



1



2



Your Instructor For This Webinar

"G" Jerry Truglia
gtruglia@dormanproducts.com

- National Trainer, ASE World Class, Master Auto, Truck, School Bus, L1, L3, CNG and...
- **ATTP Master Instructor, New York State, CT and New Jersey**
- STS (Service Technician Society) 2003 President
- **TST (Technicians Service Training) Founder and President**
- Author / Co Author/ Technical adviser on 25 plus books including OBD II and Mode 6, and Understanding and Diagnosing Hybrid Vehicles
- **Published articles for multiple newsletters, and magazines**
- Picked as one of the Top Instructors in the country by EPA & SAE
- **Numerous Radio, TV, Internet, and SAE Video appearances**
- PTEN, MotorAge and TST Webcast Instructor - Dorman Training Director
- **Motor Magazine Top 20 award winner**
- Provider of OBD II Training for 14 states, Ontario Canada and the US EPA
- **Guest speaker at SAE Congress, IM Solutions and Clean Air Conference**



3

3



Your Instructor For This Webinar

Joshua Weaver
jweaver2@dormanproducts.com

- Associate Degree in Applied Science for Automotive Technology
- **Collage was affiliated with General Motors and Chrysler, and I interned for Ford allowing me to learn all 3 domestic Brands**
- Worked for A Kia Dealer ship for 10 years and achieved A.S.E and Kia Master Tech Certification
- **Lead tech at dealership allowing me to see the most difficult customer concerns**
- Pennsylvania State inspection Emissions tech with waiver license
- **Holds A.S.E. L1 Advance Engine Performance**
- Holds A.S.E. L3 Light Duty Hybrid Specialist
- E.P.A. 609
- Manager of A 6 bay repair shop which also had a 6 bay body shop, allowing me to see a wide variety of electrical, drivability issue and module programing



4

4

What Will Be Covered:

- **GDI - What Is It?**
- **Primary Fuel Pump**
- **Secondary - Direct Injection Fuel Pump**
- **What To Look For In Scan Data**
- **Problem Areas**
- **Using The ADDi Interface**

5

SAFETY

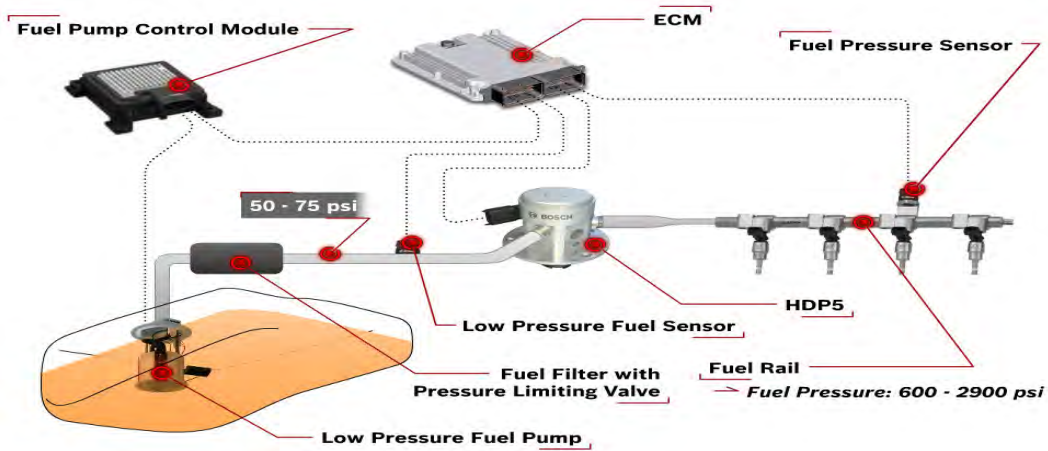


We need to protect our bodies with protective clothing and exercise a lot of caution when we work around fuel systems. With newer systems commonly operating at fuel pressures of 12 to over 2900 psi, there is no such thing as a *small* fuel system leak.

No one cares more about your safety than you do.

