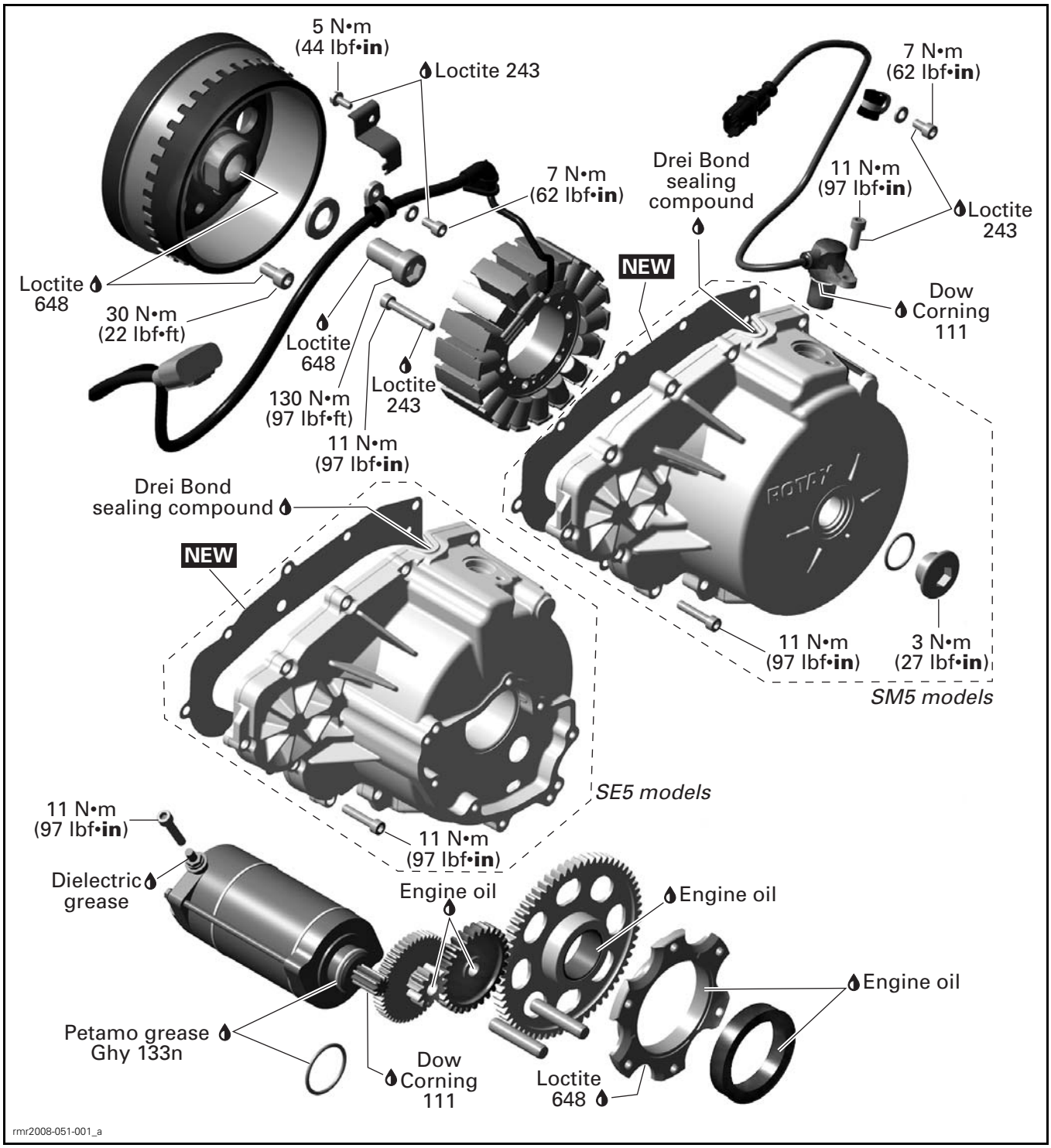
MAGNETO AND STARTER

SERVICE TOOLS

Description	Part Number	Page
MAGNETO PULLER	529 036 097	8
PULLER/LOCKING TOOL	529 036 098	7, 9

SERVICE PRODUCTS

Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	12
DOW CORNING 111	413 707 000	4, 11–12
DREI BOND SEALING COMPOUND	420 297 906	4, 7
LOCTITE 243 (BLUE)	293 800 060	4, 7
LOCTITE 648 (GREEN)	413 711 400	8, 10
PETAMO GREASE GHY 133N	420 899 271	12
PULLEY FLANGE CLEANER	413 711 809	8



rmr2008-051-001_a

GENERAL

NOTE: It is good practice to check for fault codes using the B.U.D.S. software as a first troubleshooting step. Refer to the *MONITORING SYSTEM AND FAULT CODES* subsection.

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

Always disconnect the negative wire from the battery before working on the engine.

⚠ WARNING

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

⚠ WARNING

Before carrying out any inspection or maintenance procedure on the vehicle, wait until the engine and exhaust system have cooled down to avoid potential burns.

Always carry out electrical tests on components before removing or installing them to ensure their state of operation.

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

Clean threads before applying 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, self-locking fasteners, cotter pins, etc.) must be replaced with new ones.

PROCEDURES

MAGNETO COVER

Magneto Cover Removal

Procedure with Engine in Vehicle

Remove the following LH body panels, refer to the *BODY* subsection:

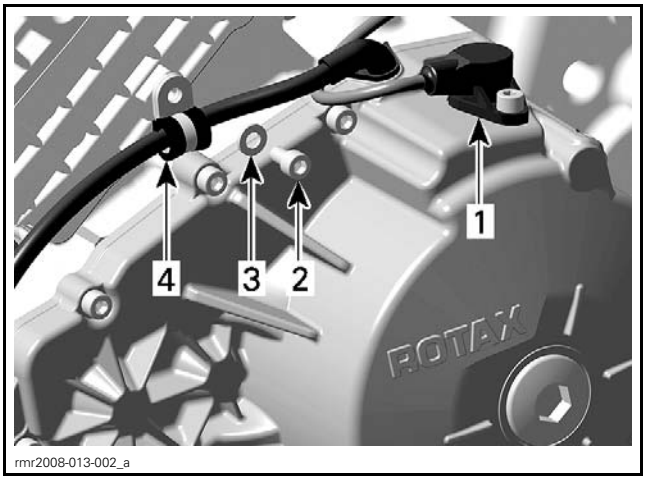
– Middle Side Panel
– Top Side Panel
– Bottom Rear Side Panel
– Bottom Front Side Panel
– Rear Side Panel

Drain engine oil, refer to the *LUBRICATION SYSTEM* subsection.

