

## Tech Bits and Bites

July 2001



By Jerry Nuijen

JAGazette Technical Editor

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**Are you too rich?** Had a problem a few months ago with our '84 XJ6. It was running rich at idle. Adjusting the air bypass on the airflow meter only made the problem worse. Since I'd just put all new injectors in about a year ago and a session on the scope told me that all the cylinders were firing I moved to the logical conclusion that the airflow meter was bad. It was obvious that some previous owner (owner's mechanic) had pried the lid off the top and probably moved the wiper arm in an attempt to make the engine run "better" (pass smog). Probing with my digital multimeter showed that the wiper resistor had a few dead spots in it, but was in spec. So I made the big sacrifice and bought a rebuilt meter. Engine ran much better at all speeds. Problem solved? Not hardly! Now the engine ran rich at all speeds! Was it the catalytic converter? I put the exhaust gas probe directly into the oxygen sensor hole and, yes, the converter wasn't doing much to clean the exhaust. But since it had been running rich for so long this didn't mean that I should replace it. As soon as the rich mixture had a few thousand miles to work its "magic" on the new converter I would be right back where I started. Many times when a car won't pass the smog test replacing the converter is the most cost effective way to get it to pass, but unless you fix the underlying problem in the long run you just wasted your money on a new converter. I looked for vacuum leaks and corrected those that I found. I checked the timing and the advance curve. OK. I put each injector on a sampling digital oscilloscope. Each was getting exactly the same pulse of exactly the same duration. I pulled the individual injectors and checked their spray pattern and volume (I have a timed pulse switch that is made for GM cars but will work on Bosch injectors). All the patterns and volumes were within spec. I back probed the computer. Everything that I had the ability to check was OK. The computer is almost never the problem if the car runs and drives OK. The injector resistor block checked OK, as did the wiring harness. The temperature sensor for the computer was within spec. The cold start injector was not leaking. Compression and leakdown tests showed the mechanical side of the engine to be OK. Pulling the cam covers showed the exhaust valves needed adjustment, but this did nothing to cure the rich condition. Oh, I forgot to mention that somewhere along the way I disconnected the altitude compensator next to the computer. Jaguar started putting these in around '84 to make the car run better at high altitude. The compensator senses atmospheric pressure and sends a signal to the computer to richen the mixture if the atmospheric pressure is low. Usually the compensator sticks after six months and if it sticks at high altitude you have a car that runs rich when you return to sea level. Many knowledgeable Jaguar mechanics will tell you to disconnect the compensator. I want to thank **Tony Zannoto**, shop manager at San Jose British, and a recently joined member, for setting me straight about the correct way to disconnect the compensator. You must hook the two loose ends together. Otherwise the computer thinks that you are sending the low-pressure signal and it will richen the mixture all the time. Now that the computer isn't artificially richening the mixture I need to get the catalytic converter working properly again. Running hard with the oxygen sensor disconnected should do the trick. There's a lot of gunk that needs to be burned away, but I'm not replacing that cat unnecessarily.

**GDI** While I'm on the subject of fuel injected engines I'd like to pass along a few tidbits from a recent visit to the Chevron Research facility in Richmond. The main purpose of this facility is to test

Chevron's additives for their effectiveness in different engines and to make sure that running these additives will not adversely effect any pollution control devices. As you know from the advertising, Chevron is proud of their proprietary additive, Techron. All modern gasolines have additives in them to clean injectors and intake valves. Chevron makes additives that they sell to other refiners. Does Chevron really put a different, and better, mix in their own gasoline? I never did get the answer to that question, but I will tell you that independent tests show Chevron fuels to be among the cleanest burning over the long haul. Is it worth it to pay 30 cents more per gallon, as compared to Tosco (every gasoline in the Bay Area except Chevron and Union 76 is refined and blended by Tosco)? I leave that for you to decide. I need to get to the point. Chevron is currently testing some gasoline direct injection (GDI) cars from Mitsubishi. As you may know these cars are already on sale in Japan and Europe. The benefits are many. More power, better fuel economy (as much as 20%) and better throttle response with the super-lean mixtures all cars run today. So why don't we have any GDI cars in the U.S.? One minor and one major reason. How are you going to clean the intake valves if the only thing that goes past them is air? A minor problem. It takes a long time for deposits to build to the level that they will effect performance and exhaust quality. GDI engines, at least as conceived by Mitsubishi, produce EXTREMELY fine carbon particles out the tailpipe. These particles are pure carbon and measure about 6-9 nanometers. By comparison diesels produce particles that are a carbon matrix filled with all kinds of nasty stuff that causes cancer and are about 6-9 microns in diameter, a thousand times as big. We all know that diesel exhaust is bad for our health. What do the GDI particles do? They are so small that they stay afloat in the atmosphere for days and when we inhale them they pass right through all our usual defenses like nose hair, mucus, and beating cilia that try to sweep all that crud into our stomachs. They probably even pass right into our bloodstream through the alveoli at the ends of our bronchial tubes. Certainly they will coat our lungs. MAJOR PROBLEM.

**Non-essential tools** A few months ago when I talked about replacing steering rack bushings I mentioned that you will need some kind of a press. A rudimentary hydraulic press is a necessity for a lot of repair jobs. One can be purchased or made for about \$100. Now I'd like to show you the Rolls Royce of hydraulic presses. [Click here](#) and get a view of my assistant, Eli, using a 40 ton Nugier. He's pressing a bearing off some Japanese rice grinder countershaft, but we've used the press on Jag rearends and it up to the job. It has some nice features like two stage action; moving quickly when the pressures are not great and slowing down when the going gets tough. [Click](#) The real secret to the usefulness of this non-essential tool is all the adapters for various pressing jobs. Some are custom made for a particular job. [Click](#) Every well equipped shop should have a Nugier with all the accessories. Have I ever seen 40 tons on that dial? Are you kidding?

**GGG** (Griot's Garage Gadgets) Got a catalog in the mail the other day from Griot's Garage. Griot's uses the profile of an XK140 as his logo, but as near as I can tell he offers nothing special for Jag enthusiasts. He does have some very interesting gadgets though. Example: a flexible magnetic pickup tool that has the magnet in a sleeve so you only grab what you want. [Click](#) Another example: universal thread restorer that starts on the inside of the thread where it is still good [click](#) (anybody ever use this gadget? Does it really work?) Check him out at [www.griotsgarage.com](http://www.griotsgarage.com).

**Errata** When I wrote about multispeed planetary transmissions I stated that the IC engine is basically a constant speed engine. I should have said it is a constant speed *and constant load* engine. I stand corrected. In order to optimize the efficiency of the IC engine it needs to supply a constant amount of torque. This is the rationale behind hybrid power. When the engine isn't working to accelerate the car or pull it up a hill it should be charging batteries. Otherwise it will be spinning but not working at peak efficiency. The problem is that hybrid power is heavy and the increased efficiency may not be worth it. Saab's variable compression ratio engine might be another answer to maximizing efficiency at a constant engine speed without the weight penalty.