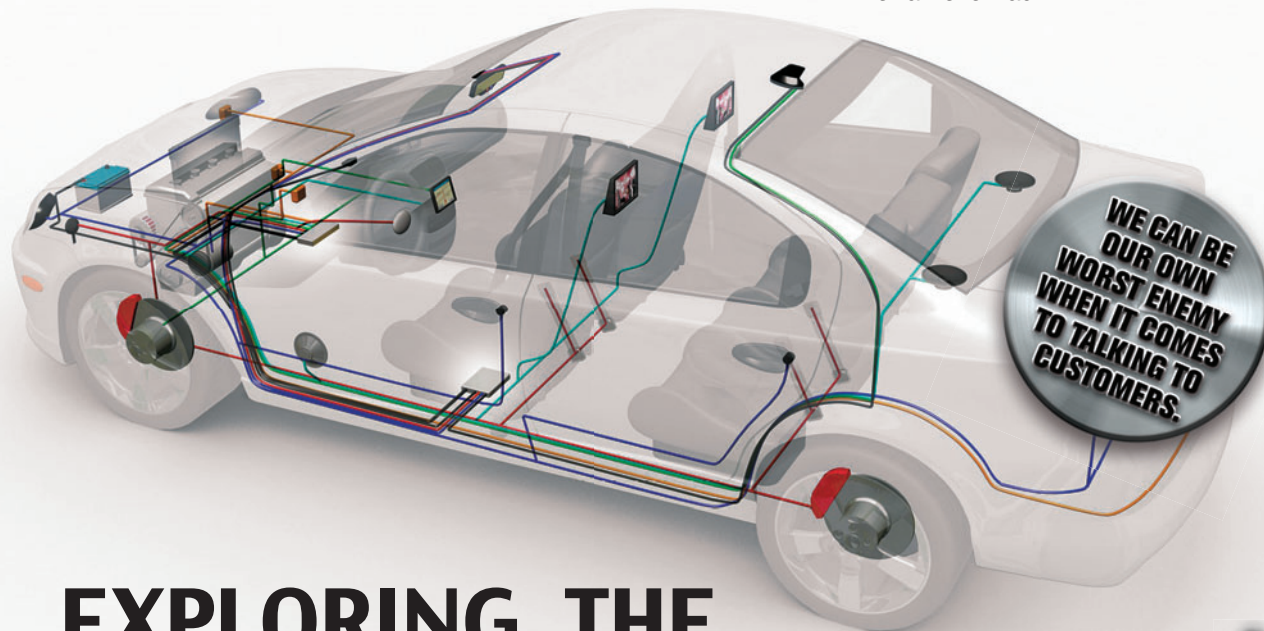
NEW TOOLS FOR YOUR EMPLOYEES

We're bringing you more tools to meet your shop's needs.

OPERATIONS

WE HAVEN'T ALWAYS DONE IT THAT WAY

Your approach to how employees work together might be in need of an overhaul.



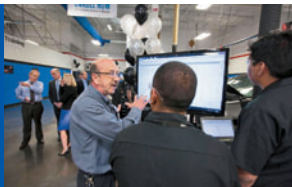
EXPLORING THE 'CONNECTED' CAR

ADVANSTAR
AUTO

TRENDING

UTI STARTS GM TECH TRAINING PROGRAM

The new courses offer techs a head start on GM technology.



TECHNOLOGY

LEARNING FROM A RACING LEGEND

Teams invest a lot to drill down to the millisecond.



ONLINE EXCLUSIVE!

ONLINE EXCLUSIVE MACS, VISION FOLLOW-UPS

Check out training from these two conferences.

JUST SCAN IT

Scan here for your direct link to motorage.com





Performance. Reliability. Success.

With our competitively priced replacement parts, you no longer have to settle for anything less than Mercedes-Benz quality. But that's just part of the story. You see, our filters all carry a 12-month, no mileage-restriction warranty. So our parts are not only a great deal. They're a great value. Since they're genuine Mercedes-Benz, you can have confidence they'll last, and so will your relationship with your customers.

Contact an authorized Mercedes-Benz dealer or learn more at www.mbwholesaleparts.com.

MSRP excludes state and local taxes and freight if applicable. Prices may vary by dealer. See your authorized Mercedes-Benz dealer for additional details or a copy of the Mercedes-Benz parts limited warranty.



Mercedes-Benz

EDITORIAL STAFF

Group Content Director

Michael Willins
mwillins@advanstar.com
(440) 891-2604

Managing Editor

Tschanen Brandyberry
tbrandyberry@advanstar.com
(440) 891-2745

Technical Editor

Pete Meier ASE
pmeier@advanstar.com

Art Director

Steph Bentz
Senior Designer
Stalin Annadurai

Contributing Editors

Vanessa Attwell
Brian Canning
Mark DeKoster
Chris Frederick
Bill Haas
Dave Hobbs
Tim Janello
John D. Kelly
Dave Macholz
Richard McCuistian
Mike Miller
Albin Moore
Mark Quarto
G. Jerry Truglia

Editorial Director, ASE Study Guides

James Hwang
jhwang@advanstar.com
(714) 513-8473

SUBSCRIPTION CHANGES/ CUSTOMER SERVICE

(888) 527-7008
(218) 740-6395

BUSINESS STAFF

Vice President/General Manager

Jim Savas
Group Publisher
Terri McMenamin
tmcmamin@advanstar.com
(610) 397-1667

Business Manager

Nancy Grammatico
Administrative Coordinator
Gladys Hart

Sr. Production Manager

Karen Lenzen
(218) 740-6371

Circulation Director

Anne Brugman

Circulation Manager

Tracy White
(218) 740-6540

Marketing Director

Boris Chernin
bchernin@advanstar.com
(310) 857-7632

Web Marketing & Strategy Manager

Bala Vishal
bvishal@advanstar.com
310-857-7659



©Advanstar Communications 2014
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:



COMMUNITY

10 Building a better offer for your customers

Don't make an offer in your marketing pieces just for the sake of it. Make sure there is a purpose.



Q+A WITH

14 Jay Horak, owner of AutoEnginuity

From the track to the business world, this owner shares where he's moving his company.

plus **Stats & Trends**
Noteworthy

FROM THE **BLOG SPHERE**

BEST OF THE BLOGS

TOP VIDEOS CALENDAR

120 The Trainer Learning More About Mode \$06

Mode \$06 is one of the most commonly discussed modes in Global OBDII. But what's with the dollar sign, and what should you look for when the PID isn't there? Let us answer that for you.

ONLINE COVERAGE

MotorAge TRAINING

Self-Study Guides for ASE Certification

Upcoming Webinars & Archives

Check out our free technical and transmission webinars throughout 2014.

MotorAge.com/webinars

POWERTRAIN PRO

Read new technical content for general repair and specialty shops.

MotorAge.com/POWERTRAINPRO

MotorAge

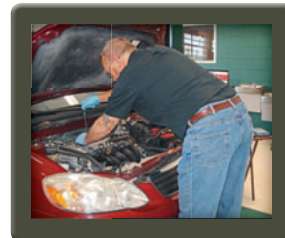
Check out past videos from Pete Meier and your manufacturers.

MotorAge.com/AfterHours



ONLINE VIDEO KNOW-HOW

MotorAge.com/video



The Trainer video series

What to look for in Mode \$06 when the PIDs aren't there.

MotorAge.com/mar14trainer



CHOICE AWARDS

[/techchoice](http://techchoice)



BROKEN FASTENERS

[/fasteners](http://fasteners)

FOLLOW US!

Check out new tech tips every day on our social networks!

Twitter: @pete_meier, @Motor_Age, @ATSGcompany

Facebook: Pete Meier, Tschanen Brandyberry

Workshop: Peter, CarGirl, BWrench, jatonymartin and more!



Talk shop (and tech) in the AutoPro Workshop!

Join **FREE TODAY** at Workshop.Search-AutoParts.com to discuss:

- ▶▶ 6 steps to TPMS success
- ▶▶ Replacing central port injection tips
- ▶▶ The Why generation
- ▶▶ 4 truths and a lie about social media

TECHNOLOGY

UNDERCAR



A NEW CRUZE

BY **PETE MEIER** | TECHNICAL EDITOR

72 GM reenters the passenger car light-diesel market after more than a 35-year absence.

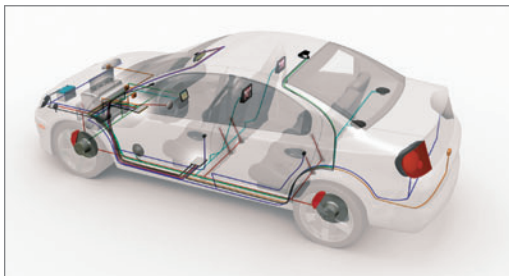
DRIVABILITY

LEARNING FROM A RACING LEGEND

BY **DAVE HOBBS** | CONTRIBUTING EDITOR

50 Race teams know the difference between winning and losing is measured in milliseconds. They invest a lot of time and technology to track progress.

POWERTRAIN PRO



POWERTRAIN PRO COLUMN

A TRIPLE THREAT

BY **WAYNE COLONNA** | POWERTRAIN PRO PUBLISHER

30 These transmissions can throw problems at you from several directions. You need to be ready with a good defense.



UNDERHOOD

GOING FAST ON A BUDGET

BY **VANESSA ATTWELL** | CONTRIBUTING EDITOR

62 There are several ways you can speed up your car without speeding up the flow of cash from your wallet.

SCOPE & SCAN

WHAT WE HAVE HERE

BY **EDWIN HAZARD** | CONTRIBUTING EDITOR

78 Was a lack of communication the cause of this Town Car's no start?

MOTOR AGE GARAGE

THE CAR THEY LOVE

BY **RICHARD MCCUUSTIAN** | CONTRIBUTING EDITOR

82 Helping customers is really important, especially when the vehicle is worth a lot more to them than it would be to those of us working on it.

ELECTRICAL

EXPLORING THE 'CONNECTED CAR' OF TODAY

BY **PETE MEIER** | TECHNICAL EDITOR

38 What exactly are we connecting to? With telematics nowadays, it's other vehicles, you and repair shops.

ATSG TECHNICAL TRAINING

MASQUERADING PROBLEMS

BY **WAYNE COLONNA** | POWERTRAIN PRO PUBLISHER

46 When you expect one code to be thrown but see another, the problem might be hidden a little too well at first glance.

Chief Executive Officer
Joe Loggia

Chief Executive Officer Fashion Group,
Executive Vice-President
Tom Florio

Executive Vice-President, Chief Administrative
Officer & Chief Financial Officer
Tom Ehardt

Executive Vice-President
Georgiann DeCenzo

Executive Vice-President
Chris DeMoulin

Executive Vice-President
Ron Wall

Executive Vice-President, Business Systems
Rebecca Evangelou

Executive Vice-President, Human Resources
Julie Molleston

Sr Vice-President
Tracy Harris

Vice-President, Information Technology
Joel Horner

Vice-President, Legal
Michael Bernstein

Vice-President, Media Operations
Francis Heid

Vice-President, Treasurer & Controller
Adele Hartwick

SALES STAFF

Midwest/Western/Northern California
Chuck Steinke, Regional Sales Manager
Tel: (630) 369-0752
Fax: (630) 369-3755
csteinke@advanstar.com

Eastern/Southern States
Paul A. Ropski, Regional Sales Manager
Tel: (312) 566-9885
Fax: (312) 566-9884
propski@advanstar.com

Ohio/Michigan/Southern California
Lisa Mend, Regional Sales Manager
Tel: (773) 866-1514
Fax: (773) 866-1314
lmend@advanstar.com

Inside Sales/Classified Sales/Recruitment
Keith Havemann, Sales Representative
Tel: (310) 857-7634
Fax: (310) 943-1465
khavemann@advanstar.com

List Rental Sales
Carissa Simmerman
csimmerman@advanstar.com
(440) 891-2655

Permissions/International Licensing
Maureen Cannon
(440) 891-2742

Reprint Services
877-652-5295 ext. 121/ bkolb@wrightsmedia.com
Outside US, UK, direct dial: 281-419-5725. Ext. 121



NO COMEBACKS.

CARQUEST® is proud to introduce a premium brake pad engineered with **professionals like you in mind**. TEQ Correct Professional brake pads feature the exclusive benefits of **Optimized Performance Technology**, **HEX Shim Technology**, and **FusionLock**. Your customers trust you to do the job right, and you can trust CARQUEST to provide quiet, long-lasting premium pads. Contact your nearest CARQUEST Auto Parts store for more information on TEQ Correct Professional brake pads.

Great people, great products, great prices!SM

CARQUEST **AUTO PARTS**

CARQUEST.com

**SPECIALTY PARTS
UPKEEP/MAINTENANCE
SHOP EQUIPMENT
SHOP MATERIALS**

**PAINT & REFINISH
REPLACEMENT PARTS
VEHICLE STYLING
BUSINESS SYSTEMS**

**ORGANIZATIONS/
ASSOCIATIONS
OFF-ROAD**

...AND MUCH MORE

OPERATIONS



MANAGEMENT

WE HAVEN'T ALWAYS DONE IT THAT WAY

BY **BILL HAAS** | CONTRIBUTOR

16 Maybe your approach to how employees work together could use an overhaul.

PROFIT MATTERS

ARE WE THE PROBLEM?

BY **CHRIS "CHUBBY" FREDERICK** | CONTRIBUTOR

20 We can be our own worst enemy. Rephrasing our approaches can help.

FINANCIAL FIGURES

AN INFORMED CLIENT BECOMES A GREAT CLIENT

BY **BOB GREENWOOD** | CONTRIBUTOR

24 Teaching customers is important, and a price breakdown is a good starting point.

SHOP PROFILE

PUT SERVICE TO THE TEST

BY **ROBERT BRAVENDER** | CONTRIBUTOR

26 Be a guest at Mighty and you'll get more than mimosas and Nancy Sinatra boots.

TRENDING



UTI STARTS GM PROGRAM

6 Universal Technical Institute has launched the first GM Technician Career Training program at its Avondale, Ariz., campus to train techs for work on these vehicles.

NACE/CARS TAKING SHAPE

6 OEMs will have a larger focus at this year's event, moving to Detroit in July for the first time.

MOTOSHOP PROGRAM OFFERS GUARANTEED ROI

8 The 5X Guarantee is new from MotoREV, a marketing program to improve brand awareness for today's shops.

AUTOENGINUITY OWNER WINS CHAMPIONSHIP IN 2013

8 Jay Horak raced to the top in the 2013 Expert class of the Pro Mazda Championship Presented by Cooper Tires, and we have a recap here.

PRODUCTS

THERMAL IMAGING CAMERAS

112 The PREDATOR Series of Thermal Imaging Cameras from General Tools & Instruments (General) is expanding to include nine extended temperature range models.

112

Leak Detector



113

Fuel Injection



118

APG

Ultimate Jack System



Motor Age (Print ISSN: 1520-9385, Digital ISSN: 1558-2892) is published monthly, by Advanstar Communications Inc., 131 W. 1st Street, Duluth, MN 55802-2065. 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, 131 W. 1st Street, Duluth, MN 55802-2065. Canadian G.T.S. number: R-124213133RT001. Publications Mail Agreement Number 40612608. Return Undeliverable Canadian Addresses to: IMEX Global Solutions PO Box 25542 London, ON N6C 6B2 CANADA One-year rates for non-qualified subscriptions: U.S. \$70.00; Canada/Mexico \$106.00; International surface \$106.00. For information please call (866) 529-2922 (Domestic inquiries); (218) 740-6395 (Canadian/Foreign). **Printed in the U.S.A.**

© 2014 Advanstar Communications Inc. 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 Advanstar Communications Inc. 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 440-756-5255 or email: mcannon@advanstar.com.

Advanstar Communications Inc. 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 Advanstar Communications Inc. to make your contact information available to third parties for marketing purposes, simply call toll-free 866-529-2922 between the hours of 7:30 a.m. and 5 p.m. CST and a customer service representative will assist you in removing your name from Advanstar's lists. Outside the U.S., please phone 218-740-6477.

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.

To subscribe, call toll-free 888-527-7008. Outside the U.S. call 218-740-6477.

Increased car count = Increased profits



EXPERT HYBRID SERVICE IS A GAME-CHANGER

Turning away hybrid service is like turning your back on money. Now your team can offer the best hybrid service experience anywhere – and increase profits dramatically!

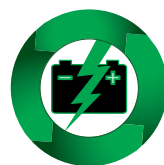


The Hybrid Shop delivers proprietary diagnostic equipment, intensive training and SAE Certificate of Competency. Plus, proven marketing tools that drive customers to your shop.

As one of our exclusive dealers, you'll be a leader in an explosive new field, able to service every aspect of a hybrid vehicle's high-voltage electrical system and conditioning the battery to 95% of its original power and energy. Increase your profits and save your customers thousand of dollars they would otherwise spend on replacement batteries.

For more information, visit www.thehybridshop.com or call 800-397-2690

MINIMUM INVESTMENT. MAXIMUM RETURN.
LOCK IN YOUR EXCLUSIVE TERRITORY
BEFORE YOUR COMPETITION DOES!



the
HYBRIDSHOP
info@thehybridshop.com

SUPERCHARGE YOUR BUSINESS!

TRENDING

INDUSTRY NEWS,
NOTES AND HAPPENINGS



Stay on top of Industry Developments.

Sign up today for **FREE SUBSCRIPTIONS** to

- ▶ Service Repair E-News & Alerts
- ▶ Certified Technician E-News & Alerts
- ▶ POWERTRAIN PRO E-News & Alerts

MOTORAGE.COM/SUBSCRIBE



ONLINE COVERAGE

THERE'S MORE ONLINE:

MITCHELL 1 ADDS TRAINING

Mitchell 1 has added Get2Know, a training center portal to help master the company's solutions.

»» MOTORAGE.COM/GET2KNOW

ALLDATA LAUNCHES APP

ALLDATA's app now is available for Android phones, complete with an OBDII port.

»» MOTORAGE.COM/ALLDATAAPP

MOHAWK LIFTS UNVEILS BLOG

The lift company's blog covers news, reviews, safety and common questions.

»» MOTORAGE.COM/MOHAWKBLOG

WHAT'S NEXT FOR ADVANCE?

Advance has a strong track record of integrating companies it acquires. One writer recalled its history of acquisitions, but forgot how significant a history it was.

»» AFTERMARKETBUSINESS.COM/NEXT

PEP BOYS HITS THE AIRWAVES

Pep Boys is spicing up its relatively recent retail and wholesale sales presence within the specialty equipment marketplace by sponsoring a new "West Coast Customs" TV show.

»» AFTERMARKETBUSINESS.COM/WCC

THE TELEMATICS WORKLOAD

Telematics can encourage drivers to bring vehicles into your shop for maintenance, but are you prepared for the work?

»» ABRN.COM/MAINTENANCE

NEGOTIATING THE NON-INCLUDED

Don't forget to add for repair, refinish or adjacent panels after welded-panel removal

»» ABRN.COM/ADDONS

LEARN MORE: MotorAge.com IS UPDATED CONTINUALLY

ENTER INDUSTRY NEWS

SEARCH THOUSANDS OF ARCHIVED AND BREAKING NEWS STORIES BY **KEYWORD**



A Universal Technical Institute instructor, students shift into high gear in the GM Technician Career Training program.

EDUCATION

UTI starts GM tech training program

Universal Technical Institute is launching the first General Motors Co. (GM) Technician Career Training program at its Avondale, Ariz., campus. Initially available only in Avondale, the GM program joins more than 30 other manufacturer-specific advanced training (MSAT) programs to help fill a nationwide demand for professional automotive service technicians.

The GM Technician Career Training program was developed in partnership with GM and Raytheon Professional Services (RPS), GM's training services provider for the past 15 years. To meet the needs of a progressive industry partner, graduates will receive credits, which prepare them for certification through GM's Service Technical College.

"The availability of qualified, trained automotive technicians is and will continue to be a critical area of importance for GM," said Mike Durkin, director Dealer Service and Warranty Operations, at GM.

"Through manufacturer partnerships, rigorous curriculum and ongoing investments in classroom tools and technology, we are proud to be industry's choice in meeting the entry-level technician demands of our customers," said Kim McWaters, chairman and chief executive officer at UTI. "We are excited to offer the GM Technician Career Training program to our students, which will provide GM dealers even greater access to qualified entry-level technicians."

BREAKING NEWS

EVENTS

NACE/CARS 2014 TAKING SHAPE

The NACE/CARS 2014 conference and exposition, North America's largest auto collision and service repair event, is approaching fast. This year's event will be held in Detroit at COBO Center July 30 to Aug. 2, with other industry meetings taking place throughout the week. This event offers more training, education and networking for collision and mechanical repair professionals than ever before.

An early schedule of events includes:

- Monday, July 28: CEICA, SCRS, NABC and other board meetings and roundtables
- Tuesday, July 29: CIC quarterly meeting and evening reception
- Wednesday, July 30: I-CAR annual meeting and gala reception, NACE personal development programs, industry and museum tours, ASA board meeting
- Thursday, July 31: NACE and CARS conference sessions and exhibition, ALCOA aluminum presentations, Collision Industry Education Foundation annual golf tournament and scholarship fundraiser, industry and museum tours, MSO and Mechanical

[CARS] CONTINUES / PAGE 8

Discussion is on-going in MotorAge.com forums



IT'S HARD TO BE COMPLETELY PRODUCTIVE WITHOUT COMPLETE TOOLS.

ESPECIALLY YOUR REPAIR INFORMATION RESOURCE.

With ProDemand™ from Mitchell 1, you can have full access to the best technical data, wiring diagrams, labor estimating and verified fixes — all in one complete package. In fact, techs can find everything necessary to troubleshoot and finish a job in just one simple lookup. Which will streamline your shop's daily workflow — entirely. For the complete story, talk to your Mitchell 1 Representative or call 800-896-3126. Mitchell1.com/ProDemand

Mitchell1
Powerful. Intelligent. Simple.

[CARS]

CONTINUED FROM PAGE 6

Symposium receptions, numerous industry receptions

- Friday, Aug. 1: NACE and CARS conference sessions and exhibition, MSO Symposium, Mechanical Symposium, ALCOA aluminum presentations, industry and museum tours
- Saturday, Aug. 2: CARS techni-

cal conference sessions, industry and museum tours

Numerous hotels will host this event, with the Marriott at the Renaissance Center serving as the headquarter hotel. Only a short walk along the river to the convention center or one stop on the motorized People Mover, visitors will find this to be a convenient location, organizers state.

In addition to the industry events taking place throughout the week,

there will be numerous tours and recreational outings for spouses, guests and families. Some of these events include museum tours, Detroit Tigers baseball games, river and city tours, casinos, and much more. More information on Detroit can be found through the Convention & Visitor's Bureau at www.visitdetroit.com.

For those interested in attending, information can be found at www.NACEexpo.com or www.CARSevent.com.

MOTOSHOP PROGRAM OFFERS SHOP OWNERS GUARANTEED ROI

MOTOSHOP Technology Tools, a product portfolio from Advance Auto Parts, recently introduced "The 5x Guarantee" for MotoREV, a marketing program that helps commercial shops improve brand awareness and attract, retain and connect with more customers. The 5x Guarantee promises a \$5 return for every dollar spent on the MotoREV Shop Marketing Program, or a repair shop's next month with MotoREV is free, the company said.

"The MotoREV Shop Marketing Program minimizes a shop owner's purchase risk by offering an industry-leading return on investment," said Walter Scott, vice president of eCommerce and eServices for Advance Auto Parts. "We help shops better connect with their customers, both new and returning, in a meaningful way that generates results."

With MotoREV, shop owners have access to tools that

automate personalized, shop-branded communications to new and returning customers based on vehicle information and service history. On average, customers of MotoREV shops return 36 days faster, which means higher customer value for those shops on program. MotoREV tracks on-program revenue from customer receipts directly influenced by the Shop Marketing Program to determine the return on investment, according to the company.

MotoREV also includes reputation management services such as online customer reviews and professional website development and management. MotoREV shops average more than 4.5 stars out of five after just six months with the program.

"Marketing should be user-friendly with outside-the-box thinking," said Gus Hirth, vice president of operations at Chicagoland Havoline Xpress Lube. "To grow as a company, we chose to go with a company as aggressive as we are to achieve our goals. That's why we use the MotoREV Shop Marketing Program."

To learn more about MotoREV, visit www.motoshop.com/motorev. For more information on the tools available from MOTOSHOP Technology Tools, visit www.motoshop.com.

AutoEnginuity owner wins championship in 2013 Expert class

M1 Racing's Jay Horak of Mesa, Ariz., is the 2013 Expert class champion of the Pro Mazda Championship Presented by Cooper Tires.

Horak finished second in the class, which is for drivers 30 years old and older, in both 45-minute races. He earned enough points that no one else could catch him even though two more races remained in the 2013 season.

The Expert champion receives a cash award of \$6,000 at the end of the year.

Horak led the Expert class for most of the second race with his AutoEnginuity No. 37 after starting 13th. He got around his Expert class rival, Bobby Eberle, during a wild standing start when both Horak and Eberle took evasive action to

avoid an accident in Turn 6 involving Kyle Kaiser, Stefan Rzadsinski, Shelby Blackstock and Lloyd Read.

When the race restarted on lap four, Eberle immediately pressured Horak for the class's top spot, but Horak was able to hold him off until lap 20. Horak was able to get Eberle back a few laps later, and with 15 minutes remaining in the 45-minute event Horak was once again in line for the trophy. Eberle kept the pressure up, however, and with just four minutes to go Eberle once again got by and he went on to claim the class victory by 3.059 seconds.

Horak finished ninth overall and set his fastest lap of that race and the weekend on lap 11 with a time of 1:04.293.

Horak started 13th in the first race, but he moved up one position right away when Kaiser dropped from seventh to 13th after the standing start.

Kaiser got by Horak shortly after the halfway point on lap 19. Zack Meyer dropped from 10th to 12th with 21 laps down to become the new driver Horak was chasing. On lap 29, both Kaiser and Meyer passed Eberle, and Horak trailed Eberle the rest of the way until the checkered waved with 40 laps complete.

Although Horak finished second to Eberle in the Expert class and 13th overall, he was able to consistently better his individual times throughout another race, which went non-stop. He bettered his fastest lap of the race mark on laps 10, 11, 12, 21, 25 and 27, running a 1:05.263 on the latter lap. That was more than a second faster than the time he ran during qualifications on Friday, when he posted a 1:06.572 for the 11-turn, 1.5207-mile street course.

The doubleheader supported a NASCAR Canada event.

REMOVES RUSTED BOLTS
50% FASTER. SO I CAN GET
BACK TO DESIGNING CARS.



IF YOU WANT TO BUILD LIKE CHIP FOOSE,
YOU FIRST NEED TO WORK LIKE CHIP FOOSE.
And when he needs to cut through rust and
loosen stuck parts fast, Chip trusts WD-40
Specialist Rust Release Penetrant. Featuring
Blu Torch Technology, it works *50% faster*
than the leading competitor.

Visit us at www.WD40Specialist.com/fast



Win this truck.



Chip designed it. You can win it! Valued
at \$80,000, this is the ultimate off road
machine. See truck specs and purchase
raffle tickets here:

WD40.COM/F150RAFFLE

COMMUNITY

EXPERT OPINION, INPUT FROM THE FIELD, FORUM COMMENTS, & SOCIAL MEDIA



Stay on top of Industry Developments. Sign up today for **FREE SUBSCRIPTIONS** to

- Service Repair E-News & Alerts
- Certified Technician E-News & Alerts
- POWERTRAIN PRO E-News & Alerts

MOTORAGE.COM/SUBSCRIBE

ASE GUIDES

QUESTION OF THE MONTH



SPONSORED BY **Federated Auto Parts**

☑ **SURVEY:** Many of the ASE questions appear to have more than one correct answer. Consider that a hint as we offer this month's question from the L1 certification study guide. All of the cylinders in an SOHC 4-cylinder engine have low compression. What is the MOST likely cause of this condition?

- A. burned valves
- B. leaking head gasket
- C. worn piston rings
- D. broken timing belt

Answer the question at MotorAge.com/mar14survey and enter our monthly contest from Federated Auto Parts.



Building a better offer for your customers

Don't make an offer in marketing just for the sake of making an offer.

BY TIM ROSS | WORKSHOP MEMBER

Including an offer on a postcard mailer really can help increase the response rates from your direct mail campaign, but not all offers are created equal. Simply throwing out a discount isn't always the best way to drive traffic to your shop.

Not all of your shop's customers are going to consider the same thing valuable, so how do you come up with an offer that appeals to the most customers? Here are a few ways to do just that.

Create a sense of urgency. Use a

timeframe that will draw customers in immediately because of time restrictions. Your promotion should have an expiration date within the next 30 to 45 days. Tying the promotion to an in-demand service, such as air conditioning checks in the summer, also will help create urgency.

State the value for the customer. Offering a free gallon of washer fluid with every oil change may not resonate with someone who has never purchased washer fluid. State the advantage of receiving the washer fluid and how it benefits the customer's vehicle.

MotorAge.com

BEST OF THE BLOGS

BECOME A BLOGGER
MotorAge.com/BestBlogs



BEST OF THE BLOGS are articles written by bloggers on Motor Age's community pages

MrJEG / Ohio

TV show hosts Pep Boys shop

Pep Boys is spicing up its relatively recent retail and wholesale sales presence within the specialty equipment marketplace by sponsoring a new "West Coast Customs" television show airing Sunday nights on the Fox Sports Network.

Leveraging an anticipated nationwide audience of some 70 million weekly viewers, an actual Pep Boys Speed Shop has been installed inside the West Coast Customs facility to directly source parts for the on-camera exotic and entertaining automotive builds conducted by Ryan Friedlinghaus and his crew.

Headquartered in Corona, Calif., West Coast Customs, also known as WCC, was established by Friedlinghaus in 1993. It has since grown to become an international

franchiser with locations in Russia, Mexico, Germany, Japan and Malaysia. Additional expansion efforts are being pursued, including branded licensing arrangements with manufacturers and other aftermarket businesses. And while WCC is not seeking franchisees in the U.S., it does utilize American sales agents who are assigned exclusive territories.

JHedges / Ohio

How auto sites rank in Google

Here's a summary of our automotive SEO ranking factors and correlations study, evaluating factors that may contribute to a high (or low) SEO ranking in Google for automotive pages.

This study was done only on automotive search terms so this can be a helpful guide for auto service repair businesses,

online auto parts retailers, or any automotive aftermarket business marketing their parts or services online.

We based our study using data from Moz. They did extensive analysis on more than 100 ranking factors and we used their original search engine correlation dataset. The original study looked at 14,641 general keyword queries and included results from the top ranked page down to the 50th ranked page for each search query. We took the dataset and edited it down to 362 automotive keyword queries.

Our automotive SEO analysis shows common characteristics of pages that rank high for automotive search terms used on Google. It's important to note, correlation is not causation.

March 8, 12 p.m. CDT

Cat converter efficiency codes

We took two webinars on the road, broadcasting live from VISION. If you missed it, check the archives for this and a lesson on Blue Link diagnostics.



PAGE

6

UNIVERSAL TECHNICAL INSTITUTE

GM TECH COURSE

A new course for techs to focus on.

PAGE

14

Q+A WITH JAY HORAK

OWNER AUTOENGINEUITY

Moving this company on track.

PAGE

120

THE TRAINER VIDEO

PETE MEIER

More understanding on Mode \$06.

Think in terms of dollars instead of percentages. When it comes down to it, offering a certain dollar amount off of a service always outperforms providing customers with a percentage off of a service.

If you're going to take half off any repair job over \$100, pin it down to a dollar value. That way it will seem more tangible to the customer if you state "a \$50 value" versus "50 percent off." *ZZZ*



MotorAge TOP VIDEOS

MOST WATCHED VIDEO



Autonomous driving: Closer than you think

SEARCH OUR ARCHIVES OF OVER 800 ONLINE VIDEOS

MotorAge.com/autonomous

Headlight reconditioning

Like with many other practices, small mistakes can make a big difference in the quality of your repair.

MotorAge.com/headlights

More on fluid testing

When you want to know the facts about fluid testing, go to an expert. That would be Ron Schornstein, CEO of Acustrip.

MotorAge.com/fluidtest

Conversions save money

Many large corporations are converting their conventional vehicles to hybrid drives using systems like this one.

MotorAge.com/conversions

TO WATCH NOW



JUST SCAN IT

Scan the QR Code with your smartphone's camera, or go to: MotorAge.com and enter the [autonomous]

TO GET THE FREE APP: FROM YOUR PHONE'S BROWSER, GO TO: WWW.SCANLINE.COM



Noteworthy

comments from MotorAge's online communities

The best of what you're saying on [Facebook.com/MotorAgeMagazine](https://www.facebook.com/MotorAgeMagazine) [@Motor_Age](https://twitter.com/Motor_Age) and [@PeteMeier](https://twitter.com/PeteMeier) and the AutoPro Network.

vazzanatomiothy:

I agree the training is the most important thing a tech can do to keep her or she current on the ever changing technology.

mcperf:

I get to wear many hats in this business as do most involved owners: coach, crew chief, deliveryman, C tech, obtuse view on diagnostics and the shop welder are among many roles. Sound familiar? The compatibility of the techs in an enjoyable, challenging

environment keeps them focused on their tasks with less time to look around and be dissatisfied.

eallanboggs:

If a bill was passed and signed into law (actually there have been three contradictory RtoR bills signed by the governor) by the governor why is a MOU needed? Doesn't a law trump a MOU? In most cases it does, but maybe RtoR is different? The bottom line is not one consumer has received any benefit from RtoR.

David Friend via Facebook: OEMs giving up info can't come any sooner.

Kyle Munson via Facebook:

A simpler solution would be to use thermal electronic devices (TEDs). Smaller, less involved and less moving parts. Have one for each side of the car, even independent for front and rear. This idea of making components thinner and whatnot isn't going to work on HVAC doors. They already break and get tweaked and warped as it is.



the community—
join the discussion

MotorAge.com/Community

LEARN MORE: MotorAge.com IS UPDATED CONTINUALLY

ENTER WEBCASTS

SEARCH THOUSANDS OF ARCHIVED AND BREAKING NEWS STORIES BY KEYWORD

MARCH

Cat converter efficiency codes

This webinar aired live from VISION Hi-Tech Training & Expo and is available in our archives.

MARCH

Blue link diagnostics

This webinar aired live from VISION Hi-Tech Training & Expo and is available in our archives.

MAY

EPA 609 certification

This webinar will be brought to you in cooperation with MacDill Air Force Base.

JUNE

Using scopes

This webinar will be brought to you in cooperation with ATSG.

More from Shanghai

John Sollazzo, VP Sales & Marketing, Precision International, spoke with us at Automechanika Shanghai, Asia's largest trade fair for auto parts, equipment and services.

Ready for hybrids?

The AutoNetTV camera caught up with Deb Van Batenburg at AAPEX. She is the co-owner of the Automotive Career Development Center that has trained thousands of automotive service professionals on working with hybrids. She briefly describes the business opportunity represented by hybrid service and repair and how to prepare for the hazards involved.

Audi's future look

Audi demos driverless technology in this video of its A7, which it calls the auto pilot car of the future.

MARCH 21-23

Automotive Training Expo

SeaTac, Wash.

MARCH 22

TST Technicians Big Training Event

Located in Fishkill, N.Y., the event features Bernie Thompson, Wayne Colonna, Scott Brown and Pete Meier.

MAY 20-21

Global Automotive Aftermarket Symposium

Chicago

JULY 30-AUG. 2

NACE/CARS

Detroit



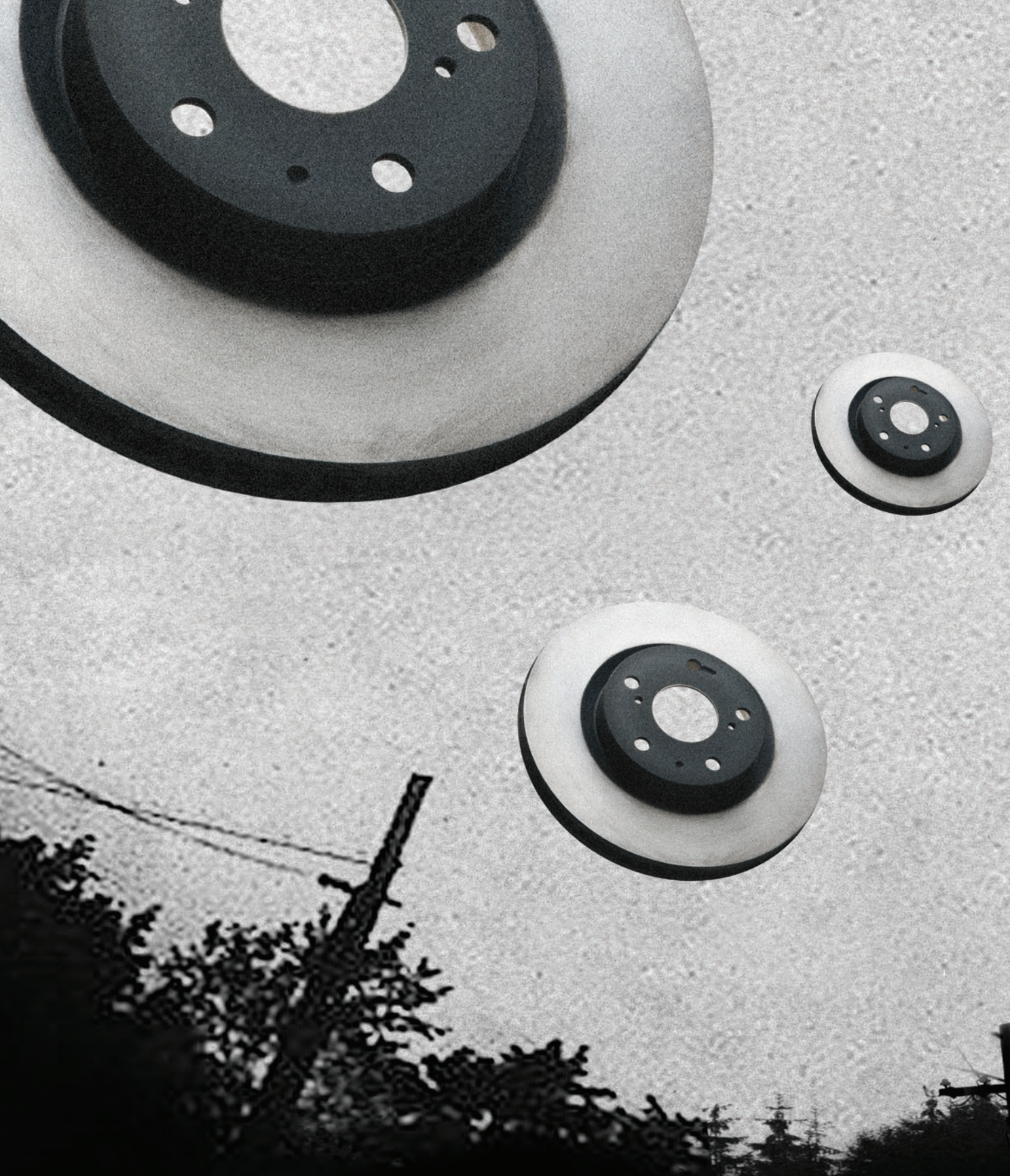
2014 WEBCAST SCHEDULE



STREAMING PROGRAMS



2014 INDUSTRY CALENDAR



 TOYOTA

WHOLESALE PARTS

**INTRODUCING NEW
DOWN TO EARTH PRICES
ON TOYOTA GENUINE ROTORS.
{TOYOTA GENUINE CALIPERS AND RADIATORS, TOO!}**

It's real! New, **significantly lower prices** on Toyota Genuine Rotors for ALL models—plus lower prices on Toyota Genuine Calipers and Radiators, too.

