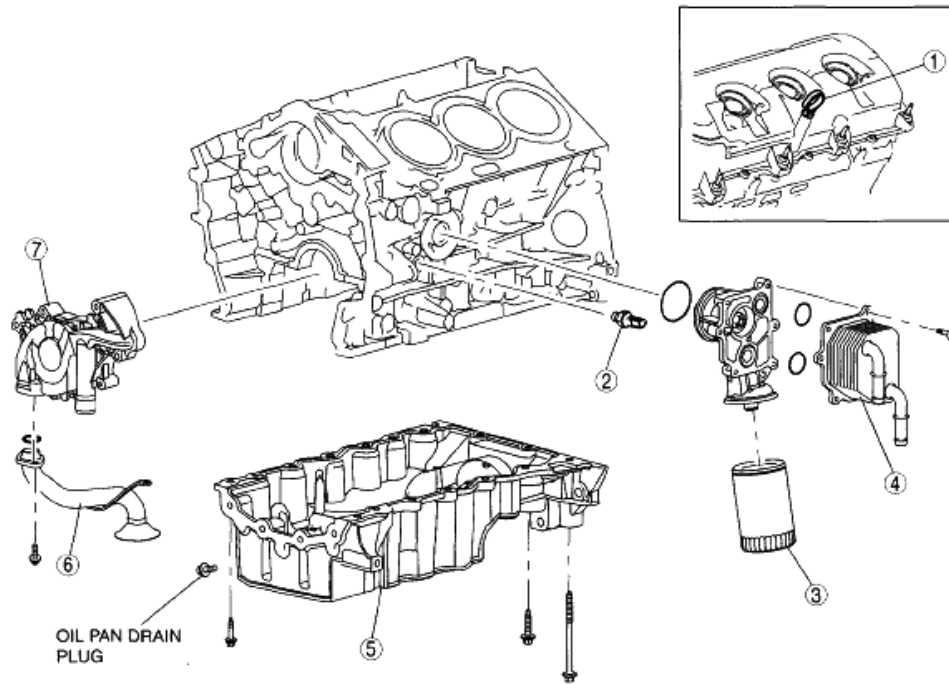


2007 ENGINE

Lubrication (MZI-3.5) - CX-9

LUBRICATION SYSTEM LOCATION INDEX [MZI-3.5]



ac9kuuw0002189

1	Dipstick (See [MZI-3.5].) (See [MZI-3.5].)	ENGINE OIL LEVEL INSPECTION ENGINE OIL REPLACEMENT [MZI-3.5].
2	Oil pressure switch (See [MZI-3.5].)	OIL PRESSURE INSPECTION [MZI-3.5].
3	Oil filter (See [MZI-3.5].)	OIL FILTER REPLACEMENT [MZI-3.5].

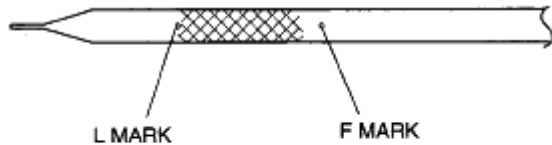
4	Oil cooler (See [MZI-3.5].)	OIL COOLER REMOVAL/ INSTALLATION [MZI-3.5].
5	Oil pan (See [MZI-3.5].)	OIL PAN REMOVAL/INSTALLATION
6	Oil strainer (See [MZI-3.5].)	OIL PAN REMOVAL/INSTALLATION
7	Oil pump (See [MZI-3.5].)	OIL PUMP REMOVAL/ INSTALLATION [MZI-3.5].

Fig. 1: Identifying Lubrication System Components Location
Courtesy of MAZDA MOTORS CORP.

ENGINE OIL LEVEL INSPECTION [MZI-3.5]

1. Position the vehicle on level ground.
2. Warm up the engine.
3. Stop the engine and **allow approx. 5 min** before continuing.
4. Remove the dipstick, wipe it clean, and reinstall it fully.
5. Remove the dipstick and verify that the oil level is between the L and F marks on the dipstick.

- If the oil level is below the L mark, add engine oil.



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Fig. 2: Identifying Engine Oil Level (Dipstick)
Courtesy of MAZDA MOTORS CORP.

ENGINE OIL REPLACEMENT [MZI-3.5]

WARNING:

- Hot engines and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.
- A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.
- Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

CAUTION:

- If engine oil is spilled on the exhaust system, wipe it off completely. If you fail to wipe the spilled engine oil, it will produce fumes because of the heat.

