

June 2023



Technicians Service Training

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Editor

"G" Jerry Truglia

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"Lessons In Asian Drivability"

With Asian vehicles being a very large part of the U.S. automotive market, more than likely you are already working on a few of the different brands. This article will describe some of my recent experiences with Asian vehicles and what I did to diagnose and repair them. Let's start out with a 2009 Subaru Forester 2.5 DOHC turbo that came in with a complaint of low power.

A Sagging Subaru

Since this vehicle had 171k miles, it just may be in need of some normal service. A vehicle check of this Subaru revealed that the Check Engine light was not illuminated and there were no codes stored in any computer system. The vehicle owner's complaint was an intermittent noise from the engine as she was driving. Our normal routine when checking out a vehicle is to always check the basics first since any one of these can potentially cause a problem. Prior to the previous checks and test we had performed a visual inspection, TSB look up, Identifix search and a system scan of the complete vehicle. Our next step on this Subaru was to check the mechanical condition of the engine by performing a relative compression test using one of our labsopes. Believe it or not, we still use our old Fluke 98 Labscope since it turns on just by pressing a button and goes right into the relative

(Con't on page 2)

"Lessons In Asian Drivability" (con't from p. 1)

Compression test with a few clicks of a button.

The test is easy to perform, since all we have to do is connect the Labscope

leads with a filter to the positive and negative leads of the vehicle's battery post. Once the labscope is connected to the vehicle's battery, the fuel is disabled by either the Clear Flood method or removing the fuel pump re-



lay, followed by cranking the engine over for 30 seconds or so while the test results are being displayed on the screen. We make sure to perform the test two times, making sure that the test results are the same whether the results indicate a good or a bad condition. If the test indicates a cylinder problem we then proceed to connect another scope channel so we can sync to the firing order, via number one ignition.

The reason to sync the scope is to confirm what cylinder in the firing order (1-3-4-2 in this case) would be identified as the problem cylinder. When we locate the weak cylinder, we request more time from the vehicle owner to perform a dry and wet compression test followed by a cylinder leak down test, so we can pin down the cylinder that has the issue.

(Con't on page 6)

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Jorge Menchu the “Labscope Guru,” AES Wave

John Anello of Auto Tech On Wheels

Mark Warren of World Pac / Motor Magazine

Brandon Steckler of CTI & Motor Age Magazine

Peter Meier of Motor Age Magazine

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"Lessons In Asian Drivability" (con't from p. 6)

Since the Subaru engine's relative compression test was good, we could rule out an engine issue and continue to look elsewhere for the noise. We road tested the vehicle and thought that we heard a noise, so we returned to the shop and set the vehicle up on the lift. To pinpoint the exact area of the noise, Franklin drove the vehicle on the lift while Bill and I were underneath the Subaru confirming the area the noise seemed to come from. The noise seemed loudest at the turbo, so Bill unbolted the rusty exhaust and here is what he found **(Figure 1)**. As you can see, the turbo was in bad shape **(Figure**

2) and needed to be replaced. To make sure the new turbo would not fail prematurely, the oil lines were checked for proper oil flow along with the banjo bolt that connects the line to the turbo. FYI, the banjo bolt does not come with the turbo, so make sure you order it or the new turbo will fail prematurely. Subaru will not warranty the turbo if you don't install that new



bolt! So, on this Subaru, we replaced the oil feed tube along with the banjo bolt that connects to right front of the engine head. Remember that the bolt is crucial for proper lubrication since the small filter that is inside it is prone to clog up. Once the repair was completed and an oil change was performed, the Subaru was test driven and ready to be billed out.

No Charge

Our next Asian gem at first seemed like a typical alternator failure that needed replacement. Over the years, we have all replaced our share of alternators without encountering any real problems. Well this 2002 Toyota Camry with 222,861 miles on it with the original alternator may change your mind. It's not what you're thinking - it wasn't difficult to remove because of rust or broken bolts.

