Dorman Training Center Presents:

"OBD II DIAGNOSTIC STRATEGIES"

PART 2

DORMAN TRAINING CENTER

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Your Instructor For This Webinar

- National Trainer, ASE World Class, Master Auto, Truck, School Bus, L1, L3, CNG
- 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, Motor Age 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

"G" Jerry Truglia

gtruglia@dormanproducts.com

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Your Instructor For This Webinar

- **Associate Degree in Applied Science for Automotive Technology**
- **College was affiliated with General Motors and Chrysler, and I interned for Ford allowing me to learn all 3 domestic Brands**
- **Worked for a Kia dealership for 10 years and achieved Kia Master Tech Status**
- **Lead tech at the dealership allowing me to see the most difficult customer concerns**
- **Pennsylvania State inspection Emissions tech with waiver license**
- **Holds ASE L1 Advance Engine Performance**
- **Holds ASE L3 Light Duty Hybrid Specialist**
- **EPA 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 issues and module programming**

Josh Weaver

jweaver2@dormanproducts.com

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What Will Be Covered

Instructions For This Webinar

This seminar will be approx. 1 + hour long

- **All slides that are presented are in your handout and are numbered**
- **Have a pen or pencil and paper for notes**
- **Questions can be asked at anytime**

01 **OBD II Monitor Status**

02 **Using Pending DTCs**

03 **Mode 6**

04 **Case Studies and more……**

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OBD II Diagnostic Strategies Part 2

- This Lunch & Learn picks up where Part 1 left off
- In this part we will focus on Mode 6 and how to use it to determine if the engine is going to illuminate a MIL
- Using a diagnostic "Game Plan" will provide the correct path to repair the vehicle correctly
- Case Studies and more…

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OBD II Generic/Global - Use It

- When it comes to diagnosing engine performance, DTCs or driveability problems use Generic/Global OBD II.
- A Generic/Global OBD II scan tool allows us to view information quickly while allowing access to, Pending DTCs, Monitors, Mode 6, Mode 0A/10 and Freeze Frame to name a few. You won't get all that information in the enhanced side of your scan tool.
- Also, Generic/Global PIDs are the same on every vehicle, whether it's a GM, Toyota or a BMW.
- The data PIDs are all the same and easier to understand.

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Mode 6

What is Mode 6?

In a nutshell, Mode 6 allows a scan tool to access the results of the onboard test results for non-continuous monitors. Ideally, Mode 6 will provide us with information about the most recent test data for these monitored systems.

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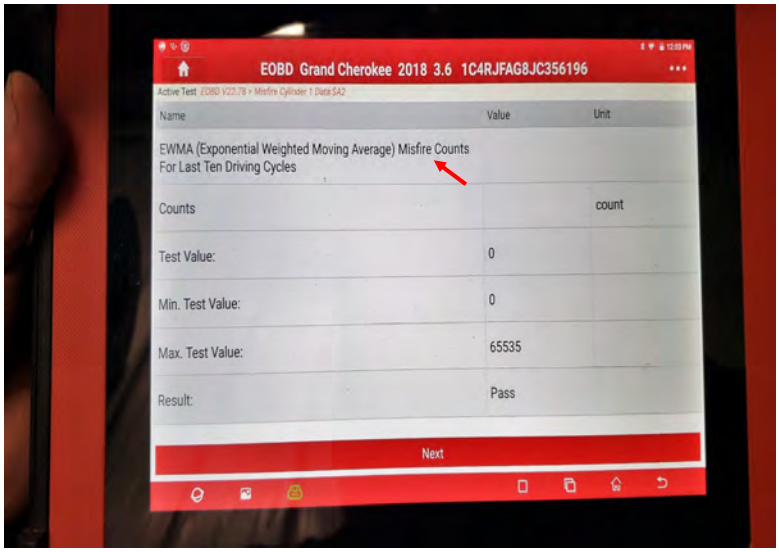
Mode 6 Misfire



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Mode 6

Pass/Fail Standards

Here is how Mode 6 is ***supposed*** to work:

- Vehicle manufacturers assign **Test IDs (TIDs)** and **Component IDs (CIDs)** for different systems and components used in their vehicles. Test data for many of these components and systems can be found in Mode 6.

- Mode 6 data are all manufacturer-specific — from the components listed — to the test values for each component. Mode 6 data is vehicle specific.

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Mode 6

Pass/Fail Standards

- Raw test values are numbers that indicate test limits and actual results. These numbers do not always correspond to common measurement values like miles per hour, inches of vacuum, or rpm. They may be "computer speak" that won't mean a thing to us until they are converted to those common measurement values. Raw test values should be reported only as positive (unsigned) values. (Once again, this has not always been the case, and the use of negative test values has caused some problems.)

- Pass/Fail standards are referred to as test limits. To pass, a component test result must be **below a maximum**, **above a minimum**, or fall **between a minimum and a maximum** level. In cases where a minimum and a maximum test limit are used, two separate tests are run on the same component; one a minimum test, the other a maximum test. Two test results will be given.

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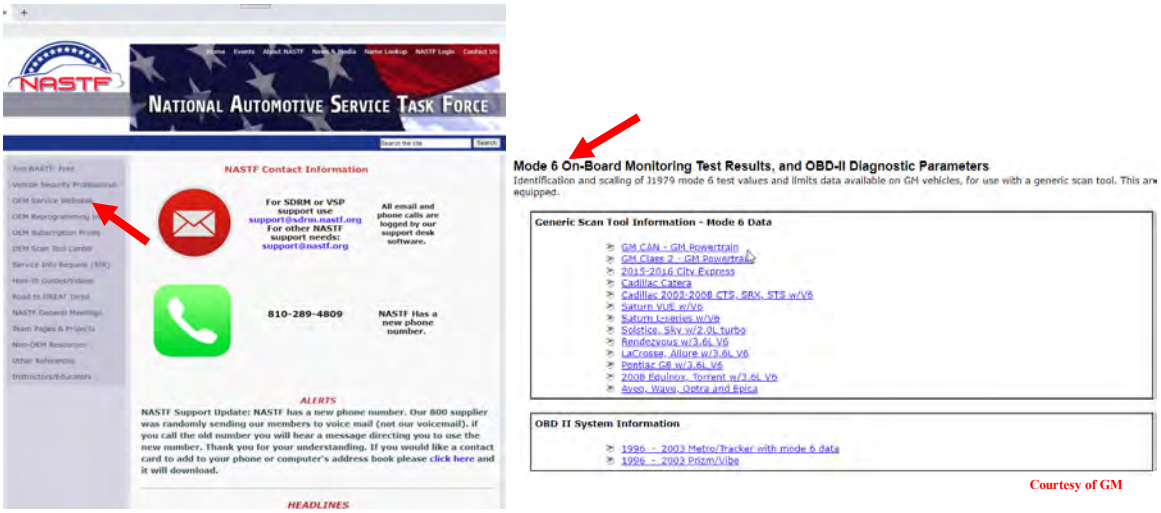
Get Factory Scan Tool Data Including Mode 6



