

PTEN

PROFESSIONAL TOOL & EQUIPMENT NEWS

\$15.00 - October 2023
Volume 34, Number 9

ENDEAVOR
BUSINESS MEDIA

PTEN
PEOPLE'S
CHOICE
2023

AWARD WINNER

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FRANKENSTEIN'S
TOOLBOX

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TOOL BRIEFING

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INSPECTION TOOLS

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POWER PROBE

INT500 INSULATION TESTER & MULTIMETER

Provides optimal automotive diagnostics

DETAILS ON THE COVER PRODUCTS
AND OTHER NEW TOOLS **PAGE 10**



▲ 360-degree
LED shadowless
light ring



▲ Provides bifocal
eye protection



▲ Features two
layers for safety

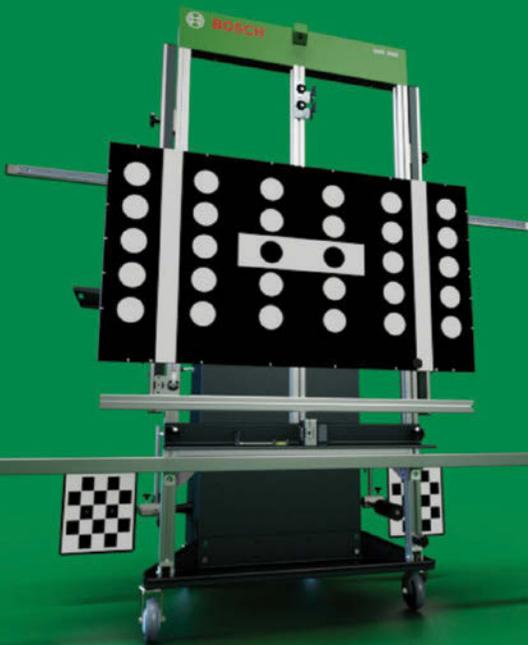


A powerhouse lineup of repair solutions from the global leader in diagnostics



Professional Diagnostics

The next generation of scan tools with the most advanced OE level vehicle coverage supporting scanning, live data access and complete bi-directional functions.



ADAS Recalibration

A seamless, full-system solution that guides you from setup through calibration in half the time.



Heavy Duty Diagnostics

Heavy duty solutions to help you get the repair done right and the vehicle back in operation.



Test, Tune and Analyze

Test, analyze and diagnose your vehicle electrical and mechanical systems.



BIG BRANDS, UNDER ONE ROOF

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**AT THREE
LOCATIONS!**



1 Outside Booth #81030
Silver Lot

2 Inside Booth #47119
Lower South Hall

3 Inside Booth #35137
Upper South Hall

The Benchmark of Quality Returns to SEMA

America's Favorite Car Lift Company is heading to SEMA 2023, and we're coming fully loaded! Come visit us at **Booth #81030** out on the Silver Lot and **Booth #47119** in the Lower South Hall. BendPak's top brands will be on full display, brands like QuickJack, Autostacker, MaxJax, Ranger and more! When it gets too hot, make sure to swing by our Cool Boss **Booth #35137**, so you can beat the heat and check out the new and improved JackPak lineup. Also, don't forget to take advantage of **EXCLUSIVE SEMA SHOW SPECIALS** on all your favorite BendPak equipment across all brands!

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AUTEL® MAXISYS™

ULTRA THE BEST KEEPS GETTING BETTER



The Ultra continues to be the most advanced diagnostic tablet in the industry, with ever-improving functionality and features.

BEYOND AFTERMARKET

Access to OE software, repair data, and functions with Remote Expert, AsTech services, AutoAuth, and OE-server authentication capability

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Examine the latest Diagnostic and Repair information with code-related analysis, component location diagrams, code-linked TSBs, and Service Campaign info to improve repair efficiency

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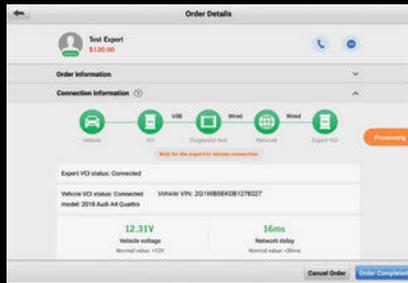
CLOUD-BASED REPORT MANAGEMENT

Print and share customer scan reports

*Additional software and hardware purchases necessary



TOPOLOGY



REMOTE EXPERT



EXTENSIVE VEHICLE COVERAGE

VISIT AUTEL AT AAPEX + SEMA
FOR FREE TOOL
GIVEAWAYS

aapecx
ahead of the curve
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While Supplies Last
October 31 - November 2
AAPEX BOOTH # A1432



SEMA
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November 3, Starting at 10AM
SEMA BOOTH # 41207
South Hall Lower



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GIVEAWAY



Our annual Great Prize Giveaway contest is back! Now until Oct. 31, valued readers — such as yourself — can select from several prize packs. Be sure to enter daily to improve your chances of winning.
[VehicleServicePros.com/gpg](https://www.VehicleServicePros.com/gpg)

TECH TIP



How often should you charge your jump starter? Hint: Batteries don't like to sit too long in a discharged state. In this Tech Tip, Clore Automotive offers inside tips and recommendations on how often to charge jump starters.
[VehicleServicePros.com/53071174](https://www.VehicleServicePros.com/53071174)

INDUSTRY EVENT



With more than 2,200 exhibitors set to attend the SEMA Show this year, several thousand new products are expected to be unveiled. If you plan on attending, here's a quick tour of what's new to see.
[VehicleServicePros.com/53072067](https://www.VehicleServicePros.com/53072067)

CASE STUDY



The owner of a 1999 Dodge Ram 2500 said his truck stalled a few times while driving, then it would crank but not start. A "No Bus" message was also displayed in the odometer field of the instrument cluster.
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FEATURED PRODUCTS



Snap-on
21-pc Essential Air Hammer Bit Foam Set, No. PHGFSET01FR
[VehicleServicePros.com/53071451](https://www.VehicleServicePros.com/53071451)



GripEdge Tools
G-FORS (Foreign Object Removal System) Extractors
[VehicleServicePros.com/53073439](https://www.VehicleServicePros.com/53073439)



Milwaukee Tool
M12 FUEL Insider Extended Reach Box Ratchet, No. 3050-20
[VehicleServicePros.com/53071268](https://www.VehicleServicePros.com/53071268)

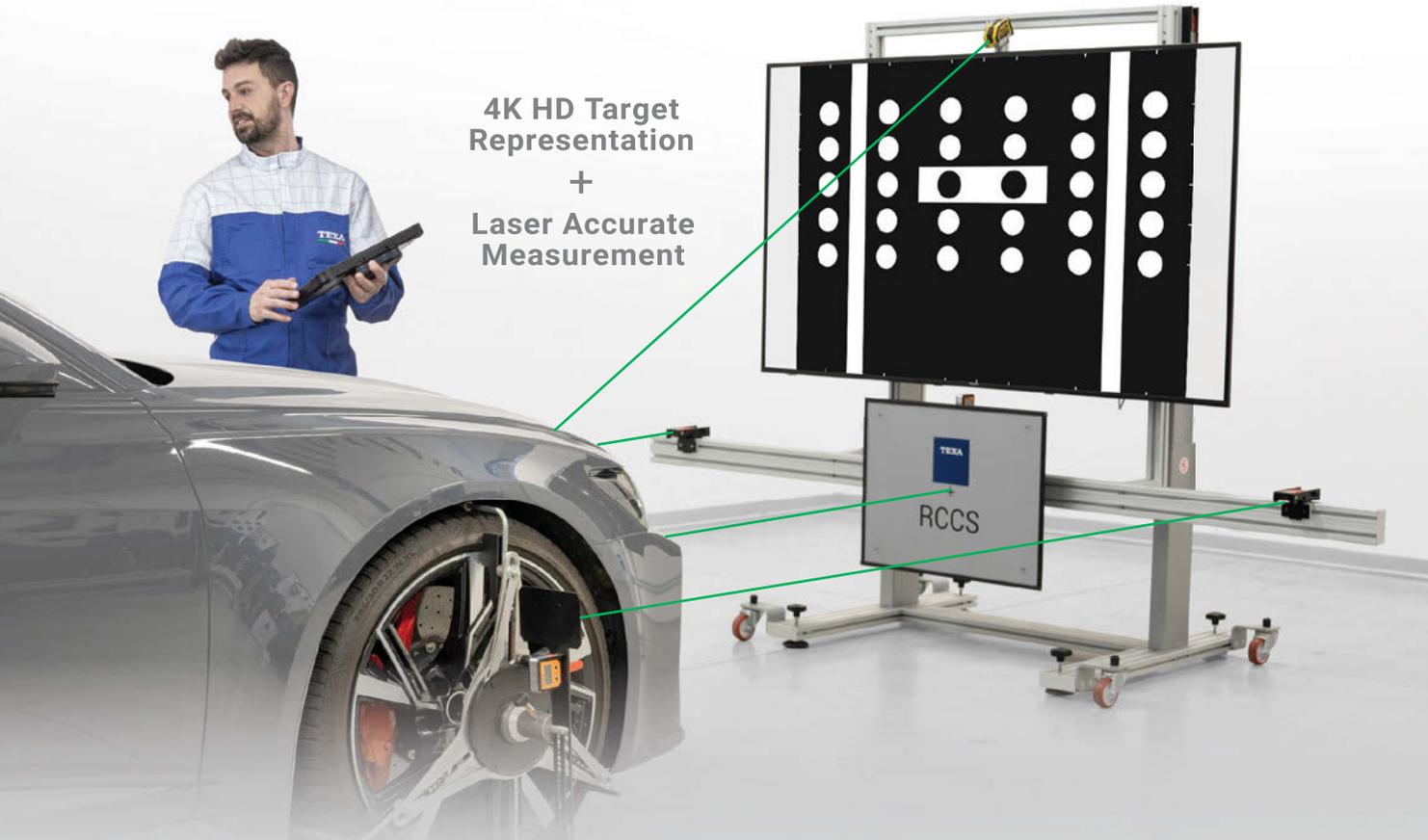


Ledlenser
HF4R Work Headlamp
[VehicleServicePros.com/53070771](https://www.VehicleServicePros.com/53070771)



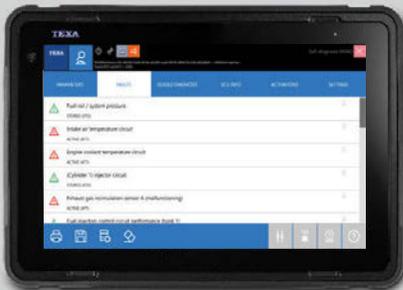
CALIBRATE WITH CONFIDENCE

ADAS CALIBRATION THAT MEETS OE SPECIFICATION



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+
Laser Accurate Measurement

DIAGNOSTICS



ADVANCED COVERAGE

AUTO SCAN ALL VEHICLE SYSTEMS
ADVANCED COMPONENT HEALTH CHECK
ADAS MODULE CONFIRMATION

VIRTUAL POSITIONING



GUIDED PROCEDURES

STEP-BY-STEP ILLUSTRATED INSTRUCTION
BLUETOOTH LASER DISTANCE MEASURE
CALIBRATION FRAME MICRO ADJUSTMENT

DOCUMENTATION



CALIBRATION REPORT

INSURANCE COMPLIANT SUBMISSION
PRE-SCAN PDF FILE PRINTED OR SAVED
POST SCAN CALIBRATION ACCURACY

OWN IT TODAY

12 MONTH FINANCE

OPTIONS AVAILABLE THRU
SELECT TEXA DEALERS



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OCT 31 - NOV 2

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Technology is king

Utilizing digital inspection tools offers shops many benefits over more traditional methods.

By **Emily Markham**, Editor
Emily@VehicleServicePros.com

It's no surprise that in a magazine titled *Professional Tool & Equipment News*, we talk A LOT about tools and equipment for automotive technicians.

However, in this month's Tool Briefing article (page 44), Ross Colket looks at a different type of tool — digital inspection tools.

Many shops have embraced going digital in order to better serve their customers, improve shop efficiency, and create a more streamlined work environment.

"By using a digital inspection system, you can communicate with [customers] very quickly and also illustrate to them the reasons for the needed repairs to their vehicle," Colket says. "You can fully explain and document the reasons why they need to repair their vehicle with complete transparency."

These tools offer technicians the capability to perform a digital vehicle inspection (DVI), meaning that instead of writing everything out with pen and paper, technicians can take photos or videos and add comments to explain what those graphics mean. This way the customer sees everything the technician sees.

As many of you might agree technicians are not always portrayed in the best

light. This bad reputation comes in part from poor past experiences where customer service was less than spectacular, but mainly, I believe, from a lack of understanding. Working as a technician makes *you* the car expert. *You* are who your customers turn to when their vehicles start making a funny noise or the gear shift begins to stick. Think of it this way — if a person brings their child to a doctor, they expect that the doctor can tell them what's wrong with their child and how the doctor intends to make them better. If the doctor fails to do this, a lack of trust is formed.

By utilizing a digital inspection tool, you can bridge the potential gap of mistrust between you and your customers by communicating to them exactly what is wrong with their vehicle and how you'll fix it.

Other benefits of utilizing this tool include:

- A more professional-looking check-out — there will be no difficulties reading someone's chicken scratch handwriting.
- A more uniform inspection process — each technician will be following the same step-by-step process.
- A readily available service history of each vehicle providing all the back-

ground information necessary to make a fully informed diagnosis.

If you're looking to learn about other exciting tools, this issue also features our ninth annual People's Choice award winners. This is a fun off-shoot of our Innovation Awards where you — our valued reader — choose the new tools you think will have the greatest impact in improving productivity in your shop. Check out page 18, to see the top 26 products per product category that were picked as your favorites. Which tool would you want to add to your collection? Send me an email at Emily@VehicleServicePros.com and let me know! ✖

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FEATURED NEW PRODUCTS



360-DEGREE LED SHADOWLESS LIGHT RING

The **Ingersoll Rand W3151 IQV20 Cordless Compact 1/2" Impact Wrench** features a 1/2" square anvil size for use with impact-rated sockets. With 450 ft-lbs of breakaway torque, 320 ft-lbs of fastening torque, 2,800 rpm, and 4,200 bpm, the impact wrench is designed to quickly complete demanding applications. Its 5.3" tip-to-tail length and compact size make this tool ideal for accessing tight spaces while reducing fatigue. It also features an overmolded ergonomic grip, a patented 360-degree LED shadowless light ring, three speed options with a variable speed trigger, and impact-resistant bumpers on upper and lower housing.

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AVAILABLE IN FIVE DIOPTR STRENGTHS

The **Brass Knuckle Read Safety Glasses**, No. BKREAD-6010, provide bifocal eye protection and are designed to help prevent the hazardous practice of switching back and forth between regular safety glasses and reading glasses on the job. The protective readers are available in five diopter strengths: 1.0, 1.5, 2.0, 2.5, and 3.0. A durable polycarbonate frame provides extra side protection and all-day comfort. The clear lenses are ANSI-rated hard-coated polycarbonate with BK-Anti-FOG which is permanently bonded to the lens, ensuring it will not wear off and will retain its anti-scratch, anti-static, and UV protection properties.



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INSULATED TO 1,000V

The **Gray Tools 25-pc 1/4" Drive Set**, No. 15025-I, includes 12-point SAE sockets ranging from 3/16" to 9/16" and 6-point metric sockets from 4mm to 15mm. The sockets are stored in a dual-color foam organizer with imprinted size markings on the top layer for quick identification. Each socket is individually insulated to 1,000V and tested to 10,000V, in compliance to ASTM F1505 standards. Insulation features an orange top insulation layer (orange), and a second layer (yellow) that also serves as a visual safety indicator: should the yellow layer be visible through the outer orange layer, the tool is no longer safe and should be discarded.



Made in the U.S.A.

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FOR MORE INFORMATION ON THESE PRODUCTS, CLICK ON "PTEN E-INQUIRY" at VehicleServicePros.com OR CIRCLE THE NUMBER ON THE CARD.

Kicking off the New Products section each month, our Featured New Products page includes brand new products showcased on the cover that are available to the automotive market.



WORKS WITH VT750LCD VOLTAGE TESTER FOR EV TESTING

The **Power Probe INT500 Insulation Tester and**

Multimeter is an indispensable tool for both electric and gasoline vehicles. The INT500 allows technicians to assess the integrity of insulation in wiring and components, crucial for the safety and performance of electric vehicles (EVs) and ensuring gasoline vehicles' electrical systems remain reliable. When used with Power Probe's VT750LCD Voltage Tester, it also empowers technicians to accurately measure and diagnose voltage levels in both types of vehicles, aiding in identifying issues quickly. This versatile tool enhances efficiency, safety, and precision in automotive diagnostics, making the INT500 an indispensable asset for maintaining and servicing both EVs and traditional gasoline-powered vehicles.

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SPONSORED BY POWER PROBE



IDEAL FOR REMOVING SEALS, O-RINGS, AND MORE

The **1/4" Pry Bar with Strike Cap**, No. 35100, from **Lisle Corporation** is designed to remove seals, electrical connectors, O-rings, plastic caps, interior trim pieces, metal, and plastic retainers. The strike cap in the top of the handle can be tapped with a hammer, and the 1/4" square shaft pry bar has a pocket clip. The tool measures 5" in length. In addition to these features, the tip design cradles the return spring to keep it from sliding off. The heat-treated material and extra-long shaft provides strength and stability, and an ergonomic handle gives users comfort as they work.

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CUSTOMER REVIEW:
 “Great little pocket bar with striker shaft that goes all the way through. Very chunky and well built for such a small bar.”



