

Technicians Service Training

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CA Sept Tech Training Big Event

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Upcoming Seminars:

December 10, 11, 12, 13 2012 Ken Zanders Top Ten DTC

March 23, 2013 TST Big Event Instructors John Thorton and Dave De-courcey

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TST Motor Age Carter Fuel Pump webcast November 20, 8 pm EST

Ongoing FREE Webcasts

Editor

Jerry "G" Truglia

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EGR Valves and DTCs

You may ask why diagnosing EGR valves are such a problem when we have OBD II. You would think when the MIL (Malfunction Indicator Lamp) is lit up, the fix would be a slam dunk, but we know that's not always the case. With that in mind let's first go over the basics of the EGR valve and system. Remember that there is more to the EGR system than just the valve.

EGR, How it Works and What it Does

EGR systems reduce nitrogen oxide (NOx) by displacing oxygen and adding exhaust gas. Mixed with incoming air, the inert exhaust gases lower combustion temperatures. If we have high NOx emissions, engine pinging, clogged EGR passages, or rough idle we will want to diagnose the EGR.



There are a few ways to test EGR valves depending on the type of EGR system. On some you can use a vacuum pump and or backpressure, and on others a scan tool can command the valve pintel up and down while observing the engine RPM, O2, MAP or MAF readings.

(Con't on page 3)

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Information contained in this newsletter is intended for use by professional auto repair technicians familiar with approved vehicle repair procedures. The authors are not responsible for physical injury or property damage resulting from the incorrect application of information or procedures outlined in this volume.

Currently there are **TST chapters in Connecticut, Massachusetts, New Jersey, New York** and membership continues to grow. For more information you can call

TST headquarters at:

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Technicians Service Training



www.TSTseminars.org

What is TST?

TST is a group of dedicated technicians and instructors committed to the continuing education of our fellow technicians. We provide once a month training seminars to technicians at a reasonable price. TST brings our members nationally known instructors and state of the art training.

Our Goal & Mission Statement

- **Keep our fellow technicians up to date with the latest technology.**
- **Provide training seminars for a reasonable price.**
- **Deliver information that the technician can use now.**
- **Keep technicians informed of information affecting our industry.**
- **Increase consumer awareness of what a good technician is.**

Why join TST?

TST membership includes special pricing on once a month week-day night seminars and the occasional full Saturday seminar. With a **\$75.00 yearly membership, the monthly seminars are only \$65.00.** **TST classes are NOT sales or product seminars.** The instructors that TST brings in are all “hands-on” industry experts with up to date, cutting edge knowledge that you can use in your shop the next day. That’s 65 dollars for a seminar in which you are able to learn something useful, for fixing those tough jobs that we all see on a regular basis. Our instructors are masters at making the complex understandable. Membership also includes a Monthly Newsletter full of real world technical articles, diagnostic case studies, and solutions to the kinds of problems you see in your bays each week.

The following are some of TST’s regular instructors:

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 Motor Magazine

Bob Pattengale of Bosch

Peter Meier of Motor Age Magazine

Ken Zanders of Illinois Air Team

Jerry “G” Truglia of A.T.T.S. Inc.

EGR Valves and DTCs (con't from p. 1)

Don't forget to check the EGR passages that may need a good cleaning in order for the EGR system to work properly. Other times, the problem has to do with a component-specific defect.

Three Types Of Vacuum EGR Valves

Vacuum

Just use some sort of vacuum control to open the valve.

Positive and Negative Backpressure

Positive backpressure EGR valves can only be tested when installed on the engine with it running – some backpressure must be present for the valve to work. By design this valve will not hold vacuum until some exhaust backpressure is present. Positive and Negative backpressure EGR valves often look identical.

The difference between the positive and negative EGR valve is a spring that is located below the lower diaphragm (negative) rather than between the upper and lower diaphragm (positive). Both valves need to be installed on an engine since they both need exhaust backpressure to seal the center hole. The sealed center hole creates a sealed vacuum chamber in the upper portion of the valve. This means when vacuum is applied to the vacuum port the EGR valve will open.



Intake Vacuum Leak – Smoke Testing

Con't on p. 7)

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Jim Bradanini
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QUOTE

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They offer \$50,000 for \$250 but we upped it to \$70,000 for \$350. <http://www.mechanicsinsurance.com>. The guys name is Jim Bradanini and his email address is: JimB@cpminsurance.com. Their phone is 203-439-2810. I had left a message and he got back to me within the hour.

