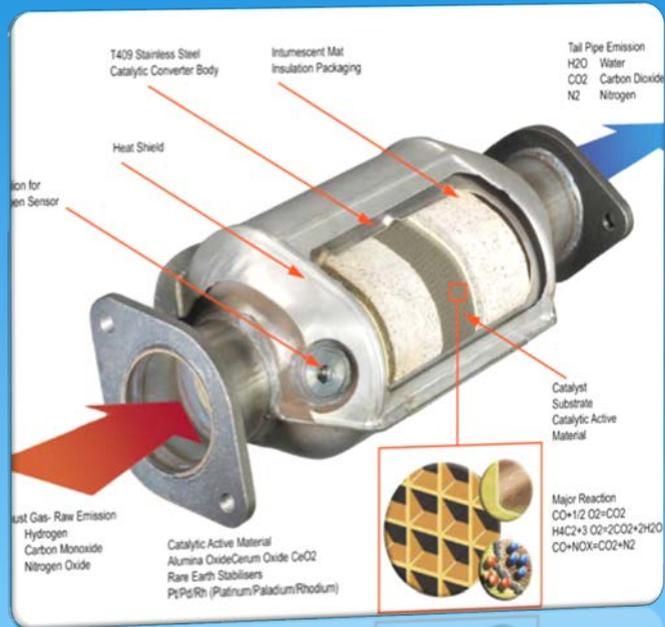


General Knowledge Overview on Catalysts and Ignition Systems

What they look like, where they are installed, and when they have been illegally removed or Tampered with.

