2000-01 ENGINES

3.8L V6

MODEL IDENTIFICATION

MODEL IDENTIFICATION

Body Code (1)	Model
"C"	Park Avenue
"F"	Camaro & Firebird
"H"	Bonneville & LeSabre
"W"	Grand Prix, Impala, Monte Carlo & Regal
(1) Vehicle body code is fourth character of VIN.	

ENGINE IDENTIFICATION

Engine can be identified by eighth character of Vehicle Identification Number (VIN) which is stamped on a metal pad located near lower left corner of windshield. See **ENGINE IDENTIFICATION CODES** table. "Y" in the tenth character of the VIN indicates 2000 model year, and "1" indicates 2001 model year.

Engine can also be identified by a 3-character engine code (RPO code). See **ENGINE IDENTIFICATION CODES** table. This code may be stamped on engine. See **Fig. 1** .

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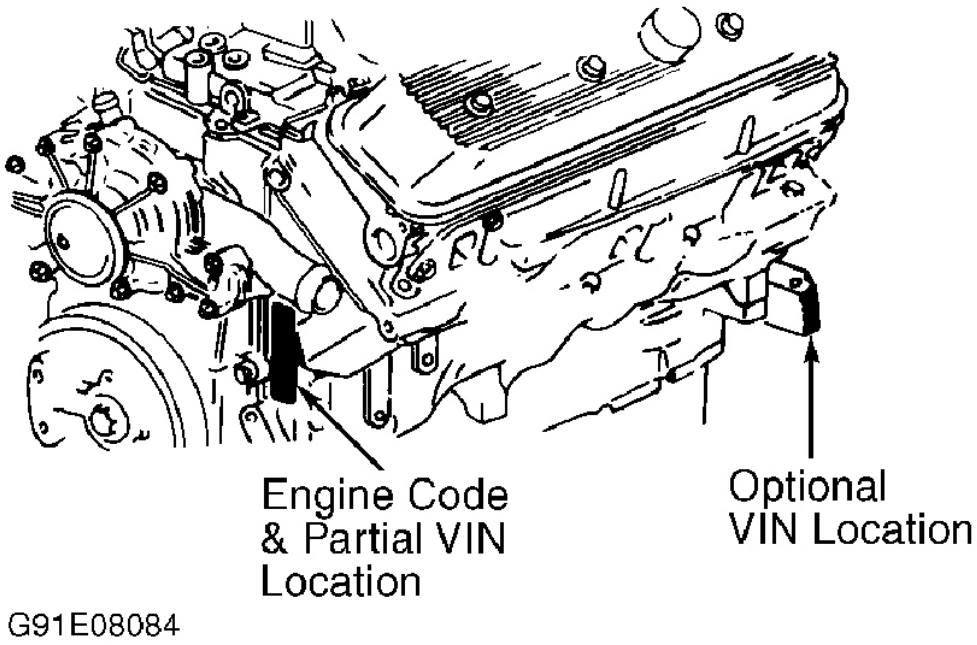


Fig. 1: Locating Engine Codes
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ENGINE IDENTIFICATION CODES

Engine	Code
3.8L SFI	
8th Character Of Dash VIN	K
Engine Code (RPO Code)	L36
3.8L SFI Supercharged	
8th Character Of Dash VIN	1
Engine Code (RPO Code)	L67

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

Hydraulic valve lifters are used. No valve adjustment is required.

TROUBLE SHOOTING

NOTE: To trouble shoot mechanical engine components, see

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appropriate table in TROUBLE SHOOTING article in GENERAL INFORMATION.

REMOVAL & INSTALLATION

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

NOTE: For reassembly reference, label all electrical connectors, vacuum hoses and fuel lines before removal. Also place mating marks on engine hood and other major assemblies before removal.

FUEL PRESSURE RELEASE

Disconnect negative battery cable. Loosen fuel tank filler cap. Connect Fuel Pressure Gauge (J-34730-1) to fuel line fitting (wrap shop towel around fitting to absorb leakage). Place gauge bleed hose into container. Open bleed valve to release pressure.

COOLING SYSTEM BLEEDING

Except "W" Body

1. Fill radiator to base of filler neck. Start engine. Place A/C-heater control in any position except MAX. Select highest temperature setting. Idle engine until lower radiator hose is hot.
2. Increase engine speed to 3000 RPM and then back to idle. Do this 5 times to expel any air trapped in system. Fill radiator as necessary. Install radiator cap. Allow engine to cool. Fill coolant recovery reservoir as necessary.

"W" Body

Open air bleed valve on thermostat housing. Fill radiator until coolant level is even with filler neck and no air bubbles are coming out of air bleed valve. Close air bleed valve. Install radiator cap. Fill coolant reservoir. Warm engine. Allow engine to cool. Fill radiator and coolant reservoir.

POWER STEERING BLEEDING

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CAUTION: If air was introduced into hydraulic system during servicing, bleed system. Aerated fluid, which appears Light Tan in color, results in poor steering performance and will cause pump damage.

1. Turn ignition off. Raise and support vehicle with front wheels off ground. Turn wheels fully to left. Add power steering fluid to FULL COLD mark on dipstick. Turn wheels from side to side at least 20 times, but DO NOT touch steering stops. Add fluid as necessary to maintain level at FULL COLD mark.
2. Start engine. With engine idling, check fluid level. Add fluid as necessary to bring fluid level to FULL COLD mark. Return wheels to center position. Lower vehicle. Continue to run engine for 2 to 3 minutes to raise temperature of fluid and eliminate trapped air. Turn steering wheel in both directions.
3. Road test vehicle. Check for leaks. Ensure fluid level is at FULL HOT mark when fluid is stabilized at operating temperature.

ENGINE

NOTE: Remove engine (without transaxle) through top.

Removal & Installation (Except "F" & "W" Bodies)

1. Remove hood. Disconnect battery cables. Release fuel pressure. See **FUEL PRESSURE RELEASE** . Remove fuel injector sight shield. Disconnect brake booster connections, and position aside. Disconnect fuel lines from fuel rail. Remove EVAP canister purge valve.
2. Remove cruise control and throttle cables. Remove serpentine drive belt. Raise and support vehicle. Remove engine ground harness from engine block. Disconnect all necessary electrical connectors. Disconnect wiring harness clip on A/C compressor.
3. Remove torque converter cover. Remove starter motor. Remove bolts securing flywheel to torque converter. Remove bolts securing transaxle brace-to-transaxle.
4. Remove exhaust manifold pipe from right exhaust manifold studs and remove gasket. Remove right wheelhouse extension. Remove A/C compressor.
5. Lower vehicle. Remove generator. Remove air cleaner intake duct. Install engine support fixture. Remove power steering pump mounting bolts. Position power steering pump against firewall. Raise and support vehicle. Remove right engine mount bracket. Remove right lower engine-to-transaxle mounting bolt. Drain cooling system. Lower vehicle.
6. Remove radiator inlet hose from water pump. Remove radiator outlet hose from thermostat housing. Remove heater hoses from drive belt tensioner. Remove engine support fixture. Install engine lift chain to engine lift brackets. Remove remaining engine-to-transaxle mounting bolts. Carefully raise engine from vehicle.

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7. To install, reverse removal procedure. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING** . Fill and bleed power steering system. See **POWER STEERING BLEEDING** . Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

Removal & Installation ("F" Body)

1. Disconnect negative and positive battery cables. Discharge A/C system using approved refrigerant recovery/recycling equipment. Relieve fuel pressure. See **FUEL PRESSURE RELEASE** . Disconnect A/C compressor and condenser hose from accumulator. Plug openings. Raise and support vehicle. Remove front tires. Drain coolant and engine oil.
2. Remove heated oxygen sensors. Remove catalytic converter bolts. Remove exhaust pipe clamp bolt at catalytic converter and catalytic converter. Remove front fascia lower deflectors and stabilizer bar bushing bolts. Remove radiator inlet hose.
3. On A/T models, remove torque converter bolts. Disconnect transmission fluid oil cooler lines. Disconnect transmission range selector lever cable from transmission. Remove left and right transmission support brackets.
4. On M/T models, disconnect transmission control lever handle. Remove clutch actuator cylinder line from actuator. On all models, remove driveshaft. Remove torque arm from transmission.
5. Remove steering gear coupling shaft from rack and pinion. Remove ground strap. Remove starter. Disconnect A/C compressor and condenser hose from compressor and condenser. Remove negative battery cable from rear compressor bracket mounting stud.
6. Lower vehicle. Remove heater hoses from drive belt tensioner. Remove air cleaner. Disconnect fuel lines at fuel rail. disconnect cruise control cable from throttle body. Disconnect accelerator control cable from throttle body. Remove radiator outlet hose from thermostat housing.

WARNING: To avoid personal injury, gear tension relief function of scan tool must be performed prior to disconnecting ABS hydraulic modulator.

7. Disconnect brake booster vacuum hose. Using scan tool, perform gear tension relief sequence. Disconnect brakelines and clips from ABS hydraulic modulator. Remove right-hand body hinge pillar trim panel. Disconnect engine wiring harness connectors. Disconnect forward lamp wiring harness connectors.
8. Disconnect Powertrain Control Module (PCM) and harness, and place on top of engine. Pull engine wiring harness through front dash. Place harness on top of engine. Disconnect positive lead at generator. Raise vehicle. Remove lower shock attachment nuts and bolts from lower control arms. Remove upper control arm ball stud from steering knuckle. Use upper control arm to secure struts.

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9. Disconnect electrical connectors to wheel speed sensors at engine frame. Position engine support under engine frame. Remove engine frame and transmission support bolts. Lower engine, transmission and engine frame. Remove transmission. On M/T models, remove clutch housing and clutch. On all models, remove engine mount through-bolts. Remove engine from engine frame.
10. To install, reverse removal procedure. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING** . Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

Removal & Installation ("W" Body)

1. Remove hood. Disconnect negative battery cable. Release fuel pressure. See **FUEL PRESSURE RELEASE** . Remove air cleaner. Disconnect fuel lines from fuel rail. Remove coolant recovery bottle, inner fender electrical cover, and fuel injector cover. Disconnect throttle cables.
2. Remove heat shield from exhaust crossover pipe. Remove throttle cable bracket and vacuum line as an assembly. Remove exhaust crossover pipe. Remove engine torque strut from between engine and top of radiator panel. Drain cooling system. Disconnect oil cooler hoses from radiator.
3. Remove serpentine belt. Remove power steering pump. Where necessary to gain clearance, remove washer reservoir, diagonal braces, cooling fans, generator and generator support bracket with ignition coil pack. Raise and support vehicle. Remove flexplate cover. Mark flexplate in relation to torque converter for reassembly reference. Remove torque converter bolts. Remove A/C compressor (leave hoses attached). Remove starter.
4. Remove bolts securing transaxle mount to engine. Remove nuts securing engine mount to frame. Disconnect oil cooler pipes. Disconnect exhaust pipe from manifold. Lower vehicle. Remove bolts securing transaxle to engine. Separate transaxle from engine. Lift engine out of vehicle.
5. To install, reverse removal procedure. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING** . Fill and bleed power steering system. See **POWER STEERING BLEEDING** . Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

INTAKE MANIFOLD (UPPER)

NOTE: On supercharged engine (VIN 1), supercharger acts as an upper intake manifold. See SUPERCHARGER .

Removal

1. Release fuel pressure. See **FUEL PRESSURE RELEASE** . Disconnect negative

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battery cable. Drain cooling system. Remove air intake duct and air cleaner assembly.

2. Remove spark plug wires and fuel rail. On "F" body, remove EGR outlet pipe from intake manifold. Remove exhaust crossover heat shield and power steering pump bracket. Remove serpentine belt, generator and generator bracket.
3. Remove heater pipes and by-pass hose. Remove throttle cable bracket and if necessary, throttle body. Remove intake manifold bolts, manifold, gaskets and seals.

Installation

1. Ensure sealing surfaces, bolt threads and bolt holes are clean. Install manifold and gaskets.
2. Coat bolt threads with thread locking compound. Tighten intake manifold bolts in sequence to specification. See **Fig. 2** and **Fig. 3** . See **TORQUE SPECIFICATIONS** . Lubricate fuel rail "O" rings with engine oil. To complete installation, reverse removal procedure. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING** .

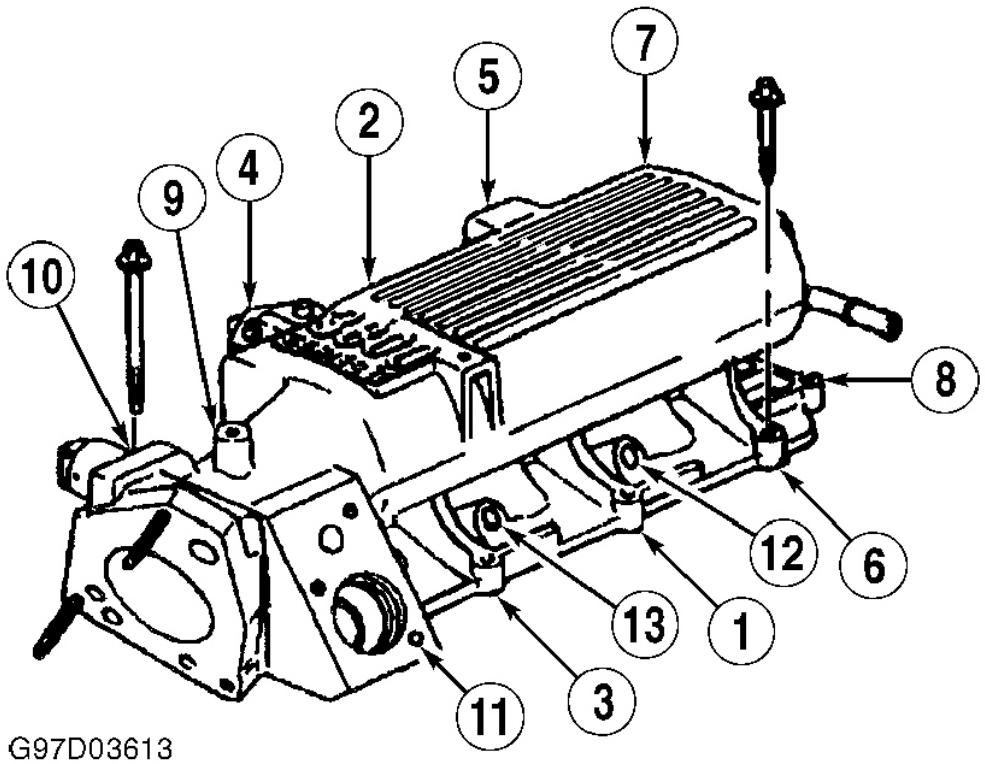


Fig. 2: Upper Intake Manifold Bolt Tightening Sequence ("F" Body)
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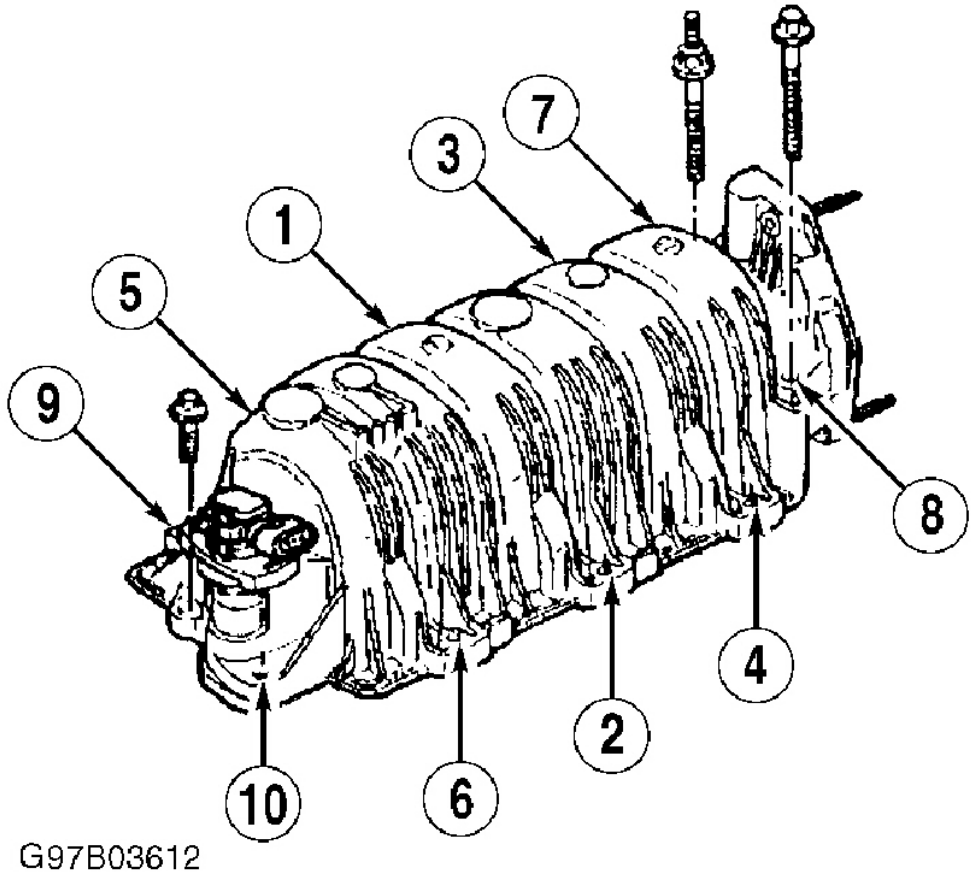


Fig. 3: Upper Intake Manifold Bolt Tightening Sequence (Except "F" Body)
Courtesy of GENERAL MOTORS CORP.

INTAKE MANIFOLD (LOWER)

Removal

1. On VIN "K", remove upper intake manifold. See **INTAKE MANIFOLD (UPPER)** . On VIN "1", remove supercharger. See **SUPERCHARGER** .
2. On all models, remove spark plug wires and fuel rail. Remove exhaust crossover heat shield and power steering pump bracket. Remove serpentine belt, generator and generator bracket. Remove cable bracket, heater pipes and by-pass hose. Remove EGR outlet pipe from intake manifold. Remove lower intake manifold bolts. Remove 2 bolts hidden in right front and left rear corners of lower intake manifold. Remove intake manifold, gaskets and seals.

Installation

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1. Ensure sealing surfaces and bolt threads and holes are clean. Apply Sealant (12345336) at end of seals on cylinder block. Install manifold and gaskets. Coat bolt threads with thread locking compound.
2. Tighten the intake manifold bolts in sequence to specification. See **Fig. 4** or **Fig. 5** . See **TORQUE SPECIFICATIONS** . Lubricate fuel rail "O" rings with engine oil. To complete installation, reverse removal procedure. Fill and bleed engine cooling system. See **COOLING SYSTEM BLEEDING** .

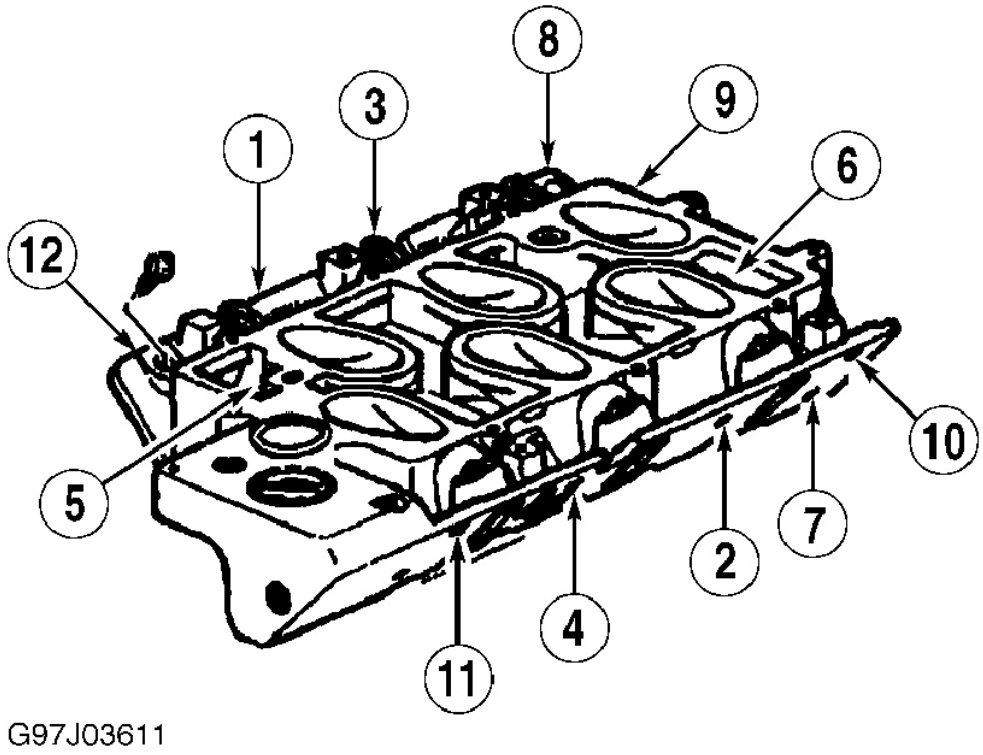


Fig. 4: Lower Intake Manifold Bolt Tightening Sequence - "F" Body
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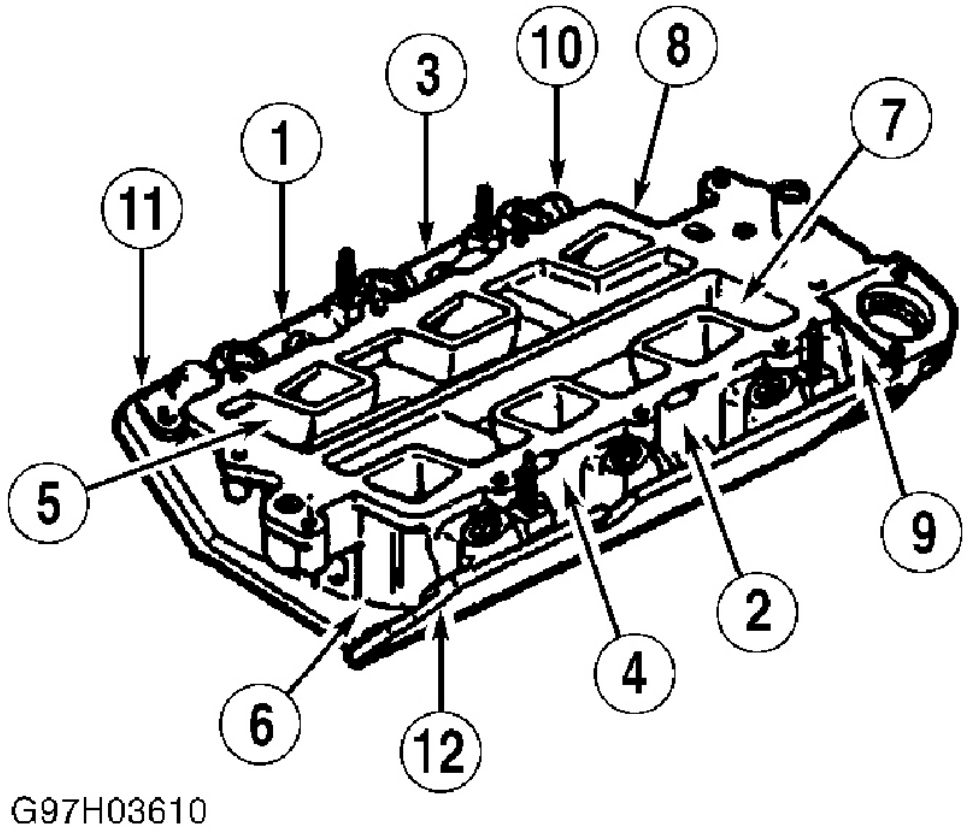


Fig. 5: Lower Intake Manifold Bolt Tightening Sequence - Except "F" Body (VIN "K" Shown, VIN "1" Is Similar)
Courtesy of GENERAL MOTORS CORP.

EXHAUST MANIFOLD

NOTE: Not all components need to be removed on all models. Remove as necessary for access and clearance.

Removal & Installation (Left)

1. Disconnect negative battery cable. Remove air inlet duct. Disconnect spark plug wires. Remove crossover pipe from manifold. On some models, it may be necessary to remove cooling fan and/or radiator hose for clearance.
2. On all models, remove engine lift hook and manifold heat shield (if equipped). Remove oil dipstick tube and oil dipstick. Remove exhaust manifold bolts, exhaust manifold and gasket. To install, reverse removal procedure using NEW gasket.

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Removal & Installation (Right)

NOTE: Whenever right exhaust manifold pipe is removed, inspect EGR outlet pipe for leaks. If any leaks exist, replace EGR adapter.

1. Disconnect negative battery cable. Remove air inlet duct. Remove throttle cable from throttle body. Remove brake booster hose. Remove serpentine belt and power steering pump bracket with hoses attached, and position aside.
2. Drain cooling system. Disconnect spark plug wires and oxygen sensor. Disconnect crossover pipe and exhaust pipe from manifold. Remove transaxle dipstick tube and dipstick.
3. Remove manifold heat shield (if equipped). Remove catalytic converter heat shield and pipe hanger. Remove exhaust pipe-to-manifold nuts. Remove engine lift bracket, exhaust manifold bolts, exhaust manifold and gasket. To install, reverse removal procedure using NEW gasket.

SUPERCHARGER

Removal

1. Release fuel pressure. See **FUEL PRESSURE RELEASE** . Disconnect negative battery cable. Partially drain cooling system. Remove accessory drive belt from supercharger pulley. Remove fuel injector shield. Disconnect fuel lines from fuel rail. Disconnect vacuum hoses as necessary.
2. Disconnect electrical connectors from fuel injectors. Remove electrical harness shield. Disconnect electrical harness from front of supercharger. Remove fuel rail and injectors as an assembly. Disconnect electrical connectors as necessary. Remove air intake duct. Disconnect EGR pipe, throttle cable, and cruise control cable from supercharger. Remove boost pressure/vacuum hose block. Remove cable bracket.
3. Remove stud securing tensioner bracket to supercharger (use a stud remover or jam-nut procedure, if necessary). This stud must be removed to allow supercharger to clear lower intake locator pins. Remove throttle body from supercharger. Remove supercharger bolts, supercharger and gasket.

Installation

Install NEW supercharger gasket. DO NOT use sealant on supercharger gasket. Install supercharger. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.

CYLINDER HEAD

NOTE: Not all components need to be removed on all models. Remove

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as necessary for access and clearance.

Removal

1. Remove the upper and lower intake manifold. See **INTAKE MANIFOLD (UPPER)** and **INTAKE MANIFOLD (LOWER)** . Remove exhaust manifold. See **EXHAUST MANIFOLD** .
2. On front cylinder head applications, disconnect spark plug wires. Remove engine lift bracket and rocker arm cover. Remove exhaust crossover pipe and cooling fan. Remove generator. Remove ignition coil and bracket. Remove A/C compressor bracket bolt.
3. On rear cylinder head, disconnect spark plug wires. Remove exhaust crossover pipe. Remove power steering pump with hoses attached, and position aside. Remove heater pipe from front cover housing. Remove transaxle dipstick tube and dipstick.
4. Remove rocker arms, push rods and guide plates. See **ROCKER ARMS & PUSH RODS** . Remove cylinder head bolts, and discard. Remove cylinder head and gasket.

Inspection

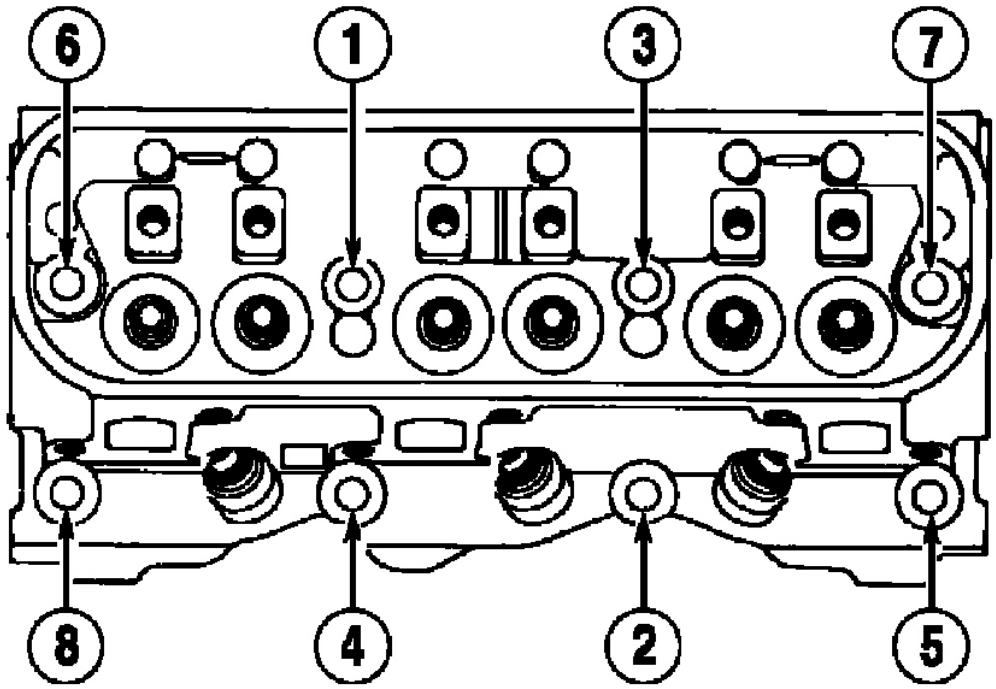
Inspect cylinder head for warpage. See **CYLINDER HEAD** under OVERHAUL.

Installation

1. Ensure cylinder head bolt threads and cylinder block holes are clean. Ensure all gasket holes align with cylinder block and arrow on gasket is pointing to front of engine. Apply Sealant (1052080) to cylinder head bolt threads.
2. Install NEW cylinder head gasket. Tighten bolts to specification in sequence. See **TORQUE SPECIFICATIONS** . See **Fig. 6** . To complete installation, reverse removal procedure.

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Fig. 6: Cylinder Head Bolt Tightening Sequence
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FRONT COVER SEAL

Removal

Disconnect negative battery cable. Remove serpentine belt. Raise and support vehicle. Remove right front wheel and inner splash shield. Remove crankshaft pulley/balancer bolt and crankshaft pulley/balancer. Pry seal from front cover and discard seal.

Installation

Coat seal with oil. Using Seal Installer (J 35354) and crankshaft pulley/balancer bolt, install seal. Remove seal installer. Coat sealing surface of crankshaft pulley/balancer with oil. To complete installation, reverse removal procedure.

FRONT COVER

Removal

1. Disconnect negative battery cable. Drain cooling system and crankcase oil. Remove serpentine belt. Remove water pump pulley. Disconnect heater pipes. Disconnect coolant

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hoses from front cover.

2. Raise and support vehicle. Remove right front wheel and inner splash shield. Remove crankshaft balancer bolt and discard. Remove crankshaft balancer. Disconnect electrical connections at oil pressure sender, camshaft sensor and crankshaft sensor.
3. Remove bolts securing front cover to oil pan. Remove power steering pump (leave hoses attached). Remove remaining bolts, front cover and gasket. See **Fig. 7** .

Installation

1. Replace timing chain and sprockets if worn. See **TIMING CHAIN & SPROCKETS** . Install NEW front cover gasket. Coat front cover bolt threads with Sealant (12346004). Install NEW crankshaft balancer bolt. To install, reverse removal procedure. Install crankshaft sensor and shield. See **TORQUE SPECIFICATIONS** .
2. Install Crankshaft Sensor Gauge (J 37089) onto rear of crankshaft balancer. See **Fig. 8** . If gauge contacts balancer at any point, replace crankshaft balancer. To complete installation, reverse removal procedure. Coat sealing surface of crankshaft balancer and seal with oil.

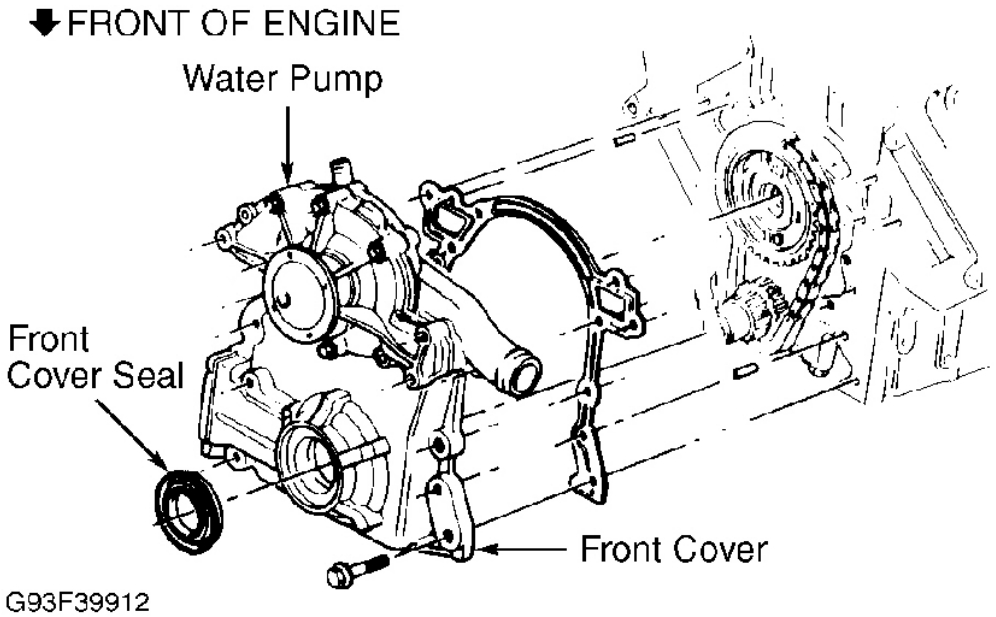


Fig. 7: Removing Front Cover
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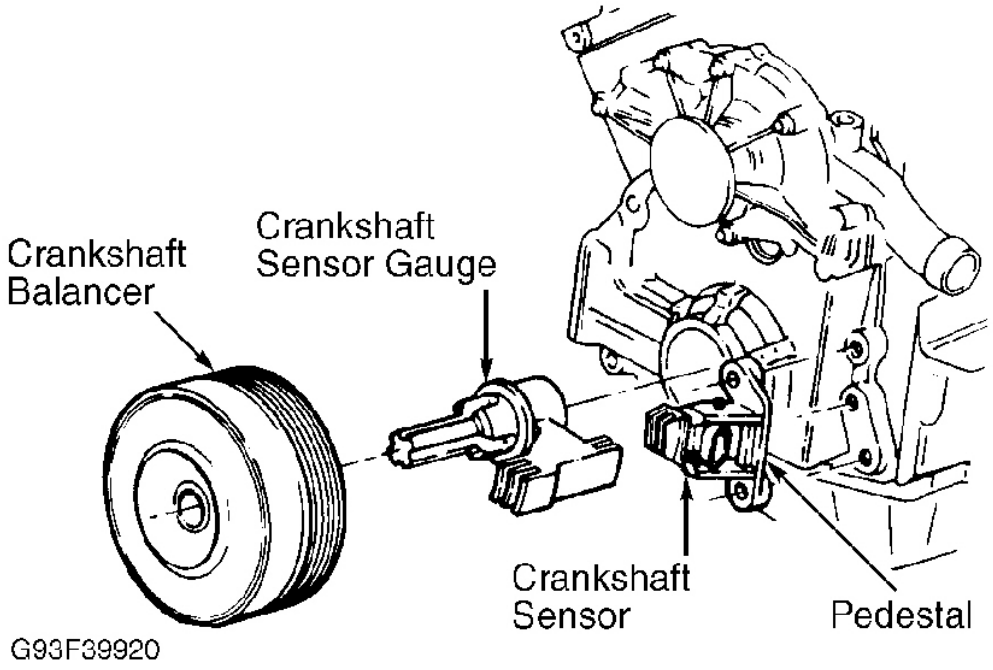


Fig. 8: Checking Crankshaft Balancer Clearance
Courtesy of GENERAL MOTORS CORP.

TIMING CHAIN & SPROCKETS

Removal

1. Remove front cover. See **FRONT COVER** . Inspect timing chain and sprockets for wear. Timing chain in-and-out movement should not exceed 1" (25.4 mm). Replace components as necessary.
2. Rotate crankshaft to align timing marks on camshaft and crankshaft sprockets. See **Fig. 9** . Remove timing chain damper assembly. Remove camshaft sprocket bolts, and discard. Remove camshaft sprocket and timing chain. Remove crankshaft sprocket.

NOTE: If balance shaft has been moved, ensure alignment is correct before installing timing chain and sprockets. See BALANCE SHAFT .

Installation

1. If engine has been rotated, rotate the crankshaft so No. 1 cylinder is at TDC. Temporarily install camshaft sprocket. Rotate camshaft sprocket so timing mark points downward.

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2. Install timing chain on camshaft and crankshaft sprockets. Align timing marks. See **Fig. 9** . Install NEW camshaft sprocket bolts. Install timing chain damper. Rotate engine 2 revolutions. Ensure timing marks are aligned. To complete installation, reverse removal procedure.

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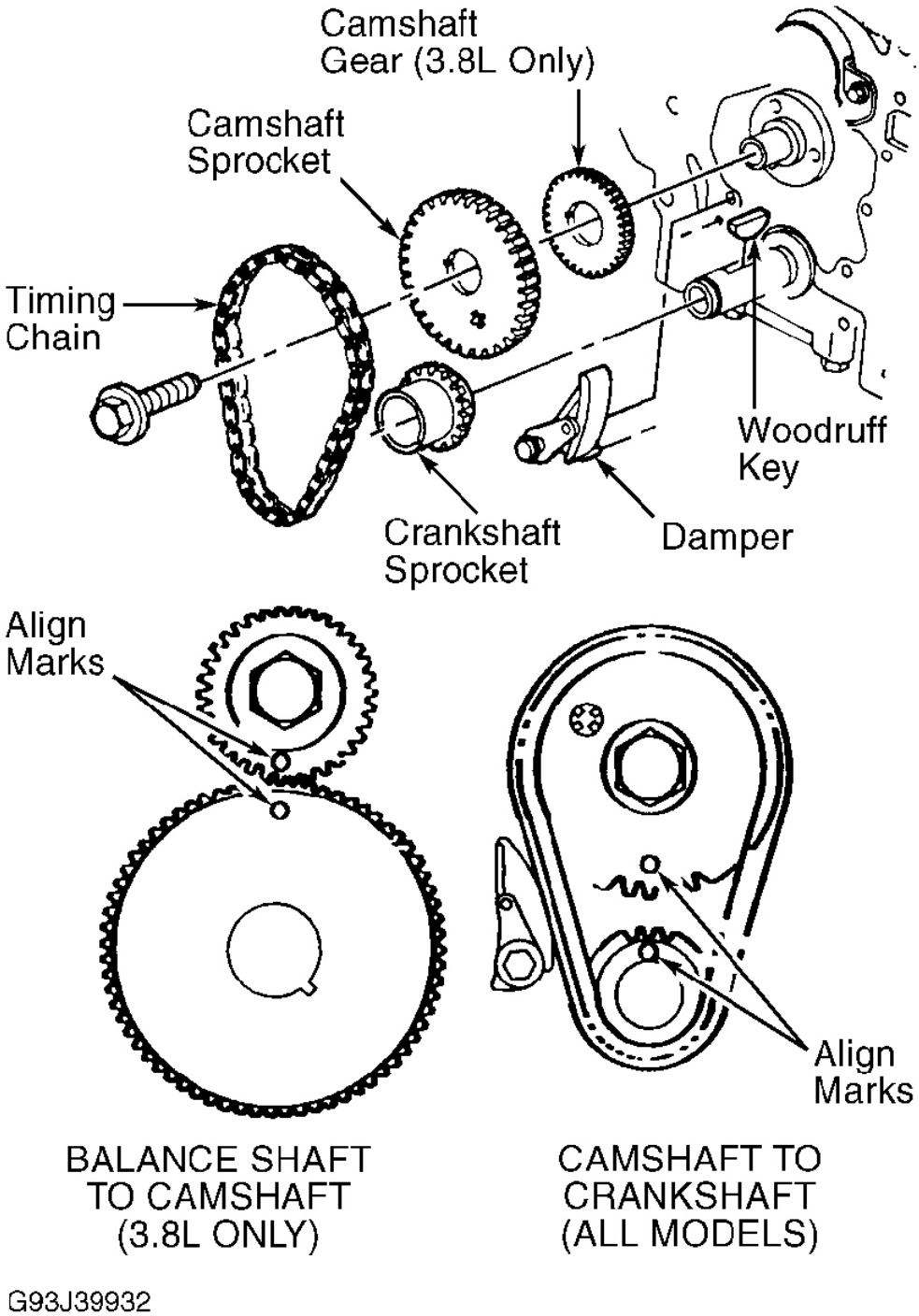


Fig. 9: Exploded View Of Timing Chain & Sprockets
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ROCKER ARMS & PUSH RODS

NOTE: Not all components need to be removed on all models. Remove as necessary for access and clearance.

Removal

1. Disconnect negative battery cable. Remove serpentine belt. To remove left rocker arm cover, remove generator bracket and spark plug wires. Disconnect torque strut (if equipped) at radiator support. Remove torque strut bracket bolts at manifolds. Remove engine lift bracket.
2. To remove right rocker arm cover, loosen power steering pump bolts, and move pump forward with hoses still attached. Remove power steering pump brackets. Remove spark plug wires.
3. On either side, remove rocker arm cover. Remove and discard rocker arm pivot bolts. Mark rocker arm component locations for reassembly reference. Remove rocker arms and components. See **Fig. 10** .

Installation

To install, reverse removal procedure. Apply Prelube (12345501) or equivalent, to any bearings and friction surfaces. Using NEW bolts, coat rocker arm bolt threads with thread Threadlock (12345493). Apply thread sealant to rocker arm cover bolt threads.

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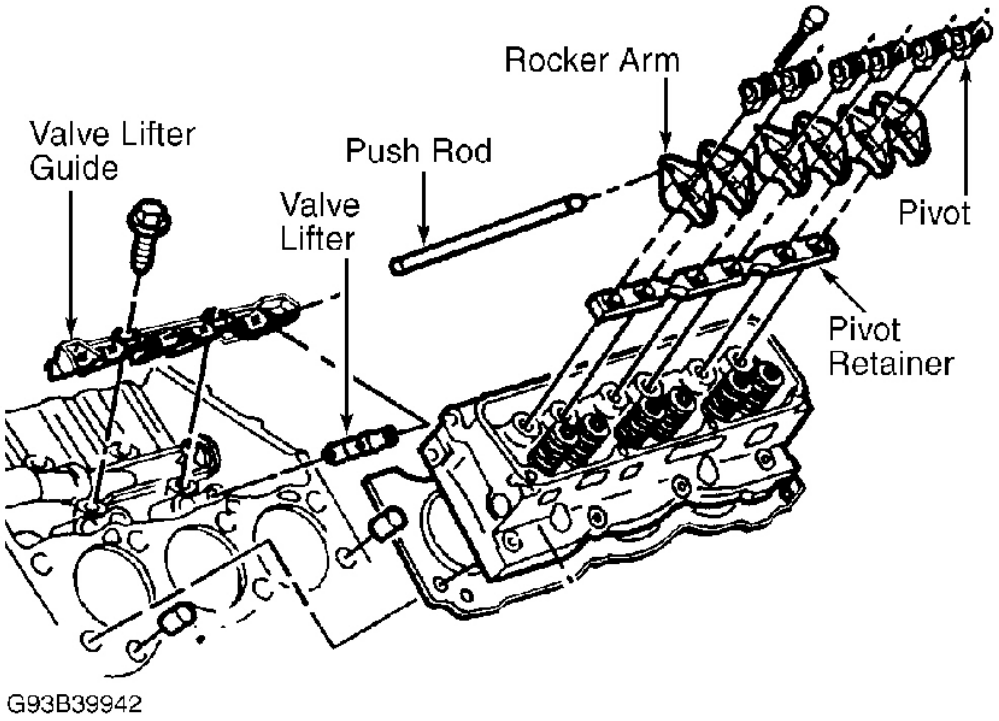


Fig. 10: Exploded View Of Rocker Arm & Components
Courtesy of GENERAL MOTORS CORP.

VALVE LIFTERS

Removal

Remove upper and lower intake manifold. See **INTAKE MANIFOLD (UPPER)** and **INTAKE MANIFOLD (LOWER)** . Remove rocker arms and push rods. See **ROCKER ARMS & PUSH RODS** . Remove valve lifter guide and valve lifters. See **Fig. 10** . Mark component locations for reassembly reference.

Installation

Coat valve lifters with Engine Prelube (1234550). Install components in original location. To complete installation, reverse removal procedure.

CAMSHAFT

Removal

1. Disconnect negative battery cable. Remove engine. See **ENGINE** . Remove upper and lower intake manifold. See **INTAKE MANIFOLD (UPPER)** and **INTAKE**

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MANIFOLD (LOWER) . Remove rocker arms and push rods. See **ROCKER ARMS & PUSH RODS** .

2. Remove valve lifters. Remove timing chain and sprockets. See **TIMING CHAIN & SPROCKETS** . Remove camshaft thrust plate and camshaft. Install one 1/2-20 x 6.0" bolt into camshaft front bolt hole. Carefully rotate and pull camshaft out of bearings.

Inspection

Measure camshaft journal diameter, lobe lift and oil clearance. Replace components if not within specification. See **CAMSHAFT** table under ENGINE SPECIFICATIONS.

Installation

Install camshaft bearings (if removed). Ensure oil holes are aligned. Coat camshaft journals and lobes with Lubricant (12345507). Install camshaft. Install components in original locations. Apply Sealant (1052914) to camshaft rear plug. To complete installation, reverse removal procedure. Ensure timing marks are aligned.

BALANCE SHAFT

Removal

1. Disconnect negative battery cable. Remove engine. See **ENGINE** . Remove flexplate/flywheel. Remove upper and lower intake manifolds. See **INTAKE MANIFOLD (UPPER)** and **INTAKE MANIFOLD (LOWER)** . Remove lifter guide. See **Fig. 10** .
2. Remove front cover. See **FRONT COVER** . Remove and discard balance shaft gear bolt. See **Fig. 11** . Remove camshaft sprocket and timing chain. See **TIMING CHAIN & SPROCKETS** . Remove balance shaft retainer and gear. See **Fig. 11** . Using Slide Hammer (J 6125-1B), remove balance shaft from front of engine.

NOTE: Balance shaft and bearings are serviced as a complete assembly only. Use specified installation tools to prevent balance shaft damage.

3. Remove balance shaft plug from rear of cylinder block. Note direction of rear bearing installation. Using Balance Shaft Bearing Remover/Installer (J 36995), remove bearings from block. See **Fig. 12** .

Inspection

Replace components if damaged or not within specification. See **BALANCE SHAFT SPECIFICATIONS** table.

Installation

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1. Lubricate balance shaft bearings with engine oil. Install NEW front and rear bearings using Balance Shaft Bearing Remover/Installer. On rear bearing, be sure rolled edge faces inward, toward engine, and manufacturer's marking faces flywheel side of engine. See **Fig. 12** .
2. Using Balance Shaft Installer (J 36996), install balance shaft. Temporarily install balance shaft retainer and bolts. Install balance shaft gear. Apply Threadlock (12345493) to NEW gear bolt, and install bolt. Tighten gear bolt to specification. See **TORQUE SPECIFICATIONS** .
3. Install balance shaft rear plug. Using dial indicator, measure balance shaft end play and radial clearance at front and rear of balance shaft. See **Fig. 13** . Replace components if measurements are not within specification. See **BALANCE SHAFT SPECIFICATIONS** table.
4. Rotate camshaft so timing mark is pointing downward when sprocket is installed. With camshaft sprocket and gear removed, rotate balance shaft so timing mark on gear is pointing downward.
5. Rotate balance shaft to align timing marks on camshaft gear and balance shaft gear, and install camshaft gear. See **Fig. 9** . Rotate crankshaft so No. 1 piston is at TDC. Install timing chain and sprocket. Ensure timing marks are aligned. See **Fig. 9** .
6. Using dial indicator, measure gear lash at 4 places, every 1/4 turn. Gear lash should be within specification. See **BALANCE SHAFT SPECIFICATIONS** table.
7. If measurements are within specification, tighten balance shaft retainer bolts to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.

BALANCE SHAFT SPECIFICATIONS

Application	In. (mm)
Bearing Bore I.D.	
Front	2.0462-2.0472 (51.973-51.999)
Rear	1.8735-1.8745 (47.584-47.612)
End Play	0-.0067 (0-.171)
Gear Lash	.002-.005 (.05-.13)
Radial Clearance	
Front	0-.0010 (0-.025)
Rear	.0005-.0043 (.012-.109)

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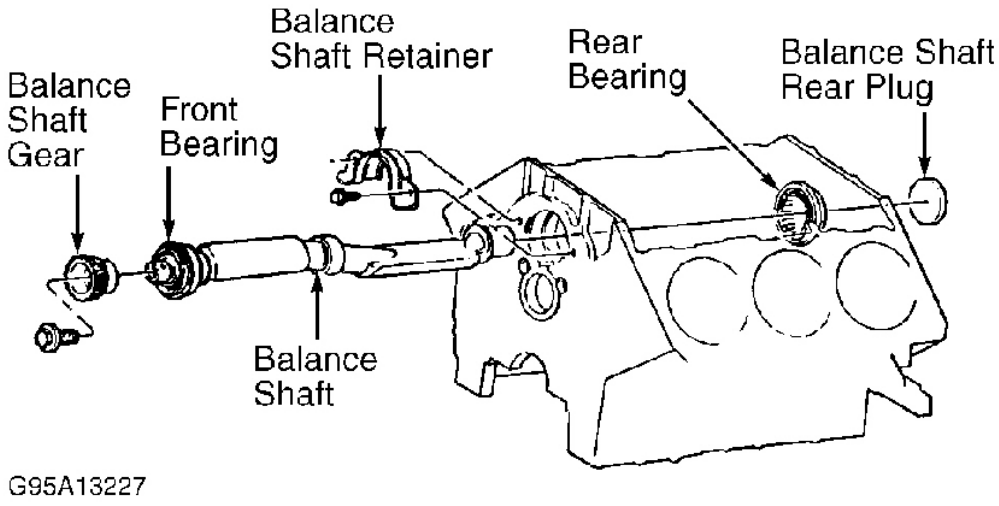


Fig. 11: Identifying Balance Shaft & Components
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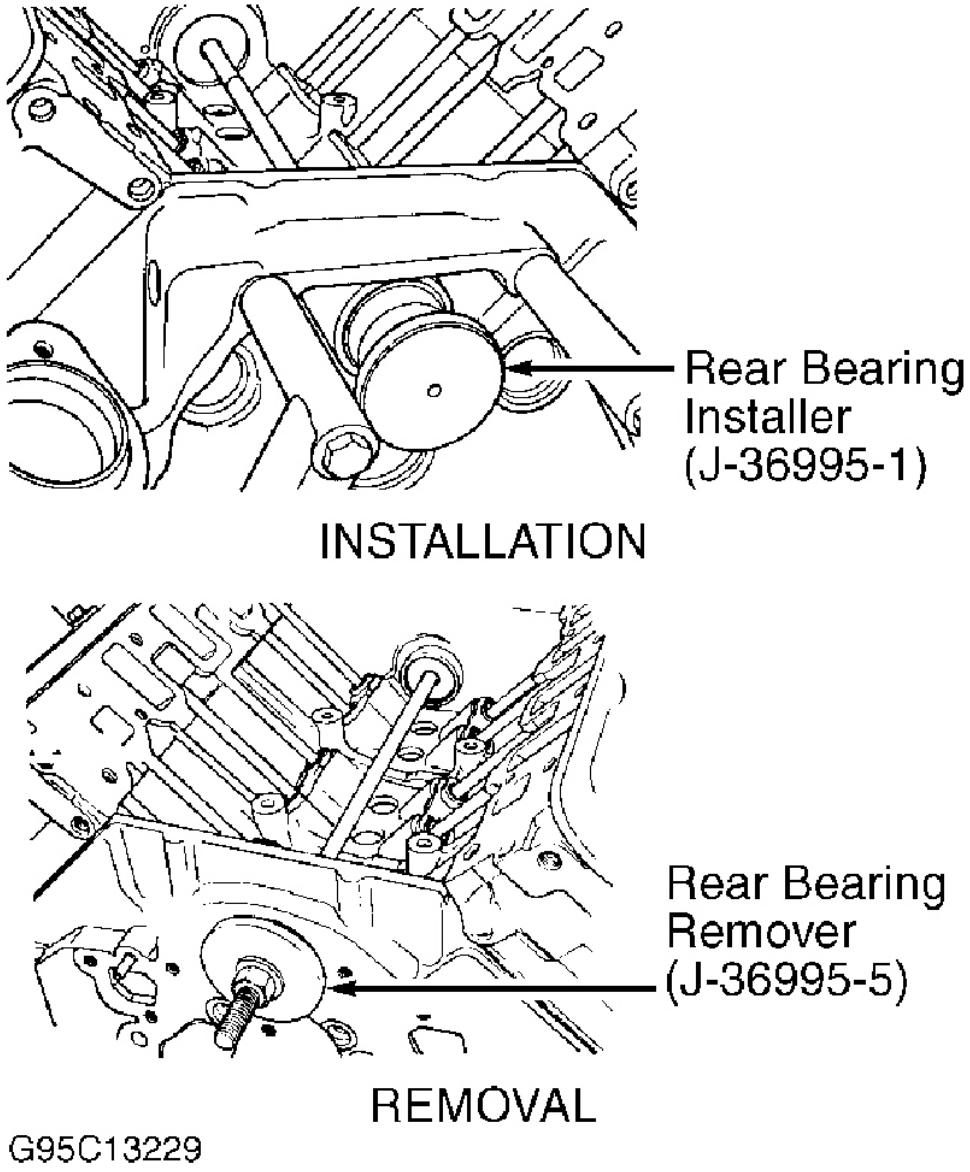


Fig. 12: Replacing Balance Shaft Rear Bearing
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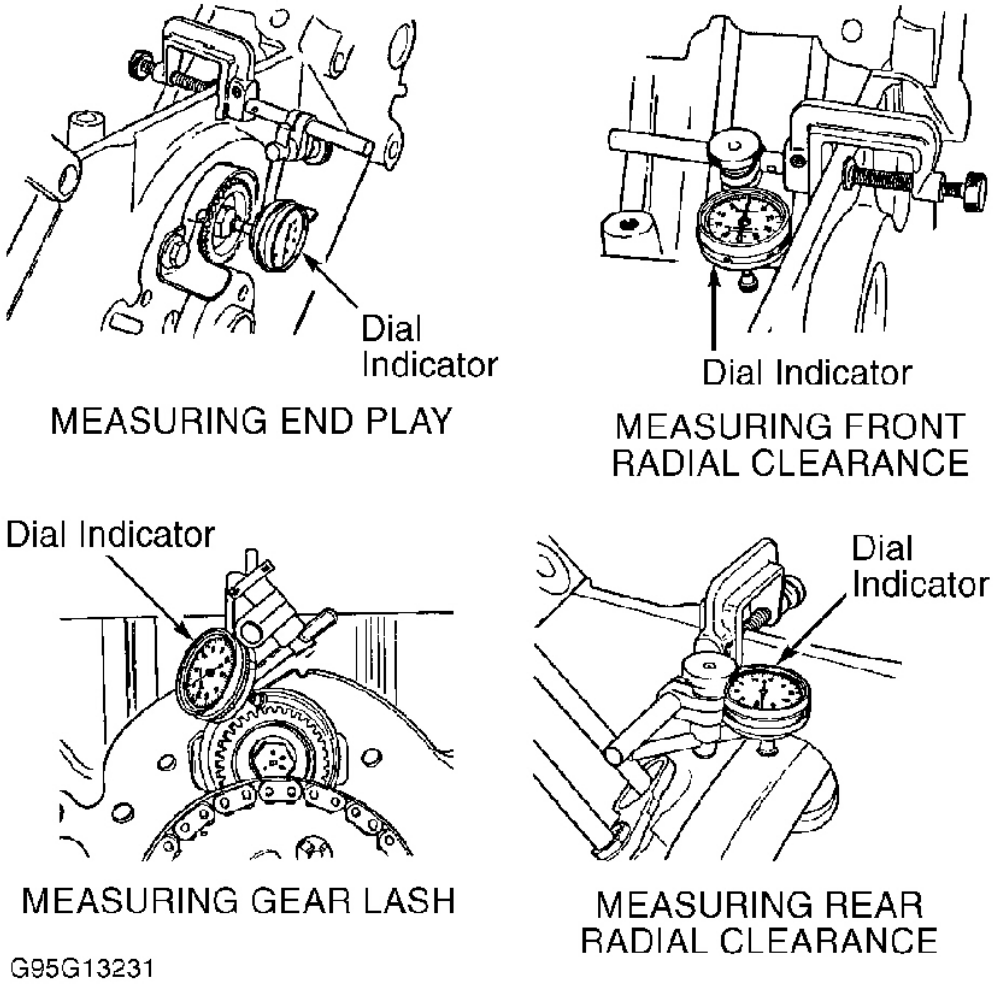


Fig. 13: Measuring Balance Shaft Clearances
Courtesy of GENERAL MOTORS CORP.

CRANKSHAFT REAR OIL SEAL

Removal & Installation

NOTE: If rear oil seal housing has been removed, see CRANKSHAFT REAR OIL SEAL HOUSING before installing new seal.

Remove transaxle. For A/T, see appropriate TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. For M/T, see appropriate article in CLUTCHES. Remove flexplate/flywheel. Pry seal from bore with a screwdriver (DO NOT damage crankshaft or seal bore). To install, apply engine oil to new seal. Press seal into bore using Seal Installer (J-38196). To complete installation, reverse removal procedure.

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CRANKSHAFT REAR OIL SEAL HOUSING

CAUTION: If seal housing bore is not centered in relation to crankshaft flange, seal may leak.

Removal

Remove transaxle. For A/T, see appropriate TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. For M/T, see appropriate article in CLUTCHES. Remove flexplate/flywheel. Remove oil pan. See **OIL PAN** . Loosen seal housing bolts (bolts should stay with housing). Remove seal housing. Remove seal from housing.

Installation

1. DO NOT install seal into housing at this time. Clean gasket surfaces of housing and block. Install NEW gasket onto housing bolts to hold it in place. Install seal housing. Finger-tighten bolts so housing can be aligned (centered). Ensure gasket does not protrude beyond oil pan gasket surface.
2. Apply a thin film of engine oil to inner and outer surfaces of Seal Housing Aligner (J 41349). Install seal housing aligner onto crankshaft, twisting and turning it as necessary to aid installation.
3. Lay a straightedge across cylinder block oil pan flange and seal housing flange. Using a feeler gauge, ensure there is no more than .004" (.10 mm) step (high or low) on either side. Rotate housing if necessary. If specification cannot be met, replace housing.
4. Apply engine oil to NEW seal. Using Seal Installer (J 38196), press seal into bore. To complete installation, reverse removal procedure.

WATER PUMP

NOTE: Not all components need to be removed on all models. Remove as necessary for access and clearance.

Removal & Installation ("F" & "W" Bodies)

1. Disconnect negative battery cable. Drain cooling system. Remove accessory electrical junction block, and position aside. Loosen water pump pulley bolts. Remove drive belt. Remove water pump pulley bolts and pulley.
2. Remove power steering pump mounting bolts, and position aside. Remove water pump bolts, water pump and gasket. To install, reverse removal procedure using NEW gasket. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING** .

Removal & Installation (Supercharged "C" & "H" Bodies)

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1. Disconnect negative battery cable. Remove A/C compressor splash shield. Loosen water pump pulley bolts. Drain cooling system. Remove drive belts. Remove coil pack. Remove supercharger belt tensioner.
2. Remove engine mount. Remove power steering pump. Remove engine mount bracket. Remove idler pulley. Remove water pump pulley. Remove water pump and gasket. To install, reverse removal procedure using NEW gasket. Fill and bleed the engine cooling system. See **COOLING SYSTEM BLEEDING** .

Removal & Installation (Non Supercharged "C" & "H" Bodies)

Drain cooling system. Loosen water pump pulley bolts. Remove drive belt. Remove water pump pulley bolts and pulley. Remove water pump and gasket. To install, reverse removal procedure using NEW gasket. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING** .

OIL PAN

NOTE: Not all components need to be removed on all models. Remove as necessary for access and clearance.

Removal & Installation

1. Disconnect negative battery cable. Remove engine torque strut. Raise and support vehicle. Drain crankcase. Disconnect oil level sensor electrical connector. Remove oil level sensor and oil filter. Disconnect front exhaust pipe from manifold. Remove right front wheel and splash shield.
2. Disconnect oil cooler pipes. Disconnect A/C compressor electrical connector. Remove A/C compressor, and position aside. Disconnect engine mounts from frame.
3. Remove flexplate access cover. Use transmission jack at transaxle to raise engine. Remove oil pan bolts and oil pan. To install, reverse removal procedure. Install oil level sensor after oil pan is installed. Tighten retaining bolts to specification. See **TORQUE SPECIFICATIONS** .

OVERHAUL

NOTE: For repair procedures not covered in this article, see ENGINE OVERHAUL PROCEDURES article in GENERAL INFORMATION.

CYLINDER HEAD

Inspection

1. Inspect cylinder head for warpage at deck and manifold surfaces. Resurface cylinder

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head if warpage exceeds specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

2. After resurfacing, use a depth micrometer to measure distance from deck surface to 3 cast pads. See **Fig. 14** . Replace cylinder head if dimension is less than .044" (1.12 mm). New cylinder head dimension should be .054-.066" (1.37-1.68 mm).

Valve Seats

No replacement procedure is given by manufacturer.

Valve Guides

If valve stem oil clearance is not within specification, ream valve guides for oversize valve stem. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

Valve Seat Correction Angles

After grinding, if seat width is too wide, use 20-degree or 70-degree stone to reduce seat width. A 20-degree stone will lower seat. A 70-degree stone will raise seat.

Valve Spring Installed Height

1. Install valve, valve retainer and keepers. Pull upward on valve, and measure height from top of spring seat to spring side of valve retainer. See **Fig. 15** .
2. Ensure spring installed height is within specification. See **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS. If measurement exceeds specification, add shims under valve spring to obtain correct height.

Valve Stem Height

With valve installed in cylinder head (closed position), use steel ruler to measure distance from spring seat to valve tip. Distance should be 1.935-1.975" (49.15-50.17 mm).

Valve Stem Oil Seals

Oversize valve stem oil seals are used for valves with oversize stems. Intake and exhaust valve stem oil seals are different. Install oil seal according to part number and package instructions.

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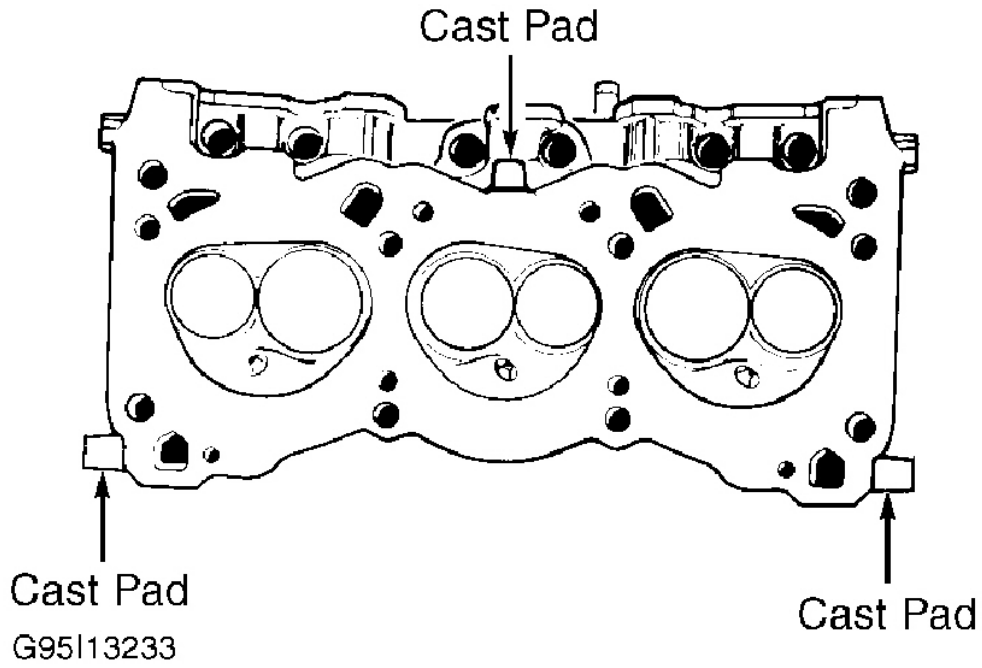


Fig. 14: Measuring Cylinder Head Thickness
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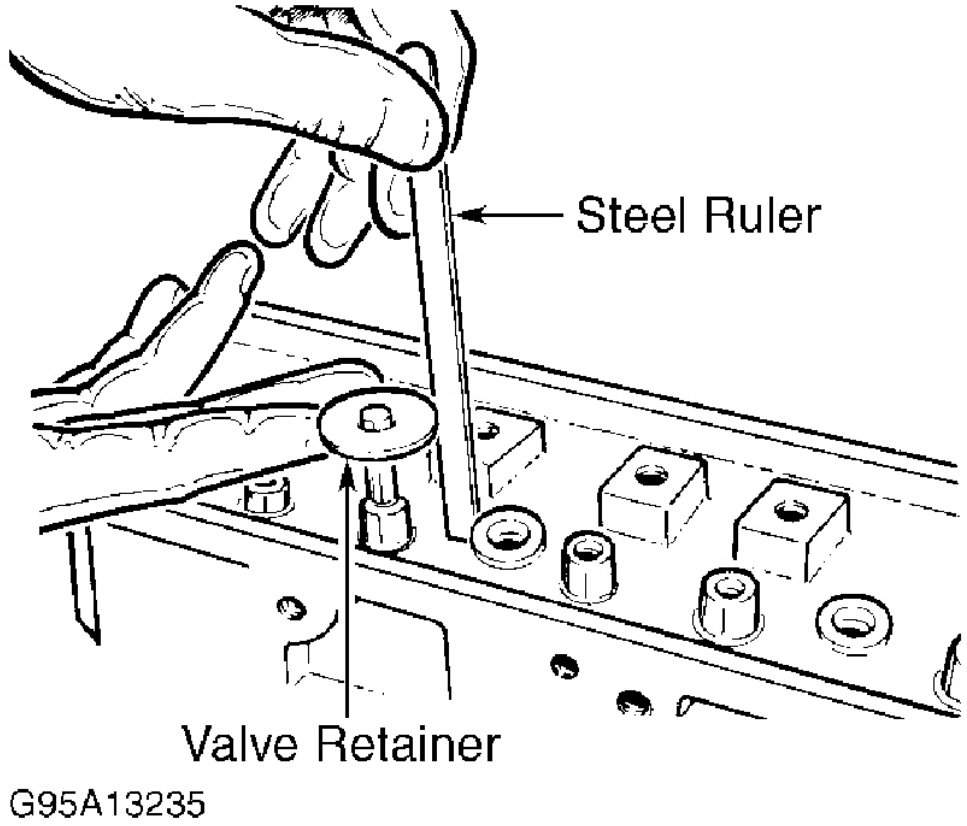


Fig. 15: Measuring Valve Spring Installed Height
Courtesy of GENERAL MOTORS CORP.

CYLINDER BLOCK ASSEMBLY

Cylinder Block

Using feeler gauge and straightedge, inspect deck surface for warpage. Replace cylinder block if more than .010" (.25 mm) material is removed from deck surface.

Cylinder Block Flange Runout

1. With engine removed and crankshaft installed, measure cylinder block flange runout. Mount dial indicator gauge plate flat against crankshaft flange. Place dial indicator stem on lower left transmission bolt boss (flat area around bolt hole). Adjust dial indicator to zero.
2. Observe and record readings obtained on all bolt hole bosses. Measurements should not vary more than .010" (.25 mm). If readings exceed specification, check crankshaft flange

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runout. See **CRANKSHAFT FLANGE RUNOUT** .

Piston Ring Installation

Install piston rings with identification mark toward top of piston, and ring gaps properly spaced. See **Fig. 16** .

Piston & Rod Assembly

Piston can be installed on connecting rod in either direction. Install piston and connecting rod onto crankshaft, with arrow on top of piston and/or ridge(s) on bottom of pin boss facing toward front of engine.

Fitting Pistons

NOTE: DO NOT machine oversize pistons, or engine balance will be affected.

Piston diameter should be measured 1.73" (44 mm) from top of piston.

Crankshaft & Main Bearings

1. Main bearing caps are a press fit. All main caps incorporate side bolts except the rear. Remove side bolts. Remove main cap bolts. Using Slide Hammer (J 6125-B) and Main Bearing Cap Puller (J 41348), carefully remove caps for service. Install main bearings and main caps. Hand tighten main bearing cap bolts.

   NOTE: Misalignment of No. 4 main bearing cap toward transaxle can cause interference with the flywheel-to-converter bolts.

   NOTE: DO NOT shim, scrape or file bearing inserts. DO NOT touch bearing surface with fingers.

2. Tighten main bearing cap bolts to 52 ft. lbs. (70 N.m) to fully seat crankshaft. Loosen main bearing cap bolts 360 degrees. Tighten bolts to specifications. See **TORQUE SPECIFICATIONS** . Using wooden mallet, carefully tap crankshaft forward and then backward to seat thrust bearing.

Rod Bearings

1. Ensure bearing cap bolt holes and mating surfaces are clean and dry. Use connecting rod stud protector on rod cap bolts. Install bearing inserts in connecting rod and cap. Lubricate bearings and crank pin.
2. Replace both upper and lower bearings as a set. Install bearing cap. Tighten NEW rod bearing cap bolts to 20 ft. lbs. (27 N.m). Tighten bolts an additional 50 degrees using

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Torque Angle Meter (J 36660).

Crankshaft Flange Runout

1. With engine removed and crankshaft installed, or with crankshaft mounted on "V" blocks, measure crankshaft flange runout. Mount dial indicator and place dial indicator stem on crankshaft flange. Adjust dial indicator to zero.
2. Mark reference point on crankshaft flange. Ensure crankshaft is thrust forward so end float will not affect readings. Turn crankshaft 360 degrees.
3. Observe and record readings. Reading should not vary more than .002" (.05 mm). Replace crankshaft if runout exceeds specification.

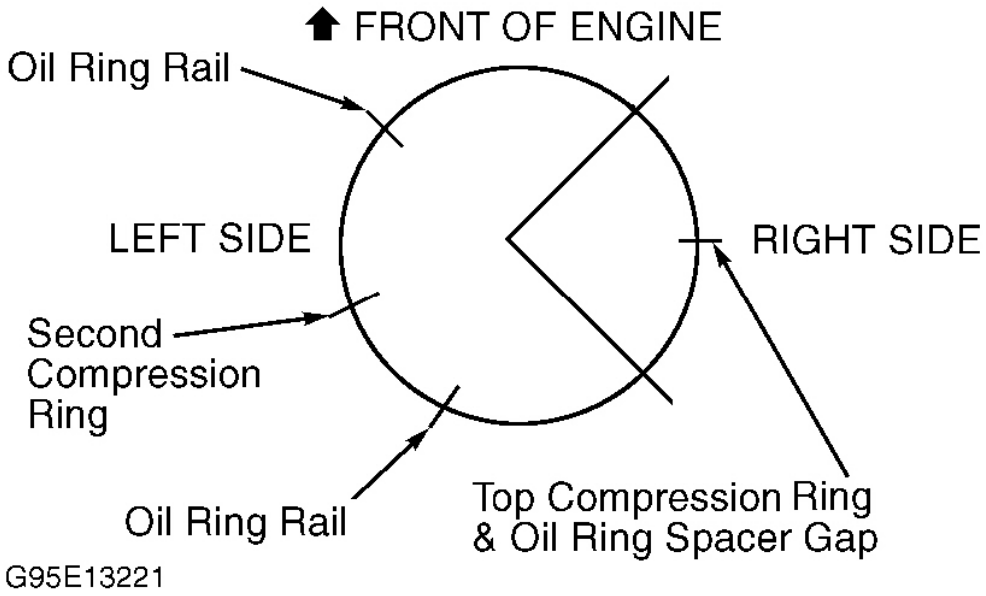


Fig. 16: Positioning Piston Ring Gaps
Courtesy of GENERAL MOTORS CORP.

ENGINE OILING

LUBRICATION SYSTEM

The crankshaft driven, gear-type oil pump provides pressurized lubrication to the main gallery. See **Fig. 17** . Oil pump and pressure regulator valve are located in front cover.

Crankcase Capacity

Engine oil capacity is approximately 4 qts. (3.7L) without filter change. After changing filter,

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recheck oil level and add oil as necessary.

Normal Oil Pressure

With engine at normal operating temperature, oil pressure (with 5W-30 or 10W-30 engine oil) should be 60 psi (4.2 kg/cm^2) at 1850 RPM.

