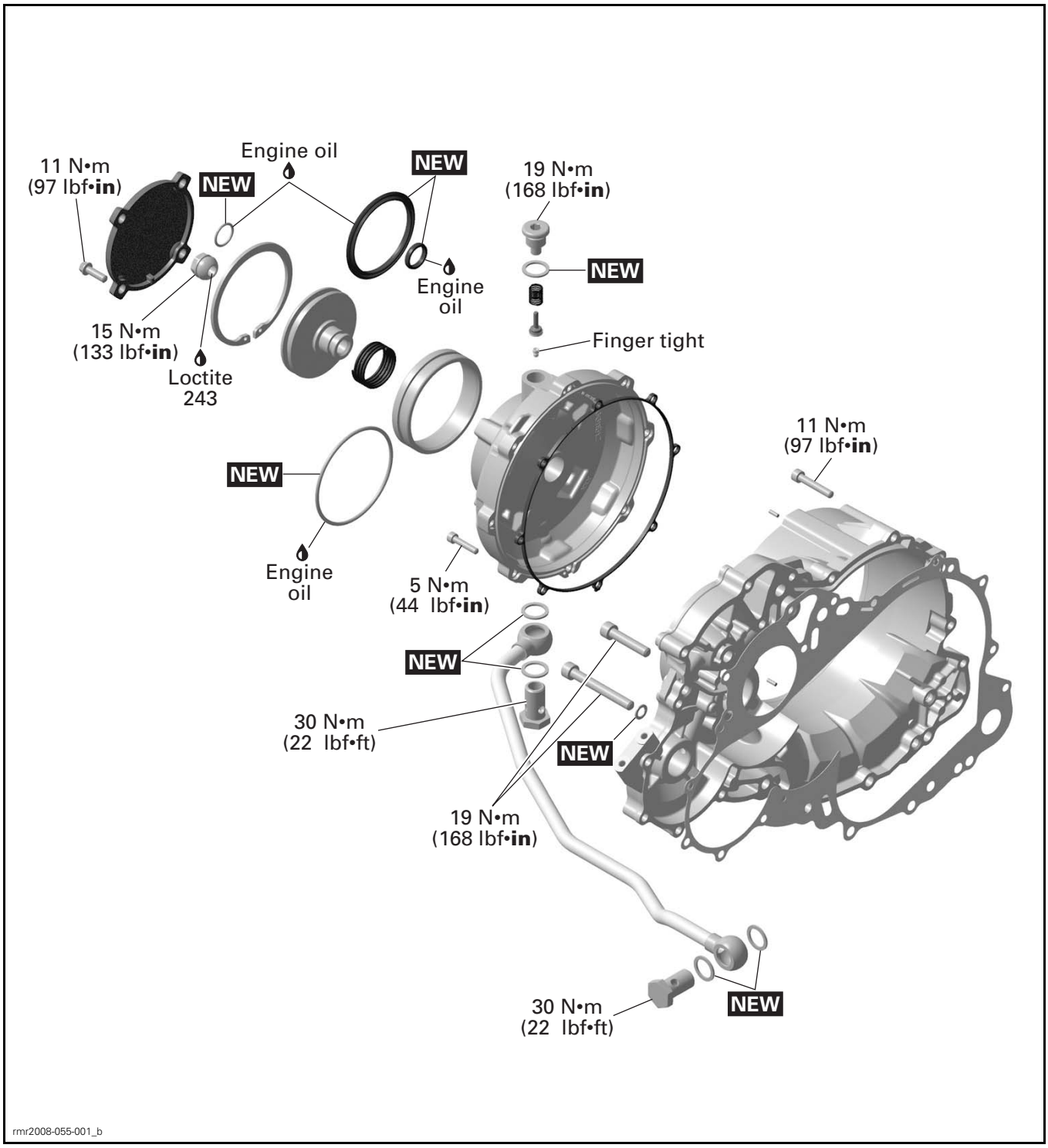
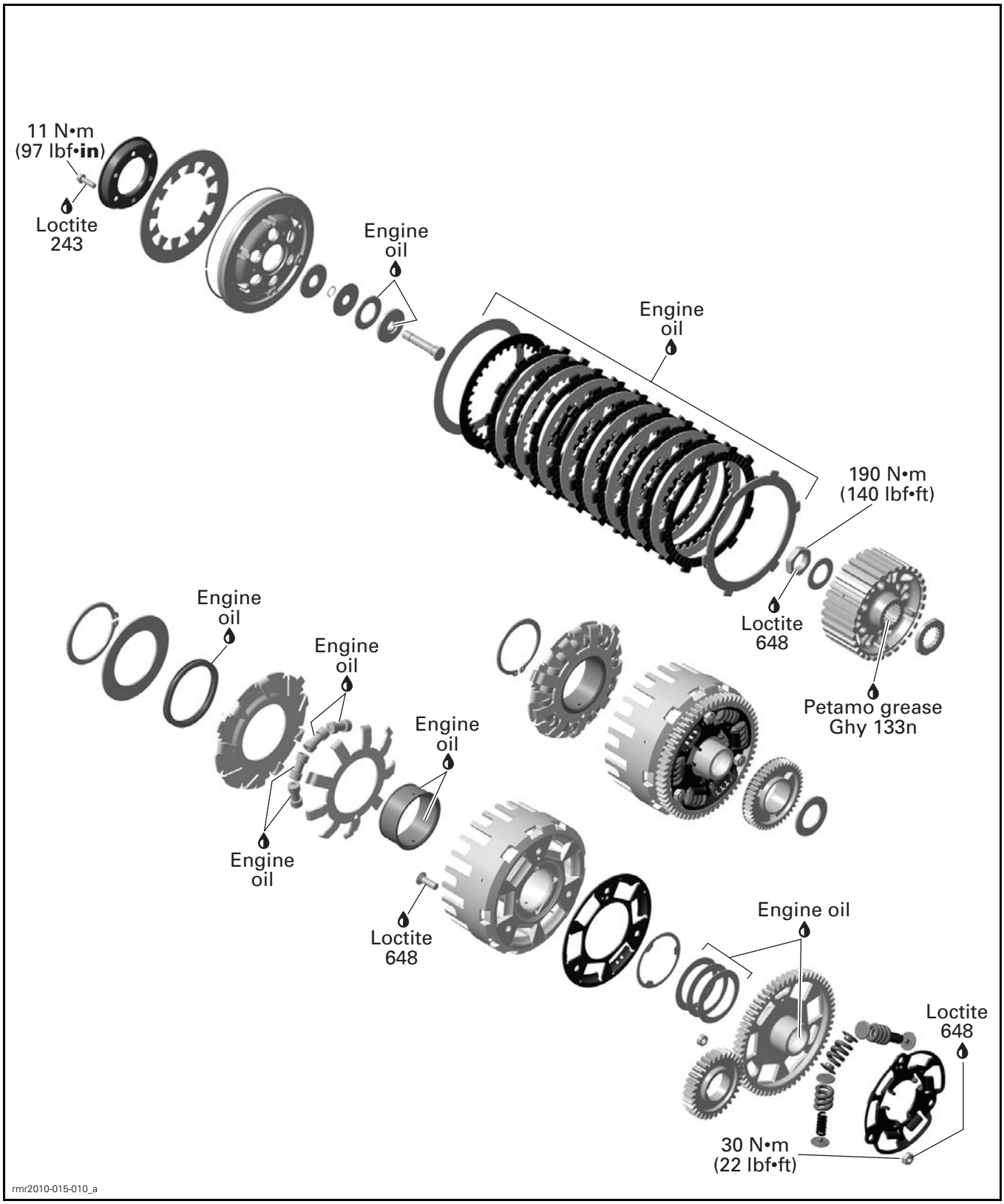
CLUTCH (SE5)

SERVICE TOOLS

SERVICE PRODUCTS


11 N•m
(97 lbf•in)
NEW
Engine oil
NEW
19 N•m
(168 lbf•in)
NEW
Engine
oil
15 N•m
(133 lbf•in)
Loctite
243
Finger tight
11 N•m
(97 lbf•in)
NEW
Engine
oil
5 N•m
(44 lbf•in)
NEW
30 N•m
(22 lbf•ft)
NEW
19 N•m
(168 lbf•in)
30 N•m
(22 lbf•ft)
NEW
rmr2008-055-001_b


11 N•m
(97 lbf•in)
Loctite
243
Engine
oil
Engine
oil
190 N•m
(140 lbf•ft)
Loctite
648
Petamo grease
Ghy 133n
Engine
oil
Engine
oil
Engine
oil
Engine
oil
Loctite
648
Engine oil
Loctite
648
30 N•m
(22 lbf•ft)
rmr2010-015-010_a

GENERAL

NOTE: For a better understanding, many of the following illustrations are produced with the engine out of vehicle. To carry out the instructions, it is not necessary to remove the engine from vehicle.

Always disconnect the battery negative cable before working the engine.

⚠ WARNING

Always disconnect BLACK (-) cable first and reconnect last.

During assembly/installation, use torque values and service products as specified 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 pins, etc.) must be replaced with new ones.

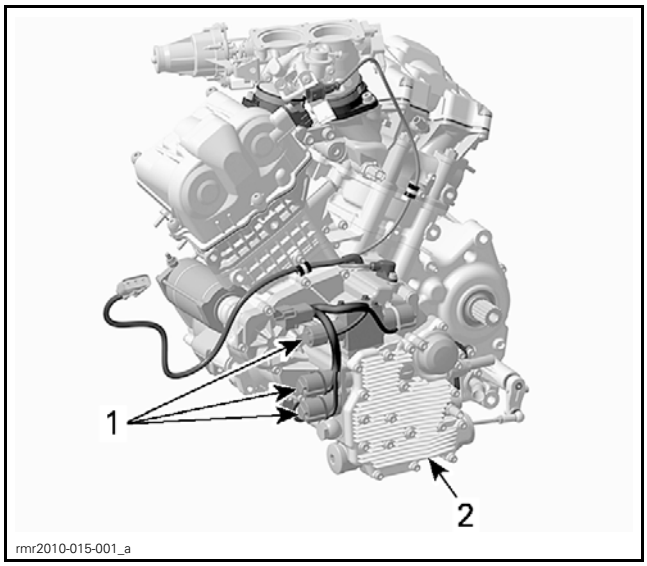
NOTICE **Sealing washers must be discarded and replaced with new ones every time a Banjo fitting is unscrewed.**

Periodically check the oil hoses for damages or leaks. Repair any leaks and replace damaged hose.

SYSTEM DESCRIPTION

The engine on the SE5 model features a sequential electronically controlled mechanical 5-speed transmission with a hydraulic type clutch system.

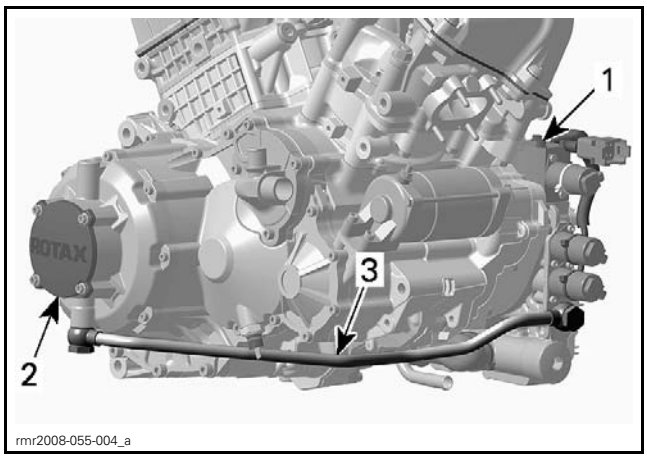
The clutch is disengaged and engaged by 2 valves in the hydraulic control module (HCM) that are controlled by the transmission control module (TCM).



1. Solenoid valves
2. Hydraulic control module (HCM)

One valve engages/disengages the clutch and the other valve modulates the clutch to control the speed of the clutch engagement for smooth operation.

Depending on which solenoid valve is activated, oil flows either from the HCM to the hydraulic clutch piston or from the hydraulic clutch piston to HCM.



1. HCM side
2. Hydraulic clutch side
3. Oil hose between hydraulic clutch and HCM

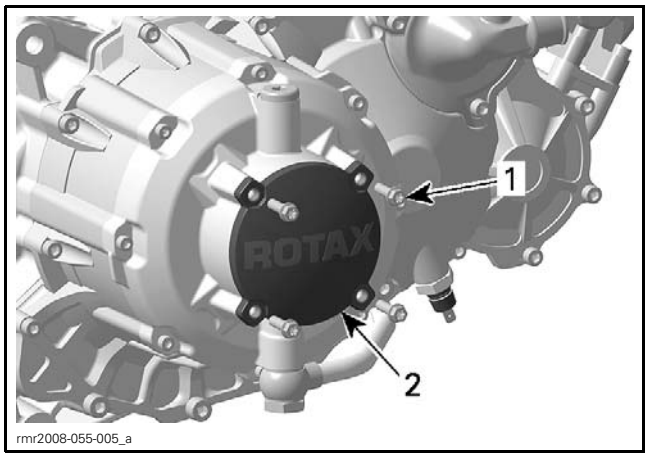
The SE5 clutch system uses the same oil as the engine.

PROCEDURES

HYDRAULIC PISTON

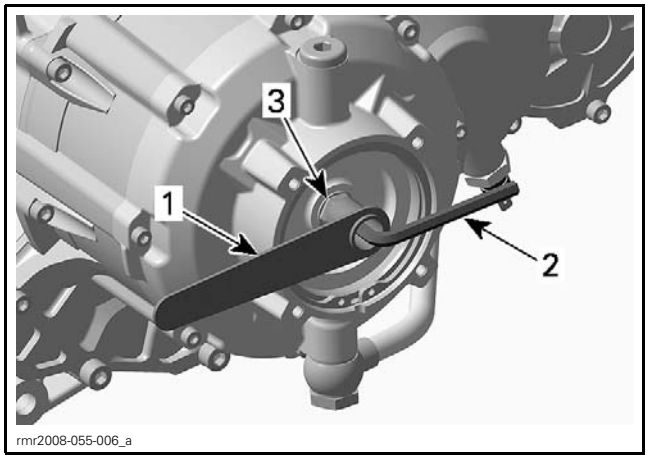
Hydraulic Piston Removal

Remove hydraulic piston cover screws.



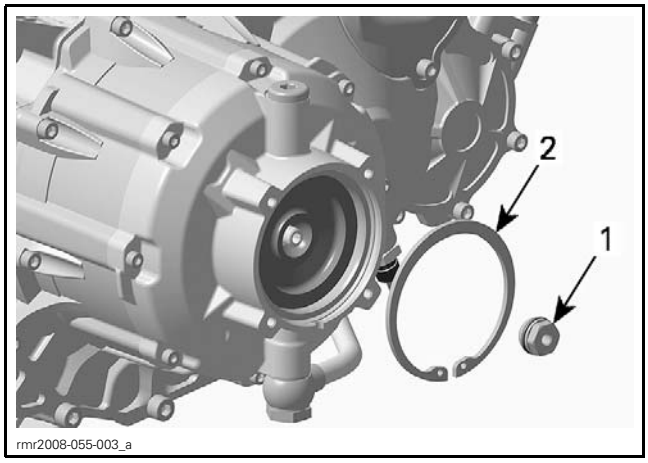
1. *Screws (x4)*
2. *Hydraulic piston cover*

Using a 17 mm deep offset wrench, unscrew the hydraulic piston nut **while holding the clutch release shaft** with a 5 mm Allen wrench.



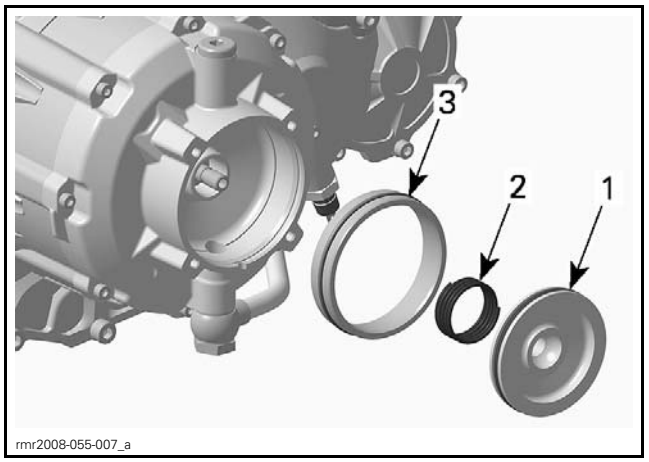
1. *Deep offset wrench*
2. *Allen wrench*
3. *Hydraulic piston nut*

Remove retaining ring and hydraulic piston nut.



