

January 2025



Technicians Service Training

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"Driveability Powertrain Related Issues"

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Upcoming

February
Jeff Zide

TST Big Event March
29th 2025

Bill Weaver

Josh Weaver

Eric Zigler

Keynote Carm Capriotto

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Editor

"G" Jerry Truglia

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"Driveability Powertrain Related Issues"

Our first vehicle is a 2007 Ford Mustang 4.6L with 90,960 came in with an illuminate MIL and two DTCs, **(Figure 1)**

P0171
(System
Too
Lean
Bank 1)
and
P0174
(System
Too
Lean
Bank 2).

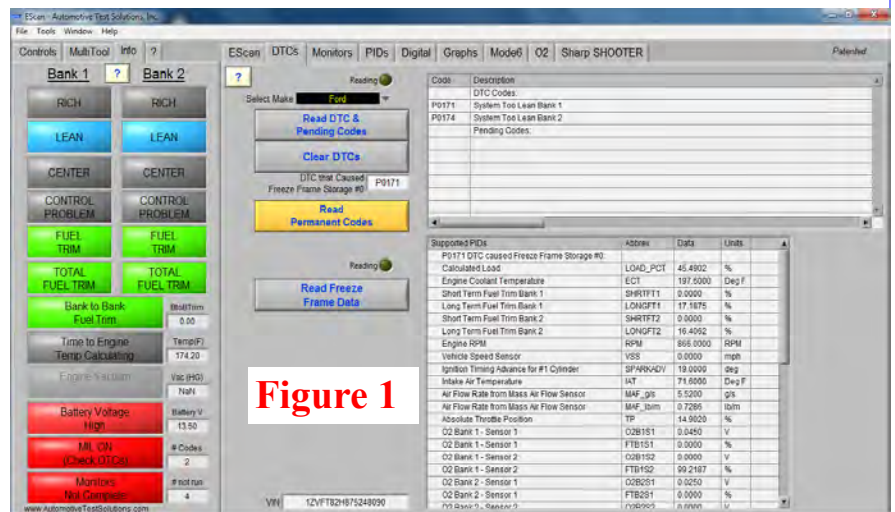


Figure 1

Bank 2). We interviewed the vehicle owner to make sure what his concern was on the vehicle followed by a good visual inspection. The inspection uncovered an aftermarket intake air tube and air filter that can be a suspect when dealing with a lean mixture. After reviewing scan data PIDs on the ATS EScan we reviewed the Freeze Frame data that captured LTFT 17% Bank 1 and 16% Bank 2 that was recorded at idle. The MAF reading for this 4.6L was at 5.5 gps (grams per second) that seemed to be in the range. Although knowing it's a Ford I thought that we better check the MAF sensor **(Figure 2)** for volumetric efficiency readings, that was a good call as you can see by the test data. Moving on we ran the STFT and LTFT test that confirmed that the MAF

(Con't on page 3)

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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

