

# Networking

Newsletter

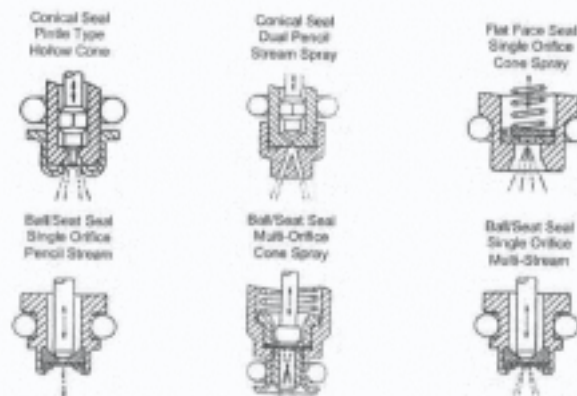


Jim Linder  
The Injector “Guru”

## Injector Fouling?

Fuel injectors must retain their calibration while in use in order to retain satisfactory engine performance, driveability and emission control levels. Cleanliness of the injector metering orifices and spray-forming nozzles must be maintained in order for the initial calibration to be dependable after extended use. This requires a careful selection of *fuel supply*, *additive treatment*, or *periodic injector cleaning* to maintain flow stability as mileage increases. A variety of injector designs are being used today to try to achieve a longer time cycle before this problem occurs.

The location of injector restriction actually happens to be in two areas of the injector itself. The tip area is one and the injector basket upper filter is the other. In stop-and-go city driving an accumulation of varnish-like deposits can occur. These deposits reduce the fuel flow and cause poor fuel distribution and in some cases a lean engine operation. This faulty operation will continue until the injectors are replaced or cleaned.



Examples of newer tip designs

### Case study:

Recently we were approached to perform fuel injector cleaning and testing of various chemicals and devices. To evaluate the effects of injector cleaning we used a 1996 Buick equipped with a 3800 V6 engine. Injectors used for these tests were taken from our large supply of core units. Each test performed used two problem fuel injectors: one with little or no flow and the other showing at least a 50% reduction in flow. These units were tested and flowed on our in-house off car flow benches. A four gas analyzer was connected in the exhaust pre-cat to read all the readings prior to converter for accuracy. A scan tool was used to determine the effects of the miss-fire caused by the defective injectors. Each test used a cylinder balance with gases to measure the actual fuel contribution ( in HC's ppm ) . Once the fault was confirmed, the injector cleaning process was applied and the engine was run on the injector cleaning mixture only with vehicles fuel supply removed for a specific length of time. *The results were amazing !* In ALL tests the no flow unit showed increased flow ( most of the time within specification) and the reduced flow unit was restored to specification.

If your shop doesn't clean injectors as a preventive maintenance item, they should!  
Our testing has shown time and time again that this service works!!  
One of my favorite saying is "IT WORKS SO WELL WE QUIT DOING IT " .

## Analysis from the “Sleuth”, Michele Winn



This month’s case study is a 1999 Mercury Cougar equipped with a 2.5L V-6 engine and only 54,000 miles on the odometer. Customer complaint is slight misfire at idle that seems to go away if you increase engine rpm. The symptom is also accompanied by a check engine light and a stored PO304 (cylinder #4 misfire). As usual, someone has already done the “gravy” work and replaced the spark plugs, wires and fuel filter. Unfortunately that didn’t fix the problem, so now it’s in our shop to find out what’s really wrong.



Pulling the car into the bay confirmed that there was definitely a misfire. Judging from the symptom that the misfire only occurred (or was worse) at idle, I started by checking for a vacuum leak.....nothing. My second thought was possibly a partially stuck open EGR valve, but as you can see in the picture to the right, the valve is located in the rear on the driver’s side of the car. Cylinder #4 is located on the front on the passenger’s side. Not likely that it would effect that cylinder. It wasn’t very likely that the problem was a dirty or restricted injector since the misfire seemed less off idle when there was more demand for fuel. Besides the fact that the vehicle had new plugs and wires, it also wasn’t likely that it was ignition-related since a weak coil should show more of a problem off-idle when KV demand is higher. The customer had already been warned of possible internal engine trouble. The next step was to check compression, both static and running.

Here are the results:

### Static Compression Test Results:

Cylinder #	1	2	3	4	5	6
First Hit	125	130	125	65	130	125
Final Reading	180	180	180	90	190	185

### Running Compression Test Results:

Cylinder #	1	2	3	4	5	6
	145	145	150	120	150	145

*Continued on back page.....*

## What's happening at LTS?

Here at LTS we stay very busy and it looks like the year 2002 will be no exception. Once again this year Jim will be traveling to many different states to provide training classes. We will also take our fuel injection trade show booth to 8 different trade shows in as many different states. In addition, we still have our on-going local training classes every month and also our week-long Guru Schools.

**Here's what's coming up during the first part of 2002 at LTS:**

### **JANUARY**

21-24 Local training

### **FEBRUARY**

1-3 World Of Wheels, trade show booth

8-9 ASA Cincinnati, trade show booth and training seminar

15-17 Guru-3

22-24 ASA Vision in Kansas City, trade show booth and training seminar

25-28 Local training

### **MARCH**

1-3 UCI Autowares, training seminar

8-10 ASA-Illinois, trade show booth and training seminar

18-22 Guru School

25-28 Local training

### **APRIL**

5-7 ASC-Ontario, California, trade show booth and training seminar

22-25 Local training

### **MAY**

1-12 Jim's annual Bug trip

20-23 Local training

### **JUNE**

6-16 The analysis "sleuth" goes on vacation (Harley trip to bike week in New Hampshire)

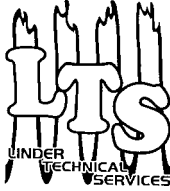
17-21 Guru School

You can keep up with our changing schedule by checking out our website at [www.lindertech.com](http://www.lindertech.com) That is where you will find the most up-to-date information regarding our schedule and "where's Jimmy".

# LINDER TECHNICAL SERVICES

4-D GASOLINE ALLEY  
INDIANAPOLIS INDIANA 46222

Phone: (317) 487-9460  
Fax: (317) 487-1868  
Toll Free: (888) 809-FUEL (3835)  
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## **Analysis from the “Sleuth” (cont.)**

Even if you don't have much experience with compression tests and don't know the specifications, you can probably tell from the readings that there is a problem with cyl. #4. Just like doing a quick check with an ignition scope, you are looking for one or two cylinders that stand out as being different from the others. It was obvious from the first two tests that there was definitely an internal engine problem. I could have narrowed the problem down further by doing a snap compression test. This would have told me if I was looking at a valve-train problem. In this case, I knew the engine would have to be torn down, so I advised the customer that his vehicle would need to be taken to a shop where those types of repairs are made.

Running compression testing was the focus of our May 1996 LTS newsletter. To read the entire article, it can be found in the newsletter archives on our website: [www.lindertech.com](http://www.lindertech.com), or call Michele at 888-809-3835 to obtain a copy.

The customer took his vehicle to one of the shops that is in our local year-long D.A.T.A. Center training programs. They advised us yesterday that the piston was bad on cyl. #4.