

Inspection Update

A Publication of the Massachusetts *Enhanced Emissions & Safety Test* Program

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A Compromise You'll Regret: Using Non-Licensed Inspectors

Registry of Motor Vehicles (RMV) officials are lately finding more non-licensed personnel inspecting vehicles, and they speculate that recent economic pressures on station owners are to blame in some instances.

"We haven't analyzed it, but the problem seems to have worsened in recent months," said **Frank Coletti**, chief RMV investigator for the *Enhanced Emissions & Safety Test* program.

Smaller, low-volume stations apparently are more likely to turn to non-licensed inspectors because of cost and workload factors.

"It's definitely getting harder for some shops to make a go of it, whether from a decrease in repair work, because there are fewer after-market repairs than there used to be, or from the higher cost of utilities, labor, insurance, equipment and overall operations, etc.," said **Mark C. LaFrance**, project manager in RMV's Vehicle Safety and Compliance Services Department.

Part of the problem, Coletti said, is the difficulty in finding, training and retaining good inspectors.

"Some stations can afford to pay inspectors only the minimum wage, or a little over minimum, so there tends to be more turnover," he said. "On top of that, it appears that fewer people overall are interested in being inspectors today. I hear it from stations all the time: 'Where can I find good inspectors?'"

The end result is that some stations succumb to the temptation to use an unqualified person to perform all or part of an inspection, thus "compromising program integrity

continued on page 2

RMV Targets Stations Faking Dyne Problems

Meet the newest tenants of the Registry of Motor Vehicles (RMV) doghouse: inspection stations that refuse to perform dynamometer emissions tests because they don't want to be bothered.

The agency reports that it has recently investigated several complaints about stations dumping dynamometer tests on others, and is taking enforcement action against any station guilty of this practice.

With the number of vehicles featuring on-board diagnostic (OBD) systems constantly growing, stations are performing fewer dynamometer tests all the time. Dynamometer testing, however, still holds a meaningful place in the *Enhanced Emissions & Safety Test* program.

The Massachusetts Department of Environmental Protection (MassDEP) estimates that about 250,000 vehicles will be tested on dynes this year.

"Problems arise when a station decides it would prefer to do only OBD tests, because they require less time and effort," said **Frank Coletti**, the program's chief RMV

continued on page 3

Worn-Plate Issue Will Not Fade Away

The February 2008 edition of *Inspection Update* carried an article reminding inspectors of the requirement to turn away motorists whose vehicles have faded, illegible and/or damaged license plates.

Several inspectors subsequently contacted RMV to express the view that more should be done, network-wide, to enforce this requirement. If not, they asserted, station operators who are lax on worn-out plates would gain at the expense of those who are strict.

"We understand their point," said Coletti. "You make money on a turn-away only if the motorist returns to your station for an inspection after going to the Registry and getting a replacement set of plates. You lose if the customer goes down the street to another station where they don't care that much about the condition of the plates."

Coletti reported that RMV "is now ratcheting up enforcement" directed toward greater compliance on legibility and overall condition of license plates.

continued on page 2

INSIDE

How to Analyze an EGR Flow Problem Pages 9-11

First Quarter Enforcement Stats Page 3

What's Happening on the Diesel Emissions Front Pages 6-7

Non-Licensed Inspectors Harm Program Integrity, Threaten Public Safety

continued from page 1

and, to a certain degree, public safety," said LaFrance.

RMV has repeatedly pointed out that unlicensed and/or poorly trained inspectors are prone to mistakes and omissions. As Coletti has observed, "They miss things, especially on the safety side, that have potentially dangerous implications."

Controlling the Process

According to RMV, there are two related issues that keep cropping up as well:

- Failure to ensure the security of personal identification numbers (PIN); and
- Failure to control the inspection process by leaving the bay mid-test and later returning to complete the test, or by allowing an unlicensed person to finish a test.

"We don't like to see an inspector stop in the middle of a test to do something else, such as answer the phone or talk to a customer, and we don't like it when an inspector asks

someone else to complete an inspection because the person available may not be qualified," said Coletti.

"Unfortunately, the multi-tasking station owner who doubles as inspector is too often turning to an unlicensed individual to take over inspections-in-progress."

On PIN security, he said, "You cannot have someone beside you, or looking over your shoulder, when you're entering your number, even if you're training that person to be an inspector. And you cannot deliberately share your password and PIN with someone under any circumstances. That's a sure way to get suspended from the program."

No Slack

While RMV may have sympathy for overstressed station owners and managers, they are not prepared to cut them much slack.

"This is about accountability, pure and simple," Coletti said.

"When one of our field investigators sees

someone he knows is not an inspector performing an inspection, he's going to issue a violation on the spot.

"When they see someone unfamiliar, they're going to check that person's credentials.

"And when one of our folks checks the password of a person recorded as doing an inspection, and finds out that password does not belong to the person doing the inspection, both the station and inspector will receive violations."

LaFrance concluded:

"Program enforcement will never ease up on these issues. We are always going to insist that only licensed inspectors in good standing with the RMV perform inspections.

"And we are always going to insist that a licensed inspector who starts a test complete it. From the moment an inspector takes the keys and registration from a motorist, he or she is responsible for the sticker affixed to the windshield." ■

Worn Plates continued from page 1

"We want stations to know we are doing our part to get motorists to replace worn-out plates," said Coletti. "The field staff is raising this issue more and more during station visits, and whenever they see a station putting a sticker on a car that should have been turned away for this reason, they're issuing violations."

