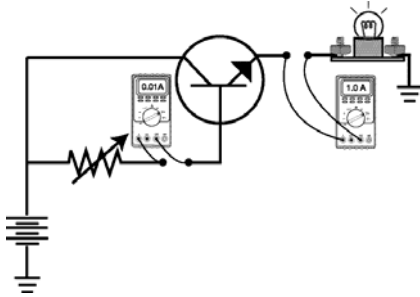




*Presented By...*



# Course Catalog

## TECHNICIAN TEAMMATE TRAINING PROGRAMS



31 Fairview Road  
Medford New Jersey 08055  
Office-856-810-4075  
888-979-9920  
Fax-856-810-4073



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



The EAST Core Curriculum Programs were  
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.*

# Enhanced Automotive Systems Technology



**31 Fairview Road  
Medford New Jersey 08055**



***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 Coast-to-Coast.***

## **Who we are**

EAST has provided quality performance-based training to **Bridgestone/Firestone**, 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 employs full time 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.

Working out of their Research Center in New Jersey, EAST trainers and curriculum designers develop programs based on real world problem vehicles diagnosed in their 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 operation. 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. Students will be 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 your productivity.

## Recognition

Upon completion of each course a personalized certificate will be awarded. EAST is a certified provider of CASE (Continuing Automotive Service Education) approved through ASE/NATEF. 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. The student is encouraged to retake the final evaluation at a future time and upgrade his Certificate status.

## Local Training

EAST establishes local training regions, which will keep your teammates travel to a minimum. They can be held in your Districts training room. There will be a total of four days of training scheduled for each Phase, presented in individual 8 hour modules. Classes run approximately from 8:00 AM until 4:00 PM, but time can be adjusted for your district. Once a Phase has been established in your area, dates for the entire series will be provided.

## Technician Placement and Driveability Skill Assessment Tools

If you would like to establish a benchmark for your Technician's present skill level to better gauge your training efforts, EAST can also provide assessment and profiling of students prior to the class, at additional cost. These educational tools are available in a proctored session at a convenient location.

## Education Reports

EAST maintains a comprehensive database of all our **Bridgestone/Firestone** students, and of all classes presented. All student records are diligently maintained. Hardcopies of attendance records are maintained for 6 years, and electronic records are kept indefinitely. Tracking your Technicians accomplishments is easy. Call our IT department with your needs. Individual Technicians can call or email requests for transcripts which can be printed as pdf's and emailed, or hardcopies printed and mailed. Reports on attendance, or courses required, can be created for managers on all levels- store, district, Zone or Corporate.

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



# EAST Training

## Technical Team Profiles

### Vince Virgilio

Vince is the founder and President of EAST. He is an automotive technician turned trainer with over 20 years of hands-on experience. 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 30 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

### Paul Whelan

With over 50 years in the industry, as a technician, diagnostic roadtester, and shop forman, Paul spent 17 years as Sr. VP, Lead Instructor; Research & Development, Production & Training Manager, and QA/QC manager for ASPIRE, Inc. He has been a pioneer in modern techniques of training in the automotive service business. He has been personally responsible for new course curriculum development and training methods being used throughout the industry. He was in charge of production for the Systems Theory, Advanced Systems Theory, Fast PASE (ASE Prep series), FIRST and EDGE, NY ATTP, National ATTP, Florida ASERT, Fluke 97 Scopemeter, Fluke 88 Programs and many others. He has written and produced training materials for clients including GM, Toyota, Honda, VW, Standard Motor Products, Exxon, Sun Electric, Snap on, Mobil, Chevron, MACS, Sunoco and others. He has written, edited and produced dozens of hours of video and numerous student training guides, and has written and contributed to automotive textbooks, trade periodicals, and SAE papers.