1. Position the vehicle on level ground.
2. Remove the oil filler cap.
3. Remove the oil pan drain plug.
4. Drain the engine oil into a container.
5. Inspect the rubber seal of the oil pan drain plug and make sure there are no cracks, deterioration, or damage.
 - If necessary, replace the oil pan drain plug.
6. Clean the flange surface (seal rubber) on the oil pan drain plug, then install the oil pan drain plug.

Oil pan drain plug tightening torque

27 N.m {2.8 kgf.m, 20 ft.lbf}

2007 Mazda CX-9 Grand Touring

2007 ENGINE Lubrication (MZI-3.5) - CX-9

NOTE:

- The amount of residual oil in the engine can vary according to factors such as the replacement method and oil temperature. Verify the oil level after engine oil replacement.

7. Refill with the following type and amount of the engine oil.

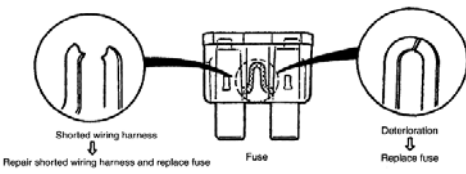


Engine oil capacity (approx. quantity)

Oil replacement: 4.7 L {5.0 US qt, 4.2 Imp qt}

Oil and oil filter replacement: 5.2 L {5.5 US qt, 4.6 Imp qt}

Engine oil specification

ENGINE OIL SPECIFICATION

Item	U.S.A. and CANADA	Except U.S.A. and CANADA
Engine oil grade		 
Engine oil viscosity	5W-20	

8. Install the oil filler cap.
9. Start the engine and confirm that there is no oil leakage.
 - If there is oil leakage, repair or replace the applicable part.
10. Inspect the oil level. (See **ENGINE OIL LEVEL INSPECTION [MZI-3.5]**.)

OIL PRESSURE INSPECTION [MZI-3.5]

WARNING:

- Hot engines and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.
- A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.
- Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

1. Disconnect the negative battery cable.

2. Remove the engine cover.
3. Remove the fan control module No.2 with the connectors still connected (Dual fan control module) (see **FAN MOTOR REMOVAL/INSTALLATION [MZI-3.5]** .)
4. Remove the oil pressure switch.
5. Screw the **SSTs** into the oil pressure switch installation hole.
6. Connect the negative battery cable.
7. Warm up the engine to normal operating temperature.
8. Run the engine at the specified speed, and note the gauge readings.
 - If not within the specification, inspect for the cause and repair or replace if necessary.

NOTE: • **The oil pressure can vary with oil viscosity and temperature.**

Oil pressure (reference value) [oil temperature: 93.3 °C {200 °F}]

310-621 kPa {3.17-6.33 kgf/cm², 45.0-90.0 psi} [2,000 rpm]

9. Stop the engine and wait until it is cool.
10. Disconnect the negative battery cable.
11. Remove the **SSTs**.

CAUTION: • **Be sure there is no sealant adhering to the first two threads from the end of the oil pressure switch to prevent a possible operation malfunction.**

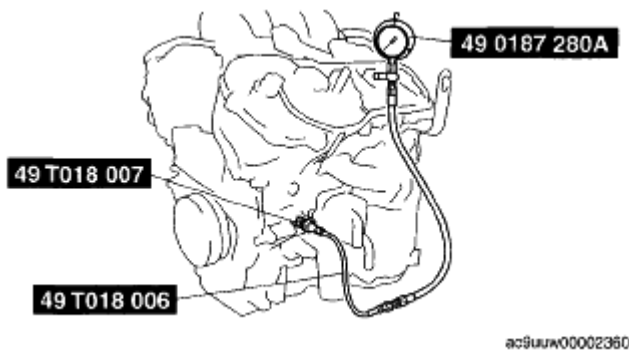


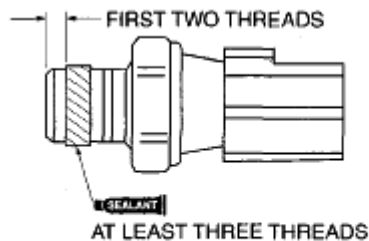
Fig. 3: Connecting Oil Pressure Gauge
Courtesy of MAZDA MOTORS CORP.

12. Apply silicone sealant to the oil pressure switch threads as shown in the figure.
13. Install the oil pressure switch.

