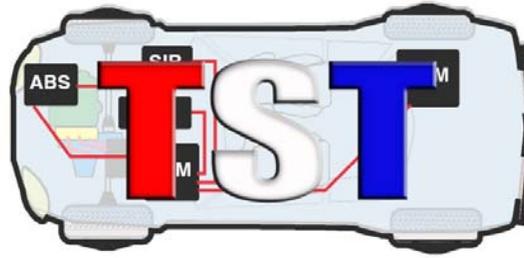


September 2012



## Technicians Service Training

### INSIDE THIS ISSUE:

*P0171 System Lean DTC*

*P. 1 - 18*

#### **Upcoming Seminars:**

*September 29th 8am to 5 pm  
PST*

*TST Big Event Ontario*

*November 12, 13, 14, 15  
2012 Peter Orlando The 3  
How's, it Works, to Diagno-  
sis, to Fix it*

*December 10, 11, 12, 13  
2012 Ken Zanders Top Ten  
DTC*

***March 23, 2013 TST Big  
Event Instructors John  
Thorton and Dave De-  
courcey***

***May 13, 14, 15, 16 2013 In-  
structor Dave Crippen***

***TST Round Table Every 3rd  
Thursday at 8 pm EST***

***TST Motor Age Carter Fuel  
Pump webcast November 20,  
8 pm EST***

***Ongoing FREE Webcasts***

***Editor***

***Jerry "G" Truglia***

### *P0171 System Lean DTC*

Your customer comes with a complaint of stalling, bad gas mileage, or even just a simple Check Engine Light. You scan their vehicle and see that there is a P0171. Now a P0171 is a system lean code for Bank 1 of the engine.



Many things can cause this code including a Mass Air Flow sensor, vacuum leaks, fuel restrictions and much more.

A P0171 will force you to think. Throwing a new MAF sensor will not fix every P0171, even though this is very common on Toyotas and Volkswagens. Even still, even on these vehicles you should be testing, not guessing the problem. The days are over where you can reassure the customer that their vehicle is "better" if the problem is not totally resolved—that Check Engine Light will let your customer know if your repair was the right one.

So, what causes a P0171 System Lean Bank 1 DTC? The following are the most common causes given the symptoms you observe:

*(Con't on page 3)*

*Technicians Service Training*

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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:

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Technicians Service Training



## What is TST?

*TST is a group of dedicated technicians and instructors committed to the continuing education of our fellow technicians. We provide once a month 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 once a month week-day night seminars and the occasional full Saturday seminar. With a \$75.00 yearly membership, the monthly seminars are only \$65.00. TST classes 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 65 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 Monthly 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 Motor Magazine

**Bob Pattengale** of Bosch

**Peter Meier** of Motor Age Magazine

**Ken Zanders** of Illinois Air Team

**Jerry “G” Truglia** of A.T.T.S. Inc.

## *P0171 System Lean DTC (con't from p. 1)*

At low speed and load:

- Vacuum leaks (typically at low speed and load)

At high speed and load:

- Clogged fuel filter
- Worn fuel pump
- Clogged fuel injectors

Any condition:

- HO2S problem
- Unmeasured intake air leak on MAF vehicles
- Wrong PCM command
- Mechanical problems



Intake Vacuum Leak – Smoke Testing

There are other, more rare causes of a system lean code. These include a leaking fuel pump pick up tube, hose, check valve or damper, fuel pump and injector voltage drops, any fuel rail, injector, or line restrictions, leaking purge valve (only after all HC have been purged from the canister), engine mechanical problems, exhaust leaks before the upstream (exhaust manifold) oxygen sensors, HO2S sensor problems, EGR leaks that include the gasket, diaphragm or vacuum lines, intake manifold leaks, on a MAF system leaks before the sensor that include all engine gaskets, dip stick seals, PCV system and valves, AIR (Secondary Air Injection) systems that do not divert the air from the upstream manifold, any vacuum that controls the AIR system solenoids, and a defective PCM.

*Con't on p. 7)*

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**Jim Bradanini**  
Program Administrator

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They offer \$50,000 for \$250 but we upped it to \$70,000 for \$350. <http://www.mechanicsinsurance.com>. The guys name is Jim Bradanini and his email address is: [JimB@cpminsurance.com](mailto:JimB@cpminsurance.com). Their phone is 203-439-2810. I had left a message and he got back to me within the hour.