Courtesy of GM

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Get Factory Scan Tool Data Including Mode 6

GM mode $06 data definitions for GM vehicles using GMLAN diagnostic data link

Some items have footnotes, defined on the last pages.

OBD Monitor ID (OBDMID)	Test ID (TID)	Units and Scaling ID (UASID)	Description	Range For Information ONLY. Source information is J1979	Resolution For Information ONLY. Source information is J1979
A8	0C	24 [131]	Misfire counts since the last restart after hybrid/electric autostart	0 to 65535 counts	1 count / bit
A8	0C	24 [132]	Misfire counts for last/current driving cycles (calculated) [133]	0 to 65535 counts	1 count / bit
A8	A5	24	EWMA (Exponentially Weighted Moving Average) misfire counts for the last 10 driving cycles	0 to 65535 counts	1 count / bit
		Misfire Cylinder 8 Data			
A9	0B	24	EWMA (Exponential Weighted Moving Average) misfire counts for the last 10 driving cycles	0 to 65535 counts	1 count / bit
A9	0B	24 [131]	EWMA (Exponential Weighted Moving Average) misfire counts since the last restart after hybrid/electric autostop for the last 10 driving cycles	0 to 65535 counts	1 count / bit
A9	0B	24 [132]	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles (calculated), Calculation: 0.1 * (current counts) + 0.9 * (previous average), Initial value for (previous average) = 0 [134]	0 to 65535 counts	1 count / bit
A9	0C	24	Misfire counts for the last / current driving cycles	0 to 65535 counts	1 count / bit
A9	0C	24 [131]	Misfire counts since the last restart after hybrid/electric autostart	0 to 65535 counts	1 count / bit
A9	0C	24 [132]	Misfire counts for last/current driving cycles (calculated) [133]	0 to 65535 counts	1 count / bit
A9	A5	24	EWMA (Exponentially Weighted Moving Average) misfire counts for the last 10 driving cycles	0 to 65535 counts	1 count / bit
AA	0B [135]	24	**EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles (calculated)**, Calculation: 0.1 * (current counts) + 0.9 * (previous average), Initial value for (previous average) = 0	0 to 65535 counts	1 count / bit
AA	0C [136]	24	Misfire counts for last/current driving cycles (calculated)	0 to 65535 counts	1 count / bit
AB	0B [135]	24	**EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles (calculated)**, Calculation: 0.1 * (current counts) + 0.9 * (previous average), Initial value for (previous average) = 0	0 to 65535 counts	1 count / bit
AB	0C [136]	24	Misfire counts for last/current driving cycles (calculated)	0 to 65535 counts	1 count / bit
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AC	0C [136]	24	Misfire counts for last/current driving cycles (calculated)	0 to 65535 counts	1 count / bit

Courtesy of GM

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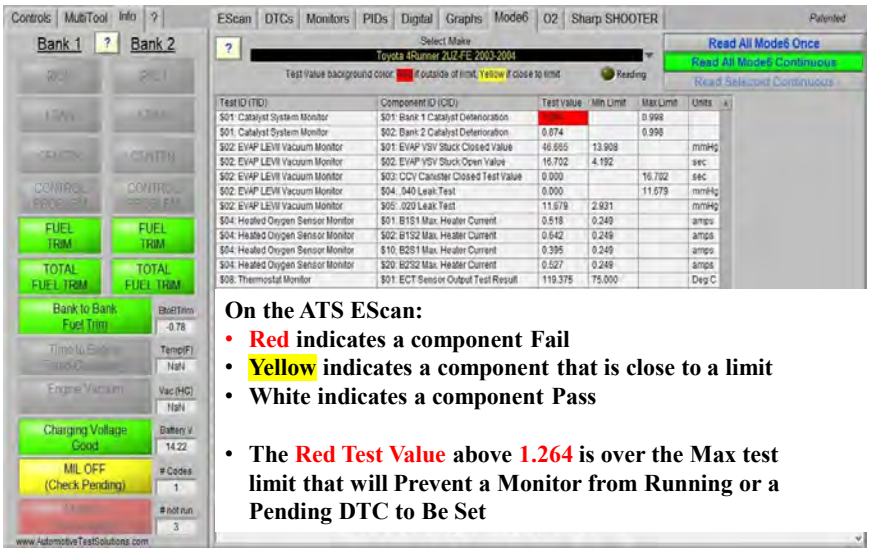
Mode 6



On the ATS EScan:

- **Red indicates a component Fail**
- **Yellow indicates a component that is close to a limit**
- **White indicates a component Pass**

- **The Red Test Value above 1.264 is over the Max test limit that will Prevent a Monitor from Running or a Pending DTC to Be Set**

