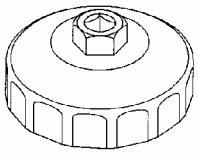
2003-06 ENGINE

Engine Lubrication - Element

SPECIAL TOOLS

Ref. No.	Tool Number	Description	Qty
①	07HAA-PJ70100	Oil Filter Wrench	1



①

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Fig. 1: View Of Service Tool And Description Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

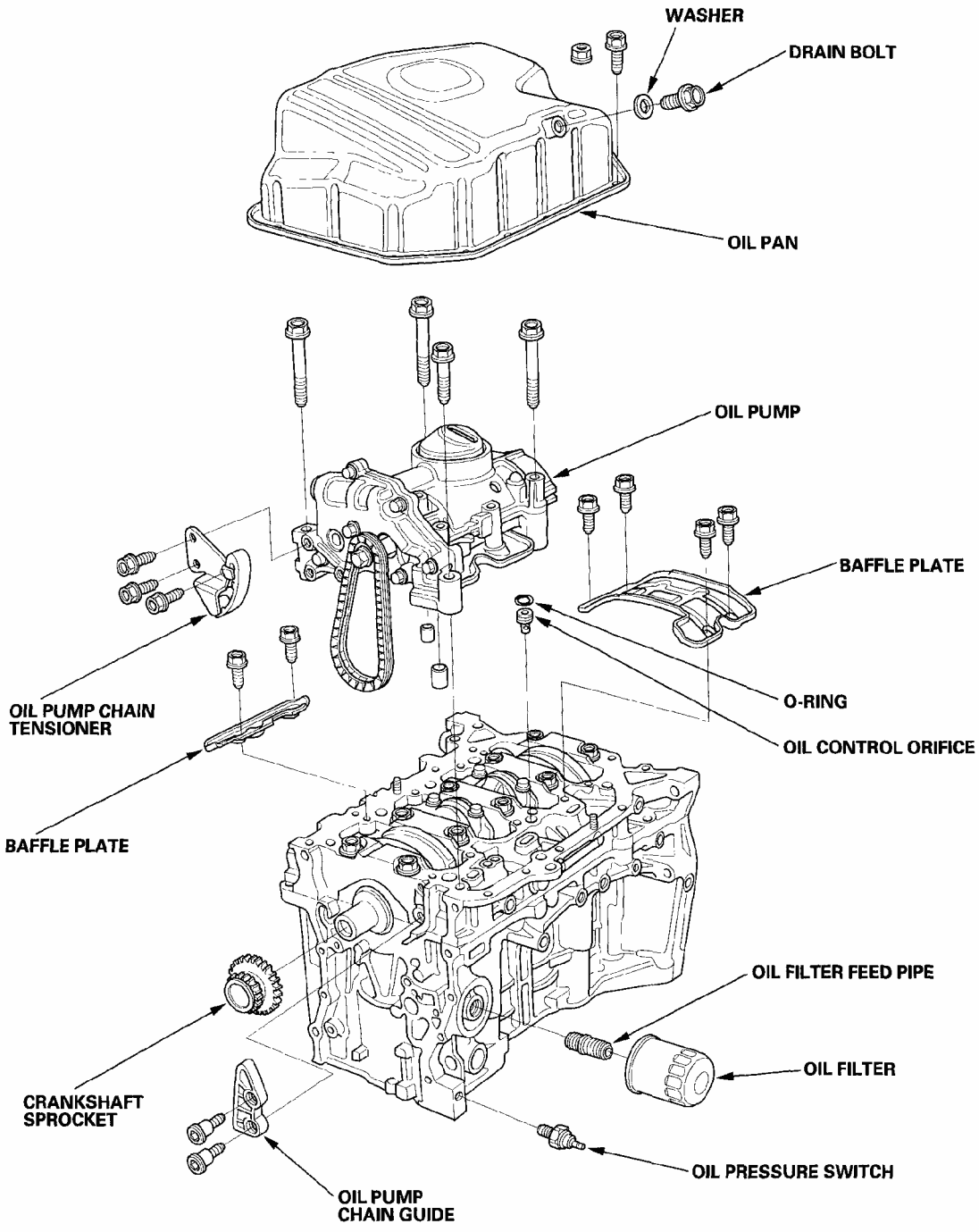

Fig. 2: Identifying Engine Lubrication System Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SYMPTOM TROUBLESHOOTING INDEX

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Symptom	Diagnostic procedure	Also check for

Excessive engine oil consumption	1. Check the loose of the engine oil filler cap, oil drain bolt, and oil filter. 2. Check for oil leaks. 3. Check for worn valve guide(s) (see **VALVE INSPECTION**) or worn valve stem seal(s) (see **VALVE INSPECTION**). 4. Check for damaged or worn piston ring(s) (see **PISTON RING REPLACEMENT**). 5. Check for damaged or worn engine internal parts (cylinder wall, pistons, etc.) (see **BLOCK AND PISTON INSPECTION**).	
Low oil pressure indicator does not come on with the ignition switch ON (II)	1. Do the gauge assembly self-diagnostic function (see **SELF-DIAGNOSTIC FUNCTION**). 2. Test the oil pressure switch (see **OIL PRESSURE SWITCH TEST**).	An open in the wire between the gauge assembly and the oil pressure switch
Low oil pressure indicator stays on	1. Check the engine oil level. 2. Do the gauge assembly self-diagnostic function (see **SELF-DIAGNOSTIC FUNCTION**). 3. Test the oil pressure switch (see **OIL PRESSURE SWITCH TEST**). 4. Check the engine oil pressure (see **OIL PRESSURE TEST**). 5. Check the oil filter for clogging. 6. Check the oil screen for clogging. 7. Check the relief valve. 8. Check the oil pump (see **OIL PUMP INSPECTION**).	A wire shorted to ground between the gauge assembly and the oil pressure switch

OIL PRESSURE SWITCH TEST

1. Remove the YEL/RED wire (A) from the engine oil pressure switch (B).

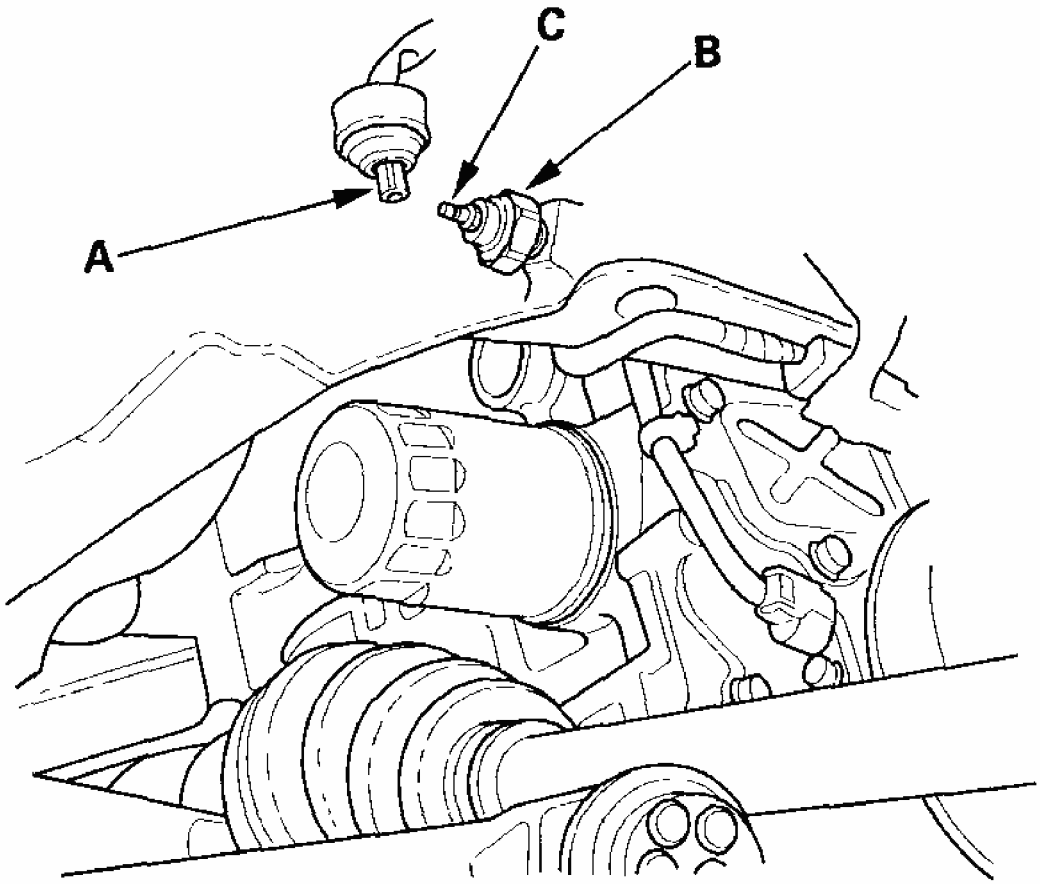


Fig. 3: Removing Yellow/Red Wire From Engine Oil Pressure Switch
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Check for continuity between the positive terminal (C) and the engine (ground). There should be continuity with the engine stopped. There should be no continuity with the engine running.
3. If the switch fails to operate, check the engine oil level. If the engine oil level is OK, check the engine oil pressure. If the oil pressure is OK, replace the oil pressure switch (see **OIL PRESSURE SWITCH TEST**).

OIL PRESSURE SWITCH REPLACEMENT

1. Disconnect the oil pressure switch connector, then remove the oil pressure switch.

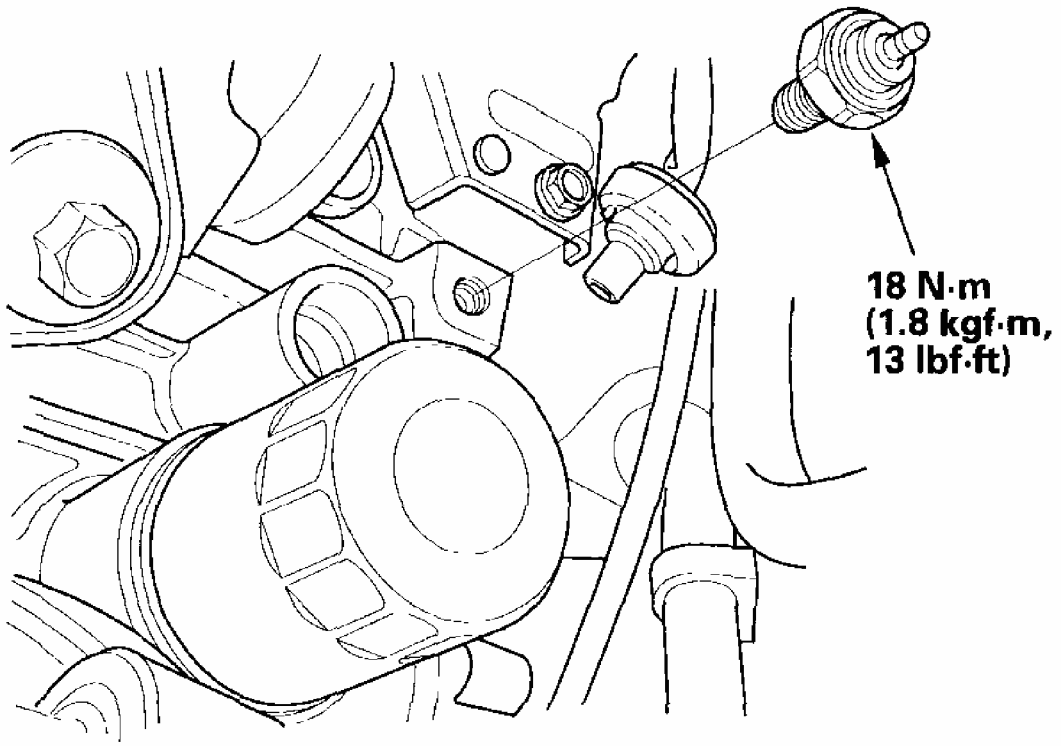


Fig. 4: Removing Oil Pressure Switch And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove any old liquid gasket from the switch and switch mounting hole.
3. Apply liquid gasket to the new oil pressure switch threads, then install the oil pressure switch.

NOTE: Do not install components if too much time has passed after applying the liquid gasket (for P/N 08718-0002, no more than 4 minutes, for all others, no more than 5 minutes). Instead, remove the old residue and reapply the liquid gasket.

