

ASK THE EXPERT



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Why Does My Shop Need a Lab Scope?

CHRIS MARTINO, IVS 360 Support Center Manager – East Coast

Vehicles are not getting any simpler. In the old days you used to be able to listen to a noise, feel where the vibration was coming from, and know what bolt to tighten to address a customer complaint. With the advent of scan tools in the 1980s, technicians were taught to get a fault code and test the system. This was usually done with a meter or test light. As scan tools became more advanced and data PIDs became more abundant, techs started to rely on codes and scan tool data without doing any component level testing.

Fast forward to today's vehicles. Vehicle modules communicate with each other through high-speed CAN BUS, and vehicle systems detect faults in milliseconds. Some systems are not capable of pushing enough amperage to illuminate a test light, and sometimes using a test light can trigger a fault! While I am a fan of old school diag tools at times, there are many instances that using them can lead you down the wrong path.

Why can't I just use my scan tool?

A: While modern scan tools are light years better than they used to be, they have a couple of flaws.

They only tell you what the computer sees and interprets. This roughly translates into "garbage in, garbage out." What if a sensor is lying? Computers only know what is told to them and then they make calculations based on that information.

What if your timing chain is worn? That computer sees a slow down and speed up of the crank sensor, then calculates the engine position using the cam and crank sensor. If the chain is off, the engine might attribute the misfire to a different cylinder. How many of us have replaced a coil, plug, and injector on the wrong cylinder because "the dang scanner told me to?"

Even the best scan tools can only show data so fast. How many of us have turned off as many data PIDs as possible so that we see only what we need right then and there just to keep the refresh rate high? Sometimes even looking at data, the refresh rate is not fast enough.

Some of these newer modules can read sensor and voltage input in the microsecond range. There is no scan tool that will display data that fast. To diagnose today's tech-heavy vehicles, you need to see the data at the same speed the module can see it.

Now the next question would be, "can I use a meter?" An average multimeter has a refresh rate of about 250ms. On top of that, while it is sampling data, it is averaging the voltage it sees and displaying it. If you have a really fast spike or dropout, your meter may not see it, but the module will. This is where a scope comes in handy!

What lab scope should I buy?

A: I get asked this question all the time. The best answer is: the one you will use. Do you have one sitting in the bottom drawer of your toolbox, right under the R12 AC sniffer? Does it power on? Use that! Are you considering purchasing a scan tool with a scope attached? Use that one! If you ask anyone's opinion, they will tell you to get what they use. I would recommend doing some research. Look on YouTube or Google — there are thousands of videos and reviews out there that will display the usage, layout, and functions of most scopes available on the market.

Will this scope magically tell me what is wrong with the vehicle?

A: No!

That's like asking, "will this wrench fix the car for me?" A scope shows voltage over time. Knowing what



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good voltage or amperage patterns look like comes with training.

As with anything, the more you use one, the better you will get at it. Coupling scope usage with a good understanding of how electricity works will make you unstoppable!

What kinds of things can I test with a scope?

A: To be quite honest, with some imagination, there is not much that you cannot test with a scope. You can test things like simple voltage drop across a circuit, sensor voltage dropouts, primary and secondary ignition, and so much more!

Amp clamps and transducers open the door to more possibilities. With the proper attachments and some creativity, the sky is the limit. I have a friend who used a simple piezoelectric sensor he found on eBay, hooked some leads to it, attached it to a vice grip, and he made his own version of chassis ears. When the vice grip is hooked to a chassis component and it makes noise, there is a visual confirmation on the screen showing where the noise is loudest.

He also took another piezoelectric sensor and hooked his mechanic's stethoscope to it. He now can use it to look for noises in bearings and such. Ever have a belt pulley make noise but were unable to pin it down right away? Not anymore!

When should I pull out my scope?

A: In my opinion, a scope should never be put away. Once you see the things you can do with one, it will never go back in the box. You will find

and learn techniques that will greatly speed up your diagnosis. You may even look at a diagram and come up with a test that may take five steps out of a diagnostic trouble tree by looking at one amperage waveform.

Did you activate a component on a scan tool and nothing happened? Is the scan tool bad or is the vehicle bad? What if the component is bad and the module cuts off voltage after 20ms to save itself from shorting out? Hook up a scope, activate the component. See what happens. I cannot tell you how many times this has stopped me from going sideways in a diagnosis.