Thank you so much for making your process so smooth and painless, kind and professional.

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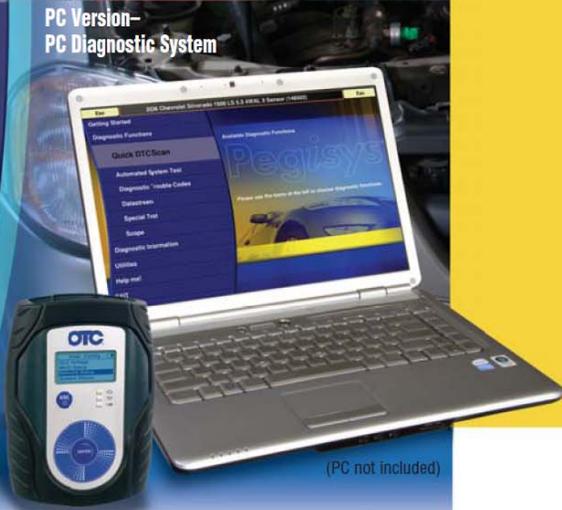
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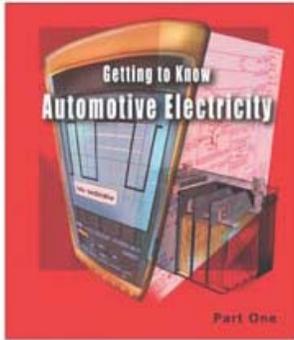
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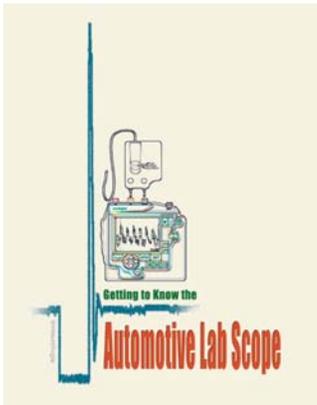
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EGR Valves and DTCs (con't from p. 3)

Linear EGR Valves

Exhaust Linear EGR valves are operated by a small electrical stepper motor that drives the EGR pintle open and closed on command from the PCM. The valve also contains a position sensor that signals a change in pintle position as the valve operates. These valves can be a problem since they are exposed to high exhaust temperature. You can check the stepper motor's current draw by placing an amp clamp around the power or ground wires, make sure you are not on the position sensor wires. If there is a short in any of the windings the PCM driver will burn out and the valve will not be able to operate.



Depending on the manufacturer OBD II vehicles may use a temperature sensor, oxygen sensor, pressure sensor, MAP sensor, vacuum switching valve, stepper motor, that can compromise proper EGR operation or the PCM's ability to test the EGR.

Testing

EGR Vacuum Signal Testing

If we have confirmed EGR flow, on vacuum operated EGR valves we are going to check if the PCM is providing the signal to the valve via the solenoid. Here's how:

1. Attach a vacuum gauge to the hose that supplies vacuum to the EGR valve.

(Con't on page 9)

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EGR Valves and DTCs (con't from page 7)

2. Run the engine until it reaches operating temperature and drive.
3. Observe a vacuum signal, it should be at least 2 inches HG while driving about 15 MPH.

When we can confirm the steps 1 - 3, the EGR signal is good, if not look for EGR sensor-related faults.



Note: An EGR stuck open leans out the fuel mixture while pushing up Fuel Trim numbers, making the FT numbers more positive.

EGR Flow Testing

If you have an EGR DTC or emissions readings that may implicate the EGR, you are going to want to test if EGR flow is good. Here is how you do it:

1. Bring the vehicle to 1800 to 2500 RPM.
2. Apply vacuum to the EGR, if the valve has a bleed port, cover it by placing a rag over the ports so the valve can be opened. If the valve and passages are good, the engine RPMs and the way it runs should be noticeably different.
3. If the engine does not run differently, check to see if there is a blocked exhaust gas passage or if the EGR valve is sticking.



Positive pressure EGRs will require you to increase exhaust backpressure to perform the test. Just partially block the tailpipe with a rag to accomplish this.

(Con't on page 12)

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EGR Valves and DTCs (con't from page 9)

Questions:

1. Do you want seminars to continue in your area?

2. Do you find the seminars useful?

Please ask a fellow technician to come and check-out our seminars so we can continue to bring you the best available information each month.

