# 1998-99 ENGINES

## 4.3L V6 & 5.0L, 5.7L & 7.4L V8 - Trucks

## MODEL IDENTIFICATION

**MODEL IDENTIFICATION - TRUCKS**

| Series (1) | Model |
|---|---|
| "C" | 2WD Pickup, Sierra, Silverado, Suburban, Tahoe & Yukon |
| "G" | Express, G-Van & Savana |
| "K" | 4WD Pickup, Sierra, Silverado, Suburban, Tahoe, Yukon & AWD Escalade |
| "L" | AWD Astro & Safari |
| "M" | 2WD Astro & Safari |
| "P" | Commercial Van (P42) & Motorhome (P32) |
| "S" | 2WD Blazer, Envoy, Jimmy, Pickup & Sonoma |
| "T" | 4WD Blazer, Bravada, Envoy, Jimmy, Pickup & Sonoma |
| (1) Vehicle series is fifth character of VIN. | |

## ENGINE IDENTIFICATION

Engine is identified by eighth character of Vehicle Identification Number (VIN). VIN is stamped on a metal plate on the top left end of the instrument panel, near windshield. See **ENGINE IDENTIFICATION CODES** table.

Engine can also be identified by engine identification (ID) number. Number is stamped on front of cylinder block, immediately forward of right cylinder head or on left side of cylinder block, on engine-to-transmission mating flange.

**ENGINE IDENTIFICATION CODES**

| Engine | (1) VIN Code | Engine ID |
|---|---|---|
| 4.3L | | |
| SFI | W | L35 |
| SFI | X | LF6 |
| 5.0L SFI | M | L30 |
| 5.7L SFI | R | L31 |
| 7.4L SFI | J | L29 |
| (1) Eighth character of VIN. | | |

**NOTE: In this article, references to Express and Savana also apply to 1998 G-Van.**

## ADJUSTMENTS

### VALVE CLEARANCE ADJUSTMENT 4.3L

**NOTE: Although valve clearance adjustment is not usually required (engine uses hydraulic valve lifters), perform the following procedure after servicing valve train.**

Engine uses screw-in rocker arm studs with a shoulder. Tighten rocker arm nuts to specification. See **TORQUE SPECIFICATIONS**.

### VALVE CLEARANCE ADJUSTMENT 5.0L & 5.7L

**NOTE: Although valve clearance adjustment is not usually required (engine uses hydraulic valve lifters), perform the following procedure after servicing valve train.**

Rotate crankshaft until timing marks are aligned and cylinder No. 1 is at TDC of compression stroke (Firing position). Adjust exhaust valves at cylinders 1, 3, 4, and 8, intake valves at cylinders 1, 2, 5, and 7. To adjust, loosen rocker arm adjusting nut until up and down lash is present. Tighten adjusting nut until lash is removed, then tighten adjusting nut one full turn. Rotate crankshaft 360 degrees to bring cylinder No. 6 to TDC of compression stroke and timing marks are aligned. Adjust exhaust valves 2, 5, 6 and 7, intake valves 3, 4, 6 and 8.

### VALVE CLEARANCE ADJUSTMENT 7.4L

**NOTE: Although valve clearance adjustment is not usually required (engine uses hydraulic valve lifters), perform the following procedure after servicing valve train.**

Tighten rocker arm bolts to specification. See **TORQUE SPECIFICATIONS** table.

## TROUBLE SHOOTING

**NOTE: To trouble shoot engine mechanical components, see appropriate table in TROUBLE SHOOTING article in GENERAL INFORMATION.**

## REMOVAL & INSTALLATION

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

**WARNING: On vehicles equipped with air bag restraint system, see appropriate AIR BAG RESTRAINT SYSTEMS article before servicing steering wheel or column. Use extreme caution to avoid personal injury and vehicle damage.**

 

**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.**

## POWER STEERING BLEEDING

**NOTE: 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. Using steering wheel, 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.

## COOLING SYSTEM BLEEDING

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.
3. Crush and add 2 Coolant Sealant Pellets (GM P/N 3634621) or equivalent to radiator (if reservoir is not pressurized) or coolant reservoir (if reservoir is pressurized).

## FUEL PRESSURE RELEASE

Disconnect negative battery cable. Loosen fuel tank cap to relieve tank pressure. Wrap a shop towel around fitting while connecting fuel gauge top avoid spillage. Connect one end of fuel gauge hose to pressure relief fitting on fuel rail. Place other end of hose in a container. Open relief valve to release pressure.

## ENGINE (4.3L)

**NOTE: Minimal clearance exists between oil pump pick-up tube and bottom of oil pan.**

 

**DO NOT place jack under oil pan, crankshaft pulley or any sheet metal when lifting engine.**

**WARNING: Provide addition support for opposite end from which components are being removed. When removing major components of vehicle, vehicle frame should be chained to hoist pads at same end as removed components to prevent tip-off. Failure to follow these precautionary measures could result in vehicle damage or serious personal injury.**

**NOTE: Flush out oil cooler and engine cooling system when installing new engine.**

**Removal (Astro & Safari)**

1. On this vehicle, engine and sub-frame must be removed out from the bottom of the vehicle. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove interior engine cover. Remove air filter assembly and disconnect accelerator and cruise control cables from throttle body. Discharge A/C system using approved refrigerant recovery/recycling equipment and disconnect A/C pipes from accumulator and condenser. See appropriate article in REFRIGERANT RECOVERY/RECYCLING in A/C GENERAL SERVICING.
2. Drain cooling system, disconnect transmission fluid lines and engine oil cooler lines from radiator. Remove radiator. Remove power steering reservoir and disconnect hydro-boost pipes. Remove brake master cylinder from hydro-boost unit and tie to oil fill tube. Disconnect steering shaft from steering gear. Disconnect heater hoses from engine. Disconnect fuse box and wiring harness from the bulk head (firewall) connector and lay wiring harness on engine.
3. Raise and support vehicle. Drain oil from crankcase. Remove drive shaft. Remove starter, flywheel cover, 3 torque converter bolts (A/T) and oil filter. Disconnect shift linkage. Disconnect exhaust at main flange behind catalytic converter. Remove park brake bracket from frame. Disconnect rear brake line. Remove front bumper and disconnect the power steering cooler from the front air deflector and disconnect SIR sensor connector.
4. Disconnect rear A/C pipes from rear crossmember. Leave A/C pipes attached to powertrain assembly. Disconnect fuel lines from fuel filter. Pull fuel lines forward through the crossmember. Disconnect fuel tank electrical connector and disconnect transfer case vent hose (4WD). Ensure all connections are disconnected between the chassis and frame. Remove A/C compressor and power steering mounting bracket. Remove EGR tube from intake manifold. Attach engine Lifting Brackets (J-41427) to right-rear and left-front of intake manifold.
5. Remove engine mount through-bolts. Disconnect fuel pipe bracket form rear of left cylinder head. Disconnect fuel pipes from fuel rail. Disconnect electrical harness from transmission and all other emission sensors. disconnect transfer case to engine block support brace (if equipped). Raise engine slightly and support transmission. Remove exhaust pipes from exhaust manifolds. Remove 9 bellhousing bolts. Lower engine from vehicle.

**Installation (Astro & Safari)**

1. Place engine in position on frame. Install engine mount through bolts. Torque to specification. See **TORQUE SPECIFICATIONS**. Remove engine lift Adapter (J-41427).
2. Connect transmission to engine, torque to specification. See **TORQUE SPECIFICATIONS**. Install

 

exhaust "Y" pipe to engine. On 4WD models, install transfer case support brace. Route and connect all fuel lines, hoses and transmission wiring harness. Connect steering shaft and wheel housing splash shields.

3. Install distributor cap. Connect heater hose from coolant pump. Connect harness at knock sensor module. Connect wiring harness at bulkhead. Install CPI or TBI unit to intake manifold. Install A/C compressor.
4. Lower vehicle into position for engine/subframe installation. Install subframe bolts and tighten in sequence. See **Fig. 1**. Connect engine electrical harness. Route and install remaining accessory, bulkhead and fuse box wiring. Secure fuse box. Connect wheel housing splash shields to frame. Install steering shaft and torque to specification. See **TORQUE SPECIFICATIONS**. Install power steering pump bracket and pump. Connect A/C compressor hose assembly. Install cruise control servo and bracket.
5. Connect power steering pump. Connect hydraulic lines at gear-box, pump, hydro boost and reservoir. Install serpentine belt. Install/connect A/C accumulator and hoses. Install radiator. Install upper radiator hoses and cooler lines. Connect heater hoses. Install all vacuum hoses.
6. Install fan and fan clutch assembly. Install fan shroud and radiator filler panels. Install grille and headlamp bezels.
7. Install master cylinder and connect all fittings disconnected previously. Install hood latch and radiator braces. Install transmission and engine filler tubes. Install cruise control stepper motor cable, wiring and accelerator cable. Install plug wires.
8. Install air cleaner and ducts. Connect fuel lines at intake manifold. Install fuel line bracket and connect fuel lines at frame. Raise and support vehicle with safety stands.
9. Connect lower engine oil cooler line to radiator. Install power steering cooler and lines. Install lower transmission oil cooler line and lower radiator hose to radiator. Install front bumper. Connect drive shaft and transmission linkage. Torque all fasteners to specification. See **TORQUE SPECIFICATIONS**. Connect all fuel hoses. Install air bag sensor wiring. Install starter. Connect remaining wiring at engine and frame.
10. Install torque converter bolts and cover. See **TORQUE SPECIFICATIONS**. Connect exhaust pipes and lower vehicle. Install oil filter and oil. Ensure oil level is correct. See **CRANKCASE CAPACITY**. Ensure transmission fluid level is correct. Fill and bleed power steering system. See **POWER STEERING BLEEDING**. Install air filter assembly. Install battery and negative battery cable. Install engine cover. Install right kick panel.
11. Install battery. Fill and bleed brake system. Install coolant as needed. See **COOLING SYSTEM BLEEDING**. Evacuate and charge A/C system. See appropriate article in REFRIGERANT RECOVERY/RECYCLING in A/C GENERAL SERVICING.
12. Check all components for leaks, proper fluid levels and proper operation.

 

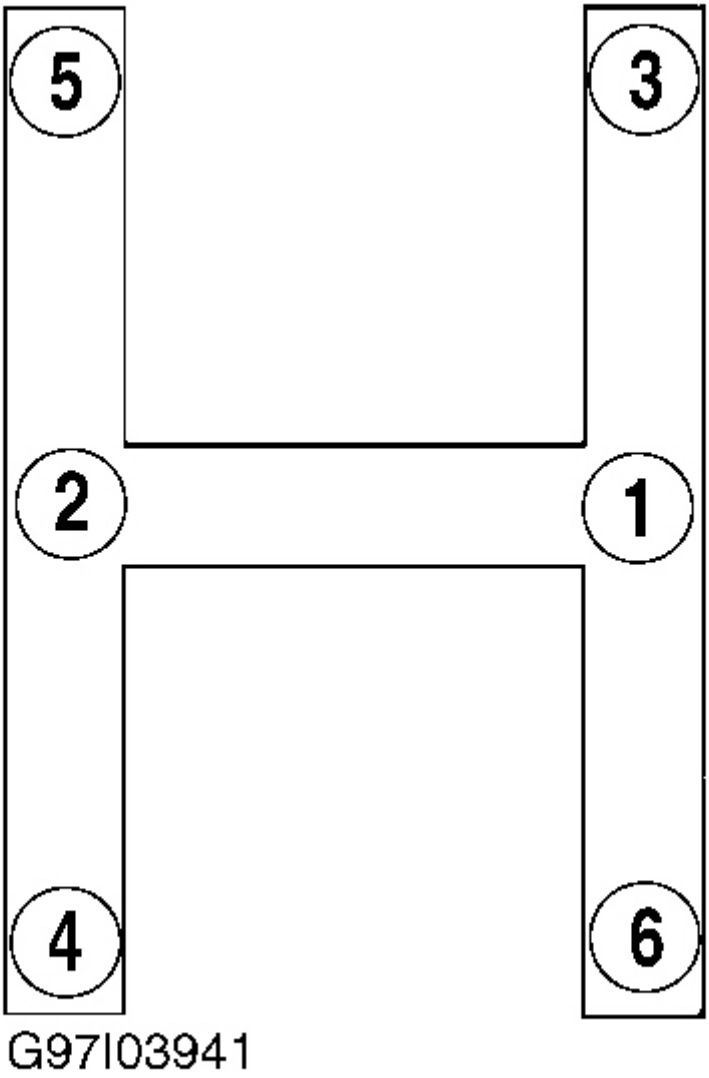


**Fig. 1: Tightening Frame Mounting Bolts In Sequence (Astro & Safari 4.3L)**
**Courtesy of GENERAL MOTORS CORP.**

**Removal (Commercial Van)**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Remove engine cover and floor panel sections. Remove air cleaner assembly. Drain cooling system. Remove engine oil filler tube. Remove upper and lower radiator hose and both heater hoses. Remove upper and lower fan shrouds. Remove accessory drive belt and fan. Remove accelerator and cruise control (if equipped) cables. Disconnect fuel lines from rear of engine.

 

2. Remove A/C compressor with hoses attached and position aside (if equipped). It is not necessary to discharge A/C system. Remove power steering pump pulley, power steering pump from mounting bracket, and position power steering pump with hoses attached aside. Remove power steering mounting bracket. Raise and support vehicle. Drain crankcase. Remove starter and starter opening cover. Remove torque converter to flexplate bolts (A/T). Disconnect transmission cooler pipe bracket from right side of oil pan (if equipped).
3. Remove exhaust pipe from exhaust manifolds. Remove engine oil cooler pipes. Support transmission with a suitable strap and remove 7 bellhousing bolts. Remove engine mount through-bolts. Lower vehicle. Disconnect engine wiring harness. Remove distributor cap and disconnect fuel pipes from rear of engine. Remove 2 upper bellhousing bolts. Remove EGR pipe. Attach engine lifting brackets (J-41427) to right-rear and left-front of intake manifold. Attach engine hoist. Remove engine from vehicle.

**Installation (Commercial Van)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

**Removal (Sierra, & "C" & "K" Pickup)**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove hood. Remove air cleaner assembly. Drain cooling system. Remove upper and lower radiator hose and both heater hoses. Remove upper and lower fan shrouds. Remove accessory drive belt and fan. Remove accelerator and cruise control cables. Disconnect fuel lines from rear of engine.
2. Remove A/C compressor and (if equipped). It is not necessary to discharge A/C system. Remove power steering pump pulley, power steering pump from mounting bracket, and position power steering pump with hoses attached aside. Remove power steering mounting bracket. Raise and support vehicle. Drain crankcase. Remove starter and starter opening cover. Remove torque converter to flexplate bolts (A/T). Disconnect transmission cooler pipe bracket from right side of oil pan (if equipped).
3. Remove exhaust pipe from exhaust manifolds. Remove engine oil cooler pipes. Support transmission with a suitable strap and remove 7 bellhousing bolts. Remove engine mount through-bolts. Lower vehicle. Disconnect engine wiring harness. Remove distributor cap and disconnect fuel pipes from rear of engine. Remove 2 upper bellhousing bolts. Remove EGR pipe. Attach engine lifting brackets (J-41427) to right-rear and left-front of intake manifold. Attach engine hoist. Remove engine from vehicle.

**Installation (Sierra, & "C" & "K" Pickup)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

**Removal (Blazer, Bravada, Jimmy, Sonoma & "S" & "T" Series Pickup)**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove battery ground cable at engine. Raise and support vehicle. Remove underbody shield. Drain crankcase and cooling system. Remove braces from engine to transmission. Disconnect exhaust pipe from exhaust manifolds. Disconnect slave cylinder or hydraulic line if cylinder is mounted inside bellhousing.

 

2. Disconnect fuel line clamp at bellhousing. Remove starter. Disconnect torque converter bolts from flywheel. Disconnect front drive shaft and transfer case (4WD). Remove oil filter. Remove all transmission to engine bolts except for upper left bolt. Remove engine mount through-bolts. Remove transmission mount to crossmember nut and washer. Support transmission with a suitable strap. Lower vehicle. Remove upper and lower radiator hoses
3. Remove upper and lower fan shrouds. Remove drive belt and fan. Remove water pump pulley. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment. Remove A/C compressor and mounting bracket. Remove radiator and A/C condenser. Disconnect power steering hoses from pump and cap them. Disconnect heater hoses from engine. Disconnect engine wiring harness. Disconnect accelerator and cruise control cables.
4. Disconnect necessary vacuum lines. Mark and remove distributor. Disconnect fuel lines from rear of engine. Support transmission and remove final transmission-to-engine bolt. Attach engine lifting brackets (J-41427) to right-rear and left-front of intake manifold. Attach engine hoist. Remove engine from vehicle.

**Installation (Blazer, Bravada, Jimmy, Sonoma & "S" & "T" Series Pickup)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

**Removal (Express, Savana & G-Van)**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove interior engine cover. Remove coolant recovery bottle, air cleaner assembly and air cleaner intake duct. Remove front bumper, grill, and radiator support. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment. Drain cooling system. Remove upper and lower fan shroud, accessory belt, and fan.
2. Remove upper and lower radiator hoses. Remove radiator and A/C condenser. Disconnect heater hoses from engine. Disconnect engine wiring harness. Disconnect accelerator and cruise control cables. Remove generator and mounting bracket. Remove A/C compressor and mounting bracket. Remove engine ground straps. Remove pulley from power steering pump. Remove power steering pump and mounting bracket. Remove upper intake manifold. See INTAKE MANIFOLD (UPPER).
3. Disconnect fuel lines form rear of engine. Remove transmission oil level indicator tube and shift cable connector. Raise and support vehicle. Drain oil from crankcase. Remove exhaust pipes from exhaust manifolds. Remove engine oil cooler lines form retaining brackets and remove from engine. Remove flywheel cover and remove starter. Remove torque converter bolts. Remove transmission cooler lines from engine. Remove all bellhousing bolts. Support transmission with a suitable strap. Lower vehicle.
4. Attach engine lifting brackets (J-41427) to right-rear and left-front of intake manifold. Attach engine hoist. Remove engine mount through-bolts. Remove engine mounts from vehicle frame. Remove engine from vehicle.

**Installation (Express, Savana & G-Van)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

 

## ENGINE (5.0L & 5.7L)

**NOTE: Minimal clearance exists between oil pump pick-up tube and bottom of oil pan. DO NOT place jack under oil pan, crankshaft pulley or any sheet metal when lifting engine.**

**WARNING: Provide addition support for opposite end from which components are being removed. When removing major components of vehicle, vehicle frame should be chained to hoist pads at same end as removed components to prevent tip-off. Failure to follow these precautionary measures could result in vehicle damage or serious personal injury.**

### Removal & Installation (Commercial Van)

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Remove engine cover and floor panel sections. Remove air cleaner assembly. Drain cooling system. Remove engine oil filler tube. Remove upper and lower radiator hose and both heater hoses. Remove upper and lower fan shrouds. Remove accessory drive belt and fan. Remove accelerator and cruise control (if equipped) cables. Disconnect fuel lines from rear of engine.
2. Remove A/C compressor with hoses attached and position aside (if equipped). It is not necessary to discharge A/C system. Remove power steering pump pulley, power steering pump from mounting bracket, and position power steering pump with hoses attached aside. Remove power steering mounting bracket. Raise and support vehicle. Drain crankcase. Remove starter and starter opening cover. Remove torque converter to flexplate bolts (A/T). Disconnect transmission cooler pipe bracket from right side of oil pan (if equipped).
3. Remove exhaust pipe from exhaust manifolds. Remove engine oil cooler pipes. Support transmission with a suitable strap and remove 7 bellhousing bolts. Remove engine mount through-bolts. Lower vehicle. Disconnect engine wiring harness. Remove distributor cap and disconnect fuel pipes from rear of engine. Remove 2 upper bellhousing bolts. Remove EGR pipe. Attach engine lifting brackets (J-41427) to right-rear and left-front of intake manifold. Attach engine hoist. Remove engine from vehicle.

### Installation (Commercial Van)

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

### Removal (Sierra, Suburban, Tahoe, Yukon & "C" & "K" Series Pickup)

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove hood. Remove air cleaner assembly. Drain cooling system. Remove upper and lower radiator hose and both heater hoses. Remove upper and lower fan shrouds. Remove accessory drive belt and fan. Remove accelerator and cruise control cables. Remove A/C compressor with hoses attached and position aside (if equipped). It is not necessary to discharge A/C system.
2. Remove power steering pump pulley, power steering pump from mounting bracket, and position power steering pump with hoses attached aside. Remove power steering mounting bracket. Raise and support vehicle. Drain crankcase. Remove starter and starter opening cover. Remove torque converter to flexplate

 

bolts (A/T). Disconnect transmission cooler pipe bracket from right side of oil pan (if equipped). Remove exhaust pipe from exhaust manifolds.

3. Remove engine oil cooler pipes. Support transmission with a suitable strap and remove 7 bellhousing bolts. Remove engine mount through-bolts. Lower vehicle. Disconnect engine wiring harness. Remove distributor cap and disconnect fuel pipes from rear of engine. Remove 2 upper bellhousing bolts. Remove EGR pipe. Attach engine lifting brackets (J-41427) to right-rear and left-front of intake manifold. Attach engine hoist. Remove engine from vehicle.

**Installation (Sierra, Suburban, Tahoe, Yukon & "C" & "K" Series Pickup)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

**Removal (Express, Savana & G-Van)**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove interior engine cover. Remove coolant recovery bottle, air cleaner assembly and air cleaner intake duct. Remove front bumper, grill, and radiator support. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment. Drain cooling system. Remove upper and lower fan shroud, accessory belt, and fan.
2. Remove upper and lower radiator hoses. Remove radiator and A/C condenser. Disconnect heater hoses from engine. Disconnect engine wiring harness. Disconnect accelerator and cruise control cables. Remove generator and mounting bracket. Remove A/C compressor and mounting bracket. Remove engine ground straps. Remove pulley from power steering pump. Remove power steering pump and mounting bracket. Remove upper intake manifold.**See INTAKE MANIFOLD (UPPER)**.
3. Disconnect fuel lines form rear of engine. Remove transmission oil level indicator tube and shift cable connector. Raise and support vehicle. Drain oil from crankcase. Remove exhaust pipes from exhaust manifolds. Remove engine oil cooler lines form retaining brackets and remove from engine. Remove flywheel cover and remove starter. Remove torque converter bolts. Remove transmission cooler lines from engine. Remove all bellhousing bolts. Support transmission with a suitable strap. Lower vehicle.
4. Attach engine lifting brackets (J-41427) to right-rear and left-front of intake manifold. Attach engine hoist. Remove engine mount through-bolts. Remove engine mounts from vehicle frame. Remove engine from vehicle.

**Installation (Express, Savana & G-Van)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

**ENGINE (7.4L)**

**NOTE: Minimal clearance exists between oil pump pick-up tube and bottom of oil pan. DO NOT place jack under oil pan, crankshaft pulley or any sheet metal when lifting engine.**

 

**WARNING: Provide addition support for opposite end from which components are being removed. When removing major components of vehicle, vehicle frame should be chained to hoist pads at same end as removed components to prevent tip-off. Failure to follow these precautionary measures could result in vehicle damage or serious personal injury.**

**Removal & Installation (Commercial Van/Motorhome)**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove engine cover and floor panel sections. Remove air cleaner duct and resonator from throttle body. Remove ignition coil from intake manifold. Disconnect electrical connector at distributor and disconnect fuel lines from fuel rail. Drain cooling system. Remove upper and lower radiator hoses. Remove upper and lower fan shrouds. Remove radiator.
2. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment. Remove A/C compressor. Remove accelerator and cruise control (if equipped) cables from throttle body. Remove all necessary vacuum lines from engine. Remove generator from mounting bracket. Disconnect engine wiring harness and tie out of the way. Raise and support vehicle. Remove hoses from power steering pump. Disconnect engine ground straps from engine block.
3. Remove starter and flywheel cover. Remove torque converter bolts. Remove exhaust pipes from exhaust manifolds. Remove 8 bellhousing bolts from transmission. Remove oil cooler lines from engine block. Attach lifting brackets (J-36857) to front of left cylinder head and to rear of right rear of cylinder head. Attach engine hoist. Remove engine mount through-bolts. Remove engine from vehicle.

**Installation (Commercial Van/Motorhome)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

**Removal (Sierra, Suburban, Tahoe, Yukon & "C" & "K" Series Pickup)**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove hood. Remove air cleaner duct and resonator from throttle body. Remove ignition coil from intake manifold. Disconnect electrical connector at distributor and disconnect fuel lines from fuel rail. Drain cooling system. Remove upper and lower radiator hoses. Remove upper and lower fan shrouds. Remove radiator.
2. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment. Remove A/C compressor. Remove accelerator and cruise control cables from throttle body. Remove all necessary vacuum lines from engine. Remove generator from mounting bracket. Disconnect engine wiring harness and tie out of the way. Raise and support vehicle. Remove hoses from power steering pump. Remove front drive shaft (4WD). Disconnect engine ground straps from engine block.
3. Remove starter and flywheel cover. Remove torque converter bolts. Remove exhaust pipes from exhaust manifolds. Remove 8 bellhousing bolts from transmission. Remove oil cooler lines from engine block. Attach lifting brackets (J-36857) to front of left cylinder head and to rear of right rear of cylinder head. Attach engine hoist. Remove engine mount through-bolts. Remove engine from vehicle.

**Installation (Sierra, Suburban, Tahoe, Yukon & "C" & "K" Series Pickup)**

 

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

**Removal (Express, G-Van & Savana)**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove battery from vehicle. Remove interior engine cover. Remove air intake duct from throttle body. Remove air cleaner assembly. Drain cooling system and remove coolant reservoir. Remove front bumper, grill/parking light assembly and radiator support. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment.
2. Remove upper and lower radiator hoses. Remove upper and lower fan shrouds. Remove A/C condenser and radiator from vehicle. Remove accessory drive belt and cooling fan. Disconnect engine wiring harness and tie out of the way. Remove engine oil fill tube and engine oil level indicator tube. Remove A/C compressor, A/C compressor mounting bracket and power steering pump. Remove generator and mounting bracket. Remove throttle body from upper intake manifold.
3. Remove upper intake manifold. See **INTAKE MANIFOLD (UPPER)**. Remove lower intake manifold. See **INTAKE MANIFOLD (LOWER)**. Remove transmission oil level indicator tube. Disconnect transmission shift cable connector. Disconnect fuel supply and return lines at rear of engine. Raise and support vehicle. Remove starter motor and flywheel cover. Remove exhaust pipes and exhaust manifolds. Disconnect oil cooler lines from retaining brackets and block. Remove torque converter bolts.
4. Remove bellhousing bolts. Support transmission with a suitable strap. Lower vehicle. Attach a length of chain to front of left cylinder head and to rear of right rear of cylinder head. Attach engine hoist. Remove engine mount through-bolts. Remove engine from vehicle.

