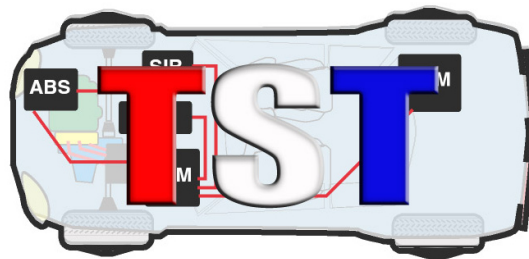


September 2020



Technicians Service Training

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"Hot And Long Cranking Infiniti"

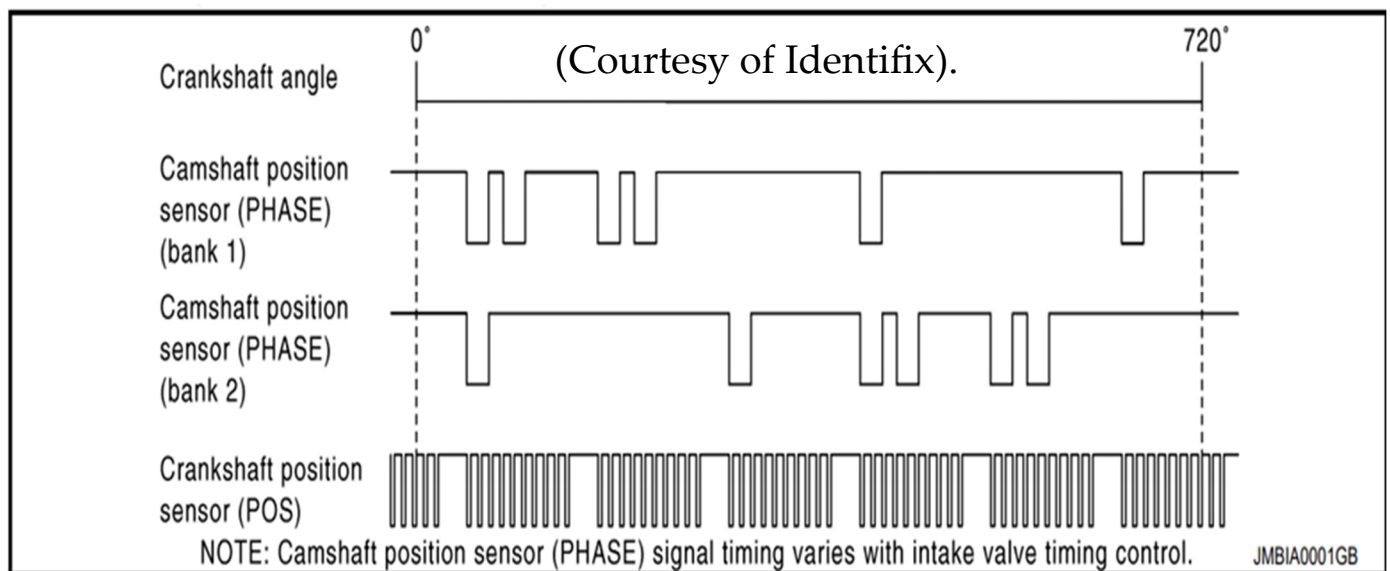
A 2013 Infiniti G 37 3.7 liter engine with 99724 miles on the odometer came in with a long cranking issue only when the engine was hot. The owner of this vehicle was a first time customer who had just purchased the vehicle. As you can imagine there was no repair history on this Infiniti that may have been helpful in diagnosing this problem. The owner had contacted us through Repair Pal and told us what was going on with the vehicle. His complaint was that the G 37 had a long crank time when the vehicle set anywhere from 1-3 hours after driving. He went on to say that the car would start perfectly fine if he let it sit overnight and cool down. He also took a video clip of the car to show me what the car was doing, this was helpful since there was no history that I could review. I took the car for a test drive with I-Scan 3 connected to monitor the G 37 operation. I watched the fuel trims and calculated load Pids very carefully since they can report the what's happening story. The results was that the computer had good fuel control and the calculated load was hitting the mark of 100%. During my preliminary diagnosis we performed a complete scan of all the systems on the vehicle that did not display any codes at all, including in Mode 0A/10. Our next plan of attack was to connect the leads of our EScope to the cam sensors, crank sensor and an ignition coil while it was cold so we wouldn't burn our fingers. We also installed a fuel pressure gauge in the fuel rail and found

