



INSPECTION UPDATE

Volume 16, Issue 3

Fall 2015

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Inspection Update is a publication produced by Massachusetts Vehicle Check; a joint program of the Massachusetts Department of Environmental Protection (MassDEP), the Registry of Motor Vehicles (RMV) and Parsons Environment and Infrastructure Group, Inc.

Registry of Motor Vehicles Welcomes New Director of Vehicle Safety and Compliance Services

The Massachusetts Department of Transportation (MassDOT) Registry of Motor Vehicles Division (RMV) recently named Mary-Jo Griffin as the new Director of Vehicle Safety and Compliance Services (VSCS). Mary-Jo joins the RMV from her former position as Director of Public Affairs at Middlesex Community College. Mary-Jo may be familiar to many inspectors from her time serving as the RMV's representative on the Board of Appeals and her tenure as the Director of RMV's Driver Control.



Mary-Jo Griffin, Director of Vehicle Safety and Compliance, Registry of Motor Vehicles

In embracing this latest challenge, Ms. Griffin will be working hard with the VSCS team on procurement of the new inspection system, beginning in late 2017. She will also lead the VSCS team as it continues to oversee the current inspection program, school bus inspection programs and the licensing of 7D school pupil-transport vehicle operators.

Massachusetts Vehicle Check Program Says Goodbye to Veteran Inspection and Maintenance Oversight Staff

Massachusetts Vehicle Check recently celebrated the careers of several Massachusetts Department of Transportation (MassDOT) Registry of Motor Vehicles Division (RMV) Vehicle Safety and Compliance Services (VSCS) and Massachusetts Department of Environmental Protection (MassDEP) staff as they began their well-deserved retirements.

The MassDOT/RMV/VSCS retirees are: Program Coordinators Sharyn LeCesse and Janet Bourgeois; Field Supervisors Fred Garand and Larry O'Hearn; and Field Investigators Bob McCorry Jr., Bill Shannon, and John LaBossiere. Together these seven individuals represent over 100 combined years of vehicle inspection experience.

Retiring from MassDEP service are Laura Merrill and Robbie Brown, who have more than 50 years of combined vehicle inspection experience. Before she left state service, Inspection Update had an opportunity to speak with Ms. Merrill.

Q: How long did you work for the Commonwealth of Massachusetts? In what roles and time periods?

Merrill: I've worked for the Commonwealth for 28 years, first working on energy audit programs for schools, hospitals and industry and then joining the Inspection and Maintenance (I&M) program in 1999.

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Inspection Procedure Reminders

► Commonwealth Investigators Conduct Random Compliance Checks

Inspectors are reminded that the annual safety and emissions inspection requirement for passenger vehicles, such as taxis and limousines, and the semi-annual safety inspection requirement for 7D school pupil-transport vehicles, are not the only inspections these vehicles may undergo.

To ensure the public's safety, the Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Transportation (MassDOT) Division of Registry of Motor Vehicles (RMV) coordinate with local cities and police departments to conduct random compliance checks of commercial vehicles that transport passengers.

Not only can these investigations reveal safety and emissions vehicle failures, they can also identify operators without proper driver's licenses, missing mandatory safety equipment (e.g. chock blocks, fire extinguishers, school bus signs), or overloaded vehicles.

Documented violations can lead to RMV or police enforcement actions including, but not limited to warnings, hearings, compliance certificate (windshield sticker) removal, vehicle towing, and/or traffic citations.

For these reasons, MassDEP and MassDOT/RMV remind all vehicle inspectors to thoroughly and professionally inspect all vehicles, especially 7D school pupil transport vehicles, livery vehicles, and taxis, so that all of them can pass random compliance checks.



RMV Field Supervisor Gary Harvey and Field Investigators Richard Brooks and Gary Colwell conduct a taxi compliance check in Falmouth, MA.

