



October 2026

## Technicians Service Training

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### Coming up webinars:

**Nov 25<sup>th</sup>** Gary Smith

**Dec 2<sup>nd</sup>** Scott Brown

**Jan 6<sup>th</sup>** Isaac Rodel

**Feb 11<sup>th</sup>** Peter Orlando

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"G" Jerry Truglia

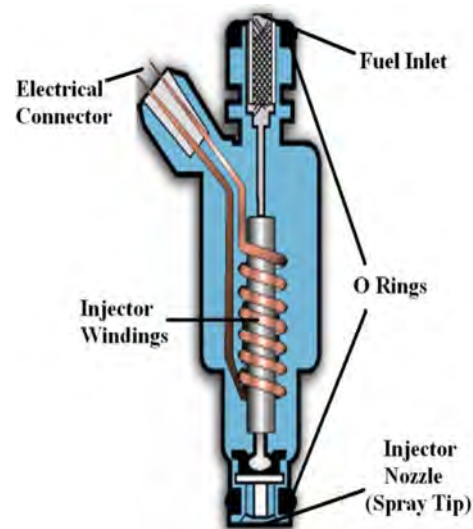
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## "Today's Fuel Systems Diagnosis"

### INJECTOR ANATOMY

Injectors come in different sizes and shapes but have some common features we need to know about. Here are the main features:

- **Fuel inlet-** This is a **top feed** injector. Fuel enters through this port. A small inlet strainer catches any particles of dirt or debris. These strainers can become clogged and restrict fuel flow. You've probably seen this in many vehicles.



- **Electrical connector-**

Most modern sequential injectors have a constant voltage supply at one terminal KOER. The PCM pulses the other terminal to ground to fire the injector. The length of time the injector is held open each time it is grounded is called its **pulse width**. More pulse width = more fuel.

- **O-Rings-** The injector is sealed by o-rings to prevent fuel leaks at the inlet and vacuum leaks at the bottom where the

(Con't on page 4)

## *What is TST?*

### *Why Join TST?*

TST is a group of dedicated automotive technicians and instructors committed to the continuing education of our fellow technicians. We provide quality training seminars at a reasonable price, bringing our members nationally recognized instructors and state-of-the-art technical training.

### **Our Goals & Mission Statement**

- **Keep technicians up to date** with the latest automotive technology, diagnostic strategies, and repair procedures.
- **Provide affordable training seminars** that make continuing education accessible to working technicians.
- **Deliver practical, relevant information** technicians can put to use immediately in their shops.
- **Keep technicians informed** about industry developments, emerging technologies, and information affecting the automotive repair industry.
- **Increase consumer awareness** of the knowledge, training, and expertise required to be a qualified automotive technician.

Key benefits are:

- **Affordable training:** \$99 annual individual membership or \$299 shop membership that includes hundreds of videos and a discount on new training for just \$20.00.
- **Discounted seminars:** Weeknight webinars and occasional full-day Saturday seminars.
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- **Practical instruction:** Hands-on experts teach diagnostic techniques and repair strategies rather than sales pitches.
- **Technical resources:** A newsletter with diagnostic case studies, technical articles, and solutions to difficult repair problems.

The following are some of TST's instructors:

**Bernie Thompson** of ATS - **John Thornton** of Autotrain Inc. - **Wayne Colonna** of ATSG - **Jorge Menchu** the "Labscope Guru," AESwave - **John Anello** of Auto Tech On Wheels - **Mark Warren** of World Pac / Motor Magazine - **Brandon Steckler** of CTI & Motor Age Magazine - **Peter Meier** of Motor Age Magazine - **Ken Zanders** of Illinois Air Team - **"G" Jerry Truglia** of ATTS & Dorman Training ...to name a few  
**"G" Jerry Truglia** of ATTS / Dorman Training

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## ***"Today's Fuel Systems Diagnosis" (con't from p. 1)***

**Injector windings-** The injector is a solenoid-operated control valve used to dispense fuel. A coiled winding of very thin insulated wire surrounds a control valve that moves up and down to open and close the fuel delivery passage. Shorted electrical windings increase current and a shorted injector can steal enough current to shut down good injectors wired in parallel. That's why it's so important to test injectors while they are working.

### **Bottom - Side Feed Port Injectors**

Port, bottom and side feed injectors are installed in a plenum that connects the fuel wells for each injector. Fuel enters the plenum flowing around the bottom feed injectors. Electrical connections for individual injectors may be routed through a channel in the plenum cover to a multi-pin connector.



### **GM Vortec System**

This system uses mechanical poppet valves that are reminiscent to the Bosch CIS system along with one or two TBI injectors that are electronically controlled by the PCM. This pump supplies 60 to 77 psi when working properly.

