
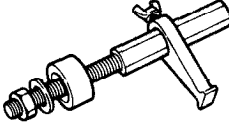
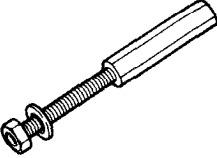


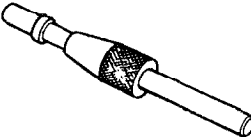
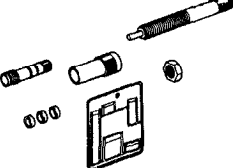

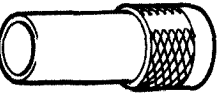

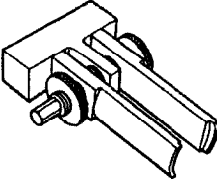
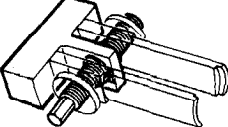
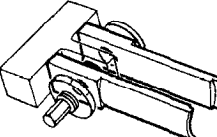
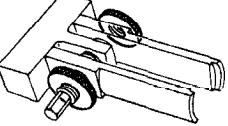
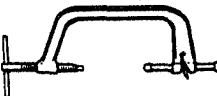


ASSEMBLY

PREPARATION SST

<p>49 0221 061A</p> <p>Remover & installer, piston pin</p> 	<p>For removal and installation of piston pin</p>	<p>49 E011 1A0</p> <p>Ring gear brake set</p> 	<p>For prevention of engine rotation</p>
<p>49 E011 103</p> <p>Shaft (Part of 49 E011 1A0)</p> 	<p>For prevention of engine rotation</p>	<p>49 E011 104</p> <p>Collar (Part of 49 E011 1A0)</p> 	<p>For prevention of engine rotation</p>
<p>49 E011 105</p> <p>Stopper (Part of 49 E011 1A0)</p> 	<p>For prevention of engine rotation</p>	<p>49 SE01 310A</p> <p>Centering tool, clutch disc</p> 	<p>For installation of clutch disc</p>
<p>49 L012 0A0</p> <p>Installer set, valve seal & valve guide</p> 	<p>For installation of valve seal</p>	<p>49 L012 001</p> <p>Installer (Part of 49 L012 0A0)</p> 	<p>For installation of valve seal</p>
<p>49 L012 002</p> <p>Body (Part of 49 L012 0A0)</p> 	<p>For installation of valve seal</p>	<p>49 L012 005</p> <p>Spacer (Part of 49 L012 0A0)</p> 	<p>For installation of valve seal</p>
<p>49 B012 0A2</p> <p>Pivot, valve spring lifter</p> 	<p>For removal / installation of valves</p>	<p>49 B012 012</p> <p>Body (Part of 49 B012 0A2)</p> 	<p>For removal / installation of valves</p>
<p>49 B012 013</p> <p>Foot (Part of 49 B012 0A2)</p> 	<p>For removal / installation of valves</p>	<p>49 B012 014</p> <p>Locknut (Part of 49 B012 0A2)</p> 	<p>For removal / installation of valves</p>
<p>49 0636 100A</p> <p>Arm, valve spring lifter</p> 	<p>For removal and installation of valve</p>		

23U0B2-038

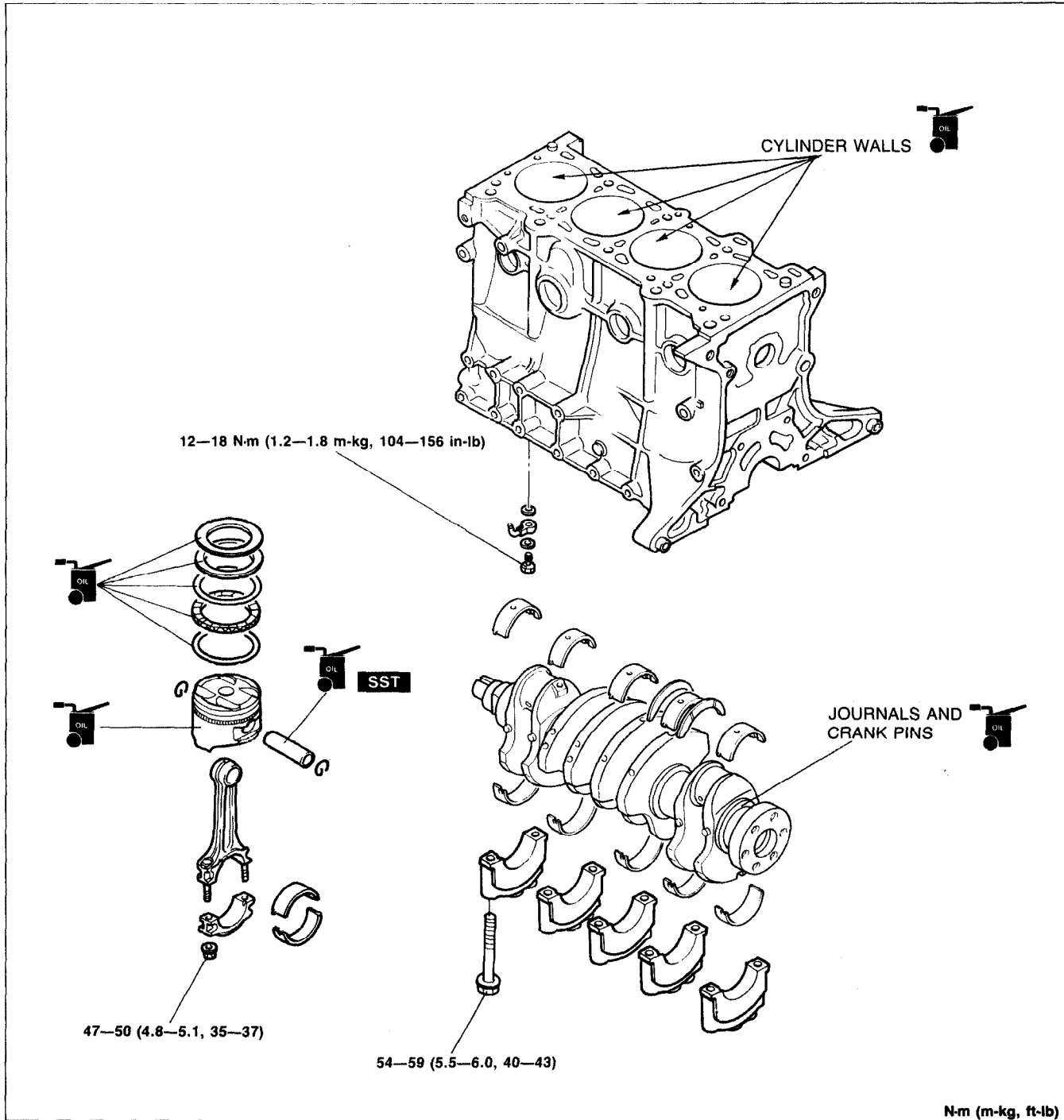
1. Clean all parts before reinstallation.
2. Apply new engine oil to all sliding and rotating parts.
3. Replace plain bearings if they are peeling, burned, or otherwise damaged.
4. Tighten all bolts and nuts to the specified torques.

