March 2012

Technicians Service Training

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Everyday Labscope Usage

Peter Meier

April 2nd to 5th, 2012

No Code Diagnostics

Bernie Thompson

May 7th to 10th, 2012

Editor

Jerry "G" Truglia

Diagnosing Fuel Pumps Using Current Ramping

Fuel pump current ramping is nothing new for some technicians, but it might be new to you. Or maybe you're getting rusty. We do not diagnose as many fuel problems as we used to. Well, don't worry whether you are a pro or a novice, because with just a little background a few good tips and tricks we'll have you testing fuel pumps like a pro.

Why should we current ramp? There are two simple reasons: (1) it's the quickest way to see how a fuel pump is running and (2) it's the easiest way to see how a fuel pump is running. Quick and easy is good, right?

What do we need to current ramp? All we need are two tools: (1) an Amp Clamp that allows us to read amperage without taking wires apart and (2) a labscope that allows us to look at electricity like a meter but in the form of a picture.

Now let's get started! The first step is to locate the fuel pump relay circuit and figure out which plugs are the fuel pump's power and ground. If there is something else that is controlled by the relay such as ignition or injectors, then you will need to go to the power or ground for the fuel pump directly and clamp there.

(Con't on page 3)

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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 TST headquarters at:

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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.***

Why join TST?

TST membership includes special pricing on once a month weekday 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:

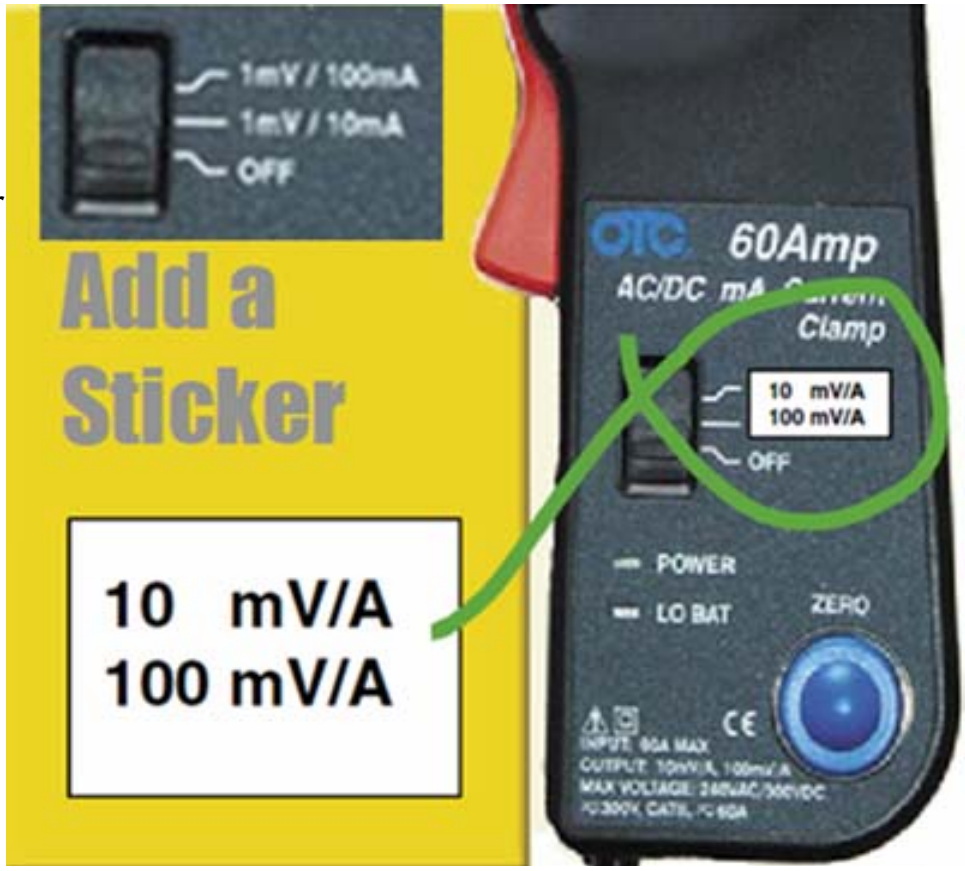
Bernie Thompson of ATS
John Thornton of Autotrain Inc.
Wayne Colonna of ATSG
Jorge Menchu the "Labscope Guru," AES Wave
John Anello of Auto Tech On Wheels
Mark Warren of Motor Magazine
Bob Pattengale of Bosch
Peter Meier of Motor Age Magazine
Ken Zanders of Illinois Air Team
Jerry "G" Truglia of National Instructor & owner of A.T.T.S. Inc.

