



# TECH TIMES

The Professional Publication for Kia Dealership Technicians & Service Staff

2013

Volume 16, Issue 4

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## ACU VARIANT CODING AFTER PARTS SUPERSESSION

KMA has received reports of some 2011~13MY Optima and 2010~13MY Forte vehicles not accepting the Variant Code listed on KGIS, following replacement of the air bag control module.

In some cases, an air bag module with a superseded part number may have been installed and may require a different Variant Code. KGIS is being

updated in phases and will list both variant codes (Old and New) in case of P/N supersession, as shown in the sample screenshot below.

### Variant Code Tables

Use the tables to the right to verify the different air bag control module part number and the corresponding Variant Code to complete the repair.

### \* NOTICE

1. Undiagnosed issue(s) still present in the air bag system will prevent the Variant Code from being accepted. Please refer to Tech Times Volume 16, issue 1 for additional information.
2. If you've identified a superseded part number, insure the GDS is NOT connected to the internet when performing the Variant Code setting procedure. The "disconnected" status will allow you to enter the proper variant code. If the GDS is connected to the internet, the Old Variant code will be referenced and entered potentially causing further complications.
3. Example – If the original Part Number was 95910 1M150 with a variant code of TDA4 and a replacement part number 95910 1M160 is used then, per the table on Page 1, the correct Variant Code will be TDN4.

| Forte (TD) |                          |                          |
|------------|--------------------------|--------------------------|
|            | (Old P/N)<br>95910-1M150 | (New P/N)<br>95910-1M160 |
| TD 4DR     | TDA1                     | TDN1                     |
|            | TDA2                     | TDN2                     |
|            | TDA3                     | TDN3                     |
|            | TDA4                     | TDN4                     |
|            | TDA5                     | TDN5                     |
|            | TDA6                     | TDN6                     |
|            | (Old P/N)<br>95910-1M450 | (New P/N)<br>95910-1M460 |
| TD 2DR     | TDK1                     | TDP1                     |
|            | TDK2                     | TDP2                     |
|            | TDK3                     | TDP3                     |
|            | TDK4                     | TDP4                     |
|            | TDK5                     | TDP5                     |
|            | TDK6                     | TDP6                     |

| Optima (TF/QF/TF HEV) |                          |                          |
|-----------------------|--------------------------|--------------------------|
|                       | (Old P/N)<br>95910-2T600 | (New P/N)<br>95910-2T610 |
| TF                    | TF18                     | TF76                     |
|                       | (Old P/N)<br>95910-4C000 | (New P/N)<br>95910-4C010 |
| QF                    | TFA1                     | TFA3                     |
|                       | TFA2                     | TFA4                     |
|                       | (Old P/N)<br>95910-4U600 | (New P/N)<br>95910-4U610 |
| TF HEV                | TFH3                     | TFH6                     |

Note: KMA, together with our GDS supplier, is reviewing the possibility of expanding GDS functionality in this specific area.

Vehicle Specification (To Print, right click within the vehicle specification area and select PRINT)

| Key No.        | Search                                       | PIN Code        | Search     | Engine No.    | G4KDBH729137 |
|----------------|--|-----------------|------------|---------------|--------------|
| ACU Code       | TDA3 : (95910-1M150)<br>TDN3 : (95910-1M160) | Cluster         |            | ESC           |              |
| Delivery Date  |  | Production Date | 2011-11-04 | Shipping Date | 20111114     |
| Interior Color | 80   | Exterior Color  | 3D         | Country       | U.S.A        |
| MODEL YEAR     | 12 MODEL                                     | MODEL_2ND BYTE  | TD         | DRIVE TYPE    | FWD          |

## Tech Line Tech Tips

| Vehicle   | Concern   | Recommendation Before Calling Techline  |
|---|---|---|
| 2011-2013 Optima (QF/TF)  | 2011-13 Optima with a roaring noise coming from right or left front wheel area. Tire has good tread and no feathering. The front drive axles are fully seated and the CV-joints are okay. | Check the front hub bearing for an issue and repair as needed.  |
| ALL   | What information should I include when opening a Techline case?   | Please provide as much relevant information as possible. If it is an audio concern, provide the type of audio unit and software version. Let us know if there have been any recent repair attempts, collisions or aftermarket accessories installed. The more complete information you give us will help speed up the diagnostic process. |
| 2006-2014 Sedona (VQ), 2006- 2009 Sorento (BL), 2007-2009 Amanti (GH) | Engine noise heard on 3.3L and 3.8L engines   | Please refer to Engine TSB028 before starting a techline case. This TSB contains information that can help you resolve these engine noises in a timely manner.  |
| ALL   | Dealers open Techline cases or call in because they are having concerns with gaining access to LTS for Warranty.  | Dealers are advised to contact the DCS help desk at (800) 327-2707, even on a Saturday to report the issue.   |

