COOLING SYSTEM

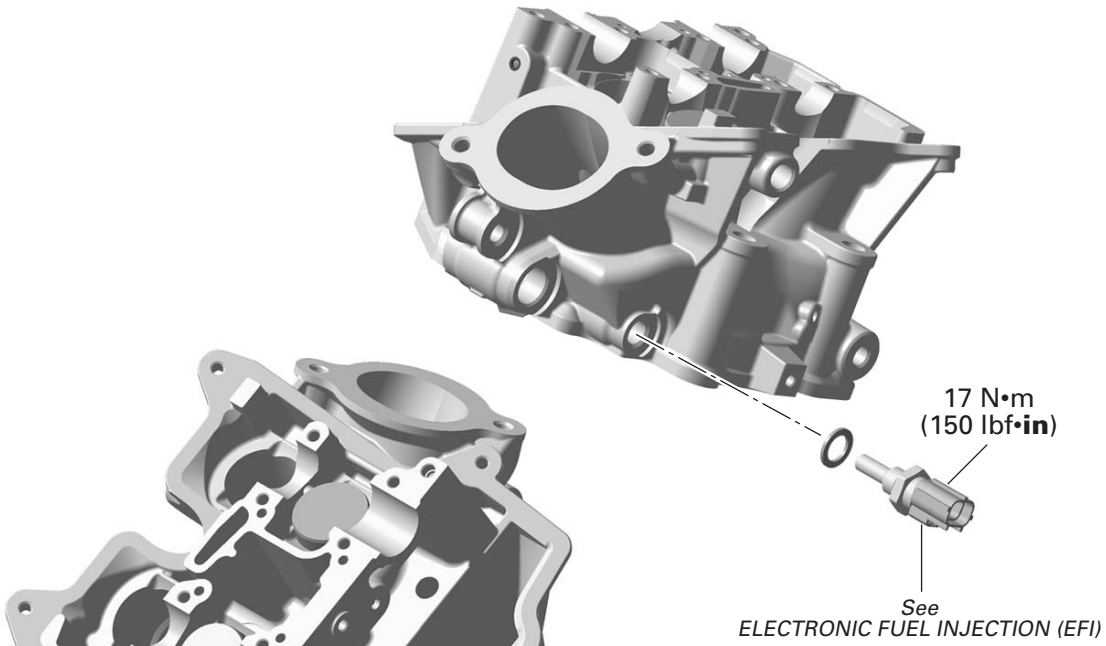
SERVICE TOOLS

Description	Part Number	Page
HANDLE	420 877 650	12
LARGE HOSE PINCHER	529 032 500	9
OETIKER PLIERS	295 000 070	7–9
OIL SEAL PUSHER	529 035 757	12
TEST CAP	529 035 991	6
VACUUM/PRESSURE PUMP	529 021 800	6
WATER PUMP CERAMIC SEAL INSTALLER	529 035 766	12

SERVICE PRODUCTS

Description	Part Number	Page
BRP PREMIXED COOLANT	219 700 362	5
DOW CORNING 111	413 707 000	12

COOLANT TEMPERATURE SENSOR (CTS)



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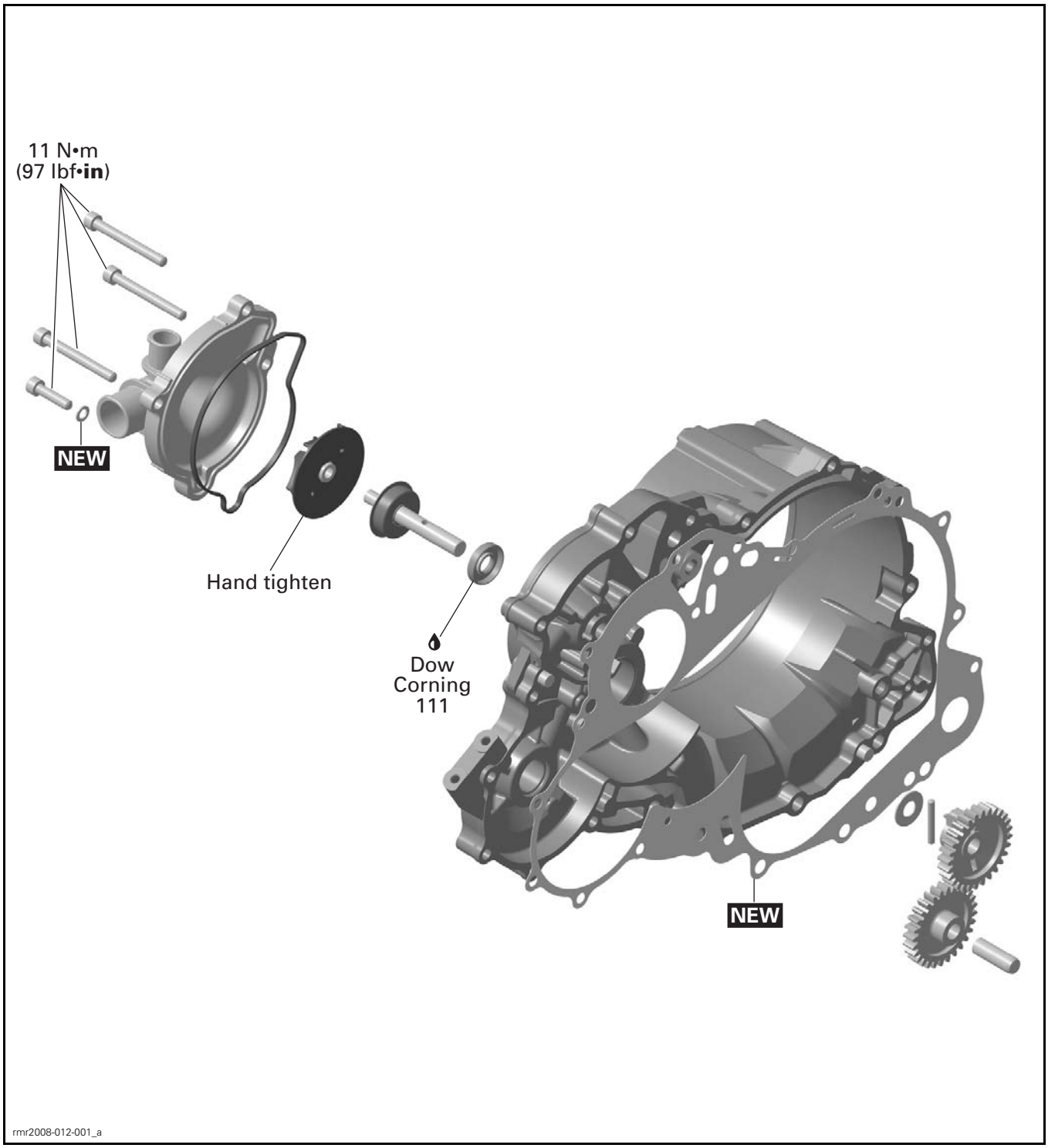
WATER PUMP


