3. Check cylinder bore to determine piston-to-cylinder clearance. Clearance should be within specification. See **PISTONS, PIN & RINGS** table under ENGINE SPECIFICATIONS.

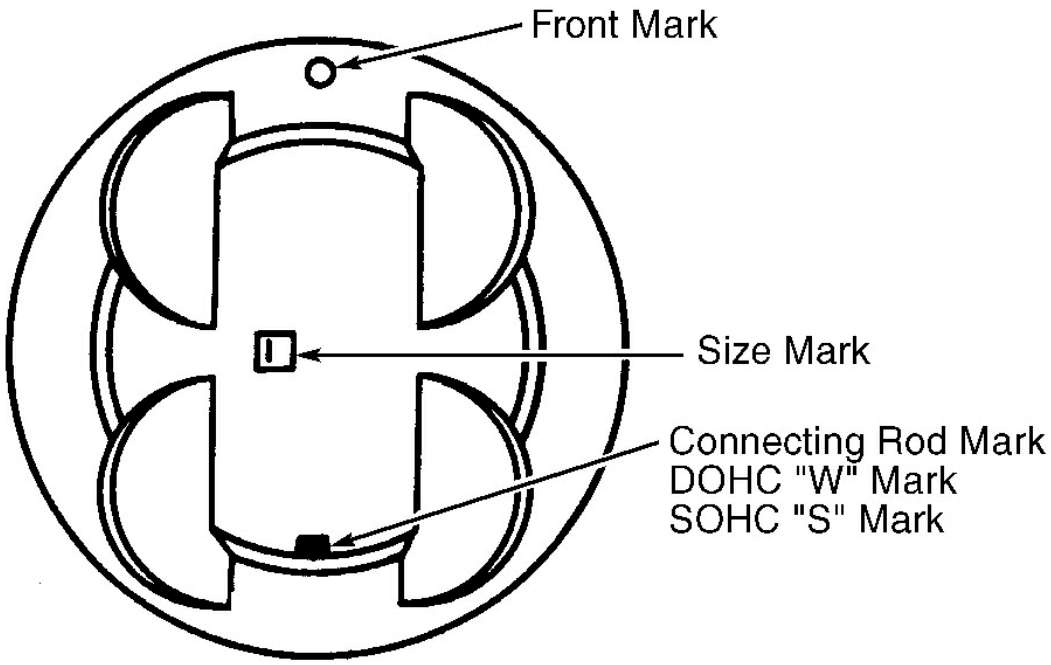

Fig. 6: Identifying Piston & Connecting Rod Size
Courtesy of ISUZU MOTOR CO.

Piston Pins

1. Measure piston pin outside diameter in 2 directions and 3 places. See **Fig. 7**. If outside diameter is not within specification at any one place, replace piston pin. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.
2. Ensure piston pin to connecting rod interference fit is within specification. Measure inside diameter of connecting rod small end. If interference fit is not within specification, replace connecting rod and piston pin. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.