## Latest Technical Service Bulletins, Service Actions and Campaigns

- TRA 048** Shift Knob Trim Ring Replacement Procedure (SA147)
- BOD 103** Panorama Sunroof & Sunshade Motor Replacement
- ENG 139** VCMA Diagnosis - MIL On With DTC P200A
- ENG 137** Data Collection - Extract California Emissions Data From ECU (DC005)
- SC 099** Right Front Axle Driveshaft Replacement Procedure
- FUE 025** ECM Upgrade -- MIL On With DTC P0300 and/or P0301, P0302, P0303 and P0304
- ENG 133** ECM Upgrade -- MIL on With DTC P0638 and ETC Carbon Cleaning (SA153)
- BOD 102** Seat Back Panel Removal Procedure

### CAUTION

VEHICLE SERVICING PERFORMED BY UNTRAINED PERSONS COULD RESULT IN DAMAGE TO THE VEHICLE.

### WARNING

- Vehicle servicing performed by untrained persons could result in injury to those persons or to others.
- The Kia technician newsletter (Tech Times) is intended for use by professional Kia automotive technicians only. It is written to inform technicians of conditions that may occur on some vehicles. Trained Kia technicians have the equipment, tools, safety instructions, publications and expertise to perform the job correctly and safely.

### NOTICE

The topics covered in this newsletter are designed to assist you with the diagnosis and repair of specific vehicle conditions. Just because a condition is described in this newsletter, do not assume that it applies to your vehicle, or that your vehicle will have that condition. In all cases, the procedures in the applicable Service Manual and/or Electrical Trouble-shooting Manual or on KGIS should be performed first.



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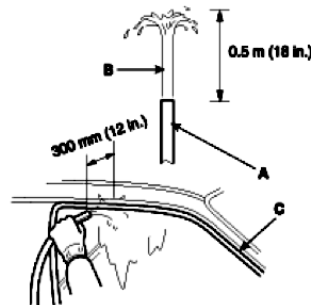
Mario Garcia

## Pesky Water Leaks

In the last Tech Times issue we discussed wind noises. In this issue we will be talking about water leaks.

Water leaks can sometimes be harder to diagnose than wind noises. Water can travel and end up in another location sometimes far from point of entry which complicates diagnosis. Coming in October of 2013, we will be introducing a Wind Noise and Water Leak web course to assist you in locating these types of concerns.

There are a number of methods for finding water leaks. Using the improper procedure, such as too high of water pressure or unregulated shop air could cause misdiagnosis.

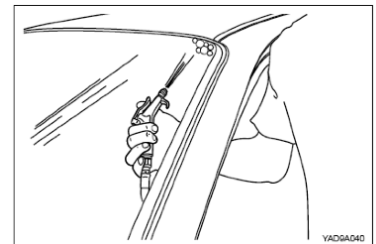


The course will cover the correct procedures to diagnose with water pressure including:

- How to adjust the water pressure to make an 18 inch tall water column for proper pressure
- Hold the hose 12 inches from the vehicle for proper volume
- How to use ultraviolet dye

Also reviewing the correct method of diagnosis using low pressure air and soap solution to find:

- Windshield seal leaks
- Door and window seam leaks



Don't forget to check service bulletins, PitStops and TechTimes, for tips that can save you diagnostic time.

When you are using water or ultraviolet dye, don't forget to clean any evidence of diagnosis. This Best Practice goes a long way in customer satisfaction.

Look for the web course on [KiaUniversity.com](http://KiaUniversity.com) in October 2013.

## Are you on Track for Elite Certification?

2013 year-end is swiftly approaching. Are you on track to attain your Certification? Achieving Elite Certification will qualify you for valuable recognition rewards. In addition, attaining Certification is a pre-qualifier for the other Kia Elite programs. Please look for the Kia Elite 2013 Program Guides available on [www.myKiaPerformanceCenter.com](http://www.myKiaPerformanceCenter.com).