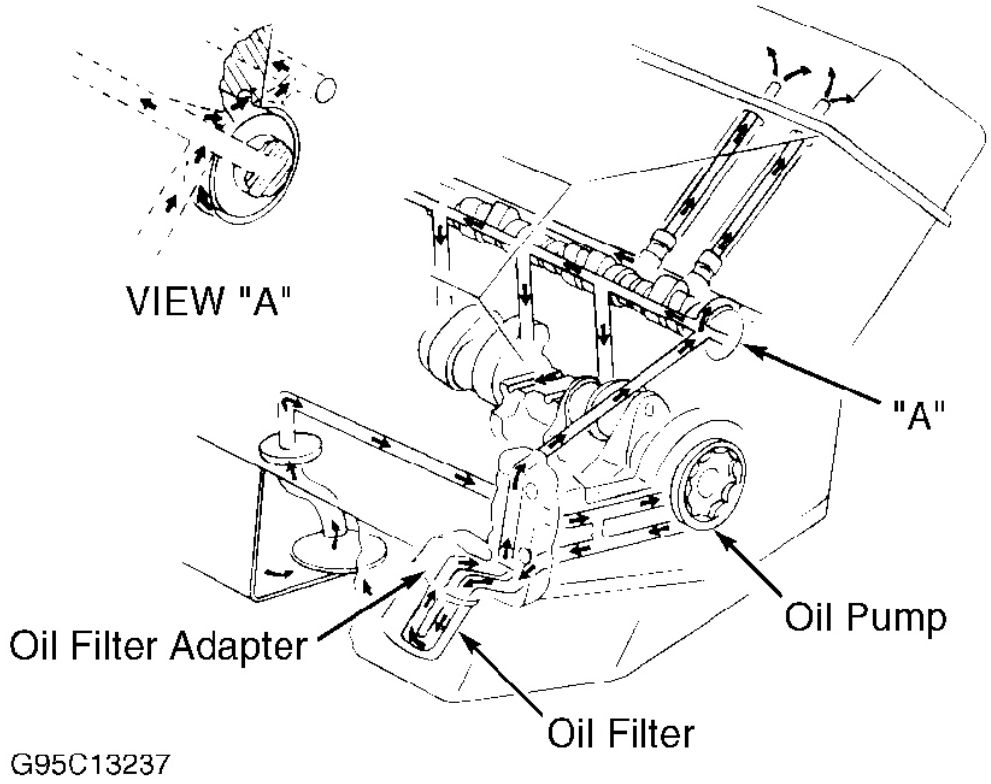


Fig. 17: Cross-Sectional View Of Engine Oiling System
Courtesy of GENERAL MOTORS CORP.

OIL PUMP

Removal & Disassembly

Remove front cover. See **FRONT COVER** under REMOVAL & INSTALLATION. Remove oil filter adapter, gasket, pressure regulator and valve from front cover. Remove pump cover bolts, cover and gears from front cover.

Inspection

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1. Inspect components for damage. Measure gear end clearance. Measure housing gear pocket depth and diameter. Measure tip clearance between gears. Measure outer gear-to-housing clearance.
2. Check clearance between pressure regulator valve and bore. Replace components or pump assembly if measurements are not within specification. See **OIL PUMP SPECIFICATIONS** table.

Reassembly & Installation

To reassemble, reverse disassembly procedure. Lubricate gears, and fill cavities with petroleum jelly. Install pump cover. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

OIL PUMP SPECIFICATIONS

Application	In. (mm)
Gear End Clearance	.0010-.0035 (.025-.089)
Gear Tip Clearance	.006 (.15)
Housing Gear Pocket	
Depth	.4610-.4625 (11.71-11.75)
Diameter	3.508-3.512 (89.10-89.20)
Outer Gear-To-Housing Clearance	.008-.015 (.20-.38)
Pressure Regulator Valve-To-Bore Clearance	.0015-.0030 (.038-.076)

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Balance Shaft Gear Bolt (1)	
Step 1	16 (22)
Step 2	Additional 70 Degrees
Balance Shaft Retainer Bolt	22 (30)
Camshaft Sprocket Bolt	
Step 1	74 (100)
Step 2	Additional 90 Degrees
Connecting Rod Bolt	
Step 1	20 (27)

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Step 2	Additional 50 Degrees
Crankshaft Pulley/Balancer Bolt	
Step 1	110 (149)
Step 2	
"C", "H", & "W" Bodies	Additional 76 Degrees
"F" Body	Additional 114 Degrees
Cylinder Head Bolts (2)	
Step 1	37 (50)
Step 2	
2000	Additional 130 Degrees
2001	Additional 120 Degrees
Step 3 (2000 "C", "H", & "W" Bodies 4 Center Bolts)	Additional 30 Degrees
Drive Bolt Tensioner Bracket Bolt (VIN 1)	37 (50)
EGR Valve Adaptor Nut	37 (50)
Exhaust Manifold Bolt	
"C", "H", & "W" Bodies	22 (30)
"F" Body	17 (23)
Flywheel Bolt	
Step 1	11 (15)
Step 2	Additional 50 Degrees
Front Cover Bolt	
Step 1	(3) 15 (20)
Step 2	Additional 40 Degrees
Fuel Feed & Return Line Fitting	18 (24)
Intake Manifold Bolts	
VIN 1	
Lower	(1) (4) 11 (15)
Upper (Supercharger)	17 (23)
VIN K	
Lower	(1) (5) 11 (15)
Upper	(6)
Main Bearing Cap Bolt	
Step 1	30 (41)
Step 2	Additional 110 Degrees
Oil Cooler Adapter Connector	37 (50)
Oil Filter Adapter-To-Front Cover Bolt	

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Application	Ft. Lbs. (N.m)
"H" Body	12 (16)
"W" Body	
Balance Shaft Gear Bolt (1)	
Step 1	11 (15)
Step 2	Additional 50 Degrees
Balance Shaft Retainer Bolt	10 (14)
Camshaft Sprocket Bolt	11 (15)
Oil Pan Bolt	
Step 1	74 (10)
Step 2	Additional 90 Degrees
Oil Pump Pick-Up Tube Bolt	11 (15)
Rocker Arm Bolt (1)	
Step 1	11 (15)
Step 2	Additional 90 Degrees
Connecting Rod Bolt	
Step 1	20 (27)
Step 2	Additional 50 Degrees
Side Main Bearing Cap Bolt	
Step 1	11 (15)
Step 2	Additional 45 Degrees
Crankshaft Pulley/Balancer Bolt	
Step 1	110 (149)
Step 2	17 (23)
Supercharger-To-Intake Manifold Bolt (VIN 1)	
Step 1	16 (22)
Step 2	22 (30)
Timing Chain Damper Bolt (Special Bolt)	
"C", "H", & "W" Bodies	Additional 76 Degrees
Valve Lifter Guide Bolt	
"F" Body	Additional 114 Degrees
Water Pump Bolt	
Step 1	11 (15)
Step 2	Additional 80 Degrees
Cylinder Head Bolts (2)	**INCH Lbs. (N.m)**
2000	Additional 130 Degrees
2001	Additional 120 Degrees
Oil Pump Cover Screw	89 (10)
Rocker Arm Cover Bolt	89 (10)
Step 3 (2000 "C", "H", & "W" Bodies 4 Center Bolts)	Additional 30 Degrees
Throttle Body Nut	89 (10)
Drive Belt Tensioner Bracket Bolt (VIN 1)	37 (50)
EGR Valve Adaptor Nut	37 (50)
Exhaust Manifold Bolt	
"C", "H", & "W" Bodies	22 (30)
"F" Body	17 (23)
Flywheel Bolt	
Step 1	11 (15)
Step 2	Additional 50 Degrees
Front Cover Bolt	
Step 1	89 (10)

(1) Apply thread locking compound to bolt(s).
(2) Tighten bolts in sequence. See **Fig. 6** .
(3) Apply thread sealant to bolt(s).
(4) Tighten bolts in sequence. See **Fig. 5** .
(5) Tighten bolts in sequence. See **Fig. 4** or **Fig. 5** .
(6) On Camaro and Firebird, tighten vertical bolts to 11 Ft. Lbs. (15 N.m) and side bolts to 22 Ft. Lbs. (30 N.m) in sequence. See **Fig. 2** . Except Camaro and Firebird, tighten bolts to 89 INCH lbs. (10 N.m) in sequence. See **Fig. 3** .

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Application	Specification

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Displacement	231 Cu. In. (3.8L)
Bore	3.80" (96.5 mm)
Stroke	3.40" (86.4 mm)
Compression Ratio (VIN K)	9.4:1
Compression Ratio (VIN 1)	8.5:1
Fuel System	SFI

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

Application	In. (mm)
Crankshaft End Play	.003-.011 (.08-.28)
Main Bearings	
Journal Diameter	2.4988-2.4998 (63.470-63.495)
Journal Out-Of-Round	.00025 (.0064)
Journal Taper	.00035 (.0089)
Oil Clearance	
Journal No. 1	.0007-.0016 (.0178-.0406)
Journals No. 2, 3 & 4	.0009-.0018 (.0229-.0457)
Connecting Rod Bearings	
Journal Diameter	2.2487-2.2499 (57.117-57.147)
Journal Out-Of-Round	.0002 (.005)
Journal Taper	.00035 (.0089)
Oil Clearance	.0005-.0026 (.0127-.0660)

CONNECTING RODS

Application	In. (mm)
Maximum Bend	(1) .005 (.13)
Maximum Twist	(1) .005 (.13)
Side Play	.0040-.0200 (.102-.508)

(1) Bend or twist measured over total length.

PISTONS, PINS & RINGS

Application	In. (mm)
Piston Clearance (1)	

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Used Piston	
VIN 1	.0008-.0039 (.020-.099)
VIN K	.0020-.0036 (.050-.091)
New Piston	
VIN 1	.0008-.0017 (.020-.043)
VIN K	.0004-.0020 (.010-.051)
Pins	
Diameter	
VIN 1	.9053-.9055 (22.995-23.000)
VIN K	.8659-.8661 (21.995-22.000)
Piston Fit	
VIN 1	.00026-.00061 (.0066-.0155)
VIN K	.00008-.00051 (.0020-.0130)
Rod Fit	
VIN 1	.00029-.00089 (.0073-.0226)
VIN K	.00030-.00090 (.0076-.0228)
Rings	
No. 1	
End Gap	.010-.018 (.25-.46)
Side Clearance	.0013-.0031 (.033-.079)
No. 2	
End Gap	.023-.033 (.58-.84)
Side Clearance	.0013-.0031 (.033-.079)
No. 3 (Oil)	
End Gap	.010-.030 (.25-.76)
Side Clearance	.0009-.0079 (.023-.201)
(1) Measure 1.5" (39 mm) form top of engine block.	

CYLINDER BLOCK

Application	In. (mm)
Cylinder Bore	
Diameter	3.80 (96.5)

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Maximum Taper	.001 (.0254)
Maximum Out-Of-Round	.001 (.0254)

VALVES & VALVE SPRINGS

Application	Specification
Valves	
Face Angle	45°
Minimum Margin	.025" (.64 mm)
Installed Height	1.935-1.975" (49.15-50.17 mm)
Valve Springs	
Free Length	1.960" (49.78 mm)
Installed Height	1.690-1.720" (42.93-43.69 mm)
	Lbs. @ In. (kg @ mm)
Pressure	
Valve Closed	75 @ 1.72 (34 @ 43.7)
Valve Open	228 @ 1.277 (104 @ 32.4)

CYLINDER HEAD

Application	Specification
Maximum Warpage	.010" (.25 mm)
Valve Seats	
Intake Valve	
Seat Angle	45°
Seat Width	.060-.080" (1.52-2.03 mm)
Seat Runout (Maximum)	.002" (.05 mm)
Exhaust Valve	
Seat Angle	45°
Seat Width	.090-.110" (2.29-2.79 mm)
Seat Runout (Maximum)	.002" (.05 mm)
Valve Guide Oil Clearance	.0015-.0032" (.038-.089 mm)

CAMSHAFT

Application	In. (mm)

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Journal Diameter	1.8448-1.8462 (46.858-46.893)
Lobe Lift	
Intake	.258 (6.55)
Exhaust	.255 (6.48)
Oil Clearance	.0016-.0047 (.041-.119)

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2000 ACCESSORIES/SAFETY EQUIPMENT

General Motors Corp. - Air Bag Restraint Systems

DESCRIPTION & OPERATION

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all WARNINGS and AIR BAG SAFETY PRECAUTIONS .

SUPPLEMENTAL INFLATABLE RESTRAINT (SIR) SYSTEM

Supplemental Inflatable Restraint (SIR) system is designed to supplement protection provided by driver and passenger-side seat belts. A frontal crash of sufficient force up to 30 degrees off center line of vehicle will deploy driver and passenger-side air bags and seat belt pretensioners. Steering column and knee bolsters below instrument panel also absorb crash energy.

Side impact air bag system supplements protection offered by driver-side and front passenger-side doors, and vehicle structure. When a side impact of sufficient force occurs, side impact air bag system deploys an air bag from driver or front passenger"s seat.

SIR system consists of Sensing and Diagnostic Module (SDM), driver and passenger-side air bag modules, side impact air bag modules, driver and passenger Side Impact Sensors (SIS), SIR coil assembly and AIR BAG warning light in instrument cluster.

SENSING & DIAGNOSTIC MODULE (SDM)

SDM monitors vehicle velocity changes to detect frontal crashes which are severe enough to warrant SIR system deployment. When a frontal crash of sufficient force is detected, SDM causes enough current to flow through air bag modules and seat belt pretensioners to deploy. SDM also maintains a 23 Volt Loop Reserve (23 VLR) energy supply to provide deployment energy for up to 10 minutes after loss of ignition voltage.

SDM provides diagnostic monitoring of SIR system electrical components. When a malfunction is detected, SDM sets a Diagnostic Trouble Code (DTC) which can be retrieved using a scan tool. SDM warns driver of system malfunctions by controlling AIR BAG warning light.

AIR BAG WARNING LIGHT

AIR BAG warning light is installed in Instrument Panel Cluster (IPC). SDM communicates with IPC using serial data communications. When ignition switch is first turned ON, AIR BAG warning light verifies system operation by flashing 7 times and turning off. During vehicle operation, AIR BAG warning light warns driver of malfunctions which could

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potentially affect SIR system operation.

SIR COIL ASSEMBLY

SIR coil assembly consists of 2 or more current-carrying coils. Coils are attached to steering column and allow rotation of steering wheel, while maintaining continuous (directly wired) contact of deployment loop through driver-side air bag module.

Shorting bar across terminals, short circuits to SIR coil and driver-side air bag module when disconnected. This prevents deployment of air bag module when servicing steering column or other SIR components.

AIR BAG MODULES

Air bag modules consist of an inflatable bag and inflator. When vehicle is in an accident of sufficient force, SDM causes current flow through deployment loops. Current passing through modules ignites inflator charges, producing gas which rapidly inflates air bags.

Shorting bars on Yellow 2-pin connectors short circuits to driver-side, passenger-side and side impact air bag modules when disconnected. This prevents deployment of air bag modules when servicing SIR components.

SIDE IMPACT SENSOR (SIS)

Side Impact Sensors (SIS) monitor vehicle acceleration and velocity changes to detect side impact crashes, severe enough to cause air bag deployment. SDM sends deployment signal to appropriate side impact air bag during a side impact. During frontal impact, SIS are used as a normal discriminating sensor.

KNEE BOLSTERS

Knee bolsters are used to absorb energy and control forward movement of front passengers. This is accomplished by limiting leg movement during a frontal crash.

COMPONENT LOCATIONS

COMPONENT LOCATIONS

Component	Location
Air bag warning light	In instrument cluster
Driver air bag module	On steering wheel
Knee bolsters	Lower driver & passenger-side instrument panel
Passenger air bag module	Passenger-side instrument panel
Sensing & Diagnostic Module (SDM)	Under rear of center console

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SIR coil assembly	Within steering column
Driver inflator module	On steering wheel

SERVICING

SYSTEM OPERATION CHECK

If system is functioning normally, AIR BAG warning light flashes 7 times and then turns off when ignition switch is turned ON. System malfunction is indicated when light does not illuminate at all, light comes on while vehicle is driven, light flashes 7 times and remains on, or light does not flash but remains on when ignition switch is turned on.

SIR system faults are usually due to a disconnected or loose electrical connectors caused by previous service on vehicle. Always check SIR coil connector at base of steering column for loose or damaged wiring.

AIR BAG SAFETY PRECAUTIONS

Observe the following precautions when working with SIR system:

- SDM maintains sufficient voltage to cause air bag deployment for up to 10 minutes after ignition switch is turned OFF, battery is disconnected, or fuse powering SDM is removed. In order to begin servicing immediately, air bag modules must be removed from deployment loop. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
- After repairs, ensure AIR BAG warning light is working properly and no system faults are indicated. See **SYSTEM OPERATION CHECK** .
- Always wear safety glasses when servicing or handling an air bag module.
- Air bag modules must be stored in original special containers until used for service. Store in a clean, dry place, away from sources of extreme heat, sparks, or high electrical energy.
- Air bag modules or SDMs should not be subjected to temperatures greater than 150 F (65 C).
- Air bag modules or SDMs should not be used if they have been dropped from a height of 3 feet or greater.
- When placing a live air bag module on a bench or other surface, always make certain that trim cover faces up. This will reduce motion of module if accidentally deployed.
- After deployment, air bag surface may contain deposits of sodium hydroxide, which can irritate skin. Always wear safety glasses, rubber gloves and long-sleeved shirt during clean-up, and wash hands using mild soap and water. Follow correct disposal procedures. See **DISPOSAL PROCEDURES** .
- At no time should any electrical source be allowed near inflator on back of air bag module.

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- DO NOT apply power to SIR system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code.
- When carrying a live air bag module, trim cover should be pointed away from body to minimize injury in case of accidental deployment.
- DO NOT attempt to service any SIR component. All defective SIR components must be replaced.
- DO NOT probe a wire through insulator; this damages wire and eventually causes failure due to corrosion.
- When performing electrical tests, prevent accidental shorting of terminals. Such mistakes can damage fuses or components and may cause a second fault code to set, making diagnosis of original problem more difficult.
- When using diagnostic charts to diagnose SIR system, under no circumstances should a volt/ohmmeter, test light or any type of electrical equipment not specified by manufacturer be used. See **SPECIAL TOOLS** .
- If SIR system is not fully functional for any reason, vehicle should not be driven until system is repaired. DO NOT remove bulbs, modules, sensors or other components or in any way disable system from operating normally.

SPECIAL TOOLS

To avoid accidental deployment when working on SIR system, use only electrical test equipment specified by manufacturer. See **RECOMMENDED TOOLS** table.

RECOMMENDED TOOLS

Tool Name	Tool Number
Connector test adapter kit	J-35616-A
Digital multimeter	J-39200
Scan tool	Tech 2
SIR deployment harness	J-38826
SIR deployment tool	J-39401-B
SIR driver/passenger load tool	J-38715-A
Steering wheel puller	J-1859-A
Steering wheel puller legs	J-42578
Terminal repair kit	J-38125-B

ADJUSTMENTS

CENTERING COIL ASSEMBLY

1. If coil assembly has been removed from steering column and is being reinstalled, go to next step. New coil assemblies are pre-centered and include a centering tab that is

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removed once coil is installed.

2. Hold coil assembly with clear bottom upward to see coil bottom. While holding coil assembly housing, depress spring lock and rotate hub in direction of arrow until it stops. Coil ribbon should now be wound up snugly against center hub. Rotate coil hub in opposite direction approximately 2 1/2 turns. Release spring lock between locking tabs. See **Fig. 1** .

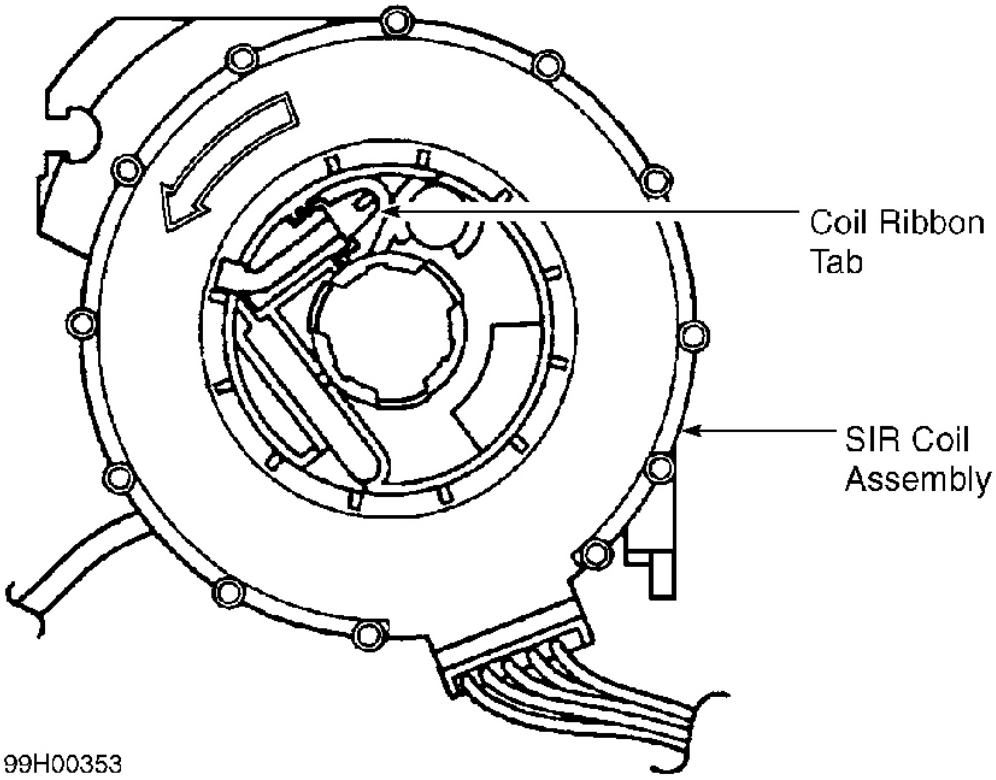


Fig. 1: Centering SIR Coil Assembly
Courtesy of GENERAL

DISABLING & ACTIVATING AIR BAG SYSTEM

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See Computer Relearn Procedures in the Reference Information section. Record preset radio stations and obtain code for theft deterrent-equipped radios before disconnecting battery.

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DISABLING SYSTEM

WARNING: SDM maintains sufficient voltage to cause air bag deployment for up to 10 minutes after ignition switch is turned OFF, battery is disconnected, or fuse powering SDM is removed. In order to begin servicing immediately, air bag modules must be removed from deployment loop.

NOTE: When SIR fuse is removed and ignition switch is in RUN position, AIR BAG warning light will be on. This does not indicate a system malfunction.

1. Turn steering wheel to place vehicle wheels in straight-ahead position. Turn ignition off and remove key.
2. Remove SIR fuse (15-amp) from rear junction block, located in left rear of passenger compartment, under rear seat. Remove driver-side sound insulator panel. Remove Connector Position Assurance (CPA) clip and disconnect driver-side Yellow 2-pin connector near base of steering column. See **Fig. 2** .
3. Remove passenger-side sound insulator panel. Remove CPA clip and disconnect passenger-side air bag Yellow 2-pin connector. See **Fig. 3** .
4. Lift driver seat. Remove CPA clip and disconnect driver"s seat air bag Yellow 2-pin connector. See **Fig. 4** . Lift passenger seat. Remove CPA clip and disconnect passenger"s seat air bag Yellow 2-pin connector.

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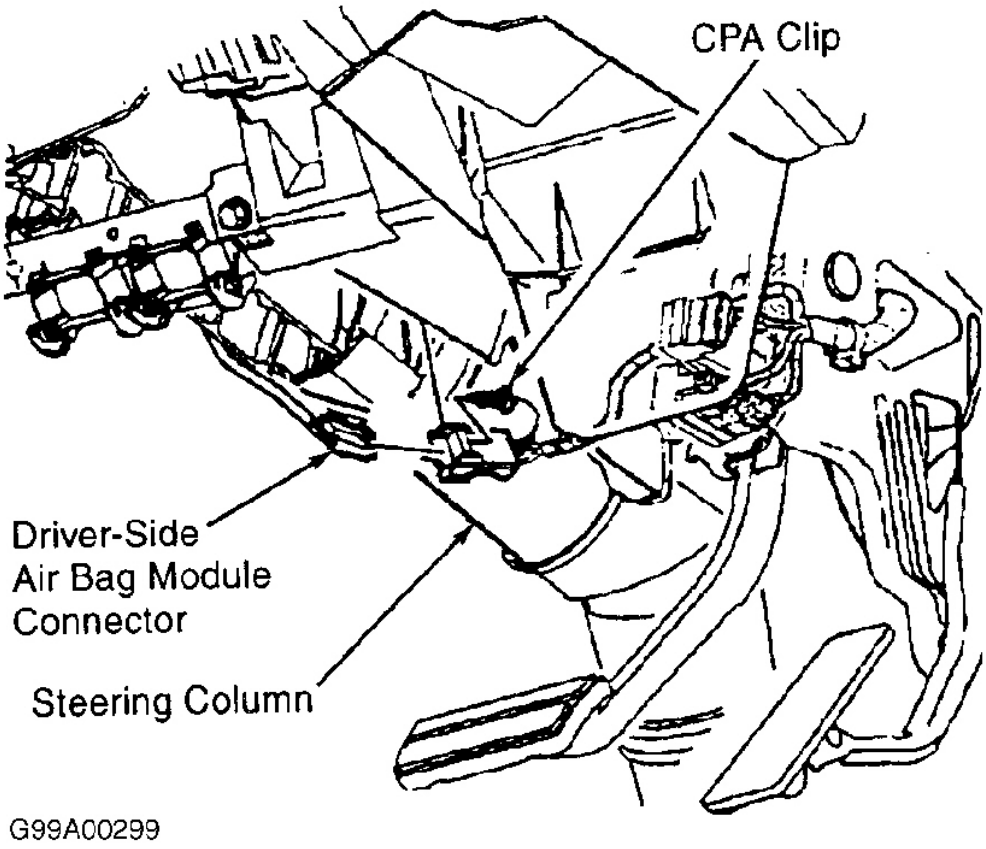


Fig. 2: Locating Driver-side Air Bag Yellow Connector
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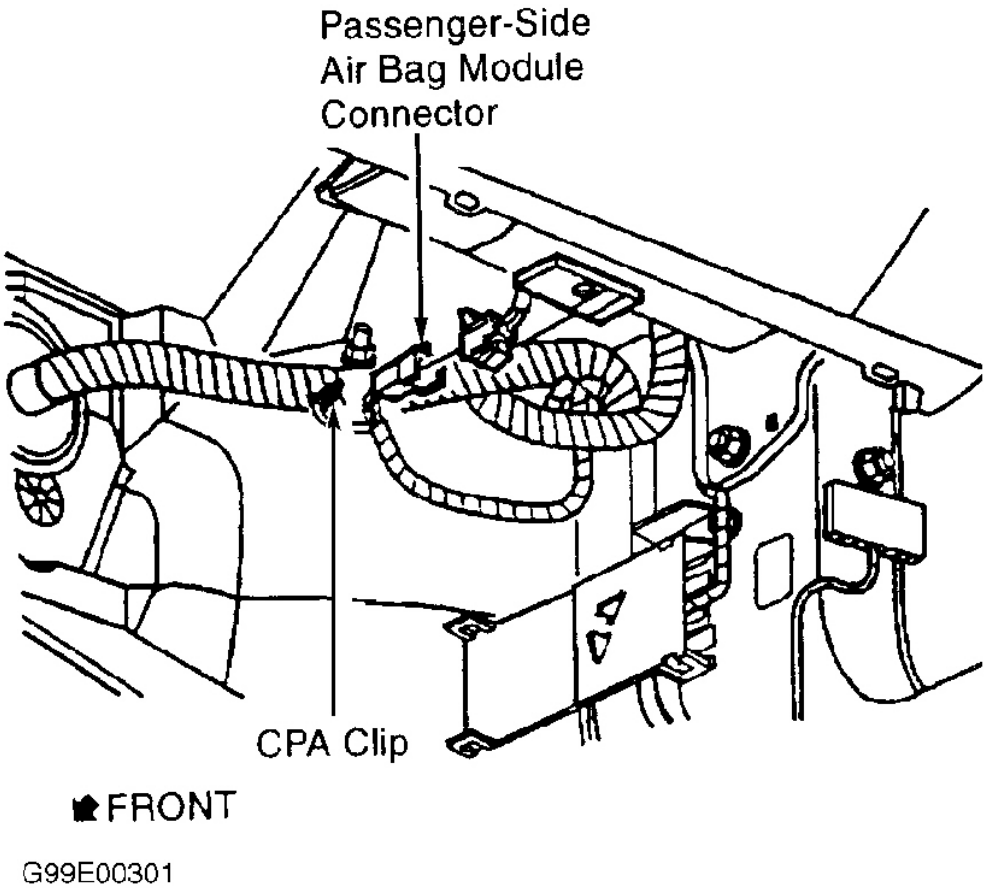


Fig. 3: Locating Passenger-side Air Bag Yellow Connector
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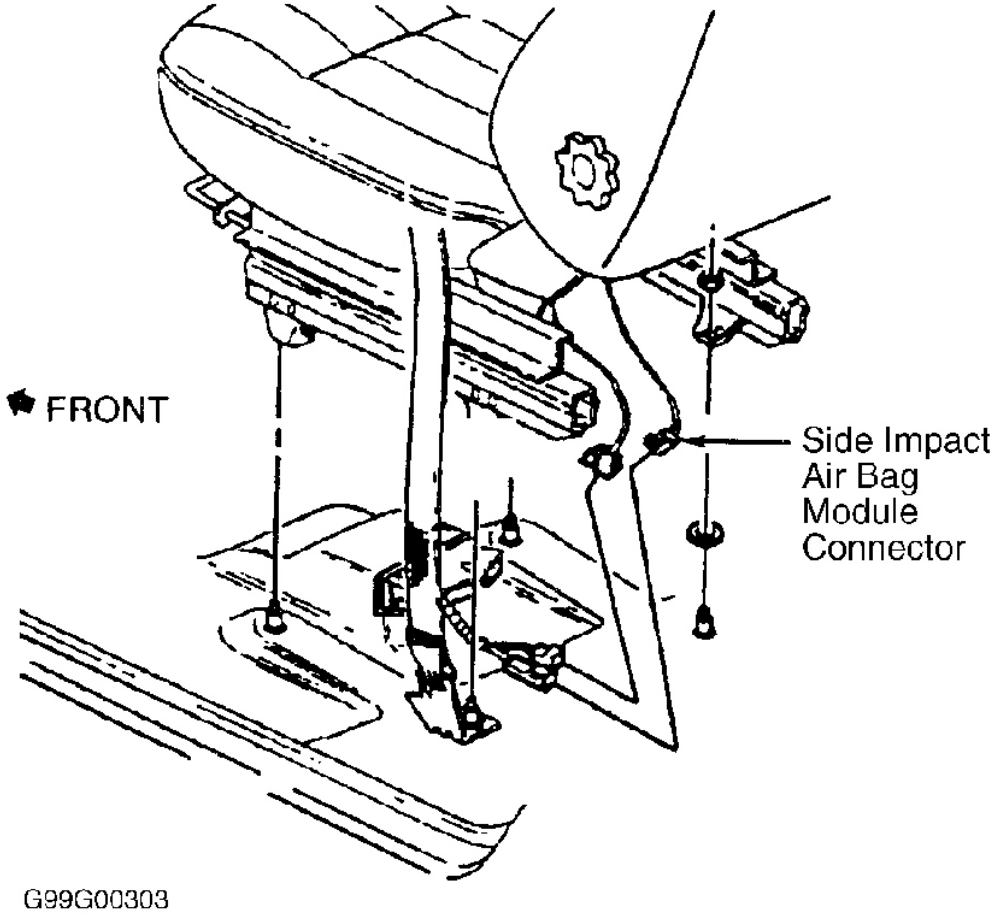


Fig. 4: Locating Side Impact Air Bag Yellow Connector
Courtesy of GENERAL

ACTIVATING SYSTEM

1. Remove key from ignition switch. Connect passenger-side air bag Yellow 2-pin connector and install CPA clip. See **Fig. 3** .
2. Connect driver-side Yellow 2-pin connector near base of steering column and install CPA clip. See **Fig. 2** .Install sound insulator panels.
3. Connect side air bag Yellow 2-pin connectors located under front seats and install CPA clips. See **Fig. 4** .
4. Install SIR fuse to rear junction block. Check system for proper operation. See **SYSTEM OPERATION CHECK** .

DISPOSAL PROCEDURES

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WARNING: To prevent accidental deployment and personal injury, deploy air bags before disposal. DO NOT dispose of undeployed air bag modules at normal refuse locations. Undeployed air bag modules contain substances that can cause severe illness or personal injury if sealed container is damaged during disposal.

NOTE: If vehicle is to be scrapped, perform on-vehicle air bag deployment procedure.

ON-VEHICLE DEPLOYMENT

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Turn ignition switch OFF, remove key and put on safety glasses. Disconnect driver-side and passenger-side frontal air bag module Yellow 2-pin connectors. See **Fig. 2** & **Fig. 3** . Disconnect driver"s and passenger"s seat air bag Yellow 2-pin connectors. See **Fig. 4** .
2. Cut air bag module harness connector from vehicle leaving at least 6" of wire at the connector. Strip 1/2" (13 mm) of insulation from each wire lead to the connector. Cut 2 deployment wires at least 20 feet long from 18-gauge multi-strand wire. Strip 1/2" (13 mm) of insulation from each connector wire lead. Cut 2 15-foot deployment wires from 18-gauge multi-strand wire. Strip 1/2" (13 mm) of insulation from both ends of wires. Twist wires together at one end to short.
3. Twist together one connector wire lead to other end of each deployment wire. See **Fig. 5** . Bend twisted connection flat and wrap tightly with electrical tape to insulate. Repeat this step for other connector wire lead.
4. Remove all loose objects from front seat, and ensure no one is in vehicle. Connect deployment harness to air bag module connector. Stretch wires away from car as far as possible.
5. Repeat steps 2 through 4 for passenger-side and side impact air bag modules. See **Fig. 6** & **Fig. 7** . Cover windshield and front door openings with a drop cloth.
6. Separate wire ends. Connect wires to a 12-volt battery. Air bag should deploy. Disconnect wires from battery. DO NOT touch metal surfaces of air bag module for at least 10 minutes due to heat generated during deployment. Wear gloves and safety glasses when handling deployed air bag module. Wash hands with mild soap and water. Dispose of deployed air bag module like any other part. Repeat deployment procedure for remaining air bags and pretensioners.
7. If air bag modules do not deploy, carefully remove from vehicle. See **REMOVAL & INSTALLATION** . Temporarily store module with trim facing up. Contact manufacturer for proper disposal instructions.

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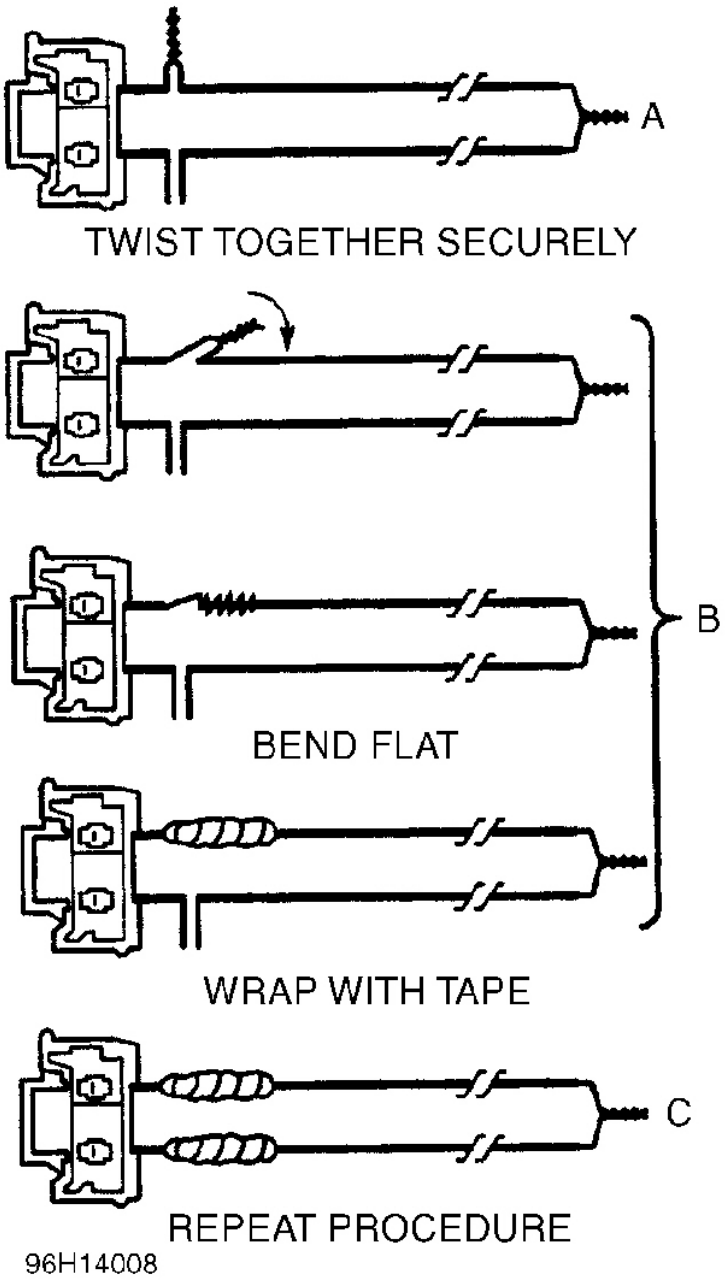


Fig. 5: Preparing Deployment Harness For Driver-side Air Bag On-vehicle Deployment
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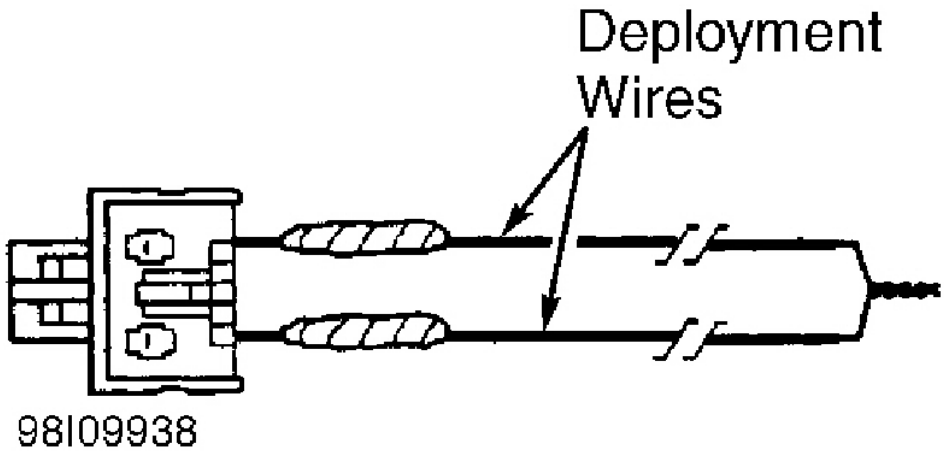


Fig. 6: Preparing Deployment Harness For Passenger-side Air Bag On-vehicle Deployment
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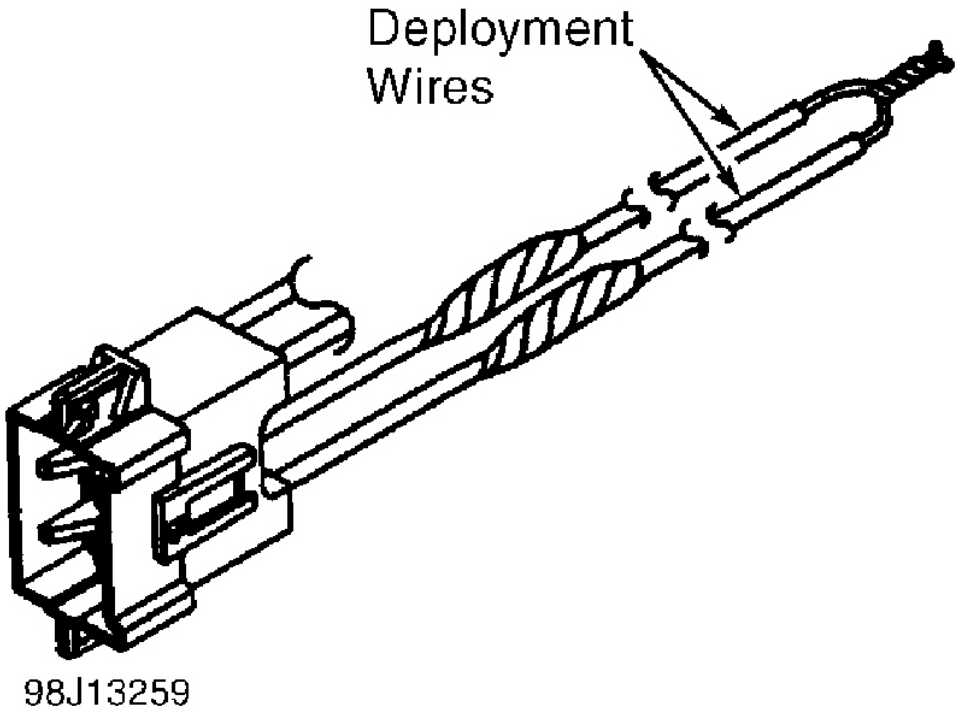


Fig. 7: Preparing Deployment Harness For Side Impact Air Bag On-vehicle Deployment
Courtesy of GENERAL

OFF-VEHICLE DEPLOYMENT

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Turn ignition switch OFF, remove key and put on safety glasses. Short 2 SIR Deployment Harness (J-38826) leads together by fully seating one banana plug into the other. Connect appropriate pigtail adapter to SIR deployment harness. See **Fig. 8** .
2. Remove driver-side air bag module. See **AIR BAG MODULES** under REMOVAL & INSTALLATION.
3. Place air bag module on ground (preferably outdoors) at least 6 feet away from any people or objects. Stretch SIR deployment harness and pigtail adapter from air bag module to its full length. Place a 12-volt battery near shorted end of SIR deployment harness.
4. Connect air bag module to pigtail adapter on SIR deployment harness. See **Fig. 8** . Ensure area around air bag module is clear of people and objects. Verify that air bag module is resting with trim cover facing up.

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5. Separate 2 banana plugs on SIR deployment harness. Connect SIR deployment harness wires to battery. See **Fig. 8** . Air bag module should deploy immediately. If air bag module does not deploy, go to step 7 . Disconnect SIR deployment harness from battery. Short 2 SIR deployment harness leads together. DO NOT touch metal surfaces of air bag module for at least 10 minutes due to heat generated during deployment. Wear gloves and safety glasses when handling deployed air bag module. Wash hands with mild soap and water after handling. Dispose of deployed air bag module like any other part. Inspect pigtail adapter and SIR deployment harness for damage after each use.
6. Using SIR Deployment Tool (J-39401-B) to hold air bags, repeat deployment procedure for passenger-side air bag and side air bag modules.
7. Ensure that SIR deployment harness is disconnected from battery and that 2 banana plugs have been shorted together. Disconnect pigtail adapter from air bag module. Temporarily store air bag modules with trim cover facing up. Contact manufacturer for proper disposal instructions.

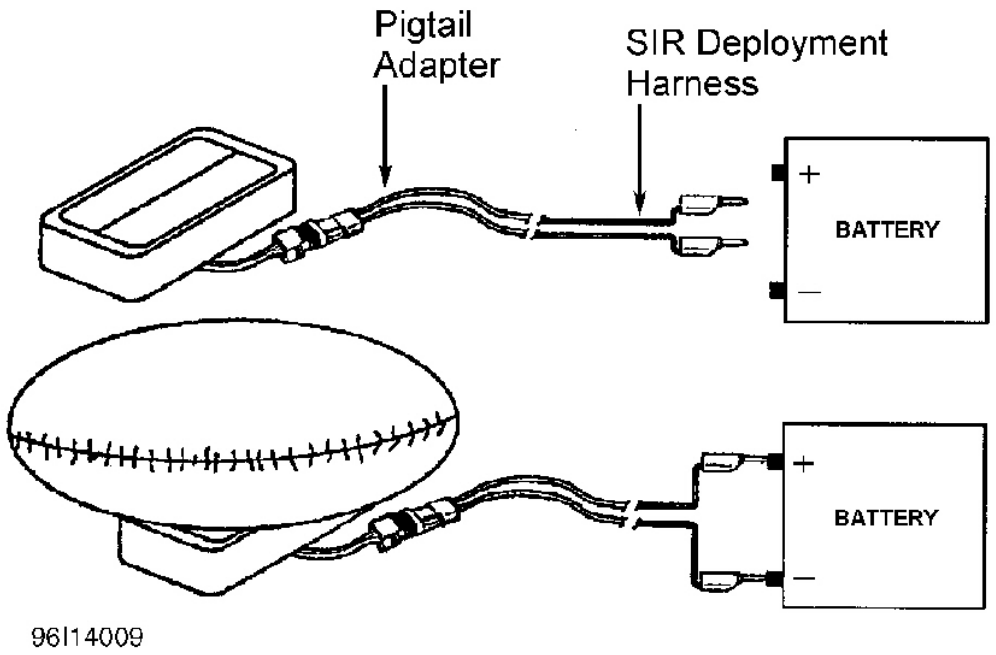


Fig. 8: Preparing Deployment Harness For Off-vehicle Deployment
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POST-COLLISION INSPECTION

See Air Bag/SRS Component Inspection & Replacement Tables in Reference Information section.

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REMOVAL & INSTALLATION

WARNING: Failure to follow service precautions may result in air bag deployment and personal injury. See AIR BAG SAFETY PRECAUTIONS . After component replacement, check system operation. See SYSTEM OPERATION CHECK .

SENSING & DIAGNOSTIC MODULE (SDM)

Removal

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Remove front bench seat (if equipped). Move front bucket seats to full forward position (if equipped). If vehicle is equipped with bucket seats, remove center console. Remove carpet retainer and fold rear back carpet and insulation to access SDM. Remove Connector Position Assurance (CPA) clip and disconnect SDM harness connector. See **Fig. 9** .Remove SDM fasteners and SDM.

Installation

1. Mount SDM on vehicle, ensuring arrow points toward front of vehicle. Install SDM fasteners and tighten to 80 INCH lbs. (9 N.m). Reconnect SDM harness connector and CPA clip.
2. Position carpet and insulation over SDM. Install carpet retainer, center console and front seats. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Check system for proper operation. See **SYSTEM OPERATION CHECK** .

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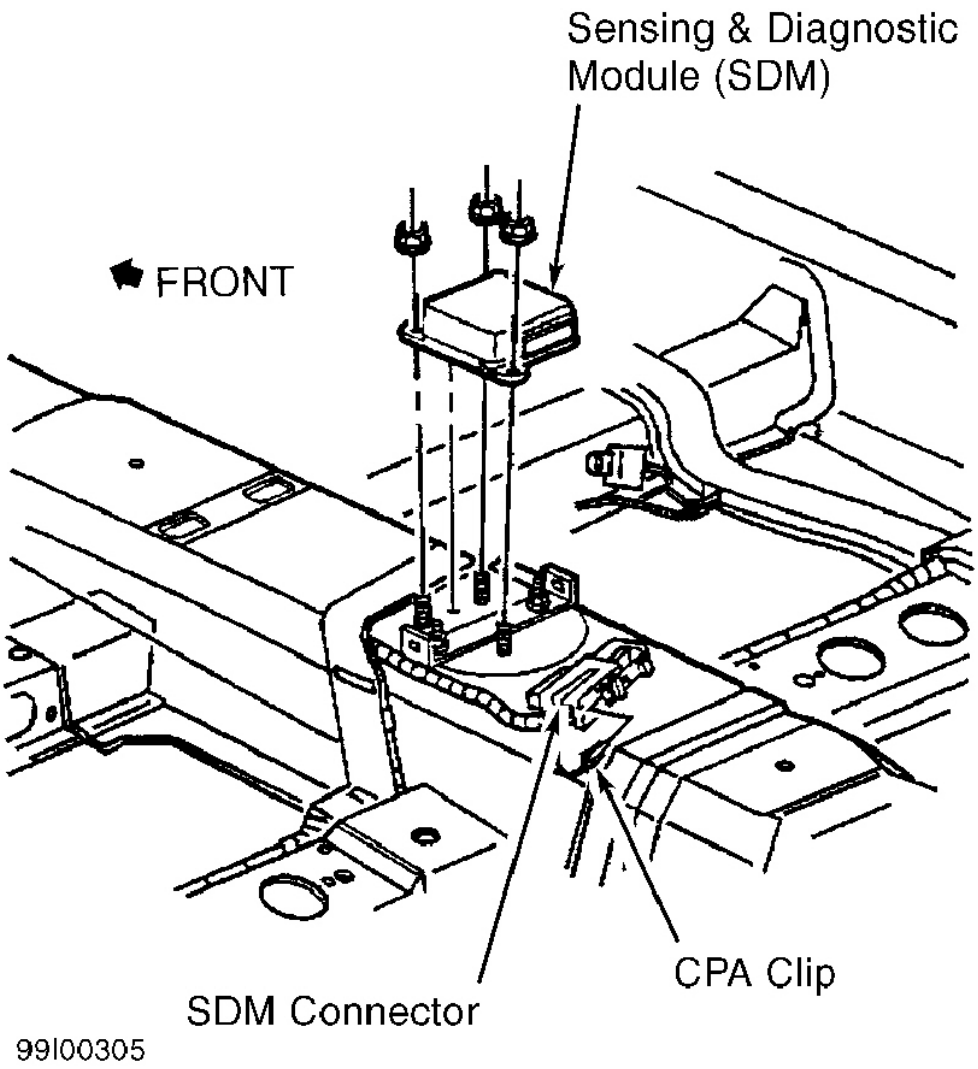


Fig. 9: Removing Sensing & Diagnostic Module (SDM)
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STEERING WHEEL

Removal

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Remove driver-side air bag module. See **AIR BAG MODULES** . Remove steering wheel nut. Note mark on steering shaft and steering wheel to ensure proper alignment during installation. Using Steering Wheel Puller (J-1859-A) and Steering Wheel Puller

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Legs (J-42578), remove steering wheel.

Installation

1. To install, feed wiring through steering wheel. Align mark on steering wheel with mark on shaft, then install nut. Tighten nut to 30 ft. lbs. (41 N.m). Install driver-side air bag module. See **AIR BAG MODULES** .
2. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Check system for proper operation. See **SYSTEM OPERATION CHECK** .

SIR COIL ASSEMBLY

Removal

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Ensure front wheels face straight ahead. Remove driver-side air bag module. See **AIR BAG MODULES** . Remove steering wheel. See **STEERING WHEEL** . Remove upper and lower steering column covers. Remove harness straps attaching SIR coil wire harness to steering column. Disconnect Black SIR connector from fused jumper assembly connector. Remove coil assembly retaining ring. Let coil hang freely. See **Fig. 10** .Remove wave washer.

Installation

1. Install wave washer. Center SIR coil assembly if necessary. See **CENTERING COIL ASSEMBLY** under ADJUSTMENTS. Align SIR coil assembly with horn tower on turn signal cancel cam assembly. Install coil assembly retaining ring. Route coil assembly wire harness along steering column. Connect Black SIR coil assembly wire harness connector to fused jumper assembly connector. Install wire harness straps.
2. Install upper and lower steering column covers. Install steering wheel. See **STEERING WHEEL** . Install driver-side air bag module. See **AIR BAG MODULES** . Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Check system for proper operation. See **SYSTEM OPERATION CHECK** .

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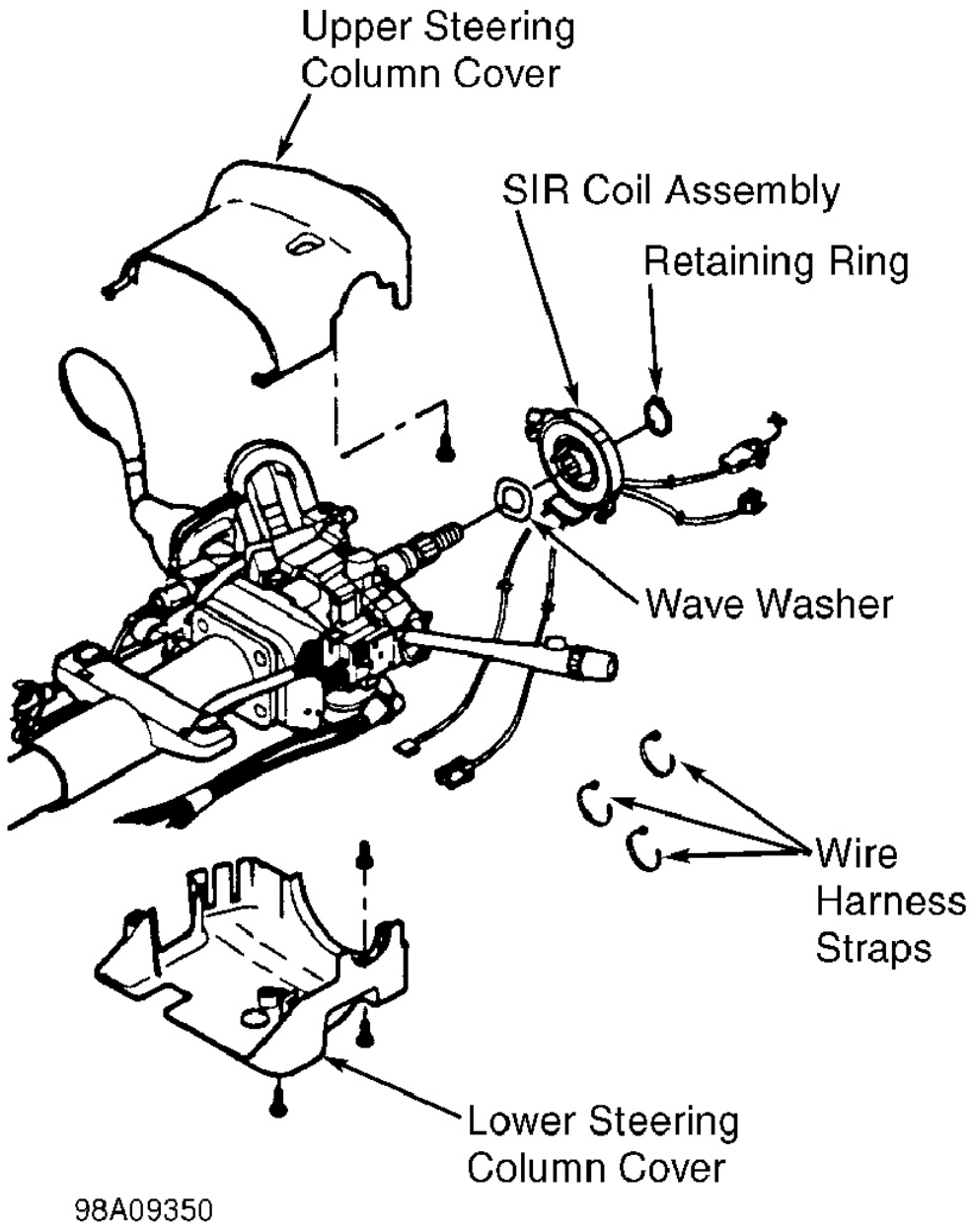


Fig. 10: Removing SIR Coil Assembly
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SIDE IMPACT SENSOR (SIS)

Removal

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Disable air bag

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system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

2. Move appropriate front seat fully forward. Remove front and rear carpet retainers. Remove center pillar garnish molding. Disconnect CPA clip and disconnect SIS connector. Remove SIS fasteners and remove sensor from center pillar. See **Fig. 11** .

Installation

To install, reverse removal procedure. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Check system for proper operation. See **SYSTEM OPERATION CHECK** .

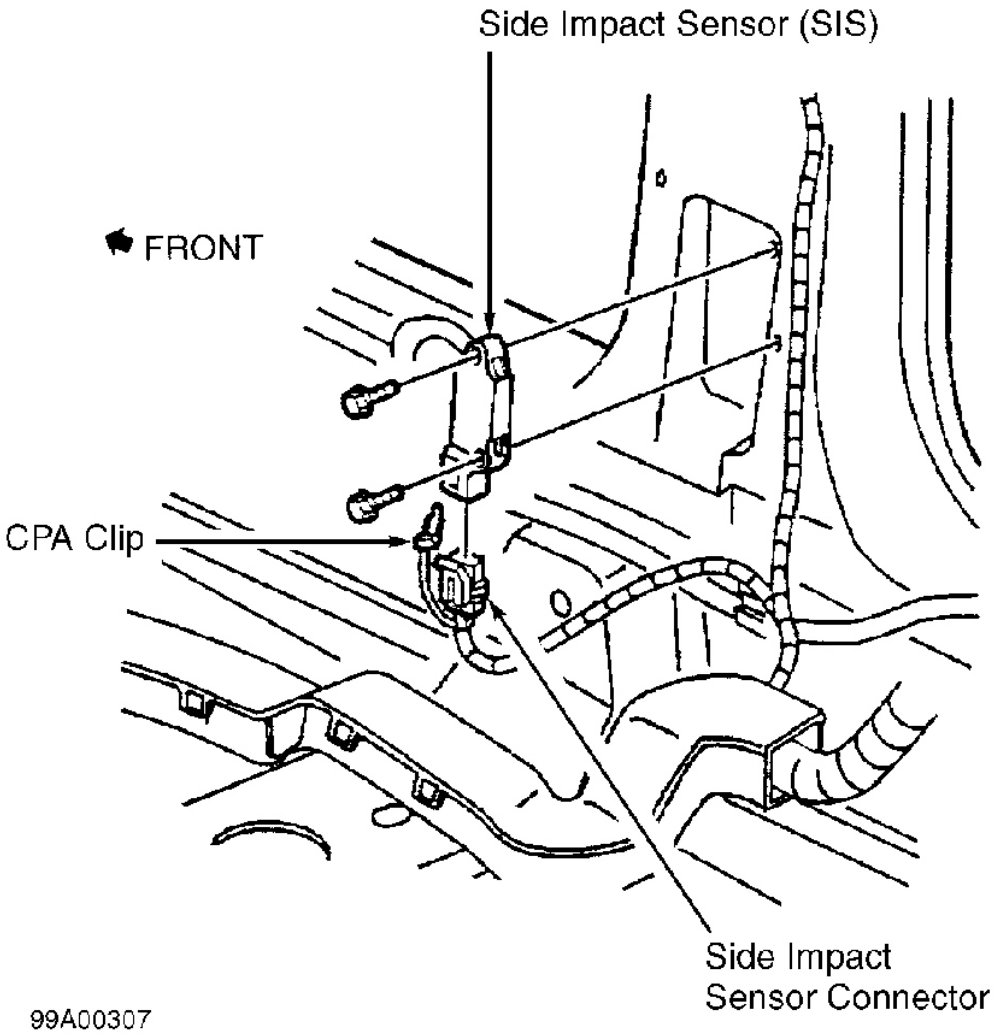


Fig. 11: Removing Side Impact Sensor (SIS)
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AIR BAG MODULES

Removal Driver-side

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Insert flat-blade screwdriver into each of 4 openings in back of steering wheel and turn counterclockwise to disengage wire from slot in air bag module fastener. Pull air bag module gently away from steering wheel. See **Fig. 12** .
3. Note position of wire routing for correct reassembly. Disconnect CPA clip and air bag connector. Disconnect horn leads. Remove air bag module.

Installation

To install, reverse removal procedure. Activate air bag system. See **STEERING WHEEL** . Check system for proper operation. See **AIR BAG MODULES** .

Removal Passenger-side

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Remove instrument panel upper trim pad. See **INSTRUMENT PANEL UPPER TRIM PAD** . Unclip air bag module Yellow 2-pin connector from above passenger-side sound insulator. Remove air bag module fasteners. Remove passenger-side air bag module. See **Fig. 13** .

Installation

1. Turn ignition off. Install air bag module. Tighten air bag module fasteners to 80 INCH lbs. (9 N.m). Clip air bag module Yellow 2-pin connector above passenger-side sound insulator. Install instrument panel upper trim pad.
2. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Check system for proper operation. See **SYSTEM OPERATION CHECK** .

CAUTION: DO NOT remove center fastener from side impact air bag module. Removing fastener may cause air bag to deploy.

Removal Side Impact

1. Before proceeding, See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Move seat to full forward position. Remove seatbelt post rear cover from front cover. Locate seat back zipper and unzip seat cover. Remove 2 fasteners securing air bag

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module. See **Fig. 14** . Disconnect CPA clip from connector. Disconnect electrical connector and remove side impact air bag module from seat.

Installation

Install air bag module to seat. Tighten fasteners to 80 INCH lbs. (9 N.m). Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Check system for proper operation. See **SYSTEM OPERATION CHECK** .

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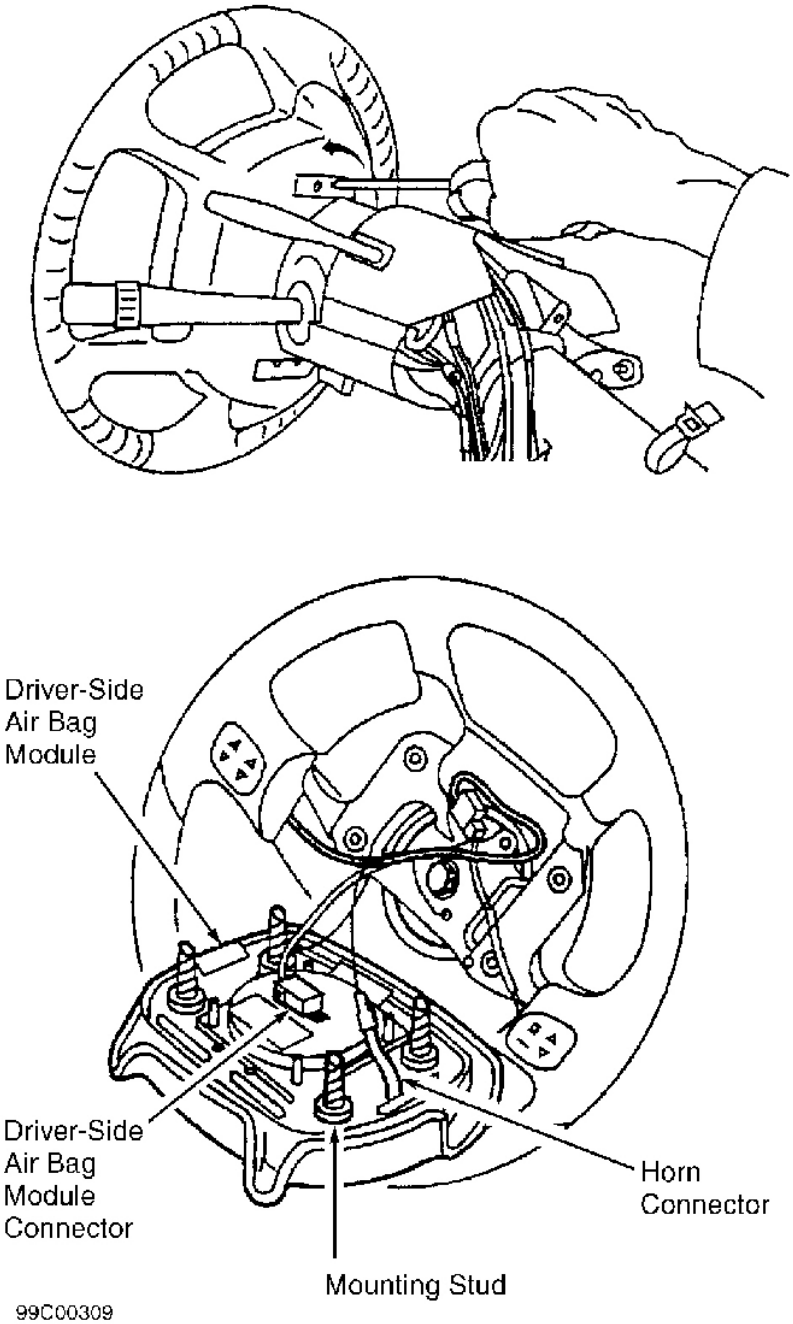


Fig. 12: Removing Driver-side Air Bag Module
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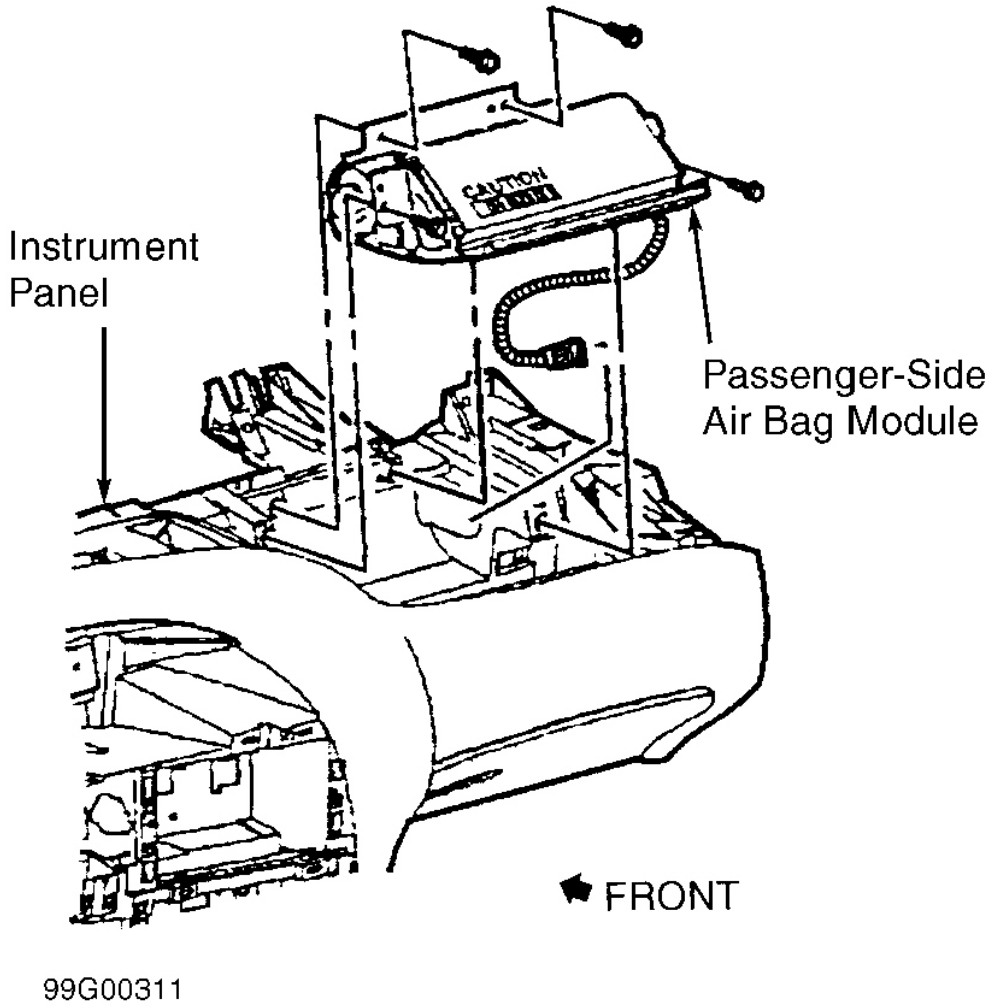


Fig. 13: Removing Passenger-side Air Bag Module
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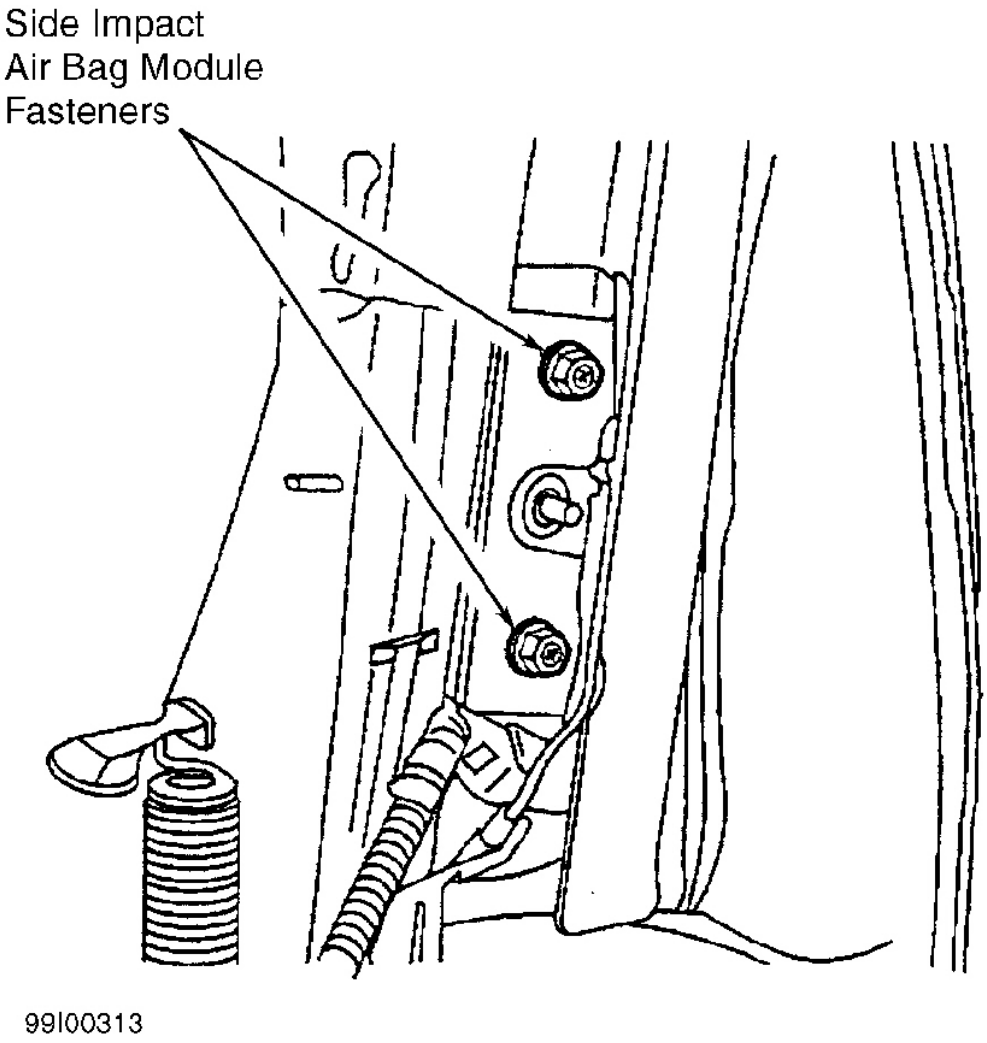


Fig. 14: Removing Side Impact Air Bag Module
Courtesy of GENERAL

INSTRUMENT PANEL UPPER TRIM PAD

Removal

1. Before proceeding, See **AIR BAG SAFETY PRECAUTIONS** . Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Remove defroster grille. Remove windshield garnish mouldings. Remove fasteners securing upper trim pad-to-instrument panel. See **Fig. 15** . Lift upper trim pad and pull rearward at an angle to detach from instrument panel. Disconnect all electrical connectors and remove upper trim pad from vehicle.

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Installation

1. To install, reverse removal installation procedure. Tighten all bolts/nuts to specification. See **TORQUE SPECIFICATIONS** .
2. Activate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Check system for proper operation. See **SYSTEM OPERATION CHECK** .