Inspectors and motorists who have questions or want more information on obtaining replacement plates may contact RMV at 617-351-4500.

To read the February 2008 article on this subject, ("Inspectors Need to Turn Motorists Away for Worn-Out Plates"), go to:

<http://.mass.gov/vehicletest/newsletters.html> ■

Inspection Update is published quarterly and distributed to the automotive service and repair industry in Massachusetts by the Department of Environmental Protection and the Registry of Motor Vehicles, in association with Aplus+ Technologies.

Our mission is to help foster the success of the enhanced vehicle inspection and maintenance program by providing news and useful information to vehicle inspectors and repair technicians in a timely fashion.

We also want to facilitate the sharing of helpful information among people within the industry. Toward that end, we encourage our readers to contact us with their suggestions, observations and constructive criticism. Ideas that would benefit the industry as a whole will be presented in subsequent editions of *Inspection Update*, as space allows.

To register your comments, please e-mail or phone: **John Hahey**, Preti Minahan Strategies, 617-451-8600, jhahey@pretiminahan.com

The Vehicle Maintenance Initiative Committee (VMI), composed entirely of volunteers from the repair industry, serves as *Inspection Update's* editorial advisory board.



RMV Targets Stations Faking Dyne Problems

continued from page 1

investigator. "Next thing you know, that station is telling motorists who need a dyne test it can't be done there because their dyne is broken, so, 'Sorry, you'll have to find another station.' "

Predictably, stations on the receiving end of "dynamometer dumping" become suspicious of a nearby station whose equipment never seems to be working — and they quickly bring the situation to the attention of an RMV field investigator.

'The trouble of putting a car on the dyne is small, indeed, compared to the trouble you'll have with us for ducking the dyne.'

*Frank Coletti
Chief RMV Investigator*

"If the dyne is broken, we check to see if the station has an open service ticket. If there is no remedy ticket on record, we issue a violation."

For any station owner entertaining the thought of pulling the broken equipment stunt, Coletti had these final words:

"You're barking up the wrong tree! The trouble of putting a car on a dyne is small, indeed, compared to the trouble you'll have with us for ducking the dyne." ■

Investigators follow up on every one of these complaints.

"When we go to a station where an inspector has said the dyne is broken, and it is not, we issue a violation," Coletti said.



MARTHA REYNOLDS

Death of I&M Program Licensing Specialist A Harsh Blow to RMV

Martha Reynolds, a Registry of Motor Vehicles (RMV) employee known to many inspection station owners, died unexpectedly on Saturday, April 26, 2008. She was 52 years old.

Martha had been with RMV for 17 years, the last 10 in the Vehicle Safety and Compliance Services Department. As a program coordinator on the department's support staff, she was responsible for all aspects of inspection station licensing.

Martha's job at RMV was a demanding, front-line position, focused on licensing for the 1,600-plus stations in the *Enhanced Emissions & Safety Test* program network. It required not only coordination and accuracy, but also solid communication skills, as she spent a great deal of time on the phone, helping station owners through initial licensing, station location changes, ownership changes and annual renewal processes.

"We are all deeply saddened by the sudden loss of our close friend Martha," said Judith Dupille, Director of Vehicle Safety and Compliance Services. "Her outgoing personality and sense of humor made her very popular with her co-workers at the RMV, customers she assisted in the inspection station community, and everyone whose life she touched."

Dupille added, "We will all miss the enthusiasm she brought to our office every day and her familiar sign-off: 'It's a go! You're all set!'" ■

ENFORCEMENT ACTIONS

January 1 - March 31, 2008

Violations Issued to Inspectors : 82

Violations Issued to Stations: 93

Inspector Privileges Revoked: 6

Inspectors Required to Retrain: 28

Inspectors Suspended: 40

Stations Suspended: 58

PLEASE REMEMBER!

Give a Vehicle Inspection Report Folder to every motorist whose vehicle fails the Enhanced Emissions & Safety Test.



As Good as Your Generic Scan Tool Might Be, Sometimes Only a Factory Tool Will Do the Trick

By Paul Jannoni

At one time or another, everyone has heard the expression, “You have to know what you don’t know.”

It’s a way of expressing the need for caution in the face of a difficult task — an occasion, most likely, when failure is a particularly unattractive option.



It’s also good advice: Identify the gaps in your knowledge of a problem, and fill in the blanks, before embarking on a solution.

“You have to know what you don’t know” applies as much to automotive diagnosis and repair as to any craft or profession.

Show me a technician who’s befuddled in the middle of a complicated emissions repair, and I’ll show you someone who is unaware of the fundamental flaws in his diagnostic and repair strategies.

To cite just one problem, many are getting into trouble today by using a generic scan tool when only a factory scan tool will get the job done.

All vehicle manufacturers must comply with on-board diagnostic (OBD) monitoring regulations, and a generic scan tool will yield the basic diagnostic information from any OBD II-compliant vehicle.

With a generic scan tool, you can obtain a vehicle’s diagnostic trouble codes (DTCs), freeze frame data, generic data stream information, and status of engine monitors. You can also access information in the electronic control module (ECM) relating to general, helpful diagnostic procedures.

When fixing an emissions failure, there are times when a generic scan tool will do just fine...And there are times when using a generic scan tool is like taking a BB gun on a bear hunt.

Because all manufacturers use unique hardware and software to run powertrain management systems, they build into those systems vehicle-specific diagnostic information. Some manufacturers, for example, provide a key-on/engine-off (KOEO) and a key-on/engine-running (KOER) test to check various engine components and functions.

