



Inspection Update

A Publication of the Massachusetts Enhanced Emissions and Safety Test Program

Volume 5, Issue 2, September 2004

Plan Calls for All Improvements to Be Made by End of February Major Equipment Upgrades Under Way

Fall is in the air and so are changes at inspection stations across Massachusetts. Since a nine-month emissions testing equipment replacement and upgrade phase-in began in June, the *Enhanced Emissions & Safety Test* network has been evolving. Among the major developments:

- All ESP stations have stopped tailpipe and diesel testing, and will resume only after being retrofitted with SPX equipment.
- Current SPX stations have received several software updates already and will be receiving new benches and other upgrades in the coming months.
- Equipment compliance teams have started performing quarterly audits at existing SPX locations.

Program contractor Agbar Technologies has committed to invest as much as \$15 million on the equipment replacements and upgrades, and to complete them at all inspection stations by the end of February 2005.

ESP stations will start receiving their new SPX workstations soon. The top 200 high-volume ESP stations will have their replacement equipment by mid fall: 50 by the end of September and 150 more by the end of October.

Agbar reconfigured all ESP workstations to block them from performing tailpipe and diesel emissions tests. At ESP stations, vehicles due for these tests this year are being given a one-year deferral, meaning they will not need to undergo emissions tests again until their next inspections, at which time all ESP

workstations will have been replaced. This approach will allow the state to keep its entire network of inspection stations up and running while equipment changes are made, as opposed to completely shutting down all ESP stations.

Current SPX workstations will be receiving new non-dispersive infra-red (NDIR) NOx sensors, bar code scanners, Controller Area Network (CAN) OBD capability, and a number of software changes by the completion of the phase-in. Once these upgrades are completed, existing SPX stations will have equipment on a par with the new equipment being installed at ESP stations.

"In the short term, there will be some disruptions and inconveniences, but in the long run we'll have a program that works for inspection stations and repair shops, and does what it is supposed to do for motorists and air quality," said DEP Inspection and Maintenance Program Manager Paul Davis.

While equipment replacement and upgrade plans were being finalized, compliance teams from Agbar began quarterly audits of exist-

ing SPX locations in July. According to **Jon Hess**, the program contractor's Quality Assurance Audit Compliance Manager, the audits take about an hour to complete.

"Our audit teams are working to ensure that stations' equipment is well maintained and in compliance," Hess said. "We appreciate we are receiving from stations and our field staff are doing their best to avoid undue downtime."

Consumables such as calibration gases and printer ribbons are *continued on page 2*

What's Being Done and When

ESP workstation replacement

- By September 29, 2004** Equipment replaced in 50 high-volume stations
- By October 29, 2004** Equipment replaced in additional 150 high-volume stations
- By February 26, 2005** All ESP workstations replaced

SPX equipment upgrades

In July and August

- Begin daily gas bench calibrations
- Replace flex tips with needle probe tips
- Begin quarterly equipment audits
 - Gas bench
 - VMAS dilute O2 sensor
 - Gas cap tester
- Add gas bottle calibration
 - Bar code scanner
 - Inspectors required to scan every two weeks
- Begin automatic workstation lockouts
 - Expiration date of gas bottles
 - Bench response time (including O₂ sensor)
 - NOx cell response time

Begin digital audits for VMAS dilute O₂ sensor

Begin checks/audits for VMAS flow to avoid drift

To Be Added in September

- VMAS baseline values for hose-off flow check
- Digital auditing
 - VMAS hose-off flow check
 - Excessive drift between calibrations

By February 26, 2005

- NDIR NOx sensors
- CAN technology

Some Vehicles Defy Expectations, Still Have to Undergo Tailpipe Tests

Since the pass/fail OBD emissions test went into effect June 15, you may have noticed that some vehicles you would expect to receive OBD tests are getting tailpipe tests instead. Here's why:

- In previous software, you were prompted to perform an OBD test on any non-diesel vehicles, 1996 and newer, regardless of gross vehicle weight rating (GVWR). This is no longer the case.
- For model years 1996 through 2003, only vehicles up to 8,500 pounds GVWR will receive OBD tests. For model years 2004 and newer, vehicles up to 14,000 pounds GVWR will receive OBD tests. (This is consistent with federal vehicle certification standards.) Vehicles over these weights may or may not be equipped with functioning OBD systems, and therefore cannot be required to pass the OBD test.
- Certain model year 2003 and newer vehicles use a new OBD communication protocol called CAN (controller area network) that our analyzers currently cannot communicate with. These vehicles should receive a visual check to ensure that their dashboard MIL indicators are working properly, and then be given tailpipe tests. By February 26, 2005, all of the analyzers will be upgraded to read CAN-equipped OBD vehicles so that they can be tested like other OBD vehicles. *See separate article, back page.*

If you need more information or experience problems in this area, please call the Station Support Hotline at 877-297-5552. ■

Equipment Upgrades

continued from page 1

now carried aboard Agbar audit vehicles, making it easier for stations to keep their inspection bays open and in compliance. Stations are billed accordingly for parts and materials.

The Department of Environmental Protection (DEP), Registry of Motor Vehicles (RMV) and Agbar Technologies agreed to the emissions testing equipment improvement and auditing plan in June. Agbar was then given 30 days to determine what workstations, if any, would need to be replaced and/or upgraded. On July 18, the contractor notified ESP stations that their equipment would be replaced and SPX stations that their equipment would be upgraded over a nine-month period.

A workgroup including representatives from DEP, RMV, Agbar, the U.S. Environmental Protection Agency (EPA), the New England Service Station and Repair Association (NESSARA) and the Alliance of Automotive Service Providers (AASP) convened last year after problems with equipment reliability and maintenance surfaced, and produced a report for getting the *Enhanced Emissions & Safety Test* program back on track. ■

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 Agbar Technologies, Inc.