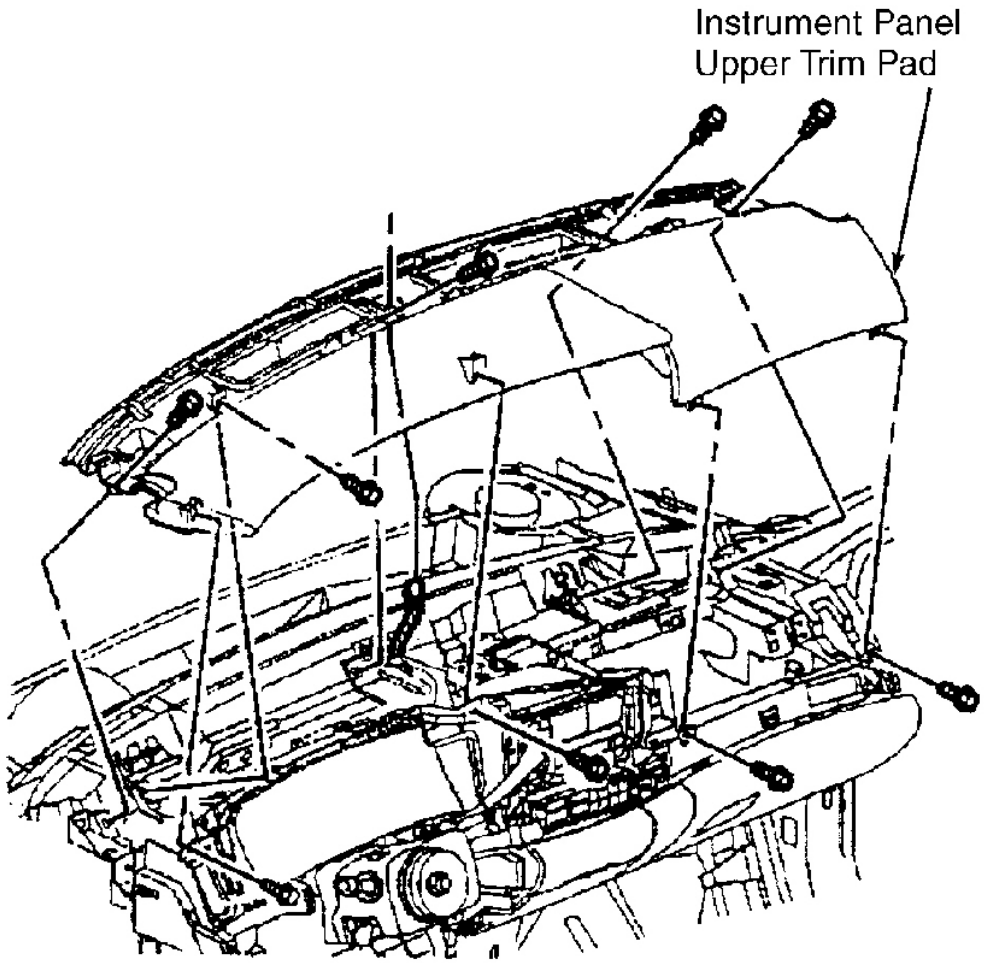


Fig. 15: Removing Instrument Panel Upper Trim Pad
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DIAGNOSTICS

WARNING: Failure to follow service precautions may result in air bag deployment and personal injury. See AIR BAG SAFETY

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PRECAUTIONS . After component replacement, check system operation. See SYSTEM OPERATION CHECK .

DIAGNOSTIC TROUBLE CODES (DTCS)

Sensing & Diagnostic Module (SDM) provides a record of DTCs, stored according to type. SDM performs diagnostic monitoring of SIR system electrical components and sets a diagnostic trouble code (DTC) when a malfunction is detected. Current DTCs are stored in SDM and are erased when fault is corrected. Current DTCs can be read using a scan tool such as Tech 2.

SCAN TOOL DIAGNOSTICS

Scan Tool (Tech 2) reads and clears current and history codes. Ensure scan tool contains correct software cartridge for SIR diagnostics. To use scan tool, connect it to DLC connector, plug in power source and turn the ignition switch to RUN position. Follow scan tool manufacturer instructions for communication with SIR system. Scan tester reads serial data from SDM data link output terminal No. 5 to DLC connector terminal No. 2.

DIAGNOSTIC PROCEDURES

Diagnostic procedures are designed to find and repair SIR malfunctions. It is important to use diagnostic charts and follow sequence listed below:

Perform SIR System Diagnostic Check

SIR System Diagnostic Check should always be starting point for any SIR diagnostics. It checks for proper AIR BAG warning light operation and SIR trouble codes using both flash code and scan tool methods.

Refer To Proper Diagnostic Chart

SIR Diagnostic System Check indicates correct chart to diagnose SIR problems. Bypassing procedures may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.

Repeat SIR Diagnostic System Check

Performing SIR Diagnostic System Check after all repair or diagnostic procedures ensures that repair has been made correctly and that no other conditions exist.

DIAGNOSTIC TESTS

DIAGNOSTIC TROUBLE CODE (DTC) CHART

Trouble Code	Possible Cause

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B0016	Passenger deployment loop resistance low
B0017	Passenger deployment loop open
B0018	Passenger deployment loop short to ground
B0022	Driver deployment loop resistance low
B0024	Driver deployment loop short to ground
B0026	Driver deployment loop open
B0028	Passenger-side deployment loop resistance low
B0029	Right front deployment loop open
B0030	Passenger-side deployment loop short to ground/voltage out of range
B0040	Driver-side deployment loop resistance low
B0041	Driver-side deployment loop open
B0045	Driver-side deployment loop short to ground/voltage out of range
B0051	Deployment commanded
B0053	Deployment commanded with loop malfunctions present
B0077	Driver-side impact system malfunction
B0078	Passenger-side impact system malfunction
B0079	Incorrect driver-side impact system installed
B0080	Discard driver-side impact system
B0081	Incorrect passenger side-impact system installed
B0082	Discard passenger-side impact system
B1001	Option configuration error
U1000	Loss of data communication
U1016	Loss of PCM data communication
U1040	Loss of ABS data communication
U1064	Loss of DIM data communication
U1096	Loss of IPC data communication
U1300	Class 2 serial data line short to ground
U1301	Class 2 serial data line short to voltage

CONNECTOR IDENTIFICATION

NOTE: Refer to illustrations to identify SIR connector terminals. See Fig. 16 , Fig. 20 , Fig. 17 , Fig. 18 & Fig. 19 .

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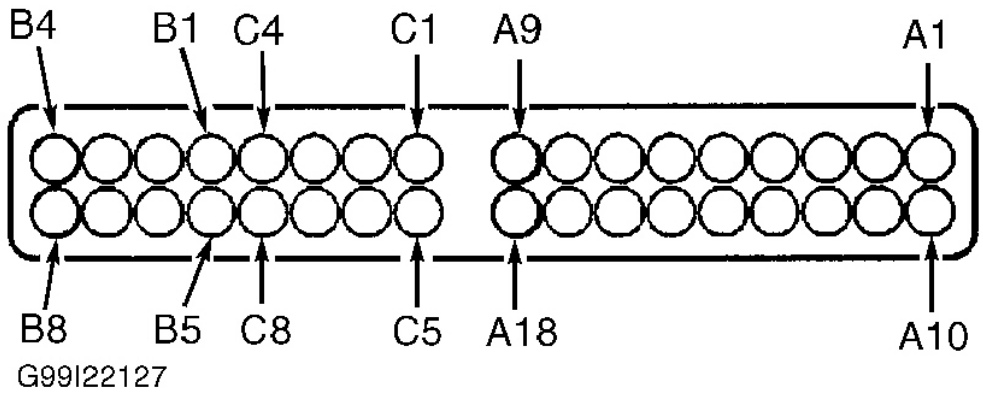


Fig. 16: Identifying SDM Connector Terminals
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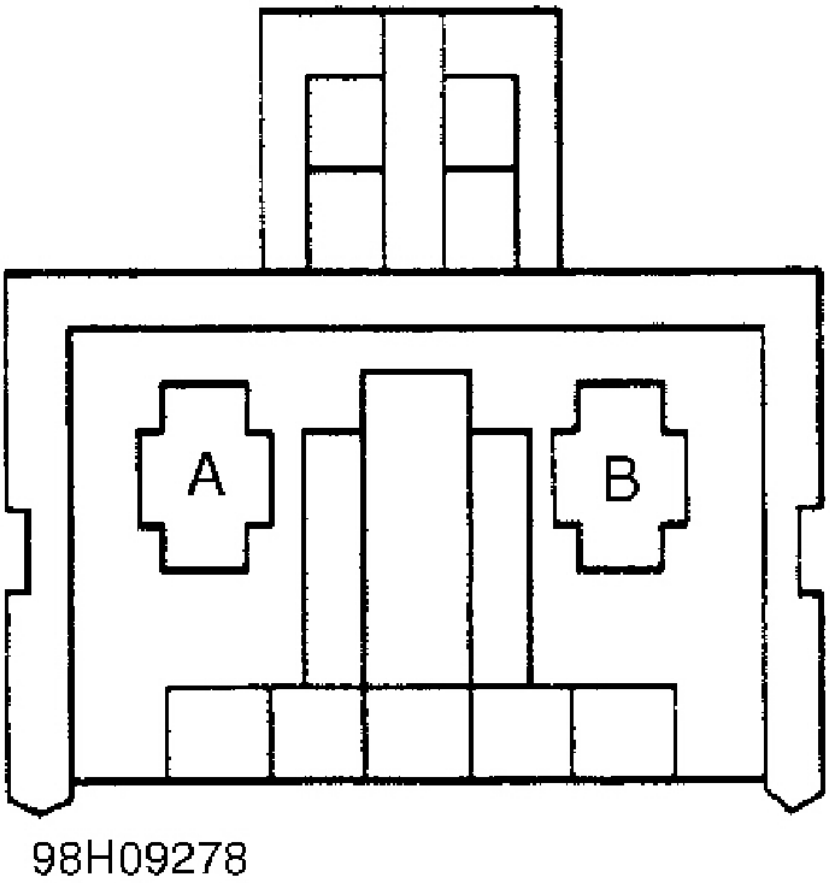


Fig. 17: Identifying Driver & Passenger-side Air Bag Connector Terminals
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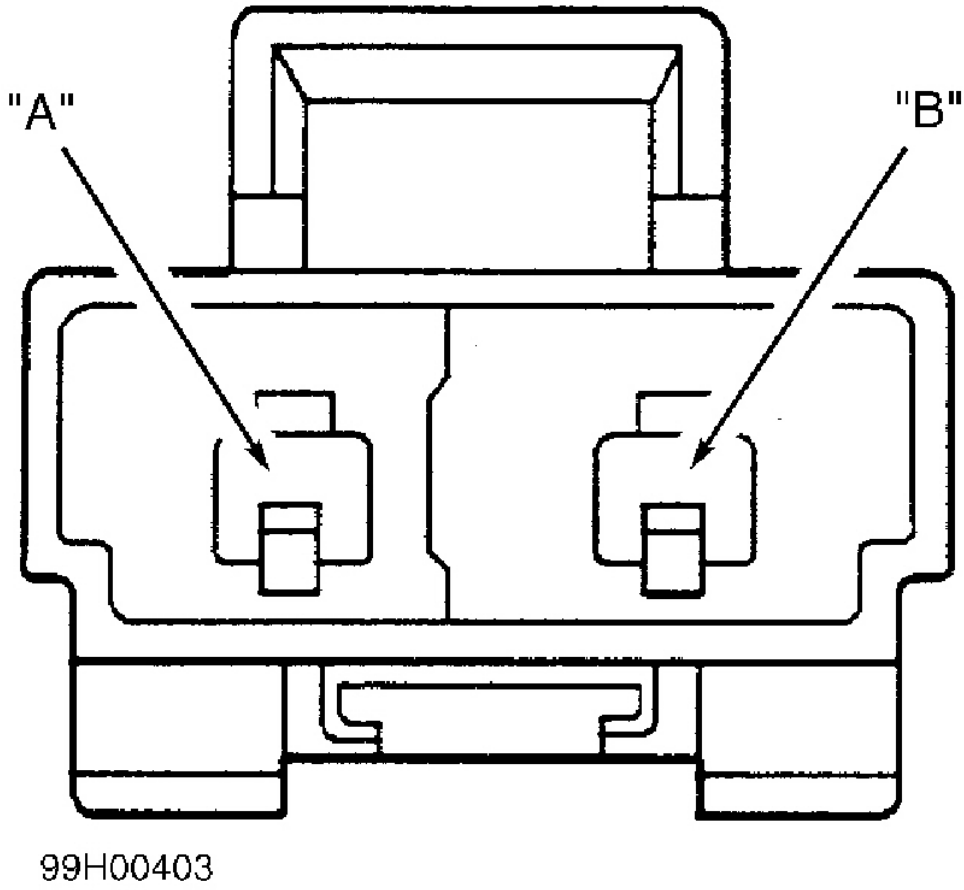


Fig. 18: Identifying SIR Coil Connector Terminals
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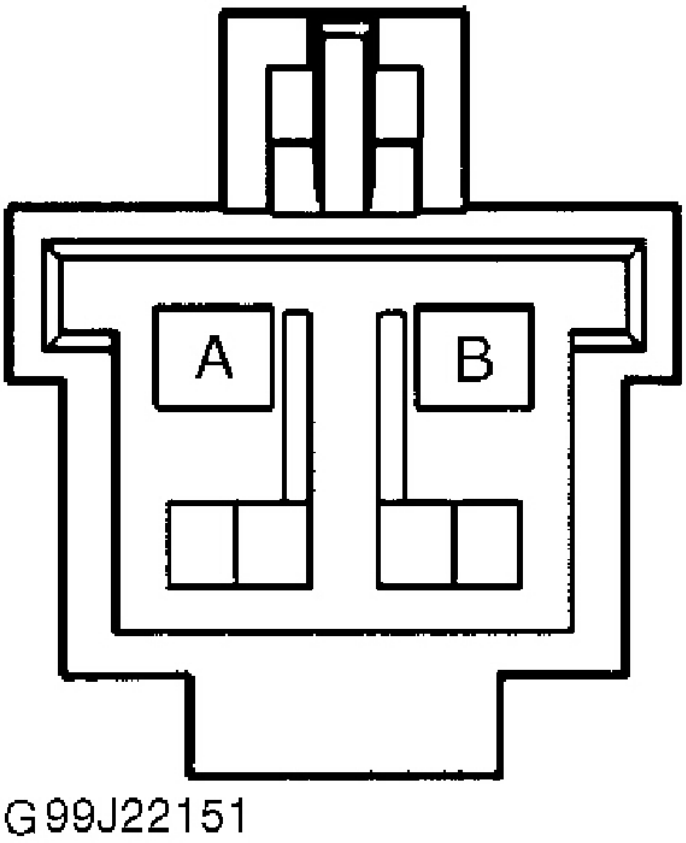


Fig. 19: Identifying Side Air Bag Terminals
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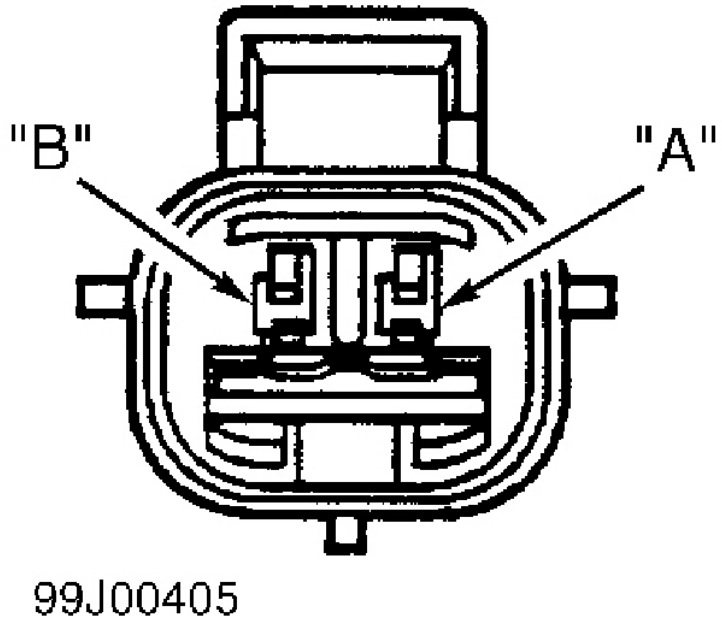


Fig. 20: Identifying Side Impact Sensor (SIS) Connector Terminals
Courtesy of GENERAL

SIR DIAGNOSTIC SYSTEM CHECK

WARNING: To avoid air bag deployment and injury when trouble shooting system, only use test equipment specified. Carefully follow all instructions.

Circuit Description

When ignition switch is turned to RUN position, IGNITION POSITIVE VOLTAGE is applied from SIR fuse to SDM at IGNITION POSITIVE VOLTAGE input terminal No. A1. SDM responds by flashing AIR BAG warning light 7 times then turning off while performing tests on SIR system. If SDM detects no malfunctions, SDM commands Instrument Panel Cluster (IPC) to turn off AIR BAG warning light. If malfunction is detected, SDM commands IPC to turn AIR BAG warning light on.

Diagnostic Aids

Intermittent conditions or history DTCs that cannot be duplicated are usually caused by circuit

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or connector malfunctions. Check circuit harness and connectors for damage or corrosion.

Diagnostic Procedure

1. Turn ignition on and note AIR BAG warning light. If light flashes 7 times, go to next step. If light does not flash, go to **AIR BAG WARNING LIGHT CIRCUIT MALFUNCTION** .
2. Install scan tool to Data Link Connector (DLC). If scan tool powers up, go to next step. If scan tool does not power up, check power and ground circuits for DLC and repair as necessary.
3. Check scan tool communication with SDM. If scan tool communicates with SDM, go to next step. If scan tool does not communicate with SDM, check Class 2 Data Serial circuit and repair as necessary.
4. Using scan tool, request DTCs. If current or history DTCs exist, go to next step. If no DTCs exist, system is okay at this time.
5. If scan tool displays any "U" type DTCs, repair any other system DTCs before attempting air bag system repairs.

AIR BAG WARNING LIGHT CIRCUIT MALFUNCTION

Circuit Description

When ignition switch is turned to RUN position, IGNITION POSITIVE VOLTAGE is applied from SIR fuse to SDM at IGNITION POSITIVE VOLTAGE input terminal No. A1 and Instrument Panel Cluster (IPC). SDM responds by flashing AIR BAG warning light 7 times then turning off while performing tests on SIR system. If SDM detects no malfunctions, SDM commands IPC to turn off AIR BAG warning light. If malfunction is detected, SDM commands IPC to turn AIR BAG warning light on.

Diagnostic Aids

If battery voltage is outside normal operating range, AIR BAG warning light will turn on, with no DTCs set.

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Using scan tool, establish communication with SDM. Request SIR data list. If ignition voltage is 9-16 volts, go to next step. If voltage is not 9-16 volts, check battery and charging systems for malfunction. Repair as necessary.
3. Using scan tool, request SPECIAL FUNCTIONS in INSTRUMENT PANEL CLUSTER. Select WOW INSTRUMENT CLUSTER in OUTPUT CONTROL. Using scan tool, turn instrument panel cluster indicator lights on and off. If AIR BAG warning

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light operates normally, go to next step. If AIR BAG warning light does not operate normally, go to step 5 .

4. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .
5. Replace Instrument Panel Cluster (IPC). Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0016 : PASSENGER DEPLOYMENT LOOP RESISTANCE LOW

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range condition, due to short to voltage.

Conditions For Setting DTC

DTC sets when passenger deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE and DEPLOYMENT LOOP RESISTANCE tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not open.
- Deployment loop is not shorted to ground.
- Deployment loop resistance is at least 1.3 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when ignition switch is cycled and resistance is greater than 1.3 ohms for 500 milliseconds. History DTC clears when scan tool CLEAR CODES is received or when 255 malfunction-free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short between circuits 1403 and 1404, or

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a malfunctioning shorting bar on passenger-side air bag connector.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect passenger-side air bag Yellow 2-pin connector located behind glove box. See **Fig. 3** . If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 4 .
3. Replace passenger-side air bag Yellow 2-pin connector. Go to step 10 .
4. Reconnect passenger-side air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0016 is retrieved, go to next step. If DTC B0016 is not retrieved, go to step 3 .
5. Turn ignition off. Disconnect passenger-side air bag Yellow 2-pin connector located behind glove box. See **Fig. 3** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connectors. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0016 is retrieved, go to step 7 . If DTC B0016 is not retrieved, go to next step.
6. Turn ignition off. Replace passenger-side air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 10 .
7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connectors. Disconnect SDM harness connector. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminals No. A3 and A8. See **Fig. 20** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 9 .
8. Repair short between circuit 1403 and circuit 1404. Go to step 10 .
9. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
10. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0017 : PASSENGER DEPLOYMENT LOOP OPEN

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range condition, due to short to voltage.

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Conditions For Setting DTC

DTC sets when passenger deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- PASSENGER FRONTAL HIGH voltage is less than 2.4 volts.
- Deployment loop resistance is greater than 4.8 ohms for 500 milliseconds.

DTC will set if DEPLOYMENT LOOP RESISTANCE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not shorted to ground.
- Deployment loop resistance is greater than 4.8 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when CLEAR CODES command is issued via scan tool or passenger frontal deployment loop resistance is 4.8 ohms or less for 500 milliseconds. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a poor connection at passenger-side air bag connector terminals "A" or "B", SDM terminals No. A3 or A8, or an open in circuits 1403 or 1404.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Disconnect passenger-side air bag Yellow 2-pin connector located behind glove box. See **Fig. 3** . Check for proper connection at terminals "A" and "B" on harness side of

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passenger-side air bag Yellow 2-pin connector. See **Fig. 17** . If terminals are damaged or corroded, go to next step. If terminals are okay, go to step 4 .

3. Replace passenger-side air bag harness Yellow 2-pin connector. Go to step 14 .
4. Reconnect passenger-side air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0017 is retrieved, go to next step. If DTC B0017 is not retrieved, see DIAGNOSTIC AIDS.
5. Turn ignition off. Disconnect passenger-side air bag Yellow 2-pin connector behind glove box. See **Fig. 3** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0017 is retrieved, go to step 7 . If DTC B0017 is not retrieved, go to next step.
6. Turn ignition off. Replace passenger-side air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 14 .
7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connectors. Disconnect SDM harness connector. Inspect for proper connection at SDM harness connector terminals No. A3 and A8. See **Fig. 16** . If terminals are damaged or corroded, go to next step. If terminals are okay, go to step 9 .
8. Replace SDM harness connector. Go to step 14 .
9. Using Digital Multimeter (J-39200), measure resistance between passenger-side harness connector terminal "A" and SDM connector terminal No. A3. See **Fig. 16** & **Fig. 17** . If resistance is 0-0.5 ohms, go to step 11 . If resistance is greater than 0.5 ohms, go to next step.
10. Repair open or high resistance in circuit 1403. Go to step 14 .
11. Measure resistance between passenger-side harness connector terminal "B" and SDM connector terminal No. A8. See **Fig. 16** & **Fig. 17** . If resistance is 0-0.5 ohms, go to step 13 . If resistance is greater than 0.5 ohms, go to next step.
12. Repair open or high resistance in circuit 1404. Go to step 14 .
13. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
14. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0018 : PASSENGER DEPLOYMENT LOOP VOLTAGE OUT OF RANGE

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

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Conditions For Setting DTC

DTC sets when passenger deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- PASSENGER FRONTAL HIGH voltage is greater than 6 volts for 500 milliseconds.

DTC will set if DEPLOYMENT LOOP RESISTANCE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- PASSENGER FRONTAL HIGH voltage is less than 2 volts and deployment loop resistance is less than 6 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when:

- DEPLOYMENT LOOP VOLTAGE test determines PASSENGER HIGH terminal No. A3 is less than or equal to 6 volts for 500 milliseconds.
- Current DTC also will clear if DEPLOYMENT LOOP RESISTANCE test determines PASSENGER FRONTAL HIGH terminal No. A3 is less than 2.4 volts AND passenger frontal deployment loop resistance is less than 6 ohms for 500 milliseconds.
- History DTC may be cleared by once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short to voltage or ground in passenger-side air bag module circuit. Inspect circuits 1403 and 1404 carefully for cutting or chafing. If wiring pigtail of passenger-side air bag module is damaged, component must be replaced.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic

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System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .

2. Turn ignition off. Disconnect passenger-side air bag Yellow 2-pin connector located behind glove box. See **Fig. 3** . If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 4 .
3. Replace passenger-side air bag Yellow 2-pin connector. Go to step 16 .
4. Reconnect passenger-side air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0018 is retrieved, go to next step. If DTC B0018 is not retrieved, see DIAGNOSTIC AIDS.
5. Turn ignition off. Disconnect passenger-side air bag Yellow 2-pin connector located behind glove box. See **Fig. 3** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connectors. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0018 is retrieved, go to step 7 . If DTC B0018 is not retrieved, go to next step.
6. Turn ignition off. Replace passenger-side air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 16 .
7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connectors. Disconnect SDM harness connector. Using Digital Multimeter (J-39200), measure resistance between ground and SDM harness connector terminal no. A3. See **Fig. 16** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 9 .
8. Repair short to ground in circuit 1403. Go to step 16 .
9. Using Digital Multimeter (J-39200), measure resistance between ground and SDM harness connector terminal No. A8. See **Fig. 20** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 11 .
10. Repair short to ground in circuit 1404. Go to step 16 .
11. Turn ignition on. Measure voltage between ground and SDM connector terminal No. A3. See **Fig. 20** . If voltage is one volt or greater, go to next step. If voltage is less than one volt, go to step 13 .
12. Repair short to voltage in circuit 1403. Go to step 16 .
13. Measure voltage between ground and SDM connector terminal No. A8. See **Fig. 20** . If voltage is one volt or greater, go to next step. If voltage is less than one volt, go to step 15 .
14. Repair short to voltage in circuit 1404. Go to step 16 .
15. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
16. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0022 : DRIVER DEPLOYMENT LOOP RESISTANCE LOW

Circuit Description

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When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

DTC sets when driver deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE and DEPLOYMENT LOOP RESISTANCE tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not open.
- Deployment loop is not shorted to ground.
- Deployment loop resistance is less than 1.3 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when driver deployment loop resistance is at least 1.3 ohms or more for 500 milliseconds or CLEAR CODES command is issued via scan tool. History DTC will clear once 255 malfunction-free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short between circuits 347 and 348, or a malfunctioning shorting bar on driver-side air bag connector or SIR coil connector.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect driver-side air bag Yellow 2-pin connector located at base of steering column. See **Fig. 2** . If harness connector is damaged or corroded, go to next

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step. If harness connector is okay, go to step 4 .

3. Replace driver-side air bag Yellow 2-pin connector. Go to step 12 .
4. Reconnect driver-side air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0022 is retrieved, go to next step. If DTC B0022 is not retrieved, go to step 3 .
5. Turn ignition off. Disconnect passenger-side air bag Yellow 2-pin connector located behind glove box. See **Fig. 3** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connectors. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0022 is retrieved, go to step 9 . If DTC B0022 is not retrieved, go to next step.
6. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connectors. Reconnect driver-side air bag Yellow 2-pin connector. Connect SIR Driver/Passenger Load Tool (J-38715-A) to SIR coil-to-air bag module connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0022 is retrieved, go to step 8 . If DTC B0022 is not retrieved, go to next step.
7. Turn ignition off. Replace driver-side air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 12 .
8. Turn ignition off. Replace SIR coil. See **SIR COIL ASSEMBLY** under REMOVAL & INSTALLATION. Go to step 12 .
9. Turn ignition off. Disconnect SDM connector. See **Fig. 12** . Disconnect SIR Driver/Passenger Load Tool. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminals No. A6 and A7. See **Fig. 16** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 11 .
10. Repair short between circuits 347 and 348. Go to step 12 .
11. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
12. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0024 : DRIVER DEPLOYMENT LOOP VOLTAGE OUT OF RANGE

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

DTC will set when voltage at driver frontal high terminal No. A6 is greater than 6 volts for 500 milliseconds or voltage at driver frontal high terminal No. A6 is less than 2.4 volts AND

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deployment loop resistance is less than 6 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when DEPLOYMENT LOOP VOLTAGE test determines voltage at DRIVER FRONTAL HIGH terminal No. A6 is less than 6 volts for 500 milliseconds, or when voltage at DRIVER FRONTAL HIGH terminal No. A6 is greater than or equal to 2.4 volts AND DRIVER FRONTAL DEPLOYMENT LOOP RESISTANCE is less than 6 ohms for 500 milliseconds or when CLEAR CODES command is issued via scan tool. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short to ground in driver-side air bag module circuit. Inspect circuits 347 and 348 carefully for cutting or chafing. SIR coil pigtail damage requires replacement of SIR coil.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect driver-side air bag Yellow 2-pin connector located at base of steering column. See **Fig. 2** . If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 4 .
3. Replace driver-side air bag Yellow 2-pin connector. Go to step 18 .
4. Reconnect driver-side air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0024 is retrieved, go to next step. If DTC B0024 is not retrieved, see DIAGNOSTIC AIDS.
5. Turn ignition off. Disconnect driver-side air bag Yellow 2-pin connector located behind glove box. See **Fig. 2** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0024 is retrieved, go to step 9 . If DTC B0024 is not retrieved, go to next step.
6. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connectors. Reconnect driver-side air bag Yellow 2-pin connector. Connect SIR Driver/Passenger Load Tool (J-38715-A) to SIR coil-to-air bag module connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0024 is retrieved, go to step 8 . If DTC B0024 is not retrieved, go to next step.

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7. Turn ignition off. Replace driver-side air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 18 .
8. Turn ignition off. Replace SIR coil. See **SIR COIL ASSEMBLY** under REMOVAL & INSTALLATION. Go to step 18 .
9. Turn ignition off. Disconnect SDM connector. Disconnect SIR Driver/Passenger Load Tool. Using Digital Multimeter (J-39200), measure resistance between ground and SDM harness connector terminal No. A6. See **Fig. 16** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 11 .
10. Repair short to ground in circuit 347. Go to step 18 .
11. Using Digital Multimeter (J-39200), measure resistance between ground and SDM harness connector terminal No. A7. See **Fig. 16** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 13 .
12. Repair short to ground in circuit 348. Go to step 18 .
13. Turn ignition on. Measure voltage between ground and SDM connector terminal No. A6. See **Fig. 16** . If voltage is one volt or less, go to next step. If voltage is less than one volt, go to step 15 .
14. Repair short to voltage in circuit 347. Go to step 18 .
15. Measure voltage between ground and SDM connector terminal No. A7. See **Fig. 16** . If voltage is one volt or greater, go to next step. If voltage is less than one volt, go to step 17 .
16. Repair short to voltage in circuit 348. Go to step 18 .
17. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
18. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0026 : DRIVER DEPLOYMENT LOOP OPEN

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

DTC sets when driver deployment loop and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE test is within the following ranges:

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- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- DRIVER FRONTAL HIGH voltage is less than 2.4 volts.
- Deployment loop resistance is at least 6 ohms for 500 milliseconds.

DTC will set if DEPLOYMENT LOOP RESISTANCE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not shorted to ground.
- Deployment loop resistance is greater than 4.8 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when voltage at DRIVER HIGH terminal No. A6 is more than 2 volts and driver frontal deployment loop resistance is less than 6 ohms for 500 milliseconds. or when DEPLOYMENT LOOP RESISTANCE test is 4.8 ohms or less for 500 milliseconds or when CLEAR CODES command is issued via scan tool. History DTC will be cleared once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a poor connection at driver-side air bag connector terminals "A" or "B", SDM terminals No. A6 or A7, or an open in circuits 347 or 348.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Disconnect driver-side air bag Yellow 2-pin connector located at base of steering column. See **Fig. 2** . Check for proper connection driver-side air bag Yellow 2-pin connector. If terminals are damaged or corroded, go to next step. If terminals are okay, go to step 4 .
3. Replace driver-side air bag harness Yellow 2-pin connector. Go to step 16 .
4. Reconnect driver-side air bag Yellow 2-pin connector. Ensure CPA clip is installed

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correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0026 is retrieved, go to next step. If DTC B0026 is not retrieved, see DIAGNOSTIC AIDS.

5. Turn ignition off. Disconnect driver-side air bag Yellow 2-pin connectors located at base of steering column. See **Fig. 2** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0026 is retrieved, go to step 9 . If DTC B0026 is not retrieved, go to next step.
6. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connector. Reconnect driver-side air bag Yellow 2-pin connector. Connect SIR Driver/Passenger Load Tool (J-38715-A) to SIR coil-to-air bag module connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0024 is retrieved, go to step 8 . If DTC B0024 is not retrieved, go to next step.
7. Turn ignition off. Replace driver-side air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 16 .
8. Turn ignition off. Replace SIR coil. See **SIR COIL ASSEMBLY** under REMOVAL & INSTALLATION. Go to step 16 .
9. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connector. Disconnect SDM harness connector. Inspect for proper connection at SDM harness connector terminals No. A6 and A7. See **Fig. 16** . If terminals are damaged or corroded, go to next step. If terminals are okay, go to step 11 .
10. Replace SDM harness connector. Go to step 16 .
11. Using Digital Multimeter (J-39200), measure resistance between driver-side harness connector terminal "A" and SDM connector terminal No. A6. See **Fig. 16** & **Fig. 18** . If resistance is 0-0.5 ohms, go to step 13 . If resistance is greater than 0.5 ohms, go to next step.
12. Repair open or high resistance in circuit 347. Go to step 16 .
13. Measure resistance between driver-side harness connector terminal "B" and SDM connector terminal No. A7. See **Fig. 16** & **Fig. 18** . If resistance is 0-0.5 ohms, go to step 15 . If resistance is greater than 0.5 ohms, go to next step.
14. Repair open or high resistance in circuit 348. Go to step 16 .
15. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
16. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0028 : PASSENGER-SIDE FRONT SEAT DEPLOYMENT LOOP RESISTANCE LOW

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to

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voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

DTC sets when passenger-side front seat deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE and DEPLOYMENT LOOP RESISTANCE tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not open.
- Deployment loop is not shorted to ground.
- Deployment loop resistance is at least 1.3 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when ignition switch is cycled and resistance in deployment loop is greater than 1.3 ohms for 500 milliseconds or a CLEAR CODES command is issued via scan tool. History DTC clears when 255 malfunction-free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short between circuits 2103 and 2104, or a malfunctioning shorting bar on passenger-side front seat air bag connector.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect passenger-side front seat air bag Yellow 2-pin connector located under front passenger seat. See **Fig. 4** . If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 4 .
3. Replace passenger-side front seat air bag Yellow 2-pin connector. Go to step 10 .
4. Reconnect passenger-side front seat air bag Yellow 2-pin connector. Ensure CPA clip is

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installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0028 is retrieved, go to next step. If DTC B0028 is not retrieved, go to step 3 .

5. Turn ignition off. Disconnect passenger-side front seat air bag Yellow 2-pin connector located under front passenger seat. See **Fig. 4** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connectors. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0028 is retrieved, go to step 7 . If DTC B0028 is not retrieved, go to next step.
6. Turn ignition off. Replace passenger-side front seat air bag module. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 10 .
7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connectors. Disconnect SDM harness connector. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminals No. B3 and B4. See **Fig. 16** . If resistance not is infinite, go to next step. If resistance is infinite, go to step 9 .
8. Repair short between circuit 2103 and circuit 2104. Go to step 10 .
9. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
10. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0029 : PASSENGER-SIDE FRONT SEAT DEPLOYMENT LOOP OPEN

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

DTC sets when passenger-side front seat deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- RF SIDE HIGH voltage is less than 2.4 volts.
- Deployment loop resistance is at least 6 ohms for 500 milliseconds.

DTC will set if DEPLOYMENT LOOP RESISTANCE test is within the following ranges:

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- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not shorted to ground.
- Deployment loop resistance is greater than 4.8 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when voltage at RF SIDE HIGH terminal No. B4 is more than 2.4 volts for 500 milliseconds. DTC will also clear if DEPLOYMENT LOOP RESISTANCE test is more than 4.8 ohms for 500 milliseconds. A CLEAR CODES command issued via scan tool will also clear code. History DTCs will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a poor connection at passenger-side front seat air bag connector terminals "A" or "B", SDM terminals No. B3 or B4, or an open in circuits 2103 or 2104.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Disconnect passenger-side front seat air bag Yellow 2-pin connector located under front passenger seat. See **Fig. 4** . Check for proper connection at terminals "A" and "B" on harness side of passenger-side front seat air bag Yellow 2-pin connector. See **Fig. 19** . If terminals are damaged or corroded, go to next step. If terminals are okay, go to step 4 .
3. Replace passenger-side front seat air bag harness Yellow 2-pin connector. Go to step 14 .
4. Reconnect passenger-side front seat air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0029 is retrieved, go to next step. If DTC B0029 is not retrieved, go to DIAGNOSTIC AIDS.
5. Turn ignition off. Disconnect passenger-side front seat air bag Yellow 2-pin connector under front passenger seat. See **Fig. 4** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connectors. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0029 is retrieved, go to step 7 . If DTC B0029 is not retrieved, go to next step.

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6. Turn ignition off. Replace passenger-side front seat air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 14 .
7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connector. Disconnect SDM harness connector. Inspect for proper connection at SDM harness connector terminals No. B3 and B4. See **Fig. 20** . If terminals are damaged or corroded, go to next step. If terminals are okay, go to step 9 .
8. Replace SDM harness connector. Go to step 14 .
9. Using Digital Multimeter (J-39200), measure resistance between passenger-side front seat harness connector terminal "A" and SDM connector terminal No. B4. See **Fig. 16** & **Fig. 19** . If resistance is 0-0.5 ohms, go to step 11 . If resistance is greater than 0.5 ohms, go to next step.
10. Repair open or high resistance in circuit 2103. Go to step 14 .
11. Measure resistance between passenger-side front seat harness connector terminal "B" and SDM connector terminal No. B3. See **Fig. 16** & **Fig. 19** . If resistance is 0-0.5 ohms, go to step 13 . If resistance is greater than 0.5 ohms, go to next step.
12. Repair open or high resistance in circuit 2104. Go to step 14 .
13. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
14. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0030 : PASSENGER-SIDE FRONT SEAT DEPLOYMENT LOOP VOLTAGE OUT OF RANGE

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

DTC sets when passenger deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- RF SIDE HIGH voltage is greater than 6 volts for 500 milliseconds.

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DTC will set if DEPLOYMENT LOOP RESISTANCE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- RF SIDE HIGH voltage is less than 2.4 volts and deployment loop resistance is less than 6 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when DEPLOYMENT LOOP VOLTAGE test determines RF SIDE HIGH terminal No. B4 is equal to or less than 6 volts for 500 milliseconds. Current DTC also will clear if DEPLOYMENT LOOP RESISTANCE test determines RF SIDE HIGH terminal No. B4 is greater than or equal to 2.4 volts AND passenger-side front seat deployment loop resistance is less than 6 ohms for 500 milliseconds. Issuing a CLEAR CODES command via scan tool will also clear code. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short to voltage or ground in passenger-side front seat air bag module circuit. Inspect circuits 2103 and 2104 carefully for cutting or chafing. If wiring harness or pigtail of passenger-side front seat air bag module is damaged, components must be replaced.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect passenger-side front seat air bag Yellow 2-pin connector located under front passenger seat. See **Fig. 4** . If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 4 .
3. Replace passenger-side front seat air bag Yellow 2-pin connector. Go to step 16 .
4. Reconnect passenger-side front seat air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0030 is retrieved, go to next step. If DTC B0030 is not retrieved, go to DIAGNOSTIC AIDS.

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5. Turn ignition off. Disconnect passenger-side front seat air bag Yellow 2-pin connector located under front passenger seat. See **Fig. 4** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0030 is retrieved, go to step 7 . If DTC B0030 is not retrieved, go to next step.
6. Turn ignition off. Replace passenger-side front seat air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 16 .
7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connector. Disconnect SDM harness connector. Using Digital Multimeter (J-39200), measure resistance between ground and SDM harness connector terminal No. B4. See **Fig. 16** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 9 .
8. Repair short to ground in circuit 2103. Go to step 16 .
9. Using Digital Multimeter (J-39200), measure resistance between ground and SDM harness connector terminal No. B3. See **Fig. 16** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 11 .
10. Repair short to ground in circuit 2104. Go to step 16 .
11. Turn ignition on. Measure voltage between ground and SDM connector terminal No. B4. See **Fig. 16** . If voltage is one volt or greater, go to next step. If voltage is less than one volt, go to step 13 .
12. Repair short to voltage in circuit 2103. Go to step 16 .
13. Measure voltage between ground and SDM connector terminal No. B3. See **Fig. 16** . If voltage is one volt or greater, go to next step. If voltage is less than one volt, go to step 15 .
14. Repair short to voltage in circuit 2104. Go to step 16 .
15. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
16. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0040 : DRIVER-SIDE FRONT SEAT DEPLOYMENT LOOP RESISTANCE LOW

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

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DTC sets when driver-side front seat deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE and DEPLOYMENT LOOP RESISTANCE tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not open.
- Deployment loop is not shorted to ground.
- Deployment loop resistance is at least 1.3 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when ignition switch is cycled and resistance is equal to or greater than 1.3 ohms for 500 milliseconds or when a CLEAR CODES command is issued via scan tool. History DTC clears when 255 malfunction-free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short between circuits 2105 and 2106, or a malfunctioning shorting bar on driver-side front seat air bag connector.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect driver-side front seat air bag Yellow 2-pin connector located under driver seat. See **Fig. 4** . If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 4 .
3. Replace driver-side front seat air bag Yellow 2-pin connector. Go to step 10 .
4. Reconnect driver-side front seat air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0040 is retrieved, go to next step. If DTC B0040 is not retrieved, go to DIAGNOSTIC AIDS.
5. Turn ignition off. Disconnect driver-side front seat air bag Yellow 2-pin connector

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located under driver seat. See **Fig. 4** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0040 is retrieved, go to step 7 . If DTC B0040 is not retrieved, go to next step.

6. Turn ignition off. Replace driver-side front seat air bag module. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 10 .
7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connector. Disconnect SDM harness connector. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminals No. B1 and B2. See **Fig. 16** . If resistance is infinite, go to next step. If resistance is not infinite, go to step 9 .
8. Repair short between circuit 2105 and circuit 2106. Go to step 10 .
9. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
10. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0041 : DRIVER-SIDE FRONT SEAT DEPLOYMENT LOOP OPEN

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

DTC sets when driver-side front seat deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- LF SIDE HIGH voltage is less than 2.4 volts.
- Deployment loop resistance is at least 6 ohms for 500 milliseconds.

DTC will set if DEPLOYMENT LOOP RESISTANCE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not shorted to ground.

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- Deployment loop resistance is greater than 4.8 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when voltage at LF SIDE HIGH terminal No. B1 is more than 2.4 volts AND driver-side front seat deployment loop resistance is less than 6 ohms for 500 milliseconds. Current DTC also will clear if DEPLOYMENT LOOP RESISTANCE test is 4.8 ohms or less for 500 milliseconds. Issuing a CLEAR CODES command via scan tool will also clear code. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a poor connection at driver-side front seat air bag connector terminals "A" or "B", SDM terminals No. B1 or B2, or an open in circuits 2105 or 2106.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Disconnect driver-side front seat air bag Yellow 2-pin connectors located under driver seat. See **Fig. 4** . Check for proper connection at terminals "A" and "B" on harness side of driver-side front seat air bag Yellow 2-pin connector. See **Fig. 19** . If terminals are damaged or corroded, go to next step. If terminals are okay, go to step 4 .
3. Replace driver-side front seat air bag harness Yellow 2-pin connector. Go to step 14 .
4. Reconnect driver-side front seat air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0041 is retrieved, go to next step. If DTC B0041 is not retrieved, go to DIAGNOSTIC AIDS.
5. Turn ignition off. Disconnect driver-side front seat air bag Yellow 2-pin connector under driver seat. See **Fig. 4** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connector. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0041 is retrieved, go to step 7 . If DTC B0041 is not retrieved, go to next step.
6. Turn ignition off. Replace driver-side front seat air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 14 .

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7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connector. Disconnect SDM harness connector. Inspect for proper connection at SDM harness connector terminals No. B1 and B2. See **Fig. 16** . If terminals are damaged or corroded, go to next step. If terminals are okay, go to step 9 .
8. Replace SDM harness connector. Go to step 14 .
9. Using Digital Multimeter (J-39200), measure resistance between driver-side front seat harness connector terminal "A" and SDM connector terminal No. B1. See **Fig. 16** & **Fig. 19** . If resistance is 0-0.5 ohms, go to step 11 . If resistance is greater than 0.5 ohms, go to next step.
10. Repair open or high resistance in circuit 2105. Go to step 14 .
11. Measure resistance between driver-side front seat harness connector terminal "B" and SDM connector terminal No. B2. See **Fig. 16** & **Fig. 19** . If resistance is 0-0.5 ohms, go to step 13 . If resistance is greater than 0.5 ohms, go to next step.
12. Repair open or high resistance in circuit 2106. Go to step 14 .
13. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
14. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0045 : DRIVER-SIDE FRONT SEAT DEPLOYMENT LOOP VOLTAGE OUT OF RANGE RANGE

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. DEPLOYMENT LOOP VOLTAGE test is performed to ensure voltage is within normal range. If voltage test does not detect out of range condition (due to short to voltage), SDM then performs DEPLOYMENT LOOP RESISTANCE test. Resistance test will not be performed if voltage test detects out of range, due to short to voltage.

Conditions For Setting DTC

DTC sets when driver-side front seat deployment loop voltage and resistance tests are not within specified ranges.

DTC will set if DEPLOYMENT LOOP VOLTAGE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- LF SIDE HIGH voltage is greater than 6 volts for 500 milliseconds.

DTC will set if DEPLOYMENT LOOP RESISTANCE test is within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.

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- Deployment loop is not shorted to voltage.
- LF SIDE HIGH voltage is less than 2.4 volts and deployment loop resistance is less than 6 ohms for 500 milliseconds.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Current DTC clears when DEPLOYMENT LOOP VOLTAGE test determines LF SIDE HIGH terminal No. B2 is 6 volts or less for 500 milliseconds. Current DTC also will clear if DEPLOYMENT LOOP RESISTANCE test determines LF SIDE HIGH terminal No. B2 is less than 2.4 volts AND driver-side front seat deployment loop resistance is less than 6 ohms for 500 milliseconds. Issuing a CLEAR CODES command via scan tool will also clear codes. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short to voltage or ground in driver-side front seat air bag module circuit. Inspect circuits 2105 and 2106 carefully for cutting or chafing. If wire harness or pigtail of driver-side front seat air bag module are damaged, components must be replaced.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect driver-side front seat air bag Yellow 2-pin connector located under driver seat. See **Fig. 4** . If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 4 .
3. Replace driver-side front seat air bag Yellow 2-pin connector. Go to step 16 .
4. Reconnect driver-side front seat air bag Yellow 2-pin connector. Ensure CPA clip is installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0045 is retrieved, go to next step. If DTC B0045 is not retrieved, go to DIAGNOSTIC AIDS.
5. Turn ignition off. Disconnect driver-side front seat air bag Yellow 2-pin connector located under driver seat. See **Fig. 4** . Install SIR Driver/Passenger Load Tool (J-38715-A) to harness connectors. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0045 is retrieved, go to step 7 . If DTC B0045 is not retrieved, go to next step.

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6. Turn ignition off. Replace driver-side front seat air bag. See **AIR BAG MODULES** under REMOVAL & INSTALLATION. Go to step 16 .
7. Turn ignition off. Remove SIR Driver/Passenger Load Tool (J-38715-A) from harness connectors. Disconnect SDM harness connector. See **Fig. 12** . Using Digital Multimeter (J-39200), measure resistance between ground and SDM harness connector terminal No. B1. See **Fig. 16** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 9 .
8. Repair short to ground in circuit 2105. Go to step 16 .
9. Using Digital Multimeter (J-39200), measure resistance between ground and SDM harness connector terminal No. B2. See **Fig. 16** . If resistance is not infinite, go to next step. If resistance is infinite, go to step 11 .
10. Repair short to ground in circuit 2106. Go to step 16 .
11. Turn ignition on. Measure voltage between ground and SDM connector terminal No. B1. See **Fig. 16** . If voltage is one volt or greater, go to step 13 . If voltage is less than one volt, go to next step.
12. Repair short to voltage in circuit 2105. Go to step 16 .
13. Measure voltage between ground and SDM connector terminal No. B2. See **Fig. 16** . If voltage is one volt or greater, go to step 15 . If voltage is less than one volt, go to next step.
14. Repair short to voltage in circuit 2106. Go to step 16 .
15. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
16. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0051 : DEPLOYMENT COMMANDED

Circuit Description

SDM contains a sensing device which converts vehicle velocity changes to an electrical signal. Electrical signal is processed by SDM and compared to a value stored in memory. When signal exceeds stored value, additional signal processing is performed and signals are compared to values stored in memory. When 2 signals exceed stored values, SDM causes current to flow through air bag modules, deploying air bags and causing DTC B0051 to set.

Conditions For Setting DTC

DTC sets when SDM detects a side impact or a frontal crash up to 30 degrees off centerline of vehicle, of sufficient force to warrant deployment of air bags.

Action Taken

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SDM sets DTC, turns on AIR BAG warning light, and records crash data.

Conditions For Clearing DTC

DTC B0051 is a latched coed and cannot be cleared. Replace SDM after diagnosis and repair of all other DTCs has been completed.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. If air bags have deployed, go to step 5 . If air bags have not deployed, go to next step.
3. Inspect front of vehicle and undercarriage for signs of impact. If impact has occurred, go to step 5 . If no impact has occurred, go to next step.
4. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION. Go to step 6 .
5. Replace components and perform inspections as required following an accident. See **POST-COLLISION INSPECTION** .
6. Reconnect all SIR components. Ensure that all components are properly mounted. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0053 : DEPLOYMENT COMMANDED WITH LOOP MALFUNCTION

Circuit Description

SDM contains a sensing device which converts vehicle velocity changes to an electrical signal. Electrical signal is processed by SDM and compared to a value stored in memory. When signal exceeds stored value, additional signal processing is performed and signals are compared to values stored in memory. When 2 signals exceed stored values, SDM will cause current to flow through air bag modules, deploying air bags. DTC B0053 will set along with B0051 when a deployment occurs while an inflator circuit fault exists that could result in a non-deployment situation in one or both air bag modules.

Conditions For Setting DTC

DTC sets when SDM detects a side impact condition or a frontal crash up to 30 degrees off centerline of vehicle, of sufficient force to warrant deployment of air bags.

Action Taken

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SDM sets DTC B0053 and B0051, turns on AIR BAG warning light, and records crash data.

Conditions For Clearing DTC

DTC B0053 is a latched code and cannot be cleared. Replace SDM after diagnosing and repairing all DTCs.

Diagnostic Aids

DTC B0053 will be accompanied by another DTC (other than DTC B1000). Repair malfunction causing other DTCs before installing new SDM.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. If air bags have deployed, go to step 5 . If air bags have not deployed, go to next step.
3. Inspect front of vehicle and undercarriage for signs of impact. If impact has occurred, go to step 5 . If no impact has occurred, go to next step.
4. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION. Go to step 6 .
5. Replace components and perform inspections as required following an accident. See **POST-COLLISION INSPECTION** .
6. Reconnect all SIR components. Ensure that all components are properly mounted. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0077 : DRIVER-SIDE SIS CIRCUIT MALFUNCTION

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. SDM provides input power to SIS. SIS performs internal diagnostics, then sends an ID message to SDM. SDM receives ID message within 5 seconds of power being turned on and determines if message is valid. SIS continually communicates a status message to SDM. SDM can reset SIS by removing and reapplying power to SIS.

Conditions For Setting DTC

DTC sets when driver-side SIS deployment loop tests are not within specified ranges.

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DTC will set if LF SIS LOOP tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not shorted to ground.
- No valid ID message is received within 5 seconds of power up.
- Status message not received.
- SDM failed twice to reset SIS.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

DTC will be cleared when SDM detects correct operation, the SIS sends a valid ID message to SDM or a CLEAR CODES command is issued via scan tool. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short to voltage or ground in driver-side SIS circuit. Inspect circuits 2161 and 2162 carefully for cutting or chafing.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect SDM connectors. If harness connector is damaged or corroded, repair condition and go to next step. If harness connector is okay, go to step 14 .
3. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminals No. B5 and B6. See **Fig. 16** . If resistance is infinite, go to next step. If resistance is less than infinite, go to step 8 .
4. Turn ignition on. Measure voltage between SDM harness connector terminal No. B5 and ground. See **Fig. 20** . If voltage is greater than one volt, go to step 8 . If voltage is one volt or less, go to next step.
5. Using Digital Multimeter (J-39200), measure voltage between SDM harness connector terminal No. B6 and ground. See **Fig. 16** . If voltage is greater than one volt, go to step 8 . If voltage is one volt or less, go to next step.

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6. Turn ignition off. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminal No. B6 and ground. See **Fig. 20** . If resistance is infinite, go to next step. If resistance is less than infinite, go to step 8 .
7. Measure resistance between SDM harness connector terminal No. B5 and ground. See **Fig. 20** . If resistance is less than infinite, go to next step. If resistance is infinite, go to step 10 .
8. Disconnect driver-side SIS connector. See **SIDE IMPACT SENSOR (SIS)** under REMOVAL & INSTALLATION. If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 14 .
9. Repair short in circuits 2161 and 2162 as necessary. Go to step 14 .
10. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminal No. B5 and driver-side SIS connector terminal "B". See **Fig. 16** & **Fig. 20** . If resistance is one ohm or less, go to next step. If resistance is one ohm or greater, go to step 12 .
11. Measure resistance between SDM harness connector terminal No. B6 and driver-side SIS connector terminal "A". See **Fig. 16** & **Fig. 20** . If resistance is less than one ohm, go to step 13 . If resistance is one ohms or greater, go to next step.
12. Repair open or high resistance in circuit 2161 or 2162. Go to step 14 .
13. Replace driver-side SIS. See **SIDE IMPACT SENSOR (SIS)** under REMOVAL & INSTALLATION.Go to next step.
14. Reconnect all connectors. Ensure CPA clips are installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0077 is retrieved, go to next step. If DTC B0077 is not retrieved, system is functioning normally at this time.
15. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
16. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0078 : PASSENGER-SIDE SIS CIRCUIT MALFUNCTION

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. SDM provides input power to SIS. SIS performs internal diagnostics, then sends an ID message to SDM. SDM receives ID message within 5 seconds of power being turned on and determines if message is valid. SIS continually communicates a status message to SDM. SDM can reset SIS by removing and reapplying power to SIS.

Conditions For Setting DTC

DTC sets when passenger-side SIS deployment loop tests are not within specified ranges.

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DTC will set if RF SIS LOOP tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not shorted to ground.
- No valid ID message is received within 5 seconds of power up.
- Status message not received.
- SDM failed twice to reset SIS.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

SDM has detected correct operation, SIS sends a valid ID message to SDM or CLEAR CODES command is issued via scan tool. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

An intermittent condition is likely to be caused by a short to voltage or ground in passenger-side SIS circuit. Inspect circuits 2163 and 2164 carefully for cutting or chafing.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Disconnect SDM connectors. If harness connectors are damaged or corroded, repair condition and go to next step. If harness connector is okay, go to step 14 .
3. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminals No. B7 and B8. See **Fig. 16** . If resistance is infinite, go to step 8 . If resistance is less than infinite, go to next step.
4. Turn ignition on. Measure voltage between SDM harness connector terminal No. B7 and ground. See **Fig. 16** . If voltage is greater than one volt, go to step 8 . If voltage is one volt or less, go to next step.
5. Using Digital Multimeter (J-39200), measure voltage between SDM harness connector terminal No. B8 and ground. See **Fig. 16** . If voltage is greater than one volt, go to step 8 . If voltage is one volt or less, go to next step.

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6. Turn ignition off. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminal No. B7 and ground. See **Fig. 16** . If resistance is infinite, go to next step. If resistance is less than infinite, go to step 8 .
7. Measure resistance between SDM harness connector terminal No. B8 and ground. See **Fig. 16** . If resistance is less than infinite, go to next step. If resistance is infinite, go to step 10 .
8. Disconnect passenger-side SIS connector. See **SIDE IMPACT SENSOR (SIS)** under REMOVAL & INSTALLATION. If harness connector is damaged or corroded, go to next step. If harness connector is okay, go to step 14 .
9. Repair short or corrosion in circuits 2163 and 2164 as necessary. Go to step 14 .
10. Using Digital Multimeter (J-39200), measure resistance between SDM harness connector terminal No. B7 and passenger-side SIS connector terminal "A". See **Fig. 16** & **Fig. 20** . If resistance is less than one ohm, go to next step. If resistance is one ohm or greater, go to step 12 .
11. Measure resistance between SDM harness connector terminal No. B8 and passenger-side SIS connector terminal "B". See **Fig. 16** & **Fig. 20** . If resistance is less than one ohm, go to step 13 . If resistance is one ohm or greater, go to next step.
12. Repair open or high resistance in circuit 2163 or 2164. Go to step 14 .
13. Replace passenger-side SIS. See **SIDE IMPACT SENSOR (SIS)** under REMOVAL & INSTALLATION.Go to next step.
14. Reconnect all connectors. Ensure CPA clips are installed correctly. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0078 is retrieved, go to next step. If DTC B0078 is not retrieved, system is okay at this time.
15. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
16. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. See **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0079 : INCORRECT DRIVER-SIDE SIS INSTALLED

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. SDM provides input power to SIS. SIS performs internal diagnostics, then sends an ID message to SDM. SDM receives ID message within 5 seconds of power being turned on and determines if message is valid. SIS continually communicates a status message to SDM. SDM can reset SIS by removing and reapplying power to SIS.

Conditions For Setting DTC

DTC sets when driver-side SIS deployment loop tests are not within specified ranges.

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DTC will set if LF SIS LOOP tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not shorted to ground.
- No valid ID message is received.
- SDM failed to receive a valid ID message after resetting SIS twice.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

DTC is cleared when SIS sends a valid ID message to SDM. DTC can also be cleared by sending a CLEAR CODES command via scan tool. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

Ensure correct driver-side SIS has been installed.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Install scan tool to DLC. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0079 is retrieved, go to next step. If DTC B0079 is not retrieved, system is okay at this time. Go to step 4 .
3. Replace driver-side SIS. See **SIDE IMPACT SENSOR (SIS)** under REMOVAL & INSTALLATION.Go to next step.
4. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0080 : DISCARD DRIVER-SIDE SIS

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. SDM provides input power to SIS. SIS performs internal diagnostics, then sends an ID message to SDM. SDM receives ID message within 5 seconds of power

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being turned on and determines if message is valid. SIS continually communicates a status message to SDM. SDM can reset SIS by removing and reapplying power to SIS.

Conditions For Setting DTC

DTC sets when driver-side SIS deployment loop tests are not within specified ranges.

DTC will set if LF SIS LOOP tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- SDM receives NOK (Not Okay) message from SIS. 1

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Replace driver-side SIS. Issue CLEAR CODES command via scan tool. History DTC will be cleared once 255 malfunction free ignition cycles have occurred.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Install scan tool to DLC. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0080 is retrieved, go to next step. If DTC B0080 is not retrieved, system is okay at this time. Go to step 4 .
3. Replace driver-side SIS. See **SIDE IMPACT SENSOR (SIS)** under REMOVAL & INSTALLATION.Go to next step.
4. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0081 : INCORRECT PASSENGER-SIDE SIS INSTALLED

Circuit Description

When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. SDM provides input power to SIS. SIS performs internal diagnostics, then sends an ID message to SDM. SDM receives ID message within 5 seconds of power being turned on and determines if message is valid. SIS continually communicates a status message to SDM. SDM can reset SIS by removing and reapplying power to SIS.

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Conditions For Setting DTC

DTC sets when passenger-side SIS deployment loop tests are not within specified ranges.

DTC will set if RF SIS LOOP tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- Deployment loop is not shorted to voltage.
- Deployment loop is not shorted to ground.
- No valid ID message is received.
- SDM failed to receive a valid ID message after resetting SIS twice.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

SIS sends a valid ID message to SDM. CLEAR CODES command is issued via scan tool. History DTC will clear once 255 malfunction free ignition cycles have occurred.

Diagnostic Aids

Ensure correct passenger-side SIS has been installed.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Install scan tool to DLC. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0081 is retrieved, go to next step. If DTC B0081 is not retrieved, system is okay at this time. Go to step 4 .
3. Replace passenger-side SIS. See **SIDE IMPACT SENSOR (SIS)** under REMOVAL & INSTALLATION.Go to next step.
4. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B0082 : DISCARD PASSENGER-SIDE SIS

Circuit Description

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When ignition switch is turned to RUN position, SDM performs tests to diagnose critical internal malfunctions. SDM provides input power to SIS. SIS performs internal diagnostics, then sends an ID message to SDM. SDM receives ID message within 5 seconds of power being turned on and determines if message is valid. SIS continually communicates a status message to SDM. SDM can reset SIS by removing and reapplying power to SIS.

Conditions For Setting DTC

DTC sets when passenger-side SIS deployment loop tests are not within specified ranges.

DTC will set if RF SIS LOOP tests are within the following ranges:

- IGNITION POSITIVE VOLTAGE is within normal operating range.
- SDM receives NOK (not okay) message from SIS.

Action Taken

SDM turns on AIR BAG warning light and sets DTC.

Conditions For Clearing DTC

Replace passenger-side SIS. Issue CLEAR CODES via scan tool. History DTC will clear once 255 malfunction free ignition cycles have occurred.

NOTE: For circuit number and wire color identification, See WIRING DIAGRAMS .

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Turn ignition off. Install scan tool to DLC. Turn ignition on. Using scan tool, check for SIR DTCs. If DTC B0082 is retrieved, go to next step. If DTC B0082 is not retrieved, system is okay at this time. Go to step 4 .
3. Replace passenger-side SIS. See **SIDE IMPACT SENSOR (SIS)** under REMOVAL & INSTALLATION.Go to next step.
4. Reconnect all SIR components. Ensure that all components are properly mounted. Clear all SIR DTCs. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC B1001 : OPTION CONFIGURATION ERROR

Circuit Description

When ignition is turned on, Dash Integration Module (DIM) sends identification information to SDM. DIM sends information containing the last 4 digits of the SDM part number and

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information containing a partial VIN. SDM compares this information to numbers stored in memory.

Conditions For Setting DTC

DTC sets when IGNITION POSITIVE voltage is within normal operating range and one or both messages received from DIM do not match SDM stored information.

Action Taken

SDM sets DTC, turns on AIR BAG warning light, and disables air bag deployment.

Conditions For Clearing DTC

DTC clears when information SDM receives from DIM matches stored information.

Diagnostic Aids

DTC 1001 may be an indication that an incorrect SDM has been installed.

Diagnostic Procedure

1. If SIR Diagnostic System Check has been performed, go to next step. If SIR Diagnostic System Check has not been performed, go to **SIR DIAGNOSTIC SYSTEM CHECK** .
2. Install scan tool to DLC. Using scan tool, check for SIR DTCs. If DTC B1001 is retrieved, go to next step. If DTC B1001 is not retrieved, system is okay at this time.
3. Turn ignition off. Replace SDM. See **SENSING & DIAGNOSTIC MODULE (SDM)** under REMOVAL & INSTALLATION.Go to next step.
4. Reconnect all SIR components. Ensure that all components are properly mounted. Go to **SIR DIAGNOSTIC SYSTEM CHECK** .

DTC U1000 : LOSS OF DATA COMMUNICATION

Circuit Description

When the ignition switch is in RUN position, all modules communicating on class 2 serial data line send a State of Health (SOH) message every 2 seconds to ensure that the system is operating properly.

Diagnostic Aids

Engine will not start if there is a total malfunction of the class 2 serial data line circuit.

DTC U1016 : LOSS OF PCM DATA COMMUNICATION

Circuit Description

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When the ignition switch is in RUN position, all modules communicating on class 2 serial data line send a State of Health (SOH) message every 2 seconds to ensure that the system is operating properly.

Diagnostic Aids

Engine will not start if there is a total malfunction of the class 2 serial data line circuit.

DTC U1040 : LOSS OF ABS DATA COMMUNICATION

Circuit Description

When the ignition switch is in RUN position, all modules communicating on class 2 serial data line send a State of Health (SOH) message every 2 seconds to ensure that the system is operating properly.

Diagnostic Aids

Engine will not start if there is a total malfunction of the class 2 serial data line circuit.

DTC U1064 : LOSS OF DIM DATA COMMUNICATION

Circuit Description

When the ignition switch is in RUN position, all modules communicating on class 2 serial data line send a State of Health (SOH) message every 2 seconds to ensure that the system is operating properly.

Diagnostic Aids

Engine will not start if there is a total malfunction of the class 2 serial data line circuit.

DTC U1096 : LOSS OF IPC DATA COMMUNICATION

Circuit Description

When the ignition switch is in RUN position, all modules communicating on class 2 serial data line send a State of Health (SOH) message every 2 seconds to ensure that the system is operating properly.

Diagnostic Aids

Engine will not start if there is a total malfunction of the class 2 serial data line circuit.

DTC U1300 : CLASS 2 SERIAL DATA LINE SHORT TO GROUND

Circuit Description

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When the ignition switch is in RUN position, all modules communicating on class 2 serial data line send a State of Health (SOH) message every 2 seconds to ensure that the system is operating properly.

Diagnostic Aids

Engine will not start if there is a total malfunction of the class 2 serial data line circuit.

DTC U1301 : CLASS 2 SERIAL DATA LINE SHORT TO VOLTAGE

Circuit Description

When the ignition switch is in RUN position, all modules communicating on class 2 serial data line send a State of Health (SOH) message every 2 seconds to ensure that the system is operating properly.

Diagnostic Aids

Engine will not start if there is a total malfunction of the class 2 serial data line circuit.

WIRE REPAIR

SIR system requires special wiring repair procedures due to sensitive nature of circuitry. Wire Repair Kit (J-38125-A) contains special sealed splices for use in repairing SIR wiring. Splices use a heat shrink sleeve with sealing adhesive to produce a sealed splice and a cross-hatched core crimp to produce a positive contact for low energy circuits.

Repair damaged SIR wire harness connectors and terminals (except pigtails) using connector repair assembly packs and splice crimping tool provided. Terminals in SIR system are manufactured from a special metal to provide necessary contact integrity for sensitive, low-energy circuits. These terminals are only available in connector repair assembly packs, and no other terminal should be substituted.

If individual terminals on SDM harness connector are damaged, SDM harness connector must be replaced using SDM harness connector pigtail assembly or SDM harness connector replacement kit. If individual terminals on any other SIR connector are damaged, entire connector must be replaced. Use appropriate connector repair assembly pack. Replace entire SIR wire harness, if necessary to maintain SIR circuit integrity.

DO NOT make wiring, connector or terminal repairs on components with wiring pigtails. If a wiring pigtail is damaged, entire component (including pigtail) should be replaced.

Any wiring other than a pigtail can be repaired by splicing in a new section of wire of same gauge. Sealed splices and crimping tool must be used for these splices. Open wire harness by removing tape as necessary, using a sewing seam ripper. Refer to instructions in kit for wiring

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repair procedure.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft-lbs N.m
Seat anchor bolt	22 (30)
Steering wheel nut	30 (41)
	Inch-lbs N.m
Instrument panel upper trim pad bolt	18 (2)
Passenger-side air bag module fasteners	80 (9)
Sensing & Diagnostic Module (SDM) fasteners	80 (9)
Side impact air bag module fasteners	80 (9)
Side Impact Sensor (SIS) fasteners	80 (9)

WIRING DIAGRAMS

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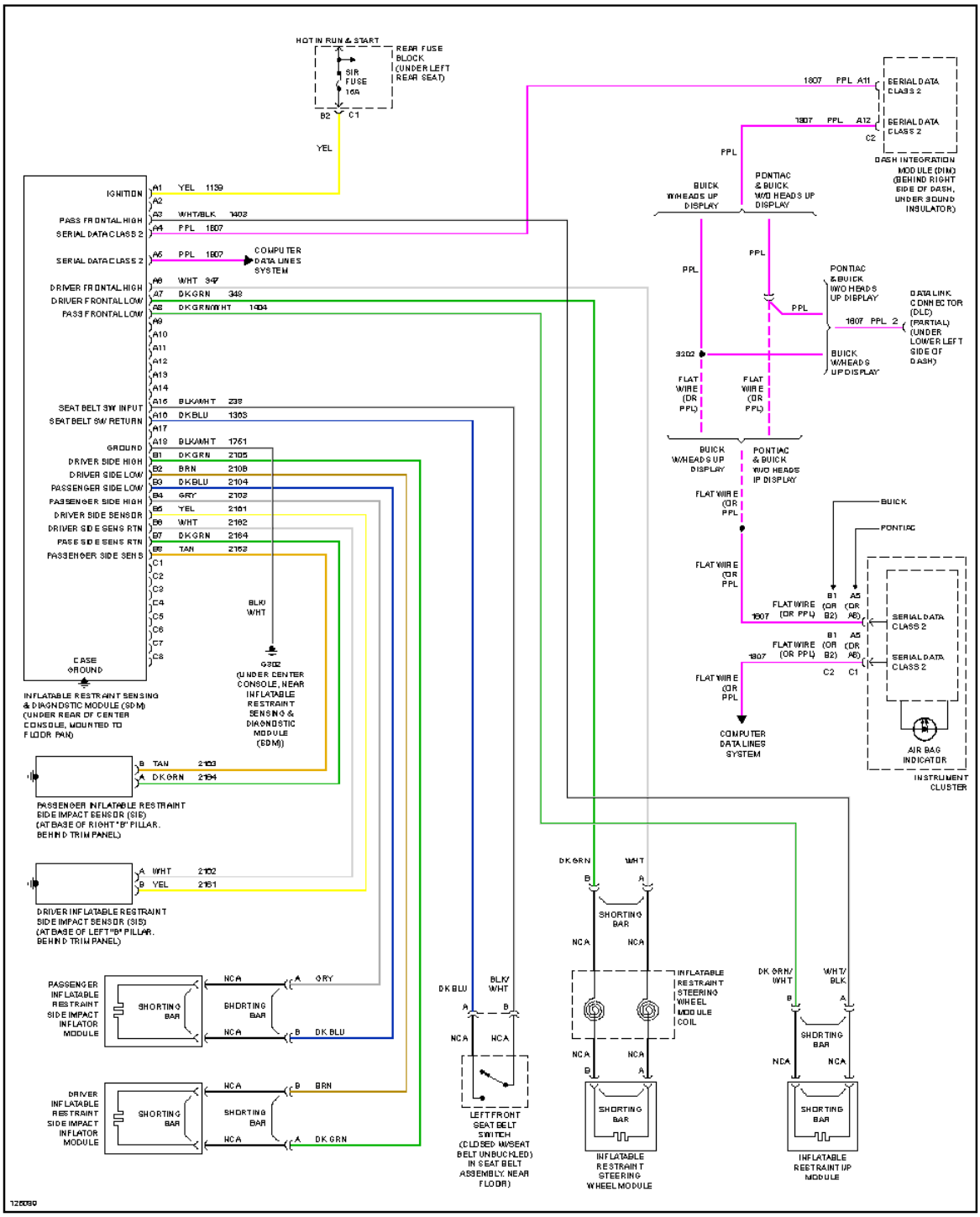


Fig. 21: SIR System Wiring Diagram (Bonneville & Le Sabre)
Courtesy of GENERAL

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2000 STARTING & CHARGING SYSTEMS

Generators & Regulators - Bonneville & LeSabre

DESCRIPTION & OPERATION

The AD230 and AD237 generators have high amperage output. The AD230 has an outside stator lamination diameter of 130 mm. The AD237 has an outside stator lamination diameter of 137 mm. Generators include a delta stator, rectifier bridge, and rotor with slip rings and brushes. A built-in regulator incorporates fault detection circuitry. A conventional pulley and dual internal fans are used to cool slip ring end frame, rectifier bridge and regulator.

The generator operates with 4 wire connections and a ground path through the mounting bracket. The first wire connection is the BAT (output) terminal. This terminal must be connected to the battery during operation. The second wire connection is connected from generator terminal "L" (connector terminal "B") internal regulator lamp driver to Powertrain Control Module (PCM). This circuit monitors and controls generator operation. The PCM controls indicator light function. The third wire connection is connected from generator terminal "F" (connector terminal "C") to PCM. The PCM also monitors this circuit. The fourth wire is connected from generator terminal "S" (connector terminal "D") to an external voltage reading. If this circuit is interrupted, regulator will default to internal voltage reading for control.

Regulated voltage varies with temperature. System limits voltage by controlling rotor field current while field current is on. Regulator switches rotor field current on and off at a fixed frequency of 400 cycles per second to help control radio noise. By varying overall on/off time, correct average field current for proper system voltage control is obtained. At high speeds, with lower electrical loads, on-time may be 10 percent. At low speeds, with higher electrical loads, on-time may be as much as 90 percent. See **GENERATOR OUTPUT RATING** table.

GENERATOR OUTPUT RATING

Option Code	Generator	Rated AMP Output
L36	AD230	105
L37	AD237	125

ADJUSTMENTS

BELT TENSION

NOTE: Drive belt tension is controlled by a belt tensioner. No adjustment is required.

TROUBLE SHOOTING

NOTE: For additional information, see TROUBLE SHOOTING article in GENERAL INFORMATION.

GENERATOR NOISE DIAGNOSIS

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Generator noise may be caused by a loose drive pulley, loose mounting bolts, worn or dirty bearings, defective diode, or defective stator. It is normal to hear a high frequency whine or magnetic noise at full output. An output test should be performed to distinguish bearing noise from a magnetic noise. See **CHARGING SYSTEM FUNCTIONAL TEST** .

A shorted bridge diode will reduce output by 1/3 of the rating and will have a growling noise when at high load. Listening to generator with a moderate load (engine cooling fans or headlights on) can also assist in determining if a bearing or magnetic noise is present.

ON-VEHICLE TESTING

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

NOTE: Before making electrical checks, visually inspect all terminals for clean, tight connections. Ensure all charging system related fuses are okay. Check generator mounting bolts and drive belt tension. Ensure battery is in good condition prior to testing charging system.