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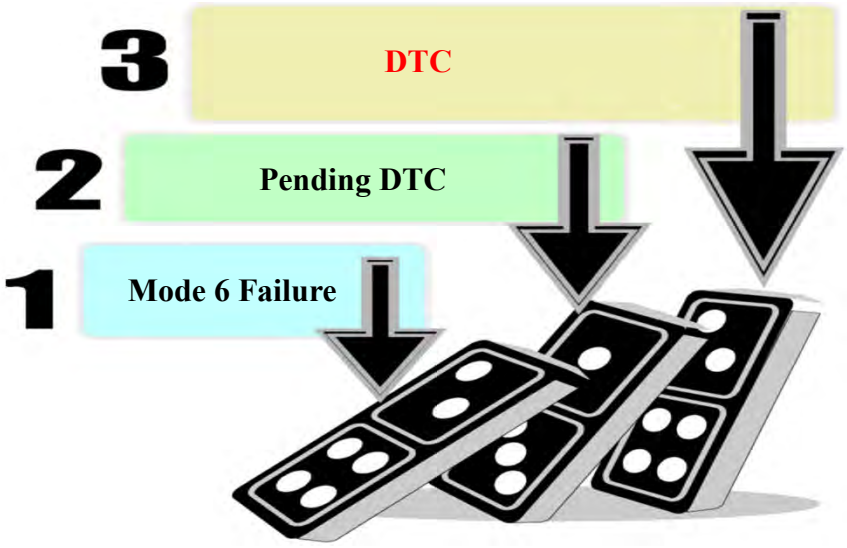
DTCs And The Domino Effect



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TIME OUT - CASE STUDY

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2002 Chevy Silverado DTCs P0300 & Pending DTCs

2002 Chevy Silverado with a 5.3L V8 came in with one DTC, P0300 Random/Multiple Cylinder Misfire along with three Pending DTCs, P0106 Manifold Absolute Pressure, P0171 System Too Lean Bank 1 and P0174 System Too Lean Bank 2.

Now where do you start to diagnosis and repair this vehicle?

Many would say you don't have to worry about Pending DTCs, so start with the P0300 because it's a hard DTC. Well, that would be absolutely wrong because the Pending DTCs provides great insight on why the P0300 was set. Your "Game Plan" should always be to look at all PID data, Monitor status, Freeze Frame, Mode 6, Mode 0A / 10 (2010 and up), Mode 9 and Pending DTCs. In this case the Pending DTCs are leading us to the source of the problem, the MAP sensor and the two lean DTCs P0171 and P0174.

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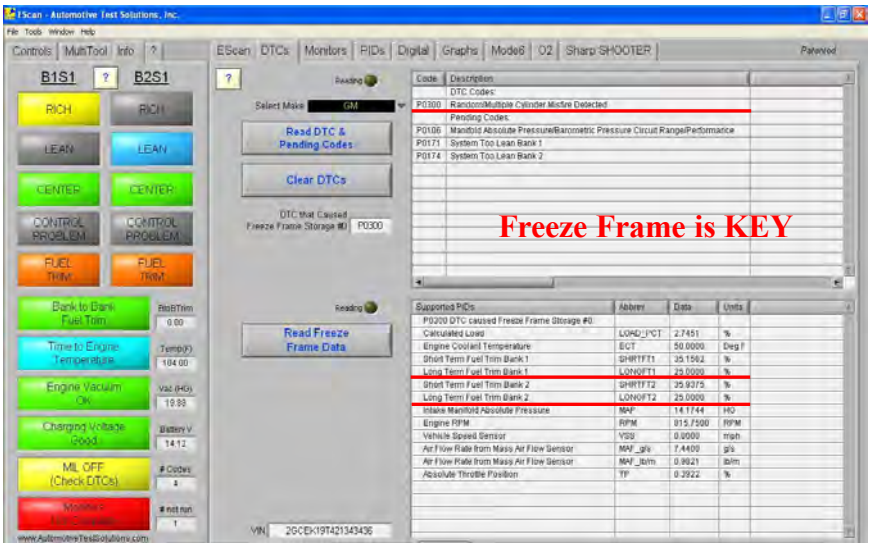
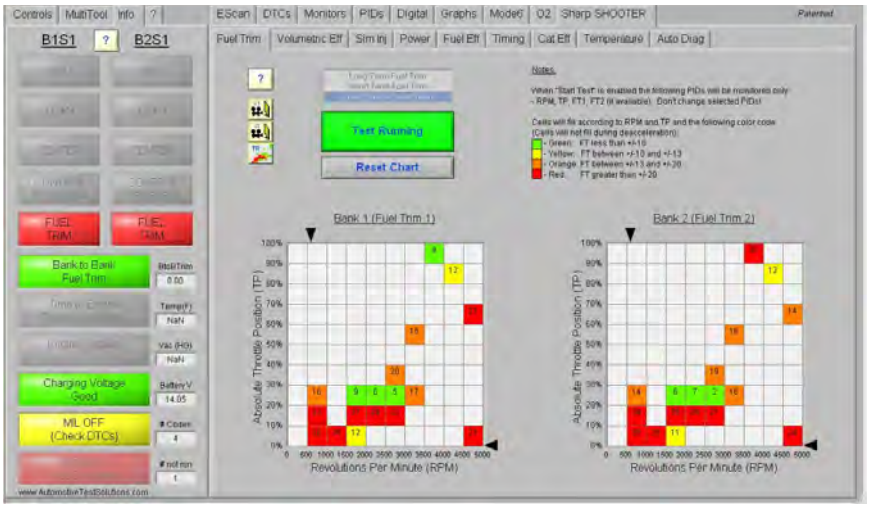
2002 Chevy Silverado DTCs P0300 & Pending DTCs



17

2002 Chevy Silverado Fuel Trim No Load

Take a look at the fuel trim numbers, what do you think is the problem?



