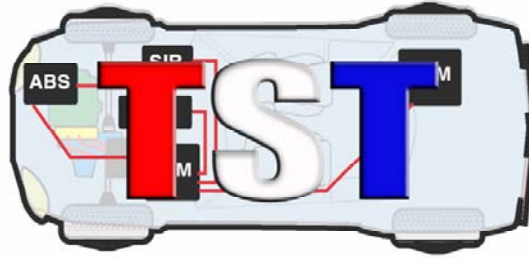


June 2012



Technicians Service Training

INSIDE THIS ISSUE:

*Diagnosing Fuel Pumps
Using Current Ramping*

P. 1 - 18

Diagnosing Fuel Pumps Using Current Ramping CONTINUED!

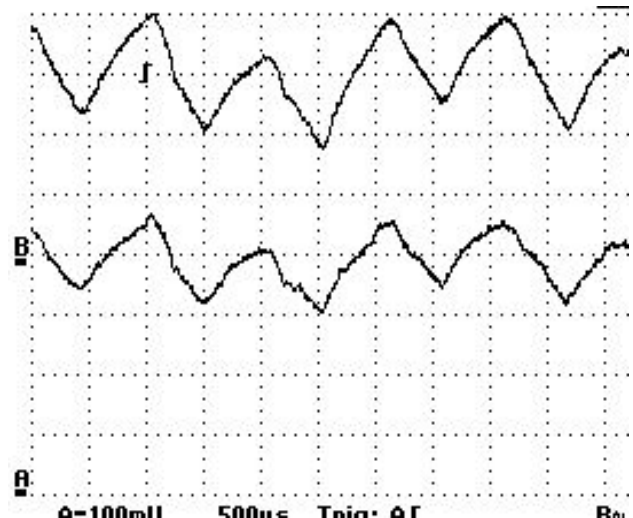
Last month we covered how to diagnose fuel pumps and covered the basics. This month we presume that all of that is old news, so we are going to get into more advanced diagnostics. Let's get back into it!

Upcoming Seminars:

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CLAMP OR NO CLAMP?

Amp probes are a pretty accurate way of testing fuel pumps and other components. If you do not own an amp clamp and need to know the signature of a fuel pump, try hooking up the red (positive) lead to the positive side and the black (negative) lead to the negative side of the fuel pump. As you can see on the scope screen the wavelengths are nearly identical. The top waveform is from the amp clamp top and the bottom one is straight AC voltage.



Editor

Jerry "G" Truglia

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(Con't on page 3)

Technicians Service Training

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Currently there are **TST chapters in Connecticut, Massachusetts, New Jersey, New York** and membership continues to grow. For more information you can call

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Technicians Service Training



www.TSTseminars.org

What is TST?

TST is a group of dedicated technicians and instructors committed to the continuing education of our fellow technicians. We provide once a month training seminars to technicians at a reasonable price. TST brings our members nationally known instructors and state of the art training.

Our Goal & Mission Statement

- *Keep our fellow technicians up to date with the latest technology.*
- *Provide training seminars for a reasonable price.*
- *Deliver information that the technician can use now.*
- *Keep technicians informed of information affecting our industry.*
- *Increase consumer awareness of what a good technician is.*

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TST membership includes special pricing on once a month week-day night seminars and the occasional full Saturday seminar. With a **\$75.00 yearly membership, the monthly seminars are only \$65.00.** **TST classes are NOT sales or product seminars.** The instructors that TST brings in are all “hands-on” industry experts with up to date, cutting edge knowledge that you can use in your shop the next day. That’s 65 dollars for a seminar in which you are able to learn something useful, for fixing those tough jobs that we all see on a regular basis. Our instructors are masters at making the complex understandable. Membership also includes a Monthly Newsletter full of real world technical articles, diagnostic case studies, and solutions to the kinds of problems you see in your bays each week.

The following are some of TST’s regular instructors:

Bernie Thompson of ATS

John Thornton of Autotrain Inc.