Your personal certification training through Kia University will assist you with fixing your customer's Kia vehicles correctly the first time. Not only can you impact their loyalty to Kia, but you can also earn their future service business at your dealership.



### New for 2013: Elite "Premium" Certification



In order to earn the new Elite **Premium** Certification, the following requirements must be met during 2013:

- Earn Master Elite, Senior Elite, or Professional Elite Certification Status
- Earn ASE Elite *Plus* Certification
- Complete Web-Based Course: 2014 Cadenza Technical Highlights Course & Test (WEB: TEC-01-042-1)
- Complete Instructor-Led Course: 2014 Cadenza Diagnosis Course (ILC: TEC -03-021-1)

Note: These Premium Cadenza courses are not required to earn Professional Elite Certification (Please refer to [www.KiaUniversity.com](http://www.KiaUniversity.com) requirement details)

If you have not already done so, enroll today.

The web-designed courses are available on the [KiaUniversity.com](http://KiaUniversity.com) website 24/7.

## New Courses Launched During September on KiaUniversity.com

Kia University is pleased to announce the following course additions which are currently available on KiaUniversity.com:

### Fall 2013 Service Technical Update Test

[TEC-04-051-1]

"Now Available"

Service Technicians need every edge to increase productivity and fix it right the first time performance to drive superior customer satisfaction and owner loyalty to their dealership. This certification test challenges skilled technicians to discover out the latest Service Information pertaining to new technology operation and diagnosis, emerging troubleshooting strategies, and tips for effective special service tool usage.

This web-based test is required for Service Technician's certification.

### 2014 Soul Technical Highlights Course & Test [TEC-01-043-1] "Now Available"

The redesigned 2014 Soul incorporates a long list of advancements such as a new powertrain and refinements to the electrical and safety systems. In addition, the 2014 Soul features the newest UVO eServices and AVN 4.0 systems. Successful completion of this 60 minute on-line course will provide service technicians with the foundation and knowledge necessary to enhance their diagnostic and troubleshooting efficiency on this vehicle.

This web course is required for Service Technician's professional certification.