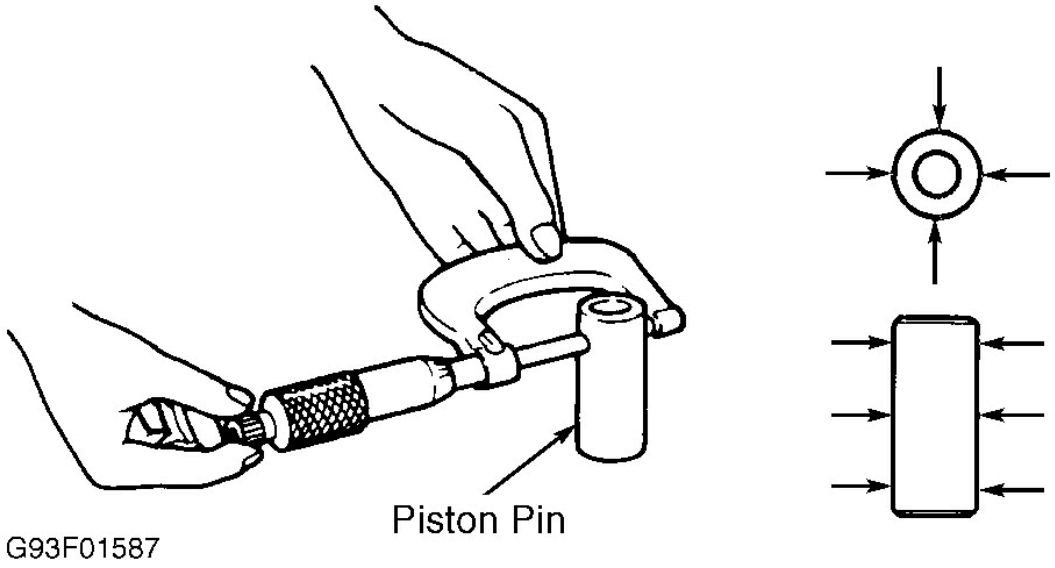

Fig. 7: Measuring Piston Pins
Courtesy of ISUZU MOTOR CO.

Piston Rings

1. Place NEW piston ring into cylinder bore. Using a piston, push ring into smallest part of cylinder bore. Measure ring end gap. If ring end gap is too large, use an oversize ring. If ring end gap is too small, file material from end of ring. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.
2. Measure clearance between piston ring groove and piston ring. If clearance is not within specification, replace piston. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS. Position piston ring gaps in proper areas. See **Fig. 8**.

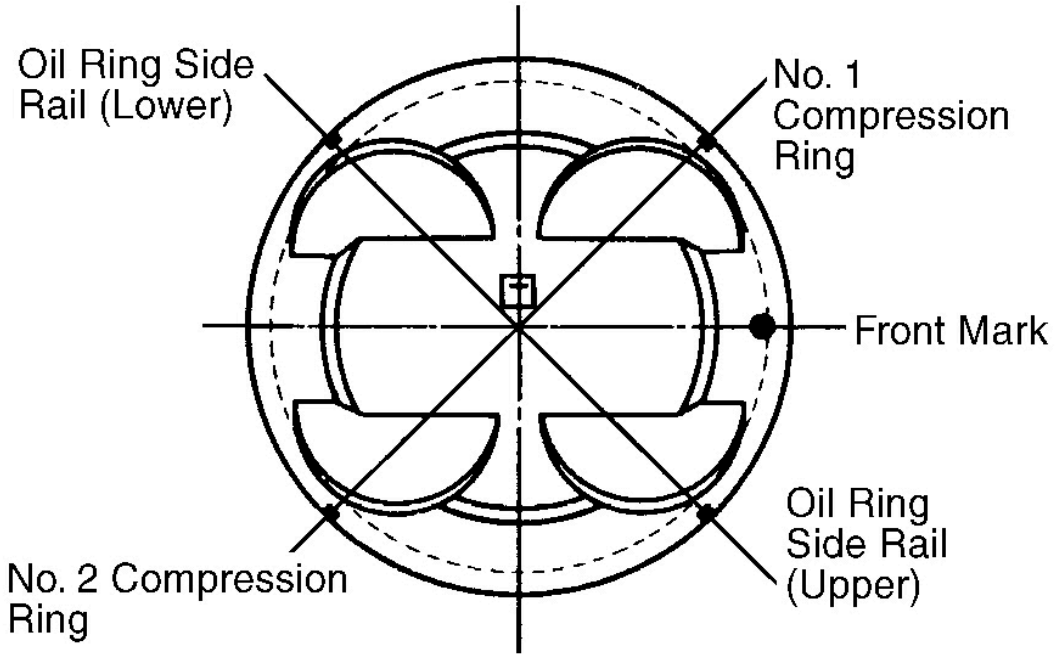

Fig. 8: Positioning Piston Rings
Courtesy of ISUZU MOTOR CO.