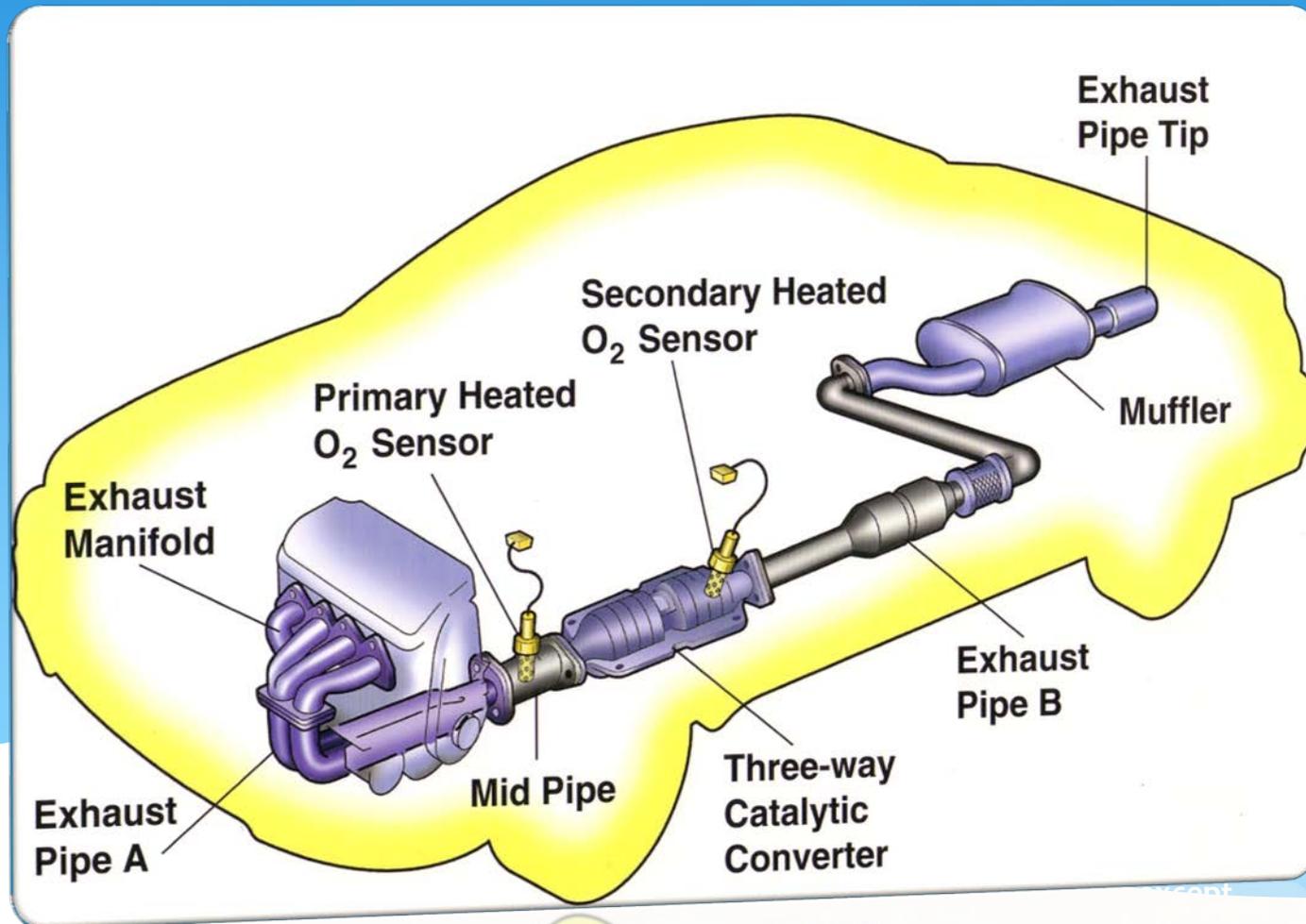




Common Three-Way Catalyst for Automotive Use

Catalytic Converters are nothing new. They have been installed on passenger cars and light-duty trucks since 1975. The history of their use coincided with the introduction of Unleaded Gasoline, also in 1975.

Basic Exhaust system may have Catalytic converter at exhaust manifold (Exhaust pipe A) or multiple Cats.



Now, let's talk about some common abbreviations used when describing catalysts:

- **TA-** is an early catalyst called a “therm-actor”
- **OC-** is an early style “oxidizing catalyst”
- **ORC-** is also an early style “oxydation reducing catalyst”
- **OC/ORC or OC+ORC-** is an early style “dual-bed” or combination catalyst
- **REDOX-** is an early style oxidation reducing catalyst used on trucks only
- **TWC-** is the currently used “three-way” catalyst

We will talk first about catalytic converters used with Gasoline, E85, Compressed Natural Gas and Propane powered vehicles. Diesel vehicle catalysts are covered in the second half of this same presentation.

The first European and English made cars that came with catalysts had therm-actors installed in them. Year model ranges were: 1975 to 1980.

Oxidizing and Oxidation Reducing Catalysts were installed on early North American made cars and light trucks from 1975 to the early 1990's.

The Dual-Bed and Combination Catalysts were installed on vehicles which used air-injection systems which pumped fresh air into the Catalysts through piping. 1975 and early 1980's model light trucks with higher gross vehicle weight ratings used the REDOX style catalysts instead of the Dual-Bed combination types.

In the mid-1990's, the Three-Way-Catalysts began to replace all types of catalysts; these are still in use today for all Non-Diesel vehicle applications.



This is a catalyst installed in a modern light truck.

Notice how the lines of the outer body of the catalyst are quite smooth. It still has clearly visible certification stamping on the lower part of the outer body or shell. Notice the difference in comparison to the muffler.



Typical catalyst system for an older light truck.

This system is showing signs of its age. Both the piping and the shielding are showing indications of rust. Even though the system has rusted and shows other signs of long use, it is still functional and has no leaks.



This is a typical example of a modern passenger car exhaust system showing new design catalyasts installed.

Notice the “funneled” shape of the end flanges as they are tapered down to the size of the exhaust piping. Careful examination reveals these are multi-seam welded assemblies that resemble mufflers; except these units are fitted with exhaust gas oxygen sensors. Mufflers do not have O₂ sensors on them.

