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Cam Phasing Technology

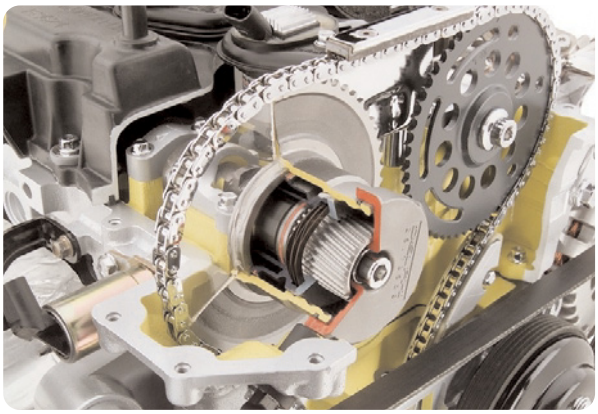
2002 4.2L RPO LL8 (VIN S)

Why Cam Phasing is Used

As emissions standards continue to grow stricter, devices have been added to vehicles to decrease pollutants. These have included AIR , PCV and EGR. Recently engineers have sought ways to control major pollutants through engine design, while increasing torque and horsepower. Cam phasing is one of the new technologies that provides a finer control of engine operation.

At engine combustion chamber temperatures above 2500°F, nitrogen mixes with oxygen to form oxides of nitrogen (NOx) which is a major contributor to smog. Because each cylinder experiences combustion temperatures well above that level, methods for reducing combustion temperatures have been a goal for all automotive manufacturers.

Traditionally the method for reducing the formation of NOx is through the use of an external exhaust gas recirculation (EGR) valve. Exhaust gas is reintroduced into the intake manifold through a valve, diluting the intake charge and effectively reducing combustion chamber temperatures and the formation of NOx. A side effect of introducing external EGR to reduce NOx is that it causes the hydrocarbon (HC) levels to increase.



A more effective method of controlling emissions is to increase intake and exhaust valve overlap. Valve overlap refers to the amount of time in the four-cycle engine event when both the intake and exhaust valves are open. A reversion occurs in the cylinder as the piston is moving down while both valves are open. Exhaust gas is drawn back into the cylinder, simulating an EGR function. Being able to control the length of this event can substantially lower NOx. HC levels are also reduced by re-burning the tail of the exhaust event which is rich in hydrocarbons. However, placing the camshafts in a permanent increased overlap position would affect idle and low rpm performance. The greater the overlap, the lower the intake manifold vacuum levels.

A cam phaser allows the position of the

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Techline News

Benefits Of A Pentium 4 Processor

Pentium 4 processors have recently been added to the Techline Hardware Specification (http://service.gm.com). When evaluating a new PC for the Service Department, one may wonder about the benefits of a Pentium 4 over another processor.

Increased system responsiveness for multitasking means that more applications can simultaneously be open with less chance of the PC locking up or slowing down.

This Pentium 4 chipset was designed for enhanced web based performance. As more Service Departments use the World Wide Web and other applications become web based, a Pentium 4 processor will enhance the performance of these applications.

The Pentium 4 design is based on the Intel® NetBurst™ technology. This new architecture promotes top-level performance by the PC and will promote growth for both new applications and operating systems in the future. With the proper software, security features can be increased greatly over previous PCs.

Another great benefit of a Pentium 4 is the price of a business grade PC. The price will actually be less than that of a Pentium III with equivalent specifications. A PC with a Pentium 4 processor will ensure the greatest performance now and also allow flexibility for the future.

TIP: Pentium 4 processors presently exhibit a conflict with the SI 2000 software. However, this can be corrected with certain modification. JRE 1.3.1 must be downloaded from http://java.sun.com before loading SI 2000. Once SI 2000 is loaded, only the Basic version will function; the Enhanced will not work. This will be corrected in a future release of SI 2000.

– Thanks to Sam Hutson

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TECHlink GM

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GM Service Operations

PC Viruses Are Still a Concern

Last April, we brought you an article about protecting your dealership's computers from viruses. (Back issues available on the TechLink web page, at http://service.gm.com.) As you've no doubt heard in the news, viruses continue to be a problem, and the likelihood is high that your system will come under attack.

Due to the recent impacts of the CodeRed and Nimda viruses, maintaining virus protection on Techline clients has never been more important. In order to assure maximum security, anti-virus software should be installed and maintained on all Techline clients.

There are currently over 57,000 known viruses, and new viruses are found all the time, so updating anti-virus definition files on a weekly basis is a necessity. Once a virus infects a client PC, it may spread and infect the entire network.

Any PC that has access to the Internet, receives Email, can access information on a CD-ROM/Diskette, or is connected to a network with another PC that can perform any one of these functions is at risk.

The results of a virus infecting a PC can range from minor annoyances to all data stored on the PC's hard drive being erased. A format and recovery may be required in order to completely clean the PC, and some files may be permanently lost. The recovery process could last a week or more, which would have a direct impact on business.