With these great prices on Rotors, and Calipers, plus Genuine Toyota Brake Pads, Struts, CV Joints and more, think Toyota Genuine Parts for every “around the wheel” repair.

Contact your Toyota Dealer to find out more.



ToyotaPartsAndService.com/rotor



Q+A WITH JAY HORAK

OWNER, AUTOENGINUITY

**FROM THE TRACK TO THE BUSINESS WORLD,
THIS OWNER SHARES WHERE HE'S MOVING
HIS COMPANY TO STAY ON TRACK.**

BY KRISTA MCNAMARA | CONTRIBUTING EDITOR



A global leader in vehicle diagnostic solutions, AutoEnginuity boasts delivering superior vehicle specific coverage while maintaining reasonable prices.

Jay Horak, owner of AutoEnginuity and an avid, successful racer, talks with *Motor Age* about the company's new Service Reset Tool, getting diagnostic solutions on a budget and what is ahead for the company in 2014 and beyond.

MA: AutoEnginuity recently released the Service Reset Tool. Tell me about the features it offers.

JH: The Service Reset Tool is the first of its kind to perform the Conditional Based Service (CBS) oil reset and battery replacement registration without a personal computer. The tool can perform both the Service Interval Reset (SIR) and CBS oil resets and perform the battery replacement registration feature for late-model BMW/MINIs.

It does not require a personal computer, nor does it require you to enter the make, model or year of the vehicle. With a push of a button, the hardware will intelligently determine the correct protocol for your vehicle and send the appropriate commands — it's a true one-touch reset tool. Field updatable, it will help you to continue to service newer

BMW/MINIs without having to purchase a new reset tool. Firmware updates are available online and will be free for the life of the product.

MA: What are some diagnostic tools you recommend that can give shops the biggest bang for their buck?

JH: Our ProLine bundle is really the most versatile and cost effective tool for any fleet. It provides factory-level Asian and U.S. carmakers coverage. We find that almost every fleet or shop supports these vehicles and require a robust and comprehensive solution. But that solution also has to fit into ever shrinking budgets. With the ProLine bundle having an MSRP price at \$1,300 and our annual updates being priced at \$150 for each of the three regions, it's hard to beat the coverage for the cost.

MA: Can you also explain the fleet maintenance solutions available through AutoEnginuity?

JH: Our ProLine bundle is really a universal fit for fleets. It's a compact solution that uses a shop's Windows PC computing device. Our software can be installed on any device without interfering with other factory or aftermarket products — i.e., no standalone laptop required. What's more, the soft-



ware unifies the user-interface experience for all car makes so as to allow the technician to focus on repairing the vehicle — and not learning a function on a scan tool. Finally, with coverage for 48 car makers available, the ProLine bundle has the breadth and depth of coverage required to effectively repair the vehicles in any fleet

MA: What is on the horizon for AutoEnginuity in 2014 and beyond?

JH: We are currently looking at the creation of a tablet-based (i.e., Apple iOS) device. Shops aren't using tablets today, but they will be in the near future. We will also be offering a new user-interface for the ProLine bundle in the summer. The new user-interface will streamline common functions so as to allow the technician the fastest way to repairing the vehicle. *MA*

Photo: Jay Horak

Give your employees the duck. Anything else is just chicken.



Almost 60 percent of employees wish their employers offered voluntary insurance¹.

The question is, who will you choose?

You could opt for a voluntary option from your medical carrier, or you could offer coverage from the number one voluntary provider²: Aflac.

There's no direct cost to you for offering it, and getting started is as simple as adding a payroll deduction. That's why business owners like you have chosen Aflac for nearly 60 years. It's also why we're so confident Aflac is the right partner for your business.

You can bet the farm on it.

Call your local agent and visit
aflac.com/business



OPERATIONS

TAKE CONTROL
OF YOUR BUSINESS

IN THIS SECTION

- 16** Management
- 20** Profit Matters
- 24** Financial Figures
- 26** Shop Profile

read it on **MotorAge.com**

TECHS IN TRAINING

Four strong traits every tech should develop before they get paid good money for work.

[/trainingtechs](#)

TECHS SELLING

Before you can decide if techs should sell service, you need to clarify their job.

[/sellservice](#)

A BETTER OFFER

Here are a few ways to make an offer that appeals to multiple customers.

[/betteroffer](#)

MANAGEMENT



**WE
HAVEN'T
ALWAYS
DONE IT
THAT
WAY**

JUST LIKE VEHICLE TECHNOLOGIES ARE CHANGING, MAYBE YOUR APPROACH TO HOW EMPLOYEES WORK TOGETHER COULD USE AN OVERHAUL.

BY **BILL HAAS** | CONTRIBUTOR

HAVE YOU ever had an idea for a new way of doing something or suggested a different way to accomplish a task, only to be told no? If you were bold enough to ask, why not? The answer is something like, "We have always done it this way."

Many of us started our careers learning the trade from an experienced craftsman who developed his or her skills over time. They were our mentors. Our mentors were much older than we were, had many years on the job, were respected by their peers and usually earned the most money in the shop. They were who we wanted to be when we grew up.

I remember a guy named Vince was my first automotive mentor. I was 17 years old and starting a two-year cooperative education program. I went to school in the morning (including auto shop) and worked at the Lincoln Mercury dealership in the afternoon. Vince was the oldest mechanic in the shop and two years from retirement when he was

assigned to me. I still wonder how that happened. Maybe Vince drew the short straw. Vince had rules, and as long as I followed the rules, we got along very well. The rules were pay attention, do exactly as I tell you and don't do anything that will get Vince in trouble.

Baby boomers can relate to a workplace culture in which older workers are bosses and younger workers do what they are told, no questions asked. That is the way it was. In this environment, you had to wait until you were the boss to make a change or attempt another way of doing something. Maybe that's why many techs go on to own the business.

JUST
SCAN IT

Scan this QR Code to read more on your smartphone about how to turn the tables on mentoring. Or visit MotorAge.com/turmtables

GET A FREE SCAN TOOL APP AT:
www.scanlife.com



WELL HUNG.

Visit bigassfans.com/offer and use promo code **MA314**
or call **888-958-1341** to receive a FREE mug.



BIGASS
FANS

No Equal

What if the change that took place was a reversal of roles? I'm suggesting the kind of change to allow the new hire, entry-level technician or youngest, least experienced team member to be the mentor. In fact, this is now a common practice in corporate America. Many companies are pairing senior executives with younger employees in a practice known as reverse mentoring. Technology, social media and workplace trends are common issues addressed in a reverse mentoring setting.

Jack Welch as the chief executive at General Electric, gets much of the credit for reverse mentoring. He ordered 500 GE executives to work with employees below them to learn how to use the Internet. Welch himself worked with a 20-something employee to learn how to surf the web. The founder of Fast Company, Alan Webber describes reverse mentoring like this: "It's a situation where the old fogies in an organization realize that by the time you're in your 40s and 50s, you're not in touch with the future the same way as the young 20-somethings. They come with fresh eyes, open minds and instant links to the technology of our future."

Corporate America is not that different than your auto repair business. The environment might be different, but the culture can be very much the same. I think there is something to learn here that will benefit your company, employees and customers. Implementing a reverse mentoring strategy provides your business distinct advantages over your competitors.

The program brings team members of different generations together to share their knowledge and eliminates the "us versus them" mentality. Think about how the Gen Y person can be an asset to your company and make positive contributions immediately. What do they know that you or your long-time employees don't know? Look at aspects of your business that are changing and have your young employee offer a perspective from that

fresh set of eyes or share the knowledge they gained through their instant links to technology.

If the entry-level technician recently graduated from an automotive program, they were exposed to the latest tools and equipment available in the industry, and in many cases learned on the equipment. When your business is in the market to upgrade or purchase equipment, they have an unbiased opinion to offer.

They have lived their lives immersed in technology, growing up with a computer in their pocket. While the business owner creates policy to prohibit them from using their phone at work, they should have the Gen Y person help the mature staff understand the advantages of different

smartphone platforms and install apps for service information, diagnostic procedures, fault code definitions and any other resource that will save the technician time, improve work quality and workflow efficiencies. An emerging technology is the Electronic Inspection Sheet, a vehicle preventive maintenance inspection performed on a tablet or smartphone. I predict that as mature technicians see the younger technicians benefit from the increased sales and reduced time to perform the inspections, they will be eager to learn how to use the electronic version.

No group of people understands social media better than Gen Y. This is a resource you can't afford to overlook. Your marketing strategy has to include social media, and the strategy needs to be built around reaching Generations X and Y the largest segment of the population. We can learn from our youngest team members where they look for products and services, and most importantly, learn what influences their purchasing decisions and what keeps them engaged with a business.

Everything we learn from our employees about their social interaction should be integrated into our marketing strategy. The future of the business depends on the customer of the future and there is a good chance that

future customer thinks just like your youngest team member.

The automotive industry faces more technological challenges than any other industry. The landscape changes constantly with an influx of new vehicle systems, advanced technologies, powertrain designs, software programming, diagnostic test procedures and extended service intervals to mention a few. The younger, recently hired worker might be more knowledgeable about technology, new systems or methods than the tenured employee. Their instant links to technology usually include researching topics of interest and participation in user groups and web forums.

Now think about a strategic or business planning meeting for your company. Should the participants all be long-term employees with only the history of how it has always been? What if the participants were younger teammates with little or no history to impede their ideas of what could be? For your business to have a future, your business needs a plan. Developing the plan should include those with fresh eyes, open minds and a vision of the technology necessary to carry your business to the future. The future should be focused on the customer and will require we get better at what we do. We will have to serve them quicker without sacrificing quality and communicate through their preferred methods and accept financial transactions other than cash, check or credit card.

Take advantage of the knowledge and skills the younger worker brings with them. Listen and learn from them. They have tremendous knowledge to share. Establish open communications between the different generations, create a culture of respect for young and old alike and become the best choice for the customer of the future. *ZZZ*



BILL HAAS
CONTRIBUTOR

Bill Haas is the owner of Haas Performance Consulting LLC, with 40 years of experience in the automotive service and repair industry. Clients now have access to Bill's solution based focus, expertise, unique perspectives and in-depth knowledge of the industry.

 E-mail Bill at billh1317@gmail.com

INTRODUCING REAL WORLD TRAINING®



INVEST IN YOUR FUTURE

Training classes offered through the O'Reilly Real World Training program contain current information critical to the success of technicians, service writers, shop managers and shop owners. All live and on-line training clinics come with a 100% satisfaction guarantee.

We offer a number of classes on the following topics:

- Service Writer and Shop Management
- Diagnostic and Driveability
- Hybrid Vehicle Technology
- HVAC and Air Conditioning System Repair
- General Diesel Technology - including Ford 6.0, 6.4 and 7.3 Powerstroke, GM Duramax, Dodge Cummins and Diesel Diagnostic Procedures
- Vehicle and Manufacturer Specific Courses: Chrysler, Ford, GM, Honda, Hyundai, Kia, Acura, Volkswagen and Audi
- Variable Valve Timing, CAN BUS, Fuel Trim, Direct Injection, Vehicle Electronics and more



Contact your O'Reilly representative for complete class information.
O'Reilly Clinic Hotline 1-800-283-1702

All Real World Training instructors have multiple ASE certifications and years of experience as technicians and/or shop owners. Individual instructor information is available upon request. Customized training packages are also available.

FirstCallOnline.com

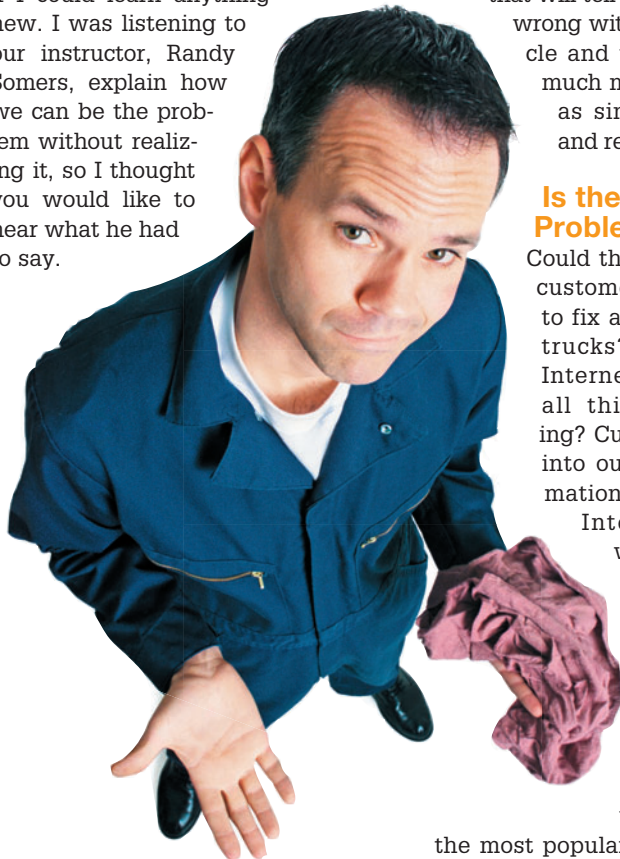


ARE WE THE PROBLEM?

WE CAN BE OUR OWN WORST ENEMY WHEN TALKING TO CUSTOMERS. REPHRASING OUR APPROACHES CAN TURN OPPORTUNITIES INTO CLOSED SALES.

BY CHRIS "CHUBBY" FREDERICK | CONTRIBUTOR

ONE OF the most important people in a shop is the one who communicates with the customer. He or she has a direct effect on customer retention and visit frequency for your shop. Last year we trained more than 1,000 service managers on relationship-based service advisor skills, and I sat in on one of those classes to see if I could learn anything new. I was listening to our instructor, Randy Somers, explain how we can be the problem without realizing it, so I thought you would like to hear what he had to say.



For as many years as I can remember, the automotive world has battled a public perception that is anything but positive. We want our customers to see us as professionals, treat us as professionals and pay us as professionals. But the general perception from some consumers is that we are just mechanics — greasy, knuckle-dragging guys who fix cars. We have a magic crystal ball that will tell us everything that is wrong with a customer's vehicle and we charge way too much money for something as simple as car service and repair.

Is the Internet the Problem?

Could there be a reason our customers think it is easy to fix and service cars and trucks? Could it be the Internet is the source of all this misunderstanding? Customers are coming into our shops with information they found on the Internet (oftentimes wrong information, by the way) about needed repairs and maintenance on their vehicle. According to a new poll in the United States reported by Reuters, the Internet is by far the most popular source of informa-

tion and the preferred choice for news ahead of TV, newspapers and radio.

In speaking with shop owners, I constantly hear how much bad or mistaken information is out there about our industry. All of us in the automotive world, whether in service and repair, collision, parts or sales, would like to have that negative perception corrected. We, again, would like customers to see us as professionals, treat us as professionals and pay us as professionals. If only the customers stopped looking at bad information on the Internet it would make our jobs oh so much easier.

In our daily struggles of running a business it is sometimes easy to think, "It sure would be nice if our customers understood how hard our job really is, how complicated today's modern automobiles are, how expensive high-quality state-of-the-art equipment really can be, how hard it is to attract and retain employees nowadays." Right?

One thing we should remember is that we are consumers also, and we are more like our customers than we might realize. For example, if you want to buy a big-screen TV, a laptop computer or a cell phone, you probably do

JUST SCAN IT 

Scan this QR Code to get more on your smartphone. Or visit MotorAge.com/ProfitMatters314

GET A FREE SCAN TOOL APP AT:
www.scanlife.com



**Right
Right
Right**
SWEEPSTAKES

GET CLEARED FOR ACCESS
to the Ford experience of your choice.

FordParts.com is the right tool to get you the right part. At the right time. And right now, you can enter for a chance to win the Ford experience done the right way. Backstage. Front row. VIP. Behind the wheel. In the stands. If you win it, you choose it. So, get cleared for access at FordParts.com/rightrightright. Right away.



PARTS
FORDPARTS.COM

AMERICAN IDOL®/© and IDOL®/©: 19 TV Ltd. and Fremantle Media North America, Inc. 2014. NASCAR® is a registered trademark of the National Association for Stock Car Auto Racing, Inc. NO PURCHASE NECESSARY. A PURCHASE WILL NOT INCREASE YOUR CHANCES OF WINNING. MUST BE LEGAL RESIDENT OF THE 50 UNITED STATES/DC, 18 YEARS OF AGE OR OLDER. Void where prohibited. Promotion ends 11:59 PM ET on 4/27/14. For complete entry, eligibility requirements, prize details and odds disclosure, see Official Rules at FordParts.com/rightrightright. Sponsored by Ford Motor Company, One American Road, Dearborn, MI 48126.

“IF REPAIR ORDER SIZE HAS BEEN DROPPING WHAT CAN I DO? MYSTERY SHOP YOUR BUSINESS BY PHONE THEN TUNE UP YOUR COUNTER SKILLS. SELLING IS NOT LIKE RIDING A BIKE.”

CHRIS “CHUBBY” FREDERICK [ATI CEO]

some research on the Internet. Armed with that information, you walk into a consumer electronics store and say, based on the research you did, this is the laptop you want to buy. You are “an educated consumer.” When our customers do that, we almost always think things like, “Boy, this business sure was easier before the Internet came along.”

We should not blame our customers for looking up car information on the Internet when we do the same thing for products and services outside our industry. We need to realize that if customers are looking up information on the Internet, then they are information hungry. If they are information hungry, then we need to give them more information than they get off the Internet.

Look and Talk Like a Pro

We need to be aware that if we want people to see us as professionals, treat us as professionals and pay us as professionals, we should look, talk and act as professionals. Have you ever given an estimate to a customer that sounded something like this? “The water pump is leaking. We need to throw on a new one, and it will be \$600.” What usually happens next is that the customer wants to question our prices.

Perhaps our problems aren’t the result of a bad economy, but rather a poor use of terminology? We will “throw” on a water pump. To us that is a technical term meaning to remove and replace a leaking pump. To the



average consumer hearing this, they probably think: Can’t the customer just throw on their own water pump? How hard do you throw when you throw on a water pump? Why do they charge so much to throw one on? It sounds easy.

Bad Economy or Presentation?

If we want people to treat us as professionals, then shouldn’t we at least talk that way? Shouldn’t we say in a professional manner, “We have determined that the coolant leak is coming from a defective water pump. In order to stop the leak, we need to replace the pump. In order to replace the pump, we need to remove the fender to access the timing belt cover, which the water pump sits under.”

Or this one. Instead of saying, “We need to hook up our test equipment to the computer in the vehicle and access the onboard monitoring system to determine which stored trouble codes are the cause of the drivability concern,” we say things like “I need to pull the codes.”

If it isn’t our job to educate consumers, then what other choice do they have but to look on the Internet? If we want to be treated like professionals we should talk that way. Not “plug

a tire,” but, “We need to remove the tire from the rim to inspect the integrity of the interior sidewall to verify its safety, and then perform an inside plug patch repair. Then the second step is to perform a water test on it to verify the integrity of the seal.”

We sometimes speak in terminology that we in the automotive industry understand. To assume the general public understands what we mean when we say we will “pull the codes” is to assume that the general public knows as much about the automotive profession as we do. After all, even the dentist performs a “tooth extraction.” He or she doesn’t just yank that sucker out of there.

Maybe the economy and the Internet aren’t our worst enemies. Maybe, my friends, we ourselves are the problem. Remember, selling service is not like riding a bike. It is very easy to develop bad habits that will decrease your average repair order and return visits from your customers.

If you want to increase revenue and maintain your status as the best shop in your market, go to www.ationlinetraining.com/2014-03 and download our list of the top 13 things you should never say to your customers. Our list of replacement phrases will make you sound like the professional you are. **ZZ**



CHRIS “CHUBBY”
FREDERICK
CONTRIBUTOR

Chris “Chubby” Frederick is the CEO and founder of the Automotive Training Institute. ATI’s 108 associates train and coach more than 1,150 shop owners every week across North America to drive profits and dreams home to their families. Our associates love helping shop owners who are having the same struggle as many of them have had, and who are looking for the same answers, and in some cases looking for a lifeline. This month’s article was written with the help of Randy Somers, ATI’s head instructor, who has had decades of experience at the front counter.

E-mail Chubby at cfrederick@autotraining.net

Increase Car Count

Our life-changing 1-Day Workshops are coming to venues all over the US and Canada!

- The average attendee picks up 3-8% profit
- We’ve helped more than 25,000 shops over 35-plus years
- Rated the #1 management consulting firm in the industry by Frost & Sullivan

ATI Spots are limited. Find out when we’ll be near you and sign up online at atiworkshops.com

Chris “Chubby”
Frederick, CEO

KYB[®]
World Class Shocks & Struts



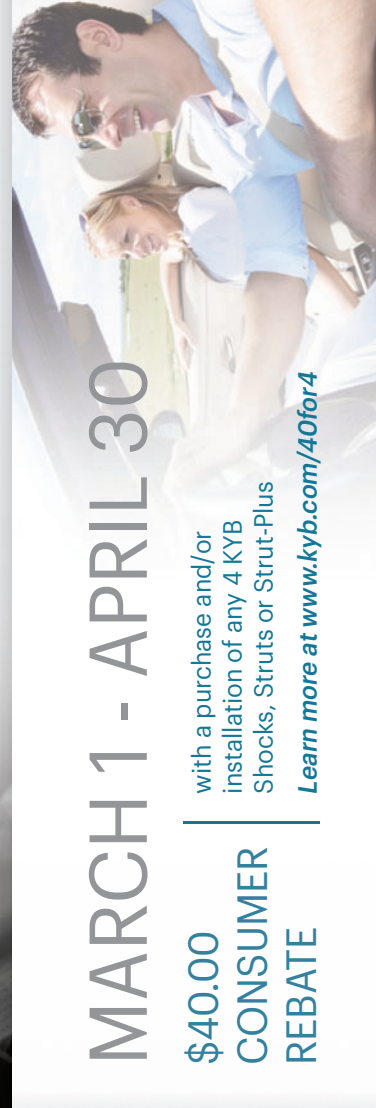
Original
Equipment
for the Aftermarket[®]

KYB SHOCKS & STRUTS

Research, testing, zero-defect manufacturing tolerance and a commitment to original vehicle design and performance. The choice of New Vehicle Manufacturers and Top Service Professionals around the world.



Don't take a chance:
Crash avoidance technologies help driving safety.
...KYB Shocks & Struts help them work properly.



MARCH 1 - APRIL 30

with a purchase and/or installation of any 4 KYB Shocks, Struts or Strut-Plus

Learn more at www.kyb.com/40for4

\$40.00 CONSUMER REBATE

\$40 FOR FOUR



AN INFORMED CLIENT BECOMES A GREAT CLIENT

TEACHING TODAY'S CUSTOMERS IS AN IMPORTANT PART OF THE PROCESS. STARTING WITH A PRICE BREAKDOWN IS ONE WAY TO GO.

BY **BOB GREENWOOD** | CONTRIBUTOR

IN PART one of this two-part series on educating today's customers, I mentioned some basic criteria that we can start

to share with the customer/client. I noted in February that it's important to build into your business budgets, money to develop material that educates consumers on the real costs

of running your business in order to allow you to serve them effectively and professionally.

Consider developing a menu style board for posting in the client area,



Win The Parts. Car Included.



Image for illustration purposes only

Enter to Win the **Intermotor® Import Parts Car:** A 2014 Subaru® Impreza WRX

Intermotor®
Genuine Import Parts



THE IMPORT LEADER BY **DESIGN**

ENTER ONLINE AT:

www.intermotorpartscar.com or  facebook.com/Intermotor

(OR ENTER USING ENTRY FORM BELOW)

See our expansive Subaru® Impreza WRX coverage for yourself at intermotorpartscar.com

Intermotor® Import Parts Car Sweepstakes Entry Form

**MAIL ENTRY FORM BY APRIL 15, 2014 TO: INTERMOTOR PARTS CAR PROMOTION,
STANDARD MOTOR PRODUCTS, 3718 NORTHERN BLVD, LIC, NY 11101**

Name: _____

Address: _____
No P.O. Boxes

Address: _____

City: _____ State: _____ Zip Code: _____

Phone: (____) _____ E-mail: _____

NO PURCHASE NECESSARY TO ENTER Open to legal residents of the U.S. 18 years and older. All local, state, and federal taxes are the responsibility of the winner. Void where prohibited. All entries must be postmarked by April 15, 2014 and received by April 30, 2014. For complete official rules and regulations visit www.intermotorpartscar.com

One GRAND PRIZE winner will receive a 2014 Subaru® Impreza WRX; Five First Prize winners receive a GoPro® HERO3+ Camera; Ten Second Prize winners will receive a Garmin NÜVI® LM

Intermotor®
Genuine Import Parts



INTERMOTOR® is a registered trademark of Standard Motor Products, Inc. SUBARU®, IMPREZA® and WRX® are registered trademarks of Fuji Jukogyo Kabushiki Kaisha, TA Fuji Heavy Industries Ltd. GOPRO® is a registered trademark of Woodman Labs, Inc. GARMIN® and NÜVI® are registered trademarks of Garmin Switzerland GmbH. All rights reserved.

DESIGNED TO GO THE DISTANCE

EGR VALVE



Flexible Graphite Gasket

Precious Metal Alloy
Sensor Contact

Heavy-Duty Solenoid

Stainless Steel
Internal Components

Fully-Encapsulated
Copper Windings

Sintered Metal
Technology

PRECIOUS METAL ALLOY SENSOR CONTACTS



At Intermotor®, every part we design features thoughtful details that elevate it above the competition. Our EGR valve sensor contacts are made

with a precious metal alloy that withstands millions of duty cycles. EGR valves are manufactured and 100% factory tested for proper flow, solenoid resistance, valve response time and leakage of internal and external components in our TS16949 certified, SMP® Independence, KS facility. It's this commitment to excellence that makes us the import leader by design.

Intermotor®
Genuine Import Parts



THE IMPORT LEADER BY **DESIGN**



with effective lighting, that breaks down how \$1 on the client's invoice is spent, in order to serve them professionally. You can start with phrasing like, "Where does your average dollar go to maintain your vehicle?"

Out of \$1:

- 35¢ to replace total parts installed (oil, tires, batteries, parts)
- 33¢ to replace all shop wages (this includes technician, administrative, management)
- 3¢ to replace legislated state and federal payroll taxes
- 23¢ to replace shop operating expenses (insurance, shop and office supplies, utilities, business and property taxes, maintenance and repair, rent, etc.)
- 6¢ shop profit before corporate income taxes

Consider this concept. The numbers I have used are an example only. The goal is to achieve a net income of 10 percent of gross sales before corporate taxes are paid. That can be achieved only with the right labor rate and the shop operating with a productive process format. It is imperative that you sit down with your own accountant and work out your shop numbers. Take your year-end numbers and summarize them into this format. It is something the customer/client can understand.

Do not be afraid to admit that you make a profit. Profit is not a dirty word, and profit is required if you are interested in serving your clientele properly in the future. The client becomes a big winner when the shop is profitable, because then you will have the monies required to invest in new high-tech equipment that will be needed to serve their future vehicle needs, and be able to afford the best and competent staff to ensure the clients work is done right.

Also, it is imperative that we educate the client regarding your policy

on the quality of business you want to deliver to them. Consider making up another wallboard, or on your monitor in the client waiting area, with the quality and the management broken out. The information under quality can be used on the wallboard.

Quality

As much as we would like to, we cannot provide both quality parts and professional workmanship and low prices.

Our regular clients know that our prices might be perceived to be in the higher bracket of the industry, but they come back again and again because we do the work right the first time and guarantee both parts and workmanship. Further than this, we will run real values from time to time, but will not run loss leaders just to draw people in and use high pressure tactics to sell work or parts.

We will counsel you about real deficiencies in your vehicle, give you an honest quotation concerning repair, maintenance and service costs, and leave the decision concerning whether you want us to do it to your discretion.

Please note that our maintenance and technical service rates must include the wages of our highly skilled and trained technicians plus other overhead costs such as rent, equipment costs, insurance, utilities, business and payroll taxes, etc. Oh, yes, one further addition, our prices include a profit allowance for us so that we can continue to provide quality service to our many valued friends and clients.

Please do not hesitate to ask for a quotation on any work or service. We are not ashamed to quote our rates and take the time to share with you what extras you get for the sometimes perceived higher costs than those provided by some competitors.

The Management

Looking at these two educational tools coupled with January's article on this issue, you are now beginning the process of upfront education of your clientele. This is only the beginning. There are so many topics to discuss such as the technology in a car today compared to five or seven years ago, the life expectancy of today's vehicles, the life expectancy of today's shop equip-

ment, the types of different equipment required today to service a vehicle, the diagnostic skill level required (and not just a mechanical level) and so much more. The message you clearly want to achieve is that your shop today is in the knowledge business, not just the parts business, and your educational material must clearly define this.

Independent service shops that continually run their business on price are doomed, and if they don't want to change, there is not much a lot of us can do about it, other than wait them out to go out of business. You are in business for the long run — the journey — a career, not an overnight trip that so many are seemingly determined to be.

Education of your clientele will determine the level of relationship you end up with. Set an objective of producing one new educational material per month for your shop. When your client walks in, let them see how fully informed you want them to be. Consider direct mail pieces, email or Facebook material provided to your clientele as an informational feature on our industry and on your shop.


It is only with education that one can see rightly, see what is essential is actually invisible to the eye. Your educational message, in essence, should be screaming to the marketplace, "We are the independent sector, and I, as a competent shop owner, want you, my client, to clearly understand that there are only three ways to run our type of business, namely price, service or quality — pick two! We, as a competent shop have chosen our two; we are in the service/quality business."



BOB GREENWOOD
CONTRIBUTOR

Bob Greenwood, AAM, is president and CEO of Automotive Aftermarket E-Learning Centre Ltd. (AAEC), a company focused on providing business management resources and development for the independent sector of the automotive aftermarket industry utilizing the Internet environment. Bob has more than 36 years of business management experience within the independent aftermarket industry, consulting independent retail shops on all facets of their business operations. Bob is one of 150 worldwide AAM approved instructors.

E-mail Bob at greenwood@aaec.ca



JUST SCAN IT

Scan this QR Code to get more on your smartphone. Or visit MotorAge.com/financial

GET A FREE SCAN TOOL APP AT:
www.scanlife.com

OPERATIONS

SHOP PROFILE

A snapshot of one of the industry's leading shops

MIGHTY AUTO PRO / MEDINA, OHIO



Put service to the test

Be a guest at Mighty and you'll get more than mimosas and Nancy Sinatra boots.

BY **ROBERT BRAVENDER** | CONTRIBUTOR

There's a song from Disney's "Beauty and the Beast" called "Be Our Guest" — you know, the one sung by the candelabra? OK, so maybe you don't have kids the right age, but the concept of top-quality customer service espoused by the tune probably goes a long way toward describing Mighty Auto Pro's success in the Medina, Ohio, market outside Cleveland.

As President/CEO William Hill — better known as Bill — puts it, he built his business based on superior consumer relations.

"I felt that at every shop I ran prior to my own, everybody tried to talk over the client," he states. "What I felt needed to be done was to listen to what the client had to say and then repeat it back to them so they knew you were listening. It became really important, for especially women clients, because I think women always have a feeling going to an automotive repair shop they're not being listened to."

Mighty was a large 19-bay facility when he bought it in 1987, but not very well known until Hill brought his methodical approach to his new enterprise. "I used to carry this little notebook in my pocket all the time and I would write

stuff down that I felt really irritated me as a customer," not just in automotive but any service industry, he notes. "When I go to a place like a restaurant, I want to make sure I'm being treated properly and in a timely manner."

Later Hill would expand his customers' perks. "I used to provide just coffee," he says. "Now I have a coffee maker that has hot tea, hot cocoa, cider, 10 different types of coffee. I have a small refrigerator that not only has bottled water and juices, but all different kinds of sodas and chocolate milk for the children. When you come in to Mighty Auto Pro, we try to make the experience more like sitting in my living room, and you're being treated as a guest, not just a customer."

Hill applied the same methodology to shop operations. "When I decided to

AT A GLANCE

Mighty Auto Pro

Shop name

William Hill

Owner

Medina, Ohio

Location

1

Number of locations

27 years

Years in business

14

Total number of employees

5

Number of technicians

10,000 square feet

Shop size

14

Number of bays

101

Average vehicles per week

\$339

Average weekly repair ticket

\$1.8 million

Annual gross revenue

CARQUEST, CCPN, ACDELCO TSS

Shop affiliations

SEE HOW YOU CAN GET A JUMP ON THE 2014 CONTEST
MOTORAGE.COM/TOPSHOPS

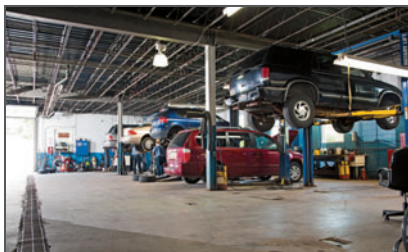
take my business to the next level, I learned that I needed to have some systems and procedures in place, explain-

Photos: Mighty Auto Pros

ing how everything should work. Say we have a car come in with an overheating problem; there's a procedure written up on how to deal with that.

"I'm a very detail-oriented person and I like organization," he continues. "Nothing occurs in my business by happenstance. Everything we do has a way of being done properly. I'm one of the few people in the automotive repair business who's written their own manual, a systems and procedures book."

So it was Hill's habit of organizing his thoughts and ideas on paper that lead him into another field, book publishing. Hill so far has co-written two books with Amy Mattinat, who owns Auto Craftsman in Montpelier, Vt. The first, "How to Buy a Great Used Car," came out of a conversation with a client



Cars are serviced by ASE certified technicians in the shop work area.



Auto technicians huddle together every morning for a team meeting prior to starting their work day.



Clients can enjoy a complimentary snack while they relax in the customer waiting area.

who asked for some pointers. Naturally, Hill started jotting notes down, and five or six months later he had a tome. His second book, "What Ever Happened to Outstanding Customer Service," was based on the notes he had taken before starting his business.

"We have to make customer service a reality again," Hill argues, "because in my opinion, it's not a big thing anymore. We all get treated poorly and we just accept it." The books themselves aren't geared to generate profit; it's all about helping the clients.

Hill got the input to organize his shop through his participation in Repair Coach Shops, a national group, but he notes that when it came to marketing back in the 1980s and '90s, there weren't a lot of tools out there. So he developed index-sized postcards with offers of \$25 off anything over \$75, and put expiration dates on them. "For the first year and a half to two years, I would print them on my own printer, cut them up, put address labels on them and mail them."

Of course that's Flintstone technology compared to what's available now. "There's Mudlick Mail, where they'll design a whole campaign for you," Hill comments. "All you have to do is call them up. If you're looking for new clients, there's a place called New Customers Now; they'll build a list, make you a marketing campaign, mail it for you and everything."

However, Hill admits they still design their own campaigns, although they contract out the footwork. Outside of the discount fliers and emails, Hill instituted the Mighty Auto Pro Car Care Card Club, a more traditional discount that offers \$475 worth of service for \$99.95, and the VIP Text Club, which knocks \$10 off the next service if you join via a text code with more monetary savings to come.

Then there's the Women, Wheels and Waffles program. While it sounds like the title of his next book, or at the very least an intriguing lifestyle, it is Hill's seminar program for the ladies. "Sixty-two percent of the clientbase that comes through my door are women," Hill reports. So one Saturday morning five years ago, he called in a caterer and set up work stations designed to teach about vehicle computers, changing tires, fluid levels, etc.

"This year when we had it in September, we had 153 women," proclaims Hill. "What's amazing to me is that out of the 153, close to 61 of them had never been to Mighty Auto Pro before. The seminars are about two and half hours long, and it's a roaming thing. There's no schedule involved; if you're not there at 10:30, you're not going to miss something. It's supposed to be fun." Besides the waffles, there's an open bar featuring mimosas.

"Everything we do has a way of being done properly. I'm one of the few people in the automotive repair business who's written their own manual, a systems and procedures book," — William Hill

"If we do something kind of cool, we'll put it on Facebook," notes Hill. "The first thing you'll notice there is that we have a lot of fun at work. Like my girls will dress up; every Friday around Christmas they dress up as an elf and Mrs. Claus and have cookies. Then we have a Nancy Sinatra day, a pirates day—" (record scratch). Whoa, back up. A what day?

Hill laughs as he explains: in honor of Nancy Sinatra's one hit wonder, "These Boots Where Made for Walking," the women on the front desk wear blond wigs, miniskirts and, of course, the boots. "We get a lot of guys in on that day."

It's only fair to the guests; mimosas for the women, boots for the men. *MA*



Robert Bravender graduated from the University of Memphis with a bachelor's degree in film and video production. He has edited magazines and produced shows for numerous channels, including "Motorhead Garage" with longtime how-to guys Sam Memmolo and Dave Bowman.

Email Robert at rbravender@comcast.net

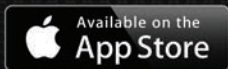
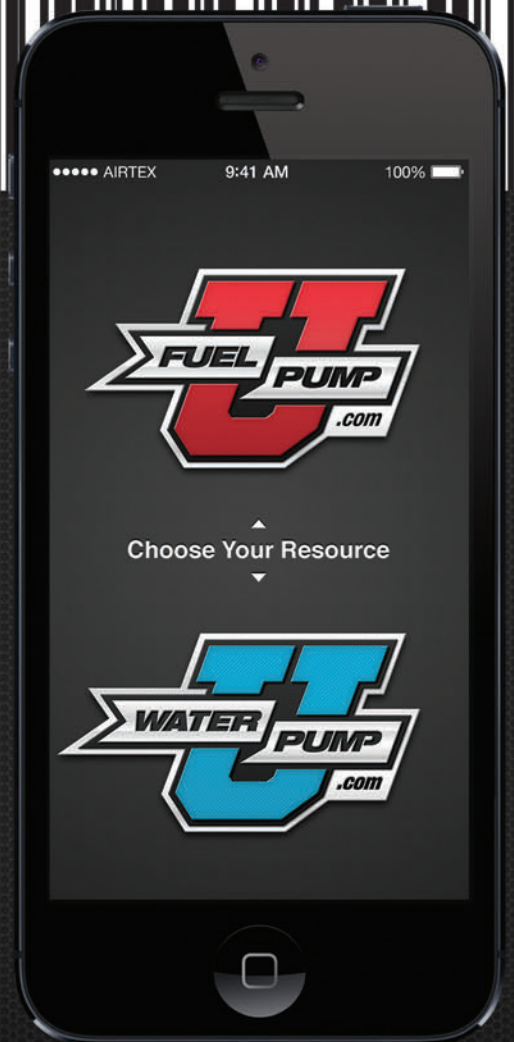
TWO PUMPS ARE E

FREE AIRTEX VIN SCAN APP GIVES YOU INSTAN

Whether you're searching for information on vehicle fuel pumps or water pumps, your search just got easier. Download the free Airtex VIN Scan App today. It uses your smartphone's camera to scan the VIN and takes you to a wealth of product information like technical specifications and installation videos.