1. *Hydraulic piston nut*
2. *Retaining ring*

Remove the hydraulic piston, compression spring and hydraulic cylinder sleeve.

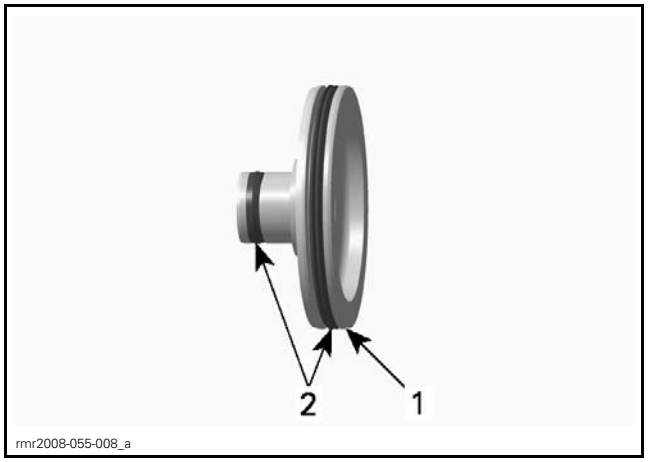


1. *Hydraulic piston*
2. *Compression spring*
3. *Hydraulic cylinder sleeve*

Hydraulic Piston Inspection

Clean piston and visually inspect piston surface for scoring, scratches or abnormal wear. Replace if necessary.

Remove and discard piston seals.

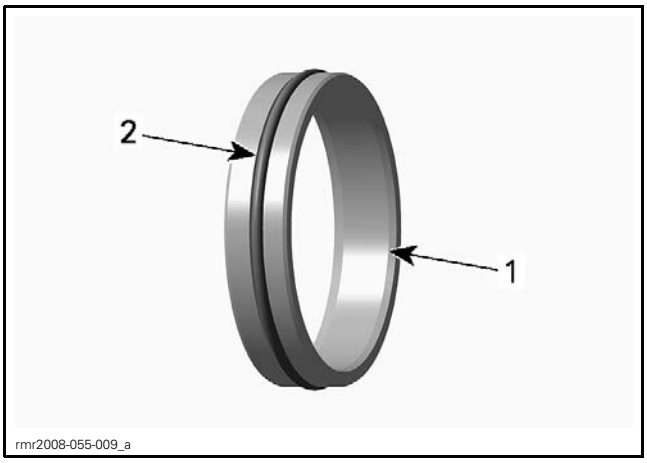


1. *Inspect piston surface*
2. *Inspect piston seals*

Hydraulic cylinder sleeve inspection

Clean hydraulic cylinder sleeve and visually inspect sleeve surface for scoring, scratches or abnormal wear. Replace if necessary.

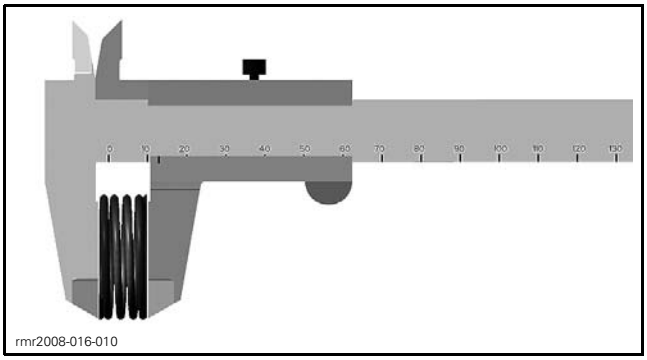
Remove and discard sleeve O-ring.



1. Inspect hydraulic cylinder sleeve
2. Discard O-ring

Compression Spring

Check free length of compression spring.



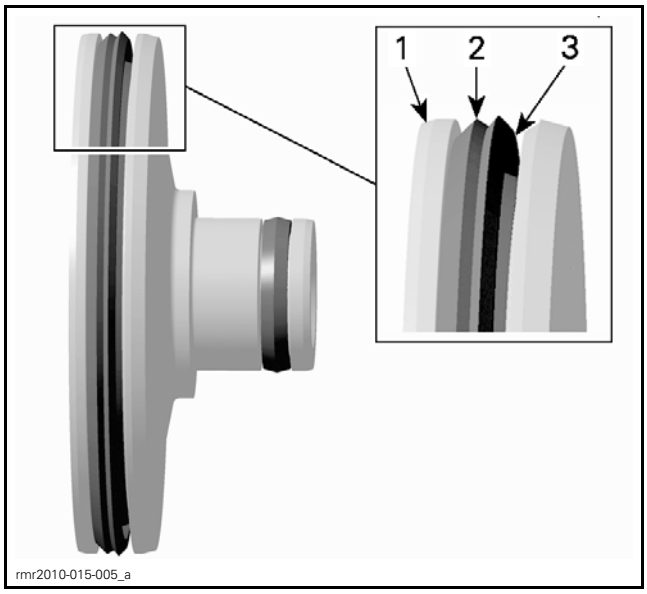
COMPRESSION SPRING FREE LENGTH	
NEW	32.50 mm to 33.50 mm (1.28 in to 1.319 in)
SERVICE LIMIT	32.00 mm (1.26 in)

If the compression spring is out of specifications, replace it.

Hydraulic Piston and Hydraulic Cylinder Sleeve Installation

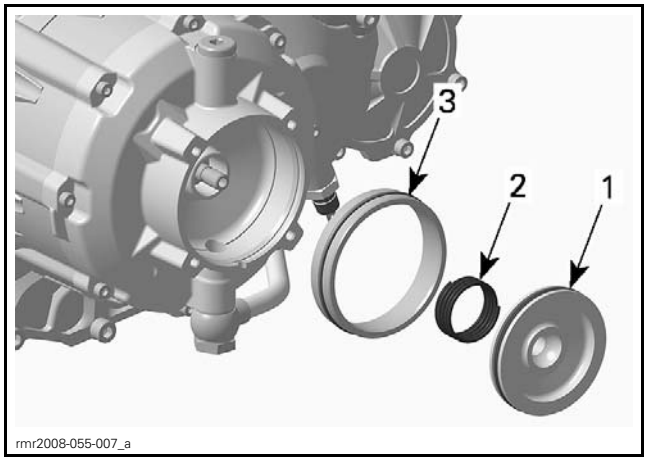
Installation is the reverse of the removal procedure. However, pay attention to following details.

Install **NEW** hydraulic piston seals and hydraulic cylinder sleeve O-ring.



LARGE SEAL POSITIONING
1. Piston
2. Large seal
3. Open side of seal

Coat hydraulic piston, seals, hydraulic cylinder sleeve and O-ring with engine oil before installing them in the clutch cover.



1. Hydraulic piston
2. Compression spring
3. Hydraulic cylinder sleeve

Apply LOCTITE 243 (BLUE) (P/N 293 800 060) to the hydraulic piston nut and torque to 15 N•m (133 lbf•**in**).

Install hydraulic piston cover.

CLUTCH COVER

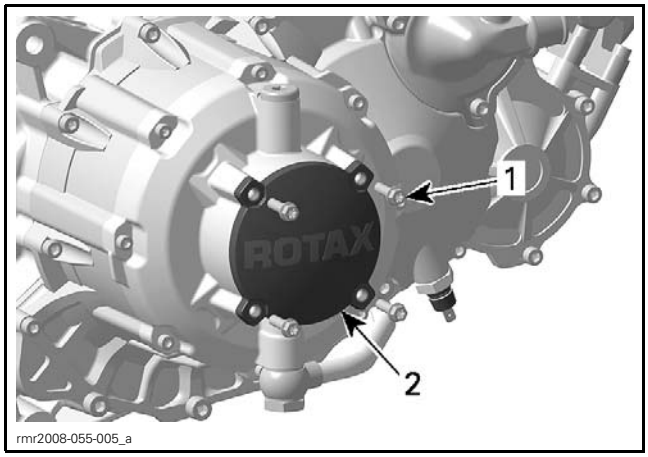
Clutch Cover Removal

Remove RH bottom rear side panel. Refer to the *BODY* subsection.

Lift and safely block RH front of vehicle to prevent engine oil leakage when removing components (if servicing clutch cover in vehicle).

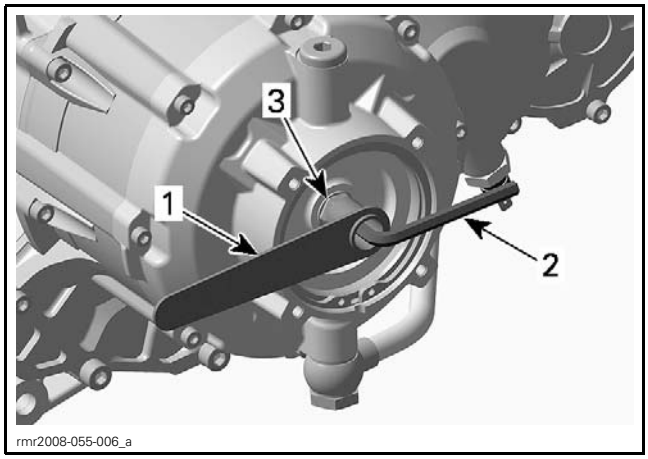
NOTE: Install a drain pan under the clutch cover and oil line to catch engine oil spillage.

Remove hydraulic piston cover screws.



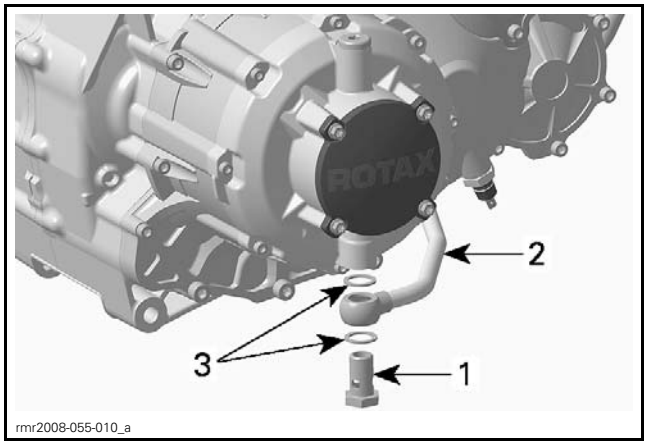
1. Screws (x4)
2. Hydraulic piston cover

Using a 17 mm deep offset wrench, unscrew the hydraulic piston nut **while holding the clutch release shaft** with a 5 mm Allen wrench.



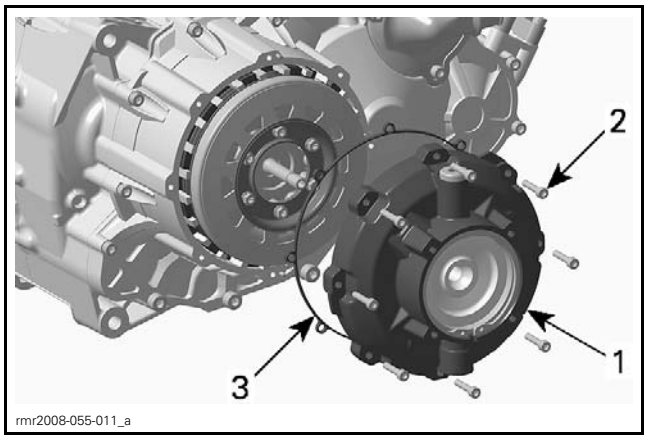
1. Deep offset wrench
2. Allen wrench
3. Hydraulic piston nut

Remove oil hose from clutch cover.



1. Banjo bolt
2. Oil hose
3. Gaskets

Remove clutch cover retaining screws.



1. Clutch cover
2. Retaining screws
3. Gasket

Remove clutch cover from the engine.

Clutch Cover Inspection

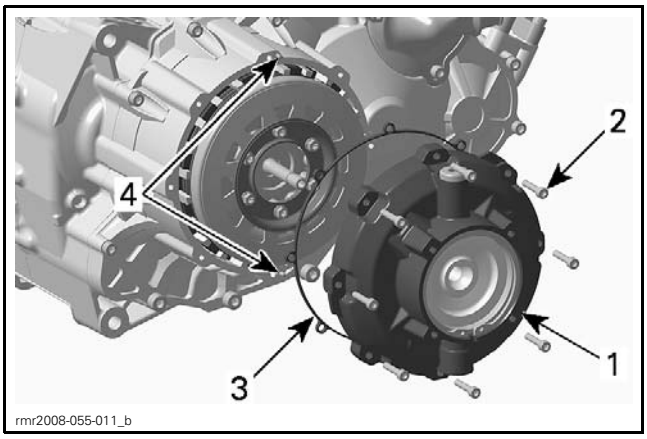
Clean clutch cover and inspect for cracks or other damages.

Clutch Cover Installation

Installation is the reverse of the removal procedure. However, pay attention to following details.

Ensure clutch cover gasket is in good condition and positioned correctly. Replace if necessary.

Ensure the clutch cover is properly positioned on the two alignment pins on the clutch housing.



1. *Clutch cover*
2. *Retaining screws (x8)*
3. *Gasket*
4. *Alignment pins*

NOTE: Install oil line with NEW gasket rings.

PRESSURE RETAINING VALVE

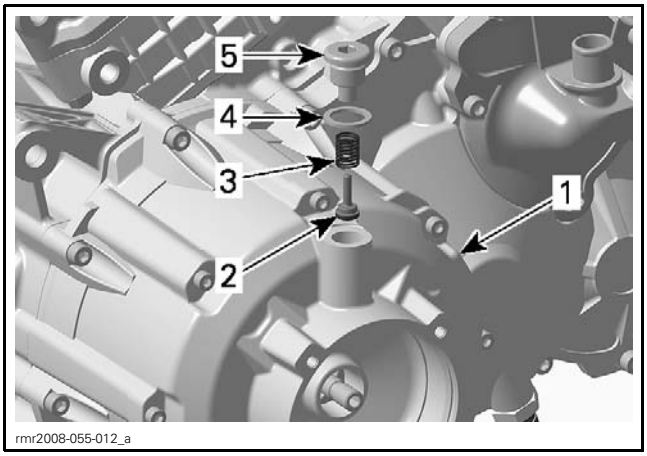
Pressure Retaining Valve Removal

Remove RH bottom rear side panel. Refer to *BODY*.

NOTE: Install a drain pan under clutch cover to catch engine oil.

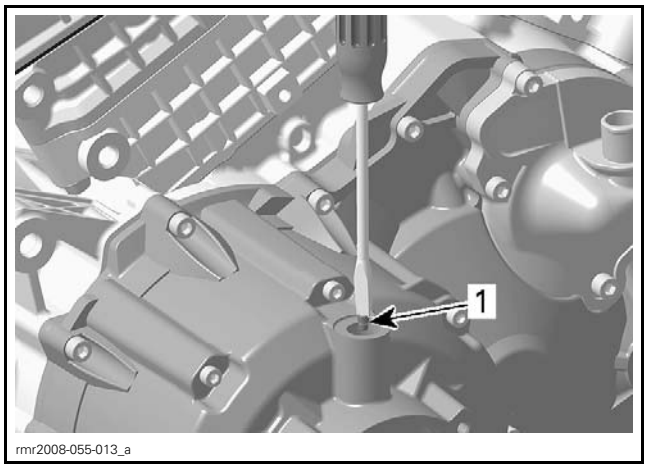
Remove plug screw on top of clutch cover.

Remove pressure retaining valve from clutch cover.



1. *Clutch cover*
2. *Pressure retaining valve*
3. *Compression spring*
4. *Gasket ring*
5. *Plug screw*

Using a flat screw driver, remove air nozzle from clutch cover.



1. *Air nozzle*

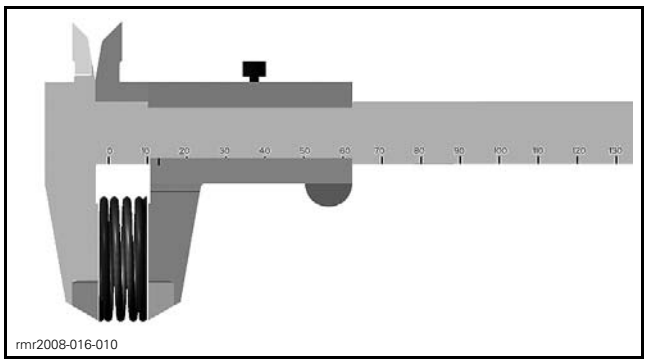
Pressure retaining valve Inspection

Clean all parts and inspect for damage.