It is a dealer's responsibility to have a virus engine (McAfee or Norton) and also the most current definition file for that engine to work with on each Techline client.

The base engine can be purchased for $30-40 at such retail outlets as Best Buy, Circuit City, Comp USA, etc.

However, installing the anti-virus engine alone is not enough for proper protection. The definition file needs to be updated on a weekly basis. The definition file provides the protection from new viruses. The latest definition files can be located at http://www.mcafee.com for McAfee users or http://www.symantec.com for Norton users.

All PCs purchased from PC Source and GM Dealer Equipment come preloaded with a virus engine. The definition files will still need to be updated.

In order to assure protection from the Nimda virus, your anti-virus software should be dated no earlier then 9/19/2001. Once updated to this level, updates should be done on a regular basis. If GM is required to assist in cleaning up a virus, the dealership will be billed accordingly.

For assistance with the virus protection software, contact your software manufacture or visit their web site at http://www.mcAfee.com or http://www.symantec.com

– Thanks to Sam Hutson

One of the easiest tests to run on the Class 2 bus is a voltage check, using a DVOM in normal DC volts mode. In a properly operating vehicle, the DVOM will display a low voltage, around 1 volt, but will vary depending on the activity on the bus.

The Class 2 bus is held at ground potential until a controller sends a message, at which time it toggles the voltage up to 7 volts for as little as 64 microseconds. Because the majority of the time the bus is at ground potential, using a DVOM in normal mode to measure a normal operating Class 2 bus circuit will display a reading between 0.7 and 1.5 volts.

TIP: These values will vary depending on the position of the ignition switch and the number of controllers on the vehicle.

If the Class 2 bus is shorted to ground, the DVOM will display a consistent 0 volts. If it is shorted to battery, it will display battery voltage. This would typically cause a No-Start or No-Start/No-Crank condition.

– Thanks to Mark Harris

GM TechLink

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camshaft to be changed, dependent on need. At idle and low engine load, overlap is minimum, improving idle quality. At higher engine speed and load, overlap is increased, allowing emissions to decrease.

General Motors Continuously Variable Cam Phaser

The 2002 4.2L RPO LL8 (VIN S) is the first General Motors application for a continuously variable cam phaser (CVCP). The CVCP is a hydro-mechanical device that regulates the position of the exhaust camshaft relative to crankshaft position.

The CVCP system consists of two major assemblies:

– Control Valve

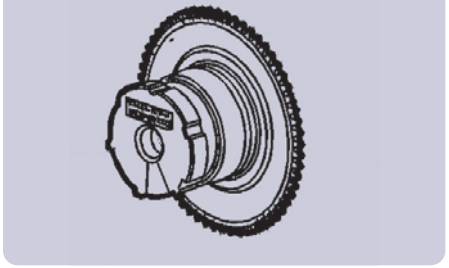
– Cam Phaser

CVCP System Operation

The control valve is positioned horizontally on the forward left side of the cylinder head. It receives oil pressure from the oil pump by way of a port in the cylinder head. The PCM operates the control valve using pulse-width-modulation, according to inputs from the crankshaft position sensor and MAP sensor. Oil pressure that is regulated by the control valve is then directed to a port in the cylinder head leading to the camshaft and cam phaser piston.

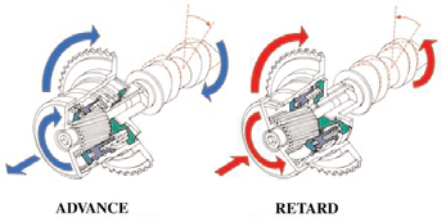
Control Valve

Cam Phaser



The exhaust cam gear is integral with the cam phaser and is located on the end of the exhaust camshaft. The piston within the cam phaser interfaces with the camshaft and cam phaser sprocket by helical splines. The piston within the cam phaser is spring loaded to maintain an advanced position without oil pressure from the control valve. As oil pressure from the control valve increases, due to an increase in pulse width, the piston is moved within the cam phaser, causing it to ride along the helical splines and compress the spring. This action causes the cam phaser gear and the camshaft to move opposite of each other, retarding the cam timing.

Cam Phaser Operation



CVCP System Service

Refer to SI 2000 for details. These are the highlights.

Access to the cam phaser (proper terminology is Exhaust Camshaft Position Actuator) requires removing the intake manifold and camshaft cover.

IMPORTANT: It is critical not to lose tension on the chain when replacing the phaser.

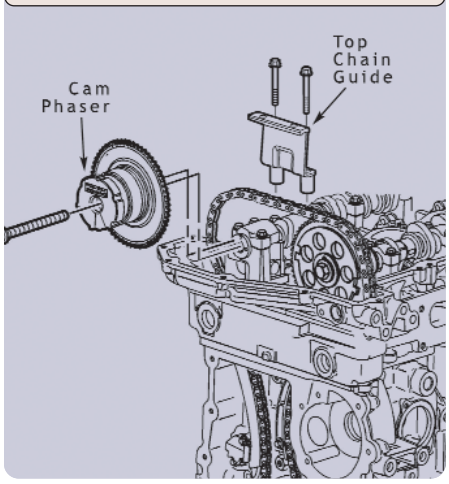
Chain Holding Tool J-44217 consists of a hooked rod, a block and a wingnut. You will need to hook one tool into the chain on each side of the engine to maintain tension on the chain.

