



## Technicians Service Training

**INSIDE THIS ISSUE:**

*"Vehicle Sensors & Scan Tools"*

*P. 1 - 13*

*Coming up webinars:*

*June Gary Smith*

*Upcoming Webinar as low as*

*\$20.00 for Members -*

*\$40.00 Non Members*

*Check out our YouTube channel [tstseminars](#)*

*Like us Facebook*

*Editor*

*"G" Jerry Truglia*

© 2026 ATTS INC.

### *"Vehicle Sensors & Scan Tools"*

KS (Knock Sensor) consists of a piezoelectric element attached to the cylinder block to detect engine knocking conditions. Knocking in the cylinder block is converted to an AC varying voltage signal which is sent to the PCM and used for timing adjustment.

VSS (Vehicle Speed Sensor) is an AC or DC voltage depending on the sensor installed. This sensor informs the PCM of the rate of acceleration and how fast the vehicle is moving. VSS is a major input to the TCM (Transmission Controller Computer).

Coolant Warmup Rate (per second)	Symptom	Possible Cause
Near 0°F	Water is not moving through the engine and cannot transfer heat away from the engine's metal components.	<ul style="list-style-type: none"> <li>Missing water pump drive belt</li> <li>Voltage drop or open circuit on an electric water pump</li> <li>Faulty or broken water pump</li> </ul>
Slow <0.2°F	Cold (or cooler) coolant from the radiator is able to move into the engine, thus slowing the warmup rate.	<ul style="list-style-type: none"> <li>Thermostat not sealing properly</li> <li>Thermostat leaking</li> </ul>
Fast 0.5°F to 0.7°F	Engine heats too quickly.	<ul style="list-style-type: none"> <li>System doesn't have enough coolant</li> </ul>
Warmup rate correct but temperature keeps climbing	Engine overheats.	<ul style="list-style-type: none"> <li>Thermostat open: Check for temperature drop at ~175°F. If temperature drops, thermostat is open.</li> <li>Thermostat closed: Check for temperature drop; if no drop is apparent, the thermostat is stuck closed.</li> </ul>

**Figure 1**

**NOTE:** If the coolant temperature is below 30°F on start, the coolant warmup rate will be higher due to the large difference in temperatures. For proper test results, the cooling system must have no air in the system, and the coolant mixture must be at the proper 50/50 mixture rate. If the system has air or if the mixture is incorrect, the rate of coolant temperature rise will be affected.

*(Con't on page 4)*

## What is TST?

*TST is a group of dedicated technicians and instructors committed to the continuing education of our fellow technicians. We provide training seminars to technicians at a reasonable price. TST brings our members nationally known instructors and state of the art training.*

### Our Goal & Mission Statement

- *Keep our fellow technicians up to date with the latest technology.*
- *Provide training seminars for a reasonable price.*
- *Deliver information that the technician can use now.*
- *Keep technicians informed of information affecting our industry.*
- *Increase consumer awareness of what a good technician is.*

## Why join TST?

TST membership includes special pricing on weekday night seminars and the occasional full Saturday seminar. With a **\$99.00 yearly individual or shop \$299.00 membership**, the simulcast are only **\$20.00**. **TST seminars are NOT sales or product seminars.** The instructors that TST brings in are all “hands-on” industry experts with up to date, cutting edge knowledge that you can use in your shop the next day. That’s 99 dollars for a seminar in which you are able to learn something useful, for fixing those tough jobs that we all see on a regular basis. Our instructors are masters at making the complex understandable. Membership also includes a newsletter full of real world technical articles, diagnostic case studies, and solutions to the kinds of problems you see in your bays each week.

The following are some of TST’s regular instructors:

**Bernie Thompson** of ATS

**John Thornton** of Autotrain Inc.

**Wayne Colonna** of ATSG

**Jorge Menchu** the “Labscope Guru,” AES Wave

**John Anello** of Auto Tech On Wheels

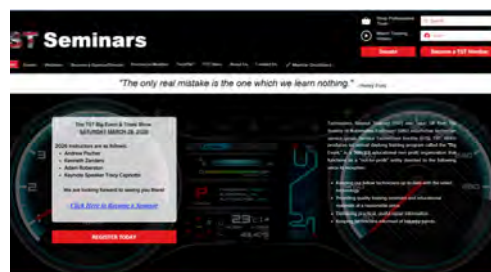
**Mark Warren** of World Pac / Motor Magazine