Thank you so much for making your process so smooth and painless, kind and professional.

Jo



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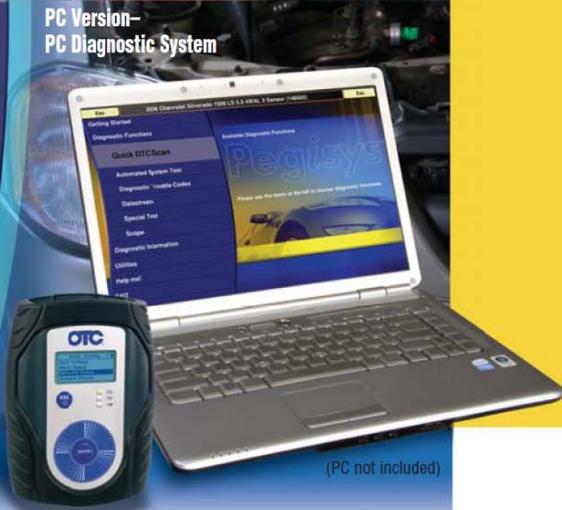
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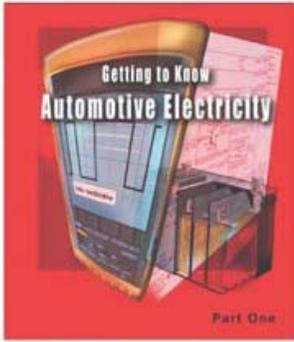
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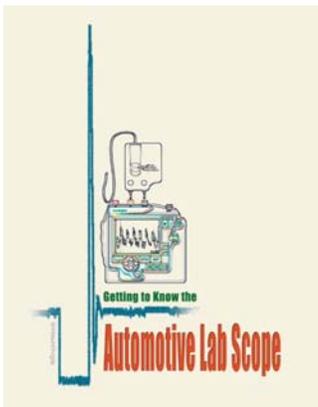
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### *P0171 System Lean DTC (con't from p. 3)*

How can we test for all these things, or better yet how do we know that we want to test for certain things? First, let's explore our options on what tools to use and how to diagnose P0171 DTCs.

The best place and tool to use is the scan tool's Freeze Frame data for this DTC, and if you have OEM enhanced software on your scan tool the Freeze Frames for any other DTCs on the vehicle. This way we will know under what load conditions, temperatures, and etcetera will be useful for testing for this DTC. Take caution, however, and understand the limitations of Freeze Frame. Freeze Frame data can be stored within a 15 percent window of when the DTC was stored.



Engine Misfire On GM Tech 2



Exhaust Leak Smoke Leaking

DTC.....	P0171
Engine SPD...	2567RPM
ECT (°).....	108°F
VEHICLE SPD...	54 MPH
ENGINE LOAD....	18.8%
MAP.....	14.8 inHg
FUEL STAT 1.....	CL
FUEL STAT 2....	UNUSED
ST FT 1.....	3.1%
LT FT 1.....	-1.5%
.....	.....

Freeze Frame From A DTC

*(Con't on page 9)*

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## P0171 System Lean DTC (con't from page 7)

That means the RPM, speed, load, and etcetera could have actually been within a plus/minus 15 percent range of what you actually see on your scan tool.

### Ford Escort P0171

Let's take a look at a few quick case studies starting with a 2003 Ford Escort with a 2.0L. This vehicle came in with a P0171 DTC and a customer complaint of poor fuel economy. Of course we started by plugging in our scan tool, and looking at the DTCs and Freeze Frame.



Reviewing Freeze Frame (right) provided us with all the clues to diagnose this vehicle. Let's take a look at the VSS (Vehicle Speed). Notice that the speed is at 0 MPH? Looking at RPM, Load, LTFT (Long Term Fuel Trim), and ECT, load was 25 percent, LTFT 18, and the ECT was 206 degrees F.

So, what can we gather from this information? Now we know that we have to test this vehicle at idle and not drive the vehicle down the road. Freeze Frame data does not indicate that any speed, load or cold engine conditions will help us test for the DTC.