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2002 Chevy Silverado DTCs P0300 & Pending DTCs

Supported PIDs	Abbrev	Data	Units
P0300 DTC caused Freeze Frame Storage #0:			
Calculated Load	LOAD_PCT	2.7451	%
Engine Coolant Temperature	ECT	50.0000	Deg F
Short Term Fuel Trim Bank 1	SHRTFT1	35.1562	%
Long Term Fuel Trim Bank 1	LONGFT1	25.0000	%
Short Term Fuel Trim Bank 2	SHRTFT2	35.9375	%
Long Term Fuel Trim Bank 2	LONGFT2	25.0000	%
Intake Manifold Absolute Pressure	MAP	14.1744	HG
Engine RPM	RPM	815.7500	RPM
Vehicle Speed Sensor	VSS	0.0000	mph
Air Flow Rate from Mass Air Flow Sensor	MAF_g/s	7.4400	g/s
Air Flow Rate from Mass Air Flow Sensor	MAF_lb/m	0.9821	lb/m
Absolute Throttle Position	TP	0.3922	%

BARO - MAP

29 - 14 (approx.) = 15 in of vacuum

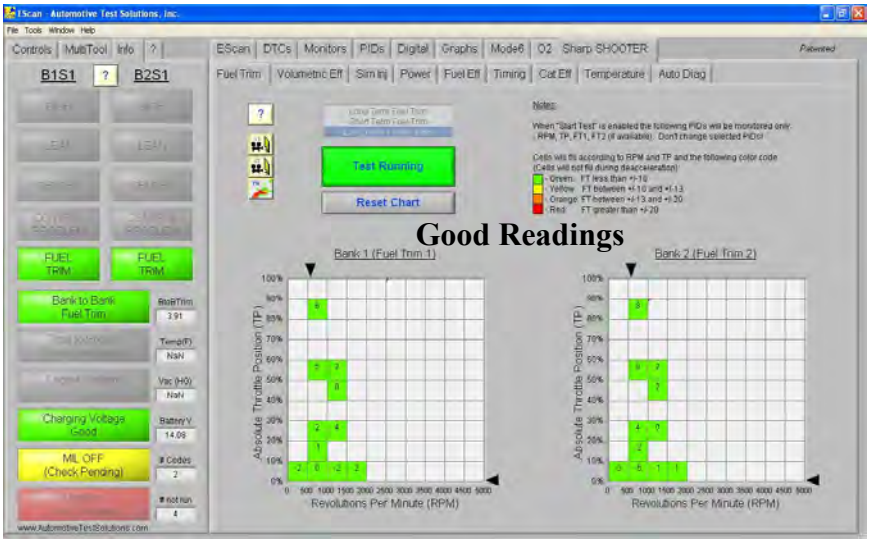
So, what's the problem?

2002 Chevy Silverado DTCs P0300 & Pending DTCs

Looking at the scan data the PCM is doing its job and commanding a large amount of fuel delivery to compensate for a lean condition. With the Freeze Frame data providing us with the temperature information of 50 F it's a good idea to smoke the engine when it's cold to locate the source of the problem. On this vehicle the intake manifold gaskets needed to be replaced in order to get this engine back in fuel control.

Note: Many times, smoke will not be visible due to hydrocarbons that are in the intake manifold. In chemistry two likes will attract and the one with more volume will consume the other. In other words, the smoke is a HC base that will be absorbed in the manifold by the fuel vapors making it difficult to find the leaking area. A good suggestion is to use CO2 along with CO2 leak detector and the special ATS form. The tool is called BULLSEYE, that can be used for EVAP, A/C systems, crankcase leaks, tires or anything that holds something.

2002 Chevy Silverado FT After Repair



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2002 Chevy Silverado 5.3L V8 DTCs

If you would have chased the P0300 you would have gone in circles. Do you now understand why you need to use a Generic scan tool for an illuminated MIL and driveability issues? In Enhanced mode (GM, Toyota, VW etc…) you would have overlooked the Freeze Frame data and Pending DTCs. Always use a systematic approach when diagnosing a problem vehicle. The "Game Plan" we mention in the first part of this case study should be followed for a successful diagnosis.

The moral of this case study is not to just jump on the DTC but to take advantage of what OBD II information has to offer and use that information to solve the problem. If this vehicle had a CAN (controller area network) system I would have suggested looking at Mode 6 data for test results on cylinder misfires.

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MODE 0A/10

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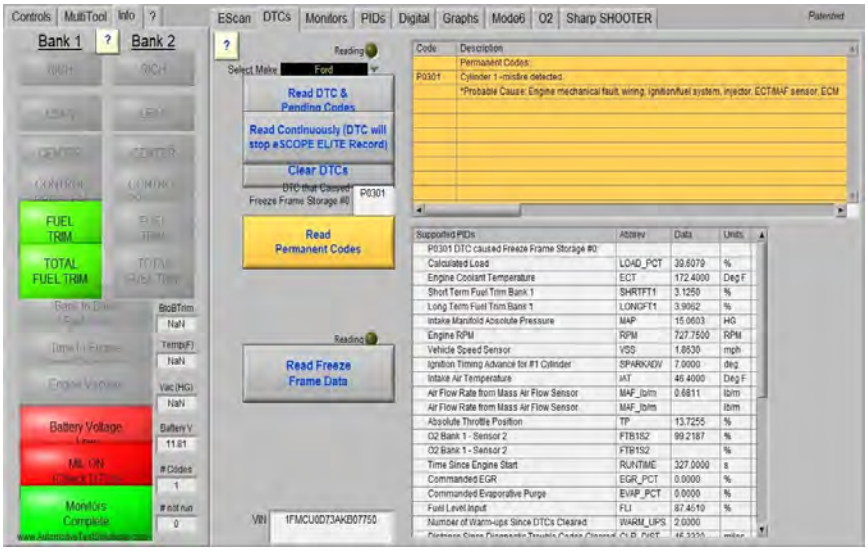
OBD II Mode 0A /10



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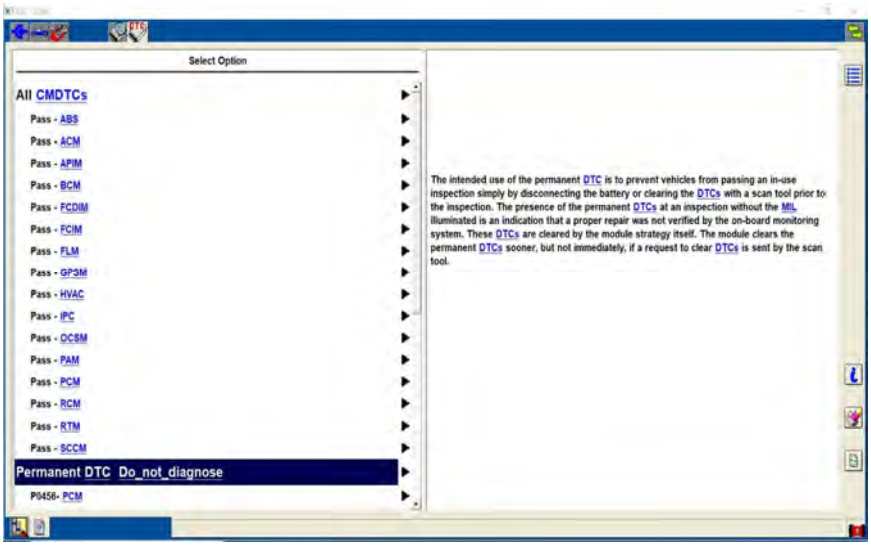
OBD II Mode 0A /10