► Consistent and Repeatable Inspection Procedures are Every Inspector's Responsibility

The Massachusetts Vehicle Check inspection provides a way for the Commonwealth to evaluate its 4.5 million registered vehicles annually to ensure all of them are safe to operate, roadworthy, and emissions compliant. The Registry of Motor Vehicles (RMV) reminds each inspector of the need to have a repeatable inspection routine to ensure a thorough evaluation of the entire vehicle for all required emissions and safety inspection items. Here is Part 1 of a list of suggestions to develop consistent inspection procedures:

- Vehicle registrations should always be verified with the vehicle's publicly-displayed Vehicle Identification Number (VIN) located on the driver's side of the windshield. *Do not* assume that scanning a previous year's windshield sticker 2D barcode will enter the correct vehicle identification information. The data that is entered from a scanned sticker *must be* confirmed with the vehicle's registration and with the vehicle's publicly-displayed VIN. If a sticker's VIN data is scanned but not verified, you run the risk of repeating a previous inspector's VIN entry error.
- The license plate and plate decal must also be checked to see if they match the registration and the registration's expiration date. If you scan the windshield sticker 2D barcode, you must confirm that the decoded plate information from the scan matches the plate on the vehicle before proceeding. Please note that you will not lose a Test Authorization for an inspection that does not proceed because of a vehicle match failure. Turn the vehicle away from inspection and refer the motorist to the RMV.
- Confirming the vehicle-specific data as you are entering will ensure the workstation selects the proper inspection type for the vehicle in your bay. Because any incorrect entry could mean the vehicle gets the wrong type of emissions or safety test, please double-check the following vehicle-specific data fields before proceeding with the inspection:
 - o **Model Year/Make/Model:** The workstation uses a generic VIN decoder. The values displayed should be checked for accuracy and updated only if necessary.
 - o **Fuel Type:** This is the type of fuel the vehicle's engine consumes. All hybrid electric vehicles will have a liquid fuel type (either gasoline or diesel) that must be confirmed.
 - o **Gross Vehicle Weight Rating (GVWR):** In many cases, the GVWR value is grayed-out on the workstation and the inspectors cannot change the value. If the field is blank, you need to enter a value in pounds, *not* kilograms. The GVWR value can be found on the

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Inspection Procedure Reminders

(Continued from page 2)

vehicle's driver's side door pillar sticker. If there is no GVWR sticker, be sure to use only information from the vehicle's manufacturer. You should *never* use the vehicle registration document to determine the correct GVWR. If you are unsure of the correct GVWR value, call the Inspection Station Hotline toll-free at 877-834-4677 or your local Motorist Assistance Center.

- o **Odometer:** You must enter a value in miles, *not* kilometers. Be sure not to enter the "Miles to Empty" or "Trip Odometer" reading. If the electronic odometer display is not visible, enter "BROKEN" in the odometer field.

As you can see, being consistently accurate in all of these areas improves your integrity and benefits your customers and the Massachusetts Vehicle Check Program as a whole. Look for the Winter 2015 Inspection Procedures article that will provide additional suggestions to develop consistent inspection procedures.

Massachusetts Vehicle Check Program Says Goodbye to Veteran Inspection and Maintenance Oversight Staff

(Continued from page 1)

Q: How has the emissions inspection program changed during your tenure?

Merrill: The biggest change was moving away from dynamometer testing and relying entirely on OBD for emissions inspections. The changes in vehicle emissions control technologies have been huge, and must provide a real challenge for the repair industry.

The other big change I notice is improved air quality. It used to be that every day smoky vehicles would make me cough as I waited for the bus. Now I can go a whole year without a smoky vehicle passing by.

Q: What do you like most about your position?

Merrill: The best part of my job has been the people that I work with. They are not just good company. They are extremely competent and committed to improving the environment.

Q: Retirement plans?

Merrill: I plan to try lots of new things, starting with 3D printing and tai chi.

Q: Final thoughts?

Merrill: The thousands of people who work in the Massachusetts Vehicle Check Program should be proud that their efforts lead to clean air and safer vehicles.