11 N•m
(97 lbf•in)
NEW
Hand tighten
Dow
Corning
111
NEW
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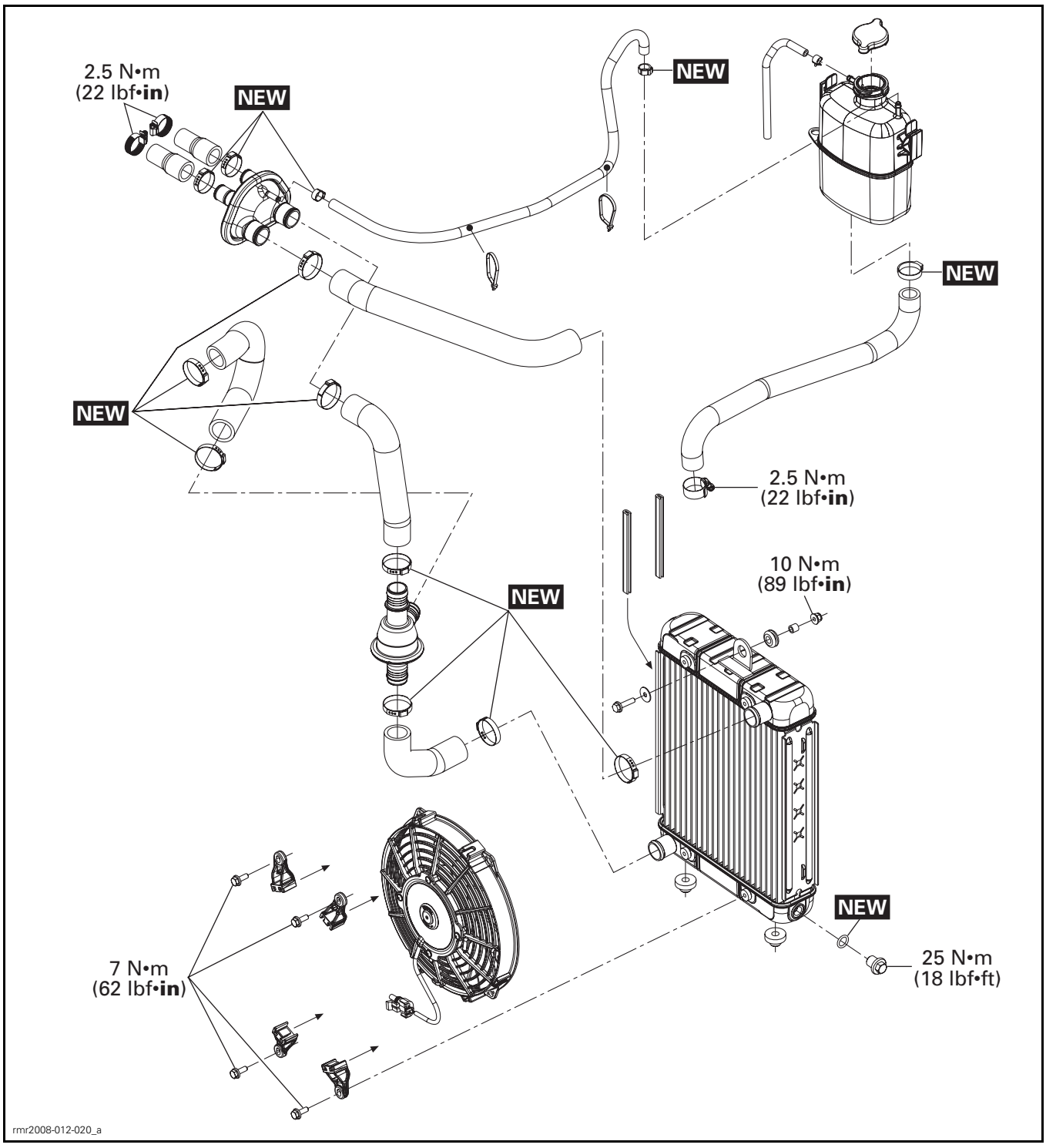
RADIATOR, COOLING FAN, THERMOSTAT AND COOLANT TANK



GENERAL

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, cotter pin, etc.) must be replaced with new ones.

NOTICE **Hoses, cables or locking ties removed during a procedure must be reinstalled as per factory standards.**

MAINTENANCE

ENGINE COOLANT

⚠ WARNING

To avoid potential burns, do not remove the coolant tank cap or loosen the cooling drain plug if the engine is hot.

Recommended Coolant

Use BRP PREMIXED COOLANT (P/N 219 700 362) or a blend of 50% antifreeze with 50% distilled water.

To prevent antifreeze deterioration, always use the same brand. Never mix different brands unless cooling system is completely flushed and refilled.

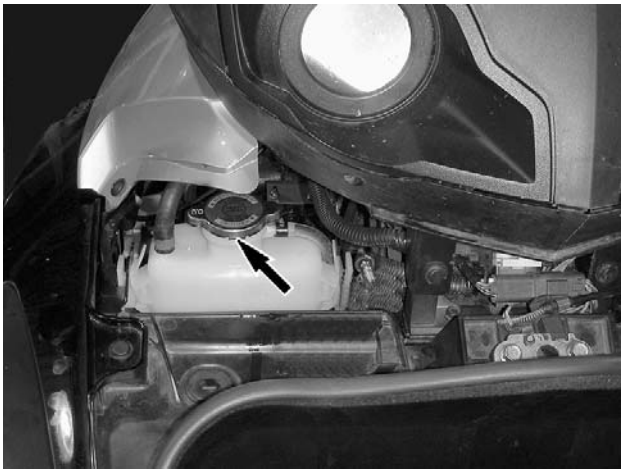
NOTICE **To prevent rust formation or freezing condition, always replenish the system with the BRP premixed coolant or with 50% antifreeze and 50% distilled water. Do not use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system. During cold weather, straight water causes the system to freeze while straight antifreeze thickens and does not have the same efficiency. Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.**

Draining Engine Coolant

Open the front storage compartment cover.

