

Technicians Service Training

Technician in a Bottle

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Diagnostic Soup II

John Anello

Editor

Jerry "G" Truglia

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To be honest, I'm very skeptical of snake-oil salesmen. I find it hard to believe that a pill can make anything bigger, that a fluid can seal a cracked head gasket, or a bottle of anything will really fix a P0420 Cat Efficiency code.

So, we get two P0420s consecutively. My father, the only man crazy enough to be President of TST, taught a class on P0420s that I got to sit in. His whole assumption in the class was that catalytic converters, unless they rattle or are melted when viewed with a boroscope, are almost never to blame.

Instead it's usually something sensor, ignition, or fuel delivery related that creates a condition that slowly wears down the catalytic converter. The fix? Usually an O2 sensor, tune up, or a Run Rite fuel system cleaning.

The first two make sense, but Run Rite? I know that their selling point includes getting cars to pass inspection, but that's just a selling point, right? I find it hard to believe that Run Rite, or any other fuel system cleaner, is a technician in a bottle.

So, I cringed when my father demanded that we do everything BUT replace the catalytic converter on these vehicles. Now, it was time to put his theory to the test.



(Con't on page 3)

Technicians Service Training

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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



Technicians Service Training



www.TSTseminars.org

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 www.ATSnm.com

John Thornton formerly of Team AVI

Wayne Colonna of ATSG www.ATSGmiami.com

Jorge Menchu the “Labscope Guru,” owner of AES

www.aeswave.com/aboutaes.htm

John Anello Auto Tech On Wheels www.autotechonwheels.com

Luis Ruiz Mechanic’s Education Association

www.meatraining.com

Jerry “G” Truglia National Instructor & owner of A.T.T.S. Inc.

www.attstraining.com

Technician in a Bottle (con't from p. 1)

2001 Toyota Celica

This Celica came in and it was the customer's daughter's car, so everything had to be taken care of and just right. Freeze Frame showed that the failure happened at about 65 MPH, so we knew that the Cat only failed when the engine was really at work.

Code	Description
DTC Codes:	
P0420	Catalyst System Efficiency Below Threshold Bank 1
No Pending Codes Present	

Supported PIDs	Abbrev	Data	Units
P0420 DTC caused Freeze Frame Storage #0:			
Calculated Load	LOAD_PCT	39.2157	%
Engine Coolant Temperature	ECT	181.4000	Deg F
Short Term Fuel Trim Bank 1	SHRTFT1	-0.7812	%
Long Term Fuel Trim Bank 1	LONGFT1	6.2500	%
Engine RPM	RPM	2840.5000	RPM
Vehicle Speed Sensor	VSS	61.4790	mph
Intake Air Temperature	IAT	59.0000	Deg F

Supported PIDs	Abbrev	Data	Units
Calculated Load	LOAD_PCT		%
✓ Engine Coolant Temperature	ECT	85.0000	Deg C
✓ Short Term Fuel Trim Bank 1	SHRTFT1	0.0000	%
✓ Long Term Fuel Trim Bank 1	LONGFT1	-7.8125	%
✓ Engine RPM	RPM	804.5000	RPM
Vehicle Speed Sensor	VSS		km/h
Ignition Timing Advance for #1 Cylinder	SPARKADV		deg
Intake Air Temperature	IAT		Deg C
Air Flow Rate from Mass Air Flow Sensor	MAF_g/s		g/s
Air Flow Rate from Mass Air Flow Sensor	MAF_lb/m		lb/m
Absolute Throttle Position	TP		%
✓ O2 Bank 1 - Sensor 1	O2B1S1	0.0250	V
✓ O2 Bank 1 - Sensor 1	FTB1S1	0.0000	%
✓ O2 Bank 1 - Sensor 2	O2B1S2	0.0200	V
✓ O2 Bank 1 - Sensor 2	FTB1S2	99.2187	%
✓ Total Trim Bank1 (Calculated)	TotalTrimB1	-7.8125	%
✓ Cross Rate O2B1S1 (Calculated)	O2Cross11	0.0000	Hz
✓ Cross Rate O2B1S2 (Calculated)	O2Cross12	0.0000	Hz
✓ Engine Running Time (Calculated)	RunTime	346.5200	s
✓ Fuel Control Monitor Bank1 (Calculated)	FCtrlMonB1	0.0000	%
✓ Catalyst Efficiency Bank1 (Calculated)	CatEffB1	0.0000	%
Battery Voltage at DLC (Calculated)	BatteryV		V
Closed Loop 1 (Calculated)	ClosedLp1		
Closed Loop 2 (Calculated)	ClosedLp2		
Theoretical Air Flow (Calculated) **	TAF		g/s
Volumetric Efficiency (Calculated) **	VE		%

What stood out to us most was the O2 sensor reading when we were looking at the PIDs. The Bank 1 O2 sensor looked suspicious because it did not change. To the left we can see it stuck at 0.025V (250 mV). Long Term Fuel Trim was a little high on the negative side.

