

“Putting it in reverse”



A research project on reverse engineering

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The article, "Get Ahead by Putting It in Reverse" about reverse engineering, has made me look at things a little different when approaching a vehicle in my service bay. Reverse Engineering has made me think of the diagnostic process and how it really helps out when it comes to diagnosing the issues in a timely manner. A few key points that I will explain are what you have and what you don't have, how I have applied this theory to live work, and how to incorporate this knowledge into every day work.

The reason I chose to write about this article is because this is more my style of diagnosing vehicle problems. When I was younger my main mechanical influence was my granddad, we would find a lawn mower in the trash that someone would junk because they didn't know the nature of the beast. My granddad always told me before you try to fix something you need to figure out how it works, that quote has stuck with me since the day he said that and I use that theory on everything from changing a headlight bulb to diagnosing a crank no start condition. When reading this article by Jorge Menchu one of the main things I picked up on was "find what you have (and what you don't have). To find out what is wrong with a vehicle in order to fix it you need to know whether or not you have spark, compression, and fuel. Every internal combustion engine needs these three things whether it's a lawn mower engine, or a Lamborghini.

When you get a customer's vehicle in your service bay you must be strategic about you approach it. One of the most helpful things that Mr. Morton showed us was a customer interview sheet. And on that sheet he showed us it asked questions that the customer could answer whether they are mechanically minded or not. One of the questions that stuck out was

“have you had any recent work done to the vehicle?” this question came in handy when at school we had a Chevrolet impala in for spark plugs and wires. The student’s car was a former patrol car due to the 3.8 liter v6 verses the normal 3.4 liter v6 and the one piece vinyl back seat. The student stated they wanted new spark plugs and wires installed due to one of the plugs breaking off into the cylinder head and wires due to one of the ends snapping off while removing the spark plug boots. So I changed all the plugs and wires with no issues, or so I thought. As we cranked it over the vehicle would crank but not start. We ran a few quick tests and found that we had spark but no fuel; this eliminated the “alarm clock”. The student’s gas gauge was not functional on the dash board so we decided to put one gallon in just to be sure that there was fuel in it. We hooked up a noid light to check for injector pulse, the injector pulse was fine. This left me scratching my head because the student drove it into the shop for the other class in the morning so we talked to the owner of the car and asked did you have any recent work done to the car? The student said they just tried to take out the plugs for a cranking compression test and an injector balance test. Knowing that they unplugged the injectors was a great deal of information and found that the pins for the injectors were bent and not making contact with the harness which explains the cranking and having pulse but no fuel being added to the cylinder. So I straightened the pins as best as I could and cranked the car over and it started right up. This was great because the student was happy because he didn’t have to put any additional money into the car to make it run, especially because he just bought the vehicle two days before.

This car was a little tricky because every injector appeared to be plugged in properly and if we didn’t talk to the customer to find out that they were running tests on the injectors it

would have taken a bit longer to solve the problem. This diagnosis was fairly straight forward with finding that when we injected propane into the intake the car started right up and because we had injector pulse made me look more closely at the injectors themselves, just another way finding what you have and what you don't have to get you into the proper funnel. Since reading the article about diagnostic reverse engineering and having a few diagnostic jobs under my belt I've learned to check the connections on every connector I can see mostly with a wiggle test. This is a pretty quick and easy G test that allows you to track down wiring issues. Between a decent digital volt ohm meter a good wiring diagram and a box of crayons you can have the upper hand of almost any electrical system.

Like I said earlier about my grandfather telling me you need to know how something works in order to fix it. When you become a professional learner and really start to understand how to make a system work properly. Then when it breaks you can fix it easier by knowing what a known good vehicle is like. Like Mr. Morton always says "it's the 85- 15%" meaning the 85% is how a vehicle does something and the 15% is how a vehicle dos it. This helps you to "know your opponent" the more you know about a vehicle the better understanding of the systems allows you to find the issue in a timelier manner. When you really grasp the concept and really get down to it, it's fairly straight forward. As my granddad always said "it's like pouring water out of your boot with the directions on the heel"

Bibliography

- Real life experience
- And Mr. Morton's theory class
- "Get Ahead By Putting It In Reverse" by Jorge Menchu, Motor Magazine, Nov 2007.

Additional articles by Jorge: <http://www.aeswave.com/Articles-by-Jorge-Menchu-17.html>