

VCERTT NEWS



VCERTT: VERMONT CENTER FOR EMISSIONS
REPAIR AND TECHNICIAN TRAINING
A PARTNERSHIP OF VERMONT TECHNICAL
COLLEGE AND THE VT DEPARTMENT OF
ENVIRONMENTAL CONSERVATION TO
PROVIDE OBDII INFORMATION AND
TRAINING TO VERMONT TECHNICIANS

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WWW.VCERTT.ORG

We're on the internet! Now you can learn more about VCERTT and our training classes. Look for our updated and in depth course list and descriptions. Check out the fall training schedule and email us to sign up for a class in your area. You'll also find our past newsletters available with their useful information always handy. We also have links to some great web resources. Check us out!

Soon we'll catalogue our case studies for quick reference. What else would you like to see? Email us at OBDNews@vtc.edu with suggestions or comments.

MAF SENSOR WOES

Numerous manufacturers have been having troubles with their mass airflow (MAF) sensors recently. The affected sensors are a Bosch product used widely by foreign and domestic manufacturers. The symptoms range from hesitation to stalling to bucking on acceleration. The malfunction indicator light (MIL) is often illuminated. The diagnostic trouble code (DTC) may or may not indicate a faulty MAF sensor. On many vehicles DTCs P0171 or P0174 for system too lean may be set. Sometimes an oxygen sensor DTC will be set as well because the system is running so lean that the sensor voltage consistently stays low. Several manufacturers have technical service bulletins published regarding this problem. The suggested repair for the problem is to replace the sensor.

The fault with the sensor appears to be contamination of the sensor's hot wire. The sensor wire is heated to a particular temperature. Air passing across the sensing wire cools it. The sensor increases the current to maintain a constant wire temperature. The more airflow across the wire the greater the

current required to maintain the wire temperature. This varying current is converted to a variable frequency that the PCM uses to infer intake airflow. When the wire becomes contaminated, the airflow across it does not cool it as it should. The current is not increased as much and the PCM "sees" less airflow than is actually occurring. This results in a lean air/fuel mixture.

In order to diagnose the sensor, some suggest cleaning the hot wire with Brake Kleen or electric cleaner. Lint from low quality air filters is a very common culprit. Excessive oil on a K and N air filter will also contaminate



the hot wire and limit its sensitivity. Some technicians are carefully pulling lint off of the sensing wire with tweezers. After cleaning the wire, drive the vehicle to see if the symptoms have lessened. If so, the sensor is the faulty component. Some technicians are cleaning the sensors without replacing them though most are following the manufacturers suggestion and replacing the sensors.

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CHECK OUT OUR NEW
EVAPORATIVE EMISSIONS
SYSTEMS CLASS!

ABOUT VCERTT NEWS:

The purpose of this newsletter is to provide specialized information to the front line: you, the technicians, service advisors and managers in the field handling repairs and customers. The OBD Inspection Program is now well established. While the OBD inspection itself is an easy addition to the VSI we know that repairing OBD II faults may not be as simple. The success of the OBD Inspection Program falls largely on your ability to perform effective repairs. VCERTT is committed to trying to help. We offer this newsletter to provide information and a forum for discussion. We ask you to call or email us with your questions or suggestions. When you have a troublesome vehicle repair related to OBDII, we'd like to hear about it. If you have problems with a particular vehicle or a scan tool, give us a call. We may be able to help and we can pass along relevant information. We're always looking for test vehicles for our Case Studies - let us take your problem vehicle and attempt a repair, no charge for our time, just help for everyone.

CALL US AT: 802-238-3211

OR EMAIL US AT: OBDNEWS@VTC.EDU

CAN LIST GROWS

As we've reported in previous issues, CAN (Controller Area Network) protocol is a new OBD II communication protocol being used on a growing number of 2003—2005 model year vehicles (see list below). Each year, more new vehicles will use CAN, and by the 2008 model year all new vehicles must use CAN. Not all scan tools currently support CAN protocol, and therefore will not communicate with vehicles using CAN.