NOTE: Ensure the port in the air nozzle is not clogged or dirty. Clean as required.

Compression Spring

Check free length of compression spring.



TYPICAL

COMPRESSION SPRING FREE LENGTH	
NEW	38.00 mm to 39.00 mm (1.496 in to 1.535 in)
SERVICE LIMIT	36.00 mm (1.417 in)

If the compression spring is out of specification, replace it.

Pressure retaining valve Installation

Installation is the reverse of the removal procedure. However, pay attention to following details.

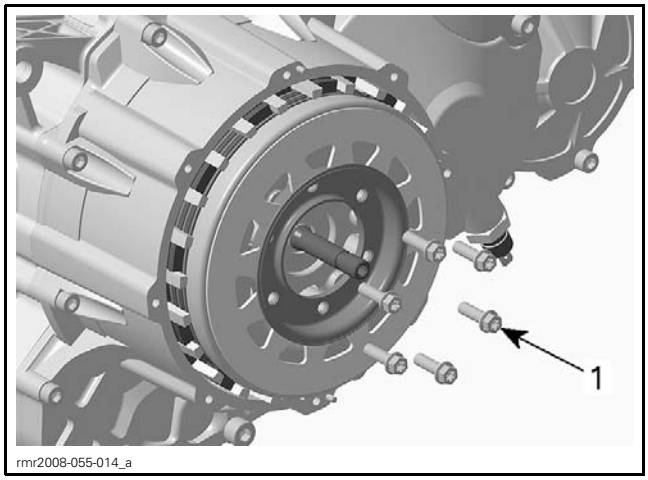
NOTE: Install the plug screw with a NEW gasket.

PRESSURE PLATE AND CLUTCH DISK SPRING

Pressure Plate and Clutch Disk Spring Removal

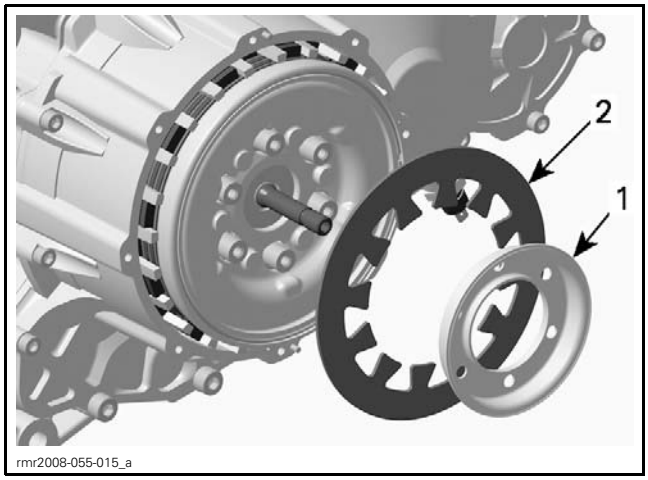
Remove *CLUTCH COVER*, see procedure in this subsection.

Loosen the inner plate retaining screws using a crisscross pattern, then remove them.



1. Inner plate retaining screws (x6)

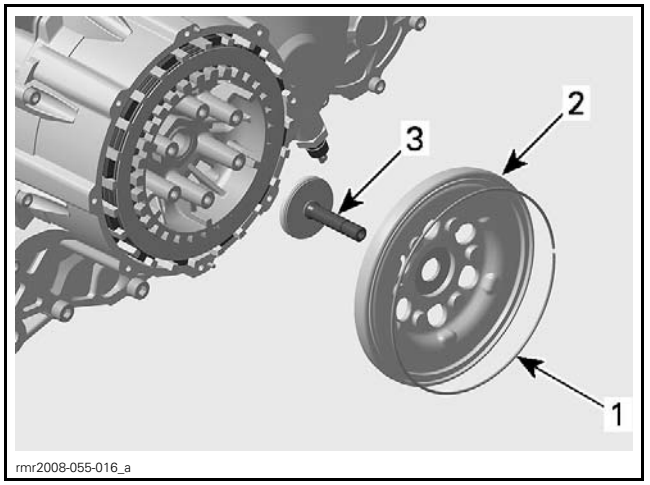
Remove inner plate and disk spring.



1. Inner plate
2. Disk spring

Remove pressure plate with retaining ring and clutch release pin.

Remove retaining ring from pressure plate only if necessary.



1. Retaining ring
2. Pressure plate
3. Clutch release pin

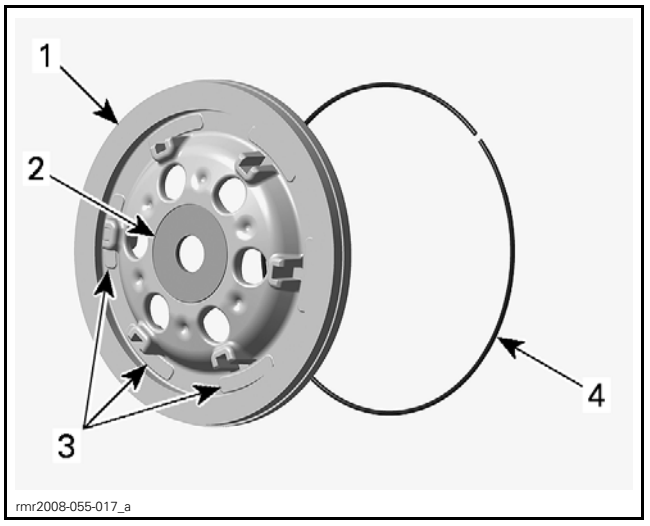
Pressure Plate, Disk Spring and Clutch Release Pin Inspection

Pressure Plate

Inspect pressure plate for cracks or other damages. Replace if necessary.

Inspect pressure plate thrust washer for cracks, wear or other damages. Thrust washer must fit tightly in pressure plate. Replace if necessary.

Inspect retaining ring for damage or wear. Replace if necessary.



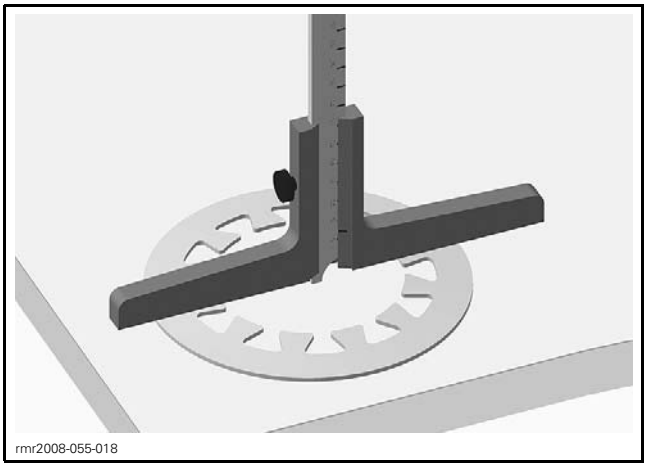
1. Pressure plate
2. Thrust washer
3. Trust surfaces
4. Retaining ring

Disk Spring

Inspect disk spring for cracks, wear or other damages. Replace if necessary.

Place disk spring on a flat surface so that the outer circumference of the disk is flat on the surface. Measure the height of the spring in a crosswise direction, with reference to the flat surface.

DISK SPRING FREE LENGTH	
MINIMUM SERVICE LIMIT	7.00 mm (.2756 in)

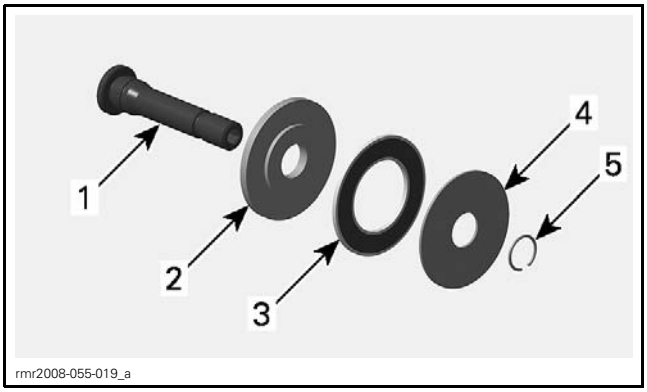


MEASURING DISK SPRING FREE LENGTH

Rotate tool and measure spring free length across several of the disk fingers. Replace disk spring if out of specification.

Clutch Release Pin

Visually inspect clutch release pin, thrust washers and axial needle bearing for wear or other damages. Replace if necessary.

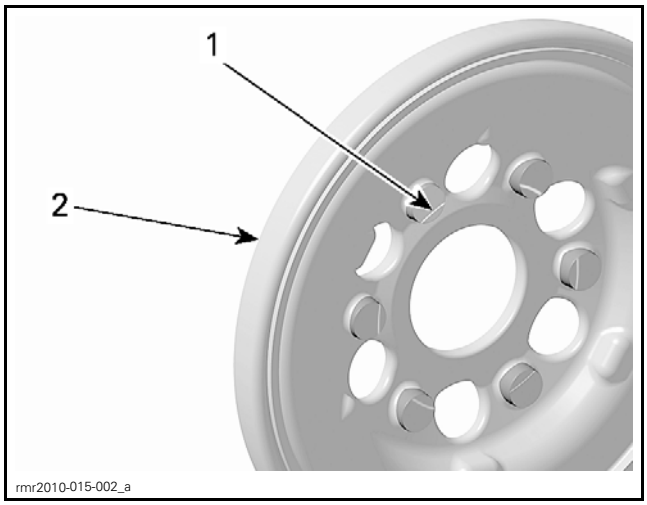


1. *Clutch release pin*
2. *Trust washer*
3. *Axial needle bearing*
4. *Thrust washer*
5. *Retaining ring*

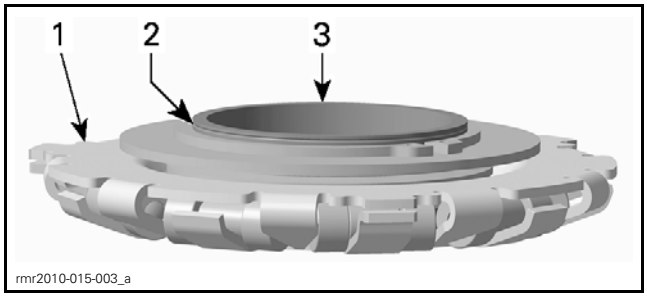
Pressure Plate, Disk Spring and Clutch Release Pin Installation

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

NOTE: The pressure plate must show an identification groove and must be installed with the proper centrifugal clutch assembly equipped with bushing also showing an identification groove.



1. *Identification groove*
2. *Pressure plate*



1. *Centrifugal clutch assy*
2. *Identification groove*
3. *Bushing*

NOTE: Disk spring must be installed with the concave side towards the pressure plate.

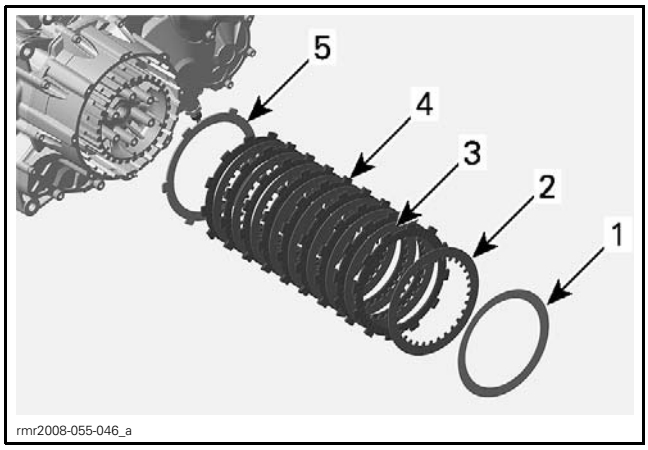
Tighten retaining screws to 11 N•m (97 lbf•**in**) using a crisscross pattern.

CLUTCH PLATES

Clutch Plate Removal

Remove pressure plate. See *PRESSURE PLATE AND CLUTCH DISK SPRING* in this subsection.

Remove friction plates and steel driven plates.



1. *Disk spring*
2. *Adjustment plate*
3. *Steel driven plates*
4. *Friction plates*
5. *Steel driven plate (2.5 mm (.098 in) thick)*

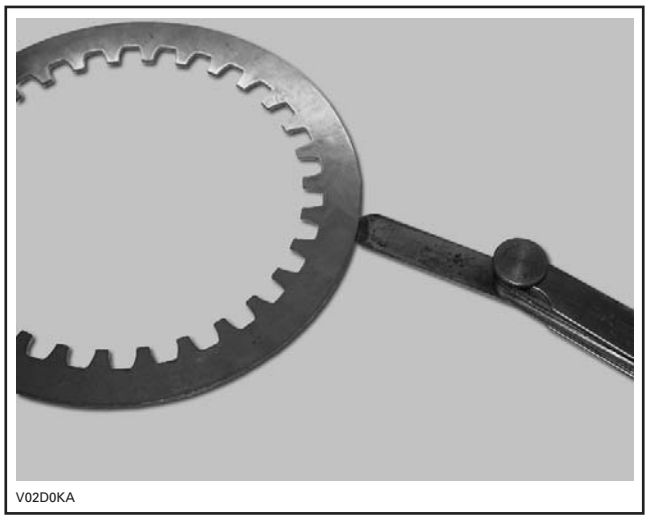
Clutch Plate Inspection

Inspect each plate for cracks, bent or broken teeth, missing or excessively worn friction material and any other damage.

Check friction and steel driven plates for warpage.

Place plates on a flat surface. Use a feeler gauge to measure warpage between plates and flat surface.

FRICTION AND STEEL DRIVEN PLATE WARPAGE	
MAXIMUM SERVICE LIMIT	0.15 mm (.006 in)



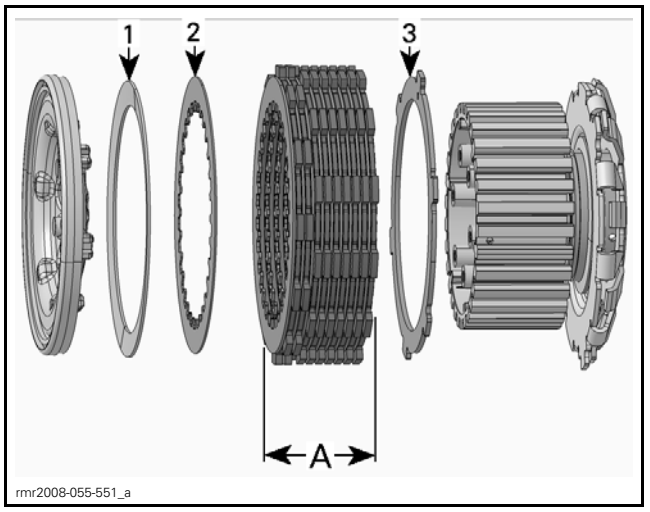
TYPICAL

Plate warpage must not exceed service limit.

Measure the thickness of the clutch plate assembly (friction and steel driven plates).

NOTE: Thickness of the clutch plate assembly is measured **without the disk spring, the adjustment plate and the 2.5 mm (.098 in) thick plate**.

CLUTCH PLATES ASSEMBLY THICKNESS	
MINIMUM SERVICE LIMIT	42.50 mm (1.673 in)



1. *Disk spring*
2. *Adjustment plate*
3. *2.5 mm (.098 in) thick plate*

A. Minimum service limit

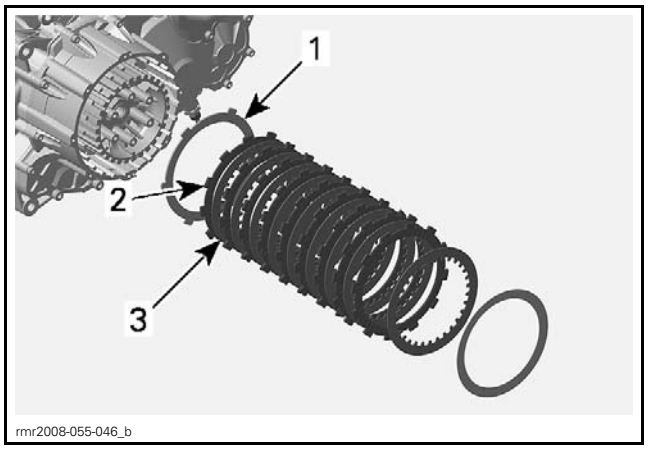
If plates are warped, damaged, or worn out of tolerance, replace all clutch plates.

