

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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CASE STUDY...

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Gross Leak 3

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trainer extraordi-
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An introduction to hy-
brids, and to be contin-
ued.

**EXCITING VCERTT NEWS FOR THE FALL:
THURSDAY DECEMBER 1st
A NEW PRESENTATION WITH MORE INFO,
MORE EXPERTS, TOOLS AND A NICE MEAL!**

WHAT: JOIN US FOR DINNER, AN EQUIPMENT SHOW, AND A NEW PRESENTATION DEMONSTRATING SMOKE LEAK TECHNOLOGY AND PROPER EVAPORATIVE EMISSIONS SYSTEMS TESTING. BEAT THOSE EVAP DTCS!

We will highlight the many uses of smoke technology and look at the operation and testing of "traditional" vacuum decay systems, and leak detection pump systems. We'll offer tips and examples about the increasingly common drivability concerns caused by evap system problems. And we'll explain the new engine-off natural vacuum (EONV) systems now in use.

This will be a great opportunity to network with technicians, tool and industry representatives, and training specialists. Update your knowledge to the latest evap emissions systems technology with a great group.

**WHERE: THE SHERATON IN BURLINGTON
AT EXIT 14W OFF I-89**

WHEN: THURSDAY DECEMBER 1st AT 5:30 PM

The equipment exhibit and preshow will begin at 5:30, a full buffet dinner will be offered at 6:00 and the presentation will begin after dinner. There will be ample time after the presentation for questions and networking. A certificate of training participation will be offered through VCERTT. All-inclusive reservations for \$50 may be made by calling **BETSY DORRIES AT 802-238-3211 BEFORE MONDAY NOVEMBER 28th**. Late registrations and walk-ins will be charged \$60 due to extra meal planning and set-up charges.



LEAK DETECTION PUMP

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

CHRYSLER 3.5 INTAKE LEAKS

In our last newsletter, we reported on a common cause of misfire, an intake manifold vacuum leak, on Chrysler's 3.5 L engine. The vacuum leak may be small and hard to find using propane. To make matters worse, we have now heard reports that the intake leak may cause misfire only when the vehicle is cold. The customer may not notice the misfire, just the MIL (Malfunction Indicator Light). Use your scan tool to check the freeze frame data to see what the coolant temperature was when the misfire occurred. If the DTC for misfire was set when the engine was cool, you may have to check for vacuum leaks when the engine is cool. As the engine warms up, it swells the manifold and improves the seal. Use propane or a smoke leak detector on a cool engine. If you see smoke, replace the gasket. When using propane or carb clean you can spray the manifold seams thoroughly and listen for a change in idle. You can also monitor the short term fuel trim (STFT) values on the scan tool. When the propane or carb clean reaches the leak the STFT value will fall as the PCM takes away fuel to compensate for the added "fuel" provided by the propane or carb clean. Look for updated gaskets from the aftermarket that are thicker than the OEM paper gasket.

ANY PROBLEM HERE?

EVAP system problems are now becoming much more frequent culprits of powertrain drivability concerns! We need to get ready. Join our December 1st seminar to learn about a wide range of drivability issues caused by EVAP system problems. Is there money to

**1996-2001 NISSAN EVAP DTC**

1996-2001 Nissans may illuminate the MIL and set one or more EVAP DTCs. 1996 and 1997 Nissans are likely to set DTCs P0440, P0443, P0446 or P0450. 1998-2001 models may set P0440, P0450, P0455, P0446, P1440, P1446, P1448, or P1493. All of these DTCs may be set because of a faulty EVAP vent control valve. To test the valve, remove it from the vehicle and try to blow through the passage. Without power applied, air should pass easily through the valve. Next, apply 12V power and ground to the solenoid and check that the valve now blocks air from flowing; the vent should close. Nissan suggests checking this a few times because sometimes the valves stick intermittently or responds slowly. You may be able to activate and deactivate the vent solenoid through a scan tool on later models. If the valve fails any test, replace it. If the valve passes the live tests, check the O-ring on the valve. If it is broken, deformed, or misplaced, replace the O-ring and lube it with mineral oil. If the vent valve and the O-ring are both good, the likely culprit is a plugged water separator or its hoses. It is very common for these to get plugged with dirt, debris and insects. Thoroughly clean the separator and hoses and clear the codes.