Paul's credentials and certifications include the following:

- ASE World Class Technician (original group of inductees 1986)
- For over 35 years held ASE Certifications in all areas (55 total)
- ASE Master Technician in 7 Master areas plus stand-alone certifications-
- Master Automobile, (w/L-1 and Undercar Specialist), Master Medium/Heavy Duty Truck, (w/L-2)
- Master Engine Machinist (Gas & Diesel), Master School Bus, Master Collision Repair/Refinishing
- Master Transit Bus Specialist, Master Truck Equipment Specialist, Alternate Fuels Technician, Certified Parts Specialist (Auto & Truck).
- 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
- Member of Society of Automotive Engineers- 30years
- ASE/ATMC CASE Evaluation Team Leader •ASE NATEF Evaluation Team Member
- Fall 2004 awarded ATMC "Member of the Year"

## **Jerry Stahl**

Jerry has been involved for the past 25 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

## **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 Forman. 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 25 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. Formerly a Tech rep with Bosch, Roland works with shops to diagnose problem vehicles and specializes in reprogramming and flashing of ECM/PCM's.



Roland holds the following certifications-

- ASE Master Automotive Technician with L1,
- RVIA/RVDA Master Recreational Vehicle Technician,
- PA certified State Safety Inspection Instructor,
- Dale Carnegie Certified.



Accredited Training Provider

**EAST Training Inc.**

**EAST schedules classes in Phases (Groups) which are presented in a predetermined order allowing for optimum understanding, retention and review of materials covered. Classes are presented approximately every one to two months. This schedule can be adjusted for the requirements of your particular District. Following are the courses listed in proper order for Phases 1, 2, 3 and 4.**

<b>Phase 1</b>	<b>Page</b>
BF519- Battery, Starting & Charging System Diagnosis -----	13
BF522- Engine Performance Diagnosis & Testing -----	13
BF527- Ignition System Theory & Testing -----	14
BF516- Scan Tool Operation and Diagnostics -----	14
<b>Phase 2</b>	
BF511- Enhanced DVOM Diagnostics -----	15
BF535- OBD-II Evaporative Emission System Theory, Operation & Diagnosis -----	15
BF531- Electronics in the Modern Automobile -----	16
BF517- Advanced Engine Performance -----	17
<b>Phase 3</b>	
BF514- Oxygen Sensor Theory And Diagnostics -----	10
BF523- Ford Electronic Control Diagnostics -----	10
BF524- Chrysler Engine Control Diagnostics -----	12
BF550- Genisys Scantool Function, Operation and Diagnostic Procedures -----	12
<i>Genisys Scan Tool- Due to it's importance, EAST considers this a standalone class and suggests additional technicians be registered for this class, even though they may not be registered for all Phase 3 classes.</i>	
<b>Phase 4</b>	
BF541- Intro to Hybrid Vehicle Servicing -----	18
BF527A- Asian Ignition System Troubleshooting -----	20
BF531B- Electronics in the Modern Automobile Update -----	16
BF580- General Motors OBD-II Operation & Scan Tool Diagnosis -----	20

***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

Page

### BFRC Series

*Most courses were designed to be delivered in a one or two day, 8 hour per day format.*

Leader-Led ASE Preparation Classes- -----	9
Oxygen Sensor Theory And Diagnostics (BF514) -----	10
Ford Electronic Control Diagnostics (BF523) -----	10
Brake System Theory And Operation (BF521) -----	11
Diesel Theory & Operation (BF560) <b>NEW!</b> -----	11
Chrysler Engine Control Diagnostics (BF524) -----	12
Genisys Scantool Function, Operation and Diagnostic Procedures (BF550) -----	12
Battery, Starting & Charging System Diagnosis (BF519) -----	13
Engine Performance Diagnosis & Testing (BF522) -----	13
Ignition System Theory & Testing (BF527) -----	14
Scan Tool Operation and Diagnostics (BF516) -----	14
Enhanced DVOM Diagnostics (BF511) -----	15
OBD-II Evaporative Emission System Theory, Operation & Diagnosis (BF535) -----	15
Electronics in the Modern Automobile (BF531) -----	16
Advanced Engine Performance (BF517) -----	17
Introduction to Hybrid Vehicle Servicing (BF541) -----	18
Automotive Air Conditioning System Theory, Diagnosis, Service & Retrofit Procedures (BF532A) ----	21
2 Day Electrical Program (BF510) -----	22-23
2 Day Total Wheel Alignment (BF520A) -----	24
Servicing Toyota Hybrid Vehicle Systems(BF570) -----	19
Asian Ignition System Troubleshooting (BF527A) -----	20
Electronics in the Modern Automobile Update (BF531B) -----	16
General Motors OBD-II Operation & Scan Tool Diagnosis (BF580) <b>NEW!</b> -----	20
Servicing the Toyota Prius Generation 2(BF571) -----	25