6

GDI System

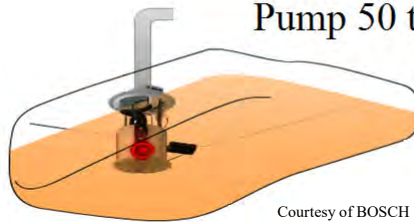


7

GDI System

The Fuel Tank Pressure Module or Low Pressure Fuel Pump is a similar type of pump that has been used for years on other fuel injection systems. Testing is also the same as it was before on non GDI fuel systems. Remember that the volume of fuel is very important, so don't just check the fuel pressure.

Low Pressure Fuel
Pump 50 to 75 psi



8

GM - Bosch GDI System Example

The high fuel pressure necessary for direct injection is supplied by the high pressure fuel pump. The pump is mounted on the rear of the engine and is driven by a three lobe cam on the Bank 2 exhaust camshaft. This pump also regulates the fuel pressure using an actuator in the form of an internal solenoid controlled valve. In order to keep the engine running efficiently under all operating conditions, the PCM requests pressure ranging from 290 to 2176 psi, depending on engine speed and load. Output drivers in the PCM provide the pump control circuit with a 12 V pulse-width modulated signal, which regulates fuel pressure by closing and opening the control valve at specific times during pump strokes. This effectively regulates the portion of each pump stroke that is delivered to the fuel rail. When the control solenoid is NOT powered, the pump operates at maximum flow rate. In the event of pump control failure, the high pressure system is protected by a relief valve in the pump that prevents the pressure from exceeding 2538 psi.



GM - Bosch GDI System Example

The PCM controls each fuel injector with 65 V. This is controlled by a boost capacitor in the PCM. During the 65 V boost phase, the capacitor is discharged through an injector, allowing for initial injector opening. The injector is then held open with 12 V.

The fuel injector assembly is an electrical magnetic injector. The injector has six precision machined holes that generate a cone shaped oval spray pattern. The fuel injector has a slim extended tip in order to allow a sufficient cooling jacket in the cylinder head.



GDI Injector Information

Electromagnetic GDI Injector

Electrical Activation

In the pickup phase, the valve pintle needle then achieves the maximum opening lift. **When the fuel injector is open (maximum pintle needle lift), a lower control current (holding current) is sufficient to keep the valve open.** With a constant injector pintle needle lift, the injector fuel quantity is proportional to the injector duration.



GDI Injector Information

Piezo GDI Injector

Piezo are similar to the Electromagnetic injector.

A coding process integrated into the production sequences determines the electrical charge requirement of each piezo fuel injector. The valve is stored by the way of a data matrix code for programming in the engine ECU. This compensates for the manufacturing tolerances and improves significantly the accuracy of fuel quantity metering during operation.



GDI Injector Information

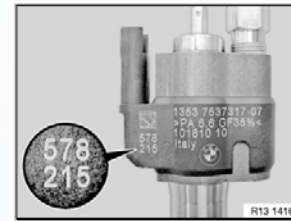
Injector adjustment!

An injector adjustment must be carried out if an injector is replaced or changed from the original cylinder.

Injector adjustment is carried out with the aid of a so-called adjustment value.

The adjustment value is printed in two blocks of three digits on the injector.

The adjustment value must be read off before installation!



Courtesy of AllData

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13

13

GDI Injector Tools And Caps



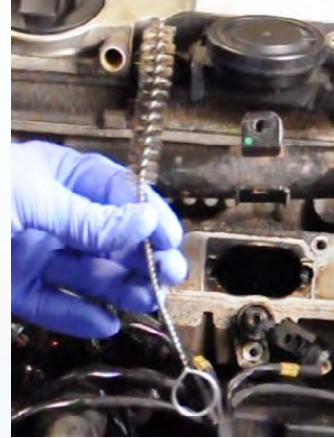
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14