NOTE: Connector Test Adapter Kit (J 35616-A) must be used whenever a test procedure requires checking or probing terminal. Manufacturer recommends using CS Electronic Generator Tester (J41450-B) to test charging system. Follow instructions provided with tester. No additional testing available.

CHARGING SYSTEM FUNCTIONAL TEST

1. Start engine and observe charge indicator on Instrument Panel Cluster (IPC) or message in Driver Information Center (DIC). If charge indicator illuminates or DIC displays a charging system message, go to next step. If charge indicator does not illuminate or DIC does not display a charging system message, problem is probably intermittent.

   NOTE: Green POWER lamp of tester should remain illuminated while tester is being used.

2. Turn ignition off. Using CS Electronic Generator Tester (J41450-B), connect Red lead to generator output terminal and Black lead to metal generator housing. If Green POWER lamp is not on, go to next step. If Green power lamp is on, go to step 4 .
3. Using a DVOM, measure voltage between output terminal of generator and battery negative terminal. If battery voltage exists, go to step 10 . If battery voltage does not exist, go to step 9 .

CAUTION: Make sure load is completely turned off before connecting or disconnecting carbon pile load tester to battery.

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4. Connect carbon pile tester to battery. Connect inductive ammeter to output circuit of generator. Disconnect generator harness connector. Locate matching harness connector on CS Electronic Generator Tester (J41450-B) and connect it to generator. If Red DIAGNOSTIC lamp is on, go to next step. If Red DIAGNOSTIC lamp is off, go to step 11 .
5. Start engine and allow to idle for 30 seconds. Increase engine speed to 2500 RPM. If Red DIAGNOSTIC lamp is off, go to next step. If Red DIAGNOSTIC lamp is on, go to step 11 .
6. Maintain engine speed at 2500 RPM. Turn on load of carbon pile tester and increase load until load is equal to test value of generator (AD230 is 73 amps; AD237 is 87 amps). If Red DIAGNOSTIC lamp is not on, go to next step. If Red DIAGNOSTIC lamp is on, go to step 11 .
7. Maintain engine speed at 2500 RPM and continue to operate generator at load test value. Using a DVOM, measure voltage drop between generator output terminal and positive battery terminal. If voltage drop is less than 0.5 volt, go to next step. If voltage drop is more than 0.5 volt, go to step 9 .
8. Maintain engine speed at 2500 RPM and continue to operate generator at load test value. Using a DVOM, measure voltage drop between generator metal housing and negative battery terminal. If voltage drop is less than 0.5 volt, go to step 12 . If voltage drop is more than 0.5 volt, go to step 10 .
9. Repair high resistance or open in Black wire between generator output terminal and positive battery terminal. See **WIRING DIAGRAMS** . Go to step 12 .
10. Repair high resistance or open in ground circuit of generator. See **WIRING DIAGRAMS** . Go to step 12 .
11. Check generator connector for poor connections. If connector is good, replace generator. See **GENERATOR** under REMOVAL & INSTALLATION. Go to next step.
12. Retest system to verify repair.

CHARGE INDICATOR LIGHT ALWAYS ON

1. Connect scan tool. Start engine. Using scan tool, observe BATTERY VOLTAGE parameter in Instrument Panel Cluster (IPC) data list. If voltage is 10-15 volts, go to next step. If voltage is not 10-15 volts, see **CHARGING SYSTEM FUNCTIONAL TEST** .
2. Using scan tool, observe BATTERY SAVE ACTIVE parameter in Dash Integration Module (DIM). If scan tool indicates battery save function is not active, go to next step. If scan tool indicates battery save function is active, see **CHARGING SYSTEM FUNCTIONAL TEST** .
3. Replace IPC. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

CHARGE INDICATOR LIGHT INOPERATIVE

1. Connect scan tool. Start engine. Using scan tool, observe BATTERY VOLTAGE parameter in Instrument Panel Cluster (IPC) data list. If voltage is greater than 9.5 volts, go to next step. If voltage is less than 9.5 volts, see **CHARGING SYSTEM FUNCTIONAL TEST** .
2. Turn ignition off. Turn ignition on, engine off. If battery charge indicator light illuminates for 5 seconds during bulb check, system is good. If battery charge indicator light does not illuminate for 5 seconds during bulb check, go to next step.
3. Replace IPC. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

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SELF-DIAGNOSTIC SYSTEM

NOTE: Diagnostic trouble code tests are written specifically for use with GM Tech I or Tech II scan tools. Generic scan tool can be used but may have limited functions. This article only covers the portion of those systems which relates to charging system diagnosis. For further information, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

DIAGNOSTIC SYSTEM CHECK

1. Ensure battery condition, cold cranking amperage and reserve capacity meet specifications. Replace as necessary. Install scan tool. If scan tool powers up, go to next step. If scan tool does not power up, see SCAN TOOL DOES NOT POWER UP in BODY CONTROL MODULES - BONNEVILLE & LESABRE article in ACCESSORIES & EQUIPMENT.
2. Turn ignition on, engine off. Try to establish scan tool communication with each module on Class 2 serial data circuit. If communication with each module is established, go to next step. If communication with each module is not established, see SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE in BODY CONTROL MODULES - BONNEVILLE & LESABRE article in ACCESSORIES & EQUIPMENT.
3. Select display DTC function for each module. Record all displayed DTCs, status of displayed DTCs and module that set the DTC. If DTCs are displayed, go to next step. If no DTCs are displayed, see **ON-VEHICLE TESTING** .
4. Retrieve codes and perform appropriate test. See **DIAGNOSTIC TROUBLE CODE INDEX** table.

DIAGNOSTIC TROUBLE CODE INDEX

DTC (1) (2)	Description
B1000, B1004, B1007 or B1009	(3)
B1327	(3)
B1513	Charging System Volts Low
B1514	Charging System Volts High

(1) For any DTC beginning with the letter "U", see SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE in BODY CONTROL MODULES - BONNEVILLE & LESABRE article in ACCESSORIES & EQUIPMENT.

(2) For any DTC beginning with the letter "P", see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

(3) See DIAGNOSTIC TESTS in BODY CONTROL MODULES - BONNEVILLE & LESABRE article in ACCESSORIES & EQUIPMENT.

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CLEARING DIAGNOSTIC TROUBLE CODES

To clear DTCs, connect scan tool to Data Link Connector (DLC). Establish communication with Powertrain Control Module (PCM) and follow scan tool instructions.

DIAGNOSTIC TESTS

DTC B1513: CHARGING SYSTEM VOLTS LOW

Description

DTC sets when voltage falls below 10.5 volts for 30 seconds with engine running.

Testing

1. Connect scan tool. Start engine. Allow voltage to stabilize. Using scan tool, observe VOLTS parameter in Instrument Panel Cluster (IPC). If voltage is 10.5-16.2 volts, go to next step. If voltage is not 10.5-16.2 volts, see **CHARGING SYSTEM FUNCTIONAL TEST** under ON-VEHICLE TESTING.
2. Replace IPC. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. Go to next step.
3. Using scan tool, clear DTCs. See **CLEARING DIAGNOSTIC TROUBLE CODES** . Operate vehicle and recheck codes.

DTC B1514: CHARGING SYSTEM VOLTS HIGH

Description

DTC sets when voltage is greater than 16.2 volts for 30 seconds with engine running.

Testing

1. Connect scan tool. Start engine. Allow voltage to stabilize. Using scan tool, observe VOLTS parameter in Instrument Panel Cluster (IPC). If voltage is 10.5-16.2 volts, go to next step. If voltage is not 10.5-16.2 volts, see **CHARGING SYSTEM FUNCTIONAL TEST** under ON-VEHICLE TESTING.
2. Replace IPC. See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. Go to next step.
3. Using scan tool, clear DTCs. Operate vehicle and recheck codes.

BENCH TESTING

NOTE: Manufacturer recommends replacing generator assembly. Bench testing procedures are not provided.

REMOVAL & INSTALLATION

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WARNING: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

DASH INTEGRATION MODULE (DIM)

NOTE: Record personalization settings to transfer to new module. Program new DIM prior to installation. See BODY CONTROL MODULES - BONNEVILLE & LESABRE article in ACCESSORIES & EQUIPMENT.

Removal & Installation

Remove right sound insulator. Remove DIM from bracket by releasing tab behind module. Disconnect electrical connectors. To install, reverse removal procedure.

GENERATOR

Removal & Installation

Disconnect negative battery cable. Remove drive belt. Remove fuel injection sight shield. Remove generator brace. Remove nut retaining positive battery cable to generator BAT terminal. Disconnect generator electrical connector. Remove mounting bolts. Remove generator. To install, reverse removal procedure.

OVERHAUL

NOTE: All generators are serviced by replacement only.

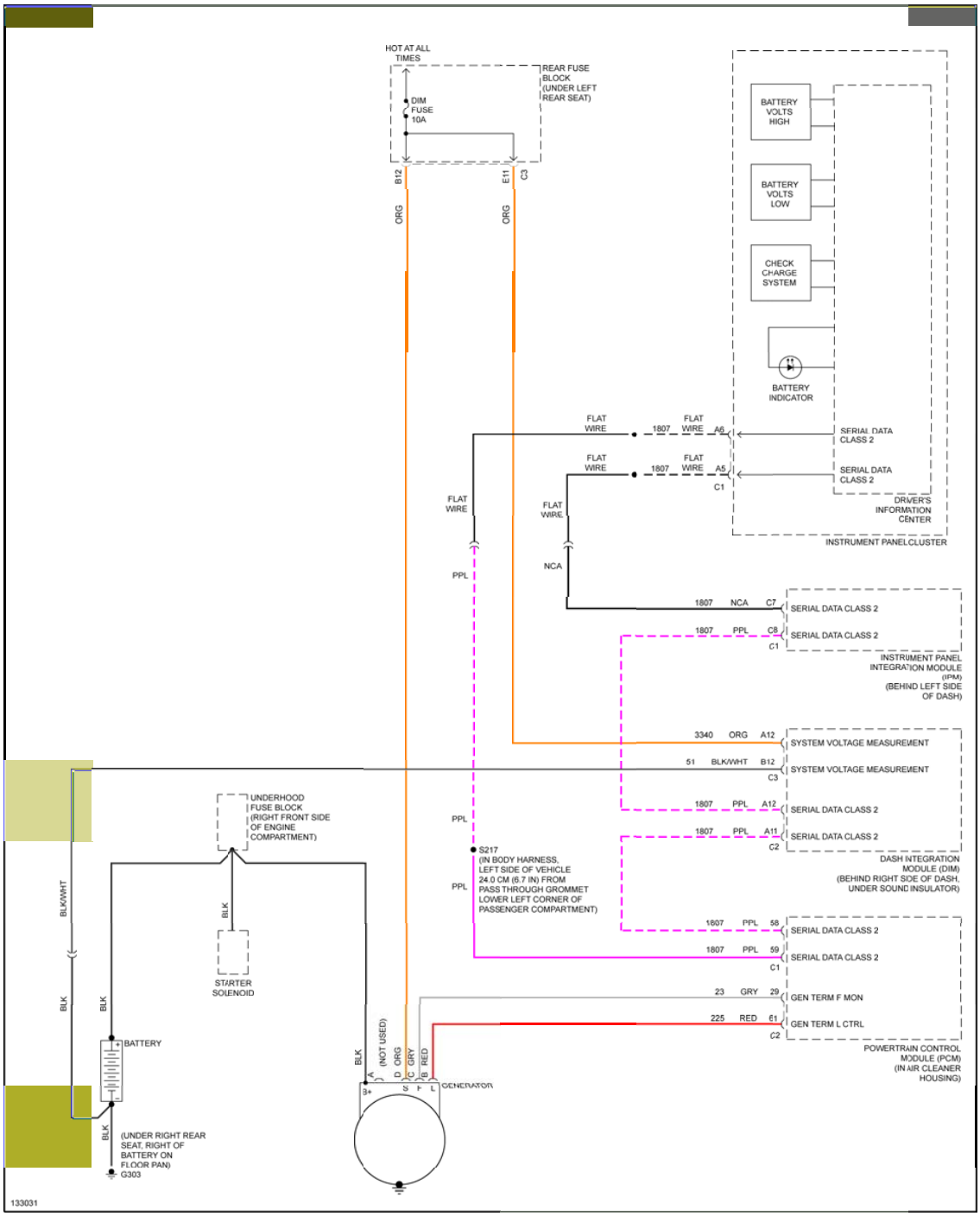
TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Mounting Bolt	37 (50)
Pencil Brace Bolt	19 (25)
Pencil Brace Nut	37 (50)

WIRING DIAGRAMS

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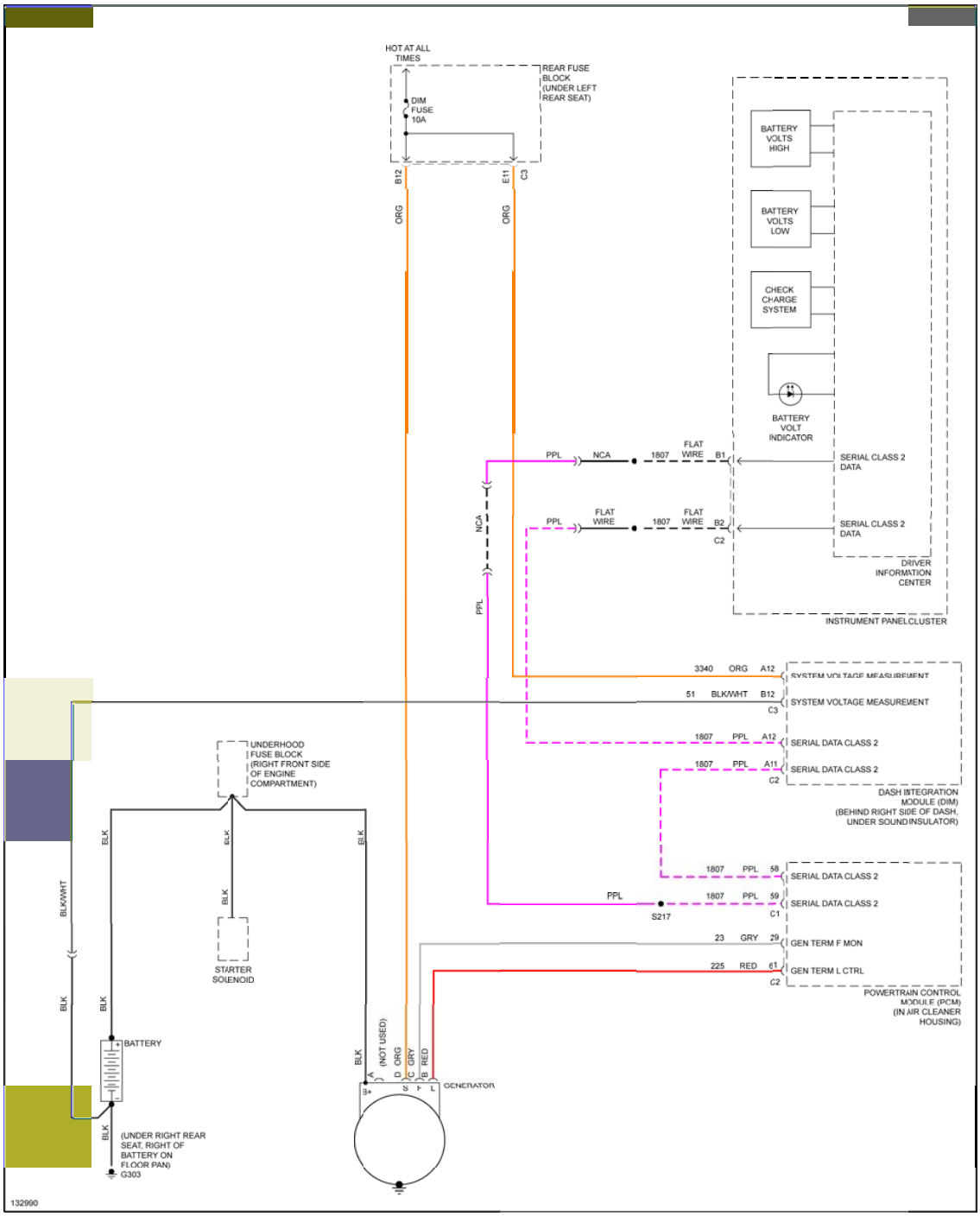


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Fig. 1: Charging System Wiring Diagram (Bonneville)

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Fig. 2: Charging System Wiring Diagram (LeSabre)

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2000 GENERAL INFORMATION

Computer Relearn Procedures - General Motors Corp.

INTRODUCTION

BODY CONTROLS

NOTE: The following information is for general information purposes only. For specific relearn procedures, if available, see RELEARN PROCEDURES .

Vehicles equipped with body, air conditioning, anti-lock brake or memory computers may require a computer relearn procedure after components are replaced or the vehicle battery is disconnected. Vehicle computers memorize and store vehicle information and operation selections. When the vehicle battery is disconnected, vehicle computer memory may be lost, requiring relearning or resetting. Depending on the vehicle and how it is equipped, the following secondary memories may exist:

- Air conditioning.
- Clock.
- Door key lock entry custom features.
- Mirror position.
- Power window or sun roof operation.
- Radio presets and anti-theft code.
- Remote keyless entry custom features.
- Seat position.
- Tilt/telescoping steering wheel position.

These do not affect primary vehicle systems. For secondary vehicle systems, see appropriate article for relearn procedures. Other computer relearn procedures are required for primary vehicle system operation. These may include:

- Initial control unit programming.
- Traction control yaw sensor initializing.
- Multiplex communication.
- Anti-theft system or engine immobilizer system passwords.

ENGINE CONTROLS

NOTE: The following information is for general information purposes

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only. For specific relearn procedures, if available, see RELEARN PROCEDURES .

Vehicles equipped with powertrain control computers may require a computer relearn procedure after the vehicle battery is disconnected. Vehicle computers memorize and store vehicle operation patterns for optimum driveability and performance. When the vehicle battery is disconnected, this memory is lost, which may result in a driveability problem. Depending on the vehicle and how it is equipped, the following driveability problems may exist:

- Rough or unstable idle.
- Hesitation or stumble.
- Rich or lean running.
- Poor fuel mileage.
- Harsh or poor transmission/transaxle shift quality.

Default data is used until NEW data from each key start is stored. As the computer restores its memory from each new key start, driveability is restored.

Driveability problems may occur during the computer relearn stage. To accelerate computer relearn process after battery removal and installation, specified computer relearn procedures should be performed. See appropriate procedures for specified manufacturer.

RELEARN PROCEDURES (CARS)

NOTE: Before performing Electronically Erasable Programmable Read Only Memory (EEPROM) programming procedure, check for any applicable Technical Service Bulletins (TSBs) that may apply to vehicle application. Body Control Module (BCM) must be programmed with proper Regular Production Option (RPO) configurations. Follow instructions on Techline Terminal and scan tool to program BCM.

ALERO, GRAND AM & MALIBU

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (2.4L)

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.

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- Diagnostic Trouble Code (DTC) P1336 exists.
- Crankshaft, crankshaft position sensor, engine or Powertrain Control Module (PCM) have been replaced.
- Any repairs have been performed that disturbs the crankshaft or vibration damper to the crankshaft position sensor relationship.

2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.
3. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Apply parking brake. Block front wheels. Ensure hood is closed.
4. Place transaxle in Park or Neutral. Ensure all accessories are off. Start engine and warm engine until engine coolant temperature is at least 185°F (85°C).
5. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate or cut out. Quickly release throttle to idle position once CKP sensor variation learn procedure is obtained and engine decelerates or cuts out. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate or cut out.

7. Using scan tool, verify that CKP sensor variation learn procedure was completed. If CKP sensor variation learn procedure was not completed, go to next step. If CKP sensor variation learn procedure was completed, shut engine off and remove scan tool.
8. If CKP sensor variation learn procedure was not completed, repeat entire procedure up to 10 times. If PCM will not learn the CKP sensor variation compensating values, a DTC P1336 should be stored in the PCM. Perform test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (Alero 3.4L & Grand Am 3.4L)

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.
   - If Diagnostic Trouble Code (DTC) P1336 exists.
   - If crankshaft, crankshaft position sensor, engine, Powertrain Control Module (PCM) or vibration damper have been replaced.

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2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.
3. Using scan tool, check for stored DTCs. If no DTCs exist, or if DTC P1336 exists, go to next step. If any DTCs exist except for P1336, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure all DTCs are cleared from PCM. Go to next step.
4. Ensure ignition is off. Apply parking brake. Block front wheels. Ensure hood is closed. Start engine and warm engine until engine coolant temperature is at least 158°F (70°C). Turn ignition off.

NOTE: Ensure engine coolant temperature is at least 158°F (70°C) before performing CKP sensor variation learn procedure.

5. Apply service brakes. Using scan tool, select and enable CKP sensor variation learn procedure. Follow instructions displayed on scan tool.
6. If CKP sensor variation learn procedure was not terminated, go to next step. If CKP sensor variation learn procedure was terminated, this may be caused by PCM detecting a problem in cam signal causing DTC P0341, 3X crank signal causing DTC P1374 3X, or 24X crank signal causing DTC P0336 24X. Using scan tool, check for stored DTCs. Perform test procedures for specified DTCs and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
7. Check scan tool for status of DTC P1336. If scan tool indicates DTC P1336 ran and passed, CKP sensor variation learn procedure is complete. If scan tool indicates DTC P1336 failed or was not run, check for any other DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If any other DTCs exist, perform test procedures for specified DTC and repair as necessary. If no other DTCs exist, repeat CKP sensor variation learn procedure.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (2.4L)

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM or PCM may be damaged. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
2. Once EEPROM is reprogrammed, the Crankshaft Position (CKP) sensor variation learn procedure must be performed. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (2.4L).

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (3.1L & 3.4L)

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be

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programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.

2. Ensure battery is fully charged. If battery is being charged, ensure battery charger is disconnected before performing EEPROM programming procedure.
3. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
4. Once EEPROM is reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check.

NOTE: If EEPROM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

Password Learn Procedure For Anti-Theft System (Malibu)

1. Password learn procedure must be performed if Body Function Controller (BFC) is replaced. A password is communicated between BFC and Powertrain Control Module (PCM) to provide engine operation. If BFC is replaced, the PCM must learn the password from the BFC. If password learn procedure is not performed, Diagnostic Trouble Codes (DTC) P1631 and P1632 may be set in the PCM when attempting to start the engine.
2. Attempt to start engine and then leave ignition on. DO NOT turn ignition off. The THEFT SYSTEM indicator light will flash for about 10 minutes and then turn off. THEFT SYSTEM indicator light is located on instrument panel, just to the left of tachometer.

NOTE: If PCM is replaced, the Electronically Erasable Programmable Read Only Memory (EEPROM) should be programmed. When EEPROM is programmed, the PCM will learn the password when ignition is initially turned on. Password learn procedure is not required when replacing the PCM and EEPROM is programmed.

3. Once THEFT SYSTEM indicator light stops flashing, turn ignition off. Attempt to start the engine. If engine starts, the password learn procedure is complete.
4. On Malibu 2.4L, if password is not learned, a Diagnostic Trouble Code (DTC) P1626, P1632 and U1064 may be set in PCM. Perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE

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PERFORMANCE.

5. On Malibu 3.1L, if password is not learned, a Diagnostic Trouble Code (DTC) P1610, P1626 and P1632 may be set in PCM. Perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

NOTE: Passlock(TM) learn procedure must be performed when Passlock (TM) sensor, BCM or PCM are replaced.

Password Learn Procedure For Passlock(TM) Anti-Theft System (Alero 3.4L & Grand Am 3.4L)

Turn ignition switch to ON position. Momentarily turn ignition switch to START position and release to ON position. Do not start vehicle. Observe SECURITY indicator light for about 10 minutes. Indicator light will go off after about 10 minutes. Turn ignition off. Start vehicle. Password is now in memory. Clear DTCs using scan tool.

Vehicle Driveability Computer Relearn Procedure (A/T Models)

1. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, turn ignition off. Reconnect PCM battery feed. Turn A/C off. Set parking brake and block drive wheels. Start engine.
2. Idle engine until it reaches operating temperature. Shift transmission into Drive. Allow engine to idle for 5 minutes. Shift transmission selector into Park. Allow engine to idle another 5 minutes. Turn engine off for 30 seconds. Vehicle should now be returned to learned idle.

Vehicle Driveability Computer Relearn Procedure (M/T Models)

1. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, turn ignition off. Reconnect PCM battery feed. Turn A/C off. Set parking brake and block drive wheels. Shift transmission into Neutral.
2. Start engine. Idle engine until it reaches operating temperature. Allow engine to idle for 5 minutes. Turn engine off for 30 seconds. Vehicle should now be returned to learned idle.

BONNEVILLE & LE SABRE

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Crankshaft Position (CKP) Sensor Variation Learn Procedure

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.

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- If Diagnostic Trouble Code (DTC) P1336 exists.
- If crankshaft, crankshaft position sensor, engine, Powertrain Control Module (PCM) or vibration damper have been replaced.

2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.
3. Using scan tool, check for stored DTCs. If no DTCs exist, or if DTC P1336 exists, go to next step. If any DTCs exist except for P1336, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure all DTCs are cleared from PCM. Go to next step.
4. Ensure ignition is off. Apply parking brake. Block front wheels. Ensure hood is closed. Start engine and warm engine until engine coolant temperature is at least 158°F (70°C). Turn ignition off.

NOTE: Ensure engine coolant temperature is at least 158°F (70°C) before performing CKP sensor variation learn procedure.

5. Using scan tool, select and enable CKP sensor variation learn procedure. Start engine. Apply service brakes. Ensure transaxle is in Park.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut off is obtained at 5150 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained.

7. If CKP sensor variation learn procedure was not terminated, go to next step. If CKP sensor variation learn procedure was terminated, this may be caused by PCM detecting a problem in cam signal causing DTC P0341, 3X crank signal causing DTC P1374 3X, or 18X crank signal causing DTC P0336 18X. Using scan tool, check for stored DTCs. Perform test procedures for specified DTCs and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
8. Check scan tool for status of DTC P1336. If scan tool indicates DTC P1336 ran and passed, CKP sensor variation learn procedure is complete. If scan tool indicates DTC P1336 failed or was not run, check for any other DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If any other DTCs exist, perform test procedures for specified DTC and repair as necessary. If no other DTCs exist, repeat CKP sensor variation learn procedure.

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Dash Integration Module (DIM) Programming (Bonneville)

Prior to replacing DIM, note vehicle personalization features. To program DIM, appropriate article in BODY CONTROL MODULES.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.
2. Ensure battery is fully charged. If battery is being charged, ensure battery charger is disconnected before performing EEPROM programming procedure.
3. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
4. Once EEPROM is reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check. Also after EEPROM is reprogrammed, the Crankshaft Position (CKP) sensor variation learn procedure must be performed. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE.

NOTE: If EEPROM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

NOTE: PASS-Key(R) III system auto learn procedure must be performed if Powertrain Control Module (PCM), ignition lock cylinder, reader/exciter or ignition key are replaced.

PASS-Key(R) III System Auto Learn Procedure

1. Insert a valid mechanical coded unlearned ignition key in the ignition switch. Place ignition switch in the RUN position. The SECURITY indicator light will come on for 10 minutes, the length of the auto learn timer.
2. When auto learn timer expires and SECURITY indicator light goes off, place ignition switch in OFF position. Remove ignition key from ignition. Wait 10 seconds.
3. Repeat steps 1) and 2) 2 more times. Insert the newly learned ignition key in ignition switch.
4. Place ignition switch in RUN position. The SECURITY indicator light should remain off to indicate the ignition key was learned. If security indicator does not remain off, repeat procedure.

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NOTE: PASS-Key(R) III system quick learn procedure is used to learn additional ignition keys (Black master or Gray valet). A learned Black master key must be used to initiate procedure. Up to 10 ignition keys can be learned.

PASS-Key(R) III System Quick Learn Procedure

1. Insert a valid Master ignition key in the ignition switch. Start engine. After 10 seconds, turn ignition off and remove key.
2. Within 10 seconds, insert new valid mechanical code unlearned key and turn ignition switch to RUN position. Security light will illuminate until key is learned. This may happen so quickly light is not observed. Turn ignition off and remove key 10 seconds after light goes out. To learn additional keys, repeat this step.

NOTE: RIM may be referred to as BCM.

Rear Integration Module (RIM) Programming (Bonneville)

Prior to replacing RIM, note vehicle personalization features. To set or change features, install scan tool. Turn ignition switch to ON position, with engine off. Under CHASSIS MAIN MENU, select Rear Integration Module (RIM). Under RIM Main Menu, select RECALIBRATION. Follow scan tool on screen instructions to recalibrate automatic level control. Perform vehicle personalization to reset owner's desired personalization settings.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

CAMARO & FIREBIRD

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (3.8L)

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.
   - If Diagnostic Trouble Code (DTC) P1336 exists.
   - If crankshaft, crankshaft position sensor, engine, Powertrain Control Module (PCM) or vibration damper have been replaced.

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2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.
3. Using scan tool, check for stored DTCs. If no DTCs exist, or if DTC P1336 exists, go to next step. If any DTCs exist except for P1336, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure all DTCs are cleared from PCM. Go to next step.
4. Ensure ignition is off. Apply parking brake. Block rear wheels. Ensure hood is closed. Start engine and warm engine until engine coolant temperature is at least 158°F (70°C). Turn ignition off.

NOTE: Ensure engine coolant temperature is at least 158°F (70°C) before performing CKP sensor variation learn procedure.

5. Using scan tool, select and enable CKP sensor variation learn procedure. Start engine. DO NOT start engine until instructed to do so by scan tool. Apply service brakes. Ensure transmission is in Park.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut off is obtained at 5150 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained.

7. If CKP sensor variation learn procedure was not terminated, go to next step. If CKP sensor variation learn procedure was terminated, this may be caused by PCM detecting a problem in cam signal causing DTC P0341, 3X crank signal causing DTC P1374 3X, or 18X crank signal causing DTC P0336 18X. Using scan tool, check for stored DTCs. Perform test procedures for specified DTCs and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
8. Check scan tool for status of DTC P1336. If scan tool indicates DTC P1336 ran and passed, CKP sensor variation learn procedure is complete. If scan tool indicates DTC P1336 failed or was not run, check for any other DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If any other DTCs exist, perform test procedures for specified DTC and repair as necessary. If no other DTCs exist, repeat CKP sensor variation learn procedure.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (5.7L)

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1. Procedure must be performed if any of the following have been done:
   - EEPROM was reprogrammed.
   - If crankshaft position sensor was removed or replaced.
   - Powertrain Control Module (PCM) has been replaced.
2. Install scan tool on Data Link Connector (DLC). Apply parking brake. Block rear wheels. Ensure hood is closed. Ensure transmission is in Park (A/T models) or Neutral (M/T models). Start engine and allow engine to idle until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
3. Apply brakes. Ensure brakes remain applied during remaining duration of this procedure. Using scan tool, select and enable CKP sensor variation learn procedure.
4. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.
5. If CKP sensor variation learn procedure was not terminated, turn ignition off for at least 15 seconds. CKP sensor variation learn procedure is complete. If CKP sensor variation learn procedure was terminated, turn ignition off. Refer to Diagnostic Trouble Code (DTC) P1336 for additional diagnostic information. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. On 3.8L, once EEPROM is reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check. Perform Crankshaft Position (CKP) sensor variation learn procedure. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (3.8L).

NOTE: If EEPROM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

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4. On 5.7L, once EEPROM is reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check. Also, after EEPROM is reprogrammed, the idle learn procedure and then Crankshaft Position (CKP) sensor variation learn procedure must be performed using proper procedures. See IDLE LEARN PROCEDURE (5.7L). See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (5.7L).

Idle Learn Procedure (5.7L)

1. Idle learn procedure must be performed to provide proper positioning of Idle Air Control (IAC) valve to obtain proper engine idle. If idle learn procedure is not performed, engine idle may become unstable. Procedure must be performed if any of the following have been done:
   - Vehicle battery was disconnected.
   - PCM was disconnected or PCM looses battery voltage. On A/T models, go to next step. On M/T models, go to step 4).
2. On A/T models, ensure ignition is off. Restore battery voltage to PCM. Ensure A/C is turned off. Apply parking brake. Block rear wheels. Start engine. Place transmission in Drive. Allow engine to idle for 5 minutes. Place transmission in Park.
3. Allow engine to idle for 5 minutes. Shut engine off for 30 seconds. Clear Diagnostic Trouble Codes (DTC) from PCM. Perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check.
4. On M/T models, ensure ignition is off. Restore battery voltage to PCM. Ensure A/C is turned off. Apply parking brake. Block rear wheels. Place transmission in Neutral. Start engine. Allow engine to idle for 5 minutes.
5. Shut engine off for 30 seconds. Clear Diagnostic Trouble Codes (DTC) from PCM. Perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check.

NOTE: New modules are unprogrammed. New module must be programmed with code that matches customer's key for PASS-Key(R) II operation. New module can only be programmed once.

Programming New Body Control Module (BCM)

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1. To program a NEW Body Control Module (BCM), install new module into vehicle. Insert customer's key into ignition lock cylinder and turn to RUN position. Start engine to verify operation.
2. Observe SECURITY indicator. SECURITY indicator should illuminate for about 5 seconds and go out (BCM is programmed). If SECURITY indicator flashes one flash per second and engine starts, check wiring, contacts to key resistance pellet, and key for defects or intermittents. Repair or replace as necessary. Repeat procedure because module did not program key code.

Vehicle Driveability Computer Relearn Procedure (All Models)

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

CATERA

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Content Theft Deterrent Systems & Immobilizer

NOTE: All theft deterrent module and Engine Control Module (ECM) functions must be programmed using GM Tech 2 scan tool.

Theft Deterrent module must be programmed after installation with (in order) security code, engine type, key cylinder number and VIN number. ECM must be programmed to learn new frequency code. To obtain security code and key cylinder number, call GM TRACS 2000 at 1-800-433-6961.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. The replacement Powertrain Control Module (PCM) comes with the EEPROM already programmed. However, the PCM must be programmed with proper immobilizer signal for anti-theft system before the vehicle will start. See CONTENT THEFT DETERRENT SYSTEMS & IMMOBILIZER.
2. Once PCM is programmed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Sun Roof Actuator Programming

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1. Procedure must be performed when vehicle battery is disconnected. Turn ignition on.
2. Rotate knob on sun roof control switch to CLOSED position. Sun roof control switch is located on the overhead console near the windshield. After sun roof is fully closed, press and hold knob on sun roof control switch inward for 3 seconds.
3. Rotate knob on sun roof control switch to the VENT position. After sun roof moves to the vent position, press and hold knob on sun roof control switch inward for 3 seconds.
4. Rotate knob on sun roof control switch to the OPEN position. After sun roof fully opens, press and hold knob on sun roof control switch inward for 3 seconds.
5. Rotate knob on sun roof control switch to CLOSED position. After sun roof is fully closed, press and hold knob on sun roof control switch inward for 3 seconds.
6. Sun roof actuator is now programmed. If after programming the sun roof actuator, the sun roof opens after being closed, it may be necessary to reprogram actuator up to 3 more times.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

CAVALIER & SUNFIRE

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Crankshaft Position (CKP) Sensor Variation Learn Procedure

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.
   - If Diagnostic Trouble Code (DTC) P1336 exists.
   - If crankshaft, crankshaft position sensor, engine or Powertrain Control Module (PCM) have been replaced.
   - Any repairs have been performed that disturbs the crankshaft or vibration damper to the crankshaft position sensor relationship.
2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.
3. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Apply parking brake. Block front wheels. Ensure hood is closed.

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4. Place transaxle in Park (A/T models) or Neutral (M/T models). Ensure all accessories are off. Start engine and warm engine until engine coolant temperature is at least 185°F (85°C).
5. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate or cut out. Quickly release throttle to idle position once CKP sensor variation learn procedure is obtained and engine decelerates or cuts out. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate or cut out.

7. Using scan tool, verify that CKP sensor variation learn procedure was completed. If CKP sensor variation learn procedure was not completed, go to next step. If CKP sensor variation learn procedure was completed, shut engine off and remove scan tool.
8. If CKP sensor variation learn procedure was not completed, repeat entire procedure up to 10 times. If PCM will not learn the CKP sensor variation compensating values, a DTC P1336 should be stored in the PCM. Perform test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM or PCM may be damaged. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
2. Once EEPROM is reprogrammed, the Crankshaft Position (CKP) sensor variation learn procedure must be performed using proper procedure. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE.

NOTE: Password must be learned when Passlock(TM) sensor, BCM or PCM is replaced. BCM must be programmed with proper RPO configurations before performing relearn procedures. If PCM is replaced, after programming, PCM will immediately learn the first password it receives. If password needs to be changed, learn procedure will need to be performed.

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Password Learn Procedure For Anti-Theft System

1. Clear all DTCs. Turn ignition off. Replace component(s) as necessary.
2. With transmission in Park (A/T) or Neutral (M/T), turn ignition switch momentarily to START position (engine will not start). Leave ignition switch in RUN position (engine off). If Passlock(TM) sensor was replaced, SECURITY indicator light will flash for 10 minutes. If Passlock(TM) module was replaced, SECURITY indicator light will flash for a few seconds, then stay on for 10 minutes. If PCM was replaced with a new PCM, vehicle may start and procedure may not be needed. If replacement PCM was used even momentarily, SECURITY indicator light will flash for a few seconds, then stay on for 10 minutes. After 10 minutes, when light turns off, turn ignition switch to OFF position for 5 seconds.
3. Repeat step 2) twice more. Ignition switch must be turned to OFF position. Auto learn procedure will be completed during next start attempt. Clear all DTCs.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

CENTURY, GRAND PRIX, INTRIGUE, LUMINA, MONTE CARLO & REGAL

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (3.1L)

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.
   - If Diagnostic Trouble Code (DTC) P1336 exists.
   - If crankshaft, crankshaft position sensor, engine, Powertrain Control Module (PCM) or vibration damper have been replaced.
2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.
3. Using scan tool, check for stored DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If no DTCs exist, or if DTC P1336 exists, go to next step. If any DTCs exist except for P1336, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure all DTCs are cleared from PCM. Go to next step.

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4. Ensure ignition is off. Apply parking brake. Block front wheels. Ensure hood is closed. Start engine and warm engine until engine coolant temperature is at least 158°F (70°C). Turn ignition off.

NOTE: Ensure engine coolant temperature is at least 158°F (70°C) before performing CKP sensor variation learn procedure.

5. Using scan tool, select and enable CKP sensor variation learn procedure. Start engine. Apply service brakes. Ensure transaxle is in Park.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut off is obtained at 5150 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained.

7. If CKP sensor variation learn procedure was not terminated, go to next step. If CKP sensor variation learn procedure was terminated, this may be caused by PCM detecting a problem in cam signal causing DTC P0341, 3X crank signal causing DTC P1374 3X, or 24X crank signal causing DTC P0336 24X. Using scan tool, check for stored DTCs. Perform test procedures for specified DTCs and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
8. Check scan tool for status of DTC P1336. If scan tool indicates DTC P1336 ran and passed, CKP sensor variation learn procedure is complete. If scan tool indicates DTC P1336 failed or was not run, check for any other DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If any other DTCs exist, perform test procedures for specified DTC and repair as necessary. If no other DTCs exist, repeat CKP sensor variation learn procedure.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (3.5L & 3.8L)

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.
   - If Diagnostic Trouble Code (DTC) P1336 exists.
   - If crankshaft, crankshaft position sensor, engine, Powertrain Control Module (PCM) or vibration damper have been replaced.
2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.

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3. Using scan tool, check for stored DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If no DTCs exist, or if DTC P1336 exists, go to next step. If any DTCs exist except for P1336, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure all DTCs are cleared from PCM. Go to next step.
4. Ensure ignition is off. Apply parking brake. Block front wheels. Ensure hood is closed. Start engine and warm engine until engine coolant temperature is at least 158°F (70°C). Turn ignition off.

NOTE: Ensure engine coolant temperature is at least 158°F (70°C) before performing CKP sensor variation learn procedure.

5. Using scan tool, select and enable CKP sensor variation learn procedure. Start engine. Apply service brakes. Ensure transaxle is in Park.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut off is obtained at 4300 RPM (3.5L) or 5150 RPM (3.8L). Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained.

7. If CKP sensor variation learn procedure was not terminated, go to next step. If CKP sensor variation learn procedure was terminated, this may be caused by PCM detecting a problem in cam signal causing DTC P0341, 3X crank signal causing DTC P1374 3X, or 18X crank signal causing DTC P0336 18X. Using scan tool, check for stored DTCs. Perform test procedures for specified DTCs and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
8. Check scan tool for status of DTC P1336. If scan tool indicates DTC P1336 ran and passed, CKP sensor variation learn procedure is complete. If scan tool indicates DTC P1336 failed or was not run, check for any other DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If any other DTCs exist, perform test procedures for specified DTC and repair as necessary. If no other DTCs exist, repeat CKP sensor variation learn procedure.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.

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2. Ensure battery is fully charged. If battery is being charged, ensure battery charger is disconnected before performing EEPROM programming procedure.
3. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
4. Once EEPROM is reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check. After EEPROM is reprogrammed, the proper Crankshaft Position (CKP) sensor variation learn procedure must be performed. For 3.1L, see CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (3.1L). For 3.5L or 3.8L, see CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (3.5L & 3.8L).

NOTE: If EEPROM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

PASS-Key(R) III Module Programming (Grand Prix)

- If replacing a theft deterrent module, the new module will learn keys immediately. However, the existing Powertrain Control Module (PCM) must learn the new fuel continue password when theft deterrent module is replaced.
- If replacing a PCM, after programming, these modules will learn incoming fuel continue password immediately upon receipt of a password message. Once a password message is received, and a password is learned, a learn procedure must be performed to change this password again. A PCM which has been previously installed in another vehicle will have learned the other vehicle's fuel continue password and will require a learn procedure after programming to learn current vehicle's password.
- When performing 30 minute relearn procedure, all previously learned keys will be erased from theft deterrent module's memory
- Additional keys may be learned immediately after 30 minute relearn procedure by inserting additional key to be learned and turning ignition switch to RUN position within 10 seconds of removing previously learned key.
- When performing 30 minute relearn procedure, be sure to use only a master key (Black) during procedure. If a valet key (Gray) is learned first, theft deterrent module will not allow additional keys to be learned.

NOTE: PASS-Key(R) III system auto learn procedure must be performed if all keys are lost, or Powertrain Control Module (PCM), PASS-

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Key(R) III module, ignition lock cylinder, steering column assembly or ignition key are replaced. A password is communicated between PASS-Key(R) III module and PCM to provide engine operation. If PCM is replaced, the PCM must learn the password from the PASS-Key(R) III module.

PASS-Key(R) III System Auto Learn Procedure (Grand Prix)

1. Insert a valid mechanical coded unlearned master ignition key (Black) in the ignition switch. Place ignition switch in RUN position. The SECURITY indicator light will flash once per second for 10 minutes for the length of the auto learn timer.
2. When auto learn timer expires and SECURITY indicator light goes off, place ignition switch in LOCK position. Wait 5 seconds.
3. Repeat steps 1) and **2)** 2 more times. Insert the newly learned ignition key in ignition switch.
4. Place ignition switch in RUN position. The SECURITY indicator light should remain off to indicate that ignition key was learned. This will be the only learned key. To program more keys, see PASS-KEY(R) III SYSTEM QUICK LEARN PROCEDURE (GRAND PRIX). If security indicator does not remain off, repeat procedure. Use scan tool to clear any DTCs.

NOTE: PASS-Key(R) III system quick learn procedure is used to learn additional ignition keys. A learned key must be used to initiate procedure. Up to 10 ignition keys can be learned.

PASS-Key(R) III System Quick Learn Procedure (Grand Prix)

1. Insert a valid ignition key in the ignition switch. Turn ignition on. After 2 second bulb test, turn ignition off and remove key.
2. Within 10 seconds, insert new valid mechanical code unlearned key and turn ignition switch to RUN position. Security light will illuminate until key is learned. This may happen so quickly security light illumination is not observed. Turn ignition off. Remove ignition key 10 seconds after light goes out.
3. To learn additional keys, repeat step 2). To exit procedure, turn ignition off for more than 10 seconds.

Passlock(TM) Theft Deterrent Relearn (Intrigue)

Password must be learned when Passlock(TM) sensor, BCM or PCM is replaced. This procedure must be performed after ignition switch replacement. If BCM is replaced, BCM must be programmed with proper RPO configurations before performing relearn procedures. If PCM is replaced, after programming, PCM will immediately learn the first password it receives. If password needs to be changed, learn procedure will need to be performed.

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Turn ignition off. Turn ignition switch from OFF to START position, then leave in on position. SECURITY indicator will come on and stay on for at least 10 minutes. After SECURITY indicator goes out, turn ignition off for 5 seconds. Repeat this procedure 2 more times. After third time, turn ignition off. Turn ignition switch to START position, engine should start and run. Recheck BCM for Diagnostic Trouble Codes (DTC).

NOTE: 10 minute procedure requires special equipment to perform. If special equipment is not available, 30 minute procedure may be used. This procedure allows relearning of BCM or PCM learned data code after replacement of Passlock(TM) module, Passlock (TM) sensor or VCM. DTC B3031 will set when entering programming mode. Reprogram BCM with proper RPO configurations before performing 30 minute relearn procedure. After reprogramming a new PCM, PCM will learn incoming fuel continue password immediately. After initial password is learned, relearn procedure will have to be performed to change password.

PASSLOCK(TM) 30 Minute Relearn Procedure (Impala & Monte Carlo)

1. Clear all DTCs. See scan tool manufacturer's instructions. Turn ignition off. Replace component(s) as necessary.
2. With transmission in Park (A/T) or Neutral (M/T), turn ignition switch momentarily to START position (DO NOT start engine). Leave ignition switch in RUN position (engine off). After 10 minutes, when SECURITY light turns off, turn ignition switch to OFF position for 5 seconds.
3. Repeat step 2) twice more. Turn ignition switch to OFF position. Auto learn procedure will be completed during next start attempt. Clear all DTCs.

NOTE: New module can only be programmed once. Verify customer's code prior to programming to ensure key code is correct.

Programming New Theft Deterrent Module (Lumina)

1. With new theft deterrent module installed and connected, insert customer's key into ignition key lock cylinder and turn ignition switch to RUN position. New modules are programmed to store first pellet resistance detected. Start engine to verify system operation. If engine starts, go to next step. If engine does not start, diagnose and repair anti-theft system. See ANTI-THEFT SYSTEMS - LUMINA article under ACCESSORIES & EQUIPMENT.
2. Observe SECURITY indicator light. Indicator light should illuminate for about 5 seconds and go out. This indicates module programming has been successfully completed. If indicator light flashes once per second and engine starts, module did not program.

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Check wiring, connectors, contacts to key resistance pellet, and key for defects or intermittents. Repair or replace as necessary and repeat programing procedure.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

CORVETTE

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

NOTE: Performing following procedure will set DTC P1630. This is normal. After procedure has been completed, turn ignition off for 30 seconds. Turn ignition on. DTC P1630 should clear. If DTC does not clear, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Battery voltage must be maintained during procedure.

BCM/PASS-KEY Relearn Procedure For Anti-Theft System

1. Connect scan tool. Turn ignition on. Select BCM RPO Programming. Program BCM with proper RPO codes. Go to next step.
2. Ensure proper communications between BCM and ECM. If communication to PCM does not exist, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If communication to BCM does not exist, see BCM DIAGNOSTIC SYSTEM CHECK in BODY CONTROL MODULES - CORVETTE article. If a Techline Terminal T50/T60(R) is available, go to step 5). If a scan tool is available, go to step 4). If a scan tool is not available, go to next step.
3. Turn ignition on (engine off) for 11 minutes. Turn ignition off for 30 seconds. Turn ignition on (engine off) for 11 minutes. Turn ignition off for 30 seconds. Turn ignition on (engine off) for 11 minutes or until DTC P1630 sets. Turn ignition off for 30 seconds. Turn ignition on for 30 seconds. Start engine. If engine starts, perform BCM diagnostic system check. See BCM DIAGNOSTIC SYSTEM CHECK in BODY CONTROL MODULES - CORVETTE article. If engine does not start, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
4. Connect scan tool to vehicle Diagnostic Link Connector (DLC). Turn ignition on. Using scan tool, enter SERVICE PROGRAMMING SYSTEM (SPS). After entering vehicle information, select Request Info soft key. Select DONE and follow instructions on

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Vehicle Set-Up screen. Disconnect scan tool from vehicle and connect to Techline terminal. Using Techline terminal, select SERVICE PROGRAMMING SYSTEM (SPS). Select terminal to scan tool programming method. Select DONE. Follow instructions on terminal. Select Vehicle Theft Relearn. Select Program at summary screen. Terminal will download information to scan tool. Disconnect scan tool from terminal and reconnect to vehicle DLC. Select SERVICE PROGRAMMING SYSTEM (SPS) from main menu. Enter vehicle model year and type information. Select Theft Relearn soft key. Follow instructions on scan tool. Security timer will remain on for about 11 minutes or until DTC P1630 sets. DO NOT disconnect scan tool during this time. When system is ready, turn ignition off for 30 seconds. Start engine. If engine starts perform BCM diagnostic system check. See BCM DIAGNOSTIC SYSTEM CHECK in BODY CONTROL MODULES - CORVETTE article. If engine does not start, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

5. Using Techline Terminal T50/T60(R), enter SERVICE PROGRAMMING SYSTEM (SPS). Select terminal to vehicle programming. Select DONE and follow instructions on Vehicle Set-Up screen. Select Vehicle Theft Relearn. Follow instructions on terminal. Security timer will remain on for about 11 minutes or until DTC P1630 sets. DO NOT disconnect terminal during this time. When system is ready, turn ignition off for 30 seconds. Start engine. If engine starts perform BCM diagnostic system check. See BCM DIAGNOSTIC SYSTEM CHECK in BODY CONTROL MODULES - CORVETTE article. If engine does not start, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Door Control Module (DCM) Programming

On hardtop models, when a Door Control Module (DCM) is replaced, the DCM must be reprogrammed. Using scan tool, select RH DCM for right DCM or LH DCM for left DCM. Select DCM REPROGRAM and follow scan tool instructions.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. Once EEPROM is reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check. Also after EEPROM is reprogrammed, the password

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learn procedure for the anti-theft system must be performed. See BCM/PASS-KEY RELEARN PROCEDURE FOR ANTI-THEFT SYSTEM.

NOTE: If EEPROM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

DEVILLE, ELDORADO & SEVILLE

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM or PCM may be damaged. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model. Perform Vehicle Theft Deterrent (VTD) system auto learn procedure. See VEHICLE THEFT DETERRENT SYSTEM AUTO LEARN PROCEDURE.
2. To verify proper EEPROM programming, start engine. If engine starts, go to next step. If engine fails to start, ensure all electrical connections on PCM are okay and all fuses are okay. Check Techline for latest software. Once engine is repaired so it will start, go to next step.
3. Once EEPROM is programmed, use scan tool to clear DTC P0603 from PCM. Engine oil life interval and transaxle fluid life interval must now be reprogrammed. See ENGINE OIL LIFE INTERVAL PROGRAMMING. See TRANSAXLE FLUID LIFE INTERVAL PROGRAMMING.

Engine Oil Life Interval Programming

1. Engine oil life interval programming must be performed if any of the following have been done:
   - Battery voltage was disconnected from PCM before ignition switch was placed in LOCK position for a minimum of 30 seconds.

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- EEPROM was reprogrammed.
- Powertrain Control Module (PCM) was replaced.

2. Engine oil life interval is calculated by the PCM. The PCM uses many engine parameters to determine the percentage of engine oil life remaining before engine oil should be changed.
3. Engine oil life interval may be read by the operator by depressing INFO button on Driver Information Center (DIC). The DIC is located above the stereo. Engine oil life interval will be displayed as a percentage when DIC indicates OIL LIFE LEFT.
4. If battery voltage was disconnected from PCM before ignition switch was placed in LOCK position for a minimum of 30 seconds, or PCM was replaced, engine oil life interval must be reprogrammed or reset. Engine oil life interval may be programmed or reset by using a scan tool or the DIC.
5. If using scan tool to reprogram or reset engine oil life interval, use scan tool manufacturer's instructions and reprogram or reset engine oil life interval back to the closest original interval index that was recorded on original PCM. Scan tool may reset engine oil life interval index in 10 percent intervals.

NOTE: Scan tool may reset engine oil life interval index in 10 percent intervals. The DIC can only reprogram or reset engine oil life interval to 100 percent.

6. If using DIC to reprogram or reset engine oil life interval, depress INFO button on DIC. Depress and hold INFO RESET button on DIC until 100 percent OIL LIFE LEFT is displayed on instrument panel. Release all buttons. The DIC can only reprogram or reset engine oil life interval to 100 percent.

Transaxle Fluid Life Interval Programming

1. Transaxle fluid life interval programming must be performed if any of the following have been done:
   - Battery voltage was disconnected from PCM before ignition switch was placed in LOCK position for a minimum of 30 seconds.
   - EEPROM was reprogrammed.
   - Powertrain Control Module (PCM) was replaced.
2. Transaxle fluid life interval is calculated by the PCM. The PCM uses many engine parameters to determine the percentage of transaxle fluid life interval remaining before fluid should be changed.
3. When PCM determines transaxle fluid should be changed, a signal is sent to the instrument cluster and warning light is displayed. If battery voltage was disconnected from PCM before ignition switch was placed in LOCK position for a minimum of 30 seconds, or PCM was replaced, transaxle fluid life interval must be reprogrammed or

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reset.

4. To reprogram or reset transaxle fluid life interval to original interval set in the PCM, connect scan tool to Data Link Connector (DLC). Using scan tool manufacturer's instructions and reprogram or reset transaxle fluid life interval back to the closest original interval index that was recorded on original PCM.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

NOTE: Vehicle Theft Deterrent (VTD) system auto learn procedure must be performed if Powertrain Control Module (PCM), VTD module, ignition lock cylinder, steering column assembly or ignition key are replaced. A password is communicated between VTD module and PCM to provide engine operation. If PCM is replaced, the PCM must learn the password from the VTD module.

Vehicle Theft Deterrent System Auto Learn Procedure

1. Insert a valid mechanical coded unlearned ignition key in the ignition switch. Place ignition switch in RUN position. The SECURITY indicator light will come on for 10 minutes for the length of the auto learn timer.
2. When auto learn timer expires and SECURITY indicator light goes off, place ignition switch in OFF position. Wait 5 seconds.
3. Repeat steps 1) and 2), 2 more times. Insert the newly learned ignition key in ignition switch.
4. Place ignition switch in RUN position. The SECURITY indicator light should remain off to indicate that ignition key was learned. If security indicator does not remain off, repeat procedure.

METRO

NOTE: Powertrain Control Module (PCM) does not have a reprogrammable EEPROM. No special procedures are required for programming the PCM.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper

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driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

PARK AVENUE

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Crankshaft Position (CKP) Sensor Variation Learn Procedure

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.
   - If Diagnostic Trouble Code (DTC) P1336 exists.
   - If crankshaft, crankshaft position sensor, engine, Powertrain Control Module (PCM) or vibration damper have been replaced.
2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.
3. Using scan tool, check for stored DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If no DTCs exist, or if DTC P1336 exists, go to next step. If any DTCs exist except for P1336, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure all DTCs are cleared from PCM. Go to next step.

NOTE: Ensure engine coolant temperature is at least 158°F (70°C) before performing CKP sensor variation learn procedure.

4. Ensure ignition is off. Apply parking brake. Block front wheels. Ensure hood is closed. Start engine and warm engine until engine coolant temperature is at least 158°F (70°C). Turn ignition off.
5. Using scan tool, select and enable CKP sensor variation learn procedure. Start engine. Apply service brakes. Ensure transaxle is in Park.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut off is obtained at 5150 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off

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is obtained.

7. If CKP sensor variation learn procedure was not terminated, go to next step. If CKP sensor variation learn procedure was terminated, this may be caused by PCM detecting a problem in cam signal causing DTC P0341, 3X crank signal causing DTC P1374 3X, or 18X crank signal causing DTC P0336 18X. Using scan tool, check for stored DTCs. Perform test procedures for specified DTCs and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
8. Check scan tool for status of DTC P1336. If scan tool indicates DTC P1336 ran and passed, CKP sensor variation learn procedure is complete. If scan tool indicates DTC P1336 failed or was not run, check for any other DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If any other DTCs exist, perform test procedures for specified DTC and repair as necessary. If no other DTCs exist, repeat CKP sensor variation learn procedure.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.
2. Ensure battery is fully charged. If battery is being charged, ensure battery charger is disconnected before performing EEPROM programming procedure.
3. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model. Perform password learn procedure. See PASSWORD LEARN PROCEDURE FOR PASS-KEY(R) III ANTI-THEFT SYSTEM.

NOTE: If EEPROM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

4. Once EEPROM is reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check. Also after EEPROM is reprogrammed, the Crankshaft Position (CKP) sensor variation learn procedure must be performed. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE.

Password Learn Procedure For Pass-Key(R) III Anti-Theft System

1. Password learn procedure must be performed if Powertrain Control Module (PCM),

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Pass-Key(R) III module, ignition lock cylinder, steering column assembly or ignition key are replaced. A password is communicated between Pass-Key(R) III module and PCM to provide engine operation. If PCM is replaced, the PCM must learn the password from the Pass-Key(R) III module.

2. Insert a valid mechanical coded unlearned ignition key in the ignition switch. Place ignition switch in the RUN position. The SECURITY indicator light will come on for 10 minutes for the length of the auto learn timer. SECURITY indicator light is located on instrument panel, just below the fuel gauge.
3. When auto learn timer expires and SECURITY indicator light goes off, place ignition switch in OFF position. Remove ignition key from ignition. Wait 10 seconds.
4. Repeat steps 2) and 3) 2 more times, for a total of 30 minutes. Insert the newly learned ignition key in ignition switch.
5. Place ignition switch in RUN position. The SECURITY indicator light should remain off to indicate the ignition key was learned. If security indicator does not remain off, repeat procedure.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

PRIZM

NOTE: Powertrain Control Module (PCM) does not have a reprogrammable EEPROM. No special procedures are required for programming the PCM.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

SATURN

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

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Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. EEPROM must also be programmed if replacing Powertrain Control Module (PCM) or changing Transaxle Control (TC) calibrations. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Perform EEPROM programming using the Service Stall System (SSS) equipment manufacturer's instructions and latest software applicable for the vehicle model.

CAUTION: PCM may be damaged if programming procedure is interrupted during the downloading procedure. Ensure cable for scan tool is securely connected to SSS equipment and power supply for SSS is securely connected to power supply before proceeding.

NOTE: Ensure original PCM has the correct Vehicle Identification Number (VIN), vehicle tire size and vehicle options prior to programming the EEPROM. If original PCM is not available or incapable of communicating, the VIN, vehicle tire size and vehicle options must be manually entered into the replacement PCM.

NOTE: On A/T models, when replacing PCM for an engine related problem, the transaxle adaptives should be transferred from original PCM to replacement PCM. Transaxle adaptives should be reset if replacing PCM for transaxle related failure, transaxle, transaxle line pressure actuator, transaxle valve body or transaxle is overhauled. Transaxle adaptives may be reset using Service Stall System (SSS) equipment or a scan tool. See VEHICLE DRIVEABILITY COMPUTER RELEARN PROCEDURE.

3. Perform anti-theft relearn procedure. See PASSLOCK(TM) ANTI-THEFT LEARN PROCEDURE. Once EEPROM is reprogrammed, check for any Diagnostic Trouble Codes (DTC). See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Also, after EEPROM is reprogrammed, crankshaft learn procedure and vehicle driveability computer relearn procedure must be performed. See CRANKSHAFT LEARN PROCEDURE. See VEHICLE DRIVEABILITY COMPUTER RELEARN PROCEDURE.

NOTE: Once EEPROM is reprogrammed, the SERVICE indicator light on

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instrument panel will flash. This is a normal function, as the PCM must learn the crankshaft notches for engine misfire diagnosis. SERVICE indicator light is located on instrument panel, just to the left of the speedometer. See CRANKSHAFT LEARN PROCEDURE.

Crankshaft Learn Procedure

1. The Powertrain Control Module (PCM) uses crankshaft velocity calculations to determine engine misfire and to operate engine misfire self-diagnostics. PCM must know precisely the variation between notches on the crankshaft. PCM contains crankshaft learn procedure which learns the variation between notches on crankshaft. The crankshaft learn procedure must be reset if PCM, crankshaft, or crankshaft position sensor are replaced.
2. If crankshaft learn procedure is being performed as a result of replacing the crankshaft, reset crankshaft learn procedure using Service Stall System (SSS) equipment and manufacturer's instructions. If replacing PCM with a replacement PCM, procedure will be prompted automatically. Allow engine to idle until SERVICE light flashes. Hold engine speed between 3000-4000 RPM until light goes off after about 10-20 seconds.

NOTE: If any Diagnostic Trouble Codes (DTC) exist that relate to an engine misfire, crankshaft learn procedure will not be initiated. Any DTCs for engine misfire must be corrected before performing crankshaft learn procedure.

Vehicle Driveability Computer Relearn Procedure

1. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability and engine idle. Until PCM has completed computer relearn procedure, driveability or idle may differ from standard vehicle operation. On A/T models, transaxle shift qualities must be relearned.
2. On all models, start engine and warm engine to normal operating temperature. Perform 10 sets of upshifts (1-2, 2-3 and 3-4) at about 30 percent throttle.
3. On DOHC engine, while coasting at 35 MPH, slowly accelerate to 1/2 throttle to achieve a 4-3 downshift. Place gearshift in "D3" while coasting at 20 MPH, slowly accelerate at 3/4 throttle to achieve a 3-2 downshift.
4. Repeat step 3) 5 times. Vehicle driveability computer relearn procedure is now complete.
5. On SOHC engine, while coasting at 40 MPH, slowly accelerate to 1/2 throttle to achieve a 4-3 downshift. Place gearshift in "D3" while coasting at 30 MPH, slowly accelerate at 1/2 throttle to achieve a 3-2 downshift.

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6. Repeat step 5) 5 times. Vehicle driveability computer relearn procedure is now complete.

Passlock(TM) Anti-Theft Learn Procedure

Passlock(TM) learn procedure must be performed when Passlock(TM) sensor, BCM or PCM are replaced. If only Passlock sensor was replaced, Auto Learn method my be used. See PASSLOCK(TM) ANTI-THEFT AUTO LEARN METHOD. BCM or PCM replacement requires Seed And Key method. Seed And Key method require use of Tech 2 scan tool. See PASSLOCK(TM) ANTI-THEFT SEED AND KEY METHOD.

Passlock(TM) Anti-Theft Seed And Key Method

1. Check BCM and PCM for existing codes. If codes exist, repair and proceed to next step. If no codes exist, go to next step.
2. Install scan tool. Turn ignition switch to RUN position. Using Programming System, select Passlock relearn procedure. Wait for 10 minutes. When security light changes from flashing or on to off, turn ignition switch to OFF position. Vehicle should start on next ignition cycle.

NOTE: If ignition is turned off before security light changes state, relearn procedure must be restarted.

Passlock(TM) Anti-Theft Auto Learn Method

1. Check BCM and PCM for existing codes. If codes exist, repair and proceed to next step. If no codes exist, go to next step.
2. Turn ignition switch to RUN position. Momentarily rotate ignition to START position. DO NOT start vehicle. Wait for 10 minutes. When security light changes from flashing or on to off, turn ignition to OFF position. Perform this process 3 times. After the third time, vehicle should start on next ignition cycle.

NOTE: If ignition is turned off before security light changes state, relearn procedure must be restarted.

RELEARN PROCEDURES (TRUCKS & VANS)

NOTE: Before performing Electronically Erasable Programmable Read Only Memory (EEPROM) Programming procedure, check for any applicable Technical Service Bulletins (TSBs) that may apply to vehicle application. Body Control Module (BCM) must be programmed with proper Regular Production Option (RPO) configurations. Follow instructions on Techline Terminal and

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scan tool to program BCM.

ASTRO & SAFARI

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Crankshaft Position (CKP) Sensor Variation Learn Procedure

1. Procedure must be performed if any of the following have been done:
   - EEPROM was reprogrammed.
   - If crankshaft position sensor was removed or replaced.
   - Vehicle Control Module (VCM) was replaced.
2. Install scan tool on Data Link Connector (DLC). Apply parking brake. Block rear wheels. Ensure hood is closed.
3. Place transmission in Park (A/T models) or Neutral (M/T models). Start engine and warm engine until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
4. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.
5. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the VCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate.

6. If CKP sensor variation learn procedure was completed, turn ignition off for at least 15 seconds and remove scan tool. If CKP sensor variation learn procedure was not completed, a DTC P1336 should be stored in the VCM. Perform test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Vehicle Control Module (VCM) was replaced, the EEPROM in the VCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the VCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline

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equipment manufacturer's instructions and latest software applicable for the vehicle model.

3. Once EEPROM is reprogrammed, Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system must be performed. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE. See PASSWORD LEARN PROCEDURE FOR PASSLOCK(TM) ANTI-THEFT SYSTEM.

NOTE: If EEPROM programming fails, ensure all electrical connections on VCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace VCM.

4. Once Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

NOTE: If BCM or VCM are replaced, modules must be programmed with vehicle configuration before performing Passlock(TM) reprogramming.

Password Learn Procedure For Passlock(TM) Anti-Theft System

1. Password learn procedure must be performed if Vehicle Control Module (VCM), passlock module or passlock sensor is replaced. A password is communicated between VCM and passlock module to provide engine operation. If VCM is replaced, the VCM must learn the password from the passlock module.
2. Momentarily rotate ignition switch to CRANK position, but do not start engine. Release switch to RUN position, but do not turn off. Wait 10 minutes and observe SECURITY indicator.

NOTE: Ensure battery is fully charged before proceeding. Ensure steps are followed in correct order or procedure may need to be repeated.

3. If passlock sensor was replaced, SECURITY indicator will flash for 10 minutes. If passlock module was replaced, SECURITY indicator will flash for a few seconds, then remain on for 10 minutes. If VCM was replaced with a new programmed VCM and connected to vehicle for the first time, vehicle will start and this procedure is not necessary. If replacement VCM was connected to any vehicle at any other time, SECURITY indicator will flash for a few seconds, then remain on for 10 minutes.

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4. After 10 minutes, SECURITY indicator will turn off. Turn ignition off and wait 10 seconds.
5. Repeat programming procedure 2 more times. New security code is ready to be communicated. New password is learned on next ignition switch lock cylinder from OFF to CRANK to ON.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Vehicle Control Module (VCM) was replaced, driving the vehicle will enable the VCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the VCM completes the computer relearn procedure.

BLAZER, BRAVADA, ENVOY, JIMMY, PICKUP & SONOMA

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

BCM Programming

This procedure requires Techline terminal and equipment. Ensure battery is fully charged. Ensure battery and lighter connectors are secure. Ensure DLC is accessible. Turn ignition on. Refer to Techline terminal and equipment user's instructions.

If BCM fails to program, check all BCM connections, check Techline terminal and equipment for latest software version. Retry programming. If BCM fails to program again, replace BCM. See BODY CONTROL MODULES - BLAZER, BRAVADA, ENVOY, JIMMY, SONOMA & S10 PICKUP article in ACCESSORIES & EQUIPMENT. Clear DTCs after programming.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (2.2L & 4.3L)

1. Procedure must be performed if any of the following have been done:
   - EEPROM was reprogrammed.
   - If crankshaft position sensor was removed or replaced.
   - Vehicle Control Module (VCM) was replaced.
2. Install scan tool on Data Link Connector (DLC). Apply parking brake. Block rear wheels. Ensure hood is closed.
3. Place transmission in Park (A/T models) or Neutral (M/T models). Start engine and warm engine until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
4. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.

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5. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the VCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate.

6. If CKP sensor variation learn procedure was completed, turn ignition off for at least 15 seconds and remove scan tool. If CKP sensor variation learn procedure was not completed, a DTC P1336 should be stored in the VCM. Perform test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (2.2L)

1. If Powertrain Control Module (PCM) was replaced, the EPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
2. Once EEPROM is reprogrammed, the Crankshaft Position (CKP) sensor variation learn procedure must be performed. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (2.2L & 4.3L).

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (4.3L)

1. If Vehicle Control Module (VCM) was replaced, the EEPROM in the VCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the VCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. Once EEPROM has been reprogrammed, Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure must be performed. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE (2.2L & 4.3L). See PASSLOCK(TM) ANTI-THEFT LEARN PROCEDURE. Once Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If EEPROM programming fails, ensure all electrical connections on VCM are okay. Check Techline for latest

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software. If EEPROM programming still fails, replace VCM.

NOTE: This procedure allows relearning of BCM module or VCM/PCM learned data code after replacement of BCM module, Passlock (TM) sensor or VCM/PCM. DTC B3031 will set when entering programming mode.

Passlock(TM) Anti-Theft Learn Procedure

1. Turn ignition off. Replace failed component.
2. With transmission in Park (A/T) or Neutral (M/T), turn ignition switch momentarily to START position (engine will not start), then leave in RUN position. SECURITY indicator will stay on for 10 minutes. After 10 minutes, when light turns off, turn ignition switch to OFF position for 5 seconds.
3. Repeat step 2) twice more. Auto learn procedure will be completed during next start attempt. If VCM/PCM was replaced, reprogram VCM/PCM. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
4. Check for DTCs. If Passlock(TM) codes exist, go to ANTI-THEFT SYSTEMS - BLAZER, BRAVADA, ENVOY, JIMMY, SONOMA & S10 PICKUP article in ACCESSORIES & EQUIPMENT. If powertrain codes exist, go to applicable test. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Vehicle Driveability Computer Relearn Procedure (2.2L)

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

Vehicle Driveability Computer Relearn Procedure (4.3L)

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Vehicle Control Module (VCM) was replaced, driving the vehicle will enable the VCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the VCM completes the computer relearn procedure.

CUTAWAY, EXPRESS, RV CUTAWAY & SAVANA

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

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NOTE: References to California models apply to California emission vehicles, which may be verified by underhood Emission Control label. California emissions may be available in other states.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (4.3L, 4.8L, 5.0L, 5.3L, 5.7L 5.7L & 6.0L)

1. If Vehicle Control Module (VCM) was replaced, the EEPROM in the VCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the VCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. Once EEPROM is reprogrammed, Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system must be performed using proper procedure.

NOTE: If EEPROM programming fails, ensure all electrical connections on VCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace VCM.

4. Once Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (7.4L)

1. If Vehicle Control Module (VCM) was replaced, the EEPROM in the VCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the VCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. Once EEPROM is reprogrammed, use scan tool to reset Idle Air Control (IAC) valve. On Calif. models, go to next step. On Except Calif. models, go to step 5).
4. Once EEPROM is reprogrammed, password learn procedure for anti-theft system must be performed. See PASSWORD LEARN PROCEDURE FOR ANTI-THEFT SYSTEM (7.4L). Once password learn procedure for anti-theft system has been performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN

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ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

NOTE: Crankshaft Position (CKP) sensor variation learn procedure should ONLY be performed on Except Calif. models. DO NOT perform CKP sensor variation learn procedure on Calif. models. Verify vehicle application by using underhood Emission Control label. If EEPROM programming fails, ensure all electrical connections on VCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace VCM.

5. Once EEPROM is reprogrammed, Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system must be performed using proper procedure. Once Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Powertrain Control Module (PCM) Programming (6.5L Diesel)

1. If PCM was replaced, the PCM must be programmed. If PCM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.
2. Ensure battery is fully charged. Ensure cable at Data Link Connector (DLC) and power supply for scan tool are properly connected. Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. Perform password learn procedure for anti-theft system. See PASSWORD LEARN PROCEDURE FOR ANTI-THEFT SYSTEM (6.5L DIESEL). Once PCM is programmed, if only the PCM was replaced, go to next step. If the crankshaft position sensor, engine or PCM with fuel injection pump were replaced, perform TDC offset learn procedure. See TDC OFFSET LEARN PROCEDURE (6.5L DIESEL).

NOTE: If PCM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

4. Start engine and warm engine until engine coolant temperature is at least 170°F (77°C). This will allow TDC offset to be programmed into the PCM if necessary. The PCM has the ability to determine the amount of offset required to bring the engine to TDC. PCM uses the TDC to determine proper fuel injection pump timing. If TDC offset is not programmed, a Diagnostic Trouble Code (DTC) P1214 will be set in the PCM.

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TDC Offset Learn Procedure (6.5L Diesel)

1. Procedure must be performed if any of the following have been done or exists:
   - If sent here from Diagnostic Trouble Code (DTC) P1214.
   - Engine has been replaced.
   - Crankshaft position sensor or engine front cover has been replaced.
   - Powertrain Control Module (PCM) and fuel injection pump have been replaced.

   NOTE: DO NOT perform procedure unless sent here from DTC P1214 or one of the components listed above have been replaced.