On SE5 model, remove the hydraulic control module. Refer to the *HYDRAULIC CONTROL MODULE (SE5)* subsection.

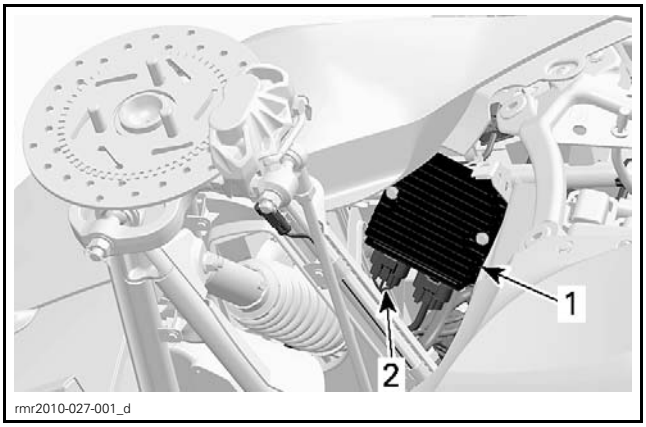
Remove crankshaft position sensor (CPS).

Remove screw and washer securing magneto cable clamp to engine.



TYPICAL
1. *Crankshaft position sensor (CPS)*
2. *Retaining screw*
3. *Washer*
4. *Cable clamp*

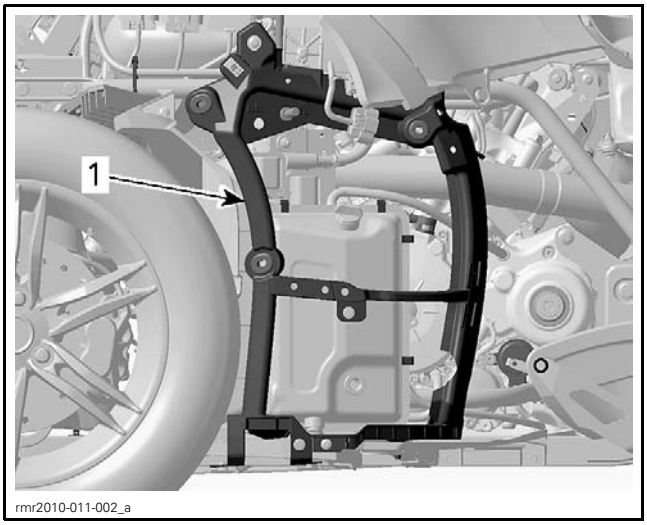
Disconnect magneto connector from voltage regulator and cut locking tie (gray connector with YELLOW wires).



UNDERNEATH LH LATERAL SUPPORT
1. *Voltage regulator/rectifier*
2. *Magneto connector*

Remove headlight adjustment cable from LH middle side panel support.

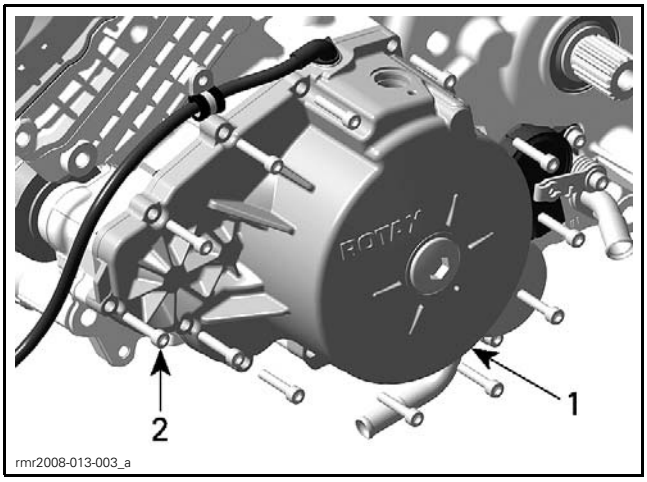
Remove LH middle side panel support.



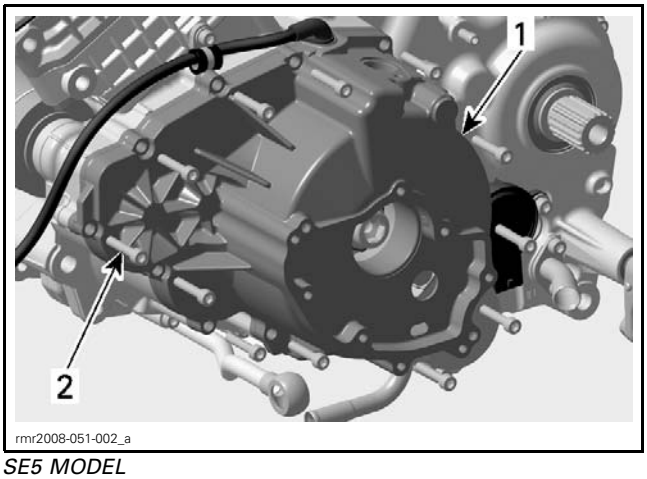
1. Middle side panel support

Procedure with Engine Removed from Vehicle

Remove magneto cover retaining screws and pull magneto cover from engine.



SM5 MODEL
1. Magneto cover
2. Retaining screws



SE5 MODEL
1. Magneto cover
2. Retaining screws

Magneto Cover Inspection

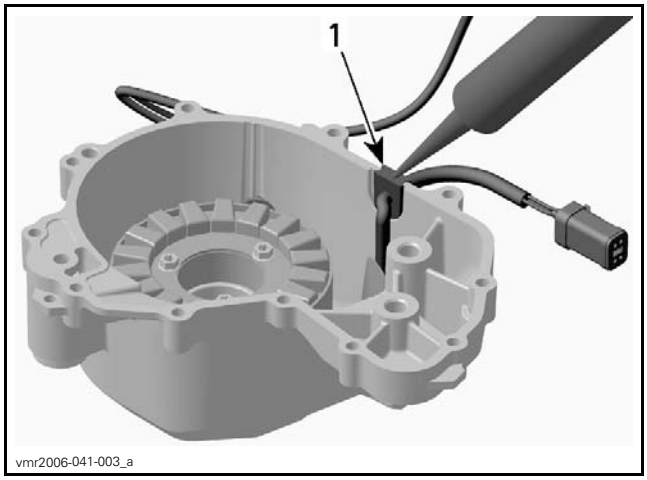
Clean magneto cover and check for cracks or other damages. Replace if necessary.