OIL PRESSURE TEST

If the oil pressure warning light stays on with the engine running, check the engine oil level. If the oil level is correct:

1. Remove the engine oil pressure switch, and install an oil pressure gauge (A).

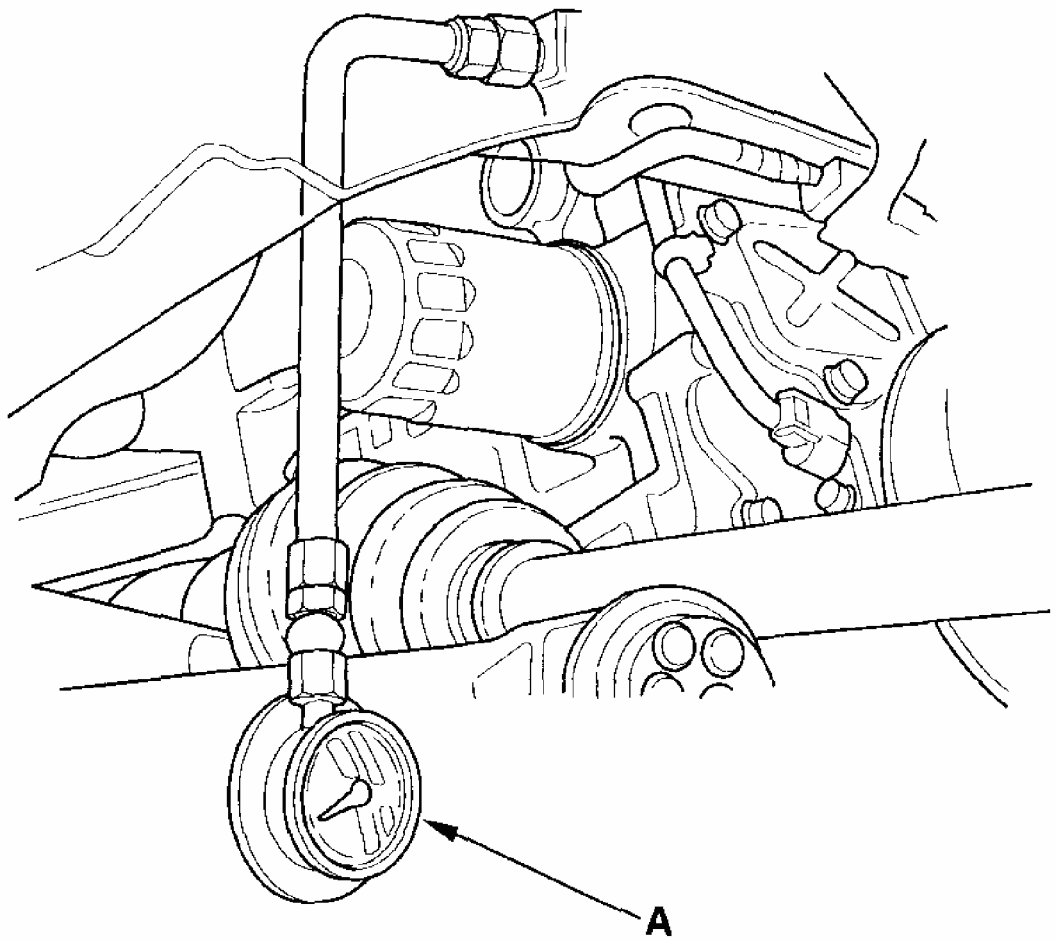


Fig. 5: Removing Engine Oil Pressure Switch
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Start the engine. Shut it off immediately if the gauge registers no oil pressure. Repair the problem before continuing.
3. Allow the engine to reach operating temperature (fan comes on at least twice). The pressure should be:

Engine Oil Temperature: 176°F (80°C)

Engine Oil Pressure:

At Idle: 70 kPa (0.7 kgf/cm^2 , 10 psi) min.

At 3,000 RPM: 300 kPa (3.1 kgf/cm^2 , 44 psi) min.

4. If the oil pressure is not within specifications, inspect these items:
   - Check the oil screen for clogging.
   - Inspect the oil pump (see **OIL PUMP INSPECTION**).

ENGINE OIL REPLACEMENT

1. Warm up the engine.
2. Remove the drain bolt (A), and drain the engine oil.

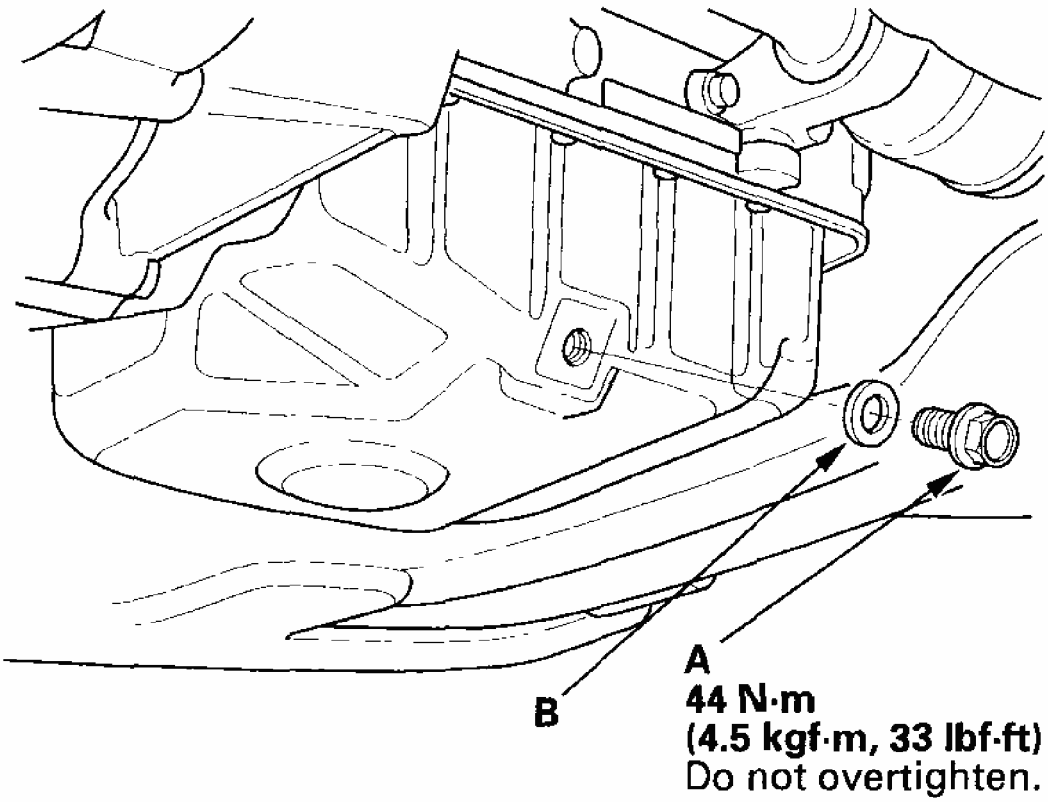


Fig. 6: Removing Engine Drain Bolt And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Reinstall the drain bolt with a new washer (B).
4. Refill with the recommended oil .

Capacity

At Oil Change: 4.0 L (4.2 US qt)

At Oil Change including Filter: 4.2 L (4.4 US qt)

After Engine Overhaul: 5.3 L (5.6 US qt)

5. Run the engine for more than 3 minutes, then check for oil leakage.

ENGINE OIL FILTER REPLACEMENT

Special Tools Required

Oil filter wrench 07HAA-PJ70100

1. Remove the oil filter with the special tool.
2. Inspect the threads (A) and rubber seal (B) on the new filter. Clean the seat on the engine block, then apply a light coat of new engine oil to the filter rubber seal. Use only filters with a built-in bypass system.

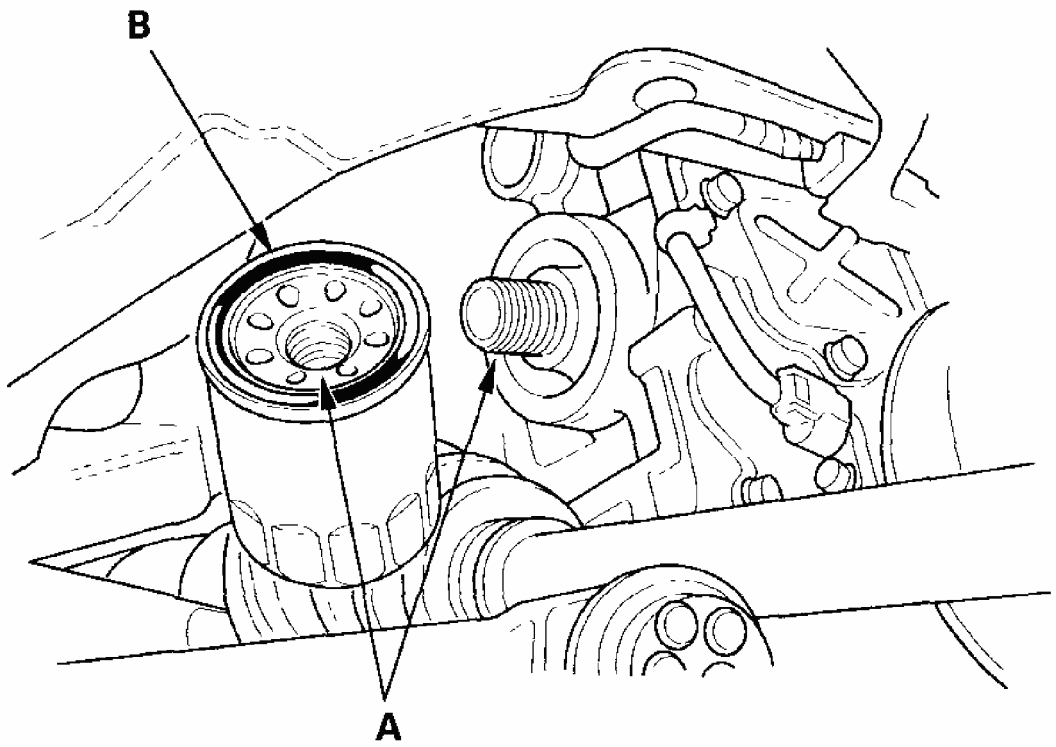


Fig. 7: Inspecting Oil Filter Threads And Rubber Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the oil filter by hand.

4. After the rubber seal seats, tighten the oil filter clockwise with the special tool.

   Tighten: 3/4 Turn Clockwise

   Tightening Torque: 12 N.m (1.2 kgf.m, 8.7 lbf.ft)

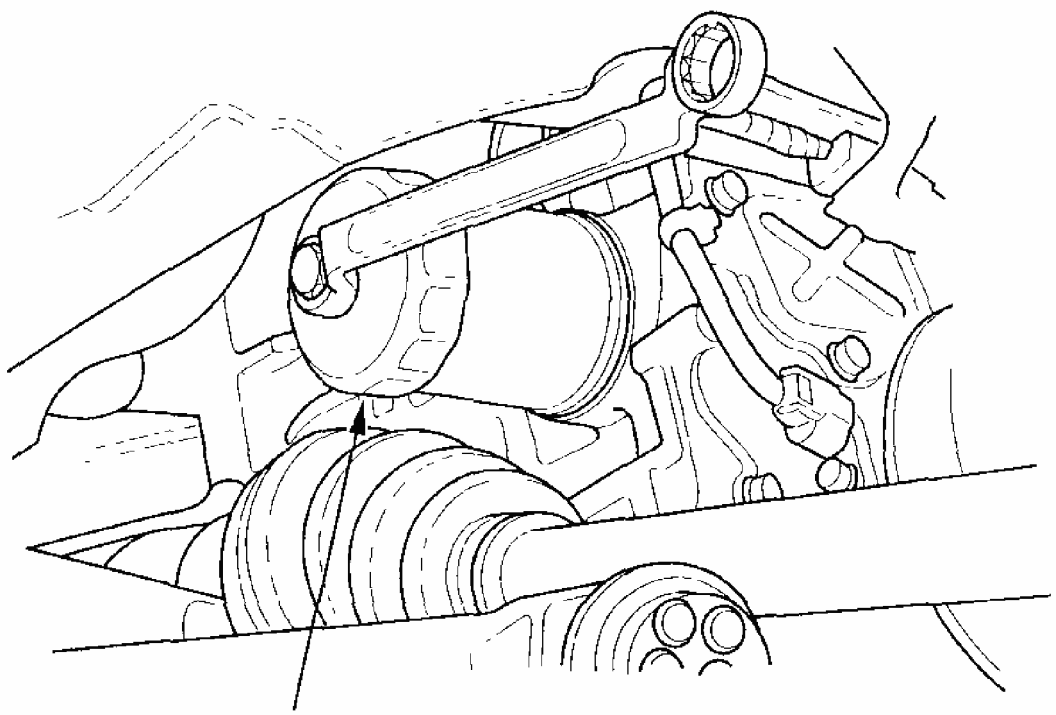
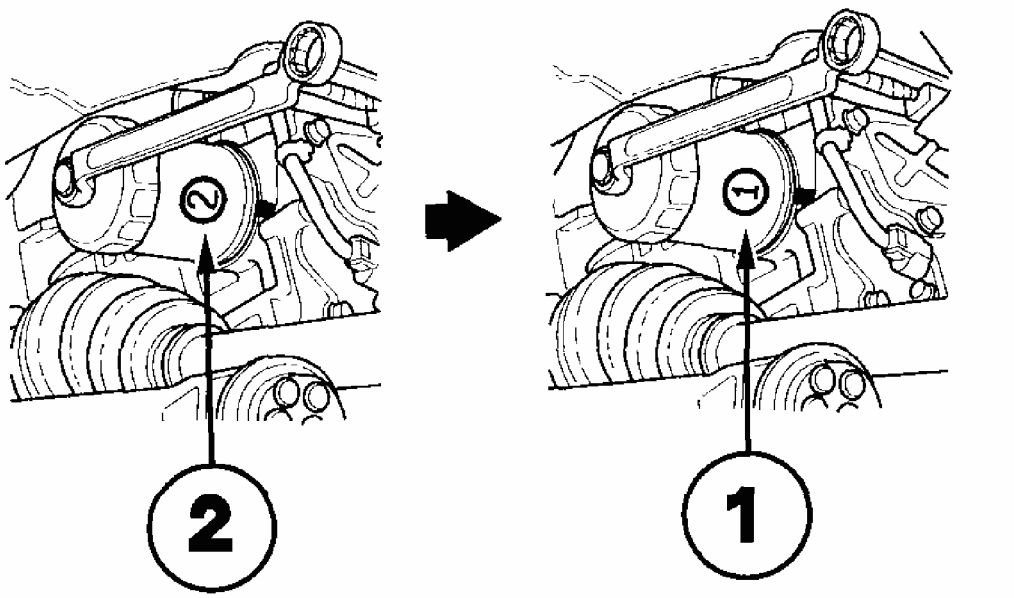


Fig. 8: Tightening Oil Filter Clockwise
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. If four numbers or triangle marks are printed around the outside of the filter, use the following procedure to tighten the filter.
   - Spin the filter on until its seal lightly seats against the block, and note which number or mark is at the bottom.
   - Tighten the filter by turning it clockwise three numbers or marks from the one you noted. For example, if number 2 is at the bottom when the seal is seated, tighten the filter until the number 1 comes around the bottom.



Number or mark when rubber seal is seated	1 or ▼	2 or ▼▼	3 or ▼▼▼	4 or ▼▼▼▼
Number or mark after tightening	4 or ▼▼▼▼	1 or ▼	2 or ▼▼	3 or ▼▼▼

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Fig. 9: Locating Engine Oil Filter Marks And Number Position Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. After installation, fill the engine with oil up to the specified level, run the engine for more than 3 minutes, then check for oil leakage.