**Brandon Steckler** of CTI & Motor Age Magazine

**Peter Meier** of Motor Age Magazine

**Ken Zanders** of Illinois Air Team

**"G" Jerry Truglia** of A.T.T.S. Inc.



*Technicians Service Training*

**11 Lupi Plaza  
Mahopac, NY 10541**

**Phone: (845) 628-6928**

**Fax: (845) 628-9109**

**Email:**

[Info@tstseminars.org](mailto:Info@tstseminars.org)

**TST on YouTube...type  
in tstseminars**

**No part of this newsletter may be reproduced, stored in a retrieval system, or transmitted, in any form by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission of the authors.**

Information contained in this newsletter is intended for use by professional auto repair technicians familiar with approved vehicle repair procedures. The authors are not responsible for physical injury or property damage resulting from the incorrect application of information or procedures outlined in this volume.

Currently there are **TST chapters in Connecticut, Massachusetts, New Jersey, New York** and membership continues to grow. For more information you can call **TST headquarters** at:

**(845) 628-6928**

**www.TSTseminars.org**

## DORMAN TECHNICIAN TRAINING



### YOU KNOW US FOR THE PARTS. NOW WE DELIVER THE SMARTS.

We are continuing to invest in the transportation aftermarket by offering in-person training throughout North America, and online training wherever you are. As vehicles are always changing, we are always releasing new solutions, and now that means both products and knowledge.

**For additional information contact**

**[DTC@DormanProducts.com](mailto:DTC@DormanProducts.com).**



Get vehicle applications and technical details at [dormanproducts.com](http://dormanproducts.com)  
Dorman Products, Inc. | Corporate Office and Customer Service: 1-800-523-2492 | Tech Line: 1-855-933-2911  
©2021 No reproduction in whole or in part without prior written approval.

### Curriculum Includes:

- **Critical Thinking-  
Diagnostic Strategies**
- **P0420 & P0430 “Keeping  
the Light Off”**
- **Unlocking the Potential of  
Your Scan Tool**
- **Understanding  
and Diagnosing Air  
Conditioning**
- **20+ additional topics  
available**