Clutch Plate Installation and Adjustment

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

Soak the NEW clutch plates in engine oil for 30 minutes before assembly to prevent clutch plate burning during break-in period.

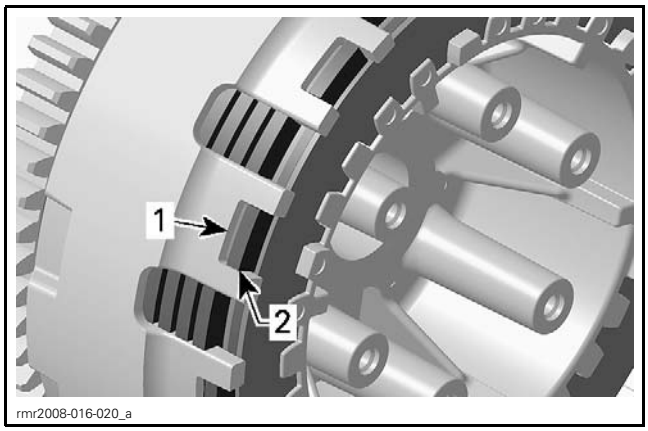
First, install the 2.5 mm (.098 in) thick steel driven plate.



1. *Steel driven plate (2.5 mm (.098 in) thick)*
2. *Friction plate*
3. *Steel driven plate*

Beginning with a friction plate, install friction plates and steel driven plates in alternate order.

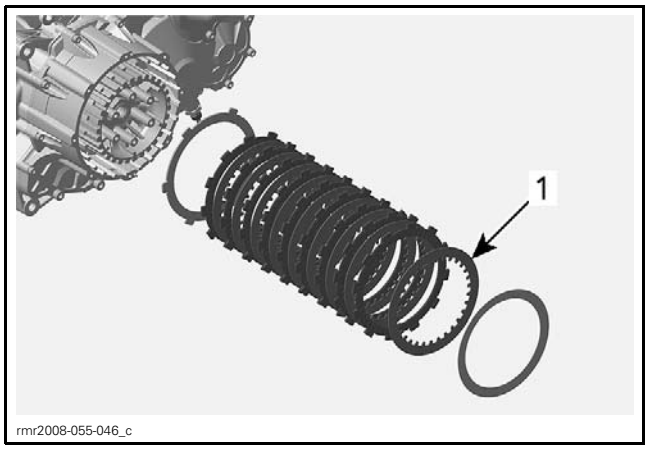
Place the tabs of the last friction plate into the shorter slots of clutch drum.



1. Shorter slot
2. Last friction plate

Clutch Free-Play Adjustment

NOTE: The clutch free play is adjusted by installing an adjustment plate of the appropriate thickness. Adjustment plates of a variety of thicknesses are available for this purpose. The adjustment plates come in a kit of 11 plates. They range in thickness from 1 mm to 2 mm (.039 in to .079 in) in 0.1 mm (.004 in) increments.



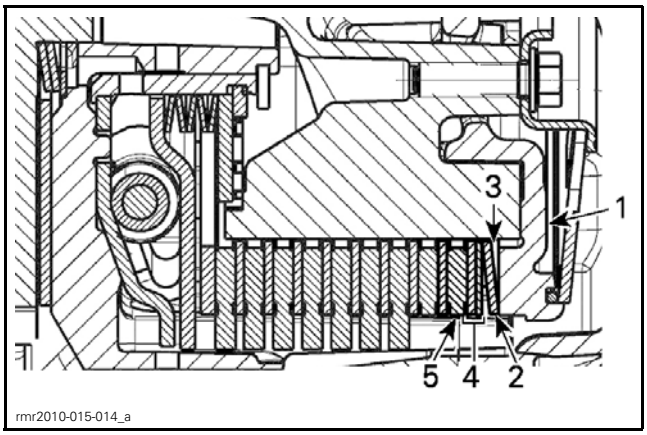
1. Adjustment plate

The thickness of the adjustment plate needs to be determined using the following procedure.

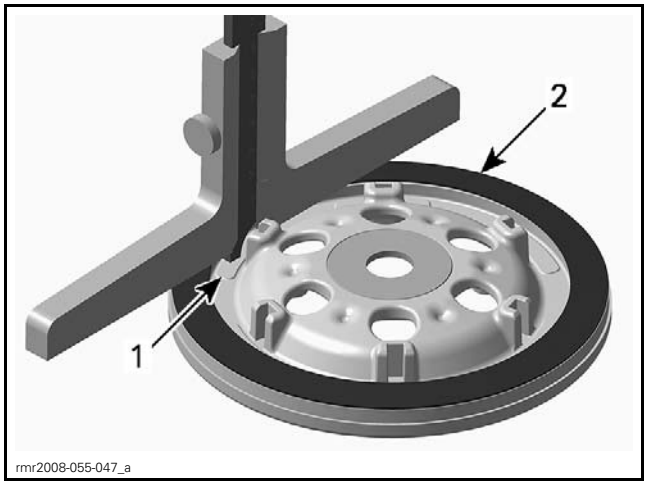
Measurement A

Install the disk spring on the pressure plate and measure the distance from the top of the disk spring to the machined surface of the pressure plate.

⚠ CAUTION Disk spring must be installed with the concave side towards the pressure plate. Incorrectly assembled disk spring can cause a clutch malfunction. Clutch will not disengage.



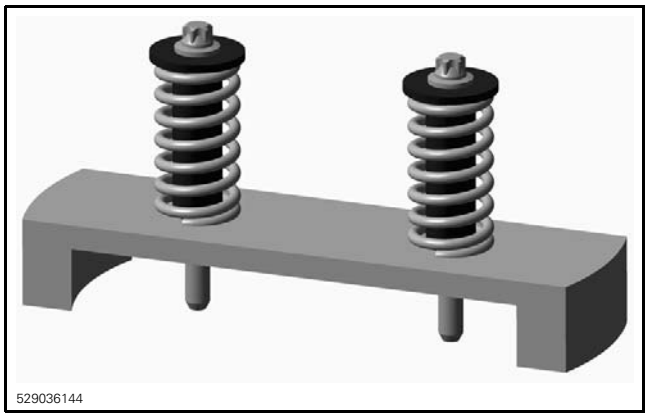
1. Pressure plate
2. Disk spring
3. Assembly direction of disk spring
4. Adjustment plates
5. Friction plate



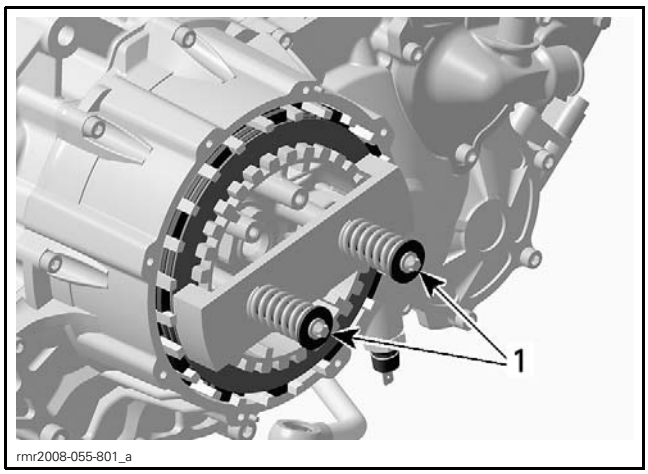
MEASUREMENT A
1. Machined surface on pressure plate
2. Disk spring

Measurement B

Use the CLUTCH PACK COMPRESSION TOOL (P/N 529 036 144).



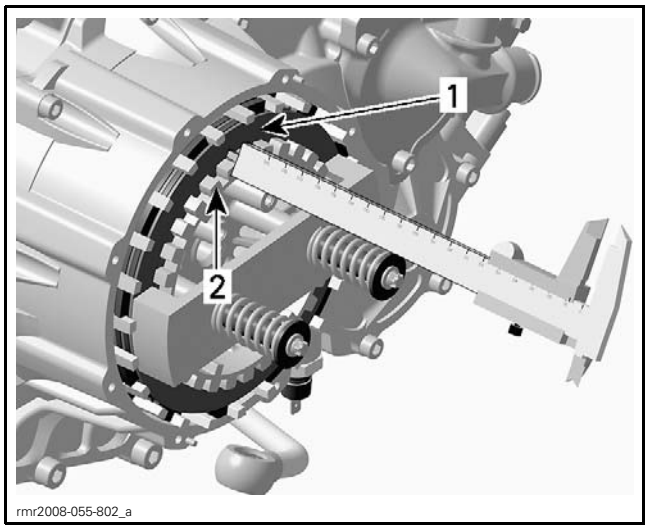
Install the tool on top of the plate assembly.



1. Tool installed

Alternately tighten tool screws to eliminate unevenness and to recover all play between plates.

Measure the distance from the top of the clutch hub to the top of the last friction plate.



MEASUREMENT B
1. Top of friction plate
2. Top of clutch hub

Use the following course of calculation to determine the thickness of the adjustment plate.

Adjustment plate thickness = B - A - 1 mm (.039 in)

For example: B 10.3 mm (4.055 in) - A 7 mm (.276 in) - 1 mm (.039 in) = 2.3 mm (.906 in)

Install a 2.3 mm (.906 in) thick adjustment plate.

EXAMPLE	
B=	10.3 mm
A=	- 7.0 mm
Subtract B from A	= 3.3 mm
Subtract 1mm	- 1 mm
Adjustment plate thickness equals	= 2.3 mm

NOTE: If necessary 2 plates of the adjustment plate kit can be installed to achieve the proper thickness of the adjustment plate.

For example: To get a 2.3 mm (.906 in) thick adjustment plate install a1.0 mm (.033 ft) plus a 1.3 mm (.043 ft) thick adjustment plate.

Reinstall remaining parts, refer to the appropriate instructions.

CLUTCH HOUSING

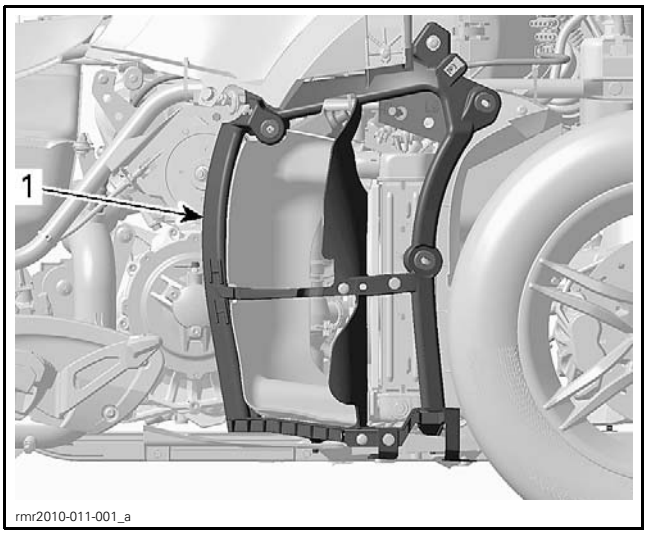
Clutch Housing Removal

Engine Installed in Vehicle

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

Drain engine oil, refer to *LUBRICATION SYSTEM*.

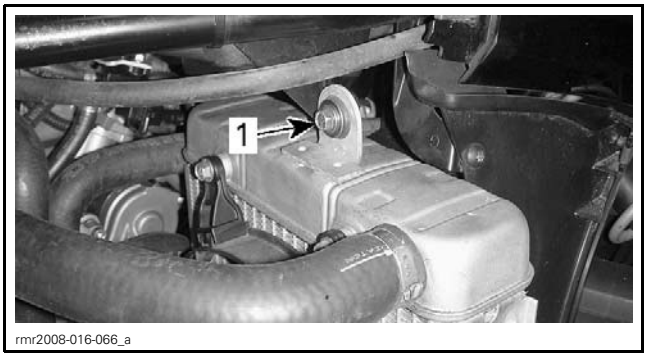
Drain engine coolant. Refer to *COOLING SYSTEM*.

Disconnect coolant hose from top of thermostat.

Disconnect coolant hose from top of radiator.

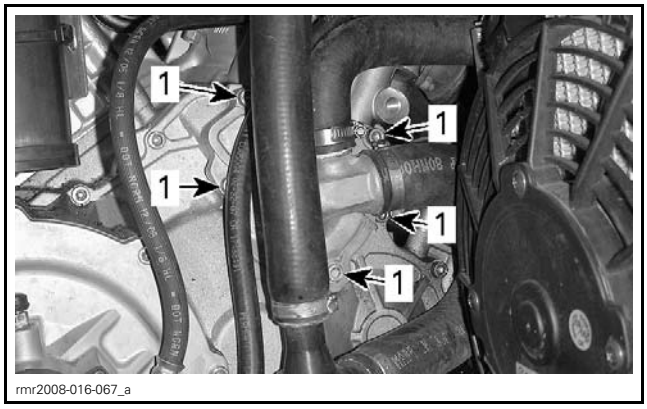
Disconnect the top coolant hose of the water pump cover.

Remove the radiator retaining bolt.



TYPICAL - TOP OF RADIATOR
1. Radiator retaining bolt

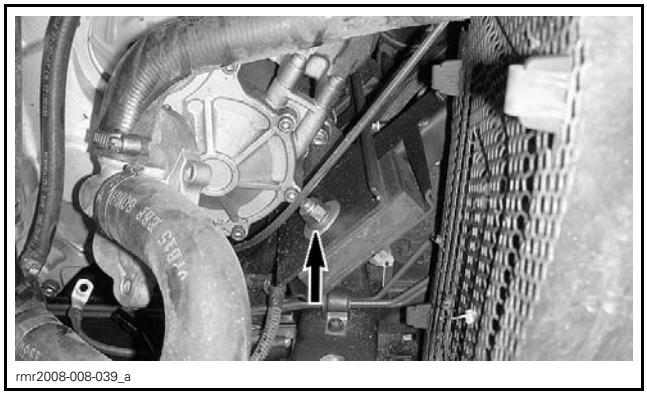
Remove water pump cover screws.



TYPICAL
1. Water pump cover screws

Disconnect cooling fan connector.

Remove the front engine mount bolt.

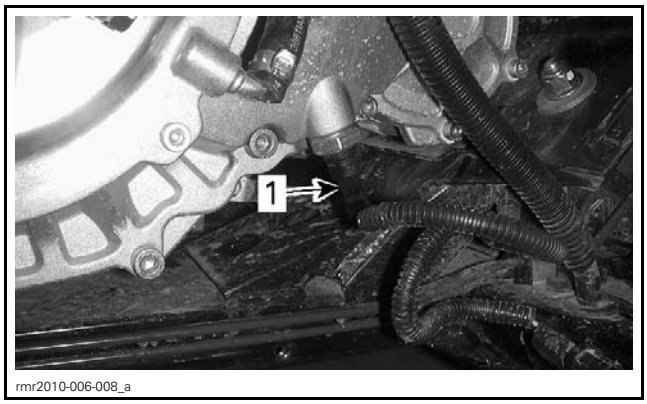


TYPICAL

Remove radiator, thermostat and water pump cover as an assembly.

Remove *CLUTCH COVER*. See procedure in this subsection.

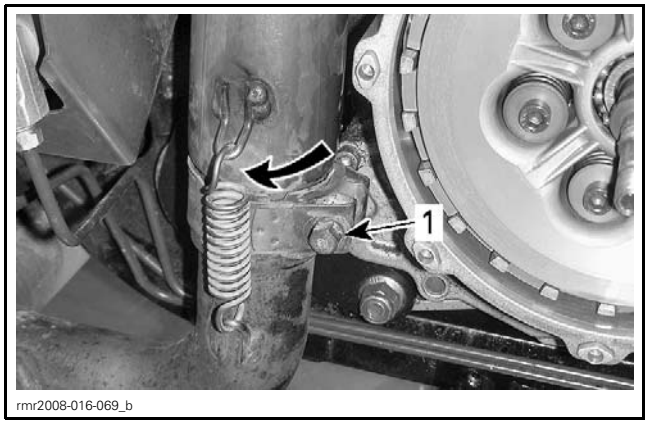
Disconnect the oil pressure switch connector.



1. Oil pressure switch connector

Remove exhaust spring.

Loosen exhaust clamp and turn it in order to the screw clutch housing screw behind.