OIL FILTER FEED PIPE REPLACEMENT

1. Remove the oil filter (see **ENGINE OIL FILTER REPLACEMENT**).

2. Remove the oil filter feed pipe.

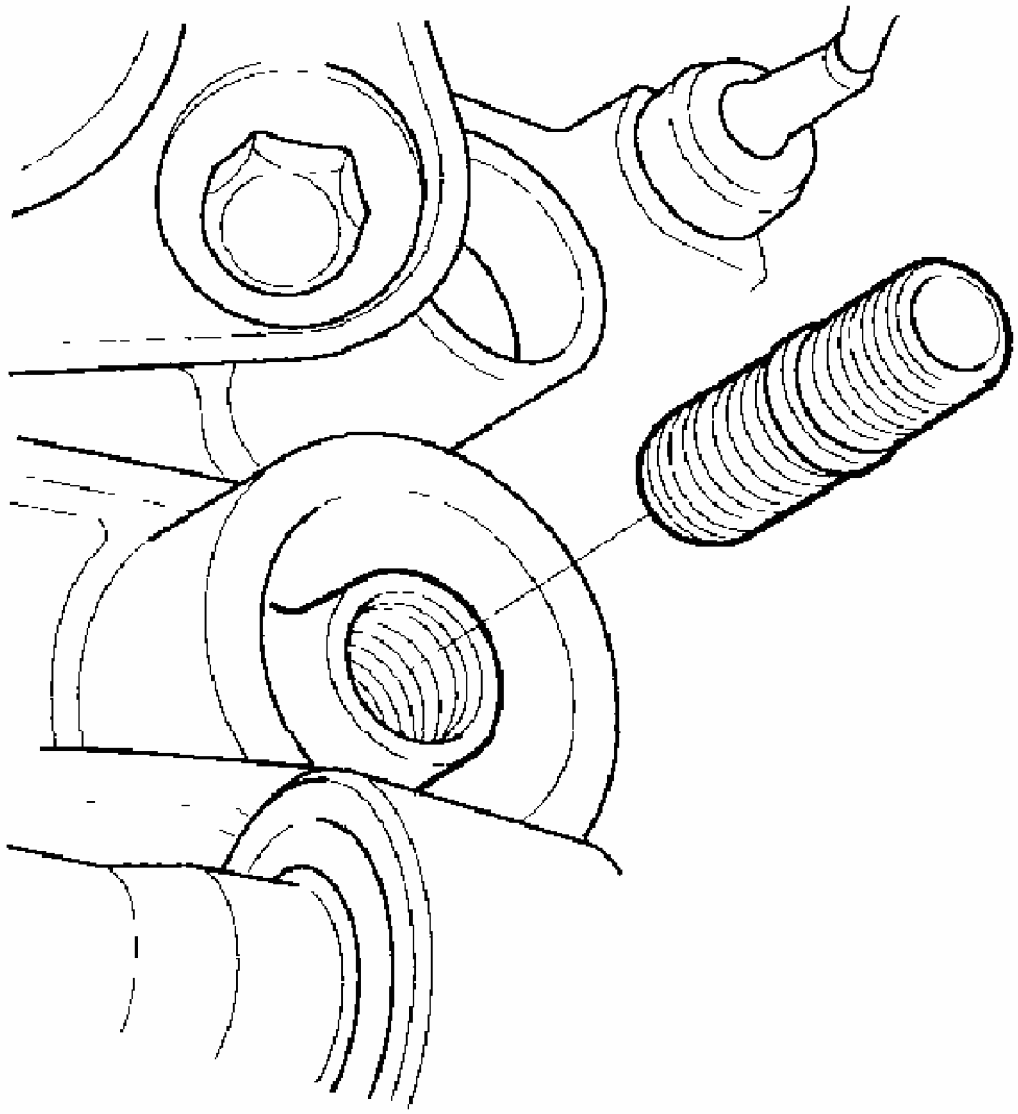

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Fig. 10: Removing Oil Filter Feed Pipe
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the two 20 x 1.5 mm nuts (A) onto the new oil filter feed pipe. Hold the nut with a wrench, then tighten the other nut.

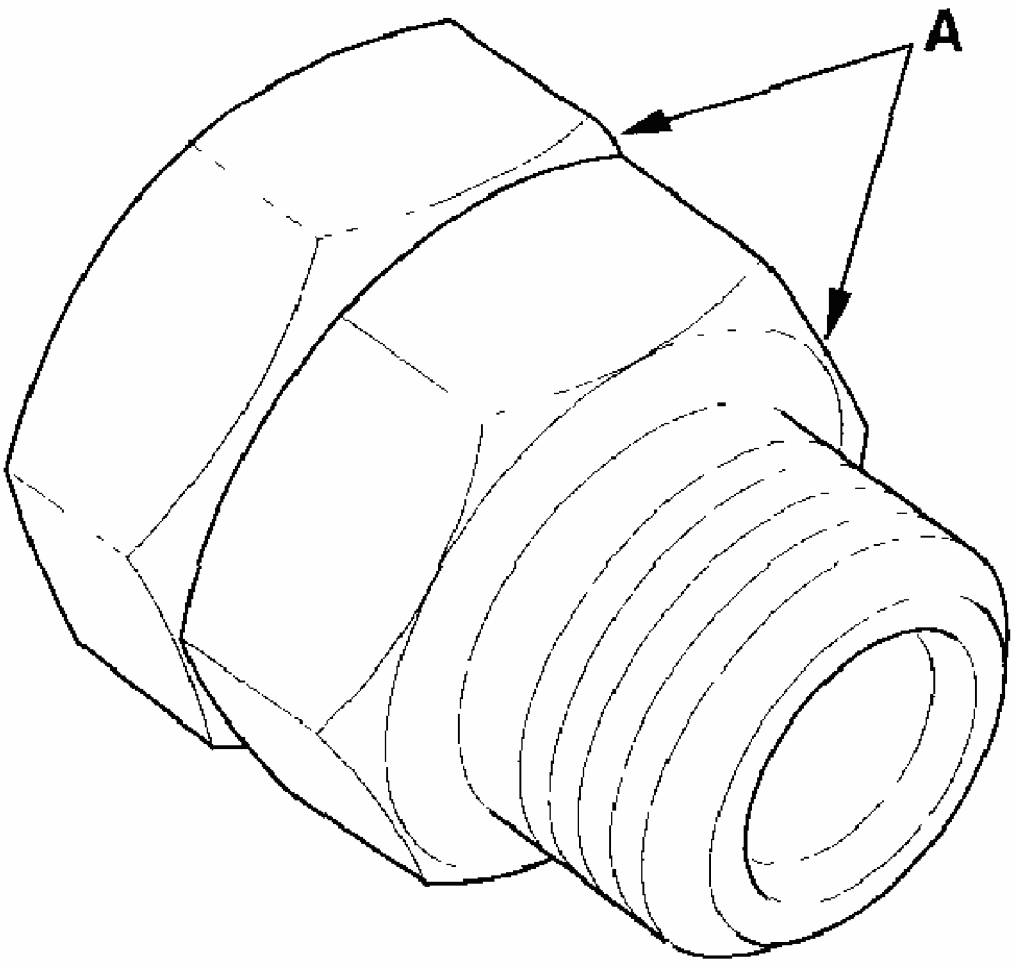

Fig. 11: View Of 20 x 1.5 MM Nut
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Tighten the oil filter feed pipe to the engine block to 49 N.m (5.0 kgf.m, 36 lbf.ft), then remove the nuts from the oil filter feed pipe.

OIL PUMP OVERHAUL

EXPLODED VIEW

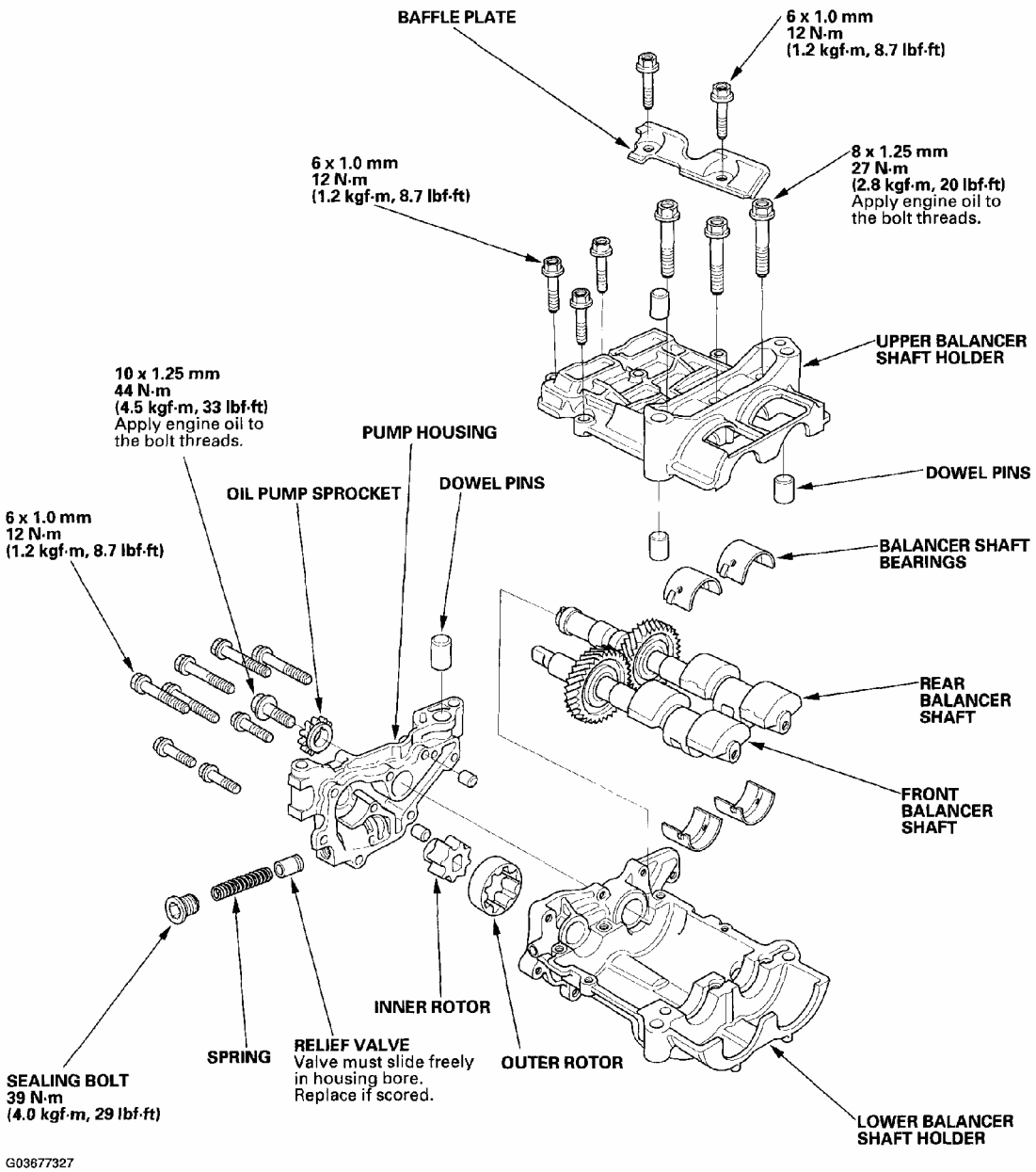

Fig. 12: Exploded View Of Oil Pump Related Components And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP REMOVAL

1. Set the No. 1 piston at top dead center (TDC) (see step 1 on **CAM CHAIN REMOVAL**).
2. Remove the oil pan (see **OIL PAN REMOVAL**).
3. Remove and discard the oil pump chain tensioner.

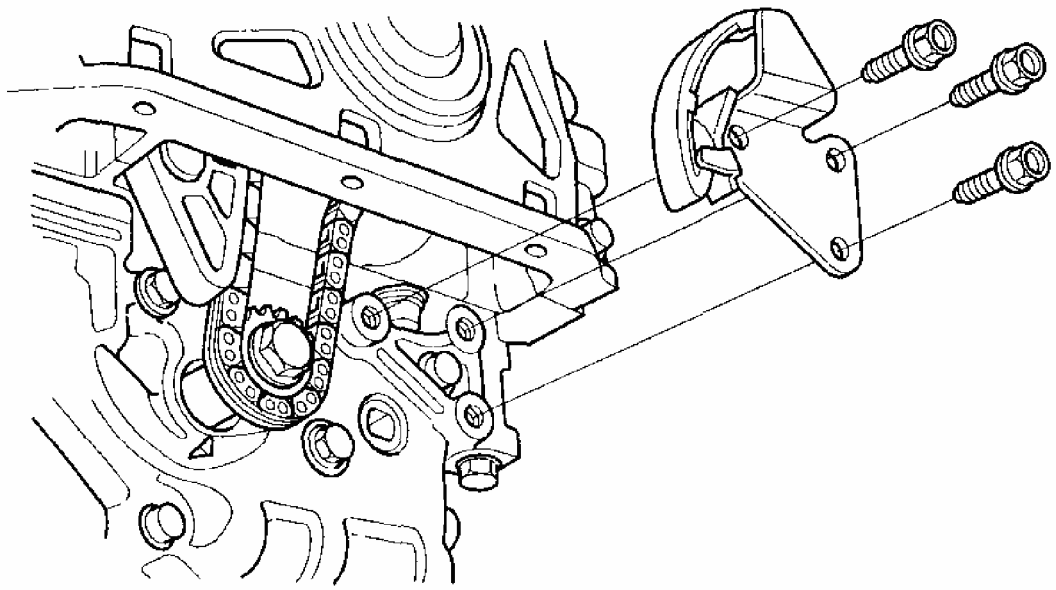

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Fig. 13: Removing Oil Pump Chain Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. To hold the rear balancer shaft, insert a 6 mm pin driver (A) into the maintenance hole in the lower balancer shaft holder and through the rear balancer shaft.