2. The PCM has the ability to determine amount of offset required to bring the engine to TDC when TDC offset is not present or has been cleared. This procedure must be performed to allow PCM to be updated with the correct TDC offset for vehicle application.
3. Install scan tool on Data Link Connector (DLC). Start engine and warm engine until engine coolant temperature is at least 170°F (77°C). Using scan tool, clear DTCs from PCM. Turn ignition on with engine off. Fully depress and hold throttle at full throttle for at least 45 seconds.
4. Turn ignition off for 30 seconds. Start engine. Verify scan tool indicates TDC offset has been cleared to zero. If TDC offset has been cleared to zero, go to next step. If TDC offset has not been cleared to zero, repeat step 3) until TDC offset has been cleared to zero.
5. With engine running, use scan tool to verify engine coolant temperature is greater than 170°F (77°C). It may be necessary to drive vehicle to obtain correct engine coolant temperature if engine coolant temperature is less than specified.
6. As soon at engine coolant temperature is greater than 170°F (77°C) and engine speed is less than 1500 RPM, the PCM automatically learns a NEW TDC offset. The NEW TDC offset will overwrite the previous TDC offset. Using scan tool, note NEW TDC offset. TDC offset should be -.25 to -.75.
7. Shut engine off. If TDC offset is not within specification, go to next step. If TDC offset is within specification, TDC offset learn procedure is complete.
8. Using Flange Nut Wrench (J41089), loosen fuel injection pump retaining nuts. Fuel injection pump must be rotated to change TDC offset. Rotating fuel injection pump .039" (1.00 mm) will change TDC offset about 2 degrees. Rotating fuel injection pump toward driver's side of vehicle will produce a positive (+) number and rotating fuel injection pump toward passenger's side of vehicle will produce a negative (-) number.
9. Using Fuel Injection Pump Wrench (J 29872-A), slightly rotate fuel injection pump. Tighten fuel injection pump retaining nuts.
10. Repeat step 3) through 9) until TDC offset is within specification. If proper TDC offset

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cannot be obtained, check the following:

- Ensure engine coolant temperature is greater than 170°F (77°C).
- Electric connectors at PCM are properly installed.
- Electric connectors at injection timing stepper motor on side of fuel injection pump is correctly installed.
- Ensure latest Techline software was used.
- Check for proper base installation of fuel injection pump. The electric engine shutoff solenoid on top of fuel injection pump should be approximately straight up and down.
- Fuel injection pump may be defective, although manufacturer states this is highly unlikely.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (4.3L, 5.0L, 5.7L & 7.4L Except Calif.)

1. Procedure must be performed if any of the following have been done:
   - EEPROM was reprogrammed.
   - If crankshaft position sensor was removed or replaced.
   - Vehicle Control Module (VCM) was replaced.
2. Install scan tool on Data Link Connector (DLC). Apply parking brake. Block rear wheels. Ensure hood is closed.
3. Place transmission in Park (A/T models) or Neutral (M/T models). Start engine and warm engine until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
4. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.
5. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the VCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate.

6. If CKP sensor variation learn procedure was completed, turn ignition off for at least 15 seconds and remove scan tool. If CKP sensor variation learn procedure was not completed, a DTC P1336 should be stored in the VCM. Perform test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Password Learn Procedure For Anti-Theft System (4.3L, 5.0L & 5.7L)

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1. Password learn procedure must be performed if Vehicle Control Module (VCM), passlock module or passlock sensor is replaced. A password is communicated between VCM and passlock module to provide engine operation. If VCM is replaced, the VCM must learn the password from the passlock module.
2. Attempt to start engine. Engine will start and then stall. After engine stalls, leave ignition on for 10 minutes. After engine stalls the SECURITY indicator light will come on for 10 minutes and then go off. The SECURITY indicator light is located on right corner of instrument panel, just to the right of battery charge indicator.

NOTE: Ensure battery is fully charged before proceeding. Ensure steps are followed in correct order or procedure may need to be repeated.

3. After SECURITY indicator light goes off, turn ignition off for 30 seconds. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off. After SECURITY indicator light goes off, turn ignition off for 30 seconds.
4. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off.
5. Turn ignition off for 30 seconds. Turn ignition on and wait 30 seconds. Attempt to start engine. If engine starts, password learn procedure is complete. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Password Learn Procedure For Anti-Theft System (6.5L Diesel)

1. Password learn procedure must be performed if Powertrain Control Module (PCM), passlock module or passlock sensor is replaced. A password is communicated between PCM and passlock module to provide engine operation. If PCM is replaced, the PCM must learn the password from the passlock module.
2. Attempt to start engine. Engine will start and then stall. After engine stalls, leave ignition on for 10 minutes. After engine stalls the SECURITY indicator light will come on for 10 minutes and then go off. SECURITY indicator light is located on right corner of instrument panel, just to the right of battery charge indicator.

NOTE: Ensure battery is fully charged before proceeding. Performing this procedure will cause a Diagnostic Trouble Code (DTC) P1630 to be set in the VCM. It will be necessary to use scan tool to check for DTC P1630 when performing

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this procedure. Ensure steps are followed in correct order or procedure may need to be repeated.

3. After SECURITY indicator light goes off, turn ignition off for 30 seconds. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off. After SECURITY indicator light goes off, turn ignition off for 30 seconds.
4. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off or until DTC 1630 is set in PCM.
5. Turn ignition off for 30 seconds. Turn ignition on and wait 30 seconds. Attempt to start engine. If engine starts, password learn procedure is complete. Ensure DTC 1630 is cleared from PCM by turning ignition off for 30 seconds and then turning ignition on again. If DTC 1630 is not cleared from PCM, perform test procedures for DTC 1630 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

NOTE: DTC 1630 will be set in PCM as result of this procedure. DTC P1630 may be cleared from PCM by turning ignition off for 30 seconds and then turning ignition on again.

6. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Password Learn Procedure For Anti-Theft System (7.4L)

1. Password learn procedure must be performed if Vehicle Control Module (VCM), passlock module or passlock sensor is replaced. A password is communicated between VCM and passlock module to provide engine operation. If VCM is replaced, the VCM must learn the password from the passlock module.
2. Attempt to start engine. Engine will start and then stall. After engine stalls, leave ignition on for 10 minutes. After engine stalls the SECURITY indicator light will come on for 10 minutes and then go off. SECURITY indicator light is located on right corner of instrument panel, just to the right of battery charge indicator.

NOTE: Ensure battery is fully charged before proceeding. Performing this procedure will cause a Diagnostic Trouble Code (DTC) P1630 to be set in the VCM. It will be necessary to use scan tool to check for DTC P1630 when performing this procedure. Ensure steps are followed in correct order or

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procedure may need to be repeated.

3. After SECURITY indicator light goes off, turn ignition off for 30 seconds. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off. After SECURITY indicator light goes off, turn ignition off for 30 seconds.
4. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off or until DTC 1630 is set in VCM.
5. Turn ignition off for 30 seconds. Turn ignition on and wait 30 seconds. Attempt to start engine. If engine starts, password learn procedure is complete. Ensure DTC 1630 is cleared from VCM by turning ignition off for 30 seconds and then turning ignition on again. If DTC 1630 is not cleared from VCM, perform test procedures for DTC 1630 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

NOTE: DTC 1630 will be set in VCM as result of this procedure. DTC P1630 may be cleared from VCM by turning ignition off for 30 seconds and then turning ignition on again.

6. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Vehicle Driveability Computer Relearn Procedure (4.3L, 5.0L, 5.7L & 7.4L)

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Vehicle Control Module (VCM) was replaced, driving the vehicle will enable the VCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the VCM completes the computer relearn procedure.

Vehicle Driveability Computer Relearn Procedure (6.5L Diesel)

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

ESCALADE, PICKUP, SIERRA, SILVERADO, TAHOE, YUKON & YUKON XL

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NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

NOTE: References to California models apply to California emission vehicles, which may be verified by underhood Emission Control label. California emissions may be available in other states.

Crankshaft Position (CKP) Sensor Variation Learn Procedure (4.3L, 4.8L, 5.0L, 5.3L, 5.7L, 6.0L & 7.4L)

1. Procedure must be performed if any of the following have been done:
   - EEPROM was reprogrammed.
   - If crankshaft position sensor was removed or replaced.
   - Vehicle Control Module (VCM) was replaced.
2. Install scan tool on Data Link Connector (DLC). Apply parking brake. Block rear wheels. Ensure hood is closed.
3. Place transmission in Park (A/T models) or Neutral (M/T models). Start engine and warm engine until engine coolant temperature is at least 150°F (65°C). Ensure all accessories are off.
4. Apply service brakes. With engine idling, use scan tool to select and enable CKP sensor variation learn procedure.
5. Gradually accelerate engine to 4000 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the VCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate.

6. If CKP sensor variation learn procedure was completed, turn ignition off for at least 15 seconds and remove scan tool. If CKP sensor variation learn procedure was not completed, a DTC P1336 should be stored in the VCM. Perform test procedures for DTC P1336 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (4.3L, 5.0L & 5.7L)

1. If Vehicle Control Module (VCM) was replaced, the EEPROM in the VCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the VCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link

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Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.

3. Once EEPROM is reprogrammed, Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system must be performed using proper procedure.

NOTE: If EEPROM programming fails, ensure all electrical connections on VCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace VCM.

4. Once Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming (7.4L)

1. If Vehicle Control Module (VCM) was replaced, the EEPROM in the VCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the VCM.
2. Ensure battery is fully charged. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. Crankshaft Position (CKP) sensor variation learn procedure should ONLY be performed on Except Calif. models. DO NOT perform CKP sensor variation learn procedure on Calif. models. Verify vehicle application by using underhood Emission Control label. If EEPROM programming fails, ensure all electrical connections on VCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace VCM. Once EEPROM is reprogrammed, use scan tool to reset Idle Air Control (IAC) valve. On Calif. models, go to next step. On Except Calif. models, go to step 5).
4. Once EEPROM is reprogrammed, password learn procedure for anti-theft system must be performed using proper procedure. Once password learn procedure for anti-theft system has been performed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
5. Once EEPROM is reprogrammed, Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system must be performed using proper procedure. Once Crankshaft Position (CKP) sensor variation learn procedure and password learn procedure for anti-theft system are performed, perform powertrain On-

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Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Powertrain Control Module (PCM) Programming (4.8L, 5.3L & 6.0L)

1. Ensure battery is fully charged. Turn ignition on. Program PCM using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
2. Once PCM is reprogrammed, Crankshaft Position (CKP) sensor variation learn procedure, password learn procedure for anti-theft system, and PCM idle learn procedure must be performed.

NOTE: If programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If programming still fails, replace PCM.

Powertrain Control Module (PCM) Programming (6.5L Diesel)

1. If PCM was replaced, the PCM must be programmed. If PCM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.
2. Ensure battery is fully charged. Ensure cable at Data Link Connector (DLC) and power supply for scan tool are properly connected. Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model.
3. Perform password learn procedure for anti-theft system using proper procedure. Once PCM is programmed, if only the PCM was replaced, go to next step. If the crankshaft position sensor, engine or PCM with fuel injection pump were replaced, perform TDC offset learn procedure. See TDC OFFSET LEARN PROCEDURE (6.5L DIESEL).

NOTE: If PCM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

4. Start engine and warm engine until engine coolant temperature is at least 170°F (77°C). This will allow TDC offset to be programmed into the PCM if necessary. The PCM has the ability to determine the amount of offset required to bring the engine to TDC. PCM uses the TDC offset to determine proper fuel injection pump timing. If TDC offset is not programmed, a Diagnostic Trouble Code (DTC) P1214 will be set in the PCM.

Password Learn Procedure For Anti-Theft System (4.3L, 4.8L, 5.3L & 6.0L)

1. Password relearn procedure must be performed if passlock sensor, Body Control Module

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(BCM), PCM or Vehicle Control Module (VCM) are replaced. Ensure battery is fully charged.

2. Using scan tool, erase Diagnostic Trouble Codes (DTC). Turn ignition switch from OFF to CRANK position, allowing vehicle to try and start. Vehicle will start and then stall. Leave ignition on while observing SECURITY indicator on instrument panel. When security indicator turns off (after about 10 minutes), turn ignition off. Wait 10 seconds. Repeat this step 3 more times. New password will be learned on next start attempt.

Password Learn Procedure For Anti-Theft System (5.0L, 5.7L & 7.4L)

1. Password learn procedure must be performed if Vehicle Control Module (VCM), passlock module or passlock sensor is replaced. A password is communicated between VCM and passlock module to provide engine operation. If VCM is replaced, the VCM must learn the password from the passlock module.
2. Attempt to start engine. Engine will start and then stall. After engine stalls, leave ignition on for 10 minutes. After engine stalls, the SECURITY indicator light will come on for 10 minutes and then go off. The SECURITY indicator light is located on upper right corner of instrument panel, just above battery charge indicator.

NOTE: Ensure battery is fully charged before proceeding. Performing this procedure will cause a Diagnostic Trouble Code (DTC) P1630 to be set in the VCM. It will be necessary to use scan tool to check for DTC P1630 when performing this procedure. Ensure steps are followed in correct order or procedure may need to be repeated.

3. After SECURITY indicator light goes off, turn ignition off for 30 seconds. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off. After SECURITY indicator light goes off, turn ignition off for 30 seconds.
4. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off or until DTC 1630 is set in VCM.
5. Turn ignition off for 30 seconds. Turn ignition on and wait 30 seconds. Attempt to start engine. If engine starts, password learn procedure is complete. Ensure DTC 1630 is cleared from VCM by turning ignition off for 30 seconds and then turning ignition on again. If DTC 1630 is not cleared from VCM, perform test procedures for DTC 1630 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

NOTE: DTC 1630 will be set in VCM as result of this procedure. DTC P1630 may be cleared from VCM by turning ignition off for 30

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seconds and then turning ignition on again.

6. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

Password Learn Procedure For Anti-Theft System (6.5L Diesel)

1. Password learn procedure must be performed if Powertrain Control Module (PCM), passlock module or passlock sensor is replaced. A password is communicated between PCM and passlock module to provide engine operation. If PCM is replaced, the PCM must learn the password from the passlock module.
2. Attempt to start engine. Engine will start and then stall. After engine stalls, leave ignition on for 10 minutes. After engine stalls, the SECURITY indicator light will come on for 10 minutes and then go off. SECURITY indicator light is located on upper right corner of instrument panel, just above battery charge indicator. After SECURITY indicator light goes off, turn ignition off for 30 seconds.

NOTE: Ensure battery is fully charged before proceeding. Performing this procedure will cause a Diagnostic Trouble Code (DTC) P1630 to be set in the VCM. It will be necessary to use scan tool to check for DTC P1630 when performing this procedure. Ensure steps are followed in correct order or procedure may need to be repeated.

3. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off. After SECURITY indicator light goes off, turn ignition off for 30 seconds.
4. Attempt to start engine and then leave ignition on. After engine has stalled, leave ignition on for 10 minutes. SECURITY indicator light will come on for 10 minutes and then go off or until DTC 1630 is set in PCM.
5. Turn ignition off for 30 seconds. Turn ignition on and wait 30 seconds. Attempt to start engine. If engine starts, password learn procedure is complete. Ensure DTC 1630 is cleared from PCM by turning ignition off for 30 seconds and then turning ignition on again. If DTC 1630 is not cleared from PCM, perform test procedures for DTC 1630 and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

NOTE: DTC 1630 will be set in PCM as result of this procedure. DTC P1630 may be cleared from PCM by turning ignition off for 30 seconds and then turning ignition on again.

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6. If engine does not start, ensure procedure was properly followed. If procedure was properly followed, check for any DTCs. If any DTCs exist, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

TDC Offset Learn Procedure (6.5L Diesel)

1. Procedure must be performed if any of the following have been done or exists:
   - If sent here from Diagnostic Trouble Code (DTC) P1214.
   - Engine has been replaced.
   - Crankshaft position sensor or engine front cover has been replaced.
   - Powertrain Control Module (PCM) and fuel injection pump have been replaced.

   NOTE: DO NOT perform procedure unless sent here from DTC P1214 or one of the components listed above has been replaced.

2. The PCM has the ability to determine amount of offset required to bring the engine to TDC when TDC offset is not present or has been cleared. This procedure must be performed to allow PCM to be updated with the correct TDC offset for vehicle application.
3. Install scan tool on Data Link Connector (DLC). Start engine and warm engine until engine coolant temperature is at least 170°F (77°C). Using scan tool, clear DTCs from PCM. Turn ignition on with engine off. Fully depress and hold throttle at full throttle for at least 45 seconds.
4. Turn ignition off for 30 seconds. Start engine. Verify scan tool indicates TDC offset has been cleared to zero. If TDC offset has been cleared to zero, go to next step. If TDC offset has not been cleared to zero, repeat step 3) until TDC offset has been cleared to zero.
5. With engine running, use scan tool to verify engine coolant temperature is greater than 170°F (77°C). It may be necessary to drive vehicle to obtain correct engine coolant temperature if engine coolant temperature is less than specified.
6. As soon at engine coolant temperature is greater than 170°F (77°C) and engine speed is less than 1500 RPM, the PCM automatically learns a NEW TDC offset. The NEW TDC offset will overwrite the previous TDC offset. Using scan tool, note NEW TDC offset. TDC offset should be -.25 to -.75.
7. Shut engine off. If TDC offset is not within specification, go to next step. If TDC offset is within specification, TDC offset learn procedure is complete.
8. Using Flange Nut Wrench (J41089), loosen fuel injection pump retaining nuts. Fuel injection pump must be rotated to change TDC offset. Rotating fuel injection pump .039" (1.00 mm) will change TDC offset about 2 degrees. Rotating fuel injection

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pump toward driver's side of vehicle will produce a positive (+) number and rotating fuel injection pump toward passenger's side of vehicle will produce a negative (-) number.

9. Using Fuel Injection Pump Wrench (J 29872), slightly rotate fuel injection pump. Tighten fuel injection pump retaining nuts.
10. Repeat steps 3) through 9) until TDC offset is within specification. If proper TDC offset cannot be obtained, check the following:
    - Ensure engine coolant temperature is greater than 170°F (77°C).
    - Electric connectors at PCM are properly installed.
    - Electric connectors at injection timing stepper motor on side of fuel injection pump is correctly installed.
    - Ensure latest Techline software was used.
    - Check for proper base installation of fuel injection pump. The electric engine shutoff solenoid on top of fuel injection pump should be approximately straight up and down.
    - Fuel injection pump may be defective, although manufacturer states this is highly unlikely.

Vehicle Driveability Computer Relearn Procedure (4.8L, 5.3L & 6.0L)

1. On manual transmission vehicles, go to next step. On automatic transmission vehicles, turn ignition off. Reconnect PCM battery connection. Turn A/C off. Set parking brake and block drive wheels. Start and run engine so coolant reaches 176°F (80°C). Shift transmission into Drive. Idle engine for 5 minutes. Shift transmission into Park. Idle engine another 5 minutes. Turn engine off for 30 seconds. PCM relearn procedure is completed.
2. On manual transmission vehicles, turn ignition off. Reconnect PCM battery connection. Turn A/C off. Set parking brake and block drive wheels. Shift transmission into Neutral. Start and run engine so coolant reaches 176°F (80°C). Idle engine for 5 minutes. Turn engine off for 30 seconds. PCM relearn procedure is completed.

Vehicle Driveability Computer Relearn Procedure (4.3L, 5.0L, 5.7L & 7.4L)

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Vehicle Control Module (VCM) was replaced, driving the vehicle will enable the VCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the VCM completes the computer relearn procedure.

Vehicle Driveability Computer Relearn Procedure (6.5L Diesel)

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was

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replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

MONTANA, SILHOUETTE & VENTURE

NOTE: Read all procedures listed to determine why and when each procedure is to be performed before proceeding.

Crankshaft Position (CKP) Sensor Variation Learn Procedure

1. Procedure must be performed if any of the following have been done or exist:
   - EEPROM was reprogrammed.
   - If Diagnostic Trouble Code (DTC) P1336 exists.
   - If crankshaft, crankshaft position sensor, engine, Powertrain Control Module (PCM) or vibration damper have been replaced.
2. CKP sensor variation compensating values are stored in PCM after a learn procedure has been performed. If actual CKP sensor values are not within specification, DTC P0300 will be stored in the PCM.
3. Using scan tool, check for stored DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If no DTCs exist, or if DTC P1336 exists, go to next step. If any DTCs exist except for P1336, perform test procedures for specified DTC and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure all DTCs are learned from PCM. Go to next step.
4. Ensure ignition is off. Apply parking brake. Block front wheels. Ensure hood is closed. Start engine and warm engine until engine coolant temperature is at least 158°F (70°C). Turn ignition off.

NOTE: Ensure engine coolant temperature is at least 158°F (70°C) before performing CKP sensor variation learn procedure.

5. Using scan tool, select and enable CKP sensor variation learn procedure. Start engine. Apply service brakes. Ensure transaxle is in Park.
6. Accelerate engine until CKP sensor variation learn procedure fuel cut off is obtained at 5150 RPM. Quickly release throttle to idle position once CKP sensor variation learn procedure fuel cut off is obtained and engine starts to decelerate. Once CKP sensor variation values are learned, the PCM will return engine control to the operator and engine will respond to throttle position.

CAUTION: Ensure throttle is quickly released to idle position once CKP sensor variation learn procedure fuel cut off is obtained.

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7. If CKP sensor variation learn procedure was not terminated, go to next step. If CKP sensor variation learn procedure was terminated, this may be caused by PCM detecting a problem in cam signal causing DTC P0341, 3X crank signal causing DTC P1374 3X, or 24X crank signal causing DTC P0336 24X. Using scan tool, check for stored DTCs. Perform test procedures for specified DTCs and repair as necessary. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.
8. Check scan tool for status of DTC P1336. If scan tool indicates DTC P1336 ran and passed, CKP sensor variation learn procedure is complete. If scan tool indicates DTC P1336 failed or was not run, check for any other DTCs. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If any other DTCs exist, perform test procedures for specified DTC and repair as necessary. If no other DTCs exist, repeat CKP sensor variation learn procedure.

Electronically Erasable Programmable Read Only Memory (EEPROM) Programming

1. If Powertrain Control Module (PCM) was replaced, the EEPROM in the PCM must be programmed. If EEPROM is not programmed, a Diagnostic Trouble Code (DTC) will be set in the PCM.
2. Ensure battery is fully charged. If battery is being charged, ensure battery charger is disconnected before performing EEPROM programming procedure.
3. Ensure cable is properly connected on Data Link Connector (DLC). Turn ignition on. Perform EEPROM programming using the Techline equipment manufacturer's instructions and latest software applicable for the vehicle model. New PCM must learn Pass Key(R) password. See PASS-KEY(R) III MODULE PROGRAMMING.
4. Once EEPROM has been reprogrammed, perform powertrain On-Board Diagnostic (OBD) system check. See POWERTRAIN ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. Ensure engine is idling for one minute before checking for DTCs when performing powertrain OBD system check. Also, after EEPROM has been reprogrammed, the Crankshaft Position (CKP) sensor variation learn procedure must be performed. See CRANKSHAFT POSITION (CKP) SENSOR VARIATION LEARN PROCEDURE.

NOTE: If EEPROM programming fails, ensure all electrical connections on PCM are okay. Check Techline for latest software. If EEPROM programming still fails, replace PCM.

PASS-Key(R) III Module Programming

NOTE: New modules are unprogrammed. New module automatically learns first key used to start engine. New module can only be programmed once.

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NOTE: PASS-Key(R) III system auto learn procedure must be performed if all keys are lost, or Powertrain Control Module (PCM), PASS-Key(R) III module, ignition lock cylinder, steering column assembly or ignition key are replaced. A password is communicated between PASS-Key(R) III module and PCM to provide engine operation. If PCM is replaced, the PCM must learn the password from the PASS-Key(R) III module.

PASS-Key(R) III System Auto Learn Procedure

1. Insert a valid mechanical coded unlearned ignition key in the ignition switch. Place ignition switch in RUN position. The SECURITY indicator light will flash once per second for 10 minutes for the length of the auto learn timer.
2. When auto learn timer expires and SECURITY indicator light goes off, place ignition switch in OFF position. Remove ignition key. Wait 10 seconds.
3. Repeat steps **1)** and **2)** 2 more times. Insert the newly learned ignition key in ignition switch.
4. Place ignition switch in RUN position. The SECURITY indicator light should remain off to indicate that ignition key was learned. This will be the only learned key. To program more keys, see PASS-KEY(R) III SYSTEM QUICK LEARN PROCEDURE. If security indicator does not remain off, repeat procedure.

NOTE: PASS-Key(R) III system quick learn procedure is used to learn additional ignition keys. A learned key must be used to initiate procedure. Up to 10 ignition keys can be learned.

PASS-Key(R) III System Quick Learn Procedure

1. Insert a valid ignition key in the ignition switch. Turn ignition on. After 2 second bulb test, turn ignition off and remove key.
2. Within 10 seconds, insert new valid mechanical code unlearned key and turn ignition switch to RUN position. Security light will illuminate until key is learned. This may happen so quickly light illumination is not observed. Turn ignition off. Remove ignition key 10 seconds after light goes out.
3. To learn additional keys, repeat step 2). To exit procedure, turn ignition off for more than 10 seconds.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they

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are accustomed to until the PCM completes the computer relearn procedure.

TRACKER

NOTE: Powertrain Control Module (PCM) does not have a reprogrammable EEPROM. No special procedures are required for programming the PCM.

Vehicle Driveability Computer Relearn Procedure

Manufacturer does not provide a specified computer relearn procedure for obtaining proper driveability. If vehicle battery was disconnected or Powertrain Control Module (PCM) was replaced, driving the vehicle will enable the PCM to perform a computer relearn procedure for obtaining proper driveability. Inform customer that driveability may differ from what they are accustomed to until the PCM completes the computer relearn procedure.

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2000-01 BRAKES

Anti-Lock/TCS - Bosch 5.3 - C, G, H & K Bodies

MODEL IDENTIFICATION

MODEL IDENTIFICATION

Body Code (1)	Model
"C"	Park Avenue
"G"	Aurora
"H"	Bonneville & LeSabre
"K"	DeVille & Seville
(1) Vehicle body code is fourth character of VIN.	

DESCRIPTION & OPERATION

ANTI-LOCK BRAKING

The Anti-Lock Brake System (ABS) and Traction Control System (TCS) increases vehicle control during severe deceleration and acceleration on most road surfaces. The ABS/TCS monitors individual wheel speed during a braking event. The Electronic Brake Control Module (EBCM) processes these values and produces commands to prevent braked wheels from locking.

The Brake Pressure Modulator Valve (BPMV) regulates brake fluid pressure based on road condition information from EBCM, regardless of master cylinder output pressure. The BPMV can maintain, reduce or increase brake fluid pressure under ABS conditions; however, BPMV cannot increase brake fluid pressure above master cylinder output. BPMV can apply brake pressure to front brakes when EBCM requires a front wheel be slowed (regulated) during a Traction Control System (TCS) event.

DYNAMIC REAR PROPORTIONING

The Dynamic Rear Proportioning (DRP) is a control system that replaces the hydraulic proportioning function of the mechanical proportioning valve in the base brake system. DRP control system is part of the operation software in EBCM. DRP uses active control with existing ABS to regulate vehicle's rear brake pressure. The red brake warning indicator is illuminated when the dynamic rear proportioning function is disabled.

TRACTION CONTROL SYSTEM

When drive wheel slip is noted while brake is not applied, EBCM will enter traction control mode.

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First, EBCM requests PCM to reduce amount of torque to drive wheels via requested torque signal circuit. PCM reduces torque to drive wheels by retarding spark timing and turning off fuel injectors. PCM reports amount torque delivered to drive wheels via delivered torque signal circuit.

If engine torque reduction does not eliminate drive wheel slip, EBCM will actively apply drive wheel brakes. During traction control braking, hydraulic pressure in each drive wheel circuit is controlled to prevent drive wheels from slipping. Master cylinder isolation valve closes in order to isolate master cylinder from rest of hydraulic system. Prime valve then opens to allow pump to accumulate brake fluid to build hydraulic pressure for braking. Drive wheel inlet and outlet solenoid valves then open and close in order to perform pressure hold, pressure increase and pressure decrease.

VEHICLE STABILITY ENHANCEMENT SYSTEM

Vehicle Stability Enhancement System (VSES) includes an additional level of vehicle control to EBCM. VSES is activated by EBCM, calculating desired yaw rate and comparing it to actual yaw rate input. Desired yaw rate is calculated from measured steering wheel position, vehicle speed and lateral acceleration. The difference between desired yaw rate and actual yaw rate is yaw rate error, which is a measurement of oversteer or understeer. If yaw rate error becomes too large, EBCM will attempt to correct vehicle's yaw motion by applying differential braking to left or right front wheel.

SYSTEM SELF-TEST

The EBCM performs an automatic test once every ignition cycle when ignition switch is turned to RUN position. The self-test cycles each solenoid valve and pump motor (and any necessary relays) in order to check component operation. If a malfunction is detected, EBCM will set a DTC. The self-test may be heard and felt, and is a normal mode of operation.

BRAKE PRESSURE MODULATOR VALVE

Brake Pressure Modulator Valve (BPMV) contains hydraulic valves and pump motor that are controlled electrically by EBCM. BPMV uses a 4 circuit configuration with a diagonal split. BPMV directs fluid from reservoir of master cylinder to left front and right rear wheels and fluid from the other reservoir to right front and left rear wheels. Diagonal circuits are hydraulically isolated so that a leak or malfunction in one circuit will allow continued braking ability on the other.

ELECTRONIC BRAKE CONTROL MODULE (EBCM)

Electronic Brake Control Module (EBCM) is mounted directly to BPMV. EBCM receives input from Powertrain Control Module (PCM), wheel speed sensors, steering sensor and brake switch. EBCM outputs information to PCM and BPMV.

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EBCM determines when to activate TCS and how to respond to a particular situation requiring TCS. TCS intervention is achieved using one or more of the following: spark retard (timing), turning off fuel injectors or brake intervention. EBCM also disables TCS when engine is off, with ignition on (when vehicle is being towed).

SYSTEM RELAY

System relay is integral with EBCM and cannot be serviced separately. System relay is energized when ignition is on and no ABS DTCs are present. It supplies battery positive voltage to solenoid valves and pump motor.

SERVICING

TIRES

Tire size is important for proper performance of ABS/TCS. Replace tires in axle sets only. Tires must be same size, load range, and construction as original tires. Using any other tire size or type may affect ABS/TCS operation. Using compact spare supplied with vehicle will not affect ABS/TCS performance.

SERVICE PRECAUTIONS

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all WARNINGS and SERVICE PRECAUTIONS in appropriate AIR BAG RESTRAINT SYSTEMS article in ACCESSORIES & EQUIPMENT.

BLEEDING BRAKE SYSTEM

CAUTION: Only use DOT 3 brake fluid. DO NOT use DOT 5 silicone brake fluid. DO NOT allow brake fluid to contact skin or painted surfaces.

MANUAL BLEEDING PROCEDURE

1. Deplete vacuum reserve from power brake booster by depressing brake pedal several times with engine off. Fill master cylinder and keep at least half full during bleeding procedure. If master cylinder is not suspected of having air in bore, go to step 4 . If master cylinder is known or is suspected of having air in bore, go to next step.
2. Loosen forward brakeline fitting at master cylinder. Allow fluid to flow from fitting. Tighten fitting. Have an assistant depress brake pedal slowly and hold. Loosen forward fitting. Tighten fitting while pedal is still depressed. Release brake pedal slowly. Wait 15 seconds.

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3. Repeat step 2 , including 15-second wait, until fluid is clear and free of air bubbles. Repeat procedure at other (rearmost) brakeline fitting on master cylinder. Master cylinder is now bled. If calipers are not suspected to have air in them, it is not necessary to bleed them.
4. If calipers are known or suspected to have air in them, raise and support vehicle. Remove bleeder valve cap from right rear wheel. Place proper size box end wrench over bleeder valve. Attach one end of clear tube over valve and submerge other end in container partially filled with clean brake fluid.
5. Have an assistant depress brake pedal slowly and hold. Loosen bleeder valve to purge air from cylinder. Tighten bleeder valve and slowly release brake pedal. Wait 15 seconds. Repeat sequence, including 15-second wait, until all air is removed.
6. Remove tube and wrench. Proceed to left rear, right front and left front wheels in this order. Fill master cylinder reservoir, and install cover. Ensure there is no sponginess in brake pedal and that BRAKE warning light is off.

PRESSURE BLEEDING PROCEDURE

1. Install Bleeder Adapter (J-35589-A) to brake master cylinder. Pressurize bleeder to 30-35 psi (2.11-2.46 kg/cm^2). Connect bleeder hose to adapter, and bleed air from adapter.
2. Raise and support vehicle. Starting at right rear wheel, place proper size box end wrench over bleeder valve. Attach one end of clear tube over valve and submerge other end in container partially filled with clean brake fluid.
3. Loosen bleeder valve at least 3/4 turn to purge air from cylinder. Tighten bleeder valve when air is no longer present in tube. Repeat sequence until all air is removed.
4. Remove tube and wrench. Proceed to left rear, then right front and finish at left front wheel. Remove bleeder adapter. Fill master cylinder and install cover. Ensure there is no sponginess in brake pedal and that BRAKE warning light is off.

AUTO BLEED PROCEDURE

CAUTION: Perform MANUAL BLEEDING PROCEDURE or PRESSURE BLEEDING PROCEDURE before performing auto bleed procedure.

NOTE: Auto bleed procedure is used to provide a complete bleed procedure on Anti-Lock Brake System/Traction Control System (ABS/TCS) equipped vehicles. This procedure cycles system valves and runs the pump to purge air from circuits normally closed during non ABS/TCS (normal) brake system operation and bleeding. This procedure should be used when air is suspected in secondary circuits or when Brake Pressure Modulator Valve

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(BPMV) has been replaced.

NOTE: On limousine and hearse conversions, perform procedure twice.

1. Raise and support vehicle. Remove wheels. Inspect brake system for leaks or damage. Repair as necessary before continuing.
2. Ensure battery is fully charged. Connect scan tool to DLC. Turn ignition on, with engine off. Using scan tool, establish communications with the ABS/TCS system. Select ABS/TCS then Special Function and then AUTOMATED BLEED PROCEDURE.
3. Bleed basic brake system. See **MANUAL BLEEDING PROCEDURE** or **PRESSURE BLEEDING PROCEDURE** . Follow scan tool directions until desired brake pedal height is achieved. If bleed procedure is aborted, a malfunction is present. If a DTC is present, diagnose affected DTC first. If brake pedal is spongy, perform conventional brake bleeding procedure again.
4. After diagnosing affected DTC or performing conventional brake system bleeding procedure, go to next step.
5. When desired pedal height is achieved, depress brake pedal to check for firmness. Disconnect scan tool. Check brake fluid level. Road test vehicle.

PROGRAMMING

ELECTRONIC BRAKE CONTROL MODULE

If Electronic Brake Control Module (EBCM) is replaced, new EBCM must be programmed. See Techline Terminal/Equipment user's instructions for programming.

TIRE PRESSURE MONITOR RESET PROCEDURE

NOTE: On DeVille and Seville, Tire Pressure Monitor (TIM) is accomplished through Remote Function Actuator (RFA) module. Programming EBCM is not required for TIM operation.

NOTE: If DTC 1245 remains current, see DTC 1245: TIRE INFLATION MONITOR under DIAGNOSTIC TESTS.

Tire Inflation Monitor (TIM) Reset Using Dash Information Center (DIC)

1. Set all tires to manufacturer's recommended pressure.
2. Start engine.
3. Press SELECT buttons on DIC to scroll until GAGE PAGE is displayed in DIC.
4. Press SELECT buttons on DIC within GAGE PAGE display until TIRE PRESSURE LOW message is displayed on DIC.

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5. Press and hold DIC RESET button on DIC until TIRE PRESSURE RESET message is displayed on DIC.
6. Release button. TIRE PRESSURE NORMAL message is displayed. System is now in autolearn mode.
7. Using scan tool, clear DTCs.

Tire Inflation Monitor (TIM) Reset Using Scan Tool

1. Set all tires to manufacturer's recommended pressure.
2. Install scan tool.
3. Start engine.
4. Using scan tool, perform TIRE PRESSURE RESET in DRP/ABS/TCS/TIM/VSES (if equipped) SPECIAL FUNCTIONS. TIRE PRESSURE NORMAL message is displayed. System is now in autolearn mode.
5. Using scan tool, clear DTCs.

DIAGNOSIS & TESTING

EBCM performs system self-diagnostics and can detect and often isolate a system malfunction. When a malfunction is detected, EBCM sets a DTC and illuminates ABS/TCS warning light and may also disable ABS/TCS functions as necessary for duration of ignition cycle.

EBCM performs an auto test once per ignition cycle when ignition is turned to RUN position. Auto test cycles each solenoid valve and pump motor (and all necessary relays) in order to check component operation. If an error is detected, EBCM will set a DTC. AUTO TEST may be felt and heard while it is in progress.

RETRIEVING DIAGNOSTIC TROUBLE CODES

Diagnostic Trouble Codes (DTC) are retrieved using Tech 2 scan tool. Follow scan tool manufacturer's instructions to perform tests.

Before diagnosing DTCs, perform **DIAGNOSTIC SYSTEM CHECK** first. Scan tool is also used to perform test modes for diagnosis and service of the ABS/TCS system.

DIAGNOSTIC SYSTEM CHECK

1. Install scan tool. If scan tool powers up, go to next step. If scan tool does not power up, see SCAN TOOL DOES NOT POWER UP in appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
2. Turn ignition on, engine off. Try to establish scan tool communication with Driver Information Center (DIC), Electronic Brake Control Module (EBCM), Instrument Panel Cluster (IPC), Instrument Panel integration Module (IPM) and Powertrain Control

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Module (PCM). If communication with all modules is established, go to next step. If communication with any module is not established, see SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE in appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.

3. Select display DTC function for each module. Record all displayed DTCs, status of displayed DTCs and module that set DTC. If DTCs are displayed, go to next step. If no DTCs are displayed, see **SYMPTOM DIAGNOSIS** .
4. Retrieve codes and perform appropriate test. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** table.

DIAGNOSTIC TROUBLE CODE DEFINITIONS

DTC	Description
BXXXX	(1)
C1211	ABS Indicator Signal Circuit High
C1214	System Relay Contact Or Coil Circuit Open
C1217	BPMV Pump Motor Control Circuit Short
C1218	Pump Motor Voltage
C1221-C1224	Wheel Speed Sensor Input Signal Is Zero
C1225-C1228	Excessive Wheel Speed Variation
C1232-C1235	Wheel Speed Sensor Circuit Open Or Shorted
C1236	Low System Supply Voltage
C1237	High System Supply Voltage
C1238	Drive Wheel Brake Rotor Excessive Temperature
C1242	BPMV Pump Motor Short To Ground
C1243	BPMV Pump Motor Stalled
C1245	Tire Inflation Monitor
C1246	Brake Lining Wear Circuit Open
C1248	Dynamic Rear Proportioning Control System
C1251 (2)	RSS Indicated Malfunction
C1252 (3)	LF Normal Force Malfunction
C1253 (3)	RF Normal Force Malfunction
C1254	Checksum Error
C1255	EBTCM Internal Malfunction (ABS/TCS Disabled)
C1256	EBTCM Internal Malfunction
C1261	LF Inlet Solenoid Valve Malfunction
C1262	LF Outlet Solenoid Valve Malfunction
C1263	RF Inlet Solenoid Valve Malfunction

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C1264	RF Outlet Solenoid Valve Malfunction
C1265	LR Inlet Solenoid Valve Malfunction
C1266	Drive Wheel Brake Rotor Excessive Temperature
C1267	RF Inlet Solenoid Valve Malfunction
C1268	RR Outlet Solenoid Valve Malfunction
C1271	LF TCS Master Cylinder Isolation Valve Malfunction
C1272	LF TCS Traction Control Valve Malfunction
C1273	RF TCS Master Cylinder Isolation Valve Malfunction
C1274 (2)	RF TCS Pressure Control Solenoid Valve Malfunction
C1276 (3)	Delivered Torque Signal Circuit Malfunction
C1277 (3)	Requested Torque Signal Circuit Malfunction
C1278	TCS Temporarily Inhibited By PCM
C1281	Steering Sensor Uncorrelated Malfunction
C1282	Yaw Rate Sensor Bias Circuit Malfunction
C1283	Excessive Time To Center Steering
C1284	Lateral Accelerometer Self Test Malfunction
C1285	Lateral Accelerometer Circuit Malfunction
C1286	Steering Sensor Bias Malfunction
C1287	Steering Sensor Rate Malfunction
C1288	Steering Sensor Circuit Malfunction
C1291	Open Brakelight Switch Contacts During Deceleration
C1293	DTC C1291 Set In Previous Ignition Cycle
C1294	Brakelight Switch Circuit Always Active
C1295	Brakelight Switch Circuit Open
C1298 (4)	Class 2 Serial Data Link Malfunction
P1571	Requested Torque Signal Circuit Malfunction
P1644	Delivered Torque Signal Voltage Invalid
P1689	Delivered Torque Signal Voltage Invalid
PXXXX	(5)
UXXXX	(6)

(1) See DIAGNOSTIC TESTS in appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.

(2) Cadillac only.

(3) 2000 Cadillac only.

(4) 2000 models only.

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C1285	Lateral Accelerometer Circuit Malfunct
C1286	Steering Sensor Bias Malfunct
C1287	Steering Sensor Rate Malfunct
C1288	Steering Sensor Circuit Malfunct
C1291	Open Brakelight Switch Contacts During Decelerat

For any DTC beginning with the letter "P" except P1571, P1644 or P1689, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. For any DTC beginning with the letter "U", see SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE in appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.

CLEARING DIAGNOSTIC TROUBLE CODES

There are 2 methods to clear DTCs:

- Scan tool method. Follow scan tool manufacture's instructions.
- Ignition cycle default. On the ignition cycle default method, DTCs will be cleared if ignition cycles 100 times without a particular malfunction/DTC appearing. EBCM ignition cycle counter will reset to zero.

DTCs cannot be cleared by unplugging EBCM, disconnecting battery or by turning ignition off (except on 50th cycle of ignition cycle default). Whichever method is used, ensure proper system operation and absence of DTCs when clearing procedure is completed.

SCAN TOOL TEST MODES

Data List

Data lists for EBCM include Controller Information 1, Controller Information 2, DRP/ABS/TCS/TIM Data, VSES Data, Phase 1-4 and No Phase.

DTC History

Scan tool will display last 3 DTCs to occur, one at a time. DTC with most recent occurrence will be displayed first. Each DTC will include number of drive cycles since DTC last occurred, number of occurrences for DTC since scan tool DTC information was last cleared and most recent DTC will also display various data parameters with values from time of DTC occurrence.

DTC(s)

In this mode, DTCs stored in the EBCM memory may be displayed or cleared.

Snapshot

In this mode, scan tool captures data before and after a snapshot-triggering condition which may or may not set a DTC. Refer to scan tool manufacturer's information on the use of this mode.

Special Functions

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This mode performs functional tests on ABS/TCS system which help to verify proper operation. In this mode, testing and observing the test results can further identify malfunction conditions. Under this test, the following tests are available:

- **Automated Test**

  This test cycles each solenoid valve and pump motor to check component operation. This is identical to self-test that is performed when ignition switch is turned to RUN position. A DTC will set if malfunction is detected.

- **Automated Bleed**

  Used to bleed ABS hydraulics.

- **Solenoid Test**

  This test activates selected solenoid valves, commanding solenoid on and off.

- **Normal Mode Eavesdrop**

  Monitors serial data messages that relate to system operation. Normal mode eavesdrop is a list of data parameters. Normal mode eavesdrop function has 2 modes:

  - **Phase 1-4**

    The term phase refers to ignition switch changing states. Data parameters shown will display a value only when there is a change in ignition state. Otherwise, scan tool displays all asterisks next to each parameter.

  - **No Phase**

    Data parameters shown are not affected by changing of ignition states. Scan tool will display a value only when there is a serial data message that relates to the individual parameter. Otherwise, scan tool displays all asterisks next to each parameter.

- **Pump Motor Test**

  This test turns pump motor on and off.

- **Steering Wheel Position Sensor Test**

  This test monitors the analog and digital steering angle position and can only be run after the Steering Wheel Position Sensor has been centered.

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- **TCS On/Off Test**

  This test commands traction control system on and off. Performs same function as traction control switch.

- **TCS Test**

  Runs pump motor in order to apply fluid pressure to front wheel circuits.

SYMPTOM DIAGNOSIS

If DTCs are not stored, diagnose system by symptom, see **SYMPTOM DIAGNOSTIC TESTS** table.

SYMPTOM DIAGNOSTIC TESTS

Symptom	Perform Test
"C" Body	
ABS Indicator Always On	A
ABS Indicator Inoperative	B
VSES Inoperative	C
VSES Unwanted Activation	D
VSES Excessive Brake Pulsation	E
No Communication With EBCM (1)	F
Traction Off Indicator Always On (2)	G
Traction Off Indicator Always On (3)	G
Traction Off Indicator Inoperative (2)	H
Traction Off Indicator Inoperative (3)	H
"G" Body	
ABS Indicator Always On	A
ABS Indicator Inoperative	B
VSES Inoperative	C
VSES Unwanted Activation	D
VSES Excessive Brake Pulsation	E
Traction Off Indicator Always On	G
Traction Off Indicator Inoperative	H
Traction Active Indicator Always On	I
Traction Active Indicator Inoperative	J
"H" Body	

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Symptom	Perform T
ABS Indicator Always On (4)	A
"C" Body	
ABS Indicator Inoperative (4)	B
ABS Indicator Always On	
VSES Inoperative	C
ABS Indicator Inoperative	
VSES Unwanted Activation	D
VSES Inoperative	
VSES Excessive Brake Pulsation	E
VSES Unwanted Activation	
No Communication With EBCM (1)	F
VSES Excessive Brake Pulsation	
Traction Off Indicator Always On (1)	G
No Communication With EBCM	
Traction Off Indicator Always On (2)	G
Traction Off Indicator Always On	
Traction Off Indicator Inoperative (3)	H
Traction Off Indicator Always On	
Traction Off Indicator Inoperative (2)	H
Traction Off Indicator Inoperative	
Low Traction Indicator Always On (5)	I
Traction Off Indicator Inoperative	
"G" Body	
Low Traction Indicator Inoperative (5)	J
ABS Indicator Always On (5)	K
Traction Ready Indicator Always On	
ABS Indicator Inoperative	L
Traction Ready Indicator Inoperative (5)	
VSES Inoperative	
"K" Body	
VSES Unwanted Activation	
ABS Indicator Always On	A
VSES Excessive Brake Pulsation	
ABS Indicator Inoperative	B
Traction Off Indicator Always On	
VSES Inoperative	C
Traction Off Indicator Inoperative	
VSES Unwanted Activation	D
Traction Active Indicator Always On	
VSES Excessive Brake Pulsation	E
Traction Active Indicator Inoperative	
No Communication With EBCM (1)	F
"H" Body	
Traction Off Indicator Always On (1)	G
Traction Off Indicator Inoperative (2)	H
Traction Off Indicator Inoperative (3)	H
Traction Control Indicator Always On	I
Traction Control Indicator Inoperative	J

(1) 2000 only.

(2) 2000.

(3) 2001.

(4) ANTILOCK indicator on 2000 Bonneville.

(5) Bonneville only.

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INTERMITTENT OR POOR CONNECTIONS

Most intermittent conditions are caused by faulty electrical connections or wiring. Inspect for the following items:

- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector--Refer to Testing for Proper Terminal Contact for the specific procedure.
- Poor terminal to wire connection--Some conditions which fall under this description are poor crimps, poor solder joints, crimping over the wire insulation rather than the wire itself and corrosion in the wire to terminal contact area, etc.
- Wire insulation which is rubbed through--This causes an intermittent short as the bare area touches other wiring or parts of the vehicle.

It is important to test terminal contact at component and any in-line connectors before replacing a suspect component. Mating terminals must be inspected to ensure good terminal contact. A poor connection between male and female terminal at a connector may be the result of contamination or deformation. Contamination may be caused by connector halves being improperly connected. A missing or damaged connector seal, damage to connector itself, or exposing terminals to moisture and dirt can also cause contamination. Contamination, usually in underhood or underbody connectors, leads to terminal corrosion, causing an open circuit or intermittently open circuit. Deformation is caused by probing mating side of a connector terminal without proper adapter, improperly joining connector halves, or repeatedly separating and joining connector halves. Deformation, usually to female terminal contact tang, can result in poor terminal contact causing an open or intermittently open circuit.

SYMPTOM TESTS

NOTE: To identify circuits and wire colors referenced in testing, see WIRING DIAGRAMS . Testing system requires the use of Pinout Box (J 39700) and Adapter Cable (J 39700-300). After repairs, recheck system operation to verify that problem has been repaired. See DIAGNOSTIC SYSTEM CHECK under DIAGNOSIS & TESTING.

TEST A: ABS INDICATOR ALWAYS ON ("C", "G", "H" & "K" BODIES)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Check EBCM ground, making sure ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to next step.

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3. Install scan tool. Turn ignition on, engine off. Using scan tool, observe ABS WARNING INDICATOR parameter in DRP/ABS/TCS data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 5 .
4. Turn ignition off. Turn ignition on, engine off. Observe ABS indicator on instrument cluster during bulb check. If ABS indicator illuminates during bulb check, and then turns off, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If ABS indicator does not illuminate during bulb check, and then turn off, go to step 6 .
5. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 7 .
6. Check instrument cluster connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 8 .
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 9 .
8. Replace instrument cluster. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
9. Operate system to verify repair.

TEST B: ABS INDICATOR INOPERATIVE ("C", "G", "H" & "K" BODIES)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Check EBCM ground, making sure ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to next step.
3. Install scan tool. Turn ignition on, engine off. Using scan tool, observe ABS WARNING INDICATOR parameter in DRP/ABS/TCS data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 5 .
4. Turn ignition off. Turn ignition on, engine off. Observe ABS indicator on instrument cluster during bulb check. If ABS indicator illuminates during bulb check, and then turns off, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If ABS indicator does not illuminate during bulb check, and then turn off, go to step 6 .
5. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 7 .
6. Check instrument cluster connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 8 .
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 9 .
8. Replace instrument cluster. See appropriate ANALOG INSTRUMENT PANELS article

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in ACCESSORIES & EQUIPMENT. After repairs, go to next step.

9. Operate system to verify repair.

TEST C: VSES INOPERATIVE ("C", "G", "H" & "K" BODIES)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Start engine. Observe VSES IS CENTERED parameter in VSES data list. Perform **DIAGNOSTIC TEST DRIVE** . If scan tool displays YES within 30 seconds, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If scan tool does not display YES within 30 seconds, go to next step.
3. Using scan tool, perform STEERING POSITION SENSOR TEST. If Steering Wheel Position Sensor (SWPS) passed test, go to next step. If SWPS did not pass test, go to step 7 .
4. Using scan tool, observe LATERAL ACCELEROMETER INPUT parameter in VSES data list. If scan tool displays 2.3-2.7 volts, go to next step. If scan tool does not display 2.3-2.7 volts, go to step 8 .
5. Using scan tool, observe YAW RATE SENSOR INPUT parameter in VSES data list. If scan tool displays 2.3-2.7 volts, go to next step. If scan tool does not display 2.3-2.7 volts, go to step 9 .
6. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 10 .
7. Replace SWPS. See appropriate STEERING COLUMNS article in STEERING. After repairs, go to step 10 .
8. Replace lateral accelerometer sensor. See **LATERAL ACCELEROMETER SENSOR** under REMOVAL & INSTALLATION. After repairs, go to step 10 .
9. Replace yaw rate sensor. See **YAW RATE SENSOR** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Operate system to verify repair.

Diagnostic Test Drive

CAUTION: Do not perform any unlawful or unsafe maneuvers.

When servicing vehicles with Vehicle Stability Enhancement System (VSES), test drives will be necessary to allow all tests to be run, and all system functions to be enabled and exercised. A test drive may also be required to duplicate specific DTCs covered in this section. Diagnostic system check (including test drive) should be run when vehicle repairs are complete in order to verify repair. Diagnostic test drive will vary for ABS, TCS, or VSES

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concerns.

The following is a suggested VSES diagnostic test drive.

1. Read Diagnostic Aids.
2. Turn ignition off.
3. Reconnect any previously disconnected components.
4. Start engine.
5. Install scan tool.
6. Using scan tool, observe VSES IS CENTERED parameter in VSES data list. Scan tool will indicate YES with steering wheel centered. Drive vehicle in a straight line for 45 seconds at 15 MPH while monitoring scan tool.
7. Remove scan tool.
8. Drive vehicle under the following conditions for at least 10 minutes:
   - Highway driving.
   - Rough roads.
   - Perform turning maneuvers (curved freeway entrance ramp, parking lot maneuvers) and high steering angles and yaw rates at low speeds.
   - Verify customer concern and duplicate driving conditions.
9. With engine still running, using scan tool, check for DTCs. If any DTCs are set, see **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under DIAGNOSTIC SYSTEM CHECK under DIAGNOSIS & TESTING.

TEST D: VSES UNWANTED ACTIVATION ("C", "G", "H" & "K" BODIES)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Inspect mounting of yaw rate sensor. See **YAW RATE SENSOR** under REMOVAL & INSTALLATION. If problem was found, repair as necessary. After repairs, go to step 15 . If problem was not found, go to next step.
3. Install scan tool. Start engine. Using scan tool, observe YAW RATE SENSOR INPUT parameter in VSES data list. Perform **DIAGNOSTIC TEST DRIVE** under TEST G: VSES INOPERATIVE. If scan tool displays sudden increase or decrease without rapid turning of vehicle, go to next step. If scan tool does not display sudden increase or decrease without rapid turning of vehicle, go to step 5 .
4. Perform diagnosis for DTC C1282. See **DTC C1282: YAW RATE SENSOR BIAS CIRCUIT MALFUNCTION** under DIAGNOSTIC TESTS. If problem was found, repair as necessary. After repairs, go to step 15 . If problem was not found, go to step 12 .
5. Straighten front wheels. Observe DUAL ANALOG SWPS INPUT A and DUAL

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ANALOG SWPS INPUT B in VSES data list. Slowly rotate steering wheel in both directions. If scan tool display changes state as steering wheel is rotated, go to next step. If scan tool display does not change state as steering wheel is rotated, go to step 14 .

6. Using scan tool, perform STEERING POSITION SENSOR TEST. If Steering Wheel Position Sensor (SWPS) passed test, go to next step. If SWPS did not pass test, go to step 14 .
7. Place vehicle on a level surface. Using scan tool, observe LATERAL ACCELEROMETER INPUT parameter in VSES data list. If scan tool displays 2.3-2.7 volts, go to step 9 . If scan tool does not display 2.3-2.7 volts, go to next step.
8. Inspect mounting of lateral accelerometer sensor. See **LATERAL ACCELEROMETER SENSOR** under REMOVAL & INSTALLATION. If problem was found, repair as necessary. After repairs, go to step 15 . If problem was not found, go to next step.
9. Check EBCM for proper part number. If EBCM has correct part number, go to next step. If EBCM does not have correct part number, go to step 12 .
10. Inspect power steering gear for proper part number. If power steering gear has correct part number, go to next step. If power steering gear does not have correct part number, go to step 13 .
11. Inspect alignment of vehicle. If problem was found, repair as necessary. After repair, go to step 15 . If problem was not found, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING.
12. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repair, go to step 15 .
13. Replace power steering gear. See appropriate RACK & PINION article in STEERING. After repair, go to step 15 .
14. Replace SWPS. See appropriate STEERING COLUMNS article in STEERING. After repairs, go to next step.
15. Operate system to verify repair.

TEST E: VSES EXCESSIVE BRAKE PULSATION ("C", "G", "H" & "K" BODIES)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Select Powertrain Control Module (PCM) display DTCs function. If scan tool displays DTC P1575, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If scan tool does not display DTC P1575, go to next step.
3. Using scan tool, observe EXTENDED TRAVEL BRAKE SWITCH parameter in DRP/ABS/TCS data list. Step on and off brake pedal with enough force to simulate a hard braking condition. As brake pedal is pressed and released, scan tool should read

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APPLIED and RELEASED. Use a tape measure to measure distance brake pedal travels for scan tool to read APPLIED. If distance is 1.0-1.3 inch (2.5-3.3 cm), problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If distance is not 1.0-1.3 inch (2.5-3.30), go to next step.

4. Adjust or repair extended travel brake switch as necessary. See **STOPLIGHT SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
5. Operate system to verify repair.

TEST F: NO COMMUNICATION WITH EBCM (2000 "C", "H" & "K" BODIES)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Turn ignition off. Install scan tool. Turn ignition on, engine off. Attempt to establish communication with other modules on class 2 serial data line, such as PCM. If scan tool communicates with any other modules on class 2 serial data line, go to next step. If scan tool does not communicate with any other modules on class 2 serial data line, see SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE in appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
3. Turn ignition off. Inspect ABS fuse (10-amp) in rear fuse block. If fuse is okay, go to next step. If fuse is not okay, go to step 7 .
4. Inspect ABS fuse (50-amp) in underhood fuse block. If fuse is okay, go to step 9 . If fuse is not okay, go to next step.
5. Install new ABS fuse (50-amp) in underhood fuse block. Inspect new ABS fuse (50-amp). If fuse is okay, see **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If fuse is not okay, go to next step.

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters and DTC C1245 setting. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

6. Turn ignition off. Remove ABS Fuse from underhood fuse block. Disconnect EBCM connector. Connect Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check battery voltage circuit for short to ground. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to step 15 .
7. Turn ignition off. Install new ABS fuse in rear fuse block. Turn ignition on, engine off. Inspect new ABS fuse (10-amp). If fuse is okay, see **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If fuse is not okay, go to next step.

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NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters and DTC C1245 setting. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

8. Turn ignition off. Remove ABS fuse (10-amp) from rear fuse block. Disconnect EBCM connector. Connect Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Turn ignition on, engine off. Check ignition voltage circuit for short to ground. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to step 15 .
9. Install fuses, if removed. Turn ignition on, engine off. Measure voltage at ABS fuse (10-amp) in rear fuse block by probing between fuse test terminals and ground. If battery voltage is present, go to next step. If battery voltage is not present, go to step 16 .
10. Measure voltage at ABS fuse (50-amp) in underhood fuse block by probing between fuse test terminals and ground. If battery voltage is present, go to next step. If battery voltage is not present, go to step 17 .
11. Check EBCM ground, making sure ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to next step.
12. Turn ignition off. Disconnect EBCM connector. Connect Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check EBCM ground circuit for open. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to next step.
13. Turn ignition on, engine off. Check ignition voltage circuit of EBCM for open. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to next step.
14. Check battery voltage circuit of EBCM for open. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to next step.
15. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to step 18 .
16. Check rear fuse block connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to step 19 .
17. Check underhood fuse block connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 21 . If problem was not found, go to step 20 .
18. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repair, go to step 21 .
19. Replace rear fuse block. After repairs, go to step 21 .
20. Replace underhood fuse block. After repairs, go to next step.

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21. Operate system in order to verify repair.

TEST G: TRACTION OFF INDICATOR ALWAYS ON (2000 "C" BODY)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TRACTION SWITCH parameter in BODY CONTROL MODULE data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 4 .
3. Activate traction control switch. Using scan tool, observe TRACTION SWITCH parameter. If TRACTION SWITCH parameter changes state, see **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TRACTION SWITCH parameter does not change state, go to next step.
4. Turn ignition off. Disconnect traction control switch connector. Turn ignition on, engine off. Using scan tool, observe TRACTION SWITCH parameter. If scan tool displays OFF, go to step 7 . If scan tool does not display OFF, go to next step.
5. Check signal circuit of traction control switch for short to ground. If problem was found, repair as necessary. After repairs, go to step 10 . If problem is not found, go to next step.
6. Check BCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 8 .
7. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 9 .
8. Replace BCM. See appropriate BODY CONTROL MODULES article ACCESSORIES & EQUIPMENT. After repairs, go to step 10 .
9. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Operate system to verify repair.

TEST G: TRACTION OFF INDICATOR ALWAYS ON (2000 "H" BODY)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter in CLIMATE CONTROL PANEL data list (manual A/C) or INSTRUMENT PANEL MODULE data list (automatic A/C). If scan tool displays OFF, go to next step. If scan tool dose not display OFF, go to step 4 .
3. Activate traction control switch. Using scan tool, observe TCS SWITCH parameter. If TCS SWITCH parameter changes state, see **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TRACTION SWITCH parameter does not change state, go to next step.

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4. Turn ignition off. Disconnect traction control switch connector. Turn ignition on, engine off. Using scan tool, observe TRACTION SWITCH parameter. If scan tool displays OFF, go to step 7 . If scan tool does not display OFF, go to next step.
5. Check signal circuit of traction control switch for short to ground. If problem was found, repair as necessary. After repairs, go to step 10 . If problem is not found, go to next step.
6. Check A/C control connector (manual A/C) or instrument panel module connector (automatic A/C) for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 8 .
7. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 9 .
8. Replace A/C control (manual A/C) or instrument panel module (automatic A/C). See appropriate MANUAL A/C HEATER SYSTEMS article in AIR CONDITIONING & HEATING SERVICE & REPAIR or appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repair, go to step 10 .
9. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Operate system to verify repair.

TEST G: TRACTION OFF INDICATOR ALWAYS ON (2000 "K" BODY)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter in INSTRUMENT PANEL MODULE data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 4 .
3. Activate traction control switch. Using scan tool, observe TCS SWITCH parameter. If TCS SWITCH parameter changes state, see **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TRACTION SWITCH parameter does not change state, go to next step.
4. Turn ignition off. Disconnect traction control switch connector. Turn ignition on, engine off. Using scan tool, observe TRACTION SWITCH parameter. If scan tool displays OFF, go to step 7 . If scan tool does not display OFF, go to next step.
5. Check signal circuit of traction control switch for short to ground. If problem was found, repair as necessary. After repairs, go to step 10 . If problem is not found, go to next step.
6. Check Instrument Panel integration Module (IPM) connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 8 .
7. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 9 .
8. Replace IPM. See appropriate ANALOG INSTRUMENT PANELS article in

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ACCESSORIES & EQUIPMENT. After repairs, go to step 10 .

9. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Operate system to verify repair.

TEST G: TRACTION OFF INDICATOR ALWAYS ON (2001 "C", "G" & "H" BODIES)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS WARNING INDICATOR/MESSAGE parameter in DRP/ABS/TCS data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 4 .
3. Turn ignition off. Turn ignition on, engine off. Observe TRACTION OFF indicator on instrument cluster during bulb check. If TRACTION OFF indicator illuminates during bulb check, and then turns off, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TRACTION OFF indicator does not illuminate during bulb check, and then turn off, go to step 5 .
4. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to step 6 .
5. Check instrument cluster connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to step 7 .
6. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 8 .
7. Replace instrument cluster. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
8. Operate system to verify repair.

TEST H: TRACTION OFF INDICATOR INOPERATIVE (2000 "C" BODY)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TRACTION SWITCH parameter in BODY CONTROL MODULE data list. Activate traction control switch. If TRACTION SWITCH parameter changes state, see **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TRACTION SWITCH parameter does not change state, go to next step.
3. Turn ignition off. Disconnect traction control switch connector. Connect fused jumper between signal circuit of traction control switch connector and ground. Turn ignition on, engine off. Using scan tool, observe TRACTION SWITCH parameter. If scan tool displays ON, go to step 5 . If scan tool does not display ON, go to next step.
4. Check signal circuit of traction control switch for open or high resistance. If problem

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was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 6 .

5. Check ground circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 7 .
6. Check BCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 8 .
7. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 9 .
8. Replace BCM. See appropriate BODY CONTROL MODULES article ACCESSORIES & EQUIPMENT. After repairs, go to step 10 .
9. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Operate system to verify repair.

TEST H: TRACTION OFF INDICATOR INOPERATIVE (2000 "H" BODY)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter in CLIMATE CONTROL PANEL data list (manual A/C) or INSTRUMENT PANEL MODULE data list (automatic A/C). Activate traction control switch. If TCS SWITCH parameter changes state, see **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TCS SWITCH parameter does not change state, go to next step.
3. Turn ignition off. Disconnect traction control switch connector. Connect fused jumper between signal circuit of traction control switch connector and ground. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter. If scan tool displays ON, go to step 5 . If scan tool does not display ON, go to next step.
4. Check signal circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 6 .
5. Check ground circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 7 .
6. Check A/C control connector (manual A/C) or instrument panel module connector (automatic A/C) for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 8 .
7. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 9 .

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8. Replace A/C control (manual A/C) or instrument panel module (automatic A/C). See appropriate MANUAL A/C HEATER SYSTEMS article in AIR CONDITIONING & HEATING SERVICE & REPAIR or appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repair, go to step 10 .
9. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Operate system to verify repair.

TEST H: TRACTION OFF INDICATOR INOPERATIVE (2000 "K" BODY)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter in Instrument Panel Module (IPM) data list. Activate traction control switch. If TCS SWITCH parameter changes state, see **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TCS SWITCH parameter does not change state, go to next step.
3. Turn ignition off. Disconnect traction control switch connector. Connect fused jumper between signal circuit of traction control switch connector and ground. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter. If scan tool displays ON, go to step 5 . If scan tool does not display ON, go to next step.
4. Check signal circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 6 .
5. Check ground circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 7 .
6. Check IPM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 8 .
7. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 9 .
8. Replace IPM. See appropriate ANALOG INSTRUMENT PANELS or ANALOG & ELECTRONIC INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to step 10 .
9. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Operate system to verify repair.

TEST H: TRACTION OFF INDICATOR INOPERATIVE (2001 "C" & "G" BODIES)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to

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next step.

2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS WARNING INDICATOR/MESSAGE parameter in DRP/ABS/TCS data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 13 .
3. Turn ignition off. Turn ignition on, engine off. Observe TRACTION OFF indicator on instrument cluster during bulb check. If TRACTION OFF indicator illuminates during bulb check, and then turns off, go to next step. If TRACTION OFF indicator does not illuminate during bulb check, and then turn off, go to step 14 .
4. Turn ignition off. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter in INSTRUMENT PANEL MODULE data list. Activate traction control switch. If TCS SWITCH PARAMETER changes state, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TCS SWITCH PARAMETER does not change state, go to next step.
5. If scan tool indicates TCS SWITCH parameter as ON, go to next step. If scan tool does not indicate TCS SWITCH parameter as ON, go to step 7 .
6. Turn ignition off. Disconnect traction control switch connector. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter. If scan tool displays OFF, go to step 12 . If scan tool does not display OFF, go to step 8 .
7. Turn ignition off. Disconnect traction control switch connector. Connect fused jumper wire (3 amp) between traction control switch connector signal circuit and ground circuit. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter. If scan tool displays ON, go to step 12 . If scan tool does not display ON, go to step 9 .
8. Test signal circuit of traction control switch for short to ground. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 11 .
9. Test signal circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to next step.
10. Test ground circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to next step.
11. Check IPM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 15 .
12. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 16 .
13. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 17 .
14. Check Instrument Panel Cluster (IPC) connector for poor connections. If problem was

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found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 18 .

15. Replace IPM. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to step 19 .
16. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to step 19 .
17. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 19 .
18. Replace IPC. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
19. Operate system to verify repair.

TEST H: TRACTION OFF INDICATOR INOPERATIVE (2001 "H" BODY)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS WARNING INDICATOR/MESSAGE parameter in DRP/ABS/TCS data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 13 .
3. Turn ignition off. Turn ignition on, engine off. Observe TRACTION OFF indicator on instrument cluster during bulb check. If TRACTION OFF indicator illuminates during bulb check, and then turns off, go to next step. If TRACTION OFF indicator does not illuminate during bulb check, and then turn off, go to step 14 .
4. Turn ignition off. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter in CLIMATE CONTROL PANEL data list (manual A/C) or INSTRUMENT PANEL MODULE data list (automatic A/C). Activate traction control switch. If TCS SWITCH parameter changes state, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TCS SWITCH PARAMETER does not change state, go to next step.
5. If scan tool indicates TCS SWITCH parameter as ON, go to next step. If scan tool does not indicate TCS SWITCH parameter as ON, go to step 7 .
6. Turn ignition off. Disconnect traction control switch connector. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter. If scan tool displays OFF, go to step 12 . If scan tool does not display OFF, go to step 8 .
7. Turn ignition off. Disconnect traction control switch connector. Connect fused jumper wire 3 amp between traction control switch connector signal circuit and ground circuit. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter. If scan tool displays ON, go to step 12 . If scan tool does not display ON, go to step 9 .
8. Test signal circuit of traction control switch for short to ground. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 11 .

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9. Test signal circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to next step.
10. Test ground circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to next step.
11. Check A/C control connector (manual A/C) or instrument panel module connector (automatic A/C) for poor connections. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 15 .
12. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 16 .
13. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 17 .
14. Check instrument panel cluster connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 19 . If problem was not found, go to step 18 .
15. Replace A/C control (manual A/C) or instrument panel module (automatic A/C). See appropriate MANUAL A/C HEATER SYSTEMS article in AIR CONDITIONING & HEATING SERVICE & REPAIR or appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repair, go to step 19 .
16. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to step 19 .
17. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 19 .
18. Replace instrument panel cluster. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
19. Operate system to verify repair.

TEST H: TRACTION OFF INDICATOR INOPERATIVE (2001 "K" BODY)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Turn ignition on. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter in INSTRUMENT PANEL MODULE data list. Activate traction control switch. If TCS SWITCH parameter changes state, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TCS SWITCH PARAMETER does not change state, go to next step.
3. If scan tool indicates TCS SWITCH parameter as ON, go to next step. If scan tool does

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not indicate TCS SWITCH parameter as ON, go to step 5 .

4. Turn ignition off. Disconnect traction control switch connector. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter. If scan tool displays OFF, go to step 10 . If scan tool does not display OFF, go to step 6 .
5. Turn ignition off. Disconnect traction control switch connector. Connect fused jumper wire (3 amp) between traction control switch connector signal circuit and ground circuit. Turn ignition on, engine off. Using scan tool, observe TCS SWITCH parameter. If scan tool displays ON, go to step 10 . If scan tool does not display ON, go to step 7 .
6. Check signal circuit of traction control switch for short to ground. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to step 9 .
7. Check signal circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to next step.
8. Check ground circuit of traction control switch for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to next step.
9. Check IPM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to step 11 .
10. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to step 12 .
11. Replace IPM. See appropriate ANALOG INSTRUMENT PANELS or ANALOG & ELECTRONIC INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to step 13 .
12. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
13. Operate system to verify repair.

TEST I: TRACTION ACTIVE INDICATOR ALWAYS ON (BONNEVILLE & "K" BODY, & 2001 2001 "G" BODY)

NOTE: Indicator is TRACTION ACTIVE on Aurora, LOW TRAC on Bonneville and TRACTION CONTROL on Cadillac.

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Check EBCM ground, making sure ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to next step.
3. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS ACTIVE

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INDICATOR/MESSAGE parameter in DRP/ABS/TCS data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 5 .

4. Turn ignition off. Turn ignition on, engine off. Observe TRACTION ACTIVE indicator on instrument cluster during bulb check. If TRACTION ACTIVE indicator illuminates during bulb check, and then turns off, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TRACTION ACTIVE indicator does not illuminate during bulb check, and then turn off, go to step 6 .
5. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 7 .
6. Check instrument cluster connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 8 .
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 9 .
8. Replace instrument cluster. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
9. Operate system to verify repair.

TEST J: TRACTION ACTIVE INDICATOR INOPERATIVE (BONNEVILLE & "K" BODY, & & 2001 "G" BODY)

NOTE: Indicator is TRACTION ACTIVE on Aurora, LOW TRAC on Bonneville and TRACTION CONTROL on Cadillac.

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Check EBCM ground, making sure ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to next step.
3. Install scan tool. Turn ignition on, engine off. Using scan tool, observe TCS ACTIVE INDICATOR/MESSAGE parameter in DRP/ABS/TCS data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 5 .
4. Turn ignition off. Turn ignition on, engine off. Observe TRACTION ACTIVE indicator on instrument cluster during bulb check. If TRACTION ACTIVE indicator illuminates during bulb check, and then turns off, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If TRACTION ACTIVE indicator does not illuminate during bulb check, and then turn off, go to step 6 .
5. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 7 .
6. Check instrument cluster connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 8 .

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7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 9 .
8. Replace instrument cluster. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
9. Operate system to verify repair.

TEST K: TRACTION READY INDICATOR ALWAYS ON (BONNEVILLE)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Turn ignition off. Disconnect instrument cluster. Turn ignition on, engine off. If TRACTION READY indicator turns off, go to step 5 . If TRACTION READY indicator does not turn off, go to next step.
3. Check White wire between traction control switch and Instrument Panel Cluster (IPC) for short to voltage. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to next step.
4. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to step 6 .
5. Check IPC connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to step 7 .
6. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to step 8 .
7. Replace IPC. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
8. Operate system to verify repair.