***For your newer, less experienced Technicians,  
ask about our BF100 Series of courses!!***

BF119.1	Electrical Theory BSC Part 1	BF111.1	Electrical Principles
BF119.2	Electrical Theory BSC Part 2	BF111.2	Electrical Troubleshooting
BF120.1	Suspension & Steering Principles	BF135.1	Evaporative Systems Theory
BF120.2	Alignment Service	BF135.2	Evaporative Systems Diagnosis
BF121.1	Brake System Principles	BF131.1	Principles of Electronics Part1
BF121.2	Anti Lock Brake System Principles	BF131.2	Principles of Electronics Part2
BF122.1	Engine Performance Diagnosis Part 1	BF132.1	Air Conditioning Principles
BF122.2	Engine Performance Diagnosis Part 2	BF132.2	Air Conditioning Troubleshooting
BF127.1	Ignition System Principles	BF150.1v4	Genisys setup, programming & updating
BF127.2	Ignition System Diagnosis	BF150.2 v4	Genisys Scantool Diagnosis
BF116.1	OBD-II System Principles		
BF116.2	OBD-II Scan-Tool Troubleshooting		



# EAST TRAINING

## *Leader-led ASE preparation classes-*

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 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...**

<i>Engine Repair- A1</i>	<i>Electrical/Electronic Systems- A6</i>
<i>Automatic Transmission/Transaxle- A2</i>	<i>Heating and Air Conditioning- A7 *</i>
<i>Suspension and Steering- A4</i>	<i>Engine Performance- A8 **</i>
<i>Brakes- A5</i>	<i>Advanced Engine Performance- L1</i>

*“... 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

## OXYGEN SENSOR THEORY AND DIAGNOSTICS

Course #BF514

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 #BF511 or BF519*)

### 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.*

**Bring your Scan tool or a DVOM!**



## FORD ELECTRONIC CONTROL DIAGNOSTICS

Course #BF523

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!**

# EAST TRAINING

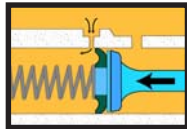
## TOTAL BRAKE SERVICE

Course #BF521A v2

2 Day Class- 16 Hours

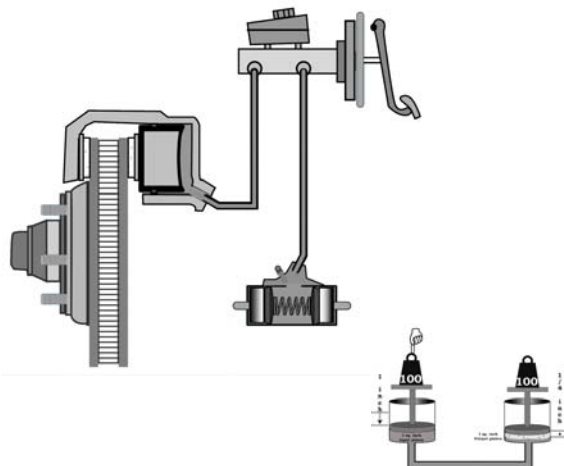
- Learn the laws of fluids and physics.
- Learn how to diagnose and solve braking problems.
- Learn how to prevent comebacks.
- Learn how to use measuring tools and perform proper bleeding procedures.

**Note: This is a “Hands-on Class. Please dress appropriately, and bring gloves and Safety glasses!”**



*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.  
will be able to proficiently operate the Pro-Cut on-car brake lathe.*

See our flyer for full details!



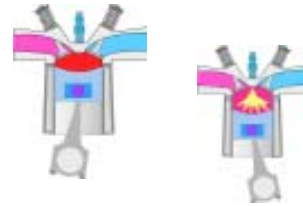
## DIESEL THEORY & OPERATION

COURSE# BF 560

1 DAY

Begins by explaining the reasons behind the recent resurgence of diesel engine technology.

