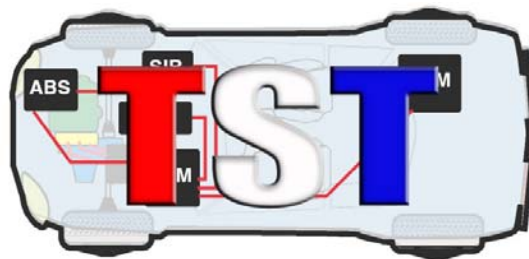


December 2016



## Technicians Service Training

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**MA, CT, NJ & NY**

**February 2017**

**Peter Orlando**

**TST Big Event Saturday**

**March 25th, 2017**

**Tarrytown, New York**

**Tom Rayk—NAPA**

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**Editor**

**"G" Jerry Truglia**

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### "European Smorgasbord"

Our first vehicle is a 2006 Audi A4 2.0L Turbo (**Figure 1**) that was towed in for a no-start concern. The young guy who was driving the vehicle stated that the vehicle had been losing power and smoking from the tailpipe before it shut down and no longer started.

Our next step after the owner interview was a visual inspection that revealed a motor that was down a quart of

oil and looked like no maintenance had been done for a while. The visual was followed by a scan of the computer system, which revealed a P2293 (Fuel Pressure Regulator 2 Performance), P1093 (Fuel Trim 2, Bank 1 Malfunction), P0300 (Random Cylinder Misfire), P301, P302, P303 and P304 (Cylinders 1 – 4 Misfire) DTCs.



**Figure 1**

**(Con't on page 2)**

## ***“European Smorgasbord” (con’t from p. 1)***

Checking our service information system, we found a Technical Service Bulletin (TSB) No. 2013147/1 that detailed a problem with the camshaft, camshaft follower and fuel pump. Armed with the TSB information, we decided to call the local dealer and provided them with the VIN number to see if the vehicle was eligible for the warranty repair. Unfortunately for the vehicle owner, his vehicle was not eligible for the repair, as the car was over the 10-year, 120,000-mile limitation. Now the vehicle owner was on the hook for the repairs that needed to be performed.

We called the owner and requested additional time to check fuel pressure and for the labor necessary to remove the fuel pump so that we could visually check the cam follower, fuel pump and camshaft for damage. The fuel pressure test was not conclusive because it tested only the low-pressure side (the delivery from the fuel tank to the low pressure side of the high-pressure fuel pump). Because there was no way for us to test the high-pressure side of the pump, we had to remove the fuel pump and visually inspect the cam follower (**Figure 2**). Take a look at the worn one verses the new one. The camshaft was also damaged (**Figure 3**), along with the tip of the high-pressure fuel pump.



**Figure 2**



**Figure 3**

During our visual inspection, we had noticed an oil change sticker from a tire shop that advertises a \$19.95 oil and filter change. We have seen a variety of engine problems over the years caused by improper oil changes using the wrong type of oil and suspected the same here.

***(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.**

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The following are some of TST's regular instructors:

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**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

**Bob Pattengale** of Bosch

**Peter Meier** of Motor Age Magazine

**Ken Zanders** of Illinois Air Team

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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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### ***“European Smorgasbord” (con’t from p. 2)***

As most of you know, you cannot purchase the correct oil and filter for \$19.95 for an Audi, let alone perform the service for that price. With that information at hand, we thought that we better do a bit more digging into to the engine before providing the owner with a price for the repairs.

When we removed the air filter box and tubing to the turbo, we found oil in the intake **(Figure 4)**. Upon finding oil in the intake upper tubes, we thought that it would be a good idea to remove the lower turbo intake hoses and inspect them for oil as well. My tech Bill found about a quart of oil sitting in the lower turbo hoses that poured out in a steady stream. After collecting all the information, Bill and I concluded that the engine was using oil for a while, most likely due to a turbo seal problem. Since the vehicle owner’s father would be paying for the repair, he naturally wanted to know what the cheapest alternative was to getting his son back on the road.