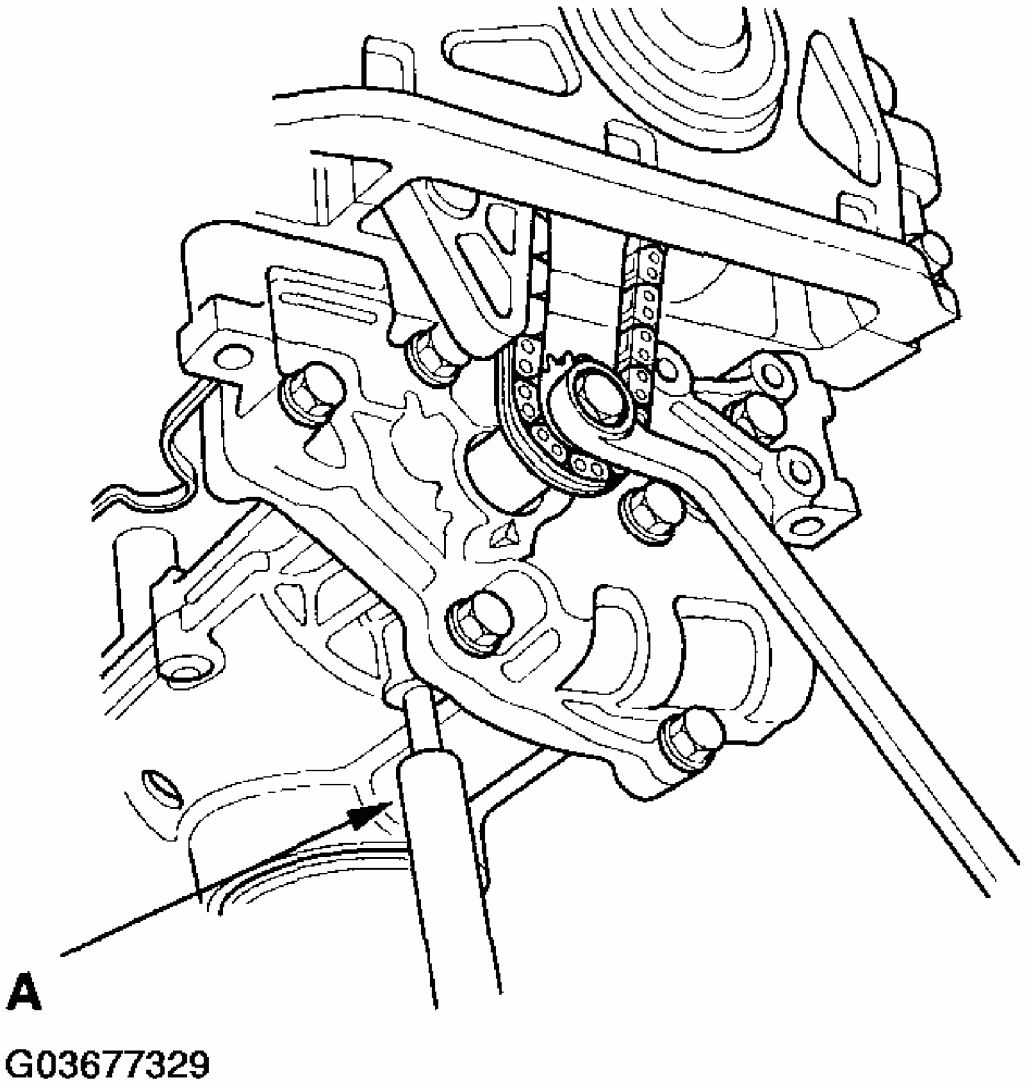

Fig. 14: Inserting Pin Driver Into Maintenance Hole In Lower Balancer Shaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Loosen the oil pump sprocket mounting bolt.
6. Remove the oil pump sprocket (A), then remove the oil pump (B).

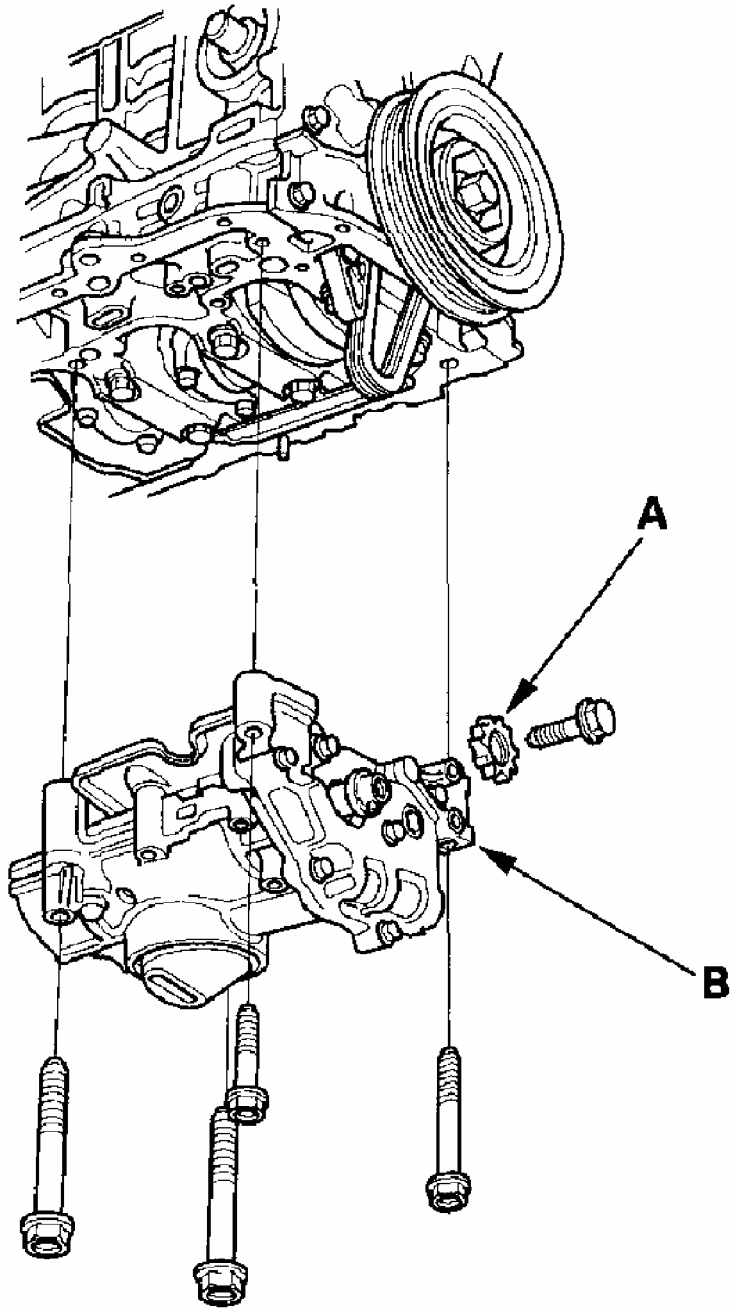

Fig. 15: Removing Oil Pump Sprocket And Oil Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP INSPECTION

1. Remove the pump housing.

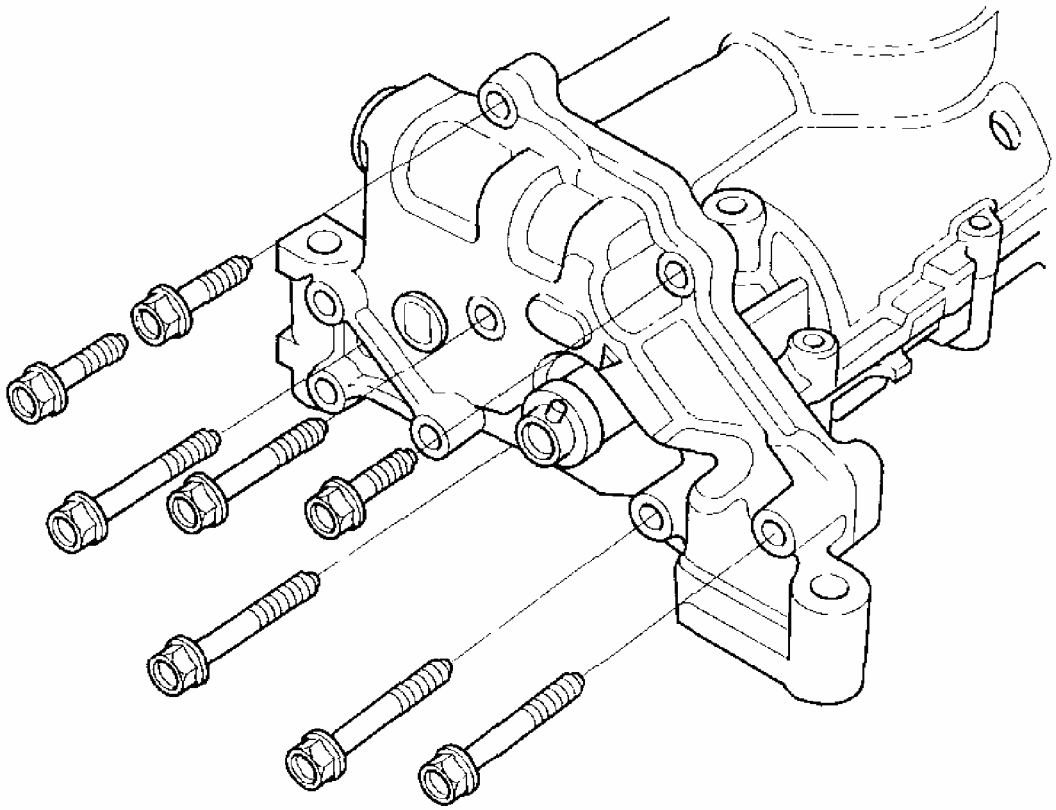

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Fig. 16: Removing Pump Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Check the inner-to-outer rotor radial clearance between the inner rotor (A) and outer rotor (B). If the inner-to-outer rotor radial clearance exceeds the service limit, replace the oil pump.

Inner Rotor-to-Outer Rotor Radial Clearance

Standard (New): 0.06-0.16 mm (0.002-0.006 in.)

Service Limit: 0.20 mm (0.008 in.)

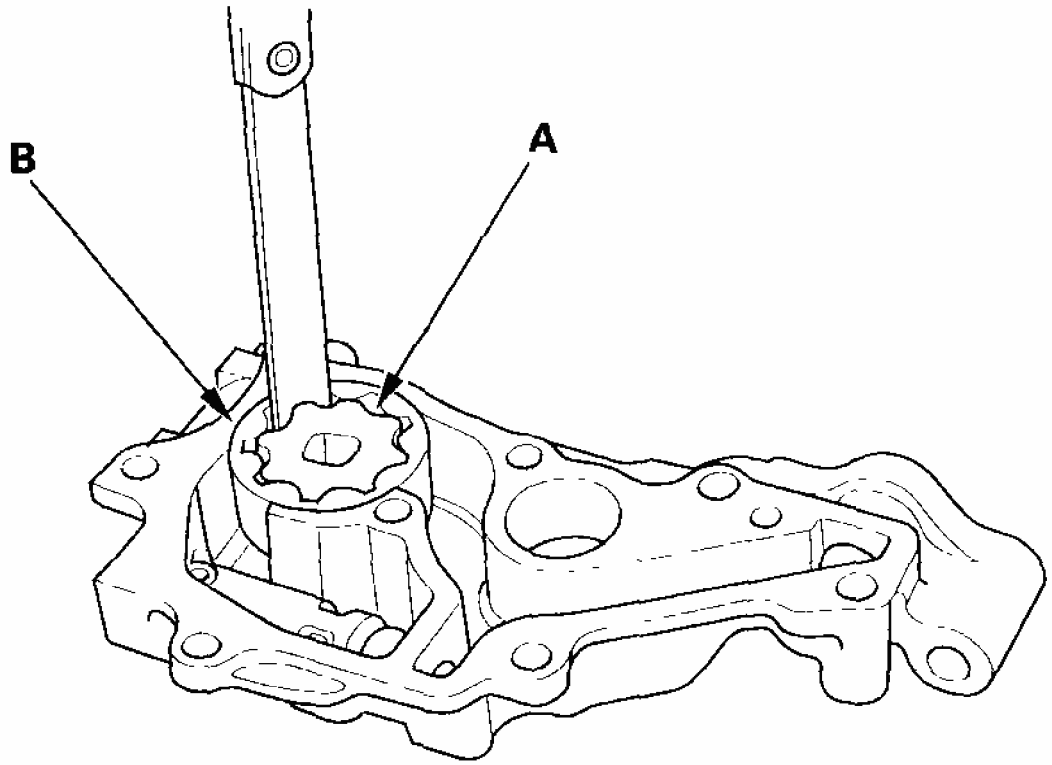

Fig. 17: Checking Radial Clearance Between Inner And Outer Rotor
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Check the housing-to-rotor axial clearance between the rotor (A) and pump housing (B). If the housing-to-rotor axial clearance exceeds the service limit, replace the oil pump.

   Housing-to-Rotor Axial Clearance

   Standard (New): 0.035-0.070 mm (0.0014-0.0028 in.)

   Service Limit: 0.12 mm (0.005 in.)

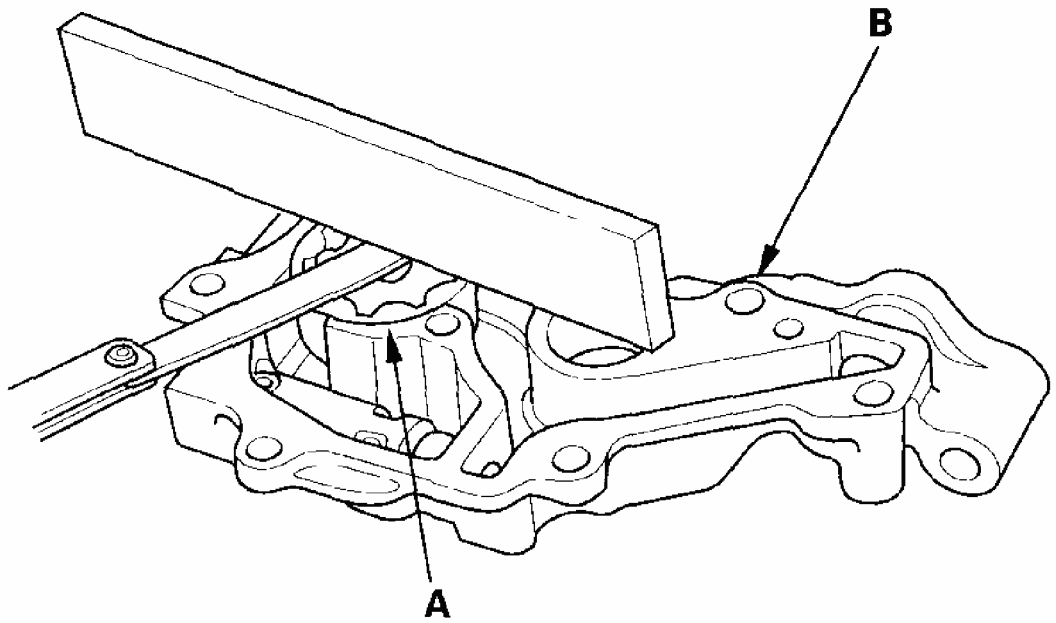

Fig. 18: Checking Housing-To-Rotor Axial Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Check the housing-to-outer rotor radial clearance between the outer rotor (A) and pump housing (B). If the housing-to-outer rotor radial clearance exceeds the service limit, replace the oil pump.

