



# IN-SERVICE TECHNICIAN TRAINING PROGRAMS

*The right information... to the right technician... at the right time!*

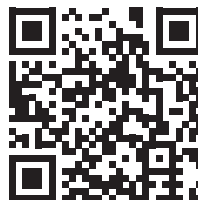


Accredited Training Provider

EAST Training Inc.

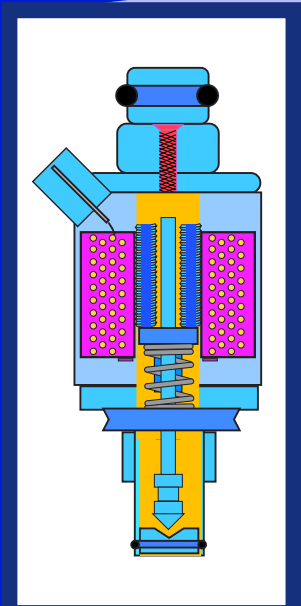
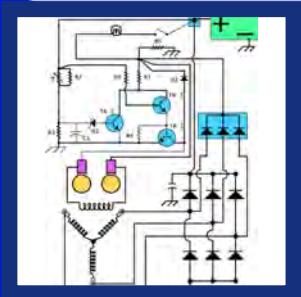
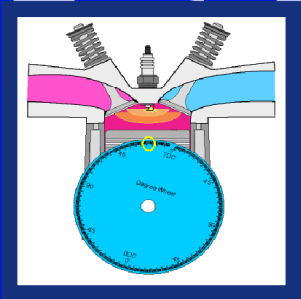
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To visit the EAST web site Scan the  
QR code below with a Smartphone, or  
click the hyperlink below.



web site

<http://www.easttraining.com>



Medford, NJ 08055

31 Fairview Road

Enhanced Automotive Systems Technology



*CASE since 2002*



*Blue Seal since 2001*

### **Awarded the Automotive Training Managers Council 2002 “Excellence In Training” Award**

#### ***Mission Statement***

*EAST’s mission is to provide convenient, accurate, timely, and enjoyable, leader-led training for professional in-service technicians. Training that is performance-based and measurable by an increase in the technicians’ knowledge, productivity, profitability, and quality of repair services offered.*

*EAST curriculum is designed for professional, in-service technicians with a minimum of 2 years field experience. Prerequisites are noted where applicable. Pre and post course testing is conducted where appropriate.*

***Visit the EAST “Customer Service Corner” Blog available on our website.***



Transcripts of courses attended are available to all students by email (PDF). Scan the QR code to the left with your Smartphone and it will take you to the transcript request page on our web site. Or, you can click on the hyperlink below. You will be asked to provide ID information and your current email address. A transcript will be sent to the email account you provide, usually within 2 business days.

<http://www.easttraining.com/transcripts.php>

# Enhanced Automotive Systems Technology, Inc.

31 Fairview Road  
Medford NJ 08055  
856-810-4075



*You are invited to participate in the most advanced, and comprehensive technical training program available to aftermarket industry repair shops. Courses are presented by Enhanced Automotive Systems Technology Inc., an award winning New Jersey based training company that has acquired a reputation for quality hands-on training from coast-to-coast.*

EAST has provided quality performance-based training to independent shops, OEM dealers, industry associations, municipal and state fleets, parts and equipment companies, mass merchandiser chains, Vo-Tech schools, and community colleges since 1998.

EAST only employs trainers with many years of experience repairing cars *and* training. Training, not only professional technicians, but also professional instructors.

EAST provides T<sup>3</sup> (train-the-trainer) services to several well-known industry schools, and the United States Marine Corps. (See our website at [www.easttraining.com](http://www.easttraining.com) for more on EAST and our Instructor's qualifications.)

Working from our Research Center in New Jersey, EAST trainers and curriculum designers develop programs based on *real world* problem vehicles diagnosed in our Research Center, and student's shops. Courses are presented using PowerPoint presentations enhanced with computer animation and video clips for greater understanding of systems theory and component operation. When helpful, instructors use video cameras in the classroom to enhance visual understanding. High resolution light boxes are used to project slides and video images.

## Course Curriculum

Courses are developmentally articulated, which means that each course, and each semester, builds upon the previous. Each course contains hands-on training, either on simulators, electrical boards, electronic breadboards, or on-car demonstrations and exercises. For optimum learning, students are asked to bring their own small equipment (DVOM, DSO, Scan tool etc.) depending on class subject. The instructors are experienced in the use of all major brands of equipment used in the industry and can show you many tips and techniques to get greater understanding and service out of your equipment to improve productivity.

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## Recognition

Upon completion of each course a personalized certificate will be awarded. All Classes are ASE/ATMC accredited through CASE (Continuing Automotive Service Education). If the course is successfully completed, CASE CEU's will be awarded along with a Certificate of Achievement. If the student attends the full course, but does not pass the final evaluation, a Certificate of Attendance will be awarded. Individual Technicians can call or email requests for Transcripts which can be printed as pdf's and emailed, or hardcopies printed and mailed.

## Local Training

EAST establishes local training regions, which will keep your travel to a minimum. Our classes are 8 or 16 hours long. They can be taught in full 8 hour day classes or 4 hour evening classes. *See our pricing policy for particulars.* For evening classes there will usually be a total of 8-10 nights of training scheduled for the semester, presented in 2 night modules. Classes begin at 6:00 PM and conclude at 10:00 PM. Once a region has been established in your area, dates for the entire year will be provided. You will know exactly which courses are scheduled, when and where all courses will be presented. (one and two-day, daytime, weekend, and T<sup>3</sup> classes can be scheduled by special arrangement).

### ***Attention: Education Managers***

*Additional services available from EAST...*

## Technician Skill Assessments

If you would like to establish a benchmark for your employee's present skill level and decide what training is needed to better gauge your training efforts, EAST can also provide a Placement Test and/or Skill assessment with Profiling of attendees prior to the class, at additional cost. This assessment is available in a proctored session at a convenient location.

## Promotional materials

If you do not have a marketing department available to provide materials for promotion of your classes, EAST can help with that. We have the in-house capabilities to design and print flyers and other promotional materials.

## Reports

Perhaps you or your corporate managers require reports detailing classes taught, attendance, certificates issued, GPA, test score improvement, etc. EAST maintains a comprehensive LMS of all our students, and of all classes presented. All student records are diligently maintained. Hardcopies of attendance records are maintained for 6 years, tests and evaluations for 4 years, and electronic records are kept *indefinitely*. Tracking your customers/technicians accomplishments is a prime goal of our educational consultants. Call our IT department to discuss your needs. Custom reports on attendance, or future course recommendations, can be created for managers for future planning.



## *EAST Learning Management System*



# EAST Training Technical Team Profiles

## Vince Virgilio

Vince is the founder and President of EAST. He is an automotive technician turned trainer with over 35 years of hands-on experience. He was GM factory trained at the GM Moorestown NJ Training Center. Vince was a Flat rate “A” technician for Oldmobile, Pontiac, and Buick dealerships in the Delaware Valley area. He also owned and operated Total Car Care, a combination facility Auto Repair and Body Shop. In the early 90’s, Vince joined ASPIRE, Inc. and was instrumental in the development of the EDGE training programs – chosen for emissions training in nearly 38 states. His work at ASPIRE also became the basis for Snap-On’s Emission Solutions series and Standard Motor Products’ Advanced Emission Diagnosis program.



Vince holds the following certifications and credentials:

- ASE Master Technician and Advanced Engine Performance Specialist (L1) Certification
- MACS Certified Instructor
- NTTP Senior Master Instructor
- New Jersey Certified Repair Technician

## Jerry Stahl

Jerry has been involved for the past 20 years with research and development, training and technical assistance. His experience and ability over this time period have allowed him to manage a customer relations department including product sales, promotional information, database management, as well as processing national and regional automotive testing and certifications.

Jerry holds the following certifications and credentials:

- ASE Master Technician and Advanced Engine Performance Specialist (L1) Certification
- MACS R12 Recovery and Recycling Certification
- Senior instructor, CSCV/NERC’s National Train The Trainer Program
- Service Manager - 10 years, Firestone Lead Tech – 5 years
- Allen Test Products Technician Of The Year – 5 years



***Training is not expensive...***  
**it's PRICELESS!**

# EAST Training

## Technical Team Profiles

### Paul T. Whelan

**Paul has over 55 years in the automotive industry.**

Paul is the Vice-President of EAST. He worked in the aftermarket as a technician, then moved to new car dealerships, eventually landing at Reedman corporation in Langhorne PA, the largest auto dealer in the world. He worked as an “A” Technician, diagnostic road tester, and eventually, shop foreman/instructor.

Paul was one of the Founders of ASPIRE, Inc. and spent 17 years as Sr. Vice President while building their training program, diagnostic hotline, IM240 R & D Autolab, Graphics & video Production depts. He has been a pioneer in modern techniques of training in the automotive service business, and was personally responsible for many new course curriculum designs and training methods being used throughout the industry.

He was in charge of production for the Advanced Systems Theory program, Fast PASE (ASE prep video series), FIRST, EDGE, NY ATTP, Florida ASERT, National ATTP programs and many more, which were used for loaded-mode emission training nationwide. He was lead researcher and production manager for the Fluke 97 Scopemeter (Leader Led & Self Study), and Fluke 88/87 Programs.

He has produced training materials for clients including: GM, Honda, Acura, VW, Toyota, Standard Motor Products, Exxon, Sun Electric, Snap on tools, Mobil, Chevron, MACS, Sunoco and many others. He has designed, written, edited, and produced -from both sides of the camera- dozens of hours of video and numerous student training guides, and has written and contributed to automotive textbooks, trade periodicals, and SAE papers. Paul was in the original group of ASE-ASIA World Class Technicians inducted in 1986.

Paul's credentials and certifications include the following:

For over 35 years Paul was certified in *ALL* ASE categories (60 total areas) Holding 7 Master Certifications- Auto & Light Truck w/ L1 & Diesel A9, Medium/Heavy Duty Truck w/L-2, Engine machinist (Gasoline & Diesel), Collision Repair & Refinishing, School Bus, Parts Specialist (Auto & Truck), Transit Bus, Truck Equipment Specialist, GM Certified Parts Specialist, Alternate fuels Technician, Undercar Specialist, and C1- Service Consultant.

- President- ATMC Automotive Training Managers Council 1999-2000. Board member for 14 years and Chaired many Committees
- GM Master Technician – 25 years
- National Train the Trainer- Senior Master Instructor
- Enhanced I/M Instructor- Pennsylvania FIRST, EDGE, EEIC
- Society of Automotive Engineers (SAE) member for over 30 years
- MACS & ASE Refrigerant Recovery Certified
- ASE CASE Evaluation Team Leader
- ASE-NATEF Evaluation Team Member
- Fall 2004 was awarded ATMC “Member of the Year”.



# EAST Training

## Technical Team Profiles

### Joel Martel

Trained at the Hartford Technical Institute, Joel has 5 years dealership experience (GM, Ford, Lincoln/Mercury), and 10 years in the aftermarket. Six of those years were spent as shop Foreman. He was the lead trainer in West Springfield for the Massachusetts enhanced emission program, and has taught over 600 students in those programs. Joel was a student of EAST training and, for two years, assisted Vince in teaching classes in New England, before becoming a full time EAST instructor. When he is not instructing, he spends his free time diagnosing electrical, driveability, & enhanced emission failures at an emission repair center.

Joel holds the following certifications and credentials:

- National Train the Trainer program phase III instructor
- MA FIRST and EDGE Instructor.
- ASE Master Technician and L-1
- MA Diesel Smoke inspection trainer



### Roland B. Bell JR.

Roland has over 45 Years of experience in both new car dealers and the aftermarket. He has taught for 8 Years at the Northampton Community College Bethlehem, Pa. and is an Adjunct Professor of Automotive Technologies teaching credit courses in-Engines, Brakes and Suspension Systems, Basic and Advanced Automotive Electrical and Electronics Systems, PA Inspection and Emission Certification, A/C and Heating Systems, Automotive Fuel Systems, Tune Up and Diagnostic Procedures, Automotive Mechanical Drive train Systems. He has worked for Vetronix, Bosch Diagnostics Group doing Sales and Technical Support for parts of Pennsylvania, New Jersey, New York and Connecticut. When he is not instructing, he spends his time working as a mobile automotive technician, initializing and programming modules, diagnosing driveability complaints, electrical system failures, DTC diagnostics, and enhanced emission failures for his past and present customers.



Roland holds the following certifications

- ASE Master Automobile & Light Truck Technician with L1
- RVIA/RVDA Master Recreational Vehicle Technician
- PA certified State Safety Inspection Instructor
- MACS R12 Recovery and Recycling Certification
- MACS Certified Instructor

# EAST Training

## Technical Team Profiles

### Jeff Therkelsen

Jeff has served in the automotive industry for 43 years. He has worked as a Lead Technician, Manager of Vehicle Services, Store Manager and Technical Trainer. During his 25 year career with Firestone Complete Auto Care, he was instrumental in developing and delivering numerous training programs. Jeff's work with Firestone earned him the prestigious Bridgestone President's Award (twice) and the exclusive Bridgestone CEO award. He excels in developing young technicians to become ASE Master Automobile & Light Truck Technicians with L1, Service Managers, and Store Managers.

Jeff holds the following certifications and credentials:



- Council of Advanced Automotive Trainers (CAAT) - Certified instructor.
- Mobile Air Conditioning Society (MACS) - Certified instructor.
- Hunter Engineering – Certified Instructor.
- Moog – Certified Instructor.
- State of Wisconsin – Licensed Air Conditioning Certification Instructor (Rule AG 136 program)
- ASE Certified for 30 years.