The screenshot shows a scan tool interface with various diagnostic panels. On the left, there are fuel trim controls for Bank 1 (B1S1) and Bank 2 (B2S1), with buttons for RICH, LEAN, CENTER, CONTROL PROBLEM, and FUEL TRIM. The B1S1 fuel trim is currently at 0.00. Other panels show Temp(F) at 203.00, Engine Vacuum at NaN, Battery Voltage at 12.55, and # Codes at 1. The VIN is listed as Not Available.

The central panel shows the DTC that caused the Freeze Frame Storage #0 as P0171. There are buttons for 'Read DTC & Pending Codes', 'Clear DTCs', and 'Read Freeze Frame Data'.

The right panel displays the DTC details for P0171:
 

Code	Description
P0171	System Too Lean
Pending Codes: No Pending Codes Present	

Below the DTC details is a table of Supported PIDs:
 

Supported PIDs	Abbrev	Data	Units
P0171 DTC caused Freeze Frame Storage #0:			
Calculated Load	LOAD_PCT	25.8628	%
Engine Coolant Temperature	ECT	206.8000	Deg F
Short Term Fuel Trim Bank 1	SHRTFT1	3.1250	%
Long Term Fuel Trim Bank 1	LONGFT1	18.7500	%
Engine RPM	RPM	681.2500	RPM
Vehicle Speed Sensor	VSS	0.0000	mph

(Con't on page 12)

# Got Wires?



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## P0171 System Lean DTC (con't from page 9)

### Questions:

*1. Do you want seminars to continue in your area?*

*2. Do you find the seminars useful?*

*Please ask a fellow technician to come and check-out our seminars so we can continue to bring you the best available information each month.*

*We need your support:*

*Thank you,  
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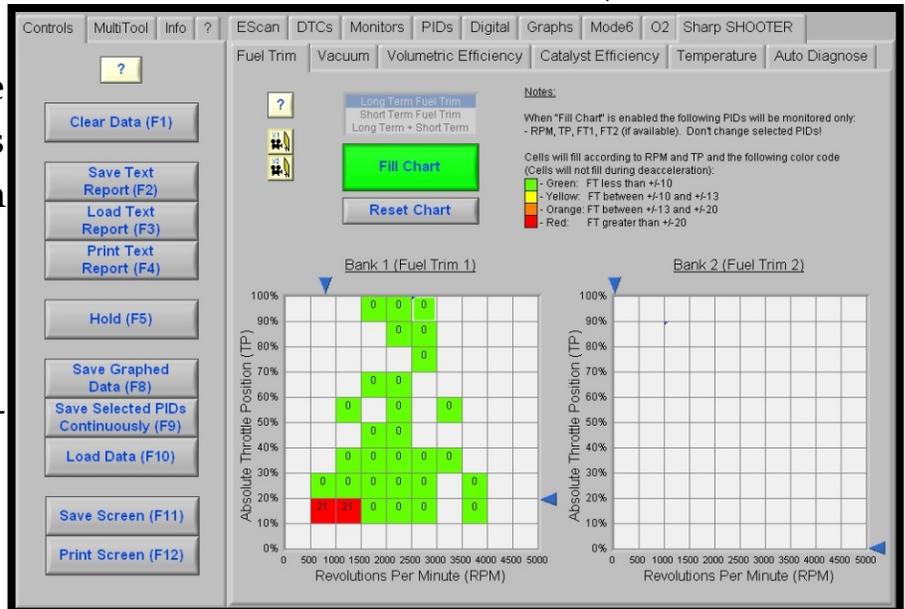
Next, we can take a closer look at the P0171 (right) Lean Condition by selecting the Fuel Trim screen from the ATS (Automotive Test Solution)

EScan. What we are doing here is seeing Fuel Trim visually on a grid so we can see whether it is positive or negative during different throttle positions and engine

RPMs. We see that the red boxes are from 500 to 1500 RPM range and 10 to 20 percent Absolute Throttle /Load positions.

You do not need an EScan to get this valuable data. You can simply select the right PIDs to reflect the data we are currently looking at, but the EScan makes it quicker and easier to see. If you don't own this scan tool just use any other Generic/Global scan tool and look at the LTFT PID (Parameter ID), then rise the idle up to 2500 RPMs and look at the STFT and the LTFT.

