TECHlink

GM

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A Monthly Publication for GM Dealership Service Professionals

Attention Chevrolet Dealers

Within the next few weeks, the 2004 Chevrolet Malibu will begin to ship to dealers. This revolutionary new automobile joins the Cadillac XLR and Saturn Ion in using the GMLAN (local area network) data communication system.

TIP: You can review GMLAN principles and purposes in the March 2003 TechLink.

TIP: You can learn more about the GMLAN system in rebroadcasts of the Know-How 10270.15D – Tech 2 Functional Diagnostics & GMLAN. In Canada, watch for Service Know How release 50325.12 due early August.

The Malibu will use the GMLAN for everything but the ECM, which is Class 2.

TIP: The Cadillac XLR uses the GMLAN primarily in the powertrain and brake systems, while a Class 2 data system is used for body and accessory controllers.

TIP: The 2004 Cadillac SRX uses GMLAN for the ECM and TCM on both 8 cylinder (LH2) and 6 cylinder (LY7) engines. The remaining modules on the vehicle are on the Class 2 bus.

Your Tech 2 will require an interface called the CANdi module, to communicate with the GMLAN. CANdi stands for controller area network diagnostic interface. The CANdi modules and instructions for use will begin arriving at Chevrolet dealerships shortly.

continued on page 2

Fuel System Diagnostic Tips — Part I

Recent TechLink articles have covered:

- Changes in Gen III Engine Fuel Injection System (Jan. 2002)
- MFI Systems (Oct. 2002)
- Testing Fuel Injectors – Misfires (Dec. 2002)
- 3 Step Maintenance Fuel Induction Service Kit (Dec. 2002)

With many of the individual components addressed, it's time to examine the operation of the entire fuel system and how the components interact.

Fuel injected engines require fuel under pressure to ensure correct fuel delivery from the fuel injectors and to maintain driveability.

TIP: Proper fuel system diagnosis requires a fuel pressure gauge that reads psi and kPa on a scale that is easy to see. Fuel pressure specifications vary between platforms and engines. Always refer to SI for the current fuel pressure specs.

Three types of fuel systems can be found on GM vehicles today.

Return System – In a return fuel system, fuel travels thought the entire fuel rail, and unused fuel passes through the regulator and back to the fuel tank.

Semi-Returnless System – In semi-returnless systems, fuel travels a short distance outside the fuel tank to an underbody-mounted pressure regulator/fuel filter assembly. Returned fuel does not travel through the engine's fuel rail, decreasing the amount of heat it's exposed to.

Returnless System – In a returnless system, the regulator is in fuel tank. Excess fuel returns directly to the fuel tank. The filter may be in the tank, inside the pump module. Environmental regulations have made the returnless fuel system necessary. It keeps fuel cooler,

continued on page 3

TECHlink GM

Contents

GM Service and Parts Operations

Chevy Dealers — from page 1

TIP: It's strongly recommended that you perform the Tech 2 functionality test before you connect the CANdi module.

In preparation for this new Tech 2 use, you must perform a functionality test on your Tech 2 to be sure the circuits used by the CANdi module are operating properly.

An explanation of the functionality test is being sent to Chevrolet and Cadillac dealers along with this August issue of TechLink. The software necessary to perform these tests should be available the last week of August (Tech 2 Software version 23.005). You must have this enhanced software loaded to ensure accurate test results.

To perform the functionality test, you will need:

- Tech 2
- Tech 2 cable
- ALDL loopback adapter
- VCI

The instructions will guide you to perform the following routines built into your Tech 2:

- VCI Automated Test
- VCI Dual Uart Test
- VCI TPU Option F6 Test
- VCI J1708 Test

These routines verify that a Tech 2 and VCI are working according to specifications and able to work with the CANdi module. These tests can also be found on your Tech 2 User Guide CD.

You can perform the functionality test quickly. Do it right away. This will allow sufficient time if your Tech 2 needs repair.

The August 2002 issue of TechLink contained a thorough explanation of how to obtain repair for the Tech 2, whether or not it is in warranty or under a service contract. Guidance is available at the Techline Customer Support Center (1.800.828.6860 English or 1.800.502.3222 French).

- Thanks to Mark Stesney, Matt Singer, Craig Jones and Richard St. Pierre

Cadillac dealerships received their CANdi modules in March, along with instructions for the functionality test.

Copies of the functionality test are being sent again to Cadillac dealers this month as a reminder.

TIP: If you haven't run the test yet, do so immediately.

Floor Pan Repair Kit

This information applies to various Buick LeSabre and Riviera, Cadillac Seville and DeVille, Oldsmobile Aurora and Pontiac Bonneville models between 2000 and present.

For these vehicles, Bulletin 99-06-03-009A contains information for repairing the floor pan in the area where the battery is located. Damage may result from weeping of acid from the battery or dislodged vent tube.