<u>YEAR</u>	<u>MAKE</u>	<u>MODEL</u>
2005	Audi	A4 w/2.0, 3.2 A6 w/3.2, 4.2
2004-05	Buick	Rendezvous
2005	Buick	LaCrosse w/3.6, Ranier
2004-05	Cadillac	CTS, SRX, XLR
2005	Cadillac	STS
2005	Chevrolet	Cobalt w/2.2, 2.4, Corvette w/6.0, Equinox, Malibu w/3.5, SSR, Trailblazer EXT w/5.3
2005	Chrysler	300C
2004-05	Dodge	Durango
2005	Dodge	Dakota, Magnum
2003-05	Ford	Focus w/2.3, Thunderbird, Lincoln LS
2004-05	Ford	F150, Taurus, Explorer
2005	Ford	Crown Victoria, E150, Escape, Five Hundred w/3.0, Focus w/2.0, Free style w/3.0, Mustang, Expedition w/ 5.4
2005	GMC	Envoy w/5.3
2005	Isuzu	Ascender w/5.3
2005	Jeep	Grand Cherokee
2005	Land Rover	LR3 w/4.0, 4.4
2004-05	Lexus	LS430
2005	Lexus	LS400, GX470
2003-05	Mazda	6
2004-05	Mazda	3, RX-8

2005	Mazda	MPV, Tribute
2005	Mercedes	SLK350
2004-05	Mercury	Sable
2005	Mercury	Grand Marquis, Mariner, Montego
2005	Pontiac	Grand Prix, G6, GTO
2003-05	Saab	9-3
2005	Saab	9-7X
2003-05	Saturn	Ion
2004-05	Toyota	Prius
2005	Toyota	Avalon, Tacoma, 4Runner, Tundra w/4.0, 4.7, Sequoia
2004-05	Volvo	S40 w/2.4, 2.5
2005	Volvo	V50, S60, V70, S80, XC90

Of the scan tools most commonly used to conduct the OBD II test in Vermont, the Autoxray scan tools currently support CAN, a CAN update kit is currently available for the Snap-on MT2500 and Ease Diagnostics now has an updated CAN able scan tool. Kal-Equip plans to have a new tool that supports CAN available by early next year. For further information on these scan tools, contact Autoxray at 800-595-9729 (www.autoxray.com), Snap-on at 800-370-5290 (www.snapon.com), Kal-Equip at 800-253-9880 (www.actron.com), and Ease Diagnostics at 888-366-3273 (www.obd2.com). Most other scan tool manufacturers are also in the process of integrating CAN into their scan tools.

If you are an inspection station, DMV has the following policy: If your station's scan tool does not currently support CAN, vehicles on this list may still receive an inspection sticker provided the vehicle passes the visual MIL checks (i.e., MIL illuminates at key-on-engine-off, and MIL is not illuminated with engine running) and the safety inspection standards. The fact that the vehicle was passed according to this policy should be noted on both the OBD II Inspection form and the Inspection Sticker Log sheet. If the vehicle owner prefers a complete OBD II test, the customer can be referred to an inspection station with a scan tool that supports CAN. This policy applies only to the vehicles on this list, and is in effect only through December 31, 2004. Effective January 1, 2005, all inspection stations must have their scan tools updated to support CAN protocol.

VCERTT CASE STUDY: P0130, P0133 OXYGEN SENSOR FAILURES

With gas prices as high as they are, you may be able to save your customers some money by replacing the oxygen sensor (O2S). An O2S with over 100,000 miles may well deserve to be changed; evidence shows that fuel economy increases with new oxygen sensors. It is not uncommon to gain 4-5 mpg after replacing a faulty O2S. With today's gas prices that means that a \$100 O2S on a vehicle that went from 25 to 30 mpg would be paid for in about 7,000 miles. Most OBDII vehicles will do a pretty good job at identifying a faulty oxygen sensor. If you get a vehicle into your shop with the MIL on and an O2S DTC, visually inspect the wiring and test the heater circuit to be sure it is functional. Most vehicles will show voltage across the heater wires with the key on but a few require that the vehicle be running. Many manufacturers activate the heater using a steady 12 volt supply; others use a duty cycle signal to control the current flow. If you find a heater circuit with less than 12 volts and the wiring is good you are probably testing a duty cycle controlled O2S. Any voltage between 1 and 12 volts indicates that the circuit is functional. Many Bosch O2S (there are a lot out there!) use white wires on the O2S as the heater wires as shown in the figure below. One other thing to