So, we then looked at Mode 6. Mode 6 showed us the Catalytic Converter was not presently failing, with a value of 0.253 (see below). Nonetheless it was testing really close to the limit so we boroscoped the Car to check the its physical condition. We saw no obvious problems. Now, what do we do?

(Con't on page 7)

Test ID (TID)	Component ID (CID)	Test Value	Min Limit	Max Limit	Units
\$01: Catalyst System Monitor	\$01: Bank 1 Catalyst Deterioration	0.253		0.300	
\$02: EVAP Vacuum Monitor	\$01: EVAP VSV Test	9.801	6.962		mmHg
\$02: EVAP Vacuum Monitor	\$02: CCV & Bypass VSV Test	0.459	0.001		mmHg
\$02: EVAP Vacuum Monitor	\$03: .040 Leak Test	0.046		1.786	mmHg
\$04: Heated Oxygen Sensor Monitor	\$01: B1S1 Max. Heater Current	0.623	0.249		amps
\$04: Heated Oxygen Sensor Monitor	\$02: B1S2 Max. Heater Current	0.664	0.249		amps

CV BOOT INSTALLER




- The CV Boot Installer makes CV boot installation easier and quicker.
- Designed to increase profits
- Replacing CV boots just got as easy as putting on your slippers.
- Installers have a new tool for preventive maintenance.

The CV Boot Installer is utilized by placing a universal CV Flex Boot over the Installer's retractable aluminum arms. Then, using compressed air, the boot is spread open wide enough to be passed over the axle shaft, without having to remove the axle.

CV BOOT INSTALLER





CV Solution

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FB3000: Universal FLEX BOOT covers over 98% of automotive applications.



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CV Boot Replacement as a repair or a preventative maintenance service will produce the following benefits for your operation:

- New profit
- Easy to diagnose need
- Easy repair
- Minimal inventory and tooling investment
- 2 SKU'S cover 96 % of vehicles in operation
- One tool
- Profit capture

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Astoria 2000, LLC also offers a universal Rack & Pinion Boot which can be installed without removing the rack thus eliminating the need for an alignment.

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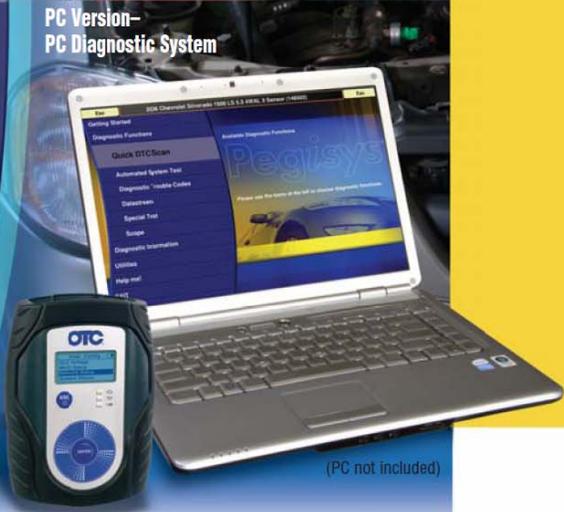
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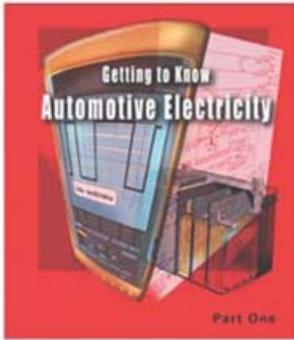
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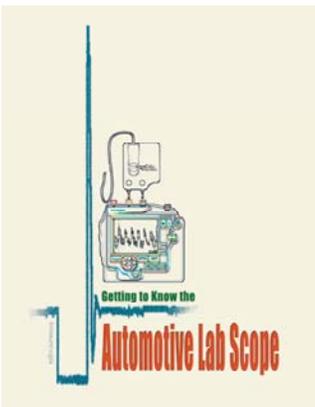
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Technician in a Bottle (con't from p. 3)