Let's say you see the STFT and LTFT numbers drop. You would know the P0171 DTC was caused by a vacuum leak at idle. Your next step would be to smoke the engine or use an alternative method to find the cause of the vacuum leak. On many vehicles you can leave the DTC and have the owner drive the vehicle and watch for the MIL to go out. The extinguished MIL will confirm you repair.



(Con't on page 16)

# DYING TO FIND A/C LEAKS?

The new **UV Phazer NEO™** UV light finds leaks others miss.



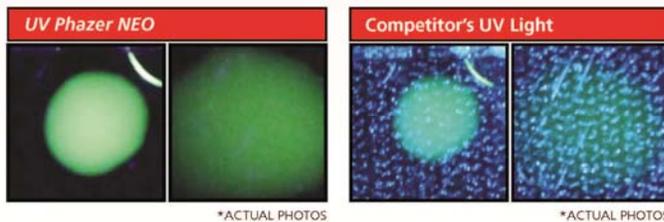
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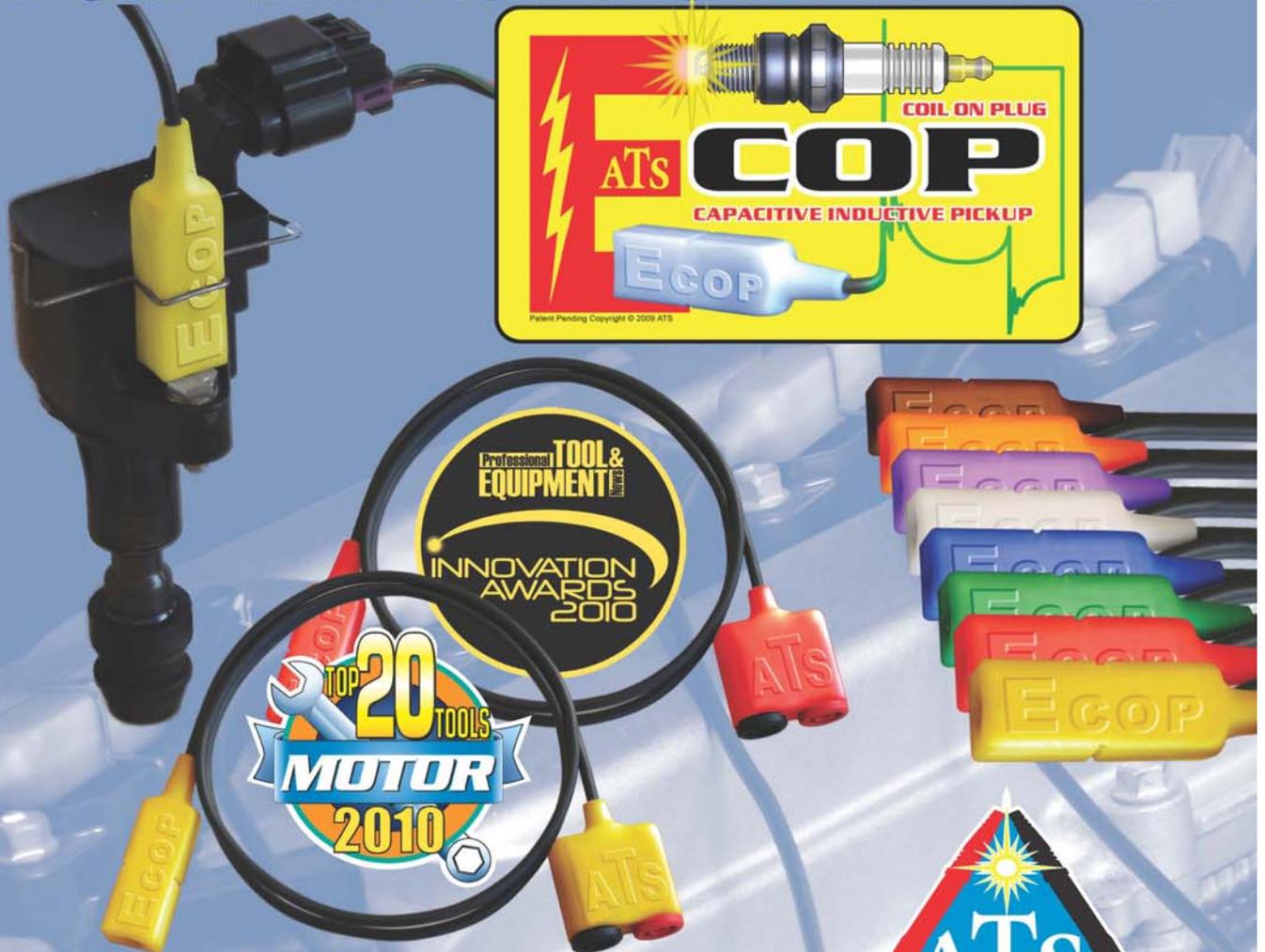
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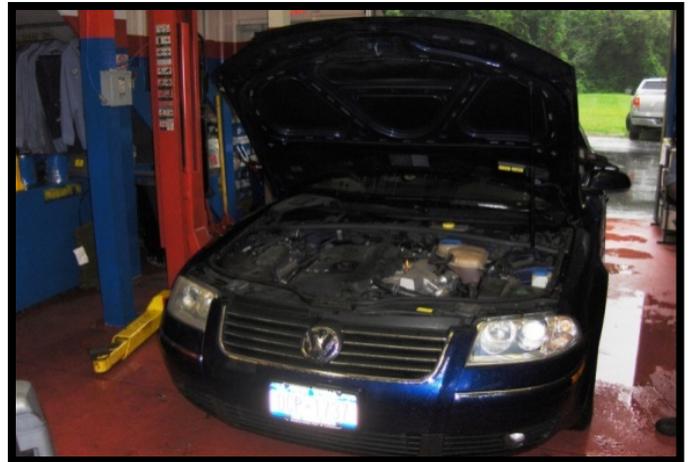