Tightening torque

10.7-24.5 N.m {1.1-2.4 kgf.m, 7.9-18.0 ft.lbf}

14. Install the fan control module No.2 (Dual fan control module) (see **FAN MOTOR REMOVAL/INSTALLATION [MZI-3.5]** .)
15. Connect the negative battery cable.
16. Start the engine and confirm that there is no oil leakage.
 - If there is oil leakage, repair or replace the applicable part.
17. Install the engine cover.



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Fig. 4: Applying Silicone Sealant To Oil Pressure Switch Threads
 Courtesy of MAZDA MOTORS CORP.

OIL FILTER REPLACEMENT [MZI-3.5]

WARNING:

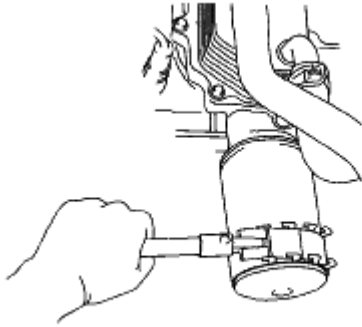
- Hot engines and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.
- A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.
- Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

CAUTION:

- If engine oil is spilled on the exhaust system, wipe it off completely. If you fail to wipe the spilled engine oil, it will produce fumes because of the heat.

1. Remove the oil filter using a oil filter wrench.
2. Use a clean rag to wipe off the mounting surface on the oil filter adapter and the oil filter.
3. Apply clean engine oil to the O-ring of a new oil filter.
4. Install the oil filter until the O-ring contacts the sealing surface.
5. Tighten the oil filter 3/4 turns by hand.

6. Start the engine and confirm that there is no oil leakage.
 - If there is oil leakage, repair or replace the applicable part.
7. Inspect the oil level. (See **ENGINE OIL LEVEL INSPECTION [MZI-3.5]**.)



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Fig. 5: Identifying Oil Filter

Courtesy of MAZDA MOTORS CORP.

OIL COOLER REMOVAL/INSTALLATION [MZI-3.5]

WARNING:

- Hot engines and engine oil can cause severe burns. Turn off the engine and wait until it and the engine oil have cooled.
- A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.
- Continuous exposure to USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (see **ENGINE COOLANT REPLACEMENT [MZI-3.5]** .)
3. Remove the air cleaner and fresh air duct component. (see **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [MZI-3.5]** .)
4. Remove the cooling fan component. (see **FAN MOTOR REMOVAL/INSTALLATION [MZI-3.5]** .)
5. Remove the exhaust manifold insulator (LH). (see **EXHAUST SYSTEM REMOVAL/INSTALLATION [MZI-3.5]** .)
6. Remove in the order indicated in the table.
7. Use a clean rag to wipe off the mounting surface on the oil filter adapter and the oil cooler.
8. Install in the reverse order of the removal.
9. Refill the engine coolant. (see **ENGINE COOLANT REPLACEMENT [MZI-3.5]** .)
10. Start the engine and confirm that there is no oil leakage.

- If there is oil leakage, repair or replace the applicable part.
11. Inspect the oil level. (See **ENGINE OIL LEVEL INSPECTION [MZI-3.5]**.)
 12. Inspect for engine coolant leakage. (see **ENGINE COOLANT LEAKAGE INSPECTION [MZI-3.5]** .)

1	Water hose
2	Oil cooler (See Oil Cooler Installation Note.)
3	O-ring

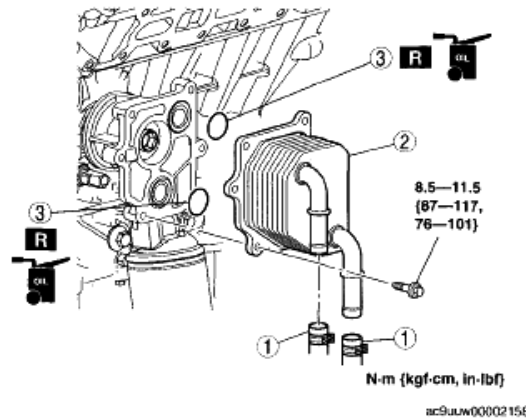
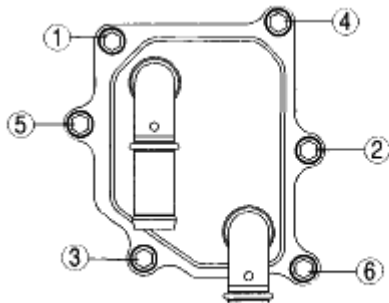


Fig. 6: Identifying Water Hose, Oil Cooler And O-Ring With Torque Specifications
 Courtesy of MAZDA MOTORS CORP.