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:

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The Vehicle Maintenance Initiative Committee (VMI), composed entirely of volunteers from the repair industry, serves as *Inspection Update's* editorial advisory board. William Cahill, of B.C. Auto Repair, Randolph, is chair of the VMI Committee.

'Town Meetings' Held Around State To Explain Changes

The Department of Environmental Protection (DEP) and Agbar Technologies hosted seven "town meetings" with inspectors and station owners at locations across Massachusetts in late June and early July.

Representatives of DEP and Agbar summarized past audit findings that uncovered problems with emissions testing equipment reliability and maintenance, reviewed the government/industry discussions that led to a plan for solving those problems, detailed that plan and presented the timelines for equipment replacements and upgrades, then opened the floor to question-and-answer sessions.

ESP station operators were concerned about turning customers away; SPX station operators about the burden of having to do extra tailpipe tests. To clarify, the following is the list of vehicles that ESP stations may test:

- Vehicles due for safety inspections only
- OBD vehicles
- New registrations that are not title transfers (e.g. Cape and Islands plate, antique, etc.)
- Vehicles due for emissions inspections may receive safety-only inspections (provided title transfers or emissions retests are not involved).
- Municipal vehicles
- Diesel vehicles
- Vehicles over 10,000 pounds

In addition, many of the stations performing a high percentage of initial inspections are slated for upgrading in the first 200 (Oct. 29, 2004). ■

Helpful Web Sites on Drive Cycles

Web sites to visit when needing information on readiness for OBD II testing and on drive cycles that re-set monitors:

<http://www.mitchell1.com>

<http://www.alldata.com/techtips>

<http://www.obdii.com>

Clampdown Coming on Inspection Scofflaws

The Registry of Motor Vehicles is planning to put new teeth into regulations governing vehicle inspections by suspending the registration of any vehicle whose owner fails to get it inspected.

The clampdown on inspection scofflaws, which has the potential to raise program enforcement to an unprecedented level of effectiveness in Massachusetts, is slated to coincide with the completion of emissions testing equipment upgrades.

“There’s been a great deal of work that we’ve needed to complete before we could start registration enforcement,” said **Mark C. LaFrance**, RMV’s Project Manager for Vehicle Safety and Compliance Services. “Implementation is on track and everything seems to be coming together nicely.”

In all cases, violators will have more than enough time to get their vehicles inspected before being hit with a suspension, LaFrance emphasized. But since driving a vehicle with a suspended registration can lead to more serious consequences, motorists should not ignore an RMV warning letter.

Here’s the timetable for registration enforcement under three different scenarios; (please also see chart below):

- **Expired Sticker:** Thirty days following the end of the month in which a vehicle was due to be inspected but was not, RMV will send a warning letter to the owner stating that its registration will be suspended if the vehicle does not successfully undergo inspection in the next 30 days.
- **Ownership Change/New Registration:** The new owner of a vehicle is required by law to have it inspected within seven days of taking ownership. If the owner fails to have his vehicle inspected, and if he remains non-

“To join the ranks of the very best in program enforcement, we have to become more effective... We’re hopeful that we can achieve that goal, over time, through this new registration enforcement effort.”



Mark C. LaFrance
RMV Project Manager
Vehicle Safety/Compliance Services

compliant for 30 days, RMV will send him a warning letter stating that the registration will be suspended in another 30 days if the vehicle does not undergo an inspection.

- **Failure to Pass Inspection:** The owner of a vehicle that fails the emissions and/or safety test has 60 days to pass a re-test. If that does not occur, RMV will send the owner a notice at the end of

that 60-day period stating that the registration will be suspended in another 30 days if he remains non-compliant.

The administrative and operational changes that RMV had to make before implementing this new enforcement measure are extensive and costly. They include employee training, upgrades to computer software, creation of new forms and record-keeping systems, modification of the

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‘Don’t Let Customers Leave Without Their VIRs’



No inspection is complete if the motorist leaves your station without a vehicle inspection report (VIR).

“The VIR provides the motorist with important and valuable information about his or her vehicle, but it is also the best and most-readily-available proof that a valid inspection was performed,” said **Mark C. LaFrance**, project manager of Vehicle Safety and Compliance Services for the Massachusetts Registry of Motor Vehicles, “and inspectors are required to provide the motorist with a copy.

“We can’t say it often enough: Give your customers their VIRs. Don’t let them leave without them,” LaFrance emphasized.

As the registration enforcement program is phased in over the next several months, it becomes even more important that motorists have documented proof of their inspections.

Every chance he gets, LaFrance encourages inspectors and repairers to advise customers to hold onto their VIRs until their next *Enhanced Emissions & Safety Test*. “Keeping the VIR with the registration in the glove compartment is a good idea,” he said. “You never know when you’re going to need it.” ■

Registration Enforcement Timetable			
Event	Enforcement Event Occurs	Letter: Registration Will Be Suspended in 30 Days	Letter: Registration Is Now Suspended
Sticker expires	Expiration of sticker +1 day	Event +30 days	Event +60 days
Ownership change/ New registration	8th day after registration	Event +30 days	Event +60 days
Failure to PASS inspection	Date of failure +30 days	Event +30 days	Event +60 days



It's a Trombly Tradition to Embrace Change

Rick Trombly has been around the vehicle inspection business so long that he remembers when inspections cost 50 cents and were required twice a year, in the spring and fall. Now 64, Rick began working part-time in the Trombly Brothers automotive inspection, service and repair shop in North Andover when he was 10 years old.

"Those were good times," he says, as he recalls working side by side with his father, **Harold W. Trombly** and his uncle, **Frank**. But Rick Trombly is no sentimentalist; he doesn't yearn for the return of "the good old days." Rather, he embraces the new, especially the new technology that has made the modern automobile a computerized wonder on wheels.



Trombly Brothers, Inc. has been a fixture in North Andover for almost a century. Rick Trombly (second from right) is a member of the third generation of Tromblys to be in the business. Representing the fourth generation in this photo are Rick's nephews, L to R, Scott, Mark and Harold Trombly, III.