(Con't on page 8)

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"Lessons In Asian Drivability" (con't from p. 6)

In fact, it was an easy removal and install. The problem was that after the alternator was installed in the vehicle it did not seem to charge and the idle seemed low. The white wire at the sensing terminal on the alternator had 11.6 volts at idle, while all the other wires had battery voltage. This is where you start to question the quality of the replacement alternator and your install. Since the alternator was a quality NAPA alternator **(Figure 3)** that has never let us down in the past and my top tech Bill was working on it, neither one was likely the problem.



This is where information systems come into play; in this case when we encounter something like this we go directly to Identifix. If there is no information in Identifix we go to iATN, Diag.net, Mitchell, ALLDATA, Motologic, YouTube and Google. As we searched Identifix we found the problem that we encountered listed right on their main page of our search. They provided the following test procedures: 1.) Voltage drop the white wire to see why it is only 11.6 volts. Run a jumper wire between the battery and the white wire at the alternator and recheck to see if the alternator will charge. 2.) Clean the battery terminal connections and clean the battery cable ends at the transmission and the body connections. 3.) Check the alternator and try a new source if the new alternator is faulty.

We performed the recommended procedures and found all of them to be in specification. We followed the Identifix suggestion of performing a throttle-body cleaning procedure as described. Once we were finished with the cleaning the idle returned to normal and the alternator was charging normal. It seems hard to believe that a dirty throttle body could

(Con't on page 11)



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"Lessons In Asian Drivability" (con't from p. 8)

cause a charging and low idle issue. Remember that you don't know what you don't know; we learn something new every day, and that day we certainly did.

An After-Crash-Repair

The next vehicle came in from one of the body shops we do work for that had nine body, one network and one chassis DTC (**Figure 4**). The vehicle was a

2016 Mazda CX-5 with 8,800 miles that was involved in a collision and had been repaired. The dash had the airbag, seat belt and a couple more icons illuminated. Knowing that the vehicle was new,

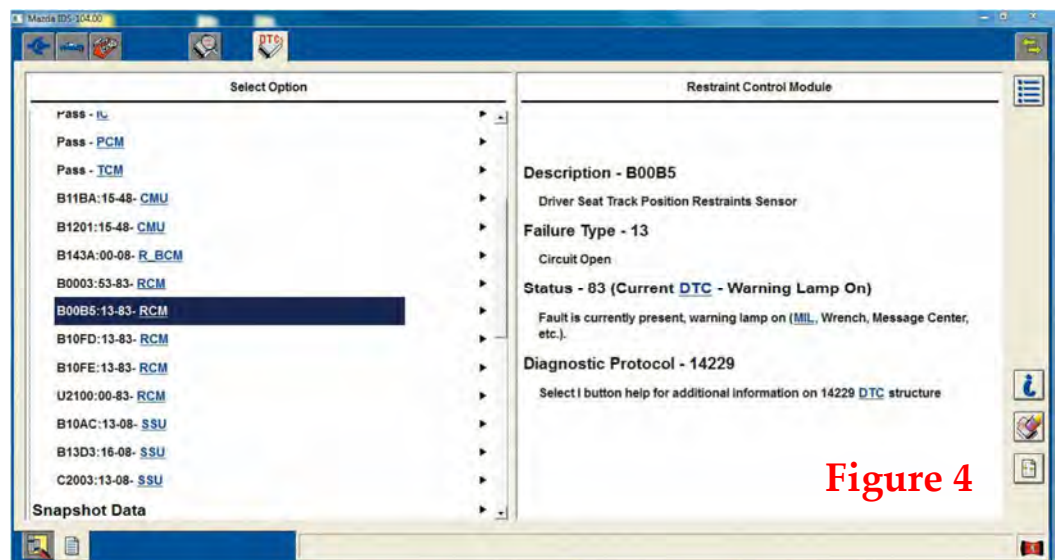


Figure 4

we decided that the only scan tool that would be capable to perform a complete and accurate vehicle scan would be the Mazda IDS. We needed to perform a test on the SRS system then initialize components and perform other resets that only would be available with factory software.