   Housing-to-Outer Rotor Radial Clearance

   Standard (New): 0.15-0.21 mm (0.006-0.008 in.)

   Service Limit: 0.23 mm (0.009 in.)

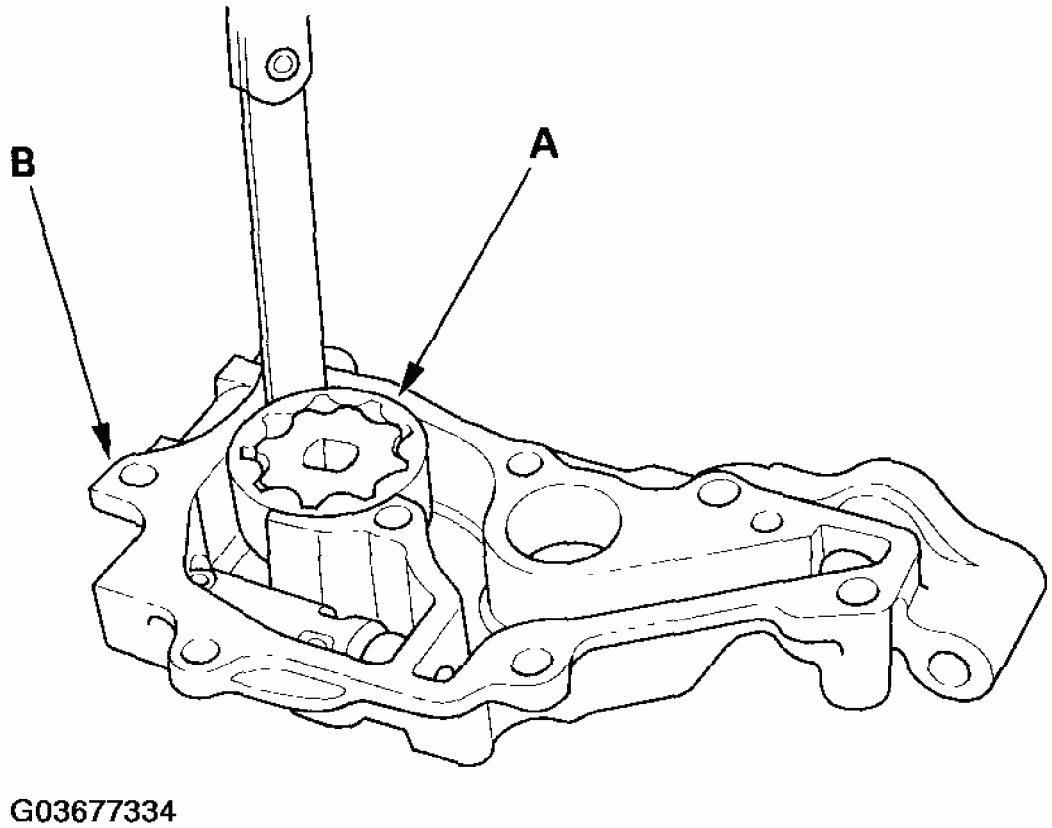

Fig. 19: Checking Housing-To-Outer Rotor Radial Clearance Between Outer Rotor And Pump Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Inspect both rotors and the pump housing for scoring or other damage. Replace the damaged parts if necessary.

BALANCER SHAFT INSPECTION

1. Seat the balancer shaft by pushing it away from the oil pump sprocket end of the oil pump.
2. Zero the dial indicator against the end of the balancer shaft, then push the balancer shaft back and forth and read the end play.

Balancer Shaft End Play

Front Balancer Shaft:

Standard (New): 0.063-0.108 mm (0.0025-0.0043 in.)

Service Limit: 0.14 mm (0.0055 in.)

Rear Balancer Shaft:

Standard (New): 0.063-0.108 mm (0.0025-0.0043 in.)

Service Limit: 0.14 mm (0.0055 in.)

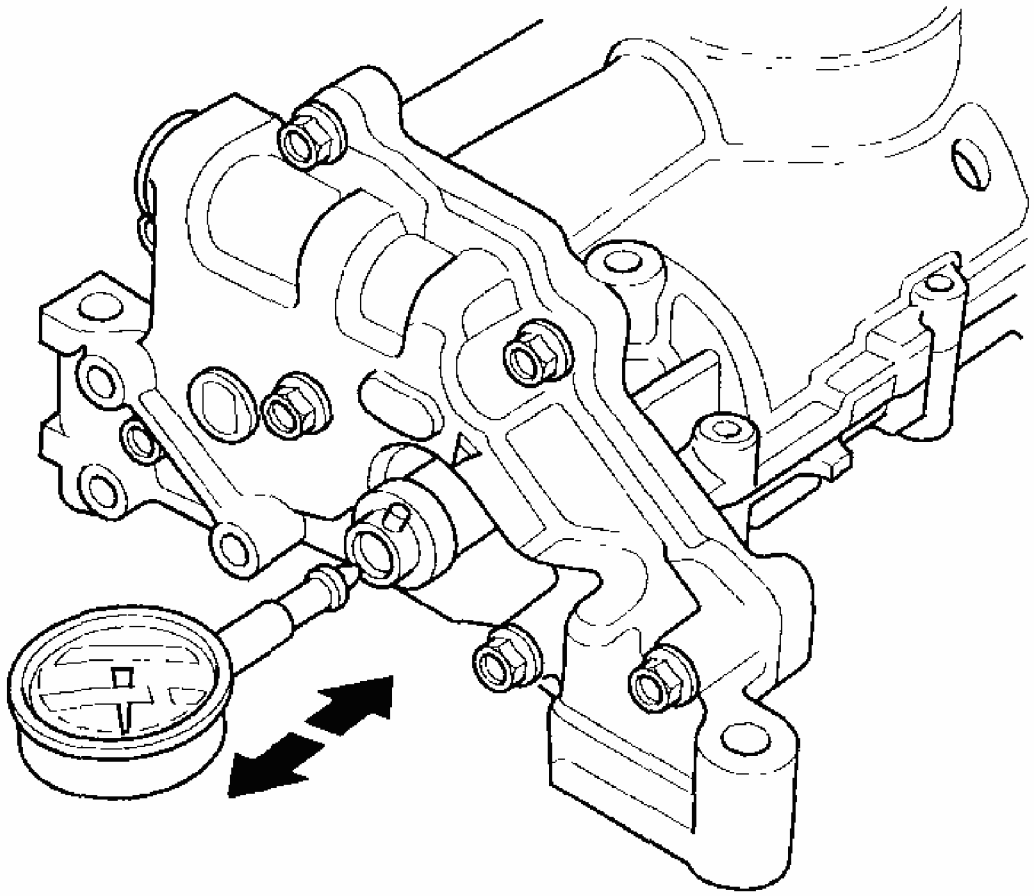

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Fig. 20: Attaching Dial Indicator To Balancer Shaft End
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the baffle plate (A) and upper balancer shaft holder (with bearings) (B), then remove the front balancer shaft (C) and rear balancer shaft (D).

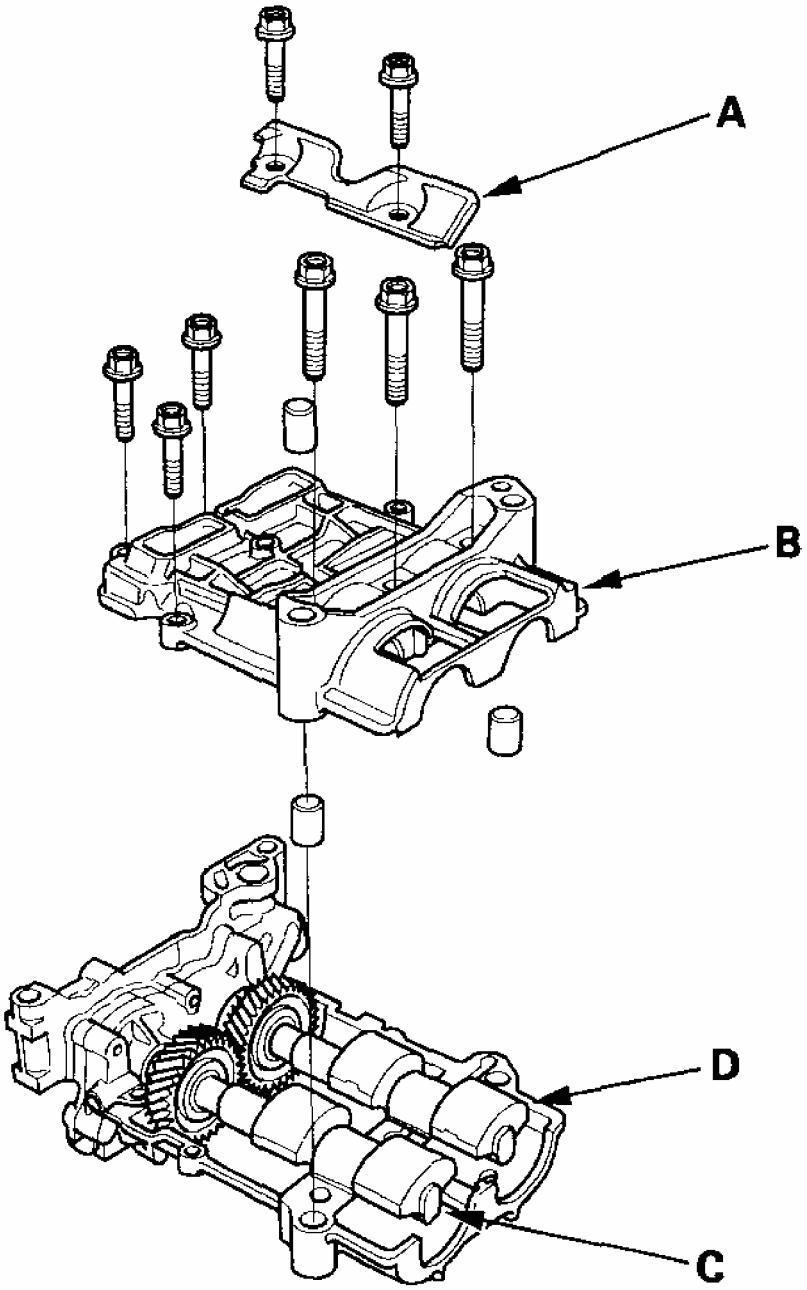

Fig. 21: Removing Baffle Plate And Upper Balancer Shaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the inner diameter of the No. 1 bearing for the front balancer shaft hole and the rear balancer shaft hole.

Bearing Inner Diameter

Front:

Standard (New): 20.000-20.020 mm (0.7874-0.7882 in.)

Service Limit: 20.03 mm (0.789 in.)

Rear:

Standard (New): 24.000-24.020 mm (0.9449-0.9457 in.)

Service Limit: 24.03 mm (0.946 in.)

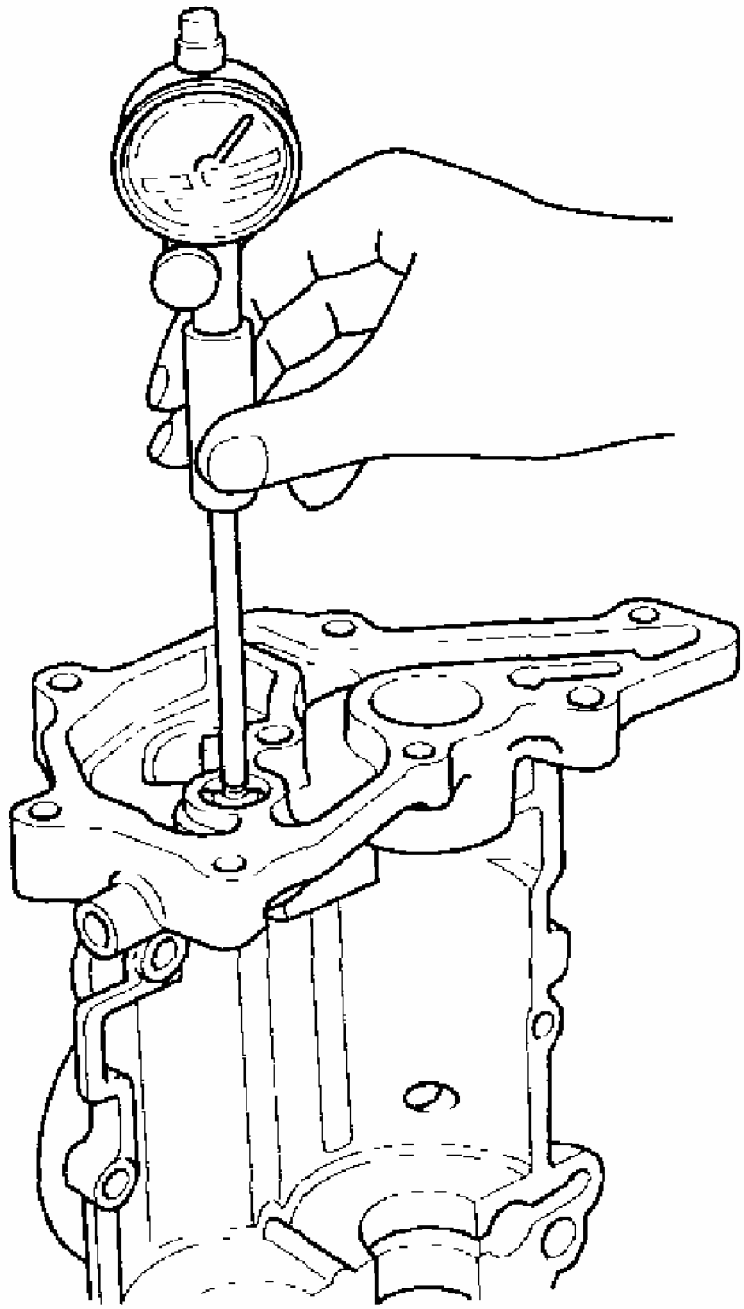

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Fig. 22: Measuring No. 1 Bearing Inner Diameter (Front)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