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

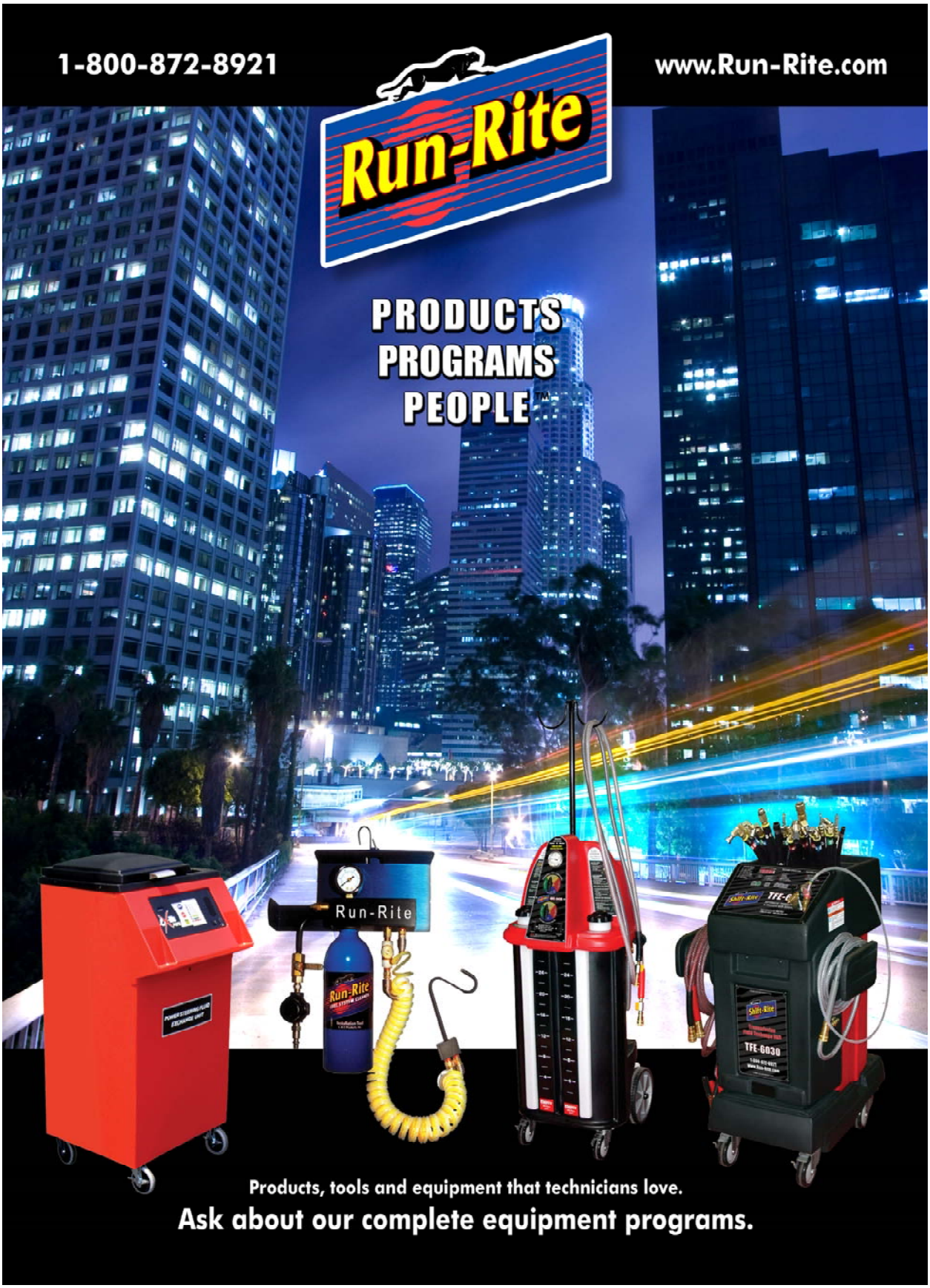
But in most cases we are going to be able to work smart and easy by connecting right to 30 (battery power) and 87 (load) in order to get a scope waveform. Quite simply we use a suitable fused jumper wire and connect it to 30 and 87.