After we performed the vehicle scan, we identified the problems and tried to perform coding and resets that are commonly performed. On this new Mazda, the coding and reset functions would not reset the airbag, seat belt or other systems or extinguish the illuminated lights. The only way we could reset all the DTCs, and let the computers realize that the new parts were installed, was to go into the scan tool programming functions. This was a change from the normal way that we usually get the vehicle back to proper operation. We now had to change direction and go into module configuration (**Figure 4**) and find the As Built Data (**Figure 5**) to complete the operation. *(Con't on page 15)*


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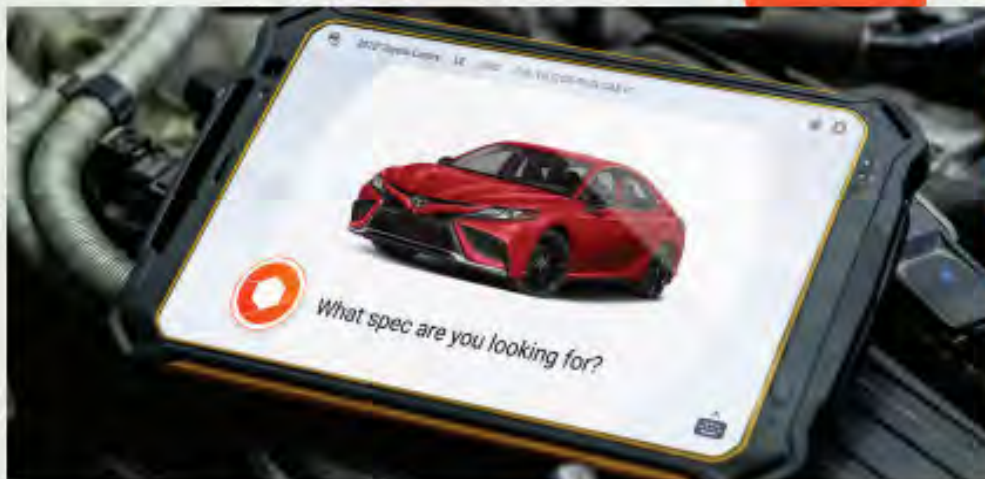
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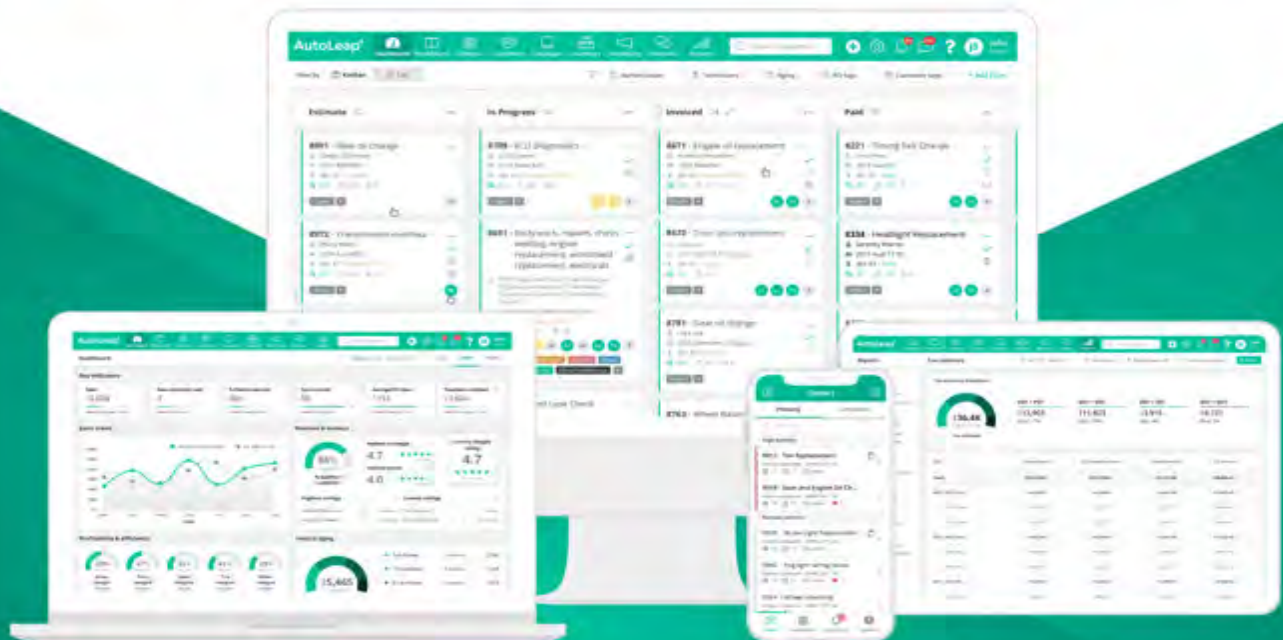
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"Lessons In Asian Drivability" (con't from p. 11)