P0300 ON 1999-2000 SILVERADOS AND GMC C/K PICKUPS

TSB # 00-06-04-024 describes an engine misfire condition and water in the fuel rail near the #7 and #8 injectors. If "standard" diagnostics do not lead to the resolution of the engine misfire, remove the fuel rail and check the fuel system for water. Believe it or not, this is due to a faulty EVAP canister vent hose assembly that is included with a replacement solenoid. Apparently it was facing up in between the chassis and cab, and does it rain? It is recommended to replace the canister as well. Five years ago would you ever have thought of an EVAP problem causing this?

be made in EVAP repairs and maintenance? YES, YES, YES! Learn how to resolve problems quickly and prevent future problems all while making honest money.

VCERTT CASE STUDY

2001 FORD EXPLORER WITH P0455

The evaporative emissions control system is designed to minimize the evaporative emissions from the fuel system. The EVAP system manages the fuel tank pressure and purges the fuel vapors from the tank into the intake manifold rather than the atmosphere. The charcoal canister serves as a storage chamber for the fuel vapors. Monitored EVAP systems began in 1996 and by 2000 every OBD II certified vehicle had to have full (enhanced) system monitoring capabilities. Enhanced EVAP systems provide for full monitoring of the system by checking the system for purge (vapor) flow and for vapor leaks.

A 2001 Ford Explorer was brought to us with an evaporative emissions (EVAP) system fault after a couple of unsuccessful repair attempts at a dealership. The MIL light was on and the DTC was P0455 for an EVAP system gross leak detected. The fuel cap had been replaced at the dealership and the code had been cleared only to reappear shortly afterwards.

First we made a thorough visual inspection of the system. The spare tire had to be removed to view the evaporative canister, purge solenoid, and canister vent solenoid. The components and vacuum purge and tank lines all looked intact.

Next we looked for any technical service bulletins (TSB) on the system and found one that related to our DTC. The TSB covered P0455, P0456, P0442, P1443, P1450; these are all EVAP DTCs indicating a leak in the system. The TSB cites the frequency of loose or broken fuel caps and a leak at the top of the fuel filler pipe neck between the filler pipe and the plastic insert. We carefully inspected those areas but found no faults. It then describes a diagnostic procedure using a smoke leak detector and the Ford factory scan tool to determine the cause of the leak. We will describe this procedure and use parts of it in the paragraphs that follow.

To fully understand how this system works and to check out how well the auto manufacturers are complying with the service information rule, we went to the Ford technical service website @ www.motorcraft.com. To choose a single vehicle and model year techs can obtain a 72-hour subscription to Ford Technical Service Information for \$12.95. A 72-hour subscription for all makes and model years is \$19.95. Under "Technical Resources" the site also has free information about the OBD II system for model years 1996 through 2004. The articles give a fairly thorough description of the OBD II operation and monitoring strategies. Our subscription proved to be quite a deal as we were able to download all the information we wanted about the EVAP system and still have plenty of time to download information about other systems we were interested in. We were on a fast cable link and we were able to pull up anything we wanted quickly and easily. We also tried the system on a dial-up line and found it a bit slower but fully functional since most of the documents were in manageably

sized PDF format.

The EVAP system found on the 2001 Explorer uses a fairly common strategy to check for system leaks. The fuel tank has a vent line that leads to the charcoal canister. The charcoal adsorbs the fuel vapors from the tank and stores them until the EVAP system can purge those vapors to the manifold. A line from the canister leads to a canister vent solenoid. This normally open solenoid allows a small, calibrated leak to the atmosphere to prevent excess pressure or vacuum from building in the fuel tank when purging cannot occur and to allow fresh air into the tank when the system is purging. The purge line out of the canister leads to the normally closed purge solenoid (Ford calls this a vapor management valve). The solenoid has power normally applied and the PCM opens the purge solenoid to vent fuel vapors into the manifold through a duty cycle controlled ground signal. When the car is warmed up, the PCM energizes the purge solenoid at different percentages depending on engine speed and load. It is open at some percentage most of the time the vehicle is running. The system uses a fuel tank pressure (FTP) sensor, similar to a manifold absolute pressure (MAP) sensor, on the tank and a fuel level input for use in system monitoring.