OIL COOLER INSTALLATION NOTE

1. Tighten the oil cooler bolts in the order shown in the figure.



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Fig. 7: Tightening Oil Cooler Bolts With Tightning Sequence
 Courtesy of MAZDA MOTORS CORP.

OIL PAN REMOVAL/INSTALLATION [MZI-3.5]

WARNING:

- Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.
- Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injures or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedure". (see **BEFORE REPAIR PROCEDURE [MZI-3.5]** .)

2007 Mazda CX-9 Grand Touring

2007 ENGINE Lubrication (MZI-3.5) - CX-9

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

NOTE:

- **The following procedure "OIL PAN REMOVAL/INSTALLATION" is performed after the engine and transaxle component is removed from the vehicle.**

1. Drain the engine oil. (See ENGINE OIL REPLACEMENT [MZI-3.5].)
2. Remove the engine and transaxle component. (see ENGINE REMOVAL/INSTALLATION [MZI-3.5] .)
3. Using a hoist, lower the engine and transaxle component on a level surface.

WARNING:

- **Protect and stabilize the lowered engine and transaxle component with cross ties to prevent injury or damage due to roll over.**

4. Remove the automatic transaxle. (see AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION [AW6A-EL, AW6AX-EL] .)
5. Remove the drive plate. (see DRIVE PLATE REMOVAL/INSTALLATION [AW6A-EL, AW6AX-EL] .)
6. Remove the dynamic chamber and throttle body as a single unit. (see INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [MZI-3.5] .)
7. Remove the ignition coils. (see IGNITION COIL REMOVAL/INSTALLATION [MZI-3.5] .)
8. Remove the dipstick.
9. Remove the power steering oil pump drive belt. (see DRIVE BELT REMOVAL/INSTALLATION [MZI-3.5] .)
10. Remove the power steering oil pump. (see POWER STEERING OIL PUMP REMOVAL/INSTALLATION .)
11. Remove the exhaust manifold (RH). (see EXHAUST SYSTEM REMOVAL/INSTALLATION [MZI-3.5] .)
12. Remove the transfer bracket. (AWD) (see TRANSFER REMOVAL/INSTALLATION .)
13. Install the engine to the SST (engine stand). (See ENGINE MOUNTING/DISMOUNTING.)
14. Remove the engine front cover. (see TIMING CHAIN REMOVAL/INSTALLATION [MZI-3.5] .)
15. Remove in the order indicated in the table.
16. Install in the reverse order of removal.
17. Start the engine and:
 1. Inspect the runout and contact on the pulley and belt.
 2. Inspect for engine oil, engine coolant, ATF, power steering fluid and fuel leakage.
 3. Verify the ignition timing, idle speed and idle mixture. (see ENGINE TUNE-UP [MZI-3.5] .)