### Anthony Minniti

An Automotive Professional with 40 years of Experience as a Technician, Instructor and Manager, with Bridgestone/Firestone Corporation.

While serving for 17 years as both an “A” Technician and a Manager of Vehicle Services (MVS), Anthony was awarded numerous Customer Satisfaction and Bridgestone “Certified Excellence” Awards.

He also served as a District Technical Trainer for 22 years and instructed Technicians and Sales personnel on new automotive systems and Concepts. While working with BSRO corporate education managers, Anthony designed and implemented training courses for new Technician Teammates on Brakes, Steering & Suspension, Alignments, Heating & Air Conditioning, Starting & Charging Systems and Engine Performance. He also prepared technicians for ASE certification, and also served on the Bridgestone/Firestone Northeast Zone Loss Prevention Council.



As a member of the Technical Advisory Board at Lincoln Technical Institute in North Jersey, he has had the honor of being the Industry Keynote Speaker at LTI Graduation Ceremonies.

Anthony holds multiple ASE certifications, is a MACS certified technician and a Mobile Air Conditioning Society Worldwide Certified Instructor.



# EAST Training Technical Team Profiles

## Michael Virgilio

Michael graduated from Rowan University with a degree in Communications, with a Specialization in Radio, Television, & Film Production. He worked on television and film production in and around the Philadelphia market and held multiple positions on productions ranging from commercials, television programs, and even big-budget Hollywood movies for ABC, Dreamworks Pictures, The Food Network, and NFL Films.

Now working with EAST as a full-time Training Manager he is relied upon to coordinate the everyday logistics necessary for our classes to run smoothly out in the field. Whether he is in the office or out on the road, Michael does anything he can to support the entire team here at EAST.

When he is not assisting our trainers in the field, Michael brings experiences from his previous career to assist Paul producing multimedia projects to enhance our training programs.



## Bill Sheridan

Bill has worked in the Automotive Service Industry for over 43 years. He started his career in independent service shops as a technician and Service Manager for 20 years. He was then employed by Bridgestone/Firestone for the next 23 years. During his time with Bridgestone/Firestone he served as a Lead Technician, Technical Education Coordinator, Manager of Vehicle Services, Store Manager, and the last 12 years in the Southeast Zone as Technical Education Manager and Sales Education Manager. Where he assisted and developed various training courses as well as delivered them to Technicians and Sales teammates.

Bill's accomplishments in the Education Department won him the prestigious Bridgestone Presidents Award.

He holds a MACS certification and is a MACS 609 certified trainer.



## EAST Training Technical Team Profiles

### Scott Boege

Scott has 40 years experience in the Automotive industry. He holds ASE Certification: as an Automobile and Light truck Master Technician , L-1 Advanced Automobile Engine Performance Technician and , C1- Service Consultant.

He spent 23 years as a Service Technician Specializing in Engine Performance, Computer Controls, and Driveability; 20 Years Working for Bridgestone Retail Operations as a Technical Instructor, and Program Developer.



*EAST courses are too numerous to provide a complete list here. EAST develops courses in-house (research, artwork, photographs, video and animation) and also prints all student materials, as needed, in-house. These courses are modularized and can be custom blended to suit your specific educational program requirements.*

***Tell us what you need!***

*Where appropriate, EAST programs contain integrative STEM review. (STEM is an acronym for Science, Technology, Engineering and Mathematics.) Review of STEM principles are recommended by Federal and State education curriculum developers, and industry educators to provide a better understanding of concepts presented. Prior to implementation in our program, endorsement guidelines from several state sources were referenced. Most areas in EAST courses where STEM education is included are interactive presentations where student participation is encouraged.*

***All students successfully completing EAST Courses will be awarded CASE CEU's from ASE.  
(.1 CEU per hour- .8 for an 8 hour course)***

## Course Information

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*Classes may be delivered in one 8 hour day, or two 4 hour evening formats*

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# EAST TRAINING

## *Leader-led* ASE preparation classes- each course 8 Hours in length

Taught by instructors with years of experience as technicians, instructors and as ASE “test takers”. All hold a minimum status of Certified Master Automobile Technician with L1 (Advanced Engine Performance Specialist).

### **This is the real deal!**

These courses are assembled using a “Backward Planning” approach and cover the meat & potatoes of the information needed to be successful in your efforts. If you want to be successful not only in your ASE test taking, but want to have a better understanding of system operation and be a more productive, more profitable, all around better technician, then this is for you! These programs were developed by a team of ASE Master Certified Technicians, under the guidance of an instructor holding a Master status in Automobile, Medium/Heavy truck, School bus, Engine Machinist, and Collision Repair/Refinishing, as well as, Parts Specialist, Under car Specialist, Collision repair Estimator, Service Consultant, Alternate fuels Technician, L1, L2, and “ASE World Class” status.



### **Recertifying Technicians**

These courses are also excellent for technicians preparing to recertify who would like to take a more organized approach to preparing for the ASE tests and, at the same time, review materials pertinent to content areas and tasks which have changed since they last certified 5 years ago. New technology coverage, which has recently been added to the tests, will be covered.

### **Focus your test preparation on the areas you are weakest.**

Technicians with many years of experience and a vast knowledge of vehicle diagnosis and repair are still not successful at acquiring ASE certification. *Why?* Passing an ASE test also involves reading comprehension and test taking skills. While these courses are heavy in technical content, other topics are covered like: how ASE tests are developed, question design and approaches to answering the different type questions, test preparation methods, and test taking skills & tips. Techniques will be covered which will allow you to identify the areas you are weakest and focus your test preparation effort on those areas, minimizing the time required for study. ASE style questions will be used throughout to emphasize and reinforce the information being covered. And, with a knowledgeable instructor to guide you, your questions can be explained and answered in detail as they come up!

The following ASE test areas are covered...

Engine Repair- A1

Automatic Transmission/Transaxle- A2

Suspension and Steering- A4

Brakes- A5

Electrical/Electronic Systems- A6

Heating and Air Conditioning- A7

Engine Performance- A8

Advanced Engine Performance- L1

\*

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*“... with a knowledgeable instructor to guide you, your questions can be explained and answered in detail as they come up!”*

\* The Electrical/Electronic Systems- A6 course will also help in preparation for Medium/Heavy Truck Electrical/Electronic Systems- T6, School Bus Electrical/Electronic Systems- S6, and Collision Repair test B5- Mechanical and Electrical components for Content area B- Electrical.

\*\* The Heating and Air Conditioning- A7 course will also help in preparation for the Medium/Heavy Truck Air Conditioning- T7 and School Bus Air Conditioning- S7.



# EAST TRAINING

## Enhanced DVOM Diagnostic Strategies

Course #111

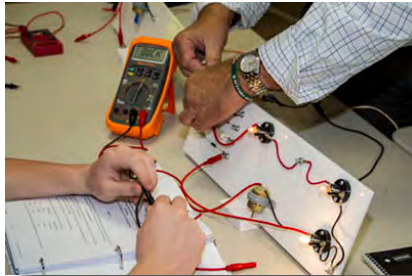
8 Hours

*This class reviews electrical concepts— atomic structure, charges, magnetism, and DMM- Digital Multi-Meter use. Circuits are examined and analyzed. The student will participate in practical application of Ohm's and Kirchhoff's laws. Students will discover many advanced uses for the digital meter. This is a hands-on class. Each student will need to bring their own meter. Hands-on testing will be performed by the students on electrical circuit training aids, and on vehicles.*

### Topics covered:

*Electricity & Electronics— Simple, series, parallel and series-parallel circuits.*

*“Real world” application of Ohm's and Kirchhoff's laws, Induction and inductive reactance, DC Voltage signals, AC Sinusoidal and non-sinusoidal signals, Conductors and insulators, Current flow- Conventional Vs. Electron theory. Semi-conductors- diode and transistor construction, function, identification, application and out-of-circuit testing. NPN & PNP transistors- small signal, rectifier, clamping, and avalanche diodes are discussed.*

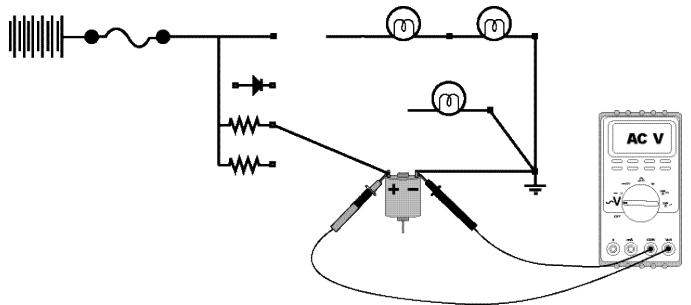


*Digital Meters— Meter construction and function, manual and auto ranging meter scaling and interpretation. High impedance digital meters- why they are needed, and does yours qualify? Circuit damage caused by using the wrong meter. Meter accuracy, measuring EMF, intensity of current, electrical resistance, static Vs. dynamic resistance, diode test function, true RMS vs. average responding meters, Zero-delta-relative modes, trigger, measuring frequency, pulse width, and duty cycle, meter maintenance.*

*This is a hands on class, bring your DVOM/DMM!*

### Advanced meter features—

*How and when to use-Min-Max-Average-Recording, Touch-hold function. Power up options- Disable auto off, High accuracy 1 ms (millisecond) response, Low ohm scale.*



*Classroom exercises— Voltage drop, amperage, and resistance testing conducted on electrical simulator boards. Semi-conductor testing, Voltage and frequency measurements conducted on sensor simulators.*

*Shop exercises— Testing O2 sensors and other computer input and output devices. Quickly measure amperage draw of all on board computer controlled actuators (solenoids, relays etc.), Voltage drop testing.*

### The objectives stated for this course are:

*Upon completion of this course the student...*

- will be able to use his DVOM to successfully diagnose circuit and component failures.*
- will be able to explain the practical application of Ohm's and Kirchhoff's laws.*
- will be able to identify simple, series, parallel and series-parallel circuits and diagnose failures.*
- will be able to explain the difference between conventional and electron theories of current flow.*
- will be able to explain the difference between dynamic and static resistance as it applies to Ohm's law.*
- will have a basic understanding of semiconductor operation and will be able to properly identify diodes, NPN & PNP transistors, and Zener diode symbols as used in wiring schematics.*
- will be able to identify the value indicated on the DVOM based on displayed digits, decimal point location, scale selected and range indicator displayed.*

# EAST TRAINING

## Electricity, Electronics and Meter Diagnostics

Course #211

8 Hours

This is an even more advanced version of our DVOM Diagnostics and Auto Electric courses. More electrical theory and electronics are introduced, as well as, use of the inductive amperage probe for electrical/engine performance diagnostics. Additional DVOM information (Uses, maintenance etc.) and information on the CAT-III meters required for Hybrid/High Voltage vehicle service is included.

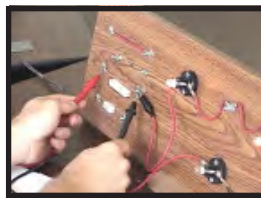
*This is a hands-on class! Bring a DVOM/DMM and Inductive Amperage Probe. Considerable live circuit testing will be conducted using circuit simulators and components tests will be performed.*

- DVOM-DMM Functions Review
- Proper Scaling/ ranging of a meter
- Reading and comprehending the meters values/scales

Students will perform hands-on exercises using DMM's to select proper meter functions, probe leads, and port locations.

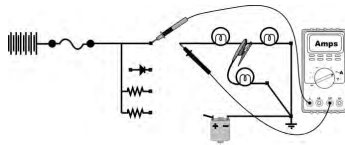
### Electricity Review

- Volts / Amps / Ohms:  
The definition of all three components that create electromotive force.
- Structure of the Atom.
- Theory- correcting misguided assumptions and myths.
- Practical application of Ohm's Law and its importance to successful electrical diagnosis.



### Practical Applications of Amperage Testing

- Understanding current flow in a live circuit
- Using amperage measurements to diagnose electrical failures.
- Parasitic draw testing
- Inductive current probes (Low and High amp)
- Probe Operation
- Connecting to your Meter or DSO.
- Setting up and Zeroing the probe.
- Diagnostic Techniques
- Calculating and confirming PCM Controlled Component current values (Solenoids, relays, motors, etc.)



Several Case Studies of Diagnosis' using the Low Current Probe will be explained and advanced uses of the probe will be covered.

**Bring your DVOM (and/or DSO) and Inductive Current Probe!**

### Electrical Circuits Review

- Voltage Dividing Circuits
- Parallel Circuits
- Series-Parallel Circuits
- Static vs. Dynamic Testing
- Circuits will be analyzed and compared to actual automotive systems found in today's automobile.
- Relays and Solenoid Operation and Testing
- Induction and Inductive Reactance

### New Battery Technology-

- Spiral Wound Cell (Gel Cell, Absorbed Glass Mat etc.)
- Advantages & Servicing



### Scan Tool Vehicle Computer Technology

- PCM Functions & Operations
- Understanding PCM Input and Output Circuits
- PCM Power and Ground requirements
- Examine PCM circuit failures, cause and effects

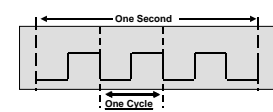
### Automotive Basic Sensor Diagnosis and Testing

- Introduction to analog signals.
- How to test potentiometer sensors.
- How to test permanent magnet sensors.
- How to test NTC and PTC thermistor sensors

### Understanding Input Signals & output Signals

- What is Frequency?                      -What is a Pull up circuit?
- What is Duty Cycle?                      -What is a Pull down circuit?
- What is Pulse Width?                      -What is Pulse Width Modulation?
- What does trigger +/- mean?