Refer to *BODY* subsection and remove on the RH side of vehicle:
– Service cover
– Middle side panel
– Bottom front side panel.

Remove coolant tank pressure cap.



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TYPICAL

Place a drain pan under radiator drain plug.

Drain engine coolant by removing the drain plug from radiator.

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TYPICAL

Discard the O-ring on drain plug.

Adding Engine Coolant

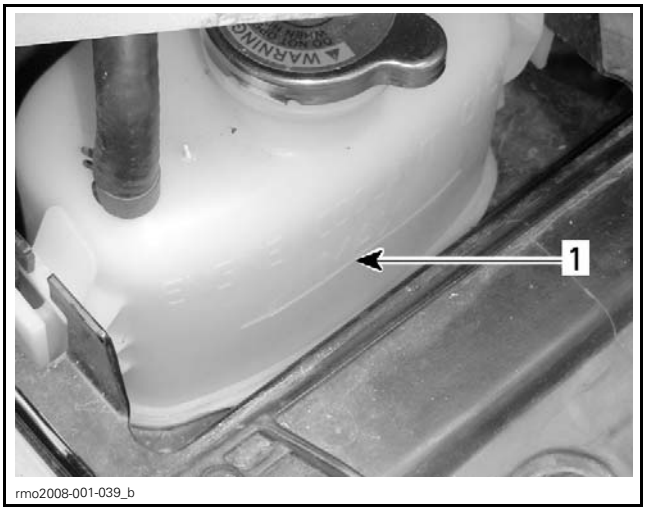
Ensure vehicle is on a flat surface and engine is cold.

Install a NEW O-ring on drain plug.

Torque drain plug to 25 N•m (18 lbf•ft).

Using a long reach funnel, fill cooling system until coolant reaches upper level mark of coolant tank.

NOTE: Filling requires approximately 3.2 L (3.4 qt (U.S. liq.)) of coolant.



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TYPICAL
1. Upper level mark

Do not install coolant tank pressure cap yet.

Run engine until thermostat opens, then stop engine.

NOTE: Use B.U.D.S. to monitoring engine temperature. The thermostat opening begins at 75°C (167°F). The coolant tank should be hot.

Let engine cool down.

Recheck coolant level and top up if necessary.

Test the density of the coolant using an antifreeze hydrometer. Follow the hydrometer manufacturer instruction for proper use.

NOTICE **Ensure the coolant density is adequate to avoid any damages from freezing.**

Reinstall pressure cap.

Reinstall removed parts.

INSPECTION

COOLING SYSTEM LEAK TEST

⚠ WARNING

In order to avoid getting burned, do not remove the coolant tank cap or loosen the engine drain plug if the engine is hot.

Open the front storage compartment cover.

Remove the service cover on the RH side. Refer to *BODY* subsection.

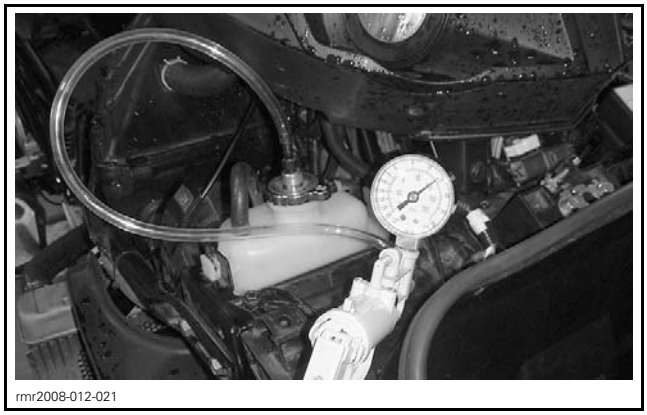
Remove coolant tank cap.

Install the TEST CAP (P/N 529 035 991) on filler neck of coolant tank.

Pressurize the system through coolant tank to 90 kPa (13 PSI) by using the pump included in the VACUUM/PRESSURE PUMP (P/N 529 021 800).

5290359912

5290218002



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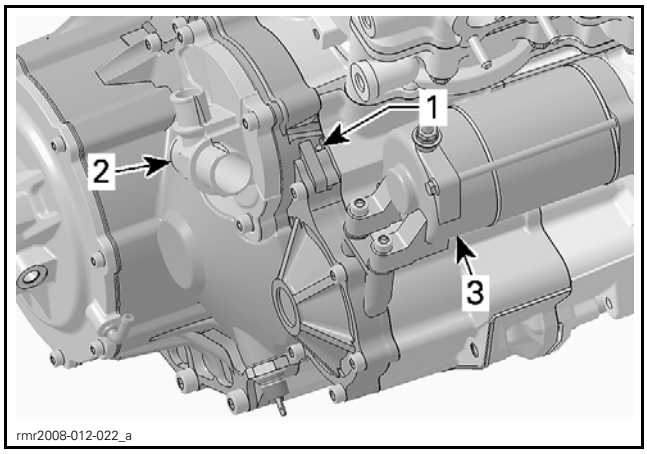
TYPICAL

If pressure drops, check all hoses, radiator and cylinder/base for coolant leaks. Spray a soap/water solution and look for air bubbles.

Inspect the engine leak indicator hole.



TYPICAL
1. *Leak indicator hole*
2. *Water pump housing*
3. *Starter*

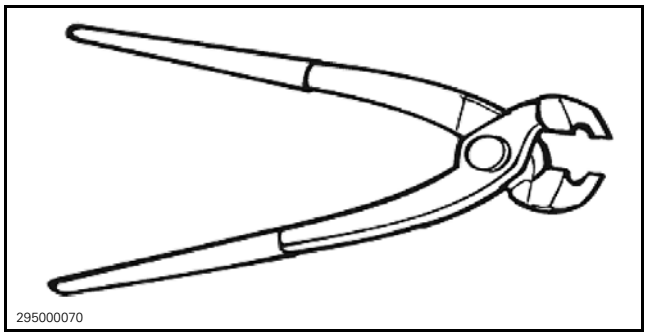
NOTE: Leaking coolant indicates a damaged rotary seal on water pump side. Refer to *WATER PUMP SHAFT AND SEALS* in this subsection.