2014 Kia Soul PS | TEC-01-043-1  
Technology Service Groups > Technical Wrap-Up

HOME GLOSSARY RESOURCES HELP EXIT

## 2014 Kia Soul Technical Highlights Course

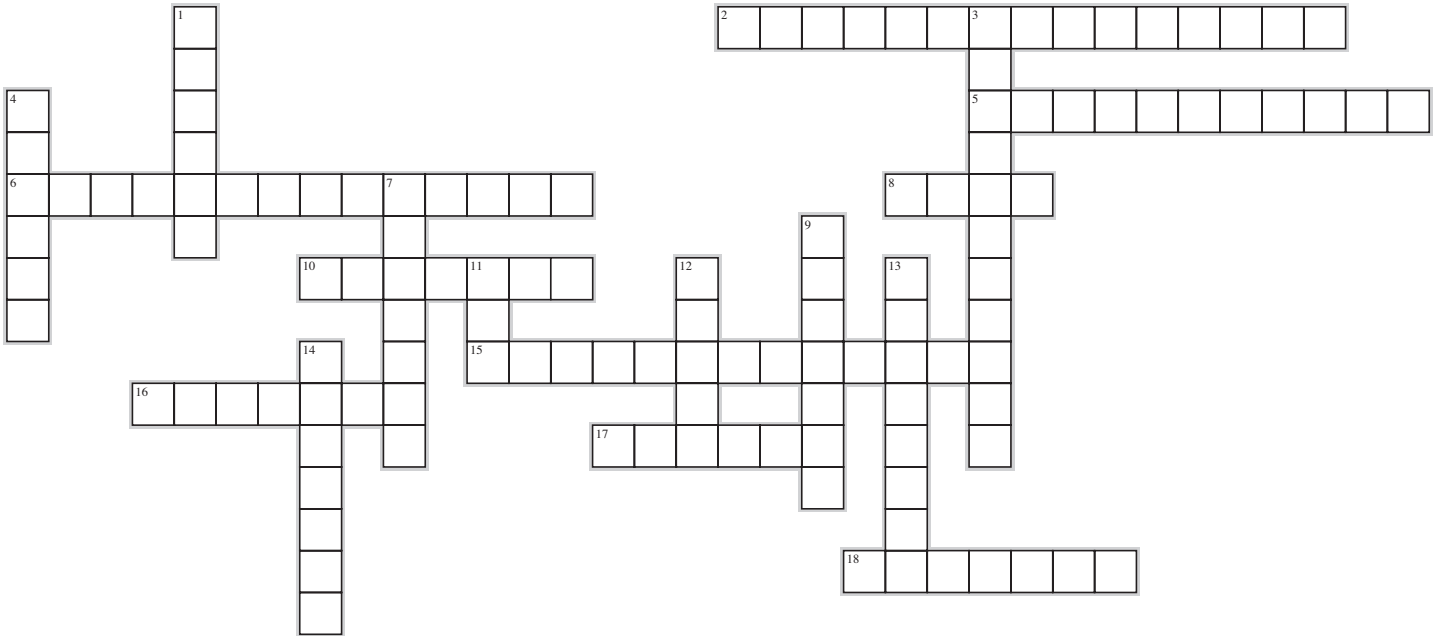
**COURSE OBJECTIVES**

- Identify new Soul technology and related acronyms
- Identify the engines and transmissions available in the 2014 Soul
- Identify the three piston types for the NU engine and the method to select the correct type.
- List the special functions of the OAD pulley on the Soul's NU engine alternator

These September web-based interactive courses are available for your service personnel to take at [www.kiauniversity.com](http://www.kiauniversity.com).

## Crossword Puzzle

Test your knowledge of the articles in this issue of TechTimes by completing this crossword puzzle. The solution to this month's puzzle can be found on page 13.



### Across

- When opening a Techline case with an audio concern, provide the type of audio unit and \_\_\_\_\_. (Two Words)
- Advantages of this system are lower current \_\_\_\_\_, higher fuel efficiency by optimizing the fuel output pressure, extended fuel pump life with a lower pump noise.
- The IPS monitors the \_\_\_\_\_ through a circuit and will turn the circuit off if a short is detected. (Two Words)
- This feedback system allows the FPCM to precisely control the low fuel pressure by way of a pulsed 3-phase voltage input to the \_\_\_\_\_.
- When the OCL \_\_\_\_\_ an open circuit, it will increase the rate of flashing on the remaining turn signals.
- When electrons move through a wire it will produce a \_\_\_\_\_ around that wire. (Two Words)
- As described in TSB ENG 083, it is important to \_\_\_\_\_ the fuel-line rather than to re-use or re-tighten the existing fuel line fittings.
- To ensure correct knock detection in all cylinders it is extremely important that the sensor be tightened to the correct \_\_\_\_\_ value.
- Becoming Certification Elite will qualify you for valuable recognition \_\_\_\_\_.

### Down

- There should be an AC voltage spike with each \_\_\_\_\_ strike.
- "Faster Time" routes reflect distance and traffic conditions replaces \_\_\_\_\_.
- Resistance in an electrical circuit works like a \_\_\_\_\_ on the highway.
- Look for the web course on Kia University.com in \_\_\_\_\_ 2013.
- The FPCM measures the \_\_\_\_\_ line pressure with a fuel pressure sensor (FPS) at the pump outlet. (Two Words)
- When replacing the Fuel Pump, make sure the cam lobe is on the lowest part of the \_\_\_\_\_.
- \_\_\_\_\_ can travel and end up in another location sometimes far from point of entry, which complicates diagnosis.
- Voltage is electrical \_\_\_\_\_, which pushes the electrons through the circuit.
- In some cases, an air bag module with a superseded part number may require a different \_\_\_\_\_ Code.

## Variable Fuel Pump (VFP) System Overview

The 2014 Cadenza is equipped with a low pressure Variable Fuel Pump or VFP. A Fuel Pump Control Module (FPCM) is mounted on the chassis behind the right rear tire. The FPCM controls the low pressure fuel pump located inside the fuel tank.