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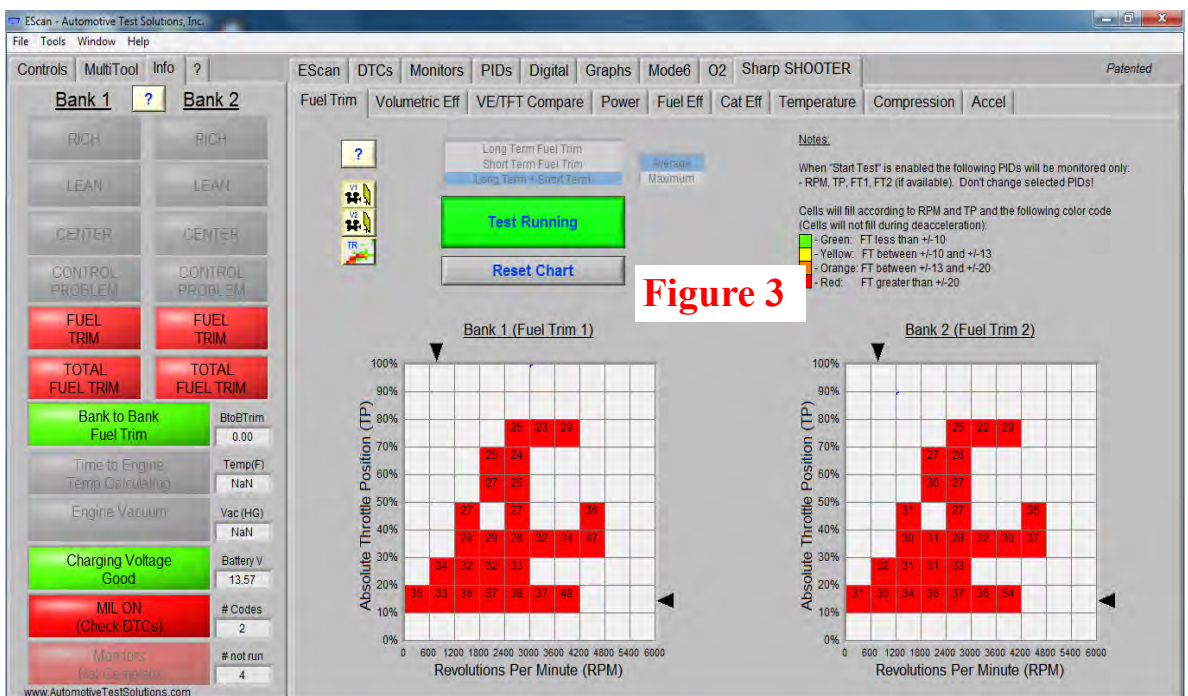
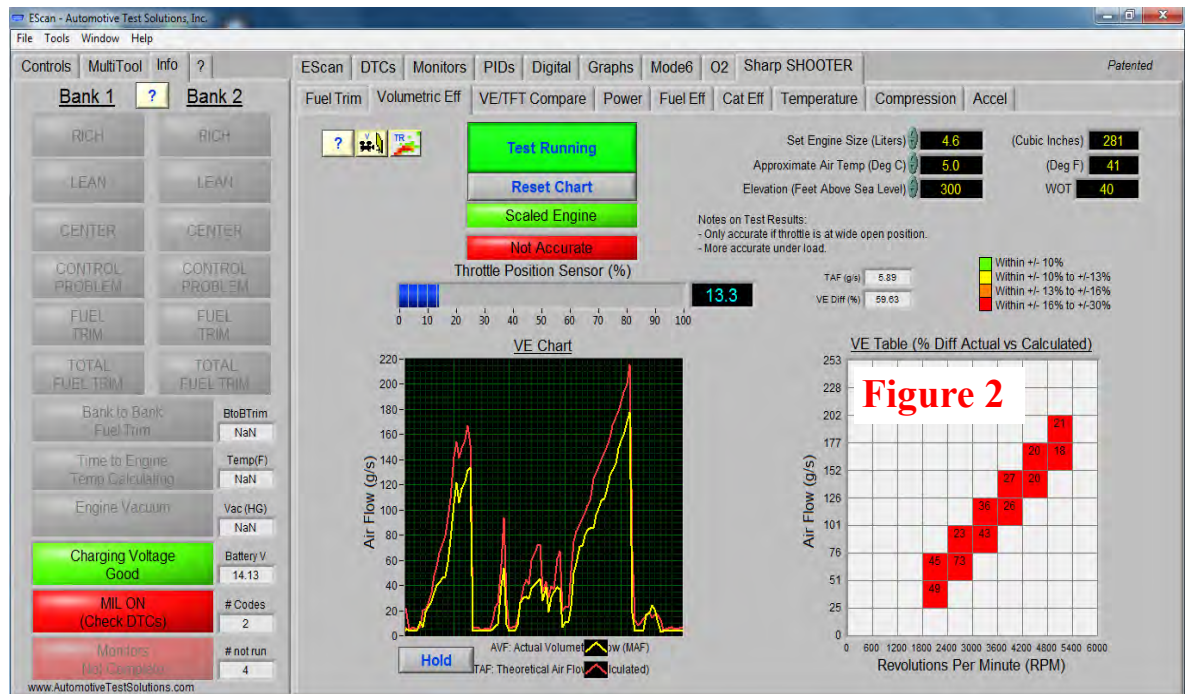
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DTC-2465-Rev1-20240318-01