**Installation (Express, G-Van & Savana)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure. Fill crankcase and cooling system. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

## INTAKE MANIFOLD (UPPER) REMOVAL (4.3L)

**CAUTION: Always apply a few drops of clean engine oil to the male fuel pipe ends before connecting fuel pipe fittings in order to reduce the risk of fire and personal injury. This will ensure and prevent a possible fuel leak. During normal operation, the O rings located in the female connector will swell and may prevent proper reconnecting if not lubricated.**

**NOTE: Manufacturer does not provide a torque sequence for upper intake manifold on 4.3L, 5.0L & 5.7L engines.**

1. Remove air cleaner assembly. Remove interior engine cover (if equipped). Remove canister purge solenoid. Disconnect A/C pressure switch, Throttle Position (TP) sensor, Idle Air Control (IAC) motor, Sequential Central Port Injection (SCPI) harness connector and the Manifold Absolute pressure (MAP) sensor.

 

2. Disconnect accelerator and cruise control cables from throttle body. Disconnect fuel lines at rear of engine. Remove brake booster vacuum hose. Remove upper intake manifold bolts. Remove upper intake manifold. See **Fig. 2**.

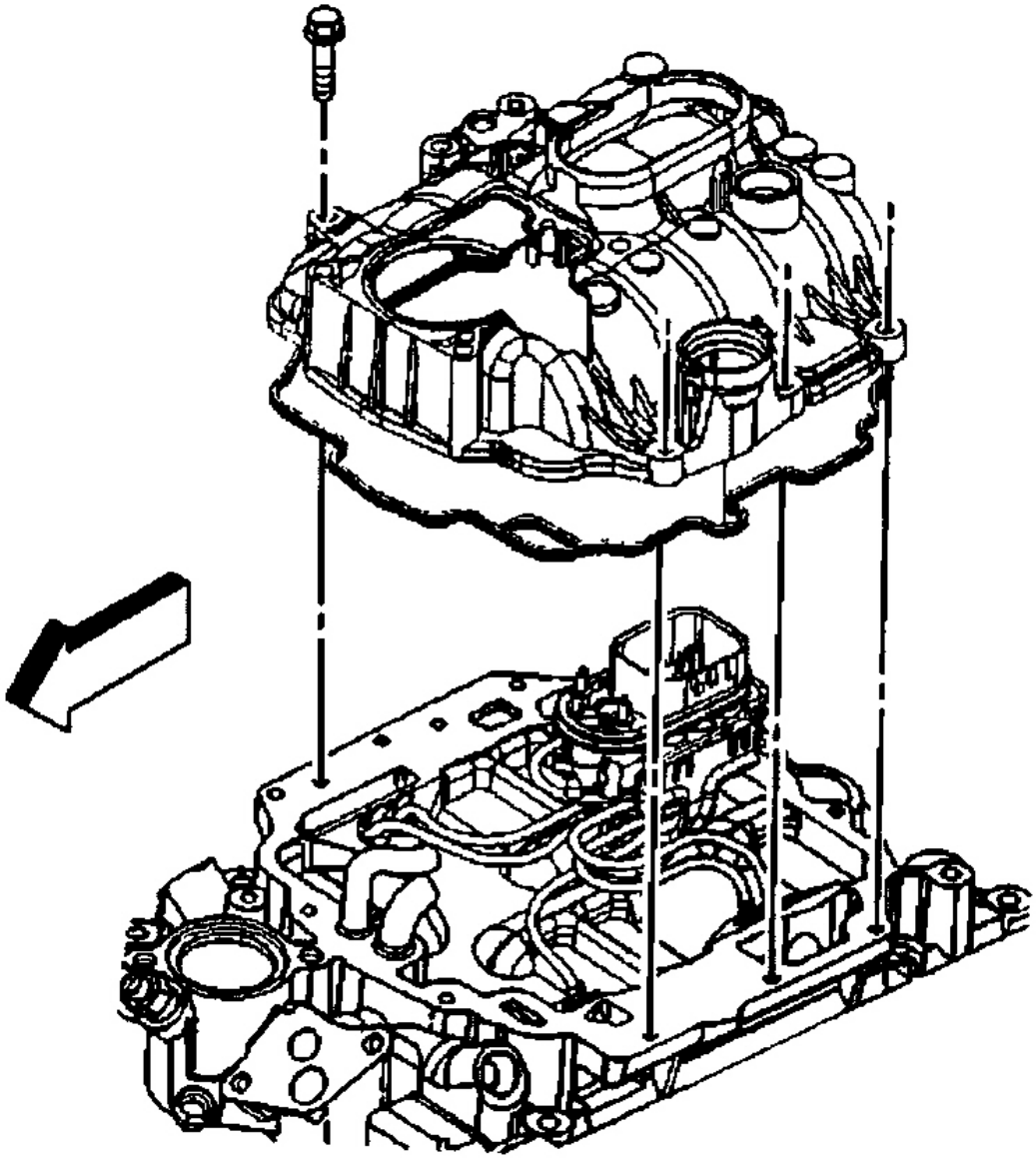


**Fig. 2: Exploded View Of Intake Manifold Assembly (4.3L)**
**Courtesy of GENERAL MOTORS CORP.**

**INTAKE MANIFOLD (UPPER) REMOVAL (5.0L & 5.7L)**

 

**CAUTION: Always apply a few drops of clean engine oil to the male fuel pipe ends before connecting fuel pipe fittings in order to reduce the risk of fire and personal injury. This will ensure and prevent a possible fuel leak. During normal operation, the O rings located in the female connector will swell and may prevent proper reconnecting if not lubricated.**

**NOTE: Manufacturer does not provide a torque sequence for upper intake manifold on 4.3L, 5.0L & 5.7L engines.**

1. Disconnect negative battery cable. Remove interior engine cover (if equipped). Remove air cleaner assembly and inlet duct. Disconnect accelerator and cruise control cables. Remove throttle cable bracket. Remove canister purge solenoid.
2. Disconnect the Sequential Central Port Injection (SCPI) injector, ignition coil, Ignition Control Module (ICM), generator, Idle Air Control (IAC) motor, Throttle Position (TP) sensor, O2 sensor, Exhaust Gas Recirculation (EGR) valve and Engine Coolant Temperature (ECT) sensor wiring harness connectors.
3. Remove the distributor cap and disconnect fuel pipes at rear of engine. Remove PCV valve and hose. Remove the wiring harness support bracket at the rear of the intake manifold. Remove upper intake manifold bolts. Remove upper intake manifold. See **Fig. 3**.

**INTAKE MANIFOLD (UPPER) INSTALLATION (4.3L, 5.0L & 5.7L)**

**CAUTION: Always apply a few drops of clean engine oil to the male fuel pipe ends before connecting fuel pipe fittings in order to reduce the risk of fire and personal injury. This will ensure and prevent a possible fuel leak. During normal operation, the O rings located in the female connector will swell and may prevent proper reconnecting if not lubricated.**

**NOTE: Manufacturer does not provide a torque sequence for upper intake manifold on 4.3L, 5.0L & 5.7L engines.**

**CAUTION: Always apply a few drops of clean engine oil to the male fuel pipe ends before connecting fuel pipe fittings in order to reduce the risk of fire and personal injury. This will ensure and prevent a possible fuel leak. During normal operation, the O rings located in the female connector will swell and may prevent proper reconnecting if not lubricated.**

1. Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure using NEW gaskets. See **Fig. 2** or **Fig. 3**.

**NOTE: Tighten upper intake manifold bolts to specification in a criss-cross pattern. Manufacturer does not provide a specific torque sequence.**

2. Tighten all retaining nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

**INTAKE MANIFOLD (UPPER) REMOVAL (7.4L)**

 

**CAUTION: Always apply a few drops of clean engine oil to the male fuel pipe ends before connecting fuel pipe fittings in order to reduce the risk of fire and personal injury. This will ensure and prevent a possible fuel leak. During normal operation, the O rings located in the female connector will swell and may prevent proper reconnecting if not lubricated.**

**NOTE: Manufacturer does not provide a torque sequence for upper intake manifold on 4.3L, 5.0L & 5.7L engines.**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove interior engine cover (if equipped). Remove air cleaner assembly and inlet duct.
2. Remove the crankcase vent tube from the throttle body and valve cover. Remove PCV valve and hose. Remove EGR pipe from upper intake manifold and exhaust manifold. Remove ignition coil and throttle body from upper intake manifold.
3. Remove EVAP canister solenoid valve. Remove number 8 spark plug wire from distributor cap. Remove upper intake manifold bolts. Remove upper intake manifold. See **Fig. 4**.

**INTAKE MANIFOLD (UPPER) INSTALLATION (7.4L)**

**CAUTION: Always apply a few drops of clean engine oil to the male fuel pipe ends before connecting fuel pipe fittings in order to reduce the risk of fire and personal injury. This will ensure and prevent a possible fuel leak. During normal operation, the O rings located in the female connector will swell and may prevent proper reconnecting if not lubricated.**

**NOTE: Manufacturer does not provide a torque sequence for upper intake manifold on 4.3L, 5.0L & 5.7L engines.**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. To install, reverse removal procedure using NEW gaskets. Tighten upper intake manifold bolts to specification in sequence. See **Fig. 5**. See **TORQUE SPECIFICATIONS** table.

 

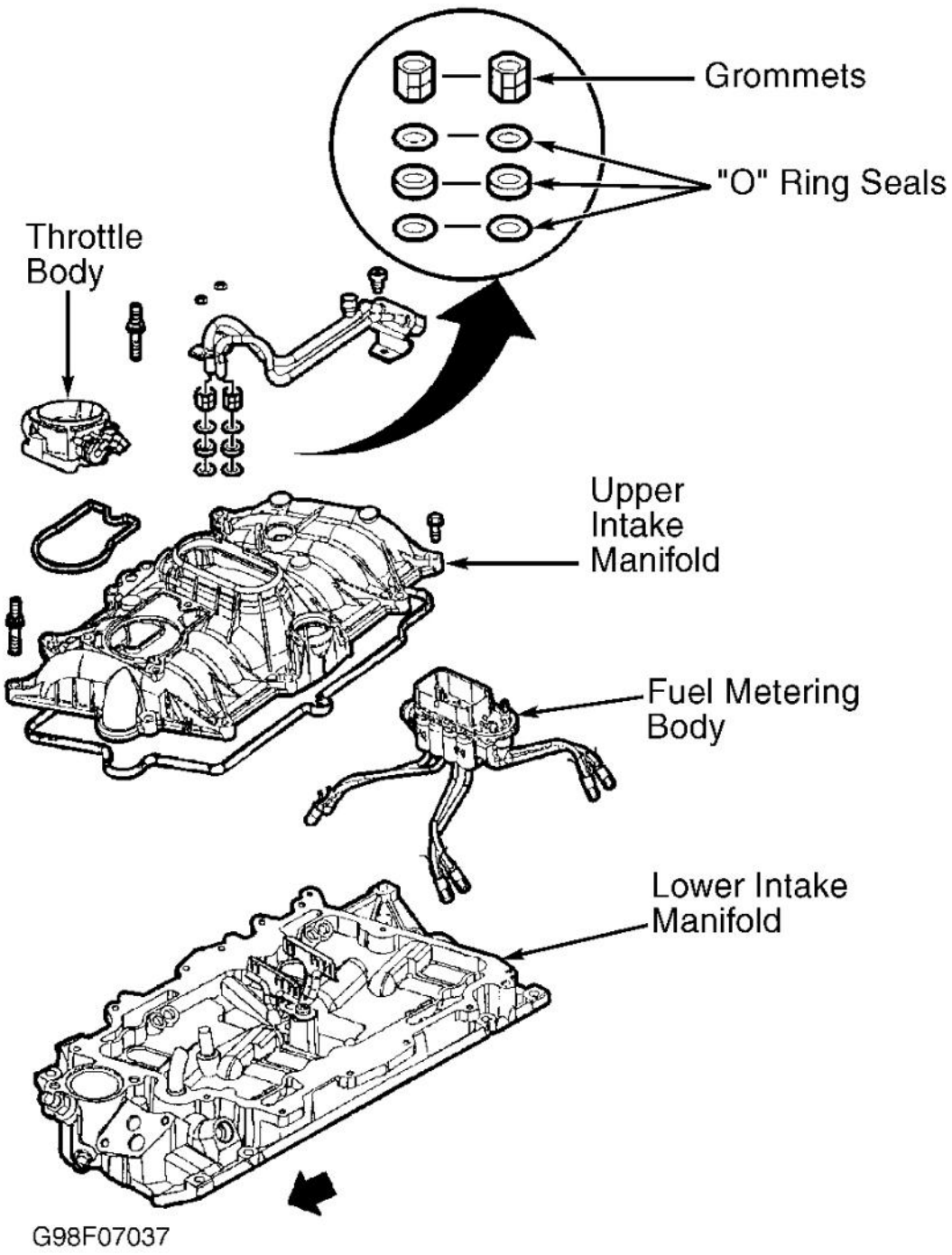


**Fig. 3: Exploded View Of Intake Manifold Assembly (5.0L & 5.7L)**
**Courtesy of GENERAL MOTORS CORP.**

 

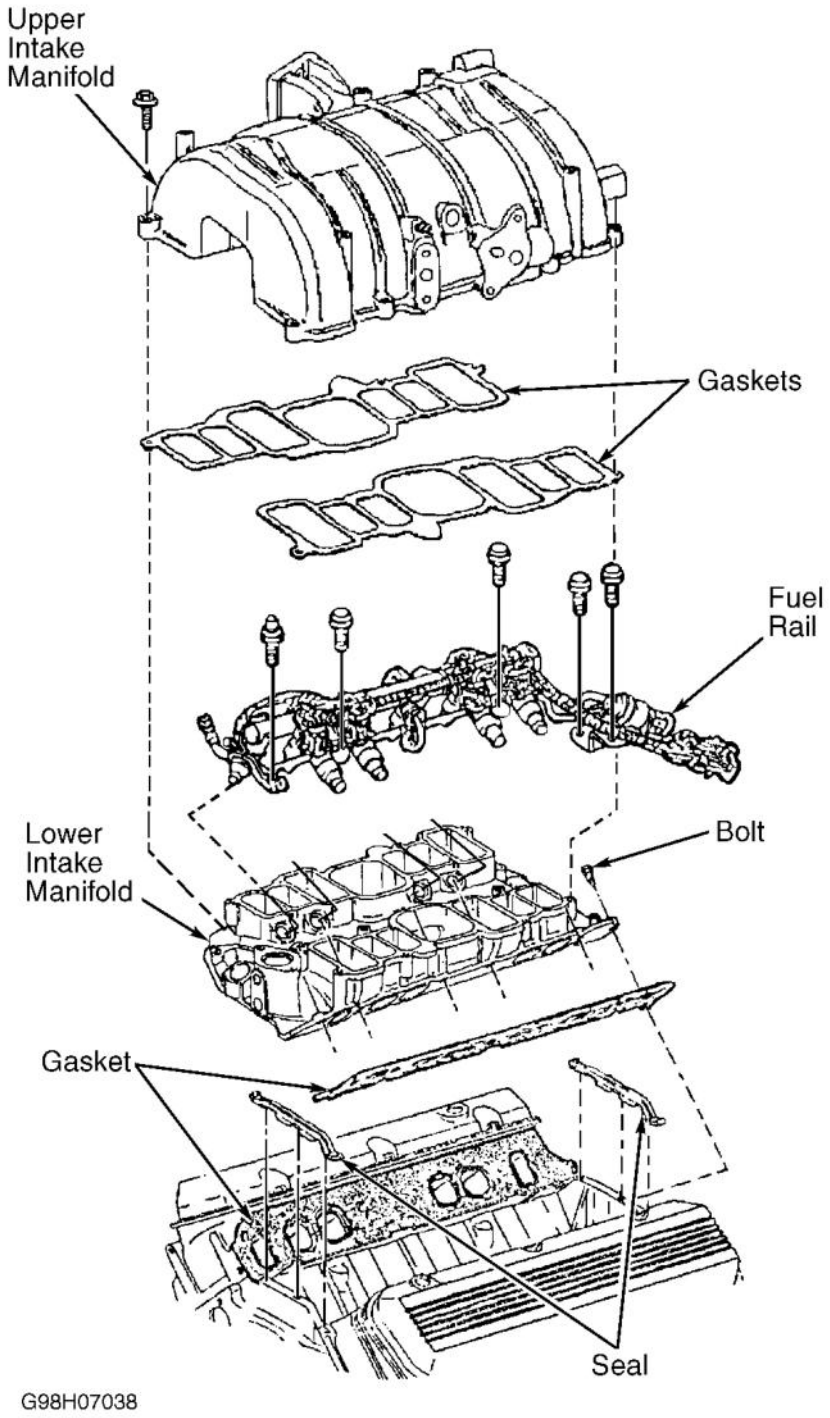


**Fig. 4: Exploded View Of Intake Manifold Assembly (7.4L)**
**Courtesy of GENERAL MOTORS CORP.**

 

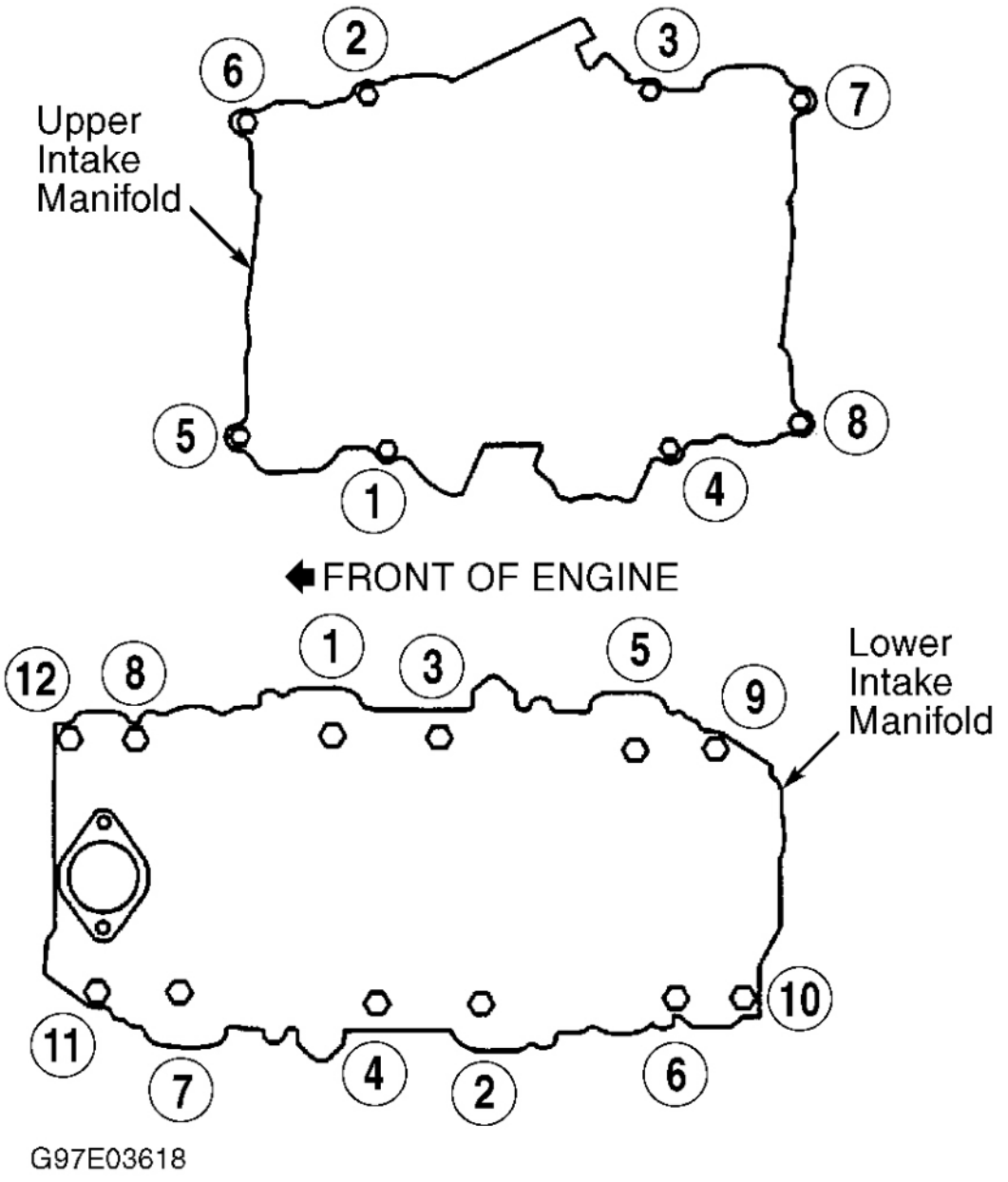


**Fig. 5: Intake Manifold Bolt Tightening Sequence (7.4L)**
**Courtesy of GENERAL MOTORS CORP.**

## INTAKE MANIFOLD (LOWER)

### INTAKE MANIFOLD (LOWER) REMOVAL (4.3L, 5.0L & 5.7L)

**NOTE: Removing the upper intake manifold is not necessary when removing**

 

**lower intake manifold, they are removed as an assembly.**

1. Disconnect negative battery cable. Remove interior engine cover (if equipped). Drain cooling system. Remove air cleaner assembly and inlet duct. Mark and remove distributor. Remove upper radiator hose at thermostat housing. Disconnect accelerator and cruise control cables. Remove heater hoses from intake manifold. Remove EGR pipe.
2. Disconnect fuel lines at rear of engine. Remove A/C compressor and set aside (leave hoses connected). Remove canister purge solenoid. Disconnect the SCPI injector, ignition coil, Ignition Control Module (ICM), generator, IAC motor, TP sensor, O2 sensor, Exhaust Gas Recirculation (EGR) valve and Engine Coolant Temperature (ECT) sensor wiring harness connectors. Remove PCV valve and hose. Remove lower intake manifold bolts. Remove lower intake manifold.

**INTAKE MANIFOLD (LOWER) INSTALLATION (4.3L, 5.0L & 5.7L)**

Always use NEW "O" rings when reconnecting fuel lines at rear of engine. Apply a bead of RTV silicone sealer along the front and rear sealing surfaces of the block. See **Fig. 6**. Install NEW gaskets and intake manifold on block while RTV is still wet to the touch. Use Threadlock (12345382) or equivalent to lower intake manifold bolts. Tighten lower intake manifold bolts in sequence to specification. See **Fig. 7**. See **TORQUE SPECIFICATIONS** table. To complete installation, reverse removal procedure.

**INTAKE MANIFOLD (LOWER) REMOVAL (7.4L)**

1. Disconnect negative battery cable. Drain cooling system. Remove upper intake manifold. See **INTAKE MANIFOLD (UPPER)**. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment. Disconnect suction and discharge lines from A/C compressor. Cap off A/C compressor and A/C lines.
2. Mark and remove distributor. Remove Manifold Absolute Pressure (MAP) sensor from lower intake manifold.
3. Remove upper radiator hose and thermostat housing. Remove heater and bypass hoses. Remove fuel rail. Remove lower intake manifold mounting bolts. Remove lower intake manifold. See **Fig. 4**.

**INTAKE MANIFOLD (LOWER) INSTALLATION(7.4L)**

Use NEW gaskets if old gaskets are damaged. Install gaskets with "THIS SIDE UP" stamp facing up. Apply Loctite® 242 (12345382) or equivalent, to lower intake manifold bolts. Tighten lower intake manifold bolts in sequence to specification. See **Fig. 5**. See **TORQUE SPECIFICATIONS** table. To complete installation, reverse removal procedure. See **Fig. 4**.