#### Frequency Measurement - Hz



- Hertz = the number of complete voltage cycles occurring in one second
- What is the frequency of this signal?

*The objectives stated for this course are:*

*Upon completion of this course the student...*

- will be able to use his DVOM to successfully diagnose circuit and component failures.*
- will be able to identify simple, series, parallel and series-parallel circuits and diagnose failures.*
- will be able to explain the difference between dynamic and static resistance as it applies to ohm's law.*
- will be able to identify the value indicated on the DVOM based on displayed digits, decimal point location, scale selected and range indicator displayed.*
- will be able to explain and demonstrate voltage drop testing.*
- will be able to diagnose circuit or component failures using min-max-averaging and touch hold features of the DVOM*
- will be able to successfully measure frequency, pulse width modulated and duty cycle signals*

# EAST TRAINING

## Digital Storage Oscilloscope Part 1

Course #212

8 Hours

This class is designed to instruct the student in the proper thought process to be used when setting up a digital storage oscilloscope- DSO. Learn about the many different types of automotive signals. Instructions are provided on how to acquire the many common waveforms and how to interpret these waveforms. Relevant electrical and electronics concepts introduced in the DVOM course will be reviewed. This is a hands-on class. If you have a DSO bring it. If not, you will still have an opportunity to learn features and benefits of available units which will make you better informed to help you choose a DSO and become immediately productive. (Prerequisite course #111)



**This is a hands on class, bring your DSO!**

### Topics covered:

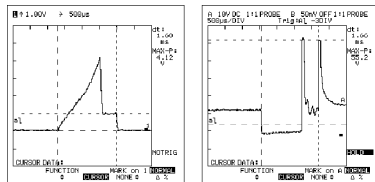
Electricity & Electronics- Analog Vs digital scopes, Electrical cycles, Analog/digital signals, Frequency/Hertz, Pulse width, Duty Cycle, Analog & digital signals.

DSO- Voltage scale,

Time-base, Ground position, Auto set, Trigger level, slope, and source, Auto trigger/freerun, Trigger delay, Single/continuous sweep, 1-2-5 rule, A/C - D/C coupling, Record function, Cursor function, Proper Test connections, Interpreting waveforms.

Classroom exercises: Capturing and storing of analog & digital signals from sensor simulators.

In shop testing:- Sensor worksheets, Stress testing and capture of O<sub>2</sub> sensor waveforms, testing computer system input and output signals, Injector driver diagnosis.



*The objectives stated for this course are:*

*Upon completion of this course the student...*

while receiving signals of known frequency, speed, and amplitude the student will be able to properly set the DSO- volts per division, time-base, ground position, trigger level, trigger slope, and source to display a proper waveform.

will be able to correctly identify when to use AC coupling.

will be able to capture analog and digital signals from inputs (TPS, EVP, MAP) and outputs (fuel injectors).

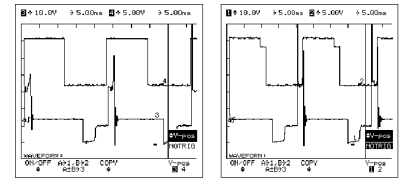
will be able to properly stress test oxygen sensors, capture and store the waveforms and identify sensor failures.

## Digital Storage Oscilloscope – Part II

Course #215

8 Hours

This class reviews the thought process used to set up a DSO. Relevant electrical and electronics concepts introduced in the DVOM and DSO-I course will be reviewed. Learn about the many different types of automotive signals. Instructions are provided on how to acquire and interpret strategic waveforms. Advanced methods demonstrated include use of AC coupling to look for compression and vacuum problems, and how to use and compare dual traces to their fullest advantage. Current ramping concepts will be covered. Bring your DSO. (Prerequisite course #112)



### Topics covered

Electricity & Electronics- Analog/digital signals, Frequency/Hertz, Pulse width and Duty Cycle.

Advanced DSO- Creative testing techniques—Engine compression & volumetric efficiency testing, Computer input sensor dual trace testing, Road testing techniques, Cursor measurement functions. Creative Triggering techniques and special Functions.

Thought Process to acquire and view a waveform, Down loading and printing waveforms. Storing & retrieving waveforms from memory, Building your own waveform library. Inductive and capacitive pick-ups, probe calibration, accessories, and adapters. Avoiding EMI (Electro-Magnetic Interference). Dual trace testing- Mixture Solenoid or injector over oxygen Sensor, Measuring Secondary Ignition waveforms. Injector Misfire Diagnostics—Saturated drivers, Peak and Hold drivers, Injector On-Time. Amperage Waveforms- Fuel Pump RPM and Amp Testing

**This is a hands on class, bring your DSO!**

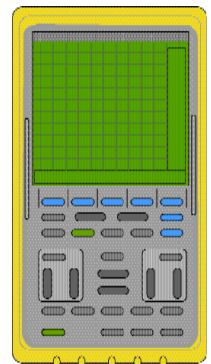
Classroom exercises- Signal capturing, interpreting, storing, and retrieving using sensor simulators.

In shop exercises- Capturing, interpreting, storing and retrieving several waveforms using single and dual trace capabilities.

*The objectives stated for this course are:*

*Upon completion of this course the student...*

while receiving signals of known frequency, speed, and amplitude the student will be able to properly set the DSO- volts per division, time-base, ground position, trigger level, trigger slope, channels, and source to display dual channel waveforms. will be able to use cursors to properly measure signal parameters. will be able to capture, store, and retrieve waveforms.





# EAST TRAINING

## Battery, Starting & Charging System Diagnosis

Course #219

8 Hours

This class reviews electrical concepts—atomic structure, charges, magnetism, and Digital Volt Ohmmeter use. The students will participate in practical application of Ohm's Law during hands-on sessions using table mounted electrical circuit training aids, and on vehicles. We will review starting and charging system theory, operation, and diagnosis and will cover common, and not so common, starting and charging system failures. Learn about battery construction, testing, and checking for high resistance connections. Also covered is diagnosis of electrical failures using wiring diagrams.

### Topics Covered-

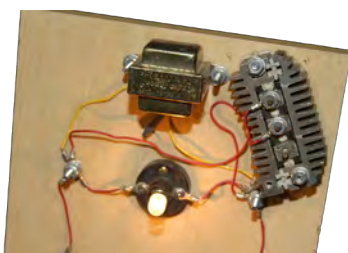
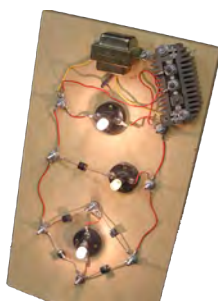
#### Electricity & Electronics-

Metric Units of Measurement, Electrical principles—atomic structure, charges, magnetism. Practical application of Ohm's and Kirchhoff's laws, Induction and inductive reactance, AC & DC Voltage signals, Induction and inductive reactance, simple, series, parallel and series-Parallel circuits.

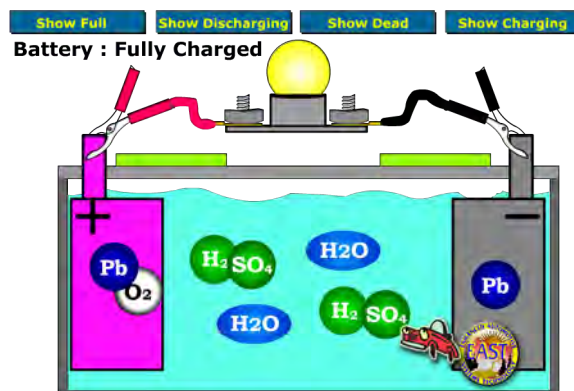
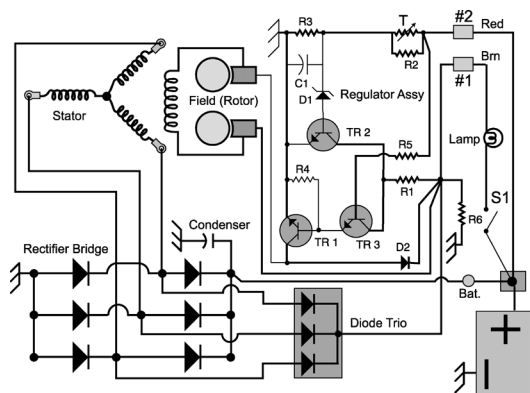
**System testing-** Starter System & Component Testing, voltage drop testing, battery construction, and testing - State of Charge Test, Open circuit voltage test methods, Load and capacitance Testing, Parasitic draw testing. Charging System Operation & Testing, Rectification.



*What is Field current*



*What is Rectification?*



Copyright 2003-2014 EAST Training - Battery Animation

*Battery Chemistry Animation*

**Electrical failures-** Charging circuit, Cooling fan circuit, Asian PFI & TBI circuits, Airbag circuit, PCM circuit

**Classroom exercises-** Voltage drop, amperage, and resistance testing on electrical simulator boards. Voltage and frequency measurements on sensor simulators. Demonstration of half wave and full wave rectification on a simulator board.

**In shop exercises-** Voltage drop testing of battery, starter, and alternator circuits; OCV testing, component amperage draw testing. Testing for alternator AC ripple and coolant electrolysis.

*The objectives stated for this course are:*

*Upon completion of this course the student...*

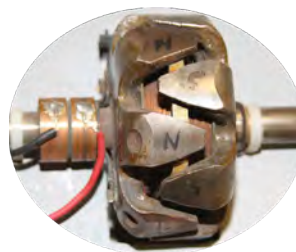
*Given a properly functioning DVOM the student will be able to measure voltage, amperage, and resistance in starting, charging and lighting circuits.*

*will be able to explain and demonstrate voltage drop testing in starting, charging and lighting circuits.*

*will be able to perform battery OCV and load tests, charging system output, starter draw tests and interpret the results.*

*will be able to properly test for excessive alternator AC ripple and coolant electrolysis.*

*will be able to perform parasitic draw testing.*



**This is a hands on class, bring your DVOM/DMM!**



# EAST TRAINING

## Air/Fuel Driveability & Emission Diagnostics

Course #213

8 Hours

Learn about the Chemistry of combustion. Learn what each of the exhaust gases- CO, CO<sub>2</sub>, O<sub>2</sub>, HC, NO<sub>x</sub> indicate. Learn how to use exhaust readings to diagnose engine performance and driveability concerns, as well as, emission problems. Learn what happens in the combustion chamber and in the catalytic converter. See how other gases such as ammonia affect emissions. Learn how to interpret exhaust readings before and after the catalytic converter.

### Topics covered:

Gas Analyzers- BAR 74, 80, 84, 90, 97, Calibration and maintenance tips.

Emission testing- I&M tests explained- FTP, Static and loaded mode tests, transient and steady state, basic idle, two speed idle, IG-240, IM-240, BAR 31, IN 93, ASM 5015, 2525. Sampling methods- Partial stream, CVS, VMAS (percentages Vs Grams per mile), DCF, Standards- Phase in Vs final.

Chemistry of Combustion- Types of matter, Mass Energy/Radiant Energy, Atoms, molecules, molecular structure, Reading chemical formulae, Perfect combustion Vs real world, Stoichiometry. Exhaust gas relationships- CO, CO<sub>2</sub>, O<sub>2</sub>, HC, NO<sub>x</sub>. Practical uses for an exhaust analyzer: Engine condition analysis, Mechanical / Ignition engine failures, Cylinder balance tests (HC per cyl.), Gasoline & Exhaust leaks, Catalytic converter testing, O<sub>2</sub> sensor testing, I&M testing and diagnosis.

### In-Shop exercises -

Recognizing open / closed loop, identifying lean conditions, diagnosing inoperative fuel injectors & ignition misfires, interpreting gas readings before and after the catalytic converter using worksheets. Engine faults will be induced and the results analyzed.

### *The objectives stated for this course are:*

*Upon completion of this course the student...*

*will be able to properly explain the relationship between CO, HC, CO<sub>2</sub>, O<sub>2</sub> and NO<sub>x</sub> formation during combustion.*

*will be able to explain the major differences between basic and enhanced I/M tests (steady state / transient, static / loaded mode). while using an exhaust analyzer the student...*

*will be able to diagnose- inoperative fuel injectors, ignition misfires, and lean misfires.*

*will be able to identify abnormal gas readings before and after the catalytic converter.*

## O<sub>2</sub> Sensor & Cata Conv Oper & Testing

Course #214

8 Hours

Learn to pinpoint driveability and emission problems by looking at the O<sub>2</sub> sensor's output. Learn how to detect exhaust gas levels by looking at the O<sub>2</sub> sensor's waveforms. Compare the O<sub>2</sub> signal to the computer's fuel command to narrow down your search for the problem. Learn about the different types of catalytic converters including: pre-cats, two way, three way, dual bed and dual bed with supplemental air. How to test catalytic converters using many different methods and tools. Learn how to comply with government regulations when replacing catalytic converters. Bring your DVOM or DSO. (Prerequisite course #111 or 211 & 212)

### Topics covered:

Oxygen Sensors- Types of sensors- Zirconia, Titania. One, two, three, four, and seven wire sensors. Sensor locations- OBD-I & II. O<sub>2</sub> sensor construction, function, and operation and testing.

Tools and equipment required, how to connect, what to look for, interpreting results, causes of failures. Interpreting O<sub>2</sub> waveforms, and when to replace a sensor. Using the O<sub>2</sub> sensor to isolate defective systems, diagnose mechanical problems, verify repairs, and providing a diagnostic baseline. How to sell the repair. Catalytic Converters- Purpose, Design, Construction. Testing catalytic converters- Temperature, Rattle test, Back pressure, O<sub>2</sub> Snap test, CO<sub>2</sub> HC Test, Gas test before/after cat.