"Driveability Powertrain Related Issues" (con't from p. 1)

numbers were a low of 22 and a high of 54 on the (Figure 3) EScan fuel trim

chart. That test confirmed we in fact had a problem with the MAF system. You may be wondering how this test can be performed if the shop you're working in does not own an EScan. Not a problem, you must work a bit harder and use any scan tool in generic scan mode



that will allow the user to confirm this issue. Start off by checking DTCs following by looking at Freeze Frame PIDs. Viewing the high fuel trim reading on a generic scan tool other than EScan, most of the time

(Con't on page 5)

"Driveability Powertrain Related Issues" (con't from p. 4)

will not provide you a defined failure of the MAF. The EScan makes our job easier when working on drivability and/or check engine light problems. The test for fuel trim on EScan allows us to view the fuel trim numbers that were high from the bottom to the top of the chart is always a good indication that the MAF can be the issue. The next step on a generic scan tool would be to graph Calculated Load and making sure that the test reading can obtain 90% at sea level (adjust for elevation) as you press the pedal to the metal. Always make sure that the road in front of you is clear and safe, nothing worse than crashing into something, after all we want you to stay in one piece. A one car length is all you need to complete the test and view results along with another length to repeat the test. The EScan makes testing a breeze but if you do not have one you have to work with the tool you have, remember you can run the tests on any scan tool in generic mode using the steps I outlined above. The problem on the Mustang was not the usual MAF sensor issue, rather something that was a related item. We tried cleaning the MAF sensor as a first step but did not see any improvement, so we RTFI (read the fricking information) and found that some aftermarket intake air tube can cause an issue mimicking a MAF sensor problem. We called the dealer to order a new OE intake tube and was told that it was no longer in production or available. The next step was a Google search that can up short, so we called LKQ a salvage yard and found a used OE intake duct and installed it. The engine was now running the way it should with the intake gps (grams per second) back to normal. The only procedure we had left to complete was to reset the adaptive fuel trim before shipping the vehicle.

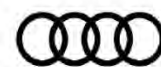
2013 Audi A4 2.0L

The next vehicle was one of our new customers that arrived with his 2013 Audi A4 2.0L turbo with 74,111 on the odometer. He told us that he had regularly serviced the vehicle at the Audi dealer from when it was new. The Audi owner proceeded to tell us that he was no longer happy with the dealer service since he just had the vehicle serviced and then a

(Con't on page 6)

"Driveability Powertrain Related Issues" (con't from p. 5)

few days later the check engine light illuminated. After more than a couple of trips back to the dealer along with more money spent the check engine light came back on. The dealer recommended and replaced the spark plugs and ignition coils along with some other service items before returning the vehicle to the owner without any other service recommendations. After the light came back on after those repairs the Audi owner returned to the dealer and was advised to leave the vehicle once again. The fed up owner decided to search for a different repair facility to diagnosis and service his vehicle. The dealer's mistake lost them a good customer that turned out to be a win for us. When we received the vehicle, we explained to the vehicle owner that we would have to perform a diagnosis before we would recommend any service or repair anything. After a good visual inspection that was followed by a TSBs search which yielded two important bulletins. One bulletin (Figure 4) was on gasoline quality and carbon build up that is very common.



Technical Service Bulletin

01 MIL on (gasoline quality), DTCs for misfire, air/fuel ratio imbalance, or lean fuel system are stored in the ECM

01 20 54 2014753/11 April 1, 2020. Supersedes Technical Service Bulletin Group 01 number 20-46 dated March 6, 2020 for reasons listed below.

Model(s)	Year	VIN Range	Vehicle-Specific Equipment
All	2000 - 2019	All	Gasoline engines

Condition

REVISION HISTORY		
Revision	Date	Purpose
11	-	Revised <i>Required and Tools</i> (Changed to Shop Supply)
10	03/06/2020	Revised title Revised header (Added model years) Revised <i>Technical Background</i> (Added information) Revised <i>Service</i> (Added information for model years added and added part number) Revised <i>Warranty</i> (Added part number and table for 2016-2019 vehicles only and Claim Types)
9	03/09/2015	Revised title Revised header (Added model year) Revised <i>Condition</i> (Added DTCs) Revised <i>Service</i> (Updated part number)

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- Excessive accumulation of deposits on intake valves, intake manifold, fuel injectors, and combustion chambers.
- Engine running rough after cold start.
- Excessive engine cranking time.
- Hesitations while driving.
- Rough engine idle.
- Reduced engine performance.
- Poor fuel economy.