Wayne Colonna of ATSG

Jorge Menchu the “Labscope Guru,” AES Wave

John Anello of Auto Tech On Wheels

Mark Warren of Motor Magazine

Bob Pattengale of Bosch

Peter Meier of Motor Age Magazine

Ken Zanders of Illinois Air Team

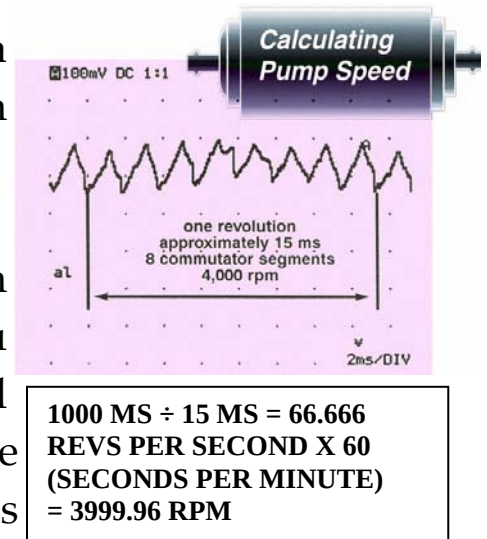
Jerry “G” Truglia of National Instructor & owner of A.T.T.S. Inc.

Diagnosing Fuel Pumps Using Current Ramping (con't from p. 1)

FUEL PUMP SPEED (nice to know, but not need-to-know)

First, you need to figure out how many “humps” in an amperage waveform make up a full fuel hump revolution. Is this the same on all fuel pumps? No!

Each current hump in a waveform has its own characteristics, like a fingerprint. The way you can figure out how a pump went through a full revolution is by looking for a distinctive “signature hump” that repeats. This indicates that the pump commutator has made one complete revolution.



Now, measure the time it takes for one complete revolution in ms. Simply count this by looking the time per division on your scope. This pump has eight commutator bars.

Then perform the following math equation (all technicians love math, right?):

$$(\text{Time for one fuel pump revolution} \div \text{amount of humps}) \times 60 = \text{RPM}$$

Why in the world would I ever want to calculate the speed of a fuel pump? Pump speed drops off with age. Comparison of pump speed and average current can identify a weak pump.

(Con't on p. 7)

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Jim Bradanini
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QUOTE

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Anyway, I figured whoever needs insurance on your tools against theft, flood, fire, etc.... blanket coverage. The people are really nice and you can do it over the phone. You don't have to have a tool inventory list, though you will need one if you have a claim so do one up front anyway.

They offer \$50,000 for \$250 but we upped it to \$70,000 for \$350. <http://www.mechanicsinsurance.com>. The guys name is Jim Bradanini and his email address is: JimB@cpminsurance.com. Their phone is 203-439-2810. I had left a message and he got back to me within the hour.

Thank you so much for making your process so smooth and painless, kind and professional.