Rather than doing the job right (replacement of the camshaft, cam follower, fuel pump, timing belt and parts related to this type of repair), we had to put a bandage on it. Because the main problem was a no-start due to fuel, the most logical step was to order the least expensive part — the cam follower. We were able to order an OE Audi cam follower from WORLDPAAC, who had it available for a reasonable price. With the new cam follower installed, the engine cranked over and ran, but blew so much smoke out of the tail pipes that it looked like a five-alarm fire. We moved the vehicle out of the shop to one of our outside parking spots so we could run the engine and see if the smoke from the oil would burn off. There was no letting up with the oil burning, and that most likely indicated that the turbo seals and possibly the turbo bearings were wiped out. I had an idea to bypass the turbo, going directly to the air intake system.

***(Con’t on page 7)***

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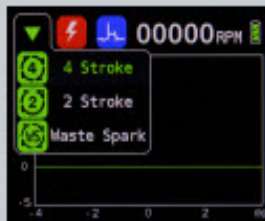
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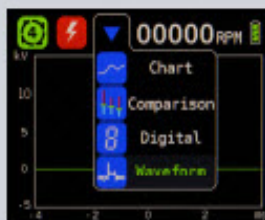
Displays secondary ignition waveforms.



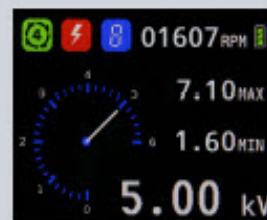
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Specially designed pick-ups for coil on plug ignition modules (left) and spark plug wires (right).

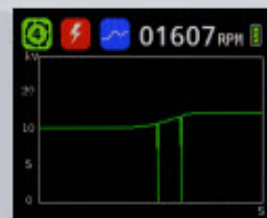


Chart mode used for detecting intermittent or infrequent failures and misfires.

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### ***"European Smorgasbord" (con't from p. 4)***

This would allow the engine to run while eliminating the turbo's oil burning and would allow us to make sure the engine could run properly. In order to do this, we had to remove the airbox that has the MAF attached and directly connect it to the intake.

The engine was now running without smoking, allowing us to concentrate on checking if there was sufficient fuel delivery without setting a DTC. The outcome of our test revealed that the fuel pressure was still not building enough pressure. The problem was not only the cam follower but also (as we knew) that the camshaft and the fuel pump were worn. After the vehicle was running for a while, the same P2293 DTC returned, so we had to try something else.

With a vehicle owner who wanted the cheapest way out, I had to be creative on how to get this engine to deliver enough fuel without installing all of the needed components. I removed the cam follower and installed three washers inside the cup part of the follower that contacts the high-pressure fuel pump. We restarted the engine and found that it ran better, but it still illuminated the MIL. Once again, we removed the fuel pump and added two more washers. Now the engine would run without setting the DTCs. It was time to call the customer and tell him that, in order to get this engine running, he would at least have to replace the cam follower, high pressure fuel pump and turbo.

With the owner's approval, we began the repairs. We removed the old turbo and found that the blower vanes were not able to turn due to the bearing being severely damaged. We installed the new turbo along with the new high-pressure fuel pump and test drove the vehicle. The engine ran remarkably well, but was far from perfect since it needed the camshaft replaced. What we found was that under normal driving, the engine ran fine even up to speeds over 65 mph. If you pressed the pedal to the metal, though, the check engine light would illuminate and the same P2293 DTC would return.

***(Con't on page 8)***

## ***“European Smorgasbord” (con’t from p. 7)***

*Often, the hardest part of our job is not fixing the vehicle but rather trying to fix the customer.* Trying to get the vehicle owner to perform the proper repairs is really their call since they dictate what happens. We told the vehicle owner and his father that due to poor maintenance and the lack of a full repair approval, the job was not totally complete. We explained to them that since the recommended parts were not installed, they could expect the check engine light to come back on. We also stressed that at some point the engine would stop running due to the worn camshaft, so they should stay local and prepare to break down.

We highly recommended that he trade in the vehicle or perform the necessary engine repairs. As you can gather, I am annoyed that I could not perform my job properly because I am not the real boss when it comes right down to fixing the vehicle — the owner is.