To complete this repair, you will need the materials in the table below. Follow the procedure in the bulletin.

- Thanks to Bill Denton

Part Number	Description
12482411	Panel Kit -- Floor Pan Repair
12378567 (US) or 88901675 (Canada)	GM Metal Bonding Adhesive*

* or Fusor 108B Metal Bonding Adhesive (Medium Set) and applicator 103. Contact Fusor at 1.800.234.3876, ext. 3, or www.fusor.com.

Coolant Loss, Milky Oil

This condition can affect some 2000-03 Buick LeSabre, Park Avenue, Regal, Chevrolet Impala, Monte Carlo, Pontiac Bonneville, Grand Prix with 3.8L V6 Engine (VIN K -- RPO L36).

According to bulletin 03-06-01-016, coolant may leak past the intermediate intake or throttle body gaskets.

Owners may comment about various symptoms of lost coolant, including a milky substance on the oil fill cap or dipstick.

The repair kit includes both gaskets. It's recommended to replace the throttle body nuts with a new design that improves torque retention. Medium strength threadlocker is also required.

TIP: Do not replace the upper intake manifold unless a specific driveability condition and related DTC are noted.

- Thanks to John Fletcher

GM TechLink

GM *TechLink* is a monthly magazine for all GM retail technicians and service consultants providing timely information to help increase knowledge about GM products and improve the performance of the service department.

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General Motors service tips are intended for use by professional technicians, not a "do-it-yourselfer." They are written to inform those technicians of conditions that may occur on some vehicles, or to provide information that could assist in the proper service of a vehicle. Properly trained technicians have the equipment, tools, safety instructions and know-how to do a job properly and safely. If a condition is described, do not assume that the bulletin applies to your vehicle or that your vehicle will have that condition. See a General Motors dealer servicing your brand of General Motors vehicle for information on whether your vehicle may benefit from the information.

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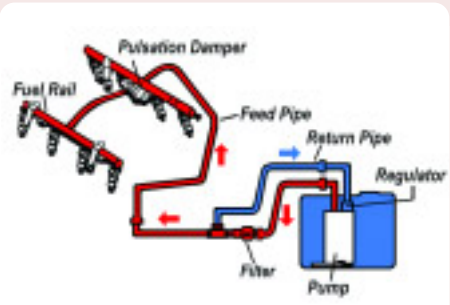
reducing evaporation and excessive hydrocarbon emissions.

Typical Return System

The fuel system is divided into two parts, low pressure and high pressure. In all three types of systems, the high-pressure side begins at the fuel pump and ends inside the fuel rail. The low pressure side begins at the regulator fuel bypass port and ends at the fuel reservoir in the tank. Returnless systems are characterized by a single high-pressure line that runs to the engine compartment.



Typical Semi-Return System

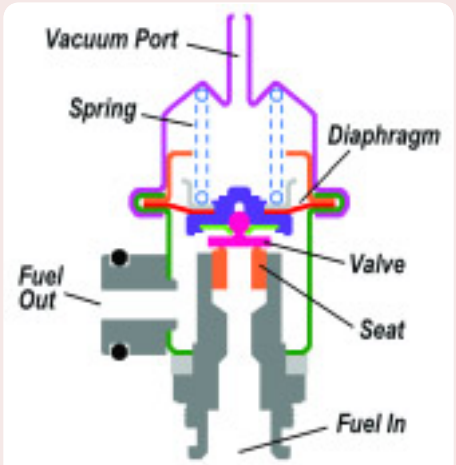
The main difference between the three systems is the location of the fuel pressure regulator. In return systems, the regulator is in the engine compartment (on or near the fuel rail) and in returnless and semi-returnless systems, it's in or near the fuel tank.

Regardless of location, the fuel pressure regulator regulates system pressure by bypassing excess fuel back to the tank. In return and semi-returnless systems, proper diagnosis of pressure concerns requires testing and inspection of the regulator and verification that the pump or pump module is delivering adequate fuel. Inadequate fuel flow may be caused by clogged strainers or filters, rather than pump failure, especially if fuel starvation symptoms occur only at low fuel levels or during hot weather.

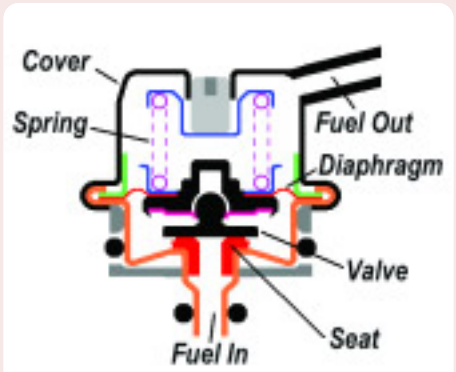
Fuel Pressure Regulator Operation

There are two types of Delphi fuel pressure regulators on GM vehicles, Universal Pressure Regulator (UPR) and Mini-Cartridge Regulator (MCP). GM uses regulators from other suppliers, too, but the designs are similar and operation is identical.