This is a similar function that is used by Ford Motor company since they both use the same scan tool manufacturer. Once we completed the programming we were able to perform a seat belt calibration, steering wheel, audio pack, crash event, driver seat track, driver/passenger side peripheral sensor, to name a few, resets.

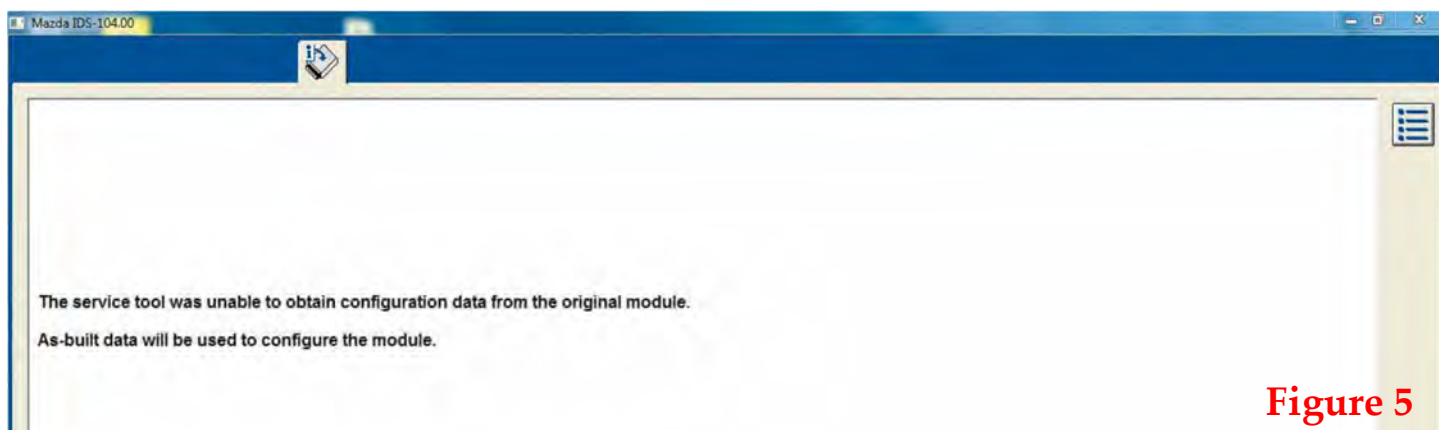


Figure 5

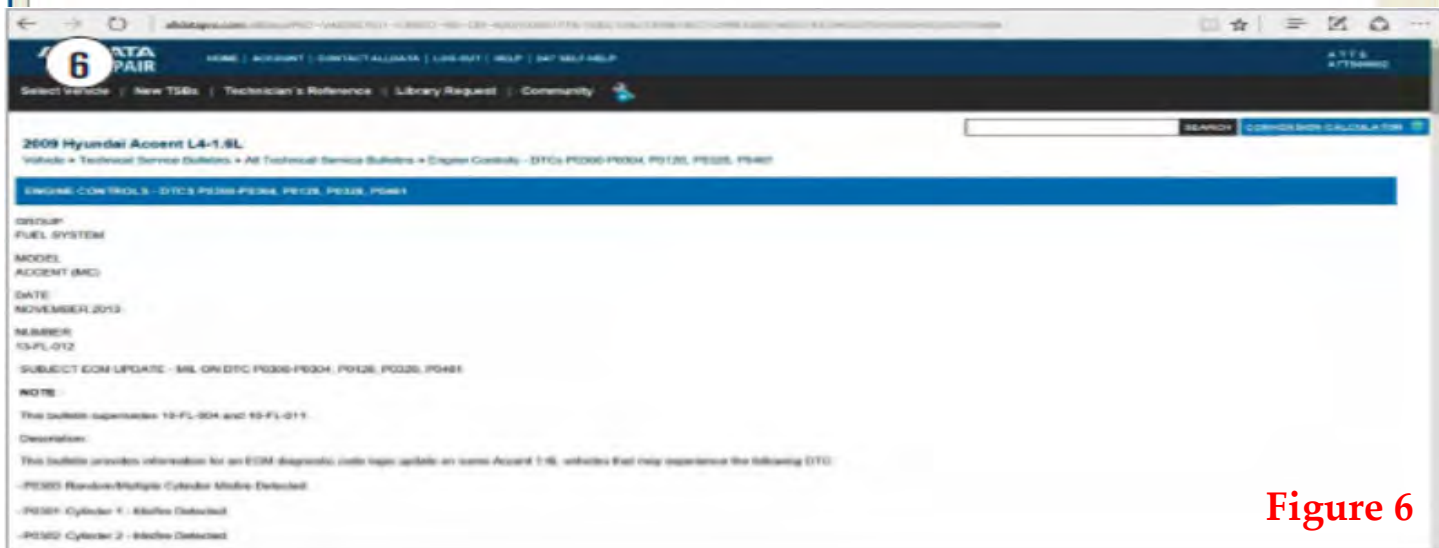


Figure 6

The lesson learned with this vehicle is that on some of these newer vehicles you may need to have the OE scan tool and the ability to think out of the box. When no directions are available on how to reset a system or component you have to draw down on your past experience and come up with a different approach. Trying something different than just a reset or calibration that refused to work led me to reprogramming the modules that restored this Mazda to new condition. With so many different scan tools and OEs using many different methods, you need to take your time and carefully explore all the functions in their scan tools or you won't fix the vehicle.

(Con't on page 17)



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“Lessons In Asian Drivability” (con’t from p. 11)

A Hiccupping Hyundai

A 2009 Hyundai Accent 1.6 L with 79k on it came in with an illuminated MIL. The vehicle was already to a local shop for a tune up that replaced the plugs, coils, air filter and performed an injection cleaning service. The vehicle owner did not understand why the vehicle was still illuminating the MIL so she decided to have us diagnosis it. After checking the vehicle out, we found that the wrong spark plugs were installed, so we suggested that they be replaced with the OE plugs for starters. We also found a TSB in ALLDATA (**Figure 6**) that pertained to engine misfire, stating a P0300 to P0304 could all be displayed as a result of a software issue. We recommended to the vehicle owner that we update the software to get her computer up to date.

We prepared the vehicle for the update program by first making sure that everything was working properly on the vehicle and making sure to shut off everything so the computer programming would not be interrupted. Next, we installed a battery maintainer, connected the Drew Tech M box to our laptop and the vehicle’s OBD II connector then downloaded the Hyundai J2534 (**Figure 7**) software. Once the software was installed we made sure to check for DTCs along with checking the Drew Tech Tool Box to see if there are any special procedures such as crank/cam relearn that would be required. The procedure went well, so we disconnected the

equipment and test drove the vehicle. We

reconnected the scan tool to confirm that there were no DTCs, misfires, or Mode 6 failures. We explained the repairs to the vehicle owner and

provided her with pictures of the reprogramming confirmation screen and the TSB. Now the vehicle was ready to hit the road with its happy owner.