## “Vehicle Sensors & Scan Tools” (con’t from p. 1)

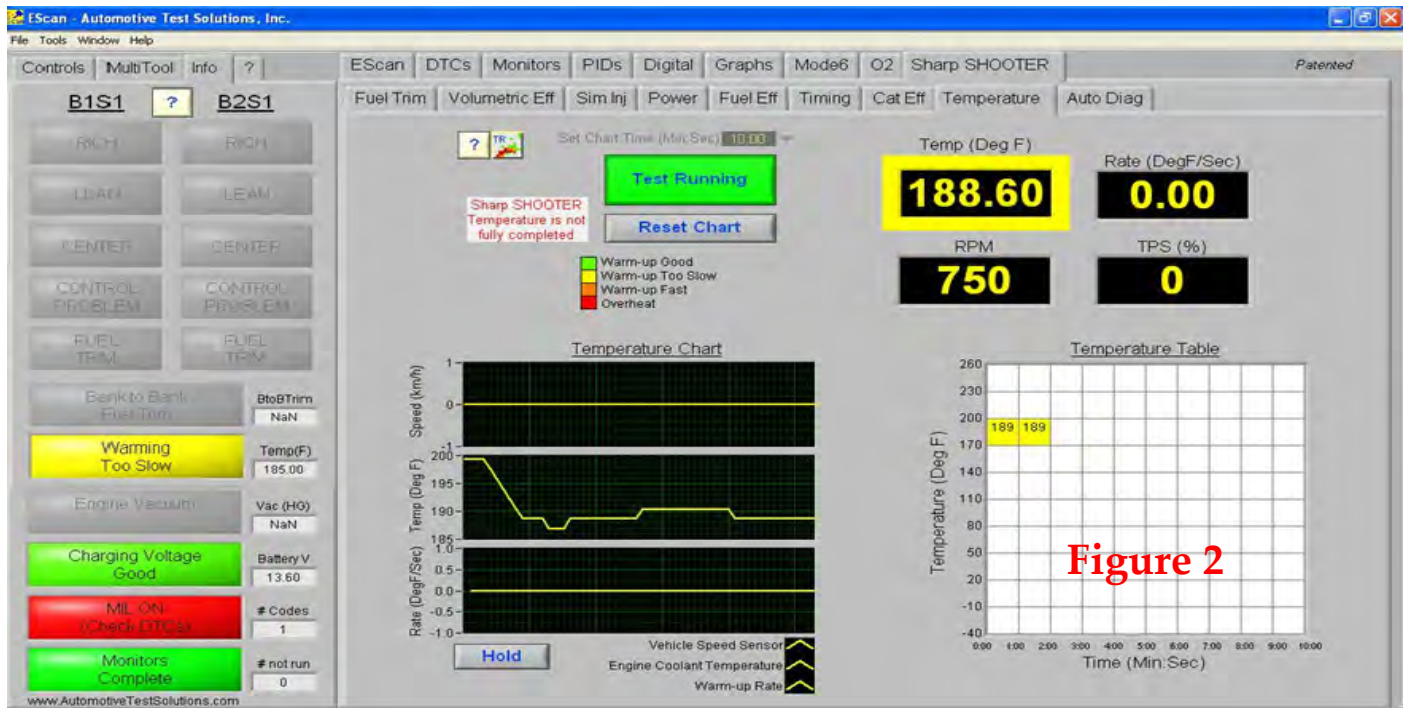


Figure 2

### Cooling System Diagnosis