---

**Our next vehicle was a 2005 Mercedes Benz S430** from South Carolina (**Figure 5**) that came as a referral from our listing on the RepairPal website. The vehicle had a problem scraping the road since the air suspension system was not working correctly. The vehicle owner at first went to the closest European shop he could find driving up to New York. After experiencing his vehicle suspension system problem, he was in for another shock when the European shop provided him with prices for OE replacement parts. Thinking that it was too expensive, the vehicle owner decided to purchase the air suspension components himself online. The shop charged him for a diagnosis and installed four air struts, a level control valve unit, axle damping valve units, AIRmatic central unit and AIRmatic compressor unit. Once all the parts were installed, the system would still not function



**Figure 5**

***(Con’t on page 10)***

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### ***“European Smorgasbord” (con’t from p. 8)***

After spending all the money and virtually replacing every air suspension component on the car, he lost confidence in the shop and pulled his car out of there. He began his search for another shop on the internet. During a phone conversation with us, we discussed his problem and assured him that we would diagnosis his suspension properly and recommend only the needed repairs. He decided to have his car towed rather than driving it to prevent any further damage to the new parts that were just installed.

Before we started the diagnosis of the vehicle, we reviewed the information about the system. Before we diagnose any system that we are not fully familiar with we research how the system works. By looking up system description in AllData. The system level control allows both manual and speed-responsive adjustments by automatically raising or lowering the ride height.

The AIRmatic control system levels the front and rear of the vehicle, ensuring that the vehicle remains level for a particular driving condition. The system has three levels for comfort, sport or damping forces that can be used for the road conditions and or driving style. It’s normal for the air suspension to lower when the vehicle is parked and locked, then rise again once the vehicle is started.

Basically the vehicle is realigned or leveled to adjust for any additional weight. The vehicle level system is continually monitored and readjusted whenever there is more than a  $\pm 20\text{mm}$  difference. The most common failure items are the air compressor, air struts, leaking lines, faulty relay or fuse, valve block leaks, faulty level sensor or the valves on the top of the strut towers. If the system encounters a problem such as not rising to the proper height, or if it’s touching the ground, codes will be set and an error will be displayed on the instrument cluster.

After reading through the system description, we drove the vehicle into our bay,

***(Con’t on page 11)***

## ***“European Smorgasbord” (con’t from p. 10)***

then connected the Autologic scan tool to activate the suspension system (**Figure 6**). We found that the right front would not go up while the left side seemed to reach normal height. In the rear of the vehicle, the right rear went up but would not reach the proper



**Figure 6**

height, while the left side seemed normal. When it comes to testing air suspension systems, it can be difficult to find problems if you do not have the correct tools and proper understanding of the system.

To make our diagnosis easier, we used the Automotive Test Solutions (ATS) Bullseye Air Ride Suspension Test Kit for Voss Systems (**Figure 7**) that we connected to the suspension level control valve unit. We ruled out the AIRmatic compressor since it was able to pump air and obtain the normal height on the left side of the vehicle. We started flowing CO<sub>2</sub> to the attached Bullseye tool (**Figure 8**) and started testing with the leak detector tool (**Figure 9**) so we could locate the leaking areas. We located two areas that were leaking and confirmed

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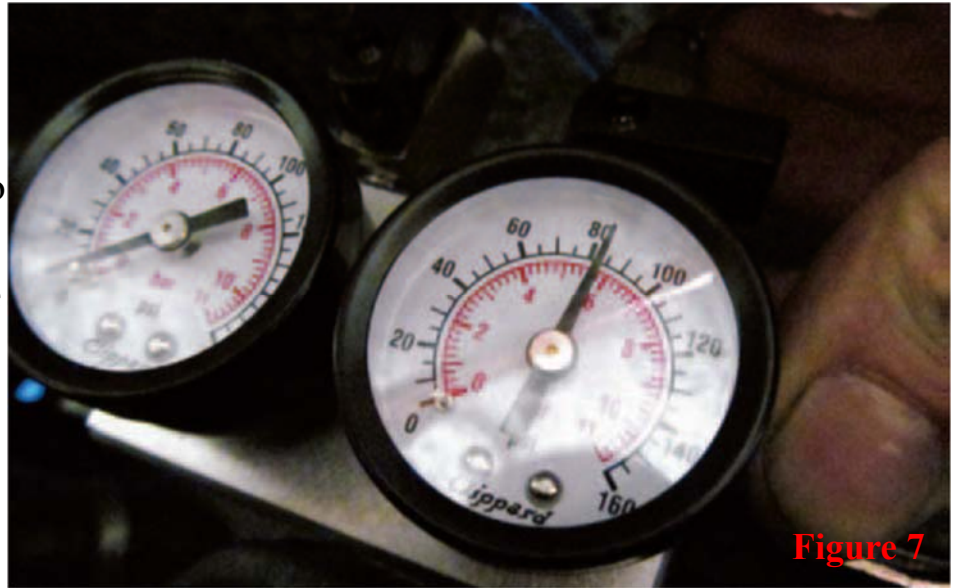
**Getting to Know the Automotive Lab Scope**