The fuel pump and fuel pressure regulator work in concert to control fuel pressure supplied to the fuel injectors. At a given voltage, the fuel pump supplies fuel at a relatively constant rate to the pressure regulator. Unneeded fuel diverts back to the tank, to match fuel delivery to engine demand. Fuel flow from the pump



Universal Pressure Regulator (UPR)



Mini-Cartridge Regulator (MCP)

varies strongly with voltage. If system voltage is low, the pump may not receive enough power to fully pressurize the system or supply the engine at high fuel demand conditions. Fuel pressure regulators are preset for a particular operating pressure during assembly, and are not adjustable.

Return System Operation

In most all return systems, the fuel pressure regulator contains a vacuum chamber that is connected to manifold vacuum and is separated from the fuel by a diaphragm and valve assembly. The diaphragm has fuel on one side and engine manifold pressure (vacuum) on the other.

All GM fuel pressure regulators contain a calibrated spring located in the vacuum chamber side. Fuel pressure in the fuel rail is regulated by pressurized fuel from the pump acting on the fuel rail side of the regulator's diaphragm, pushing against the spring pressure and manifold pressure (vacuum) on the other side.

When the combined force of vacuum on one side plus pressurized fuel on the diaphragm gets high enough to overcome spring pressure, the relief valve orifice opens, reducing rail pressure slightly by bypassing a controlled amount of fuel to the fuel tank. When an injector fires, it causes a slight pressure drop in the rail. In return systems with a vacuum hose connected to the regulator, vacuum applied to the regulator keeps the pressure difference (pressure drop) constant between manifold absolute pressure and supplied fuel pressure.

Returnless System Operation

Returnless systems operate similarly, but fuel rail pressure decreases slightly with increasing fuel demand. Fuel pressure does not vary with manifold vacuum because the regulator is referenced to atmosphere, not to manifold vacuum. Except for the lack of a vacuum reference, fuel pressure regulators in returnless systems work just like they do in return fuel systems. The calibration of the PCM is modified to look at changes in MAP and vary the pulse width of the fuel injectors to adapt to varying engine loads.

Fuel Pressure Regulator Common Problems

TIP: These conditions apply to return or semi-return systems.

Leaks – Regulators can leak internally or externally. An internal leak is usually caused by a crack in the diaphragm. An internal leak can be diagnosed by removing the vacuum hose and checking for fuel seepage on the outlet tube or the vacuum line. Place a clear piece of vacuum hose over the vacuum orifice for a short period of time (15 – 30 minutes). If fuel rises up in the hose, the regulator is leaking and needs to be replaced.

Common customer complaints that suggest a leaking regulator are extended crank and fuel odor. More diagnostic tips will be given later.

Noise – Regulator related noise may be system oriented or the regulator itself. Hold a stethoscope on the regulator and listen for the noise the customer is concerned about. If the regulator is noisy, replace it.

TIP: A noisy regulator may be improperly diagnosed as a noisy alternator.

Disconnecting the alternator is not a good test for isolating noise issues. System voltage will drop, which causes the fuel pump to create lower pressure, eliminating the fuel pressure regulator noise.

Temporarily disconnect the vacuum hose from the regulator if it has one, which slightly raises controlled fuel pressure. If the regulator has no vacuum hose, connect the fuel shutoff valve special tools listed in SI and slightly close

continued on page 6

Module Application and Programming for 2003

There are a number of modules included on cars and trucks that need to be configured to the vehicle when a replacement is installed. For your convenience, the accompanying table covers all cars and light duty trucks for the 2003 model year. The table indicates the type of action required; you must refer to SI 2000 for procedures and details.

The modules listed across the top of the table require configuring to the vehicle after installation. All of the vehicles are listed in the left column. Here's how to interpret the symbols in the table.

- S indicates need for SPS (service programming).
- O indicates set-up required with or without Tech 2
- A indicates actuator set-up is required.
- T indicates an on-vehicle tire pressure monitor programming procedure is required using special tool J-41760
- # indicates vehicles produced after January 31, 2003 which no longer require SPS programming

These symbol interpretations are also given in the bottom-left corner of the table.

The following modules may be installed on certain vehicles, but require no action, so they are not included in the table:

- Heated Seat Module
- Head Up Display
- Rear Park Assist
- Driver Information Center
- CD Changer

- Thanks to Lindsey Beauchamp

New Monthly Feature Coming

Beginning with the September issue, look for the Programming and Setup Corner. This new feature will discuss a different programming or setup issue each month.

TIP: This new feature will supplement related information in SI under the Programming and Setups heading.