SI 2000 explains how to get the camshaft, phaser (actuator) and chain back into correct timing. The camshaft actuator must be fully advanced during installation. Engine damage may occur if the camshaft actuator is not fully advanced.

TIP: The labor operation for the solenoid is J0822. And the labor operation for replacing the actuator (phaser) is J0823.

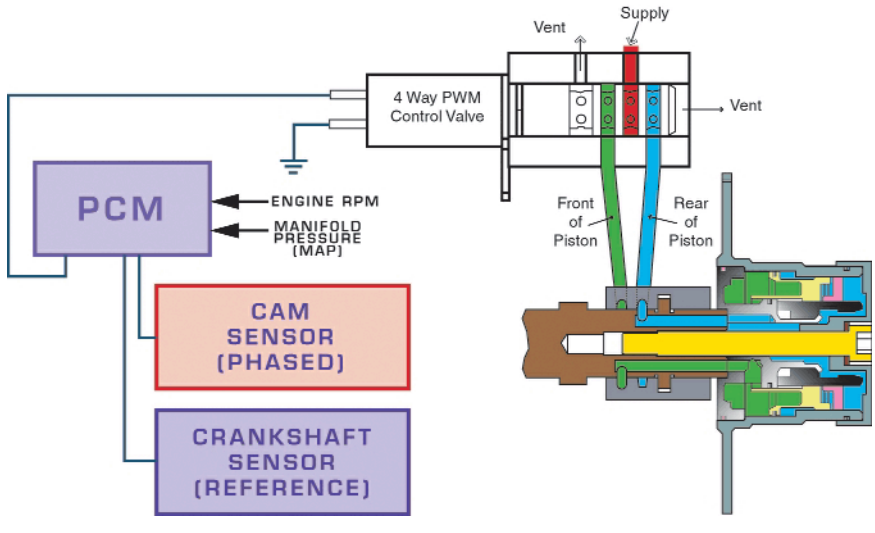
– Thanks to Kevin Hogle and Randy Pearl

Removing the cam phaser (actuator)



Chain Holding Tool J-44217 in place

Cam Phaser Schematic



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Power Modes

What are they and why do I care?

Simply put, power modes are the basis for all module operations on today's vehicles. As we respond to customer demand for features, we add to the complexity of the vehicle operations. We also add to the demands we place upon the battery and electrical generation systems of our vehicles. A way to control this demand is to turn on only certain features at any one time. This is accomplished with power modes.

A traditional power mode example

The power mode signal may be as simple as a battery positive voltage input wired to a particular ignition switch contact. If this is also the battery positive voltage supply to the module/device, the module/device will operate only with the ignition contact closed to battery positive voltage.

An example of this is the starter relay when it is wired directly to the CRANK/START contact of the ignition switch. When the CRANK/START contacts are closed, the starter relay is energized and provides a current source to the starter and starter solenoid. When the ignition switch leaves the CRANK/START position, the switch contacts open and the starter relay is de-energized. This removes the current source from the starter and solenoid and the starter operation stops.

Power mode defined

The power mode is the information used by the various control modules on the vehicle to determine operation. If a control module does not receive a power mode signal (either a serial data message or a hard wire input) the control module does not operate.

On a vehicle utilizing a module for power mode control, no operations using two or more modules are possible without a power mode decision by the power mode master (PMM) and a power mode message from the PMM. The possible power modes are:

- **OFF-ASLEEP**: no activity on the serial data circuits; the modules are asleep and in their minimum power usage state
- **OFF-AWAKE**: activity on the serial data circuits; the modules are awake and expecting either serial data or hardwire inputs
- **RAP**: those modules that have functions enabled in Retained Accessory Power are fully operational; the rest will be OFF-AWAKE
- **ACCESSORY**: those modules that have functions enabled in ACCESSORY are fully operational; the rest will be OFF-AWAKE
- **RUN**: all modules are fully functional
- **CRANK**: those modules that have no function critical to engine starting are OFF, to provide maximum power for cranking and starting operation and to limit customer concerns, i.e. audio system noise.

Power mode master

On vehicles that have several control modules connected by serial data circuits, one module is the power mode master (PMM). On all vehicles, the PMM is a body control module. The specific body control module used depends upon the vehicle configuration and system architecture. Possible PMMs are:

- Body Control Module (BCM)
- Dash Integration Module (DIM)
- Instrument Panel Module (IPM)
- Instrument Panel Cluster (IPC)

The PMM receives inputs from the ignition switch and uses these inputs to determine the proper power mode. To determine the correct power mode the PMM uses:

- The state of these signals/circuits, either switch closed = 1 *or* switch open = 0.
- The sequence of switch closures received by the PMM.
- The status of the engine run flag, a serial data message.