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TIME OUT - CASE STUDY

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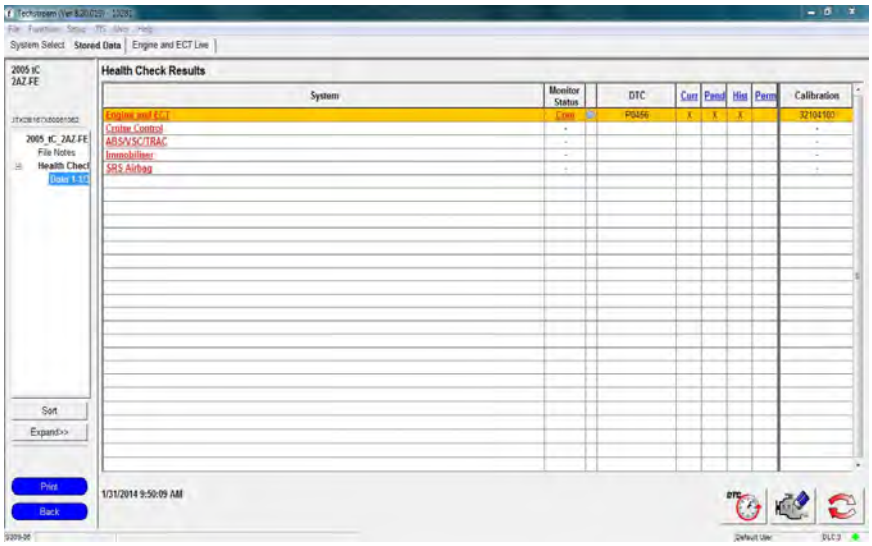
2005 Scion TC P0456 DTC Small Leak



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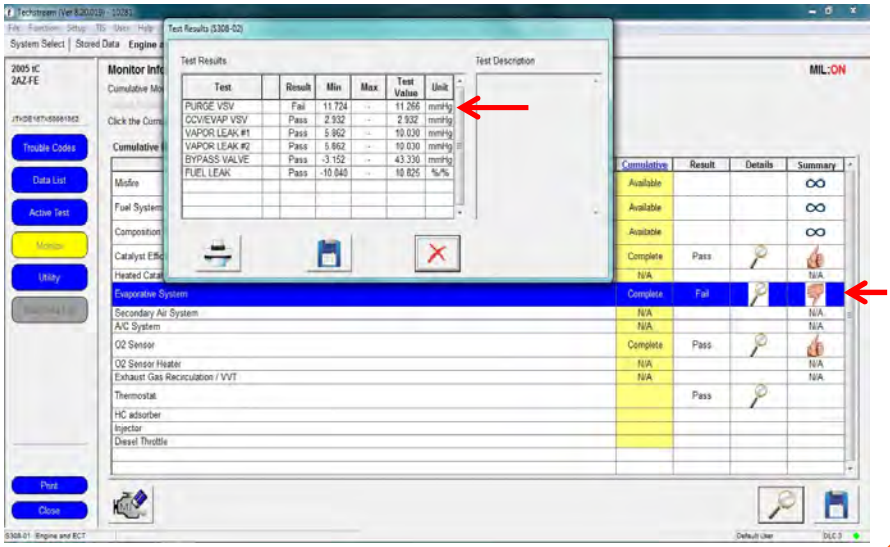
2005 Scion TC Mode 6 & EVAP



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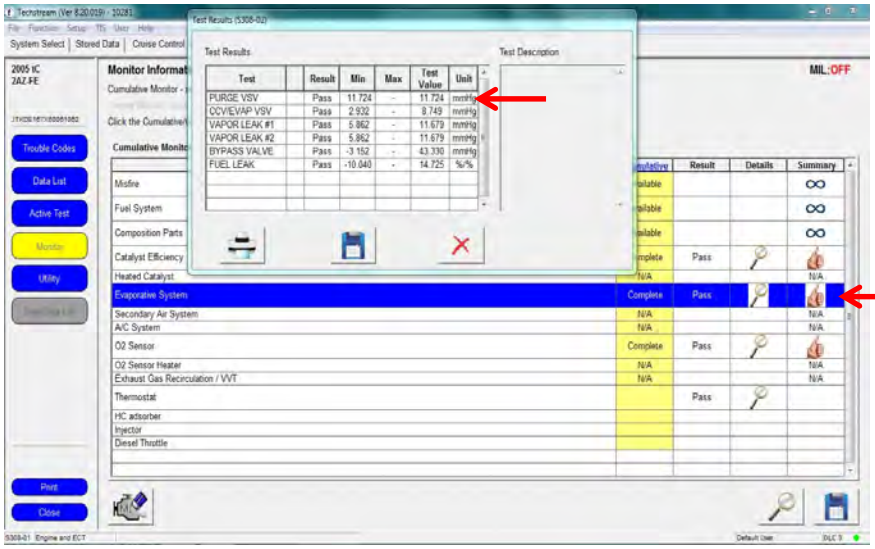
2005 Scion TC Mode 6 & EVAP