Module Application and Programming for 2003

Service Information Module Name*	Body Control Module (BCM)	Dash Integration Module (DIM)	Rear Integration Module (RIM)	Instrument Panel Integration Module (IPM)	Electronic Brake Control Module (EBCM) M.Y. '03	Electronic Brake Control Module (EBCM) M.Y. '04	Electronic Suspension Control Module	HVAC Control Module	Instrument Panel Cluster	Door Control Module	Memory Seat Module	Cellular Telephone Module	Vehicle Communicatio Interface Modu (VCIM)
Tech 2 Module Name	Body Control Module	Dash Integration Module	Rear Integration Module	Instrument Panel Module			1. RTD 2. RTD/EVO 3. CVRSS/ALC	1. Heating & Air Conditioning 2. Climate Control Panel	Instrument Panel Cluster	1. Driver Door Module 2. Passenger Door Module 3. Left Rear Door Module 4. Right Rear Door Module 5. Driver Door Switch/Module 6. Passenger Door Switch/Module	1. Memory Seat Module 2. Seat Control Module	Cellular Telephone	OnStar
Buick													
Century	O							A					O
LeSabre		O	O	O	S/O	S/O		A			O		S/O
Park Avenue	O				S/O	S/O		A			O		O
Regal	O				O	O		A					O
Rendezvous	O							A	O		O		S/O
Cadillac													
Deville		O	O	O	S	S	O	A		S	O	O	S/O
Escalade	S/O				O	O	S/O#	A	S	S	O		S/O
STS					S	S				S	O	O	S/O
Seville (SLS)		O	O	O	S	S	O	A		S	O	O	S/O
CTS		O	O		S	S		A		S	O		S/O
Chevrolet													
Astro	S/O				O	O							
Avalanche	S/O				O	O		A	S	S/O			S/O
Blazer	S/O				O	O		A					
C-Series (Truck Line D & H)	O				O	O			O				
Cavalier	O				O	O							S/O
Corvette	O							A	O		O		
Express	S				O	S/O							S/O
Impala	O				O	O			S/O				S/O
Malibu	O				O	S							
Monte Carlo	O				O	O			S/O				S/O
S-10	S/O				O	O							
Silverado	S/O				O	O		A	S	S/O	O		S/O
Suburban	S/O				S/O	S/O	S/O#	A	S	S/O	O		S/O
SSR	S/O				O	O							
T-Series (Truck Line C)					S	S							
Tahoe	S/O				S/O	S/O	S/O#	A	S	S/O			S/O
Trailblazer	S/O				O	O		A	S	S/O	O		S/O
Tracker (E/J Truck)													
Venture	O				O	O			O				S/O
GMC													
C-Series (Truck Line D & H)	O				O	O			O				
Denali	S/O				O	O	S/O#	A	S	S/O	O		S/O
Envoy	S/O				O	O		A	S	S/O			S/O
Jimmy	S/O				O	O							
Safari	S/O				O	S/O							
Savana	S/O				O	O							S/O
Sierra	S				O	O		A	S	S/O	O		S/O
Sonoma	S/O				O	O							
T-Series (Truck Line C)					S/O	S/O							
Yukon	S/O				O	O	S/O#	A	S	S/O	O		S/O
Hummer													
H2	S							A	S	S/O	O		S/O
Isuzu													
Ascender	S												S/O
Oldsmobile													
Alero	O				O	O							
Aurora		O	O	O	S/O	S/O		A			O		S/O
Bravada	S							A	S	S	O		S/O
Silhouette	O								O				S/O
Pontiac													
Aztek	O							A	O				S/O
Bonneville		O	O	O	S/O	S/O		A			O		S/O
Grand Am	O				O	O							
Grand Prix													O
Montana	O								O				S/O
Sunfire	O												S/O
Vibe													
Saturn													
Ion	S/O												S/O
L-Series	S/O				O	O							S/O
Vue	S/O								O				S/O

= Not on vehicle

S = Needs SPS

O = Setup Required with or without Tech 2

A = Actuator Setup Required

T = Requires an on vehicle Tire Pressure Monitor programming procedure using special tool J-41760.

= Vehicles produced after January 31, 2003 no longer require SPS programming

GMLAN Wire Repair

Beginning this year, a number of GM vehicles will be equipped with a new serial data system called GMLAN (TechLink, March 2003). Much new information will be shared about GMLAN and how it functions, from the GM Technical College and other TechLink articles. Two types of GMLAN Serial Data Networks can be applied to a vehicle, Low Speed GMLAN and High Speed GMLAN.

Low Speed GMLAN carries body control serial data messages around the vehicle. This network is wired with a single wire between modules and functions at a relatively low speed. For higher priority messages, High Speed GMLAN may be employed to provide serial data messaging between different powertrain and chassis controllers. The High Speed GMLAN Network is wired with two wires in a twisted pair configuration.