In the following example, the PMM receives three signals/circuits from the ignition switch. These are the Unlock (IGN 0), Run/Crank (IGN 1) and Crank ignition switch signals/circuits. The chart below indicates the modes detected and transmitted by the PMM using this three-wire ignition switch input configuration:

Ignition switch signal/input errors

As with any circuit, the ignition switch inputs can be open circuited/shorted to ground, shorted to battery voltage or shorted to another ignition switch circuit. We will examine each circuit for each error condition below.

Fail-safe operation

Because the operation of the vehicle systems depends on the power mode, there is a fail-safe plan in place if the PMM should fail to send a power mode message. The fail-safe plan covers those modules using exclusively serial data control of power mode as well as those modules with discrete ignition signal inputs.

Serial Data Messages

The modules that depend exclusively on serial data messages for power modes stay in the state dictated by the last valid PMM message until they can check for the engine run flag status on the serial data circuits. If the PMM fails, the modules monitor the serial data circuit for the engine run flag serial data. If the engine run flag serial data is true, indicating that the engine is running, the modules fail-safe to RUN. In this state the modules and their subsystems can support all operator requirements.

If the engine run flag serial data is false, indicating that the engine is not running, the modules fail-safe to OFF-AWAKE. In this state the modules are constantly checking for a change status message on the serial data circuits and can respond to both local inputs and serial data inputs from other modules on the vehicle.

Discrete Ignition Signals

Those modules that have discrete ignition signal inputs also remain in the state dictated by the last valid PMM message received on the serial data circuits. They then check the state of their discrete ignition input to determine the current valid state. If the discrete ignition input is active, battery positive voltage, the modules will fail-safe to the RUN power mode. If the discrete ignition input is not active, open or 0 voltage, the modules will fail-safe to OFF-AWAKE. In this state the modules are constantly checking for a change status message on the serial data circuits and can respond to both local inputs and serial data inputs from other modules on the vehicle.

Sampled Ignition Signal States (with the engine not running)

Ignition Switch Position	Engine Run Flag State	Crank	Run/Crank IGN 1	Unlock IGN 0	Power Mode Transmitted
OFF	0	0	0	0	OFF-ASLEEP Opening a door or pressing a key fob button changes this to OFF-AWAKE.
Unlock	0	0	0	0 to 1	Unlock (OFF-AWAKE) PMM then transitions to Accessory
Accessory	0	0	0	1	Accessory
RUN	0	0	1	1	RUN
Crank	0	1	1	1	Crank
OFF from RUN or Accessory	0	0	0	1 to 0	RAP Opening a door or an internal timer cancels this power mode.

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Diagnosis of power mode errors

TIP: Not all vehicles support all Power Modes, and those vehicles that do not support all power modes may cause the Tech 2 to display a false loss of communication screen, followed or accompanied by beeping. This condition is considered normal.

Beginning in July 2001, all subsystems affected by power mode should have added a step to their Diagnostic System Check to verify the power mode as sensed and transmitted by the power mode master (PMM). This is accomplished through a new feature on the Tech 2. Follow this path on your Tech 2 to reach this feature:

- Diagnostics
- Model Year
- Vehicle Type
- Diagnostic Circuit Check
- Class 2 Power Mode

While in this function, rotate the ignition switch through all positions. The Tech 2 should display all power modes as the ignition switch signal is processed by the PMM and transmitted on the serial data circuits.

IMPORTANT: The engine may start during this procedure.

Depending upon the PMM programming, and whether or not you have all of the doors closed, you can expect to see the following displayed as you rotate the ignition switch from OFF, through all positions and back to OFF:

- **Off** / Off-Awake
- Unlock / Off-Awake
- **ACC** / Accessory
- **RUN** / ON / Run / On
- **CRANK** / Crank
- **RUN** / ON / Run / On
- **ACC** / Accessory
- Unlock / RAP
- **RAP**
- **Off** / Off-Awake

IMPORTANT: You must see some variant of the bolded items listed above matched to the appropriate ignition switch position. If you do not see the appropriate power mode matched to the ignition switch position, the new step in the subsystem diagnostic system check will direct you to a Power Mode Mismatch test located in the Body Control System service category. This new test will diagnose the root cause for the concern.

TIP: RAP will not be displayed if you have the driver door open or if the PMM does not support that function.