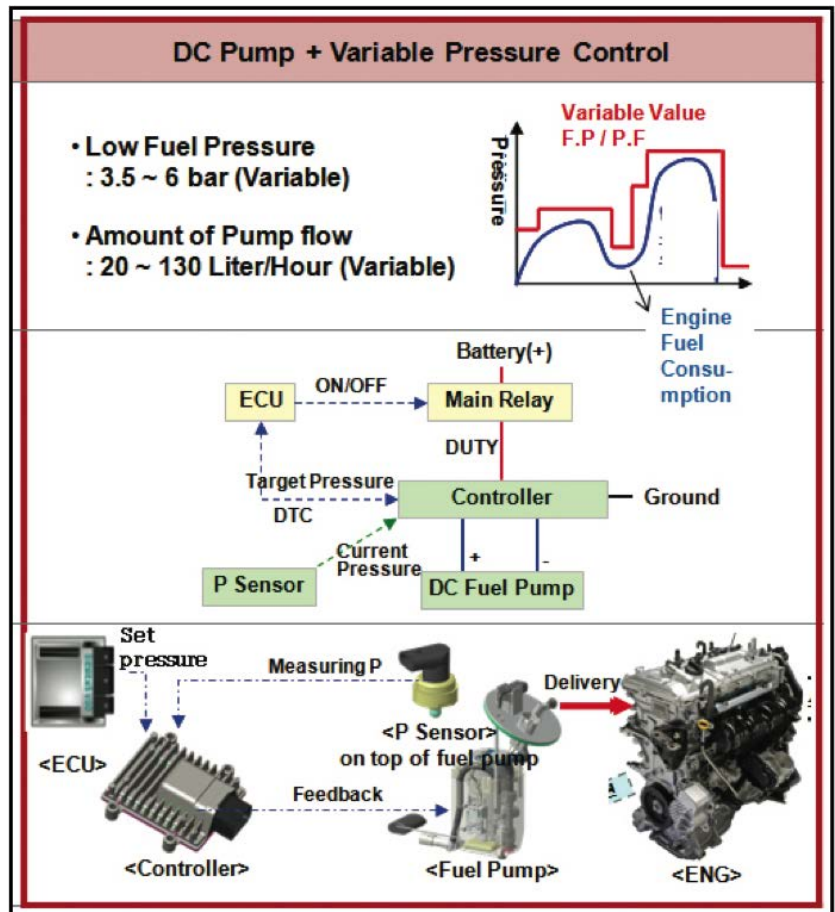
Previous non-variable GDI in-tank fuel pumps run at a constant speed and can produce 72.5 psi (5 bar) of fuel pressure under normal driving conditions. The FPCM measures the low fuel line pressure with a fuel pressure sensor (FPS) at the pump outlet. The FPCM then controls the Brushless DC (BLDC) pump motor. The FPCM compares the target fuel pressure, calculated by the PCM via C-CAN communications, and compares it to the actual fuel pressure received from the FPS.

This feedback system allows the FPCM to precisely control the low fuel pressure by way of a pulsed 3-phase voltage input to the pump.

Supply voltage to the pump varies from 8v to 18v with a maximum of 10A.

Fuel pressure varies with driving conditions, 87 psi during start -up, 50psi to 72psi during driving and as low as 3 psi when stopped. Fail safe is 87 psi when a fault is detected.

Advantages of this system are lower current consumption, higher fuel efficiency by optimizing the fuel output pressure, extended fuel pump life with a lower pump noise.



## Intelligent Power Switching Overview

The VQ Sedona was the first Kia to use an Intelligent Power Switching (IPS) system and it was integrated in the Front Area Module (FAM) and the Rear Area Module (RAM). The IPS replaced the fuse and relay functions for front and rear exterior lights (except brake lights). Along with protecting the circuits the systems on the early VQs set DTCs for open circuits.

Newer vehicles may not set DTCs for opens but the IPS can inform the driver when turn signal lamps are burnt out. The newer IPS systems can control current and you will see that the short protection has been expanded to more circuits. These functions are usually built into the Smart Junction Box (SJB).

*Continued on next page*





## Map Defaults and Routing Terminology

When addressing customer concerns relating to navigation system map defaults and routing terminology, you may refer to the information below to better understand the differences between different model year navigation systems. As an example, the map defaults for routing on new vehicles (or vehicles which have received a map update) can vary depending on the head unit generation. 2014MY Sorento and Forte vehicles were the first Kia models to feature Generation 3.0 Navigation units. Prior to the 2014MY, the navigation units are classified as Generation 1.5 or Generation 2.0.

### Map defaults for Generation 1.5, 2.0 and 3.0

**Generation 1.5** (Sedona, pre-2014MY Sorento and Forte): Default routing is “Recommended”



**Generation 2.0** (Optima, Optima Hybrid, Sportage, Soul, Rio) Default routing is “Recommended”. “Use Ferries” defaults to “ON”.



