

Technicians Service Training

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"EVAP & MAF DTCs"

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Upcoming

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Editor

"G" Jerry Truglia

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"EVAP & MAF DTCs"

With young techs working in my shop, I find myself spending as much time in the bays with them as I do upstairs working on my training materials. While it makes for long hours and hectic days, it also keeps my own diagnostic skills sharp, and I enjoy passing on what I've learned to the guys.

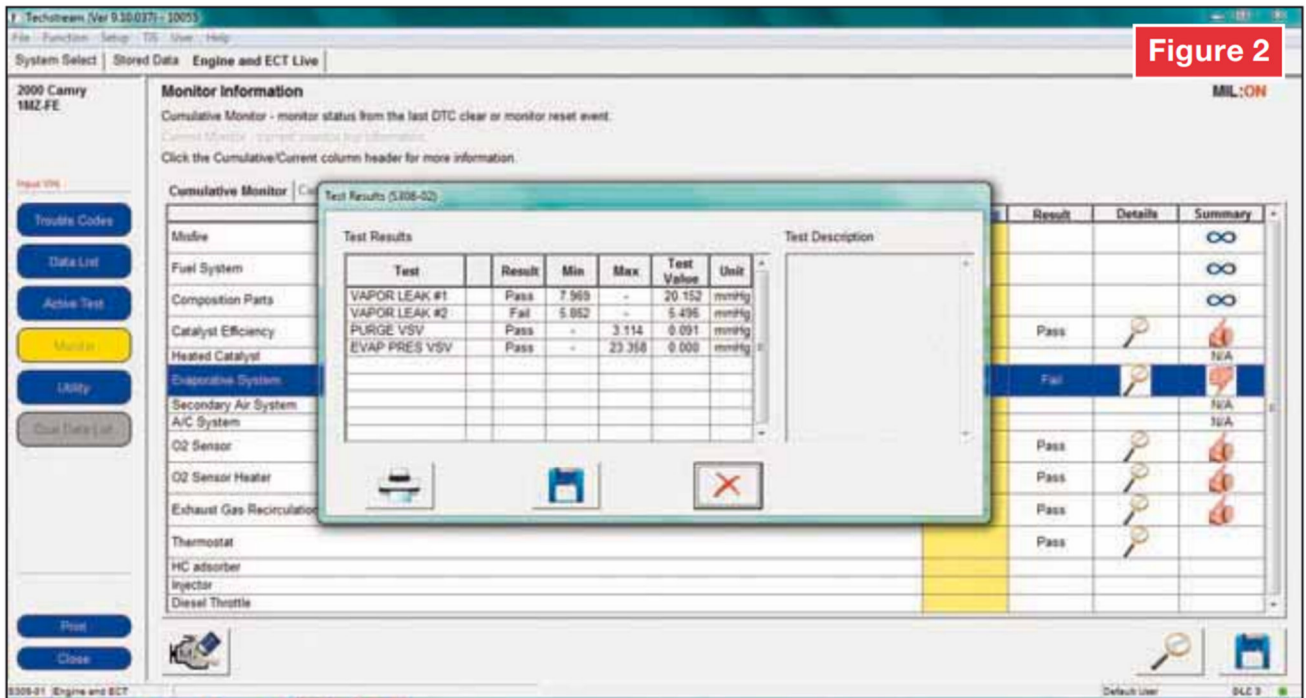
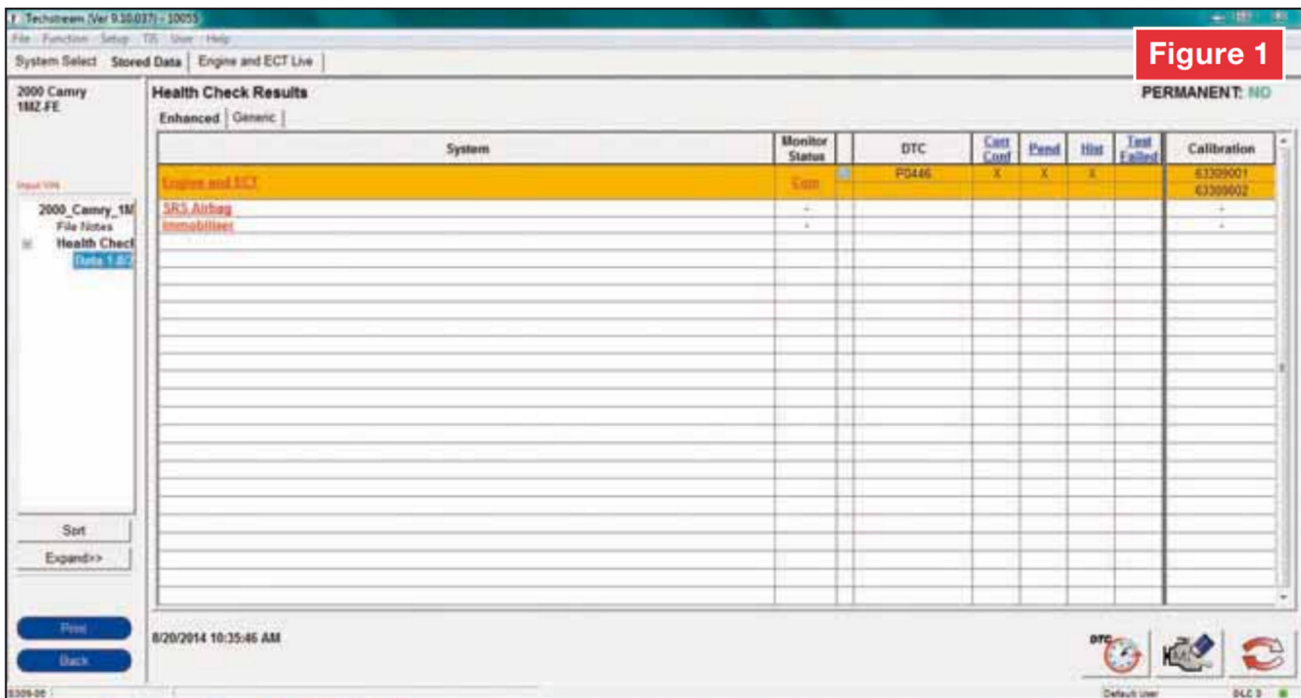
Toyota EVAP Fault

