

2004-2011 ENGINE

Overhaul - 1.3L (13B-MSP) - RX-8

ENGINE OVERHAUL SERVICE WARNING

WARNING:

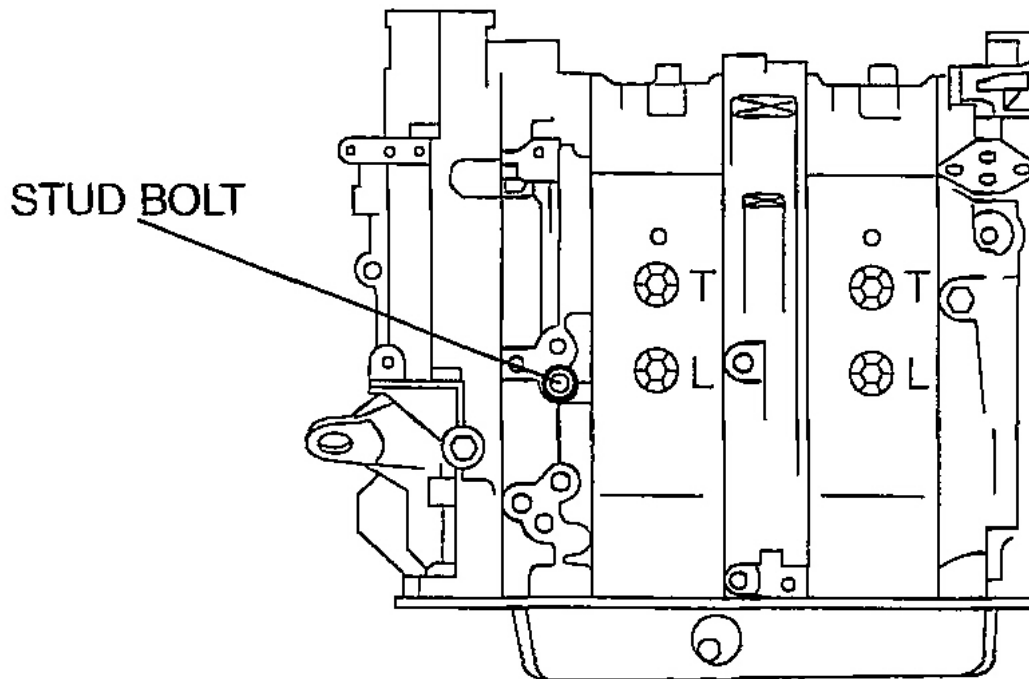
- Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.

ENGINE MOUNTING/DISMOUNTING

MOUNTING

Using 49 L010 1A0

1. Remove the stud bolt.

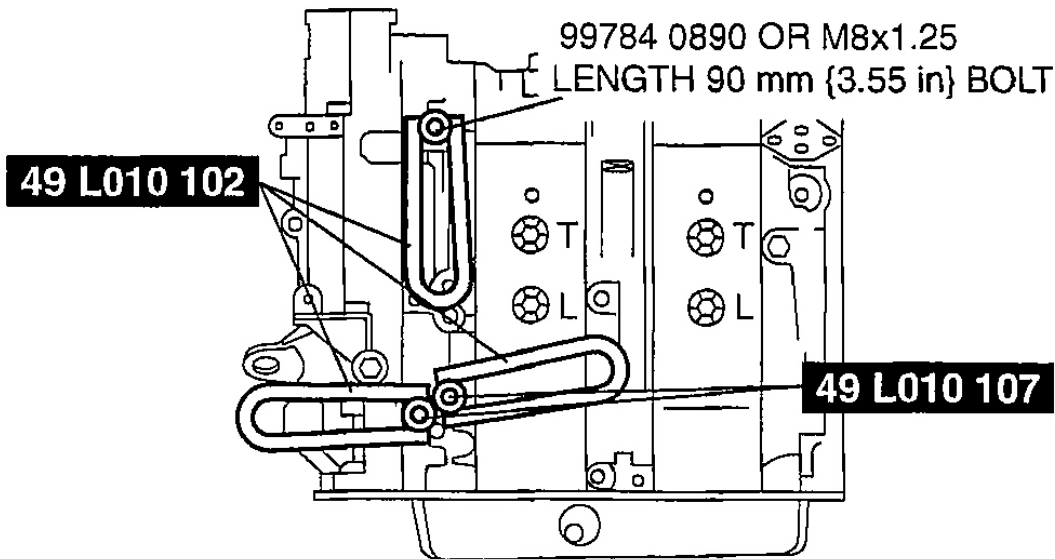


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Fig. 1: Identifying Stud Bolt

Courtesy of MAZDA MOTORS CORP.

2. Install the SSTs (arms) to the specified three position as shown in the figure, and temporarily tighten with the SSTs (bolts) and **99784 0890 or M8x1.25 length 90 mm {3.55 in} bolt**.

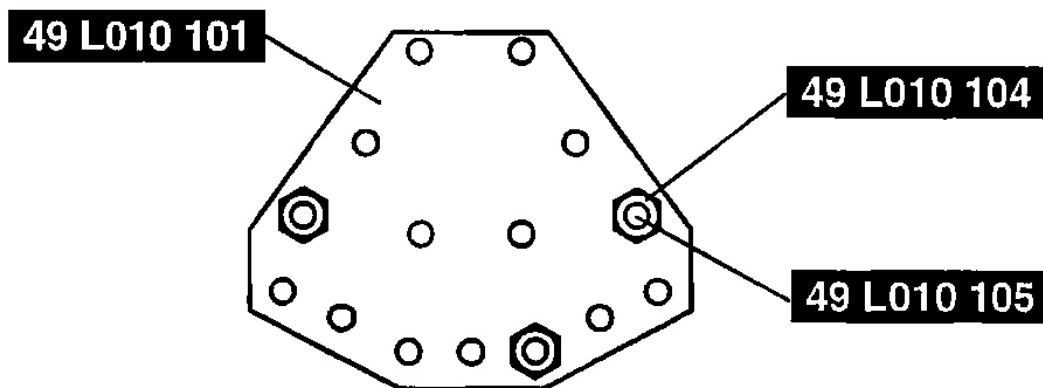


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Fig. 2: Installing SST Arms

Courtesy of MAZDA MOTORS CORP.

3. Install the SSTs (bolt, nut) to the three specified positions as shown in the figure.

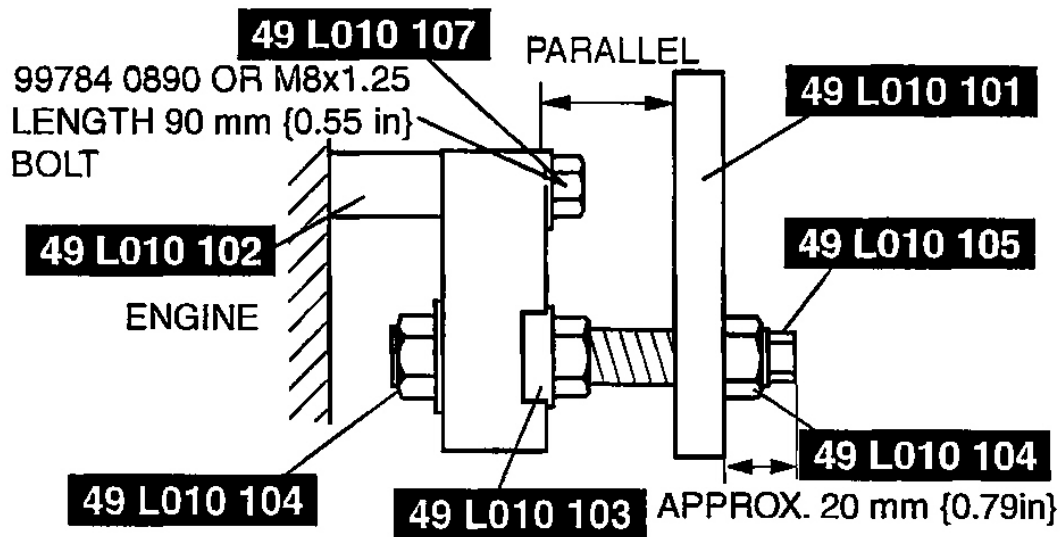


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Fig. 3: Installing SST Bolts/Nuts

Courtesy of MAZDA MOTORS CORP.

4. Install the SSTs (bolts, nuts, hook, plate) in Step 3 to the SST (arms, bolts) set in step 2.
5. Adjust the bolt threads by turning them so that they project **approx. 20 mm {0.79 in}** from the plate end.



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Fig. 4: Adjusting SST Bolt Threads
Courtesy of MAZDA MOTORS CORP.

6. Adjust the bolts and nuts so that the plate and arms are parallel.
7. Mount the engine to the SST (engine stand).
8. Remove the oil pan drain plug and drain the engine oil.
9. Replace with a new washer and install the oil pan drain plug.

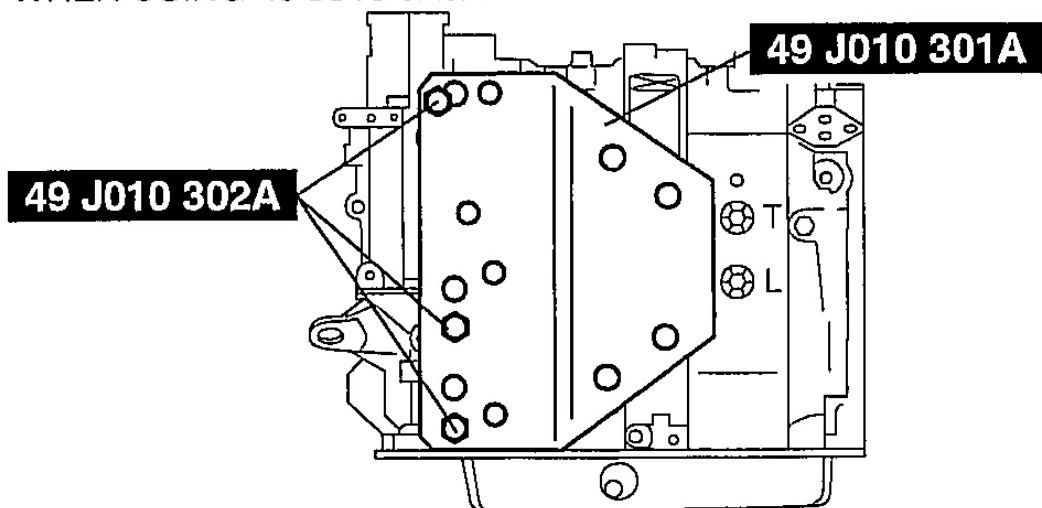
Tightening Torque

29.4-39.2 N.m {3.00-3.99 kgf.m, 21.7-28.9 ft.lbf}

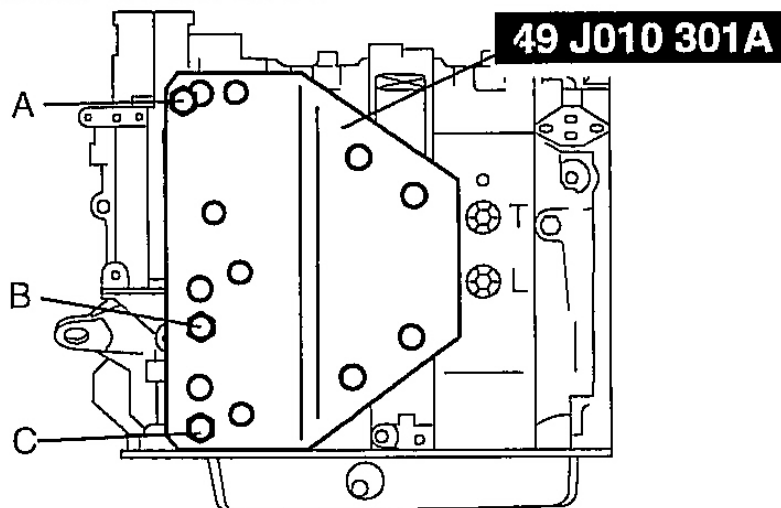
Using 49 J010 3A0A

1. Install the SSTs to the position shown in the figure.

WHEN USING 49 J010 3A0A



ONLY WHEN USING 49 J010 301A



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Fig. 5: Installing SST To Engine
Courtesy of MAZDA MOTORS CORP.

SST BOLT IDENTIFICATION

Bolt Identification/Location	Specification
A	M8x1.25 Length 25 mm {1.28 in} Bolt
B	99940 1201 (left Side Engine Mount Installation Nut) Or M12x1.5 Nut

C

99756 1230 (Left Side Engine Mount
Installation Nut) + Washer

2. Mount the engine to the **SST** (engine stand).
3. Remove the oil pan drain plug and drain the engine oil.
4. Install the oil pan drain plug with a new washer.

Tightening Torque**29.4-39.2 N.m {3.00-3.99 kgf.m, 21.7-28.9 ft.lbf}****DISMOUNTING**

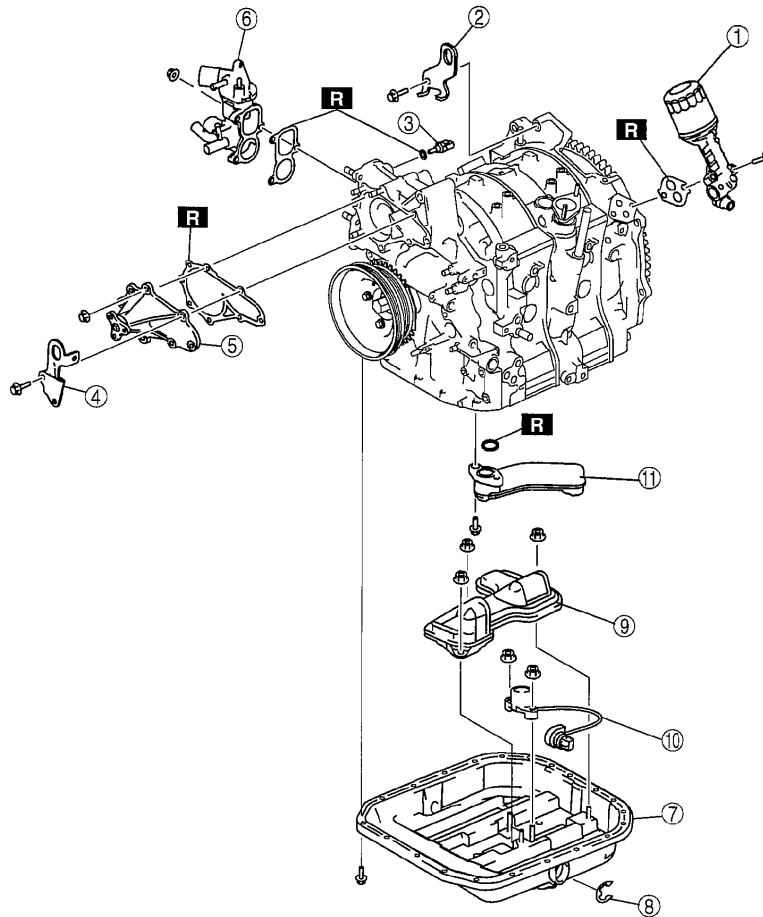
1. Dismount in the reverse order of mounting.
2. Tighten the stud bolt. (Only when using 49 L010 101.)

Tightening Torque**14.7-34.3 N.m {1.50-3.49 kgf.m, 10.9-25.2 ft.lbf}****HOUSING DISASSEMBLY I**

1. Disassemble in the order indicated in the figure.

2005 Mazda RX-8 Shinka
2004-2011 ENGINE Overhaul - 1.3L (13B-MSP) - RX-8

2005 Mazda RX-8 Shinka
2004-2011 ENGINE Overhaul - 1.3L (13B-MSP) - RX-8



1	Oil filter component
2	Engine hanger (engine rear side)
3	Engine coolant temperature sensor
4	Engine hanger (engine front side)
5	Water pump body
6	Thermostat component

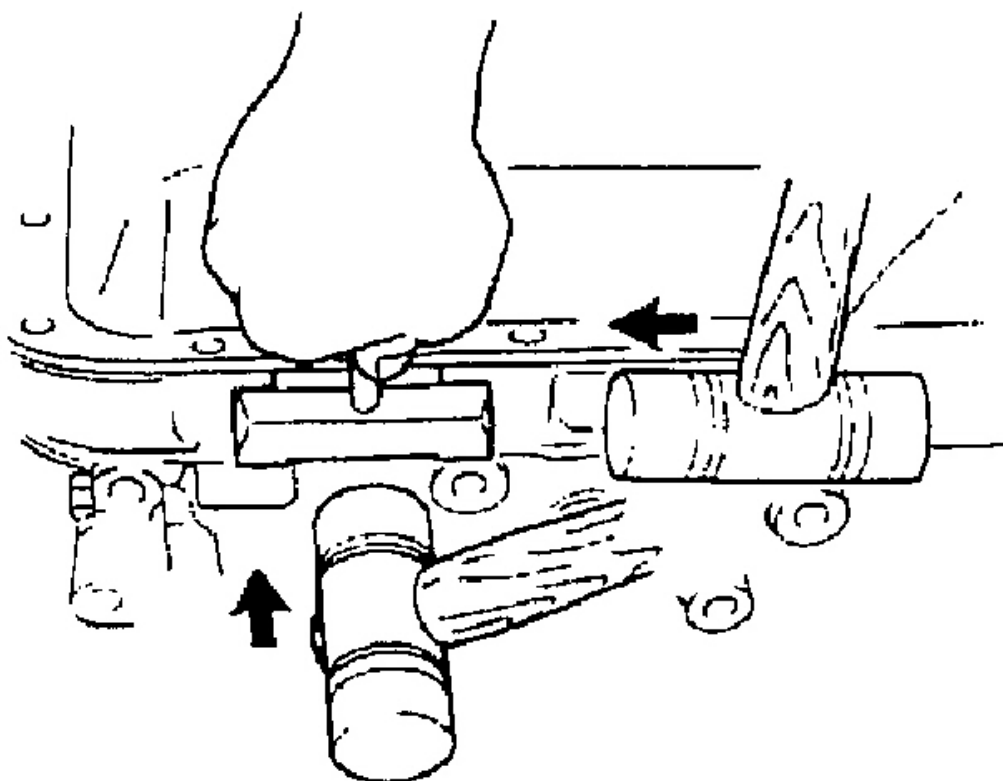
7	Oil pan (See Oil Pan Disassembly Note.)
8	Clip
9	Oil baffle plate
10	Oil-level sensor
11	Oil strainer

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Fig. 6: Exploded View Of Housing (I)
Courtesy of MAZDA MOTORS CORP.

OIL PAN DISASSEMBLY NOTE

1. Remove the oil pan using the separator tool.

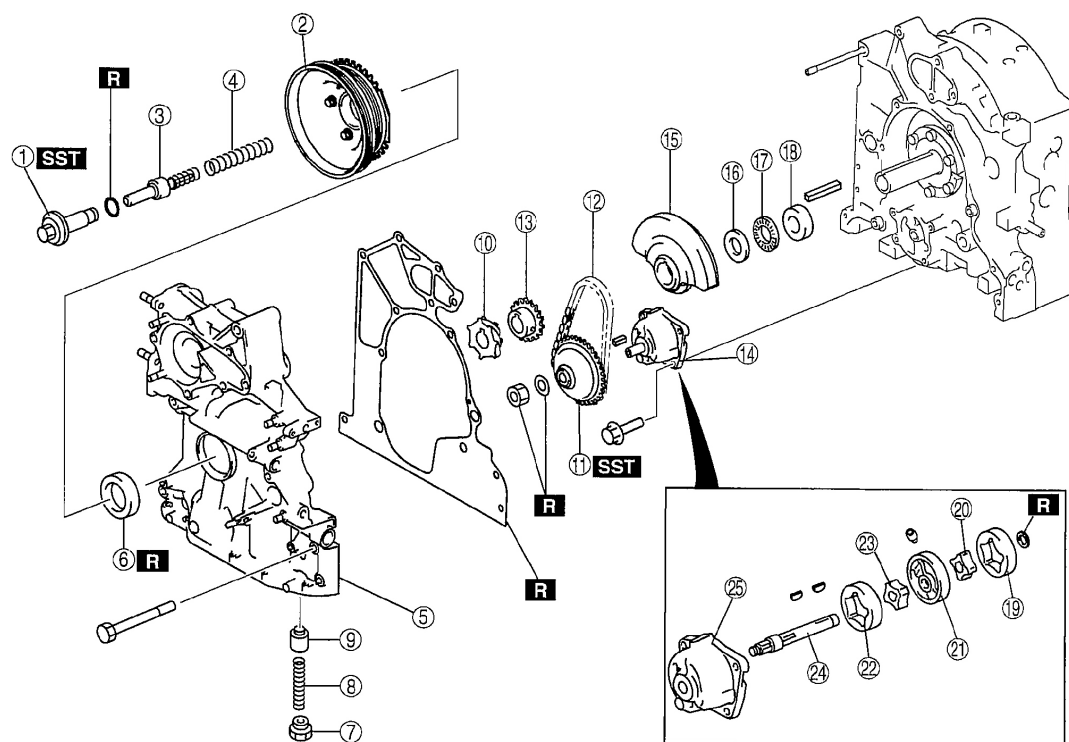


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Fig. 7: Separating Oil Pan From Block
Courtesy of MAZDA MOTORS CORP.

HOUSING DISASSEMBLY II

1. Disassemble in the order indicated in the figure.



1	Pulley lockbolt (See Pulley Lockbolt Disassembly Note.)
2	Pulley component
3	Eccentric shaft bypass valve
4	Spring
5	Front cover (See Front Cover Disassembly Note.)
6	Front oil seal
7	Plug
8	Control valve spring
9	Control valve
10	Metering oil pump drive gear
11	Oil pump sprocket wheel (See Oil Pump Sprocket Disassembly Note.)
12	Oil pump chain

13	Oil pump drive gear
14	Oil pump component
15	Balance weight
16	Thrust plate
17	Needle bearing
18	Spacer
19	Rear outer rotor
20	Rear inner rotor
21	Middle plate
22	Front outer rotor
23	Front inner rotor
24	Shaft
25	Oil pump body

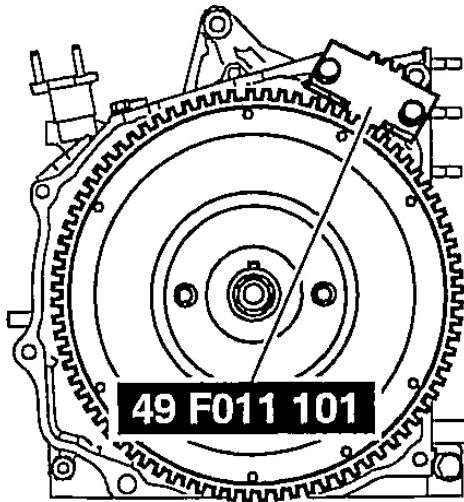
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Fig. 8: Exploded View Of Housing (II)
Courtesy of MAZDA MOTORS CORP.

PULLEY LOCKBOLT DISASSEMBLY NOTE

1. Lock the flywheel (MT) or counterweight (AT) against rotation using the SST .

MT



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AT

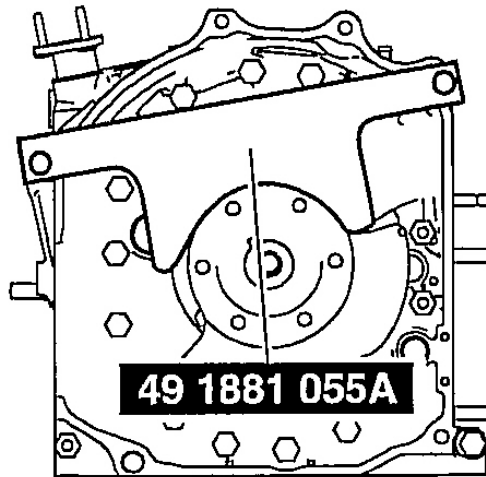
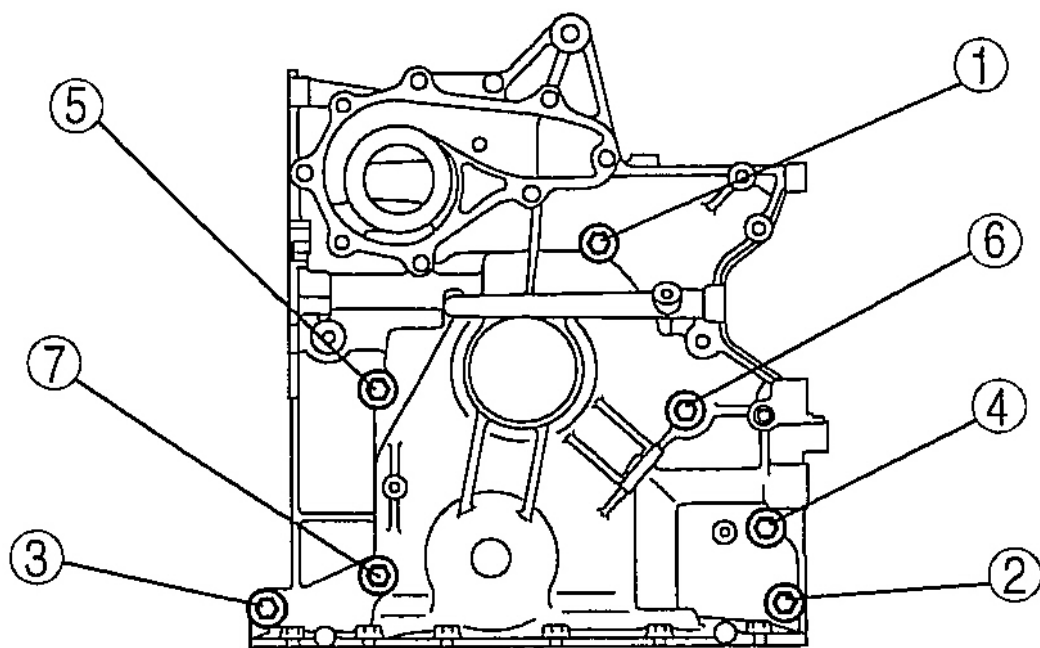


Fig. 9: Locking Flywheel/Counterweight
Courtesy of MAZDA MOTORS CORP.

FRONT COVER DISASSEMBLY NOTE

1. Loosen the engine front cover installation bolts in the order shown in the figure.



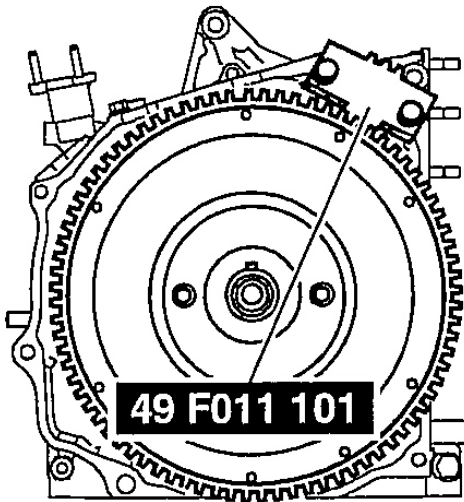
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Fig. 10: Front Cover Bolt Loosening Sequence
Courtesy of MAZDA MOTORS CORP.

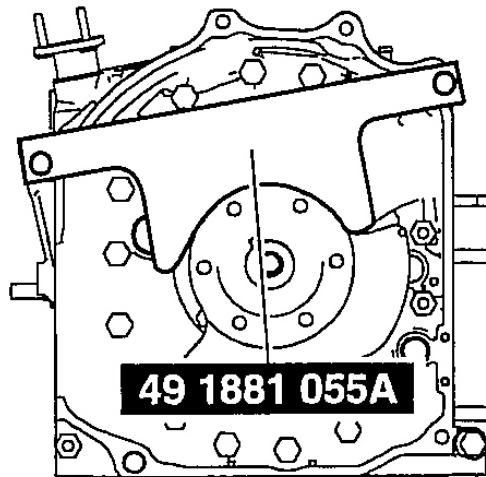
OIL PUMP SPROCKET DISASSEMBLY NOTE

1. Lock the flywheel (MT) or counterweight (AT) against rotation using the SST .

MT



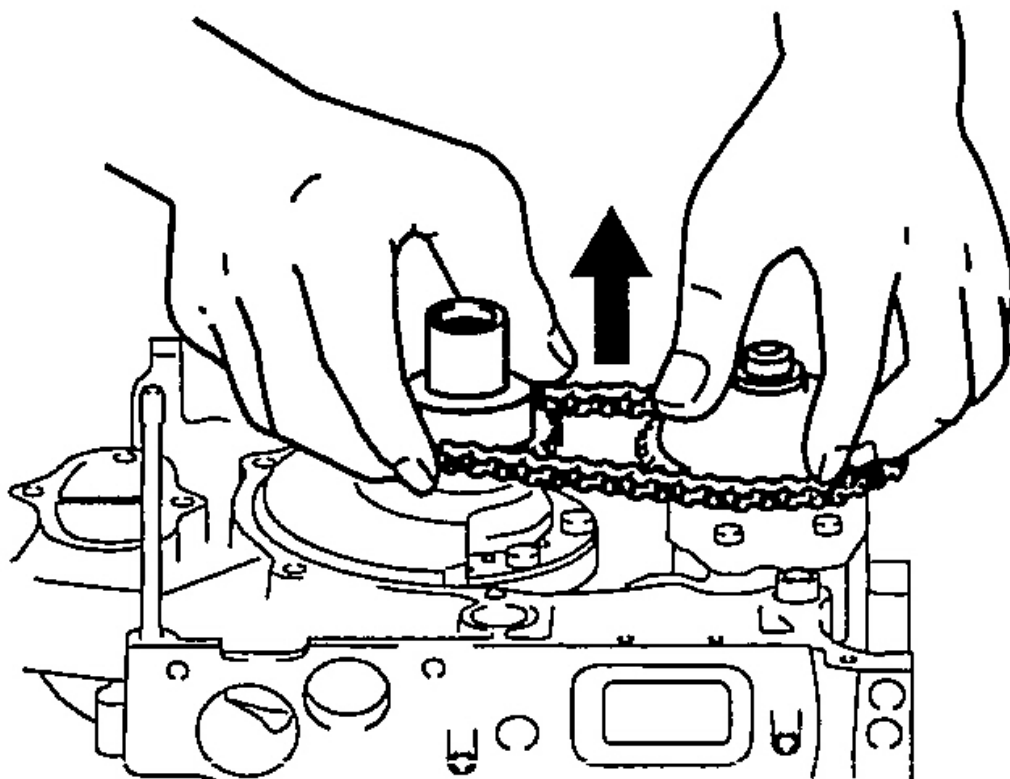
AT



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Fig. 11: Locking Flywheel/Counterweight
Courtesy of MAZDA MOTORS CORP.

2. Unlock the crimped part of the lock washer and remove the locknut and lock washer.
3. Remove the oil pump drive gear and oil pump sprocket wheel with the oil pump chain engaged.

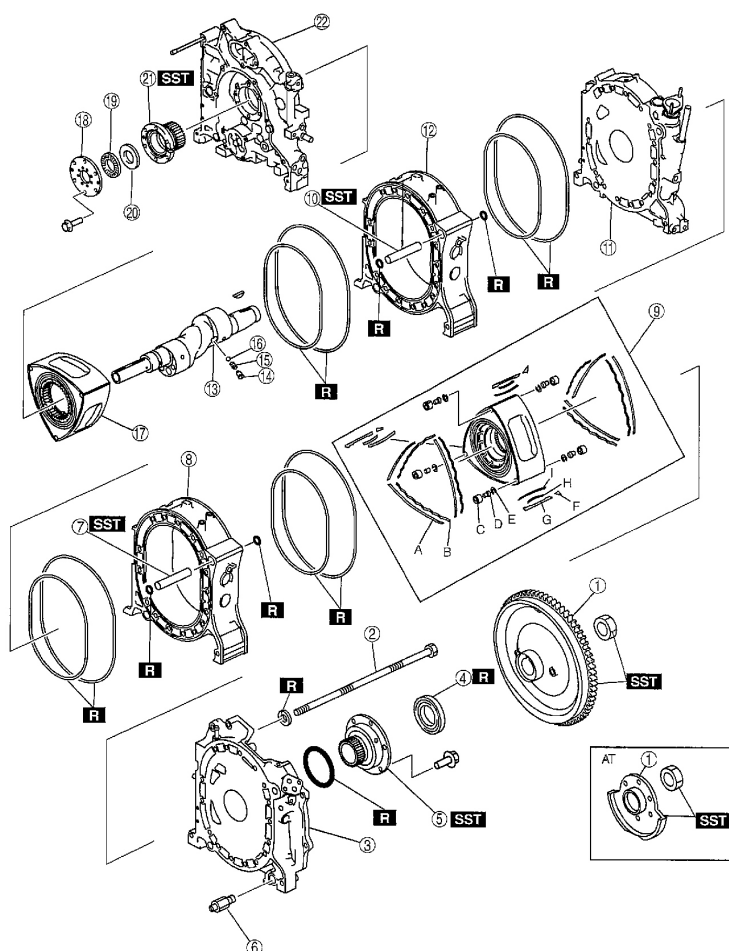


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Fig. 12: Removing Oil Pump Drive Gear
Courtesy of MAZDA MOTORS CORP.

HOUSING DISASSEMBLY III

1. Disassemble in the order indicated in the figure.



1	Flywheel (MT), counterweight (AT) (See Flywheel (MT), Counterweight (AT) Disassembly Note.)
2	Tension bolt (See Tension Bolt Disassembly Note.)
3	Rear housing (See Rear Housing Disassembly Note.)
4	Rear oil seal
5	Rear stationary gear (See Stationary Gear Disassembly Note.)
6	Pressure regulator
7	Tubular dowel (rear rotor housing side) (See Tubular Dowel Disassembly Note.)
8	Rear rotor housing (See Rotor Housing Disassembly Note.)
9	Rear rotor A: Side seal B: Side seal spring C: Corner seal D: Corner seal plug E: Corner Seal Spring F: Side piece G: Apex seal H: Apex seal spring (short) I: Apex seal spring (long) (See Rotor Disassembly Note.)

10	Tubular dowel (front rotor housing side) (See Tubular Dowel Disassembly Note.)
11	Intermediate housing (See Intermediate Housing Disassembly Note.)
12	Front rotor housing (See Rotor Housing Disassembly Note.)
13	Eccentric shaft
14	Oil jet plug
15	Spring
16	Steel ball
17	Front rotor (See Rotor Disassembly Note.)
18	Plate
19	Needle bearing
20	Thrust plate
21	Front stationary gear (See Stationary Gear Disassembly Note.)
22	Front housing

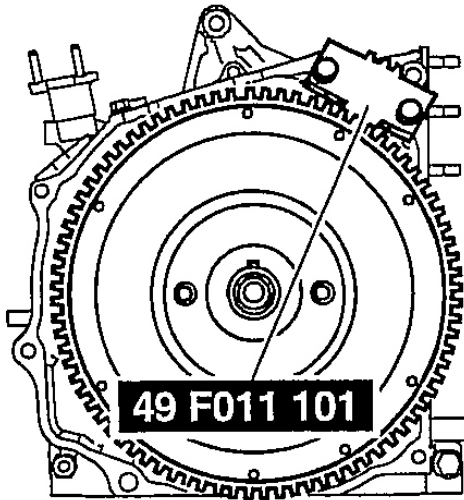
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Fig. 13: Exploded View Of Housing (III)
Courtesy of MAZDA MOTORS CORP.

FLYWHEEL (MT), COUNTERWEIGHT (AT) DISASSEMBLY NOTE

1. Lock the flywheel (MT) or counterweight (AT) against rotation using the SST .

MT



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AT

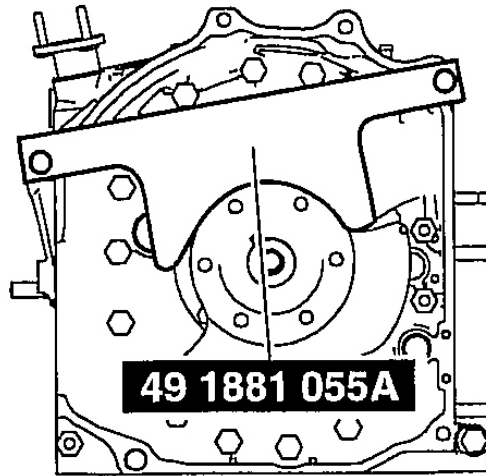


Fig. 14: Locking Flywheel/Counterweight
Courtesy of MAZDA MOTORS CORP.

2. Remove the locknut using the SST .

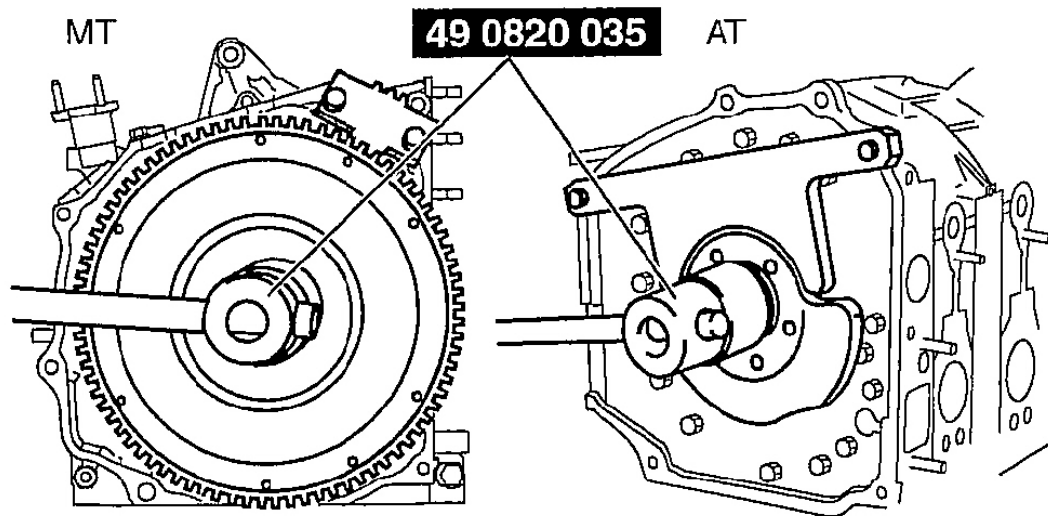


Fig. 15: Removing Locknut
Courtesy of MAZDA MOTORS CORP.

3. Remove the flywheel (MT) or counterweight (AT), using the SST .

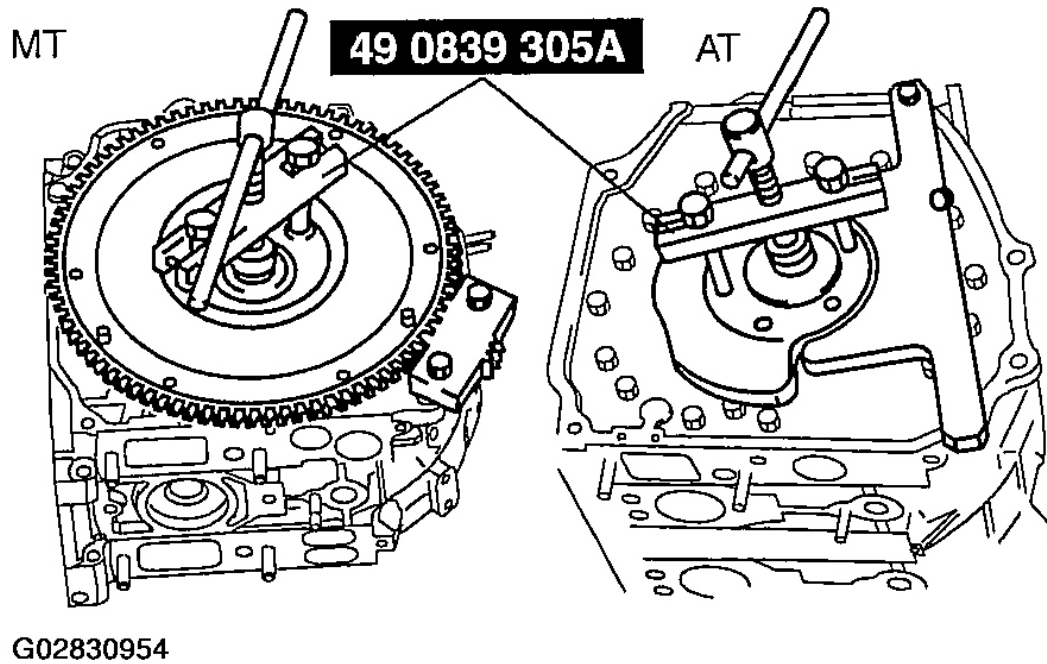
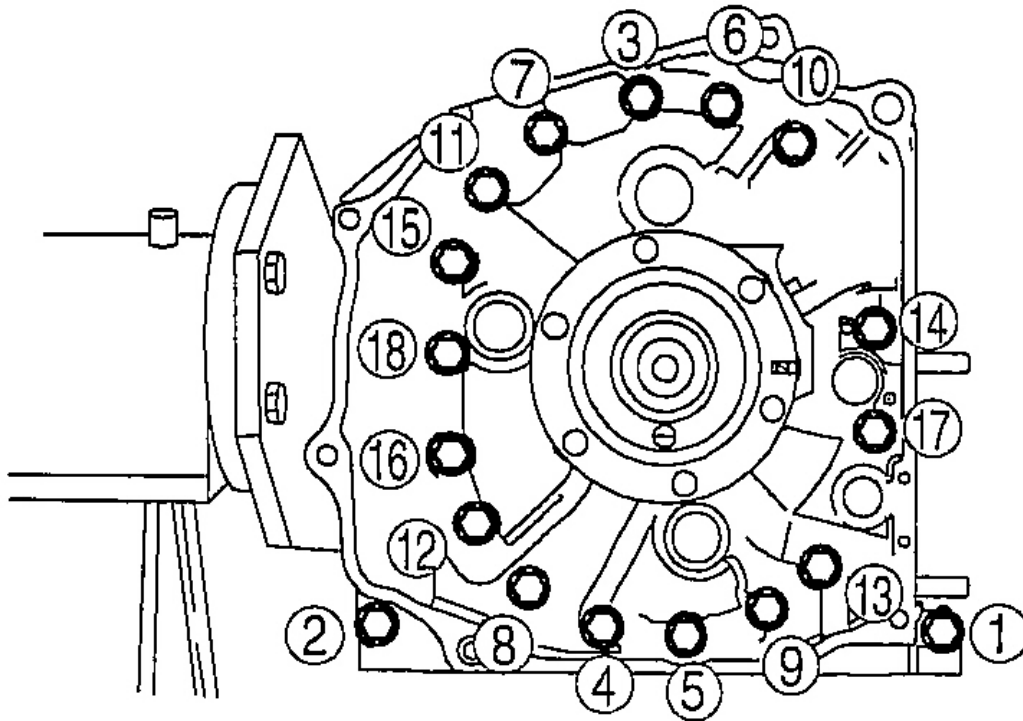


Fig. 16: Removing Flywheel/Counterweight
Courtesy of MAZDA MOTORS CORP.