BAD

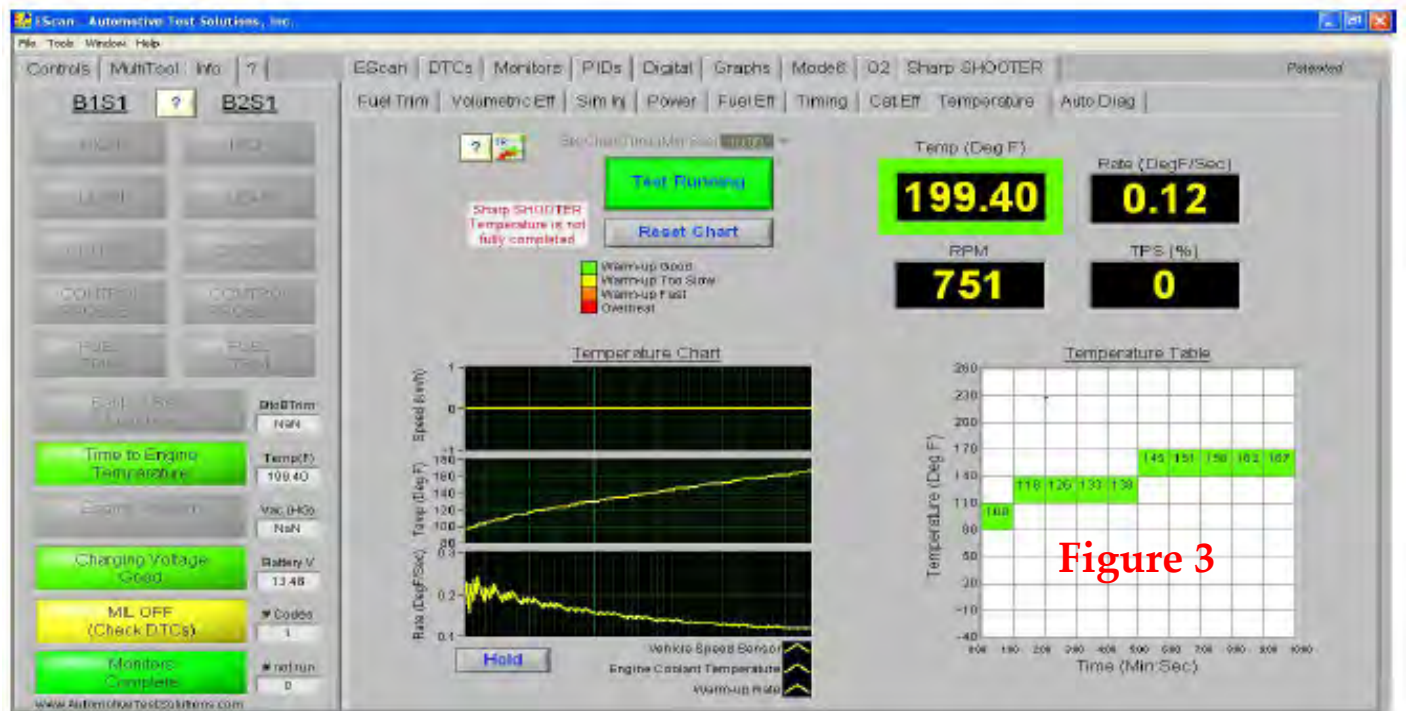


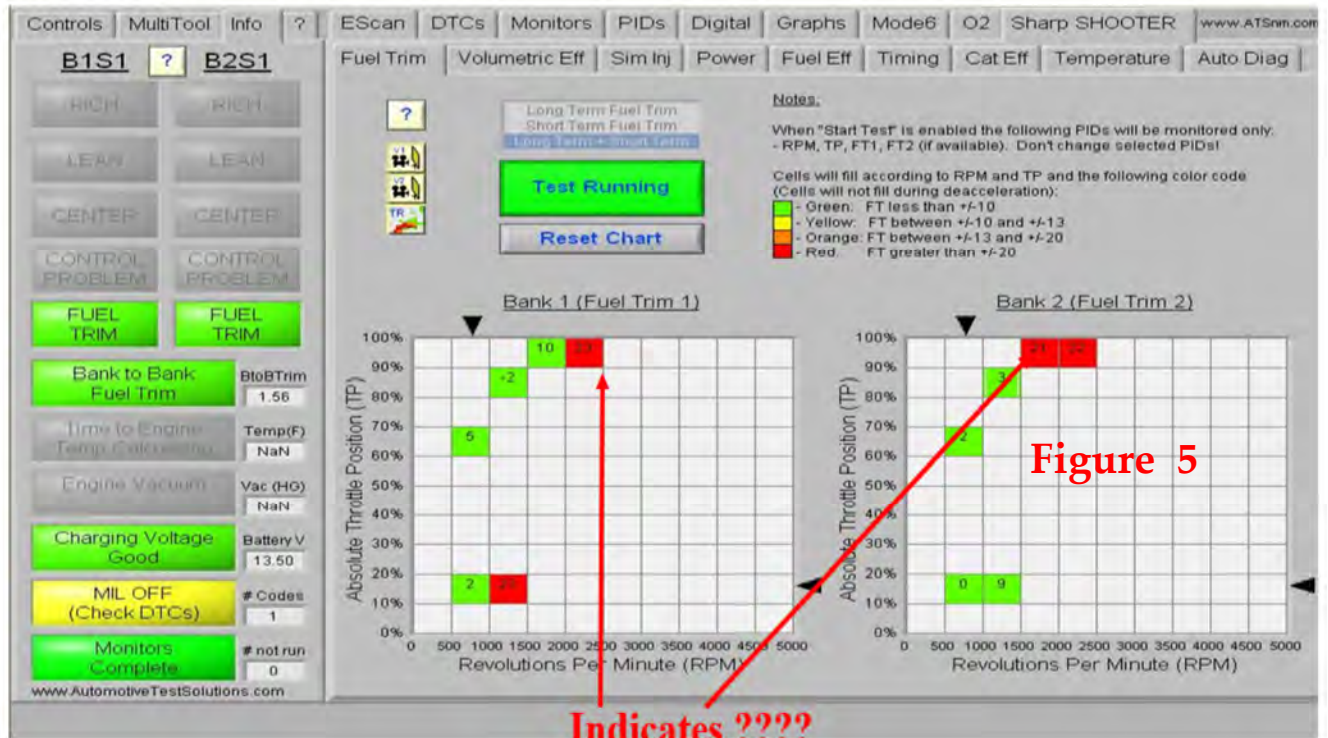
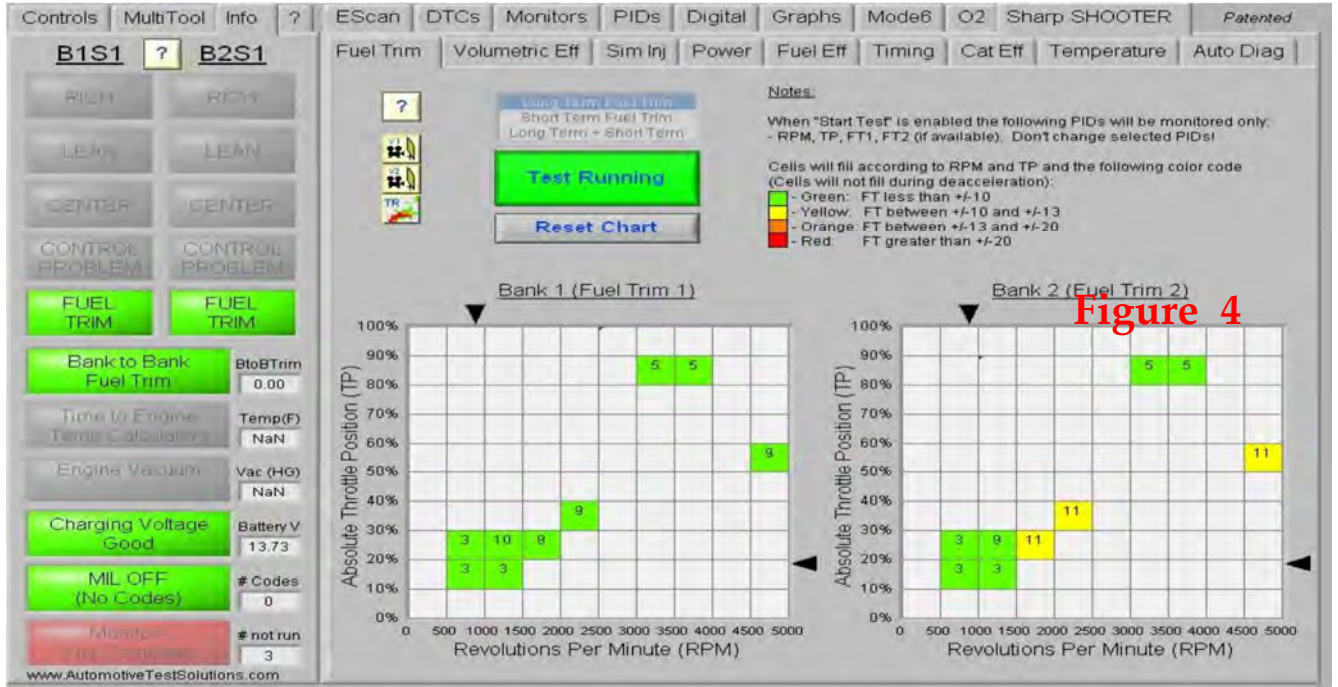
Figure 3