Paul Jannoni is an L1 technician and supervisor of the Applus+ Technologies Diagnostic and Training Center (DTC) in Dedham. He also serves as the waiver assistance coordinator for the Enhanced Emissions & Safety Test program.

With a factory scan tool, you can select individual components to be commanded on and off, and then see if an appropriate response takes place. Among other components, you can manipulate engine output and transmission output controls with a factory scan tool, which can be a big help in determining what’s wrong with a vehicle.

To put it plainly, there are many instances when a successful diagnosis and repair will hinge on whether you’re using a factory scan tool.

If a repair will involve making the engine “re-learn” something at the end, for example, or if an entire re-programming of the engine’s electronic control module (ECM) will be necessary, you should have, or gain access to, the scan tool designed for that vehicle.

Notice I said “gain access to.”

There are as many kinds of factory scan tools as there are manufacturers, and each tool can cost as much as \$5,000, not counting the fees for the regular software updates.

With no single independent repair shop able to acquire every factory scan tool, it’s not unusual for several shops in an area to spread the technological wealth around. They share “theirs” to gain access to “yours.” If you’re not already into sharing, you may want to consider it.

Some shops, faced with a re-learning or re-programming, will pay a nearby friendly dealership to perform that aspect of the repair for them.

Now, not every dealership is willing to become a sub-contractor to an independent repairer in this fashion, but it happens often enough that you can be confident at least asking the question. Nothing ventured, nothing gained.

Like almost everything else concerning automotive technology, re-learning is an always complex, sometimes contradictory, and often idiosyncratic process.

Take distributors as an example:

After replacing the distributor on an eight-cylinder Chevy truck, you will need a scan tool to make the ECM re-learn the precise (and inter-related) positions of the crankshaft position sensor and the camshaft position sensor. The only scan tool that can reliably perform that task is one made by General Motors.

But if you have to replace the distributor on a similar Ford truck, almost any good generic scan tool will be able to show the ECM where the re-set sensors should be.

continued on page 8



'Old School' Ways Make 'em Wild About Harry's

Walk in the door at Harry's Auto Repair in Salisbury and you're immediately struck by how clean and orderly it is.

Harry's is a big shop, but there's no clutter in any of the seven bays, no dirt or debris on the floors, no workbenches strewn with old parts. Not one of the fluorescent tubes in the many overhead fixtures is burned out, and every tool is in place on a pegboard or shelf.

Harry's has six full-time employees, is open six days week, and routinely performs 600 inspections and 20 emissions repairs a month. So it's no small feat to keep the place in tip-top shape.

The key, says owner **Harry Karahalis**, is simple: hard work and attention to detail.

"I open the door every morning at 6:30 to get ready for business at 8:00," said Karahalis, "and I'm here for at least an hour every night after we close at 5:00. I work hard at it; we all work hard at it. There's no other way, there are no shortcuts, if you want to be good in this business."

Those long days have rolled into some long years. During 33 years in the automotive inspection, service and repair business, 23 of them as his own boss, Karahalis has not missed a scheduled day of work.

"I guess I'm just 'old school,'" he said. "I've always tried hard to avoid going into debt, for example; I pay as I go. Everything in this shop I own free and clear."

That old school touch extends to customer service. "We treat our customers fairly and honestly. We give them full value for the money they spend," Karahalis said. "We do good work and we stand by the work we do."

Customers have responded to that approach in droves. There are nearly 5,000 names in the shop's clientele database, with most coming from communities at the eastern end of the Merrimack Valley: Amesbury, Salisbury, Newburyport, Ipswich, Rowley, Byfield, West Newbury, Newbury and Merrimac.

"We have loyal customers and good repeat business. For the most part, our customers understand when we do a very thorough test, even if that means failing their vehicles," Karahalis said. "They respect the importance of the inspection program."

Karahalis, 54, started working in 1974 as an automotive technician and inspector. In 1985, he opened his own business, which also sold fuel, in Amesbury. Two years later, he left that to start Harry's Auto Repair with his wife, **Stephanie Karahalis**, on Route 110, not far from the center of Salisbury, its current location. "We've both worked very hard for many years to make the business what it is today," said Harry Karahalis.

For a long time, Karahalis thought he would build the business to a peak, sell it when he was in his mid-to-late fifties, and enjoy himself. But when his two sons, **Jason**, 27, and **Chad**, 25, expressed an interest in taking over one day, Karahalis changed his mind.

"Now, I want to stay around and keep building it with them," he said.

The Karahalis sons have prepared well to follow their father. Jason is a graduate of the New England Institute of Technology (West Palm Beach, Florida). Chad holds a business degree from Champlain College (Burlington, VT) and has also graduated



At the shop he founded 23 years ago near Salisbury center, Harry Karahalis works closely with sons Chad (left) and Jason.

continued on page 8



Benefits of Diesel E

Q & A

with Julie Ross

As a regional planner in the Bureau of Waste Prevention at the Massachusetts Department of Environmental Protection (MassDEP), Julie Ross has concentrated on emissions testing of diesel-powered vehicles. Her work furnishes a fascinating window into the current state of diesel technology and the ongoing effort to reduce the harmful effects of diesel emissions. Here are highlights from a recent discussion with Ross, who holds a master's degree in planning, rides a motorcycle for relaxation, and describes herself as a "bit of a motorhead."