TENSION BOLT DISASSEMBLY NOTE

1. Loosen the tension bolts in 2-3 passes in the order shown in the figure and remove them.



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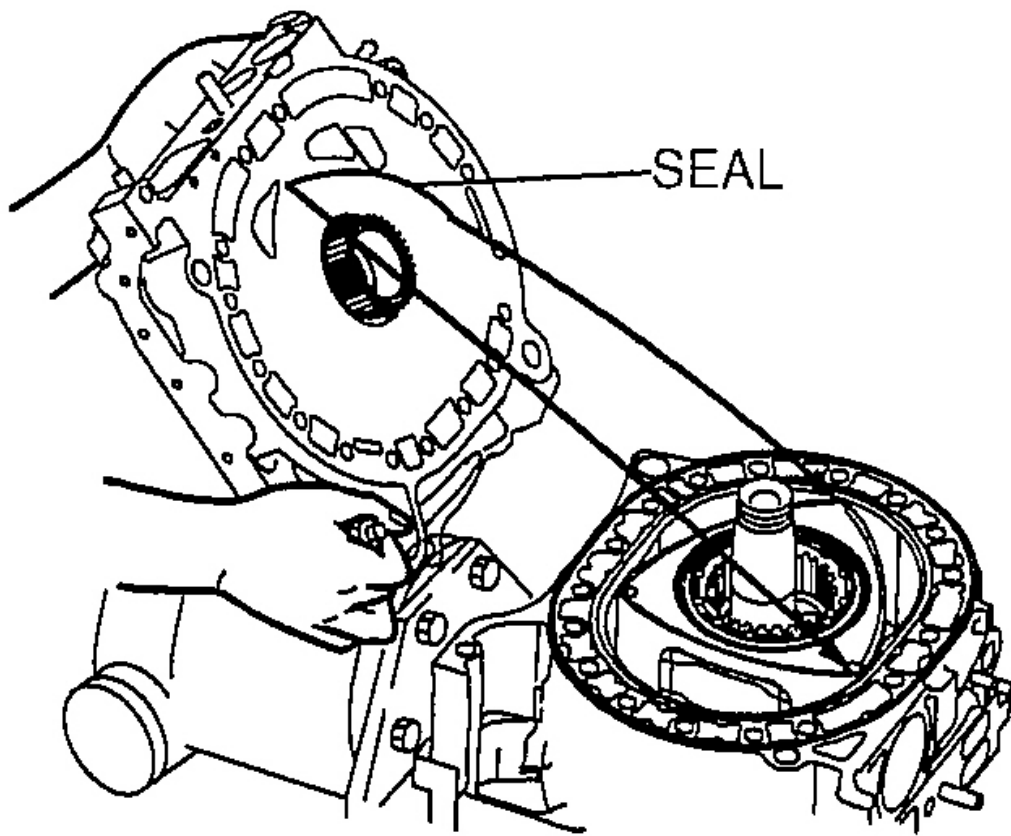
Fig. 17: Tension Bolt Loosening Sequence
Courtesy of MAZDA MOTORS CORP.

REAR HOUSING DISASSEMBLY NOTE

1. Move the rear housing to the left and right to cut the oil film.
2. Remove the rear housing.

CAUTION:

- If a seal adheres to the rear housing, put it back in its original position in the rotor.



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Fig. 18: Rear Housing Seal

Courtesy of MAZDA MOTORS CORP.

STATIONARY GEAR DISASSEMBLY NOTE

1. Remove the stationary gear using the SST .

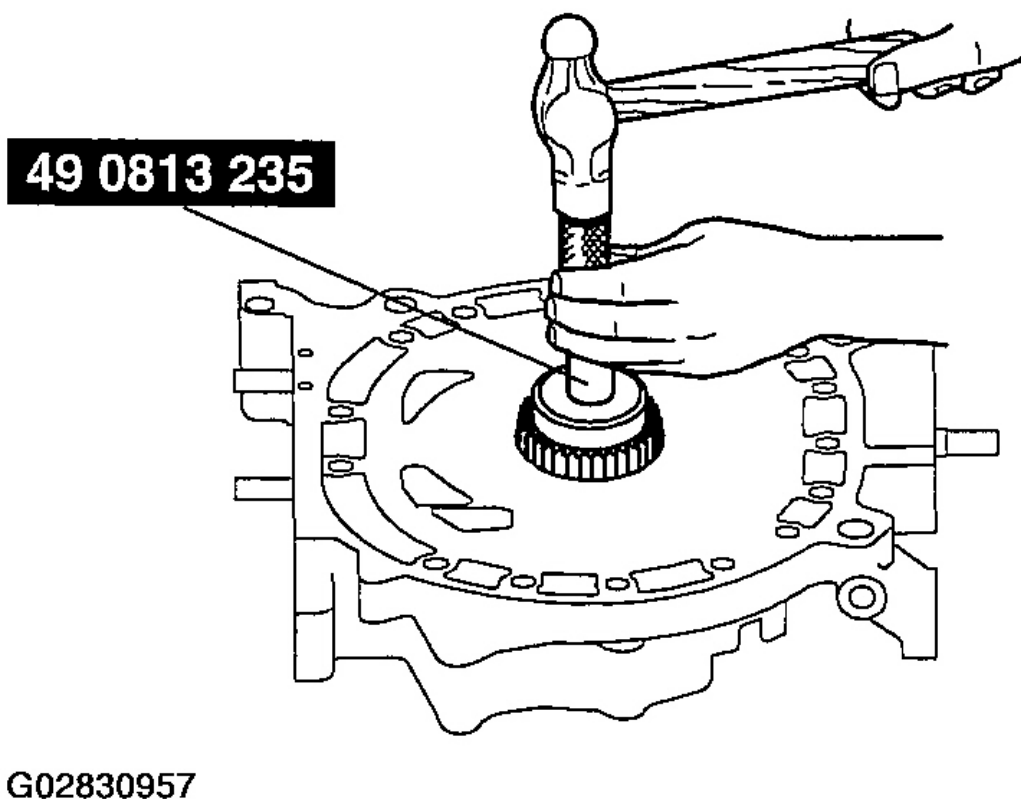


Fig. 19: Removing Stationary Gear
Courtesy of MAZDA MOTORS CORP.

TUBULAR DOWEL DISASSEMBLY NOTE

1. Remove the tubular dowel using the SST .

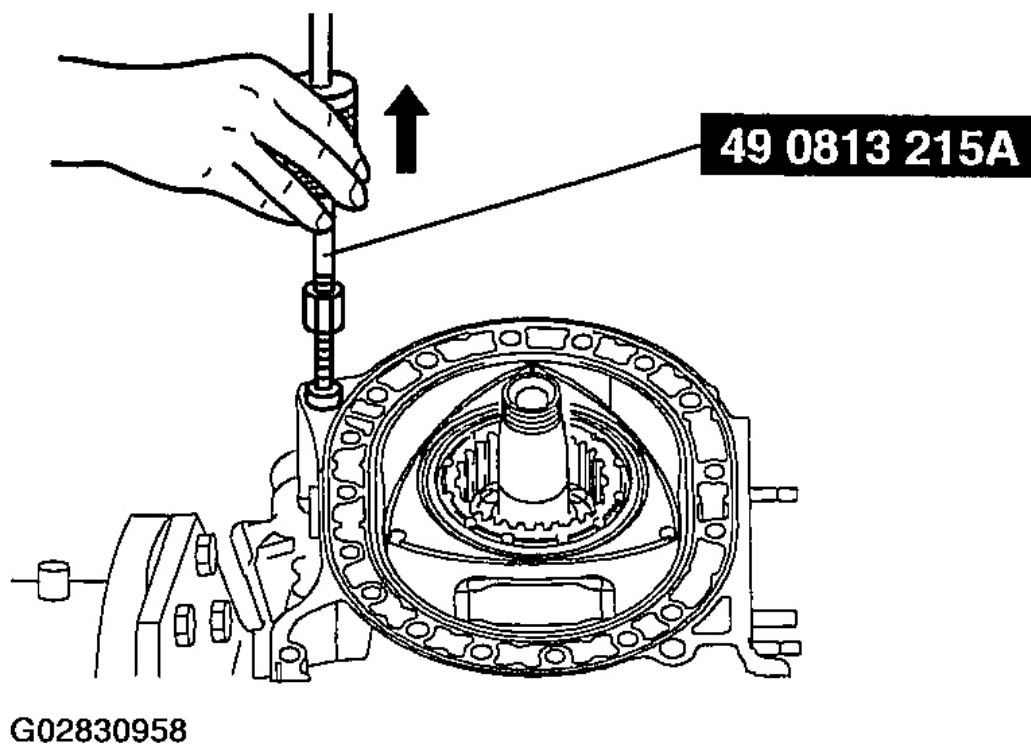
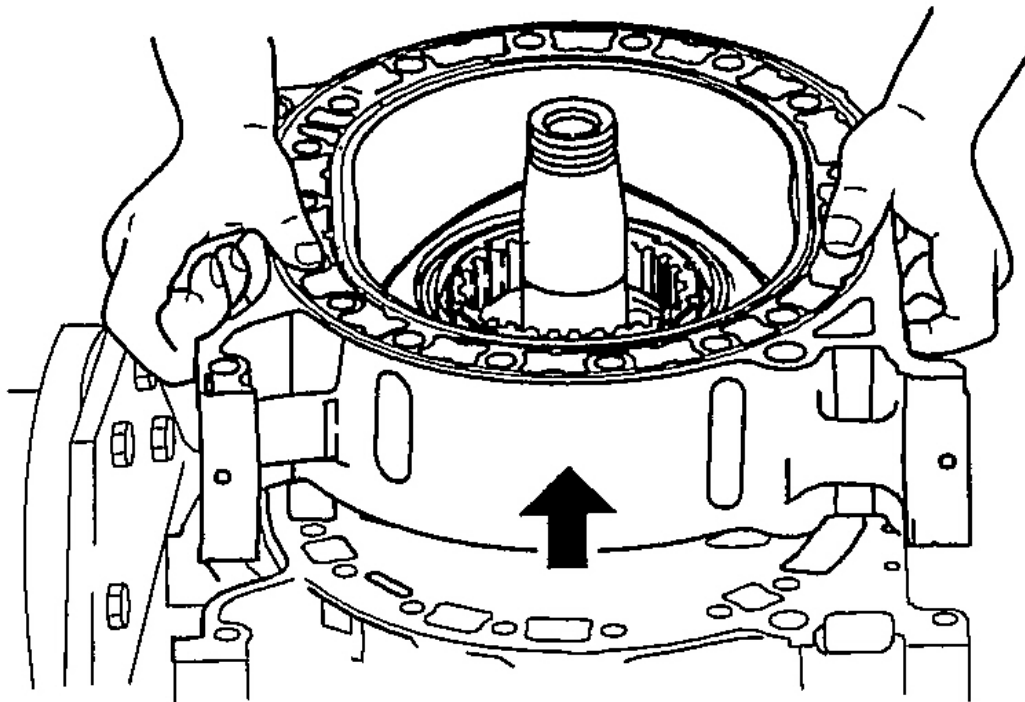


Fig. 20: Removing Tubular Dowel
Courtesy of MAZDA MOTORS CORP.

ROTOR HOUSING DISASSEMBLY NOTE

1. Remove the rotor housing being careful not to drop the apex seal.



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Fig. 21: Removing Rotor Housing
Courtesy of MAZDA MOTORS CORP.

ROTOR DISASSEMBLY NOTE

NOTE:

- Pair each seal and spring according to the numbers shown in the figure, and place them in the SST according to the numbers shown on the SST .

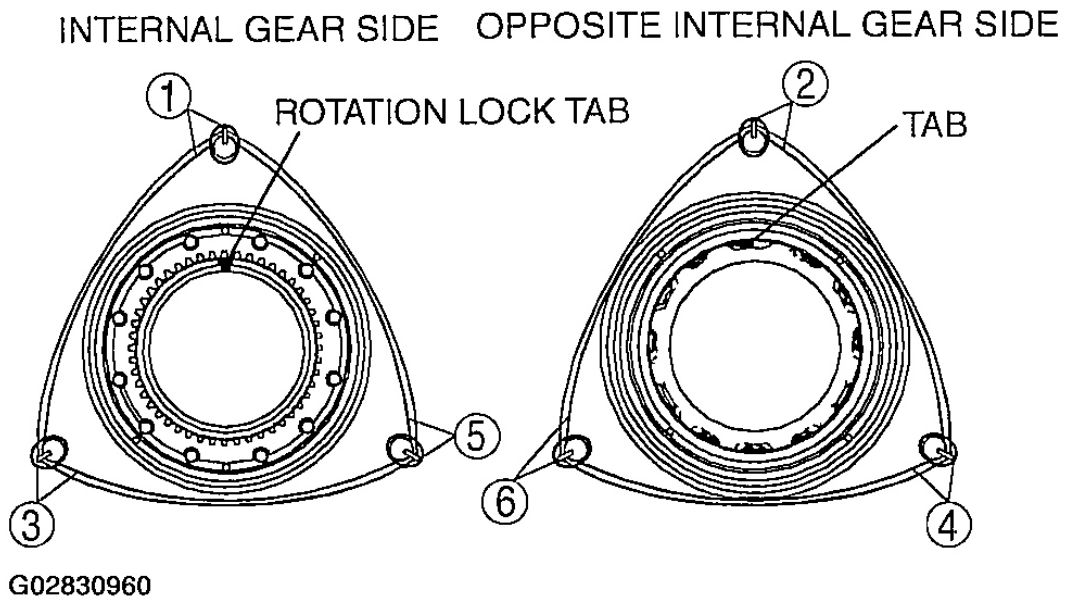
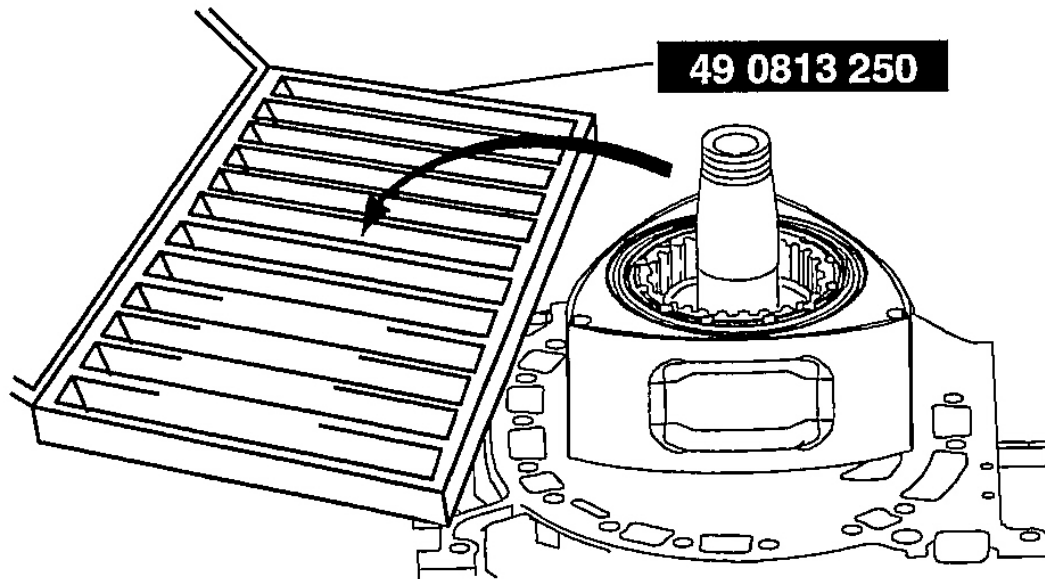


Fig. 22: Identifying Seal & Spring
 Courtesy of MAZDA MOTORS CORP.

1. Remove the side piece, apex seal, corner seal, side seal, and spring on the engine rear side, and place them in the SST while keeping them in order.



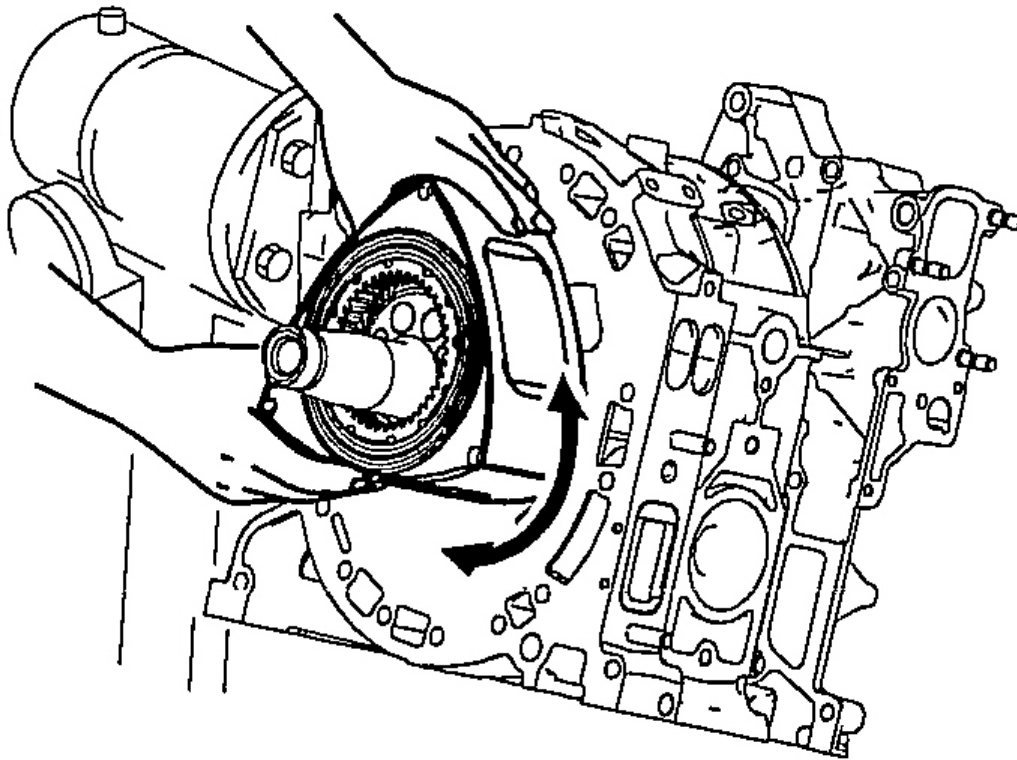
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Fig. 23: Removing Side Piece, Apex Seal, Corner Seal, Side Seal, & Spring (Engine Rear Side)
Courtesy of MAZDA MOTORS CORP.

2. Move the rotor to the left and right to cut the oil film.
3. Remove the rotor.

CAUTION:

- If a seal adheres to the side housing, put it back in its original position in the rotor.
- Place the removed rotor upright on soft material such as a rubber sheet or cloth. Do not allow the oil seal to directly contact metal or similar hard surface.

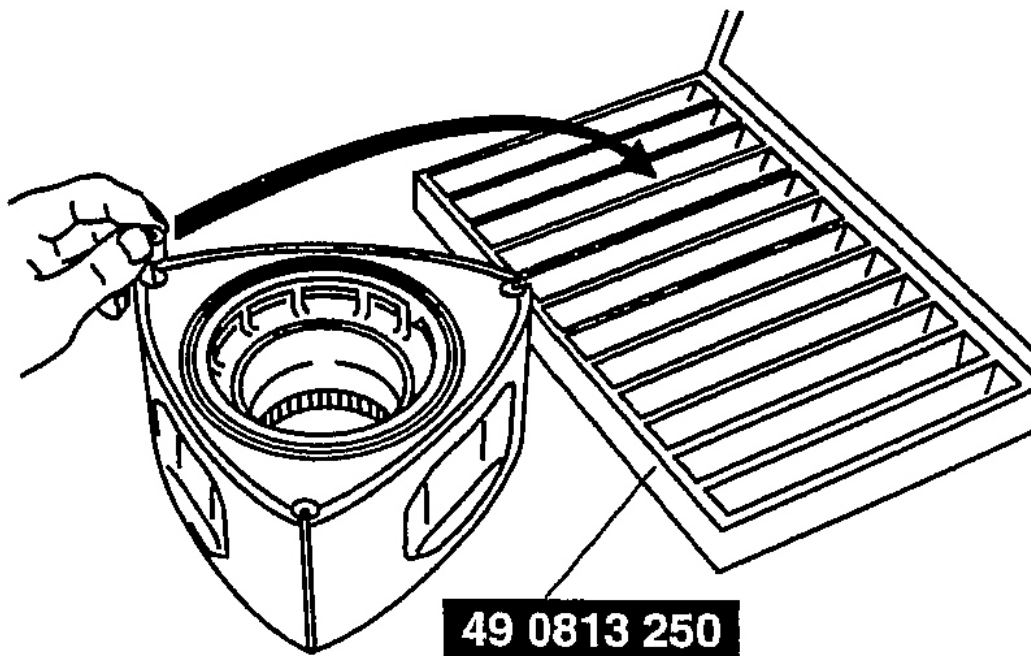


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Fig. 24: Removing Rotor

Courtesy of MAZDA MOTORS CORP.

4. Remove the corner seal, side seal, and spring on the engine front side, and place them in the SST while keeping them in order.

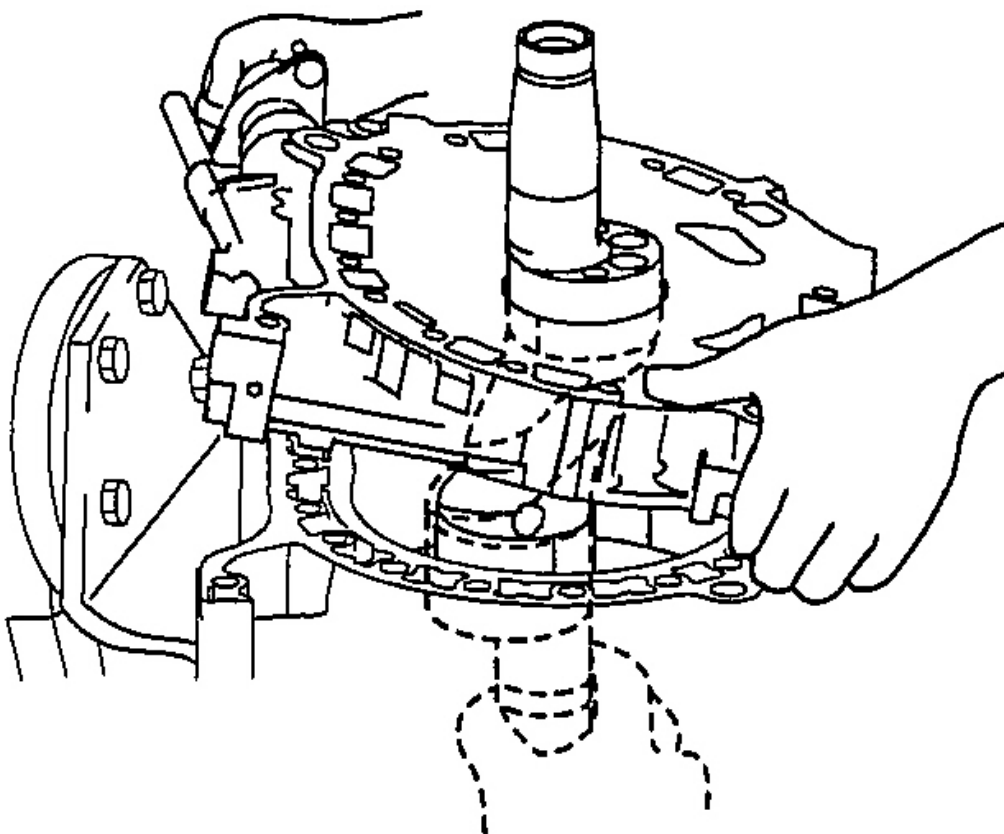


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Fig. 25: Removing Corner Seal, Side Seal, & Spring (Engine Front Side)
Courtesy of MAZDA MOTORS CORP.

INTERMEDIATE HOUSING DISASSEMBLY NOTE

1. Lift the intermediate housing up while another person pushes the eccentric shaft upward **approx. 3 cm {1.18 in}** .



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Fig. 26: Removing Intermediate Housing
Courtesy of MAZDA MOTORS CORP.

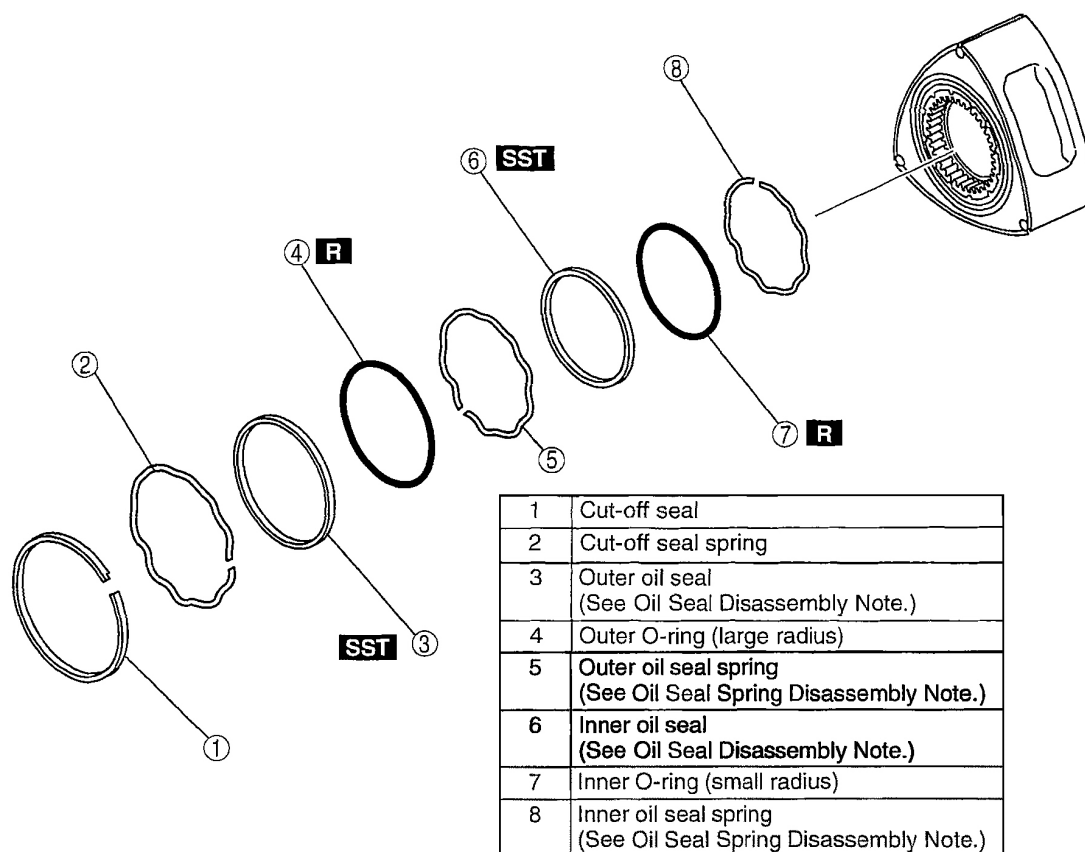
2. Rotate and remove the intermediate housing at the point where the eccentric shaft does not catch.

CAUTION:

- If a seal adheres to the intermediate housing, put it back in its original position in the rotor.

ROTOR DISASSEMBLY

1. Disassemble in the order indicated in the figure.



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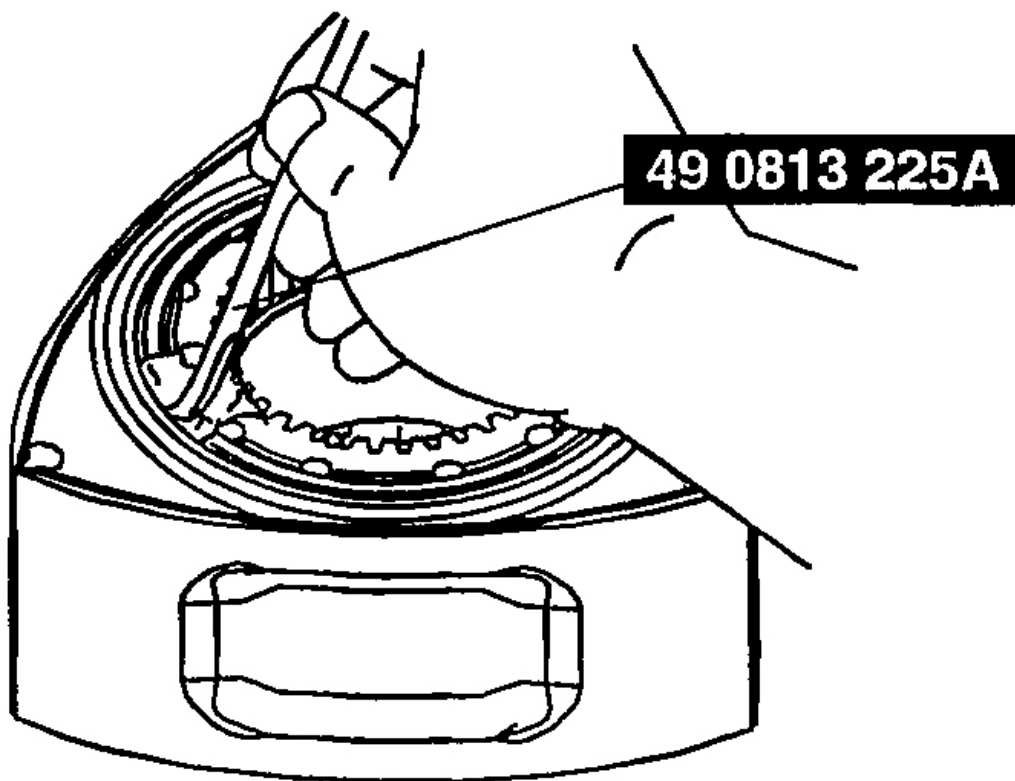
Fig. 27: Disassembling Rotor
Courtesy of MAZDA MOTORS CORP.

OIL SEAL DISASSEMBLY NOTE

1. Remove the oil seal using the SST .

CAUTION:

- Be sure to keep the removed oil seals separated according to their removal position.



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Fig. 28: Removing Oil Seal

Courtesy of MAZDA MOTORS CORP.

OIL SEAL SPRING DISASSEMBLY NOTE

CAUTION:

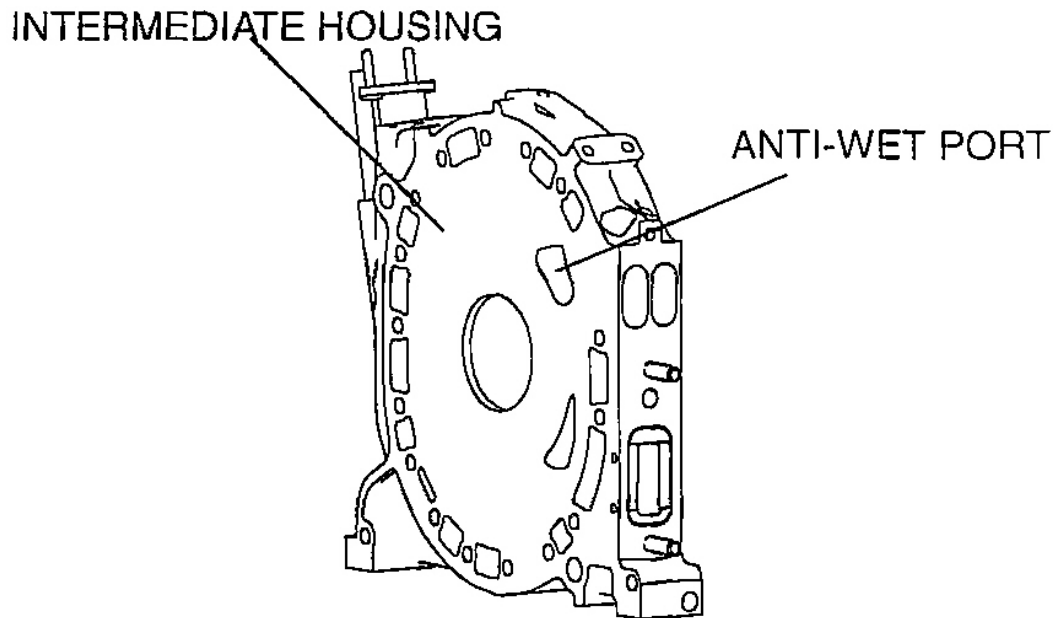
- Be sure to keep the removed oil seal springs separated according to their removal positions.

SIDE HOUSING (FRONT, INTERMEDIATE, REAR) INSPECTION

1. Inspect the intermediate housing for clogging in the intake and exhaust port.

CAUTION:

- Carefully inspect the anti-wet port of the intermediate housing since it is an essential port.
- If there is any malfunction, replace the corresponding side housing.



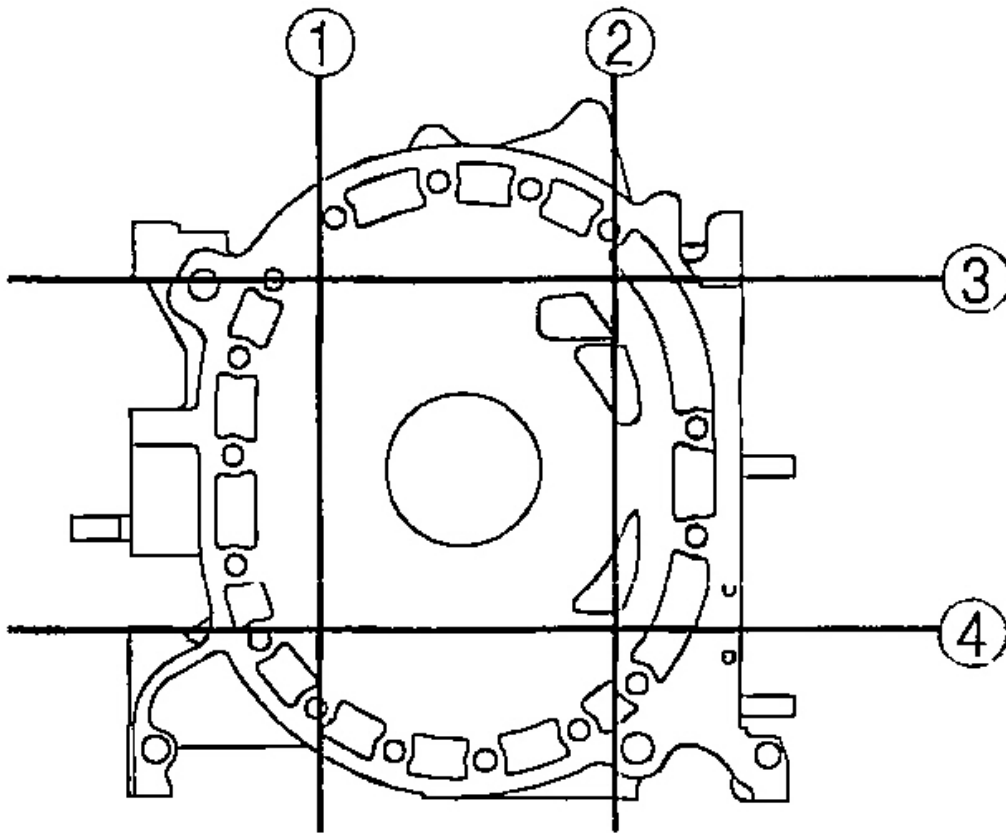
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Fig. 29: Inspecting Intermediate Housing
Courtesy of MAZDA MOTORS CORP.

2. Inspect the side housing for distortion in four positions as shown in the figure using a straight edge and a feeler gauge.
 - If the distortion exceeds the maximum, replace the corresponding side housing.

Maximum Distortion

0.04 mm {0.0016 in}



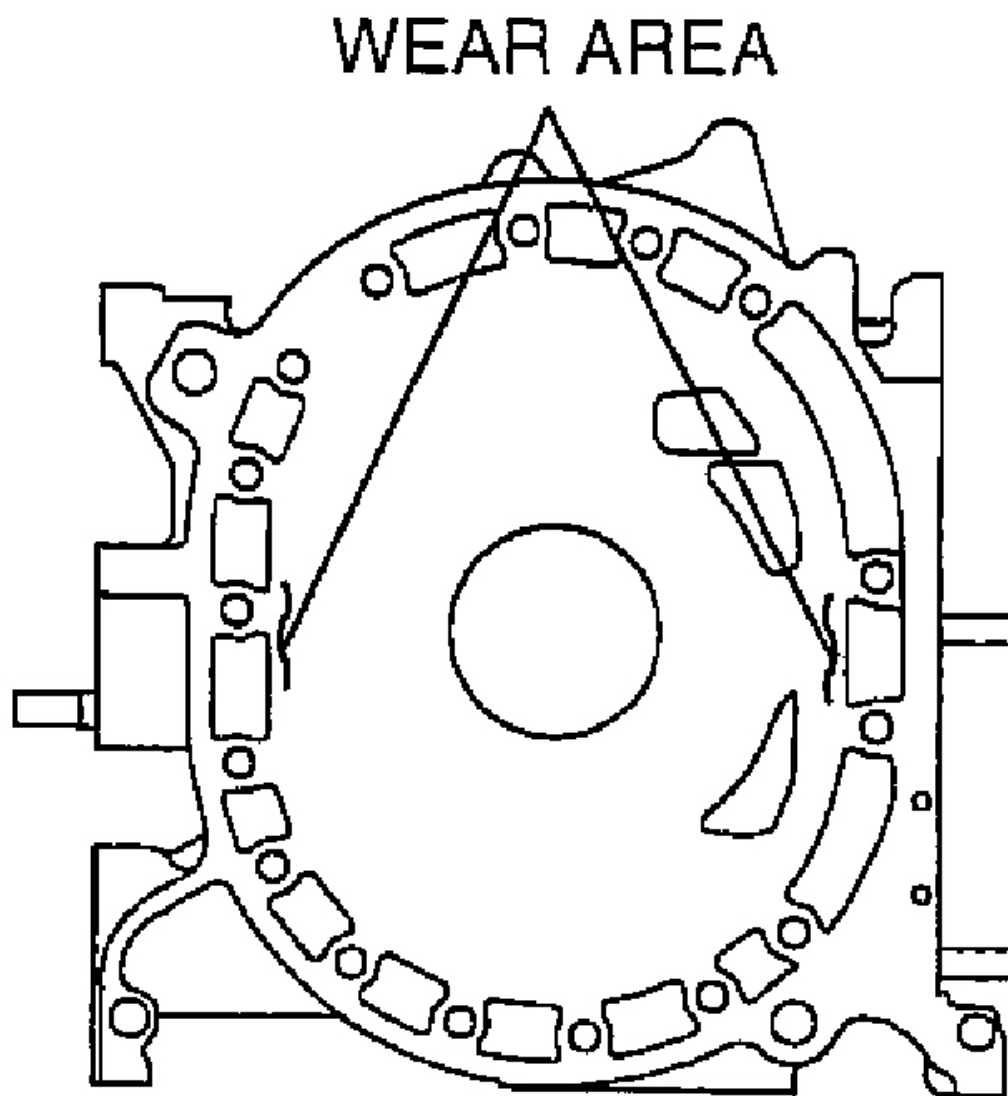
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Fig. 30: Inspecting Side Housing For Distortion
 Courtesy of MAZDA MOTORS CORP.

3. Inspect the following three items related to wear in the areas where the rotor contacts the side housing using a dial gauge.
 - If any one of the items exceeds the maximum, replace the corresponding side housing.
1. Vertical wear.

Maximum Wear

0.10 mm {0.0039 in}



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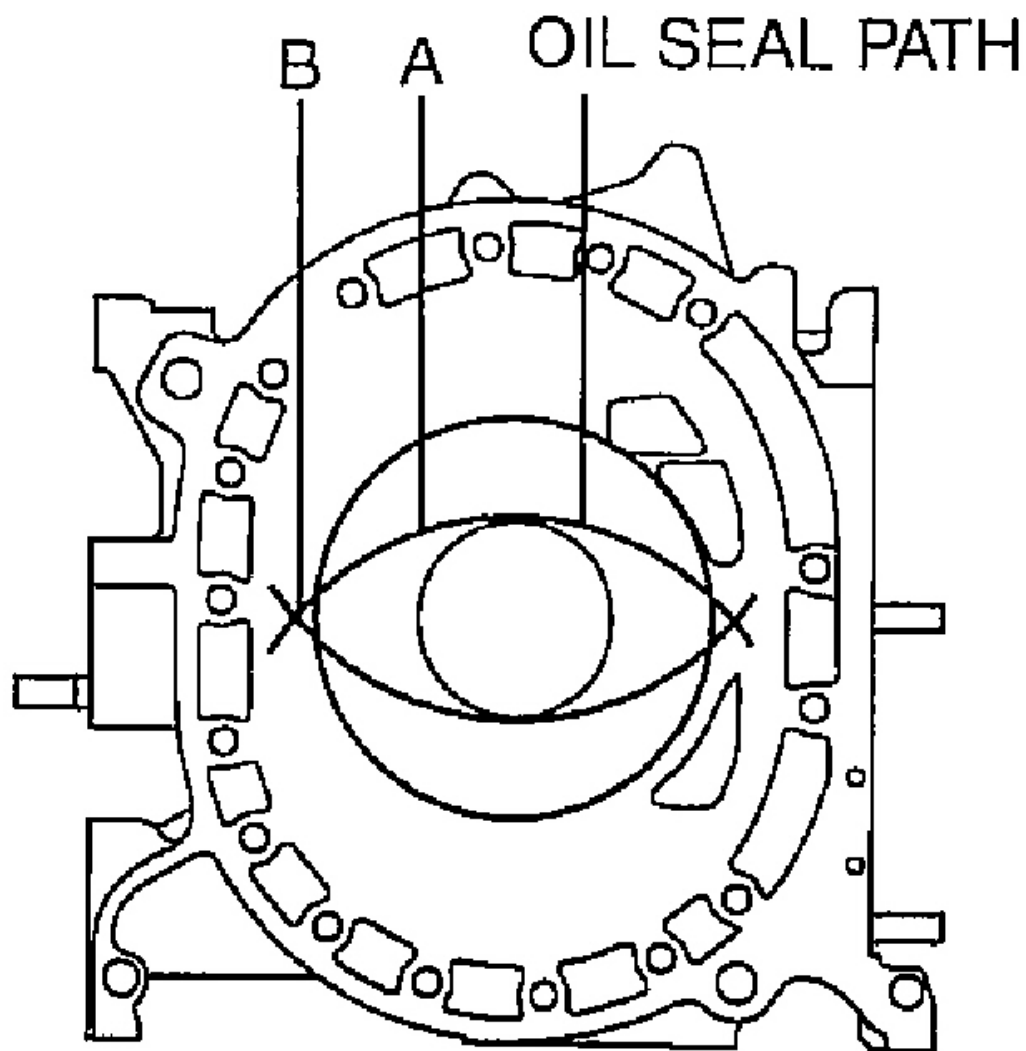
Fig. 31: Checking Vertical Wear
Courtesy of MAZDA MOTORS CORP.