**“Recommended”** tends to route based on distance and traffic conditions (customer may not be routed on the shortest distance on smaller, slower speed limit streets – may route more on major thoroughfares)

**“Shortest”** tends to route based on the shortest distance from the start point to the destination, reducing the distance travelled, however, not necessarily the time travelled when compared to “Recommended”.

**“Minimize Freeway”** routes with minimal use of highways.

**“Minimize Toll Road”** routes with minimal use of toll roads.

**“Use Ferries”** routes to include the use of ferries.

**“Use Ferries”** is default “On” also.

**Generation 3.0** (2014MY Sorento, Forte and Cadenza)

Default routing is **“Faster Time”**

**“Use Ferries”** defaults to “OFF”.



**Added and modified options on the Generation 3.0 Navigation:**

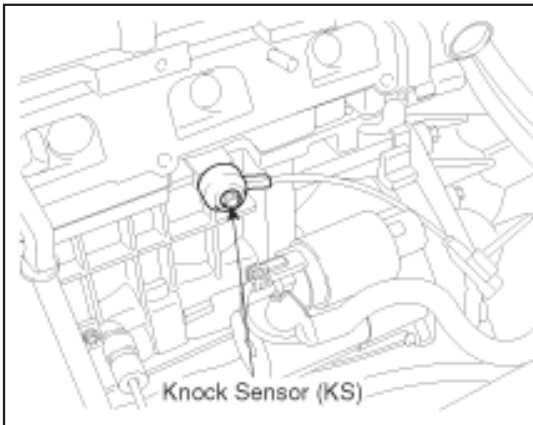
**“Faster Time”** routes reflect distance and traffic conditions (replaces “Recommended”).

**“Use HOV/Carpool Lanes”** routes to include High Occupancy Vehicle/Carpool Lanes.

**“Use Toll Pass”** routes to include the use of Toll Pass Roads (Easy Pass, Fastrack, etc.)

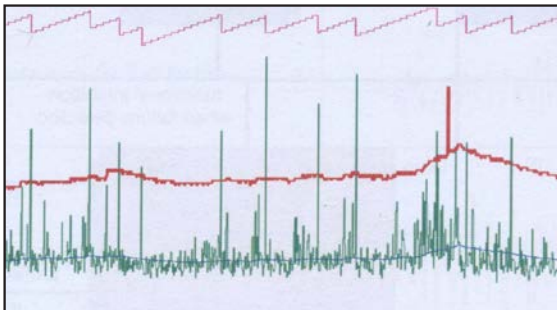
For information regarding the changes a customer might notice when a map upgrade is installed, see PS253.

## Knock Sensor Circuit. (piezo-electric)

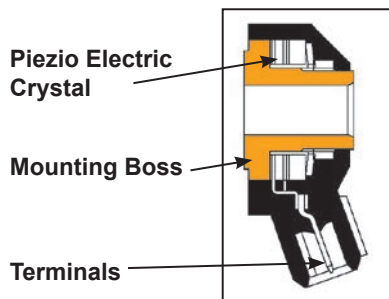


The knock sensor is attached to the engine block to detect engine knocking. Engine knocking typically occurs when the ignition timing is too far advanced based on engine rpm and load.

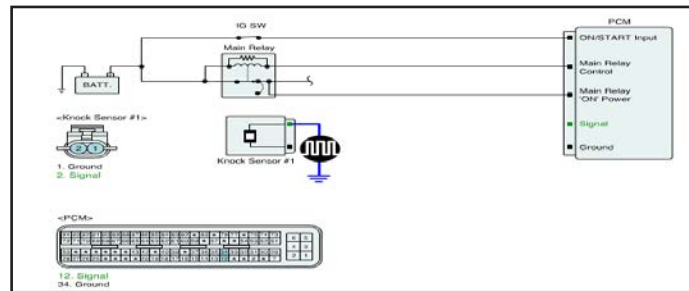
To ensure knock detection in all cylinders it is extremely important that the sensor be tightened to the correct torque value.



