Linder Technical Services

Networking Newsletter

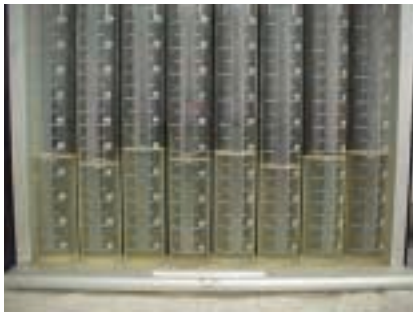
August 2006

A CASE OF MISTAKEN IDENTITY

Have you ever tried to save a dollar or two and wound up with something that was of little or no use? Did you have to spend even more money to get things right? Well, here is one of those stories. A potential customer (I will call him Titus) called and wanted to know the price for a set of eight, 24Lb (60 mil).Ford injectors. Titus also wanted to make sure that they were a light blue color at the top. I quoted him the price, to which he informed me he knew where he could get them for half that price. I thanked him for calling and told him if we could do anything for him to let us know.

A little over a week later Titus showed up at the shop with his purchase of 8 light blue top injectors and wanted us to check them before they were installed. Though they looked a little rough, I thought he might have found a bargain.

While I was setting up the ASNU to flow the injectors, Titus was telling me that the guy he bought the injectors from has about 50 of them and he would probably give me a good deal if I want to buy all of them.



Once I got the injectors hooked up and working, Titus' bargain didn't seem so good. The spray pattern of the injectors was all over the place. These definitely needed the Wizard's magic touch. I proceeded to flow the injectors to show Titus how the spray may affect volume.

The flow was just as bad as the spray pattern. None of the injectors flowed 60-mil like they should. At best, there were 3 injectors flowing 50-mil. Titus agreed to have the injectors cleaned. During the ultra-sonic cleaning all sorts of contamination came out of the injectors. Most of it looked to be rust.

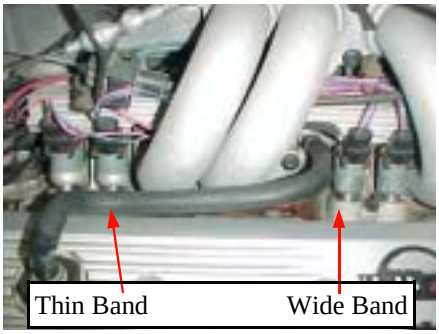
When the injectors were done with cleaning, I put them back on the flow bench. (Middle picture) They all had a good spray pattern. However, why would they all flow only 50-mil? (picture on the right)

Further investigation revealed the injectors that Titus had bought were not 24Lb injectors. The Bosch casting number didn't match any Ford application. They were actually BMW injectors and they were flowing at spec. So what is the moral to this story? The next time you need injectors, listen to the advise of The Wizard. Don't be a Titus!

Analysis from the "Sleuth", Michele

How Do I Get Myself Into These Situations?

A customer called with a problem on a 1939 Chevy Sedan w/ 1991 Corvette engine. He bought the car in Sept. 2004 and it hasn't run right since he drove it off the lot. The car starts hard, idles rough, runs very rich and intermittently stalls at stops. The customer mentioned that recently when he was out of town, the car started running so badly that he had to have some "work" done on the distributor but he still didn't feel like it was right. He felt like there was a problem with the fuel injectors and possibly with the distributor. Oh, and then he mentioned that he really has no paperwork on the car. He "thinks" it has a painless wiring harness, possibly a stock GM ECM, but with some sort of a chip and he's not sure if anything has been done to the engine internally. Then he reminded me that it's "just a 1991 Corvette engine", so how hard could it be?