2. Convex oval.

Maximum Wear

Oil Seal Inner Path (A): 0.01 mm {0.0004 in}

Oil Seal Outer Path (B): 0.10 mm {0.0039 in}



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Fig. 32: Checking Convex Wear
Courtesy of MAZDA MOTORS CORP.

3. Oil seal stepped path wear.

Maximum Wear

0.02 mm {0.0008 in}

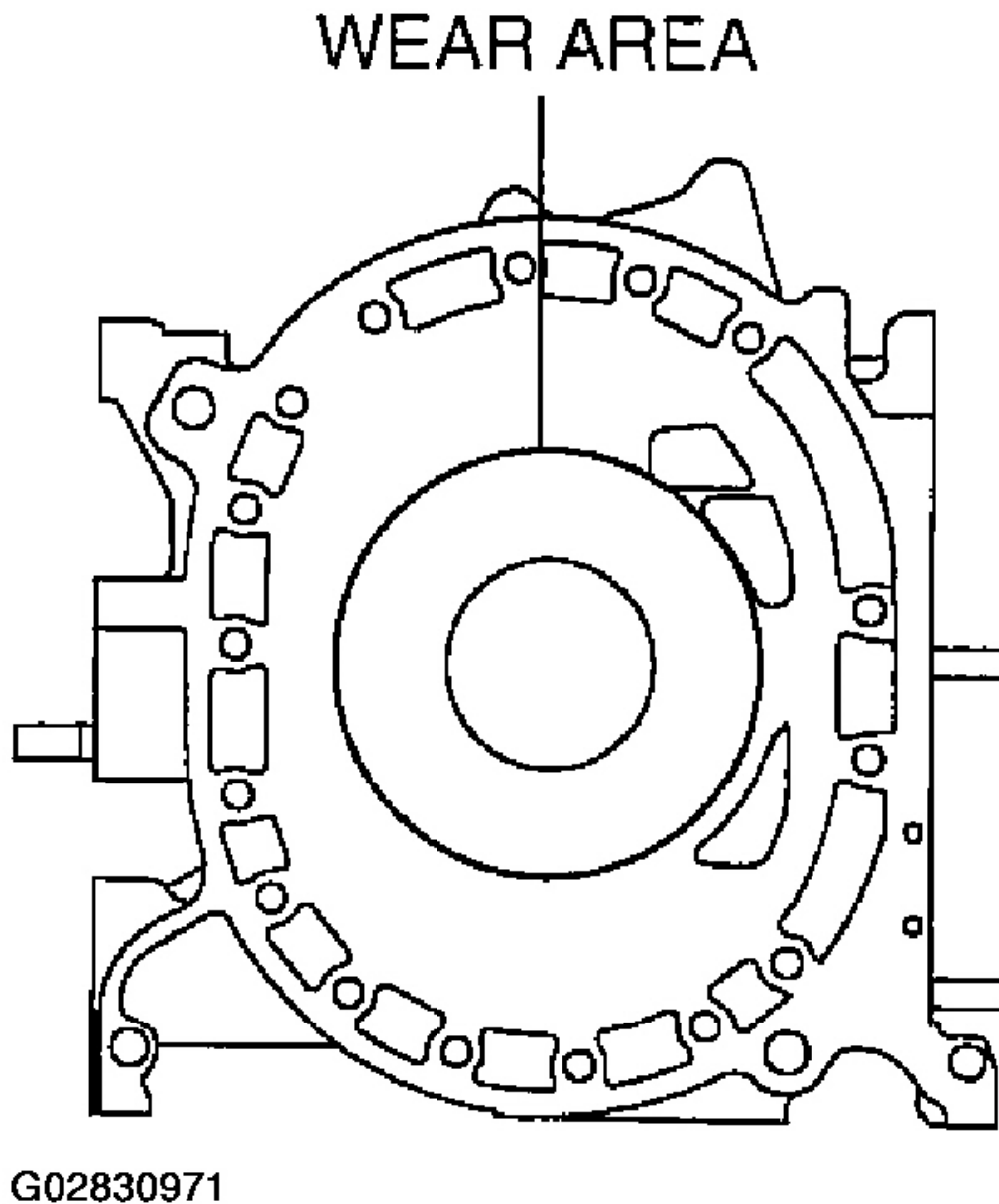


Fig. 33: Checking Oil Seal Stepped Path Wear
Courtesy of MAZDA MOTORS CORP.

ROTOR HOUSING INSPECTION

1. Measure the width of the rotor housing at four points (A, B, C, and D) as shown in the figure using a micrometer.

2. Compute the width variation.

- If it exceeds the maximum, replace the rotor housing.

Width Difference = (width A) - (the smallest of widths B, C, or D)

Maximum Width Difference

0.06 mm {0.0024 in}

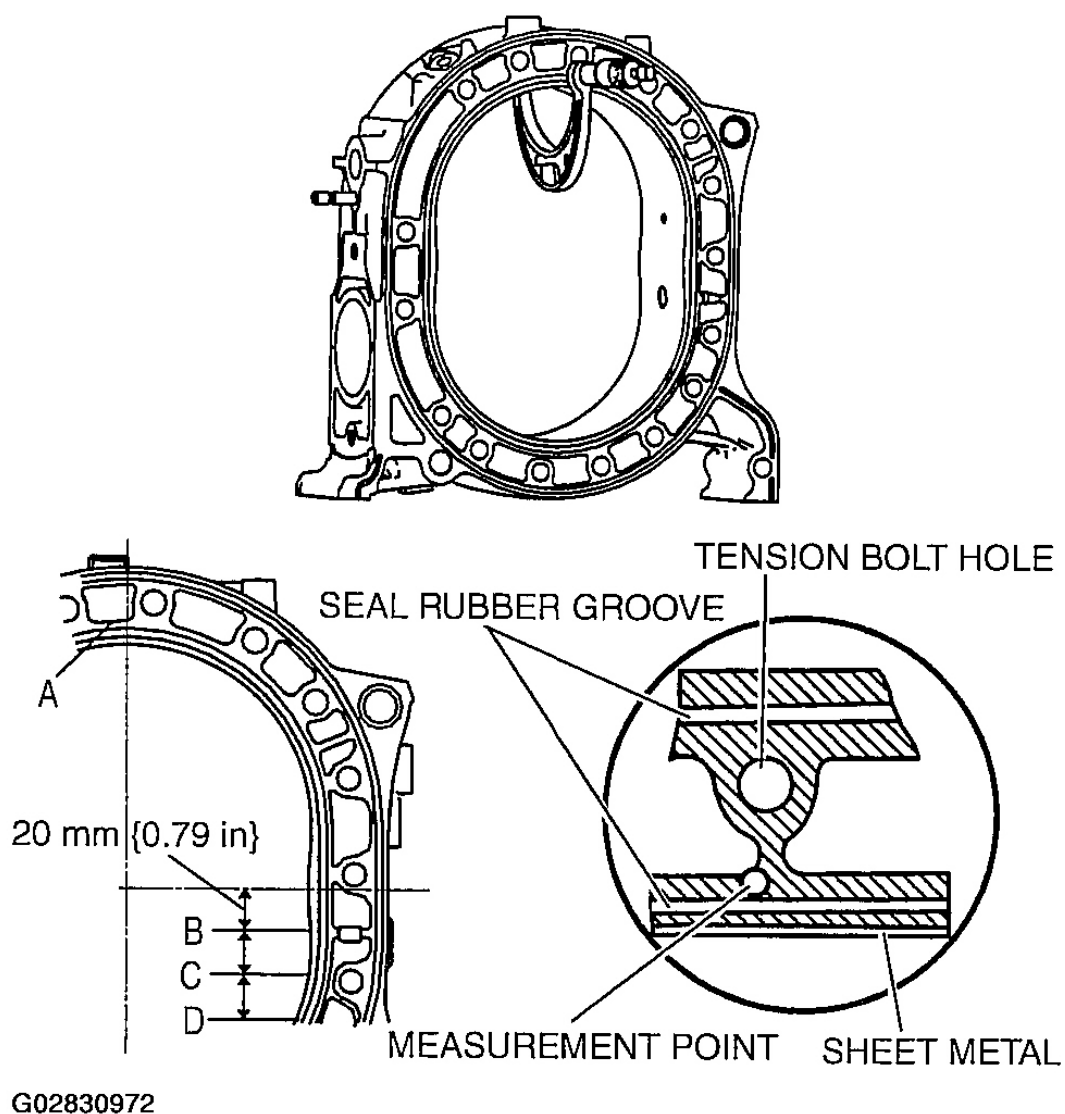


Fig. 34: Measuring Rotor Housing Width
 Courtesy of MAZDA MOTORS CORP.

ROTOR INSPECTION

1. Inspect the rotor and side housing clearance according to the following procedure:
 - If it is less than the minimum specification, replace the rotor.
1. Measure the width of the rotor housing in the position shown in the figure using a micrometer.

CAUTION: • Move the sheet metal piece out of the way when measuring.

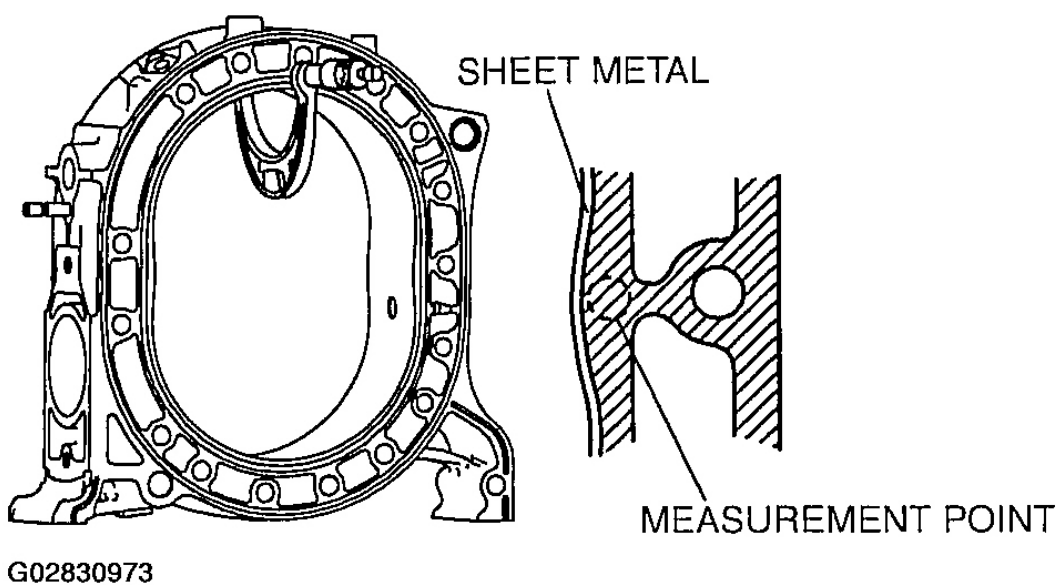
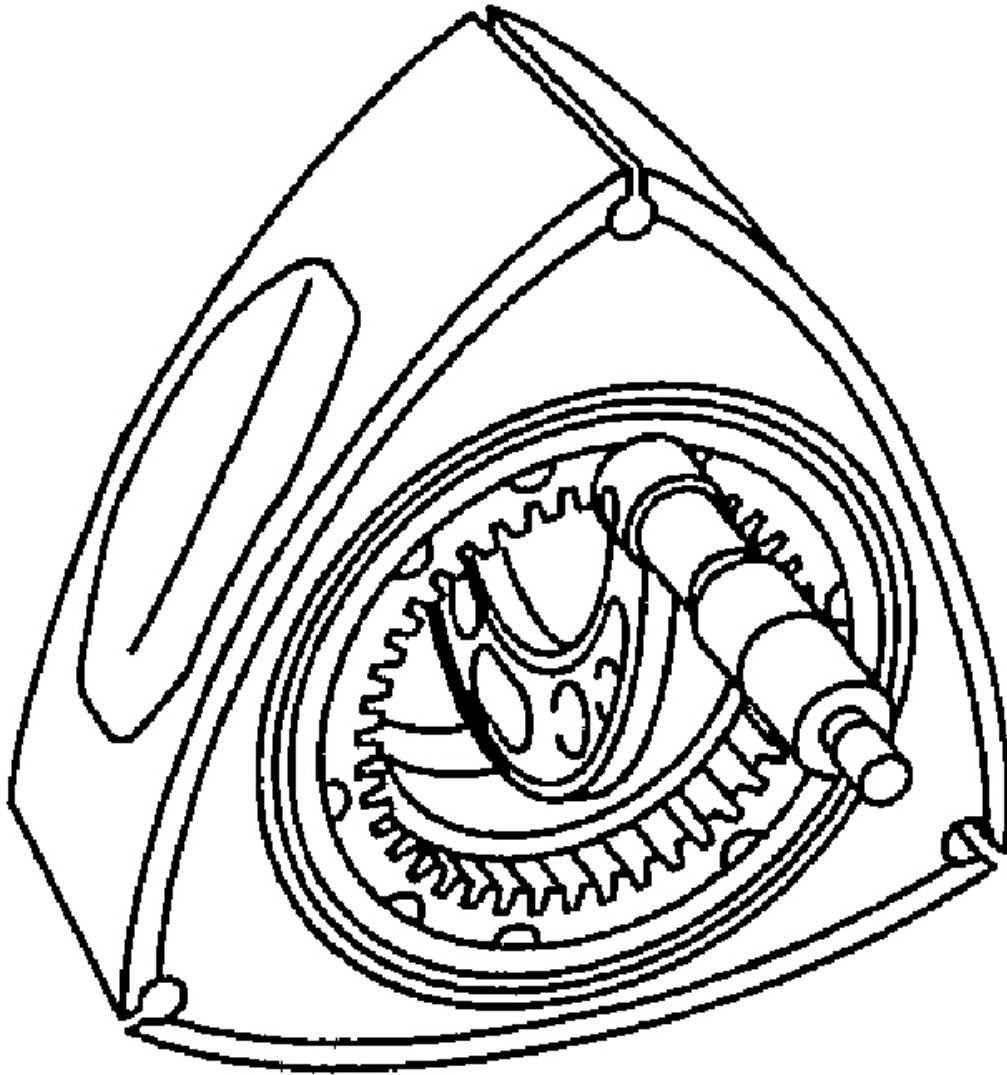


Fig. 35: Measuring Rotor Housing Width
Courtesy of MAZDA MOTORS CORP.

2. Measure the rotor width at various positions around the rotor round periphery using a micrometer.



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Fig. 36: Measuring Rotor Width
Courtesy of MAZDA MOTORS CORP.

3. Compute the rotor and side housing clearance using the measurements from (1) and (2).

Rotor And Side Housing Clearance = (Rotor Housing Width) - (Maximum Rotor Width)
Standard Clearance

0.05-0.19 mm {0.0020-0.0074 in}

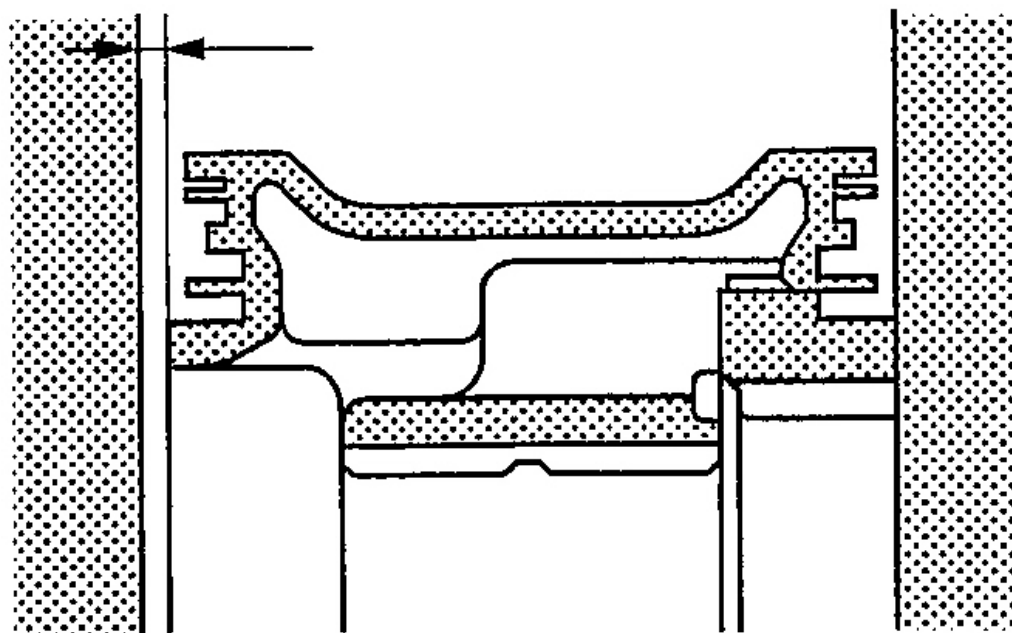
Minimum Clearance**0.05 mm {0.002 in}****G02830975**

Fig. 37: Rotor & Side Housing Clearance
Courtesy of MAZDA MOTORS CORP.

2. Measure the protrusion of the rotor round using a straight edge and a feeler gauge.

CAUTION:

- Measure the protrusion of the rotor round in the three apexes of the rotor on both the front and rear sides.
 - Because the rotor round has two levels, be careful not to measure the level difference of the middle level.
-
- If it is less than the minimum specification, replace the rotor.

Standard Projection**0.12-0.18 mm {0.0048-0.0070 in}****Minimum Projection****0.1 mm {0.0039 in}**

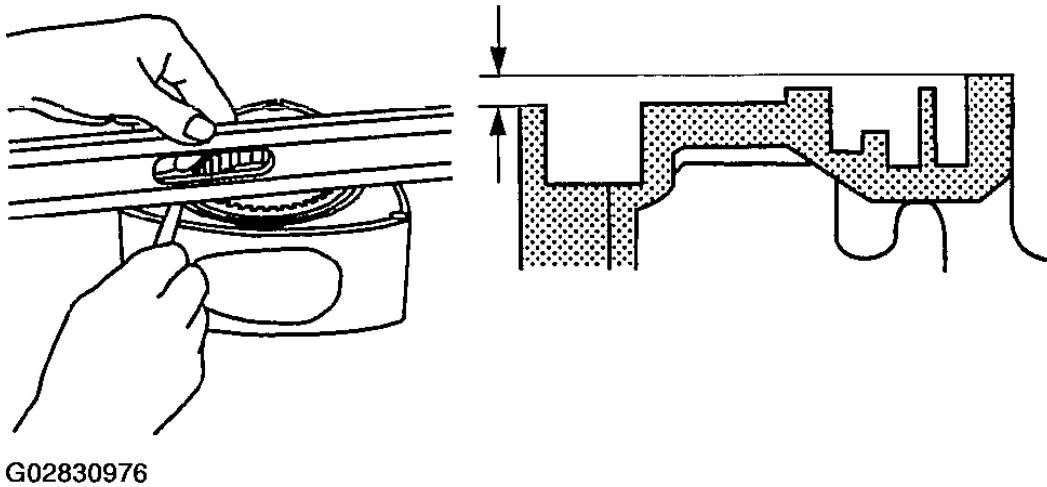


Fig. 38: Measuring Rotor Round Protrusion
 Courtesy of MAZDA MOTORS CORP.

3. Inspect the corner seal groove of the rotor by inserting the SST .
 - If **1/2 or more** of either end of the SST can be inserted into the seal groove, replace the corner seal.
 - If **1/2 or more** of both ends of the SST can be inserted into the corner seal groove, replace the rotor.

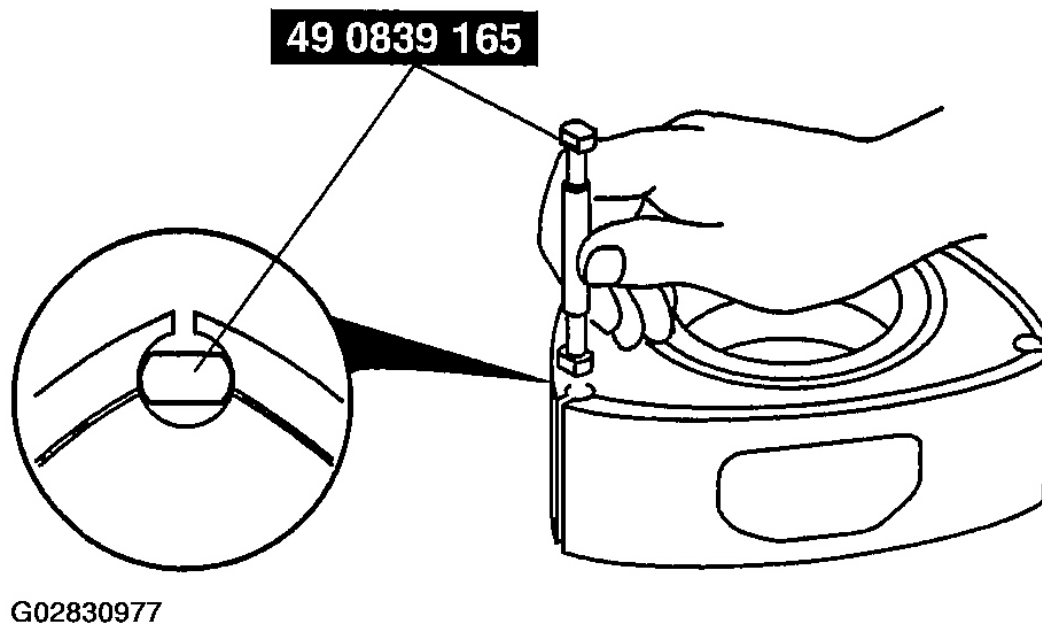


Fig. 39: Inspecting Corner Seal Groove
Courtesy of MAZDA MOTORS CORP.

CAUTION:

- Do not push the SST in with force.
- Keep the SST perpendicular to the seal groove.
- When replacing the corner seal, replace with one that matches the S or L inscription on the rotor.

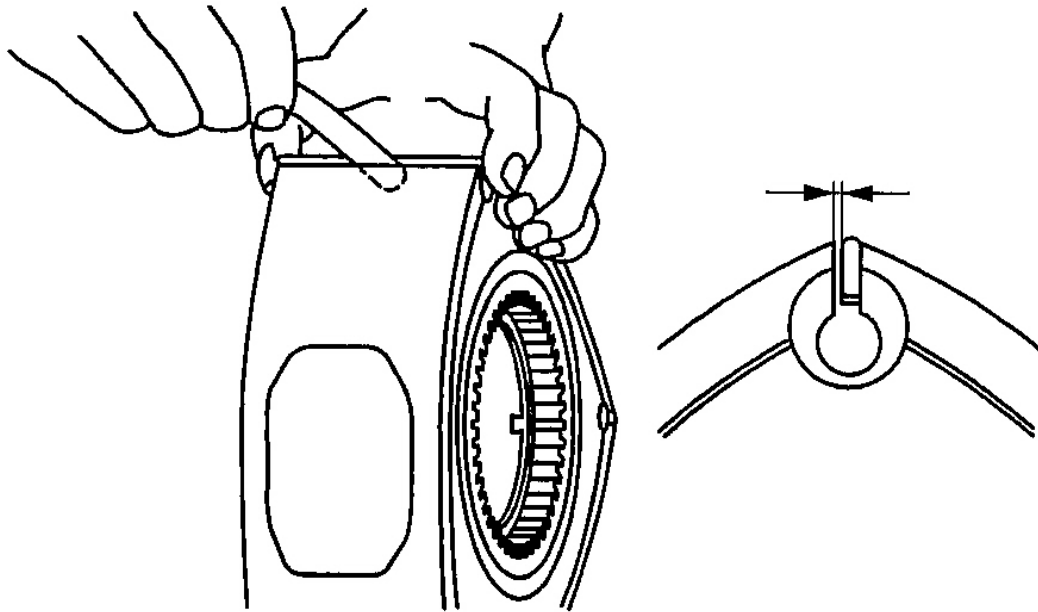
4. Measure the clearance between the apex seal groove and the apex seal using a feeler gauge.
 - If it exceeds the maximum specification, replace the apex seal.
 - If the clearance is still not within the standard after replacing the apex seal, replace the rotor.

Standard Clearance

0.042-0.101 mm {0.0017-0.0039 in}

Maximum Clearance

0.15 mm {0.0059 in}



G02830978

Fig. 40: Measuring Apex Seal Groove-To-Apex Seal Clearance
Courtesy of MAZDA MOTORS CORP.

APEX SEAL INSPECTION

1. Measure the height in the positions shown in the figure.
 - If it is less than the minimum specification, replace the apex seal.
 - Replace the apex seal spring also whenever replacing the apex seal.

Standard Height

5.3 mm {0.20 in}

Minimum Height

4.3 mm {0.17 in}

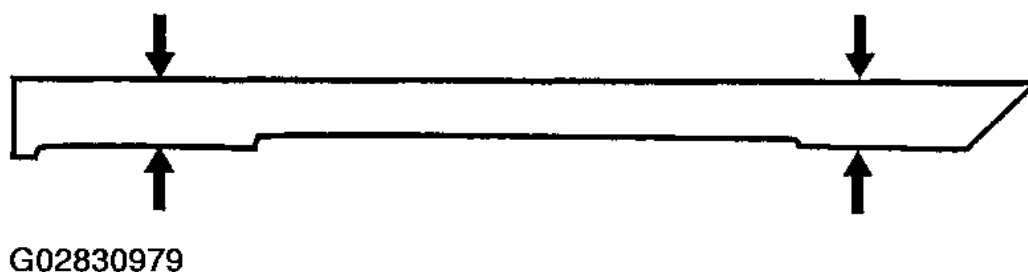


Fig. 41: Measuring Apex Seal Height
Courtesy of MAZDA MOTORS CORP.

SIDE SEAL INSPECTION

1. Assemble the side and corner seals of the rotor.
2. Press the side seal up against the inner side of the side seal groove using **0.05-0.15 mm {0.0020-0.0059}** feeler gauges as shown in the figure.

CAUTION:

- Press the feeler gauges against the both ends of the side seals correctly.

NOTE:

- Any side seal height is acceptable.

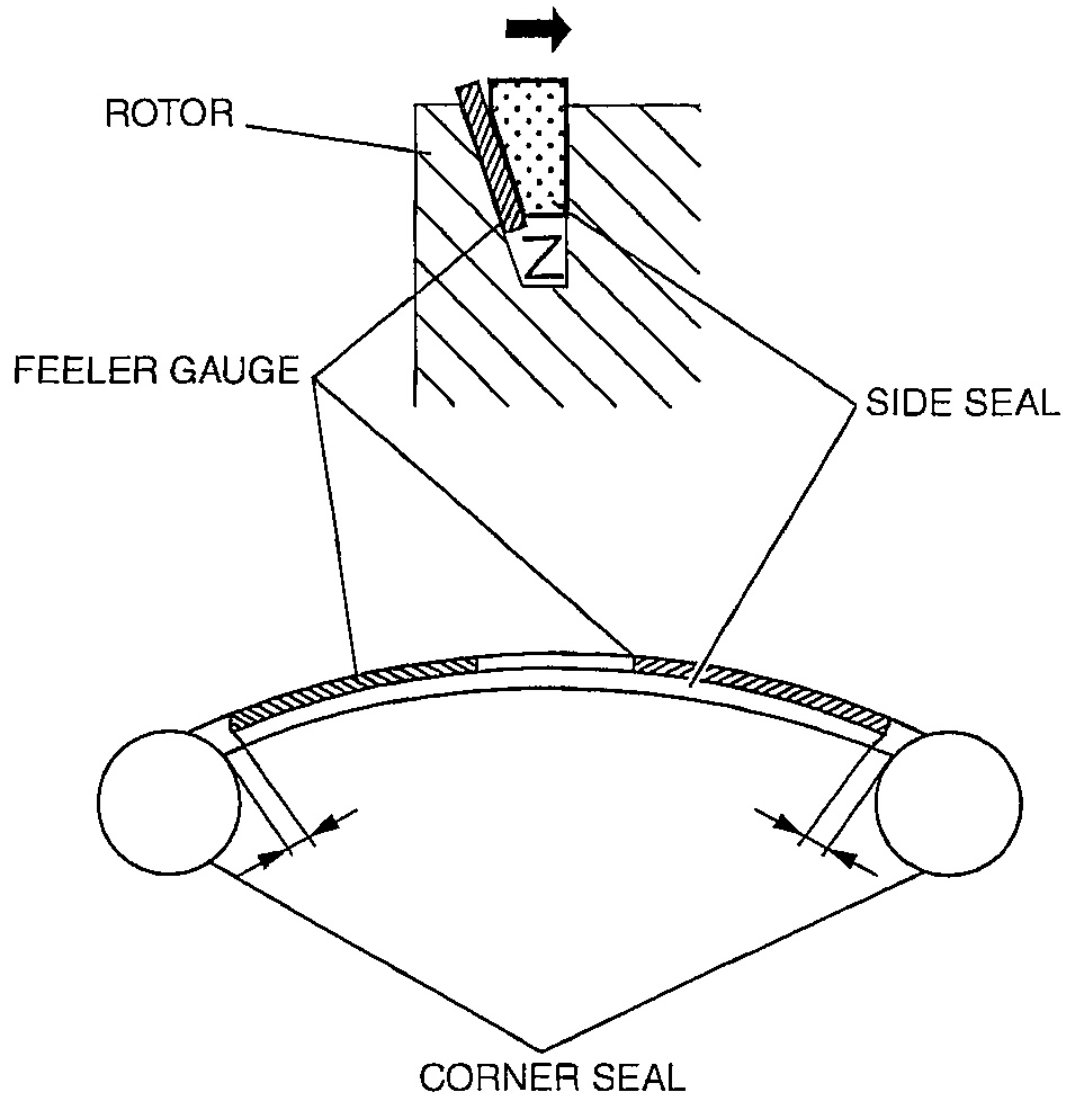
3. Measure the clearance between both ends of the side seal and the corner seal using a feeler gauge.
 - If it exceeds the maximum specification, replace the side seal.

Standard Clearance

0.05-0.15 mm {0.0020-0.0059 in}

Maximum Clearance

0.4 mm {0.016 in}



G02830980

Fig. 42: Measuring Clearance Between Both Ends Of Side Seal & Corner Seal
 Courtesy of MAZDA MOTORS CORP.

- Select the proper side seal using the side seal selection table when replacing a side seal.

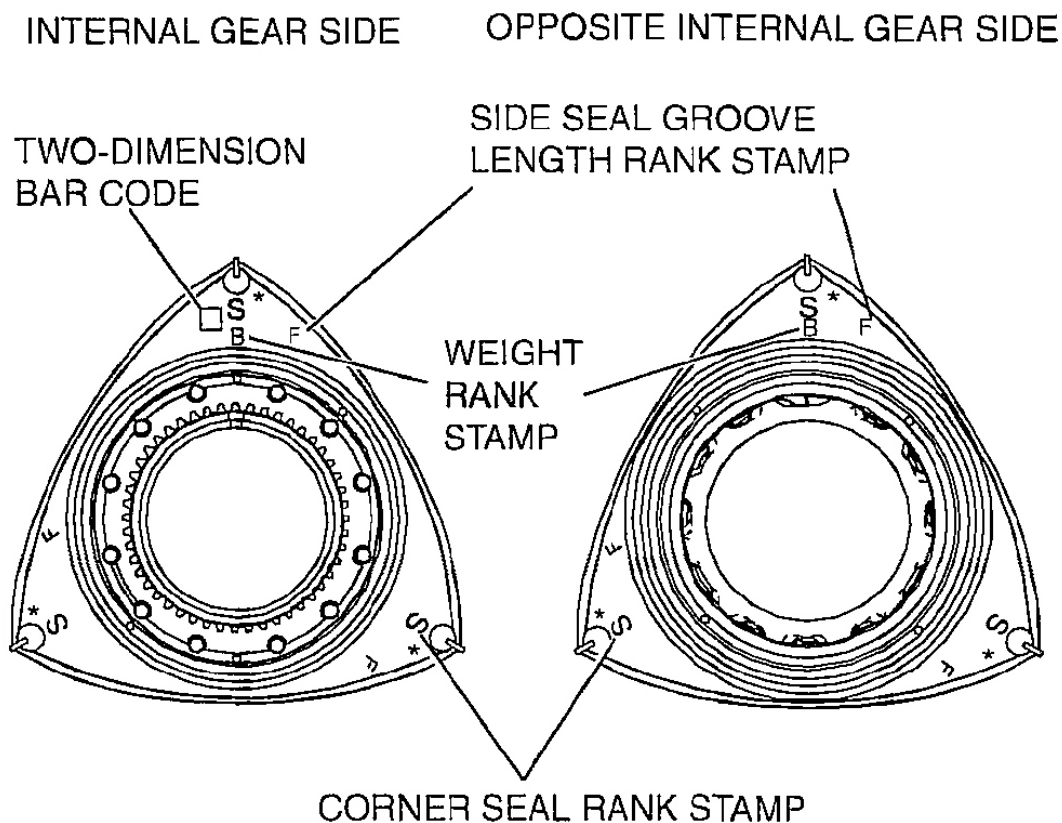
SIDE SEAL SELECTION

Side Seal Groove Length Rank Stamp	(1) Part Number Of Side Seal
F	N3Z1 11 C10
G	N3Z1 11 C10

2005 Mazda RX-8 Shinka

2004-2011 ENGINE Overhaul - 1.3L (13B-MSP) - RX-8

H	N3Z1 11 C10
I	N3Z1 11 C10
J	N3Z2 11 C10
K	N3Z2 11 C10
L	N3Z2 11 C10
K	N3Z2 11 C10
M	N3Z2 11 C10
N	N3Z3 11 C10
O	N3Z3 11 C10
P	N3Z3 11 C10
Q	N3Z3 11 C10
R	N3Z4 11 C10
S	N3Z4 11 C10
T	N3Z4 11 C10
U	N3Z4 11 C10
(1) Revision indication (alphabetical order).	



*: IDENTIFICATION NUMBER (1 OR 2) USED ONLY FOR
LINE ASSEMBLY

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Fig. 43: Locating Two-Dimension Bar Code, Side Seal Groove Length Rank Stamp & Corner Seal Rank Stamp

Courtesy of MAZDA MOTORS CORP.

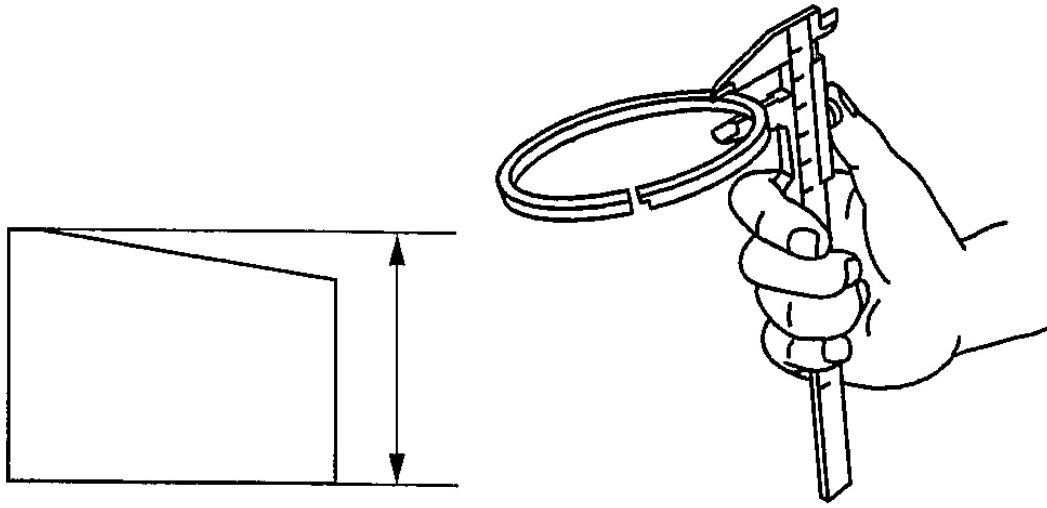
CUT-OFF SEAL INSPECTION

1. Measure the cut-off seal height using a vernier caliper.
 - If it is less than the minimum specification, replace the cut-off seal.

CAUTION: • Measure the cut-off seal height around the complete perimeter.

Standard Height

3.95 mm {0.1555 in}

Minimum Height**3.8 mm {0.15 in}**

G02830982

Fig. 44: Measuring Cut-Off Seal Height
Courtesy of MAZDA MOTORS CORP.

OIL SEAL INSPECTION

1. Measure the following two items using a vernier caliper.
 - If either of the items exceeds the maximum specification, replace the oil seal.
1. Width of area that contacts the oil seal lip.

CAUTION: • Measure the contact width around the complete perimeter.

Maximum Contact Width**0.5 mm {0.02 in}**

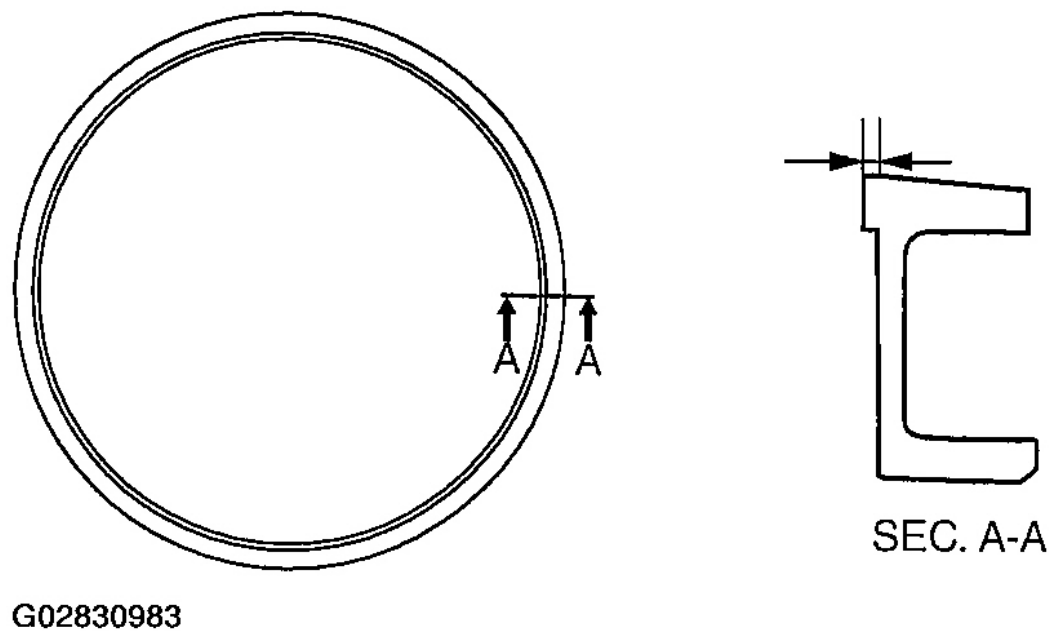
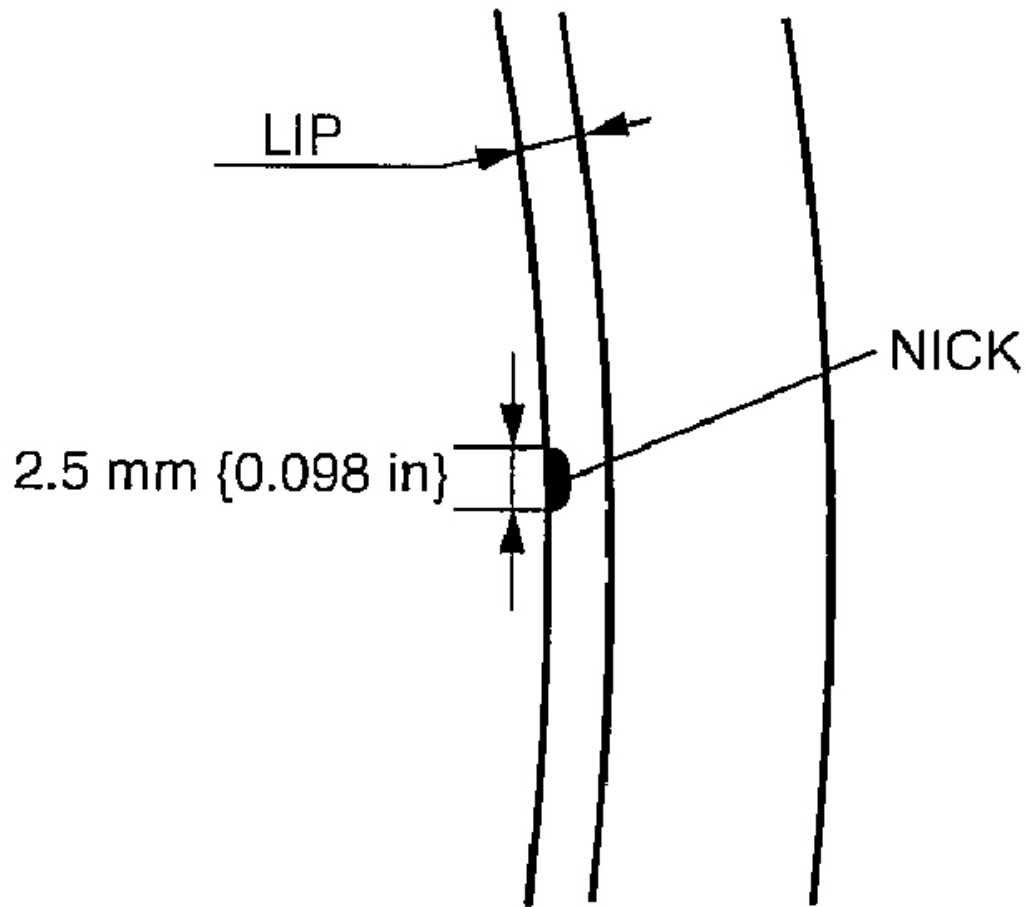


Fig. 45: Measuring Contact Width
Courtesy of MAZDA MOTORS CORP.