TIP: This twisting is critical to protect the network from outside RF signals and also to prevent radiation of RF interference from the network. These problems exist on class 2 serial data networks, but are more critical on GMLAN Networks, and are extremely critical on the two-wire High Speed GMLAN network.

A vehicle with GMLAN may have two different serial data networks (the 2004 Chevrolet Malibu). Some vehicles may have only one GMLAN Network (the 2004 Cadillac XLR, some 2004 Cadillac CTSs and the 2004 Cadillac SRX).

This article is to remind you that repair of GMLAN wiring must maintain the integrity of the original network to minimize the risk of outside RF interference with messaging on the network(s) or having the network cause noise audible through the radio.

The key things to remember are:

1. Wire repair procedures remain the same as for any other wire repair.

2. The network wire length after repair must be the same length (or very close to the same) as before the repair.

3. If the network is made up of a twisted pair of wires, the twist must be maintained or re-created after the repair (usually one twist per inch, 25 mm.).

When making a wire repair such as an open circuit, use the appropriate crimp and seal splice, and maintain the twist in

continued on page 7

	Digital Radio Receiver	Amplifier	Radio	Lift Gate Control Module	Passenger Presence System Module	Sensing and Diagnostic Module	Remote Control Door Lock Receiver (RCDLR)	Theft Deterrent Control Module	Theft Deterrent Control Module - Immobilizer	Engine Control Module	Powertrain Control Module	Transmission Control Module	Transfer Case Control Module	Rear Wheel Steering Control Module	Diversity Antenna Module	Sunroof/ Power Roof Control Module	Steering Control Module	Automatic Headlamp Leveling Module
	Digital Radio Receiver		Radio	Lift Gate Module	Passenger Presence Module	Supplemental Inflatable Restraint	Remote Function Actuation	1. Vehicle Theft Deterrent 2. VTD 3. Passlock	Immobilizer					Rear Wheel Steering				Headlamp Leveling Module LH/ Headlamp Leveling Module RH
						O	O	S			S							
	O		O			O	O	S			S							
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						O	O	S			S							
	O		O			O	O	S			S							
	O					O	O/T	S			S							
	O	O	S		O	O	O	S	S		S			S/O				
	O					O												
	O					O	O/T	S			S							
	O		O			O	O	S		S		S			O			O
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	O	O	S		O	O	S/O	S	S		S			S/O		O		
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							* The following modules do not require setup/programming for any 2003 MY vechicles:											
							Heated Seat Module, CD Changer, Head Up Display, Rear Parking Assist, Driver Information Center (DIC)											

either valve to alter controlled pressure. DO NOT fully close either valve when the pump is running, as regulator or pump damage could occur.

With either procedure, if the noise is gone, the problem is not the alternator. Be sure to reconnect the vacuum hose if it was disconnected.

TIP: A regulator that is noisy on one vehicle may not be noisy if placed on another vehicle. And a noisy regulator may be quiet for awhile when removed and inspected on the same vehicle.

Fuel Injectors

An injector operates on 12 volts and delivers fuel when opened. Voltage is supplied to the injector when the key is turned on. Some vehicles have the voltage side of the injector circuit connected to the fuel pump relay. Therefore the injectors will not receive voltage unless the fuel pump is energized. The PCM controls the ground circuit to complete the path for current to flow.

You may suspect an injector is not working if there is a misfire with a code and a dead skip, and the spark is good. Check for voltage to the injector and check that the PCM has the ability to pulse the injector on and off.

TIP: The recommended test for a complete electrical circuit to the injector utilizes a noid light. Simply disconnect the wire harness connector, plug in the noid light, and crank the engine. If the light flashes, voltage to the injector and the PCM's ability to turn the injector on and off are good.

TIP: The noid light does not have the same resistance as the injector and may not draw the same current. A high resistance circuit may not affect the noid light as much as it would an injector.

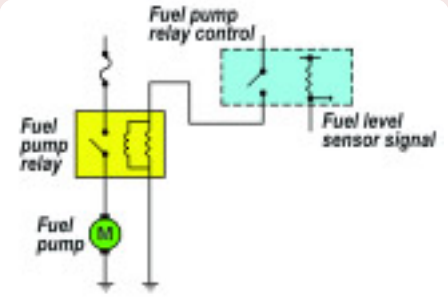
Two causes of intermittent injector operation were covered in past TechLink articles: 'fretting corrosion' in June, 2003 and injector partially restricted in December, 2002. If you suspect either of these conditions, refer to the TechLink article or a bulletin that advises you on how to test for these conditions.

TIP: If you perform a balance test to find a tricky injector misfire, be sure to use the kPa scale on your pressure gauge and not the psi scale.