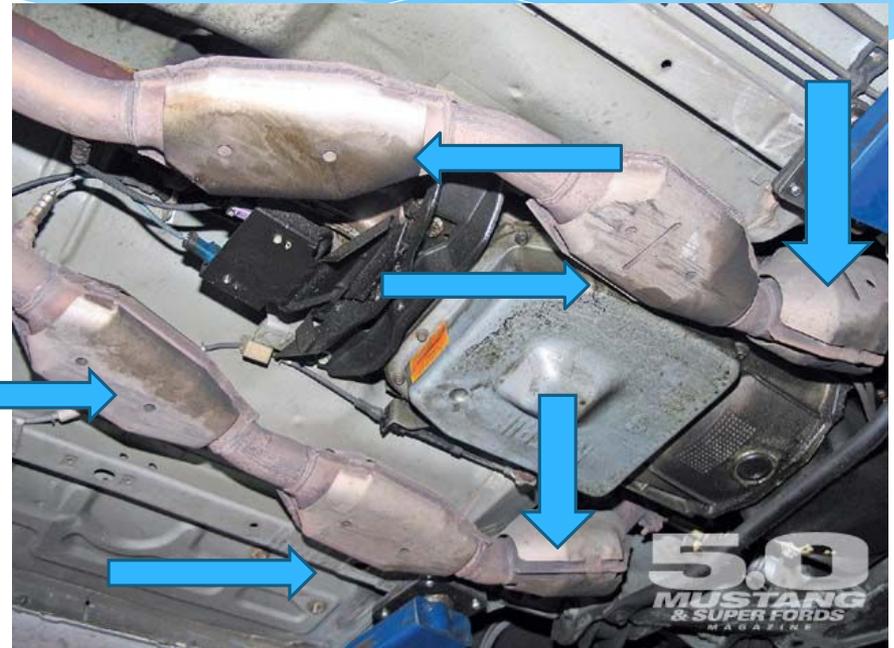


Automotive exhaust system resonator: installed.

Shown is an exhaust system resonator, welded into the system toward the rear of the vehicle. Notice the “rolled” appearance at the flange ends of the unit; a clear indicator this device is not a catalytic converter.

After-market and factory performance catalysts systems.

Six cat's shown

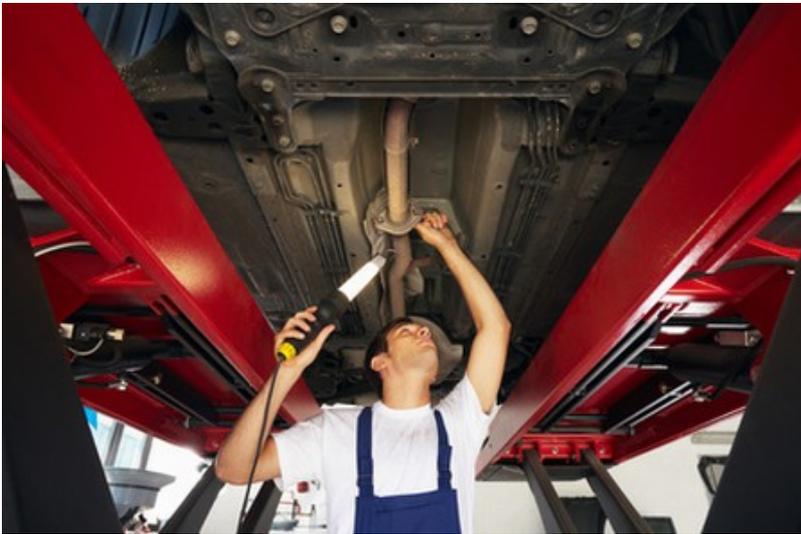


Shown in these two photographs are high performance exhaust systems installed on a street hot rod application and a factory built high performance “Muscle-Car” vehicle.

Notice the distinctive appearance of the catalytic converters used in each system.

Missing Catalysts: Illegal = Fail

This photograph shows an example of a catalyst replaced with a straight pipe.



This is an example of a catalyst removed outright and not having been replaced.



Well, so much for gasoline vehicle catalysts. Now for Diesel Catalysts.

The catalytic converter has been around on gasoline powered vehicles for a very long time: Thirty-eight years to be exact.

For vehicles powered by Diesel engines, catalysts began to be installed in the late nineteen-nineties.

Diesel engines release the same kinds of pollutants that gasoline engines do; they also release soot and more of a pollutant called oxides of nitrogen.

Because of this different dynamic in the Diesel engine, catalysts had to be redesigned specifically to deal with the soot and the oxides of nitrogen.

Early catalysts for Diesels were called Diesel Oxidation Catalysts, soot traps for these catalysts were called Diesel Particulate Filters. Later designed catalysts used uric acid fluid to deal with the soot; newest of these types use Diesel fuel oil to burn off the soot in a regeneration phase controlled by the vehicle's powertrain control computer.