2. Circumferential width of any damage along the lip.

Maximum Circumferential Width Of The Oil Seal Lip
2.5 mm {0.098 in} Or 10 Nicks Or More



G02830984

Fig. 46: Measuring Circumferential Width Of Damage
Courtesy of MAZDA MOTORS CORP.

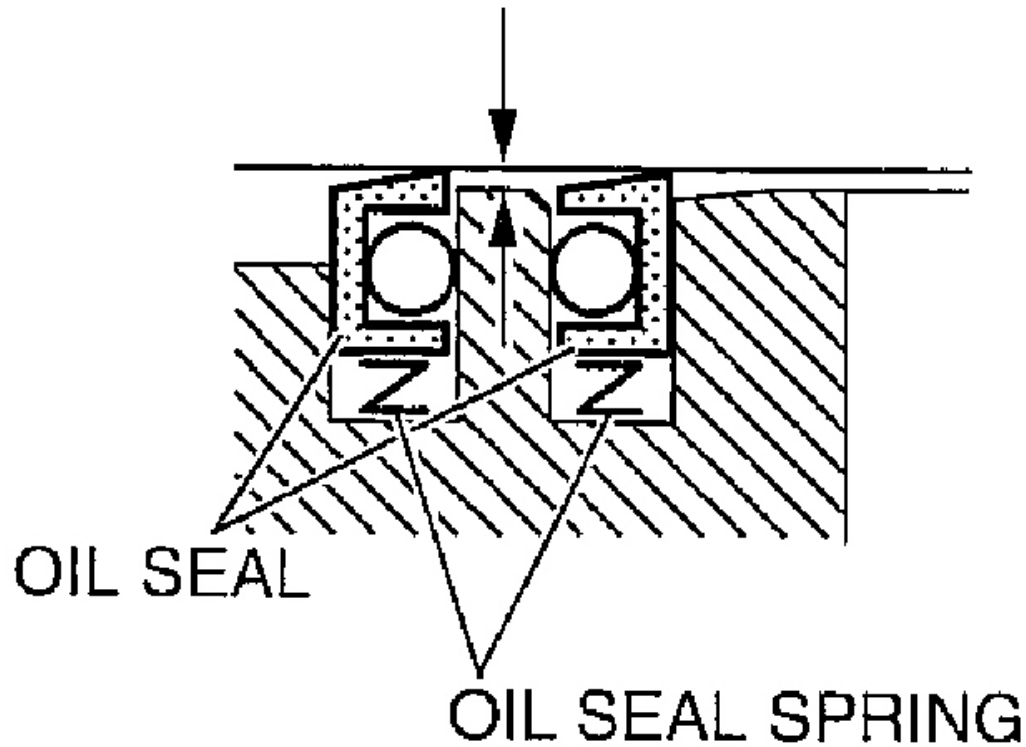
SPRING INSPECTION

OIL SEAL SPRING

1. Assemble the oil seal springs into the rotor.
2. Assemble the O-rings into the oil seals.
3. Assemble the oil seals into the rotor.
4. Measure the oil seal projection using a vernier caliper.
 - If it is less than the minimum specification, replace the oil seal spring.

Minimum Projection

0.5 mm {0.02 in}



G02830985

Fig. 47: Measuring Oil Seal Projection
Courtesy of MAZDA MOTORS CORP.

CUT-OFF SEAL SPRING

1. Assemble the cut-off seal spring into the rotor.
2. Assemble the cut-off seal into the rotor.
3. Measure the cut-off seal projection using a vernier caliper.
 - If it is less than the minimum specification, replace the cut-off seal spring.

Minimum Projection

0.5 mm {0.02 in}

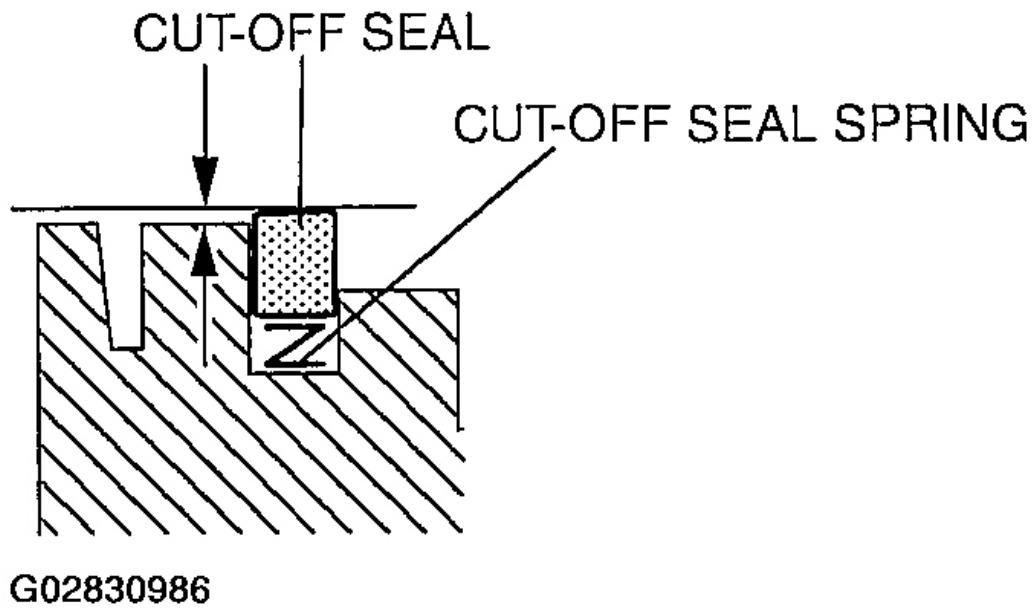


Fig. 48: Measuring Cut-Off Seal Projection
 Courtesy of MAZDA MOTORS CORP.

SIDE SEAL SPRING

1. Assemble the side seal spring into the rotor.
2. Assemble the side seal into the rotor.
3. Measure the side seal projection using a vernier caliper.
 - If it is less than the minimum specification, replace the side seal spring.

Minimum Projection

0.5 mm {0.02 in}

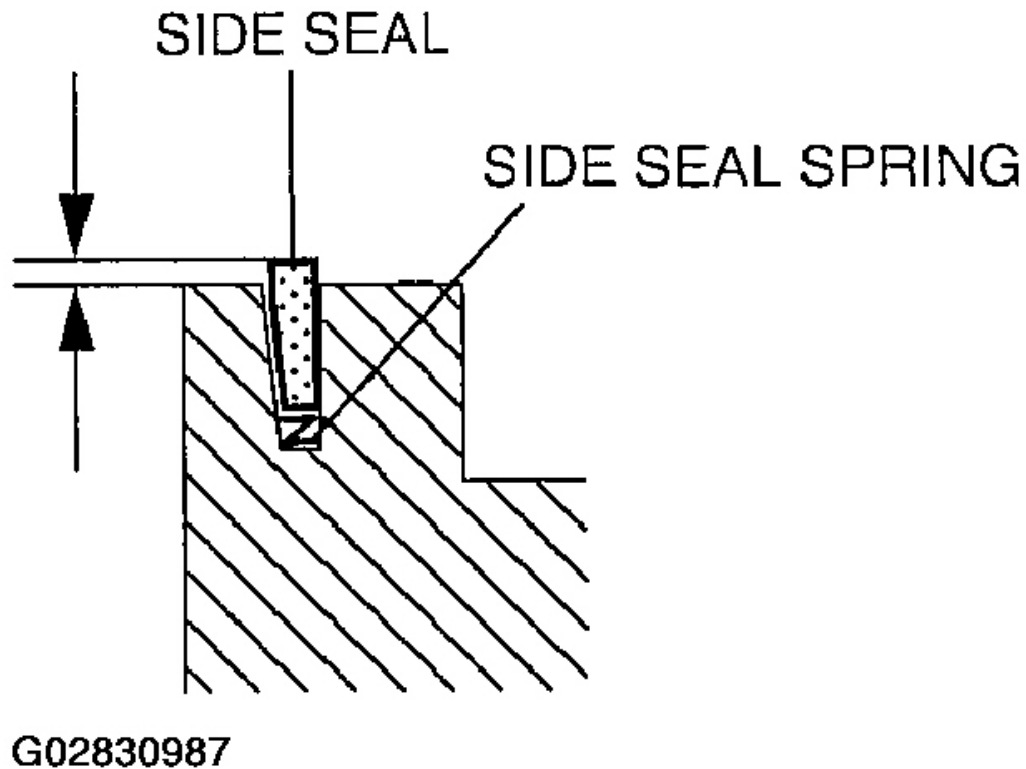


Fig. 49: Measuring Side Seal Projection
Courtesy of MAZDA MOTORS CORP.

CORNER SEAL SPRING

1. Assemble the corner seal spring into the rotor.
2. Assemble the corner seal into the rotor.
3. Measure the corner seal projection using a vernier caliper.
 - If it is less than the minimum specification, replace the corner seal spring.

Minimum Projection

0.5 mm {0.02 in}

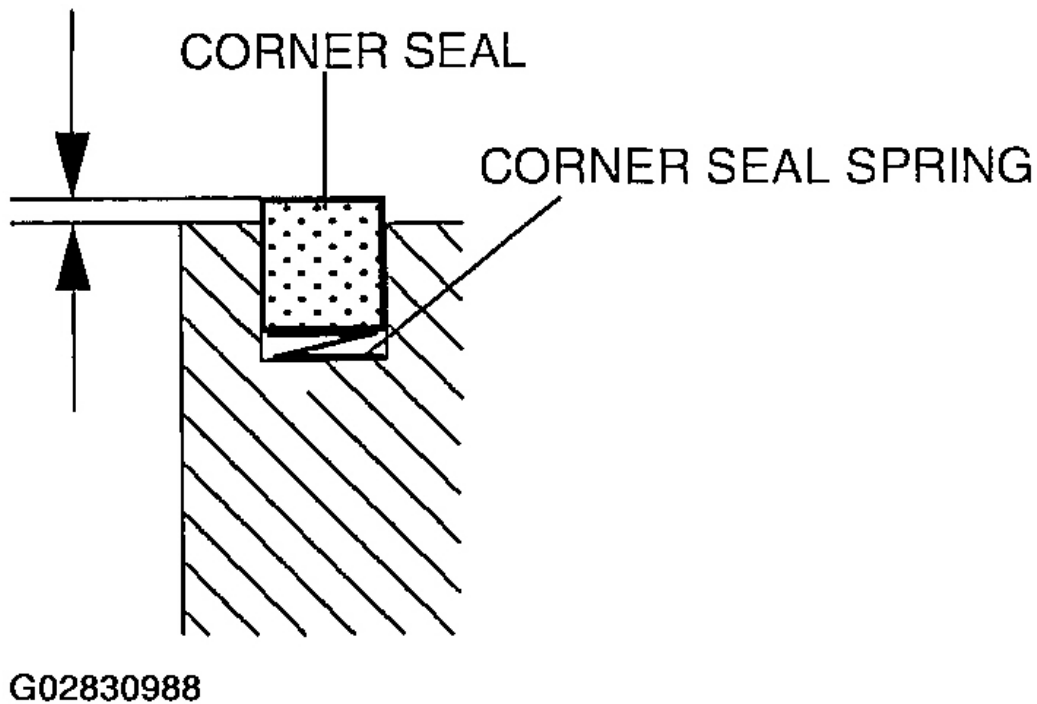


Fig. 50: Measuring Corner Seal Projection
Courtesy of MAZDA MOTORS CORP.

APEX SEAL SPRING

NOTE:

- Inspect the long apex seal spring.

1. Measure the height of the apex seal spring using a vernier caliper with the spring placed on a surface plate.
 - If it is less than the minimum specification, replace the apex seal spring.

Standard Height

5.4 mm {0.213 in}

Minimum Height

3.5 mm {0.148 in}

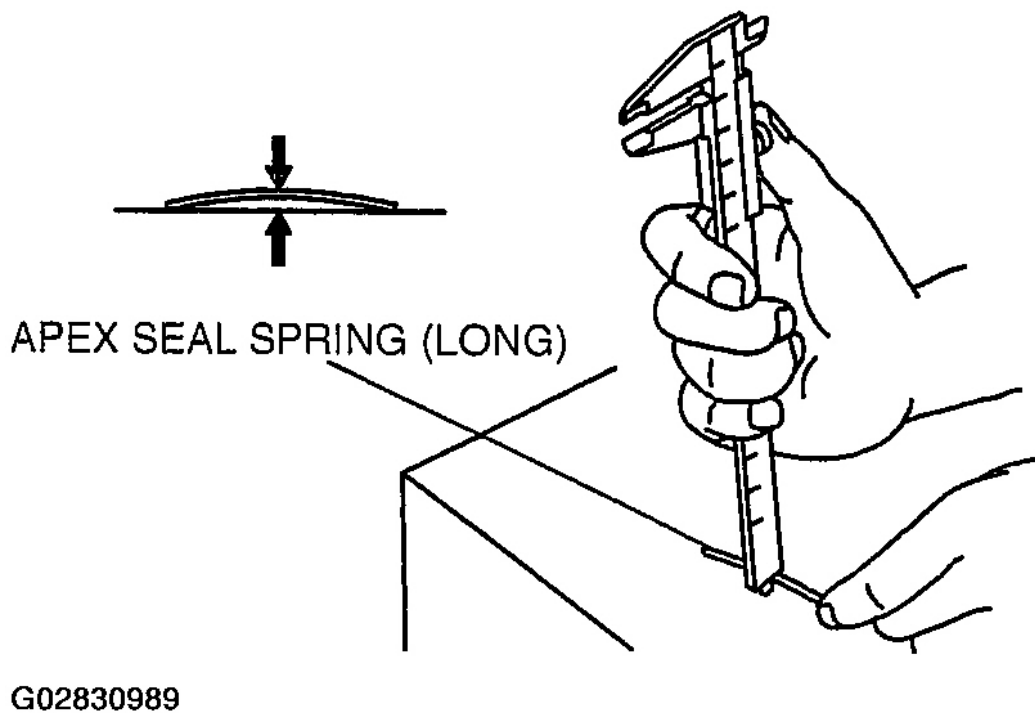


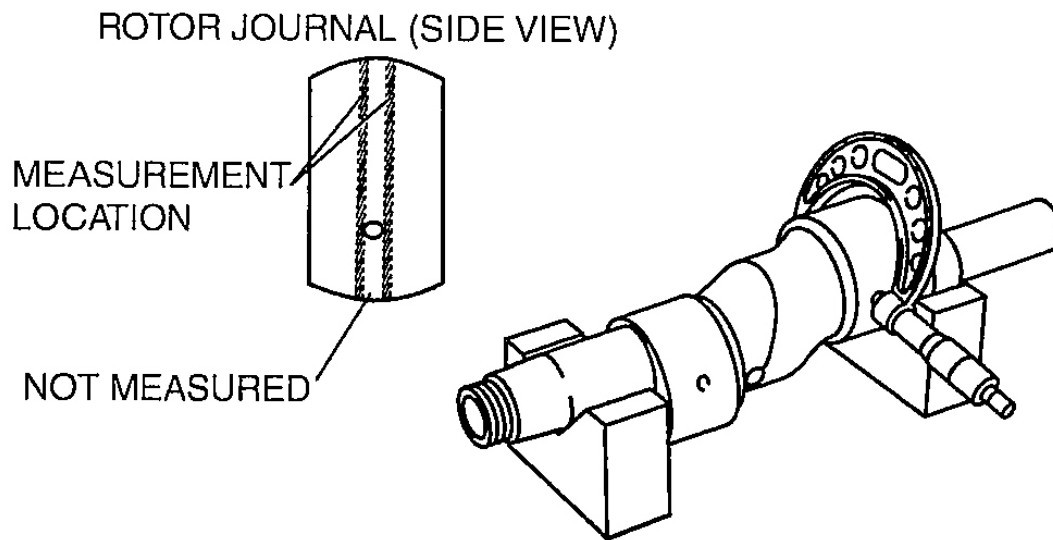
Fig. 51: Measuring Height Of Apex Seal Spring
Courtesy of MAZDA MOTORS CORP.

ROTOR BEARING OIL CLEARANCE INSPECTION

1. Measure the outer diameter of the rotor journal using a micrometer.

CAUTION:

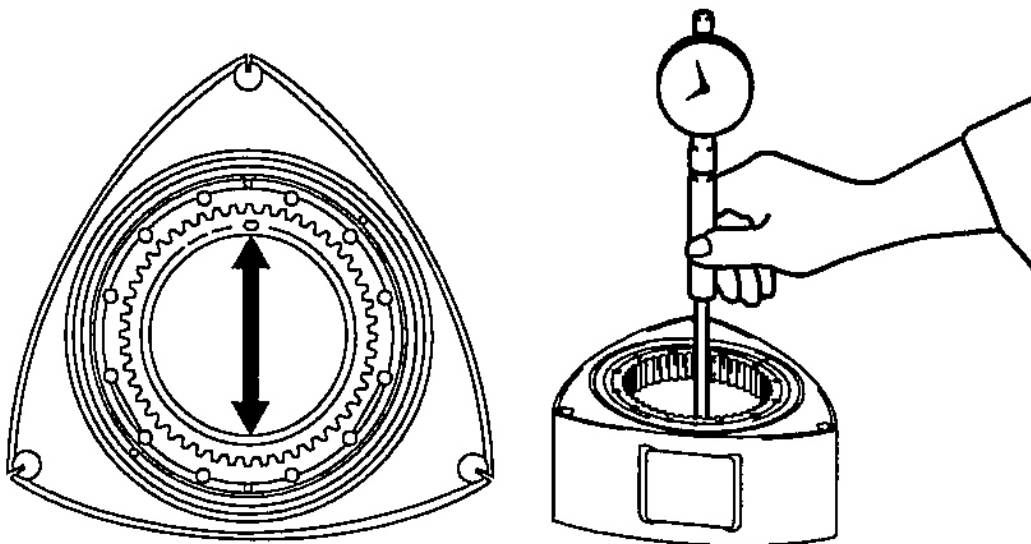
- Measure the rotor journal at a point slightly off-center since the center section is raised. Do not measure at the center because it does not contact the rotor bearing.



G02830990

Fig. 52: Measuring Rotor Journal
Courtesy of MAZDA MOTORS CORP.

2. Measure the inner diameter of the rotor bearing using a cylinder gauge.



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Fig. 53: Measuring Rotor Bearing Inner Diameter
Courtesy of MAZDA MOTORS CORP.

3. Calculate the rotor bearing oil clearance from the rotor journal outer diameter and the rotor bearing inner diameter.

Rotor Bearing Oil Clearance = (Rotor Bearing Inner Diameter) - (Rotor Journal Outer Diameter)

- If it exceeds the minimum specification, replace the rotor bearing. (See **ROTOR BEARING REPLACEMENT**.)
- If not within the specification, even with the rotor bearing replaced, replace the eccentric shaft.

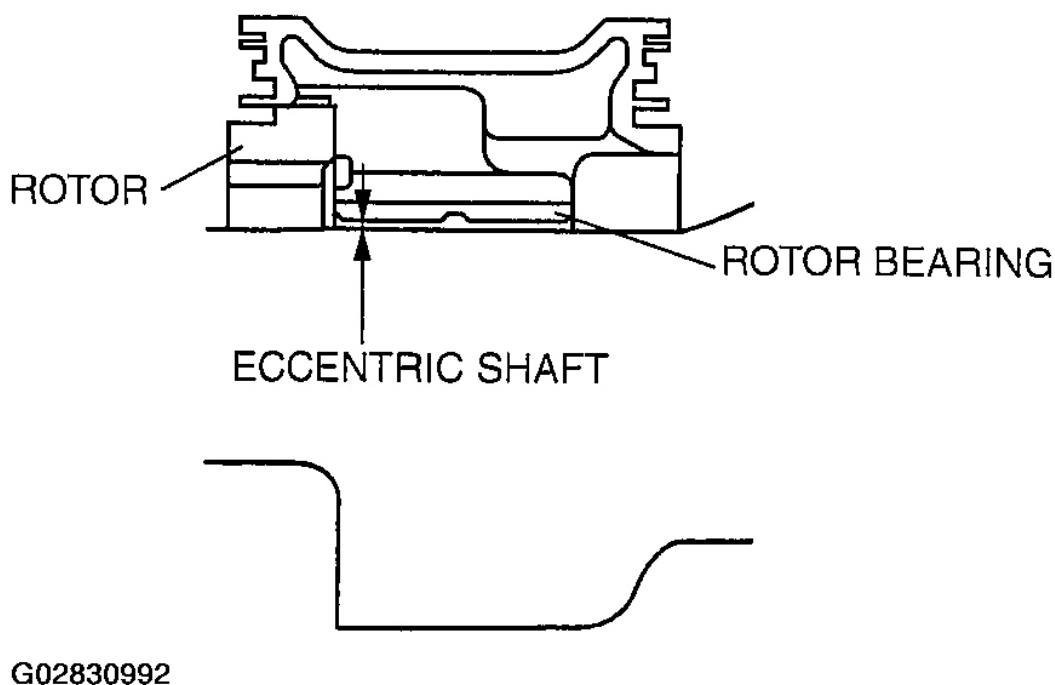


Fig. 54: Identifying Rotor Bearing Oil Clearance
Courtesy of MAZDA MOTORS CORP.

Standard Rotor Bearing Oil Clearance

0.06-0.08 mm {0.0024-0.0030 in}

Maximum Rotor Bearing Oil Clearance

0.1 mm {0.0039 in}

ROTOR BEARING REPLACEMENT

REMOVAL

1. Set the rotor with the internal gear at the bottom.
2. Remove the adapter ring and the securing screw from the SST .
3. Remove the rotor bearing using the SST .

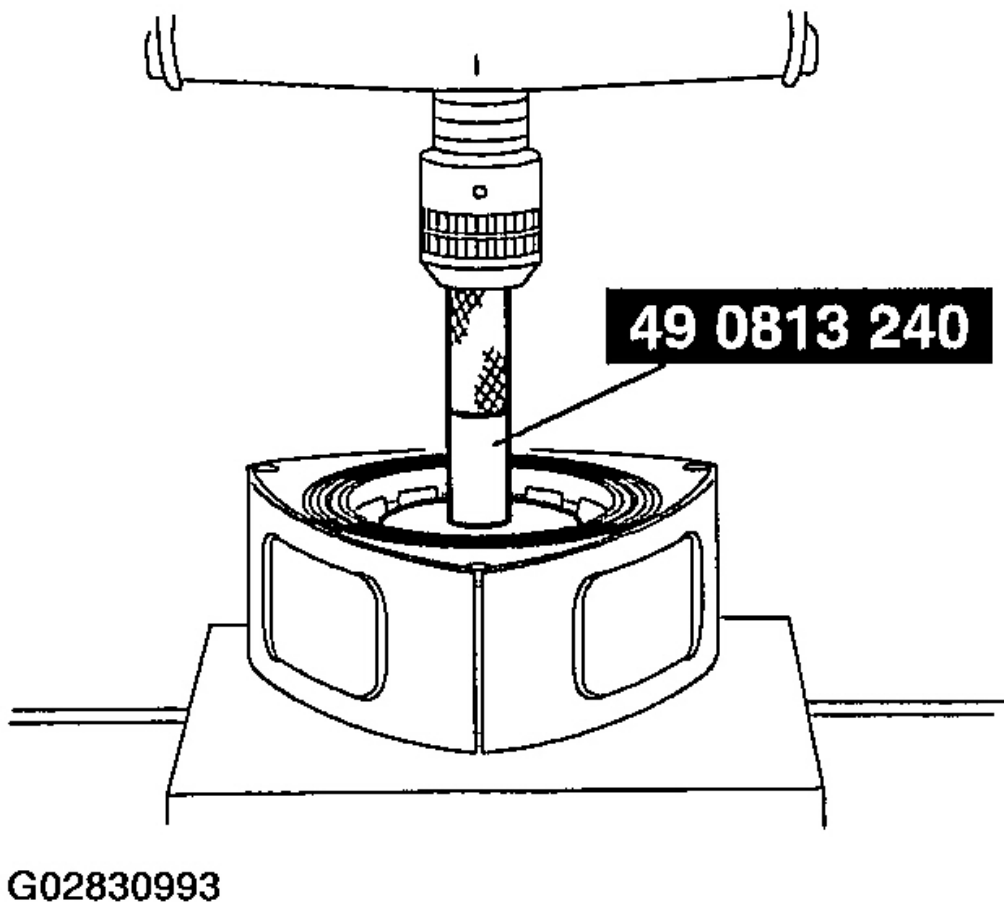


Fig. 55: Removing Rotor Bearing
Courtesy of MAZDA MOTORS CORP.

INSTALLATION

1. Remove the SST handle.

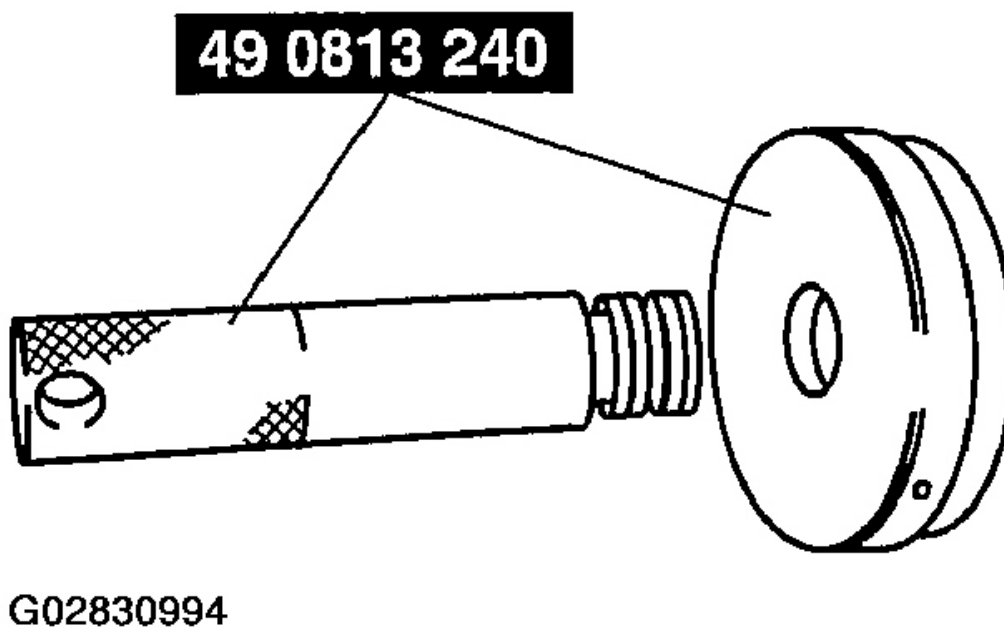


Fig. 56: Remove SST Handle
Courtesy of MAZDA MOTORS CORP.

2. Temporarily assemble so that the rotor bearing tab and the rotor notch are aligned after pressing in the rotor bearing and rotor.

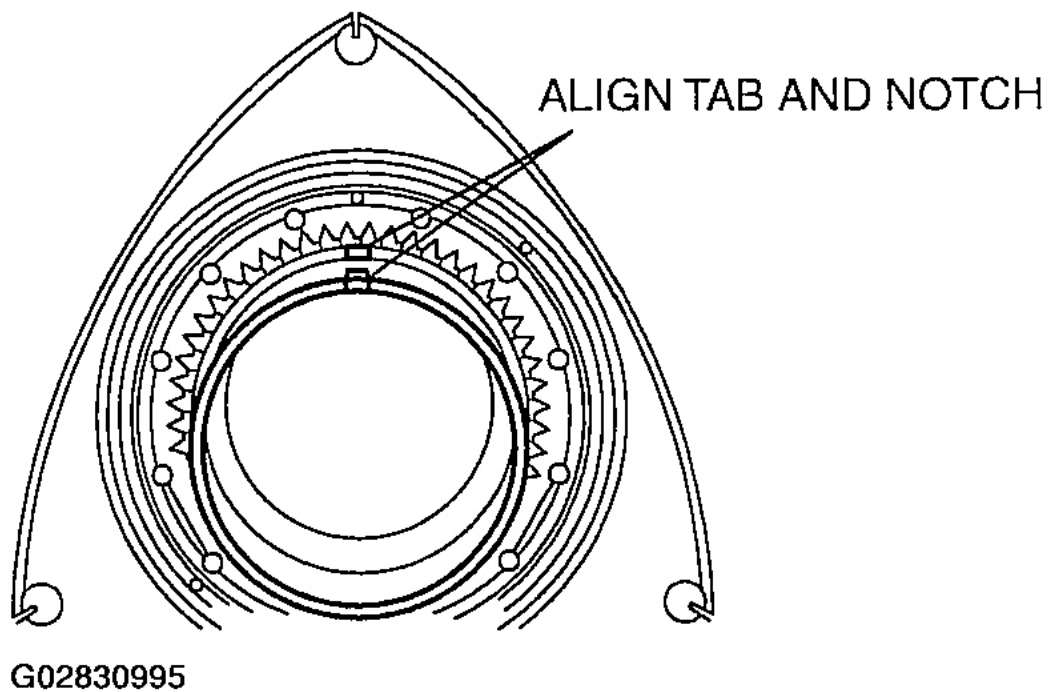


Fig. 57: Aligning Rotor Bearing Tab & Rotor Notch
Courtesy of MAZDA MOTORS CORP.

3. Set the temporarily assembled rotor bearing and rotor on a hydraulic press.
4. Press in the rotor bearing using the SST .

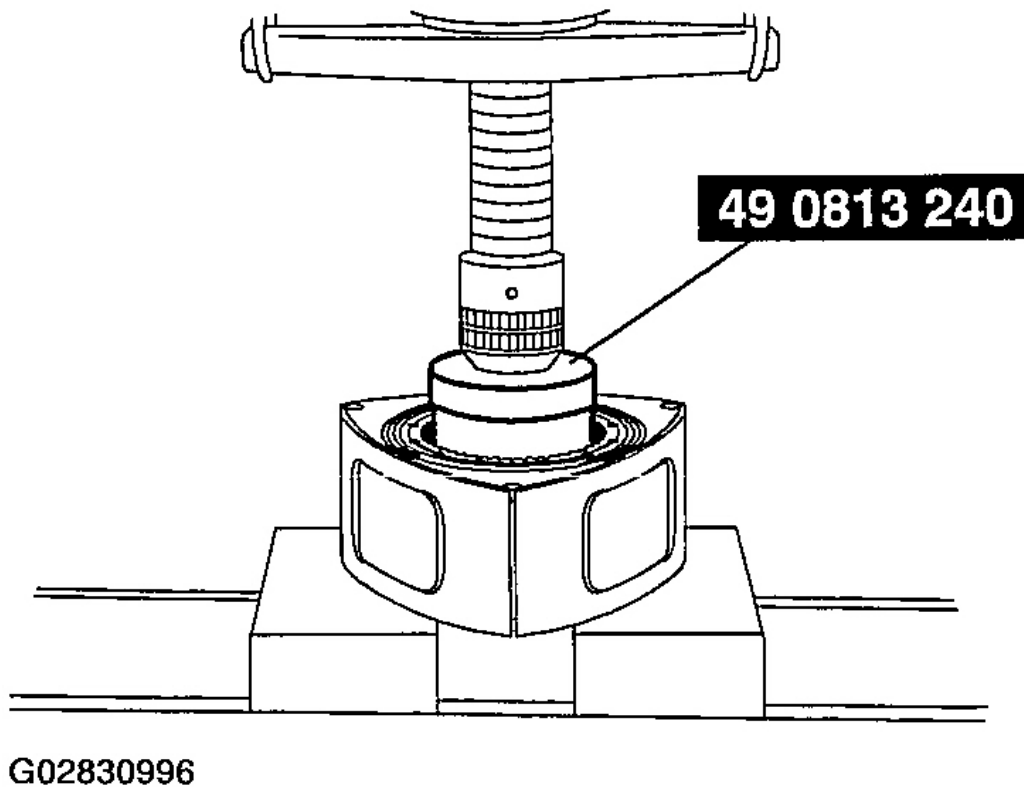
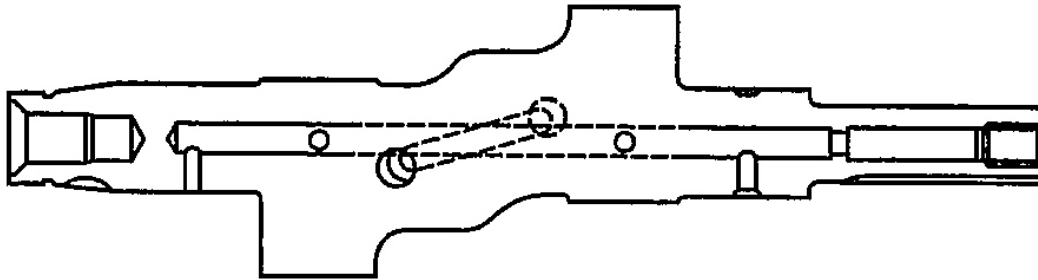


Fig. 58: Pressing In Rotor Bearing
Courtesy of MAZDA MOTORS CORP.

ECCENTRIC SHAFT INSPECTION

1. Inspect for clogging in the oil passage.
 - If there is any clogging, remove it with a needle or similar device and clean with compressed air.

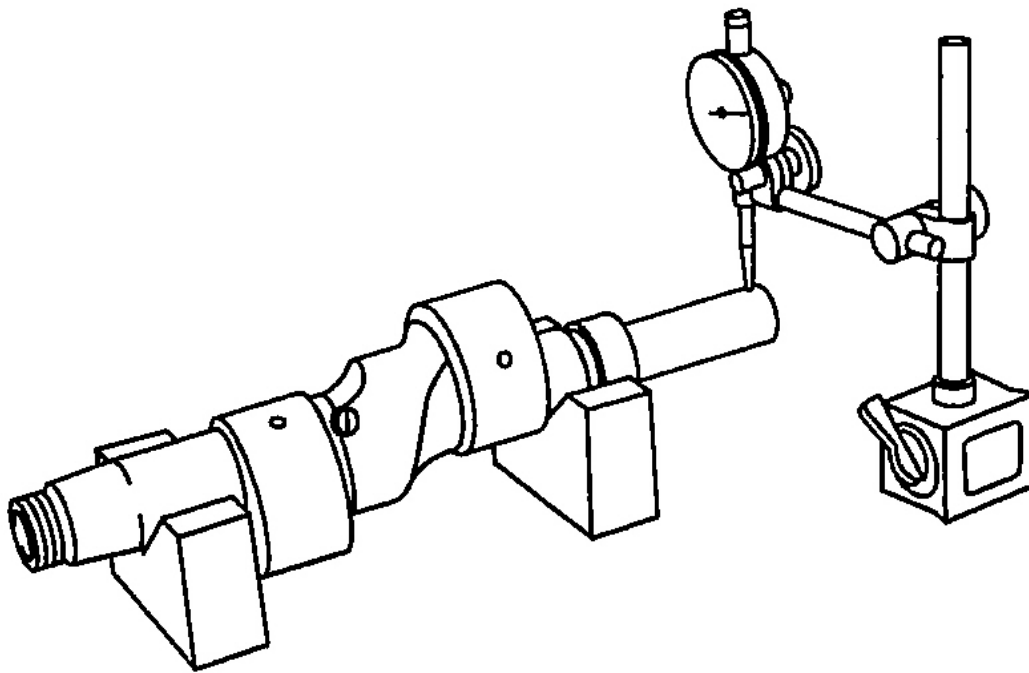


G02830997

Fig. 59: Inspecting For Clogging In Oil Passage
Courtesy of MAZDA MOTORS CORP.

2. After setting the eccentric shaft main journal on V-blocks and a surface plate, measure the runout at the end of the eccentric shaft using a dial gauge.
 - If it exceeds the maximum specification, replace the eccentric shaft.

Standard Runout**0.02 mm {0.0008 in}****Maximum Runout****0.06 mm {0.0024 in}**



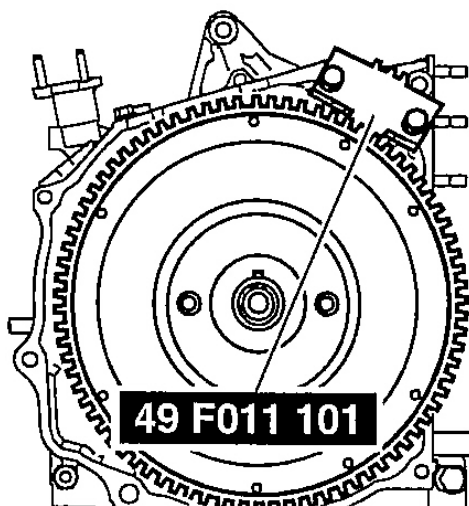
G02830998

Fig. 60: Measuring Runout At End Of Eccentric Shaft
Courtesy of MAZDA MOTORS CORP.

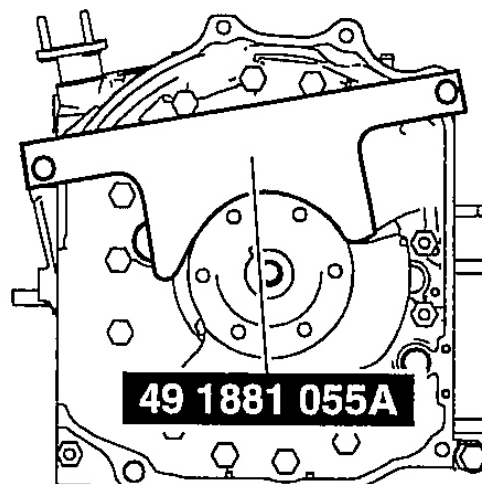
ECCENTRIC SHAFT END PLAY INSPECTION

1. Lock the flywheel (MT) or counterweight (AT) against rotation using the SST .
2. Assemble the parts in the following order:
 1. Spacer
 2. Needle bearing
 3. Thrust plate
 4. Balance weight
 5. Oil pump drive gear
 6. Metering oil pump drive gear

MT



AT

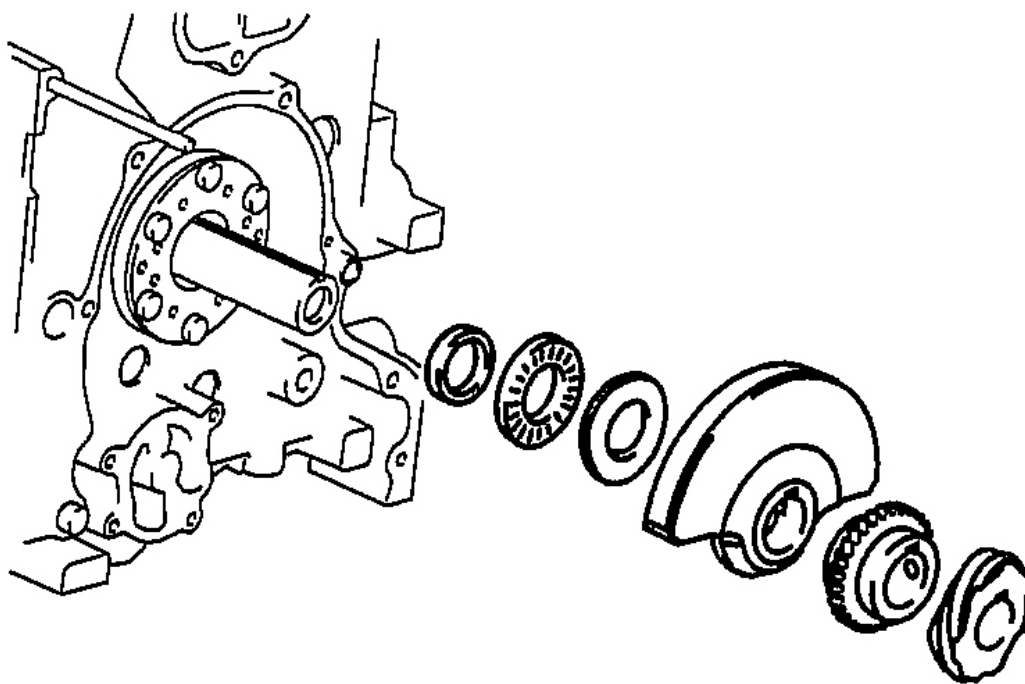


G02830999

Fig. 61: Locking Flywheel/Counterweight
Courtesy of MAZDA MOTORS CORP.

CAUTION:

- When assembling the spacer, do not allow the spacer to be caught in the needle bearing in the plate.



G02831000

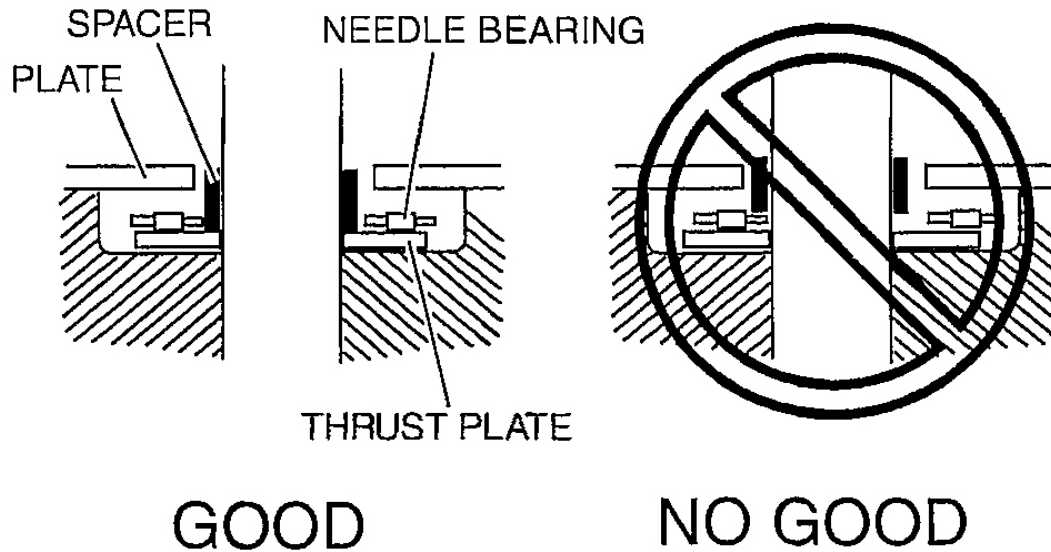
Fig. 62: Assembling Spacer

Courtesy of MAZDA MOTORS CORP.