Caution

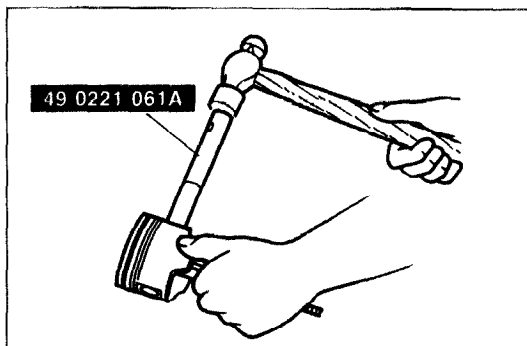
- **Do not reuse gaskets or oil seals.**

93G0B1-082

CYLINDER BLOCK (INTERNAL PARTS) Torque Specifications



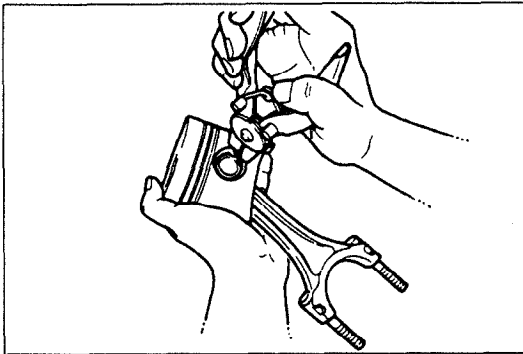
05U0BX-175



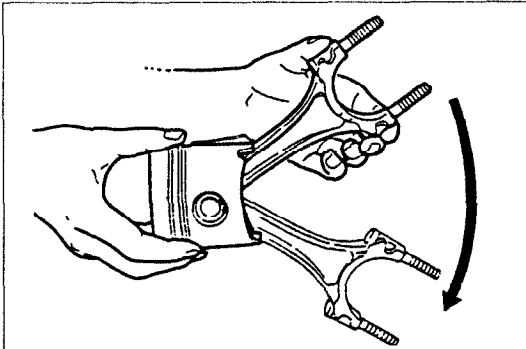
Connecting Rod

1. Install one piston pin clip into the clip groove in the piston.
2. Assemble the piston and the connecting rod, aligning the oil groove in the large end of connecting rod opposite the "F" mark on the piston.
3. Apply clean engine oil to the piston pin.
4. Install the piston pin from the side opposite the clip.

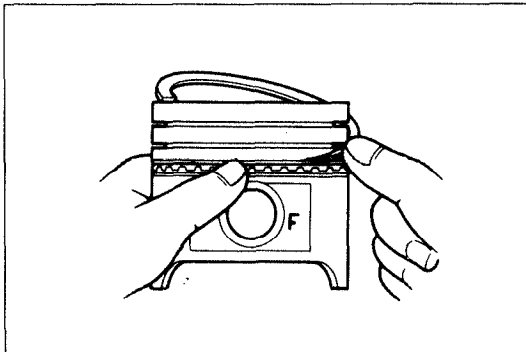
23U0B2-039



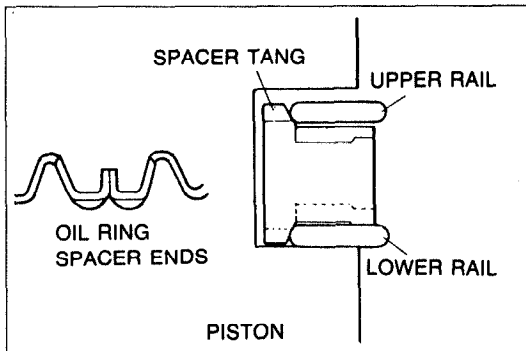
23U0B2-040



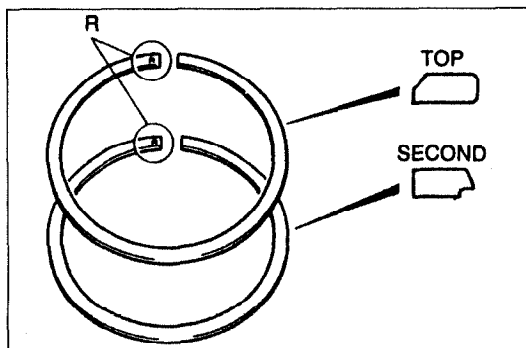
05U0BX-178



05U0BX-179



05U0BX-180



05U0BX-181

5. Tap the piston pin in with the **SST** until the pin contacts the clip.
If the pin cannot be installed easily, replace the connecting rod.
6. Install the second clip into the clip groove in the piston.

7. Check the oscillation torque of the connecting rod. If the large end does not drop by its own weight, replace the piston and/or piston pin.

Piston Ring

1. Install the three-piece oil rings on the pistons.
 - (1) Apply clean engine oil to the oil ring spacer and rails.
 - (2) Install the oil ring spacer with the ends upward.

Note

- **The upper rail and lower rail are the same.**
- **The rails may be installed with either face upward.**

- (3) Install the upper rail and lower rail.