A certified L-1 technician, Rick is as comfortable and proficient at a computer keyboard as his father and uncle ever were bent over an engine with wrenches in their hands. He says he "cannot function" without access to the vast database provided through his subscription to *Mitchell on Demand* and to its companion shop management system, *Mitchell Manager Plus*.

"Modern information systems can tell you everything you need to know about virtually every vehicle out there," he said.

When he talks about the capabilities of today's on-board diagnostic systems, Rick can become as excited as a teenager with a new computer. "OBD has made things much better in our station and in the industry as a whole, and will continue to do so," he said. "It has definitely increased our productivity. OBD is the answer."

With OBD II giving technicians "information we never had before," Rick said it is imperative that technicians be able to understand and interpret that information, "and that can only come from good training, hard work and sharing information day-to-day with others in the profession."

He himself embodies that commitment to continuing education, having earned so many ASE certificates and attended so many conferences and seminars that he doesn't bother to count them anymore. He thinks nothing, for instance, of traveling to Chicago for a four-day educational program sponsored by one of the major parts and equipment manufacturers. The four other technicians working at Trombly Brothers are all ASE-trained and certified, as well.

One of the keys to repairing OBD II-equipped vehicles is "understanding drive cycles," Rick said. "You have to know about all of the monitors and you have to know how much driving, and what kind of driving, each make and model requires before being 'ready' for the re-test. You can't remember all this for every car, and it's not something you should ever guess at, especially when that information is obtainable through one of the data systems, (which also include *All-Data* and *Motor*)."

Trombly Brothers, which has been in continuous operation at the same location for 56 years, performs between 400 and 450 inspections per month. It has averaged between five and ten emissions repairs a month since the beginning of the enhanced program in 1999, and, in the process, has earned the highest possible rating, five stars, on the program report card known as the ERSR (Emissions Repair Success Rating).

Rick attributes Trombly Brothers' success to the spirit of family togetherness, professional pride and customer/community service that has bound the Tromblys to one another through the years, and to an employee turnover rate "that is practically zero...People don't leave here."

Rick's generation, including brother **David**, who recently retired at 65; brother **Skip**, 58; and Skip's wife, **Claire**, the company bookkeeper, can contemplate the end of their working days knowing that the next generation has already proved itself in the business and is capable of meeting the challenges this industry will hurl at Trombly Brothers in the future. Carrying on the

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RMV Clampdown

continued from page 3

Registry's phone system to accommodate motorist inquiries, a sustained internal communications and problem resolution process, and communication and interaction with other state agencies.

There are more than five million registered motor vehicles in Massachusetts. Of that number, roughly 10 percent — 500,000-plus vehicles — are not in compliance with the *Enhanced Emissions & Safety Test* program at any given time, according to LaFrance.

"We know from the EPA (the federal Environmental Protection Agency) that the very best vehicle inspection programs in the country have a 96 percent compliance rate," said LaFrance. "To join the ranks of the very best in program enforcement, we have to become more effective with our compliance initiative. We're hopeful that we can achieve that goal, over time, through this new registration enforcement effort."

Suspension of registration does not necessarily mean a vehicle goes off the road, however. "Some motorists, unfortunately, continue to drive after their registrations have been suspended," LaFrance said. "Getting a letter from the Registry does not in itself stop motorists with suspended registrations from driving. We will continue to rely on the law enforcement community, as we always have, to ensure that motorists follow the rules." ■

Fund Started in Memory Of Esteemed I&M Instructor

Early on, many in the inspection and repair network learned to rely on Tom Levasseur. You may have known him as one of your teachers at Franklin Institute of Technology or a program trainer when you were certified to join the *Enhanced Emissions & Safety Test* program.

Folks from the Woburn area most likely knew him as the L-1 Technician stationed at that Diagnostic and Training Center (DTC). Shortly before he died unexpectedly on April 4 at the age of 40, Tom had been promoted to L-1 Supervisor of the Dedham DTC.

Tom is remembered by his peers for his willingness to always jump in and help whenever needed, his wonderful spirit, and his infectious sense of humor. "I am honored to have known Tom Levasseur. It was an experience to have Tom pass through my life," said Henry Wysk, Woburn DTC L-1 Super-

visor. "Besides being a great friend, he was a great asset in his field. He loved the inspection and automotive industry, and it showed by how he worked with people."

An incident that illustrates Tom's dedication, and the positive impact he had on his students, occurred a week after he died. A student Tom had been tutoring on his own time, unaware of Tom's passing, came to see him at the Dedham DTC. He knew that Tom loved his coffee and he showed up

carrying two cups; he wanted to thank Tom and share the good news of passing his inspector's exam.

In memory of Tom, a fund has been established in his name. Proceeds will be awarded to Franklin Institute of Technology. Contributions can be made to the Thomas M. Levasseur Memorial Fund, Fleet Boston Financial, 601 Donald Lynch Boulevard, Marlborough, MA 01752.



Tom Levasseur

Life Cut Short at 40

ENFORCEMENT ACTIONS

December 1, 2003 – May 31, 2004

Violations Issued to Inspectors : 185

Violations Issued to Stations: 195

Inspectors Required to Retrain: 20

Inspector Privileges Revoked: 9

Inspectors Suspended: 30

Stations Suspended: 80

Trombly Bros. Profile

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Trombly tradition are Skip's and Claire's three sons, **Scott**, **Harold III** and **Mark**.

"They're fine young men, my nephews," said Rick, "and they know this business backwards and forwards."

Rick added that, if the next generation of Tromblys continues to have the services of longtime employee **Berniece Ventrillo**, "I know everything will be done just right." Bernice, who has been with Trombly Brothers 30 years, "is the absolute best all-around office person I've ever seen," Rick said, "...and she's just like family." ■

Trombly Brothers, Inc.