In 2001, you were instrumental in the implementation of the diesel opacity test, the first-ever required emissions test for diesel-powered vehicles in Massachusetts. Overall, how would you describe our state's experience in tackling the problem of diesel vehicle pollution, and the various impacts of opacity testing from then till now?

The smoke test, or opacity test, is a relatively simple, dependable, repeatable test that can identify gross polluting vehicles and target them for repairs. While the program hasn't always been perfect, the smoke test has worked pretty well. We don't see as many trucks with thick black smoke coming out of the tailpipes as we did years ago. Of course, new truck and bus engines are much cleaner today than even ten years ago. We can't credit the smoke test for that, but it has been useful in identifying many of the older ones that need to be cleaned up. Fleet managers and truck and bus owners know the cutpoints, and most keep their vehicles maintained to that standard, if not lower.

On-board diagnostic (OBD) systems are on the horizon now, and will be required in heavy-duty diesels in the near future. It's a technology that will gradually replace smoke tests. However, I think we'll keep smoke tests for the older ones at least until the OBD-equipped engines become the majority of heavy-duty diesels on our roads.

You are pretty much the "go to" person at MassDEP for all things related to diesels, and you know many of the businesses well that operate their own diesel fleets or otherwise depend heavily on these kinds of vehicles. How would you characterize the industry response over the last seven-plus years to emissions testing?

All things diesel! There are so many things going on in the diesel industry these days, I need to narrow that down. Most of my diesel work involves the I&M emissions requirements of diesel vehicles and engine idling reduction programs. Lately, I've been working a little more with retrofits for on- and off-road vehicles by providing assistance to my colleagues.

The industry response to emissions testing has been very professional. Most fleet managers and independent operators ask a few, direct questions: What do I need to do? How much will it cost? When is it required? They then work with that information to remain compliant with the smoke cutpoints and engine idling restrictions. These folks are very professional, and I enjoy working with them. Also, with the cost of fuel around \$4 a gallon these days, they want their trucks and buses as well tuned as they can keep them, and the engines shut down when they don't need to be run. It improves their fuel economy and their bottom lines.

Before coming to work at MassDEP in 1995, you earned a master's degree while working as a coach driver. Has your bus driving experience shaped your approach to being a regional planner in any way?

Working around heavy-duty diesel vehicles for some 30 years has given me a good foundation of knowledge and perhaps a real-world intuition for what would help us achieve our goal of reducing the pollutants in diesel exhaust.

Getting a master's in planning taught me the methods and skills to develop proposals and programs. My evaluations and recommendations are usually guided by three criteria: Will the program be effective, efficient and equitable for all our stakeholders? Hopefully, my recommendations meet all three, and we're able to reduce pollution and improve air quality.

How did you come to be so closely associated with diesel issues in the agency's Bureau of Waste Prevention?

Coming in to one of the Transportation programs in MassDEP was a good match, especially when we were just starting to think about ways to reduce pollution from heavy-duty diesel vehicles. I had some real-world experience that helped the department develop programs that fit the industry. I like to think that I have a built-in "stupid meter" in my head that helps me detect weaknesses and contradictions before implementing programs. And, don't forget, I still drive a coach part-time in the summers, so I have to live with some of my recommendations.

What changes in diesel engine technology do you see that might affect future emissions tests?

On-board diagnostics will affect future emissions tests. OBD II has been available on light-duty diesels since 1997, and it only makes sense to start taking advantage of that technology. It also makes sense to take advantage of it for medium- and heavy-duty diesels.

OBD II was introduced into medium-duty vehicles, including diesels, beginning with model year 2005, for those with a gross vehicle weight rating (GVWR) of 8,500 to

Emissions Testing Are Clear

14,000 pounds. Diesels with a GVWR over 14,000 pounds will have OBD II technology installed beginning in the 2010 model year. Similar to using OBD II for light-duty diesels, we need to take advantage of this technology in the various weight categories when it is widely available.

Will the opacity test be abandoned?

We expect the smoke test to be around for a while; in fact, we actually expect it to become more stringent as we lower the opacity cutpoints. Heavy-duty diesels last much longer than their light-duty gasoline counterparts and can generate so much more pollution if they're not operating correctly. It's important to keep them running as cleanly as possible.

The inspections done over the past eight or nine years suggest that we can lower the cutpoints and that most trucks and buses would continue to pass the emissions test without any extra maintenance and/or repairs. Inspection and repair data from Massachusetts and a number of other states indicate that most vehicles are already coming in well under current smoke cutpoints, and that most would continue to come in under the proposed lower cutpoints as well.

Back when opacity testing was adopted, it was generally acknowledged that opacity was not a perfect way to evaluate the effectiveness of emissions controls, but that it would have to do until a more sophisticated methodology was widely available. To what degree is the OBD diesel emissions test more sophisticated?

Smoke is a symptom that something in the engine is not performing as it should. But it doesn't point to the under-performing, or non-performing, component. OBD II monitors particular components and helps technicians identify problems more effectively. The modern diesel engine is a very sophisticated piece of machinery. Electronics and computer controls provide more precise fuel delivery and more efficient combustion processes, and the introduction of ultra-low-sulfur diesel fuel enables the use of diesel particulate filters and other emissions control devices. Original equipment manufacturers are currently providing training to diesel technicians, or mechanics -- as many of them still prefer to be called

-- so they can read and understand diagnostic trouble codes and keep these engines running well.

Diesels are a huge part of the transportation picture in this country. How many diesels, in each of the standard categories, are on the road in Massachusetts?

