



Gateway Air Repair

A Newsletter for the Vehicle Repair Industry

Volume 7 Number 6 November 2005

Catalytic Converters and OBDII

By George Generke, Automotive Instructor, College of DuPage

Article originally appeared in the September 2005 issue of "Air Team," a publication of Envirotest Illinois, Inc. It is reprinted by permission.

In Illinois a vehicle that has failed an OBDII Emission Test with any catalyst diagnostic trouble code (DTC, P0420-P0439) will not pass on a retest until the Catalyst Efficiency Monitor has run to completion and passed without setting another catalyst DTC. (Editor's Note: This is true in Missouri as well, although the vehicle may receive a 'Reject' test result if no other causes of an OBDII failure are found.) Some technicians simply replace the catalytic converter (CAT) because of a DTC and then suffer the consequences of an unhappy customer returning with a malfunction indicator light (MIL) illuminated as a result of reoccurring DTC, and worse yet a repeat emission failure after they just "fixed it." The technician today needs to reference warm up cycles, drive cycles, trips, monitors, and enable criteria in order to understand why the DTC would set.



The two common methods used for determining catalyst efficiency for an Inspection/Maintenance 240 (IM240) emission failure are oxygen storage capacity and hydrocarbons (HC) conversion to carbon dioxide (CO₂), and both of these tests use a pass/fail threshold of 80 percent. These tests are inadequate for an OBDII vehicle! The OBDII catalyst must work at much higher efficiencies, often above 95 percent. The method we use to test the catalyst really isn't as important as getting the CAT to pass the catalyst monitor built into the powertrain control module (PCM) diagnostic programming. There are many pitfalls to this, and one is taking it on blind faith that the PCM can accurately determine the CAT efficiency every time.

Catalyst monitoring is normally done under either idle or light-load, steady cruise conditions. The catalytic converter conversion efficiency for HC and carbon monoxide (CO) can be greatly reduced by an air/fuel ratio (AFR) running as little as three to five percent rich. A lazy oxygen (O₂) sensor that is marginal at best when tested, yet is still within the pass criteria for OBDII, can cause the actual AFR to be a little richer than 14.7:1, or stoichiometry (Lambda for short). There have been numerous case studies done where a P0420/P0430 DTC was "fixed" by replacing one or more O₂ sensors, or "caused" by replacing a post-CAT O₂ sensor only. The mass airflow sensor (MAF) will usually underestimate the air coming into the engine when it becomes contaminated, resulting in positive fuel trim values. In addition to the MAF, the throttle position sensor (TPS) will read a value that the PCM may compare to the incorrect MAF value and "think" the engine is under a heavier load, putting the fuel delivery calculation into a different fuel trim cell. If the

continued from page 1

CAT monitor will run in this fuel trim cell, the monitor will likely fail the CAT due to additional fuel loading (running rich). Or the CAT monitor may not even run at all due to this condition.

Catalytic converter contamination is another issue facing the P0420/P0430 DTC. The current CAT killer is sulfur, and poor fuel grades (or maybe I should say fuel brands) will often have higher amounts of sulfur than others. It may be possible to reverse the condition of sulfur contamination within the catalytic converter by a change in fuel to a low sulfur grade, and then a variety of engine load and run time conditions. How long and how hard do you drive it? That's really dependent upon how bad the contamination is. Extreme engine loading conditions such as pulling heavy trailers for prolonged periods can raise catalyst temperatures to damaging levels. Don't forget, you already know engine misfires are a serious threat to catalysts. Mode 6 can give you solid data on the success of your repairs after running a monitor under the enable criteria conditions, but Mode 6 is not available for all vehicles, and interpreting Mode 6 can be a frustrating experience at first.

Do not overlook the possibility that someone has been there before you and did the unthinkable, such as installing a "used" PCM from a salvage yard or some other source of used parts. The emission calibration codes are very vehicle specific, and customers have replaced PCMs on their own to save money on repairs, not understanding that they may have actually caused the problem you are faced with now.

The problem with not using an original equipment manufacturer (OEM) catalyst is the CAT is most likely not certified to meet the United States Environmental Protection Agency (USEPA) requirements for OBDII, and it is less likely to meet the specific requirements to pass the CAT monitor on the particular vehicle it will be installed on. There are very few suppliers of aftermarket CATs that offer OBDII applications and even those that do only offer a very small selection at this time. Make sure the catalytic converter you install on an OBDII vehicle is "specific" by catalog application to the vehicle it is going on.