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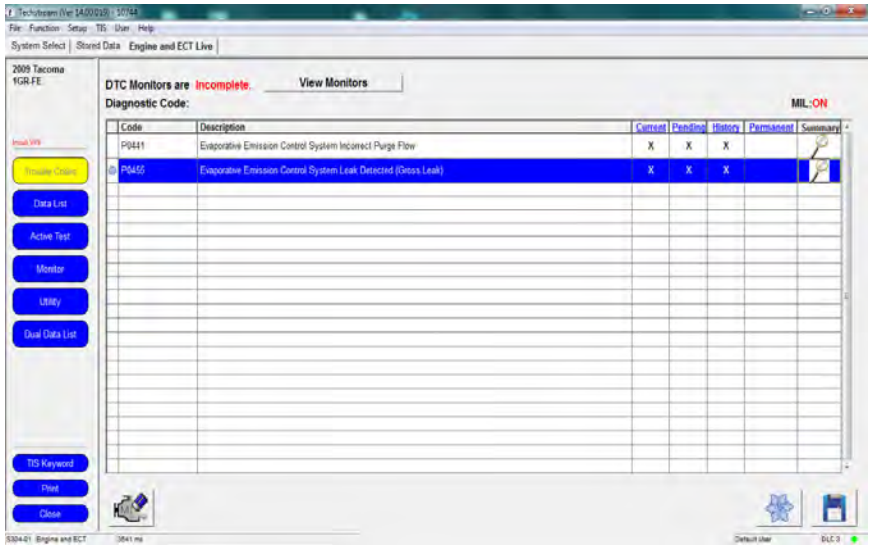
Mode 6 & EVAP



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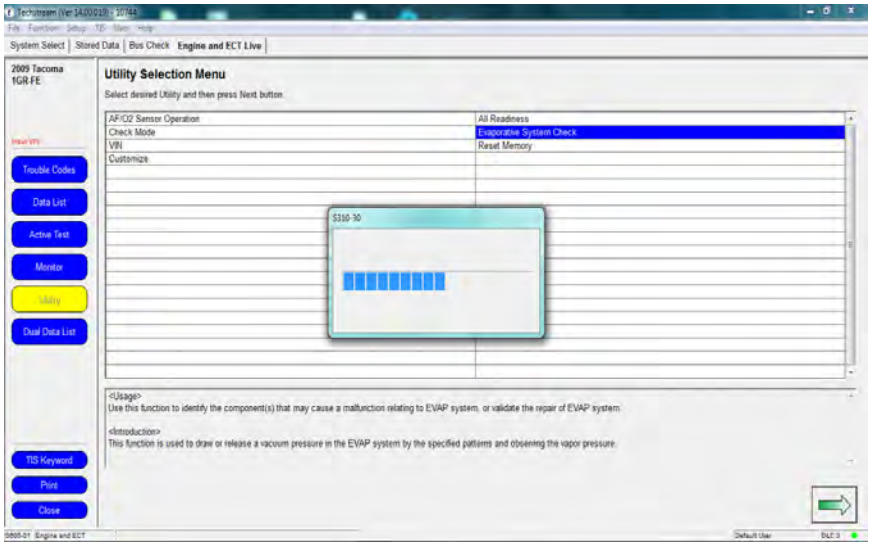
Mode 6 & EVAP



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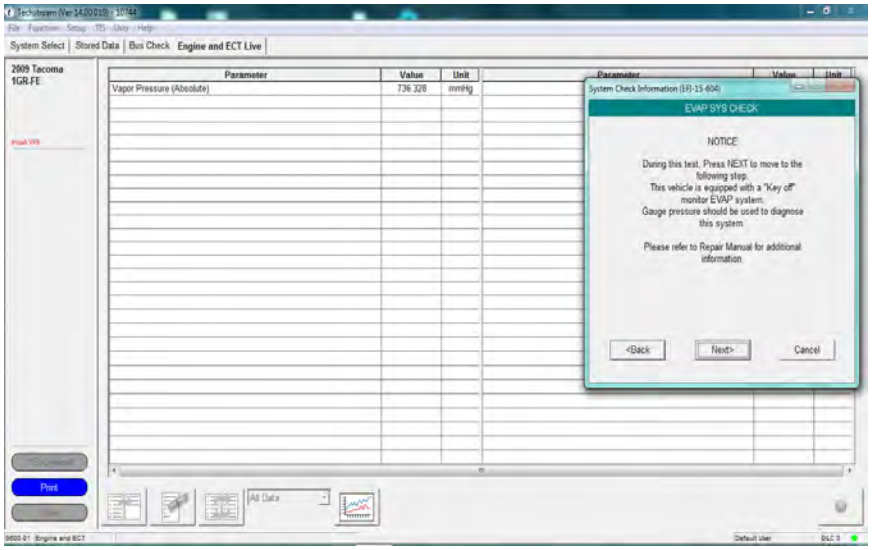
Mode 6 & EVAP



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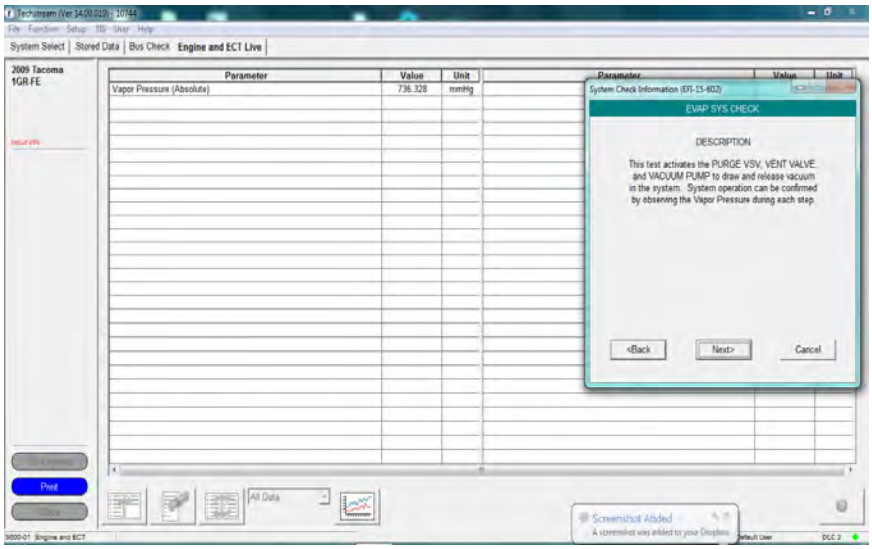
Mode 6 & EVAP