FEATURES A HOOK DESIGN

The **Thexton Best Angle Back Probe**, No. 960, is designed to access electrical circuits from the rear of the connector to prevent piercing wires and possibly damaging the circuit. The Best Angle Back Probe allows users to get at tucked away connectors easier with a hook design. The added feature allows for flexibility and assures a good connection with a voltmeter. The product is 100 percent soldered to provide an accurate and dependable reading. Made in the U.S.A.

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INCLUDES BUILT-IN AIR IONIZERS

The **CB-28 and CB-36 Portable Evaporative Air Coolers** from **Cool Boss** can drop the air temperature up to 26 degrees F using up to 70 percent less energy than conventional air conditioning, says the company. These models include built-in air ionizers, Bluetooth players, LED floodlights that emit 4,000 lm, and swivel casters. The CB-28 is engineered to send air out at 9,020 cfm to cover 2,125 sq. ft. while the higher-capacity CB-36 pumps air out at 12,615 cfm to cover 3,125 sq. ft. The CB-28 measures 52" by 37" by 76.5". The CB-36 measures 66" by 44" by 85". Other key features include an automatic water source shutoff, soft-touch LED controls, and a built-in timer.

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ABLE TO FILL STANDARD OR DUAL WHEEL VALVES

The **K-Tool International Backlit Tire Inflator Gauge**, No. KTIXD89050, features an orange backlit display and a needle designed to be easily seen in light or dark conditions. The dual-foot inflator chuck is engineered to fill standard or dual wheel valves with ease. Additionally, the polymer-coated braided hose is not meant to kink and can withstand the daily abuse delivered by technicians.

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HAS A BUILT-IN SAFETY VALVE

The **OTC 12-Ton Bottle Jack**, No. BT12, is compact, heavy duty, and is ideal for trucks. Constructed with a forged base and cylinder, this jack is built to last, ensuring strength and eliminating leaks. The chrome pump piston and ram increase rust resistance and help to extend the service life of the jack. The inline design also makes it easy to use for both positioning and lifting. The bottle jack meets or exceeds the ASME PASE-2019 safety standards for portable automotive service equipment and includes a built-in safety valve that prevents overloading and ensures that the jack has a stable base to prevent tipping when loaded off-center.

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EXTENDS FROM 47" TO 79"

The **Underhood Worklight with HBS**, No. UHWLHBSBL3, from **Matco Tools** features Human Body Sensor (HBS) technology which automatically turns off the light if no movement is detected within a 6' range for more than 30 seconds, as well as hook brackets that offer 360 degrees of angled light. The adjustable underhood bar extends from 47" to 79", allowing the light to be used with most vehicles, and the quick-release sliding bracket gives the user the ability to position the light where they need it. With an eight hour run-time, and over two hours of use on the high setting, the light is designed to provide consistent illumination. As well as this, the light can be strapped to the roof inside of a car, offering interior illumination as well.

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NEW PRODUCTS



PROTECTS PAINTED PARTS

Stand Socks from **Cretney Tools** are designed to provide complete protection for all freshly painted and delicate parts. Made with high-quality microfiber and shock absorbing foam, Stand Socks quickly slip on and off existing work stands to protect painted parts, increasing cycle times and enhancing the shops overall reassembly process.

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Watch this product in action here:
[VehicleServicePros.com/53072347](https://www.VehicleServicePros.com/53072347)



AVAILABLE IN EIGHT COLORS

The **U.S. General Series 3 56" Top Chest** from **Harbor Freight** has eight drawers, a spacious top compartment, and 20,100 cu. in. of storage. This top chest features a built-in power port for charging batteries and tools, a lid that has easy-to-open gas struts reinforced for extra strength to avoid sagging, and nonslip pre-cut drawer liners. The single-point barrel lock helps to keep tools secure while the full-width drawer latches allow the user to open the drawer easily from any point. Additionally, the full-extension ball-bearing drawer slides support up to 120 lbs per pair. Available in eight colors.

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FLIP-DOWN WHEEL STOPS

The **Autel Alignment Scissor Lift** is a flush/surface-mounted hydraulic vehicle lift compatible with passenger cars and light trucks and is available in 12,000 and 14,000-lb capacity versions with jacking beams similar to the company's Bay Max Lifts but without the floor lift table. The Alignment Scissor Lift includes front and rear opening runways, flip-down wheel stops, and low-angle approach ramps for easier access. Made in North America and is ALI certified, the lift comes standard with built-in runway air tire inflation kits at each wheel, shatterproof undercarriage LED with automatic shut off, and an enclosed console power control unit.

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HOLDS UP TO 33 LBS

The **Modular X18 Backpack** from **KNIPEX Tools** is designed to handle up to 33 lbs of tools, supplies, and personal belongings. It features 21 loops, 37 pockets, and a removable tool board to help customize how supplies are packed. The front and back panels fully hinge for access to tools and the waterproof molded bottom is made of impact-resistant plastic to keep the bag in a secure, upright position. Additionally, MOLLE straps are featured on the inside and outside of the bag, as well as a magnetic FIDLOCK connector.

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FEATURES POWERFUL MAGNETIC BASE

The **Maxxeon WorkStar LumaStik 8" Folding Light Wand** features a magnetic base and aluminum handle for added versatility, making it easier for the user to attach it to any metal surface and carry it with them wherever they go. The folding design allows for easy storage and transportation. Additionally, this light includes a floodlight of 240 lm and an hour and 30 minute run-time on high, and 60 lm and a three hour and 30 minute run-time on low. The light has a charging time of about 2.5 hours.



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INCLUDES HEAVY DUTY STORAGE CASE

The **ARES 7-pc Exhaust Pipe Stretcher Kit**, No. 14025, offers an alternative to traditional hydraulic pipe expanders, allowing users to quickly and easily widen exhaust pipes. This kit includes a heavy duty storage case, a 1-5/8" to 2" expander unit, and six aluminum collar adapters to gradually expand exhaust pipes from 1-5/8" up to 4-1/4" in diameter. The expander unit and its 28mm hex head are impact rated up to 800 ft-lbs, allowing for significant force application with the use of impact wrenches for expansion. Also included in the kit are two tubes of lubricating grease for lubrication of the O-rings and screw rods.

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STURDY ALUMINUM BODY

The **NextLED Rechargeable Pocket Task Light**, NT-6786, is designed to be fit for a wide range of tasks. Featuring a rechargeable flashlight and power bank, this light has a 500 lm LED work/tasklight. Its cast aluminum body is designed to provide a sturdy and reliable build, while the magnetic base, pocket clip, and hanging hook offer versatile mounting options. Additionally, the IPX4 waterproof rating ensures this light can withstand tough environments.



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IDEAL FOR CAR HOODS AND HATCHES

Shock Clamp from **Big Gator Tools** is designed to fix car hoods and hatches with weak gas springs. Made of stainless steel for durability, Shock clamp doesn't require other tools and installs in seconds, the company says. Available in a two-pack (No. BGT-SC2) and four-pack (No. BGT-SC4). Made in the U.S.A.



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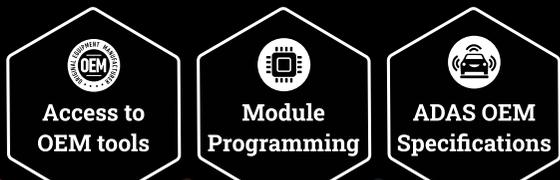
FEATURES DIGITAL SEGMENT DISPLAY

The **Millermatic 142 MIG Welder** from **Miller Electric** is equipped with Auto-Set technology to help users eliminate guesswork and ensure they are using the right parameters by simply setting the wire diameter and material thickness. Users can then easily fine tune the parameters even further using its digital segment display, if needed. The machine is capable of welding up to 3/16" mild steel in a single pass and comes spool gun ready for MIG welding aluminum. With a rated output of 100A at 60 percent duty cycle, the machine provides users the versatility to complete more jobs quickly. Additionally, the welder weighs 33 lbs and has ergonomic handles to easily carry around the shop.

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REMOTE OEM SOLUTIONS

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BLASTS AWAY DUST, CHIPS, AND DEBRIS

The **M7 Air Blow Gun with 10" Nozzle and Safety Nozzle Tip**, No. IC-410C, has a 75-120 psi working pressure range and is designed to blast away dust, chips, and debris. Featuring a 10" nozzle and bent tip for accessing hard-to-reach areas. Its pistol grip handle and trigger are designed with comfortability in mind. This blow gun has a 1/4" female air inlet and 3/8" air hose sizer making this tool compatible with most air compressors. Included with the blow gun is a safety nozzle tip to direct airflow.

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FEATURES FIVE QUICK-CLAMPING PULLERS

The **Hazet Quick-Clamping Puller Set**, No. 1750/5, features five of the most common quick-clamping pullers in one set: 1750-9, 1750-11, 1750-14, 1750-19, 1750-26. Each of the tools in the set is a two-arm puller that features a one-nut fixation per arm for quick adjustments, a solid all-steel bridge, and forged arms that can be released from the bridge and rotated 180 degrees to be used as an internal puller. Additionally, this set is designed to provide high strength and rigidity for safer work. The quick-clamping pullers are also available individually.

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FEATURES A DIRECT DRIVE TRANSMISSION

The **AS-3D Rotary Screw Compressor** from **ABAC International** features the latest air-end technology and a fully integrated aluminum block to maximize productivity and efficiency. Suitable for professional applications or general use, applications can range from auto body repair to powering a wide variety of pneumatic tools. An environmentally sustainable design allows for reduced energy costs and decreased CO2 emissions. The AS-3D also features a highly-dependable and easy-to-maintain direct drive transmission as well as an optimized cooling system.

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AVAILABLE IN A BIT OR HEX KEY SET

The **10-pc Damaged Torx Fastener Extractor Set**, No. AETS10, from **Strategic Tools & Equipment** is designed to remove Torx fasteners up to 100 percent rounded and comes available in foam packaging. The 1/4" drive sizes included in the set are T10, T15, and T20, while the included 3/8" drive sizes are T25, T27, T30, T40, T45, T50, and T55. The set is also available in a bit set and a hex key set.

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REMOVES STUCK INJECTORS

The **CTA Tools Ford Fuel Injector Puller Remover**, No. 7798, is designed to remove stuck injectors for Ford EcoBoost GDI engines, including the 1.0L, 2.0L, and 3.5L models. Designed with a precise fit, the tool is suitable for replacing Injector #CM5G-9F593-FA commonly found in Ford vehicles. In addition, the remover features a weighted slide hammer for injector extraction.

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FEATURES PROTECTIVE BLACK OXIDE COATING

The **38-pc SAE Tap and Die Packout Set**, No. 49-22-5604, from **Milwaukee Tool** includes precision machined threading accessories and a Hex-LOK two-in-one handle for common applications. The set features 17 straight-flute taps and 17 1" hex dies with laser-etched sizing and has a protective black oxide coating for corrosion resistance. The Hex-LOK handle combines both internal and external threading within one handle by its compatibility with both 1" hex dies and the Milwaukee tap collet. Additionally, the set includes accompanying drill bits for pilot drilling and is designed for use with drill drivers. Also available as a Metric set.

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1/4" AIR INLET

The **AME International Air Power Buddy (APB) 1/2" Air Impact Wrench**, No. 79700, has a 1/2" drive, a 2" extended anvil, a 1/4" air inlet, and weighs 5.9 lbs. It has a maximum torque (reverse) is 600 ft-lbs, a working torque range between 50 and 450 ft-lbs, and a free speed of 8,000 rpm. This impact wrench also features a twin hammer mechanism, a handle exhaust, and five power settings.

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OFFERS BATTERY PACK DETECTION

The **N9EV EV Smart Diagnostic System** from **Xtooltech USA** is designed to cover most EV brands. It operates on a 9.7" high-performance diagnostic tablet that supports Bluetooth communication, DoIP protocol, and CAN-FD protocols. The N9EV includes Tesla adapters with OEM-level diagnostic functions, battery pack detection, and topology mapping, and is ADAS calibration supported.

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ADDS LUBRICITY TO ALL ENGINE PARTS

Hot Shot's Secret Adrenaline Assembly Lubricant is formulated to blend with 100 percent of break-in oils, while also providing protection and swift solubility. It clings to metal surfaces through the initial startup process and adds lubricity to all engine parts including camshafts, bearings, valvetrain components, and engine fasteners such as head bolts and studs, connecting rod bolts, and other fasteners. The corrosion-resistant assembly lubricant has dry start protection with over 2,000 ppm of zinc and can be used with any engine assembly application – gasoline or diesel – and is designed to work with all camshaft types. Made in the U.S.A.



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NEW PRODUCTS



ADHERES TO ALMOST ANY SURFACE

The **Snap-on 300 lm Rechargeable Lightweight Pocket Light**, No. ECPRJ032, features a large, slim pocket clip with a magnet, allowing it to be adhered to almost any surface and making it easier to adjust it for specific tasks. With the capability to shine 300 lm, this light runs more than two hours on high and 18 hours on its low setting. Despite its slim, lightweight design, the light has a sturdy exterior that is engineered to be shock resistant.

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DELIVERS UP TO 2,100 LBF

The **DeWalt 20V MAX XR Brushless Cordless 3/16" Rivet Tool**, No. DCF403B, installs aluminum, steel, and stainless steel blind rivets up to 3/16". The brushless motor delivers up to 2,100 lbf of pulling force and has the capability to pull 800 rivets per charge. Other notable features include a tool-free nose piece change and on-board nose piece storage to collect and store loose mandrels. Also available as a kit and in 1/4".

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QUICKLY DISSOLVES GREASE

The **Fedpro Tub O' Towels Heavy Duty Cleaner and Degreaser Spray** is designed to tackle tough grease and grime. This spray is ideal for use on surfaces such as automotive parts, glass, and more. Its formula combines the cleaning power of Tub O' Towels Heavy Duty Cleaning wipes with the convenience of a spray. Additionally, the spray is alcohol-free and solvent-free, has a citrus scent, and is made in the U.S.A.

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FEATURES A DUAL NOZZLE BEAD SEALER

The **Maxx 50 Rim Clamp Tire Changer** from Coats has the capability to handle wheels ranging from 6" to 24" in diameter and up to 16" wide. Featuring a dual nozzle bead sealing system, the tire changer offers increased air flow for faster operation. Additionally, the unit has been tested up to 250,000 bead breaking cycles for durability, saves on time by not having to index the tabletop when on working on large assemblies, and is upgradable (able to add tool heads and/or foot pedal). Designed and built in the U.S.A.



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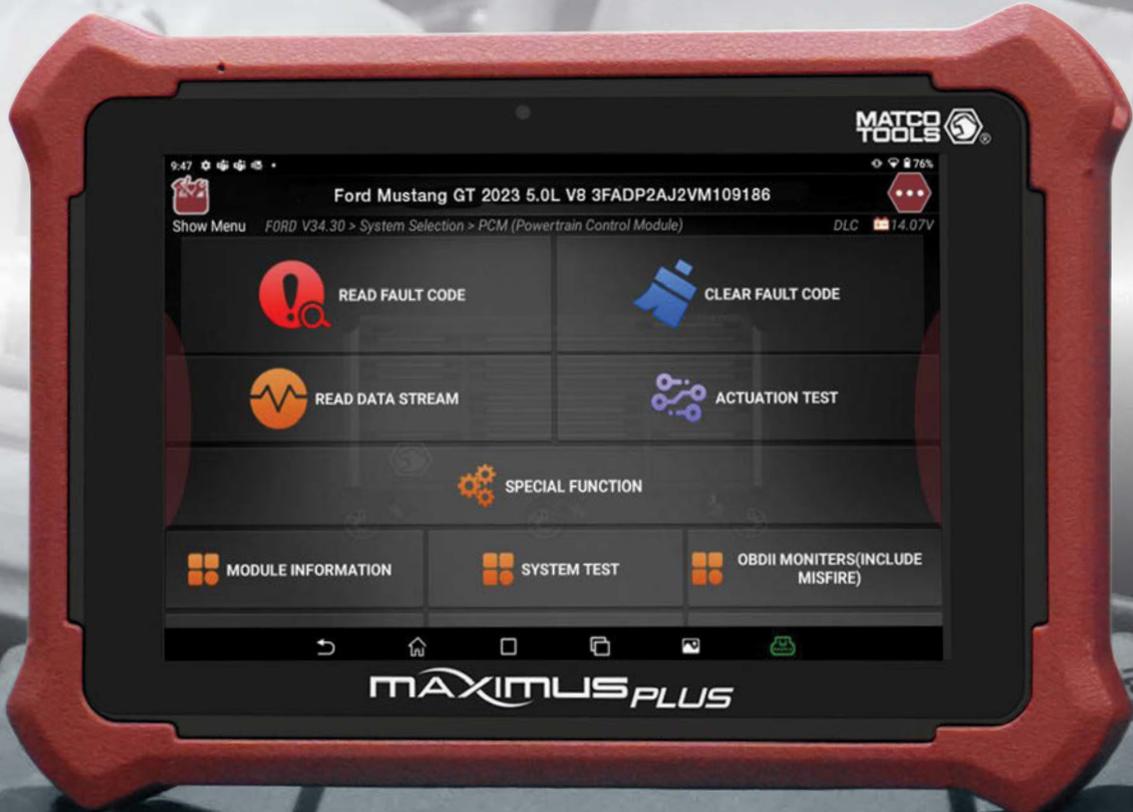
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PTEN

PEOPLE'S 2023 CHOICE

For the ninth year in a row, we asked our readers to weigh in on the *PTEN* Innovation Awards. Named the 2023 *PTEN* People's Choice, the following pages feature the top 26 products selected by our readers, per product category, that were originally nominated for the 2023 *PTEN* Innovation Awards.