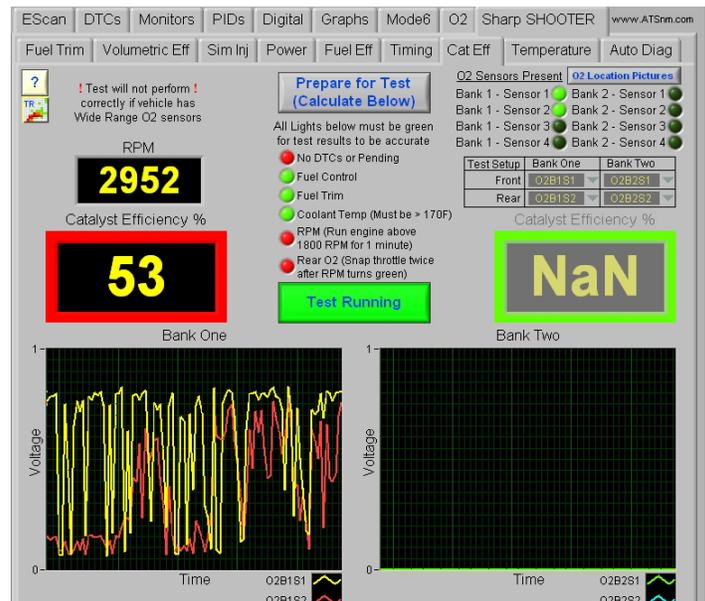
We decided to do a Catalytic Efficiency Test using the EScan software. It sounds like we are doing a commercial for ATS, but this is what we really use at our shop.

We did not even have to connect any fancy transducers or anything.

Right from the DLC, the EScan compares the oxygen sensors to each other to give a percentage of good Catalytic Converter health, color coding it so even a trained monkey like me can understand what he's reading.

Generally, a Cat Efficiency reading below 70 percent would start a DTC, but at idle the Cat was testing fine and the oxygen sensor that we had suspicions about was not missing a beat. So, we decided to recreate freeze frame conditions at a high engine load and the following occurred.

The Cat failed when the engine was working hard, confirming what the freeze frame data told us initially. But, as we can see, the fuel control (yellow) oxygen sensor was real lazy, failing to zig where the other one (red Cat efficiency) zagged on the graph. So, we decided to order a new oxygen sensor. (Con't on p. 9)



Diagnose Circuits Fast...

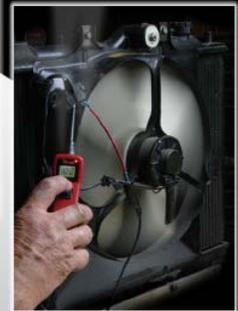
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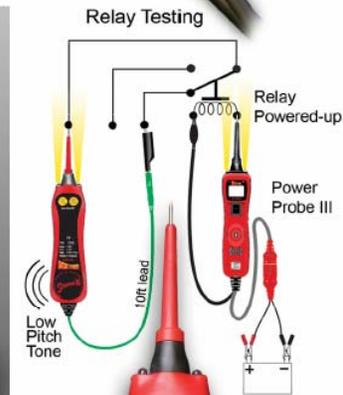


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#PPCT

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Technician in a Bottle (con't from page 7)

Then, because the car had a burned coil, we decided that a tune up was needed too. A new tune up and O2 sensor seemed like a rare but possible fix, as technicians stated on Identifix. So, we had good reason to believe that they might cure our P0420.

But, my father then demanded that we put a couple of Run Rite fuel injection cleaning kits to the test. I was afraid that this would be the snake-oil part of the fix, but I trusted my father and called the customer. The customer was great and said yes to everything (including the brakes and a transmission flush too.) Essentially, this Celica was TST's P0420 chemistry set. We were going to try to fix it with anything but a new Cat.

Test ID (TID)	Component ID (CID)	Test Value	Min Limit	Max Limit
\$01: Catalyst System Monitor	\$01: Bank 1 Catalyst Deterioration	0.086		0.398

Above, we can see Mode 6 after the Run Rite double-cleaning. I hate to admit it, but my old man was right. The Mode 6 test value for the Cat after the cleaning was much better than before (0.086 versus 0.253).

Then we did the tune up and installed a new oxygen sensor. Now, we see the Mode 6 data indicating that the Cat

Test ID (TID)	Component ID (CID)	Test Value
\$01: Catalyst System Monitor	\$01: Bank 1 Catalyst Deterioration	0.000

is perfect (0.0 versus 0.253 originally). So, for those keeping score, my father 1 me 0. You know what would have not fixed this car? A new catalytic converter. Because the Cat was good as new after the fix, a new Cat would have just broken down like the old one if we did not ascribe by the G Truglia P0420 theory. So, good diagnostics saved the day and ultimately saved the customer money.

1998 Toyota Rav4

Right after we received the first P0420, this one rolled through our bay doors. Again, my father's theory would be put to the test.

I am not going to illustrate the whole situation, because at this point it would just be redundant. The customer claimed he had a tune up not that long ago, so we diagnosed fuel delivery, the air fuel sensor (it had a new one just installed so we checked the other one), and ignition.

