The Repair Edition

Inspection Update

Massachusetts Department of Environmental Protection and the Registry of Motor Vehicles

Volume 1, Issue 3, July 2000

Signs like this are sprouting at registered repair facilities around the state as the enhanced emissions testing and repair program enters the critical "repair phase." Actual size 28" x 36".

Urge Your Customers With a "9" to Act Now

For the inspections stations of Massachusetts, this August is a time to be proactive.

If not, September at those stations could look like December at the mall, February on the ski slopes, or April at H & R Block.

Remember, there are tens of thousands of motorists who decided last September that they didn't want to deal with the enhanced inspection program, which started Oct. 1, 1999. So they got their cars inspected in droves last September, regardless of the number on their old stickers.

Now, that unusually large group of motorists is nearly due for inspections. And it could hit the network of inspection stations in such an overwhelming fashion as to create all kinds of problems...

continued on page 2

Key to Clean Air: Keen Repair

We're calling this *Inspection Update* the repair edition in recognition of the overwhelming importance of high-quality vehicle repairs and maintenance to the success of the enhanced inspection and maintenance program.

The program is all about making our air cleaner and healthier.

To do that, it depends on two features: one, testing vehicles to identify those whose emissions control systems are not working properly; two, effectively repairing vehicles with malfunctioning emissions controls.

continued on page 5

The Enhanced Program Is Here to Stay

By Fred Civian
Deputy Director, Transportation Programs,
Mass. Department of Environmental Protection

Is the Testing Program Real Yet?


Fred Civian

One year ago about 635 inspection stations had signed up to participate in the Enhanced Emissions and Safety Test. While the state had been predicting that eventually 1,200 to 1,500 stations would participate, many inspectors and repairers decided to wait. They needed more compensation, they did not believe that the state would ever get serious about implementing this program, and they doubted that the program would survive unless many more stations agreed to participate.

What a difference a year makes. As of June 16, 1,460 inspection stations have signed contracts to participate in the Enhanced Emissions and Safety Test. The 1,200 lower cost "contractor-provided" workstations are fully deployed and the waiting list for that subsidized equipment stands at 57. These stations on the waiting list are ready to take the equipment as soon as any current station decides to leave the program.

But many stations have decided that they can't wait for other stations to leave the program, and have decided to take matters into their own hands. As of June 16, 144 public stations have signed contracts to purchase equipment directly from Keating Technologies. Although this "buy your own" option costs more than the "contractor provided" equipment, these stations have decided that it's more important to provide inspection services to their customers than to hope that one of their competitors leaves the program. Each month an average of 20 stations decides to buy their own equipment, and more are expected to sign up now to be ready for the September inspection rush.

Fleet owners have also decided to join up. As of June 16, 119 fleet owners have signed contracts for the Enhanced Emissions and Safety Test. That number is also expected to increase significantly later this year, as fleet owners gear up for the start of diesel emissions testing on January 1, 2001.

The number of stations performing tests continues to increase. In the week of June 12 -16, an average of 1,256 stations performed inspections every day, up from 1,063 during the first week of January. This is good news for motorists, making it easier for them to find businesses providing inspection services.

It's too early to tell if the new program will follow the example of the old idle test, which saw the number of stations eventually double. What is clear is that over 1,460 businesses have decided that the program is here to stay, and that consumer demand for quality inspection services will result in the 1500th station signing up for the Enhanced Emissions and Safety Test sometime in August.

For information about how to become an inspection station call the station hotline: 877-297-5552 ■

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 Keating 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:
Michael.Hurley@state.ma.us
Phone: 617-292-5633
Gilbert.Cox@state.ma.us
Phone: 617-292-5745

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

The Repair Edition

Urge Customers to Act Now

continued from page 1

Unless you, the inspection station and repair facility personnel of Massachusetts, become proactive.

Please consider checking the number on every vehicle that comes into your establishment. If it's a "9," explain to the motorist how and why September is likely to be extremely busy, not just at your inspection station or repair facility, but at every such station and facility, and that it would be best to have the vehicle inspected in August. If that doesn't fit the motorist's schedule or situation for some reason, urge him or her to get the vehicle inspected early in September.

Another approach: Ask every customer you see now who has a "9" if you can do a quick, visual safety inspection. If something is obviously wrong, safety-wise, mention the benefit of taking care of the problem sooner, not later.

And if the vehicles you see now with a "9" are more than two years old and were manufactured in an even-numbered model year, tell the owners: (a.) that an emissions test will be required this year, and (b.) if the emissions controls have to be repaired, it will be much easier for everyone concerned if that is done in August rather than September, when the wave of motorists is expected to be moving through the system.

Like so many challenging tasks, and especially those we have never had to confront before, the "September wave" can be rendered substantially less difficult through good communication.

So when you see a "9," start talking! Your customers will be glad you did. ■

Web Page

Don't forget to keep an eye on our website for new program information.

www.vehicletest.state.ma.us

Diagnostic/Training Centers Help Solve Even the Trickiest Emissions Problems

The Repair Edition

Terry Hayes
Mgr., Field Operations
Keating Technologies

Cars from hell, your days are numbered!

No longer will you bedevil the best automotive technicians with your mysterious malfunctions.

No longer will your out-of-kilter emissions controls keep you stranded in your owner's favorite repair shop.

Your nemesis has arrived, and it's called DTC:

Diagnostic and Training Center.

In designing the new enhanced vehicle inspection and maintenance program, the Commonwealth of Massachusetts recognized there would always be some cars that would be extremely difficult to bring up to emissions standards — cars whose emissions control systems would defy all normal attempts at repair and improvement.

Those "hard cases" should go, the state decided, to Diagnostic and Training Centers (DTCs) to be set up at convenient locations around the Commonwealth and staffed by Keating Technologies, the general contractor for the enhanced inspection and maintenance program.

Today, there are five such DTCs in full operation five days a week, Monday through Friday, 8:00 a.m. to 6:00 p.m. daily. They are located in Bridgewater, Dedham, Oxford, West Springfield and Woburn. *See pages 14 and 15 for the address and phone number of the DTC closest to you.*

DTCs "help the repair industry make difficult emissions repairs," explains Terry Hayes, manager of field operations for Keating Technologies and supervisor of the Dedham DTC.

"There is so much that is new in the technology of emissions controls," Hayes said. "It is like its own world within the larger world of automotive repairs. We have the luxury at the Diagnostic and Training Centers of being able to focus exclusively on emissions repairs, which enables us to play a role that complements nicely the efforts of the registered repair facilities."

The DTCs offer **free** and unlimited diagnostic services; the actual repair must be done back at the repair facility that has brought the vehicle to the DTC. Only registered repair facilities may utilize a DTC. *

Hayes and his DTC colleagues have enjoyed the opportunity to work with the registered repair technicians. They respect the technicians, Hayes emphasized, "as colleagues, as highly-skilled, very experienced people who could be teaching us more than a few things about the non-emissions aspects of automotive technology."

Each DTC is staffed by two full-time emissions control specialists: the on-site DTC supervisor and a technician who, at minimum, is L-1 certified. "We are proud to say that we have 10 people, all of whom are highly-skilled in emissions repairs, and each of whom has particular skills they can apply to those hard-to-fix cases," said Hayes, who worked for several large auto dealerships as a service manager before joining Keating Technologies. "And the good thing is they are talking with each other all the time. There is a great exchange of information. We share the talent."

Mike Zabik of the West Springfield DTC provides a good example of the kinds of problems presented thus far to the centers: "We had a repair facility in Chicopee call us about a 1984 Ford Crown Victoria, which failed the emissions tests because of high carbon monoxide (CO). This particular car had been manufactured in Canada, so it had a carburetor. I did a little research and found that a technical service bulletin had been posted on the carburetor's power valve. Once the technician replaced the valve, the CO dropped and the car could pass."

Through Terry Hayes, Keating Technologies has extended an open invitation to all registered repair technicians to call or visit one of the DTCs. "An introductory visit is probably the best way to learn about a DTC and how we can best be of service," said Hayes, "but if you don't have time for a visit, call us up and have a chat. The more we know about each other, the more effective we're all going to be."

If you do make one of those introductory calls, be sure to ask about the powerful, state-of-the-art diagnostic equipment on hand at every DTC. *See accompanying list.* Each DTC also has an ASPIRE hotline and the ALL-DATA computerized information system, which allows registered repair facilities to access a wealth of technical information on every make and model, such as electrical wiring diagrams.

Notwithstanding their high-tech equipment, the DTCs have found that, so far, they have mainly been rendering services

continued on page 4

Diagnostic Equipment Available at Every Diagnostic & Training Center

- ASPIRE Hotline
- ALLDATA Online Technical Manuals
- SPX exam Engine Analyzer
- OTC Genisys Scan Tool
- Master Fuel Pressure Gauge Set
- Infrared Thermometer
- Compression Tester
- Vacuum Pump
- Vacuum Back Pressure Gauge
- Ultrasonic Leak Detector
- VAT 40
- 12 Volt Self-Powered Test Light
- Injector Noid Light Set
- Battery Charger
- Perception Multimeter/Lab Scope
- Visible Vapor Leak Detector System
- Sensor Simulator

Diagnostic/Training Centers Help Solve... continued from page 3

through that most humble of devices, the telephone.

"We have been able to solve the problem in most cases over the phone," said Hayes. "Sometimes we identify it right away. At other times, we have to walk through it slowly, checking off all the possibilities. But only rarely has a repair facility had to bring the vehicle in for us to do some tests on it."

That situation will change fairly soon, Hayes pointed out, as the emissions "cut points" continue to be lowered. To reach the clean air targets set for Massachusetts by the federal Environmental Protection Agency, the Commonwealth must gradually tighten the emissions standards, which in turn is expected to create more business for the DTCs.