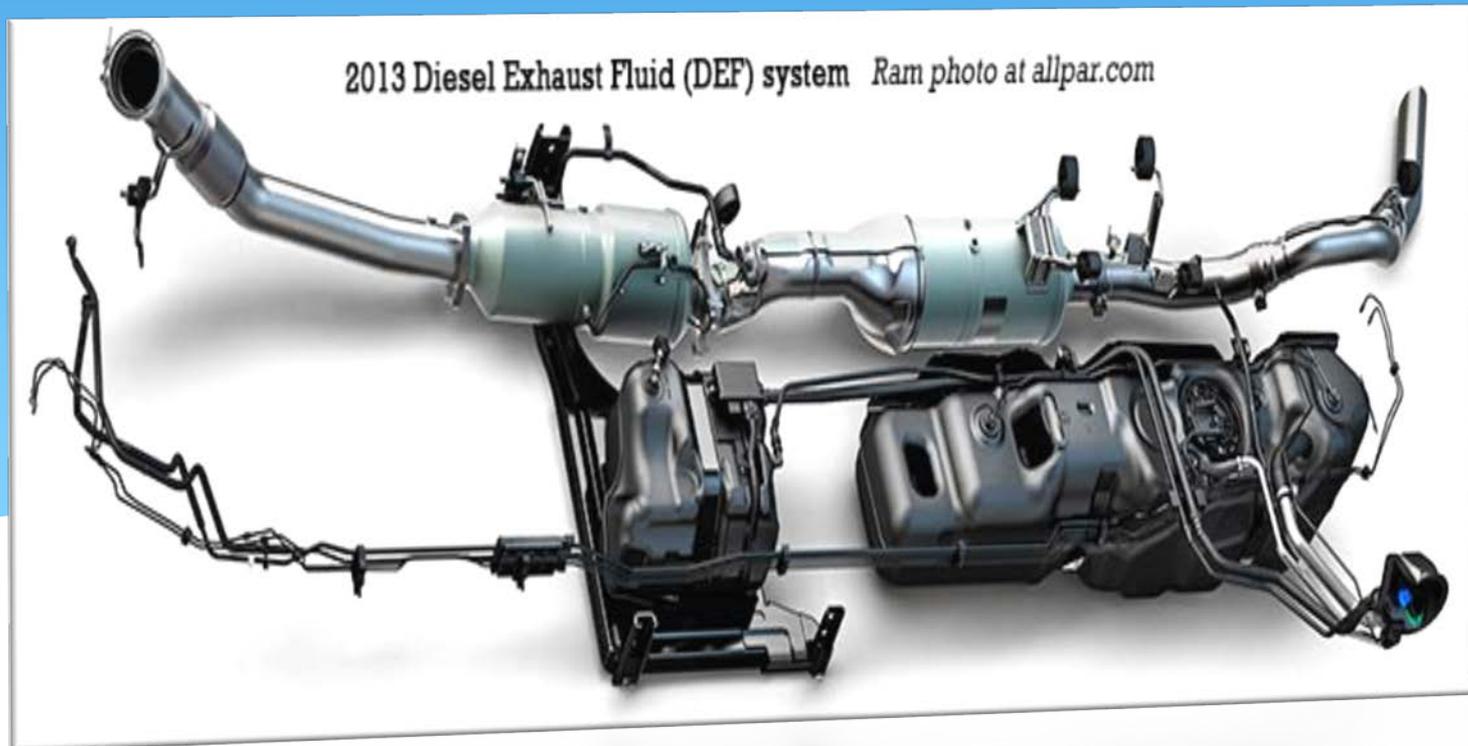


Diesel vehicle smoke checking: 25% Opacity is OK.

That is correct. Diesel vehicles are the only type allowed to release smoke at their tailpipes. This picture shows an example of 25% smoke opacity at the tailpipe; done as a free-loaded engine rev-up type test.

Diesel catalyst and Diesel Particulate Filter.

This diagram shows how Diesel Catalytic / Diesel Particulate Filter systems were constructed and installed onto passenger vehicles and light/medium duty trucks from the 1996 until the current model years.