TYPICAL
1. Exhaust clamp

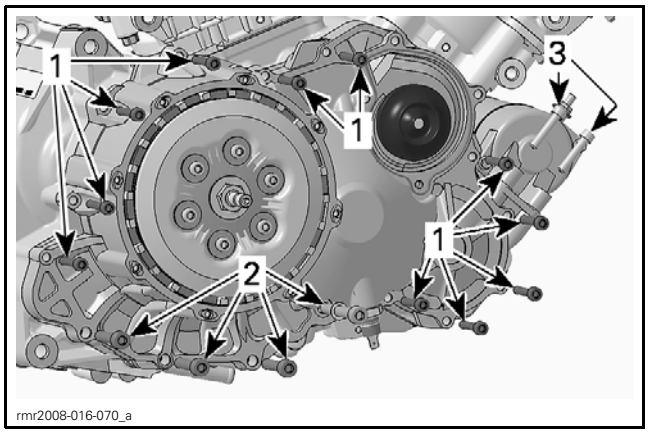
Complete the clutch housing removal by following the steps detailed in *ENGINE REMOVED FROM VEHICLE*.

Engine Removed from Vehicle

Place a drain pan under the clutch housing to catch oil spillage.

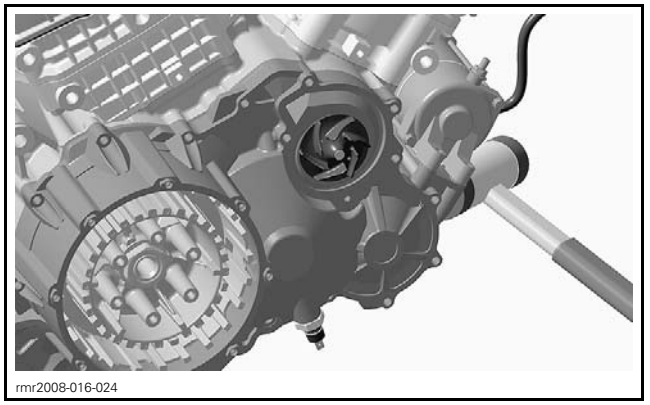
Remove starter screws.

Remove all clutch housing screws.



TYPICAL
1. M6 retaining screws (11)
2. M8 retaining screws (4)
3. M6 Starter retaining screws (2)

Remove the clutch housing. Gently tap on clutch housing using a soft rubber mallet to separate it the from the crankcase.



TYPICAL

Clutch Housing Inspection

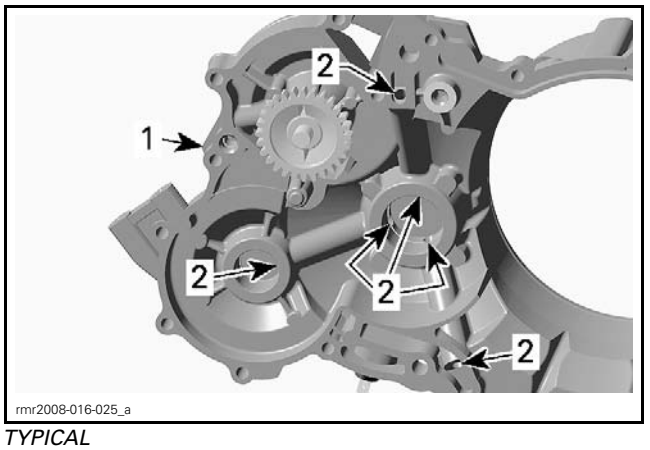
Inspect the clutch housing for cracks or other damages. Replace if necessary.

Check sealing surface for flatness.

Clean oil orifices in clutch housing from contaminants using PULLEY FLANGE CLEANER (P/N 413 711 809), then use an air gun to dry it.

⚠ WARNING

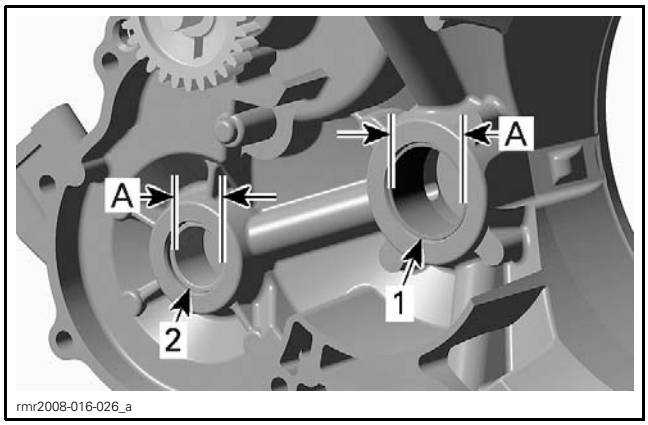
Always wear skin and eye protection. Chemicals can cause skin rash, skin burns and severe eye injury.



TYPICAL
1. Clutch housing
2. Clean oil bores

Inspect plain bearings for scoring or other damages.

Measure plain bearing inside diameters and compare to the crankshaft and balance shaft journal diameters (support bearings). Refer to *BOTTOM END* subsection. Replace if measurement is out of specification.



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TYPICAL
1. *Plain bearing (crankshaft support)*
2. *Plain bearing (balance shaft support)*

A. Measure plain bearing inside diameter

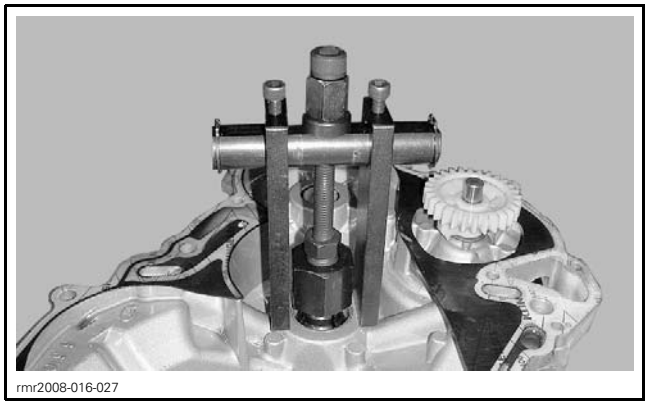
SERVICE LIMIT OF PLAIN BEARING INSIDE DIAMETER	
Crankshaft support bearing	30.040 mm (1.1827 in)
Balance shaft support bearing	20.060 mm (.7898 in)

Plain Bearing Replacement in Clutch Housing

Plain Bearing Removal

Mark the joint locations of the plain bearing segments on the clutch housing, prior to removing the plain bearings.

Pull out the plain bearings using the BLIND HOLE BEARING PULLER SET (P/N 529 036 117).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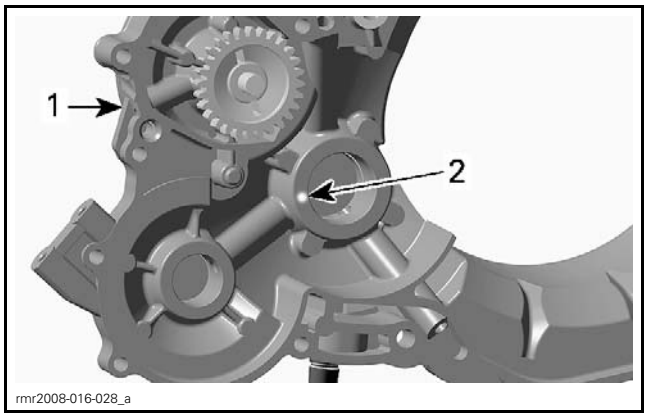
Plain Bearing Installation

Crankshaft support plain bearings are available in 3 tolerance groups (red, blue and yellow). The proper tolerance group is marked with paint on the clutch housing.



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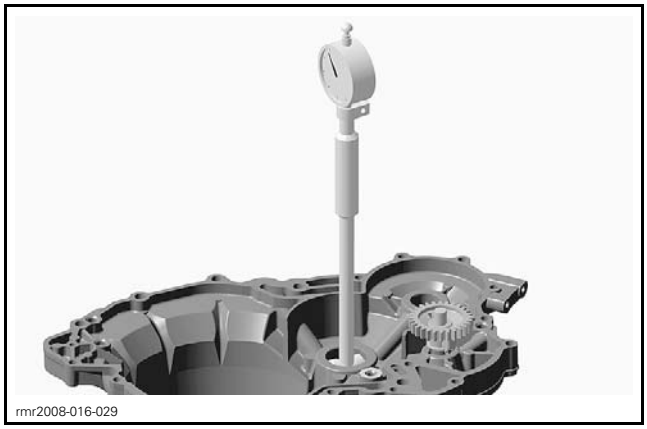
TYPICAL
1. *Clutch housing*
2. *Marking of tolerance group*

If paint marking is not visible anymore, measure inside diameter of clutch housing bore where plain bearings are inserted.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MEASURE CLUTCH HOUSING BORE DIAMETER

Use the following table to find proper tolerance group of plain bearing.

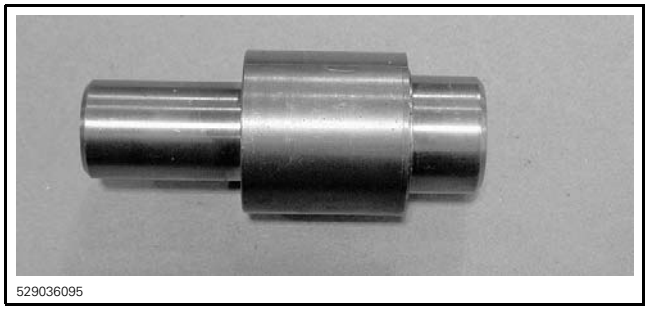
CLUTCH HOUSING BORE DIAMETER	PLAIN BEARING TOLERANCE GROUP
32.921 mm to 32.930 mm (1.2961 in to 1.2965 in)	Red
32.930 mm to 32.940 mm (1.2965 in to 1.2969 in)	Blue
32.940 mm to 32.951 mm (1.2969 in to 1.2973 in)	Yellow

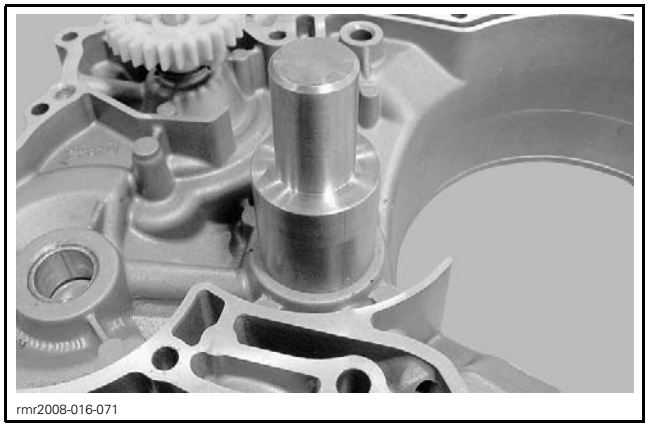
NOTICE **Unless otherwise instructed, never use a hammer to install plain bearings. Plain bearings should only be installed using a press.**

Heat clutch housing up to 100°C (212°F) before installing plain bearings.

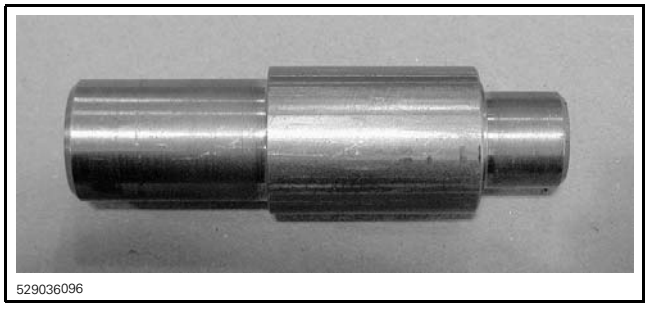
Install plain bearings using the appropriate plain bearing installer.

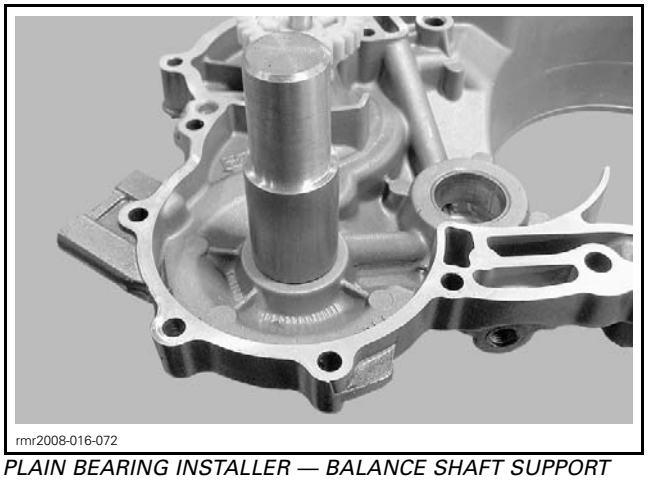
PLAIN BEARING	SERVICE TOOL PART NUMBER
Crankshaft support bearing	529 036 095
Balance shaft support bearing	529 036 096





PLAIN BEARING INSTALLER — CRANKSHAFT SUPPORT BEARING





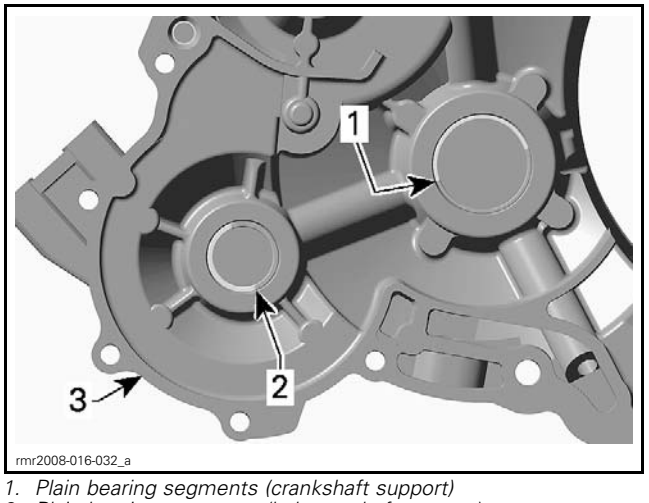
PLAIN BEARING INSTALLER — BALANCE SHAFT SUPPORT BEARING

Fit the plain bearings with PETAMO GREASE GHY 133N (P/N 420 899 271).

Support the clutch housing with a suitable support under the bearing seat. Use an O-ring to hold the plain bearings together during installation. Then carefully press-in the plain bearings.

NOTE: Remove O-ring just before plain bearings are completely pressed in.

NOTICE **The plain bearing segments must be positioned as marked during removal.**



1. *Plain bearing segments (crankshaft support)*
2. *Plain bearing segments (balance shaft support)*
3. *Clutch housing*

Clutch Housing Installation

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

Install a NEW clutch housing gasket and NEW sealing washers.

Lubricate plain bearings with PETAMO GREASE GHY 133N (P/N 420 899 271), before installing clutch housing.

Torque clutch housing screws using a crisscross pattern.

Reinstall remaining parts, refer to the appropriate instructions.

CLUTCH HUB

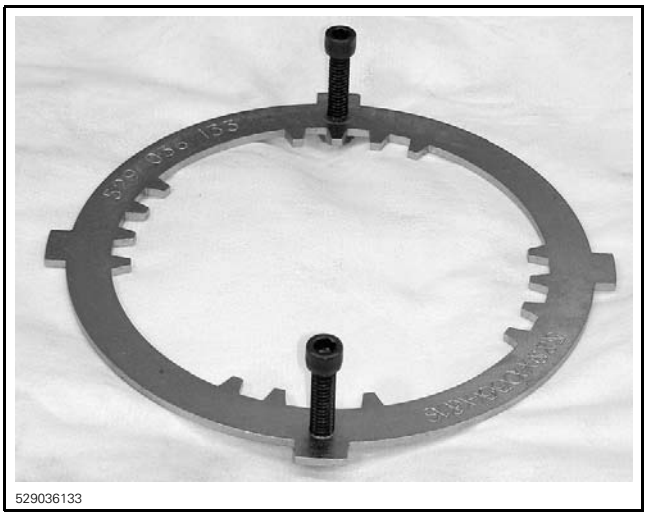
Clutch Hub Removal

Remove:
- Clutch cover
- Pressure plate
- Clutch plates.