Although the DTC staff readily accept phone calls from registered repair shops with problem vehicles on their hands, they urge repair technicians to fill out a **Diagnostic Report Form** on the vehicle first and fax that form to the nearest DTC, along with the **Vehicle Inspection Report**. These steps significantly expedite the diagnostic process

When discussing the DTCs, Terry Hayes will almost always bring the conversation around to the importance of training. "The days when an automotive technician would learn by trial and error are gone," he notes. "Vehicles today are too complex for that to work. You have to take the initiative to find out where you might have technical weaknesses. You have to recognize those weakness and you have to get yourself trained." ■

** To become a registered repair facility, that facility must employ at least one registered repair technician full time and have some specialized equipment. To enroll your business as a registered repair facility, or to obtain more information about the registration requirements, please call the main number at Keating Technologies, 508-624-9159* ■

The Repair Edition

Registered Emissions Techs Enter Spotlight During Program's Repair Phase

There is no law preventing an automotive technician who lacks formal training and certification from working on a car or a truck today in Massachusetts.

Nevertheless, the future of vehicle emissions repair work clearly belongs to those automotive technicians who have taken a professional approach to education, training and certification.

Karl Schneider of Karl's Automotive, 268 Front St., Winchendon, frames the situation in frank terms: "It's time to stop fixing cars by luck, and time to obtain the knowledge that will allow you to fix today's high-tech vehicles right the first time."

With the enhanced vehicle inspection and maintenance program entering the "repair phase," there is going to be an increasingly greater emphasis on motorists utilizing the services of registered emissions technicians when having their emissions control systems repaired.

During the implementation phase of the program, there was a great deal of essential information to communicate to consumers about the new enhanced emissions and safety test — so much so that the program messages regarding repairs were often overlooked by the media.

That situation is changing naturally now on account of the key role that emissions repairs play in the overall effort to hit the clean air targets of the program.

As the attention of consumers and of the media shifts to repairs, it also focuses, of course, on repair technicians. Questions such as, does my repair shop have the special skills it takes to work on today's computer-controlled emissions systems, and what is the difference between a registered repair technician and a non-registered technician, come to the fore.

In Massachusetts, there are a number of conveniently-located institutions where automotive technicians may take the courses and examinations needed to become a registered repairer. Before signing up for a particular course, however, a technician should take an Emissions Repair Skills Assessment, which is offered through Massachusetts Bay Community College, Wellesley. Call 781-239-2702 for more information.

Automotive technician training and certification testing are offered at the following institutions:

ADVANCED TECHNICAL TRAINING, 20 Johnson Rd., Chicopee, MA 01039. 413-268-8337. Contact: Mark Oliver.

AUTOMOTIVE CAREER DEVELOPMENT CENTER, 19 Wells St., Worcester, MA 01604. 800-939-7909. Contact: Craig Van Batenburg.

DIMAN REGIONAL VOCATIONAL TECHNICAL SCHOOL, 257 Stonehaven Rd., Fall River, MA 02723. 781-239-2702. Contact: Howard Ferris.

HI-TECH TRAINING, 298B North St., Randolph, MA 02368. 781-963-9249. Contact: Bob Mann.

MASSASOIT COMMUNITY COLLEGE, 900 Randolph St., Canton, MA 02021. 508-427-1210. Contact: Brian O'Leary.

MASS BAY COMMUNITY COLLEGE, 50 Oakland St., Wellesley, MA 02181. 781-239-2702. Contact: Howard Ferris.

MT. WACHUSETT COMMUNITY COLLEGE, 444 Green St., Gardner, MA 01440. 978-632-6600. Contact: Peter Kaufmann.

NORTH SHORE COMMUNITY COLLEGE, One Ferncroft Rd., Danvers, MA 01923. 978-762-4000, x6924 or 781-477-2134. Contact: Bob Rose.

SNAP-ON/SUN TECH SYSTEMS, 91 Cedar St., Milford, MA 01757.

800-879-3322, x6106. Contact: Peter Orlando.

THOMAS AUTOMOTIVE TRAINING SOLUTIONS, 9 North St., Bellingham, MA 02019. 609-989-8897. Contact: Mark McKenna.■

Trade Associations Directory

The interests of automotive service and repair industry people in Massachusetts are ably represented by a variety of trade associations, including the following:

Council of Advanced Automotive Trainers (CAAT)
632 Gamble Drive.
Lisle, IL 60532
www.caat.org
800-922-2894

Alliance Of Automotive Service Providers of MA and RI (AASP)
643 Broadway
Suite 129
Saugus, MA 01906
aspin@mail.tds.net
888-627-4272

New England Service Station and Automotive Repair Association Inc. (NESSARA)
574 Boston Road
Suite 12
Billerica, MA 01821
800-762-9734

Automotive Repair Association Group (ARA)
24 Wells Street.
Worcester, MA 01604
508-792-9541

MA State Automobile Dealers Association
59 Temple Place
Suite 505
Boston, MA 02111
(617) 451-1051

New England Independent Automobile Dealers
200 Wheeler Road
Suite 700
Burlington, MA 01803
(800) 573-4232

Statewide Towing Association, Inc
11 Turnpike Road
Suite 202
Southboro, MA 01772
www.sta.gisnet
508-303-6699

The Repair Edition

Waiver Denials Due Mainly to Non-Registered Emissions Technicians Doing the Work

Many Bay State motorists are apparently unaware of the requirement that emissions repairs must be done by a registered technician in order to have the option of seeking a waiver, which would exempt them from incurring further repair costs on the emissions controls for a period of two years.

Since the implementation of the enhanced vehicle inspection and maintenance program last fall, several hundred motorists have applied to the state for waivers after their vehicles failed the emissions re-test.

Approximately 50 percent of those requests have been denied, and in virtually every case, the denial was based on the fact the motorist had failed to have a registered emissions repair technician do the work, or they had had the wrong repairs done. If the motorist has utilized the services of a non-registered emissions technician, and his vehicle has failed the re-test, he has voided his chance to apply for a waiver based on those repairs.

When that fact dawns on the motorist, there is usually deep disappointment, if not outright anger. "How come no one told me that?" is the usual response.

"From Day One, it was important, whenever a vehicle failed the emissions test, for the inspection stations to inform the owner of the rules regarding waivers," said Fred Civian, Deputy Director of Transportation Programs for the Massachusetts Department of Environmental Protection. "Now, with the cut points coming down and more vehicles failing the emissions test, it is even more important for inspection stations to help protect consumers by emphasizing the need to have only registered emissions technicians working on their cars."

To date, about five-and-a-half percent of the vehicles inspected under the new program have failed. (This figure reflects both safety and emissions failures.) The new, lower cut points for emissions standards will boost that failure rate to between nine and ten percent in the coming months.

Inspection stations should, therefore, expect more questions from consumers about emissions repairs and how to qualify for a waiver. For help in answering those questions, do not hesitate to refer consumers to the free ***Enhanced Emissions and Safety Test Motorist Hotline: 1-877-387-8324*** ■

Keen Repair

continued from page 1

Now that a new state-wide network of inspection stations has been fully established, the enhanced inspection and maintenance program has entered a new, critical period: the repair phase.

The repair phase is centering naturally on the registered repair technicians and the registered repair facilities. The repair phase is *their* era because they uphold the skill and performance standards necessary to achieve the environmental objectives of the program and to earn the trust of the public. It is to those technicians and facilities that we dedicate this *Inspection Update*. We especially want to thank those facilities that were with the program from the very start. ■

FREE SEMINARS

Keating Technologies, the general contractor for the enhanced vehicle inspection and maintenance program, is offering ongoing training seminars for inspectors and service personnel to improve their inspection techniques and perfect their skills.

Conducted regularly at the five Keating-operated Diagnostic and Training Centers, the seminars focus on such subjects as calibration procedures, testing procedures, and software familiarization. Each seminar lasts for four hours.

Call the station support hotline, **1-877-297-5552**, for upcoming seminar dates, and to reserve your spot. The locations of the Diagnostic and Training Center are listed on the map on pages 14 and 15 of this publication.

It Helps to Know How Pollutants Are Formed During Combustion

The Council of Advanced Automotive Trainers (CAAT) has granted permission to Inspection Update to publish two copyrighted articles by Don Knowles in this edition. The first, which begins below and continues on page 11, deals with the components of motor vehicle exhaust. Beginning on page 11, the second article is a wonderfully detailed presentation on the five-gas analyzer and on how this device helps an automotive technician diagnose an array of engine performance problems. These articles originally appeared in the August and September 1999 editions of the CAAT publication, Automotive Emission and Repair Newsletter (AERN). We salute CAAT and AERN for their expertise, and we thank them for their generosity. For more information, visit www.CAAT.org

By Don Knowles

Technicians must understand the sources of automotive emissions, and the causes of excessive emissions. The importance of emission standards and reducing emissions also needs to be understood. Technicians must also be able to diagnose and correct the causes of excessive exhaust emissions. To accurately diagnose excessive exhaust emissions, technicians must understand how each pollutant is formed during the combustion process.

Environmentalists are mainly concerned about hydrocarbon (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) emissions from vehicle exhaust. Other measured emissions are oxygen (O2) and carbon dioxide (CO2). HC emissions may also come from evaporative sources such as fuel tanks.

Gasoline contains mainly hydrogen and carbon. HC emissions are caused by unburned fuel resulting from incomplete combustion. Excessive HC emissions are the result of a rich or lean air-fuel ratio, ignition misfiring, or mechanical engine problems.

Five-gas analyzers measure HC emissions in parts per million (ppm). HC emissions are low at the stoichiometric air fuel ratio of 14.7:1. If the air fuel ratio becomes richer than stoichiometric, HC emissions increase rapidly.

When the air-fuel ratio becomes leaner than 14.7:1, misfiring occurs resulting in unburned fuel and excessive HC emissions coming out of the tailpipe.