***(Con't on page 12)***

## ***"European Smorgasbord" (con't from p. 11)***

the components that were found defective were the front and rear right struts, so we informed the owner to order replacements.

We had to wait a week or so for the new air struts to arrive at our shop. After the replacements were installed, the job still was not over, because there is a special leveling procedure that has to be followed in order for the suspension system to function properly. The proper level calibration settings would now have to be set by using the scan tool and special tester. In the factory information, the procedure requires the use of a special MB tool called the Romess CM-09606 inclination measuring instrument, along with their scan tool. The specifications are  $3.1^{\circ}$  to  $4.1^{\circ}$  front inclination and  $-1.5^{\circ}$  to  $-0.9^{\circ}$  inclination settings. If the level settings proper range the system will not



**Figure 7**



**Figure 8**



**Figure 9** (Con't on page 14)

for the rear  
are not in the  
function properly.

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## ***“European Smorgasbord” (con’t from p. 12)***

Because we do not own the special MB Romess tool, we had to use a tape measure from the floor to the center of the fender well. The reading from the floor to the center of the fender wheel for the front should be about 27 inches, while the rear should be set to 28 inches. With the presets completed to the proper level, the next step is to perform the calibration with the scan tool. After the scan tool’s setting was completed, the vehicle leveled properly. This was followed by a shut vehicle down and restart, along with a few test drives and the S430 was no longer hitting the pavement.

---

**Next, we move on to a misfiring 2011 BMW 550iM** sport model that came in with a concern of rough running and some performance problems at times. The vehicle owner had returned to the BMW dealer multiple times with the same complaint only to be told that there were no problems found. The BMW dealer tested the vehicle with the factory scan tool, finding no DTCs present, so they sent the vehicle owner on her way. After carefully listening to the vehicle owner, we test drove the vehicle and felt the misfires she was speaking about.

We all know that it is very possible to have a misfiring engine that doesn’t set a code. It all depends on the test threshold for misfires that particular OEM uses in the computer software. Our next step was to connect our scan tool and check for DTCs as well as scan data. Since no DTCs were uncovered and the scan data looked OK, we switched scan tools to the EScan so we could easily check for volumetric efficiency, fuel trim and Mode 6 data, only to find them all acceptable.

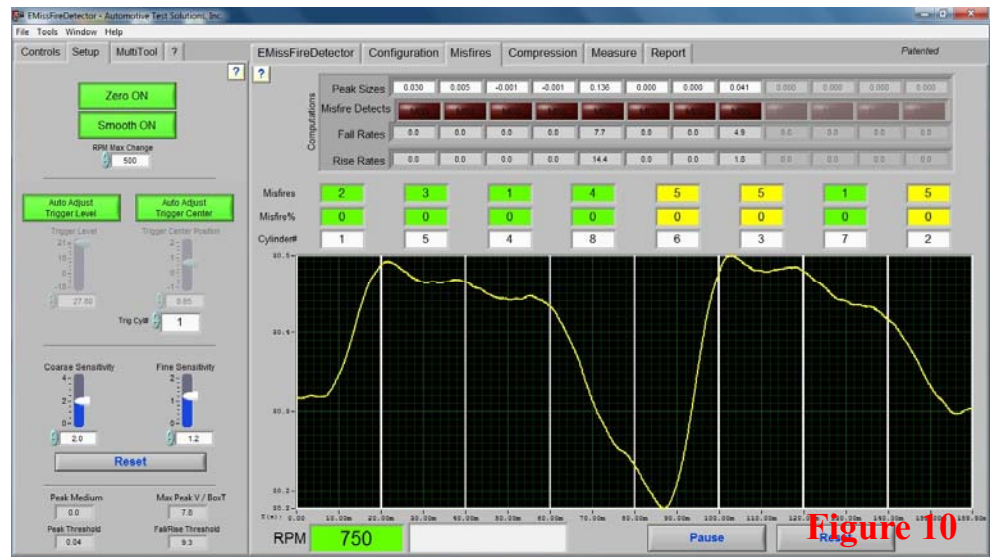
Coming up empty handed, we decided to use the ATS misfire tester. This system uses a pressure transducer installed in the tailpipe, using the exhaust pulses as an input to the ATS special software. As you can see by the screen shots of ATS misfire detector (**Figures 10 and 11**), taken in both tailpipes since the vehicle had dual exhaust, cylinders 2, 3 and 6 all displayed misfires, which confirmed what the vehicle owner was experiencing.