### Cooling System Diagnosis Good

(Con't on page 5)

# “Vehicle Sensors & Scan Tools” (con't from p. 4)

## Scan Tool Fuel T



What's the problem?

(Con't on page 6)

## *“Vehicle Sensors & Scan Tools” (con’t from p. 5)*

### Sensor Simulators - Resistance Decade & Capacitance Decade Boxes



**Figure 5**

A sensor simulator can be used to substitute a sensor signal. This type of equipment can be used to check the computer circuit making sure there is a response to the input signal from the simulator. A decade box is used to insert resistance in a circuit such as a CTS to check the PCM response. A capacitance box is used to control electrical noise from a possible solenoid or alternator.

#### **TIME OUT... Things to be aware of...**

- ADAS (Advanced Driver Assistance Systems) can cause driveability issues. Example is the system detectors another vehicle it may apply the brakes, turn the steering wheel, cut power and perform some other function.
- Start Stop systems cut the engine out when the vehicle comes to a stop. There are enable criteria that must be met such as engine temperature, AC system to name a couple.

*(Con't on page 10)*

# GDI

## Got Deposit Issues?

### You need the Run-Rite® #1077 GDI Fuel System Cleaning Kit!

Offer a solution to your customer's deposit problems!  
 The Run-Rite® #1077 GDI Fuel System Cleaning Kit  
 removes deposits from valves, injectors and combustion chambers.  
 Use on Gasoline Direct Injection (GDI) and Port Injection Systems (PFI).  
 Safe for turbos and inter-coolers.