We need your support:

Thank you, G Truglia

You may also use a vacuum pump or if the EGR is electric, use a Power Probe or a scan tool's bidirectional controls to open the EGR. MAP voltage on an operational EGR valve will subsequently change and go higher. This confirms the EGR is getting a signal from the PCM. Furthermore, if driveability is noticeably affected, that confirms EGR operation.



EGR Common DTCs (Ford)

DTC P0400 (EGR) Flow Failure (Outside the Minimum or Maximum Limits)

DTC P0401 (EGR) Flow Insufficient Detected

DTC P0402 (EGR) Flow Excessive Detected

DTC P0403 (EGR) Control Circuit

DTC P0405 Differential Pressure Feedback Exhaust Gas Recirculation (DPFEGR) Sensor Circuit Low Voltage Detected

DTC P0406 Differential Pressure Feedback Exhaust Gas Recirculation (DPFEGR) Sensor Circuit High Voltage Detected



Let's take a closer look on how to tell if a P0400 is going to set the DTC on this Ford example. We are using our scan tool's Mode 6 function to see if and how the EGR is failing.

Test ID (TID)	Component ID (CID)	Test Value	Min Limit	Max Limit	Units
\$45: DPFE EGR System Monitor	\$20: EGR Stuck Open Test	0.655		1.282	volts
\$4A: DPFE EGR System Monitor	\$30: EGR Flow Test	-0.616	5.990		in H2O
\$4B: DPFE EGR System Monitor	\$30: EVR Duty Cycle Flow Test	89.941		79.953	%

Notice how the EGR Flow Test, Component ID (CID) \$30 has failed the test. The Min Limit is 5.990 while the PCM Test Value via the scan tool is -0.616 in units of in H2O (inches of water).

(Con't on page 16)

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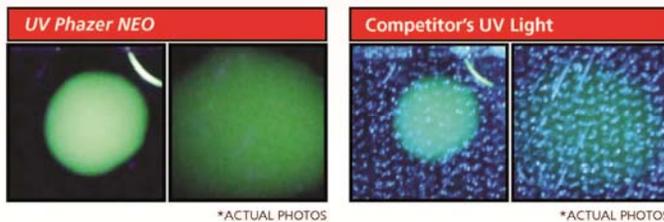
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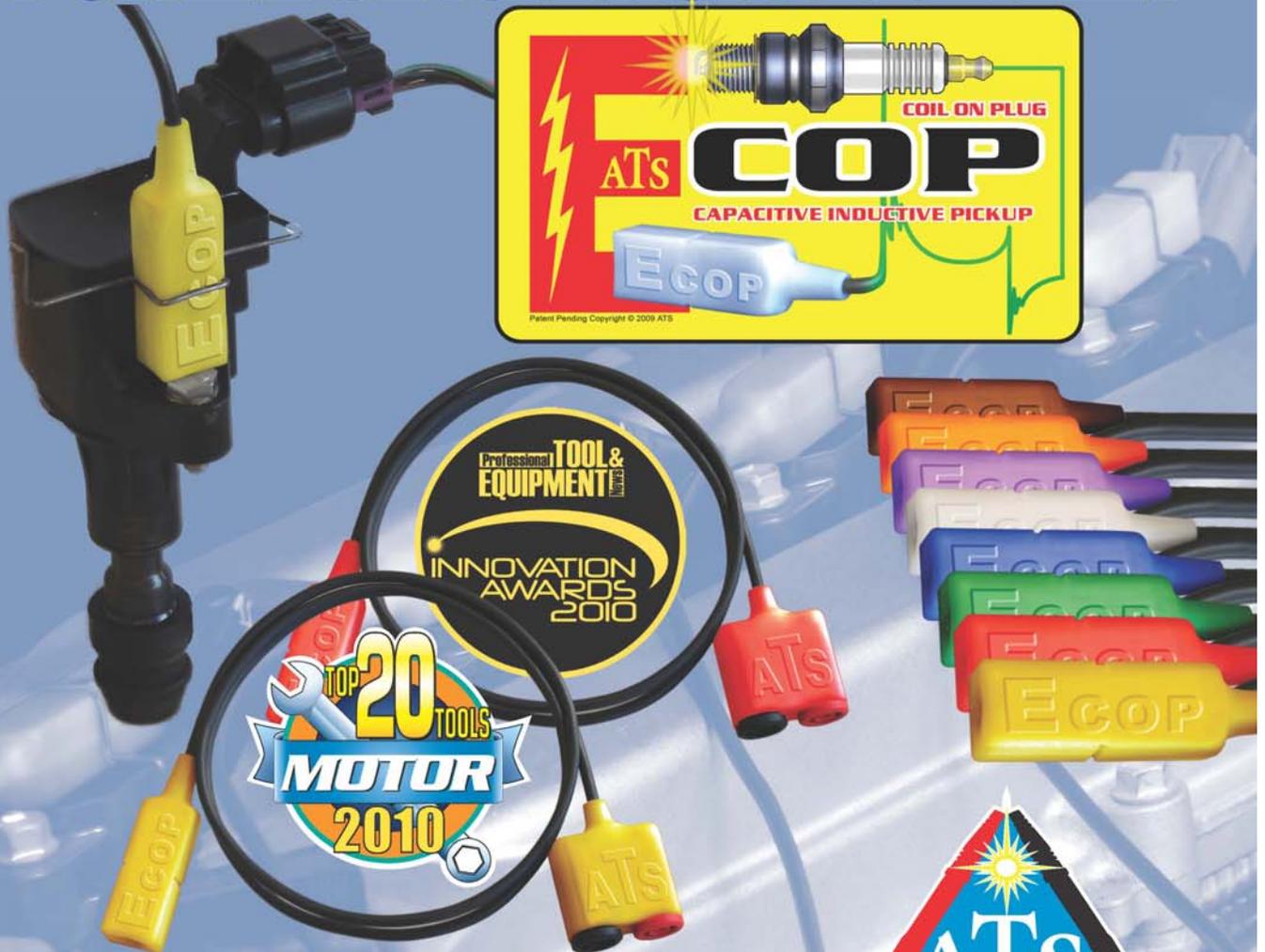
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EGR Valves and DTCs (con't from page 12)