Figure 4

Page 1 of 5

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(Con't on page 13)

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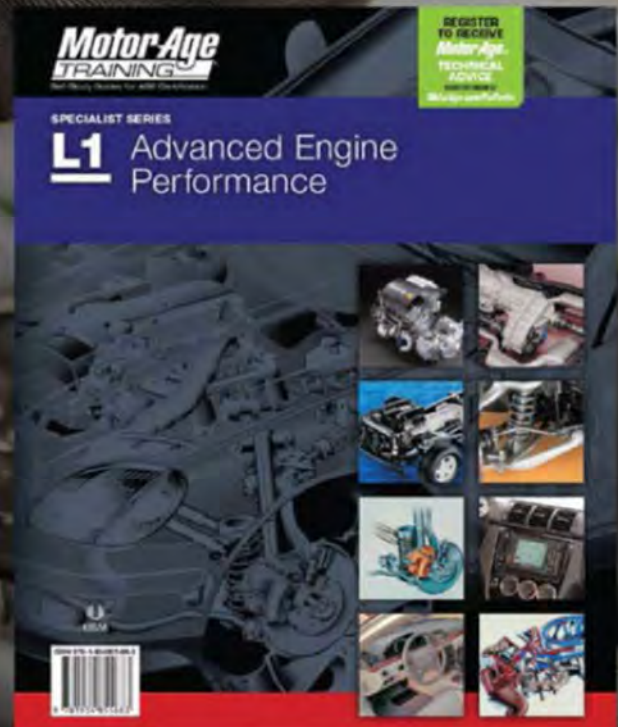


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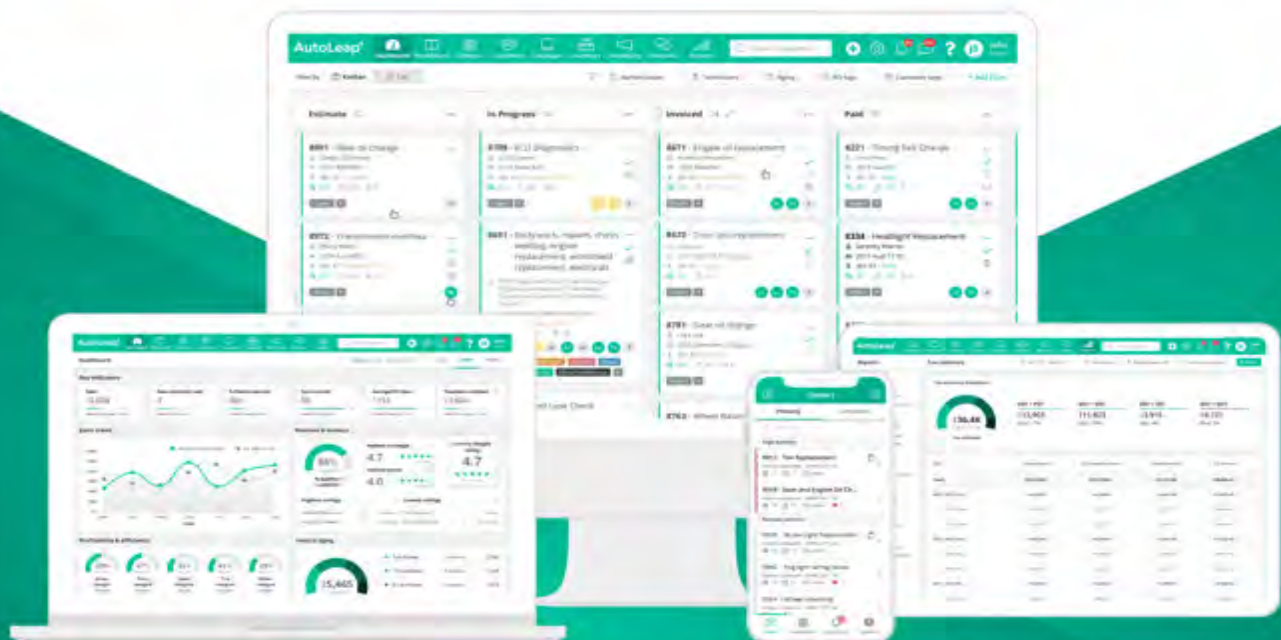
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"Driveability Powertrain Related Issues" (con't from p. 6)