Fuel

Oil

**Run-Rite® GDI Fuel System Cleaner**  
**Run-Rite® GDI Oil System Treatment**

**Run-Rite® D.I.D.C.**  
 (Direct Injection Deposit Cleaner)

- Removes Valve Deposits
- Reduces Combustion Chamber Deposits
- Designed for GDI & PFI Fuel Systems
- Safe for Turbos & Inter-coolers
- Improves Fuel Economy
- Keep Precision Oil Passages Clean



**Kleen-Rite® Engine Cleaning**

- Reduces Deposits and Soot Buildup
- Promotes a more complete drain of oil
- Helps Neutralize Combustion Acids
- Improve Oil Changes

**Run-Rite #1077 G.D.I. 3 Step Fuel System Cleaning Kit:**  
 8 kits per case (3 parts in each)

**Kleen-Rite #3110 Ultimate ECD (Engine Cleaning Detergent)**  
 4 bottles per case (1 gallon each)

**1.800.872.8921**



**www.Run-Rite.com**

# “THE SOURCE” FOR DIAGNOSTIC TEST PREP

Motor Age Training offers  
the most complete and  
extensive ASE Training  
Series available anywhere

- Study guides
- Practice tests
- Detailed illustrations
- Available in your  
favorite format



**YOU PASS OR YOU DON'T PAY!**



**MOTOR AGE  
TRAINING**



WE SUPPORT  
PROFESSIONAL CERTIFICATION  
THROUGH THE  
National Institute for  
**AUTOMOTIVE  
SERVICE  
EXCELLENCE**

[www.passthease.com](http://www.passthease.com)

# FLO-DYNAMICS®



**THE LEADER IN FLUID  
MAINTENANCE EQUIPMENT**

TRANSMISSION POWER STEERING COOLANT BRAKE AND MORE

[www.flodynamics.com](http://www.flodynamics.com)

## ***“Vehicle Sensors & Scan Tools” (con’t from p. 6)***

### **Cheat Sheet Of Common Sensors & Actuator Specs**

**A/F Sensor - when volts are LOW the mixture is RICH, when voltage is HIGH it’s LEAN.**

**When amps are negative or low amps it’s rich, when it’s positive or high amps it’s lean (to measure Amps use a meter in series connected to the signal wire) currently only expensive amp clamps cannot read that low - 3mA to 3mA.**

**2.8 V (Honda/Acura)**

**1.9 V (Hyundai/Kia)**

**2.2 V Mitsubishi**

**1.4 V up to 2006 - 2007 and up 2.2 V (Nissan/Infiniti)**

**2.4 V (Subaru)**

**3.3 V (Toyota)**

**1.00 Lambda (all European manufacturers).**

**BARO - Should be 29.9 at sea level. BARO has dramatic effects on timing and fuel trim, measured at idle or WOT from MAF/MAP sensors or PCMs. Weather and altitude changes BARO readings.**

- **Sea Level to 1000 ft = 18 to 22**
- **1001 ft. to 2000 ft = 17 to 21**
- **2001 ft. to 3000 ft = 16 to 20**
- **3001 ft. to 4000 ft = 15 to 19**
- **4001 ft. to 5000 ft = 14 to 18**
- **5001 ft. to 6000 ft = 13 to 17**
- **6001 ft. to 7000 ft = 12 to 16**
- **The higher the altitude the lower the vacuum.**

**Here’s a rule of thumb: 1 inch of vacuum per 1000 feet.**

***(Con’t on page 11)***

## *“Vehicle Sensors & Scan Tools” (con’t from p. 10)*

### **Cheat Sheet Of Common Sensors & Actuator Specs**

Circuit Voltage High (Scan Data) = Open Circuit

Circuit Voltage Low (Scan Data) = Short

CAM - Controls fuel

No Start Tip with CAM & CKP Connected - Disconnect every sensor one at a time until the engine starts.

CKP- Controls spark and timing, should show RPM during a start attempt (most engines)

Databus V

Low volts = means a short-to-ground in the network

High volts = open circuit in network

Diagnose opens and shorts: unplug the wire at the sensor/load and module, use the Power Probe and power the wire, check if you’re getting 12 V on the other end of the DISCONNECTED wire (connect your meter on HOLD) at wires other end. If Power Probe blows the fuse, the wire’s circuit has a short to ground. If you do not read 12 V the circuit has an OPEN.

Engine Vacuum - 2-5 in. engine cranking, 17 to 20 in. engine running

EGR - Should be at 0% or 0 counts at idle or the engine will run rough or possible not start.