This course covers diesel fundamentals, CI engine components, gasoline Vs diesel compression / combustion dynamics, combustion chamber & piston design differences, fuel supply & delivery systems, mechanical & electronic injection systems, glow plug control systems, cylinder balance/compression testing, smoke and noise diagnosis, scan tool diagnostics- accessing available information with your **Genisys scan tool**, understanding the diesel PID's, utilizing bi-directional capabilities, maintenance and service issues, and much, much more!



***EAST Training has many more classes which can be adapted to BSRO specific needs.***

# EAST TRAINING

## GENISYS SCANTOOL FUNCTION, OPERATION, AND DIAGNOSTIC PROCEDURES COURSE# BF550 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 Genisys!**



Genisys is a registered trademark of SPX OTC Inc.

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!

## CHRYSLER ENGINE CONTROL DIAGNOSTICS

Course #BF524

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 understand and 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.*



Accredited Training Provider

**EAST Training Inc.**

***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 TRAINING

## BATTERY, STARTING, & CHARGING SYSTEM DIAGNOSIS COURSE# BF 519

1 DAY

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.

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

### Topics Covered-

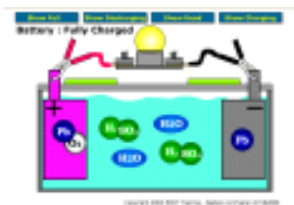
Electricity & Electronics- Metric Units of measurement, Electrical principles—atomic structure, charges, magnetism. Practical application of Ohm's and Kirchhoff's laws, Induction and inductive reactance, AC & DC voltage signals, Induction and inductive reactance, simple, series, parallel and series-Parallel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

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.*

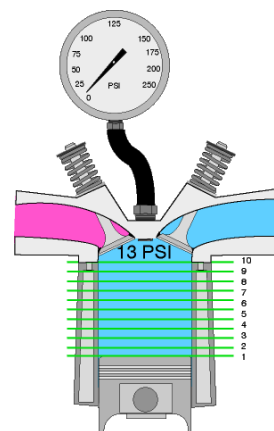
## ENGINE PERFORMANCE DIAGNOSIS & TESTING COURSE# BF 522

1 DAY

### Engine Mechanical

- Engine Theory / Thermodynamics
- Compression Theory and Diagnosis
- Volumetric Efficiency
- Engine Vacuum Theory and Diagnosis
- Effects of Valve Timing on Compression and Vacuum

*The students will perform hands-on exercises using compression and vacuum gauges.*



### Air/Fuel Mixture

- Five Gas Theory
- Exhaust Gas Analysis
- Understanding Fuel Trim.
- Analyzing Fuel Control using scan-tool parameters

*The students will perform hands-on exercises using scan tools and infrared analyzers where applicable.*

### Understanding Auxiliary Emission Controls

- PCV Systems
- A.I.R. Systems
- Exhaust Gas Recirculation systems
- Evaporative systems.
- Catalytic Converter

*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.*

# EAST TRAINING

## IGNITION SYSTEM THEORY & TESTING

COURSE# BF 527

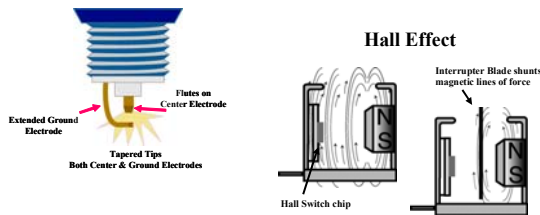
1 DAY

### Magnetic Induction, Theory and Effects

- Magnetic Lines of Force
- Relationship of Magnetism and Electricity
- Transformers (Ignition Coil)
- 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

The students will perform hands-on Ignition waveform pattern analysis using engine analyzers, DSO Lab Scope, or graphing meter (where applicable).

### 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.

*The students will perform hands-on testing using commonly found tools.*

*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*

*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.**

## SCAN TOOL OPERATION & DIAGNOSTICS

COURSE# BF 516

1 DAY

**Hands-on: Bring a Scan tool and DMM.**

### Scan Tool Features and Options OBD-I

- Retrieval of DTC's (Codes)
- Parameter Values
- Bi-Directional Testing
- Hands-on testing using Scan-tools.