Fuel Pumps

The fuel pump provides fuel flow and pressure to meet engine requirements under a wide variety of conditions. These functions must be met without creating undesirable noise, vibration, overpressure, or EMI/RFI in the vehicle.

When the ignition key is turned on, the PCM sends voltage to the fuel pump



Typical fuel pump schematic

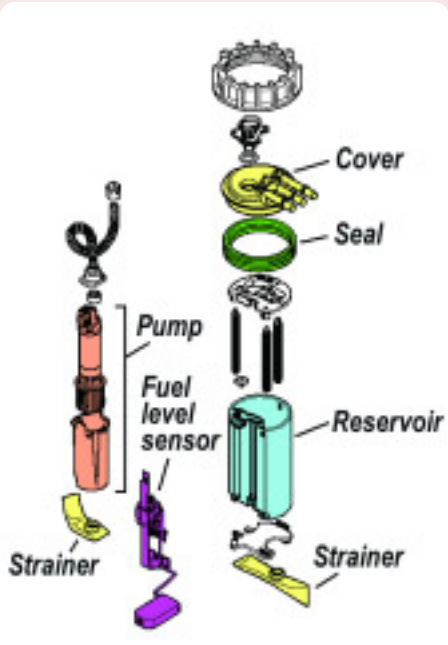
relay and cycles the fuel pump for 2 seconds. If the PCM does not see ignition reference pulses, it turns the fuel pump off. Other inputs may also be involved on some vehicles.

TIP: If you have concerns about fuel pump operation, go back to the basics, check the schematic for the vehicle you're working on, and understand how the system operates before you start replacing components.

TIP: In the fuel pump circuit, grounds are critical. Ground connections must be clean and tight.

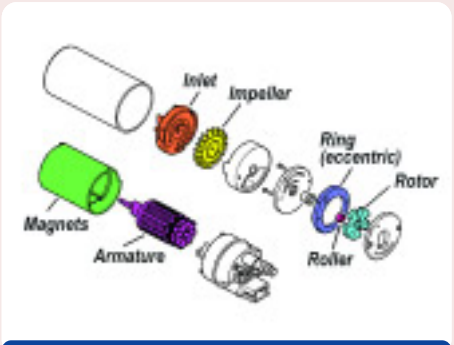
A fuel pump is designed to operate on numerous fuel compositions in a global marketplace. The pump must deliver a specific volume and pressure required for each application. If the pump does not deliver enough volume, a pressure drop occurs and the vehicle will experience lean combustion during high fuel demand conditions. If the pump delivers too much flow, a larger current draw takes place and the fuel that travels through the system heats up and creates excessive hydrocarbon vapors.

Currently, there are three types of



Modular Reservoir Assembly (MRA)

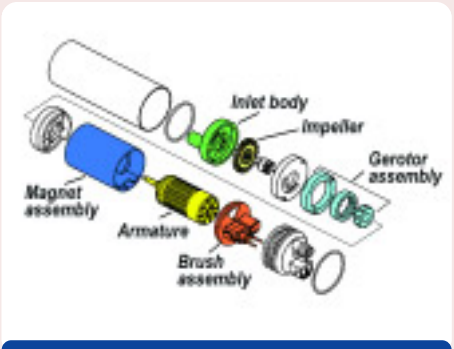
electric fuel pumps used in GM vehicles. They are the turbine, rollervane and G-rotor types. Although the pumping section of each of these pumps is different, the main purpose of the pump is the same – to provide adequate fuel flow and pressure to the engine under all operating conditions. For diagnostic purposes, fuel pressure values are most important for quick and accurate fuel pump diagnosis.



Typical Rollervane Pump

TIP: Current draw readings on the vehicle are not an accurate indicator of fuel pump condition. There are numerous variables, outside the fuel pump, which can affect the accuracy of these readings. Electric fuel pump current values are typically not published for on-vehicle diagnosis.

Because the fuel pump is located in the fuel tank, quick visual checks may be difficult. To determine if the fuel pump is working at all, hook up the Tech 2 and a fuel pressure gauge and cycle the pump on a couple times. If fuel pressure readings are within specification, you know the pump is working. If there is no fuel pressure, check for a loss of voltage to the pump. Wiring can become corroded, loose or broken. Make electrical repairs according to SI.



Typical G-Rotor Pump

If the pump runs when commanded on with the Tech 2 and you still suspect poor fuel pump performance, look for dirt or rust which could cause the pump to wear out prematurely.They can also cause the pump check valve to stick open, leading to hard starting, especially when the engine is hot. Rust is always caused by water, either from the fuel source, by condensation or by ingestion

of water by the fuel system. If the vehicle is used under extreme operating conditions (such as off-road), water and dirt may be ingested through the canister vent system.