OBDII

Drive Trace Information Available

Effectively repairing and retesting an OBDII system can be complicated. Clearing all the codes also resets the readiness monitors to "Not Ready." Before retesting can occur, these monitors will require resetting to "Ready," a possibly time consuming process.

The National Center for Vehicle Emissions Control Systems (NCVECS) has available a handy CD that provides NCVEC developed OBDII drive cycles for the majority of vehicles. Performing the specific drive cycle needed allows you, the repair technician, to validate the repair and reset the monitor(s). This leaves all the readiness monitors set, which enhances your customers' ability to acquire a retest and hopefully pass.

The cost for the Drive Trace CD is \$39.95 (plus \$4.50 s/h). To order call (970) 491-7240 or visit www.ncvecs.colostate.edu.



Articles Wanted

The Gateway Clean Air Program wants to continue to bring readers pertinent repair information. If you have an idea for an article, or have a topic you would like discussed in a future issue, please contact Robert Arrol by fax at (314) 739-2901 or by e-mail at rob.arrol@mo.etest.com.



Gateway Air Repair

is published by ESP Missouri Inc.

Editor/Contributing Writer: Robert Arrol

e-mail: rob.arrol@mo.etest.com

phone: 314-739-8500 fax: 314-739-2901

Send all address changes, mailing requests
and letters to Robert Arrol at:

Gateway Air Repair

PO Box 1034

St. Charles, MO 63302-1034

Tips for Repairing Top Ten DTCs

OBDII testing was implemented on a pass/fail basis on June 6, 2005. In the July 2005 issue of the Gateway Air Repair (volume 7, number 5), the top ten DTCs from OBDII pass/fail implementation date through July 2005 were published. The top ten DTCs by make for August and September 2005 are as follows:

Make	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
General Motors	P0420	P1870	P0440	P0300	P0410	P0102	P0141	P0171	P0133	P0401
Daimler-Chrysler	P0134	P0442	P0455	P0401	P0403	P0300	P0171	P0138	P0601	P0743
Ford	P0401	P1443	P0171	P0174	P0340	P0420	P0133	P1744	P0430	P0402
Honda/Acura	P0420	P0401	P0135	P1491	P1337	P1456	P0141	P0301	P0302	P0303
Nissan/Infiniti	P0325	P0400	P0440	P0420	P0446	P0136	P0130	P0110	P0138	P0139
Toyota/Lexus	P0420	P0171	P0401	P0430	P0440	P0441	P0446	P0135	P0300	P0304
Other Japanese	P0420	P0400	P0421	P0135	P0401	P0106	P0442	P0171	P0170	P0301
Korean	P0442	P0100	P0134	P0136	P0446	P0455	P0171	P0300	P0342	P0422
German	P0455	P1582	P0170	P0173	P0420	P0118	P1106	P1128	P0116	P0141
Swedish	P0155	P0101	P0113	P0128	P0130	P0133	P0136	P0171	P0300	P0301
English	P1138	P0455	P0134	P0135	P0155	P0171	P0174	P0420	P0456	P1317

Make	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
General Motors	P0440	P0420	P0401	P0133	P0141	P1870	P0410	P0442	P0113	P0171
Daimler-Chrysler	P0134	P0442	P0403	P0401	P0455	P0132	P0300	P0743	P0138	P0420
Ford	P0401	P0171	P1443	P0174	P0420	P0430	P0340	P0153	P1401	P0402
Honda/Acura	P0420	P1456	P0401	P1457	P1491	P0135	P0141	P0301	P0302	P0303
Nissan/Infiniti	P0325	P0400	P0420	P0301	P0440	P0500	P1447	P0110	P0130	P0446
Toyota/Lexus	P0401	P0420	P0171	P0441	P0446	P0133	P0135	P0440	P0130	P0300
Other Japanese	P0400	P0420	P0421	P0401	P0325	P0100	P0106	P0300	P1195	P1744
Korean	P0100	P0442	P0115	P0133	P0136	P0300	P0422	P0455	P0722	P1124
German	P0455	P1582	P0420	P0118	P0171	P0411	P0442	P1128	P0301	P0401
Swedish	P0172	P0410	P0133	P0128	P0303	P0442	P0455	P0456	P1171	P1175
English	P0105	P0159	P0171	P0174	P0420	P0455	P1173	P1179	P1709	N/A



