



# *Turbo Training*

**2016**

## **AUTOMOTIVE FUEL CONTROL**



### **Classes and Descriptions**

*All courses may be tailored  
to your fleet's vehicle content*

Bruce Amacker  
P.O. Box 361584  
Strongsville, OH 44136

440-846-3885  
bamacker@aol.com  
turbotraining.com

.....  
*Training Solutions for Ford Powerstroke, Navistar Chassis and Automotive Applications*

## AUTOMOTIVE FUEL CONTROL CLASSES

John Forro, Instructor

<u>COURSE TITLE</u>	<u>PAGE</u>
Electrical Theory and Troubleshooting (16 hr)	3
Introduction to Computer Controls Level 1 (16 hr)	3
Computer Controls Level 2 (16 hr)	3
OBD II Level 1 (16hr)	4
Fuel Trim and Volumetric Efficiency (8 hr)	4
Scan Tool Diagnostics (16 hr)	4
Ford IDS (8 hr)	5
Mode 6 Level 1 (8hr)	5
Using Mode 6 (8hr)	5
Quick Check Diagnostics (16hr)	6
Silver Bullets (8 hr)	6
5-Gas Analysis (16 hr)	6
Gasoline Direct Injection (4 hr)	7
Diagnostic Strategies (8 hr)	7
J-2534 Programming (8hr)	7
Throttle By Wire (8 hr)	7
Variable Valve Timing (8 hr)	8
Electronic Service Information (8 hr)	8
Intro to Lab Scopes (16 hr)	8
Picoscope Familiarization (8 hr)	9
Pressure Transducer Testing with a Lab Scope (8 hr)	9
Controller Area Networking (8hr)	9
A/C Refresher (8 hr), A/C Automatic Temperature Controls (8 hr)	10
Toyota Hybrid Level 1 (16 hr) and Level 2 (16 hr)	10
Ford Hybrid Level 1(16 hr) and Level 2 (16 hr)	11
Air Bag Systems (4 hr)	11
ABS/Traction Control/Stability Control (8 hr)	11
Intro to Automotive Telematics (4 hr)	11

John Forro has over 30 years of automotive experience. He has written 20 automotive manuals, produced several AVI training videos, and currently writes articles for Tech Shop, Under Hood Service and other trade magazines. He was the recipient of Motor Magazine's *Top 20 Tool Award* for his "Silver Bullets" book. John is a nationally recognized automotive instructor who enjoys training, being a shop owner and a working technician. He is passionate about the industry and works hard to be current with technology and trends. John's knowledge and real world experience help him relate to automotive technicians, shop owners and management personnel.

***All courses may be tailored to your fleet's vehicle content***

***For more information, contact Bruce Amacker /TurboTraining***

## **Electrical Theory and Troubleshooting**

This class covers principles, operation, and diagnosis of automotive electrical systems and focuses on fundamentals of electrical circuits, charging systems, and starting systems. Many technicians struggle with electrical testing; this class helps reinforce electrical testing procedures using common shop tools like a DVOM and VAT. By using large demonstrator boards (one per student), voltages, amperages, relay operation, series and parallel circuits, DVOM use, and diagnostics. Classroom instruction and hands-on diagnostic experience in the shop will be provided. Each student will complete a "Ten Minute Test" electrical worksheet, with emphasis on starter and alternator amperage testing, voltage drop testing, proper alternator and battery testing, and ground circuits. Testing in the shop is done with a VAT, DVOM, capacitance tester, or any tool of choice. This class may focus on either automotive, truck, or both applications; students bring their own DVOM and fuses for testing. Class size is limited to approximately 10 because of the hands-on nature of the presentation. A full-color training manual is included. **16 Hours**

## **Introduction to Computer Controls Level 1**

This class explores sensor inputs, outputs, PCM strategies and how they relate to a modern fuel control system. Sensor operation, open and closed loop, and use of fuel trims are discussed. Multiple scan tools are used during the shop portion of the class to force situations and codes. A full-color training manual is included. **16 Hours**