– Thanks to Bob Keefer

Ignition switch signal/input errors chart

Circuit	Error	Affected Functions		Possible Customer Complaint
Crank	Open / Shorted to ground	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	Noisy audio Battery draw with these options ON and operating in Crank may cause a no crank condition RAP will function normally.
	Shorted to Voltage	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	These features will be inoperative. The PMM senses a Crank condition and sends the Crank power mode message with the ignition switch in the RUN and Accessory positions. There will be no RAP functionality.
	Shorted to IGN 1	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	These features will be inoperative with the ignition switch in RUN. Those features that operate in Accessory will operate correctly in the ACCESSORY ignition switch position. RAP will function normally.
	Shorted to IGN 0	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	These features will be inoperative with the ignition switch in RUN. Those features that operate in Accessory will not operate correctly in the ACCESSORY ignition switch position. There will be no RAP functionality.
IGN 1	Open / Shorted to ground	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	Inoperative in RUN ignition switch position, unless the feature operates in Accessory. Those features that operate in Accessory will operate correctly in the ACCESSORY ignition switch position. RAP will function normally.
	Shorted to Voltage	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	All modules remain ON-AWAKE at all times, all automatic features ON at all times, causing dead battery. High current draws in CRANK, possible no crank condition. There will be no RAP functionality.
	Shorted to Crank	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	All features fully functional only in CRANK ignition switch position. RAP will function normally.
	Shorted to IGN 0	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	All features fully functional in UNLOCK, ACCESSORY, RUN and CRANK ignition switch positions. Possible dead battery if ACCESSORY position used for extended periods. There will be no RAP functionality.
IGN 0	Open / Shorted to ground	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	All features operational only in RUN ignition switch position. There will be no ACCESSORY functionality. There will be no RAP functionality.
	Shorted to Voltage	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	All features operational in ACCESSORY ignition switch position will be ON at all times. Possible dead battery and a no-crank/no-start condition. Full feature operation in RUN ignition switch position. There will be no RAP functionality.
	Shorted to Crank	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	There will be no ACCESSORY functionality. There will be no RAP functionality.
	Shorted to IGN 1	Radio/Audio System Heated Seats Power Seats Power Windows	OnStar HVAC Power Mirrors Automatic Lighting	All RUN features are operable in Accessory position, no discrimination of accessory only features. There will be no specific ACCESSORY functionality. There will be no RAP functionality.

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EVAP System Tester

In the past, when you've needed to locate a leak in a vehicle's EVAP system, you've pressurized the system with your EVAP Pressure/Purge Diagnostic Station J-41413, and listened for leaks with the Ultrasonic Detector Kit J-41416.

Why a New Detector is Needed

New government regulations require all cars and light duty trucks to be capable of detecting EVAP system leaks of 0.020-inch or greater in the near future. GM began implementing this capability on some 2000 models, with more models added each year. The sound created by a leak this tiny is very hard to locate using the existing test equipment, especially in the noisy conditions of a service department.

The Solution

About the time you read this, you should be receiving your new J-41413-200 Evaporative Emission System Tester (EEST), which is an essential tool.

The EEST is designed to install in place of the the gauge panel in your existing J-41413 Cart. Follow the instructions that come with the kit.

What the Kit Contains

J-41413-200	EEST Main Unit
J-41413-VLV	EVAP Port Vent Fitting
J-41413-SPT	Spotlight
J-41413-210	Operator Manual
504956	Ultra Trace™ Smoke Producing Fluid

Fuel Tank Adapter

Hooking up the EEST to the vehicle requires one of the following adapters. These adapters are previously released essential tools, specific to various vehicle lines, so they are not included in the EEST kit. The adapter screws into the fuel tank filler neck, and the fuel cap screws into the adapter. Finally, the EEST is connected to the adapter.

Refer to SI 2000 to determine which adapter to use.

J-41415-10	Shallow Cam Type
J-41415-20	Deep Cam Type
J-41415-30	Threaded Type
J-41415-40	Quarter Turn Type

Fuel Tank Adapter

Using the Tech 2

You also need to use your Tech 2 when using the EEST to test the EVAP system. In normal operation, a vent valve is open to allow fresh air to flow into the canister. An electrical solenoid energizes to close the EVAP vent valve. The vent valve must be sealed before the EEST can be used to pressurize the system.

With key on, engine off, after "building" the vehicle on the Tech 2, under the POWERTRAIN section:

– select F2: Special Functions.
– select F0: Engine Output Controls
– select F1: EVAP System
– select F2: EVAP Vent Solenoid.

This will allow energizing the vent solenoid to seal the EVAP system.

How the EEST Tester Works

The EEST creates an inert, non-toxic white smoke by heating and vaporizing a special mineral oil supplied with the kit. Nitrogen from the EVAP Cart carries the smoke under low (1/2 psi, or 13-in. H_2O) pressure to the fuel tank adapter. The adapter is installed to the fuel filler neck of the vehicle, and the fuel filler cap is installed to the adapter. This permits checking the integrity of both the EVAP system and the filler cap at the same time.

TIP: The low pressure applied to the EVAP system by the EEST is measured in inches of water (in. H_2O), not the more customary inches of mercury (in. Hg.) There is a significant difference in scale between these two measuring systems.