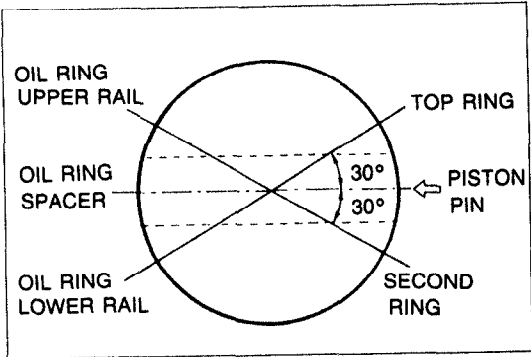
2. Verify that both rails are expanded by the spacer tangs as shown in the figure by making certain the rails turn smoothly in both directions.

Caution

- **The rings must be installed with the R marks upward.**
- **The second ring must be installed with the scraper face downward.**

3. Apply clean engine oil to the top and second piston rings.
4. Install the second ring to the piston; then install the top ring. Use a piston ring expander (commercially available).

5. Position the end gaps of the rings as shown in the figure.



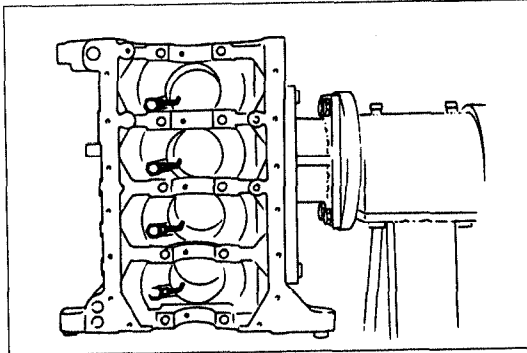
05U0BX-182

Oil Jet

1. Install the oil jets.

Tightening torque:

12—18 N·m (1.2—1.8 m·kg, 104—156 in·lb)



05U0BX-183

Crankshaft

1. Before installing the crankshaft, inspect the main bearing oil clearances as follows.

Oil clearance inspection

(1) Remove all foreign material and oil from the journals and bearings.

Caution

- Install the grooved upper main bearings in the cylinder block.
- Install the thrust bearings with the oil groove facing the crankshaft.

(2) Install the upper main bearings and thrust bearings.

(3) Set the crankshaft in the cylinder block.

Caution

- Do not rotate the crankshaft when measuring the oil clearances.

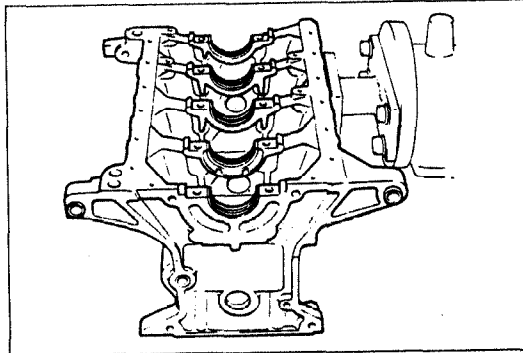
(4) Position Plastigage atop the journals in the axial direction.

(5) Install the lower main bearings and the main bearing caps according to the cap number and \Leftarrow mark.

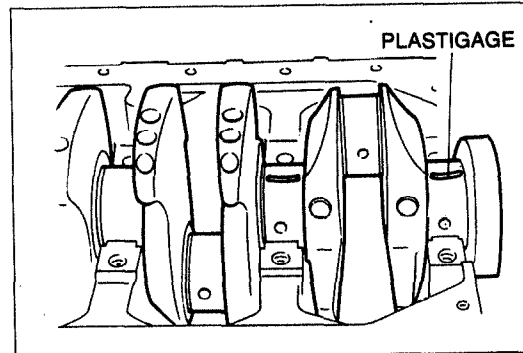
(6) Tighten the main bearing cap bolts in two or three steps in the order shown in the figure.

Tightening torque:

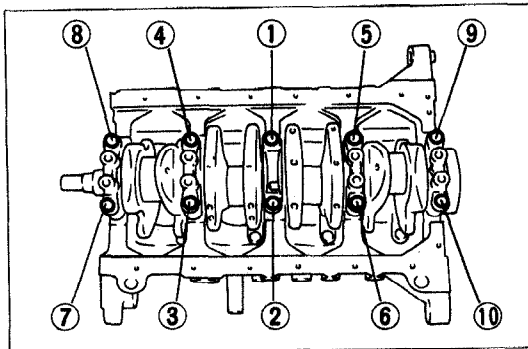
54—59 N·m (5.5—6.0 m·kg, 40—43 ft·lb)



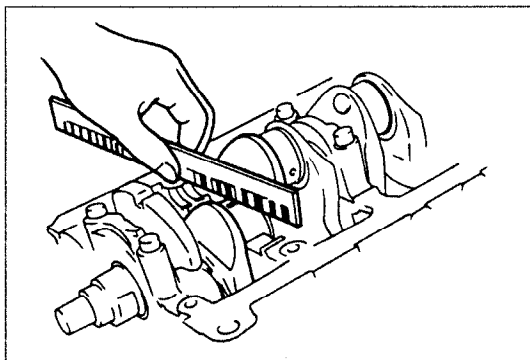
05U0BX-184



05U0BX-185



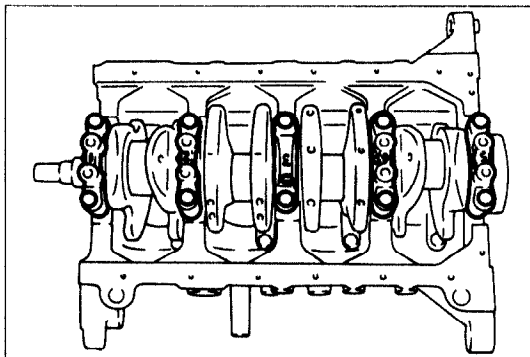
05U0BX-186



03U0B2-091

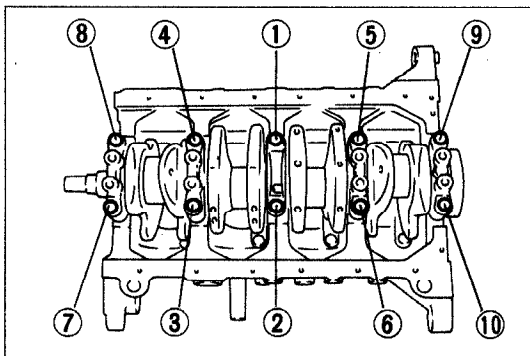
- (7) Remove the main bearing caps, and measure the Plastigage at each journal at the widest point for the smallest clearance, and at the narrowest point for the largest clearance.
- (8) If the oil clearance exceeds specification, grind the crankshaft and use undersize main bearings. (Refer to page B2-64.)