CO is an colorless, odorless, tasteless gas. Excessive CO emissions are caused by a rich air-fuel ratio and incomplete combustion. When the air-fuel ratio is rich, there is not enough oxygen to combine with the fuel for complete burning of the fuel. CO emissions are low at 14.7:1 air-fuel ratio and these emissions increase as the air fuel ratio becomes richer. If the air fuel ratio is leaner than 14.7:1, CO emissions remain low. Therefore, high CO emissions indicate a rich air-fuel ratio. Five-gas analyzers measure CO emissions in percentage by volume of exhaust.

NOx is an odorless, colorless gas that is a natural byproduct of combustion under certain conditions. Five-gas analyzers measure NOx in parts per million (ppm). Approximately 78 to 79 percent of the air we breath contains two atoms of nitrogen (N2). Nitrogen is a stable, inert gas that does not easily change composition or combine with other gases.

However, if nitrogen is heated above 2500 degrees F, (1371 degrees C), it becomes unstable and easily joins with other gases such as oxygen. The air we breath also contains about 21 percent oxygen which contains 2 atoms of oxygen (O2). Normal combustion temperatures may exceed 2500 degrees F (1371 degrees C). If combustion temperatures exceed this value, atoms of nitrogen are released from the nitrogen to join with an undetermined number of oxygen atoms to from oxides of nitrogen (NOx). When the air-fuel ratio is rich, NOx emissions are very low. In relation to air-fuel ratio, Nox emissions are highest when the air-fuel ratio is slightly leaner than stoichiometric. The secret to reducing NOx emissions is to keep combustion temperature below 2500 degrees F (3171 degrees C). The exhaust gas recirculation (EGR) valve allows exhaust flow into the intake manifold to reduce combustion temperature and NOx emissions.

Excessive NOx emissions may be caused by a defective EGR system, cooling system defects, ignition system faults, or fuel system malfunctions. Later we will discuss exhaust emission diagnosis in detail, and the causes of high NOx emissions.

Oxygen is the amount of O2 left in the vehicle exhaust after combustion. Five-gas analyzers measure O2 emissions in percentage of exhaust volume. The O2 level is low at 14.7:1 air fuel ratio. If the air-fuel ratio becomes leaner than 14.7:1, the O2 emissions increase. When the air-fuel ratio is richer than 14.7:1, O2 emissions do no increase above the O2 level at 14.7:1 air-fuel ratio. O2 emissions are not harmful to the environment or to humans.

CO2 emissions are a product of complete combustion. When combustion efficiency increases CO2 emissions become higher. Five-gas analyzers measure CO2 emissions in percentage of exhaust volume. CO2 emissions are not harmful to humans. Although CO2 emissions are not directly harmful to the environment here on earth, they are a greenhouse gas, and scientists believe these gases contribute to global warming.

Health Effects of CO and Nox Emissions

HC and NOx emissions in the atmosphere are catalyzed by sunlight to form ozone. The rate at which this chemical reaction takes place depends on the intensity of sunlight and the temperature. More ozone is created from HC and NOx emissions on hot summer afternoons. Ozone is a molecule containing three oxygen atoms linked together. HC and NOx emissions come from a variety of industrial and combustion sources. In a typical urban area 30 percent to 50 percent of the HC and NOx emissions come from cars, trucks, and buses.

The ozone layer in the upper atmosphere protects us from the sun's harmful ultra violet rays. However, ozone at ground level is highly corrosive and damages plant, animal, and human

continued on page 11

Congratulations to the Registered Repair Technicians of Massachusetts*

The Repair Edition

First Name	Last Name	City/Town
JOHN	ADAMCZYK	CHICOPEE
STANLEY	ADAMCZYK, III	CHICOPEE
DAVID	ADARIO	MELROSE
JAMES	AIKEN	ASHFIELD
JAMES	ALDOUPOLIS	WEYMOUTH
JAMES A.	ALEXANDER	CAMBRIDGE
DAVID	ALFANO	MELROSE
WILLIAM M.	ALLEN	NEWBURYPORT
SCOTT R.	ALLEN	SHREWSBURY
JOEL	AMARAL	EAST FREETOWN
PAUL W.	AMES	BYFIELD
SCOTT D.	AMUNDSEN	HAVERHILL
ALAN A.	ANACKI	BRIDGEWATER
KEVIN D.	ANDERSON	SPRINGFIELD
KARLTON	ANDERSON	BONDSVIILLE
DANIEL	ANDREWS	MEDFORD
TIMOTHY E.	ANDREWS	MIDDLEBORO
ROBERT	ANSELL	SWAMPSCOTT
JOSEPH F.	ANTANAVICH	ANDOVER
DON	AREL	WESTPORT
GERARD	ARMSTRONG	STOUGHTON
EDWARD J.	ARSENAULT, JR.	PEABODY
WILLIAM P.	AUCOIN	MILFORD
PETER	AYRTON	EAST FALMOUTH
RUSSELL	BACA	NORTHAMPTON
PAUL	BACHOFNER	HOLBROOK
TED	BANACH	WORCESTER
YUVAL	BANAYAN	MELROSE
JAMES L.	BARTELS	PEMBROKE
DOUG	BASHISTA	SOUTH DEERFIELD
AUBREY	BATES	BRADFORD
DEREK	BEAULIEU	WRENTHAM
STEPHEN P.	BELITSOS	BELCHERTOWN
PETER J.	BELLEFEUILLE	DERRY
MARK	BELLEGARDE	TOWNSEND
EDWIN	BENNETT	YARMOUTH
RICHARD E.	BENNETT JR.	TYNGSBORO
SIMON	BERBARA	NORWOOD
ROBERT J.	BERGMANN	NEW BEDFORD
DEREK	BERGQUIST	WARWICK
THOMAS P.	BILODEAU	DEERFIELD
MARTIN	BIRD JR.	COLRAIN
DIRK	BOHN	CHICOPEE
PATRICK	BOND	LEXINGTON
WILLIAM R.	BONIA	BRIDGEWATER
DAN	BONNETTE	WEBSTER
MICHAEL	BORGES	NEW BEDFORD
RAYMOND	BORON, JR.	SHELBURNE
CHRISTOPHER	BOTELHO	REHOBOTH
MICHAEL R.	BOUCHARD	MARBLEHEAD
ROBERT M.	BOUCHARD	SALEM
KEVIN	BOUCHER	LEOMINSTER
PAUL	BOUTHILLER, JR.	SOUTH HADLEY
BRIAN	BOUVIER	HAVERHILL
CHARLES	BOYLE	NORTH OXFORD
STEPHEN J.	BRACKETT	NORTHHAMPTON
RUSSELL K.	BRADWAY	SHREWSBURY
MATTHEW T.	BRATSOS	MILLIS
ROLAND P.	BRETTA	EAST LONGMEADOW
WAYNE	BROOKS, SR.	WEST BROOKFIELD
RICHARD J.	BROWN	EASTHAMPTON
GARY P.	BROWN	HOLDEN
CHARLES	BROWNE	NORTH PROVIDENCE
TAD	BURAK	HADLEY
ROBERT	BURESH	ABINGTON
WILLIAM	BURKE	BARRINGTON
DENNIS	BURKE	HANSON
ROBERT C.	BURKE	SOUTH WEYMOUTH
STEPHEN	BURKE	MILFORD
LENNY	BURNHAM	WOBURN
RICHARD	BURNHAM	SALEM
FRANCOIS	BURNOT	GEORGETOWN
DIMITRY	BYKHOVSKY	BOXBORO
FERNANDO	CABRAL	TAUNTON
RICHARD	CADOTTE	WAKEFIELD
J. WILLIAM	CAHILL	RANDOLPH
MICHAEL	CALAUTTI	BURLINGTON
TIMOTHY	CALEY	SOUTH WEYMOUTH
STEVEN J.	CAMPANALE	HOLDEN
RICHARD A	CAMPBELL	WALTHAM
KEVIN S.	CAMPBELL	WEST WAREHAM
DANIEL	CAMPBELL	MARLBORO
JAMES	CARGILL	MEDFORD
DEAN	CARLTON	WEYMOUTH
JOHN F.	CARMODY	WALTHAM
MANUEL A.	CARNEIRO	MILFORD
KEVIN	CARPENTER	HUBBARDSTON
JOSEPH	CARUSO, JR.	WALTHAM
JAMES E.	CASEY, JR.	BELLINGHAM
RUSSELL	CENTERBAR	CHICOPEE
ROBERT A.	CHACE	SOMERSET
JEFF	CHANDLER	TAUNTON
JEFFREY	CHANDLER	DUXBURY
MICHAEL D.	CHANDLER	CHICOPEE
ARTHUR	CHARTIER	WORCESTER
BRYAN	CHEVARIE	LEOMINSTER
SAUNDY C.	CHIN	WEYMOUTH
MARK ROBERT	CHISAM	BROCKTON
TOBY	CHIXARRO	TAUNTON
WILLIAM	CHOPELAS	READING
ROGER L.	CHOUINARD	WAKEFIELD
GEOFFREY	CIRINNA	SALEM
JOHN	CLAPP	CLINTON
PAUL	CLARK	SOUTH EASTON
ED	CLASS	VERNON
PHILIP H.	CLEMENT	PEABODY
DANIEL J.	CLIFFORD	YARMOUTHPORT
PETER	COFFEY	HOPKINTON
ROBERT	COLE JR.	EASTHAMPTON
GEORGE	COLLINS III	NEEDHAM
JOHN	COMER	HUDSON
ROBERT	CONNOLLY	EAST WAREHAM
CHRIS I.	CONNOLLY	GREENFIELD
GERARD D.	CONTON	NORFOLK
ROBERT	COOPER	LYNNFIELD
MARK	COPELAND	MILLBURY
NEIL	CORCORAN	KINGSTON
RICHARD	CORREIRA	BERKLEY
JOHN	COSIMINI	NATICK
GERALD A.	COSTA JR.	DOUGLAS
LAURENT	COTE	WORCESTER
MATTHEW W.	CRAIG	GEORGETOWN
BRIAN	CREEGAN	TYNGSBORO
THOMAS	CRONIN	BLACKSTONE
SHAMUS P.	CURRAN	WAKEFIELD
RICHARD CHARLES	CURRIER	AMESBURY
FRANK	CURRO, JR.	ACTON
KEVIN	CYR	NORTON
ANTHONY	DALLAS	SPRINGFIELD
GEORGE P.	DAMATO	HYDE PARK
MIKE	DANE	WILBRAHAM
WILLIAM	DANGLEIS	WILBRAHAM
RANDY S.	DANIELS	PERU
MARC	DARISSE	SALEM
THOMAS A.	DARU	WEYMOUTH
JAMES	DAVIDIAN	CONCORD
RICHARD M.	DAVIDSON	MEDFIELD
ROBERT B.	DAVIDSON	ROCKLAND
DALE	DEACON	ROCKLAND
BRUCE	DEANE	SAUGUS
MICHAEL	DECOURCY	PEABODY
BRIAN	DEJORDY	CHICOPEE
LARRY	DELLA PENNA	CHICOPEE
ROBERT E.	DENLEY	BECKET
THOMAS	DENNETT	CHELMSFORD
PAUL A.	DEROSIER	NORTHBORO
FRANCIS A.	DESRUISSEAUX	LOWELL
DOUG	DEVITO	WALTHAM
BERNARD	DEYO	SHELBURNE FALLS
MAURO M.	DIBACCO	ROWLEY
DANIEL R.	DIEMAND	ENFIELD
PAUL	DINEEN	PEPPERELL