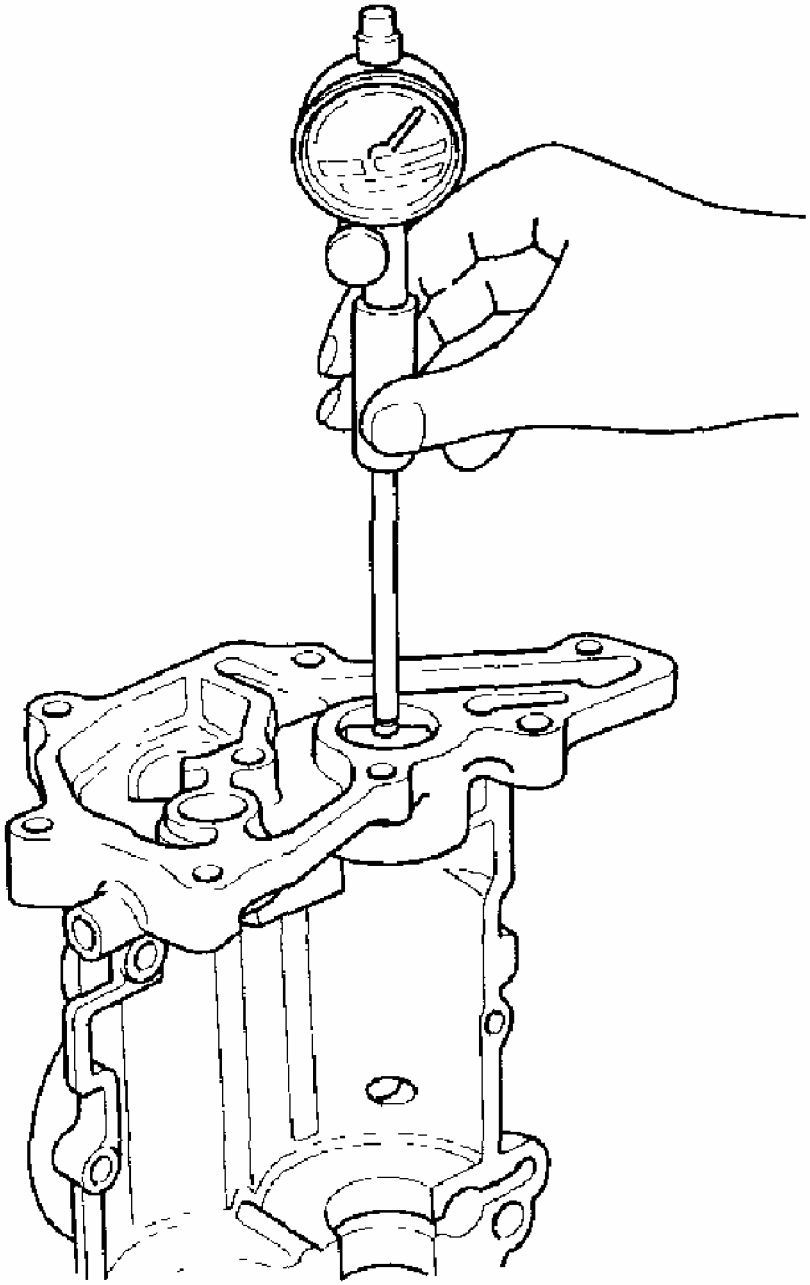

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Fig. 23: Measuring No. 1 Bearing Inner Diameter (Rear)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure the diameters of the No. 1 journals on the front balancer shaft and rear balancer shaft.

Journal Diameter

Front:

Standard (New): 19.938-19.950 mm (0.7850-0.7854 in.)

Service Limit: 19.92 mm (0.784 in.)

Rear:

Standard (New): 23.938-23.950 mm (0.9424-0.9429 in.)

Service Limit: 23.92 mm (0.942 in.)

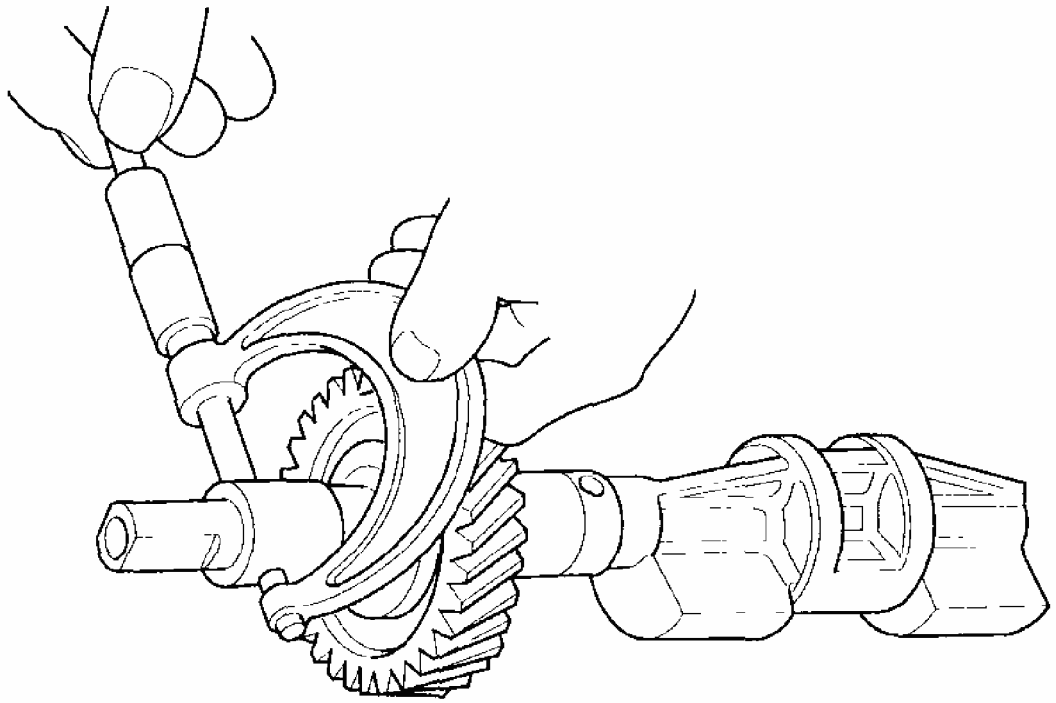

Fig. 24: Measuring No. 1 Journals Diameter (Front)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

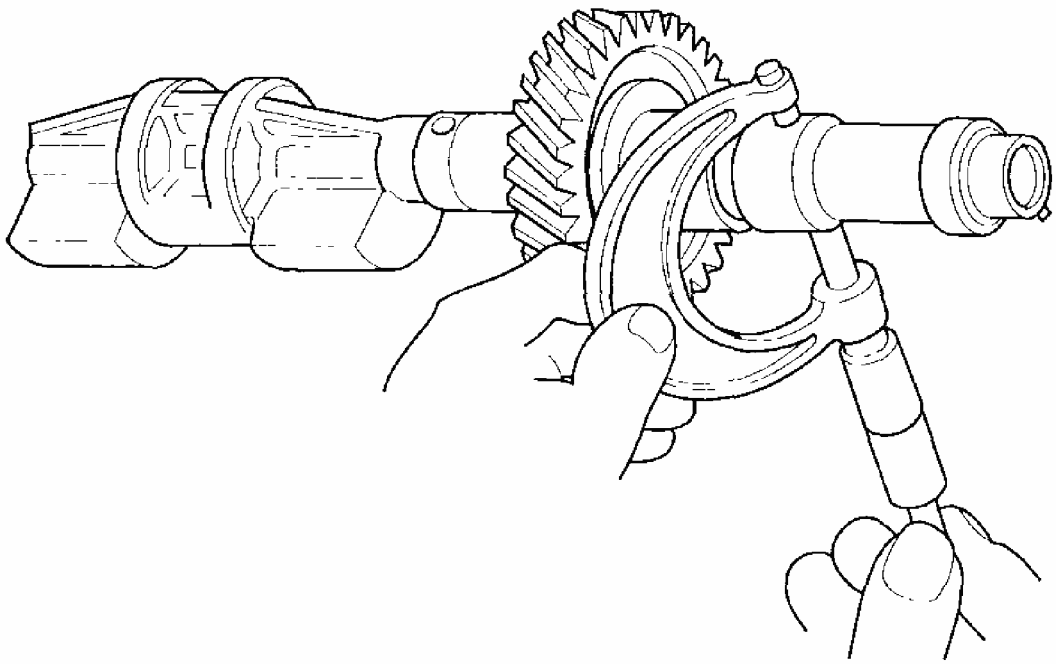

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Fig. 25: Measuring No. 1 Journals Diameter (Rear)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Clean both balancer shaft No. 2 journals and bearing halves with a clean shop towel.
7. Place one strip of plastigage across each No. 2 journal.
8. Reinstall the bearings and upper balancer shaft holder, then torque the bolts.

NOTE: Do not rotate the balancer shafts during inspection.

9. Remove the upper balancer shaft holder and bearings again, and measure the widest part of the plastigage. If the balancer shaft No. 2 journal oil clearance is out-of-tolerance, install new bearings, and recheck. If it is still out-of-tolerance, replace the balancer shafts.

No. 2 Journal Oil Clearance

Standard (New): 0.060-0.120 mm (0.0024-0.0047 in.)

Service Limit: 0.15 mm (0.006 in.)

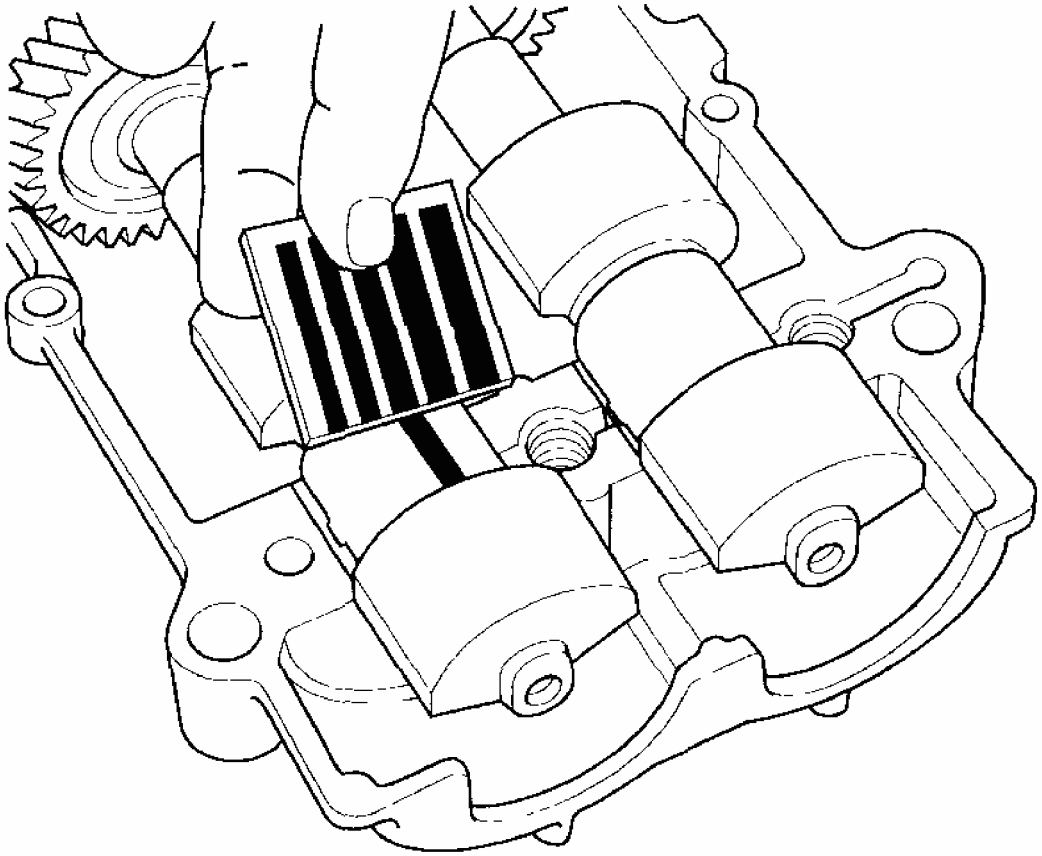

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Fig. 26: Measuring No.2 Journal Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Align the punch mark on the rear balancer shaft in the center of the two punch marks on the front balancer shaft, then install the balancer shafts on the lower balancer shaft holder.