The last time I researched this topic, there were approximately 120,000 on-road diesel vehicles in Massachusetts. About 100,000 were heavy-duty, the rest were either medium- or light-duty vehicles. There are more medium-duty than light-duty vehicles, as we really don't have that many diesel cars here.

Do those figures reflect fleet vehicles operated by companies within Massachusetts but registered in other states?

I tried to come up with that number, too, some years ago, using road use tax information and sources that regulate the trucking and bus industries at either the state or federal level. We believe there are about 600,000 diesels in Massachusetts that either travel through the state on a regular basis or are temporarily garaged here in regional operations. These are very hard numbers to nail down, though.

How many gasoline-powered vehicles are registered in Massachusetts?

About 4.5 million.

MassDEP has long had an anti-idling program, which aims to cut pollution by reducing the time that vehicles like school buses run while parked. You have played a key role in that program. How does your agency make anti-idling work?

We have a two-pronged approach: outreach and enforcement. Time limits on unnecessary idling are established in both Massachusetts law and MassDEP air pollution control regulations, and have been on the books since 1972, making them some of the earliest restrictions in the country on unnecessary idling. The limit is this: if a motorist is going to be stopped for more than five minutes, and he or she doesn't need to run the engine, then it must be shut down. There are instances when idling is necessary and those occasions are exempted. It's really common sense. The law and regulations ap-

ply to all vehicles, not just diesels. But up until five or ten years ago, many motorists had no idea there was a time limit on unnecessary idling. Outreach efforts are based on the idea that, if drivers learn about the law and regulations, and if they learn about the air quality and health issues associated with exposure to air pollution, they'll change old habits and idle their engines less.

We've identified specific transportation groups and tried to reach out to each one in various ways. For example, we created an anti-idling module for school bus drivers that fits into their annual training requirements, and we have a variation on that program for truck drivers -- especially those involved with local deliveries. Both focus on diesel engines and the effects of pollution coming from these engines. In addition, we are providing anti-idling tool kits under a municipal grants program. These kits explain to parents the dangers of gasoline exhaust to children at schools and other locations. So far, over 50 communities have participated.

Last year, MassDEP did some anti-idling outreach to utility companies, and we hope to continue those relationships.

There have been many efforts by states and the federal government to reduce idling in the over-the-road trucking industry, including building an infrastructure for truckers that provides a viable alternative to engine idling.

These efforts seem to be working. Unnecessary idling is not as common as it was years ago, especially among professional drivers. We still have work to do, of course, and we can and do use our enforcement authority with those drivers who refuse to comply with the law and air pollution regulations.

Is there anything new on the anti-idling front that our readers would be interested in?

There are new sources of data available that indicate how much fuel we are wasting and how much pollution we are generating while idling engines. Nationally, trucks and buses consume approximately 2.4 billion gallons of fuel a year just idling their engines, and private vehicles (cars, trucks and SUVs) burn an additional 2.9 billion

continued on next page

Julie Ross Q&A

continued from page 7

gallons that way. We all rely on vehicles to move people, goods and services. But an idling vehicle isn't going anywhere! What are we getting for those billions spent on fuel other than excessive engine wear and tear and unnecessary pollution?

If only 10 percent of the 4.5 million passenger vehicles in Massachusetts were idling 10 minutes a day, they would generate some 38,000 metric tons of carbon dioxide, one of the greenhouse gases, every year. And I think that hypothetical figure under-represents the actual idling total. So there is some real potential for air quality gains on the anti-idling front.

I hope inspection and repair stations are looking for opportunities to save fuel and reduce pollution by avoiding unnecessary idling. In easy situations – when a driver runs into a coffee shop, picks up lunch, or picks up parts for a vehicle in need of repair – just shut down the engine! A few minutes of idling here and there really do add up.

Your enthusiasm for work at MassDEP is obvious. This leads one to assume that work for you is at least partially an expression of strong environmental convictions. Fair assumption?

I guess so, but I haven't really thought of it that way. I'm still a bit of a motorhead: I love to drive and I appreciate a well-running engine. But I'm also a thrifty Yankee; I like to keep my cars "until the wheels fall off." They last much longer if I keep them well maintained. I get excellent fuel mileage by limiting engine idling to almost none, (I even shut the engine off at the drive-up ATM), and regular preventive maintenance helps to cut down on wear and tear.

Your penchant for riding motorcycles, is that about conserving fuel or having fun?

Fun! A strong environmentalist might not go for a ride simply because it's a nice day, even though she's getting 48 miles to the gallon. ■

Knowing When to Use a Factory Scan Tool

continued from page 4

This example points to a key "every-day question" for repairers:

"What are the intended factory repair procedures for this particular problem on this make and model?"

Most vehicles today have been designed and built in ways that virtually mandate distinctive repair steps, or procedures, for any given problem. Without a knowledge of these procedures, a repairer can easily become lost.

If you don't know, for example, that there are continuous monitors on Volvos that are non-continuous monitors on most other makes and models, there's no way you'll be able to diagnose the correct cause of a Volvo emissions failure.

I'm seeing more repairs now that call for a total re-programming of a vehicle's electronic control module (ECM), or powertrain control module.

It's a response, at least in part, to the rapid and relentless advances in automotive technology. Those advances are inevitably accompanied by changes in the software programs that govern engine operation. So if you're replacing a major component, you may have to re-program the entire ECM.

Nine times out of ten in a re-programming situation, it has to be done with factory software programs and factory scan tools. No manufacturer's software is exactly like another's, and the differences in software are reflected in the distinctive factory repair procedures intended by each manufacturer.