4. Engine accessories operation.
18. Perform a road test.

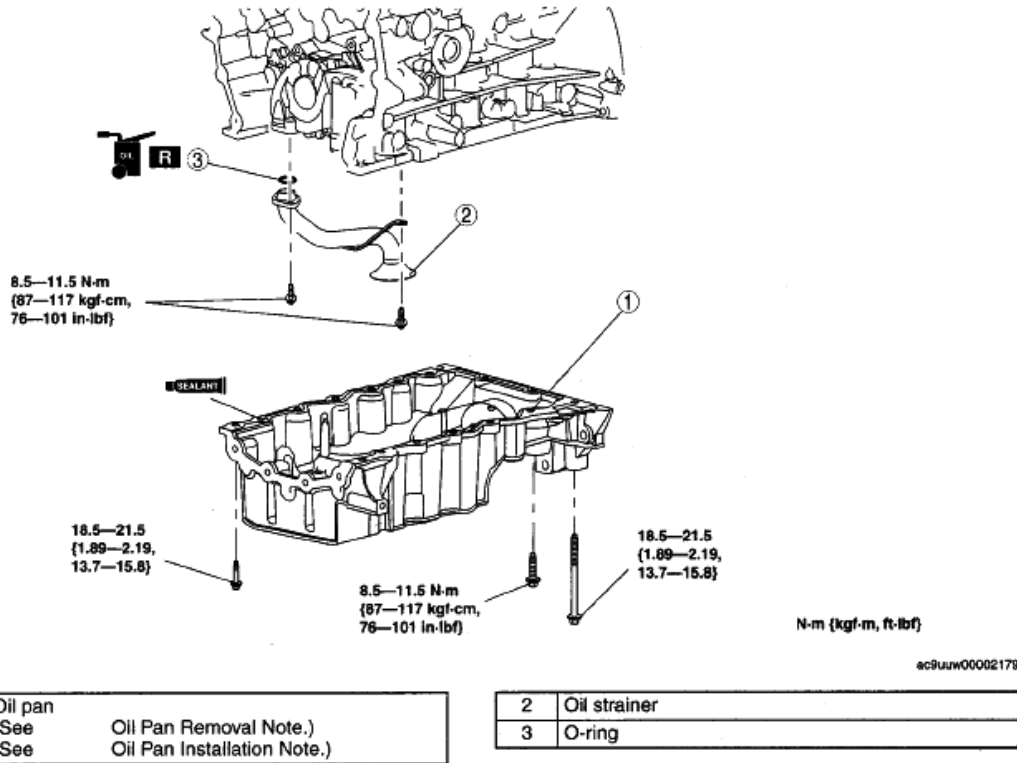


Fig. 8: Identifying Oil Pan Components With Torque Specification
 Courtesy of MAZDA MOTORS CORP.

ENGINE MOUNTING/DISMOUNTING

Mounting

1. Remove the WU-TWC (RH) bracket. (AWD)

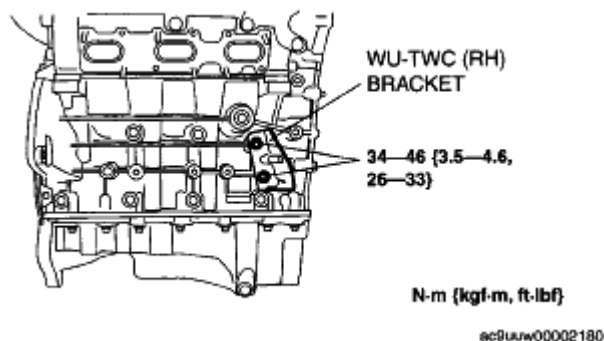


Fig. 9: Identifying WU-TWC (RH) Bracket With Torque Specifications
 Courtesy of MAZDA MOTORS CORP.

2. Install the SSTs (arms) to the cylinder block four holes as shown in the figure, and hand-tighten the bolts (M10 x 1.5T length 90 mm {3.55 in}).

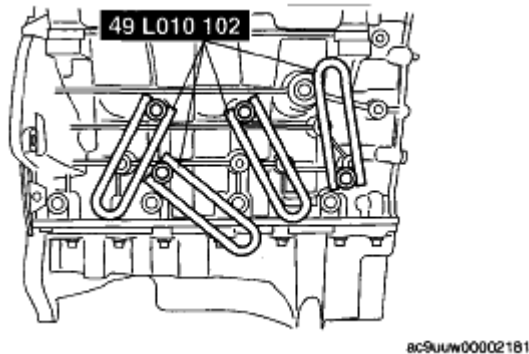


Fig. 10: Identifying Cylinder Block Holes For SST Installation
Courtesy of MAZDA MOTORS CORP.

3. Assemble the SSTs (bolts, nuts, and plate) to the specified positions as shown in the figure.

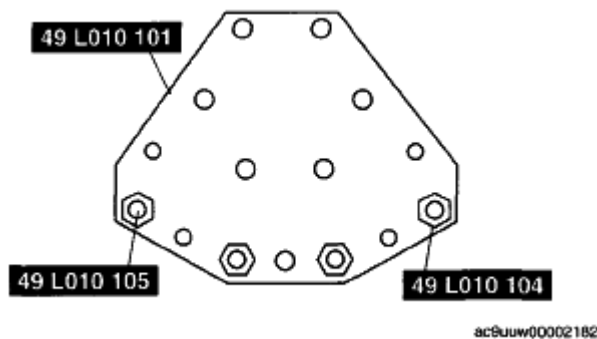


Fig. 11: Assembling SST Bolts, Nuts, And Plate
Courtesy of MAZDA MOTORS CORP.

4. Assemble the SST (bolts, nuts, and plate) set in Step 3 to the SST (arms) set in Step 2.
5. Adjust the SSTs (bolts) so that **approx. 20 mm {0.79 in}** of thread is exposed from the side of the SST (plate).
6. Make the SSTs (arms and plate) parallel by adjusting the SSTs (bolts and nuts).
7. Tighten the SSTs (bolts and nuts) to affix the SSTs firmly.