### Scan Tool Features and Options Generic OBD-II

- Retrieval of DTC's (Codes)
- Parameter Values
- Freeze Frame
- Readiness Monitors
- Hands-on testing using Scan-tools

### Scan Tool Features and Options OEM OBD-II

- Retrieval of DTC's (Codes)
- Parameter Values
- Fail Records GM only if Applicable
- Bi Directional Testing
- Test Modes-
- Other Systems
- Transmissions
- Evaporative
- EGR
- Hands-on testing using Scan-tools

### 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

The students will perform hands-on exercises using DMM's on sensor simulators, and vehicles.

*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, and interpret results.*

**Bring a Scan tool and DMM.**

# EAST TRAINING

## ENHANCED DVOM/DIAGNOSTICS

COURSE# BF 511

1 DAY

### Hands-on: Bring a DVOM/DMM!

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

The 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.

The students will perform hands-on exercises using DMM's on simulators and vehicles. Amperage measurements and testing will be performed to reinforce Ohm's Law.

### 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

### 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?

### 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.)

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

## EVAPORATIVE EMISSIONS SYSTEMS OBD-II

THEORY OPERATION & DIAGNOSIS

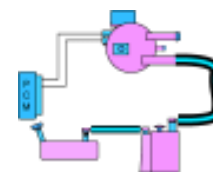
COURSE# BF 535

1 DAY

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!

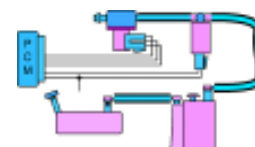
### We will cover...

- 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>
- Balanced Cycled Reactions
- OBD-II Component Monitoring
- Enabling Criteria
- EVAP System Monitoring Components
- HEGO, Fuel trim, Evap fuel level,
- Fuel tank pressure sensors
- Pressure & Vacuum measurements
- Chrysler Leak detection pumps



### 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
- System Specific component testing
- Evap & Canister purge solenoids
- Vapor Management Valves
- Ford Evaporative Systems
- 2000 Ford E-150 Case Study
- GM Evap System Monitoring
- Toyota Evap Monitoring
- 2003 Toyota Highlander
- Third EVAP Valve
- Toyota .020" Leak Detect



**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!!**

# EAST TRAINING

## ELECTRONICS IN THE MODERN AUTOMOBILE

COURSE# BF531

1 DAY

**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*

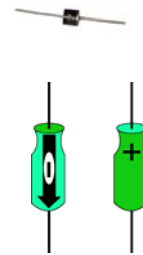
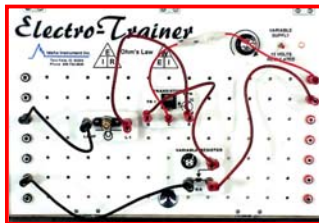
**Tools used for electronic diagnosis—**

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.**



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

## ELECTRONICS IN THE MODERN AUTOMOBILE

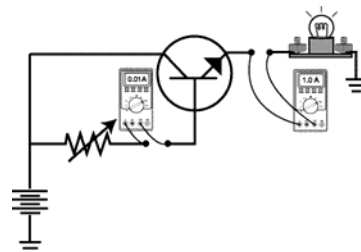
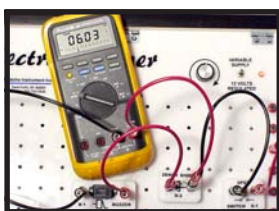
COURSE# BF531B

1 DAY

**This course builds on Electronics module 1 (BF531)**

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.

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



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





# EAST TRAINING

## INTRODUCTION TO HYBRID VEHICLE SERVICING

COURSE# BF541

1 DAY

### *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# BF570

1 DAY

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?

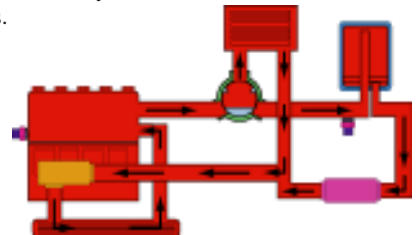
#### Maintenance/Serviceable Items:

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.