First up is a Toyota Avalon (even though the Toyota Scan tool ID'd the vehicle as a Camry) with a V6 3.0L engine that came in with the Malfunction Indicator Lamp (MIL) illuminated. We found a P0446 (Vent Control Malfunction) Diagnostic Trouble Code (DTC) stored in the engine control module (**Figure 1**). After reviewing the associated Freeze Frame data, I showed them how to access the Mode \$06 section of our scan tool in order to view the last onboard test results. We found the Mode \$06 (**Figure 2**) results showed that the evaporative emissions (EVAP) system monitor had only passed three of the four tests. The failing test was the "Vapor Leak # 2."

With so many different EVAP systems out there, it's important to always look up information in your service information system on how the one you're working on operates. This Toyota EVAP system uses these components: Vapor Pressure Sensor (VPS) measures the vapor pressure in the EVAP system, Vacuum

(Con't on page 2)

"EVAP & MAF DTCs" (con't from p. 1)



Switching Valve (VSV) normally closed, canister closed valve (CCV) normally OPEN and another VSV for pressure switching. All are used to detect abnormalities in the EVAP system. The system captures DTCs when HCs (hydrocarbons or raw fuel) leak from the components, (Con't on page 6)

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Bernie Thompson of ATS

John Thornton of Autotrain Inc.