KEY:

General Motors =	Buick, Cadillac, Chevrolet, GEO, GMC, Oldsmobile, Pontiac, Saturn
Daimler-Chrysler =	Chrysler, Dodge, American Eagle, Jeep, Plymouth
Ford =	Ford, Lincoln, Mercury
Honda =	Honda, Acura
Nissan =	Nissan, Infiniti
Toyota =	Toyota, Lexus
Other Japanese =	Isuzu, Mazda, Mitsubishi, Subaru, Suzuki
Korean =	Daewoo, Hyundai, Kia
German =	Audi, BMW, Mercedes, Porsche, Volkswagen
Swedish =	Saab, Volvo
English =	Bentley, Land Rover, Jaguar, Mini, Rolls Royce

DTC CATEGORY DEFINITIONS

PX1XX =	Fuel and Air Metering
PX2XX =	Fuel Control
PX3XX =	Ignition System or Misfire
PX4XX =	Auxilliary Emission Controls
PX5XX =	Vehicle Speed, Idle Control, Auxilliary Input
PX6XX =	Computer and Auxiliary Output Devices
PX7XX, PX8XX, PX9XX =	Transaxle/Transmission

Here are a few reminders about some of the most common codes listed:

Nissan/Infiniti P0325 (#1 most common Nissan DTC) - This is not necessarily a code that turns the MIL on or causes the vehicle to fail the emissions test. The high frequency of this code indicates that vehicles that fail the OBDII test will have other DTCs along with this code, and those other DTCs are the reason the MIL is illuminated. For more information on this DTC, see the May 2004 and July 2004 Gateway Air Repair Newsletters. If you no longer have your copy of these newsletters, you can find these and all issues of the newsletter on the Web at www.gatewaycleanair.com/mechanic/airmenu.htm

General Motors P1870 (#2 most common General Motors DTC in August, #6 most common General Motors DTC in September) – When this DTC is stored by a GM vehicle, a transmission component is slipping or the torque converter control is stuck in the off position. As a result, the vehicle is burning more fuel and is not operating as cleanly as it was designed to run. This transmission code does not necessarily require the replacement of the vehicle's transmission but should be repaired to keep the vehicle running as cleanly as possible. If you are not trained in transmission repairs, we recommend you consult with a transmission repair expert to help you diagnose the reason for this DTC being set. If this is the only DTC that the vehicle has, the vehicle is eligible for a transmission waiver from the Department of Natural Resources. For more information on transmission waivers, call (314) 416-2115.

P0420 – P0439 DTCs – This range of DTCs covers catalytic converters that are very common codes represented on these two tables. Here a couple of reminders about repairing catalytic converters:

- 1) OEM Converters are covered under warranty for 8 years or 80,000 miles. If you are servicing a vehicle that hasn't exceeded this warranty period, make sure to submit this repair under a warranty claim.
- 2) Not all replacement converters are created equally. The performance of new aftermarket converters is only warranted for 25,000 miles. Not all aftermarket converters will enable the catalytic converter monitor to reset. Make sure you consult with your customer before you install an aftermarket converter.

continued on page 8



Help is a Phone Call (or Click) Away

The following resources are presented for informational purposes only and are not necessarily official productions of the Missouri Department of Natural Resources or the Gateway Clean Air Program. No one affiliated with the Gateway Clean Air Program is responsible for the content or accuracy of any unofficial site listed.

EMISSIONS TESTING INFORMATION

www.gatewaycleanair.com
 Gateway Clean Air Program repair industry hotline:
 1-888-748-0377
 Gateway Clean Air Program general information
 hotline: 1-888-748-1247
 Missouri Department of Natural Resources:
 (314)416-2115 - information about MRRT/MQRT
 status and technical assistance.