3. Assemble the eccentric shaft pulley, eccentric shaft position plate, pulley boss component apply engine oil to the pulley lockbolt threads, and then tighten.

Tightening Torque

254-294 N.m {30.6-34.6 kgf.m, 188-215 ft.lbf}



G02831001

Fig. 63: Correct Spacer Installation
Courtesy of MAZDA MOTORS CORP.

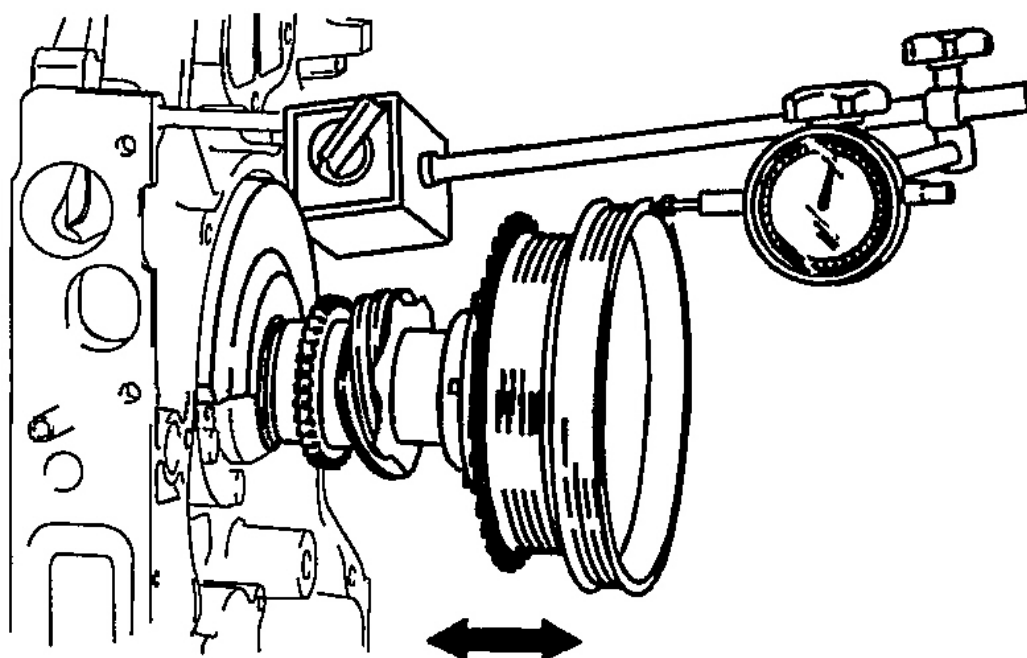
4. Remove the SST .
5. Measure the end play of the eccentric shaft using a dial gauge.
 - If not within the specification, replace the spacer with one that is thicker than the currently assembled one. If it exceeds the specification, replace with a thinner spacer.

Standard End Play

0.04-0.09 mm {0.0016-0.0035 in}

Maximum End Play

0.1 mm {0.0039 in}



G02831002

Fig. 64: Measuring Eccentric Shaft End Play
 Courtesy of MAZDA MOTORS CORP.

SPACER TYPES

Marking	Dimension - (mm {in})
A	7.985 {0.3144}
B	8.005 {0.3152}
C	8.025 {0.3159}
D	8.045 {0.3167}
E	8.065 {0.3175}

NOTE:

- If the end play is not within the specification even after replacing with an A-marked spacer, adjust by grinding it and reuse.

PILOT BEARING INSPECTION/REPLACEMENT [MT]

INSPECTION

CAUTION:

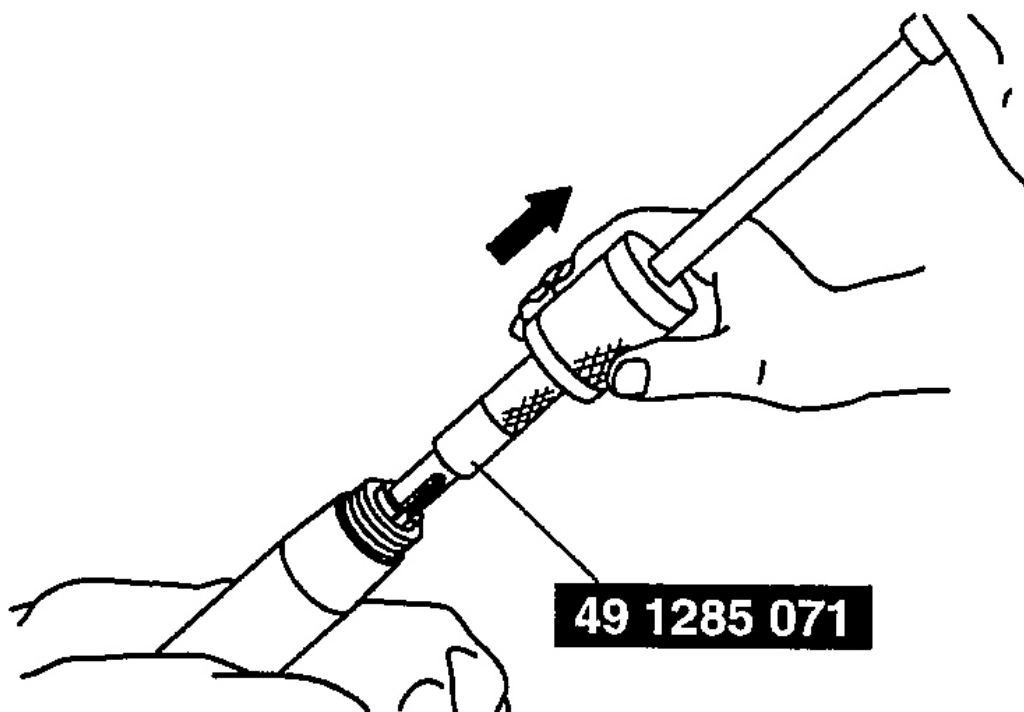
- Inspect the pilot bearing when it is installed to the eccentric shaft.

1. Before removing the pilot bearing, inspect it for damage, wear, and proper rotation.
 - If there is any malfunction, replace the pilot bearing.

REPLACEMENT

Removal

1. Fix the eccentric shaft on a vice.
2. Remove the pilot bearing and the oil seal together using the SST .



G02831003

Fig. 65: Removing Pilot Bearing & Oil Seal
Courtesy of MAZDA MOTORS CORP.

INSTALLATION

1. Install a new pilot bearing using the SSTs .
2. Apply grease to the pilot bearing.

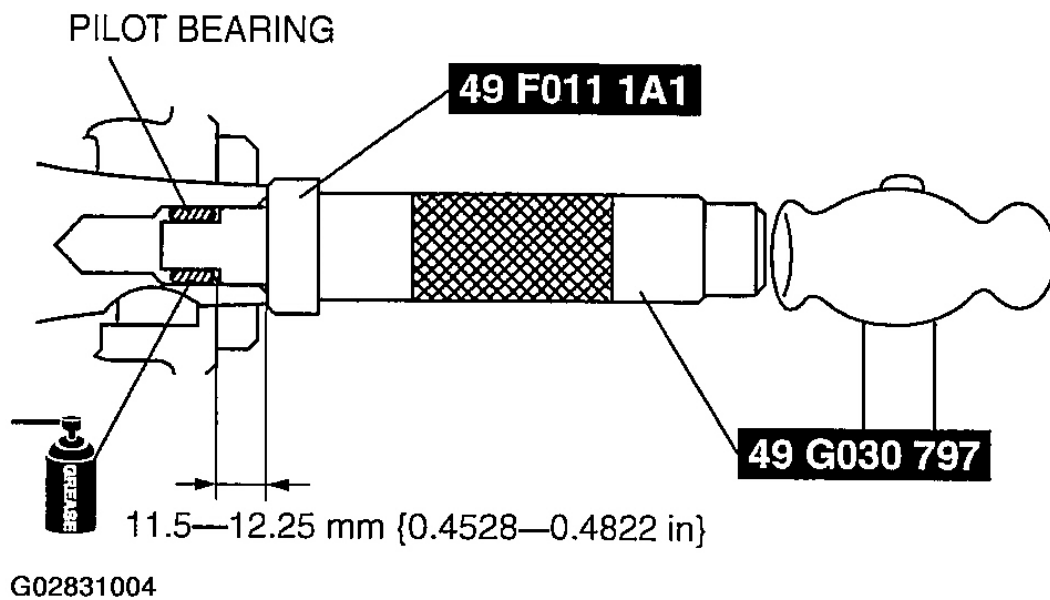


Fig. 66: Installing Pilot Bearing
Courtesy of MAZDA MOTORS CORP.

3. Install a new oil seal using the SSTs .

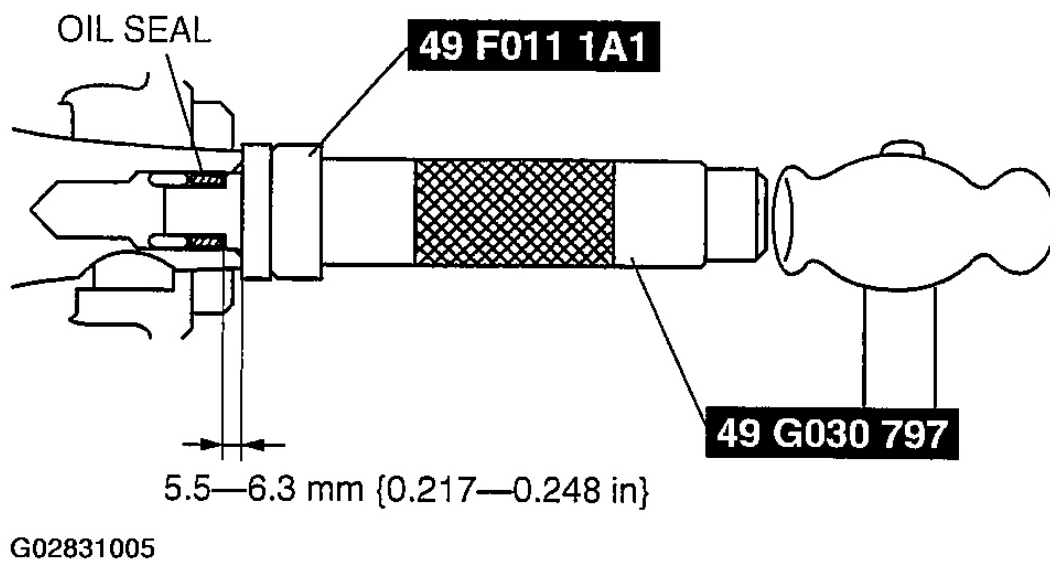


Fig. 67: Installing Oil Seal
Courtesy of MAZDA MOTORS CORP.

ECENTRIC SHAFT BYPASS VALVE

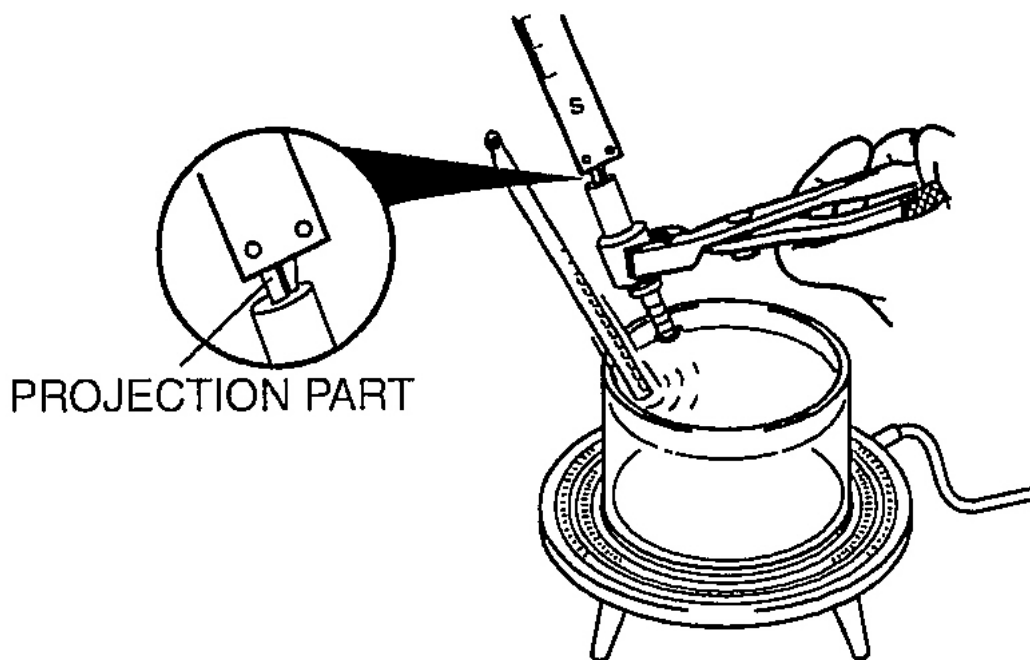
WARNING:

- Engine oil temperature will increase during the inspection and become very dangerous. Be careful not to burn yourself during the inspection.

1. Put the eccentric shaft bypass valve in a container filled with engine oil.
2. Heat the container and verify that the projection protrudes more than the minimum specification when the engine oil temperature is 60°C { 140°F } .
 - If it is less than the minimum specification, replace the eccentric shaft bypass valve.

Minimum Projection

6 mm {0.24 in}



G02831006

Fig. 68: Measuring Projection Protrusion
Courtesy of MAZDA MOTORS CORP.

ECENTRIC SHAFT POSITION PLATE INSPECTION

1. Visually inspect the eccentric shaft position plate for damage and erosion.

- If there is any malfunction, replace the eccentric shaft position plate.

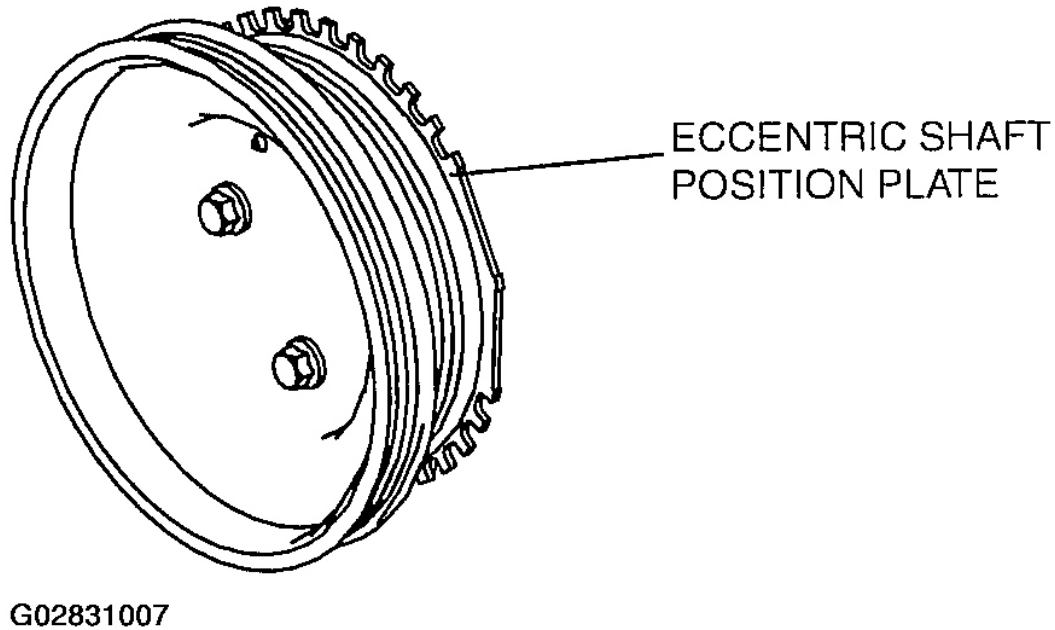


Fig. 69: Inspecting Eccentric Shaft Position Plate
Courtesy of MAZDA MOTORS CORP.

MAIN BEARING OIL CLEARANCE INSPECTION

1. Using a micrometer, measure the outer diameters of the inside main journal.

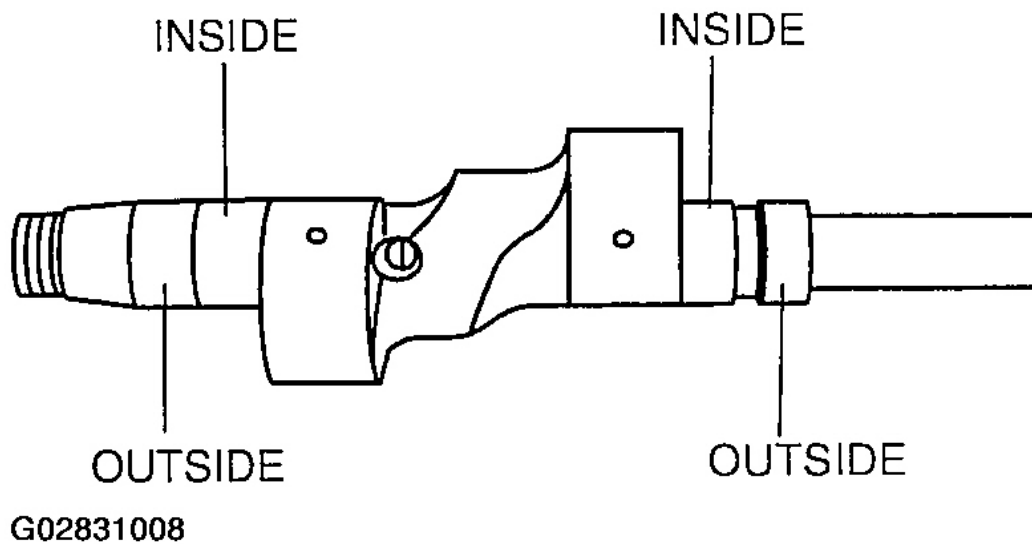
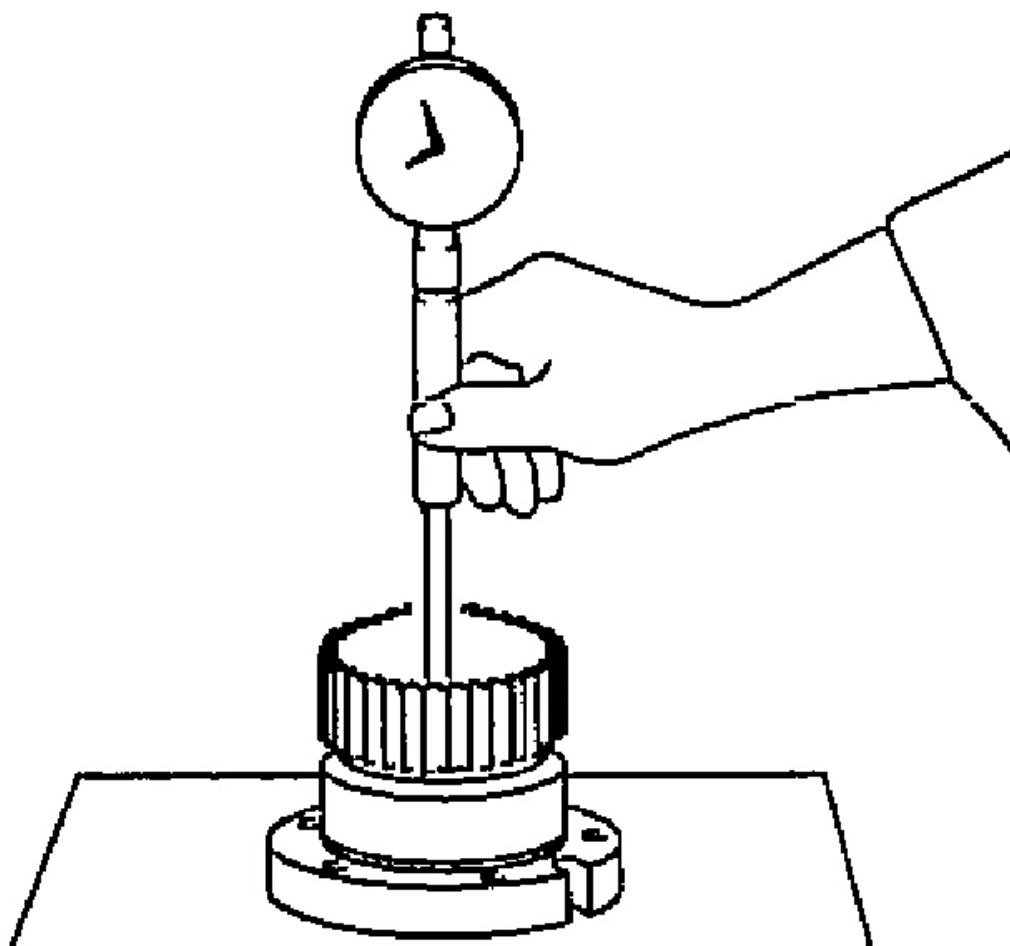


Fig. 70: Identifying Outer Diameters Of Inside Main Journal
Courtesy of MAZDA MOTORS CORP.

2. Using a cylinder bore gauge, measure the inner diameter of the stationary gear main bearing.



G02831009

Fig. 71: Measuring Inner Diameter Of Stationary Gear Main Bearing
Courtesy of MAZDA MOTORS CORP.

3. Calculate the main bearing oil clearance from the main journal outer diameter and the main bearing inner diameter.

Main Bearing Oil Clearance = (Main Bearing Inner Diameter) - (Main Journal Outer Diameter)

- If it exceeds the maximum specification, replace the main bearing. (See **MAIN BEARING REPLACEMENT.**)
 - If the clearance is not within the specification after replacing the main bearing, replace the eccentric shaft.

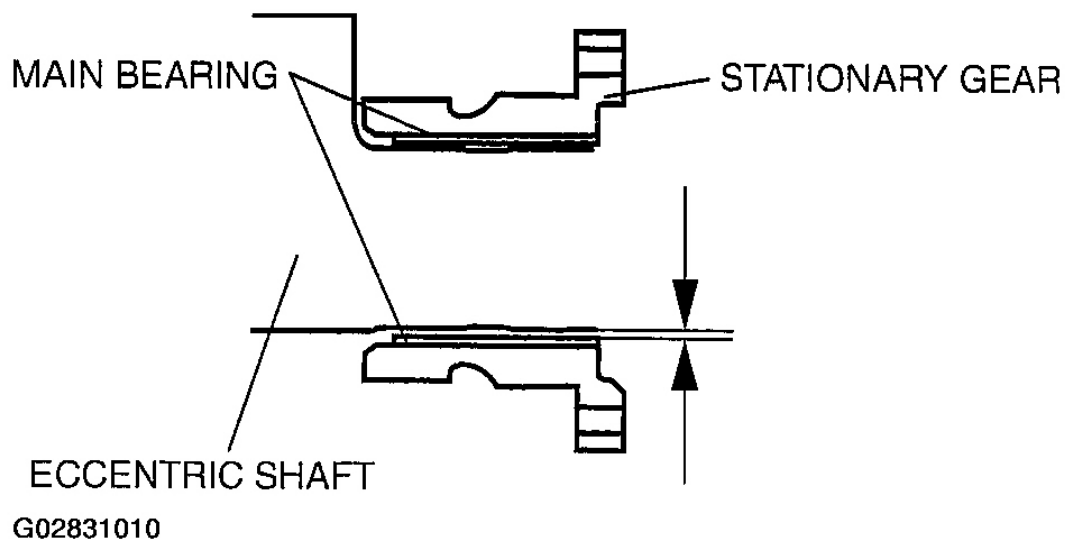
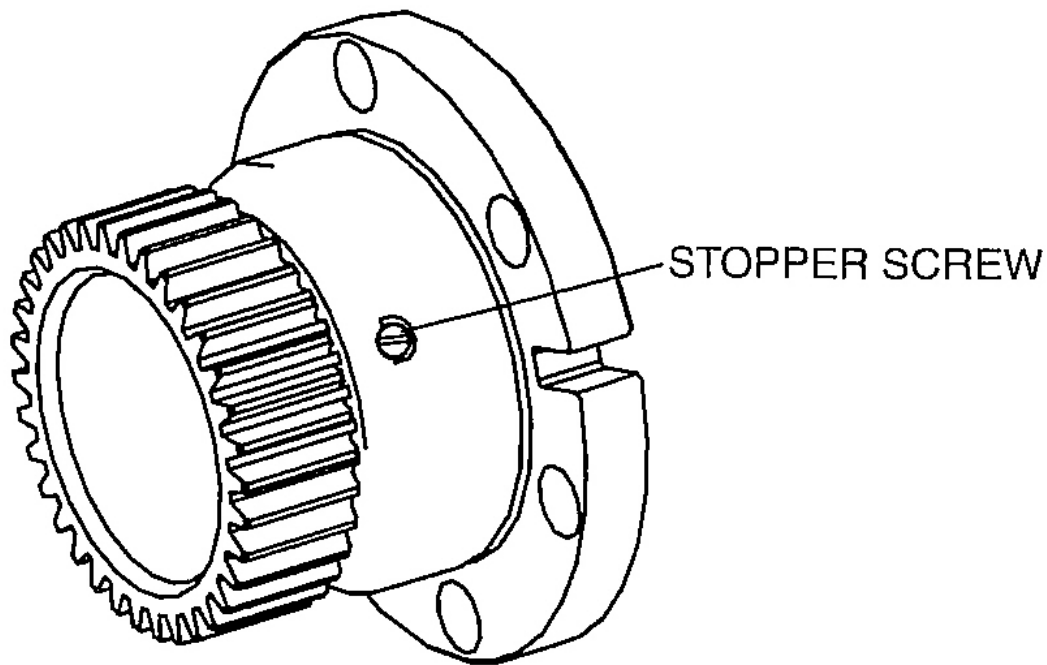
Standard Main Bearing Oil Clearance**Standard Power****0.045-0.085 mm {0.0018-0.0033 in}****High Power****0.055-0.075 mm {0.0022-0.0029 in}****Maximum Main Bearing Oil Clearance****Standard Power****0.1 mm {0.0039 in}****High Power****0.1 mm {0.0039 in}**

Fig. 72: Measuring Main Bearing Oil Clearance
Courtesy of MAZDA MOTORS CORP.

MAIN BEARING REPLACEMENT**REMOVAL**

1. Remove the stopper screw. (High power only)



G02831011

Fig. 73: Removing Stopper Screw
Courtesy of MAZDA MOTORS CORP.

2. Remove the adapter ring and the securing screw from the SST .
3. Set the stationary gear to the hydraulic press so that the gear faces upward.
4. Remove the main bearing using the SST .

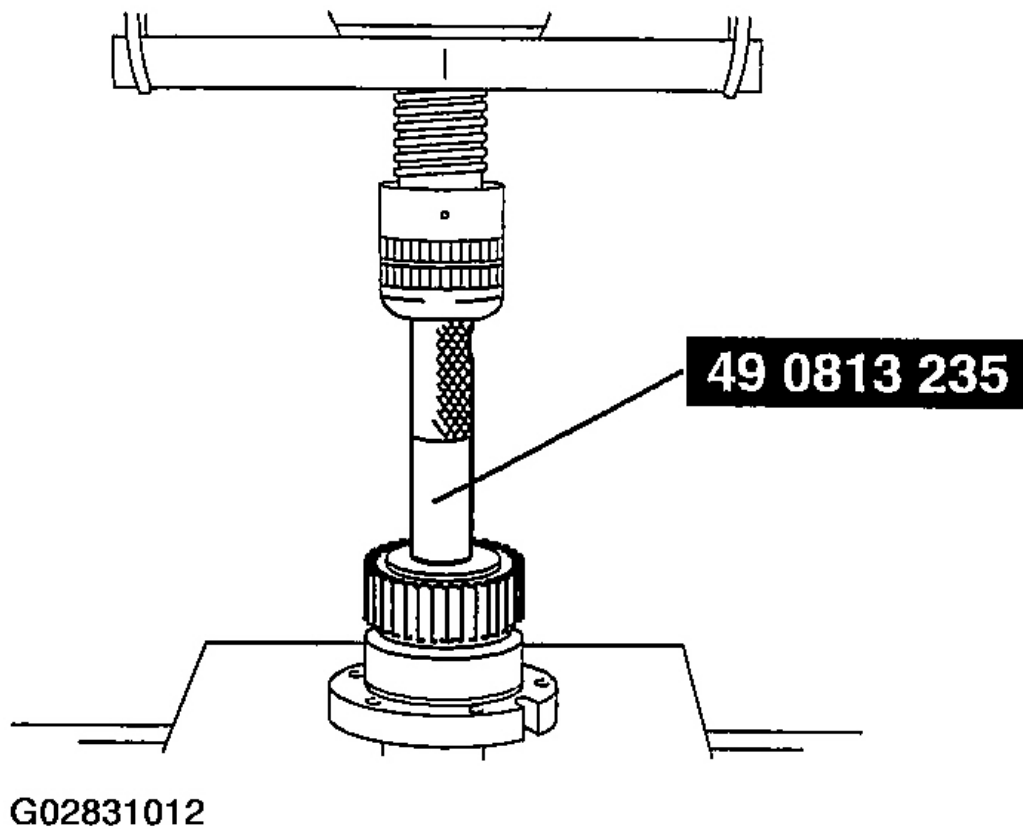
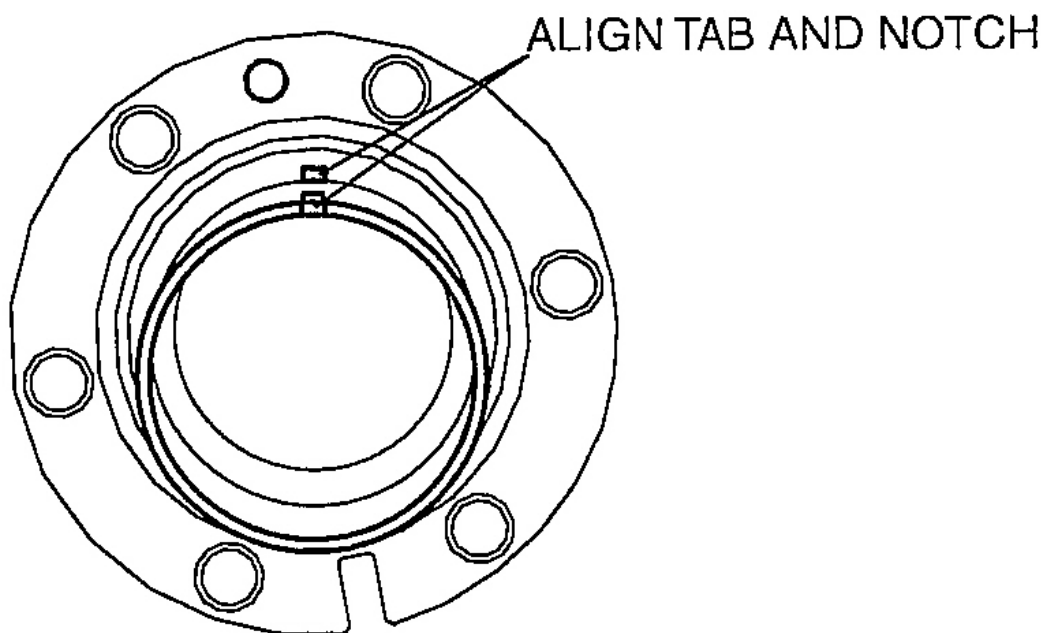


Fig. 74: Removing Main Bearing
Courtesy of MAZDA MOTORS CORP.

INSTALLATION

Standard Power

1. Temporarily assemble the stationary gear and the main bearing so that the main bearing tab and notch are aligned after pressing in the main bearing and stationary gear.



G02831013

Fig. 75: Aligning Main Bearing Tab & Notch
Courtesy of MAZDA MOTORS CORP.

2. Remove the SST handle.

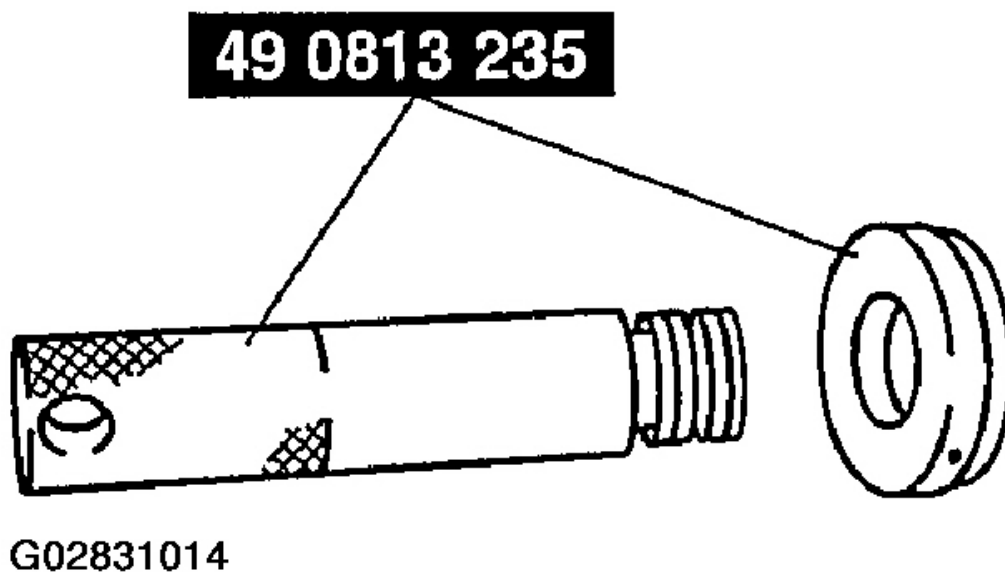


Fig. 76: Removing SST Handle
Courtesy of MAZDA MOTORS CORP.

- CAUTION:**
- Press the main bearing in so that the top of the main bearing is flush with the top of the stationary gear flange.

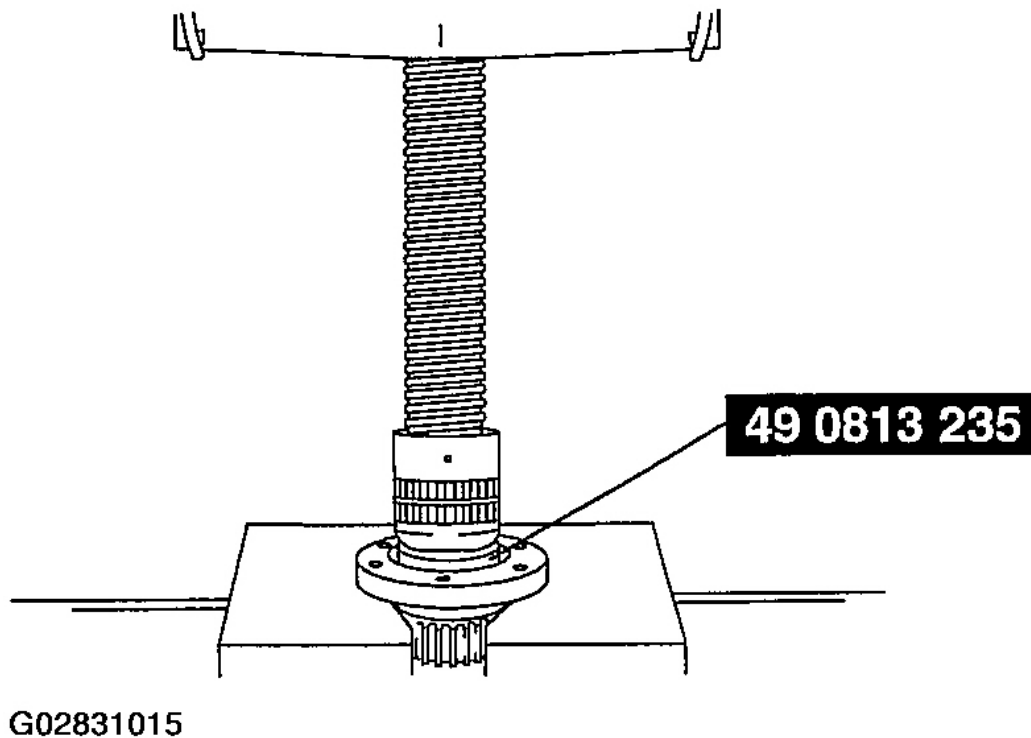
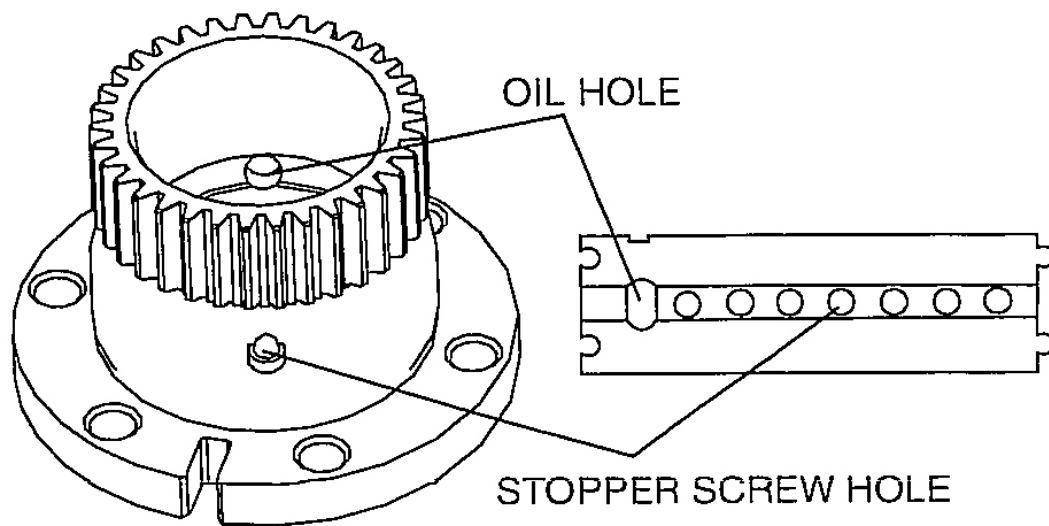


Fig. 77: Pressing Main Bearing
Courtesy of MAZDA MOTORS CORP.

3. Position the gear of the stationary gear downward, and install the main bearing by pressing it with the SST .

High Power

1. Temporarily assemble the stationary gear and the main bearing so that the main bearing screw hole and the stationary gear screw hole are aligned after pressing in the main bearing and rotor.



G02831016

Fig. 78: Identifying Oil Hole & Stopper Screw Hole
Courtesy of MAZDA MOTORS CORP.

2. Remove the SST handle.

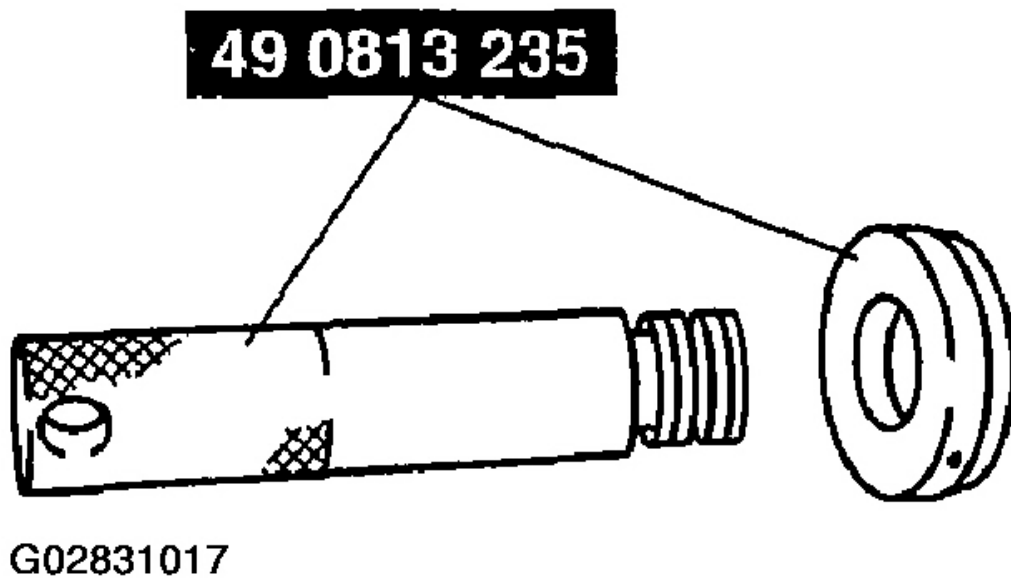


Fig. 79: Removing SST Handle

Courtesy of MAZDA MOTORS CORP.

3. Position the gear of the stationary gear downward, and install the main bearing using the SST .

CAUTION:

- Press the main bearing in so that the top of the main bearing is flush with the top of the stationary gear flange.