The EVR (EGR Vacuum Regulator) is also failing but this time there is a Max Limit of 79.953 and a Test Value of 89.941. Now let's think about the P0400 DTC with the information that we have now uncovered by using Mode 6. What do you think caused the DTC? Where would you start your diagnosis? Right ! Check the vacuum source to the EVR first followed by checking the power and ground to the solenoid. Remember that the ground is controlled by the PCM, so make sure that the PCM has the ability to operate the ground side. Check to see if your scan tool is able to perform a bi-directional command to operate the valve or if your scan tool does not have that function you can use a wiring diagram and a Power Probe to test the EVR. It's a good idea to check the current draw of the EVR to make sure that it does not consume more than 1.2 amps. If it consumes more than 1.2 amps (bad solenoid) you found out why the PCM could not supply the ground. If it's not the ground than it's the power side that has the problem, look for an Open Circuit or a Short Circuit.



Case Study

P0401 (EGR) Flow Insufficient Detected was found on this Ford vehicle along with a couple of other DTCs. The P0300 and P0308 were repaired easily by diagnosing and replacing the two defective ignition coils. Now it was time to diagnosis and repair the EGR valve DTC. Now many technicians would remove and replace the EGR valve, but wait, will this fix this problem?

(Con't on page 18)

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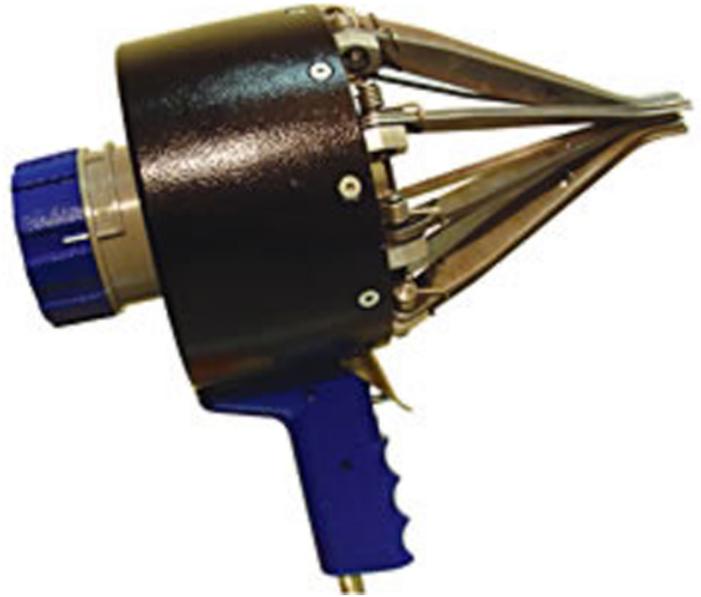