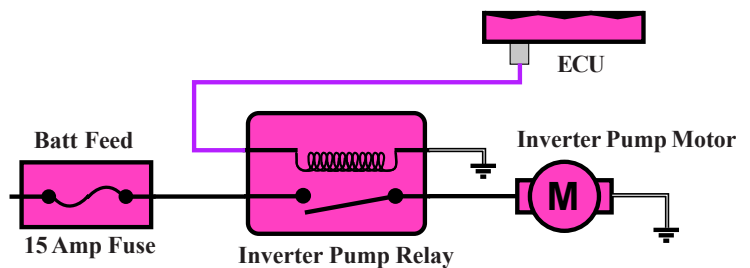
#### Other Systems covered:

Toyota Hybrid HVAC System Servicing.  
TPMS (Tire Pressure Monitoring System)  
Exterior lighting system servicing.

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

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.



MGU- Motor/Generator Unit

# EAST TRAINING

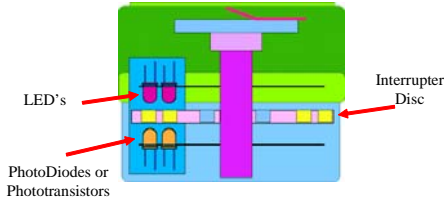
## ASIAN IGNITION SYSTEM OPERATION & DIAGNOSIS COURSE #BF527A

1 DAY

Like other systems in the modern automobile, the ignition system has continued to evolve at an alarming pace. The Asian systems can be even more daunting due to the mystique associated with them, usually compounded by 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. As a bonus we will discuss several newly emerging technologies, such as Hybrid, Fuel Cell, and electric vehicles, which the asian manufacturers are already selling overseas and in the USA.



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.

### 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.

## GM OBD-II OPERATION & SCAN TOOL DIAGNOSIS COURSE# BF580

1 DAY

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...

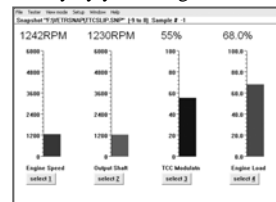
- System Diagnostic Capabilities
- Scan tool capabilities
- DLC connectors
- Diagnostic Tools and Equipment
- Misfire counter
- Relearn procedures
- Adaptive strategies
- Code terminology
- Fault code history
- Pending codes
- Diagnosing system, circuit and component faults using scan data

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 Body Control Modules, and much more.

**Bring your Scan tool!**



The Power of the Scan tool is limited only by your imagination!!!



# EAST TRAINING

## AUTOMOTIVE A/C SYSTEM THEORY, DIAGNOSIS, SERVICE AND RETROFIT PROCEDURES

COURSE #BF532A

TWO DAY- 16 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.

### A/C Theory- How does it work?

#### The process- transfer of heat

Evaporation / vaporization  
 Condensation  
 Latent Heat  
 Heat Exchangers  
 Pressure/Temp relationships

#### System Operation

Refrigerants  
 R-12 R134a  
 Lubricants

#### System Design

Expansion valve systems  
 Orifice tube systems  
 Cycling clutch  
 POA/STV systems

### Air Distribution Systems

Controls- Cable, Vacuum, Electric motors

Cabin Filters  
 Common HVAC problems and solutions

### Components- Operation and design

Compressor Designs  
 Axial, radial, var. displ,  
 rotary vane, scroll type.

### Compressor failures

Replacement issues  
 Clutch service

### Heat exchangers

### Metering devices

### Control devices

### Storage devices

### Hoses, fittings, seals

### System Diagnosis

Temperature Probe  
 Pressure gauges  
 Leak detection  
 Refrigerant identifiers

### Retrofitting-

When to retrofit  
 Type I & Type II  
 Decisions/recommendations  
 Other considerations

### Component replacements

### Flushing

### Reclaiming refrigerant

### Evacuation

### Verifying repairs

### Tamper detection

**Upon request, we will cover the MACS refrigerant recovery course material, and proctor the MACS test.**

**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.*

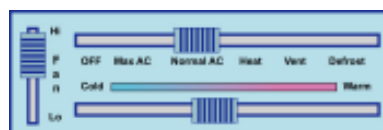
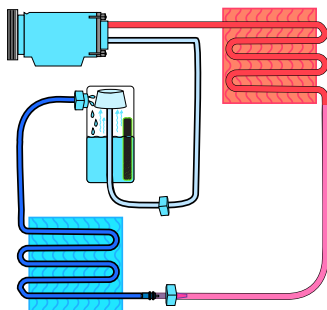
*will be able to properly explain the need for refrigerant recovery.*