 

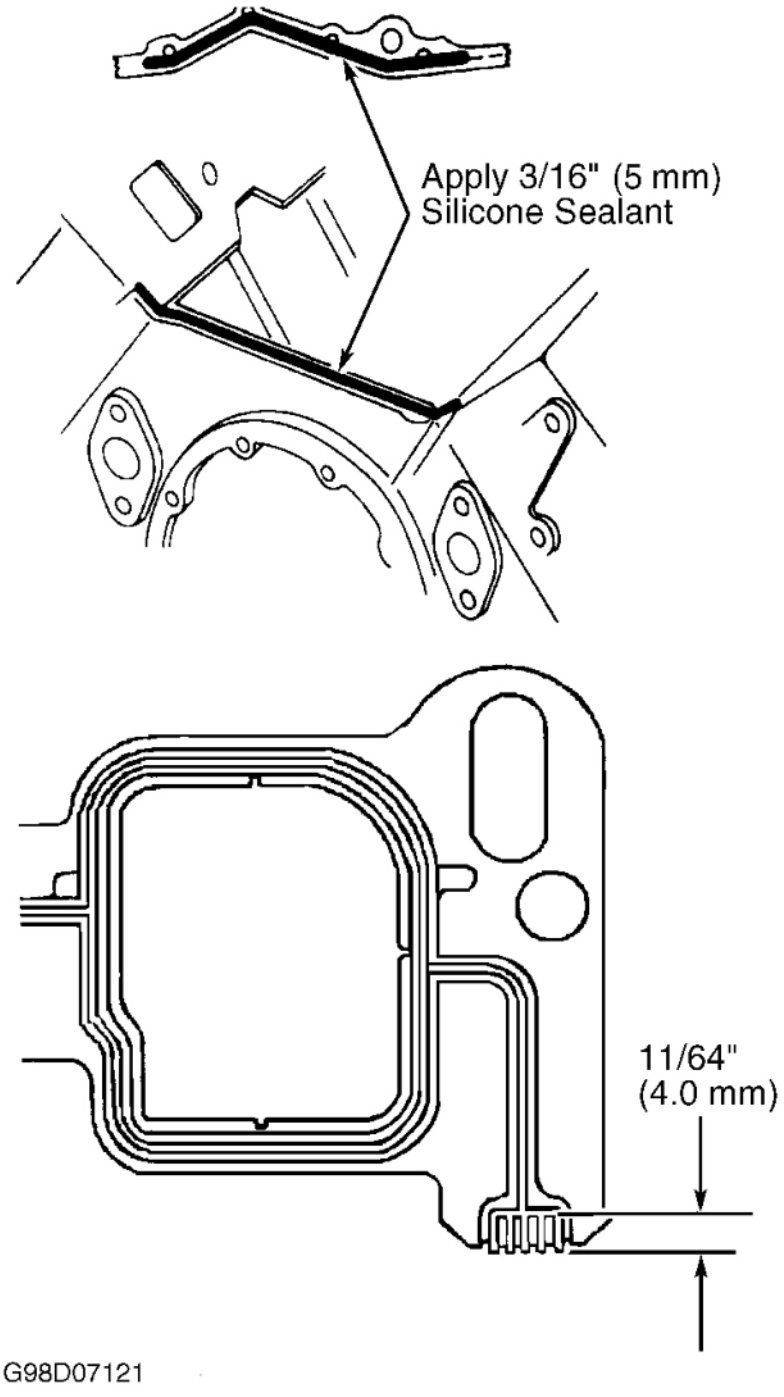


**Fig. 6: Applying RTV Sealant to Intake Manifold (4.3L, 5.0L & 5.7L)**
**Courtesy of GENERAL MOTORS CORP.**

 

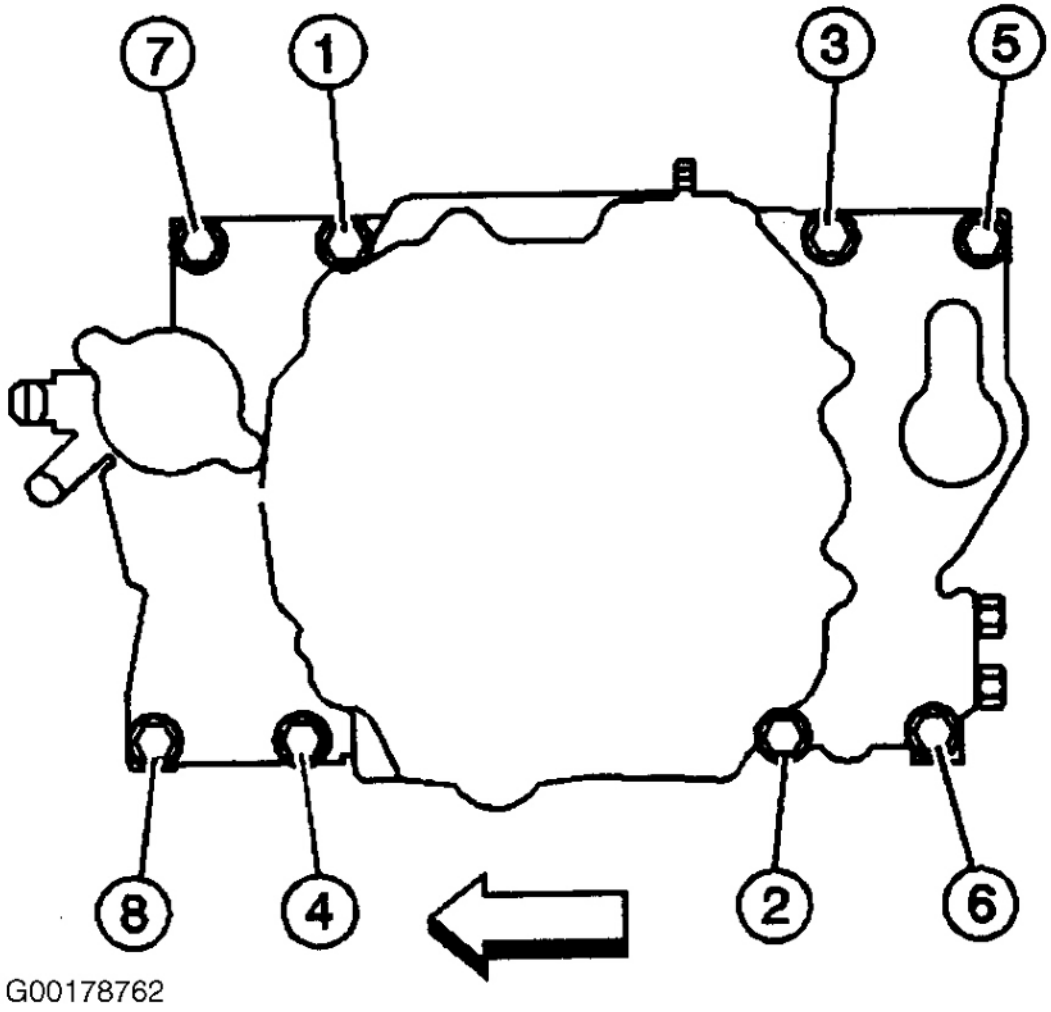


**Fig. 7: Lower Intake Manifold Bolt Tightening Sequence (4.3L, 5.0L & 5.7L)**
**Courtesy of GENERAL MOTORS CORP.**

## EXHAUST MANIFOLD

### Removal

Remove negative battery cable. Remove interior engine cover (if equipped). Remove oil level indicator tube (7.4L). Remove spark plugs from cylinder head. Remove EGR tube from exhaust manifold and intake manifold (left side). Raise and support vehicle. Disconnect O2 sensors. Disconnect exhaust pipes from exhaust manifolds. Lower vehicle. Remove exhaust manifold bolts and studs. Remove exhaust manifold heat shields. Remove exhaust manifold and gaskets.

### Installation

 

Always use NEW "O" ring when installing oil level indicator tube to prevent from leaking. To install, reverse removal procedure using new gaskets. Tighten nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

## CYLINDER HEAD

**NOTE: Organize valve train components so that they can be reinstalled in their original location. Note that on 7.4L, exhaust valve push rods are longer than intake valve push rods.**

### Removal

Remove negative battery cable. Remove interior engine cover (if equipped). Drain cooling system. Remove accessory drive belt. Remove A/C compressor and set aside (leave hoses attached on 5.0L and 5.7L). Remove the intake manifold. See **INTAKE MANIFOLD (UPPER)** and **INTAKE MANIFOLD (LOWER)** . Remove the exhaust manifold. See **EXHAUST MANIFOLD**. Remove power steering pump pulley. Remove power steering pump and mounting bracket (left cylinder head). Remove generator, generator mounting bracket and oil level indicator tube (right cylinder head). Remove valve cover. Remove rocker arms and pushrods. Remove cylinder head bolts, noting bolt lengths. On 7.4L, discard cylinder head bolts. Remove cylinder head and gasket.

### Installation (4.3L, 5.0L & 5.7L)

Clean gasket surfaces, bolt threads and bolt holes. Position NEW head gasket on cylinder block. Ensure all holes align. Coat head bolt threads with GM Sealant (1052080). Install cylinder head with bolts finger-tight. Tighten head bolts in sequence to specification. See **Fig. 8** - **Fig. 9** . See **TORQUE SPECIFICATIONS**. Lubricate the valve tip, rocker arm pivot and push rod socket with a high viscosity oil containing Zinc (1052367) or equivalent. To complete cylinder head installation, reverse removal procedure. Adjust the valves. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS.

 

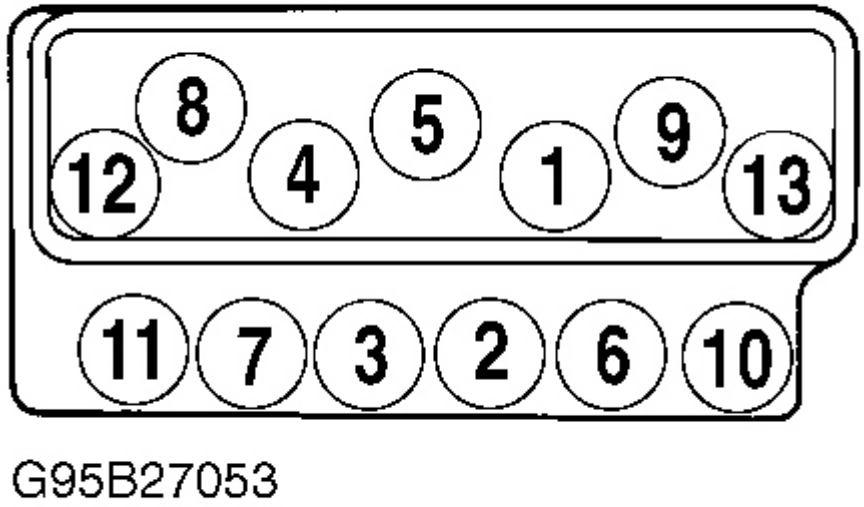


**Fig. 8: Cylinder Head Bolt Tightening Sequence (4.3L)**
**Courtesy of GENERAL MOTORS CORP.**

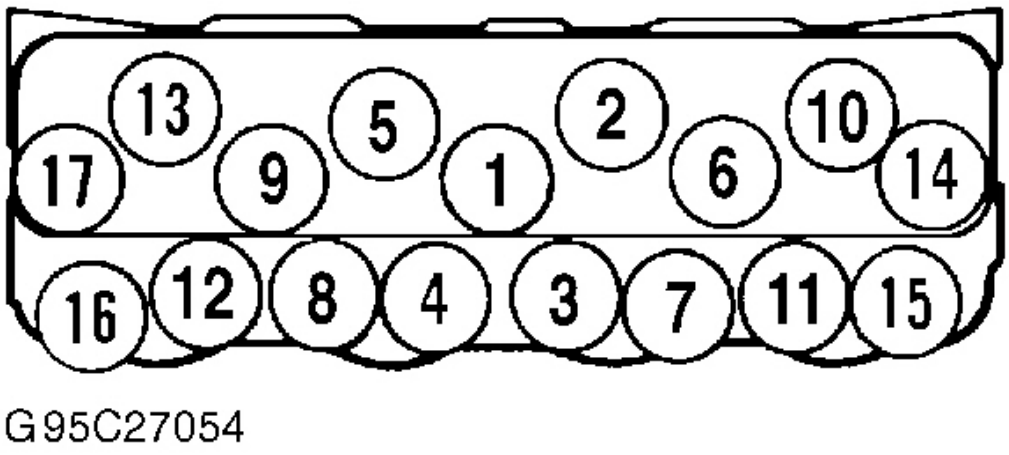


**Fig. 9: Cylinder Head Bolt Tightening Sequence (5.0L & 5.7L)**
**Courtesy of GENERAL MOTORS CORP.**

 

**Installation (7.4L - 1998)**

Clean gasket surfaces, bolt threads and bolt holes. Position NEW head gasket on cylinder block. Ensure all holes align. Coat NEW head bolt threads with GM Sealant (1052080). Install cylinder head with bolts finger-tight. Tighten head bolts in sequence to specification. in 4 passes. On first pass, tighten all bolts to 30 ft. lbs (40 N.m). On second pass, tighten to 60 ft. lbs. (80 N.m). On the third pass, tighten all long bolts (1, 2, 3, 6, 7, 8, 9, 12, 13, 14, 15 and 16) in sequence to 92 ft. lbs. (125 N.m). On the final pass, tighten all short bolts (4, 5, 10 and 11) in sequence to 89 ft. lbs. (120 N.m). See **Fig. 10**. Lubricate the valve tip, rocker arm pivot and push rod socket with a high viscosity oil containing Zinc (1052367) or equivalent. To complete cylinder head installation, reverse removal procedure. Adjust the valves. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS.

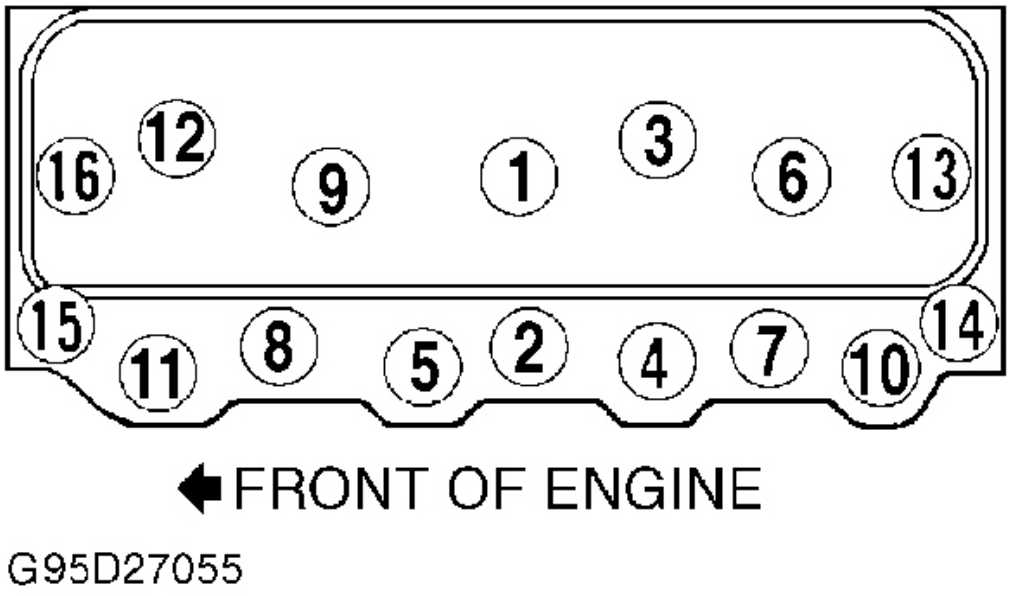


**Fig. 10: Cylinder Head Bolt Tightening Sequence (7.4L - Left Head Shown; Right Head Is A Mirror Image)**
**Courtesy of GENERAL MOTORS CORP.**

**Installation (7.4L - 1999)**

**NOTE: Do not reuse the cylinder head bolts. NEW cylinder head bolts must be used. The cylinder head bolts are torque-to-yield bolts and cannot be reused once the initial torque is applied. During the initial torque of the cylinder head bolt the cylinder head bolt is stretched to achieve proper clamp load. Proper clamp load will not be achieved if a used cylinder head bolt is torqued again. A stretched cylinder head bolt can also break when torqued. Failure to replace the used**

**cylinder head bolts with NEW cylinder head bolts can lead to improper clamp loads and extensive engine damage.**

**IMPORTANT: The sealer must be applied to a minimum of eight threads starting at the point of the cylinder head bolt.**

Clean gasket surfaces and bolt holes. Position NEW head gasket on cylinder block. Ensure all holes align. Coat NEW head bolt threads with GM Sealant (1052080). Install cylinder head with bolts finger-tight. Tighten head bolts in sequence to specification. in 4 passes. On first pass, tighten all bolts to 37 ft. lbs (50 N.m). On second pass, tighten bolts No. 1, 2, 3, 6, 7, 8, 9, 12, 14 and 15 an additional 150 degrees. On the third pass, tighten bolts No. 13 and 16 an additional 150 degrees. On the final pass, tighten bolts 4, 5, 10 and 11 an additional 90 degrees. See **Fig. 10**. Lubricate the valve tip, rocker arm pivot and push rod socket with a high viscosity oil containing Zinc (1052367) or equivalent. To complete cylinder head installation, reverse removal procedure. Adjust the valves. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS.

## ROCKER ARMS & PUSHRODS

**NOTE: Organize valve train components so that they can be reinstalled in their original location. Note that on 7.4L, exhaust valve push rods are longer than intake valve push rods.**

### Removal

1. Remove negative battery cable. Remove interior engine cover (if equipped). Disconnect spark plug wires from spark plugs. Disconnect wiring harness from clips and move wiring harness aside. Remove PCV valve and tube. Remove EGR tube from intake and exhaust manifold. Remove brake booster vacuum hose.
2. Remove air cleaner an duct. Remove oil fill tube and oil level indicator tube (if necessary). Remove A/C compressor and lay aside (leave hoses attached). Remove valve covers. Remove rocker arm nuts. If pushrods are to be replaced only, back off valve rocker arm bolts until valve rocker arm can be swung away from pushrod and remove pushrod.

### Installation

Coat bearing surfaces with a high viscosity oil with Zinc (1052367). Valve cover gaskets are reusable. Replace gaskets only if damaged. Tighten to specification. See **TORQUE SPECIFICATIONS**. To install remaining components, reverse removal procedure.

## FRONT COVER OIL SEAL

### Removal

1. Remove negative battery cable. Remove interior engine cover (if equipped). Remove upper and lower fan shrouds. Remove engine cooling fan. Remove crankshaft balancer bolt.
2. Remove accessory drive belt(s) and water pump pulley. Remove crankshaft pulley bolts and remove pulley from balancer. Using Damper Puller/Installer (J-23523-F), remove crankshaft balancer. Carefully

 

pry seal from front cover.

**Installation**

1. Coat the crankshaft front cover oil seal lips with clean engine oil. On 4.3L, 5.0L and 5.7L, install NEW seal in front cover with seal lip facing engine using Seal Installer (J-35468). On 7.4L, install NEW seal in front cover with seal lip facing engine using Seal Installer (J-22102).
2. On all models, apply RTV sealant to Woodruff keyway in crankshaft balancer. Using Damper Puller/Installer (J-23523-F), install crankshaft balancer. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**. To install remaining components, reverse removal procedure.

## FRONT COVER

**NOTE: On 4.3L, 5.0L and 5.7L, when front cover is removed, replace with NEW front cover and gasket. DO NOT reinstall original composite front cover. Reinstalling original front cover can lead to oil leaks.**

**NOTE: On 7.4L, front cover and front cover gasket are reusable if not damaged. If replacing Crankshaft Position (CKP) sensor reluctor ring on a 7.4L, a NEW CKP sensor MUST be installed.**

**Removal**

1. Remove negative battery cable. Remove interior engine cover (if equipped). Remove upper and lower fan shrouds. Remove engine cooling fan. Remove crankshaft balancer bolt.
2. Remove accessory drive belt(s) and water pump pulley. Remove crankshaft pulley bolts and remove crankshaft pulley from balancer. Using Damper Puller/Installer (J-23523-F), remove crankshaft balancer.
3. Remove water pump. See **WATER PUMP**.
4. Disconnect Crankshaft Position (CKP) sensor harness connector. Remove CKP sensor bolt and CKP sensor. Loosen or remove oil pan as necessary for removal of front cover.
5. Remove front cover bolts, front cover and gasket.

**Installation**

1. On 4.3L, 5.0L and 5.7L, install NEW front cover and gasket. On 7.4L, front cover and front cover gasket are reusable. Replace only if damaged. Tighten front cover bolts to specification. See **TORQUE SPECIFICATIONS**.
2. On all models, coat crankshaft front cover oil seal lips with clean engine oil. On 4.3L, 5.0L and 5.7L, install NEW seal in front cover with seal lip facing engine using Seal Installer (J-35468). On 7.4L, install NEW seal in front cover with seal lip facing engine using Seal Installer (J-22102).

**CAUTION: Ensure CKP sensor is fully seated and held stationary in bore of front cover upon installation. A CKP sensor that is not fully seated may result in erratic engine operation.**

 

3. Install CKP sensor. Tighten CKP sensor holddown bolt to specification. See **TORQUE SPECIFICATIONS**.
4. Apply RTV sealant to Woodruff keyway in crankshaft damper. Install crankshaft balancer using Damper Puller/Installer (J-23523-F). Install crankshaft balancer bolt and tighten to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

## TIMING CHAIN & SPROCKETS

### Removal

1. Remove front cover. See **FRONT COVER**.
2. On 4.3L, 5.0L and 5.7L, remove CKP sensor reluctor ring. See **Fig. 11** or **Fig. 12**.
3. On 7.4L, remove CKP sensor reluctor ring using Puller (J-8433-1) and Puller Plate (J-41371). See **Fig. 13**. On all models, rotate crankshaft until timing marks on camshaft and crankshaft sprockets are aligned. See **Fig. 14**. Remove camshaft sprocket and timing chain. To remove crankshaft sprocket, use Sprocket Puller (J-5825-A on 4.3L, 5.0L and 5.7L or J-28509 on 7.4L).

 

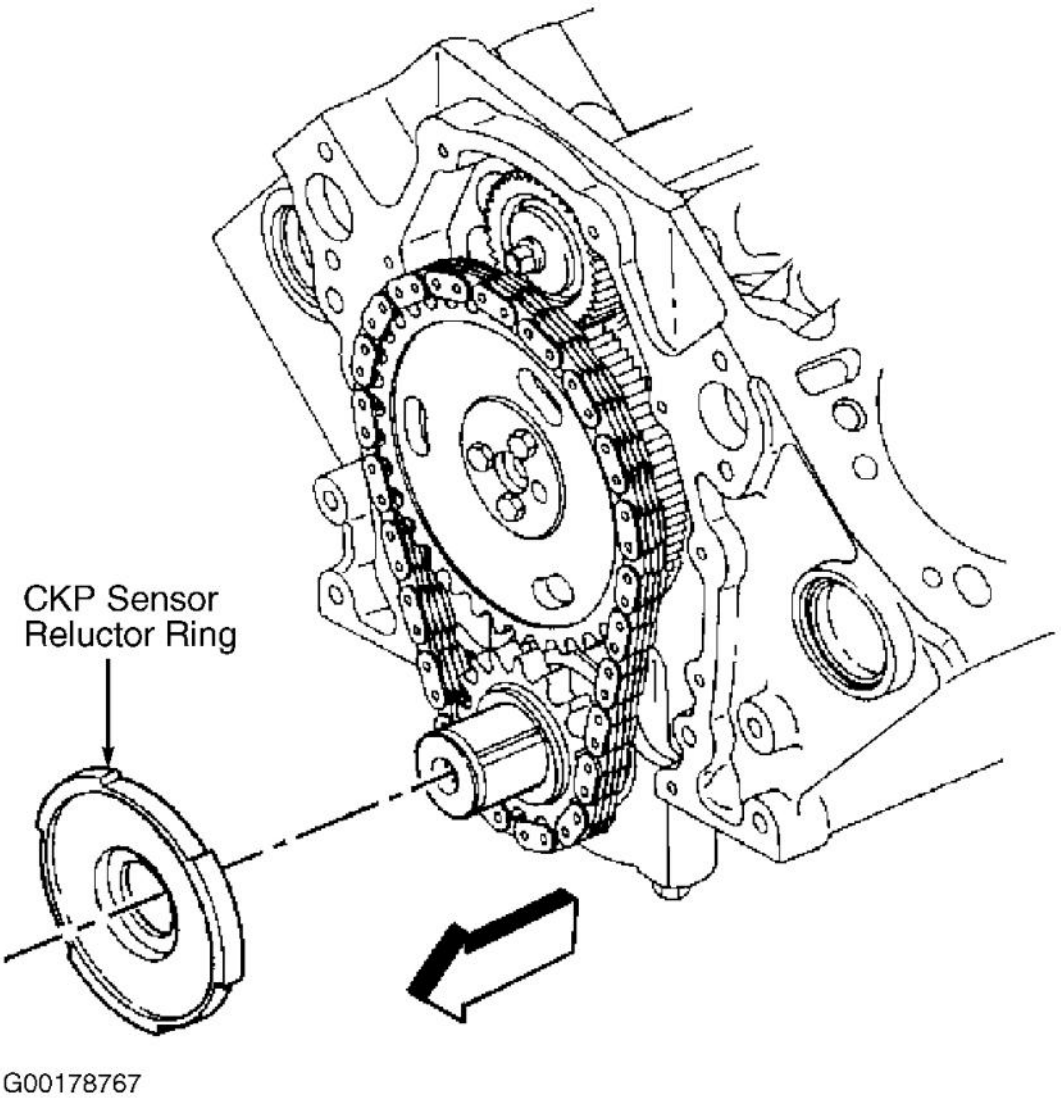


**Fig. 11: Removing/Installing CKP Sensor Reluctor Ring (4.3L)**
**Courtesy of GENERAL MOTORS CORP.**

 

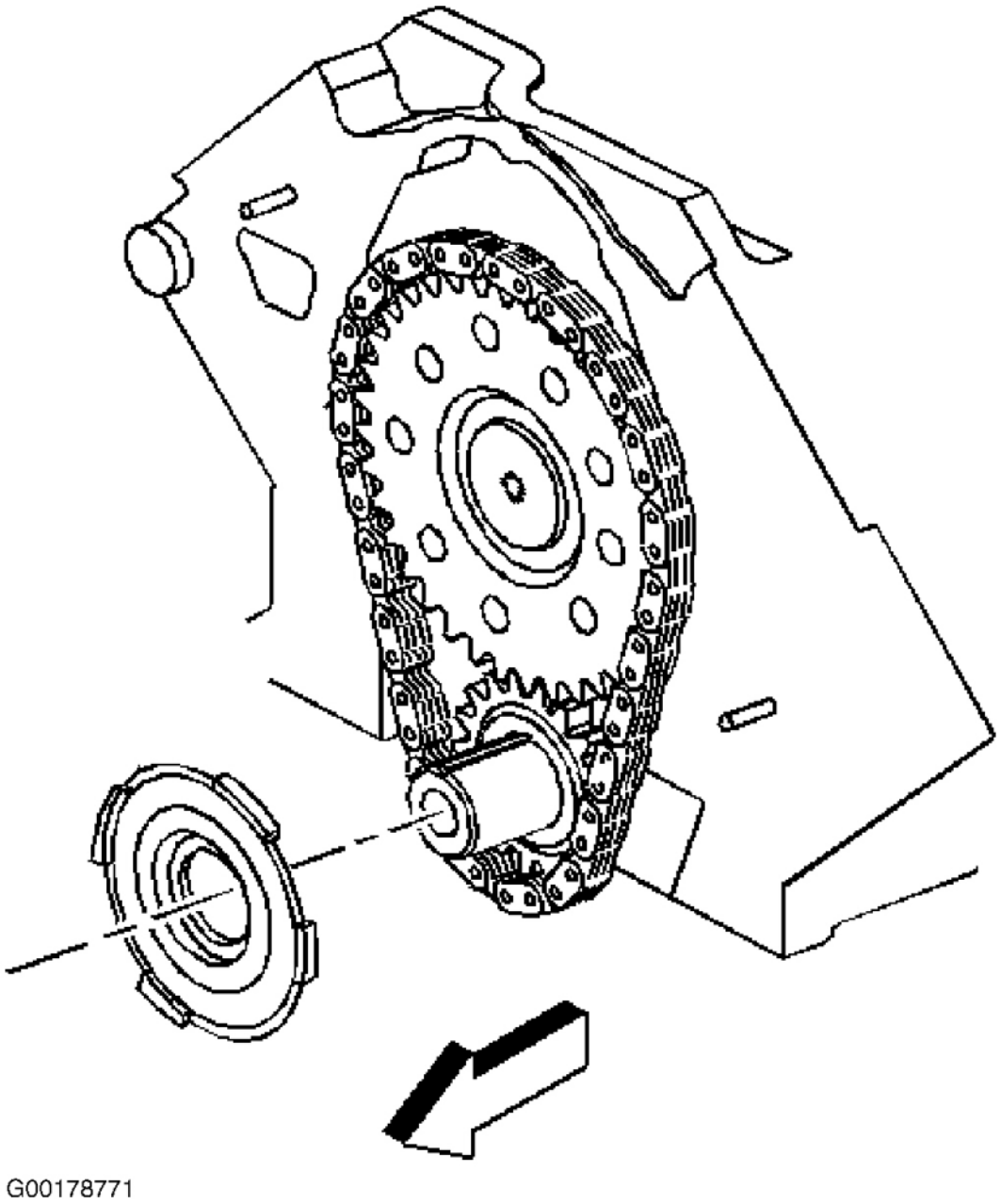


**Fig. 12: Removing/Installing CKP Sensor Reluctor Ring (5.0L & 5.7L)**
**Courtesy of GENERAL MOTORS CORP.**

 