EMISSIONS REPAIR INFORMATION

Assistance Finding Emissions Parts:
 HELP Smog Parts: 1-800-544-4357
 Brown Recycling: 1-800-367-9271
 for information on certified used
 catalytic converters.
www.tomco-inc.com or (314)815-6944

EMISSIONS-RELATED HEALTH INFORMATION

www.lungusa.org
www.envirosafeshop.com

INDUSTRY SUPPORT

www.iatn.com
www.asecert.com
www.acc-online.org
www.sts.sae.org
www.theautomotivetechshop.com
www.carcarecouncil.org

OBDII INFORMATION

www.obdclearinghouse.com
www.obdiicsu.com
www.obdii.com
www.autotap.com
bob@servicemycar.com (for free OBDII software)

OBDII OEM TECHNICAL WEB SITES

Below is a list of Original Equipment Manufacturers' Technical Web sites. The information on these Web sites can help increase your successful OBDII repair rate and should be part of your toolbox. Please note that there is a fee required to visit the majority of these sites.

ACURA – www.ServiceExpress.Honda.com
 \$500 per year, \$20 per 72 hours, \$50 per 30 days
 (the 30 day option will automatically renew)

BAVARIAN MOTOR WORKS (BMW)
www.bmwtechinfo.com - \$2500 per year,
 \$300 per month, \$25 per day

CHRYSLER GROUP – www.techauthority.com
 \$1500 per year, \$200 per 300 days, \$20 per day

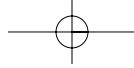
FORD – <http://motorcraftservice.com>
 \$2499.95 per year, \$19.95 per 72 hour
 OBDII Theory and Operation – FREE OF CHARGE

GENERAL MOTORS – www.acdelcotechconnect.com
 \$1200 per year, \$20 per day

HYUNDAI – www.hmaservice.com – FREE

INFINITI – www.nissantechinfo.com
 \$2499.98 per year, \$299.98 per 30 day,
 \$19.99 per day

ISUZU – www.isuzutechinfo.com –
 \$1650 per year, \$150 per 30 day, \$20 per day



KIA – www.kiatechinfo.com – \$299 per year,
\$29 per month, \$19.00 per week, \$10 for three days

LEXUS – <http://techinfo.toyota.com>
\$350 per year, \$50 per month, \$10 per day

MAZDA – www.mazdatechinfo.com
\$1500 per year, \$900 per six months,
\$199.95 per 30 day, \$19.95 per day

MINI – www.minitechinfo.com –
\$2500 per year, \$300 per 30 days, \$25 per day

NISSAN – www.nissantechinfo.com – \$2499.98 per
year, \$299.98 per 30 days, \$19.99 per day

PORSCHE – <http://techinfo.porsche.com> – \$5200
per year, \$110 per day , document search is free

SAAB – www.saabtechinfo.com - \$500 per year,
\$180 per three months, \$175 per month,
\$10 per day

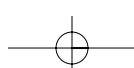
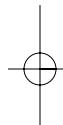
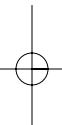
SUBARU – <http://saabtechinfo.com>
\$2499.95 per year, \$19.95 per day

TOYOTA – <http://techinfo.toyota.com> – \$350 per
year, \$50 per month, \$10 per day

VOLVO – www.volvotechinfo.com - \$3225 per year,
\$322.50 per 31 days, \$49.50 per 72 hours

TRAINING and RESOURCES

www.theautochannel.com
www.aspireinc.com or 1-800-247-1099
www.caat.org
www.ccar-greenlink.org
www.sts.sae.org
www.secondchancegarage.com
www.autoed.com
www.beyondparts.com
www.fuelline.com
www.fedworld.gov/pub/auto/auto.htm
www.aera.org
www.apra.org
www.autoshop101.com
www.toolsforeducation.com
www.bergwall.com
www.diagnostichotline.com
www.learntofixcars.com
www.asetestprep.com
www.asecert.org
www.allexperts.com
www.asld.com
www.smogfree.com
www.car-sound.com
www.mad-mechanic.com
www.carleysoftware.com
www.aecc.be



OBDII Testing Reference Sheet Available

Included as an insert with this issue is an On-Board Diagnostics (OBDII) testing reference sheet. The insert is intended for use by Service Managers when discussing with motorists the pass/fail/reject criteria for OBDII testing observed at the Gateway Clean Air Program (GCAP) testing stations in the enhanced testing area (city of St. Louis, Jefferson, St. Charles and St. Louis counties). Laminated reference sheets are available by contacting the program at gcap@mo.etest.com or by calling 1-888-748-1AIR. When requesting a laminated reference sheet, please include your name and mailing address.

continued from page 5

3) A vehicle that fails the OBDII test for a catalytic converter code must have the catalytic converter monitor reset in order to pass the OBDII retest. If the monitor is unset, the vehicle will receive a REJECT test result. Be sure to set the catalytic monitor to ready for your customers if you replace their converter.