Oil clearance: 0.018—0.036mm (0.0007—0.0014 in)
Maximum: 0.10mm (0.004 in)



05U0BX-188

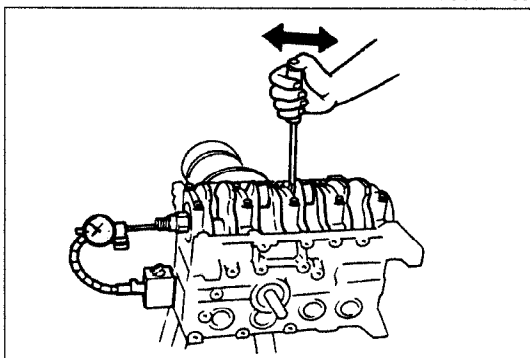
- 2. Apply a liberal amount of clean engine oil to the main bearings, thrust bearings and main journals.
- 3. Install the crankshaft and the main bearing caps according to the cap number and ← mark.



05U0BX-189

- 4. Tighten the main bearing cap bolts in two or three steps in the order shown in the figure.

Tightening torque:
54—59 Nm (5.5—6.0 m-kg, 40—43 ft-lb)

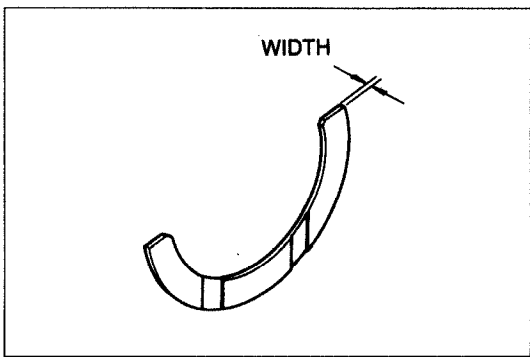


05U0BX-190

- 5. Measure the crankshaft end play.

End play : 0.080—0.282mm (0.0031—0.0111 in)
Maximum: 0.30mm (0.012 in)

- 6. If the end play exceeds the maximum, grind the crankshaft and install an oversize thrust bearing or replace the crankshaft and thrust bearing.



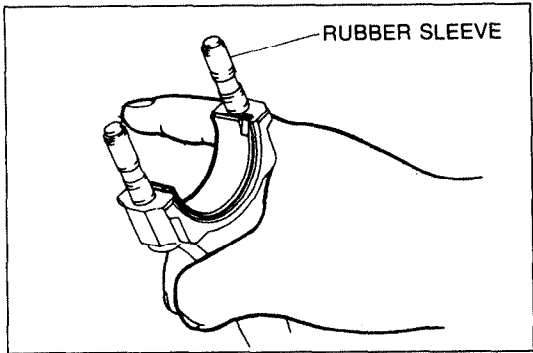
05U0BX-191

Thrust bearing width
Standard:
2.500—2.550mm (0.0984—0.1004 in)
0.25mm (0.010 in) oversize:
2.625—2.675mm (0.1033—0.1053 in)
0.50mm (0.020 in) oversize:
2.750—2.800mm (0.1083—0.1102 in)
0.75mm (0.030 in) oversize:
2.875—2.925mm (0.1132—0.1152 in)

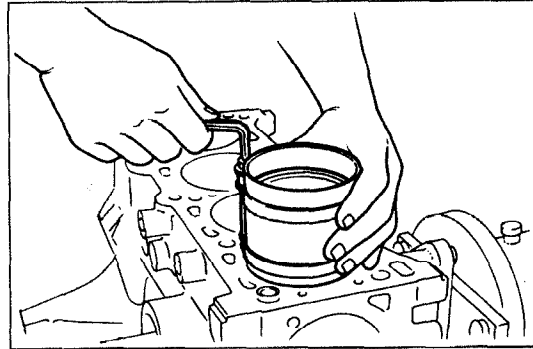
Piston and Connecting Rod Assembly

Caution

- Protect the connecting rod bolts with rubber sleeves to prevent damage to the crankpin journals.



05U0BX-192



05U0BX-193

1. Apply a liberal amount of clean engine oil to the cylinder walls, pistons, and piston rings.
2. Check the piston rings for correct end gap alignment.
3. Insert each piston assembly into the cylinder block with the **F** mark facing the front of the engine. Use a piston ring compressor (commercially available).

Connecting Rod Cap

1. Measure the connecting rod bearing oil clearances using the same procedure as for the main bearing oil clearance.

Caution

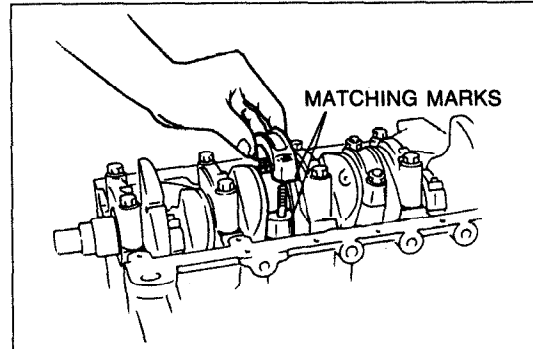
- Align the matching marks on the cap and the connecting rod when installing the connecting rod cap.