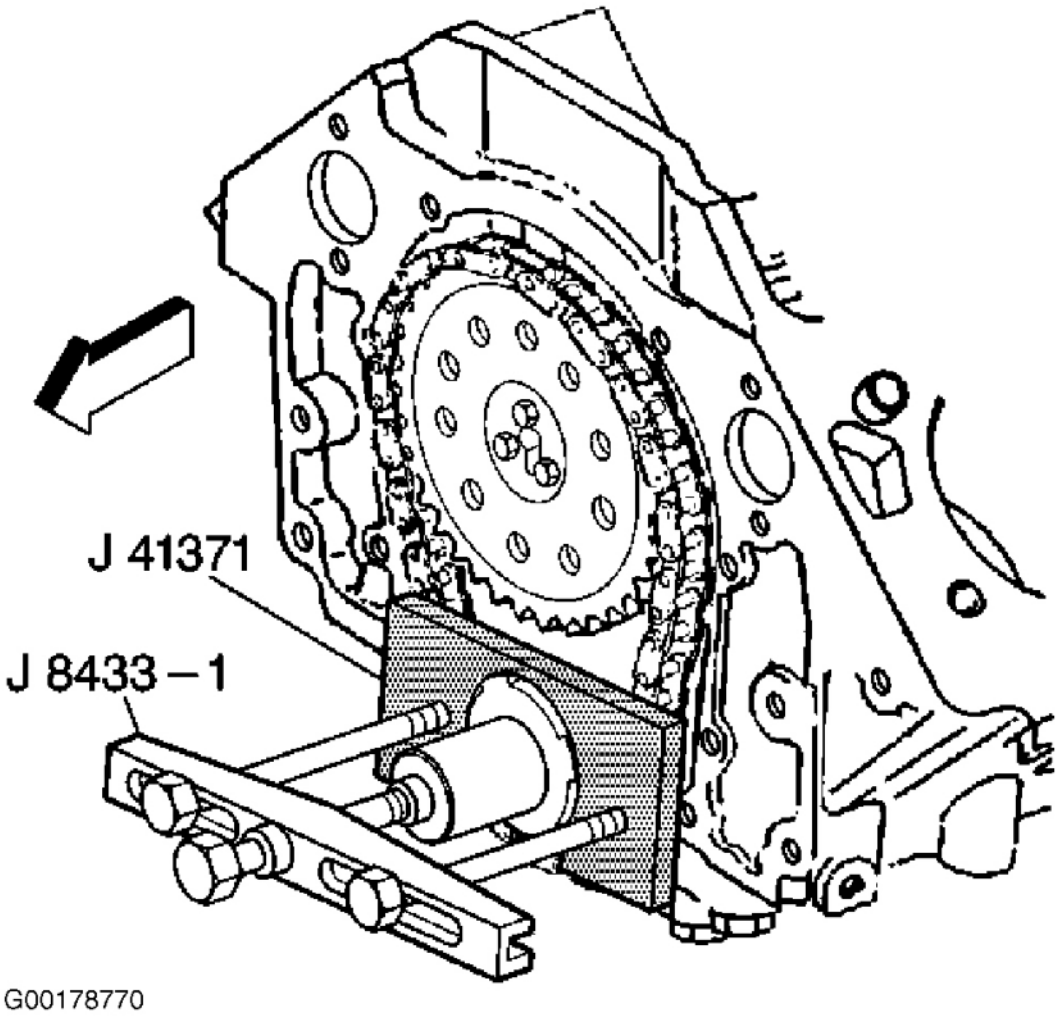


**Fig. 13: Removing CKP Sensor Reluctor Ring (7.4L)**
**Courtesy of GENERAL MOTORS CORP.**

 

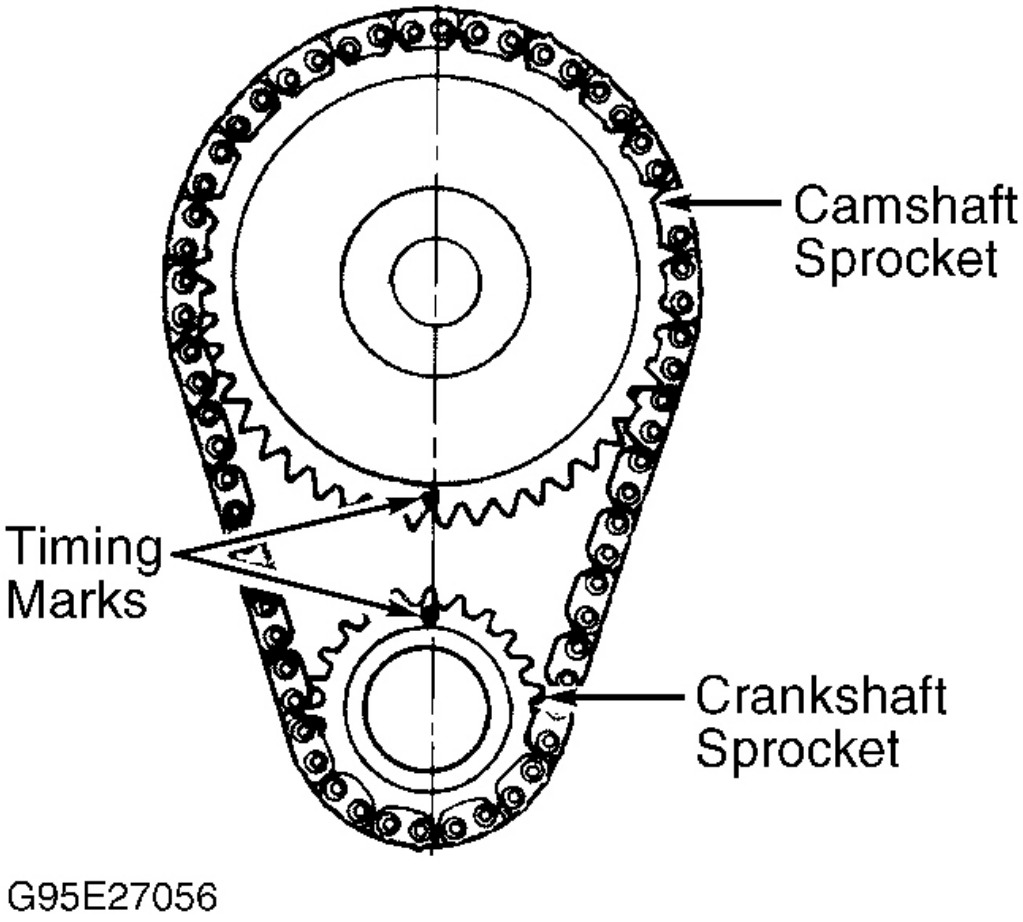


**Fig. 14: Aligning Timing Marks**
**Courtesy of GENERAL MOTORS CORP.**

**Installation**

1. Install Woodruff key in crankshaft (if removed). Using Crankshaft Sprocket Installer (J-5590 on 4.3L, 5.7L and 5.7L or J-22102 on 7.4L), install crankshaft sprocket. Install the camshaft sprocket and the timing chain. Make sure timing marks on sprockets are aligned. See **Fig. 14**. Install and tighten camshaft sprocket bolts to specification. See **TORQUE SPECIFICATIONS** table.

**CAUTION: Failure to properly align CKP sensor reluctor ring may result in component damage and could affect system performance. CKP sensor reluctor ring is shaped like a dish. Dished side of CKP reluctor ring must face engine front cover.**

 

2. Install CKP sensor reluctor ring. Install front cover and gasket. See **FRONT COVER**. To complete installation, reverse removal procedure.

## ROCKER ARM STUDS

**CAUTION: On models equipped with press in rocker arm studs, ream stud bore before installing oversize rocker arm stud, or cylinder head may be damaged.**

**NOTE: On 7.4L engine, heads are equipped with rocker arm bolts.**

### Removal & Installation (4.3L)

Unscrew rocker arm stud from cylinder head. To install, insert NEW rocker arm stud. Tighten to 35 ft. lbs. (47 N.m).

### Removal & Installation (5.0L & 5.7L)

Rocker arm studs are pressed into cylinder head. Install Stud Remover (J-5802-01) over stud. Install flat washer and nut. Tighten nut to remove stud from cylinder head. If stud is loose in cylinder head, ream stud bore for oversize stud. Use Reamer (J-5715) to Ream stud bore for.003" (.08 mm) oversize stud or (J-6036) for.013" (.33 mm) oversize stud. Coat press-fit area of stud with hypoid axle lubricant. Using Stud Driver (J-6880), drive stud into bore until driver bottoms against cylinder head.

## VALVE LIFTERS

**NOTE: On 7.4L, exhaust valve push rods are longer than intake valve push rods.**

### Removal

Remove upper intake manifold. See **INTAKE MANIFOLD (UPPER)**. Remove lower intake manifold. See **INTAKE MANIFOLD (LOWER)**. Remove valve covers. Remove push rods. See **ROCKER ARMS & PUSHRODS**. Remove valve lifter guide. Remove stuck valve lifter using Valve Lifter Remover (J-3049-A).

### Installation

Coat lifter base or roller (if equipped) and body with High Viscosity Oil/Zinc (12345501) or equivalent. Install lifters in original location. To complete installation, reverse removal procedure. Replace oil and filter, and add oil supplement (1052367) or equivalent.

## CAMSHAFT

### Removal

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Remove negative battery cable. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment. Drain cooling system. Remove front grille from vehicle. Remove radiator and A/C condenser. Remove interior

 

engine cover (if equipped). Remove the generator and the generator mounting bracket. Remove lower intake manifold. See **INTAKE MANIFOLD (LOWER)**. Remove the valve covers. Remove the push rods. See **ROCKER ARMS & PUSHRODS**. Remove the valve lifters. See **VALVE LIFTERS**. Remove the front cover. See **FRONT COVER**.

2. Align timing chain timing marks. Remove camshaft sprocket bolts, camshaft sprocket and timing chain. Remove CKP sensor reluctor ring using Puller (J-8433-1) and Puller Plate (J-41371). Remove crankshaft sprocket, use Sprocket Puller (J-28509) on 7.4L or (J-5825-A) on all others. Install three 5/16 X 18 bolts (4-5 inches long) into camshaft threaded holes. Use bolts to remove and install camshaft.

**Installation**

Coat camshaft lobes and bearing journals with High Viscosity Oil with Zinc (12345501) or equivalent. Ensure bearing oil holes align with oil holes in block. On engines where oil holes are difficult to see, use a piece of 3/32" rod to check alignment. Install outer camshaft bearing first. Install camshaft. To complete installation, reverse removal procedure. Fill and bleed cooling system. Replace oil and filter, and add High Viscosity Oil with Zinc (12345501) or equivalent.

## BALANCE SHAFT (4.3L - IF EQUIPPED)

**Removal**

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Drain cooling system. Discharge A/C system (if equipped) using approved refrigerant recovery/recycling equipment. Remove radiator, A/C condenser (if equipped) and grille. Remove lower intake manifold. See **INTAKE MANIFOLD (LOWER)**. Remove valve lifters. See **VALVE LIFTERS**. Remove accessory drive belt, water pump and front cover. See **FRONT COVER**.
2. Remove CKP sensor reluctor ring using Puller (J-8433-1) and Puller Plate (J-41371). Remove the timing chain and the camshaft sprocket. Remove the crankshaft sprocket, using (J-5825-A). See **TIMING CHAIN & SPROCKETS**. Remove balance shaft gears. Remove balance shaft retainer plate. Using a soft-faced hammer, tap balance shaft out toward front of engine.

**NOTE: Front bearing is removed with balance shaft. Replace front bearing and balance shaft as a set only. Replace balance shaft timing gears as a set only.**

**Installation**

1. Apply oil to balance shaft bearings. Using Installers (J-36996 and J-8092), install balance shaft in block. See **Fig. 15**. Install lifter retainer (if equipped). Ensure balance shaft turns.
2. Install thrust plate. Install balance shaft gears. Ensure timing marks on balance shaft gears are aligned. See **Fig. 16**. Install balance shaft timing gear bolt. Tighten bolt to 15 ft. lbs. (20 N.m), then tighten bolt an additional 35 degrees. To complete installation, reverse removal procedure. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

 

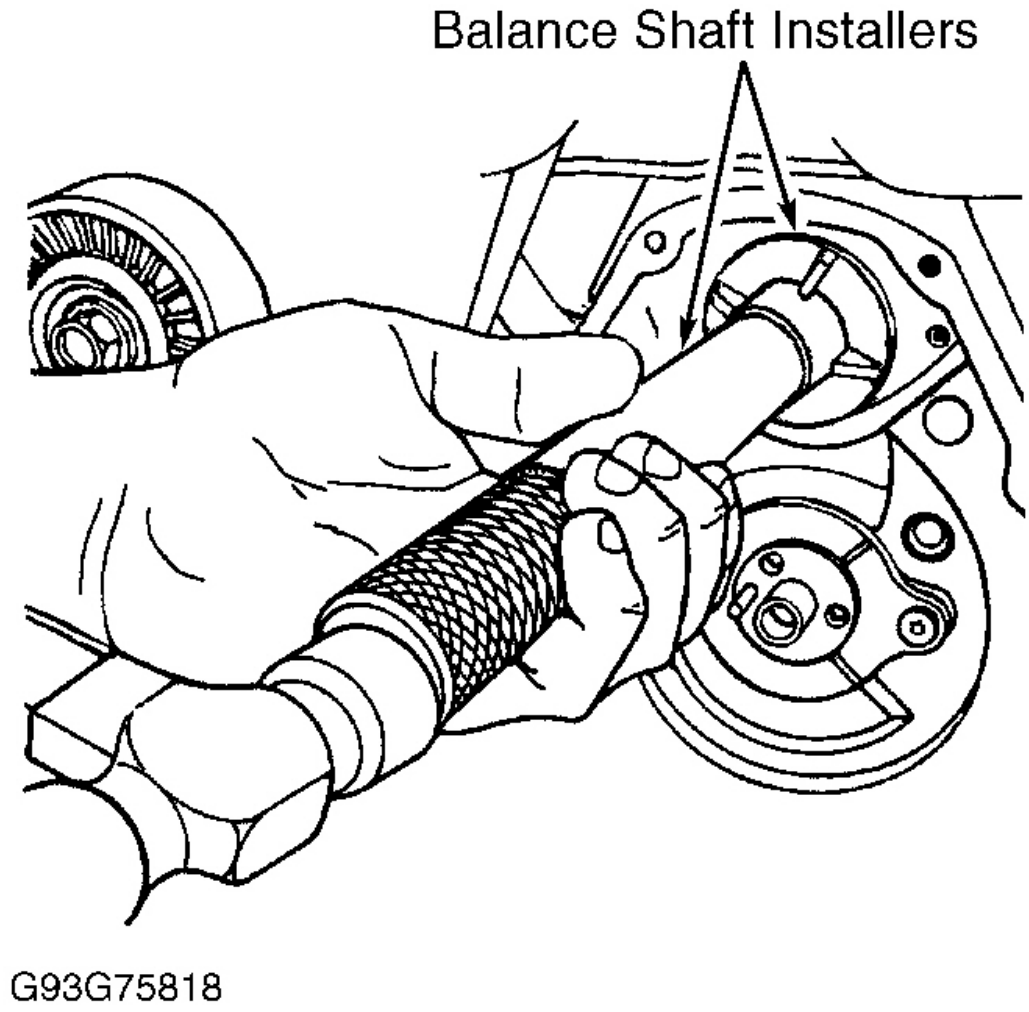


**Fig. 15: Installing Balance Shaft**
**Courtesy of GENERAL MOTORS CORP.**

 

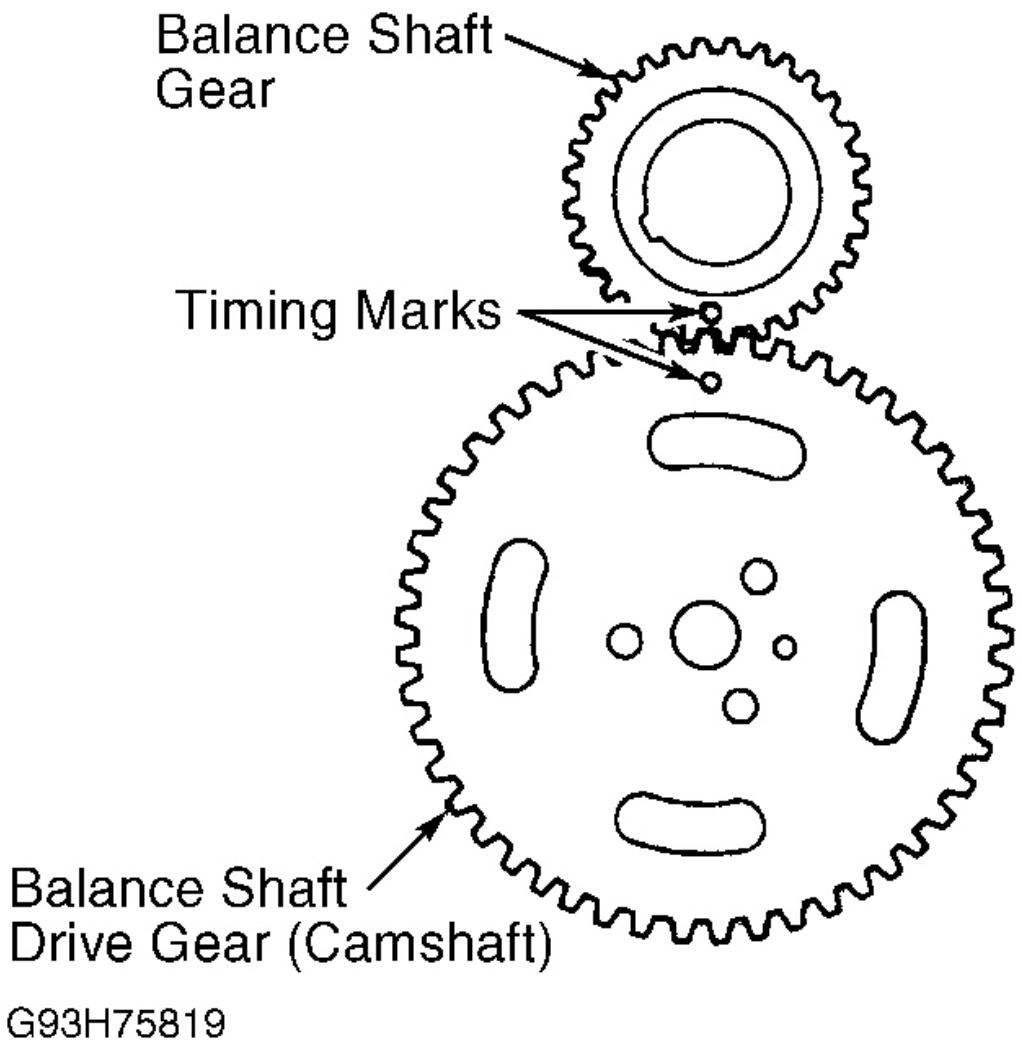


**Fig. 16: Aligning Timing Marks For Balance Shaft Gears**
**Courtesy of GENERAL MOTORS CORP.**

**REAR CRANKSHAFT OIL SEAL**

**Removal**

Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Remove transmission, clutch (M/T) and flywheel. On A/T see appropriate TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. On M/T see appropriate article in CLUTCHES. Pry seal from housing. See **Fig. 17**.

 

**NOTE: On 4.3L, 5.0L & 5.7L, DO NOT allow oil or any other lubricant to contact seal surface of oil seal.**

**Installation**

Coat seal with clean engine oil (7.4L). Place seal on Seal Installer (J-35621 for 4.3L, 5.0L and 5.7L, or J-38841 for 7.4L). Thread attaching screws into crankshaft flange and tighten. This squares seal with crankshaft. Rotate seal installer handle until it bottoms. Remove seal installer. Install flywheel, clutch (M/T) and transmission. To complete installation, reverse removal procedure. Tighten all retaining nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

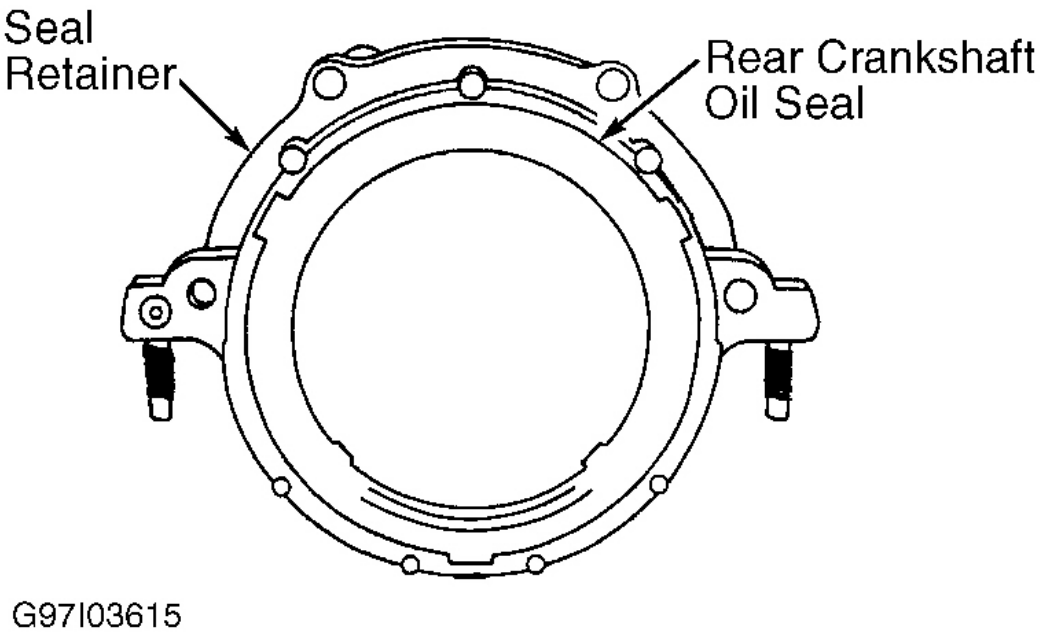


**Fig. 17: Points to Pry Rear Crankshaft Oil Seal From Retainer.**
**Courtesy of GENERAL MOTORS CORP.**

**WATER PUMP**

**NOTE: DO NOT immerse water pump in solvent. Solvent may cause premature bearing failure.**

**Removal**

Disconnect battery. Drain cooling system. Remove upper fan shroud. Remove accessory drive belt, fan, fan clutch and water pump pulley from water pump. Disconnect all coolant hoses from water pump. Remove water pump mounting bolts. Remove water pump and gaskets.

 

**Installation**

Install water pump with NEW gaskets. Tighten water pump bolts to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

## OIL COOLER LINES (RWD)

**Removal**

1. Remove the engine oil cooler lines support clamp bolt. See **Fig. 22**.

**NOTE: Have a drain pan ready for the engine oil to drain into.**

2. Remove the bolt attaching the engine oil cooler lines to the oil filter adapter. See **Fig. 24**.
3. Hold the cooler lines below the bottom of the radiator to drain the engine oil.
4. Remove and discard the seals.
5. Remove the engine oil cooler line retaining rings from the engine oil cooler line quick connectors at the radiator engine oil cooler inlet and outlet. See **Fig. 19**. Follow the next 2 steps for the proper retaining ring removal procedure.
6. Using a bent-tip screwdriver or equivalent, pull on one of the open ends of the retaining ring in order to rotate the retaining ring. See **Fig. 20**.
7. Rotate the retaining ring around the quick connector until the retaining ring is out of position and can be completely removed. Discard the retaining rings.
8. Remove the engine oil cooler lines from the quick connectors at the radiator engine oil cooler inlet and outlet. Pull the lines straight out from the connectors. See **Fig. 21**.
9. Clean all of the components in a suitable solvent, and dry them with compressed air.
10. Inspect the fittings, the connectors, the cooler lines, and the cooler for damage, distortion, or restriction. Replace parts as necessary.
11. Flush the engine oil cooler and engine oil cooler lines with the same type of engine oil normally circulating through the engine.

**Installation**

1. Install new seals on the engine oil cooler lines at the engine oil filter adapter ends.
2. Install the bolt attaching the engine oil cooler lines to the engine oil filter adapter. Tighten the bolt to 26 ft lbs (35 N.m).

**NOTE: When performing the following procedure, do not reuse the old retaining rings. Replace the old retaining rings with new ones. Do not install the new retaining ring onto the fitting by pushing the retaining ring down over the fitting.**

3. Install a new retaining ring (E-clip) into each quick connector at the radiator engine oil cooler by following the next 3 steps.

 

4. Hook one of the open ends of the retaining ring in one of the slots in the quick connector. See **Fig. 25**.
5. Rotate the retaining ring around the connector until the retaining ring is positioned with all 3 ears through the 3 slots. See **Fig. 26**.
6. Ensure the 3 retaining ring ears can be seen from the inside of the connector and the retaining ring can move freely in the slots.
7. Install the engine oil cooler lines into the quick connectors at the radiator engine oil cooler inlet and outlet until a click is heard or felt. Pull back on the engine oil cooler lines to ensure a proper connection.
8. Install the attaching clamp and the bolt. Tighten the bolt to 89 INCH lbs (10 N.m).
9. Inspect and fill the engine oil to the proper level.
10. Start the engine and check for leaks.