Failures and their causes-

replacing catalytic converters, Government regulations.

In shop exercises- O<sub>2</sub> sensor testing, Before

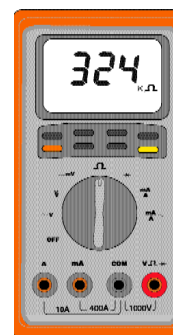
and after cat gas analysis.

### *The objectives stated for this course are:*

*Upon completion of this course the student...*

*will be able to properly perform and demonstrate the CO<sub>2</sub> / HC and catalytic converter test procedure.*

*will be able to properly connect test equipment and stress test O<sub>2</sub> sensors while measuring minimum and maximum voltage levels and testing for proper response time.*



# EAST TRAINING

## On Board Diagnostics-II (OBD-II)

Course #216

8 Hours

Learn OBD-II regulations and the J-1930 terminology. Learn the advancements in OBD-II. See how advanced computer monitoring can detect EGR, catalytic converter and emission faults. See how the PCM can detect misfires. Learn to perform an OBD drive cycle. See what a readiness code is and how to set it.

### Topics covered:

On Board Diagnostics- CARB standardization, OBD-I- Major requirements, Monitored Systems, Critical Input Signals, Problems and Limitations.

OBD-II- Regulations, Standards- SAE "J" standards included in the CAA of 1990- Common Terms, DTC's, DLC locations. Trouble Code identification, DLC 16 terminal pin commonality, OEM pin assignment, Serial data standards—UART and Class II, OBD-II Scan tool requirements, Diagnostic Test Modes, Diagnostic strategies, Component Monitoring Terms-Warm up cycle, Enable Criteria, Trip, Drive Cycle (FTP Drive Cycle).

Testing- Active, Passive, intrusive. Comprehensive component monitoring- Non-Continuous and Continuous testing  
PCM diagnostics- Diagnostic Trouble Codes- Types- A, B, C, D- Setting, retrieving, clearing, Enabling criteria. MIL operation, Freeze Frame Data, Scan Tool Capabilities, Readiness status.

*In shop exercises*- Scan tool diagnostics.

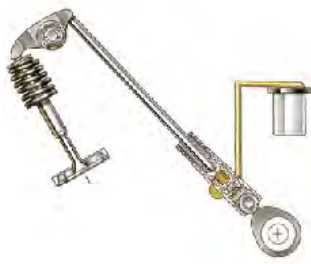
*The objectives stated for this course are:*

*Upon completion of this course the student...*

will be able to explain the major differences between OBD-I and OBD-II requirements.

will be able to explain OBD-I regulations and standards.

will be able to connect and properly set a scan tool to read system sensor parameters, diagnostic trouble codes (DTC's), freeze frame data, and monitor readiness status.



**Bring your Scan tool!**

## Advanced Engine Performance & ASE L1 Test Prep

Course #217

8 Hours

*Note: This class is excellent prep for the A8 and L1 tests. Technicians must be certified in Engine Performance A8 prior to attempting to certify for the L1 Advanced Engine Performance test. Also excellent for a review of the latest engine performance and OBD-II diagnosis techniques.*

*We will cover...*

- Power-train diagnostics including performing and interpreting compression readings, chemistry of combustion, 5-gas theory (How HC, CO, NO<sub>x</sub>, CO<sub>2</sub> are formed, and how their measurement, along with O<sub>2</sub>, can be used for diagnostics.)
- I/M failure diagnostics for Constant Volume Sampling, Pressure Purge testing, I/M 240 and ASM testing.
- OBD-II Theory, operation and diagnostics.
- Also covered will be a review of Emission Control Systems operation (EGR, AIR, PCV, Evap etc.).

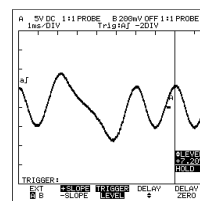
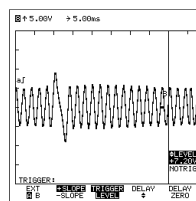
ASE test writers developed a generic OBD-II engine control system for use in the L1 test. This vehicles system is excellent for explaining engine performance related systems. The composite vehicle systems and schematics used in the L1 test will be reviewed and explained in great detail- components, inputs, outputs, scan diagnostics, sensor wiring etc.

- How the composite vehicle questions are presented
- The proper approach when answering.
- Test taking skills and tips will be offered.
- Many practice questions will be reviewed.

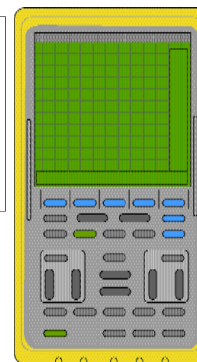
*Target Audience- Experienced Technicians preparing for the ASE L-1 test, or technicians looking for a review of the latest engine performance and OBD-II diagnosis techniques.*

**Bring Your DVOM!!**

### Crankshaft Sensor



Ford 1996 4.0 V-6



*The objectives stated for this course are:*

*Upon completion of this course the student...*

- will have the tools necessary to successfully pass the ASE L1 Certification Test.

# EAST TRAINING

## Engine Performance Anthology

Course #222

8 Hours

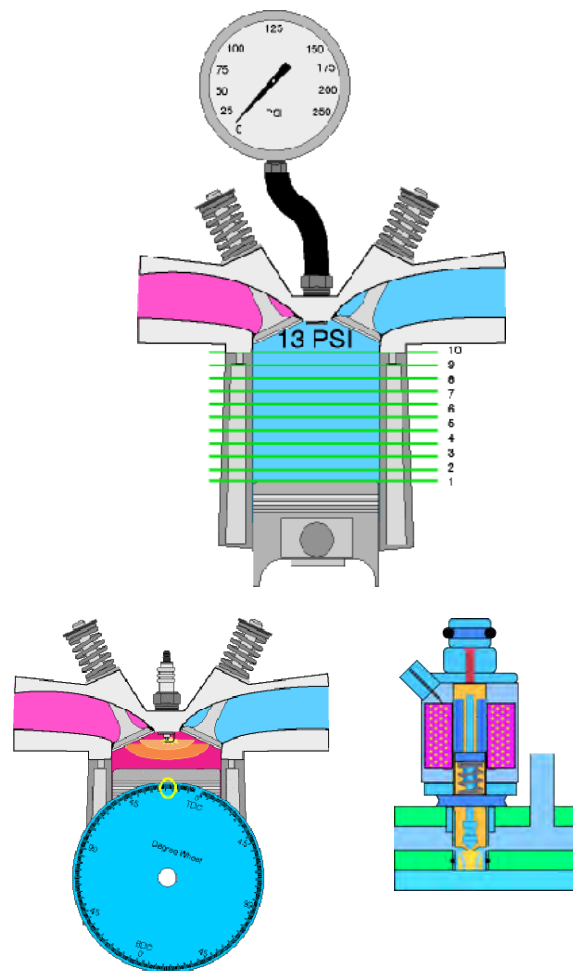
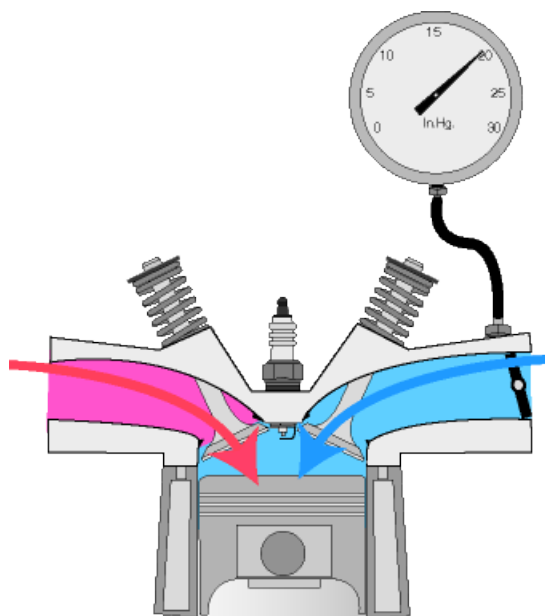
This comprehensive course covers many aspects of engine performance. It will enhance your electrical, engine performance, and emission failure diagnostic skills, and is an excellent preparatory class for ASE A-8 (Engine Performance) and L-1 ASE Advanced Engine Performance tests.

### Topics Covered -

- Combustion principles-
- Compression Theory
- Thermodynamics
- Volumetric efficiency and methods used to increase VE
- Vacuum testing, Cranking & running compression testing
- Air/Fuel Theory, 4 - 5 Gas Analysis
- Ignition System primary and secondary patterns diagnosis
- Scan Tool Diagnostics
- External Emission System Controls
- Electrical Diag.— Reading and evaluating wiring diagrams
- Understanding OBD-II Theory and Operation.

### In shop exercises-

- Cranking and running compression tests
- Vacuum tests
- Ignition scope primary and secondary ignition tests
- Diagnostic Exhaust gas analysis.



*The objectives stated for this course are:*

*Upon completion of this course the student...*

*will be able to properly perform cranking compression tests, and interpret the results.*

*will be able to properly perform running compression tests, and interpret the results.*

*will be able to explain the differences between cranking and running compression.*

*will be able to perform cranking and running vacuum tests and properly interpret the results.*

*will know how to interpret primary and secondary ignition patterns.*



# EAST TRAINING

## Ford Electronic Control Diagnostics

Course #223

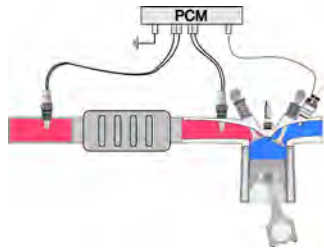
8 Hours

Understanding the Ford EEC system diagnostics— see how the EEC system evolved and where it is going. This course picks up where the OBD-II course left off. This is a hands-on class, Bring your scan tool. (Prerequisite course #116)

### Topics Covered

System Evolution- EEC-I, II, III, MCU. Diagnostic Capabilities, DLC connectors, Diagnostic tools and Equipment, Definition of system tests, Self tests, KOEO, KOER. Continuous monitoring, FMEM, Adaptive strategies, Re-learn Procedures, Code terminology- Slow codes, Fast codes, Fault codes. Diagnostic test flow, Scan data.

Serial and Non-Serial Data Vehicles, Serial Data OBD-II Vehicles, Understanding Scan-Tool Test Modes & Terminology, and Generic Scan-Tool Diagnostic Modes. Learn how to increase the scan-tool's display rates, select the proper parameters and how to customize your set-up. Review of live scanner data and study of Ford specific diagnostic modes.



EEC-IV& V- Scan Data Scope Patterns, Multiplexing, Communication Network, Optimizing your scan tool capabilities, Code parameters. Diagnostic Monitors- Ignition diagnostic monitor, Catalyst Efficiency Monitor, Enhanced EVAP system Monitors, EVAP bypass logic, Continuous memory codes, KOEO codes, KOER codes, EEC-V codes.

Classroom exercises- DPFE data point worksheet

In shop exercises- Scan tool diagnostics

*The objectives stated for this course are:*

*Upon completion of this course the student...*

*will be able to explain the evolution of the Ford electronic engine control systems.*

*will be able to properly identify the MCU and EEC I through V systems.*

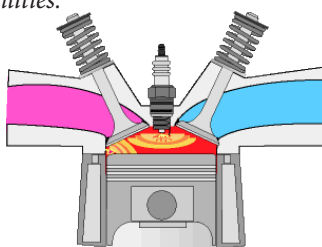
*will know the on board diagnostic capabilities of each system.*

*will be able to explain the procedure to initiate the self test, computer timing check, output actuator cycling, cylinder balance and IVSC tests.*

*will be able to explain the differences between continuous and on demand codes retrieved during KOEO and KOER tests.*

*will be able to explain FMEM, adaptive strategy and relearn procedures.*

*will be able to customize serial data parameters for optimum diagnostic capabilities.*



**Bring your Scan tool!**

## Chrysler Engine Control Diagnostics

Course #224

8 Hours

Examine Chrysler On Board diagnostics past, present and future. Understand Scan-Tool test modes and terminology, Chrysler specific diagnostic modes and using Scan-Tool bi-directional capabilities. You will review live scanner data.

Topics covered- O<sub>2</sub> Feedback Vehicles, EFI & Turbo Vehicles, Serial Data OBD-I Vehicles, CCD Vehicles, Serial Data OBD-II Vehicles. Evolution of computer modules, evolution of diagnostic connectors, connector pin assignments, scan tool tests- scan data, ATM tests, transmission data, customizing your scan tool data. CCD and PCI systems will be covered, and a review of known system problems.