TEST L: TRACTION READY INDICATOR INOPERATIVE (BONNEVILLE)

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Turn ignition off. Disconnect traction control switch. Turn ignition on, engine off. Measure voltage between White wire at traction control switch and ground. If battery voltage is present, go to step 5 . If battery voltage is not present, go to next step.
3. Check ground circuit of traction control switch for open. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to next step.
4. Check White wire between Instrument Panel Cluster (IPC) and traction control switch for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 6 .
5. Check traction control switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 7 .

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6. Check IPC connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 8 .
7. Replace traction control switch. See **TRACTION CONTROL SWITCH** under REMOVAL & INSTALLATION. After repairs, go to step 9 .
8. Replace IPC. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
9. Operate system to verify repair.

DIAGNOSTIC TESTS

NOTE: To identify circuits and wire colors referenced in testing, see WIRING DIAGRAMS . Testing system requires the use of Pinout Box (J 39700) and Adapter Cable (J 39700-300). After repairs, recheck system operation to verify that problem has been repaired. See DIAGNOSTIC SYSTEM CHECK under DIAGNOSIS & TESTING.

DTC C1211: ABS INDICATOR SIGNAL CIRCUIT HIGH

Circuit Description

Instrument cluster controls operation of ABS indicator. EBCM reports desired status of ABS indicator via serial data messages. ABS indicator signal circuit is a back-up reporting circuit to serial data messages. EBCM supplies ground through circuit when ABS is operating properly. When there is a problem with ABS that should turn on ABS indicator, EBCM opens ABS indicator signal circuit. If there is a problem with ABS serial data messages, instrument cluster uses ABS indicator signal to determine if ABS indicator should be illuminated. Using serial data messages and back-up circuit, instrument cluster decides whether to turn on ABS indicator. DTC sets when EBCM commands indicator off, and ABS indicator signal circuit voltage is greater than 4.5 volts for 2 seconds.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe ABS WARNING INDICATOR parameter in DRP/ABS/TCS data list. If scan tool displays OFF, go to next step. If scan tool does not display OFF, go to step 4 .
3. Turn ignition off. Turn ignition on, engine off. Observe ABS indicator on Instrument Panel Cluster (IPC) during bulb check. If ABS indicator illuminates during bulb check, go to next step. If ABS indicator does not illuminate during bulb check, go to step 6 .

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NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

4. Turn ignition off. Disconnect EBCM harness connector. Connect Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Disconnect instrument cluster harness connector. Check ABS indicator signal circuit for short to voltage. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to next step.
5. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 7 .
6. Check IPC connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 8 .
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 9 .
8. Replace IPC. See appropriate ANALOG INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT. After repairs, go to next step.
9. Using scan tool, clear DTCs. Operate vehicle to verify repair.

Diagnostic Aids

A possible cause of DTC is short to battery in ABS indicator signal circuit.

DTC C1214: SYSTEM RELAY CONTACT OR COIL CIRCUIT OPEN

Circuit Description

System relay is energized when ignition is on. System relay supplies voltage to solenoid valves and pump motor. This voltage is referred to as system voltage.

DTC sets when system voltage is less than 8 volts for 0.23 seconds, ignition voltage is more than 10.5 volts and system relay is commanded on.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine OFF. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC resets as a current DTC, go to next step. If DTC does not reset as a current DTC, problem is intermittent. See **INTERMITTENT**

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OR POOR CONNECTIONS under DIAGNOSIS & TESTING.

3. Disconnect pump motor harness pigtail connector of Brake Pressure Modulator Valve (BPMV). Measure resistance between each pump motor control circuit and housing of BPMV at pump motor connector of BPMV. If DVOM displays infinite resistance, go to step 5 . If DVOM does not display infinite resistance, go to next step.
4. Replace EBCM and BPMV. See **BRAKE PRESSURE MODULATOR VALVE** under REMOVAL & INSTALLATION. After repairs, go to step 6 .
5. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
6. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC does not reset, system is okay.

Diagnostic Aids

System relay is integral to EBCM. Relay is not serviceable.

DTC C1217: BPMV PUMP MOTOR CONTROL CIRCUIT SHORT

Circuit Description

System relay is energized when ignition is on. System relay supplies voltage to solenoid valves and pump motor. This voltage is referred to as system voltage. EBCM controls pump motor by grounding control circuit. DTC sets when pump motor has been commanded off for one second and system voltage is greater than 9 volts. And then, voltage across pump motor is greater than 10.2 volts or pump motor low side voltage is less than 2.7 volts for 0.2 second.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

2. Turn ignition off. Disconnect EBCM harness connector. Connect Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Test both ground circuits of EBCM including EBCM ground for high resistance or open. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to next step.

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3. Disconnect pump motor harness pigtail connector of BPMV. Measure resistance between each pump motor control circuit and housing of BPMV at pump motor connector of BPMV. If resistance is less than 5 ohms, go to next step. If resistance is 5 ohms or more, go to step 5 .
4. Check BPMV connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to step 6 .
5. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to step 7 .
6. Replace BPMV. See **BRAKE PRESSURE MODULATOR VALVE** under REMOVAL & INSTALLATION. After repairs, go to step 8 .
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
8. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC does not reset, system is okay.

Diagnostic Aids

DTC determines if there is a short in pump motor control circuit. Pump motor is integral to BPMV. Pump motor is not serviceable.

DTC C1218: PUMP MOTOR VOLTAGE

Circuit Description

System relay is energized when ignition is on. System relay supplies voltage to solenoid valves and pump motor. This voltage is referred to as system voltage. EBCM controls pump motor by grounding control circuit. DTC sets when commanded pump motor voltage is less than system voltage, actual pump motor voltage is 3 volts less than commanded voltage, or with commanded pump motor voltage greater than system voltage, actual pump motor voltage is less than 8 volts. Pump motor is commanded on, system voltage is greater than 8 volts, and conditions exists for more than 0.5 second.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC resets, go to next step. If DTC does not reset, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING.
3. Turn ignition off. Disconnect pump motor connector of BPMV. Connect test light between pump motor circuits at pump motor connector of EBCM. Refer to Using Connector Test Adapters in Wiring Systems. Using scan tool, clear DTCs. Using scan

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tool, perform Pump Motor Test. If test light illuminates, go to step 5 . If test light does not illuminate, go to next step.

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

4. Turn ignition off. Disconnect EBCM harness connector. Connect Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check both ground circuits of EBCM including EBCM ground for high resistance or open. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 6 .
5. Check BPMV connector for poor connections. If problem is found, repair as necessary. After repairs, go to step 9 . If problem is not found, go to step 7 .
6. Check EBCM connector for poor connections. If problem is found, repair as necessary. After repairs, go to step 9 . If problem is not found, go to step 8 .
7. Replace BPMV. See **BRAKE PRESSURE MODULATOR VALVE** under REMOVAL & INSTALLATION. After repairs, go to step 9 .
8. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 9 .
9. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC does not reset, system is okay.

Diagnostic Aids

Pump motor is integral to BPMV. Pump motor is not serviceable.

DTC C1221-C1228 & C1232-C1235: WHEEL SPEED SENSOR

Circuit Description

Wheel speed sensor input signal is zero:

- **DTC C1221**

  Left front wheel.

- **DTC C1222**

  Right front wheel.

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- **DTC C1223**

  Left rear wheel.

- **DTC C1224**

  Right rear wheel.

Excessive wheel speed variation:

- **DTC C1225**

  Left front wheel.

- **DTC C1226**

  Right front wheel.

- **DTC C1227**

  Left rear wheel.

- **DTC C1228**

  Right rear wheel.

Wheel speed sensor circuit open or shorted:

- **DTC C1232**

  Left front wheel.

- **DTC C1233**

  Right front wheel.

- **DTC C1234**

  Left rear wheel.

- **DTC C1235**

  Right rear wheel.

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As the toothed ring passes Wheel Speed Sensor (WSS), an AC voltage signal is produced. Signal frequency is proportional to the wheel speed. The magnitude of this signal is directly related to the wheel speed and the proximity of the WSS to the toothed ring (air gap).

DTC C1221-C1224 will set when vehicle in not in an ABS or TCS event and one wheel speed is equal to zero, other wheel speeds are greater than 5 MPH and other wheel speeds are within 7 MPH of each other for 2.5 seconds.

DTC 1225-C1228 will set when EBCM detects a rapid variation in wheel speed. Wheel speed changes by 10 MPH or more in 0.01 second and change must occur 3 times with no more than 0.2 second between occurrences.

DTC C1232-C1235 will set when one of the following conditions exists for 0.02 seconds:

- A short to voltage - wheel speed sensor signal circuit and wheel speed sensor return circuit voltages are both greater than 4.25 volts.
- A short to ground - wheel speed sensor signal circuit and wheel speed sensor return circuit voltages are both less than 0.75 volt.
- An open - wheel speed sensor signal circuit voltage is greater than 4.25 volts and wheel speed sensor return circuit voltage is less than 0.75 volt.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on. Set up scan tool snap shot feature to trigger for this DTC. Drive vehicle at a speed greater than 5 MPH. If scan tool indicates that DTC set, go to next step. If scan tools does not indicate that DTC set, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING.
3. Raise and support vehicle. Disconnect wheel speed sensor connector. Measure resistance across wheel speed sensor. If resistance is 850-1350 ohms, go to next step. If resistance is not 850-1350 ohms, go to step 8 .
4. Spin wheel. Measure AC voltage across wheel speed sensor. If AC voltage is greater than 100 millivolts, go to next step. If AC voltage is not greater than 100 millivolts, go to step 8 .
5. Check wheel speed sensor connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to next step.

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE

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PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

6. Disconnect EBCM harness connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check wheel speed sensor circuits for open, short to ground, short to voltage or shorted together. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to next step.
7. Check EBCM connector for poor connections. at the harness connector for the EBCM. If problem was found, repair as necessary. After repairs, go to step 10 . If problem was not found, go to step 9 .
8. Replace wheel speed sensor. See **WHEEL SPEED SENSORS** under REMOVAL & INSTALLATION. After repairs, go to step 10 .
9. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

DTC C1221-C1224: Under the following conditions, 2 DTCs are set: 2 suspect wheel speeds equal zero for 60 seconds, other wheel speeds are greater than 10 MPH and other wheel speeds are within 7 MPH of each other. Diagnose each wheel speed sensor individually.

DTC C1225-C1228: Possible cause of this DTC is electrical noise on wheel speed sensor harness wiring. Electrical noise could result from wheel speed sensor wires being routed to close to high energy ignition system components, such as spark plug wires.

DTC C1232-C1235: If customer comments that ABS indicator is ON only during moist environmental conditions (rain, snow, vehicle wash, etc.), inspect wheel speed sensor wiring for signs of water intrusion. If DTC is not current, clear all DTCs and simulate effects of water intrusion by spraying suspected area with a 5 percent saltwater solution. To create a 5 percent saltwater solution, add 2 teaspoons of salt to 12 oz. of water. Test drive vehicle over various road surfaces (bumps, turns, etc.) at speed greater than 25 MPH for at least 30 seconds. If DTC returns, replace suspected wheel speed sensor or repair wheel speed sensor wiring. Rinse area thoroughly when completed.

DTC C1236: LOW SYSTEM SUPPLY VOLTAGE

Circuit Description

EBCM monitors voltage level available for system operation. A low voltage condition prevents system from operating properly.

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DTC sets when, during initialization or when system is inactive, system voltage is less than 10.5 volts, or, during system operation, system voltage is less than 9.0 volts. Conditions must exist for 0.72 second, vehicle speed must be greater than 5 MPH, ignition voltage must be less than 10.5 volts and system relay must be commanded on.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Start engine. Using scan tool, observe SWITCHED SYSTEM BATTERY VOLTAGE parameter in DRP/ABS/TCS data list. If scan tool indicates voltage is greater than 10.5 volts, see **DIAGNOSTIC AIDS** . If scan tool indicates voltage is not greater than 10.5 volts, go to next step.
3. Using scan tool, observe BATTERY VOLTAGE parameter in DASH INTEGRATION MODULE data list. If scan tool indicates voltage is greater than 10.5 volts, go to next step. If scan tool does not indicate voltage is greater than 10.5 volts, see DIAGNOSTIC SYSTEM CHECK in appropriate STARTING & CHARGING SYSTEM article.

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

4. Turn ignition off. Disconnect EBCM harness connector. Install Universal Pinout Box (J 39700) using Cable Adaptor (J 39700-300) to EBCM harness connector only. Check ground circuits of EBCM including EBCM ground for high resistance or open. If problem was found, repair as necessary. After repairs, go to step 7 . If problem was not found, go to next step.
5. Reconnect EBCM harness connector. Turn ignition on, engine off. Using scan tool, clear DTCs. Operate vehicle. If DTC resets, go to next step. If DTC does not reset, see **DIAGNOSTIC AIDS** .
6. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
7. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

Test charging system. See appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS. Possible causes of DTC are:

- Charging system malfunction.

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- Excessive battery draw.
- Weak battery.
- Faulty system ground.

DTC C1237: HIGH SYSTEM SUPPLY VOLTAGE

Circuit Description

EBCM monitors voltage level available for system operation. If voltage level is too high, damage may result in system. When EBCM detects a high voltage condition, EBCM turns off system relay, which removes battery voltage from solenoid valves and pump motor.

DTC sets when system voltage is greater than 16.4 volts for 0.72 second and vehicle speed is greater than 5 MPH.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Turn off all accessories. Install scan tool. Start engine. Run engine at approximately 2000 RPM. Using scan tool, observe SWITCHED SYSTEM BATTERY VOLTAGE parameter in DRP/ABS/TCS data list. If scan tool indicates voltage is greater than 16.4 volts, go to next step. If scan tool does not indicate voltage is greater than 16.4 volts, see **DIAGNOSTIC AIDS** .
3. Using scan tool, observe BATTERY VOLTAGE parameter in DASH INTEGRATION MODULE data list. If scan tool indicates voltage is greater than 16.4 volts, see appropriate GENERATORS & REGULATORS article in STARTING & CHARGING SYSTEMS. If scan tool does not indicate voltage is greater than 16.4 volts, go to next step.
4. Using scan tool, clear DTCs. Operate vehicle. If DTC resets, go to next step. If DTC does not reset, see **DIAGNOSTIC AIDS** .
5. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
6. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

Possible cause of this DTC is overcharging.

DTC C1238: DRIVE WHEEL BRAKE ROTOR EXCESSIVE TEMPERATURE

Circuit Description

EBCM monitors vehicle speed deceleration, system activation, and stoplight switch active

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times in order to calculate an estimate of brake rotor temperatures. If EBCM calculates that brake rotor temperatures have exceeded thermal cutoff point, EBCM will temporarily suspend TCS function until the brake rotors cool. This feature is used to maintain braking effectiveness if normal base braking is required. An overly heated brake system could result in brake fade. EBCM continues calculating brake rotor temperatures after ignition is turned off. EBCM remains awake until EBCM calculates that brake rotors cooled sufficiently. Cooling period may take up to 30 minutes.

DTC sets when estimated brake rotor temperature of either drive wheel exceeds 375°C (700° F). When estimated brake rotor temperature of either drive wheel exceeds 375°C (700°F) during normal braking or normal ABS operations, DTC does not set until next TCS activation. Brake rotor temperature can exceed 375°C (700°F) without setting DTC if TCS activation has not occurred. When estimated brake rotor temperature of either drive wheel exceeds 375°C (700°F) during TCS activation, DTC sets immediately, but EBCM does not disable TCS until end of TCS event. ABS conditions and braking conditions must be normal.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Select DISPLAY DTCs function on scan tool for EBCM. If DTC is set as current, go to step 4 . If DTC is not set as current, go to next step.
3. Since most occurrences of this DTC are caused by excessive braking, review with customer to verify conditions under which DTC set. If vehicle operation caused DTC to set, see **DIAGNOSTIC AIDS** . If vehicle operation did not cause DTC to set, go to next step.
4. Allow 30 minutes from last time vehicle was driven for cooling brake rotors. Using scan tool, observe BRAKE TEMP STATUS parameter in DRP/ABS/TCS data list. If scan tool displays NORMAL, go to step 6 . If scan tool does not display NORMAL, go to next step.
5. Inspect alignment of stoplight switch. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to next step.
6. Using scan tool, clear DTCs. Operate vehicle. If DTC resets as current, go to next step. If DTC does not reset as current, system is okay.
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
8. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

With TCS temporarily disabled, EBCM continues calculating brake rotor temperatures after

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ignition is off. Turning ignition on again while TCS is temporarily disabled will not re-enable TCS. Temperature is an estimate calculated by EBCM. Possible causes of DTC are brake usage is excessive, TCS usage is excessive or stoplight switch is misaligned or damaged.

DTC C1242 OR C1243: BPMV PUMP MOTOR SHORT TO GROUND OR BPMV PUMP MOTOR MOTOR STALLED

Circuit Description

System relay is energized when ignition on. System relay supplies voltage to solenoid valves and pump motor. This voltage is referred to as system voltage. EBCM controls pump motor by grounding control circuit.

DTC C1242 sets when voltage across pump motor is 1.7-10.2 volts for 2 seconds, system voltage is greater than 8.0 volts, system relay is on and pump motor is commanded off.

DTC C1243 sets when pump motor is stalled or turning slowly, pump motor is on for at least 0.3 second and system relay is on.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC resets, go to next step. If DTC does not reset, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING.
3. Turn ignition off. Disconnect pump motor harness pigtail connector of BPMV. Connect test light between pump motor circuits at pump motor connector of EBCM using Connector Test Adapter Kit (J 35616-A). Using scan tool, clear DTCs. Using scan tool, perform PUMP MOTOR TEST. If test light illuminates, go to next step. If test light does not illuminate, go to step 5 .
4. Check pump motor connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to step 6 .
5. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to step 7 .
6. Replace BPMV. See **BRAKE PRESSURE MODULATOR VALVE** under REMOVAL & INSTALLATION. After repairs, go to step 8 .
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
8. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC does not reset, system is okay.

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Diagnostic Aids

Pump motor is integral to BPMV. Pump motor is not serviceable.

DTC C1245: TIRE INFLATION MONITOR

Circuit Description

Tire Inflation Monitor (TIM) system uses EBCM, wheel speed sensors, class 2 serial data messages, and instrument cluster in order to perform system functions. EBCM contains software to perform system monitoring functions. EBCM uses wheel speed data obtained from wheel speed sensors to detect relative pressure differences. Any ABS/TCS system activity causes EBCM to temporarily suspend tire inflation monitor system functions.

DTC D1245 sets when one of the following conditions occur and vehicle speed is 15-90 MPH:

- EBCM detects a tire pressure difference of 10 psi (69 kPa).
- EBCM sets DTC C1254.
- Loss of battery voltage at EBCM.
- Battery is disconnect or a low battery voltage condition.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, monitor DTC Information for DTC C1245 in DRP/ABS/TCS/TIM/VSES (if equipped). If scan tool indicates DTC C1245 as current, go to next step. If scan tool does not indicate DTC C1245 as current, see **DIAGNOSTIC AIDS** .
3. Since most occurrences of DTC are caused by low tire pressure, review TIM system with customer to verify conditions under which DTC set. If tire inflation caused DTC to set, go to step 5 . If tire inflation did not cause DTC to set, go to next step.
4. Perform **TIRE PRESSURE MONITOR RESET PROCEDURE** under PROGRAMMING. Using scan tool, clear DTCs. Operate vehicle. If DTC resets, see **DIAGNOSTIC AIDS** . If DTC does not reset, system is okay.
5. Inspect tire pressures and adjust if needed. Perform **TIRE PRESSURE MONITOR RESET PROCEDURE** under PROGRAMMING.

Diagnostic Aids

Any of the following conditions can cause this DTC:

- One or more tires is under inflated.

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- One or more tires is over inflated.
- Tire pressures have been altered without resetting TIM.
- Tires have been rotated or changed without resetting TIM.
- Tires are different in size than original equipment.
- Rough or slippery road conditions (dirt, gravel, wet, snow, or ice).
- Tires are out of balance.
- Loss of battery positive voltage at EBCM.
- Battery is disconnected or a low battery voltage condition.
- Water intrusion into a wheel speed sensor connector.
- Suspension condition (i.e. vehicle is out of alignment).

DTC C1246: BRAKE LINING WEAR CIRCUIT OPEN (2000 SEVILLE)

Circuit Description

Brake pad wear senor signal is normally grounded at EBCM through brake pad wear sensors in a series circuit.

DTC sets when brake pad wear sensor signal voltage is greater than 2.93 volts for one second.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Since most occurrences of this DTC are caused by worn brake pads, inspect all brake pads and replace if needed. See appropriate DISC & DRUM article in BRAKES. If problem was found and repaired, go to step 9 . If problem was not found, go to next step.
3. Install scan tool. Turn ignition on, engine OFF. Disconnect right rear brake pad wear sensor connector. Connect fused jumper between right rear brake pad wear sensor connector terminal "A" (Light Blue wire) and ground. Using scan tool, observe ELECTRONIC BRAKE LINING WEAR parameter in DRP/ABS/TCS data list. If scan tool display indicates ELECTRONIC BRAKE LINING WEAR parameter is okay, go to step 7 . If scan tool display does not indicate ELECTRONIC BRAKE LINING WEAR parameter is okay, go to next step.
4. Disconnect left rear brake pad wear sensor connector. Connect fused jumper between left rear brake pad wear sensor connector terminal "A" (Orange wire) and ground. If scan tool display indicates ELECTRONIC BRAKE LINING WEAR parameter is okay, go to step 8 . If scan tool display does not indicate ELECTRONIC BRAKE LINING WEAR parameter is okay, go to next step.
5. Disconnect right front brake pad wear sensor connector. Connect fused jumper between right front brake pad wear sensor connector terminal "A" (Brown wire) and ground. If

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scan tool display indicates ELECTRONIC BRAKE LINING WEAR parameter is okay, go to step 8 . If scan tool display does not indicate ELECTRONIC BRAKE LINING WEAR parameter is okay, go to next step.

6. Disconnect left front brake pad wear sensor connector. Connect fused jumper between left front brake pad wear sensor connector terminal "A" (White wire) and ground. If scan tool display indicates ELECTRONIC BRAKE LINING WEAR parameter is okay, go to step 8 . If scan tool display does not indicate ELECTRONIC BRAKE LINING WEAR parameter is okay, go to step 9 .
7. Check Black wire between right rear brake pad wear sensor and ground for open. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to step 10 .
8. Check brake pad wear signal circuit for open between currently disconnected brake pad wear sensor and previously disconnected sensor. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to step 10 .
9. Check White wire between left front brake pad wear sensor and EBCM. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to step 11 .
10. Check brake pad wear sensor connector that was last disconnected for poor connections. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to step 12 .
11. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to step 13 .
12. Replace brake pad wear sensor that was last disconnected. See appropriate DISC & DRUM article in BRAKES. After repairs, go to step 14 .
13. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
14. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

DTC C1248: DYNAMIC REAR PROPORTIONING CONTROL SYSTEM

Circuit Description

Dynamic Rear Proportioning (DRP) is a control system that replaces the hydraulic proportioning function of the mechanical proportioning valve in the base brake system. DRP control system is part of operating software in EBCM. DRP uses active control with existing ABS in order to regulate vehicle's rear brake pressure.

DTC sets when DTC C1214, C1217, C1237, C1254, C1255, C1261-1268, or C1271-1274 sets, DTC C1236 sets and system voltage is less than 8.5 volts, or two wheel speed sensor DTCs on same axle set.

Diagnosis

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1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Select DISPLAY DTCs function on scan tool for EBCM. If scan tool displays any ABS/TCS/VSES DTCs, see **DIAGNOSTIC TROUBLE CODE DEFINITIONS** table. If scan tool does not display any ABS/TCS/VSES DTCs, go to next step.
3. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

Use this DTC in order to differentiate which of the following conditions is present:

- EBCM turned on Red BRAKE warning indicator.
- Instrument cluster turned on Red BRAKE warning indicator due to low brake fluid in master cylinder reservoir.
- Instrument cluster turned on Red BRAKE warning indicator due to application of park brake.

Diagnose any other ABS DTCs that set along with this DTC.

DTC C1251: RSS INDICATED MALFUNCTION (CADILLAC)

Circuit Description

CVRSS calculates normal force and transmits a PWM signal to EBCM via two dedicated data lines, one right, and one left. EBCM supplies pull up voltage. EBCM uses this information to detect rough road conditions and allows for more aggressive braking on rough surfaces.

DTC sets when CVRSS diagnoses a condition in Road Sensing Suspension (RSS) system and sends a serial data message to EBCM. CVRSS will typically set a DTC and EBCM will set this DTC.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Using scan tool, observe DTC Information parameter in RSS DIAGNOSTIC TROUBLE CODES. If scan tool displays any RSS DTCs, see appropriate ELECTRONIC - CV ROAD-SENSING article in SUSPENSION. If scan tool does not display any RSS DTCs, see **DIAGNOSTIC AIDS** .

Diagnostic Aids

This DTC is for information only. As an aid to technician, this DTC indicates that there are no

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problems in ABS/TCS system.

DTC C1252 OR C1253: NORMAL FORCE MALFUNCTION (2000 CADILLAC)

Circuit Description

CVRSS calculates normal force and transmits a PWM signal to EBCM via two dedicated data lines, one right, and one left. EBCM supplies pull up voltage. EBCM uses this information to detect rough road conditions and allows for more aggressive braking on rough surfaces.

DTC sets when PWM duty cycle sent from CVRSS is between 10% and 90% or normal force value sent to EBCM does not match either previous or next normal force value. CVRSS sends each value twice therefore any normal force value should match either previous or next normal force value. Possible values of duty cycle are 20%, 40%, 60%, and 80%. Condition must be present for more than 5 seconds out of any 10 second period.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Check EBCM ground and Continuously Variable Road Sensing Suspension (CVRSS) module ground, making sure each ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to next step.
3. Install scan tool. Start engine. Using scan tool, observe FRONT NORMAL FORCE parameter in VSES/CVRSS data list. If scan tool displays 10-90 percent, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If scan tool does not display 10-90 percent, go to next step.
4. Turn ignition off. Disconnect CVRSS module connector. Turn ignition on, engine off. Measure voltage between normal force signal circuit and ground. If battery voltage is present, go to next step. If battery voltage is not present, go to step 6 .
5. Turn ignition off. Disconnect EBCM connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check normal force signal circuit for short to voltage. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 7 .
6. Turn ignition off. Disconnect EBCM connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check normal force signal circuit for open, high resistance or short to ground. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 8 .
7. Check CVRSS connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 9 .
8. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 10 .

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9. Replace CVRSS module. See ELECTRONIC - CV ROAD-SENSING - CADILLAC article in SUSPENSION. After repairs, go to step 11 .
10. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
11. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

DTC C1254: CHECKSUM ERROR

Circuit Description

The microprocessor contains a data storage area (keep alive memory) which can save pertinent data when ignition is turned off. Keep Alive Memory (KAM) data is lost if battery power or module ground is removed from module. KAM area is an integral part of microprocessor and cannot be serviced separately.

The microprocessor calculates a checksum on those areas of memory that hold critical operation data. This is done at a regular interval and is called periodic checksum. The microprocessor also calculates a checksum on these memory locations when ever new data is written to them. This is called running checksum. To check KAM, the microprocessor compares periodic checksum to running checksum. If they do not match, the microprocessor sets DTC.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

2. Turn ignition off. Disconnect EBCM harness connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Test both ground circuits of EBCM including EBCM ground for high resistance or open. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to next step.
3. If battery been disconnected recently, go to step 8 . If battery has not been disconnected recently, go to next step.
4. Test charging system. See DIAGNOSTIC SYSTEM CHECK in appropriate ALTERNATORS & REGULATORS article in STARTING & CHARGING

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SYSTEMS. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to next step.

5. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to next step.
6. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC resets, go to next step. If DTC does not reset, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING.
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
8. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC does not reset, system is okay.

Diagnostic Aids

Possible causes of this DTC are:

- Loss of battery ground.
- Disconnected battery.
- Running reset. (Running reset is detected when KAM check sum is not updated properly.)
- Sudden drop in system voltage to less than 5 volts.
- Long extended engine cranks that cause battery voltage to drop.
- Poor power or ground connections.
- An internal EBCM malfunction.

DTC C1255 OR C1256: EBCM INTERNAL MALFUNCTION (ABS/TCS DISABLED)

Circuit Description

DTC identifies a malfunction within EBCM. DTC is set when an internal EBCM malfunction exists.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC resets as current, go to next step. If DTC does not reset, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING.
3. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.

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4. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC does not reset, system is okay.

Diagnostic Aids

Scan tool displays 2 additional characters after DTC. Take note of 2 character code and any other DTCs that are set. 2 character code is an engineering aid used in order to determine cause of internal malfunction.

When scan tool displays DTC C1255m3, EBCM has not been programmed. Perform setup procedure for EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under PROGRAMMING.

DTC C1261-C1268 OR C1271-C1274: SOLENOID VALVE MALFUNCTION

Circuit Description

DTC description:

- **DTC C1261**

  Left front inlet solenoid valve malfunction.

- **DTC C1262**

  Left front outlet solenoid valve malfunction.

- **DTC C1263**

  Right front inlet solenoid valve malfunction.

- **DTC C1264**

  Right front outlet solenoid valve malfunction.

- **DTC C1265**

  Left rear inlet solenoid valve malfunction.

- **DTC C1266**

  Left rear outlet solenoid valve malfunction.

- **DTC C1267**

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Right rear inlet solenoid valve malfunction.

- **DTC C1268**

  Right rear outlet solenoid valve malfunction.

- **DTC C1271**

  Left front TCS master cylinder isolation valve malfunction.

- **DTC C1272**

  Left front TCS prime valve malfunction.

- **DTC C1273**

  Right front TCS master cylinder isolation valve malfunction.

- **DTC C1274**

  Right front TCS prime valve malfunction.

System relay is energized when ignition is on. System relay supplies voltage to valve solenoids and pump motor. This voltage is referred to as system voltage. EBCM microprocessor activates valve solenoids by grounding control circuit.

DTC sets when commanded state of driver and actual state of control circuit do not match for 0.03 second. System voltage must be greater than 8 volts and ignition voltage must be greater than 9 volts.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC resets as current, go to next step. If DTC does not reset, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING.
3. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
4. Using scan tool, clear DTCs. Using scan tool, perform AUTOMATED TEST. If DTC does not reset, system is okay.

Diagnostic Aids

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Solenoid valve circuit is internal to EBCM. Solenoid valve circuit is not diagnosable external to EBCM. DTC sets when there is a malfunction in solenoid circuit internal to EBCM.

DTC C1276, P1644 OR P1689: DELIVERED TORQUE SIGNAL CIRCUIT MALFUNCTION OR OR DELIVERED TORQUE SIGNAL VOLTAGE INVALID

Circuit Description

EBCM and PCM simultaneously control traction control. PCM reduces amount of torque supplied to drive wheels by retarding spark timing and selectively turning off fuel injectors. EBCM actively applies brakes to front wheels in order to reduce torque. EBCM sends a requested torque message via a Pulse Width Modulated (PWM) signal to PCM. Duty cycle of signal is used to determine how much engine torque EBCM is requesting PCM to deliver. Normal values are 10-90 percent duty cycle. Signal should be at 90 percent when traction control is not active and at lower values during traction control activations. PCM supplies a pull up voltage of 5 volts that EBCM switches to ground to create signal. PCM sends a delivered torque message via a Pulse Width Modulated (PWM) signal to EBCM. Duty cycle of signal is used to determine how much engine torque PCM is delivering. Normal values are 10-90 percent duty cycle. Signal should be at low values (around 10 percent) at idle and higher values under driving conditions. EBCM supplies a pull up voltage of 12 volts that PCM switches to ground to create signal. When certain PCM DTCs are set, PCM will not be able to perform torque reduction portion of traction control. A serial data message is sent to EBCM indicating that traction control is not allowed.

DTC C1276 sets when EBCM detects that delivered torque signal is out of valid range or EBCM does not receive delivered torque signal.

DTC P1644 or P1689 sets when PCM detects that delivered torque signal voltage is invalid.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Check EBCM ground and PCM ground, making sure each ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to next step.
3. Install scan tool. Start engine. Using scan tool, observe DELIVERED TORQUE parameter in DRP/ABS/TCS data list. If scan tool displays 90 percent, go to next step. If scan tool does not display 90 percent, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING.

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete,

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inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

4. Turn ignition off. Disconnect EBCM connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector and EBCM connector. Disconnect Powertrain Control Module (PCM) harness connector. Turn ignition on, engine off. Measure voltage between EBCM connector C2 terminal No. 2 (Tan/Black wire) and ground. See **Fig. 1** . If voltage is near battery voltage, go to next step. If voltage is not near battery voltage, go to step 6 .
5. Turn ignition off. Disconnect cable adapter from EBCM connector. Turn ignition on, engine off. Tan/Black wire for short to voltage. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 7 .
6. Turn ignition off. Disconnect cable adapter from EBCM connector. Test Tan/Black wire for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 8 .
7. Check PCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 9 .
8. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 10 .
9. Replace PCM. See appropriate REMOVAL, OVERHAUL & INSTALLATION article in ENGINE PERFORMANCE. After repairs, go to step 11 .
10. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
11. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

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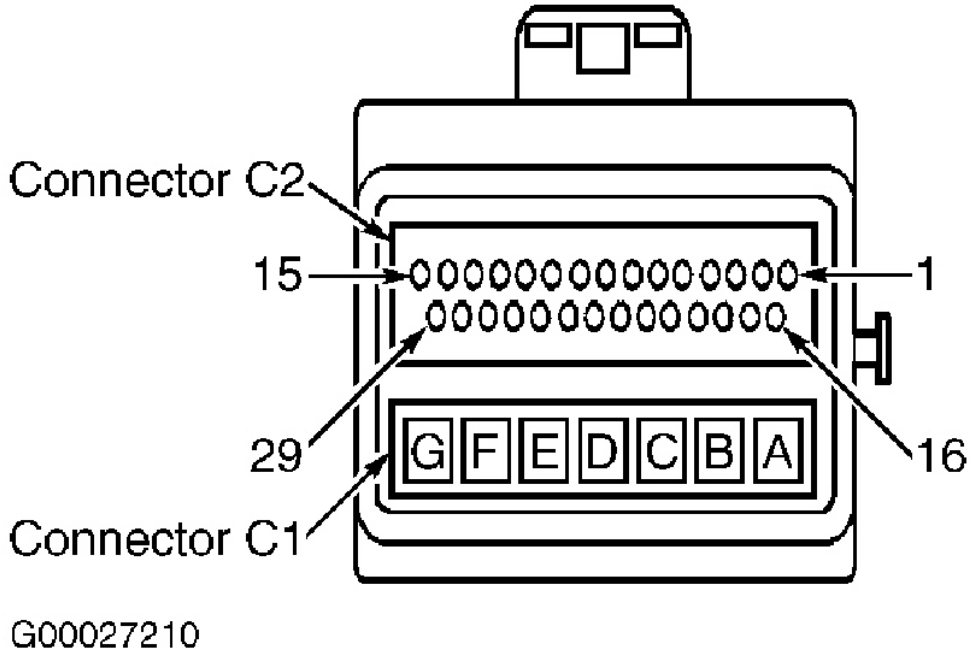


Fig. 1: Identifying EBCM Connector Terminals
Courtesy of GENERAL MOTORS CORP.

Diagnostic Aids

These conditions can cause this concern:

- Open in delivered torque circuit.
- Short to ground or voltage in delivered torque circuit.
- Wiring problem, terminal corrosion, or poor connection in delivered torque circuit.
- Communication frequency problem.
- Communication duty cycle problem.
- EBCM is not receiving information from PCM.
- Loose or corroded EBCM ground or PCM ground.

DTC C1277 OR P1571: REQUESTED TORQUE SIGNAL CIRCUIT MALFUNCTION

Circuit Description

EBCM and PCM simultaneously control traction control. PCM reduces amount of torque supplied to drive wheels by retarding spark timing and selectively turning off fuel injectors.

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EBCM actively applies brakes to front wheels in order to reduce torque. EBCM sends a requested torque message via a Pulse Width Modulated (PWM) signal to PCM. Duty cycle of signal is used to determine how much engine torque EBCM is requesting PCM to deliver. Normal values are 10-90 percent duty cycle. Signal should be at 90 percent when traction control is not active and at lower values during traction control activations. PCM supplies a pull up voltage of 5 volts that EBCM switches to ground to create signal. PCM sends a delivered torque message via a Pulse Width Modulated (PWM) signal to EBCM. Duty cycle of signal is used to determine how much engine torque PCM is delivering. Normal values are between 10 and 90 percent duty cycle. Signal should be at low values (around 10 percent) at idle and higher values under driving conditions. EBCM supplies a pull up voltage of 12 volts that PCM switches to ground to create signal. When certain PCM DTCs are set, PCM will not be able to perform torque reduction portion of traction control. A serial data message is sent to EBCM indicating that traction control is not allowed.

DTC C1277 sets when PCM diagnoses requested torque signal circuit and sends a serial data message to EBCM indicating a fault is present.

DTC P1571 sets when PCM detects that requested torque signal is out of valid range or PCM does not receive requested torque signal.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Check EBCM ground and PCM ground, making sure each ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to next step.
3. Install scan tool. Start engine. Using scan tool, observe TORQUE REQUEST SIGNAL parameter in POWERTRAIN CONTROL MODULE data list. If scan tool displays less than 100 percent, problem is intermittent. See **INTERMITTENT OR POOR CONNECTIONS** under DIAGNOSIS & TESTING. If scan tool displays 100 percent, go to next step.

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

4. Turn ignition off. Disconnect EBCM harness connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector and EBCM connector. Start engine. Measure duty cycle between EBCM connector C2 terminal No.

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12 (Orange/Black wire) and ground. See **Fig. 1** . If duty cycle is 5-95 percent, go to next step. If duty cycle is not 5-95 percent, go to step 6 .

5. Measure frequency between EBCM connector C2 terminal No. 12 (Orange/Black wire) and ground. If frequency is 121-134 hertz, go to step 8 . If frequency is not 121-134 hertz, go to next step.

NOTE: Disconnecting EBCM connector and turning ignition on could cause other modules to set loss of communication DTCs (Uxxxx). Once EBCM is reconnected, EBCM may set DTC C1245 or DTC C1298.

6. Turn ignition off. Disconnect cable adapter from EBCM connector. Turn ignition on, engine off. Measure voltage between EBCM connector C2 terminal No. 12 (Orange/Black wire) and ground. If voltage is 4-6 volts, go to step 10 . If voltage is not 4-6 volts, go to next step.
7. Turn ignition off. Disconnect Powertrain Control Module (PCM) harness connector. Check Orange/Black wire for short to voltage and short to ground. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to step 10 .
8. Turn ignition off. Disconnect Powertrain Control Module (PCM) harness connector. Check Orange/Black wire for open and high resistance. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to next step.
9. Check PCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to step 11 .
10. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 13 . If problem was not found, go to step 12 .
11. Replace PCM. See appropriate REMOVAL, OVERHAUL & INSTALLATION in ENGINE PERFORMANCE. After repairs, go to step 13 .
12. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
13. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

These conditions can cause this concern:

- Open in requested torque circuit.
- Short to ground or voltage in requested torque circuit.
- Wiring problem, terminal corrosion, or poor connection in requested torque circuit.
- Communication frequency problem.
- Communication duty cycle problem.

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- PCM is not receiving information from EBCM.
- Loose or corroded EBCM ground or PCM ground.

DTC P1571 may set along with several other PCM DTCs if the key is held in START position while engine is running. Starter lockout function of PCM is enabled several seconds after engine is running and prevents starter from engaging while engine is running. This will cause a partial loss of power to some components and systems.

DTC C1278: TCS TEMPORARILY INHIBITED BY PCM

Circuit Description

EBCM and PCM simultaneously control traction control. PCM reduces amount of torque supplied to drive wheels by retarding spark timing and selectively turning off fuel injectors. EBCM actively applies brakes to front wheels in order to reduce torque. EBCM sends a requested torque message via a Pulse Width Modulated (PWM) signal to PCM. Duty cycle of signal is used to determine how much engine torque EBCM is requesting PCM to deliver. Normal values are 10-90 percent duty cycle. Signal should be at 90 percent when traction control is not active and at lower values during traction control activations. PCM supplies a pull up voltage of 5 volts that EBCM switches to ground to create the signal. PCM sends a delivered torque message via a PWM signal to EBCM. Duty cycle of signal is used to determine how much engine torque PCM is delivering. Normal values are 10-90 percent duty cycle. Signal should be at low values (around 10 percent) at idle and higher values under driving conditions. EBCM supplies a pull up voltage of 12 volts that PCM switches to ground to create the signal. When certain PCM DTCs are set, PCM will not be able to perform torque reduction portion of traction control. A serial data message is sent to EBCM indicating that traction control is not allowed.

DTC sets when PCM diagnoses a condition preventing engine control portion of traction control function and sends a serial data message to EBCM indicating that torque reduction is not allowed. PCM will typically set a DTC and EBCM will set this DTC.

Diagnosis

Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING.

Diagnostic Aids

This DTC is for information only. As an aid to technician, this DTC indicates that there are no problems in ABS/TCS system.

DTC C1281, C1283 OR C1286: STEERING SENSOR

Circuit Description

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DTC description:

- **DTC C1281**

  Steering sensor uncorrelated malfunction.

- **DTC C1283**

  Excessive time to center steering.

- **DTC C1286**

  Steering sensor bias malfunction.

Vehicle Stability Enhancement System (VSES) is activated by EBCM calculating desired yaw rate and comparing it to actual yaw rate input. Desired yaw rate is calculated from measured steering wheel position, vehicle speed, and lateral acceleration. The difference between desired yaw rate and actual yaw rate is yaw rate error, which is a measurement of oversteer or understeer. If yaw rate error becomes too large, EBCM will attempt to correct vehicle's yaw motion by applying differential braking to left or right front wheel. VSES activations generally occur during aggressive driving, in turns or bumpy roads without much use of accelerator pedal. When braking during VSES activation, brake pedal will feel different than ABS pedal pulsation. Brake pedal pulsates at a higher frequency during VSES activation. Usable output voltage range for lateral accelerometer and yaw rate sensors is 0.25-4.75 volts. Scan tool will report zero lateral acceleration or yaw rate as 2.5 volts with no sensor bias present. Sensor bias compensates for sensor mounting alignment errors, electronic signal errors, temperature changes, and manufacturing differences. Steering wheel position sensor supplies 2 analog inputs, phase A and phase B, to EBCM. The 2 input signals are approximately 90 degrees out of phase. By interpreting the relationship between the 2 inputs, EBCM can determine the position of steering wheel and direction of steering wheel rotation. Steer angle centering is the process by which EBCM calibrates steering sensor output so that output reads zero when steering wheel is centered. Using yaw rate input, lateral accelerometer input, and wheel speed sensor inputs, the initial steering center position is calculated after driving greater than 6 MPH for more than 10 seconds in a straight line on a level surface.

DTC C1281 sets when one of the following conditions exists:

- VSES is engaged for 10 seconds with yaw rate error always in either understeer or oversteer. Under this condition, DTC will set by itself.
- Yaw rate error is greater than 10 degrees/second for 5 seconds. Under this condition, DTC will set along with DTC C1282.
- Yaw rate error is greater than 10 degrees/second with vehicle speed less than 37 MPH and accelerator pedal is pressed more than 25 percent of pedal travel range for 1 second

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during VSES activation. Under this condition, DTC will set along with DTC C1282.

- With steer rate less than 80 degrees/second, difference between the 2 steering sensor signals (phase A and phase B) is greater than 20 degrees for 1 second. Under this condition, DTC will set along with DTC C1287.

Also, steer angle must have been centered, VSES is active and direction (understeer or oversteer) of yaw rate error has not changed. Centered lateral acceleration value is less than 0.5 g.

DTC C1283 sets when vehicle has driven for 10 minutes without completing steer angle centering and vehicle speed is greater than 25 MPH.

DTC C1286 sets when steering sensor bias moves greater than 40 degrees after steer centering was accomplished, steer angle must have been centered.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine OFF. Using scan tool, perform STEERING POSITION SENSOR TEST. If Steering Wheel Position Sensor (SWPS) passed test, go to next step. If SWPS did not pass test, go to step 7 .
3. Using scan tool, observe LATERAL ACCELEROMETER INPUT parameter in VSES data list. If scan tool displays 2.3-2.7 volts, go to next step. If scan tool does not display 2.3-2.7 volts, go to step 8 .
4. Using scan tool, observe YAW RATE SENSOR INPUT parameter in VSES data list. If scan tool displays 2.3-2.7 volts, go to next step. If scan tool does not display 2.3-2.7 volts, go to step 9 .
5. Using scan tool, clear DTCs. Perform **DIAGNOSTIC TEST DRIVE** . If DTC resets, go to next step. If DTC does not reset, see **DIAGNOSTIC AIDS** .
6. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 10 .
7. Replace Steering Wheel Position Sensor (SWPS). See appropriate STEERING COLUMNS in STEERING. After repairs, go to step 10 .
8. Replace lateral accelerometer sensor. See **LATERAL ACCELEROMETER SENSOR** under REMOVAL & INSTALLATION. After repairs, go to step 10 .
9. Replace yaw rate sensor. See **YAW RATE SENSOR** under REMOVAL & INSTALLATION. After repairs, go to next step.
10. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

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During diagnosis, park vehicle on a level surface. Check vehicle for proper alignment. Car should not pull in either direction while driving straight on a level surface. Find out from driver under what conditions DTC was set (when DIC displayed SERVICE STABILITY SYSTEM message). This information will help to duplicate failure. Snapshot function on scan tool can help find an intermittent DTC.

Diagnostic Test Drive

CAUTION: Do not perform any unlawful or unsafe maneuvers.

When servicing vehicles with Vehicle Stability Enhancement System (VSES), test drives will be necessary to allow all tests to be run, and all system functions to be enabled and exercised. A test drive may also be required to duplicate specific DTCs covered in this section. Diagnostic system check (including test drive) should be run when vehicle repairs are complete in order to verify repair. Diagnostic test drive will vary for ABS, TCS, or VSES concerns.

The following is a suggested VSES diagnostic test drive.

1. Read DIAGNOSTIC AIDS.
2. Turn ignition off.
3. Reconnect any previously disconnected components.
4. Start engine.
5. Install scan tool.
6. Using scan tool, observe VSES IS CENTERED parameter in VSES data list. Scan tool will indicate YES with steering wheel centered. Drive vehicle in a straight line for 45 seconds at 15 MPH while monitoring scan tool.
7. Remove scan tool.
8. Drive vehicle under the following conditions for at least 10 minutes:
   - Highway driving.
   - Rough roads.
   - Perform turning maneuvers (curved freeway entrance ramp, parking lot maneuvers) and high steering angles and yaw rates at low speeds.
   - Verify customer concern and duplicate driving conditions.
9. With engine still running, using scan tool, check for DTCs. If any DTCs are set, see **DIAGNOSTIC TROUBLE CODE DEFINITIONS** under DIAGNOSIS & TESTING.

DTC C1282: YAW RATE SENSOR BIAS CIRCUIT MALFUNCTION

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Circuit Description

Vehicle Stability Enhancement System (VSES) is activated by EBCM calculating desired yaw rate and comparing it to actual yaw rate input. Desired yaw rate is calculated from measured steering wheel position, vehicle speed, and lateral acceleration. The difference between desired yaw rate and actual yaw rate is yaw rate error, which is a measurement of oversteer or understeer. If yaw rate error becomes too large, EBCM will attempt to correct vehicle's yaw motion by applying differential braking to left or right front wheel. VSES activations generally occur during aggressive driving, in turns or bumpy roads without much use of accelerator pedal. When braking during VSES activation, brake pedal will feel different than ABS pedal pulsation. Brake pedal pulsates at a higher frequency during VSES activation. Usable output voltage range for lateral accelerometer and yaw rate sensors is 0.25-4.75 volts. Scan tool will report zero lateral acceleration or yaw rate as 2.5 volts with no sensor bias present. Sensor bias compensates for sensor mounting alignment errors, electronic signal errors, temperature changes, and manufacturing differences. Steering wheel position sensor supplies 2 analog inputs, phase A and phase B, to EBCM. The 2 input signals are approximately 90 degrees out of phase. By interpreting relationship between the 2 inputs, EBCM can determine position of steering wheel and direction of steering wheel rotation. Steer angle centering is the process by which EBCM calibrates steering sensor output so that output reads zero when steering wheel is centered. Using yaw rate input, lateral accelerometer input, and wheel speed sensor inputs, initial steering center position is calculated after driving greater than 6 MPH for more than 10 seconds in a straight line on a level surface.

EBCM performs 6 different tests to detect a DTC condition.

1. Yaw rate bias is greater than 7 degrees/second with ignition on.
2. Yaw rate input change is greater than 390 degrees/second/second with ignition on.
3. Yaw rate input voltage is less than 0.15 volts or greater than 4.85 volts for 1 second with vehicle stopped or with vehicle speed greater than 28 MPH.
4. Yaw rate error is greater than 10 degrees/second 30 times within a drive cycle with brake pedal is not pressed, ABS not active and vehicle speed greater than 3 MPH.
5. Yaw rate error is greater than 10 degrees/second for 5 seconds with VSES active. Under this condition, DTC C1281 will also set.
6. Yaw rate error is greater than 10 degrees/second with vehicle speed less than 37 MPH and acceleration pedal is pressed more than 25 percent of pedal travel range for 1 second during VSES activation. Under this condition, DTC C1281 will also set.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe YAW RATE SENSOR INPUT parameter in VSES data list. If scan tool displays YAW RATE

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SENSOR INPUT parameter as 0.15-4.85 volts, go to step 6 . If scan tool does not display YAW RATE SENSOR INPUT parameter as 0.15-4.85 volts, go to next step.

3. Turn ignition off. Disconnect yaw rate sensor connector. Turn ignition on, engine off. Using scan tool, observe YAW RATE SENSOR INPUT parameter. If scan tool displays YAW RATE SENSOR INPUT parameter as less than 0.15 volt, go to next step. If scan tool does not display YAW RATE SENSOR INPUT parameter as less than 0.15 volt, go to step 10 .
4. Turn ignition off. Disconnect yaw rate sensor connector. Connect fused jumper wire (3 amp) between yaw rate sensor connector terminals "A" (Gray/Black wire) and "C" (Dark Blue wire). See **Fig. 2** . Turn ignition on, engine off. Using scan tool, observe YAW RATE SENSOR INPUT parameter. If scan tool displays YAW RATE SENSOR INPUT parameter as greater than 4.85 volts, go to next step. If scan tool does not display YAW RATE SENSOR INPUT parameter as greater than 4.85 volts, go to step 8 .
5. Disconnect fused jumper wire. Measure voltage between yaw rate sensor connector terminals "A" (Gray/Black wire) and "B" (Light Green/Black wire). See **Fig. 2** . If voltage is less than 5 volts, go to step 12 . If voltage is not less than 5 volts, go to step 7 .
6. If scan tool displays YAW RATE SENSOR INPUT parameter as 2.3-2.7 volts, see **DIAGNOSTIC AIDS** . If scan tool does not display YAW RATE SENSOR INPUT parameter as 2.3-2.7 volts, go to step 11 .
7. Check Gray/Black wire between yaw rate sensor and EBCM for short to voltage. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 13 .
8. Check Gray/Black wire between yaw rate sensor and EBCM for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to next step.
9. Check Dark Blue wire between yaw rate sensor and EBCM for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 13 .
10. Check Dark Blue wire between yaw rate sensor and EBCM for short to voltage. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 13 .

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

11. Turn ignition off. Disconnect EBCM harness connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check

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Light Green/Black wire between yaw rate sensor and EBCM for high resistance or open. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to next step.

12. Check yaw rate sensor connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 14 .
13. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 15 .
14. Replace yaw rate sensor. See **YAW RATE SENSOR** under REMOVAL & INSTALLATION. After repairs, go to step 16 .
15. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
16. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

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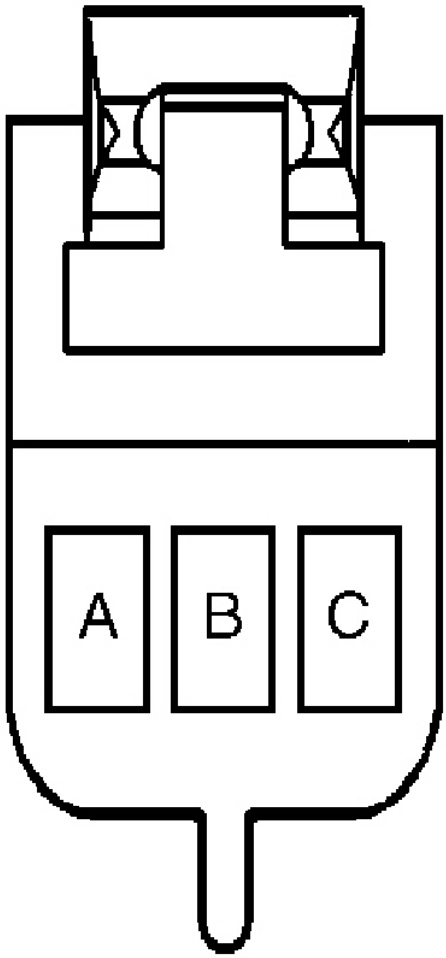


Fig. 2: Identifying Yaw Rate Sensor Connector Terminals
Courtesy of GENERAL MOTORS CORP.

Diagnostic Aids

During diagnosis, park vehicle on a level surface. Check vehicle for proper alignment. Car should not pull in either direction while driving straight on a level surface. Find out from driver under what conditions DTC was set (when DIC displayed SERVICE STABILITY SYSTEM message). This information will help to duplicate failure. Snapshot function on scan tool can help find an intermittent DTC.

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DTC C1284 OR C1285: LATERAL ACCELEROMETER SELF TEST MALFUNCTION OR LATERAL ACCELEROMETER CIRCUIT MALFUNCTION

Circuit Description

Vehicle Stability Enhancement System (VSES) is activated by EBCM calculating desired yaw rate and comparing it to actual yaw rate input. Desired yaw rate is calculated from measured steering wheel position, vehicle speed, and lateral acceleration. The difference between desired yaw rate and actual yaw rate is yaw rate error, which is a measurement of oversteer or understeer. If yaw rate error becomes too large, EBCM will attempt to correct vehicle's yaw motion by applying differential braking to left or right front wheel. VSES activations generally occur during aggressive driving, in turns or bumpy roads without much use of accelerator pedal. When braking during VSES activation, brake pedal will feel different than ABS pedal pulsation. Brake pedal pulsates at a higher frequency during VSES activation. Usable output voltage range for lateral accelerometer and yaw rate sensors is 0.25-4.75 volts. Scan tool will report zero lateral acceleration or yaw rate as 2.5 volts with no sensor bias present. Sensor bias compensates for sensor mounting alignment errors, electronic signal errors, temperature changes, and manufacturing differences. Steering wheel position sensor supplies 2 analog inputs, phase A and phase B, to EBCM. The 2 input signals are approximately 90 degrees out of phase. By interpreting relationship between the 2 inputs, EBCM can determine position of steering wheel and direction of steering wheel rotation. Steer angle centering is the process by which EBCM calibrates steering sensor output so that output reads zero when steering wheel is centered. Using yaw rate input, lateral accelerometer input, and wheel speed sensor inputs, initial steering center position is calculated after driving greater than 6 MPH for more than 10 seconds in a straight line on a level surface.

DTC C1284 sets when compensated bias value of lateral accelerometer is greater than 0.3 g.

DTC C1285 sets when lateral accelerometer input voltage is less than 0.15 volt or greater than 4.85 volts for one second.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe LATERAL ACCELEROMETER INPUT parameter in VSES data list. If scan tool displays LATERAL ACCELEROMETER INPUT parameter as 0.15-4.85 volts, go to step 6 . If scan tool does not display LATERAL ACCELEROMETER INPUT parameter as 0.15-4.85 volts, go to next step.
3. Turn ignition off. Disconnect lateral accelerometer sensor connector. Turn ignition on, engine off. Using scan tool, observe LATERAL ACCELEROMETER INPUT parameter. If scan tool displays LATERAL ACCELEROMETER INPUT parameter as less than 0.15 volts, go to next step. If scan tool does not display LATERAL

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ACCELEROMETER INPUT parameter as less than 0.15 volt, go to step 10 .

4. Turn ignition off. Connect fused jumper wire (3 amp) between lateral accelerometer sensor connector terminals "A" (Gray/Black wire) and "B" (Light Blue wire). See **Fig. 3** . Turn ignition on, engine off. Using scan tool, observe LATERAL ACCELEROMETER INPUT parameter. If scan tool displays LATERAL ACCELEROMETER INPUT parameter as greater than 4.85 volts, go to next step. If scan tool does not display LATERAL ACCELEROMETER INPUT parameter as greater than 4.85 volts, go to step 8 .
5. Disconnect fused jumper wire. Measure voltage between lateral accelerometer sensor connector terminals "A" (Gray/Black wire) and "C" (Light Green wire). See **Fig. 3** . If voltage is less than 5 volts, go to step 12 . If voltage is not less than 5 volts, go to step 7 .
6. If scan tool displays LATERAL ACCELEROMETER INPUT parameter as 2.3-2.7 volts, see **DIAGNOSTIC AIDS** . If scan tool does not display LATERAL ACCELEROMETER INPUT parameter as 2.3-2.7 volts, go to step 11 .
7. Check Gray/Black wire between lateral accelerometer sensor and EBCM for short to voltage. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 13 .
8. Check Gray/Black wire between lateral accelerometer sensor and EBCM for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to next step.
9. Check Light Blue wire between lateral accelerometer sensor and EBCM for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 13 .
10. Check Light Blue wire between lateral accelerometer sensor and EBCM for short to voltage. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 13 .

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

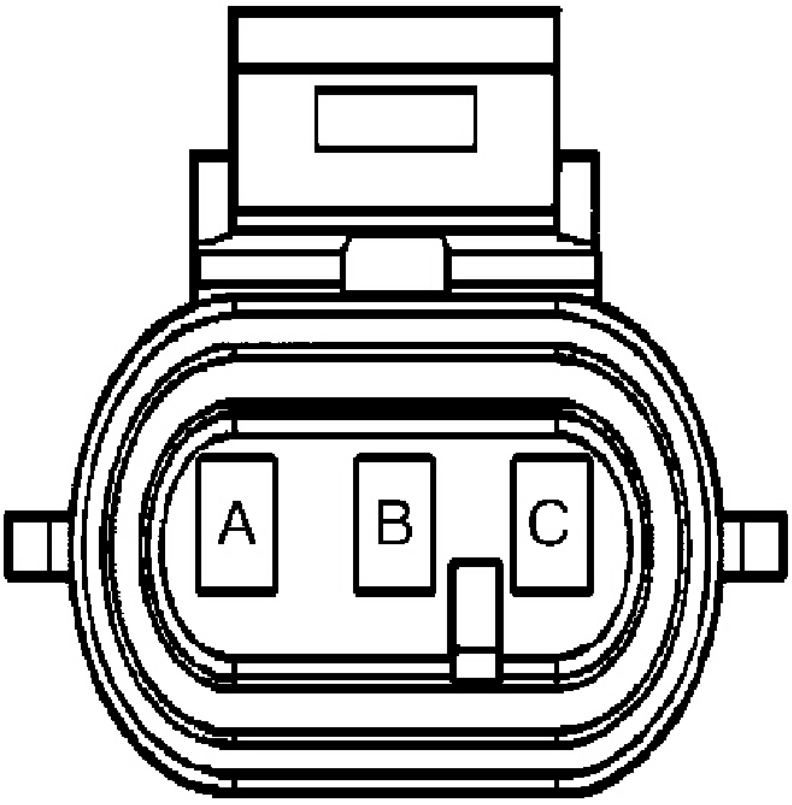
11. Turn ignition off. Disconnect EBCM harness connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check Light Green wire between lateral accelerometer sensor and EBCM for high resistance or open. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to next step.
12. Check lateral accelerometer sensor connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to

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step 14 .

13. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 16 . If problem was not found, go to step 15 .
14. Replace lateral accelerometer sensor. See **LATERAL ACCELEROMETER SENSOR** under REMOVAL & INSTALLATION. After repairs, go to step 16 .
15. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
16. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.



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Fig. 3: Identifying Lateral Accelerometer Sensor Connector Terminals (2001 Shown, 2000 Similar)
Courtesy of GENERAL MOTORS CORP.

Diagnostic Aids

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During diagnosis, park vehicle on a level surface. Check vehicle for proper alignment. Car should not pull in either direction while driving straight on a level surface. Find out from driver under what conditions DTC was set (when DIC displayed SERVICE STABILITY SYSTEM message). This information will help to duplicate failure. Snapshot function on scan tool can help find an intermittent DTC.

DTC C1287 OR C1288: STEERING SENSOR RATE MALFUNCTION OR STEERING SENSO SENSOR CIRCUIT MALFUNCTION

Circuit Description

Vehicle Stability Enhancement System (VSES) is activated by EBCM calculating desired yaw rate and comparing it to actual yaw rate input. Desired yaw rate is calculated from measured steering wheel position, vehicle speed, and lateral acceleration. The difference between desired yaw rate and actual yaw rate is yaw rate error, which is a measurement of oversteer or understeer. If yaw rate error becomes too large, EBCM will attempt to correct vehicle's yaw motion by applying differential braking to left or right front wheel. VSES activations generally occur during aggressive driving, in turns or bumpy roads without much use of accelerator pedal. When braking during VSES activation, brake pedal will feel different than ABS pedal pulsation. Brake pedal pulsates at a higher frequency during VSES activation. Usable output voltage range for lateral accelerometer and yaw rate sensors is 0.25-4.75 volts. Scan tool will report zero lateral acceleration or yaw rate as 2.5 volts with no sensor bias present. Sensor bias compensates for sensor mounting alignment errors, electronic signal errors, temperature changes, and manufacturing differences. Steering Wheel Position Sensor (SWPS) supplies 2 analog inputs, phase A and phase B, to EBCM. The 2 input signals are approximately 90 degrees out of phase. By interpreting relationship between the 2 inputs, EBCM can determine position of steering wheel and direction of steering wheel rotation. Steer angle centering is the process by which EBCM calibrates steering sensor output so that output reads zero when steering wheel is centered. Using yaw rate input, lateral accelerometer input, and wheel speed sensor inputs, initial steering center position is calculated after driving greater than 6 MPH for more than 10 seconds in a straight line on a level surface.

DTC C1287 sets when steering wheel position sensor is synchronized and steer rate (speed that steering wheel appears to be turning) is greater than 1100 degrees/second, steer rate is less than 80 degrees/second and difference in phase angle between phase A and phase B is greater than 20 degrees, or the 2 steering sensor signals (phase A and phase B) do not agree for 1 second. Under this condition, DTC C1281 will also set.

DTC C1288 sets when both phase A and phase B are greater than 4.9 volts for 1.6 seconds, both phase A and phase B are less than 0.2 volts for 1.6 seconds, or the difference in changes in phase A and phase B is greater than 35.2 degrees for 9.76 milliseconds.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to

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next step.

2. Install scan tool. Turn ignition on, engine off. Using scan tool, perform STEERING POSITION SENSOR TEST. If SWPS passed test, see **DIAGNOSTIC AIDS** . If SWPS did not pass test, go to next step.
3. Turn ignition off. Disconnect SWPS connector. Turn ignition on, engine off. Using scan tool, observe DUAL ANALOG SWPS INPUT A parameter in VSES data list. If scan tool indicates DUAL ANALOG SWPS INPUT A parameter as less than 0.2 volt, go to next step. If scan tool does not indicate DUAL ANALOG SWPS INPUT A parameter as less than 0.2 volt, go to step 13 .
4. Using scan tool, observe DUAL ANALOG SWPS INPUT B parameter. If scan tool indicates DUAL ANALOG SWPS INPUT B parameter as less than 0.2 volt, go to next step. If scan tool does not indicate DUAL ANALOG SWPS INPUT B parameter as less than 0.2 volt, go to step 14 .
5. Turn ignition off. Disconnect SWPS connector. Connect fused jumper wire (3 amp) between SWPS connector terminals No. 1 (Dark Green wire) and No. 5 (Light Green wire). See **Fig. 4** . Turn ignition on, engine off. Using scan tool, observe DUAL ANALOG SWPS INPUT A parameter. If scan tool indicates DUAL ANALOG SWPS INPUT A parameter as greater than 4.9 volts, go to next step. If scan tool does not indicate DUAL ANALOG SWPS INPUT A parameter as greater than 4.9 volts, go to step 10 .
6. Turn ignition off. Disconnect fused jumper wire. Connect fused jumper wire (3 amp) between SWPS connector terminals No. 1 (Dark Green wire) and No. 6 (Light Blue wire). See **Fig. 4** . Turn ignition on, engine off. Using scan tool, observe DUAL ANALOG SWPS INPUT B parameter. If scan tool indicates DUAL ANALOG SWPS INPUT B parameter is greater than 4.9 volts, go to next step. If scan tool does not indicate DUAL ANALOG SWPS INPUT B parameter as greater than 4.9 volts, go to step 10 .
7. Disconnect fused jumper wire. Measure voltage between SWPS connector terminals No. 1 (Dark Green wire) and No. 2 (Light Blue wire). See **Fig. 4** . If voltage is less than 5 volts, go to next step. If voltage is not less than 5 volts, go to step 9 .
8. Turn ignition off. Disconnect negative battery cable. Measure resistance between SWPS connector terminal No. 2 (Light Blue wire) and ground. See **Fig. 4** . If resistance is less than 5 ohms, go to step 16 . If resistance is not less than 5 ohms, go to step 15 .
9. Check Dark Green wire and Gray/Black wire between SWPS and EBCM for short to voltage. If problem was found, repair as necessary. After repairs, go to step 20 . If problem was not found, go to step 17 .
10. Check Dark Green wire and Gray/Black wire between SWPS and EBCM for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 20 . If problem was not found, go to next step.
11. Check Light Green wire between SWPS and EBCM for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 20 . If

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problem was not found, go to next step.

12. Check Light Blue wire between SWPS and EBCM for open, short to ground or high resistance. If problem was found, repair as necessary. After repairs, go to step 20 . If problem was not found, go to step 17 .
13. Check Light Green wire between SWPS and EBCM for short to voltage. If problem was found, repair as necessary. After repairs, go to step 20 . If problem was not found, go to step 17 .
14. Check Light Blue wire between SWPS and EBCM for short to voltage. If problem was found, repair as necessary. After repairs, go to step 20 . If problem was not found, go to step 17 .

NOTE: Removing battery voltage or ground from EBCM will result in loss of TIM learned tire inflation configuration parameters in EBCM. EBCM sets DTC C1245. When diagnosis is complete, inspect tire pressures and perform TIM reset. See TIRE PRESSURE MONITOR RESET PROCEDURE under PROGRAMMING.

15. Disconnect EBCM harness connector. Install Universal Pinout Box (J 39700) using Cable Adapter (J 39700-300) to EBCM harness connector only. Check Light Blue wire and Light Green/Black wire between SWPS and EBCM for high resistance or open. If problem was found, repair as necessary. After repairs, go to step 20 . If problem was not found, go to step 17 .
16. Check SWPS connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 20 . If problem was not found, go to step 18 .
17. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 20 . If problem was not found, go to step 19 .
18. Replace SWPS. See appropriate RACK & PINION article in STEERING. After repairs, go to step 20 .
19. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
20. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

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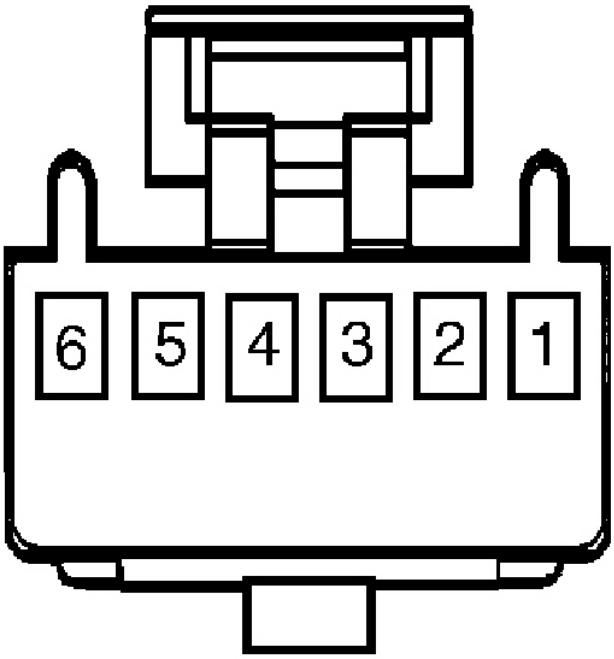


Fig. 4: Identifying SWPS Connector Terminals
Courtesy of GENERAL MOTORS CORP.

Diagnostic Aids

During diagnosis, park vehicle on a level surface. Check vehicle for proper alignment. Car should not pull in either direction while driving straight on a level surface. Find out from driver under what conditions DTC was set (when DIC displayed SERVICE STABILITY SYSTEM message). This information will help to duplicate failure. Snapshot function on scan tool can help find an intermittent DTC.

DTC C1291 OR C1293: OPEN BRAKELIGHT SWITCH CONTACTS DURING DECEL DECELERATION OR DTC C1291 SET IN PREVIOUS IGNITION CYCLE

Circuit Description

Stoplight switch signal informs EBCM when brake pedal is pressed.

DTC C1291 sets when stoplight switch remains open for 3 deceleration cycles.

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DTC C1293 sets when DTC C1291 was set in a previous ignition cycle.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Press brake pedal. If brake lights turn on, go to next step. If brake lights do not turn on, go to step 7 .
3. Press brake pedal. Using scan tool, observe STOP LAMP SWITCH parameter in DRP/ABS/TCS data list. If STOP LAMP SWITCH parameter changes state, see **DIAGNOSTIC AIDS** . If STOP LAMP SWITCH parameter does not change state, go to next step.
4. Turn ignition off. Inspect stoplight switch and adjust and/or calibrate if needed. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to next step.
5. Turn ignition off. Disconnect stoplight switch connector. Connect fused jumper wire (3 amp) between stoplight switch connector terminals "A" (Orange wire) and "B" (White wire). Turn ignition on, engine off. Using scan tool, observe STOP LAMP SWITCH parameter. If scan tool displays APPLIED, go to step 11 . If scan tool does not display APPLIED, go to next step.
6. Check White wire between stoplight switch and EBCM for open. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to step 10 .
7. Check Orange wire between rear fuse block and stoplight switch for short to ground or open. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to next step.
8. Check White wire between stoplight switch and EBCM for open. If problem is found, repair as necessary. After repairs, go to step 14 . If problem is not found, go to next step.
9. Check White wire between stoplight switch and EBCM for short to ground. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to next step.
10. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to step 12 .
11. Check stoplight switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 14 . If problem was not found, go to step 13 .
12. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 14 .
13. Replace stoplight switch. See **STOPLIGHT SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
14. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

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Diagnostic Aids

Diagnose any wheel speed sensor DTCs before continuing with diagnosis of DTC.

Deceleration cycle consists of the following sequence:

1. Vehicle speed is greater than 15 MPH.
2. Vehicle decelerates more than 5 MPH/second for 2 seconds.
3. Vehicle speed decelerates to less than 10 MPH.

Verify proper stoplight switch operation using data list of scan tool. As brake is applied, data list should display stoplight switch on within 1 inch (2.54 cm) of travel.

Possible causes of this DTC are the following conditions:

- Open stoplight switch.
- Stoplight switch is misadjusted.
- Open fuse.
- Circuit has a wiring problem, terminal corrosion, or poor connections.
- Erratic wheel speeds.

DTC C1294: BRAKELIGHT SWITCH CIRCUIT ALWAYS ACTIVE

Circuit Description

Stoplight switch signal informs EBCM when brake pedal is pressed.

DTC sets when stoplight switch input was active for 2 consecutive ignition cycles. Vehicle speed is greater than 25 MPH.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, observe STOP LAMP SWITCH parameter in DRP/ABS/TCS data list. If scan tool displays RELEASED, go to next step. If scan tool does not display RELEASED, go to step 4 .
3. Press brake pedal. Using scan tool, observe STOP LAMP SWITCH parameter. If STOP LAMP SWITCH parameter changes state, see **DIAGNOSTIC AIDS** . If STOP LAMP SWITCH parameter does not change states, go to next step.
4. Turn ignition off. Inspect stoplight switch and adjust and/or calibrate if needed. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to next step.