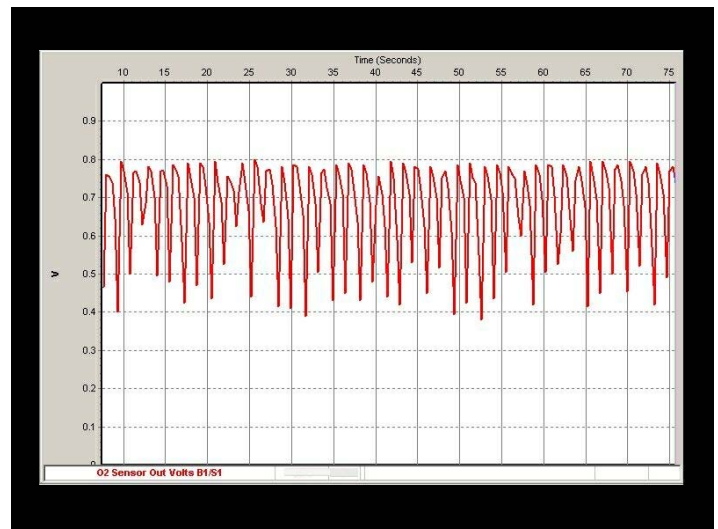


check is the heater element resistance. Put your digital multimeter probes across the two heater terminals on the O2S and check that you have continuity. Resistance values will vary with temperature. If you have an open, you have found a faulty O2S. If the heater circuit checks out OK, you can be pretty confident that the powertrain control module (PCM) has correctly identified a faulty O2S. If the PCM sees either a too lean or too rich condition it will usually set a fuel trim DTC, not an O2S DTC. To confirm the PCM's diagnosis, check the O2S signal with a scan tool, voltmeter, or scope. The scan tool may be inconclusive if the sensor is still functional; the sampling rate is so slow it is difficult to pick up the signal trend. You may well see a .2 and .8 volt signal but you may not be able to tell that the sensor is biased either rich or lean. A digital mul-

timeter does a better job because it refreshes the data about once a second. Test the sensor at idle and at 2,500 and see if it is biased rich or lean. If it appears biased, you still need to confirm that the sensor is faulty rather than correctly responding to a true rich or lean condition. Pull a spark plug and see what it looks like. If, for example, it's white from running lean the O2S is probably fine and you'll have to find the cause of the lean condition. However, if the plug is tan or black the faulty O2S signal is causing the PCM to drive the system rich.

The best way to view an O2S signal is with a scope. We recently worked on a 1995 OBDII Toyota Tacoma 2.7L, 5-speed, 4WD with about 114,000 miles on it. The MIL was on and DTCs P0130 (O2S circuit malfunction), and P0133 (O2S circuit slow response), were present. The wiring to the sensor looked good and the heater had 12 volts and ground with the key on. The following figure shows the O2S signal with the old sensor installed.

SIGNAL FROM FAULTY O2S



The sensor was biased rich, cycling between .4 and .8 volts. We also performed emissions testing on the dynamometer and calculated fuel economy. The hydrocarbons (HC) and carbon monoxide (CO) were quite low but the oxides of nitrogen (NOx) were above the federal standard. The biased O2S had been causing the PCM to adjust fuel trim to be too lean. This lean, hot air/fuel mixture produced high NOx emissions.

We replaced the faulty O2S and retested the system. The new oxygen sensor was cycling regularly between .2 and .8 volts as shown in the figure on the next page.

The NOx emissions went way down below the standard and the calculated fuel economy increased by 30%! The customer should make money on that repair. We will wait for an update from the customer about the actual fuel economy

MEET VCERTT'S TOM HASKINS

VCERTT: VERMONT CENTER FOR EMISSIONS REPAIR AND TECHNICIAN TRAINING

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Tom Haskins is an automotive instructor at the Southwestern VT Career and Technical Center in Bennington. He has been teaching VCERTT classes for five years. Tom has been officially in the automotive industry for about 22 years. He has been an active enthusiast for his whole life. Tom graduated from Springfield Technical College in 1982 and then spent 10 years as a tech at a GM dealership in Bennington.