Snap-on

Zeus+

The **Snap-on ZEUS+** is an advanced information-driven scan and scope device, offering onboard storage and processing and communications capabilities. Fast-Track Intelligent Diagnostics simplifies the diagnostic process and guides technicians through the repair, avoiding unnecessary steps along the way. It includes SureTrack for verified parts replacement records and real fixes, smart data for relevant vehicle and code specific PIDs, and prefiltered functional tests and guided component tests to verify repairs. ZEUS+ also delivers the software coverage, processing power and speed, and access to the information needed for technicians to work quickly and efficiently.

CATEGORY: *Automotive Scan Tools*

Circle 41 on card or click "PTEN e-inquiry" on VehicleServicePros.com



Flo-Dynamics

EV Battery Pack Leak Tester

The Flo-Dynamics EV Battery Pack Leak Tester

No. LPLT-100, is a multi-purpose, low-pressure leak tester designed to test the battery chamber/compartments in electric vehicles. It uses shop air and removes oil, particles, and moisture to ensure a safe condition when testing the vehicle's battery chamber. Its flow meter and gauge verifies if the vessel has been compromised and the patent-pending high-voltage glove adapter allows technicians to check their gloves before each use. If the gloves have a hole, the test will quickly inform them. The LPLT-100 is OE approved.

CATEGORY: *EV Tools & Equipment*

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Exair

TurboBlast Safety Air Gun

The **Exair TurboBlast Safety Air Gun** is ideal for blowoff applications that need maximum force. It can remove heavy debris, dry or cool parts from a distance, and clean up facilities. It features a cast aluminum handle with a comfortable and durable grip, a light touch trigger, and a safety guard. It also shuts off air if dropped. Models are available with an adjustable gate valve to control blowing force on the fly, or without the gate valve. The TurboBlast is CE compliant, meets OSHA standards, and is available in multiple different flow rates and extensions up to 6' long.

CATEGORY: *Air Tools*

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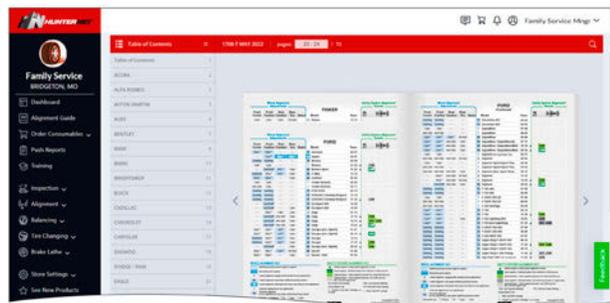




Power Probe

PPTAMP Amperage Adapter
 The **Power Probe PPTAMP Amperage Adapter** allows technicians to measure current when applying power and ground to a circuit. The tool connects in line with any Power Probe PP3/PP3EZ/PP4/Maestro and is rated to 20A. It also features minimum and maximum readings as well as a backlit display, giving technicians the ability to not only measure voltage when testing components, but also amperage, which is critical to a complete diagnosis on a circuit's health.

CATEGORY: Diagnostic Equipment
Circle 44 on card or click "PTEN e-inquiry" on VehicleServicePros.com



Hunter Engineering

1708-T Online Alignment Guide

The **Hunter Engineering 1708-T Online Alignment Guide** is now available online via the HunterNet 2 portal. Updated twice yearly, the guide has long been a staple of point-of-sale counters, serving as the go-to source for service advisors quoting work, the company says. The comprehensive document guides shops on vehicle suspension adjustments as well as any electronic resets or ADAS calibrations required after wheel alignment, thus adding a large revenue opportunity. The online version is intuitive and easy to use, with a linked table of contents, quick search capability and full-screen display. Shops can now always have the latest version online, with no reordering of printed copies necessary.

CATEGORY: Automotive Software
Circle 45 on card or click "PTEN e-inquiry" on VehicleServicePros.com



Snap-on

Bench Top Battery Charger Plus

The **Snap-on Bench Top Battery Charger Plus**, No. EEBC30A12V, can quickly charge 6V, 8V, or 12V AGM, standard lead acid, and LiFeP04 vehicle batteries. Its rugged design features wraparound cord storage bristles to secure clamps and a retractable hook for under hood hanging. Its large LCD color, readable-in-sunlight display offers selection prompts, charge status, and diagnostic information. Performing a multi-stage charge cycle, the unit offers a charge rate of 2A, 15A, or 30A (2A or 10A for LiFeP04) and a stable power mode that maintains vehicle battery voltage during repairs and offsets battery drawdown while the engine is off. Includes field replaceable cables and AC power cord, complete with two-year warranty.

CATEGORY: Battery Starting & Charging
Circle 46 on card or click "PTEN e-inquiry" on VehicleServicePros.com

LTI Tools by Milton

Shockit Socket Diesel NOx and Particulate Sensor Removal Kit

The **LTI Tools by Milton Shockit Socket Diesel NOx and Particulate Sensor Removal Kit**,

No. LT996D, uses the force and vibration of

an air hammer to loosen and remove rusted diesel exhaust sensors without damaging the threads.

With its compact size, users can access hard-to-reach sensors. Each Shockit Socket has

three driving ears with 8mm inverted index holes for tightening and loosening, allowing for the most stubborn sensors to be worked back and forth during removal. The kit includes a non-turning offset 8mm radius tip 11" Standard Shockit Punch, No. LT1910P, as well as 20mm, 22mm, and 27mm bottoming tap and dies for sensor and mounting hole threads.

CATEGORY: Specialty Tools
Circle 47 on card or click "PTEN e-inquiry" on VehicleServicePros.com





Flo-Dynamics

Transmission Flusher

The **Flo-Dynamics Transmission Flusher**, No. TTCF-9A, features an adjustable flow rate, which allows one machine to perform services from small vehicles to large heavy duty trucks and busses. The programmable control board easily allows the technician to set circulation time, along with short bursts of air to further agitate the cooler and remove stubborn particles. Its reversible flow direction valve eliminates the need to change hoses during service. The unit includes a heater to remove built up tarnish. Additionally, its removable screen verifies all particles are flushed out and the control panel displays service time, before and after, temperature, flow rate, and pressure. The unit is OE approved and patent pending.

CATEGORY: Shop Equipment

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Snap-on

Impaktor Safety Glasses

The **Snap-on Impaktor Safety Glasses**, No. SOSG05KRCL01, are made in the U.S.A. to keep users safe in all types of work environments. With the ability to easily switch from prescription lenses to clear lenses or sunglasses, the interchangeable lenses make the glasses comfortable for all day wear. Machined from lightweight aluminum, the functional glasses are durable enough to withstand tough shop and outdoor conditions. With a seven-barrel hinge, the glasses stay on during high-intensity activities, and the adjustable fit lowers the risk of debris getting inside the glasses during jobs.

CATEGORY: Safety & Personal Gear

Circle 50 on card or click "PTEN e-inquiry" on VehicleServicePros.com

Tracer Products

LeakFinder A/C Leak Sealant

The **LeakFinder A/C Leak Sealant**, No. LF200CS, from **Tracer Products** is a single-use syringe injector designed to seal pinhole leaks in accumulator/receivers, evaporators, condensers, O-rings, hoses, and more. With LF200CS, users can fix hard-to-find leaks and extend the service life of the A/C system. The sealant is easy to use and is compatible with all popular refrigerants, including R-1234yf systems. The sealant formula is also compatible with electrically-driven A/C compressors used in hybrid/electric vehicles. With the included patented dual adapter, users can easily connect to either R-1234yf or R-134a systems.

CATEGORY: Air Conditioning Service

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Hunter Engineering

BL Series of Bench Lathes with Tablet

Hunter Engineering's BL Series of Bench Lathes with Tablet now connects with the HunterNet 2 platform, a free customer portal developed for undercar service operators with single or multiple rooftops. The platform allows operators to access actionable performance data for all their Hunter-connected equipment. With the connectivity, shop owners and managers will be able to view before and after cut results for rotors and drums online, view initial runout, plus monitor lathe usage counts and track equipment ROI in real time. Users will also be able to order consumables 24/7 and access the online user manual. The before-and-after data will provide valuable documentation for warranty purposes, as well as for customers.

CATEGORY: Brake Service

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Snap-on

High-Definition Borescope with 5.5mm Dual Imager
 The **Snap-on High-Definition Borescope with 5.5mm Dual Imager**, No. BK7000, is an end-to-end, high-definition borescope that provides ideal image quality and comes ready to use out of the box. A picture-in-picture makes it possible for technicians to capture forward and side images simultaneously, even video, on a large, 5" capacitive touchscreen, similar to a phone screen. Users can overlay text or audio information to the image and software/



feature updates are easy through the tool's Wi-Fi connectivity. It has quick USB-C charging with the battery providing up to 1.5 hours of run-time.

CATEGORY: Inspection Tools & Lab Scopes

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CanDo

HD Code Pro

The **CanDo HD Code Pro** is a mid-line code scanner that will diagnose light to heavy duty commercial vehicles. The scanner reads and clears codes as well as performs DPF resets and regens. In addition, the scanner allows users to perform SCR, ash, and soot level resets, along with service maintenance resets. The full DPF service tool also comes with manufacturer-specific engine, brakes, and transmission coverage.

CATEGORY: Heavy Duty Scan Tools

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H&S Autoshot

Pull-Pro Portable Dent Pulling Tower

The H&S Autoshot Pull-Pro Portable Dent Pulling Tower,

No. UNI-1096, is a lightweight portable setup that is space-saving in the shop. Quickly setup the tower and place the plate 15 degrees behind the tower. Plug in your airline to the receptacle and the steel plate secures to the floor by way of a rubber gasket. While the air is engaged, expect up to 1,350 lbs of pulling force. The industrial ratcheting winch allows for precision to the pull and the tower has many vertical positions to get the best pull possible. The standard tower is 66" tall. Optional accessories include the lower pull base plate (UNI-1097) and high pull extension kit (UNI-1098).

CATEGORY: Body Shop

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ARES Tool

18-pc Combo Turbo Socket Set

The **ARES Tool 18-pc Combo Turbo Socket Set**, No. 29022, comes with 16 1/4" drive turbo sockets with SAE and metric size markings, a 1/4" drive hex adapter, a knockout pin, and a storage case. Socket sizes include 3/16", 7/32", 1/4", 9/32", 5/16", 11/32", 3/8", 4.5mm, 5mm, 5.5mm, 6mm, 6.5mm, 7mm, 7.5mm, 8mm, 8.5mm, 9mm, 9.5mm, and 10mm. Made of premium hardened steel, the impact grade turbo sockets feature a helical teeth design that offers a secure grip and reduces slippage when removing damaged, tapered, rounded, or frozen fasteners. The set is ideal for automotive repair involving rusted and damaged fasteners, and small engine care.

CATEGORY: Tool Accessories

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2023 CHOICE



Snap-on

3/8" Drive Cordless Impact To Go Kit
 The **Snap-on 3/8" Drive Cordless Impact To Go Kit**, No. 262CTSS01FR, organizes and protects power tools for technicians on the go. Complete with a Snap-on CTR861 14.4 V 3/8" Drive Cordless Ratchet and CT861 14.4 V 3/8" Drive Cordless Impact Wrench, this 62-pc kit organizes the necessary tools for tackling mobile jobs. Included are 12 3/8" drive shallow SAE impact sockets, 12 3/8" drive deep SAE impact sockets, 14 3/8" drive shallow metric impact sockets, 14 3/8" drive deep metric impact sockets, four 3/8" drive impact extensions, and a 3/8" drive friction ball swivel ball impact universal joint. Tools are precision fitted in closed-cell cross-linked foam, providing ideal tool organization and protection.

CATEGORY: Tool Organization

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TEXA

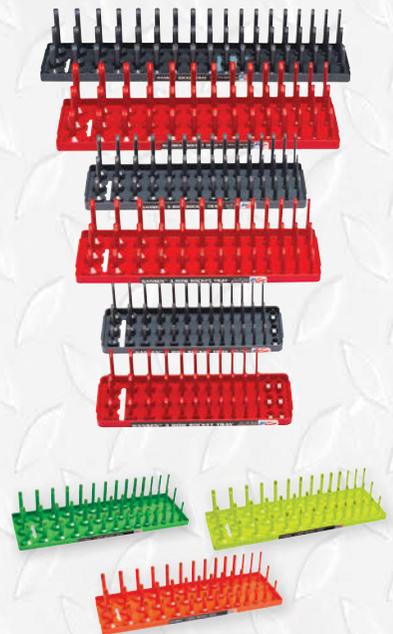
RCCS3

The **TEXA RCCS3 Digital Innovation** offers precise ADAS target placement by accurately centering and squaring the calibration frame to the vehicle by use of Bluetooth laser distance measurement, as well as by providing step-by-step guided graphic instructions and by having a larger calibration frame with oversize pivoting wheels. The RCCS3 has a wide range of accessory options to support calibrations for other ADAS sensors like AVM for 360 degree cameras, blind spot, and doppler radar, as well as infrared and night vision. Additionally, it features a 75" HD screen for optimal display and target proportion ratio.

CATEGORY: ADAS

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Milwaukee Tool

M18 Fuel 1/4" Lockbolt Tool with One-Key

The **Milwaukee Tool M18 Fuel 1/4" Lockbolt Tool With One-Key** eliminates compressors and hoses when installing lockbolts, increasing portability and maneuverability. Designed to withstand harsh shop environments, the tool features an all metal gearcase, impact strength plastics, and a rubber overmold while the optimized ergonomic design provides maximum comfort for all-day use. Additionally, it features a 4,500 lbs pull force and 1.18" stroke length. It weighs 4.68 lbs (without the battery) and comes with a mandrel collector, a bobtail cap, and a belt clip.

CATEGORY: Power Tools

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NextLED

Ultimate Series NT-6926M
 Cordless Tripod Work Light

The **NextLED Ultimate Series NT-6926M**

Cordless Tripod Work Light is designed to provide high performance and quality. The LED can illuminate up to 6,000 lm in brightness with high, medium, and low options. Its 8,000 mAh Li-ion battery is quick to recharge and continues to charge while plugged in and in use, eliminating downtime. The remote control allows users to conveniently adjust the brightness levels with two light colors choices, while the detachable magnetic lamp head with hook design offers maximum flexibility for various lighting setups.

The tripod can extend to 75.5".

CATEGORY: Lighting

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Electron John

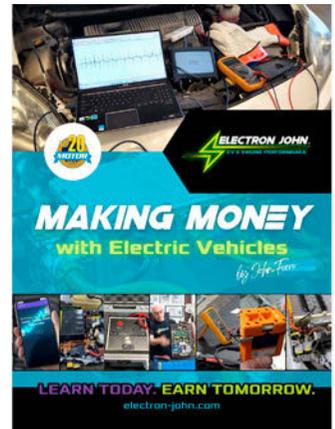
Making Money with EVs

The **Electron John's Making Money with EVs** program addresses the need for technician training pertaining to electric vehicles. It covers all the technical materials needed as well as uses custom training props to simplify the explanation of various complex subjects pertaining to how EVs are designed to work. The course consists of either instructor-led

or video training, breaking the course into chapters where the attendee must pass their current section before continuing on to the next chapter. A manual accompanies both the instructor-led and video training course and features QR codes throughout to show short videos to help explain more complex sections.

CATEGORY: Training

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Snap-on

68" Nine-Drawer Double-Bank EPIQ Series
 Roll Cab with PowerDrawer and Speedrawer

The **Snap-on 68" Nine-Drawer Double-Bank EPIQ Series Roll Cab with PowerDrawer and Speedrawer**, No. KETP682ATWHC, is designed to improve productivity and offer technicians workspace personalization. A customizable feature, the color-changing LED PowerTop, illuminates drawer contents in a multitude of user-chosen colors through an integrated RGB LED light bar controlled by a dedicated Snap-on app. The PowerTop and PowerDrawer provide 15 power outlets and six USB ports throughout, ensuring cordless tools, lights, and accessories are always charged. Also included are three extra-wide drawers allowing quick access to frequently used tools and a Speedrawer with customizable organization.