Originally created for fuel delivery information, the Airtex VIN Scan App now includes information on water pumps and cooling systems. The app is full of user-friendly resources like downloads, videos, and free tech support. Plus, the app is now available for both Android and Apple mobile devices.

No more typing in VIN numbers...just scan the VIN and go. It's all part of Airtex's commitment to exceptional quality and unmatched customer support.



FREE Tech Line: +1.800.424.7839
airtexproducts.com

© 2014 Airtex Products, LP

BETTER THAN ONE

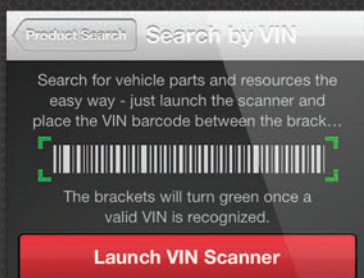
GET FUEL PUMP AND WATER PUMP INFORMATION.



CHOOSE YOUR PUMP TYPE

The Airtex VIN Scan App allows you to choose fuel delivery system or cooling system before you begin your scan.

AIRTEX PUMPS
75 YEARS
OF EXPERTISE AT
YOUR FINGERTIPS



SEARCH BY VIN

Once you've selected your pump type, simply click the Launch VIN Scanner button and then hold the device directly over the VIN barcode on the vehicle. Your smartphone's camera will scan the VIN and pull up the correct product information.



PRODUCT INFORMATION

Once the application has pulled up the correct part, you'll find a wealth of technical support content like 360-degree product photography, installation videos, product application information, technical data and more.



RESOURCES

Click on the Resources button under the product photo for helpful information guides, wiring diagrams and technical service bulletins.



AIRTEX

Exceptional Quality. Unmatched Support.





IN THIS SECTION

- 30** POWERTRAIN PRO Column
- 38** Electrical
- 46** ATSG Technical Training

IT DID MOVE

Several Ford 500s underwent repairs, but the transmission wouldn't engage then.
/itmoved

WET VOLVOS

Volvo explains a cause of a leak, but not where the water travels to.
/volvowater

HYBRID READY

A look at the opportunity hybrids represent & hazards to be ready for.
/readyhybrids

A Triple Threat

THESE TRANSMISSIONS CAN THROW PROBLEMS AT YOU FROM SEVERAL DIRECTIONS. YOU NEED TO BE READY WITH A GOOD DEFENSE.

BY **WAYNE COLONNA** | POWERTRAIN PRO PUBLISHER

IN THE late 19th Century, gridiron football emerged here in North America, a deviation of both rugby and association (soccer) football. Nowadays, we simply call it football. But back in the day, in addition to playing defense, a player in the gridiron game could be referred to as a "triple-threat man" if he excelled at kicking, running and passing. He was the team's utility man and a big threat to the opposing team.

What does this have to do with transmissions? Well, it's just my own personal viewpoint of how I observe a problematic transmission. I call it a "triple-threat trans," for it can oppose you on any one of three fronts, or a combination thereof: mechanically, hydraulically and/or electronically.

I find that breaking the transmission down into these three basic categories contributes to the diagnostic process. The computer calls the plays. The electrical solenoids receive that com-

mand, which in turn, direct hydraulic pressure to operate mechanical parts to complete the play. Each play begins with a command based on computer programming ending with a controlled gear transition. Besides the initial command and the achieved shift, there are many things that can go wrong in between. With some causes being less thought of than others, to mention a few of these overlooked points might be helpful.

Starting with programming (Figure 1), there can be challenges in determining a problem in this area affecting the direction one would take in the diagnostic process. At times, manufacturers might not develop the cleanest software affecting the quality of a shift and/or shift scheduling. Premature failure of the transmission occurs during the warranty period prompting reprogramming repairs. As a result, these types of failures do not regularly show up in aftermarket repair facilities.

But when they do, a transmission comes in with just 15,000 miles on it for example, yet one or two clutch assemblies are totally destroyed with no visible signs as to why. The fluid isn't burnt, no bushing failure, sealing ring failure or rubber seal failure can be found anywhere. In fact, you stack up the assembly with new steel and friction plates and it pressure checks



Figure 1



WAYNE COLONNA

is President of the Automatic Transmission Service Group (ATSG) in Cutler Bay, Fla., and a frequent speaker/instructor for transmission training around the globe.

STAY UP TO DATE

YOU CAN GET AHEAD OF THE GAME WITH OUR TWICE WEEKLY EMAILS.
www.MotorAge.com/ptpflash



WE SPEAK TRANSMISSION.



We also eat, sleep, and breathe it.

Whether you need parts, advice, or answers to your tough technical questions, one call to Transtar is all it takes. With four decades of transmission experience, you can trust us to provide the products, support, and expertise you need to get the job done right.

Get the parts and advice you need, fast. Same and next day delivery on most orders.



TRANSTAR®

Trust the Experts

855-800-5585

Our partners in dependability

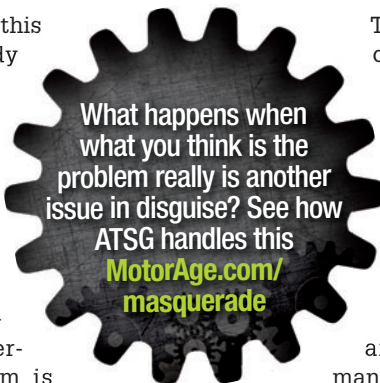
Transtar1.com



perfectly. Usually, at this point, the valve body and/or solenoids become suspect when all along the route cause is really a programming issue.

The opposite also is known to occur. For fuel economy purposes, a perfectly good program is written for what is commonly referred to as a "neutral idle stop." The computer commands off the driving clutch during "in gear" idle stops, such as stopping at a red traffic light. As soon as the brake pedal is released, the computer engages the clutch before the accelerator pedal can be depressed. In time, valves in the valve body wear into the bore hydraulically compromising the task resulting in a flare-bang engagement.

Rather than replacing the valve body, reprogramming the computer is done to remove the original program. The vehicle now remains in gear during any stop-idle conditions. However, had a new valve body with solenoids been purchased and installed, the vehicle would have worked as originally designed. The choice is between an \$800 to \$1,000 valve body and a \$50 to \$75 programming charge. Which do you think occurs most? I am sure you guessed correctly.



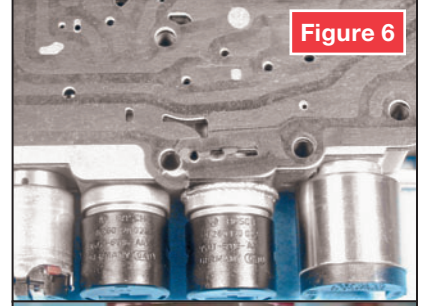
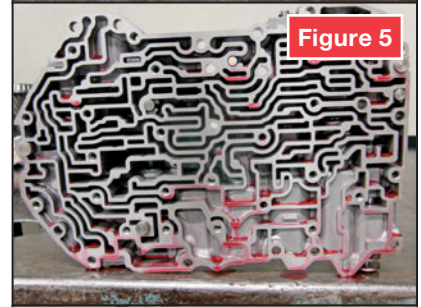
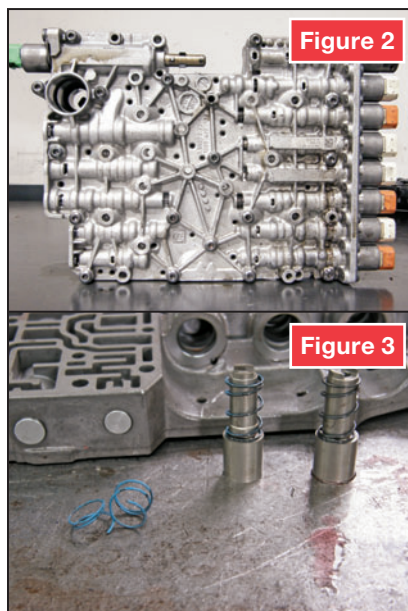
Though the re-flash cured an immediate problem, the transmission is headed for failure as the valve body is not going to get better with time.

In comparison, another neutral idle control problem with an entirely different manufacturer is the result of a programming problem. In this case, when the clutch is released, the program also entails lowering engine idle. The problem is getting the engine idle back up while engaging the clutch all before acceleration after a brake release. This results in a similar complaint of a flare bang engagement. A slight change in the programming via a re-flash and the problem is resolved.

These are just basic examples with which to reveal the challenges a tech faces with this aspect to the triple-threat-trans, particularly since most manufacturers's programming information remains proprietary. Of course the electrical facet to this triple threat also consists of input information to the computer, output commands and hardware (connectors, wiring sensors, switches and solenoids). With this one threat alone consisting of such a variety of components, it can be a respectable opponent.

The major link between computer commands and the actual shift are the solenoids and valve body (Figure 2). The solenoids receive the electrical commands, which in turn operate their respective hydraulic circuits. Most operate valves within the valve body to direct pressure for a specific task. Others receive full line pressure which the solenoids then regulates to directly ramp on and ramp off their respective clutch assembly.

This aspect of the transmission is not as nearly involved as the electrical. There are several straight forward areas prone to problems and failures that typically can be identified rather quickly, if one knows where and how to look. The exception to this would be related to mechanically failed solenoids, especially during cases when they fail intermittently.



Some basic things to look for with a valve body would be a stuck or sticking valve, worn or broken valve plugs, broken or incorrectly located retainers,

4 HOT SUPERIOR SOLUTIONS

From Your Friends At Superior Transmission Parts, Inc.

Award Winning Shift Correction Packages® and Superior Solutions® that virtually eliminate end plug leaks and restore hydraulic integrity to your next rebuild or repair. For more info, Visit our website @ www.superiortransmission.com for all your End Plug Simple Solutions™ and Shift Correction Packages®

CHEVY / GMC TRUCK

The 4L80E Kit
Incorporates
Normal and
Heavy Duty Steps

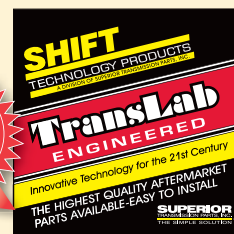


PART#
K4L80E

TOYOTA / LEXUS

THE FIX IS IN!

This award winning kit provides all around consistency and reliability for your customer's Toyota/Lexus units. Try one today and you'll say, "Thanks Superior & TransLab!"



PART#
STL-U140-U250

TOYOTA / LEXUS



PART# K096



Install the Superior U150-U250 or U140-U241E End Plug Package that fits your application and rest easy knowing that your unit won't be back for a bad leak due to a failed, leaking end plug.

Part # K096 End Plug Package for U150-U250 series
Part # K097 End Plug Package for U140-U241E series

FORD / JAGUAR / ZF



PART# K095



Simply put – another Superior Solution® to a common problem now showing up on a transmission rebuild bench in your shop! The K095 "Sure-Seal"™ End Plug Kit fits most ZF6HP 19 thru 36 types or Ford 6R60 thru 6R75/80.

Our Commitment To Quality & Innovation

At Superior Transmission Parts, we're committed to the continuous development of innovative problem solving products for today's automatic transmissions. From research & development and manufacturing to customer service and shipping, each member of the Superior team is dedicated to providing the best possible quality and service to our customers.

SUPERIOR
TRANSMISSION PARTS, INC.
THE SIMPLE SOLUTION



FOR MORE INFORMATION GO TO:
www.superiortransmission.com

JUST MOUSE OVER TO THE MAP OF THE WORLD
& CLICK TO FIND YOUR NEAREST DISTRIBUTOR

Facebook Superior Transmission Parts, Inc. Twitter superiortrans1

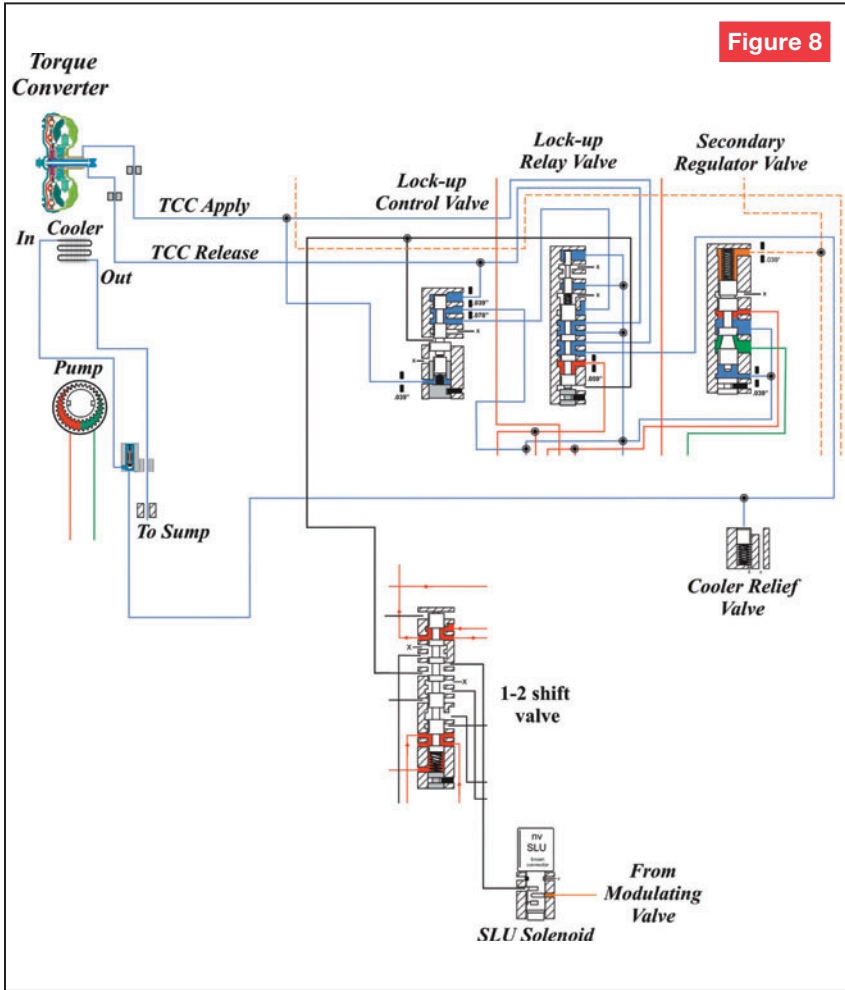


Figure 8

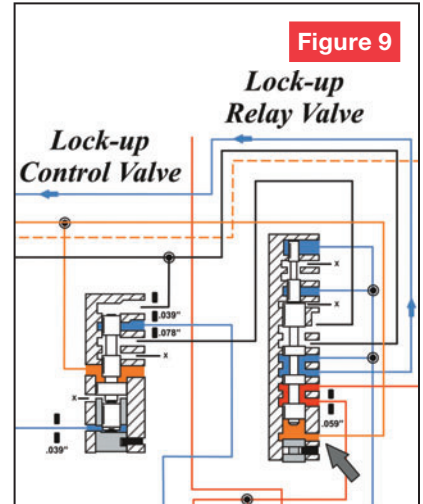


Figure 9

A careful look at the hydraulics (Figure 8) shows how this solenoid sends pressure to the relay valve between one end of the valve and the valve's plug retainer (Figure 9). With oil pressure from the solenoid being used to pulse this valve, the plug will rock or resonate in the bore making its perimeter susceptible to wear. Eventually, the plug will be unable to retain pressure. With the plug now leaking solenoid pressure, the relay valve no longer will stroke properly, compromising converter clutch apply. This typically causes an SLU solenoid performance code P2757 to be logged due to the loss of proper TCC pressure control.

This is just one simple example. There are quite a few transmissions that can develop this type of concern. Not only with solenoids related to the converter clutch, but shift and clutch control solenoids as well. It will produce a performance code for the related solenoid and/or its related clutch assembly, whichever the system is equipped with to produce.

Besides doing a visual inspection of the valve body, pouring solvent between the valve and bore plug to see what runs past the plug or captive vacuum testing are additional ways to inspect this area of the valve body. There are aftermarket sources for replacement end plugs.

If in a pinch, slightly flaring the outer perimeter of the plug using a tube cutter will provide enough of an interference fit to seal off the leak. Just be sure you carefully tap the plug in

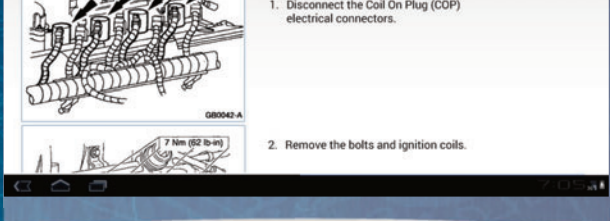
loose end plates, broken springs, bore wear, out of flat surfaces, missing, distorted or incorrectly located check balls, limit/check valves missing or out of place or blown out gaskets (Figures 3 through 7).

Worn valve plugs are easy enough to inspect, but often times are out of mind. With many solenoids now being

pulse width modulated, the problem of valve plugs leaking has increased.

One example of this can be with the Toyota A750 transmission. The SLU solenoid pulse width modulates to influence both the Lock-up Control Valve and Relay Valve for flex lock-up control (a controlled slip of the converter clutch as early as second gear).

Clear, up-close views of manufacturers' original images, drawings, and diagrams



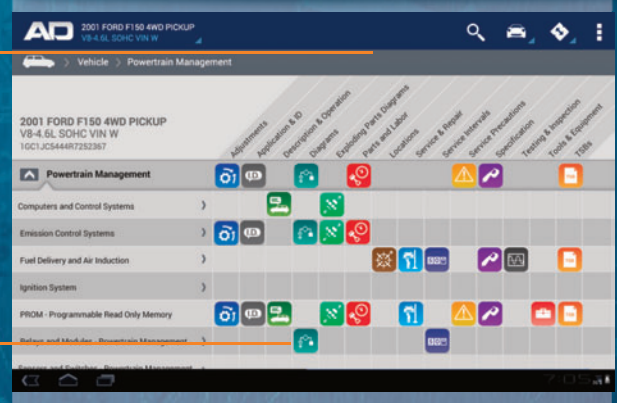
ALLDATA MOBILESM

CHANGING THE INDUSTRY!



Access to the entire ALLDATA Repair database

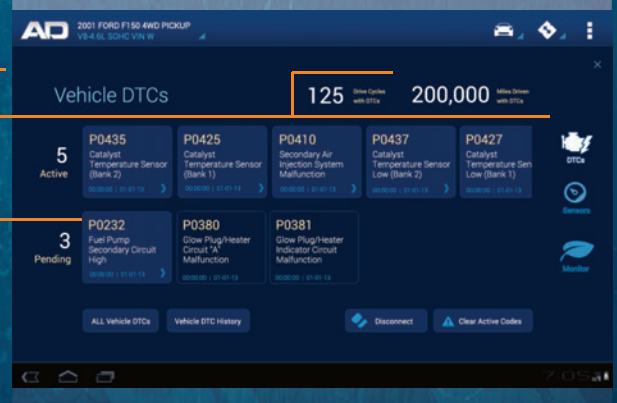
Directly access repair data from an easy-to-read grid



Access basic OBDII diagnostics

View supported parameter data

Emissions related P Codes link directly to ALLDATA Repair information



Get **ALLDATA** MobileSM and make a change for the better.

ALLDATA Mobile reinvents the automotive repair process through industry-changing tablet technology. Whether you choose to use an Android™ or Apple® device, you can now access OEM diagnostic & repair data, TSBs, diagrams and DTCs via Wi-Fi*:

- In your bay
- In the vehicle
- Under the hood
- Under the car

Connect to the vehicle's OBDII port to automatically read and translate VINs**. Read and clear emissions-related P Codes and automatically link to code-specific OEM information. Store P Code histories by VIN.

ALLDATA

www.ALLDATA.com | 877-506-1910

*Requires Wi-Fi Internet access. **Service available on vehicles which support VIN access through the ECU.

just far enough for the retainer to drop in place. Do not over travel the plug placing it too far in-board compromising the stroke of the valve and making yourself a different problem.

One other point to consider that can cause a similar complaint is using substandard filters. There have been occasions where the filter element itself introduces enough particles into the fluid that it clogs the solenoids. It's comparable to a rebuilt trans-

mission that left behind excessive rag lint. Once the solenoid screen is clogged, performance codes will set in the same way as a leaking end plug.

The often times overlooked mechanical aspect to the triple-threat-trans is related to bushings and end play. An AW55-50SN/AF23/33-5 transmission is a perfect example of this. The planetary components are quite heavy with inadequate bushing support. In time, the bushings wear causing

the gear train to become sloppy. As torque loads up and release, bumps and clunks can be heard and felt. Coast downshift bumps and clunks are typically the initial early stage observation of this problem. Because faulty solenoids, valve bodies and shift adapt programming have been known to cause this complaint, they become the first approach to resolving the problem. One reason worn bushings in this transmission are often times overlooked are that they usually look fine.

With many of the Asian transmissions on the road today, one way this could be identified quickly is to check lubrication pressure. When bushings are worn, this pressure can drop to 0 psi at operating temperature (normal pressure runs around 6 to 10 psi at operating temperature 220°F).

Fair warning: This also could be due to a worn secondary pressure regulator valve bore. The sure thing is, with zero psi there is a definite problem in the transmission, which can be sorted out quickly once the unit is out and apart.

Bushing wear also will cause sealing rings to dig into the surfaces they seal against. This in turn causes soft or flared shifts and burned clutch assemblies. Excessive endplay in the gear train can present itself much in the same way as worn bushings. Clunks and bumps, loss of lubrication pressure and sealing ring grooves. Overlooking excessive gear box end play does not occur frequently but when it does, it typically remains an obscure possibility in the technicians thinking.

If a unit was taken down to be rebuilt, if all the hard parts are good (case, pump, drums, planetary assemblies, etc.), as well as all the washers, endplay basically will remain the same once rebuilt. For this reason, some rebuilders bypass end play checks. But when a rebuild requires a hard part or parts to be replaced, end play can be affected and overlooked. Especially if special tools are required to properly check end play.

To overcome a triple-threat-trans you no doubt need to be a triple-threat-man by keeping some of these mechanical, hydraulic and electronic issues not typically considered in the diagnostic process. **TZ**

GMB

Performance & Durability For the Road Ahead



The GMB Hub Bearing

Extensive Domestic, Asian & European Coverage.
Triple Lip Seal prevents bearing contamination.
Bearing Noise & ABS Sensor Tested.
Durability & Strength Tested.
OE Form, Fit & Function.



GMB Catalog
Mobile App



GMB

100 Herrod Blvd. Dayton, NJ 08810 | 1.800.421.5019 | www.gmb.net

© 2014 GMB North America, Inc.

  /GMBNorthAmerica

MANY MAKE
WORK PANTS.

ONLY RED KAP MAKES
"WORK ON CARS"
PANTS.

Hand-Workin'
WRENCHER

GARAGE TESTED.
GEARHEAD APPROVED.

NO DEVIL'S
IN THE
DETAILS

Fully Loaded
WITH
POCKETS
To FULLY
LOAD
with
TOOLS

All Hail Horsepower

HARD-WORKIN'
SOFT FABRIC

REINFORCED.
TOUGH
TIMES
TWO
DOUBLE KNEES

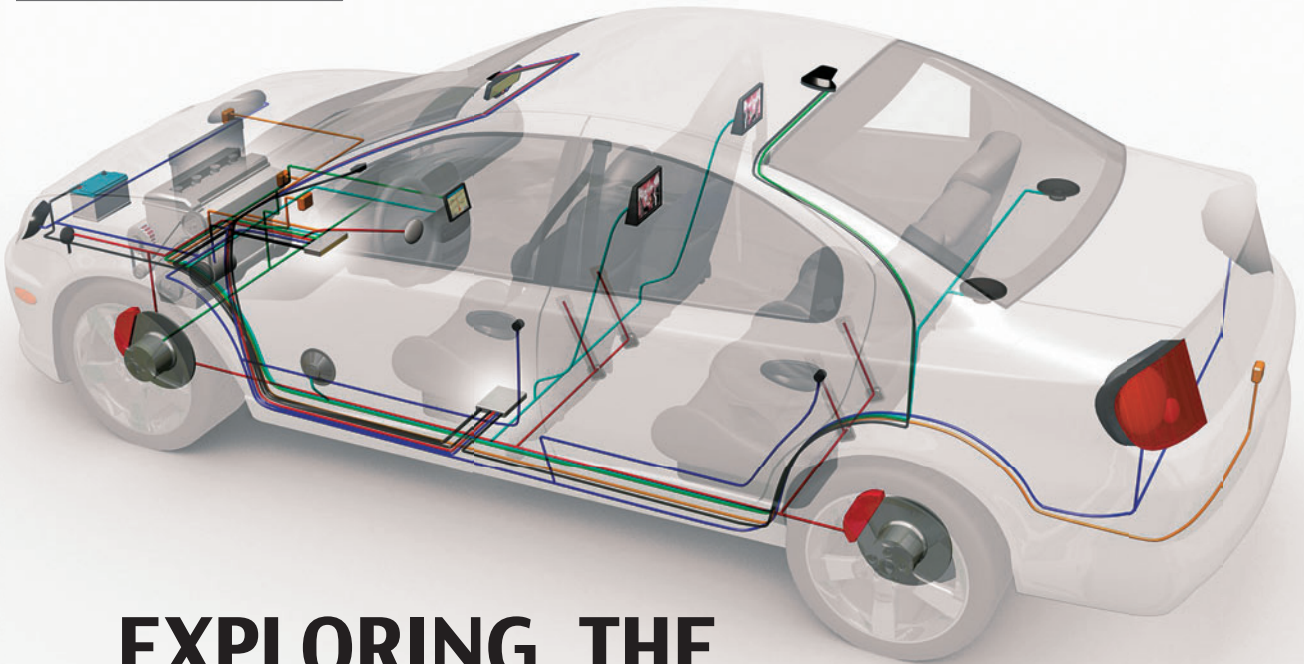
TAKE A
FREE
PAIR
OF
SHOP PANTS
For a Spin
GO TO
REDKAPFREEPANTS
.COM
FOR A CHANCE TO WIN



DRIVEN BY CARS.

GET THE ONLY GEAR MADE FOR CAR GUYS.

VISIT REDKAPFREEPANTS.COM TO
SEE OFFICIAL WRENCHER RULES



EXPLORING THE 'CONNECTED' CAR

Telematics is the convergence of telecommunications and information processing, providing for numerous owner services like accident response, vehicle theft location and more.

WHAT EXACTLY ARE WE CONNECTING TO?

BY **PETE MEIER** | TECHNICAL EDITOR

Telematics, as it applies to the automotive industry and defined in Wikipedia, most often refers to the “convergence of telecommunications and information processing.” Beginning with hands-free calling and screen-based navigation systems, the field of telematics has grown rapidly.

Today, it’s possible to turn your smart phone into a key fob, scan tool and even use it to summon your car from its parking space. Take a look at the video of Audi’s demonstration of this technology at the 2013 Consumer Electronics Show if you don’t believe me. It’s posted in the AutoPro Workshop. But is this technology helpful or is it a hindrance? What will the impact of this technology be on


your business, besides understanding it well enough to fix it?

Get a Fix on Me

Let’s start this discussion with one element we are all familiar with: navigation systems. When the military opened the Global Positioning System (GPS) to the public, the aftermarket and OEMs alike were quick to recognize the benefits of in-car navigational capability. Certainly, being able to plug in your starting point and destination and then following the onscreen prompts made finding one’s way around a strange town much easier than trying to read a paper map.

It didn’t take long to expand the use of onboard GPS. GM’s OnStar is one

JUST SCAN IT



Scan this QR Code to watch a video of Charlie Gorman at the 2013 NASTF meeting on your smartphone. Or visit MotorAge.com/nastf2013

GET A FREE SCAN TOOL APP AT: WWW.SCANLIFE.COM

example. General Motors established OnStar in 1995 with cooperation from Hughes Electronics and Electronic Data Systems, and the first OnStar units were made available in several Cadillac models for the 1997 model year. Each OnStar system that’s installed as original equipment is capable of gathering data from both the on-board diagnostics (OBDII) system and built-in GPS functionality. Add in the ability to transmit and receive voice and data communications over a Code Division Multiple Access (CDMA) cellular network, and now you have the capability

Photo: Daimler

Welcome to the all-new QuickBooks®

Pry with it.

Gauge with it.

Tighten with it.

Run with it.

Wellington & Sons Automotive

Income

OPEN INVOICES	\$6,457
OVERDUE	\$3,684
BILLED LAST 90 DAYS	\$21,263

Expenses

\$13,992
SPENT LAST 30 DAYS

- \$2,798 Payroll
- \$5,737 Parts & Materials
- \$1,959 Rent & Utilities
- \$3,498 Operating Costs

Profit & Loss

NET INCOME	\$7,271
INCOME	\$21,263
EXPENSES	-\$13,992

The essential tool for running your entire business.

Smarter. Faster. Simpler. The all-new QuickBooks helps you do more than ever before. Track sales, pay employees, scan receipts and get paid however and whenever you want. Turn on only what you need — it all works together so your data syncs automatically. This is your business on the all-new QuickBooks. **Run with it.**



Start now for free at [QuickBooks.com](https://www.quickbooks.com)

Free offer applies to QuickBooks Online, Online Payroll and payments monthly service fee; transaction fees apply. ©2014 Intuit Inc. All rights reserved.

to offer a suite of services to the subscribing owner. Some examples of the services available through the OnStar system include turn-by-turn navigation assistance, automatic crash response, and roadside assistance. And it's all accessible with the press of a button (and a subscription).

Combining onboard diagnostics, GPS and the ability to connect that data to a cellular network has created a multitude of options for consumer and automaker alike. Just consider some of the benefits that have resulted from this union. If your car has been stolen, it can tell the monitoring service where it is. Some applications can transmit this information directly to your smartphone. Accident response modes have

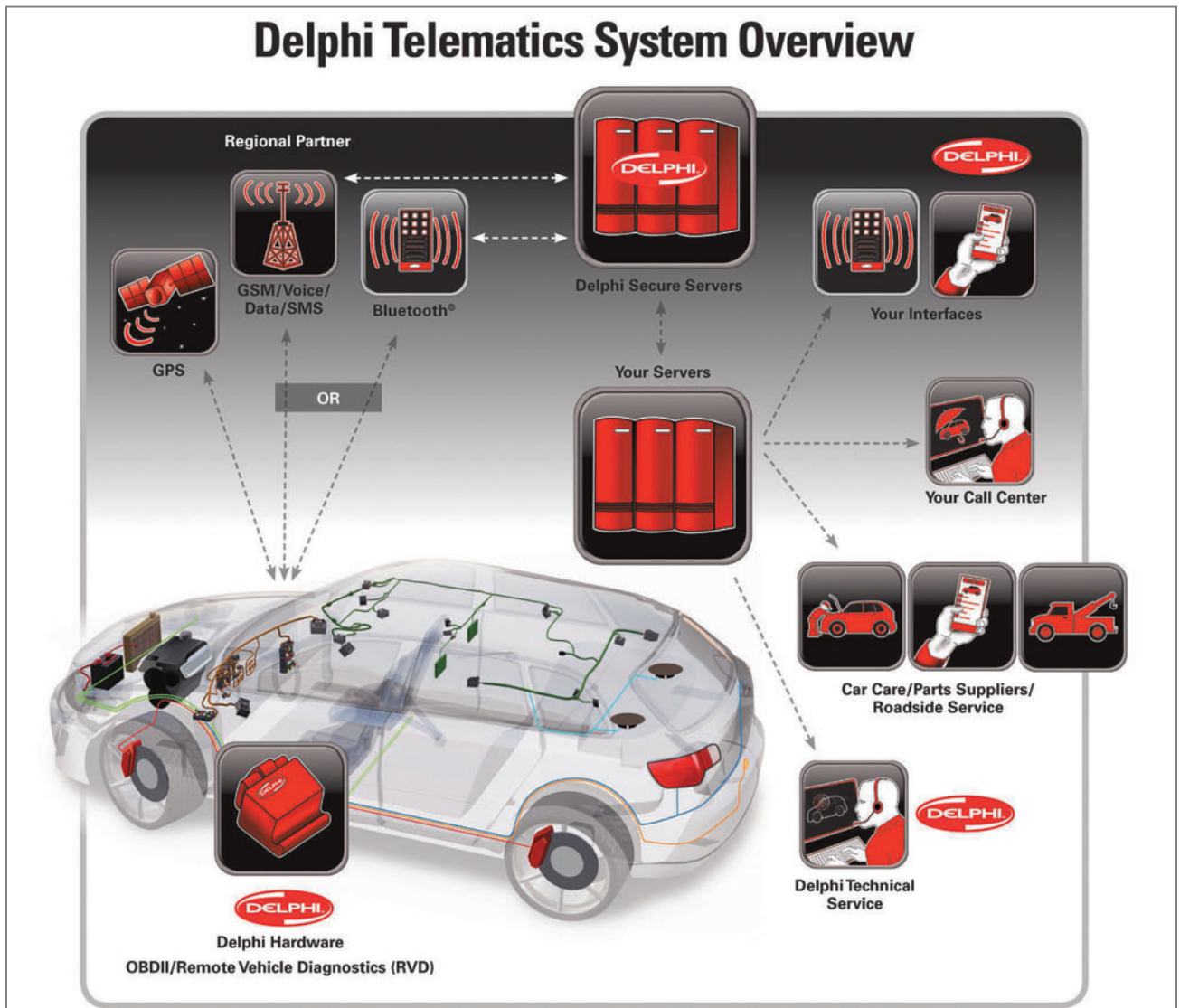
improved, with some OEM systems automatically initiating a 911 call, turning on the vehicle's hazard lights and reporting your position if an air bag deployment is recorded.

Are you a parent with teenaged drivers? Some manufacturers offer varying levels of parental controls that can be programmed by the vehicle owner. You can limit the top speed of the car to prevent your young driver from going too fast, set volume limits on the audio system to keep them focused on the task at hand and not the latest Miley Cyrus hit, even set up "geo-fences," or boundaries, that will send your smartphone an alert should your child stray too far.

Do you use your car or truck for business? Now it's possible to have WiFi

right in the front seat, allowing businesses of all types to conduct business on location. It also can keep the kids happy by allowing them to search the web on those long trips and opens up media options that not too long ago were only available at home. The big cellular providers, Verizon and AT&T, both have deals with automakers to supply 4G connectivity. In addition, Verizon offers its customers Delphi Connect, a program that offers anyone with an OBDII-compliant vehicle all the bells and whistles we've talked about so far. Imagine turning your smartphone into your key fob, being able to check your vehicle's health from your sofa, or knowing where your car is 24/7?

Delphi Telematics System Overview



The Delphi Connected Car system evens the playing field between the OEM dealer and the independent shop owner.

Photo: Delphi

STRENGTH IN NUMBERS



On any given day, all around the world, over 100 different models and capacities of BendPak and Ranger products safely move and support over six billion pounds of vehicles – jacks, lifts and stands backed by a warranty as strong as our brands. You stay focused on making money; leave the heavy lifting to us.

www.bendpak.com

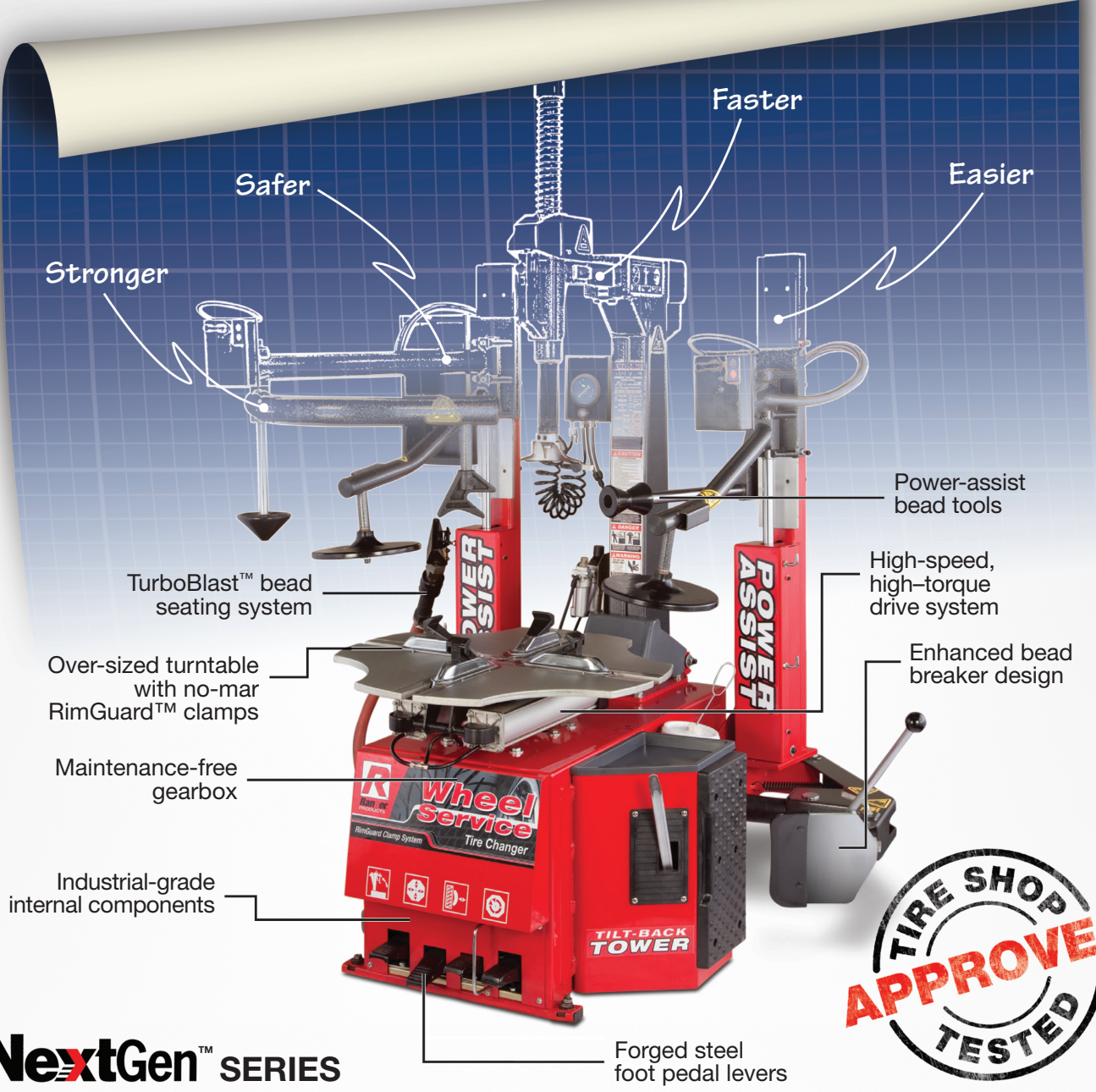
© 2014 BendPak / Ranger Products are registered trademarks.