Rod Bearings

1. Note direction of connecting rod and cap installation. Ensure connecting rod is installed so front mark at center of connecting rod is toward front of engine. See **Fig. 5**.
2. Connecting rod big end bore diameter is indicated by an "A", "B" or "C" size mark stamped on one side of connecting rod. See **Fig. 5**. Ensure big end bore diameter is within specification. See **CONNECTING RODS** table under ENGINE SPECIFICATIONS.
3. Check rod bearing oil clearance using Plastigage. Ensure bearing oil clearance and side play are within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** and **CONNECTING RODS** tables under ENGINE SPECIFICATIONS.
4. If rod bearing oil clearance is incorrect, it may be possible to obtain correct clearance using selective service rod bearings. Rod bearings are available in 3 standard service sizes, indicated by a color code on bearing. See **ROD BEARING SPECIFICATIONS** table. Coat nut and threads with engine oil before installing. Tighten nuts to specification. See **TORQUE SPECIFICATIONS**.

ROD BEARING SPECIFICATIONS

Color Code	Bearing Thickness - In. (mm)
Yellow	.0595-.0597 (1.512-1.516)

Green	.0594-.0595 (1.508-1.512)
Pink	.0592-.0594 (1.504-1.508)

Crankshaft & Main Bearings

1. Ensure main bearing caps are numbered for location. Mark bearing cap for reassembly reference. Remove main bearing cap bolts in proper sequence. See **Fig. 9**.
2. Cylinder block main bearing bore size is indicated by numerical size mark stamped on cylinder block. See **Fig. 10**. Main bearing journal size is determined by size marks, given in dashes (-), located on crankshaft front counterweight. See **Fig. 11**.
3. If color code on original bearing cannot be obtained, use size marks on cylinder block and crankshaft to determine proper color-coded main bearing. See **MAIN BEARING SELECTION** table.
4. When installing main bearing caps, ensure reassembly reference mark on cap points toward front of engine. Coat bolt threads with engine oil before installing.
5. Tighten bolts in sequence to specification. See **Fig. 16**. See **TORQUE SPECIFICATIONS**. Ensure crankshaft end play is within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS.

MAIN BEARING SELECTION

Cylinder Block Size Mark	Crankshaft Size Mark	Bearing Color Code
1	1 Or -	Brown
1	2 Or - -	Blue
2	1 Or -	Green
2	2 Or - -	Brown
3	1 Or -	Yellow
3	2 Or - -	Green