CATEGORY: Tool Storage

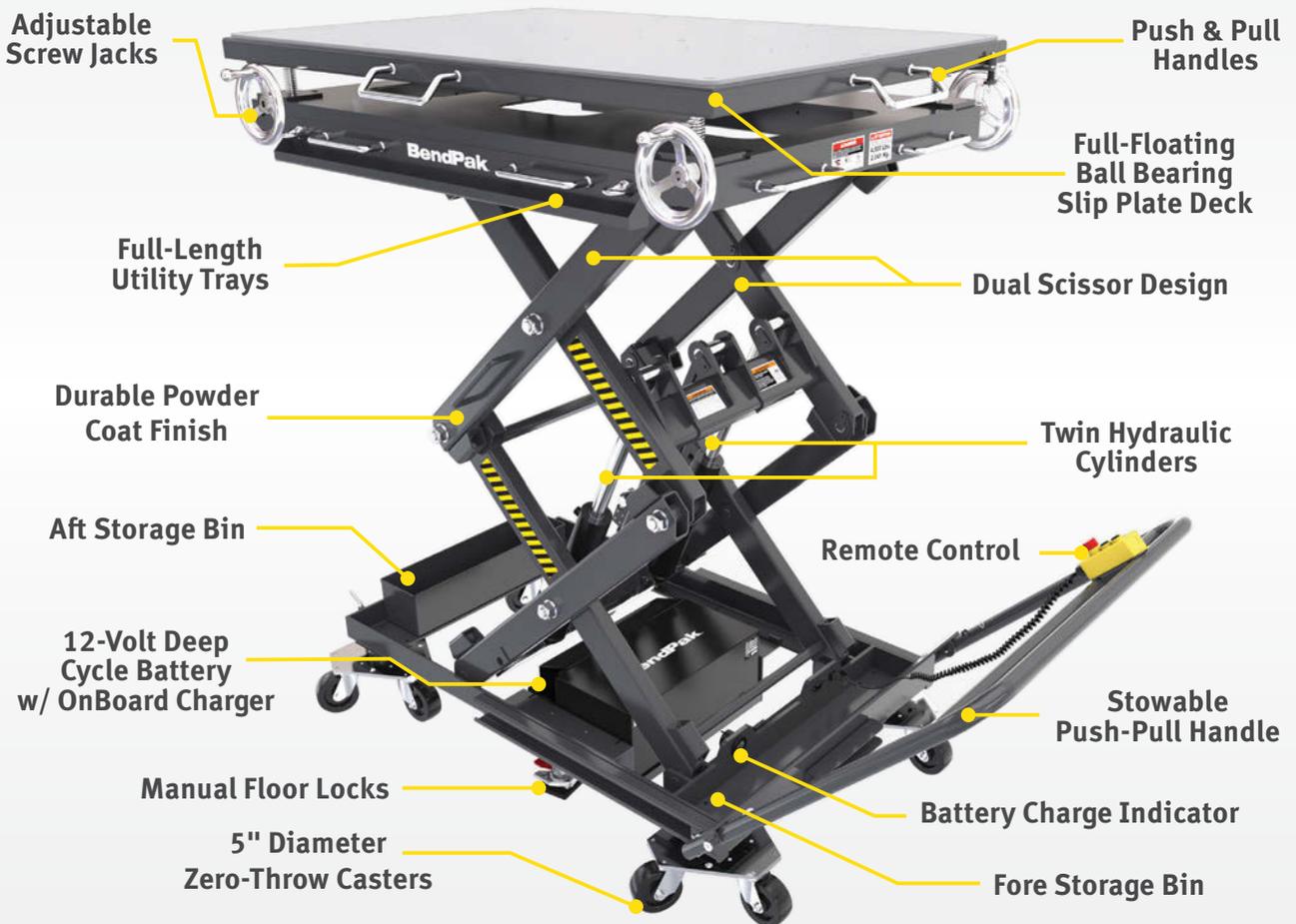
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BendPak's revolutionary **Mobi-EVS™** is a full-rise battery powered mobile scissor lift table that is perfectly suited for Electric Vehicle Service and EV Battery Pack replacement. With its compact design, this space-saving scissor lift can be easily transported anywhere in the workplace, making it ideal for multi-bay facilities or workplaces with confined areas. To learn more visit bendpak.com/evs4500

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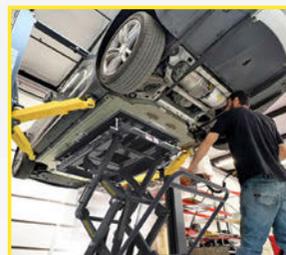
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BendPak

10AP Series Two-Post Lifts

The **BendPak 10AP Series Two-Post Lifts** are designed to make lifting ICE and electric vehicles safer, easier, and more efficient. The patent-pending arm design offers maximum extension and retraction to reach more lifting points with less risk of vehicle damage, saving technicians time and hassle while also enhancing safety. The 10AP Series also features a new automatic swing arm restraint system (ASARS) that offers more holding grip to prevent dangerous, unplanned movement of the lift arms and an automatic safety lock system that ensures the locks engage automatically when the lift is rising and makes releasing them for descent as easy as pushing a button. Additionally, the lifts' 360 degrees of steel teeth keep the arms in place against more than 2,000 lbs of side force.

CATEGORY: Lifts, Jacks, & Stands

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AGS Resto Solutions

Bumper and Trim Restorer

The **AGS Resto Solutions Bumper and Trim Restorer** is designed to permanently restore plastic bumpers, fenders, cladding, and trim a factory look. No re-application is needed. Exclusive technology imbeds the coating into the plastic, making it impervious to sun, harsh weather, and car washes. Comes with a limited lifetime warranty.

CATEGORY: Chemicals

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Hofmann

geoliner 609 Imaging Wheel Aligner
 The **Hofmann geoliner 609 Imaging Wheel Aligner** integrates the core system features of the advanced imaging alignment systems in a compact, economical design. Ready out of the box with minimal installation, the geoliner 609 includes intelligent software tools and can be controlled from anywhere in the shop with a tablet. It has an elevated, two-wheel compensation mode for shops with limited space, providing flexibility in performing alignments

in situations where an alignment rack is unable to be used. The geoliner 609 also includes a predictive alignment flow, automatic error detection, video-speed imaging for fast compensation, and never requires recalibration.

CATEGORY: Tire & Wheel Service

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Snap-on

Skull Auto-Darkening Welding Helmet with Light

The **Snap-on Skull Auto-Darkening Welding Helmet with Light**, No.

WELDIGNSKULL, features a built-in pivoting, flip-out light that functions when the helmet is raised or lowered and fully integrates into the contour of the helmet when

not in use. A 180-degree viewing area includes shade 10 peripheral-vision-enhancing side lenses creating a wide field of vision. Including true color technology brightened by IGNITE Series 360 LED light-balance technology, the helmet also features an extra-large, four-sensor solar-powered ADF with a lithium battery backup. The patented quick-adjust, comfort-fit headgear has push button adjustment.

CATEGORY: Welding

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▲ Derek Mohart

DEREK MOHART'S TOP 5 FAVORITE TOOLS:

- Milwaukee Tool 1/2" electric impact
- Milwaukee Tool hood lamp
- General stethoscope from Amazon
- Snap-on tap and die set
- Milwaukee Tool 1/4" impact

Chris Chesney, vice president of training and organizational development for Repairify, nominated Mohart for this year's *Motor Age* and *PTEN* Best Young Tech Award.

The award is designed to honor technicians aged 35 or younger who are moving the service repair industry forward, excel in their current role, and are passionate about their work.

FINDING A PLACE IN THE INDUSTRY

Mohart, age 28, has had an interesting career pathway thus far. After graduating from Ranken Technical College with a degree in High Performance Racing Technology, he worked a job diagnosing and rebuilding transmissions as well as doing custom engine work. From there, he began work as a subcontractor for Anheuser-Busch where he performed maintenance, repairs, and diagnostics on Cummins compressed natural gas (CNG) engines. During that time, he also received his Class A CDL. A little further down the road, Mohart became the lead technician at a restoration facility when he was only 23 years old. The young technician dipped his toe into many different facets of the automotive industry before he began working at his current place of employment, asTech.

At asTech, Mohart started as an in-shop technician managing a fleet of cars by using an asTech device and submitting the vehicles for diagnostics to the company's remote technicians. He also worked to expand his industry knowledge. He went from having two ASE certifications to 12, becoming a certified ASE Master Technician, along with procuring his B2-B5 and C1 certifications.

"As time went on, Derek started learning all the OEM scan tool software and became

Derek Mohart claims the title of 2023 Best Young Tech

Mohart stood out for his can-do attitude, penchant for problem-solving, and ability to quickly find ways to improve clunky work processes.

By Emily Markham, Editor

Derek Mohart has spent his entire life around cars.

Growing up, he notes that his dad owned a variety of different vehicles from a 1932 Hudson Essex to an '88 Chevy Crew Cab with an 8' bed and everything in between. He spent a lot of time as a kid helping his dad with those vehicles. However, when it came time to head off to college, Mohart never dreamed of going to school to become a technician.

"I went to [University of Missouri] for pre-med in biochemistry," he says. "I was planning to be a radiologist."

With this career path, he was going to follow his mom into the medical field, but after a year full of science and math classes, Mohart found he was losing interest. Over the summer, he went home and started working on his truck and fell in love with doing upgrades and putting aftermarket parts on it. That's when his passion for the automotive industry really started to grow.

This passion has taken Mohart far in his journey as a technician. With his can-do attitude, penchant for problem-solving, and ability to quickly find ways to improve clunky or outdated processes, it's no wonder



GRAND PRIZE

As the winner of the Best Young Tech Award, Derek Mohart received the following prize pack:

- All expenses paid trip for two to the 2023 AAPEX/SEMA Shows in Las Vegas provided by *Motor Age* and *PTEN* magazines
- All expenses paid trip for two to the 2024 STX Supplier and Training Expo in Nashville provided by CTI-WTI (Advance Auto)
- A tablet and complimentary ALLDATA subscription for 12 months provided by Duralast Parts
- Haynes Model V8 Engine provided by TechForce Foundation
- A TBD prize provided by Solera
- An award plaque and uniform patch

more efficient at the process,” Chesney notes. “[He] started scanning the vehicles that he was hooking up in the shop, no matter what manufacturer the vehicle was from, [and] eventually became the highest scanning technician in the company, while still managing a shop full of cars.”

Early on in 2020, Mohart’s career shifted once again. This time he found himself working as a remote diagnostic technician. Remote isn’t a word most people think of when it comes to fixing cars, and four years ago when Derek started at asTech, he never thought he’d eventually be a technician working from home.

“It’s a different mindset,” Mohart explains of his transition from in-shop to

remote. “You can’t really see what happened, even though the shop will tell you where the damage is, [and] what kind of damage it is. You’ve got to think in different ways once you go remote.”

As was Mohart’s norm throughout his career, Chesney notes that as a diagnostic technician, Mohart focused on becoming the most efficient and best technician he could be. Through that determination, Mohart became the top remote technician in the company within a month. On average, Chesney says Mohart was scanning 80 vehicles a day compared to the company average of 40 to 50 per technician. Eventually, his scanning average hit 100 vehicles per day with an all-time high of 203 scans in one day.

“After becoming efficient in his own work,” Chesney says, “Derek started looking for ways to make everyone around him more efficient.”

ALL ABOUT EFFICIENCY

Mohart’s drive to create efficiency in his workplace perfectly set him up for the position he’s working now – continuous process improvement manager.

Though he still jumps into helping with scanning when need be, his current job has him scrutinizing the processes they have in place in order to streamline them, making work a bit easier for everyone.

“Derek’s ability to review processes and identify areas of improvement in a short amount of time is unique,” Chesney says. “He brings a ‘can-do’ attitude to work every day and has become an essential team member on every project in our organization.”

Mohart notes that he’s always worked this way, looking for a different way to do things.

“I’ve always just kind of tried to find the inefficiencies in everything I do and just find ways to make any processes better,” Mohart explains.

For example, he notes that for his remote office setup, he has multiple computer screens on his desk. While he worked as a diagnostic technician, he would set the screens up in a way that created a natural flow with the information he was looking at, which helped to create a good working rhythm.

FOR THE LOVE OF A CHALLENGE

After having worked in many parts of the automotive industry, diagnostics is still Mohart’s favorite part of being a technician.

“One-off instances are my favorite because you just get to dive into the wiring diagrams or the exploded parts view diagram,” Mohart says. “It’s really fun being able to diagnose an issue that nobody else has figured out.”

It’s challenges like these that keep the young tech motivated to continue growing his knowledge as new technology emerges in the industry. Though he notes, now that he’s in a leadership position it’s not just about expanding his own knowledge, it’s about helping others learn as well.

“This industry is ever-changing,” Mohart says. “There’s never day-to-day, month-to-month, year-to-year — nothing stays the same with automotive.”

For Mohart, it’s about helping the other technicians become better technicians. Looking ahead, he wants to do much of the same — continue learning, build more skills, get more certifications, and just do anything that can help him do his job better, so he can continue helping others be their best.

“[Derek’s] example of continuing to look for a rich challenge to express his skills is worthy of sharing with entry-level technicians as they consider a career in our industry,” Chesney says. “As well, his path serves as a wake-up call to shop owners and other business owners that they should continue to invest in and stretch the talent on their teams to allow people like Derek to find their best opportunity.” ❌

RUNNERS-UP:

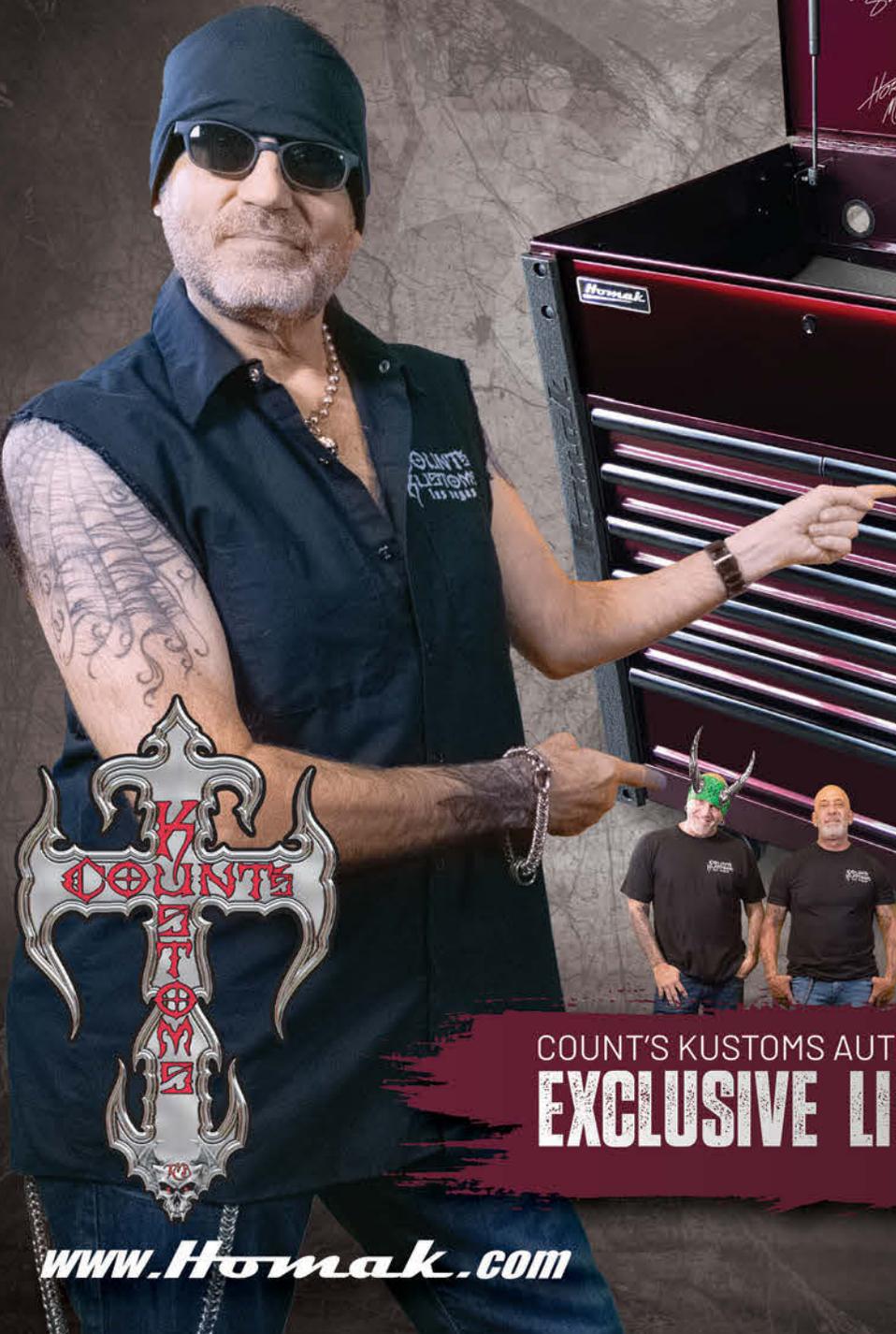
Be on the lookout, starting January 2024, for the first online exclusive interview featuring one of the talented top nine runners-up for this year’s Best Young Tech Award. Throughout the year, *Motor Age* editors will be chatting with the top nine to get the inside scoop on how these techs have come to thrive in the industry. The top nine include the following:

- | | |
|---------------------|-------------------|
| ▪ Josh Whiteman | ▪ Melina Algier |
| ▪ Nick Kolodgie | ▪ Aaron Schnabl |
| ▪ Logan Garber | ▪ Logan Tate |
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Decoding automobile network communication challenges

Gaining a deeper understanding of troubleshooting techniques and resolutions for network communication issues in modern vehicles.

