2021 Can-Am Renegade 570, 650, 850, 1000R Series

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This manual is made up of the base manual with all needed supplements organized into one easy to use manual.

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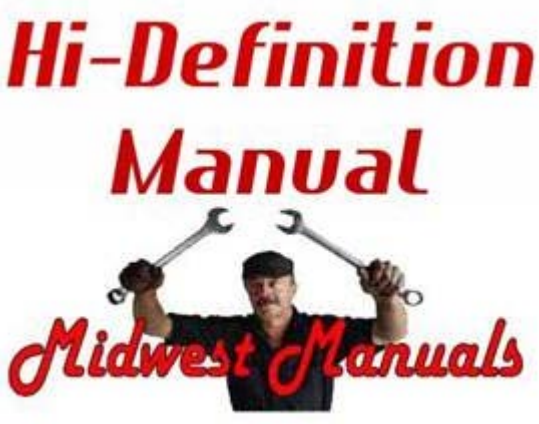


SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair the Can-Am® Outlander™ and Renegade™ Series ATV.

This edition was primarily published to be used by mechanics and technicians who are already familiar with all service procedures relating to BRP products. Technicians should attend training courses given by BRPTI.

Please note that the instructions in this manual will apply only if proper hand tools and special service tools are used.

The contents of this manual depicts parts and procedures applicable to the particular product at the time of writing. Service and warranty bulletins may be published to update the content of this manual. Dealer modifications that were carried out after manufacturing of the product, whether or not authorized by BRP, are not included.

In addition, the sole purpose of the illustrations throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of BRP parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

The engines and the corresponding components identified in this document should not be utilized on product(s) other than those mentioned in this document.

It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

This manual emphasizes particular information denoted by the following wording and symbols:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

⚠ CAUTION **Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**

NOTICE **Indicates an instruction which, if not followed, could result in severe damage to vehicle components or other property.**

NOTE: Indicates supplementary information required to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use.

Unless otherwise noted, the engine must be stopped and the key must be removed prior to performing any services.

Torque wrench tightening specifications must be strictly adhered to. Use the torque values and service products as in the exploded views or in the procedures when noted.

Locking devices when removed must be replaced (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.).

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

When ordering parts always refer to the specific model *PARTS CATALOGS*.

We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic.

It is understood that this manual may be translated into another language. In the event of any discrepancy, the English version shall prevail.

BRP disclaims liability for all damages and/or injuries resulting from the improper use of the contents of this publication.

IMPORTANT SAFETY PRECAUTIONS

We do not provide warnings about many basic shop safety practices (e.g.: Use Grinding Wheel – wear safety glasses). If you have not received shop safety training or do not feel confident about your knowledge of safe servicing practices, we recommend that you do not attempt to perform the procedures described in BRP shop manuals.

You should have a clear understanding of all basic shop safety practices. You should be wearing the appropriate clothing, using appropriate safety equipment and taking all necessary safety precautions. Please be especially careful of the following:

– Read and understand all instructions before you begin a procedure or repair.

– Ensure you have the proper tools, any necessary replacement parts and the skills to perform the tasks safely and completely.
– Protect your eyes by using approved and properly fitted safety glasses.
– Use other protective wear when necessary, for example safety shoes and gloves.
– Unless the service procedure requires that the engine remain running, make sure the engine is off **before** beginning service.
– Be sure there is adequate ventilation whenever you run the engine, to avoid the risk of Carbon Monoxide poisoning.
– To avoid injury from moving parts, make sure your hands, fingers and clothing are out of the way when the engine is running.
– Gasoline vapors and hydrogen gases from batteries are explosive. Keep all cigarettes, sparks and flames away from the battery, fuel-related components and other enclosed compartments.
– Never use gasoline to clean parts, always use an approved nonflammable solvent.
– Never drain or store gasoline in an open container.

⚠ WARNING

The foregoing list represents general safety practices. For details on workplace health and safety requirements in your area, consult your local workplace health and safety agency or association.

We have provided you with some of the most important general service safety precautions, above. We cannot, however, warn you of every conceivable hazard that can arise in performing the service and repair procedures depicted in BRP manuals. Only you can decide whether or not you should perform a given task.

INTRODUCTION

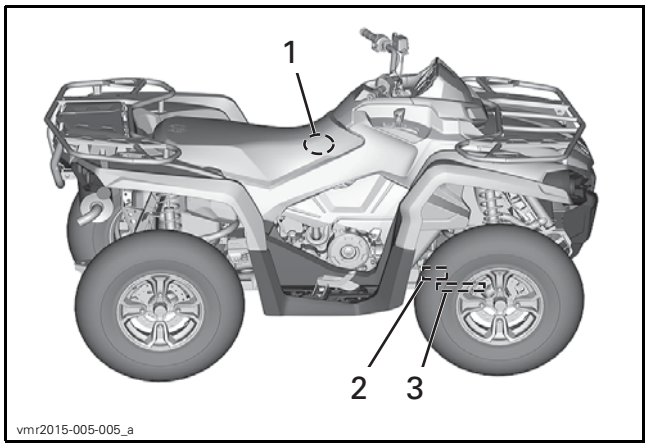
The information and component/system descriptions contained in this manual are correct at time of publication. BRP however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Due to late changes, it may have some differences between the manufactured product and the description and/or specifications in this document.

BRP reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

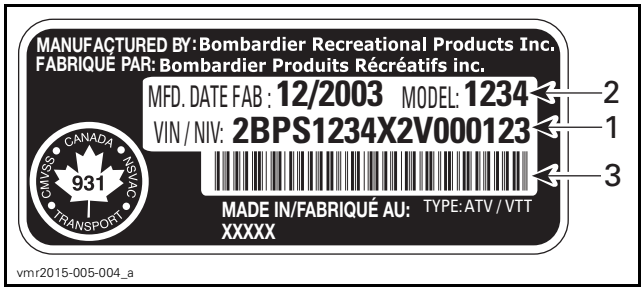
VEHICLE INFORMATION

VEHICLE IDENTIFICATION NUMBER (VIN) LOCATIONS



VIN LOCATIONS
1. *VIN decal under seat*
2. *VIN decal on lower frame member, RH side*
3. *VIN stamped on lower frame member, RH side*

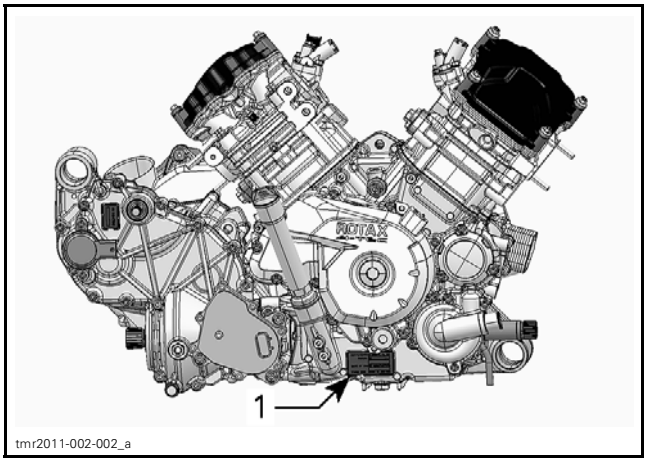
VIN Decal Description



TYPICAL — VEHICLE SERIAL NUMBER DECAL UNDER SEAT
1. *VIN (Vehicle Identification Number)*
2. *Vehicle manufacturing date and model number*
3. *VIN bar code*

TYPICAL — VEHICLE SERIAL NUMBER DECAL ON RH SIDE OF FRAME
1. *VIN (Vehicle Identification Number)*
2. *Vehicle manufacturing date and model number*

ENGINE IDENTIFICATION NUMBER (EIN)

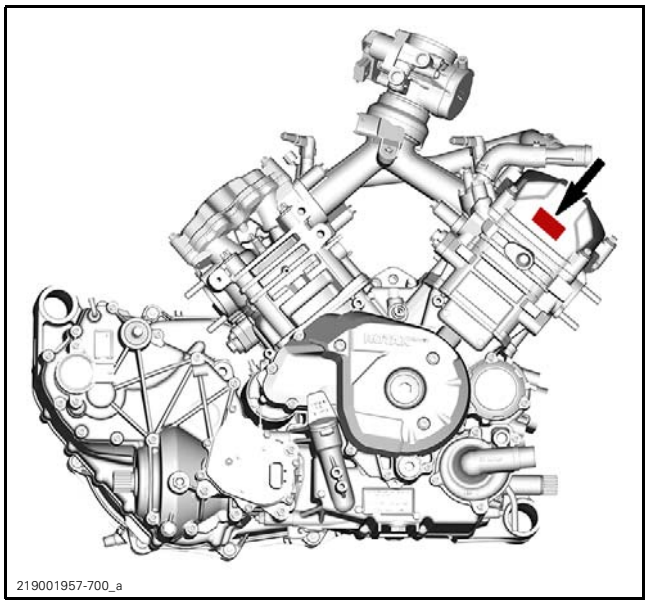


1. *Engine Identification Number (EIN)*

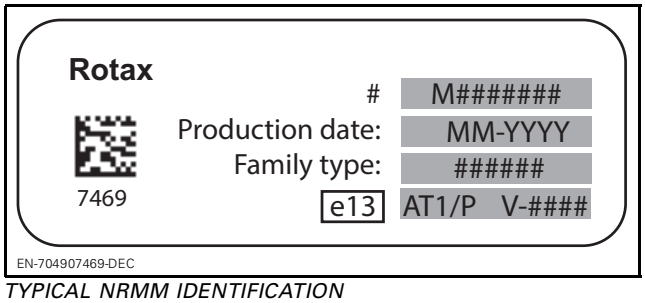
COMPLIANCE LABEL

Regulation (EU) 2016/1628 applicable for Non-Road Mobile Machineries

Vehicles who comply to Regulation (EU) 2016/1628 (NRMM) are identified on the engine valve cover.



TYPICAL



TYPICAL NRMM IDENTIFICATION

NOTE: Any tampering with the engine or its components will void the EU type-approval of the vehicle.

ENGINE EMISSIONS INFORMATION

MANUFACTURER'S RESPONSIBILITY

Manufacturers of engines must determine the exhaust emission levels for each engine horsepower family and certify these engines with the United States of America Environmental Protection Agency (EPA). An emissions control information label, showing emission levels and engine specifications, must be placed on each vehicle at the time of manufacture.

DEALER RESPONSIBILITY

When servicing any vehicle that carry an emissions control information label, adjustments must be kept within published factory specifications.

Replacement or repair of any emission related component must be executed in a manner that maintains emission levels within the prescribed certification standards.

Dealers are not to modify the engine in any manner that would alter the horsepower or allow emission levels to exceed their predetermined factory specifications.

Exceptions include manufacturer's prescribed changes.

OWNER RESPONSIBILITY

The owner/operator is required to have engine maintenance performed to maintain emission levels within prescribed certification standards.

The owner/operator is not to, and should not allow anyone else to modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

EMISSION REGULATIONS

The vehicle you are servicing may have been certified to applicable emission regulations in your country or state. Not as an exhaustive list; this may include standards for engine exhaust emissions, crankcase emissions, permeation emissions and evaporative emissions. Servicing procedures in this manual must be strictly followed in order to keep the vehicle within the factory specifications. Failure to follow servicing procedures in this manual may lead a vehicle to be out of compliance with applicable emission regulations.

When servicing any vehicle; adjustments must be kept within published factory specifications. Replacement or repair of any emission related component must be executed in a manner that maintains emission levels within the applicable certification standards. Nobody is allowed to modify the engine in any manner that would alter the horsepower or allow emission levels to exceed their predetermined factory specifications. Exceptions include manufacturer’s prescribed changes.

The owner/operator is required to have engine maintenance performed to maintain emission levels within the prescribed certification standards. The owner/operator is allowed and should not allow anyone else to modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

MANUAL INFORMATION

MANUAL PROCEDURES

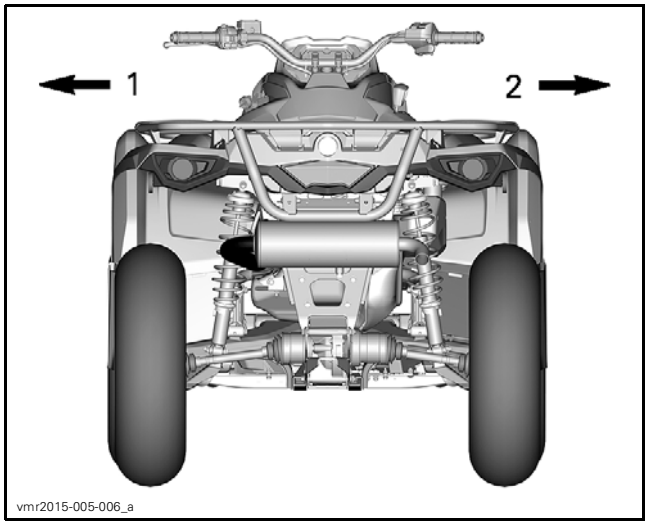
Many of the procedures in this manual are interrelated. Before undertaking any task, you should read and thoroughly understand the entire section or subsection in which the procedure is contained.

⚠ WARNING

Unless otherwise specified, the engine should be turned OFF and cold for all maintenance and repair procedures.

A number of procedures throughout the book require the use of special tools. Before starting any procedure, be sure that you have on hand all required tools, or their approved equivalents.

The use of RIGHT and LEFT indications in the text are always referenced to the driving position (sitting on the vehicle).



TYPICAL
1. Left
2. Right

This manual uses technical terms which may be different from the ones of the parts catalogs.

When ordering parts always refer to the specific model *PARTS CATALOGS*.

NOTICE **Most fasteners are metric, and most components are built with parts dimensioned using the metric system. Consult the appropriate *PARTS CATALOG* to obtain and use the correct parts and fasteners. Mismatched or incorrect fasteners could cause damage to the vehicle.**

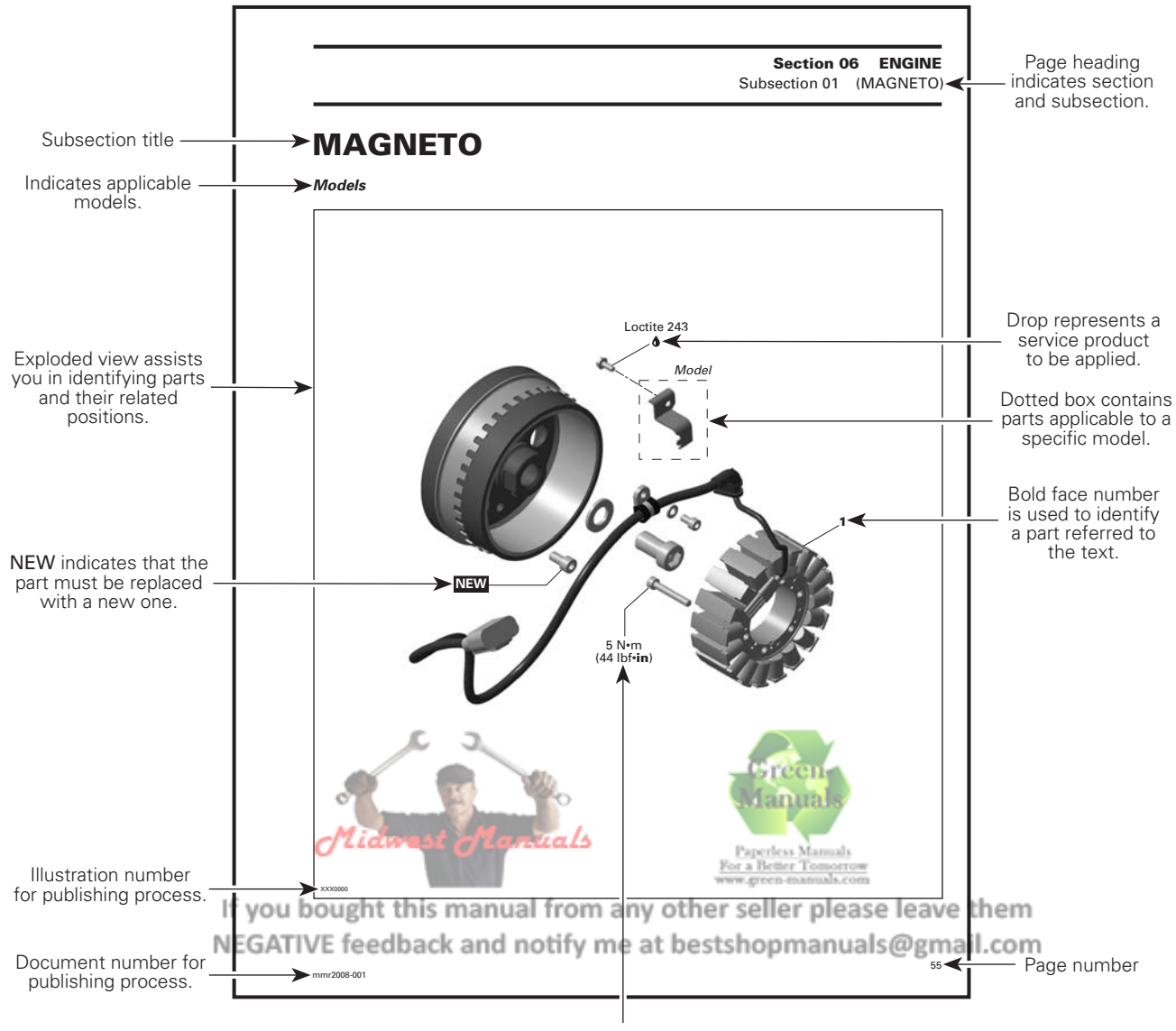
MANUAL LAYOUT

This manual is divided into many major sections as can be seen in the main table of contents at the beginning of the manual.

Each section is divided into various subsections, and again, each subsection has one or more divisions.

Illustrations and photos show the typical construction of various assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts used in a particular model vehicle. However, they represent parts which have the same or a similar function.

TYPICAL PAGE



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TYPICAL PAGE

Tittle in bold indicates category of information to be carried out.

Reference to a specific section or subsection.

Indicates component procedures apply to.

Indicates specific procedure to be carried out.

"TYPICAL" indicates a general view which may not represent exact details.

Call-outs pertaining to above illustration.

Illustration always follows text to which it applies.

Italic bold face type-setting indicates a procedure applicable to a specific model(s).

Bold face number following part name refers to exploded view at beginning of subsection.

Section 03 ENGINE
Subsection 09 (MAGNETO SYSTEM)

GENERAL

NOTE: The following procedures can be done without removing the engine.

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* sections 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, etc.) must be replaced with new ones.

PROCEDURES

MAGNETO FLYWHEEL

Magneto Flywheel Cleaning

Clean all metal components in a non-ferrous metal cleaner.

CAUTION: Clean magneto flywheel using only a clean cloth.

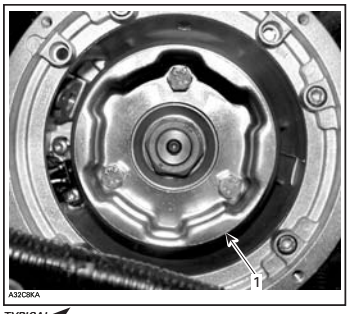
Magneto Flywheel Removal

Remove muffler, refer to the *EXHAUST SYSTEM* section.

Remove acoustic panel.

Remove rewind starter.

Remove starting pulley **no. 2**.



TYPICAL
1. Starting pulley

NOTE: To remove starting pulley bolts, hold magneto flywheel with a socket as shown.

TYPICAL

Models

Remove the connecting flange retaining the rewind starter to the engine housing.

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57

typical_txt_2008_en

TIGHTENING TORQUE

Tighten fasteners to the torque specified in the exploded view(s) and/or in the written procedure. When a torque is not specified, refer to the following table.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices must be replaced when removed (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.).

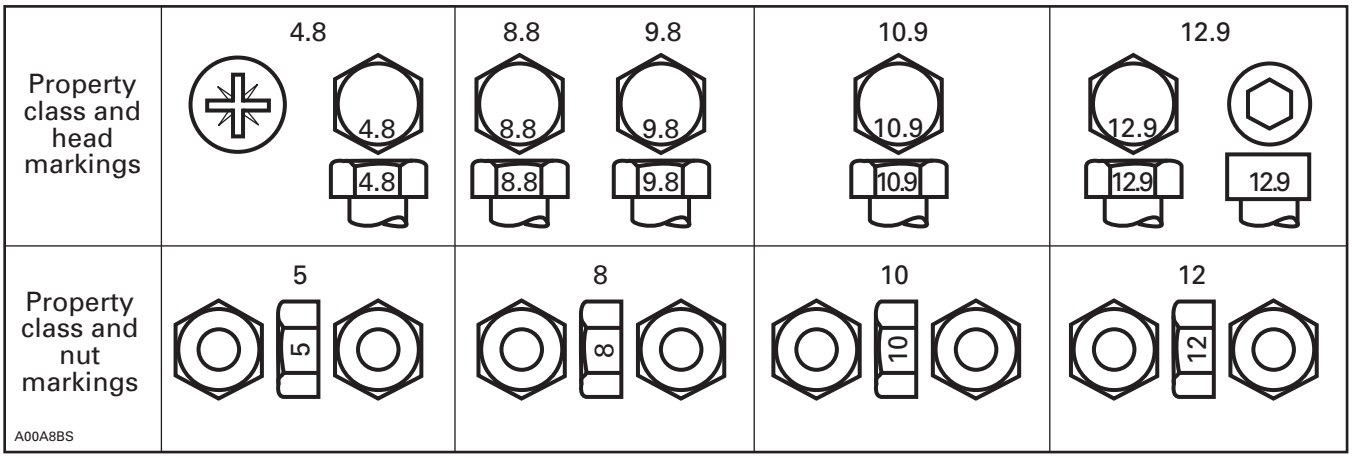
In order to avoid a poor assembly, tighten screws, bolts, or nuts in accordance with the following procedure:

1. Manually screw in all screws, bolts and/or nuts.
2. Apply half the recommended torque value.
3. Tighten fastener to the recommended torque value.

NOTICE **Be sure to use the recommended tightening torque for the specified fastener used.**

Whenever possible, always apply torque on the nut.

Always torque screws, bolts and/or nuts using a crisscross pattern when multiple fasteners are used to secure a part (eg. a cylinder head). Some parts must be torqued according to a specific sequence and torque pattern as detailed in the installation procedure.

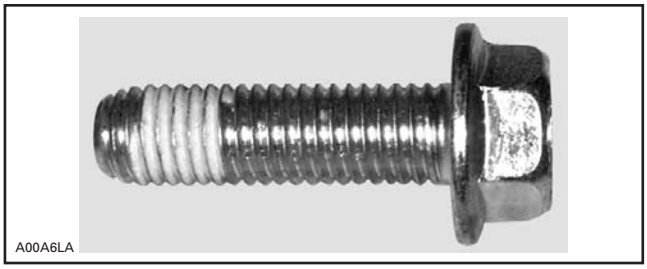


FASTENER SIZE	FASTENER GRADE/TORQUE			
	5.8 Grade	8.8 Grade	10.9 Grade	12.9 Grade
M4	1.5 – 2 N•m (13 – 18 lbf•**in**)	2.5 – 3 N•m (22 – 27 lbf•**in**)	3.5 N•m - 4 N•m (31 lbf•**in** - 35 lbf•**in**)	4 N•m - 5 N•m (35 lbf•**in** - 44 lbf•**in**)
M5	3 N•m - 3.5 N•m (27 lbf•**in** - 31 lbf•**in**)	4.5 N•m - 5.5 N•m (40 lbf•**in** - 49 lbf•**in**)	7 N•m - 8.5 N•m (62 lbf•**in** - 75 lbf•**in**)	8 N•m - 10 N•m (71 lbf•**in** - 89 lbf•**in**)
M6	6.5 N•m - 8.5 N•m (58 lbf•**in** - 75 lbf•**in**)	8 N•m - 12 N•m (71 lbf•**in** - 106 lbf•**in**)	10.5 – 15 N•m (93 – 133 lbf•**in**)	16 N•m (142 lbf•**in**)
M8	15 N•m (133 lbf•**in**)	25 N•m (18 lbf•ft)	32 N•m (24 lbf•ft)	40 N•m (30 lbf•ft)
M10	29 N•m (21 lbf•ft)	48 N•m (35 lbf•ft)	61 N•m (45 lbf•ft)	73 N•m (54 lbf•ft)
M12	52 N•m (38 lbf•ft)	85 N•m (63 lbf•ft)	105 N•m (77 lbf•ft)	128 N•m (94 lbf•ft)
M14	85 N•m (63 lbf•ft)	135 N•m (100 lbf•ft)	170 N•m (125 lbf•ft)	200 N•m (148 lbf•ft)

FASTENER INFORMATION

NOTICE Most components in the vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice-versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

SELF-LOCKING FASTENER PROCEDURE



TYPICAL — SELF-LOCKING FASTENER

The following describes common procedures used when working with self-locking fasteners.

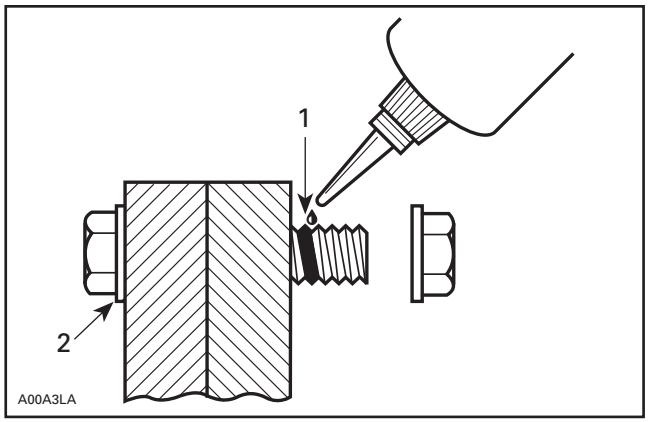
Use a metal brush or a tap to properly clean a threaded hole, then use a solvent. Allow the solvent time to act, approximately 30 minutes, then wipe off. Solvent utilization is to ensure proper adhesion of the product used for locking the fastener.

LOCTITE® THREADLOCKER APPLICATION PROCEDURE

The following describes common procedures used when working with Loctite products.

NOTE: Always use proper strength Loctite product as recommended in this Shop Manual.

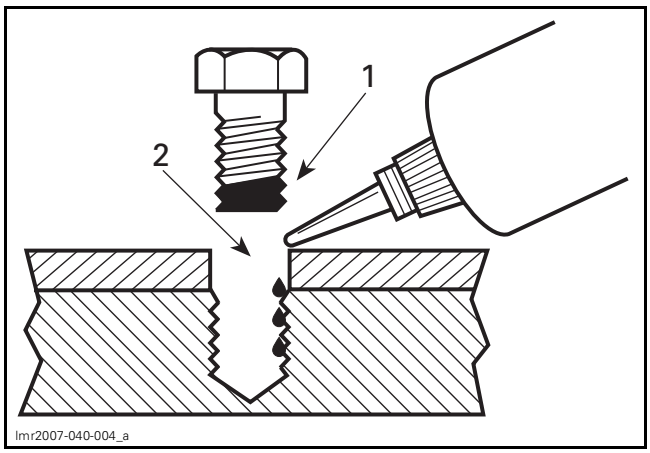
Threadlocker Application for Uncovered Holes (Bolts and Nuts)



1. Apply here
2. Do not apply

1. Clean threads (bolt and nut) with solvent.
2. Apply LOCTITE 7649 (PRIMER) (P/N 293 800 041) on threads and allow to dry.
3. Choose proper strength Loctite threadlocker.
4. Fit bolt in the hole.
5. Apply a few drops of threadlocker at proposed tightened nut engagement area.
6. Position nut and tighten as required.

Threadlocker Application for Blind Holes

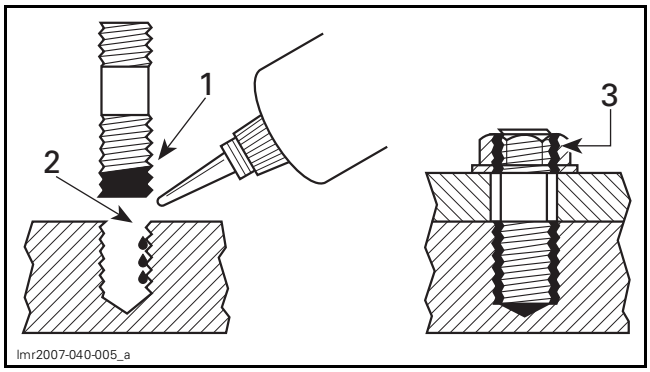


1. On fastener threads
2. On threads and at the bottom of hole

1. Clean threads (bolt and hole) with solvent.
2. Apply LOCTITE 7649 (PRIMER) (P/N 293 800 041) on threads (bolt and nut) and allow to dry for 30 seconds.
3. Choose proper strength Loctite threadlocker.

4. Apply several drops along the threaded hole and at the bottom of the hole.
5. Apply several drops on bolt threads.
6. Tighten as required.

Threadlocker Application for Stud Installation in Blind Holes



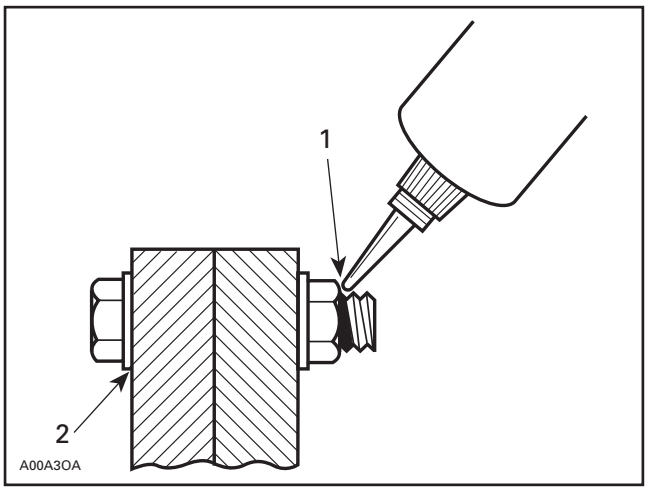
1. On stud threads
2. On threads and in the hole
3. On retaining nut threads

1. Clean threads (stud and hole) with solvent.
2. Apply LOCTITE 7649 (PRIMER) (P/N 293 800 041) on threads and allow to dry.
3. Apply 2 or 3 drops of proper strength Loctite threadlocker on female threads and in hole.

NOTE: To avoid a hydro lock situation, do not apply too much Loctite.

4. Apply several drops of proper strength Loctite on stud threads.
5. Install stud.
6. Install cover, part, etc.
7. Apply a few drops of proper strength Loctite on uncovered stud threads.
8. Install and tighten retaining nut(s) as required.

Threadlocker Application for Pre-Assembled Parts

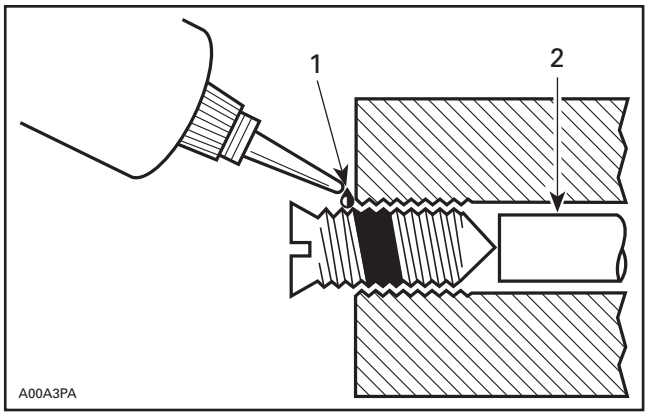


1. Apply here
2. Do not apply

1. Clean bolts and nuts with solvent.
2. Assemble components.
3. Tighten nuts.
4. Apply a few drops of proper strength Loctite on bolt/nut contact surfaces.
5. Avoid touching metal with tip of flask.

NOTE: For preventive maintenance on existing equipment, retighten nuts and apply proper strength Loctite on bolt/nut contact surfaces.

Threadlocker Application for an Adjustment Screw

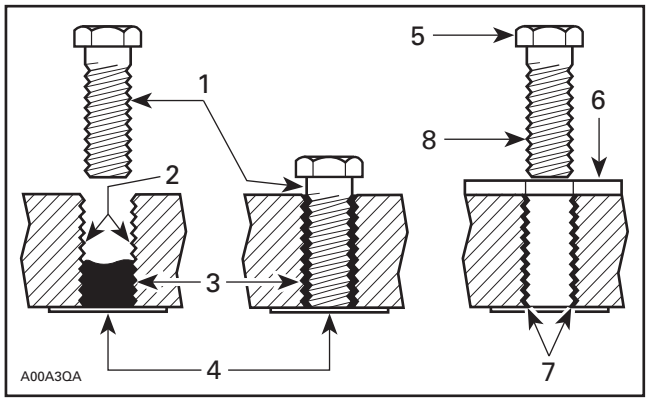


1. Apply here
2. Plunger

1. Adjust screw to proper setting.
2. Apply a few drops of proper strength Loctite threadlocker on screw/body contact surfaces.
3. Avoid touching metal with tip of flask.

NOTE: If it is difficult to readjust, heat screw with a soldering iron (232°C (450°F)).

Application for Stripped Thread Repair



1. *Release agent*
2. *Stripped threads*
3. *Form-A-Thread*
4. *Tape*
5. *Cleaned bolt*
6. *Plate*
7. *New threads*
8. *Threadlocker*

Standard Thread Repair

Follow instructions on Loctite FORM-A-THREAD 81668 package.

If a plate is used to align bolt:

1. Apply release agent on mating surfaces.
2. Put waxed paper or similar film on the surfaces.
3. Twist bolt when inserting it to improve thread conformation.

NOTE: NOT intended for engine stud repairs.

Repair of Small Holes/Fine Threads

Option 1: Enlarge damaged hole, then follow *STANDARD THREAD REPAIR* procedure.

Option 2: Apply FORM-A-THREAD on the screw and insert in damaged hole.

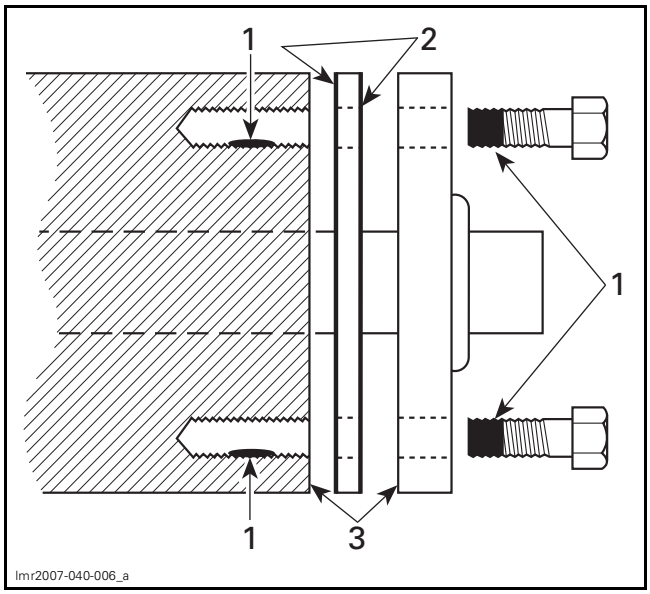
Permanent Stud Installation (Light Duty)

1. Use a stud of the desired thread length.

NOTE: DO NOT apply release agent on stud.

2. Follow Standard Thread Repair procedure.
3. Allow 30 minutes for Loctite FORM-A-THREAD to cure.
4. Complete part assembly.

Gasket Compound Application



1. *Proper strength Loctite*
2. *Loctite Primer N (P/N 293 800 041) and Gasket Eliminator 518 (P/N 293 800 038) on both sides of gasket*
3. *Loctite Primer N only*

1. Remove old gasket and other contaminants using LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500). Use a mechanical means only if necessary.

NOTE: Avoid grinding.

2. Clean both mating surfaces with solvent.
3. Spray Loctite Primer N on both mating surfaces and on both sides of gasket and allow to dry 1 or 2 minutes.
4. Apply LOCTITE 518 (P/N 293 800 038) on both sides of gasket, using a clean applicator.
5. Place gasket on mating surfaces and assemble parts immediately.

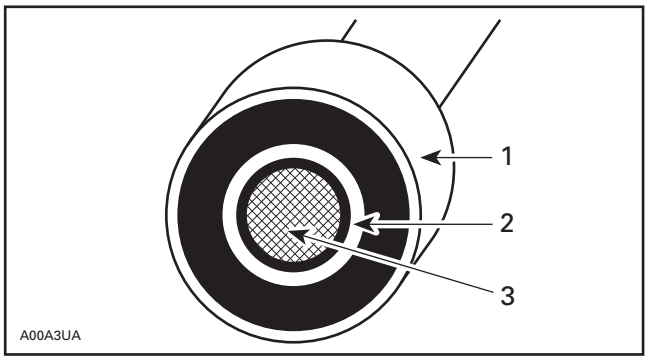
NOTE: If the cover is bolted to blind holes, apply proper strength Loctite in the hole and on threads. Tighten fastener.

NOTE: If holes are sunken, apply proper strength Loctite on bolt threads.

6. Tighten as usual.

Threadlocker Application for Mounting on a Shaft

Mounting with a Press



1. Bearing
2. Proper strength Loctite
3. Shaft

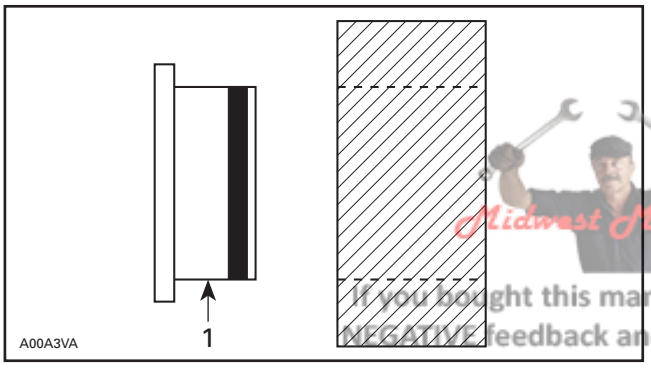
1. Clean shaft external contact surface.
2. Clean internal contact surface of part to be installed on shaft.
3. Apply a strip of proper strength Loctite on circumference of shaft contact surface at insertion or engagement point.

NOTE: Retaining compound is always forced out when applied on shaft. DO NOT use Loctite antiseize or any similar product. No curing period is required.

Mounting in Tandem

1. Apply retaining compound on internal contact surface (bore) of parts to be installed.
2. Continue parts assembly in the prescribed order.

Threadlocker Application for Case-In Components (Metallic Gaskets)



1. Proper strength Loctite

1. Clean inner housing diameter and outer gasket diameter.
2. Spray housing and gasket with LOCTITE 7649 (PRIMER) (P/N 293 800 041).
3. Apply a strip of proper strength Loctite on leading edge of outer metallic gasket diameter.

NOTE: Any Loctite product can be used here. A low strength liquid is recommended as normal strength and gap are required.

4. Install according to standard procedure.
5. Wipe off excess product.
6. Allow 30 minutes for product to cure.

NOTE: Normally used on worn-out housings to prevent leaking or sliding.

It is generally not necessary to remove gasket compound applied on outer gasket diameter.

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PERIODIC MAINTENANCE SCHEDULE

GENERAL

Maintenance is very important for keeping your vehicle in safe operating condition. The vehicle should be serviced as per the maintenance schedule.

⚠ WARNING

Failure to properly maintain the vehicle according to the maintenance schedule and procedures can make it unsafe to operate.

EPA Regulation - Canadian and USA Vehicles

A repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems. These instructions do not require components or service by BRP or authorized Can-Am Off-Road dealers.

Although an authorized Can-Am Off-Road dealer has an in-depth technical knowledge and tools to service your vehicle, the emission-related warranty is not conditioned on the use of an authorized Can-Am Off-Road dealer or any other establishment with which BRP has a commercial relationship.

Proper maintenance is the owner’s responsibility. A warranty claim may be denied if, among other things, the owner or operator caused the problem through improper maintenance or use.

You must follow the instructions for fuel requirements in the fueling section of this manual. Even if gasoline containing greater than ten volume percent ethanol is readily available, the US EPA issued a prohibition against the use of gasoline containing greater than 10 vol% ethanol that applies to this vehicle. The use of gasoline containing greater than 10 vol% ethanol with this engine may harm the emission control system.

SEVERE DUSTY CONDITIONS

Engine Air Filter Maintenance Guideline

Air filter maintenance should be adjusted according to riding conditions.

Air filter maintenance must be increased in frequency in the following dusty conditions:

– Riding on dry sand
– Riding on dry dirt covered surfaces
– Riding on dry gravel roads or similar conditions.

NOTE: Riding in a group in these conditions would increase even more the air filter maintenance.

MAINTENANCE SCHEDULE LEGEND

Operation in trail riding conditions
Operation in severe riding conditions (dusty or muddy) or carrying heavy loads condition

MAINTENANCE SCHEDULE

Make sure to perform proper maintenance at recommended intervals as indicated in the tables. Some items of the maintenance schedule must be performed in function of the calendar, regardless of the distance or time of operation.

EVERY 1 500 KM (1,000 MI) OR 50 HOURS (whichever comes first)
EVERY 750 KM (500 MI) OR 25 HOURS (whichever comes first)
Verify and clean engine air filter. Replace as needed
Verify battery connections
Inspect front differential, middle differential (6x6 models) and rear final drive oil level and look for contamination. Replace if necessary (X mr models)
Lubricate rear propeller shaft joint
Inspect tie rod ends and ball joints for play and boots condition
Lubricate front suspension arm bushings
Lubricate front (if equipped) and rear stabilizer bar bushings
Inspect the drive shaft boots and protectors
Inspect brake pads. Replace as needed
Inspect wheel bearings for abnormal play
Inspect and clean CVT air filter. Replace as needed. (If equipped)
Tighten wheel beadlock bolts (If equipped)
Lubricate lower shock absorber spherical bearings (Outlander Limited, XT-P and X xc models)
Lubricate upper shock absorber spherical bearings (Outlander Limited and X mr 1000R)

EVERY 3 000 KM (2,000 MI) OR 100 HOURS (whichever comes first)
EVERY 1 500 KM (1,000 MI) OR 50 HOURS (whichever comes first)
Adjust valve clearance
Clean muffler spark arrester
Verify and clean throttle body
Replace fuel vent breather filter
Verify CVT drive belt and clean CVT pulleys
Lubricate the one way bearing of the drive pulley
The following must be performed at least once a year:
Change engine oil and filter
Lubricate throttle cable
Inspect and clean brake system
Inspect battery condition
Verify steering system for abnormal play
Verify front differential and rear final drive oil level and look for contamination
Verify gearbox oil level and look for contamination (except 450)

PERFORM AT THE FIRST 3 000 KM (2,000 MI)AND AT 6 000 KM (4,000 MI) THEN FOLLOW THE REGULAR SCHEDULE
PERFORM AT THE FIRST 1 500 KM (1,000 MI) AND AT 3 000 KM (2,000 MI) THEN FOLLOW THE REGULAR SCHEDULE
Replace gearbox oil (except 450)
Clean the vehicle speed sensor (VSS) (except 450)

EVERY 6 000 KM (4,000 MI) OR 200 HOURS (whichever comes first)
EVERY 3 000 KM (2,000 MI) OR 100 HOURS (whichever comes first)
Verify the cooling system
Test engine coolant strength
Verify fuel system for leaks
Verify fuel pump pressure
Replace spark plugs
Replace front differential oil
Replace middle drive unit oil (6x6 models) and rear final drive oil
Replace gearbox oil (except 450)
Inspect input and output shaft seals (gearbox, differential and final drive)
Clean vehicle speed sensor
Clean and lubricate lower and upper steering column half bushings
The following must be performed every 2 years:
Replace the brake fluid

EVERY 12 000 KM (8,000 MI) OR 5 YEARS (whichever comes first)
EVERY 6 000 KM (4,000 MI) OR 5 YEARS (whichever comes first)
Replace engine coolant

PERIODIC MAINTENANCE PROCEDURES

SERVICE TOOLS

Description	Part Number	Page
TEST CAP	529 035 991	10
VACUUM/PRESSURE PUMP	529 021 800	10

SERVICE PRODUCTS

Description	Part Number	Page
4T 0W40 SYNTHETIC OIL (EUR)	779286	5
4T 0W40 SYNTHETIC OIL	779139	5
4T 10W50 SYNTHETIC OIL (EUR)	779240	6
4T 10W50 SYNTHETIC OIL	779234	6
4T 5W40 SYNTHETIC BLEND OIL (EUR)	779290	5
4T 5W40 SYNTHETIC BLEND OIL	779133	5
75W140 SYNTHETIC GEAR OIL (EUR)	779215	12, 19
75W140 SYNTHETIC GEAR OIL	779160	12, 19
75W90 SYNTHETIC GEAR OIL (EUR)	779212	18
75W90 SYNTHETIC GEAR OIL	779158	18
AIR FILTER OIL	219 700 340	3
BRAKE FLUID DOT 4 (EUR)	779207	22
BRAKE FLUID DOT 4	779151	22
EXTENDED LIFE PRE-MIXED COOLANT (EUR)	779223	8
EXTENDED LIFE PRE-MIXED COOLANT	779150	8
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	17
PROPELLER SHAFT GREASE	293 550 063	19
SYNTHETIC GREASE (EUR)	779231	23
SYNTHETIC GREASE	779162	23
SYNTHETIC SUSPENSION GREASE (EUR)	779226	20–21
SYNTHETIC SUSPENSION GREASE	779163	20–21
XPS BRAKES AND PARTS CLEANER (USA)	219 701 705	23
XPS BRAKES AND PARTS CLEANER	219 701 776	23

GENERAL

This subsection provides:

– Fluid level verifications

– Maintenance procedures.

The following systems should be serviced according to the appropriate *PERIODIC MAINTENANCE SCHEDULE*.

PROCEDURES

AIR INTAKE SYSTEM

Engine Air Filter Maintenance Guideline

As with any ATV, air filter maintenance is critical to ensure proper engine performance and life span.

Air filter maintenance should be adjusted according to riding conditions.

Air filter maintenance must be increased in frequency and oil must be added to the foam filter for the following dusty conditions:

– Riding on dry sand

– Riding on dry dirt covered surfaces
– Riding on dry gravel trails or similar conditions.

NOTE: Riding in a group in these conditions would increase even more the air filter maintenance.

Air Intake Prefilter (X mr)

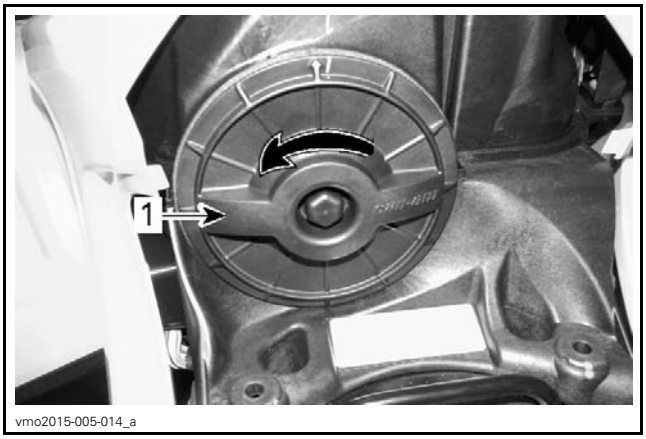
See *CLEANING THE CVT AIR FILTER* in this subsection.

Removing the Engine Air Filter

NOTICE Never remove or modify any component in the air filter housing. Otherwise, engine performance degradation or damage can occur. The engine is calibrated to operate specifically with these components.

1. Remove seat.
2. Remove console. Refer to *BODY* subsection.
3. Rotate air filter cover counterclockwise to remove it.

NOTE: A socket wrench may be used to ease removal of the air filter cover.



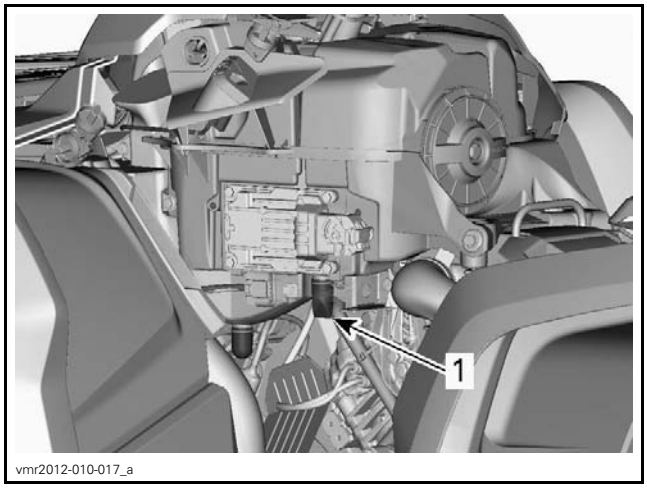
1. Air filter cover

4. Remove air filter.

AIR FILTER REMOVAL

Inspecting and Draining the Engine Air Filter Housing

1. Remove LH side panel and extension. Refer to *BODY* subsection.
2. Drain air filter housing drain tube.

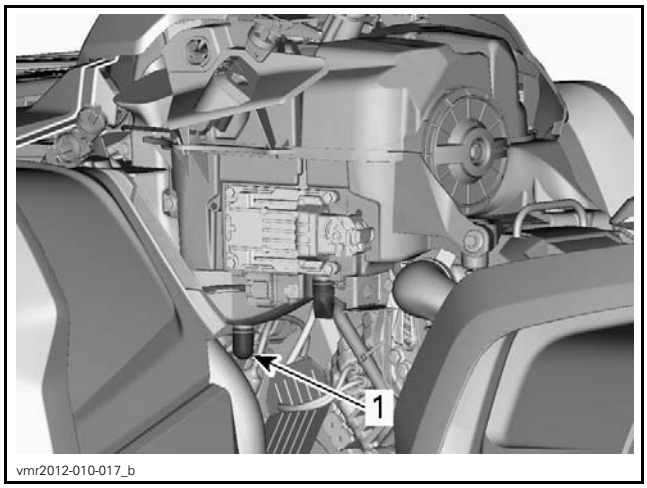


TYPICAL - SOME PARTS REMOVED FOR CLARITY
1. Air filter housing drain tube

3. Check air filter dirty chamber for cleanliness.
   – If any debris or water are found, clean air filter chamber using a vacuum cleaner.

NOTICE Do not blow compressed air into air filter chamber.

4. Check air filter housing drain tube (clean chamber).
   – If any debris or water are found, refer to *SPECIAL PROCEDURES* subsection.
   – Investigate for contamination source.



TYPICAL - SOME PARTS REMOVED FOR CLARITY
1. Air filter drain tube

Cleaning the Paper Filter

1. Ensure that the foam filter is removed from paper filter.
2. Tap out heavy dust from the paper filter.

This will allow dirt and dust to get out of the paper filter.

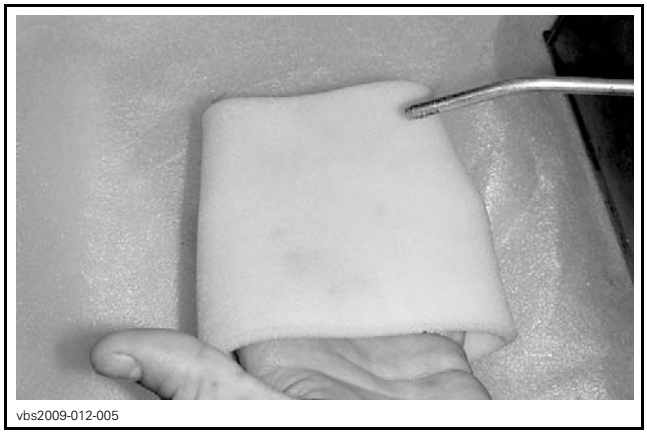
NOTE: Paper filter have a limited life span; replace filter if too dirty or clogged.

NOTICE It is not recommended to blow compressed air on the paper filter; this could damage the paper fibers and reduce its filtration ability when used in dusty environments.

NOTICE Do not wash the paper filter with any cleaning solution.

Cleaning the Foam Filter

1. Spray the foam filter inside and out with air filter cleaner and follow manufacturer's instructions.
2. Dry the foam filter completely.



TYPICAL - DRY

NOTE: A second application may be necessary for heavily soiled elements.

Oiling the Foam Filter

1. Spray the recommended air filter oil on the foam filter previously cleaned and dried. Follow manufacturer's informations.

SERVICE PRODUCT	
AIR FILTER OIL (P/N 219 700 340)	

TYPICAL - OIL THE FOAM FILTER

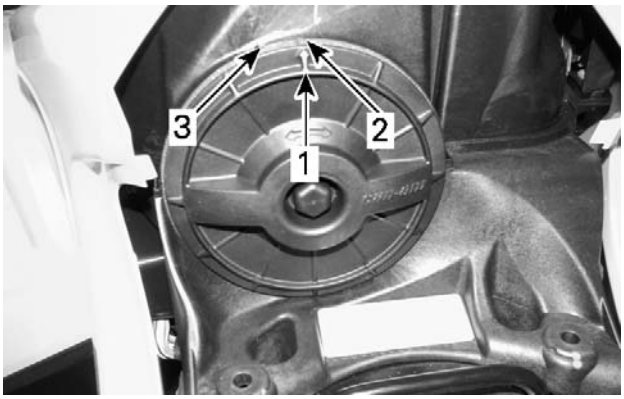
Reinstall oiled foam filter over the paper filter.

Installing the Engine Air Filter

Slightly grease O-ring seal and plastic body of air filter. Refer to *AIR INTAKE SYSTEM* exploded view.

Install filter assembly in air filter housing.

Ensure air filter cover is properly locked onto the air filter housing. See indications on filter cover and housing.



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1. Cover position arrow
2. Locked
3. Unlocked

Reinstall the console.

EXHAUST SYSTEM

Cleaning and Inspecting the Muffler Spark Arrester

The muffler must be periodically purged of accumulated carbon.

⚠ WARNING

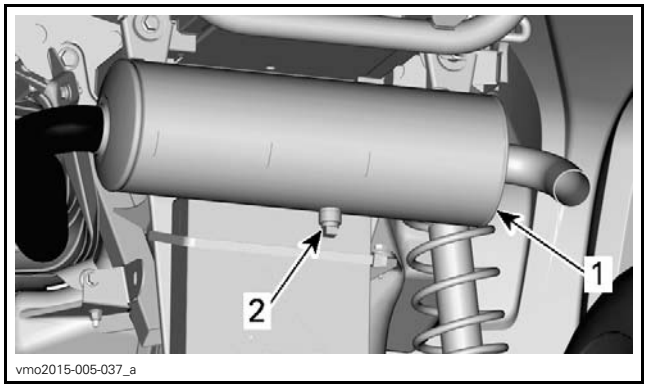
Never run engine in an enclosed area. Never perform this operation immediately after the engine has been run because exhaust system is very hot. Make sure that there are no combustible materials in the area. Wear eye protection and gloves. Never stand behind the vehicle while purging exhaust system. Respect all applicable laws and regulations.

Select a well-ventilated area and make sure the muffler is cool.

⚠ CAUTION **Never perform this operation immediately after the engine has been running as exhaust system is very hot.**

Muffler (Transversal Mounting)

1. Place transmission on PARK position.
2. Remove the clean out plug of the muffler.



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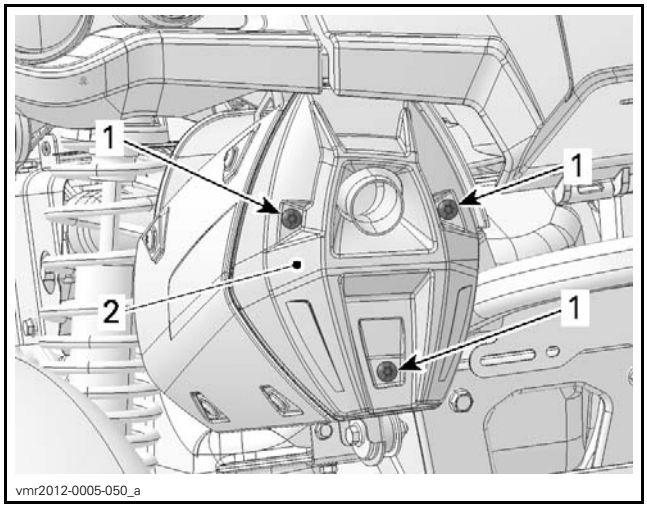
TYPICAL
1. Muffler
2. Clean out plug

3. Block the end of the muffler with a shop rag and start engine.
4. Momentarily increase engine RPM several times to purge accumulated carbon out of the muffler.
5. Stop engine and allow muffler to cool.
6. Reinstall the clean out plug.

Muffler (Longitudinal Mounting)

1. Remove the muffler cover and discard the screws.



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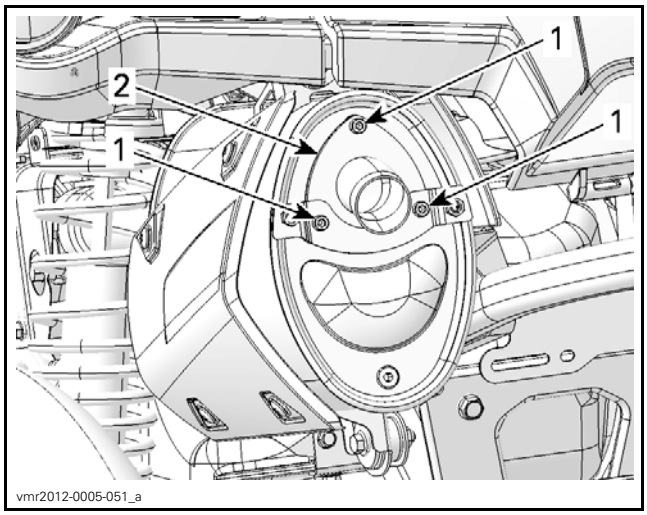
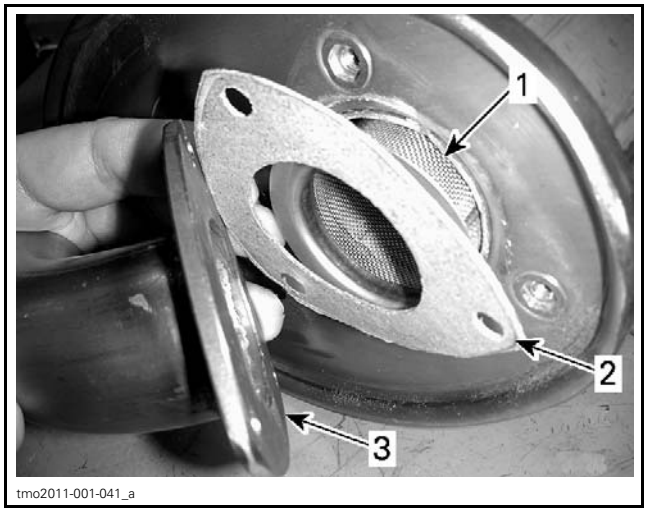
TYPICAL
1. Remove and discard screws
2. Cover

2. Remove and discard the tail pipe retaining screws.



TYPICAL — ALL MODELS
1. *Screws*
2. *Tail pipe*

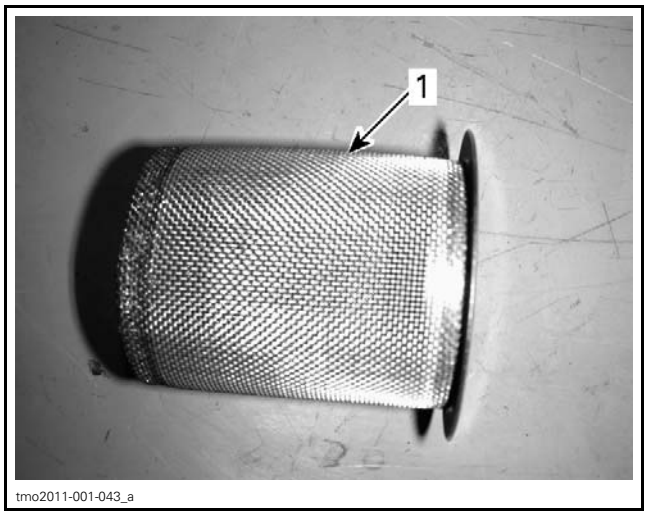
3. Remove exhaust tail pipe, gasket (discard) and spark arrester.



1. *Spark arrester*
2. *Gasket*
3. *Exhaust tail pipe*

4. Remove carbon deposits from the spark arrester using a brush.

NOTICE **Use a soft brush and be careful to avoid damaging spark arrester mesh.**



1. *Clean spark arrester*

5. Inspect mesh of spark arrester for any damage. Replace as required.
6. Inspect spark arrester chamber in muffler. Clean as required.

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

Install new gasket and new retaining screws.

TIGHTENING TORQUE	
Tail pipe retaining screws	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)

LUBRICATION SYSTEM

Recommended Engine Oil

Rotax® engines were developed and validated using the XPS™ oil. BRP recommends the use of its XPS engine oil or an equivalent at all time. Damages caused by the use of an oil not suitable for the engine may not be covered by the BRP Limited Warranty.

XPS RECOMMENDED ENGINE OIL	
General purpose	**Scandinavia:** 4T 5W40 SYNTHETIC BLEND OIL (EUR) (P/N 779290) **Other Countries:** 4T 5W40 SYNTHETIC BLEND OIL (P/N 779133)
Cold temperature	**Scandinavia:** 4T 0W40 SYNTHETIC OIL (EUR) (P/N 779286) **Other Countries:** 4T 0W40 SYNTHETIC OIL (P/N 779139)

XPS RECOMMENDED ENGINE OIL	
Warm temperature	Scandinavia: 4T 10W50 SYNTHETIC OIL (EUR) (P/N 779240) Other Countries: 4T 10W50 SYNTHETIC OIL (P/N 779234)

IF THE RECOMMENDED XPS ENGINE OIL IS NOT AVAILABLE

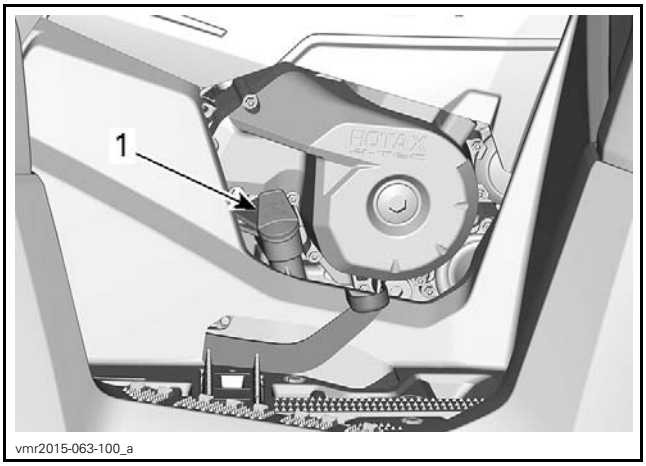
Use a 4-stroke SAE engine oil meeting or exceeding the following lubricant industry specifications. Always check the API service label certification on the oil container, it must contain at least one of the indicated standards.