## OIL COOLER LINES (4WD)

**Removal**

1. Remove the steering linkage shield.

**NOTE: Have a drain pan ready for the engine oil to drain into.**

2. Remove the bolt attaching the engine oil cooler lines to the remote (frame mounted) oil filter adapter. See **Fig. 18**.
3. Remove and discard the seals. See **Fig. 19**.
4. Remove the engine oil cooler line retaining rings from the engine oil cooler line quick connectors at the radiator engine oil cooler inlet and outlet. Follow the next 2 steps for the proper retaining ring removal procedure.
5. Using a bent-tip screwdriver or equivalent, pull on one of the open ends of the retaining ring in order to rotate the retaining ring. See **Fig. 20**.
6. Rotate the retaining ring around the quick connector until the retaining ring is out of position and can be completely removed.
7. Discard the retaining rings. Remove the engine oil cooler lines from the quick connectors at the radiator engine oil cooler inlet and outlet. Pull the lines straight out from the connectors. See **Fig. 21**.
8. Remove the remote engine oil filter lines support clamp bolt. See **Fig. 22**.
9. Remove the bolt attaching the remote engine oil filter lines to the remote (frame mounted) engine oil filter adapter. See **Fig. 23**.
10. Hold the remote engine oil filter lines below the remote engine oil filter lines (engine mounted) adapter to drain the engine oil.
11. Remove and discard the seals. See **Fig. 24**.
12. Remove the bolt attaching the remote engine oil filter lines to the remote engine oil filter lines (engine mounted) adapter.
13. Remove and discard the seals.
14. Clean all of the components in a suitable solvent, and dry them with compressed air.
15. Inspect the fittings, the connectors, the cooler lines, the cooler, the filter lines, and the remote filter

 

adapter for damage, distortion, or restriction. Replace parts as necessary.

16. Flush the engine oil cooler, the engine oil cooler lines, the remote engine oil filter adapter, and the remote engine oil filter lines with the same type of engine oil normally circulating through the engine.

**Installation**

1. Install new seals on both ends of each remote engine oil filter line.
2. Install the bolt attaching the remote engine oil filter lines to the remote engine oil filter lines (engine mounted) adapter. Tighten the bolt to 26 ft lbs. (35 N.m).
3. Install the bolt attaching the remote engine oil filter lines to the remote (frame mounted) engine oil filter adapter. Tighten the bolt to 26 ft lbs. (35 N.m).
4. Install the remote engine oil filter lines support clamp bolt. Tighten the bolt to 10 N.m (89 INCH lbs).
5. Install new seals to the engine oil cooler lines at the remote (frame mounted) engine oil filter adapter.
6. Install the bolt attaching the engine oil cooler lines to the remote (frame mounted) engine oil filter adapter. Tighten the attaching bolt to 35 N.m (26 ft lbs).
7. When performing the following procedure, do not reuse the old retaining rings. Replace the old retaining rings with NEW ones. Do not install the NEW retaining ring onto the connector by pushing the retaining ring down over the connector.
8. Install a new retaining ring (E-clip) into each quick connector at the radiator engine oil cooler inlet and outlet by following the next 3 steps.
9. Hook one of the open ends of the retaining ring in one of the slots in the quick connector. See **Fig. 25**. Rotate the retaining ring around the connector until the retaining ring is positioned with all 3 ears through the 3 slots. See **Fig. 26**.
10. Ensure the 3 retaining ring ears can be seen from the inside of the connector and the retaining ring can move freely in the slots.
11. Install the engine oil cooler lines into the quick connectors at the radiator engine oil cooler inlet and outlet until a click is heard or felt. Pull back on the engine oil cooler lines to ensure a proper connection.
12. Inspect and fill the engine oil to the proper level.
13. Start the engine and check for leaks.

 

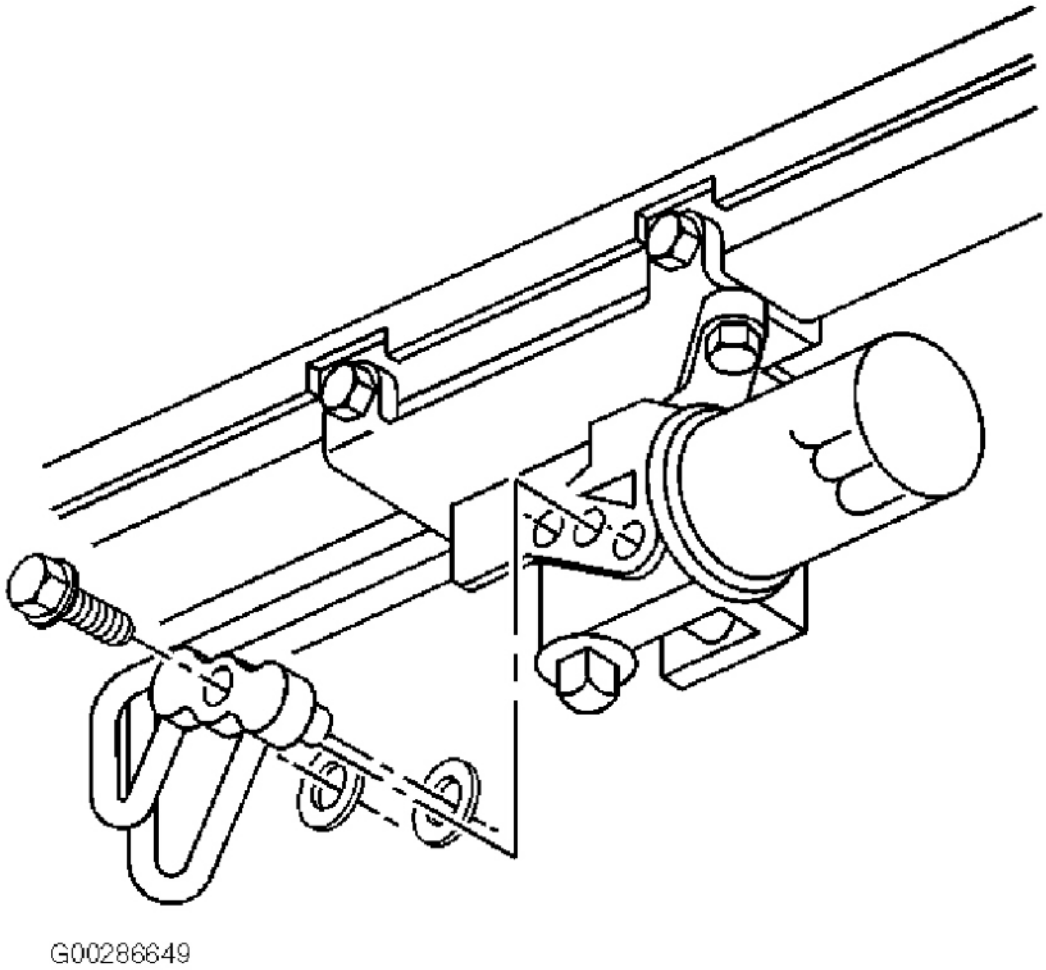


**Fig. 18: Removing & Installing Oil Cooler Lines At Oil Cooler**
**Courtesy of GENERAL MOTORS CORP.**

 

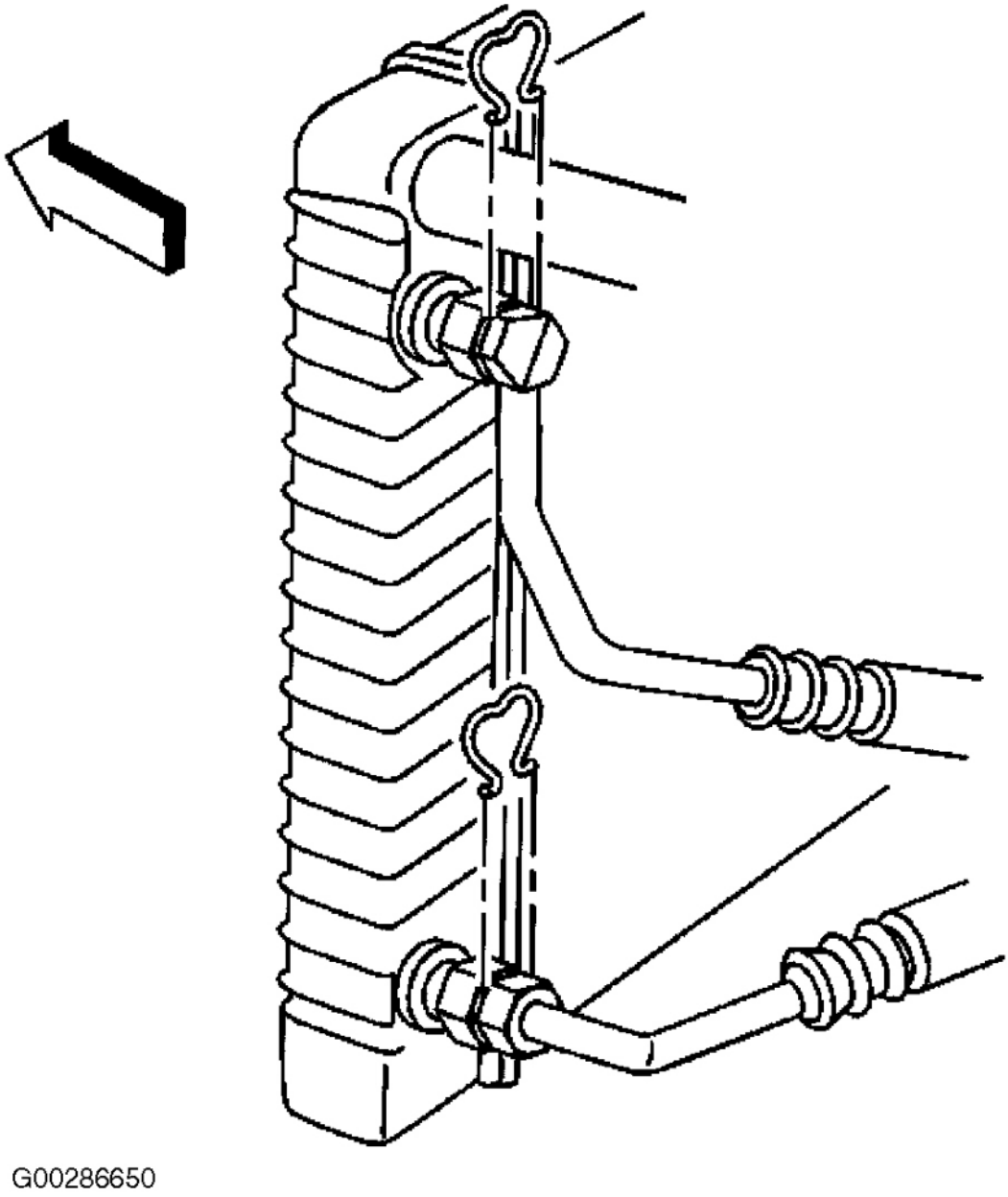


**Fig. 19: Removing Retainer Rings From Radiator Fittings**
**Courtesy of GENERAL MOTORS CORP.**

 

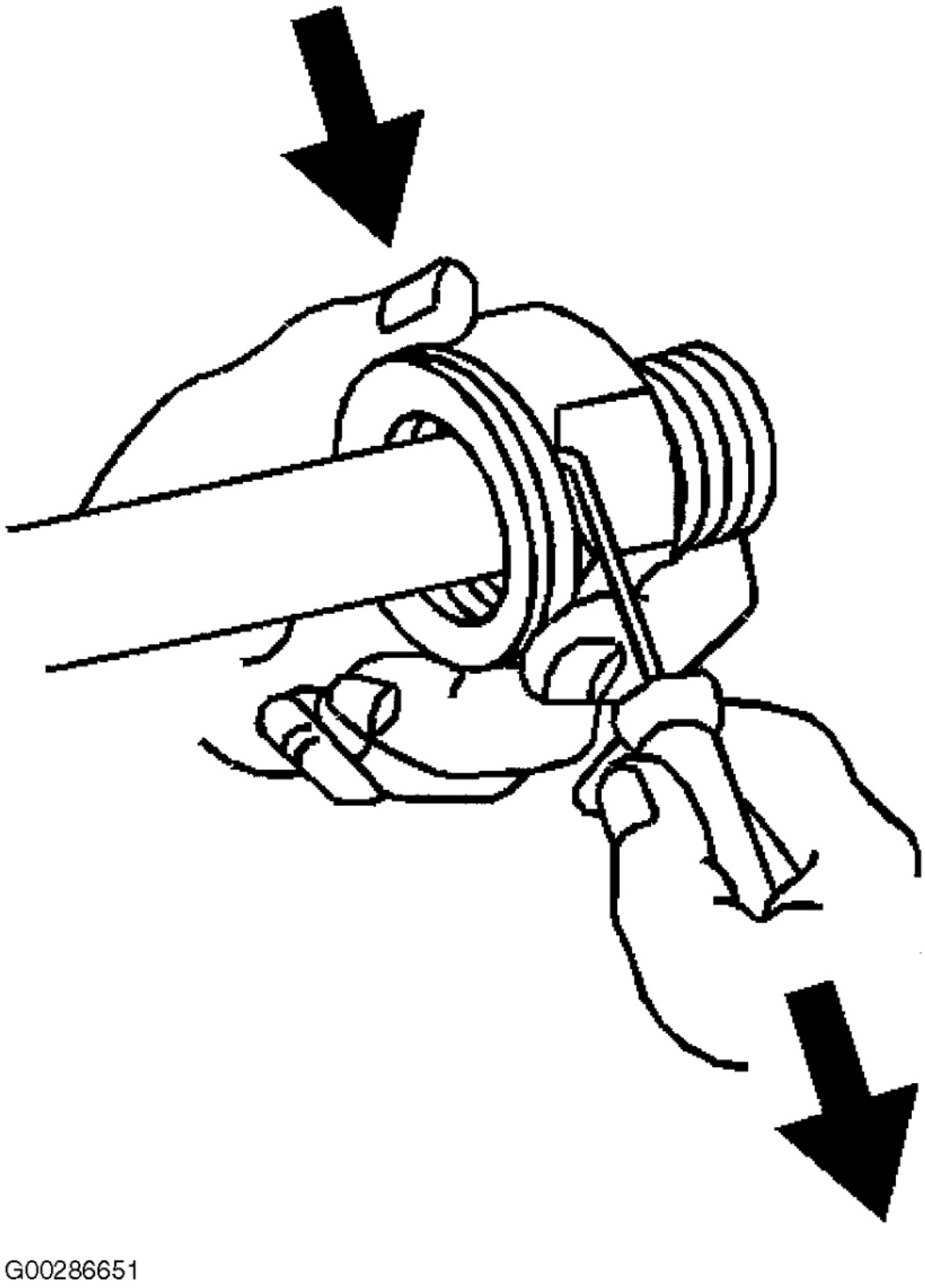


**Fig. 20: Removing Retaining Ring From Fitting**
**Courtesy of GENERAL MOTORS CORP.**

 

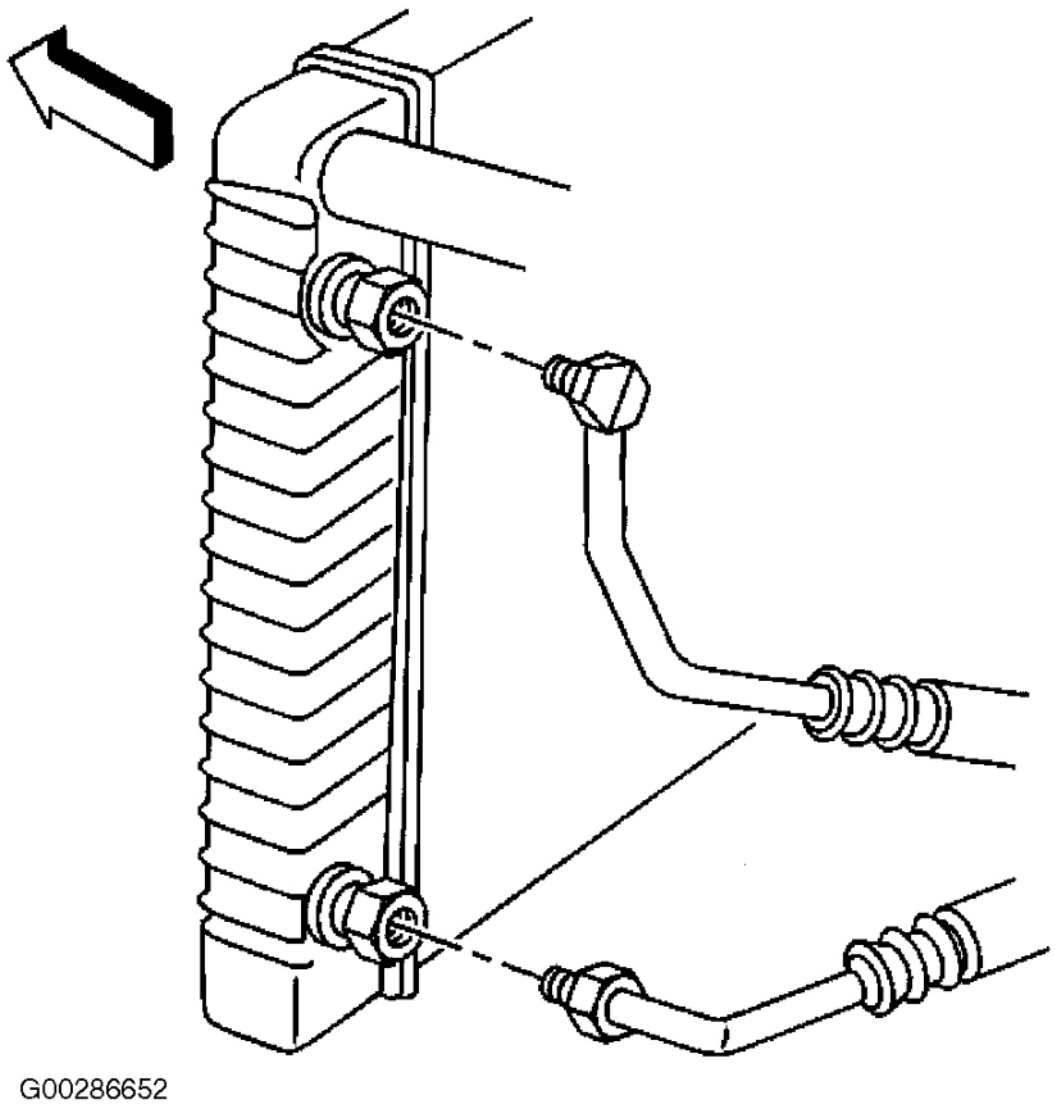


**Fig. 21: Pulling Oil Cooler Lines From Radiator**
**Courtesy of GENERAL MOTORS CORP.**

 

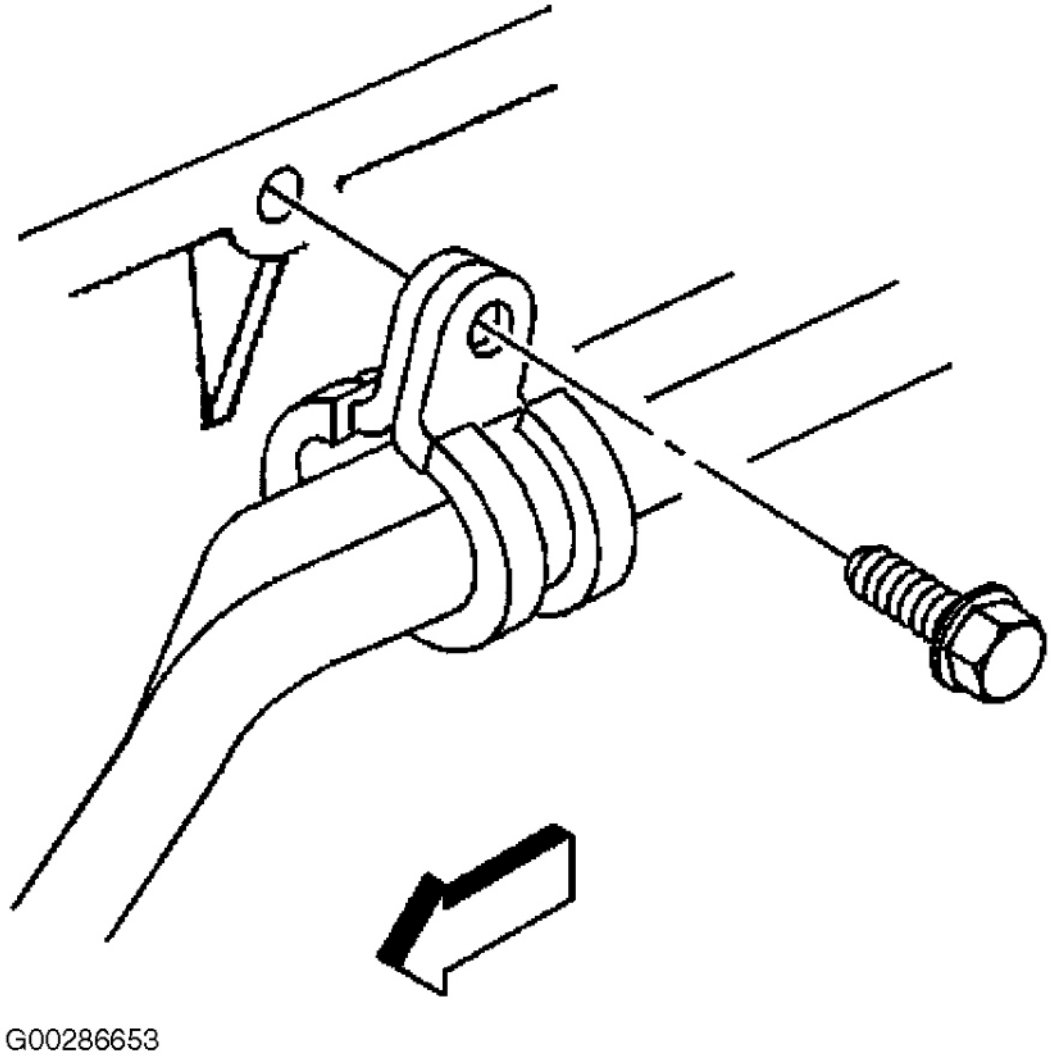


**Fig. 22: Removing & Installing Support Clamp**
**Courtesy of GENERAL MOTORS CORP.**

 

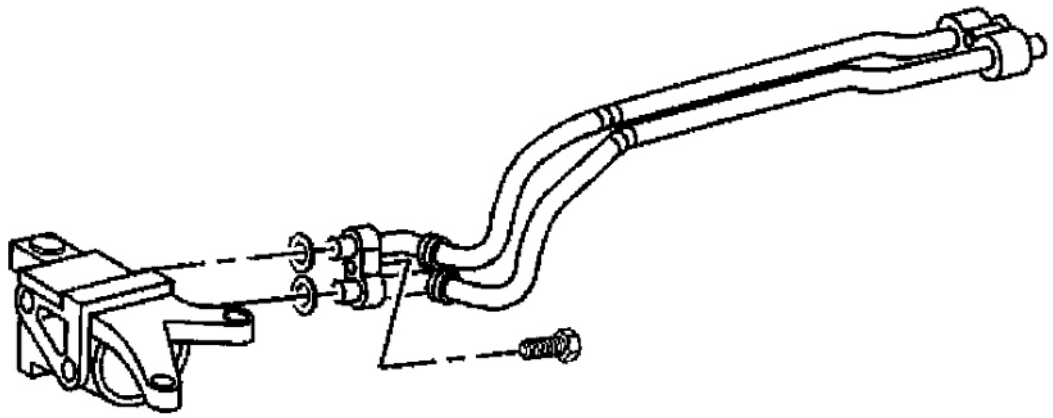


**Fig. 23: Removing & Installing Oil Filter Adapter line**
**Courtesy of GENERAL MOTORS CORP.**

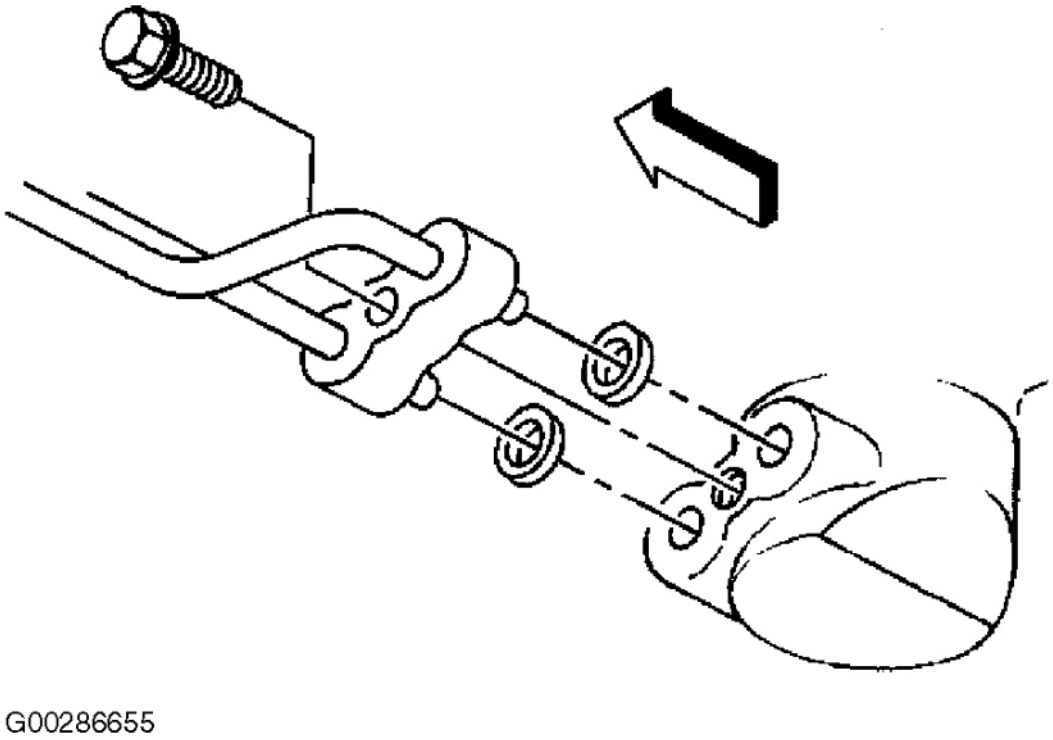


**Fig. 24: Removing Oil Cooler Lines & Seals At Filter Adapter**
**Courtesy of GENERAL MOTORS CORP.**

 