*The objectives stated for this course are:*

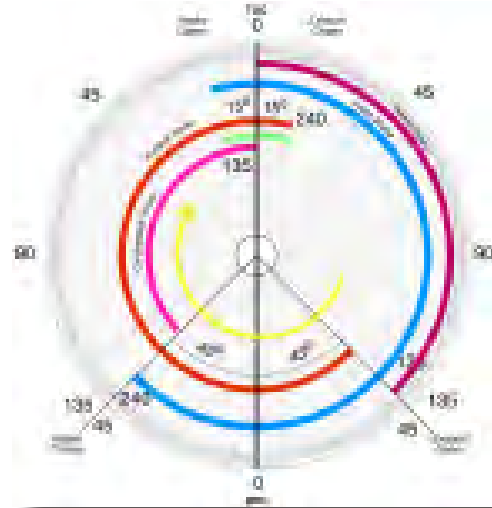
*Upon completion of this course the student...*

*will be able to properly explain the evolution of the Chrysler engine control systems.*

*will be able to perform scan data, ATM switch tests and transmission data tests.*

*will understand and be able to explain the operation of the CCD and PCI systems..*

*will be able to customize scan tool serial data parameters for optimum diagnostic capabilities.*



**EAST's mission is to provide convenient, accurate, timely, and enjoyable, leader-led training for professional in-service technicians. Training that is performance-based and measurable by an increase in the technicians' knowledge, productivity, profitability, and quality of repair services offered.**

**Bring your Scan tool!**



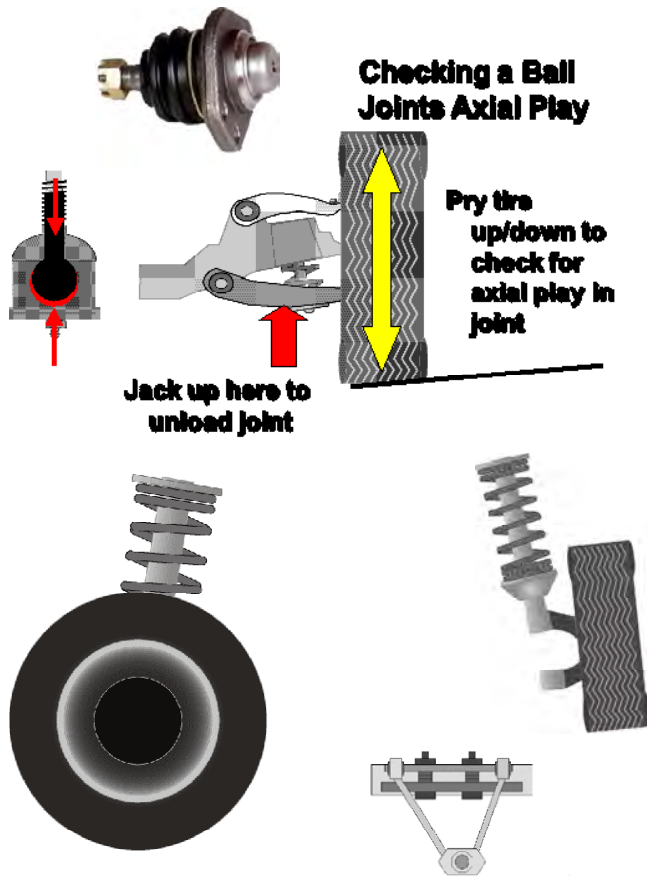
# EAST TRAINING

## Wheel Alignment

Course #120

8 Hours

This course has been developed for the technician that wants to truly understand suspension, steering and wheel alignment theory and operation. Learn road-testing techniques to help diagnose pulling, drifting, bearing and tire noises. Learn how to put the vehicle back to specifications when other repair centers can't.



*The objectives stated for this course are:*

*Upon completion of this course the student...*

- will be able to identify the different designs of suspension and steering systems.*
- will understand how to view the vehicle specifications and make adjustments accordingly.*
- will be able to set caster, camber, toe in, and toe out adjustments*
- will be able to identify front-end problems causing tire wear conditions.*

*Target Audience- for the new or experienced technician or those preparing for the ASE Suspension & Steering test. A great refresher for the experienced technician who wants a review of the basics and also wants to pick up a few tips.*

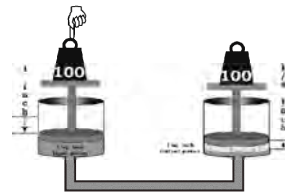
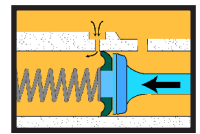
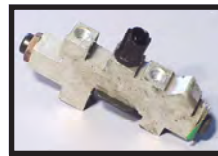
## Brake System Theory and Operation

Course #121

8 Hours

Excellent for a new man in the shop, as preparation for the ASE Brake test, or as a review for experienced technicians.

- Learn about the laws of fluids and physics.
- Learn how to diagnose and solve braking problems.
- Learn how to prevent comebacks.
- Learn how to use measuring tools and perform proper bleeding procedures.

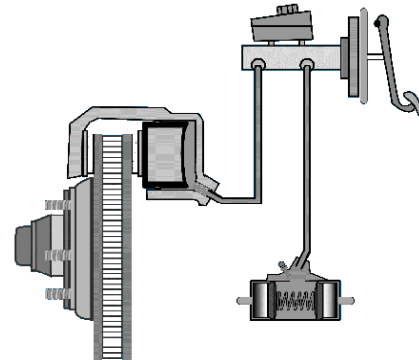


*The objectives stated for this course are:*

*Upon completion of this course the student...*

- will understand the operation of brake hydraulic control components- Master Cylinder, metering valves, proportioning valves, residual check valves, pressure control valves.*
- will be able to properly diagnose causes of brake pulling.*
- will understand proper bleeding methods.*
- will be able to properly diagnose causes of brake drum and rotor failures.*
- will be able to explain and demonstrate measuring and machining of drums and rotors.*

*Target Audience- New and experienced technicians. For ASE Brake test preparation and/or review of brake system operation for recertification.*



# EAST TRAINING

## Ignition System Operation & Diagnosis

Course #227

8 Hours

Like all other systems in the modern automobile, the ignition system has continued to evolve at an alarming pace. Understanding the theory, operation, and testing of the new systems is critical to customer friendly diagnosis and repair.

- After a quick review of magnetic fields, self/mutual induction, and ignition system operation- we will cover the Domestic systems in detail- primary circuit triggering- (Hall effect, magnetic, and optical).
- GM, Ford, and Chrysler spark distribution systems- DI, EI, Coil Over Plug, and Coil Near Plug will be explained.
- Methods of triggering the modules and coils on each system (on-car and on-bench) to speed up diagnosis will be described.

### Magnetic Induction, Theory and Effects

- Magnetic Lines of Force
- Relationship of Magnetism and Electricity
- Transformers (Ignition)
- Permanent Magnet Sensors
- Hall Effect switches

### Semiconductor Theory and Effects

- Diodes
- Transistors
- Solid State Devices
- Optical Sensors

### Ignition System Theory and Analysis

- Ignition Primary circuit operation and analysis
- Ignition Secondary circuit operation and analysis

### Ignition System Triggering and No-Spark Diagnosis

- Creative methods to substitute an electrical signal to quickly check major ignition system components. (Methods and possibilities vary with particular systems.)
- Instructions for assembling shop built testing tools.

### Classroom exercises-

An **ignition simulator** is used to demonstration methods for triggering several types of ignition systems. Demonstration of tools available for purchase (and to fabricate) for triggering common, and not so common, systems.

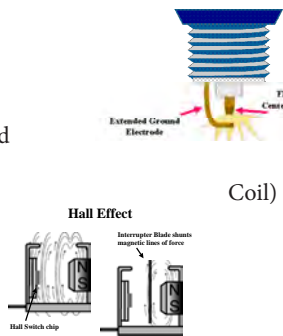
### In shop exercises-

Demonstrations of triggering several ignition systems on vehicles.

### The objectives stated for this course are:

#### Upon completion of this course the student...

- will be able to explain magnetic fields and induction as related to ignition operation.
- will be able to explain transistor operation and use in ignition circuits.
- will understand Circuit Switching (points & transistor)
- will understand the theory and methods used for triggering- Hall Effect, magnetic, & Optical



## Asian Ignition System Operation & Diagnosis

Course #227A

8 Hours

The Asian systems can be even more daunting due to the mystique associated with them, usually compounded by than domestic due to the lack of understandable repair information. Knowing the theory, operation, and testing of the systems is critical to quick and profitable diagnosis and repair.

### Topics covered:

- After a quick review of magnetic fields, self/mutual induction, and ignition system operation- we will cover the Asian systems in detail- primary circuit switching and triggering methods- (Hall effect, magnetic reluctance and optical sensors).
- Spark distribution systems- DI, EI, Coil Over Plug, and Coil Near Plug will be covered. New spark plug technologies will be explained. Ignition timing will be discussed, as well as, combustion anomalies.
- Methods of triggering the modules and coils on several representative systems using an ignition simulator, or on-car, to speed up diagnosis will be described. Toyota, Honda, Nissan, Hyundai/Mitsubishi, Mazda, and Subaru are among the systems which will be described.

### Classroom exercises-

An ignition simulator is used to demonstration methods for triggering several types of ignition systems. Demonstration of tools already in your box, or available for purchase (or to fabricate) for triggering ignition systems will be shown.

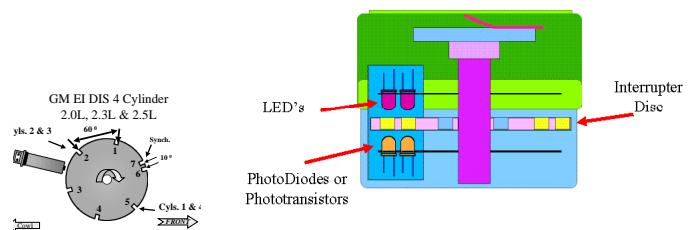
### In shop exercises-

(Location and Time permitting) Demonstrations of triggering several ignition systems on vehicles.

### The objectives stated for this course are:

#### Upon completion of this course the student...

- will be able to explain magnetic fields and induction as related to ignition operation.
- will be able to explain transistor operation and use in ignition circuits.
- will understand Circuit Switching (points & transistor)
- will be able to explain photoelectric device operation and use in ignition circuits.
- will understand the theory and methods used for triggering- Hall Effect, magnetic reluctance, & Optical
- will be able to identify the various types of spark distribution systems used today- DI, EI, Coil Over Plug, and Coil Near Plug.



Bring a DSO, or Graphing meter.

# EAST TRAINING

## AutoTrans/Transaxle Operation & Diagnosis

Course #130

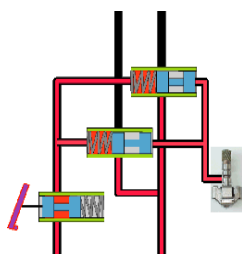
8 Hours

Whether you're trying to improve your automatic transmission diagnostic skills, learn how to identify transmission-related performance problems, or just want to earn ASE gold, this is the course for you.

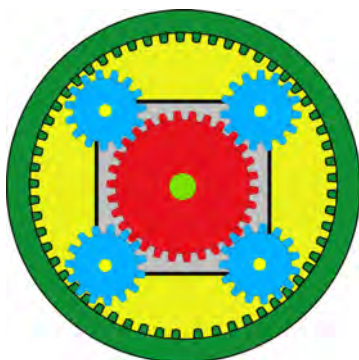
To properly diagnose transmission-shifting failures, and transmission related engine performance problems on new vehicles with computer controlled shifting, you must understand what makes a transmission "tick". This course is a prerequisite for our #130E course covering electronic computer controlled transmissions, which will be introduced during 2003.

### Topics covered include:

**Fundamentals of operation-** Fulcrums, levers, and creating mechanical advantages; Converter operation- stators & TCC; Performing/evaluating oil pressure tests; Fluid coupling, Friction, and planetary unit operation; Road testing and evaluating drivers concerns; Scan tool diagnostics; Computer Controlled Transmission Functions- TCC application, gear changes, and mainline pressure control. This course is excellent preparation for the ASE A-2 test. It has been our experience that this test is the one most responsible for technicians failing to attain ASE Master Technician status.



Shift Valves



Planetary Gears

A pneumatically operated, cutaway automatic transmission will be used to demonstrate transmission operation. Animation is used to explain key operating points.

The objectives stated for this course are:

Upon completion of this course the student...

will be able to properly explain the operation and purpose of holding units (clutches, bands).

will be able to properly explain the operation and purpose of planetary gear units.

will be able to perform oil pressure diagnostic tests and evaluate results.

will understand and be able to explain hydraulic valve operation (shift valves, pressure valves etc.).

will be able to explain TCC clutch operation and perform diagnostics on TCC systems.

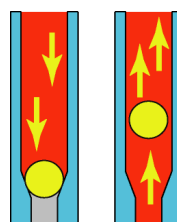
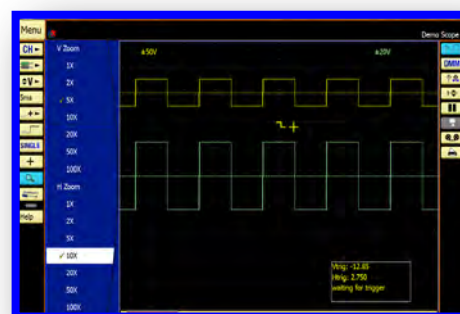
## Electr AutoTrans/Transaxle Operation & Diagnosis

Course #130E

8 Hours

Builds on Automatic Transmission Course #130. Reviews transmission mechanical and electronic theory and operation then covers electronic pressure and shift control. This course is excellent preparation for the ASE A-2 test. The L1- Advanced Engine Performance test also covers several questions regarding to the electronic shift computer controlled transmission. **This course, and course #130, are a must for Engine Performance Diagnosticians.**

*Target Audience- Experienced technicians with a background in automatic transmission theory/diagnosis and repair.*

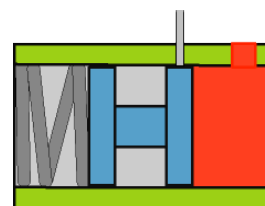


Check Valve



Mechanically released Check Valve

Balance Valve



The objectives stated for this course are:

Upon completion of this course the student...