– API service classification SJ, SL, SM or SN

Verifying the Engine Oil Level

NOTICE **Operating the engine with an improper level may severely damage engine.**

NOTE: While checking the oil level, visually inspect engine area for leaks.

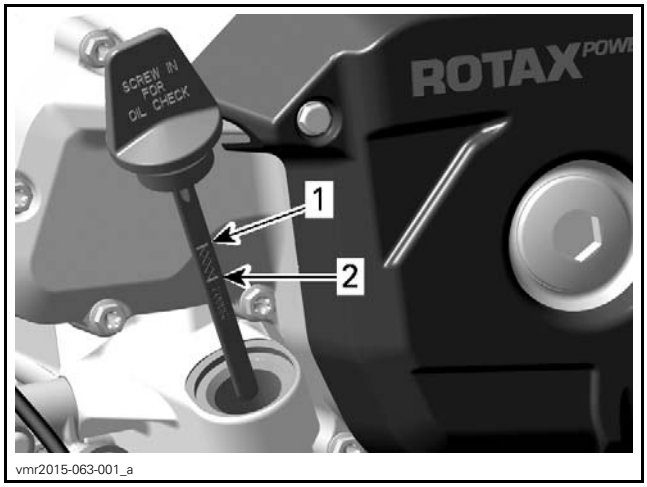


TYPICAL - RH SIDE OF ENGINE
1. Dipstick

NOTE: Do not lose the O-ring placed on the dipstick.

With vehicle on a level surface and engine cold, not running, check the oil level as follows:

1. Unscrew dipstick then remove it and wipe clean.
2. Reinstall dipstick, screw in it completely.
3. Remove and check oil level. It should be near or equal to the upper mark.



1. Full
2. Add

To add oil, remove the dipstick. Place a funnel into the dipstick orifice.

Add a small amount of recommended oil and recheck oil level.

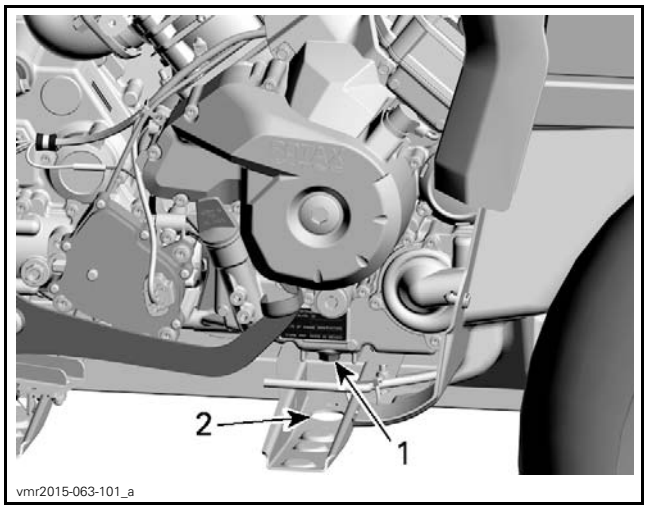
Repeat the above procedures until oil level reaches the dipstick's upper mark. **Do not overfill. Wipe off any spillage.**

Properly tighten dipstick.

Changing the Engine Oil

1. Start and warm-up engine.
2. Stop engine.
3. Ensure vehicle is on a level surface.
4. Remove dipstick.
5. Place a drain pan under the engine drain plug area.
6. Clean the magnetic drain plug area.
7. Unscrew magnetic drain plug and discard the gasket ring.

⚠ CAUTION **The engine oil can be very hot.**



TYPICAL - SOME PARTS REMOVED FOR CLARITY
1. *Magnetic drain plug*
2. *Access through frame*

Allow oil to drain completely from the crankcase.

8. Clean the magnetic drain plug from metal shavings and residue. Presence of debris gives an indication of internal engine damage.
9. Install a NEW gasket ring on the magnetic drain plug.

NOTICE Never use the gasket ring a second time. Always replace by a new one.

10. Install and tighten magnetic drain plug to the recommended torque.

TIGHTENING TORQUE	
M12	20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)
M18	30 N•m ± 2 N•m (22 lbf•ft ± 1 lbf•ft)

11. Replace oil filter. Refer to *REPLACING THE ENGINE OIL FILTER* in this subsection.
12. Refill engine with recommended engine oil.

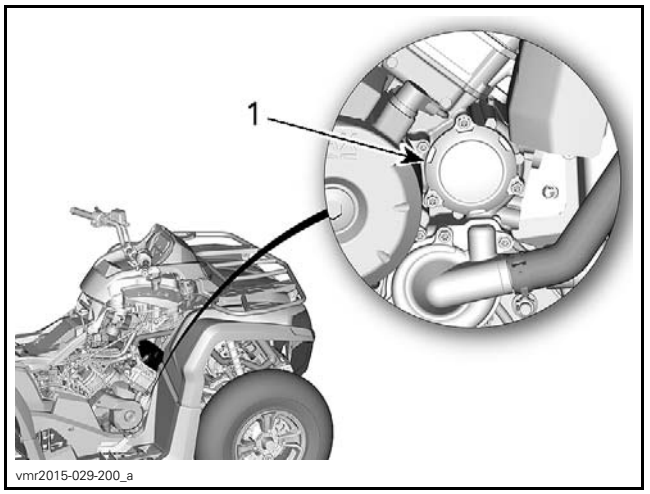
MODEL	ENGINE OIL CAPACITY
450 engines	3 L (3.2 qt (U.S. liq.))
All other engines	2 L (2.1 qt (U.S. liq.))

13. After filling, check the oil level, refer to *VERIFYING THE ENGINE OIL LEVEL* in this subsection.
14. Start engine and let it idle for a few minutes.
15. Ensure oil filter and drain plug areas are not leaking.
16. Stop engine.
17. Wait a while to allow oil to flow down to crankcase, then check oil level again.
18. Refill as necessary.
19. Dispose oil and filter as per your local environmental regulations.

Replacing the Engine Oil Filter

Engine Oil Filter Access

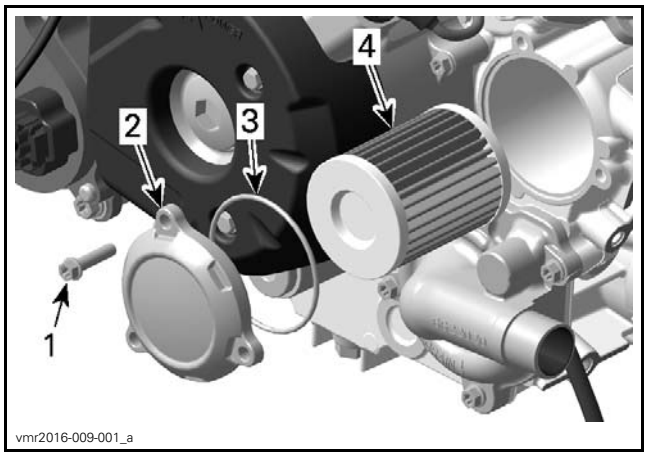
To reach oil filter, refer to *BODY* subsection and remove the following parts:
- Seat
- Console
- RH side panel and extension
- RH inner fender panel.



1. *Oil filter cover*

Removing the Engine Oil Filter

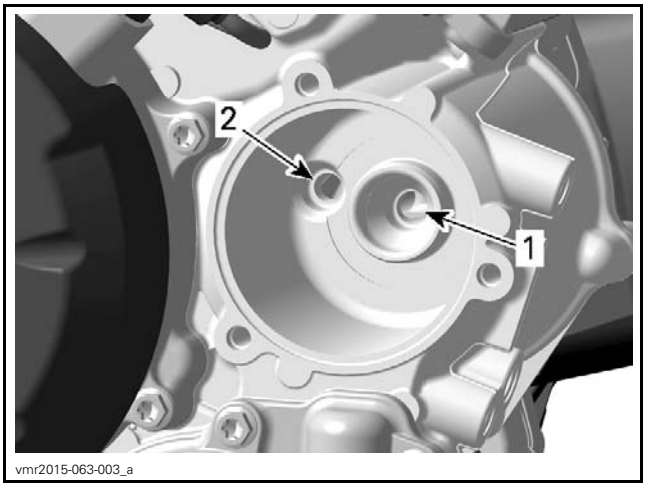
1. Clean oil filter area.
2. Remove oil filter cover.
3. Remove oil filter.



1. *Oil filter screw*
2. *Oil filter cover*
3. *O-ring*
4. *Oil filter*

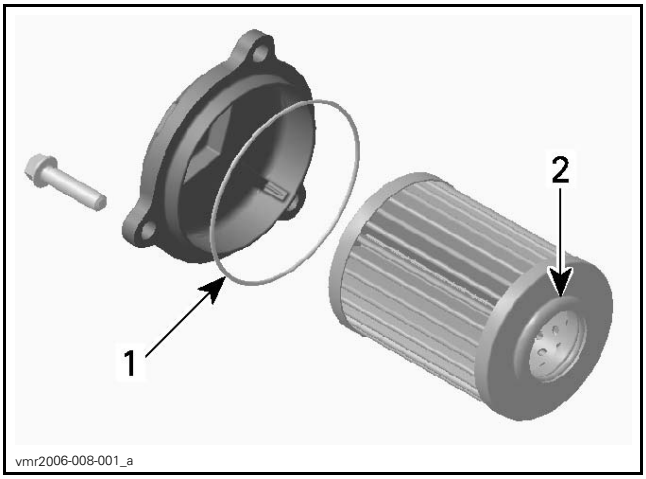
Installing the Engine Oil Filter

1. Check and clean the oil filter inlet and outlet area of dirt and other contaminations.



1. Outlet bore to the engine oil providing system
2. Inlet bore from the oil pump to the oil filter

2. Install a NEW O-ring on oil filter cover.
3. Install the new filter into the cover.
4. Apply engine oil on O-ring and on end of filter.



1. O-ring - slightly oil
2. End of filter - slightly oil

5. Install the cover on the engine.

NOTICE Pay attention to avoid pinching the O-ring during filter and cover installation.

6. Tighten oil filter cover screws to specification.

TIGHTENING TORQUE	
Oil filter cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

7. Reinstall remaining parts if applicable.
8. Wipe off any oil spillage on engine.

COOLING SYSTEM

Recommended Engine Coolant

XPS RECOMMENDED COOLANT	
Scandinavia	EXTENDED LIFE PRE-MIXED COOLANT (EUR) (P/N 779223)
Other Countries	EXTENDED LIFE PRE-MIXED COOLANT (P/N 779150)
IF THE RECOMMENDED XPS COOLANT IS NOT AVAILABLE	
Use distilled water and antifreeze solution (50% distilled water, 50% antifreeze)	

NOTICE Always use ethylene-glycol antifreeze containing corrosion inhibitors specifically formulated for internal combustion aluminum engines.

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

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.

Verifying the Engine Coolant Level

⚠ WARNING

In order to avoid potential burns, check coolant level with engine cold. Do not remove the radiator cap if the engine is hot.

1. Place vehicle on a level surface.
2. Remove gauge support. Refer to *BODY* subsection.

With the vehicle on a level surface, coolant level should be between the MIN. and MAX. marks of the reservoir.

TYPICAL
1. Engine coolant reservoir

NOTE: When checking level at temperature lower than 20°C (68°F), it may be slightly lower than MIN. mark.

3. Add coolant up to MAX. mark if required.
4. Use a funnel to avoid spillage. **Do not overfill.**
5. Properly reinstall and tighten reservoir cap.
6. Reinstall gauge support.

NOTICE **Do not store any objects under the gauge support.**

Checking the Engine Coolant Specific Gravity

1. Remove gauge support. Refer to *BODY* subsection.
2. Remove pressure cap.

⚠ WARNING

To avoid potential burns, do not remove the pressure cap if the engine is hot.

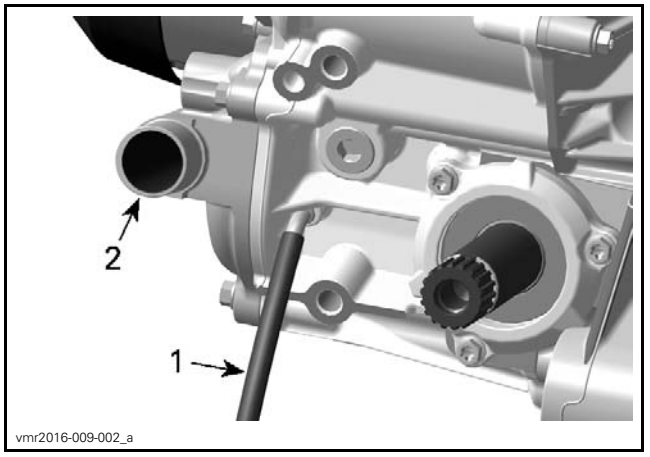
3. Using an antifreeze tester, test coolant strength.

MINIMUM RECOMMENDED COOLANT STRENGTH
-30°C (-22°F)

Inspecting the Engine Cooling System

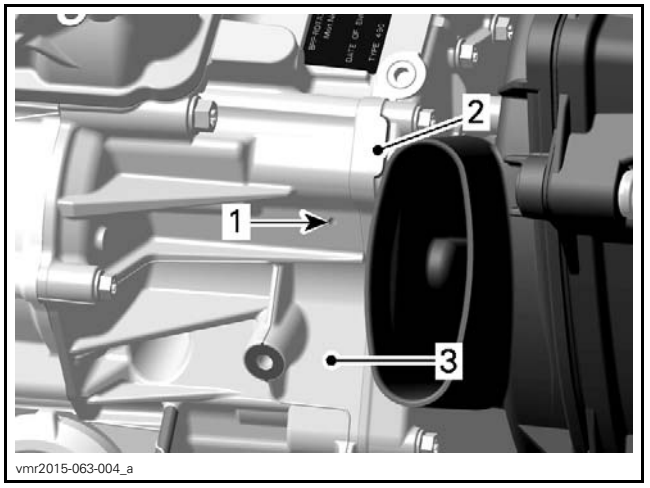
1. Check general condition of hoses and clamps for tightness.
2. Check the leak indicator hose for oil or coolant.

Leaking coolant indicates a defective rotary seal. Leaking oil indicates a defective oil seal. If either seal is leaking, both seals must be replaced at the same time. Refer to *WATER PUMP SHAFT AND SEALS* in the *COOLING SYSTEM* subsection.



1. Leak indicator hose
2. Water pump

Another leak indicator hole is visible on the PTO side. It provides an indication of the PTO gasket condition. If a liquid leaks from this hole, PTO gasket replacement is necessary.



TYPICAL
1. Leak indicator hole
2. PTO cover
3. Crankcase PTO, front side

3. Ensure vent hose on coolant expansion tank is not obstructed.

Testing the Engine Cooling System Pressure Cap

1. Remove gauge support. Refer to *BODY* subsection.
2. Remove pressure cap.

⚠ WARNING

To avoid potential burns, do not remove the pressure cap if the engine is hot.

3. Test the pressure cap using a cooling system tester.
4. Replace the cap if it does not hold the pressure, or if it opens at a relief pressure that is too low or too high.

PRESSURE CAP RELIEF PRESSURE
Approximately 110 kPa (16 PSI)

Testing the Engine Cooling System Leak

1. Remove gauge support. Refer to *BODY* subsection.
2. Remove pressure cap.

⚠ WARNING

To avoid potential burns, do not remove the pressure cap if the engine is hot.

3. Pressurize cooling system as follows.

REQUIRED TOOLS	
TEST CAP (P/N 529 035 991)	
VACUUM/PRESSURE PUMP (P/N 529 021 800)	

COOLING SYSTEM LEAK TEST
110 kPa (16 PSI)

If there is no pressure drop after 10 minutes, there is no leak in the cooling system.

If the pressure drops, check all hoses, radiator, cylinders and engine base for coolant leaks or air bubbles.

Replacing the Engine Coolant

Draining the Engine Cooling System

⚠ CAUTION Engine coolant can be very hot. Coolant draining should be carried out on a cold engine.

1. Remove gauge support. Refer to *BODY* subsection.
2. Remove cooling system pressure cap.

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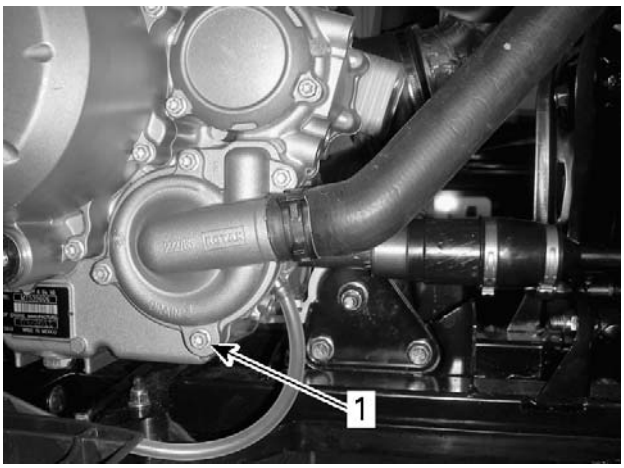
TYPICAL
1. Cooling system pressure cap

3. Unscrew coolant drain plug.

NOTE: Coolant drain plug is accessible from underneath RH footrest panel.



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TYPICAL - SOME PARTS REMOVED FOR CLARITY
1. Coolant drain plug

4. Drain cooling system into a suitable container.
5. Disconnect the lower radiator hose and drain the remaining coolant.

NOTE: Take note of the hose clamp position before it is loosened for hose removal.

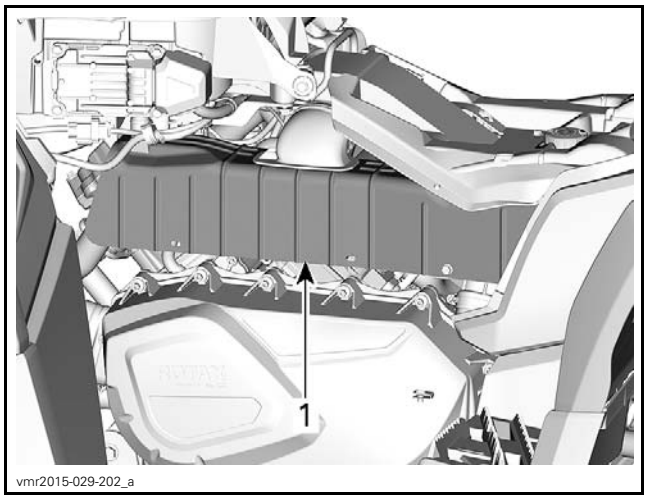
6. Reinstall coolant drain plug with a NEW sealing washer.
7. Tighten coolant drain plug to specification.

TIGHTENING TORQUE	
Coolant drain plug	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

8. Fill cooling system with recommended coolant, refer to *FILLING AND BLEEDING THE COOLING SYSTEM* procedure.

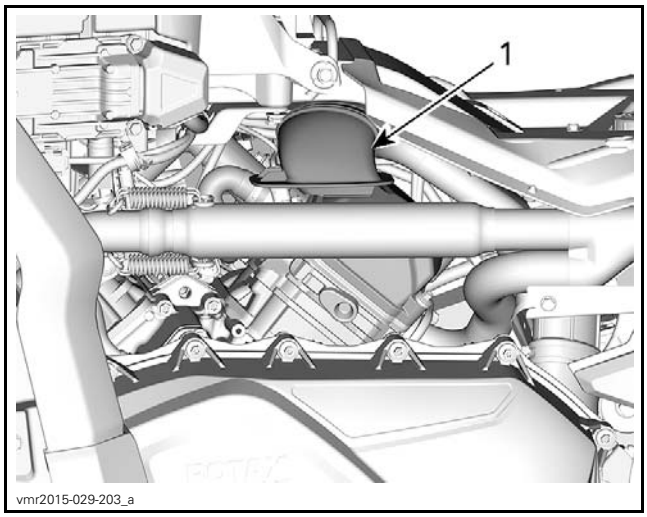
Filling and Bleeding the Engine Cooling System

1. Remove cooling system pressure cap.
2. Remove RH and LH side panels. Refer to *BODY* subsection.
3. On LH side of engine, remove outer exhaust heat shield. Refer to *EXHAUST SYSTEM* subsection.



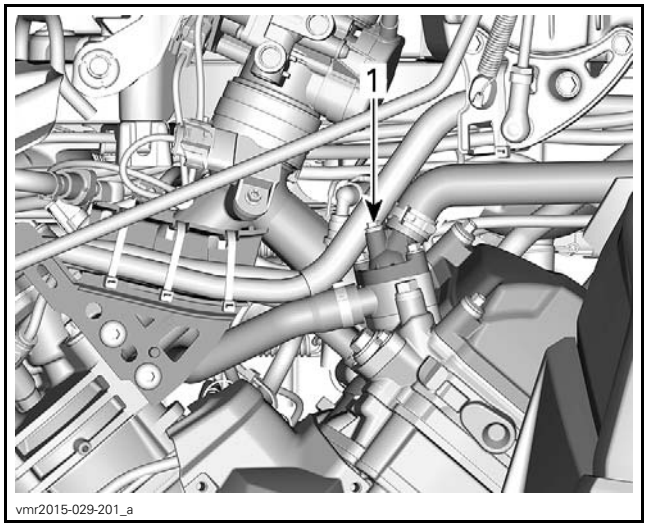
1. Outer exhaust heat shield

4. Remove CVT duct outlet.

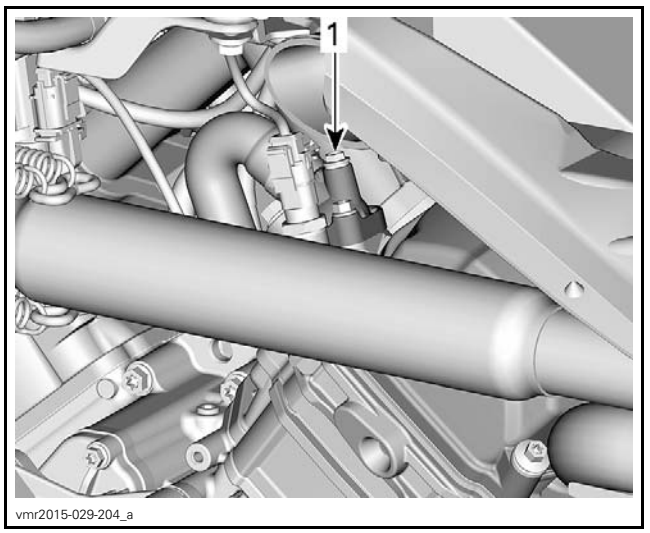


1. CVT duct outlet

5. Unscrew bleed screws on thermostat housing covers of both front and rear cylinders.



RH SIDE
1. Front cylinder bleed screw



LH SIDE
1. Rear cylinder bleed screw

6. Fill cooling system until coolant comes out of bleed screws.
7. Squeeze the top of the coolant hose between the radiator and coolant pump several times to bleed all air from the highest point of the hose.
8. Install bleed screws using **NEW** gasket rings.
9. Tighten bleed screws.

TIGHTENING TORQUE	
Bleed screws	5.0 N•m ± 0.6 N•m (44 lbf•**in** ± 5 lbf•**in**)

10. Refill coolant tank up to MAX level mark.
11. Install cooling system pressure cap.
12. Run engine at idle until the cooling fan cycles on for a second time.
13. Stop the engine and let it cool down.

⚠ WARNING

Do not remove the pressure cap if the engine is hot.

14. Check coolant level in the coolant tank. Refer to *VERIFYING THE ENGINE COOLANT LEVEL* in this subsection.
15. Add coolant if required.

CYLINDER HEAD

Inspecting and Adjusting the Engine Valve Clearance

NOTE: Check and adjust valve clearance only when engine is cold.

1. Remove valve covers, refer to *TOP END* subsection.
2. Before checking or adjusting the valve clearance, turn crankshaft clockwise to TDC ignition of the respective cylinder, refer to *CAMSHAFT TIMING GEAR* in the *TIMING CHAIN* subsection.

NOTICE **Crankshaft must be turned clockwise only to avoid loosening the magneto retaining bolt.**

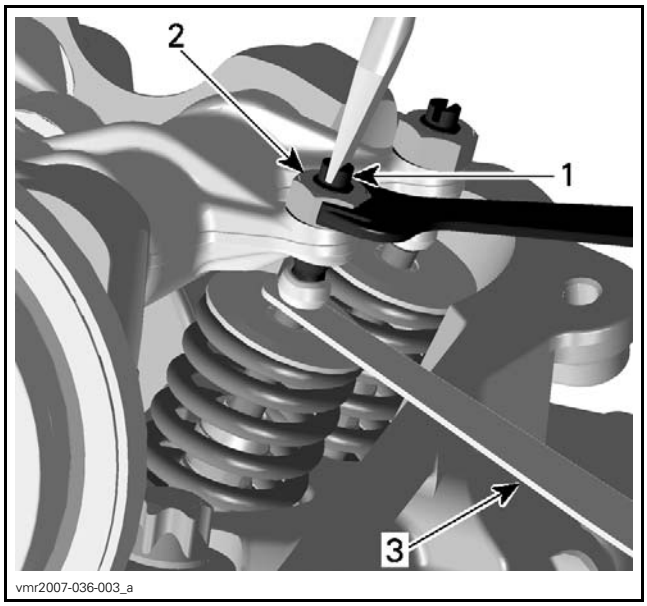
3. Using a feeler gauge, check the valve clearance.

VALVE CLEARANCE	
EXHAUST	0.11 mm to 0.19 mm (.0043 in to .0075 in)
INTAKE	0.06 mm to 0.14 mm (.0024 in to .0055 in)

If the valve clearance is out of specification, adjust valves as follows.

NOTE: Use the center value of exhaust/intake specification to ensure a proper valve adjustment.

4. Hold the adjustment screw at the proper position and torque the locking nut.



1. Adjustment screw
2. Locking nut
3. Feeler gauge

5. Repeat the procedure for each valve.
6. Before installing valve covers, recheck valve clearance.

GEARBOX

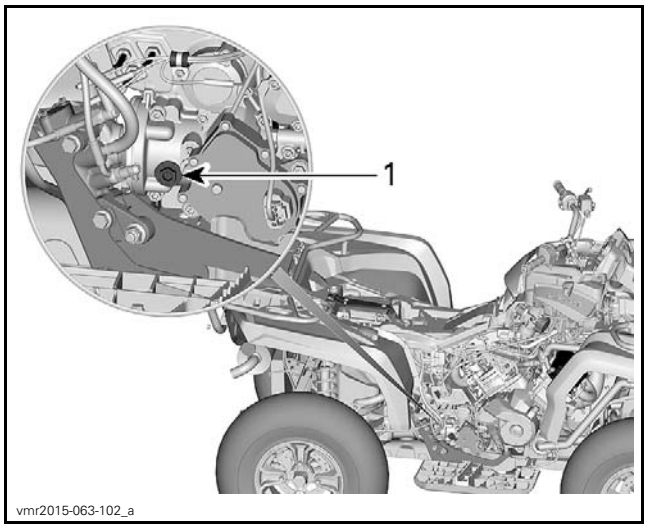
Recommended Gearbox Oil (Except 450 Engines)

XPS RECOMMENDED GEARBOX OIL	
Scandinavia	75W140 SYNTHETIC GEAR OIL (EUR) (P/N 779215)
Other Countries	75W140 SYNTHETIC GEAR OIL (P/N 779160)
IF THE RECOMMENDED XPS GEARBOX OIL IS NOT AVAILABLE	
Use a 75W140 gearbox oil that meets the API GL-5 specification	

Verifying the Gearbox Oil Level

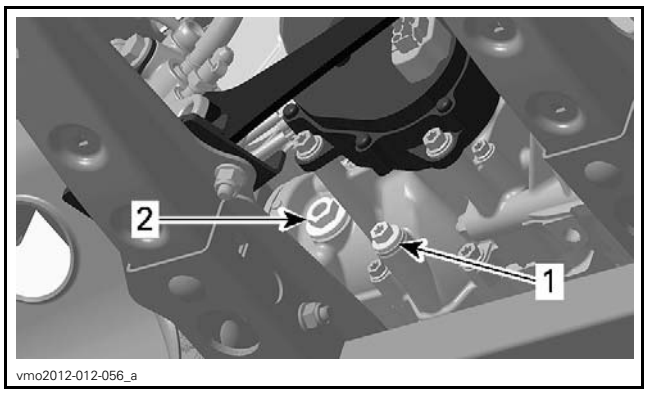
NOTE: Prior checking the gearbox oil level, ensure vehicle is on a level surface.

1. To access gearbox oil level plug, refer to *BODY* subsection and remove the following parts:
   - Seat
   - Console
   - RH side panel and extension(s)
   - RH footrest panel.



TYPICAL
1. Oil level plug

2. Remove the gearbox oil level plug.



TYPICAL
1. Drain plug
2. Oil level plug

3. Check oil level.

The oil should be level with the bottom of the oil level hole.

NOTICE **Operating the gearbox with an improper oil level may severely damage gearbox.**

4. Install the oil level plug with its O-ring. Tighten plug as per table.

TIGHTENING TORQUE	
Oil level plug	5 N•m ± 0.6 N•m (44 lbf•**in** ± 5 lbf•**in**)

Replacing the Gearbox Oil

Draining the Gearbox Oil

1. Start engine and operate vehicle to warm-up the gearbox oil.

NOTE: Running engine at idle is not sufficient, vehicle transmission must be operated.

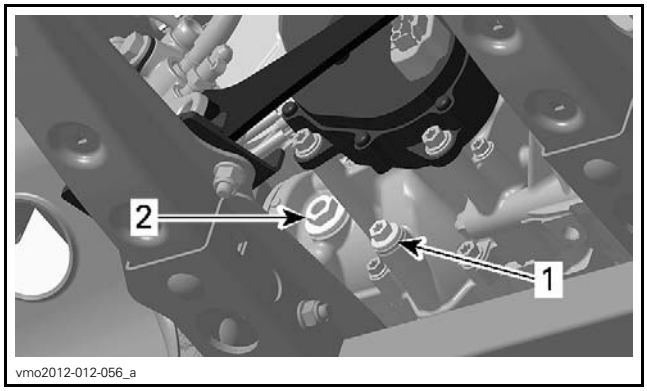
2. Position vehicle on a level surface.
3. Place a drain pan under the gearbox drain plug area.
4. Clean drain plug area.
5. Remove magnetic drain plug and sealing washer. Discard sealing washer.

⚠ WARNING

The gearbox oil can be very hot.

6. Remove oil level plug and its O-ring.

NOTE: Allow oil to completely flow out of gearbox.



TYPICAL
1. Magnetic drain plug
2. Oil level plug

7. Clean magnetic drain plug and pay attention to any debris present on drain plug.

NOTE: Presence of excessive debris provides an indication of a gearbox problem.

8. Reinstall magnetic drain plug with a NEW sealing washer.

TIGHTENING TORQUE	
Magnetic drain plug	20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)

9. Dispose gearbox oil as per your local environmental regulations.

Filling the Gearbox Oil

1. Fill the gearbox through the oil level hole until the oil reaches the bottom of the oil level hole.
2. Install the oil level plug with its O-ring.

TIGHTENING TORQUE	
Oil level plug	5 N•m ± 0.6 N•m (44 lbf•**in** ± 5 lbf•**in**)

Inspecting the Gearbox Input and Output Shafts Oil Seals

Remove driven pulley. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection.

Visually inspect gearbox oil seals for leaks. Replace if required.

Cleaning the Vehicle Speed Sensor (VSS)

Remove the VSS. Refer to *GEARBOX AND 4X4 COUPLING UNIT* subsection.

Remove all metal particles and oil from the VSS magnet.

NOTE: A dirty VSS will cause erratic speedometer readings.

CONTINUOUSLY VARIABLE TRANSMISSION (CVT)

Cleaning the CVT Air Inlet/Outlet

1. Remove CVT cover, refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection.
2. Inspect and clean the air inlet and outlet openings from inside the CVT cover.
3. Inspect and clean the air outlet duct connected to the exhaust system heat shield under the seat.

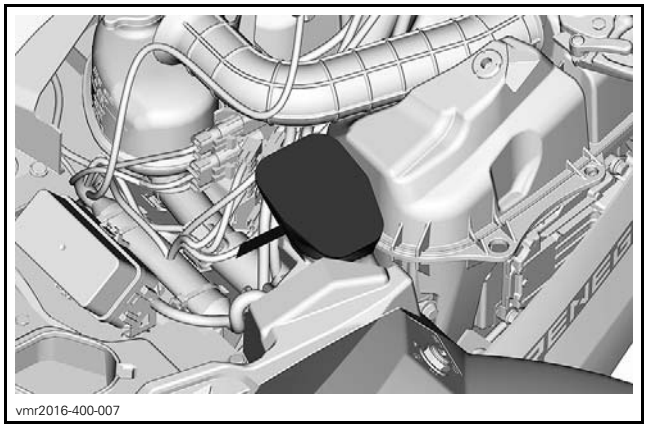
NOTE: If a lot of debris or grime are found in the CVT system, it may be necessary to remove the ducts and thoroughly clean them.

4. Reinstall CVT cover.

Cleaning the CVT Air Filter

Removing the CVT Air Filter

1. Remove gauge support, refer to the *BODY* subsection.
2. Remove air filter from CVT air inlet by stretching its sides.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Cleaning the CVT Air Filter

1. Remove CVT air filter.
2. Inspect filter and replace if damaged.
3. Gently clean filter using a solution of soft soap and tap water, then rinse thoroughly.
4. Dry filter completely.
5. Clean inside the CVT air inlet duct.

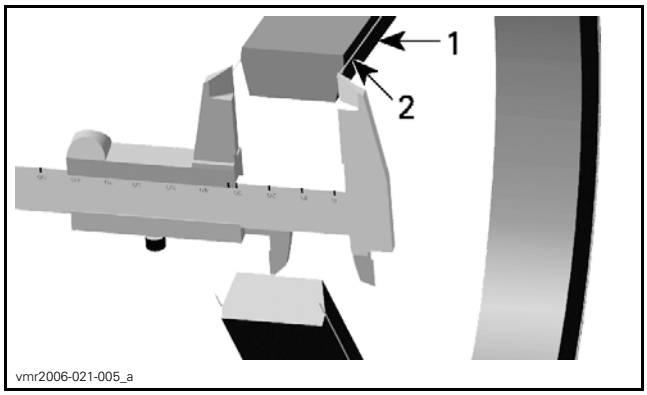
Installation the CVT Air Filter

The installation is the reverse of the removal procedure.

Inspecting the Drive Belt

1. Inspect belt for cracks, fraying or abnormal wear. Replace if necessary.
2. Check drive belt width at cord level. Replace if it is out of specification.

DRIVE BELT WIDTH	
SERVICE LIMIT	30 mm (1.181 in)



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1. Drive belt
2. Cord in drive belt

Drive Pulley, Driven Pulley and One-Way Bearing Maintenance

Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection.

FUEL SYSTEM

Inspecting and Cleaning the Throttle Body

1. Remove the air intake housing, refer to *AIR INTAKE SYSTEM* subsection.
2. Visually inspect throttle plate and throttle body venturi for cleanliness.
3. Clean inside throttle body if necessary. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.

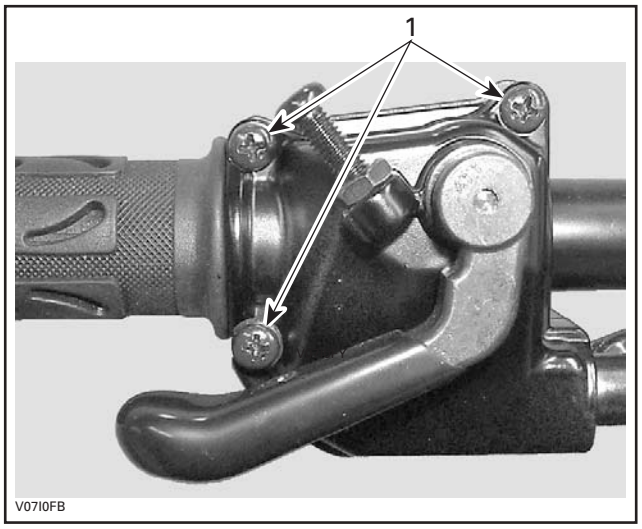
Lubricating the Throttle Cable

The throttle cable must be lubricated with a silicone based lubricant.

⚠ WARNING

Always use a silicone-based lubricant. Using another lubricant (like a water-based lubricant) could cause the throttle lever/cable to become sticky and stiff.

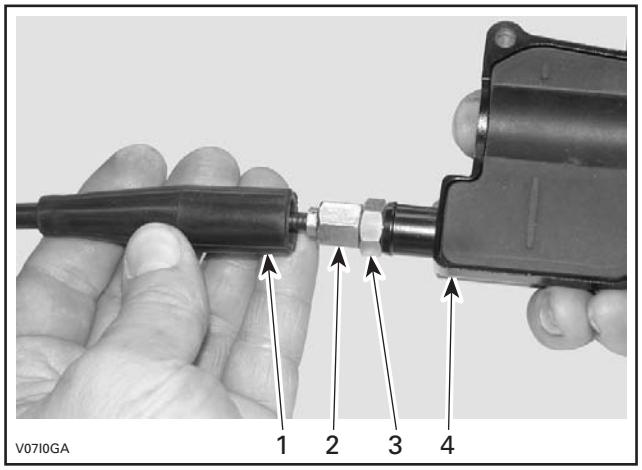
Open the throttle lever housing.



1. Remove these screws

Separate the housing.

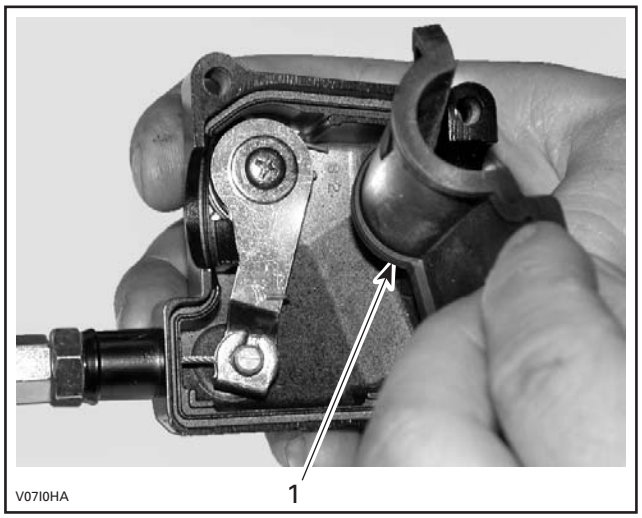
Slide rubber protector back to expose throttle cable adjuster.



1. Cable protector
2. Throttle cable adjuster
3. Lock nut
4. Throttle lever housing

Screw in the throttle cable adjuster.

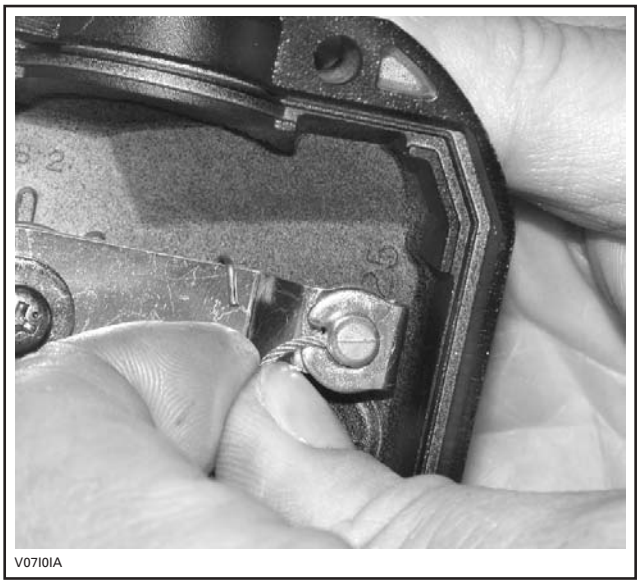
Remove inner housing protector.



1. Inner housing protector

Remove the cable from the throttle lever housing.

NOTE: Slide cable in clip slot and remove the end of cable from clip.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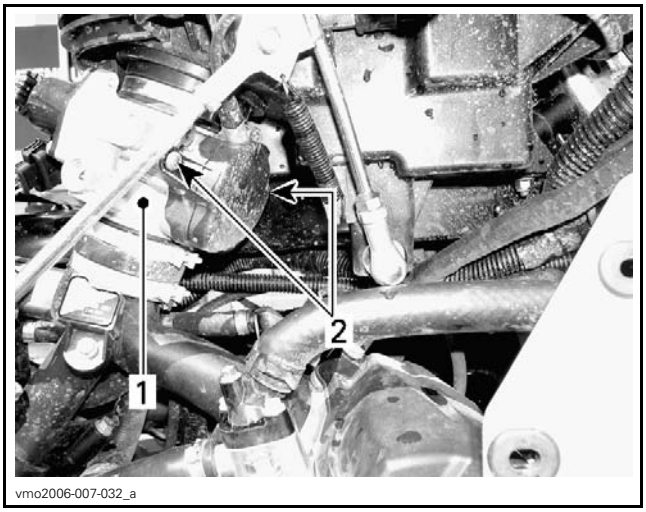
Remove the throttle body side cover.



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1. *Throttle body*
2. *Side cover screws*

Insert the needle of the lubricant can in the end of throttle cable adjuster.

V07I0JA

TYPICAL

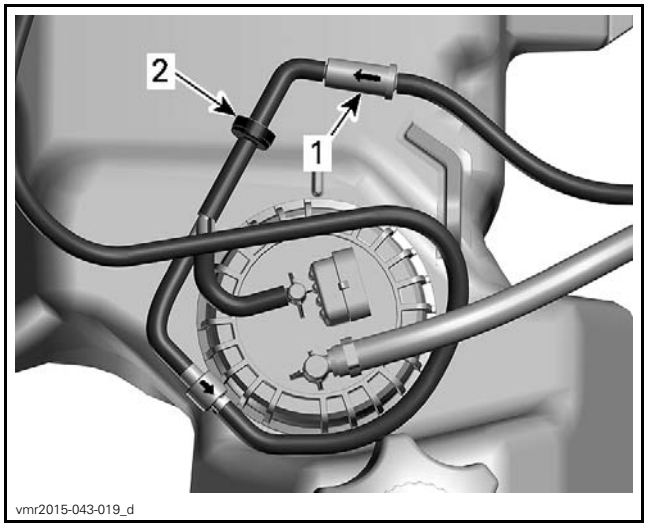
NOTE: Place a rag around the throttle cable adjuster to prevent the lubricant from splashing.

Add lubricant until it runs out at throttle body end of the throttle cable.

Reinstall and adjust the cable. Refer to *ELECTRONIC FUEL INJECTION* subsection.

Replacing the Fuel Tank Vent Breather Filter

Ensure breather filter is installed with the flow arrow pointing towards the vent inlet check valve.



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1. *Vent breather filter*
2. *Vent inlet check valve*

Inspecting the Fuel System

1. Visually inspect fuel tank for cracks, wear marks, signs of leakage or any other damages.
2. Visually inspect fuel system hoses for proper rooting, cracking, wear marks, signs of leakage or any other damages.

3. Carry out a *FUEL TANK LEAK TEST*, refer to *FUEL TANK AND FUEL PUMP* subsection.

⚠ WARNING

All fuel system leaks must be repaired. Damaged, worn or leaking fuel system components should be replaced to ensure fuel system tightness.

Testing the Fuel Pump Pressure

Refer to *FUEL TANK AND FUEL PUMP* subsection for procedure.

ELECTRICAL SYSTEM

Inspecting the Battery

Visually inspect battery casing for cracks or other damage. If casing is damaged, replace battery and thoroughly clean battery rack with water and sodium bicarbonate (baking soda).

Inspect battery posts condition and battery retainer plate.

For battery testing, refer to *CHARGING SYSTEM* subsection.

Replacing the Spark Plug

Spark Plug Access

For access to the LH spark plug, remove the LH inner fender panel.

For access to the RH spark plug, remove the RH side panel and extension(s).

Removing the Spark Plug

1. Remove spark plug cable from spark plug.
2. Clean the spark plug area using pressurized air.
3. Remove spark plug.

Installing the Spark Plug

Prior to installation, ensure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap as specified in *TECHNICAL SPECIFICATIONS*.
2. Apply lubricant over the spark plug threads to prevent possible seizure.

SERVICE PRODUCT
LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

NOTICE **Do not apply antiseize lubricant on the first 2 spark plug threads.**

3. Hand screw spark plug into cylinder head, then tighten to specification using a torque wrench and an appropriate socket.

450, 570 and 650 Engines

TIGHTENING TORQUE	
Spark plug	20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)

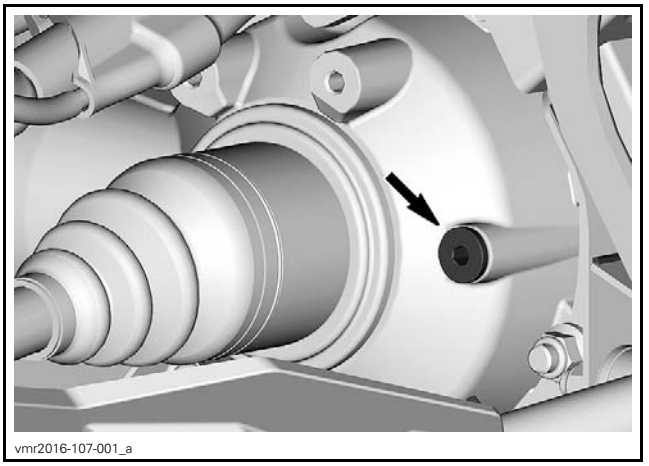
850 and 1000R Engines

TIGHTENING TORQUE	
Spark plug	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)

DRIVE SYSTEM

Verifying the Front Differential Oil Level

1. Clean filler plug prior to checking oil level.



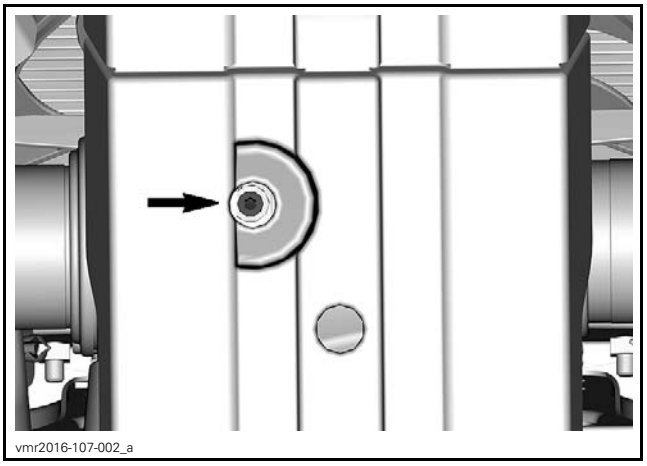
RH SIDE OF VEHICLE

2. With vehicle on a level surface, check oil level by removing filler plug. Oil level must reach the lower edge.
3. Reinstall filler plug with a **NEW** sealing washer.

TIGHTENING TORQUE	
Filler plug	22.5 N•m ± 2.5 N•m (17 lbf•ft ± 2 lbf•ft)

Replacing the Front Differential Oil

1. Place vehicle on a level surface. Set transmission in park position.
2. Clean filler and drain plug areas.
3. Place a drain pan under the front differential.
4. Remove filler plug.
5. Remove drain plug.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BOTTOM VIEW OF VEHICLE

NOTE: Allow enough time for oil to flow out.

6. Install and tighten drain plug to specification.

TIGHTENING TORQUE	
Drain plug	7.5 N•m ± 0.5 N•m (66 lbf•**in** ± 4 lbf•**in**)

7. Refill front differential with recommended oil.

XPS RECOMMENDED DIFFERENTIAL OIL	
Scandinavia	75W90 SYNTHETIC GEAR OIL (EUR) (P/N 779212)
Other Countries	75W90 SYNTHETIC GEAR OIL (P/N 779158)
IF THE RECOMMENDED XPS DIFFERENTIAL OIL IS NOT AVAILABLE	
Use a 75W90 gearbox oil that meets the API GL-5 specification	

8. Reinstall filler plug with a NEW sealing washer.
9. Tighten filler plug to specification.

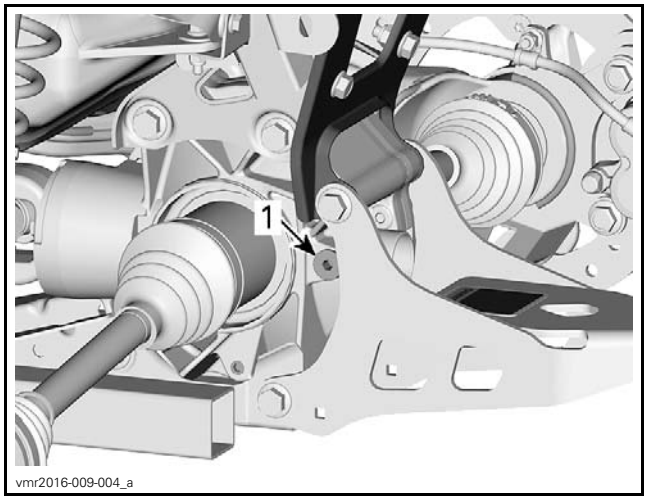
TIGHTENING TORQUE	
Filler plug	22.5 N•m ± 2.5 N•m (17 lbf•ft ± 2 lbf•ft)

Inspecting the Front Differential Oil Seals

Visually inspect oil seals for leak. Replace if required.

Verifying the Rear Final Drive Oil Level

1. Ensure vehicle is on a level surface.
2. Clean filler plug area.
3. Remove filler plug.



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LH REAR SIDE OF VEHICLE
1. Filler plug

4. Verify the oil level by inserting a wire with a 90° bend through the oil filler hole.
5. Oil level must be within the following specification from the bottom of oil filler hole.

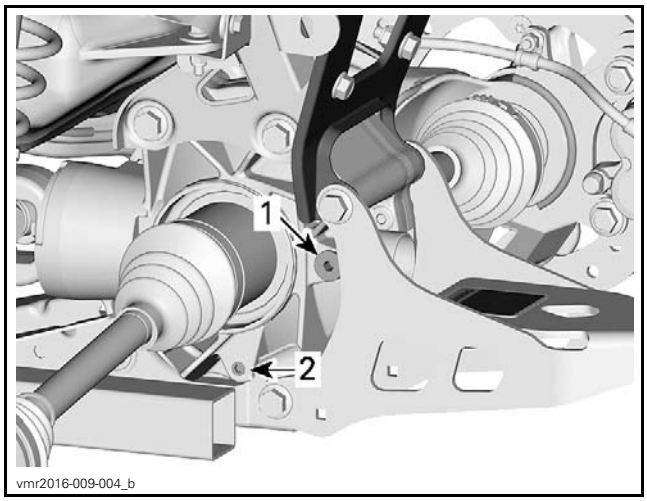
OIL LEVEL
20 mm ± 5 mm (9/16 in ± 3/16 in)

6. Reinstall filler plug with a NEW sealing washer.

TIGHTENING TORQUE	
Filler plug	22.5 N•m ± 2.5 N•m (17 lbf•ft ± 2 lbf•ft)

Replacing the Rear Final Drive Oil

1. Ensure vehicle is on a level surface.
2. Clean filler and drain plug areas.
3. Place a drain pan under rear final drive.
4. Unscrew filler plug.
5. Remove drain plug.



LH REAR SIDE OF VEHICLE
1. *Filler plug*
2. *Drain plug*

NOTE: Allow enough time for oil to flow out.

6. Install drain plug.

TIGHTENING TORQUE	
Drain plug	7.5 N•m ± 0.5 N•m (66 lbf•**in** ± 4 lbf•**in**)

7. Refill the rear final drive.

XPS RECOMMENDED FINAL DRIVE OIL	
Scandinavia	75W140 SYNTHETIC GEAR OIL (EUR) (P/N 779215)
Other Countries	75W140 SYNTHETIC GEAR OIL (P/N 779160)
IF THE RECOMMENDED XPS FINAL DRIVE OIL IS NOT AVAILABLE	
Use a 75W140 gearbox oil that meets the API GL-5 specification	

8. Reinstall filler plug with a NEW sealing washer.

TIGHTENING TORQUE	
Filler plug	22.5 N•m ± 2.5 N•m (17 lbf•ft ± 2 lbf•ft)

Inspecting the Rear Final Drive Oil Seals

Visually inspect final drive oil seals for leaks. Replace if required.

Inspecting Drive Shaft Boot and Protector

1. Visually inspect each drive shaft boot for grease leak, cracks or opening.
2. Check if the drive shaft boot protectors are fixed firmly, not torn or otherwise damaged.
3. Replace if necessary.

Inspecting Drive Shaft Joint

Turn and move drive shaft back and forth to detect excessive play.

Inspecting Rear Propeller Shaft U-Joint

Check yoke U-joints for wear, backlash or axial play. Replace if necessary.

Lubricating Rear Propeller Shaft U-Joint

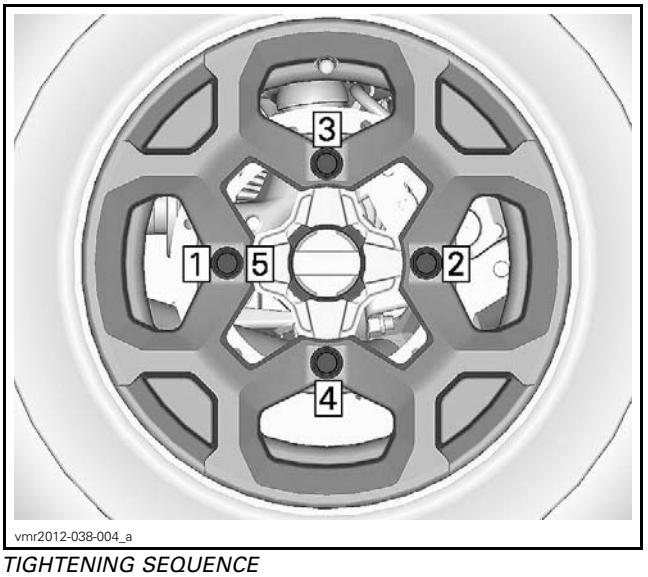
RECOMMENDED PROPELLER SHAFT U-JOINT GREASE
PROPELLER SHAFT GREASE (P/N 293 550 063)
IF THE RECOMMENDED PROPELLER SHAFT U-JOINT GREASE IS NOT AVAILABLE
Hi-temp bearing grease NLGI-2 or an equivalent

WHEELS AND TIRES

Checking the Wheel Lug Nut Torque

Tighten wheel lug nuts to the specified torque using the illustrated sequence.

TIGHTENING TORQUE	
Wheel lug nuts	80 N•m ± 5 N•m (59 lbf•ft ± 4 lbf•ft)

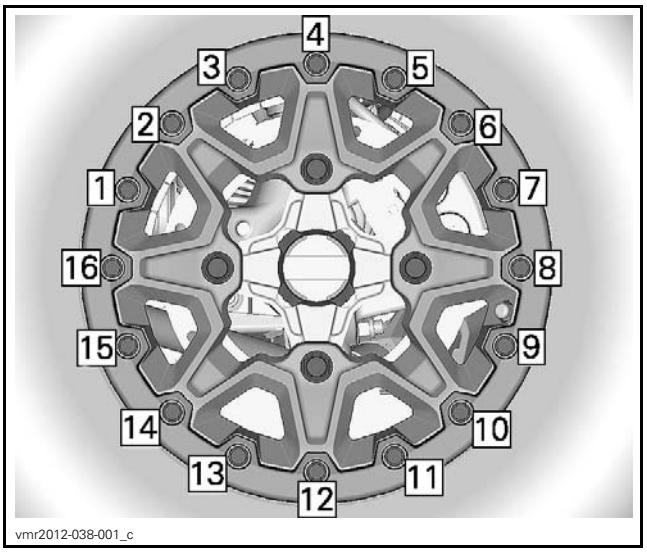


TIGHTENING SEQUENCE

Wheel Beadlocks (On applicable models)

Tighten beadlock screws as per specification and following sequence.

TIGHTENING TORQUE	
Beadlock screws	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)



TIGHTENING SEQUENCE

Inspecting Wheel Bearing

1. Safely lift and support the vehicle.
2. Hold wheel by the top and the bottom and try to move it by pulling and push alternately with both hands. Check for any play.
3. If there is any looseness detected, replace the wheel bearing. refer to *STEERING SYSTEM* subsection.

NOTE: To properly locate play during this inspection, be sure to check other components for wear or looseness (ball joints, suspension pivots, etc). If necessary repair or replace all defective parts before checking the wheel bearing condition. Be careful not to misinterpret a loose ball joint as a loose wheel bearing.

STEERING SYSTEM

Inspecting the Steering System

Steering Column

Turn and move steering column back and forth to detect any abnormal play.

If abnormal play is detected, inspect upper and lower steering column half bushings. Replace halve bushings and O-rings as necessary, refer to *STEERING SYSTEM* subsection.

If steering column feels stiff, refer to *STEERING COLUMN HALF BUSHING CLEANING AND LUBRICATION* in this subsection.

Tie-Rod End

Check tie-rod end ball joint for:
– Damage
– Pitting
– Abnormal play.

Replace if necessary.

Cleaning and Lubricating Steering Column Half Bushing

Clean, inspect and lubricate upper and lower steering column half bushings and O-rings. Refer to *STEERING SYSTEM* subsection.

SUSPENSION

Inspecting Shock Absorber

Check shock absorber for any leaks, replace if necessary.

HPG Shock Absorber (without Remote Reservoir)

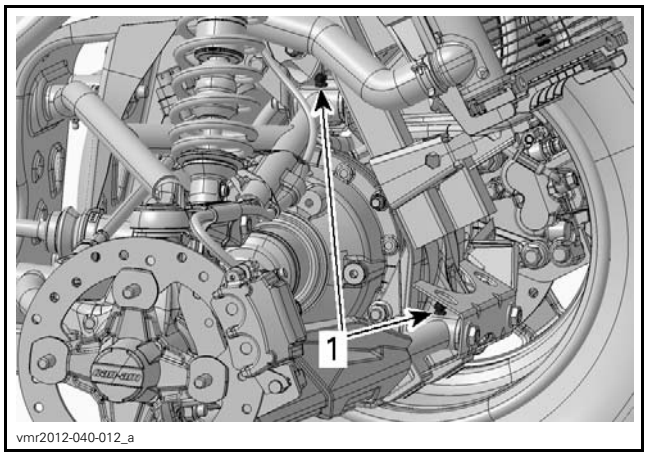
Check shock absorber for abnormal play:
– Front to back
– Up and down.

If any play is detected, replace shock absorber bushings. Refer to *REAR SUSPENSION* subsection.

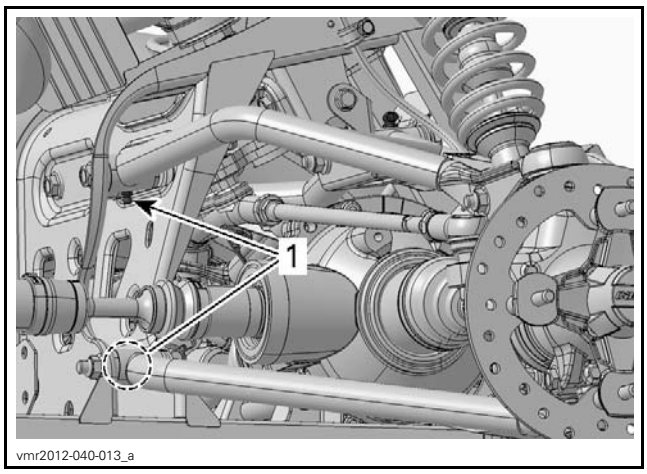
Lubricating Front Suspension Arm

Lubricate suspension arm at grease fittings.

SERVICE PRODUCT	
Scandinavia	SYNTHETIC SUSPENSION GREASE (EUR) (P/N 779226)
Other Countries	SYNTHETIC SUSPENSION GREASE (P/N 779163)



TYPICAL
1. Grease fittings



TYPICAL
1. Grease fittings

Inspecting Front Suspension Arm

1. Check suspension arm for:
   – Cracks
   – Pitting
   – Bending
   – Distortion.
2. Check suspension arm for abnormal play:
   – Side to side
   – Up and down.
3. If any play is detected, inspect:
   – Wear plates
   – Bushings
   – Sleeves.
4. Check ball joint for:
   – Damage
   – Pitting
   – Play.
5. Check ball joint bellows for:
   – Damage
   – Cracks.

Inspecting Rear Suspension Trailing Arm

1. Check trailing arms for:
   – Cracks
   – Pitting
   – Bending
   – Distortion.
2. Check trailing arm for abnormal play:
   – Side to side
   – Up and down.
3. If any play is detected, inspect:
   – Spacers
   – Bearings
   – Inner spacers.

Inspecting and Lubricating Rear Stabilizer Bar Bushing

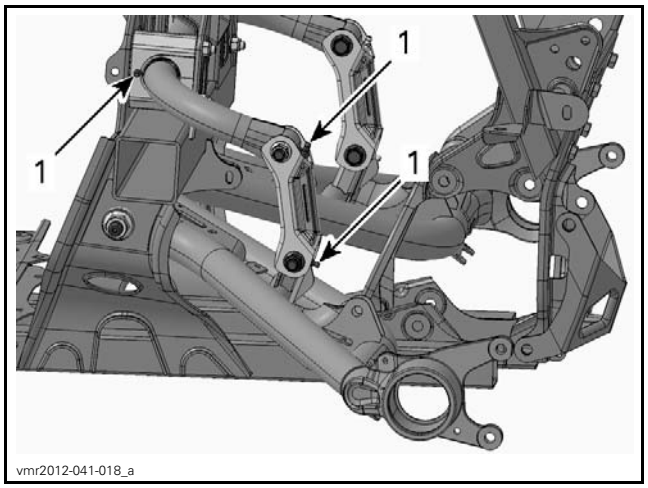
Rear Stabilizer Bar Bushing Inspection

Inspect bushings for:
– Cracks
– Damage
– Abnormal wear.

Lubricating Rear Stabilizer Bar Bushing

Lubricate bushings at grease fittings.

SERVICE PRODUCT	
Scandinavia	SYNTHETIC SUSPENSION GREASE (EUR) (P/N 779226)
Other Countries	SYNTHETIC SUSPENSION GREASE (P/N 779163)



TYPICAL
1. Grease fittings

BRAKES

Recommended Brake Fluid

Always use brake fluid meeting the specification DOT 4 only.