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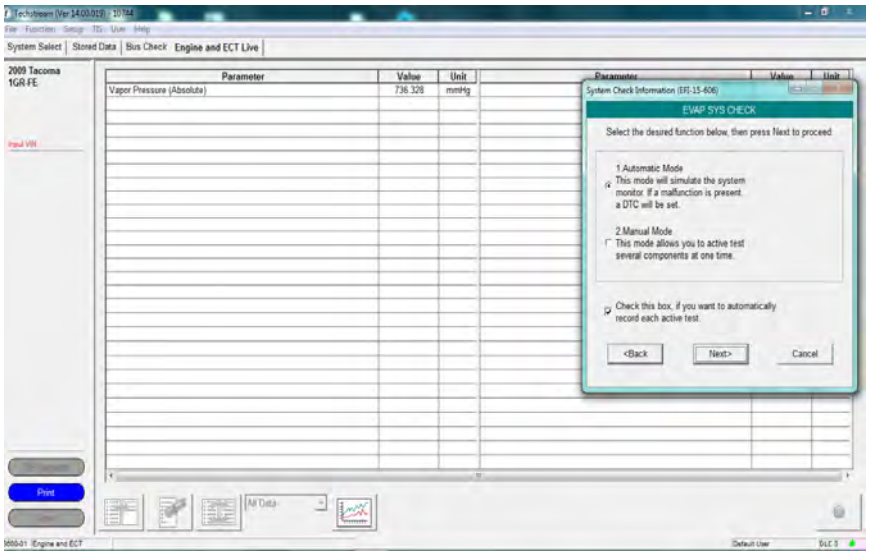
Mode 6 & EVAP



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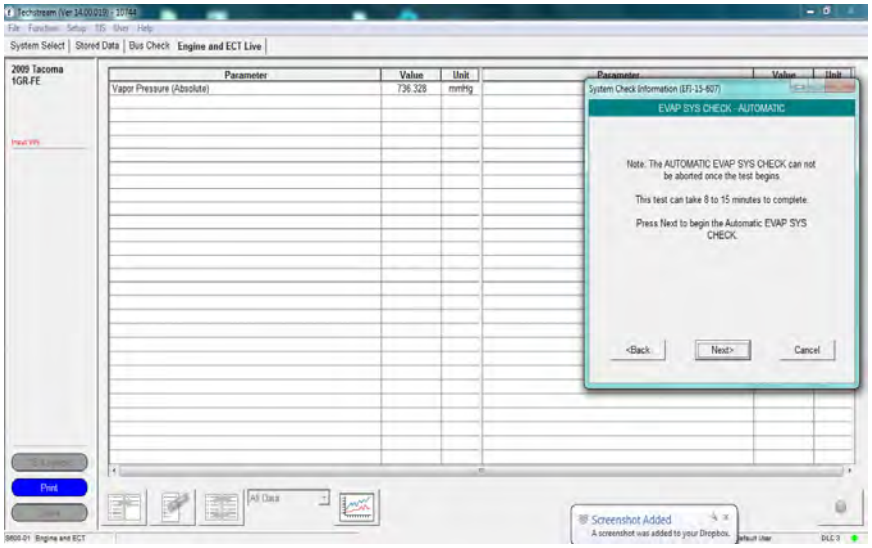
Mode 6 & EVAP



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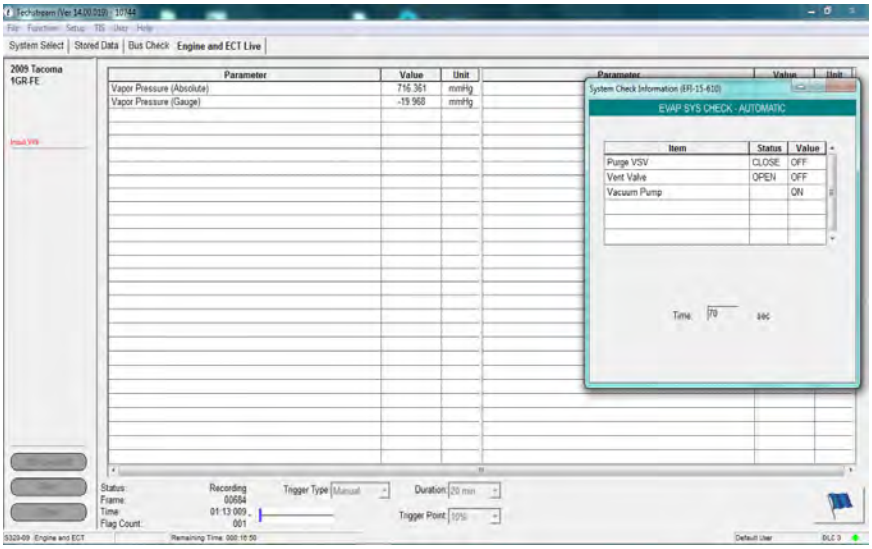
Mode 6 & EVAP



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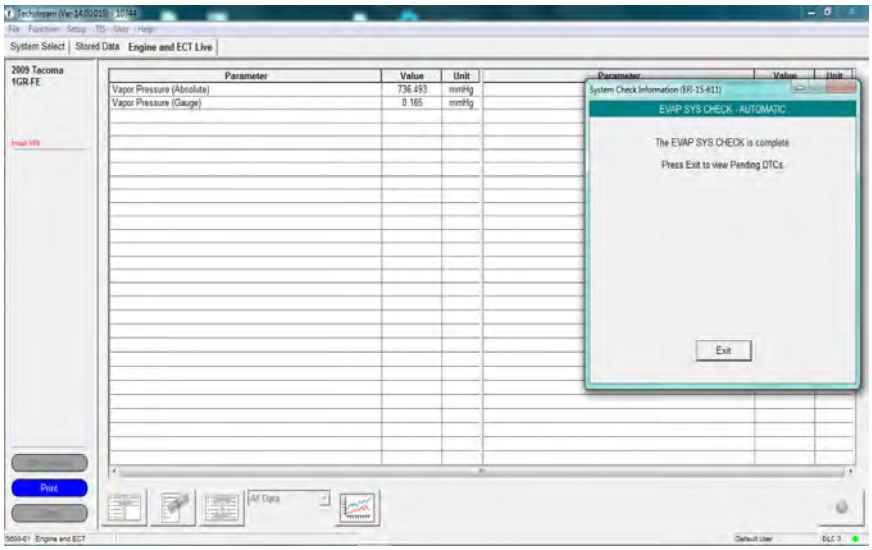
Mode 6 & EVAP