4) Catalytic converters are exempt from state sales tax. For more information on sales tax exempt parts, see: <http://www.dnr.state.mo.us/oac/pub1294.pdf>.

P0440 – P0459, P1443, P1446 DTCs – This range of DTCs covers the evaporative system and includes very common codes represented on these two tables. Here are a couple of reminders about repairing evaporative systems:

1) The IM240 tailpipe test was not designed to measure evaporative emissions, so the presence of these codes may have been ignored in the past. In other words, these codes may not have been repaired for an extended period of time.

2) Evaporative emissions are becoming an ever larger portion of the emissions from a vehicle. Therefore, it is important to repair these codes correctly to improve air quality.

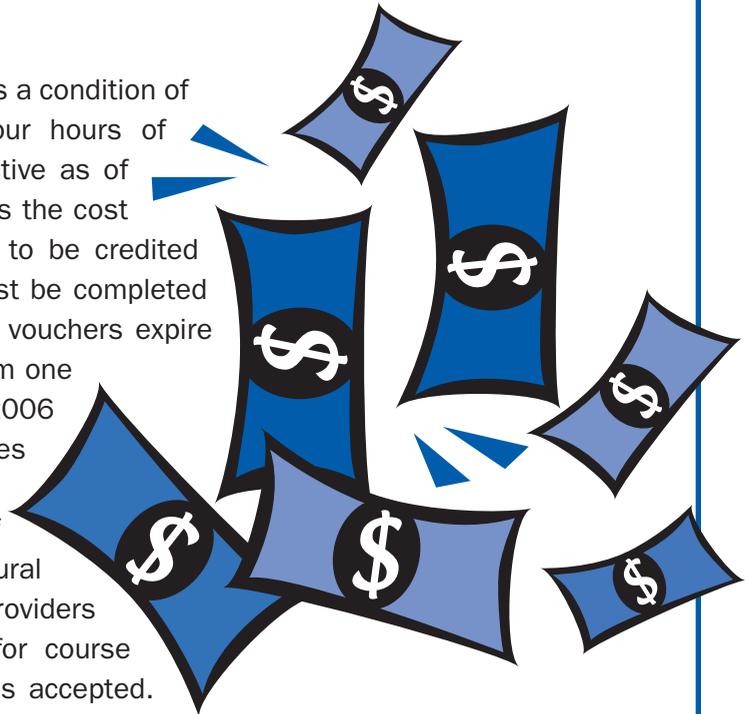
Area Trainers!

Are you currently offering automotive repair training in the St. Louis area? If so, please contact the Gateway Clean Air Program to be included in future issues of the Gateway Air Repair. Please include a detailed description of your course, including topics covered, dates, costs and location. Notices may be sent to Robert Arrol at rob.arrol@mo.etest.com or faxed to (314) 739-2901. If the training is emissions-related and you would like it evaluated as a continuing education course offered to all Missouri Recognized Repair Technicians, please contact the Missouri Department of Natural Resources at (314) 416-2115.