## **Computer Controls Level 2 (Diagnostic Treasure Chest)**

A short review of Level 1 is followed by diagnostic procedures and system strategies section on engine mechanical, ignition, fuel, computer controls, anti-theft and emissions control systems. Students are engaged throughout the entire course using demo boards, worksheets, and live vehicle testing. Various types of automotive diagnostic tools are used throughout this class. Includes a manual, an instructor disk with all the power point presentations listed by section, lesson plans, tests with answer keys, learning modules and student work sheets. Each technician receives our exclusive on demand diagnostics reference program. A full-color training manual is included. **16 Hours**

## **OBD II Level 1**

This class covers the operation of OBD2, including P, B, and U series codes, pending trouble codes, diagnostics, generic and factory sides of data, freeze frame, and how to use these effectively to reduce comebacks. Understand how continuous and non-continuous monitors work, what enable criteria is and how to comprehend the strategies. Time is spent in the shop tracking monitors and data. Multiple scan tools and workstations are set up during the shop portion of the class and a road test is included to show how monitors complete. A full-color training manual is included. **16 Hours**

## **Fuel Trim and Volumetric Efficiency**

If you are looking for a class unlike any other course you have attended before, than this is the class for you. This class explains in great detail how to use your scan tool and various VE calculators to address these troublesome vehicles. Case studies and actual live vehicle testing are used in this course to help understand the strategies. Certain scan tools come equipped with the ability to graph VE and FT dynamically instead of just statically. If your tool can do these tests be sure to utilize their diagnostic powers to locate engine mechanical issues, restricted exhaust, computer strategy issues, low compression and cylinder leakage issues. A full-color training manual is included. **8 Hours**

## **Scan Tool Diagnostics**

This course explores all the capabilities of a modern day scan tool. Topics such as choosing a scan tool for the job at hand, the differences between a factory vs. an aftermarket tool, choosing the correct diagnostic protocol, interfacing of various vehicle modules such as PCM, BCM, Chassis, Airbag, Transmission etc, retrieving DTC's, monitoring and interpreting PIDs, bi-directional tests, and graphing will be covered in this class. Considerable hands-on instruction will be used in a shop environment. Various types of tools will be used throughout the class. A full-color training manual is included. **16 Hours**

## **Ford IDS**

This course is designed for those who are unfamiliar with the IDS. Topics covered are updating the IDS software and the VCM, connecting to vehicles, retrieving global codes, key on engine off codes, codes from all modules, key on engine running codes, continuous memory codes, selecting PIDS, graphing, taking and reviewing recordings, module programming, performing bi-directional tests, performing special service functions such as tire size calibrations and a quick overview of the Motor Craft website. Operations are performed in training mode in the classroom and live vehicles will be used in the shop. A full-color training manual is included. **8 Hours**

## **Mode 6 Level 1**

This course is an entry level class covering what Mode 6 is and how it can be used to diagnose problems found in the EVAP, Misfire, Catalyst, EGR and O2 monitors. Students will be taught how to access this valuable information using their scan tools and how to obtain the hexadecimal deciphering of the TIDS, CIDS and MIDS. Several case studies will be used to show the value of this diagnostic test mode in operation. Full-color training manual is included. **8 Hours**

## **Using Mode 6**

This class picks up where our Mode 6 Level 1 class left off and uses several case studies showing the proper usage of mode 6 on EVAP, Catalyst, O2, EGR and misfire systems. Students will use their scan tools on live bugged vehicles in the shop to determine the fault of the vehicle using just the Mode 6 information. A full-color training manual is included. **8 Hours**

## Quick Check Diagnostics

This is an advanced level course for seasoned technicians. This course was developed from our days as a mobile diagnostician where we found the need to perform various conventional tests quicker and easier. This exclusive series of tests include relative compression testing, vacuum waveform analysis, current ramping, thermal imaging diagnostics, pressure transducer testing, fuel and air trim testing and mode 6. Quick Check Diagnostics will replace the conventional tests such as compression tests, cylinder leakage tests, exhaust back pressure tests, visual inspection of engine timing marks, parasitic draw testing, electrical short/open tests and more. Shop time will be spent performing each test to familiarize the testing procedures. Students have found this to be a very valuable course to hone diagnostic skills. Full-color training manual is included. **16 Hours**