SERVICE PRODUCT	
Scandinavia	BRAKE FLUID DOT 4 (EUR) (P/N 779207)
Other Countries	BRAKE FLUID DOT 4 (P/N 779151)

⚠ WARNING

To avoid damage to the braking system, do not use other brake fluid types.

Verifying the Brake Fluid Reservoir Level

With vehicle on a level surface, check brake fluid in reservoirs for proper level.

NOTE: A low level may indicate leaks or worn brake pads.

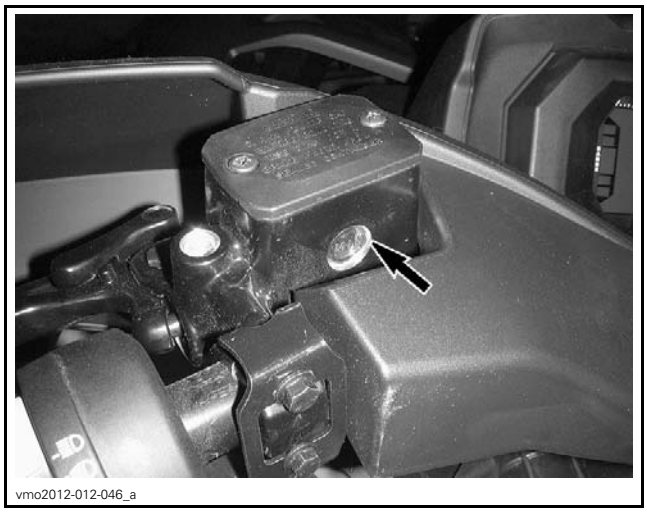
Front Brake Reservoir

Turn steering in the straight-ahead position to ensure reservoir is level.

Check the brake fluid level, the reservoir is full when the fluid reaches of the top of window.

Visually inspect lever boot condition.

Check for cracks, tears, etc. Replace if damaged.

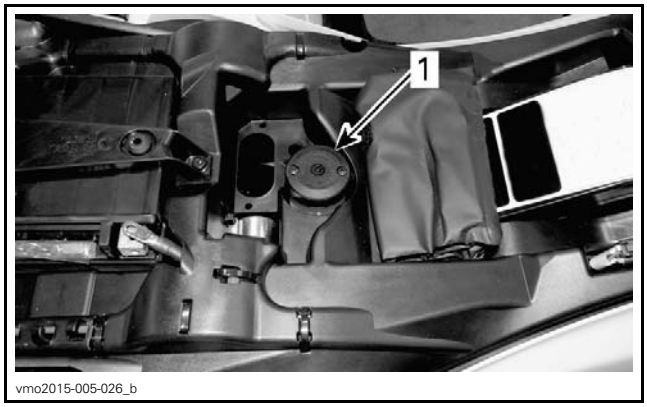


TYPICAL

Rear Brake Reservoir

Remove the seat.

With vehicle on a level surface, liquid should be between MIN. and MAX. level marks of brake pedal fluid reservoir.



1. Rear brake fluid reservoir

Adding Brake Fluid

Clean filler cap.

⚠ WARNING

Clean filler cap before removing.

Remove screws retaining the reservoir cap.

Remove reservoir cap.

Add fluid as required using a clean funnel. **Do not overfill.**

NOTICE **Brake fluid can damage plastic and painted surface. Wipe off and clean any spillage.**

Reinstall reservoir cap and tighten screws.

NOTE: Ensure filler cap diaphragm is pushed inside the cap before closing the brake fluid reservoir.

Inspecting and Cleaning Brake System

NOTICE Do not clean brake components in petroleum based solvent. Use brake system cleaner only. Soiled brake pads must be replaced with new ones.

To clean parts from the brake system, use the following recommended products or an equivalent.

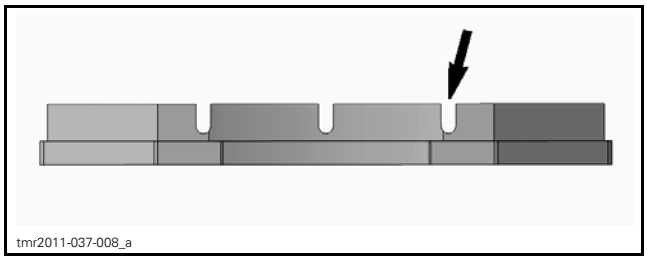
SERVICE PRODUCT	
United States of America	XPS BRAKES AND PARTS CLEANER (USA) (P/N 219 701 705)
Other countries	XPS BRAKES AND PARTS CLEANER (P/N 219 701 776)

Brake Pads

1. Measure brake pad lining thickness.

BRAKE PAD MINIMUM THICKNESS
1 mm (1/32 in)

NOTE: The brake pad grooves are wear indicators.



BRAKE PAD GROOVE

NOTICE Brake pads must always be replaced in pairs.

Brake Caliper

1. Remove caliper then check the following components:
   – Check brake pad pin
   – Check caliper boots for cracks
   – Check caliper movement on its support
   – Check pistons movement
   – Check pistons for scratches, rust or other damages.
2. Clean the following components using the recommended product or an equivalent:
   – Brake pads
   – Caliper support and slider
   – Caliper pistons and pin.

NOTE: Do not remove pistons from caliper for cleaning them.

3. Lubricate caliper slider using an appropriate *BRAKE CALIPER SYNTHETIC GREASE*.

Brake Disc

1. Check brake disc as follows:
   – Check disc thickness
   – Check disc surfaces
   – Check disc warpage.

NOTE: Refer to *BRAKE DISC INSPECTION* in *BRAKES* subsection for details.

2. Clean brake disc using the recommended product or an equivalent.

Master Cylinder

1. Check master cylinder as follows:
   – Leaks or damages.
   – Brake fluid level.
   – Check cleanliness of master cylinder rod and boot.
   – Check master cylinder boot for cracks or damage. Replace as necessary.

Hand Lever

Check hand lever as follows:
– Lever pivot bolt cleanliness
– Lever pivot bolt movement.

Brake Pedal

1. Check brake pedal as follows:
   – Brake pedal pivot movement
   – Brake pedal pivot cleanliness.
2. If required, clean then lubricate brake pedal pivot using a recommended grease.

SERVICE PRODUCT	
Scandinavia	SYNTHETIC GREASE (EUR) (P/N 779231)
Other Countries	SYNTHETIC GREASE (P/N 779162)

Brake Hoses

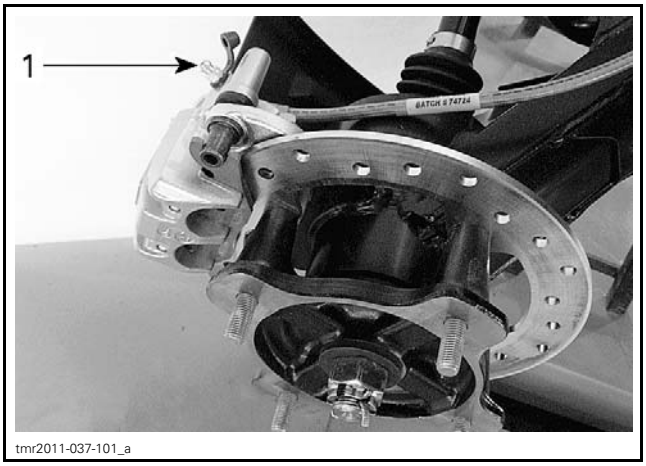
1. Check hoses for leaks, crushed, deformations, cracking or scrapes.

NOTE: Any deformation can restrict the proper flow of fluid and cause braking problems.

Replacing the Brake Fluid

Draining the Brake Fluid

1. Clean and remove reservoir cover with its diaphragm.
2. Connect a clear hose onto bleeder.



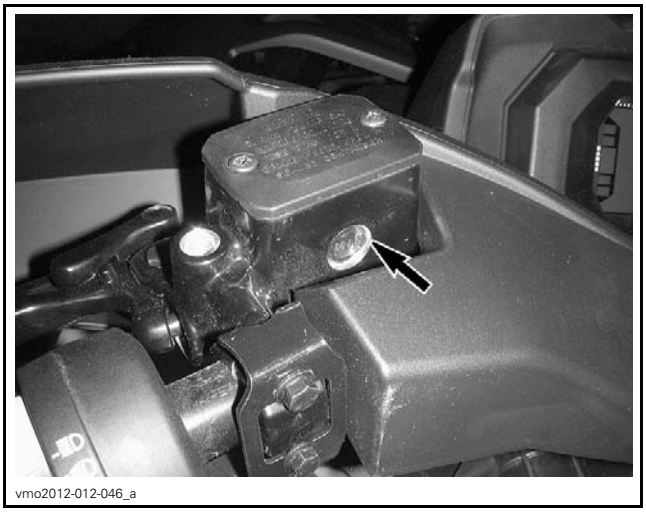
TYPICAL
1. Caliper bleeder

3. Loosen bleeder.
4. Pump brake lever(s) and/or brake pedal until no more fluid flows out.
5. Repeat draining procedure for the other bleeders.

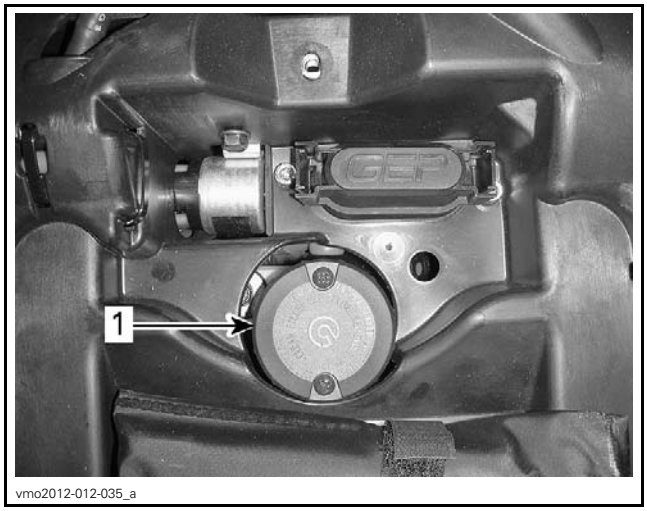
NOTE: To locate all bleeders according to vehicle configuration, refer to *EXPLODED VIEW* and *BRAKE CIRCUIT CONFIGURATIONS*. See *BRAKES* subsection.

Filling the Brake Fluid

1. Add recommended brake fluid to MAX. mark. Do not overfill.



TYPICAL - BRAKE FLUID RESERVOIR



TYPICAL - UNDER THE SEAT
1. Brake fluid reservoir

NOTE: If applicable, ensure filler cap diaphragm is fully retracted before closing the cap.

⚠ WARNING

Use only DOT 4 brake fluid from a sealed container.
Do not use brake fluid from an old or already opened container.

Bleed the brake system. Refer to the *BRAKE* subsection.

BODY

Inspecting Seat Latch Operation

Ensure seat latch functions properly and that seat is properly secured when latched.

FRAME

Inspecting the Frame

Inspect frame for damages such as:
– Cracks
– Dents
– Twisting
– Deformation
– Corrosion
– Loose fasteners.

Pay particular attention to:
– Front and rear frame extensions (body modules)
– Underside of frame
– Suspension attachment points
– Engine attachment points.

Inspecting the Tow Hitch

1. Ensure tow hitch receptacle module is solidly mounted.
2. Inspect hitch for cracks and other damages.
3. Repair or replace if necessary.

STORAGE PROCEDURE

SERVICE PRODUCTS

Description	Part Number	Page
BRP HEAVY DUTY CLEANER	293 110 001	3
CLEANER AND DEGREASER PRO C1	779262	3
FUEL STABILIZER	779171	1
LUB. & ANTI-CORROSIVE	779168	2–3
OIL STORAGE (EXCEPT USA)	779173	1
OIL STORAGE (USA)	779182	1
XPS ATV CLEANING KIT	219 701 713	3
XPS ATV FINISHING SPRAY	219 701 704	3
XPS ATV WASH	219 701 702	2

GENERAL

If the ATV is not used or is to be stored for an extended period of time, more than 4 months, be sure to perform the storage procedures described below.

Where applicable, refer to the appropriate subsections in this manual for details of the required tasks as outlined in these procedures.

PROCEDURES

NOTE: To facilitate the inspection and ensure adequate lubrication of components, it is recommended to clean the entire vehicle. Refer to *CLEANING THE VEHICLE* in this subsection.

FUEL SYSTEM

Fuel System Protection

Pour fuel stabilizer in fuel tank and fill up fuel tank.

Start vehicle to allow for fuel stabilizer to spread through the fuel system.

Follow the manufacturer's instructions for proper use.

RECOMMENDED FUEL SYSTEM PROTECTION
FUEL STABILIZER (P/N 779171)

NOTICE **Fuel stabilizer should be added prior to engine lubrication to ensure fuel system components protection against varnish deposits.**

ENGINE

Engine Internal Lubrication

Engine internal parts must be lubricated to protect them from rust formation during the storage period.

Proceed as follows:

1. Remove side body panels.
2. Remove spark plugs.
3. Spray storage oil into each cylinder (see following table).

NOTE: Use the storage oil as per country availability.

RECOMMENDED PRODUCTS
OIL STORAGE (EXCEPT USA) (P/N 779173)
OIL STORAGE (USA) (P/N 779182)

4. Press start button, 1 or 2 seconds maximum, to lubricate cylinders.
5. Reinstall spark plugs.

NOTE: Do not run engine during storage period.

Engine Air Intake System

Remove parts required for access to engine air inlet hose, refer to *AIR INTAKE SYSTEM* subsection.

Block engine air inlet hose using a rag to prevent intrusion of small animals.

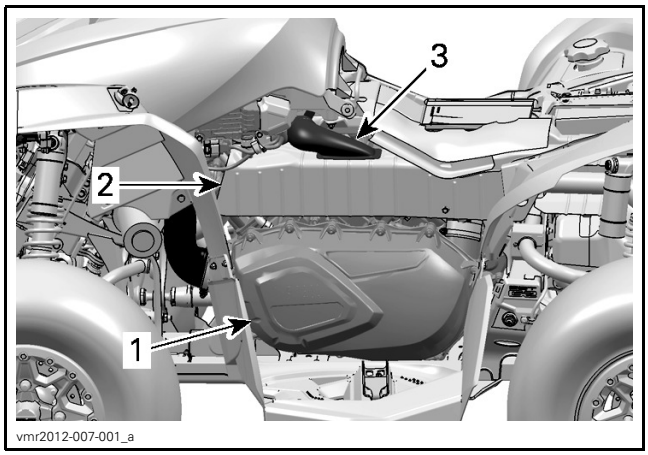
CVT Protection

1. Remove drive belt. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)*.
2. Inspect and clean pulleys.

3. Protect pulleys by spraying LUB. & ANTI-CORROSIVE (P/N 779168) on pulley faces.

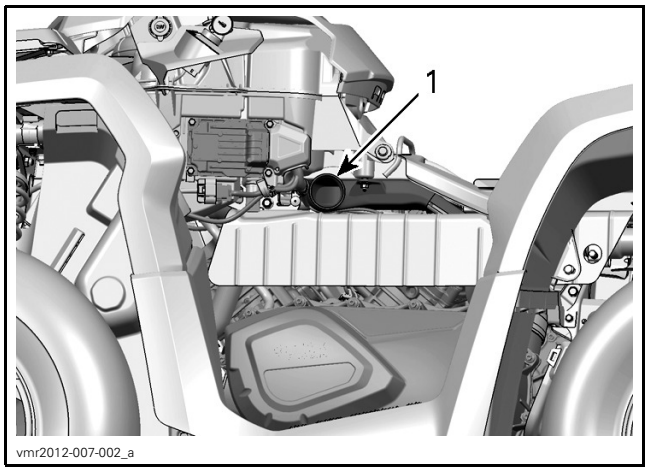
NOTE: Do not reinstall drive belt.

4. Close CVT cover.
5. Remove CVT outlet from exhaust system heat shield and from CVT outlet hose.



TYPICAL
1. *CVT cover*
2. *Exhaust system heat shield*
3. *CVT outlet*

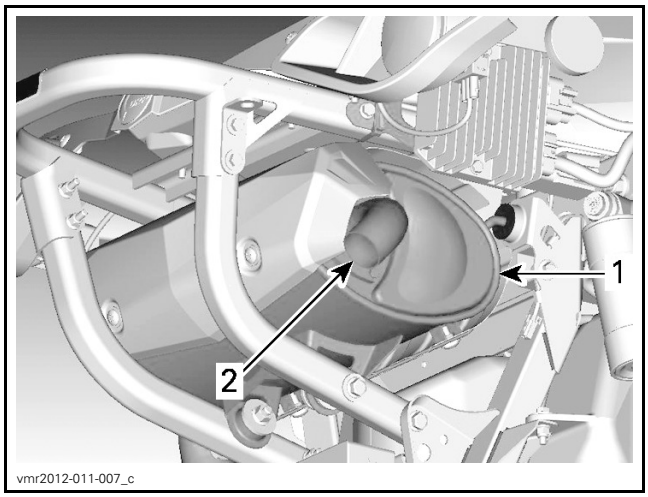
6. Block CVT outlet hose using a rag.



TYPICAL
1. *CVT outlet hose*

Exhaust System

Block muffler outlet using a rag to avoid intrusion of small animals.



TYPICAL - RENEGADE MODEL ILLUSTRATED
1. *Muffler*
2. *Block with rag here*

ELECTRICAL SYSTEM

Removing the Battery

Remove battery from ATV.

Store and charge battery as per battery manufacturer's recommendations.

DRIVE SYSTEM

Lubricate rear propeller shaft U-joints.

CHASSIS

Lubrication

Lubricate front and rear suspension.

Tire Pressure

Inflate tires to recommended pressure.

Cleaning the Vehicle

Wash and dry the vehicle.

NOTICE Never use a high pressure washer to clean the vehicle. USE LOW PRESSURE ONLY (such as a garden hose). The high pressure can cause electrical or mechanical damages.

Remove any dirt or rust.

To clean plastic parts, use only flannel cloths and XPS ATV WASH (P/N 219 701 702) or soapy water.

To clean vinyl parts, use only flannel cloths and a mild non abrasive multipurpose cleaner.

RECOMMENDED PRODUCT FOR PLASTIC PARTS
XPS ATV Wash (P/N 219 701 702)
Soapy water

NOTICE It is necessary to use flannel cloths on plastic parts to avoid damaging surfaces. Never clean plastic parts with strong detergent, degreasing agent, paint thinner, acetone, products containing chlorine, etc. To avoid damaging the glossy finish on Polypropylene body parts, never use:

– Petroleum based cleaning products
– XPS ATV FINISHING SPRAY (P/N 219 701 704)
– XPS ATV CLEANING KIT (P/N 219 701 713).

RECOMMENDED PRODUCT FOR VINYL PARTS
CLEANER AND DEGREASER PRO C1 (P/N 779262)

To clean heavily soiled parts of the vehicle, including metallic parts use the following.

RECOMMENDED PRODUCT FOR HEAVILY SOILED PARTS
BRP HEAVY DUTY CLEANER (P/N 293 110 001)

Inspect the vehicle and repair any damage. Touch up all metal spots where paint has been scratched off.

Spray all metal parts with an appropriate lubricant for rust protection.

RECOMMENDED RUST PROTECTION
LUB. & ANTI-CORROSIVE (P/N 779168)

Vehicle Protection

Protect the vehicle with a cover to prevent dust accumulation during storage.

NOTICE The vehicle has to be stored in a cool and dry place, and covered with an opaque tarpaulin. This will prevent sun rays and grime from affecting plastic components and vehicle finish.

PRESEASON PREPARATION

Proper vehicle preparation is required after a storage period.

Any worn, broken or damaged parts found must be replaced.

Remove rags that were installed for storage: engine air inlet hose, CVT outlet hose and muffler.

Clean drive and driven pulleys to remove storage protective lubricant, then reinstall drive belt. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)*.

Remove parts required to allow inspection of entire engine air inlet system. Check for animal nests and other foreign material. Reinstall removed parts.

Drain fuel tank and fill with fresh fuel if a fuel stabilizer was not used for storage.

Reinstall battery. Refer to *CHARGING SYSTEM* subsection.

Inflate tires to the recommended pressure.

Do each items indicated in the table entitled:

EVERY 3 000 KM (2,000 MI) OR 100 HOURS (whichever comes first)
EVERY 1 500 KM (1,000 MI) OR 50 HOURS (whichever comes first)

NOTE: If the EVERY 6 000 km (4,000 mi) OR 200 HOURS OF OPERATION maintenance service is due, also perform the related items as per the *MAINTENANCE SCHEDULE*.

Test drive vehicle.

SPECIAL PROCEDURES

SERVICE PRODUCTS

Description	Part Number	Page
XPS LUBE	293 600 016	2

GENERAL

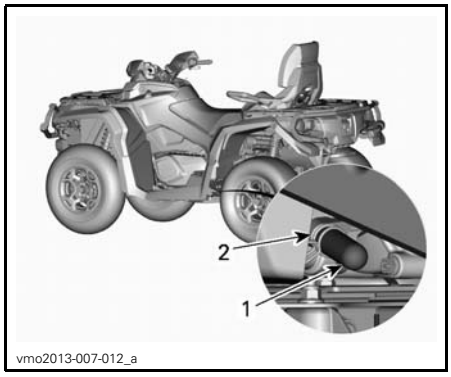
NOTE: Component failures resulting from these events are not warrantable.

Refer to the appropriate subsections in this manual for details of the required tasks as outlined in these procedures.

WHAT TO DO IF WATER IS IN THE CVT

The CVT drain plug is located on the rear portion of the CVT cover. It is accessible from the rear LH fender.

Inspect the CVT drain plug to validate if water is present.



1. Drain plug
2. Spring clamp

NOTICE If water is present in the CVT, it could result in belt slippage. The engine will accelerate but the vehicle will remain still.

If water is present, remove CVT drain plug to expel water.

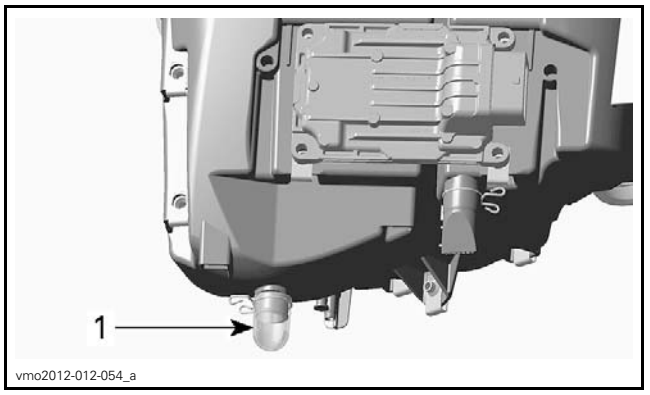
Reinstall the drain plug and secure it using the spring clamp.

NOTE: Make sure hose is properly inserted on CVT cover nipple.

If an appreciable amount of water is drained from the CVT cover, remove the cover and properly service the CVT.

WHAT TO DO IF WATER IS IN THE AIR FILTER HOUSING

Inspect the drain reservoir underneath the air filter housing to validate if water is present.



TYPICAL
1. Air filter housing drain reservoir

If water is present, press clamp and remove reservoir to drain water from air filter housing.

If one of the following conditions is met, refer to *WHAT TO DO IF VEHICLE IS IMMERSED IN WATER*:

- If more than 50 ml (2 U.S. oz) of water (approximately 5 drain reservoirs) is found in the air filter housing.
- If any deposits are present in the drain reservoir.

NOTICE Failure to service vehicle properly may lead to component permanent damage.

WHAT TO DO IF VEHICLE IS TURNED OVER

In the event the vehicle was rolled over tilted on it's side; put the vehicle back on its wheel, wait 3 to 5 minutes, then check the following:

- Inspect air filter housing for oil accumulation, if any oil is found, clean air filter and air filter housing.
- Check engine oil level and refill if necessary.
- Check engine coolant level and refill if necessary.
- Check gearbox oil level and refill if necessary.

– Check rear final drive oil level and refill if necessary.
– Inspect suspension components and steering system components.
– Inspect body and chassis for any damages.
– Start engine. If the oil pressure light stays on, stop engine immediately and investigate the problem.
– After restarting engine, check for indicator lights or messages displayed in the multifunction gauge. Correct as required.

Limited model: Inspect ACS intake hose for any trace of oil. Clean thoroughly if oil is found in hose. If oil reached compressor, disassemble compressor and clean thoroughly.

⚠ WARNING

Do not use vehicle if any of the controls, steering, suspension or brakes are damaged or inoperative.

WHAT TO DO IF VEHICLE IS IMMERSED IN WATER

In the event the vehicle was immersed, proceed with the following.

NOTICE **A vehicle that was immersed may be damaged or prone to malfunctions (short and long term) if not serviced promptly and appropriately. Do not crank or start engine.**

Drain the entire air intake system. Inspect the throttle body. Remove parts as required.

Inspect and clean air box as needed. Remove parts as required.

Replace the air filter.

Drain, inspect and clean the CVT.

Limited model: Inspect ACS hose. If water is present, disassemble and dry compressor.

Inspect front differential and rear final drive vents. Clean or replace as necessary

Drain muffler and exhaust pipes (removal required).

Clean muffler spark arrester..

Remove fuse box covers. Check for presence of water. Dry as necessary.

Disconnect, clean and dry the following electrical connectors:
– ECM
– Multifunction gauge
– DPS.

Replace the engine oil (without starting the engine).

Replace gearbox oil.

Inspect fuel tank for water intrusion. If in doubt, flush fuel tank and refill with new fuel.

Inspect fuel tank vent system for water intrusion. Clean as required. Replace breather filter. Carry out a fuel pump pressure test.

Inspect brake system for water intrusion. Replace brake fluid as required.

Inspect all lights for water intrusion. Dry as required.

Inspect multifunction switch for water intrusion. Dry as required.

Remove spark plugs. Crank engine in drowned mode to expel any water.

⚠ CAUTION Keep away from spark plug holes to avoid being splashed when cranking engine.

Add a small quantity of engine oil in cylinders (approximately 2 teaspoonfuls).

Install spark plugs (replace if required).

⚠ WARNING

Before starting engine, use B.U.D.S. and check vehicle for fault codes.

Start the engine and allow it to run at idle speed until the engine reaches its operating temperature.

Stop the engine.

Change engine oil and filter.

NOTE: Change oil as many times as necessary, until there is no whitish appearance in engine oil.

Replace front differential oil.

Replace rear final drive oil.

Lubricate front and rear suspensions and propeller shaft joints.

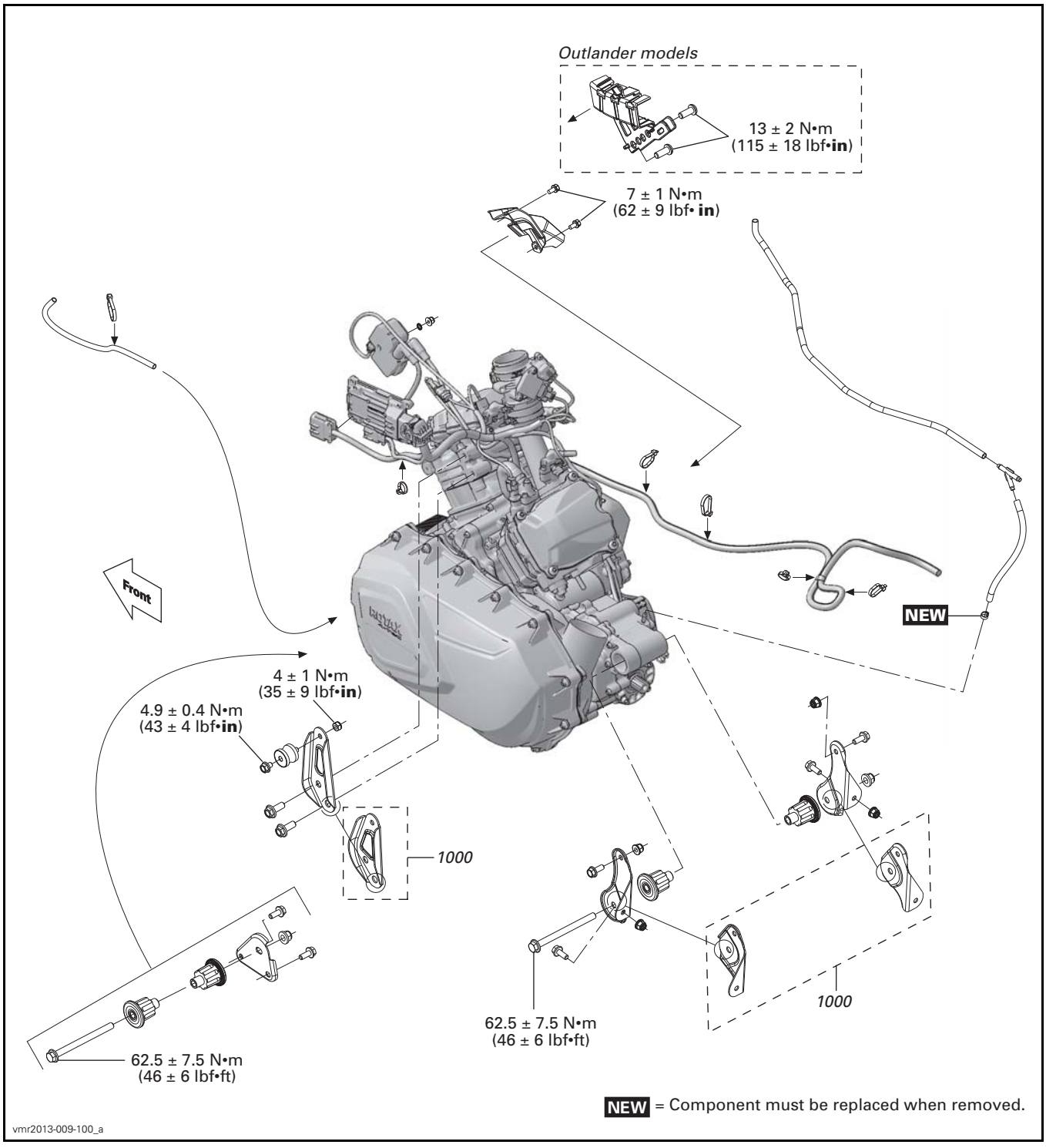
Spray all metal parts with XPS LUBE (P/N 293 600 016).

Test drive to confirm proper operation.

ENGINE REMOVAL AND INSTALLATION

SERVICE TOOLS

Description	Part Number	Page
ENGINE LIFTING TOOL	529 036 022	5



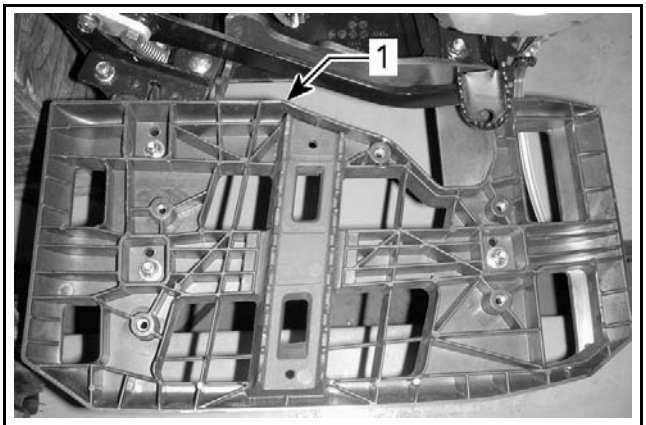
PROCEDURES

ENGINE REMOVAL

1. Place vehicle on a workstation equipped with an engine-lifting hoist.
2. Disconnect negative (-) cable from battery.
3. Carry out the following operations. Refer to table.

OPERATIONS	REFERENCES (SUBSECTION)
Safely lift and support the vehicle	*INTRODUCTION*
Release fuel pressure	*FUEL TANK AND FUEL PUMP*
Drain engine coolant	*PERIODIC MAINTENANCE PROCEDURES*
Remove front body module	*BODY*
Remove RH footrest panel	
Remove air filter housing	*AIR INTAKE SYSTEM*
Remove muffler	*EXHAUST SYSTEM*
Remove exhaust pipes	
Remove CVT air inlet	*CONTINUOUSLY VARIABLE TRANSMISSION (CVT)*
Remove CVT air outlet	
Disconnect positive (+) starter cable	*STARTING SYSTEM*
Disconnect TPS connector	*ELECTRONIC FUEL INJECTION (EFI)*
Disconnect MAPTS connector	
Remove intake manifold	*INTAKE MANIFOLD*
Remove spark plug cables	*IGNITION SYSTEM*

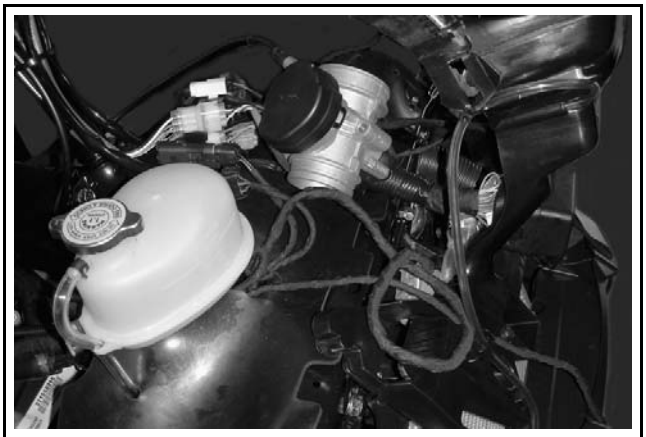
4. Remove RH footrest support.



vmr2012-009-003_a

TYPICAL - OUTLANDER SHOWN
1. RH footrest support

5. Move throttle body aside to make room.


vmr2012-009-001

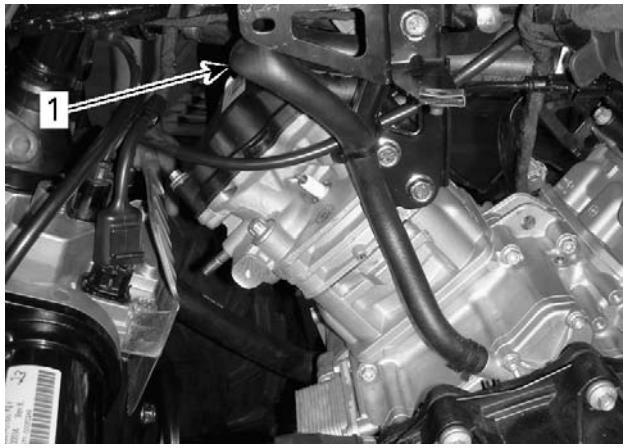
TYPICAL - THROTTLE BODY ATTACHED ON FRAME

6. Move master cylinder aside to make room.

vmr2012-009-002

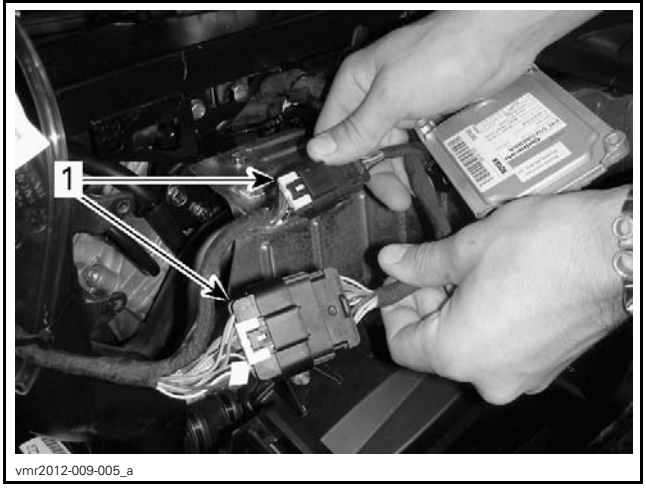
TYPICAL - MASTER CYLINDER ATTACHED ON REAR FENDER

7. Move crankcase vent hose as illustrated.



TYPICAL
1. Crankcase vent hose

8. Disconnect both engine harness connectors (HIC).



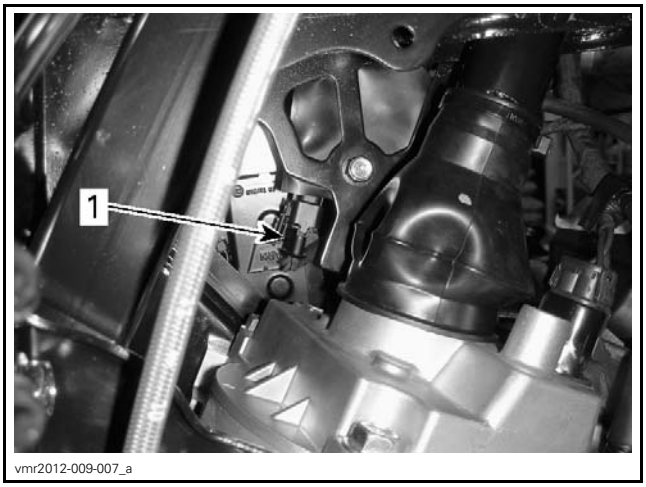
TYPICAL
1. Engine harness connectors (HIC)

9. Move ECM as illustrated.

TYPICAL

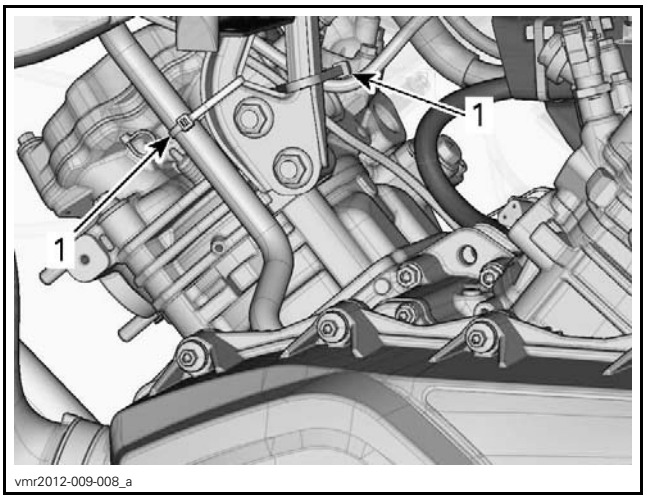
10. Cut locking ties from ignition coil harness.

11. Disconnect ignition coil connector.



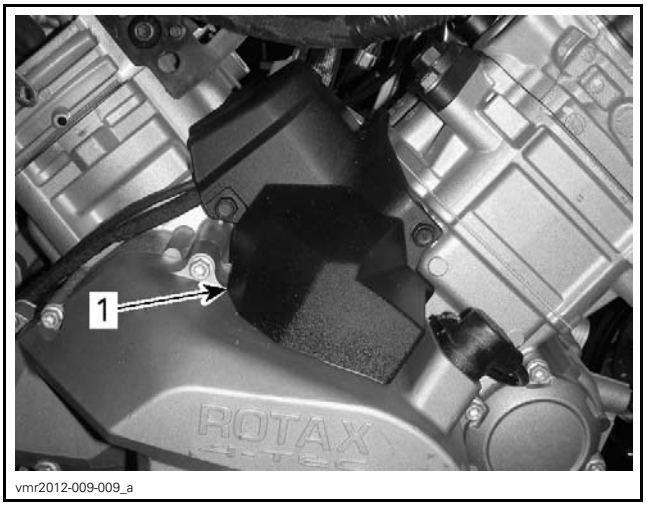
TYPICAL - FROM LH SIDE
1. Ignition coil connector

12. Remove the following locking ties.



TYPICAL
1. Locking ties

13. Remove plastic cover from engine.

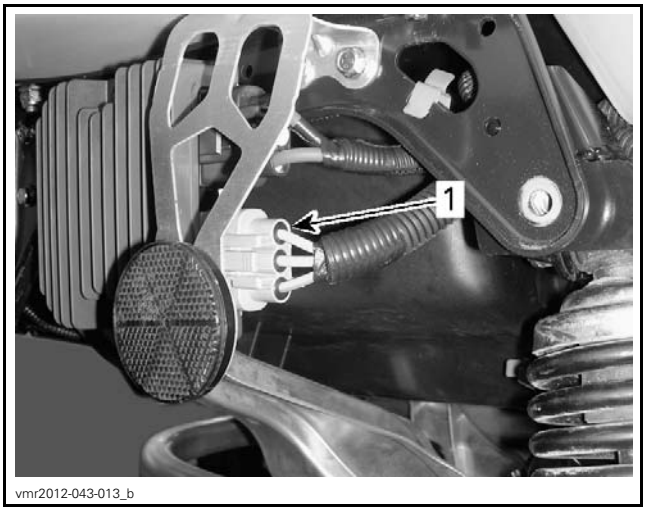


TYPICAL
1. Plastic cover

14. Remove harnesses support from engine.

TYPICAL
1. Harnesses support

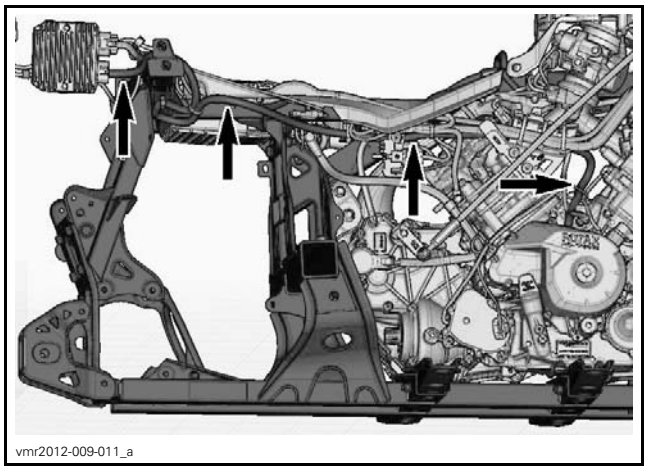
15. Disconnect magneto connector from voltage regulator rectifier.



TYPICAL - OUTLANDER SHOWN
1. Magneto connector

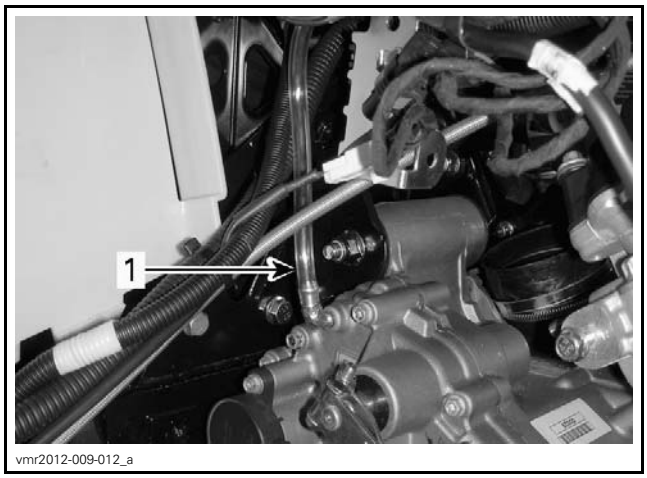
16. Remove magneto harness from its location along vehicle and gather it in a bundle near engine.

NOTE: It may be necessary to slightly lift the rear body module to ease magneto harness removal. Refer to *BODY* subsection.



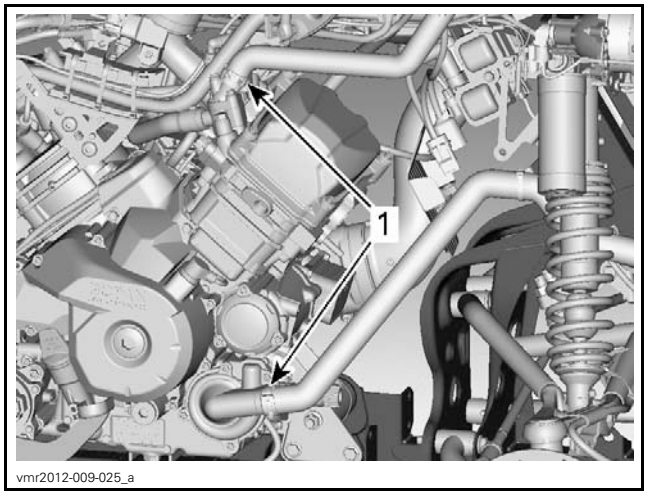
MAGNETO HARNESS (SOME PARTS REMOVED FOR CLARITY)

17. Disconnect vent hose from gearbox.

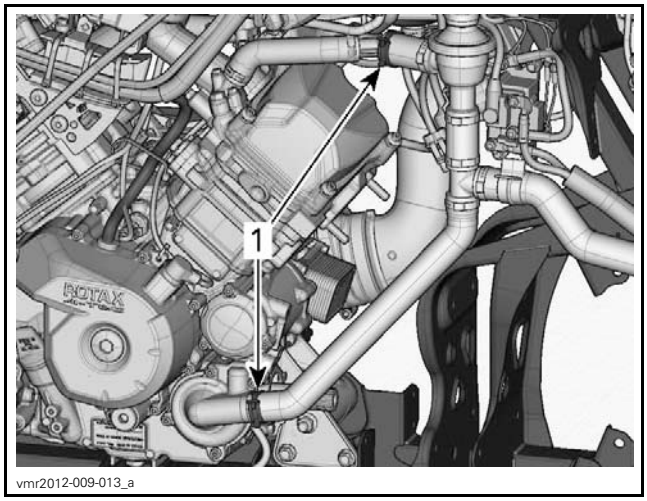


TYPICAL - OUTLANDER SHOWN
1. Vent hose

18. Disconnect coolant hoses as illustrated.

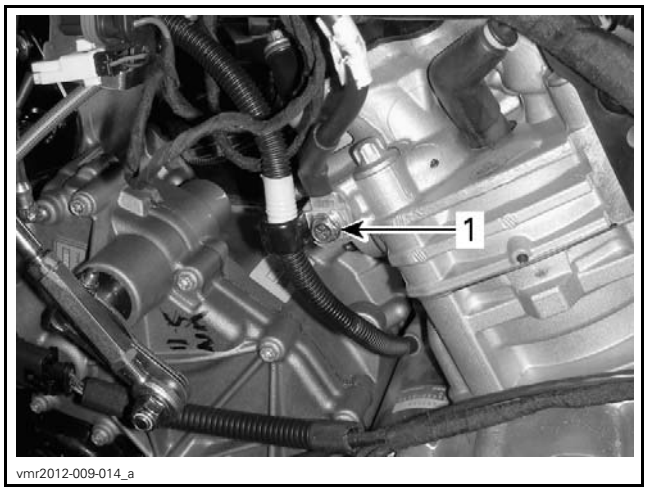


500/650/800R ENGINES - SOME PARTS REMOVED FOR CLARITY
1. Disconnect the following coolant hoses



1000 ENGINE - SOME PARTS REMOVED FOR CLARITY
1. Disconnect the following coolant hoses

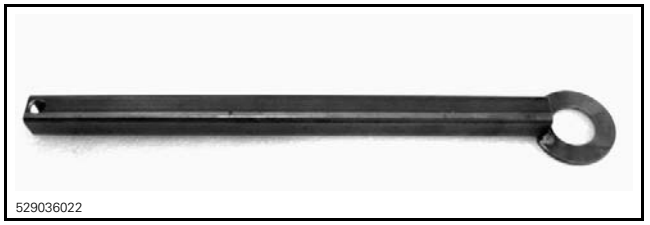
19. Remove main ground wire from engine.

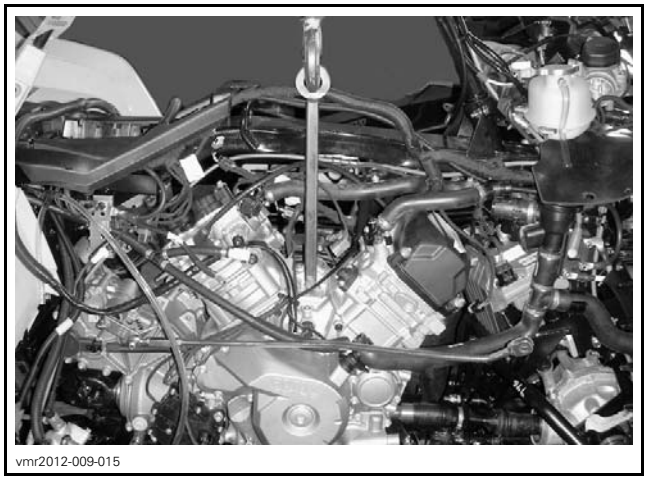


TYPICAL - OUTLANDER SHOWN
1. Main ground wire

Engine Lifting

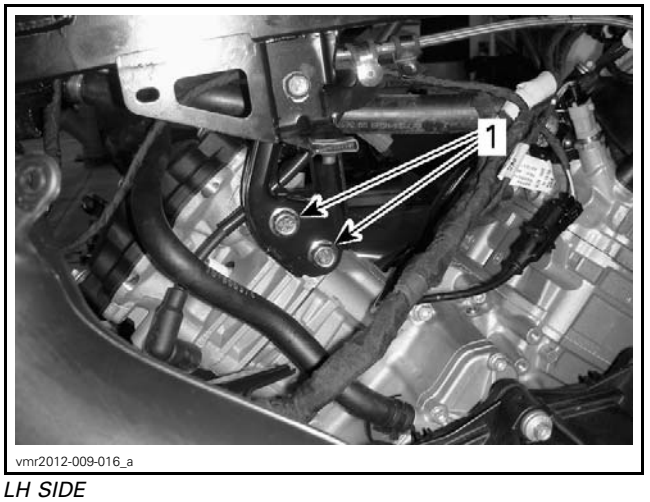
1. Install the ENGINE LIFTING TOOL (P/N 529 036 022) on engine.





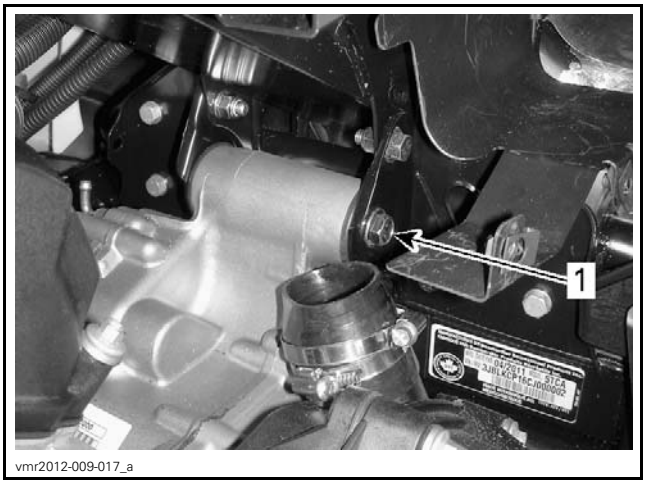
TYPICAL

2. Remove upper retaining screws from engine.



LH SIDE
1. Upper retaining screws

3. Remove rear retaining bolt from engine.



vmr2012-009-017_a

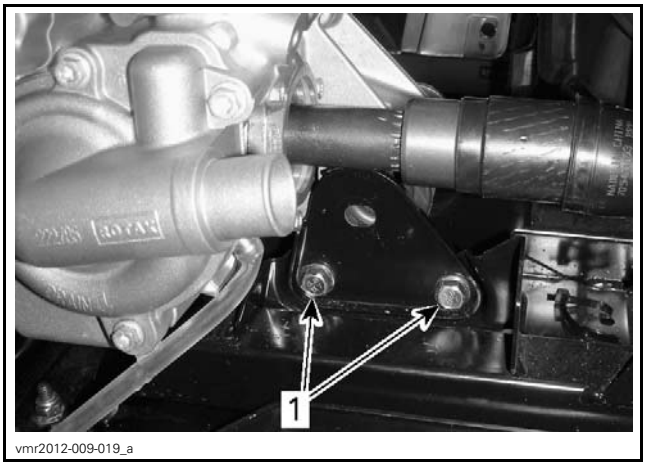
LH SIDE
1. *Rear retaining bolt*

4. Remove front retaining bolt from engine.

vmr2012-009-018_a

LH SIDE
1. *Front retaining bolt*

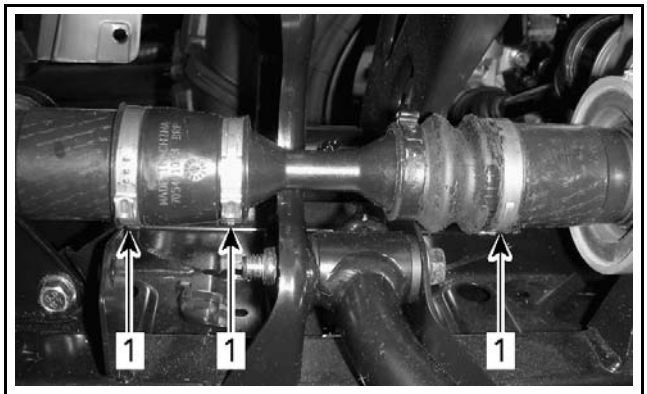
5. Remove engine support plate from frame.



vmr2012-009-019_a

RH SIDE
1. *Engine support plate screws*

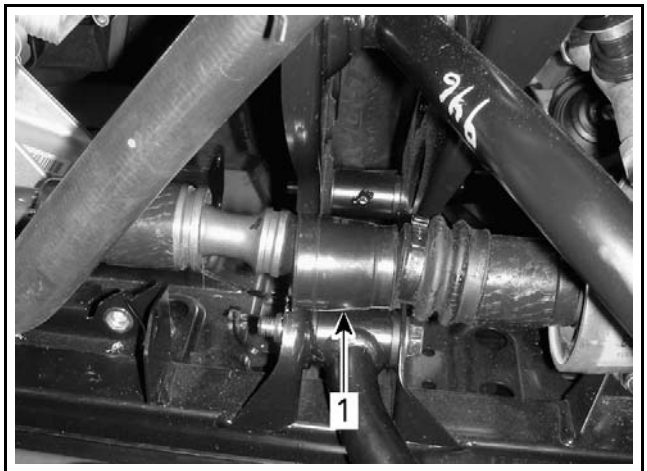
6. Remove the following Oetiker clamps from front propeller shaft.



vmr2012-009-020_a

1. *Oetiker clamps*

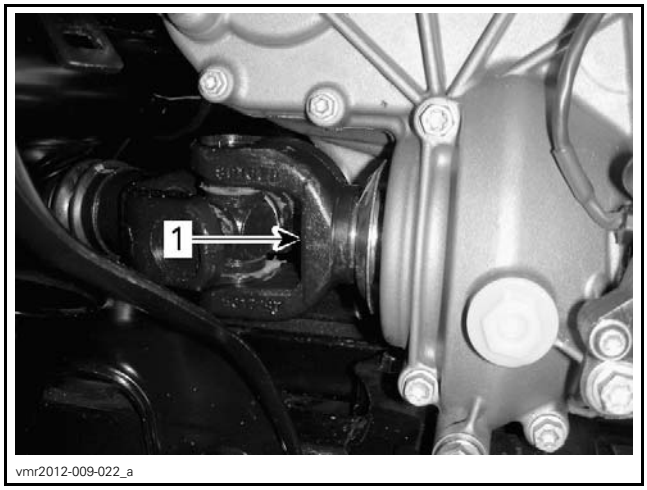
7. Move front propeller shaft bellows forward.



vmr2012-009-021_a

1. *Front propeller shaft bellows*

8. Remove propeller shaft screw from gearbox output shaft.

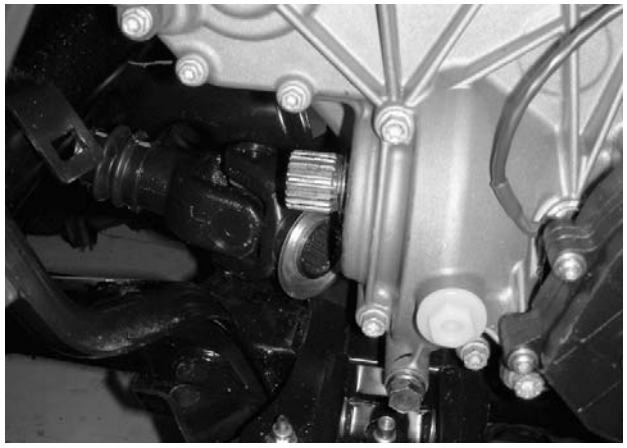


vmr2012-009-022_a

1. *Rear propeller shaft screw*

9. Slightly lift engine and move it forward to disconnect rear propeller shaft from engine.

10. Move propeller shaft yoke downwards to make room.



vmr2012-009-023

TYPICAL

11. Move engine rearward to disconnect front propeller shaft from engine.
12. Remove engine by the RH side.

vmr2012-009-024

TYPICAL

ENGINE INSTALLATION

The installation is the reverse of the removal procedure. However, pay attention to the following.

1. Inspect condition of engine mounts.
2. Install engine on vehicle.
3. Install all engine retaining bolts loosely.
4. Install and tighten propeller shaft screw. Refer to *REAR DRIVE* subsection.
5. Tighten engine retaining bolts to specification.

TORQUE	
Engine retaining bolts	62.5 N•m ± 7.5 N•m (46 lbf•ft ± 6 lbf•ft)

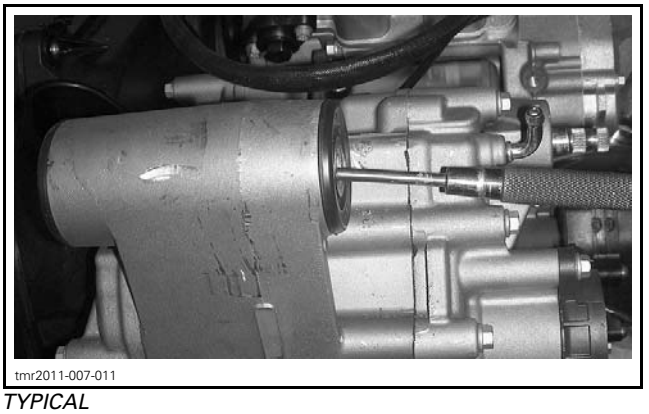
6. If applicable, fill engine as per specification. Refer to *LUBRICATION SYSTEM* subsection.
7. Fill and bleed cooling system. Refer to *PERIODIC MAINTENANCE PROCEDURE* subsection.
8. Check for any leaks.
9. Reinstall all the remaining parts as the reverse of removal procedure. Refer to exploded views and proper subsections.
10. Test drive vehicle to confirm proper operation.

ENGINE MOUNTS REPLACEMENT

NOTE: Use the same procedure for the front and rear engine mounts.

Engine Mount Removal

Insert a punch into engine mount bushing and push the opposite engine mount out.



tmr2011-007-011

TYPICAL

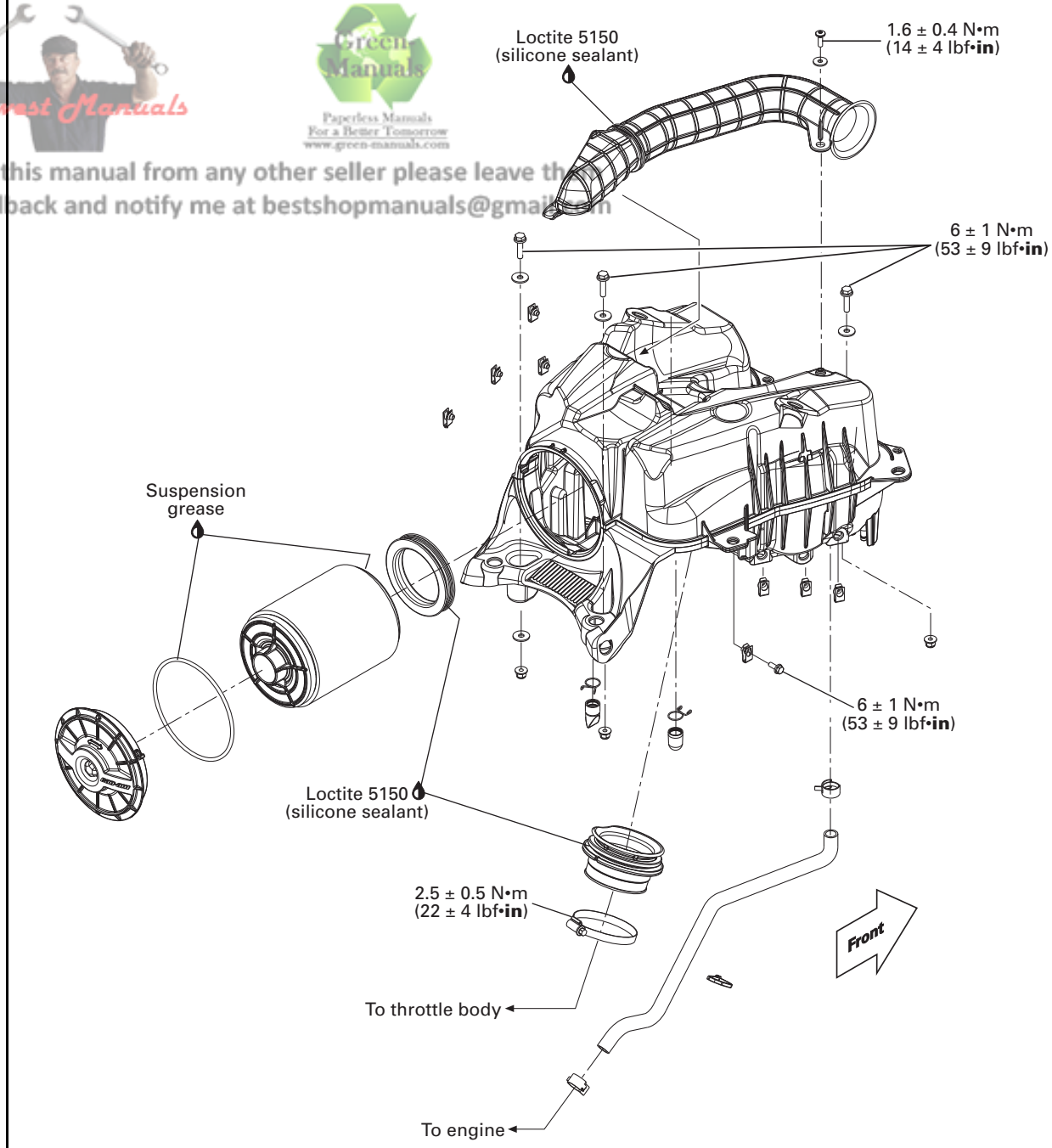
Engine Mount Installation

The installation is the reverse of the removal procedure.

AIR INTAKE SYSTEM

AIR FILTER HOUSING

Midwest Manuals
Green Manuals
Paperless Manuals For a Better Tomorrow www.green-manuals.com
If you bought this manual from any other seller please leave th
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



GENERAL

NOTICE Never modify the air intake system. Otherwise, engine performance degradation or damage can occur. The engine is calibrated to operate specifically with these components.