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## *P0171 System Lean DTC (con't from page 12)*

### *VW Passat 16555 DTC*

Here's another one. This 2005 VW Passat 1.8L was running rough and stalling. In good Volkswagen fashion, it had 5 DTCs! Let's take a look at the DTCs on the scan tool screen (below right). Where would YOU start your diagnosis?



You might be thinking, "Hey, wait a second, what's with the 16XXX and 17XXX DTCs?" Well, that is the VW OEs code. You can avoid this by using Generic OBD II instead of using OEM Enhanced software on your scantool. Otherwise, it just needs to be translated to regular DTCs using an automotive information system such as AllData or Identifix. For example, the first code 16706 = P0322 (Ignition/Distributor Engine Speed Input Circuit No Signal) OBD II DTC.

Now, if your next step was to start diagnosing the P0322, that'd be a big mistake. Why, you ask? Well, remember that the vehicle was stalling and rough running, so the P0322 may have been set when the engine actually stalled and is not the root cause of the problem. We have System Lean code 16555 = P0171, Fuel Trim 17544, and Oxygen sensor DTCs. System Lean seems to be a DTC that could potentially cause a lot of these problems, so let's start there.

*(Con't on page 18)*

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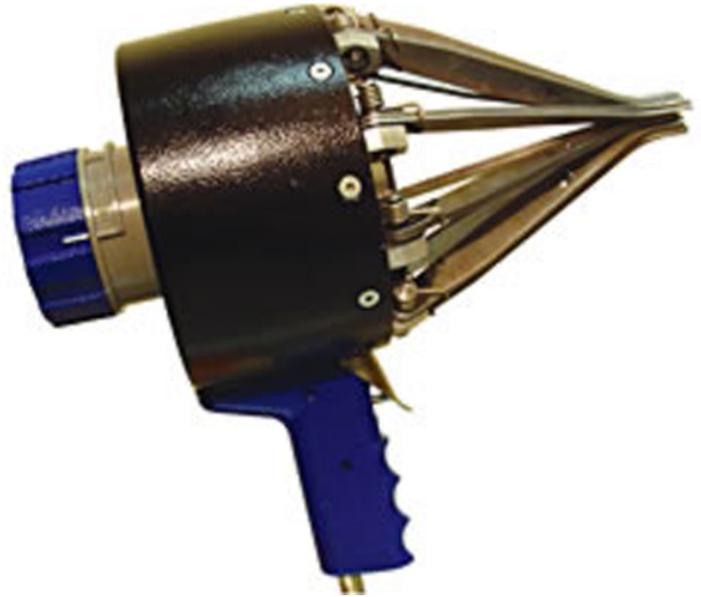