BP BendPak
PROVIDING AUTOMOTIVE SERVICE SOLUTIONS

R Ranger
PRODUCTS

ENGINEERED TO PERFORM

And then some



Stronger

Safer

Faster

Easier

TurboBlast™ bead seating system

Power-assist bead tools

High-speed, high-torque drive system

Enhanced bead breaker design

Over-sized turntable with no-mar RimGuard™ clamps

Maintenance-free gearbox

Industrial-grade internal components

Forged steel foot pedal levers



NextGen™ SERIES



8 TIRE CHANGERS ENGINEERED TO TAME ANY TIRE

www.bendpak.com/nextgen • 1-800-253-2363

© 2014 Ranger Products, Inc. • BendPak, Inc. and Ranger Products are registered trademarks.



Even Google is getting into the telematics arena, recently announcing its partnership with five automakers to develop an Android-based operating system for automotive applications.

Going forward into the not-so-distant future, autonomous driving will rely on telematics. If you've got grandchildren of elementary school age or younger, odds are when it comes time for them to learn how to drive, they won't have to. All they'll need to do is get in and tell the car where they want to go.

Who Else Is Looking?

Of course, while there are very real benefits to telematics to the owner, there are also benefits to third parties. One that you'll immediately recognize is Progressive Insurance's "Smart Insurance" program utilizing a plug and play device that plugs directly into your OBDII Diagnostic Link Connector (DLC). The device, introduced way back in 1998 and called "Snapshot," sends information about your driving habits directly to the insurer in real time. Mileage driven, braking habits, and other data is used to determine how safe a driver you are and is promoted as offering consumers the opportunity to get a better rate in the process.

In 2012, Progressive reports it wrote more than \$1 billion in premium revenue related to the Smart Insurance program and they forecast that, by 2020, more than 25 percent of the entire U.S. auto insurance premium revenues will be generated by telematics and User Based Insurance (UBI) policies.

What, exactly, are UBIs? There are two models for UBI found globally: Pay As You Drive (PAYD) and Pay How You Drive (PHYD).

The PAYD model is attractive to drivers who don't drive that much. A plug and play device (similar to the Snapshot) with GPS capability is used to monitor how far you drive and a menu of pay as you go plans are offered. But the drawback to this UBI is that it doesn't take into account driver habits. Bad drivers pay the same rates, at least initially, as good ones do.

PHYD, on the other hand, records a multitude of factors related to driving habits like location, speed, cornering force, braking force and even how frequently you change lanes. The insur-

ance industry believes that this type of information will encourage bad drivers to improve their skills. State Farm, for example, includes a driver feedback application that helps their customers to monitor their driving habits based on three parameters: acceleration, braking and cornering.

Companies today offering some form of UBI include Progressive (Snapshot), Nationwide (SmartRIDE), Allstate (Drivewise) and State Farm. Others are looking hard at UBI, and some have announced plans to enter the market within the next few years.

And you know that if auto insurance companies are intrigued about the use of telematics, so are their arch enemies — the personal injury attorneys. Under most insurers' policies, the insurance company retains ownership of both the telematics device and the data recorded. This does not prevent savvy attorneys from requesting that data to use in their client's defense or favor. It also opens up a whole new potential career field — telematics data expert — at least until there is a standard format for the saved information.

The Negatives

Certainly, having your location tracked and reported over the cellular airwaves is an invitation to tracking by anyone else that can hack into that signal. And it's not just hackers we might need to be concerned with. Recently, the U.S. Government Accountability Office (GAO) looked into data farming practices at General Motors, Ford, Chrysler, Toyota, Honda and Nissan. It also took a look at practices at two of the country's largest GPS manufacturers, Garmin and TomTom.

The report found that the automakers collect data at times to assist drivers with traffic updates, roadside assistance and to track stolen vehicles but did not find evidence that they are selling the data they are collecting. However, the report stated that motorists were not informed as to what type of information was being collected nor did they have the ability to opt out of the data collection systems.

Further, the report states that companies "can track where consumers are, which can in turn be used to steal their identity, stalk them or monitor them without their knowledge. In addi-



The Delphi unit connects to the DLC and provides a secure "car to cloud, cloud to car" connection.



Progressive was one of the first insurers to use telematics to monitor policy holder driving habits.

Photos: (TOP) Delphi; (BOTTOM) Progressive Insurance

tion, location data can be used to infer other sensitive information about individuals such as their religious affiliation or political activities."

Minnesota Democratic Sen. Al Franken, chair of a Judiciary subcommittee on privacy, requested the report. In a statement, Franken says, "Modern technology now allows drivers to get turn-by-turn directions in a matter of seconds, but our privacy laws haven't kept pace with these enormous advances. Companies providing in-car location services are taking their customers' privacy seriously — but this report shows that Minnesotans and people across the country need much more information about how the data are being collected, what they're being used for, and how they're being shared with third parties."

Other distractors of telematics involving a vehicle's GPS position and OBDII link suggest that talented hackers could use the technology to directly interfere with the car's systems by sending commands to the onboard computers via the data connection

provided by the telematics device. Consider finding yourself in a car that suddenly stalls or accelerates, seemingly all by itself. Now multiply that by thousands at the same time. Paranoid? Maybe, but the scenario is a possibility that cannot be overlooked.

Another potential issue with the connected car is driver distraction. We've all seen it and many of us are guilty of it — talking on our phones or worse, reading and responding to text messages. In a recent Society of Automotive Engineers (SAE) article, author Paul Weissler reports that automakers are well aware of the distractive nature of these habits but shares that they are also exploring what they call "cognitive overload." Research performed by the American Automobile Association (AAA) and the University of Utah seems to suggest that the effort needed to focus on a phone conversation, even if hands-free, or the interaction with other connected services is still sufficient to reduce the driver's ability to recognize and react to visual clues they should be paying their full attention to.

A Massachusetts Institute of Technology (MIT) study funded by Toyota found that driver personality also might play a role, finding that drivers who regularly use smartphones and telematics tend to drive faster and change lanes more frequently than drivers who don't, even if they didn't have their cell phones with them.

Benefitting Your Business

Another benefit owners enjoy with their OEM telematics is the vehicle



The future is not that far away. Total connectivity and autonomous driving could mean you can play your favorite video game or work on that upcoming presentation while you commute to work.

health report they can provide. Depth of information varies, but if a code has triggered the Check Engine light, the onboard system can pass the information on to the owner via text, email or as an app downloaded to his or her phone. In addition to notifying them of the problem, the program often locates the nearest dealer and will provide directions to the dealership and provide contact information for making a service appointment.

This gives dealers a competitive advantage on top of the extended factory warranties and routine maintenance for the first two to three years they already offer. But it is one you can compete with.

Remember the Delphi Connect program I mentioned that Verizon offers? The program won the 2013 Aftermarket Telematics Challenge awarded by the Automotive Aftermarket Industry Association (AAIA). According to the press release, consumers respond favorably to maintenance reminders that are delivered by the vehicle itself. The Delphi Connect plug in provides a secure "car to cloud, cloud to car" data link accessible by the user via his desktop, tablet or smartphone. While first marketed directly to the consumer via the Verizon program, Delphi originally envisioned a total service solution that would help independent shops compete with the OEMs.

In this program, the shop would sell, lease or give the plug-ins to their customers. Service data would be monitored and in the event a problem is noted (code set, battery voltage low, etc.), the shop would be notified the same time the owner was. You would be able to immediately advise them if the problem required immediate attention or could wait, and then set a service appointment for them. The same app on your end would assist you in diagnosing the fault, perhaps even allowing you to order the parts needed via the Delphi catalog also included in your app. You could also use the connectivity to send maintenance reminders, appointment confirmations and thank you notes, all automatically as you establish in the program.

In May 2013, Auto-Wares Group of Companies announced the launch of an aftermarket telematics system that utilizes Delphi Connected Car technology.



Turn your smartphone into a key fob? VW's Car-Net can do that and a lot more.

The telematics system allows Auto-Wares to "talk" with car owners and assist customers with a variety of services, including remote vehicle diagnostics, roadside assistance, service and maintenance and vehicle health monitoring benefits.

"By offering telematics to our more than 1,000 parts stores and certified service centers throughout Michigan, Illinois, Ohio, Wisconsin and Indiana, we are positioning Auto-Wares to better serve our network, fleet customers and consumers," said Fred Bunting, CEO, Auto-Wares Group of Companies. "This technology will build strong value for our network by supporting our shops with marketing and part sourcing. In turn, they are assisting their customers with remote vehicle diagnostics, and other service and maintenance benefits."

To see a *Motor Age* video presentation with Delphi on their connected car solution, visit the AutoPro Workshop and search "The Connected Car and You." We guarantee you won't look at your car or your smartphone the same way ever again. [TV](#)



Pete Meier is an ASE certified Master Technician and sponsoring member of iATN. He has over 35 years practical experience as a technician and educator, covering a wide variety of makes and models. His primary goal is to bring working techs the information they need.

Email Pete at pmeier@advanstar.com

1 ANDROID MOBILE OPERATING SYSTEM AT LIGHTNING SPEED

The Encore™ doesn't stray from its roots as an OTC diagnostics tool. OTC took the strengths of its diagnostics programs and merged them with the Android™ system to provide not only a tool—but a tablet—that understands the technician's mobile life.



SCAN

IDENTIFY

FIX



Built-in WiFi and Bluetooth allows a technician to scan a vehicle while browsing popular online forums to research trouble codes, easily accessible via OTC's Fast Touch home page.



Dive right in with a familiar Android operating system.



7-inch capacitive touch screen (like your smartphone).



Boot up and get ready to rock in less than 15 seconds.



The OTC Encore is proudly assembled in Owatonna, Minnesota, USA.



otctools.com/encore

800-533-6127



MASQUERADING PROBLEMS

WHEN YOU EXPECT ONE CODE TO BE THROWN BUT SEE ANOTHER,
THE PROBLEM MIGHT BE HIDDEN A LITTLE TOO WELL AT FIRST GLANCE.

BY WAYNE COLONNA | POWERTRAIN PRO PUBLISHER

A GM truck equipped with an Allison 1000/2000 transmission and a New Process (NP) 263XHD Transfer Case (Figure 1) comes into the shop with a complaint of harsh coast down shifts followed by a perceived no move condition. The speed signal seen in the instrument cluster intermittently jumps as well. Code P0746 for Solenoid A Controlled Clutch Stuck Off performance code and/or P0776 for Solenoid B Controlled Clutch Stuck Off performance code might be stored in memory.

Once the code sets, the computer aborts to a high gear failsafe. The abort also causes the transmission to have no reverse. With the vehicle being very heavy and stuck in high gear, it doesn't move forward very well either. This deliberate computer abort has at times been confused with thinking there is a problem inside the transmission causing a no move condition. As a result, the source of the problem being inside the transfer case is at times overlooked so the transmission is pulled. When the transmission is dismantled,

no evidence of a problem related to the complaint is observed.

The transfer case is made of magnesium. There is a steel bearing inside that supports the load of the output shaft and rear drive shaft yoke. This bearing wears into the case, compromising the support due to a combination of load and dissimilar metals (steel and magnesium do not cohabit well with each other).

The torque load is then placed on the rear output shaft yoke bushing. With this bushing not being designed

Photos: Wayne Colonna

The Original
Gabriel[®]

SHOCK MADNESS

BUY 4 FOR THE PRICE OF 3

IT'S LIKE GETTING

**ONE FOR
FREE**

VIA MAIL-IN REBATE



We Must Be *Crazy!*

From March 1 – April 30, consumers can receive a mail-in rebate for the price of one unit when four qualifying Gabriel[®] products are purchased. Maximum rebate amount is \$125. See rebate form for details.

The Original
Gabriel[®]

Ride the independent spirit™

www.gabriel.com

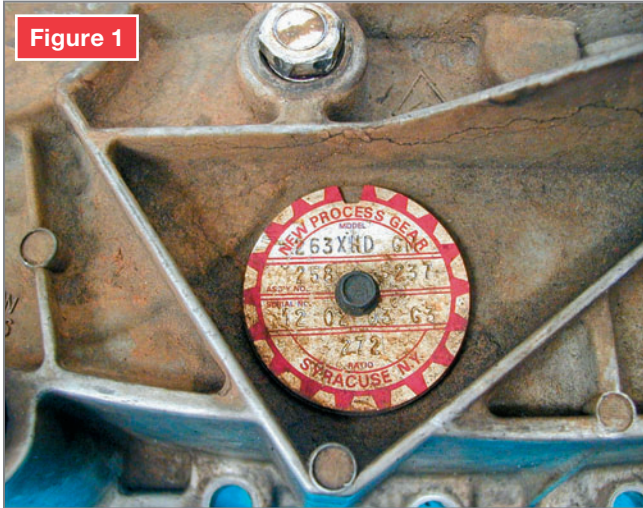


Figure 1



Figure 2

to support such a load, abnormal wear takes place. The wear can be at times so extreme the yoke wears into the housing (Figure 2). As crazy as it sounds, there are occasions where under these extreme wear conditions, the rear seal will not leak. This too assists in diverting ones attention from the real problem area.

This excessive wear coupled with damage to the bearing bore because of dissimilar metals (steel and magnesium), produces enough slop in the transfer case output shaft that the tone wheel is able to erratically rub into the tip of the vehicle speed sensor (Figure 3).

Strangely enough, the computer doesn't generate a code for a compromised speed signal as one might think, especially because the irregular air gap of the speed sensor causes the speed reading in the instrument cluster to jump intermittently.

The damage to the transfer case in some instances is so severe, it is not

worth rebuilding. But once the problem with the transfer case is corrected and the codes are erased, the vehicle works flawlessly.

But why did code P0746 and/or P0776 store rather than a VSS code? With these codes stored, along with a perceived no move condition and the rear seal not leaking, the real cause to the problem certainly is masqueraded.

The best answer I have is a system description from GM. It says:

"The transmission has two pressure control solenoids that controls the flow of transmission fluid to engage clutches. The flow is directed through shift valves that allow it to engage different clutches. The vehicle speed sensor and automatic transmission turbine speed sensor contains a permanent magnet surrounded by a coil that gives off a continuous magnetic field. As the vehicle is driven, a speed sensor rotor located near the magnetic pickup of the speed sensor coil also rotates. This rotation produces a variable AC voltage

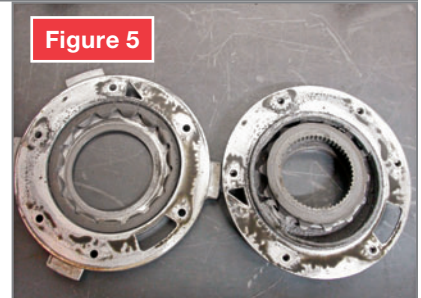


Figure 5

signal. The frequencies of the signals are proportional to the transmission turbine and output speeds. The transmission control module (TCM) uses the signals to calculate the gear ratio. The TCM compares the computed ratio to the commanded gear ratio."

From this description, it is clear that the vehicle speed signal plays an intricate roll in determining gear ratio. My guess is that though the speed sensor dug in to the tone wheel, the signal was not bad enough, long enough to trip a code. Yet the readings were confusing enough to produce an incorrect gear ratio calculation thus blaming the solenoids for not doing their job.

Heavy duty trucks with diesel engines are prone to frequent failure in this area due to the heavy work load they continuously undergo, as are those that use an aftermarket tuner or any other method of boosting turbo power. Rockland Standard Gear has designed a beefy aluminum case half that prevents continued failure in this area (Figure 4). This also will eliminate another well-known problem this transfer case suffers from. That is, the lubrication pump (Figure 5) wearing into the case enough to dig a hole through it. ☹

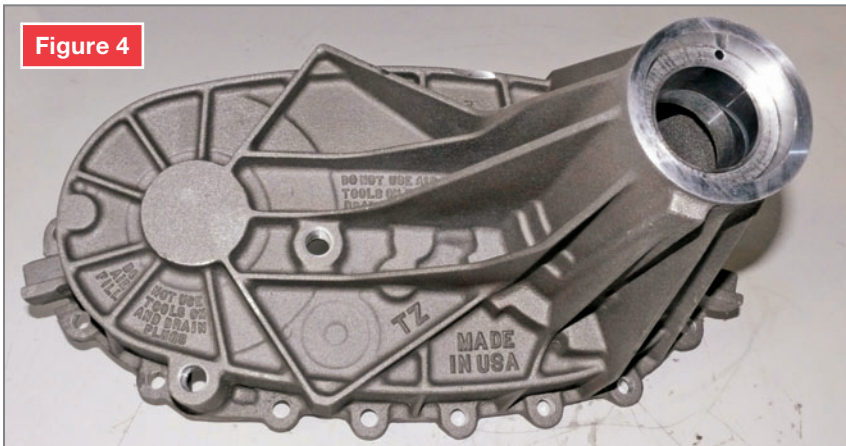
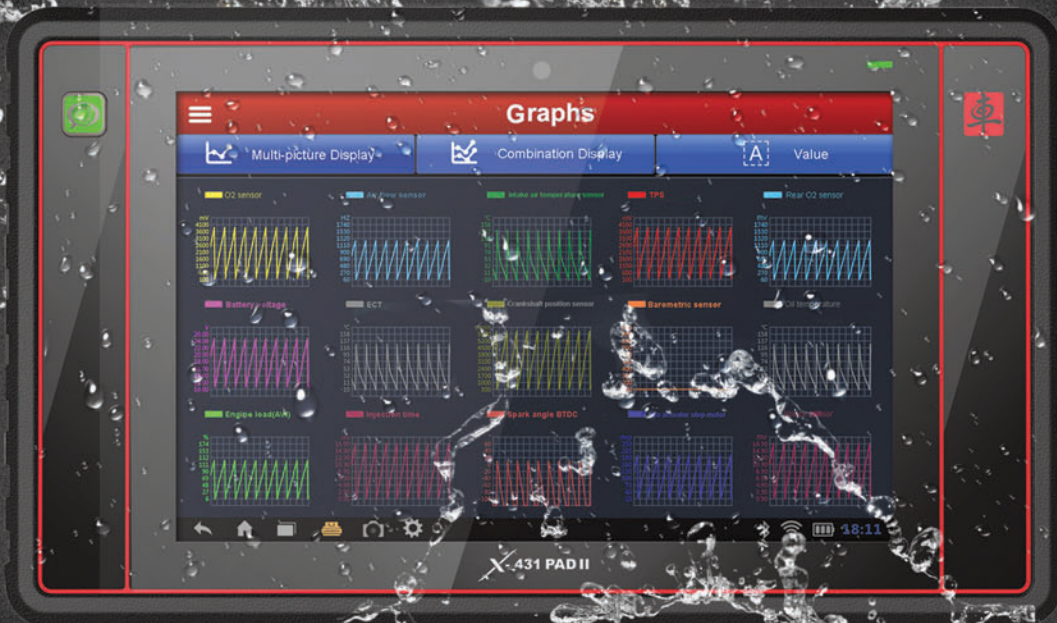


Figure 4

FROM THE CREATORS OF THE X-431 PAD COMES

THE PAD II



IP65 WATERPROOF RATING. DROP TESTED, DUST PROOF DESIGN.

ANDROID™ OPERATING SYSTEM: ACCESS GOOGLE PLAY, DOWNLOAD THIRD PARTY APPS AND MORE • LARGE 10.1" HIGH RESOLUTION IPS CAPACITIVE TOUCH SCREEN • CODE SEARCH: QUICKEST RESPONSE FOR CODE SOLUTIONS, AUTO SEARCH GOOGLE WITH DTC AND RELATED INFORMATION • VIN-SCAN: CAMERA BASED VEHICLE AND SYSTEM AUTO-ID

LAUNCH
CREATE • CHANGE

www.launchtechusa.com

IP-65

WATERPROOF RATING
DROP-TESTED
DUST-PROOF DESIGN.



TECHNOLOGY

THE NUTS AND BOLTS OF AUTOMOTIVE REPAIR



IN THIS SECTION

- 62 Underhood**
- 72 Undercar**
- 78 Scope & Scan**
- 82 Motor Age Garage**

read it on **MotorAge.com**

EPA WANTS BAN

EPA did clarify this ban will not impact use of 134a in motor vehicles on the road.
[/r134aban](#)

FLUSHING TIPS

Try to flush the entire hydraulic system when replacing the power steering pump.
[/psflush](#)

FUEL INJECTOR REPLACEMENT

Check out this video with tips on replacing this part.
[/injectortips](#)



DRIVABILITY

LEARNING FROM A RACING LEGEND

This 2009 Dodge Caravan came in with a P0404 EGR position sensor performance code. The valve was replaced for the same DTC two years ago. If the old valve had been stuck closed or was inoperative, there could be excessive carbon to limit flow once the new valve was installed.

RACE TEAMS KNOW THE DIFFERENCE BETWEEN WINNING AND LOSING IS MEASURED IN MILLISECONDS AND THEY INVEST A LOT OF TIME AND TECHNOLOGY TO TRACK THEIR PROGRESS.

BY **DAVE HOBBS** | CONTRIBUTING EDITOR

Growing up in my dad's auto electric business in Kokomo, Ind., I have to admit I didn't migrate toward the performance side of the industry. While my gearhead friends in high school were making horsepower mods on their rides, I was playing with electronic ignition conversions and water injection. I guess that made me a geeky gearhead.

When I left the family repair shop in 1989 to go to work on the technical assistance hotline at Delco Electronics (now Delphi), I immediately was

immersed into the world of auto racing thanks to a colleague named Steve Butler. In his spare time, Steve was a racer – and a good one at that. He raced motorcycles on the flat tracks taking the Indiana half-mile AMA championship in 1976 and had transitioned into racing sprint cars prior to our working together. Steve wasn't your typical short track driver — he was as talented in the technical aspects of racing as he was the behind the wheel winning a half dozen USAC Sprint and Silver Crown championships. After retiring from racing, Steve kept on working at

Delco Electronics (now Delphi), becoming a very successful systems engineer.

Looking back on the days we worked together I consider myself fortunate to have worked with a true champion. While I learned most of the fundamentals from my father, I learned a lot of technology working with Steve. No doubt Steve Butler is blessed with talent, determination and sheer nerve but I suspect there is something more than that. I believe it has been his ability to discern the proper time for fundamentals and the proper time for technology that gave him that winning edge.

JUST SCAN IT



Scan this QR Code to watch an After Hours video on Global OBDII. Or visit MotorAge.com/obdiiafterhours

GET A FREE SCAN TOOL APP AT:
www.scanlife.com

Why install any other Oxygen Sensor... Period!

"Yes, Walker Products has packaging that wins awards, but it's what's inside the box that matters most to me."

Nothing but the best for me and my customers. I have been buying and installing parts for over 25 years, and when it comes to service with my name on it, quality is number one. That's why I install Walker Oxygen Sensors. I need OE fit, form, function and performance. Walker Products' quality is the result of listening and learning from years of experience. It's what's inside the box that matters to me. Designed for technicians like myself that share Walker's commitment to quality and service.



KIM JUNG
PRO AUTOMOTIVE-
FOREIGN AND DOMESTIC
SANTA ANA, CA

Contact Us Today

to learn why many auto repair pros are installing Walker quality products.

**Call us for details at: (636) 257-1700
or visit us at: www.walkerproducts.com**



GETTING the part
is **only** the
BEGINNING

WELLS
TECH



At Wells you know you can rely on our high quality products. Did you know you can also count on us to help you do the job right - the first time?

Call or email our technical support team of ASE-certified professional technicians for free support.

Monday - Friday
7 a.m. - 7 p.m. CST
1-800-558-9770
technical@wellsVE.com



WELLS
VEHICLE ELECTRONICS

WellsVE.com



Back probing the digital solenoid style valve proves what the scan tool PID shows the EGR position steady at 3.8 volts (valve closed), but doesn't move even when the PCM gives a command to move the valve. The solenoid in the valve is not open or shorted.

Is There a Winning Edge In Your Shop?

Both today's production cars and race cars have seen tremendous changes in technology. One of those changes on the track has been data acquisition. While there still might be some types of racing that keep it simple, the use of data acquisition devices has become relatively affordable for most forms of racing. Even if the rules don't allow data acquisition during the actual race, it's often still allowed for car testing and setup. A dozen or more sensors on the car capture information ranging from track speed to rpms to lateral G's that stream into a black box so the crews in the pits can analyze and determine what changes the car needs to win.

It's one winning edge you need to be successful on the track. It's very much the same with data acquisition in the world of production OBDII vehicles. You need that edge to be successful in your service bay tackling challenging drivability problems. What data recording acquisition do I refer to? Mode \$06 data for non-continuous emissions monitors is one such edge.

Mode \$06 Basics

Using the terms Mode \$06 and basics together is a bit of a stretch for those who know anything at all about this subject. The very presence of the dollar sign (\$) symbol indicates that the numbering system associated with this diagnostic technique is not in the normal base 10 numbering system we all learned in grammar school. That \$ symbol represents the origins of Mode \$06 data being in hexadecimal.

Hex (for short) is a preferred alphanumeric system used in computer engineering leading me to my personal theory that Mode \$06 originally was developed by engineers for other engineers to analyze — meaning it was never intended for the rest of us! Hex uses the digits zero to nine used in our familiar Base 10 numbering system along with the addition of the letters A through F. Fortunately, if your scan tool was made in the last decade it probably converts from Hex to Base 10 for you already.

Pro Mazda Expert Championship Winner

AUTO ENGINEUITY *Racing*

CONGRATULATIONS Jay Horak!



AutoEnginuity was born out of a passion for all things automotive. That passion burned brightly through the years with the sponsoring of several winning race cars. This year we took that passion for racing to the next level with an open wheel formula car in the Road to Indy series. Jay Horak joined M1 Racing, and with the help of a great crew, he won the expert championship in his rookie year. Work hard, play hard.

At AutoEnginuity, we spent the last 14 years perfecting PC-based diagnostics. When you need the same level of passion in your tools as you put into your work - look no further than AutoEnginuity.

PRO-LINE *BUNDLE*

Professional PC based OBD-II diagnostic tool with OE-level coverage options for:

- Reset adaptations, run calibrations, etc.
- Actuators and System Tests (KOEO, KOER, Crank Learn, graphing Power Balance '04 - '13, etc.)
- Fully translated and scaled Mode 6 data
- Virtual-buffered graphing offering powerful pan and zoom features
- Powerful and configurable user-interface
- User upgradable hardware
- Downloadable software updates from 50 - 450 USD per year. First year of software updates are free!



Our coverage spans the '96 - '13 model years and includes engine, transmission, body, and chassis.

480-827-TOOL (8665)
www.autoenginuity.com



THE WORLD'S TOUGHEST WIPES



BIGGER. STRONGER.

Soaked in our proprietary 9-cleaning-agent formula, these extra large 10" x 12" wipes are built to withstand vigorous scrubbing and your toughest messes.

TOUGHER.

Our tough wipes are the perfect tool to knock out grease, oil, tar, scuff marks, brake dust and other messes to make clean-up on and off the job quicker and easier. The final touch that shows you went the extra mile to make sure everything is perfect.

**LEARN MORE @
1.800.846.7325**

tubotowels.com

©2014 Federal Process Corporation. All rights reserved.

OBDMID (Hex)	OBDMID Description	Test ID (TID)	Scaling ID	Service ID \$06
				'All V6/V8 Gasoline Engines'
31	EGR Monitor Bank 1			
	- Fuel Shift Above Threshold Counter	93	24	C
	- Fuel Shift Below Threshold Counter	94	24	C
	- Fuel Shift Trim Percent of Bank 1	95	39	C
	- Fuel Shift Trim Percent of Bank 2	96	39	C

Looking at this 2009 Dodge Caravan's Mode \$06 descriptions from Chrysler OEM information, we can determine that EGR flow is checked via the O₂ sensor(s) effect on fuel trim when EGR is operated during the test period.

How Can it Help Me?

In a nutshell, Mode \$06 data is much like an enhanced Freeze Frame, giving a look at exactly what the results were when each OBDII non-continuous monitor ran. It is the details of diagnostic trouble code (DTC) magic so to speak. Mode \$06 also might have some monitors that are continuous, such as O₂ sensor and misfire on some vehicles. While OBDII Freeze Frames become available only when a DTC sets, Mode \$06 data is stored whenever a monitor runs — pass or fail and whether the DTC is current or pending. Like a DTC Freeze Frame, Mode \$06 is not dynamic — it only shows information that was stored from the past.

Mode \$06 came onto the scene in the service bay when Ford misfire diagnostics without the factory scanner proved to be a bit unreliable. When it was discovered that you could enter into this special scan tool mode to more accurately determine which cylinder was misfiring on those stubborn Fords, the interest in this diagnostic method picked up.

Master Mode \$06 with an OBDII Review

You have to get inside the Powertrain Control Module's (PCM) head a bit to determine the best use for Mode \$06. First, recall there are different types of tests (monitors) that the PCM performs to ensure that emissions don't exceed the limit of 150 percent of the federal government's test procedure (FTP). If you're an older tech like me who worked on OBDI vehicles, you recall sensors getting unplugged, shorted or just plain going bad that turned on a Malfunction Indicator Lamp (MIL). Those types of continuous tests (referred to as Comprehensive Component Monitors) ran and when they failed the light came on and a Freeze Frame was recorded.

Data Parameter IDs (PIDs) allowed us few clues after a DTC was set and a Freeze Frame stored to recreate the condition and observed the entire PID list on a road test to confirm our diagnostic suspicions. That dates back to vehicles where the PID list numbered maybe a few dozen. Now PIDs can range in the hundreds. Today's OBDII vehicles have a growing list of monitors that are non-continuous. The list includes Catalytic Converter Efficiency, Evaporative Emissions (EVAP) Leaks and Performance, Exhaust Gas Recirculation (EGR) Performance, Variable Valve Timing Performance, Thermostat Performance, O₂ and O₂ Heater Performance, Secondary AIR and even the Positive Crankcase Ventilation (PCV) System.

Some of these monitors no vehicle on the road has, and some are just not on every vehicle. How do you know which ones? If the vehicle doesn't have that equipment then the monitor is not relevant even if it shows up in

Let us promote your business with our

Ultra Targeted Marketing Services!

We can reach your **most likely customers** at the **key times and places** they are most receptive to your offers!



100% turnkey.
We do **ALL** the work for you.

- ✓ **Proven effective.**
Response rates of 10–15% or more.
Bring in lots of buyers quickly.
- ✓ **Affordable. Low flat rates.**
High return on investment.
- ✓ **No contracts. No commitments.**
No hidden charges.
- ✓ **Satisfaction Guaranteed.**
Love your results or fire us with no further obligation.

Moving Targets creates **highly personalized, targeted advertising**, using your choice of **print, digital and social media**.

Then through our **proven marketing services**, we deliver these ads to the right people, at the right time, at the right place, to create **rapid sales and boost loyalty**.

**Moving
Targets**®



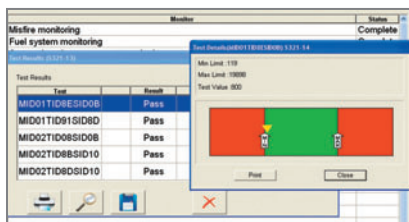
See how it works. Ask for your
FREE SAMPLES & INFO
CALL 800.926.2451 ext.326

www.movingtargets.com

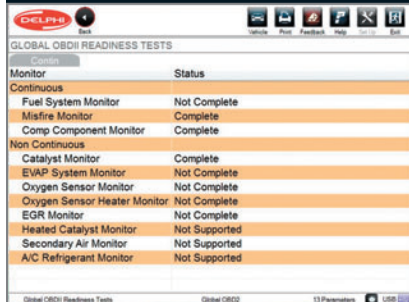


Mode \$06. Examples are Secondary Air Monitor and EGR. Some vehicles don't have either one of those systems. You might see "Not Supported" or "NA" when you review the status of all the monitors in Mode \$01 when that's the case. You'll always see a "Not Supported" note on your scan tool for Heated Catalyst Monitor and A/C Refrigerant Monitor, as OBDII vehicles and R-12 never coexisted and there has never been a "Mobile Chernobyl" heated catalytic converter on a production vehicle to date.

When you look at a scan tool's OBDII Readiness Test screen displaying which monitors have ran and which ones haven't, you'll always see comprehensive component monitor saying "Ready," "Complete" or some similar word. You also might see in the category for other continuous monitors



Anyone with a J2534 universal reprogrammer can subscribe and download Toyota's factory Techstream scan tool software on their laptop. While most older non PC based factory scanners like GM's Tech 2 and Chrysler's DRBIII don't do Mode \$06, the Toyota Techstream has an OBDII generic feature that will run Mode \$06.



OEMs vary in how they display the values when monitors have not yet ran. Always go to OBDII readiness status before putting stock in your Mode \$06 results.

TID	CID	RESULTS	TEST VALUE	MINIMUM	MAXIMUM
CAT MONITOR	BANK 1 SWITCH RATIO	PASS	0.021	0.000	0.686
CAT MONITOR	BANK 2 SWITCH RATIO	PASS	0.658	0.000	0.686

Notice bank 2's cat passed, but just barely by coming in right under the 0.686 percentage mark. This vehicle most likely will be back in the shop with a MIL illuminated.

like Misfire and Fuel System either "Ready / Complete" or "Not Ready / Incomplete." Under those categories, you'll then see the list of non-continuous monitors which Mode \$06 addresses in more depth. They also will say either "Ready / Complete" or "Not Ready / Incomplete."

Take note, regardless of whether it is a continuous monitor or non-continuous monitor "Ready / Complete" does not necessarily mean it passed. If you successfully completed a test in school did that mean you passed? No. It means you took the test, and got it turned in on time with your name on it. The teacher then graded it and told you that you passed or failed. In the school of OBDII, if the teacher (PCM) sees one or two fails (depending on the DTC), the MIL will illuminate. You don't know how badly that particular test failed or what part of the test caused the F on the report card.

Mode \$06 is like looking at your test after it was graded by the teacher. If you just barely passed a test in geometry wouldn't you want to know not only that fact but also know what aspect of geometry you are weak in? Mode \$06 does just that. It tells you if a monitor was close to failing. It tells you what aspect of the monitor had the problem.

Obstacles of Mode \$06

Aspects of Mode \$06 can at times be less than perfect. Mode \$06 test results are not dynamic. They are static. Unplug a spark plug wire and Mode \$06 test results won't change on most scan tools. Unless your tool's Mode \$06 has an update/refresh feature, you might have to back out of Mode \$06 and then re-enter it to see a monitor in Mode \$06 change. Understanding the drive cycle and knowing the art of monitor completion is a MUST for using Mode \$06 with any success. There are times where you might observe Mode \$06 data looking exceedingly perfect. That might be another indication that a monitor has not been totally completed or doesn't

exist on that vehicle. Always ensure monitors have run before putting any credence in Mode \$06 data.

Where to Find Mode \$06

You'll typically find Mode \$06 on the generic OBDII side of most scan tools, but on many scan tools you also will see it on the enhanced side of the tool in the powertrain section. Often when this diagnostic mode is accessible in both the generic and enhanced powertrain, the version in generic lacks any detailed explanations of the data and sometimes is even in a raw untranslated hex format. If your scan tool doesn't simply call it by name (Mode \$06) it might be called Non-Continuous Monitored Systems or Display Test Parameter Results, (Snap-On) On Board Test Results, (Auto Enginuity) Diagnostic Monitor Test Results, (NGS) Special Tests/Component Parameters, (OTC) or Non-Continuous Test Results. (BDM)

TIDs, CIDs and MIDs

Mode \$06 data is divided into two sections – the general monitor that was run (i.e. heated O₂, Misfire, EGR, Evap, etc.) and the more specific detail (component) of that monitor such as which O₂ sensor or cylinder is being reported on, what is looked at when EGR is commanded off, or the exact type of test being performed for EVAP such as time vacuum is held or presence of excessive vacuum.

The first section, the general monitor that was run, is called the TID (Test ID) on pre-Controller Area Network (CAN) bus vehicles and MID (Monitor ID) on CAN bus vehicles. The second (more detailed) section is the CID (Component ID) for pre-CAN bus vehicles and TID (Test ID) for CAN bus vehicles.

On pre-CAN bus vehicles, TIDs are all over the place in regards to their Hex number identification. CAN vehicles have those Hex assignments more standardized which can be a help. CAN communications are standard on everything 2008 and up and started appearing in the Diagnostic Link Connector (DLC) on pins 6 and 14 around 2003. I suppose engineers saw the new bus as an opportunity to do a better job at making Mode \$06 usable for us.

An even bigger help with CAN vehicles is the lack of need to run something called a conversion on reported Mode \$06 values. Take for example TID \$53

GENUINE KIA PARTS

True. Dependable. Genuine.



Kia vehicles are at the forefront of today's technological engineering. Unique components in our Kia vehicles demand precise engineering and fit. Kia customers deserve Genuine Kia replacement parts to keep them satisfied for years to come. Our brand's popularity continues to grow meaning more Kia customers for your shop. Always specify Genuine Kia Parts for the highest level of fit, function and quality.

Contact your local Kia dealer today for assistance and delivery of your parts.



Genuine Parts

on a pre-OBD II Ford. (TID #51 on pre-1998 Fords) When you scroll down the TID list on your scan tool and come to that group of TIDs with CIDs \$01-\$0A (cylinders 1 thru 10 potentially) you'll

Monitor ID	Test ID	Result	Value	Min.	Max.	Unit
\$01	\$01	Pass	450.18	450.18	450.18	mV
\$01	\$02	Pass	450.18	450.18	450.18	mV
\$01	\$03	Pass	325.13	325.13	325.13	mV
\$01	\$04	Pass	600.362	600.362	600.362	mV
\$02	\$8A	Pass	0	0	200	counts
\$35	\$8D	Pass	0	0	135	counts
\$A2	\$0C	Pass	0	0	65535	counts

Monitor	Status
Fuel System Monitor	Not Complete
Misfire Monitor	Complete
Comp Component Monitor	Complete

This Delphi J2534 PC based programmer/scan tool combo is similar to many scan tool applications of Mode \$06 in that in order to get the MID/TID to be translated beyond Hex you simply click on a monitor. MID 01 / TID 01 (O2 B1/S1 Rich to Lean Threshold Voltage) is selected and shown in blue.