Now that you located the correct source to the fuel pump, now you will need to set your equipment up properly to get the best waveform. First let's take a look at how to set up the two most common amp clamps, the Fluke 80I-110 and the PDI (OTC, ATS, and just about every other company).

1. Make sure the 9 volt battery in the amp clamp is good.
2. Select 100mV/A. This is the best setting to use for the finest resolution on your labscope. *If you are using the PDI place a sticker over the 1mV / 100mA and 1mV / 10mA as pictured to the right.*
3. Connect your amp clamp to your scope and zero it.
4. On your labscope select 100 mV or 1 V per division.



(Con't on p. 7)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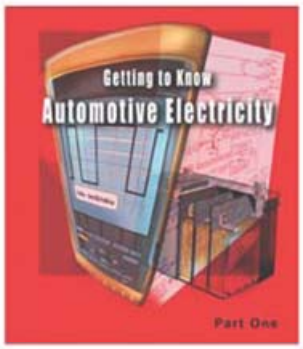

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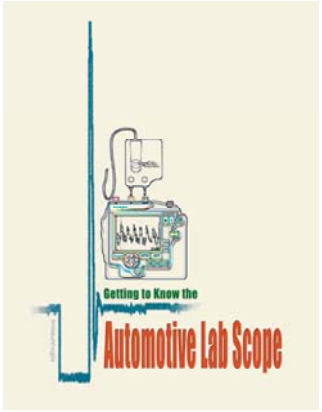
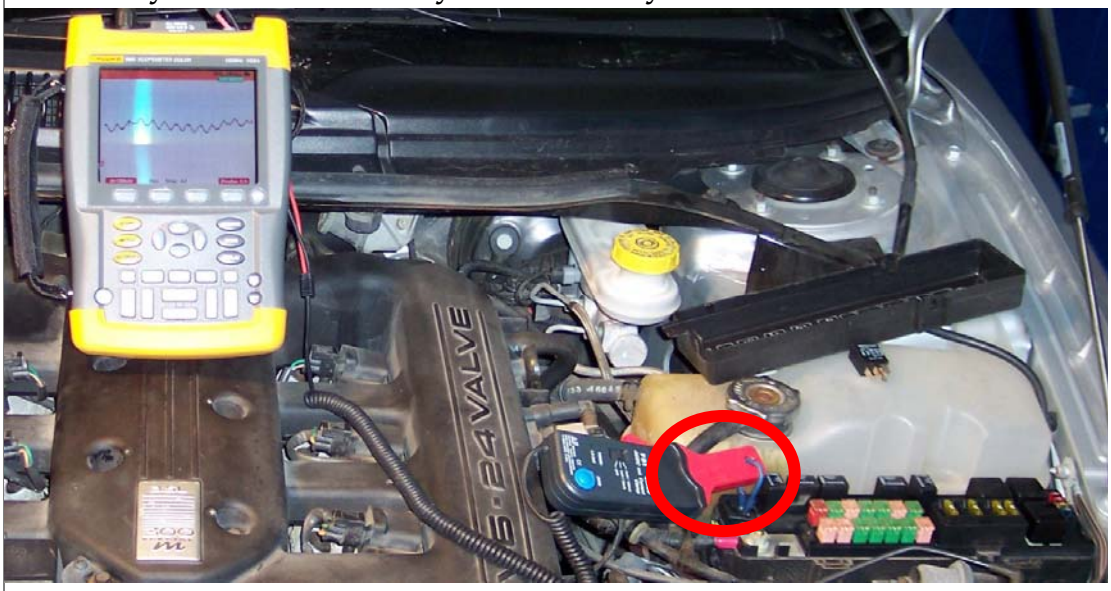