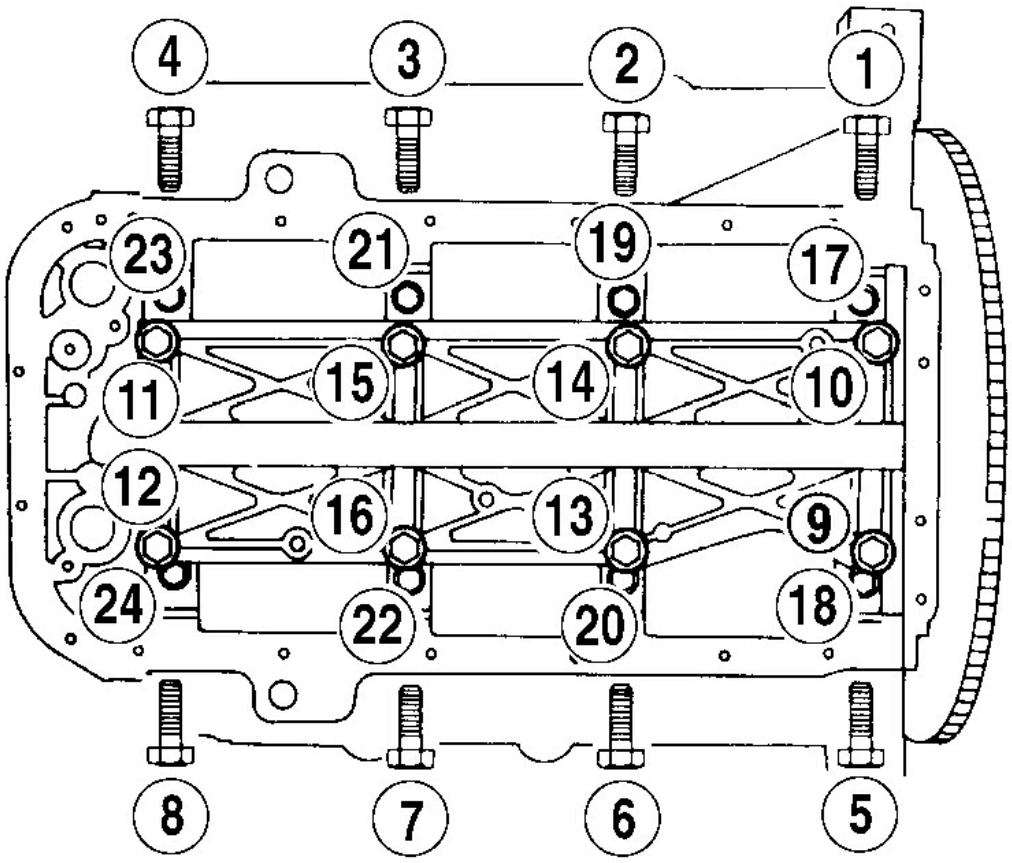

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Fig. 9: Main Bearing Bolt Removal Sequence
Courtesy of ISUZU MOTOR CO.

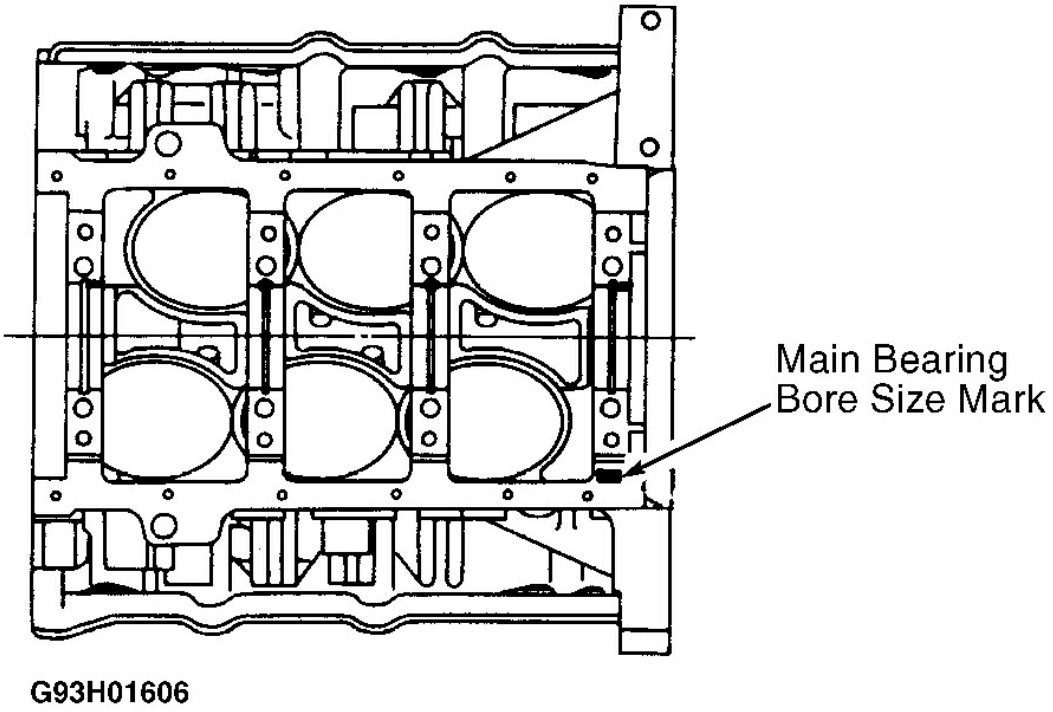

Fig. 10: Identifying Main Bearing Bore Size
Courtesy of ISUZU MOTOR CO.