Magneto Cover Installation

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

NOTE: At installation, replace the magneto cover gasket.

Apply DREI BOND SEALING COMPOUND (P/N 420 297 906) on stator cable grommet as shown in following illustration.

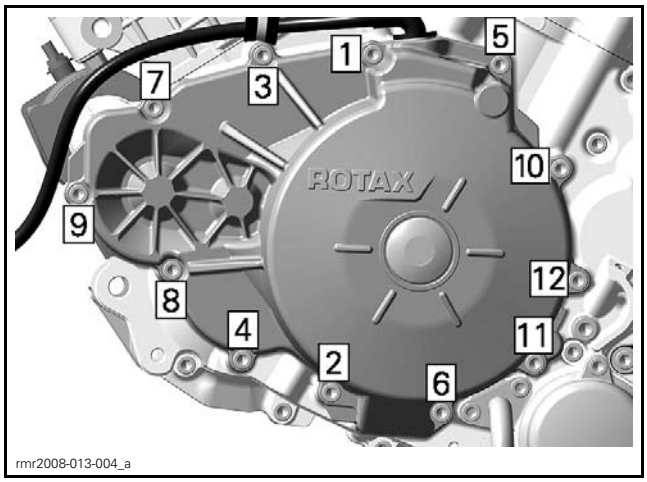


TYPICAL
1. Apply Drei Bond sealing compound

Apply DOW CORNING 111 (P/N 413 707 000) to the O-ring on the crankshaft position sensor (CPS).

Apply LOCTITE 243 (BLUE) (P/N 293 800 060) to the mounting screws retaining the CPS and it's harness retaining clamp.

Refer to the following illustration for the torque sequence of the magneto cover retaining screws.



TYPICAL – TORQUE SEQUENCE

Refill engine with recommended oil.

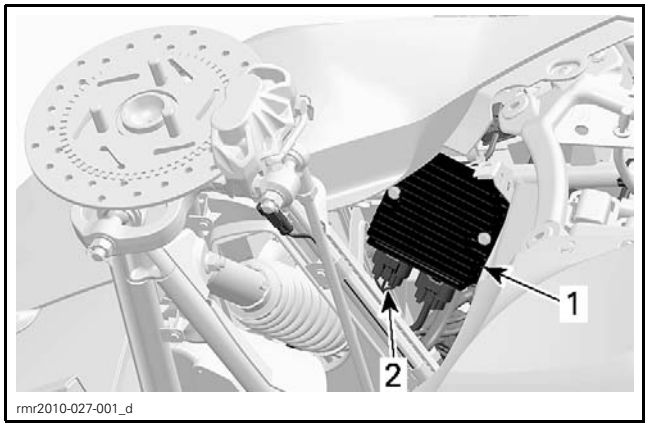
STATOR

Stator Continuity Test

Remove the following body panels to access voltage regulator/rectifier, refer to the *BODY* subsection:

– LH Mirror
– LH Wind deflector
– LH Middle side panel
– LH top side panel

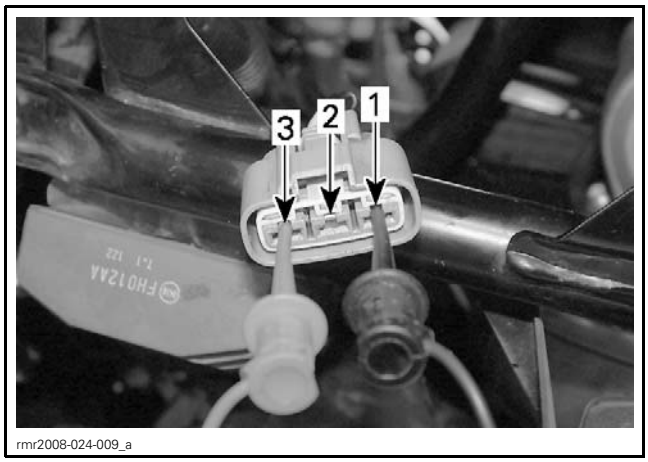
Disconnect the magneto wiring harness connector on the voltage regulator/rectifier.



UNDERNEATH LH LATERAL SUPPORT
1. *Voltage regulator/rectifier*
2. *Magneto connector*

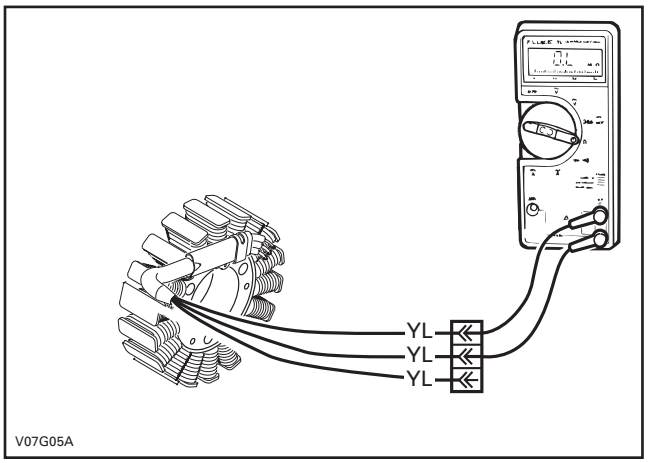
Set multimeter to Ω and compensate resistance of the multimeter probes.

Connect multimeter between YELLOW wires as per table below.



Read resistance.

STATOR CONTINUITY TEST	
TERMINAL	RESISTANCE @ 20°C (68°F)
1 and 2	0.1 - 1 Ω
1 and 3	
2 and 3	



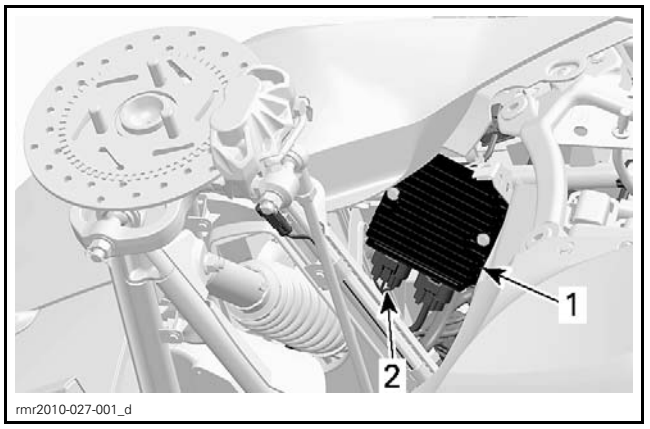
TYPICAL

If any reading is out of specification, replace stator.