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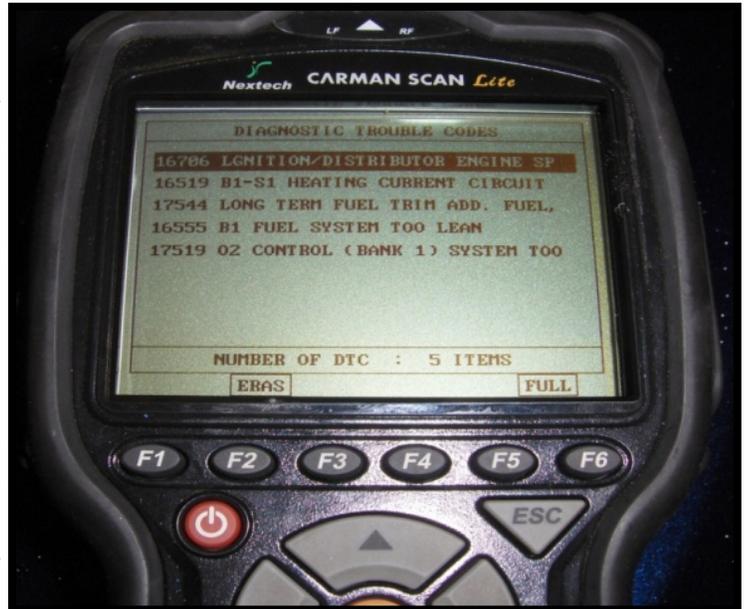
*\$39.99 for Box of Universal Gomex Clamps*

*\$259.99 for New CV Boot Installer Claw including Gomex Clamp Tool*



## *P0171 System Lean DTC (con't from page 16)*

We began by checking the O2 Heater by seeing if it pulled amperage when commanded on, and it tested fine. Volkswagens oftentimes will store codes in OEM enhanced that are not persistent enough faults to set Generic/Global OBD II DTCs. So, while a bad O2 sensor can cause lean issues, in this instance that was not the case.



When looking at Fuel Trim, we noticed that it was only very high at idle. Using common sense, we started with a good visual inspection of the engine to locate a vacuum leak or check for proper fuel system delivery. Take a look at the picture to the right (red circle area) and locate the broken vacuum check valve (generic name). We did not even need to use a smoke machine.

Replacing this broken part, the gas soaked oil and filter, and clearing the DTCs allowed this engine to run smooth without resetting any DTCs.





# Tech Tip: SECRETS TO INTERMITTENT MISFIRES REVEALED!

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# Diagnose Circuits Fast...

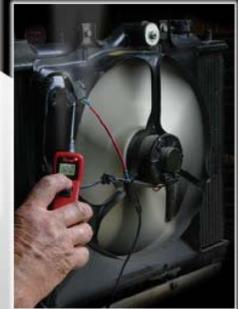
A Multitude of Testers right at your fingertips...

## Power Probe III

- Volt Meter
- Power Supply
- Short Circuit Indicator
- 20ft Jumper Lead Set
- Bad Ground Indicator

**Powers Up Components!**

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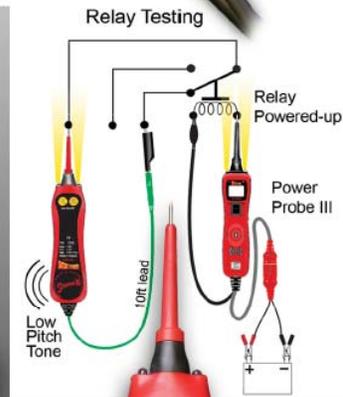


## the "Smart" ECT2000



#PPECT2000

The "SMART" receiver indicates the direction to the short circuit eliminating the guesswork.



## Power Probe Lead Set



#PPLS01



*Gold Series*

Power Probe Lead Sets makes your Power Probe more useful than ever before!



#PPCT

# POWER PROBE®

The Perfect Compliment to the Power Probe III

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- ➔ GET HIRED FIRST
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