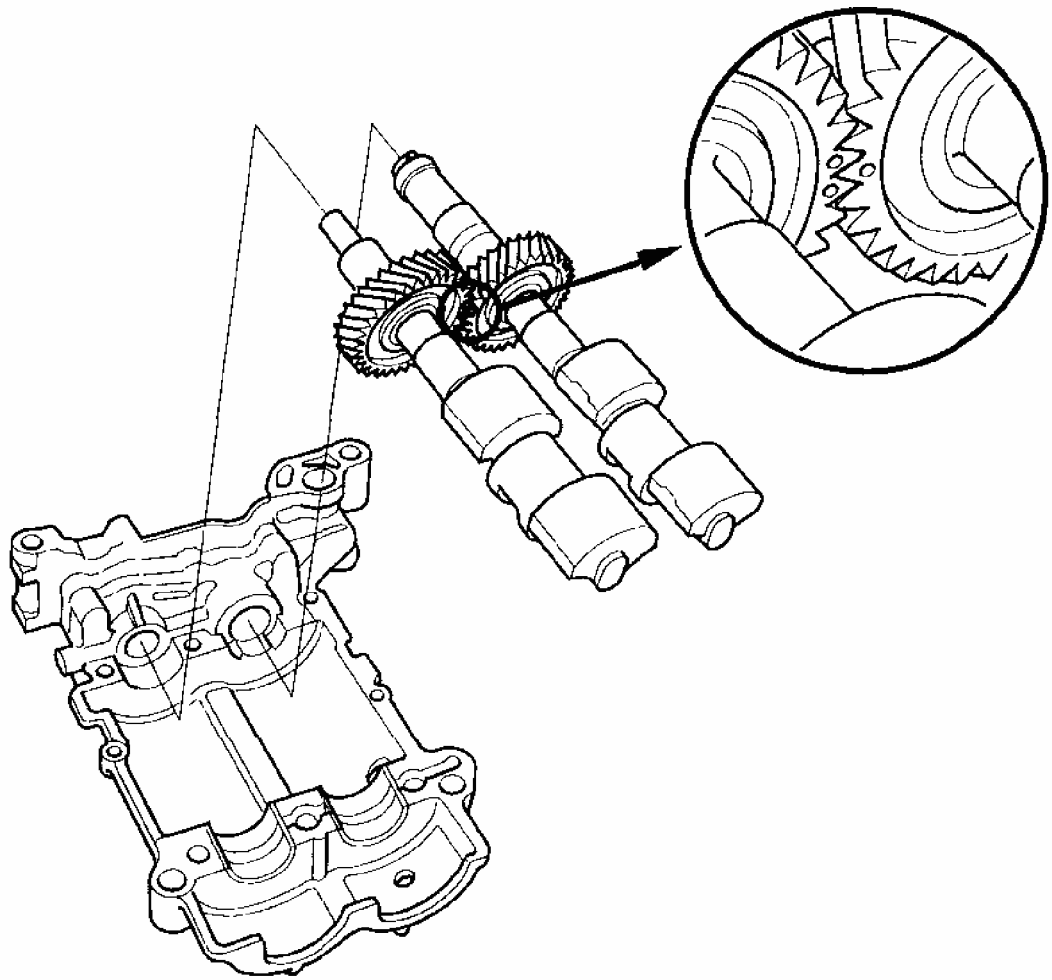

Fig. 27: Aligning Punch Mark On Rear Balancer Shaft And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Apply new engine oil to the threads of the 8 mm bolts (A).

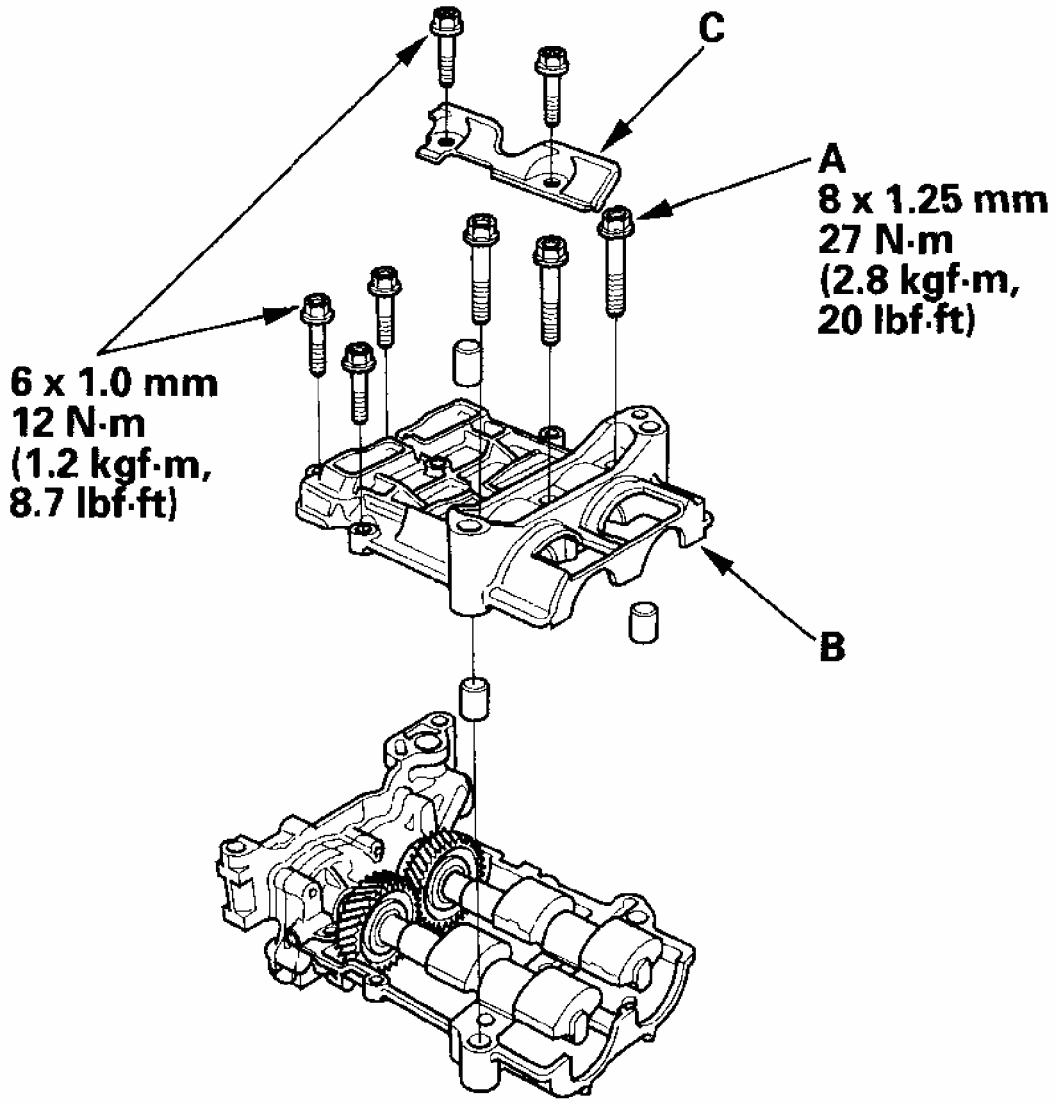

Fig. 28: Locating Engine Oil Applying Point And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the upper balancer shaft holder (B) and baffle plate (C).
13. Install the pump housing.

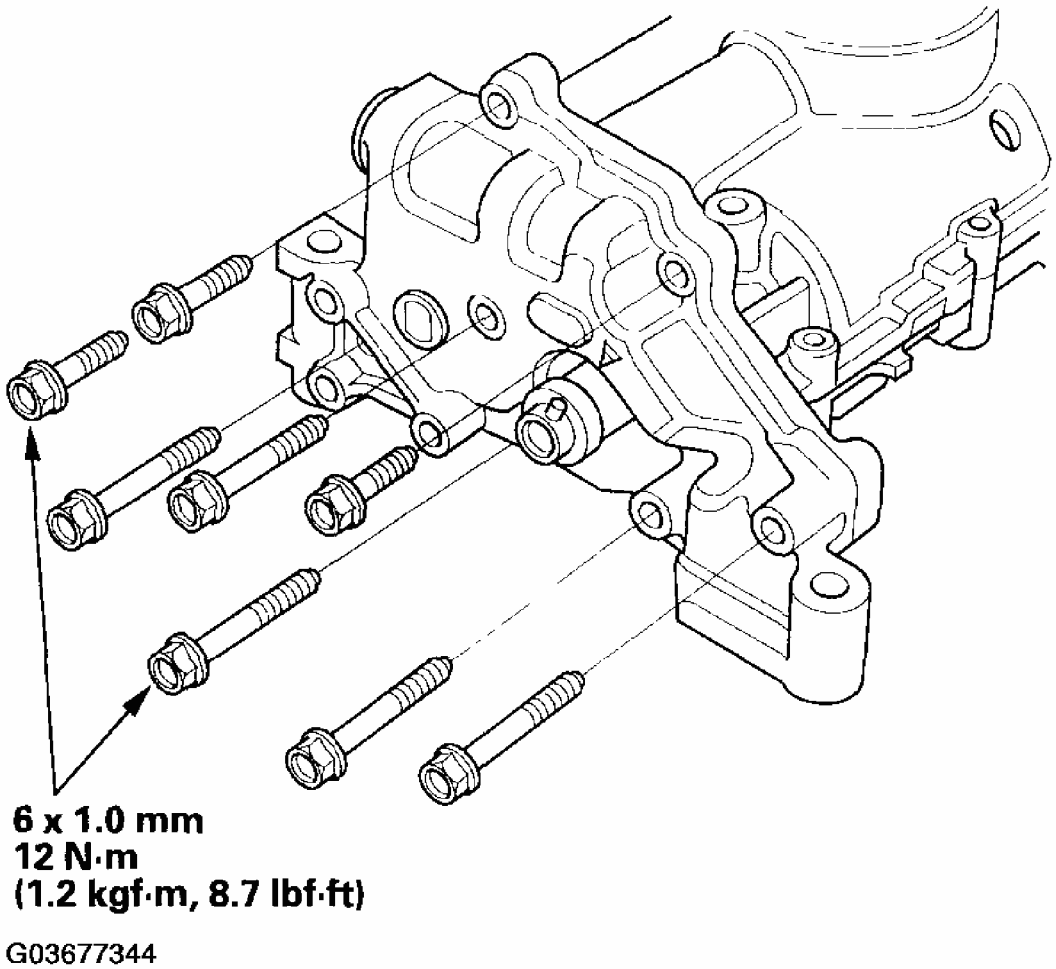

Fig. 29: Installing Pump Housing And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP INSTALLATION

1. Make sure the No. 1 piston is at TDC (see step 1 on **CAM CHAIN REMOVAL**).
2. Align the dowel pin (A) on the rear balancer shaft with the mark (B) on the oil pump.

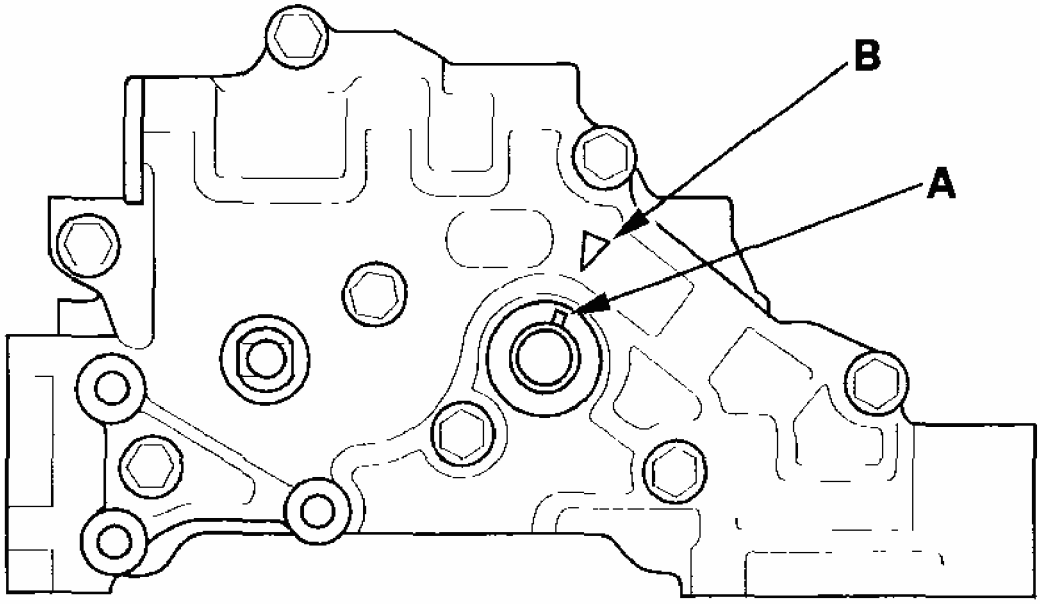

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Fig. 30: Aligning Dowel Pin On Rear Balancer Shaft With Mark On Oil Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. To hold the rear balancer shaft, insert a 6 mm pin driver (A) into the maintenance hole in the lower balancer shaft holder and through the rear balancer shaft.

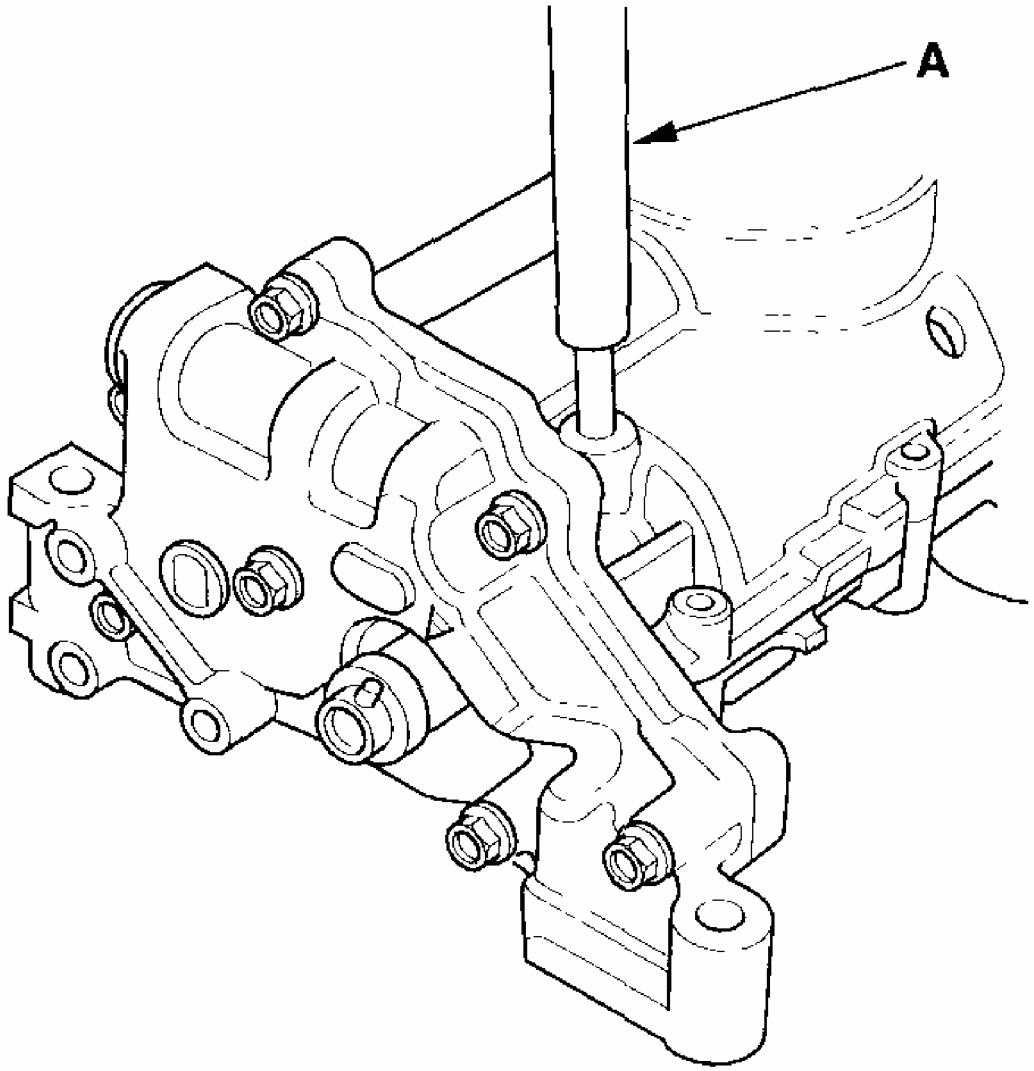

Fig. 31: Inserting Pin Driver Into Maintenance Hole In Lower Balancer Shaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Apply new engine oil to the threads of the oil pump sprocket mounting bolt (A).