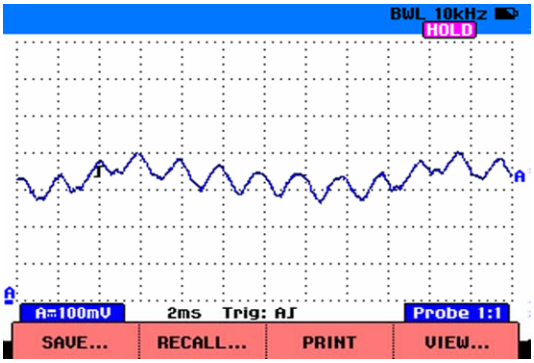
Diagnosing Fuel Pumps... (con't from p. 3)

Now, let's take a look at a real-world amp clamp setup on a lab-scope screen that is displaying a fuel pump waveform. This is what a proper set-up should appear (amp clamp connection circled in red.) In your opinion, is this a good or bad waveform? Well, if you are not sure, you definitely need to read on.



Here's an easy location to current ramp the fuel pump

One of the easiest places to start when you suspect a fuel delivery problem and/or high Fuel Trim readings is current ramping the fuel pump. Low average current, high average current, and abnormal fuel pump waveforms alert us to many potential fuel supply problems, including:



- Restrictions in the fuel supply line (clogged filters, etc.)
- Restrictions at the pump inlet (clogged inlet sock at pump pickup)
- Worn pump brushes
- Worn armature bushings
- Worn commutator bars
- Restrictions in the return line (sticking pressure regulator)

(Con't on page 9)

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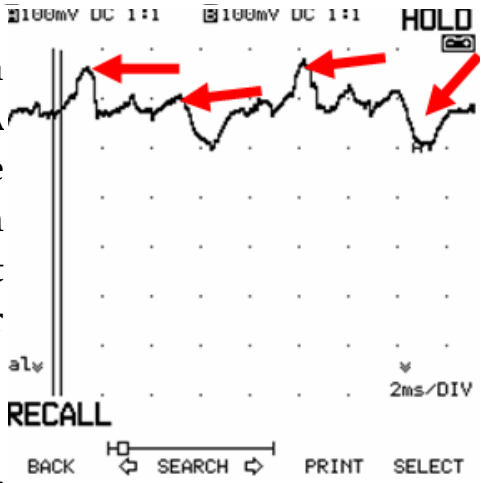
Diagnosing Fuel Pumps Using Current Ramping *(con't from page 7)*

The waveform to the left is from a good fuel pump. Take notice that humps that are not more than one box/grid difference from each other and they look relatively evenly spaced. *Play the comparison game!* With scope waveforms, everything should look similar to one another. Just like a bad secondary ignition waveform looks different on your scope than a good one, a different looking hump that repeats itself every so often *may* reflect a problem. ***CAUTION!*** *A waveform might look messy or a hump might look "different" than another but repeat itself every 6 or 10 times like clockwork. As long as you have not ruled out everything else, don't blame the pump if amperage is good and fuel volume/pressure passes specifications.*



The fuel pump waveform to the right is an example of a ***BAD*** pump. Notice how the humps are not even? A GOOD pump waveform should have humps that are almost even at the top and bottom of the waveform as in the example above. Remember, a fuel pump current waveform with jagged, uneven humps indicates loose or worn brushes and/or burned commutator bars.

Note that the "humps" in this waveform from a good pump are very similar in appearance. Their height and shape are not identical, but relatively even in shape and amplitude.

Article by G Truglia, To Be Continued...

Questions:

1. Do you want seminars to continue in your area?

2. Do you find the seminars useful?

Please ask a fellow technician to come and check-out our seminars so we can continue to bring you the best available information each month.