**This list reflects all those who were enrolled with Keating Technologies, Inc. as registered repaired technicians as of Monday, June 19, 2000. Inspection Update will publish the names of newly-enrolled registered repair technicians in future editions.*

Registered Repair Technicians-continued

First Name	Last Name	City/Town
RICHARD D.	DIORIO	READING
RALPH	DIPRIMIO	HANSON
JOHN V.	DOBAY SR	FRAMINGHAM
MICHAEL	DONAHUE	SPRINGFIELD
MICHAEL E.	DONELAN	ORANGE
ROY	DOUCETTE	WESTFORD
JOSEPH JOHN	DOUCETTE	WORCESTER
DAVID C.	DOW	FOXBORO
PAUL	DRAPEAU	MILLBURY
RONALD P.	DUBE JR.	LAWRENCE
NORMAN	DUBOIS	MILFORD
JEFFREY M.	DUBREUIL	CHESHIRE
DAVID A.	DUCHARME	TOWNSEND
RICHARD	DUFFY	EAST FALMOUTH
THEODORE	DUMAS	HOLDEN
PAUL	DUNTON, JR.	MARSHFIELD
DENNIS	DURAND	SWANSEA
KEITH	DURAND	BLACKSTONE
EDWIN	DZIOBA	SALEM
RANDY	EAKIN	MEDWAY
SCOTT	EAKIN	MEDWAY
JOHN	ELFBAUM	EAST BRIDGEWATER
TIMOTHY P.	ELLIOTT	WEST BROOKFIELD
BRIAN	ELMES	ATTLEBORO
CHARLES	ENTWISTLE	LEICESTER
JEFFREY	ERICKSON	PEABODY
EDWARD	ERLENBAUGH	ABINGTON
MICHAEL	ERWIN	GLOUCESTER
ANDREW	EVERSON	ATTLEBORO
LOUIS J.	FARKAS JR	WILMINGTON
EDWARD	FARRELL	BURLINGTON
DANA	FAULKNER	TEWKSBURY
STEPHEN	FAVREAU	AVON
HOWARD	FERRIS	MARLBORO
STEVEN	FERRON	WEST BOYLSTON
DAVID E.	FERRON	FLORENCE
JOHN J.	FERRY, JR.	HANSON
JOHN	FINLAYSON	NEWTON
ROBERT	FINOS	SAUGUS
SCOTT	FITZGERALD	HUDSON
DENNIS	FLAHERTY	NORWOOD
BRYAN W.	FLOOD	ACTON
LAURENCE C.	FLYNN	GREENFIELD
WAYNE D.	FOLEY	BLACKSTONE
DANIEL	FOURNIER	BEVERLY
ROGER	FOWLER	SHIRLEY
RANDALL	FOX	WOBURN
ROBERT P.	FRAIN, JR.	WESTWOOD
STEVEN	FRANCHITTO	FRAMINGHAM
DAMIAN	FRATTASIO	PEMBROKE
WILLIAM	FREEMAN	AMHERST
WILLARD	FRENCH	STERLING
SAMUEL J.	FRINK	CHESTER
STEPHEN	FROST	LANCASTER
ROBERT G.	GADSBY, JR.	MIDDLEBORO
KENNETH	GAGNE	WARE
MICHAEL D.	GALANTE	NORTON
JOHN	GALBRAITH	BRAINTREE
SEAN	GALIANO	WEYMOUTH
PAUL T.	GALLAGHER	WEST SPRINGFIELD
ROBERT	GALLANT	RAYMOND
SCOTT H.	GARCEAU	CLINTON
JAMES E.	GARDNER	STERLING
JAMES	GARRETT	WOBURN
JAMES	GEMMA	LEOMINSTER
STEPHEN	GEMME	SPRINGFIELD
ANTONIO	GENCARELLI	WORCESTER
DANIEL	GENTILE	WESTWOOD
MARK	GIAMMALVO	NEW BEDFORD
GLENN	GIAMMALVO	NEW BEDFORD
STEVEN H.	GILLARD	PEMBROKE
ANTHONY	GIRARD	TAUNTON
ROBERT J.	GLASTETTER	NORTH CHELMSFORD
MICHAEL	GONTHIER	SOUTH HAMPTON
RAUL	GONZALEZ	HOLYOKE
ROBERT	GOOCH	ASHLAND
BARRIE	GORDON	BURLINGTON
MARK T.	GORMAN	NORTH WEYMOUTH
CHARLES	GOVE	HAVERHILL
EMERSON	GRANT	CHICOPEE
ROBERT B.	GREER	MILFORD
DANNY J.	GRIFFIN	GROTON
GLENN W.	GRIGGS	WESTFORD
RAYMOND	GRIMSLEY	TOWNSEND
ROBERT	GRINLEY	MEDFORD
GARY A.	GUIDETTI	FEEDING HILLS
NATHAN R.	GUILE	FITCHBURG
BART	GUINEY	YARMOUTHPORT
DAVE	HACKETT, JR.	MELROSE
EDWARD A.	HAGELSTEIN JR.	FLORENCE
WAYNE W.	HAGMAN	BRIDGEWATER
WILLIAM	HAMILTON	SWANSEA
ANDREW S.	HAMILTON	WENDELL
JAMES	HANNIFAN	EASTHAMPTON
DONALD	HANSEN	WESTFIELD
CHARLES	HARKINS	STOUGHTON
JAMES A.	HARPER, JR.	BREWSTER
JAMES G.	HARRIMAN	SOUTH DENNIS
JOSEPH F.	HARTIN, JR.	NATICK
GLENN A.	HARTLAND	LINWOOD
DAVID R.	HASKINS	WESTPORT
NICHOLAS N.	HATHEWAY	NEWBURY
LARRY J.	HATINEN	MANOMET
RALPH A.	HAYNES	NORTH ATTLEBORO
ERNEST	HAYWARD	LUDLOW
KEVIN	HEBERT	FLORENCE
BRIAN K.	HENDERSON	COLRAIN
DENNIS	HENNIHAN	EAST LONGMEADOW
DAVID	HENRY	EASTHAMPTON
DANIEL J.	HENSEL, JR.	LAWRENCE
STEVEN	HERGET	OCEAN BLUFF
KARL	HERING	BEVERLY
STANLEY R.	HIBBINS JR.	AMESBURY
FRED	HILTON	BRADFORD
DAVID R.	HILTON	ACTON
GEORGE	HOC	EAST BRIDGEWATER
FRANK A.	HODELL	LUNENBURG
HOWARD	HOGG	WARWICK
ERIC	HOHMANN	ROSLINDALE
ROBERT	HOLCOMB	HOUSATONIC
MIKE	HOLLAND	IPSWICH
THOMAS	HOLMES	WEST WAREHAM
JOEL D.	HONIG	RANDOLPH
ALBERT	HORGAN	KINGSTON
PAUL F.	HOULE	EASTHAMPTON
STEPHEN S.	HOWLEY	UXBRIDGE
STEPHEN	HUBACHECK	BOURNE
ARTHUR E.	HUBBARD	NEWBURYPORT
PHILIP C.	HUGHES	MEDFORD
KEVIN J	HUNT	MEDFORD
BARRY	INNERFIELD	WAKEFIELD
LARRY	JACOBS	ABINGTON
CARL	JACOBS	BROCKTON
JAMES	JAMISON	ATTLEBORO
WILLIAM	JARMULOWICZ	SUDBURY
BRUCE	JEPSEN	HOLDEN
JEFFREY L.	JOHNSON	HUDSON
TRAVIS	JOHNSON	SPENCER
THEODORE M.	KAJDAN	ENFIELD
PAUL J.	KARPOWICZ	METHUEN
HERBERT	KELDER	WILBRAHAM
DONALD	KELLER	NORTHBORO
CHARLES V.	KELLEY	YARMOUTHPORT
JEFFERY P.	KELLICKER	WORCESTER
JAMES S.	KELLY	HALIFAX
JOHN	KELLY	NEWTOWN
ALAN	KENT	WORCESTER
ROBERT	KENYON	GLOUCESTER
SCOTT E.	KESSELL	PLYMOUTH
ERVANT	KIBARIAN	CHELSEA
JOHN	KINGSBURY	CANTON
JOSHUA	KIRK	GROTON
RICHARD	KLEINER	ADAMS
DANIEL	KLIMOSKI	HOLYOKE