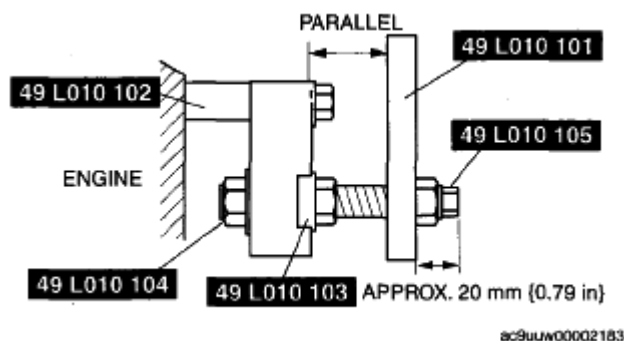


Fig. 12: Identifying SST On Bolts, Nuts, And Plate With Specifications
 Courtesy of MAZDA MOTORS CORP.

8. Mount the engine on the SST (engine stand).

WARNING:

- Self-locking brake system of the engine stand may not be effective when the engine is held in an unbalanced position. This could lead to sudden, rapid movement of the engine and mounting stand handle and cause serious injury. Never keep the engine in an unbalanced position, and always hold the rotating handle firmly when turning the engine.

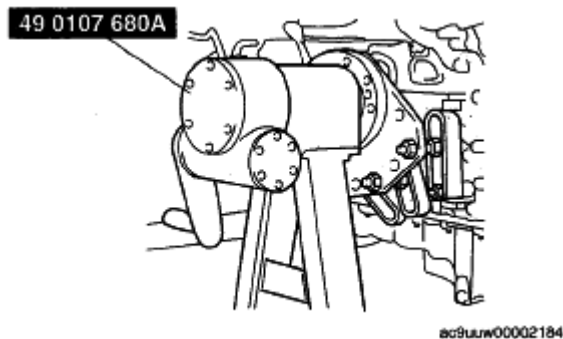


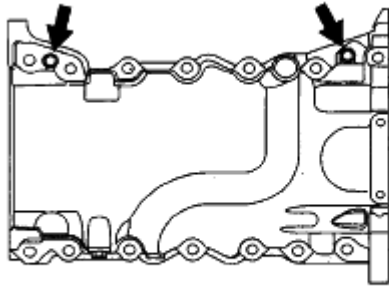
Fig. 13: Mounting Engine On SST (Engine Stand)
 Courtesy of MAZDA MOTORS CORP.

Dismounting

1. Dismount in the reverse order of mounting.

OIL PAN REMOVAL NOTE

1. Install two of the oil pan bolts temporarily into the two threaded holes in the oil pan.
2. Alternately tighten the two bolts one turn at a time until the oil pan-to-cylinder block seal is released.
3. Remove the oil pan.



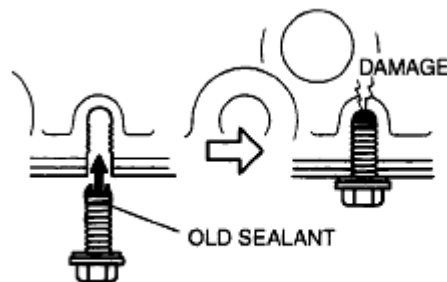
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Fig. 14: Locating Oil Pan 2 Threaded Holes
Courtesy of MAZDA MOTORS CORP.

OIL PAN INSTALLATION NOTE

CAUTION:

- Apply silicon sealant in a single, unbroken line around the whole perimeter.
- The oil pan and bolts must be installed and the oil pan aligned to the cylinder block within 5 min of sealant application. Final tightening of the oil pan bolts must be carried out within 60 min of sealant application.
- Using bolts with the old sealant adhering could cause cracks in the cylinder block.



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Fig. 15: Precaution For Removing Old Sealant From Bolts
Courtesy of MAZDA MOTORS CORP.

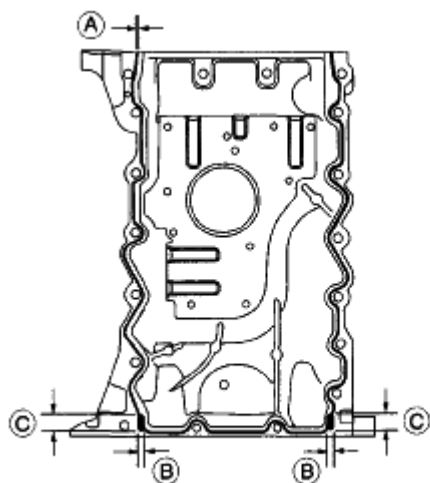
1. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the cylinder block and oil pan.
2. When reusing the oil pan installation bolts, clean any old sealant from the bolts.
3. Apply silicone sealant (Loctite 5900) to the oil pan along the inside of the bolt holes as shown in the figure.