Jo



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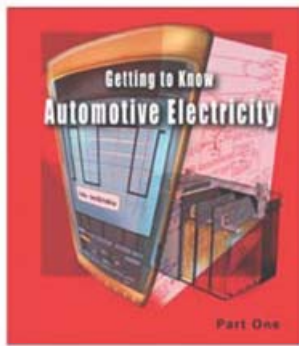
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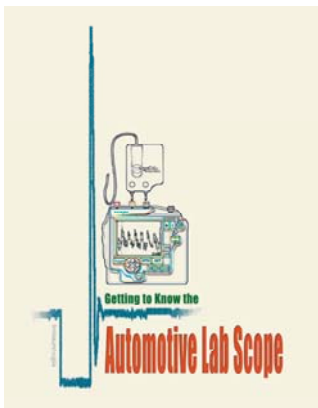
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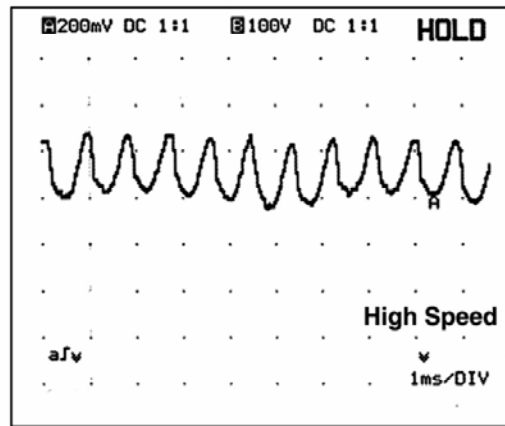
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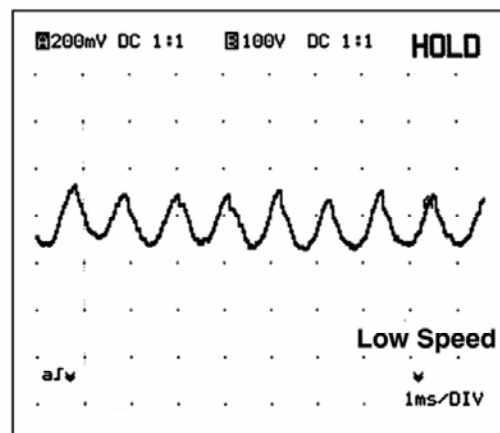
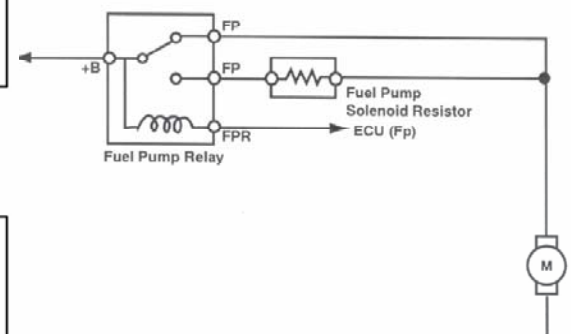


Diagnosing Fuel Pumps... (con't from p. 3)

FUEL PUMP VARIABLE SPEED WAVEFORMS



Many vehicles now use two-speed, or infinitely variable speed fuel pump controls.



The diagram above shows a sample two-speed fuel pump control relay circuit. In one relay position, the pump receives full voltage and runs at high speed.

When the relay switch moves to the second contact position, voltage is connected through a resistor to reduce pump current and speed. The waveforms to the left show two views of the same pump operating at both high and low speeds that *are BOTH good fuel pump waveforms*.

Take the time to identify the type of circuit before falsely condemning a pump for a normal function.

(Con't on page 9)

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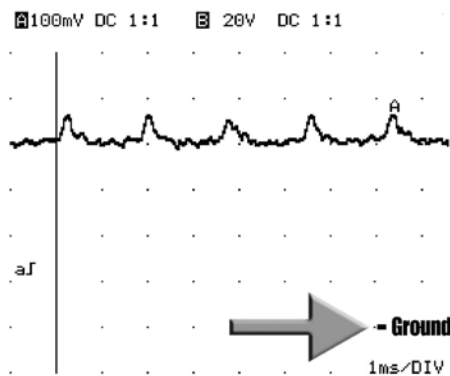
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Diagnosing Fuel Pumps Using Current Ramping (con't from page 7)

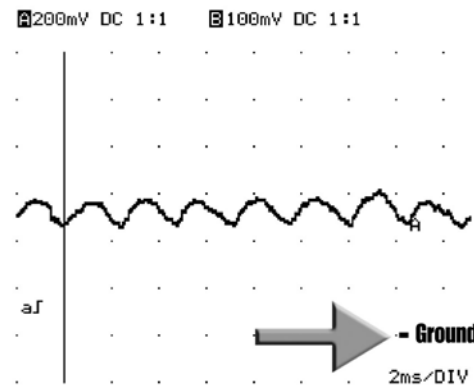
GM FUEL PUMP WAVEFORMS

All samples shown here were collected with the amp probe set to 100 mV/Div. The scope is set to either 100 mV/Div or 200 mV/Div.