By **Scott Brown**, *Technical Editor*

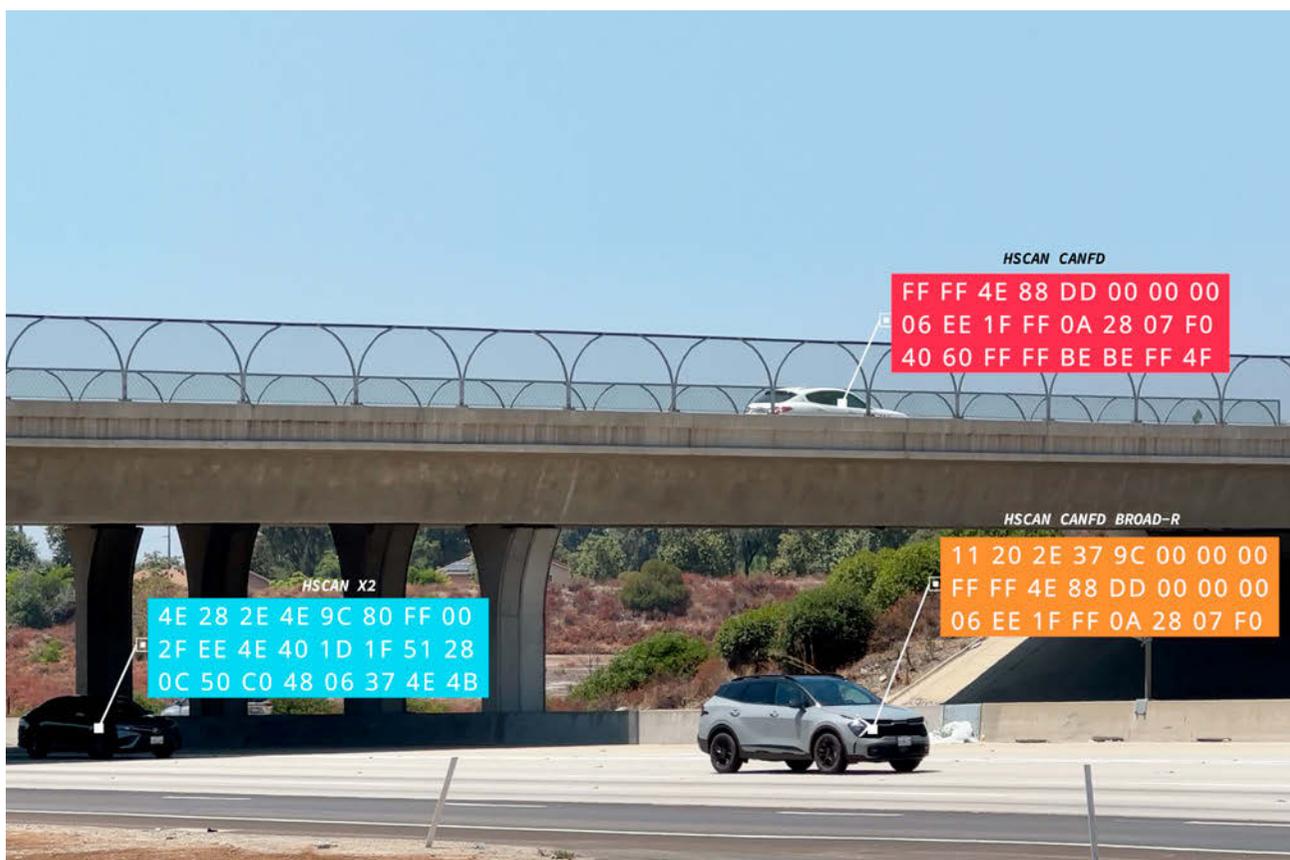
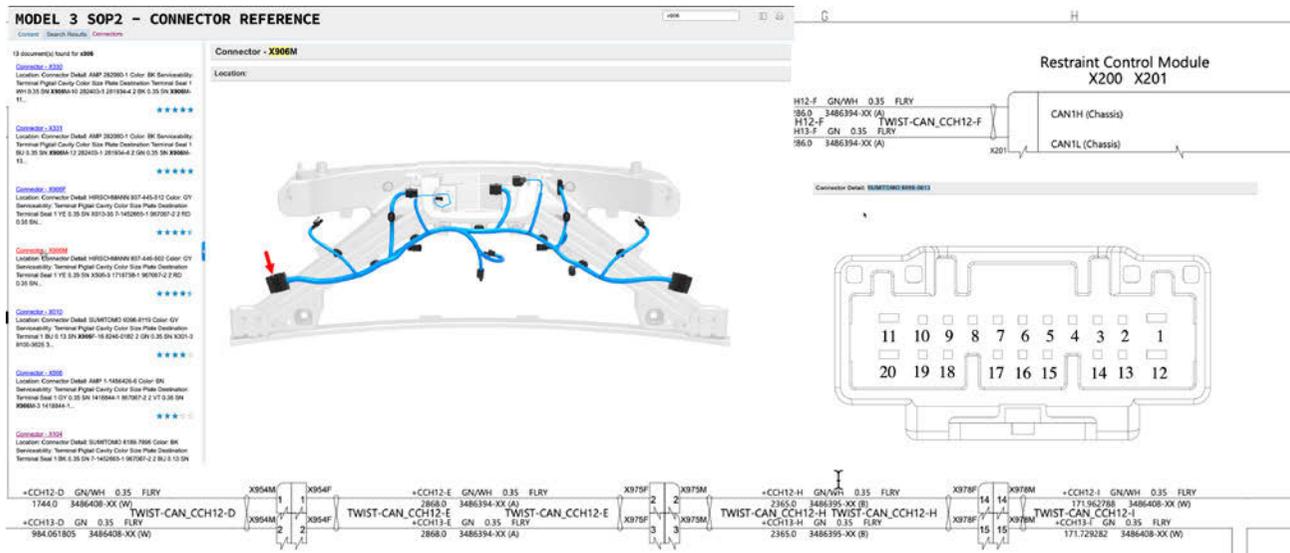


Photo courtesy of Scott Brown

Network communications are an essential part of modern vehicle operations. Most vehicles today possess multiple modules that use shared information across different networks with some network protocols being different. Certain modules are responsible for linking these devices and other electronic systems in the vehicle together. However, when communication faults occur, they can surface various problems, from erratic vehicle operation to warning messages announced on the instrument cluster, along with decreased vehicle performance and potential safety deficiencies. In this article, we will discuss the common causes of automobile network communication faults and troubleshooting techniques.

We'll go over some of the basic methods used in troubleshooting network problems such as using an ohmmeter to quickly assess an HSCAN network's wiring connection integrity and how to go about checking for an intermittent high resistance condition you suspect the vehicle of having. We'll also discuss how using a lab scope can be especially useful when inspecting live network communication signals, as well as some alternate diagnostic methods utilizing different tools that may prove to be beneficial not only for troubleshooting but for growing your knowledge on this topic as well.

Today, the service technician responsible for troubleshooting network communication problems must possess a unique set of



▲ **Figure 1 — Wiring diagram, connector location**
Photo from Tesla SI



▲ **Figure 2 — Mercedes-Benz CAN junction points 2015 MY**
Photo courtesy of Scott Brown

skills that will allow him or her to navigate complex vehicle systems and drill down to locate and rectify trouble. In some cases, the vehicle may have an intermittent network problem, and this is where the job can become the most difficult and time consuming.

In my opinion, network communication faults will require the technician to possess the following at minimum:

Network basics: An understanding of the distinct types of networks which each require a different approach. For this article, we'll be focusing on HSCAN (high-speed controller area network) which is typically operating at 500kbps, and we'll also briefly discuss local interconnect network (LIN) which is a popular choice for low-speed, non-mission critical communication due to its low cost.

Electrical fundamentals: An understanding of ohms law, basic circuits, power, ground, voltage drop, and the ability to understand and decipher wiring diagrams and knowing where else to source information to establish a sound understanding of the system you're currently addressing.

Tool awareness: Understand how to assess a tool's strengths and weaknesses and how to apply them to make the best use of the tool when the time is right. Possessing basic DVOM skills will go a long way toward helping the technician get on the right track to success, especially regarding circuit resistance testing.

Diagnostic scenarios can be classified as either a hard fault (good) or an intermittent fault (bad). We'll go over both.

For the most part, faults caused can be placed into three buckets:

- Connections
- Module failure
- External influence

Within these buckets, we can tie the following conditions to each.

CONNECTIONS

Connectors are potential failure points and can serve as potential test and isolation points. Connection problems can be caused by conditions such as terminal fretting, or they could have been influenced by previous service events or external influences such as moisture or improper testing (otherwise known as maintenance-induced failure). Accurate wiring diagrams and connector locator tools are essential for proper troubleshooting (**Figure 1**).

Some manufacturers do an excellent job of locating network junction points which can be extremely useful for diagnostics such as shown in **Figure 2**.

MODULE FAILURE

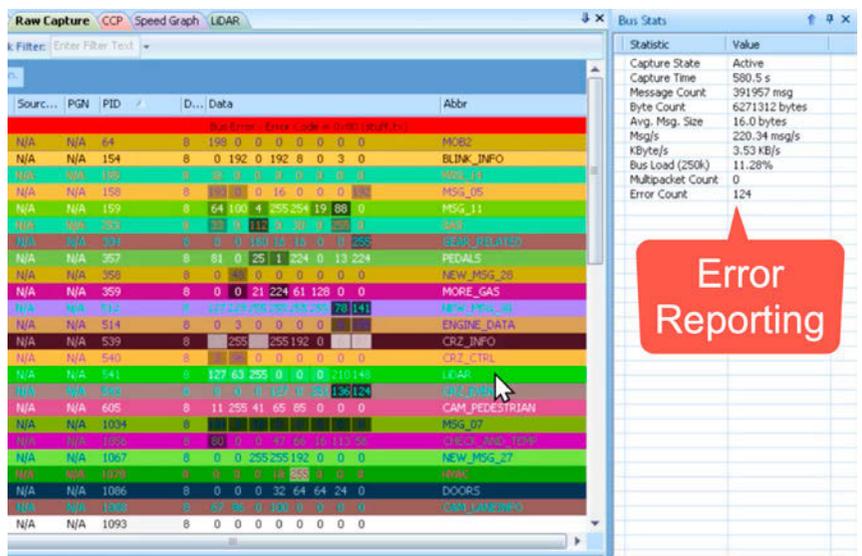
Verification of bucket #1 is an absolute must before condemning a module and possessing a solid understanding of how a module is powered and commanded to wake up is essential. Additionally, understanding where relevant messages originate, which modules are complaining, and when their complaints surface will greatly assist the technician in assessing the situation.

EXTERNAL INFLUENCE

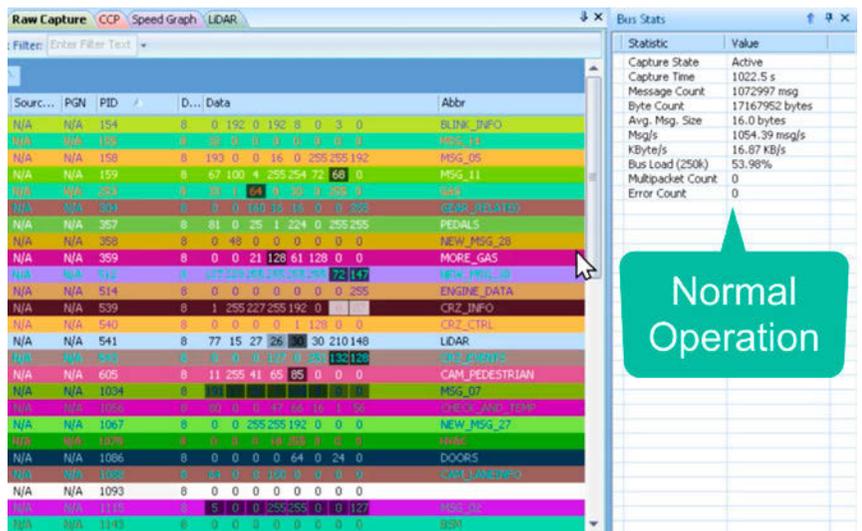
External influence is always a possibility, and this is why performing visual inspections is a must. I recommend following this pathway so that your initial visual inspection isn't influenced by any specific fault. I find myself picking up potentially useful information when taking a quick look under the hood, under the dash, seats, and cargo areas, especially when looking for any add-on communication devices. Additionally, I like to walk around the vehicle inspecting for evidence of collision repair or other service events that may have introduced problems. This provides a global view of the vehicle I can use during the next phases of diagnostics, greatly enhancing the decision-making processes to come. Your front office staff should always be questioning your clients for clues that might prove to be useful. I have an example to share with you later in this article about a scan tool that induced a communication fault (U0235) that stayed active even after the tool was disconnected.

HSCAN CIRCUIT BASICS

Not all HSCAN networks are the same, but they all have terminating resistance. Terminating resistance is used in high-speed networks to minimize signal reflections that result from rapidly changing voltage levels. Many HSCAN systems utilize two terminating resistors which are typically located at the ends of the network. There are many network construction guidelines manufacturers follow regarding the overall length of the wiring, number of modules, and network message load. It's quite common to see two 120-ohm terminating resistors used at the end of each network backbone but it isn't always the case. General Motors typically uses



▲ Figure 3 — Network error reporting
Photo from CANCapture



▲ Figure 4 — Normal network operation
Photo from CANCapture

passthrough wiring for its two-wire CANBUS systems. This allows the technician to troubleshoot network wiring integrity more effectively than other systems that use stub harnesses to link modules to the network. With GM's circuit, a technician can truly assess total wiring integrity by leveraging terminating resistors where some other manufacturers are different.

For example, Volkswagen Audi Group (VAG) will utilize a single module to serve as the primary termination point and this is usually done by using a resistance value of about 60 ohms. Additionally, the other modules will also be equipped with a higher level of termination between CANH and CANL, typically 2k-3k ohms. The design of the network is usually driven by the manufacturer and

their component suppliers. The technicians will need to familiarize themselves with this information so it can also be leveraged during diagnostics. Missing termination will result in high signal reflection and improper communication. However, some vehicles may use multiple resistors so beware and never assume that the network design is the same from one vehicle to another. VAG vehicles use shorter wiring stubs between their modules which allows them to minimize signal reflection, allowing the use of a centralized primary resistor in the ECM. You may have also noticed that HSCAN wiring utilizes a twisted pair wiring, and this is because any electromagnetic interference on the harness will affect both CANH and CANL electrical signals equally so that the voltage difference between the two is unaffected if such a condition were to occur. Additionally, you may not always find the exact info you need within service information. Often, I find myself researching training documents offered by the OEM or aftermarket resources for additional insight.

ERROR REPORTING

HSCAN messages are broadcast on the network and are received by modules that have a responsibility to report any errors they receive. This is done via the cyclic redundancy check (CRC). A CRC is a common method used for validating digital messages. If you've ever scoped an HSCAN circuit, you will have likely observed a one-bit spike at the very end of the message. This is an acknowledgment bit and the reason it's elevated is because it's a sum of all the modules acknowledging the message at the same time. If the CRC doesn't match, then this is where the tracking of error messages kicks in. Managing these errors can assist in telling an offending module to switch offline temporarily and then come back online after a brief period. Essentially, the design and function of this is complex and will take an accumulation of errors to cross a threshold before advising a module to switch off. What this means is that there may be a few errors on a bus over time that won't result in any negative operation of the vehicle. The tools we commonly use today do not show us error messages statistically but there are tools out there that can (Figures 3 and 4).

TROUBLESHOOTING

You may be presented with a vehicle containing a fault from one module stating that it can no longer communicate with another module. This may be one of the simplest types of failures and here's why. The modules deployed on the vehicle from the factory designed to be part of a network have been engineered to work under very robust conditions. The language they all speak has been carefully refined and has been designed to look out for each other.



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In the event that a module drops offline, their counterparts are at the ready to raise awareness of their visibility or lack thereof. When you're presented with such a problem you will need to know a few things about that module which are as follows:

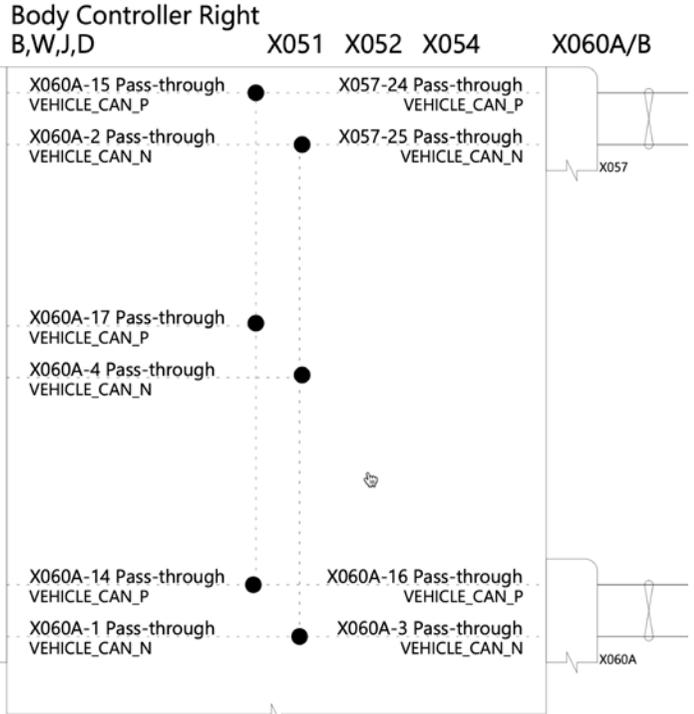
- Module location (inside or outside of the vehicle)
- Power and ground supply points
- Any connections between the module and the rest of the vehicle
- How the module is activated for action

Armed with that information you would now want to find the most efficient way to analyze the situation. If this device has a single power source protected by a fuse that isn't responsible for supplying power to any other components on the vehicle, then you have the upper hand. From this single fuse, you may be able to learn more about this module quickly. If I'm presented with such a scenario, I'll not only check for voltage on either side of the fuse, but I'll install a fused current loop in place of the fuse so I can measure current flow since this will give me a sense of whether the module is able to power up and attempt to work or is the device down for the count. If I find the protected supply voltage is sufficient at the fuse and has zero energy being consumed, I am now interested in validating the ground side of the module. And from there I'll be looking into how the module is activated for service, and now I'm prepared to properly analyze the module.

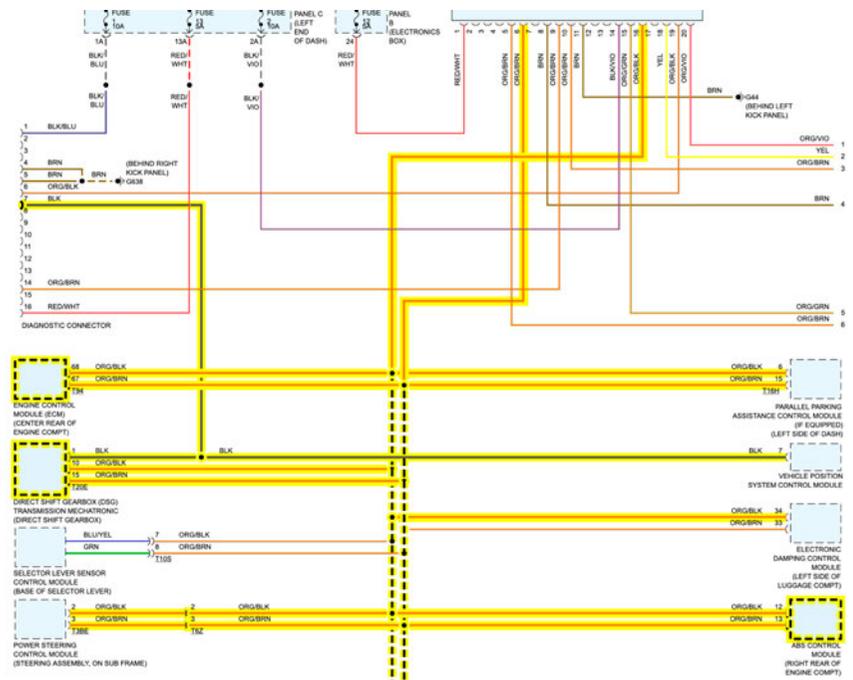
At the module armed with an accurate connector pin-out diagram, I'm ready to test.