141-153 Sutton St.
North Andover, MA
978-683-1031

Monday-Friday, 7:30-5:00; Saturday, 7:30-2:00



If You Have ‘Readiness’ Down Cold,

A Look at the Basics of Test Readiness

In this new era of emissions testing through on-board diagnostics, test readiness presents a special challenge – and a potential pitfall—to vehicle inspectors and repairers every day.

It’s not enough for an inspector or repairer to know why a vehicle may not be ready for an emissions test, or a re-test, and what should be done to make a vehicle ready. They also have to be able to explain readiness in terms a typical motorist can understand, and answer any question a motorist might have on the subject.

Fortunately, there’s plenty of information on OBD II and readiness available to those in the automotive service and repair industry through online databases, technical service manuals and continuing education programs. (See *list of web sites*, page 2.) There’s even a National OBD Clearing House at Weber State University (Utah) where technicians can, with just a few mouse clicks, go for free information. (See *separate article*, page 7.)

With full OBD II emissions testing a relatively new phenomenon in Massachusetts, a brief review of the “readiness basics” for model year 1996 and newer vehicles featuring on-board diagnostics is in order. For example:

- 1.** If a vehicle is not ready for the *Enhanced Emissions & Safety Test*, it fails the initial test. It fails because the vehicle’s OBD system did not have enough valid data to evaluate the current effectiveness of its emissions controls.
- 2.** If a vehicle is “not ready” for an emissions re-test, it will be turned away. The motorist may return for another re-test without paying an additional fee as long as he returns to your station within 60 days of the original *Enhanced Emissions & Safety Test*.
- 3.** For 2001 model year and newer vehicles, you will not be allowed to do an emissions test if more than one non-continuous monitor is “not ready.” There is only one exception to this rule: if the catalytic converter failed on the initial emissions test, the non-continuous catalytic converter monitor must be “ready” for the re-test to be possible. (See *accompanying chart*, *Criteria for Readiness*.)

4. Common reasons for a vehicle being “not ready” include a recent disconnection of the battery and/or recent repair work on the alternator, starter, electrical system, engine or transmission. When a vehicle is not ready for these reasons, the OBD system can usually be reset if the vehicle is driven for about a week under varying conditions: when the engine is hot and when it is cold, in the city and on the highway, at low speeds and high speeds, etc.

5. For vehicle-specific information on the drive cycle needed to reset an OBD system, consult one of the newly published guides on the subject, such as those by All Data, Motor, Mitchell, etc. (See *next page* for examples from *Motor OBD II Drive Cycle Guide*.)

6. If a vehicle fails because the MIL was commanded on, and one of the listed diagnostic trouble codes is for the catalytic converter, then the catalyst monitor must be reset to “ready” before the vehicle is brought in for a re-test.

7. In an OBD-equipped vehicle, there are three continuous monitors and anywhere from five to ten non-continuous monitors. The continuous monitors are for engine misfire, fuel system and the comprehensive component. Among the non-continuous monitors are those for the catalytic converter, heated catalytic converter, evaporative system, secondary air injection, A/C refrigerant, oxygen sensors, oxygen sensor heaters and EGR system.

8. After every OBD-related emissions repair, the non-continuous monitors have to be reset by putting the vehicle through a drive cycle so that it will be ready for the re-test.

9. For 2000 model year and older vehicles, up to two of the non-continuous monitors may be “not ready” and you can still perform an emissions test.

Bert Cox, chief of vehicle programs for the Massachusetts Department of Environmental Protection (DEP), points out that only two situations exist when a vehicle is not ready for OBD testing: “Either the vehicle hasn’t met all criteria for readiness or there is something interfering with the criteria being met.”

For example, Cox said, there are vehicles whose fuel tanks must be at least one-quarter full before the evaporative system monitor can be reset. “But if the fuel level sensor is faulty, you won’t be able to reset the monitor no matter what,” he said.

Darrin Greene, program manager for the state’s vehicle inspection contractor, Agbar Technologies, notes that Agbar’s five diagnostic and training centers are “always ready” to assist inspectors and repairers in obtaining vehicle-specific information on drive cycles and readiness criteria. “People should think of the DTCs when they need reliable information in a hurry,” said Greene.

And Cox is always ready with a word of caution for emissions repairers on trouble codes. “A trouble code only means that the vehicle’s on-board computer observed something that indicates trouble in the engine,” he said. “It’s the starting point for a repairer to find what’s actually wrong, not a diagnosis of what’s wrong.

“A trained technician uses codes — and other information — to go into the vehicle’s computer, look at the free-stream data, find out when certain things happened in the engine and under what conditions they occurred, and go through a careful thought process to diagnose the problem.” ■

Criteria for Readiness			
	Readiness Criteria	Initial Test	Re-test
2000 and older vehicles	Up to 2 monitors for “not ready” status	Fail	Turn-away
2001 and new vehicles	Up to 1 monitor for “not ready” status	Fail	Turn-away
Catalytic converter efficiency	Must be ready at the re-test		Turn-away