TIP: The pressure gauge on the EEST indicates total pressure in the EVAP system. The tester applies a maximum of 13 in. H_2O. If the gauge reads higher than that, the difference is likely from the vapor pressure of the fuel, which is present in any sealed

Smoke Producing Fluid, 16 oz.

container of gasoline.

TIP: The EEST does not use the underhood EVAP system connector. Exceptions are noted in SI 2000.

Once the EVAP system is filled with smoke, you'll use the spotlight to inspect all lines, fittings, and components in the EVAP system. Look for a plume of smoke, which will be emitted from the leak location. Although the spotlight is powerful, you'll get the best results by using it under subdued light. (That means, don't use it in direct sunlight.)

TIP: Be sure to turn off fans and close doors to protect the vehicle from breezes, which will disturb the smoke.

When you locate the leak, perform conventional repairs. Then, use the EVAP Service Bay Test or the EEST's built in flow meter to check your work.

Additional Features

The spotlight is powered by a rechargeable battery, so it's extremely portable,

If the vehicle being tested does not support the EVAP Service Bay Test, the EEST contains test orifices for both 0.020-inch (0.5 mm) calibrated vehicles and 0.040-inch (1.0 mm) calibrated vehicles. Refer to Bulletin 01-06-04-044 to determine the correct test orifice to use for the vehicle being tested.

Attach the hose to the appropriate test orifice, press the remote button to activate nitrogen flow, and align the flow meter's red flag with the float. Then reattach the hose to the vehicle and pressurize the EVAP system. The time necessary to fill the system will vary depending on fuel tank size and fuel level. Once the float on the flow meter settles, compare its position to the red arrow. If the float is above the arrow, further repair is needed. If the float is below the arrow, repairs are satisfactory.

– Thanks to Mike Sculthorpe and Jack Woodward

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GM Oil Life System Revisited

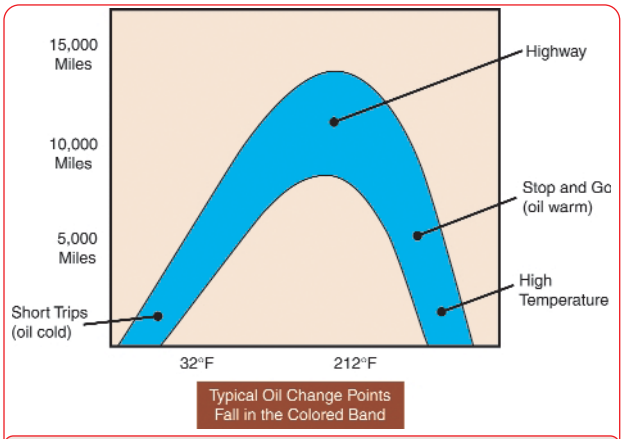
The February and March 2000 issues of TechLInk brought you information on how the GM oil life system works, and how to reset it in various vehicles. You may wish to review this information on the TechLink web page, at http://service.gm.com.

Briefly, engine oil degrades in a predictable fashion, according to several measurable engine operating conditions. The engine control module counts combustion events (measured in rpm) and reads coolant temperature. From these numbers, the computer is able to track oil deterioration and notifies the driver when a change is needed.

The best value from the cost of an oil change is obtained by maximizing the mileage between changes, so long as there is no adverse effect to the engine. With the GM oil life system, the average person can expect oil change intervals of 4000-7000 miles for mixed driving, and 7000 to 10000 miles for highway driving, while the Chevrolet Corvette and the 2002 Envoy, Bravada and TrailBlazer can achieve 15000 miles under ideal conditions.

Since the GM oil life system first appeared on some 1988 Oldsmobiles, over 10 million have been built, presently at the rate of over 3 million a year. By model year 2003, GM expects to install oil life systems on essentially all cars and light duty trucks.

This past May, the GM oil life system development team was honored by receiving the first ever Environmental Excellence in Transportation award from the Society of Automotive Engineers. This award recognizes that the extended range offered by the oil life system can save huge amounts of new oil, and can keep thousands of gallons of used oil out of the environment.



How Driving Style Affects Oil Life

There's a lot of information on vehicle maintenance shared on consumer-oriented websites – some correct, come erroneous, and some simply outdated. For instance, conventional wisdom calls for oil changes every 3000 miles. Not surprisingly, this conservative figure is also supported by those who derive income from selling oil changes. Many of your customers have become convinced that any longer oil change interval is somehow harmful to their engine.

At the retail level, you can do your part by promoting proper use of the GM oil life system. Become familiar with its function, and be prepared to help customers understand that observing the montor's recommendation is the easiest way to take the guesswork out of oil change intervals. It also ensures that they are giving their vehicle the proper care it deserves, at the minimum expense.