No doubt about it, there's a lot of new stuff to learn every year, which is why everyone in this industry should be making a commitment to continuing education.

Technical courses, training seminars, and certification programs all help a diagnostician/repairer gain the knowledge essential to success, and the rewards that go with it.

Educational forums also put you in touch with other smart people in a setting conducive to the exchange of ideas and insights. The surprise of learning something new and useful and clever can't be beat.

You want to know what you don't know. ■

Profile: Salisbury

continued from page 5

from Universal Technical Institute (Norwood). In addition, both frequently attend the technical repair seminars offered by independent trainer Gary Machiros at his shop in nearby Plum Island.

But does the next generation share their dad's old school work ethic?

"Well, they're here on Saturday mornings in the summer when one car after another drives up and folks ask, 'Which way to the beach?' I'm sure they'd like to be going out fishing on their boat, but they understand that many of our customers depend on us for Saturday repairs and inspections," said Karahalis.

"I'm not worried," he added. "In fact, I'm enjoying the thought of what this business will be like when they're in charge." ■

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Who Says Every New Part Deserves Respect?

An EGR Flow Problem Presents A More Than Sufficient Challenge

By David DeCoursey

When a repair shop encountered a baffling EGR (exhaust gas recirculation) problem in a well-known make and model recently, they called for my assistance.

I want to recount a successful resolution of that problem because my efforts in this case could prove helpful to others in similar situations.



The experience was also noteworthy, I believe, because it showed the wisdom of questioning even the most obvious assumptions we make about engine components, the new parts as well as the old.

The vehicle was a 2.0-liter, four-cylinder 2002 Mitsubishi Lancer with a recurring malfunction indicator lamp (MIL). The diagnostic trouble code (DTC) that had illuminated the MIL was P0401, which indicates “insufficient EGR flow.”

When I arrived at the shop, a technician informed me that the EGR system had been removed and thoroughly checked for proper operation. The tech said they had inspected the exhaust and intake passageways for restrictions that could be causing a “low flow” or a “no flow” condition, and had found none.

The tech further noted that the system’s vacuum solenoid, which controls the operation of the EGR valve, in concert with the powertrain control module (PCM), had been replaced in a previous recent visit to the shop.

Per my usual practice, I recorded the pertinent information on the car: vehicle identification number (VIN), mileage, and DTCs, including pending codes and freeze frame data. Then I performed a visual inspection and checked the operation of the EGR system.

I found some carbon build-up at the throttle body vacuum supply port. It was enough, I thought, potentially to restrict the supply of intake vacuum to the system, so I cleaned the throttle plate assembly and finished testing the system. I found no other problems at that time.

Next, I looked up the drive cycle conditions needed to run an EGR readiness test on that Mitsubishi.

I then cleared the memory of the PCM in order to erase the DTC and freeze frame data and to reset all the readiness indicators to “incomplete/not run status.”

Now it was time to take the car on the road: I drove it several times under the exact conditions required for running an EGR readiness indicator test. Each time, it passed the test. *See Image 1.*

(I like to use the term readiness indicator instead of monitor because I think it is less confusing when explaining cases like this one. The PCM is programmed to be always monitoring system circuits and components for faults, whereas the readiness indicator test occurs only in a certain state of engine operation. *See article on page 11 explaining how a PCM runs this test.*)

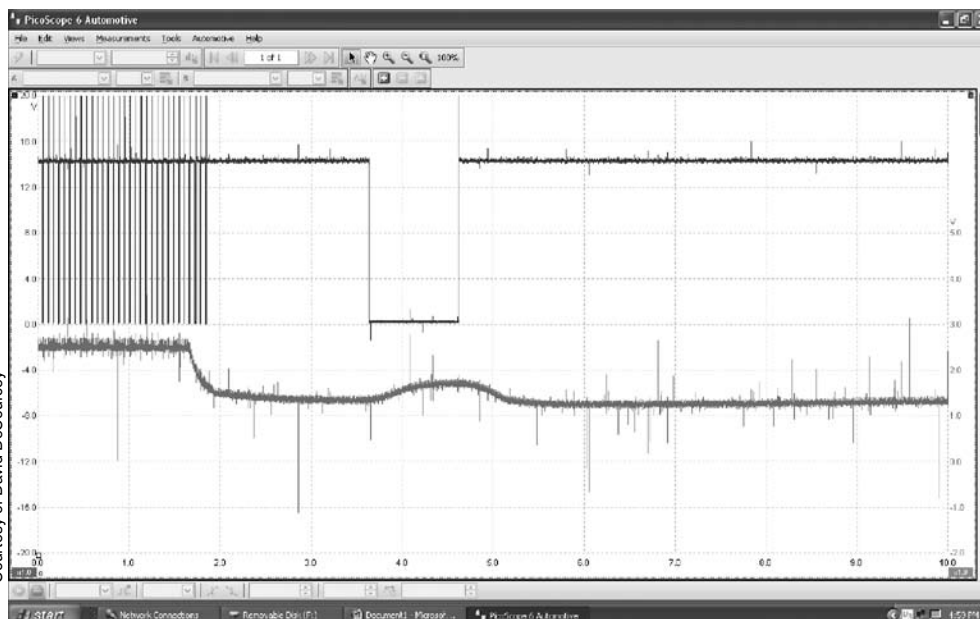
It took about 15 minutes to drive back to the shop. Pulling in there, I noticed that the engine had started running slightly rough at idle,

a problem that had not cropped up at any point during my diagnosis or road test. I immediately asked the tech who had worked on the car about it.