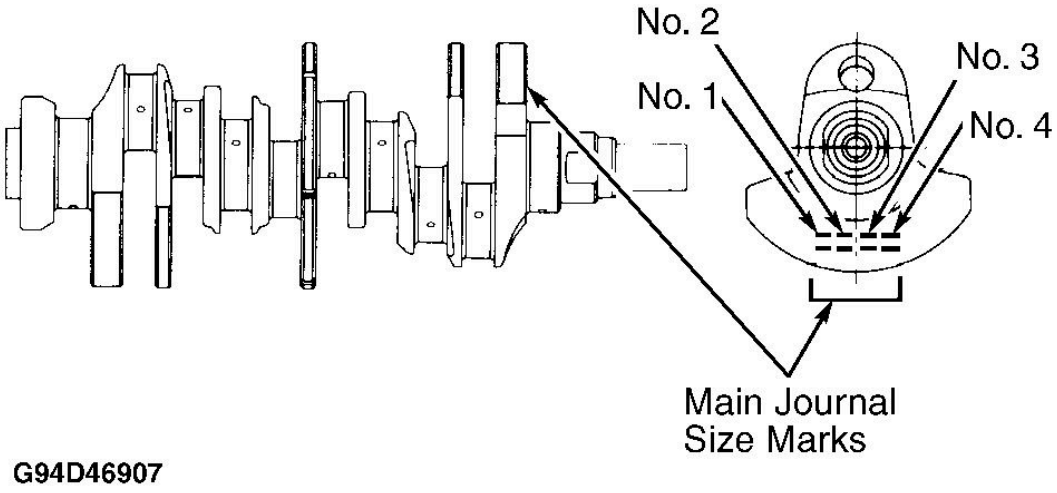

Fig. 11: Identifying Main Bearing Journal Size

Courtesy of ISUZU MOTOR CO.

Thrust Bearing

Install thrust bearing on No. 3 main bearing so grooves are toward crankshaft, away from cylinder block. Replace thrust bearing if crankshaft end play is not within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS.

Cylinder Block

1. Using feeler gauge and straightedge, check cylinder block deck surface warpage. If warpage exceeds specification, resurface or replace cylinder block. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS.
2. Check diameter of cylinder bore. Measure cylinder in axial and thrust directions. Different cylinder bore sizes are used and can be identified by size marks on deck surface of cylinder block. See **Fig. 12**. Cylinder size marks are stamped in relation to cylinder layout.
3. Ensure diameter of cylinder bore is within specification. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS. If diameter of cylinder bore exceeds maximum limit, replace cylinder block.

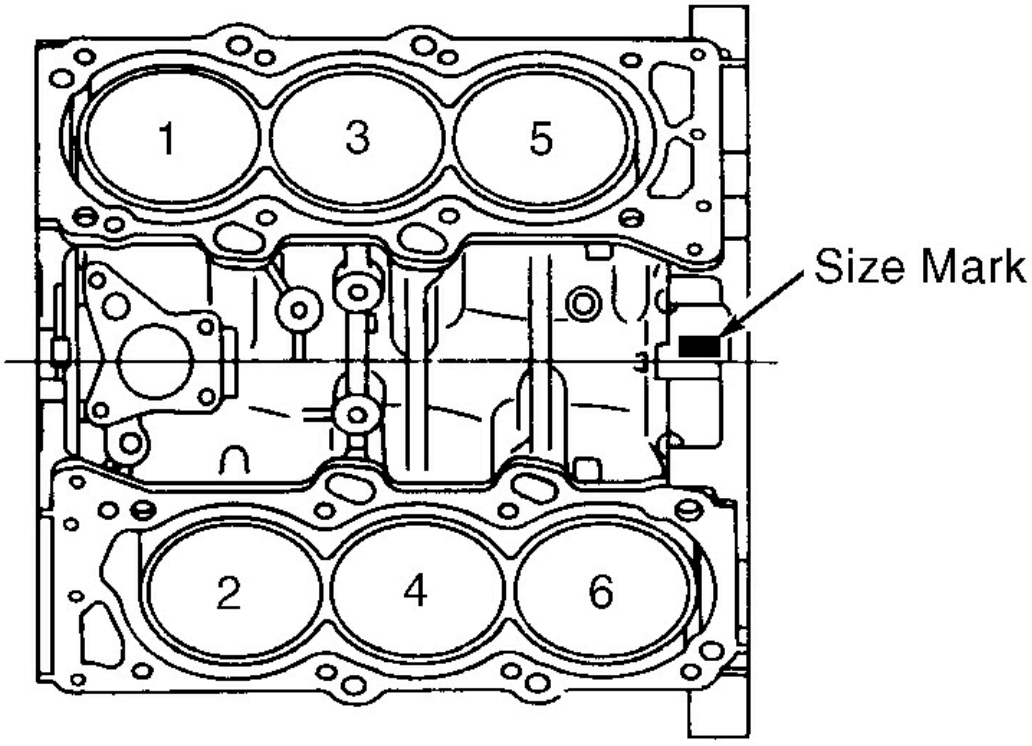

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Fig. 12: Identifying Cylinder Bore Diameter
Courtesy of ISUZU MOTOR CO.