Wayne Colonna of ATSG

Jorge Menchu the “Labscope Guru,” AES Wave

John Anello of Auto Tech On Wheels

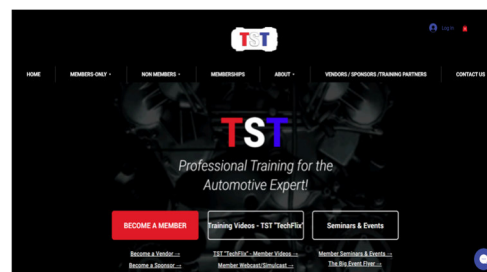
Mark Warren of World Pac / Motor Magazine

Brandon Steckler of CTI & Motor Age Magazine

Peter Meier of Motor Age Magazine

Ken Zanders of Illinois Air Team

"G" Jerry Truglia of A.T.T.S. Inc.



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"EVAP & MAF DTCs" (con't from p. 6)

or when the vapor pressure sensor malfunctions. The Powertrain Control Module (PCM) then decides whether there is an abnormality in the EVAP system based on the vapor pressure sensor signal readings.

With a good understanding of the system, our next step was to connect a smoke machine to check for leaks. The smoke test results found that the front vacuum switching valve (VSV) and the rear canister closed valve (CCV) both were weathered and not working as designed. We installed a new front VSV along with the rear CCV (it came as an assembly with the complete charcoal canister). We test drove the vehicle and rechecked Mode \$06 test results to see if all four now got a passing grade.

The results were all passes, so we gave the vehicle back to the owner. We told her to drive it for a week then come back so we could make sure there were no other issues. A week later, the MIL still was off and the EVAP problem was a confirmed fix.

Another EVAP Problem

Next is a 2007 Hyundai Sonata 3.0L V6 came in with a P0442 (Small Leak EVAP) DTC. This seemed like it was going to be a tough one to find the leak on, because we could not find any smoke coming out anywhere on the vehicle. The smoke machine flow meter gauge ball was just above the limit (barely falling in the failing zone), meaning the leak was going to be really small just as described by the DTC.

We decided that we had to use a different procedure in finding this leak, so we replaced the smoke machine with the BullsEye leak detection tester. The BullsEye leak detection system uses CO₂, a gauge that has a scale to identify a leak, a CO₂ leak detector and special pink foam that turns yellow when a leak is detected (CO₂ is present.) As we were checking under the vehicle for leaks with the leak detector, we found that the detector indicated a leak coming from the top of the fuel tank.

(Con't on page 8)



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"EVAP & MAF DTCs" (con't from p. 6)



Luckily for us, on a Hyundai it's easy to get to the top of the tank area (**Figure 3**), because there is an access cover under the rear seat.

When we removed the access cover, the BullsEye leak detector went crazy, confirming a leak at the fuel pump lock ring and gasket. We thought for a second that maybe we just missed the smoke coming out, so out of curiosity we reconnected the smoke machine to see if smoke could be seen escaping from the fuel pump locking area. With the smoke machine reconnected, it still indicated a leak on the units flow gauge but we could not find any traces of smoke escaping. We thought that this was odd since the smoke machine had helped us so many times in the past, but this time it was coming up short.

We reinstalled the BullysEye on the vehicle and sprayed the area with the special foam. It provided us proof of the leak since the pink foam turned yellow (Figure 4), indicating that CO₂ was leaking from the locking ring. Because this fuel tank is a composite type and not metal, we knew that the O-ring and locking ring were most likely the only problem. We ordered the new O-ring and locking ring from the Hyundai dealer and used our special tool (Hyundai special lock ring removal and installation tool is needed to remove or install the lock ring) to remove and install the

(Con't on page 11)