Registered Repair Technicians-continued

First Name	Last Name	City/Town
MARK	KNIGHT	GROVELAND
SHANE L.	KUJA	PEPPERELL
GERARD	LACHANCE	NEW IPSWICH
ERIC	LACOMB	CHICOPEE
ROGER A.	LAFEUR	LEOMINSTER
STEVE	LAFOND	ARLINGTON
JAMES DAVID	LAJEUNESSE	MILLBURY
KEVIN R.	LALONDE	WEST SPRINGFIELD
JOHN	LAMB	MILFORD
BARRY	LAMOTTE	BROCKTON
SCOTT	LANDRY	GARDNER
CHRIS	LAPIERRE	REHOBOTH
CHRIS	LAPLANTE	EASTHAMPTON
MARK	LAPOINTE	PELHAM
WALTER	LARDIN	MEDWAY
BRIAN	LARSON	LEICESTER
JOHN E.	LARSON	PEABODY
BRIAN	LAVIGNE	WOONSOCKET
DAVID S.	LAWRENCE	PEPPERELL
GERARD	LAZZARO	WALPOLE
KENNETH	LE BLANC	HAVERHILL
THOMAS R.	LEAVENS	ROCKLAND
PHILL G.	LEE	NASHUA
MICHAEL W.	LEE	ABINGTON
MIKE	LEES	OXFORD
JONATHAN W.	LEIGHTON	BELCHERTOWN
ANDREW	LEMOINE	HUBBARDSTON
RICHARD	LEPAGE	CHICOPEE
MARGUERITE	LEVASSEUR-FISCHE	MARLBORO
THOMAS	LINCOLN	ATTLEBORO
BRUCE	LISAK	WHITINSVILLE
WILFRED	LIVERNOIS	BELCHERTOWN
GORDON	LOMAX, JR.	CHARLTON
KEVIN	LONG	FRAMINGHAM
GERALD W.	LOONEY	LOWELL
GERALD	LORANGER	MONSON
ERIC	LUBARSKY	AGAWAM
RICHARD	LUCENTE	NATICK
HAROLD	LUNNIN	LAKEVILLE
PAUL A.	LUSSIER	HUDSON
SEAN	LYNCH	WEST ROXBURY
MICHAEL J.	LYONS	BRIDGEWATER
DAVID	LYSTILA	FITCHBURG
JAMES	MACDONALD	SOMERVILLE
SCOTT	MACDONALD	PEABODY
GARY	MACHIROS	ROWLEY
KEN	MACIEL	ROCKPORT
WAYNE K.	MACKEIL	FRAMINGHAM
BRUCE	MACKINNON	CAMBRIDGE
ROBERT	MACKINNON	GLOUCESTER
DAVID L.	MACMURDO	TEWKSBURY
DAVID J.	MACRAE	DANVILLE
HANI	MAKHLOUTA	QUINCY
JOHN F.	MALANEY, JR.	WHITMAN
CYRIL	MALEY	GROTON
ROBERT	MANN	PEMBROKE
ROBERT C.	MANTHORNE	WOODSTOCK
JOHN M.	MARCHOCKI	MATTAPAN
FRANCIS	MARCOUX	DOUGLAS
JOHN C.	MARE	NEW BEDFORD
RICHARD A.	MARINO	MARLBORO
GLENN	MARKLEY	NORTH PROVIDENCE
RICHARD	MARRIER	DUDLEY
ERIC D.	MARSCHKE	WALPOLE
HARRY A.	MARSHALL	TOWNSEND
JOEL S.	MARTEL	BRIMFIELD
STEVE	MARTIN	WALPOLE
STEVEN	MARTIN	HUDSON
KAMEL	MASOUD	MALDEN
MARK	MAZUROSKI	FRAMINGHAM
DAVID A.	MCALLISTER	NORTH CHELMSFORD
JAMES P.	MCCALL	FRANKLIN
MICHAEL	MCCANN	WESTFIELD
GLEN	MCCARTHY	MARSHFIELD
CARL JAMES	MCCLATCHEY, JR.	GROTON
STEPHEN	MCGAFFIGAN	PEPPERELL
STEPHEN T.	MCGRATH	EASTHAMPTON
KEVIN F.	MCGROARTY	BRAINTREE
WILLIAM	MCLEAN	NEWTON
RICHARD G.	MCNICHOLS	WEST ROXBURY
WILLIAM	MCSOLLA	BRIDGEWATER
JOSE	MEDEIROS	NEW BEFORD
DAVID	MELLO	WESTPORT
LYN L.	MENARD	CHICOPEE
STEVEN	MERRILL	GRANDBY
ROBERT L.	MILLER	GILL
JEFFREY	MILLER	LEYDEN
MICHAEL J.	MILLER	GARDNER
JOHN L.	MIRANDA	WESTPORT
STEVEN	MISCH	PEPPERELL
ROGER L.	MITCHELL	ORANGE
RICHARD	MITCHELL	LANCASTER
RAYMOND	MOLONEY	MILLVILLE
ANTHONY	MONACO	REVERE
JOSEPH	MONIZ	FALL RIVER
STEVE	MONIZ	FALL RIVER
PHILIP	MORAN	MEDFORD
ARTHUR	MORGAN	DEERFIELD
ROBERT	MORRILL	RANDOLPH
JUSTIN	MORRISON, SR.	EAST SANDWICH
ERIC	MOYNIHAN	LAKEVILLE
ROBERT J.	MUNTER	BERLIN
JOSEPH J.	MURPHY	HOLLISTON
WILLIAM D.	MURPHY, SR.	PEPPERELL
BRIAN	MURRAY	HAMPDEN
DAN	MURRAY	SPRINGFIELD
MICHAEL	NARDONE	CHARLTON
TONY	NASSIF	DEDHAM
LOUTFI	NASSIF	WEST ROXBURY
CARLOS	NASSIF	WEST ROXBURY
DAVID S.	NEDELL	TAUNTON
THOMAS J.	NEE	STOUGHTON
JOSEPH M.	NELSON	WORCESTER
ALFRED	NEWBERRY	HOLBROOK
ROBERT	NEWMAN	TAUNTON
MICHAEL	NICKERSON	HALIFAX
ROBERT	NICOLL	BYFIELD
EDWARD	OGDEN	MIDDLETON
DANIEL	O'KEEFE	NEWBURY
MARK	OLIVER	HAYDENVILLE
RICHARD	O'NEIL	DRACUT
STEPHEN	ORANELLAS	TAUNTON
RICHARD D.	ORCHULEK	LUDLOW
MICHAEL	OUELLETTE	METHUEN
TIMOTHY	OWEN	WEYMOUTH
WAYNE	OXNER	MARSHFIELD
CHRIS	OXNER	MARSHFIELD
PAUL	PAGE	SOUTH HADLEY
WILLIAM	PAGE	LAKEVILLE
ROBERT	PAILLER	WHITINSVILLE
JASON M.	PAJAK	WEST SPRINGFIELD
FRANK V.	PALANGE	WEST SPRINGFIELD
CHRISTOPHER	PAPA	EVERETT
MALCOLM J.	PAPAZ	WORCESTER
ERNEST	PAPPAS	HARVARD
RICHARD	PARTRIDGE, JR.	STOW
LIONEL	PAYNE	BOSTON
STEPHEN D.	PAYNE	AGAWAM
THOMAS	PAYNTER	ORANGE
DAVID W.	PEARCE SR.	KINGSTON
JAMES D.	PEARSON	NEWBURY
CHARLES R.	PEARSON, JR	FITCHBURG
MICHAEL	PELOQUIN	LEICESTER
LUCIAN J.	PEREZ	HARWICH
BRYAN	PERRY	CHICOPEE
GERALD E.	PIERCE, JR.	STOUGHTON
VERN	PINEO	HOLLAND
LAWRENCE	PLOTCZYK	SANDWICH
GORDON	POCOCK	NORTH ATTLEBORO
JEFFREY	POIRIER	SOUTH HADLEY
WILLIAM	POIRIER, JR.	GREENVILLE
DAVID	POITRAS	MARION
JOHN	POLOVITCH	BELLINGHAM
ALBERT	POMERLEAU	WEST BRIDGEWATER
ROBERT	POMERLEAU	BROCKTON
ROBERT	PRICE	REVERE
GORDON G.	PROSSER, JR.	HOLDEN
DAVID	PROUIX	FEEDING HILLS