PROCEDURES

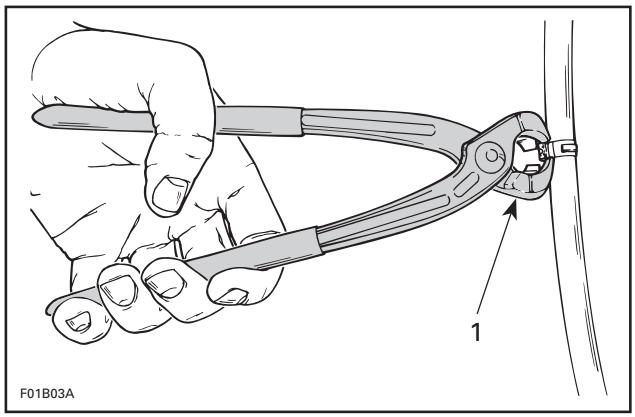
OETIKER CLAMPS

Oetiker Clamp Replacement

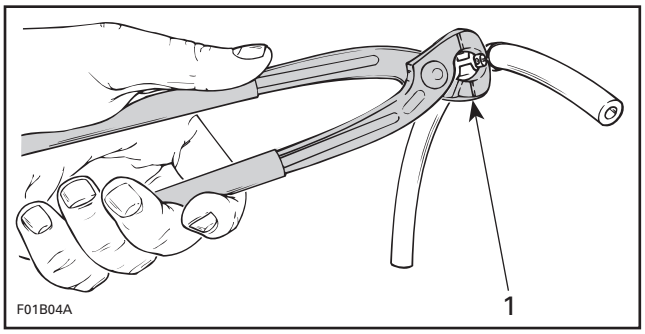
To secure or cut Oetiker clamps, use OETIKER PLIERS (P/N 295 000 070).



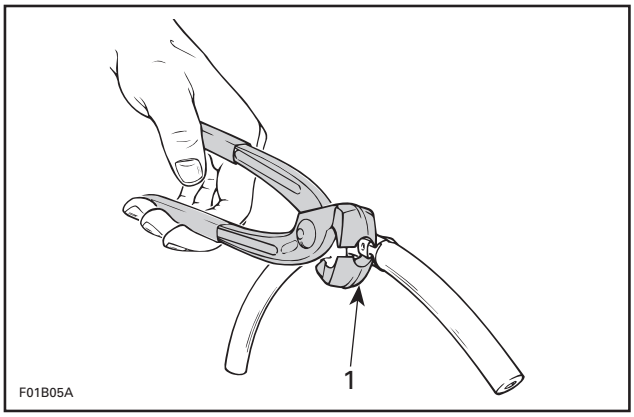
OETIKER PLIERS



1. *Cutting clamp*



1. *Securing clamp*



1. *Securing clamp in limited access*

COOLING FAN

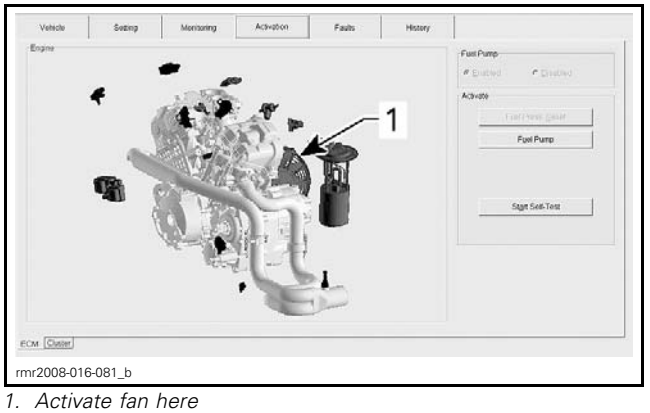
The cooling fan turns on when engine coolant temperature reaches 102°C (216°F).

Coolant Fan Test with B.U.D.S.

Connect B.U.D.S. Refer to *COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE*.

In B.U.D.S., select **Activation** folder then the **ECM** page.

Press on the cooling fan to activate it.



1. *Activate fan here*

If cooling fan works, check coolant temperature sensor (CTS).

If the cooling fan does not work, check the 10 A fuse. If fuse is good, check the cooling fan relay.

Cooling Fan Relay Test

Remove the cooling fan relay (R4). Refer to *POWER DISTRIBUTION* subsection.

Install a jumper wire end between pins D8 and C7.

If the fan works correctly by jumping the relay, replace the relay.

If the fan does not work, check the wiring harness and connectors between fuse box and cooling fan.

If the fan does not work after all tests, replace it.

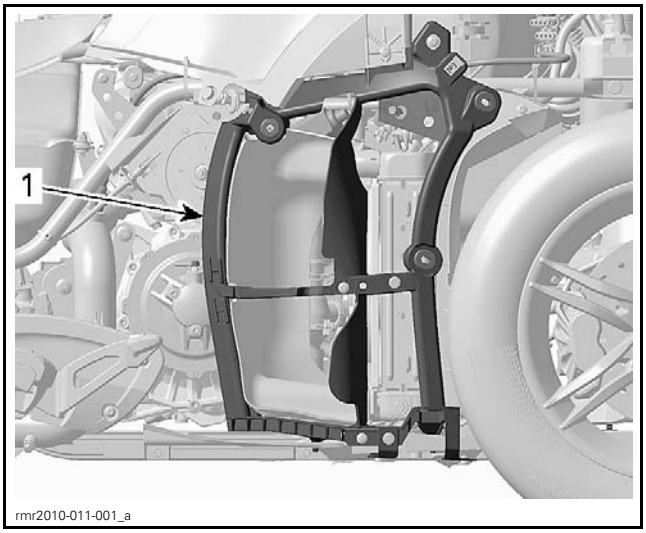
Cooling Fan Removal

Refer to *BODY* and remove the following panels on the RH side:

– Middle Side Panel
– Top Side Panel
– Bottom Rear Side Panel
– Bottom Front Side Panel
– Rear Side Panel

Remove headlight adjustment cable from LH middle side panel support.