In the scenario where you have multiple modules reporting communication faults with other modules, then a close look at an accurate wiring diagram is step one. When analyzing the diagram take note of where each module is located (inside or outside) on the vehicle, how it is wired into the network, and how termination is provided. Some wiring diagrams do an excellent job of calling out terminating resistors and their values while others require more research to surface this information. Understanding how the system is wired is crucial since you may find a module serving as a Pass-Thru device (**Figure 5**) potentially offering up a convenient testing location.

In the condition where the faults are intermittent (non-hard



▲ Figure 5 — Body controller Pass-Thru network
Photo from Tesla



▲ Figure 6 — VW network wiring diagram
Photo from ALLDATA

fault) you may need to deconstruct the series of DTCs initially encountered and compare those to new faults that may have been set after a code clear. Using this information can aid the technician with enough evidence to hold against a module you suspect as being the source of the intermittent failures. ➡

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For example, we recently had a 2015 Volkswagen Eos arrive at the shop with the following complaints:

“The customer drove the vehicle in. The customer states that the MIL steering and EPC light came on yesterday. The ABS light intermittently came on for about a week and the brake light flashed. Inspect and advise on repairs.”

The initial inspection revealed the following list of faults:

Engine control module 1

- U1017:00/532 71:000 / ABS brake control module read out DTC (active/static)
- U1017:00/532 71:000 / ABS brake control module read out DTC (passive/sporadic)
- U0415:00/501 97:000 / Invalid data received from anti-lock brake system control module (active/static)
- P0501:00/012 81:000 / Vehicle speed sensor ‘A’ range/performance (active/static)

Transmission electronics

- 17106:000 / Output speed sensor circ., no signal (passive/sporadic)
- 18201:000 / Transmission output speed sensor 2, no signal (passive/sporadic)
- 18255:000 / Read DTC memory of ABS CM (passive/sporadic)

Brakes

- 03840:000 / Right front speed sensor, incorrect signal (passive/sporadic)
- 00285:003 / Right front ABS wheel speed sensor, mechanical malfunction (passive/sporadic)
- 00285:012 / Right front ABS wheel speed sensor, electrical error in circuit (passive/sporadic)
- 00283:012 / Left front ABS wheel speed sensor, electrical error in circuit (active/static)

Air conditioning

- U111300 / Function limitation due to received malfunction value (passive/sporadic)

Electronic central electric

- 01038:000 / Central locking overheating protection (passive/sporadic)

Airbag

- 01316:008 / Brake control module, implausible signal (passive/sporadic)

Power steering

- 01316:013 / Brake control module, please read DTC (passive/sporadic)

Tire pressure monitoring

- 02801:002 / Hard warning 1, lower limit not reached (passive/sporadic)

Looking at the list above and correlating the results might have one thinking that there is a problem with the ABS control

- DISCONNECT: Data Bus On Board Diagnostic Interface (J533) harness connector.
- The Engine Control Module (J623) must remain connected for the following step.
- CHECK: Data Bus On Board Diagnostic Interface (J533) harness connector terminals 6 to 16 for resistance.
- SPECIFIED VALUE: 60 - 72 Ω (at approx. 20° C).
- Was Value obtained?

▲ **Figure 7 — CAN-Bus terminal resistance checking**
Photo from ALLDATA Repair

module and the reason for this is that the following list of modules is reporting that the ABS control module isn't doing its job:

- Engine
- Transmission
- Air conditioning
- Airbag
- Power steering

The first thing I observed while looking at this diagram (**Figure 6**) is that this network is isolated from the J1962 OBD-II diagnostic port. Secondly, I see that this vehicle has a Data Bus Diagnostic Interface (J533) that serves as a gateway between three different two-wire busses and a LIN bus and could serve as a potential test point. The next question I have is, ‘How is termination performed on this network?’ I started reading within service information (SI) and found the following when searching for “terminating resistor” (**Figure 7**).

What I found with this system is that the engine controller possesses the main terminating resistor while all the other modules on the circuit have high resistance (about 2.7k ohms) between their high and low circuits. What this means is that there is an overall 60-72 ohms of bus terminating resistance in this circuit. If the ECM BUS connections had high resistance, then my measurements would be much greater than this.

With the vehicle powered off (sometimes requiring a battery disconnect) a DVOM can be deployed to begin interrogating of the network connectivity by assessing terminating resistance. However, this is highly dependent on network wiring. In most cases, the technician can assess network wiring integrity and then begin performing connector integrity (wiggle) testing but only after they have a solid understanding of the wiring and termination strategy. But you may ask, how do I verify the integrity of the other modules on the network, and can I leverage the fact that there is a 2.7k ohm in the other modules? With the ECM disconnected and measuring the resistance between CANH and CANL, your measurement would reflect the entire parallel resistance of the circuit. The number of modules on the circuit would dictate the value however, with the meter in sight, one could start wiggling suspect connectors looking for a change in resistance. Another test to perform ➔

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HINT:

When entering Test Mode (Signal Check), the skid control ECU (master cylinder solenoid)*1 or skid control ECU (brake actuator assembly)*2 communicates with the millimeter wave radar sensor assembly to judge whether the vehicle is equipped with the pre-collision system. Therefore, do not exit Test Mode (Signal Check) within 5 seconds of entering Test Mode (Signal Check).

*1: for Hydraulic Brake Booster

*2: for Vacuum Brake Booster

(a) Procedure to enter Test Mode

- (1) Turn the ignition switch off.
- (2) Check that the steering wheel is centered.
- (3) Check that the shift lever is in P.
- (4) Connect the Techstream to the DLC3.
- (5) Turn the ignition switch to ON.

▲ Figure 8 — U0235 Warning, Toyota Tacoma

Photo from Toyota TIS

is the resistance test from CANH and CANL to ground and B+. Obviously, either of those with continuity would result in a major network failure.

On the VW example, all connections were found to be problem-free and after clearing all the DTCs and road testing the vehicle on several occasions over the course of a couple of days,

the problem resurfaced which occurred right after startup. Not all the previously reported DTCs were set but enough information was gathered which pointed to a module fault. In this case, it was the brake control module that was suspected to be at fault in the beginning.

U0235 CASE STUDY

Recently, one of my apprentices informed me that his friend's 2019 Toyota Tacoma was exhibiting an error message on the cluster stating that the pre-collision system was disabled and a U0235 was stored. This seemed to surface after they were using a scan tool on the vehicle at school. After performing some research, we discovered that this code was set when they entered test mode and then immediately exited that mode. Toyota's service information provides more detail as to why this is. See **Figures 8 and 9**.

TOOLS FOR TESTING

DVOM: We've already discussed leveraging the power of the ohmmeter for testing but what about using the voltmeter or the scope? The voltmeter can serve a purpose by measuring CANH and CANL referenced to the ground. Since the non-dominant voltage level for each ride is at 2.5V, depending on how much traffic (bus load) there is the CANH will measure slightly higher than 2.5V and the CANL will measure slightly lower.

Scope: While the scope is a powerful tool, it must be used with caution since it can take the technician down the wrong pathway if he or she doesn't know what to expect. An example of this is shown in **Figure 6** where normal message arbitration is taking place. It's entirely possible that a technician seeing this for the first time may begin to suspect that this is an anomaly and decide to research further. The higher levels shown are simply because at least three different modules started to communicate their message IDs (during the arbitration period) with one (or more) dropping off at the next bit until the message with the lowest ID won and was then able to continue to broadcast its message (**Figure 10**).

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▲ **Figure 9** — U0235 Warning, Toyota Tacoma
Photo from Toyota TIS

HINT:

Do not exit Test Mode (Signal Check) within 5 seconds of entering Test Mode (Signal Check). If Test Mode (Signal Check) is exited within 5 seconds of entering Test Mode (Signal Check), DTC U0235 may be stored. If DTC U0235 is output after exiting Test Mode (Signal Check), enter Test Mode (Signal Check) again, wait at least 5 seconds, then recheck for DTCs.

(8) Check that the ABS warning and slip indicator lights come on for several seconds and then blink in the Test Mode (Signal Check) pattern.

HINT:

If the ABS warning and slip indicator lights do not blink, inspect the ABS warning and slip indicator light circuits.

(b) End Test Mode (Signal Check)

- (1) Turn the ignition switch off to exit mode.
- (2) Disconnect the Techstream.

Sniffers: CANBUS sniffers may also provide support for network troubleshooting as they can provide additional information such as bus traffic (load) and other statistical data such as the number of errors and other data metrics (see **Figures 3 and 4**). Knowing the bus load could prove to be helpful in cases where aftermarket

devices have been unknowingly added to the network and may be the source of the problems you're researching. One that I've been using is CANCapture from eControls as mentioned earlier. Another tool is the PhysiCAN SnS GRIP Tester from Sital which comes with Windows software. This tool requires specific network configura-

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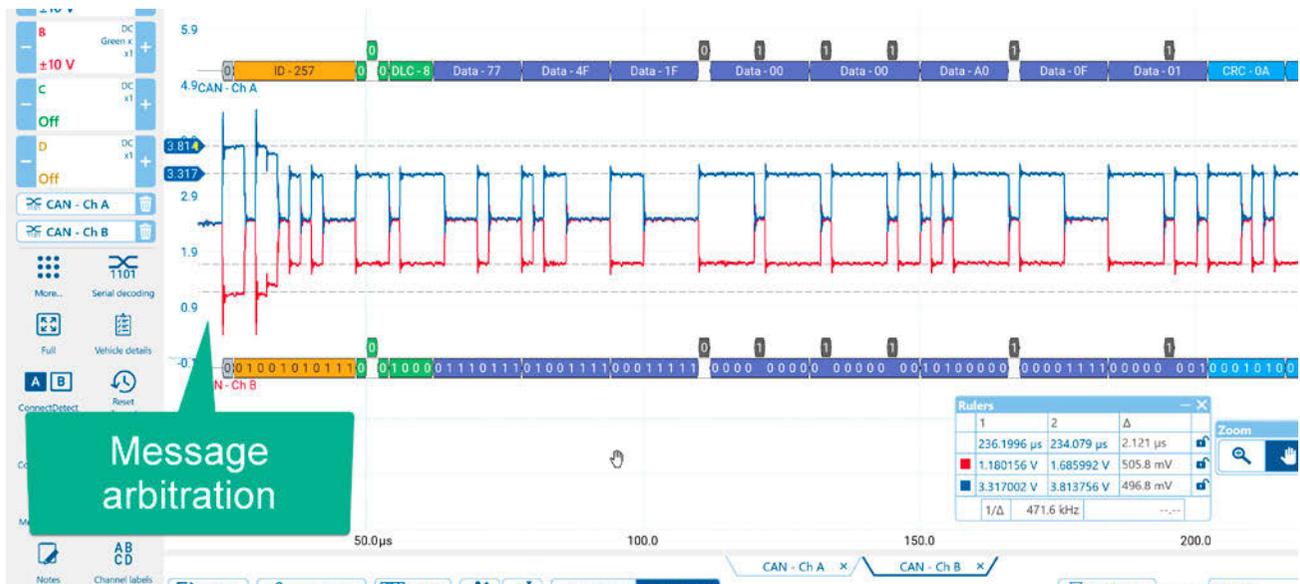
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▲ **Figure 10 — CAN message arbitration**

Photo from PicoScope

tion information so it can leverage its proprietary time domain latency algorithms to identify trouble. I know a technician who works for Rivian who uses this tool regularly for troubleshooting.

OTHER NETWORKS

A local interconnect network (LIN) bus is a single-wire network that typically operates at a much lower speed and has a 0-12V digital signal. This network will have one master module and can have a maximum of 16 nodes connected. Any messages on this bus that need to be shared with other non-LIN modules the transfer of this info will be carried out via a gateway module. I have a video sharing how I was able to leverage a breakout junction on a 2013 Chevrolet Volt to diagnose a faulty module that was pulling the LIN bus down. The diagnostic steps utilizing the oscilloscope begin here: youtu.be/YAKJsiy4rh4?t=176.

CONCLUSION

This article discussed vehicle network fault troubleshooting and highlighted some of the causes of network communication faults, such as poor connections, damaged wiring, and malfunctioning control modules. We also discussed various tools and techniques that can be used to troubleshoot and diagnose these faults, including digital multimeters, scan tools, oscilloscopes, and CANBUS sniffing tools. Overall, just remember the importance of following the vehicle manufacturers' recommended procedures for scanning the vehicle so one doesn't inadvertently inject a problem into a vehicle during service. ❌



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SCOTT BROWN is an ASE Master Certified L1 Technician and has over 37 years of professional service industry experience. He is an independent shop owner in Southern California and is engaged at various levels within the industry. He has a deep understanding of the challenges technicians experience at the service level and is continuously striving to move the industry forward through education and networking. Brown founded Diagnostic Network (diag.net) after 22 years of service at iATN, where he retired as company president in 2018.

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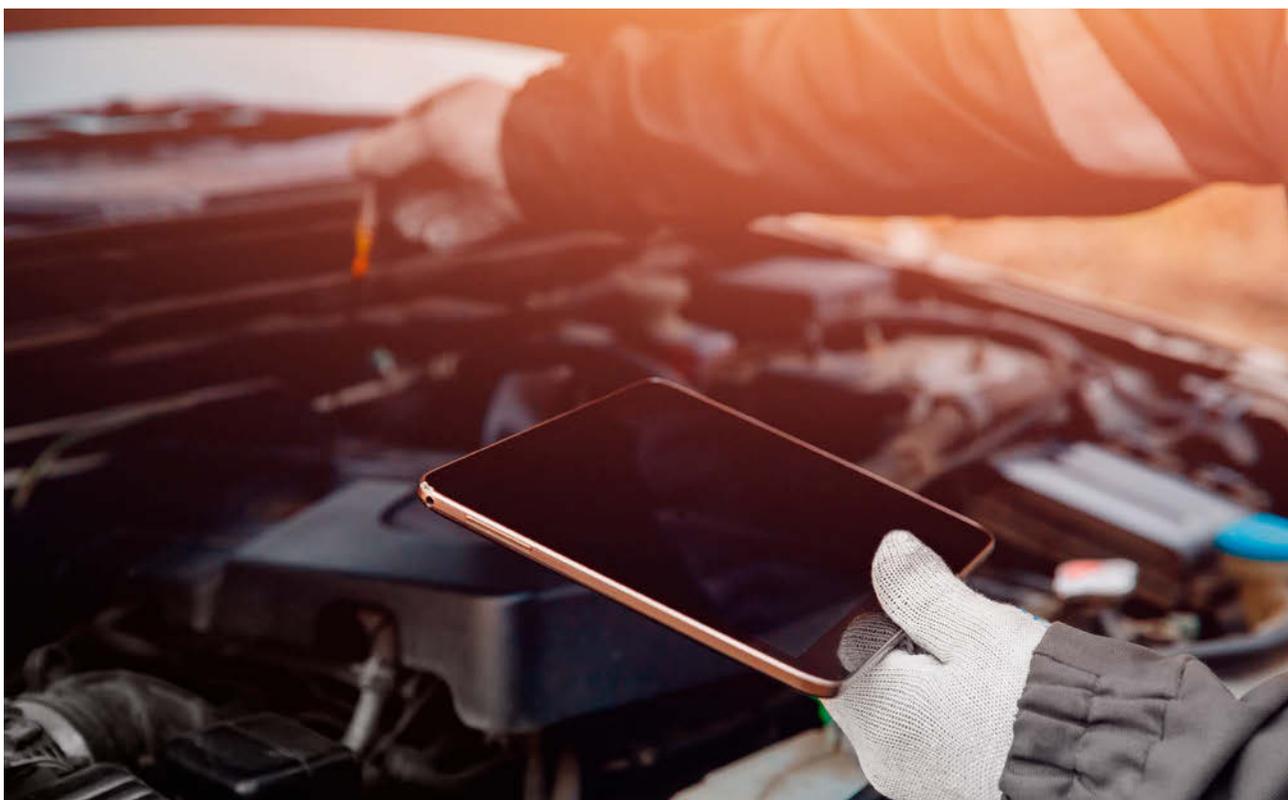
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Today's digital inspection tools

One of the best tools for transparency in our industry is a digital inspection tool.

By Ross Colket, Contributing Editor



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We are all very much aware of the distrust some of our clientele has for the automotive repair industry. This is a result of decades of fraudulent practices by a select few people in our industry. Unfortunately, it is very hard to gain that trust back. Now, we all know that some of this is simply people not wanting to spend money. It is like going to the dentist, we know we have to, but it adds insult to injury when you also have to pay for an appointment you really didn't want to have to begin with.

OVERCOMING DISTRUST

So how do we overcome this distrust? We educate our customers and make sure they understand the reasons for the repairs.

I believe the old saying is, "A picture is worth a thousand words." We are very fortunate that we live in an era of technology. This has given us the ability to have cell phones and the immediate ability to reach our clients. With so many mobile devices available, it makes communication in both verbal, written, picture, and video extremely easy. By using a digital inspection system, you can communicate with them very quickly and also illustrate to them the reasons for the needed repairs to their vehicle. You can fully explain and document the reasons why they need to repair their vehicle with complete transparency. They can even share with someone close to them that can help them to understand.

My service writers communicate almost exclusively with our clients through text messages. The reason being the fast

Being proactive with digital inspection tools

Using a digital inspection tool to view a vehicle's service history provides technicians with invaluable insights into customers' vehicles.