Reconnect the magneto harness connector to the voltage regulator/rectifier.

Stator Insulation Test

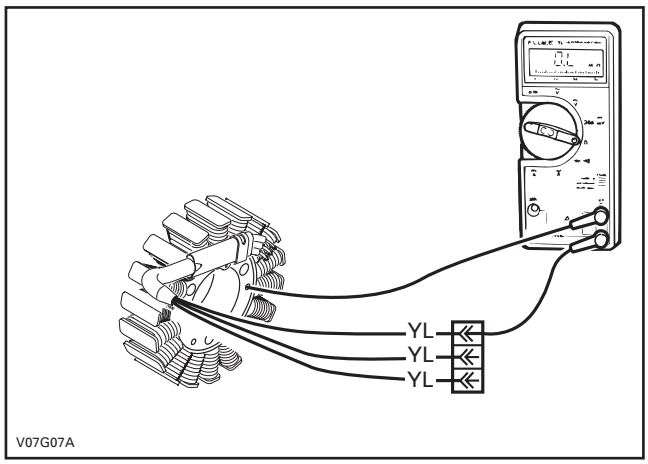
Disconnect the magneto harness connector as per the previous continuity test.



UNDERNEATH LH LATERAL SUPPORT
1. *Voltage regulator/rectifier*
2. *Magneto connector*

Set multimeter to Ω.

Connect multimeter between any YELLOW wire and engine ground.



TYPICAL

Read resistance.

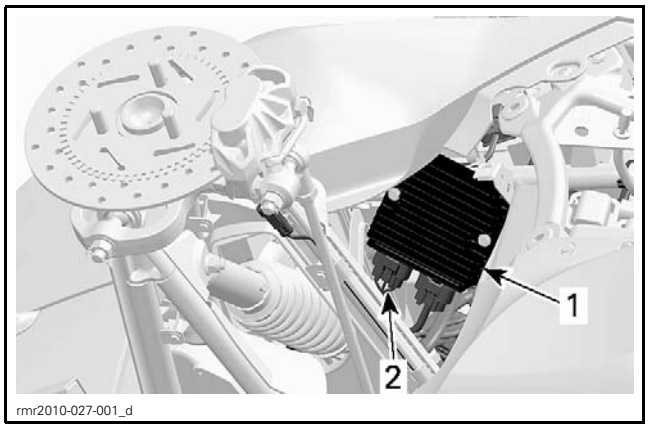
STATOR INSULATION TEST	
TEST PROBES	RESISTANCE @ 20°C (68°F)
Any YELLOW wire and engine ground	Infinity (open circuit)

If there is any resistance or continuity, the stator coils and/or the wiring is grounded and needs to be repaired or replaced.

Reconnect the magneto harness connector to the voltage regulator/rectifier.

Stator Output AC Voltage Test

Disconnect the magneto harness connector on the voltage regulator/rectifier unit.



UNDERNEATH LH LATERAL SUPPORT
1. *Voltage regulator/rectifier*
2. *Magneto connector*

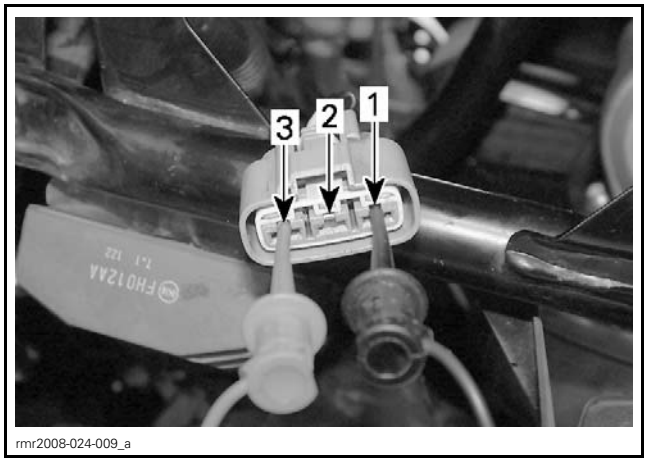
Secure the connector over the lateral frame support with a locking tie so that the pins are facing outwards towards you.

Install a set of thin, insulated, "clip-on" type probes on the multimeter.

Set multimeter to Vac scale.

Start engine.

Connect multimeter alternately between the terminals as indicated in the following chart.



Read voltage.

STATOR OUTPUT AC VOLTAGE TEST		
TEST ENGINE SPEED	TERMINAL	VOLTAGE
4000 RPM	1 and 2	60 Vac minimum
	1 and 3	
	2 and 3	

If voltage is lower than specification, replace magneto stator.

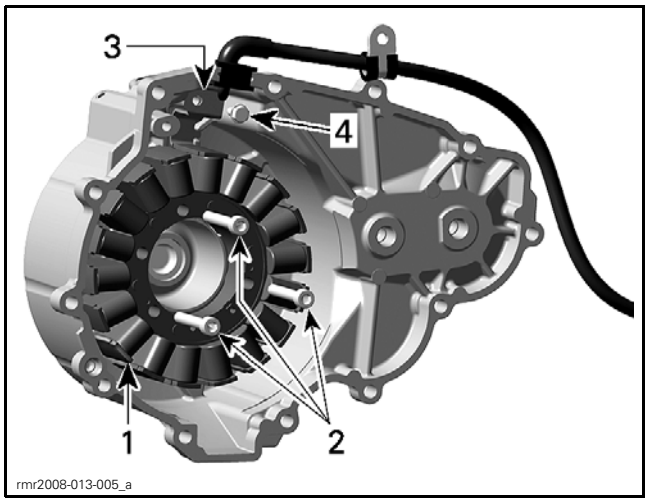
Cut the locking tie and reconnect the magneto harness connector to the voltage regulator/rectifier unit.

Stator Removal

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

Remove screw securing stator cable holding plate.

Remove stator retaining screws, then pull the stator and it's cable from the cover.