Registered Repair Technicians-continued

First Name	Last Name	City/Town
WILLIAM J.	RAND	SHREWSBURY
MARK A.	RANO	DEDHAM
RALPH D.	RAPHAEL	DRACUT
JOSEPH A.	RASMUSON	LUNENBURG
PAUL D.	REBELLO	DIGHTON
THOMAS J.	REBERT	BOOTHWYN
MICHAEL A.	REDA III	DEDHAM
MARK	REGAN	STOUGHTON
STEPHEN	REHM	S. HADLEY
GEORGE	REID	ORANGE
THOMAS E.	REILLY	PITTSFIELD
DAVID L.	REIMELS	MANOMET
BRUCE	REYNOLDS	ANDOVER
STEVEN	REYNOLDS	FRANKLIN
COLIN	RICHARDSON	CHARLESTOWN
RICHARD	RILEY	WHITMAN
JOHN	RINDONE	BELLINGHAM
RANDAL	RIVET	NEW BEDFORD
RICHARD	ROBERTS	BALDWINVILLE
MICHAEL	ROBILLARD	CHICOPEE
KEVIN	ROCHE	NORFOLK
DON	ROCHEFORT	TIVERTON
RUI	RODRIGUES	TAUNTON
EDWARD M.	ROSE	ASHLAND
STEPHEN C.	ROSSI	FRANKLIN
DAVE	ROSSINI	HALIFAX
JASON	ROUSSEAU	DUDLEY
PETER	ROWELL	BRIDGEWATER
LARRY	RUBENSTEIN	GEORGETOWN
LEALON	RUSSELL	PITTSFIELD
JOSEPH C.	RYAN	SOUTHAMPTON
JOSEPH S.	RYZNIC	AMHERST
DONALD	SADUSKY	NORTHAMPTON
PAUL	SALAMONE	WATERTOWN
JOSEPH E.	SAMPSON	BEDFORD
ROGER F.	SAMUELSON	NORTH GRAFTON
CHRIS	SANFORD	ATTLEBORO
ANTHONY	SANTORE	FEEDING HILLS
RAYMOND J	SAVIGNAC	OAKHAM
JOHN	SAVILONIS	NATICK
ROBERT J.	SAWICKI	HARWICH
RAYMOND H.	SAWYER	ACTON
RICKEY P.	SCEELES	SEEKONK
JEFFREY A.	SCHARMANN	SOUTHWICK
CHARLES	SCHLIKER	LEICESTER
KARL D.	SCHNEIDER	WINCHENDON
MARK	SCHROTH	ATTLEBORO
NORBERT	SCHULTE	NORTHAMPTON
GERALD	SEARS	SAUGUS
PAUL	SEELEY	AYER
MICHAEL	SHANAHAN	FRANKLIN
JEFFREY T.	SHAW	UXBRIDGE
KEVIN R.	SHORTIS	PETERSHAM
THOMAS	SIGGENS	METHUEN
GENE	SILVA	GLOUCESTER
JOHN D.	SIMONE	LOWELL
WALTER W.	SISSON JR.	FRAMINGHAM
PAUL	SITOMER	KINGSTON
JEFFREY J.	SKIBIK	CHARLEMONT
JOSEPH	SKRYPEK JR.	MILLERS FALLS
MARTIN	SKUSE	GILL
MICHAEL R.	SKWISZ	NORTHAMPTON
ROBERT	SLUYSKI	MAYNARD
DONALD R.	SMITH	NORTH GRAFTON
RICHARD T.	SMITH	GROVELAND
ROBERT S.	SMITH	FOXBORO
STEPHEN B.	SMITH	MATTAPOISETT
WILLIAM	SMITS	STOUGHTON
DAVID	SNIGIER	RAYNHAM
JOHN A.	SNIGIER	RAYNHAM
AL	SOLEIMANI	BELCHERTOWN
GEORGE	SOTIROPOULOS	WORCESTER
GILLIS L.	SOUCY	SHIRLEY
ANTHONY J.	SOUSA, JR.	SEEKONK
TRUMAN	SOUTHWORTH	BENNINGTON
PAUL	SOWA	GRANBY
PAUL	SPILIOTIS	SALEM
GREG	SPILLER	MEDWAY
GARY	SPRAGUE	SAUGUS

First Name	Last Name	City/Town
PAUL D.	STAFFIER	MENDON
ROBERT E.	STAFINSKI	SPENCER
BILL	STAPLETON, JR.	SOUTHBORO
JAMES B.	STARK	HOLLISTON
NEAL F.	STEINKRAUSS	WEYMOUTH
DAVID	STEINKRAUSS	QUINCY
THOMAS P.	STILLSON	WEST BREWSTER
ROBERT	STOCKDALE	DUDLEY
ROBERT E.	STONE	LONDERRY
RICHARD J.	STUART	STERLING
MARK	SUBOCZ	EASTHAMPTON
STEPHEN J.	SULLIVAN	TEWKSBURY
MICHAEL	SULLIVAN	MANCHESTER
BRIAN	SULLIVAN	CHICOPEE
DANIEL	SULLIVAN	HULL
RALPH R.	SULLIVAN	WESTFORD
RICHARD	SURRETTE	BELLINGHAM
ROGER W.	SWALLOW	SPENCER
DAVID	SWEETMAN	SPRINGFIELD
SCOTT	SZOLUSHA	SOUTHBRIDGE
KEITH	TALBOT	SUTTON
HENRI	TALBOT	HOLBROOK
JEFFREY	TALBOT	DOUGLAS
STEVE	TARANTINO	PEABODY
DAVID K.	TAYLOR	GLOUCESTER
JAMES	TELLO, JR.	WAREHAM
NEIL	TELLSTONE	BLACKSTONE
DONALD	TEWKSBURY	WEST NEWBURY
TIMOTHY J.	THIRKELL	TYNGSBORO
JOHN P.	THOMAS III	NORTH BROOKFIELD
FREDERICK	TILTON	BELCHERTOWN
MARK	TIMBERLAKE	LEYDEN
WILLIAM	TIRRELL	RANDOLPH
TONY	TOUMA	RANDOLPH
JAYSEN A.	TRAJANOWSKI	WEBSTER
THU MINH	TRAN	QUINCY
JAMES	TRINQUE, JR.	WEBSTER
WILLIAM L.	TROMBLY	NORTH ANDOVER
ROBERT	TROPEA	EAST SANDWICH
PAUL M.	TRULLI	MALDEN
MICHAEL	TURNER	PEABODY
CHRIS G.	UNAITIS	GREENFIELD
WILLIAM	VALLEY III	OXFORD
CRAIG	VAN BATENBURG	WORCESTER
EDMUND K.	VANDECASTEELE III	SALEM
KURT S.	VANDENAKKER	WHITINSVILLE
JOHN	VARNUM	WESTBORO
JOHN R.	VATALARO	MELROSE
JOHN	VENUTI	BERLIN
JOHN T.	VERDEAUX	NORFOLK
DANIEL	VIEIRA	TAUNTON
PAUL J.	WAGNER	LUNENBURG
PAUL D.	WAGNER	EASTHAMPTON
STEPHEN M.	WAIT	TYNGSBORO
WILLIAM R.	WALL	HALIFAX
WILLIAM T.	WALLS	ROCKLAND
GERALD T.	WALSH	SPRINGFIELD
KENNETH P.	WALSH	NORTH CHELMSFORD
FRANK	WDOWIAK	HADLEY
SEAN C.	WEBB	SHIRLEY
SCOTT	WEIGEL	ROCHESTER
MICHAEL E.	WELLS	BRIDGEWATER
WALTER E.	WENTZELL	EASTON
DAVID L.	WESTGATE	EAST FREETOWN
JOSEPH	WESTWELL III	SOUTHBRIDGE
RICARDO	WHARTON	ROXBURY
JOHN	WHITE	GLOUCESTER
RICHARD	WHITE III	SAUGUS
MARK	WHITMAN	ROCKLAND
MICHAEL A.	WHITTIER	TAUNTON
EDWARD	WILKINS	SPRINGFIELD
STEPHEN	WILLEY	SUDBURY
BRYAN	WILSON	SOUTHBRIDGE
RICHARD W.	WILSON	ABINGTON
EDWARD	WIRTH	HANSON
DOMINGO C.	XAVIER	FALL RIVER
MIKE	YOKUM	WINCHESTER
MEDERICK W.	ZAHER	TYNGSBORO
KURT R.	ZIMMERMAN	WILBRAHAM
LAWRENCE	ZONENSHINE	MANSFIELD

It Helps to Know How Pollutants Are Formed During Combustion

continued from page 6

tissue, plus other materials such as masonry and metals. Ozone is the major component of smog, and this gas is a severe irritant. Ozone can be responsible for choking, coughing, and stinging eyes. Ozone may damage lung tissue, aggravate respiratory disease, and causes people to be more susceptible to respiratory infections.

Children are especially vulnerable to ozone's harmful effects, as are adults with existing respiratory problems.

Ozone and concentrations of other atmospheric pollutants are continually monitored by networks of national, state, and local monitoring stations. Ozone is often carried by the wind to locations other than the area where it was formed. Therefore, ozone becomes a regional problem, and ozone transport regions were established which may include a number of major urban areas in several states.

CO enters the bloodstream through the lungs and forms carboxyhemoglobin. This compound inhibits the bloods capacity to carry oxygen to the organs and tissues. Even in healthy individuals, CO reduces exercise capacity, visual perception, manual dexterity, learning functions, and causes headaches and nausea. CO can be fatal if inhaled in sufficient quantity. The concentration of CO in the atmosphere is also measured by the monitoring station networks. Most stations are located near congested urban traffic areas.

CO concentrations are averaged over periods of one hour and eight hours. CO violations are based on the second highest daily readings. The one hour averaged readings must not exceed 35 ppm, and the eight hour averaged readings must be below 9 ppm. An area meets CO standards if it has no more than two readings that exceed the above values in two years.

Progress Toward Cleaner Air

The original Clean Air Act was signed by President Nixon in 1970. Major amendments were added to the Act in 1977 and 1990. In 1990, 98 cities with a combined population of over 140 million had excessive ozone or smog levels and were considered non-attainment areas. In 1995 over half of these 98 cities urban centers had met the Federal ozone standard, because of the more stringent vehicle and industrial emission standards.

It is important to note that this reduction in atmospheric pollution has been achieved despite the fact that the vehicle miles traveled in the USA continues to increase dramatically.

The 1990 Clean Air Act amendments gave non-attainment areas a specific time to reach attainment status depending on the levels of ozone and CO in their area (Figure 3). To achieve and maintain attainment status many states introduced enhanced, compulsory emission testing such as I/M240.