***(Con’t on page 15)***

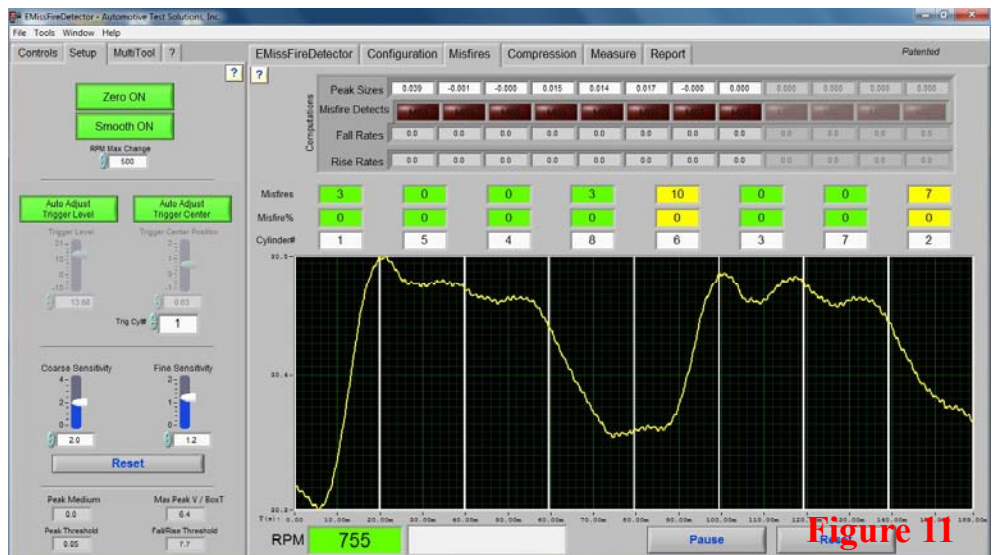
## *"European Smorgasbord" (con't from p. 14)*

We looked up TSBs and found that there were numerous bulletins covering everything from ignition coils problems to injector issues. The vehicle owner also had repair orders from the dealer stating that the coil and injector problems were addressed.

We removed one of the spark plugs to check inside the cylinder for carbon build up on the valves and pistons. The inspection revealed that there was, in fact, carbon build up on the valve that is very common on GDI (gasoline direct injection) engines.



**Figure 10**



**Figure 11**

The vehicle owner was informed of what we found and decided to install a bottle of carbon build-up cleaner and fill the tank up with a Tier One gasoline such as Shell or Mobil in an effort to clean out the carbon. After driving the vehicle for a few full tanks, she noticed an improvement but decided that she had enough of the problems with this vehicle and traded the vehicle in at a non-BMW dealer.