Test ID	Component ID	Result	Min.	Value	Max.	Unit
\$2A	\$00	Fail	1.7472	-63.8976	--	inH2O
\$2B	\$00	Fail	4.9920	-63.8976	--	inH2O
\$26	\$00	Pass	--	-7.6343	-7.4850	inH2O
\$42	\$12	Pass	--	-258.0818	-248.5938	inH2O
\$55	\$00	Pass	--	0	0	%
\$01	\$11	Pass	0.5018	0.8438	--	Volts
\$01	\$21	Pass	0.5018	0.8016	--	Volts
\$03	\$01	Pass	0	0.4508	--	Volts

Color displays like those made possible with the latest stand alone scan tools and PC based scan tools bring faster diagnostics to Mode \$06. Results in green passed with flying colors. Those in yellow just barely passed (and deserve a closer look) while results in red mean stop and look very close at that data.

Test ID	Comp ID	Description	Units
\$26	\$00	Phase 0 Initial tank vacuum and minimum limit	in H ₂ O
\$2B	\$00	Phase 0 Initial tank vacuum and maximum limit	in H ₂ O
\$27	\$00	Phase 2 0.0407 cruise leak check vacuum bleed-up and max threshold	in H ₂ O
\$2A	\$00	Phase 4 Vapor generation maximum change in pressure and max threshold	in H ₂ O
\$2B	\$00	Phase 4 Vapor generation maximum absolute pressure rise and max threshold	in H ₂ O

The exact component of the test (CID \$00 for Phase 4 Vapor Generation) is a bit overwhelming. Ford gives full explanations on all J1979 data (a.k.a. Mode \$06) in its free downloadable files titled OBDII Theory and Operation located at www.motorcraftservice.com. This is the same document that gives the conversion numbers to subtract from and then multiply by the test result in order for the number to make sense.

see numbers on some scan tools that don't make any sense at all.

TID#53 - CID\$04 - RESULT / PASS - TEST VALUE / 37819 - MIN / 0 MAX / 65535

TID#53 - CID\$05 - RESULT / PASS - TEST VALUE / 0 - MIN / 0 MAX / 65535

If you're working with a scan tool with a color display, the hard part is close to over. With these newer generations of scanners, the test result not only will show a clinical "Pass or Fail," but the result value will be color coded green for passing with flying colors, yellow for just barely passing and red for the failing Mode \$06 test results. Not only that, but you'll likely see the TIDs and CIDs described in plain English. This gives you one more winning edge that you need to make this otherwise complex subject more practical for repeat use.

Should you still want to make sense of those test result values that are less than self-explanatory, you can look for the information to convert the numbers for MIN, MAX and VALUE to something you can get your head around. Ford doesn't like misfires to go much over 1 to 3 percent. If you consult service information for Mode \$06, you can obtain the magic numbers to do a bit of math that will convert your specs and test values to something more understandable.

In the case above, a quick trip to a very in-depth (and free) OBDII Theory of Operation booklet (downloadable as a PDF file) from www.motorcraftservice.com tells us to multiply those misfire CID values by 0.000015 to get usable percentages. Following Motorcraft's directions we multiply all the numbers above by that tiny fraction and apply the percentage unit to get these converted numbers.

TID#53 - CID\$04 - RESULT / PASS - TEST VALUE / .5673% - MIN / 0 MAX / .983%

TID#53 - CID\$05 - RESULT / PASS - TEST VALUE / 0.0% - MIN / 0 MAX / .983%

If you did have a color display scanner, you might see cylinder 4's results in yellow meaning its getting too close to comfort (more than half way there) to that maximum value. Other test results may require a certain numeric value to be subtracted from the test result value prior to being multiplied by the magic conversion number in order to come up

with the correct understandable number that makes sense when sat next to the unit of measurement such as percentage, voltage, amperage, etc. CAN bus vehicles will not need such conversions (math) on Mode \$06 test results. They will be numbers that make more sense right off the bat. A helpful quirk to know about CAN vehicles and Mode \$06 is the fact that the MIN and MAX specs will be reset to zero for each TID when that particular monitor hasn't fully ran. You still might see a reported value but don't assume it's valid yet.

When to Use This Edge

I don't find a need to use Mode \$06 on every MIL or whenever an engine hiccups. Personally, I use it to:

1. Locate and quantify misfires on Fords and some other vehicles.
2. Prevent yet another comeback for a stubborn MIL.
3. Supplement other diagnostic methods when making a decision on an expensive catalytic converter.
4. Solve tough EVAP problems that I can't find with a smoke machine and the DTC is less than helpful.

Another personal preference is I pay close attention only to monitors associated with a system on the vehicle is having a DTC, complaint or symptom. For example if the vehicle is in for a difficult EVAP problem and I see some Mode \$06 test results with a variable valve timing monitor, I may elect to disregard those MIDs. I'll record them for posterity just in case, but I won't usually go much further. You can go broke chasing ghosts.

Like so many other specialized techniques that get used infrequently, Mode \$06 takes some getting used to, but when you do you'll agree that it was time investments like this that gave you the winning edge in your shop. **MZ**

Like so many other specialized techniques that get used infrequently, Mode \$06 takes some getting used to, but when you do you'll agree that it was time investments like this that gave you the winning edge in your shop. **MZ**



Dave Hobbs is a field trainer and training product developer for Delphi Product & Service Solutions. He holds ASE CMAT/L1 and EPA 609 certifications and is an experienced hybrid instructor. Dave has been featured as an instructor in more than 15 automotive training videos.

Email Dave at david.a.hobbs@delphi.com

Photos: (TOP, MIDDLE) Dave Hobbs; (BOTTOM) Ford

Homak

SINCE 1947.

SERIOUS. PROFESSIONAL. TOOLBOXES.



Industrial SERVICE CARTS for the **PROFESSIONAL**

DURABLE. DEPENDABLE. PROFESSIONAL.

Homak's Service Carts are there when you need mobile storage that's as demanding as you are. We offer a variety of options to suit all your needs. Whether you choose the highly mobile (and vast storage capacity of the) 10 Drawer Maintenance Cart or opt for the convenience of our 2 Drawer Unit with Top Locking Slide Panels, you'll be investing in a professional grade product from a company that knows nothing else.


Product Shown:
32" PROFESSIONAL SERIES
4-Drawer Slide Top Service Cart

1.800.874.6625

Or Visit Us At:

www.Homak.com



 Find us on
Facebook

facebook.com/HomakManufacturing

**The largest supplier in
North America is
committed to the success
of your business.**



ADVANCE AUTO PARTS PROFESSIONAL SERVES, SUPPLIES AND SUPPORTS YOUR SHOP WHILE HELPING YOU GROW YOUR BUSINESS.

MORE QUALITY PARTS AVAILABLE

Advance has more than 500,000 automotive and light duty parts, including late model applications — from quality brands such as MOOG®, Wearever®, ToughOne®, Dorman® and BWD®. Plus, parts assortments are customized at your local delivery store so the parts you need are always nearby and ready to deliver, fast.

MORE EXPERIENCED PARTS SPECIALISTS

ASE trained and certified Team Members are on hand at every commercial delivery location, and are dedicated to our commercial customers. And because we grade ourselves on the speed and accuracy of every commercial order, you can count on fast delivery and an accurate order the first time, every time.

SHOP-FRIENDLY TECHNOLOGY TOOLS

MOTOSHOPSM Technology Tools are designed to help your shop save time, improve efficiency and connect with more customers — beyond the service bay. Learn more at www.motoshop.com.

CONVENIENT SERVICES AND REWARDING PROGRAMS

A range of easy-to-use service options includes Advance Commercial Credit, our streamlined, in-house credit program, a stocking dealer program and Carquest Technical Institute. Exclusive programs include ProRewards, our commercial loyalty program, and TechNet, a professional auto service program that helps you market, support and grow your shop.



To learn more about Advance Auto Parts Professional visit pro.AdvanceCommercial.com.



Follow us on Twitter @AdvanceAutoPro



Service is our best part.

TECHNOLOGY

↘ UNDERHOOD



There are lots of ways to go fast in today's vehicles. But if you're limited by a small budget, spend the money where it matters the most.

THERE ARE SEVERAL WAYS YOU CAN SPEED UP YOUR CAR WITHOUT SPEEDING UP THE FLOW OF CASH FROM YOUR WALLET.

BY VANESSA ATTWELL | CONTRIBUTING EDITOR

Do you have a lot of money to spend upgrading your vehicle for maximum performance? Me neither. But that doesn't mean we have to settle for mediocre performance. There are ways to go fast on a budget, no matter what vehicle you're driving or what your budget is. Here's how.

Racing, sadly, is not a cheap hobby — but it sure is a fun one. Having a big budget to finance that hobby makes it much easier to go fast, but unfortu-

nately that's not often the case. More often than not, it's important to figure out how to go fast on a budget.

Winning races without spending money on performance upgrades is really tough (but not impossible) to do, which is unfortunate for drivers with passion or talent but very limited funds. True, sponsorships can ease the costs, but sponsorship usually comes with wins and wins come with speed, creating a vicious circle. The key to breaking the circle is knowing how



to go faster with limited resources — while keeping it legal, of course. And this really is possible.

Whether it's enhancing the performance of a newer vehicle with an aggressive emission control system, improving the speed of a pre-emission classic vehicle, getting the most from a race car for a certain division or class, or just tweaking any vehicle that would be more fun to drive if it

Photos: Vanessa Attwell

AUTO ENGINEUITY

THE **MOST** COVERAGE FOR YOUR MONEY!



Tired of paying thousands of dollars on scan tools, only to find out that “expensive” doesn’t always mean “expansive” coverage. Worse, the costs of the updates rival the cost of the tool itself—and yet the coverage isn’t keeping pace with the price.

So the next time you think about purchasing a scan tool, ask yourself these questions:

- ① *WHAT DOES IT HAVE FOR COVERAGE?*
- ② *HOW MUCH DOES IT COST TO STAY CURRENT?*

Come to our website and compare your current tool to ours. You may find that all you were promised - is right here. In fact, we are so proud of our coverage, we show it at the system - level right on our website.

- 46 vehicle manufacturers spanning '96 - '13MY
- Reset adaptations and calibrations
- Bi-directional controls and system tests
- Downloadable software updates
- Update costs 50 - 450 USD

**Come see why we are the
LATE-MODEL COVERAGE LEADER for
Asian, Domestic, and European.**



**J2534
Hardware
Option
Now
Available!**

www.autoenginuity.com

480-827-TOOL (8665)

Nothing beats the original!

more services

Hotline
1.800.274.5001



Not all replacement parts are the same!

Trust the companies who brought you the OE design.

SCHAEFFLER
AUTOMOTIVE AFTERMARKET



were quicker, here's how you can make improvements affordable.

Reduce Resistance

In the olden days, it was easy to install performance parts onto any vehicle with minimal problems during the installation process and notice a definite improvement in speed and performance afterwards. That's just not true anymore. While it's still possible and relatively easy to install performance enhancing parts on older units, modern vehicles have incredibly sensitive fuel and emission control systems that don't play nicely with certain performance upgrades. So then the challenge on these newer vehicles becomes going faster and keeping that speed up without offending the sensors or altering the emissions controls and, of course, without going broke in the process.

One way of doing this, cheaply, is by reducing the amount of power it takes to actually move the vehicle by lowering its resistance as it rolls down the road or track.

A good way to start is by aligning all four wheels to match driving

Read about the 2013 MOOG Problem Solver of the Year Matt Borland and how he is like you.
MotorAge.com/problemsolver

conditions. If you're going fast on straightaways, make sure the wheels are properly aligned so that the wheels aren't dragging as they roll down the road. If you're going to be racing on an oval, consider setting up the alignment — in particular the thrust line — to match the angle of the track. If you have access to an alignment machine, this can be done at minimal cost.

If clearance is a problem when driving onto the alignment machine, one way to get a lowered vehicle safely onto an alignment rack is by putting long wooden planks by the ramp. I used to keep eight-foot-long planks handy to place in front of the alignment machine's drive-on ramps to raise the car's front end up enough to drive onto the hoist without contacting it — cheap and it worked well.

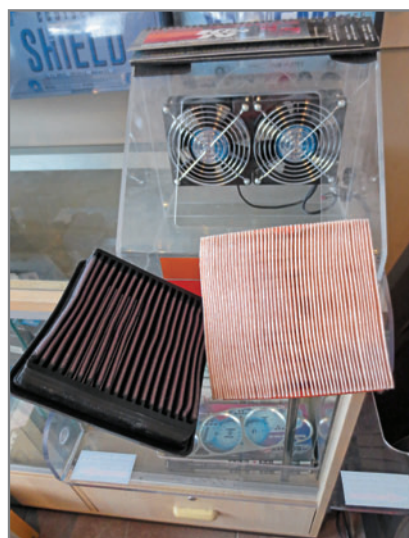
Also, in addition to setting up the vehicle's alignment for minimal resistance, reduce the resistance of the vehicle's tires — if there's money in the budget for better quality racing tires, it will make a big difference. If there's not enough money to upgrade, make sure the pressures are set correctly. Inflated tires are easy to roll, while flat tires create resistance that fights forward motion — try pushing a car with a flat tire if you need proof.

Minimizing the things that work against the vehicle as it rolls along is an easy, low cost way to go faster that can really help if you're on a budget.

Lighten Up

This one is obvious but true: A sure way to go faster cheaply is by removing excess weight and unnecessary items from the vehicle. Manufacturers have been doing this for years, lightening their vehicles to improve their fuel economy ratings, and there's no harm using the same thinking to improve overall speed and shave seconds off lap times.

Removing cargo and unused items stored in the vehicle is a good start (for free). But if you have a bit of money, you can change out heavy components for lighter ones for great results.



Installing a freer flowing air filter — usually one that isn't replaced during service — is a cost effective and popular way to go fast on a budget.

+ Starts Like New.

+ Stays Like New Longer.

EXIDE® Edge™ AGM Batteries
with exclusive SureLife® Technology.



AGM ADVANTAGE
Learn more about Exide AGM advantages. Let us help you find the right battery. Scan the code to the left with your smart phone or visit us at www.Exide.com/AGM



Confidence, Performance & Protection for Today's Drivers

Driving habits have changed and AGM batteries are becoming the battery of first replacement. Today's drivers have more electrical devices to charge, advanced technology to power, and more key-on/key-off moments during the day. Exide® Edge™ AGM batteries are the first and only with SureLife® Graphite Technology.* They are designed to meet the demands of today's busy drivers - from start to destination, and every point in between.

*Among leading competitors



Made in the USA with some foreign components

©2013 Exide Technologies. Exide® is a registered trademark of Exide Technologies, Milton, GA 30004-8532
NASCAR® is a registered trademark of the National Association for Stock Car Auto Racing, Inc.

 StartPositiveStayPositive.com

EXIDE®

Replacing stock hood or body panels with lighter carbon fiber replacement body panels also will shed a few more pounds and make a difference. Lighter wheels shed a few pounds and also reduce unsprung weight for a double payoff. You can even use a smaller, lighter battery to reduce weight — if that's a trade-off you're willing (and permitted) to make.

Reducing the weight of the vehicle is important for newer units with

stringent emission controls and super advanced suspension systems, because it makes the vehicle faster without worrying about upsetting any of those control systems. As important as those systems are, they sure make it difficult to modify a vehicle for high speed performance, cheaply.

Keeping the hypersensitive emission sensors on newer vehicles from detecting values outside of their ranges prevents a common prob-

lem when upgrading to performance parts on newer vehicles — emission and stability systems warning lights and DTCs that work against vehicle performance.

Overall, the purpose of this weight reduction step is reducing the weight of the vehicle so that it weighs the same — or less — than it did when it rolled out of the showroom. One note before you head for the track, though: Always be sure to check the weight restrictions and regulations for the category and division you're racing in. Getting disqualified is never fun.

Make the Most of the Power You Do Have

Keeping speed and control in turns is critical when going fast, so it's no surprise that upgrades to braking and handling systems are common on vehicles intended for high speed use.

Upgrading brakes definitely will make a noticeable difference — in both stopping and starting off the line — but unfortunately this is usually a pretty costly upgrade. Brakes are just all around expensive. If you're on a budget, a good compromise is using a set of pads with performance material. It won't make the big difference that lighter brake parts, bigger rotors or bigger and better calipers and pads make but it will make a difference. While you're on a budget it's important to make the most of the money you do have.

In addition to improving the braking system, stiffer springs and bushings also will make a noticeable difference at an easier price point. One import tuner I know and respect highly recommends coil-overs with adjustable shocks. He says they offer great value with good results. Plus you can adjust ride height as well as dampening force for road and track use.

One important note about lowering a vehicle's suspension: Make sure the wheels turn freely when the racing tires are installed. If the wheel catches on the body panels it can cause very expensive damage. One customer brought a car like that in for an alignment before a race. Sadly the tires had chunks scraped out from contacting the body on turns and his cheap modification ended up being really expensive.



“Our techs work faster, customers get in and out quicker and the shops save on energy costs.”



— Forry Hargitt, Director of Sales and Operations at Tire Discounters



Visit rotarylif.com/tirediscounters/ma to hear more from Forry — and find out how Shockwave can help you.

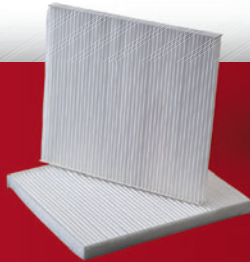


Keep Kias Genuine. Keep your business growing.

Installing Genuine Kia Parts can help keep your customers satisfied and your Kia service business growing. The only way to assure that you are getting Genuine Kia Parts, backed by the Kia Warranty, is to order them from your local authorized Kia dealer.

Contact your local Kia dealer today for assistance and delivery of the parts you need.

www.kiagenuineparts.com



CALIFORNIA

The Kia Depot
Santa Ana
(888) 859-6573
Fax (714) 560-4124
parts@kiacarparts.net
www.kiacarparts.net

CONNECTICUT

Kia of Stamford
Stamford
(203) 883-8888
Fax (203) 883-8889
jgentillo@stamfordkia.com
www.kiapartsamerica.com

KENTUCKY

The Kia Store on Preston
Louisville
(502) 962-3261
Fax (502) 962-3239
Largest Kia Parts Dealer
in KY
Next Day Delivery

MASSACHUSETTS

Wagner Kia of Shrewsbury
Shrewsbury
(888) 859-4827
Fax (508) 581-5789
wagnerkia.com
CollisionLink Dealer

Lev Kia
Framingham
(508) 879-5555
Fax (508) 626-1585
www.levkia.com

NORTH CAROLINA

Gerry Wood Kia
Salisbury
(704) 216-2688
Fax (704) 638-9095
www.gerrywood-kia.com

Rogers Kia
Shelby
(704) 406-8191
Fax (704) 471-2542
wearls@rogersnc.com
Rogerskia.com

SOUTH CAROLINA

Best Kia
Easley
(864) 312-4049
Fax (864) 312-4061
Bestkia.com

WASHINGTON

Performance Kia
Everett
(425) 609-5622
Fax (425) 609-5661
parts@performanceKia.com



Genuine Parts

*Contact an Authorized Kia Dealer for details.



www.vdo.com/usa

VDO: coverage, quality and peace of mind

When you choose VDO, you can be confident you've made the right call.

VDO electric motors are ready to install right out of the box. Every one is built and tested to OE specs and is backed up by real OE engineering expertise.

And, when it comes to coverage, no one beats VDO!

- Blower Motors
- Radiator and Condenser Fan Motors
- Cooling Fan Assemblies

For more information, call: 800-569-5066 or email: salesupport-us@vdo.com

Find your application online:



VDO

VDO - A Trademark of the Continental Corporation

Keeping the speed up into and through the turns can make all the difference in a race — sometimes even making up for a smaller engine — so upgrading braking and handling systems can be a wise investment. Just do some research and planning to avoid expensive (and dangerous) problems.

Breathe Freely

There's a reason why installing a freer flowing air filter is usually one of the first things recommended to make vehicles go quicker — it's easy and it works. A replacement air filter (preferably a reusable freer flowing filter that's cleaned out at service time rather than replaced) usually is quick to install and the difference in horsepower is noticeable.

On older vehicles, this swap is quick and painless, but newer vehicles with incredibly sensitive sensors might not like the difference, so it's important to read reviews and verify that the swap doesn't cause problems before going ahead.

It might be tempting to install a freer flowing air box, too, but these can be tough to install if clearance is tight and there might be sensors that are difficult to relocate and set DTCs that activate the MIL (which is definitely not good for performance). Engine control and emission systems are there for a reason, like it or not, and we have to make nice with them.

Along those lines of getting more air into the engine, a Cold Air Intake system (in particular one that's outside of the engine compartment or has a separator around the filter that blocks off the hot air from the engine) also can help a vehicle go faster, relatively cheaply.

If you've got some money to spend, another way to get performance bang for the buck is installing an aftermarket intake manifold and larger throttle body, something designed for performance. On older vehicles without sensitive fuel injection sensors it's possible (and very common) to "port" and polish the cylinder heads to improve performance — sculpting the inner passages of the head to improve and direct airflow for more power. It's also very common to ruin a perfectly good head in the process if you're not careful.



Like it or not, emission systems are there for a reason. This straight-through pipe might increase power, but it also might not work on newer systems with rigorous emission systems.



Brakes, unfortunately, are just all around expensive, but spending some money in this area pays off with brakes that don't fade when they heat up.



Sure they reduce weight, but carbon fiber replacement panels aren't cheap. If these aren't in your budget, never fear. There are other ways to get faster that really work.

No doubt this takes some skill and practice, so one tip is to get a scrap one, cheaply, and to practice on that one before taking the tools to your good one. Porting and polishing isn't always possible or wise with newer vehicles, because they might set DTCs when the air flow is not what's expected. Again, these systems are there for a reason and must be respected.

TEST YOUR TRAILER WITHOUT THE TRUCK

Light Ranger MUTT® #9101

- For utility and RV type trailers
- Tests 7 spade, 6 round and 4/5 flat pin trailer side harnesses



ENHANCE ELECTRICAL CONNECTIONS

HD Fleet Technician's Electrical Terminal Maintenance Set #8048

- 17-pc. set
- Extends harness life

Patented



CLEAN LARGE SPADE ELECTRICAL CONTACTS

Diamond-Coated Flexible Flat Point and Contact Cleaners #8047



NEW

CLEAN BUSHINGS, TUBES, PORTS, BRAKE GUIDES, ETC.

36-Piece Original Bore Brush Set #8001D

- Stainless Steel, Brass, Nylon



A REVOLUTIONARY GUN CLEANER



RamRodz™

- Thoroughly cleans rifling grooves
- Faster and more efficient than patches
- No splatter or mess
- Cleans all critical internal gun parts

NEW

8" Bamboo Handle

Precisely wound to caliber sizes

Size	Part#	Qty
.22 Caliber	#22300	300
.38 Caliber/9mm	#38200	200
.40 Caliber	#40100	100
.45 Caliber	#45075	75
.50 Caliber	#50075	75
Breech (3")	#11800	800



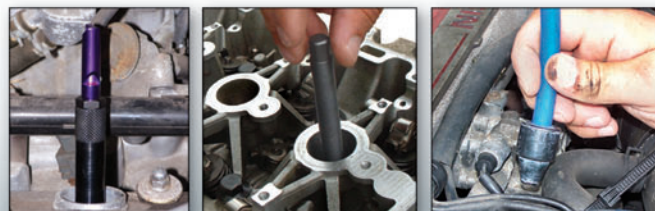
ELIMINATE MISTAKES WHEN PERFORMING ENGINE SETUP

Engine Calibration Set Up Kit #7891

- Aids in the setup of timing chains, timing belts, distributor installations, and more.
- Includes TDC Indicators (Standard and Extended), Compression Gauge Extension, Whistle Alerts (Rigid and Flexible), Long Piston Stop and Spark Plug Thread Adapters



MADE IN USA



INSTANTLY OPEN CLOGGED GREASE JOINTS

Grease Joint Rejuvenator® Master Kit #7863

- Lifetime warranty



Patented

ENERGIZE A FUEL PUMP WITH THE PUSH OF A SWITCH

6-Pc. Relay Bypass Switch Master Kit #9038



FUEL FILTRATION AND TRANSFER

Fleet Tank Sweeper® #9049M

- Lightweight
- For tank applications

MADE IN USA



90° MULTI-PORT AIR GUN

Air Comb® #8050-8053

5X
the air volume

- Cleans air filters, condensers and radiators
- Focused high pressure output
- Available in 12", 24", 36", 48"

Patents Pending



EPA-COMPLIANT OBDII
CATALYTIC CONVERTERS



THE RIGHT CONVERTER. THE RIGHT CHOICE.

UNIVERSAL AND DIRECT-FIT
FOR OBDII VEHICLES
(1996 AND NEWER)



Application-engineered to address the emissions challenges of modern vehicles, Walker® Ultra® catalytic converters feature premium substrate materials and a high-technology washcoat.



Scan the code, see the movie.

WALKER
Ultra
CATALYTIC CONVERTERS

www.walkerexhaust.com

©2014 Tenneco

And if there's room in the budget, installing a full exhaust system, something lightweight and freer flowing but still legal and compliant with any catalytic converters will make a noticeable difference. But this upgrade can be a bit more expensive — maybe wait for a birthday and suggest it as a gift.

Smart Weight

It's so important to keep weight down that if you must leave weight on the vehicle it should be "smart weight" that provides a big performance improvement. And if your vehicle doesn't have an emission system to work around, there are some easy ways to go faster, cheaply, by adding some smart weight.

One of those ways to make a big difference is by investing in a digital ignition system for those vehicles equipped with distributors — a great upgrade since they improve spark and timing for impressive results.

Additionally, lightweight drive pulleys (pulleys and harmonic balancers made of lighter materials) will reduce engine load and increase performance. Again, this upgrade might not be possible on a newer vehicle with a low-tension drive belt even though it's pretty simple on an older one. And also along those lines, a smaller supercharger pulley (for those vehicles with factory superchargers) or replacing the drive pulley of the blower — if equipped — with a smaller one will increase boost without breaking the bank.

And, of course, you always can upgrade to a bigger motor if you can find one at a good price — it's probably a good idea to find out why it's going at a good price though before you install it.

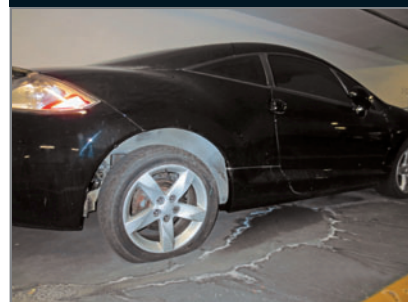
Conclusion

No doubt it's easier to go fast when there's a big budget for upgrades. Installing an aftermarket supercharger kit (if you have a couple thousand to spend) or aftermarket turbocharger kit (if you have a few thousand to spend) comes to mind.

But there are also ways to go fast on a budget, ways that can provide definite improvements with minimal cost. The important things when doing this are understanding the



Lowering the vehicle can make the most of its speed, but clearance issues can be a problem. Adjustable coil-over struts are a cost effective way around this.



One of the cheapest ways to go fast is making sure the tire pressures are set correctly. These aren't.

vehicle and how and where it'll be driven and then spending the money where it'll make the most difference — and overcoming the challenges along the way from emissions systems and delicate sensors.

Going fast doesn't have to mean going broke, but it does mean some careful planning and a bit of skilled work. There's not much that can make up for limited driving ability, but a limited budget can often be overcome with great results.

It's often just a matter of being smarter to be faster. *ZZ*

VANESSA ATTWELL
CONTRIBUTING EDITOR

Vanessa Attwell is a Master Technician for two major manufacturers and has also worked on the bench of an independent shop. She has developed and delivered training for both vehicle manufacturers and independents, and helped develop government training and regulations standards.

DENSO

first time fit[®]

DENSO Experience



OE IS OUR HERITAGE

DENSO Wiper Blades: a Competitive Edge.

With windshield wipers, it's all about the match between blade and glass. That's why DENSO meticulously spaces contact points across the blade, for even pressure across the wiping edge. Our beam style blade has more than 1,500 contact points! As one of the world's leading suppliers of OE wiper blades, DENSO promises premium quality, performance and value for the aftermarket in three sleek, aerodynamic styles that cover the majority of cars on the road today. For a clear advantage, count on DENSO.

Check out our full line of First Time Fit[®] replacement parts | 1-888-96-DENSO | densowipers.com

a/c compressors & components • cabin air filters • air filters • fuel pumps • oil filters • ignition wire sets • oxygen sensors • spark plugs • starters • alternators • wiper blades



Be Car Care Aware



©2013 DENSO Products and Services Americas, Inc. First Time Fit is a registered trademark of DENSO Products and Services Americas, Inc. All Rights Reserved.

Scan with your
smartphone to
learn more



A NEW CRUZE



The 2014 Cruze diesel is taking aim at the VW Jetta TDI, and might be a real challenger.

GM REENTERS THE PASSENGER CAR LIGHT-DIESEL MARKET AFTER MORE THAN A 35-YEAR ABSENCE.

BY PETE MEIER | TECHNICAL EDITOR

It's no secret that the U.S. fleet is totally at odds with its European counterpart in the mixture of diesel to gasoline powered cars and light trucks. And one has to wonder why diesel passenger cars are not as popular here as they are across the pond. After all, diesels are proven more efficient and more durable than their gasoline gobbling cousins, and significantly so. If in doubt, just ask Audi, the World Endurance champions for the past 15 years, running a diesel-powered car.

According to a recent poll sponsored by Audi, 59 percent of American drivers between the ages of 18 and 34 polled said they would buy a light diesel passenger car if the cost of diesel fuel were on par with gasoline. At the end of 2013, diesel fuel (even though it is cheaper to produce) cost almost 60 cents a gallon more. In addition to the disparity in fuel cost, diesel-equipped

models carry a higher sticker price than the same model using a more traditional engine. It doesn't take an MIT graduate to figure out that recouping the increased costs involved would take a long time, even with the more efficient powerplant.

In Europe, those factors are almost reversed. Cost of the initial purchase might be relatively equal, but the fuel costs are not. There, diesel fuel (dependent on country) can be significantly less than gasoline. Why? Taxation. Many European countries subsidize diesel fuel with lower tax rates, resulting in a lower pump price, while the U.S. tax diesel more. Add in the increased fuel economy typically enjoyed by a diesel owner, and you can understand why diesels are the more popular choice.

German manufacturers want the American trend to change and have serious advertising campaigns in place

JUST SCAN IT 



Scan this QR Code to watch on your smartphone a video on the 24 Hours of LeMans by Audi and its diesel vehicle. Or visit MotorAge.com/24hours

GET A FREE SCAN TOOL APP AT:
www.scanlife.com

to educate American consumers about the benefits of modern diesel ownership. In addition to the basic economics, these spots are showing how today's diesels are also quieter and cleaner than the diesels of days past.

"The market for diesel cars in the U.S. is small at present," says Mike Omotoso, powertrain analyst at LMC Automotive. "But it is expected to grow due to Corporate Average Fuel Economy (CAFE) requirements and expected increases in gas prices. So far, the German automakers haven't had any real competition in North America." Until now, as at least two of the Big Three announce plans to add diesels to their model lines.

GM Joins The Market

Many of our readers might recall GM's dismal diesel forays back in the mid-

Photo: General Motors



Standard

Phillips CrystalVision Ultra

COLLISION AVOIDANCE

When you install Phillips Lighting Capsules from CARQUEST, you help customers to see further down the road, even on the darkest of nights or in challenging road conditions. Helping to make the journey safer for drivers and others who share the road is just part of our vision.

Over 230,000,000 vehicles covered; Asian, European or Domestic.

Great people, great products, great prices!SM



CARQUEST.com

STOP PREMATURE BRAKE PAD REPLACEMENT



Instead of glues that fail under high temperatures and extreme pressures, NRS hooks create a mechanical bond between the backing plate and the friction that will not fail throughout the life of the brake pad. We are so sure of NRS we offer a **\$250 guarantee** against delamination on any brake pad using it. Stop wasting time and money, on your next brake job use NRS equipped pads.



NUCAP®

For more
information
go to
nucap.com



1980s. The diesel Chevette and infamous Olds V-8s were well known for their failure rates. But the 2014 model year brings with it a new diesel offering, the Chevrolet Cruze. Not to be confused with its Suzuki cousin, the new Cruze started life as a globally developed platform back in 2008. It replaced the Chevy Cobalt in the North American market with its debut in the 2010 model year.

The North American version of the Cruze is built in GM's Lordstown, Ohio, facility. Its 2.0-liter turbocharged diesel powerplant might be a new offering here, but it is hardly a new design. The basic architecture has been sold in Europe over the last 16 years under the Opel and Chevrolet nameplate and is assembled in Kaiserslautern, Germany. U.S. engineers worked with their European counterparts at GM's Torino, Italy, design center to refine the design and insure it would meet or exceed all U.S. emissions standards.

According to Mike Siegrist, chief engineer on the project, there were four main areas the engineering team focused on; emissions, diagnostics, environmental conditions (of the U.S. market) and altitude. Siegrist noted in his AutoblogGreen interview that America has higher altitudes to deal with than Europe does and stricter emissions regulations to meet, all of which necessitated the engineering improvements before GM could bring the 2.0 to the States.

Like most of today's low emissions diesels, the 2.0 is turbocharged and uses a common rail injection system with piezo injection. The U.S. version gets a new aluminum intake manifold and throttle body, a larger capacity Exhaust Gas Recirculation (EGR) cooler, ceramic glow plugs and an engine oil heater. With the updates, the emissions of the U.S. version are significantly cleaner than the European original. The concession is a slight loss of power, though, with an estimated 148 hp output versus the Euro's 163. You'll likely not miss

Read more
on clean diesel
technology highlighted
at the 2013
Washington Auto Show.
[MotorAge.com/
dieselshows](http://MotorAge.com/dieselshows)

the extra ponies, as the U.S. version is equipped with an "overboost" feature capable of increasing torque from its rated 250 foot-pounds to 280 foot-pounds when needed. Not bad for an engine expected to deliver 46 mpg highway and making it the most fuel efficient non-hybrid on the market today.

Tech Features

The new intake is a big player in helping the Cruze deliver on its fuel economy promises. GM engineers refer to the design as a "variable swirl intake system." According to Siegrist, the system is designed to increase the mixture motion of air and fuel in low-speed, low-load driving. Each cylinder has two intake ports, one of which is controlled by a mechanical valve. During the variable swirl process, each throttle valve varies its opening amount to improve the mixture motion of the incoming air/fuel charge. The valves are controlled by the Engine Control Module (ECM) to ensure optimum performance.

Other than a big green fuel cap and a label on the fuel door, GM currently has no provisions to prevent fueling mistakes on the diesel model. Ultra Low Sulfur Highway diesel fuel is recommended (2-D), but the engine is approved for up to B20 biodiesel as well. In addition to specific fuel recommendations, the Cruze requires dexos



The 2.0-liter powerplant is based on a proven platform, with more than half a million of them sold overseas. A few U.S. models, however, were in order to meet market needs.

2™ engine oil. Keep in mind that some products may say they meet dexos specs, but if they aren't specifically certified, don't use them. You can find out what products are properly certified at www.gmdexos.com. The transmission, likewise, requires a specific fluid (AW-1) and GM is clear to state that the use of DEXRON™ VI is not approved.

In addition to the normal stock of fluids, you'll need to consider keeping some diesel exhaust fluid (DEF) on hand if you don't already. Most new diesel powertrains are using urea injection and particulate filters for NO_x emissions reduction. The fill

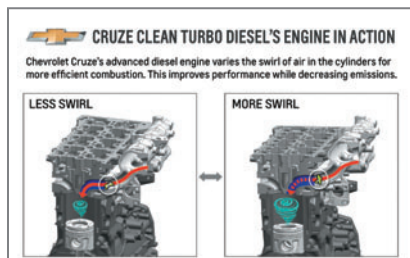
for the urea tank on the Cruze is in the trunk. Not a bad idea, as it helps to avoid accidental filling of the tank with coolant or windshield wiper fluid, a common (and costly) mistake when the fill is located under the hood. The tank capacity is 4.9 gallons, enough for about 10,000 miles of ordinary driving, and is designed to coincide with routine oil change intervals to make servicing easier on the owner.

The DEF fluid level indicator is displayed in the Driver's Information Center (DIC). When the tank is nearing empty, a warning message will be displayed. If the tank is not refilled, the ECM will start limiting vehicle speed starting at 65 mph. Speed will continue to reduce to a limit of 10 mph. A fill of at least two gallons is required to release the limitation. DEF fluid is made up of a mixture of synthetic urea (32.5 percent) and deionized water (67.5 percent). It is considered corrosive and should be handled with care. Use skin and eye protection, don't overfill the tank and don't spill it on the car.

Urea injection is used in a process called Selective Catalyst Reduction (SCR). Diesel engines run at an over-stoichiometric air/fuel ratio to ensure the combustion of soot and prevent unburned fuel from passing through the exhaust. The excess oxygen, though, encourages the emissions of nitrogen oxides. Diesel exhaust fluid is precisely metered into the exhaust stream where it vaporizes and decomposes to form ammonia and carbon dioxide. This leads to a catalytic reaction with NO_x to form water and nitrogen, resulting in near zero NO_x levels leaving the tailpipe.

A Look Underneath

If all you've ever worked on are gasoline engines, taking a look at the Cruze's exhaust line will leave you with a lot of questions. First, there are so many things sticking out of it. From the engine back, you'll find an oxygen (lambda) sensor, upstream NO_x sensor, exhaust gas temperature (EGT) sensors (before and after the oxidation catalyst), a diesel particulate filter (DPF) pressure sensor, yet another EGT sensor, the DEF fluid injector, a downstream NO_x sensor and finally a particulate matter (PMS) sensor. That's a lot of inputs on one exhaust, but it



One unique American add-on was the variable swirl intake system.



Like most clean diesels, the Cruze uses a common rail piezo injection system. That means high pressure and a need for common sense when servicing.



A Garrett turbo mounted close to the exhaust promotes efficiency.

Photos: (TOP) GM; (MIDDLE, BOTTOM) Pete Meier

SHOW US YOUR WORST BRAKE PADS AND WIN.



When you are working with brakes day in day out, we know that you will come across some brake pads in the worst conditions.

Some of these pads shouldn't be like that. Newer brake pads with lots of friction material remaining shouldn't need to be replaced for excessive noise, friction delamination, edge lift or rust jacking. That is why you should always use pads equipped with NRS backing plates. Together we can raise the standard when it comes to aftermarket brake pads and you could win free stuff .

For more information visit www.safebraking.com or www.nucap.com.



is all necessary as part of the exhaust aftertreatment system needed to meet stringent emissions standards.

The first stop for the engine exhaust gasses is the Diesel Oxidation Catalyst (DOC). It functions similarly to the catalytic converters you're familiar with



The DEF tank is located in the trunk. Use caution when filling.



Lots of things stick out of the exhaust underneath, such as this DEF fluid injection module.



Located after the SCR catalyst is the Particulate Matter Sensor (left) and the downstream NO_x sensor (right).



There is no spare in the car, only this air pump equipped with a sealant additive.

and must reach operating temperature before it can do its job of converting hydrocarbons (HC) and carbon monoxide (CO) into water and CO₂. The point at which the DOC reaches that temperature is called "light off." Knowing when that happens is important to the ECM, since the DOC provides the exhaust temperature needed for SCR. The three EGT sensors in the exhaust system monitor the temperature so the ECM knows when light off occurs. Proper function of the DOC relies on the use of ultra low sulfur fuel as recommended by the manufacturer.