14

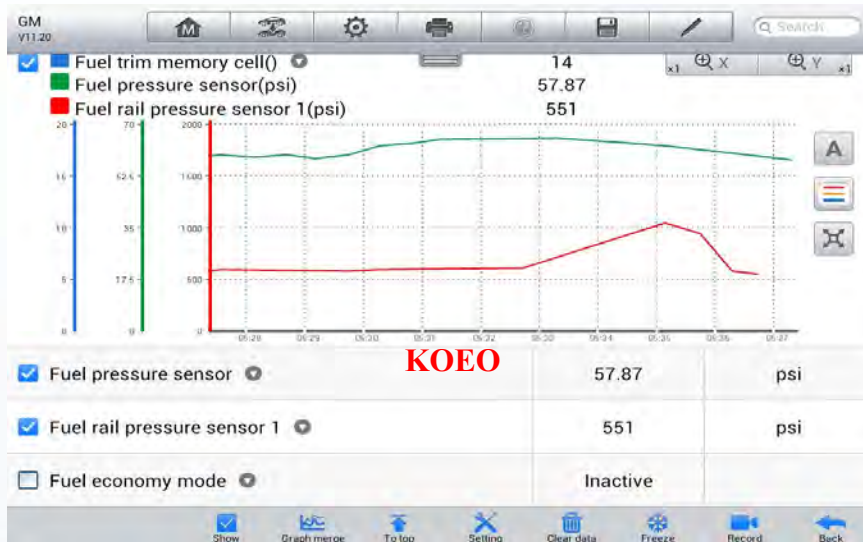
GDI Brushes To Clean Injector Ports

It is important to clean injector ports that are located in the manifold or head with a soft brush. Leaving any debris behind can damage the injector seals.