- will understand and be able to explain TCM (PCM) control of Electronic Transmission Components their Functions.
- will be able to perform Scan tool diagnostic tests and evaluate results.
- will understand and be able to explain electronic control of hydraulic Holding Component operation.
- will be able to explain TCC clutch operation and perform diagnostics on TCC systems.

# EAST TRAINING

## Electronics in the Modern Automobile

Course #131

8 Hours

**This is a Hands-On Class- Bring your DVOM!**

**Explains the application of semiconductors and other electronic components in the automobile of today—**

*Topics covered include:* Construction, function, identifying ratings, and testing of the following components: Diodes— for rectification, circuit protection, current control, Zener diodes (for voltage regulation), Relays and solenoid circuits.

Also, Bipolar Transistors— NPN & PNP used for switching and amplification, SCR's— (Silicon Controlled Rectifiers) Resistors— Carbon composite, Metal film, Wire wound, Variable Resistors (Rheostats, Potentiometers, Thermistors), Capacitors— Ceramic, Mica, Electrolytic, R/C circuits, Coils & transformers, Photoelectric devices— photodiodes, phototransistors, LED's. Integrated circuits will also be introduced (with emphasis this class on the 555 timer chip). Animation is used to explain P & N material and diode function.

*ESD— what it is and how to guard against damage of solid-state devices during diagnosis and service*

**Tools used for electronic diagnosis—**

DSO's, Analog Scopes, DVOM/DMM's, Logic Probes, Logic Pulsers, LED testlights, and discrete component testers will also be discussed.

**Classroom exercises—** The student will build circuits using tabletop electronic trainers. Diodes, Zener Diodes, LED's, Relays, and Transistor Circuits will be built and analyzed.

*Several different automotive electronic circuits will be evaluated, analyzed, and explained. Schematics will be presented describing construction of several useful shop diagnostic tools, which can be assembled using knowledge learned in this course.*

**Due to the amount of time spent building circuits on the electronic trainers in the classroom, there will be no shop time.**

**Bring your DVOM!**



**This is a hands on class, bring your DVOM/DMM!**

## Electronics in the Modern Automobile PartB

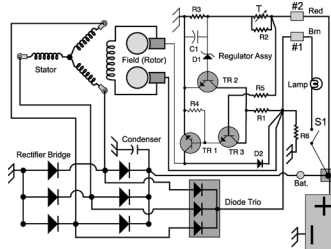
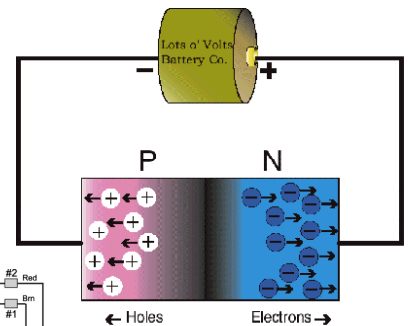
Course #131B

8 Hours

**This course builds on Electronics module 1 (#131)**

We will cover additional electronic components and systems used in the automobiles of today and tomorrow. We will delve deeper into the use of semiconductors- Transistor Gain, Transistors as amplifiers, Darlington pairs; open collector transistors, op-amps, PhotoResistive Photocells, and other components will be covered. We will discuss diode and transistor gate logic circuits, and will begin covering DIN wiring schematics. Recently introduced sensors will be covered. We will be constructing more complex circuits using many of the components listed above on our electronic trainer boards. As in module 1, several types of automotive electronic circuits will be evaluated and explained.

**This is a hands on class, bring your DVOM/DMM or DSO!**

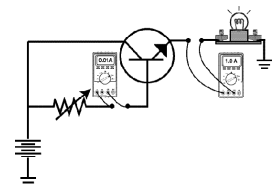


**The objectives stated for this course are:**

**Upon completion of this course the student...**

- Will be able to explain diode function
- Understand and explain difference between solid state and semi-conductor devices
- Will be able to explain use of diodes in circuits
- Will understand and be able to explain use of transistors
- Explain difference between NPN and PNP transistors
- Will understand and be able to explain use of potentiometers and rheostats

**Schematics will be presented describing construction of useful shop diagnostic tools, which can be assembled using knowledge learned in this course.**





# EAST TRAINING

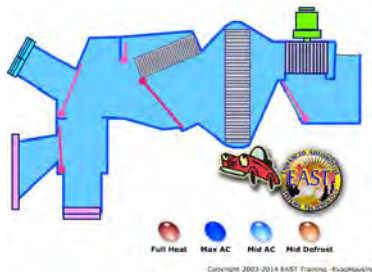
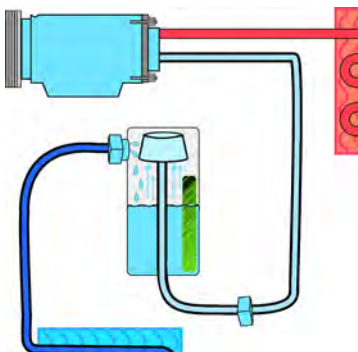
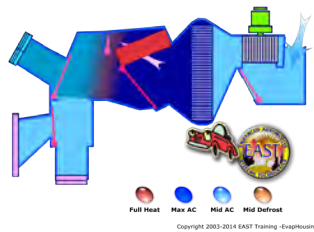
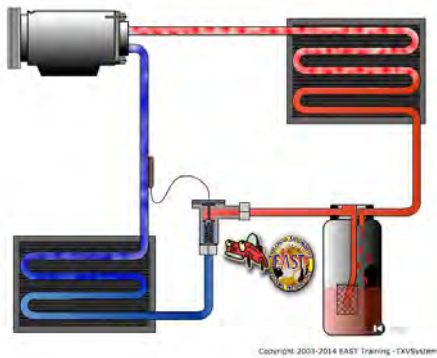
## A/C System Theory, Diagnosis, Service and Retrofit Procedures

Course #232

8 Hours

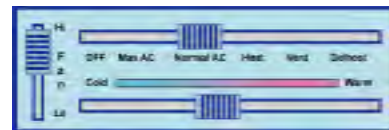
Covers both R 12 and R134a refrigerants used in auto A/C applications. Designed to enhance technician skill levels with the latest methods and service techniques along with the correct procedures and problems associated with retrofitting an automotive R12 system to R134a. Compressor, evaporator, condenser designs, air distribution and control methods, and blower speed control systems will be covered.

**Animation** will be used to demonstrate key operating points.



This class will help you to avoid many common pitfalls when retrofitting and servicing today's A/C systems and will also alert you to the potential problems of cross-contamination of refrigerant and air in an A/C system.

*Target Audience- Experienced technicians with some background in Air Conditioning diagnosis and service.*



*The objectives stated for this course are:*

*Upon completion of this course the student...*

- will be able to properly explain A/C refrigerant system (Orifice tube & Expansion valve) operation.*
- will be able to explain system component operation and function.*
- will be able to properly perform an A/C system leak check.*
- will be able to properly perform an A/C system performance test and interpret the results.*
- will be able to diagnose A/C system faults using pressure and temperature readings.*
- will be able to properly explain the need for refrigerant recovery.*
- will be able to properly explain the danger of improper refrigerant use.*
- will be able to determine proper retrofit procedures and equipment requirements.*
- will be able to determine proper retrofit component needs.*
- will be able to properly avoid system contamination.*

# EAST TRAINING

## EVAP Systems OBD-II Operation & Diagnosis

Course #235

8 Hours

Enhanced and Non-enhanced evaporative systems will be included on import, and domestic vehicles. Includes comprehensive coverage of operational theory, system components, & component monitoring strategies on systems with and without leak detection pumps. Evaporative system diagnosis and DTC repairs will be covered. Fuel cap testing principles and procedures will also be included.

**Bring a Scan tool and/or DVOM!**

### We will cover...

- Major Systems Controlling Emissions
- HC's - VOC's
- Automobile VOC Sources
- Crankcase HC Emissions
- Tailpipe HC Emissions
- Evaporative HC Emissions
- Allowable Evaporative Losses
- FTP- Grams per mile
- Vapor Canister System Operation
- Formation of Ozone & Tropospheric Ozone
- Photo-disassociation of NO<sub>2</sub>

And Much More!

### System diagnostics

- Methods of Checking for leaks (Incl. Smoke machines)
- PCM component control
- Component testing
- LDP - Leak Detection Pump
- NVLD Systems
- Fuel Caps
- Diagnostic Tools
- Case Studies- Domestic & Import Vehicles

And Much More!

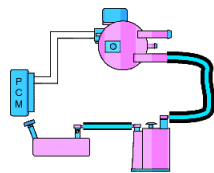
**In shop exercises-** Scan tool, DSO, DVOM diagnostics. Frequency and duty cycle measurement of solenoids and relays. Obtaining diagnostic trouble codes (DTC's), obtaining and analyzing evap system freeze frame data, and monitoring evap readiness status

**Bring Your Scan Tool and/or DVOM/DSO!!**

*The objectives stated for this course are:*

*Upon completion of this course the student...*

- will understand all possible sources of automotive EVAP emissions
- will know the difference between Enhanced and Non-Enhanced evaporative systems.
- will know operational theory, system component operation, and component monitoring strategies on systems with and without leak detection pumps.
- will be capable of performing proper leak check procedures on EVAP systems, including proper use of "smoke machines".
- will understand operation of, and Diagnostic Procedures for, NVLD Natural Vacuum Leak Detection Systems.
- will understand Canister Purge Solenoid System Operation and be capable of performing Diagnostic Procedures.
- will understand and be capable of following proper methods for integrating Scan tool use in the diagnostic process of EVAP related CEL and Diagnostic Trouble Code repair.
- will be capable of measuring Frequency and Duty cycle measurement of EVAP solenoids and relay control.
- will be capable of measuring Amperage Draw of EVAP solenoids and relays, as relating to ECM/PCM circuit failures.



NVLD Valve

## Ford OBD-II Diagnostics

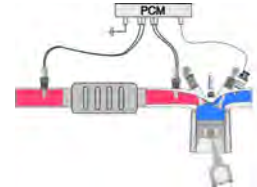
Course #236

8 Hours

Learn what advancements Ford has designed into their OBD-II diagnostics and how they addressed the OBD-II regulations.

See how Ford's advanced computer monitoring can detect:

- EGR,
- catalytic converter,
- idle air control and
- emission faults.



### Testing-

- Active, Passive, intrusive
- Comprehensive component monitoring
- Non-Continuous and Continuous testing.
- Critical Input Signals
- Problems and Limitations.



Scan tool requirements

Diagnostic Test Modes, Diagnostic strategies, Component

See how the Ford system detects misfires.

PCM diagnostics

Diagnostic Trouble Codes- Types- A, B, C, D- Setting, retrieving, clearing, Enabling criteria. MIL operation, Freeze Frame Data, Scan Tool Capabilities, Readiness status.



**Bring your scan tool.**

*The objectives stated for this course are:*

*Upon completion of this course the student...*

- will be able to explain the major differences between OBD-I and OBD-II requirements.
- will be able to explain OBD-II regulations and standards.
- will be able to connect and properly set a scan tool to read system sensor parameters, diagnostic trouble codes (DTC's), freeze frame data, and monitor readiness status.
- will be able to explain the differences between continuous and on demand codes retrieved during KOEO and KOER tests.
- will be able to explain FMEM, adaptive strategy and relearn procedures.
- will be able to customize serial data parameters for optimum diagnostic capabilities.



# EAST TRAINING

## Scan Tool Func, Oper and Diagn Procedures

Course #150

8 Hours

You have a significant investment in a state of the art diagnostic tool. Wouldn't you like to get a return on that investment? Have you received any training on the equipment that will allow a proper return? Do you know all you need to know about the Genisys to ensure you are getting all you should out of the tool?

**This is a hands on class, bring your ScanTool!**



Genisys is a registered trademark of SPX OTC Inc.

*Note: This course can be delivered with a focus on the Autel, Genisys, or Pegasys scan tool. Course description is for the Genisys Scan Tool.*

Some of the topics covered will be...

- External Ports and their Functions- Smart Card & PC Card Slot.
- Cartridge Reader Module.
- Command Buttons- Function, Direction, & Action Keys
- Using the Application Manager- Setting unit defaults, Adjusting screen contrast, Determining available memory.
- Updating using a modem card or a PC
- Interface cables - DB-25 Extension, OBD-I & II
- Scan Data/ Scope Patterns.
- Selecting and Sorting PID's- Viewing in Graphic & Analog View.
- Capturing Data - Record Mode, Freeze Frame and record, Code Trigger.
- Playback, Saving Data, Making a recording.
- Function Key 4- Print, Zoom, Sort, etc.-Pathfinder Mode - Using Pathfinder Software, Repair Trac, Symptoms, Data/ Sensor, TSB references, Drive cycle & BOB information, Component Location.
- Programming - Entering Information, "Reusing setups", Demo mode.
- Other Programs in Scan Diagnostics- OBD II Diagnostic Tests, Cartridge reader, ABS/Air Bag, GM SPS Reprogramming, Monitor 4000 Emulation.
- Controller Area Network (CAN) Compatibility.
- Case Studies will be covered highlighting diagnostic techniques using the Genisys.
- Generic - Global OBD II Functions... and much, much more!

## GM OBD-II Operation & Scan Tool Diagnosis

Course #180

8 Hours

Understand GM system diagnostics. See how the GM OBD-I and OBD-II systems evolved and what we can expect in the future. This course picks up where our generic OBD-II course left off.