Next in line is the DPF. As its name implies, the DPF captures small particulates, otherwise known as soot, and prevents their release into the air. Particulate heavy gasses enter into a filter substrate consisting of thousands of porous cells. Half of these cells are open on the inlet side but capped off at the other end. The other half are closed on the inlet side but open on the back end. More than 90 percent of the particulates are strained from the gasses as they pass through the porous material.

The PMS sensor monitors the amount of soot that gets by so the ECM knows how efficiently the DPF is working. The DPS sensor is similar to Ford's DPFE sensor, in that it measures the pressure differential between the inlet and outlet of the particulate filter. This is a measure of how full the filter is becoming. If left unmonitored, the increasing back-pressure eventually would choke off the engine and result in drivability issues.

When the pressure variance measured by the sensor indicates excessive build up, the ECM initiates a regeneration of the filter (cleaning the filter by burning off the collected particulates). This typically will occur during normal driving without the driver ever knowing it's happening. Normal regeneration usually occurs with the vehicle traveling over 30 mph and it can take 20 to 30 minutes of continuous operation to perform a full regeneration process. During that time, extra fuel is injected into the engine to raise the exhaust gas temperatures to a level sufficient to clean the substrate. Should the driver slow to an idle condition during the normal regeneration mode, he may notice a slightly elevated idle speed to prevent thermal shock to the DPF catalyst.

If the owner operates his Cruze pri-


marily at low speeds, or for short hops, normal regenerations might not be able to take place. If that happens, the DIC will alert him to the need to continue operation or illuminate the Service Engine Soon light and operate under reduced power mode until a manual regeneration is performed. A manual regeneration can be commanded using an OE or OE-equivalent scan tool.

Finally, the exhaust gas is injected with the DEF discussed earlier to remove any NO_x remaining in the exhaust stream before exiting the tailpipe. Upstream and downstream NO_x sensors monitor the system's function and allow for adjustments to the amount of DEF injected.

Sprechen Sie Deutsch?

"The Cruze Clean Turbo Diesel fills an important role in Chevrolet's diverse four-cylinder lineup, and is primed to win over diesel devotees and compact car buyers with its performance, torque and fuel economy," says Chris Perry, Chevrolet vice president of marketing.


And it's pretty obvious that Chevy is looking straight down the barrel at the VW Jetta TDI as its primary competitor. One can't help but to hear the distinct "tick" of the high pressure injection while standing outside the car but attention to sound dampening makes the noise almost imperceptible in the car and while driving. Equipped with a 6-speed Aisin automatic and a broad torque curve, the car performs well but won't give anyone whiplash even if aggressively pushed. And it comes standard with a host of features not found on a base model Jetta; OnStar, turn-by-turn navigation, leather-trimmed power front seats, rearview camera, blind spot monitoring and more.

For an American car, its German is pretty good. 



PETE MEIER
TECHNICAL EDITOR

Pete Meier is an ASE certified Master Technician and sponsoring member of iATN. He has over 35 years practical experience as a technician and educator, covering a wide variety of makes and models. His primary goal is to bring working techs the information they need.

 Email Pete at pmeier@advanstar.com



GREASY FINGERPRINTS NOT NECESSARY.

With **FordParts.com** at your fingertips, you get 24-hour access to the right parts for the vehicles you service. And the right service for your business. A simple VIN search points you to the exact parts you need and a simple platform handles the business. It all starts with the click of a button. **So get cleared for access.**



PARTS
FORDPARTS.COM

WHAT WE HAVE HERE

WAS A LACK OF COMMUNICATION THE CAUSE OF THIS TOWN CAR'S NO START?

BY EDWIN HAZZARD | CONTRIBUTOR

Most of the time when a shop calls me in for a diagnostic job, there's a pretty cut and dry fix. Every once in a while, a job comes along that becomes a challenge.

In this case, the vehicle is a 2001 Lincoln Town Car that will not start. The shop stated that there wasn't any communication with the Powertrain Control Module (PCM). One of the first things I do when it comes to a control module that isn't communicating is to test and see if there are any other modules that aren't communicating as well. I performed a network test, which is kind of like a roll call.

After performing the test with the scan tool, all the modules reported for duty except the PCM. I visually checked to see if the PCM was there (I've seen stranger things) and that the connector was plugged in (it was). The next step is to see if the PCM is getting the proper powers and grounds to make it functional. Remember, when working on a network problem it is essential that a good wiring schematic is available.

When looking at the PCM schematic, I looked for the power feeds going

to it. Using a wire schematic feature, I highlighted the two power circuits in question. The PCM is located beneath the brake booster by the bottom of the firewall, not an easy place to access.

I disconnected the PCM connector and obtained a picture of the connector to determine the correct wires to test for power. The terminals that should have power to them are Terminals 55 and 71. I checked both wires Key On Engine Off (KOEO), and both had 12 volts at their respective pins. I even loaded the circuit with a headlight bulb to make sure that both circuits were in good condition. This confirmed that both power circuits were operating properly.

The next step is to check the ground circuits. These circuits are Terminals 3 and 25 along with Terminals 77 and 103. All four terminals checked out fine and passed the headlight test.

I have good power and grounds at the PCM. Now to see if the network circuits are shorted or open. This particular vehicle uses a Standard Corporate Protocol (SCP) network. Every module on this network communicates with each other except the Restraint Control Module (RCM). The RCM is on another network called the ISO 9141, or International Standards Organization network. The

scan tool reads both networks at the Diagnostic Link Connector (DLC).

Next, I pulled a schematic of the communications network. Circuits 914 and 915 connect to every module on the car except the RCM. With the PCM connector still disconnected, I installed my DLC breakout box. Using my ohm meter, I measured circuit 914 from terminal 16 at the PCM to terminal 2 at the DLC. I also measured circuit 915 from terminal 15 to terminal 10 of the DLC. Both circuits tested less than 5 ohms. If they had tested more than 5 ohms, it would mean that there is a short in the bus circuit.

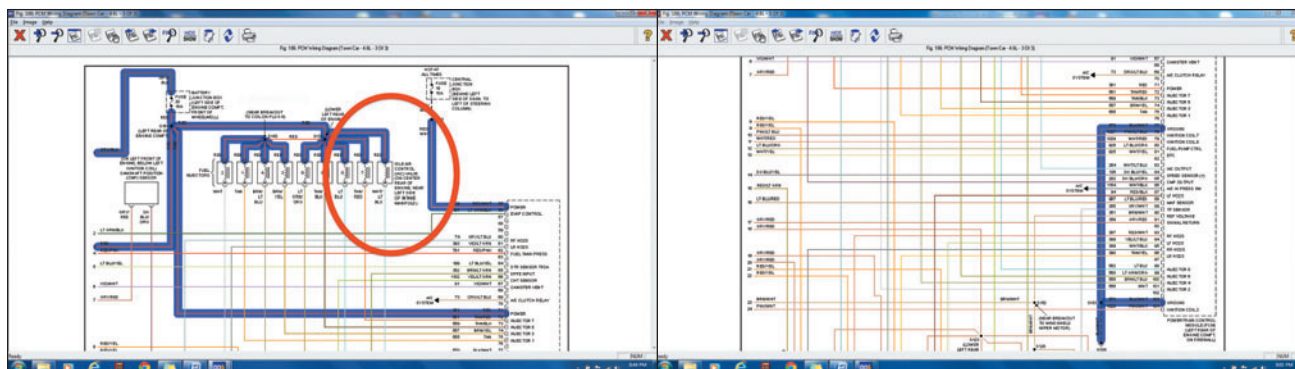
Now what? My bus circuits are good and my powers and grounds going to the PCM are good. This PCM must be bad, right? I told the shop to get a replacement PCM and I would be back to program it. A couple of days later, I hooked up my scan tool and guess



JUST SCAN IT 

Scan this QR Code to read on your smartphone more diagnostic tips. Or visit MotorAge.com/scopescan

GET A FREE SCAN TOOL APP AT:
www.scanlife.com



My mistake was in unplugging the PCM connector, thereby relieving any additional loads on the power feed caused by other circuits that shared this source. So much for using a headlight to load test the wire.

Portable. Quick. Safe.


Fastest way to get your car in the air.



MSRP \$995⁰⁰



The truly portable QuickJack™ is convenient to use and lightning fast. Use it anytime, anywhere, for fast wheel service and general repair. The low profile design means it fits where other jacks don't and an optional 12-volt power supply means you can even take it on the road. Sturdy lock bars, a remote pendant control, and adjustable rubber contact pads make it the perfect lifting system for the shop, track or home. Visit www.quickjack.com to learn more.

 See it on YouTube

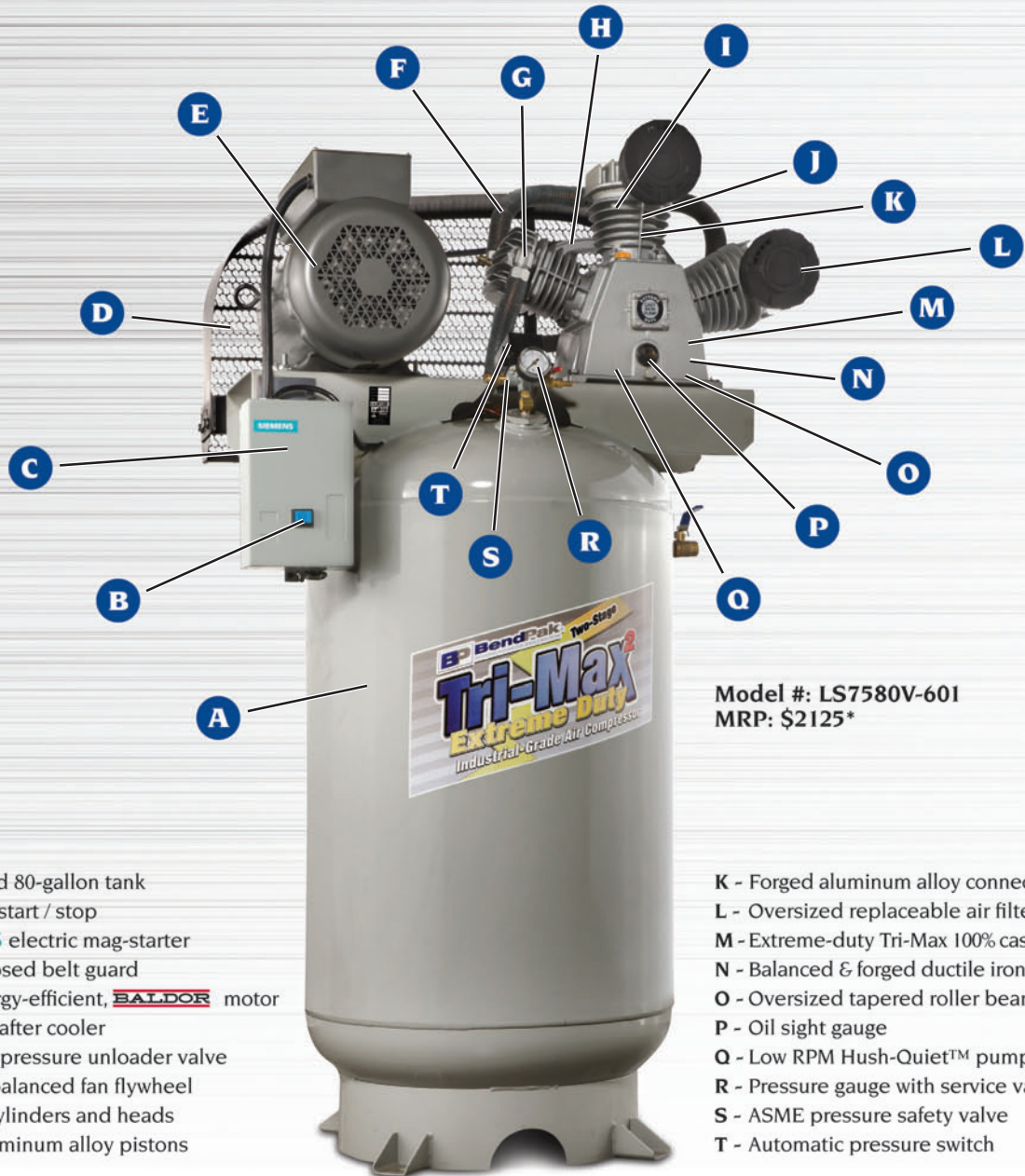
www.quickjack.com • BL-3500

© 2014 Ranger Products • Ranger Products is a division of BendPak Inc.

QUICKJACK™
By Ranger Products

The Better Compressor

More air, less noise.



- A - ASME rated 80-gallon tank
- B - Automatic start / stop
- C - **SIEMENS** electric mag-starter
- D - Fully-enclosed belt guard
- E - 7.5 HP, energy-efficient, **BALDOR** motor
- F - Forced-air after cooler
- G - Integrated pressure unloader valve
- H - Precision balanced fan flywheel
- I - Cast iron cylinders and heads
- J - Forged aluminum alloy pistons

- K - Forged aluminum alloy connecting rods
- L - Oversized replaceable air filters
- M - Extreme-duty Tri-Max 100% cast iron pump
- N - Balanced & forged ductile iron crankshaft
- O - Oversized tapered roller bearings
- P - Oil sight gauge
- Q - Low RPM Hush-Quiet™ pump
- R - Pressure gauge with service valve
- S - ASME pressure safety valve
- T - Automatic pressure switch



Visit www.bendpak.com or call 1-805-933-9970

© 2014 BendPak / Ranger Products are registered trademarks.

BP BendPak.
PROVIDING AUTOMOTIVE SERVICE SOLUTIONS

*Valid at participating dealers. Prices are subject to change.

what? No communication with the PCM. I misdiagnosed this vehicle. I promptly rechecked my previous diagnosis and came up with the exact same results.

This PCM must be faulty. By all circumstances it should be alive. Now what? I plugged the PCM connector back into the PCM and started to reread my wiring schematics. I also did a quick search on Identifix and iATN.

While I was going over what I checked previously, I noticed that there was a humming noise coming from the top of the engine that was underneath the air tube going to the throttle body. Once I removed the air tube I determine the sound was coming from the Idle Actuator (IAC) motor. I went to the connector to unplug the IAC motor and touched the metal housing. It was so hot that it actually burned my hand.


After receiving some pain, at least the motor noise went away. I thought to myself, "That motor must be going bad." I got back inside the car where my scan tool PC is and I notice my scan tool is showing a data stream for the PCM. Why? I didn't do anything, or did I?

I went back to the Idle Actuator motor and plugged it back in. The noise was back and my PCM communication was gone. I did this a couple of times to make sure I was seeing things correctly. This IAC motor was pulling down communications that caused the problem with the PCM. I reviewed my schematic and noticed that the IAC motor shares the same power as the PCM on Terminal 71.

I checked the circuit again at the PCM and at the IAC motor. Both connectors had 12 volts. Now I realized my mistake. I disconnected the PCM connector to check my voltage at my two power terminals because access to the PCM connector was in a hard to reach area. In doing that, I took all loads off the circuit. With the PCM harness pulled out of the way and having access to the old PCM, I plugged in the harness and

checked for my powers on circuit 55 and 71. Terminal 55 had 12 volts, but terminal 71 only had 7 volts. The IAC motor was shorting internally and causing a voltage drop.

Normally, I always check for powers and grounds at a module while the module is plugged in. Due to the inconvenient location of the PCM and not wanting to struggle with it, this car wasn't diagnosed properly. Replacing the IAC motor and installing the original PCM fixed it. Luckily the shop was able to return the PCM because it wasn't programmed. **ZZ**



EDWIN HAZZARD
CONTRIBUTOR

Edwin Hazzard has more than 30 years experience in the automotive industry as a tech, service consultant and mobile diagnostic tech. He is the owner of a successful mobile auto and truck repair service in Newburgh, N.Y.

Email Edwin at
ehazzard@automotivetechsystems.com

Visit **MotorAge.com**
ENTER SCOPE & SCAN
SEARCH THOUSANDS OF RESOURCES
TO HELP YOU WORK SMARTER

THE WORLD'S TOP TECHNICIANS ARE ON iATN

- + Over 70,000 members from over 150 countries
- + Sharing over 1.5 million years of experience
- + Using iATN's Knowledge Base of 3+ million records



www.iatn.net/join
International Automotive Technicians' Network **iATN**

... on the road to success ... my tool of choice for the future ... empowering ...

AMI courses have had a huge impact on the way I operate my business...

great instructors ... only AMI training ... unparalleled real world approach ...



See what everyone is talking about ...
www.amionline.org/talk13

AMI AUTOMOTIVE MANAGEMENT INSTITUTE
Success Starts Here
800.272.7467 ext. 101

THE CAR THEY LOVE

HELPING CUSTOMERS IS REALLY IMPORTANT, ESPECIALLY WHEN THE VEHICLE IS WORTH A LOT MORE TO THEM THAN IT WOULD BE TO US.

BY RICHARD MCCUUSTIAN | CONTRIBUTING EDITOR

Once back in the 1990s, I worked on a 1984 Tempo that came in on the hook as a no-start. The old man who owned that car was hovering nearby watching me work on his baby (personally, I wouldn't have given him \$50 for that rusty old car at the time).

That Tempo was one of the early ones with a carburetor, and since I worked on those cars at the Lincoln Mercury dealer when they were brand new, I was familiar with it. To start, there was no gas in the carburetor, but the gas needle read something other than empty. While that gauge could have been wrong, I chose to poke around under the hood before pushing the car into the shop.



A CLASSIC ISSUE

2004 CHEVY "CLASSIC"

Vehicle Year/Make/Model

2.2L

Engine

4T40E TRANSAXLE

Transmission

189,558

Mileage

VEHICLE QUIT WHILE DRIVING AND WON'T RESTART.

Vehicle complaint

This one had a strange two-wire solenoid mounted so that it bisected the fuel line, and the ground wire for that solenoid was connected in a very easy to see place by the cowl. The ground screw was rusty and loose, so I spun it out, shined the metal, reconnected it securely and opened the solenoid. Fuel filled the reservoir, and the car started.

The old man was surprised that I had found it so quickly; he told me that he had installed the solenoid as a theft protection device right after he bought the car brand new. I guess he had a hidden switch somewhere that energized the solenoid. I didn't tell him that his anti-theft solenoid was now unnecessary, because nobody would even consider stealing that rusty old ride. Nevertheless, he was joined at the hip with that car and loved it dearly.

I have, for the past 37 or so years of my life on the wrench, experienced in an intimate, yet somewhat detached way the love some customers have for their cars. To the technician who wrenches on 30 or 40 cars a week, that car is just another machine in need of a field fix. But to the person whose fanny keeps the driver's seat warm, that ride is their best friend, even if they don't always treat it in a friendly way.

This story has some satellite tales to go with it, but the title vehicle is a 2004 Chevy "Classic" that quit running and was spinning slower than normal and the owners didn't know why. The man and his wife came to ask if we could have a look at it, and I agreed. They spoke of how much she loved that car

and how they would do just about anything to get it going again.

She said during our initial conversation that the temp gauge never showed the car to be hot, and so she wasn't sure why it quit. But from what she told me there were some unmentioned reasons why she believed engine heat was a factor. Not the least of which was that they had purchased a new radiator that they wanted us to install.

Holes Incapable of Fire

Identifix spoke of timing chain issues with this platform, and the engine didn't sound normal while spinning, so the timing chain was a possibility, to be sure. We screwed the spark plugs out and checked the compression to find none. Not a single ounce on any hole. Had it jumped time and bent valves?

Peering into the spark plug holes with a streamlight, the tops of the pistons were clearly visible, and right away I pointed two things out to my guys. To begin with, there was no carbon at all—the pistons looked really clean. Second, there were significant beads of coolant resting on two of the four too-clean pistons.

JUST SCAN IT 



Scan this QR Code to read more on your smartphone about problems blowing up in your face. Or visit MotorAge.com/blowsup

GET A FREE SCAN TOOL APP AT:
www.scanlife.com

Photos: Richard McCuustian



REVOLUTIONARY. EVOLUTIONARY.

Open **Android™** Architecture | Ultra Rugged **Drop-Tested** Design

7.1 Inch Screen | **Wireless** Bluetooth® 2.1

Auto-ID Vehicle | Auto-ID **All** Available Systems

Unparalleled Coverage & Capabilities

Very **Affordable** At Under \$2,000



The New **ScanPad** from LAUNCH.

LAUNCH

CREATE • CHANGE

For More Info Contact Your Local Launch Representative

www.launchtechusa.com

We've Got You COVERED!

The All-New Code Reader Line from LAUNCH.



The all-new **C-Reader IV+** is simply in a class of its own. No other code reader in its price point has the capability to view live data! The C-Reader IV+ is also internet updateable, so code libraries are always the most current! Features include read/clear codes, view readiness monitors, freeze frame data & VIN ID. **MSRP: \$49.95**

Yet another class leader - the **C-Reader V+** boasts a full color QVGA screen, the ability to graph 2 PIDs of data, along with blazing fast refresh rate for better graphing & live data readings - all for under \$100! Features include read/clear codes, view/graph live data, along with I/M readiness monitors, freeze frame data & VIN ID. **MSRP: \$69.95**

The **CReader VI+** boasts the capability of recording and storing up to 8 hours of data – crucial for diagnosing intermittent problems. The CReader VI+ also supports J-OB2, extending coverage to imported Japanese Domestic Market vehicles which are gaining popularity in both North and South America and the Caribbean. **MSRP: \$119.95**

The **C-Reader VII** integrates the award winning code reader capabilities of the C-Reader VI & the reset functions of the C-Resetter! Read & clear OBDII trouble codes, view, record & graph live data in full color, perform oil service light resets and more! The C-Reader VII is fast & ultra-portable, making it the perfect go-to code reader & reset tool for today's modern technician. **MSRP: \$179.95**

LAUNCH

CREATE • CHANGE



For More Info Contact Your
Local Launch Representative

www.launchtechusa.com

This cooling system had experienced an epic failure, and an engine would be in order. I called LKQ and priced out an engine with less than 90,000 on the clock. They opted for the engine and would pay extra for a year's worth of parts and labor warranty. I ordered the engine, but we had a lot of other stuff in the shop that bears short mention here.

Cases in point, we had two Chrysler products that needed transmissions. One was a 2003 Neon that was full of fluid but had no engagement in reverse, and the other one was a 2007 Dodge Charger that would sulk up like an opossum and stop pulling after a short drive. It was full of fluid as well, and I priced out transmissions for both cars. The transaxle for the Neon would cost more than the transmission for the Charger, believe it or not.

We ordered a transaxle for the Neon after the owner gave us the green light, but it would be slow getting to us. LKQ didn't have one, so I had my industrial sales guy at Advance check his network of salvage yards. The Charger transmission I picked up at a local salvage yard, and one of my guys hammered that one out in a fairly short period of time, for a student anyway.

Checking the fluid in that Charger's Mercedes transmission with that \$88 dipstick tool is an interesting experience for those who haven't done it. The tool is a fairly long cable with millimeters marked out on a tempered blade at the business end of the cable. The filler tube is capped with a "hands off" message of sorts. There is no dipstick, and you shove the tool into the tube until it touches the bottom of the transmission oil pan. This dipstick tool enters the pan vertically, and the flat-buttoned bottom of the graduated blade touches the trans oil pan. There is a temperature/fluid level graph you're supposed to use in order

Read more from Richard McCuistian including this piece on waitresses and their cars.
[MotorAge.com/
waitresses](http://MotorAge.com/waitresses)

to determine whether the fluid level is correct.

This critical fluid level check is the trend on some (not all) modern transmissions, and quite frankly, this way of checking the fluid makes more sense than Ford's stand pipe or GM's remove the plug method. You can do this check with the tires on the floor.

Repeat Business

Speaking of cooling systems, we had a small war going on with a 2006 Mercury Mariner that kept throwing P0128 codes. The dash gauge was reading kind of low and we threw a thermostat at it, but the problem persisted. With a temp gun aimed at the water passage where the sensor was and those numbers compared to scan tool readings, we found just more than 200 degrees actual temperature and a sensor reporting 60 degrees less than that. A sensor was in order. When the sensor was replaced, reality and the reading were more in agreement. Case closed, right? Wrong!

The Mercury's P0128 returned the following week, this time with the temp gun agreeing with the sensor, and we found the engine was running at 160 degrees. Another thermostat was in order, and we popped one in there. This one warmed it up to 195 degrees or so, and the sensor still agreed with the temp gun.

A week later, the P0128 was back, and this time the thermostat was OK, but the sensor we had installed was now reporting 30 degrees cooler than the gun, and so we had to replace the sensor again. That finally took care of the P0128, but what a ride that was. Some seemingly straightforward repairs aren't so cut and dry when the quality of the parts comes into question.

Speaking of repeat repairs, my son came to town on a sweet little 1998 Camry he uses on trips, but he told me he had a nasty oil leak that was dumping a quart of oil every 150 miles, which translated to a half an oil change on a 300-mile trip. The problem was he had a shop in the town where he lives replace the oil pan gasket in a failed attempt to repair that leak, and the charges were north

of \$400. When we first got it up on the lift, there was oil all over the place, but a dye test confirmed what we suspected.

Folks who are familiar with these 2.2L Camry engines know that the oil pump is a common leak point, and that's where my son's Toyota was leaking oil. An oil pan would have to have a serious breach to lose the kind of oil this baby was dribbling.

I had one of my guys remove the timing belt and the oil pump cover to find

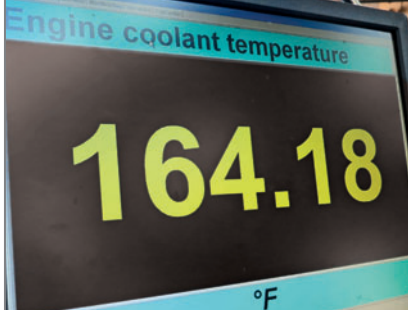


These are sweet little engines when they're running right, but bleeding the air from the cooling system is kind of dicey. The book says there are bleeders, but we couldn't find any, so we filled the block through the upper radiator hose. The thermostat was in the other one, like on some Camrys and VW Rabbits.



It's not hard to see how they'd love this 2007 Charger. It was enough of a cream puff to warrant a good used transmission, and I paid the \$50 core charge for the old transmission. This'll make a good trainer unit.

Visit MotorAge.com
ENTER MOTOR AGE GARAGE
SEARCH THOUSANDS OF RESOURCES
TO HELP YOU WORK SMARTER



This 2006 Mercury Mariner fought us tooth and nail with bad thermostats and temp sensors. That P0128 would stay gone for a week to 10 days and then come right back. We finally got it taken care of.



This 1999 Taurus had no heat and no flow to the heater core. It's a wonder it wasn't running hot. But after replacing the pump and flushing the rust, it was warm again.

that triangle-shaped O-ring type rubber seal cracked and flattened with heat and age, which was no surprise. After our repair, my son and his wife drove back home without having to add oil. After I sent photos and a synopsis of what we found, the other shop refunded the \$400-plus for its misdiagnosis.

A Snowballing Heater Job

When Garrett and Daniel, two students, jerked the engine out of the Classic, they managed to break a \$15 cast aluminum support bracket that had to be ordered from the dealer. Because the replacement engine LKO brought us came out of a Cavalier, there was some parts swapping in order before the engine could be dropped into the Classic.

The torque converter seal also needed to be replaced on general principle, lest we find ourselves with a transmission leak at that point. That's an oft-overlooked easy preventative fix when doing an engine swap.

Snowballing heater No. 1 was on a 1999 Taurus that had no cabin heat whatsoever, but the blend door and its actuator were working famously. The heater hoses, however, were very cool in spite of the fact that the engine was running nice and toasty at 210 degrees. It was full of coolant and the thermostat seemed to be operating, but there was (quite predictably) quite a bit of rusty mud in the cooling system.

We took the Taurus to the wash rack behind the shop, removed both heater hoses, and ran a nice vigorous flow of water through the heater core, shoving a lot of rusty mud out of that heat exchanger. But when we started the engine with the hoses disconnected, there was no flow of coolant at all.

We shoved our water hose into first one heater hose and another (engine off) and shoved another large quantity of muddy looking rust out of the heater hose piping. Still no flow with the engine started. It was water pump time for the Taurus, and when we saw the eroded impeller on that old pump, we knew why there was no flow.

Having witnessed this exercise, Willie, another student, was experiencing a no-heat situation on his 2002 F150 and asked if he could have a look at possible reasons for his cold cab. After all, winter weather was biting us at this point and who enjoys long cold drives?

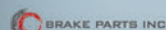


THE ULTIMATE IN BRAKING CONTROL

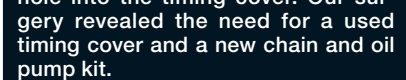
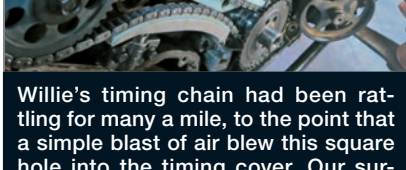


Element3™ brake pads with Enhanced Hybrid Technology (EHT™) deliver a new level of control and confidence... and they are 100% copper compliant to 2025.

www.element3eht.com
800-323-0354

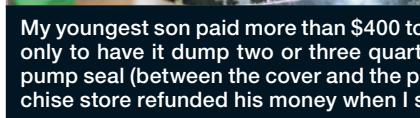


©Copyright 2014, Brake Parts Inc LLC. All rights reserved. The trademarks EHT and Element3 are among the trademarks of Brake Parts Inc LLC. Raybestos and The Best in Brakes are used under license from Affinia International Inc. The LeafMark is a trademark of The Motor and Equipment Manufacturers Association.



Willie's timing chain had been rattling for many a mile, to the point that a simple blast of air blew this square hole into the timing cover. Our surgery revealed the need for a used timing cover and a new chain and oil pump kit.

It was easy to jerk the water pump off that 4.6L, and while there was only a small amount of erosion visible on his pump, he figured he'd replace it anyway. I had warned him that he might have blend door problems, and I don't think he ever checked to see if his heater hoses were hot. Well, there was a lot of crud on the timing cover right below the water pump, and when he applied shop air to clean that off, he actually blew a square hole the size of a sugar cube in his timing cover. Right beneath that square hole,



My youngest son paid more than \$400 to have this oil leak fixed on his 1998 Camry, only to have it dump two or three quarts of oil en route from Augusta, Ga. An oil pump seal (between the cover and the pump) took care of the real cause. The franchise store refunded his money when I sent photos.

you could see the timing chain, which had worn the cover to paper thickness at that spot, which had simple air pressure to blow a hole in the timing cover.

Exploratory surgery revealed those all too familiar broken chunks of nylon bouncing around in the cover — chunks that had once been one with the chain guide on the passenger side bank. He remarked that he had been hearing a rattle in that area for quite some time, and the next time he hears that rattle on one of these modular Ford engines, he'll know what that means.

Willie did some eBay shopping and found a timing cover and a complete chain set for a good price, and he began the grand adventure of doing his first one of those babies.

Conclusion

Time would fail me to tell how Willie's F150 engine ran great when he was done but how he had to replace the almost new power steering pump because it simply wouldn't work after



everything was reassembled. Or how the Chevy Classic's published cooling system bleed procedure speaks of bleeder screws on that engine and there aren't any. We filled the block with coolant by pouring it in the top radiator hose, which works famously and doesn't hurt a doggone thing. We also used my electrical roulette method to check the cooling fan, and made sure it cycled several times. Everybody was happy, particularly the customers, and that's a high you can't buy. **TM**



RICHARD MCCUISTIAN
CONTRIBUTING EDITOR

Richard McCuistian is an ASE-certified Master Auto Technician and was a professional mechanic for more than 25 years. Richard is now an auto mechanics instructor at LBW Community College/MacArthur Campus in Opp, Ala.

E-mail Richard at rwm19@mail.com

ADVANCE AUTO PARTS PROFESSIONAL — MSD PRO-BILLET DISTRIBUTORS

Advance Auto Parts Professional and MSD Performance have what you need for the high performance jobs coming into your shop. Advance carries a wide range of MSD products from ignition control boxes and plug wires to coils and distributors. When you break down all the parts that comprise an engine, on the track or for the street, the distributor is one of the hardest-working parts. A distributor does more than simply distribute the spark to each cylinder. In fact, there are four functions that



MSD's Pro-Billet Distributors are designed to handle the demands of race engines. With a billet aluminum housing, ball-bearing guided shaft, and maintenance-free magnetic trigger pickup, an MSD Pro-Billet Distributor will provide the reliability you need for high performance jobs.

most distributors accurately and reliably perform: trigger the spark from the ignition control or coil, distribute the spark to each plug wire and cylinder, alter the ignition timing to correspond with the engine's speed and load, and drive the oil pump.

In the case of race engines, endurance, accuracy, and performance are required to handle the rigors of high compression, high RPM, wide-open throttle conditions. That's a tall order for any component, and that is why so many technicians rely on MSD's Pro-Billet Distributor when working on race engines.

MSD Performance was the first company to offer a distributor designed with the strength and reliability to handle the demands of race engines. The foundation for every Pro-Billet Distributor is a housing that is CNC-machined from billet aluminum resulting in incredible strength. Perched atop each housing is a sealed ball-bearing assembly that guides an oversized .500 shaft through high RPM for stability and endurance.

With the extra strength and endurance mapped out, the internals were next to receive a performance upgrade. These feature an adjustable centrifugal advance assembly, which can be adjusted easily or even locked out to match an engine's timing requirements, an injection molded

rotor, and provisions to bolt the MSD cap in place.

MSD's Pro-Billet Distributors have been on winning engines from NASCAR to NHRA Pro Stock to even the Bonneville Salt Flats. There is a variety of Pro-Billet Distributors for Chevrolet, Ford, Chrysler, AMC, and many more. Some models are designed exclusively for circle track racing such as their dual pickup distributors and the professional HVC racing distributor.

These distributors have provisions for dual ignition systems (for reliability) while the HVC series allows for the timing to be altered for each cylinder. For drag racing, models with adjustable slip collars compensate for specially machined blocks. Special caps and housings help clearance, and crank trigger applications are low profile.

What if you don't need a race distributor for a muscle car or street car repairs? MSD has you covered. They take the technology and capabilities of their race distributors and build it into the street models. From easy-to-install ready-to-run models to a Pro-Billet HEI distributor, MSD and Advance have the parts you need.

For your racing, strip, or street needs, Advance has a large inventory of quality performance products available for fast delivery. For more information, contact your local Advance delivery location or visit Advancecommercial.com.



MSD was the first company to offer a distributor built around a billet aluminum, CNC-machined housing. Their Pro-Billet Distributors have been used to trigger engines on super speedways to drag strips, Monster Trucks to land speed racing, and everything in between.

**Advance
Auto Parts
Professional** 

Service is our best part.®

HUNDREDS OF EVENTS INCLUDING NASCAR SPRINT CUP, ARCA AND DIRT TRACK RACES HIGHLIGHT MOTORSPORTS PROGRAM FOR FEDERATED MEMBERS AND CUSTOMERS

A wide array of racing events, including the “Last Race before the Chase”, the Federated Auto Parts 400 NASCAR Sprint Cup on Sept. 6 at the Richmond International Raceway, highlight another great motorsports program for Federated members and their customers.

“Starting in February and going until November, we have put together an impressive selection of racing events that our members can use to entertain their customers,” said J.R. Bishop, director of motorsports and event marketing for Federated. “From NASCAR to ‘Get Dirty with Kenny’ to dirt track events, our racing program provides our members with tremendous marketing and promotional opportunities.”

Over 1,200 Federated guests will again experience an unforgettable weekend of NASCAR racing and hospitality this September in Richmond. In addition to attending the Federated 400 race, select Federated contest winners will also partake in a driving experience hosted by NASCAR legend Kenny Schrader.

“The first two years of sponsoring the Federated Auto Parts 400 has been a fantastic experience for us and we look forward to another great year partnering with Richmond International

Raceway in sponsoring the crucial ‘Last Race before the Chase,’” said Bishop. “Our members were thrilled with the weekend activities surrounding the race last year and many of them have already started planning for this year’s race.”

The long-time association between Federated and Schrader will expand to include a season-long sponsorship of the Ken Schrader Racing ARCA car, which Schrader himself will drive in 10 races, including the two stops at the Salem (Ind.) Speedway: the Federated Auto Parts ARCA 200 on April 27 and the Federated Car Care ARCA Fall Classic on Sept. 13. Federated will also sponsor Schrader in a NASCAR Truck series race and in over 50 dirt track races.

One of Federated’s most popular events for its Car Care Center members, the “Get Dirty with Kenny” promotion, returns with a few new additions. In addition to dirt track driving with Schrader at his own track, the Federated Auto Parts I-55 Raceway in Pevely, Mo., the winners of this annual extravaganza will also sit in a skybox for a Cardinals-Reds baseball game at Busch Stadium.

“Over the years, we have worked closely with our members to provide them with a comprehensive motorsports program that provides a host of promotional and hospitality opportunities,” said Bishop. “This year, we feel we have developed one of our best programs ever and we are excited to get to the track and have some fun.”



2014 Federated Motorsports Highlights

- Federated Auto Parts NASCAR Sprint Cup 400 at Richmond International Raceway on Sept. 6
- Seventh annual “Get Dirty with Kenny” promotion
- Primary sponsor of Ken Schrader Racing ARCA car for entire season
- Primary sponsor of three ARCA Races
- Federated Car Care presenting sponsor at three ARCA races
- Primary Sponsor of Ken Schrader in one NASCAR truck race
- Primary sponsor of Ken Schrader Racing in over 50 dirt track racing events
- Primary sponsor of Jim Inglebright in the NASCAR K&N Pro Series Sonoma race
- Federated Batteries Ironman 55 at Federated Auto Parts Raceway on August 2
- Federated Auto Parts Racing Hospitality events coast-to-coast



Federated



It's Easy to Stand Behind These Brands

DENSO
first time fit

ACDelco



BOSCH



WIX
FILTERS

KYB
Our Precision, Your Advantage



BANDO

MOOG



UCX



DAYCO

CARDONE

MAGNAFLOW
Performance EXHAUST

Vista-Pro
AUTOMOTIVE, LLC
Your source for OE Quality

GOJO

SST
TECHNOLOGY

TechSmart
FILTERS

STANDARD



Grote
INDUSTRIAL

HAYDEN AUTOMOTIVE
A COMPANY OF FOUR SEASONS DIVISION / STANDARD MOTOR PRODUCTS, INC.

4 SEASONS
Your Automotive PARTNER

HASTINGS
PREMIUM FILTERS
CLASSIC Industry



Valvoline

FELPRO

ANCO

Littelfuse

Stant

BECK/ARNLEY
GENUINE Foreign Nameplate Parts

MONROE

LUBE GUARD

REESE

atp

PERFECTION
Performance Proven

Raybestos
The last in brakes

SEALED POWER

FEDERAL MOGUL

WAGNER
BRAKE PRODUCTS

CRC



Federated BATTERIES
EAST PEBB manufacturing co., inc.