(Con't on page 2)

"Hot And Long Cranking Infiniti" (con't from p. 1)

that the pressure was in spec at 52 psi. That most likely ruled out a fuel delivery problem but to make sure a fuel volume test would be needed.

I drove the car to get the engine warmed up to temperature and see for myself if a problem did exist. I unhooked the EScope and drove leaving the leads under the hood tied out of the way and back probed into the sensors. The G 37 was left for 2 hours so we could monitor the cam and crank sensors on the EScope. We captured the cam/crank sync pattern and saved it so we could compare it to the pattern we found in Identifix.



With the EScope connected I selected deep record mode. Cranked the engine over and sure enough it cranked for 10 -15 seconds before it started. We captured the signal on the scope (on page 6) and when we looked at the signal it appeared to us that we may have been missing signals on the crank sensor. When we compared it to the signal in Identifix (above) and found that we needed to have 10 pulses a space then 10 pulses again that keeps repeating. Since our captured crank signal was broken up and some of *(Con't on page 6)*

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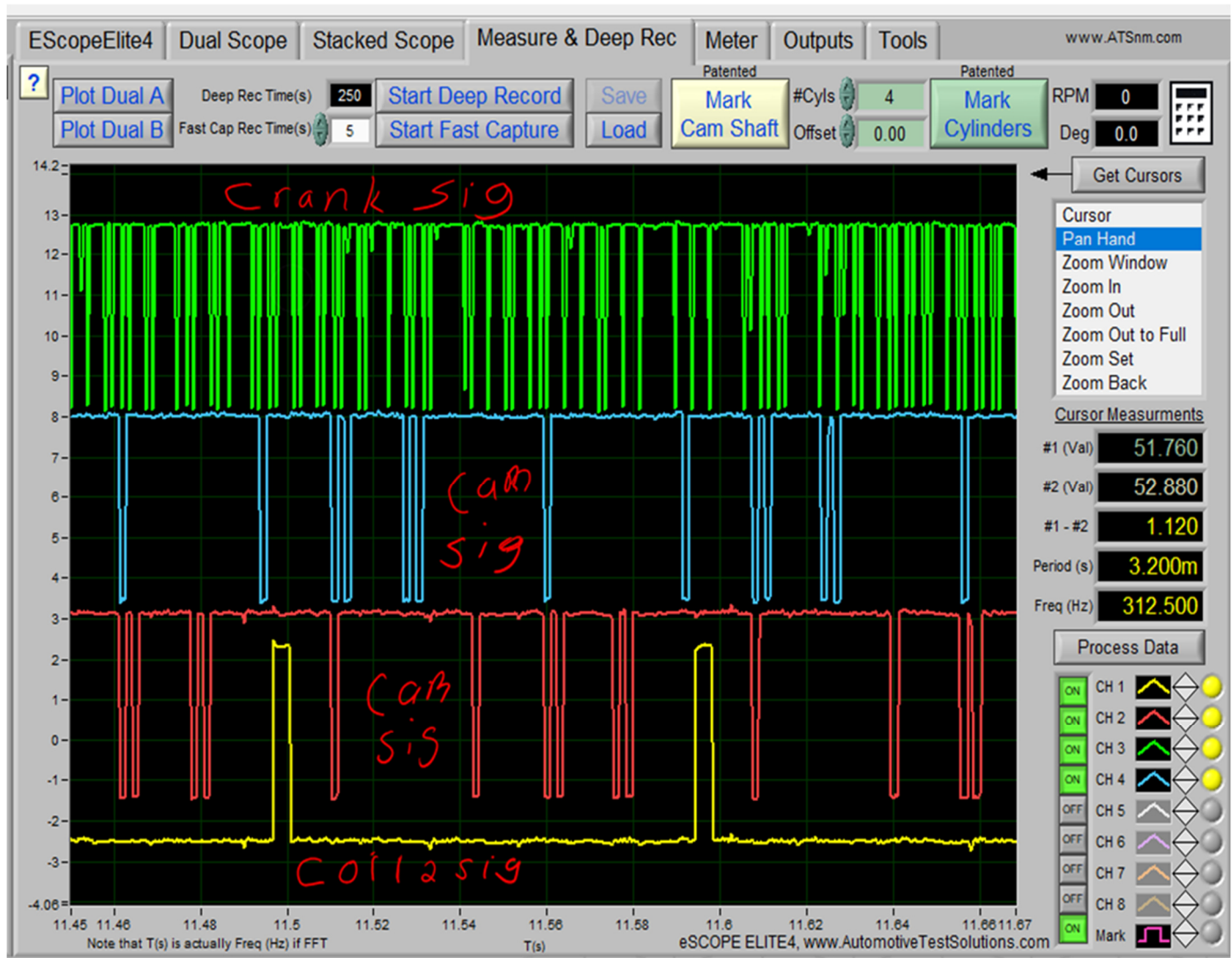
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"Hot And Long Cranking Infiniti" (con't from p. 2)