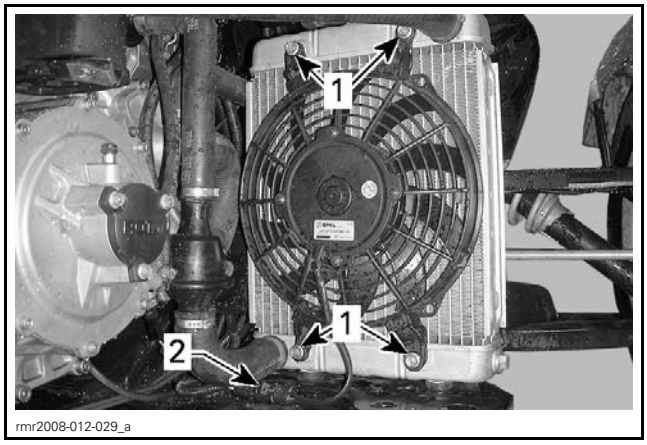
Remove RH middle side panel support.



1. Middle side panel support

Remove screws securing cooling fan to radiator.

Unplug fan connector.



TYPICAL
1. Cooling fan screws
2. Cooling fan connector

Cooling Fan Installation

For the installation, reverse the removal procedure.

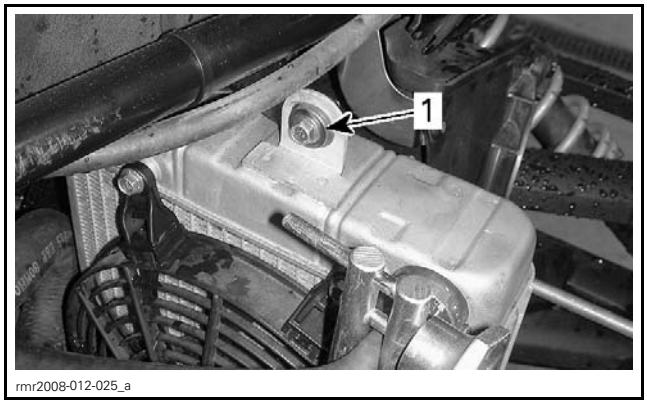
RADIATOR

Radiator Removal

For access, refer to *COOLING FAN REMOVAL* in this subsection.

Drain the engine coolant. Refer to *ENGINE COOLANT* in this subsection.

Unscrew bolt on the top of radiator.



TYPICAL
1. Radiator bolt

Unplug the cooling fan connector.

Cut the Oetiker clamps securing hoses to radiator using the OETIKER PLIERS (P/N 295 000 070). Refer to *OETIKER CLAMPS* in this subsection for instructions.

Disconnect radiator hoses.

Lift radiator and remove it from vehicle.

Unscrew cooling fan from radiator.

Radiator Inspection

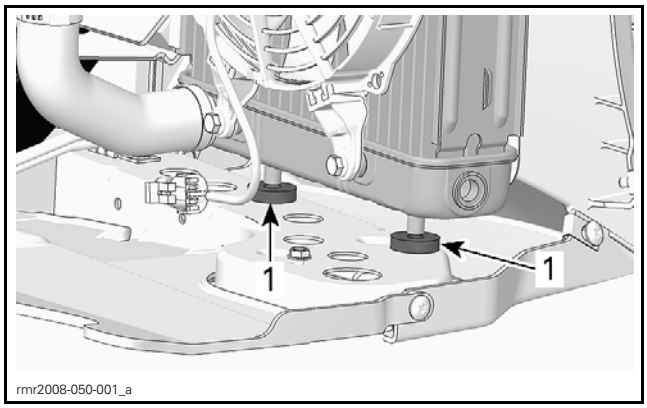
Check radiator fins for clogging or damage.

Remove insects, mud or other obstructions with low pressure water.

Radiator Installation

For installation, reverse the removal procedure. However, pay attention to the following.

Make sure the rubber mounts between bottom of radiator and frame are not missing.



TYPICAL
1. Radiator rubber mounts

Install a NEW radiator drain plug O-ring.

Add engine coolant and bleed cooling system. Refer to *ENGINE COOLANT* in this subsection.

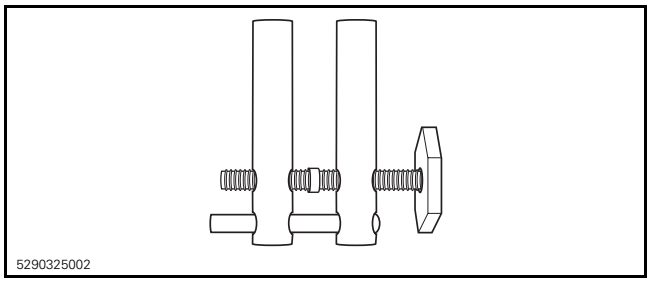
THERMOSTAT

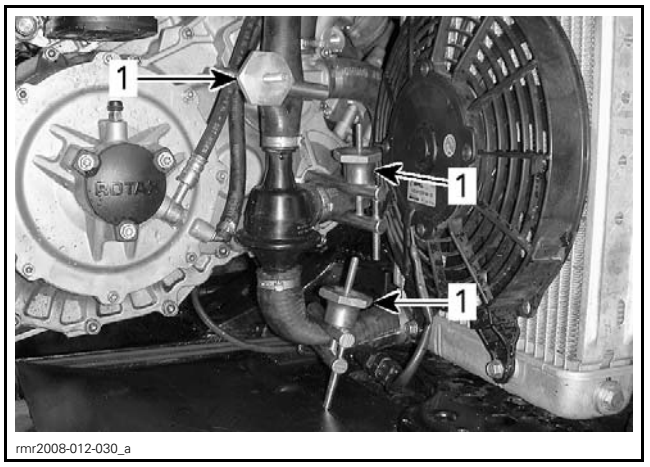
The thermostat is a single action type mounted externally to the engine on the RH side. The thermostat starts opening when engine coolant reaches 75°C (167°F).

Thermostat Removal

For access, refer to *COOLING FAN REMOVAL* in this subsection.

Install a LARGE HOSE PINCHER (P/N 529 032 500) on each cooling hoses from thermostat housing.





TYPICAL
1. Hose pinchers

NOTE: As an alternative method, drain the engine coolant. Refer to *ENGINE COOLANT* in this subsection for the procedure.