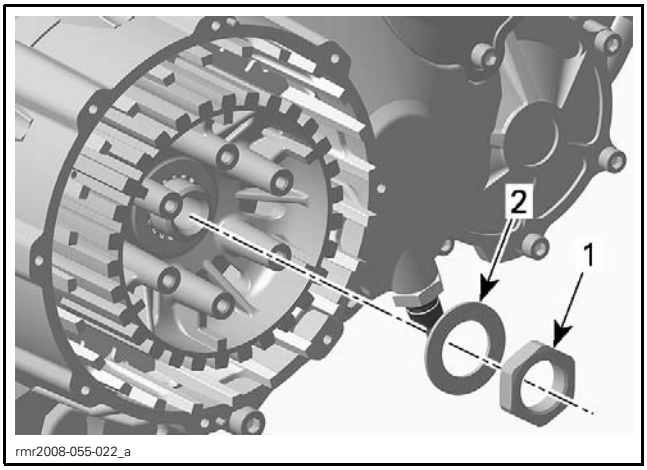
See procedures in this subsection.

Lock crankshaft in TDC position, refer to *CRANKCASE AND CRANKSHAFT*.

Install CLUTCH ASSEMBLY HOLDER (P/N 529 036 133).

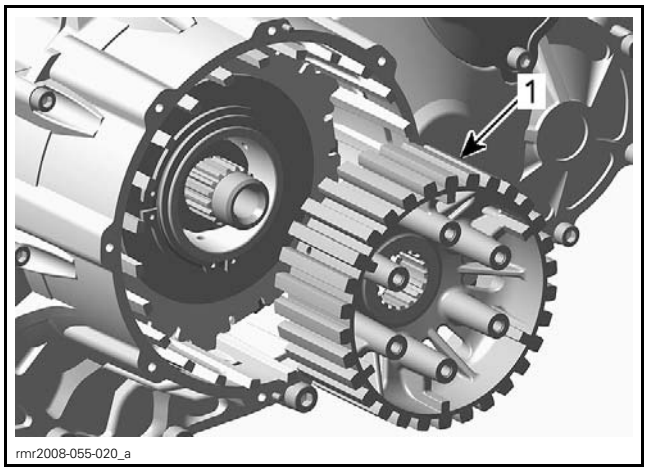


Remove the clutch hub retaining nut and spring washer.



1. *Clutch hub retaining nut*
2. *Spring washer*

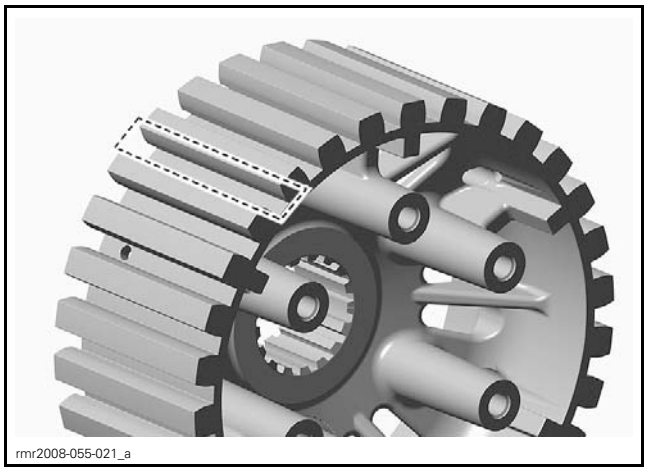
Remove clutch hub.



1. *Clutch hub*

Clutch Hub Inspection

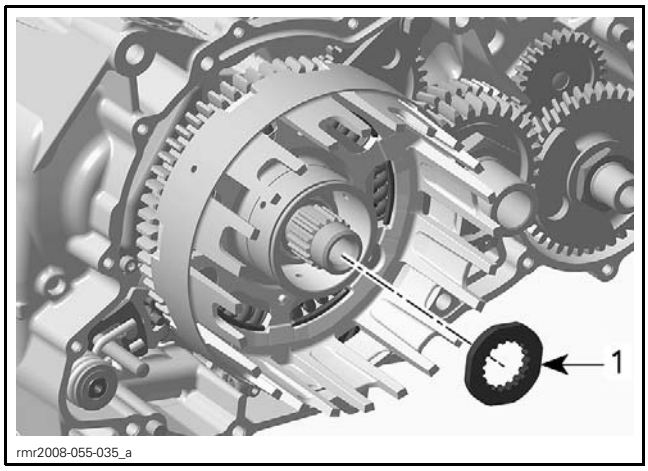
Inspect grooves in clutch hub for damages or wear caused by steel driven plates. Replace if necessary.



INSPECT GROOVES IN CLUTCH HUB FOR WEAR

Clutch Hub Installation

Ensure thrust washer is installed on clutch shaft ahead of clutch drum assembly before installing the clutch hub.

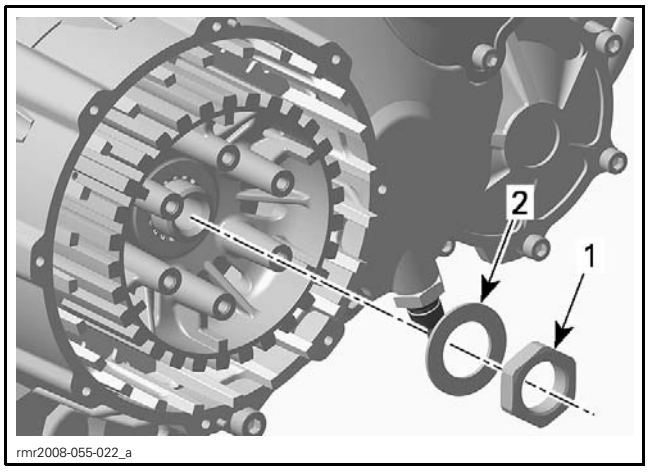


1. Clutch drum thrust washer

Apply PETAMO GREASE GHY 133N (P/N 420 899 271) on clutch hub teeth.

Insert clutch hub.

Reinstall spring washer and hub retaining nut.



1. Clutch hub retaining nut
2. Spring washer

Apply LOCTITE 648 (GREEN) (P/N 413 711 400) on hub retaining nut threads.

Torque nut to 190 N•m (140 lbf•ft).

Reinstall remaining parts, refer to the appropriate instructions in this subsection.

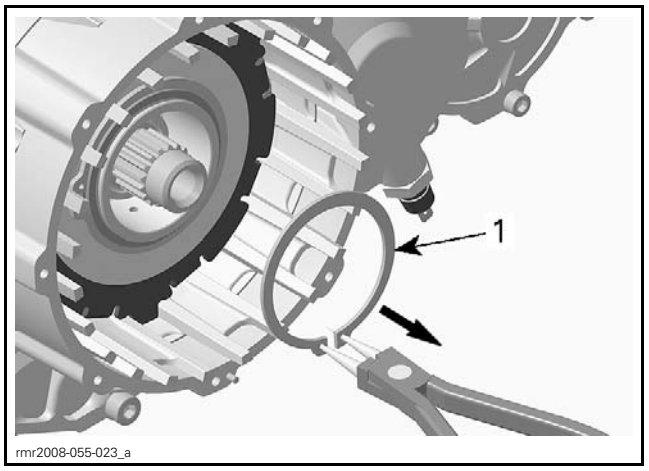
CENTRIFUGAL CLUTCH

Centrifugal Clutch Removal

Remove the following components, see procedure in this subsection.

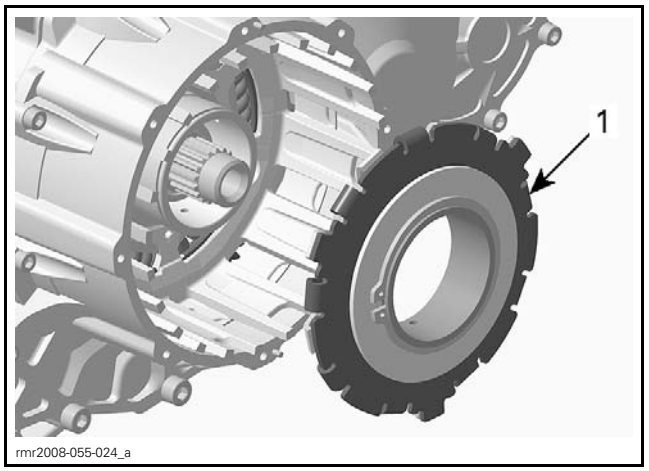
– Clutch cover
– Pressure plate
– Clutch plates
– Clutch hub.

Remove retaining ring.



1. Retaining ring

Remove centrifugal clutch assembly.



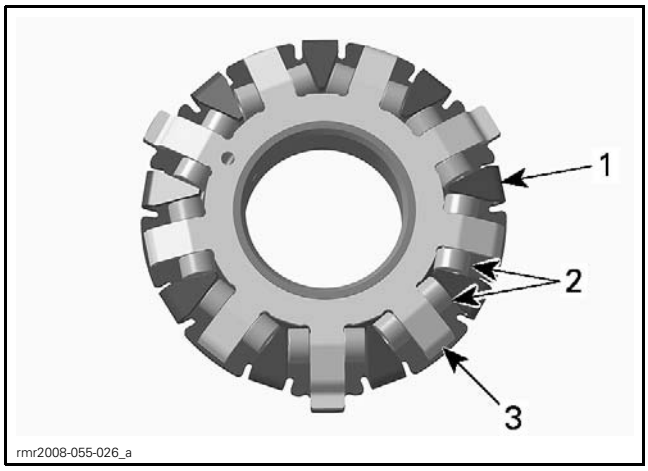
1. Centrifugal clutch assembly

Centrifugal Clutch Disassembly

Clean and thoroughly dry the centrifugal clutch assembly to remove all lubricating oil.

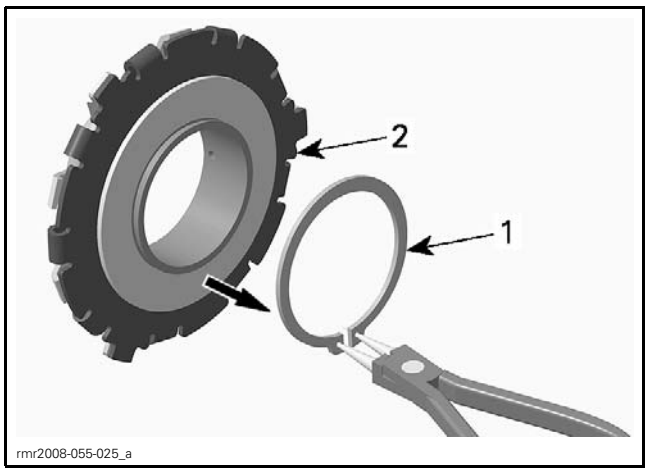
Using a permanent marker to number the position of the pressure plate, cam and centrifugal weights (rollers), so they may be reassembled in the same position.

NOTE: Mark the position of the pressure plate, cam and centrifugal weights, prior to disassembling them.



1. Pressure plate
2. Centrifugal weights (rollers)
3. Cam

Remove retaining ring.



1. Retaining ring
2. Centrifugal clutch assembly

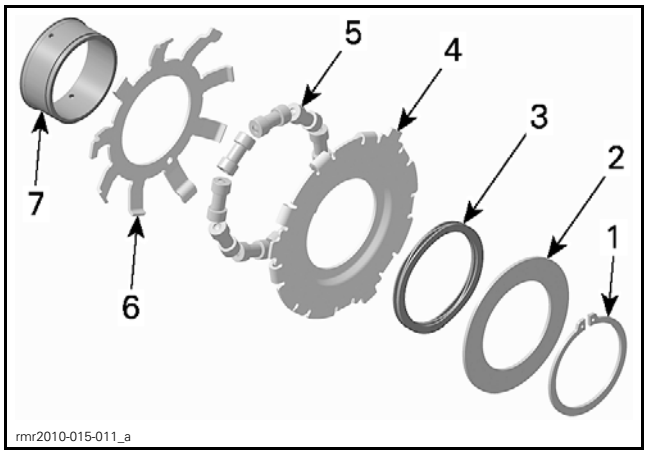
Remove stop plate.

Remove wave spring.

Remove pressure plate.

Remove centrifugal weights.

Remove cam.



1. Retaining ring
2. Stop plate
3. Wave spring
4. Pressure plate
5. Centrifugal weights
6. Cam
7. Bushing

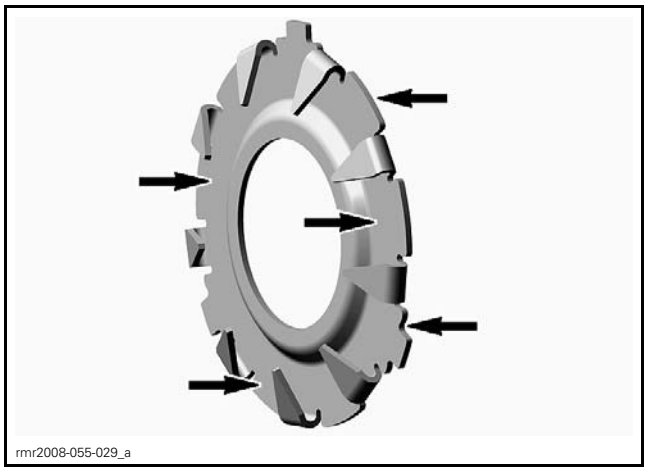
Centrifugal Clutch Inspection

Inspect stop plate for cracks or abnormal wear. Replace if necessary.

Pressure Plate

Inspect pressure plate for cracks, deformation or abnormal wear. Replace if necessary.

Inspect the thrust surfaces on both sides of the pressure plate for abnormal wear or grooves.



INSPECT THRUST SURFACE OF PRESSURE PLATE

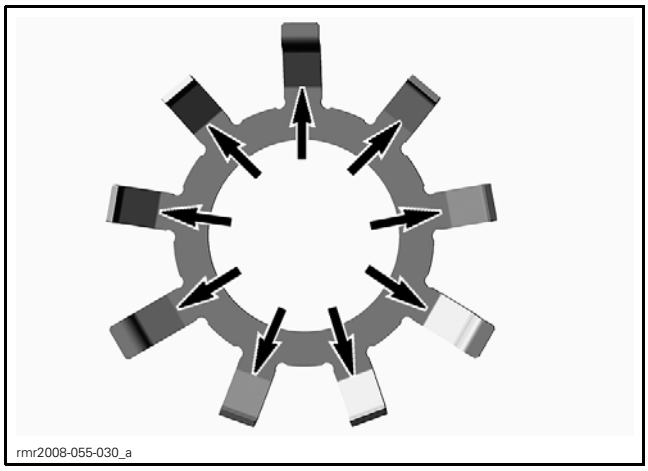
Centrifugal Weights

Inspect centrifugal weights for scoring and wear. Check if needle bearings of centrifugal weights move freely. Replace if necessary.

Cam

Inspect cam for cracks, deformation or abnormal wear. Replace if necessary.

Inspect the cam thrust surfaces for grooves or abnormal wear.

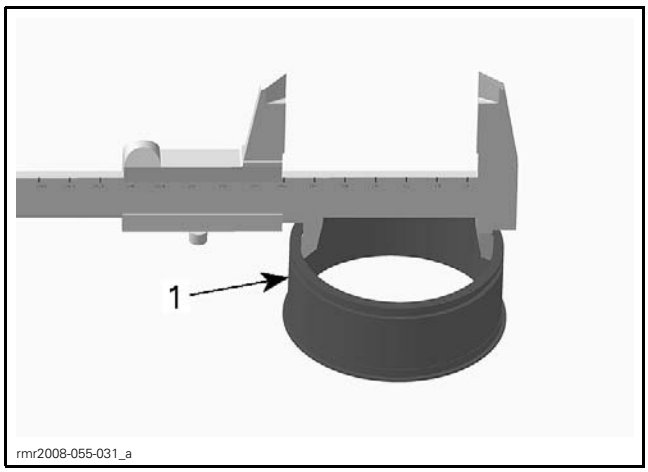


INSPECT THE CAM THRUST SURFACES

Bushing

Inspect bushing for cracks, grooves, or abnormal wear. Replace if necessary.

Measure inner diameter of bushing.



INNER DIAMETER MEASUREMENT
1. Bushing

BUSHING INNER DIAMETER	
MAXIMUM SERVICE LIMIT	63.10 mm (2.484 in)

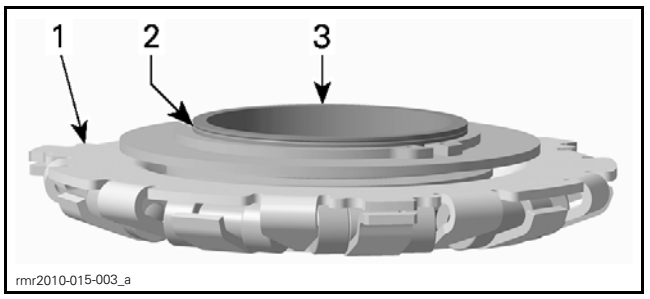
Replace bushing if inner diameter is worn beyond specification.