PROCEDURES

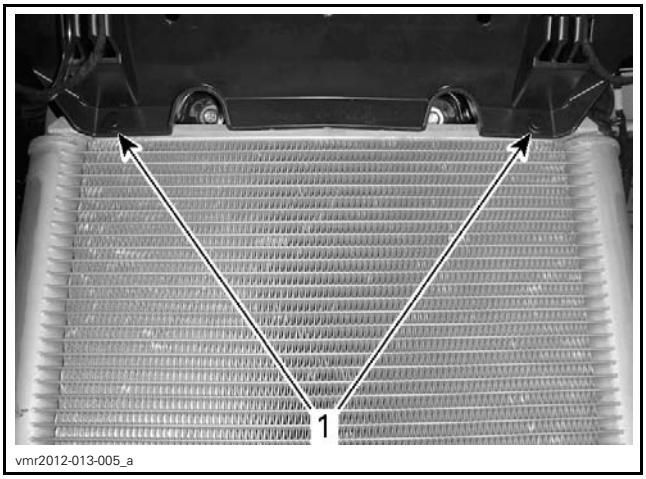
AIR FILTER

For air filter servicing, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

AIR FILTER HOUSING

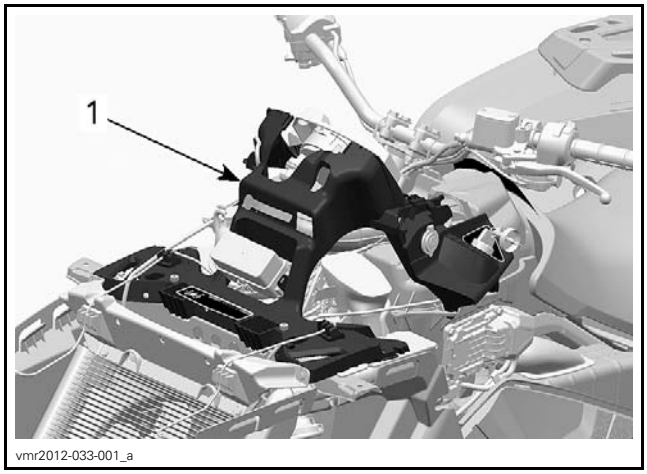
Air Filter Housing Removal

1. Remove front body module. Refer to *BODY* subsection.
2. On applicable models, remove the following plastic rivets.



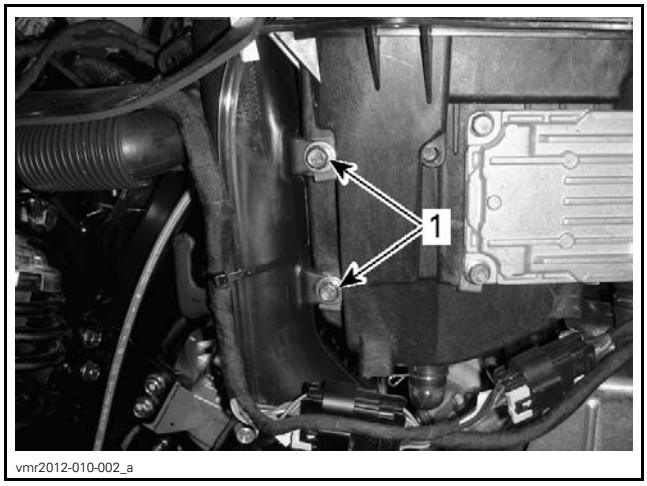
TYPICAL
1. Plastic rivets

3. On applicable models, move dashboard support toward front.



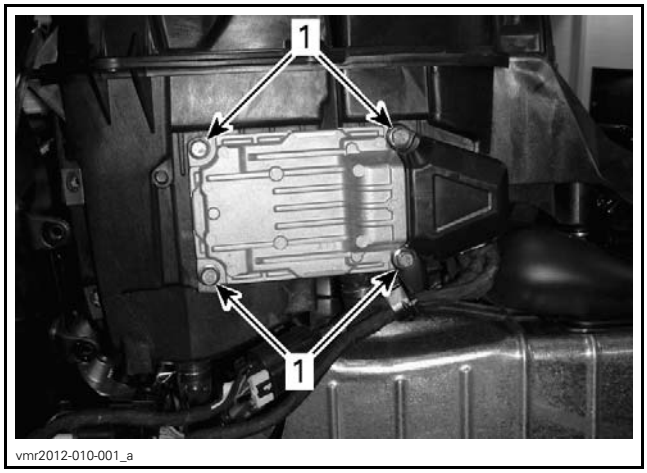
TYPICAL
1. Dashboard support

4. Remove screws securing CVT air inlet to air filter housing.



TYPICAL
1. CVT air inlet screws

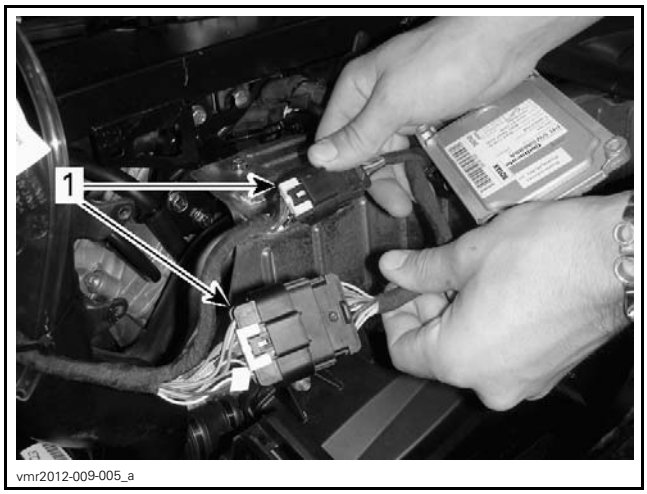
5. Remove ECM retaining screws.



1. ECM retaining screws

6. Disconnect both engine harness connectors (HIC).

7. Move ECM aside.



vmr2012-009-005_a

TYPICAL
1. Engine harness connectors (HIC)

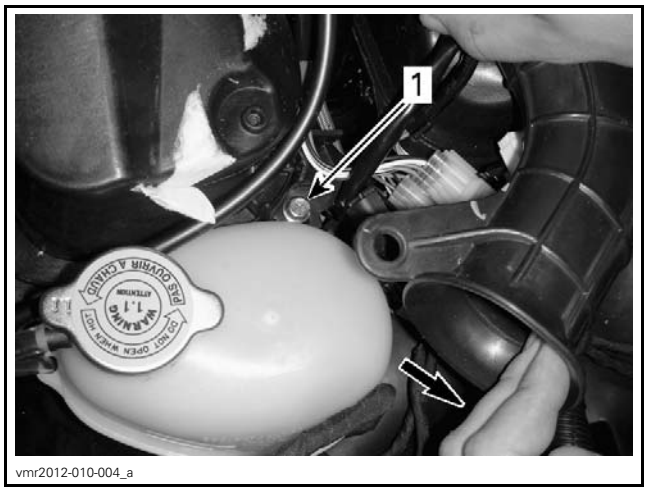
8. Remove air intake tube retaining screw.

vmr2012-010-003_a

1. Air intake tube retaining screw

9. Move air intake tube to gain access to coolant tank LH screw.

10. Remove coolant tank retaining screws.



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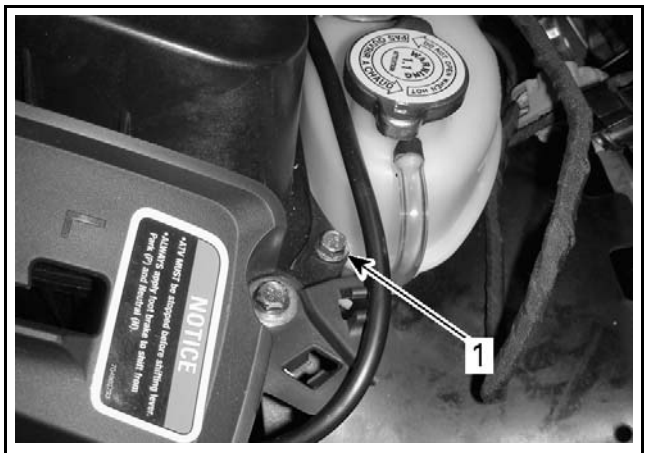
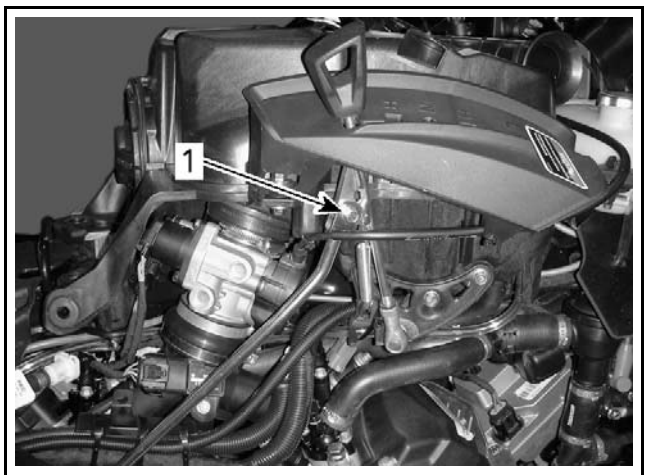
AIR INTAKE TUBE MOVED TO GAIN ACCESS
1. Coolant tank LH retaining screw



vmr2012-010-005_a

1. Coolant tank RH retaining screw

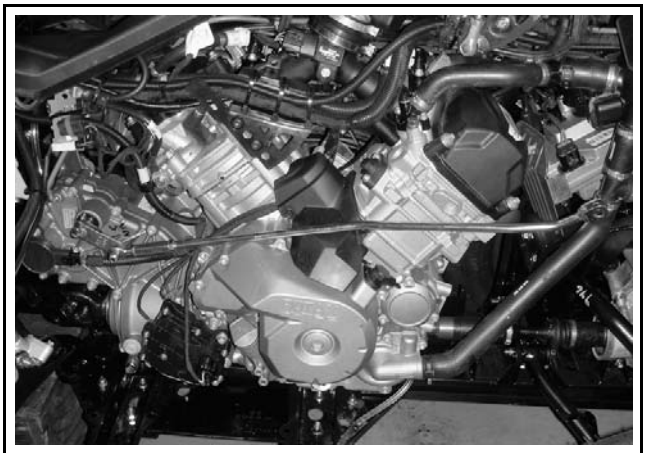
11. Detach link rod from shift lever.



vmr2012-010-006_a

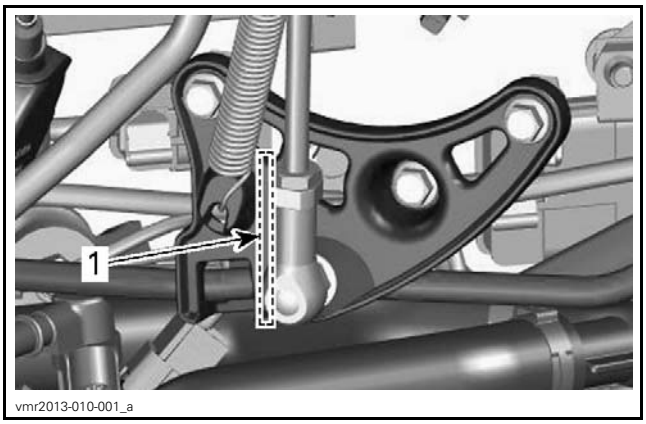
TYPICAL - OUTLANDER SHOWN
1. Link rod retaining bolt

12. Carefully move link rod downward.


vmr2012-010-007

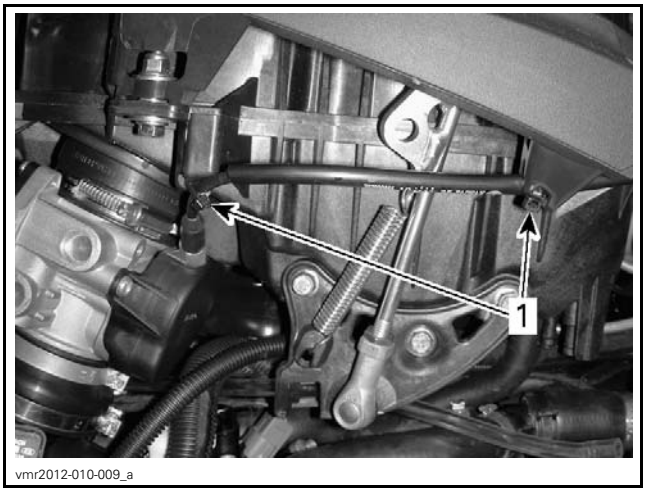
TYPICAL - OUTLANDER SHOWN

13. Remove the following locking ties.



vmr2013-010-001_a

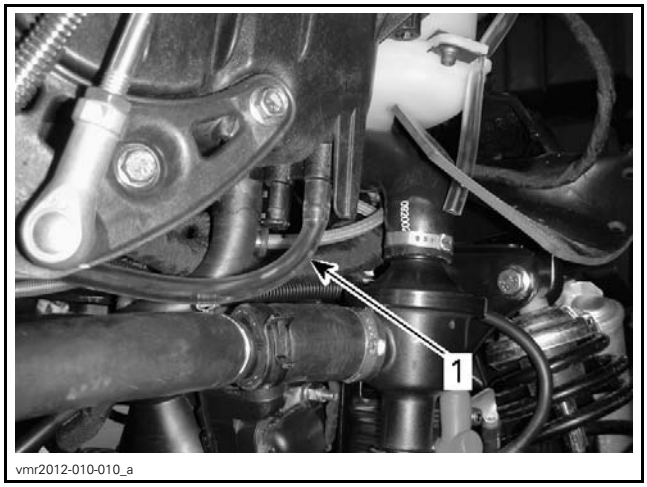
TYPICAL - OUTLANDER SHOWN
1. Locking tie to remove - location shown



vmr2012-010-009_a

TYPICAL - OUTLANDER SHOWN
1. Locking ties to remove

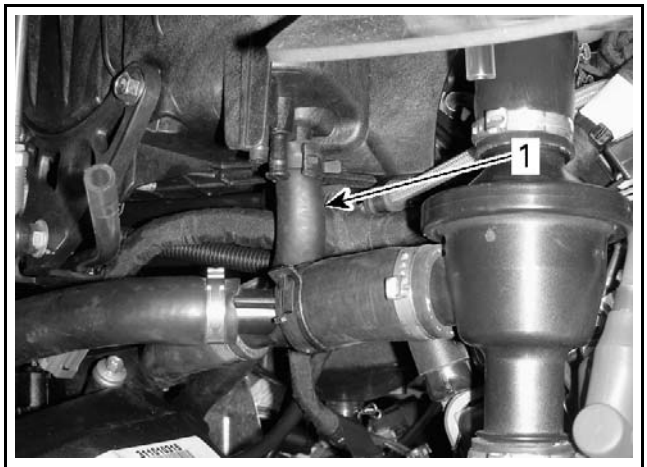
14. Detach gearbox vent hose from air filter housing.



vmr2012-010-010_a

TYPICAL
1. Gearbox vent hose

15. Detach crankcase vent hose from air filter housing.



vmr2012-010-011_a

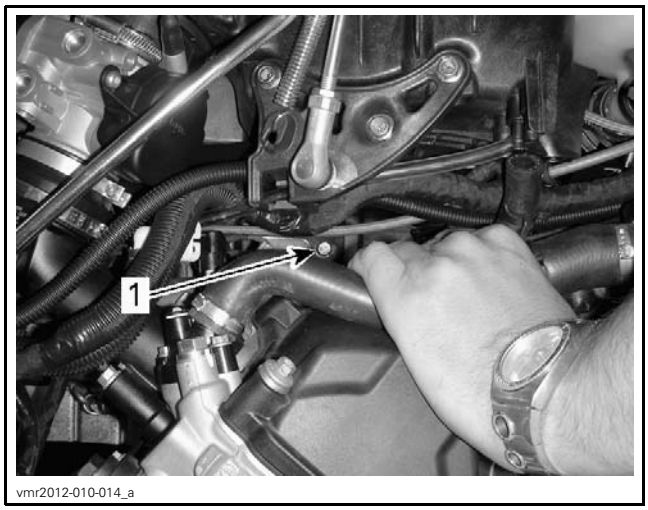
TYPICAL
1. Crankcase vent hose

16. Remove air filter housing retaining screws.

vmr2012-010-012_a

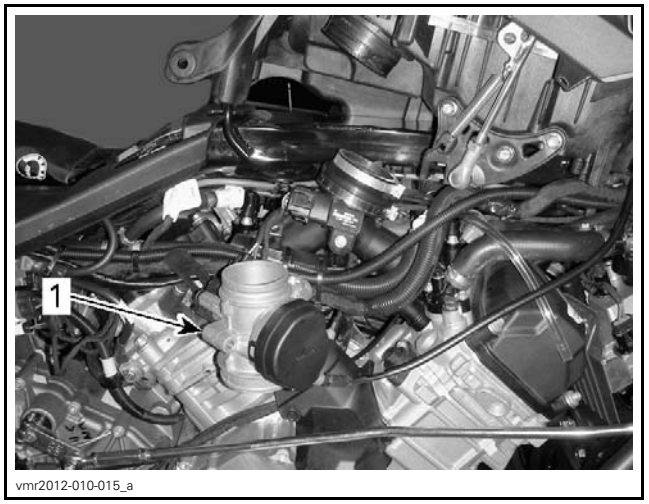
SCREWS LOCATED NEAR SEAT ANCHORAGE
1. Air filter housing retaining screws

SCREW LOCATED UNDER COOLANT TANK
1. Air filter housing retaining screw



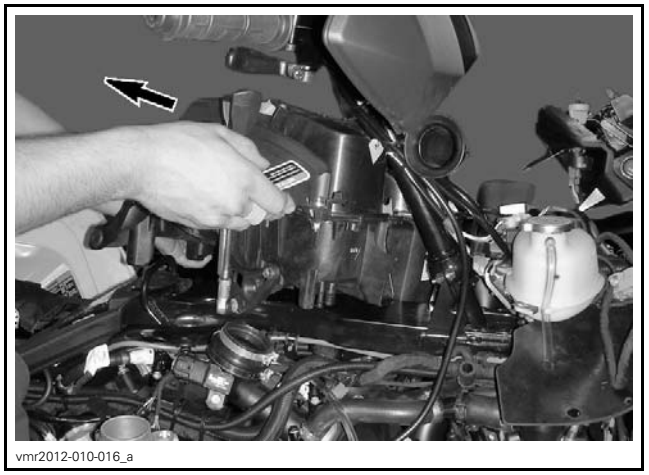
SCREW LOCATED ON LH SIDE - ACCESS FROM UNDER SHIFT LEVER
1. Air filter housing retaining screw

17. Detach throttle body from intake adapters.
18. Slightly lift air filter housing upward.
19. Move throttle body aside to make room.



TYPICAL - OUTLANDER SHOWN
1. Throttle body

20. Remove air filter housing by pulling it towards rear.



AIR FILTER HOUSING REMOVAL

21. Remove remaining components from air filter housing.

Air Filter Housing Inspection

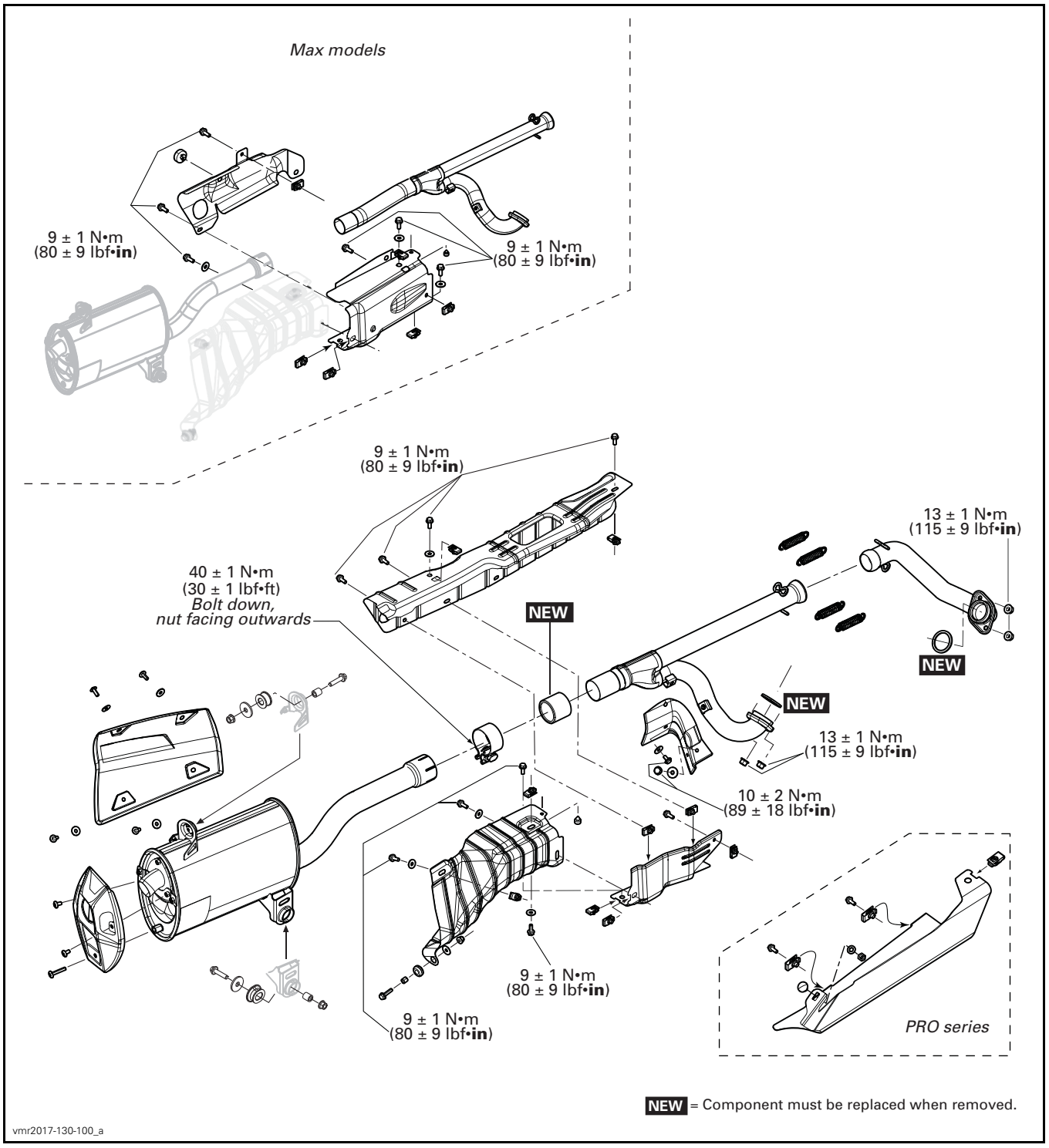
Check air filter housing for cracks or other damage. Replace if necessary.

Air Filter Housing Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Refer to applicable exploded views for tightening torque.

EXHAUST SYSTEM (LONGITUDINAL MOUNTING)



GENERAL

⚠ WARNING

Never touch exhaust system components immediately after the engine has run.

PROCEDURES

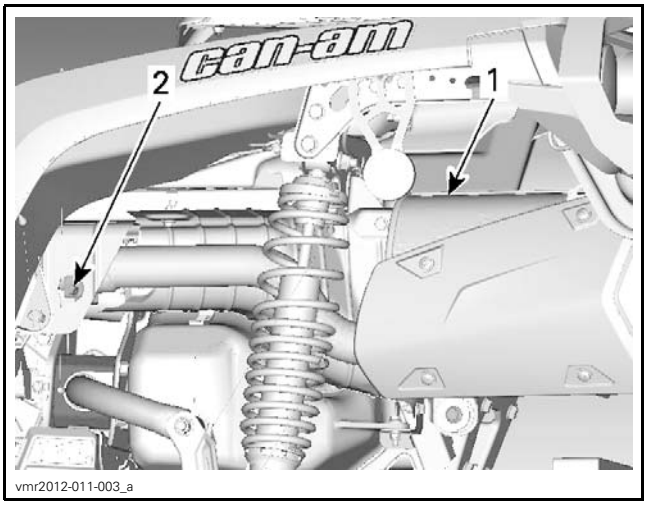
SPARK ARRESTER

For spark arrester servicing, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

MUFFLER

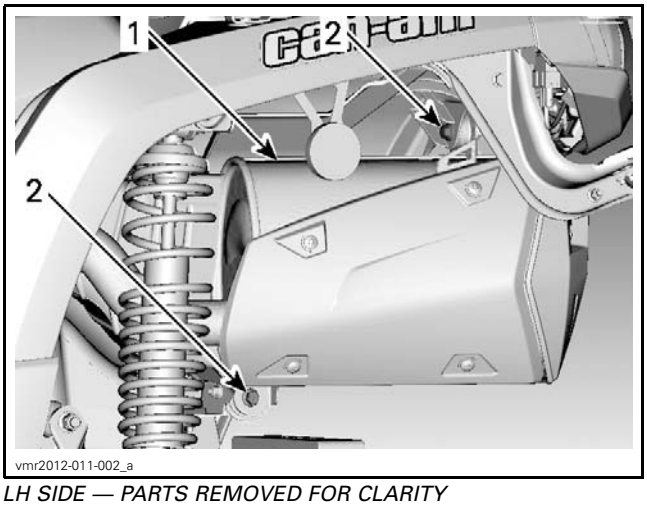
Removing the Muffler

1. Loosen exhaust pipe clamp.



LH SIDE — PARTS REMOVED FOR CLARITY
1. *Muffler*
2. *Loosen clamp*

2. Remove muffler retaining bolts.



LH SIDE — PARTS REMOVED FOR CLARITY
1. *Muffler*
2. *Remove bolts*

3. Remove the muffler.

Inspecting the Muffler

Check muffler and cover for cracks or other damages. Replace if necessary.

Check if the rubber support is brittle, hard or otherwise damaged. Replace if needed.

Installing the Muffler

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

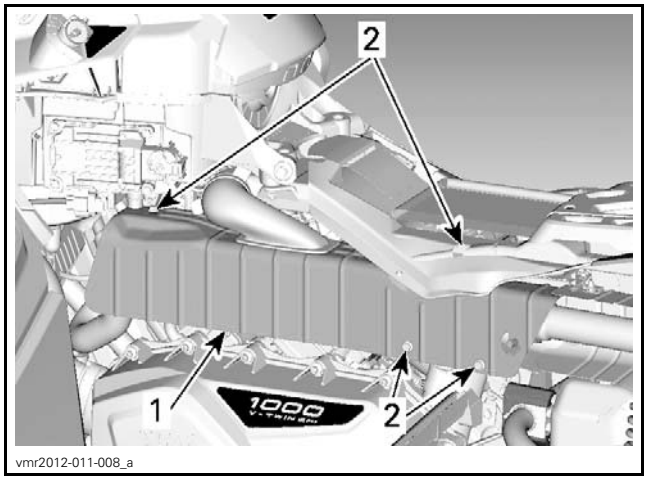
Install new exhaust gasket.

HEAT SHIELD

Removing the Heat Shield

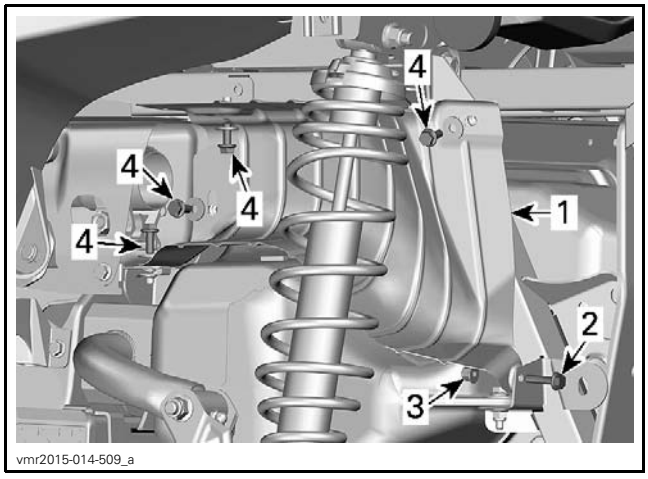
1. Refer to *BODY* and remove LH panel.
2. Remove heat shield retaining bolts.

NOTICE **Do not use an impact tool to remove or install heat shield bolts.**

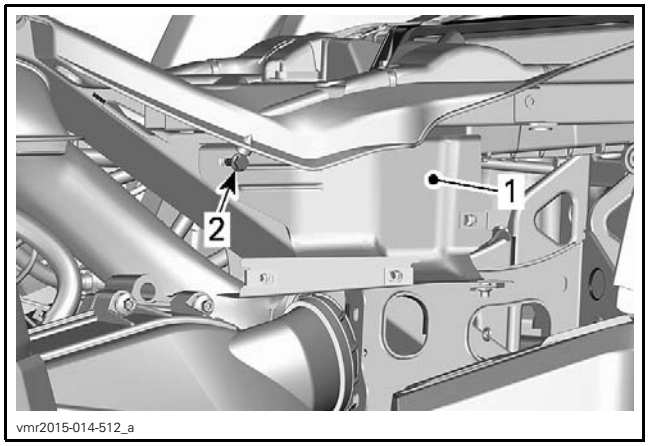


TYPICAL LH SIDE — PARTS REMOVED FOR CLARITY
1. *Heat shield*
2. *Remove bolts*

3. Remove muffler for rear and inner heat shield removal.



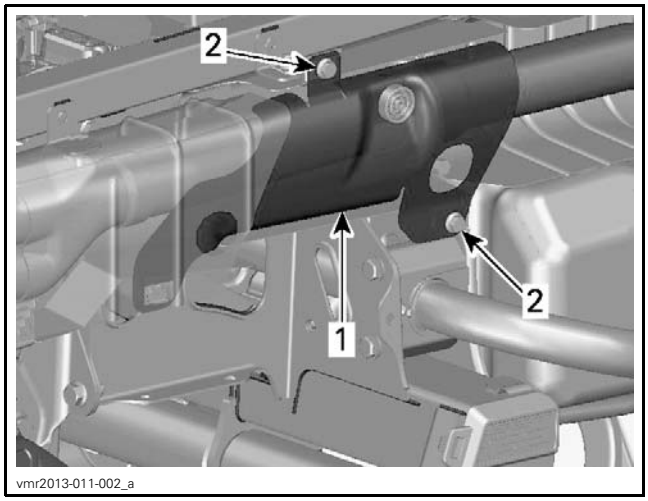
TYPICAL - REAR HEAT SHIELD REMOVAL
1. *Rear heat shield*
2. *M6 x 25 bolt*
3. *M6 elastic nut*
4. *M6 x 16 bolts with washers*



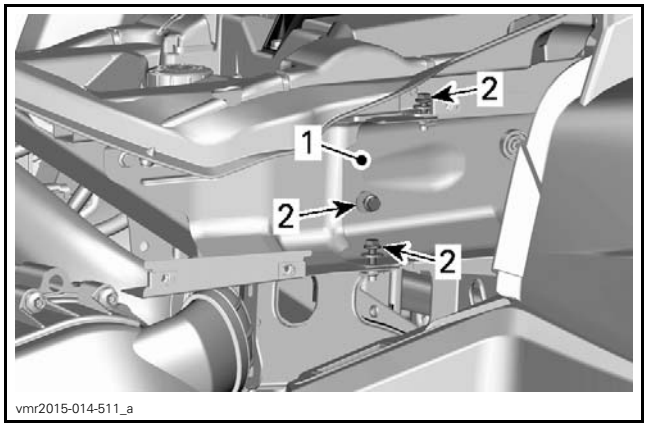
TYPICAL - INNER HEAT SHIELD REMOVAL
1. *Inner heat shield*
2. *M6 x 16 bolts*

Max Models

4. Remove heat shield extensions retaining bolts.



LH SIDE — PARTS REMOVED FOR CLARITY
1. *Outer heat shield extension*
2. *M6 x 16 bolts*

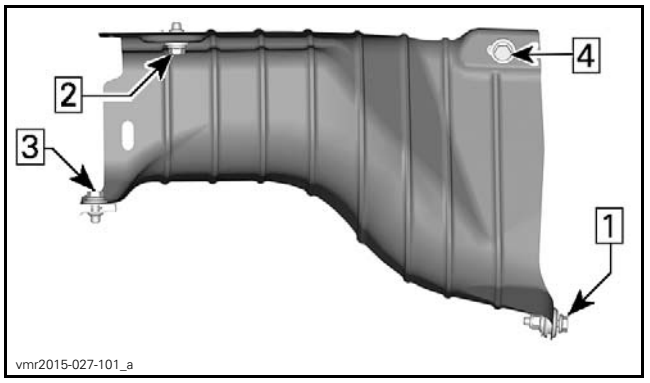


TYPICAL
1. *Inner heat shield extension*
2. *M6 x 16 bolts*

Installing the Heat Shield

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

Refer to exploded view for torque specifications, and following illustration for rear heat shield tightening sequence.

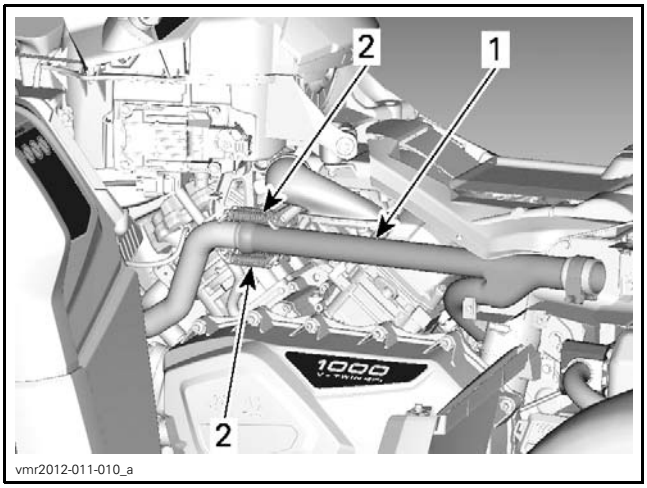


REAR HEAT SHIELD TIGHTENING SEQUENCE

Y-PIPE

Removing the Y-Pipe

1. Remove *MUFFLER*. See procedure in this subsection.
2. Remove *HEAT SHIELD*. See procedure in this subsection.
3. Remove the following parts:
   - Springs from head pipe
   - Y-pipe retaining nuts on rear cylinder.
   - Y-pipe from vehicle.



TYPICAL LH SIDE — PARTS REMOVED FOR CLARITY
1. Y-pipe
2. Springs

Inspecting the Y-Pipe

Check Y-pipe for cracks, bending or other damages. Replace if needed.

Installing the Y-Pipe

The installation is the reverse of the removal procedure.

Install NEW exhaust gaskets and exhaust pipe retaining nuts.

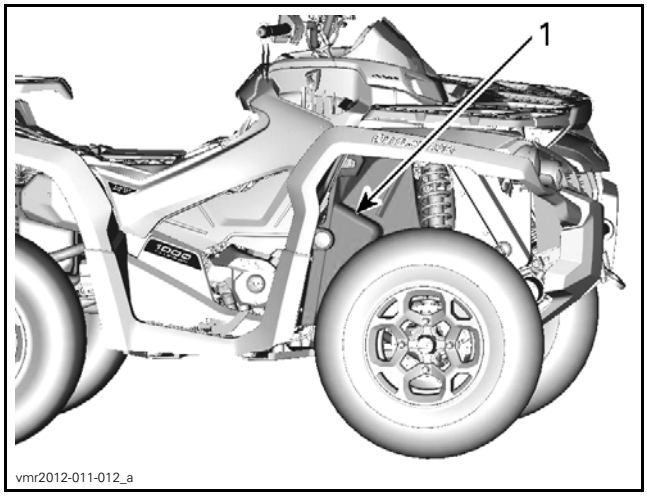
Properly position exhaust pipe before tightening.

TIGHTENING TORQUE	
Head pipe nuts (rear cylinder)	13 N•m ± 1 N•m (115 lbf•**in** ± 9 lbf•**in**)

HEAD PIPE (FRONT CYLINDER)

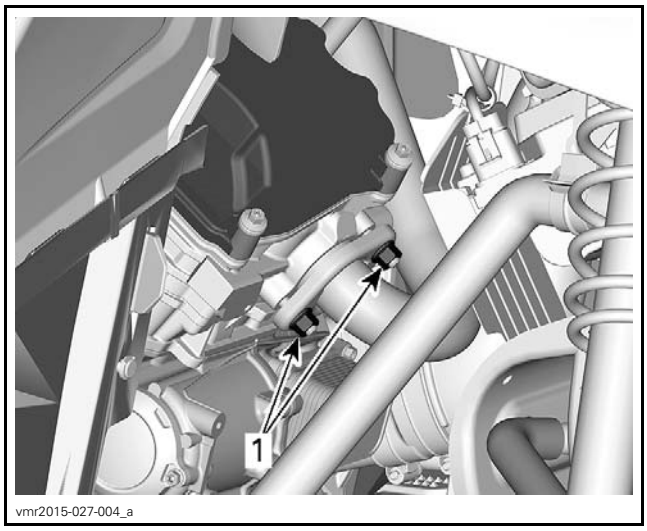
Removing the Front Head Pipe

1. Remove *Y-PIPE* See procedure in this subsection.
2. Refer to *BODY* and remove rear part of RH inner fender to reach head pipe screws (Outlander series only).



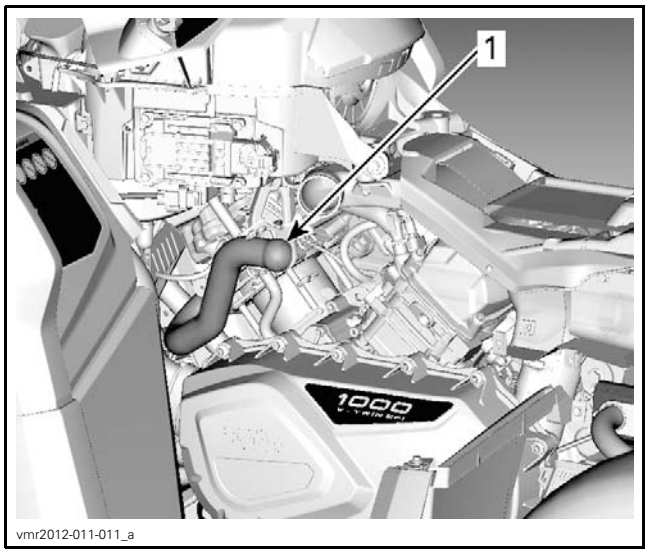
TYPICAL
1. Remove

3. From RH side of vehicle, remove head pipe retaining nuts.



TYPICAL
1. Head pipe retaining nuts

4. Remove front head pipe from vehicle.



TYPICAL LH SIDE — PARTS REMOVED FOR CLARITY
1. Head pipe

NOTE: The space to remove the front head pipe is limited. Remove it without force.

Inspecting the Front Head Pipe

Check head pipe for cracks, bending or other damages. Replace if needed.

Installing the Front Head Pipe

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install NEW exhaust gaskets.

Refer to *EXHAUST SYSTEM TIGHTENING SEQUENCE*.

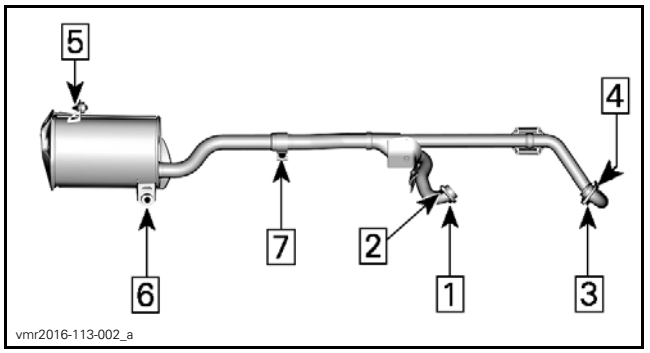
TIGHTENING TORQUE	
Head pipe nuts	13 N•m ± 1 N•m (115 lbf•**in** ± 9 lbf•**in**)

Exhaust System Tightening System Sequence

Install all nuts and bolts loosely.

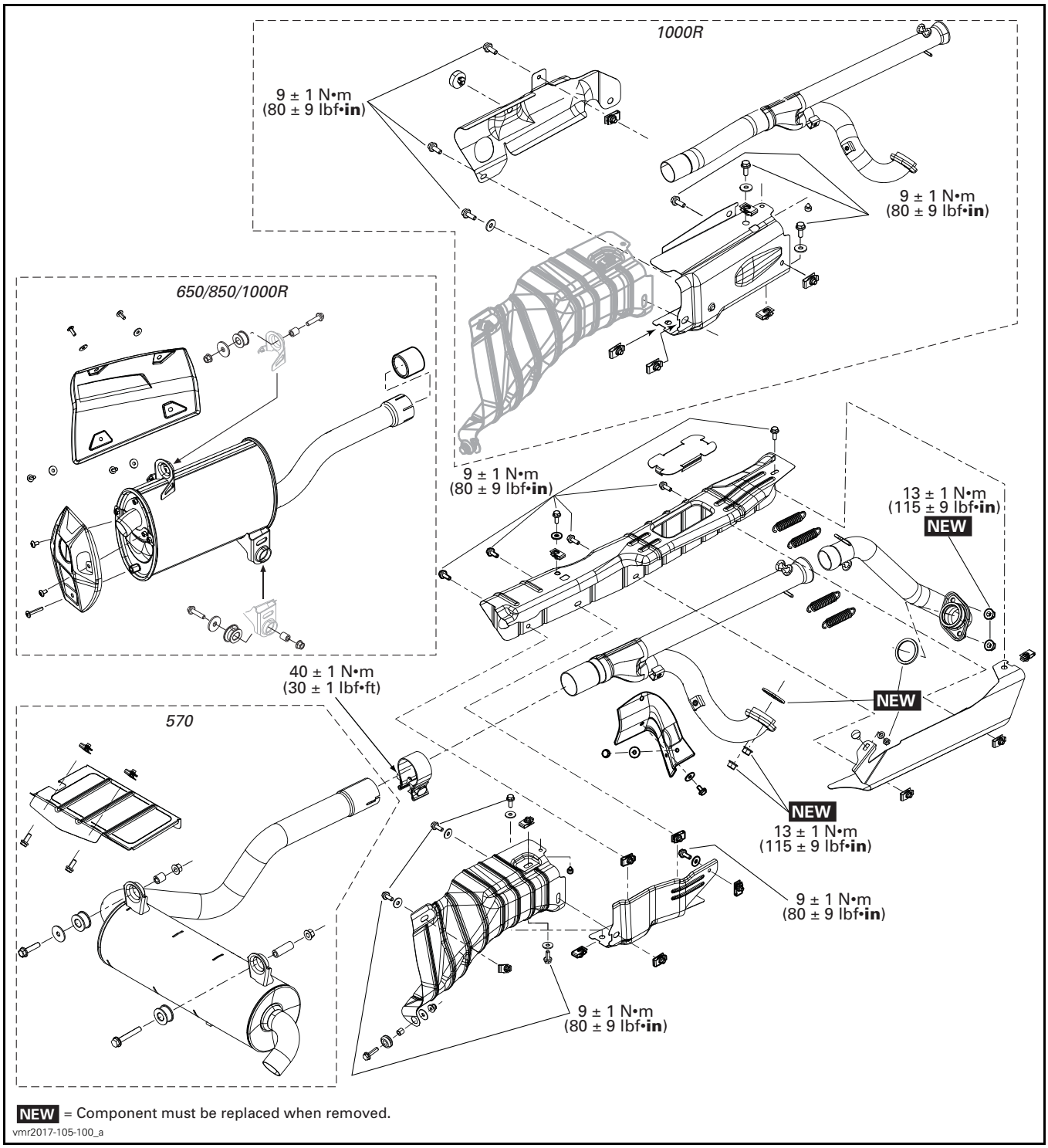
Install springs.

Tighten all fasteners as per following tightening sequence. Refer to exploded view for torque specifications.



EXHAUST SYSTEM TIGHTENING SYSTEM SEQUENCE

EXHAUST SYSTEM (OUTLANDER XMR)



NEW = Component must be replaced when removed.

vmr2017-105-100_a

GENERAL

⚠ WARNING

Never touch exhaust system components immediately after the engine has run.

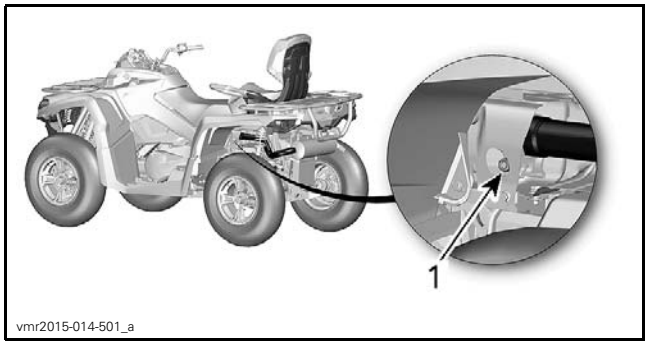
PROCEDURES

MUFFLER

Removing the Muffler

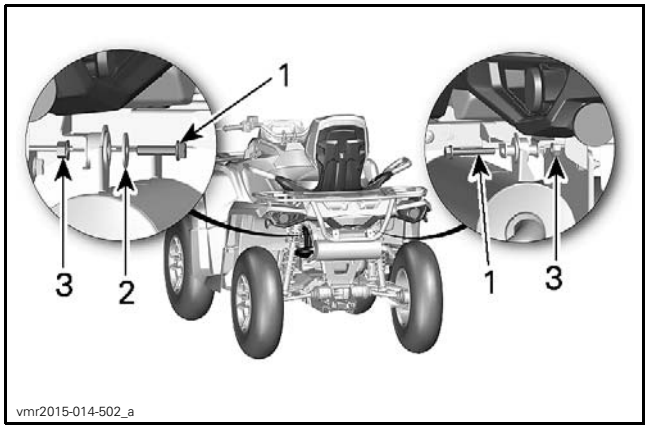
570 Model

1. Loosen exhaust pipe clamp.



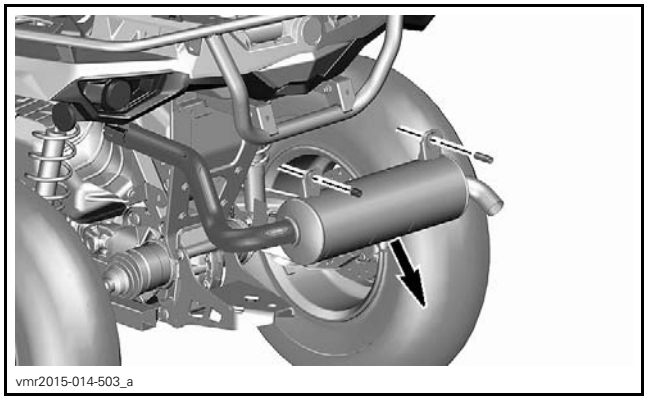
1. Clamp nut

2. Remove muffler retaining bolts.



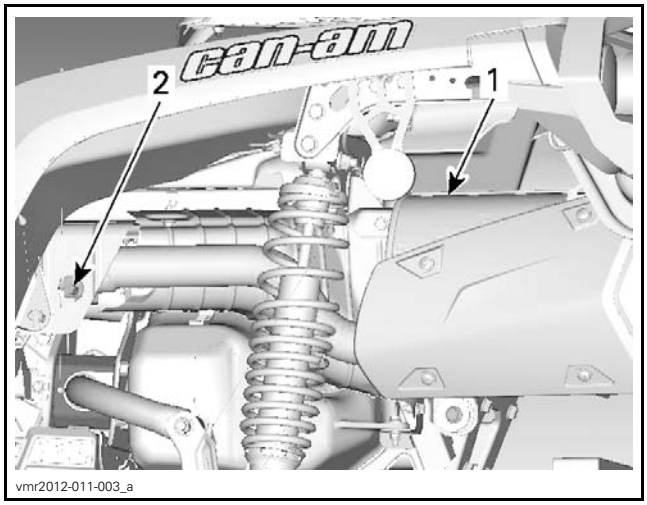
1. Bolt
2. Washer
3. Nut

3. Remove the muffler.



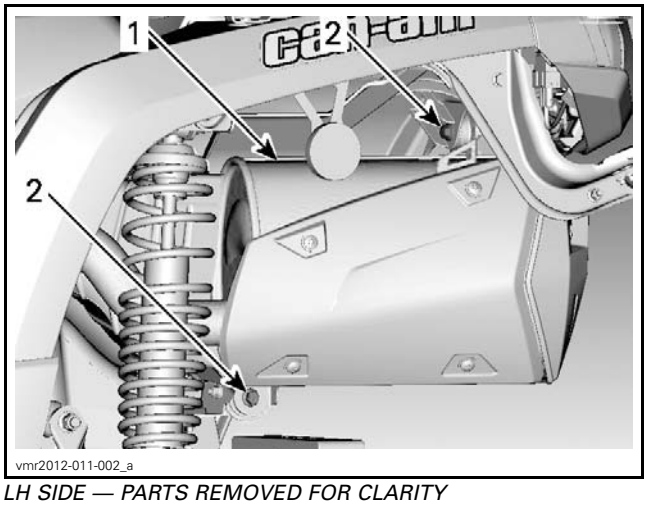
650, 850 and 1000R Models

1. Loosen exhaust pipe clamp.



LH SIDE — PARTS REMOVED FOR CLARITY
1. Muffler
2. Loosen clamp

2. Remove muffler retaining bolts.



LH SIDE — PARTS REMOVED FOR CLARITY
1. Muffler
2. Remove bolts

3. Remove the muffler.

Inspecting the Muffler

Check muffler and cover for cracks or other damages. Replace if necessary.

Check if the rubbers supports are brittle, hard or otherwise damaged. Replace if needed.

Installing the Muffler

The installation is the reverse of the removal procedure. However, pay attention to the following.

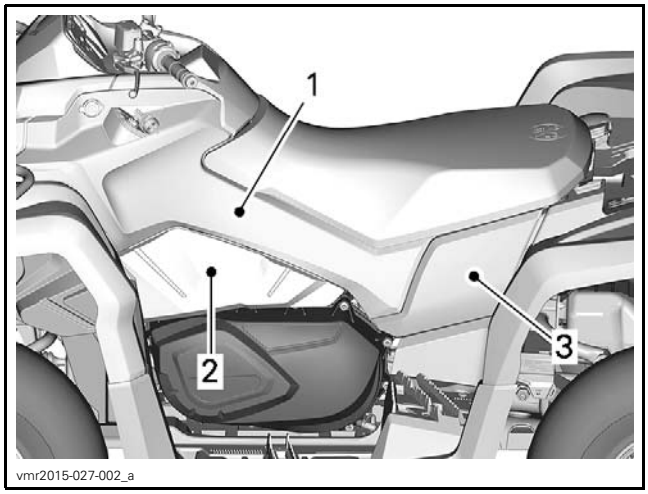
Install a **NEW** exhaust gasket (all models except 570).

TIGHTENING TORQUE	
Exhaust pipe clamp	40 N•m ± 1 N•m (30 lbf•ft ± 1 lbf•ft)

HEAT SHIELD

Removing the Heat Shield

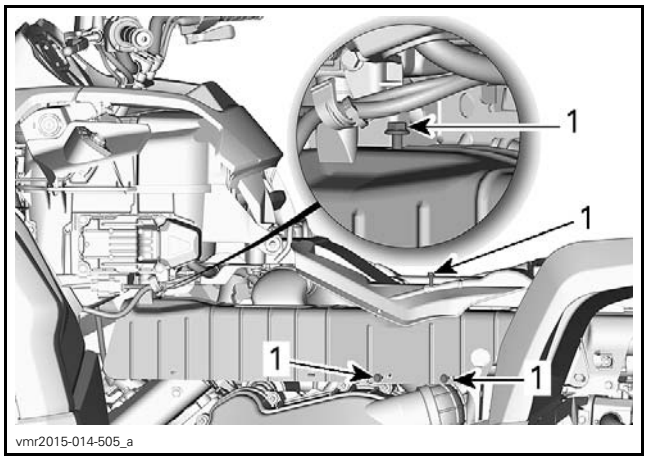
1. Refer to *BODY* and remove following LH body panels.



LH SIDE
1. *Side panel*
2. *Side panel extension*
3. *Rear panel extension (Max models)*

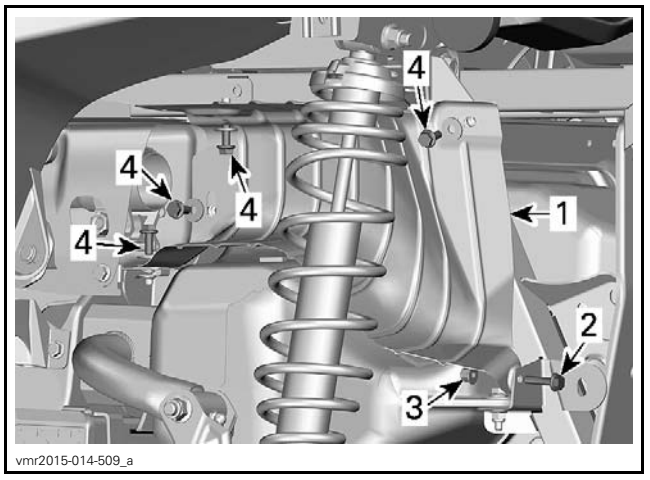
2. Remove outer heat shield retaining bolts.

NOTICE Do not use impact tool to remove or install heat shield bolts.

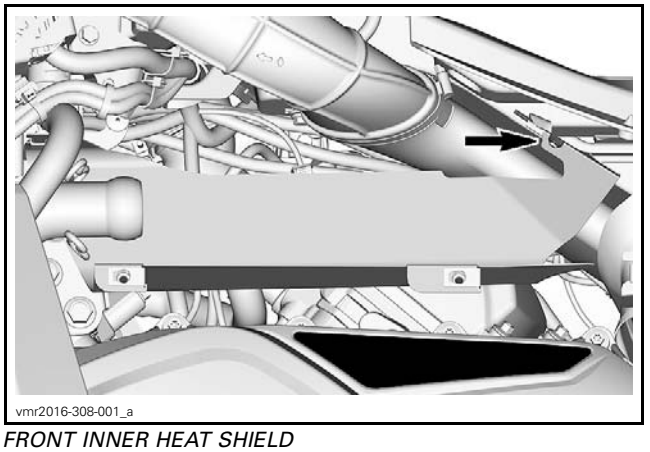


OUTER HEAT SHIELD
1. *Heat shield bolts*

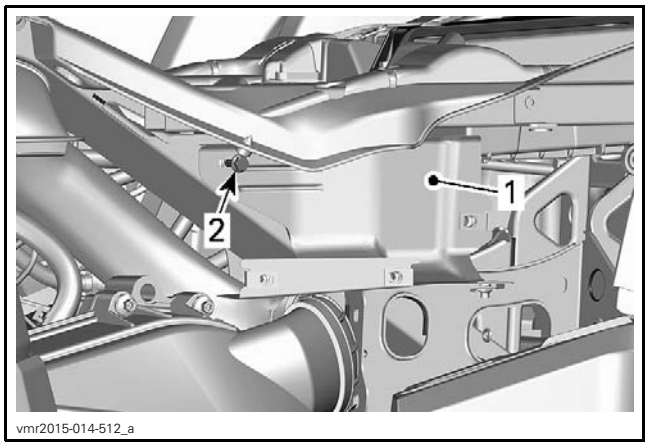
3. Remove muffler for rear and inner heat shield removal.



REAR HEAT SHIELD REMOVAL
1. *Rear heat shield*
2. *M6 x 25 bolt*
3. *M6 elastic nut*
4. *M6 x 16 bolts with washers*



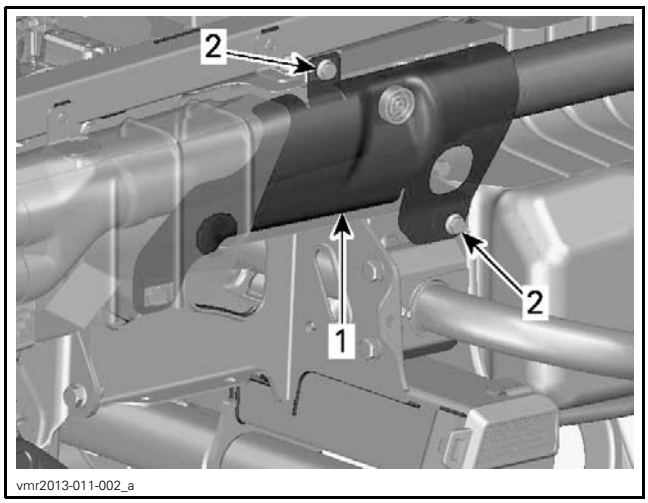
FRONT INNER HEAT SHIELD



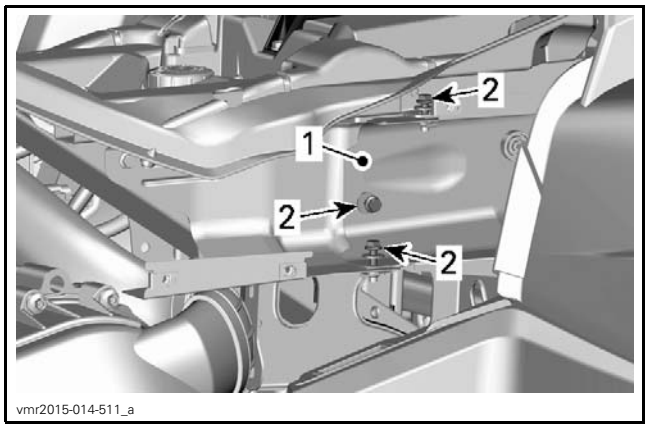
INNER HEAT SHIELD
1. *Inner heat shield*
2. *M6 x 16 bolts*

1000R model

4. Remove heat shield extension retaining bolts.



1. *Outer heat shield extension*
2. *M6 x 16 bolts*

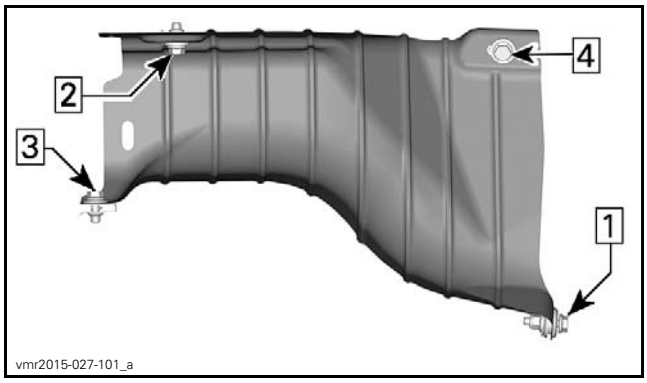


1. *Inner heat shield extension*
2. *M6 x 16 bolts*

Installing the Heat Shield

Reverse the removal procedure. However, pay attention to the following.

Refer to exploded view for torque specifications, and following illustration for rear heat shield tightening sequence.

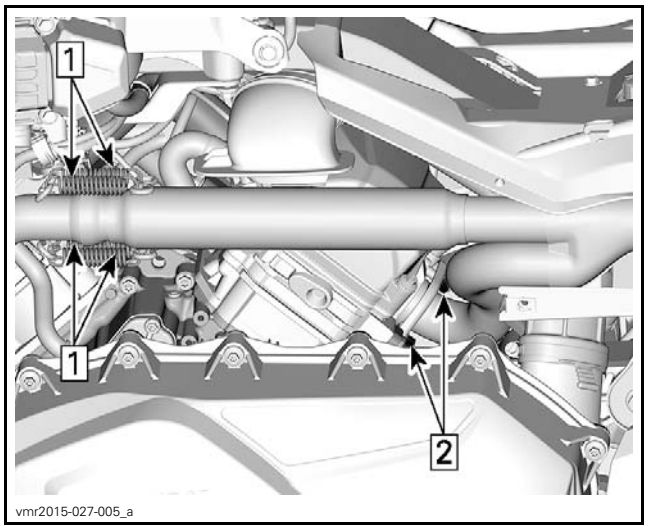


REAR HEAT SHIELD TIGHTENING SEQUENCE

Y-PIPE

Removing the Y-Pipe

1. Remove *MUFFLER*. See procedure in this subsection.
2. Remove *OUTER HEAT SHIELD*. See procedure in this subsection.
3. Remove the following parts:
   - Springs from head pipe
   - Y-pipe retaining nuts on rear cylinder
   - Y-pipe from vehicle.



TYPICAL
1. *Springs (4)*
2. *Y-pipe retaining nuts on rear cylinder (2)*

Inspecting the Y-Pipe

Check Y-pipe for cracks, bending or other damages. Replace if needed.

Installing the Y-Pipe

Reverse the removal procedure. However, pay attention to the following.

Install **NEW** exhaust gasket and exhaust pipe retaining nuts.

Properly position exhaust pipe before tightening.

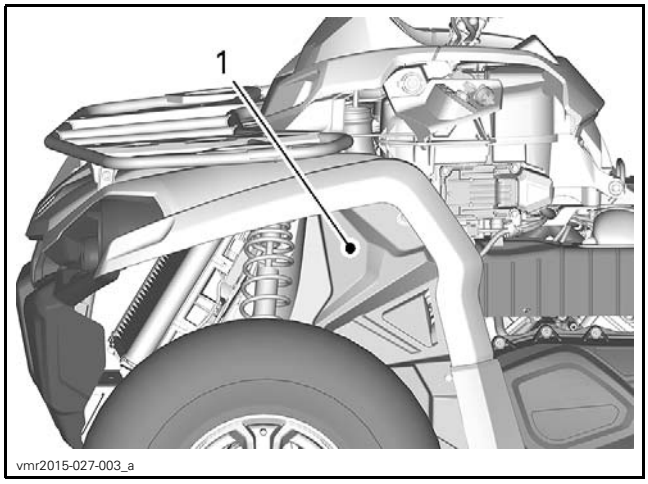
Refer to *EXHAUST SYSTEM TIGHTENING SEQUENCE*.