the signals weren't pulled all the way to ground we thought that there was an issue. I found it difficult to tell where the 10 pulses started and stopped, maybe due to a top dead sync issue or maybe not.



We ordered a new crank sensor confident that this would take care of the hard starting problem. I purchased the new sensor from the Infiniti dealer and installed it. That was followed by taking the G 37 for another test drive in order to get the temperature up with the EScope connected so I could capture another cam/crank syn signal. As you can see from the EScope capture (on page 7) there was a big improvement. The capture looked like the one that was on Identifix. We now had 10 definite pulses that all went all the way to ground with no breakups and were nice and clean.

(Con't on page 7)

"Hot And Long Cranking Infiniti" (con't from p. 6)



We let the car sit for 2 hours then tried starting it thinking we had this one licked but it still had an extended crank. Now we had to come up with another plan of attack. We performed another scan of the vehicle only to find no DTC or Pending DTCs. I took it for a test drive to double check calculated load and fuel trims in Generic OBD II. Calculated load hit 100%, fuel trims were + - 10 % in all loads and conditions that I drove in. I drove back in the garage and we decided to hook the EScope to coil 2 and the amp clamp to the injector power out of the fuse box. I took channel 2 lead (red trace) and hooked into coil signal wire for cylinder 2. Channel 1 (yellow trace) I used my I-30S fluke amp clamp and a fusible lead from AESwave that you put in place of the fuse and has amp loop on the lead (makes life easier to have these cool little tools) and captured the signal (on page 10). During the long crank you can see that I have 6 injector pulses. One thing I should have done different was to check for spark on all the coils with my GTC 505 instead of assuming

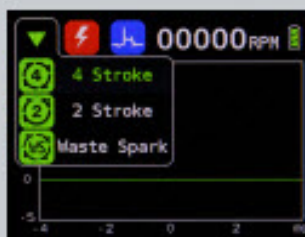
(Con't on page 10)

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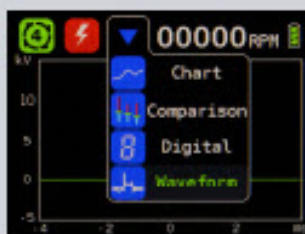
Displays secondary ignition waveforms.