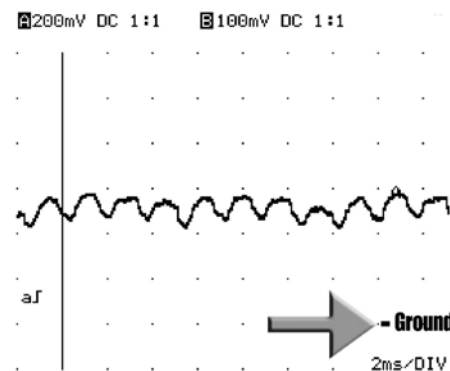
Bad Pumps

Note the uneven humps



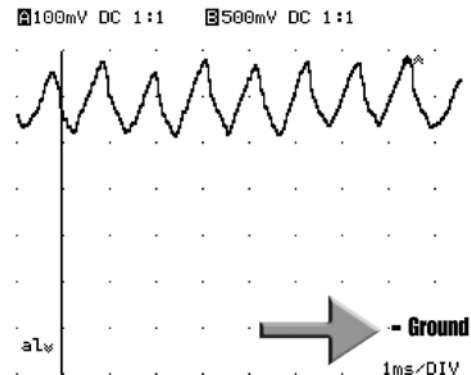
Low Current – Pump Okay

This pump in a GM CSFI system should be pulling 9-11 amps. The problem? A voltage drop in the pump circuit that reduces pump current to about 6 amps.



Good Pump

This is a fresh OEM replacement pump.



Good Pump

This is a new aftermarket replacement

Note how the waveform differs from pump the OEM pump to the left.

Are aftermarket fuel pumps really made to OE spec? No way! The pump to the left is pulling almost 5 amps (since its 200mV = 2 amps per division. The pump to the right is pulling almost 6 amps since the scope is set to 100 mV per division that = 1 amp per division. The difference is obvious.

(Con't on page 12)

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2. Do you find the seminars useful?

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We need your support:

Thank you,
G Truglia

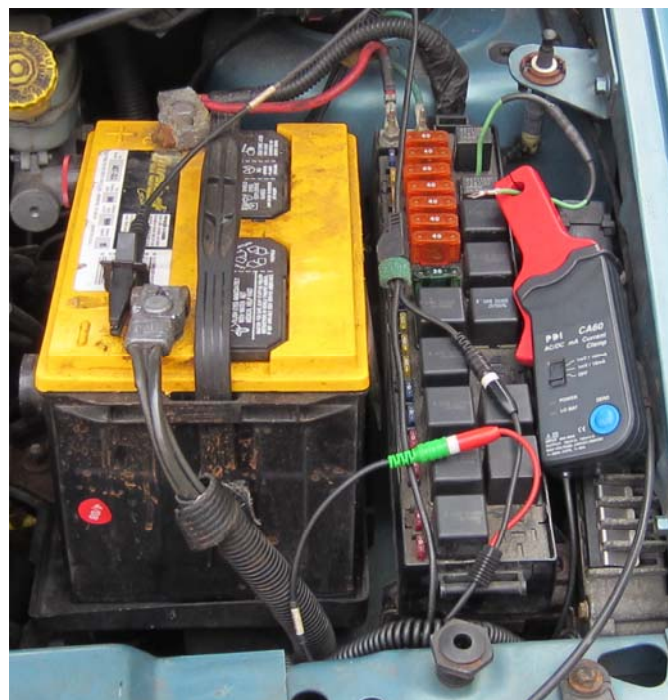
Diagnosing Fuel Pumps (con't from page 9)

CASE STUDY: STALLING & NO-START 1997 CARAVAN

Note: The vehicle in this case study is old, but the essentials of diagnostics remain the same. This vehicle was diagnosed and repaired in 2012.

So a customer came in with a complaint of an intermittent no start and stalling issue. The vehicle had a system lean and a MAP sensor DTC. So a vacuum line was replaced and the wiring to the MAP sensor was repaired. No more stalling, right?

Wrong. The customer came back, but this time without a check engine light and with the vehicle refusing to start in the parking lot. Using some propane, the technician was able to drive the vehicle to the back. So, he not only saved himself the pushing, he proved there was a fuel problem. Furthermore, the customer informed the shop that the vehicle had an aftermarket fuel pump and a new fuel filter.