*All Articles By G Truglia TST Founder, President and ASE World Class Triple Master L1, L3 Technician*

*(Con't on page 16)*

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Seminars / TST MARCH 25TH, 2017 BIG EVENT / TST MARCH 25TH, 2017 BIG EVENT

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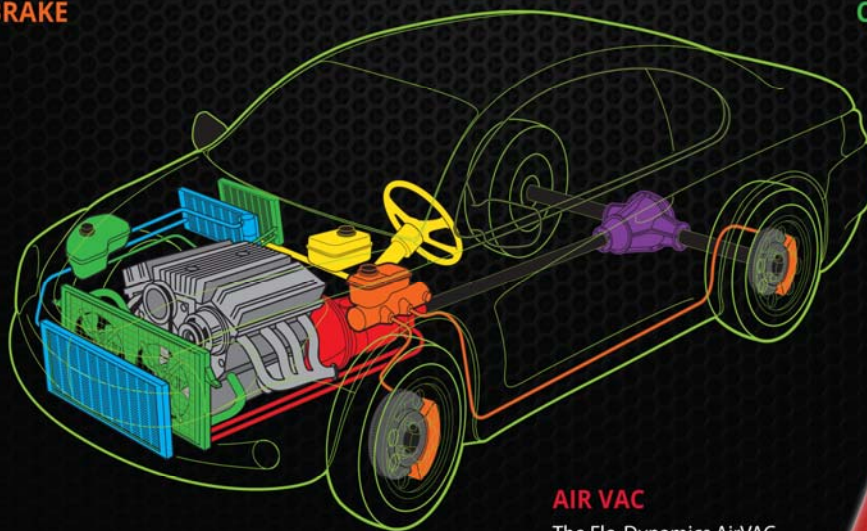
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# TECHNICAL BULLETIN

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Vacuum, EVAP (Fuel Vapor Recovery) Exhaust, Oil, Turbos and Intercoolers, Manifolds, Break Boosters, EGR Valves, Seals, Gaskets, Brake Vacuum Hoses, Cooling Systems, Wind and Water Leaks, Diaphragms, Central Locking Systems and much more.

### Find More Repair Jobs

Find leaks and sell the repair to your customer with visual confirmation.

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One simple connection diagnoses an entire system in seconds so that technicians can repair more vehicles in less time.

### Improve Accuracy of Repairs

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**FULL SCHEDULE**

|      | Monday   | Tuesday  | Wednesday | Thursday  | Friday    | Saturday |
|------|----------|----------|-----------|-----------|-----------|----------|
| 8AM  | Jones    | Travis   | Mead      | Lee       | Mahoney   | Caroline |
| 9AM  | Chu      | Eagle    | Brown     | O'Donnell | Conn      | Zumpe    |
| 10AM | Smith    | Wooden   | Cisco     | Chin      | Chang     | King     |
| 11AM | Moore    | Baker    | Glass     | Burton    | Ellis     | Cassidy  |
| 12PM | Daniels  | Amber    | Green     | Alph      | Fullerton | Dink     |
| 1PM  | Fisch    | Smith    | Ricco     | Nichols   | Treash    | Blake    |
| 2PM  | Hovan    | Perry    | Green     | Line Co.  | McArthur  | Carissim |
| 3PM  | Allen    | Capstone | Testa     | Baxter    | Blow      | Corica   |
| 4PM  | Williams | Getz     | Longo     | Pitts     | Quincy    | Donovan  |
| 5PM  | Merry    | Papa     | Warshi    | Quincy    | Donovan   | Donovan  |
| 6PM  |          |          |           |           |           |          |