Registered Repair Technician Updates

► Emissions Repair Success Ratings Reminder

For Registered Emissions Repair Shops that have entered repair data, the Second Quarter 2015 Emissions Repair Success Ratings are now available on Vehicle Inspection Reports and on the Repair Shop Locator, found at: http://www.massvehiclecheck.state.ma.us/find_emissions_repair.php.

Each repair shop is responsible for entering its vehicle repair information for any given month by the tenth day of the following month. For more information about repair data entry, visit: http://www.massvehiclecheck.state.ma.us/inspection_repair_data_entry.php

► Spring Training Recap

In June, the Massachusetts Vehicle Check program offered a Registered Repair Technician ongoing training module titled "Strengthening Diagnostic Skills."

Instructor Jerry "G" Truglia trained a total of 43 Registered Repair Technicians and 11 non-Registered Repair Technicians who attended the trainings at four Motorist Assistance Centers (MACs).



On June 8, 2015, "G" Truglia instructed repair technicians at the Braintree MAC on how to strengthen their diagnostic skills.

► OBD Diagnosis and Repair Training

On-Board Diagnostics (OBD) Diagnosis and Repair Training is designed for motor vehicle repair professionals who are seeking to become Massachusetts Registered Emissions Repair Technicians.

This class is open to all technicians, including those studying to take the A8 Engine Performance or L1 Advanced Engine Performance Specialist National Institute for Automotive Service Excellence (ASE) tests. In other words, you do not need to be ASE-certified repair technician to take this course.

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Registered Repair Technician Updates

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The OBD Diagnosis and Repair Training course is a 28-hour course consisting of 20 hours of classroom lecture and eight hours of hands-on training and examination. The class provides foundational information concerning the diagnosis and repair of OBD-equipped vehicles. The course fee is \$600. The next class is being offered in November.

Courses Offered	Dates and Times (Location to be determined based on demand)
Fall 2015	Monday - Wednesday, November 16 - 18, 8:00 AM - 5:00 PM Thursday, November 19, 8:00 AM - 12:00 PM

The application for this course is available at http://www.massvehiclecheck.state.ma.us/inspection_ongoing.html. If you have questions or need help signing up, please contact our Registered Repair Coordinator at (781) 794-2961.

► 2015 Ongoing Training Courses

All current Registered Emissions Repair Technicians are required to attend one four-hour ongoing training seminar each year to maintain their status in the Massachusetts

Vehicle Check Program. Parsons is offering these quarterly seminars from 6:00 PM to 10:00 PM at Motorist Assistance Centers (MACs) located across the state. Four more sessions will be offered in 2015.

Ongoing Training Course	Locations and Dates
Fall 2015 Variable Valve Timing (VVT)/ Variable Valve Lift (VVL) Systems	Braintree MAC - November 9 Pocasset MAC - November 10 Shrewsbury MAC - November 23 West Springfield MAC - November 24

All Training Seminars for Registered Repair Technicians are currently offered free of charge. The applications for these courses are available at http://www.massvehiclecheck.state.ma.us/inspection_ongoing.html.

Should you need help registering or have any questions, please contact our Registered Repair Coordinator at (781) 794-2961. Space is limited to 35 technicians per class; please enroll as soon as possible to secure a place.