By Emily Markham

Digital inspection tools serve many purposes in the shop from streamlining a technician's workflow to reducing paper waste, these tools enhance overall shop efficiency. In particular, a digital inspection tool can be used to quickly view a vehicle's service history as well as provide automated reminders for factory-scheduled maintenance checks.

Having a vehicle's service history at their fingertips allows technicians to gain valuable insight into any previous maintenance and repair work done.

"Reviewing the service history allows technicians to identify recurring problems, previously addressed issues, and any outstanding concerns," says Brian Canning, a veteran of the automotive repair industry. "It also keeps on our radar service and repair items that a customer might have declined on a previous visit, so they are not overlooked or forgotten about."



zephyr_p | Adobe Stock

Canning notes, this overview of the vehicle's past helps technicians:

- Better understand current problems and provide a more accurate diagnosis,
- Eliminates unnecessary repairs,
- Identifies potential warranty coverage,

And helps assure the customer that the shop is keeping their vehicle well-maintained.

The service history also shows the technician the vehicle's age, mileage, and historical patterns. This information allows them to recommend maintenance measures that can be taken in advance to ward off future problems.

By taking this proactive approach, the vehicle's overall condition is improved with the added benefit of enhancing the customer's trust and satisfaction with the shop's service.

response rate. Take a moment and think, if a person is in a meeting or some other situation that they can not speak on the phone, it is going to take until they have an open opportunity to speak with you. Also, as people are so busy today, they may simply forget to return the call. But by texting, they can communicate with you when they would normally not be able to. Typically, almost instantly. Think about how quickly you answer your text messages.

With digital inspection tools, you can add notes, measurements, pictures, and videos. This will give you incredible credibility and transparency with your client to increase their trust level in you. Furthermore, some of the systems allow you to classify the repairs as safety, needed, and recommended repairs that way your client can easily understand the importance of having the repairs made. Also, you can explain the order in which the repairs should be made. If the repairs are not all completed at this visit, it is an easy way for them to look back and see which repairs still need to be completed. Yes, all of this may generate questions, but I would much rather have a client who fully understands the job than one who leaves the shop with questions. They will typically be an easier sale if they fully understand why.

THE BENEFITS OF DIGITAL INSPECTION TOOLS

Let's talk about some more of the benefits that you will experience. First and foremost, you will no longer have to struggle with trying to read your technicians' handwriting. No more estimating mistakes due to misread checkout sheets. A more professional-looking vehicle checkout. Some of the digital

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inspection tools can also be dictated to, meaning no more misspellings and better wording by your technicians. Nowadays, as younger techs come into the field, many times they do not have a good inspection process for looking the vehicles over, this lends itself to missed items and more importantly missed revenue and potentially an upset client. With digital inspection tools, you will have one checkout process for all of your technicians in the shop.

LEVELS OF INSPECTION TOOLS

Now that we know some of the benefits, let's start to talk about the different levels of inspection tools. Almost all the tools on the market have some sort of customizable features. Some can only handle sending the inspection report, others will be integrated into your management system, and in some cases, they are fully integrated into your management system. When they are fully integrated you can also send estimates directly to

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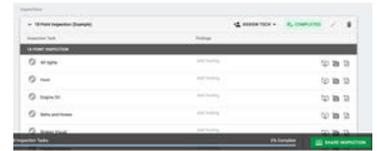
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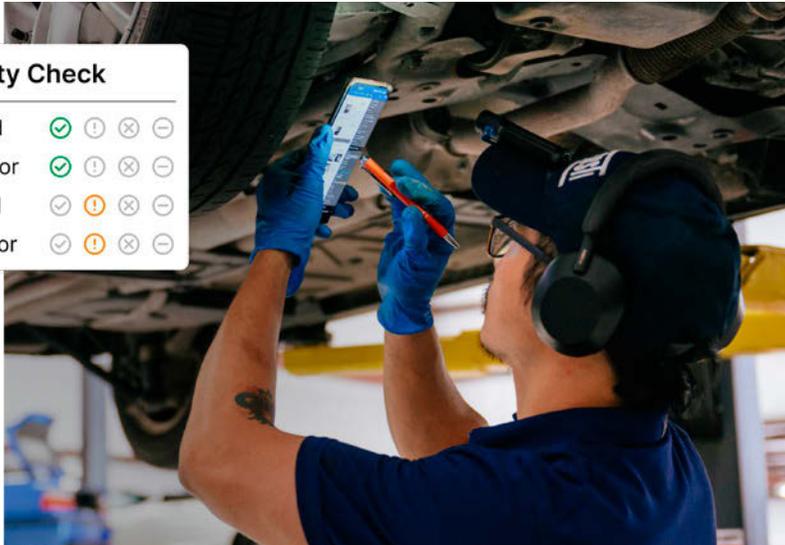
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With digital inspection tools, you can add notes, measurements, pictures, and videos, giving you credibility and transparency with your client.

Photo courtesy of Tekmetric

your client. Some of the better inspection programs will also accept payment. You can have a complete client experience with better information exchange than if you were in person. Think of the money you will save on paper, ink, and toner by going digital.

Yes, it is going to take your technician more time to do the inspection and fill out all the notes, but you are going to see as they get more and more used to it that the time will come down. Your clients will be happier and more educated and typically your average dollar per ticket is going to increase as a result. A little bit of investment in time by your technician goes a long way in the end.

PICKING YOUR DIGITAL INSPECTION TOOL

There are many DVIs on the market from Bolt on Technology, Kukui, Mitchell / ShopKey, Auto Vitals, and more. How do you decide which one is right for you? I strongly recommend you find out which ones will fully integrate with your management system first. Once you have determined that, spend some time on the internet to see what type of feedback people have on the digital inspection system you are interested in. Many of the systems have multiple levels

of operation, make sure that you are clear about that when speaking with a representative from the company. Finally, you should be able to schedule time with the representative to have a virtual demo of the system.

When it comes time to institute it in the shop, have a team meeting at lunch and roll out the new system. Be excited about it. Your enthusiasm will help your team have more of an open mind. Give a demo, or have the company representative give the demo. That way all of your technicians will be on a level playing field. Give them some time to get used to it, but be clear to them on how you expect them to use it. Make sure you explain the benefits, such as, if they are generating a higher average ticket, it will positively affect their income. ✗



ROSS COLKET is the owner of Colket Automotive Technical Services in Lansdale, Pennsylvania. He is an ASE Certified Master

Technician with over 30 years of experience as both a technician and educator. As a former CTI instructor, he believes in the importance of training and giving back to the industry. Ross fully supports and believes in Motor Age's mission to "advance the automotive professional."

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Flo-Dynamics Transmission Flusher, No. TTCF-9A

Q & A with Frank Casale, director of sales and marketing at Flo-Dynamics.



Q: What makes this product innovative?

A: We were one of the first units on the market. We actually acquired [G-TEC] about five years ago. They were OE approved by multiple car manufacturers and when we acquired them, it was primarily for automotive — smaller vehicles, lower flow — and we had interest in the heavy duty side of the market and realized that there are some machines out there that did heavy duty but they couldn't do both. Which means [shops that repaired] heavy duty vehicles and cars would have to buy two separate machines.

So, we designed, developed, and patented a device that could change the flow rate so you can have eight gallons per minute when doing a heavy duty vehicle and then you can dial it down to one gallon per minute for smaller vehicles. You really don't want to put eight gallons of fluid per minute through a small system, so this product allows a technician or a shop to buy one unit that does both.

We've also added a very easy-to-use LCD screen with some buttons so it's very easy to see what you're doing, and it also records what the flow rate, pressure, and temperature was when you started and when you finished. And you can easily see that you improved the cooler or lines that may have had a blockage in it and meets the OE specs as far as flow rate.

So, all that combined in one machine saves the shop money and saves them floor space.

Q: What was the inspiration behind creating this product?

A: We spent a lot of time in shops talking to technicians, asking them what they want. We found out they hated buying two sepa-

rate machines, so we decided to develop and research an idea that works, and it has been very successful. Those who have purchased it are extremely happy with it.

Q: How will this transmission flusher improve the lives of technicians and shop owners?

A: It makes their job easier. You can program the machine and let it do all the work. Technicians can be doing something else while it's going through its process. Again, it saves them money. The return on investment is faster and it's easy to use. It doesn't require much training at all. Easy instructions and away they go.

Q: What has been the feedback from technicians who've purchased this tool?

A: Our industry is pretty funny. No news is good news. If people are having issues or problems, we would hear about it. There are some that will reach out to take that extra effort and compliment on the machine. We have OE approval and they're still purchasing them. So that's always a good sign. ✖

 To view the full interview, visit: VehicleServicePros.com/53073148

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Tool Aid

In-Line Brake Pad Gauge

Reviewed by Matt Fanslow, diagnostic tech/shop manager at Riverside Automotive in Red Wing, Minnesota.



Q: How did the tool function as far as saving you time?

A: The Tool Aid In-Line Brake Pad Gauge, No. 65300, allows you to contribute to evidence-based inspections by quickly measuring the brake pad friction thickness. In many cases, you don't need to remove the wheel to do so. This saves the shop time and the client money as they are not paying for a full-blown brake inspection, namely in cases when the

vehicle is not in for a brake inspection or complaint, but as part of a courtesy inspection.

Q: What kind of setup was involved before using the product?

A: The setup involved removing the product from its packaging which was solved with a razor blade. No humans were harmed during the extraction.

Q: How easy was it to use?

A: It was so easy that we didn't immediately realize there were instructions with the tool.

Q: How was its packaging? Did it come with any accessories?

A: The packaging enabled the tool to be easily displayed in a store or tool truck.

Q: Was there a manual included? If so, did you use the manual and was the manual easy to understand?

A: There were instructions; the tool is quite self-explanatory in its use.

Q: What features did you like?

A: The color coding makes for great DVI inspection photos. People see red and are quicker to spend green.

Q: What types of jobs/repairs did you use this tool for?

A: We used it almost 100 percent for courtesy inspections.

Q: Have you used a previous version of this tool? If so, what are some features compared to the older version?

A: I don't know that it is technically a previous version, but we have two other versions of this type of tool. Our techs gravitated to this one after a few days. Luckily, we have yet to witness a fistfight over the tool.

Q: On a scale of 1 to 10, how would you rate this tool overall? Why?

A: Nine or 10. My gut says nine, but for what it is and what it offers us in the service bay it is a 10. This does what you need it to. ✖



MATT FANSLAW is the shop manager for Riverside Automotive, an all makes/all models independent repair shop in Red Wing, Minnesota. He has over 27 years of experience in the automotive industry and is an ASE Master Certified Technician (A1-A8) and an L1 Automobile Advanced Engine Performance Specialist. He also has his own podcast, Matt Fanslow Diagnosing the Aftermarket A to Z, that provides a wide-open perspective on all aspects of the automotive aftermarket from a working diagnosticians' point of view.

PRODUCT DESCRIPTION

The **Tool Aid In-Line Brake Pad Gauge**, No. 65300, provides an easy and compact way of taking brake pad readings during service. The in-line style allows the gauge to be used on many vehicles without removing the wheels, the straight probe makes it possible to take and maintain readings, even when vision is obscured, and it works on internal and external pads. The red, yellow, green metric gauge allows for quick go-no-go readings on the fly and is calibrated against a 6mm backing plate.

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K-Tool International Extended Reverse Cut-Off Tool

Reviewed by John Baumgardt, owner, operator, and technician at Baumgardt's Auto Repair in Fillmore, Indiana.



Q: How did the tool function as far as saving you time?

A: Due to both the length and the ability to cut in reverse direction, it was able to be used in spaces that formerly needed extra disassembly to reach and/or cut.

Q: How easy was it to use?

A: This was the first time I've used a cut-off tool like this and initially the weight that extends past the handle was a bit awkward. It didn't take long to get used to it though.

Q: How was its packaging? Did it come with any accessories?

A: It came packaged in a nicely illustrated

box that holds the tool securely. It came with a 4" cutoff disk, an Allen wrench, and a pin-style wrench for securing the cutting disk as well as a washer to use a disk with a 5/8" center bore.

Q: Was there a manual included? If so, did you use the manual and was the manual easy to understand?

A: Yes, a small, easily understood manual was included.

Q: Is there any way you could think to improve or add to this tool?

A: As a cut-off tool it works great. I think if there was a larger safety shield and an arbor adapter or a way to use 4" or 4.5" sanding disks and grinding wheels with having reverse it would be more versatile, even if it was an add-on kit. I would also make the Allen wrench and the pin wrench a single tool so that you don't have to keep track of two separate tools for changing disks, and it would be nice if the shield used the same size Allen wrench.

Q: What features did you like?

A: Being able to cut in the reverse direction is awesome. I know this thing is going to save me so much time in the future. The extended reach makes it possible to reach into spaces that ordinary cut-off tools won't reach. The adjustable airflow helps make cleaner cuts in thinner material,

reserve air, and make even less noise. It's a pretty quiet tool already.

The tool comes with what you need to run a 3/8" or 5/8" center cut-off disk. It has a push-button arbor lock, making disk changes easier. There is also a left-hand thread Allen bolt to ensure the main arbor nut doesn't come loose while cutting in reverse. The metal safety guard is a big improvement over the plastic ones that don't hold up to a drop or an exploded disk.

Q: What types of jobs/repairs did you use this tool for?

A: I had to cut a couple of body mount bolts that I was unable to reach with my other cut-off tools. It was very beneficial because of the extended length, and the 4" disk gave me that little extra to cut cleanly through. I also used it to cut some motor mount bolts. By using reverse I was able to greatly reduce the sparks that went toward me and also toward the oil leaks that the engine had, reducing the risk of fire.

Q: On a scale of 1 to 10, how would you rate this tool overall? Why?

A: I would rate this a nine. The tool works great. I think that my suggestions would make it better and more versatile. ✖



JOHN BAUMGARDT III is the owner/operator of Baumgardt's Auto Repair in Fillmore, Indiana. He has been a professional auto tech for about 20 years. He attended the two-year Auto Mechanics program at Lancaster Vocational High School. Previously, Baumgardt worked at AAMCO Transmissions and earned about a dozen AAMCO certificates. He believes it's important to provide an honest, quality service that people can depend on.

This product was given to the reviewer free of charge from the manufacturer.

PRODUCT DESCRIPTION

The **K-Tool International Extended Reverse Cut-Off Tool**, No. KTIXD707, has a 4" low profile head for use in tight spaces. It cuts metals (and more) with accuracy while the reverse operation directs sparks away from the user. The tool features a compact head and an extended length which can be used for accessing hard-to-reach places. Weighing only 1.85 lbs and 16" long, this power tool can be used for a number of different applications.

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Prologics Sensor Simulator & 12V/24V Sensor Voltage Probe

Reviewed by Phil Fournier, owner of Phil's Auto Clinic in Hemet, California.

Q: How did the tools function as far as saving you time?

A: These tools save many unnecessary parts installations if used as designed. For example, too many technicians are content to read a code, say, for a vehicle speed sensor issue on a wheel, and go straight to the recommendation and installation of a wheel bearing with a sensor integral to it. If the problem turns out to be a wiring issue



Q: How was its packaging? Did it come with any accessories?

A: The tools come in a sturdy plastic box which I wish was just a little bit larger as the leads need to be coiled up properly to fit. The only accessories are the voltage leads.

Q: What features did you like?

A: I like the backlit screen and the built-in flashlight on the one model. Since I'm an automotive instructor as well, I see huge benefits in using the tool to teach entry-level technicians sensor functions without having to deal with the danger of a running engine. It's also a great tool for demonstrating lab scope functions. I love the versatility of the wide and extremely precise ability to adjust the tool's outputs.

Q: On a scale of 1 to 10, how would you rate these tools overall? Why?

A: I give them a nine. If parts companies could convince technicians to use these tools in lieu of installing parts that may not be needed, the savings in returned parts would be enormous. As an automotive instructor, I can see almost endless possibilities to use this tool in a lab-type teaching environment. ❌



PHIL FOURNIER has been the owner/technician at Phil's Auto Clinic for 32 years and a working auto technician for 45 years. Fournier received his ASE Master Certification in 1982 and his AAM

from the Automotive Management Institute in 1994. Currently, he works as a consultant doing diagnosis, reprogramming, and virtual instruction. Fournier currently holds 17 ASE certifications including ASE Master Auto and Master truck plus L1, L2, and L3.

or a module issue, it turns into an ethical dilemma. Who pays for the part that was installed that didn't solve the problem? Or do I return the part as "defective"? Either way, someone is being cheated and this tool can quickly and easily be used to simulate the signal BEFORE the part is replaced which is a huge benefit.

Q: What types of jobs/repairs did you use these tools for?

A: I used them on a 2021 Chevy Silverado 1500 with P0521 and P0522 codes. The oil pressure indication on the scan tool varied wildly. Rather than replace the sensor and hope that was it, the simulator tool connected to the pigtail output a specific voltage, which should have resulted in a steady pressure reading on the scan tool. It didn't, which proved the problem was not the sensor. The problem was in a chaffed harness causing the signal wire to ground out and reading 0 psi when the actual oil pressure was completely normal.

PRODUCT DESCRIPTION

The **Prologics Sensor Simulator** is designed to simulate and actuate an output signal from automotive sensors incorporating frequency, voltage, and test sequences. The Sensor Simulator lets the technician know if the faulty operation is a defective sensor, an issue with the ECM / ECU, or a defect in the wiring. It can simulate ABS sensors, lambda sensors, EGR, CKP, MAP, knock sensors, and more.

The **12V/24V Sensor Voltage Probe** by **Prologics** can emulate signals generated by different types of sensors in a vehicle. Simply set the output voltage to the correct value and activate it with either 3A or 150mA on a permanent output or with a switch. Whether checking the component independently or using a diagnostic scanner, this voltage probe is designed to make it easy to identify if the fault lies in the sensor or its connection.