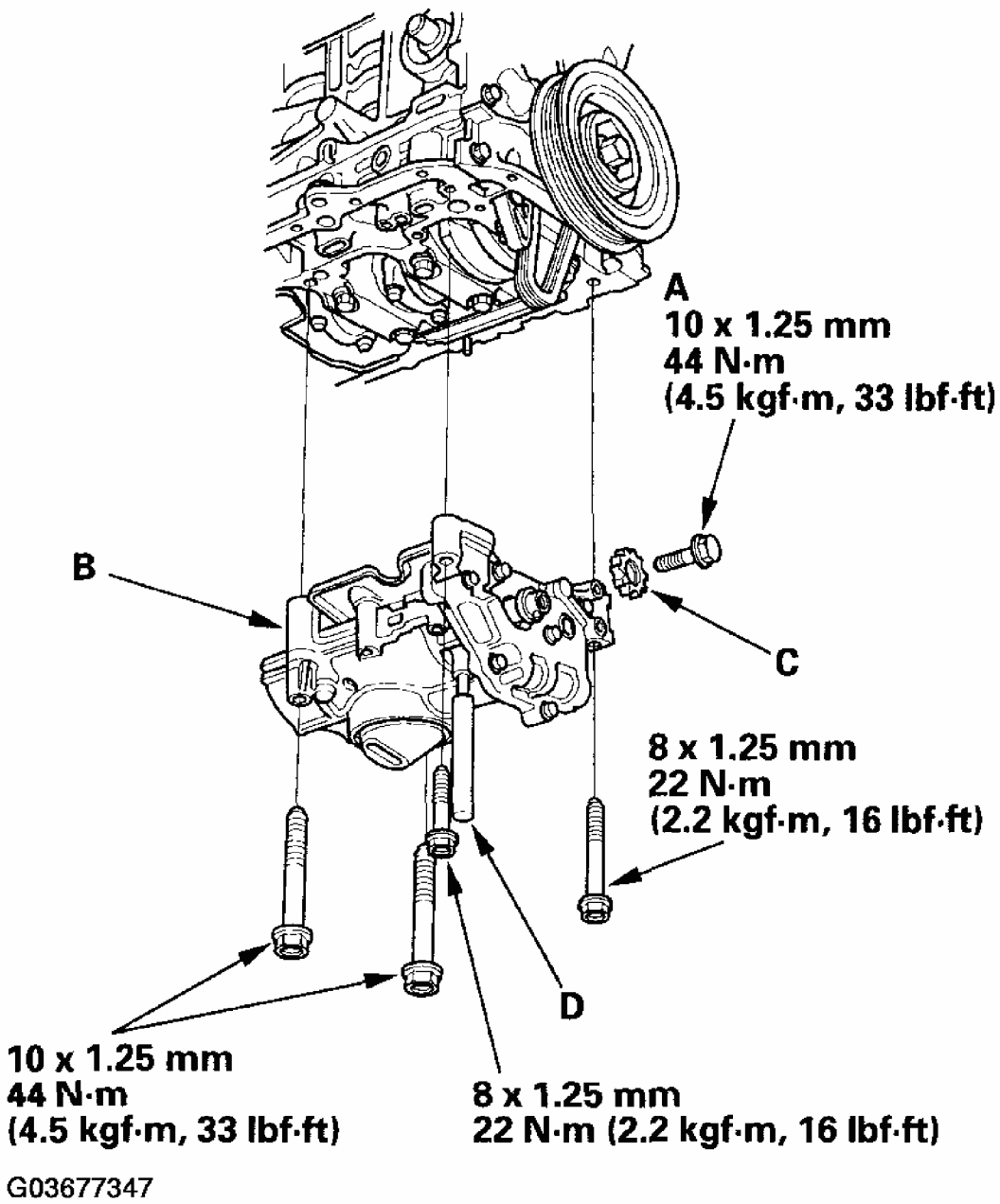

Fig. 32: Locating Engine Oil Applying Points And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Loosely install the oil pump (B), then install the oil pump sprocket (C).
6. Remove the pin driver (D).
7. Tighten the oil pump mounting bolts.
8. Squeeze the new oil pump chain tensioner (A), then install the set clip (B) on it as shown.

NOTE: The set clip is supplied with the oil pump chain tensioner.

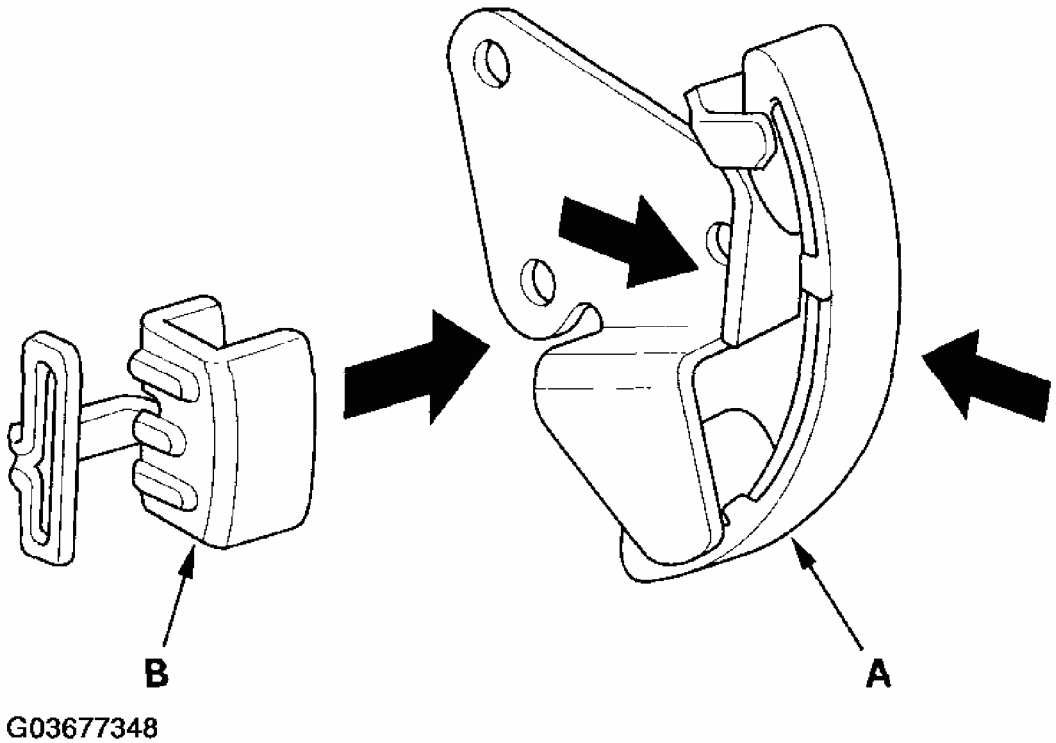

Fig. 33: Squeezing Oil Pump Chain Tensioner And Installing Set Clip
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the new oil pump chain tensioner.

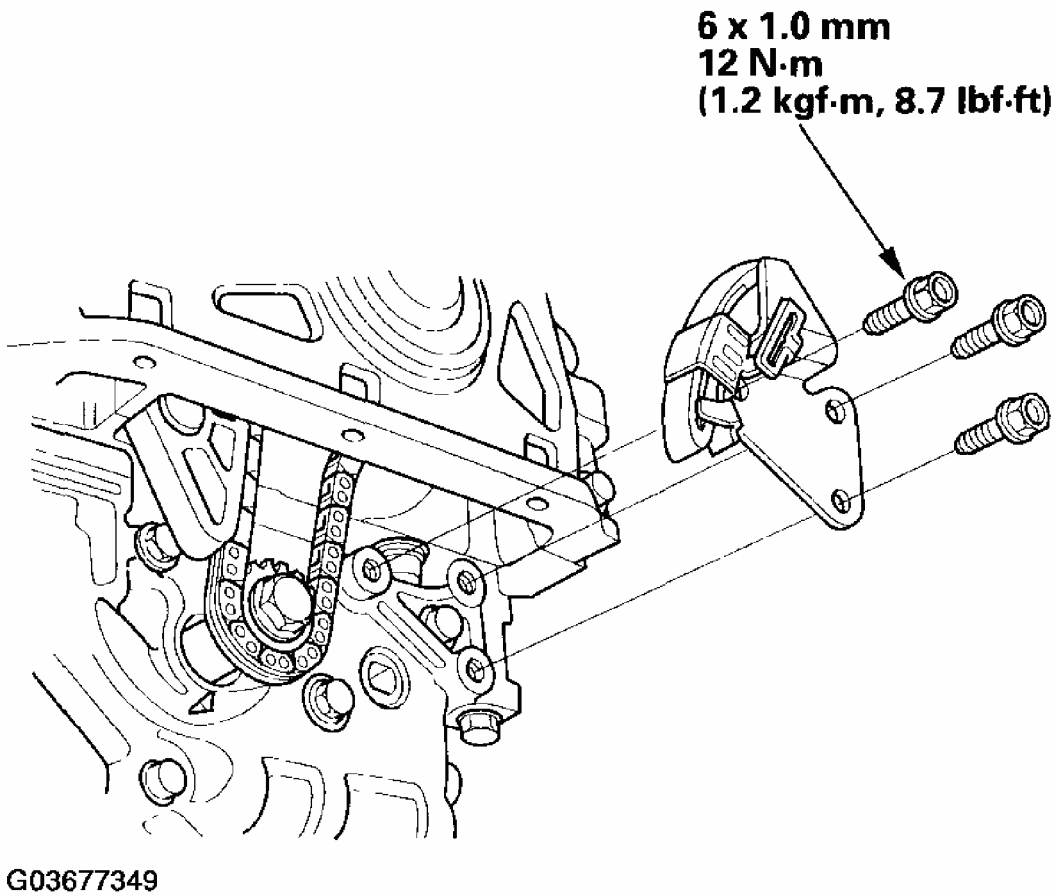

Fig. 34: Installing Oil Pump Chain Tensioner And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the set clip from the oil pump chain tensioner.

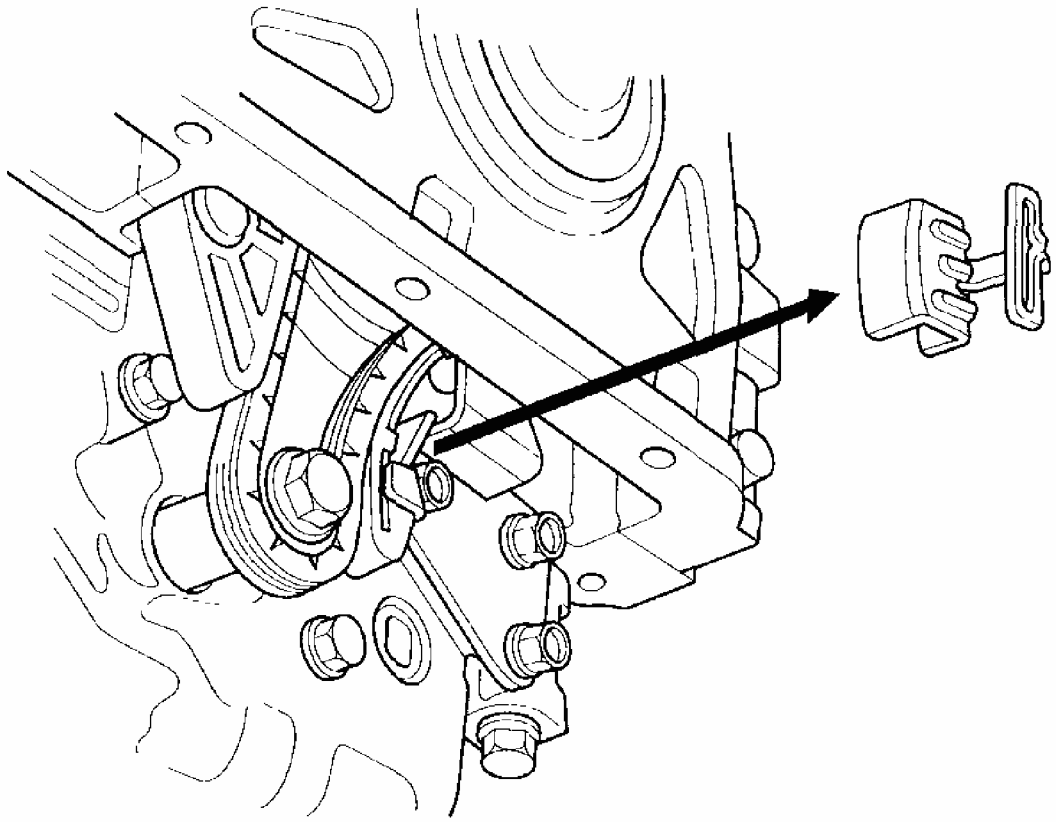

Fig. 35: Removing Set Clip From Oil Pump Chain Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the oil pan (see **OIL PAN REMOVAL**).