Tightening torque:

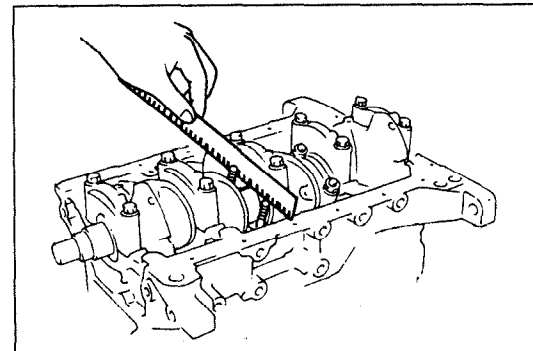
47—50 N·m (4.8—5.1 m·kg, 35—37 ft·lb)

Oil clearance: 0.028—0.068mm (0.0011—0.0027 in)
Maximum: 0.10mm (0.004 in)

2. If the oil clearance exceeds the maximum, grind the crankshaft and use undersize bearings. (Refer to page B2-64.)



03U0B2-170

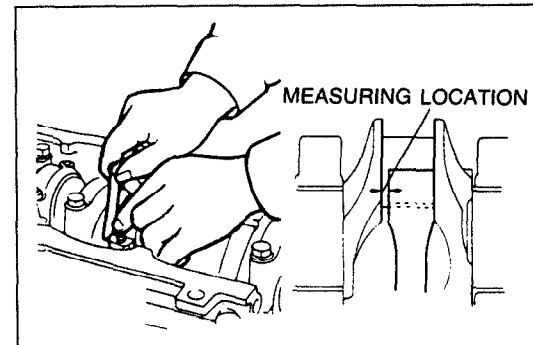


03U0B2-092

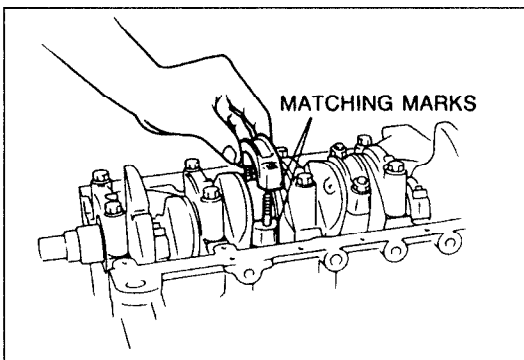
3. Measure the connecting rod side clearances.

Side clearance: 0.110—0.262mm (0.0043—0.0103 in)
Maximum: 0.30mm (0.012 in)

4. If the clearance exceeds the maximum, replace the connecting rod and cap.



05U0BX-196



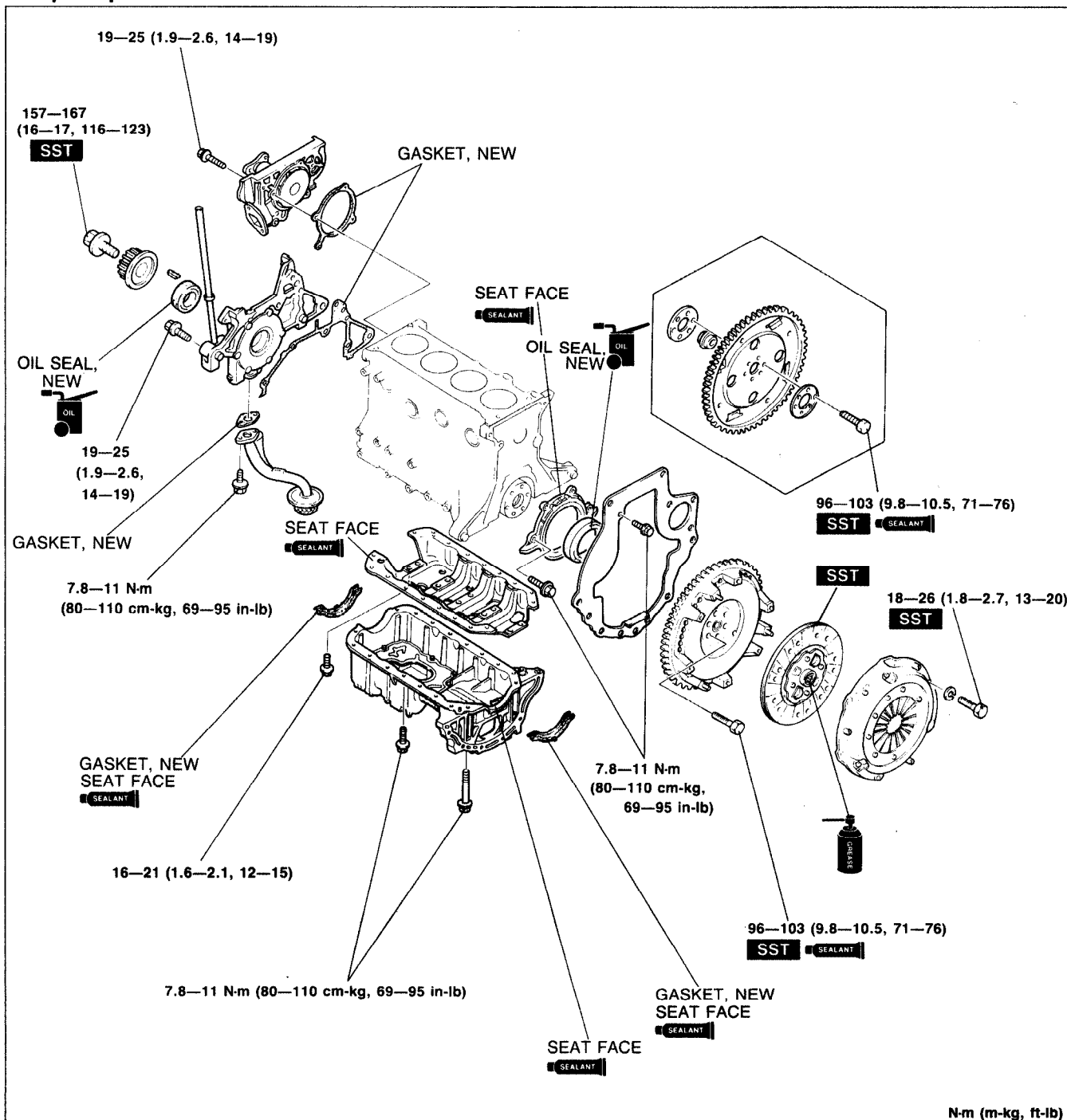
03U0B2-171

5. Apply a liberal amount of clean engine oil to the crankpin journals and connecting rod bearings.
6. Install the connecting rod caps with the matching marks aligned.
7. Tighten the connecting rod cap nuts in two or three steps.