– Thanks to David Staley and Chuck Burns

Clunk During a Turning Maneuver

Affected Vehicles:

- 1997-2002 Chevrolet Cavalier
- 1998-2002 Oldsmobile Intrigue
- 1999 Buick Regal
- 2000-2002 Buick LeSabre, Cadillac DeVille and Seville, Chevrolet Impala and Monte Carlo, Pontiac Bonneville and Sunfire
- 2001-2002 Buick Regal, Oldsmobile Aurora

Some customers may comment on a clunk noise from the front of the vehicle when turning. This condition may also be felt throught the steering wheel when turned from stop to stop with the vehicle stationary. The clunk may be heard at 180° or 360° of wheel rotation in either direction.

This condition is commonly misdiagnosed as originating in the steering gear. Actually, it may be caused by inadequate lubrication of the steering intermediate shaft.

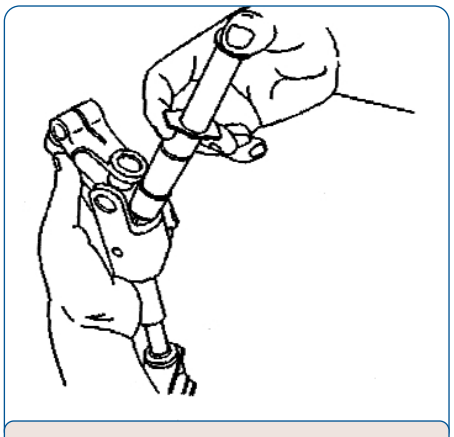
These are the highlights. A detailed bulletin will follow.

Remove the intermediate shaft and lubricate it with Kit GM P/N 26098237.

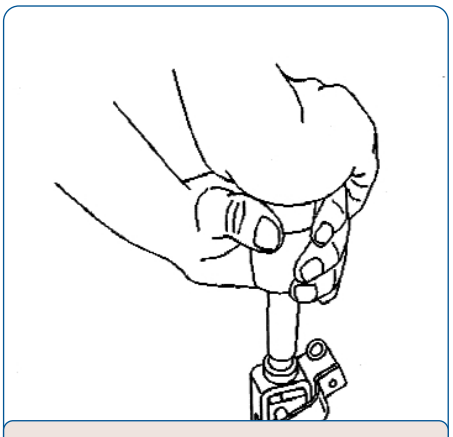
With the shaft fully extended, dispense the full contents of the kit syringe into the aluminum end of the yoke opening. Use the rubber stopper in the kit to plug the yoke opening. Swing the upper yoke 90° to retain the rubber plug while you collapse the shaft as far as possible. With the plug removed, extend the shaft and inspect for minimum of 5 mm of grease on the shaft splines.

TIP: Stroke and extend the shaft at least 15 times before installing to the vehicle.

– Thanks to Gary McAdam



Dispensing Lubricant



Collapsing Shaft to Distribute Lubricant.

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Bulletins – October 2001

This review of service bulletins released through mid-October lists the bulletin number, superseded bulletin number (if applicable), subject and models.

GENERAL INFORMATION:

01-00-89-013; Correct Use of Labor Operation R4490, RKE Transmittter, Replace; 2002 and Prior Passenger Cars and Light Duty Trucks

HVAC:

01-01-38-010; Noise When A/C Selected and Rear Fan On (Replace Auxiliary Thermal Expansion Valve); 2001 Chevrolet Venture, Oldsmobile Silhouette, Pontiac Montana with Rear Auxililary Air Conditioning (RPO C69)

STEERING:

01-02-32-007; Accessory Drive Belt Whine (Reposition Power Steering Pump Pulley); 2001-02 Chevrolet and GMMC C/K 1500 Series Utility Models

SUSPENSION:

01-03-07-001; Revised Wheel Alignment Specifications, Rear Camber Adjustment (AWD) and Rear Toe Adjustment; 2002 Buick Rendezvous, Chevrolet Venture, Oldsmobile Silhouette, Pontiac Montana, 2001-2002 Pontiac Aztek

01-03-10-005; Wheel Squeak (Install Wheel Cover Insulators); 2000-2001 Chevrolet Cavalier, Pontiac Sunfire

DRIVELINE AXLE:

99-04-20-002A; replaces 99-04-20-002; Driveline Clunk; 2002 and Prior Light Duty Truck Models

99-04-21-004A; replaces 99-04-21-004; Discontinue Flushing and Replacing Transfer Case Fluid Due to Bump/Clunk Concerns; 1998-2000 Chevrolet and GMC K1-2 Pickup and Utility Models, Cadillac Escalade, with NP246 Automatic Transfer Case (RPO NP8)

01-04-17-003; Propeller Shaft and Rear Drive Axle Diagnostic Information; 2001 Chevrolet Camaro and Pontiac Firebird

BRAKES:

01-05-22-003; Revised Vacuum Brake Booster Replacement Procedure; 1999-2001 Chevrolet Corvette with Telescoping Steering Column (RPO N37)

ENGINE/PROPULSION SYSTEM:

99-06-04-005B; replaces 99-06-04-005A; Driveability Symptoms Due to Clogged Fuel Injectors (Clean Injectors); specified car models 1994-1999 with 3.1L or 3.4L Engine (VINs E, J, M – RPOs LA1, LG8, L82)