Thickness

A: Approx. 3.0 mm {0.12 in}

B: 5.0-6.0 mm {0.20-0.23 in}

C: 10.0 mm {0.39 in}



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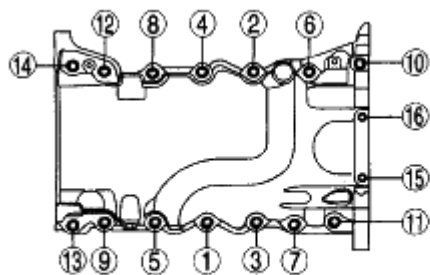
Fig. 16: Applying Silicone Sealant To Oil Pan
 Courtesy of MAZDA MOTORS CORP.

4. Install the oil pan and the bolts to the cylinder block.
 1. Tighten the bolts in the order shown in the figure.

Tightening torque

3.0 N.m {31 kgf.cm, 27 in.lbf}

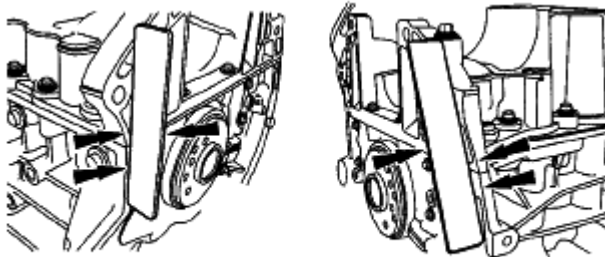
2. Loosen the bolts **180 °**.



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Fig. 17: Identifying Oil Pan Bolts With Tightning Sequence
 Courtesy of MAZDA MOTORS CORP.

5. Using a straightedge, align the oil pan flush with the rear of the cylinder block at the two areas as shown.



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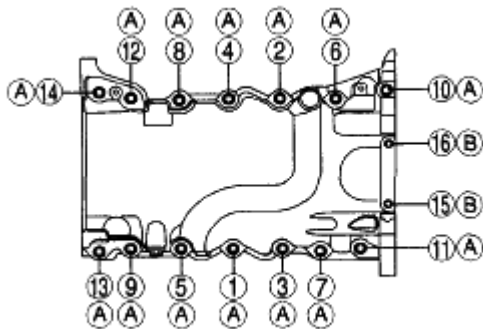
Fig. 18: Aligning Oil Pan Flush With Rear Of Cylinder Block
Courtesy of MAZDA MOTORS CORP.

6. Tighten the bolts in the order shown in the figure.

Tightening torque

Bolt A: 18.5-21.5 N.m {1.89-2.19 kgf.m, 13.7-15.8 ft.lbf}

Bolt B: 8.5-11.5 N.m {87-117 kgf.cm, 76-101 in.lbf}



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Fig. 19: Identifying Oil Pan Bolts With Tightning Sequence
Courtesy of MAZDA MOTORS CORP.

OIL PUMP REMOVAL/INSTALLATION [MZI-3.5]

WARNING:

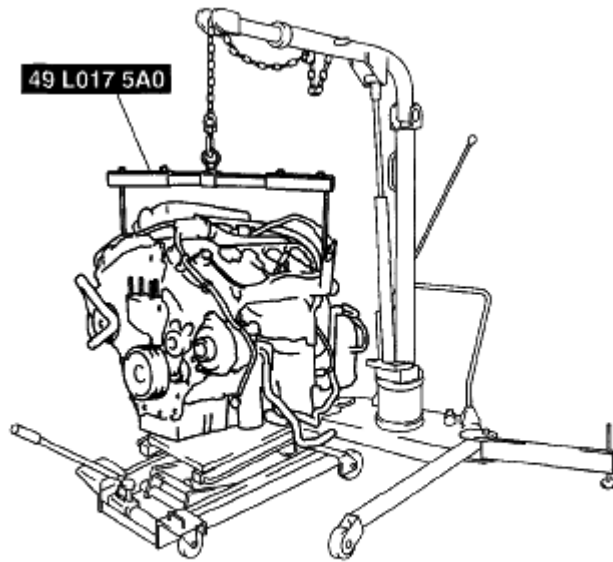
- Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.
- Fuel line spills and leakage are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and, eyes. To prevent this, always complete the "Fuel Line Safety Procedure". (see BEFORE REPAIR PROCEDURE [MZI-3.5] .)
- Continuous exposure to USED engine oil has caused skin cancer in

laboratory mice. Protect your skin by washing with soap and water immediately after working with engine oil.