Five-Gas Exhaust Analyzer Reveals Significant Details of Engine Performance

Reprinted by permission of the Council of Advanced Automotive Trainers.
By Don Knowles

Four-gas analyzers measure HC, CO, CO2, and O2. Five-gas analyzers measure these gases plus NOx. A five-gas analyzer is an essential piece of equipment when diagnosing and correcting high exhaust emissions. Four or five-gas analyzers require a warm-up period of up to 15 minutes after they are turned on. During this warm-up period the analyzer automatically performs a calibration procedure. The analyzer display indicates when the warm-up period and calibration procedure is completed. Some older exhaust gas analyzers require a manual calibration procedure. Always be sure the analyzer hose or tailpipe pickup is not restricted. A water trap or filter on the analyzer prevents water in the exhaust from entering the analyzer. The filter (s) must be changed periodically. If the analyzer pickup, hose, or filter is restricted, most analyzers illuminate a warning light or warning display to inform the technician. The exhaust system on the vehicle being tested must not have any leaks. Exhaust leaks allow air to enter the exhaust, and this changes the emission readings. The engine should be at normal operating temperature during the exhaust gas analysis. If the engine has a secondary air system the air pump must be disabled during the tests. This is usually accomplished by squeezing the outlet air hose on the pump completely flat with a pair of straight-jaw vise grips.

When diagnosing exhaust emissions the technician must have baseline figures for all five exhaust emissions. If your state is using non-enhanced compulsory exhaust emission testing, this baseline is the maximum exhaust emission levels required by the compulsory emission test standards. During an enhanced emission test, exhaust emissions are measured in grams per mile (gpm), and the five-gas analyzer provides emission readings in percentage of volume or parts per million (ppm). Non-enhanced emission tests are often completed at idle and 2,500 rpm, whereas enhanced emission tests are run on a dynamometer under many different speed and load conditions. Therefore, there is no accurate cross reference between gpm obtained during an enhanced emission test and the percentage of volume or ppm readings on a five-gas analyzer. For this reason the technician must have baseline figures for exhaust emissions in percentage of volume and ppm. These baseline figures will vary depending on the vehicle year and the enhanced emission cut-points. There are some variables even in enhanced emission testing. For example, most states use phase-in cut-points for a specific length of time when enhanced emission testing is first introduced. After the phase-in period, more stringent cut-points are used.

When the technician performs the necessary repairs and all five exhaust emission levels are below the baseline figures, the technician is sure the vehicle will pass the compulsory emission test or retest. If the air-fuel ratio is at stoichiometric during idle speed operation, CO2 should be 12 to 15 percent.

continued on next page

continued from page 11

Since catalytic converters produce some CO2, this emission is higher on converter equipped vehicles compared to non-converter equipped vehicles. CO and O2 should be nearly equal and both gases should be 0.2 to 1.5 percent. HC should be low, below 150 ppm. NOx should be less than 400 ppm. The technician must establish baseline figures for the area in which he or she is working and for the year of vehicle being tested. These baseline figures must also be in relation to the cut-points for compulsory state emission tests.

Diagnosis of HC

High HC emission levels may be caused by anything that causes cylinder misfiring such as ignition defects, low cylinder compression, or a vacuum leak. If high HC emissions are caused by cylinder misfiring, CO levels are low because there is very little or no combustion taking place in the misfiring cylinder. When cylinder misfiring and high HC emissions are caused by an intake manifold vacuum leak, O2 levels will be higher than normal. An oscilloscope diagnosis may be performed to detect ignition problems, and a compression test will indicate the low compression defects. High HC emissions may be caused by an air-fuel ratio that is leaner or richer than stoichiometric. If the air-fuel ratio is leaner than stoichiometric, CO is low, and O2 is high. When the air-fuel ratio is richer than stoichiometric, the CO is high and O2 is low.

If the HC emissions are higher than baseline, locate and correct the cause of the high HC emissions first. After any repairs to correct high HC emissions always be sure the oxygen (O2) sensor signal is normal. A lab scope waveform is the most accurate indication of an O2 sensor signal, but a scan tool does indicate proper O2 sensor voltage switching and crosscounts. The powertrain control module must be in closed loop when checking this sensor signal.

A normal O2 sensor signal indicates this sensor and the powertrain control module (PCM) are in control of the air-fuel ratio. If the O2 sensor waveform is abnormal, this sensor and the PCM are not in proper control of the air-fuel ratio. Under this condition it is unlikely the vehicle will pass an emission test.

Diagnosis of CO

High CO emissions are usually caused by a rich air-fuel ratio. Fuel pump pressure and volume should be some of the first tests to be performed when diagnosing a rich or lean air-fuel ratio. Higher than specified fuel pump pressure causes a rich air-fuel ratio on fuel injected engines. The fuel pump pressure and flow must be verified within the vehicle manufacturer's specifications. Other causes of a rich air-fuel ratio include dripping injectors, or defective input sensors such as the O2, MAP or MAF, ECT, and IAT.

Carbon buildup in the combustion chamber, or on the intake valves and intake manifold also contributes to a rich air-fuel ratio. Carbon buildup in these locations reduces the amount of air flow into the cylinder. Under this condition there is not enough oxygen to mix with all the hydrogen and carbon in the fuel, and some left-over carbon doesn't receive enough oxygen to oxidize properly. This action results in CO formation. A defective catalytic converter may cause high HC and/or CO emissions.

Diagnosis of NOx

High NOx emissions may be caused by the following defects:

1. An inoperative EGR valve. When NOx emissions are high, the EGR valve may be defective, or the EGR solenoid and electrical control circuit may be faulty. A plugged, disconnected, or leaking vacuum hose in the EGR system also results in an inoperative EGR valve. Restricted, or partially restricted, exhaust passages from the exhaust system through the EGR valve to the intake system may be the cause of high NOx. When the EGR valve and system are operating properly, a specific amount of exhaust gas flows past the EGR valve into the combustion chambers when the EGR valve opens. This exhaust flow lowers the combustion temperature. When the EGR valve opens, the MAP sensor detects a drop in intake manifold vacuum, and the O2 sensor should sense a change in oxygen content in the exhaust. The PCM will quickly restore the air-fuel ratio to stoichiometric in response to the O2 sensor signal. If the EGR valve is inoperative, a 5-gas analyzer displays high NOx, high HC, low CO, low CO2, and low O2. When Nox is formed, some of the oxygen combines with nitrogen to form NOx. Under this condition there is not enough oxygen to combine with all the hydrogen and carbon in the fuel, and this increases HC emissions.

   When the engine is idling and the EGR valve is opened manually, or with a vacuum hand pump, the engine should slow down 200 rpm or stall if the EGR valve and exhaust passages are satisfactory. If there is not much change in engine rpm, the EGR valve is stuck open or the exhaust passages are restricted. Partially restricted EGR valve exhaust passages may cause a vehicle to fail NOx on an emissions test, but the engine may still slow down the specified rpm when the EGR valve is forced open. In some cases partially restricted EGR exhaust passages can only be checked by visual inspection. If a vacuum gauge is connected with a T-fitting in the vacuum hose between the EGR solenoid and valve, the gauge should indicate intake manifold vacuum when the engine conditions required for EGR opening are present. A scan tool may be used to diagnose the EGR system. However, when the scan tool displays EGR-ON, this only indicates the PCM has commanded the EGR valve on. Under this condition a defective EGR valve, solenoid, or vacuum hose still causes the EGR valve to be inoperative.

2. If a cooling system contains pure water, the water has a lower boiling point than a water and antifreeze solution. Under high atmospheric temperature conditions and heavy engine loads, the coolant contacting the outside of the cylinders may boil creating an air pocket and high cylinder wall temperatures. This action increases combustion temperatures and NOx emissions. The same action may occur if the coolant contains an excessively high percentage of antifreeze in relation to the amount of water. For example if the coolant is 65 percent antifreeze, the coolant's ability to dissipate heat from the cylinder is slowed and combustion temperatures increase. Other cooling system defects that increase combustion temperature and NOx emissions include, a partially restricted air or coolant passages in the radiator, a defective thermostat, or a faulty water pump.

continued on next page

continued from page 12

These cooling system defects also cause high NOx, high HC, and low CO, CO2, and O2.

3. A lean air-fuel ratio results in high cylinder temperature and excessive NOx emissions. As the combustion temperature increases, some of the nitrogen atoms separate and join with the oxygen atoms to form NOx. Some of the oxygen is used to form NOx, and there is not enough oxygen to combine with the hydrogen and carbon in the fuel. Therefore, HC emissions become excessive. A lean air-fuel ratio may be caused by low fuel pump pressure, partially plugged injectors, a vacuum leak, or defective O2, MAP, ECT, or IAT sensors. A lean air-fuel ratio causes high NOx, high HC, high O2, and low CO and CO2.

4. Carbon buildup on top of the pistons or on valves may cause preignition. This problem causes high combustion temperatures and high NOx emissions much like cooling system defects. Reduced valve margin may cause overheated exhaust valves, preignition and high NOx emissions. Improper exhaust valve seating also increases valve temperature and this may result in preignition, and high NOx emissions. Excessive base timing also causes preignition and high NOx emissions. If any of these problems are causing preignition, the 5-gas analyzer indicates high NOx, high HC, high O2, and low CO, CO2. When preignition occurs one of the defects mentioned above ignites the air-fuel ratio before the spark plug fires. This action attempts to drive the piston back down in the compression stroke creating excessive heat and NOx emissions. When the spark plug does fire there is not enough fuel and air left for complete combustion, and the left over fuel and air forms high HC and O2 emissions.

5. Late valve timing caused by a slipped timing belt or chain causes the intake and exhaust valves to open and close later in relation to crankshaft rotation. Under this condition engine power is reduced and more throttle opening is required at any vehicle speed. The increased throttle opening causes more air flow to the cylinders and higher combustion temperatures. Under this condition the MAP sensor detects lower intake manifold vacuum at any vehicle speed, indicating higher engine loads. This MAP sensor signal to the PCM causes a richer air-fuel ratio. When these conditions are present a 5-gas analyzer indicates high NOx, high HC, high CO, low O2 and CO2.