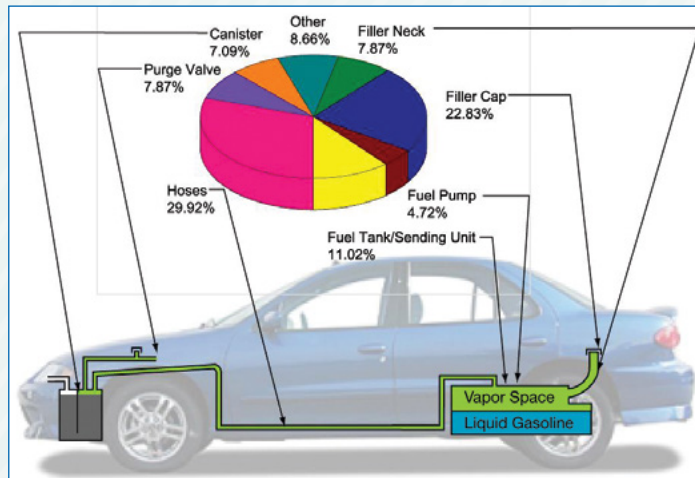


Motorist Assistance Center Repair Technician's Corner

► EVAP Fundamentals

Introduction

There is a common misnomer that an evaporative system (EVAP) problem is "just a gas cap." According to Society of Automotive Engineers (SAE) paper number 1999-01-1463 (<http://papers.sae.org/1999-01-1463/>), the gas cap is to blame only a quarter of the time for an EVAP diagnostic



Percent of EVAP DTCs by EVAP System Component

trouble code (DTC). So, even if you are in the habit of sending motorists with an EVAP-related DTC on their way, they are likely to come back to you with the same problem. This means that we are going to have to pin-point the real cause of EVAP DTC issues.

EVAP System Theory

Since we are limited to the length of this article we are going to cover only generic principles of EVAP systems. The following information will provide EVAP theory essentials, so that you know enough to be able to make educated judgments during your diagnosis. Our next article will build on these generic principles.

EVAP System Operation

The EVAP system prevents the escape of hydrocarbon (HC) fuel vapors from the fuel system into the atmosphere. On a vehicle with its engine off, the gasoline fuel in the tank starts to evaporate. Vapors travel through the vent hoses/tubes to be stored in the charcoal canister. When the engine is started, vapors are drawn by a vacuum into the intake and burned during combustion.

EVAP Design

Most systems consist of an EVAP Purge Solenoid, Charcoal (Continued on page 6)

Inspection Update Profile

George "Junior" Damato, Jr., Owner
Junior's Automotive Engineering, Inc., Hyde Park, MA



Junior Damato, owner
of Junior's Automotive
Engineering

Q: What services does Junior's Automotive Engineering offer?

A: We offer excellent service for both domestic and foreign cars. We do a tremendous amount of diagnostic work, check engine performance, look for diagnostic issues, as well as brake and service maintenance.

Q: What are your roles and responsibilities as owner?

A: I am a hands-on owner and do everything from opening the door at 6:00 a.m. each

morning to complete general oversight of everything that goes on at our shop. We have two locations: one in Hyde Park, a 10-bay shop that serves Boston and all surrounding areas and the other in Middleborough, where I work on Saturdays. This location started as a four-bay shop, and within one year, we doubled in size to eight bays, due to high demand.

Q: How many employees do you have? What are their roles?

A: We have four employees, and each one of them communicates and speaks directly with our customers: Rich Riley has been at the shop for 35 years; Bob Lawrence has been at the shop for 30 years; as well as another technician in training and full-time technician. My wife Carla is also an intricate part of the operation; she helps me handle all the paperwork at night.

Q: How did you get your start in the automotive industry? What made you want to open your own business?

A: My family owned our original Hyde Park location in the 1950s as a small shop with gas pumps. I attended Newton Vocational High school and alternated between working at my family's shop and attending classes. I've been coming into the same shop for about 50 years. I worked for the phone company for a year or two, but my passion has always been repairing cars. Eventually, I bought my family out of the original shop, put on two additions, and expanded the shop from three bays to 10 bays.

Q: Have you attended any of the Ongoing Training? How else do you keep up with changes in vehicle technology and emerging technologies in the Industry?

A: We attend MAC classes whenever possible. "G" Truglia does a great job teaching in a lot of different areas. We

subscribe to all of the industry magazines, such as MOTOR and Motor Age, and we use Identifix (<https://www.identifix.com/>) on a daily basis. We also use ALLDATA (<http://www.alldata.com/>) quite a bit.

Q: Are you a Registered Repair Technician? If so, how has being a Registered Repair Technician (RRT) helped your business?