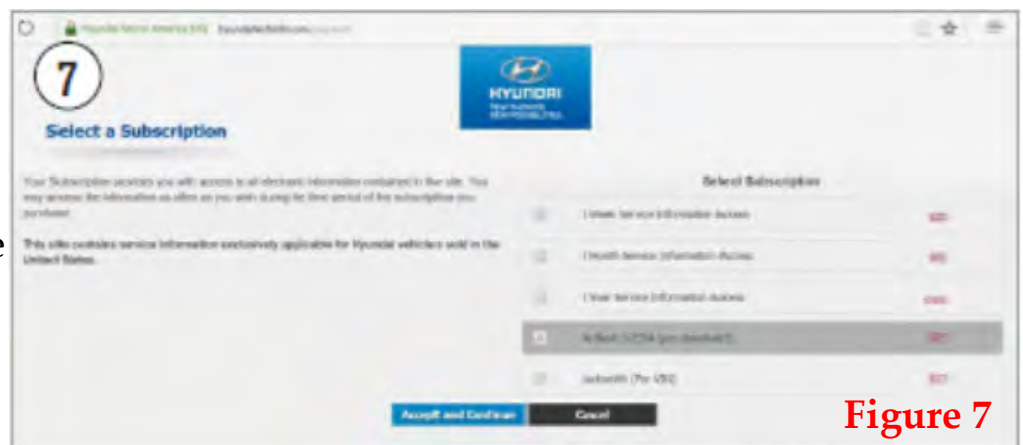


Figure 7

(Con’t on page 19)



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“Lessons In Asian Drivability” (con’t from p. 17)

An Unhappy Kia Converter

A 2005 Kia Sedona 3.5L came in with a P0430 Catalytic Inefficiency DTC due to a few issues. Remember the cat just doesn’t decide to die. Rather, it’s been poisoned for a while before failing.

In the case of this Sedona we found that the LTFT was at -19 on both banks that logged high numbers at idle and in the middle of the Fuel Trim graph on our EScan. We also found that MAF sensor voltage at idle was 0.9 V when the specification is 1.2 V, so we performed a Volumetric Efficiency test (**Figure 8**) on the EScan. The test failed.

If you don’t have the EScan, just look at any generic scan tool and select the Calculated Load PID, select graphing, followed by pressing the pedal to the metal. When WOT is obtained (I do a rolling start and graph the PID, waiting to catch it at the 1-2 shift) you can expect to see at least 90 percent or better if the MAF and intake system is functioning properly. Since we know that extra fuel is what kills the catalytic converter, we now found our defective part that was causing the problem.

We installed a new MAF sensor, but the converter still failed the test. We called the vehicle owner and explained the converter also needed to be replaced; he agreed so we replaced it. Now the vehicle would have a better chance of passing the OBD II emission inspection.

Unfortunately, even after replacing the parts the vehicle still had a problem with a high negative Fuel Trim on both banks. We know normally that only mechanical conditions cause the PCM to issue a command to reduce the amount of fuel being delivered to the engine. We had to continue looking for any mechanical problems that could be the cause such as high fuel pressure, bad fuel pressure regulator, leaking injectors, open EVAP purge valve, timing issues or even a bad computer. The first place for us to start was checking make sure it was at

(Con’t on page 20)

“Lessons In Asian Drivability” (con’t from p. 19)

at 39 psi, which it was. Now we moved on to the EVAP Purge solenoid making sure that it would open and close all the way while watching STFT readings. The test results for the EVAP solenoid were also good, so we now moved on to test the fuel injectors.

We decided to perform a hydrocarbon per cylinder test since it is the easier of the two injector tests that we can use on this engine. We removed the ignition coil, wire and spark plug to each cylinder (engine off) while observing the HC readings. We found that two of the cylinders were particularly out of range with a reading of 2,000 PPM HC versus 100 PPM HC in the other cylinders. With the HC reading at 2000 PPM in those two cylinders it indicated that the injectors were either leaking or not spraying the fuel properly, causing puddling.

To confirm the previous test results, we decided to perform an injector balance test. The injector balance test requires a fuel pressure tester that was previously installed on the fuel test port along with a special injector tester that is connected directly to the fuel injector. The next step was making sure the tester was set to the 500 ms (**Figure 9**) setting, while pressing the activation button on the tool. We observed the pressure drop reading on the fuel gauge and recorded the results. After the initial pressure drop, the ignition key was cycled so the fuel pressure could build back up to the normal limit before repeating the test. After the second test, we started the engine up to prevent hydrostatic lock and came up with the same two cylinders that had the high HCs. The two bad injectors dropped the fuel pressure over 2 PSI while the maximum



Figure 8



Figure 9

(Con't on page 21)

“Lessons In Asian Drivability” (con’t from p. 20)

reading is 1.5 PSI. The other four injectors dropped the fuel pressure by 1 PSI and passed the test.