6. A defective three-way catalytic converter may result in high NOx emissions.

Diagnosis of CO2 and O2

When diagnosing exhaust emissions, the CO2 and O2 readings must be considered with the other emission readings. A high O2 reading indicates a lean air-fuel ratio. Always be sure there are no leaks in the exhaust system that allow air to enter the exhaust system and provide a false high O2 reading. A low O2 reading indicates satisfactory engine operation, but the technician must remember O2 is also low with a rich air-fuel ratio. A high CO2 reading indicates satisfactory combustion efficiency. If the air-fuel ratio becomes richer or leaner than stoichiometric, CO2 emissions decrease. High CO2 is an excellent indicator of efficient engine operation. ■

The Repair Edition

Be Your Own Local Press Agent

(Why Should PR Guys Have All the Fun?)

Good public relations (PR) is a great way to get the word out about your business. Editors and reporters at local newspapers are always looking for local stories and events to cover. Is your business expanding in some way? Are you doing something good for your community? Tell your local newspaper about it!

As you know, the primary goal of the Enhanced Emissions and Safety Test is to reduce air pollution by identifying and getting people to fix the Commonwealth's worst-polluting vehicles. The role your service station is playing in implementing the Enhanced Emissions Program can be a great source of positive publicity for your business.

Issue News Releases

Submitting a written news release to your local paper is one of the most effective ways to get media attention. Your news release should contain information on:

- What is happening, when and where;
- Why it is happening;
- Who is involved; and
- The name and phone number of someone to call for more information.

Keep it brief – two or three paragraphs will do. Also, consider what about the event would make an interesting photograph. Make sure to call the editor or a reporter personally to invite them to the event and to alert them of your news release (contact information for editors and reporters can be found on the editorial page of the paper). Keep in mind that newspapers will not feature your business in an article if they believe the event is more appropriate for a paid advertisement.

This is an example of a community event that would warrant a news release:

• Sponsor youth sports teams or participate in and/or sponsor local charity events, particularly those linked to the environment or public health, and use the opportunity to highlight your emissions testing services. This will greatly increase your exposure in the community.

Write Articles

Write a brief article on the common reasons why vehicles fail the Enhanced Emissions and Safety Test, and ways motorists can increase their chances of passing it. The summary should include strong messages about the environmental mission of the Test, and that proper car care contributes to better air quality. It should not include lots of specific information about your business. Articles like this help to establish you as a local expert, which can grow your business.

Your participation in the Enhanced Emissions and Safety Test Program is improving air quality in your community. The PR tools described above can help you use your involvement in the Program as a source of good PR for your business! ■

Strategically Located Diagn

Complementing the role of the

DTC Groundrules

- **Only registered repair facilities in Massachusetts may utilize the services of a DTC (Diagnostic and Training Center)**
- **DTCs offer free, unlimited diagnostic services regarding emission controls**
- **Repair work is not permitted at a DTC**
- **Each DTC is staffed by two full-time emissions control specialists**
- **The DTCs are open Monday through Friday, 8:00 a.m. to 6:00 p.m.**

How to Get the Best Results

If you need help diagnosing or repairing a problem with an automobile, you may contact one of the five Diagnostic and Training Centers for assistance. Keating Technologies recommends that you take the following steps when you need this assistance:

1. Fill out a Diagnostic Report Form (DRF). Please fill it out completely and carefully; all the information on this form is pertinent and important.

2. Fax the form to your assigned Diagnostic and Training Center along with the Vehicle Inspection Report (VIR).

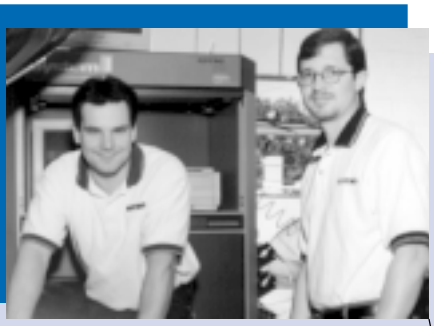
3. Allow the Keating Technologies staff adequate time to look into the problem. The Diagnostic and Training Center staff will research the issue and will place a call to you within two business hours.

4. Review the Diagnostic Report Form with the staff of your assigned Diagnostic and Training Center when the staff calls. Be prepared to supply any further information the staff may require. The goal is to direct the technician to a solution during this phone discussion. *

5. If the problem cannot be solved over the phone, schedule a time to bring the car into the Diagnostic and Training Center. It is important to schedule any such visits in order to assure that the staff will be able to give you their complete attention, and to prevent inefficient and costly back-ups.

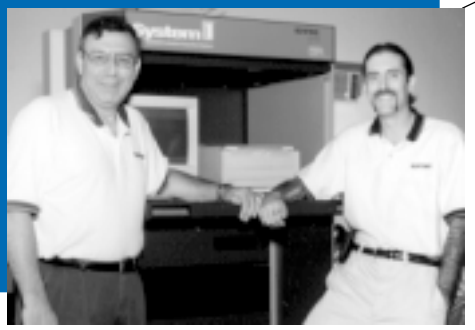
** All successful repairs must be reported to the Diagnostic and Training Center.*

West Springfield DTC
Keating Technologies, Inc.
33 L Street
West Springfield, MA 01115
(413) 732-8729
(413) 732-8708 Fax



Mike Zabik, L-1 Technician (left), Walter Moran, Supervisor

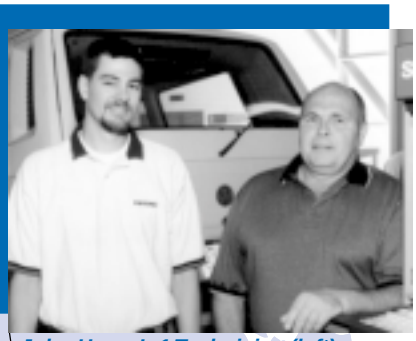
Oxford DTC
Keating Technologies, Inc.
731 Main Street
North Oxford, MA 01537
(508) 987-7663
(508) 987-7664 Fax



Jim Sbrogna, Supervisor (left), Jim Ethier, L-1 Technician

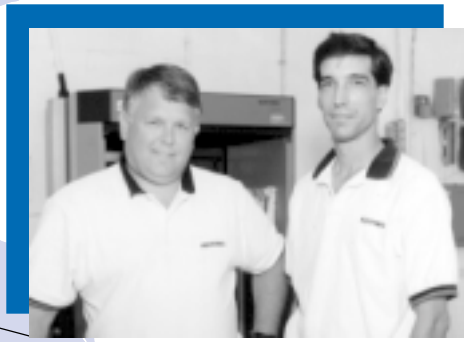
ostic and Training Centers

e Registered Repair Facilities



John Hess, L-1 Technician (left), Henry Wysk, Supervisor

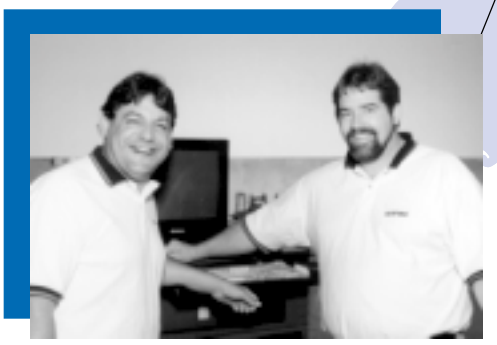
Woburn DTC
Keating Technologies, Inc.
10-V Gill Street
Woburn, MA 01801
(781) 376-6099
(781) 376-6098 Fax



Terry Hayes, Supervisor (left), Dave Perrault, L-1 Technician

Dedham DTC
Keating Technologies, Inc.
263 Milton Street
Dedham, MA 02026
(781) 251-9645
(781) 251-9629 Fax

Bridgewater DTC
Keating Technologies, Inc.
30 Bedford Park, Unit # 13
Bridgewater, MA 02324
(508) 279-1846
(508) 279-1861 Fax



Joe Baiardi, Supervisor (left), Chris Weeks, L-1 Technician

A Pre-Inspection "Once-Over" Often Proves Very Helpful

Here's some great common-sense advice from George Elwell of George's Automotive, 19 Garden St., Arlington:

"As for the new inspection program, I have had quite a few customers bring their cars in for a 'once-over' prior to their inspections," George noted recently. *"I don't push this, but it is a service issue. If I can quickly replace a couple of bulbs, or a set of wiper blades, I have saved my customer from a 'Fail' sticker, as well as the hassle and inconvenience of a re-test. They appreciate this and keep coming back.*

"The new vehicle inspection program has brought some changes to my shop," George continued, *"but in general we do business the way we always have.*

"Whenever a car comes into my facility for service, be it mounting snow tires, an oil change, heater core, whatever, the car is given a thorough safety check.

"It only takes a couple of minutes to make sure that the car is in good running order, and that basic things like wiper blades and lights are functioning the way that they are supposed to.

"In addition to this, when the vehicle goes on the lift, we check the undercarriage for leaking fluids, condition of exhaust system, and the condition of the tires.

"Also, I always mention tune-ups. I remind my customers that the time for a tune-up is before your next inspection, not after.

"And when the customers come in to pick up their cars after they've been serviced, I give them a quick rundown on its overall health. They appreciate this service because it shows we are taking an active interest in the car, as well as in their personal safety." ■

A Gigantic Wave Is Heading Straight for Inspection & Repair Facilities in September

For Perfect advice on how to cope, see page 1

P.O. Box 75
Marlborough, MA 01752

PRSRT STD
U.S. POSTAGE
PAID
PERMIT 74
FARMINGTON CT