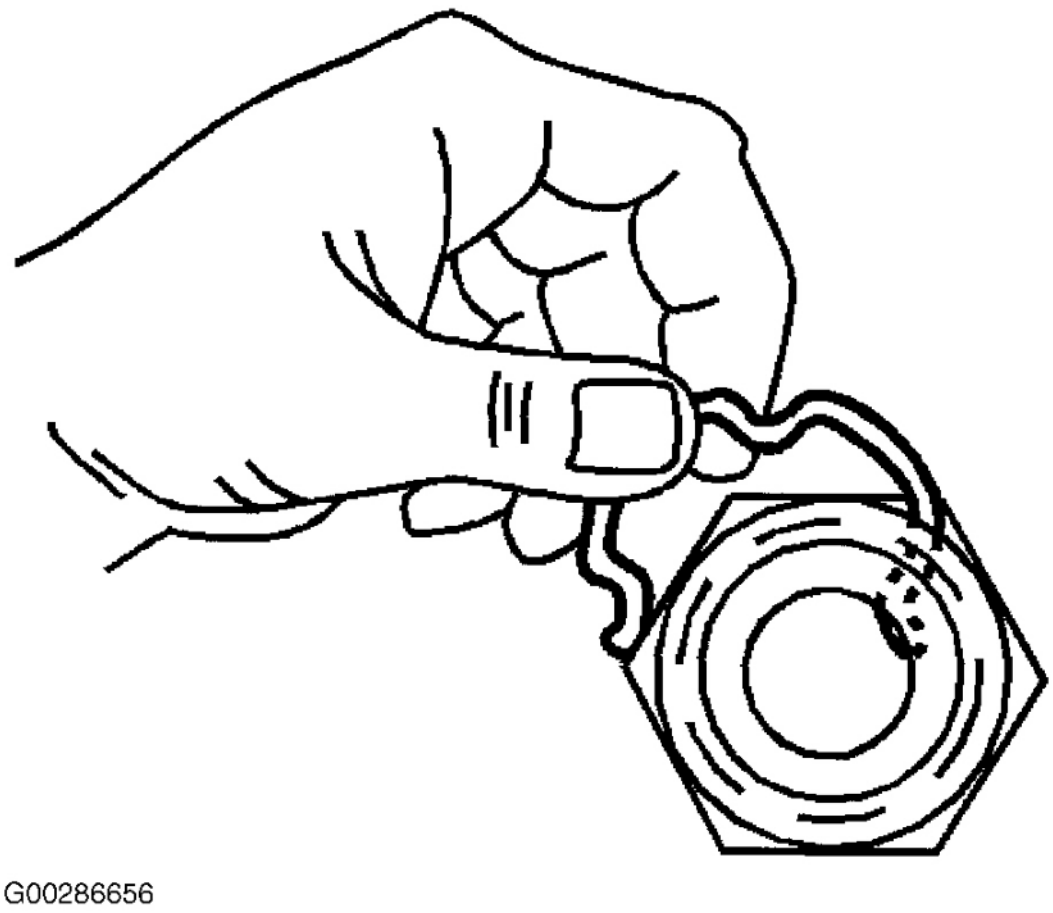


**Fig. 25: Installing Retaining Ring In Fitting**
**Courtesy of GENERAL MOTORS CORP.**

 

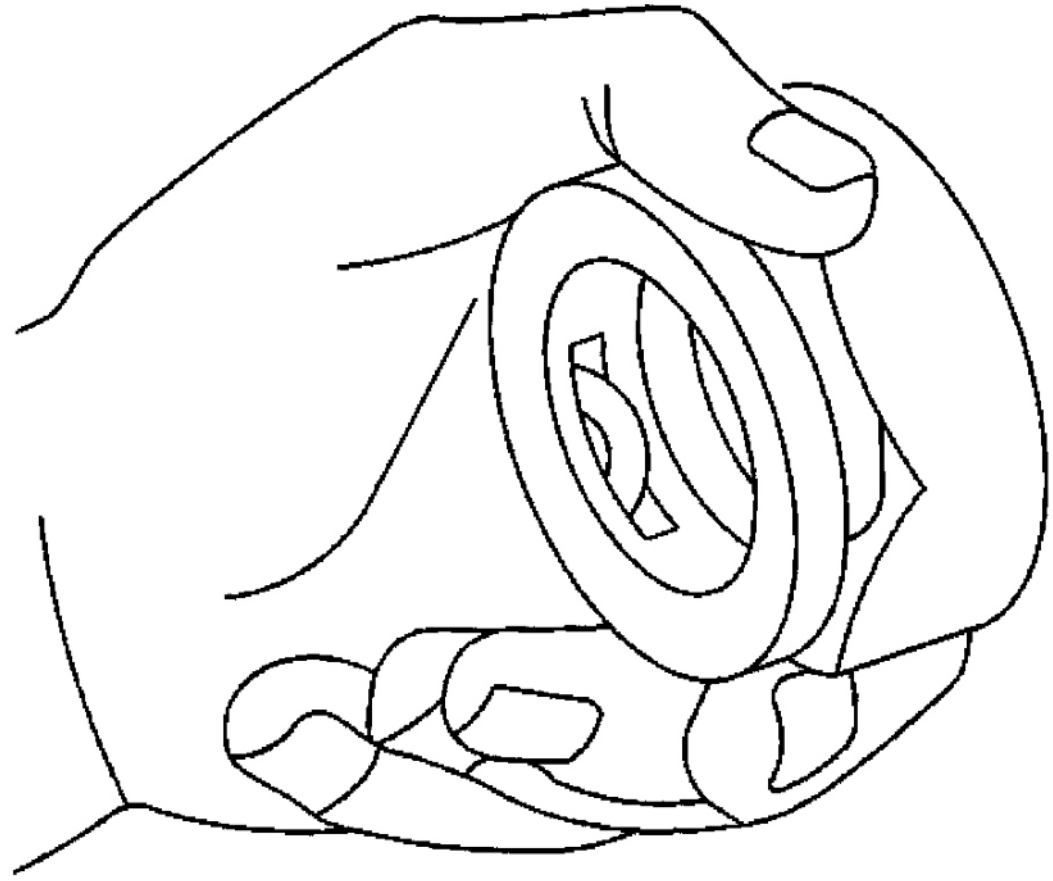


**Fig. 26: Rotating Fitting To Seat Retainer Ring**
**Courtesy of GENERAL MOTORS CORP.**

## OIL FILTER ADAPTER

### Removal

1. Raise the vehicle.
2. Position a suitable container to catch the engine oil when the hoses are removed.
3. Remove the engine oil cooler pipes from the remote engine oil filter adapter.
4. Remove the remote oil filter inlet and outlet hoses from the remote oil filter adapter.
5. Remove the nuts and the remote oil filter adapter from the remote oil filter mounting bracket. See **Fig. 27**.
6. If necessary, remove the remote oil filter adapter mounting bracket and bolts from the radiator support.

### Installation

 

1. Install the remote oil filter adapter mounting bracket and bolts to the radiator support, if removed. Tighten the remote oil filter adapter mounting bracket bolts to 22 ft lbs. (30 N.m). See **Fig. 27**.
2. Install the remote oil filter adapter and nuts to the mounting bracket. Tighten the remote oil filter adapter nuts to 18 ft lbs. (25 N.m).
3. Install the remote oil filter inlet and outlet hoses to the remote oil filter adapter.
4. Install the engine oil cooler pipes to the remote engine oil filter adapter.
5. Lower the vehicle.

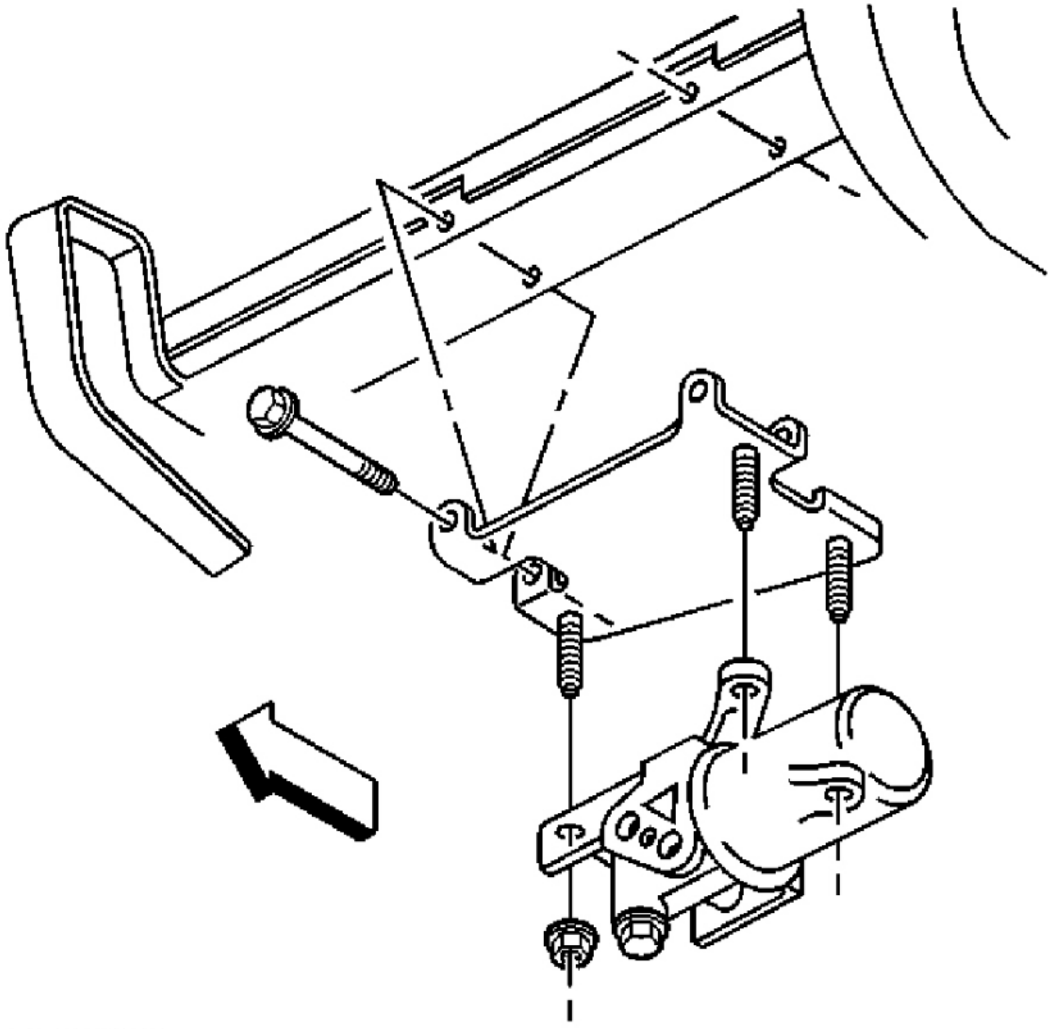


**Fig. 27: Removing & Installing Oil Cooler Adapter**
**Courtesy of GENERAL MOTORS CORP.**

**OIL PAN**

 

**CAUTION: Minimal clearance exists between oil pump pick-up tube and bottom of oil pan. DO NOT place jack under oil pan, crankshaft pulley or any sheet metal when lifting engine.**

**Removal (4.3L Astro & Safari)**

Disconnect the negative battery cable. Raise and support vehicle. Drain crankcase and remove the oil filter. Disconnect oil cooler lines from pan and oil filter adapter. Remove oil filter adapter. Remove starter and flywheel shield. Disconnect transmission cooler lines. Remove front axle tube mount nuts and lower left drive axle bushing bolt (AWD). Remove rubber bellhousing plugs and remove oil pan bolts. Remove oil pan from vehicle.

**Removal (4.3L Commercial Van, 2WD Jimmy & Sonoma, 2WD "S" Series Pickup)**

Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect battery. Remove engine from vehicle. See **ENGINE (4.3L)** removal and installation procedure. Remove oil pan bolts from engine, and remove oil pan.

**Removal ("C" & "K" Series)**

**Removal Procedure**

1. Disconnect the battery negative cable. Remove the oil level indicator. Raise the vehicle.
2. Remove the engine oil and the engine oil filter. Remove the oil filter adapter. Refer to **OIL FILTER ADAPTER**.

 

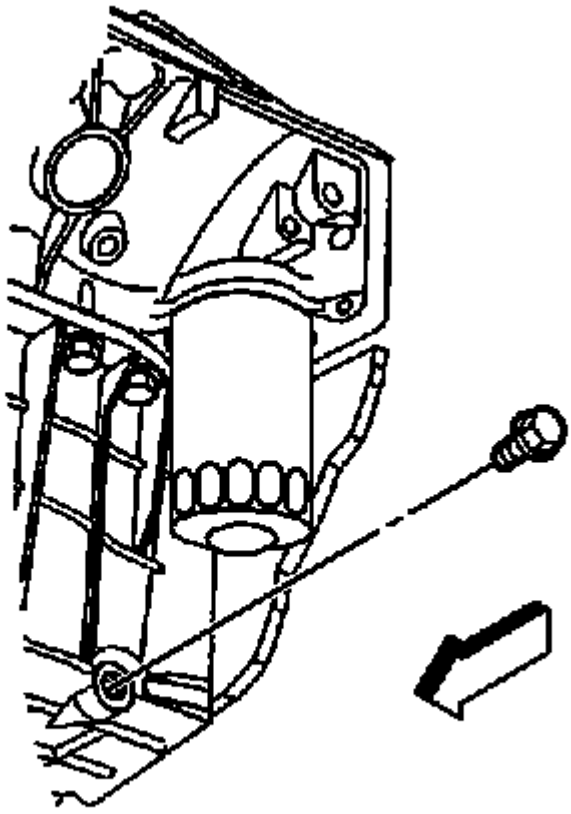

**Fig. 28: Identifying Oil Drain Plug**
**Courtesy of GENERAL MOTORS COMPANY**

3. Remove the starter motor. Remove the transmission cover.

 

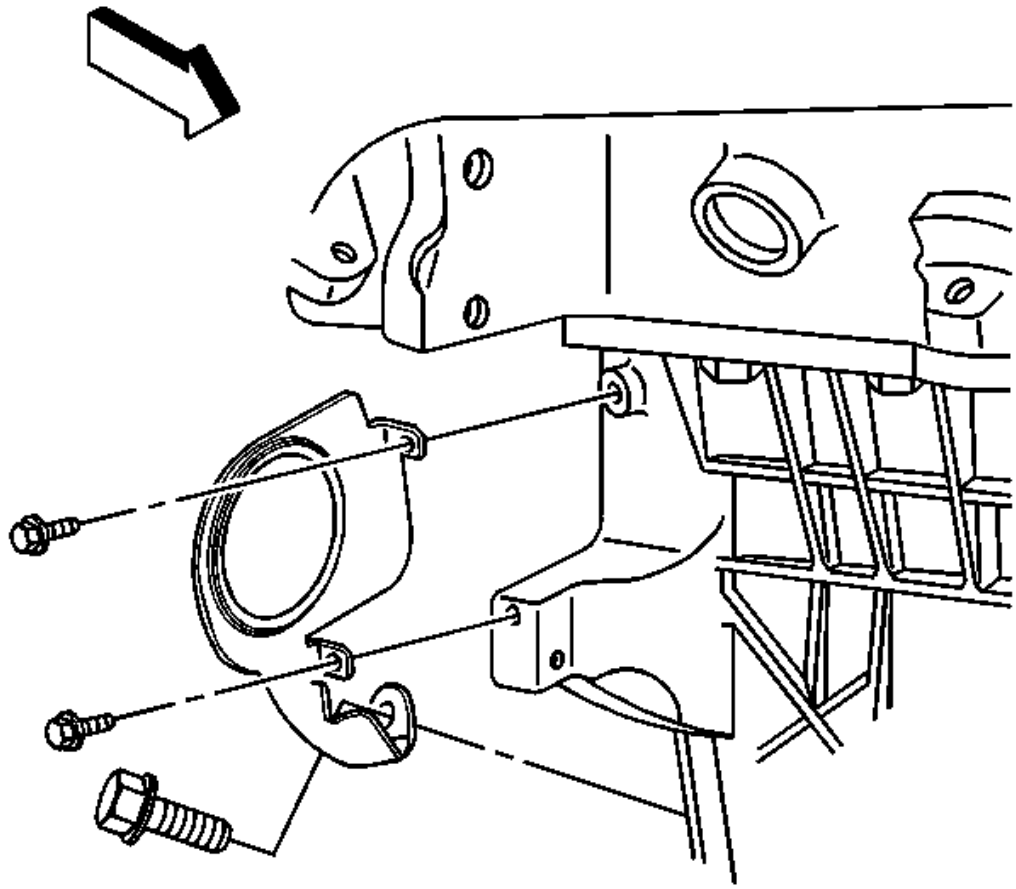

**Fig. 29: Transmission Starter Cover**
**Courtesy of GENERAL MOTORS COMPANY**

4. Remove the oil cooler pipes and the retainer from the side of the engine.

 

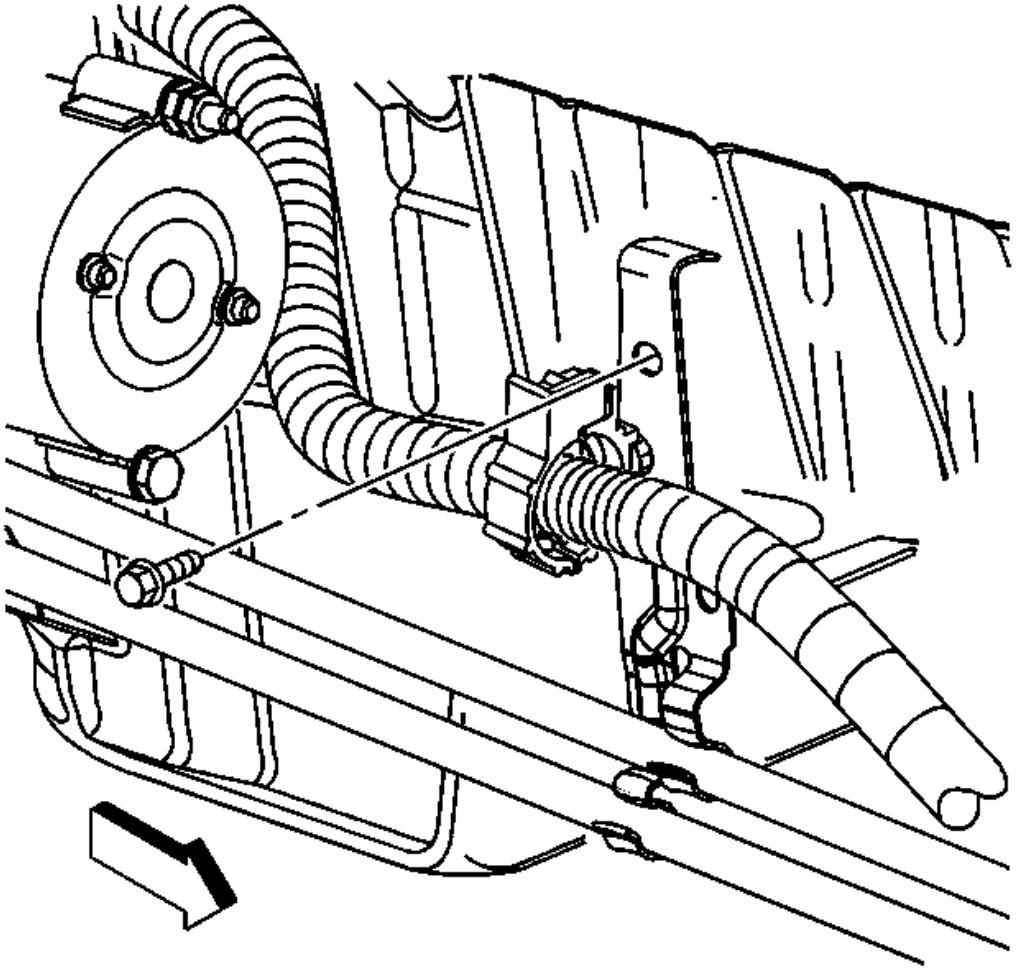

**Fig. 30: Starter Positive Cable Bracket And Transmission Cooler Lines Bracket**
**Courtesy of GENERAL MOTORS COMPANY**

5. Remove the transmission. Refer to **REMOVAL & INSTALLATION ("C" & "K" SERIES)** .
6. Remove the engine flywheel.
7. Remove the access plugs for the oil pan rear nuts. Remove the oil pan nuts and bolts.
    - Remove the ten oil pan bolts.
    - Remove the two nuts at the crankshaft rear oil seal.
    - Remove the transmission to oil pan bolts.

 

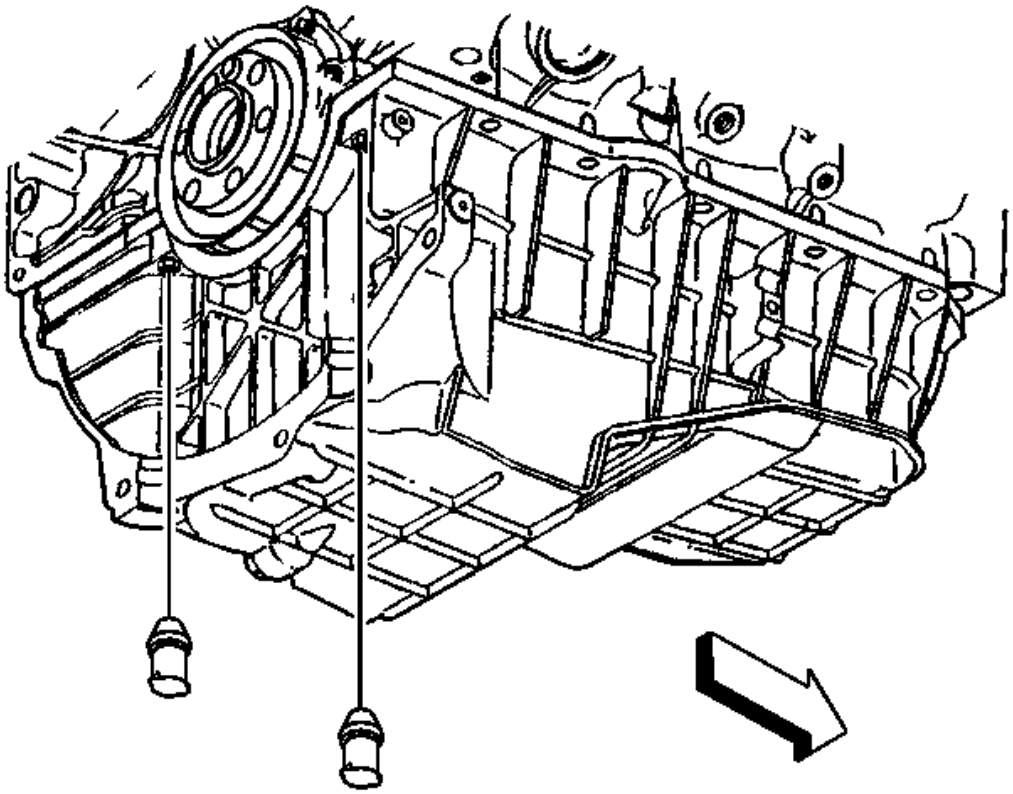

**Fig. 31: Expanded View Of Oil Pan Rear Nuts Access Plugs**
**Courtesy of GENERAL MOTORS COMPANY**

8. Remove the engine oil pan and the oil pan gasket.

   Clean all sealing surfaces.

 

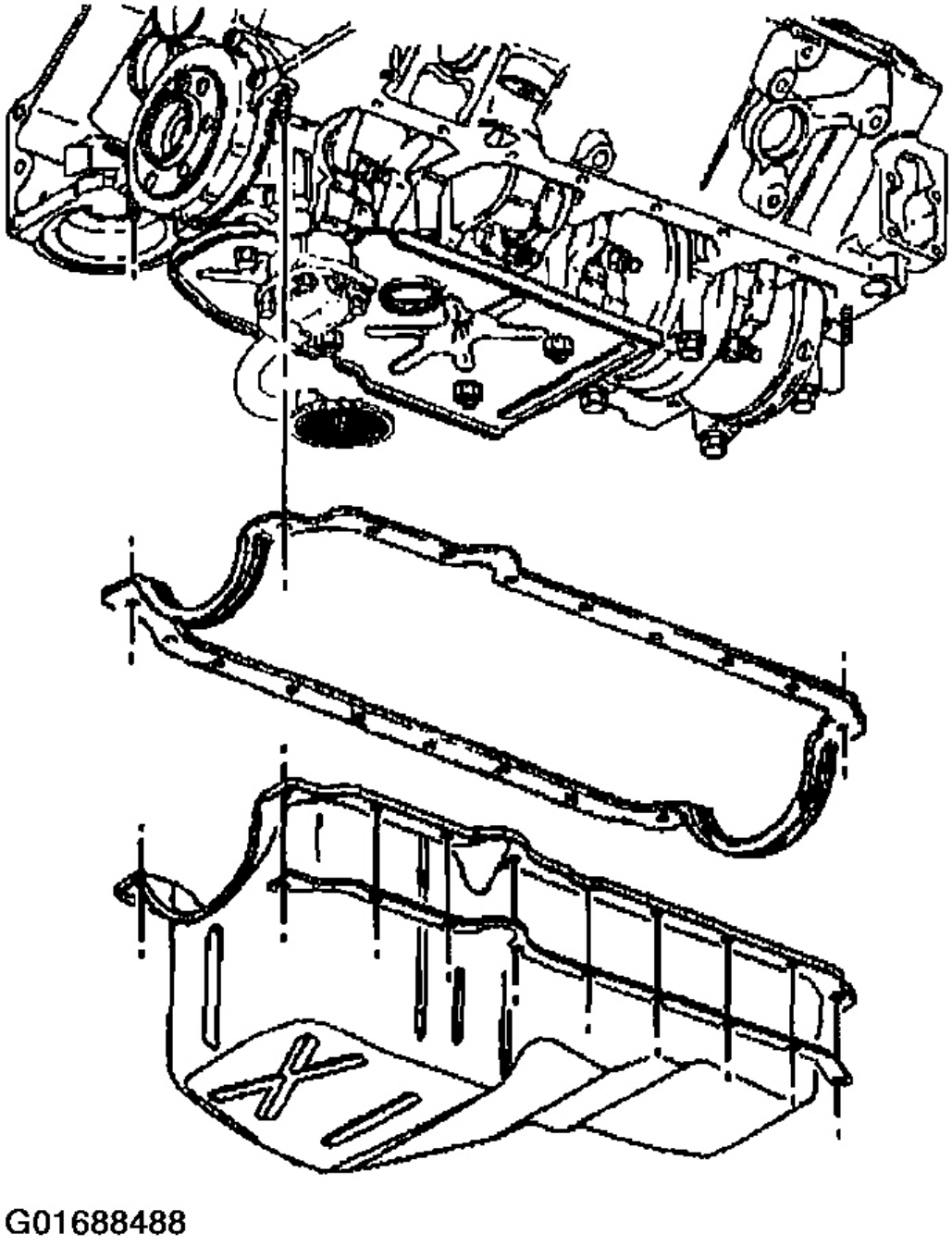


**Fig. 32: Removing Oil Pan & Gasket**
**Courtesy of GENERAL MOTORS CORP.**

**Installation Procedure**

 

**NOTE: Any time the transmission and the engine oil pan are off of the engine at the same time, install the transmission before the oil pan. This is to allow for the proper measurement of the oil pan tolerance. Failure to achieve the correct clearance can result in premature transmission failure.**

1. Install the engine oil pan and a NEW oil pan gasket.
2. Install the engine flywheel.
3. Install the transmission. Refer to **REMOVAL & INSTALLATION ("C" & "K" SERIES)** .
4. Install the access plugs for the oil pan rear nuts.
5. Install the oil cooler pipes and the retainer from the side of the engine.
6. Install the oil filter adapter. Refer to **OIL FILTER ADAPTER**.
7. Install the starter motor.
8. Install the engine oil filter and the engine oil.
9. Lower the vehicle.