*(Con’t on page 12)*

## *“Vehicle Sensors & Scan Tools” (con't from p. 11)*

### **Cheat Sheet Of Common Sensors & Actuator Specs**

**Figure 9**

- Fuel Flow at idle - 0.4 a gallon 4 cyl, 0.5 a gallon for, 4 cly supercharge - turbo and 6 - 8 – 10 cylinders.
- Fuel Injector - Windings should be at 10-15 ohms (TBI and GDI 0.5 ohm)
- If injector has 12V at both sides, computer is not grounding it, or the engine is not running.
- GDI injectors are controlled by the PCM for both power at 65V and ground.
- Voltage drop should be below 100 mV
- If you activate a single injector at a time and record fuel pressure, the injector with abnormal pressure drop is bad. If measuring PSI, a difference of more than 1.5 psi is bad.

#### Fuel Injectors

Most injectors should pull about 900 mA or a bit more not exceeding 1.2 amps (1200ma), 4-5 Amps Peak and Hold, 7 – 10 Amps Pulse Width Modulated (35 V or more voltage at peak on all injectors). GDI injectors use a different circuit that may pull 8 or more amps due to the circuit and high fuel pressure. GDI injectors use 65 volts via a boost converter (capacitors) that takes 12 volts and boost it to 65 volts.

Injector Balance Test - Disable an injector and record RPM drop. Remember to disable IAC if equipped.

*Next month more cheat sheet and case studies*

*Article by*

*“G” Jerry Truglia*

*TST Founder- President - ASE Master Technician*

# Welcome to the Future of Vehicle Diagnostics



## Scan Tool Hub

### Autologic European Software

- European Brand Specific Software
- Comprehensive Data Display with Graphing
- Bi-directionals Controls
- Complete Vehicle Fault and Freeze-Frame Scanning and Logging
- Native Programming Options Available on Tool for BMW and JLR

### AutoEnginuity Software

- Comprehensive Coverage with a Focus on Asian and Domestic Brands
- Comprehensive Data Display with Graphing
- Bi-directionals Controls
- Complete Vehicle Fault and Freeze-Frame Scanning and Logging



## Farsight OE Diagnostics

- Streamlines the Installation & Management of Windows-Based OE Manufacturer Software Through Virtual Machines
- OE Manufacturer Diagnostic & Programming Applications are Pre-Configured for Ease of use
- Simplifies your Workflow with Regards to OE Software
- Eliminates the Need for IT Computer or Software Support



## RAP & Remote Services

- RAP Offers Customers the Ability to Remotely Program Replacement Modules to Bring Vehicles into Service
- Programming Performed with OE Solutions on a Pay Per use Basis
- Gives the Customer Access to Brand Specific Master Technicians for Technical Support
- IVS360 will Assist Customers with Vehicle Diagnostics and Programming Assistance
- IVS360 Gives the Customer the Opportunity to Broaden their Vehicle Service Base



## My CarDAQ

- Enables the use of Windows-Based Applications & the Devices Internal J2534 Communication Interface using OE Software
- User May Install & Manage their Own OE Manufacturer Software Utilizing the Internal J2534 Device with no Additional Hardware Requirements
- Provides Access to a Windows Virtual Machine Allowing the User to Browse the Web and/or Utilize Various PC Tools or Software for General Computing Needs

Professional Training for Automotive Experts

# TST Seminars

Shop Professional Tools | Search... | Watch Training Videos | Login | Donate | Become a TST Member

Homepage | Events | Webinars | Password Webinars | Become a Sponsor | Become a Member | TechFix™ | TST Store | About Us | Contact Us | Member Dashboard

"The only real mistake is the one which we learn nothing." - Henry Ford

The TST Big Event & Trade Show  
**SATURDAY MARCH 28, 2026**

2026 Instructors are as follows:

- Andrew Fischer
- Kenneth Zanders
- Adam Roberston
- Keynote Speaker Tracy Capriotto

We are looking forward to seeing you there!

[Click Here to Become a Sponsor](#)

**REGISTER TODAY**

Technicians Service Training (TST) was spun off from the Society of Automotive Engineers (SAE) automotive technician service group, Service Technicians Society (STS). TST, which produces an annual daylong training program called the "Big Event," is a 501(c)(3) educational non profit organization that functions as a "not-for-profit" entity devoted to the following since its inception:

- Keeping our fellow technicians up to date with the latest technology.
- Providing quality training seminars and educational materials at a reasonable price.
- Delivering practical, useful repair information.
- Keeping technicians informed of industry trends.