I was excited because it appeared that the diagnosis would be easy. A fuel pressure check showed 42psi KOEO (spec is 40.5-47) and 34psi KOER (spec is 10psi lower w/ vacuum on regulator). Next I decided to check the injectors because I noticed there were 2 different types of injectors in the rail. They were all gray GM Multec injectors, but 4 of of them had a wide band and the other 4 had a thin band around the bottom. I remembered from an article Doug wrote back in September 2001 that the wide band injectors were less prone to electrical failure, but the thin band injectors were the ones that always shorted out. On this engine, all of the injectors should read at least 16 ohms (more if the engine is hot). It was easy to get to all of the injectors, so a quick resistance checked showed the following:

17.3 10.9 17.5 12.2 17.9 17.5 13.5 14.2

All 4 of the thin band injectors were bad and all 4 of the wide band injectors were good. The injector "Wizard" must really know what he's talking about! I was excited to think that I would be able to throw in a set of injectors and ship this thing out the door. I called the customer for approval and padded the labor figure a little anticipating problems. Wow, I'm really glad I did!

I am very familiar with these engines and I've become fairly quick and comfortable with changing injectors on them. However, the first thing I noticed was the A/C Compressor (aftermarket) would have to be removed. No big deal, just 3 bolts and it was out of the way. Removing the upper plenum went smoothly with no major problems except when I removed the coolant lines, the pipes were very crusty, so that required some cleaning before reassembly. With the top plenum off, I could see a mess of wires running everywhere. As you can see from this picture, even without removing the plenum, it didn't look like much care was taken when the wiring was done. Jim surveyed the mess and said that he would go get some tape and wire loom and tidy everything up before I put it back together. I took a break to rest my back and Jim came back to straighten up the wires. At that time, he found one of the wires on the alternator (which was put together with a butt-connector), was broken. He soldered in a new wire and finished wrapping the wires.

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Analysis from the "Sleuth", (Cont. from page 2)

When he was done, it really made a big difference in the appearance of the engine. At this point the day was almost over, so I decided to finish putting it back together the next morning.

Back at work the next day, I finished putting it back together and had the "Wizard" help "Key on" so I could check for fuel leaks. It all looked good, so I released him and tried to start the car myself. (I like to be alone after a big job so there are no witnesses if anything goes wrong :) It cranked a few times and started briefly but died. Not unexpected. Seems like every time I have a car apart, it never wants to start and run beautifully on the first try. I tried again and this time it started quicker and ran a few seconds and died again. OK, 3rd time is a charm, right? I tried to crank it over again and all I heard was the buzzing of the starter. Nice. The battery was dead. (Remember that broken wire to the alternator?) Of course, since it's "just a 1991 Corvette" , so the battery must be easily visible under the hood. WRONG! I had to call the customer to find out how to open the truck to get to the battery. After all, none of the doors on this car had handles. Both passenger doors were activated with a button on the key fob. After talking to the customer and laying underneath the rear end of the car, I found the trunk release cable. While I was charging the battery, I had to take the door panel off the driver's side door because the last time I popped it open with the key fob, it opened, but wouldn't stay shut. Yes, my day was going downhill fast and to make it worse, when I was talking to the customer about getting the trunk open, he mentioned that "ever since" he had the distributor "worked on" at the last shop, it has started hard and pinged. He wanted to know if I could make sure the distributor was put in properly. I explained that I don't mess with distributors, but Jim did. When and IF I got his car running, I would take it over to the hot rod shop for him to look at.

At this point, the customer had the nerve to remind me that he "really wanted his car back today". I reminded him that he has had 2 years to get it fixed and I thought another day wouldn't kill him. Then I mentioned that if it actually had been "JUST A 1991 CORVETTE", it would be finished by now.

With a freshly charged battery, the car started and ran! WOOOHOO! I was so relieved. A check of my scan tool showed the block learn and integrator numbers that had been down around 110 (very rich because of shorted injectors that were being held open) were now 128 +/- 2. I was happy with that except it still ran a little rough and after running for a few minutes, it died. I decided it was time to walk over to the hot rod shop and ask the "old guys" for help.