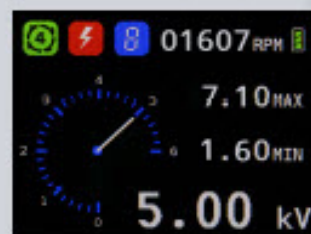
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Chart mode used for detecting intermittent or infrequent failures and misfires.



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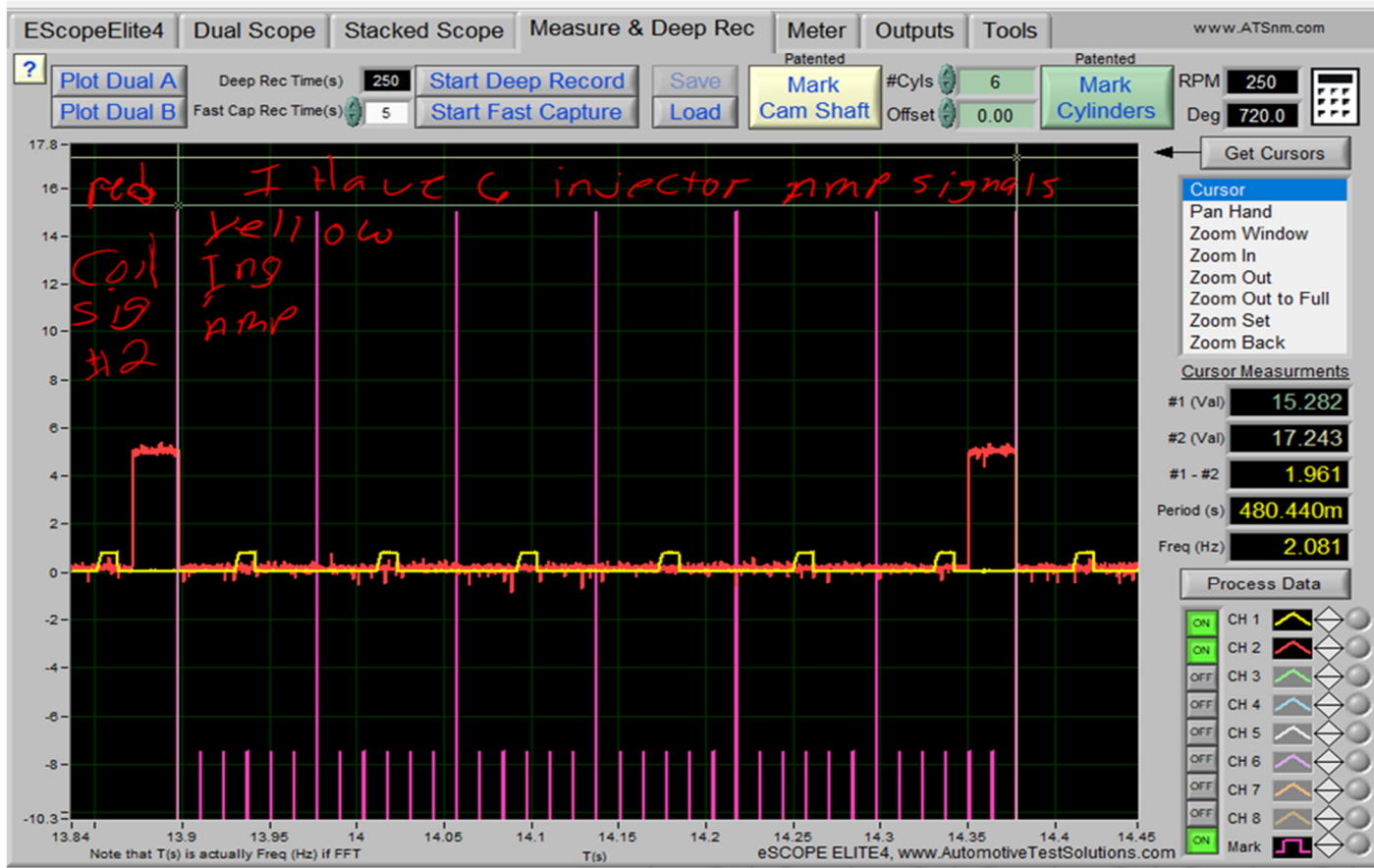


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"Hot And Long Cranking Infiniti" (con't from p. 6)

that I had spark (fortunately it didn't come back to bite me).