**Removal (4.3L 4WD "T" Series Pickup, Jimmy & Sonoma)**

Disconnect battery and remove battery tray. Disconnect shift cable at actuator. Raise and support vehicle. Remove underbody shield from steering linkage and engine oil pan. Drain crankcase. Remove starter motor. Remove oil cooler pipes and both front wheels. Disconnect electrical connector and remove wiring harness bracket at shift cable housing. Remove 3 shift cable housing bolts and disconnect shift cable from differential carrier. Remove both front drive axles. Remove differential housing. Remove 10 oil pan bolts, 2 nuts at crankshaft rear oil seal and remove 2 transmission to oil pan bolts. Remove oil pan from vehicle.

**Installation (4.3L)**

**NOTE: If transmission and oil pans are removed at same time. Transmission pan must be installed before oil pan. This allows for proper oil pan tolerance. Failure to achieve correct clearance can result in premature transmission failure.**

Apply a 13/64 (5 mm) bead of RTV (12346141) or equivalent to front cover/block joint and for 1 (25 mm) in each direction at rear main seal housing/block joint. Install NEW oil pan gasket and oil pan. Slide oil pan back against a suitable straight edge. Oil pan alignment must always be flush or forward of the rear face of the engine block. Using a feeler gauge check the clearance between the 3 oil pan-to-transmission bell housing contact points. If clearance exceeds 0.011 (0.3 mm) repeat procedure until within specification. Install oil pan nuts and bolts, do not tighten. Recheck oil pan alignment. Tighten all nuts and bolts to specification and in order. See **Fig. 33**. See **TORQUE SPECIFICATIONS** table. Recheck oil pan clearance to verify proper alignment.

 

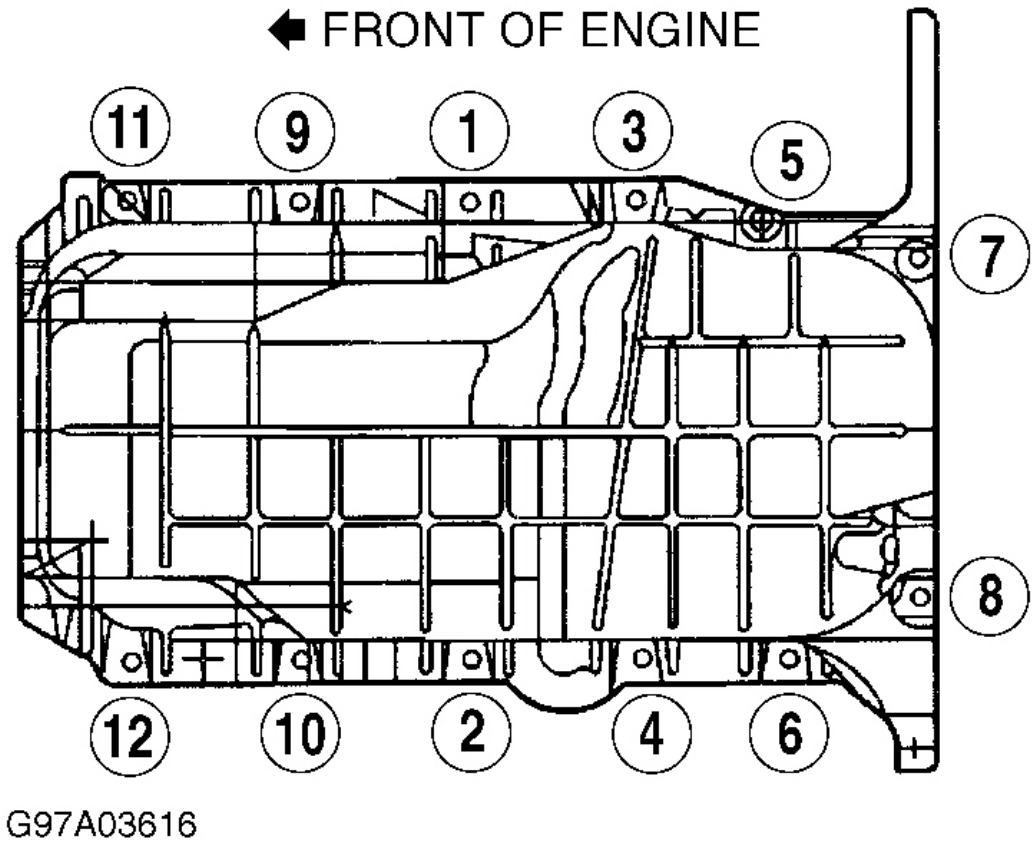


**Fig. 33: Oil Pan Bolts Tightening Sequence (4.3L)**
**Courtesy of GENERAL MOTORS CORP.**

**Removal (5.0L & 5.7L "C" & "K" Series Pickup, Commercial Van, Escalade, Express, Savana, Suburban, Tahoe & Yukon)**

**Removal Procedure**

1. Remove the oil level indicator tube.
2. Raise the vehicle.
3. Remove the engine oil and the engine oil filter.
4. Remove the oil filter adapter.
5. Remove the starter. Note shim location and position of snap shield for installation purposes.
6. Remove the flywheel inspection cover.
7. Remove the engine mount through bolts.
8. Raise and support the engine.

 

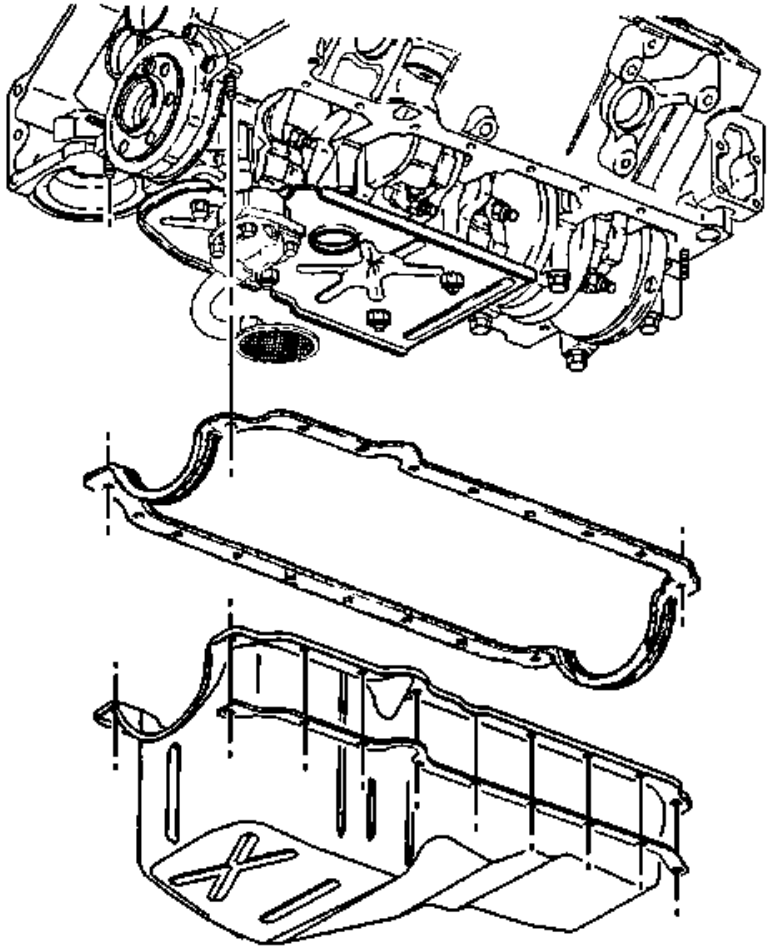

**Fig. 34: View Of Oil Pan & Gasket**
**Courtesy of GENERAL MOTORS CORP.**

9. Remove the oil pan.
10. Remove oil pan nuts and bolts. Note the location of any studs to assist reassembly.
11. Remove the engine oil pan and gasket.
12. Clean all the sealing surfaces.

**Installation Procedure**

1. Install the engine oil pan and a NEW oil pan gasket.
2. Lower the engine onto the engine mounts.
3. Install the engine mount through-bolts.
4. Install the starter.
5. Install the flywheel inspection cover.
6. Install the oil filter adapter.

 

7. Install the engine oil filter and the engine oil.
8. Lower the vehicle.

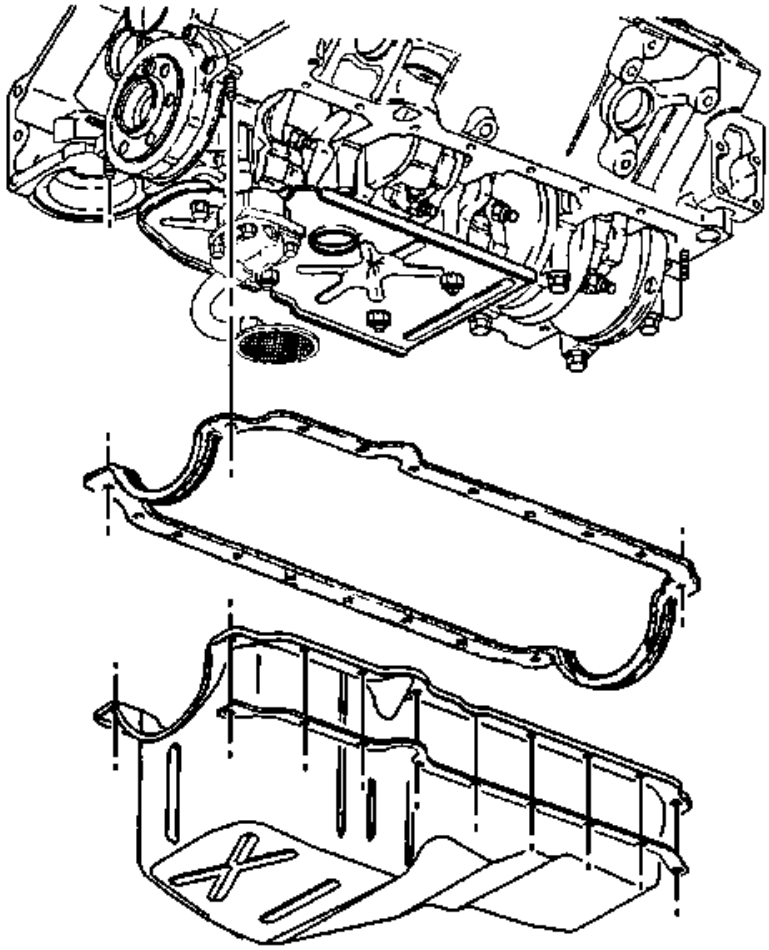

**Fig. 35: View Of Oil Pan & Gasket**
**Courtesy of GENERAL MOTORS CORP.**

9. Install the oil level indicator tube.

**Removal (7.4L Commercial Van/Motorhome & "C" & "K" Series Pickup)**

Disconnect negative battery cable. Remove oil level indicator tube. Raise and support vehicle. Drain oil from crankcase. Disconnect exhaust pipe from exhaust manifolds. Remove starter. Remove flywheel cover. Remove front drive shaft and oil filter adapter (4WD). Remove oil cooler lines from retaining bracket. Remove transmission, clutch (M/T) and flywheel. On A/T, see appropriate TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. On M/T, see appropriate article in CLUTCHES. Remove flywheel/flexplate from crankshaft. Remove oil pan bolts. Remove oil pan and gasket.

**Removal (7.4L Express, Savana & G-Van)**

 

Disconnect negative battery cable. Remove oil level indicator tube. Raise and support vehicle. Drain oil from crankcase. Disconnect exhaust pipes from exhaust manifolds. Remove starter. Remove flywheel cover. Remove oil pan bolts. Remove oil pan and gasket.

**Installation (7.4L)**

Apply a 13/64" (5 mm) bead of RTV (12346141) or equivalent to front cover/block joint and a 1" (25 mm) bead in both directions from each of the 4 corners. Install NEW oil pan gasket. Install oil pan and tighten bolts to specification. See **TORQUE SPECIFICATIONS** table. To complete installation, reverse removal procedure. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS** table.

# OVERHAUL

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

## CYLINDER HEAD

**Valve Springs**

Measure valve spring free length, installed height and pressure (tension). Replace valve spring if measurement is not within specification. See appropriate VALVES & VALVE SPRINGS table under ENGINE SPECIFICATIONS. Measure installed height between cylinder head spring seat (or top of shim, if shimmed) and top of spring shield (top of spring on 7.4L). If installed height exceeds specification, install shims as necessary to bring installed height to specification. On 5.7L engines, DO NOT install shims. Ensure installed height is not less than specified.

**Valve Stem Oil Seals**

On 4.3L, intake valve uses upper "O" ring seal and lower umbrella seal; exhaust valve uses upper "O" ring seal. On 5.0L and 5.7L, intake and exhaust valves use upper "O" ring seal and lower umbrella seal. On 7.4L, intake and exhaust valves use lower umbrella seal. When installing umbrella seal, seat seal against valve guide boss on cylinder head. If equipped, coat upper "O" ring seal with engine oil before installation and ensure seal is not twisted when installed. A gap of.04-.08" (1-2 mm) must exist between edge of oil seal and valve guide. See **Fig. 36**.

**Valve Guides**

Valve guides are part of cylinder head (not replaceable). Measure valve guide oil clearance. See appropriate CYLINDER HEAD table under ENGINE SPECIFICATIONS. If not within specification, ream valve guide and install valves with oversize stems.

**Valves**

Replace valve if margin is less than 0.031" (0.8 mm).

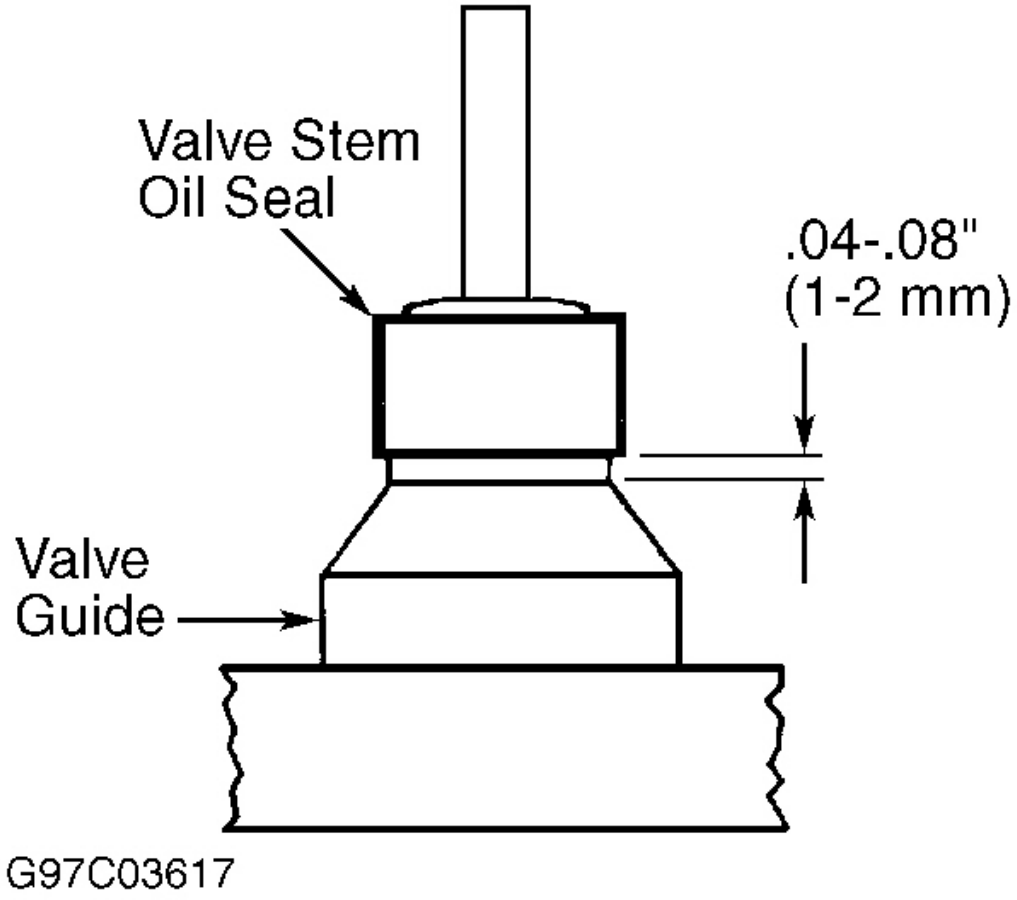


**Fig. 36: Installation Of Valve Stem Oil Seal.**
**Courtesy of GENERAL MOTORS CORP.**

## VALVE TRAIN

### Rocker Arm Assembly

Clean push rods, rocker arms, balls and nuts with solvent and blow dry. Inspect rocker arms and balls at mating surface. Surface should be smooth and free of damage. Inspect push rods for bends or wear. Ensure oil passages are clear.

## CYLINDER BLOCK ASSEMBLY

### Piston & Rod Assembly

Mark piston in relation to cylinder bore before removal. Piston pin is press-fit in connecting rod. Mark piston in

 

relation to connecting rod before separating components. Replace piston and piston pin as matched set. Install piston in bore with notch (dimple on 7.4L) on top of piston toward front of engine.

**Fitting Pistons**

Measure piston diameter at 90-degree angle to piston in, on piston pin center line. Measure cylinder bore diameter 2 1/2" below cylinder block deck. Determine piston clearance. If piston clearance is not within specification, replace piston and/or machine cylinder bore as necessary. See appropriate CYLINDER BLOCK and PISTONS, PINS & RINGS tables under ENGINE SPECIFICATIONS. On 5.7L engines, position pistons so that arrow is facing front of engine. On 7.4L engines, position pistons so that valve cutout is pointing to centerline of engine, or dimple is facing front of engine.

**Piston Rings**

Measure piston ring end gap and side clearance. If measurement s not within specification, replace piston and/or rings as necessary. See appropriate PISTONS, PINS & RINGS table under ENGINE SPECIFICATIONS. Install rings with mark on ring facing upward. Position ring end gaps around circumference of piston as shown. See **Fig. 37**.

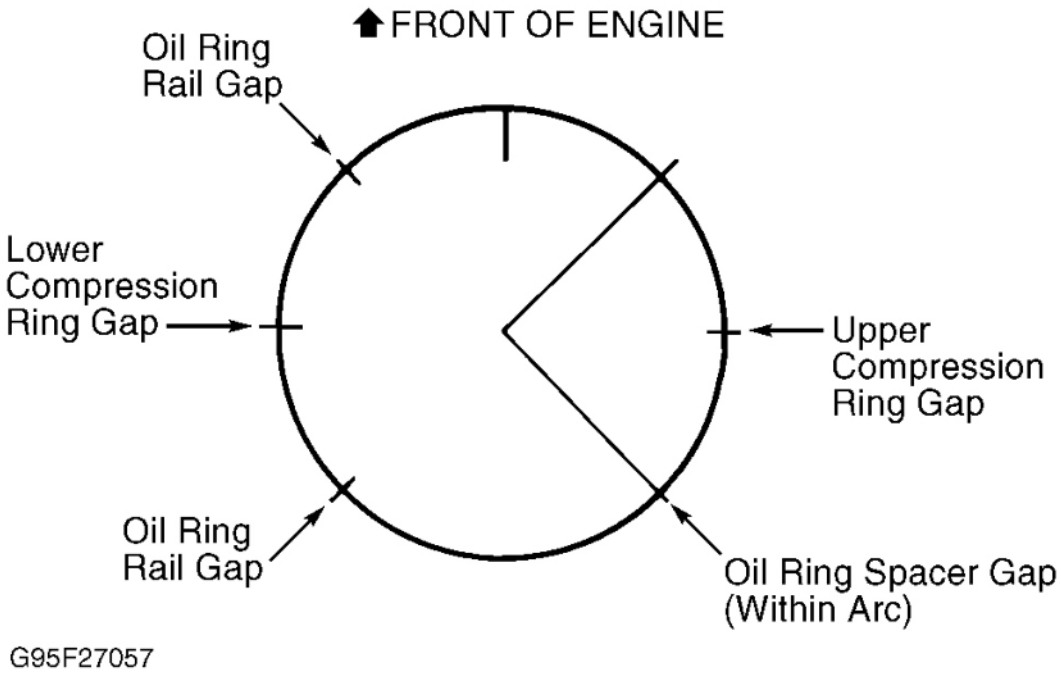


**Fig. 37: Positioning Piston Ring End Gaps**
**Courtesy of GENERAL MOTORS CORP.**

**Rod Bearings**

Measure rod bearing journal out-of-round, taper and oil clearance. If measurement is not within specification,

 

replace rod bearings and/or machine crankshaft. See appropriate CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS. Ensure rod side play is within specification. On 7.4L engine, tighten inside bearing cap bolts first, then outside bearing cap bolts.

**NOTE: On 7.4L, if rear main bearing cap is removed, replace rear crankshaft oil seal (transmission must be removed to replace seal).**

**Crankshaft & Main Bearings**

1. Mark bearing caps for reassembly. Measure journal diameter, out-of-round, taper and oil clearance. If measurement is not within specification, replace main bearings and/or machine crankshaft. See appropriate CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS. Align thrust bearing surfaces, and measure crankshaft end play. See **THRUST BEARING**. Main bearing caps are press fit.
2. Using Tool (J-6125-B and J-41348), carefully remove caps for service. Install main bearings and main caps. Tap bearing caps into cylinder block cavity using a brass, lead, or leather mallet before installing attaching bolts. DO NOT use cap bolts to pull crankshaft bearing caps into seats. Tighten NEW main cap bolts evenly. On 5.7L engine, crankshaft can be ground to.0090" (.229 mm) undersize. Undersize bearings are available. Install crankshaft bearing caps with arrows facing front of engine.

**CAUTION: On some 4.3L, 5.0L and 5.7L engines, the distance between rear main bearing thrust faces is.008" (.2 mm) wider than standard (identified by.008" stamped on crankshaft rear counterweight). When replacing rear main bearings on these engines, use only.008" (.2 mm) wider bearings.**

**Thrust Bearing**

Install main bearing caps (except rear), and tighten cap bolts to specification. See **TORQUE SPECIFICATIONS**. On 7.4L, apply anaerobic sealant to cap-to-cylinder block mating surfaces. On all engines, Install rear main bearing cap and tighten cap bolts to 10 ft. lbs. (14 N.m). Tap crankshaft rearward then forward to align thrust surfaces. Tighten rear main bearing cap bolts to specification. Measure crankshaft end play at forward thrust surface of rear main bearing cap. See appropriate CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table under ENGINE SPECIFICATIONS.

**Cylinder Block**

Measure cylinder bore out-of-round and taper. If measurement s not within specification, machine cylinder bore and/or replace piston. See appropriate CYLINDER BLOCK table under ENGINE SPECIFICATIONS. Finish bore with a 45-65 degree cross-hatch pattern.

# ENGINE OILING

## ENGINE LUBRICATION SYSTEM

Gear-type oil pump delivers full pressure lubrication through full-flow oil filter to main oil gallery. Main oil gallery feeds crankshaft and camshaft bearings through drilled passages in block. Valve lifter oil gallery feeds valve lifters. From lifters, oil is routed through hollow push rods to upper valve train components. Timing chain

 

and sprockets are lubricated by oil drainage from No. 1 camshaft bearing. Pistons and piston pins are lubricated by oil splash. Nonadjustable oil pressure regulator is located in oil pump body. See **Fig. 38**.

**CRANKCASE CAPACITY (1)**

| Application | Qts. (L) |
|---|---|
| 4.3L | 4.5 (4.3) |
| 5.0L & 5.7L | 5.0 (4.8) |
| 7.4L | 6.6 (6.3) |
| (1) Capacity includes oil filter. | |

**Oil Pressure**

Measure oil pressure with engine at operating temperature and specified RPM. See **OIL PRESSURE SPECIFICATIONS** table.