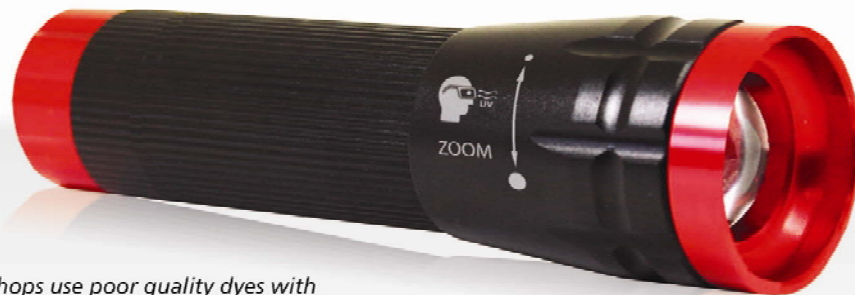
So, the technician went right for the fuel pump, pulling out the relay and looking for an amperage waveform. Using iATN, he checked the waveform library and the waveform looked good. It was at about 5.5 amps and it had uniform humps.

(Con't on page 16)



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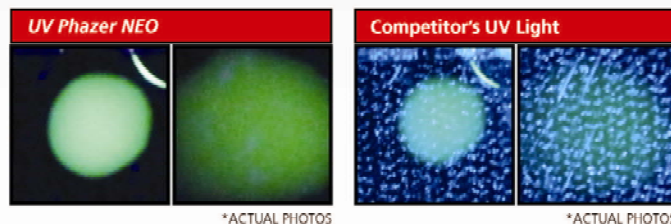
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Diagnosing Fuel Pumps Using Current Ramping (con't from page 12)



The vehicle was not stalling anymore, so the vehicle was hooked up for the road. A trick we like is using painter's tape to hold anything to glass, including a fuel pressure gauge to the windshield so the technician can observe what's going on when driving. Using a pc-based lab-scope is easy when you have a \$30 DC plug into the cigarette lighter. Then, run some wires through the window, plug into your OTC Geni-

sys, and *voila*, you are a mobile diagnostic machine.

The vehicle was driven for a total of one hour and never once stalled. In fact, it ran great. Then the technician realized told the dealer to send him another relay, because he was going to take it apart and look inside. Therein was his answer.



(Con't on page 18)