*The most common problems with this older style Vortec system is the pressure regulator blowing out causing multiple problems (no starts, rich running conditions or lean running conditions) and the plastic tubes crack causing a dead cylinder.*



The later style Vortec uses the same plastic tubes and regulator with one new difference that is a separate electronic injector per cylinder to supply fuel to each mechanical poppet valve. The latest change has been to install a regulator set of top feed electronic injectors on a metal rail that replaces the plastic lines and poppet valves. Their failure rate has been lowering along with emission output.



**(Con't on page 5)**

## *"Today's Fuel Systems Diagnosis" (con't from p. 4)*

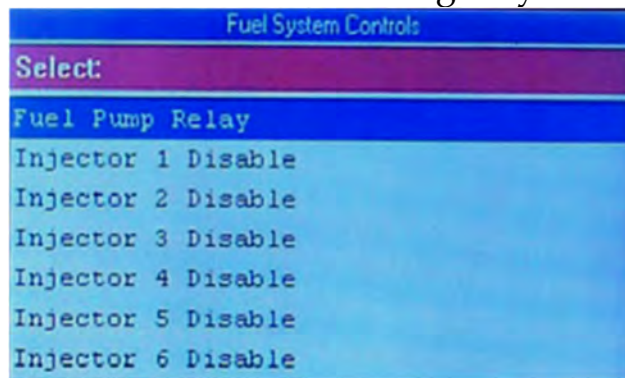
### **DIAGNOSING FUEL INJECTORS**

Before we do that, let's go over a few basic tips:

- **If voltage at both of the injector terminals is equal to system voltage KOER, then you have an open trigger circuit.**
- Check for a voltage drop on the feed side of the injector. Any reading more than 100mv indicates a problem.
- Disable injectors manually or use bi-directional controls and use an emissions analyzer to do a *Hydrocarbons per Cylinder Test*.

When you disable an injector check to see the HC reading on your emissions analyzer.

- If, when you disable a particular injector, the HC readings plummet, then you know that there is not a problem with that particular injector.



### **Leaky Injectors**

This is a very easy test if you suspect that improper fuel injection is the root cause of your driveability problem: put an emissions analyzer in each cylinder. The cylinder with the highest HC reading has the leaky injector.



**(Con't on page 6)**

## *"Today's Fuel Systems Diagnosis" (con't from p. 5)*

### **FUEL INJECTOR BALANCE TEST**

With the ignition off remove the injector plug /wire connectors and install a fuel pressure gauge and fuel injector tester.

Next turn the ignition on and watch the pressure gauge hit 38 lbs (or whatever the specification for the vehicle that is being tested). Afterward, select 1 Pulse/500ms. Press the Activate Injector button once and record the pressure drop. Do this twice for each injector.



**Be sure to start the engine up between doing the tests on each cylinder to prevent hydrostatic lock.**

**(Con't on page 10)**



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## ***"Today's Fuel Systems Diagnosis" (con't from p. 6)***

### **INJECTOR VOLTAGE**

#### **Test Injector Available Voltage**

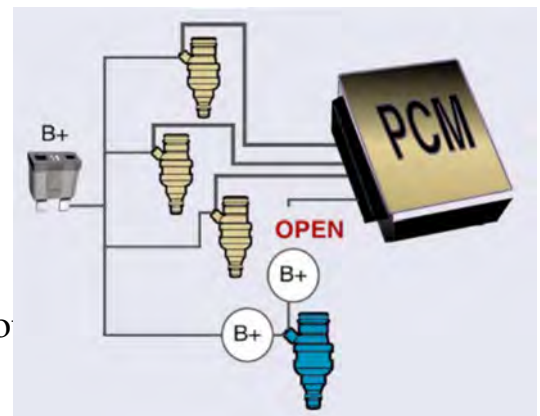
Injectors can't work without power. Test for battery/system voltage at one injector terminal with the engine cranking/running. Some, but not all, injectors are powered KOEO. Chrysler powers the injectors when the ignition is first switched on but turns the power off again in a couple of seconds until the engine is cranked. Identify the type of system you're testing.



**Insert a test pin by gently backprobing the rubber boot at the injector connector.** Paper clips work, but a T-Pin, available from a local craft and art supply store, has a pointed tip that slips into the rubber boot surrounding the wire. The T-shaped head of the pin is a good place to connect your meter test lead clamp.

#### **Use a wiring diagram to identify the injector's voltage supply terminal.**

Set the DMM to Volts DC and ground the meter COM lead. Crank or start the engine and take your reading. Expect to see battery voltage when cranking and system voltage when the engine starts. Next, move the DMM COM test lead from ground to the battery positive post. The voltage drop should be less if the circuit is good.



#### **QUICK TIP:**

*If voltage at both of the injector terminals is equal to system voltage KOER, then you have an open trigger circuit. The PCM isn't toggling the circuit to ground or there's an open circuit between the injector and PCM.*

**(Con't on page 11)**

## *"Today's Fuel Systems Diagnosis" (con't from p. 10)*

### **INJECTOR GURU TIPS**

Jim Linder (may he rest in peace) was commonly known as the Injector Guru. Jim, who ran a respected fuel injector sales and service in Indianapolis, Indiana, had been messing around with injectors for longer than he cares to admit. With his kind permission, we have borrowed his recommendations regarding correct fuel system and injector service procedures.