## Silver Bullets

This course covers various pattern failures found on a variety of vehicles. After the pattern failure is identified, a quick, precise repair is explained in detail. Digital photography identifies the cause of the pattern failure helping the technician to identify the issue. Using the "Silver Bullets" book will greatly shorten the time to diagnose problem cars. The "Silver Bullets" book won a national award in Motor Magazine for *Best New Tool* and is included with this class. **8 Hours**

## 5-Gas Analysis

If your state has emissions testing this is a must have class. This course covers the use and interpretation of the 5 gasses and analyzer used to read the gasses. A heavy emphasis is placed on how to reduce the poisonous gasses levels along with stoichiometric fuel efficiency. Converter operation along with oxygen sensor operations will be discussed in great detail. Base lining worksheets are provided along with several diagnostic procedures. Shop time will be used evaluating exhaust gasses and rich/lean/misfire situations. A full-color training manual is included. **16 Hours**

## **Gasoline Direct Injection**

This course is designed to give the technician a firm understanding of the gasoline direct injection systems currently being used on today's vehicles. Specific components such as high pressure pumps, camshafts and more are discussed in great detail. Emphasis is placed on personal safety as well as diagnostic and service procedures. Scan tool diagnostics and pattern failures with these systems are covered throughout the class. Live vehicle testing is used in this class with accompanying case studies. A full-color training manual is included. **4 Hours**

## **Diagnostic Strategies**

Learn common sense approaches to improving diagnostic skills. This course uses case studies to help develop a diagnostic strategy which is a critical part of correctly repairing a vehicle. Worksheets and a live "bugged" vehicle are used in the shop during the hands-on portion of the class. A full-color training manual is included. **8 Hours**

## **J-2534 Programming**

Federal mandate require all cars to have the ability to be reflashed using an aftermarket J-2534 programmer. This class covers the tooling requirements, flash file acquisition, OEM website navigation and the actual programming procedure of a PCM using standard SAE J-2534 reflashing equipment. Module replacement may also be different than module programming. The hands on section of the course will perform reprogramming procedures using both an OE level tool along with a J-2534 programmer. Live vehicles are needed for this course. A full-color training manual is included. **8 Hours**

## **Throttle By Wire**

The student will understand operation of the new throttle by wire systems used on most vehicles today. They will be able to perform circuit diagnostics, understand computer strategies and perform basic functions including throttle body cleaning and minimum air flow rate adjustments. Actual case studies will be used to discuss pattern failures on Big Three vehicles. Various throttle bodies will be used in class to help understand the system. Shop time will include live diagnostics using a scan tool of choice. A full-color manual is included. **8 Hours**

## **Variable Valve Timing**

This class covers electronic variable valve timing which replaces EGR systems on most modern vehicles. Students will learn how to use pressure gauges, a scan tool and TSB's to diagnose and repair these systems. Various sensors such as cam/crank and the cam phaser solenoids will also be tested in this course. Shop time will include using a pressure transducer to determine if camshaft timing is correct. A full-color training manual is included. **8 Hours**

## **Electronic Service Information**

The class is aimed at high-level technicians, foremen, managers and assistants. The objective is to increase productivity and lower comebacks by providing more information and support to the technician through the use of websites such as IATN, Identifix, factory websites, and others. Internet and PC skills are a prerequisite. Much of diagnostics is doing research on a particular problem or symptom, this class explores PC and Internet-based sources of repair information and how to use them effectively. A PC lab is requested, but not required. Full-color training manual is included. **8 Hours**

## **Lab Scope Classes**

### **Intro to Lab Scopes**

Focus will be on acquiring and interpreting various waveforms using the scope as a diagnostic tool. Time base, voltage scaling, trigger, slope coupling, frequency, shape and glitch terminology will be explained for proper scope set up. During classroom instruction the class will be wired to provide live signals for each technician to evaluate and get comfortable with basic "buttonology" of their scope. During the shop portion multiple vehicles and signals will be utilized to get the technicians familiar with what to be looking for during diagnostics. It is recommended that students provide their own oscilloscopes, but we can also provide different types of scopes for student use. A full-color training manual is included. **16 Hours**