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5	8	7	8	9	10	11
12 Flag In Power - PMSV & MSV 2023 Changing - 1st	13	14	15 EPCOT Conference 2023 - 1st	16	17	18
19	20	21 International CyberSecurity Dark Network (Private)	22 Networking 6:30 pm - 8:00 pm Networking (ICM & Diagnostic AC System) Diagnostic Vehicle - SAE	23 6:00 pm - 7:30 pm Chicago Diagnostic & Repair - SAE	24	25 6:00 am - 5:00 pm TROUBLESHOOTING & DIAGNOSTIC TECHNIQUES - Workshop
26 6:00 am - 5:00 pm TROUBLESHOOTING & DIAGNOSTIC TECHNIQUES - Workshop	27 6:00 pm - 7:30 pm WCCO (International) - SAE	28 6:00 pm - 7:30 pm WCCO (International) - SAE	29 Diagnostic System Administration (New Students)	30 6:00 pm - 7:30 pm WCCO (International) - SAE	31 6:00 pm - 7:30 pm WCCO (International) - SAE	1 6:00 am - 5:00 pm TROUBLESHOOTING & DIAGNOSTIC TECHNIQUES - Workshop

"EVAP & MAF DTCs" (con't from p. 8)

new parts. We tested the system once again and found no leaks, confirming our repair.

A Drivability Problem Next

So far, so good. Nothing too complicated, and the 2002 SAAB 95 2.3 Turbo with a P0101 and low power complaint should be the easiest of the day. We asked the vehicle owner when they first noticed the problem and if any work or maintenance had been performed recently. The vehicle owner told us that she keeps up on all the maintenance on her vehicle. We started our diagnosis with a visual check to make sure there were no broken or loose hoses that were causing the problem. Because our visual came up short, we connected the SAAB factory scan tool to check all the systems on the vehicle.

Next we checked the Freeze Frame records to see if it would pinpoint any data that could be helpful to us during our diagnosis. We followed that by removing the air boot from the throttle plate and found that the screen for the Mass Airflow Sensor (MAF) was very dirty. We cleaned it with CRC MAF cleaner and were successful in restoring the sensor's performance, but we had to find why it was so dirty in the first place.

One lesson I've learned being in this business so long is never fully trust that the vehicle has been maintained just because the owner says so. When we lifted up the vehicle to remove the air filter, we found that this vehicle in fact was not maintained, and you can see why. We installed a new air filter (**Figure 5**), replaced the PCV oil trap and hoses, and cleared the DTC. A test drive later confirmed that the complaint was corrected. Just two simple maintenance items fixed this vehicle.