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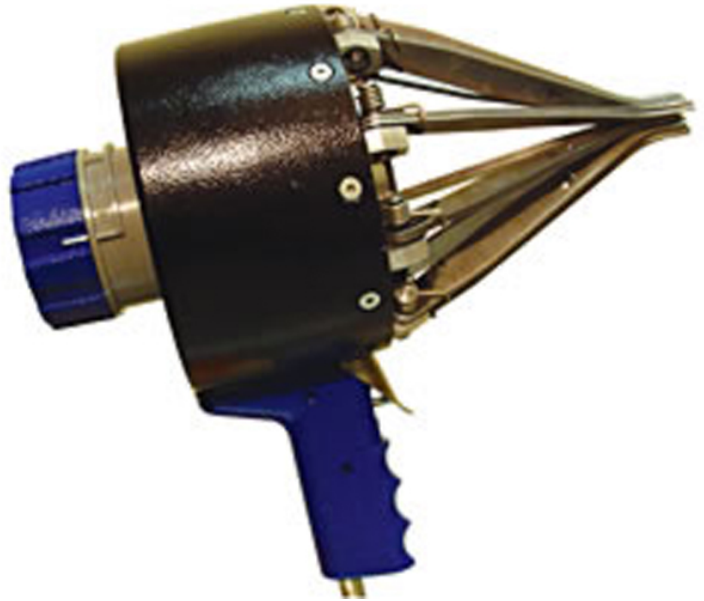
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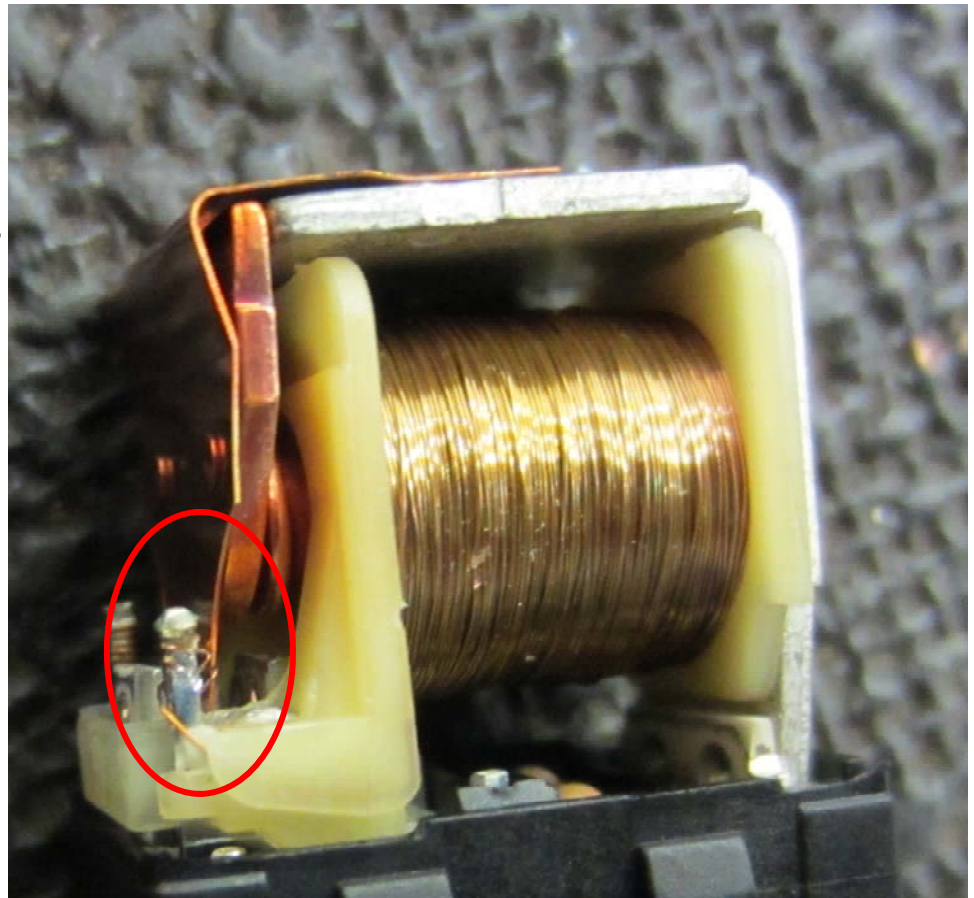
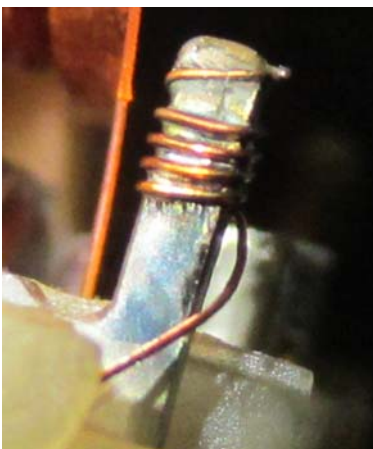
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Diagnosing Fuel Pumps Using Current Ramping (con't from page 16)

The vehicle was driven for a total of one hour and never once stalled. In fact, it ran great. Then the technician realized told the dealer to send him another relay, because he was going to take it apart and look inside. Therein was his answer.

The car was running great because everything was good... besides the relay! Take the relay out of the equation, and the car will run fine. Take a look at how the windings were damaged on one side and not the other.



When the other fuel pump went bad, it must have been running at a higher amperage which damaged the old relay. The Caravan was fixed for \$14.50.