TIGHTENING TORQUE	
Head pipe nuts (rear cylinder)	13 N•m ± 1 N•m (115 lbf•**in** ± 9 lbf•**in**)

HEAD PIPE (FRONT CYLINDER)

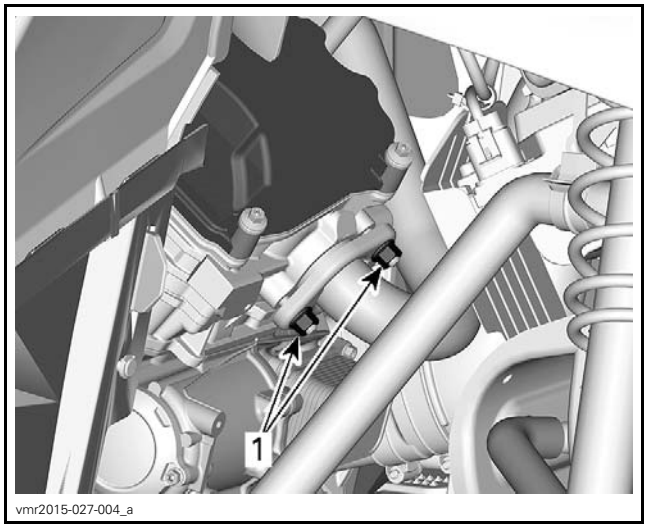
Removing the Front Head Pipe

1. Remove *Y-PIPE* See procedure in this subsection.
2. Refer to *BODY* and remove LH and RH inner fenders.



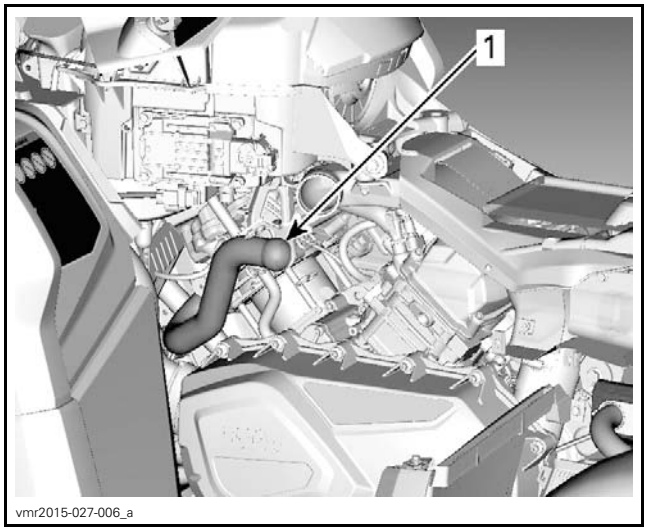
1. Remove inner fender panel (both sides)

3. From RH side of vehicle, remove head pipe retaining nuts.



1. Head pipe retaining nuts

4. Remove front head pipe from vehicle.



1. Head pipe

NOTE: The space to remove the front head pipe is limited. Remove it without forcing it.

Inspecting the Front Head Pipe

Check head pipe for cracks, bending or other damages. Replace if needed.

Installing the Front Head Pipe

Reverse the removal procedure. However, pay attention to the following.

Install **NEW** exhaust gaskets and nuts.

Refer to *EXHAUST SYSTEM TIGHTENING SEQUENCE*.

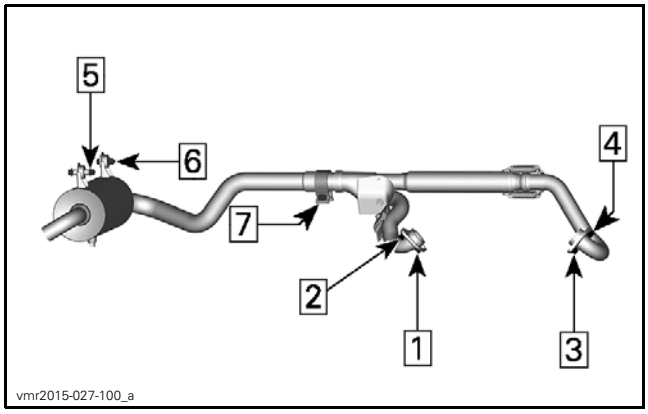
TIGHTENING TORQUE	
Head pipe nuts	13 N•m ± 1 N•m (115 lbf•**in** ± 9 lbf•**in**)

Exhaust System Tightening Sequence

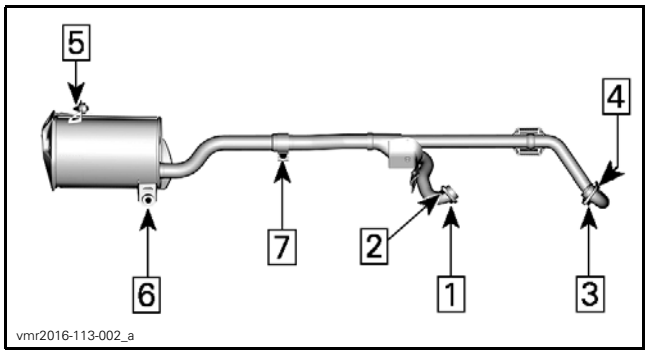
Install all nuts and bolts loosely.

Install springs.

Tighten all fasteners as per following tightening sequence. Refer to exploded view for torque specifications.



570 - TIGHTENING SEQUENCE



650, 850 AND 1000R - TIGHTENING SEQUENCE

LUBRICATION SYSTEM

SERVICE TOOLS

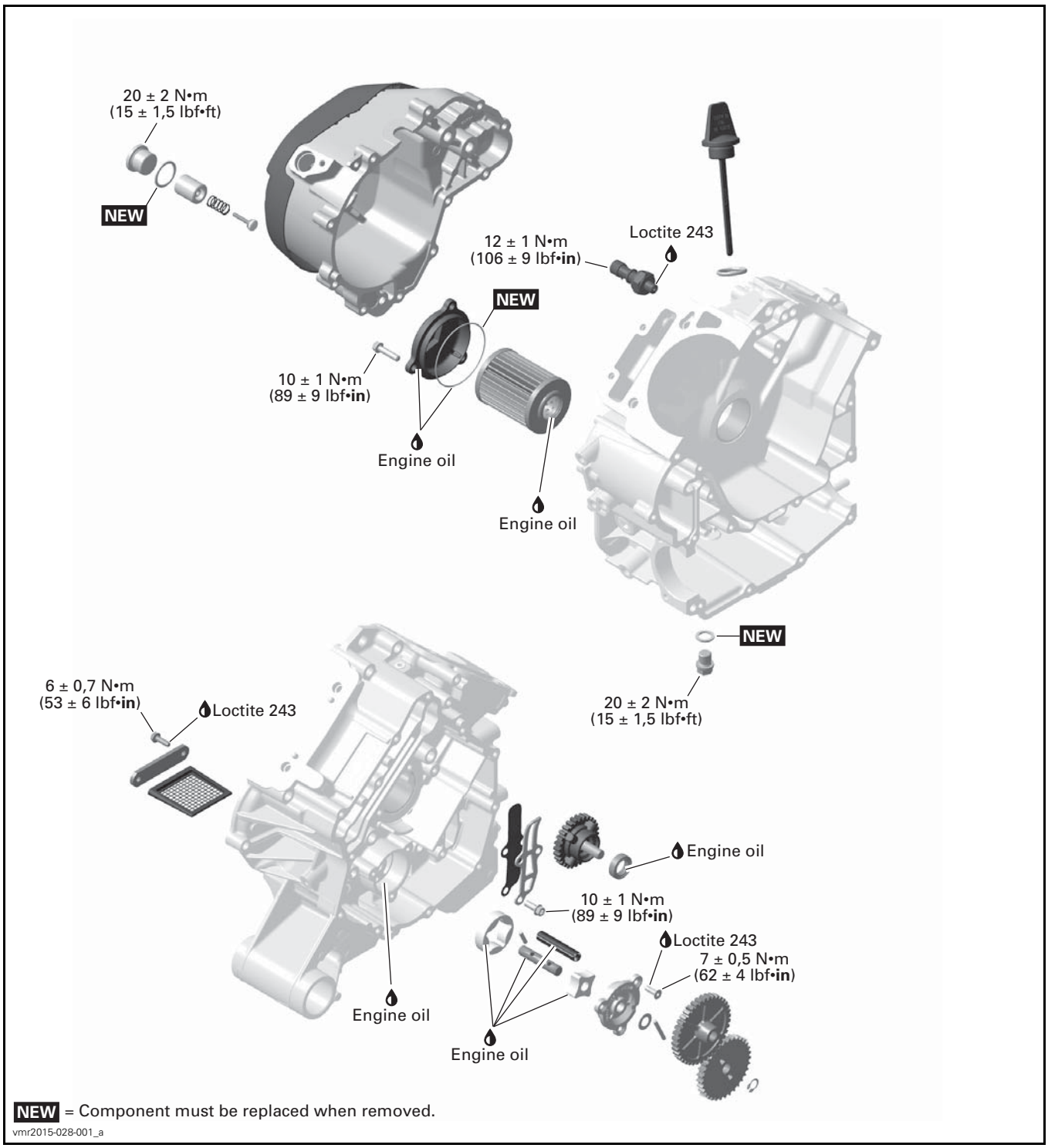
Description	Part Number	Page
ADAPTER HOSE	529 035 652	5
DISCONNECT TOOL	529 035 714	5
PRESSURE GAUGE	529 035 709	5

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	7, 11

COMPONENTS

570 Engine



NEW = Component must be replaced when removed.

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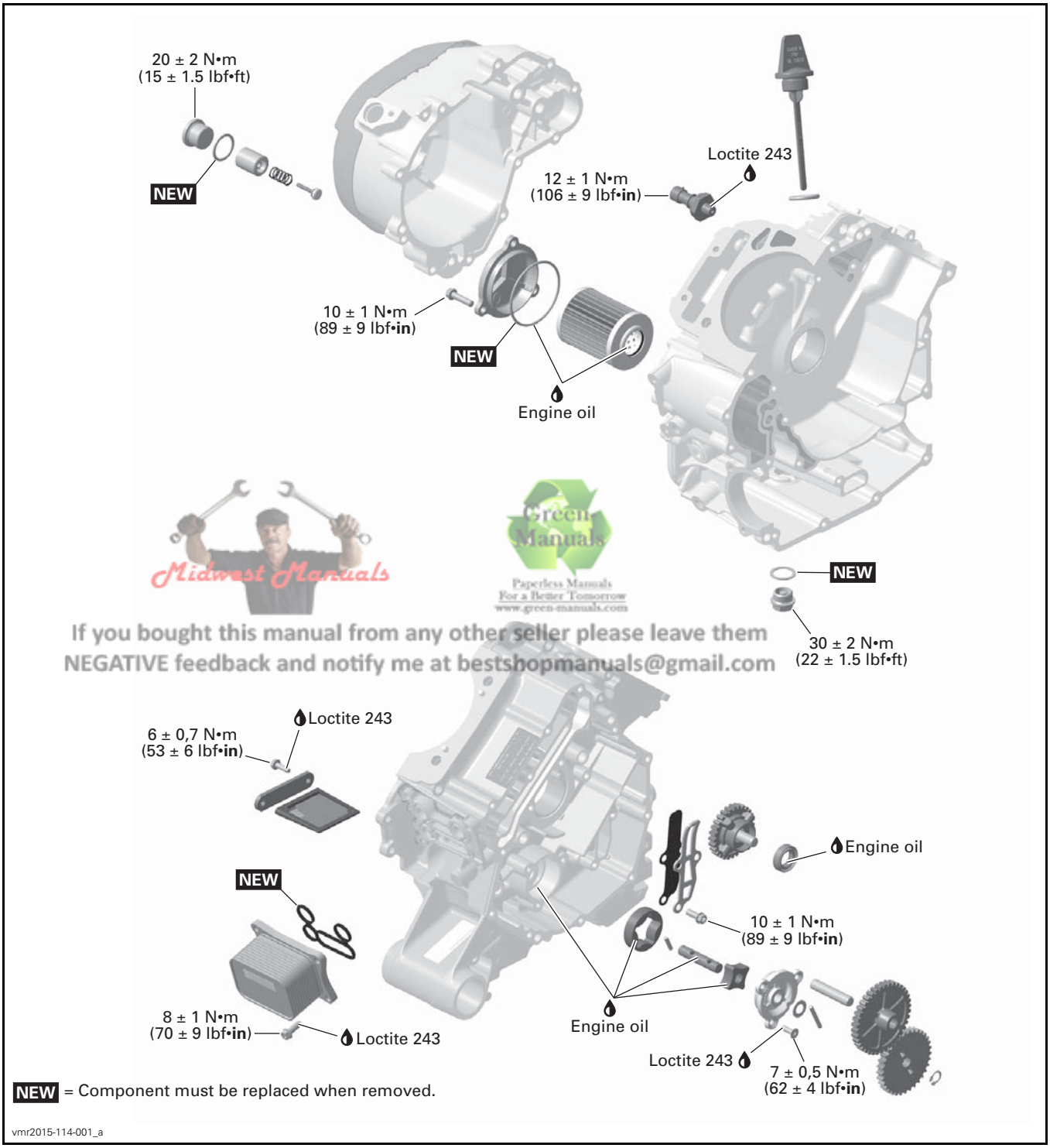
COMPONENTS

850 and 1000R Engines



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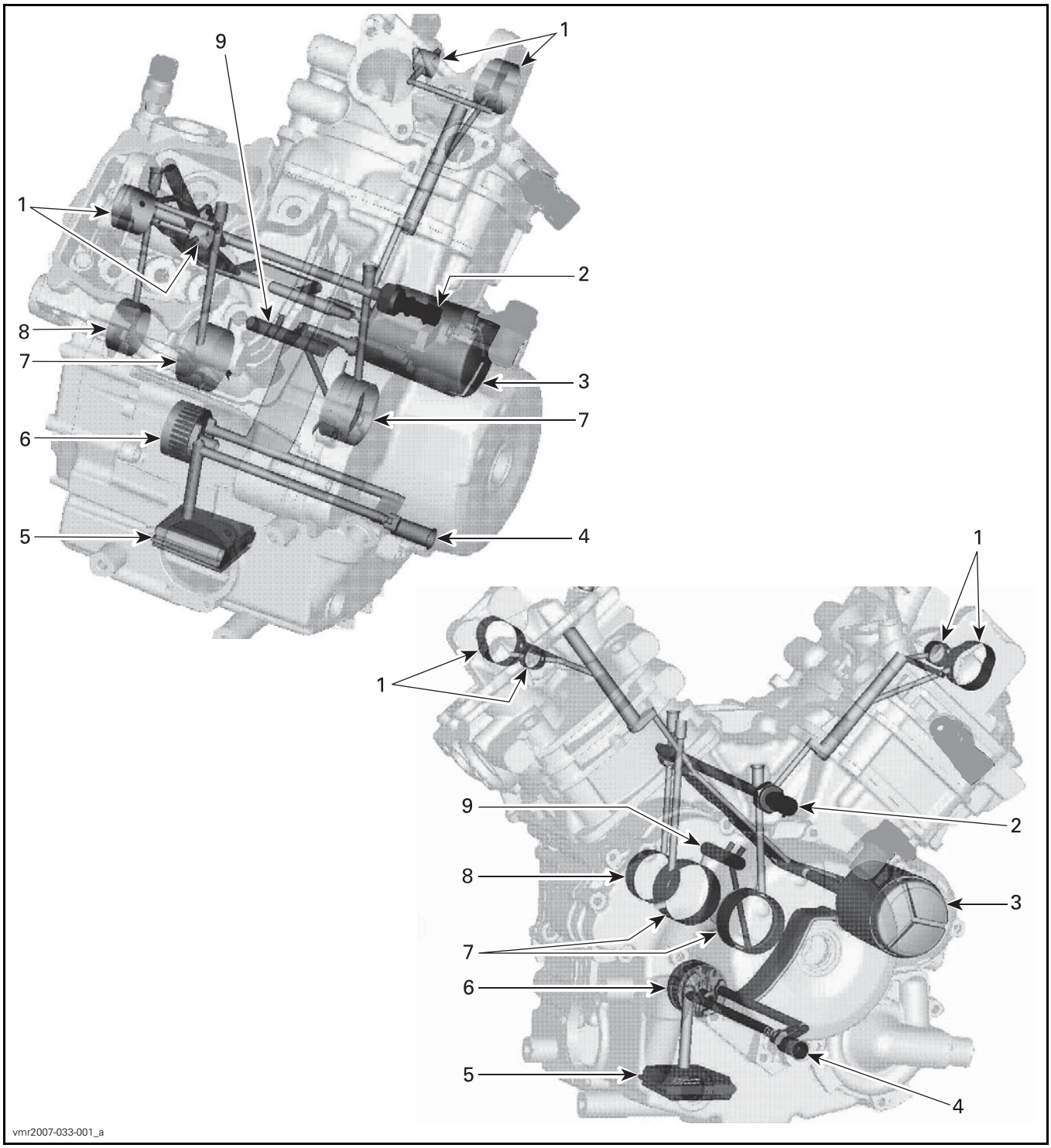
NEW = Component must be replaced when removed.

vmr2015-114-001_a

ENGINE LUBRICATION CIRCUIT



1. *Camshaft bearings*
2. *Oil pressure switch*
3. *Oil filter*
4. *Oil pressure regulator valve*
5. *Oil strainer*
6. *Oil pump*
7. *Crankshaft main bearings*
8. *Crankshaft support bearing*
9. *Connecting rod bearings*

INSPECTION

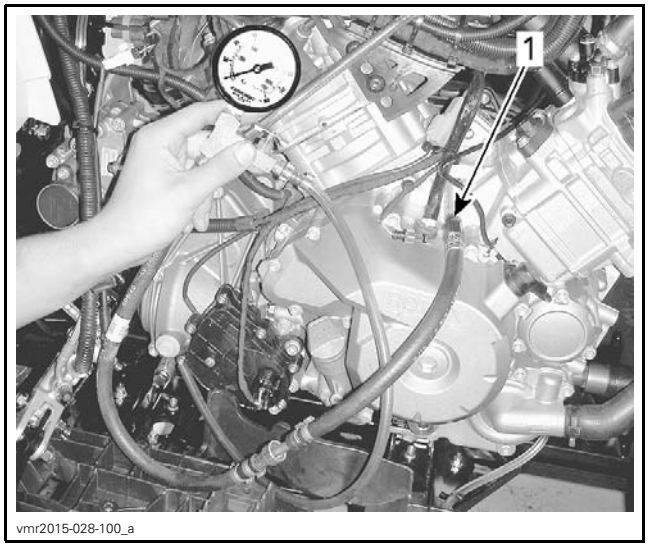
TESTING THE ENGINE OIL PRESSURE

NOTE: The engine oil pressure test should be done with a warm engine 100°C (212°F) and the recommended oil.

Remove the oil pressure switch. Refer to *OIL PRESSURE SWITCH* in this subsection.

Install the pressure test gauge with the proper adapter hose in the OPS engine bore.

REQUIRED TOOL	
PRESSURE GAUGE (P/N 529 035 709)	
ADAPTER HOSE (P/N 529 035 652)	



TYPICAL
1. Gauge connected in OPS engine bore

The engine oil pressure should be within the following values.

OIL PRESSURE	1250 RPM	6000 RPM
MINIMAL	70 kPa (10 PSI)	300 kPa (44 PSI)
NOMINAL	150 kPa (22 PSI)	350 kPa (51 PSI)
MAXIMAL	250 kPa (36 PSI)	450 kPa (65 PSI)

If the engine oil pressure is out of specifications, check the points described in *TROUBLESHOOTING* in this subsection.

Remove oil pressure gauge and adapter hose.

NOTE: To remove adapter hose from oil pressure gauge, use the disconnect tool.

REQUIRED TOOL	
DISCONNECT TOOL (P/N 529 035 714)	

Reinstall the oil pressure switch and remaining components.

TROUBLESHOOTING

LOW OR NO OIL PRESSURE

1. Oil level is too low.
   - *Refill engine with recommended engine oil. Refer to OIL LEVEL VERIFICATION in the PERIODIC MAINTENANCE PROCEDURES subsection.*
   - *Check for high oil consumption, refer to HIGH OIL CONSUMPTION in this TROUBLESHOOTING.*
   - *Check for engine oil leaks. For leak indicator hose and leak indicator hole, refer to COOLING SYSTEM INSPECTION in the PERIODIC MAINTENANCE PROCEDURES subsection. Repair if necessary.*
2. Use of unsuitable engine oil type.
   - *Replace engine oil by the recommended engine oil.*
3. Clogged oil filter.
   - *Replace oil and oil filter at the same time.*
4. Defective oil pressure switch.
   - *Test oil pressure switch, see procedure in this subsection.*
5. Defective or worn oil pump.
   - *Check oil pump, see procedure in this subsection.*
6. Defective engine oil pressure regulator.
   - *Check engine oil pressure regulator, see procedure in this subsection.*
7. Worn plain bearings in crankcase.
   - *Check plain bearing clearance, refer to BOTTOM END subsection.*
8. Clogged engine oil strainer.
   - *Clean engine oil strainer, see procedure in this subsection.*

OIL CONTAMINATION

1. Defective water pump seal ring or rotary seal.
   - *Check for oil or coolant leak from indicator near water pump, refer to COOLING SYSTEM INSPECTION in the PERIODIC MAINTENANCE PROCEDURES subsection. Replace seal if necessary.*

2. Cylinder head or cylinder base gasket leak.
   - *Retighten cylinder head to specified torque, refer to TOP END subsection. Replace gasket if tightening does not solve the problem.*
3. Engine internal damage.
   - *Repair engine.*
4. Oil cooler gasket leak.
   - *Replace oil cooler gasket and change engine oil.*

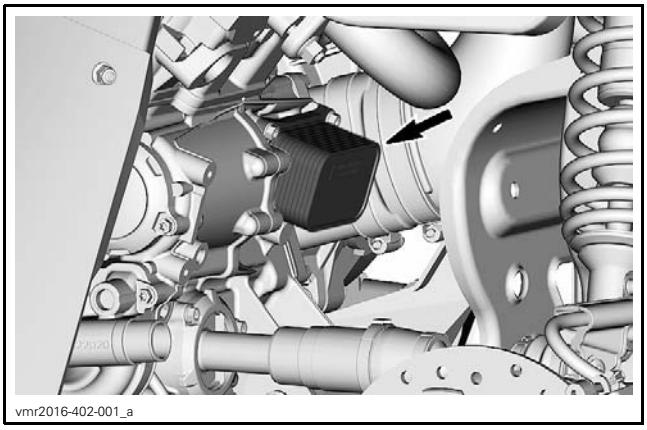
HIGH OIL CONSUMPTION

1. Leaking breather oil seal.
   - *Check if the oil seal of the breather is brittle, hard or damaged. Refer to BOTTOM END subsection.*
2. Valve stem seals worn or damaged.
   - *Replace valve stem seals.*
3. Worn piston rings (blue exhaust smoke).
   - *Replace piston rings.*

PROCEDURES

OIL COOLER (850 AND 1000R ENGINES)

Oil Cooler Location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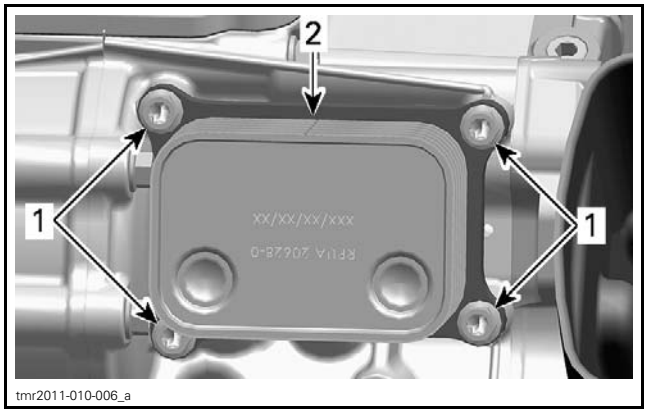
Removing the Oil Cooler

Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection to:

– Drain engine oil. Refer to *ENGINE OIL CHANGE*
– Drain coolant. Refer to *ENGINE COOLANT REPLACEMENT*.

Remove oil cooler retaining screws.

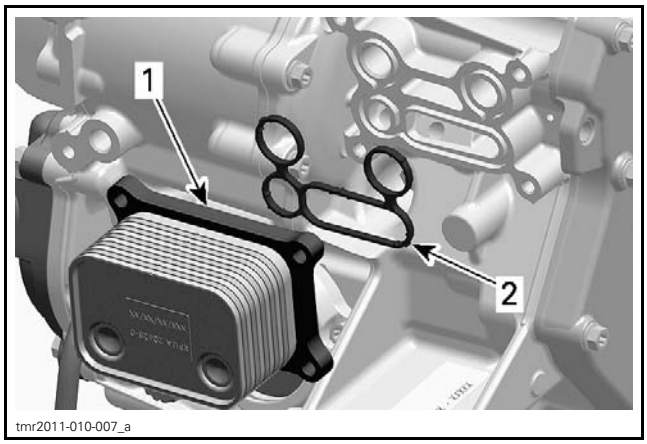


tmr2011-010-006_a

1. Retaining screws
2. Oil cooler

Place rags or towels under oil cooler to catch remaining oil and coolant.

Remove oil cooler and discard gasket.



tmr2011-010-007_a

1. Oil cooler
2. Gasket

Inspecting the Oil Cooler

Check oil cooler for cracks or other damage.

Replace if necessary.

Installing the Oil Cooler

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

Wipe off any oil and coolant spillage.

Install a NEW gasket.

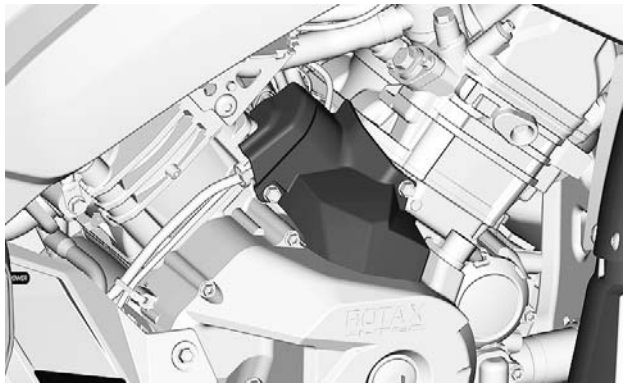
Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection and carry out the following:

– Refill engine with recommended oil. See *ENGINE OIL CHANGE*.
– Refill and bleed cooling system. See *ENGINE COOLANT REPLACEMENT*.

OIL PRESSURE SWITCH (OPS)

Oil Pressure Switch Access

Remove OPS cover.



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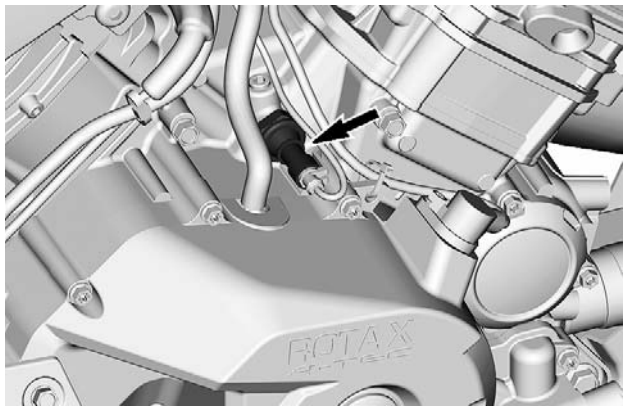

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Oil Pressure Switch Activation

The oil pressure switch activates when the engine oil pressure is lower than following specified pressure range.

OIL PRESSURE SWITCH ACTIVATION RANGE
30 kPa ± 10 kPa (4.35 PSI ± 1.45 PSI)

To check the function of the oil pressure switch, an oil pressure test has to be performed. Refer to *ENGINE OIL PRESSURE* in this subsection.

If the engine oil pressure is good, perform the oil pressure switch resistance test.

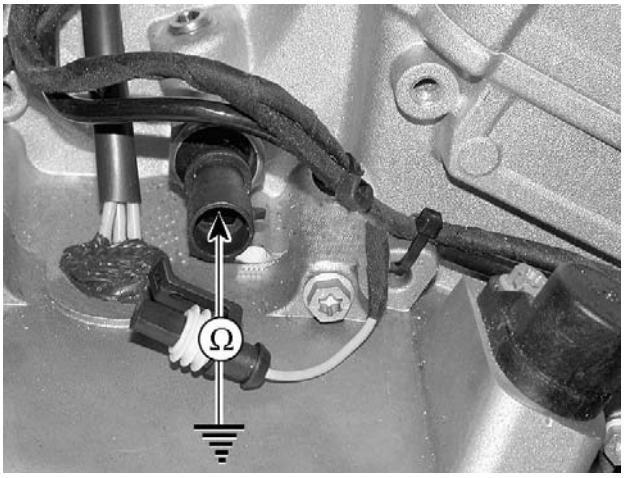
Testing the Oil Pressure Switch Resistance

Disconnect the connector from the oil pressure switch.

Check resistance as per following tables.

OPS CONNECTOR	ENGINE	ENGINE NOT RUNNING
PIN		RESISTANCE (Ω)
1	Engine ground	Close to 0 Ω (normally closed switch)

OPS CONNECTOR	ENGINE	ENGINE RUNNING
PIN		RESISTANCE (Ω)
1	Engine ground	Infinite (open) when pressure reaches 30 kPa ± 10 kPa (4.35 PSI ± 1.45 PSI)



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If resistance values are incorrect, replace the oil pressure switch.

If the values are correct, check wiring.

Removing the Oil Pressure Switch

Unplug the oil pressure switch connector.

Unscrew and remove oil pressure switch.

Installing the Oil Pressure Switch

Apply required service product on threads of oil pressure switch.

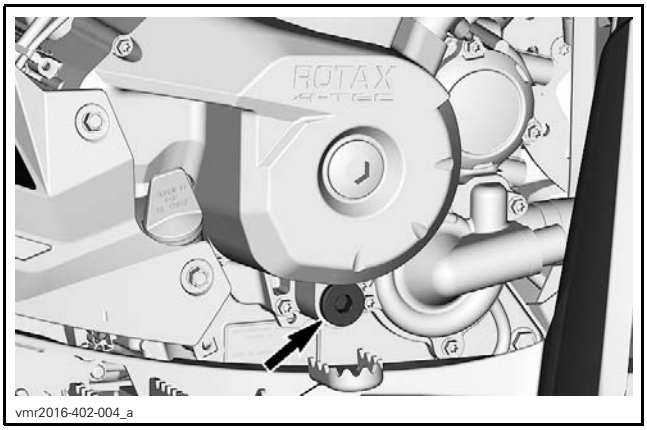
Tighten oil pressure switch to specification.

TIGHTENING TORQUE	
Service product	LOCTITE 243 (BLUE) (P/N 293 800 060)
Oil pressure switch	12 N•m ± 1 N•m (106 lbf•**in** ± 9 lbf•**in**)

ENGINE OIL PRESSURE REGULATOR

Oil Pressure Regulator Location

The oil pressure regulator is located on the engine magneto side, integrated in the magneto cover.



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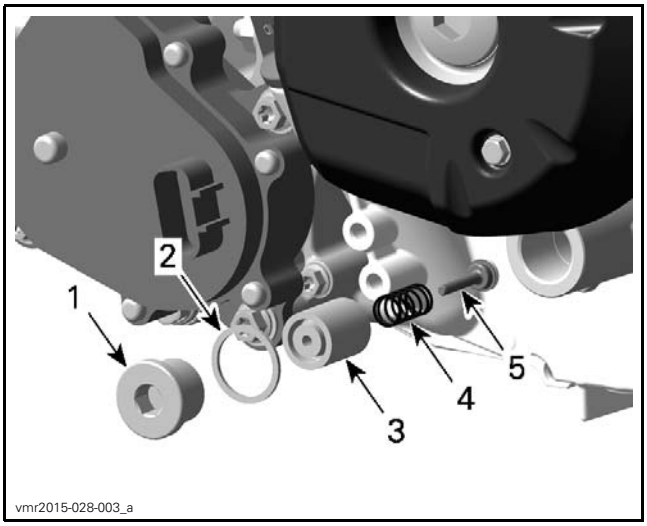
NOTE: The oil pressure regulator system works when the oil pressure exceeds 400 kPa (58 PSI).

Removing the Oil Pressure Regulator

Remove plug screw and pull oil pressure regulator out.



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1. *Plug screw*
2. *Gasket ring*
3. *Pressure regulator housing*
4. *Spring*
5. *Pressure regulator valve*

Inspecting the Oil Pressure Regulator

Inspect pressure regulator housing and valve for scoring or other damages.

Check spring for free length.

SPRING FREE LENGTH	
NEW NOMINAL	39 mm (1.535 in)
SERVICE LIMIT	37 mm (1.457 in)

NOTE: Replace worn or damaged components.

Clean bore and thread in the magneto housing from metal shavings and other contaminations.

Installing the Oil Pressure Regulator

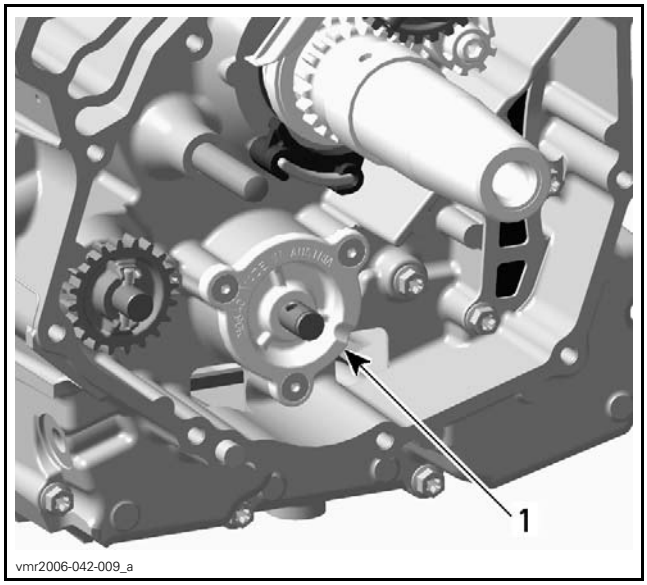
For installation, reverse the removal procedure. Pay attention to the following details.

NOTE: At installation always replace the gasket ring of the plug screw by a NEW one.

OIL PUMP

Oil Pump Location

The oil pump is located on the engine PTO side (behind PTO cover).



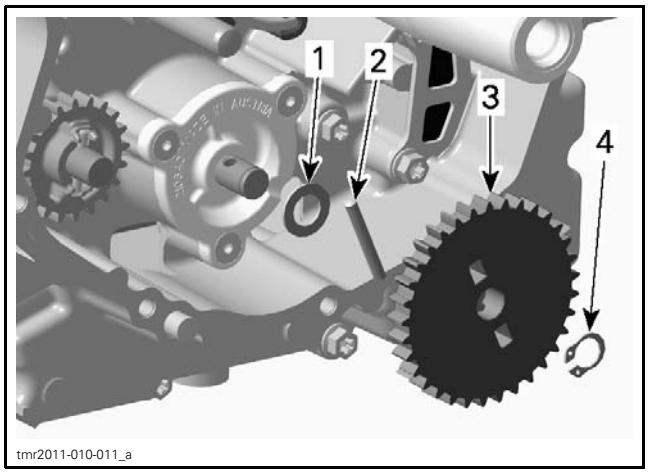
vmr2006-042-009_a

1. *Oil pump*

Removing the Oil Pump

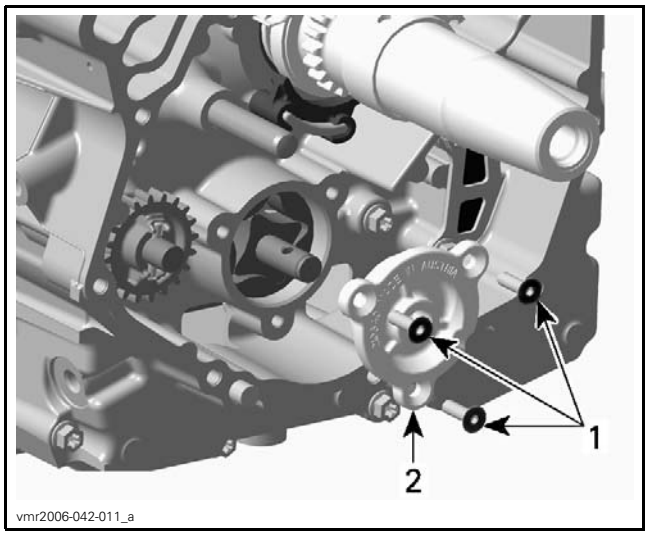
Remove the PTO cover. Refer to *PTO COVER* in the *BOTTOM END* subsection.

1. Remove:
   - Retaining ring
   - Oil pump gear
   - Needle pin
   - Thrust washer.



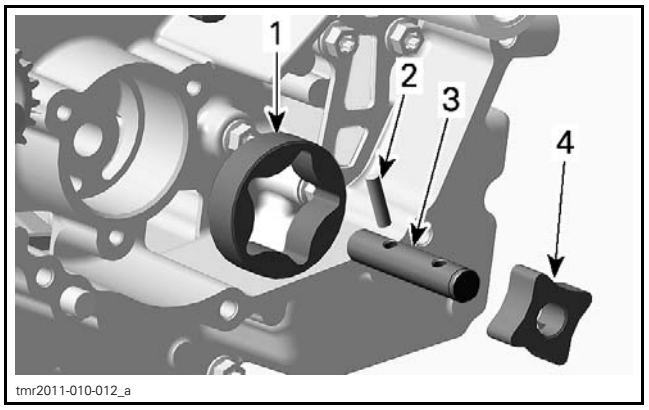
1. Thrust washer
2. Needle pin
3. Oil pump gear
4. Retaining ring

2. Remove oil pump cover screws and pull oil pump cover out.



1. Retaining screws
2. Oil pump cover

3. Remove oil pump shaft with needle pin and inner rotor.
4. Remove outer rotor.

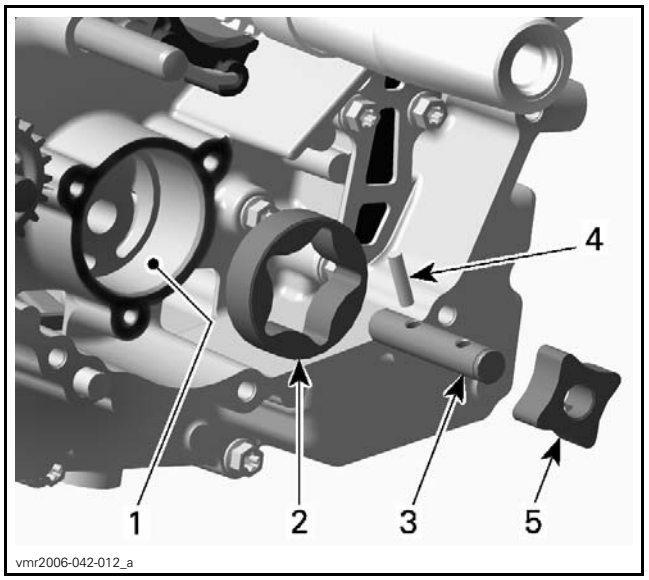


1. Outer rotor
2. Needle pin
3. Oil pump shaft
4. Inner rotor

Inspecting the Oil Pump

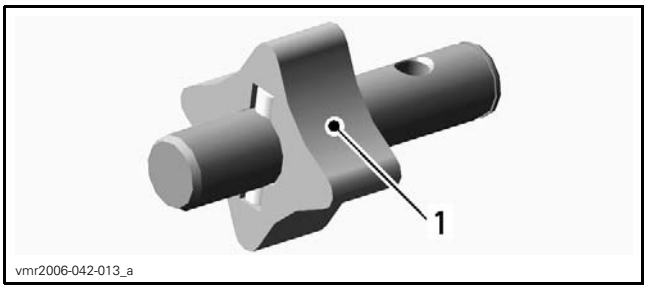
Inspect oil pump and oil pump cover bore for marks, scratches or other damages. Check for scratches in crankcase between outer rotor and oil pump bore. If so, replace damaged parts.

Check oil pump cover for damages and for surface straightness with a straightedge.



1. Oil pump bore
2. Outer rotor
3. Oil pump shaft
4. Needle pin
5. Inner rotor

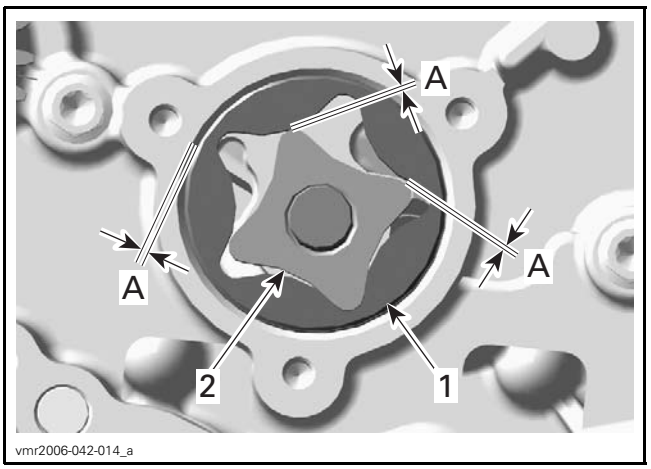
Check inner rotor for corrosion pin holes or other damages. If so, replace oil pump shaft assembly.



1. Pittings on the teeth

Using a feeler gauge, measure the clearance of inner and outer rotors as shown.

CLEARANCE OF INNER AND OUTER ROTOR	
SERVICE LIMIT	0.25 mm (.0098 in)

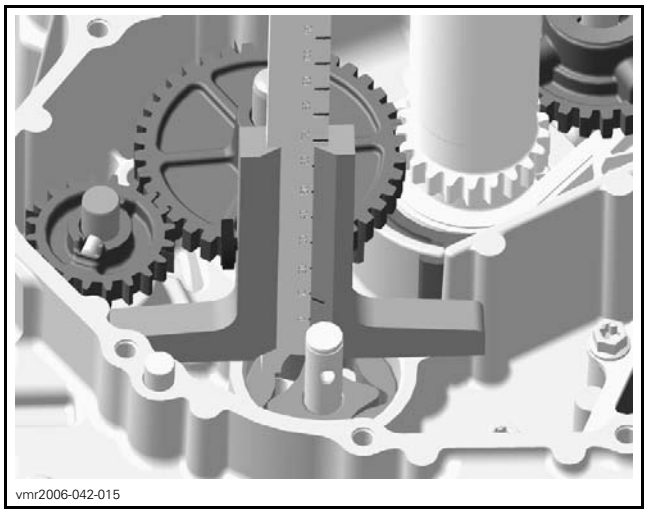


1. Outer rotor
2. Inner rotor
A. 0.25 mm (.0098 in)

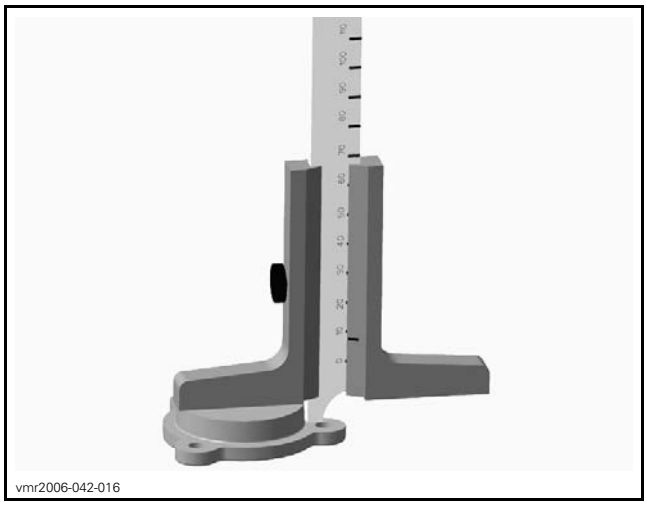
If clearance of inner and outer rotors exceeds the tolerance, replace oil pump rotors. Ensure to also check oil pump cover. If damaged, replace the complete oil pump assembly.

If clearance between outer rotor and its bore in crankcase exceeds the tolerance, replace the complete oil pump rotors and/or the crankcase.

Using a depth gauge, measure the axial clearance of the oil pump as shown.



OIL PUMP — MEASUREMENT "A"



OIL PUMP COVER — MEASUREMENT "B"

Substract measurement B from measurement A to obtain axial clearance.

OIL PUMP AXIAL CLEARANCE	
SERVICE LIMIT	0.20 mm (.008 in)

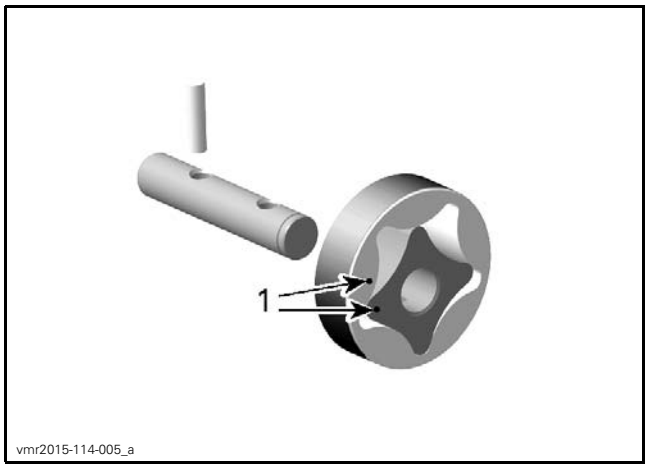
NOTE: When the axial clearance of the oil pump assembly increases, the oil pressure decreases.

Installing the Oil Pump

For installation, reverse the removal procedure.

Pay attention to the following details.

NOTE: When installing the oil pump rotors, make sure both markings are on the outer side.



1. Markings

After reinstallation of the remaining parts, check for smooth operation of the oil pump assembly.

Testing the Oil Pump Function

After engine is completely reassembled, start engine and make sure oil pressure is within specifications (refer to *ENGINE OIL PRESSURE* in this subsection).

ENGINE OIL STRAINER

Oil Strainer Location

The engine oil strainer is located between both crankcase halves.

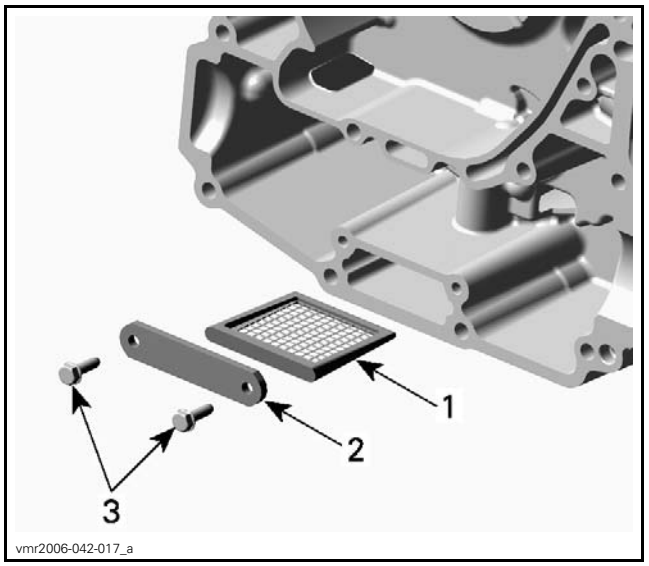
Removing the Oil Strainer

Remove engine from vehicle.

Separate crankcase halves. Refer to *BOTTOM END* subsection.

Remove screws and retaining plate.

Pull out engine oil strainer.



1. Engine oil strainer
2. Retaining plate
3. Screws

Cleaning and Inspecting the Oil Strainer

Clean engine oil strainer with a part cleaner then use an air gun to dry it.

⚠ WARNING

Always wear eye protector. Chemicals can cause a rash break out and injure your eyes.

Check engine oil strainer for cracks or other damage. Replace if damaged.

Installing the Oil Strainer

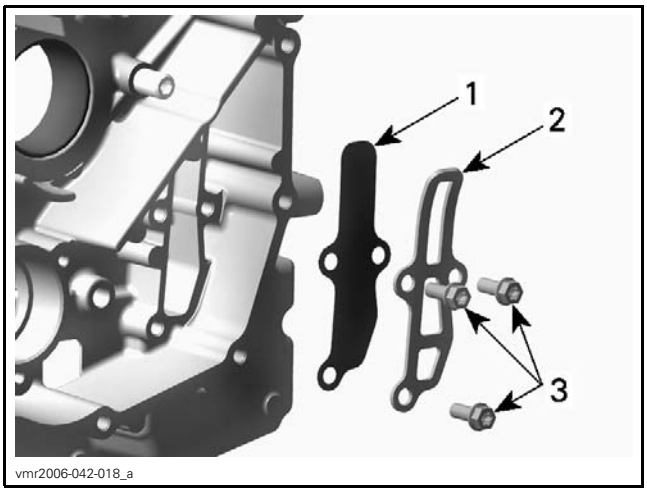
The installation is the reverse of the removal procedure.

SERVICE PRODUCT	
Oil Strainer screws	LOCTITE 243 (BLUE) (P/N 293 800 060)

TIGHTENING TORQUE	
Oil strainer screws	6 N•m ± 0.7 N•m (53 lbf•**in** ± 6 lbf•**in**)

REED VALVE

The engine is equipped with a reed valve which prevents accumulation of larger oil quantities in the crankcase. The reed valve is fitted into the crankcase.



1. Reed valve
2. Stopper
3. Screws

Removing the Reed Valve

Remove:
- Engine from vehicle
- PTO cover (refer to *PTO COVER* in the *BOTTOM END* subsection)
- Reed valve retaining screws
- Stopper plate
- Reed valve.

Inspecting the Reed Valve

Check reed valve for cracks or other damage.

Replace reed valve if damaged.

Installing the Reed Valve

The installation is the reverse of the removal procedure.

LUBRICATION SYSTEM

SERVICE TOOLS

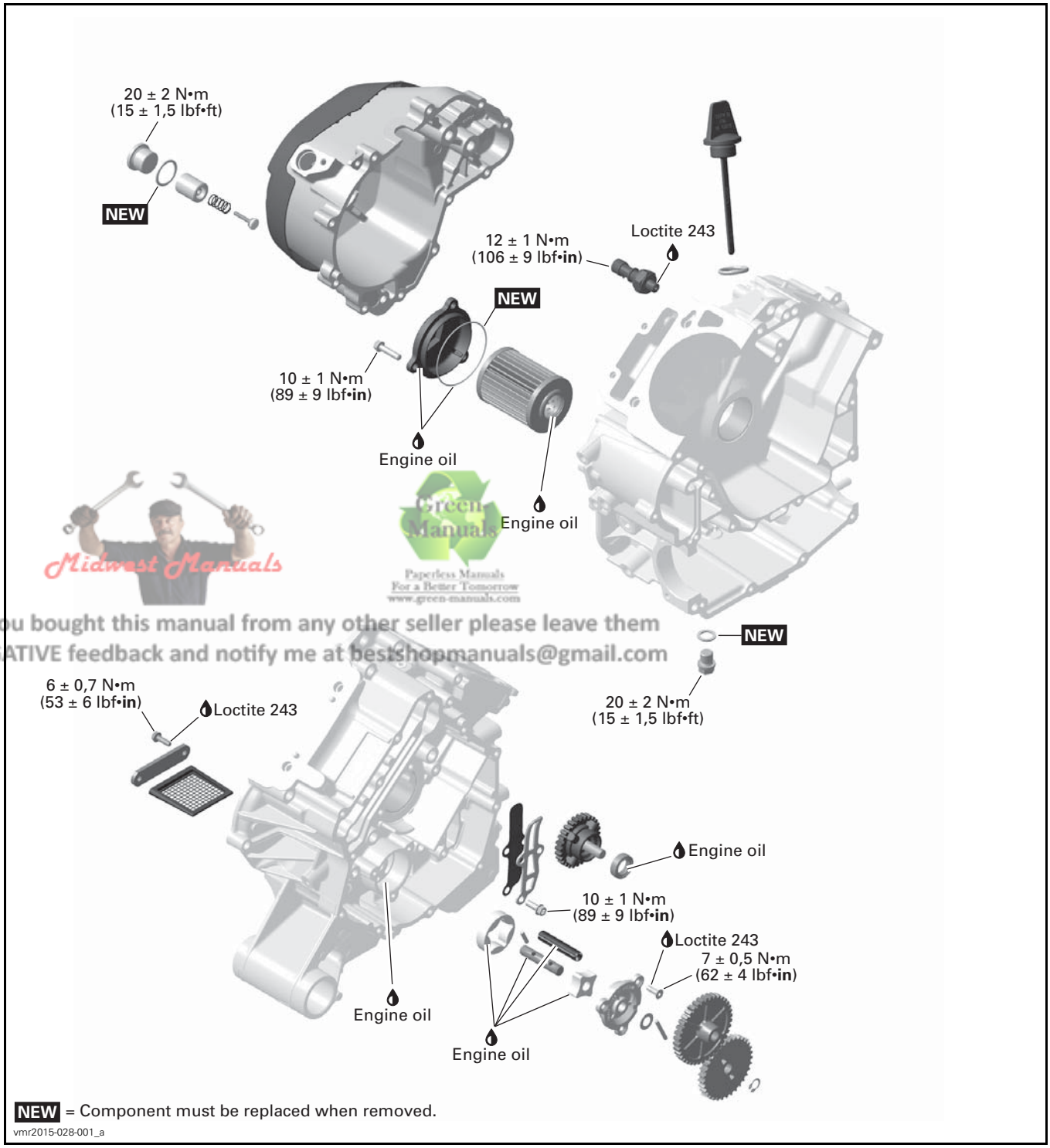
Description	Part Number	Page
DISCONNECT TOOL	529 035 714	5
OIL PRESSURE HOSE	529 036 394	5
PRESSURE GAUGE	529 036 395	5

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	8, 12

COMPONENTS

Outlander 570/650 (except PRO package)



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NEW = Component must be replaced when removed.

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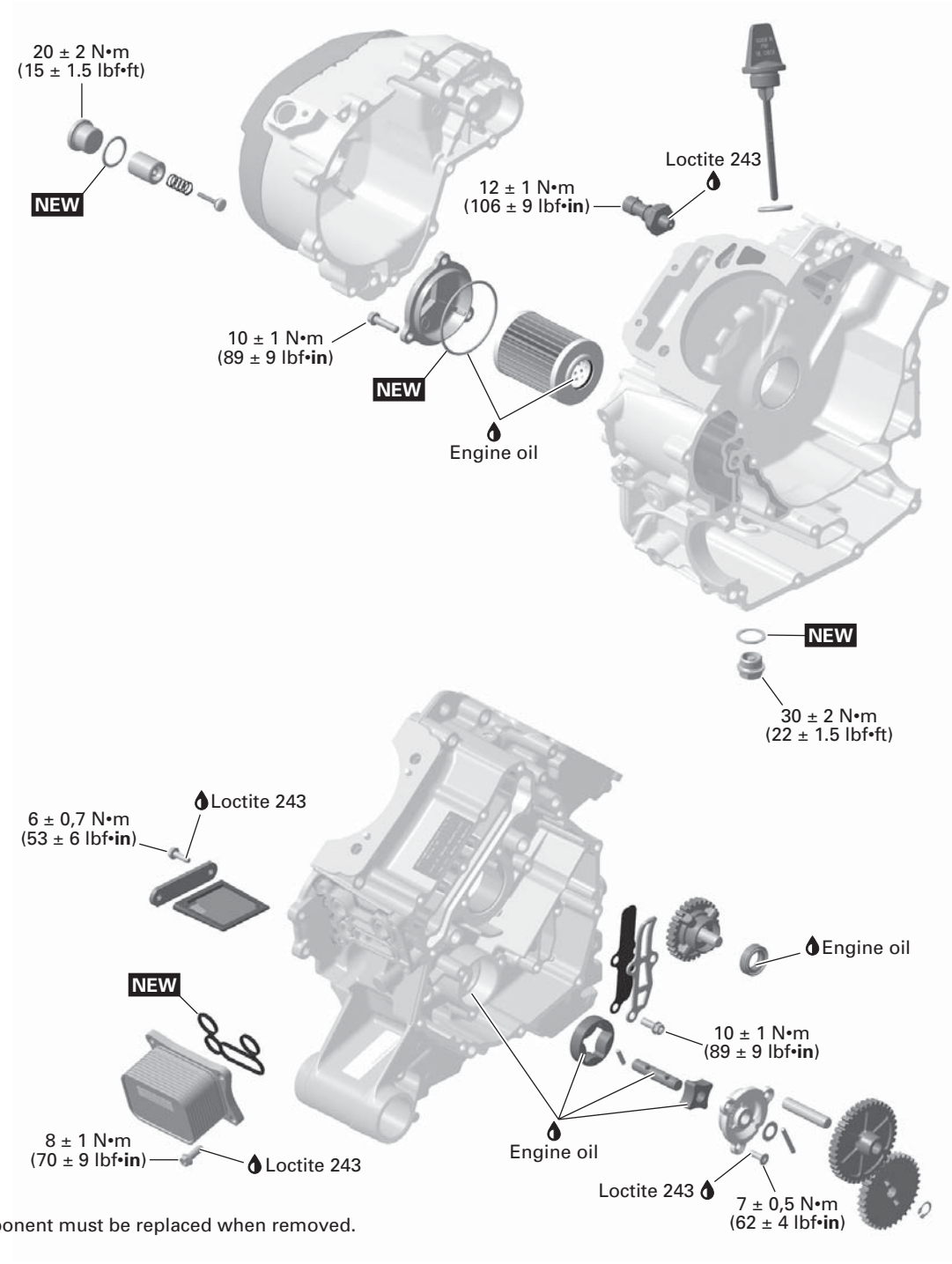
COMPONENTS

Outlander 850/1000R and all models with PRO Package



NEW = Component must be replaced when removed.

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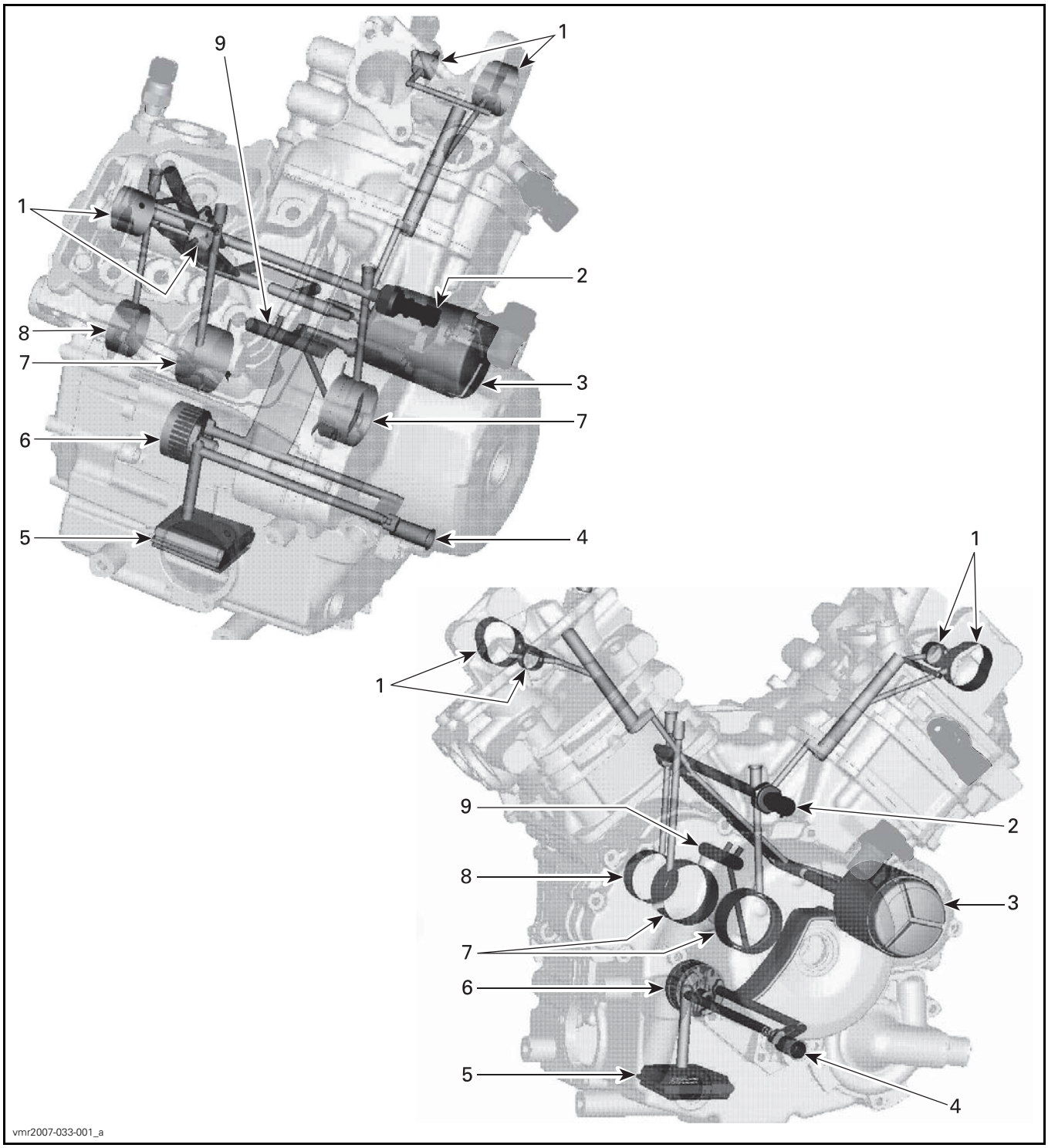
ENGINE LUBRICATION CIRCUIT



1. *Camshaft bearings*
2. *Oil pressure switch*
3. *Oil filter*
4. *Oil pressure regulator valve*
5. *Oil strainer*
6. *Oil pump*
7. *Crankshaft main bearings*
8. *Crankshaft support bearing*
9. *Connecting rod bearings*

INSPECTION

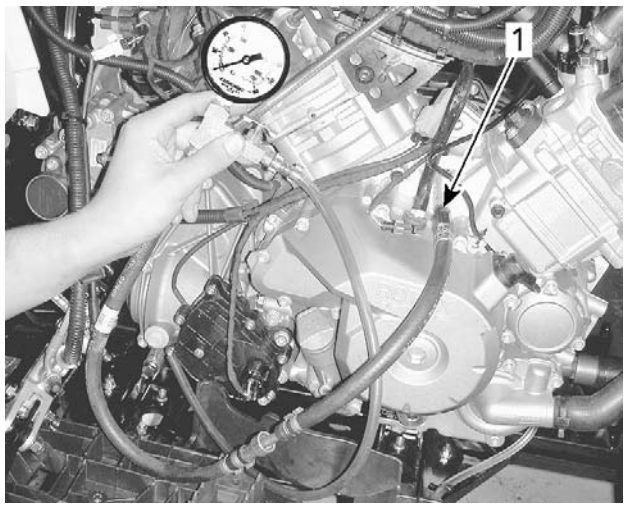
TESTING THE ENGINE OIL PRESSURE

NOTE: The engine oil pressure test should be done with a warm engine 100°C (212°F) and the recommended oil.

Remove the oil pressure switch. Refer to *OIL PRESSURE SWITCH* in this subsection.

Install the pressure test gauge with the proper adapter hose in the OPS engine bore.

REQUIRED TOOL	
PRESSURE GAUGE (P/N 529 036 395)	
OIL PRESSURE HOSE (P/N 529 036 394)	



TYPICAL
1. Gauge connected in OPS engine bore

The engine oil pressure should be within the following values.