ENGINE OILING

ENGINE LUBRICATION SYSTEM

A trochoid-type oil pump is used. Oil pump is driven by crankshaft. Oil pump delivers filtered oil through full-flow oil filter and water-cooled oil cooler to main oil gallery, feeding crankshaft journals and cylinder head. Oil passages in crankshaft supply oil to connecting rod journals. Engine cylinder bore and piston pins are lubricated by oil sprayed from connecting rods.

Crankcase Capacity

Crankcase capacity is 5.6 qts. (5.3L) with oil filter change.

Oil Pressure

With engine at normal operating temperature, ensure oil pressure is 57-80 psi (3.9-5.6 kg/cm^2) at 3000 RPM.

OIL PUMP

Removal & Disassembly

1. Remove timing belt. See **TIMING BELT** under REMOVAL & INSTALLATION. Remove crankshaft sprocket from oil pump. Remove oil pan. Remove oil strainer and oil pipe.
2. Remove oil cooler assembly. Remove oil pump bolts and oil pump. See **Fig. 13**. Remove pressure relief valve. Remove oil pump cover. Mark oil pump gears for reassembly reference. Remove oil pump gears. Remove oil seal from oil pump housing.

NOTE: In colder climates, pressure relief valve may stick, creating excessive oil pressure and causing oil filter to deform and leak. If this condition exists, install NEW pressure relief valve and spring.

Inspection

1. Inspect components for damage. Install gears in oil pump housing. Place straightedge across oil pump housing surface.
2. Using feeler gauge, measure gear side clearance. Replace components if clearance exceeds specification. See **OIL PUMP SPECIFICATIONS** table.
3. Using feeler gauge, measure side clearance between outside edge of outer gear and oil pump housing. Replace components if clearance exceeds specification. See **OIL PUMP SPECIFICATIONS** table.
4. Assemble gears in oil pump housing. Using feeler gauge, measure clearance between tip of inner gear and tip of outer gear. Replace components if clearance exceeds specification. See **OIL PUMP SPECIFICATIONS** table.

OIL PUMP SPECIFICATIONS

Application	In. (mm)
Gear Side Clearance	
Standard	.001-.004 (.03-.10)
Wear Limit	.006 (.15)
Outer Gear-To-Oil Pump Housing Clearance	
Standard	.004-.007 (.10-.18)
Wear Limit	.008 (.20)
Gear Tip Clearance	
Standard	.004-.009 (.10-.23)
Wear Limit	.014 (.35)