We need your support:

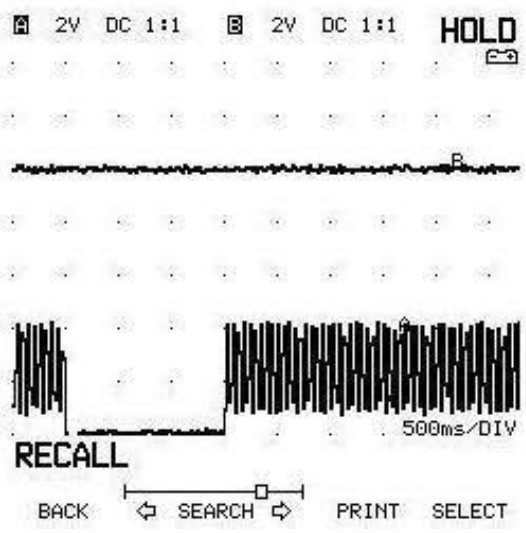
Thank you,
G Truglia

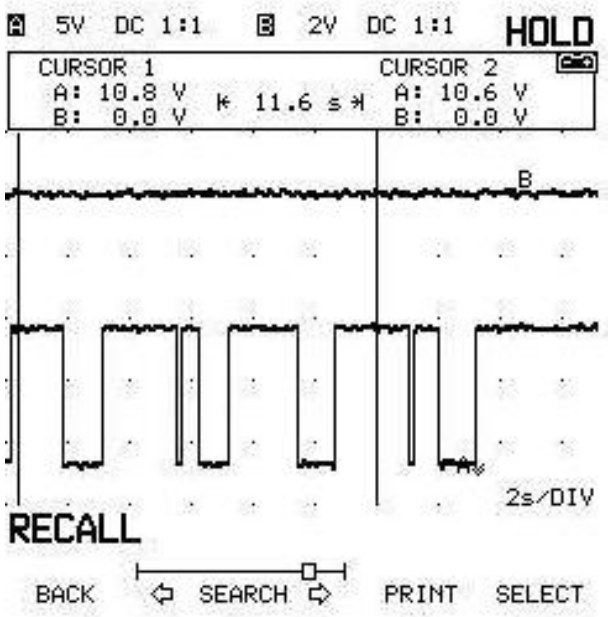
1997 BMW 528i No Start/Tranny Diagnosis

So, I had a 1997 BMW 528i with a no start/EWS (drive away protection - anti-theft) problem. Scanning with two different scan tools showed no communication with EWS. Immediately I suspected the module so I removed the EWS module from the car and checked the powers, grounds and signal wires.

At first there was too small a square wave signal on the K bus line at the EWS. It was running about two volts total amplitude while the spec is 2V or below for low and 7V or above for high.

So, I inspected the splice connector for the K-BUS located in front of the glovebox and found corrosion. The connection was cleaned up and a jumper wire was run from that connector over to the EWS and full signal amplitude of about 600 mV to about 10.8 V was observed.





The waveform to the left has only has a 5V amplitude while the one to the right (corrected with a jumper wire) a 10.8V amplitude. Don't be fooled by the scale...one is 2V/div and the other is 5V/div.

(Con't on page 16)

1997 BMW 528i No-Start/Tranny Diagnosis (con't from p. 12)

The K bus is used for diagnostics and runs from the dash cluster (gateway) to the EWS, Body, and Heating/AC modules. A failure on the K bus will not cause a no-start, so I had to fix this problem to continue diagnosing the car.

So, after fixing the connection and getting no communication to the EWS, I thought it made sense to condemn the EWS module. However, I used my scan tool and found that the body module was also not communicating.

After some testing, it was found that there was also corrosion in the fuse block and even though the fuses for the body module were good, one of the wires out the back of the fuse block did not have any power to it. So, I went ahead an repaired the connector inside the fuse block. The body module was now able to communicate, but the EWS still could not.

Being that I fixed the connection on the K bus AND brought the body module back to life without resurrecting the EWS, I figured that I needed a new one. A new EWS model module was installed and coded and get this, the car still wouldn't start! However, I was able to communicate to the module and found that now I was reading a DTC: Key Not Recognized.