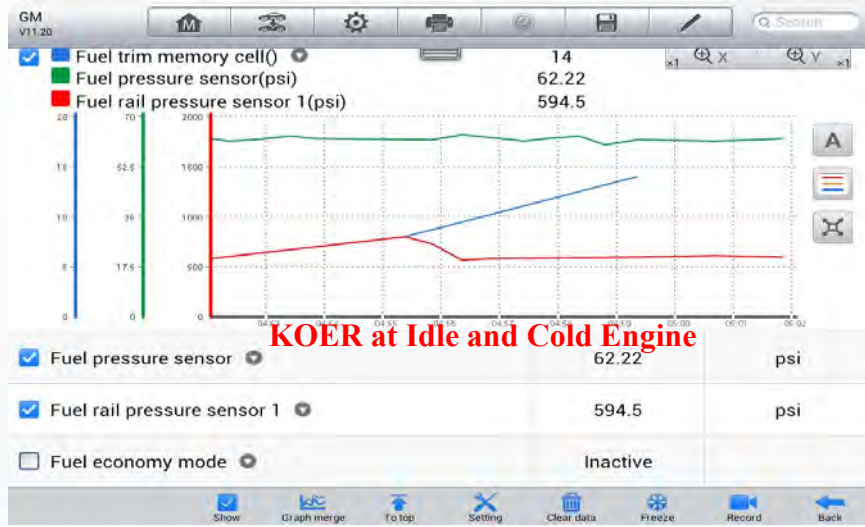
15

GDI GM Fuel Trim Cell & Low And High Pressure



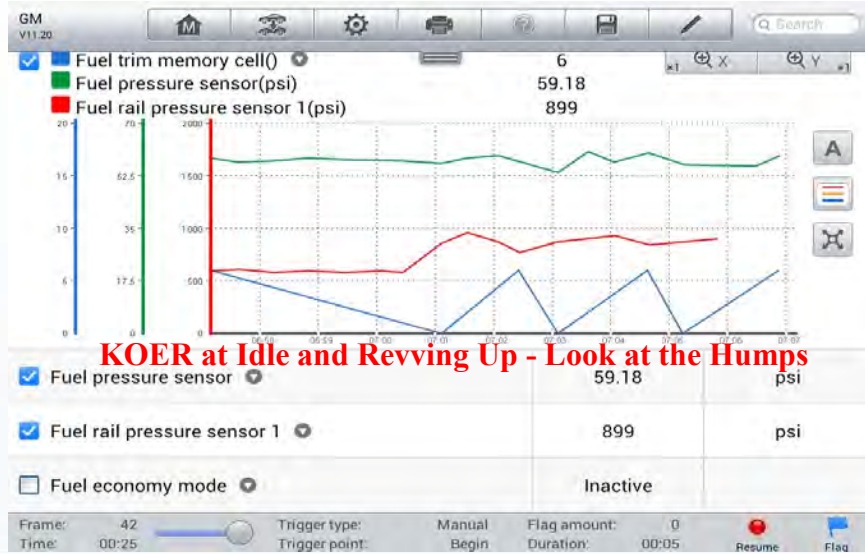
16

GDI GM Fuel Trim Cell & Low And High Pressure



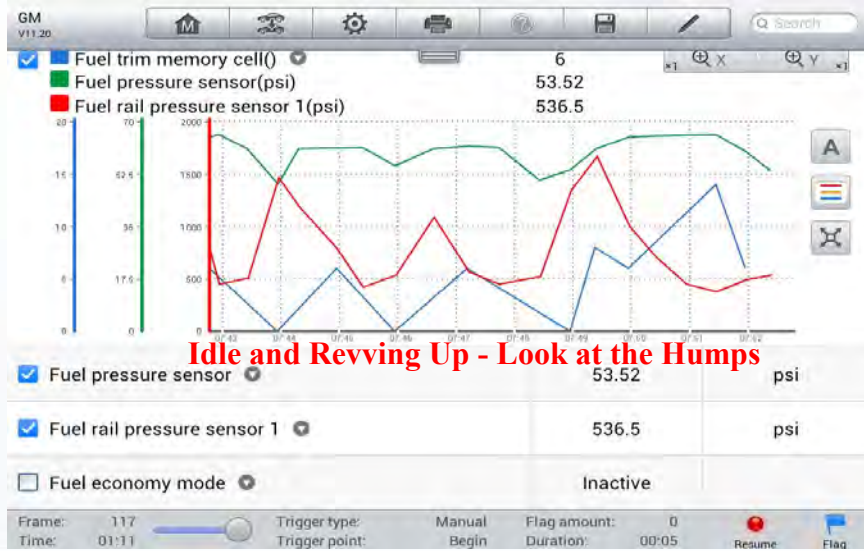
17

GDI GM Fuel Trim Cell & Low And High Pressure



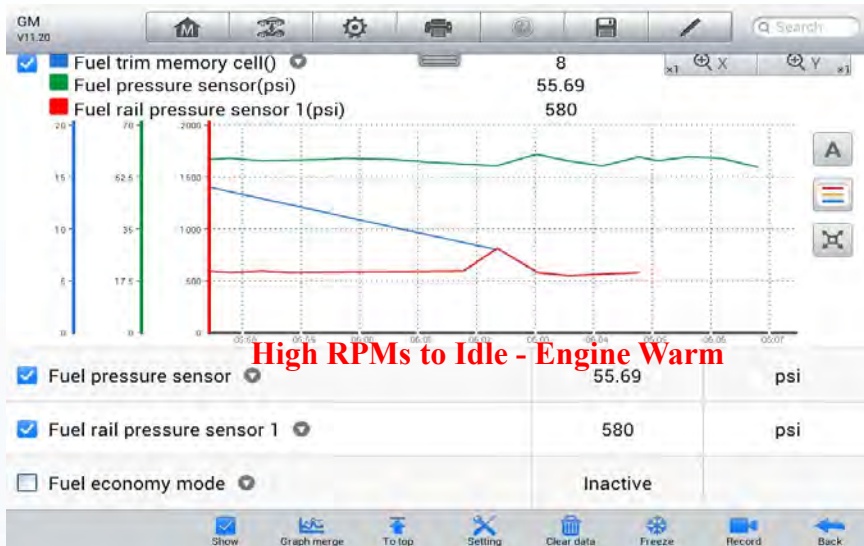
18

GDI GM Fuel Trim Cell & Low And High Pressure



19

GDI GM Fuel Trim Cell & Low And High Pressure



20

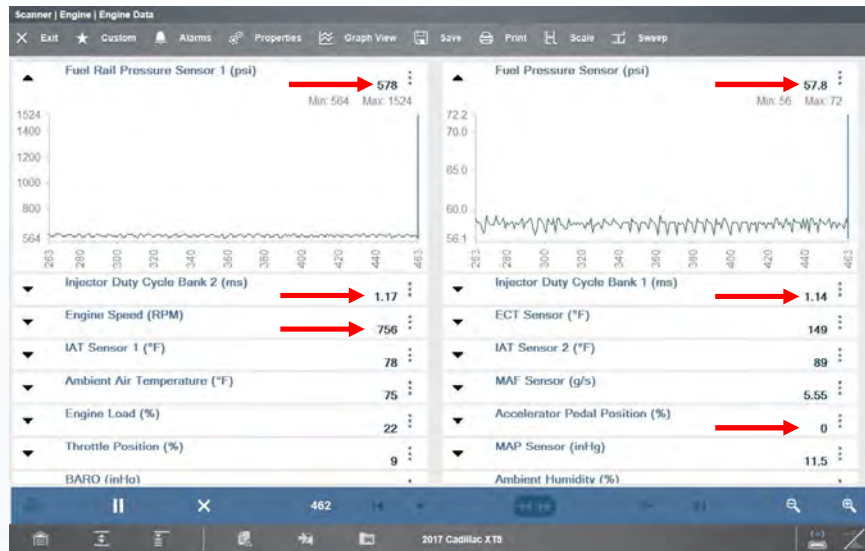
GDI Injector Information

- 1. When removing GDI injectors carefully clean the manifold or engine bore with a soft brush to remove the carbon build up.**
- 2. GDI fuel injection pulse width or on time is much lower than conventional fuel injection. GDI on time at idle 0.4 to less than 2 mS compared to 3 to 5 mS.**
- 3. GDI injector are low resistance injector about 1 ohm rather than 14 ohms for conventional injectors.**

GDI Injector Information

- 4. GDI injector use 65 volts due to a boost converter (capacitors) that takes 12 volts and boost it to 65 volts.**
- 5. Note: GM recommendations along with some other OEs are to replace the high pressure stainless steel fuel lines once they are loosen to prevent fuel leaks.**