You're Hot Stuff in the World of OBD II

... and Some Sample Drive Cycles to Reset System Monitors*

OBDII Drive Cycles

General Motors All Models

All Monitors - Complete System Set Procedure

All Except Diesel and CNG Engines
1996-2003

- Notes**
1. Use this drive cycle when 2 or more of all readiness monitors are set to NO.
 3. Preprogramming the scan tool will shorten test length.
- Conditions**
1. Refer to the "Conditions for Running Monitors" chart at the back of this manual.
- Step 1** Perform the I/M System Check. Failure to do so may result in difficulty in updating the monitor(s) status to YES.
- Step 2** Turn ignition OFF for 5 minutes. Pre-program the scan tool with vehicle information before turning ignition ON. Start the engine and do not turn it OFF for the remainder of the test.
- Step 3** Turn OFF all accessories and set parking brake. A/T should be in P and M/T should be in N. Idle the engine for 2 minutes.
- Step 4** Accelerate at part throttle to 55 mph and maintain speed until engine reaches operating temperature. This could take 8-20 minutes depending on coolant temperature at start-up.
- Step 5** Maintain speed of 55 mph for an additional 6-7 minutes.
- Step 6** Reduce speed to 45 mph and maintain 45 mph for 1 minute.
- Step 7** From 45 mph, perform 4 decelerations of 25 seconds each under the conditions in Step 8. Keep the speed above 25 mph and return to 45 mph for 15 seconds after each deceleration.
- Step 8** Each deceleration period should be at closed throttle with NO brake application, NO clutch actuation and NO manual downshift.
- Step 9** Accelerate at part throttle to 45-55 mph and maintain speed for 2 minutes.
- Step 10** Decelerate to 0 mph and idle for 2 minutes with foot on brake pedal, A/T in D or M/T in N with clutch depressed.
- Step 11** Access the readiness status on the scan tool. Perform the individual drive cycle for any monitor that does not display YES (monitor is not ready).
- Step 12** Check for DTCs. Any DTCs will require diagnosis and repair.
- Step 13** Following repairs and clearing DTCs, perform Steps 1-12 again or perform steps for individual monitors that are not set.
- Step 14**
- Step 15**

Refer to Safety Notice Before performing Drive Cycle

Honda II Models

OBDII Drive Cycles

2003-2003
All Engines

Catalytic Converter Monitor

- Notes**
1. Readiness status is set to Not Ready if DTCs are erased or if the battery is disconnected.
 2. Do not turn ignition OFF during procedure.
 3. Low ambient temperatures or excessive stop-and-go may increase time for monitor to complete.
- Conditions**
1. IAT 20 degrees F. or higher
 2. ECT 158 degrees or higher
 3. Vehicle speed sensor (VSS) reads more than 25 mph.
- Step 1** Turn the ignition switch ON; do not start engine. The MIL will come on for 15-20 seconds. If it goes OFF, readiness codes are Complete. If it blinks several times, one or more readiness codes are Incomplete.
- Step 2** Check the status of readiness codes and perform the appropriate procedure.
- Step 3** The readiness code will not switch to complete until all the enable criteria are met. If a fault in the secondary HO₂S system caused the MIL to light, the readiness code cannot be set to complete until the fault is corrected.
- Step 4** Connect the scan tool. In generic mode, access the status screen for DTC P0420.
- Step 5** Start the engine.
- Step 6** Drive the vehicle under stop and go conditions with short periods of steady cruise. Readiness code should switch to complete after about 5 miles.
- Step 7** If the readiness code is still Incomplete, check for a temporary DTC. If no DTC is present, one or more of the enabling criteria were probably not met. Repeat the procedure.
- Step 8**
- Step 9**
- Step 10**
- Step 11**
- Step 12**
- Step 13**
- Step 14**
- Step 15**

Refer to Safety Notice Before performing Drive Cycle

* Motor Information Systems, a division of Hearst Business Publishing, Inc. has granted permission to *Inspection Update* to reprint the above pages from Motor's OBD II Drive Cycle Guide for 1996-2003 Domestic & Import Cars, Light Trucks, Vans & SUVs—a quick reference guide to reset the readiness status of OBD II system monitors. Later this month (September 2004), Motor will publish its 2004 Drive Cycle Guide, which will contain over 990 pages of drive cycles.

Info Gold Mine:

New National OBD Clearing House

To foster greater understanding of on-board diagnostics technology, the Center for Automotive Science and Technology at Weber State University (Ogden, Utah) has established the *National OBD Clearing House*.

Made possible by a grant from the U.S. Environmental Protection Agency, the clearing house is dedicated to providing accurate, timely information on all aspects of OBD to persons working in the automotive service and repair industry. It also shares information on new automotive technology and regulatory requirements with public officials across the nation.

The web site of the *National OBD Clearing House*, <http://www.autocenter.weber.edu/OBD-CH/>, encompasses everything from OBD regulations and original equipment manufacturer service data to status reports on I&M programs around the country and where to purchase the latest scan tools. ■

MassBay Offering New Classes for Repairers

MassBay Community College is holding four special classes for emissions repairers this fall at its Technology Center in Ashland. Each of the classes will consist of a single four-hour session beginning at 5:30 p.m. Here are the subjects and dates:

Five-Gas Analysis: Fixing Tailpipe Failures, Tuesday, September 28.

OBD Evap Failures, Thursday, September 30.

Scan Tool Review: No Tool Does It All — Learn the Difference, Wednesday, October 13.

Introduction to OBD II: What Is It? Wednesday, October 20.

For information on fees, and to register, call 781-239-3048. ■



Have Suggestions on Interim Criteria? Call DEP

New OBD II Waiver Criteria Developed

Wherever you look in the *Enhanced Emissions & Safety Test* program, there are changes, and OBD is the common denominator in many of them.

A case in point: The system of granting waivers to motorists who legitimately try but are unable to bring their vehicles into compliance with the program's emissions standards.

Before the June 15 arrival of mandatory pass/fail OBD II emissions testing for model year 1996 and newer vehicles, there was one set of criteria for determining if a motorist should be granted a waiver. For example, if the owner of a 1998 Mercury Sable had spent \$300 or more on repairs at a registered emissions repair shop, and if the vehicle was still producing excessive NOx, (but at a level less than three times the cutpoint), the motorist would likely have received a waiver.

Now, if the same vehicle fails the emissions test, the failure is detected through an electronic test of its emissions controls rather than an analysis of its tailpipe gases. And the effectiveness of the mandated repairs

is gauged solely by the results of the subsequent electronic re-test, which do not fit the original waiver criteria. Therefore, new waiver criteria have been established for OBD-tested vehicles.

Assume the same amount is spent on repairs to that Mercury today at a registered emissions repair shop. If the OBD re-test shows the car still has a NOx problem, the waiver would likely be granted — provided several other electronic indicators are in order, according to OBD waiver guidelines developed by the Department of Environmental Protection (DEP) and used by the Registry of Motor Vehicles (RMV). The car would have to meet all readiness criteria, for example, and its catalytic converter would have to be working efficiently. If the re-test detected a cat failure, or cat-damaging conditions, such as a misfire, the owner would *not* qualify for a waiver.