Catalyst installed on a light-duty Diesel pickup truck.

This picture shows an all-in-one type Diesel Catalytic converter with the Diesel Particulate Filter built into the unit. Notice the all-welded seams type construction of the unit; there is none of the classic “ribbing” on it.



Typical Uric Acid Fluid Injection Diesel Catalyst.

This picture shows a Uric Acid Fluid Injection Type Diesel Catalytic Converter installed on a light-duty Sport Utility Vehicle. Notice the injection tubing and fitting for the internal nozzle at the front of unit.



Typical Regeneration type Diesel truck catalyst.

Shown here is a Regeneration Type Diesel Catalyst installed on a light-duty pick-up truck. Notice the tubing/fittings for the Diesel fuel oil injection nozzles inside it; plus the wiring harness for the igniter inside.

Diesel Catalytic Converters are described in Emissions Application Guides as:
DOC, which means Diesel Oxidation Catalytic Converter.
DPF, which means Diesel Particulate Filter.
DPR, which means Diesel Particulate Reduction System.
SCR, Selective Catalytic Reduction.

NOTICE: The DPR Systems are those which include Regeneration Type Catalytic Converters and Uric Acid Injection Type Catalytic Converters. Be alert to this subtlety. Catalyst inspection is required on ALL Vehicles. On systems like the Regeneration and Uric Acid Injection type catalysts, make sure these systems are intact: that is, installed complete with the fittings, sensors and wiring harnesses.

Your inspection station is required to have the Emissions Application Guide manuals or the VPMD approved computer software from Motor-Alldata or Mitchell On-Demand with the emissions application data module installed.

If you encounter a vehicle which has had the catalyst equipment removed, you will have to “fail” it for not having the equipment installed. This can be irritating to your customer, but do not give in to pressure to “pass” an illegally modified vehicle.

If you have any questions during an inspection, call: 505-764-1110, weekdays 8:00am to 4:30pm; ask for the technicians in the bay for guidance on your concerns.

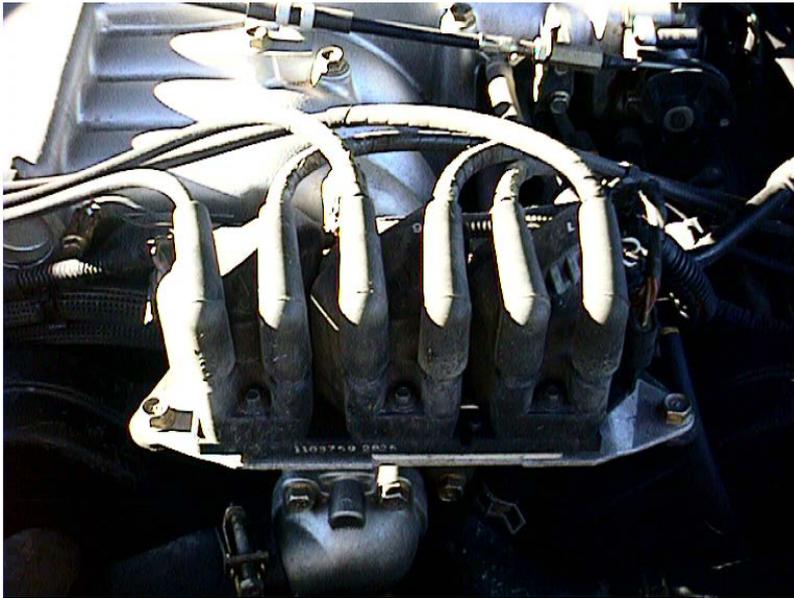
Ignition Systems. Distributors, DIS, Coil over Plugs determine number of cylinders

Standard or conventional ignition systems use distributors. The spark plug wires will be arranged in a circular pattern. Some will also have a coil wire in the center as shown.