Using the OETIKER PLIERS (P/N 295 000 070), cut hose clamps. Refer to *OETIKER CLAMPS* in this subsection for instructions.

Pull out thermostat housing. Catch spilled coolant.

Thermostat Test

To check thermostat, put housing in water and heat water. Thermostat should begin to open when water temperature reaches 75°C (167°F).

Thermostat Installation

For installation, reverse the removal procedure. Pay attention to the following.

Thermostat must be installed with its wider section toward the bottom.

Install NEW clamps using Oetiker pliers.

Refill coolant tank and bleed cooling system.

COOLANT TANK CAP

Coolant Tank Cap Inspection

Using a pressure cap tester, check opening pressure 90 kPa (13 PSI).

COOLANT TANK

The coolant expands as the temperature and pressure rise in the system. If the limiting system working pressure cap is reached 90 kPa (13 PSI), the pressure relief valve in the pressure cap is lifted from its seat and allows coolant to flow through the overflow hose into the coolant tank.

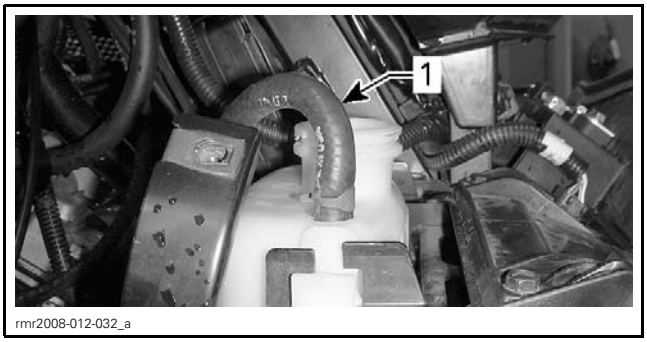
Coolant Tank Removal

Drain the engine coolant. Refer to *ENGINE COOLANT* in this subsection.

Remove the front fascia. Refer to *BODY* subsection.

Remove the RH side headlight. Refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.

Disconnect the overflow hose on the top of coolant tank.



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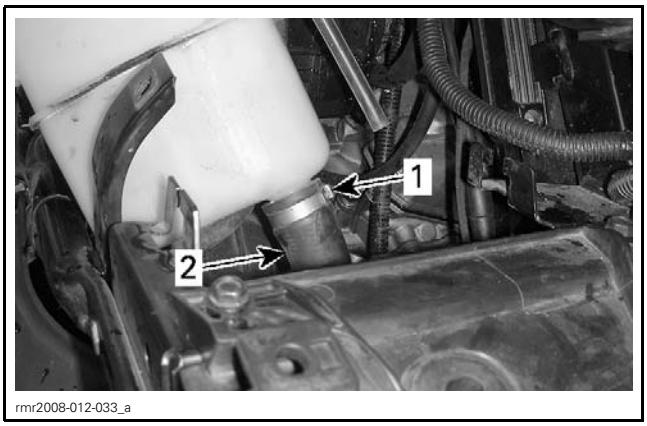
TYPICAL
1. *Overflow hose*

Unlatch coolant tank and lift it.

Cut the Oetiker clamp securing coolant tank hose.



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TYPICAL
1. *Oetiker clamp*
2. *Coolant hose*

Remove hose from coolant tank.

Coolant Tank Installation

The installation is the reverse of the removal procedure.

WATER PUMP HOUSING

Water Pump Housing Removal

For access, refer to *COOLING FAN REMOVAL* in this subsection.

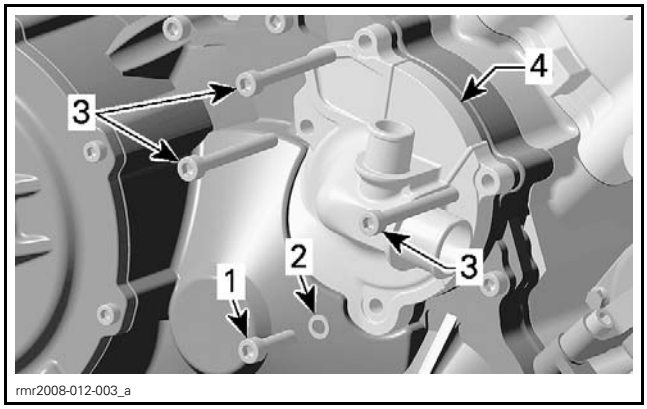
⚠ WARNING

To avoid potential burns, do not remove the coolant tank cap or loosen the cooling drain plug if the engine is hot.

Drain cooling system. Refer to *ENGINE COOLANT* in this subsection.

Remove water hoses from water pump housing.

Remove screws retaining water pump housing.



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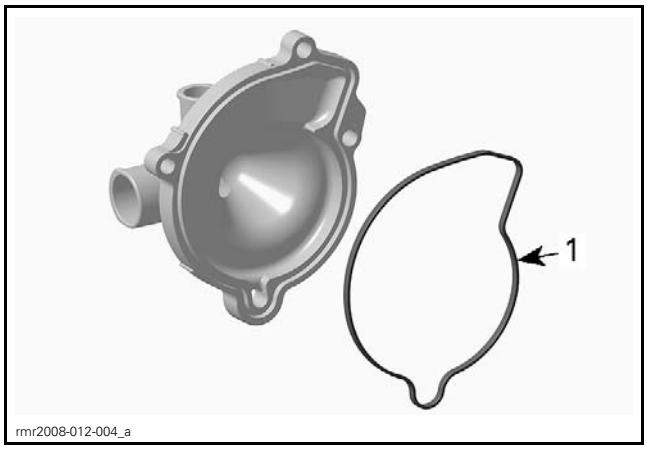
1. *Cooling drain plug*
2. *Sealing ring*
3. *Screws*
4. *Water pump cover*

Water Pump Housing Inspection

Check if gasket is brittle, hard or damaged and replace as necessary.



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1. *Gasket*

Water Pump Housing Installation

The installation is the opposite of the removal procedure.

NOTICE **To prevent leaking, take care that the gasket is exactly in groove when you reinstall the water pump housing.**

Tighten screws of water pump housing in a criss-cross sequence.

