

SOHC 1.9L ENGINE

DOHC 1.9L ENGINE

| Model Year | Reman Engine | Reman Head | Model Year | Reman Engine | Reman Head |
|------------|--------------|------------|------------|--------------|------------|
| 91-92 | 21009300 | 21009404 | 91-92 | 21009307 | 21009407 |
| 93-94 | 21009301 | " | 93 | 21009308 | " |
| 95 | 21009302 | 21009405 | 94 | " | 21009408 |
| 96-97 | 21009303 | 21009406 | 95 | 21009309 | 21009409 |
| 98 | 2109304 | " | 96-97 | 21009310 | 21009410 |
| 99 | 21009305 | " | 98 | 21009311 | " |
| 00-02 | 21009306 | 21009319 | 99 | 21009312 | 21009411 |
| | | | 00-02 | 21009313 | 21009414 |

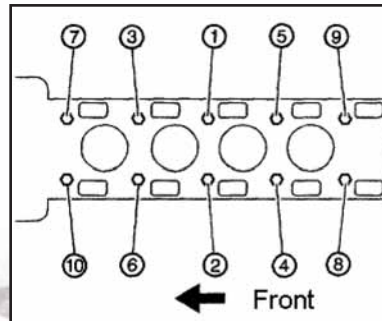


Chart 1 Saturn 1.9L remanufactured engine identification. Parts may be non-standard.

Remanufactured Engine Caution For 1.9L DOHC Saturn Engines

The AERA Technical Committee says that certain 1998-2003 1.9L VIN 7 Saturn engines remanufactured by General Motors may have used internal parts that may be considered non-standard over/under sizes to aftermarket suppliers.

General Motors has identified those components (rings, bearings and pistons) on a decal that is applied to the engine block. The caution expressed in this bulletin applies to engines that require parts replacement after a GM rebuilt engine is installed.

1) Determine if the engine was remanufactured by GM: Raise the hood and, with a flashlight, look for the yellow Mylar sticker located in the lower area of the bell housing flange on the exhaust side of the engine (thermostat side).

2) The sticker contains information about the remanufactured engine such as part number, serial number and size of the crankshaft bearings and piston bores.

This is how to read the sticker:

Located in the left top corner is an 8 digit part number (Saturn Service Parts number).

Located below that is the part number and remanufactured serial number (6 digits). The serial number is unique for each engine.

The sticker uses a punched hole that shows the size of ALL main

bearings. There are four sizes: standard or .0005", .0010" and .010" (.012, .025, and .250 mm) under-size (.250 mm is under-size limit).

A punched hole also shows the size of ALL connecting rod bearings. There are four sizes – standard or .0005", .0010" and .010" (.012, .025, and .250 mm) under-size (.250 mm is under-size limit).

The placement of another punched hole shows the size of ALL the bores/pistons. There are three sizes – standard or .0049" and .016" (.125 and .400 mm) over-size (.400 mm is over-size limit).

If the remanufactured engine is repairable, use the correct size bearings for the crank and rods, or pistons and rings as indicated on the sticker (or machine to the next size if the engine has not been remanufactured to the size limit). Aftermarket piston and bearing suppliers have additional sizes readily available, but not in all of the above listed sizes.

Saturn offers many combinations of different cylinder head and complete engines depending on the applications as shown in **Chart 1**, above.

Cylinder Head Bolt Caution On 2001-'02 GM 2.2L VIN F Engines

Saturn service manuals may have the incorrect torque listed for 2001-2002 GM 2.2L VIN F engines, says AERA's Technical Committee.

Figure 1 2001-'02 GM 2.2L Head bolt torque sequence.

If the published torque is used, cylinder head bolts may break. Previously published head torque had an additional 185° added to the torque. The correct torque for this engine should be 22 ft.lbs. + 155°. Any time the cylinder head is taken off of this engine, cylinder head bolts must be replaced. Follow the torque sequence provided in **Figure 1**, above.

Low Coolant Or Loss On 1997-2001 GM 3.0L VIN R Engines

Customers/installers may complain of a low coolant light being on and/or engine overheating on 1997-2001 GM 3.0L VIN R engines, which was used in the Cadillac Catera. A leaking oil cooler cover due to an adhesion condition between the cover and the engine block may cause this condition.