The most important thing I need to add here is this: The first time you pull out a scope should not be when a car is broken. What if you do not see a trace? Is it hooked up wrong? Is it set wrong? Is no voltage change part of the issue? You need to know what good is before you can know what bad is. Practice on known good vehicles. Get used to your scope. This way, when you get one that's bad, you know what you are looking for.

I have heard too many people complain that they wasted all this money on this fancy scope that did absolutely nothing to help them with their vehicle.

No. They bought a piece of equipment they did not understand and expected it to tell them everything without any practice. That's just not how it works.

So, in conclusion, get a scope. Get any scope and scope all of the things! ☒

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Keys to Successful Vehicle Programming

TEDDY JERNIGAN, *RAP Support Center Manager*

I have been in the automotive aftermarket for roughly 20 years. I started out like a lot of you, doing oil changes and tires and worked my way up. When I started programming vehicles there wasn't a lot of information out there. I had to figure a lot out on my own. I am going to be addressing some of the frequently asked questions I get daily.

Why should I be programming when I can just send it to the dealer?

A: If you are not programming in-house, you are letting money walk out the door. It is that simple. Most modern vehicles have 30 to 40 ECUs that will need some sort of programming, setup, or calibration for a related repair even if the module is not replaced. Even if your shop is only servicing suspension and brakes, you will find that many vehicles will need some sort of calibration to complete the repair. Are you going to send a customer to the dealer for a rack and pinion replacement? Keep the job and the profits in-house. You will also be making your shop more valuable to your customer base because you will be able to do something that many people think can only be done at the dealer.

Programming is too hard and time-consuming for me.

A: No, it is not. Everyone has heard a horror story about programming. Someone in another shop or a tech that used to work in your shop "bricked" a car and the dealer charged a bazillion dollars to fix it. First, this is most likely an exaggeration. Second, they "bricked" the car because they didn't do something right. Programming is not some magical thing that only a select few can pull off; it should be thought of in the same manner as any other replacement part. If a module needs to be updated or, we are just replacing the software in the module.

I don't have the equipment for programming.

A: Chances are you have some of what you need already. You'll need a laptop, a battery maintainer, a programming interface, and a subscription to the OE software. Most likely you already have a laptop to access service information, if not you can get started programming with an inexpensive refurbished laptop. Battery maintainer, not battery charger — there is a difference between the two. You will also need a programming interface or VCI. I recommend a J2534 compliant interface if you are servicing a variety of OEs as it will give you a wide variety of coverage, including dealer-level access for a lot of vehicles.

I have had several vehicles flashed and it never fixes the problem, so I just don't think programming is worth it.

A: I get this a lot. Programming is not a magical silver bullet. It will only "fix the problem" if it is designed to. The OEM service information will outline if programming should be done as part of diagnosis and/or repair and TSBs will be released if a software update is needed to fix an issue. It is also important to note that if you find a TSB that does not list your vehicle, then it doesn't apply. Don't grasp at straws hoping to find the silver bullet, follow the diagnostic process and program when needed. And don't let the inability to program hinder your business. The last thing you want is to spend time diagnosing an issue, only to have to send it off to the dealer for programming.

I'll just order pre-programmed modules, so I don't have to worry about programming.

A: That is good in theory, until you realize that in most cases there will be some sort of setup that needs to be done after it is installed. For example, if you install a pre-programmed PCM in a Ford, you will need to run the PATS function to make the vehicle start. You may also run into situations where the tire size or axle ratio is not set during the programming, and you will have to correct that. Without an in-house programming solution, you will have to send the job out and I guarantee the dealer will not charge you less because the module was pre-programmed. You also run the risk of getting an incorrectly pre-programmed

module for the vehicle you're servicing, and many OE's don't allow programming to be overwritten. Save yourself some trouble by programming in-house.

Isn't it best to make sure the modules are up to date before I diagnose any issues?

A: In most cases, the answer is no. Programming prior to diagnostics could break something or add another variable to your diagnostics, making your job harder. Imagine telling a customer that you must change their brake pads before you can figure out why it pulls to the right when braking? Yeah, it may also need brake pads, but chances are something else is the root cause. ☒



Developing An Efficient Diagnostic Process

CHRIS MARTINO, *IVS 360 Support Center Manager - East Coast*

Every technician has his or her own diagnostic process. But there are commonalities that everyone who repairs vehicles can utilize to make their diagnostic process smoother, more efficient and more accurate. Using a live diagnostic support service like what Opus IVS offers to technicians is one piece of the diagnostic process that many techs might not realize or utilize.