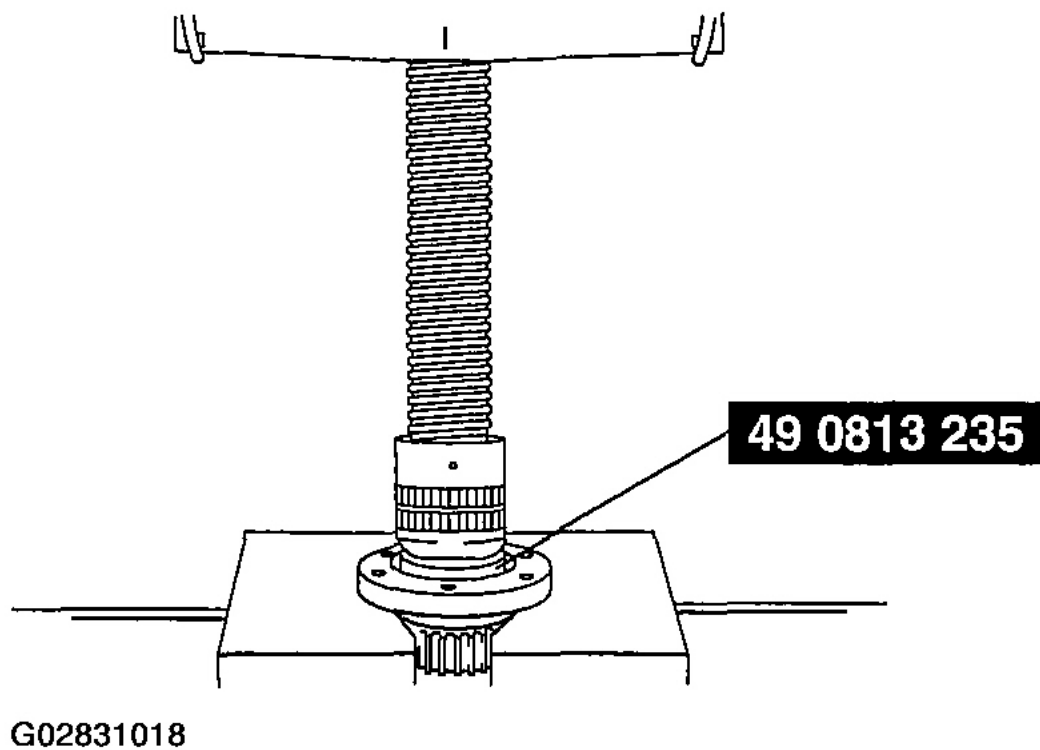
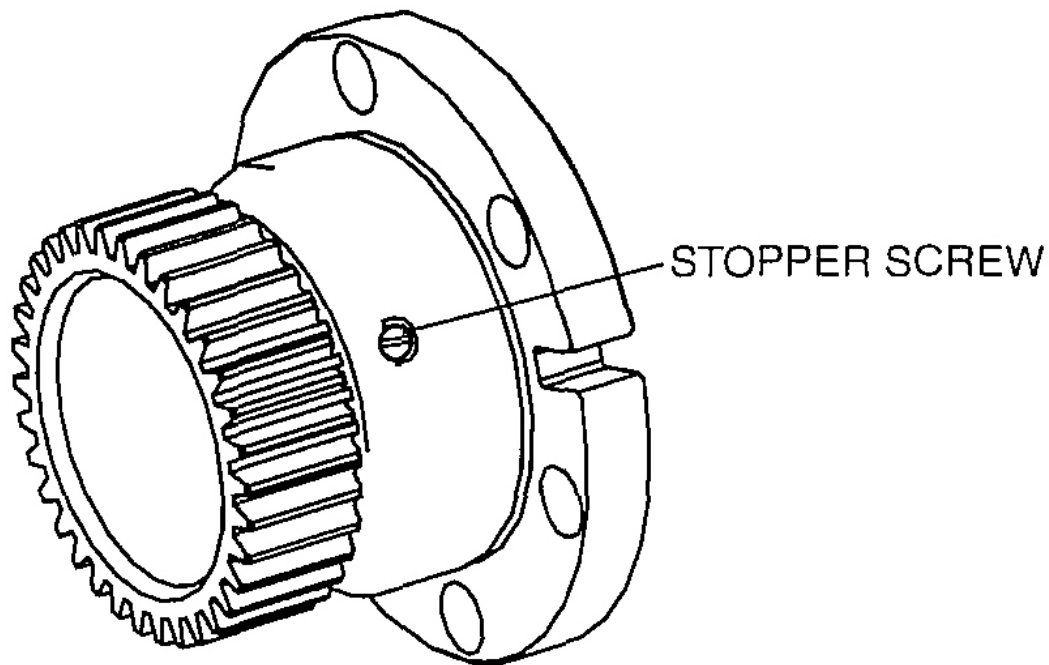


Fig. 80: Pressing Main Bearing
Courtesy of MAZDA MOTORS CORP.

4. Apply thread-locking compound to the stopper screw and install.

Tightening Torque

3.2-4.7 N.m {33-47 kgf.cm, 29-41 in.lbf}



G02831019

Fig. 81: Installing Stopper Screw
Courtesy of MAZDA MOTORS CORP.

OIL PUMP INSPECTION

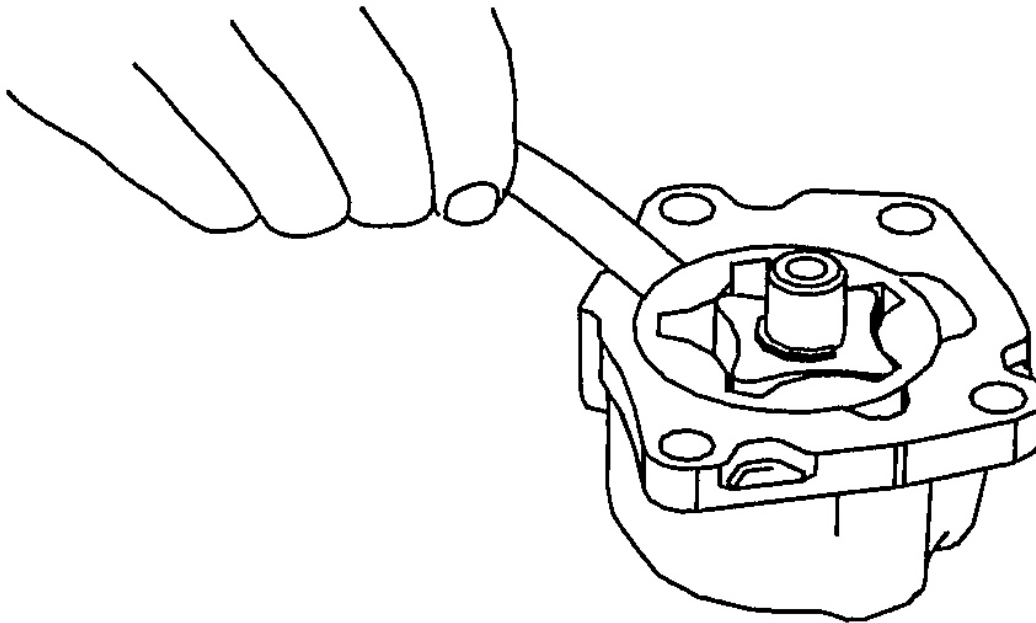
1. Measure the side clearance between the outer rotor and the body using a feeler gauge.
 - If it exceeds the maximum specification, replace the oil pump.

Standard Side Clearance

0.20-0.25 mm {0.0079-0.0098 in}

Maximum Side Clearance

0.3 mm {0.0118 in}



G02831020

Fig. 82: Measuring Side Clearance
Courtesy of MAZDA MOTORS CORP.

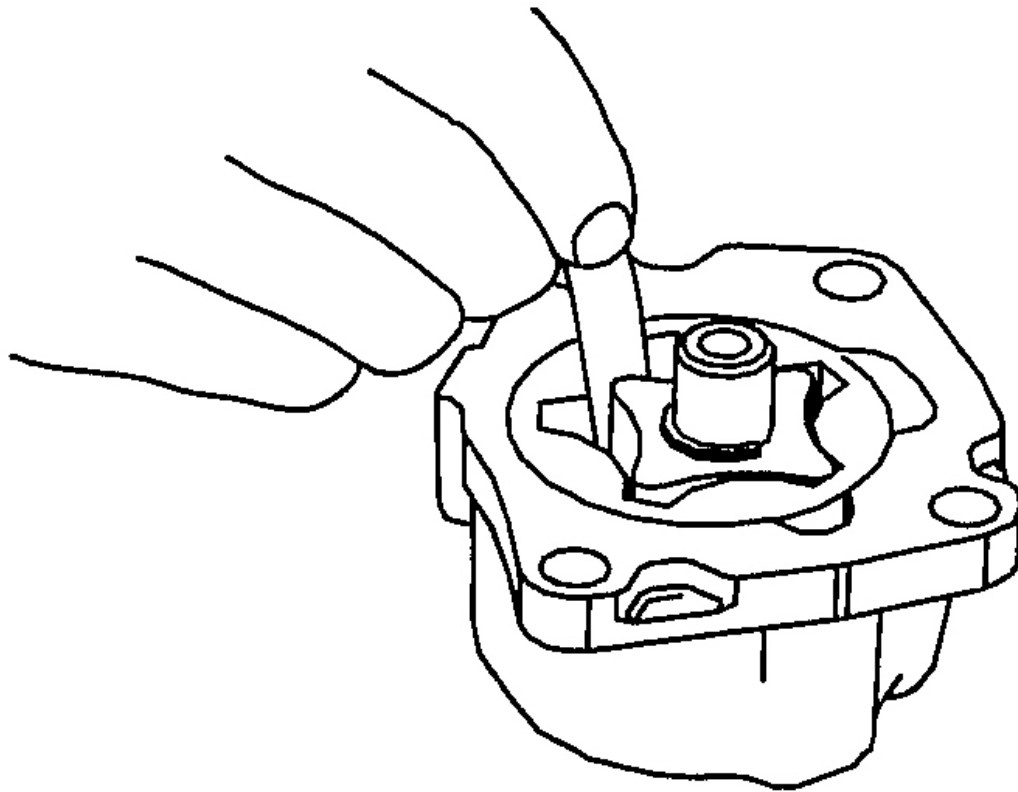
2. Measure the tip clearance between the inner rotor and the outer rotor using a feeler gauge.
 - If it exceeds the maximum specification, replace the oil pump.

Standard Tip Clearance

0.03-0.12 mm {0.0012-0.0047 in}

Maximum Tip Clearance

0.15 mm {0.0059 in}



G02831021

Fig. 83: Measuring Tip Clearance
Courtesy of MAZDA MOTORS CORP.

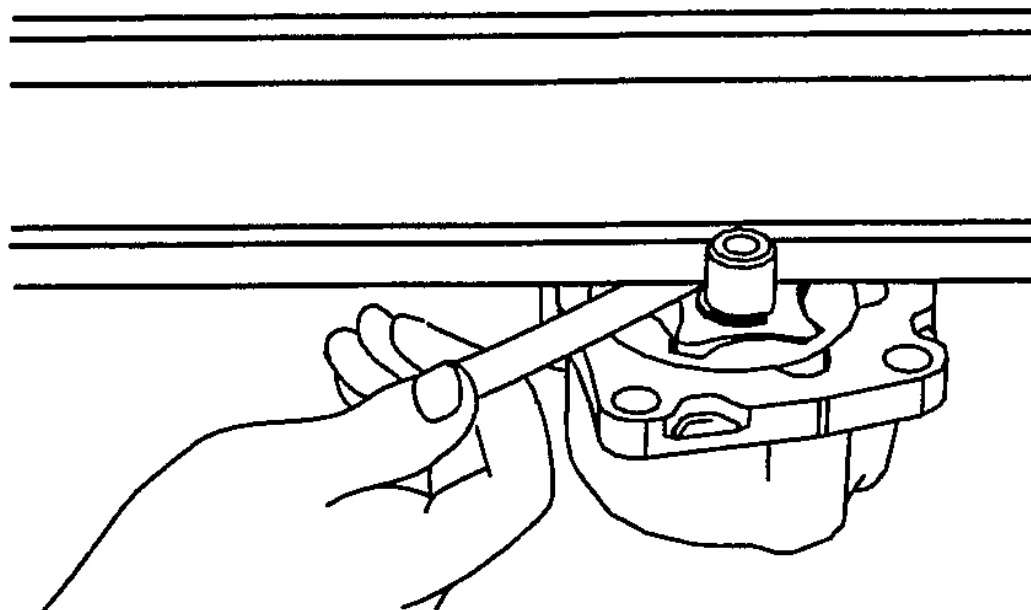
3. Measure the body clearance between the rotor and the side housing using a straight edge and a feeler gauge.
 - If it exceeds the maximum specification, replace the oil pump.

Standard Body Clearance

0.03-0.125 mm {0.0012-0.0049 in}

Maximum Body Clearance

0.15 mm {0.0059 in}

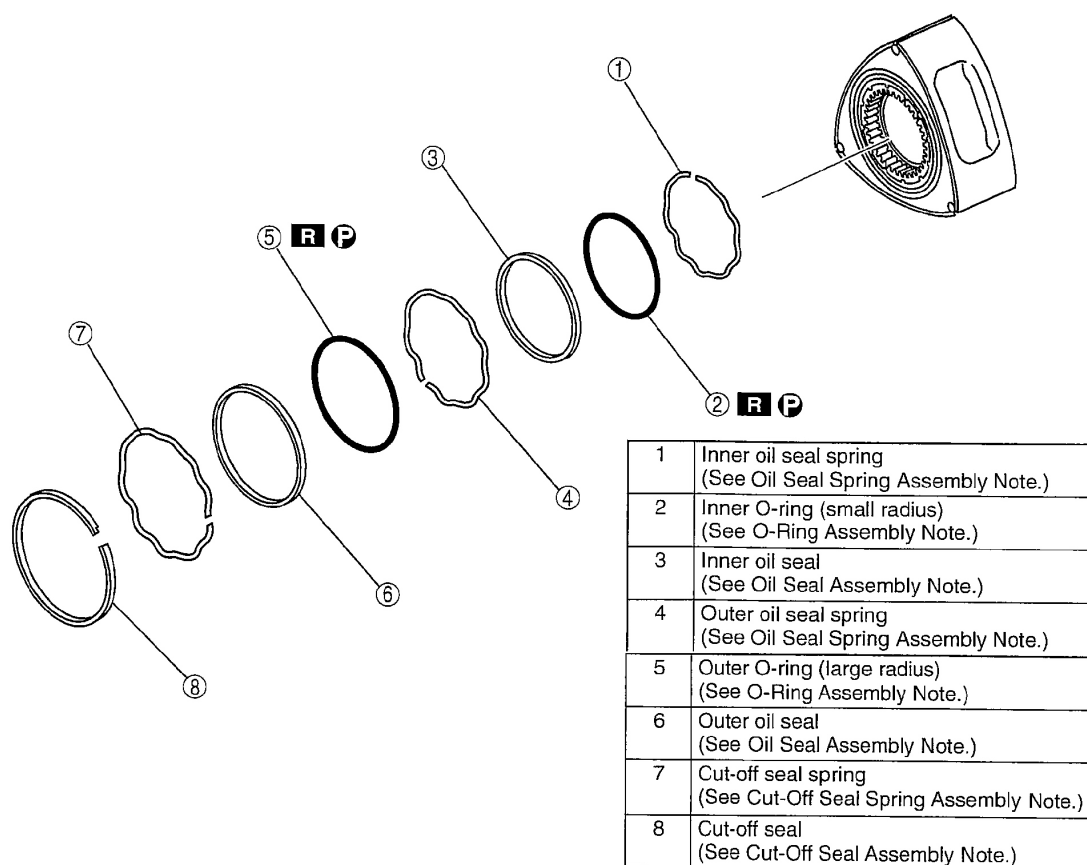


G02831022

Fig. 84: Measuring Body Clearance
Courtesy of MAZDA MOTORS CORP.

ROTOR ASSEMBLY

1. Assemble in the order indicated in the figure.



G02831023

Fig. 85: Assembling Rotor
Courtesy of MAZDA MOTORS CORP.

OIL SEAL SPRING ASSEMBLY NOTE

1. Assemble the oil seal spring with the identification color upward.

OIL SEAL SPRING IDENTIFICATION COLOR

Rotor	Front Rotor		Rear Rotor	
Rotor	Engine Front Side	Engine Rear Side	Engine Front Side	Engine Rear Side
Inner	White	Blue	White	Blue
Outer	White+Pink	Blue+Pink	White+Pink	Blue+Pink

CAUTION:

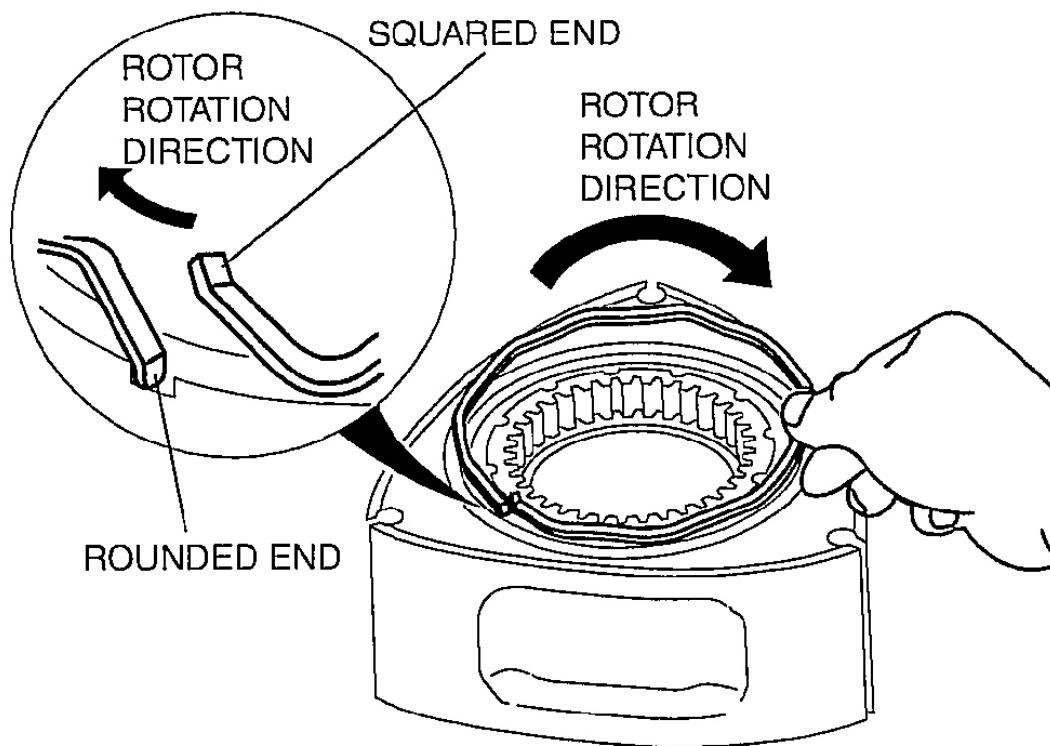
- It is possible that the identification color may not be visible when reusing the oil spring. In that case, assemble the rounded end towards the rotor side and the squared end upward.
- Be careful when assembling the oil seal spring of the front and rear rotor since each spring of the engine front side and engine

rear side are the same.

NOTE:

- Either one of the two rotation lock slots on the oil seal can be used as a reference.

ENGINE FRONT SIDE AND REAR SIDE



G02831024

Fig. 86: Assembling Oil Seal Spring
Courtesy of MAZDA MOTORS CORP.

- Assemble the rounded end within **0-15 mm {0-0.59 in}** away from the oil seal spring rotation lock.

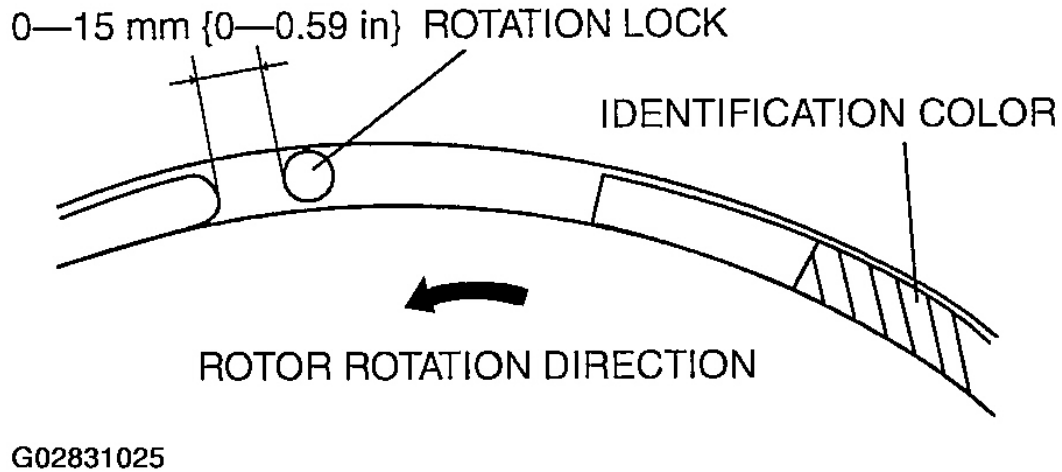


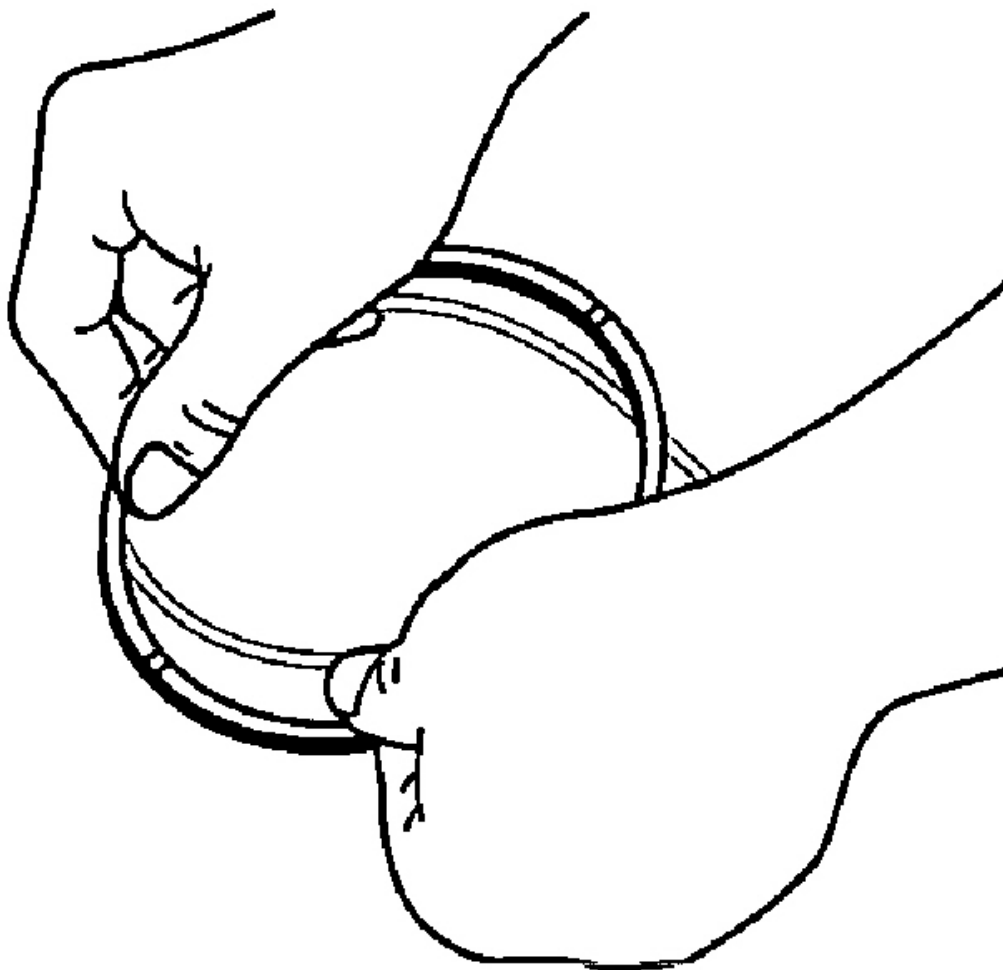
Fig. 87: Identifying Oil Seal Spring Rotation Lock
 Courtesy of MAZDA MOTORS CORP.

O-RING ASSEMBLY NOTE

1. Apply petroleum jelly to a new O-ring.
2. Assemble the O-ring to the oil seal.

NOTE:

- Assemble the thicker O-ring to the inner oil seal (small radius), and the thinner O-ring to the outer oil seal (large radius).



G02831026

Fig. 88: Assembling O-ring To Oil Seal
Courtesy of MAZDA MOTORS CORP.

OIL SEAL ASSEMBLY NOTE

1. Temporarily install the oil seal with the squared end of the oil seal spring fit into the slot of the oil seal.

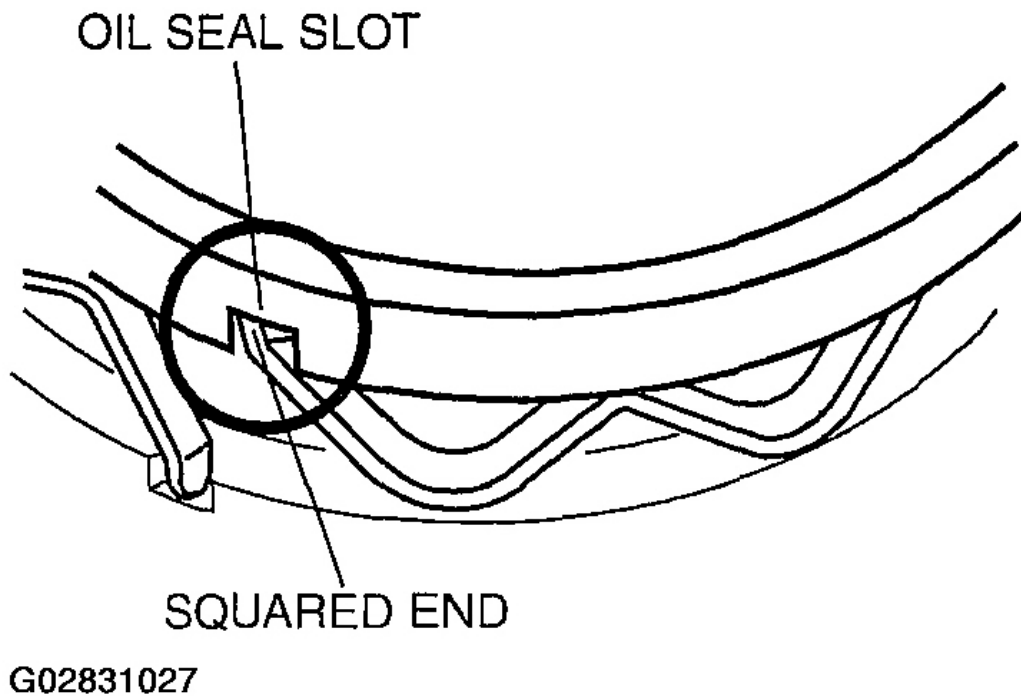
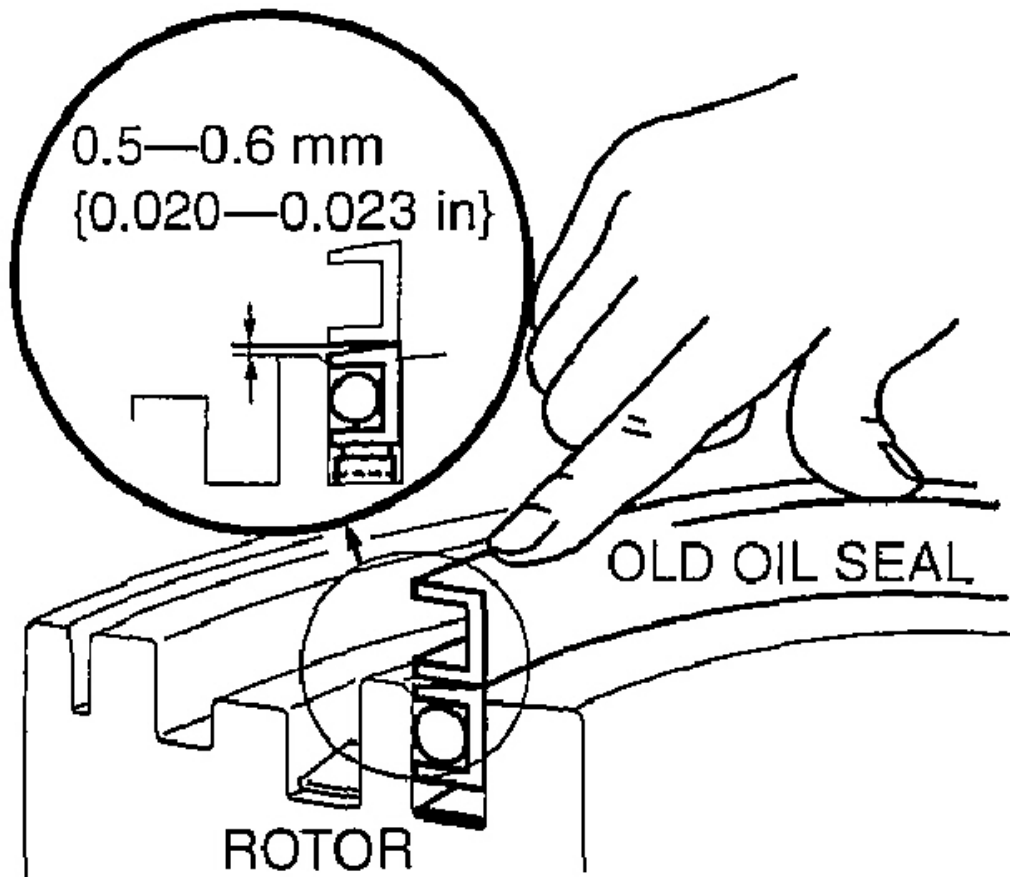


Fig. 89: Installing Oil Seal

Courtesy of MAZDA MOTORS CORP.

2. Push in the oil seal using an old oil seal.
3. Verify that the stroke of the oil seal is smooth and there is no catching by pushing the oil seal with your hand.



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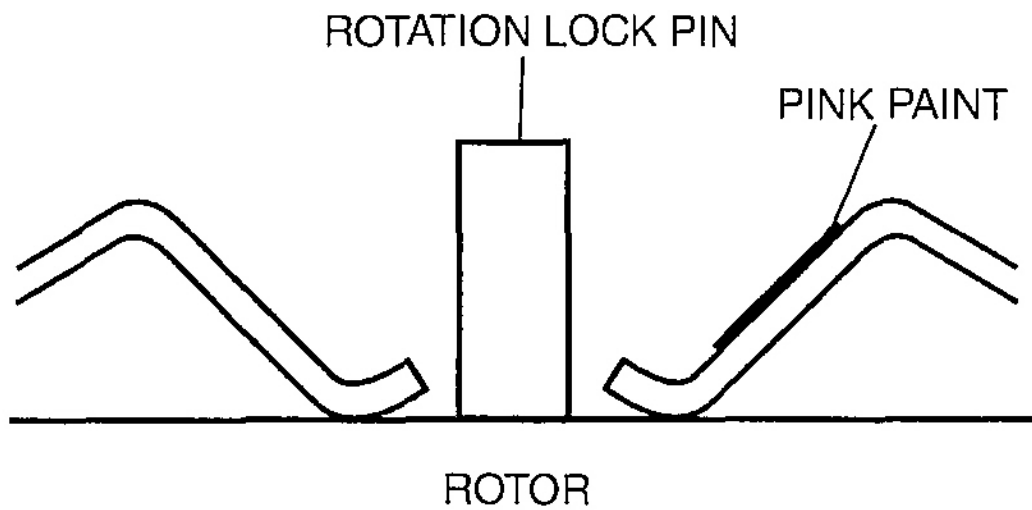
Fig. 90: Verifying Oil Seal Stroke For Smoothness
Courtesy of MAZDA MOTORS CORP.

CUT-OFF SEAL SPRING ASSEMBLY NOTE

1. Assemble the cut-off seal spring with the spring end turned upward.

NOTE:

- When replacing a cut-off seal with a new one, assemble the seal with the pink surface facing upward.



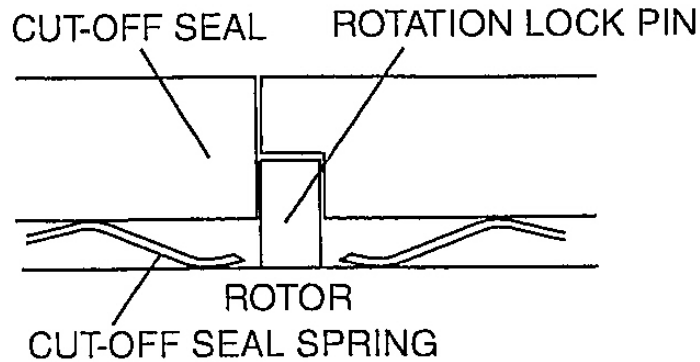
G02831029

Fig. 91: Assembling Cut-Off Seal Spring With Spring End Turned Upward
Courtesy of MAZDA MOTORS CORP.

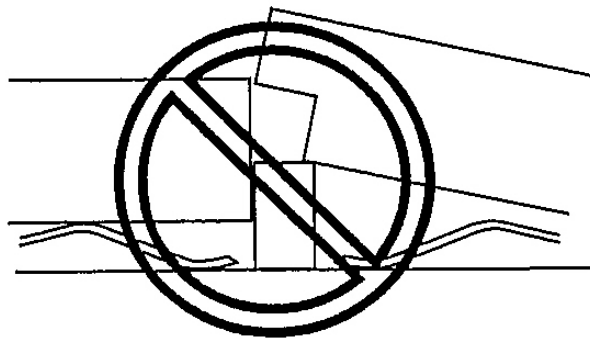
CUT-OFF SEAL ASSEMBLY NOTE

1. Assemble the cut-off seal so that it does not run over the rotation lock pin.

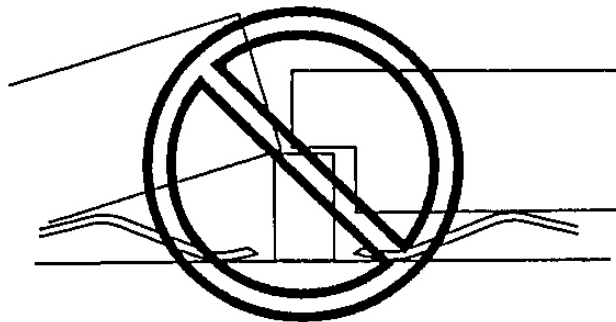
GOOD



NO GOOD



NO GOOD



G02831030

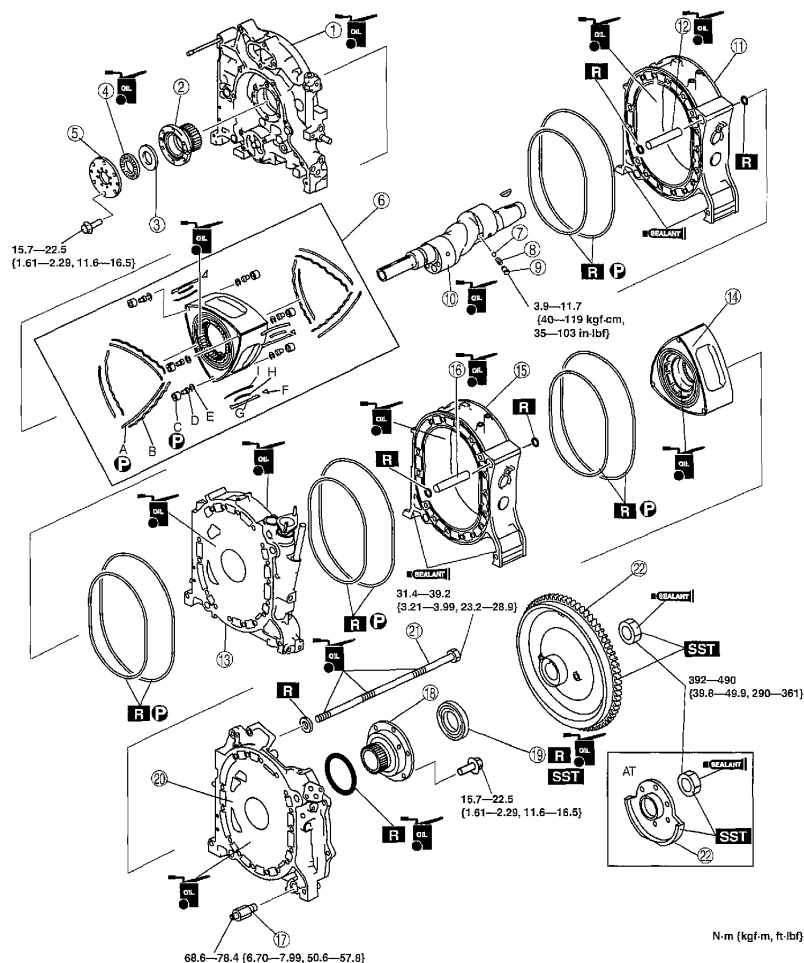
Fig. 92: Assembling Cut-Off Seal Spring
 Courtesy of MAZDA MOTORS CORP.

HOUSING ASSEMBLY I

1. Assemble in the order indicated in the figure.

2005 Mazda RX-8 Shinka

2004-2011 ENGINE Overhaul - 1.3L (13B-MSP) - RX-8



1	Front housing
2	Front stationary gear
3	Thrust plate (See Thrust Plate Assembly Note.)
4	Needle bearing
5	Plate
6	Front rotor A: Side seal B: Side seal spring C: Corner seal D: Corner seal plug E: Corner seal spring F: Side piece G: Apex seal H: Apex seal spring (short) I: Apex seal spring (long) (See Rotor Assembly Note.)
7	Steel ball
8	Spring
9	Oil jet plug (See Oil Jet Plug Assembly Note.)
10	Eccentric shaft
11	Front rotor housing (See Rotor Housing Assembly Note.)
12	Tubular dowel (front rotor housing side)

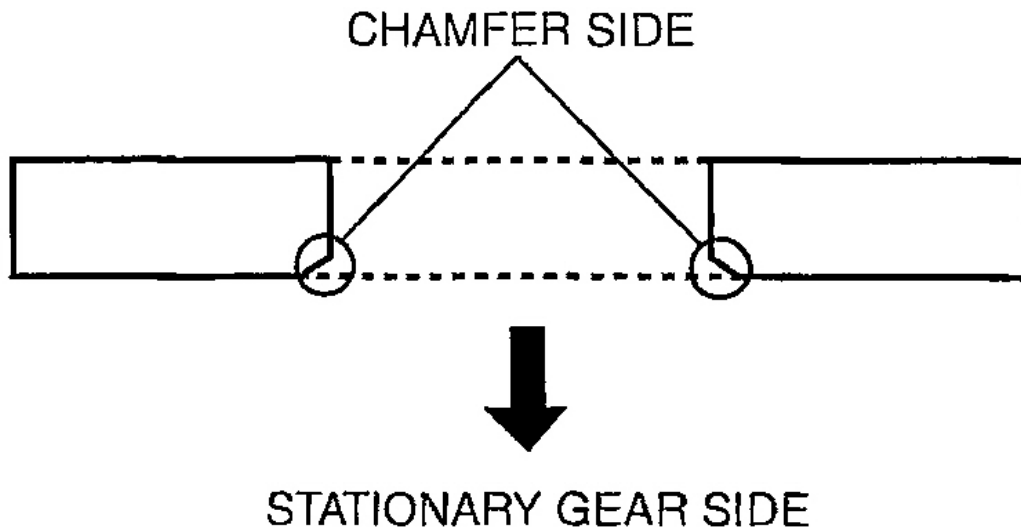
13	Intermediate housing (See Intermediate Housing Assembly Note.)
14	Rear rotor (See Rotor Assembly Note.)
15	Rear rotor housing (See Rotor Housing Assembly Note.)
16	Tubular dowel (rear rotor housing side)
17	Pressure regulator
18	Rear stationary gear
19	Rear oil seal (See Rear Oil Seal Assembly Note.)
20	Rear housing (See Rear Housing Assembly Note.)
21	Tension bolt (See Tension Bolt Assembly Note.)
22	Flywheel (MT), counterweight (AT) (See Flywheel (MT), Counterweight (AT) Assembly Note.)

G02831031

Fig. 93: Assembling Housing (I)
Courtesy of MAZDA MOTORS CORP.

THRUST PLATE ASSEMBLY NOTE

1. Place the chamfer side facing the stationary gear.



G02831032

Fig. 94: Installing Thrust Plate
 Courtesy of MAZDA MOTORS CORP.

ROTOR ASSEMBLY NOTE

- CAUTION:**
- Assemble only the side seal and corner seal on the engine front side while the rotor is not assembled.

1. Assemble the side seal spring in the direction shown in the figure.

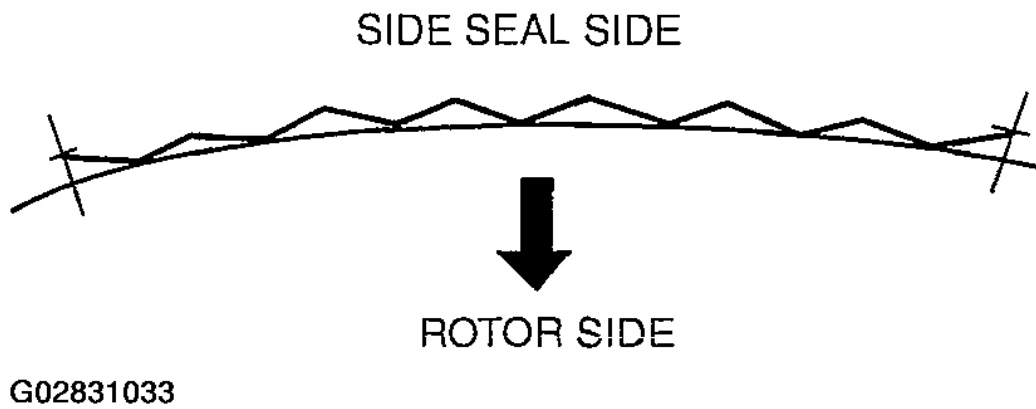


Fig. 95: Installing Side Seal Spring
Courtesy of MAZDA MOTORS CORP.