Intrigued by my problem, Walt and Jim eagerly walked back with me to check out the car. First things first, they tried to set the timing. Remember, the customer told me when he dropped it off that a shop out of town had done some "work" on the distributor and ever since then he didn't feel like it was right. A little white-out on the crank to brighten up the mark, and they were ready to go. About a 30 degree rotation of the cap moved it within sight and the distributor was tightened down. Unfortunately, now the car barely ran, started backfiring out the tailpipe and eventually died and would not re-start (no spark). (I reminded the old guys that at least the car was running after I finished working on it-heehee). Next they removed the cap only to find that it had the wrong coil. Jim spotted it right away because the coil wires were red, black and white. The white wire coils are for Pontiac and Buick. The "yellow" wire coils are for Chevrolet engines. Of course, none of this made sense to me, so Jim went to the cabinet and pulled out an old Delco book that said exactly what he had just told me. The polarity of the white and yellow coils are different and if they are installed in the wrong application, it will cause a backfire under load. A new coil was installed, but still no spark!

Conclusion on back page

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Analysis (Cont. from page 3)

Inner shaft should stick up above pickup coil so c-clip groove is visible

This time the distributor was removed from the engine only to find that the pickup coil was plugged in upside down. Yes, there is an alignment tab on the connector, but if you try really, really hard, you can plug it in upside down. Obviously having the pickup coil leads reversed along with the wrong coil could have been the cause of my backfire and misfire under load. Not only were the leads reversed, but the shaft was actually rubbing on the notches on the inside of the pickup coil and the upper bushing had been pushed down so far that the retaining groove wasn't visible and the c-clip was missing! At this point, we decided to order a new (reman) distributor and start with all good parts.

Two days later when the new distributor arrived, Walt and Jim installed it and we cranked the engine. Nothing. Checked for spark…..nothing. Unplugged the distributor harnesses, ran separate power and grounds and cranked the engine. Now we have spark! Plugged in the tach and power leads and cranked the engine. Spark! Plugged in the 4-wire connector and cranked the engine. No spark! What was going on? The only thing we did differently was to plug in the 4-wire connector that goes to the computer. Was one of the wires in the harness shorted? Was there a problem with the computer itself?

I decided it was time to locate the ECM. Easier said that done. After 1/2 day of searching and tracing wires, Walt finally found it hidden behind the only interior panel that did NOT have velcro or a hinge. Yes, it was a stock GM ECM, but the yellow "crayon" markings on it indicated it came from a junkyard. I remembered the customer mentioned there might be a "chip" , so I took off the cover to discover a Jet Products chip. A quick call to the Jet Products hotline with the part# told me that the chip was a "spark and fuel upgrade". Nothing against Jet Products or any of the other manufacturers of performance chips, but I can't tell you how many times a car came in running badly and ALL I DID was remove the chip. So, out it came. At this point, it couldn't hurt. While I was messing around with the ECM, Jim was back looking at another ACDelco book for a wiring diagram of the 4-wire distributor connector. Almost simultaneously, he shouted that one of the wires was a computer ground and I shouted that I had located a ground connection that was only finger tight. There were 7 different wires at this particular connection, most of them labeled……...yep…..one of them was for the ECM. Could this be the problem? Due to the location of the ground, there was no way to get it tight, so I relocated it to a more accessible spot a few inches away. With that tight, and the harness plugged in at the distributor, we cranked the engine…..and it started! Not only did it start, but it ran great! No misfire or backfire under load, no rough idle, just a smooth-running engine.

So, would fixing the ground wire have fixed this car to begin with? I don't think so. Remember I had 4 shorted injectors AND don't forget that the ignition coil was incorrect and the distributor shaft actually making contact with the pickup coil I don't think any SINGLE part would have fixed this car. It was a combination of things that took way too long to track down. But, at least it's fixed, out the door and the customer is happy. I only hope he DOESN'T recommend us to his fellow hot rod buddies!

Stay tuned to an upcoming newsletter to see scope captures of the old distributor with the incorrect coil and pickup leads reversed to see what effect it has.