Remove the oil cooler cover from the engine and the old sealant from the engine block and the oil cooler cover. Use only a plastic or metal scraper to remove the old sealant residue. Clean both surfaces using a solvent that will not leave any residue on those surfaces.

Apply a .080" bead of sealant (p/n 2378521; Canada use p/n 88901148 or equivalent), in the groove around the engine oil cooler cover as shown in **Figure**

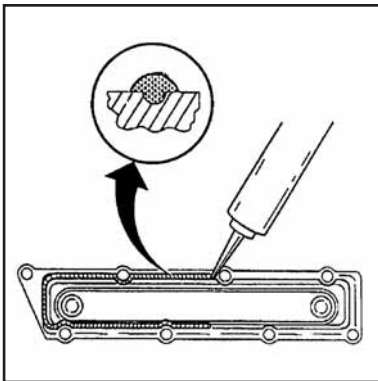


Figure 2 Apply around oil cooler on '97-2001 3.0L GM engines.

2, above.

Install the engine oil cooler cover back to the engine block and torque to 22 ft.lbs.

Rocker Arm Adjustment For 1993-'99 GM 3.1 L VIN M Engines

Generally, adjustment of the bolt-down rocker assembly for 1993-'99 GM 3.1L VIN M engines is not necessary but becomes desirable if a valve is not closing. The machining of different components during a valve job may prevent a valve from completely closing after the engine is reassembled.

Rocker arm shims may be required when reinstalling these rocker arms after surfacing the cylinder head gasket surface. There can be several reasons for this including varnish inside the hydraulic lifters, preventing full plunger travel. Engine builders report some difficulty obtaining these shims without supplying GM the part number.

Each shim (GM calls it a retain-er) is sold separately (GM p/n 88894006) and is .010" (.254 mm) thick. Do not use more than two shims per rocker as unwanted misalignment may result. If more than two shims are required to prevent valves from closing, the valve seat(s) and or valve(s) may require

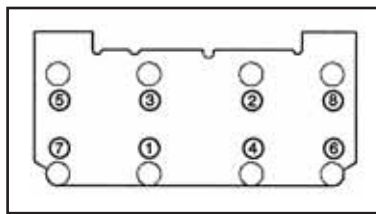


Figure 3 Revised cylinder head torque sequence for 2001-2002 GM 3.1L and 3.4L engines.

replacement.

Note: Whenever these heads hit your door you should measure and record the height of the valve tip above the retainer and the installed valve stem height. After machining the components, make sure the heights do not exceed the original figures. This may prevent the possibility of valves holding open after reassembling this engine.

Revised Cylinder Head Torque On 2001-2002 3.1 & 3.4L Engines

To correctly install the cylinder heads on 2001-2002 3.1L and 3.4L engines, GM offers the following information regarding cylinder head torque along with a torque sequence. Vehicles with the 3.1L engine have VIN Code J while vehicles with the 3.4L engine have VIN Code E.

Tighten the cylinder head bolt to 44 ft.lbs. (60 Nm) in the sequence shown in **Figure 3**, above. Using a torque angle meter, turn the bolts an additional 95°. If this torque procedure is not followed, engine damage could occur.

Revised Upper Intake Manifold Gaskets For 1995-2004 GM 3.8L VIN K Engines

The AERA Technical Committee offers the following information regarding a revised upper intake manifold for 1995-2004 GM 3.8L VIN K engines. Engines manufactured for the 2005 model year include the revised gasket.

With the recent availability of these new kits (**Figure 4** and **Chart 2**, page 21) it provides much greater ability to get exactly what is necessary for a proper repair. Previously, parts may not have been available in desired quantities, which delayed repair. In addition to better availability, some of the gaskets have been updated to a more robust design for greater durability.

Caution On Camshaft Magnet Interrupt Installation For 1985-88 GM 3.8L VIN C & 7 Engines

A no-start condition could exist if the camshaft magnet interrupt is not properly installed on 1985-'88 GM 3.8L VIN C and 7 engines.

When installing the magnet interrupt on these engines, the installer must verify that the small brass retaining clip is in the correct position to retain the magnet. The clip must be in the forward most position in the die cast housing. If the clip is not present, the magnet will be attracted to the metal camshaft sprocket. If the engine is assembled without the clip, the magnet will be too far rearward to trigger the cam sensor and cause a no-start condition.