1. *Stator*
2. *Stator retaining screws*
3. *Harness holding plate*
4. *Holding plate screw*

Stator Inspection

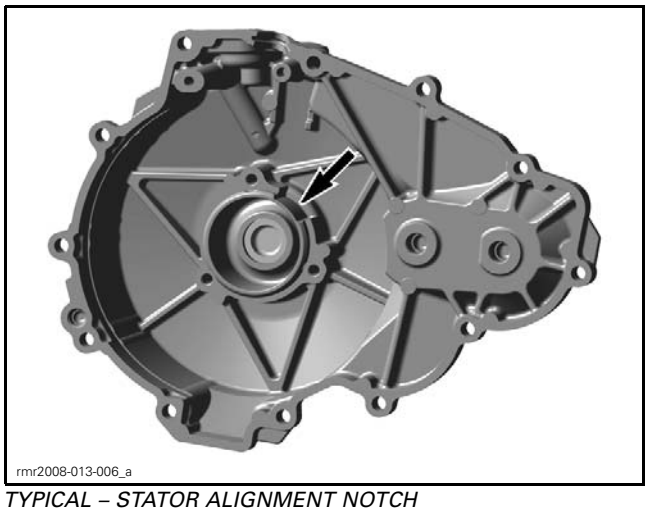
Check stator condition for signs of rubbing, overheating, insulator breakdown and any other damages which may render it unserviceable. If damaged, replace it.

For electrical tests, refer to the *CHARGING SYSTEM* subsection.

Stator Installation

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

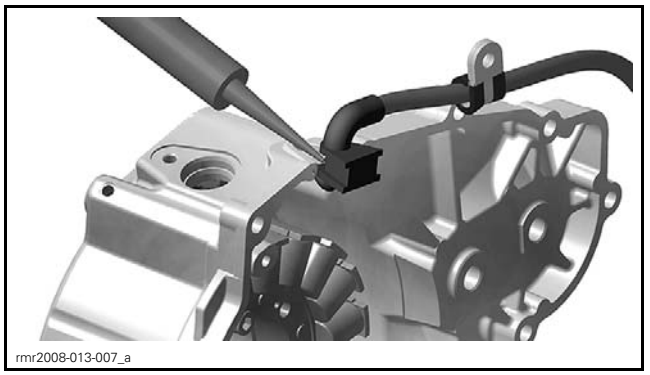
NOTE: Stator position is determined by a key tab on the stator which aligns with a notch in the case.



TYPICAL – STATOR ALIGNMENT NOTCH

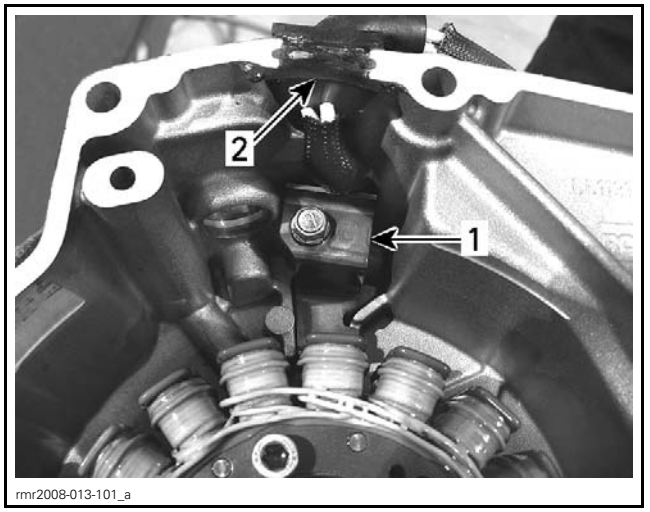
Apply LOCTITE 243 (BLUE) (P/N 293 800 060) to the stator mounting screws, the stator harness retainer screw (inside the cover) and the harness clamp screw.

Apply a bead of DREI BOND SEALING COMPOUND (P/N 420 297 906) on the stator cable grommet as shown in next illustration.



DREI BOND SEALING COMPOUND APPLICATION

NOTICE When installing the stator, align the cable in the case, insert the grommet, then install the cable holding plate to secure the cable in its proper position.

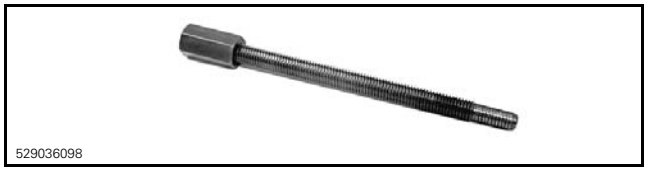


1. *Stator cable holding plate*
2. *Stator cable grommet*

ROTOR

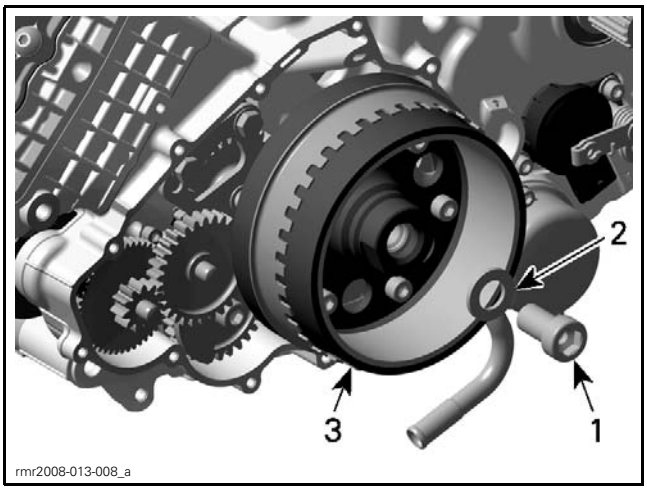
Rotor Removal

Lock crankshaft with the PULLER/LOCKING TOOL (P/N 529 036 098), refer to the *CRANKSHAFT/CRANKCASE* subsection.



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

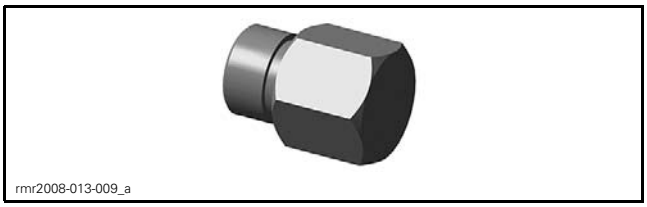
Remove screw and washer securing rotor to crankshaft.



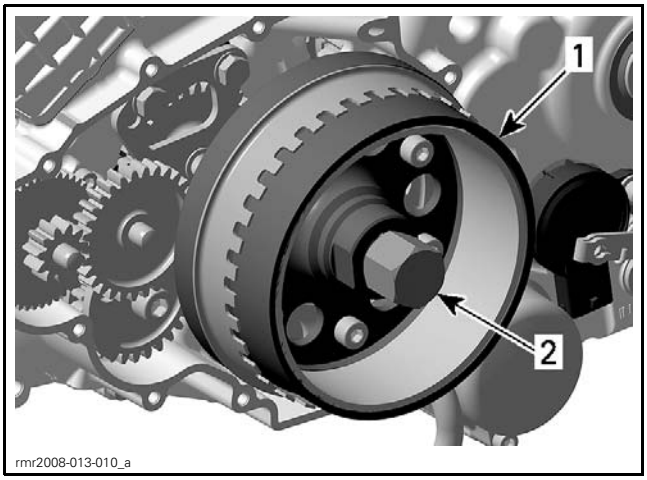
TYPICAL
1. *Screw M16*
2. *Washer*
3. *Rotor*

Install MAGNETO PULLER (P/N 529 036 097) and screw in to remove rotor.