I have written about carbon build up issues on Audi's and VWs in other Motor Age articles where we came across misfires problems on cold engines. On our problem vehicle we waited for the engine to cool down before we installed a video scope into the engine so we could examine the condition of the valve and pistons. The valves and cylinders did not look carboned up enough to cause the misfire problems that this engine produced. Reviewing the information from the scan data on the following; P0301 - (Cylinder 1 Misfire), P0302 - (Cylinder 2 Misfire), P0303 - (Cylinder 3 Misfire), P0304 - (Cylinder 4 Misfire) and a P0171 - (System too Lean) assisted us to develop a plan on repairing this Audi. We understood that a misfire can be caused by a few things such as spark, fuel, mechanical, carbon build up, a cracked flex plate, crank sensor, and a few other things we just needed to narrow it down to the correct problem.

ALLDATA Repair

Change Vehicle Bookmarks Library Request Conversion Calculator Technician's Reference - Repair

2013 Audi A4 Sedan (8K2) L4-2.0L Turbo (CAEB)

Ignition System - MIL ON, P0300/P0301 - P0304 Misfire Detected

Vehicle > Technical Service Bulletins > Ignition System - MIL ON, P0300/P0301 - P0304 Misfire Detected

IGNITION SYSTEM - MIL ON, P0300/P0301 - P0304 MISFIRE DETECTED

01 MIL on (P0300 and/or P0301, P0302, P0303, P0304 - cylinder misfire detected)

01 14 63

2033630/2

January 31, 2014

Supersedes Technical Service Bulletin Group 01 number 13-86 dated April 15, 2013 for reasons listed below.

Model(s)	Year	VIN Range	Vehicle Specific Equipment
A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, A21, A22, A23, A24, A25, A26, A27, A28, A29, A30, A31, A32, A33, A34, A35, A36, A37, A38, A39, A40, A41, A42, A43, A44, A45, A46, A47, A48, A49, A50, A51, A52, A53, A54, A55, A56, A57, A58, A59, A60, A61, A62, A63, A64, A65, A66, A67, A68, A69, A70, A71, A72, A73, A74, A75, A76, A77, A78, A79, A80, A81, A82, A83, A84, A85, A86, A87, A88, A89, A90, A91, A92, A93, A94, A95, A96, A97, A98, A99, A100	2008-2015		4 Cylinder Engines

Vehicle Information

Revision	Date	Purpose
2	-	Revised header data (Updated applicable engine codes; added DTCs)
1	04/15/2013	Initial publication

- MIL on.
- Rough idle.
- One or more of the following DTCs are stored in the Engine Control Module (ECM), J623 (address word 01):
 - DTC P0300 (Random/Multiple Cylinder Misfire Detected).
 - DTC P0301 (Cylinder 1 Misfire Detected).
 - DTC P0302 (Cylinder 2 Misfire Detected).
 - DTC P0303 (Cylinder 3 Misfire Detected).
 - DTC P0304 (Cylinder 4 Misfire Detected).
- Engine may have reduced performance without significant loss of power or stalling.

Open in New Tab Zoom/Print

Condition

Technical Background

Because there are a number of different misfire faults (unrelated to ignition coil operation) that could cause the MIL to illuminate, proper Guided Fault Finding (GFF) misfire diagnosis must be followed

Production Solution

Improved ignition coil since 2008 model year.