Revised Engine Oil Pick-Up Tube & Front Cover For 2002-2004 GM 4.2L VIN S Engines

A revised engine oil pick-up tube and front cover components for 2002-2004 GM 4.2L VIN S engines went into production during the 2004 model year.

The first design (**Figure 5**, page 22) was used in production for 2002-2003 and part of 2004 model year and used an O-ring type seal between the pick-up tube and the front cover. The second design (**Figure 6**, page 22) was used during production model year 2004

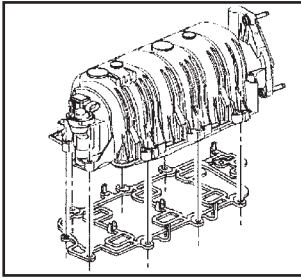


Figure 4 GM 3.8L engines manufactured for the 2005 model year include the revised gasket.

| Part Number | Item Name | Includes |
|----------------------|------------------------------|--------------------------------------------------------------------------------|
| 89017272 | Upper Intake Manifold Studs | Upper Intake Manifold & Throttle Body Mounting |
| 89017554 | Upper Intake Gasket Kit | Upper to Lower Intake Manifold Gasket, Throttle Body Gasket and PCV Draft Tube |
| 89017274 or 17113515 | PCV KIT | PCV Valve, PCV Valve Cover, "O" Ring seals & PCV Spring |
| 12580920 | Upper Intake Manifold Gasket | Upper Intake Manifold Gasket |

Chart 2 Recently updated upper intake gasket kits for 1995-2004 GM 3.8L engines.

and uses a face-type seal for the pick-up tube.

Any time the front cover or oil pick-up tube is serviced, be sure to identify which design is being serviced. The correct pick-up tube must be used with its corresponding front cover or an engine failure could result.

Any vehicle requiring a new front cover must be serviced with the second design front cover; therefore, the engine oil pick-up tube must be replaced at the same time.

Oil Filter By-Pass Valve Caution for 1985-'97

GM 4.3L VIN B, N, R, W and Z Engines

The AERA Technical Committee says 1985-'97 GM 4.3L VIN B, N, R, W and Z engines, used in a wide range of applications, require a specific oil filter by-pass valve. Most of these engine applications use a remote engine oil filter and oil cooler (remote oil filter by-pass valve p/n 25014612; standard mount oil filter by-pass valve p/n 25014006).

These engines require an oil filter by-pass valve with a higher psi opening rate. This is due to the inherent restriction caused by the oil cooler and remote fil-

ter. During engine start-up periods, unfiltered oil may enter the lubrication system if the revised by-pass valve is not used. This revised valve does not fully open until 21 psi, which should prevent unfiltered oil from entering the oil galleys. The previous valve starts opening at 8 psi and is fully open at 11 psi.

Engines that do not use a remote filter or oil cooler may use the original oil filter bypass valve.

General Motors also recommends replacing the oil cooler on any engine that has failed catastrophically or due to a bearing failure. It is also recommended all oil lines and adapters be removed from the vehicle and thoroughly cleaned and flushed, or replaced.

Never use any abrasive surface conditioning discs or similar products to clean gasket surfaces. Tests have shown grit from those pads has entered the engine oil supply and is a leading cause of bearing failure for this engine.

Installation and break-in of this engine also requires special precautions. They include:

- 1) Prime engine for at least two minutes with either the engine's oil pump (Do not use starter to rotate engine) or an external source.

- 2) GM recommends at least a 30

mile test drive and then changing engine oil and filter. Drive in both city and highway conditions, not to exceed 50 mph.

- 3) A follow-up oil and filter change after an additional 300-500 miles should also be made before returning to the regular engine maintenance schedule.

Oversize Cylinder Boring Options For The 1999-2005 GM 5.3L VIN T Engines

Currently, oversize pistons are available for 1999-2005 GM 5.3L VIN T engines in .020" (.50 mm), .030" (.75 mm) and .040" (1.00 mm), which allows for refinishing a damaged or worn cylinder bore. The original cylinder bore size is a diameter of 3.7795"-3.7802" (95.999-96.017 mm).