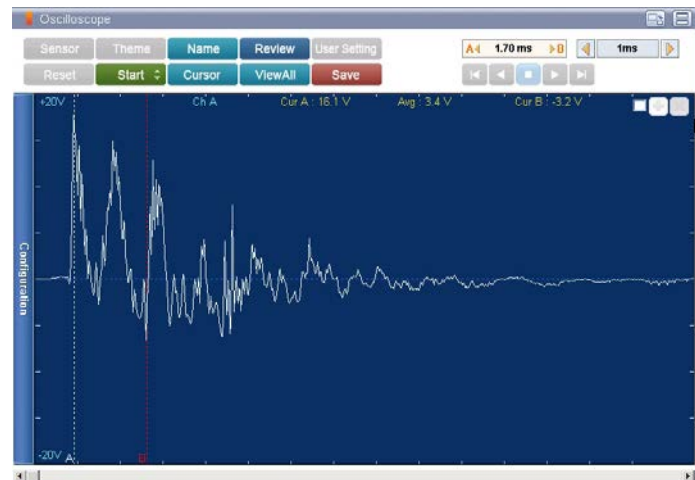
When knocking is detected, the ECM/PCM reduces the amount of timing advance a few degrees at a time until the knock stops. The ECM/PCM will continue to advance and retard the ignition timing to maintain optimal ignition of the air/fuel mixture to achieve maximum power and fuel economy, and reduce combustion emissions.



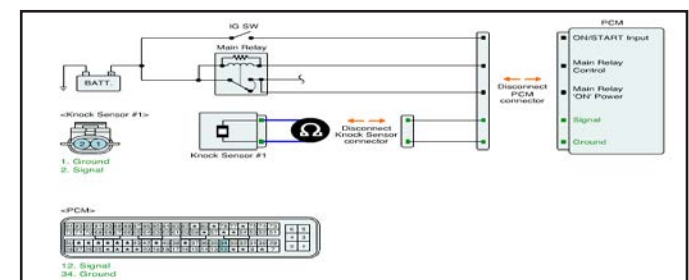
The knock sensor is a Piezoelectric Crystal that generates an AC voltage when it senses a vibration of 5kHz to 20 kHz due to engine knock.



The knock sensor can be checked with the oscilloscope function of the GDS using the VMI.



Remove the sensor and secure the "mounting boss" in the jaws of a vise, and connect the scope to the terminals. Rap on the vise with a ball peen hammer while monitoring the scope. There should be an AC voltage spike with each hammer strike.



Some knock sensors may have an internal resistance that can be measured with an ohmmeter.

Always consult the service information for correct testing procedures and tightening specifications.

In our next issue, we will discuss the Photo/Light Sensor.

## How Current Flows

### How electricity moves

We don't really need to know what an electron is but we should know how it acts. Don't get caught up with what electrons are, but think of how the electrons move.

It can be thought of electrons as something we can see and understand how they move. Similar to cars moving (or stopped) on the highway. Electrons can move at 186,000 mile a second which is slightly faster than the average Kia. The amount of electrons moving through a circuit is measured in Amperes (amps) and is known as current.



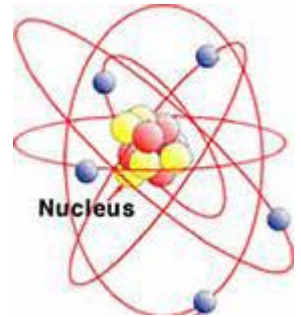
Think of the traffic light on the onramp to the highway with cars stopped waiting for the green. The cars waiting to go are like electrons waiting for the switch to close. The cars and the electrons cannot move until there is a path to travel. Once the circuit is complete, the electrons start moving like they have the open road ahead of them.

Resistance in an electrical circuit works like a backup on the highway. With 3 of the 4 lanes blocked by an accident, cars back up and the flow of traffic is reduced to one lane. When electrons hit a resistance, say a light bulb, the electrons back up



against the resistance and the flow is reduced. Just as there is pressure (hot headed drivers in a hurry) backed up at an accident, the electrons back up against a resistance. Once a car moves past the accident, the speed picks up and there is very little resistance to the flow of traffic. Once the electrons are past the load or resistance, they pick up speed. In the ground circuit (past the load), there is usually very little resistance. If there is some resistance in the ground circuit, you should see pressure (voltage) backed up.

Voltage is electrical pressure, which pushes the electrons through the circuit. The voltmeter can show us the amount of pressure in the circuit and the pressure drop across the resistance. Any time we see a voltage drop in a circuit, we know there is resistance in the circuit and current is flowing. Think of a voltmeter as a differential pressure meter. The meter displays the difference in voltage between the two probes. If one probe is on the negative battery post while the other probe is on the positive post, the meter will show the amount of voltage in the battery, say 12.6 volts. If one probe is on the engine block while the other is on the negative battery post while the engine is cranked, the meter shows the voltage difference (voltage drop) in the ground circuit.