**This is a hands on class, bring your Scan tool!!**



*We will cover...*

Learn how to properly configure your scan tool for greater productivity. Will also include using Failure Records, data stream interpretation, making use of bi-directional capabilities, accessing information on individual computers- ECM, PCM, TCM, and

System Diagnostic Capabilities	Adaptive strategies
Scan tool capabilities	Code terminology
DLC connectors	Fault code history
Diagnostic Tools and Equip.	Pending codes
Misfire counter	Diagnosing circuit and
Relearn procedures	component faults using scan data

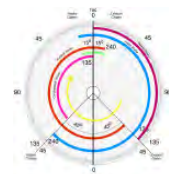
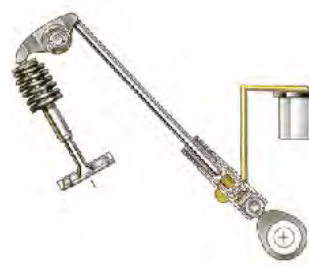
**Bring your Scan tool!**



**The objectives stated for this course are:**

**Upon completion of this course the student...**

- will understand OBD-II system operation as designed in the General Motors Systems.
- will understand General Motors Adaptive Strategies, Code Terminology, Fault Code, History, and Pending Codes.
- will be able to Properly configure Scan tools to capture Data and successfully diagnose System and component failures.
- will understand and be able to use Misfire Counter and System Relearn Procedures.





# EAST TRAINING

## 2 Day Electrical Program

Course #210

16 Hours

This class covers electrical concepts including: atomic structure, charges, magnetism, and Digital Volt Ohmmeter use. The students will participate in practical application of Ohm's Law during hands-on sessions using table mounted electrical circuit training aids, and on vehicles. We will cover starting and charging system theory, operation, and diagnosis and will cover common, and not so common system failures. Learn about battery construction, testing, and checking for high resistance connections and diagnosis of electrical failures using wiring diagrams. Some of the topics covered are:

### Digital Meters

Meter construction and function, manual and auto ranging meter scaling and interpretation, High impedance digital meters- why they are needed, and does yours qualify? Circuit damage caused by using the wrong meter. Meter accuracy, measuring EMF, intensity of current, electrical resistance, static Vs. dynamic resistance, diode test function, true RMS vs. average responding meters, Zero-delta-relative modes, trigger, measuring frequency, pulse width, and duty cycle, meter maintenance.

- DVOM-DMM Functions Review
- Proper Scaling/ ranging of a meter
- Reading and comprehending the meters values/scales
- Metric Units of Measurement



**Non-intrusive  
Amperage Testing**

**This is a Hands-on Class: Bring a DVOM/DMM and a Low Current Inductive Probe!**

### Advanced meter features

How and when to use-Min-Max-average-Recording, Touch-hold function. Power up options- Disable auto off, High accuracy 1 ms response, Low ohms.



**CAT III Meter**

### Electricity

- Volts / Amps / Ohms: The definition of all three components that create electromotive force.
- Structure of the Atom.
- Theory- correcting misguided assumptions and myths.
- Practical application of Ohm's Law and its importance to successful electrical diagnosis.
- Practical application of Kirchhoff's laws
- Induction and inductive reactance
- AC & DC Voltage signals
- Induction and inductive reactance

### Semiconductors

Diode and transistor construction, function, identification, application and out-of-circuit testing. NPN & PNP transistors, small signal, rectifier, clamping, and avalanche diodes are discussed.

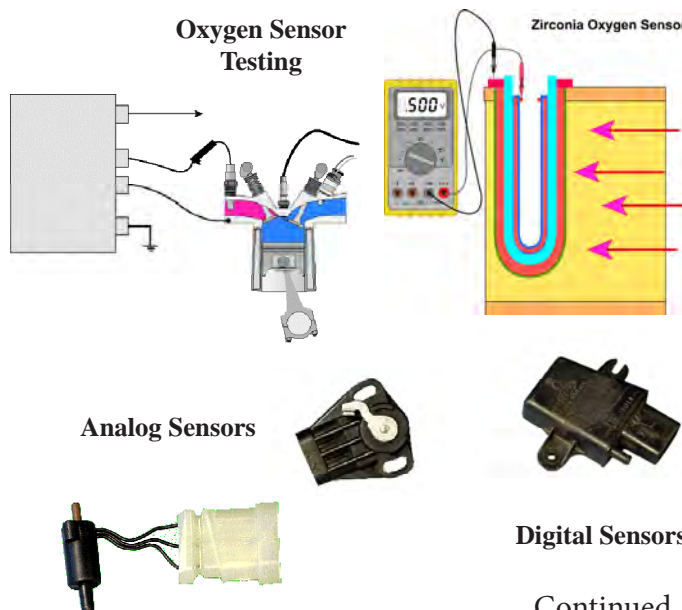
### Electrical Circuits Review

- Voltage Dividing Circuits
- Parallel Circuits
- Series-Parallel Circuits
- Static vs. Dynamic Testing
- Circuits will be analyzed and compared to actual automotive systems found in today's automobile.

### Scan Tool Vehicle Computer Technology

- PCM Functions & Operations
- Understanding PCM Input and Output Circuits
- PCM Power and Ground requirements
- Examine PCM circuit failures, cause and effects

(Continued next page)



**Digital Sensors**

Continued...



# EAST TRAINING

## 2 Day Electrical Program (Continued)

Course #210

16 Hours

### Automotive Basic Sensor Diagnosis and Testing

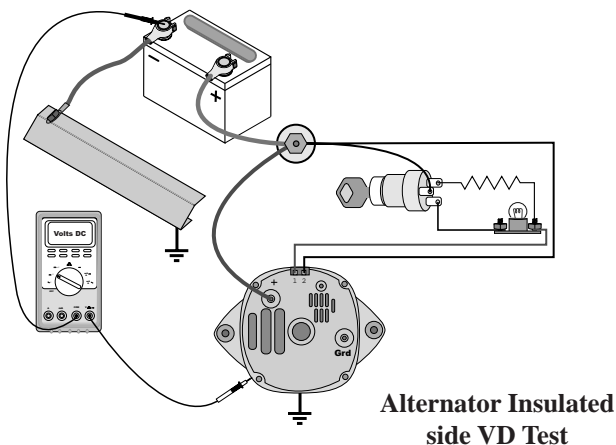
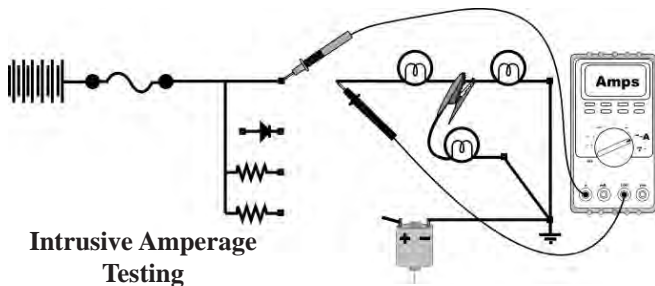
- Introduction to analog signals.
- How to test potentiometer sensors.
- How to test permanent magnet sensors.
- How to test NTC and PTC thermistor sensors
- Oxygen Sensor testing

### Understanding Input Signals & output Signals

- What is Frequency?                      -What is a Pull up circuit?
- What is Duty Cycle?                      -What is a Pull down circuit?
- What is Pulse Width?                      -What is Pulse Width Modulation?
- What does trigger +/- mean?

### Practical Applications of Amperage Testing

- Understanding current flow in a live circuit
- Using amperage measurements to diagnose electrical failures.
- Parasitic draw testing
- Inductive current probe testing (Low and High amp)
- Calculating and confirming PCM Controlled Component values (Solenoids, relays, motors, etc.)



### System testing

Starter System & Component Testing, voltage drop testing, battery construction, and testing - State of Charge Test, Open circuit voltage test methods, Load and capacitance Testing, Parasitic draw testing. Charging System Operation & Testing, Rectification.

### Electrical failures

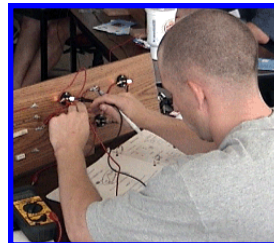
Charging circuit, Cooling fan circuit, Asian PFI & TBI circuits, Airbag circuit, PCM circuit

**Classroom exercises-** Voltage drop, amperage, and resistance testing- on electrical simulator boards. Voltage and frequency measurements on sensor simulators. Demonstration of half wave and full wave rectification on a simulator board.

### In shop exercises-

- Voltage drop testing of battery, starter, and alternator circuits
- OCV testing
- Component amperage draw testing
- Testing for alternator AC ripple and coolant electrolysis.

**Bring your DVOM/DMM and Inductive Current Probe!**



**Extensive Hands-on Testing both on circuit boards and on vehicles**

*The objectives stated for this course are:*

*Upon completion of this course the student...*

- will be able to use his DVOM to successfully diagnose circuit and component failures.
- will be able to explain the practical application of Ohm's and Kirchhoff's laws.
- will be able to identify simple, series, parallel and series-parallel circuits and diagnose failures.
- will be able to explain the difference between conventional and electron theories of current flow.
- will be able to explain the difference between dynamic and static resistance as it applies to ohm's law.
- will have a basic understanding of semiconductor operation and will be able to properly identify diodes, NPN & PNP transistors and Zener diode symbols as used in wiring schematics.

# EAST TRAINING

## Introduction to Hybrid Vehicle Servicing

Course #141

8 Hours

*Featuring the Honda Insight, Toyota Prius, and Ford Escape Hybrids*

Hybrid vehicles present an exciting new challenge and opportunity for the automotive service industry. Hybrids take many forms, and incorporate many new technologies and never before seen systems. Many components originally designed for use in the 42 volt system are being put to use in the much higher voltage Hybrid vehicles. Fuel cell equipped hybrids are a reality and are almost ready for production. Improvements in battery design and chemistry has breathed new life into PHEV's, or Plug In Hybrid Electric Vehicles. This is the first in a series of courses designed to present you with the knowledge required to successfully diagnose and service this latest addition to our industry.

***What constitutes a Hybrid Vehicle, The history and evolution of today's Hybrid.***

### **Course description:**

#### *Motors:*

Operation and theory- Electric Motors, Electric Generators, Eddy Brake Motors, Brushless Motors, ISA/ISG, Battery modules, capacitors, AC/DC converters, regenerative braking, Idle stop systems.

#### *Internal Combustion Engine Types and Designs:*

Five Stroke, VVT, Cylinder Offset, and Lean Burn.

#### *Transmission Overview:*

CVT, Manual, and PSD (Power Split Device)

#### *Hybrid Power Train Types:*

Series, Parallel, Series Parallel

#### *How to operate a Hybrid:*

Starting/Shutting down, Emergency Shut/down, Disabling auto start systems

#### *Hybrid Safety, Tools, and Equipment:*

Recognizing high voltage system components, Identifying dangers, Recognizing High Voltage cables.

Test equipment, Meter and accessory requirements-Does your present equipment meet the requirements?

#### *Instrument Display:*

Icon Recognition, Gauges / Indicators / Warning- What do they mean?

#### *Maintenance/Serviceable Items:*

Performing maintenance and repairs- cautions to observe.

Many of the same Maintenance services required on conventional vehicles are required on hybrids. A knowledge of safety precautions will ensure a safe environment when performing these services: Lube, Oil, Filter changes, Trans Service, Coolant Service, Brake Service, Tire Service, Tune Up.

#### *Introduction to Hybrid DTC's:*

This portion of the course will open your eyes to future types of repairs.

Review some new types of Diagnostic Trouble Codes

These new codes will lead us to new diagnostic procedures.

#### *Hybrids to come*

What the future looks like for the Hybrid market.

#### *The objectives stated for this course are:*

*Upon completion of this course the student...*

*will understand the types of powertrain designs used.*

*will understand the types of Motors/Generators used.*

*will be able to identify high voltage components.*

*will have an understanding of the basic maintenance services necessary on Hybrid vehicles.*

*will have an understanding of safety concerns when servicing Hybrid vehicles.*

*will understand the methods used to disable high voltage systems for service.*

*will understand the differences in tool & equipment requirements for Hybrid vehicle service.*



**This is the first in a series of courses which will cover the individual Hybrid models in more depth as they develop and become more popular.**

# EAST TRAINING

## Servicing Toyota Hybrid Vehicle Systems

Course #170

8 Hours

### Featuring the Toyota Prius, Camry and Lexus RX400h Hybrids.

Hybrid vehicles present an exciting new challenge and opportunity for the automotive service industry. Hybrids take many forms, and incorporate many new technologies and never before seen systems. Many components originally designed for use in the 42 volt system are being put to use in the much higher voltage Hybrid vehicles.

This is the first in a series of manufacturer specific courses designed to present you with the knowledge required to safely and successfully diagnose and service New Technology Vehicles. The purpose of this course is to give the Technician an overview of the various systems used in the Toyota Hybrid Vehicles. Future courses will delve deeper into the diagnosis and repair of the individual systems. As you will see, Toyota has been ahead of the curve and is currently licensing their Hybrid technologies to other manufacturers, both foreign and domestic, (Lincoln/Mercury, Ford, Nissan and Mazda) for use in their own lines of Hybrid vehicles.

### Toyota Course Highlights

#### Motors:

##### Operation and theory-

Electric Motors, Electric Generators, Eddy Brake Motors, Brushless Motors, ISA/ISG, Battery modules, capacitors, AC/DC converters, regenerative braking, Idle stop systems.

##### Internal Combustion Engine Types and Design enhancements:

Five Stroke, VVT, Cylinder Offset, and Lean Burn.

##### Transmission Overview:

Toyota PSD (Power Split Device) MG1 & MG2 operation.