*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

## 2 DAY ELECTRICAL PROGRAM

COURSE# BF 510

2 FULL DAY (16 HOURS)

### This is a Hands-on Class:

#### Bring a DVOM/DMM and a Low Current Inductive Probe!

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

#### Advanced meter features

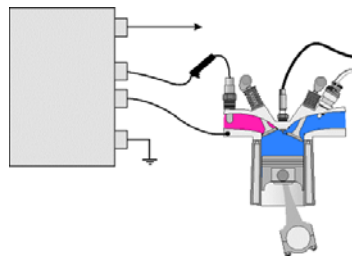
How and when to use-Min-Max-average-Recording, Touch-hold function. Power up options- Disable auto off, High accuracy 1 ms response, Low ohms.



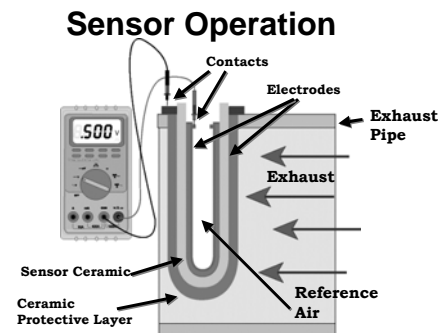
Digital Sensors



Analog Sensors



Oxygen Sensor Testing



(Continued next page)

#### 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

#### 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

# EAST TRAINING

2 DAY ELECTRICAL PROGRAM (CONTINUED)

COURSE# BF 510

2 FULL DAY (16 HOURS)

## \*\*\* Bonus \*\*\*

To increase technician Productivity and Profitability, after extensive work-performance analysis of BSRO repairs, we have expanded our coverage of reading and interpreting wiring diagrams. In-depth analysis of Power Window circuits and Intermittent/Pulse wiper circuits has been included. We have also added circuit analysis of the ASE type 3 composite vehicle used in the L1 Advanced Engine Performance test. This vehicle is a generic replication of the principal circuits used in the modern automobile.

### 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.

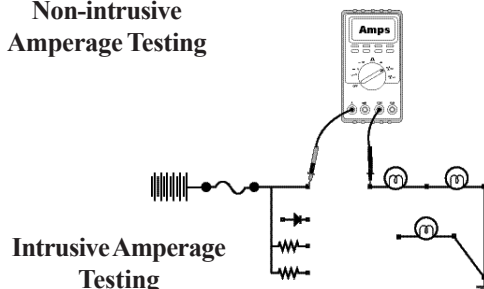
**In shop exercises-** Voltage drop testing of battery, starter, and alternator circuits; OCV testing, component amperage draw testing. Testing for alternator AC ripple and coolant electrolysis.

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



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

### Non-intrusive Amperage Testing



CAT III Meter

# BF520A- 2 Day Total Alignment

BF520A

Two Days (16 Hours)

*Note: Extensive shop work is performed during this class. Technicians should wear their normal shop uniform, footwear, safety glasses, and hand protection. MAP guidelines will be stressed through all service procedures.*

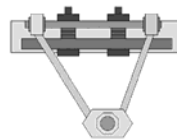
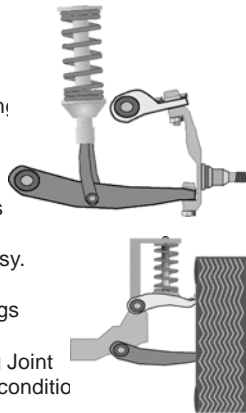
## Course description:

Learn techniques to diagnose and correct handling and tire wear concerns and how to put the vehicle back to specifications. Hands-on vehicle exercises are performed throughout class. The instructor will provide an explanation of theory and individual component function. Vehicle pre-alignment inspections are performed on several vehicles including component visual and physical inspections, individual component R&R for testing, inspection and measurements. Several complete alignment procedures are performed. This course has been developed for the technician that wants to truly understand suspension, steering and wheel alignment theory and practice.