All injectors eventually suffer the ill effects of olefin wax, dirt, water, and fuel additives. Fuel injector system service is different from simply cleaning injectors, however. Performing a thorough fuel injection system service procedure cures many problems and restores peak engine performance.

For our purposes here, it pays to remember that fuel system contamination can store OBD II diagnostic codes for fuel-related misfires, sticking idle control devices, and excessive fuel corrections, among others. OBD II isn't designed to locate broken components. It's designed to identify emissions problems, and a major cause of high emissions is poor maintenance.

Here are the steps in a thorough fuel system service:

- Test the fuel pressure (and volume).
- Test the fuel pressure regulator for operation and leakage.
- Flush the entire injector fuel rail including the injector inlet screens and regulator.
- Clean the injectors.
- Clean the throttle plate and idle air control valve and passages.
- Reset minimum idle air if necessary.
- Relearn the PCM.



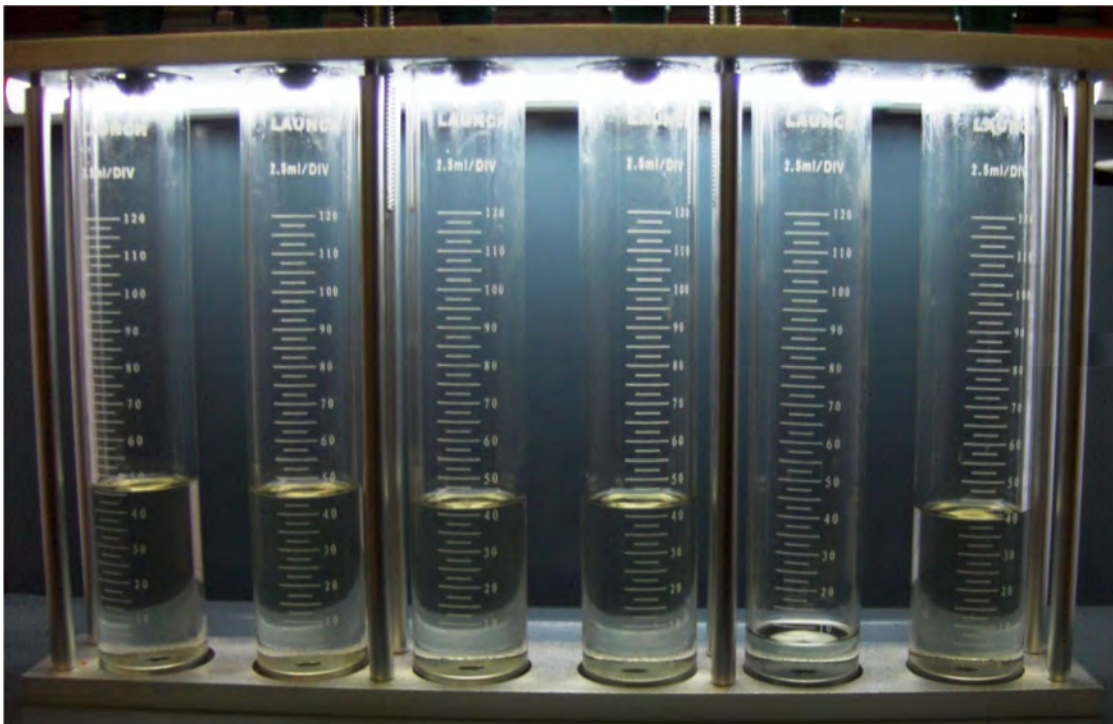
(Con't on page 12)

## *"Today's Fuel Systems Diagnosis" (con't from p. 11)*

### *INJECTOR GURU TIPS CONTINUED*

Fuel pressure and fuel volume are not the same thing. Even though a fuel system has correct pressure, it may not be able to deliver an adequate volume of fuel for peak load operation.

Two line, flow-through cleaning machines do a better job of removing system deposits than single line cleaning systems. Fuel containing a cleaning solution is circulated through the fuel rail. Some of the loosened deposits return to the flushing machine through the return line. (The vehicle fuel supply is disabled or bypassed during the cleaning process.) Single line units or pressure can flushers that screw into the fuel rail must remove inlet screen deposits by pushing them through the injector inlet screens. That forces all loosened deposits into the injectors. If some of the deposits get caught in the injector and restrict flow, the PCM increases injector pulse width, shortening injector life.



*Article by  
"G" Jerry Truglia  
TST Founder- President - ASE Master Technician*

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- Delivering practical, useful repair information.
- Keeping technicians informed of industry trends.

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