NOTE: It may be necessary to heat the rotor cone for approximately five minutes with a common heat gun to break the Loctite bond between the parts.



MAGNETO PULLER



TYPICAL
1. *Rotor*
2. *Magneto puller installed*

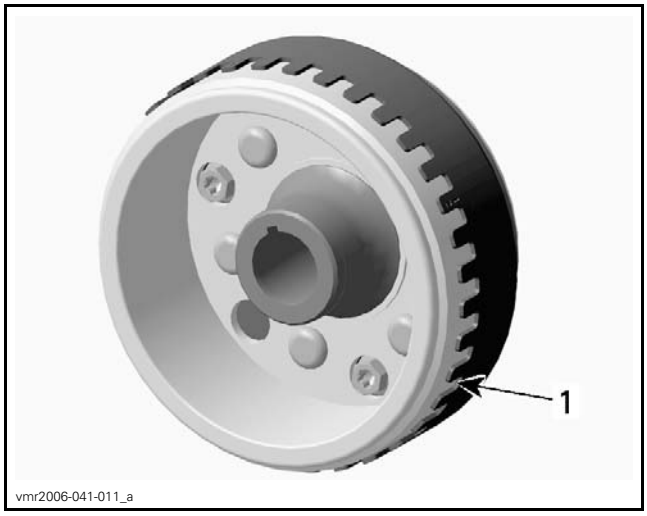
For rotor disassembly, see *SPRAG CLUTCH* in this subsection.

Rotor Inspection

Check inner surface of the rotor for scratches, cracks or other damages.

Check the rotor keyway for wear or damages.

Check if trigger wheel teeth are bent or otherwise damaged.



TYPICAL
1. *Rotor with trigger wheel*

Check the woodruff key and keyway on the crankshaft for wear or damages.

Replace parts as necessary.

Rotor Installation

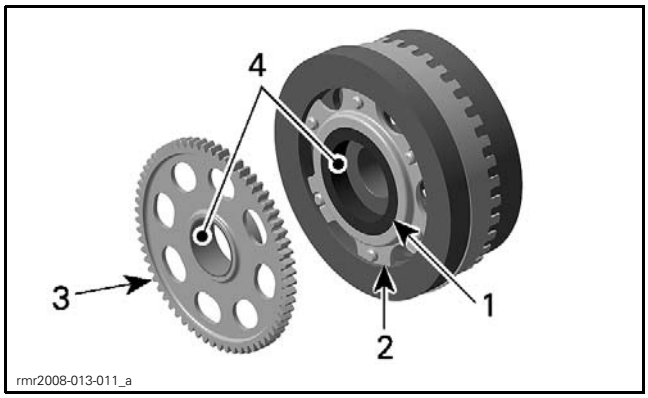
For installation, reverse the removal procedure. However, pay attention to the following.

Clean the crankshaft taper and the inside surface of the rotor cone with PULLEY FLANGE CLEANER (P/N 413 711 809).

NOTICE **Taper on crankshaft and in rotor cone must be free of grease.**

Apply LOCTITE 648 (GREEN) (P/N 413 711 400) on the inside surface of the rotor cone and on the rotor mounting screw.

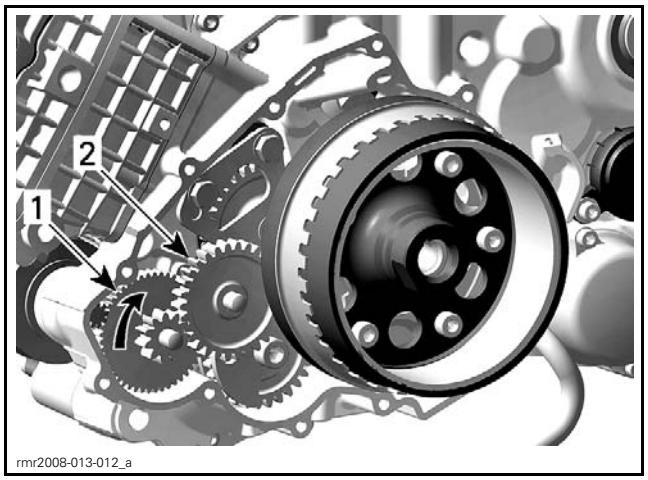
Oil sprag clutch in sprag clutch housing and install sprag clutch gear.



1. *Sprag clutch*
2. *Sprag clutch housing*
3. *Sprag clutch gear*
4. *Apply engine oil here*

Slide rotor onto crankshaft. The woodruff key and the keyway must be aligned.

Rotate the starter double gear clockwise to align the intermediate gear teeth with the sprag clutch gear.



TYPICAL
1. *Starter double gear*
2. *Intermediate gear*

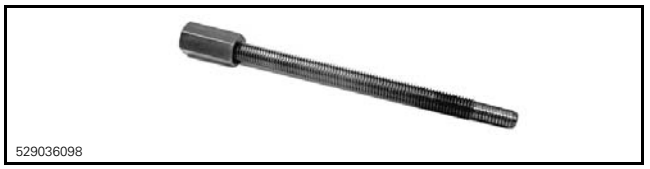
Install and torque mounting screw as per exploded view.

SPRAG CLUTCH

Sprag Clutch Removal

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

Lock crankshaft with the PULLER/LOCKING TOOL (P/N 529 036 098), refer to the *CRANKSHAFT/CRANKCASE* subsection.

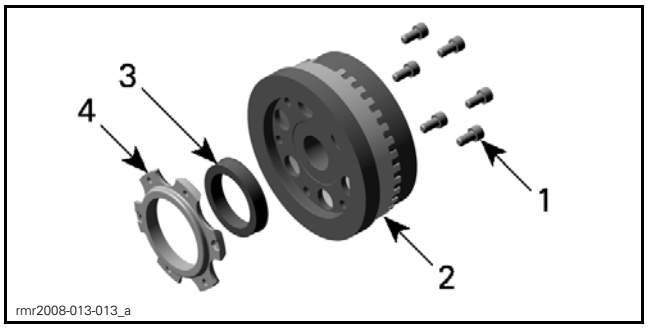


Loosen sprag clutch housing screws located inside rotor.