Figure 5

(Con't on page 14)

"Driveability Powertrain Related Issues" (con't from p. 13)

Franklin ruled out the previous mentioned and looked at the second bulletin that stated misfires P0300, P0301 to P0304 (**Figure 5**) can be associated with ignition coil issues. Since the coils were already replaced along with the spark plugs at Audi, we had to move on. The

next thing we found is something we always check for, crankcase pressure. In AllData they had a community article (**Figure 6**) that referenced a P0171 prob-

The screenshot shows the AllData Repair website interface. At the top, there's a navigation bar with links like 'Change Vehicle', 'Bookmarks', 'Library Request', 'Conversion Calculator', and 'Technician's Reference - Repair'. Below this, the vehicle information is listed: '2013 Audi A4 Sedan (8K2) L4-2.0L Turbo (CAEB)'. The main heading is 'Community Repair Questions'. The specific question is titled 'P0171, Lean Fueling Fault:'. The description states: 'The vehicle had its turbocharger replaced to address under-boosting but continued to illuminate the MIL. A scan returns the following codes: P0171 Fuel System Too Lean (Bank 1) P2177 System Too Lean Off Idle Bank 1'. Below this, there are three columns: 'Mileage' (None Indicated), 'Symptoms' (MIL/Warning Indicator Lamp On, Detonation/Spark Knock/Ping), and 'Test Performed' (None Indicated). There's also a 'Systems' section listing 'Computers and Control Systems' and 'DTC Codes' listing 'P0171' and 'P2177'. A 'Keywords' section shows 'None Indicated'. A detailed description of the issue follows: 'The PCV diaphragm is a common failure on Audi engines and when it fails, it will introduce vacuum leak to the crankcase. Check vacuum via the dipstick tube or oil fill cap; anything over 3 inHg is excessive.' It also mentions 'Monitor desired and actual fuel rail pressure PIDs if a capable scan tool is available to verify good fuel pressure.' At the bottom, it says '1 Repair(s) Available' and shows a 'Verified Repair(2)' for the PCV diaphragm issue, dated 10/01/2019 13:42:03. The repair description states: 'The air oil separator and crankcase pressure regulator valve were replaced after finding over 6 inHg of vacuum from the crankcase at idle. The new separator and valve restored normal fuel trims, no codes returned, and the issue was resolved.'

Figure 6

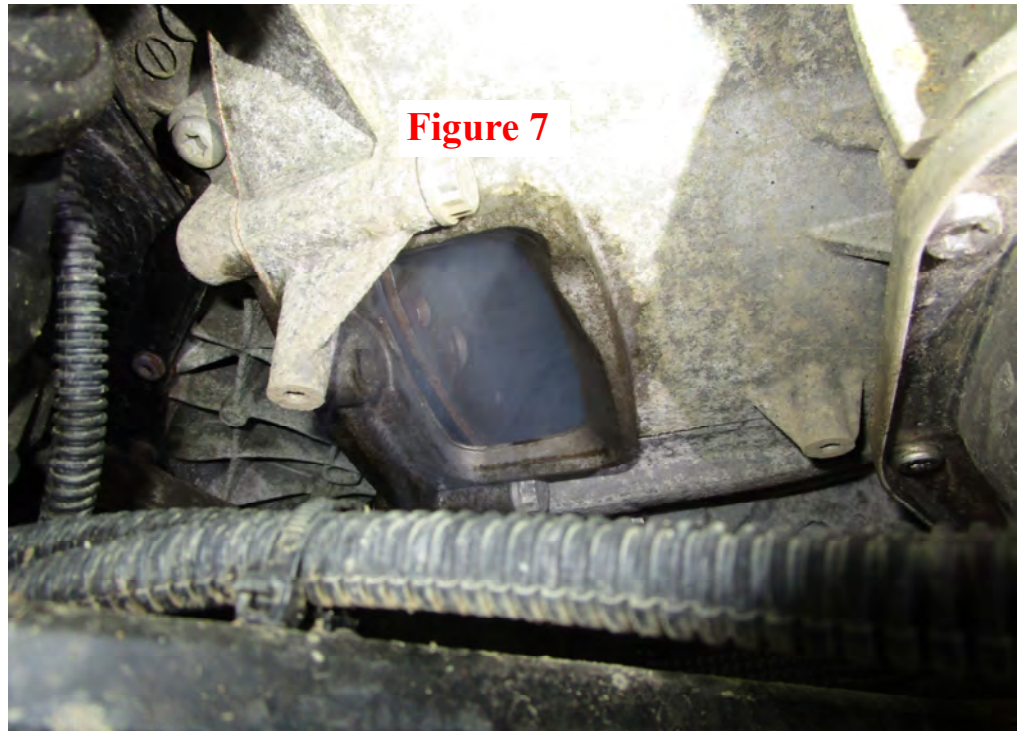
lem associated with crankcase pressure issues aka the breather / PCV system. We used our manometer to check the crankcase pressure and found it was out of specifications. With the manometer connected we viewed a crankcase pressure reading of 125 mbar way over the specification of 97mbar. Franklin connected the Smoke Wizard smoke machine and notice the flow meter ball was way on the top indicating a large leak somewhere. There was no smoke visible from the top view of the engine, so we lifted the vehicle up and found the smoke coming out (**Figure 7**) of the engine / transmission inspection cover. The excessive crankcase pressure was caused by a clogged breather / PCV system that resulted in a blown rear main seal. We explained to the Audi owner that we had to drop the transmission then