NOTE:

- **The following procedure "OIL PUMP REMOVAL/INSTALLATION" is performed after the engine and transaxle component is removed from the vehicle.**

1. Drain the engine oil. (See **ENGINE OIL REPLACEMENT [MZI-3.5].**)
2. Remove the engine and transaxle component. (see **ENGINE REMOVAL/INSTALLATION [MZI-3.5] .**)
3. Secure the engine and transaxle component using a hoist and the SST.
4. Remove the dynamic chamber and throttle body as a single unit. (see **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [MZI-3.5] .**)
5. Remove the ignition coils. (see **IGNITION COIL REMOVAL/INSTALLATION [MZI-3.5] .**)
6. Remove the dipstick.
7. Remove the power steering oil pump drive belt. (see **DRIVE BELT REMOVAL/INSTALLATION [MZI-3.5] .**)
8. Remove the power steering oil pump. (see **POWER STEERING OIL PUMP REMOVAL/INSTALLATION .**)
9. Remove the timing chain component. (see **TIMING CHAIN REMOVAL/INSTALLATION [MZI-3.5] .**)
10. Remove in the order indicated in the table.
11. Install in the reverse order of removal.
12. Start the engine and:
 1. Inspect the runout and contact on the pulley and belt.
 2. Inspect for engine oil, engine coolant, ATF, power steering fluid and fuel leakage.
 3. Verify the ignition timing, idle speed and idle mixture. (see **ENGINE TUNE-UP [MZI-3.5] .**)
 4. Engine accessories operation.
13. Inspect the oil pressure. (See **OIL PRESSURE INSPECTION [MZI-3.5].**)
14. Perform a road test.



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Fig. 20: Lifting Engine And Transaxle
 Courtesy of MAZDA MOTORS CORP.

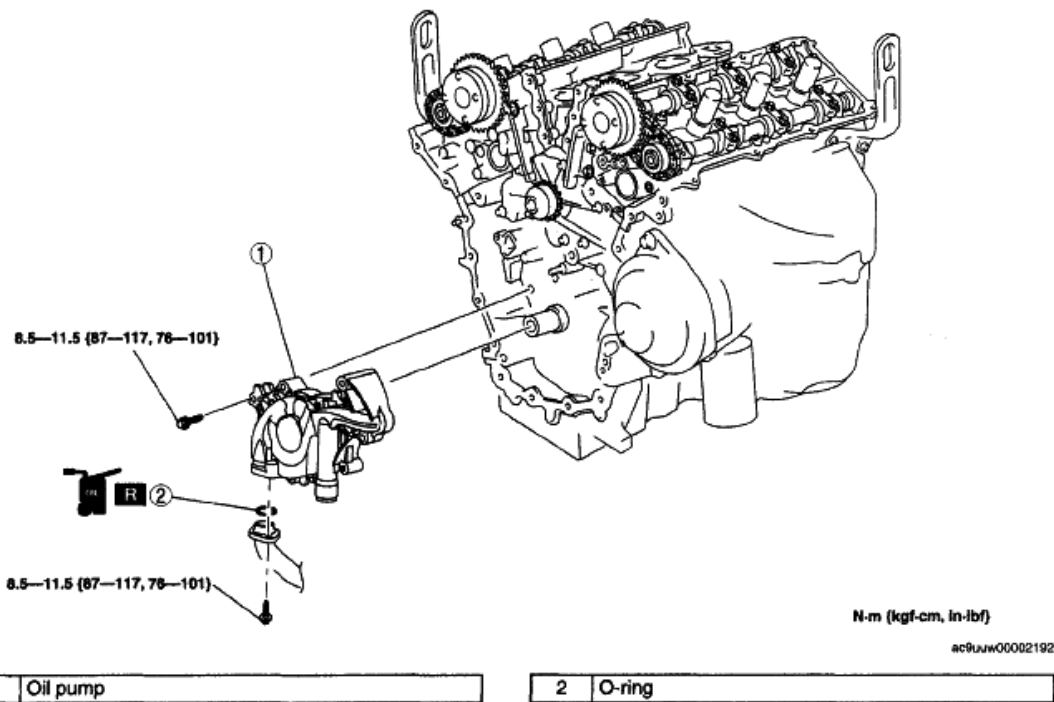


Fig. 21: Identifying Oil Pump And O-Ring With Torque Specifications
 Courtesy of MAZDA MOTORS CORP.