The tech was aware of the problem. He said the customer had mentioned it when the car was brought in for repair, but that the customer was more concerned about the illuminated MIL than anything else.

I wanted to get to the bottom of the problem because I knew that rough running at idle and an EGR problem can be related. So I performed some quick tests, including one on the application of vacuum pressure to the EGR valve.

continued on next page



Courtesy of David DeCoursey

IMAGE 1 This reflects a normal change in intake manifold pressure during an EGR readiness indicator test.

How the Exhaust Gas Recirculation System Operates

When the exhaust gas recirculation (EGR) system is functioning properly, normal intake manifold vacuum of 19 to 20 inches (inHG) is supplied to the system from a port on the throttle body assembly.

The intake vacuum is routed to the EGR control valve, which is supposed to reduce the intake manifold vacuum from 19 to 20 inHG to 6 inHG. (Vacuum-operated EGR valves on most late-model vehicles will begin to open at 3 inHG, and be fully open at 6 inHG.)

The reduced vacuum from the valve is then routed to the EGR solenoid, which governs the operation of the EGR system, in concert with the powertrain control module (PCM), by controlling the amount of vacuum pressure applied to it.

The EGR valve is an electrically operated device. On the power side, it receives voltage from the battery, while the ground side is controlled by the powertrain control module (PCM), using a duty cycle method.

When the valve is switched on, 6 inHG of vacuum is routed directly to the valve, causing it to open. (The PCM completes the path to ground.)

When the valve is switched off, the vacuum pressure is re-routed to the fresh air side of the throttle body assembly, closing the valve. (The PCM isolates the path to ground.)

It is important to keep in mind that the EGR system is *not* designed to operate when the engine is idling or when it is in wide-open throttle (WOT) conditions.

Instead, the system is supposed to operate during part-throttle/light-load conditions. The PCM controls the amount of vacuum applied to the EGR valve under these conditions.

A malfunctioning EGR system operating at idle or WOT can cause drivability problems, including rough running and/or stalling at idle, and engine surging at WOT. ■

EGR Flow Problem *continued from page 9*

Significantly, when I disconnected the vacuum line to the EGR valve as the car was idling, the engine stopped running rough.

With the EGR solenoid shut off and the PCM not providing a path to ground, I measured three inches (inHG) of vacuum being applied to the valve at idle.

With the EGR opened at idle, the intake pressure went from normal, 19 to 20 inches (inHG) vacuum, down to 12 inches.

These measurements strongly suggested that the solenoid, despite its recent vintage, was not working properly.

A defective solenoid was also consistent with the vehicle's "insufficient EGR flow" DTC. Why?

Because when the PCM ran the EGR readiness test, there would have been no high manifold vacuum created during deceleration **if the EGR valve had already been opened**. Also, there would have been no notable voltage change from the manifold pressure/vacuum sensor when the EGR was commanded on. *See Image 2.*

The PCM would have interpreted this situation as "insufficient flow" from the EGR system and recorded the EGR readiness test as a failure.

To be sure of my diagnosis, I put the Mitsubishi through another drive cycle while the solenoid was failing. Each time the PCM ran the EGR readiness test during the cycle, the engine failed the test.

Once a new, properly working solenoid was installed, the vehicle's MIL stayed off, and the engine ran smoothly, including, most notably, at idle. ■

David DeCoursey, a frequent contributor to Inspection Update, is the owner of D&D Professional Automotive Services of Leicester, which provides mobile diagnostic services to independent repair shops. He welcomes comments and questions via e-mail at ddprofessional@hotmail.com

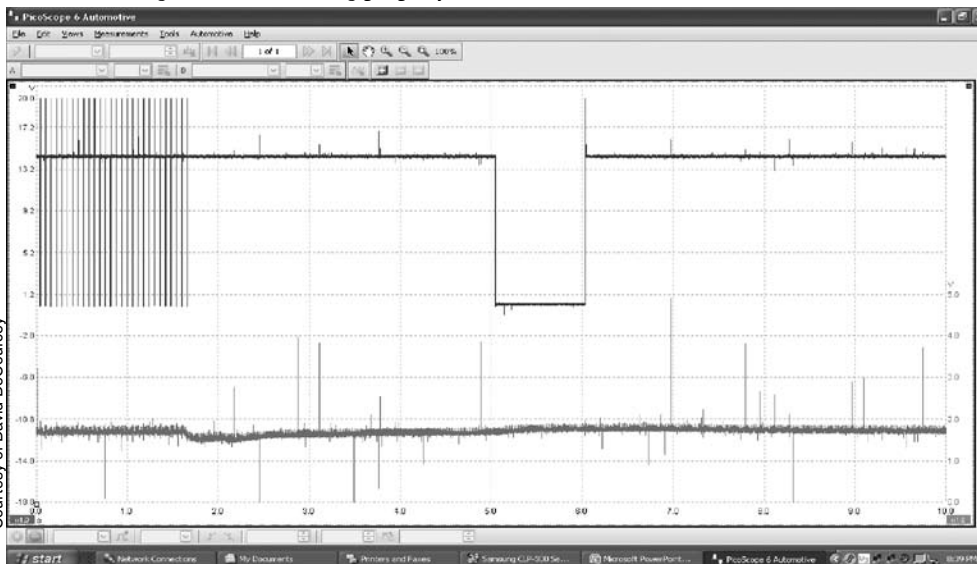


IMAGE 2 Notice the Manifold pressure is at 2.00 volts due to the failed EGR Solenoid. Even though the EGR is operating during the test, there is no significant change in voltage to let the PCM see that it actually worked.