To check the operation of the system the EVAP system monitor performs a couple of active tests. To test for leaks the first step the PCM takes is to close the canister vent solenoid. This seals the system from the atmosphere. Then it turns on the purge solenoid to create a vacuum in the system. If the system can't generate the required vacuum a DTC P0455 (large leak) is set. If the system reaches the required vacuum level (7"H20), the purge solenoid is closed and the PCM monitors the vacuum level over a period of time with both solenoids closed. If the system is properly sealed the vacuum level will remain stable. If the vacuum bleeds off, typically termed vacuum decay, the PCM determines that a small (.040" or less) leak is detected. (Vehicles meeting California emissions standards check for a .020" leak.)

After simple checks of the gas cap and visual inspections of lines and hoses we proceeded to close the vent solenoid, by jumping power and ground to the solenoid itself with the connector disconnected. We then checked the EVAP system using nitrogen to verify and quantify the leak. We had a leak well over .080"! Next we introduced smoke to locate the source of the leak and found smoke billowing out the theoretically closed vent solenoid. Solenoids fail intermittently! We were lucky to catch it on the first attempt. We definitely recommend testing solenoids four or five times to verify that they can consistently close.

We replaced the faulty solenoid, verified the inexpensive repair and returned the vehicle to a happy customer!

MEET VCERTT'S DAN CLARK

VCERTT: VERMONT CENTER FOR EMISSIONS REPAIR AND TECHNICIAN TRAINING

VCERTT

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Dan Clark is an automotive instructor at the Center for Technology Essex. He is also a past instructor at Vermont Technical College and has been teaching VCERTT classes at Essex for several years. He is a popular instructor for VCERTT. Folks report that he is down to earth, explains things very well, is extremely knowledgeable and takes the time to answer questions. Dan continues to work part time in the "real world" to keep his skills sharp. In his spare time he enjoys his family, his camp, and sugaring.

Dan teaches VCERTT classes at the Center for Technology Essex. Call Betsy Dorries at 802-238-3211 to sign up today.



HYBRID VEHICLE OPERATION AND MAINTENANCE

We know they are not driving into our bays daily, yet. But clearly hybrids have a market in our state. Shops that can maintain and repair hybrids are increasing their potential profit rather than limiting it. VCERTT is working on a class on hybrid vehicle technology and service; in the meantime here is a quick look at some of the operating features, technology and service on hybrids. We have had the opportunity to research hybrids and recently to attend several seminars on hybrid vehicles. In this article we will offer a brief overview of the models and their similarities and differences. In future articles we will go more in-depth on particular models. Are there hybrids out there? YOU BET!



There are almost 1,300 hybrid vehicles registered in VT as of 8/05. That is nearly double the number registered at the same time last year. Toyota, Honda, Ford, Lexus all have some form of hybrid this year and the numbers are increasing rapidly. Honda says that 50% of their fleet will be offered in a hybrid option by 2007!

It is true that the warranties are excellent on these vehicles, but items such as brakes, shocks, exhaust and even base engines are primarily covered by the standard warranty periods. The battery packs and electric motors have extended warranties. There are and will continue to be more and more maintenance opportunities on these vehicles.

Remember when air bag vehicles came out and we were afraid to work under the dash for fear of getting our necks blown sideways? Well, this is similar, although granted more dangerous. The reality of the situation is that most manufacturers are being very careful to put safeties into their high voltage systems to prevent us from hurting or killing ourselves with the 200-500 volts sometimes present in the vehicles. It is absolutely necessary that you follow the manufacturers' guidelines for working safely on these hybrid vehicles. The manufacturers' websites, found in our

past newsletter, still available at www.VCERTT.org, or at www.nastf.or, or www.iatn.com under technical resources, offer a low cost method to gather information about these systems.

The bottom line about hybrid service is: do not touch the orange wires without lineman's gloves on (available at www.grainger.com for under \$30) and turn the high voltage system off before servicing the vehicle. In most cases, disabling the high voltage system is a very simple task. One example includes removing the key and waiting 5 minutes for the capacitors to discharge. As a secondary prevention, manufacturers may ask you to disconnect the 12 volt battery, remove a service plug, or turn the high voltage switch to off. The service plug on the Toyota Prius is located in the left front corner of the trunk. It is bright orange, shown below, and is removed. Honda has an orange cover under



the carpet on the right side of the trunk, shown below. Simply remove the cover and turn the traditional household

type switch to off. Again, these are typical and basic procedures required to isolate the high voltage system from the rest of the powertrain and chassis. This does not mean you can take your common digital multimeter and start probing orange wires. We will cover some of those specific procedures on the more common hybrids in upcoming newsletters. Stay tuned for upcoming trainings and articles on hybrids.