2. Assemble the side seal spring in the direction shown in the figure.

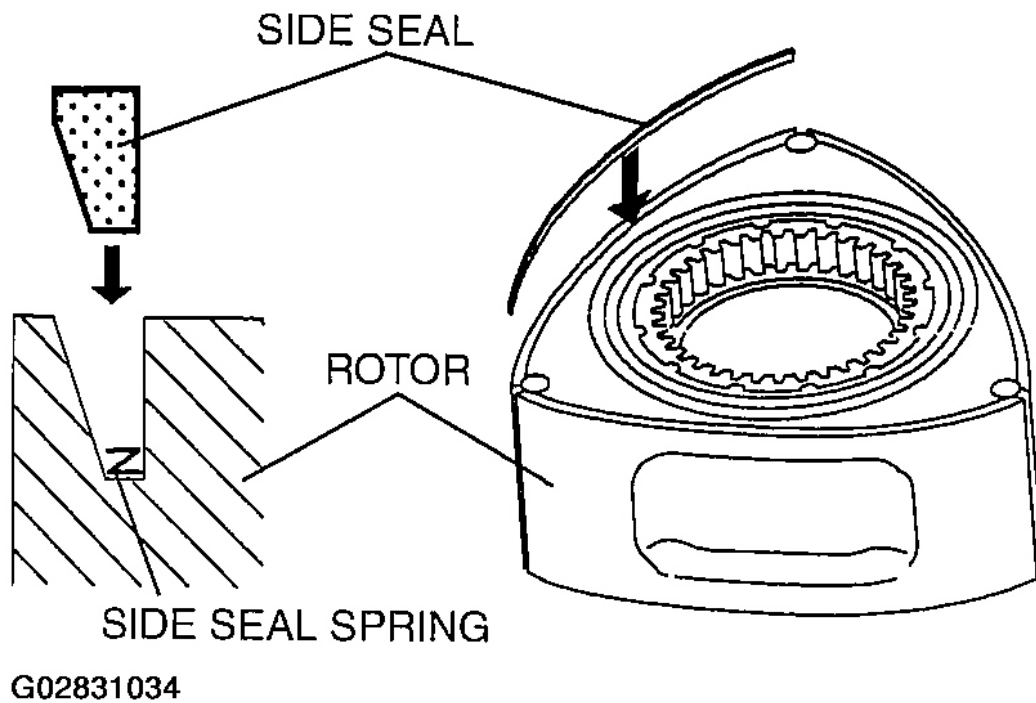
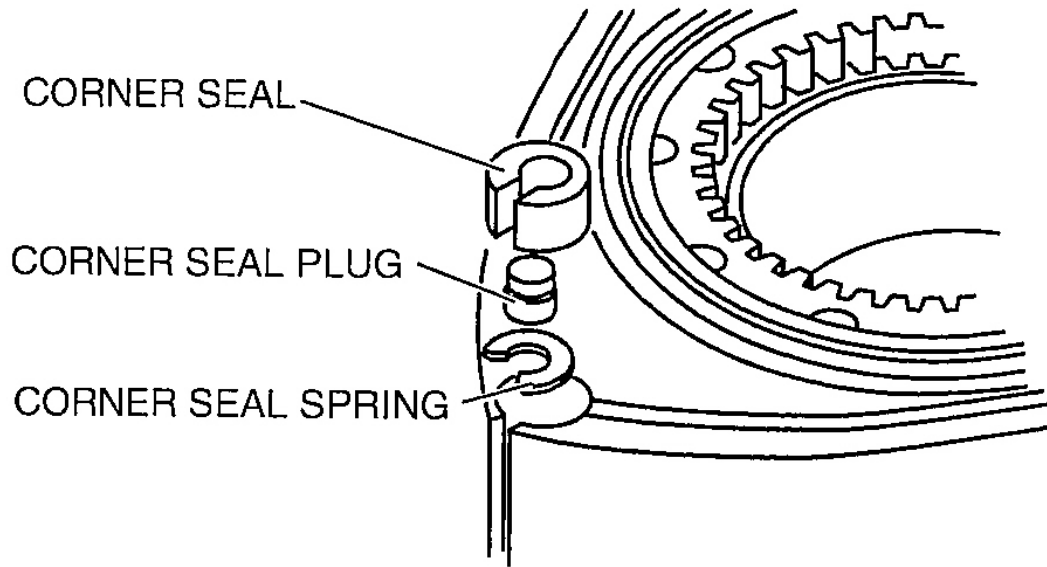


Fig. 96: Assembling Side Seal Spring
Courtesy of MAZDA MOTORS CORP.

3. Apply petroleum jelly between the side seal and side seal groove.
4. Assemble the corner seal plug to the corner seal.



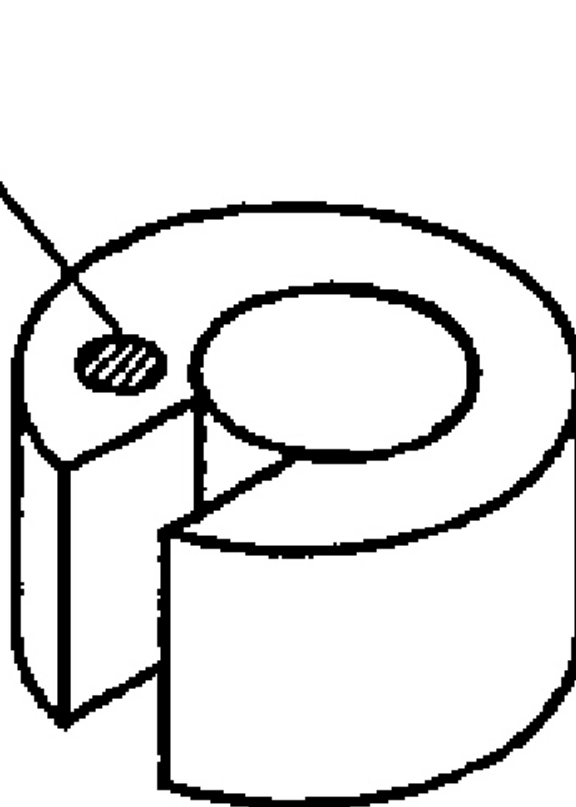
G02831035

Fig. 97: Installing Corner Seal Plug To Corner Seal
Courtesy of MAZDA MOTORS CORP.

NOTE:

- When replacing a corner seal with new one, assemble the corner seal with the painting surface facing upward.

S:PINK
L:WHITE



G02831036

Fig. 98: Identifying Painted Surface
Courtesy of MAZDA MOTORS CORP.

5. Assemble the corner seal and corner seal spring with the notch aligned with the apex seal groove.
6. Apply petroleum jelly between the corner seal and corner seal groove.
7. Insert the **SST** into the apex seal groove of the rotor and verify that the apex seal groove of the corner seal is aligned with the apex seal groove of the rotor.
8. Assemble the side seal and corner seal for the engine rear side in the same way as the engine front side.

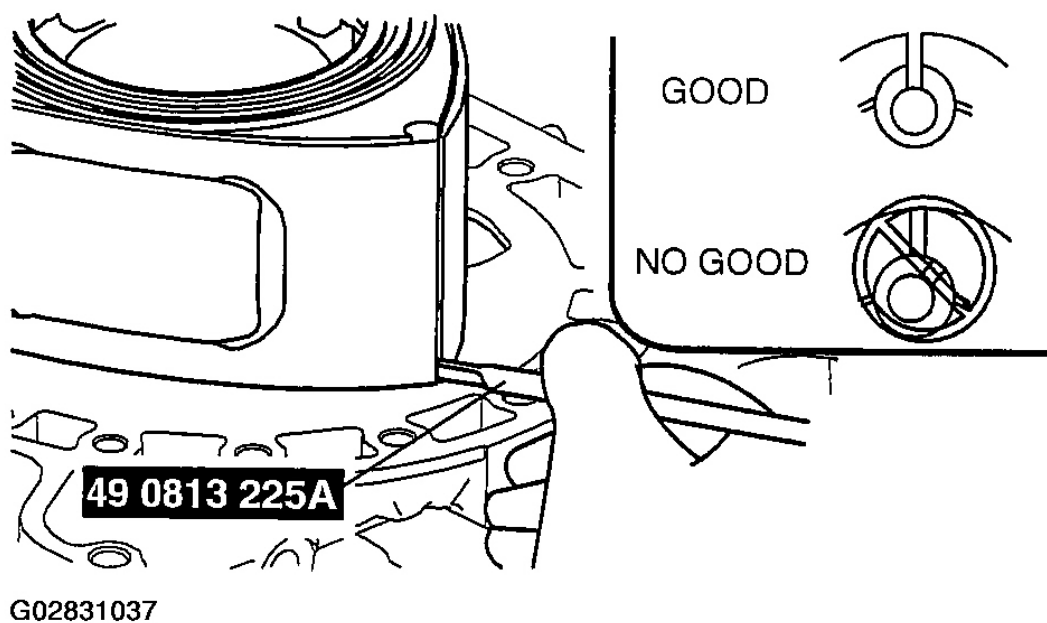


Fig. 99: Engine Rear Side, Side Seal & Corner Seal
Courtesy of MAZDA MOTORS CORP.

OIL JET PLUG ASSEMBLY NOTE

1. Apply thread locking compound to the seating face of the oil jet plug.
2. Install the oil jet plug.

Tightening Torque

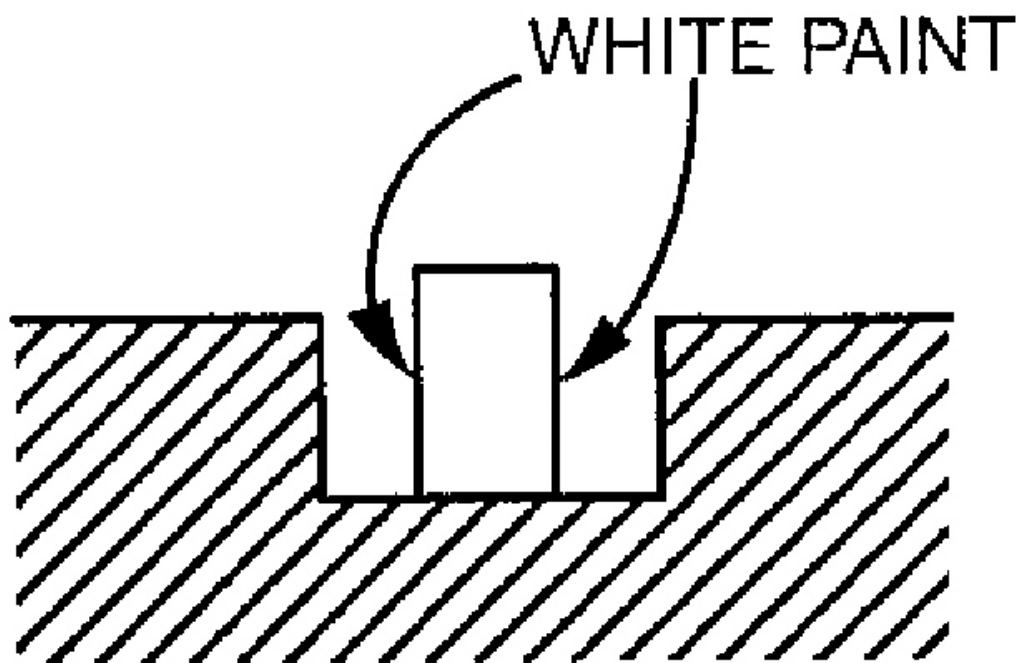
3.9-11.7 N.m {40-119 kgf.cm, 35-103 in.lbf}

ROTOR HOUSING ASSEMBLY NOTE

CAUTION:

- Assemble the seal rubber without any torsion.
- Do not get oil or grease on the seal rubber.

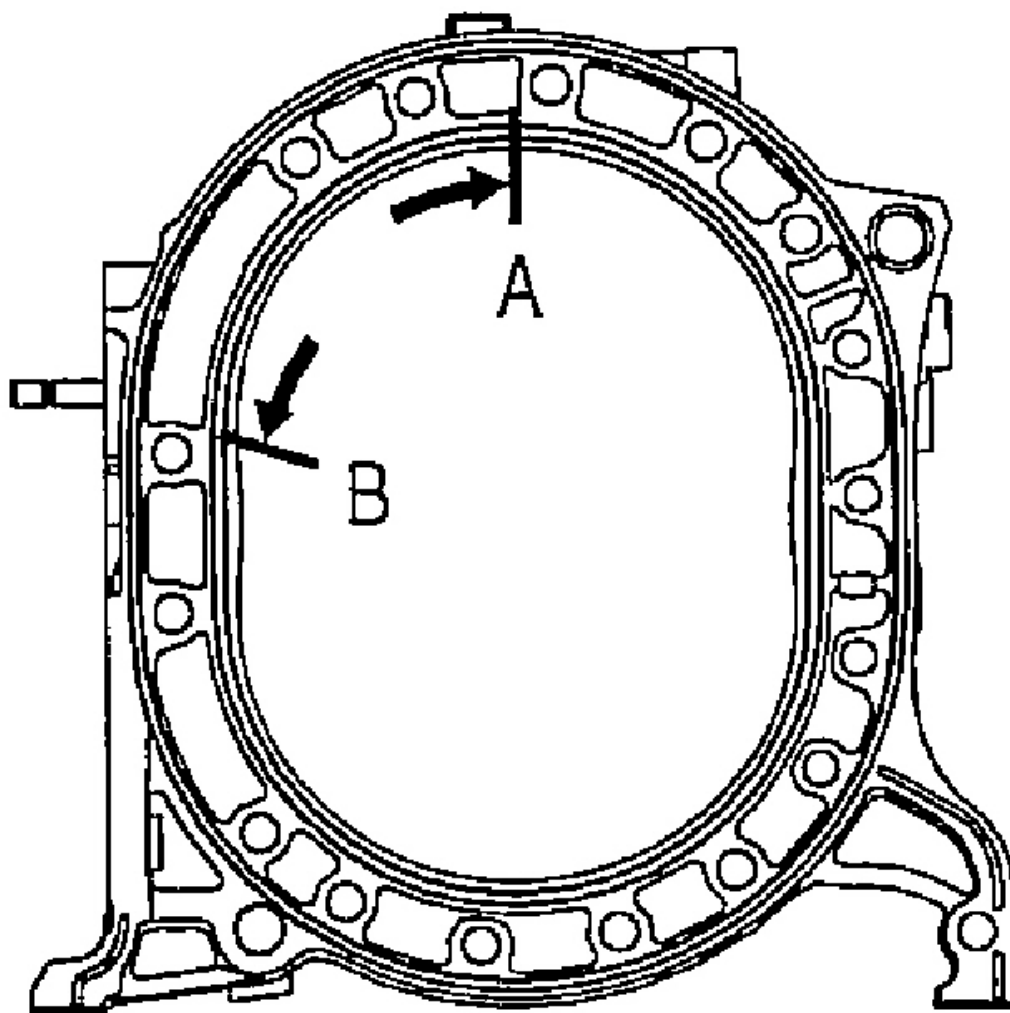
1. Apply petroleum jelly to a new seal rubber.
2. Assemble the outer seal rubber to the housing with the white paint in the direction shown in the figure.



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Fig. 100: Installing Outer Seal Rubber
Courtesy of MAZDA MOTORS CORP.

3. Assemble the inner seal rubber to the housing with the seal rubber joint placed between A-B.



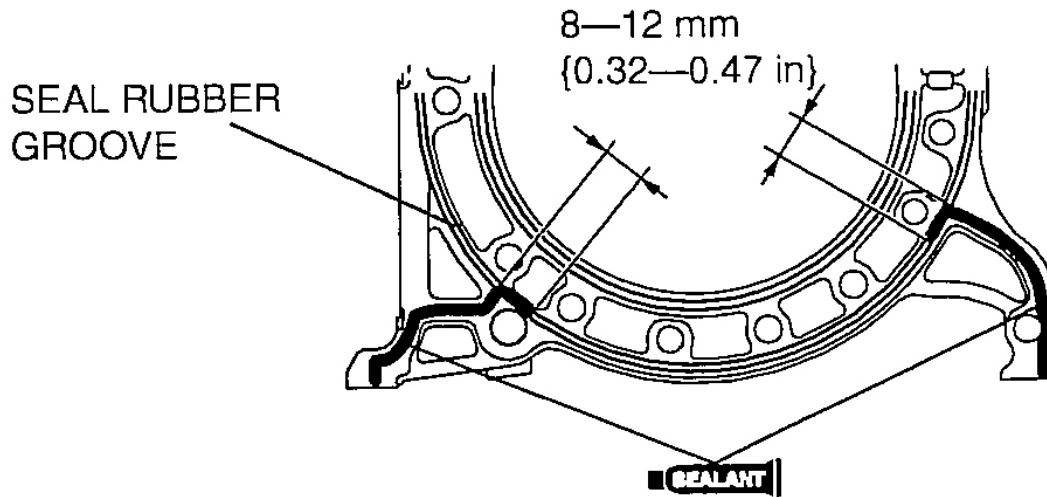
G02831039

Fig. 101: Identifying Points A & B
Courtesy of MAZDA MOTORS CORP.

4. Apply the silicone sealant to the position indicated in the figure.

Bead Thickness

2.5-6.5 mm {0.099-0.255 in}



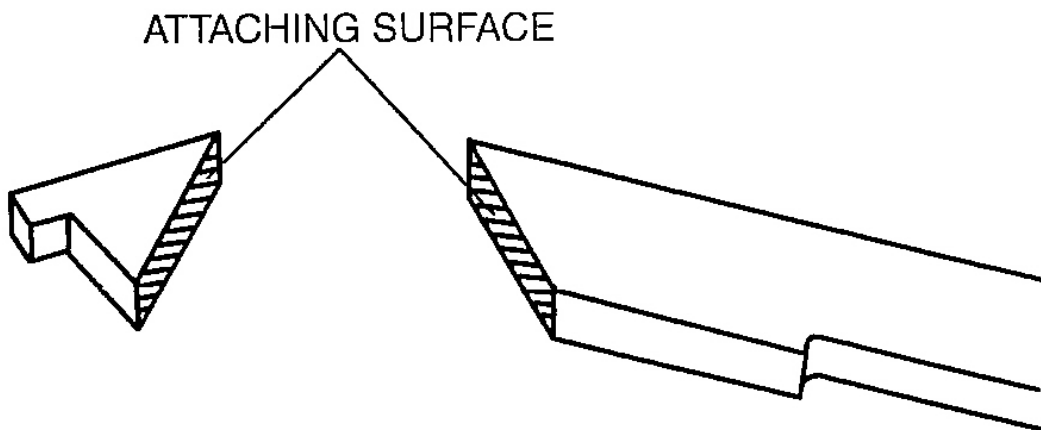
G02831040

Fig. 102: Applying Silicone Sealant
Courtesy of MAZDA MOTORS CORP.

5. Apply thread locking compound to the attaching surface of the apex seal and the side piece and affix them.

CAUTION:

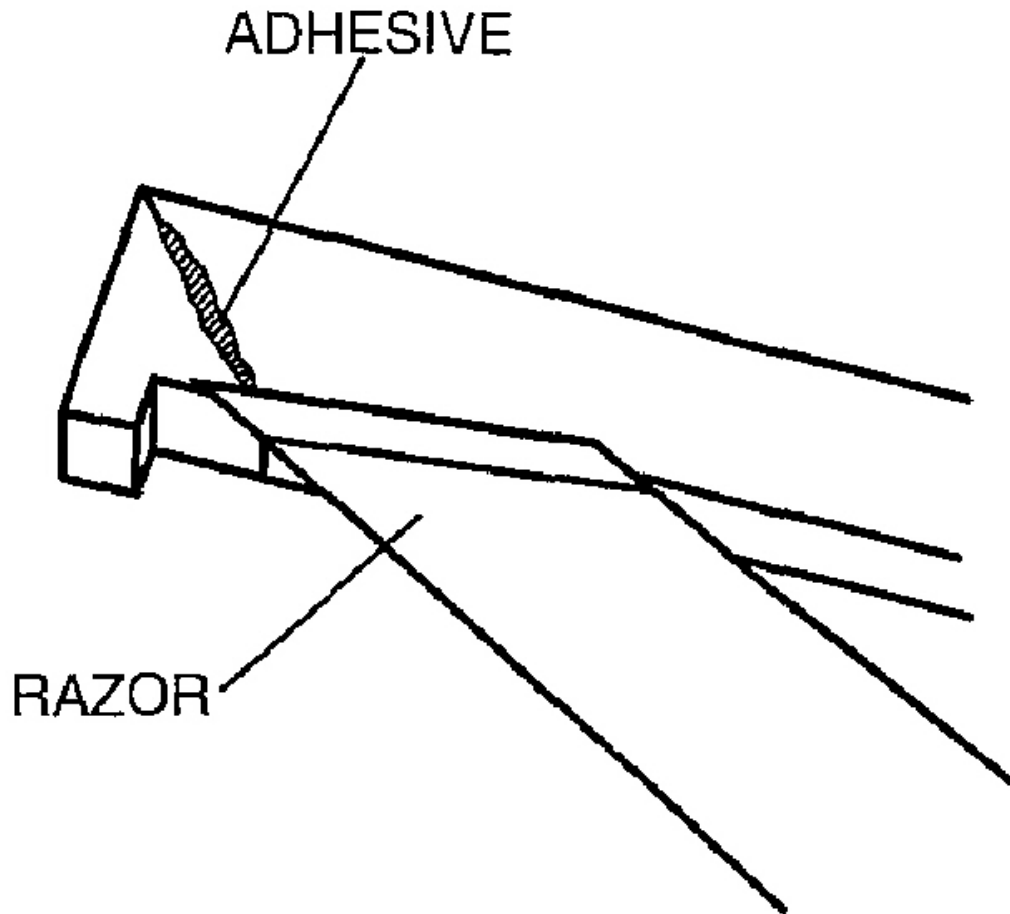
- After adhesion, make sure that there is no gap between the apex seal and side piece.



G02831041

Fig. 103: Identifying Attaching Surface
Courtesy of MAZDA MOTORS CORP.

- If adhesive protrudes, remove with a razor.



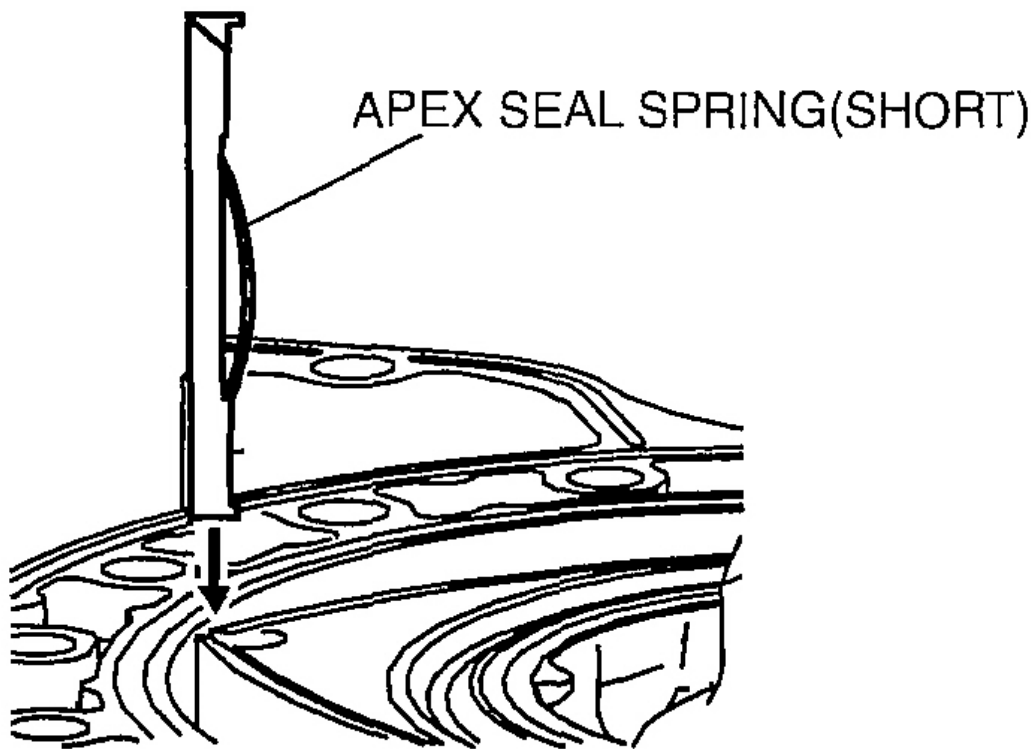
G02831042

Fig. 104: Removing Excess Adhesive
Courtesy of MAZDA MOTORS CORP.

NOTE:

- When using a new apex seal, the procedure above is not needed.

6. Assemble the apex seal and apex seal spring (short) together with the side piece to the engine rear side.

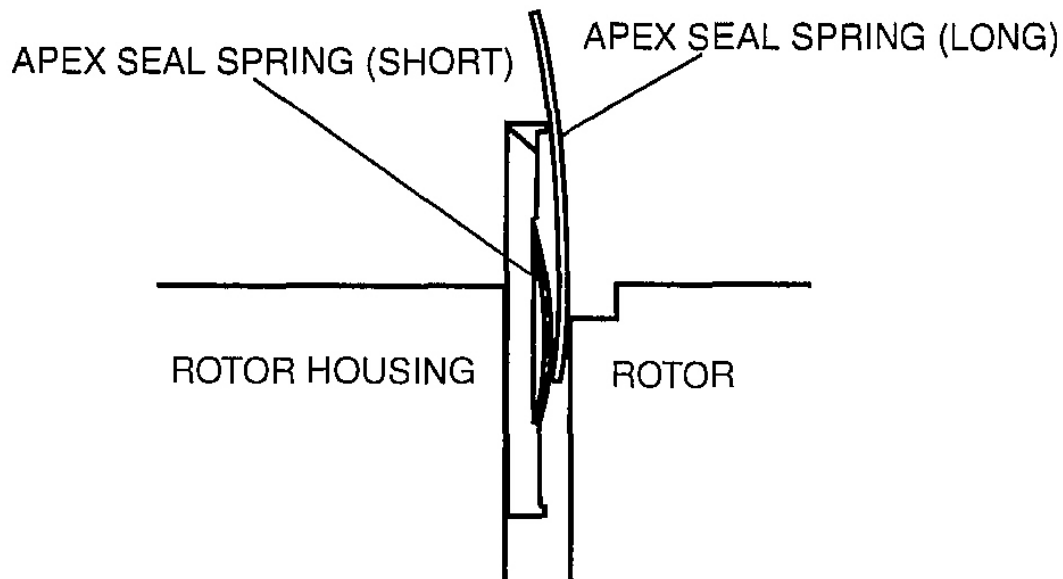


G02831043

Fig. 105: Installing Apex Seal & Apex Seal Spring (Short)
Courtesy of MAZDA MOTORS CORP.

CAUTION:

- Assemble the apex seal spring until it catches the spring stopper of the side piece.



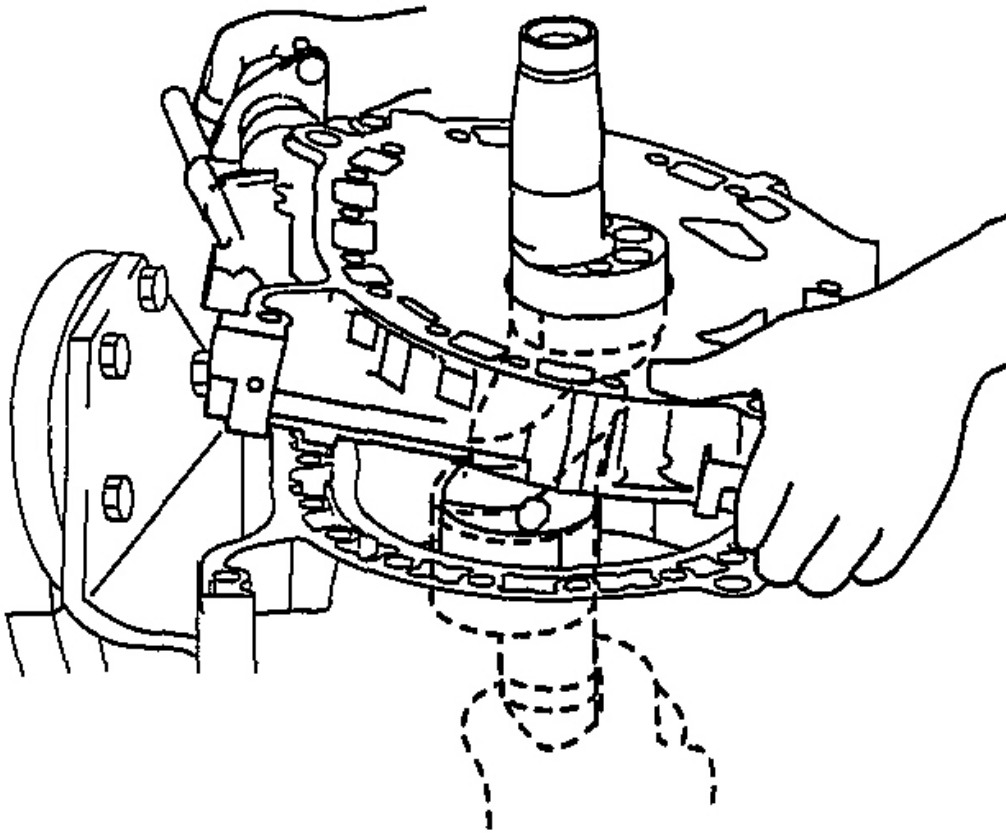
G02831044

Fig. 106: Installing Apex Seal Spring (Long)
Courtesy of MAZDA MOTORS CORP.

7. Assemble the apex seal spring (long) while pressing the apex seal spring (short).

INTERMEDIATE HOUSING ASSEMBLY NOTE

1. Assemble the intermediate housing with the support of an assistant pushing the eccentric shaft up **approx. 3 cm {1.18 in}** .



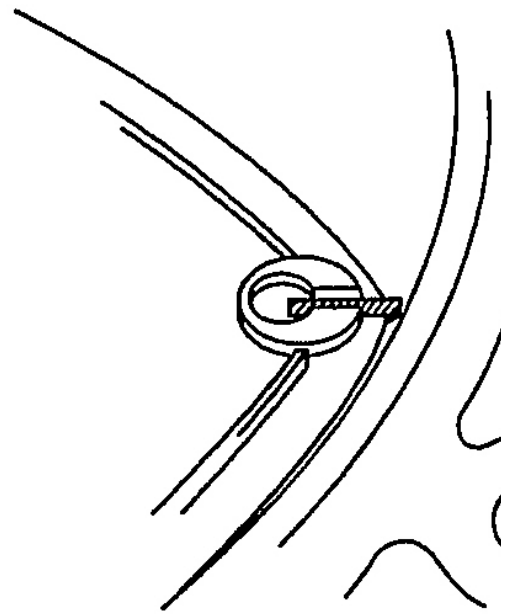
G02831045

Fig. 107: Installing Intermediate Housing
Courtesy of MAZDA MOTORS CORP.

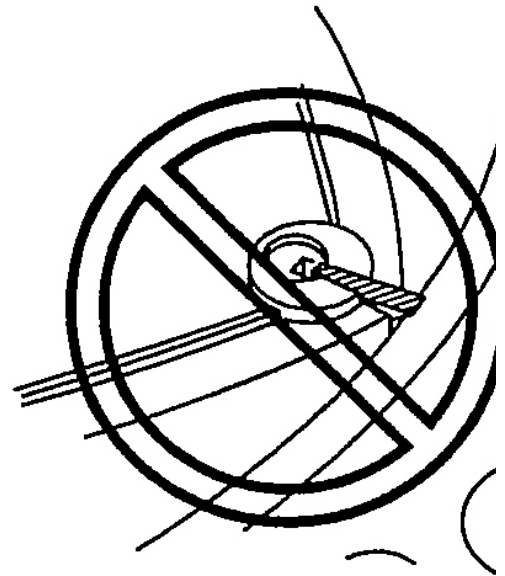
CAUTION:

- Do not allow the side piece to be caught between the rotor housing and intermediate housing.

GOOD



NO GOOD

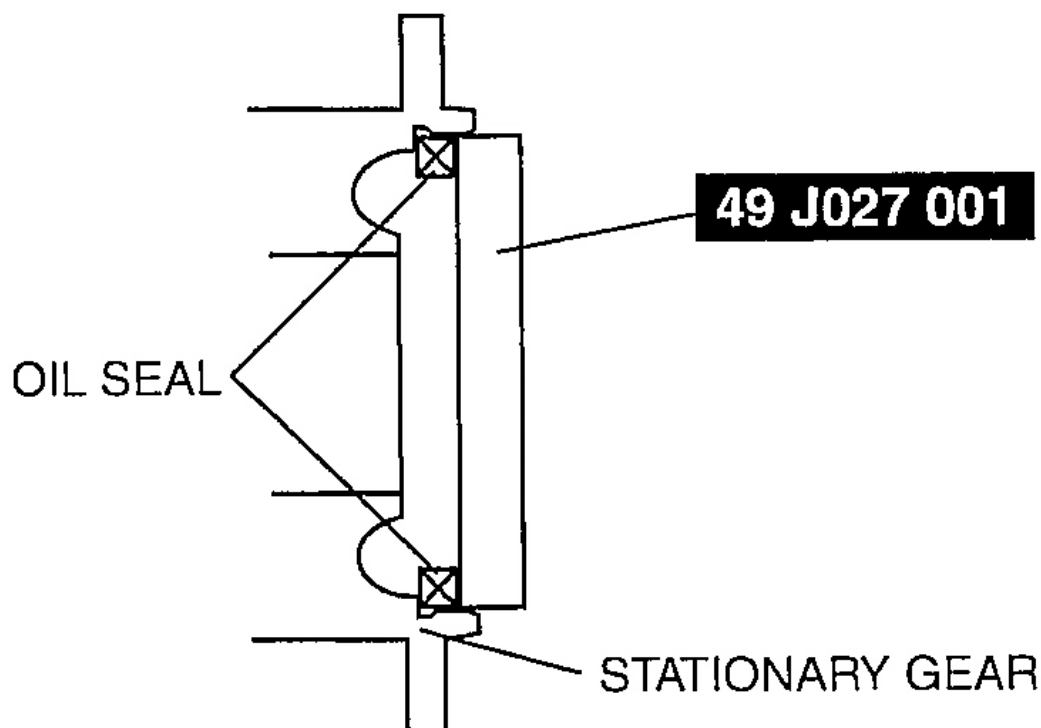


G02831046

Fig. 108: Proper Side Piece Installation
Courtesy of MAZDA MOTORS CORP.

REAR OIL SEAL ASSEMBLY NOTE

CAUTION: • Insert the rear oil seal until it reaches the seating face.



G02831047

Fig. 109: Installing Oil Seal

Courtesy of MAZDA MOTORS CORP.

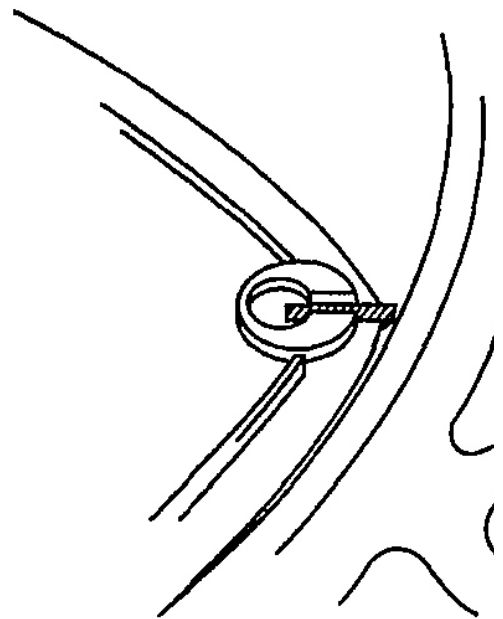
1. Assemble the oil seal using the SST .

REAR HOUSING ASSEMBLY NOTE

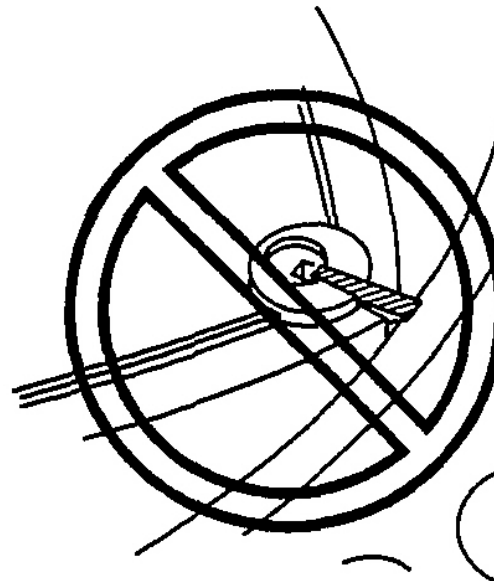
1. Assemble the rear housing with the rear stationary gear and the internal gear of the rotor engaged.

CAUTION: • Do not allow the side piece to be caught between the rotor housing and rear housing.

GOOD



NO GOOD



G02831048

Fig. 110: Proper Side Piece Installation
Courtesy of MAZDA MOTORS CORP.

TENSION BOLT ASSEMBLY NOTE

1. Apply engine oil to the tension bolt threads and assemble to the housing with a new seal washer.

CAUTION:

- Assemble a tension bolt which has a seal washer with the rubber projection facing the housing side.

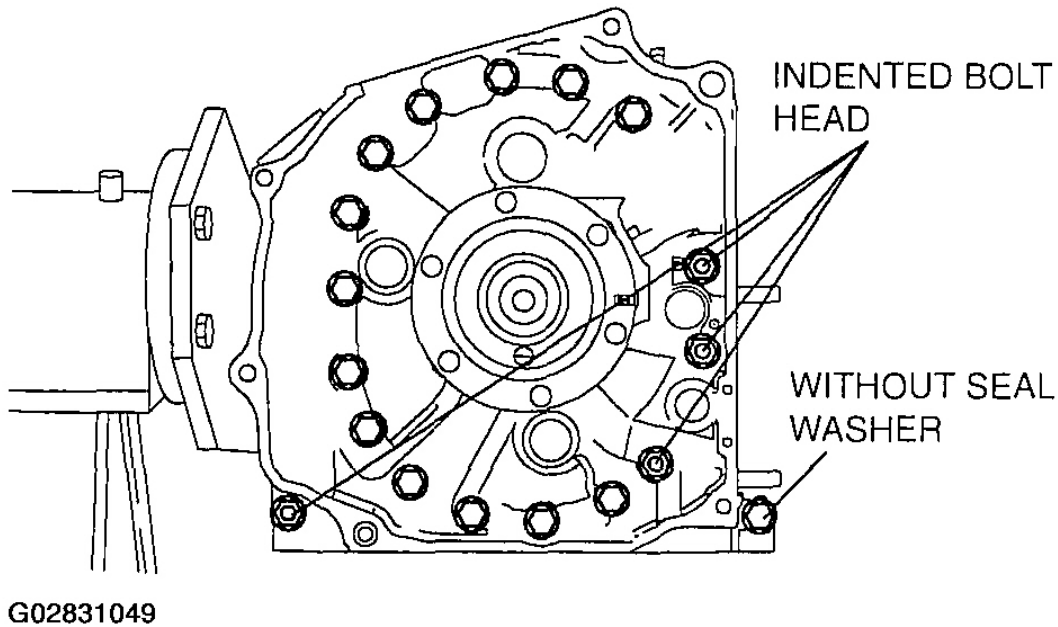
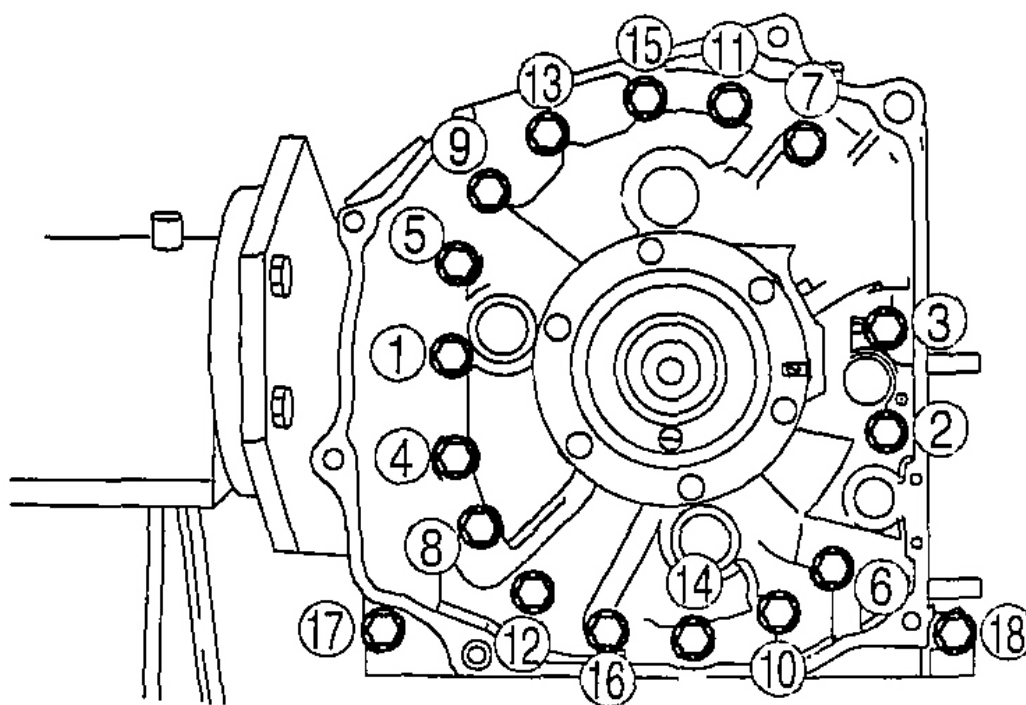


Fig. 111: Identifying Tension Bolt Installation Positions
Courtesy of MAZDA MOTORS CORP.

2. Tighten the tension bolts in the order indicated in the figure in 2-3 passes.

Tightening Torque

31.4-39.2 N.m {3.21-3.99 kgf.m, 23.2-28.9 ft.lbf}



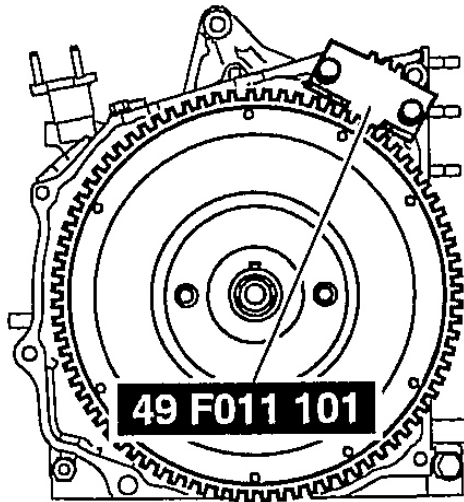
G02831050

Fig. 112: Tension Bolt Tightening Sequence
 Courtesy of MAZDA MOTORS CORP.