Understanding the Readiness Indicator Test Is Essential When Repairing EGR Failures

No discussion on exhaust gas recirculation (EGR) would be complete without an explanation of the EGR readiness indicator test, which an engine performs to evaluate the functioning of this system so crucial to emissions control. So here goes:

- A powertrain control module (PCM) normally runs a readiness indicator test on an EGR system when an engine is in a condition of steady deceleration. If the engine is functioning properly, there is high vacuum pressure within the intake manifold at that time.
- The PCM opens the EGR valve for a split second, which allows exhaust pressure to enter the intake manifold, displace the vacuum, and change the pressure.
- There is a sensor in the intake manifold that sends a continuous voltage signal

to the PCM, reflecting the manifold pressure. A change in the pressure will cause a change in the signal.

- The PCM looks for a change in voltage from the manifold pressure sensor when the EGR system turns on, as it should, during deceleration. *Image 1, on page 9, shows a normal change in intake manifold pressure during a readiness indicator test.*
- There is a vehicle-specific voltage change the PCM is searching for. If it finds that precise change, the EGR system passes the readiness indicator test.

The EGR is a non-continuously monitored system, and the PCM requires two drive cycles to complete the readiness indicator test. However, the PCM will run the test af-

ter the first good drive cycle, (for which the enabling criteria existed), and the readiness indicator will display “complete.” If the first test failed, the PCM will set a pending diagnostic trouble code (DTC). During the next consecutive drive cycle when the enabling criteria for the test exist again, the pending code will mature to a hard-fault DTC if the second test fails; also, the malfunction indicator light (MIL) will illuminate, and the PCM will record the event as freeze frame data. *See Image 2, page 10.*

...But remember, the freeze frame data is recorded at the time the PCM illuminates the MIL, which may not be the exact time the second test failed. ■

—David Decourcey

[See main article, page 9](#)

Other Facts on EGR System to Keep in Mind

Here are some other things to consider when working on exhaust gas recirculation (EGR) systems:

- ✓ A “readiness indicator” is a test performed by a powertrain control module (PCM) under certain operating conditions known as enabling criteria. These criteria have to exist before a PCM will do the test.
- ✓ The next consecutive drive cycle can begin only when the enabling criteria exist to run the readiness indicator test, not when the key is next cycled on.
- ✓ If the enabling criteria occur on a non-continuous (two-trip) readiness test, the PCM will run the test and set the readiness indicator to complete after the first test. (You need to check the diagnostic trouble codes (DTCs) afterwards. If the engine passed the test, there will be no DTCs. If it failed, a pending DTC will have been set.)
- ✓ Mode Six data is helpful when diagnosing EGR problems. But remember, the last test data you are looking at could be weeks, or even months, old! Also, a lot of the Mode Six data for pre-CAN (controller area network) vehicles does not “set to zero” when the PCM memory is cleared. So you may be observing default values rather than actual test results. To avoid confusion, be sure to record the data before and after the memory is erased.
- ✓ If there is a DTC stored in the PCM memory, other tests may have been suspended in progress or prevented altogether from running, and your customer needs to know this. Also let the customer know there’s a chance the MIL will come back on in a few days if the PCM detects a failure in one of the systems for which a test was suspended or blocked. This information is especially important if the customer waited a significant amount of time before bringing the vehicle in for repairs. (In these situations, it may be a good idea for you to take the vehicle on the required post-repair drive cycle for the customer, or at least offer to do so.) ■

—David Decourcey

New I&M 'Tech Tips' Page Drawing Many Visitors

Walter built it, and they came!

Vehicle inspectors are making frequent visits to a new section of the *Enhanced Emissions & Safety Test* program web site designed by **Walter Moran** of Applus+ Technologies to help them iron out workstation snafus.

Judging by a sudden drop in the number of equipment remedy tickets submitted to Applus+ in March, the new web page, Tech Tips, was an instant hit.

There were at least 300 fewer remedy tickets in March, the first full month that Tech Tips was available, than there were in February, said Moran, the company's contract compliance manager.

The total number of remedy tickets dropped from more than 1,100 in February to about 800 in March.

Although the latest figures for remedy tickets could not be obtained before this edition of *Inspection Update* went to press, that trend appears to have continued in April, Moran said.

"The only thing that explains the decrease in remedy tickets is Tech Tips," he said, "because it's the only recent, major thing we've done differently in the area of technical assistance.

"We introduced Tech Tips for the express purpose of helping inspectors and others solve workstation problems on their own, when they first occur, as opposed to experiencing down-time while remedy tickets were filed and acted on. We're glad to see Tech Tips is having the intended effect."

Proven advice on dealing with hundreds of possible problems involving the workstation and related equipment can be found in Tech Tips by going to:

<http://vehicletest.state.ma.us/techtips/>

Describing the months-long effort required to create and launch Tech Tips, Moran emphasized that it was a collective project within Applus+ and that staff at the company's five Diagnostic and Training Centers (DTCs) were "the key to making it a success."

Inspectors who have tips of their own to add to the new page are encouraged to call the program's Station Hotline: 877-297-5552. ■

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Obvious Assumptions Can Hinder a Diagnostic Process
See technical repair articles, Pages 9-11

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