Since we have a fuel injector flow bench we were able to test the injectors for volume while confirming the results of the previous test. The two failed injectors were not spraying the fuel in a conical pattern but rather in a stream. We removed the small injector screens from the top of the injectors and ultrasonically cleaned the injectors. After the injectors were finished being cleaned we installed new injector screens and flow tested all injectors for proper spray pattern and volume. Now that all the injectors were spraying properly it was time to reinstall them in the engine and check the fuel trim numbers again.

The trim numbers were still out of range, although better at a -14 reading for both banks. Ruling all the mechanical components out we had to look elsewhere. Checking TSBs, we located a PCM update that displayed the PCM calibration that were several software updates out of date. We tried three different J2534 programming tools to perform the software update but the PCM refused the request each time. Just to make sure we did not miss anything we checked powers and grounds making sure they were all in specification. Now our only choice in getting the fuel trim numbers back to normal was to install a new computer in the vehicle and program it with the latest software. With the new computer and software installed, the vehicle ran perfect. The vehicle passed the inspection and ran the way it was designed..

Article By
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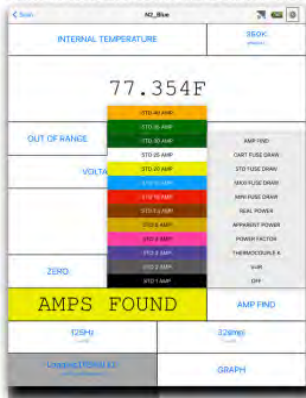
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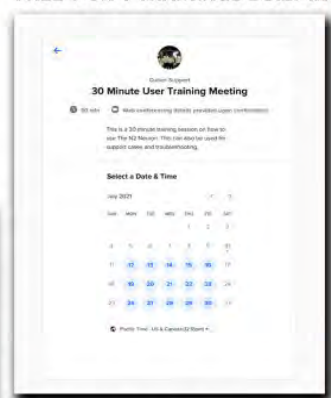
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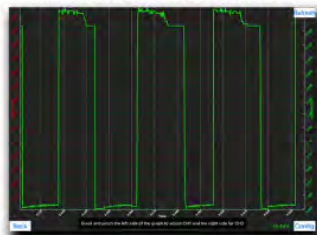
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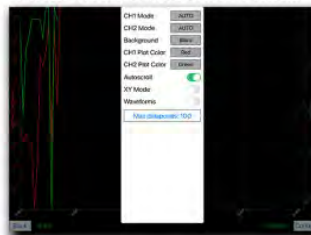
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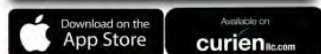
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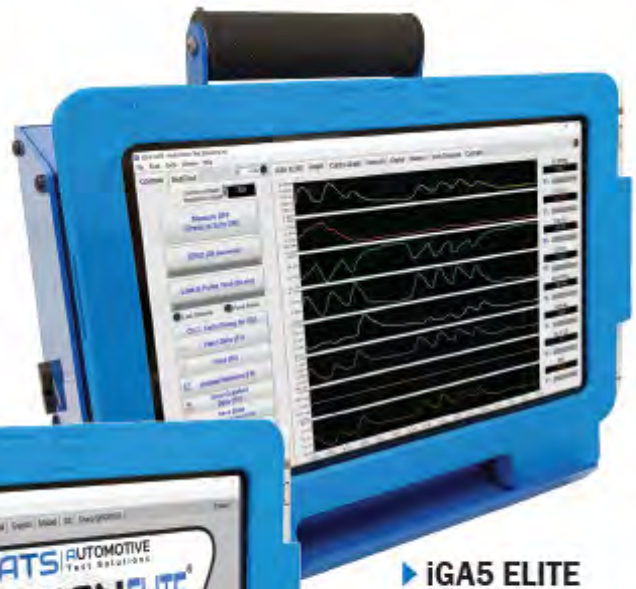
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