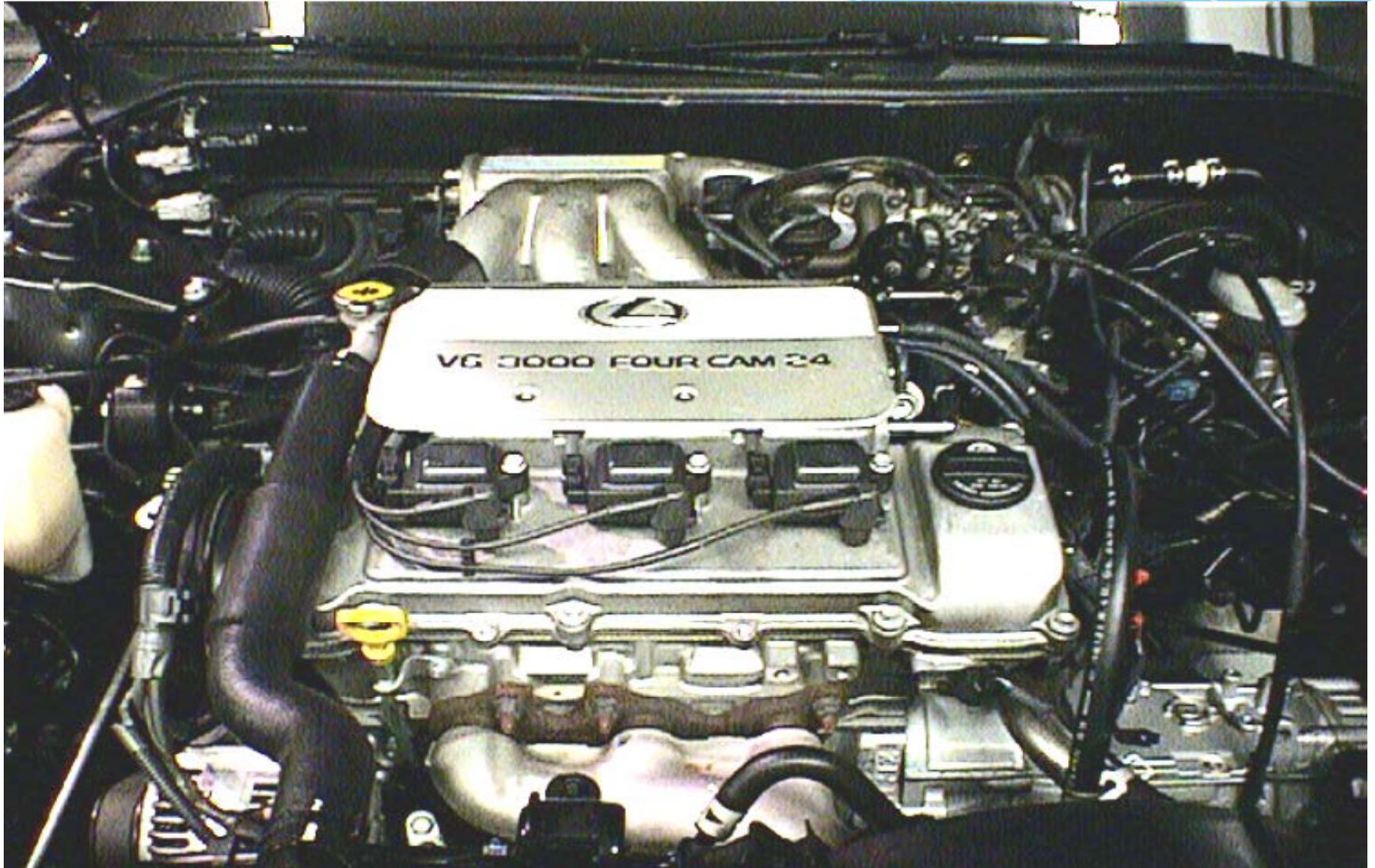
Count the intake plenum runners or spark plug wires can sometimes help to identify number of cylinders.



Direct or DIS Ignition will be rectangular with the plug wires arranged in a straight line. The type shown here is a “shared” system. Each coil fires a **pair** of plugs.



COIL OVER PLUG WITH SECONDARY WIRE



Identifying Ignition Systems

- * Proper identification of the ignition system is critical to the accuracy of the RPM reading displayed by the machine.
- * PAUSE, LISTEN AND LOOK TO BE SURE THE READING IS ACCURATE.
- * The BAR97 machine will allow you to pause the test and correct your RPM signal before finishing the test mode.

Slide Show Complete!

Any Questions Call 505-764-1110 Ext.

Bay