We searched IATN, DIAG.Net, Identifix, ProDemand, TSB'S and Google for the vehicle and couldn't find anything that related to this problem. I reached out to G Truglia and discussed what we found so far and what we did . G helped us come up with another plan checking the fuel injectors and ignition system. We decided to do a tune-up on the 3.7L engine and perform a carbon clean on the vehicle with BG products. We ordered OEM spark plugs from Infiniti because this problem was weird enough, I didn't want to second guess myself by putting in anything but OE. We replaced the spark plugs, while removal I checked the gaps on the plugs and the color of them noticing that the gap on cylinders 1 & 6 were around .090 and the rest were slightly worn around 50 or so. The spark plug gap spec for the plugs in this engine is .043 so it needed them. Before I installed the new plugs I carefully check the gap on them to make sure they were gapped properly.

(Con't on page 11)

"Hot And Long Cranking Infiniti" (con't from p. 10)

We installed the new plugs and torqued to spec, followed by reinstalled the coil packs. We hooked up the BG equipment to perform a carbon cleaning on the engine, by now it was the end of the day. I drove the car home so I could let it set for 2 hours and try starting it again, confident that it we had it fixed. You can imagine the let down feeling when I went out 2 hours later to try it again. You guessed right, still an extended crank before it started. I went back in the house did some more research. I bought access to Infiniti OEM service information to see if I could find anything, nothing found. So I decided to go to work early in the morning to take the intake off so I could use my gas analyzer and put it in each intake port to see what the hydrocarbon PPM were (one time during many times of trying to start, it had a very strong gas smell. That's where my idea for the gas analyzer and checking for the injectors leaking came from). Got to the garage pulled it in, shut it down, and took the upper intake plenum off and used my analyzer out and started sniffing the intake ports finding that cylinder 6 had the highest readings of all the ports 537 PPM hydrocarbons. There were 2 of the cylinders that were in the single digits, the other 3 had over 100 ppm. I put my ATS inspection camera in the intake port on cylinder 6 and snapped a picture of the injector and could see that it was leaking. I could see the puddle of fuel on the bottom of the injector. I called G Truglia back to let him know what I found and he suggested



that I pull the fuel rail out and see how much fuel was dripping from the injectors. I got the rail unbolted lifted it up and supported it so I could see the bottoms of the injectors.

(Con't on page 14)

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"Hot And Long Cranking Infiniti" (con't from p. 11)

I pushed the start button to run so that it would pressurize the rail and found that 4 of the 6 injectors were leaking.



I ordered 6 new injectors from Infiniti and when they came in we installed them with new metal clips. The Infiniti dealer that I bought the injectors from recommended that we replace the clips that hold them in. We pressurized the rail and all 6 of the injectors were dry with no leaks. No we were cooking and confident that this G 37 was finally fixed properly. We put the engine back together with new gaskets on the intake followed by torqueing everything down to the proper specification. Test drove the car and got it up to temperature again then let it sit for 2 hours. Went out to the car and pushed the button and it started right up. "Sweet success" this car had me stumped, we all

(Con't on page 20)