A: I am a Registered Repair Technician, which gives me a level of opportunity to explain to my customers that they can get dealer-quality service at a reduced price at my shop. We also have an impressive display board that shows all of our qualifications and plaques in the office. This display makes the customers feel more confident in our abilities to better service their vehicles.

Q: What are some of your most challenging vehicle repairs?

A: On a lot of GM vehicles, especially those with V8 engines, there are random cylinder misfires. Recently, a vehicle had a random misfire and we ended up using a dollar bill to see if the tailpipe would suck it into the pipe to identify a weak valve condition, which turned out to be the case. Then, we did a thorough valve cleaning which straightened out the misfire problem.

Q: What should motorists do to prepare their vehicles for fall?

A: A lot of the dealers give you free maintenance for two years. However, you really cannot neglect the condition of motor oil on cars and should use whatever is recommended. If you don't, the Powertrain Control Module (PCM) will set diagnostic trouble codes. Also, remember to check the battery after installation every two years.

Q: How do you advertise your business?

A: We don't do much advertising, just mostly word-of-mouth. A lot of people use Yelp and AAA to find us. Whenever in doubt, just call your AAA office and ask for a list of AAA-approved repair shops. We are on that list, and it's a great choice for motorists because the work performed by these repair shops carries a nationwide warranty.

Q: What is your business motto?

A: Always be truthful; never try to up-sell a customer. At Junior's, we will never tell our customers that their car needs additional work when there's nothing wrong.

MAC Repair Technician's Corner

(Continued from page 6)

Canister, Pressure/Vacuum Gas Cap, Fuel Tank Pressure Sensor and Vent Valve. Any problem with these or associated parts (fuel filler neck, gas tank, associated rubber lines, etc.) will prevent proper operation of the EVAP system.

OBD II Enhanced EVAP

Now that vehicles are mandated under on-board diagnostics second generation (OBD II) requirements to have ever more efficient systems for preventing fuel vapors from escaping to the atmosphere, EVAP systems have grown steadily more complicated. The demands placed on the EVAP system have increased in an effort to reduce escaping HC vapors to a minimum.

The EVAP system uses the Powertrain Control Module (PCM) to check for flow and purge, checking for leaks as small as 0.010" in diameter up to 0.040" in diameter. The following are the leak detection limits allowed by vehicle model year:

Vehicle Model Year	Diameter of OBD EVAP Leak Detection
1996 - 1999	0.040"
Phased in for 2000 – 2008 and newer	0.020"
Phased in for some 2009 and newer	0.010"

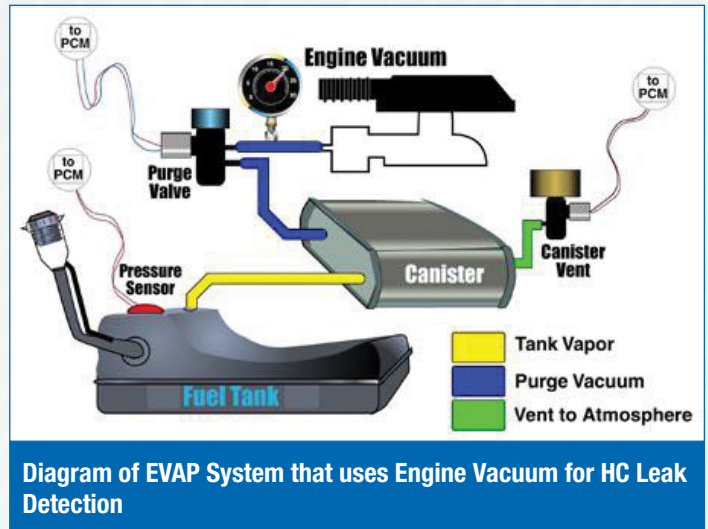
EVAP System Tips:

- The canister purge valve is normally CLOSED.
- The canister vent valve is normally OPEN.
- On EVAP systems that use service ports, the service port Schrader valve has *reverse* threads.
- If you discover a fuel-soaked charcoal canister, then the vehicle has a bad liquid fuel separator. There are different names for the liquid fuel separator, but it still has to do the same job allowing only fuel *vapors* to enter the charcoal canister. If the canister becomes fuel-soaked, you will need to blow out the fuel lines in a well-ventilated area with an inert gas (not air) in addition to replacing the liquid fuel separator and charcoal canister.
- Fuel lines and hoses are the number one areas of concern that need to be visually checked for leaks.
- Vent and purge solenoids need to be energized to the open/closed or closed/open positions at least ten times. Experience has shown that simply testing the solenoids by opening and closing them once or twice may prevent you from finding a defective valve that is sticking midway between open and closed. Try using your diagnostic OBD scan tool's bi-directional control or a Power Probe to exercise the valve to uncover a solenoid that sticks.

- The PCM uses an EVAP test sequence regularly to see if its associated components are working properly. The PCM does its testing by monitoring throttle position, fuel tank level sensor, idle air temperature sensor, fuel vapor pressure sensor, and other measurements to pass or fail the system. The test results are recorded and stored in OBD Mode 6; reviewing these results can be helpful in identifying the source of an EVAP system problem.

The Three EVAP Systems

1) Engine Vacuum EVAP Leak Detection



GM, Ford and many imports use measurements from sensors that give feedback on the fuel vapor management or purge control valve, solenoid-operated canister vent, and fuel tank pressure sensor. The PCM self-tests these components in the following order:

1. Purge valve is closed and the canister vent valve is open. No engine vacuum is reaching the canister and with the canister vent open system pressure equals atmospheric pressure.
2. Purge valve is opened and the canister vent is closed. This should increase EVAP system pressure by 6 to 8 inches of water.
3. Purge valve and canister vent remain closed while the PCM monitors how long the system retains sufficient vacuum.

2) Engine Off Natural Vacuum (EONV) or Natural Vacuum EVAP Leak Detection

Some Ford vehicles use Engine Off Natural Vacuum (EONV), which uses similar components to what are used on conventional engine vacuum systems (described above). The difference with EONV is that instead of using engine vacuum, natural vacuum (or pressure) created inside the fuel system is used to test the system for leaks *after* the engine is shut down.

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MAC Repair Technician's Corner

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Here's how it works:

A. When the engine is shut down and the ignition is switched off, the canister vent remains open to allow tank and atmospheric pressures to equalize. This is no different than with other EVAP systems.

The PCM monitors system pressure via the Fuel Tank Pressure Transducer (FTPT). If the EVAP system pressure is 1.5 inches of mercury (Hg) or more, the PCM assumes that fuel in the system is generating a lot of fuel vapor pressure and very volatile. The PCM knows that excess pressure (caused by evaporated fuel) makes the test unreliable and aborts the test. Remember, the canister vent is open. If the system can generate a positive pressure with the vent open, it's assumed that the fuel is very volatile, creating additional pressure faster than the system can vent it.

B. The canister vent closes. Since the Vapor Management Valve (VMV) or purge valve is already closed, the system should be sealed. The microprocessor continues to look at feedback from the fuel tank pressure sensor. If the EVAP system is leak-free, the pressure should increase over time as the vapors build up inside the system.

EVAP system pressure is monitored. If the system has a leak, the pressure will change very little or not at all. If a large enough change in pressure is measured (either a positive pressure or vacuum), it is assumed that the system is leak-free, and the test passes. The amount of change required for a pass depends in part on ambient temperature and fuel level.

C. If a positive pressure is recorded, but it is not high enough for a pass, the first test is repeated. The canister vent opens again to vent excess pressure from the system.

3) Chrysler EVAP Leak Detection Pump (LDP) Testing



Chrysler LDP

The following is an overview of how the Chrysler Leak Detection Pump (LDP) EVAP system works and how to test

it. This information is very similar to the BMW system that uses a Diagnostic Module Tank Leakage (DMTL), which we will cover in greater detail in the next newsletter.