### If you want more on Electrons

Let's talk about where electrons come from. Electrons are in orbits around the nucleus of an atom. But what is an atom? They are so small you cannot see them but you can see 78,000,000,000,000,000,000 atoms bunched together as a grain of sand. It is hard to think of a grain of sand as having all these moving parts.

*Continued on next page*

## How Current Flows (*Continued*)



If a satellite travelled way out into the universe and looked back at the earth, it could not see us running around on the planet. If the satellite is far enough away, the earth would look like a grain of sand. But we are here on earth just as atoms are in a grain of sand.

The atom has electrons in orbit flying around a core that has Protons and Neutrons in this core which is called a nucleus. The electrons have a negative charge and the protons have a positive charge. Just like magnets with north and south poles, the poles / charges are attracted to each other. The electrons are held in their orbits by this charge.

Do you know what an ion is? A complete atom has equal numbers of electrons and protons. Because the protons have a positive charge and the electrons have a negative charge, a complete atom is balanced. A negative ion is an atom with an extra electron. With an extra electron, a negative ion has an electron ready to jump off. An atom with one electron taken from it is called a positive ion. A positive ion has a hole looking for an electron to jump in.

Some atoms will give up electrons easier than others. Atoms that allow electrons to move easily are considered conductors. Copper's electrons move easily and so we use copper as a conductor. Rubber atoms do not give up electrons without a big push so rubber is a good insulator.

### How to move electrons

So if the flow of electrons is electricity, how do we get the electrons to move? How can we make electrons move out of their orbit?

- A knock sensor uses a piezoelectric crystal that will move electrons when crystal is pushed, squeezed or twisted. As the crystal moves with the engine vibration, electrons move.
- Electrons will move if a magnetic field is passed through a wire. Just the opposite also happens. When electrons moving through a wire will produce a magnetic field around that wire. This is how ignition coils and injectors work.
- A battery stores electrons on one set of plates while other plates store positive ions. When a connector connects the two plates, electrons move.
- The Oxygen Sensor uses an element that moves electrons based on the difference in oxygen content on both sides of the element
- Your home furnace may use a Thermocouple that moves electrons when the two dissimilar types of metals are heated. The thermocouple is heated by the pilot light.

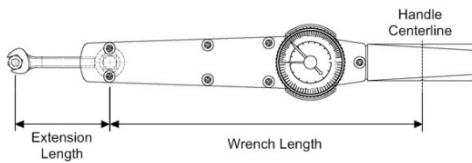
It helps to understand how electrons move and why the voltage (pressure) changes through the circuit. In many areas including electricity, it helps to visualize in your mind how things work or move. Much like automotive air conditioning, to properly diagnose a problem, you should know where in the system the refrigerant is liquid or vapor, high or low pressure.

## GDI High Pressure Fuel Lines

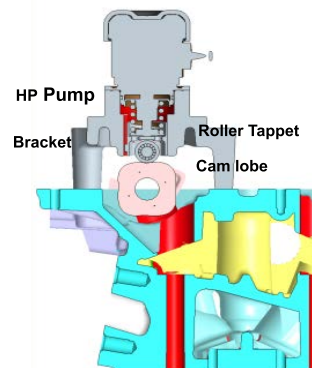
As described in TSB ENG 083, it is very important to replace the fuel-line rather than to re-use or re-tighten the existing fuel line fittings. Along with the high pressure fuel line, the bolts holding the High Pressure Fuel Pump to the head should also be replaced.

The connections are similar to a compression type fitting and should not be re-used. Once the fitting has been installed, it will not fit and/or seal as good the next time.

Because of the high pressure, the fittings should be properly torqued to avoid leaks. Where applicable, SST 09314-3Q1000 can be used. In most cases a Line-Crows-foot socket is the best tool for torquing these fittings.



When using a crows-foot socket, the torque should be set to compensate for the offset of the socket. With a crows-foot with a length of less than 2", you should be OK setting the torque wrench to the lower side of the specifications.



When replacing the Fuel Pump, make sure the cam lobe is on the lowest part of the cam. Installing the Fuel Pump when the cam is on the high lobe can damage the pump.

The TSB ENG 083 will be updated in the near future to further highlight details of the GDI system and the required procedures.

## Crossword Puzzle Solution

We hope you gave this issue's crossword puzzle on page 6 a try. In case you need a little help, here are the answers to the puzzle clues.