If it's determined a larger oversize bore may be required to repair a particular block, an alternative should be considered. The 5.3L cylinder block has very thick cylinder walls, which is uncharacteristic of modern light weight engines. It has been determined by ultrasonic testing that sufficient wall thickness exists to allow an overbore size of the LS1/LS6 GM engines. The bore size for those engines is

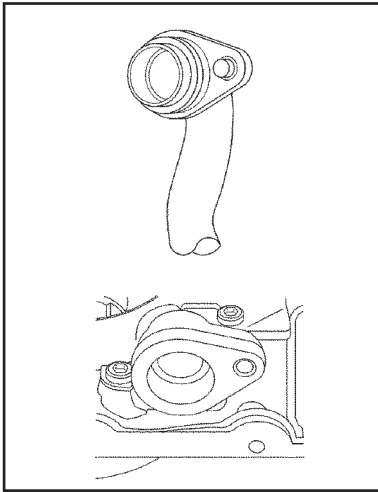


Figure 5 Oil pick-up tube for GM 4.2L 2002-'03 and part of 2004 (first design).

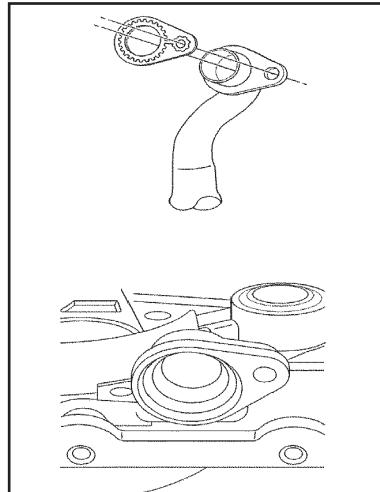


Figure 6 Oil pick up tube for 2004 GM 4.2L with face type seal (second design).

reuse the 8 mm head bolts and it is now recommended all cylinder head bolts should be replaced at the time of cylinder head installation. The new 11 mm bolts come with a pre-applied sealer and lubricant and no other sealant should be used on them.

1) Tighten new 11 mm bolts (1-10) in sequence to 22 ft.lbs. (30 Nm).

2) Rotate those bolts (1-10) in sequence an additional 90° turn using a torque angle meter.

3) Rotate only bolts 1-8 in sequence an additional 90° turn using a torque angle meter.

4) Rotate remaining 11 mm bolts 9 and 10 in sequence an additional 50° turn using a torque angle meter.

5) Apply a .200" (5 mm) bead of locking compound (GM p/n 12345382 or equivalent) to the new 8 mm bolt threads, and tighten bolts (11-15) in sequence to 22 ft.lbs. (30 Nm).

Do not re-use either the 8mm or 11mm head bolts. **EB**

3.8970" - 3.8980" (98.984 - 99.009 mm), which is an increase of .120" (3.00 mm).

One engine builder reports that a standard bore cylinder wall thickness, measured at the major and minor thrust sides (intake to exhaust sides) are a healthy .450" thick. The cylinder wall thickness measured front to rear on the block was approximately .300" (7.620 mm) thick.

A third option of repair would be to install cylinder sleeves in damaged bores. The bores could then be bored either back to the standard bore or appropriate

oversize piston diameter.

Revised Cylinder Head Installation Procedure For 1997-2005 GM 5.7L VIN G & S Engines

The AERA Technical Committee offers the following information on a revised cylinder head installation procedure for 1997-2005 GM 5.7L VIN G and S engines.

This procedure (**Figure 7**, below) should be used any time the cylinder head is being installed and supersedes information found in earlier published service manuals.

Previously, it was acceptable to

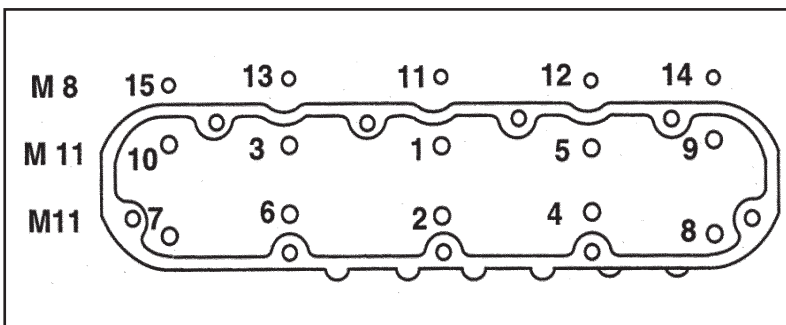


Figure 7 Cylinder head torque sequence for 5.7L GM engine using 8 mm and 11 mm head bolts.