Centrifugal Clutch Assembly

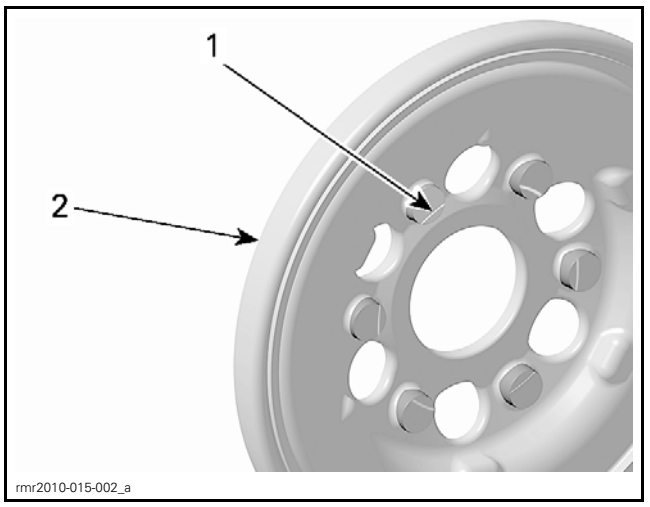
NOTICE **Assemble the centrifugal clutch with the utmost care. Failure to strictly follow procedures may cause parts to loosen and/or malfunction of clutch, and may lead to serious engine damage.**

Centrifugal clutch assembly is the reverse of disassembly. However, pay attention to the following details.

NOTE: Centrifugal clutch assembly must be equipped with bushing showing a identification groove and must be installed together with the proper pressure plate also showing an identification groove.

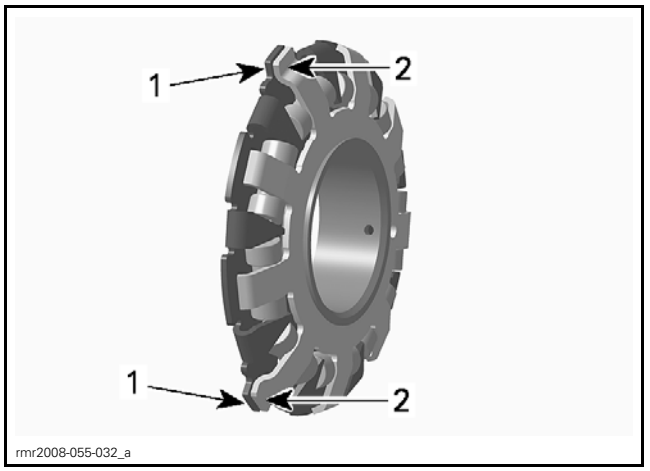


1. Centrifugal clutch assembly
2. Identification groove
3. Bushing



1. Identification groove
2. Pressure plate

Assemble cam and pressure plate so the longer fingers are facing each other.



PRESSURE PLATE AND CAM ALIGNMENT
1. Pressure plate long fingers
2. Cam long fingers

NOTE: Be sure to align corresponding numbers on cam, pressure plate and centrifugal weights (rollers) as marked prior to disassembly.

Insert the assembled clutch pressure plate, cam and weights over the bushing with the clutch pressure plate on top.

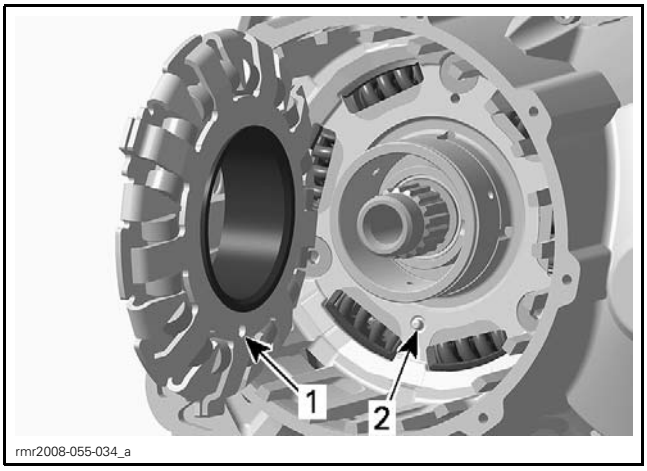
Install wave spring, stop plate and retaining ring.

Centrifugal Clutch Installation

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

Install centrifugal clutch with cam alignment hole in line with clutch drum alignment pin.

NOTICE **Make sure to correctly position centrifugal clutch in the clutch drum.**



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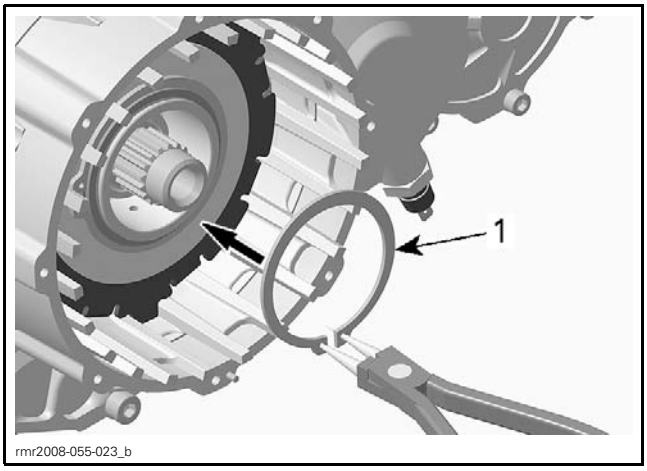
1. Alignment hole in centrifugal clutch
2. Alignment pin on clutch drum

Install centrifugal clutch retaining ring.



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1. Centrifugal clutch retaining ring

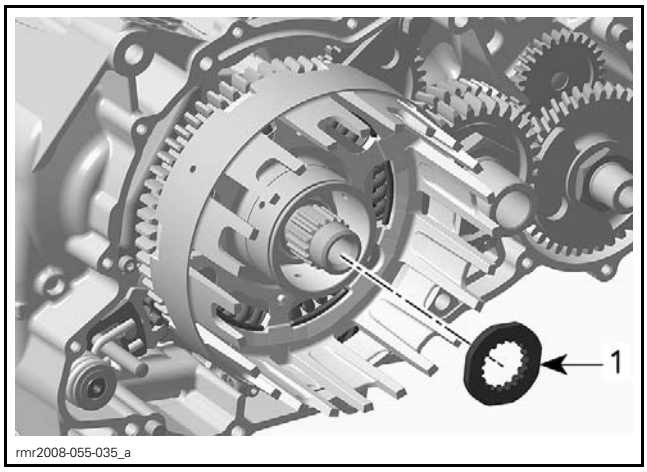
CLUTCH DRUM

Clutch Drum Removal

Remove the following items, see procedures in this subsection.

– Clutch cover
– Clutch disk assembly
– Clutch hub
– Centrifugal clutch assembly.

Remove the clutch drum thrust washer.



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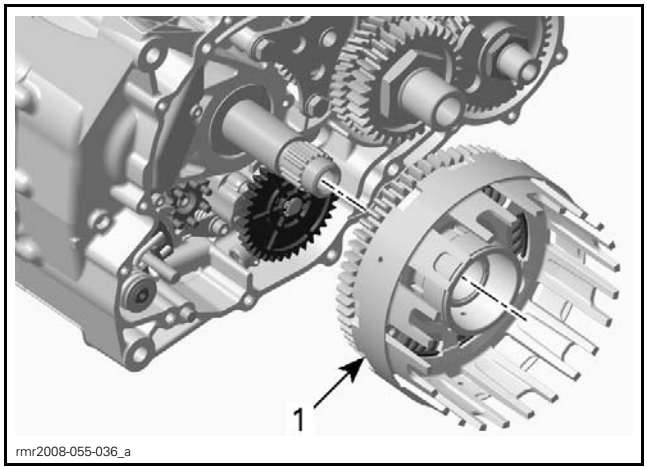
1. Clutch drum thrust washer

Remove the clutch drum.



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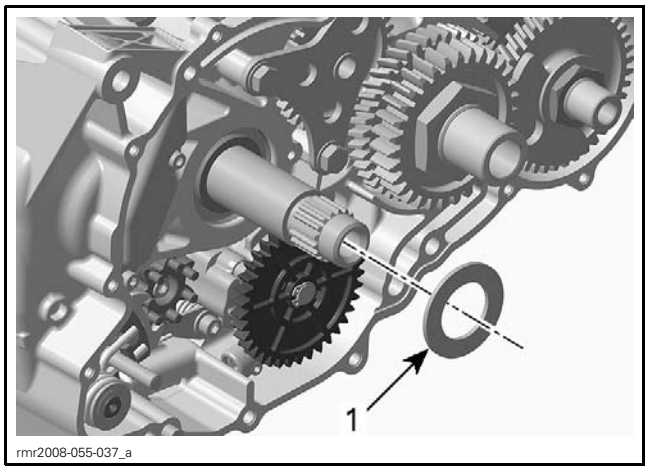
1. Clutch drum

Remove the thrust washer.



1. Thrust washer

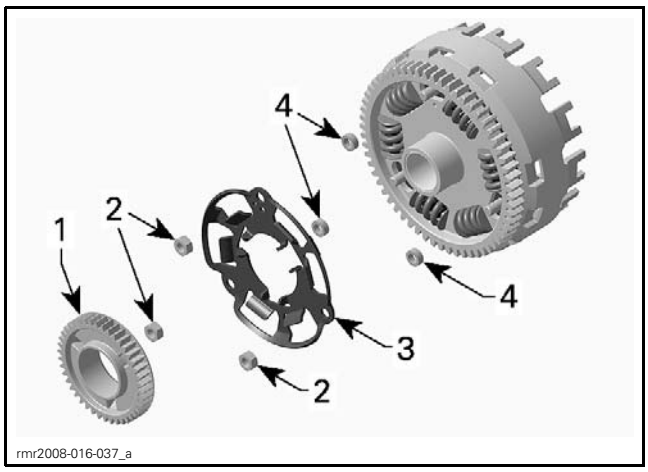
Clutch Drum Disassembly

Remove the oil pump drive gear.

Remove retaining nuts.

Remove the outer support plate.

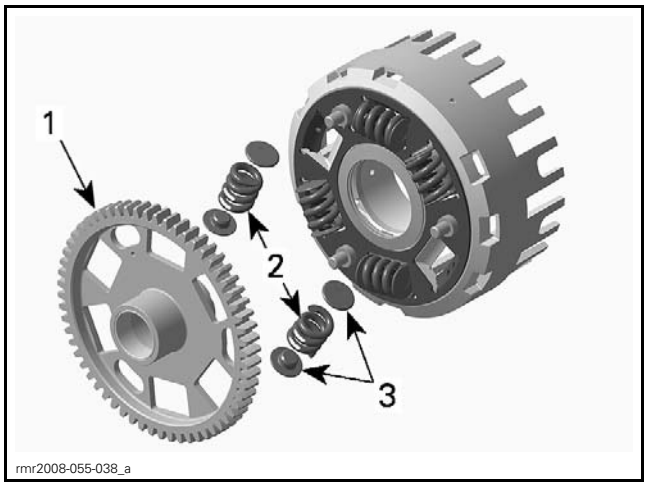
Remove distance sleeves.



1. Oil pump drive gear
2. Retaining nuts
3. Outer support plate
4. Distance sleeves

NOTE: Mark the position of springs and retainers, prior to removing them.

Remove clutch drum and gear together as well as both white marked springs and their spring retainers.



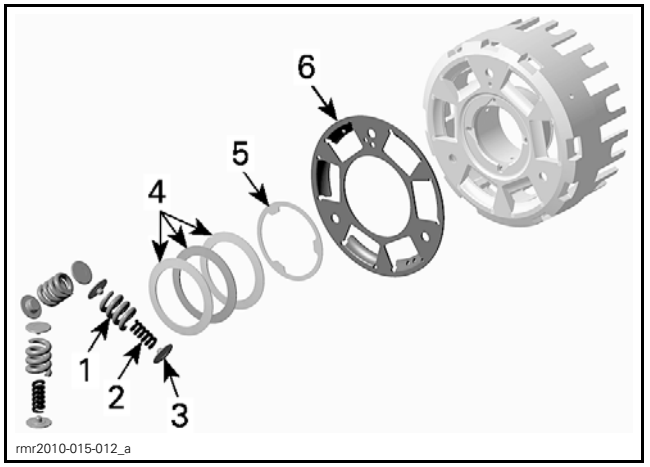
1. Clutch drum gear
2. Springs with white marks
3. Spring retainers

Remove all other springs with their spring retainers.

Remove the disc springs.

Remove the thrust washer.

Remove the inner support plate.



1. Outer compression springs
2. Inner compression springs
3. Spring retainers
4. Disc springs
5. Thrust washer
6. Inner support plate

Clutch Drum Inspection

Compression Springs and Retainers

Measure free length of each compression spring, refer to the following table.

COMPRESSION SPRING FREE LENGTH	
SERVICE LIMIT	
Outer springs and white marked springs	26.75 mm (1.053 in)
Inner springs	25.65 mm (1.01 in)

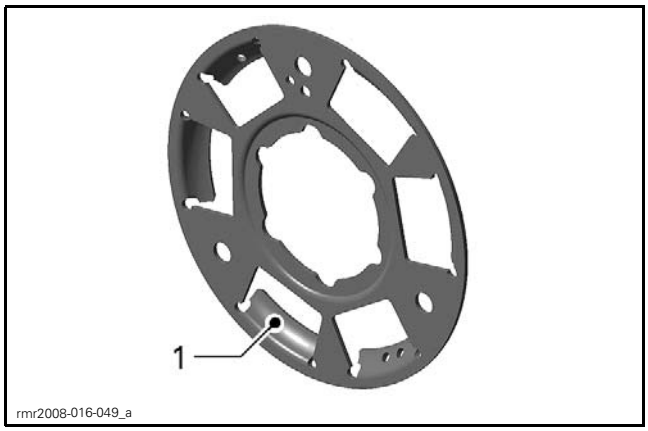
If a spring is out of specification, replace all springs as well as all spring retainers.

Inspect spring retainers for wear, cracks or scoring. Replace all springs and all spring retainers as an assembly.

Support Plates

Inspect support plates for cracks or abnormal wear. Replace if necessary.

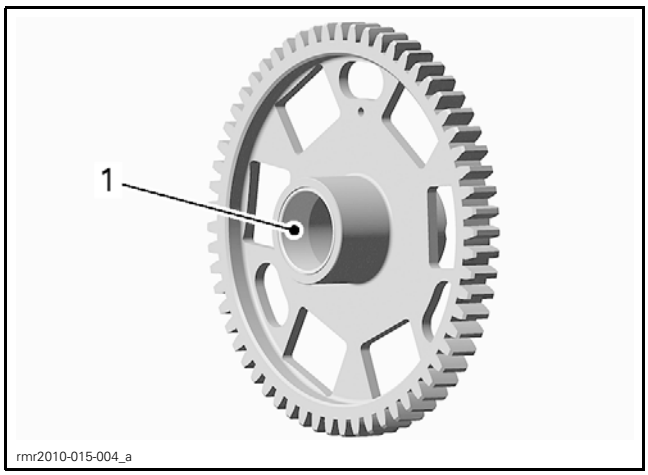
Inspect the thrust surface of inner support plate for abnormal wear or grooves. If necessary, replace inner support plate, thrust washer and disc spring as an assembly.



1. Inspect thrust surface of inner support plate

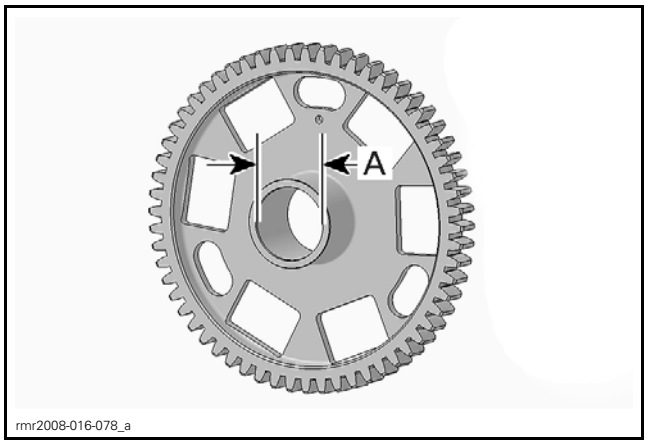
Clutch Drum Gear

Inspect bearing sleeve surface for scoring and wear.