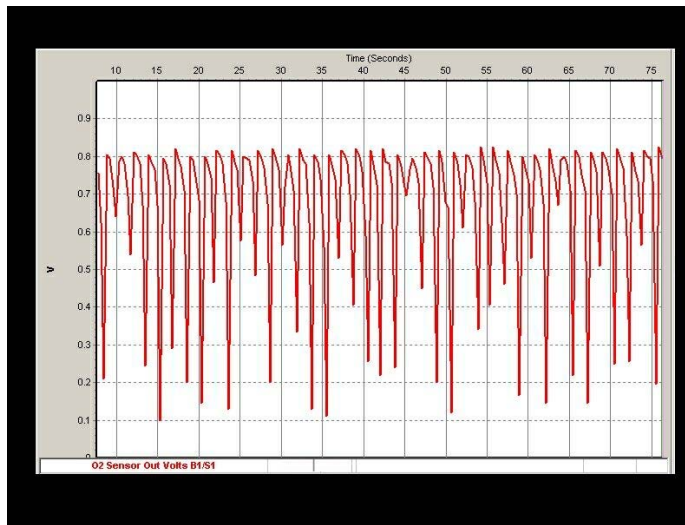
Tom enjoys working with his students and takes great satisfaction in making a difference in their lives. He also enjoys working with the techs who come to the VCERTT classes. Tom says: "We all learn in these classes. They are an excellent way to hone skills for a reasonable price. There is not a lot of training out there; VCERTT fills a need." Here is what VCERTT students have said about Tom and his classes:

Very knowledgeable
Instructor was great!
Extremely informative
It was all excellent
Tom is a first-rate instructor

Tom teaches VCERTT courses at the Southwestern VT Career and Technical Center in Bennington. Call 238-3211 today to register for his classes!

gains. The new oxygen sensor fixed the vehicle, cleaned up the NOx emissions, and increased the fuel economy.

SIGNAL FROM NEW O2S



For more information on diagnosing oxygen and wide range air fuel ratio sensors come to VCERTT's O2S Diagnosis and Repair class offered across the state. See a full course description and the training schedule in this newsletter or on our website, www.VCERTT.org.



THE FAULTY OXYGEN SENSOR

HYUNDAI: NO COMMUNICATION

Some generic OBD II scan tools will not communicate with the 2003 Hyundai Tiburon because the vehicle's data link connector (DLC) does not have the necessary ground circuit for pin #5. Hyundai has a recall in effect to deal with this issue (recall campaign #57 and TSB #03-01-003-01). If you are unable to complete the OBD inspection on this vehicle, refer the vehicle owner to a Hyundai dealer for the necessary repair, which involves installation of a DLC wire kit. You may also want to provide the vehicle owner with the recall and TSB numbers.

2002-03 DODGE TRUCKS: P0442, P0456

Numerous 02 and 03 Dodge trucks with the 4.7L engine are setting a P0442 for a small EVAP leak. Defective fuel caps are the likely cause. You can remove the cap and look for a rust stain in the center of the cap around the check valve. Techs report that it is easy to dismantle the valve to clearly see the vent valve and inspect it for rust. Some caps fail even without this visual clue however. There have been several updated part numbers for the new replacement cap, which should be gray as opposed to the original black cap.

Other problems include cracks in vacuum lines or small ozone pinholes. Apparently, batches of vacuum hoses without sufficient UV inhibitor were installed at the factory; they frequently fail after a couple of years. Another possibility is the purge solenoid leaking. When you unplug the solenoid there should be no leakage when you blow from one port to the other. Alternately, apply vacuum to one port and be sure it holds, then test the other port. When you apply power and ground to the solenoid, either with jumper wires or with a scan tool, the vacuum should be released. If the solenoid was replaced and installed upside down it will tend to leak. Intermittent problems are not uncommon, so test the solenoid several times.

If DTC P0456 sets, TSB #18-002-03 describes a reflash procedure for erroneous leak detection. This also applies to some Jeeps with the 4.7L and 2002-03 Dodge Dakota and Durango trucks (all engines).