(Con't on p. 11)

9 of the Top 10* "Check Engine" DTCs can be diagnosed with a Smoke Wizard.

Maybe it should be called the "Smoke Wizard" Light

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*Analysis of 2008 California Smog Check data.

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*Analysis of 2008 California Smog Check data.

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Technician in a Bottle (con't from page 9)

Questions:

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

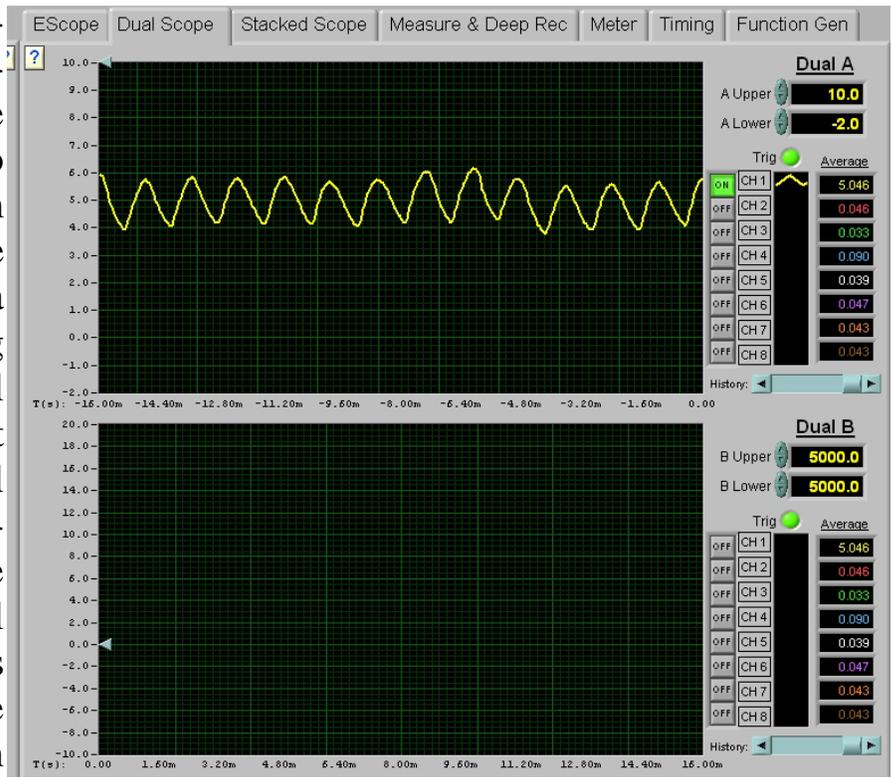
2. Do you find the seminars useful?

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,
G Truglia*

We found that contrary to the customer's claims, the spark plugs had no meat on them whatsoever. We decided to do a tune up, including replacing the fuel filter. We current ramped the fuel pump and confirmed we were not having a fuel delivery issue. As you can see, we have a nice even waveform.



After the tune up, the DTC was gone. Chalk up another one for my father: two to nothing.

So, I learned a couple things. First, listen to my old man. Second, using Identifix can be a great help because they statistically break down how many times a fix was not the self-intuitive one (like the Cat for a P0420). If you see that a few times a new oxygen sensor or tune up did the trick, I'd bet that either of these would clear up the problem. If we fix the small things first that have to be fixed anyway, we might find that the big problems will go away too. It's a cheaper and more effective repair, and that makes everyone happy, right?

Article by Craig Truglia and Kevin Quinlan

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Mt Business INSIDER

Inside the Insider

Five Ways to Limit Liability
By stepping out into the business world, every shop has exposure. While you cannot stop people from suing you, you can walk away from most liability if you take some steps to protect yourself.
(Turn to page 1)

Human Potential
The mind is a strange and powerful tool. Psychologists tell us some very interesting things about the function. First, 90% of its activity is subconscious.
(Turn to page 1)

In Times Like These
Small business is the backbone of our economy. Businesses like ours.
(Turn to page 3)

Sole Proprietorship
It does not matter whether the individual or a twenty-year business veteran this question comes up on a regular basis. My answer to this dilemma has always been the same, it depends.
(Turn to page 8)

MT Business Insider Pricing Matrix
Businesses based on percentages, but owners look at prices. How do you expect your business to make a profit? My answer to this dilemma has always been the same, it depends.
(Turn to page 8)

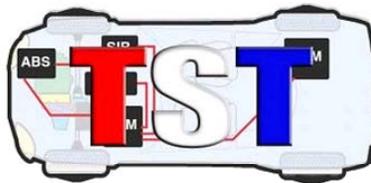
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Another Mystery Solved
Needle in a Haystack

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