**OIL PRESSURE SPECIFICATIONS (1)**

| Application | psi (kPa) |
|---|---|
| 4.3L, 5.0L & 5.7L | |
| 1000 RPM | 6 (41.4) |
| 2000 RPM | 18 (124.1) |
| 4000 RPM | 24 (165.4) |
| 7.4L | |
| 600 RPM | 10 (68.7) |
| 2000 RPM | 25 (172.4) |
| (1) Minimum specification. | |

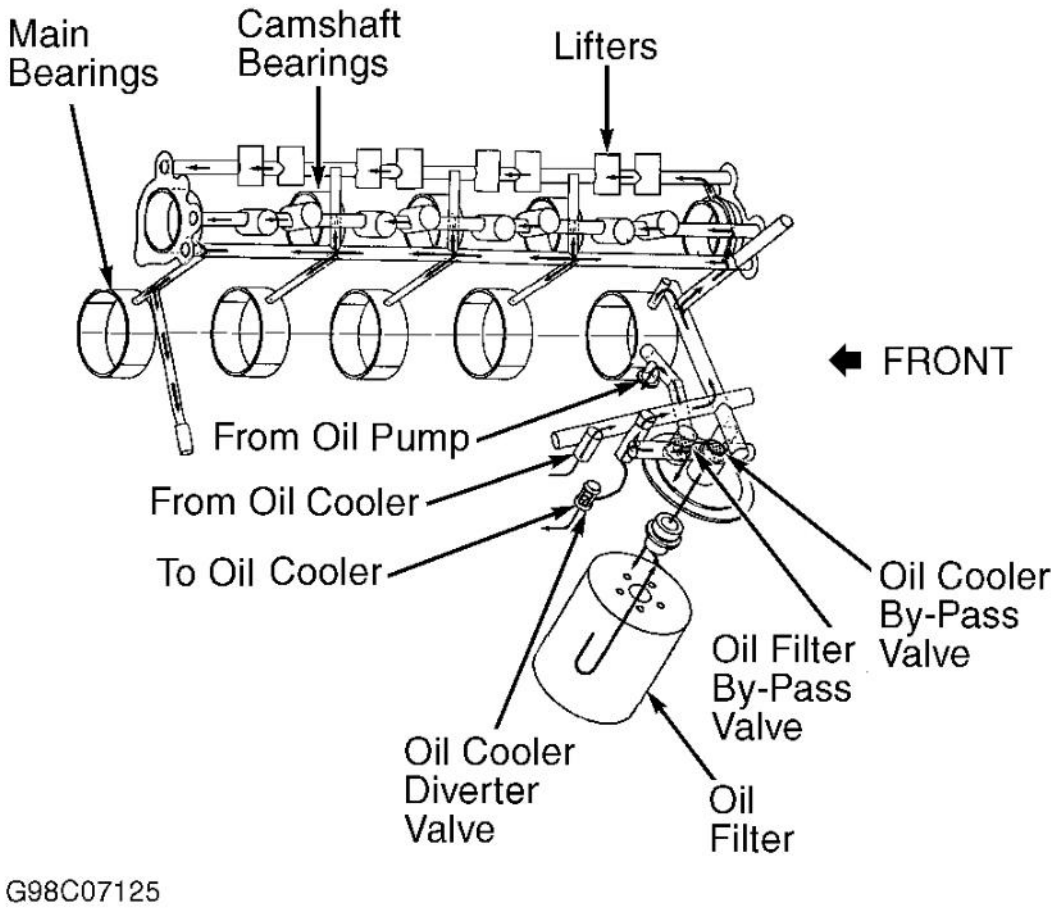


**Fig. 38: Engine Lubrication Circuit**
**Courtesy of GENERAL MOTORS CORP.**

**OIL PUMP**

**NOTE: On all except 7.4L, pick-up tube is serviceable; however, unless tube is damaged, DO NOT remove tube from pump body. On 7.4L, pick-up tube and pump are serviced as an assembly and must be replaced if oil pick-up tube and screen are damaged or loose.**

**Removal & Disassembly**

1. Remove oil pan. See **OIL PAN** under REMOVAL & INSTALLATION. Remove oil pump bolt. Remove pump and extension shaft. If necessary, on all engines except 7.4L, remove pick-up tube. Remove pump cover. Mark relationship between gears at a meshing point for reassembly. Remove gears. Remove pressure regulator valve retaining pin. Remove pressure regulator valve and spring. On 5.7L engine, remove crankshaft oil deflector nuts an d deflector. On all models, remove oil pump-to-rear crankshaft bearing cap bolt. Remove oil pump, retainer and driveshaft from rear crankshaft bearing cap.

 

**Inspection**

Inspect pump body and cover for cracks or excessive wear. Inspect pump gears for damage or wear. Check drive gear shaft for looseness in pump body. Check pressure regulator valve for fit in bore. Replace entire pump assembly if damaged. Inspect inlet tube and screen assembly for damage.

**Reassembly & Installation**

Install pump gears into pump body with marked gear teeth indexed. If pick-up tube was removed, apply sealant to tube end. Tap tube end into pump using plastic hammer. Reassemble remaining components in reverse order of disassembly. On 7.4L engine, if reusing oil pump, replace pressure relief valve spring. Prime oil pump with engine oil. Install pump and extension shaft, ensuring slot on top of extension shaft engages with drive tang on end of distributor shaft. Tighten oil pump bolt to specification. See **TORQUE SPECIFICATIONS**. Install oil pan.

# TORQUE SPECIFICATIONS

**TORQUE SPECIFICATIONS (4.3L, 5.0L & 5.7L)**

**TORQUE SPECIFICATIONS (4.3L, 5.0L & 5.7L)**

| Application | Ft. Lbs. (N.m) |
|---|---|
| Balance Shaft Gear Bolt | |
| Step 1 | 15 (20) |
| Step 2 | Additional 35 Degrees |
| Bellhousing Bolt | 35 (47) |
| Camshaft Sprocket Bolt | 18 (25) |
| Connecting Rod Cap Nut | |
| 4.3L | |
| Step 1 | 20 (27) |
| Step 2 | Additional 70 Degrees |
| 5.0L & 5.7L | |
| Step 1 | 20 (27) |
| Step 2 | Additional 55 Degrees |
| Crankshaft Damper Bolt | 74 (100) |
| Crankshaft Oil Deflector Bolt/Nut | 27 (36) |
| Cylinder Head Bolts (1) | |
| Step 1 | 24 (34) |
| Step 2 | 45 (61) |
| Step 3 | 65 (90) |
| Exhaust Manifold Bolt | |
| Step 1 | 11 (15) |
| Step 2 | 22 (30) |
| Flywheel Bolt | 74 (100) |
| Main Bearing Cap Bolt | |

| | |
|---|---|
| 4.3L | |
| Step 1 | 15 (20) |
| Step 2 | Additional 73 Degrees |
| 5.0L & 5.7L | |
| 2-Bolt Main | 77 (105) |
| 4-Bolt Main Inner | 77 (105) |
| 4-Bolt Main Outer | 67 (90) |
| Oil Filter Adapter Bolt (4.3L) | 15 (20) |
| Oil Filter Adapter Bolt (5.0L & 5.7L) | 18 (25) |
| Oil Pan Stud Nut | 18 (25) |
| Oil Pump Bolt | 66 (90) |
| Rocker Arm | |
| 4.3L With Press-In Studs | |
| Rocker Stud | 35 (47) |
| Rocker Nut | 18 (25) |
| 4.3L With Screw-In Studs | |
| Rocker Stud | 35 (47) |
| Rocker Nut | 19 (26) |
| 5.0L & 5.7L | (2) |
| Thermostat Housing Bolt | 21 (28) |
| Valve Lifter Retainer Bolt | |
| 4.3L | 12 (16) |
| 5.0L & 5.7L | 18 (25) |
| Water Pump Bolt | 33 (45) |
| | **INCH Lbs. (N.m)** |
| Balance Shaft Retainer Plate Bolts (4.3L) | 106 (12) |
| Camshaft Retainer Bolt | 106 (12) |
| Front Cover Bolt | 106 (12) |
| Intake Manifold | |
| Upper (4.3) | |
| Step 1 | 44 (5) |
| Step 2 | 88 (10) |
| Upper (5.0 & 5.7) | |
| Step 1 | 44 (5) |
| Step 2 | 88 (10) |
| Lower(3) | |
| Step 1 | 27 (3) |
| Step 2 | 106 (12) |
| Step 3 | 133 (15) |
| Oil Pan Bolt Or Stud Bolt | 106 (12) |
| Oil Pan Studs | 53 (6) |

 

| | |
|---|---|
| Oil Pump Cover Bolt | 106 (12) |
| Rear Crankshaft Oil Seal Retainer Bolt | 106 (12) |
| Valve Cover Bolt | 106 (12) |

(1) Apply GM Sealant (1052080) to head bolt threads. Tighten bolts in sequence. See **Fig. 8** or **Fig. 9** .

(2) See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS.

(3) Tighten bolts in sequence. See **Fig. 7**.

**TORQUE SPECIFICATIONS (7.4L)**

**TORQUE SPECIFICATIONS (7.4L)**

| **Application** | **Ft. Lbs. (N.m)** |
|---|---|
| Bellhousing Bolt | 30 (41) |
| Camshaft Sprocket Bolt | 22 (30) |
| Connecting Rod Cap Nut | 47 (64) |
| Crankshaft Damper Bolt | 110 (149) |
| Cylinder Head Bolts | (1) |
| Exhaust Manifold Center Bolt | 40 (54) |
| Exhaust Manifold Nut | 22 (30) |
| Flywheel Bolt | 66 (90) |
| Intake Manifold Bolt (2) | |
| Upper | |
| Step 1 | 6 (8) |
| Step 2 | 13 (18) |
| Lower | |
| 1998 | 30 (40) |
| 1999 | |
| Step 1 | 22 (30) |
| Step 2 | 30 (40) |
| Main Bearing Cap Bolt | 102 (138) |
| Oil Pan Bolt | 18 (25) |
| Oil Pump Bolt | 65 (90) |
| Rocker Arm Bolt | 40 (54) |
| Starter Motor | 30 (40) |
| Thermostat Housing Bolt | 27 (37) |
| Water Pump Bolt | 30 (41) |
| | **INCH Lbs. (N.m)** |
| Camshaft Retainer Bolt | 124 (14) |
| Crankshaft Position Sensor | 106 (12) |
| Camshaft Retainer Bolt | 106 (12) |
| Front Cover Bolt | 89 (10) |

| | |
|---|---|
| Oil Pump Cover Bolt | 106 (12) |
| Valve Cover Bolt | |
| 1998 | 71 (8) |
| 1999 | 106 (12) |

(1) For cyllinder head 7.4L installation specifications, see appropriate procedure under **CYLINDER HEAD** under REMOVAL & INSTALLATION. Apply GM Sealant (1052080) to head bolt threads.

(2) Tighten bolts in sequence. See **Fig. 5**.

# ENGINE SPECIFICATIONS

### GENERAL SPECIFICATIONS (4.3L)

### GENERAL SPECIFICATIONS (4.3L)

| Application | Specification |
|---|---|
| Displacement | 262 Cu. In. |
| Bore | 4.0" (101.6 mm) |
| Stroke | 3.48" (88.4 mm) |
| Compression Ratio | 9.2:1 |
| Fuel System | |
| VIN W | SFI |
| VIN X | SFI |

### GENERAL SPECIFICATIONS (5.0L)

### GENERAL SPECIFICATIONS (5.0L)

| Application | Specification |
|---|---|
| Displacement | 305 Cu. In. |
| Bore | 3.74" (95 mm) |
| Stroke | 3.48" (88.39 mm) |
| Compression Ratio | 9.4:1 |
| Fuel System | SFI |

### GENERAL SPECIFICATIONS (5.7L)

### GENERAL SPECIFICATIONS (5.7L)

| Application | Specification |
|---|---|
| Displacement | 350 Cu. In. |
| Bore | 4.0" (101.6 mm) |
| Stroke | 3.48" (88.39 mm) |
| Compression Ratio | 9.4:1 |
| Fuel System | CSI |

## GENERAL SPECIFICATIONS (7.4L)

### GENERAL SPECIFICATIONS (7.4L)

| Application | Specification |
|---|---|
| Displacement | 454 Cu. In. |
| Bore | 4.25" (107.95 mm) |
| Stroke | 4.0" (101.6 mm) |
| Compression Ratio | 9.1:1 |
| Fuel System | SFI |

## CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (4.3L)

### CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (4.3L)

| Application | In. (mm) |
|---|---|
| Crankshaft End Play | .002-.008 (.05-.2) |
| Crankshaft Run Out | .001 (.025) Main Bearings |
| Main Bearings | |
| Journal Diameter | |
| No. 1 | 2.4488-2.4495 (62.199-62.217) |
| No. 2 & 3 | 2.4485-2.4494 (62.191-62.215) |
| No. 4 | 2.4479-2.4489 (62.179-62.203) |
| Journal Out-Of-Round | .0002-.001 (.005-.03) |
| Journal Taper (Maximum) | .0003 (.008) |
| Oil Clearance | |
| No. 1 | .008-.002 (.02-.051) |
| No. 5 | .0025-.0038 (.064-.096) |
| Connecting Rod Bearings | |
| Connecting Rod Journal Diameter | 2.2487-2.2497 (57.116-57.148) |
| Journal Out-Of-Round | |
| Standard | .0003 (.008) |
| Service Limit | .001 (.03) |
| Journal Taper | |
| Standard | .0003 (.008) |
| Service Limit | .001 (.03) |
| Oil Clearance | .0013-.0035 (.033-.089) |
| Side Clearance | .006-.024(.150-.61) |

## CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (5.0L & 5.7L)

### CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (5.0L & 5.7L)

| Application | In. (mm) |
|---|---|
| | |

| | |
|---|---|
| Crankshaft End Play | .002-.008 (.05-.2) |
| Main Bearings | |
| Journal Diameter | |
| No. 1 | 2.4484-2.4493 (62.189-62.212) |
| No. 2, 3 & 4 | 2.4481-2.4491 (62.181-62.207) |
| No. 5 | 2.4479-2.4491 (62.177-62.207) |
| Journal Out-Of-Round (Maximum) | |
| Standard | .0002 (.005) |
| Service Limit | .001 (.03) |
| Journal Taper (Maximum) | .0002 (.005) |
| Oil Clearance | |
| No. 1 | .0007-.0021 (.018-.053) |
| No. 2, 3 & 4 | .0009-.0024 (.023-.061) |
| No. 5 | .001-.002 (.025-.051) |
| Connecting Rod Bearings | |
| Journal Diameter | 2.0978-2.0998 (53.284-53.334) |
| Journal Out-Of-Round | .0003 (.008) |
| Service Limit | .001 (.03) |
| Journal Taper | .0003 (.008) |
| Service Limit | .001 (.03) |
| Oil Clearance | .0013-.0035 (.033-.089) |
| Side Clearance | .006-.024(.150-.61) |

**CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (7.4L)**

**CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS (7.4L)**

| **Application** | **In. (mm)** |
|---|---|
| Crankshaft End Play | .005-.011 (.127-.279) |
| Crankshaft Run Out | .002 (.051) |
| Main Bearings | |
| Journal Diameter | 2.7482-2.7489 (69.804-69.822) |
| Journal Out-Of-Round | .0004 (.01) |
| Journal Taper | .0004 (.01) |
| Oil Clearance (Standard) | |
| No. 1 | .0017-.003 (.043-.076) |
| No. 2, 3 & 4 | .0011-.0024 (.028-.061) |
| No. 5 | .0025-.0038 (.064-.096) |
| Connecting Rod Bearings | |
| Journal Diameter | 2.199-2.1996 (55.854-55.869) |

| | |
|---|---|
| Journal Out-Of-Round | .0005 (.013) |
| Journal Taper | .0005 (.013) |
| Oil Clearance | .0011-.0029 (.028-.074) |
| Side Clearance | .0013-.023 (.033-.584) |

**PISTONS, PINS & PISTON RINGS (4.3L)**

**PISTONS, PINS & RINGS (4.3L)**

| Application | In. (mm) |
|---|---|
| Piston Clearance | .0007-.002 (.017-.05) |
| Pin Diameter | .9267-.9271 (23.545-23.548) |
| Piston Fit | .0002-.0007 (.005-.018) |
| Rod Fit | .0008-.0016 (.02-.041) Interference |
| Rings | |
| No. 1 | |
| End Gap | .01-.016 (.25-.4) |
| Side Clearance | .02-.06 (.508-1.524) |
| No. 2 | |
| End Gap | .018-.028 (.46-.66) |
| Side Clearance | .04-.08 (1.016-2.032) |
| No. 3 (Oil) | |
| End Gap | .015-.055 (.38-1.4) |
| Side Clearance | .02-.07 (1.016-2.032) |

**PISTONS, PINS & PISTON RINGS (5.0L & 5.7L)**

**PISTONS, PINS & RINGS (5.0L & 5.7L)**

| Application | In. (mm) |
|---|---|
| Piston Clearance | .0007-.002 (.017-.05) |
| Pin Diameter | .9267-.9271 (23.545-23.548) |
| Piston Fit | .0005-.0009 (.013-.023) |
| Rod Fit | .0008-.0016 (.02-.041) Interference |
| Rings | |
| No. 1 | |
| End Gap | .01-.0022 (.25-.51) |
| Side Clearance | .0012-.0027 (.03-.07) |
| No. 2 | |
| End Gap | .018-.028 (.46-.66) |
| Side Clearance | .0015-.003 (.04-.08) |
| No. 3 (Oil) | |
| End Gap | .015-.055 (.38-1.4) |
| Side Clearance | .01-.03 (.25-.76) |

## PISTONS, PINS & PISTON RINGS (7.4L)

### PISTONS, PINS & RINGS (7.4L)

| Application | In. (mm) |
|---|---|
| Piston Clearance | .0018-.0048 (.046-.219) |
| Pin Diameter | .9895-.9897 (25.133-25.137) |
| Piston Fit | .0002-.0007 (.005-.017) |
| Rod Fit | .0021-.0031 (.053-.079) Interference |
| Rings | |
| No. 1 | |
| End Gap | .01-.018 (.254-.457) |
| Side Clearance | .0012-.0029 (.031-.074) |
| No. 2 | |
| End Gap | .016-.024 (.406-.609) |
| Side Clearance | .001-.0029 (.025-.074) |
| No. 3 (Oil) | |
| End Gap | .01-.03 (.254-.76) |
| Side Clearance | .005-.0065 (.127-.165) |

## CYLINDER BLOCK (4.3L)

### CYLINDER BLOCK (4.3L)

| Application | In. (mm) |
|---|---|
| Cylinder Bore | |
| Diameter | 4.0007-4.0017 (101.618-101.643) |
| Maximum Taper | (1).0005 (.012) |
| Maximum Out-Of-Round | (2).0005 (.013) |

(1) Specification is for thrust side. Relief side is 0.0001" (0.025 mm).

(2) Production specification is given. Maximum service specification is 0.0020" (0.051 mm).

## CYLINDER BLOCK (5.0L)

### CYLINDER BLOCK (5.0L)

| Application | In. (mm) |
|---|---|
| Cylinder Bore | |
| Diameter | 3.7350-3.7384 (94.881-94.958) |
| Maximum Taper | (1).0005 (.013) |
| Maximum Out-Of-Round | (2).0001 (.03) |

Specification is for thrust side. Relief side is 0.0001" (0.025 mm).

(1)

(2) Production specification is given. Maximum service specification is 0.0020" (0.051 mm).

**CYLINDER BLOCK (5.7L)**

**CYLINDER BLOCK (5.7L)**

| Application | In. (mm) |
|---|---|
| Cylinder Bore | |
| Diameter | 4.0007-4.0017 (101.618-101.643) |
| Maximum Taper | |
| Standard | (1).0005 (.013) |
| Service Limit | .001 (.03) |
| Maximum Out-of-Round | |
| Standard | (2).001 (.03) |
| Service Limit | .002 (.05) |

(1) Specification is for thrust side. Relief side is.0001" (.025 mm).

(2) Production specification is given. Maximum service specification is.002" (.051 mm).

**CYLINDER BLOCK (7.4L)**

**CYLINDER BLOCK (7.4L)**

| Application | In. (mm) |
|---|---|
| Cylinder Bore | |
| Diameter | 4.2500-4.2507 (107.95-107.968) |
| Maximum Taper | |
| Standard | (1).0005 (.013) |
| Service Limit | .001 (.03) |
| Maximum Out-Of-Round | (2).001 (.03) |

(1) Specification is for thrust side. Relief side is.0001" (.025 mm).

(2) Production specification is given. Maximum service specification is.0020" (.051 mm).

**ENGINE VALVES & VALVE SPRINGS (4.3L)**

**VALVES & VALVE SPRINGS (4.3L)**

| Application | Specification |
|---|---|
| Valves | |
| Face Angle | 45° |
| Minimum Margin | .031" (.79 mm) |

| | |
|---|---|
| Valve Springs | |
| Free Length | 2.02" (51.56 mm) |
| Installed Height | |
| Intake | 1.78 (45.2 mm) |
| Exhaust | 1.7 (43.2 mm) |
| | **Lbs. @ In. (Nm @ mm)** |
| Pressure | |
| Valve Closed | 76-84 @ 1.78 (338-374 @ 43 mm) |
| Valve Open | 187-203 @ 1.27 (832-903 @ 32 mm) |

**ENGINE VALVES & VALVE SPRINGS (5.0L & 5.7L)**

**VALVES & VALVE SPRINGS (5.0L & 5.7L)**

| **Application** | **Specification** |
|---|---|
| Valve Face Angle | 45° |
| Minimum Margin | .031" (0.79 mm) |
| Valve Springs | |
| Free Length | 2.02" (51.56 mm) |
| Installed Height | 1.69-1.71" (42.92-43.43 mm) |
| | **Lbs. @ In. (Nm @ mm)** |
| Pressure | |
| Valve Closed | 76-84 @ 1.7 (338-374 @ 43.2 mm) |
| Valve Open | 187-203 @ 1.27 (832-903 @ 32.3 mm) |

**ENGINE VALVES & VALVE SPRINGS (7.4L)**

**VALVES & VALVE SPRINGS (7.4L)**

| **Application** | **Specification** |
|---|---|
| Valve Face Angle | 45° |
| Valve Springs | |
| Free Length | 2.12" (53.8 mm) |
| Installed Height | 1.838-1.869" (46.685-47.479 mm) |
| | **Lbs. @ In. (Nm @ mm)** |
| Pressure | |
| Valve Closed | 71-79 @ 1.838 (316-351 @ 46.685) |
| Valve Open | 238-262 @ 1.347 (1059-1165 @ 34.213) |

**CYLINDER HEAD (4.3L)**

**CYLINDER HEAD (4.3L)**

| | |
|---|---|

 

| Application | Specification |
|---|---|
| Valve Seats | |
| Intake Valve | |
| Seat Angle | 46° |
| Seat Width | .035-.06" (.88-1.52 mm) |
| Maximum Seat Runout | .002" (.051 mm) |
| Exhaust Valve | |
| Seat Angle | 46° |
| Seat Width | .065-.098" (1.575-2.362 mm) |
| Maximum Seat Runout | .002" (.051 mm) |
| Valve Guide Oil Clearance | .0011-.0027" (.0279-.069 mm) |
| Warpage | .004" (.1 mm) |

**CYLINDER HEAD (5.0L)**

**CYLINDER HEAD (5.0L)**

| Application | Specification |
|---|---|
| Valve Seats | |
| Intake Valve | |
| Seat Angle | 46° |
| Seat Width | .045-.07" (1.14-1.78 mm) |
| Maximum Seat Runout | .002" (.05 mm) |
| Exhaust Valve | |
| Seat Angle | 46° |
| Seat Width | .065-.098" (1.65-2.49 mm) |
| Maximum Seat Runout | .002" (.05 mm) |
| Valve Guide Oil Clearance | .001-.003" (.025-.069 mm) |
| Warpage | .004" (.1 mm) |

**CYLINDER HEAD (5.7L)**

**CYLINDER HEAD (5.7L)**

| Application | Specification |
|---|---|
| Valve Seats | |
| Intake Valve | |
| Seat Angle | 46° |
| Seat Width | .04-.065" (1.02-1.65 mm) |
| Maximum Seat Runout | .002" (.05 mm) |
| Exhaust Valve | |
| Seat Angle | 46° |
| Seat Width | |
| Light Duty | .065-.098" (1.65-2.49 mm) |

| | |
|---|---|
| Heavy Duty | .059-1.01" (1.5-2.56 mm) |
| Maximum Seat Runout | .002" (.05 mm) |
| Valve Guide Oil Clearance | .001-.0027" (.025-.069 mm) |
| Warpage | .004" (.1 mm) |

**CYLINDER HEAD (7.4L)**

**CYLINDER HEAD (7.4L)**

| Application | Specification |
|---|---|
| Valve Seats | |
| Intake Valve | |
| Seat Angle | 46° |
| Seat Width | .035-.06" (.762-1.524 mm) |
| Maximum Seat Runout | .002" (.05 mm) |
| Exhaust Valve | |
| Seat Angle | 46° |
| Seat Width | .06-.095" (1.524-2.413 mm) |
| Maximum Seat Runout | .002" (.05 mm) |
| Valve Guide Oil Clearance | |
| Intake Valve | .001-.003" (.025-.074 mm) |
| Exhaust Valve | .0012-.0031" (.030-.077 mm) |
| Warpage | .004" (.1 mm) |

**CAMSHAFT (4.3L)**

**CAMSHAFT (4.3L)**

| Application | In. (mm) |
|---|---|
| End Play | .001-.009 (.025-.229) |
| Journal Diameter | 1.8682-1.8692 (47.452-47.478) |
| Lobe Lift | |
| Intake | .286-.29 (7.26-7.36) |
| Exhaust | .292-.296 (7.41-7.52) |

**CAMSHAFT (5.0L & 5.7L)**

**CAMSHAFT (5.0L & 5.7L)**

| Application | In. (mm) |
|---|---|
| End Play | .004-.012 (.11-.3) |
| Journal Diameter | 1.8677-1.8697 (47.44-47.49) |
| Lobe Lift | |
| Intake | .274-.278 (6.96-7.07) |
| Exhaust | .283-.287 (7.2-7.3) |

## CAMSHAFT (7.4L)

### CAMSHAFT (7.4L)

| Application | In. (mm) |
|---|---|
| Journal Diameter | 1.9477-1.9497 (49.471-49.522) |
| Lobe Lift | |
| Intake | .2801-.284 (7.115-7.215) |
| Exhaust | .2843-.2862 (7.171-7.271) |

## BALANCE SHAFT (4.3L)

### BALANCE SHAFT (4.3L)

| Application | In. (mm) |
|---|---|
| Journal Diameter | |
| Front Journal | 2.1648-2.1654 (54.986-55.001) |
| Rear Journal | 1.4994-1.5 (38.085-38.1) |
| Oil Clearance (Rear Journal) | .001-.0036 (.025-.091) |