##### Hybrid Power Train Types:

Series, Parallel, Series Parallel

##### How to operate a Hybrid:

Starting/Shutting down, Prius Key systems- Electronic Key and optional Smart start/Smart Entry Systems. Emergency Shut/down, Disabling auto start systems.

Systems incorporated to attain AT-PZEU (Advanced Technology- Partial Zero Emission Vehicle) status.

##### Hybrid Safety, Tools, and Equipment:

Recognizing high voltage system components, Identifying dangers, Recognizing High Voltage cables. Test equipment, Meter and accessory requirements-

##### Instrument Display:

Icon Recognition, Gauges / Indicators / Warning- What do they mean?

##### Maintenance/Serviceable Items:

Performing maintenance and repairs- cautions to observe. Safely servicing vehicles with "Hot Storage" cooling systems, Multi-Water pump/Water Valve Systems, Electric water pump circuit operation and Power Inverter cooling systems.

##### Other Systems covered:

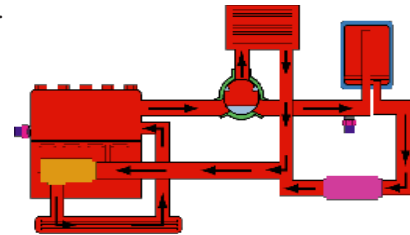
Toyota Hybrid HVAC System Servicing.  
Tire Pressure Monitoring System  
Exterior lighting System Servicing.

The objectives stated for this course are:

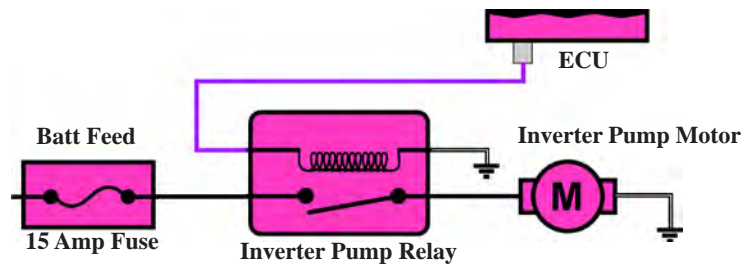
Upon completion of this course the student...

- will understand the types of powertrain designs used by Toyota.
- will understand the operation of Motors/Generators and planetary units used in the PSD.
- will be able to identify high voltage components.
- will have an understanding of the basic maintenance services necessary on Toyota Hybrid Vehicles.
- will have an understanding of safety concerns when servicing Toyota Hybrid Vehicle Systems.
- will understand the methods used to disable high voltage systems for safe service.
- will understand the requirements for tools & equipment when servicing Toyota Hybrid vehicles.

A knowledge of proper safety precautions will ensure a safe environment when performing these services: Lube, Oil, Filter changes, Trans Service, Coolant Service, Brake Service, Tire Service, Tune Up.



Hot Coolant Storage System



Inverter Water Pump Schematic



MGU- Motor/Generator Unit

# EAST TRAINING

## Servicing the Toyota Prius- Gen2

Course #171

8 Hours

### ***Featuring the Toyota Prius, Generation 2 Hybrid.***

Toyota hybrid vehicles (and *ALL* Hybrids) present an exciting new challenge and opportunity for the automotive service industry. Many shops are concerned about servicing these vehicles. An understanding of proper procedures, equipment, parts, and lubricants will make servicing these vehicles a safe and profitable experience.

This is the second in a series of manufacturer specific courses designed to present you with the knowledge required to safely and successfully diagnose and service Advanced Technology Vehicles. The purpose of this course is to give the Technician a review of the various systems used in the Toyota Hybrid Vehicles, then provide more specific procedures for the more common service procedures you will encounter. Future courses will dig deeper into the diagnosis and repair of the individual systems. (Note: Recommended Prerequisite course 141.)

### **Toyota Prius Gen 2 Course Highlights**

#### *Review of:*

##### **Motor Operation and theory-**

Electric Motors, Electric Generators, Eddy Brake Motors, Brushless Motors, ISA/ISG, Battery modules, capacitors, AC/DC converters, regenerative braking, Idle stop systems.

##### **Internal Combustion Engine Types and Design enhancements:**

##### **Transmission Overview:**

Toyota PSD (Power Split Device) MG1 & MG2 operation.

##### **Hybrid Power Train Types:**

##### **How to operate a Hybrid:**

Starting/Shutting down, Prius Key systems- Electronic Key and optional Smart start/Smart Entry Systems. Emergency Shut/down, Disabling auto start systems.

Systems incorporated to attain AT-PZEU (Advanced Technology- Partial Zero Emission Vehicle) status.

##### **In-depth coverage of:**

##### **Hybrid Safety, Tools, and Equipment:**

Recognizing high voltage system components, Identifying dangers, Recognizing High Voltage cables.

Test equipment- insulated tools, meter and accessory requirements- Including CAT III DVOM and insulation testing Meters (such as- Fluke 1503, 1507 & 1508) to test for insulation breakdown and leakage.

When to use Insulated Gloves (1000 volt certified) and requirements for testing and recertification of gloves.

Insulated Rescue Hook.

##### **Instrument Display:**

Icon Recognition- Gauges / Indicators / Warning lights- What do they mean?

##### **Maintenance/Serviceable Items:**

Performing maintenance and repairs- cautions to observe.

Proper procedures to safely disable the high voltage/current system using the Service Plug.

Disconnecting the HV battery for service.

Auxiliary Battery Removal, servicing, charging.

Proper procedure for Changing Engine Oil.

Safely servicing vehicles with "Hot Storage" cooling systems, Multi-Water pump/Water Valve Systems.

Transaxle and Inverter Coolant Service. (Improper procedures can cause expensive failures.)

Assembling an inexpensive alternative to Toyota factory scan tool, necessary to operate inverter water pump during refill.

Transaxle fluid change procedures.

Tire rotation procedures and TPMS reset.

**And Much More!**

*The objectives stated for this course are:*

*Upon completion of this course the student...*

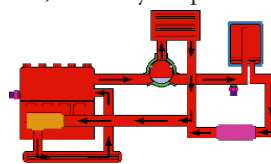
*will be able to identify high voltage components.*

*will have an understanding of safety concerns when servicing Toyota Hybrid Vehicle Systems.*

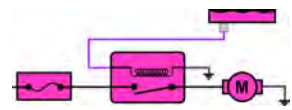
*will understand the methods used to disable high voltage systems for safe service.*

*will understand the requirements for tools & equipment when servicing Toyota Hybrid vehicles.*

*will have an understanding of the most common maintenance services necessary on Toyota Hybrid Vehicles.*



**Hot Coolant Storage System  
with 3 way valve**



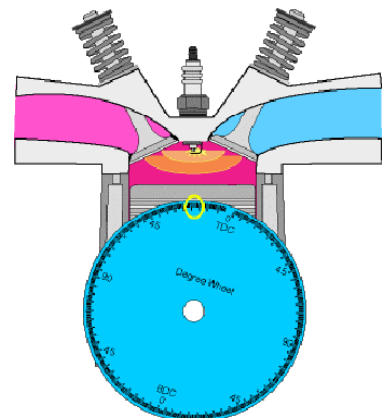
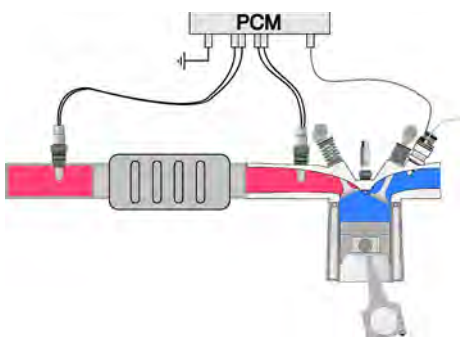
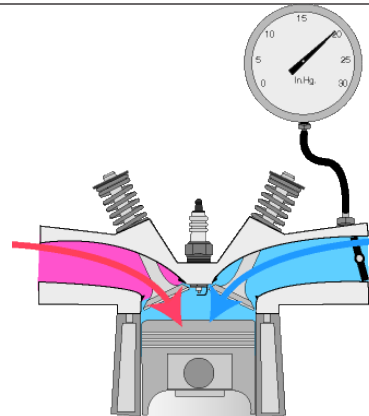
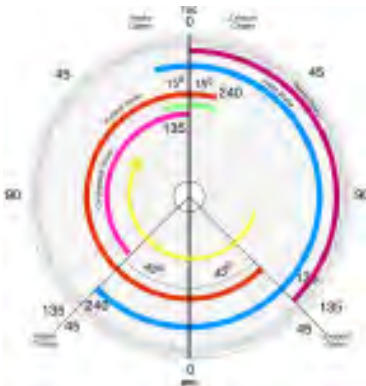
**Inverter Water Pump Schematic**



***EAST Courses are Fast-Paced classes with lots of information packed into the time available. For a greater understanding of the subject matter, some Technicians would rather cover less material, allowing more time to cover theory and perform even more hands on exercises. If your group would be interested in this approach, ask about our ET100 Series of courses!!***

ET119.1 Electrical Theory BSC Part 1  
 ET119.2 Electrical Theory BSC Part 2  
 ET122.1 Engine Performance Diagnosis Part 1  
 ET122.2 Engine Performance Diagnosis Part 2  
 ET127.1 Ignition System Principles  
 ET127.2 Ignition System Diagnosis  
 ET116.1 OBD-II System Principles  
 ET116.2 OBD-II Scan-Tool Troubleshooting

ET111.1 Electrical Principles  
 ET111.2 Electrical Troubleshooting  
 ET135.1 Evaporative Systems Theory  
 ET135.2 Evaporative Systems Diagnosis  
 ET131.1 Principles of Electronics Part 1  
 ET131.2 Principles of Electronics Part 2  
 ET121.1 Brake System Principles  
 ET121.2 Anti Lock Brake System Principles



# EAST TRAINING INC.



## **The EAST client base includes:**

### **Tool/Equipment Sales**

- Snap on tools
- MATCO Tools

### **Train-The-Trainer (T<sup>3</sup>)**

- Lincoln Technical Institute (Union & Mahwah NJ, Phila. PA, Brooklyn & Queens NY)
- United States Marine Corps (Aberdeen MD Proving Grounds)
- NACAT – North American Council of Automotive Teachers

### **Industry Associations**

- ASA of South Carolina
- IGONC- Independent Garage Owners of North Carolina

### **Independent Shop Associations we helped form/establish Training**

- Top Tech Training of South Carolina
- WV Panhandle Garage Owners assn.
- Business development group of South Hampton Roads (VA)
- Top Tech Training of Wilmington NC
- Top Tech Training of Elmira NY

### **Auto Parts**

- NAPA Auto Parts
- AutoZone
- Advantage/Hahn Auto Value Parts
- CARQUEST Auto Parts
- AutoPart International
- AutoPlus auto parts
- Auto Supply Company, Inc.
- Consumer Auto Parts

### **Repair chains**

- Bridgestone Firestone USA (NE, SE and Western Zones)
- Midas Car Care
- Meineke Car Care
- Wheel Works (CA)
- American Car Care/ Jack Williams Tire

### **Fleets**

- FLAGFA-Florida Assn. of Govt. Fleet Administrators
- SCGFMA- South Carolina Governmental Fleet Managers Assn.
- City of Hampton VA Fleet Maintenance
- City of Jacksonville NC Fleet Maintenance
- Federal Bureau of Investigation (FBI)



## Enhanced Automotive Systems Technology, Inc.

### Technical Training Courses

#### Classroom/ facility Set-up Information

The classroom should be clean, comfortable, and well lit for the students. For hands on classes, tables and chairs will be required. Many EAST classes require tabletop training aids, which require wires to be run between tables. Eight to ten foot folding tables and chairs are required (not student desk style tables). The accompanying diagram shows suggested classroom setup. In rare cases, a PA system will be necessary, if the room is large, or shop ambient noise level is very high (heaters, ventilation blowers, etc.).

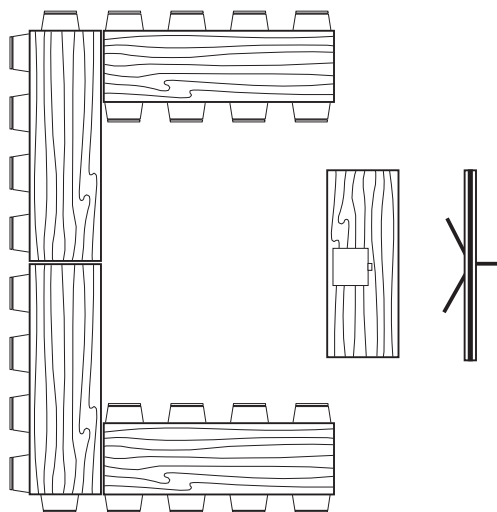
#### Shop area

A shop area will be required for hands-on activities. The shop must be clean, safe, and equipped with a ventilation system and, if possible, a lift. The class location may be a Vo-tech school, Community College, or even a repair shop facility, if it meets the requirements.

How the classroom is setup depends on a number of variables:

- the course being taught.
- the number of students in the class.
- the type of facility involved.

In most courses, (electrical systems, DVOM, DSO Etc.) it is necessary to connect a regulated power supply line and wiring for the students' meters, scopes, and training aids. The instructor needs to be able to walk to the students easily, and help them with set-ups and exercises. For that, the diagram shown below is the best way to proceed. Additional tables can be added to provide enough seating for the number of students in the class.





*"We're Proud of Our Blue Seal Team"*

# **EAST Training Inc.**

For more information contact us at 856.810.4075 or 888.979.9920  
Visit us on the web at [WWW.EASTTRAINING.COM](http://WWW.EASTTRAINING.COM)