FLYWHEEL (MT), COUNTERWEIGHT (AT) ASSEMBLY NOTE

1. Lock the flywheel (MT) or counterweight (AT) against rotation using the SSTs .

MT



G02831051

AT

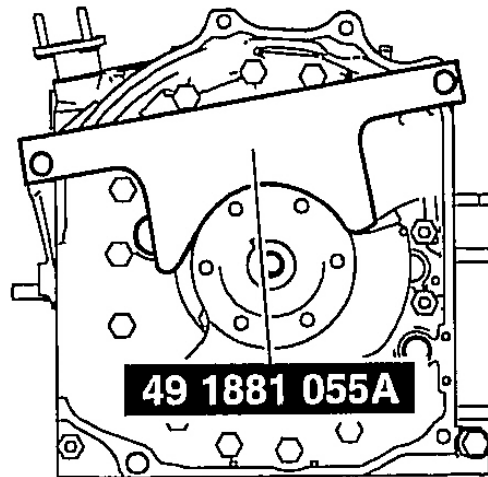
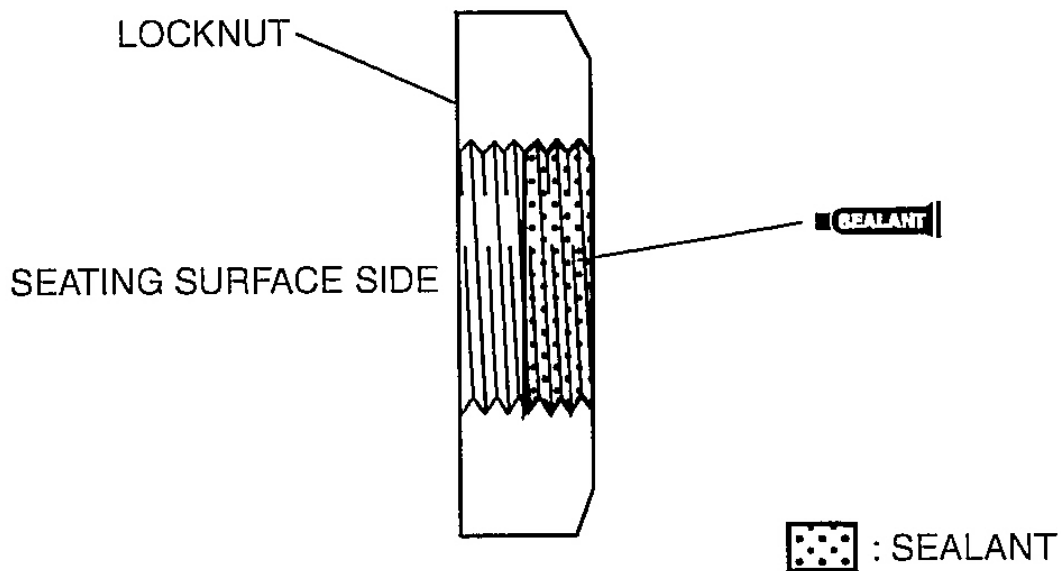


Fig. 113: Locking Flywheel/Counterweight
Courtesy of MAZDA MOTORS CORP.

2. Apply silicone sealant to the locknut threads.



G02831052

Fig. 114: Applying Silicone Sealant To Locknut
Courtesy of MAZDA MOTORS CORP.

3. Tighten the locknut using the SST .

Tightening Torque

392-490 N.m {40.0-49.9 kgf.m, 290-361 ft.lbf}

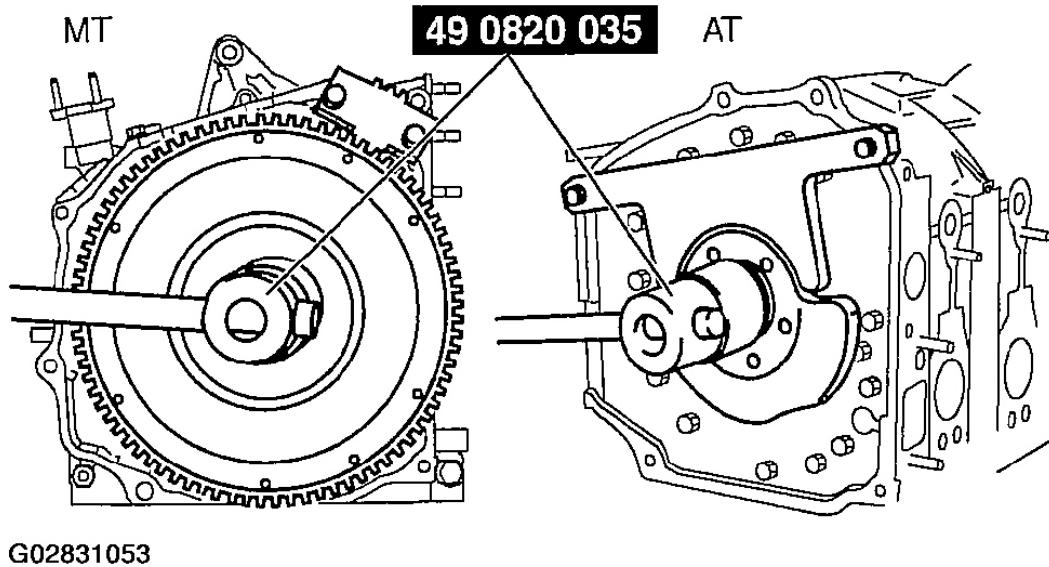
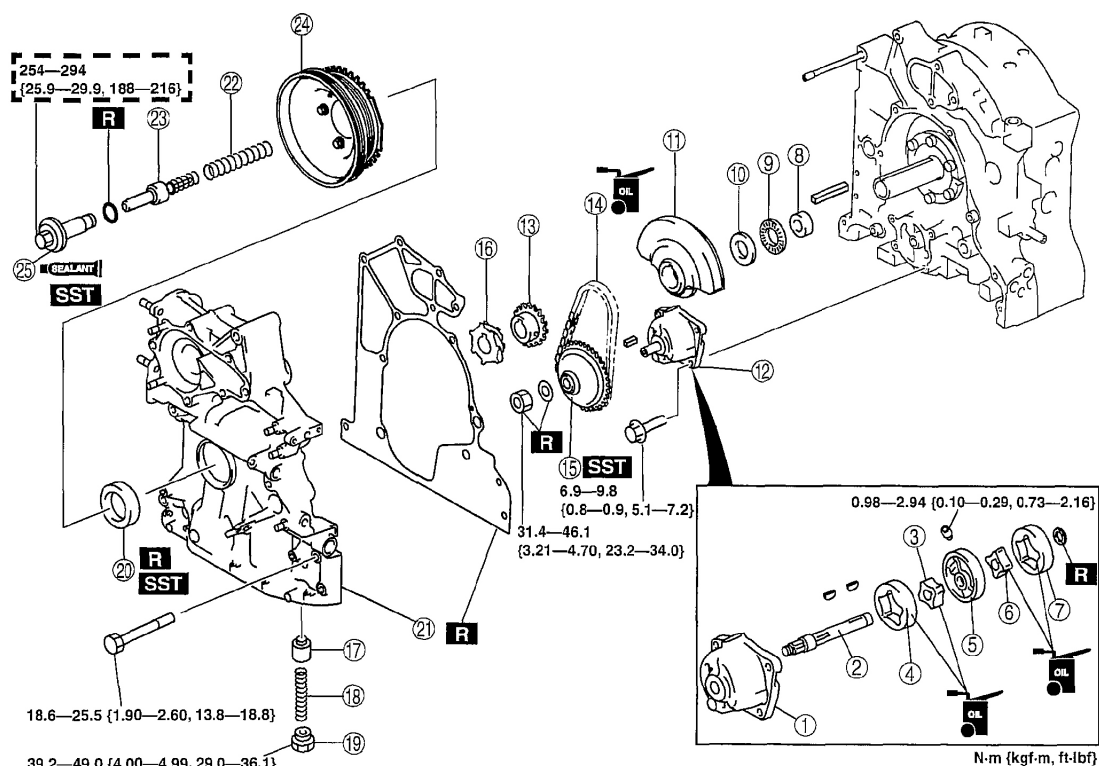


Fig. 115: Tightening Locknut
Courtesy of MAZDA MOTORS CORP.

HOUSING ASSEMBLY II

1. Assemble in the order indicated in the figure.



1	Oil pump body
2	Shaft
3	Front inner rotor
4	Front outer rotor
5	Middle plate
6	Rear inner rotor
7	Rear outer rotor
8	Spacer (See Spacer Assembly Note.)
9	Needle bearing
10	Thrust plate
11	Balance weight
12	Oil pump component
13	Oil pump drive gear (See Oil Pump Drive Gear Assembly Note.)
14	Oil pump chain

15	Oil pump sprocket wheel (See Oil Pump Sprocket Wheel Assembly Note.)
16	Metering oil pump drive gear
17	Control valve
18	Control valve spring
19	Plug
20	Front oil seal (See Front Oil Seal Assembly Note.)
21	Front cover (See Front Cover Assembly Note.)
22	Spring
23	Eccentric shaft bypass valve
24	Pulley component
25	Pulley lockbolt (See Pulley Lockbolt Assembly Note.)

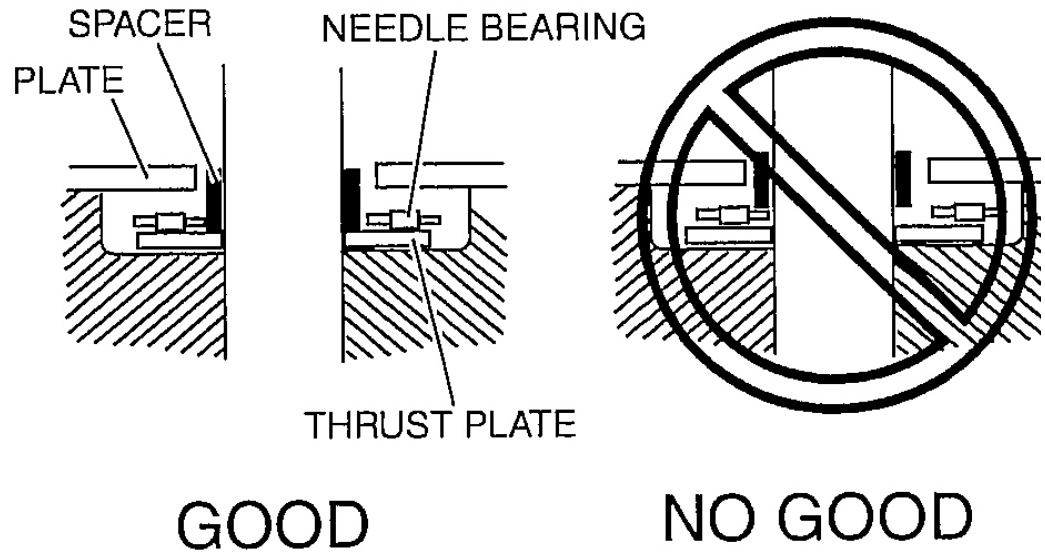
G02831054

Fig. 116: Assembling Housing (II)
Courtesy of MAZDA MOTORS CORP.

SPACER ASSEMBLY NOTE

CAUTION:

- When assembling the spacer, do not allow the spacer to be caught in the needle bearing of the plate.



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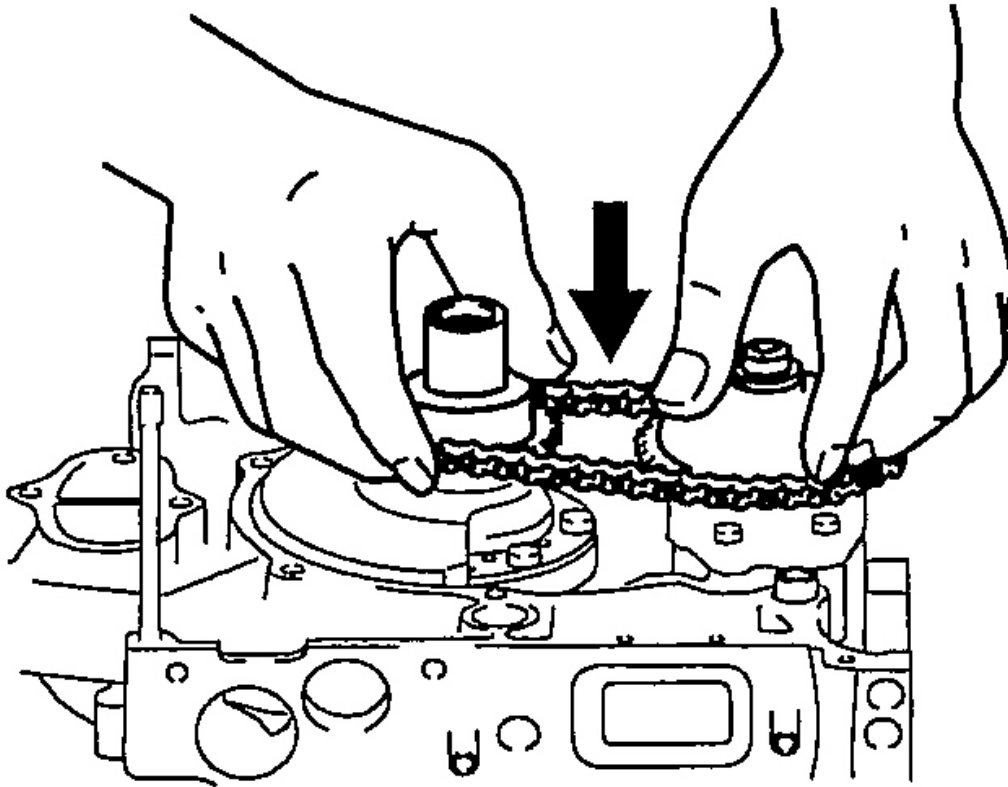
Fig. 117: Proper Spacer Installation
Courtesy of MAZDA MOTORS CORP.

NOTE:

- Perform eccentric shaft end play inspection. (See ECCENTRIC SHAFT END PLAY INSPECTION.)

OIL PUMP DRIVE GEAR ASSEMBLY NOTE

1. Assemble the oil pump drive gear or oil pump sprocket wheel with the oil pump chain engaged.



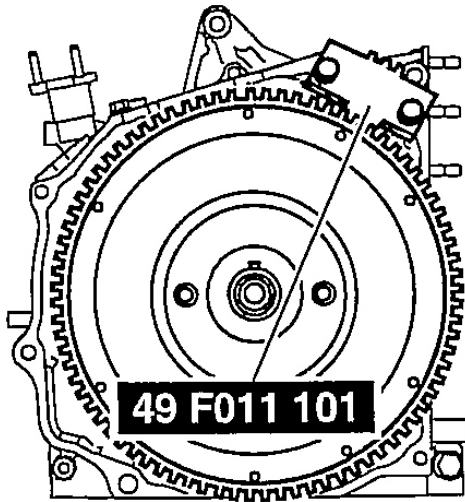
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Fig. 118: Installing Oil Pump Drive Gear Or Oil Pump Sprocket Wheel With Oil Pump Chain
Courtesy of MAZDA MOTORS CORP.

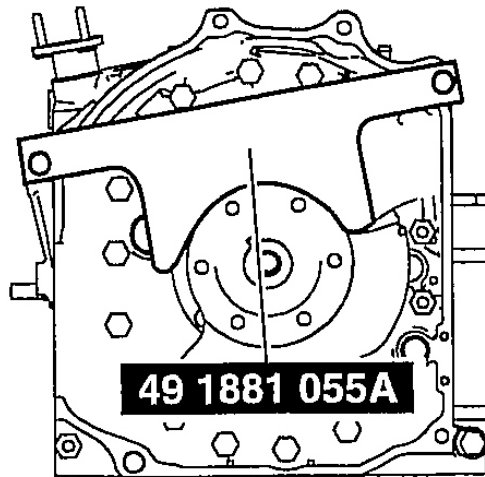
OIL PUMP SPROCKET WHEEL ASSEMBLY NOTE

1. Lock the flywheel (MT) and counterweight (AT) against rotation using the SSTs .

MT



AT



G02831057

Fig. 119: Locking Flywheel/Counterweight
Courtesy of MAZDA MOTORS CORP.

2. Assemble the oil pump shaft with a new lock washer and locknut, and tighten.

Tightening Torque

31.4-46.1 N.m {3.21-4.70 kgf.m, 23.2-34.0 ft.lbf}

3. Bend the lock washer and crimp.

FRONT OIL SEAL ASSEMBLY NOTE

1. Press the oil seal in using the SST .

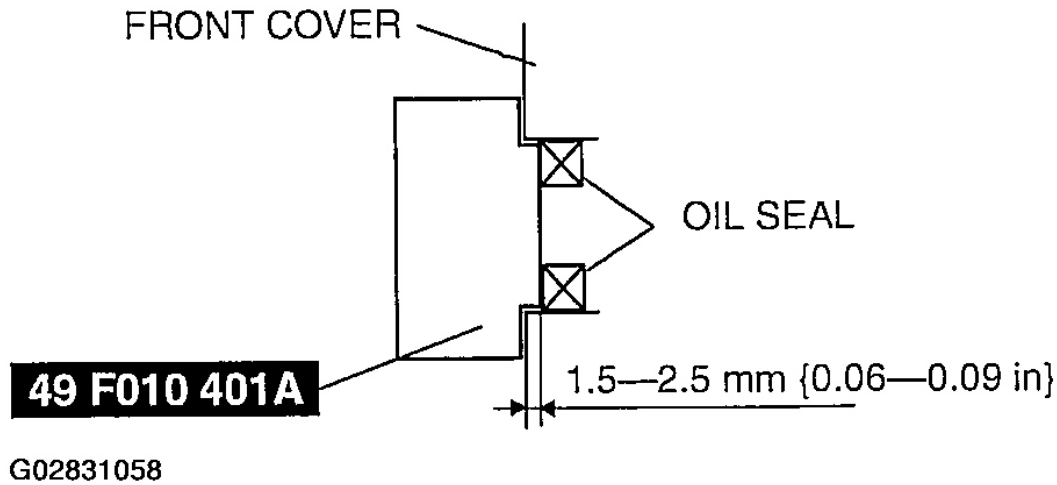


Fig. 120: Installing Oil Seal

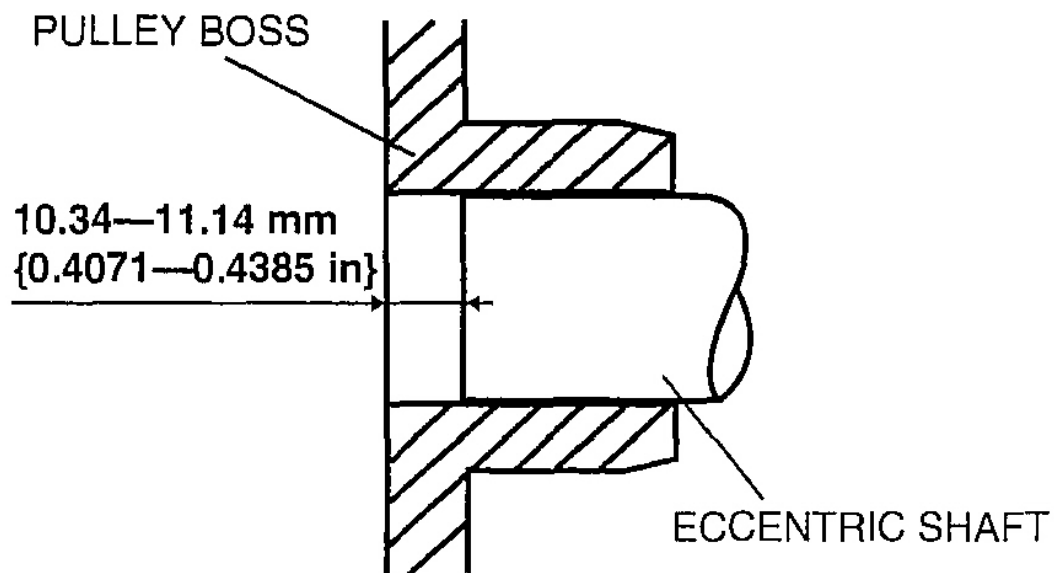
Courtesy of MAZDA MOTORS CORP.

FRONT COVER ASSEMBLY NOTE

1. Before installing the front cover, install the pulley boss to the eccentric shaft and measure the height between the eccentric shaft top and the pulley boss.
 - If not within the specification, verify that the spacer is not caught in the needle bearing.

Standard

10.34-11.14 mm {0.4071-0.4385 in}



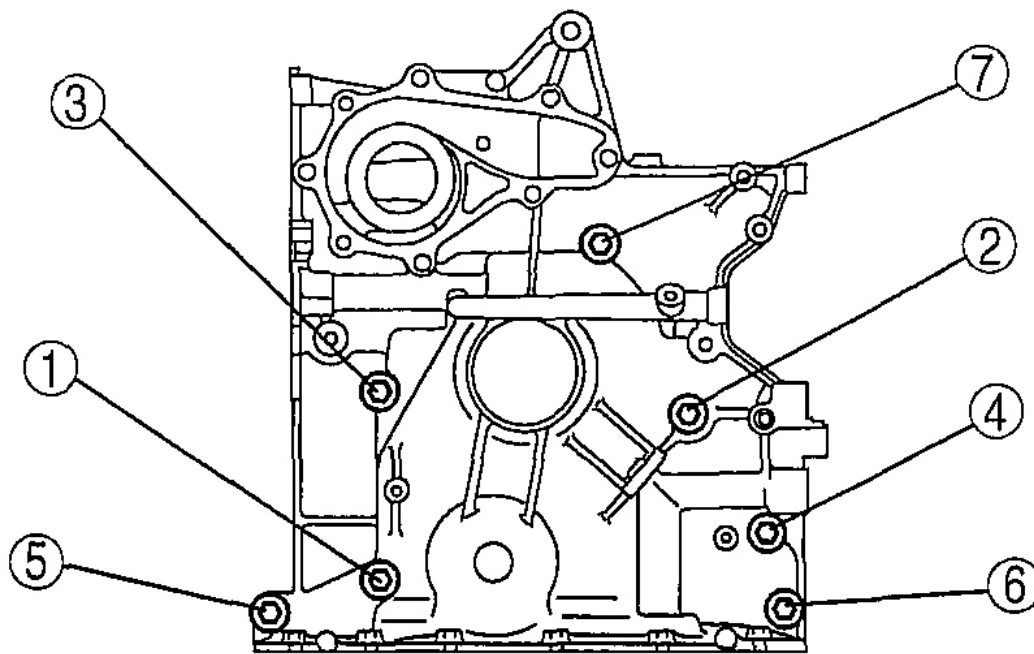
G02831059

Fig. 121: Measuring Height Between Eccentric Shaft Top & Pulley Boss
Courtesy of MAZDA MOTORS CORP.

2. Tighten the engine front cover installation bolts in the order shown in the figure.

Tightening Torque

18.6-25.5 N.m {1.90-2.60 kgf.m, 13.8-18.8 ft.lbf}



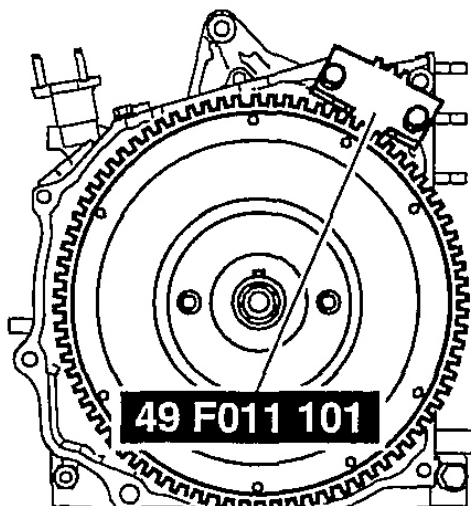
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Fig. 122: Engine Front Cover Bolt Tightening Sequence
 Courtesy of MAZDA MOTORS CORP.

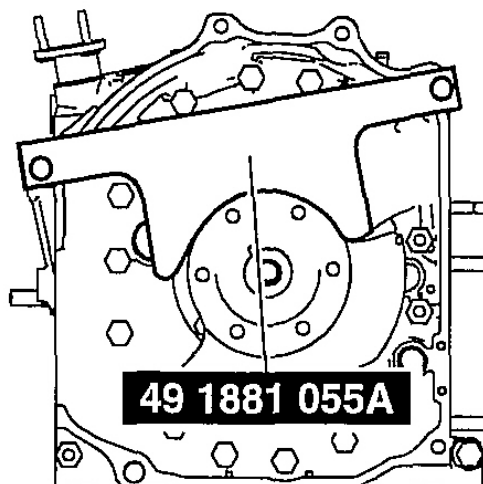
PULLEY LOCKBOLT ASSEMBLY NOTE

1. Lock the flywheel (MT) or counterweight (AT) against rotation using the SSTs .

MT



AT



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Fig. 123: Locking Flywheel/Counterweight
Courtesy of MAZDA MOTORS CORP.

2. Apply engine oil to the pulley lockbolt threads.
3. Assemble a new O-ring.
4. Apply silicone sealant to the seating face.

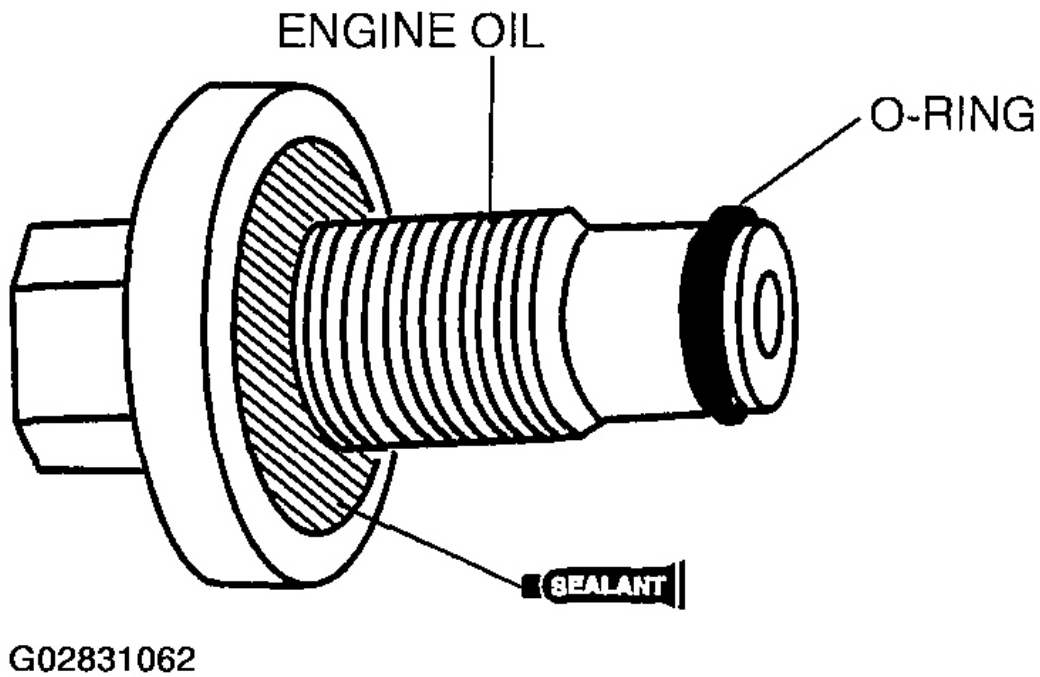


Fig. 124: Applying Silicone Sealant To Seating Face
Courtesy of MAZDA MOTORS CORP.

5. Tighten the pulley lockbolt.

Tightening Torque

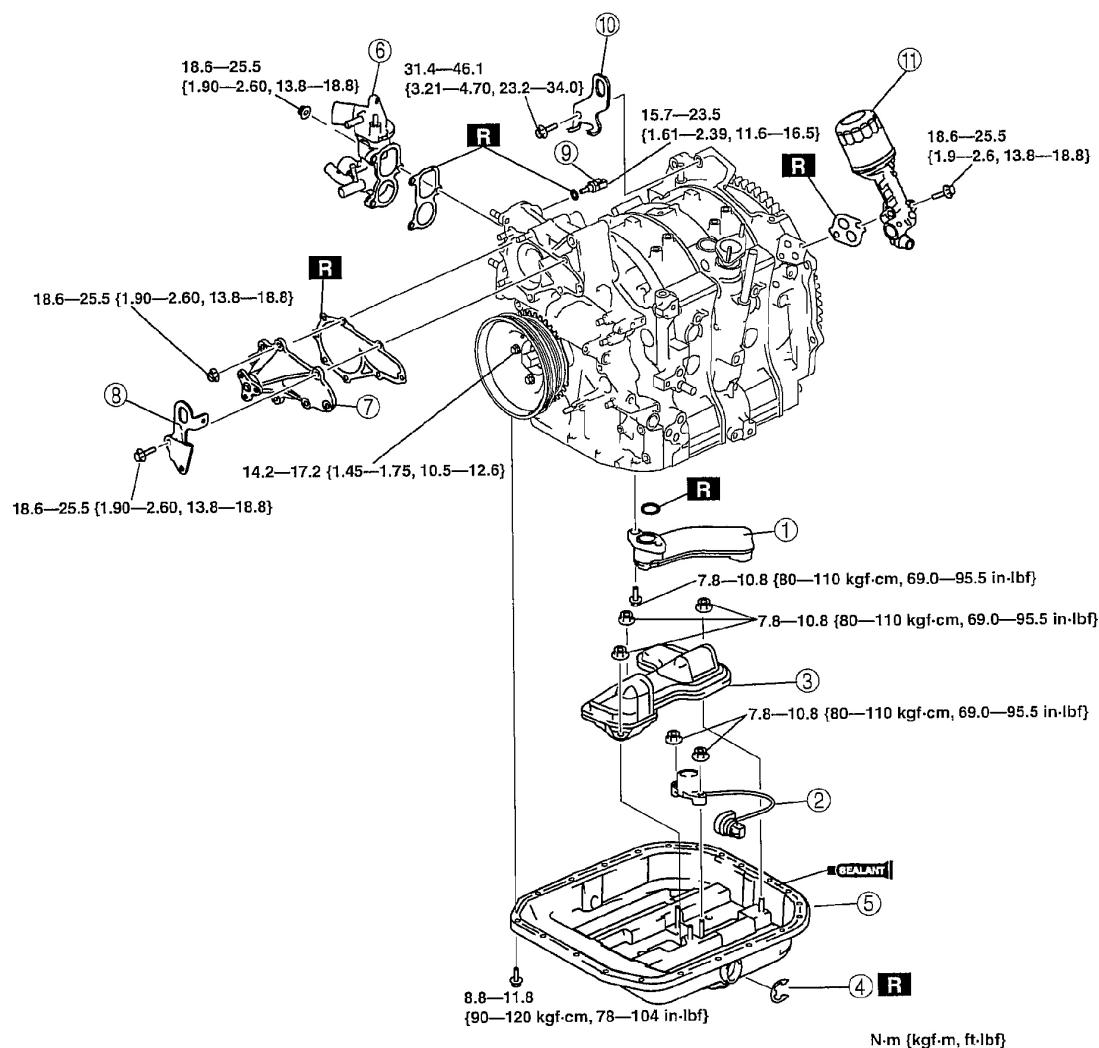
254-294 N.m {25.9-29.9 kgf.m, 188-215 ft.lbf}

HOUSING ASSEMBLY III

1. Assemble in the order indicated in the figure.

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1	Oil strainer
2	Oil-level sensor
3	Oil baffle plate
4	Clip
5	Oil pan (See Oil Pan Assembly Note.)

6	Thermostat component
7	Water pump body
8	Engine hanger (engine front side)
9	Engine coolant temperature sensor
10	Engine hanger (engine rear side)
11	Oil filter component

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Fig. 125: Assembling Housing (III)
Courtesy of MAZDA MOTORS CORP.

OIL PAN ASSEMBLY NOTE

CAUTION:

- Using bolts with the oil sealant still adhering could cause cracks in the housing. Clean all sealant off all oil pan bolts before assembly.

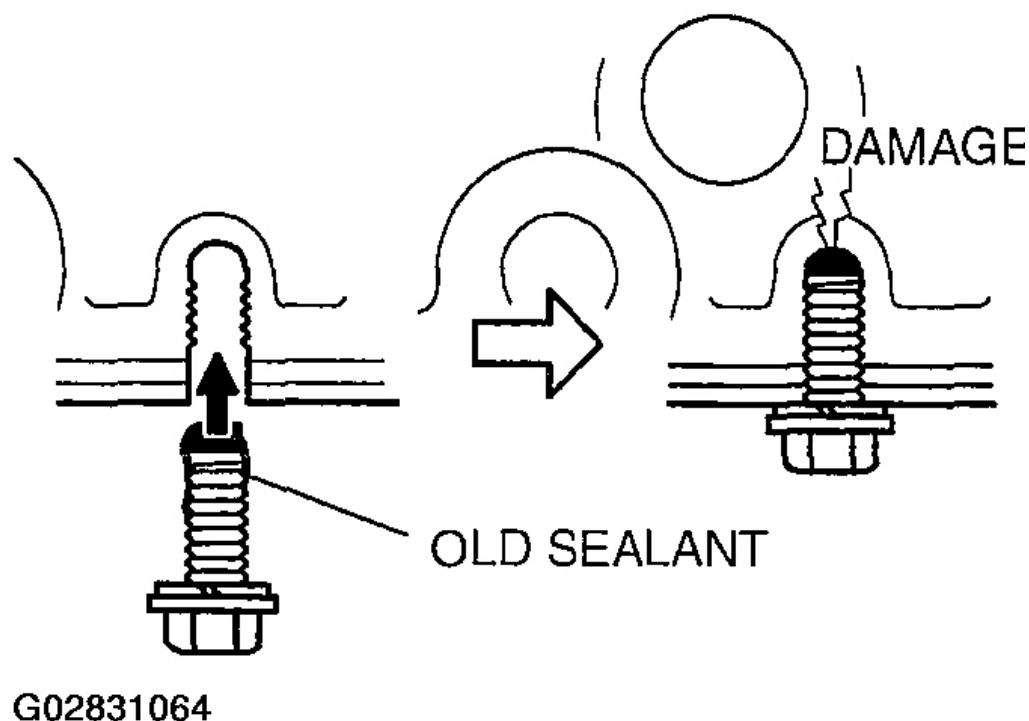
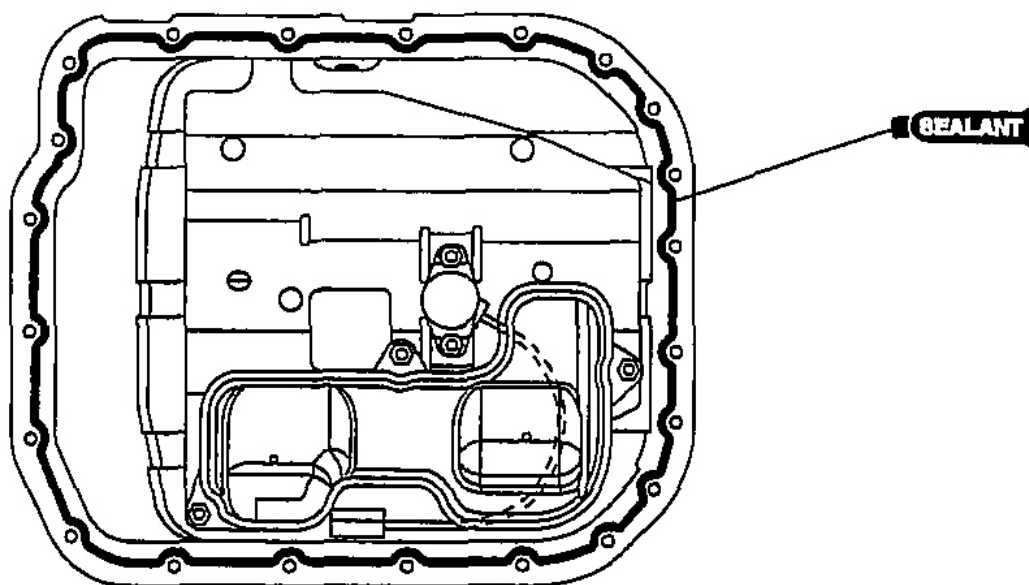


Fig. 126: Possible Old Sealant Damage
Courtesy of MAZDA MOTORS CORP.

- Apply the silicon sealant in a single, unbroken line around the whole perimeter.
 - Install the engine front cover within 5 min after applying the silicone sealant.
1. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the housing and oil pan.
 2. When reusing oil pan installation bolts, clean any old sealant from the bolts.
 3. Apply silicone sealant to the areas shown in the figure.

Bead Thickness

2.5-6.5 mm {0.1-0.2 in}



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Fig. 127: Applying Silicone Sealant
Courtesy of MAZDA MOTORS CORP.

4. Tighten the oil pan installation bolts.

Tightening Torque

8.8-11.8 N.m {90-120 kgf.cm, 78-104 in.lbf}

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

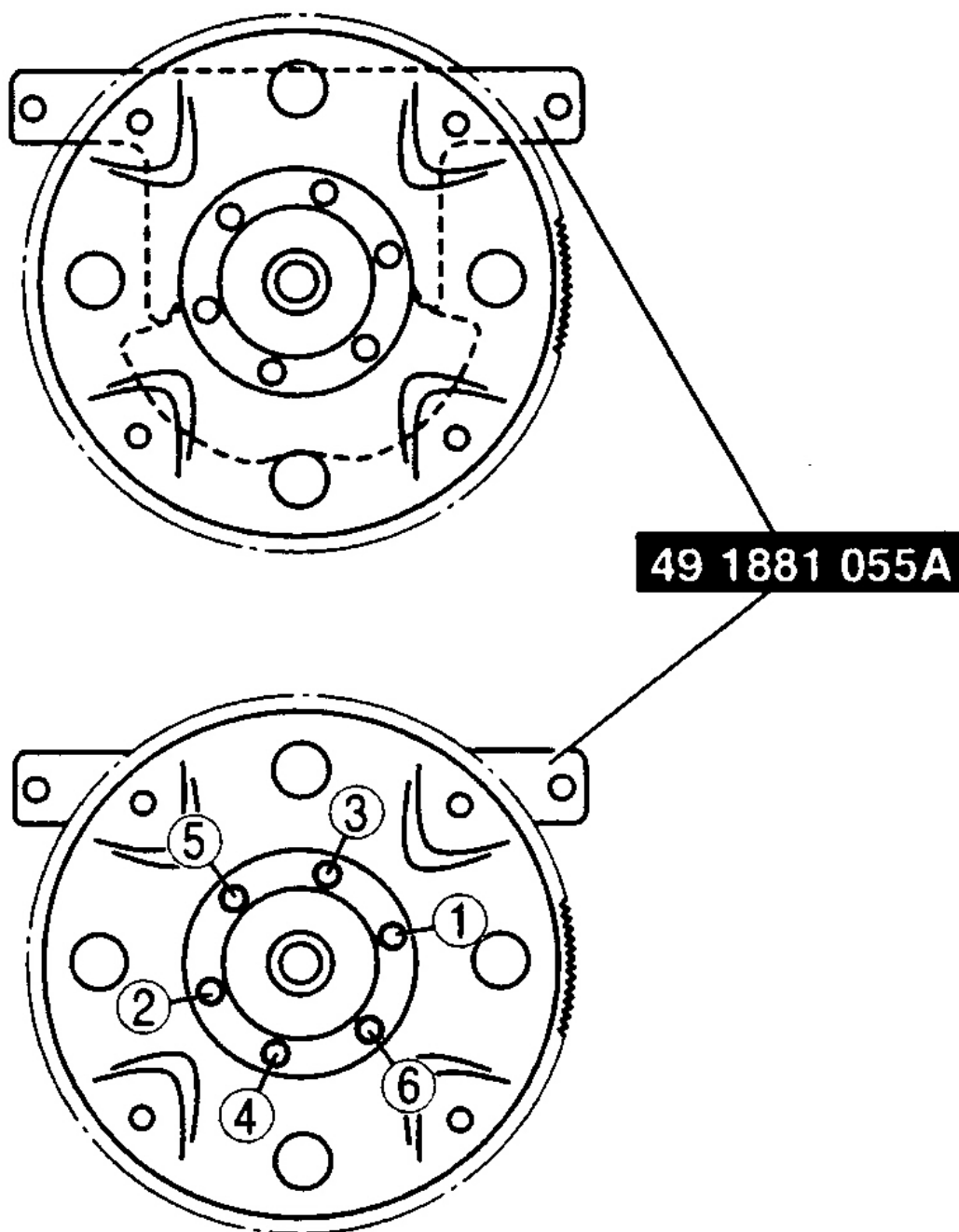
Application	Specification - Ft. Lbs. (N.m)
Control Valve Plug	29-36.1 (39.2-49)
Drive Belt Pulley-To-Crankshaft Bolt	10.5-12.6 (14.2-17.2)
Drive Plate/Flywheel Bolts (A/T)	⁽¹⁾ 30.4-45.5 (41.2-61.8)
Drive Plate/Flywheel Lock Nut	290-361 (392-490)
Engine Coolant Temperature Sensor	11.6-16.5 (15.7-23.5)
Engine Front Cover Bolt	13.8-18.8 (18.6-25.5)
Engine Hanger Bolt (Front)	13.8-18.8 (18.6-25.5)
Engine Hanger Bolt (Rear)	23.2-34 (31.4-46.1)
Exhaust Manifold Nuts	31-44 (42-60)

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Front Stationary Gear Plate Bolt	11.6-16.5 (15.7-22.5)
Oil Drain Plug	21.7-28.9 (29.4-39.2)
Oil Filter Adapter Bolt	13.8-18.8 (18.6-25.5)
Oil Pump Shaft Lock Nut	23.2-34.0 (31.4-46.1)
Pressure Regulator	50.6-57.8 (68.6-78.4)
Pulley Lock Bolt	188-215 (254-294)
Rear Stationary Gear Bolt	11.6-16.5 (15.7-22.5)
Thermostat Housing Bolts	13.8-18.8 (18.6-25.5)
Tension Bolt	23.2-28.9 (31.4-39.2)
Water Pump Bolts	13.8-18.8 (18.6-25.5)
INCH Lbs. (N.m)	
Eccentric Shaft Bolt	35-103 (3.9-11.7)
Main Bearing Stopper Screw	29-41 (3.2-4.7)
Oil Baffle Plate Nut	69-95.5 (7.8-10.8)
Oil Jet Plug	35-103 (3.9-11.7)
Oil Level Sensor Switch Nut	69-95.5 (7.8-10.8)
Oil Pan Bolts	78-104 (9-12)
Oil Pump Bolts	5.1-7.2 (6.9-9.8)
Oil Strainer Bolt	69-95.5 (7.8-10.8)
Spark Plug	114-156 (12.8-17.7)
Water Pump Pulley Bolts	69.1-95.5 (7.8-10.8)

(1) Tighten in sequence. See **Fig. 128**.



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Fig. 128: Drive Plate Tightening Sequence
Courtesy of MAZDA MOTORS CORP.