OIL PRESSURE	1250 RPM	6000 RPM
MINIMAL	70 kPa (10 PSI)	300 kPa (44 PSI)
NOMINAL	150 kPa (22 PSI)	350 kPa (51 PSI)
MAXIMAL	250 kPa (36 PSI)	450 kPa (65 PSI)

If the engine oil pressure is out of specifications, check the points described in *TROUBLESHOOTING* in this subsection.

Remove oil pressure gauge and adapter hose.

NOTE: To remove adapter hose from oil pressure gauge, use the disconnect tool.

REQUIRED TOOL	
DISCONNECT TOOL (P/N 529 035 714)	

Reinstall the oil pressure switch and remaining components.

TROUBLESHOOTING

LOW OR NO OIL PRESSURE

1. Oil level is too low.
   - *Refill engine with recommended engine oil. Refer to OIL LEVEL VERIFICATION in the PERIODIC MAINTENANCE PROCEDURES subsection.*
   - *Check for high oil consumption, refer to HIGH OIL CONSUMPTION in thisTROUBLESHOOTING.*
   - *Check for engine oil leaks. For leak indicator hose and leak indicator hole, refer to COOLING SYSTEM INSPECTION in the PERIODIC MAINTENANCE PROCEDURES subsection. Repair if necessary.*
2. Use of unsuitable engine oil type.
   - *Replace engine oil by the recommended engine oil.*
3. Clogged oil filter.
   - *Replace oil and oil filter at the same time.*
4. Defective oil pressure switch.
   - *Test oil pressure switch, see procedure in this subsection.*
5. Defective or worn oil pump.
   - *Check oil pump, see procedure in this subsection.*
6. Defective engine oil pressure regulator.
   - *Check engine oil pressure regulator, see procedure in this subsection.*
7. Worn plain bearings in crankcase.
   - *Check plain bearing clearance, refer to BOTTOM END subsection.*
8. Clogged engine oil strainer.
   - *Clean engine oil strainer, see procedure in this subsection.*

OIL CONTAMINATION

1. Defective water pump seal ring or rotary seal.
   - *Check for oil or coolant leak from indicator near water pump, refer to COOLING SYSTEM INSPECTION in the PERIODIC MAINTENANCE PROCEDURES subsection. Replace seal if necessary.*
2. Cylinder head or cylinder base gasket leak.
   - *Retighten cylinder head to specified torque, refer to TOP END subsection. Replace gasket if tightening does not solve the problem.*
3. Engine internal damage.
   - *Repair engine.*
4. Oil cooler gasket leak.
   - *Replace oil cooler gasket and change engine oil.*

HIGH OIL CONSUMPTION

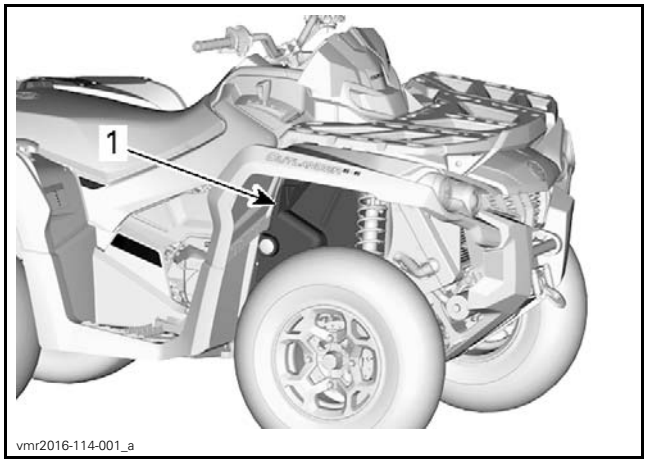
1. Leaking breather oil seal.
   - *Check if the oil seal of the breather is brittle, hard or damaged. Refer to BOTTOM END subsection.*
2. Valve stem seals worn or damaged.
   - *Replace valve stem seals.*
3. Worn piston rings (blue exhaust smoke).
   - *Replace piston rings.*

PROCEDURES

OIL COOLER

Oil Cooler Access

Refer to *BODY* and remove rear part of RH inner fender panel.



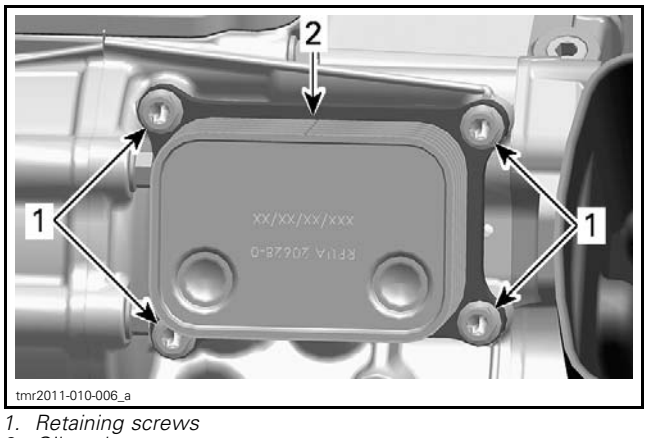
1. Remove

Removing the Oil Cooler

Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection to:

– Drain engine oil. Refer to *ENGINE OIL CHANGE*
– Drain coolant. Refer to *ENGINE COOLANT REPLACEMENT*.

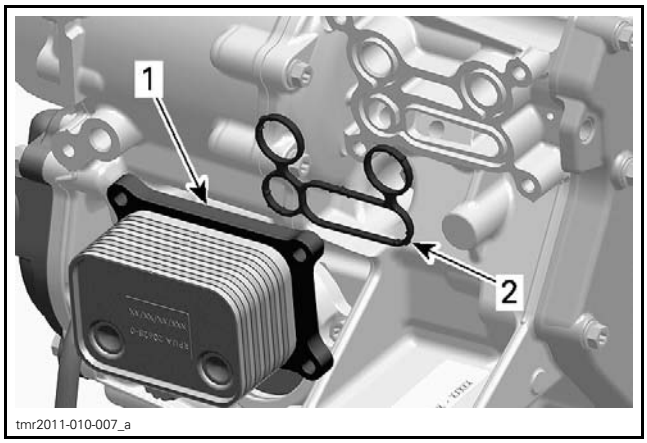
Remove oil cooler retaining screws.



1. Retaining screws
2. Oil cooler

Place rags or towels under oil cooler to catch remaining oil and coolant.

Remove oil cooler and discard gasket.



1. Oil cooler
2. Gasket

Inspecting the Oil Cooler

Check oil cooler for cracks or other damage.

Replace if necessary.

Installing the Oil Cooler

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

Wipe off any oil and coolant spillage.

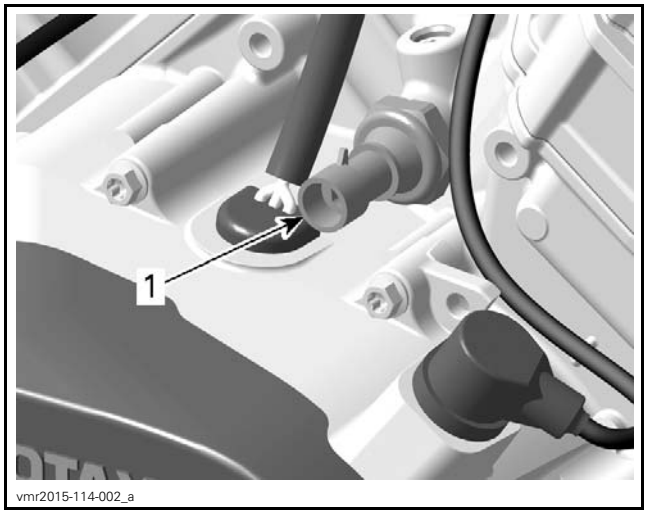
Install a NEW gasket.

Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection and carry out the following:

– Refill engine with recommended oil. See *ENGINE OIL CHANGE*.
– Refill and bleed cooling system. See *ENGINE COOLANT REPLACEMENT*.

OIL PRESSURE SWITCH (OPS)

Oil Pressure Switch Location



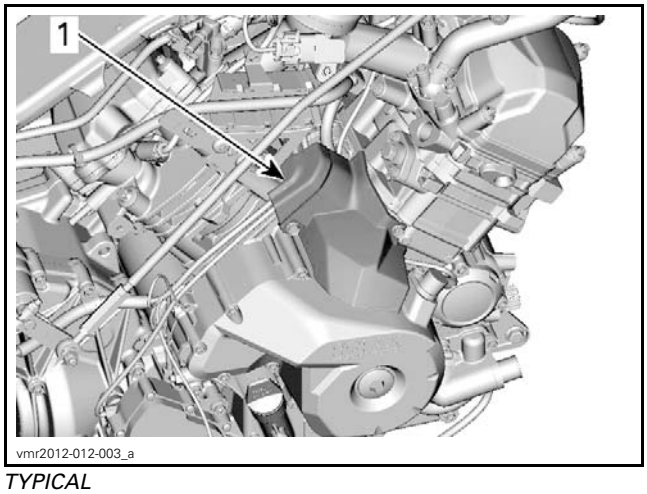
1. Oil pressure switch

Oil Pressure Switch Access

Refer to *BODY* subsection and remove the following

– Seat
– Console
– RH side panel and extension.

Remove OPS cover.



TYPICAL
1. Remove

Oil Pressure Switch Activation

The oil pressure switch activates when the engine oil pressure is lower than following specified pressure range.

OIL PRESSURE SWITCH ACTIVATION RANGE
30 kPa ± 10 kPa (4.35 PSI ± 1.45 PSI)

To check the function of the oil pressure switch, an oil pressure test has to be performed. Refer to *ENGINE OIL PRESSURE* in this subsection.

If the engine oil pressure is good, perform the oil pressure switch resistance test.

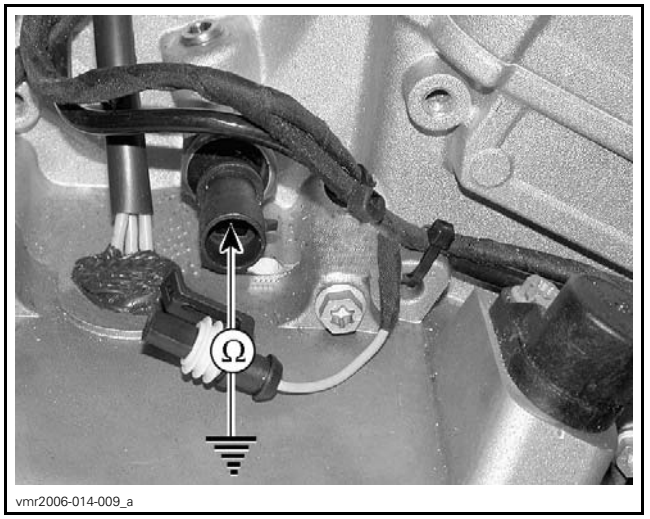
Testing the Oil Pressure Switch Resistance

Disconnect the connector from the oil pressure switch.

Check resistance as per following tables.

OPS CONNECTOR	ENGINE	ENGINE NOT RUNNING
PIN		RESISTANCE (Ω)
1	Engine ground	Close to 0 Ω (normally closed switch)

OPS CONNECTOR	ENGINE	ENGINE RUNNING
PIN		RESISTANCE (Ω)
1	Engine ground	Infinite (open) when pressure reaches 30 kPa ± 10 kPa (4.35 PSI ± 1.45 PSI)



If resistance values are incorrect, replace the oil pressure switch.

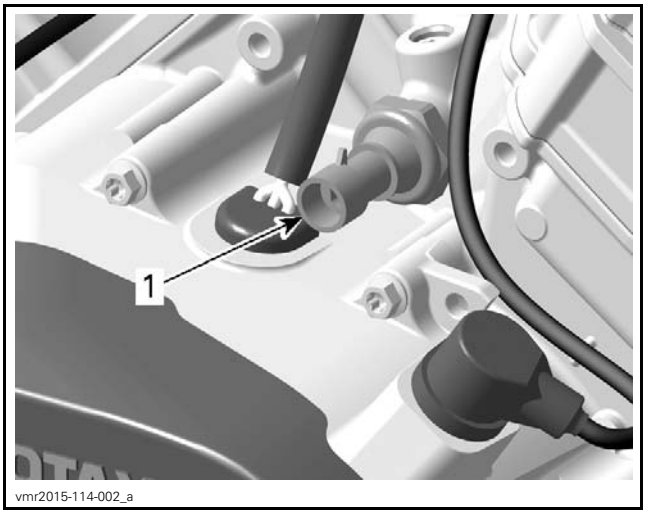
If the values are correct, check wiring.

Removing the Oil Pressure Switch

Unplug the oil pressure switch connector.

Unscrew and remove oil pressure switch.

Installing the Oil Pressure Switch



1. Oil pressure switch

Apply required service product on threads of oil pressure switch.

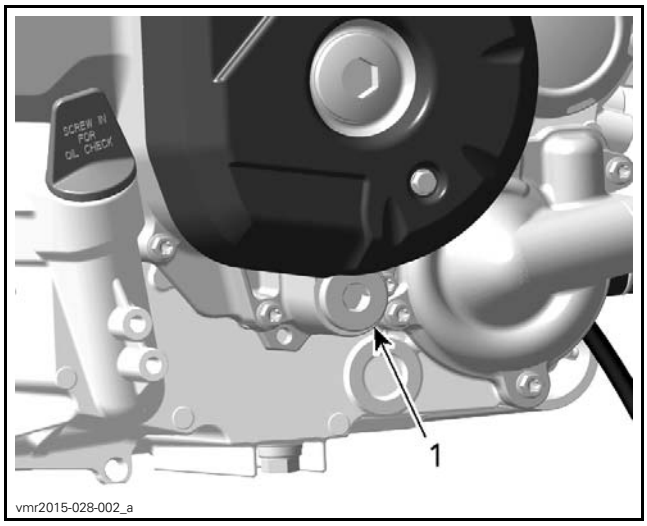
Tighten oil pressure switch to specification.

TIGHTENING TORQUE	
Oil pressure switch	12 N•m ± 1 N•m (106 lbf•**in** ± 9 lbf•**in**) + LOCTITE 243 (BLUE) (P/N 293 800 060)

ENGINE OIL PRESSURE REGULATOR

Oil Pressure Regulator Location

The oil pressure regulator is located on the engine magneto side, integrated in the magneto cover.



1. Engine oil pressure regulator

NOTE: The oil pressure regulator system works when the oil pressure exceeds 400 kPa (58 PSI).

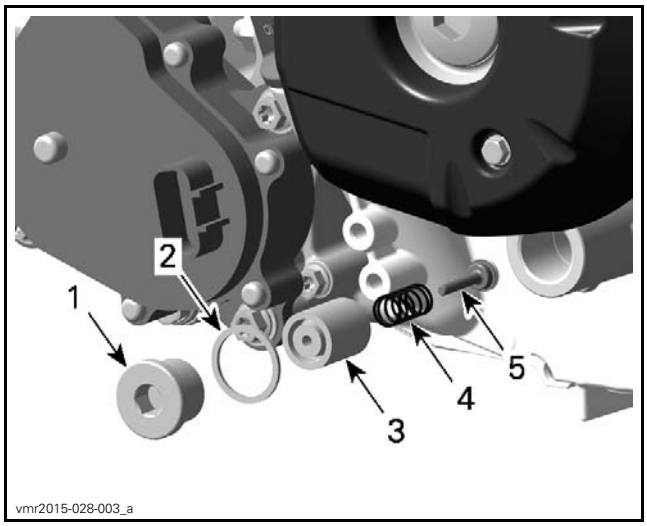
Oil Pressure Regulator Access

Refer to *BODY* subsection and remove the following:

– Seat
– Console
– RH side panel and extension
– RH footboard panel.

Removing the Oil Pressure Regulator

Remove plug screw and pull oil pressure regulator out.



1. Plug screw
2. Gasket ring
3. Pressure regulator housing
4. Spring
5. Pressure regulator valve

Inspecting the Oil Pressure Regulator

Inspect pressure regulator housing and valve for scoring or other damages.

Check spring for free length.

SPRING FREE LENGTH	
NEW NOMINAL	39 mm (1.535 in)
SERVICE LIMIT	37 mm (1.457 in)

NOTE: Replace worn or damaged components.

Clean bore and thread in the magneto housing from metal shavings and other contaminations.

Installing the Oil Pressure Regulator

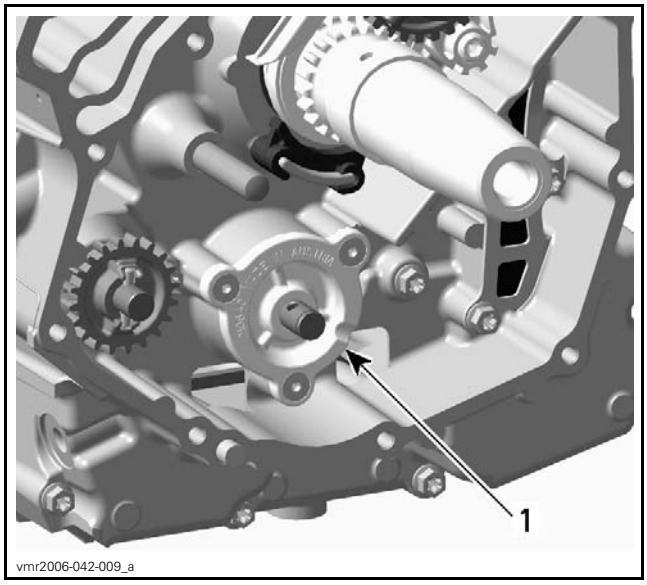
The installation is the reverse of the removal procedure. However, pay attention to the following details.

At installation always replace the gasket ring of the plug screw by a NEW one.

OIL PUMP

Oil Pump Location

The oil pump is located on the engine PTO side (behind PTO cover).

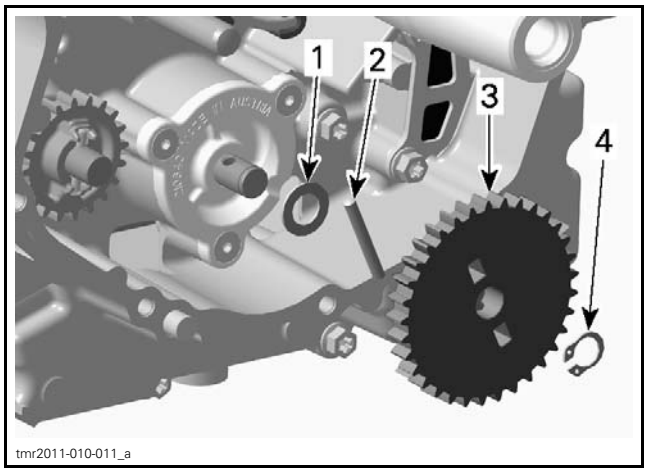


1. Oil pump

Removing the Oil Pump

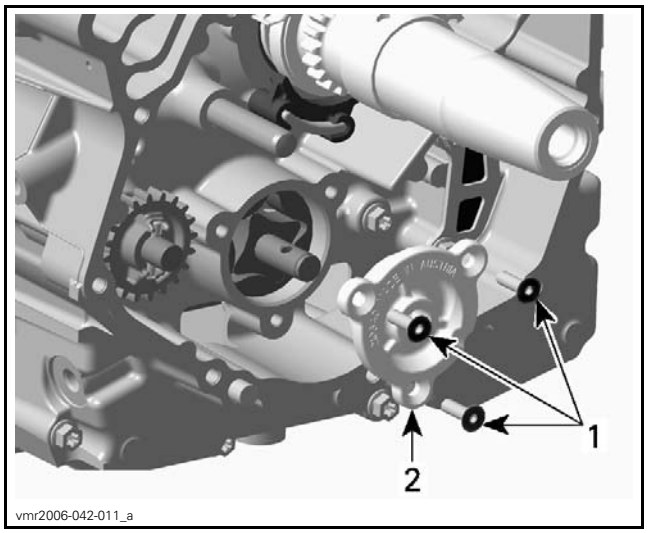
Remove the PTO cover. Refer to *PTO COVER* in the *BOTTOM END* subsection.

1. Remove:
   – Retaining ring
   – Oil pump gear
   – Needle pin
   – Thrust washer.



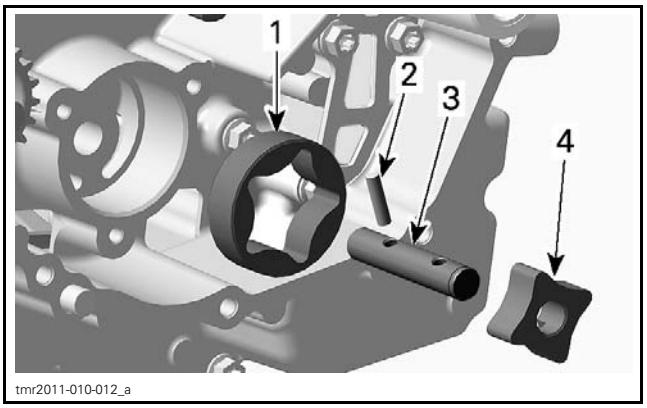
1. Thrust washer
2. Needle pin
3. Oil pump gear
4. Retaining ring

2. Remove oil pump cover screws and pull oil pump cover out.



1. Retaining screws
2. Oil pump cover

3. Remove oil pump shaft with needle pin and inner rotor.
4. Remove outer rotor.

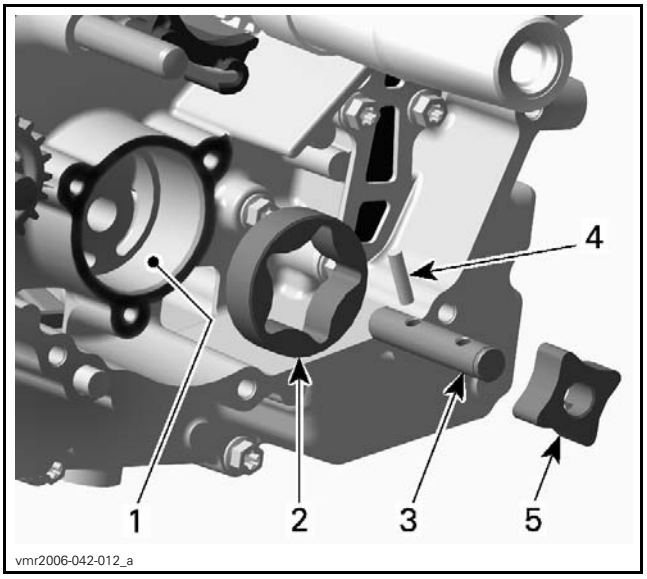


1. *Outer rotor*
2. *Needle pin*
3. *Oil pump shaft*
4. *Inner rotor*

Inspecting the Oil Pump

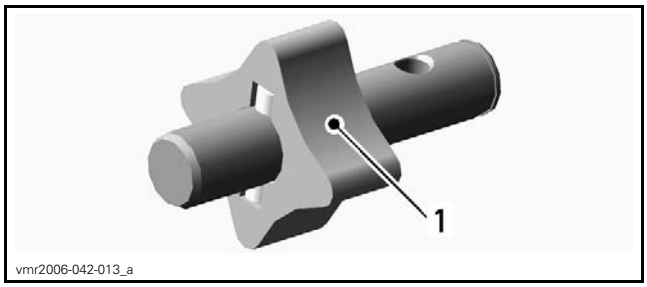
Inspect oil pump and oil pump cover bore for marks, scratches or other damages. Check for scratches in crankcase between outer rotor and oil pump bore. If so, replace damaged parts.

Check oil pump cover for damages and for surface straightness with a straightedge.



1. *Oil pump bore*
2. *Outer rotor*
3. *Oil pump shaft*
4. *Needle pin*
5. *Inner rotor*

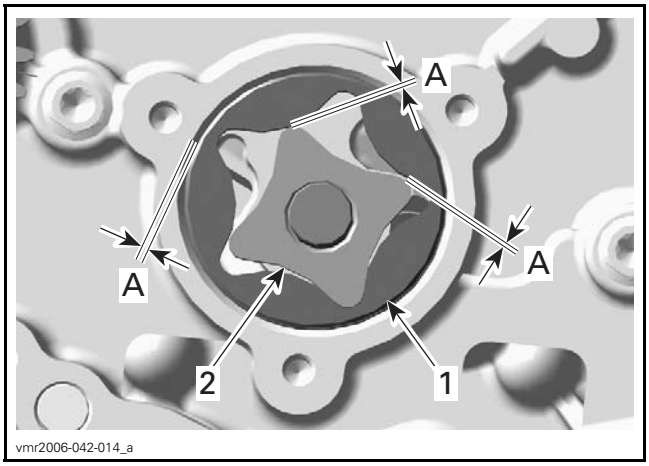
Check inner rotor for corrosion pin holes or other damages. If so, replace oil pump shaft assembly.



1. *Pittings on the teeth*

Using a feeler gauge, measure the clearance of inner and outer rotors as shown.

CLEARANCE OF INNER AND OUTER ROTOR	
SERVICE LIMIT	0.25 mm (.0098 in)



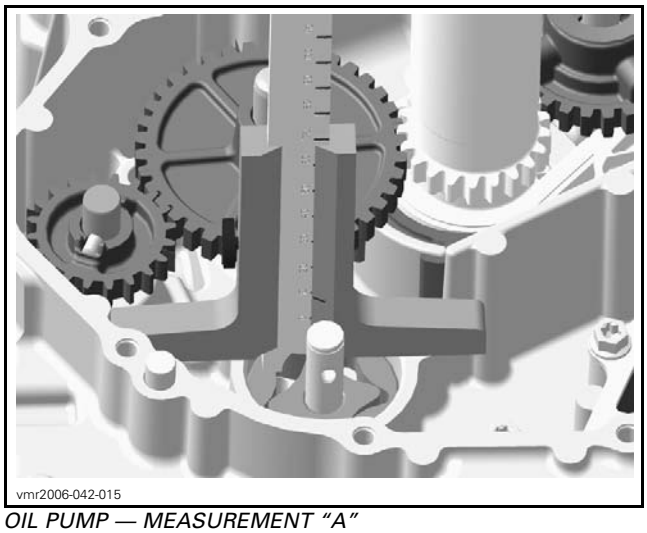
1. *Outer rotor*
2. *Inner rotor*

A. 0.25 mm (.0098 in)

If clearance of inner and outer rotors exceeds the tolerance, replace oil pump rotors. Ensure to also check oil pump cover. If damaged, replace the complete oil pump assembly.

If clearance between outer rotor and its bore in crankcase exceeds the tolerance, replace the complete oil pump rotors and/or the crankcase.

Using a depth gauge, measure the axial clearance of the oil pump as shown.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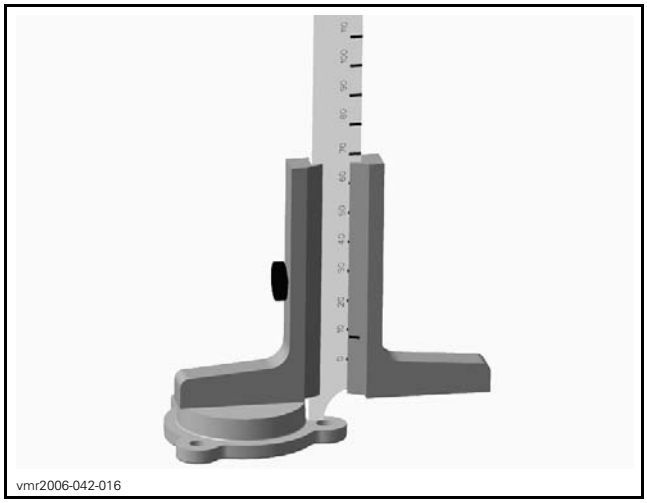
OIL PUMP — MEASUREMENT "A"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OIL PUMP COVER — MEASUREMENT "B"

Substract measurement B from measurement A to obtain axial clearance.

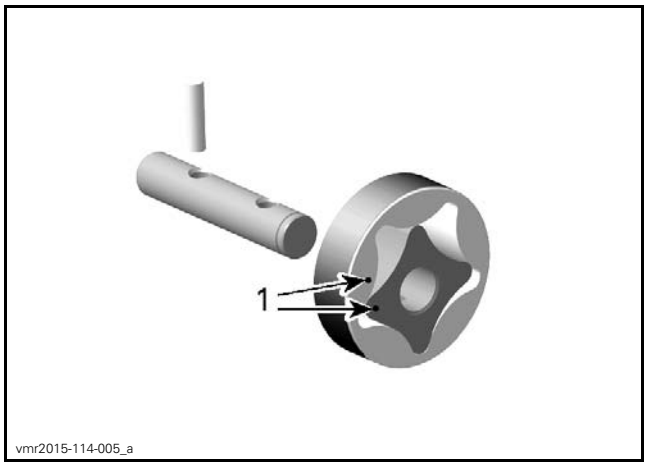
OIL PUMP AXIAL CLEARANCE	
SERVICE LIMIT	0.20 mm (.008 in)

NOTE: When the axial clearance of the oil pump assembly increases, the oil pressure decreases.

Installing the Oil Pump

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

When installing the oil pump rotors, make sure both markings are on the outer side.



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1. Markings

After reinstallation of the remaining parts, check for smooth operation of the oil pump assembly.

Testing the Oil Pump Function

After engine is completely reassembled, start engine and make sure oil pressure is within specifications (refer to *ENGINE OIL PRESSURE* in this subsection).

ENGINE OIL STRAINER

Oil Strainer Location

The engine oil strainer is located between both crankcase halves.

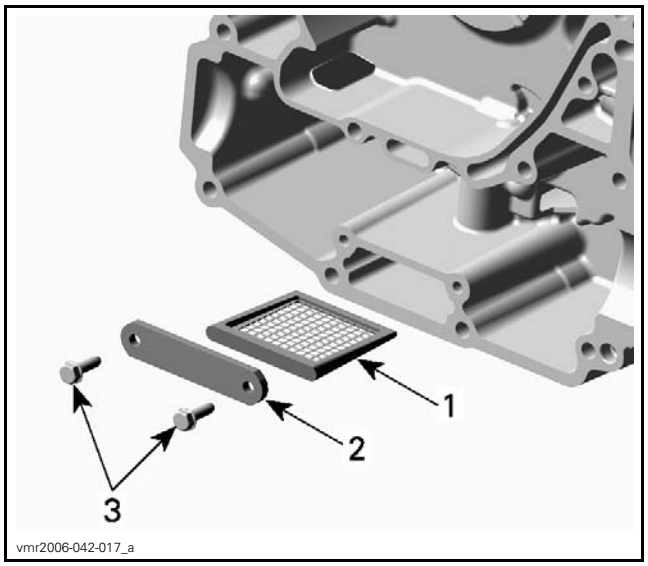
Removing the Oil Strainer

Remove engine from vehicle.

Separate crankcase halves. Refer to *BOTTOM END* subsection.

Remove screws and retaining plate.

Pull out engine oil strainer.



1. Engine oil strainer
2. Retaining plate
3. Screws

Cleaning and Inspecting the Oil Strainer

Clean engine oil strainer with a part cleaner then use an air gun to dry it.

Check engine oil strainer for cracks or other damage. Replace if damaged.

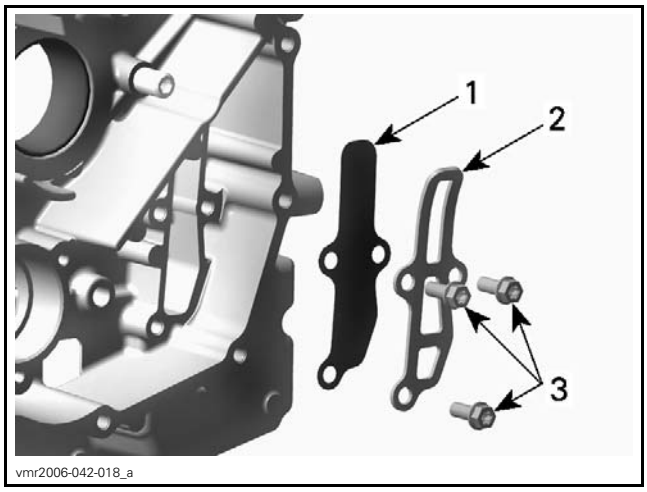
Installing the Oil Strainer

The installation is the reverse of the removal procedure.

TIGHTENING TORQUE	
Oil strainer screws	6 N•m ± 0.7 N•m (53 lbf•**in** ± 6 lbf•**in**) + LOCTITE 243 (BLUE) (P/N 293 800 060)

REED VALVE

The engine is equipped with a reed valve which prevents accumulation of larger oil quantities in the crankcase. The reed valve is fitted into the crankcase.



1. Reed valve
2. Stopper
3. Screws

Removing the Reed Valve

Remove:
- Engine from vehicle
- PTO cover (refer to *PTO COVER* in the *BOTTOM END* subsection)
- Reed valve retaining screws
- Stopper plate
- Reed valve.

Inspecting the Reed Valve

Check reed valve for cracks or other damage.

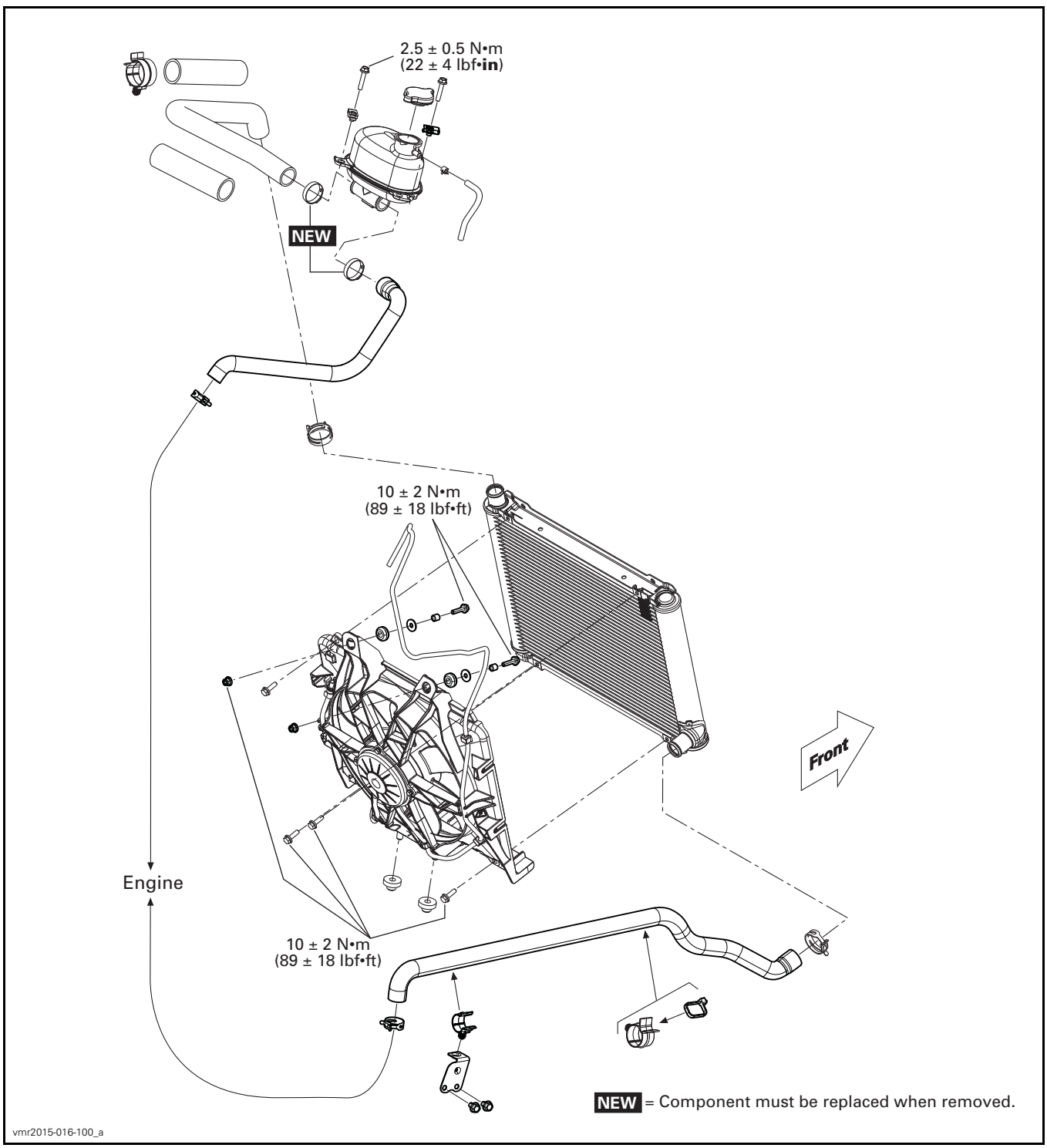
Replace reed valve if damaged.

Installing the Reed Valve

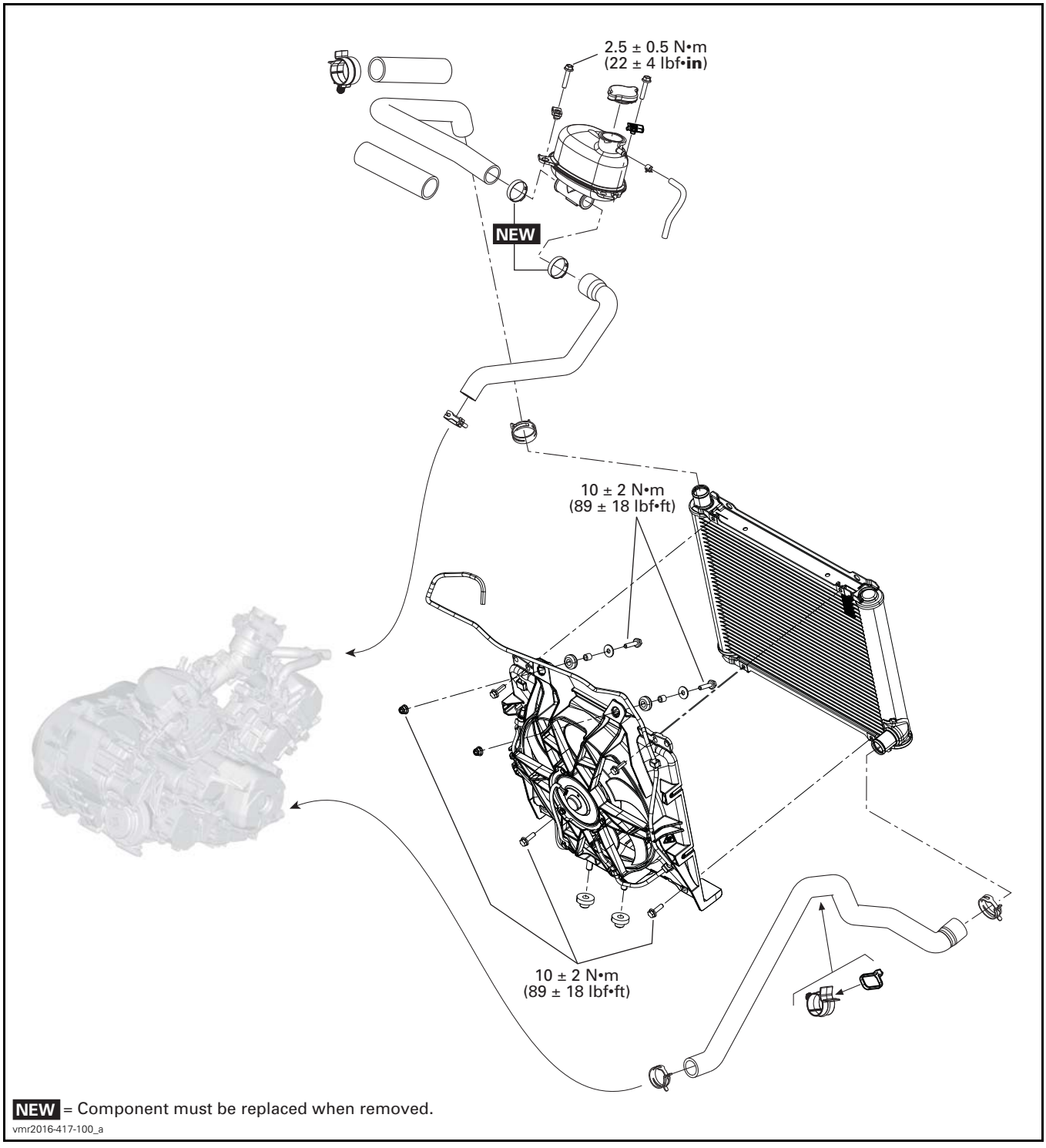
The installation is the reverse of the removal procedure.

COOLING SYSTEM - VEHICLE COMPONENTS

450 Engines



570 and 650 Engines



NEW = Component must be replaced when removed.

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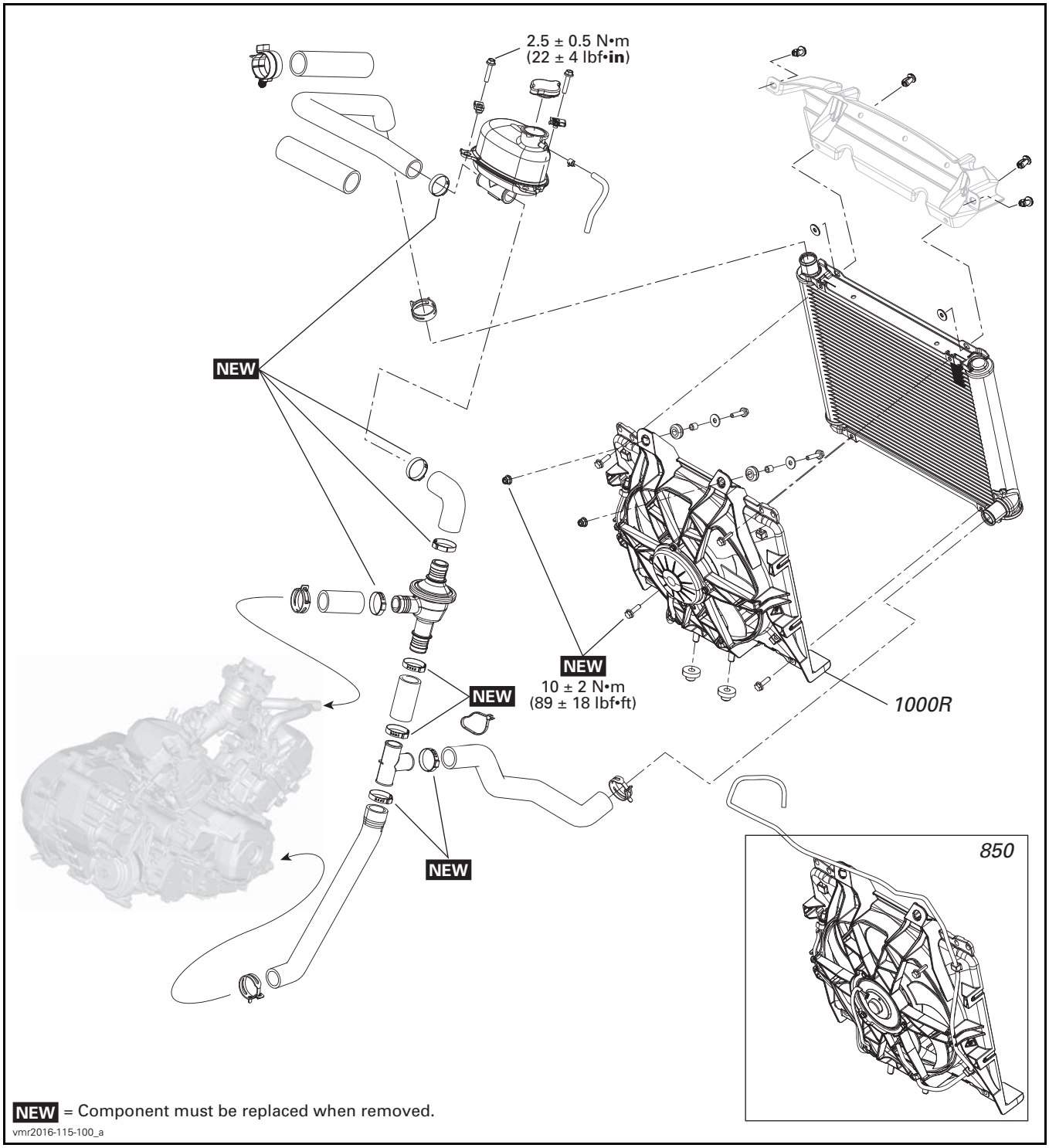
850, 1000 and 1000R Engines



GENERAL

NOTICE Never start engine without coolant. Some engine parts such as the rotary seal on the water pump shaft can be damaged.

PROCEDURES

RADIATOR

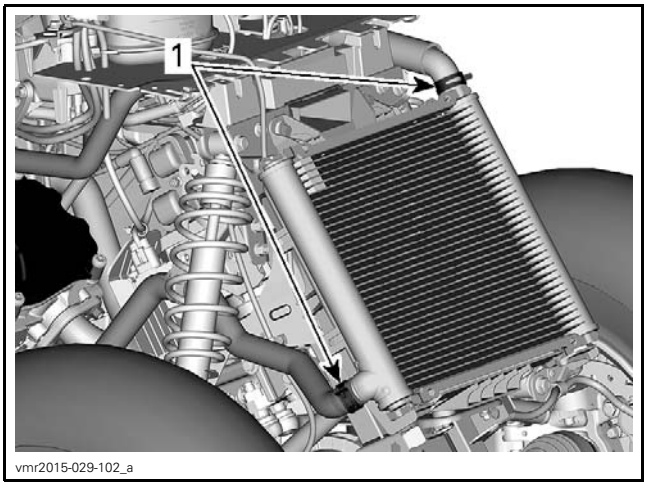
Inspecting the Radiator

Check radiator fins for clogging or damage.

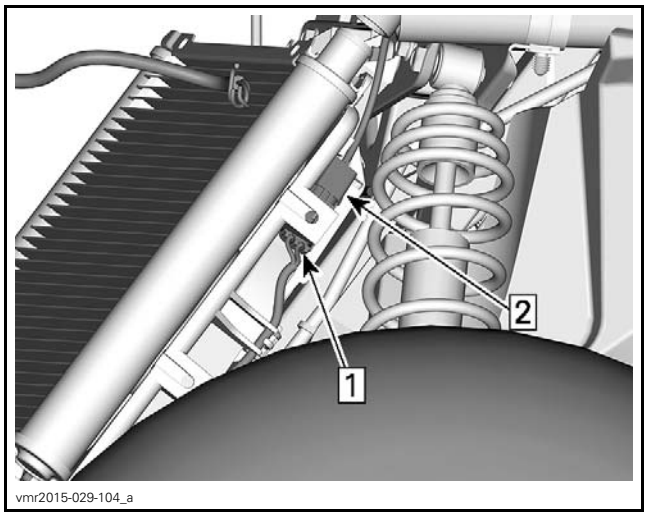
Remove insects, mud or other obstructions with compressed air or low pressure water.

Removing the Radiator

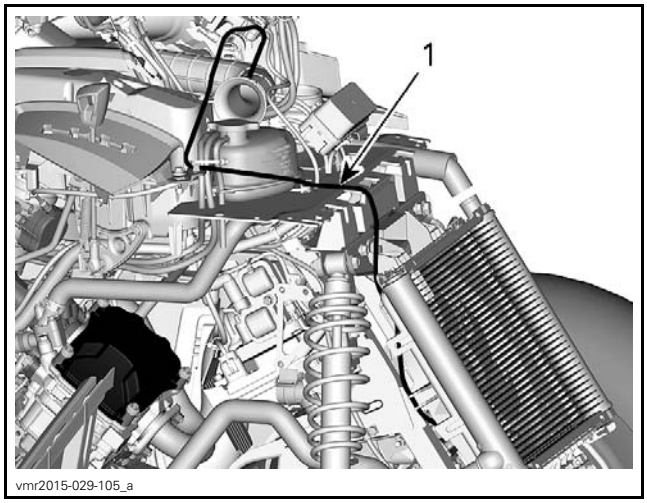
1. Drain engine coolant. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
2. Remove front body module. Refer to *BODY* subsection.
3. Disconnect radiator and fan assembly.



1. Radiator hoses

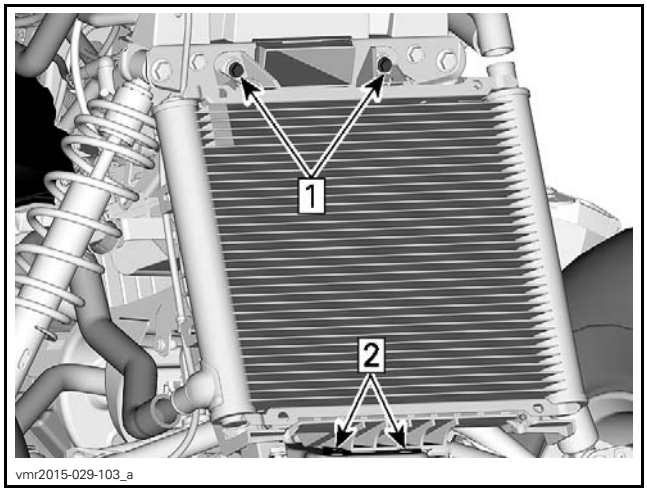


Step 1: Disconnect cooling fan connector
Step 2: Remove the harness connector from the fan shroud



1. Remove fan motor vent hose (if equipped)

NOTE: Take note of the rooting of vent hose on vehicle to ease reinstallation.



Step 1: Remove upper retaining bolts
Step 2: Remove radiator from bushings

Installing the Radiator

The installation is the reverse of the removal procedure. However, pay attention to the following.

Ensure that rubber bushings are properly installed between frame and fan shroud.

Ensure that vent hose of the cooling fan motor is properly rooted as prior to removal (if so equipped).

NOTICE **If the vent hose of the cooling fan motor is not properly rooted, the fan motor may be damaged due to improper venting.**

Tighten radiator upper retaining bolts to specification.

TIGHTENING TORQUE	
Radiator upper retaining bolts	10 N•m ± 2 N•m (89 lbf•**in** ± 18 lbf•**in**)

Refill and bleed cooling system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Check cooling system for leaks.

RADIATOR COOLING FAN

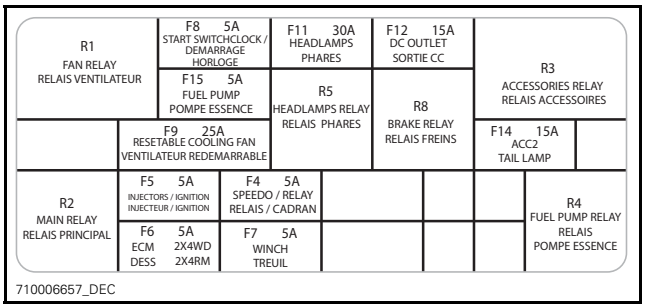
Radiator Cooling Fan Operation

The ECM controls the radiator cooling fan via the input of the coolant temperature sensor (CTS). Refer to the following table.

ENGINE TEMP.	COOLING FAN	CHECK ENGINE LIGHT	GAUGE MESSAGE
95°C (203°F)	Turns ON	—	—
93°C (199°F)	Turn OFF	—	—
115°C (239°F)	ON	Turns ON	Check engine Hi Temp
118°C (244°F)	ON	Flashes	Limp Home

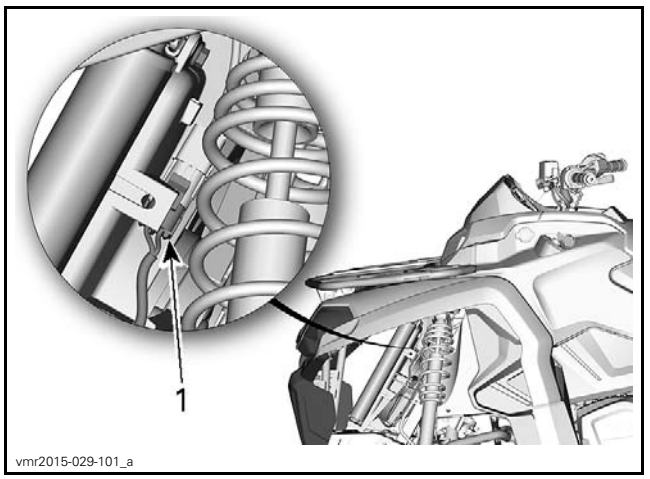
Radiator Cooling Fan Fuse Location

The radiator cooling fan fuse is located in the front fuse box, under the gauge support. Refer to fuse box cover or *WIRING DIAGRAM*.



Testing the Radiator Cooling Fan

1. Disconnect radiator cooling fan connector.



1. Cooling fan connector

2. Connect cooling fan connector pin B to a suitable 20 A fuse jumper and then directly to the positive battery post.
3. Connect cooling fan connector pin A (BK wire) directly to the negative battery post.
4. Check if cooling fan works properly.
   - If cooling fan does not work, replace it.
   - If cooling fan works properly, refer to *RADIATOR COOLING FAN TROUBLESHOOTING CHART*.
5. Reconnect radiator cooling fan connector.

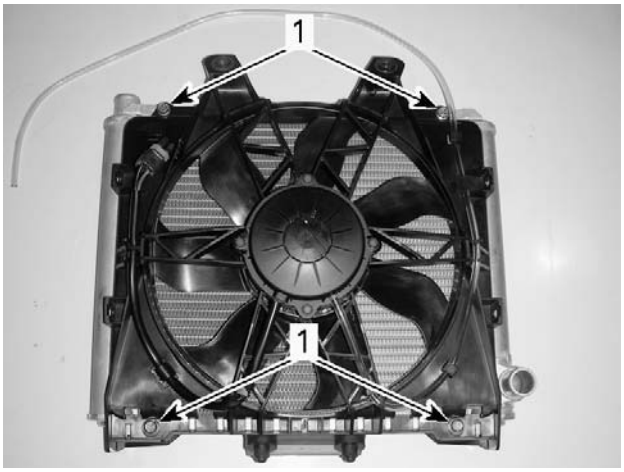
Troubleshooting the Radiator Cooling Fan

NOTE: The following troubleshooting chart assumes that the engine is operating in the fan activation temperature range. Refer to *RADIATOR COOLING FAN OPERATION*.

COOLING FAN TROUBLESHOOTING CHART		
Is fan working?	YES →	Everything is OK
NO ↓		
Check FAN fuse Is fuse burnt?	YES →	Replace fuse Is fan working?
NO ↓		
Bypass fan relay RY1 (refer to *RELAY OPERATION TEST*)		
↓		
Fan turns?	YES →	Replace relay Is fan working?
NO ↓		
Apply 12 Vdc and a ground to fan connector (refer to *RADIATOR COOLING FAN TEST*)		
↓		
Fan turns?	NO →	Replace fan Is fan working?
YES ↓		
Check CTS (refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection)		
↓		
CTS works?	NO →	Replace CTS Is fan working?
YES ↓		
Check wiring harness and connectors (refer to *WIRING DIAGRAM*)		
↓		
Harness and connectors good?	NO →	Repair or replace defective part(s)
YES ↓		
Try a new ECM	→	Is fan working?

Removing the Radiator Cooling Fan

1. Proceed with *REMOVING THE RADIATOR*. See procedure in this subsection.
2. Remove radiator cooling fan retaining screws.



1. Cooling fan retaining screws

3. Remove radiator cooling fan.

Installing the Radiator Cooling Fan

The installation is the reverse of the removal procedure. However, pay attention to the following.

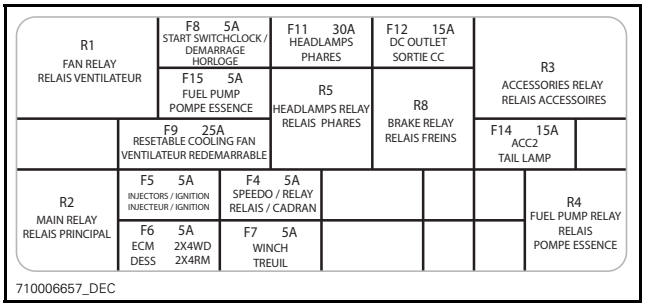
Tighten cooling fan retaining screws to specification.

TIGHTENING TORQUE	
Radiator cooling fan screws	10 N•m ± 2 N•m (89 lbf•**in** ± 18 lbf•**in**)

RADIATOR COOLING FAN RELAY (RY1)

Relay Location (Radiator Cooling Fan)

The radiator cooling fan relay (RY1) is located in the front fuse box, under the gauge support.



Testing the Radiator Cooling Fan Relay

Relay Operation Test

1. Remove relay (RY1).
2. Bypass relay using a jumper. Refer to *WIRING DIAGRAM* to locate proper terminals.

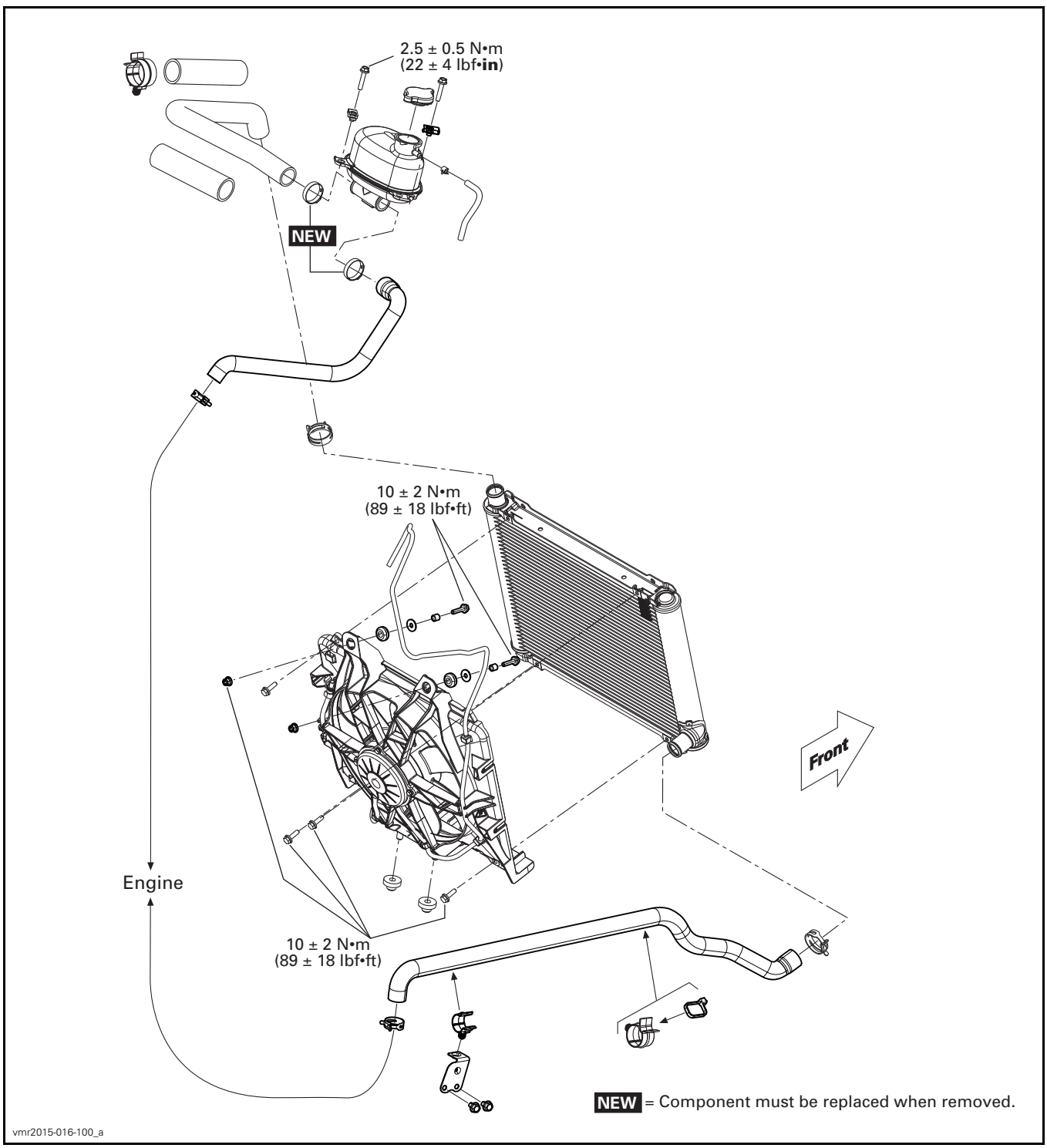
3. If the radiator cooling fan is activated, replace the relay.

Relay Continuity Test

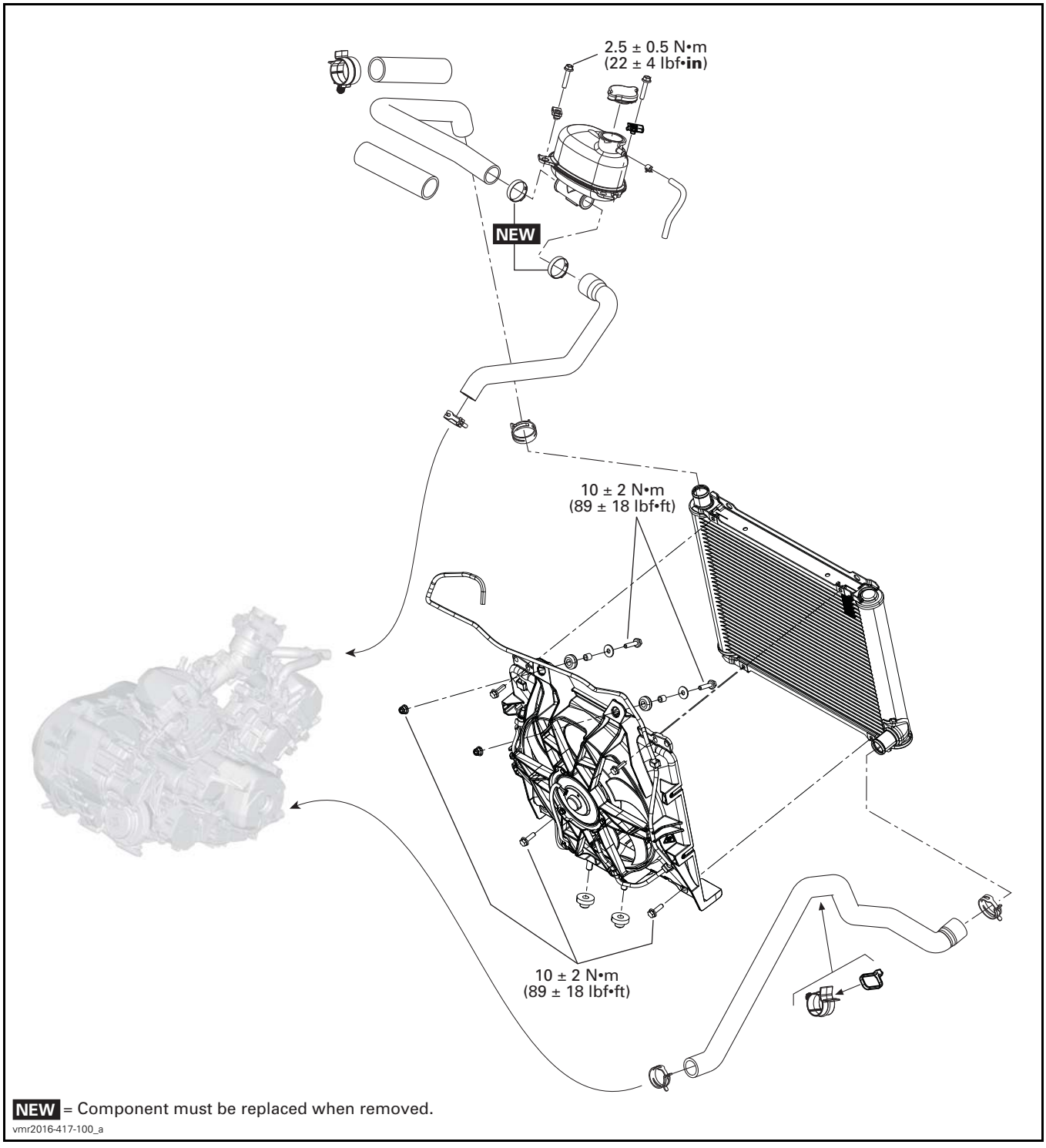
Refer to *POWER DISTRIBUTION AND GROUNDS* subsection.