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This product was given to the reviewer free of charge from the manufacturer.



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Killer Tools Vacuum Floor Puller

Reviewed by Basil Jennette, auto body repair technician at Kneisel's Collision in Natomas, California.

Q: How did the equipment function as far as saving you time?

A: Quick, easy setup. This pulling post has an incredible amount of suction to make strong sheet metal pulls with confidence. The fact that it's portable and can be moved from car to car (where our tools are located) is a huge time saver. The prior option for us was to drive to an available frame rack and bring tools with us.

Q: How has using this tool impacted your shop's profitability?

A: Anytime you can work where your tools are located and not have to go in search of them is time saved and work profit.

PRODUCT DESCRIPTION

The **Killer Tools Vacuum Floor Puller**, No. ART23, can pull from most shop floor surfaces. Simply roll the puller into position, check that the vacuum plate is not over a crack in the floor, connect to shop compressed air, step on the vacuum plate, and start pulling. Tested at over 1,200 lbs of pulling force for sheet metal non-structural pulls on both steel and aluminum. Ideal for use on sheet metal realignment and dent removal. Other features include one-pin height adjustment, anti-tip safety features, and down-pull capability. Including the pulling tower, users receive a vacuum anchor plate, a pulling strap, and a vacuum plate storage strap. The product is 60" tall.

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Q: What kind of setup was involved before using the product?

A: Very little setup was involved before using the product.

Q: How easy was it to use?

A: Very simple. Simply roll it to the vehicle and plug in an air hose.

Q: How was its packaging? Did it come with any accessories?

A: I received one of the early models and there was no packaging. It did come with all the necessary parts including a ratcheting strap.

Q: Was there a manual included? If so, did you use the manual, and was the manual easy to understand?

A: There was no manual.

Q: Is there any way you could think to improve or add to this tool?

A: No improvements.

Q: What types of jobs/repairs did you use this tool for?

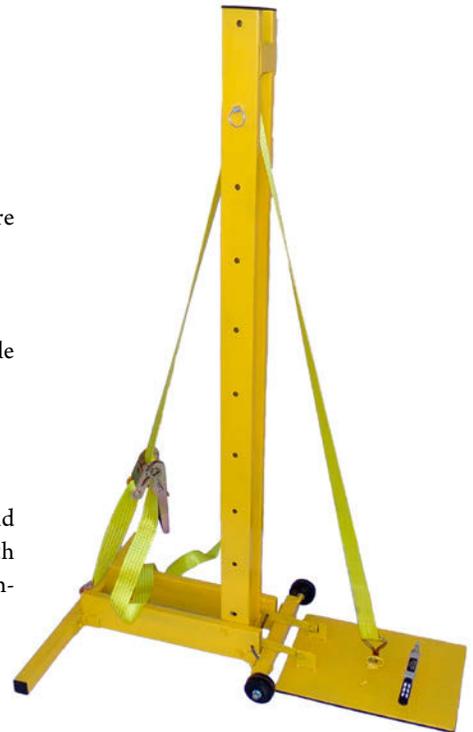
A: My apprentices and I have used it many times. The biggest benefit I've found is pulling on truck bed sides and rocker panels.

Q: Have you used a previous version of this tool?

A: I have not used any other of these tools.

Q: Is there anything you had questions or concerns about in regard to the tool?

A: No questions. It's very basic and simple to use.



Q: What features did you like?

A: It's portable and very easy to use.

Q: On a scale of 1 to 10, how would you rate this tool overall? Why?

A: A 10 for sure. It would be even more productive to have two of these in a shop of our size. ☒



BASIL JENNETTE is an auto body repair technician at Kneisel's Collision in Natomas, California. Over the years he has enjoyed different aspects of auto body work from restorations

to custom work to the last 40 years working on the collision repair side. He's invented a couple of auto body repair related tools and has raised his family doing what he enjoys most. Now that he's getting close to retirement, he's looking to give back to the industry. For the past four years, he's been training apprentices while still enjoying learning new things within the evolving automotive industry.

This product was given to the reviewer free of charge from the manufacturer.

CATEGORY SPOTLIGHT

DIAGNOSTIC TEST EQUIPMENT

Whether looking for temperature differences, inspecting difficult-to-reach components, or checking for voltage drops on circuits, having a range of diagnostic tools is becoming essential in everyday repairs – no matter what type of shop you work in or services you specialize in. Be sure to check out these recently released diagnostic test tools to give you a hand.



DIAGNOSES INCONSISTENT CELL VOLTAGE

The **Launch Tech ELB300 EV Battery Pack Cell Equalizer** is a battery maintenance diagnostic tool for EV batteries and technology. The ELB300 diagnoses numerous issues including inconsistent cell voltage, and individual battery cell capacity variances. It is designed for new energy batteries such as lithium iron phosphate, ternary lithium, and lithium manganate, and can quickly solve the cruising range degradation caused by the difference in cell capacity due to inconsistent cell voltages. It features a 7" LCD touchscreen, has Bluetooth and Wi-Fi capabilities, and is easy to carry and transport.

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PERFORMS DPF RESETS AND REGENS

The **CanDo HD Mobile II** transforms a smartphone, iOS or Android, into a Class 4-8 code scanner that can read and clear trouble codes, log live data, and perform DPF resets and regens for Detroit, Cummins, Paccar, Mack/Volvo, International, Isuzu, and Hino. It also has Caterpillar on- and off-highway coverage, as well as can work on OBD-II engine diagnostics for passenger cars and light trucks. The VCI comes with six, nine, 16-pin, and CAT connectors and has free updates.

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QUICK INSPECTION OF DIFFICULT-TO-ACCESS COMPONENTS

The **GEDORE Micro Borescope**, No. KL-0880-10, is designed to enable the quick inspection of difficult-to-access components. It is intended for use on professional damage analysis on engines, transmissions, and intake systems. The Micro Borescope allows photo and video documentation with data and time stamps, as well as direct playback of photos and videos. It can be connected to a smartphone, tablet, and/or laptop.

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NEW COVERAGE FOR MCLAREN AND TESLA

The **TEXA IDC5 Software 76.1.0 Update** offers new coverage for McLaren and Tesla, as well as full security access for VW groups and full security access with AutoAuth for FCA vehicles. Diagnostic features within the IDC5 software are intended to provide enhanced visual dashboards for all models to display live data tests on a single screen for comparisons, instead of being put in a list form.

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OFFERS THREE MEASUREMENT MODES

The **TOPDON TC005 Thermal Imager** is a handheld thermal camera that measures an expansive temperature range from -4 degrees F to 1,022 degrees F, and offers a 12-hour run-time. It features a high-resolution of 256 by 192 pixels, allowing users to capture more detail, as well as offers seven options for pseudo-color display, a 2-megapixel visible light camera for overlapping images, and a picture-in-picture mode. It also has three different measurements to detect center, hot, and cold spots, as well as four imaging modes to identify targets in a timely manner. Users can also save and share data on a PC.

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Watch this product in action here: [VehicleServicePros.com/53072305](https://www.VehicleServicePros.com/53072305)

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3-IN-1 PROGRAMMING AND COMMUNICATION DEVICE

The **Autel MaxiFlash XLink** is a three-in-one programming and communication device. It's a remote expert-ready device. Connect with module programmers, automotive diagnosticians, and system experts for tasks requiring OE data, software, or tools. The XLINK is a J2534 Pass-Thru programmer. Perform module programming with Windows-based PC and OE subscriptions. It's also an enhanced, multi-protocol VCI. Pair with any Autel MaxiSYS tablet to perform advanced diagnostics with multiple communication protocols including CAN, CAN FD, and DoIP.

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CHECKS FOR VOLTAGE DROP ON CIRCUITS

The **Lisle Corporation Digital Test Light with Load Tester**, No. 28800, is a 3V to 30V DC dual polarity digital test light that can also apply load to get an instant voltage drop reading. The light works as a regular test light, but when the button on the tool is pushed it applies an 800mA load at 12V DC to easily check for voltage drop on circuits. It includes a 48" cord with heavy duty alligator clamp for secure connections. Not computer safe with load applied and not for use on airbags, the company notes.

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United States Postal Service
Statement of Ownership, Management, and Circulation (Requester Publications Only)

1. Publication Title: PROFESSIONAL TOOL & EQUIPMENT NEWS
2. Publication Number: 012-426
3. Filing Date: 9/15/2023
4. Issue of Frequency: February, March, April, May, June, July, August, September, October, December
5. Number of Issues Published Annually: 10
6. Annual Subscription Price: Free to Qualified
7. Complete Mailing Address of Known Office of Publication (Not Printer): Endeavor Business Media, LLC, 1233 Janesville Ave, Fort Atkinson, WI 53538 Contact Person: Debbie Dumke Telephone: 920-563-1763
8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not Printer): Endeavor Business Media, LLC, 331 54th Ave N., Nashville, TN 37209
9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor - Publisher: Chris Messer, Endeavor Business Media, LLC 571 Snelling Ave N, Saint Paul, MN 55104; Editor: Emily Markham, Endeavor Business Media, LLC 1233 Janesville Ave, Fort Atkinson, WI 53538 ; Editorial Director: Matt Hudson, Endeavor Business Media, LLC 571 Snelling Ave N, Saint Paul, MN 55104
10. Owner - Full name and complete mailing address: Endeavor Media Holdings I, LLC, 905 Tower Place, Nashville, TN 37204; Endeavor Media Holdings II, LLC, 905 Tower Place, Nashville, TN 37204; Resolute Capital Partners Fund IV, LP, 20 Burton Hills Blvd, Suite 430, Nashville, TN 37215; RCP Endeavor, Inc, 20 Burton Hills Blvd, Suite 430, Nashville, TN 37215; Northcreek Mezzanine Fund II, LP, 312 Walnut Street, Suite 2310, Cincinnati, OH 45202; Invegarly Holdings, LP, 44235 Hillboro Pike, Nashville, TN 37215; Everside Fund II, LP, 155 East 44th St, Suite 2101 - 10 Grand Central, New York, NY 10017; Everside Endeavor F1 Blocker, LLC, 155 East 44th St, Suite 2101 - 10 Grand Central, New York, NY 10017; Everside Endeavor International Blocker, LLC, 155 East 44th St, Suite 2101 - 10 Grand Central, New York, NY 10017; Everside Founders Fund, LP, 155 East 44th St, Suite 2101 - 10 Grand Central, New York, NY 10017; Suncap Endeavor Blocker, LLC, 155 East 44th St, Suite 2101 - 10 Grand Central, New York, NY 10017
11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages or Other Securities: None
12. Tax Status (For completion by nonprofit organizations authorized to mail at nonprofit rates) (Check one)
The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes: N/A
13. Publication Title: PROFESSIONAL TOOL & EQUIPMENT NEWS
14. Issue Date for Circulation Data: September 2023

15. Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)	101,569	101,051
b. Legitimate Paid and/or Requested Distribution (By Mail and Outside the Mail)		
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f. Total Distribution (Sum of 15c and 15e)	101,361	100,884
g. Copies not Distributed	208	167
h. Total (Sum of 15f and g)	101,569	101,051
i. Percent Paid and/or Requested Circulation (15c divided by 15f times 100)	98.76%	99.22%
a. Requested and Paid Electronic Copies	-	-
b. Total Requested and Paid Print Copies (Line 15c) + Requested/Paid Electronic Copies (Line 16a)	100,103	100,101
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PS Form 3526-R, July 2014



TAKES HIGH-QUALITY THERMAL IMAGES

The **FLIR ONE Edge Pro** wirelessly connects to a smart device to easily inspect targets that are out of reach or out of view, or it can clip onto a phone or tablet for one-handed operation. Combining VividIR and FLIR MSX (multi-spectral dynamic imaging), users can take high-quality thermal images from any position or angle with a natural grip. With FLIR Ignite, users can instantly upload images and videos from the FLIR ONE Edge Pro to the cloud where they can edit, organize, store, and share data. It's compatible with iOS and Android smartphones and tablets.

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LIVE DIAGNOSTICS ASSISTANCE

The **Opus IVS CarDAQ-Pro** is an all-in-one Pass-Thru device for multiple vehicle brands. Users can either use their own OEM subscriptions to employ CarDAQ-Pro as a J2534 Pass-Thru device or they can use it like a RAP Kit and have Opus do the programming for them. The device offers access to live diagnostics assistance, including non-programming requirements through IVS 360 Support. Additional features include DoIP, Can FD, and Toolbox3 for OEM application descriptions, video tutorials, and the latest J2534 news, as well as, access to OEM key codes, PIN numbers, and immobilizer reset information to enable locksmith and vehicle security for multiple brands in-house.

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EXPANDED OEM COVERAGE

Noregon's JPRO Professional 2023 v2 Update includes enhanced off-highway support and expanded OEM coverage with bidirectional tests for Detroit engines and Detroit Assurance, along with new Bendix features like estimating brake wear life for pads and rotors. There is also a new virtual connection, similar to Virtual Truck, where technicians can simulate diagnostics on off-highway equipment. Additionally, the update brings new bidirectional tests for Komatsu equipment, including cylinder cut-out, DPF service regen, fuel injector performance, fuel leakage, and more. Customers with an active JPRO subscription can update via a prompt in the software or from the company's website.

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WATERPROOF PROBE HEAD AND TUBE

The **Oasis Scientific Vividia CX-6010M Flexible Smartphone Joystick Articulating Inspection Camera Borescope** features a 6mm diameter and 1m long flexible probe, which is covered with a metal-mesh tube for durability and is waterproof IP67. The CX-6010M has a 4.5" LCD monitor, bright LEDs, and a joystick pivoting 6mm (0.236") probe camera, which can be used to look into dark places as a diagnostic inspection camera. The camera head can be steered with the joystick 360 degrees in all directions and all angles. The monitor has a microSD card installed for pictures and videos. Additionally, the Vividia CX-6010M borescope can lock and unlock the articulation angle with a simple trigger and is rechargeable via included USB-C cable.

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Photo courtesy of Theo Vandenheuvel

Frankenstein's toolbox

Made up of three different brands, technician Theo Vandenheuvel's toolbox is something of a Frankenstein creation.

By Elli Carder, Assistant Editor

Three brands make up Theo Vandenheuvel's toolbox: Matco, Snap-on, and Harbor Freight. His toolbox, which he lovingly refers to as a "Frankenstein box," clocks in at 150" wide and 80" tall.

In 2020, after struggling with the minimal amount of room his old box afforded him, he set out to make a toolbox that would fit his needs while also remaining cost efficient.

IN THE LABORATORY

The first purchase Vandenheuvel made for his toolbox build was a Matco Tools MB8535, a custom three-bay rollaway in black and silver, which came with a tall, black locker that fits nicely onto the side of the box. He then added a 30" Matco SS side cabinet, which originally used to be a cart, to the main box. A Harbor Freight Icon overhead cabinet sits on top of the Matco boxes. The

OWNER

Theo Vandenheuvel
Shop: Country Mile Garage
Location: Bluffton, Indiana

latest addition, and what Vandenheuvel says will be the final, was a used Snap-on Power Locker Cabinet.

All in all, Vandenheuvel spent around \$6,600 for his entire toolbox setup.

Over the years, the journey to price conscientiousness has helped Vandenheuvel save money left and right. The biggest lesson he's learned is to see value in old things.

"My main box that I started with, that thing is like 20 years old," says Vandenheuvel. "... there's nothing wrong with working with old stuff."

The way Vandenheuvel sees it, by saving money on the storage front, he's able to spend more where it really counts: his tools.

MAKING ROOM

When it comes to organizing his tools, one way that Vandenheuvel ensures his organization grows with him is by using a peg board in his toolbox. If he were to add new tools or rearrange his existing ones, it would take little effort to get his stuff moved around.

In each drawer, the tools are neatly laid out so that when Vandenheuvel goes to grab something he won't need to dig around and waste time searching.

Vandenheuvel is a stickler when it comes to the color of each box in his setup. Black and silver handles are an absolute must. He advises anyone thinking about starting a new toolbox to choose one color—red or black—and stick to it. The technician recommends those colors because "it's really easy to find add-on pieces."

THE MAN BEHIND THE BOX

When we first reached out to Vandenheuvel to inquire about an interview with the magazine, he warned us that his answers would be different than the average person's. We were introduced to the enigmatic technician through his first-person videos of tool reviews and repair walkthroughs on his YouTube channel, @CountryMileGarage.

Through his YouTube videos, Vandenheuvel seeks to help his audience in several ways, whether that be giving them advice on the efficiency of certain tools or walking them through a particularly challenging service problem.

"There's a lot of people out there that want to fix their own stuff and sometimes they run into a snag," Vandenheuvel says. "If my video can make it happen for them, I am very happy that I could help somebody to save a dollar and get their vehicle back on the road." ❌

 Want to see more photos of Vandenheuvel's box? Visit: [VehicleServicePros.com/53073161](https://www.VehicleServicePros.com/53073161)

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- ✓ The new topology mapping function allows you to check the DTCs and all systems communication status visually
- ✓ Automatically detects the communication protocol that vehicles are using, and monitors the damage of the OBD II pin
- ✓ Code Assist by *IDENTIFIX*
- ✓ Guided function of Volkswagen and Audi

SPECIFICATIONS

 VCI
Smartlink C

 CPU
2.0GHz Octa-core

 MEMORY
8GB

 STORAGE
256GB

 OPERATING SYSTEM
Android™ 9.0

 SCREEN
13.3-inch full-fitting, Gorilla Glass - sunlight readable screen

 RESOLUTION
1920*1080

 WI-FI
Dual Band 2.4 & 5GHz

 CAMERA
Rear 13MP + Front 8MP

 BATTERY
9360mAh@7.6V/71.1Wh

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