1. Bearing sleeve surface

Measure inner diameter of bearing sleeve.



A. Inner diameter

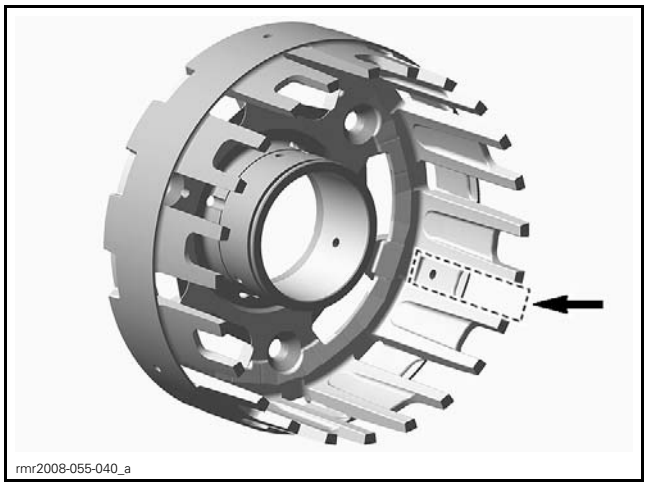
BEARING SLEEVE INNER DIAMETER	
SERVICE LIMIT	30.060 mm (1.183 in)

Inspect teeth condition for pitting or other damage.

Replace clutch drum drive gear if necessary.

Clutch Drum

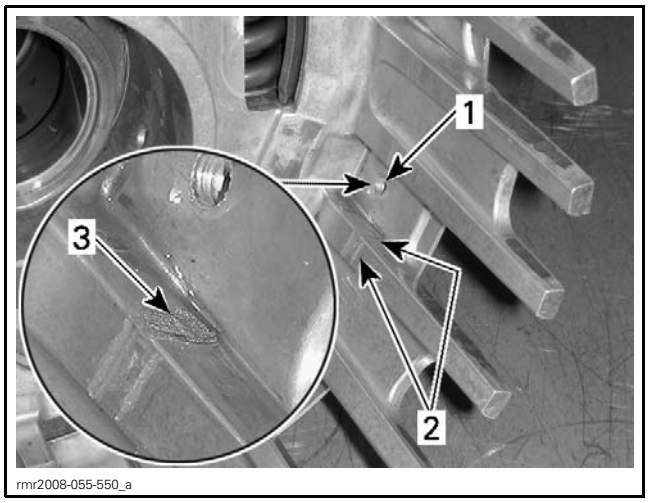
Inspect slots in clutch drum for damages or wear caused by friction plates. Replace if necessary.



INSPECT SLOTS IN CLUTCH DRUM FOR WEAR

Inspect the slots where there is a small hole.

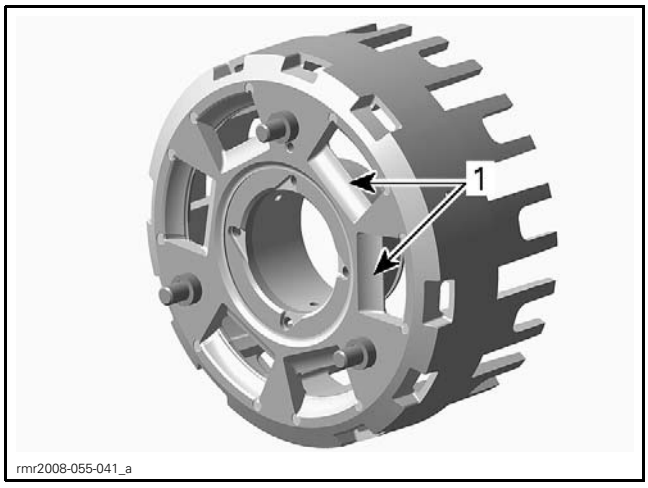
Slight markings or grooves caused by the centrifugal clutch are normal. If grooves on the side of the rib are deeper than 0.5 mm (.02 in), replace clutch drum.



1. Slot with a small hole
2. Slight markings or grooves here are normal
3. Maximum groove depth allowable here is 0.5 mm (.02 in)

Inspect spring cavities for deep grooves, caused by springs. Replace clutch drum if necessary.

NOTE: Slight markings caused by the springs are normal. Do not replace clutch drum needlessly.



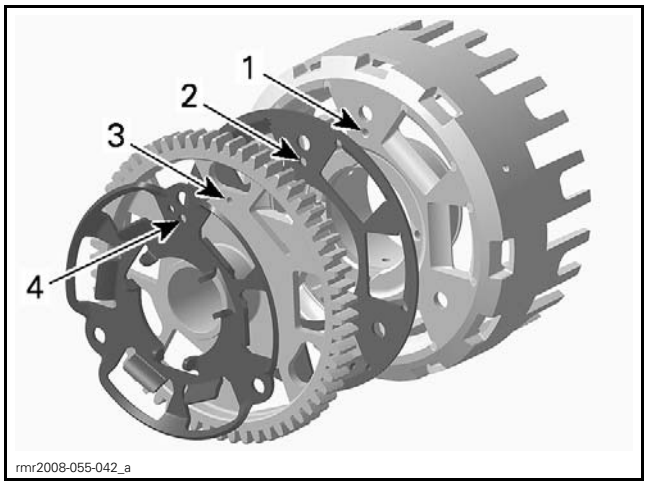
1. Inspect spring cavities

Clutch Drum Assembly

NOTICE **Assembly of the clutch drum must be carried out with utmost care. Failure to strictly follow the procedures may cause parts to loosen and/or malfunction of the clutch drum and may lead to serious engine damage.**

Assemble the clutch drum in the reverse order of disassembly. However, pay attention to the following details.

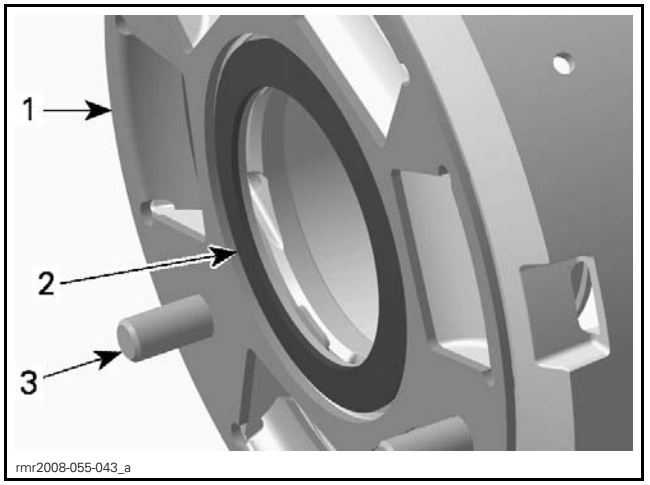
NOTICE **The position of the clutch drum, support plates and clutch drum gear for assembly is clearly indicated with location holes in each part. During assembly ensure that all location holes are aligned with each other.**



ALIGNMENT OF LOCATION HOLES FOR CLUTCH DRUM ASSEMBLY
1. Hole in clutch drum
2. Hole in inner support plate
3. Hole in clutch drum gear
4. Hole in outer support plate

Insert the three M8 x 25 flat head screws from the inside of the drum. Hold the screws in position as you install the remaining parts.

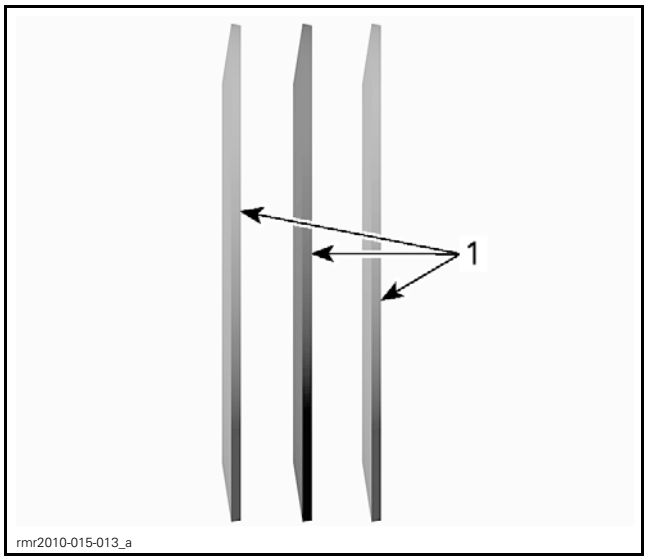
Install inner support plate on clutch drum, ensure the location holes are aligned with each other.



1. Support plate
2. Disc springs
3. Drum assembly screw

NOTE: Assemble the disk springs in the right order.

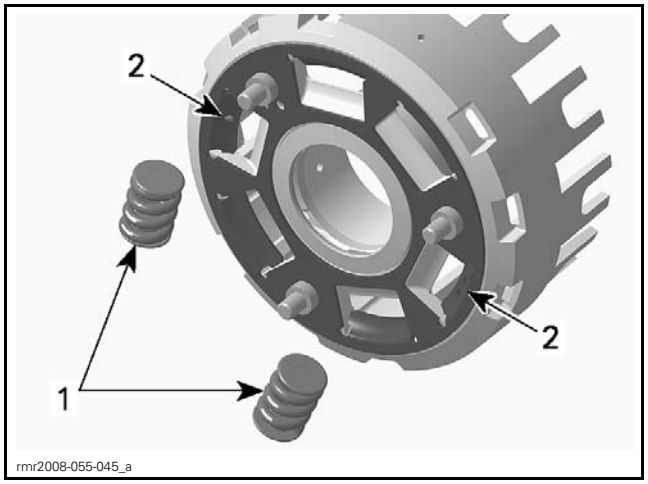
The concave side of the disk springs must face towards the clutch drum.



1. Concave side of disk springs

Install the clutch drum gear, ensure the location holes are aligned with each other.

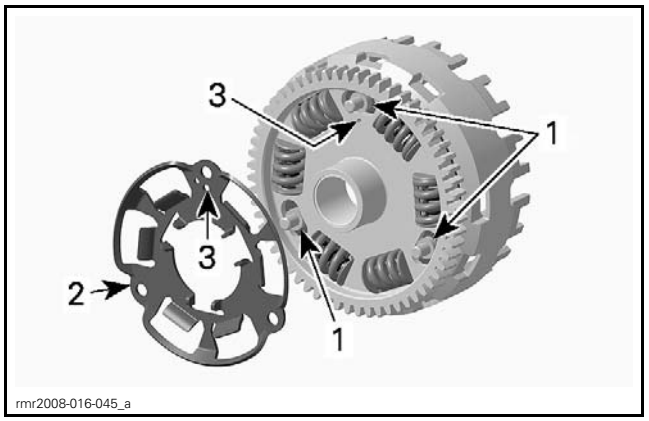
Install both white marked springs with spring retainers into the corresponding spring cavities which are marked with punched holes inside the inner support plate.



1. White marked springs
2. Spring cavities marked with punched holes

Install remaining springs and retainers into spring cavities.

Install distance sleeves on clutch drum screws, then outer support plate. Ensure that the location holes aligned with each other.



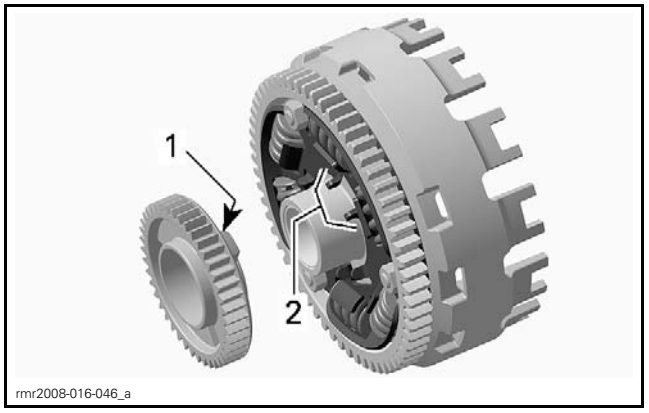
1. Distance sleeves
2. Outer support plate
3. Location holes

Install retaining nuts on clutch drum screws.

Apply LOCTITE 648 (GREEN) (P/N 413 711 400) on threads of retaining nuts.

Torque nuts to 30 N•m (22 lbf•ft).

Finally, install the oil pump gear. Ensure the drive tabs on the oil pump gear engage in the drive tabs on the outer support plate.



1. Drive tabs on oil pump gear
2. Drive tabs on outer support plate

Functional Test

After assembly of the clutch drum is complete, check for torsion of the clutch drum on clutch drum gear. Proceed as follows.

– Reinstall clutch drum on clutch shaft.
– Ensure crankshaft is locked at piston TDC.
– Try to turn clutch drum.

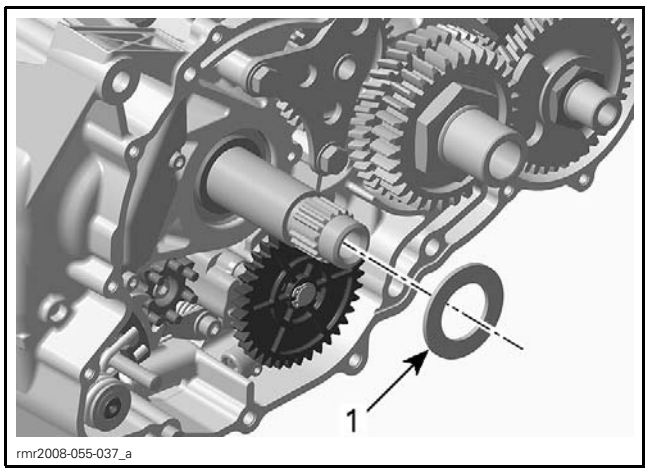
There must be no free-play between clutch drum and clutch drum gear.

If free-play has been detected, inspect all clutch drum components (e.g. disk spring, thrust washer, inner support plate). Refer to *CLUTCH DRUM INSPECTION* in this subsection.

Clutch Drum Installation

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

Insert the first thrust washer on the clutch shaft before installing clutch drum.



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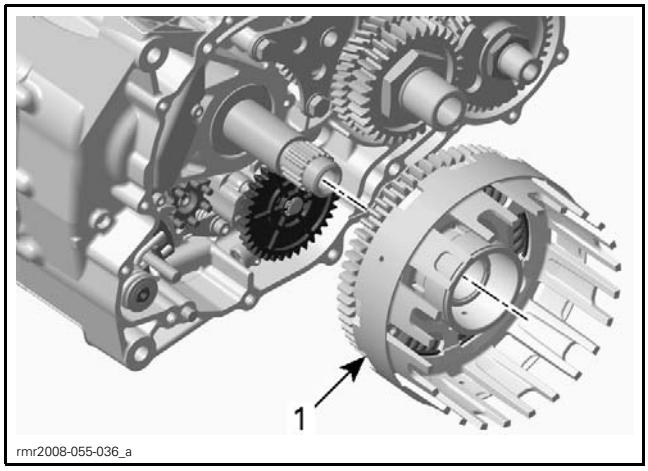
1. Thrust washer

Insert clutch drum on the clutch shaft.



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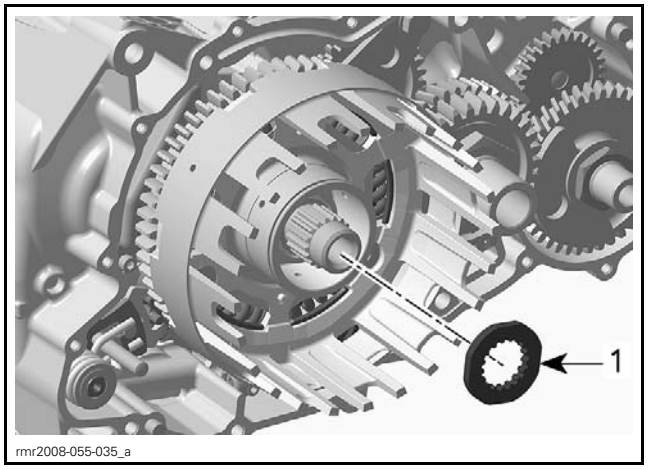
1. Clutch drum

Install the other thrust washer on clutch shaft.



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1. Thrust washer

Install clutch hub and all remaining parts. See procedures in this subsection.