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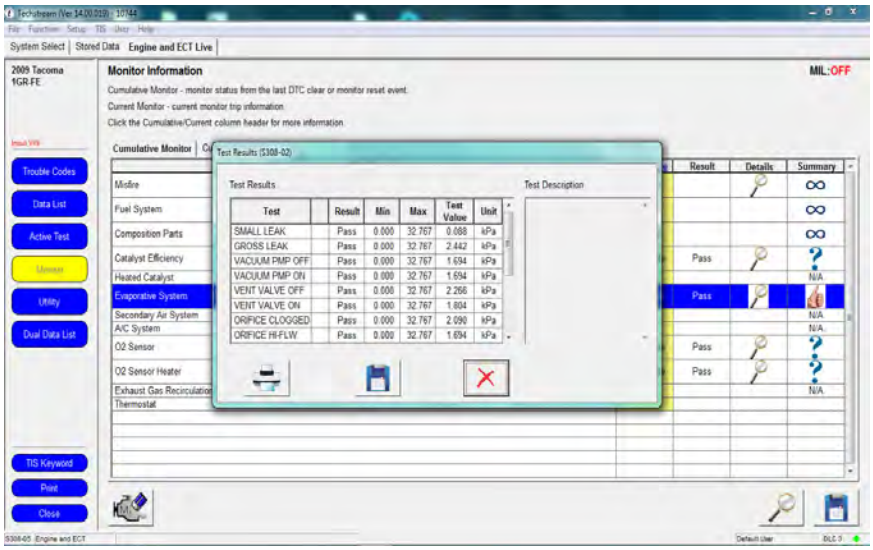
Mode 6 & EVAP



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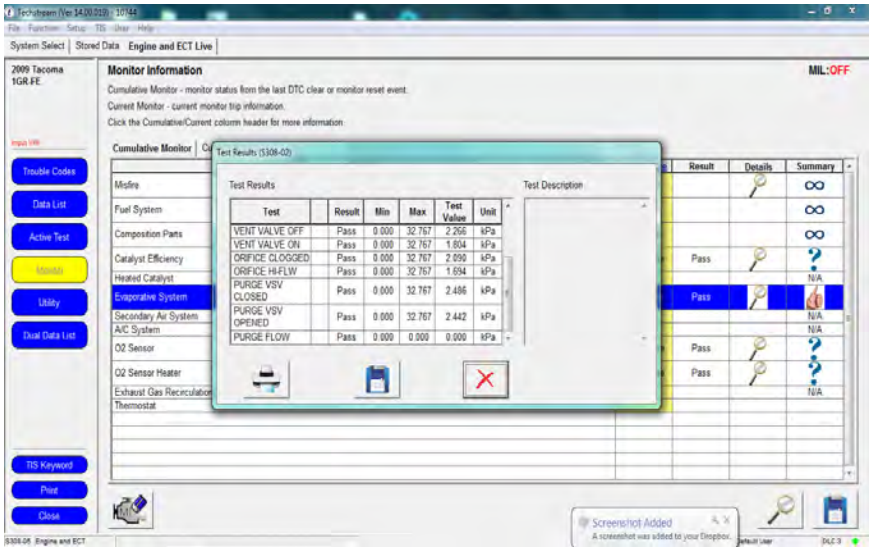
Mode 6 & EVAP



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Questions?

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Thursday December 19th, 2024

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

"End Of Year Diagnostic Grab Bag and CanDo Scan Tool Review"

The following will be covered:

- **Brief Industry Perspective**
- **Variety of simple diagnostic case examples**
- **Review of the CanDo HD Pro scantool**

Instructor: Swede Oun

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"Dorman Training"

In Shop LIVE TRAINING gtruglia@ dormanproducts.com

Thursday, December 19, 2024

Live Webinar: 7:00 p.m.—9:00 p.m. EST

In this course, technicians will learn to diagnose and address the needs of internal combustion engines like mechanical, ignition and air fuel systems. Common no start causes like anti-theft and bus communication faults will also be covered.

View Event →

Automotive Electronics for Today's Vehicles

Tue, Jan 7, 2025, - Thu, Jan 9, 2025,
Homewood Suites by Hilton Allentown (map)

5:30 p.m.—10:00 p.m. EST | Bethlehem, PA | In-Person

In this course, build useful electronic skills for diagnosing and repairing late-model vehicles. Technicians will learn about circuits and circuit testing, opens, shorts, voltage drops, relay testing, DVOM usage, lab scope/graphing meter usage, sensors and actuators.

Note: This is a three-day class

View Event →

Utilizing the Autel Diagnostic Tool Part 1

Tuesday, January 7, 2025
Fort Myers Technical College (map)

5:30 p.m.—10:00 p.m. EST | Fort Myers, FL | Hands-On

In the first part of this series, learn how to maximize the effectiveness of your Autel scan tool. Technicians will learn button functions, diagnostic aids, pre- and post-scan reports, graphing techniques, interpretation and use cases for Modes 6, 9 and GA10, plus an overview of generic and enhanced modes for the tool.

View Event →

Automotive Electronics for Today's Vehicles

Tue, Jan 7, 2025, - Thu, Jan 9, 2025,
ATTS Training Center (map)

5:30 p.m.—10:00 p.m. EST | Mahopac, NY | Hands-On

In this course, build useful electronic skills for diagnosing and repairing late-model vehicles. Technicians will learn about circuits and circuit testing, opens, shorts, voltage drops, relay testing, DVOM usage, lab scope/graphing meter usage, sensors and actuators.

Note: This is a three-day class

View Event →

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Thank You !

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Webinar Survey

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