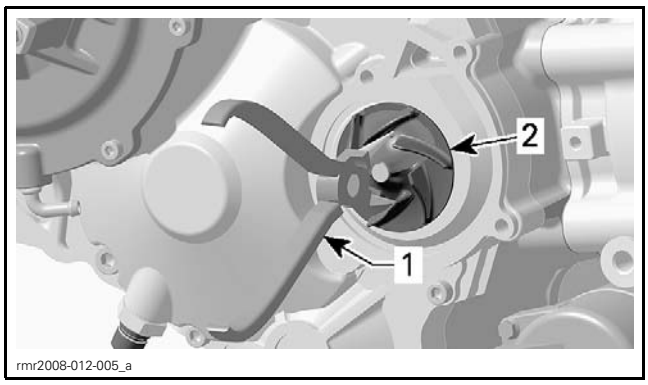
WATER PUMP IMPELLER

Water Pump Impeller Removal

Remove water pump housing. See procedure in this subsection.

Use proper snap ring pliers to unscrew water pump impeller.

NOTE: Water pump shaft and impeller have right-hand threads. Remove by turning counterclockwise and install by turning clockwise.



TYPICAL
1. *Snap ring pliers*
2. *Water pump impeller*

Remove impeller from water pump shaft.

Water Pump Impeller Inspection

Check impeller for cracks or other damage. Replace impeller if damaged.

Water Pump Impeller Installation

The installation is the opposite of the removal procedure. Pay attention to the following detail.

Tighten water pump impeller by hand. To not overtighten.

WATER PUMP SHAFT AND SEALS

Water Pump Shaft/Seal Removal

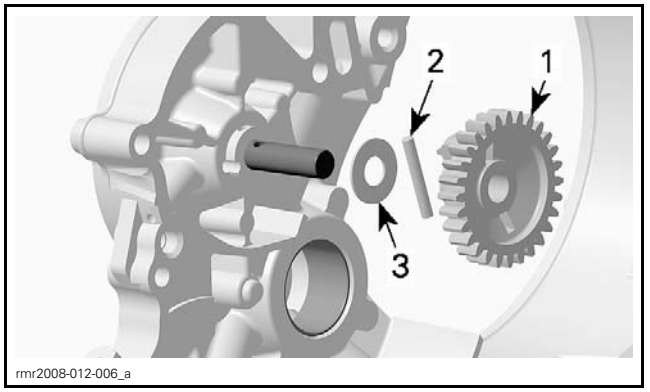
Remove clutch cover. Refer to the appropriate clutch subsection.

Remove water pump housing and impeller, see procedures in this subsection.

Pull water pump gear to remove it.

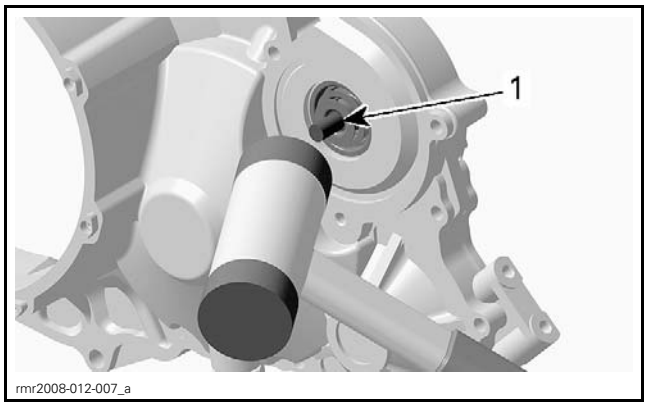
Remove needle pin.

Remove thrust washer.



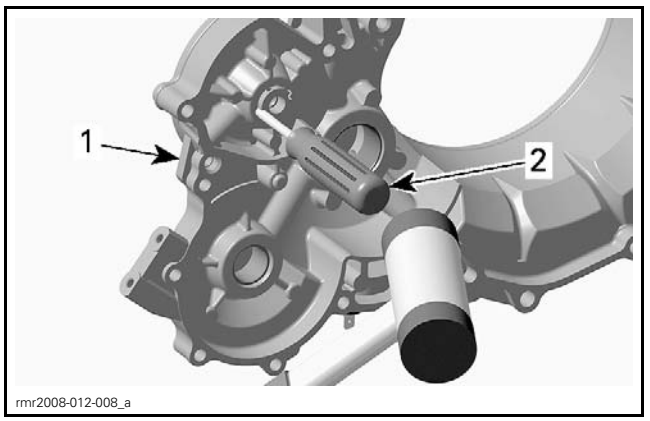
1. *Water pump gear*
2. *Needle pin*
3. *Thrust washer*

Sharply strike out water pump shaft from the outside towards the inside, using a plastic hammer.



1. *Water pump shaft*

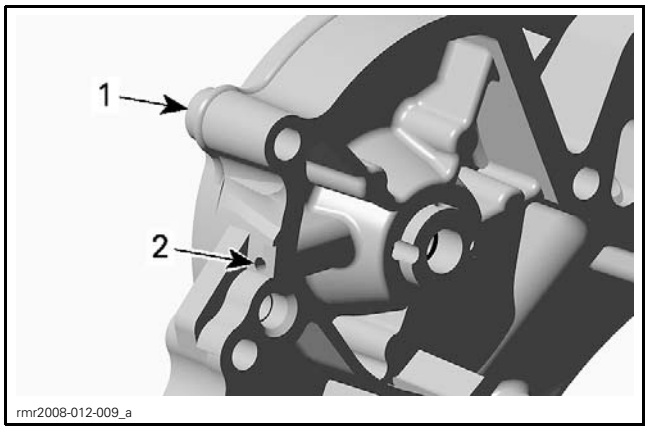
Use a suitable 4 mm (.157 in) punch and strike out oil seal and rotary seal together from inside towards the outside.



1. *Clutch cover*
2. *Punch*

Water Pump Shaft/Seal Inspection

Clean leak indicator hole in clutch cover from contamination.