## **Picoscope Familiarization**

This course is designed for technicians who currently own the Picoscope brand laptop based oscilloscope software. Topics covered throughout the class include: installing and updating the software, explanations of the various menu bars, setting up the volt/time and trigger settings to acquire various signals, and a complete overview of the engine testing presets. Hands-on is performed using demo boards in the classroom and live vehicles in the shop. A full-color training manual is included. **8 Hours**

## **Pressure Transducer Testing with a Lab Scope**

This class covers a new form of diagnostic testing being used in our industry. Using pressure transducers allows the technician to diagnose cylinder misfires, engine blowby, restrictions in fuel injectors, valve timing concerns, valve train issues, leaking head gaskets and cracked heads. Technicians will learn how to perform these tests using a pressure transducer and a lab scope. There will be a considerable amount of shop time with students working on actual vehicles. A full-color training manual is included. **8 Hours**

## **Controller Area Networking (Diagnosing Why the Scan Tool Won't Talk)**

This course covers networking high and low speed circuits, modules, data bus circuitry, star vs. loop configurations and what system is used on each vehicle. Emphasis is placed on scan tool diagnostics and wiring schematic interpretation to aid in diagnosing these systems. Diagnostics of aftermarket GPS locators, Maintenance Minders, SatCom, and SCP busses will be covered. Case studies and live vehicles are used during the hands on portion of the course to demonstrate system diagnostics. A full color manual and a training DVD are supplied with course. **8 Hours**

## Other Systems

### **A/C Refresher**

This class covers systems overviews of air conditioning systems with emphasis on component and testing strategies. The three types of refrigerants used on vehicles and pressure gauge readings will be covered. Various EPA regulations, along with system diagnostics will be discussed, and shop time includes doing an evacuation, recharge, and temperature analysis. A full-color training manual is included. **8 Hours**

### **A/C Automatic Temperature Controls**

This class covers overviews of ATC systems with emphasis on components and testing strategies. Big Three automakers systems are covered but this class can be modified to fit any manufacturer. Shop time includes sensor testing, temperature analysis, scan tool diagnostics and component replacement tips. A full-color training manual is included. **8 Hours**

### **Toyota Hybrid Level 1**

Focusing on safety is a priority when working on hybrid vehicles. Proper tooling and individual component testing will be covered during the course. Many hybrid vehicle components are used in the classroom to help explain the systems, and hands-on testing is done in the shop using various hybrid cars. A full-color training manual is included. **16 Hours**

### **Toyota Hybrid Level 2**

The Level 2 class examines each generation of Toyota hybrid and its system peculiarities. Proper tooling, scan tool diagnostics, pattern failures and individual component testing will be covered during the course. Many hybrid vehicle components are used in the classroom to help explain the systems. Hands-on testing is done in the shop using various hybrid cars. A full-color training manual is included. **16 Hours**

## **Ford Hybrid Level 1**

Focusing on safety is a priority when working on hybrid vehicles. Proper tooling and individual component testing will be covered during the course. Many hybrid vehicle components are used in the classroom to help explain the systems, and hands-on testing is done in the shop using various hybrid cars. A full-color training manual is included. **16 Hours**

## **Ford Hybrid Level 2**

The Level 2 class examines each generation of Ford hybrid and its system peculiarities. Proper tooling, scan tool diagnostics, pattern failures and individual component testing are covered in the course. Many hybrid vehicle components are used in the classroom to help explain the systems. Hands-on testing is done in the shop using various hybrid cars. A full-color training manual is included. **16 Hours**

## **Air Bag Systems**

An overview of air bag system design, functionality, disarming procedures and diagnostic procedures will be covered. Circuit and component testing will be done in the shop during the hands on portion of the course. A full-color training manual is included. **4 Hours**

## **ABS/Traction Control/Stability Control**

Most modern vehicles don't use standard ABS sensors; they use a more complex MR (Magnetic Resonance) sensor which operates much differently. Proper bleeding procedures will be covered along with several pattern failures found on modern automobiles. Scan tools, DVOMs and an oscilloscope are used to identify component failures in the shop. A full-color training manual is included. **8 Hours**

## **Intro to Automotive Telematics**

Vehicles equipped with Bluetooth, radar sensing cameras and smart phones are growing in popularity. Learn what telematics are, how they function and the various systems in use. Live vehicles will be used in class to demonstrate diagnostics. A full-color training manual is included. **4 Hours**