Fuel lubricates and cools the pump. Driving the vehicle frequently with a very low fuel level in the tank can starve the pump of lubrication and cooling, which can accelerate wear and condensation, two causes of pump problems.

If you replace a pump that has failed due to dirt or corrosion, clean out the fuel tank and lines, to avoid the same damage to the new fuel pump. Also, replace the fuel filter and clean or replace the pickup screen. Contamination on the screen cannot be seen without magnification. Newer vehicles with a pump module usually have two screens, one on the outside of the module and one on the pump inside the module. Both screens may block, but the screen on the inside of the module is not serviceable. So the module must be replaced even if the pump itself is still functional. Dirt visible inside the module "bucket" is an indication that both strainers may be blocked. If contamination is in the fuel tank, it's most likely to be in other locations in the fuel system. It's a good idea to check for contaminants in the fuel rail and fuel lines also.

Watch for Fuel System Diagnosis, part II, in an upcoming issue

- Thanks to Dan Wimer and Bob Halsall

Front Stabilizer Shaft Installation

This condition affects 2003 TrailBlazers, Envoys and Bravadas with the 4.2L L6 engine, with the stabilizer shaft running through the frame.

TIP: On earlier models, the stabilizer is mounted to the front of the frame.

On these vehicles, it is possible to install the front stabilizer shaft upside down. If this occurs, the shaft may contact and damage the engine oil filter.

There is a bend in the shaft for clearance in the area of the oil filter. When the shaft is installed correctly, it should bend away from the engine.

TIP: There may be a label on the shaft. If so, it should be on the LH side.

- Thanks to Steve Hathaway

Diesel Engine Training

The interim 2004 Duramax 6600 diesel engine (RPO LLY) becomes available January 2004. Though similar to the current production Duramax 6600, this engine offers some significant differences. The GM Service Technical College (STC) will offer an updated Diesel Engine Performance course to reflect the changes. Refreshed and updated CBT, IDL, and Hands-on course components will be released successively beginning April 2004.

To enable technicians to promptly offer service to customers with the new LLY Duramax 6600 engine, GM STC will release a supplemental video course in December of 2003 that focuses on this new engine configuration. Technicians with credit in any of the current Diesel Engine Performance 2001 course components may take this video course to receive a cross-credit to the updated course components.

Technicians are encouraged to participate in opportunities to complete the training components within the Diesel Engine Performance curriculum path. This curriculum path provides the foundation for December's supplemental video. This strategy will not only increase the dealership's overall Service Training Standard score, but will help ensure that the technicians are prepared for LLY Duramax 6600 customer concerns and able to fix them right the first time. Dealers that complete the current standards before December will be in an excellent position to address the needs of the LLY Duramax 6600 customers. Additional communication about the new courses will be available a few weeks before their release.

- Thanks to Steve Sternicki

Current Course	Supplemental Course (Released December 2003)	Updated Course (First component released April 2004)
Diesel Engine Performance 2001 (W, D, H)	Duramax 6600: 04i Engine Performance Updates (Video and Booklet)	Duramax 6600: Diesel Engine Performance

GMLAN — from page 5

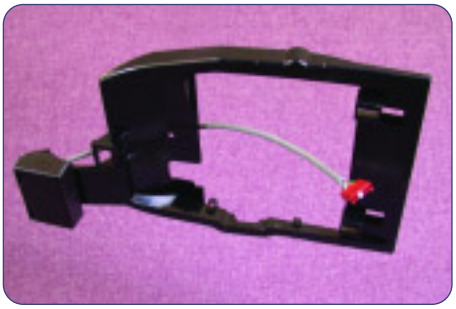
a High Speed GMLAN circuit as much as possible.

If splicing a pigtail to a Low Speed GMLAN circuit, use care to maintain the original length of the circuit. If the circuit is a High Speed GMLAN twisted pair, then factor that into the amount of wire you use from the pigtail. Also be sure to offset the crimp and seal splices and position them to maintain the one twist per inch, 25 mm.

A service terminal may be used, as long as you do not untwist any more than is necessary in a High Speed GMLAN circuit to make the repair.

- Thanks to John Roberts

Compass Erratic or Inaccurate



According to upcoming bulletin 03-08-49-008, owners of some 1999-2001 Blazers, Jimmys and Bravadas may comment that the compass is erratic or inaccurate while operating the power sunroof. The compass may stay erratic or inaccurate while the power sunroof is open.

The sunroof module cable may become magnetized with the operation of the roof, producing a false signal to the compass sensor. Relocate the compass sensor by replacing the compass sensor bracket with part number 15106819.

TIP: The compass sensor is located to the right side of the original bracket; it is located forward of the replacement bracket.

TIP: The supply is limited, so do not order parts for stock.

It is necessary to remove the driver information center and lower the headliner for access to the compass sensor mounting bracket.