*Article By "G" Jerry Truglia TST Founder and President
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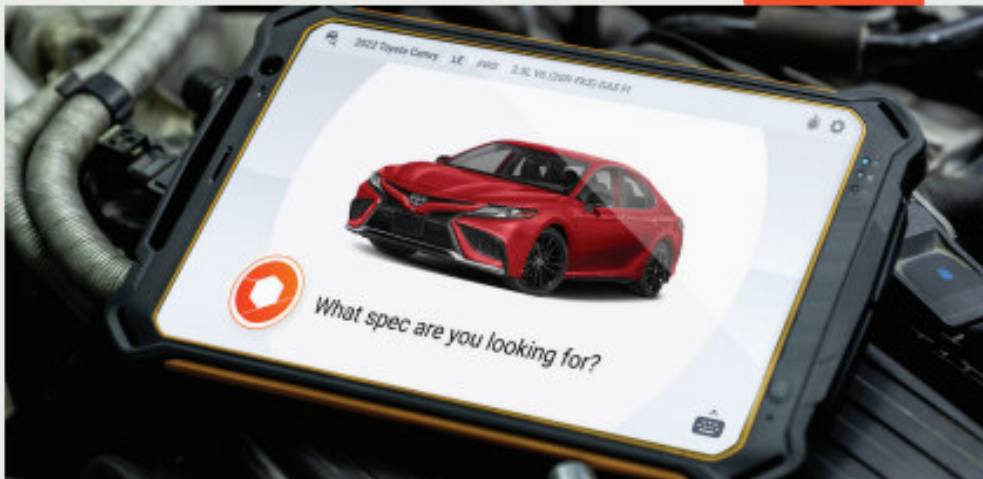
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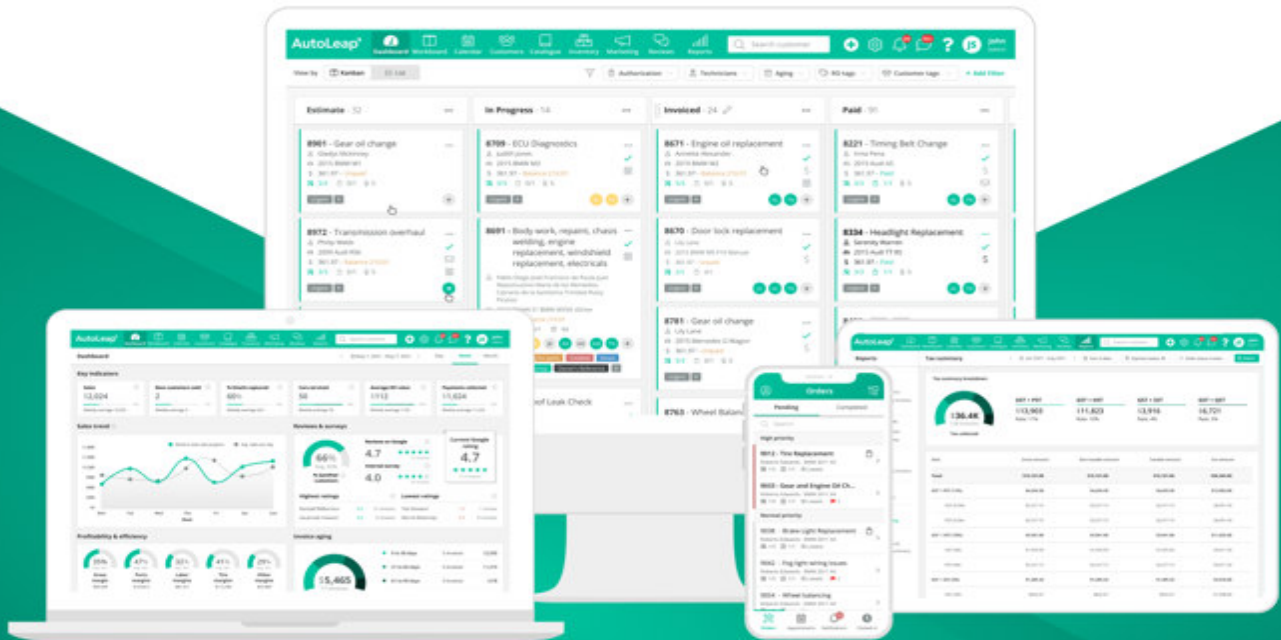
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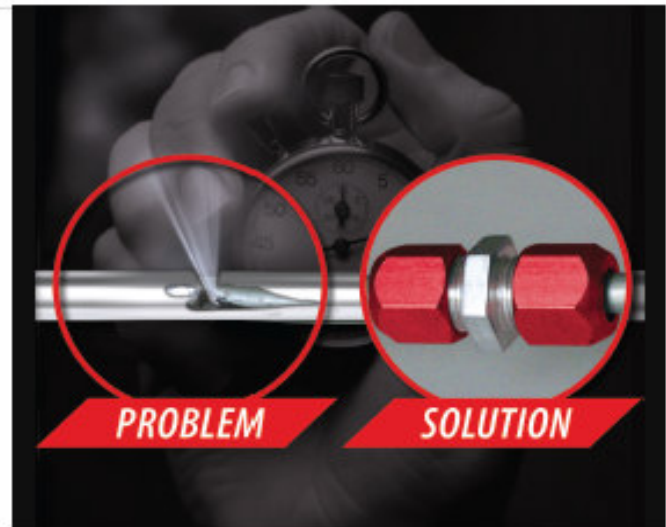
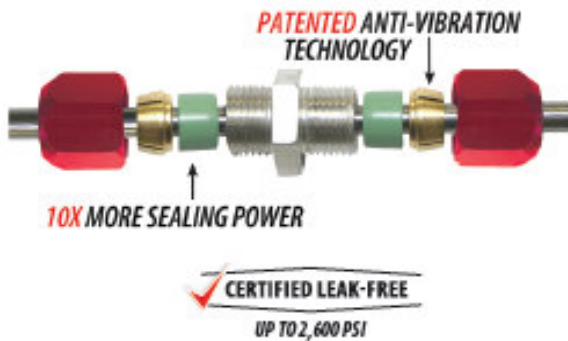
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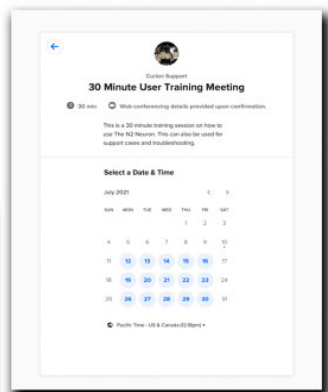
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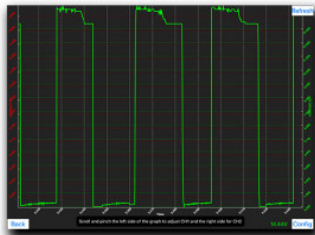
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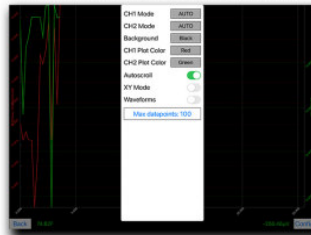
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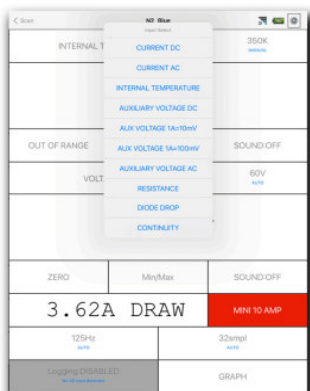