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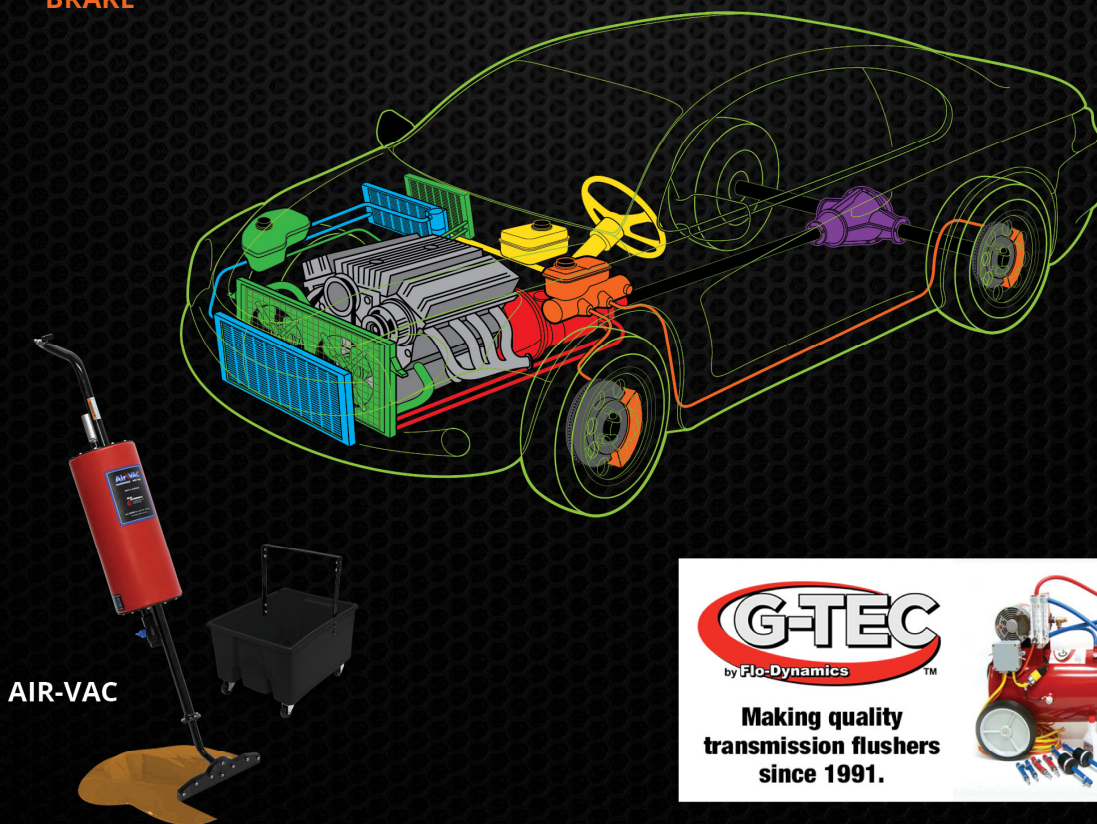
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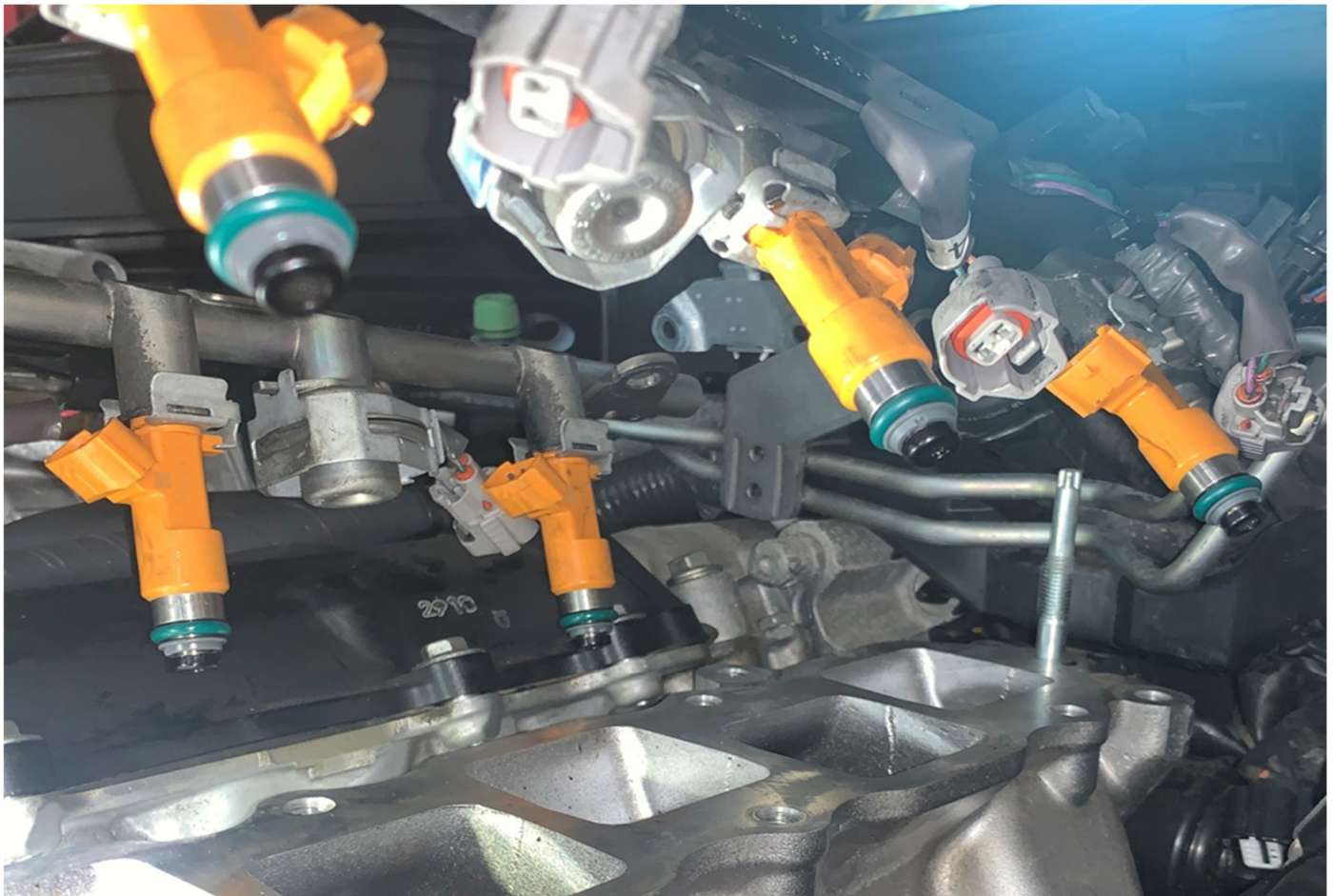
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WHAT MAKES OUR
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"Hot And Long Cranking Infiniti" (con't from p. 14)

need to reach out and network with each other on a problem car like this. Also want to give a special thanks to ATS and AESwave for making great diagnostic equipment for the automotive industry. These tools are not nice to have, you have to have them if you want to diagnose today's vehicles and do it efficiently.



*Article By
Joel Widrick
ASE Master Auto, Master Truck,
L1, L2 L3,
Technician, Shop Owner and TST Member*

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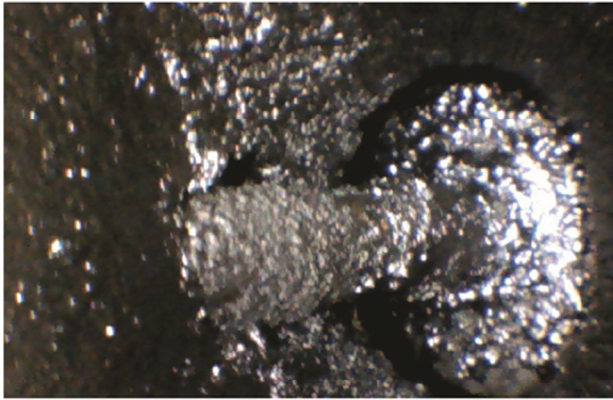


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