## Upcoming Events

Registration now open

Professional Training for Automotive Experts

# TST Seminars

Shop Professional Tools | Search... | Watch Training Videos | Login | Donate | Become a TST Member

Homepage | Events | Webinars | Password Webinars | Become a Sponsor | Become a Member | TechFix™ | TST Store | About Us | Contact Us | Member Dashboard

## Seminars & Training

Our Sponsors | Our Newsletters

**Webinars & Recordings** | **Newsletters** | **Our Sponsors**

TST Seminars deliver live hands on training taught by working experts. Each class gives clear step-by-step studies and take home handouts. Learn diagnostics electrical testing network workflows GDI and hybrid systems. Ask questions and practice methods you can use the same week. Seats are limited to register early. Members get best pricing and added perks. Bring a teammate suits it. Shop step and build a career playback for your boys. Train live. Level up.

Membership Offer

**TST 2026 Big Event and Trade Show - Saturday March 28th**  
Fri, Sep 05 | Terrytown

SAVE THE DATE!

**Register**

Membership Offer

**RECORDING OF "A Logical Approach to GDI Driveability Concerns" w/Brandon Steckler**  
Wed, Oct 22 | Live Webinar

The webinar objective is to first develop a solid understanding of the Gas direct Injection systems' components, and how they work together to accomplish the goals of balancing adequate torque/horsepower output, second gas mileage, and staying within the ever-tightening noose of emissions standards.

**Register**

Membership Offer

**TST November 12, 2025 Webinar "Start Me Up - Advanced Starter Motor Analytics and Diagnostics" w/Peter Orlando**  
Wed, Nov 12 | Live Webinar

- Starter motor design and application - Pull-in and Hold-in Winding analytics
- Still the largest load on the vehicle - How come it draws much less current?
- Why is cranking RPM so important? Is combustion really relying on the starter motor? and more.

**Register**

# TST Seminars

Professional Training, Seminars and Events for Automotive Technicians all over the World

## Webinars Recording

If you missed the TST Big Event you can purchase the recording to view from the Webinar recording Tab. **The Motor Age TST video is up for free along with other paid and free videos.** All of our instructors are the best in their field.



# SMART TOOLS OF THE TRADE

## SMART SPLICE™ LINE SPLICE METAL LINE CONNECTORS



**PRO GRADE OIL/DYE INJECTOR**  
EASILY READ, MEASURE, AND INJECT  
PROPER OIL/DYE QUANTITY



**SIGHT GLASS**  
REAL TIME VISUAL  
A/C SYSTEM DIAGNOSTICS



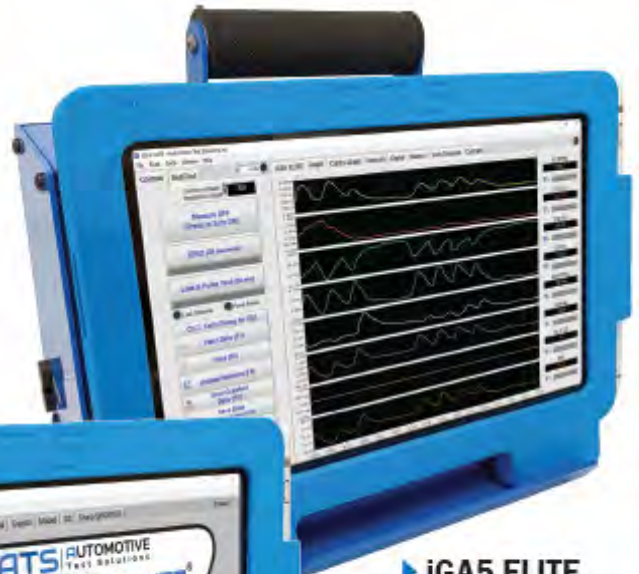
**DUAL RECYCLE GUARD™**  
PROTECT YOUR A/C SERVICE EQUIPMENT  
FROM CONTAMINANTS



# ATS | AUTOMOTIVE Test Solutions



▶ eSCOPE ELITE 8



▶ iGA5 ELITE



▶ eSCAN ELITE

[www.automotivetestsolutions.com](http://www.automotivetestsolutions.com)

800-572-6112