Remove *ROTOR*, see procedure in this subsection.

Remove sprag clutch gear.

Remove sprag clutch housing screws and sprag clutch housing.



1. *Sprag clutch housing screws*
2. *Rotor*
3. *Sprag clutch*
4. *Sprag clutch housing*

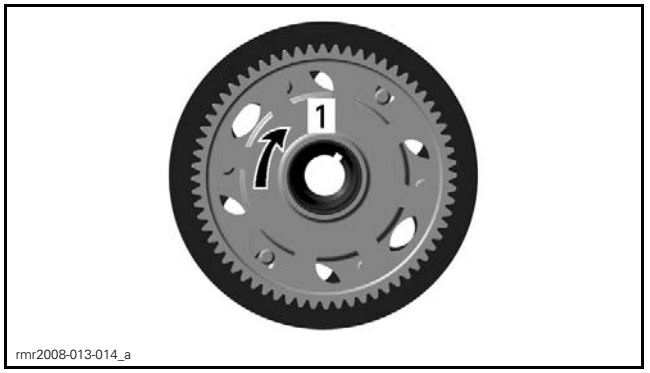
Sprag Clutch Inspection

Inspect sprag clutch and sprag clutch housing for wear and other damages.

Also check the collar of the sprag clutch gear.

Perform a functional test of the sprag clutch. To do so, rotate the sprag clutch gear in the sprag clutch.

NOTE: Sprag clutch must lock in the clockwise direction and release in the counterclockwise direction.



SPRAG CLUTCH FUNCTIONAL TEST
1. *Lock*

NOTE: If defective, the sprag clutch, sprag clutch housing and sprag clutch gear must be replaced as a unit.

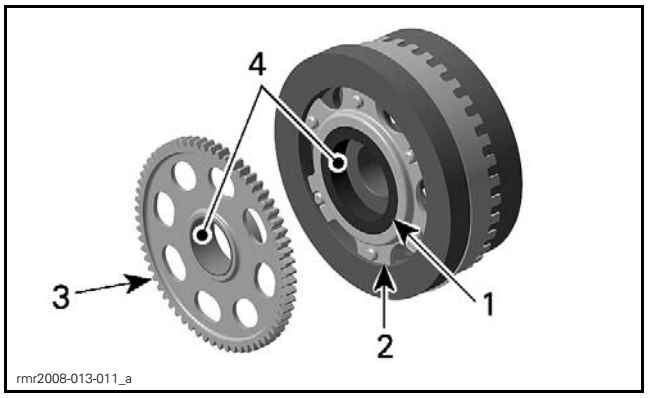
Sprag Clutch Installation

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

Apply LOCTITE 648 (GREEN) (P/N 413 711 400) between the rotor and the sprag clutch housing surface, and on the threads of the sprag clutch housing screws. Refer to the exploded view at the beginning of this subsection.

Install screws but do not torque at this time.

Apply engine oil on the sprag clutch and on the inside surface of the sprag clutch gear.



1. Sprag clutch
2. Sprag clutch housing
3. Sprag clutch gear
4. Apply engine oil here

Install rotor on crankshaft, refer to *ROTOR INSTALLATION* in this subsection.

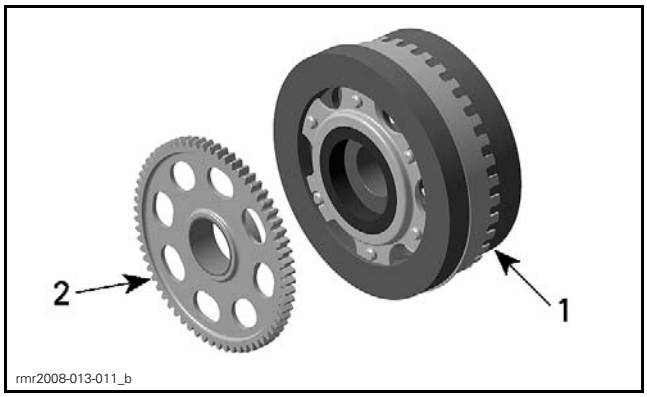
Torque sprag clutch housing screws to 30 N•m (22 lbf•ft).

SPRAG CLUTCH GEAR

Sprag Clutch Gear Removal

Remove the *ROTOR*, see procedure in this subsection.

Pull sprag clutch gear from the rotor.

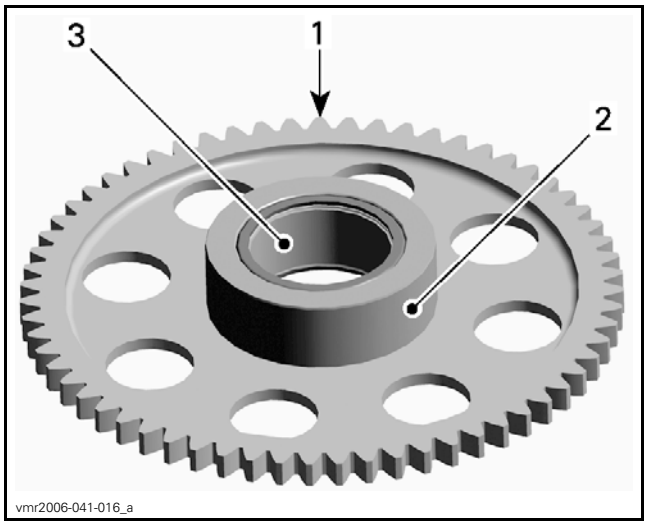


1. Rotor
2. Sprag clutch gear

Sprag Clutch Gear Inspection

Inspect gear, especially teeth and sprag clutch collar, for wear and other damages.

Check bushing for scoring, wear and other damages. Replace sprag clutch gear if necessary.



INSPECT
1. Teeth
2. Collar
3. Bushing

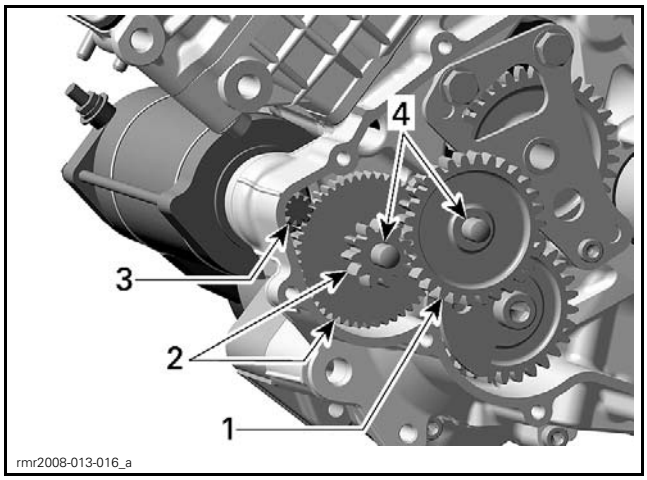
Sprag Clutch Gear Installation

The installation is the reverse of the removal procedure.