GDI Fuel System Data



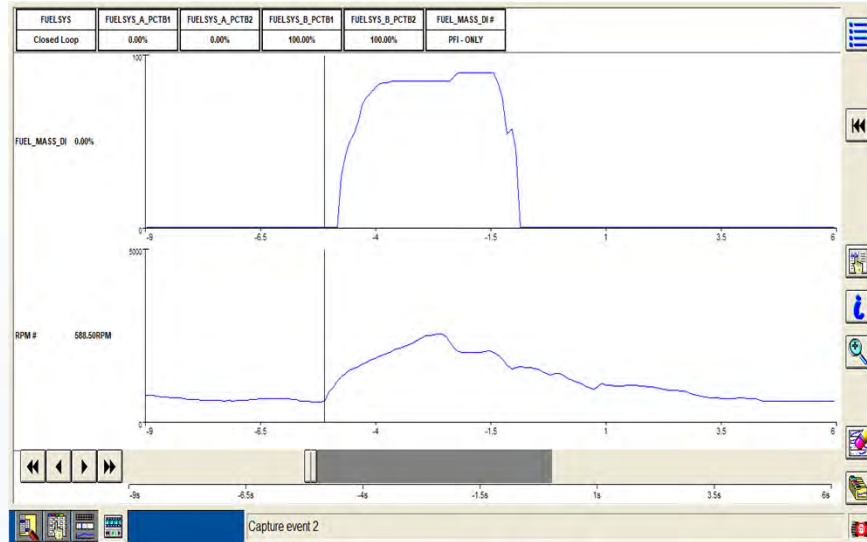
23

GDI Problem On A Chevy Malibu 2.5L

Parameter Name	Value	Unit	Control Module
Short Term Fuel Trim	10	%	Engine Control Module
Long Term Fuel Trim	40	%	Engine Control Module
Fuel Trim Learn	Enabled		Engine Control Module
Fuel Trim Memory Cell	6		Engine Control Module
Fuel Trim System Test State	Running		Engine Control Module
Short Term Fuel Trim Test Average	0	%	Engine Control Module
Long Term Fuel Trim Test Average	0	%	Engine Control Module
Long Term Fuel Trim Test Average without Purge	0	%	Engine Control Module
Fuel Control Loop Status	Closed		Engine Control Module
HO2S1	110	mV	Engine Control Module
HO2S2	30	mV	Engine Control Module
Injector Duty Cycle	1.10	ms	Engine Control Module
Fuel Enrichment - Hot Coolant	Inactive		Engine Control Module
Fuel Enrichment - Hot Catalyst	No		Engine Control Module
Power Enrichment	Inactive		Engine Control Module
Deceleration Fuel Cut-Off	Inactive		Engine Control Module
Fuel Economy Mode	Inactive		Engine Control Module
Fuel Economy	0.13	gal/h	Engine Control Module
EVAP Purge Stepped Valve Command	7	%	Engine Control Module