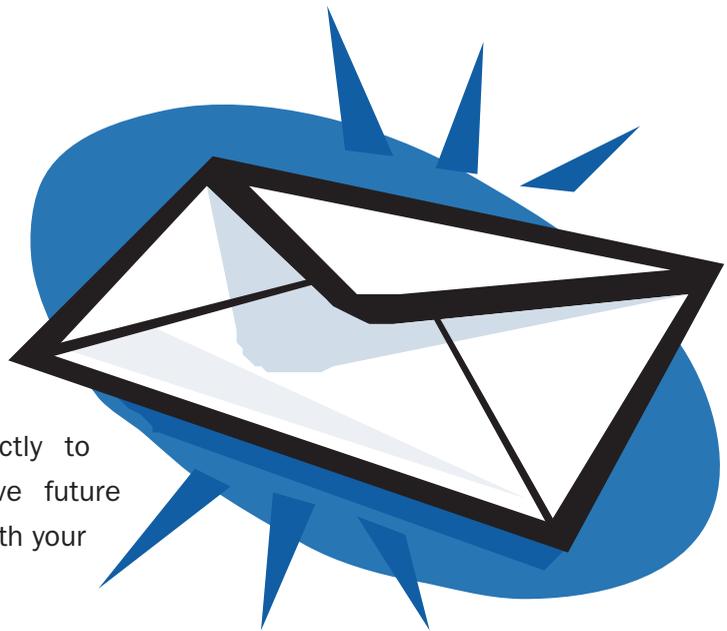
2005 Training Vouchers Expire December 31

All Missouri Recognized Repair Technicians (MRRTs), as a condition of membership, are required to complete at least four hours of continuing education each year. MRRTs listed as active as of Jan. 1, 2005 received a \$50.00 voucher good towards the cost of approved continuing education courses. Training to be credited towards 2005 continuing education requirements must be completed by December 31, 2005. Similarly, the 2005 training vouchers expire December 31, 2005. Vouchers will not carry over from one year to the next nor will they be honored towards the 2006 MRRT training requirement. Trainers and facilities seeking reimbursement for completed technician training must submit training vouchers with proof of completed training to the Missouri Department of Natural Resources by January 31, 2006. Not all training providers accept the voucher, when contacting the trainers for course availability and costs please verify that the voucher is accepted. For more information, please contact the Missouri Department of Natural Resources at (314) 416-2115.



Special Delivery

If you would like to receive the Gateway Air Repair at your home address instead of your workplace, please complete the information sheet on the back of this issue, checking the "new address" box and mail to: Gateway Air Repair, Attn: Robert Arrol, PO Box 1034, St. Charles, MO 63302 or e-mail information directly to rob.arrol@mo.etest.com. If you would like to receive future *Gateway Air Repair* issues by e-mail, contact Rob Arrol with your request and e-mail address.



Training and Special Events

The following is a list of known training available in the St. Louis area. This information is for reference only and is neither endorsed nor sponsored by the Gateway Clean Air Program. To find out what training is currently being offered, please contact any of the training providers listed below. Training providers that accept the \$50.00 (fifty-dollar) MRRT Training Voucher are noted. Please contact trainers to confirm dates and course costs, and to arrange payment.

[CARQUEST](#)

The trainer is Lou Nelson. For more information, contact Chris Chesney at (919)573-3342 or Mike Mulcahy at (314)566-4303. Courses are held at 800 N. 17th St., St. Louis, MO 63106. The MRRT Training Voucher is accepted.

[Design Technology, Inc. \(DTI\)](#)

The trainer is Lou Craven. For information on training offered by DTI, call (636)939-5670 or fax (636)477-9093. The MRRT Training Voucher is accepted.

[Federal Mogul](#)

6565 Wells Ave., St. Louis, MO 63133
Contact: Thomas Martin
(314)977-0798; fax (314)512-8398
The MRRT Training Voucher is accepted.

Technical Information: 1-888-819-5681 (no charge)
Technical Bulletins: 1-888-819-5681 (no charge)
Diagnostic Line: 1-900-486-0400
or 1-866-265-4170 (\$3.95/min.)
Training Course Information: 1-888-771-6005
Web site: www.federal-mogul.com/training

[St. Louis Community College at Forest Park](#)

The trainer is Angelo Vitullo. Contact Angelo at (314) 951-9420 for additional details. To register by phone or for payment by credit card, call Andrea at (314) 539-5341 or (314) 644-9287. All courses are held at St. Louis Community College at Forest Park at 5600 Oakland Ave., St. Louis, MO.

[Automotive Service Excellence \(ASE\) Test Prep L1 Crash Course](#)

4-hour course. All nights from 6 - 10 p.m. This course is NOT approved for MRRT continuing education.