While the headliner is lowered, follow the instructions in the bulletin for notching the headliner to provide clearance for the compass sensor.

Refer to the appropriate SI documents for component removal and installation.

- Thanks to Dan Oden and TJ Smith

Car Issues -- Fix It Right the First Time

Model Year(s)	Vehicle Line(s) -- Condition	Do This	Don't Do This	Reference Information / Bulletin
2000-2003	3800 L36 Coolant leak at intake manifold	Replace the intermediate (upper) intake gasket	Replace the intake manifold assembly	Bulletin in process VME to field 5/30/03 TechLink article in June
1998-2003	Seville – Rear Seat HVAC Controls	Replace the knob only	Replace the entire rear seat blower switch assembly	03-01-39-001A
2000-2003	Cavalier/Sunfire/Grand Am/Alero/Malibu – Inaccurate Fuel Gauge	Replace sensor card for fuel gauge – accuracy issue	Replace the fuel sender / pump assembly	01-06-04-008D
1999-2003	Grand Am/Alero – Window Disengagement, Broken Clips	Replace sash clip only	Replace door glass assembly	01-08-64-018
1997-2003	Grand Am/Alero/Malibu – Brake Pulsation	Turn rotor and use brake align procedure	Replace rotors for pulsation	00–05-23-002 01-05-23-001 (Know How Video #15040.01B)
1997-2003	Venture/Montana/Silhouette –Windshield Water Leaks	Refer to specific bulletin procedures for diagnosis	Assume that leak came from the windshield sealing	01-08-57-006
1997-2003	Century/Regal – HVAC Operation, No "Auto" Light	Normal in full heat or cold setting	Replace HVAC control head for "Auto" light	99-01-39-007B
1999-2002	Corvette – Fuel Gauge Intermittently Goes to Empty	Install revised software	Replace fuel senders or I/P cluster	02-06-04-010 (2002 MY) 1999-2001 MY software released – bulletin not yet updated
2003	All cars with 4T40/45E, 4T56E and 4T80E – Code P0742	Replace TCC PWM Solenoid	Replace transmission or valve body assembly	02-07-30-039B
2002-2004	L61 EcoTech 4 Cylinder – Engine	Replace Cylinder Bore Liner	Replace Engine	03-06-01-018

Truck Issues -- Fix It Right the First Time

Model Year(s)	Vehicle Line(s) -- Condition	Do This	Don't Do This	Reference Information / Bulletin
2003	Fullsize Pickups and Utilities – Transfer Case Service Light	Replace encoder motor sensor and reprogram TCCM	Replace the module, encoder motor or transfer case for DTCs C0327, P0836, P0500	03-04-21-001B
1999-2002	Fullsize Pickups and Utilities – Throttle Body Sticks	Clean throttle body adjust blade and insert plugs	Replace throttle body	02-06-04-054B and parts restriction
2003	Fullsize Pickups – 6.6L Diesel Engine ECM	Follow SI and bulletins for proper diagnostics for P0181. Refer to the Owner's Manual (block heater and front cover)	Replace ECM (DTCs P0540 and P0181) unless diagnostics confirm need to replace	02-06-04-048, 03-06-04-021, 02-06-04-058 and parts restriction
2003	Silverado, Sierra, Savana, Express > 8600 GVW – ABS Lamp On	Reflash for code C0550	Replace ABS module	03-05-25-003
2002-2003	Envoy, Envoy XL, Bravada with G67 – Low in Rear	Replace check valve service kit	Replace air suspension compressor	02-03-99-001
2002-2003	All TrailBlazers, All Envoys, Bravada – Mirror Erratic Return	Replace mirror actuator and reprogram module	Replace outside mirror assembly	02-08-64-008 02-08-64-021
1999-2003	Fullsize and Midsize Utilities – Sunroof	Install clip or mechanism kits. GMSPO has component parts.	Replace sunroof	02-08-67-009 03-08-67-004
1999-2003	Fullsize Pickups and Utilities, Midsize Utilities – Noise on Steering	Lube I-shaft	Replace I-Shaft	00-02-35-003B 02-02-35-006A
1999-2003	TrailBlazer, Envoy, Bravada without G67 – Moan/Boom	Replace rear coil springs	Repurchase vehicle for rear axle vibration/boom noise	02-03-09-002A
2002-2003	All TrailBlazers, All Envoys, Bravada – Inoperative Tail Light	Replace tail lamp circuit board and bulb	Replace rear tail lamp assembly for brake light	03-08-42-006

Know-How Broadcasts for September

10270.09D Emerging Issues	September 11, 2003	9:00 AM, 12:30 PM, 3:30 PM Eastern Time
10270.21D – New Model Features - 2004 Colorado and Canyon	September 25, 2003	9:00 AM, 12:30 PM, 3:30 PM Eastern Time