Tightening torque:

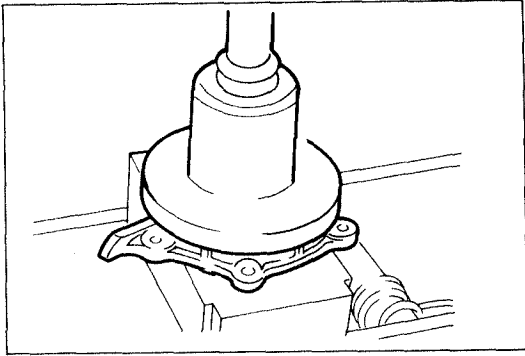
47—50 N·m (4.8—5.1 m·kg, 35—37 ft·lb)

**CYLINDER BLOCK (EXTERNAL PARTS)
Torque Specifications**



N·m (m·kg, ft·lb)

05U0BX-198



05U0BX-199

Rear Cover

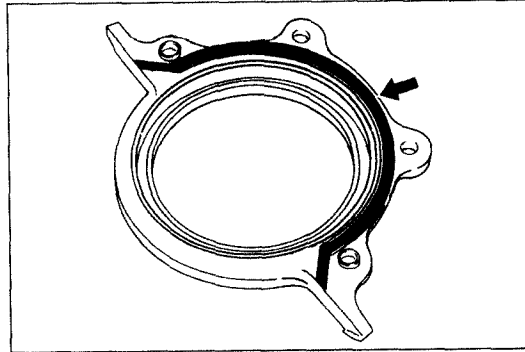
1. Apply a small amount of clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.

Caution

- The oil seal must be pressed in until it is flush with the edge of the rear cover.

3. Press the oil seal in evenly with a suitable pipe.

Oil seal outer diameter: 100mm (3.94 in)



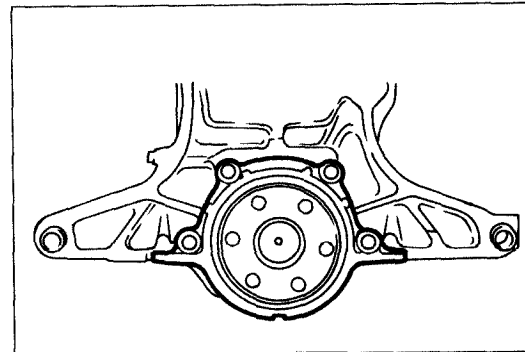
05U0BX-200

4. Apply silicone sealant to the shaded area shown in the figure.

5. Install the rear cover.

Tightening torque:

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)



05U0BX-201

Oil Pump

1. Apply a small amount of clean engine oil to the lip of a new oil seal.
2. Push the oil seal slightly in by hand.

Caution

- The oil seal must be pressed in until it is flush with the edge of the oil pump body.

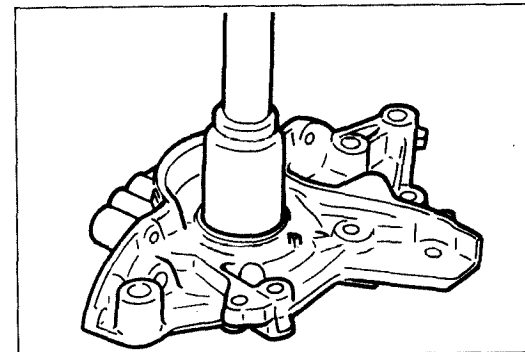
3. Press the oil seal in evenly with a suitable pipe.

Oil seal outer diameter: 44mm (1.73 in)

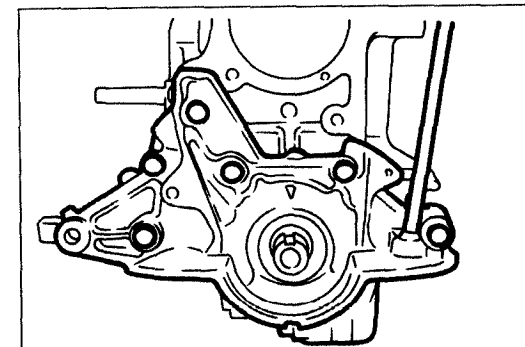
4. Install the oil pump and a new gasket.

Tightening torque:

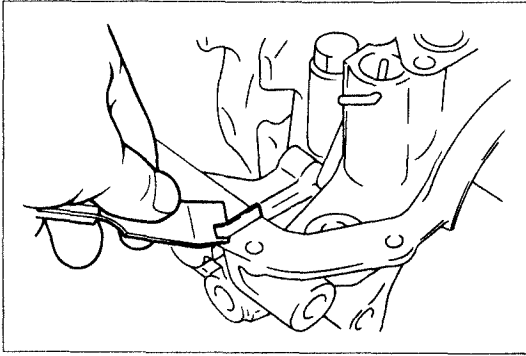
19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)