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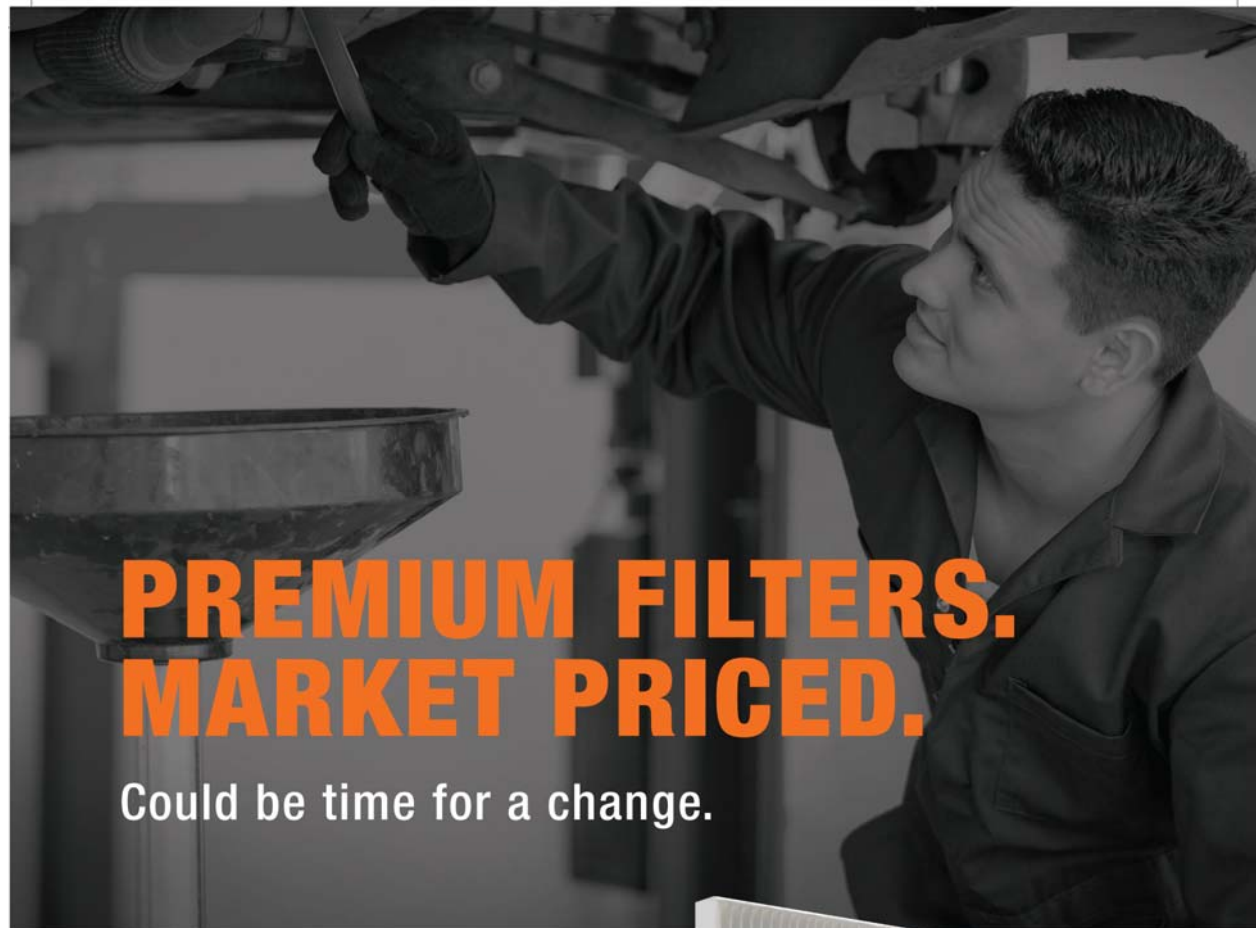


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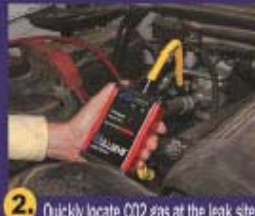
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### Leak Detector Patent Pending

FIND LEAKS QUICKLY AND ACCURATELY IN ALL SEALED SYSTEMS IN 3 EASY STEPS



1. Pressurize sealed system with CO<sub>2</sub> gas.



2. Quickly locate CO<sub>2</sub> gas at the leak site.



3. Foam color change pinpoints leak site.

## BULLSEYE Leak Detector

- ▶ Fast – Easy – Accurate
- ▶ CO<sub>2</sub> Gas Pressurization – Safe – Easy – Effective
- ▶ Electronic CO<sub>2</sub> leak detector to quickly zero in on leak site
- ▶ Color changing foam to identify exact leak location
- ▶ Safe for All Systems – EVAP, Fuel, Air Conditioning, Intercooler, Induction Systems, Air Suspension, Cooling Systems, Wheel and Tire – Any Sealed System

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A futuristic silver car is centered in the image, parked on a dark floor that appears to be a digital interface. The floor is covered with glowing red lines forming a grid, and various circular icons are scattered around, including a Wi-Fi symbol, a musical note, and a downward arrow. In the background, there are faint, glowing blue lines and a large, stylized 'X' shape. The overall aesthetic is high-tech and digital.

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