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5. Turn ignition off. Disconnect stoplight switch connector. Turn ignition on, engine off. Using scan tool, observe STOP LAMP SWITCH parameter. If scan tool displays RELEASED, go to step 8 . If scan tool does not display RELEASED, go to next step.
6. Check White wire between stoplight switch and EBCM for short to voltage. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to next step.
7. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 9 .
8. Check stoplight switch connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 11 . If problem was not found, go to step 10 .
9. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to step 11 .
10. Replace stoplight switch. See **STOPLIGHT SWITCH** under REMOVAL & INSTALLATION. After repairs, go to next step.
11. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

Possible causes of DTC are stoplight switch circuit is shorted to voltage, stoplight switch is misadjusted, stoplight switch is stuck closed, or brake pedal that is binding.

DTC C1295: BRAKELIGHT SWITCH CIRCUIT OPEN

Circuit Description

EBCM sources 5 volts on stoplight switch signal circuit when stoplight switch is inactive. Voltage is supplied a ground path through stoplight bulbs.

DTC sets when stoplight switch input voltage is 2.1-5.3 volts for 2 seconds.

Diagnosis

1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Press brake pedal. Using scan tool, observe STOP LAMP SWITCH parameter in DRP/ABS/TCS data list. If STOP LAMP SWITCH parameter displays APPLIED, go to step 4 . If STOP LAMP SWITCH parameter does not display APPLIED, go to next step.
3. Check White wire between stoplight switch and EBCM for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to step 7 .
4. Press brake pedal. If all of stoplights are off, go to next step. If all stoplights are not off, see **DIAGNOSTIC AIDS** .

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5. Check White wire between stoplight switch and stoplights for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to next step.
6. Check Black wire between stoplights and ground for open or high resistance. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, see **DIAGNOSTIC AIDS** .
7. Check EBCM connector for poor connections. If problem was found, repair as necessary. After repairs, go to step 9 . If problem was not found, go to next step.
8. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
9. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

Possible causes of DTC are:

- A signal circuit of the stoplight switch is open.
- Stoplight switch is misadjusted. Verify proper stoplight switch operation using data list of scan tool. As brake is applied, data list should display stoplight switch on within 1 inch (2.54 cm) of travel.
- All brake lights are open.
- All brake light grounds are open.
- Circuit has wiring problem, terminal corrosion, or poor connections.
- Loose or corroded EBCM ground or PCM ground.
- Internal EBCM problem.

DTC C1298: CLASS 2 SERIAL DATA LINK MALFUNCTION (2000 ONLY)

Circuit Description

Class 2 serial data line allows all modules on line to transmit information to each other as needed. Each module is assigned an ID. All information sent out on line is assigned a priority by which it is received. When ignition is turned on, each module begins to send and receive information. Each module on class 2 serial data line knows what information module needs to send out and what information module should be receiving. What modules do not know is which module is supposed to send information. This information is only learned after module has received information needed along with ID of module that sent information. This information is then remembered until ignition switch is turned off.

DTC sets when PCM does not receive any messages from EBCM for 7 seconds.

Diagnosis

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1. Perform **DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Install scan tool. Turn ignition on, engine off. Using scan tool, display DTCs function for Powertrain control module (PCM), Instrument cluster (IPC) and Inflatable restraint sensing and diagnostic module (SDM). If scan tool displays DTC U1040, see SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE in appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT. If scan tool does not display DTC U1040, go to next step.
3. Inspect EBCM ground and PCM ground, making sure each ground is clean and tight. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to next step.
4. Using scan tool, observe SYSTEM POWER MODE parameter in NORMAL MODE EAVESDROP in DRP/ABS/TCS/VSES SPECIAL FUNCTIONS. Turn ignition switch to each positions: OFF, ACC, START and RUN. If scan tool displayed correct ignition switch positions, go to next step. If scan tool did not display correct ignition switch positions, see appropriate BODY CONTROL MODULES article in ACCESSORIES & EQUIPMENT.
5. Suspect PCM. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE. If problem was found, repair as necessary. After repairs, go to step 8 . If problem was not found, go to next step.
6. Using scan tool, clear DTCs. Operate vehicle. If DTC resets, go to next step. If DTC does not reset, see **DIAGNOSTIC AIDS** .
7. Replace EBCM. See **ELECTRONIC BRAKE CONTROL MODULE** under REMOVAL & INSTALLATION. After repairs, go to next step.
8. Using scan tool, clear DTCs. Operate vehicle. If DTC does not reset, system is okay.

Diagnostic Aids

Possible causes of DTC are:

- EBCM has a class 2 serial data transmit fault.
- PCM has a class 2 serial data receiver fault.
- Class 2 serial data line has an extremely high amount of traffic.
- Loose or corroded EBCM ground or PCM ground.

REMOVAL & INSTALLATION

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN

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PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

WARNING: Vehicle is equipped with Supplemental Inflatable Restraint (SIR) system. Disable SIR system when working near steering column or instrument panel. See SUPPLEMENTAL INFLATABLE RESTRAINT (SIR) under SERVICE PRECAUTIONS.

BRAKE PRESSURE MODULATOR VALVE

Removal

1. Turn ignition off. Raise and support vehicle. Remove left front wheel. Remove front fascia extension, front air deflector, left front wheelhouse extension and air injection pump as applicable. Rotate Electronic Brake Control Module (EBCM) connector tab up to unlock position. Remove EBCM connector assurance and disconnect EBCM electrical connector.
2. Remove 2 master cylinder brake pipes from BPMV. Remove 4 wheel brake pipes from BPMV. Remove 2 BPMV mounting nuts. Remove EBCM/BPMV assembly. Disconnect BPMV electrical connector from EBCM. Remove 6 EBCM to BPMV screws and separate EBCM from BPMV.

CAUTION: Ensure brakelines are correctly connected to BPMV or wheel lock-up will occur.

Installation

To install, reverse removal procedure. Clean up any spilled brake fluid in mounting area. Tighten bolts and brakelines to specification. See **TORQUE SPECIFICATIONS** . After completing installation, bleed brake system. See **BLEEDING BRAKE SYSTEM** .

ELECTRONIC BRAKE CONTROL MODULE

Removal

1. Turn ignition off. Raise and support vehicle. Remove left front wheel. Remove front fascia extension, front air deflector, left front wheelhouse extension and air injection pump as applicable. Rotate Electronic Brake Control Module (EBCM) connector tab up to unlock position. Remove EBCM connector assurance and disconnect EBCM electrical connector.
2. Disconnect BPMV electrical connector from EBCM. Remove 6 EBCM-to-BPMV screws and separate EBCM from BPMV.

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Installation

WARNING: New EBCM must be programmed. An unprogrammed EBCM will result in inoperative or poorly functioning DRP/ABS/TCS/VSES/TIM/VES (if equipped), Red brake warning indicator on, and EBCM will malfunction internally. Refer to Techline Terminal/Equipment user's instructions for programming.

To install, reverse removal procedure. Tighten bolts and brakelines to specification. See **TORQUE SPECIFICATIONS** . Ensure EBCM is programmed. See Techline Terminal/Equipment user's instructions for programming.

LATERAL ACCELEROMETER SENSOR

Removal & Installation

Turn ignition off. Remove rear seat cushion. Disconnect lateral accelerometer sensor electrical connector. Remove 2 lateral accelerometer sensor screws. Remove lateral accelerometer sensor. To install, reverse removal procedure.

STEERING WHEEL POSITION SENSOR

The steering wheel position sensor is mounted to steering shaft. For removal and installation, see appropriate STEERING COLUMNS article in STEERING.

STOPLIGHT SWITCH

Removal & Installation

Remove left sound insulator. Rotate stoplight switch counterclockwise, then pull to remove switch. Disconnect electrical connectors from switch. To install, reverse removal procedure.

TRACTION CONTROL SWITCH

Removal & Installation (Aurora)

Pull instrument panel center trim plate rearward to disengage retaining clips. Remove center trim plate. Remove console trim plate fasteners. Pull upward on rear of console trim plate to disengage retaining clips. Disconnect electrical connectors and remove console trim plate. Remove traction control switch from console trim plate. To install, reverse removal procedure.

Removal & Installation (Bonneville)

Remove console shift knob. Remove console storage tray. Remove console trim plate by

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pulling upward on trim plate in order to disengage retainer clips. Disconnect traction control switch connector and remove traction control switch from console trim plate. To install, reverse removal procedure.

Removal & Installation (DeVille)

1. Set parking brake. Shift vehicle into neutral to allow clearance for console trim plate to be removed. Using thin bladed tool or hook tool, pry upward on rear edge of console trim plate to disengage 4 of 6 clips retaining trim plate. Lift rear of trim plate to disconnect traction control switch electrical connector.
2. Push down lightly on front of console trim plate pull towards rear to avoid interference with storage compartment door trim when disengaging front console trim panel clips. Lift console trim plate over shift handle and remove console trim plate. Remove traction control switch. To install, reverse removal procedure.

Removal & Installation (LeSabre & Park Avenue)

Traction control switch is part of shift lever. See appropriate STEERING COLUMNS article in STEERING for removal and installation.

Removal & Installation (Seville)

1. Block wheels on vehicle. Put shift lever in neutral. Insert fingers (if necessary, use flat plastic tool) between trim plate and PRNDL at right hand rear corner of chrome trim. Gently lift up trim plate to disengage right rear corner retainer. Gently lift up left rear corner and 2 front corners of chrome trim in order to disengage remaining retainers.
2. Lift console trim plate assembly upwards from rear edge and pull assembly rearward. Disconnect electrical connectors as necessary. Remove traction control switch mounting screws. Remove traction control switch from trim plate. To install, reverse removal procedure.

TOOTHED RING

NOTE: Toothed ring is not serviceable. Toothed ring is incorporated into hub assemblies. A NEW hub assembly must be installed if toothed ring requires replacement.

WHEEL SPEED SENSORS

NOTE: Wheel speed sensors are incorporated in hub assembly. Entire hub/wheel speed sensor assembly must be replaced.

Removal & Installation (Front)

1. Turn ignition off. Raise and support vehicle. Remove wheel. Remove drive axle nut.

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Remove brake caliper and rotor. Disconnect WSS electrical connector. Remove wheel hub retaining bolts and remove hub/wheel speed sensor assembly from steering knuckle.

2. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

Removal & Installation (Rear)

1. Turn ignition off. Raise and support vehicle. Remove wheel. Remove brake caliper and rotor. Disconnect WSS connector. Remove wheel hub retaining bolts and remove hub/wheel speed sensor assembly from lower control arm.
2. To install, reverse removal procedure. Tighten mounting bolt to specification. See **TORQUE SPECIFICATIONS** .

YAW RATE SENSOR

Removal & Installation

1. Turn ignition off. Remove rear seat cushion and seat back. Remove fasteners in front of rear window trim panel. Remove shoulder belts from rear window trim panel. Remove rear window trim panel.
2. Remove trim panel carrier and trunk trim panels as necessary. Remove 2 yaw rate sensor mounting nuts and remove yaw rate sensor. Disconnect yaw rate sensor electrical connector. To install, reverse removal procedure.

ADJUSTMENTS

BRAKELIGHT/CRUISE CONTROL SWITCH

Stoplamp switches are self adjusting when they are installed properly in fully locked position. Twist lock type switches do not need any further adjustment.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
BPMV Brake Pipes	11 (15)
Drive Axle Nut	118 (160)
Front Hub Bolts	70 (95)
Rear Hub Bolts	52 (70)
Wheel Nuts	100 (140)
	INCH Lbs. (N.m)
BPMV Bracket Nuts	89 (10.0)
BPMV Bracket-To-Frame Bolts	80 (9.0)

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EBCM-To-BPMV Screws	28 (3.2)
Lateral Accelerometer Sensor Screws	21 (2.4)
Yaw Rate Sensor Nuts	53 (6.0)

WIRING DIAGRAMS

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Fig. 5: Anti-Lock Brake/Traction Control System Wiring Diagram (Aurora - 2001)

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Fig. 6: Anti-Lock Brake/Traction Control System Wiring Diagram (Bonneville - 2000)

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Fig. 7: Anti-Lock Brake/Traction Control System Wiring Diagram (Bonneville - 2001)

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Fig. 8: Anti-Lock Brake/Traction Control System Wiring Diagram (DeVille - 2000)

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Fig. 9: Anti-Lock Brake/Traction Control System Wiring Diagram (DeVille - 2001)

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Fig. 10: Anti-Lock Brake/Traction Control System Wiring Diagram (LeSabre - 2000)

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Fig. 11: Anti-Lock Brake/Traction Control System Wiring Diagram (LeSabre - 2001)

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Fig. 12: Anti-Lock Brake/Traction Control System Wiring Diagram (Park Avenue - 2000)

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Fig. 13: Anti-Lock Brake/Traction Control System Wiring Diagram (Park Avenue - 2001)

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Fig. 14: Anti-Lock Brake/Traction Control System Wiring Diagram (Seville - 2000)

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Fig. 15: Anti-Lock Brake/Traction Control System Wiring Diagram (Seville - 2001)

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2000-01 BRAKES

Disc - "C", "G" & "H" Bodies

MODEL IDENTIFICATION

MODEL IDENTIFICATION

Body Code (1)	Model
C	Park Avenue
G	Aurora
H	Bonneville & LeSabre
(1) Vehicle body code is fourth character of VIN.	

DESCRIPTION & OPERATION

This article covers service and repair of conventional type brake components of Anti-Lock Brake System (ABS). All models are equipped with ABS. During normal braking applications, conventional portion of braking system is used to apply brakes.

Conventional braking system components include, but are not limited to, a diagonally split master cylinder, power brake booster, brakelines and rear in-line proportioning valves. All models are equipped with front and rear disc brakes.

On all vehicles, BRAKE warning light illuminates when one or more of the following conditions exist:

- Parking brake is applied or not fully released.
- Fluid level in master cylinder reservoir is low.
- During engine cranking. A bulb check is performed to indicate that the warning circuit is operational.

BLEEDING BRAKE SYSTEM

BLEEDING PROCEDURE

NOTE: All vehicles are equipped with Anti-Lock Brake Systems (ABS), and may also have optional Traction Control System (TCS). For complete bleeding procedures for these systems, see BLEEDING BRAKE SYSTEM in appropriate ANTI-LOCK article.

ADJUSTMENTS

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BRAKE PEDAL HEIGHT & FREE PLAY

Brake pedal height and free play are not adjustable.

BRAKE PEDAL TRAVEL

NOTE: Brake pedal travel is not adjustable. Use the following procedure to determine if brake pedal travel is as specified.

1. With engine off, pump brake pedal until all vacuum reserve is exhausted from power brake booster. A definite change in pedal feel will occur. With brake pedal released, install Brake Pedal Effort Gauge (J-28662) onto brake pedal. Hook end of tape measure over top of brake pedal. Measure and record distance to rim of steering wheel.
2. Apply 100 lbs. (45 kg) of force to brake pedal. Measure and record distance to rim of steering wheel again. Difference between measured values is brake pedal travel. If brake pedal travel exceeds 2.24" (57 mm), inspect brake system. Ensure brakes are properly adjusted and bled. Repair and replace as necessary.

BRAKELIGHT SWITCH

Brakelight switch is a self-adjusting, twist-lock type switch. When installed properly in full-lock position, the electrical connector will be in the 3 o'clock position (twisted clockwise until travel stop has been reached). Ensure brakelights do not stay on with brake pedal released.

PARKING BRAKE

2000 "C" & "H" Bodies & 2001 "G" Body

1. Press service brake pedal with about 150 lbs. (68.0 kg) of force and release. Apply parking brake 3 times with a force of about 125 lbs. (56.7 kg) and release.
2. To ensure parking brake pedal is fully released, turn ignition on. BRAKE indicator light on instrument panel should be off. If light is off, go to next step. If light is on and parking brake appears to be fully released, depress push-to-release pedal and pull front parking brake cable downward to remove slack.
3. Raise and support vehicle. Loosen parking brake cable adjuster. Check parking brake lever on each rear caliper. If levers are not against stops on caliper housings, check for binding in rear cables. Position levers against stops. Tighten parking brake cable at adjuster until left or right lever begins to move off stop.
4. Loosen cable adjuster until lever that moved off stop in previous step is again resting against stop. Both levers should now be resting against stop. Operate parking brake several times to check adjustment is correct. Firm brake pedal feel should be obtained when pressing pedal less than one full stroke.
5. Release parking brake and check that parking brake levers are resting on lever stops.

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Lower vehicle. Check operation of parking brake. If possible, place vehicle on a grade and check parking brake holding ability.

2001 Models "C" & "H" Bodies

Parking brake is self adjusting. No adjustments are necessary.

TESTING

BRAKE WARNING INDICATOR INOPERATIVE

NOTE: See appropriate INSTRUMENT PANELS article in ACCESSORIES & EQUIPMENT.

REMOVAL & INSTALLATION

FRONT BRAKE CALIPER

Removal

1. Inspect fluid level in brake master cylinder reservoir. If brake fluid level is midway between maximum-full point and minimum allowable level, no brake fluid needs to be removed from reservoir before proceeding. If brake fluid level is higher than midway between maximum-full point and minimum allowable level, remove brake fluid to midway point before proceeding. Raise and support vehicle. Mark wheel in relation to hub. Remove front wheel. Install and finger-tighten 2 lug nuts with flat side toward rotor to hold rotor when caliper is removed.
2. If not completely removing caliper (such as for overhaul), go to next step. If completely removing caliper, remove bolt securing brake hose to caliper. Disconnect brake hose from caliper. Plug opening in brake hose to prevent fluid loss and contamination.
3. Position "C" clamp with stationary end of clamp on caliper housing and threaded end on outboard pad. Tighten "C" clamp until piston is pushed into bore far enough to slide caliper off rotor. Remove "C" clamp. Plug opening in caliper to prevent further fluid loss and contamination.
4. Remove caliper bolts and bushings. See **Fig. 1** . Remove caliper. If brake hose is still connected to caliper, hang caliper by wire so brake hose will not be damaged. Remove pads from caliper.

Installation

1. Liberally coat inner diameter of bushings with silicone grease. Install caliper. Install caliper bolts and bushings. If bolts slide through bushings using hand pressure, indicating bushings, mounting bolts, and caliper slide pin bores are okay, go to step 3 .
2. If bolts do not slide through bushings using hand pressure, remove bolts and bushings.

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Inspect caliper bores for corrosion. If corroded, remove corrosion using 1" (25.4 mm) diameter wheel cylinder honing brush. Clean bores with clean denatured alcohol. Install and lubricate bushings. Install caliper bolts.

3. Tighten caliper bolts to specification. See **TORQUE SPECIFICATIONS** . If brake hose was not disconnected, go to next step. If brake hose was disconnected, connect brake hose to caliper. Tighten fitting bolt to specification. Bleed brake hydraulic system, and go to next step. See BLEEDING BRAKE SYSTEM in appropriate ANTI-LOCK article.
4. Apply brakes several times to seat pads. Install wheel, aligning marks made during removal. Tighten wheel lug nuts to specification. Fill brake fluid reservoir. Road-test vehicle.

FRONT BRAKE PADS

Removal

Remove caliper. See **FRONT BRAKE CALIPER** . Slid caliper off rotor, and wire aside. Remove outer pad from caliper, using screwdriver to disengage pad retainer buttons. See **Fig. 1** . Remove inner pad.

Installation

1. Clean outside surface of caliper piston boot with denatured alcohol. Bottom piston in caliper bore. Using small plastic or wood tool, lift inner edge of boot next to piston and press out any trapped air. Reposition boot so it lays flat with convolutions in proper position.
2. Install inner pad, snapping retainer into place in piston. Ensure pad lays flat against piston. Ensure boot is not touching pad. Install outer pad with wear sensor facing downward. Ensure pad lays flat against caliper. To install remaining components, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

FRONT BRAKE ROTOR

Removal & Installation

Remove caliper and wire aside. See **FRONT BRAKE CALIPER** . Mark rotor in relation to hub for installation reference. Remove rotor. To install, reverse removal procedure.

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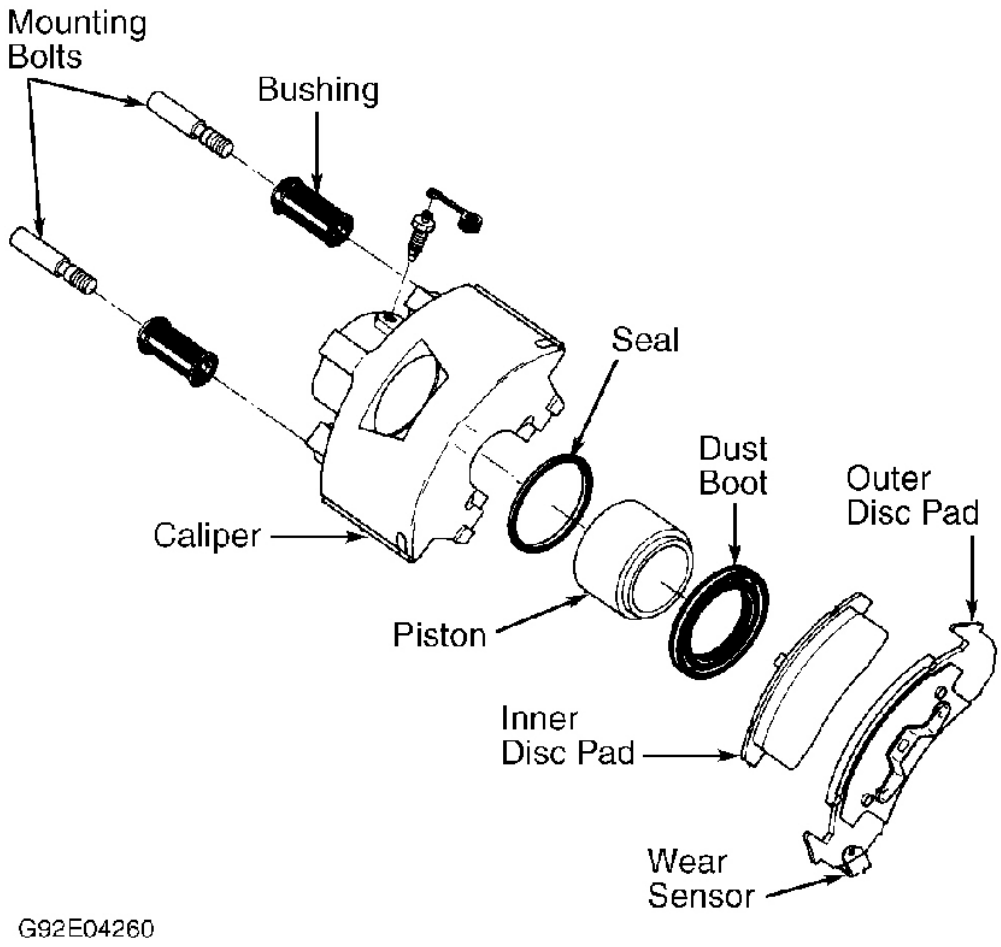


Fig. 1: Exploded View Of Front Brake Caliper Assembly
Courtesy of GENERAL MOTORS CORP.

REAR BRAKE CALIPER

Removal

1. Inspect fluid level in brake master cylinder reservoir. If brake fluid level is midway between maximum-full point and minimum allowable level, no brake fluid needs to be removed from reservoir before proceeding. If brake fluid level is higher than midway between maximum-full point and minimum allowable level, remove brake fluid to midway point before proceeding. Release parking brake. Raise and support vehicle. Mark wheel in relation to hub. Remove wheel. Install and finger-tighten 2 lug nuts with flat side toward rotor, to hold rotor when caliper is removed.
2. If not completely removing caliper (such as for overhaul), go to next step. If completely removing caliper, remove bolt securing brake hose to caliper. Disconnect brake hose

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from caliper. Plug opening in brake hose and caliper to prevent fluid loss and contamination. Position "C" clamp with stationary end of clamp on caliper housing and threaded end on outboard pad. Tighten "C" clamp until piston is pushed into bore far enough to slide caliper off rotor. Remove "C" clamp. Lift up end of cable spring clip and disconnect parking brake cable from parking brake lever. See **Fig. 2** .

3. Remove bolt and washer securing cable support bracket to caliper body. Remove sleeve bolt. Pivot caliper upward to clear rotor. Slide caliper inboard off pin sleeve to remove caliper. Hang caliper by wire if brake hose is still connected.

Installation

1. Check bolt sleeve and pin sleeve for corrosion. Replace if corroded. DO NOT polish to remove corrosion. If brake caliper was not replaced, remove pin boot from caliper. Install small end over pin sleeve (installed on caliper support) until boot is seated in pin groove. This will prevent cutting pin boot when sliding caliper onto pin sleeve.
2. Slide caliper over end of pin sleeve until caliper approaches pin boot. Work large end of pin boot in caliper groove. Push caliper fully onto pin. Pivot caliper downward, using care not to damage piston boot on inboard pad. As caliper moves into position, compress sleeve boot by hand to prevent boot damage.
3. After caliper is in position, recheck installation of pad clips. If necessary, use a small screwdriver to seat or center pad clips on support abutments. Install sleeve bolt. Tighten to specification. See **TORQUE SPECIFICATIONS** . Install cable support bracket (with cable attached), washer and bolt.
4. If caliper was not completely removed, go to next step. If caliper was completely removed, lift up end of cable spring clip and work end of parking brake cable into notch in lever to connect end of cable to lever. Connect brake hose to caliper. Tighten fitting bolt to specification. Bleed brake system. See BLEEDING BRAKE SYSTEM in appropriate ANTI-LOCK article.
5. Install wheel, aligning marks made during removal. Tighten wheel lug nuts to specification. Apply brakes several times to seat pads against rotor. Fill brake fluid reservoir. Road-test vehicle.

REAR BRAKE PADS

Removal

Pivot caliper upward. See **REAR BRAKE CALIPER** . Remove outer and inner pads. See **Fig. 2** . Remove pad clips.

Installation

1. Using spanner wrench in caliper piston slots, rotate piston until bottomed in caliper. Align slots in piston so protrusions on pads will align with slots when pads are installed.

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Using small plastic or wood tool, lift inner edge of boot next to piston and press out any trapped air. Reposition boot so it lays flat with convolutions in proper position.

2. Install NEW pad clips onto caliper support. Install pads onto caliper support. Wear sensor on outer pad must be positioned downward. To install remaining components, reverse removal procedure. Ensure boot is not touching pad.

REAR BRAKE ROTOR

Removal & Installation

Remove caliper and wire aside. See **REAR BRAKE CALIPER** . Mark rotor in relation to hub for installation reference. Remove rotor. To install, reverse removal procedure.

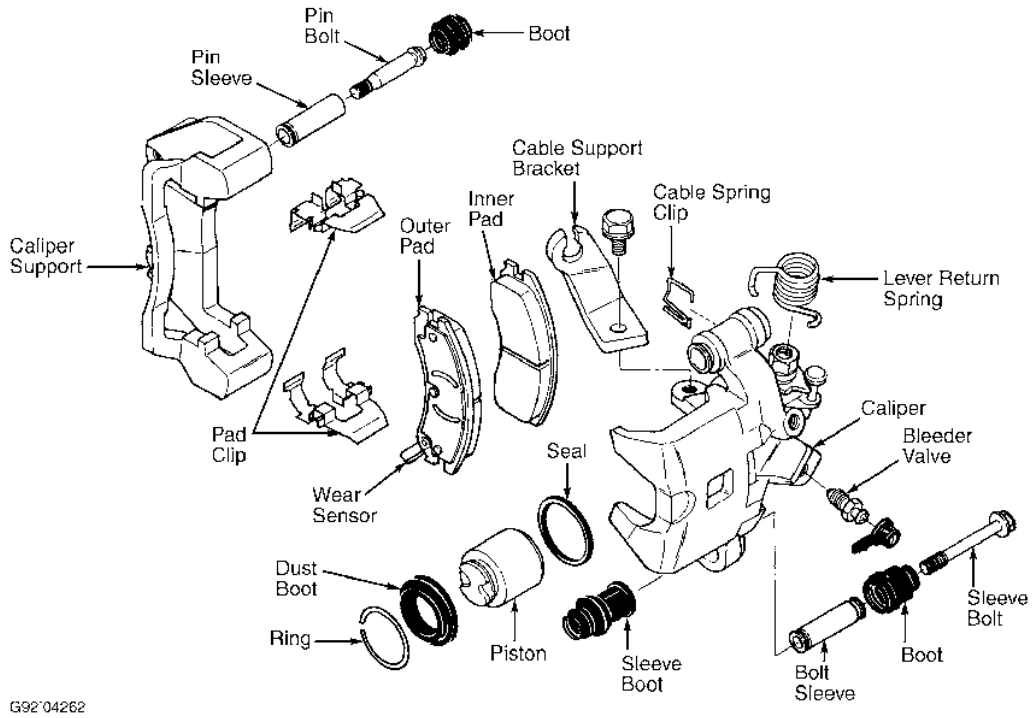


Fig. 2: Exploded View Of Rear Brake Caliper
Courtesy of GENERAL MOTORS CORP.

MASTER CYLINDER

Removal

1. Disconnect electrical connector from brake fluid level sensor. Disconnect brake pipes from master cylinder. Plug brake pipes to prevent fluid loss and contamination.
2. Remove master cylinder mounting nuts. Remove master cylinder.

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Installation

To install, reverse removal procedure. Use DOT 3 brake fluid. Bench bleed master cylinder before installation. Bleed brake system as necessary. See BLEEDING BRAKE SYSTEM in appropriate ANTI-LOCK article. Tighten master cylinder nuts and brakeline fittings to specification. See **TORQUE SPECIFICATIONS** .

MASTER CYLINDER RESERVOIR

Removal

1. Remove master cylinder from vehicle. See **MASTER CYLINDER** . Disconnect fluid level sensor electrical connector. Drain brake fluid from master cylinder.
2. Remove pins securing reservoir to master cylinder. Tap back pins until clear of reservoir, being careful not to damage reservoir or master cylinder. Remove reservoir and reservoir seals.

Installation

Lubricate NEW reservoir seals with brake fluid. Install seals. To install remaining components, reverse removal procedure. Fill master cylinder. Bleed brake system. See BLEEDING BRAKE SYSTEM in appropriate ANTI-LOCK article.

POWER BRAKE BOOSTER

Removal "C" Body

1. Remove windshield washer reservoir. Remove electrical connector from brake fluid level sensor. Remove master cylinder mounting nuts. Disconnect master cylinder from brake booster. Position master cylinder forward just enough to clear booster studs. DO NOT bend or distort pipes.
2. Disconnect brake booster vacuum check valve from brake booster and position aside. Remove left closeout panel. Lower and secure steering column. Remove vacuum brake booster pushrod retainer from brake pedal clevis pin. Disconnect pushrod from brake pedal. Remove pedal assembly from booster mounting studs. Remove vacuum brake booster.

Removal "G" Body (LX5 Engine)

1. Remove air cleaner assembly. Remove accelerator and cruise control cables. Remove shift control cable. Disconnect electrical connector on left strut tower. Remove master cylinder mounting nuts. Disconnect master cylinder from brake booster. Position master cylinder forward just enough to clear booster studs. DO NOT bend or distort pipes.
2. Disconnect brake booster vacuum check valve and hose from brake booster, and position aside. Remove support brace bolt attaching AIR injection pump tube to secondary AIR

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injection valve bracket. Loosen support brace nut securing AIR injection pump tube to transaxle. Disconnect secondary AIR injection pump hose from secondary AIR injection valve, and position aside.

3. Remove EGR inlet pipe. Remove fuel injection sight shield. Remove left closeout panel. Remove left knee bolster. Remove retaining clip and foam spacer from brake pedal clevis pin. Disconnect pushrod from brake pedal. Remove pedal assembly from booster mounting studs. Remove vacuum brake booster and gasket.

Removal "G" Body (L47 Engine)

1. Remove air cleaner assembly. Remove accelerator and cruise control cables. Remove shift control cable. Remove left carpet retainer. Remove left closeout panel. Remove left knee bolster. Remove retaining clip and foam spacer from brake pedal clevis pin. Disconnect pushrod from brake pedal. Remove pedal assembly from booster mounting studs.
2. Remove master cylinder mounting nuts. Disconnect master cylinder from brake booster, and position master cylinder aside. DO NOT bend or distort pipes. Remove cruise control module. Disconnect electrical connector on left strut tower. Remove accelerator control cable bracket from throttle body, and position bracket and cables aside. Shift vehicle into LOW gear. Disconnect shift control cable from shaft lever pin. Remove shift control cable and bracket, and position aside.
3. Disconnect brake booster vacuum check valve and hose as an assembly from vacuum brake booster. Remove vacuum brake booster and gasket.

Removal "H" Body

1. Remove fuel injector sight shield. Remove air inlet duct. Remove air cleaner assembly. Remove accelerator control cable bracket and position cables aside. Remove cruise control module. Disconnect electrical harness from left strut tower. Disconnect brake fluid level sensor wire connector.
2. Remove master cylinder mounting nuts and position master cylinder aside. Remove vacuum brake booster check valve. Remove left closeout panel. Remove knee bolster. Remove vacuum brake booster pushrod retainer from brake pedal clevis pin. Disconnect pushrod from brake pedal. Remove pedal assembly from booster mounting studs. Remove vacuum brake booster.

Installation

To install, reverse removal procedure. Tighten nuts to specification. See **TORQUE SPECIFICATIONS** . Adjust brakelight switch. See **BRAKELIGHT SWITCH** under ADJUSTMENTS.

OVERHAUL

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NOTE: Master cylinder and power booster units are no longer serviceable and must be replaced as an assembly.

FRONT CALIPER

CAUTION: DO NOT place fingers in front of caliper piston when applying compressed air to remove piston. Injury may result.

1. Remove caliper from vehicle. Remove caliper bushings and inspect. Replace bushings if nicked, worn or damaged. Using a clean shop towel to pad interior of caliper, remove piston using compressed air at caliper inlet port. Inspect piston for scoring, nicks, corrosion and worn or damaged chrome plating. Replace as necessary.
2. Using nonmetallic tools to avoid scratching, remove boot from piston and piston seal from caliper. Inspect caliper bore for scoring, corrosion, nicks and wear. Using crocus cloth, clean out caliper bore. If corrosion will not clean off of seal groove, replace caliper housing.
3. Clean all parts with denatured alcohol. Dry with compressed air. Blow out passages in caliper and bleeder valves. Install bleeder valves and tighten to specification. See **TORQUE SPECIFICATIONS** .
4. Lubricate new piston seal and install into caliper bore groove. Lubricate boot and install onto piston. Install piston and boot into caliper bore, pushing piston to bottom of caliper bore. Using Dust Boot Seal Installer (J-26267), seat boot into caliper housing. Lubricate beveled end of bushings with silicone grease. Install bushings into mounting bores, beveled end first.

REAR CALIPERS

CAUTION: DO NOT place fingers in front of caliper piston when applying compressed air to remove piston. Injury may result.

1. Remove caliper from vehicle. Remove caliper pins and bushings and inspect for nicks or damage. Replace as necessary. Using a clean shop towel to pad interior of caliper, remove piston using low pressure compressed air at caliper inlet port, or remove piston using a spanner wrench to remove threaded piston assembly out of caliper.
2. Using nonmetallic tools to avoid scratching, remove boot from piston. Remove piston seal from caliper. Inspect caliper bore for scoring, corrosion, nicks and wear. Remove bleeder valve. Remove pin boot, bolt boot, bolt and sleeve from caliper body. Remove pin bolt and pin sleeve from caliper support. Remove lever spring, if replacing spring.
3. Clean all parts with denatured alcohol. Dry with compressed air. Blow out passages in caliper and bleeder valves. Inspect caliper bore and piston for scoring, nicks, cracks,

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corrosion and wear. Replace as necessary. Do not hone caliper bore. Check seal groove for nicks or burrs, replace caliper housing if found.

4. Install pin bolts and pin sleeves to caliper support. Lube outside diameter of boot with silicone grease. Install sleeve boot, with silicone grease, through caliper. Push bolt sleeve through lip end of boot until boot seats in sleeve groove at other end. Install bolt boot onto caliper body. Install pin boot over sleeve (installed on caliper support). Install lever return spring.
5. Install bleeder valves and tighten to specification. See **TORQUE SPECIFICATIONS** . Lubricate new piston seal and install into caliper bore groove. Lubricate boot and install onto piston. Install piston and boot into caliper bore, thread into bottom of caliper using spanner wrench. Seat boot ring into counter bore of caliper body. Ensure not to pinch boot. Remove any trapped air in boot. Boot must lay flat.

DISC BRAKE SPECIFICATIONS

FRONT DISC BRAKE SPECIFICATIONS

Application	In. (mm)
Disc Diameter	
"C", "G" & "H" Bodies (16" Wheels)	11.8 (300)
"H" Body (15" Wheels)	10.9 (278)
Lateral Runout	.002 (.05)
Parallelism	.0005 (.013)
Original Thickness	1.267 (32.18)
Minimum Refinished Thickness	1.224 (31.09)
Discard Thickness (1)	1.20 (30.5)

(1) Discard dimension cast into rotor is for wear and does not apply to minimum refinished thickness.

REAR DISC BRAKE SPECIFICATIONS

Application	In. (mm)
Disc Diameter	11.06 (281)
Lateral Runout	.002 (.05)
Parallelism	.0005 (.013)
Original Thickness	.433 (11.00)
Minimum Refinished Thickness	.423 (10.74)
Discard Thickness (1)	.374 (9.50)

(1) Discard dimension cast into rotor is for wear and does not apply to minimum refinished thickness.

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TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Booster Attaching Nuts	17 (23)
Brake Hose-to-Caliper Bolt	33 (45)
Front Brake Caliper Bracket Bolt	137 (186)
Front Brake Caliper Pin Bolt	63 (85)
Master Cylinder Mounting Nuts	18 (24)
Parking Brake Cable Bracket Bolt	32 (43)
Rear Brake Caliper Bracket Bolt	94 (127)
Rear Brake Caliper Pin Bolt	20 (27)
Wheel Lug Nuts	100 (136)
	INCH (N.m)
Caliper Bleed Valve	115 (13)

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2000-01 ELECTRICAL

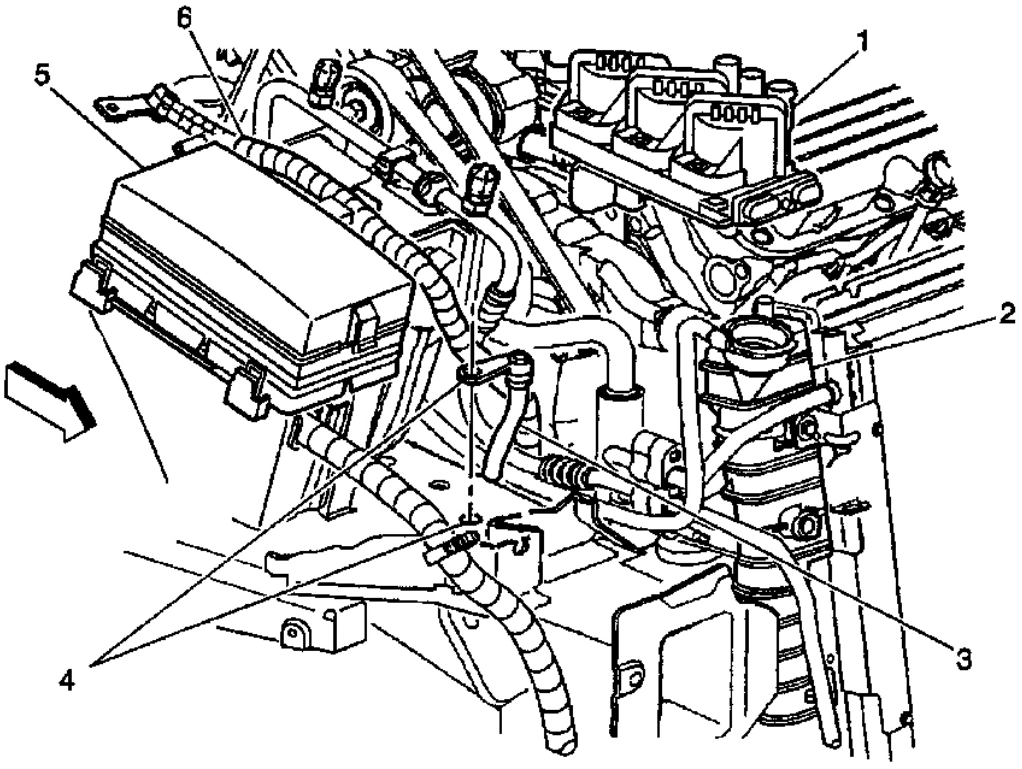
Fuses & Circuit Breakers - Bonneville & LeSabre

IDENTIFICATION

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

UNDERHOOD FUSE BLOCK

NOTE: Underhood fuse block is located on passenger's side of engine compartment. See Fig. 1 .



(1) Ignition Control Module
(2) Radiator
(3) Negative Ground Cable
(4) G107
(5) Underhood Fuse Block
(6) Positive Battery Cable

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Fig. 1: Locating Underhood Fuse Block
Courtesy of GENERAL MOTORS CORP.

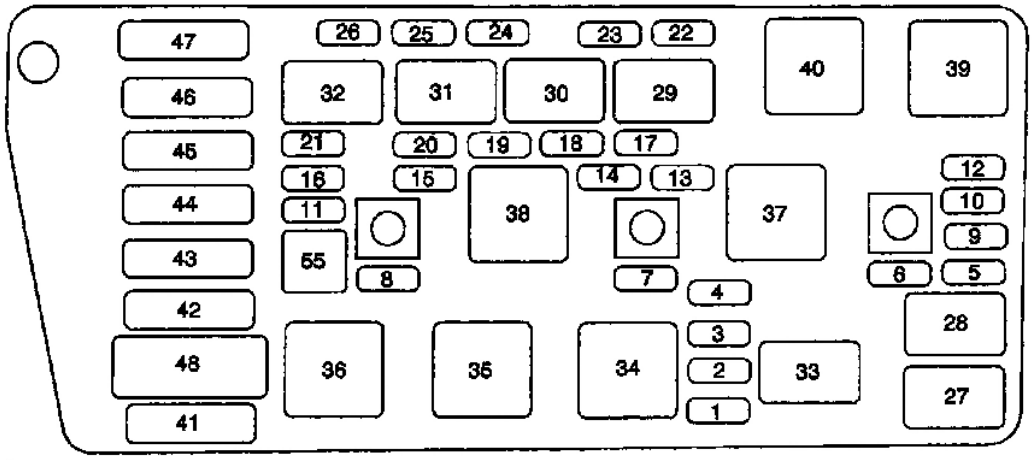


Fig. 2: Identifying Underhood Fuse Block Components
Courtesy of GENERAL MOTORS CORP.

No.	Fuse/Circuit Breaker	Rating	Description
1	—	—	Not Used
2	ACCY Fuse	15 A	Windshield Wiper Switch
3	WSW Fuse	30 A	Windshield Wiper Motor
4	—	—	Not Used
5	HDLOBML Fuse	10 A	Left Low Beam Headlamp
6	HDLOBMR Fuse	10 A	Right Low Beam Headlamp
7	Spare	10 A	—
8	PCM BATT Fuse	10 A	Powertrain Control Module (PCM) and Theft Deterrent Control Module
9	HDHIBMR Fuse	10 A	Right High Beam Headlamp
10	HDHIBML Fuse	10 A	Left High Beam Headlamp
11	IGN 1 Fuse	10 A	Mass Air Flow (MAF) Sensor, EVAP Canister Purge Valve, AIR Pump Relay, Secondary AIR Injection Bypass Valve Solenoid, and TCC/Cruise Release Switch
12	—	—	Not Used
13	TRANS Fuse	10 A	Automatic Transaxle
14	CR CONT Fuse	10 A	Cruise Control Module and HVAC SOL Relay
15	DIS Fuse	20 A	Ignition Control Modules
16	INJR 2 Fuse	10 A	Fuel Injectors 1, 3, and 5
17	—	—	Not Used
18	—	—	Not Used
19	PCM IGN Fuse	10 A	START 1 Relay and Powertrain Control Module (PCM)
20	OXY SEN Fuse	10 A	Heated Oxygen Sensors

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Fig. 3: Underhood Fuse Block Legend (1 of 2)
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No.	Fuse/Circuit Breaker	Rating	Description
21	INJR 1 Fuse	10 A	Fuel Injectors 2, 4 and 6
22	AUX PWR Fuse	20 A	Accessory Power Receptacle (Console)
23	C/LTR Fuse	20 A	Cigar Lighter and Accessory Power Receptacle (Overhead Console)
24	FOG/DRL Fuse	15 A	DRL and FOG LP Relays
25	HORN Fuse	15 A	HORN Relay
26	AC CLU Fuse	15 A	A/C Clutch Relay
27	HDLP HI BM Relay	—	HDHIBML and HDHIBMR Fuses, Headlamp Switch, and Dash Integration Module (DIM)
28	HDLP LO BM Relay	—	HDLOBML and HDLOBMR Fuses, Headlamp Switch, and Dash Integration Module (DIM)
29	FOG LP Relay	—	Front Fog Lamps, Dash Integration Module (DIM), and Ignition Switch
30	DRL Relay	—	Left High Beam Headlamp and Dash Integration Module (DIM)
31	HORN Relay	—	Horn, Dash Integration Module (DIM), and Turn Signal/Multifunction Switch
32	A/C CLU Relay	—	A/C Compressor Clutch, Dash Integration Module (DIM), Ignition Switch, and PCM
33	HVAC SOL Relay	—	Dash Integration Module (DIM) and A/C Orifice Solenoid
34	ACCY Relay	—	WSW and ACCY Fuses
35	AIR PUMP Relay (Buick/Pontiac w/NC8)	—	Secondary Air Injection (AIR) Pump
36	START 1 Relay	—	Starter Solenoid and PCM
37	COOLFAN 1 Relay	—	Right Cooling Fan and PCM
38	IGN 1 Relay	—	DIS, OXY SEN, IGN 1, INJ 1, INJ 2, TRANS, PCM IGN, and CR CONT Fuses, Ignition Switch, and Dash Integration Module (DIM)
39	COOLFAN S/P Relay	—	Cooling Fans and PCM
40	COOLFAN 2 Relay	—	Left Cooling Fan
41	START Circuit Breaker	30 A	START 1 Relay
42	AIR Fuse (Buick/Pontiac w/NC8)	30 A	AIR PUMP Relay
43	—	—	Not Used (w/ 1 AIR Pump System)
43	ABS Fuse (w/ 2 AIR Pump System)	50 A	Electronic Brake Control Module (EBCM)
44	ABS Fuse (w/ 1 AIR Pump System)	50 A	Electronic Brake Control Module (EBCM)
44	AIR PUMP B Fuse (Oldsmobile w/ 2 AIR Pump System Only)	50 A	AIR Pump Relay B
45	—	—	Not Used
46	COOL FAN 1 Fuse	30 A	COOLFAN 1 Relay
47	COOL FAN 2 Fuse	30 A	COOLFAN 2 Relay and COOLFAN S/P Relay
48-52	Spare Fuses	—	—
53	Fuse Puller	—	—

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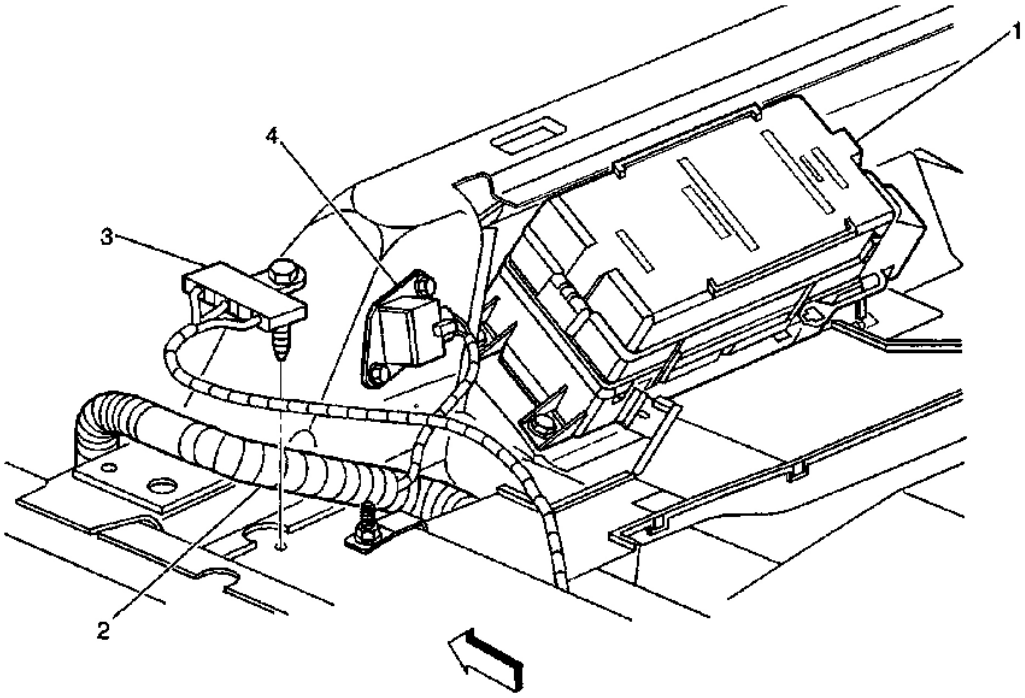
Fig. 4: Underhood Fuse Block Legend (2 of 2)
Courtesy of GENERAL MOTORS CORP.

REAR FUSE BLOCK

NOTE: Rear fuse block is located under rear seat. See Fig. 5 or Fig. 6 .

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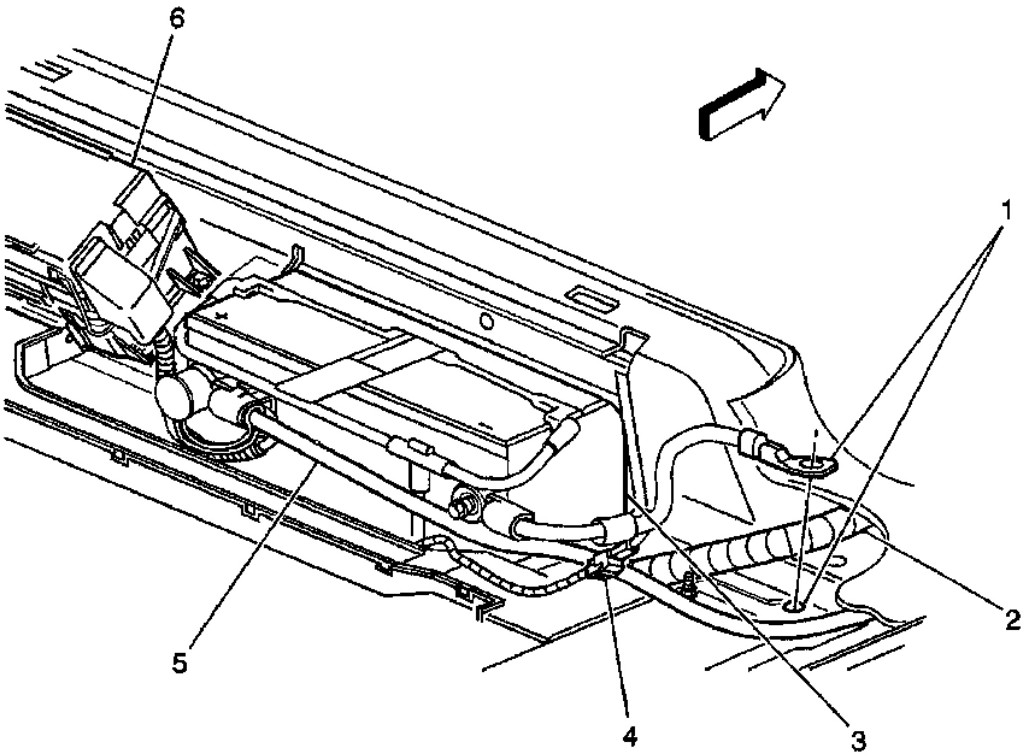


(1) Rear Fuse Block
(2) Body Harness, Left Side
(3) G302
(4) Lateral Accelerometer Sensor

Fig. 5: Locating Rear Fuse Block (2000 Bonneville)
Courtesy of GENERAL MOTORS CORP.

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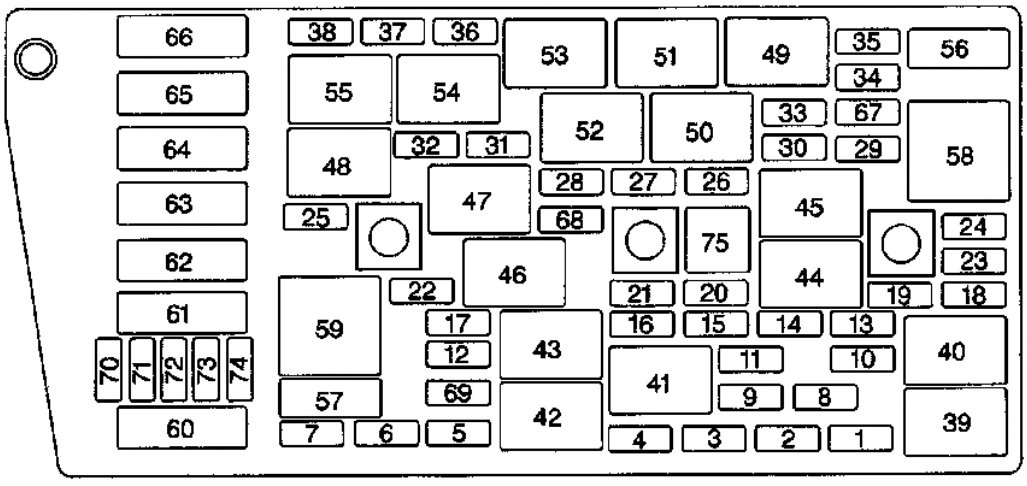
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(1) G305
(2) Body Harness, Right Side
(3) Battery
(4) C305
(5) Battery Positive Cable
(6) Fuse Block – Rear

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Fig. 6: Locating Rear Fuse Block (2001 Bonneville & 2000-01 LeSabre)
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Fig. 7: Identifying Rear Fuse Block Components
Courtesy of GENERAL MOTORS CORP.

No.	Fuse/Circuit Breaker	Rating	Description
1	F/PMP Fuse	20 A	F/PMP Relay
2	HVAC BLO Fuse	30 A	Blower Motor Control Processor
3	MEM Fuse	10 A	Memory Seat Module - Driver, Power Seat Lumbar Switch - LF, and Power Seat Switch - LF (w/A45)
4	ALDL Fuse	10 A	Data Link Connector (DLC) and Valet Switch
5	RR FOG Fuse	10 A	RR FOG LP Relay
6	CD Fuse	10 A	Remote Playback Device (CD Changer)
7	DRV MDL Fuse	10 A	Driver Door Module (DDM)
8	SIR Fuse	15 A	Inflatable Restraint Sensing and Diagnostic Module (SDM)
9	—	—	Not Used
10	LP PK R Fuse	10 A	Right Tail/Stoplamp, Side Marker Lamp, and Park/Stoplamps
11	VENT SOL Fuse	10 A	Evaporative Emissions (EVAP) Canister Purge Vent Valve
12	IGN 1 Fuse	10 A	Rear Integration Module (RIM), Turn Signal/Multifunction Switch, TCC/Cruise Release Switch, and Instrument Panel Cluster (IPC)
13	LP PK L Fuse	10 A	Left Tail/Stoplamp, Side Marker Lamp, and Park/Stoplamps
14	DIMR Fuse	10 A	Dash Integration Module (DIM) and License Plate Lamps
15	—	—	Not Used
16	HTDST LF Fuse	10 A	Left Heated Seat Module
17	—	—	Not Used
18	RRDR MDL Fuse	10 A	Rear Door Modules
19	STOP LP Fuse	15 A	Stoplamp Switch
20	PRK/REV Fuse	10 A	PARK and REVERSE Relays
21	AUDIO Fuse	10 A	Radio
22	RAP Fuse	20 A	RAP Relay
23	—	—	Not Used
24	—	—	Not Used
25	PASSMDL Fuse	10 A	Front Passenger Door Module (FPDM)
26	BODY Fuse	15 A	F/TNKDR REL and TRK REL Relays
27	INT LP Fuse	10 A	INT LP Relay
28	—	—	Not Used
29	IGN SW Fuse	15 A	Ignition Switch, Dash Integration Module (DIM), Rear Integration Module (RIM), and Remote Control Door Lock Receiver
30	IP Fuse	10 A	Instrument Panel Cluster (IPC) and Ignition Switch Lamp
31	HTDST RF Fuse	10 A	Right Heated Seat Module
32	—	—	Not Used
33	HVAC Fuse	10 A	Instrument Panel Integration Module (IPM), Recirculation Actuator, Mode Actuator, Air Temperature Acuators, and Body Control Module (BCM)
34	IGN 3 RR	10 A	Inside Rear View Mirror, HVAC Control Module (w/CJ2) or Instrument Panel Integration Module (IPM) (w/C67), Shift Control Assembly
35	ABS Fuse	10 A	Electronic Brake Control Module (EBCM)
36	TSIG/HAZ Fuse	15 A	Turn Signal/Hazard Lamp Control Module
37	HVAC BATT Fuse	10 A	Instrument Panel Integration Module (IPM)
38	DIM Fuse	10 A	Generator and Dash Integration Module (DIM)
39	F/PMP Relay	—	Fuel Pump/Sender Assembly and PCM
40	PRK LP Relay	—	DIMR, LP PK L, LP PK R Fuses, and Dash Integration Module (DIM)
41	IGN Relay	—	IGN 1 Fuse, VENT SOL Fuse, SIR Fuse, Ignition Switch, and Dash Integration Module (DIM)

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Fig. 8: Rear Fuse Block Legend (1 of 2)
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No.	Fuse/Circuit Breaker	Rating	Description
42	RR FOG LP Relay (Oldsmobile)	—	Ignition Switch, Rear Fog Lamps, Dash Integration Module (DIM), and Rear Integration Module (RIM)
43	—	—	Not Used
44	PARK Relay	—	Stoplamp Switch, Ignition Switch, and Rear Integration Module (RIM)
45	REVERSE Relay	—	Backup Lamps and Rear Integration Module (RIM)
46	RAP Relay	—	Rear Integration Module (RIM) and Power Sunroof Module
47	F/TNKDRLOCK Relay	—	Fuel Door Release Solenoid
48	—	—	Not Used
49	IGN 3 Relay	—	Ignition Switch
50	F/TNKDR REL Relay	—	Fuel Filler Door Release Solenoid and Rear Integration Module (RIM)
51	INT LP Relay	—	Front Door Courtesy Lamps, Rear Door Courtesy Lamps, Footwell Courtesy Lamps, IP Compartment Lamp and Switch, Overhead Console Reading/Courtesy Lamp, Rear Compartment Courtesy Lamps, Rear Reading Courtesy Lamp, and Vanity Lamps
52	TRK REL Relay	—	Rear Compartment Lid Release Actuator and Rear Integration Module (RIM)
53	FRT CTSY Relay	—	Rear Integration Module (RIM)
54	—	—	Not Used
55	ELC (ALC) Relay	—	Automatic Level Control (ALC) Compressor, Ignition Switch, and Rear Integration Module (RIM)
56	PWR SEAT Circuit Breaker	30 A	Memory Seat Module - Driver (w/A45), Power Seat Switch - LF (w/o A45), Power Seat Lumbar Switch - LF (w/o A45), Power Seat Recline Switch - RF (w/o AG2), Power Seat Switch - RF (w/AG2), and Power Seat Lumbar Switch - RF (w/AG2)
57	PWR WDO Circuit Breaker	30 A	Door Modules
58	CIGAR Relay	—	AUX PWR and C/LTR Fuses in the Underhood Fuse Block
59	RR DEFOG Relay	—	Ignition Switch and Rear Window Defogger
60	—	—	Not Used
61	RR DEFOG Fuse	40 A	RR DEFOG Relay
62	—	—	Not Used
63	AUDIO AMP Fuse	20 A	Audio Amplifier
64	ELC (ALC) Fuse	30 A	ELC Relay and Automatic Level Control (ALC) Compressor
65	CIGAR Fuse	40 A	CIGAR Relay
66-69	—	—	Not Used
70-74	Spare Fuses	—	—
75	Fuse Puller	—	—

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Fig. 9: Rear Fuse Block Legend (2 of 2)
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2000-01 STEERING

Steering Columns - Cars - All Others

MODEL IDENTIFICATION

MODEL IDENTIFICATION - CARS

Body Code (1)	Model
"C"	Park Avenue
"E"	Eldorado
"F"	Camaro & Firebird
"H"	Bonneville & LeSabre
"K"	DeVille & Seville
"W"	Impala & Monte Carlo
"Y"	Corvette

(1) Vehicle body code is fourth character of VIN.

DESCRIPTION & OPERATION

Steering columns are designated as fixed or tilt column, and as column shift or floor shift. Column shift and floor shift columns are basically the same, except for the shift tube on column shift steering columns.

Steering column components are designed to collapse if impacted during a collision. Steering shaft, column jacket and shift tube (column shift) are 2-piece units injected with plastic to hold the 2 pieces together as one unit. If column and/or steering wheel are impacted, the injected plastic will shear, allowing the column assembly to collapse.

BRAKE/TRANSMISSION SHIFT INTERLOCK (BTSI) SYSTEM

This system does not allow shift lever to be moved out of Park unless brake pedal is pressed. With brake pedal released and ignition on, current flows through BTSI solenoid to ground, energizing solenoid. With solenoid energized, a lock pawl protrudes from solenoid, preventing shift lever from being moved.

With brake pedal pressed, current flows through stoplight switch to ground side of solenoid. Under this condition, battery voltage is available on positive and negative sides of solenoid. This causes solenoid to de-energize, releasing lock pawl.

COLUMN COLLAPSE FEATURE

Steering column is designed to collapse if impacted during a collision. Steering shaft and

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column jacket are both 2-piece units which are internally injected with plastic. Plastic protrudes from holes in each unit keeping 2 separate pieces held together as one unit. See **Fig. 15** . If the column or steering wheel is forcefully impacted, plastic pieces break off, allowing column and shaft to collapse.

PARK LOCK CABLE SYSTEM (A/T)

A park lock cable system prevents shift lever from being moved out of Park position unless ignition lock cylinder is out of LOCK position. It also prevents the lock cylinder from being turned to LOCK position unless shift lever is in Park position. This is accomplished by a park lock cable connected between lock cylinder and shift lever.

STEERING WHEEL ROTATION SENSOR

The steering wheel rotation sensor, on vehicles equipped with variable effort steering, senses rotation speed of the steering wheel assembly. This information provides more assist during sudden directional changes at highway speeds.

SERVICE PRECAUTIONS

WARNING: All vehicles are equipped with air bag. See SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM before attempting any repairs to steering column or components.

Observe the following precautions when servicing air bag system:

- Disable air bag system before attempting any repairs to steering column or components. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
- After disabling air bag system, Diagnostic Energy Reserve Module (DERM) retains back-up voltage for about 10 minutes. To avoid accidental air bag deployment, wait at least 10 minutes after disabling air bag system before working on vehicle components.
- Always wear safety glasses when working around air bag system.
- Always carry a live (undeployed) air bag with trim cover facing away from your body. This minimizes the chance of injury if air bag accidentally deploys.
- Place a live (undeployed) air bag on a bench or other surface with trim cover facing up, away from surface. This will reduce motion of air bag if it accidentally deploys.
- Never probe air bag inflator module connectors. Air bag may accidentally deploy.
- Never attempt repair of any air bag system components. Replace any faulty components as required.

DISABLING & ACTIVATING AIR BAG SYSTEM

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WARNING: Supplemental Inflatable Restraint (SIR) Diagnostic Energy Reserve Module (DERM) retains back-up voltage for about 10 minutes after disabling SIR system. Wait a minimum of 10 minutes after disabling SIR before servicing steering column components. Servicing steering column components before 10-minute period may cause accidental deployment of air bag and possible personal injury.

1. Before proceeding, follow air bag service precautions. See **SERVICE PRECAUTIONS** . To disable air bag, with wheels in straight-ahead position, turn ignition switch to OFF-LOCK position and remove key. Remove SIR fuse (air bag fuse) from fuse block.
2. Remove left sound insulator. Remove Connector Position Assurance (CPA) clip from Yellow SIR harness connector at base of steering column. All SIR system connectors use CPA clips to ensure connector retention. Disconnect Yellow SIR connector. Wait at least 10 minutes before working on vehicle.
3. With SIR fuse removed and ignition on, AIR BAG indicator light will be on. This is normal operation for SIR system and does not indicate a fault code or system problem.
4. To activate air bag system, ensure ignition is off. Connect Yellow SIR connector and CPA clip at base of steering column. Install SIR fuse. Turn ignition switch to RUN position. Observe AIR BAG indicator light. Light should flash 7-9 times and then go out. If AIR BAG indicator light does not function as described, a malfunction in air bag system exists.

ADJUSTMENTS

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

NOTE: For aid in adjustments, see exploded views of column assemblies. See Fig. 17 -Fig. 24 .

BTSI & PARK LOCK SYSTEM

System Check

1. Place shift lever in Park. Turn lock cylinder to OFF-LOCK position. Remove key. If lock cylinder cannot be turned to OFF-LOCK position or key cannot be removed,

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perform appropriate adjustment procedure.

2. With lock cylinder in OFF-LOCK position, try to move shift lever out of Park. If shift lever can be moved out of Park, perform appropriate adjustment procedure.
3. Turn lock cylinder to RUN position. Try to move shift lever out of Park. If shift lever can be moved out of Park, perform appropriate adjustment procedure. Depress brake pedal, move shift lever out of Park. If shift lever cannot be moved out of Park, perform appropriate adjustment procedure.
4. Try to turn lock cylinder to OFF-LOCK position. Ignition switch should stop turning before reaching the OFF-LOCK position, and the key should not be able to be removed. If system does not operate as specified, perform appropriate adjustment procedure.
5. With key in same position as in previous step (just before OFF-LOCK position), place shift lever in Park. Turn lock cylinder toward RUN position, and then to OFF-LOCK position. Remove key. If system does not operate as specified, perform appropriate adjustment procedure.

Adjustment (Column Shift "C" & "H" Bodies)

1. Turn lock cylinder to OFF position (not LOCK position). Place shift lever in Neutral. Unlock shift cable adjuster at transaxle end of shift cable (pull button up) to release cable tension.
2. Lock shift cable adjuster (push button down). Place shift lever in Park. Ensure shift indicator is adjusted. Recheck BTSI system. If system still does not operate as specified, go to next step.
3. Remove interlock solenoid by prying actuator end fitting from shift lever stud and prying adjuster block from bracket. Remove retaining clip. Compress adjuster block to release, slide away from solenoid as far as possible. See **Fig. 1** . With shift lever in Neutral, reinstall solenoid. Move shift lever to Park, BTSI solenoid actuator is now properly adjusted. Reinstall adjustment retaining clip.
4. Recheck BTSI system. If system does not operate as specified, repeat previous step.

Adjustment (Column Shift "E" & "K" Bodies)

NOTE: Lock cylinder must be in RUN position when park lock cable is removed from or inserted into ignition switch inhibitor.

Turn lock cylinder to RUN position, depress brake pedal. Move shift lever out of Park position. Disengage locking button, pull cable away from solenoid until fitting starts to extend, compressing spring inside ball joint. Allow cable to move back .04-.08" (1-2 mm), engage locking button. See **Fig. 2** . Recheck BTSI system. If system does not operate as specified, repeat procedure.

Adjustment (Floor Shift)

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1. Remove center console trim for access to base of shift lever. Place shift lever in Park. Turn lock cylinder to RUN position to energize BTSI solenoid. Unlock cable adjuster at base of shift lever by pressing locking button upward. Turn lock cylinder to LOCK position.
2. On "C", "F", "H" and "Y" bodies, push cable connector nose forward to remove slack. On "E" and "K" bodies, push cable housing toward shifter to remove slack. On all models, with no load applied to cable, lock cable adjuster button by pressing locking button down. Install center console trim. Connect negative battery cable.
3. Recheck BTSI system. If system does not operate as specified, repeat previous step.

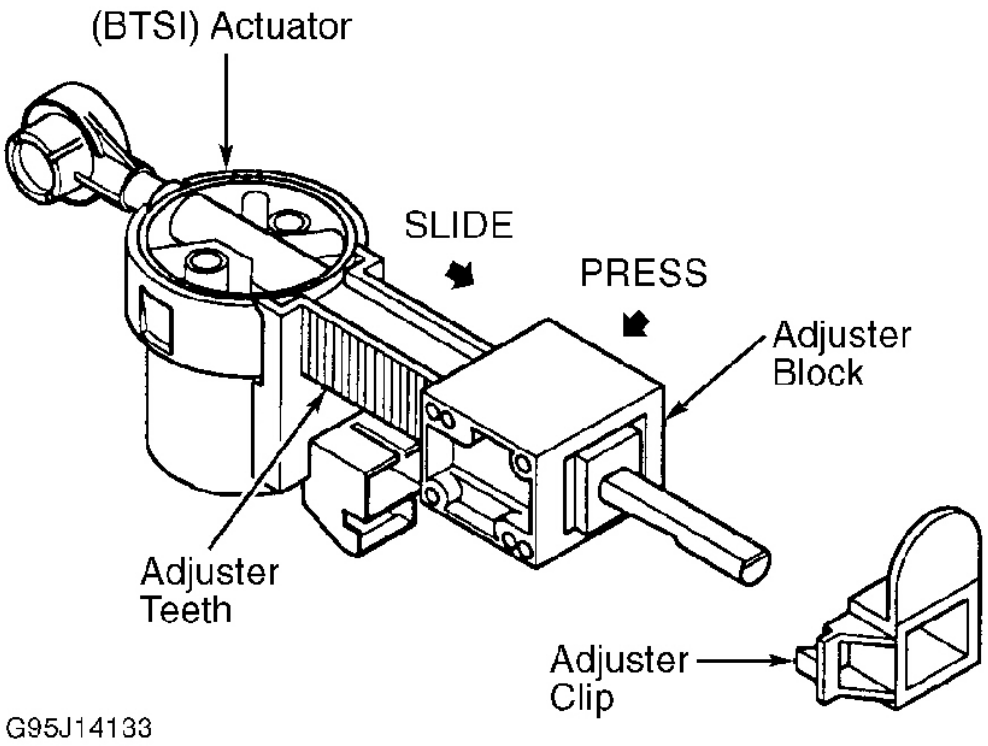
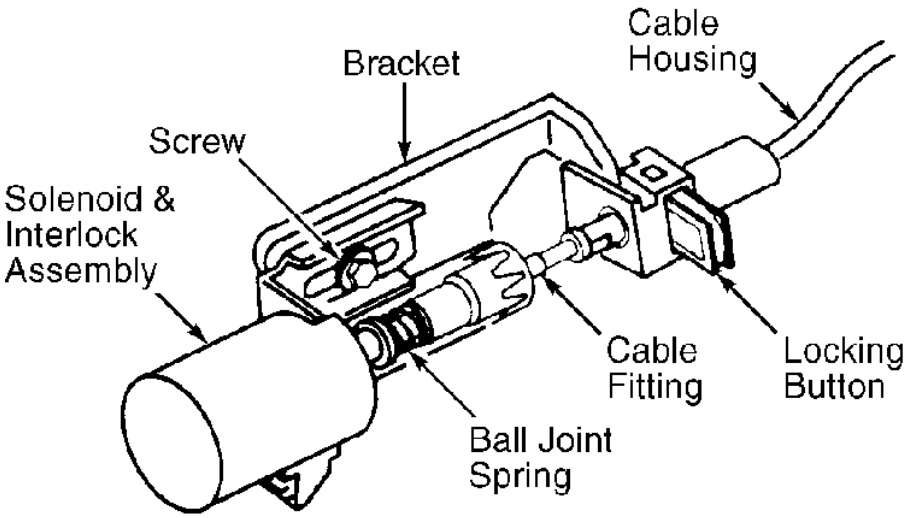


Fig. 1: Adjusting BTSI Actuator ("C" & "H" Bodies)
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NOTE: DO NOT extend cable fitting while adjusting solenoid.
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Fig. 2: Adjusting Park Lock Cable ("E" & "K" Bodies)
Courtesy of GENERAL MOTORS CORP.

DIMMER SWITCH

1. With switch removed from column bracket, insert a 3/32" drill bit into adjusting pin hole to limit switch travel. See **Fig. 3** . Insert actuator rod into switch. Install switch to column bracket, finger-tighten screws.
2. Lightly push switch upward against actuator rod until no lash (free-play) exists between rod and switch. Tighten mounting screws to 35 INCH lbs. (4 N.m). Remove drill bit. Ensure proper switch operation using dimmer/headlight switch handle.