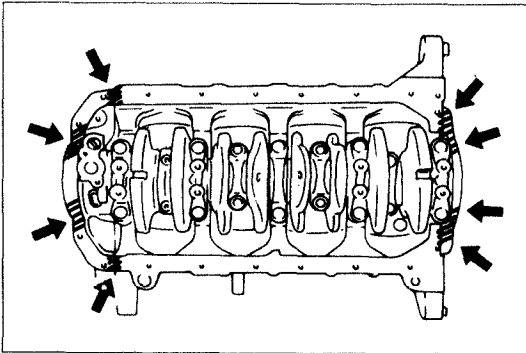
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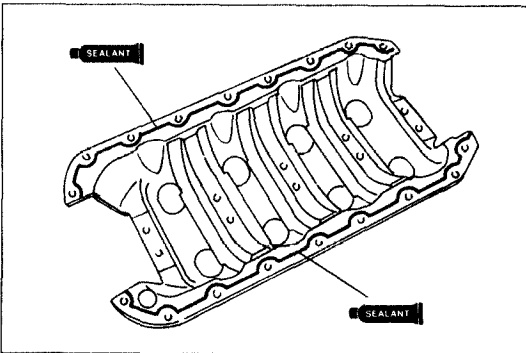
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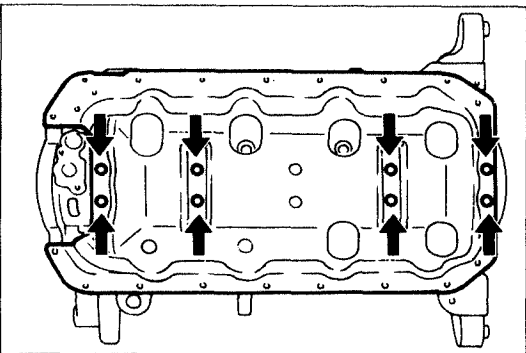
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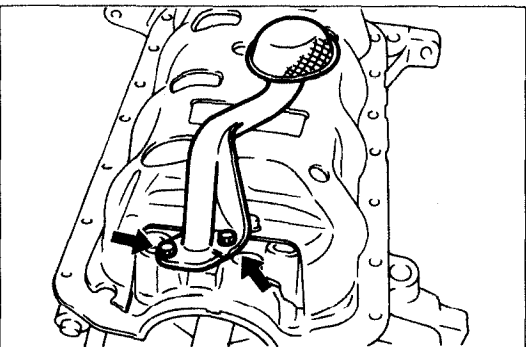
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03U0B2-094



03U0B2-095



05U0BX-207

Caution

- Do not scratch the oil pump.

5. Cut away the portion of the gasket that projects from the body toward the oil pan side.

Main Bearing Support Plate (MBSP)

1. Remove all foreign material from the contact surfaces.

Caution

- The oil pan must be secured within 30 minutes after the sealant is applied to the MBSP.

2. Apply silicone sealant to the shaded areas shown in the figure.

3. Apply a continuous bead of silicone sealant to the MBSP along the inside of the bolt holes.

4. Install the MBSP.

5. Install the MBSP bolts and tighten them in two or three steps in the order shown.

Tightening torque:

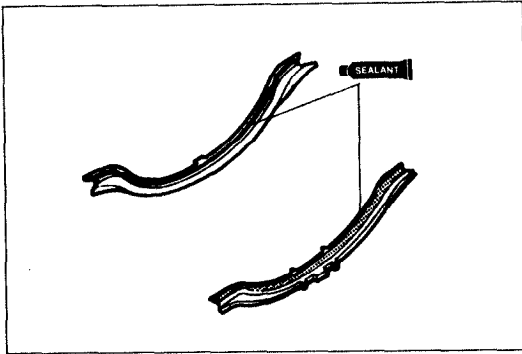
16–21 N·m (1.6–2.1 m·kg, 12–15 ft·lb)

Oil Strainer

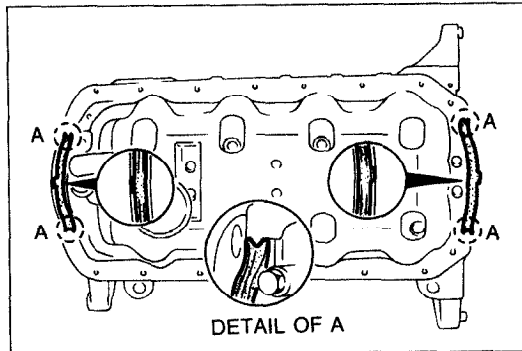
1. Install the oil strainer and a new gasket.

Tightening torque:

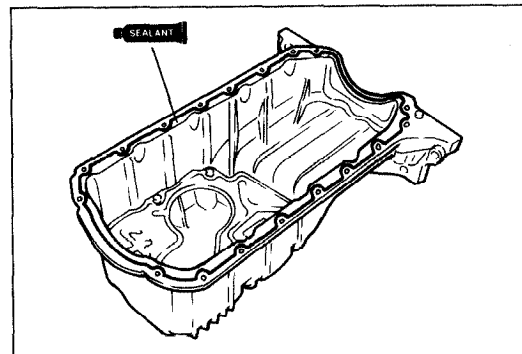
7.8–11 N·m (80–110 cm·kg, 69–95 in·lb)



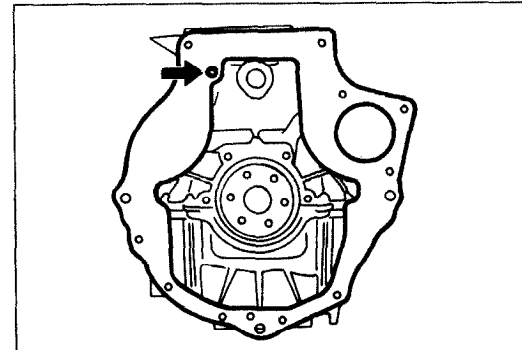
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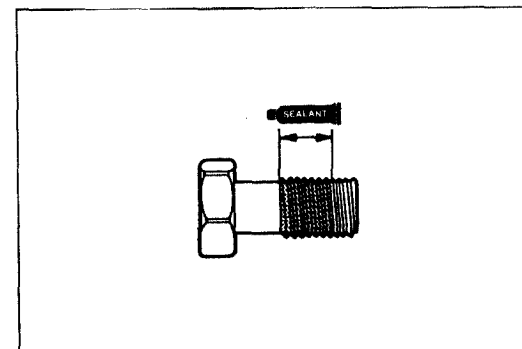
05U0BX-209



05U0BX-210



05U0BX-211



03U0B2-097

Oil Pan

1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the shaded areas shown in the figure.

3. Install new gaskets onto the oil pump body and the rear cover with the projections in the notches shown in the figure.

4. Apply a continuous bead of silicone sealant to the oil pan along the inside of the bolt holes and overlap the ends.
5. Install the oil pan.