NOTE: Apply engine oil on the bushing and collar of the sprag clutch gear.

STARTER DRIVE GEARS

The starter drive gears are located on the engine MAG side behind the magneto cover.



STARTER DRIVE GEARS
1. *Intermediate gear*
2. *Starter double gear*
3. *Starter gear*
4. *Location pins*

Starter Drive Gear Removal

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

Remove *ROTOR*, see procedure in this subsection.

Remove the intermediate gear.

Remove the starter double gear.

Starter Drive Gear Inspection

Inspect the gears for wear, pitting, cracks, chipped or broken teeth, and any other damages.

Replace parts as necessary.

Starter Drive Gear Installation

The installation is the reverse of the removal procedure. Pay attention to the following details.

Apply DOW CORNING 111 (P/N 413 707 000) on the starter gear before installing the starter double gear.

Apply engine oil on the location pins before installing the starter double and intermediate gears.

ELECTRIC STARTER

Starter Test

Refer to the *STARTING SYSTEM* subsection to validate starter operation.

Starter Troubleshooting Tips

If starter is noisy, check the condition of the starter and the starter gears.

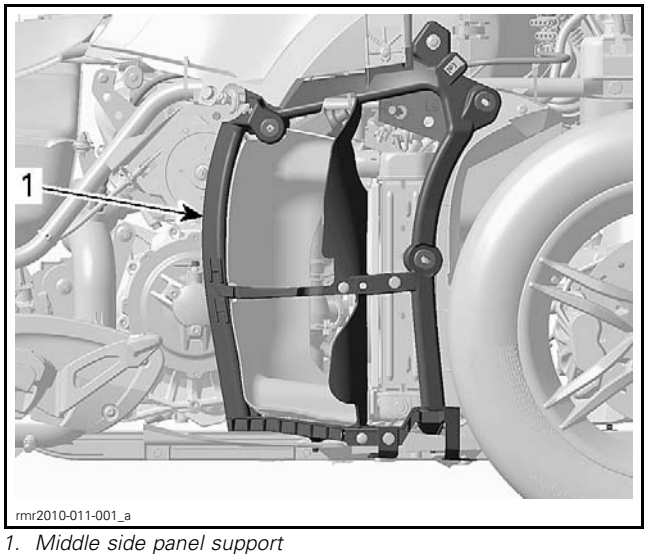
If starter is noisy and skipping, check the sprag clutch.

Starter Removal

Remove the following RH body panels, refer to *BODY* subsection:
- 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.



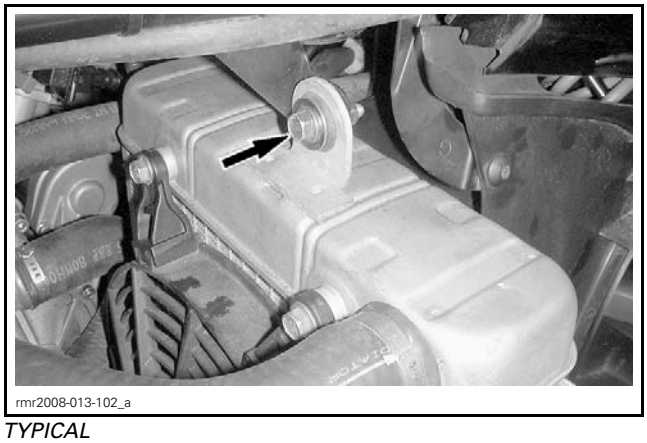
1. Middle side panel support

⚠ WARNING

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

Disconnect the battery.

Remove screw retaining top of engine coolant radiator (do not disconnect radiator hoses).



TYPICAL

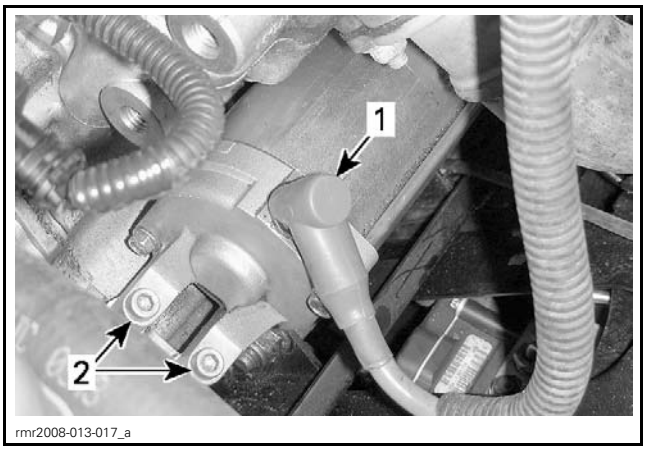
Pull radiator off its mounting plate and move it back on the lower plate to enable access to starter.

NOTICE **Radiator core is very fragile and easily damaged. Special care should be taken to avoid damaging the cooling fins when working around the radiator. Bent or torn fins reduce the radiator's efficiency and could lead to radiator leaks or higher engine operating temperatures.**

Remove the RED rubber protector from the starter terminal and disconnect the (+) cable from the starter terminal.

NOTE: Starter is case grounded.

Remove the two starter retaining screws.



1. Starter (+) terminal
2. Retaining screws

Starter Installation

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

Make sure that starter and engine mating surfaces are free of debris. Serious problems may arise if the starter is not properly aligned.

Apply PETAMO GREASE GHY 133N (P/N 420 899 271) on the starter output drive gear.

Apply DOW CORNING 111 (P/N 413 707 000) on the starter boss and O-ring seal.

Connect the RED (+) cable to the starter and torque nut to 6 N•m (53 lbf•**in**).

Apply DIELECTRIC GREASE (P/N 293 550 004) on terminal and nut.

Reconnect the battery.

⚠ WARNING

Whenever connecting the RED (+) cable to the starter motor, make sure the battery cables are disconnected to prevent electrical shock. Always connect RED (+) battery cable first then BLACK (-) cable last.

Test starter operation.