### Topics covered...

Frames- Perimeter, Unitized body / Space Frame  
Suspension Design & Function  
Types of Suspension Systems-  
Single "I" Beam  
Twin "I" Beam  
King Pins  
Springs-  
Leaf Springs/Shackle bushings  
Coil Springs  
Torsion Bars  
Shock Absorbers  
Rear Independent Suspension  
Non-Independent  
MacPherson Strut-  
Rear Suspension  
Front Suspension  
Modified MacPherson Struts  
Wish Bone  
SLA Suspension  
Steering Design & Function  
Types of Steering Systems-  
Relay Rod  
Rack & Pinion  
Parallelogram  
Haltenburg Steering Linkage  
Center steer  
Jounce & Rebound  
Power Steering Systems-  
Hydraulic System Operation  
Component function  
Pressure Testing  
Purpose of Alignment  
Pre-Alignment Inspection and Preparation  
Suspension and Steering Integrity Checks  
Inspecting Ball Joints w/ wear indicators  
Anti-sway bar Rod & links

Inspecting-  
Tie Rod Ends  
Idler Arms  
Ball Joints  
Load carrying  
Non-Load carrying  
Checking-  
Springs  
Bushings  
Shock absorbers  
Bearings  
Rack & Pinion assy.  
Inner Tie Rods  
Mounting Bushings  
U-joints  
Steering Box Rag Joint  
Diagnosing Tire wear condition  
Measuring-  
Ride Height  
Frame Angle  
Alignment-  
Proper vehicle placement on alignment rack  
Head/sensor compensation  
The Primary Alignment angles-  
Caster, Camber, Toe and Thrust angle  
How each angle affects vehicle handling  
Caster Angle  
Effects of Caster Angle errors  
Camber Angle  
Purpose of Camber Angle  
Effects of Camber Angle errors  
Instability Cross Camber Error  
Load Placement Negative & Positive Camber  
Positive Camber Roll Away  
Negative Camber Roll Inboard  
Toe Angle (FWD & RWD)  
Total Toe



Toe errors and their effects  
Rear Toe  
Two & Four Wheel Alignment  
Thrust Line and Thrust Angle Alignment  
Thrustline / centerline  
Positive (+) & Negative (-) Thrust Angle  
Cause and effects of Thrust Angle misalignment  
Adjustment Methods  
Shims for Camber & Caster  
Shims for Rear Toe & Camber  
Eccentrics (Cams) for Camber & Caster  
Struts for Caster  
Split Caster adjustments  
Setback-  
Negative (-) & Positive (+)  
SAI- Steering Axis Inclination  
SAI and Camber  
Included Angle  
Measuring SAI and Included Angle  
Scrub Radius  
Off Center Steering (Centering Steering Wheel)  
Passive 4 Wheel Steering  
Active 4 Wheel Steering  
Problems affecting Steering Quality / Handling  
Braking System  
Wheels & Tires  
Common failures- cause & correction  
Bump Steer/Toe Curve  
Memory Steer  
Torque steer  
Excessive steering effort  
Poor steering return  
Steering Harshness

## The objectives stated for this course are:

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

- will understand suspension and steering System Theory.
- will be able to identify and explain the different designs used for Suspension and Steering systems.
- will understand how to inspect and prepare the vehicle for alignment.
- will understand how to review the vehicle specifications and make adjustments accordingly.
- will understand methods to set front caster, camber, toe in, and toe out adjustments.
- will understand methods to set rear toe and camber adjustments.
- will understand methods to use SAI and included angle to identify and correct alignment and handling problems.
- will be able to identify and correct alignment problems causing tire wear conditions.



**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.



**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-PZEV (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.

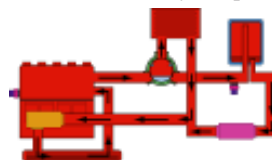
Transaxle fluid change procedures.

Tire rotation procedures and TPMS reset.

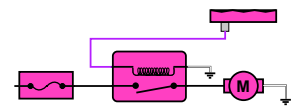
**And Much More!**



**Insulation Tester**



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



**Inverter Water Pump Schematic**

*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.*



*"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)



## 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.