The chart accompanying this article summarizes the new OBD II waiver criteria, described by DEP as interim guidelines, and compares them to waiver guidelines for tailpipe tested cars, which are still in effect for pre-1996 model year vehicles.

"We have adopted these criteria on an interim basis to evaluate waiver requests for OBD II-equipped vehicles," said **Paul Davis**, DEP program manager for the *Enhanced Emissions & Safety Test*. "We welcome feedback on these guidelines, and will be reviewing them with the I&M Advisory Committee. We want to hear what the industry and others have to say."

Davis said DEP will carefully consider all comments when fine-tuning the OBD waiver criteria.

If you have questions or comments about the criteria, or want more information, contact DEP's chief of vehicle programs, Bert Cox, at 617-292-5745. ■

Feel the Power – of CAN

continued from back cover

CAN is an international standard and is documented in ISO 11898 for high-speed applications and ISO 11519 for lower-speed applications. Originally developed by the German company, Robert Bosch, for use in the automotive industry, CAN is now being used in many other industrial control applications, such as marine engine control and navigation systems, medical diagnostic and monitoring equipment, machine tools, textile production, and even in some high-tech toys used by young children.

Inspectors and repairers can now find out which vehicles are "OBD exception vehicles," by visiting the Inspection & Repair Industry Info page www.mass.gov/vehicletest/repairer.htm and clicking on "OBD Exception Vehicles." There are two lists posted on this page. One list includes CAN-equipped vehicles that will be OBD-testable when hardware and software upgrades are completed on February 26, 2005. The other list includes 1996 and newer vehicles that possess unique testing characteristics that prevent them from receiving a complete OBD emissions test. These OBD vehicles will skip over the readiness monitor checks and go directly to the MIL (malfunction indicator light) check. Copies of these lists may also be obtained by calling the toll-free Station Support Hotline, 877-297-5552. ■

ASE Offering Certification Tests To Technicians at 13 Sites This Fall

Automotive technicians interested in taking ASE certification tests this fall must register by September 24 with the National Institute for Automotive Service Excellence.

ASE certification tests will be held nationwide on November 9, 16 and 18. Among the testing sites are 13 locations in Massachusetts, from Boston to North Adams and Chelmsford to Hyannis.

ASE offers certification in the following specialties: automobile technician, automobile service consultant, alternate fuels technician, undercar specialist, collision repair/refinishing technician, collision damage estimator, advanced level specialist, engine machinist, parts specialist, medium/heavy truck technician, school bus technician and truck equipment technician. To become ASE-certified, you must pass one or more tests and have two or more years of full-time, hands-on work experience.

To register for a test, or for more information, including a full list of Massachusetts testing sites, call the toll-free ASE registration service, 1-866-427-3273, or visit www.ase.com. ■



Interim Criteria for OBD II Waivers

Criterion	Tailpipe (Current Criteria)	OBDII Criteria
Minimum Expenditure See Footnote 1 for excluded expenditures.	\$400 for vehicles up to and including 5 model years old \$300 for vehicles 6-10 model years old \$200 for vehicles 11 or more model years old.	Same.
Recognized Repairers	Registered Repair Shop	Same.
Type of Repairs	Appropriate to failure	Same.
Gross Polluters Excluded From Waiver Eligibility	Emissions levels must be less than 3X standard	No waivers for cat efficiency failure or cat damaging conditions (i.e. misfire). No waiver if any of the following codes are present: PO420, PO422, PO430, PO432; and PO300, PO301, PO302, PO303, PO304, PO305, PO306, PO307, PO308. Cat monitor must have run if initial cat efficiency failure.
Other Exclusions From Waiver Eligibility	No waiver if any of the following exist: Failure of a pollutant that previously passed. Failure to show improvement in readings for failed pollutant. Evidence of tampering. Outstanding recalls or warranty repairs.	No waiver if any of the following exist: New systems with codes (i.e. evap codes if not present previously). Evidence of tampering (i.e. DLC must be present; bulb must be operational [ON]). Outstanding recalls (i.e. PCM reflash) or warranty repairs.
Readiness/Communication	N/A	Workstation must communicate with vehicle OBDII system and meet readiness criteria. (If excluded from OBDII testing via the VLT, then test type switches to tailpipe test and apply tailpipe criteria. Outliers may pursue a diagnostic waiver).
Safety	Must meet all safety requirements.	Same.
Diagnostic waiver	May be available for vehicles that fail the emissions test after all repairs have been completed or vehicles for which the emissions test is not suitable. For further details see 310 CMR 60.02(12) or contact DEP's Bert Cox at 617-292-5745.	Same; plus vehicles with MIL commanded on and no codes. For further details see 310 CMR 60.02(12) or contact DEP's Bert Cox at 617-292-5745.

Footnote 1

- A. tampering-related repairs to the emissions control system except where it can be verified that the part in question or one similar to it is no longer available for sale;
- B. repairs to an emissions control system which has been dismantled or rendered inoperable except where it can be verified that the part in question or one similar to it is no longer available for sale;
- C. repairs under any warranty;
- D. repairs that are subject to a manufacturer's recall;
- E. repairs unrelated to emissions performance or inappropriate for the type of emission inspection failure that occurred;
- F. repairs performed prior to the most recent initial inspection failure; and
- G. repairs not performed by a registered repair technician.

A Master Trainer's Tips on How To Repair Evap System Failures

By Chuck Pearson

As you well know by now, we have implemented full OBD II pass/fail emissions testing in our state program, and this is good.

Before June 15, evaporative emissions codes didn't necessarily mean much to a repairer. The vehicle ran fine and the light could be covered up or put out (frequently). Now, evap codes mean a lot. You have to fix it or the vehicle won't pass the *Enhanced Emissions & Safety Test*.