(Con't on page 15)

"Driveability Powertrain Related Issues" (con't from p. 14)

removed and installed the rear main oil seal. The job would also entail changing the breather / PCV components to make sure the engine was able to breathe properly. We received the ok from the vehicle owner along with getting approval

for rear brakes, starter, shifter cable, flywheel bolts (that were a onetime use) and driver's side mirror. We installed all the needed parts and retested the breather / PCV system using the manometer to make sure



the engine was operating as designed. After clearing the DTCs and test driving the vehicle we confirmed all the Monitors were Ready along with no Mode 6, Pending DTCs or DTCs problems. We now acquired a good customer since we repaired his Audi by locating the root cause of his concern of the rough running engine. We built the vehicle owners confidence level by good communication including showing him scan tool screen shots and pictures of the problem before making any repairs. We followed that up with the after repair scan tool screen shots when the vehicle was completed. Using digital inspection can be a very important tool for your shop.

Article By

"G" Jerry Truglia

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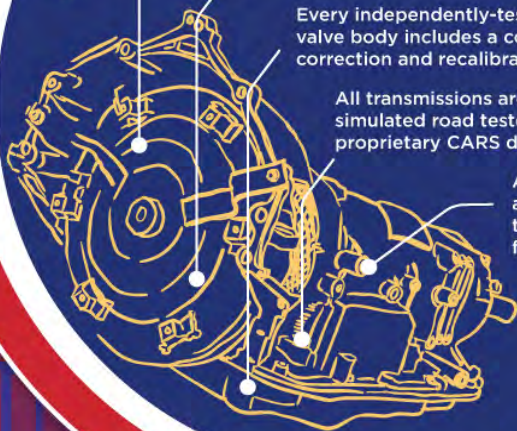
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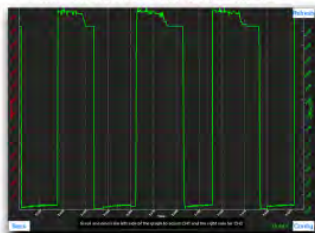
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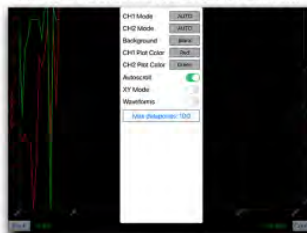
AMP FINDER & FUSE DRAW TEST



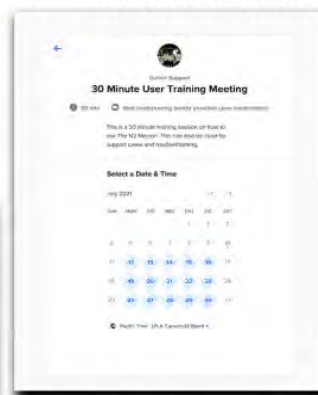
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FULL 2 CH. MULTIMETER



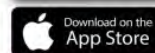
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