The purge solenoid is normally closed and grounded by the PCM. The feed side comes from a Key On, Engine Off (KOEO) fused circuit. The PCM energizes the solenoid to purge fuel vapors from the canister and to lower tank pressure.

The LDP vent valve is incorporated in the unit and is normally open. It supplies air to the charcoal canister. The PCM checks for EVAP leaks by first de-energizing the purge solenoid (normally closed) and then rapidly cycles the LDP solenoid and watches the LDP switch position. Once pressure (7.5 in. H₂O) is built up in the system, the diaphragm will be seated upwards against spring pressure. The PCM knows this because it is monitoring the LDP switch. So, the PCM compares LDP switch position against LDP solenoid cycling time to determine if leakage is present.

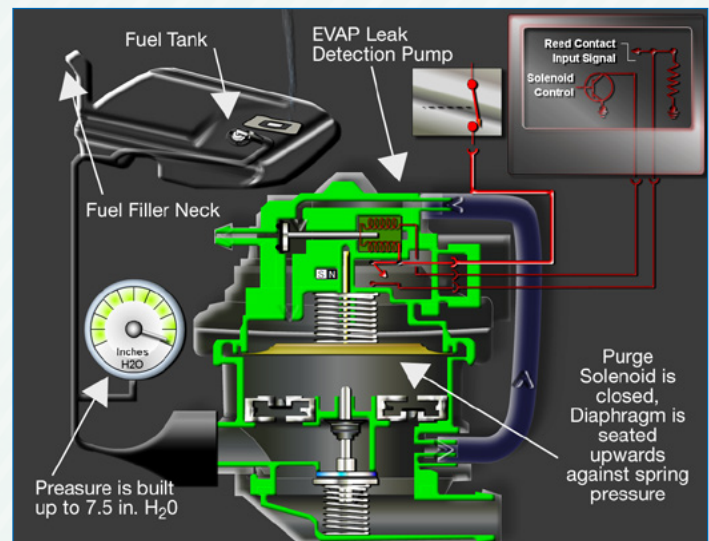


Diagram of the interior of a Chrysler LDP being tested by the PCM.

When manually checking for leaks on Chrysler vehicles, the vent valve must be closed. Closing the vent valve requires that the LDP solenoid is energized and that a vacuum source is applied to the LDP solenoid. This will enable the LDP diaphragm to stroke upwards, thereby allowing the vent valve spring to close the vent valve.

If the pump runs a short time before reaching full pressure, you can assume that there is a blockage and that only part of the EVAP LDP system is pressurized.

Now with the three system explanations out of the way, the next MAC Repair Technician Corner article will focus on repairing BMW's Diagnostic Module Tank Leakage (DMTL) System.

MASSACHUSETTS



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Inspection Update

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Repeatable Inspection Procedures – Part 1 and EVAP Fundamentals Inside!

Massachusetts Vehicle Check Program At A Glance

Program at a Glance			Enforcement Statistics	
	Count	Failure Rate		Count
Non-Commercial Safety Inspections	1,318,474	4.7%	Violations Issued to Inspectors	63
Commercial Safety Inspections	47,675	4.8%	Violations Issued to Stations	81
7D Safety Inspections	675	3.9%	Inspector Privileges Revoked	1
OBD Emissions Inspections	1,012,021	6.1%	Inspector Required to Retrain	7
Opacity Emissions Inspections	26,349	1.7%	Inspectors Suspended	8
Emissions Waivers Issued	2		Stations Suspended	19
Repair Hardship Extensions Issued	13		Penalties Assessed	\$91,000
Hotline and Training Statistics			Licensed Stations	
	Count			Count
Motorist Calls Received	3,204		Class A Stations	1,186
Inspection Station Calls Received	6,226		Class B Stations	195
Initial Non-Comm. Inspectors Trained	288		Class C Stations	30
Initial Commercial Inspectors Trained	56		Class D Stations	316
Initial 7D Inspectors Trained	12		Class E Stations	9
Initial Motorcycle Inspectors Trained	54		Reg. Emissions Repair Shops	188

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