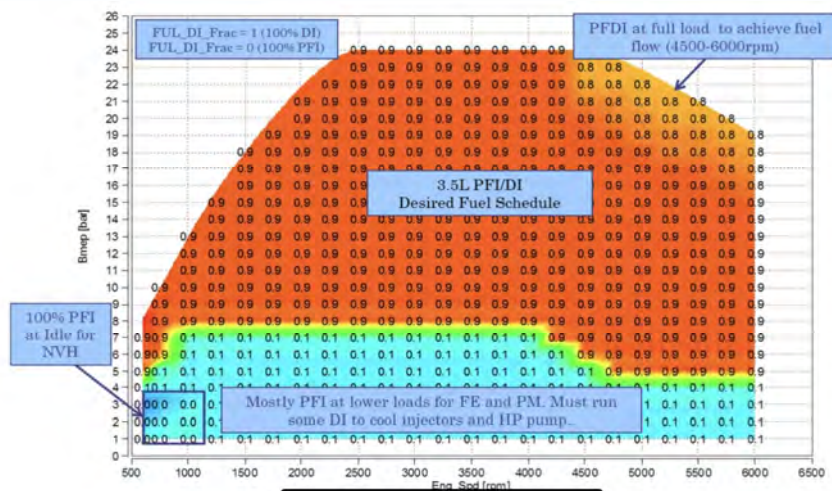
24

Ford GDI Injection Scan Tool Information On Injection A & B On 3.5L



25

Ford GDI Injection A & B Fuel Map on 3.5L



Courtesy of Ford Motor Company

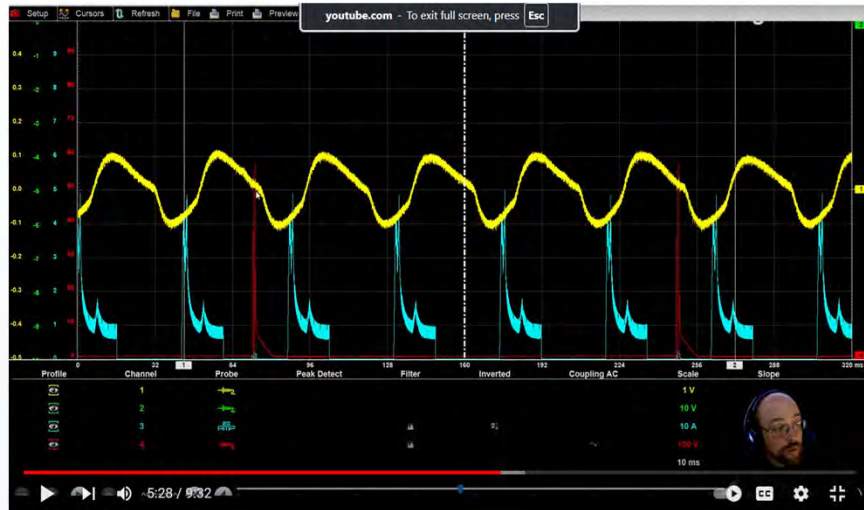
26

Using ADDi Interface



27

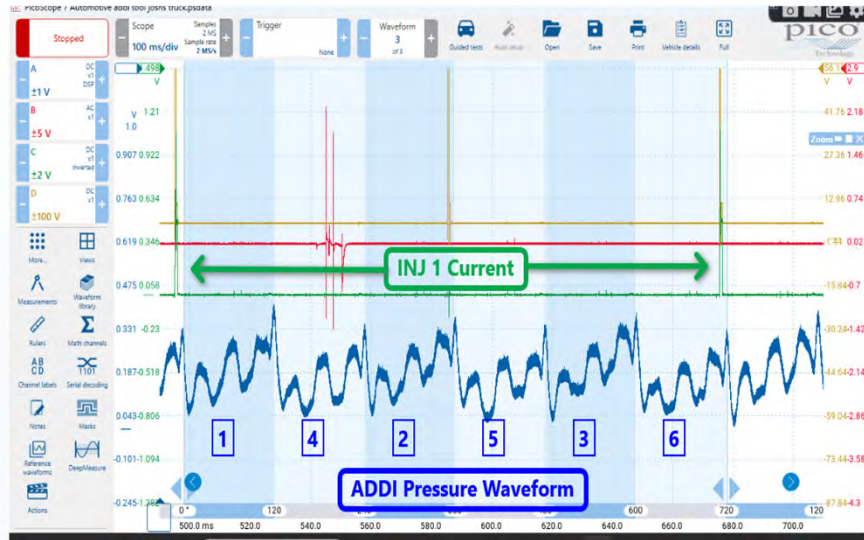
Using ADDi Interface



Courtesy of YouTube & Scot Nichols ADDi

28

Using ADDi Interface On A On 3.5L Ford



29

LIVE ON VEHICLE

30



TST Webinar Wednesday June 12th 2024



Tonight






Tonight

DORMAN 31

31



Thursday June 13th, 2024

Spanish - Lunch & Learn 12:00pm to 1:00pm ET

"Prueba de Circuitos Electronicos" Instructor: Ricardo Mucharraz

Thursday June 27th, 2024

Heavy Duty Lunch & Learn 12:00pm to 1:00pm ET

"Introduction to HD Diesel Emissions Part 3" Instructor: Swede Oun

DORMAN 32

32



Understanding and Diagnosing Air Conditioning

This course goes beyond minimum certification requirements for recovery, evacuating, recharging, and recycling by offering actual hands-on training in diagnosing and repairing A/C electrical, computer / BCMs, Climate control and electronic components. Many of today's trucks & vehicles come equipped with electronically controlled A/C systems.

Includes books, safety glasses & MACS Certification in R134a and R1234yf

Class Limit 20 technicians

Safety Glasses MUST be worn during the hands on vehicle training

2 Days / 16 hours - \$575.00

Book, Safety Glasses and Lunch Included

Instructors: Swede Oun & "G" Jerry Truglia

Dates: June 19th & 20th, 2024

Time: 8:00 AM to 4:30 PM

Location: O&K Truck Repairs Ltd.
350 Grand Island Blvd.
Tonawanda, NY 14150

Technicians MUST Register & Pre Pay
www.dormantrainingcenter.com
Phone: 845 628-1062 or 716.874.5450
drestucci@dormanproducts.com



33

33



Dorman Second Annual "Mastering the Technology"

All Day LIVE Training Event & Trade Show

When: Saturday, September 21st 2024

Time: 7 am to 6 pm

Where: ATC Automotive Training Center 900 Johnsville Boulevard, Warminster, PA 18974

Instructors: Pete Meier - Ken Zanders & "G" Jerry Truglia each teaching a different class - over 8 hours of training

What's Included: food and full color books

Cost: Special Introductory Price : \$49.99 Until July 31st 2024



34

34



35

We offer greater freedom to fix cars and trucks
by engineering exclusive, labor-saving
and cost-effective repair solutions.



Thank You !

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36

36