COOLING SYSTEM - VEHICLE COMPONENTS

450 Engines



570 and 650 Engines



NEW = Component must be replaced when removed.

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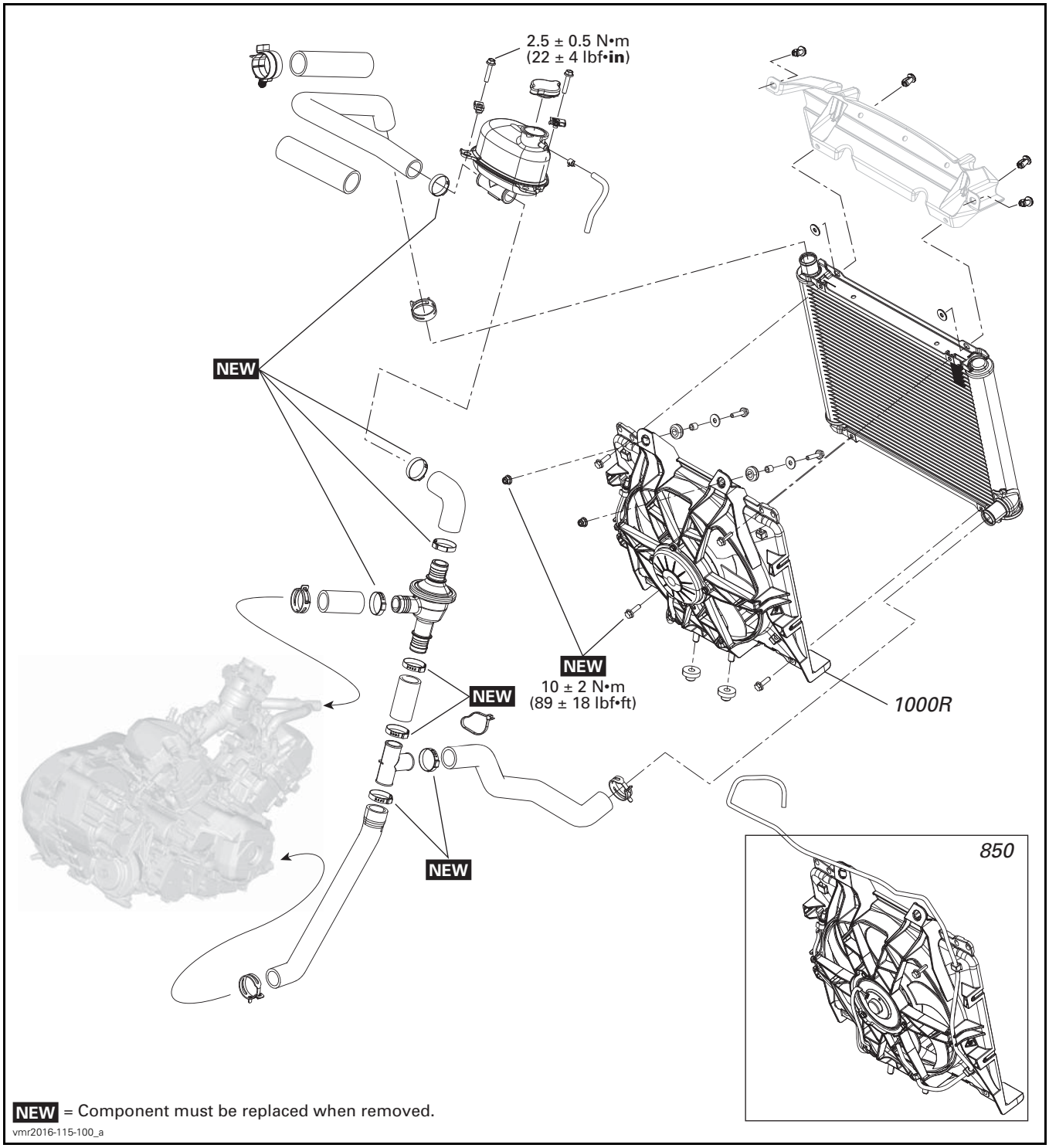
850, 1000 and 1000R Engines



GENERAL

NOTICE Never start engine without coolant. Some engine parts such as the rotary seal on the water pump shaft can be damaged.

PROCEDURES

RADIATOR

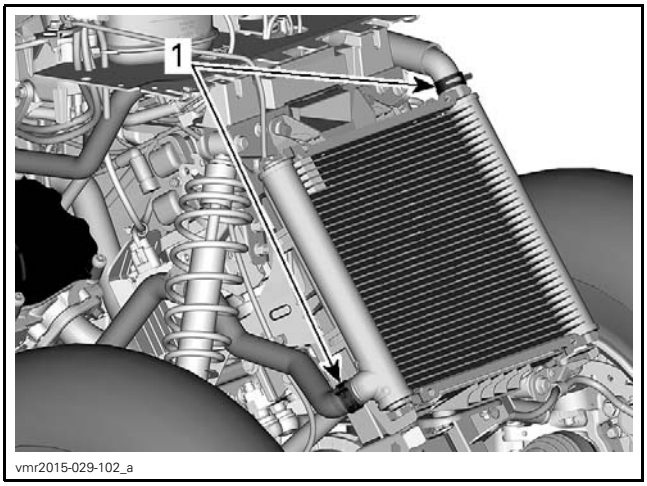
Inspecting the Radiator

Check radiator fins for clogging or damage.

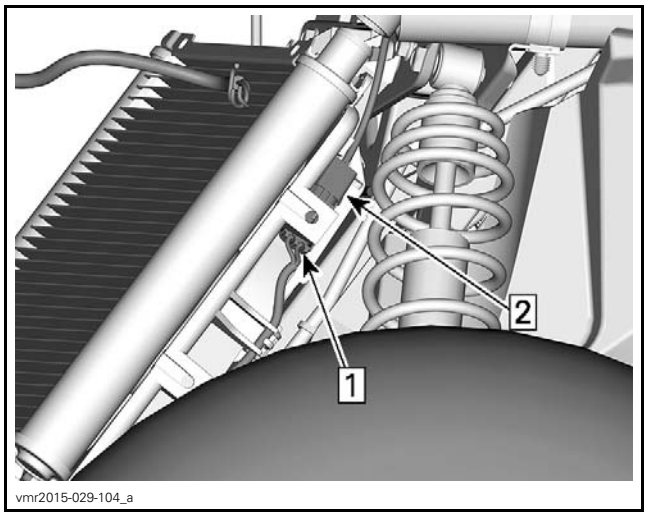
Remove insects, mud or other obstructions with compressed air or low pressure water.

Removing the Radiator

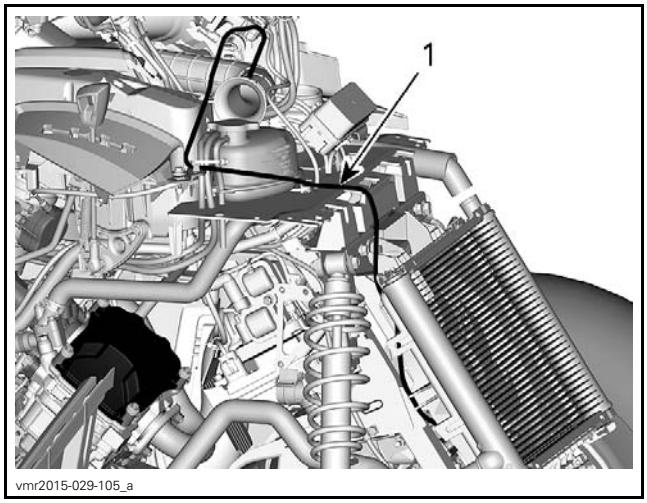
1. Drain engine coolant. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
2. Remove front body module. Refer to *BODY* subsection.
3. Disconnect radiator and fan assembly.



1. Radiator hoses

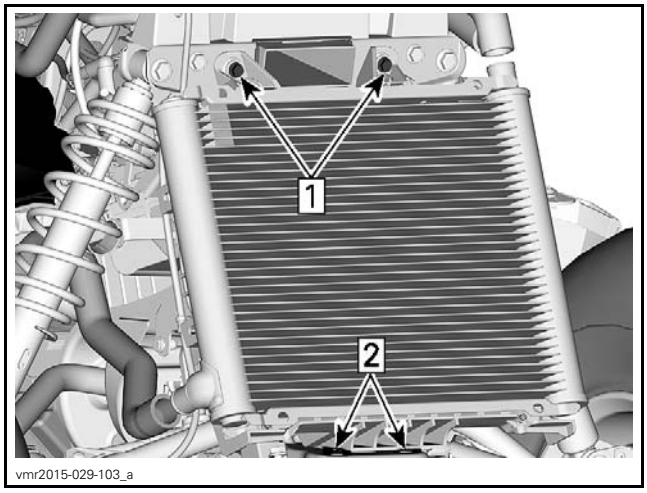


Step 1: Disconnect cooling fan connector
Step 2: Remove the harness connector from the fan shroud



1. Remove fan motor vent hose (if equipped)

NOTE: Take note of the rooting of vent hose on vehicle to ease reinstallation.



Step 1: Remove upper retaining bolts
Step 2: Remove radiator from bushings

Installing the Radiator

The installation is the reverse of the removal procedure. However, pay attention to the following.

Ensure that rubber bushings are properly installed between frame and fan shroud.

Ensure that vent hose of the cooling fan motor is properly rooted as prior to removal (if so equipped).

NOTICE **If the vent hose of the cooling fan motor is not properly rooted, the fan motor may be damaged due to improper venting.**

Tighten radiator upper retaining bolts to specification.

TIGHTENING TORQUE	
Radiator upper retaining bolts	10 N•m ± 2 N•m (89 lbf•**in** ± 18 lbf•**in**)

Refill and bleed cooling system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Check cooling system for leaks.

RADIATOR COOLING FAN

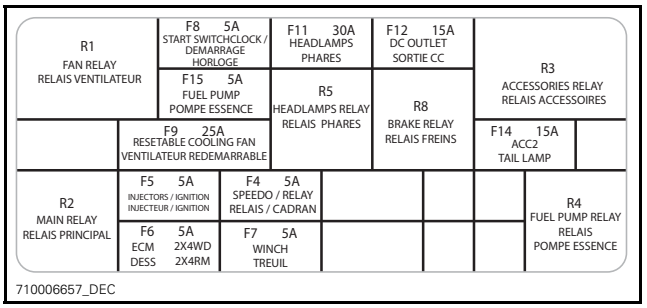
Radiator Cooling Fan Operation

The ECM controls the radiator cooling fan via the input of the coolant temperature sensor (CTS). Refer to the following table.

ENGINE TEMP.	COOLING FAN	CHECK ENGINE LIGHT	GAUGE MESSAGE
95°C (203°F)	Turns ON	—	—
93°C (199°F)	Turn OFF	—	—
115°C (239°F)	ON	Turns ON	Check engine Hi Temp
118°C (244°F)	ON	Flashes	Limp Home

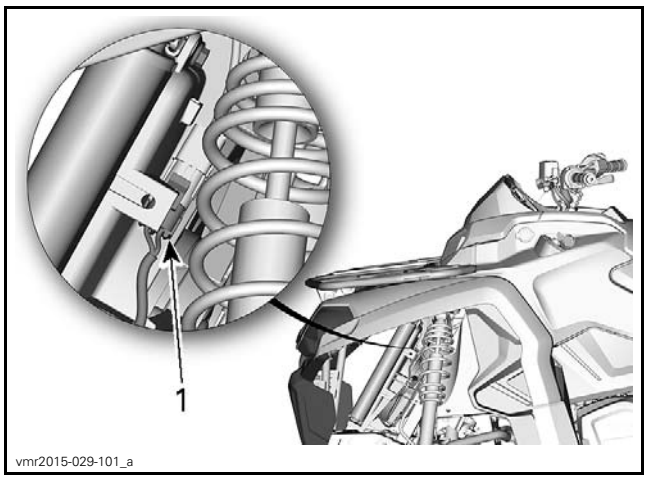
Radiator Cooling Fan Fuse Location

The radiator cooling fan fuse is located in the front fuse box, under the gauge support. Refer to fuse box cover or *WIRING DIAGRAM*.



Testing the Radiator Cooling Fan

1. Disconnect radiator cooling fan connector.



1. Cooling fan connector

2. Connect cooling fan connector pin B to a suitable 20 A fuse jumper and then directly to the positive battery post.
3. Connect cooling fan connector pin A (BK wire) directly to the negative battery post.
4. Check if cooling fan works properly.
   - If cooling fan does not work, replace it.
   - If cooling fan works properly, refer to *RADIATOR COOLING FAN TROUBLESHOOTING CHART*.
5. Reconnect radiator cooling fan connector.

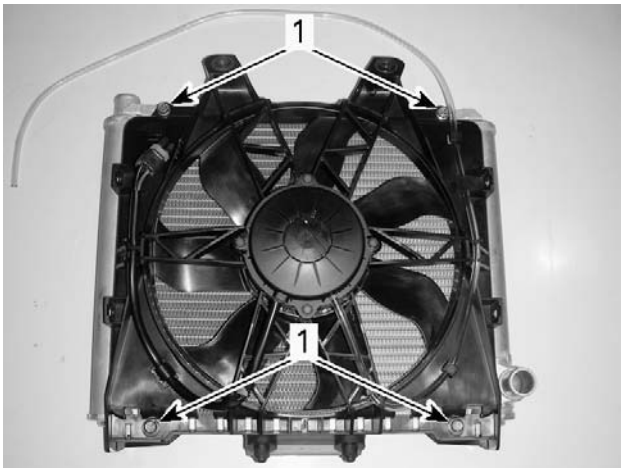
Troubleshooting the Radiator Cooling Fan

NOTE: The following troubleshooting chart assumes that the engine is operating in the fan activation temperature range. Refer to *RADIATOR COOLING FAN OPERATION*.

COOLING FAN TROUBLESHOOTING CHART		
Is fan working?	YES →	Everything is OK
NO ↓		
Check FAN fuse Is fuse burnt?	YES →	Replace fuse Is fan working?
NO ↓		
Bypass fan relay RY1 (refer to *RELAY OPERATION TEST*)		
↓		
Fan turns?	YES →	Replace relay Is fan working?
NO ↓		
Apply 12 Vdc and a ground to fan connector (refer to *RADIATOR COOLING FAN TEST*)		
↓		
Fan turns?	NO →	Replace fan Is fan working?
YES ↓		
Check CTS (refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection)		
↓		
CTS works?	NO →	Replace CTS Is fan working?
YES ↓		
Check wiring harness and connectors (refer to *WIRING DIAGRAM*)		
↓		
Harness and connectors good?	NO →	Repair or replace defective part(s)
YES ↓		
Try a new ECM	→	Is fan working?

Removing the Radiator Cooling Fan

1. Proceed with *REMOVING THE RADIATOR*. See procedure in this subsection.
2. Remove radiator cooling fan retaining screws.



1. Cooling fan retaining screws

3. Remove radiator cooling fan.

Installing the Radiator Cooling Fan

The installation is the reverse of the removal procedure. However, pay attention to the following.

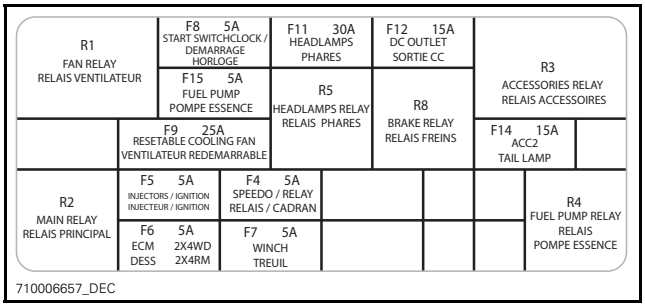
Tighten cooling fan retaining screws to specification.

TIGHTENING TORQUE	
Radiator cooling fan screws	10 N•m ± 2 N•m (89 lbf•**in** ± 18 lbf•**in**)

RADIATOR COOLING FAN RELAY (RY1)

Relay Location (Radiator Cooling Fan)

The radiator cooling fan relay (RY1) is located in the front fuse box, under the gauge support.



Testing the Radiator Cooling Fan Relay

Relay Operation Test

1. Remove relay (RY1).
2. Bypass relay using a jumper. Refer to *WIRING DIAGRAM* to locate proper terminals.

3. If the radiator cooling fan is activated, replace the relay.

Relay Continuity Test

Refer to *POWER DISTRIBUTION AND GROUNDS* subsection.

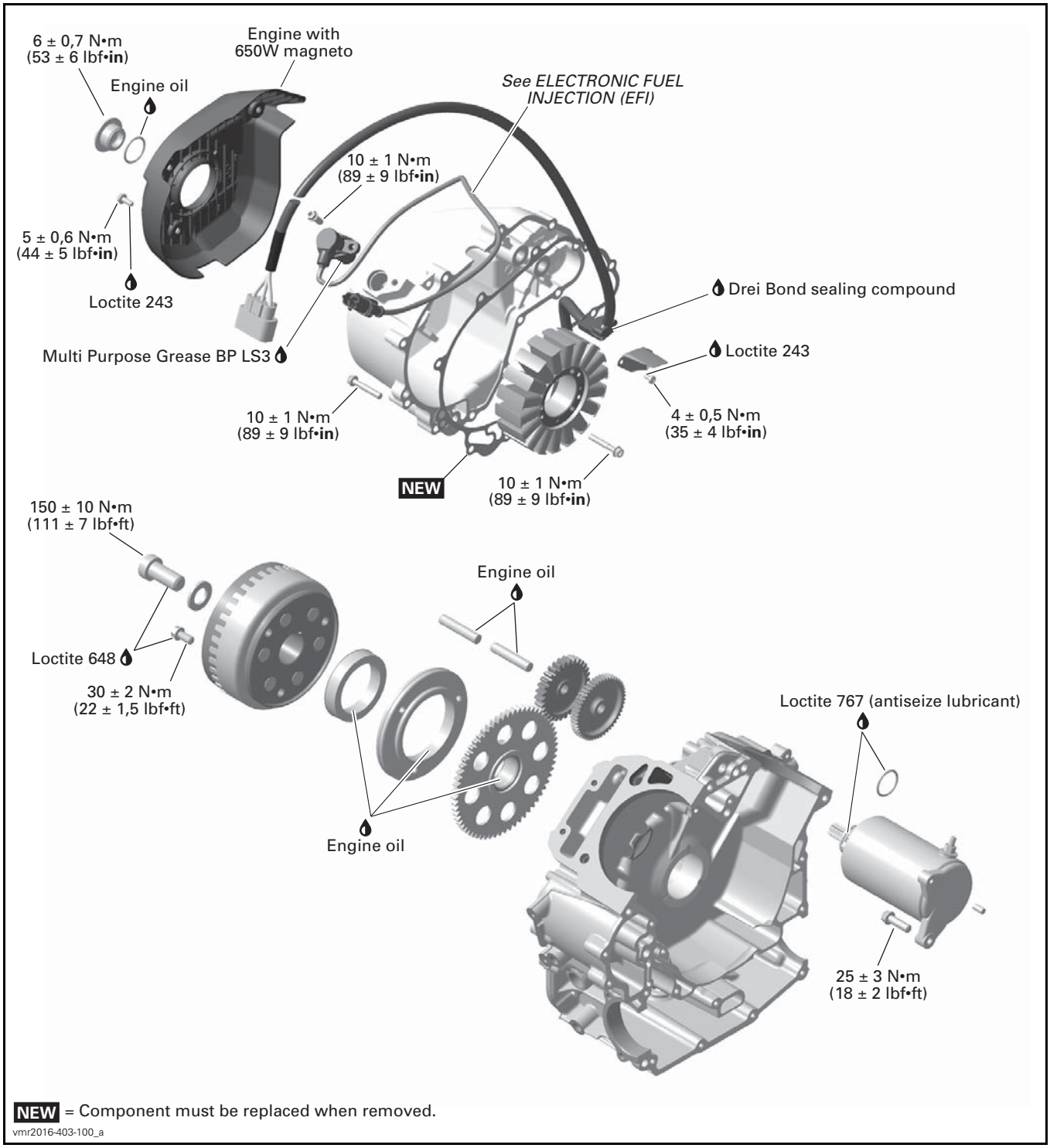
MAGNETO AND STARTER

SERVICE TOOLS

Description	Part Number	Page
CRANKSHAFT LOCKING BOLT	529 035 617	6
CRANKSHAFT PROTECTOR	529 036 034	6
FLUKE 115 MULTIMETER	529 035 868	4
MAGNETO PULLER	529 035 748	6

SERVICE PRODUCTS

Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	11
DREI BOND SEALING COMPOUND	420 297 906	4
LOCTITE 243 (BLUE)	293 800 060	6
LOCTITE 648 (GREEN)	413 711 400	8
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	10–11
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	3
PULLEY FLANGE CLEANER	413 711 809	7–8



NEW = Component must be replaced when removed.

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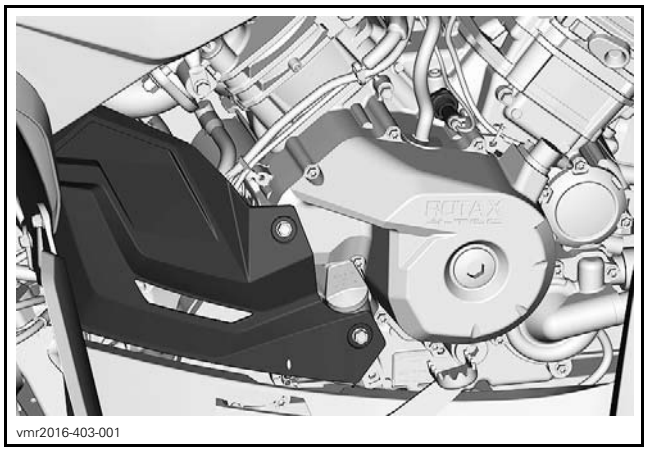
PROCEDURES

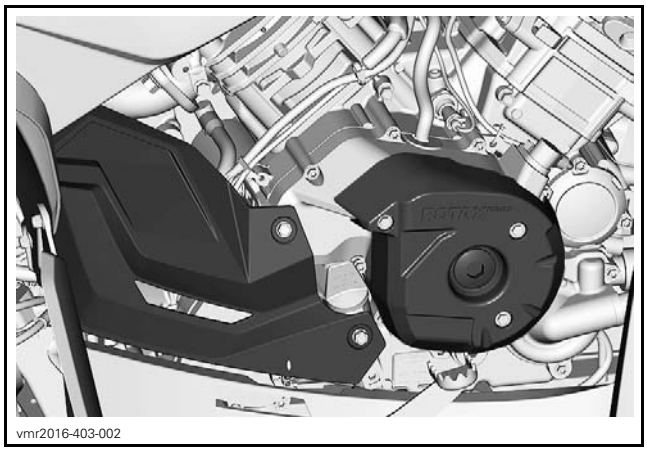
MAGNETO COVER

Magneto Cover Access

Refer to the *BODY* subsection and remove the following part.



ENGINE WITH 420W MAGNETO



ENGINE WITH 650W MAGNETO

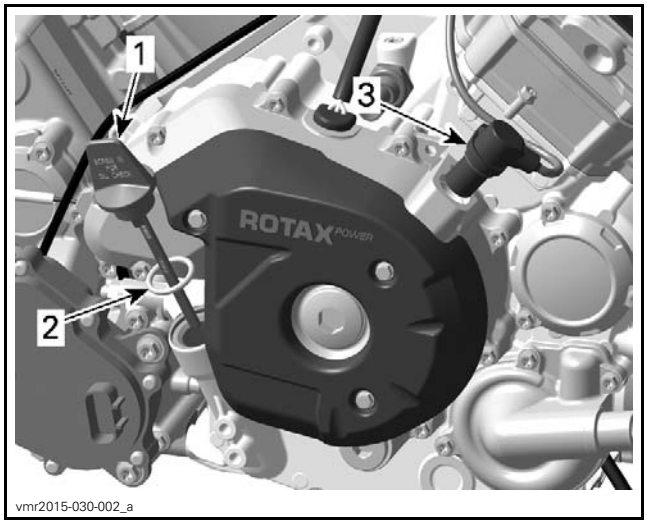
Removing the Magneto Cover

Drain engine oil (refer to *ENGINE OIL CHANGE* in the *PERIODIC MAINTENANCE PROCEDURES* subsection).

Remove crankshaft position sensor (CPS) and cut tie raps.

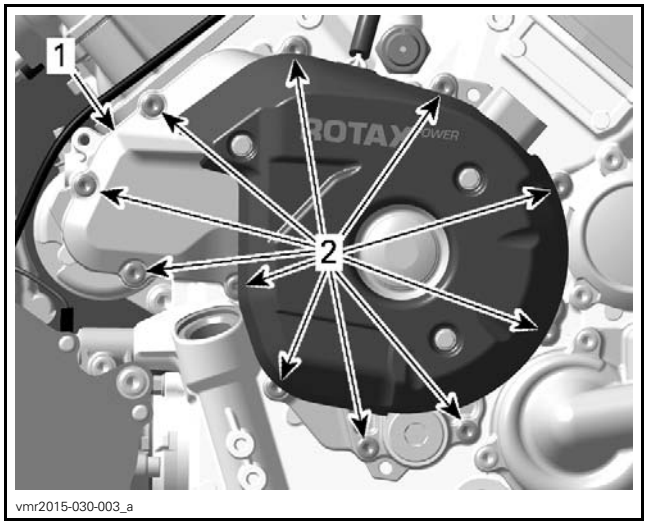
Disconnect the stator connector on the voltage regulator/rectifier, refer to *STATOR CONNECTOR ACCESS* in this subsection.

Remove dipstick with O-ring.



1. *Dipstick*
2. *O-ring*
3. *Crank position sensor (CPS)*

Remove magneto cover retaining screws.



1. *Magneto cover*
2. *Retaining screws*

Pull out magneto cover.

Inspecting and Cleaning the Magneto Cover

Check magneto cover for cracks or other damage. Replace if necessary.

NOTE: Clean all metal components in a non-ferrous metal cleaner. Use LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500), or suitable equivalent.

⚠ WARNING

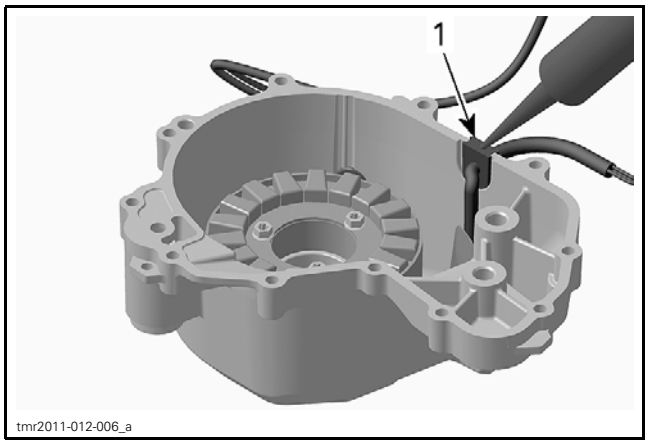
Wear safety glasses and work in a well ventilated area when working with strong chemical products. Also wear suitable non-absorbent gloves to protect your hands.

Installing the Magneto Cover

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

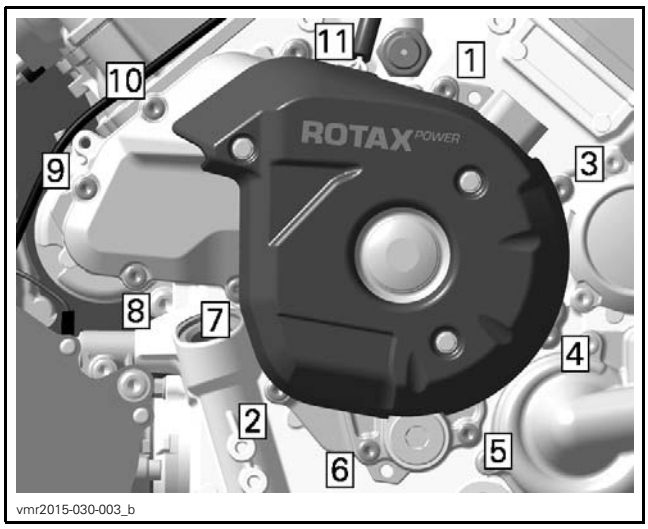
Install a **NEW** magneto cover gasket.

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



1. Stator cable grommet (apply Drei Bond sealing compound)

Tighten screws using the following sequence.



TIGHTENING SEQUENCE

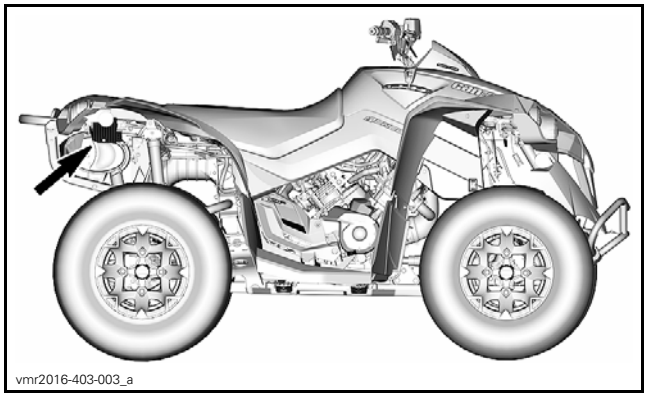
TIGHTENING TORQUE	
Magneto cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

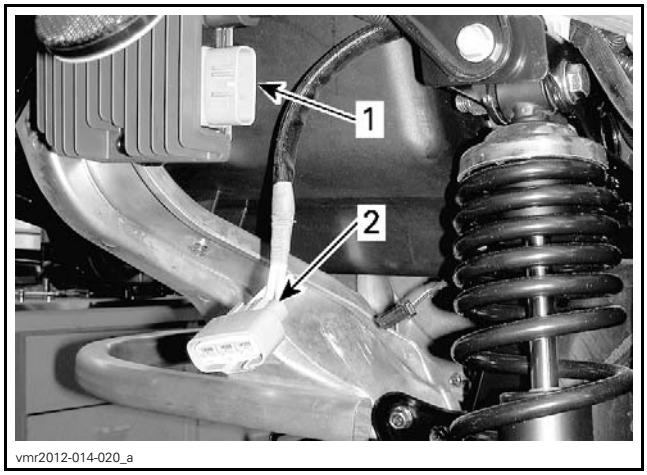
Refill engine with recommended oil.

STATOR

Stator Connector Access

NOTE: The stator is directly connected to the voltage regulator/rectifier.





1. Voltage regulator/rectifier
2. Three YELLOW wires

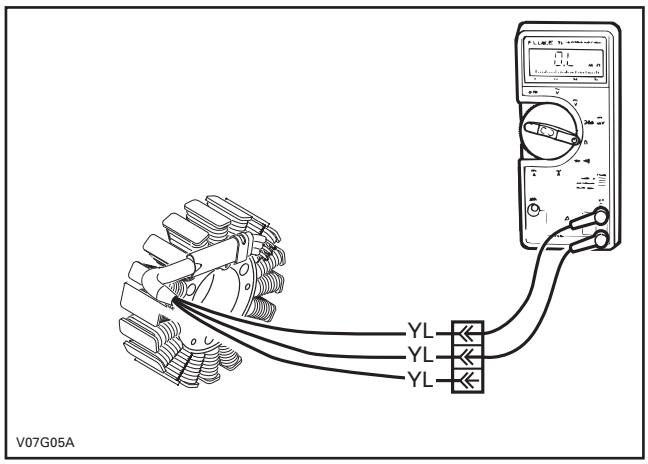
Testing the Stator Static Continuity

1. Disconnect the stator connector on the voltage regulator/rectifier.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set multimeter to Ω.
3. Connect multimeter between YELLOW wires.
4. Read resistance.

TERMINAL	RESISTANCE @ 20°C (68°F)
1 and 2	0.15 - 0.30 Ω
1 and 3	
2 and 3	



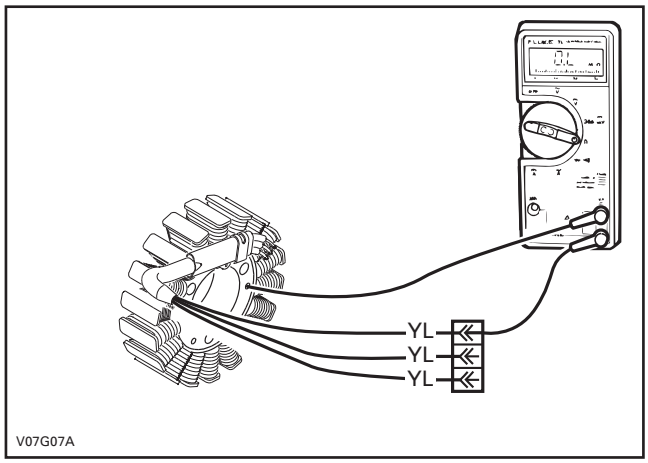
TYPICAL

5. If any reading is out of specification, replace stator.
6. Re-plug connectors properly.

Testing the Stator Insulation

1. Set multimeter to Ω.
2. Connect multimeter between any YELLOW wire (on stator connector) and engine ground.
3. Read resistance.

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



TYPICAL

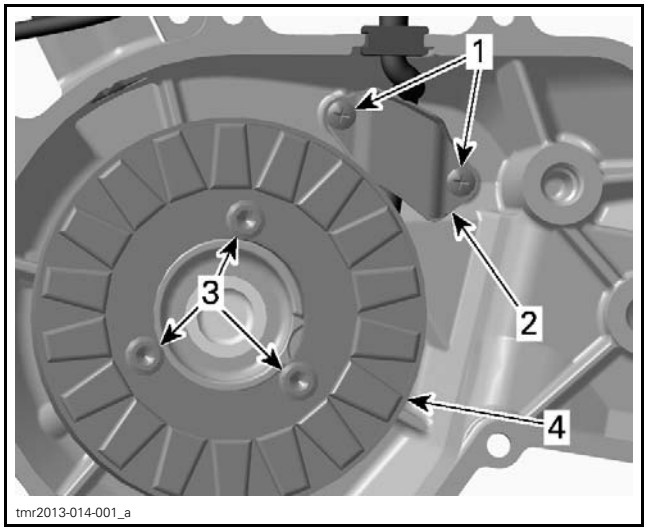
4. If there is a resistance or continuity, the stator coils and/or the wiring is shorted to ground and needs to be repaired or replaced.
5. Re-plug connectors properly.

Removing the Stator

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

Remove screws securing the wire holding strip.

Remove stator retaining screws then the stator.



1. *Holding strip screws*
2. *Wire holding strip*
3. *Stator retaining screws*
4. *Stator*

Inspecting the Stator

Check stator windings and insulation for cracks or other damages. If damaged replace it.

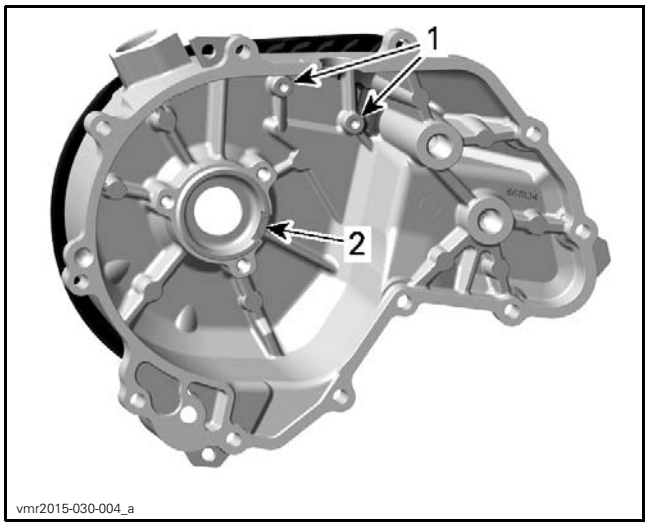
Check if stator wires are brittle, hard or otherwise damaged.

Installing the Stator

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

NOTICE **When installing the stator take care to route wires properly and install retaining strip.**

NOTE: There is only one position for the stator (notch in the magneto housing cover).



1. Threads for cable holding strip
2. Notch for stator

TIGHTENING TORQUE	
Holding strip screws	4 N•m ± 0.5 N•m (35 lbf•**in** ± 4 lbf•**in**) + LOCTITE 243 (BLUE) (P/N 293 800 060)
Stator retaining screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

ROTOR

Removing the Rotor

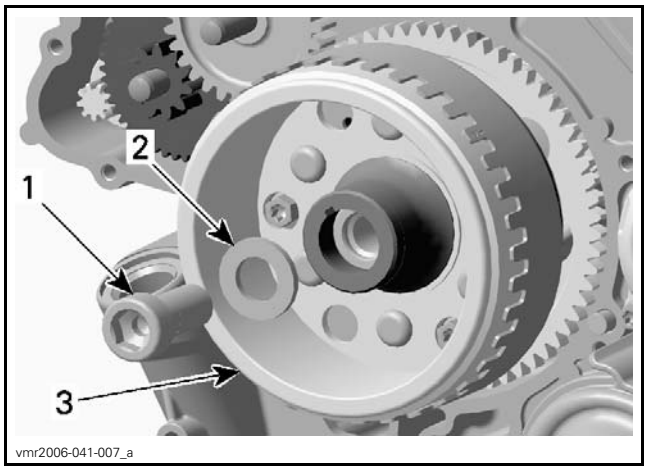
Remove *MAGNETO COVER*. See procedure in this subsection.

Lock crankshaft (refer to *CRANKSHAFT LOCKING PROCEDURE* in the *BOTTOM END* subsection).

REQUIRED TOOL	
CRANKSHAFT LOCKING BOLT (P/N 529 035 617)	

Heat screw in order to break the Loctite.

Remove screw and washer securing rotor to crankshaft.

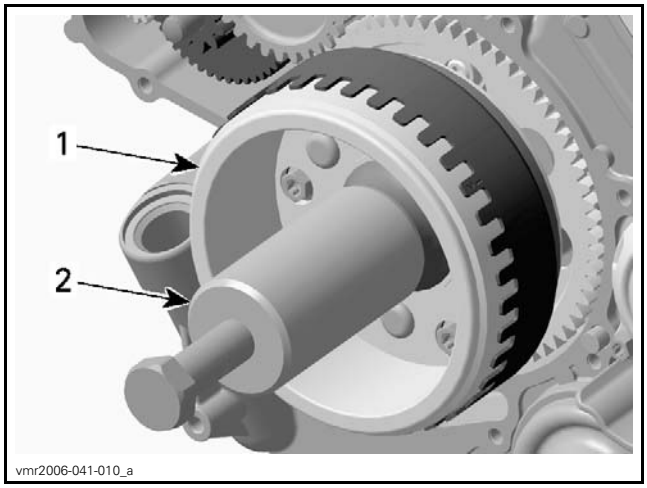


1. Screw M16
2. Washer
3. Rotor

Remove rotor.

REQUIRED TOOL	
CRANKSHAFT PROTECTOR (P/N 529 036 034)	
MAGNETO PULLER (P/N 529 035 748)	

NOTE: Use grease to place protector on crankshaft end prior to screw on the magneto puller.



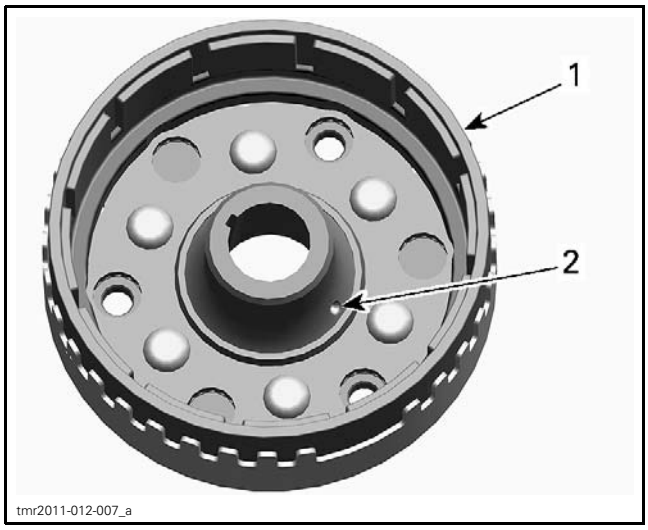
1. Rotor
2. Magneto puller

Screw magneto puller bolt to remove rotor.

Inspecting the Rotor

Check inner side of rotor for scratches or other damage.

Blow pressurized air in the rotor oil bore and make sure it is not clogged.



1. Rotor
2. Oil bore

Check keyway of the rotor for wear or damages.

Check if trigger wheel teeth are bent or otherwise damaged.

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

Replace parts as necessary.

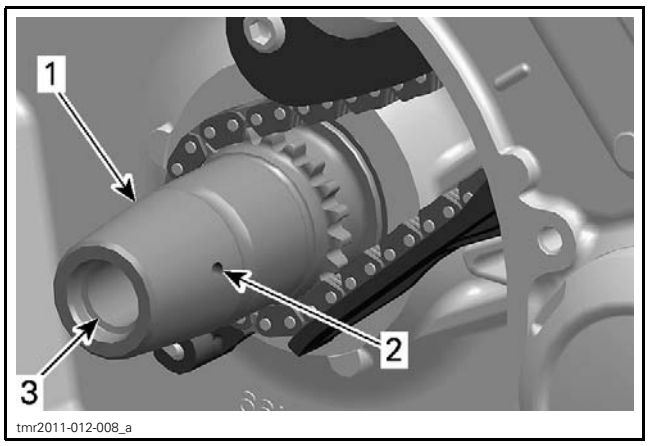
Installing the Rotor

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

Use PULLEY FLANGE CLEANER (P/N 413 711 809) to clean following parts:

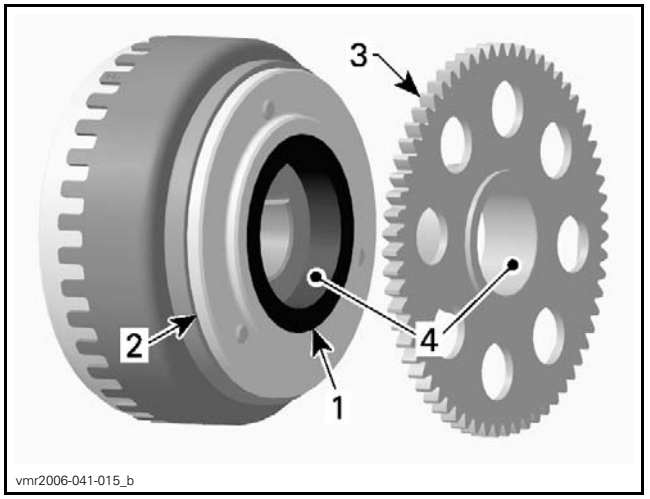
– Crankshaft taper
– Oil passage in crankshaft taper
– Thread in crankshaft
– Rotor taper
– Oil bore in rotor.

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



1. Crankshaft (MAG side)
2. Oil passage
3. Threads

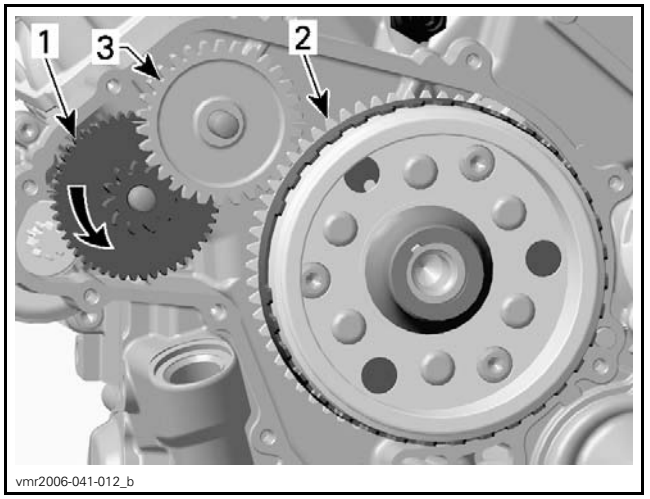
Oil sprag clutch and install sprag clutch gear.



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 starter double gear counterclockwise to align intermediate gear teeth with sprag clutch gear.



1. Starter double gear
2. Sprag clutch gear
3. Intermediate gear

TIGHTENING TORQUE	
Rotor retaining screw	150 N•m ± 10 N•m (111 lbf•ft ± 7 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)

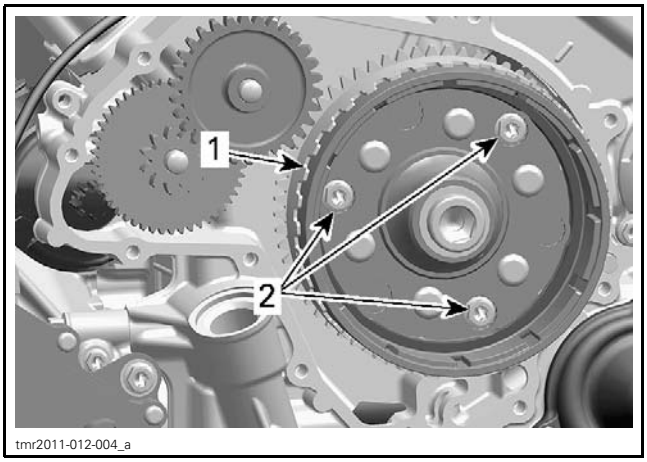
SPRAG CLUTCH

Removing the Sprag Clutch

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

Heat screws in order to break the Loctite.

Loosen sprag clutch housing screws located inside rotor.

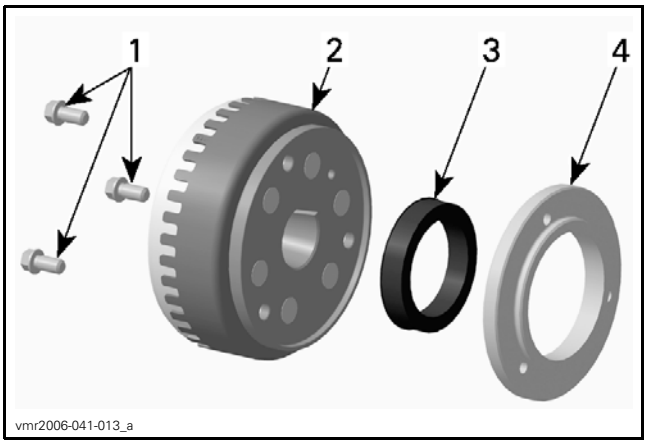


1. Rotor
2. Sprag clutch housing screws

Remove rotor (refer to *ROTOR* 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

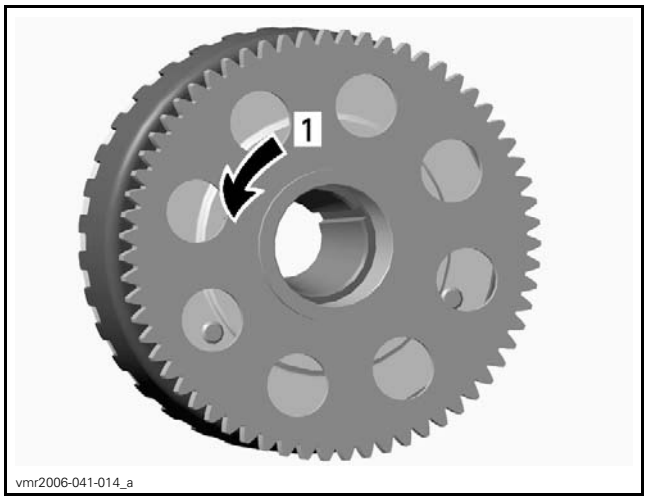
Inspecting the Sprag Clutch

Inspect sprag clutch and sprag clutch housing for wear and damage.

Also check the collar of the sprag clutch gear.

Rotate sprag clutch gear in sprag clutch.

NOTE: Sprag clutch must lock in counterclockwise direction.



SPRAG CLUTCH FUNCTIONAL TEST
1. Lock

NOTE: Sprag clutch, housing and gear must be replaced at the same time, if damaged.

Installing the Sprag Clutch

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

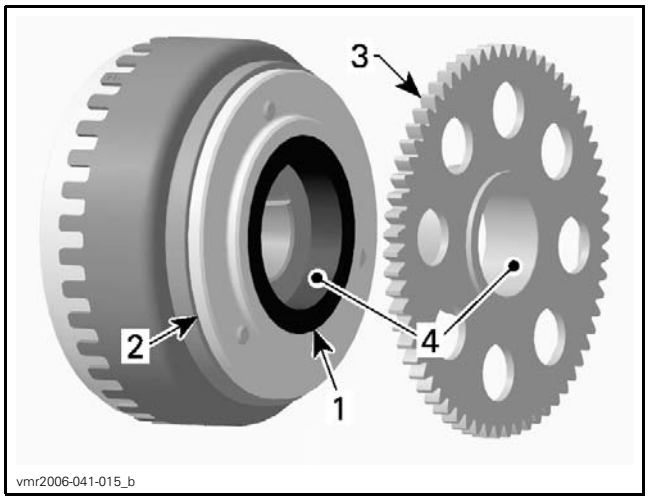
Use PULLEY FLANGE CLEANER (P/N 413 711 809)to clean following:

– Threads in sprag clutch housing
– Threads of sprag clutch housing screws.

Apply LOCTITE 648 (GREEN) (P/N 413 711 400) on threads of sprag clutch housing screws.

Install screws but do not torque yet.

Apply engine oil on sprag clutch and sprag clutch gear needle bearing.



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

Install rotor, refer to *ROTOR* in this subsection.

Tighten sprag clutch housing screws to specification.

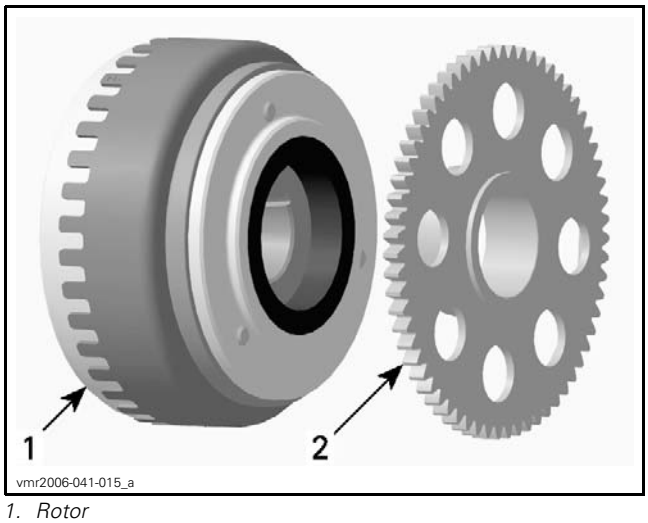
TIGHTENING TORQUE	
Sprag clutch housing screws	30 N•m ± 2 N•m (22 lbf•ft ± 1 lbf•ft)

SPRAG CLUTCH GEAR

Removing the Sprag Clutch Gear

Remove *ROTOR*. See procedure in this subsection.

Pull sprag clutch gear out of the rotor.

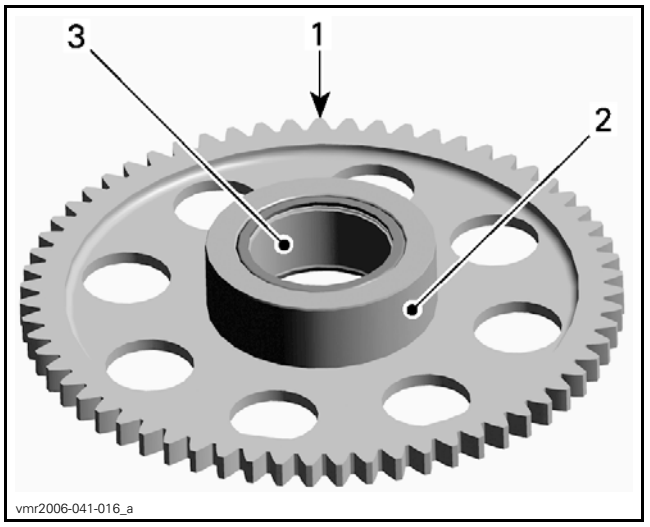


1. Rotor
2. Sprag clutch gear

Inspecting the Sprag Clutch Gear

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

Check needle bearing condition. Replace sprag clutch gear if necessary.



INSPECT
1. Teeth
2. Collar
3. Needle bearing

Installing the Sprag Clutch Gear

The installation is the reverse of the removal procedure. However, pay attention to the following.

NOTE: Apply engine oil on needle bearing and collar of sprag clutch gear.

STARTER DRIVE GEARS

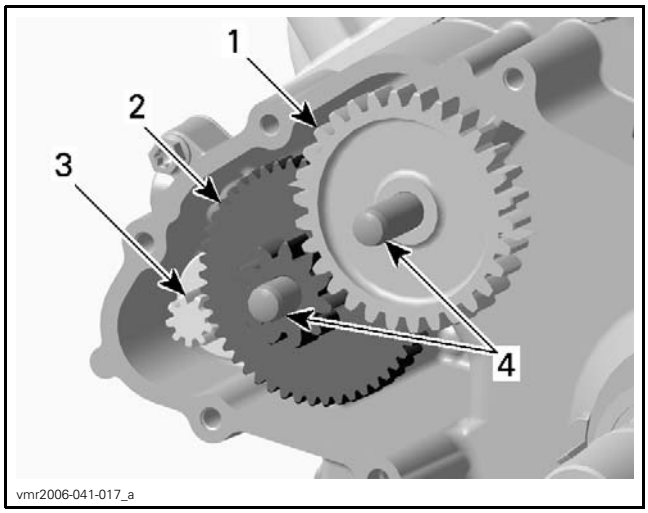
Starter Drive Gear Location

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

Removing the Starter Drive Gear

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

Remove location pins, starter double gear and intermediate gear.



1. Intermediate gear
2. Starter double gear
3. Starter gear
4. Location pins

Inspecting the Starter Drive Gear

Inspect gears and location pins for wear and damage.

Replace parts as necessary.

Installing the Starter Drive Gear

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

Apply LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070) on starter gear before installing the starter double gear.

Apply engine oil on location pins.

ELECTRIC STARTER

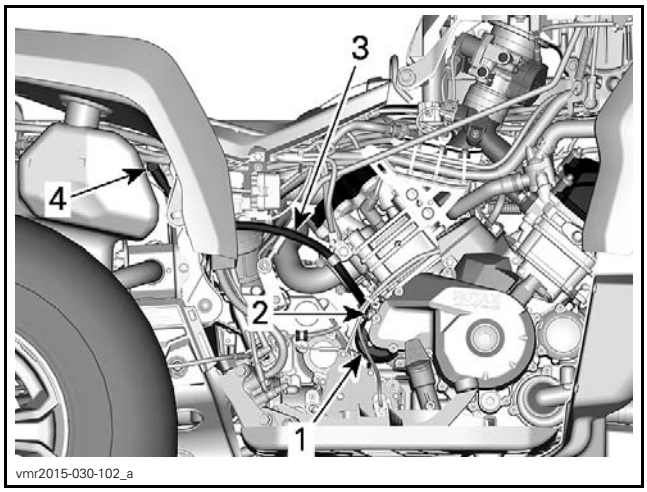
Starter Access for Testing

Refer to *BODY* subsection and remove:

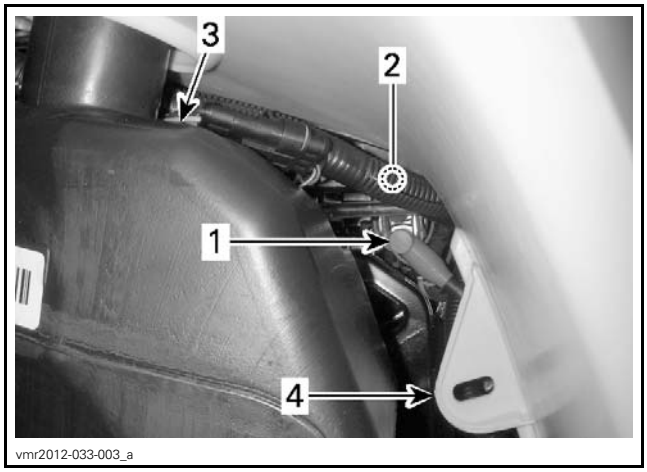
– RH engine panel.

Testing the Starter Operation

1. Disconnect starter power cable from starter solenoid and pull cable out to RH side of the vehicle.



1. Starter
2. Starter power cable connection at starter
3. Starter power cable
4. Starter power cable connection at solenoid



1. Power cable from starter solenoid to starter
2. Power cable from battery to starter solenoid (not visible)
3. Fuel tank
4. RH rear fender

2. Using booster cables, carefully supply current from a 12 volt battery directly to the starter power cable.

NOTICE **First connect the red jumper cable from the booster battery to the starter cable. Momentarily connect the BLACK (-) cable from the booster battery to engine ground last.**

If the starter turns, test other starting system components.

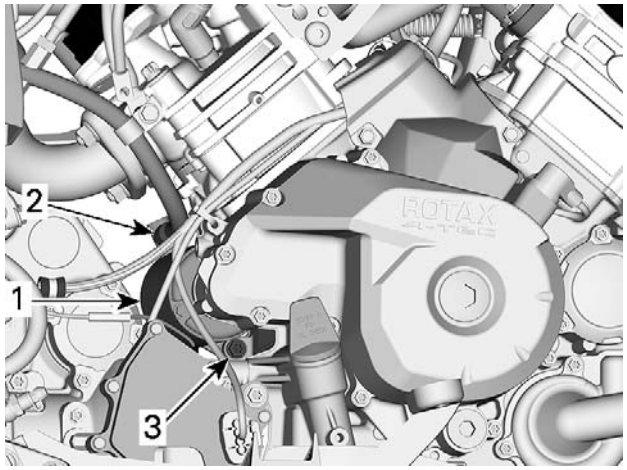
Removing the Starter

1. Ensure ignition switch is set to OFF.
2. Disconnect BLACK (-) cable from battery.

⚠ WARNING

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

3. Remove body parts as listed in *STARTER ACCESS*.
4. For models using the gearbox with GBPS, refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection and remove the:
   – Drive pulley
   – Driven pulley
   – CVT back cover.
5. Disconnect RED (+) cable from starter.
6. Clean starter area.
7. Remove starter retaining screw (from RH side of engine).



1. Starter
2. Starter power cable to disconnect
3. Starter retaining screw to remove

8. Carefully pry the starter from the engine crankcase.

Installing the Starter

The installation is the reverse of the removal procedure. However, pay attention to the following.

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

Lubricate starter O-ring.

STARTER O-RING AND MATING SURFACE	
Service product	LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

Bring starter close to its location. Rotate it so that its mounting ear allows installation in engine crankcase and on its alignment pin.

Push starter in place and align mounting ear to install screw.

TIGHTENING TORQUE	
Starter mounting screw	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

NOTICE **When connecting the RED (+) cable to the starter motor, make sure the battery cables are disconnected.**

TIGHTENING TORQUE	
Starter terminal retaining nut	6 N•m ± 0.5 N•m (53 lbf•**in** ± 4 lbf•**in**)

Apply DIELECTRIC GREASE (P/N 293 550 004) the starter terminal retaining nut.

Connect battery cables.

⚠ WARNING

Always connect RED (+) cable first then BLACK (-) cable last.

Test starter operation.