Tightening torque:

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

End Plate

1. Install the end plate.

Tightening torque:

7.8—11 N·m (80—110 cm·kg, 69—95 in·lb)

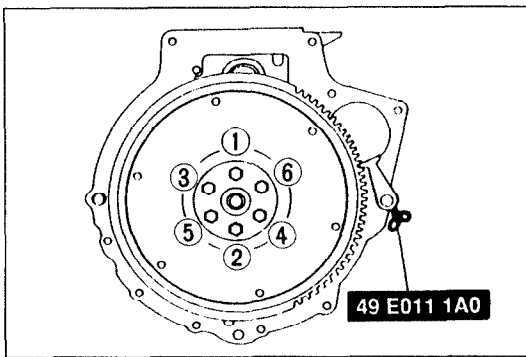
Flywheel (MTX)

1. Remove the sealant from the flywheel bolt holes in the crankshaft and from the flywheel bolts.

Caution

- If all the previous sealant cannot be removed from a bolt, replace the bolt.
- Do not apply sealant if a new bolt is used.

2. Set the flywheel onto the crankshaft.
3. Apply sealant to the flywheel bolts and install them.

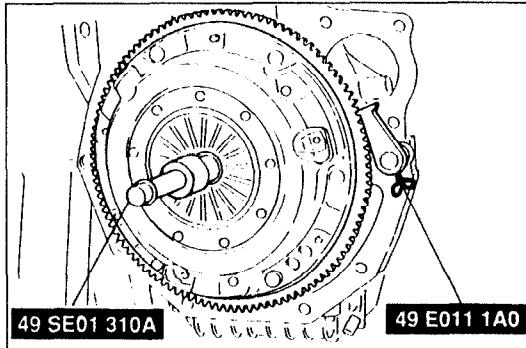


23U0B2-062

4. Hold the flywheel with the **SST** or equivalent.
5. Tighten the bolts in two or three steps in the order shown.

Tightening torque:

96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)



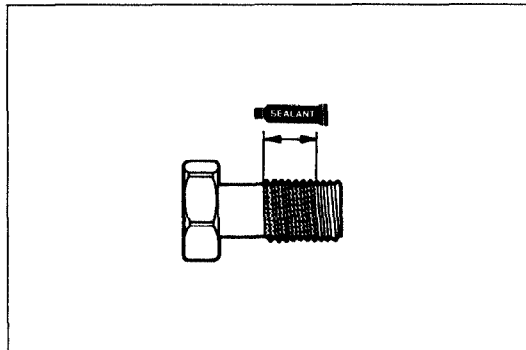
23U0B2-041

Clutch Disc and Clutch Cover (MTX)

1. Install the clutch disc and clutch cover using the **SST** or equivalent. (Refer to Section H.)

Tightening torque:

18—26 N·m (1.8—2.7 m·kg, 13—20 ft·lb)



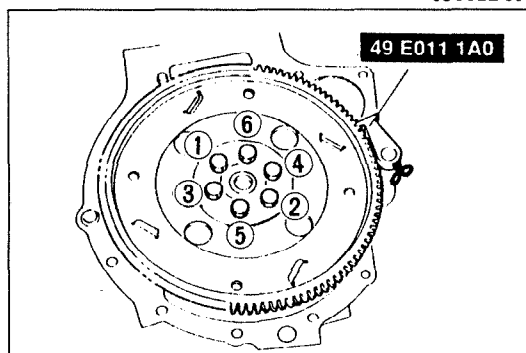
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Drive Plate (ATX)

1. Remove the sealant from the drive plate holes in the crankshaft and from the drive plate lock bolts.

Caution

- If all the previous sealant cannot be removed from a bolt, replace the bolt.
- Do not apply sealant if a new bolt is used.

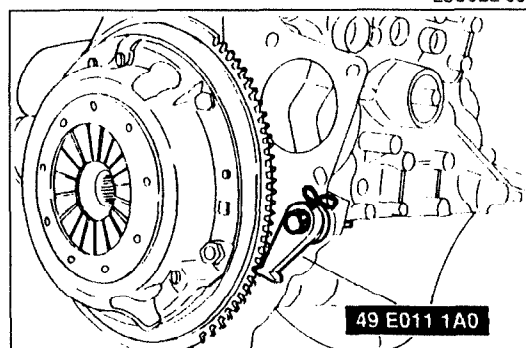


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2. Set the adapter, drive plate, and backing plate onto the crankshaft.
3. Apply sealant to the drive plate bolts and install them.
4. Hold the drive plate with the **SST** or equivalent.
5. Tighten the bolts in two or three steps in the order shown.

Tightening torque:

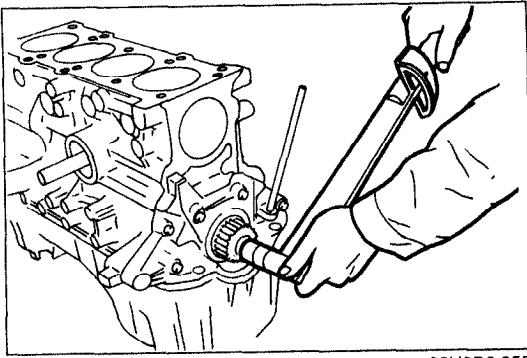
96—103 N·m (9.8—10.5 m·kg, 71—76 ft·lb)



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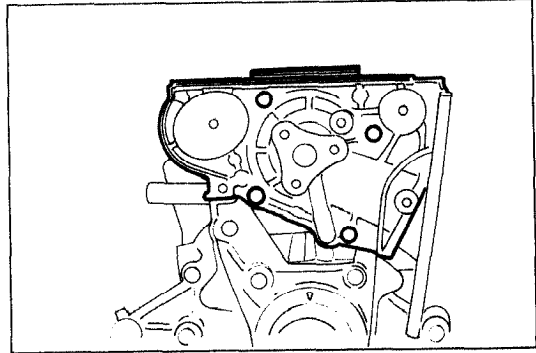
Timing Belt Pulley

1. Reverse the direction of the **SST** or equivalent on the flywheel.



23U0B2-050

2. Install the timing belt pulley.
3. Install the pulley Woodruff key with the tapered side toward the oil pump body.
4. Install the pulley lock bolt.
5. Tighten the pulley lock bolt.

Tightening torque:**157—167 N·m (16—17 m·kg, 116—123 ft·lb)**

03U0B2-101

Water Pump

1. Remove all foreign material from the water pump mounting surface.
2. Install the water pump and a new gasket.

Tightening torque:**19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)**