*Article by G Truglia, TST President
—Contributions made by Craig Truglia*

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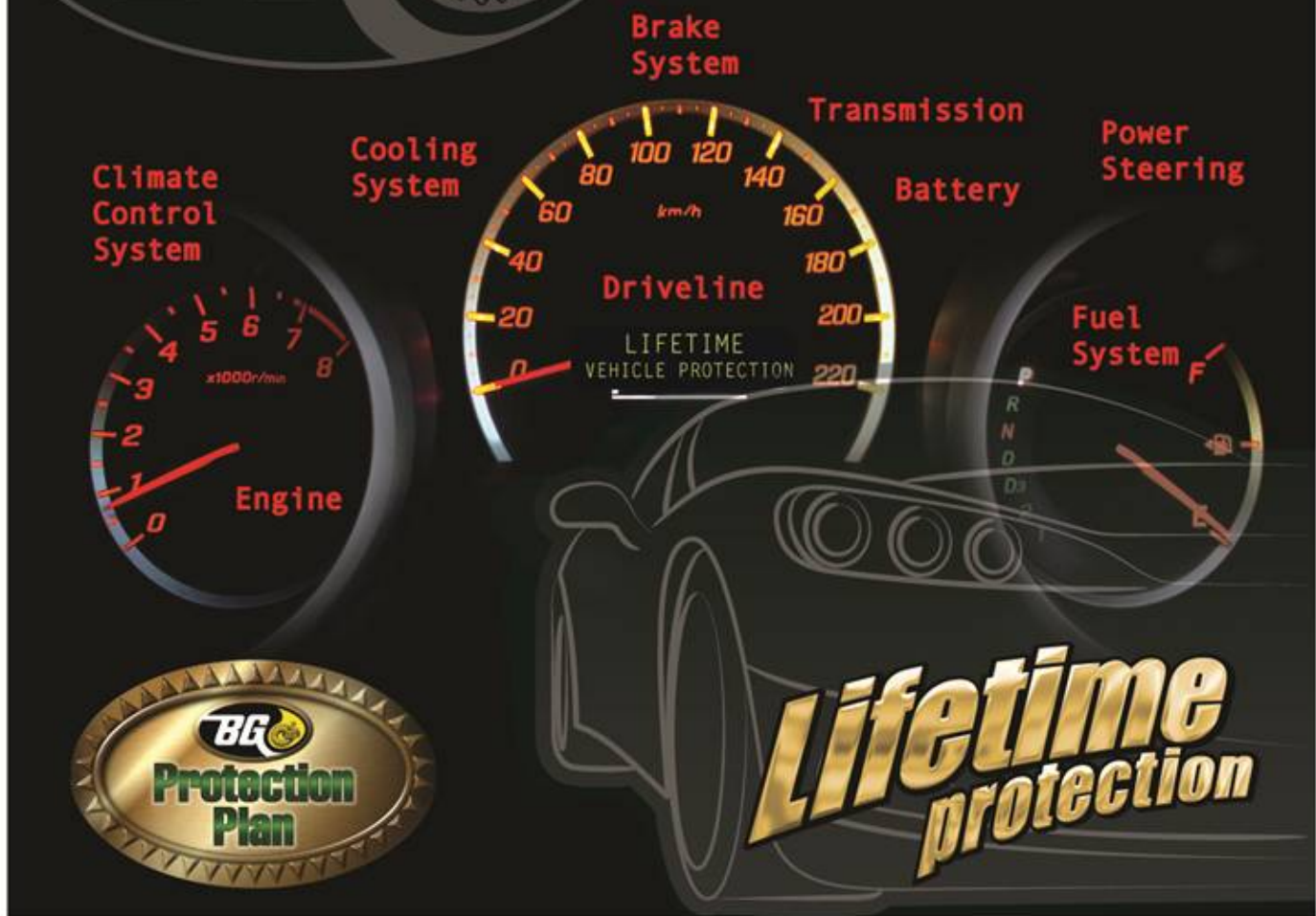


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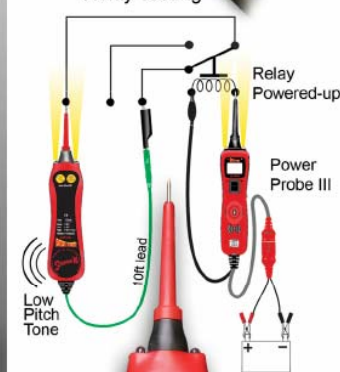
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