01-06-01-025A; replaces 01-06-01-025; Correct Oil Viscosity and Oil Filter Usage for the Duramax 6600 Diesel Engine (RPO LB7); 2001-2002 Chevrolet Silverado and GMC Sierra 2500HD and 3500 Models with 6.6L Engine (VIN 1 – RPO LB7)

01-06-04-037A; replaces 01-06-04-037; Fuel Transfer Pump Inoperative (Replace Fuel Transfer Module); specified Chevrolet and GMC Medium Duty Models between 1990 and 2001

01-06-04-042; Revised Engine Cooling Fan Ground Circuit Information; 1999 Chevrolet Malibu, Oldsmobile Cutlass with V6 Engine

01-06-04-043; Revised Diagnosis Trouble Codes (DTCs) P0404, P0405, P1404; specified 1998-2000 Truck models

01-06-125-002; Check Vehicle Message Displayed on Charger, Battery Pack Control Module DTC 267 Set (Replace and Relocate Airflow Sensor); 1997-1998 Chevrolet S-10 Electric Trucks With Lead-Acid or NiMH Battery Packs

TRANSMISSION/ TRANSAXLE:

01-07-29-005; Eaton and Spicer Manual Transmission Unit Repair Information; 2002 and Prior Chevrolet and GMC Medium Duty Trucks with Eaton or Spicer Manual Transmission

BODY AND ACCESSORIES:

01-08-46-002A; replaces 01-08-46-002; Programming of Replacement On-Star® Vehicle Communication and Interface Modules (VCIM); 2002 Buick Century, Regal, Cadillac DeVille, Seville, Chevrolet Impala, Monte Carlo, Oldsmobile Aurora, Intrigue, Pontiac Bonneville, Chevrolet and GMC S/T Utility Models, Oldsmobile Bravada

01-08-50-010; Seat Back Recliner Replacement; 1998-2000 Chevrolet and GMC S/T Models, Oldsmobile Bravada

01-08-50-011; Memory Power Seat Inoperative (Replace Memory Seat Module with New Design Module); 2002 Chevrolet and GMC S/T Utility Models, 2002 Oldsmobile Bravada, built before specified VIN breakpoint

01-08-56-004A; replaces 01-08-56-004; Security Lamp Illuminated on the IP, Engine Stalls, No Start, DTC B2960 (Security System Sensor Data Incorrect but Valid) Set (Inspect and Repair Cause of DTC B2960); 1998-2001 Chevrolet and GMC C/K Pickup and Utility, 2001 Chevrolet and GMC C/K 3500 HD Pickup; 1999-2001 Cadillac Escalade

01-08-58-004; Windnoise or Gap Between Luggage Carrier Side Rail Front Cover and Roof Sheet Metal (Secure Front Side Rail Corners and/or Reposition Cross Bows); 2002 Chevrolet and GMC S/T Utility Models, Oldsmobile Bravada

01-08-62-002; Protective Bumper Coating Applied to Prevent Stains Before Vehicle Delivery to Customer; 2002 Chevrolet Tracker LT

01-08-63-004; Creaking or Popping Type Sound from Front End or Suspension When Driving Over Bumps or in Tight Turns (Remove Road Debris from Between Front Inner Fender and Strut Support); 1999-2002 Chevrolet Tracker (Both Two- and Four-Door Models)

01-08-66-007; Center High-Mount Stop Lamp (CHMSL) Applique Loose (Re-Tape Applique); 2002 Chevrolet and GMC S/T Utility Models, Oldsmobile Bravada

RESTRAINTS:

01-09-40-003; Second Row Seat Belt Latch Plate Rattle Prevention; 2001-2002 Chevrolet and GMC C/K Utility Models, 2002 Cadillac Escalade

01-09-41-007; Side Impact Air Bag Inflator Module Replacement; 2000-2001 Buick Century, Regal, Chevrolet Impala, Monte Carlo

01-09-41-008; Side Impact Air Bag Inflator Module Replacement; specified 1997-2001 Cars and Trucks

2002 Intrigue Radio Audio Output Too Low

Some 2002 Intrigues built before VIN 2F124430 with Dimensional Sound System, option code UQ3, may have audio output that is below normal. The stereo equalization functions may also be inoperative.

This condition may be caused by an extra ground wire in the IP harness. The wire is providing a ground signal to the radio AMP SENSE circuit making it think there is an Audio Amplifier. This causes the radio unit to drop off its audio output to 10 to 14 dB less than normal operation, and equalization functions are disabled.

To repair this condition, remove the radio head and remove the Blk/Wht ground wire at terminal B6 of connector C1. The VIN breakpoint above indicates when the new IP harness went into production. However, the assembly plant reworked harnesses and contained vehicles prior to this point, so not all vehicles ahead of this VIN may be affected. A service bulletin will be published.

– Thanks to John Woodrich

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