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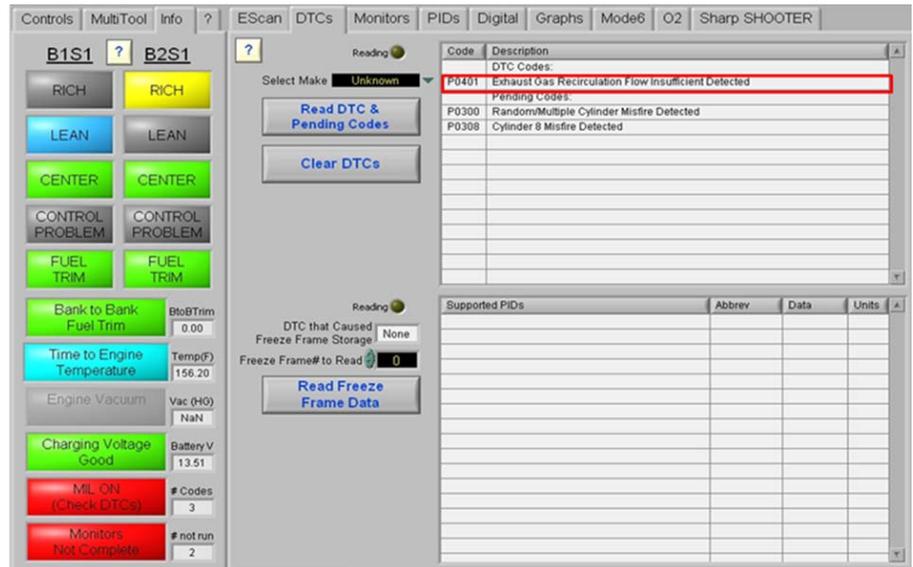


EGR Valves and DTCs (con't from page 16)

The answer maybe Yes and maybe No, remember that insufficient flow can be cause by the following; Possible Causes for the DTC:

- o EGR valve stuck open or closed
- o Vacuum problem (vacuum style valve)
- o EVR (EGR Vacuum Regulator)
- o Electrical connector to EGR not seated or open circuit (electric style valve)
- o EGR motor winding circuits short or open (electric style valve)
- o No voltage to the EGR (electric style valve)
- o Harness open or shorted to voltage or ground (electric style valve)
- o Vacuum signal to MAP restricted or leaking
- o MAF sensor signal erroneous
- o Carbon build up in the EGR valve seat area
- o One or more sensors is not responding or is out of range

Now with that said where do we start? Remember the basics? Well the fix for this EGR DTC was very simple. Take a look at the fix, a broken vacuum line. Remember always check the basics first and read up on how the system or component works.





Tech Tip: SECRETS TO INTERMITTENT MISFIRES REVEALED!

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Dave Hobbs teaching his updated Network and CAN seminar.



Pete Meier delivering his keynote speech.



G Truglia warming up the group before the day of training starts. Later that day G delivered his P0420 seminar before the prize raffle.



(Con't on page 22)

TST CA Technician Training Big Event September 29, 2012 (con't from page 22)

Our two main sponsors OTC (left) and Power Probe (right).



Left to right...Pierre Respaut, TST VP, G Truglia TST President, Scott Brown, "Mr. Iatn" himself and the great editor of Motor Age Pete Meier, all sharing a laugh after Scott's Power Probe win.

Thanks to all who attended. See you next year!



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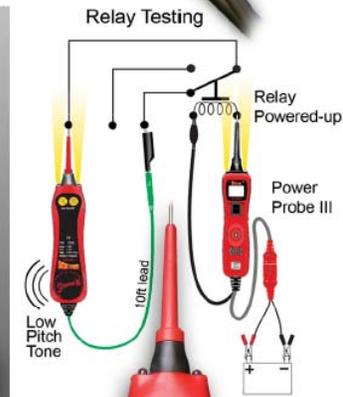


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