Why is it important for every technician to follow the same steps for every vehicle with their shop's diagnostic process?

A: I take a cue from John Thornton. He preaches keeping the same tailored process for every vehicle that he touches. This standardized practice will keep you from being led astray on a diagnosis. We've all been there: neck deep in a diagnosis jumping from system to system trying to find some bit of information to cling to. This is an extremely inefficient way to get to an answer — it's also a good way to miss a valuable piece of information that will lead to the diagnosis.

What tips do Opus IVS Master Technicians have for adjusting a diagnostic process to your skill level, not that of another tech in the shop?

A: Develop a process that works for YOU. Tailor it to the way you learn and think. My process may not be the best for you. Also, be prepared to change it. Failure is everyone's best teacher. I spend time

at night going over the vehicles I worked on that day and try to work out how I can get to the answer more efficiently the next time.

Keep in mind, a diagnostic process of a seasoned technician with 30 years of experience will never be the same as someone just getting into the business. As you learn circuit theory and design, you will grow and modify your process. ➡

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Does a diagnostic process truly start with a scan tool or should technicians reconsider how they begin?

A: Diagnostic process starts at the customer interview. Nobody knows their vehicle like the person that drives it daily. You need to start by listening to the complaint and asking guided questions. Next, recreate the complaint. I don't want to be looking at a scan tool at this point for two reasons:

1. I don't want to be distracted by trying to find scan data.
2. You are introducing a variable into the equation.

I like to think of the scientific method — first you make an observation, next you test it, then you introduce a variable, and then you test that. Repeat until you recreate the complaint.

The vehicle owner does not drive the vehicle with a scan tool, neither should you until you are able to recreate the problem.

Once the problem has been recreated, then – and only then – is it time to whip out a scan tool and look for data that can cause your issue.

What is the most effective way to diagnose intermittent issues that may not be present when the vehicle is brought in?

A: The most effective way to diagnose an intermittent issue is to question the customer. Make them part of the diagnosis. Some shops utilize a check sheet for the customer to fill out. I fully believe in this process. There are many sheets available on the internet. Incorporating something like this will put you on the right path to a confident diagnosis.

If the car isn't broken, you can't fix it. I know this is some basic info, but we technicians sometimes forget this while elbow-deep in a vehicle. If a vehicle is not acting up, and you can't get it to act up, STOP!! Re-interview your customer, maybe get in the car with them and let them recreate the issue. Let the car sit. Maybe even let it come back. If you are taking parts off and disassembling harnesses trying to diagnose a vehicle that isn't broken right now, you are only doing work that can't be charged for.

This can be a hard pill to swallow, but it will save you many headaches in the future.

How can technicians properly document repairs and test results for the client?

A: I'm a big fan of documenting all the things. I used to do this with pen and paper. This worked for the most part...until it didn't. Now, I am a big fan of the digital integration that is becoming more commonplace nowadays. This allows all notes and test results to be shared between the techs and front office. You can share videos, scan data, scope captures, etc.

Save your scan data. Save your pre- and post-scans. Save your scope captures. Use your phone to document your progress and repairs. This all can go into a final report for the customer. It can also back you up in case the customer comes back with the "ever since you's".

What should technicians consider when deciding which scan tool is best for them?

A: The first thing techs and shop owners need to understand is there isn't one tool that does everything. As a tech, I personally owned three high-end factory scan tools that the shop did not have to compliment my diagnostic workflow.

When looking for a scan tool, you need to consider your needs and what you are trying to do. You should not look for a scan tool to answer ALL your issues; this is a recipe for disappointment. You want a scan tool that meets as many of your needs as possible and use it for that. Ask yourself the following questions:

- Do you want to program with this tool?
- Do you want a platform for diagnostic support?
- Do you want a scope and scan tool in one?
- Do you want to compliment your Euro arsenal?
- Do you want a tool for quick test drives?

Think about what you want to accomplish and do your research. Today's consumers are far more informed than they have ever been. Anything you want to know about a tool is out there on the internet. Someone you know has owned one. There is a YouTube video available on it.

Do your research and be honest with yourself and your needs. This will lead to an informed decision, and a happy purchase. ☒

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