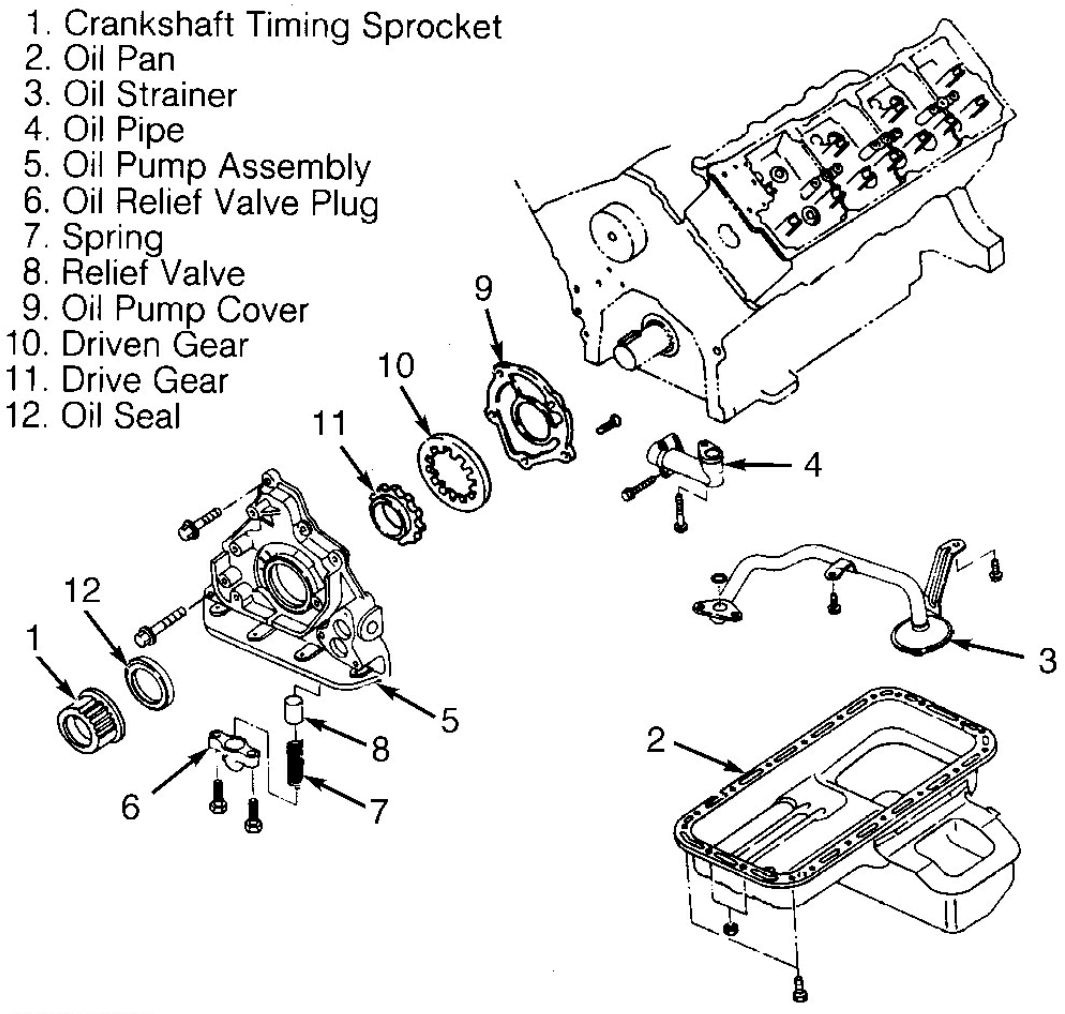

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Fig. 13: Exploded View Of Engine Oiling System
Courtesy of ISUZU MOTOR CO.

Reassembly & Installation

1. To reassemble, reverse disassembly procedure. Lubricate all components with engine oil. Install oil seal using Seal Installer (J-39202). Tighten oil pump assembly bolts to specification. See **TORQUE SPECIFICATIONS**.

   NOTE: Ensure oil pump gears rotate smoothly after oil pump cover bolts are tightened to specification.

2. To install, reverse removal procedure. Apply Sealant (TB-1207B) to oil pump gasket surface before installing oil pump. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS**.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Axle Housing Mounting Bolt	
Step 1	61 (83)
Step 2	112 (152)
Camshaft Idler Pulley Bolt	31 (42)
Camshaft Sprocket Bolt	41 (55)
Camshaft Timing Chain Tensioner Bolt	14 (19)
Common Chamber Duct Bolt	17 (23)
Connecting Rod Nut	40 (54)
Coolant Manifold Bolt	14 (19)
Crankshaft Pulley Bolt	123 (167)
Cylinder Head Bolt (1)	
M8	15 (20)
M11	47 (64)
DIS Module Assembly Bolt	14 (19)
Engine Hanger	
Bolt	15 (20)
Nut	42 (57)
Engine-To-Transmission Bolt	56 (76)
EGR Valve Bolt (Manifold Side)	21 (29)
Exhaust Manifold	
Bolt	21 (29)
Nut	42 (57)
Exhaust Pipe	