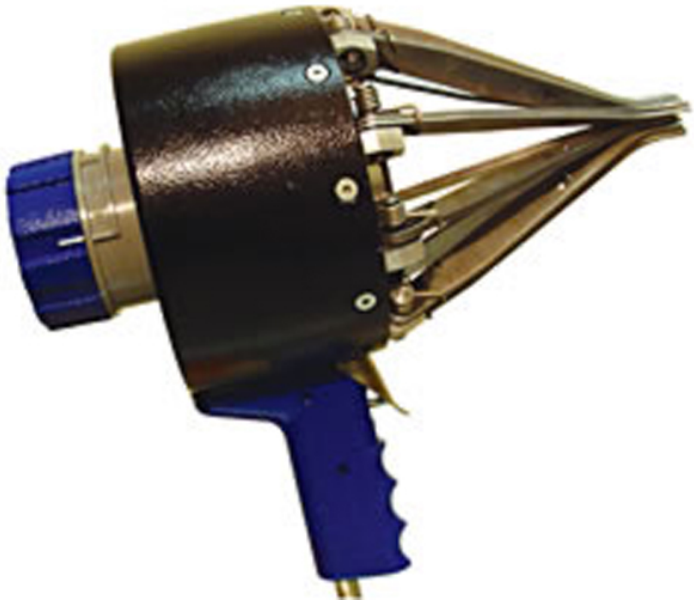
So not only did this vehicle have all these corrosion issues and a bad EWS, it *also* wasn't reading a valid key. When I tested the reader coil I found that it showed a weak signal. The reader coil was replaced and finally the car starts. The point of all this is that one car can have multiple faults which have to be tracked down one by one.

Special Note: There is a TSB on this vehicle for an updated module AND a note that the vehicle still may not start because in some vehicles a wire has to be moved one socket over in the plug.

So, I tried to take the car for a spin and it didn't even make it out of the bay. The vehicle needed a transmission. ***(Con't on p. 18)***

Featured Products

Astoria 2000 CV Axle Replacement Kit--



CV Axle Boots tear far before the cv axle has had it and replacement axles (Remanufactured and Chinese) result in comebacks. With the Astoria 2000, you can replace the CV axle boots with better-than-new boots without even removing the axle from the vehicle. Use it to repair newly ripped CV axle boots or as a maintenance item that will save your customers money in the long run and make you money too.

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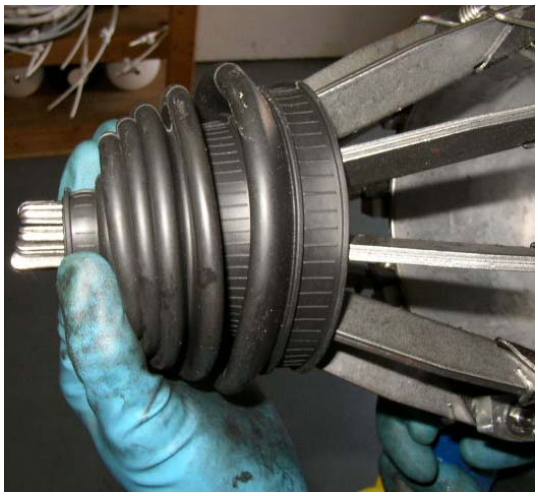

1997 BMW 528i No-Start/Tranny Diagnosis (Con't from p. 18)

Luckily, we just had a class with Wayne Colonna from ATSG that covered how I'd go about diagnosing this. I checked for DTCs and found initially it had codes for a number of solenoids.

After testing, the actual resistance of the solenoids were to spec, but some corrosion was noticed on the TCM. The case was dismantled, and corrosion was found on the circuit board. When the corrosion was cleaned off of the circuit board all the codes went away, but the vehicle still had no forward or reverse gears except in low one and two where it had sluggish acceleration forward.

The pan was dropped and no particulates or other contamination was found. The 1-2 band was adjusted, as it was quite loose, and it was reassembled for testing. It now had all forward years but still no reverse and the gears only lasted for 10 minutes and disappeared again. Pump pressure was at the low end of spec and a little jumpy, but it was not what was killing this car.

Using the ATSG charts I determined that it couldn't be a clutch or combination of clutches, it had to be a sprag. The transmission was dismantled and the 3rd clutch and the sprag were broken up. The sprag outer race was actually cracked! The transmission was overhauled replacing the 3rd clutch assy with sprag, 1-2 band, all seals, all gaskets and all the clutch plates. Now the vehicle drives like a dream and purrs like a kitten.

Article by Pierre Respaut, TST Vice President

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