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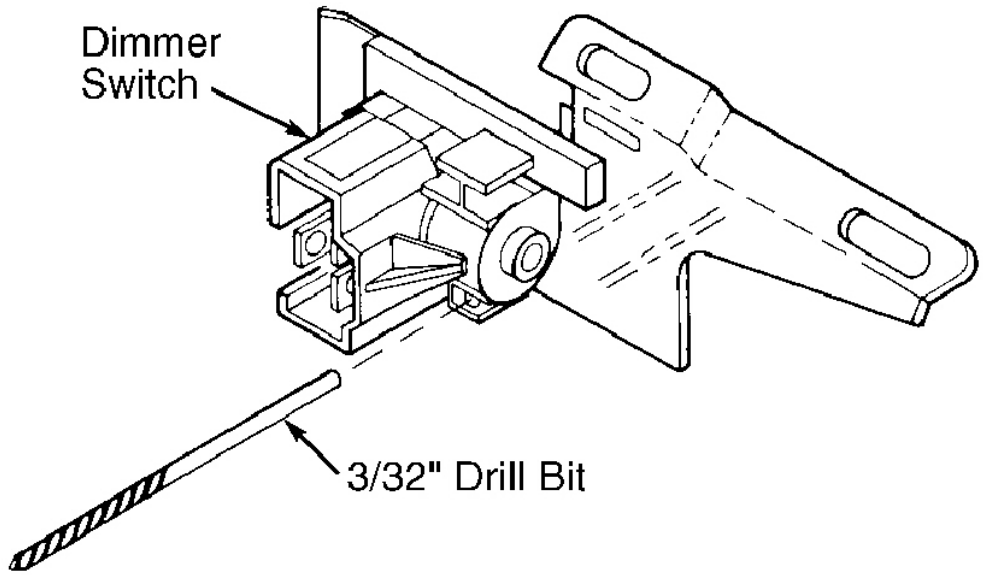


Fig. 3: Adjusting Dimmer Switch
Courtesy of GENERAL MOTORS CORP.

IGNITION SWITCH

CAUTION: New ignition switch is pinned in OFF-LOCK position. Plastic pin must be removed before operating switch.

1. Set key lock cylinder in OFF-LOCK position. On fixed column, set ignition switch slider (where actuator rod connects to switch) to OFF-LOCK position by moving slider as far left as possible, and then one detent to right. See **Fig. 4** .
2. On tilt column, set ignition switch slider (where actuator rod connects to switch) to OFF-LOCK position by moving slider to right as far as possible, and then one detent to left. See **Fig. 4** .
3. Install switch. Tighten switch screws to 35 INCH lbs. (4 N.m). Ensure ignition switch functions properly with lock cylinder in all positions.

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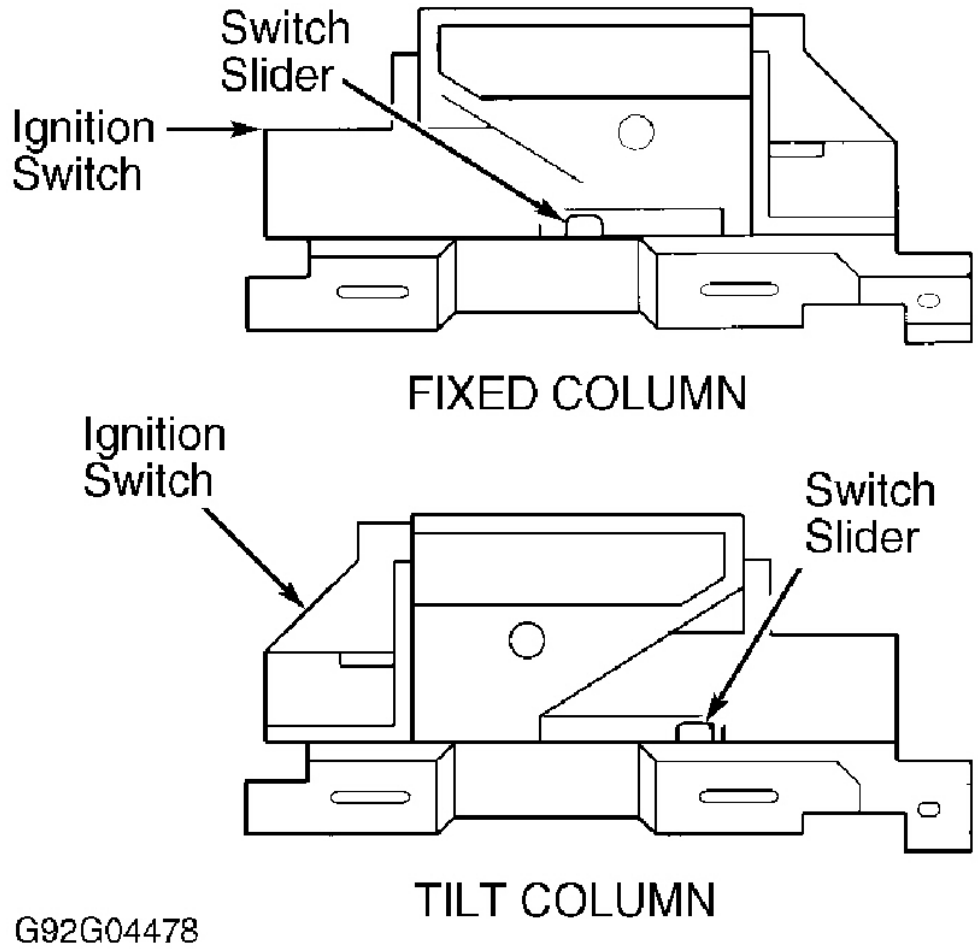


Fig. 4: Adjusting Ignition Switch
Courtesy of GENERAL MOTORS CORP.

COLUMN SHIFT INDICATOR

"E" & "K" Bodies

1. Position shift lever in Neutral. Loosen shift indicator adjustment nut on steering column. Slide adjuster until shift indicator is centered in Neutral.
2. Move shift lever through all positions, and back to Neutral to check adjustment. Verify pointer indicates proper gear position, and does not show 2 gear positions at same time. See **Fig. 5** .

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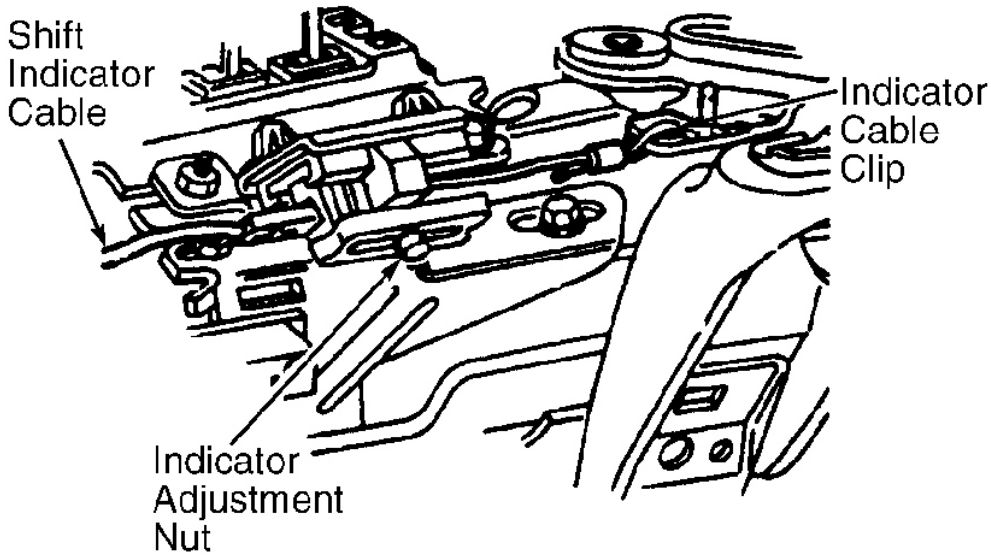


Fig. 5: Adjusting Column Shift Indicator ("E" & "K" Bodies)
Courtesy of GENERAL MOTORS CORP.

All Except "E" & "K" Bodies

1. Position shift lever in Neutral. Position guide clip on edge of shift bowl to center position pointer in Neutral. Push clip onto bowl. Ensure that cable rests on bowl and not on column jacket.
2. With gear selector in Neutral, holes must be visible on both sides of pointer. Pointer must cover portions of "1" or be to right of "1" when transaxle is in LOW position. See **Fig. 6** .

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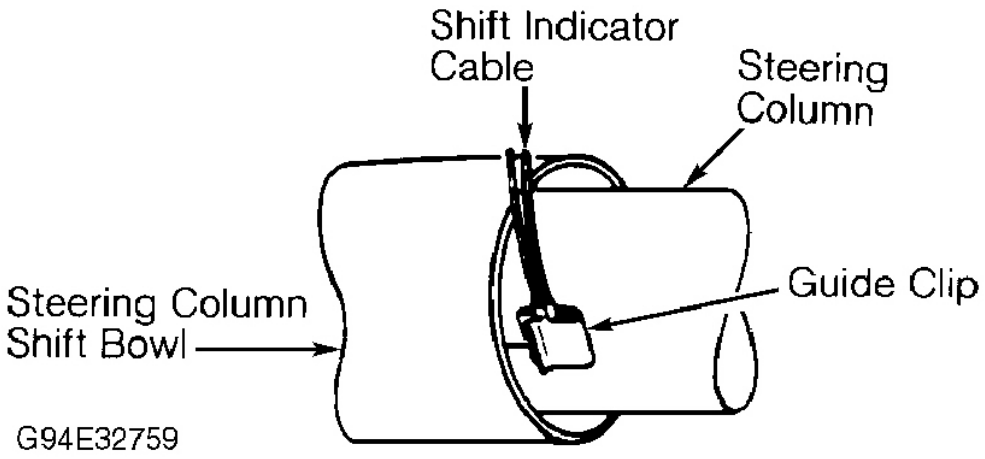


Fig. 6: Adjusting Column Shift Indicator (All Except "E" & "K" Bodies)
Courtesy of GENERAL MOTORS CORP.

SIR CLOCKSPRING ASSEMBLY

NOTE: If clockspring assembly hub or steering shaft were rotated after assembly was removed, use the following procedure to center clockspring ribbon before installing assembly. A new clockspring ribbon does not require centering, as it is already centered and held in position with a plastic tab. Remove tab after clockspring assembly is installed.

1. Hold clockspring assembly with clear bottom upward to see clockspring ribbon. While holding clockspring assembly housing and pressing spring lock, rotate hub in direction of arrow (on bottom of assembly) until it stops. Clockspring assembly should now be wound up snug against center hub.
2. Rotate clockspring assembly hub in opposite direction about 2 1/2 turns. Release spring lock between locking tabs in front of arrow. clockspring assembly can now be installed if wheels are in straight-ahead position.

REMOVAL & INSTALLATION

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before

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disconnecting battery.

NOTE: All components listed under REMOVAL & INSTALLATION can be removed without removing steering column. To remove all other components, remove steering column, and then perform appropriate procedure under OVERHAUL. See Fig. 17 -Fig. 24 .

AIR BAG (INFLATOR) MODULE

Removal

1. See **SERVICE PRECAUTIONS** . Disable SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Loosen screws behind steering wheel using No. 30 Torx bit, until air bag module is released from steering wheel. Pull up air bag module, and then disconnect electrical connectors from rear of module. Remove module and position aside with pad facing upward.

Installation

Connect electrical connectors to rear of module. Install module in steering wheel and install retaining screws. Tighten screws to specification. See **TORQUE SPECIFICATIONS** . Activate SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

STEERING WHEEL

Removal & Installation

1. Set front wheels in straight-ahead position. Turn ignition switch to LOCK position. Remove air bag module. See **AIR BAG (INFLATOR) MODULE** .
2. Mark steering wheel hub in relation to steering shaft for installation reference. Remove steering wheel nut. Using steering wheel puller, remove steering wheel. DO NOT install puller bolts too deeply into hub, as SIR clockspring assembly will be damaged.
3. To install, reverse removal procedure. Align marks on steering wheel hub and steering shaft before installing steering wheel. Tighten steering wheel nut to 30 ft. lbs. (41 N.m). Install air bag. Activate SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

SIR CLOCKSPRING ASSEMBLY

CAUTION: Set front wheels in straight-ahead position before removing or installing clockspring assembly. This centers the clockspring assembly. If an off-centered clockspring

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assembly is installed, ribbon in clockspring assembly will break when steering wheel is turned. Always keep ignition switch in LOCK position to prevent wheel from turning and allowing SIR clockspring to become off-centered. To center the clockspring assembly, see SIR CLOCKSPRING ASSEMBLY under ADJUSTMENTS.

Removal

1. Set front wheels in straight-ahead position and turn ignition switch to LOCK position. Disable SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Remove air bag module. See **AIR BAG (INFLATOR) MODULE** . Remove steering wheel. See **STEERING WHEEL** .
2. Remove clockspring assembly retaining ring. Note orientation of clockspring assembly to steering column housing. Remove clockspring assembly, allowing assembly to hang by wiring. Remove wave washer. Remove and discard lock plate retaining ring using Lock Plate Compressor (J-23653-SIR). See **Fig. 7** . Remove lock plate, turn signal cancel cam and upper bearing spring. Remove upper bearing inner race seat and inner race.
3. On all except "E" and "K" bodies, remove multifunction switch lever by grasping and pulling lever straight out. On "E" and "K" bodies, remove multifunction switch lever by pushing lever in, rotating 1/4 turn clockwise to release, and pulling it straight out. Remove screw retaining hazard flasher knob. On all models, move turn signal switch up to right turn position, remove screws and allow switch to hang by wiring.
4. To aid in installing SIR clockspring wiring and connector down through column assembly, attach long piece of mechanics wire to clockspring assembly lower wiring connector at base of steering column. Carefully pull clockspring assembly, wiring and connector up and out of column. Disconnect mechanics wire from connector and allow wire to hang.

Installation

NOTE: Use care not to pinch wires when installing components. After wiring is fed through column, attach CAUTION tag to wiring near connector at base of steering column. Tag is included in SIR clockspring assembly repair kit.

To install, reverse removal procedure. Ensure clockspring assembly hub and steering shaft are centered before installing clockspring assembly. After clockspring assembly is installed, remove slack from clockspring assembly wiring in steering column to prevent wire damage. Activate SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

TURN SIGNAL SWITCH

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Removal & Installation

1. Remove steering wheel and SIR clockspring assembly. See **STEERING WHEEL** and **SIR CLOCKSPRING ASSEMBLY** . Remove lock plate retaining ring using Lock Plate Compressor (J-23653-SIR) and small tip screwdriver or scribe. See **Fig. 7** . Remove lock plate.
2. Remove turn signal cancel cam, upper bearing spring, upper bearing inner race seat and inner race. Remove screw retaining hazard flasher knob assembly. Remove lower instrument panel and steering column covers. Disconnect turn signal switch harness connector from vehicle harness.
3. Tie mechanics wire to turn signal switch harness connector to ease installation of turn signal switch harness connector down through column. Remove turn signal switch from steering shaft while pulling harness up through column. To install, reverse removal procedure.

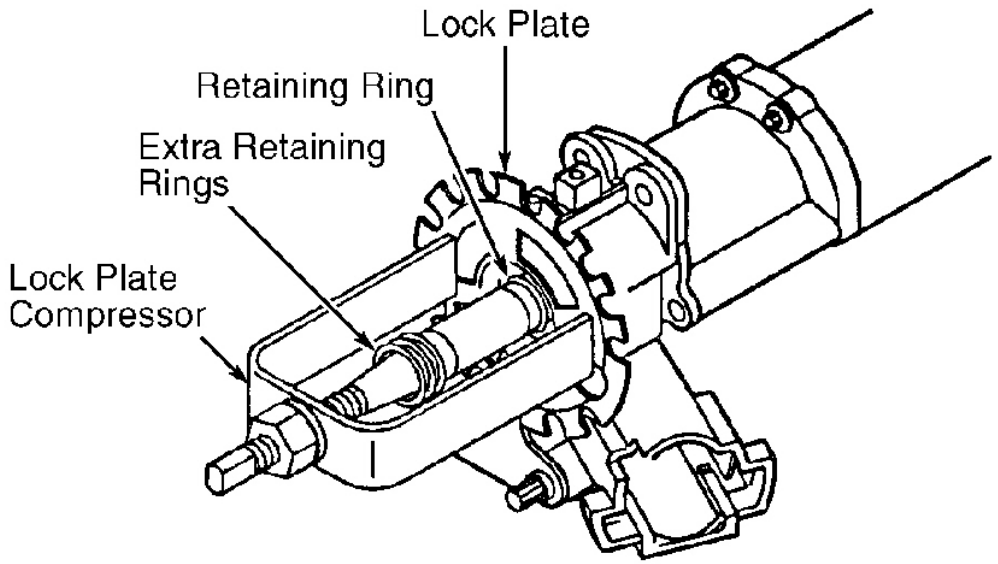


Fig. 7: Removing Shaft Lock Retaining Ring
Courtesy of GENERAL MOTORS CORP.

LOCK CYLINDER

Removal & Installation

Remove turn signal switch. See **TURN SIGNAL SWITCH** . With ignition key removed, remove buzzer switch. Insert key into lock cylinder. On all except "C" body, turn lock cylinder to LOCK position. Remove lock cylinder retaining screw.

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On "H" body, remove pivot and pulse switch connector from bulkhead connector and remove 13-way secondary lock. Remove pass key wire terminals No. 12 and 13.

On "C" body, remove lower and upper column shroud. Turn key to START position. Push lock cylinder lock pin using 1/16" Allen wrench. Release key to RUN position.

On all bodies, remove lock cylinder. To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS** .

DIMMER SWITCH

Removal

Disable SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Remove lower instrument panel trim panel(s) from base of column to access dimmer switch. Disconnect electrical connector from dimmer switch mounted on column. Remove 2 screws retaining dimmer switch and remove switch from actuator rod.

Installation

Install and adjust dimmer switch using adjustment procedure. See **DIMMER SWITCH** under ADJUSTMENTS. To install remaining components, reverse removal procedure.

IGNITION SWITCH

Removal

Disable SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Disconnect negative battery cable. Remove lower instrument panel trim panel(s) from base of steering column to access ignition switch mounted on column. Remove dimmer switch. See **DIMMER SWITCH** . Lift and remove ignition switch from actuator rod. Disconnect electrical connectors from ignition switch.

Installation

Connect electrical connectors onto ignition switch. Install and adjust ignition switch using appropriate adjustment procedure as per type of column. See **IGNITION SWITCH** under ADJUSTMENTS. Install and adjust dimmer switch using adjustment procedure. See **DIMMER SWITCH** under ADJUSTMENTS. To install remaining components, reverse removal procedure.

LOCK HOUSING COVER

Removal & Installation

1. Remove steering wheel, SIR clockspring assembly, turn signal switch and lock cylinder.

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Remove dimmer and ignition switches. Remove column end cover from lock housing (if equipped). Disconnect cruise control switch connector (if equipped) near multifunction switch.

2. Disconnect multifunction switch connector. Set multifunction switch lever in OFF position (centered). On all except "E" and "K" bodies, remove multifunction switch lever by grasping and pulling lever straight out. On "E" and "K" bodies, remove multifunction switch lever by pushing lever in, rotating 1/4 turn clockwise to release, and pulling it straight out.
3. Unscrew and remove tilt lever (if equipped). Remove lock housing screws. Remove lock housing from column. To install, reverse removal procedure.

MULTIFUNCTION SWITCH LEVER

NOTE: Multifunction switch lever incorporates wiper/washer switch and acts as mechanical link to turn signal switch and headlight dimmer switch. Also, cruise control switch (if equipped) is on end of multifunction switch lever.

Removal & Installation

Ensure lever is in center OFF position. Firmly grasp tilt lever and rotate counterclockwise to remove. Remove housing end cap. Disconnect electrical connector. On all except "E" and "K" bodies, remove multifunction switch lever by pulling it straight out of turn signal switch. On "E" and "K" bodies, remove multifunction switch lever by pushing lever in, rotating 1/4 turn clockwise to release, and pulling it straight out. To install, reverse removal procedure.

STEERING WHEEL ROTATION SENSOR

Removal & Installation

1. Set front wheels in straight-ahead position and turn ignition switch to LOCK position. Disconnect negative battery cable. Disable SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Remove bolt and nut from coupling attaching upper intermediate steering shaft assembly to lower steering shaft assembly. See **Fig. 8** .
2. Remove upper intermediate steering shaft assembly from lower steering shaft assembly. Disconnect electrical connector. Remove lower bearing adapter clip. Remove steering wheel rotation sensor. To install, reverse removal procedure. Tighten intermediate shaft nut to 40 ft. lbs. (54 N.m).

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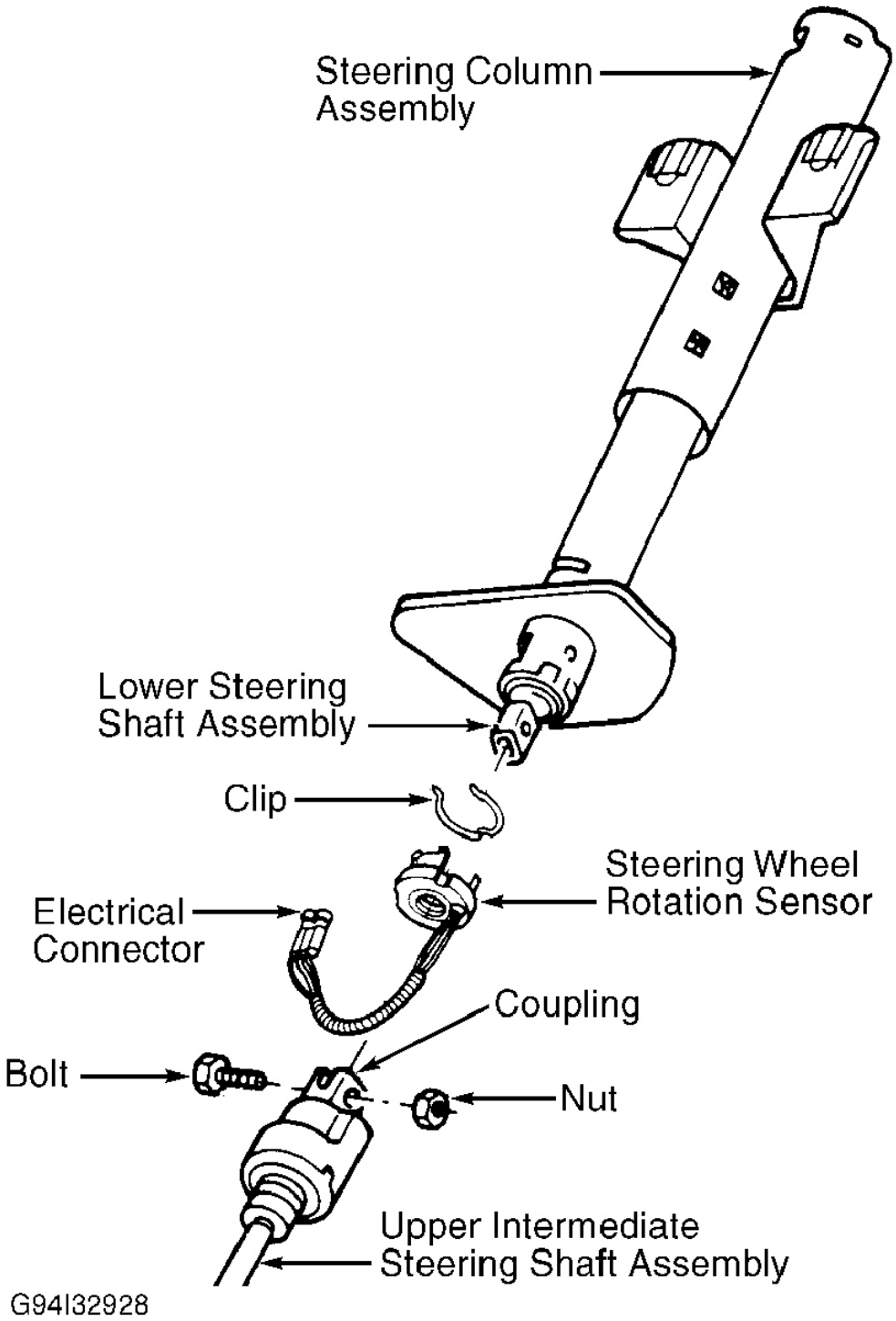


Fig. 8: Removing Steering Wheel Rotation Sensor (Typical)
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STEERING COLUMN

CAUTION: Column must be handled with care when removed from vehicle. Use only fasteners of the same or equivalent part number if replacement is necessary. Improper fasteners or tightening could result in column failure. Applying excessive pressure, or causing impact to mainshaft during service, may cause column to collapse. If weight of column is supported by lower attachment, lower retainer or bushing will be damaged. On vehicles with SIR, do not rotate steering shaft after column is removed. SIR clockspring assembly will be damaged.

Removal

1. Disable SIR system (if equipped). See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Disconnect negative battery cable. Set front wheels in straight-ahead position and turn ignition switch to LOCK position. Remove trim panels from around steering column as necessary.
2. Remove steering wheel. See **STEERING WHEEL** . Remove stoplight switch. On most models, remove lower column joint coupling bolt attaching steering rack intermediate shaft to steering column shaft. If required, remove lower column toe plate-to-firewall attaching bolts.
3. On column shift models, disconnect transmission linkage rod or cable from lever on shift tube and disconnect gear indicator cable from column. On floor shift models, disconnect park lock cable from ignition lock inhibitor. Disconnect electrical connectors as necessary. Remove steering column bracket(s) mounting nuts, and remove steering column.

Installation

To install, reverse removal procedure. Tighten column bracket mounting nuts to 20 ft. lbs. (27 N.m). Tighten shaft joint coupling nut to 35 ft. lbs. (47 N.m). Tighten column harness connector bolt to 42 INCH lbs. (4.8 N.m). After installation is complete, activate SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** .

LOWER BEARING & RELATED COMPONENTS

Removal & Installation

Remove steering column and lower shaft joint coupling. Remove column snap ring or retaining clip to remove lower bearing and related components. To install, reverse removal procedure.

OVERHAUL

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NOTE: For aid in overhaul, see exploded views of column assemblies. See Fig. 17 -Fig. 24 .

REPAIR PROCEDURES

Preparation

CAUTION: Do not strike steering shaft with hammer to remove steering wheel. Hammering will loosen plastic injections which maintain column rigidity. Do not thread steering wheel puller bolts completely through steering wheel hub, as this will damage to SIR clockspring assembly.

Disable SIR system. See **DISABLING & ACTIVATING AIR BAG SYSTEM** . Remove air bag module. See **AIR BAG (INFLATOR) MODULE** . Remove steering wheel, and steering column. See **STEERING WHEEL** and **STEERING COLUMN** . Remove all other components listed under REMOVAL & INSTALLATION. Overhaul procedures are similar and typical of all column variations.

Disassembly (Fixed Column)

Remove lower bearing and related components. See **LOWER BEARING & RELATED COMPONENTS** . Remove retaining ring from top of steering column shaft. Remove steering column shaft. Remove shift lever bowl (column shift) or bowl (floor shift). Remove bowl shroud and shift tube from column jacket.

Disassembly (Tilt Column)

1. Using Tilt Spring Compressor (J-39346), compress spring retainer at least 1/4". Rotate lower hex of tilt spring compressor counterclockwise 1/4 turn to release retainer. Remove tilt spring compressor, retainer, spring and guide. See **Fig. 9** .

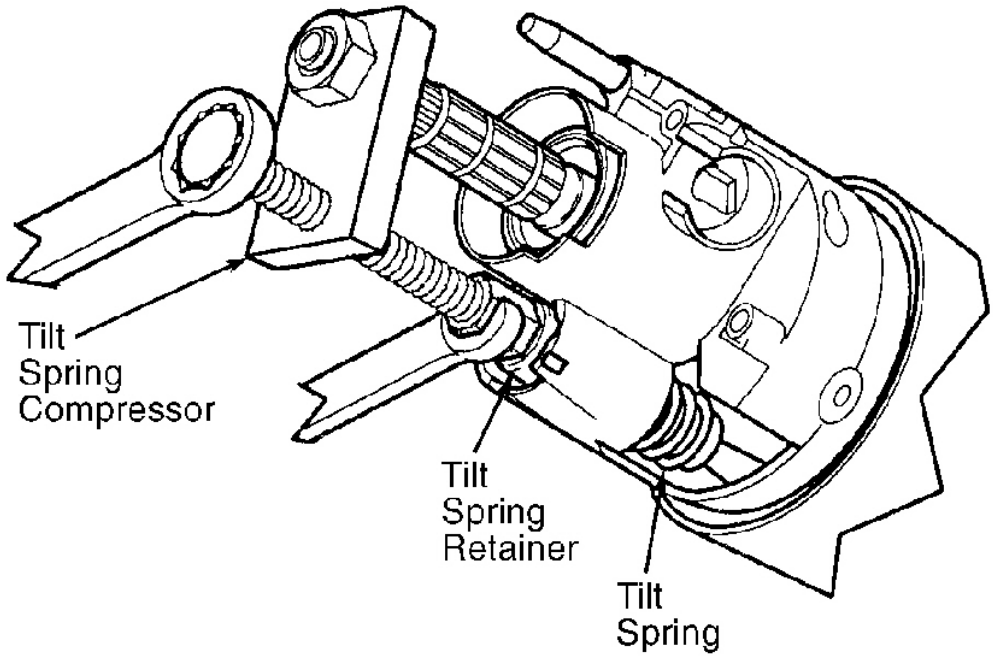
NOTE: Mark upper shaft in relation to lower shaft for reassembly reference. Failure to assemble properly will cause steering wheel to be turned 180 degrees from its correct position.

2. Using Pivot Pin Remover (J-21854-01), remove pivot pins from column housing. See **Fig. 10** . Install tilt lever. Pull back tilt lever, and then pull column housing down and away from column. Components can now be removed from column housing. Remove lower bearing and related components. Remove steering column shaft.
3. Remove upper and lower shaft assembly. Note orientation of pinch bolt notch to upper shaft block tooth. Tilt shafts at 90-degree angle to each other to disengage. Rotate centering spheres 90 degrees, and then remove spheres. Remove joint preload spring from centering sphere.

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4. Remove column housing support, shift lever gate and shift tube retaining ring. Remove thrust washer, shaft lock, wave washer and shift tube. Remove shift lever bowl (column shift) or bowl (floor shift). Remove bowl shroud. Remove shift lever spring from gearshift lever bowl. Remove gearshift bowl shroud from gearshift lever bowl (column shift).



NOTE: Seat counterbore of tool over Steering Shaft & secure with standard hexagon nut.
Turn counterclockwise to remove Spring Retainer.

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Fig. 9: Removing Tilt Spring
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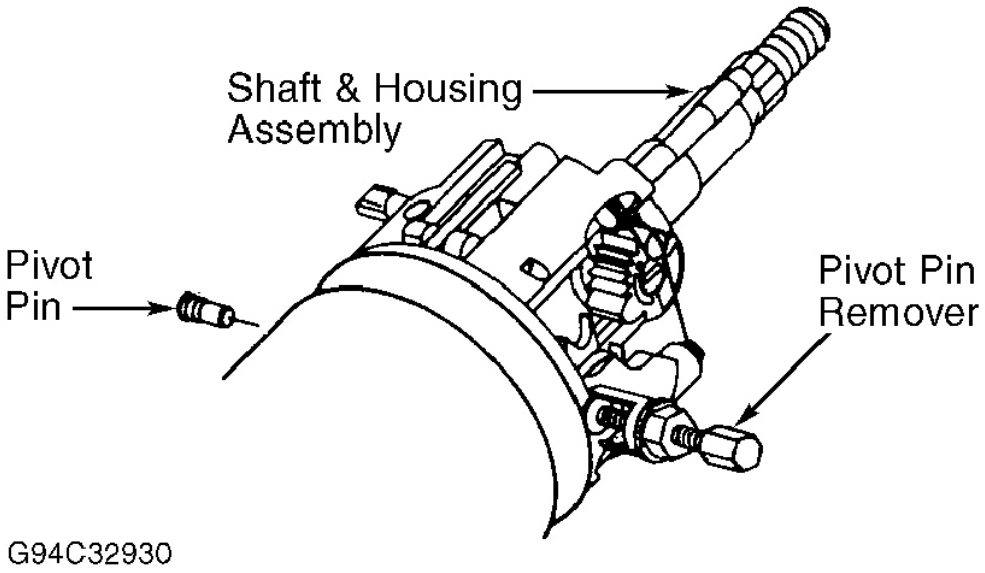


Fig. 10: Removing Pivot Pin
Courtesy of GENERAL MOTORS CORP.

NOTE: Vehicles involved in an accident with frame damage, major body damage, impact to steering column or air bag deployment may have a damaged or misaligned steering column. Use following procedures to inspect steering column for damage.

Inspection (Column Jacket)

Remove lower bearing from bottom of column. Using **COLUMN JACKET COLLAPSE MEASUREMENTS** table as a guide, measure distance between points on column jacket as specified in illustration. See **Fig. 11** -**Fig. 13** . If distance measured is not as specified, replace column jacket.

COLUMN JACKET COLLAPSE MEASUREMENTS (1)

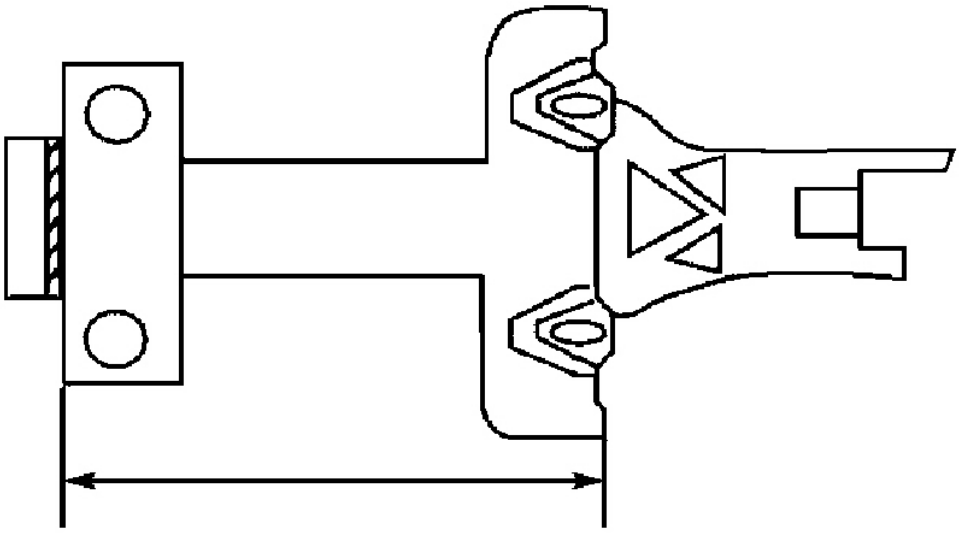
Application	In. (mm)
"C" Body	4.7 (119)
"E" Bodies	5.0 (127)
"F" Body	12.8 (324)
"H" Body	4.4 (113)
"K" Bodies	
DeVille	6.6 (167)

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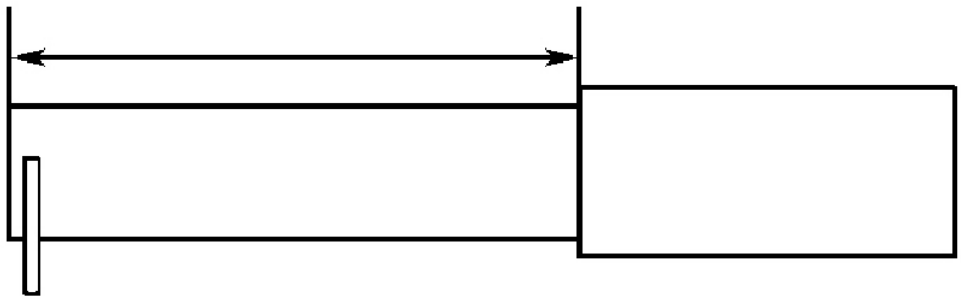
Application	In. (m)
"C" Body	15.94 (.403)
"E" Bodies	5.0 (12
"F" Body	12.8 (31

(E) See appropriate illustration.



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Fig. 11: Measuring Column Jacket (Bonneville, Le Sabre & DeVille)
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Fig. 12: Measuring Column Jacket (Camaro, Eldorado, Firebird, Seville & Park Avenue)
Courtesy of GENERAL MOTORS CORP.

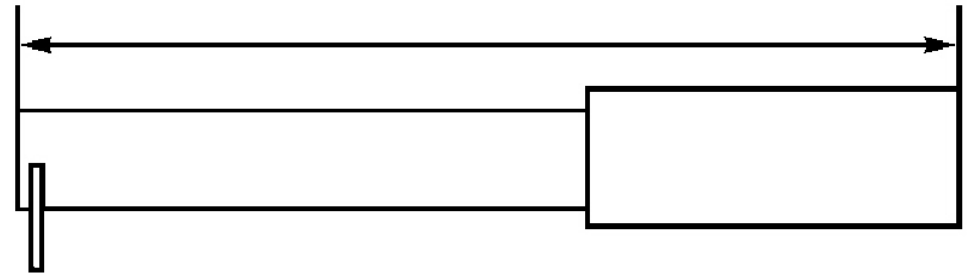


Fig. 13: Measuring Column Jacket (Corvette)
Courtesy of GENERAL MOTORS CORP.

Inspection (Shift Tube)

Inspect shift tube for sheared injection plastic See **Fig. 14** . If injection plastic is sheared, replace shift tube. Check shift lever operation. If lever can be moved to Park position without raising the lever, upper shift tube plastic bearing is broken. Replace shift tube.

Inspection (Steering Shaft)

Inspect steering shaft for sheared injection plastic. See **Fig. 15** . If injection plastic is sheared, replace steering shaft. Check steering shaft runout by installing a dial indicator at lower end of steering shaft, and then rotating steering wheel. If runout exceeds .062" (1.59 mm), replace steering shaft.

Reassembly (All Columns)

To reassemble, reverse disassembly procedure. Apply a thin coat of lithium-based grease to all friction points when reassembling.

Spring Height Measurement

Measure distance from adapter face and bearing assembly to lower spring retainer. Spring height must equal 1.0" (25.4 mm). See **Fig. 16** .

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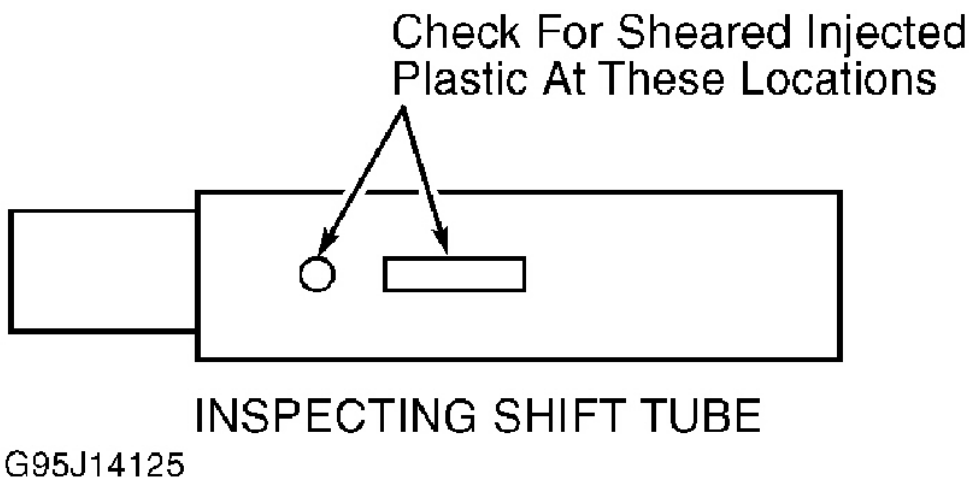


Fig. 14: Inspecting Shift Tube
Courtesy of GENERAL MOTORS CORP.

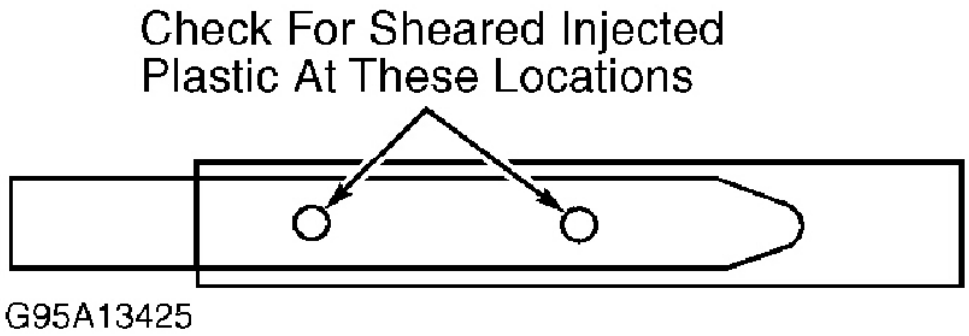


Fig. 15: Inspecting Steering Shaft
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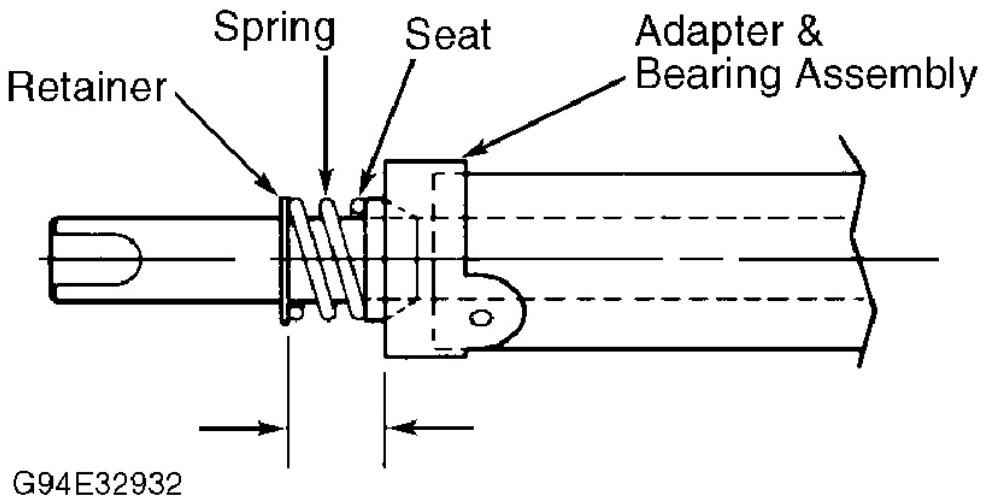


Fig. 16: Measuring Spring Height
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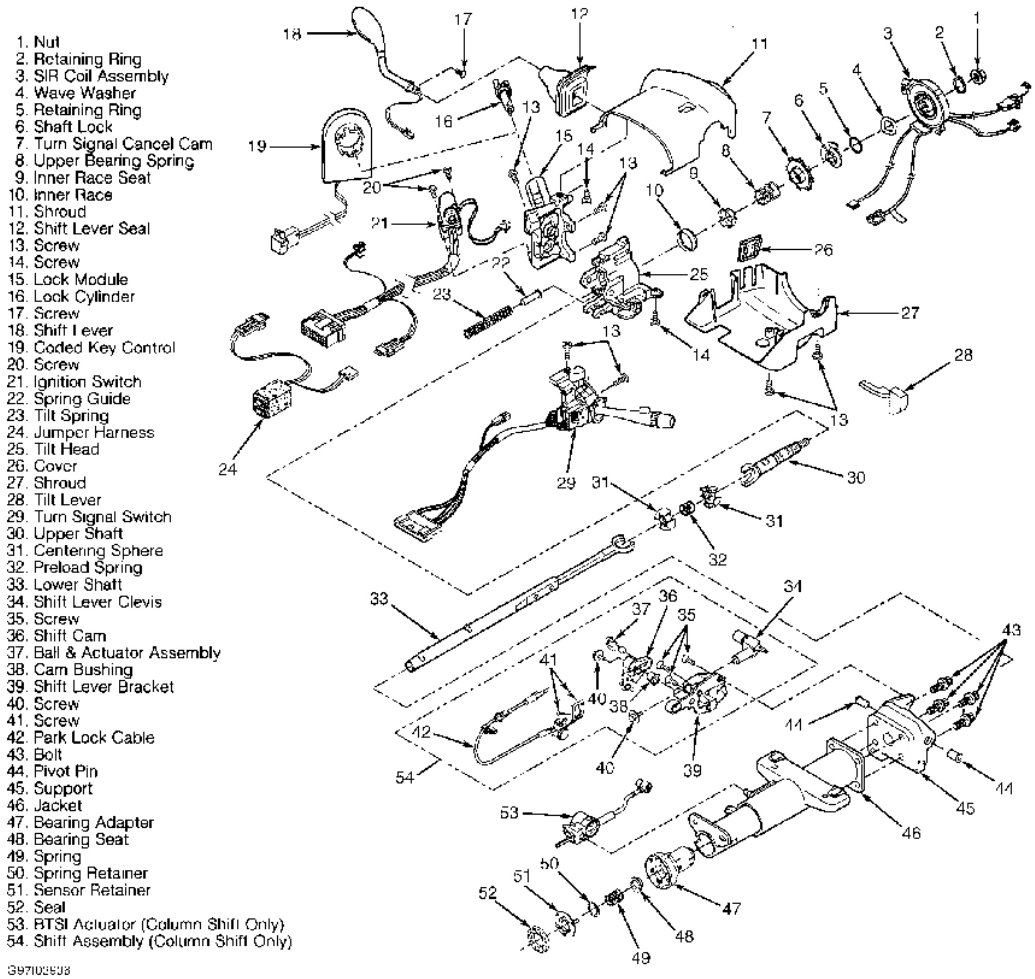
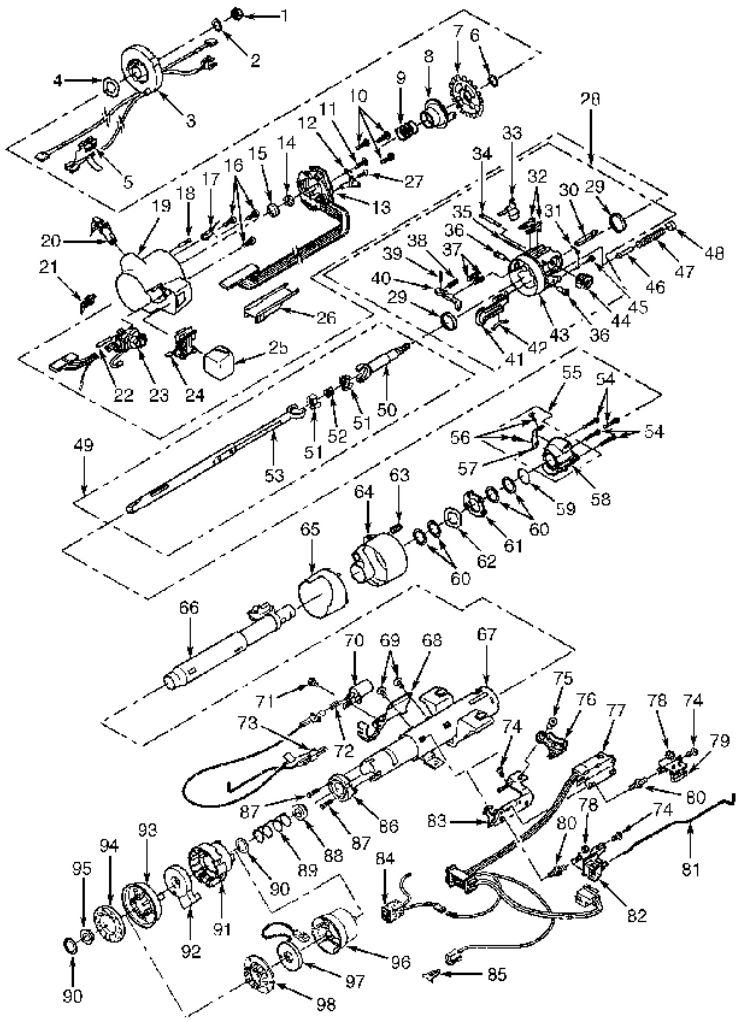


Fig. 17: Exploded View Of Steering Column Assembly ("C" Body - Column Shift)
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1. Nut
2. Retaining Ring
3. SIR Coil Assembly
4. Wave Washer
5. Connector Shroud
6. Retaining Ring
7. Shaft Lock
8. Turn Signal Cancel Cam
9. Upper Bearing Spring
10. Screw
11. Screw
12. Turn Signal Switch Arm
13. Turn Signal Switch
14. Inner Race Seat
15. Inner Race
16. Screw
17. Buzzer Switch
18. Lock Retaining Screw
19. Lock Housing Cover
20. Lock Cylinder
21. Dimmer Switch Rod Actuator
22. Pivot Pin
23. Pivot & Pulse Switch
24. Base Plate
25. Cover End Cap
26. Wiring Protector
27. Screw
28. Housing Assembly
29. Bearing Assembly
30. Lock Bolt
31. Lock Bolt Spring
32. Lock Shoe
33. Wire Protector Shield
34. Drive Shaft
35. Dowel Pin
36. Pivot Pin
37. Shoe Spring
38. Release Lever Spring
39. Release Lever Pin
40. Release Lever
41. Switch Actuator Rack
42. Rack Preload Spring
43. Housing
44. Switch Actuator Sector
45. Screw
46. Spring Guide
47. Tilt Spring
48. Spring Retainer
49. Steering Shaft Assembly
50. Race & Upper Shaft
51. Centering Sphere
52. Preload Spring
53. Lower Shaft
54. Screw
55. Support Assembly
56. Screw
57. Shift Lever Gate
58. Support
59. Retaining Ring
60. Thrust Washer
61. Lock Plate
62. Wave Washer
63. Shift Lever Spring
64. Shift Lever Bowl
65. Gearshift Bowl Shroud
66. Shift Tube
67. Jacket
68. Interlock Solenoid Bracket
69. Screw
70. Interlock Solenoid
71. Screw
72. Ball Joint Spring
73. Ignition Switch Actuator
74. Screw
75. Cam Retainer
76. Cable Shift Cam
77. Ignition Switch
78. Nut
79. PRNDL Adjuster
80. Stud
81. Dimmer Switch Rod
82. Dimmer Switch
83. Stud & Bracket
84. Harness Jumper
85. Connector Lock
86. Adapter & Bearing
87. Screw
88. Lower Bearing Seat
89. Lower Bearing Spring
90. Retainer
91. Sensor Adapter
92. High Resistance Steering Wheel Position Sensor
93. Sensor Retainer
94. Seal
95. Seal Retaining Bushing
96. Bearing Retainer
97. Steering Wheel Position Sensor
98. Damper

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Fig. 18: Exploded View Of Steering Column Assembly ("E" & "K" Bodies - Column Shift)

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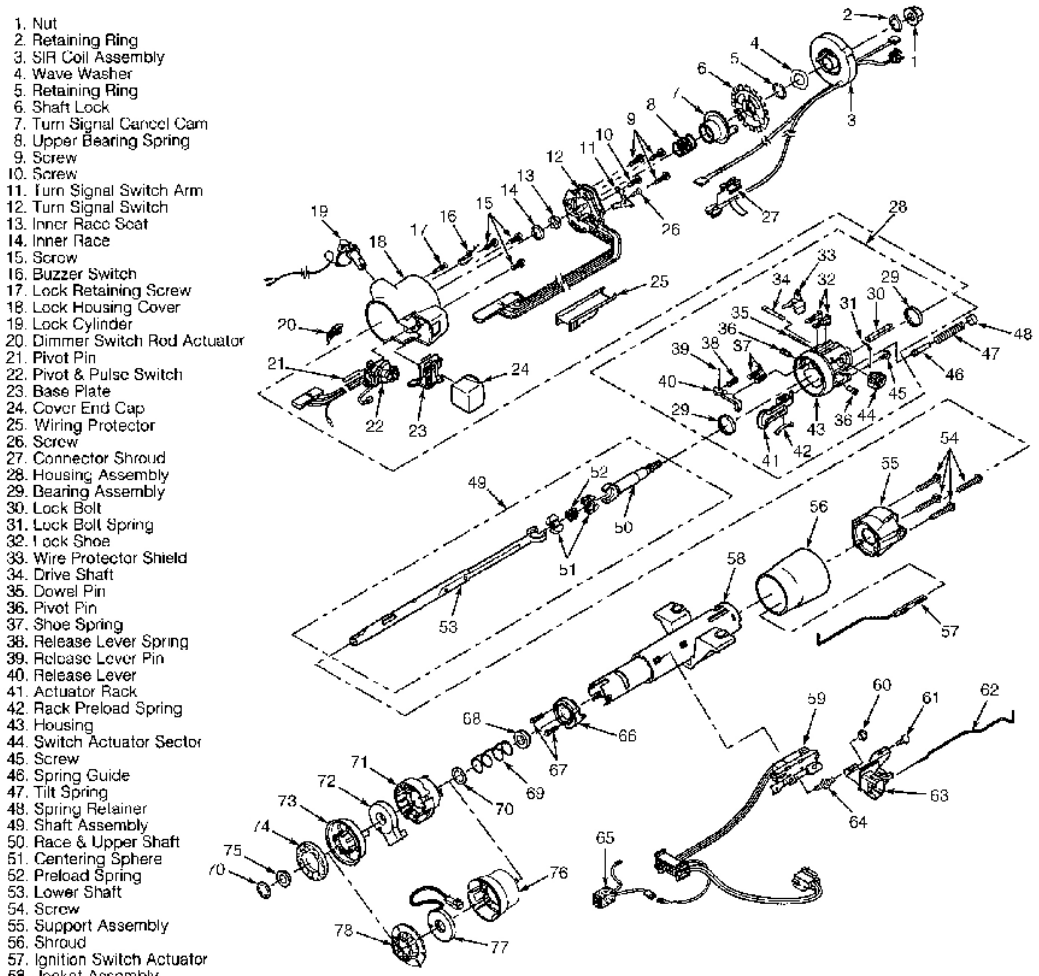
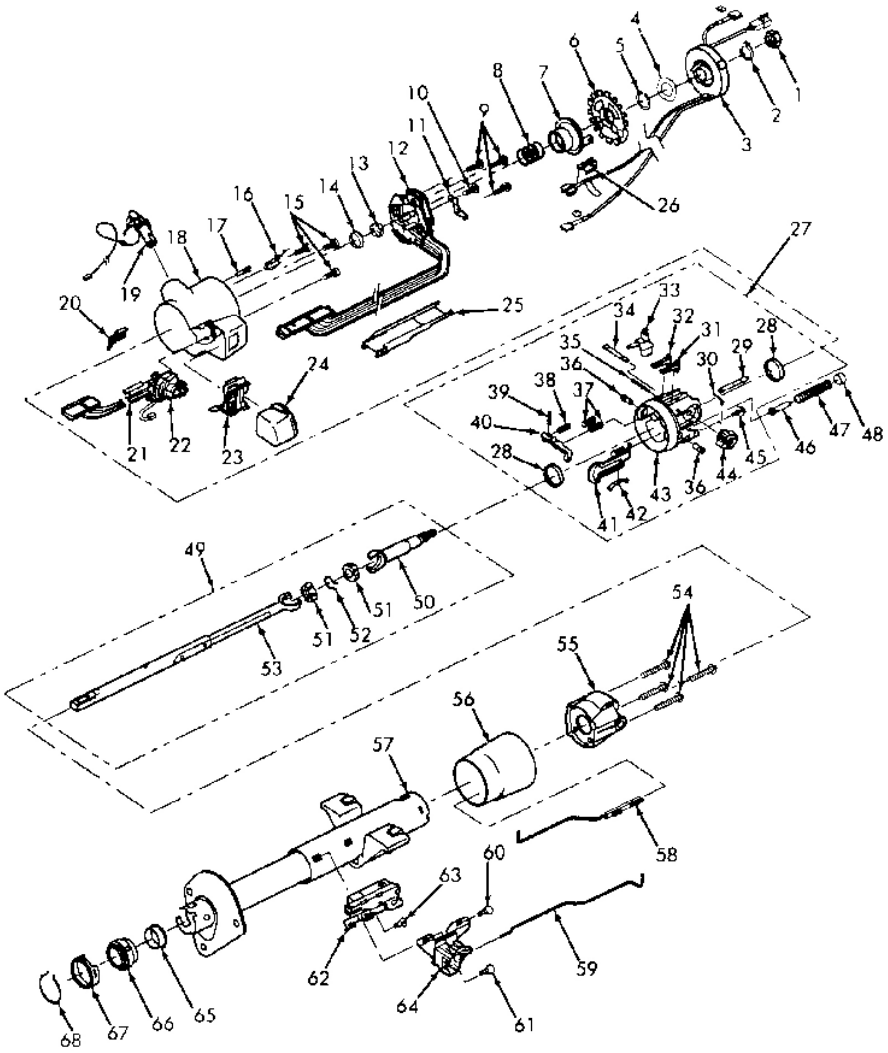


Fig. 19: Exploded View Of Steering Column Assembly ("E" & "K" Bodies - Floor Shift)

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1 Nut
2 Retaining Ring
3 SIR Coil Assembly
4 Wave Washer
5 Retaining Ring
6 Shaft Lock
7 Turn Signal Cancel Cam
8 Spring
9 Screw
10 Screw
11 Turn Signal Switch Arm
12 Turn Signal Switch
13 Seal
14 Inner Race
15 Screw
16 Buzzer Switch
17 Screw
18 Housing Cover
19 Lock Cylinder
20 Dimmer Switch Rod Actuator
21 Pivot Pin
22 Pivot & Pulse Switch
23 Base Plate
24 Cover End Cap
25 Wiring Protector
26 Shroud
27 Housing
28 Bearing
29 Lock Bolt
30 Spring
31 Lock Shoe
32 Lock Shoe
33 Shield
34 Drive Shaft
35 Dowel Pin
36 Pivot Pin
37 Shoe Spring
38 Lever Spring
39 Lever Pin
40 Release Lever
41 Actuator Rack
42 Preload Spring
43 Housing
44 Actuator Sector
45 Screw
46 Spring Guide
47 Tilt Spring
48 Retainer
49 Shaft Assembly
50 Race & Upper Shaft
51 Centering Sphere
52 Preload Spring
53 Lower Steering Shaft
54 Screw
55 Support
56 Shroud
57 Jacket Assembly
58 Ignition Switch Actuator
59 Dimmer Switch Rod
60 Screw
61 Screw
62 Ignition Switch
63 Screw
64 Dimmer Switch
65 Lower Bearing Adapter
66 Bearing Assembly
67 Retainer
68 Clip

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Fig. 20: Exploded View Of Steering Column Assembly ("F" Body)
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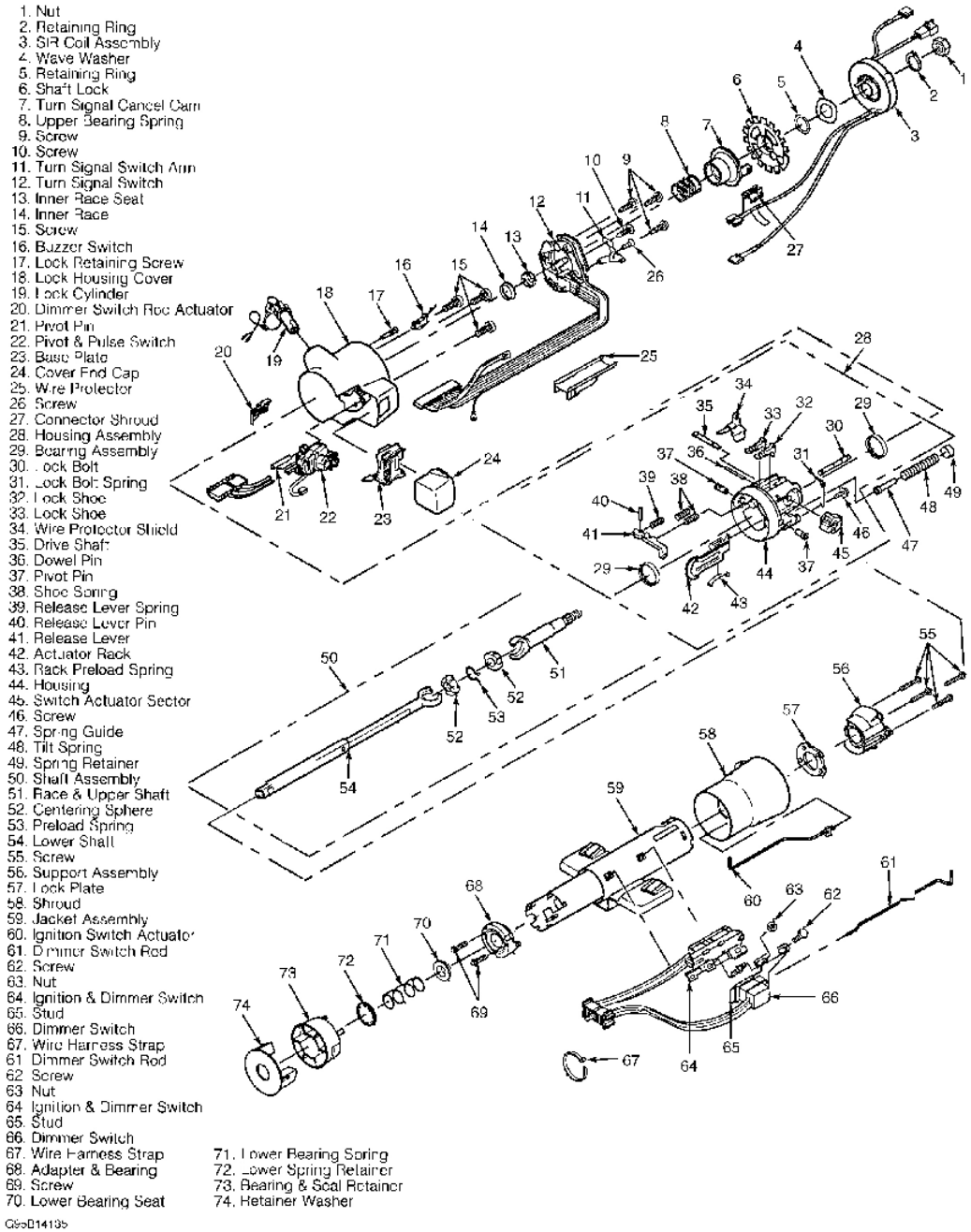
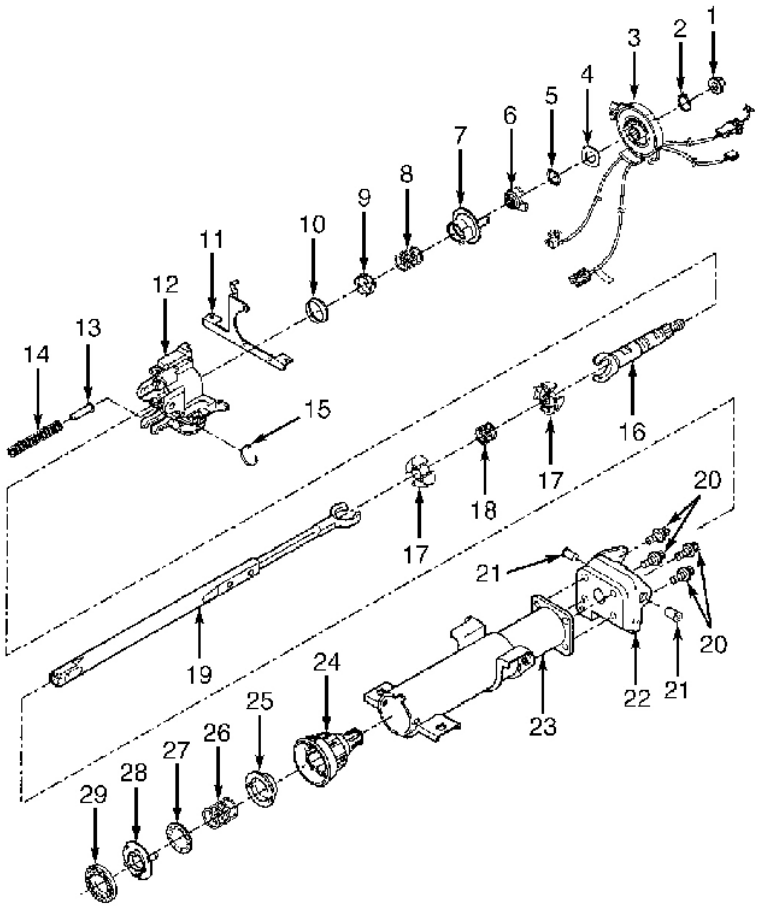


Fig. 21: Exploded View Of Steering Column Assembly ("H" Body - Floor Shift)
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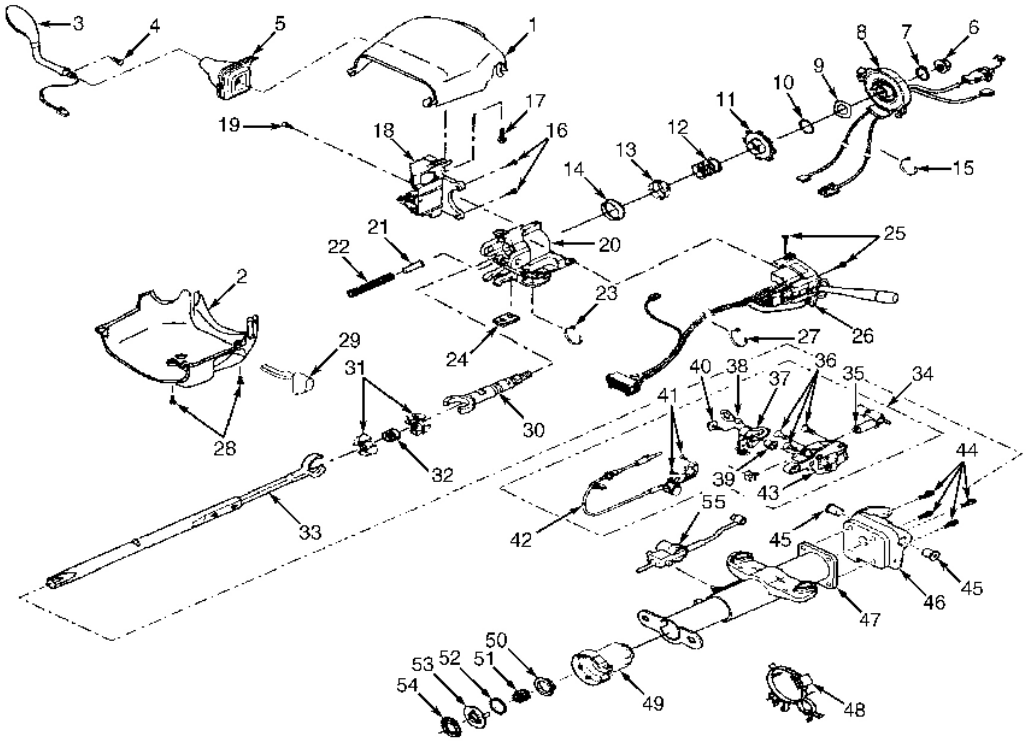


1. Nut
2. Retaining Ring
3. SIR Coil Assembly
4. Wave Washer
5. Retaining Ring
6. Cam Plate
7. Turn Signal Cancel Cam
8. Spring
9. Bearing Seat
10. Inner Race
11. Adapter Plate
12. Housing
13. Spring Guide
14. Tilt Spring
15. Strap
16. Shaft
17. Centering Sphere
18. Spring
19. Shaft Assembly
20. Screw
21. Pivot Pin
22. Support
23. Jacket
24. Adapter & Bearing
25. Bearing Seat
26. Spring
27. Spring Retainer
28. Sensor Retainer
29. Seal

Fig. 22: Exploded View Of Steering Column Assembly ("N" Body - Tilt)
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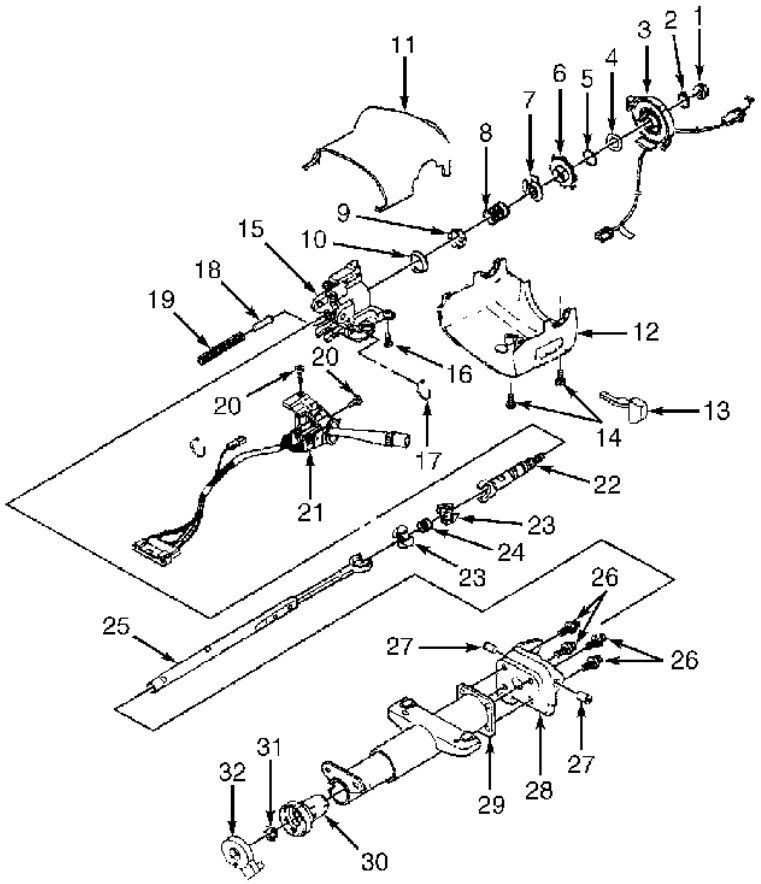
1. Upper Trim Cover
2. Lower Trim Cover
3. Shift Lever Assembly
4. Shift Lever Screw
5. Shift Lever Seal
6. Nut
7. Retaining Ring
8. SIR Coil Assembly
9. Washer
10. Bearing Retainer
11. Turn Signal Cancel Cam Assembly
12. Upper Bearing Spring
13. Upper Bearing Inner Race Set
14. Inner Race
15. Wire Harness Strap
16. Screw
17. Screw
18. Signal Switch Housing Assembly
19. Screw
20. Steering Column Tilt Head
21. Spring Guide
22. Tilt Spring
23. Wire Harness Strap
24. Spacer
25. Screw
26. Turn Signal & Multifunction Switch Assembly
27. Wire Harness Strap
28. Screw
29. Tilt Lever Assembly
30. Race & Upper Shaft Assembly
31. Centering Sphere
32. Joint Preload Spring
33. Lower Steering Shaft Assembly
34. Linear Shaft Assembly
35. Shift Lever Clevis
36. Screw
37. Cable Shift Cam Assembly
38. Ball & Actuator
39. Cam Bushing
40. Bolt
41. Screw
42. Park Lock Cable Assembly
43. Gear Shift Lever Assembly Support Bracket
44. Screw
45. Pin
46. Steering Column Support Assembly
47. Steering Column Jacket Assembly
48. Wire Harness Strap
49. Adapter & Bearing Assembly
50. Lower Bearing Seat
51. Lower Bearing Spring
52. Lower Spring Retainer
53. Sensor Retainer
54. Steering Shaft Seal
55. Automatic Transmission Shift Lock Control

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Fig. 23: Exploded View Of Steering Column Assembly ("W" Body - Tilt)
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1. Nut
2. Retaining Ring
3. SIR Coil Assembly
4. Wave Washer
5. Retaining Ring
6. Cam Plate
7. Turn Signal Cancel Cam
8. Spring
9. Bearing Seat
10. Inner Race
11. Upper Cover
12. Lower Cover
13. Tilt Handle
14. Screw
15. Housing
16. Screw
17. Strap
18. Spring Guide
19. Tilt Spring
20. Screw
21. Multifunction Switch
22. Shaft
23. Centering Sphere
24. Spring
25. Shaft Assembly
26. Screw
27. Pivot Pin
28. Support
29. Jacket
30. Adapter & Bearing
31. Bearing
32. Sensor

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Fig. 24: Exploded View Of Steering Column Assembly ("Y" Body)
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TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

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Application	Ft. Lbs. (N.m)
Column Bracket-To-Instrument Panel Stud Nuts	20 (27)
Column Bracket-To-Upper Support Bolts	20 (27)
Flexible Coupling Nuts	20 (27)
Intermediate Shaft-To-Steering Shaft Bolt	35 (47)
Lower Intermediate Shaft-To-Steering Gear Box Bolt	35 (47)
Steering Wheel Nut	
All except Camaro, Firebird & Monte Carlo	30 (41)
Camaro & Firebird	32 (43)
Monte Carlo	33 (45)
Support-To-Jacket Screws	(1) 13 (18)
	INCH Lbs. (N.m)
Air Bag Module Screws	
"C", "E", "H" & "K" Bodies	27 (3.0)
"F" Body	25 (2.8)
"Y" Body	54 (6.0)
Dimmer Switch Nut & Stud	35 (4)
Ignition Switch Screw & Stud	35 (4)
Lock Cylinder Screws	22 (2.5)
Lock Housing Cover Screws	80 (9)
Turn Signal & Multi-Function Switch Screws	62 (7)

(1) Steering column upper support assembly-to-column jacket assembly mounting screws.

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