SPECTRA PREMIUM

USA INDUSTRIES
The Network of Automotive Excellence

DORMAN

EVS
ENGINEERED VEHICLE SPECIFIC

Motorcraft

EDELMAANN

brembo

Duragloss
THE NETWORK OF QUALITY

FRAM

OMEGA

NGK SPARK PLUGS

AKBONO
BRAKE EXPERTS

K&N

MOTHERS
Polishes • Waxes • Cleaners

WALKER

STRONGARM
GAS CHARGED LIFT SUPPORTS

At Federated, what separates us from the rest is that we offer top quality, name brand parts. We provide the names that people know and trust, giving you the competitive edge you need in the marketplace.

Join Federated for the best support, service, parts and people in the business.

www.federatedautoparts.com

TODAY'S EXTENDED OIL CHANGE INTERVALS DON'T HAVE TO REDUCE LUBE SERVICE PROFITS

The FRAM Pro Series line of filters can help you get more dollars from every oil change service performed, while giving your customers peace of mind between changes.

The FRAM Pro Series provides the products and tools to sell premium oil changes. It is the first product line that aligns oil filters with the specific oil (Conventional, Synthetic Blended and Full Synthetic) with profit opportunity based on oil change trade ups. FRAM Pro Series brings filtration back into the conversation of oil changes.

Traditionally the market has offered the customer quality oil choices. For the first time, the FRAM Pro Series offers specially designed filters that align with those oil offerings.

- FRAM Pro Synthetic™ — For full synthetic oil changes up to 15,000 miles (24,000 km)
- FRAM Pro Plus™ — For synthetic blended oil changes up to 10,000 miles (16,000 km)
- FRAM Pro™ — For conventional oil changes up to 5,000 miles (8,000 km)

The FRAM Pro Series line of filters can help professional technicians get more dollars from every oil change service performed, while giving their customers peace of mind between changes. In addition, the end users are able to make an educated decision on filter protection for their vehicles, instilling confidence that they are using the best filtration products available.

What do these filters have to offer? Let's take a look.

First up is the FRAM Pro Synthetic™, engineered to optimize synthetic oil life with protection up to 15,000 miles. The FRAM Pro Synthetic™ offers the ultimate engine protection. †† It is engineered for vehicles that require full synthetic

oil, with a dual layer synthetic media reinforced with a durable metal screen to deliver up to 15,000 miles (24,000 km) of engine protection and 99 percent† Dirt Trapping Efficiency. A silicone anti-drainback valve holds a reserve of oil in the filter to help protect the engine during start-ups.

Next in line is the FRAM Pro Plus™, a trade up filter aligned with synthetic blended oil change intervals up to 10,000 miles. The FRAM Pro Plus™ offers superior engine protection †† and is engineered for newer vehicles that use synthetic blended oil with lengthened change intervals. As with the Pro Synthetic this filter has 99 percent† Dirt Trapping Efficiency and a Silicone anti-drainback valve holds a reserve of oil in the filter to help protect the engine during start-ups. This filter comes with a cellulose-fine fiber synthetic blend filter media.

Last up is the FRAM Pro™, a quality filter designed for conventional oil change intervals up to 5,000 miles. The FRAM Pro™ offers advanced engine protection with a 93 percent† Dirt Trapping Efficiency and has been specifically engineered for vehicles that use conventional oil with short change intervals. The media on this filter is a cellulose/synthetic blend.

FRAM backs this program with sales training and marketing support, as well as advertising and end user education.

This professional-grade product line means business, all the way. FRAM Pro Series—Engineered for the latest oil types and OE oil change intervals.



†FRAM Group testing of average filter efficiency of FPS8A, 3387A, and 4967 or equivalent FRAM FPP or FPS models under ISO 4548-12 for particles greater than 20 microns

††when compared to Fram Pro™ and Fram Pro Plus™ models



Today's extended oil change intervals don't have to reduce your lube service profits.



The FRAM Pro Series line of filters can help you get more dollars from every oil change service performed, while giving your customers peace of mind between changes.

FRAM Pro Series—Engineered for the latest oil types and OE oil change intervals.



**FRAM Pro™
Synthetic**

For 100% Synthetic Oil
up to 15,000 miles



FRAM Pro Plus™

For Synthetic Blended Oil
up to 10,000 miles



FRAM Pro™

For Conventional Oil
up to 5,000 Miles



FRAM
FILTRATION

Pay Me Now or Pay Me Later...

Hotline: 800.890.2075 www.framproseries.com

© 2013, FRAM Group IP, LLC. 1900 West Field Court, Lake Forest, IL 60045.



2014 NAPA RACING PREVIEW: CHASE ELLIOTT HAS ARRIVED

There is something superbly interesting about NAPA Racing's newest face – you know, the one that will represent 6,000 NAPA stores and millions of NAPA customers each weekend when he drives his 650-horsepower, 3,450-pound, NAPA-themed stock car at NASCAR Nationwide Series venues all over the country.

He's currently sitting in sixth-period study hall.

It's the final period of Chase Elliott's school day, and he'd tell you that if anything is being studied, it's the hands of a slow-ticking clock. On this day – an overcast Wednesday – Chase has a plane to catch. Waiting for him 230 miles away in Charlotte, N.C., is a television commercial production that includes three sets and a crew of more than 50 people.

At 18 years old, Elliott is a professional race car driver, not just the son of racing legend Bill Elliott but an actual racer who yearns to be faster than anyone around him, including you. He's pretty darn good at it, too. His ascent through local, regional and national ranks includes wins and records in bulk. In 2013 when the higher-ups decided to cut him loose on the NASCAR Camping World Truck Series, he won in only his sixth start.

Nothing could slow down Elliott but his age. That changed last November when he turned 18, making him eligible for Nationwide Series competition. Then in January came the colossal news that Elliott would compete for a championship with JR Motorsports, the team owned by Dale Earnhardt Jr., and carry NAPA AUTO PARTS on his No. 9 Chevrolet.

Potential champion. Son of a NASCAR great. Face of America's most beloved automotive parts and accessories brand. And right now he's stuck in sixth-period study hall.

"I'll say this, I'm looking for-

ward to graduation," Elliott said with a laugh. "The opportunity to drive for Dale Earnhardt Jr. and represent NAPA AUTO PARTS is a dream come true. Really, who gets an opportunity like this? It's incredible. I'm doing my best to stay focused on school, but the truth is it's hard."

While Elliott patiently awaits graduation, the 33-race season awaits no one, nor do the expectations that come with it. If the expectations placed on Elliott seem unfair for an 18-year-old, nobody in the universe understands more than Earnhardt Jr. The two have much in common, starting with the obvious – they are sons of NASCAR champion fathers.

"He'll learn to deal with it if he hasn't already," Earnhardt said. "People will realize as Chase progresses there's more about him than just his last name. He's his own person. Once he gets acclimated to this car, he'll be viewed as a great racer and likeable guy above everything else, and a lot of people who wouldn't normally watch the Nationwide Series will this year because of Chase. He'll take his bumps and bruises, for sure, but he seems to be quicker than the average learner."

Perhaps that's to be expected for someone with the benefits of study hall, which, by the way, just ended.

The bell has rung and Chase is gone, faster than anyone around him.

Within the hour he'll be en route to Charlotte to shoot a pair of TV commercials for NASCAR. The advertisements will feature five racers with this in common: they are the bright young stars in a sport coveted by millions. Only, the one wearing the NAPA suit will be back at school at 8 a.m. the next morning.





REDUCES HEAT

NAPA Premium Rotors, with OE matched vane designs, dissipate heat and optimize cooling to maintain an unrivaled brake system performance. But we didn't stop there; they are also 100% balanced to provide smooth vehicle operation. That's NAPA KNOW HOW at its best. Visit your local NAPA AUTO PARTS Store today.



800-LET-NAPA / NAPAonline.com



RAYBESTOS RACING BRAKES ARE TRACK TESTED AND TECH TRUSTED

Raybestos® Racing brakes have been proving-ground and speedway tested since 1902. They were used on the Pike's Peak hill climb cars in the early 1900s and were found on the open wheel Indy roadsters of the 1950s and 60s. Today, Raybestos brakes provide a competitive advantage for top NASCAR® Series teams like Joe Gibbs Racing (JGR).

“The Raybestos brakes package delivers the reduced weight and enhanced stopping power we need to win on a heavy braking track,” said Jason Ratcliff, Crew Chief of Kenseth's No. 20 Dollar General Toyota. JGR completed one of the organization's strongest seasons ever with 12 wins last season... the most in its 22 years of racing.

Raybestos brakes helped Matt Kenseth score a career-best seven race wins in his first season with Joe Gibbs Racing. He was the No. 1 seed entering the Chase for the NASCAR® Sprint Cup, and he led the standings for six of the playoff's first seven weeks. Kenseth finished the 2013 Chase for the NASCAR Sprint Cup Series Championship in second place. Teammate Kyle Busch finished fourth in the standings, which is a career-best.

To challenge the corners at tracks like Bristol, Richmond and Martinsville, Raybestos NASCAR partner teams equip their cars with the Raybestos Racing short track brakes package. The legendary high-friction racing brake pads have the benefit of more than 100 years of on-track development. The famous Raybestos “ST” series of racing brake pad compounds provide the consistent, reliable stopping power needed to win at short track events.

Raybestos Racing pads are engineered to thrive during sustained high-heat operation and deliver the high level of friction and torque necessary for improved stopping power. The Raybestos ST-range of race pads operate at 1,100-1,400°F, while typical street pads rarely see temperatures above 600°F. The friction material used in competitive racing pads is six to seven times more dense than comparable street pads.

The ultra-lightweight aluminum alloy Raybestos six-piston calipers are the stiffest and lightest calipers available in all of NASCAR, which provide a competitive advantage at hard-



braking short tracks. The innovative calipers were developed using a state of the art “optimized design” process from Alcon... a Raybestos technology partner. The calipers include an asymmetric body design and advanced between-piston and crossover cooling features. Compared to similar competitive brake packages currently available in NASCAR, Raybestos Racing calipers provide a weight savings of up to six pounds.

The brake package also provides the largest brake pad volume (surface area) and the largest rotor (13.15” outside diameter, and 1.65” thick) available in NASCAR. Engineered to withstand the high-heat torture of short tracks and road courses, the Raybestos Racing two-piece rotors provide effective, durable operation thanks to the S-Groove slot design, racing-specific vane configuration and optimized metallurgy.

Lessons learned on the track are translated into product innovations like the new Element3™ brake pad with Enhanced Hybrid Technology (EHT™). EHT delivers the best attributes of ceramic and semi-metallic in just one brake pad. This breakthrough innovation delivers ultimate performance and stopping power, which are key to gaining unprecedented braking control. For more information, visit the Motorsports section of www.raybestos-brakes.com, www.element3eht.com or call 800-323-0354.

Raybestos®
The *best* in brakes®

WE DIDN'T JUST CHANGE A BRAKE PAD. WE CHANGED THE GAME.



Copper Compliant To 2025.

INTRODUCING THE WORLD'S FIRST ENHANCED HYBRID BRAKE PAD.



Element3™ with Enhanced Hybrid Technology™ (EHT) takes braking control to a whole new level. Its innovative formulation delivers the best attributes of ceramic and semi-metallic all in one pad. The result? Long life, less noise, reduced dust, and better wear and durability across all types of vehicles and braking

situations. Not to mention fewer comebacks and more satisfied customers, too. Get ready for unprecedented braking control. Only with Element3.

www.element3eht.com
800-323-0354



©Copyright 2014, Brake Parts Inc LLC. All rights reserved. The trademarks EHT and Element3 are among the trademarks of Brake Parts Inc LLC. Raybestos and The Best in Brakes are used under license from Affinia International Inc. The LeafMark is a trademark of The Motor and Equipment Manufacturers Association.



SKF AND TEAM PENSKE: TESTING SOLUTIONS FOR THE AFTERMARKET ONE RACE AT A TIME

As an official technical partner of Team Penske for the third consecutive year, SKF brings decades of racing experience and engineering knowledge to help the entire organization compete in the NASCAR Sprint Cup and Nationwide Series along with the IndyCar Series. All told, Team Penske has recorded 34 victories and a pair of championships since 2012 when SKF came on as a partner.

In 2012, Brad Keselowski delivered the first ever NASCAR Sprint Cup Championship for himself, crew chief Paul Wolfe, team owner Roger Penske and SKF. In 2013, Keselowski along with teammates Joey Logano, Ryan Blaney and AJ Allmendinger captured the NASCAR Nationwide Series Owners' Championship, another first for team owner Roger Penske and SKF.

"For my rookie season with Team Penske what we wanted to do was go out and win the Owners' Championship for Roger," said Logano. "I want to thank crew chief Jeremy Bullins, all the guys on the No. 22 team and SKF for a great season. Think of the guys who drove this car this year – we've all won a race in the No. 22 car. I can't tell you how lucky we are to drive this car."

To help win races, SKF engineers provide a wide range of technical support thanks to SKF's five competence areas including bearings, seals, lubrication, mechatronics and services.

Additionally, SKF engineers learn a lot from testing under the harsh conditions of racing and often develop solutions for today's on-the-road applications as a result.

Testing under harsh conditions

For SKF engineers, the racetrack becomes a virtual test laboratory for researching and developing products designed to work



Pictured here is Brad Keselowski after his Nationwide Series win at Richmond International Speedway, driving a Ford Mustang with SKF as a co-primary sponsor.

under the most demanding conditions. Many innovations developed for on-track scenarios become available to a wide range of customers, including OE manufacturers and automotive aftermarket partners.

SKF shares the innovations and lessons learned from its experience in designing for harsh conditions through various channels. For example, SKF technical training trucks, manned by ASE master-certified technicians, deliver hands-on technical training, as well as education about SKF automotive services, to industry professionals in just about any location.

SKF automotive training trucks showcase a wide range of SKF automotive products from wheel hub bearings and wheel end seals to drivetrain kits and more. This hands-on training provides an automotive technician or counterperson with information about new products, part numbers and technologies including:

- Detailed automotive product cutaways
- Automotive technical tips and new product information
- Interactive automotive product videos and support materials

For more information about SKF, contact your local SKF representative, visit www.vsm.skf.com, call 800-882-0008 or visit the SKF e-catalog at www.SKFPartsInfo.com. You can also follow SKF on Twitter @skfpartsinfo or subscribe to our YouTube channel at www.skfpartsinfo.tv.



Roger Penske celebrating the 2013 NASCAR Nationwide Series Owner's Championship



Knowledge in.

SKF is committed to manufacturing premium wheel hub bearings that you can install with absolute confidence, knowing that they typically last 3-4 times as long as value grade hubs. So we put over a century of bearing knowledge and manufacturing experience into every wheel hub bearing we make.



Knowledge out.

We're also committed to supporting the technicians who install our products. So our SKF training trucks – mobile classrooms staffed by ASE Master-Certified technicians – are on the road every day, in every part of the country. Providing engineering knowledge. Sharing technical tips. And equipping you with the knowledge you need to sell the benefits of OE quality fit, form and function.

Protect your reputation – and your customers. Learn more at www.vsm.skf.com or join the discussion at the sites below.

YouTube www.skfpartsinfo.tv  [@skfpartsinfo](https://twitter.com/skfpartsinfo)



The Power of Knowledge Engineering

© SKF is a registered trademark of the SKF Group | © SKF Group 2013

SKF®

PRIMA RACING TEAMS UP WITH QUICKJACK

CONCORD, Calif. — Andrie Hartanto of Prima Racing is pleased to announce the recent partnership with BendPak-Ranger to lead the way in promoting their newest product, the QuickJack™ portable motorsports jack system. The QuickJack is a lightweight, fully portable low-rise car jacking system that professional motorsports teams can use to get their cars in the air quickly.

“At Prima Racing we pride ourselves on always using the best quality products,” said Andrie Hartanto, Prima’s world-class team driver and Chairman. “Because when we’re racing, time saved in the pits means extra time focusing on improving lap times. I’m always looking for products to help my crew work faster and perform better. I was in love with the portable QuickJack the first time they showed it to me. In the past we were always forced to use floor jacks and jack stands after every track run. The QuickJack allows us to put the floor jacks and jack stands away and gets the car off the ground in less than a minute. It’s about time someone thought of something this convenient for race teams.”



About Prima Racing’s Andrie Hartanto

A world-class professional racing driver with a proven reputation, Andrie is known for delivering results-driven marketing solutions to long-standing business partners with his fierce passion for motorsports. His engineering background allows for him to have a deeper understanding of chassis setup and development, culminating in a perfect balance of vehicle performance. Career Highlights: 2013 USTCC Laguna Seca winner, 2012 25 Hours Thunderhill Winner, 2010 Redline Time Attack Super Modified RWD National Champion, 2009 Nitto Tires USTCC National Champion, 2008 U.S. Touring Car Champion, 2007 Top Ten result in SPEED WORLD CHALLENGE at Laguna Seca, 2006 Honda Challenge National Champion, West Coast Honda Challenge Champion and 25-hours Thunderhill Winner. See more at: www.prima-racing.com

About QuickJack

See more at www.quickjack.com

QUICKJACK™
By Ranger Products

R Ranger®
PRODUCTS



REDLINE HIGH PERFORMANCE FUEL MANAGEMENT SYSTEMS

Redline Fuel Management, a premier source for high performance fuel management systems, is pleased to have contributed to past wins of the DragonFire Racing/Team Green Kawasaki-sponsored Teryx vehicle in the Sportsman UTV Division of the 42nd Annual Tecate SCORE Baja 1000, a highly coveted off-road desert race. The Baja 1000 was the second major title win in 2009 for DragonFire Racing/Team Green Kawasaki, as they also won the Tecate SCORE Baja 500. The winning Kawasaki Teryx UTV vehicle was equipped with REDLINE throttle systems and fuel injection which, when used in combination, doubles the horsepower. The combination of superior product technology and a talented team of drivers allowed DragonFire Racing/Team Green Kawasaki to win the race by more than an hour, literally leaving the competition in the dust!

All Redline fuel system products are associated with high performance. Redline developed a complete line of fully programmable fuel management, fuel injection and ignition products to become a premier source for high-performance fuel management systems. Redline fuel management products include fuel delivery components, sensors, throttle bodies, fuel pumps, regulators and fuel filters.

Redline's fully programmable sequential fuel injection systems are designed for street, strip and off-road capabilities. Complete packages come ready to run based on three electronic systems, including fuel only, fuel and distributor-based ignition, and fuel and distributorless coil-on-plug programmable ignition. The key to the Redline system is the development of user-friendly programming software, tuning software and documentation. Optional Redline fuel injection accessories are available.

Redline also has a 30-year history of supplying North America with genuine Weber carburetors, along with exclusive Redline conversion kits developed using original Weber carburetors. Redline conversion kits include complete Weber carburetor



retor components with all required parts and instructions.

Redline products are available at WORLD PAC, a wholesale distributor of OE parts for import and domestic vehicles. To become a WORLD PAC customer, visit www.worldpac.com or call 800-888-9982, ext. 5470.



Redline is proud to provide advance product performance and technology to DragonFire Racing/Team Green Kawasaki vehicles, and looks forward to powering additional title wins in the future. To learn more about Redline, visit www.redlineweber.com or call 800-733-2277, ext. 3.

REDLINE
FUEL MANAGEMENT

MOM KNOWS BEST: PROTECT YOUR BUSINESS, PROTECT YOUR CUSTOMERS

The Problem

Motorists look to you, the service professional, as a trusted source for the quality motor oils recommended for cars and trucks and for many of you, that trust is deserved. However, the American Petroleum Institute (API) has found that some service providers are installing motor oils that don't measure up to well-known industry-established standards. For the last few years, API testing has found that up to 1 in 5 oils don't measure up.

API realizes this is a problem and is now offering a solution that recognizes those who deliver and install the quality oils consumers expect.

The Solution

Motor Oil Matters (MOM), API's consumer watchdog program for the industry, has one main goal: maintaining a secure chain-of-custody for motor oil from the oil manufacturer all the way to the vehicle to make sure that motorists receive the high-quality oil they are paying for.

Joining MOM is an easy way to show your commitment to motorists and their vehicles. You qualify if you prove you know the brand, viscosity and performance level of the oil you're delivering or installing and you provide the same information to your customers. MOM certification can deliver real benefits for your business today, including helping:

- Separate you from the competition
- Protect you from potential issues caused by others in your supply chain
- Give consumers an easy way to find you through the MOM real-time licensee locator
- Highlight your business commitment to the highest quality standards
- Meet new state requirements for identifying bulk motor oil

Becoming a MOM-licensed location is simple: provide some proof to API that you meet the API chain-of-custody standard, be willing to submit to some API testing and commit to always providing quality motor oil.

MOM is here to drive motorists to service providers committed to delivering and installing quality motor oil and,

at the same time, remind motorists about the importance of using quality motor oil.

MOM is teaching motorists to look for the MOM certification mark whenever they need an oil change. It's fast becoming a sign that the location is prepared to stand behind the oil being installed.

Sign Up for MOM

Sign up today and get the help you need from the one you have always counted on – MOM.

For further information about Motor Oil Matters or to enroll in the program, visit www.MotorOilMatters.org.





CONCERNED ABOUT NEW STATE REGULATIONS?

JUST ASK MOM



If you're faced with meeting new state requirements for motor oil, API's Motor Oil Matters (MOM) program can help. States are adopting new rules that require oil change locations to provide information that consumers need to make informed decisions on motor oil. MOM helps oil change locations meet the new rules through API's standard, API 1525A, Bulk Engine Oil Chain of Custody and Quality Documentation, and the MOM licensing program for motor oil distributors and oil change locations. The new rules and API's recently published standard simply provide what consumers should know: a bulk motor oil's brand, viscosity, and performance level.

So meet MOM today and let her help you meet the new state requirements. After all, MOM knows best.

**FOR MORE INFORMATION
ABOUT MOM OR TO ENROLL,
VISIT MOTOROILMATTERS.ORG**

PROVIDING YOU WITH SEAMLESS PRODUCT INSTALLATION TO INCREASE YOUR ROI

What is the most important factor to you when selecting repair parts? According to ABRN 2012 industry research, 75 percent of the collision repairers believe that part fitment and function are the chief considerations for parts purchase.

DEPO/Maxzone Auto Parts Corp., a leading manufacturer and distributor of superior automotive lighting and mirror products, proudly serves the industry with our “Engineered to Fit” products. DEPO’s expertise in R&D, Manufacturing, and distribution truly sets us apart from other brands. We recognize how quality parts and seamless installation can save you time and increase your ROI so we’ve made it a priority to provide the highest quality part in the market.

Vehicle Test Fit

DEPO always has and will continue to strive for quality improvement. We started incorporating a self-imposed Vehicle Test Fit (VTF) in the product development process more than ten years ago. Over 90 percent of DEPO lamps and mirrors go through the VTF process. The process is conducted by DEPO engineers with years of experience in the auto parts manufacturing and fitment process.

Here is a brief synopsis of the DEPO VTF process:

- I. Acquire a non-damaged vehicle.
- II. Detailed measurements are taken of OE product.
- III. Remove the OE part and compare the overall appearance between the OE and DEPO product.
- IV. Install the DEPO product and verify functions.
- V. A comparative analysis is performed on gap, screw hole and flush measurements, bodylines, attachment points and ease of mounting.
- VI. Remove DEPO testing lamps and re-install the OE lamps back to Pre-VTF condition.

With the measurements, the necessary adjustments are made on the tooling and the process is repeated until the product prototype meets or exceeds OE fitment and function.

We are periodically looking for undamaged vehicles for our VTF program. If you are interested in earning extra cash, please register on our website.

All DEPO products comply with SAE/DOT regulations. DEPO customers will always get a quality product with OE like form, fitment and function.



Third Party Certification

DEPO is the leader in CAPA certified lamps with the largest part numbers available. To further show our commitment to quality, DEPO was the first company to receive NSF Certification on lamps.

Continuous Improvement

A major component of our continuous improvement process is requesting that all defective products be returned at our expense for individual inspection. This enables our QA team and Engineers to quickly identify the root cause of any quality issues and correct it. DEPO spares no expense in trying to deliver the highest quality product to the market. We firmly believe that our persistence will be recognized through your seamless product installation experience.

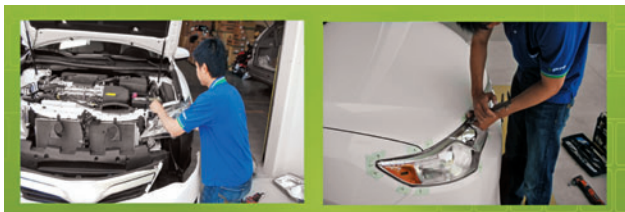
Product Lines

DEPO/Maxzone offers a wide range of quality product lines including OE replacement lamps, rear view mirrors, performance lamps, blower assemblies, radiators, cooling fan assemblies, door handles, and window regulators. With four warehouses strategically located in CA, IL, GA and NJ, Maxzone provides complete service and just-in-time delivery for our customers in North America.

Like Us on Facebook

DEPO wants to reach out and hear from end users or people who actually handle and install our parts through social media and campaigns. Like us on Facebook and share your thoughts with us. Your opinion can help improve the DEPO product and further meet your expectations.

www.maxzone.com



MAXZONE is a subsidiary of
DEPO[®]

BUILT TO TAKE IT WHEN THE HEAT IS ON



DEPO cooling system achieves optimal performance by utilizing advanced technology and quality materials in R&D and manufacturing. Furthermore, precision tests are conducted to assure that you get the same exceptional DEPO product everytime.

MAXZONE is a subsidiary of
DEPO

www.maxzone.com

SMART DEVICE PLATFORMS ENABLE ROAD DIAGNOSTIC SESSIONS

Smart Device Enabled

Diagnostic tool makers have been providing tools which run either on their own custom hardware or on common compute platforms like Windows® based PCs. With the powerful computing capabilities now available in smart devices and tablets, it is time to take advantage of these devices as diagnostic tools. As they did back in 2000 when Ross-Tech created one of the first PC based OE level diagnostic tools, Ross-Tech now brings to the aftermarket the first OE level diagnostic tool that is platform independent and can be used on hand-held smart devices. Running the acclaimed Ross-Tech VCDS® and the newly announced VCDS-Mobile™, the Ross-Tech HEX-NET™ WiFi interface eliminates the need for a wired tether to the VW-Audi Group vehicle being scanned.

Communicating through a WiFi connection (802.11B/G) and a web browser, or with the standard VCDS program on a Windows PC, this interface frees the user from needing a particular hardware platform. No longer will technicians have to wait for the shop PC to be available. They can simply pull out their smart phones, connect to the HEX-NET device, and begin diagnosing the entire vehicle, without having to install any software on their phones.

VCDS-Mobile - Smart Diagnostics

VCDS-Mobile is not an app for smart devices. It runs entirely within the HEX-NET and provides the features of Ross-Tech's VCDS on the smart mobile platforms. With VCDS-Mobile, the user can view fault code information, view and log PIDs, and they can display the PIDs using graphs and gauges. Coding, Basic Settings and Adaptations are provided through a connection to the VCDS-Cloud server. With an internet connection, these factory level functions are available in the shop or on the road!



On the Road

With the smart device and phone technology, the technician can take the HEX-NET on the road to troubleshoot dynamic problems that are not easily repeatable in the shop. Logged PIDs can be saved to the VCDS cloud for viewing upon arrival back at the shop. With a road tool that works on the technician's personal phone or other smart device, time to diagnose can be significantly reduced.



Price/Performance Unmatched

Continuing Ross-Tech's commitment to bringing cost effective VW/Audi diagnostic solutions to the aftermarket, the HEX-NET is no different. The HEX-NET delivers an OE level tool with the freedom to move around un-tethered to the car or the shop using the phones and/or tablets your technicians already own.



www.Ross-Tech.com



Ross-Tech

Diagnostic Software for VW-Audi Group Cars



HEX-NET™ Wifi Interface for VCDS® and VCDS-Mobile®

- 📶 WiFi connection (802.11B/G)
- 🌐 Coverage from 1990 to 2014
- 🔔 Read and Clear Trouble Codes
- 👤 View, Record, Display PIDs
- 🔧 Perform Calibrations and Resets
- 🔧 Code Replacement Modules



Browser Based Diagnostics
Via WiFi & Cloud



PC Based Diagnostics
via Wifi or USB

Developed, Assembled, and Supported in the USA 🇺🇸.



Smart Device Platforms Enable Road Diagnostic Sessions

www.Ross-Tech.com

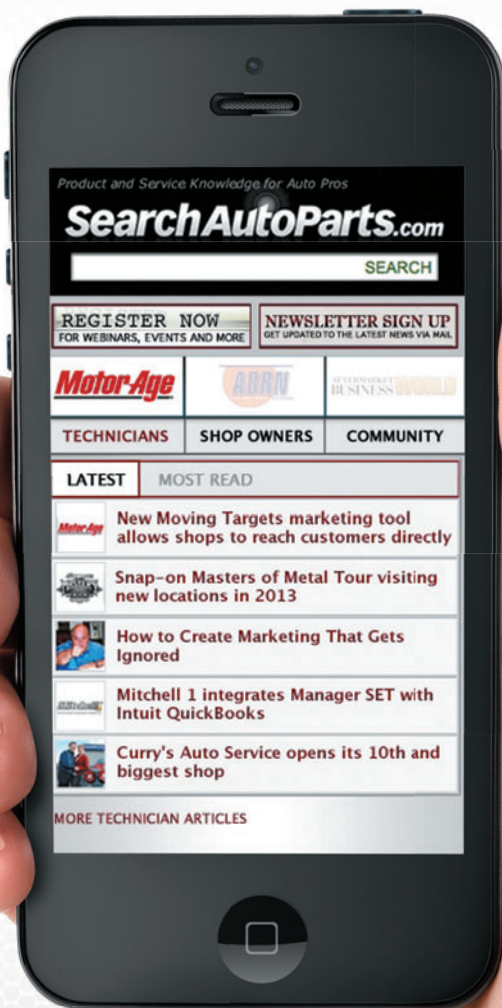
267-638-2300

NOW YOU CAN TAKE IT WITH YOU

ALL OF THE VALUABLE INFORMATION YOU'VE COME TO DEPEND ON FROM ***MotorAge*** - FORMATTED FOR YOUR MOBILE DEVICE!

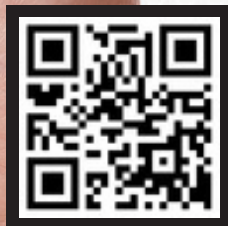
AWARD-
WINNING
NEWS AND
ANALYSIS

BUSINESS
RESEARCH AND
FORECASTING



TECHNICAL
TRAINING
AND MEDIA

PLUS SO
MUCH MORE!



MOBILE INFO FOR AUTO PROS!

VISIT **WWW.MOTORAGE.COM** FROM YOUR MOBILE DEVICE. IT'S THAT EASY TO TAKE YOUR FAVORITE INDUSTRY CONTENT ON THE ROAD!

“Hard to find parts aren’t
so hard to find anymore
with TechSmart®.”

– Oswaldo Lorenzana, Owner
Tolima’s Auto Center

Finding the right parts
doesn’t have to be hard.
Smart technicians choose
TechSmart® because of our
commitment to engineering
quality parts that meet or
exceed OE standards.

Join the thousands of
technicians like Oswaldo
who choose TechSmart®
Parts when they need to
get the job done right.

TechSmart

SMP®

Oswaldo is TechSmart – Are You TechSmart?

Learn more about Oswaldo and tell us what makes you TechSmart.
Go to www.TechSmartParts.com



TRICO: THE LEADER IN WIPER INNOVATION

In today's need-it-now marketplace, it's not enough for a wiper manufacturer to produce technologically advanced products that keep pace with improvements made in vehicle design and driver preferences. To stand above the rest, a wiper manufacturer must also develop effective ways to guide consumers through the purchase process and ultimately help automotive service professionals close the sale.

Trico Products has embraced this expanded role by continuously engineering new wiper products that aid in safer driving.

Original Look, Superior Performance

Many consumers simply want to restore their vehicles back to original factory performance, fit and look. That's why Trico Products has developed the TRICO Factory Replacement Center®, a program that makes it easy to find and install the TRICO Exact Fit® blade specifically designed for each driver's vehicle.

The TRICO Factory Replacement Center features a newly expanded line of TRICO Exact Fit blades including beam, hybrid, conventional and rear blades that provide unmatched coverage for nearly 99 percent of consumer vehicles on the road today. Leveraging TRICO's close relationships with OEMs, TRICO Exact Fit blades offer the fit, form and function of original equipment right out of the package.

TRICO now offers five new TRICO Exact Fit rear windshield beam blades to fit 2004 through 2014 models of Audi, BMW, Ford, Volkswagen and Volvo vehicles. The new line features five arm designs including V-Notch, Cross Pin, Push Button, Pinch Tab and Trunion.

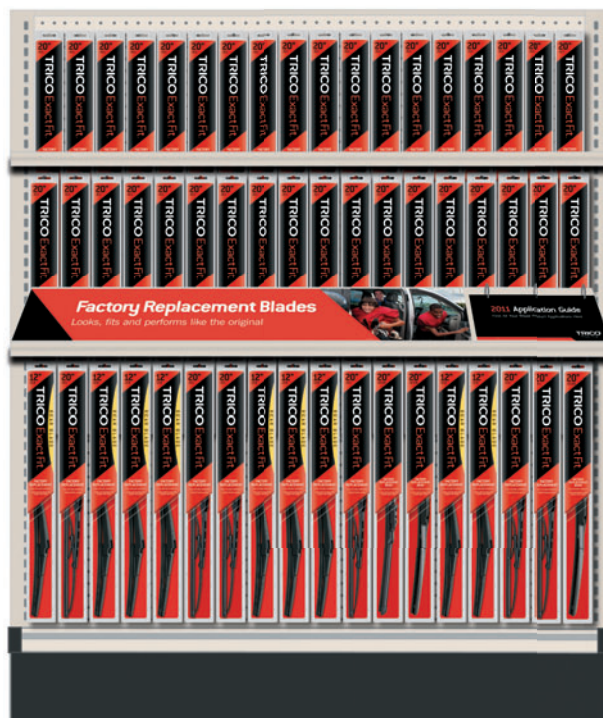
To make installation a snap, TRICO Exact Fit wiper blades are pre-assembled with the specific adaptor for the consumer's vehicle, eliminating the fuss of multiple adaptors and complicated instructions.

A Winter Weather Fighter

Although beam blades are considered an all-season wiper, TRICO invented the winter blade in 1953 and has recently perfected it with TRICO Ice®. This all-new, winter weather blade provides maximum performance in the most unrelentingly harsh conditions.

TRICO Ice features a wedge-shaped spoiler that clears away snow and ice buildup. This new design conforms to windshield shapes to distribute even pressure for a clear wipe, while the low-profile contour compliments new vehicle models and maximizes line of sight.

A form-fitted boot guards critical wiper components, yet allows complete flexibility. The wiper element infused with Teflon® surface protector helps resist tearing and ripping in sub-



zero temperatures to battle the elements and eliminate chatter for a smoother, quieter wipe.

Many Options, One Single Resource for Wiper Products

As consumer demands and automobile technology constantly evolve, Trico Products offers a full selection of advanced products and high-impact merchandising programs to support service technicians and counter professionals. TRICO. Seeing you through®.

Trico Products

3255 W. Hamlin Road, Rochester Hills, MI 48309

Phone: 1-800-388-7426

Web: tricoproducts.com

TRICO®

seeing you through™



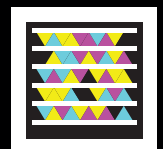
Engineered for
today's intense driving
environment.

TRICOForce®

Turning wind force into wiper pressure

TRICO® wiper products perform when you need them most. With TRICO Force, you get a superior performance blade designed to withstand even the most turbulent weather.

- **VorTec**® aerofoil converts wind force for maximum windshield contact
- **HighGlide**™ treated rubber element for a quieter wipe
- **SWIFT**® Easy Connection Technology
- Robust superstructure for durable all-weather performance



Get the free mobile app
at <http://gettag.mobi>

tricoproducts.com/force



TRICO®
seeing you through.

WHEN YOUR TOOL'S NOT ON, YOU'RE LOSING MONEY

Your phone, computer and TV seem to start instantly, why not your scan tool? After all, a minute idle is a minute you're not making money. The OTC Encore, the industry's first fully integrated scan tool for the Android platform was built to get you working faster. An intuitive mobile platform means faster boot times, faster scans and less down time.

Fully Integrated

"What we mean by a fully integrated tool is the ability to search, using the tool, Web resources and forums, as well as on-tool databases of code definitions and fixes," said Ed Lipscomb, OTC Senior Product Manager, Global Diagnostics. "There's no walking away from the car to search, you can do it all right at the fender."

Of course, what good is a fast scan tool without the vehicle coverage you need to back it up? Behind Encore's seven-inch touch screen is a wealth of OEM-level coverage, more than 30 years, for Asian, Domestic and European makes and models.

How the system works

Once Encore pulls a code, it relies on well-known resources and embedded video to offer a fix. The system automatically searches

its on-tool database, relying on millions of experience-based and reported fixes. The databases, including Code-Assist™, Repair-Trac™ and Symptom-Assist™, combine to search more than 30 million confirmed fixes, specific to vehicle year, make and model.

"We've made diagnostics easier, faster and more efficient with the Encore," added Lipscomb. "We take the code, search the Web and the tool, giving you the most likely fix, second most likely and so on."

Not only does it offer the technician a fix, embedded video can help guide the repair. Encore arrives with more than 70 training videos to guide performing specific tests or repairs.

Additionally, Encore scans Identifix® Direct-Hit® and web resources, requiring technicians to enter their Identifix Direct-Hit login just once to enable automatic searches for fixes during vehicle scans. OTC is also currently expanding to integrate IATN into the Encore.



Extent of Coverage

For a technician, nothing beats an all makes/all models tool. One purchase to service all vehicles saves money and expands the opportunity to profit.

As a scan tool in the OTC family, Encore boasts OEM data providing broad and deep coverage from late model 2013 all the way back to the early 1980's, including Domestic, Asian and European vehicles. The data, from generic to OE-specific codes, also includes component locations, specs, test procedures and TSB references for quick access and quick fixes. Encore also features bi-directional testing and vehicle data stream.

Proof is in the Product

Automatically searching onboard resources and integrated technician networks, including likely fixes and guidance, provides the type of guidance needed to find the issue, make the fix and keep you working – and profiting. While a scan tool is not an end-all to fixing a vehicle, Encore gives you what you need in a simple, familiar layout in the Android system. Other tools on the market offer similar services, but none in a complete package like the Encore, nor at the tool's price point.

The bottom line? Encore offers an intuitive, fix-it-quick scan tool for all makes and models service, backed by OTC's trusted diagnostics coverage and databases.



EXPERT TIPS FROM TECHS DRIVE MITCHELL 1 SURETRACK COMMUNITY

Every technician has hit the wall when diagnosing a vehicle. Having a community of experienced technicians to reach out to for ideas and a quick answer can help get you over the hump and back to fixing the vehicle.