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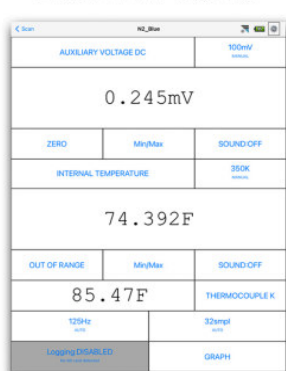


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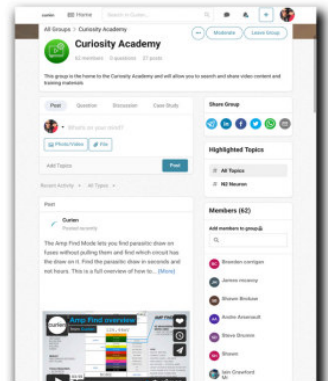
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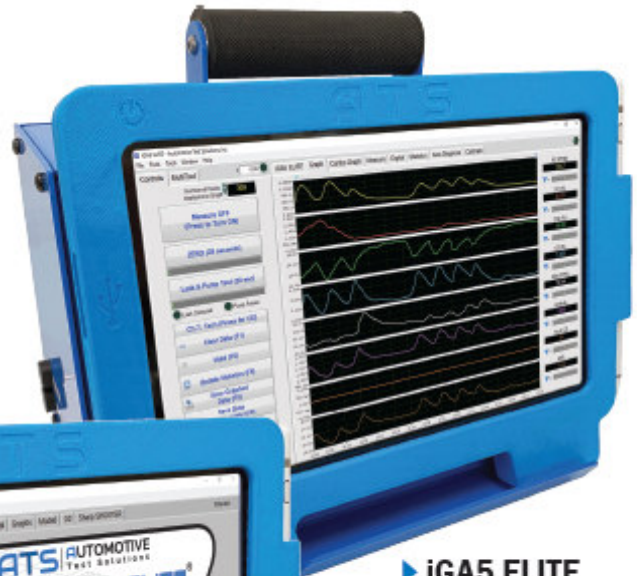
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