1. Clutch cover
2. Leak indicator hole

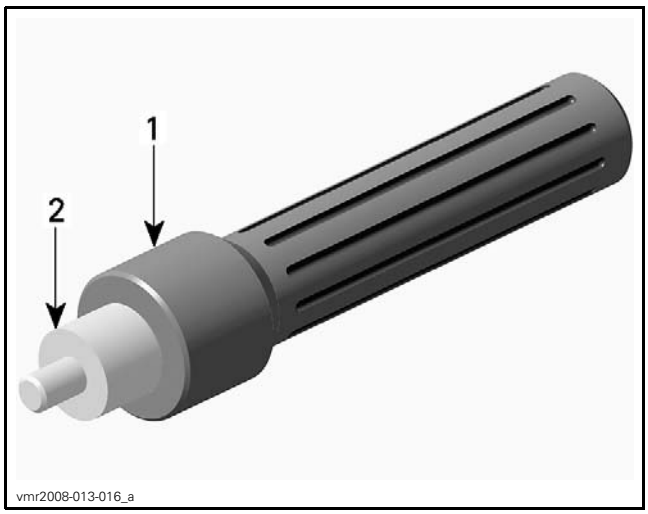
Water Pump Shaft/Seal Installation

For installation, reverse the removal procedure.

NOTICE **Always replace rotary seal and water pump shaft together. Also, install a NEW oil seal (behind rotary seal) at the same time.**

NOTE: Never use oil in the press fit area of the oil seal.

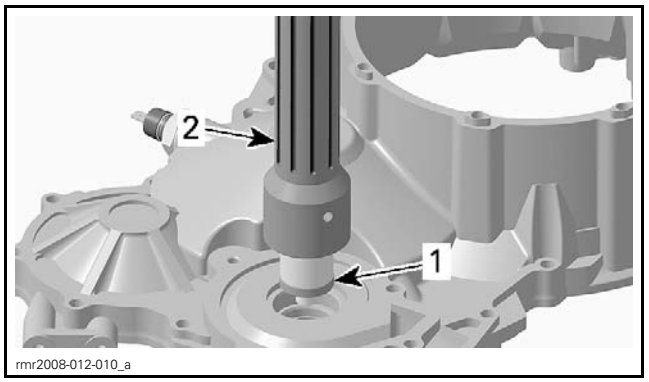
Use the OIL SEAL PUSHER (P/N 529 035 757) and the HANDLE (P/N 420 877 650) to install oil seal.



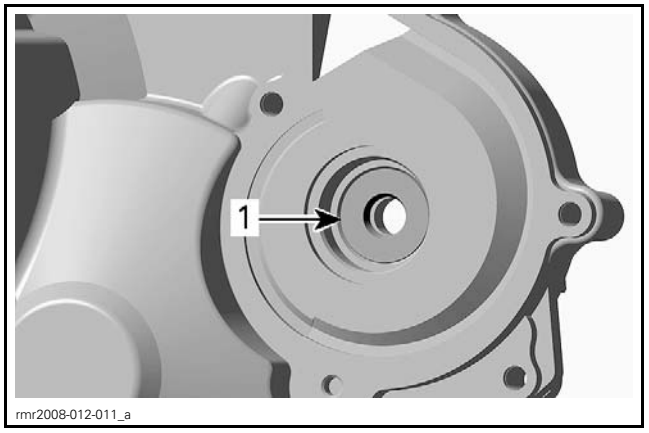
1. Handle
2. Oil seal pusher

Apply DOW CORNING 111 (P/N 413 707 000) on sealing lip and push oil seal in place.

NOTE: Sealing lip must face towards the inside of clutch cover.

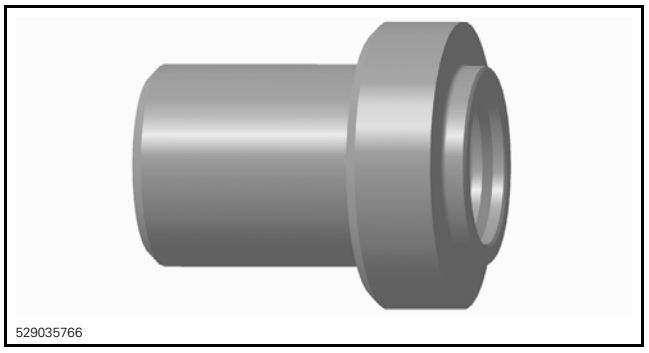


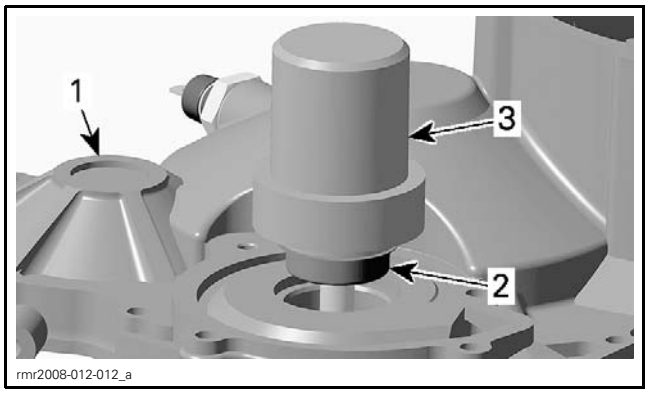
1. Oil seal
2. Installer handle with oil seal pusher



1. Proper installed oil seal

Carefully press-in water pump shaft assembly into clutch cover, using the WATER PUMP CERAMIC SEAL INSTALLER (P/N 529 035 766).

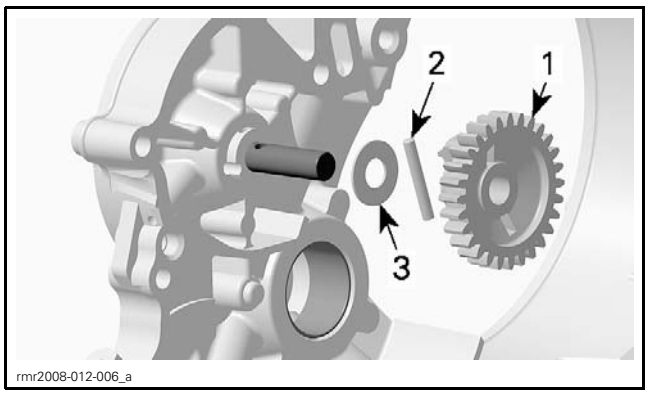




1. Clutch cover
2. Water pump shaft assembly
3. Rotary seal installer

NOTICE Never use a hammer for water pump shaft assembly installation. Use press only.

Reinstall thrust washer, needle pin and water pump gear.



1. Water pump gear
2. Needle pin
3. Thrust washer

Reinstall water pump impeller and check if water pump turns smooth after installation.

Properly reinstall remaining parts. Refer to appropriate sections.