That's why the interactive community of expert technicians in Mitchell 1's SureTrack solution has become so popular. The community is a key benefit of SureTrack™, a powerful experience-based diagnostic tool for technicians that is integrated with the OEM repair information in ProDemand™.

Eric Girard, owner of Eric's Automotive in Weaverville, N.C., is an experienced service professional whose focus is on diagnostics. With over 7,000 posts in the SureTrack Community, he's the most prolific member of the community and takes great pleasure in sharing his knowledge and experience with others. Below is an excerpt from a recent conversation that Mitchell 1 had with Eric. His story is a great example of how SureTrack helps technicians fix more cars – more accurately and with more confidence.

Mitchell 1: Tell us a little about yourself — what is your education and automotive background?

Eric: I started my life on a dairy farm in rural North Carolina working on tractors and trucks. I guess you can say that I have what I like to call “mechanicking” in my blood. My grandfather and father were both mechanics and I learned from them. From there I got my formal automotive training from Goodyear and local community college automotive training programs. I have worked professionally in the automotive field since 1987 and have been an ASE certified technician since 1992. Working on vehicles is all I have ever done. It is what I know.

Mitchell 1: With 7,121 posts, you are the most active

	ericautomotive Trusted Tech	Submitted February 5, 2014 @ 09:07 Both valve seals and piston rings..... Both are major repairs if not engine replacement... I don't like having the blocks bore excessively on Toyota products. If it is a ring issue.....	 Best Answer - Rated by Asker of Question
	10 Questions 3997 Answers 10023 Points	 264 Best Answer(s)  383 Good Answer(s)	

A SureTrack community member posted a question about a 2002 Toyota Corolla with a P0171 and rattle in the engine. The car had been recently purchased by one of their customers. The tech thought it was a problem with the O₂ sensor, but it turned out to be major engine mechanical issues due to low oil. Eric Girard (ericautomotive) had the best answer and the car was ultimately returned to the seller.

contributor in the SureTrack Community. What do you enjoy most about being part of the community?

Eric: I have gained so many friends, a sense of camaraderie and a great deal of diagnostic knowledge. I really gain a lot of satisfaction from helping my fellow technicians. I love being able to learn more about cars in general while helping others find out what is wrong with the vehicles they are working on. There is always something to learn. I feel a strong sense of accomplishment being able to help other technicians with problematic vehicles.

Mitchell 1: What are your favorite features of SureTrack – and why?

Eric: I really appreciate the code search capability and the lab scope library with the inventory of good patterns. You always want to see what a good signal looks like, it is very important. Boy, I love that thing!

To read more of our conversation with Eric, please visit the Mitchell 1 Shop Connection blog at www.mitchell1.com/shopconnection. Sometimes it really does take a community to solve tricky vehicle issues. You can take advantage of the SureTrack Community and get ideas and quick fixes by email, often within minutes of posting your question.

To get started, call 888-724-6742 to start your free trial of ProDemand optimized with SureTrack.

SURETRACK™

Mitchell1®

TOOLBOX

TOOLS, PARTS AND
RESOURCES FOR EVERY
SHOP EVERY DAY

the latest products & TECHNOLOGIES TO HELP YOU WORK SMARTER AND KEEP YOUR SHOP PROFITABLE



THERMAL IMAGING CAMERAS

The "PREDATOR" Series of Thermal Imaging Cameras from General Tools & Instruments (General) is expanding to include nine extended temperature range models. General's GTi10, GTi20 and GTi50 are now available in models with temperature measurement ranges up to 600°C (1,112°F), 1,000°C (1,832°F) and 1500°C (2,732°F). Ideal for revealing hidden heat-driven problems, General's thermal imaging cameras detect very small temperature differences from a distance and convert an object's invisible infrared radiation to a visible color image, the company states. These visual thermal images (called thermograms) with multiple temperature points enable the diagnosis of equipment malfunctions and poor performance far more effectively than single-spot conventional temperature measurement devices. Like the products in the original line, the new extended temperature range models offer outstanding benefits and value with a range of sophisticated features all at a best-in-class price.

For more information, visit

www.generaltools.com General Tools & Instruments

SYNTHETIC AUTOMATIC TRANSMISSION FLUID

AMSOIL introduces OE synthetic automatic transmission fluid, available in multi-vehicle and fuel-efficient formulations. It provides protection in normal and severe service, resisting wear on vital parts and extending transmission life, according to the company. AMSOIL OE Synthetic Automatic Transmission Fluid is thermally stable and guards against the harmful effects of thermal breakdown. It helps components stay clean by resisting heat-related evaporation and viscosity loss. It provides reliable cold-weather performance and remains fluid in sub-zero temperatures for fast, reliable shifts during cold starts. Its excellent low-temperature fluidity also maximizes fuel efficiency. Formulated with friction modifiers, AMSOIL OE Synthetic Automatic Transmission Fluid promotes shudder-free starts and smooth clutch engagement. Seal conditioners help prevent seals and gaskets from drying out and cracking, reducing the risk of fluid leaks.

For more information, visit

www.amsoil.com AMSOIL Inc.



PLIERS WRENCH

The pliers wrench, from KNIPEX, eliminates the need for a full set of wrenches by providing the functions of a pliers and a wrench all-in-one tool, the manufacturer reports. The new pliers wrench features excellent gripping, holding, pressing and bending by employing a 10-to-1 lever ratio. With smooth jaws, the pliers wrench will not damage or mar work pieces, making it ideal for work on chrome-plated fittings or soft metals. The push-button, positive-locking mechanism allows for a wide range of adjustment positions while the gripping jaws remain parallel regardless of handle position. Parallel jaws hold the full surface of a nut or bolt and will not slip or round out the fastener.

For more information, visit

www.knipex-tools.com Knipex Tools

LEAK DETECTOR

The Bullseye Leak Detector from Automotive Test Solutions, Inc. accurately finds leaks as small as .001 of an inch in just three easy steps. It analyzes pressure stability to determine if a leak is present and its size. The Bullseye Leak Detector finds the area of the leak. The Bullseye Leak Seeking Foam changes color to pinpoint the leak. Bullseye Leak Detector pressurizes a sealed system with system-safe CO₂ using readily available cartridges, the company states. Bullseye Smart Control gives the technician the ability to control vent and purge solenoids with just the push of a button. Bullseye Gauge indicates to the technician that a leak exists and its approximate size. Bullseye Leak Detector is used to locate the approximate area of the leak. The technician then sprays the non-toxic Bullseye Leak Seeker Foam on the area to pinpoint the leak. Bullseye Leak Detector finds leaks in EVAP systems, A/C systems, engine cooling systems, head gaskets, tires and wheels, air ride suspensions, air brakes and much more.

For more information, visit

www.automotivetestsolutions.com Automotive Test Solutions



HEAVY-DUTY SWAY BAR END LINKS

SuspensionMAXX have developed MAXXLink Heavy Duty Sway Bar End Links as a durable, cost-efficient and long-lasting solution for the Dodge OEM end links, which are known to have a short service life. MAXXLinks are also available in extended lengths for vehicles that have leveled or lifted up to six inches, the company reports. The MAXXLink end link system replaces the vulnerable OEM ball-in-socket style link with a simple and robust design; no more changing your Dodge's sway bar links every 50,000 miles. The company describes it as premium quality and made in the USA from a combination of high grade steel and corrosion-resistant components. MAXXLinks can be used as high-quality replacement parts or as a preventative maintenance measure and are available for 1994 to 2014 Dodge Rams.



www.suspensionmaxx.com
SuspensionMAXX Inc.

ELECTRONIC FUEL INJECTION SYSTEM

Edelbrock introduces the NEW E-Street Electronic Fuel Injection System and Fuel System Kits. The E-Street EFI System is intended as an affordable, easy to use, fuel injection solution that can be installed on any V8 engine originally equipped with a carburetor. The Edelbrock E-Street EFI System includes a pre-assembled throttle body, engine control unit (ECU), 7-inch touch screen tablet PC, high quality wiring harness, wide band O₂ sensor and instructions for a hassle free installation, according to the company. The core of the E-Street EFI



system is the 7-inch touch screen tablet PC that comes pre-installed with an easy to use application for system setup. The proprietary E-Tuner application allows the user to setup the system along with the ability to modify the tune to accommodate future engine upgrades. This full feature application is simple to use and includes pre-programmed dashboards for monitoring system performance and controlling other vehicle operations while the engine is running. Finally, the tablet PC uses wireless connectivity to communicate with the ECU and can be dash-mounted for ease of viewing while driving with the supplied mounting bracket.

www.edelbrock.com
Edelbrock

DESLUGGER

With the Deslugger, the latest from Four Seasons, professional technicians can strike out the slugging that occurs when excess oil and/or liquid refrigerant collects in the compressor after the system has been idle or parked over a period of time. Available Desluggers include the Universal Deslugger, designed for 06-02 Honda CRV's with a scroll compressor, but also can be used on applications that have a two-wire lead oil coming from the coil of the compressor. The GM Deslugger covers 09-00 GM applications with Denso 10S models. Connectors are included for easy installation. The Chrysler/Dodge Deslugger covers Chrysler Voyager and Dodge Caravan applications with Denso 10S models. Connectors are included for easy installation, according to the company.



www.4s.com
Four Seasons

CORPORATE PROFILE

ADVERTISEMENT

PILOT BEARING / BUSHING

Most rear wheel drive, and some front wheel drive, vehicles with manual transmissions use a pilot bearing/bushing. The pilot bearing/bushing supports and centers the transmission input shaft and clutch disc. When the clutch is disengaged, the pilot bearing/bushing allows the flywheel to maintain engine RPM while the input shaft is slowing down and stopping.



Types of pilot bearing/bushing include conventional ball bearings, needle bearings and sintered bronze bushings.

When a pilot bearing/bushing fails, a driver may exhibit: no release; the transmission may pop out of gear; noise; vibration; and, if not fixed, catastrophic failure of the transmission.

Early signs of the pilot failing may



be noise whenever the clutch is disengaged. The driver may also notice that the transmission is difficult to shift between gears or hard to put into reverse or first gear when stopped.

When the pilot is failing, or has failed, the input shaft will be allowed to walk around causing it to go off center. When this happens, the transmission input shaft will begin moving around inside the transmission causing the gears and synchronizers to be off center resulting in the transmission popping out of gear.

If the vehicle has a high output engine, the misalignment will cause the input shaft gear to not mesh with the counter shaft gear properly and ultimately will cause the gears to fail. (see Figures 1 and 2).

When a clutch is replaced the pilot bearing/bushing should always be replaced as part of the service.

Phone: 800-274-5001
www.Schaeffler-Aftermarket.us



SCHAEFFLER
AUTOMOTIVE AFTERMARKET



DEF TESTER

The Pocket Size DEF Tester from Thexton Manufacturing, Part No. THX109, features three floating balls which measure the concentration of urea. If one ball floats, the concentration is less than 32.5 percent, too diluted and needs replacement. If two balls float, the concentration is the proper 32.5 percent. If all three balls float, the DEF is too rich and needs replacement, the company says. THX109 comes with a vinyl pocket protector and imprinted instructions.

www.thextontools.com

Thexton Manufacturing



OXYGEN SENSOR

Bosch has introduced the generation X-Four Oxygen Sensor. The X-Four is smaller, more compact and offers greater flexibility to the OEMs (original vehicle manufacturers) in selecting the mounting position, the company states. A unique feature of the X-Four is the internal planar element. It's about a half an inch shorter and reaches full operating temperature in less than seven seconds. The original unheated thimble type sensor took over a minute to reach full operating temperature.

www.boschusa.com

Bosch



HEADLIGHT LENS CORRECTOR

This Headlight Lens Correction Kit is an affordable and easy do-it-yourself kit that requires nothing more than a little elbow grease and contains everything needed to beautify the headlights of any car, effectively eliminating light oxidation, general cloudiness and surface scratches and ultimately delivering a crystal clear finish worthy of a show car, the company states. This simple three-step Headlight Lens Correction Kit includes a 4 oz. bottle of PlastX, three double-sided sanding discs with four different grits (1800D, 2400D, 3200S and 4000S), a premium Meguiar's microfiber towel and a 1 oz. sample of Meguiar's Headlight Protectant.

www.meguiars.com

Meguiar's Inc.



REDI-SENSOR INSTALLER KIT

Continental Commercial Vehicles & Aftermarket has introduced the VDO REDI-Sensor Installer Kit for automotive technicians. The new kit comes with one of each of the three REDI-Sensor sensor assemblies and four sensor service kits. The REDI-Sensor Multi-Application TPMS Sensor Program allows technicians to cover 85 percent of TPMS equipped vehicles without waiting for parts delivery, the manufacturer says. All components in the kits are included in a special tackle box. The tackle box has adjustable compartment trays to help shops easily store and organize all of their REDI-Sensor TPMS replacement sensors and service kits, so everything is right at hand and easily accessible. VDO REDI-Sensor Multi-application TPMS sensors replace more than 140 OE sensors, are designed to follow OE vehi-



cle relearn procedures and work with all major TPMS scan tools, including those from ATEQ, Bartec, OTC / SPX, K-Tool (T.I.P.S.) and Snap-on.

www.continental-corporation.com

Continental Corporation

DIFFERENTIAL ASSEMBLIES

DTE Performance Differential Assemblies for Corvette C5 and C6 handle extra engine power while offering longer life than OE differentials and avoiding catastrophic failure. Differential packages are offered in upgrade levels that align with many common engine modification packages from stock to pure competition. The Stock Series offers an economical means to have a factory stock differential torn down, inspected and refurbished, the company says. The Street Series is for the Corvette that is exclusively driven on the street, but has mild power increases. The Sportsman Series provides ultra-high strength for high powered Corvettes that see track competition, yet also are regularly driven on the street. All series are offered with equipment options to meet exact customer specifications. Differentials can be built using a customer supplied carrier, or a DTE provided carrier, and a differential exchange program is offered.



www.performancebydte.com

DTE Performance

ENGINE HOIST

ARIHETRA debuts its newest product, the Engine Hoist AH09756, to its product line. ARIHETRA's Engine Hoist is an essential lifting accessory for the heaviest components of your heavy-duty vehicles. Its strength, boom rotation, spring retracting chain and three step boom extension lengths make it a maneuverable tool that allows technicians to work with the space afforded to them, states the company. With the AH09756 Engine Hoist, ARIHETRA has created another quality lifting accessory for the heavy-duty vehicle maintenance industry. The Engine Hoist places a large emphasis on safety with a 9,000-pound lifting capacity, which is capable of handling most engine sizes. This maximum lifting capacity combined with its collapsible frame help this tool exceed job performance standards and allow it to be easily stored away when unused.



www.arihetra.com

Ari-Hetra

AUTOMOTIVE PRODUCTS GUIDE

TESTED TO THE EXTREME

We put 100 years of under-the-hood experience into every part we make. No wonder we back our fuel pumps with a lifetime warranty. Our fuel pumps are tested to be durable up to 150,000 miles and in more than 20 percent ethanol, so they deliver 100 percent satisfaction for you and your customers.



Delphi

CYLINDER HEADS



MANUFACTURING COMPANY
800.443.7730 • Pittsburgh, PA

Crack Repair Experts!
**New and Remanufactured
Cylinder Heads**



Over 200 Part Numbers Available

**Cast Iron
or
Aluminum**

WHOLESALE PRICED HEAD GASKET SETS

Check Out a Sample of Our Pricing!

BMW	GM	HYUNDAI
2.8 3281/5281\$865.00	2.2 ECOTEC DOHC\$445.00	2.0/2.4 DOHC\$445.00
CHRYSLER	3.4 V-6 OHV\$157.00	KIA
2.4 DOHC\$315.00	4.3 V-6 OHV VORTEC\$170.00	1.6/1.8/2.0 DOHC\$445.00
3.9 V-6 MAGNUM\$170.00	4.8/5.3 V-8 OHV\$220.00	TOYOTA
5.2/5.9 V-8 MAGNUM\$195.00	5.7 V-8 OHV VORTEC\$220.00	2.2 CAMRY\$340.00
FORD	JEEP	VW
2.0 SOHC\$290.00	3.7 V-6 SOHC\$340.00	1.8 TURBO DOHC\$685.00
3.0 V-6 OHV\$175.00	4.0 STRAIGHT 6 LATE\$315.00	
4.0 V-6 OHV\$195.00	4.7 V-8 SOHC\$315.00	
4.6/5.4 SOHC\$315.00		

**FACTORY
DIRECT PRICING**

CALL 800-443-7730 TODAY!

PARTS & ACCESSORIES

**EXHAUST & INTAKE
MANIFOLDS**

49 State direct replacement manifold converter



STEVENS

Specialty Engine Parts

800-443-2673

We also stock

- Oil Pans
- Timing Covers
- Harmonic Balancers

SAME DAY SHIPPING
WWW.STEVENSAPARTS.COM

FREE Catalog available on request



ADVERTISE TODAY!

PARTS & ACCESSORIES



Turbos

All turbocharger brands rebuilt and sold
Call 800-297-3626. 1000 S. Wildwood Suite # 10
Irving TX, 75060
ONE DAY SERVICE IN MOST CASES
email: turbomike39@netzero.com

www.dallasturbo.com

POSITIONS AVAILABLE

Looking for Tech's Resumes?

16,000 + Tech's Resumes Online

looking for a job?

1000 + Automotive jobs Online

www.ACTAutoStaffing.com

800-489-0536



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 **Keith Havemann** at

Ph: 310-857-7634

Fax 310-943-1465 or

E-mail: khavemann@advanstar.com

PRODUCTS



www.TimsTurbos.com
TimTurbos@aol.com

1-866-3TURBOS
703-241-7411

TURBOCHARGER REBUILDING

Performance Turbos
Gas & Diesel
On-Line
Store

Boost it!



PRODUCTS & SERVICES

Stop Paying Part Store Prices



Sherco Auto & Marine Supply
800-548-6229

Cable Ties Made in USA - Priced per 100 pack
8" \$2.95 * 11" \$4.75 * 14" HD \$9.26

USA Primary Wire 100 ft 14 ga \$18.95, 16ga \$13.95

100 Butt Connectors, 16-14ga \$4.25 * Red 22-18ga \$3.50

U.S.A Heat Shrink Butts \$29.95 /100 Blue or Red

Lowest Pricing on Wiring Supplies, Bulbs, Fuses, Etc

Call for Catalog or Order @ <http://www.autosupply.ws>

SOFTWARE

REPAIR ORDER PRO

Affordable desktop estimating & invoicing for all repair shops.

- Easy to use
- Free trial download* or disc
- Free technical help & upgrades to new computers
- Integrated reporting & income management.
- Pay just \$240 for unlimited use
No contracts or monthly bills
- Vehicle history, stock jobs & multiline jobs.

SWAN RIVER SOFTWARE

sales@shesmylittle.com • 866.584.5556
<http://www.shesmylittle.com/>*

**Repeating
an ad
ENSURES
it will be
seen and
remembered!**

**Hit the fast lane
of the
Automotive
Industry**

**for Web Exclusives and Advertising
Opportunities Go to our Websites**

www.searchautoparts.com

MotorAge
ADVANCING THE AUTOMOTIVE SERVICE PROFESSIONAL | WWW.MOTORAGE.COM

**Content Licensing
for Every
Marketing Strategy**



Marketing solutions fit for:

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

Logo Licensing | Reprints | Eprints | Plaques

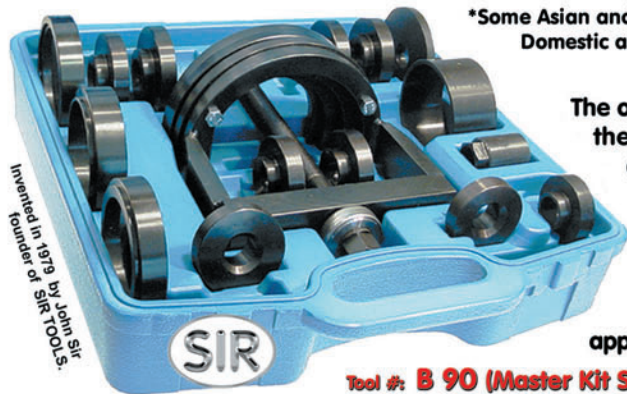
Leverage branded content from *Motor Age* to create a more powerful and sophisticated statement about your product, service, or company in your next marketing campaign. Contact Wright's Media to find out more about how we can customize your acknowledgements and recognitions to enhance your marketing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

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

TOOLS & EQUIPMENT

ORIGINAL HUB MASTER

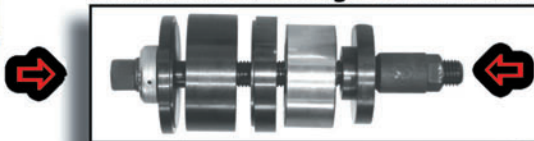
REAR + FRONT + AWD EUROPEAN VEHICLES*



Invented and
founded by Sir Tools.

*Some Asian and Domestic as well!

: Tracks Arrow-Straight Under Load :



The original "HUB MASTER" in service since 1979 and demanded the World over by race car teams, professional technicians, car clubs and serious automotive enthusiasts. Applicable to wheel bearing/hub assemblies where power is being directly applied to that wheel from the engine. Vehicles that require the HUB MASTER are equipped with an independent suspension and a Singular Solid Roller Bearing at that wheel. The HUB MASTER is not applicable to solid/live axles or trapped bearing/hub assemblies.

Tool #: **B 90 (Master Kit Shown)**
which comes complete w/ blow mold case.

THIS EXCLUSIVE DESIGN IS THE ONLY ONE OF ITS KIND FEATURING:

- Exclusive self-centering design which tracks arrow-straight under load.
- Easy R&R of rear wheel drive European vehicles.
- Wide application range of front wheel drive vehicles.
- Available as vehicle specific sub-kits (non master kit).
- Complete and very easy to follow instructions.
- Fully open-ended, the HUB MASTER is upgradeable to the ever changing vehicle market.

**SEE IT IN ACTION
ON YOUTUBE FROM
SATISFIED CUSTOMERS
ALL OVER THE WORLD!**

WWW.SIRTOOLS.COM

PORTABLE STRUT MASTER

RELIABLE + ADJUSTABLE + IMPACT WRENCH COMPATIBLE!



STOUT HINGED ARMS!

This Coil Spring Compressor Only Weighs 20Lbs. & is Stronger Than Most Work-Station Models!

Oliver Sir Concept
Launched 2006

- Portable for "On-The-Car" Use!
- Impact Wrench Compatible!*
- Fully Adjustable to Many Coil Styles & Shapes!
- Exclusive Coil Safety Locks!
- Completely Reliable!



COIL CONFORMING
NO-SLIP JAWS!

View All Features & Specifications @
www.sirtools.com

Tool #: **ST 9050**

Comes Complete With a Custom Blow Mold Storage Case!



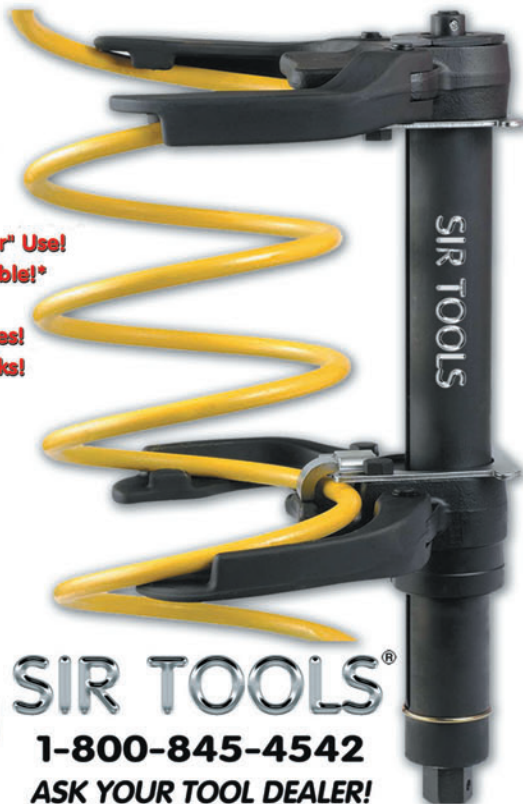
**when operated per manufacturer's guidelines.*



EXCLUSIVE COIL
SAFETY LOCK!



Optional Bench Vise
Tool #: ST 9050-BV



SIR TOOLS®
1-800-845-4542
ASK YOUR TOOL DEALER!

THE ULTIMATE MOTORSPORTS JACK SYSTEM

Ranger Products, a division of BendPak, recently unveiled its new QuickJack™ portable jack system that makes vehicle maintenance on the track and off-convenient and lightning fast. The 3,500-pound capacity lightweight QuickJack can go anywhere and can be easily stowed in the trunk or back seat of most cars when not in use. Simply position the lightweight jack frames under the vehicle, push the raise button on the remote hand-held pendant control and in less than 10 seconds the entire car is almost two feet off the ground ready for tire changes, chassis tuning or other maintenance.



Bendpak

HYBRID SERVICE FRANCHISE OPPORTUNITY

Increase revenues and car count with The Hybrid Shop's exclusive, proprietary technology and training. Learn to diagnose, repair and maintain hybrid electrical systems and condition hybrid batteries. Tap into this exciting new profit center for your business. Visit www.thehybridshop.com today and find out how.



The Hybrid Shop

A LOOK AT WORLD BRAKE RESOURCES (WBR)

WORLD BRAKE RESOURCES (WBR) is a complete braking solution for Asian, domestic and European vehicles. Products include WBR brake rotors with Run True™ Technology for exceptional braking performance, WBR Dual-Technology 100 percent copper free metallic brake pads with high heat formulation, WBR Dual-Technology ceramic brake pads with low noise and low dust formulation and WBR Premium and Premium OptiSelect calipers remanufactured to match exact OE specification. All WBR products offer professional quality with proven performance and are available exclusively at WORLDPAK.com.



WORLDPAK

FEDERATED OFFERS PREMIUM SRT BRAND HUB BEARINGS FOR OUTSTANDING LIFE AND PERFORMANCE

Federated Auto Parts offers a premium line of hub bearings for import and domestic applications under the SRT brand which deliver great performance, durability and value. SRT bearings offer leading edge design and metallurgy and are manufactured exclusively for Federated members and customers. SRT hub bearing assemblies offer original equipment designs complete with ABS sensors and seal designs that offer maximum protection from contamination and maximum durability. All SRT hub bearings are 100 percent tested to ensure reliability and performance.



Federated Auto Parts

CHECK OUT MITCHELL 1'S OFFERINGS FOR THE AFTERMARKET, TRUCKS



Mitchell 1 offers an industry-leading family of products for the automotive aftermarket and trucking industries. Mitchell 1's complete shop solutions include integrated shop management, repair information, estimating and diagnostic software solutions, as well as a suite of digital marketing and business performance services all designed to simplify everyday tasks for service professionals while improving productivity and profitability.

Mitchell 1

MSD PRO-BILLET DISTRIBUTORS

Advance Auto Parts Professional offers a variety of quality MSD Performance products including the MSD Pro-Billet Distributor. With a billet aluminum housing, ball-bearing guided shaft and maintenance-free magnetic trigger pickup, a MSD Pro-Billet Distributor provides the reliability you need for high performance jobs. For more information on our full MSD Performance product assortment, call your local Advance delivery location.



Advance Auto Parts Professional

THE PLATINUM NAPA FILTER

NAPA's Platinum filter offers technology for the latest advancements in synthetic oil and performance oil filters. Featuring a host of oil filter innovations, including wire reinforced fully-synthetic media, ultra-durable Hydrogenerated Nitrile compound anti-drain back valve (where applicable), this oil filter provides the ultimate protection in the NAPA Family of oil filters. Visit <http://www.napafilters.com> for more information.



NAPA

ENCOMPASS TECHSMART'S EXPERTISE WITH SMP

TechSmart® by SMP® is a brand of enhanced engine control products designed to help technicians with new technology, new categories and problem-solving improvements to the original with a proven quality they can trust. TechSmart encompasses SMP's innovation, engineering expertise, meticulous testing, unmatched customer service, competitive pricing and brand integrity. Visit www.TechSmartParts.com.



TechSmart

AD INDEX

That describes our new way of handling your inquiries about advertisements and product releases. You may go to www.motorage.com/readerservice and fill out a short form and we'll send your request immediately (electronically) and directly to the respective manufacturers who have the information you want.

You may also check the items you are interested in and fax the sheet to us at (416) 620-9790 to get more information on the products of interest.
Like we said — quick, easy, direct.

-  **IT'S QUICK!**
-  **IT'S EASY!**
-  **IT'S DIRECT!**

ADVERTISING AND EDITORIAL PRODUCT INDEX

MADVERTISER INDEX.....PAGE

<input type="checkbox"/> ADVANCE AUTO PARTS PROFESSIONAL.....	60-61, 87
<input type="checkbox"/> AFLAC INCORPORATED.....	15
<input type="checkbox"/> AIRTEX PRODUCTS.....	28-29
<input type="checkbox"/> ALLDATA LLC.....	35
<input type="checkbox"/> AMERICAN PETROLEUM INSTITUTE.....	100, 101
<input type="checkbox"/> AUTOENGINUITY.....	53, 63
<input type="checkbox"/> AUTOMOTIVE MGMT. INSTITUTE.....	81
<input type="checkbox"/> AUTOMOTIVE TRAINING INSTITUTE.....	22
<input type="checkbox"/> BENDPAK INC.....	41, 42, 79, 80, 98
<input type="checkbox"/> BIG ASS FANS.....	17
<input type="checkbox"/> BOSCH AUTOMOTIVE SERVICE SOLUTIONS.....	45, 110
<input type="checkbox"/> CARQUEST CORPORATION.....	3, 73
<input type="checkbox"/> DENSO PRODUCTS AND SERVICES AMERICAS, INC.....	71
<input type="checkbox"/> EXIDE TECHNOLOGIES.....	65
<input type="checkbox"/> EXXON MOBIL.....	CV3
<input type="checkbox"/> FEDERAL PROCESS CORP.....	54
<input type="checkbox"/> FEDERATED AUTO PARTS.....	88, 89
<input type="checkbox"/> FORDPARTS.COM / MOTORCRAFT.....	21, 77
<input type="checkbox"/> FRAM GROUP IP LLC.....	90, 91
<input type="checkbox"/> GMB.....	36
<input type="checkbox"/> GABRIEL RIDE CONTROL INC.....	47
<input type="checkbox"/> HOMAK MANUFACTURING.....	59
<input type="checkbox"/> IATN.....	81
<input type="checkbox"/> INNOVATIVE PRODUCTS OF AMERICA.....	69
<input type="checkbox"/> INTERMOTOR/SMP.....	24a-b
<input type="checkbox"/> INTUIT.....	39
<input type="checkbox"/> KIA MOTORS AMERICA.....	57, 67
<input type="checkbox"/> KYB AMERICAS CORP.....	23
<input type="checkbox"/> LAUNCH TECH USA INC.....	49, 83
<input type="checkbox"/> MAXZONE VEHICLE LIGHTING CORP.....	102, 103
<input type="checkbox"/> MERCEDES BENZ USA.....	CV2
<input type="checkbox"/> MITCHELL 1.....	7, 111
<input type="checkbox"/> MOVING TARGETS.....	55
<input type="checkbox"/> NAPA.....	92, 93, CVTIP
<input type="checkbox"/> NUCAP INDUSTRIES.....	74, 75
<input type="checkbox"/> O'REILLY AUTO PARTS.....	19
<input type="checkbox"/> RAYBESTOS BRAKES.....	85, 94, 95
<input type="checkbox"/> RED KAP.....	37
<input type="checkbox"/> ROSS TECH LLC.....	104, 105
<input type="checkbox"/> ROTARY LIFT.....	66
<input type="checkbox"/> SKF USA INC.....	96, 97
<input type="checkbox"/> SCHAEFFLER GROUP USA INC.....	64, 113
<input type="checkbox"/> SUPERIOR TRANSMISSION PARTS.....	33, 34
<input type="checkbox"/> TECH SMART/SMP.....	107
<input type="checkbox"/> TENNECO AUTOMOTIVE BLDG.....	70
<input type="checkbox"/> THE HYBRID SHOP.....	5
<input type="checkbox"/> TOYOTA MOTOR SALES USA.....	12-13
<input type="checkbox"/> TRANSTAR INDUSTRIES INC.....	31
<input type="checkbox"/> TRICO PRODUCTS.....	108, 109
<input type="checkbox"/> VDO OE REPLACEMENT PARTS.....	68
<input type="checkbox"/> WALKER PRODUCTS.....	51
<input type="checkbox"/> WD 40 CO.....	9
<input type="checkbox"/> WELLS MANUFACTURING CORP.....	52
<input type="checkbox"/> WORLDPCAC.....	99, CV4

EDITORIAL PRODUCTS.....PAGE

General Tools & Instruments.....	112
AMSOIL Inc.....	112
Knipex Tools.....	112
Automotive Test Solutions.....	112
SuspensionMAXX Inc.....	113
Edelbrock.....	113
Four Seasons.....	114
Thexton Manufacturing.....	114
Bosch.....	114
Meguiar's Inc.....	114
Continental Corporation.....	114
DTE Performance.....	114
Ari-Hetra.....	114

APG.....PAGE

Delphi.....	114
Bendpak.....	118
The Hybrid Shop.....	118
WORLDPAC.....	118
Federated Auto Parts.....	118
Mitchell 1.....	118
Advance Auto Parts Professional.....	118
NAPA.....	118
TechSmart.....	118

ARTICLES.....PAGE

UTI starts GM tech training program.....	6
NACE/CARS 2014 taking shape.....	6
MotoSHOP program offers shop owners guaranteed ROI.....	8
AutoEnginuity owner wins championship in 2013 Expert class.....	8
Building a better offer for your customers.....	10
Best of the blogs, videos and discussions.....	10
Q&A with Jay Horak.....	14
Management Feature: We haven't always done it that way.....	16
Profit Matters: Are we the problem?.....	20
Financial Figures: An informed client becomes a great client.....	24
Shop Profile: Put service to the test.....	26
POWERTRAIN PRO: A triple threat.....	30
Electrical: Exploring the 'connected' car.....	38
ATSG Training: Masquerading problems.....	46
Drivability: Learning from a racing legend.....	50
Underhood: Going fast on a budget.....	62
Undercar: A new Cruze.....	72
Scope and Scan: What we have here.....	78
Motor Age Garage: The car they love.....	82
The Trainer: More about Mode \$06.....	120

INFO FAX NUMBER: (416) 620-9790
WWW.MOTORAGE.COM/READERSERVICE

NAME _____
 SUBSCRIBER NUMBER FROM LABEL _____
 JOB TITLE _____
 COMPANY NAME _____
 ADDRESS _____
 CITY _____
 STATE/PROVINCE _____

ZIP/POSTAL CODE _____
 IS THIS YOUR HOME ADDRESS? yes no
 PHONE _____
 FAX _____
 E-MAIL _____

MORE ABOUT MODE \$06

WHAT TO LOOK FOR WHEN THE PID ISN'T THERE.

BY **PETE MEIER**
Technical Editor

Do you remember the days of OBDI? For those too young to remember, it was an era plagued with vague code definitions, plenty of “ghost” codes, limited data access and a lack of standardization among the manufacturers. Many scan tools still offer OBDI connectors (there seemed to be hundreds), but I found it just as easy to retrieve codes manually rather than clog up my toolbox with them.

Out of necessity, we found alternative ways to troubleshoot these early systems and used them often enough to keep them fresh in our memories. As OBDII moved onto the scene, many of these same techniques carried over, while others did not. And you know what they say, right? A skill learned and not used is a skill soon forgotten.

OBDII brought with it more diagnostic resources and some standardization across the OEMs. Global OBDII and its nine (now 10) modes provide access to information deemed necessary to troubleshoot and repair any fault that would result in increased emissions. Many of these modes you use on a daily basis.

For example, Mode \$03 (the \$ indicates a hexadecimal number) is where you go to see what turned on the Malfunction Indicator Lamp (MIL), while Mode \$04 is the mode you use when you clear the codes and reset



the MIL. Other commonly used modes you might know by a different name are Mode \$01 (live data stream), Mode \$02 (Freeze Frame data) and Mode \$07 (pending codes).

The mode we'll be discussing in this edition of The Trainer is Mode \$06. This mode provides access to the results of all the tests the Engine Control Module (ECM) performs on its non-continuous monitors. Don't worry, we'll explain what that means in the video, too.

Mode \$06 became popular when diagnosing misfires on Ford products that had not misbehaved enough to turn on the light, and since has been used by many techs for troubleshooting a variety of complaints. And while the growth of Controller Area

Networks (CAN) has made the live scan data more complete, some of the old techniques utilizing Mode \$06 are still worth practicing. *ZZ*

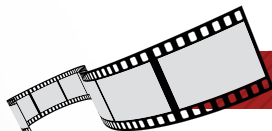
JUST SCAN IT 



Scan this QR Code to watch this video on your smartphone. Or visit MotorAge.com/mar14trainer

GET A FREE SCAN TOOL APP AT: WWW.SCANLIFE.COM

WATCH THE HOW2 VIDEO NOW



[VIDEOS]



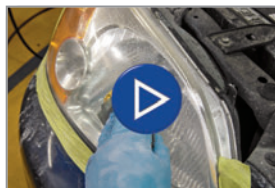
Altering the perception of a 'dirty diesel'

MotorAge.com/feb14trainer



Are you ready for hybrid service?

MotorAge.com/jan14trainer



Let there be (head)light

MotorAge.com/dec13trainer



Cabin air filters: Out of sight, out of mind

MotorAge.com/nov13trainer

In NASCAR, it's about the only thing they agree on.



With over 40 years of professional racing experience, Mobil 1™ has proven itself in the lab and on the track. That's why Tony Stewart and over half of all NASCAR® drivers choose Mobil 1 technology in their cars to help them win. What will you choose? See more at [facebook.com/mobil1](https://www.facebook.com/mobil1)

Mobil 1
MANY CHAMPIONS. ONE OIL.

Official Motor Oil of
NASCAR

© 2014 Exxon Mobil Corporation. Mobil, Mobil 1 and the 1 Icon are trademarks or registered trademarks of Exxon Mobil Corporation or one of its subsidiaries. ™2014 Stewart-Haas Racing. NASCAR® is a registered trademark of The National Association for Stock Car Auto Racing, Inc. Other trademarks shown are property of their respective owners.

★ WANTED ★

Independent Import & Domestic Professional Service Centers

WORLD PAC

Wholesale Distributor of Original Equipment Automotive Parts

PARTNER WITH US

- ✓ Comprehensive Inventory
- ✓ 100+ Locations
- ✓ Industry Leading eCatalog
- ✓ Knowledgeable Sales Team
- ✓ 40+ Carlines
- ✓ Local Delivery Fleet
- ✓ North American Distribution
- ✓ WORLD PAC Training Institute

www.worldpac.com/apply



Install products from these premier suppliers

www.worldpac.com/wanted5

USA (800) 888-9982 ext. 5470
 Western Canada (800) 644-9129
 Eastern Canada (800) 463-8749



WIN!
 iPad Air
 128GB