Chuck Pearson

Since June 15, evaporative emissions codes have been among the top three reasons for OBD emissions failures every week. So understanding the evaporative emissions system and knowing how to fix failures is an obvious priority for every repairer in Massachusetts.

To meet the self-check requirements of OBD II, manufacturers (OEMs) had to confront and overcome some major engineering challenges. They did this in part by building sophisticated systems where three different functions must successfully occur for the evaporative system to even perform the self-check:

First, most manufacturers use solenoids to seal the vents and close the system.

Second, a vacuum pump is activated and evacuates or pressurizes the system.

Finally, sensors must operate properly to monitor if the pressure differential on the system is being maintained.

To perform all these functions simultaneously (and to do so without affecting drivability) is, to put it mildly, a complex feat. A problem in any of these three areas will cause an evaporation system-related emissions code, as will a leak anywhere in the system.

Repairers have to think comprehensively and proceed carefully when dealing with an evaporative failure. To achieve a successful repair the first time out of the gate,

technicians have to take a scientific approach to every repair. Each evaporative failure has the potential to present you with some unexpected variation or unique difficulty. This is the last place where a one-size-fits-all approach does the trick.

One brief article in *Inspection Update* cannot possibly do justice to the subject of evaporative system failures. But here are some helpful tips to get you started:

- 1. How's your toolbox?** Technicians can choose from smoke machines, nitrogen systems and ultrasound to chase the plumbing. How's your scan tool? Does it have two-way communication so that it may command activating the vehicle purge functions? (See the April 2002 edition of *Inspection Update* for a review of scan tools or sign up for a scan tool course at MassBay Community College.)
- 2. How big of a leak is it?** Keep in mind how the evaporation system functions. OBD II monitors the system by testing for fuel vapor leaks once a drive cycle. Leakage greater than that which would pass through a round hole that is 0.040 inch in diameter will turn on the light (0.020 inch for 2000 and newer model year vehicles) and set off a code. In either case, that's a very small space.
- 3. First things first: Check and test the gas cap.** (And always test a new cap. Never assume it's good because you just took it out of the package and installed it.) Talk to your customer: does he know how to tighten it? (Three clicks.)
- 4. Why is the light on?** If the malfunction indicator light (MIL) comes on while driving, or remains on after starting the engine, a problem is definitely indicated. The MIL will remain on during the normal course of events, but if the fault does not recur during three consecutive drive cycles that involve the same operating conditions, or if the fault is not detected for 40 drive cycles, the OBD II system will turn off the lamp and erase the code.
- 5. What's a cycle?** Remember, an OBD drive cycle is not just turning the key on and off, or just starting the engine. A drive cycle requires starting a cold

engine and driving the vehicle until it experiences a certain increase in coolant temperature. Some vehicles have to be allowed to "cold soak" between trips so that the evaporative monitor will run its sequence. Research the system you are working on and understand the manufacturer's strategy.

- 6. Who erased my data?** Don't clear the code before you capture the freeze frame data, pending codes and manufacturer codes. The freeze frame contains all the vehicle parameters that existed when the code was set, making it easier to duplicate. **Erasing the code wipes out everything – monitors become "Not Ready," freeze frame is erased, pending and manufacturer codes – all gone. And they often contain valuable keys to the repair.** If you clear the code after repair, drive the vehicle until the evap monitor completes to confirm your success. Some techs will even let the OBD II system turn the light out for them.
- 7. Here's a quick test of the purge system** using a scan tool and a 5-gas analyzer: Run the engine at 1500-2000 rpm for one minute. Test and record the data. Also, record the O₂ and injector pulse width. Then use your scan tool to command "Purge On." Record the reading at 1500-2000 rpm. You need to know CO%, HC ppm., CO₂%, O₂%, injector pulse and O₂ volts. See if there was a change between no purge and full purge. (If the canister is partially full, the mixture will usually richen up and the pulse width of the injectors will shorten to compensate. If the canister is too full, it's time to ask "why?" If the canister is empty, or a leak exists, you just created a vacuum leak and will create a lean condition.

Study what happens to O₂ voltage, injector pulse and gas readings. If everything is not right, you have to determine what function didn't respond, or if there is a sensor, injector, or cat malfunction. If all results are fine, check for a leak visually using your choice of tester. If a leak is found, repair it. Then run the recommended drive cycle and let the system verify your repair.

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Every Station Due for Upgrade to Advanced Sensor Technology

New NOx Benches Will Strengthen I&M

Sensors used to measure nitrogen oxide (NOx) during the *Enhanced Emissions & Safety Test* are being replaced with new state-of-the-art NOx sensors that will more accurately identify polluting vehicles and cause more of them to be repaired than ever before in Massachusetts.

As part of a comprehensive effort to make the emissions test more accurate, dependable and effective, the NOx sensors in use at every station in the network will be replaced by February 26, 2005, with new benches using non-dispersive infra-red (NDIR) technology.

"The upgrade to NDIR will eliminate one of the weak links in the *Enhanced Emissions & Safety Test* and help restore confidence in the program," said **Nancy Seidman**, Director of the Division of Consumer and Transportation of the Massachusetts Department of Environmental Protection (DEP).

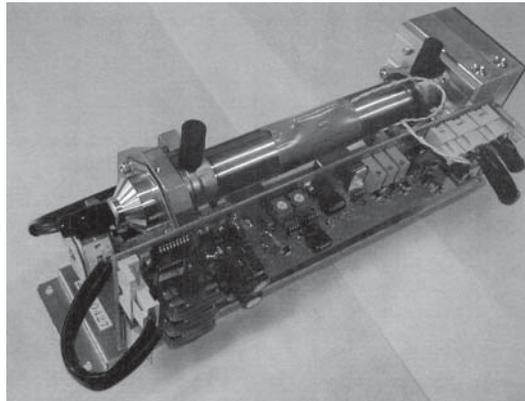
"The NOx benches now being phased out," Seidman added, "were the best available in their day: they identified gross polluting vehicles and helped us get them repaired or off the road. But the new benches will enable us, for the first time, to identify the 'marginal NOx vehicles' with a higher degree of accuracy and reliability. That's good news for the environment *and* the inspection and repair industry."