November 7

[Automotive Oscilloscopes and Emissions Diagnostics](#)

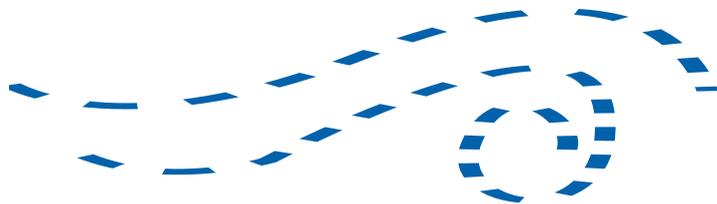
9-hour course. All nights 6 - 9 p.m. This course is approved for MRRT continuing education.

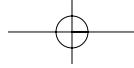
November 9, 14 and 16
December 12, 14 and 19

[Carbureted Vehicle I/M Failures and Current Topics Dealing with GCAP Program](#)

4-hour course. All nights 6 - 10 p.m. This course is approved for MRRT continuing education.

November 21
December 15 and 27





Evaporative Emissions System Course

6-hour course. All nights 6-9 p.m. This course is approved for MRRT continuing education.

December 6 and 8

Internet Resources, Electronic Information Systems, Computer Reprogramming

4-hour course. This course is approved for MRRT continuing education. Investigate three areas of interest: Electronic Information Systems, usage of popular PC software and the Internet to facilitate organization and communication of technical information and Reprogramming of Vehicle Computers.

November 8 and 29
December 22 and 28

MRRT/GCAP Course

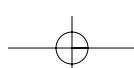
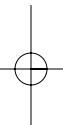
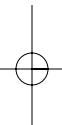
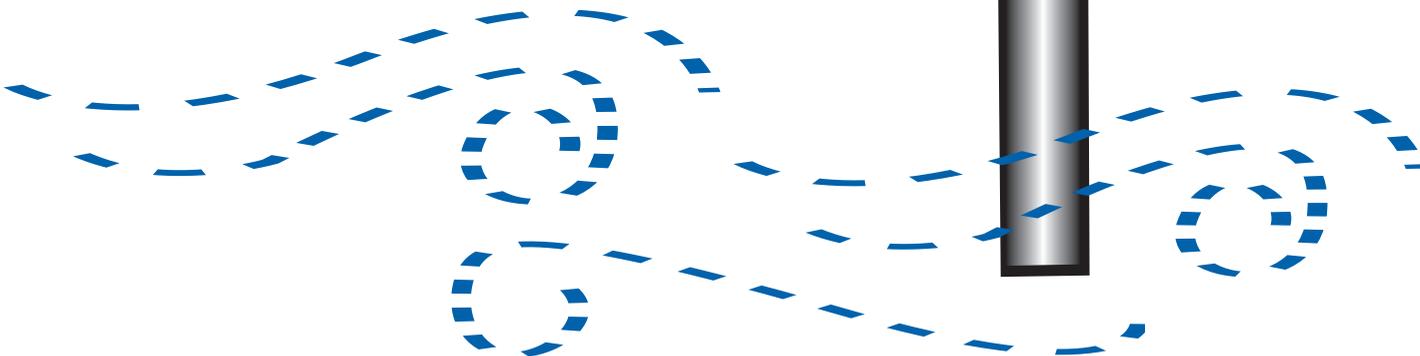
4-hour course. All nights 6-10 p.m. This course is NOT approved for MRRT continuing education.

November 2 and 23
December 7 and 21

OBDII and 5 Gas Exhaust Analysis

4-hour course. All nights 6-10 p.m. This course is approved for MRRT continuing education.

November 3 and 30
December 1, 20 and 29



Gateway Air Repair
PO Box 1034
St. Charles, MO 63302-1034

**PLEASE POST. Please pass on to any
Missouri Recognized Repair
Technicians working at this address.**



Count Me In! **I'd like more information about the Gateway Clean Air Program!**

Please Print

Name _____ Technician ID Number _____

Company Name _____ Facility ID Number _____

Address _____

City, State, Zip _____

Phone _____ E-mail Address _____

I'd like to receive the *Gateway Air Repair* electronically.

I'd like to receive future issues at home.

Please change or correct my address.

I am interested in:

Open house tour Send me OBD brochures

Training opportunities Send me a poster

More information on becoming a Missouri Recognized Repair
Technician or a Missouri Qualified Repair Technician



MAIL TO:
Gateway Air Repair
PO Box 1034
St. Charles, MO 63302-1034