NOx sensors were identified last year as a major technology weakness by DEP and a special short-term workgroup that looked at ways to improve the *Enhanced Emissions & Safety Test*.

Agbar Technologies, the program contractor, will assume the entire cost of purchasing and installing the new NOx benches. The downtime needed to install the benches has been estimated at two to four hours.

NDIR-based NOx benches, manufactured by Horiba Instruments, have significant advantages over the sensors they will be replacing:

- **Greater Accuracy, Dependability.** Because it incorporates advances in technology and manufacturing that have been made since the *Enhanced Emissions & Safety Test* debuted in 1999, the new bench provides a more precise NOx reading. This happens in part because it is better at distinguishing NOx and eliminates interference from water vapor and carbon monoxide in the test sample. The new bench is also a higher-cost-and-quality component; it will do its job longer, as well as better.
- **Better Response Time.** The new bench's response time, (the period it takes to measure NOx), is one to four seconds, whereas the old sensor's response time could stretch to 10 seconds or more. This caused problems for inspectors because the Massachusetts test analyzer is programmed to stop if the response time exceeds 9.5 seconds. "In just four seconds, the NDIR sen-



Horiba's NOx bench uses state-of-the-art non-dispersive infrared technology.

Photo courtesy of Horiba Instruments, Inc.

sor can measure NOx with an accuracy on a par with the IM240 test," noted **Bert Cox**, DEP's chief of vehicle programs, "and the IM240 is considered the gold standard. Response time is critical in programs, like ours, that have a rapidly changing trace."

- **Bigger Environmental Impact.** By making more accurate measurements, the new sensor will identify more of the vehicles producing excessive NOx. (Degraded sensors often pass vehicles that should fail.) Owners of these vehicles will have to get them repaired, or take them off the road; every such vehicle will contribute to a reduction

in pollution and help the state hit its federal Clean Air Act targets.

- **Enhanced Quality Control.** NOx benches are designed to perform self-checks constantly and to indicate when a self-check uncovers a problem in functionality and/or accuracy. Since 1999, Massachusetts has found that self-checks are not done at the desired levels of frequency and accuracy. The NDIR-based benches, which have had extended use in California and have won the approval of that state's nationally recognized Bureau of Automotive Repair (BAR), have not exhibited self-check problems.

The impetus to make major improvements in the *Enhanced Emissions & Safety Test* program, including the NOx bench upgrade, can be traced to a 2003 DEP analysis showing that the Commonwealth was achieving only 90 percent of its NOx reduction commitment to the federal government.

"The new benches will go a long way to putting us where we have to be in terms of reducing NOx," said Seidman. "In confronting the new challenge on NOx, we're fortunate to have the option of NDIR technology." ■

Evap System Tips

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There's an opportunity for repairers to learn more on this subject during a one-session, one-evening program later this month at the MassBay Community College Technology Center, 250 Eliot St., Ashland. "OBD Evap Failures" will be offered for four hours on Thursday, September 30, starting at 5:30 p.m. You may register for the class, or obtain more information, by calling 781-239-3048. Hope to see you there!

Chuck Pearson, a certified master trainer, operated his own repair shop in Fitchburg for over 30 years. He now works as a special staff assistant at MassBay Community College's Technology Center in Ashland. Contact him at cpearson@MBCC.mass.edu or at 781-239-3048. ■

Feel the Power – Soon – of CAN: Controller Area Network

Stations in the *Enhanced Emissions & Safety Test* network are due to receive a powerful new tool to pinpoint problems in emissions controls and other engine systems on newer cars.

Hardware and software upgrades now being made will give every station the capacity to perform emissions tests on recent-model vehicles equipped with controller area network (CAN) technology.

CAN harnesses the power of advances in on-board diagnostics that were only hinted at when the *Enhanced Emissions & Safety Test* was designed in the late-1990s, and thus represents a big step forward for the program.

“The difference between OBD without CAN and OBD with CAN is like the difference between an internet hook-up using a 28K modem and direct service line,” said **Chuck Pearson**, a master trainer affiliated with Massachusetts Bay Community College. “It’s that much faster and better.”

Program contractor Agbar Technologies must complete the CAN upgrades by February 26, 2005, under a revised contract intended to bring about significant improvements in equipment quality and test accuracy. Agbar is responsible for the costs of all the changes and upgrades called for in the revised contract.

Introduced widely for the first time in 2002 model vehicles, CAN features a kind of kingpin microprocessing unit that communicates with and controls every other electronic system in the vehicle.

Currently, CAN-equipped vehicles cannot be OBD tested for emissions in Massachusetts and must be tailpipe tested on a dynamometer instead.

“CAN’s analytical protocol is a quantum leap in terms of what it perceives happening in all electronically governed automotive systems, and in how it analyzes all of the data it collects,” **Bert Cox**, chief of vehicle programs for the Massachusetts De-

partment of Environmental Protection (DEP), explained.

“CAN captures more data than has ever been captured before and it does so more readily. For technicians in the know, CAN is going to save them considerable time over the course of a year. And the more they use CAN, the more productive they’ll become.”

The software and hardware upgrades needed to keep pace with the swift advance of CAN technology will also “alleviate some communications problems we are currently experiencing in the network with some OBD II-equipped vehicles,” Cox added.

Recognizing that CAN technology is supplementing the skills of emissions repairers, and, consequently, contributing to reductions in air pollution, the federal government has mandated that all vehicles manufactured after the 2006 model year be CAN-equipped.

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For Impact on Emissions Test, See Page 11

Turning Point: New NOx Benches, Network-Wide, 2/26/05

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