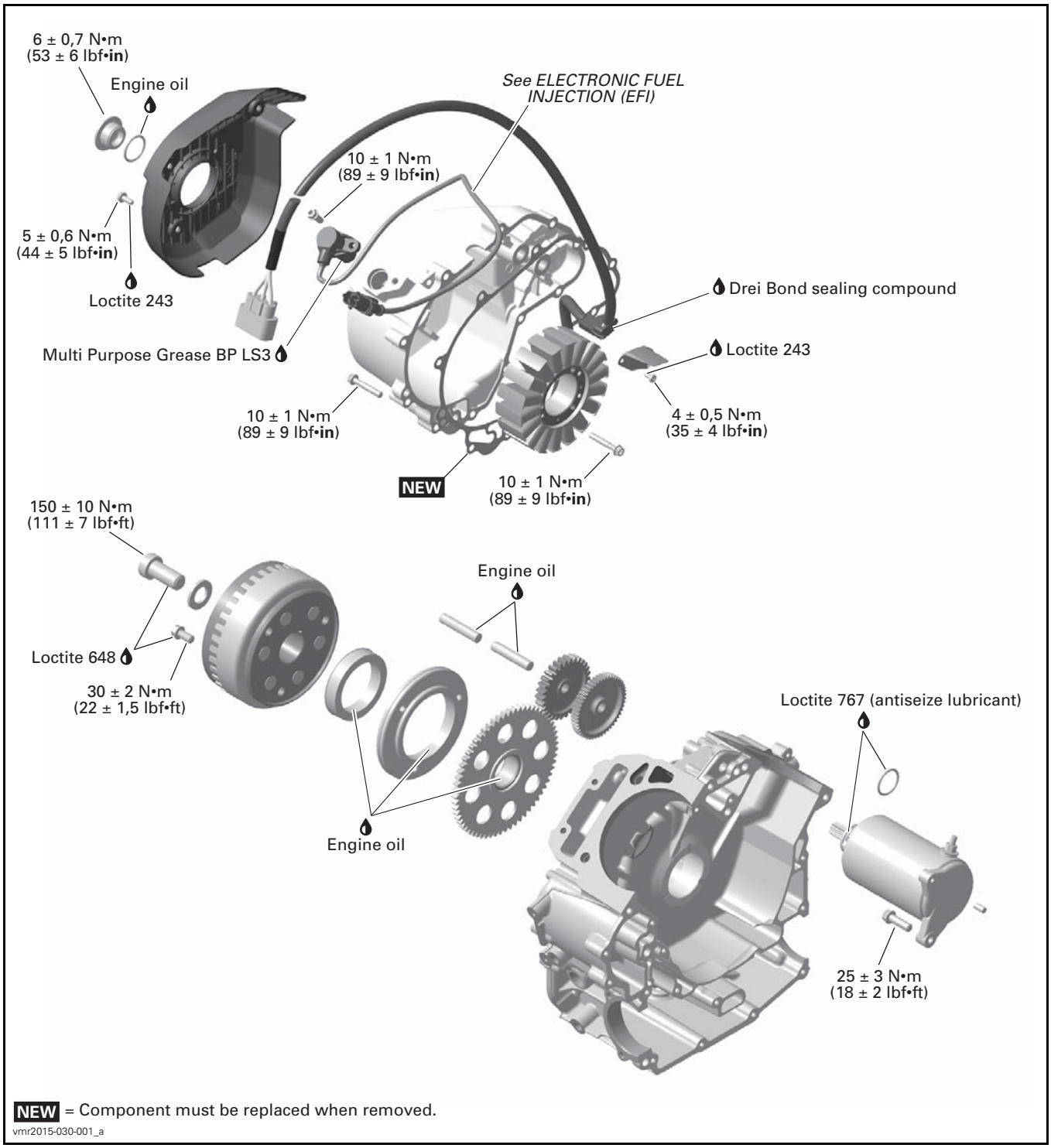
MAGNETO AND STARTER

SERVICE TOOLS

Description	Part Number	Page
CRANKSHAFT LOCKING BOLT	529 035 617	6
CRANKSHAFT PROTECTOR	529 036 034	6
FLUKE 115 MULTIMETER	529 035 868	4
MAGNETO PULLER	529 035 748	6

SERVICE PRODUCTS

Description	Part Number	Page
BLACK NEOPRENE PAINT	909570	11
CLUTCH AND PULLEY FLANGE CLEANER PRO S1	779244	7, 9
DIELECTRIC GREASE	293 550 004	11
DREI BOND SEALING COMPOUND	420 297 906	3
LOCTITE 243 (BLUE)	293 800 060	6
LOCTITE 648 (GREEN) (F)	619 600 012	9
LOCTITE 648 (GREEN)	413 711 400	8–9
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	10–11
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	3
PULLEY FLANGE CLEANER (F)	619 600 022	7, 9



NEW = Component must be replaced when removed.

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PROCEDURES

MAGNETO COVER

Magneto Cover Access

Refer to *BODY* subsection and remove the following:

– Seat
– Console
– RH side panel and extension panel
– RH footboard panel.

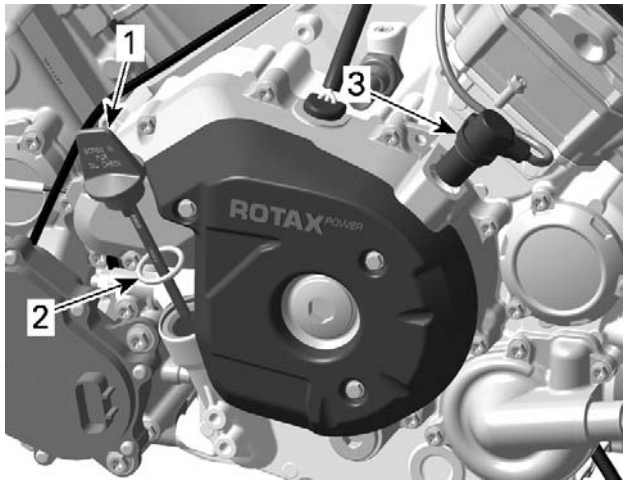
Removing the Magneto Cover

Drain engine oil (refer to *ENGINE OIL CHANGE* in the *PERIODIC MAINTENANCE PROCEDURES* subsection).

Remove crankshaft position sensor (CPS) and cut tie raps.

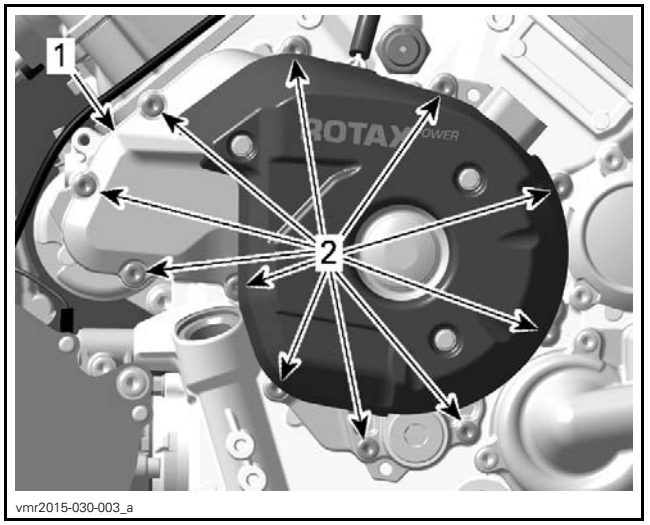
Disconnect the stator connector on the voltage regulator/rectifier, refer to *STATOR CONNECTOR ACCESS* in this subsection.

Remove dipstick with O-ring.



1. Dipstick
2. O-ring
3. Crank position sensor (CPS)

Remove magneto cover retaining screws.



1. Magneto cover
2. Retaining screws

Pull out magneto cover.

Inspecting and Cleaning the Magneto Cover

Check magneto cover for cracks or other damage. Replace if necessary.

NOTE: Clean all metal components in a non-ferrous metal cleaner.

SERVICE PRODUCT
LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500)

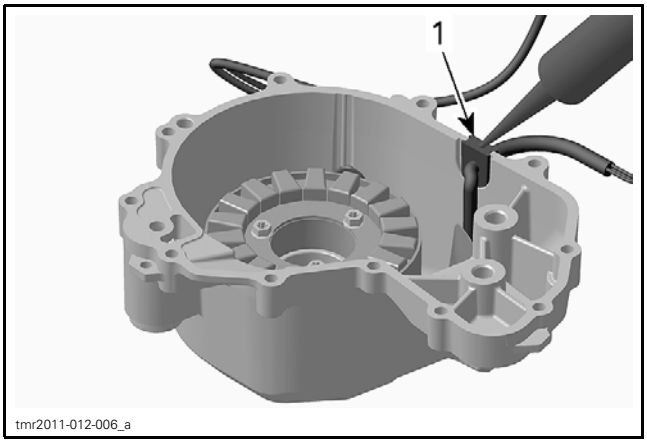
Installing the Magneto Cover

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

Install a NEW magneto cover gasket.

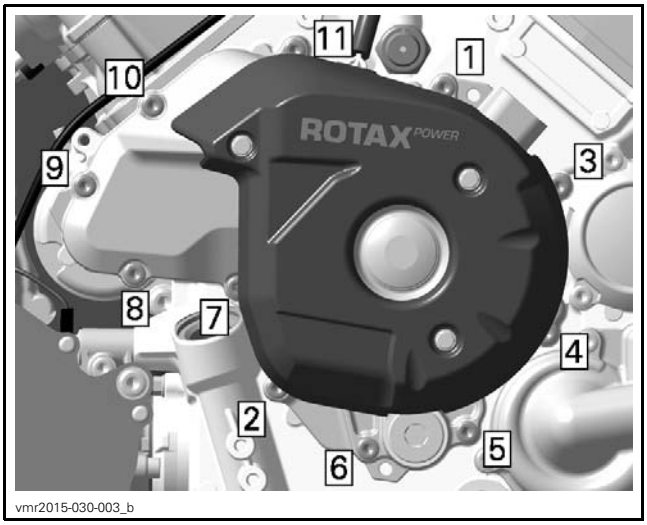
Apply sealant on stator cable grommet as shown in next illustration.

SERVICE PRODUCT
DREI BOND SEALING COMPOUND (P/N 420 297 906)



1. Stator cable grommet (apply Drei Bond sealing compound)

Tighten screws using the following sequence.



TIGHTENING SEQUENCE

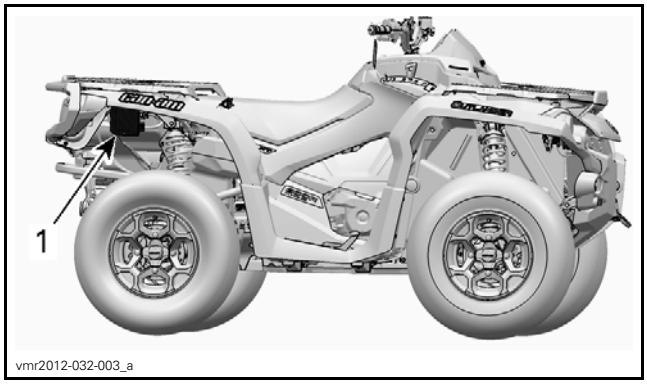
TIGHTENING TORQUE	
Magneto cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Refill engine with recommended oil.

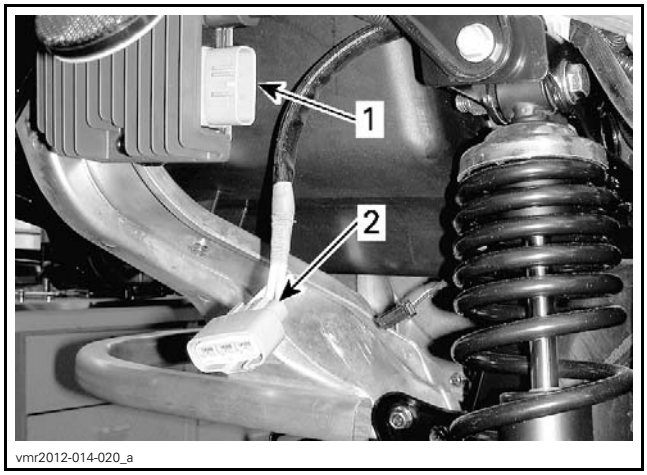
STATOR

Stator Connector Access

NOTE: The stator is directly connected to the voltage regulator/rectifier.



TYPICAL
1. Voltage regulator/rectifier location



1. Voltage regulator/rectifier
2. Three YELLOW wires

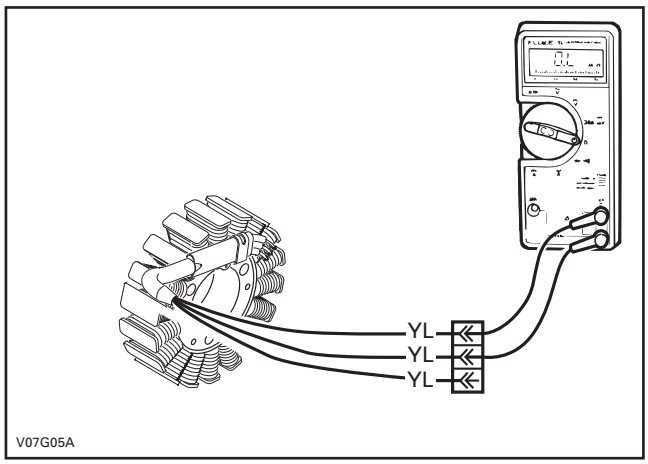
Testing the Stator Static Continuity

1. Disconnect the stator connector on the voltage regulator/rectifier.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set multimeter to Ω.
3. Connect multimeter between YELLOW wires.
4. Read resistance.

TERMINAL	RESISTANCE @ 20°C (68°F)
1 and 2	0.15 - 0.30 Ω
1 and 3	
2 and 3	



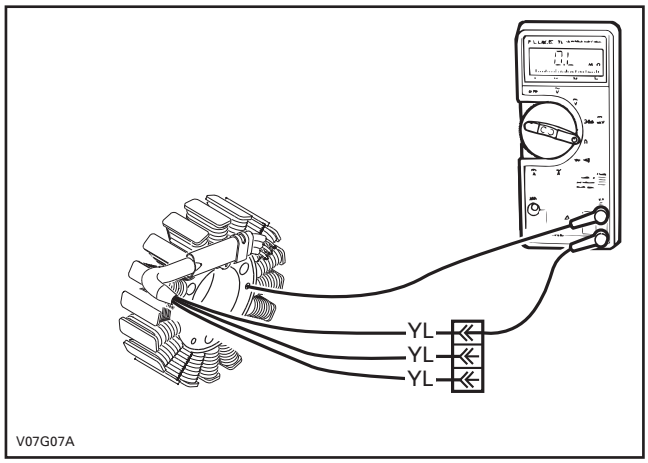
TYPICAL

5. If any reading is out of specification, replace stator.
6. Re-plug connectors properly.

Testing the Stator Insulation

1. Set multimeter to Ω.
2. Connect multimeter between any YELLOW wire (on stator connector) and engine ground.
3. Read resistance.

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



TYPICAL

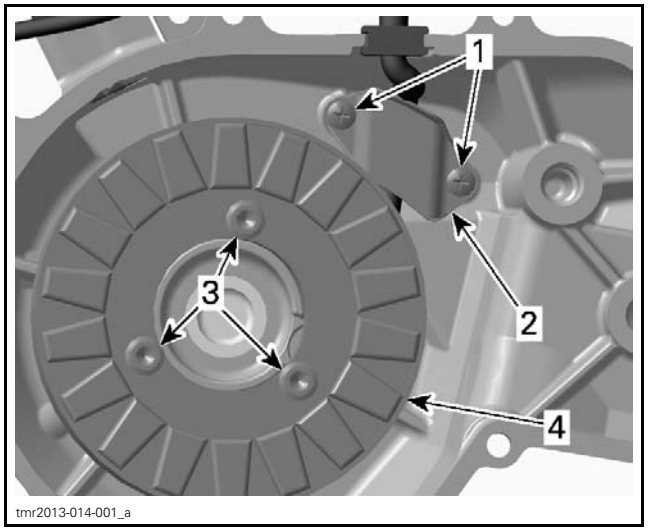
4. If there is a resistance or continuity, the stator coils and/or the wiring is shorted to ground and needs to be repaired or replaced.
5. Re-plug connectors properly.

Removing the Stator

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

Remove screws securing the wire holding strip.

Remove stator retaining screws then the stator.



1. *Holding strip screws*
2. *Wire holding strip*
3. *Stator retaining screws*
4. *Stator*

Inspecting the Stator

Check stator windings and insulation for cracks or other damages. If damaged replace it.

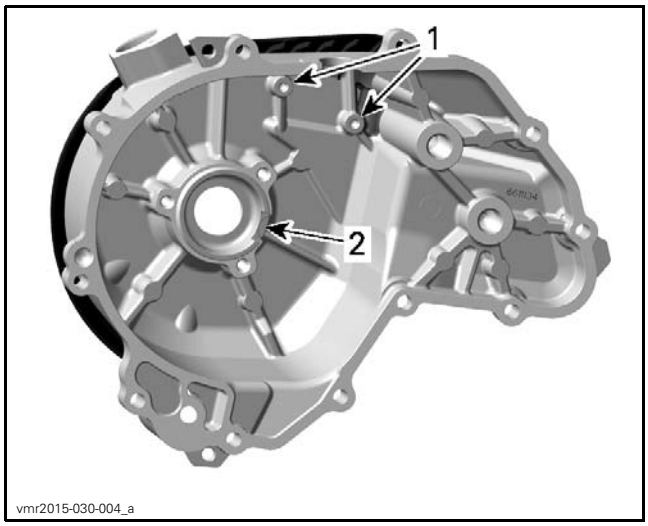
Check if stator wires are brittle, hard or otherwise damaged.

Installing the Stator

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

NOTICE **When installing the stator take care to route wires properly and install retaining strip.**

NOTE: There is only one position for the stator (notch in the magneto housing cover).



1. Threads for cable holding strip
2. Notch for stator

TIGHTENING TORQUE	
Holding strip screws	4 N•m ± 0.5 N•m (35 lbf•**in** ± 4 lbf•**in**) + LOCTITE 243 (BLUE) (P/N 293 800 060)

TIGHTENING TORQUE	
Stator retaining screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

ROTOR

Removing the Rotor

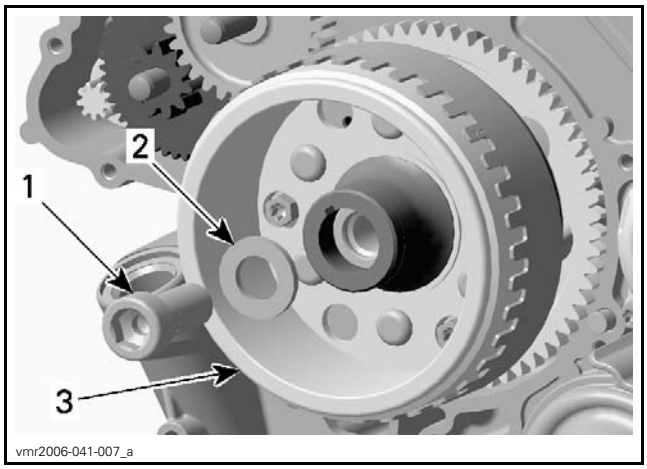
Remove *MAGNETO COVER*. See procedure in this subsection.

Lock crankshaft (refer to *CRANKSHAFT LOCKING PROCEDURE* in the *BOTTOM END* subsection).

REQUIRED TOOL	
CRANKSHAFT LOCKING BOLT (P/N 529 035 617)	

Heat screw in order to break the Loctite.

Remove screw and washer securing rotor to crankshaft.

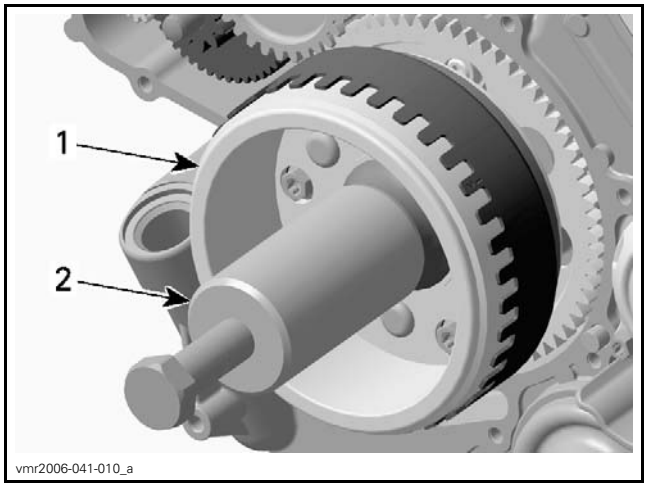


1. Screw M16
2. Washer
3. Rotor

Remove rotor.

REQUIRED TOOL	
CRANKSHAFT PROTECTOR (P/N 529 036 034)	
MAGNETO PULLER (P/N 529 035 748)	

NOTE: Use grease to place protector on crankshaft end prior to screw on the magneto puller.



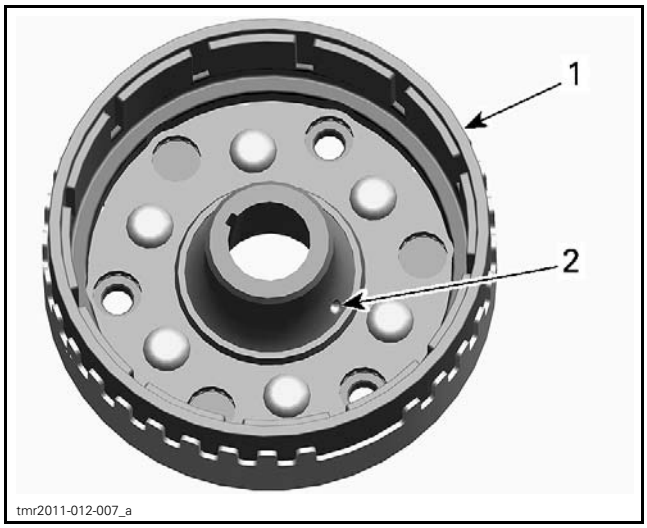
1. Rotor
2. Magneto puller

Screw magneto puller bolt to remove rotor.

Inspecting the Rotor

Check inner side of rotor for scratches or other damage.

Blow pressurized air in the rotor oil bore and make sure it is not clogged.



1. Rotor
2. Oil bore

Check keyway of the rotor for wear or damages.

Check if trigger wheel teeth are bent or otherwise damaged.

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

Replace parts as necessary.

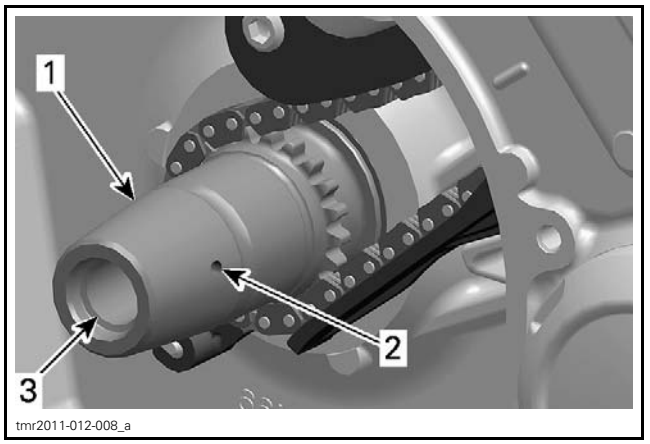
Installing the Rotor

The installation is the reverse of the removal procedure. However, pay attention to the following.

Clean following parts:
- Crankshaft taper
- Oil passage in crankshaft taper
- Thread in crankshaft
- Rotor taper
- Oil bore in rotor.

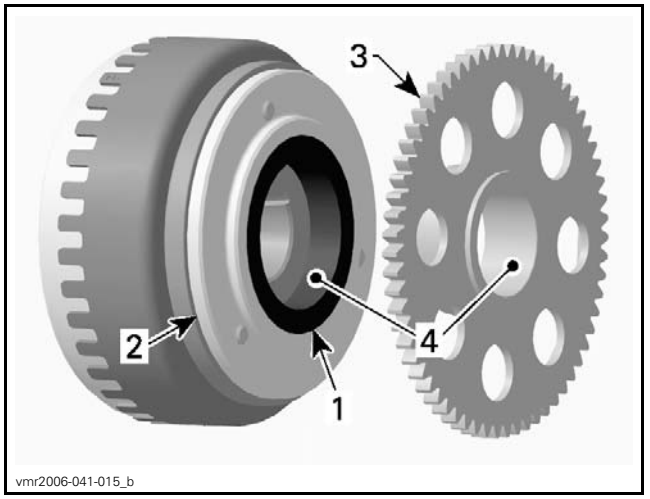
SERVICE PRODUCT	
Scandinavia	PULLEY FLANGE CLEANER (F) (P/N 619 600 022)
Other Countries	CLUTCH AND PULLEY FLANGE CLEANER PRO S1 (P/N 779244)

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



1. Crankshaft (MAG side)
2. Oil passage
3. Threads

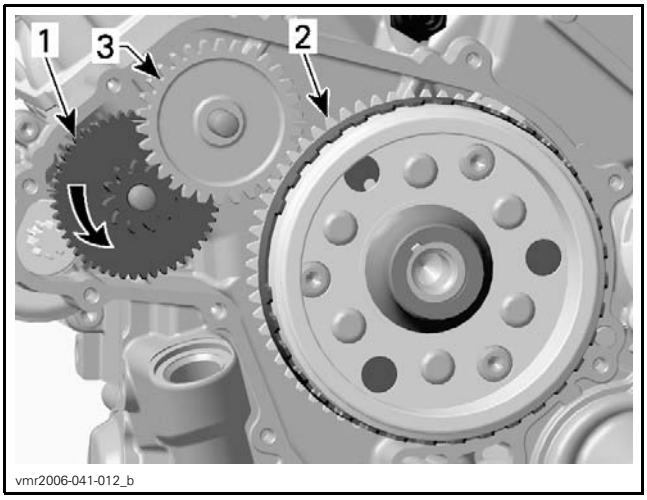
Oil sprag clutch and install sprag clutch gear.



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 starter double gear counterclockwise to align intermediate gear teeth with sprag clutch gear.



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1. Starter double gear
2. Sprag clutch gear
3. Intermediate gear

TIGHTENING TORQUE	
Rotor retaining screw	150 N•m ± 10 N•m (111 lbf•ft ± 7 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)

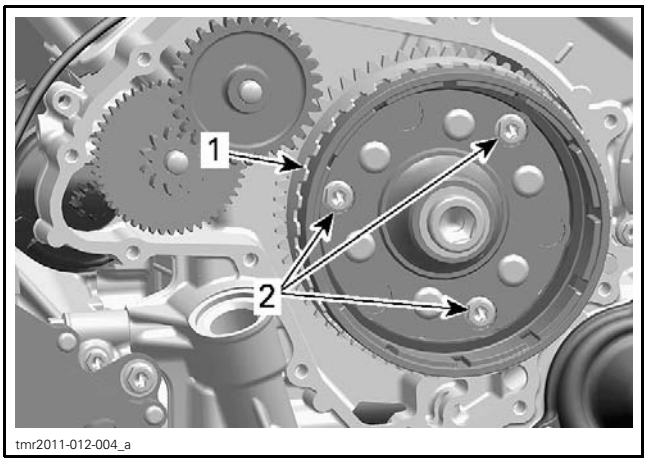
SPRAG CLUTCH

Removing the Sprag Clutch

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

Heat screws in order to break the Loctite.

Loosen sprag clutch housing screws located inside rotor.



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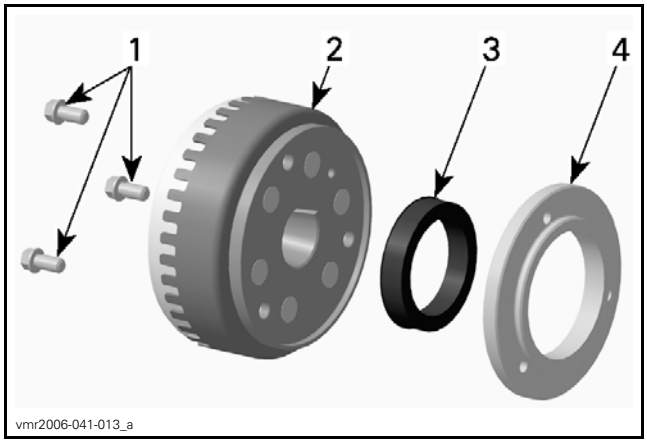
1. Rotor
2. Sprag clutch housing screws

Remove rotor (refer to *ROTOR* in this subsection).

Remove sprag clutch gear.

Remove sprag clutch housing screws and sprag clutch housing.



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

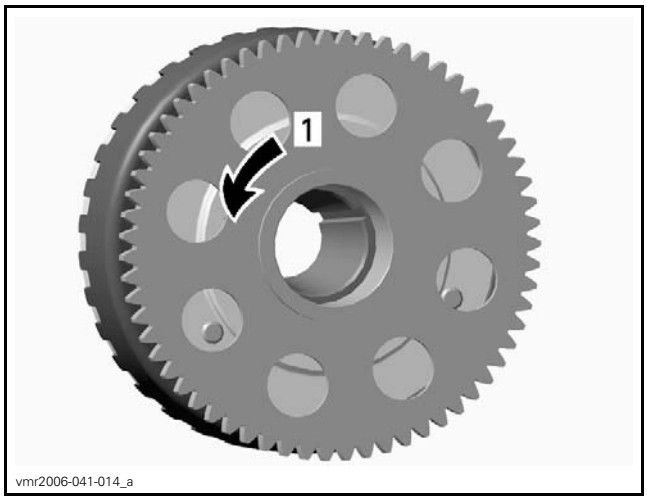
Inspecting the Sprag Clutch

Inspect sprag clutch and sprag clutch housing for wear and damage.

Also check the collar of the sprag clutch gear.

Rotate sprag clutch gear in sprag clutch.

NOTE: Sprag clutch must lock in counterclockwise direction.



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SPRAG CLUTCH FUNCTIONAL TEST
1. Lock

NOTE: Sprag clutch, housing and gear must be replaced at the same time, if damaged.

Installing the Sprag Clutch

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

Clean following parts:

– Threads in sprag clutch housing
– Threads of sprag clutch housing screws.

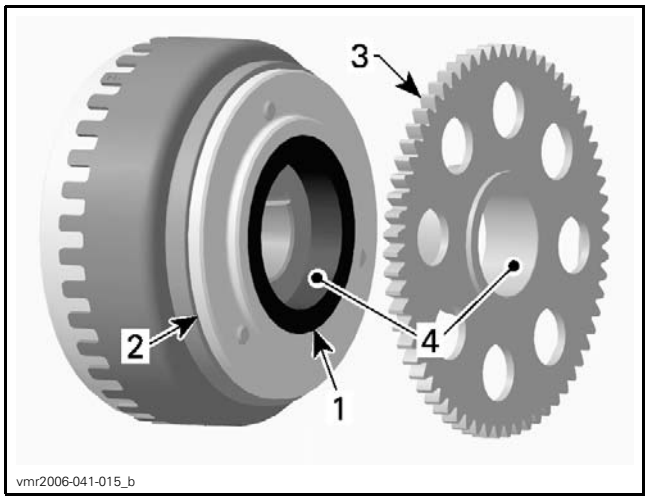
SERVICE PRODUCT	
Scandinavia	PULLEY FLANGE CLEANER (F) (P/N 619 600 022)
Other Countries	CLUTCH AND PULLEY FLANGE CLEANER PRO S1 (P/N 779244)

Apply the following threadlocker on threads of sprag clutch housing screws.

SERVICE PRODUCT	
Scandinavia	LOCTITE 648 (GREEN) (F) (P/N 619 600 012)
Other Countries	LOCTITE 648 (GREEN) (P/N 413 711 400)

Install screws but do not torque yet.

Apply engine oil on sprag clutch and sprag clutch gear needle bearing.



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

Install rotor, refer to *ROTOR* in this subsection.

Tighten sprag clutch housing screws to specification.

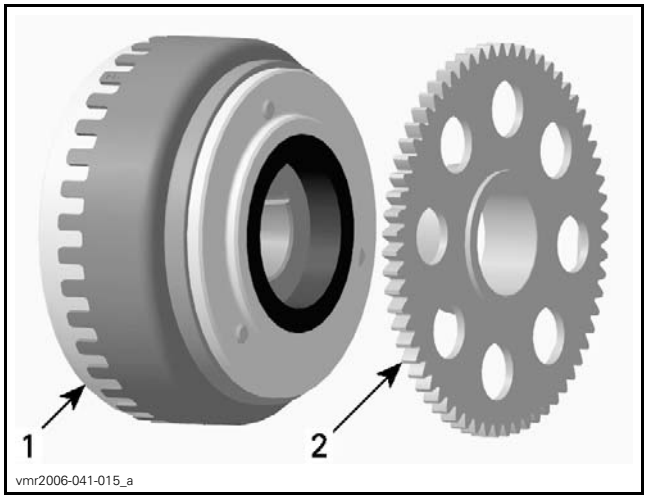
TIGHTENING TORQUE	
Sprag clutch housing screws	30 N•m ± 2 N•m (22 lbf•ft ± 1 lbf•ft)

SPRAG CLUTCH GEAR

Removing the Sprag Clutch Gear

Remove *ROTOR*. See procedure in this subsection.

Pull sprag clutch gear out of the rotor.

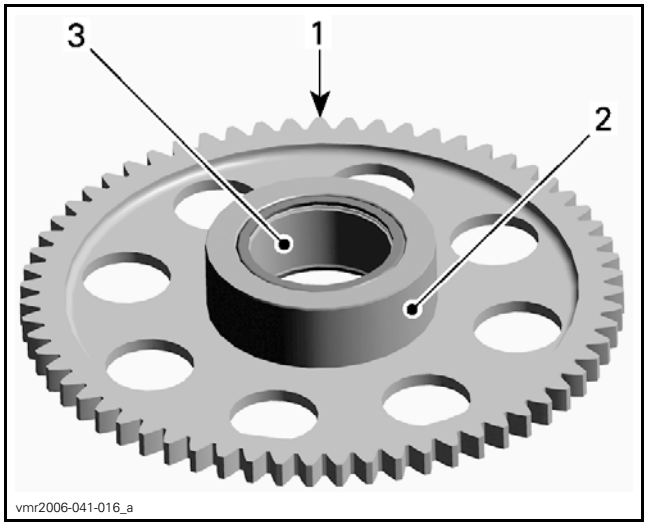


1. *Rotor*
2. *Sprag clutch gear*

Inspecting the Sprag Clutch Gear

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

Check needle bearing condition. Replace sprag clutch gear if necessary.



1. *Teeth*
2. *Collar*
3. *Needle bearing*

Installing the Sprag Clutch Gear

The installation is the reverse of the removal procedure. However, pay attention to the following.

NOTE: Apply engine oil on needle bearing and collar of sprag clutch gear.

STARTER DRIVE GEARS

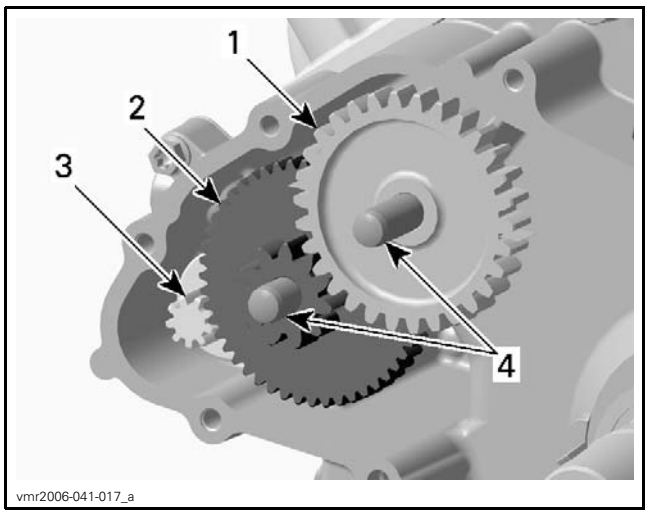
Starter Drive Gear Location

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

Removing the Starter Drive Gear

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

Remove location pins, starter double gear and intermediate gear.



vmr2006-041-017_a

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

Inspecting the Starter Drive Gear

Inspect gears and location pins for wear and damage.

Replace parts as necessary.

Installing the Starter Drive Gear

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

Apply an antiseize lubricant on starter gear before installing the starter double gear.

SERVICE PRODUCT
LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

Apply engine oil on location pins.

ELECTRIC STARTER

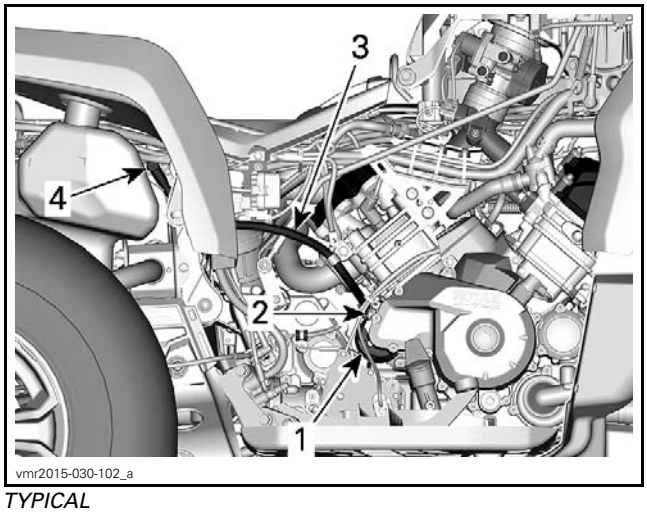
Starter Access for Testing

To access starter electrical terminal, refer to *BODY* subsection and remove the following:

– Seat
– Console
– RH side panel and extension panel
– RH footboard panel.

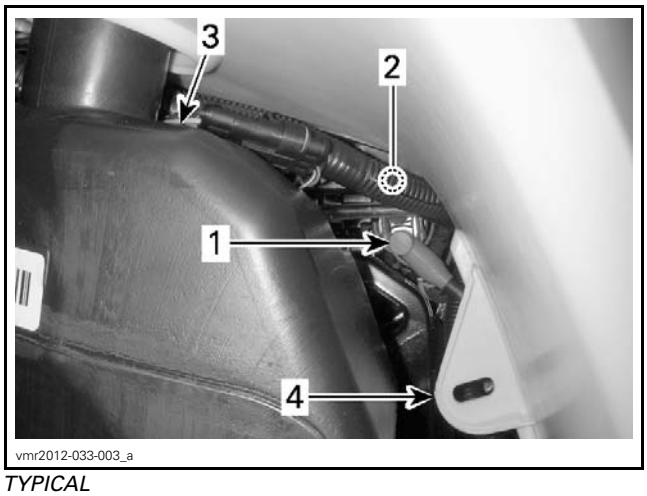
Testing the Starter Operation

1. Disconnect starter power cable from starter solenoid and pull cable out to RH side of the vehicle.



vmr2015-030-102_a

TYPICAL
1. *Starter*
2. *Starter power cable connection at starter*
3. *Starter power cable*
4. *Starter power cable connection at solenoid*



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TYPICAL
1. *Power cable from starter solenoid to starter*
2. *Power cable from battery to starter solenoid (not visible)*
3. *Fuel tank*
4. *RH rear fender*

2. Using booster cables, carefully supply current from a 12 volt battery directly to the starter power cable.

NOTICE **First connect the red jumper cable from the booster battery to the starter cable. Momentarily connect the BLACK (-) cable from the booster battery to engine ground last.**

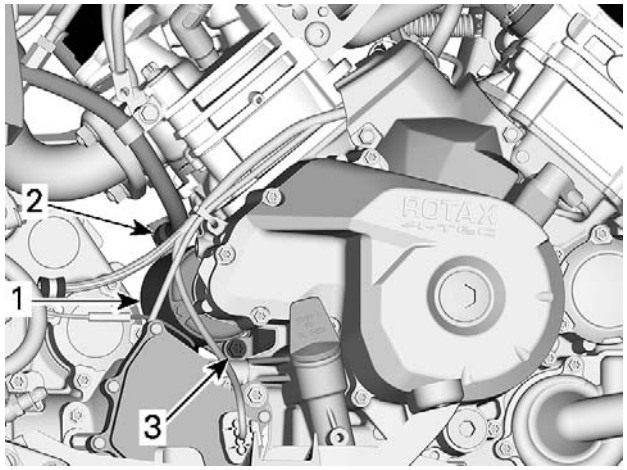
If the starter turns, test other starting system components.

Removing the Starter

1. Ensure ignition switch is set to OFF.
2. Disconnect BLACK (-) cable from battery.

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

3. Remove body parts as listed in *STARTER ACCESS*.
4. For models using the gearbox with GBPS, refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection and remove the:
   – Drive pulley
   – Driven pulley
   – CVT back cover.
5. Disconnect RED (+) cable from starter.
6. Clean starter area.
7. Remove starter retaining screw (from RH side of engine).



1. Starter
2. Starter power cable to disconnect
3. Starter retaining screw to remove

8. Carefully pry the starter from the engine crankcase.

Installing the Starter

Reverse the removal procedure. However, pay particular attention to the following.

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

Lubricate starter O-ring.

SERVICE PRODUCT
LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

Bring starter close to its location. Rotate it so that its mounting ear allows installation in engine crankcase and on its alignment pin.

Push starter in place and align mounting ear to install screw.

TIGHTENING TORQUE	
Starter mounting screw	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

NOTICE **When connecting the RED (+) cable to the starter motor, make sure the battery cables are disconnected.**

TIGHTENING TORQUE	
Starter terminal and retaining nut	6 N•m ± 0.5 N•m (53 lbf•**in** ± 4 lbf•**in**)

Protect the starter terminal and retaining nut with the following product.

SERVICE PRODUCT
BLACK NEOPRENE PAINT (P/N 909570) OR DIELECTRIC GREASE (P/N 293 550 004)

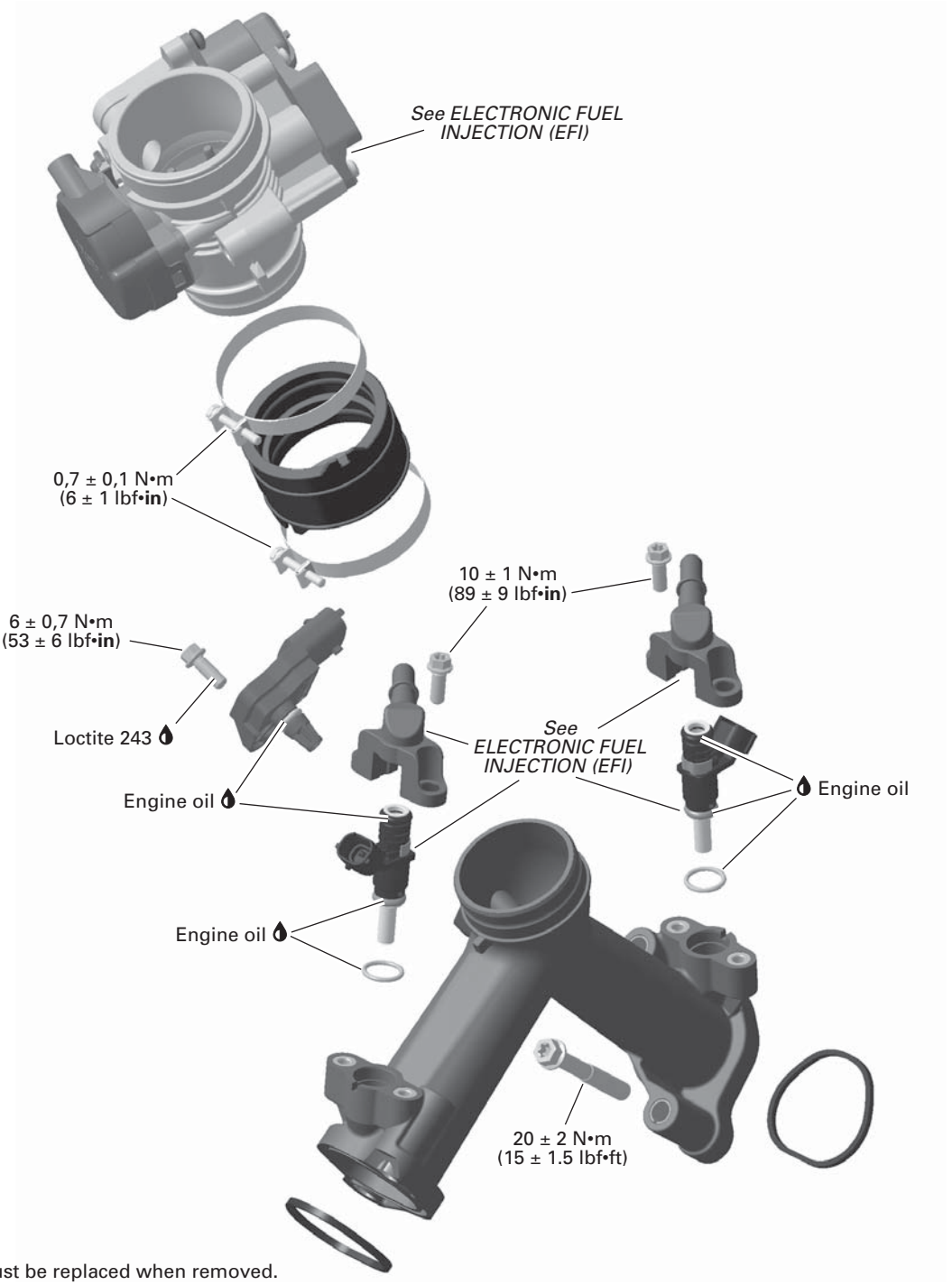
When installing remaining removed parts, refer to applicable subsections.

Connect battery cables.

NOTICE **Always connect RED (+) cable first then BLACK (-) cable last.**

Test starter operation.

INTAKE MANIFOLD



NEW = Component must be replaced when removed.

vmr2016-117-001_a

PROCEDURES

INTAKE MANIFOLD

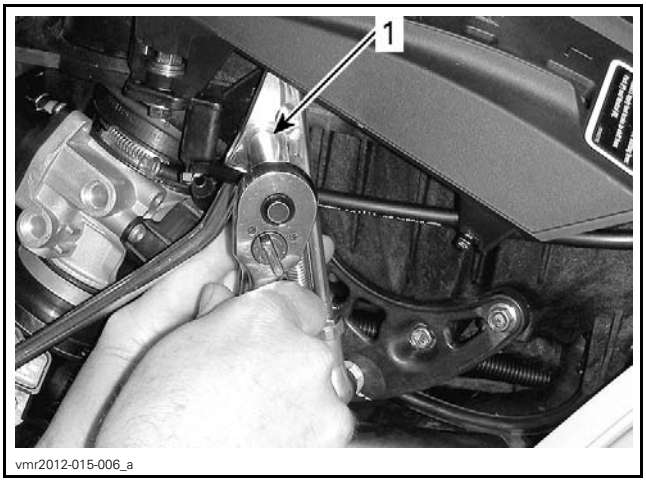
Intake Manifold Access

Refer to *BODY* subsection and remove the following:

– Console
– RH side panel and extension.

Removing the Intake Manifold

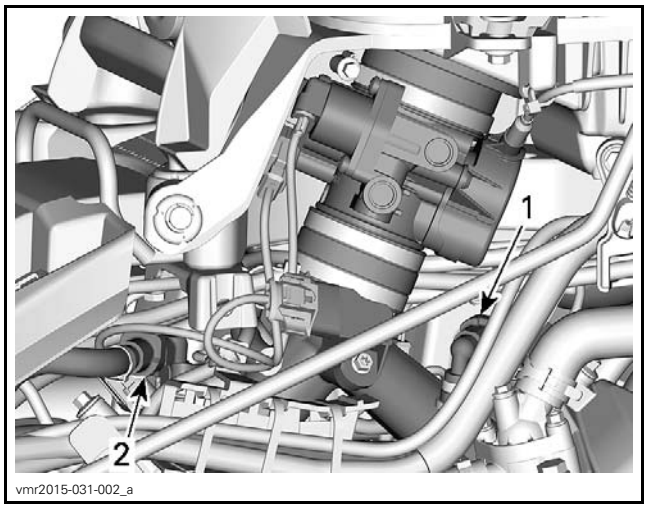
1. Release fuel pressure. Refer to *FUEL TANK AND FUEL PUMP* subsection.
2. Disconnect top of shift rod.



TYPICAL - SHIFT ROD DISCONNECT
1. Remove screw, nut, and bushing

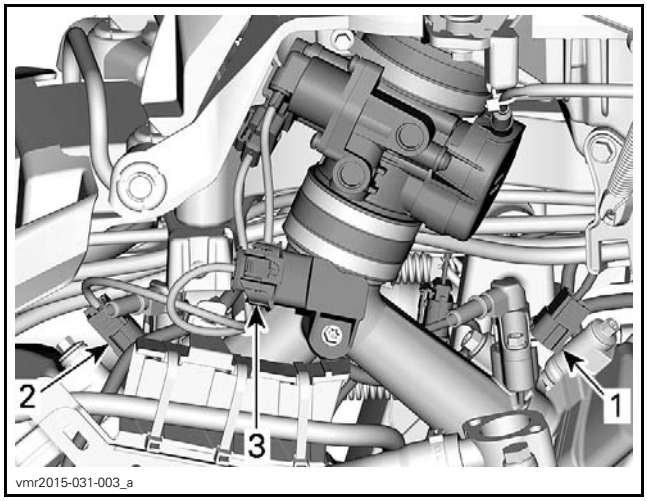
3. Disconnect the fuel hoses from fuel rails, refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.

⚠ CAUTION **The fuel hose may still be under pressure.**



1. Forward fuel rail disconnect
2. Rear fuel rail disconnect

4. Disconnect fuel injector electrical connectors.
5. Disconnect MAPTS connector.

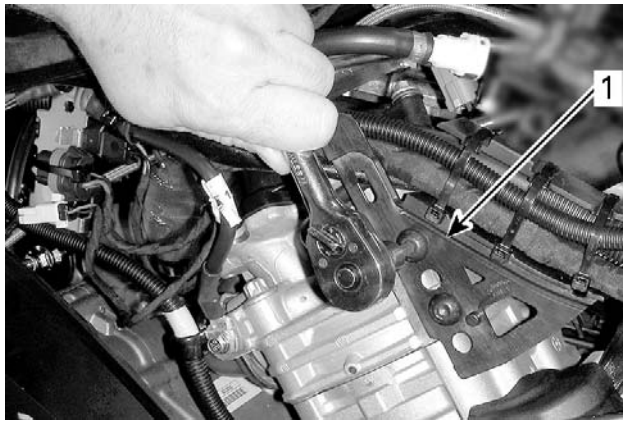


1. Forward fuel injector connector
2. Rear fuel injector connector
3. MAPTS connector

6. Disconnect throttle body from intake manifold and air intake silencer. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.

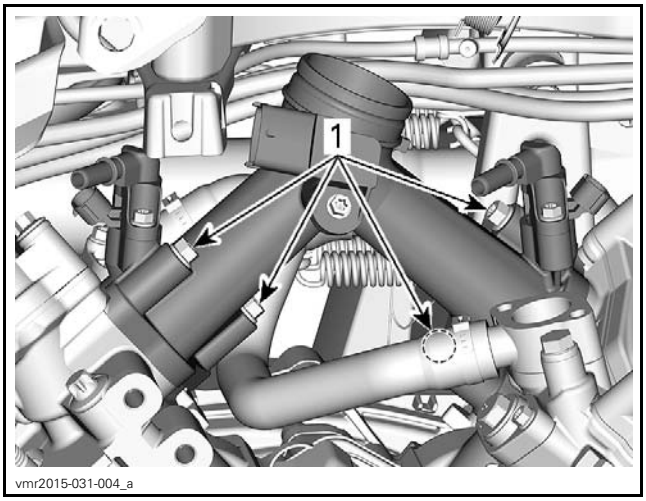
NOTE: Do not disconnect throttle cable needlessly.

7. Remove wiring harness support from engine.



1. Remove

8. Remove intake manifold from engine.



1. Manifold retaining screws (4x)

Inspecting the Intake Manifold

Check intake manifold for cracks, warping at flanges or any other damage. Replace if necessary.

Installing the Intake Manifold

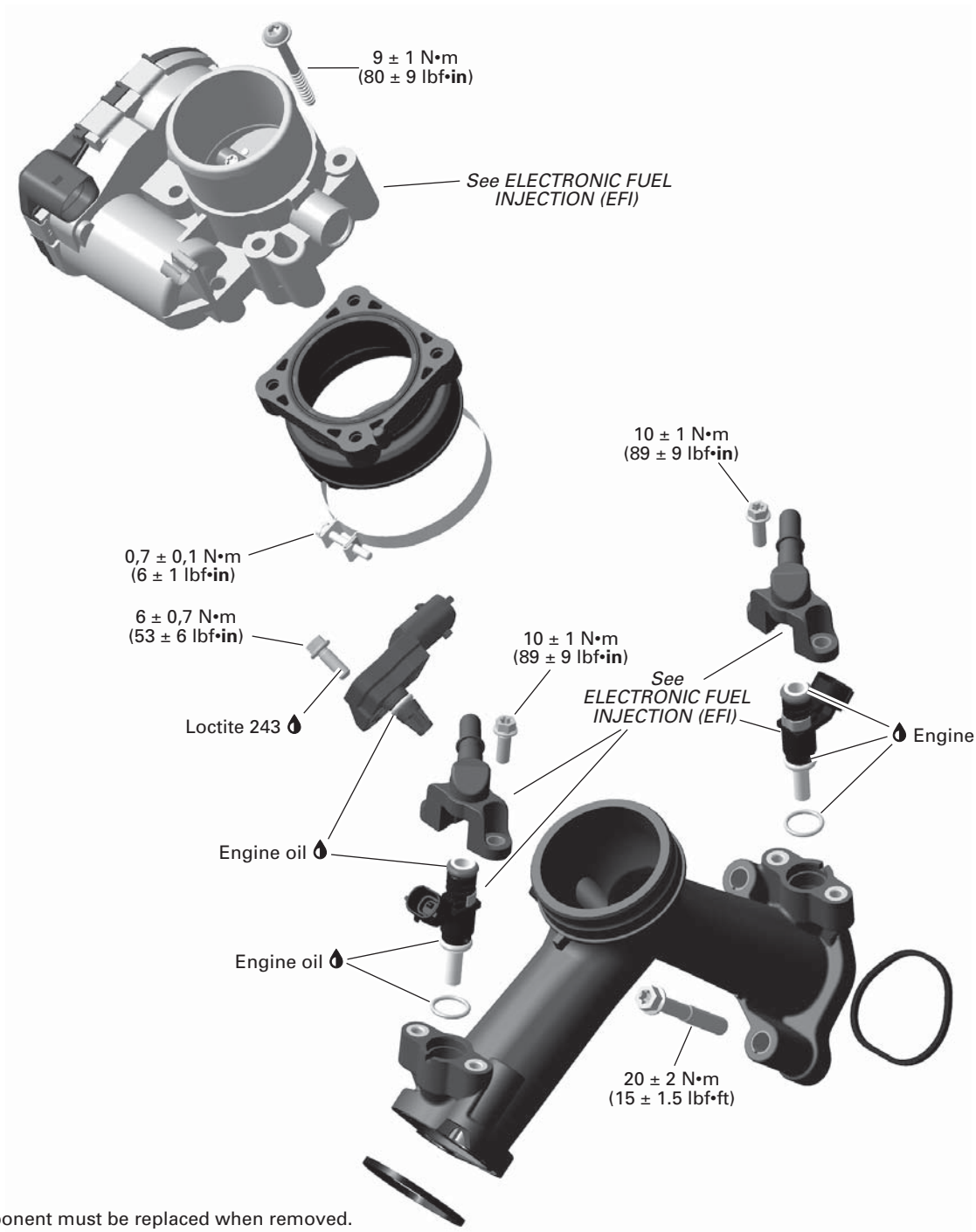
The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten intake manifold retaining screws to specified torque one cylinder at a time.

TIGHTENING TORQUE	
Intake manifold retaining screws	20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)

Enable fuel pump using B.U.D.S.

INTAKE MANIFOLD (WITH iTC)



NEW = Component must be replaced when removed.

RTXT3MY18

PROCEDURES

INTAKE MANIFOLD

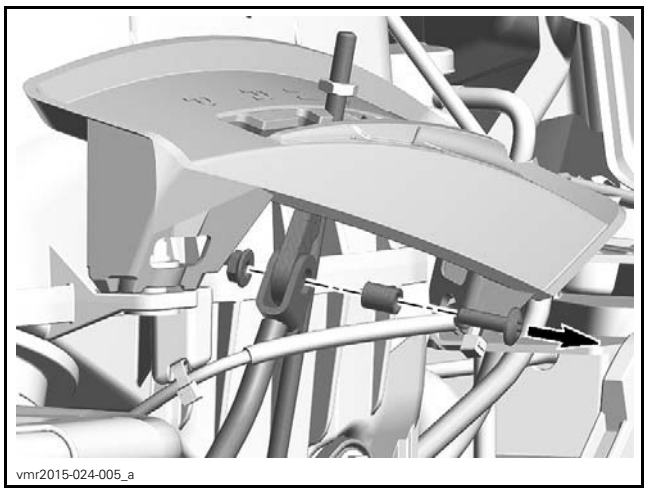
Intake Manifold Access

Refer to *BODY* subsection and remove the following:

– Console
– RH side panel and extension.

Removing the Intake Manifold

1. Release fuel pressure. Refer to *FUEL TANK AND FUEL PUMP* subsection.
2. Disconnect top of shift rod.



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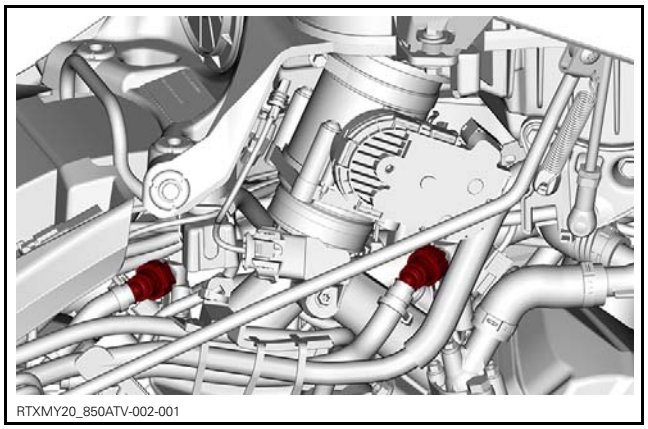
TYPICAL

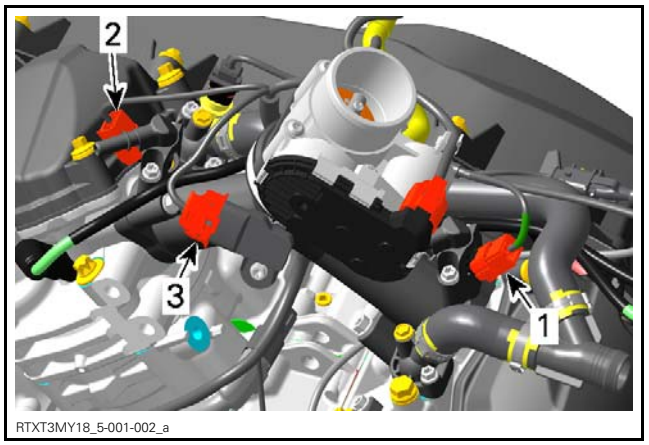
3. Disconnect the fuel hoses from fuel rails, refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.

⚠ CAUTION The fuel hose may still be under pressure.



RTXMY20_850ATV-002-001

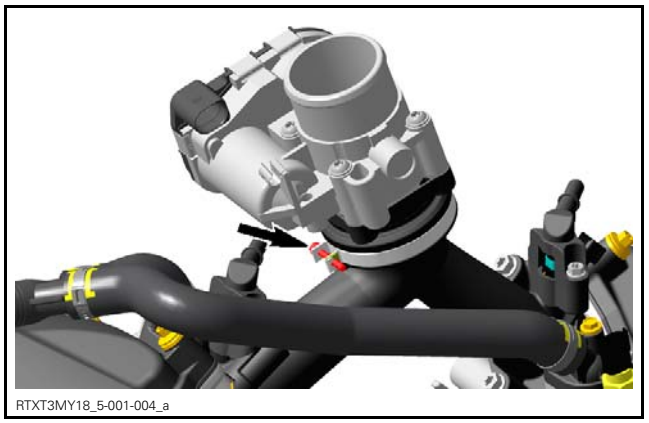
4. Disconnect fuel injector electrical connectors.
5. Disconnect MAPTS connector.



RTXT3MY18_5-001-002_a

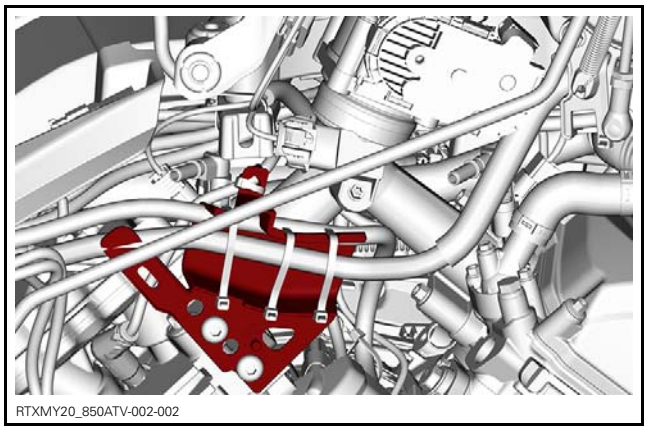
1. *Forward fuel injector connector*
2. *Rear fuel injector connector*
3. *MAPTS connector*

6. Loosen clamp and remove throttle body with intake socket from intake manifold.



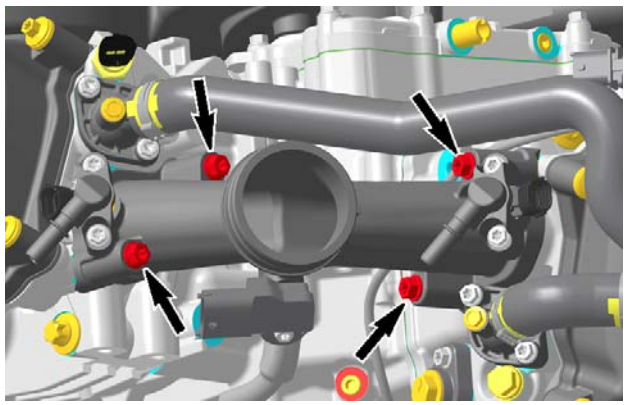
RTXT3MY18_5-001-004_a

7. Disconnect throttle body from air intake silencer. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.
8. Remove wiring harness support from engine.



RTXMY20_850ATV-002-002

9. Remove intake manifold from engine.



RTXT3MY18_5-001-003_a

Inspecting the Intake Manifold

Check intake manifold for cracks, warping at flanges or any other damage. Replace if necessary.

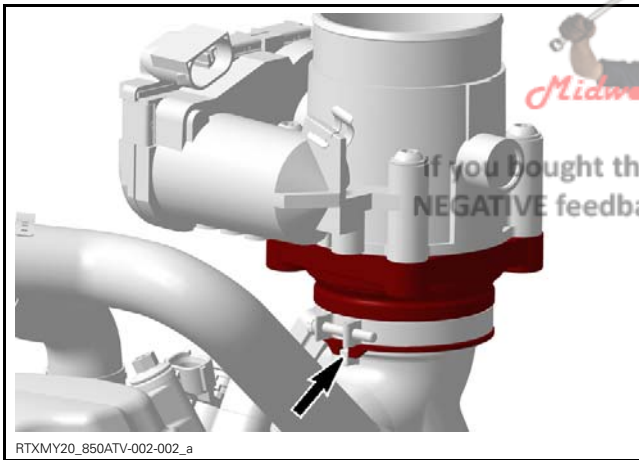
Installing the Intake Manifold

The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten intake manifold retaining screws to specified torque one cylinder at a time.

TIGHTENING TORQUE	
Intake manifold retaining screws	20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)

Ensure to index intake socket notch with intake manifold tab.



RTXMY20_850ATV-002-002_a

Tighten intake socket clamp to specification.

TIGHTENING TORQUE	
Intake socket clamp	0.7 N•m ± 0.1 N•m (6 lbf•**in** ± 1 lbf•**in**)

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TOP END

SERVICE TOOLS

Description	Part Number	Page
CRANKSHAFT LOCKING BOLT	529 035 617	21
DIAL INDICATOR ADAPTER	529 036 159	6
ENGINE LEAK DOWN TEST KIT	529 035 661	6
PISTON CIRCLIP INSTALLER	529 035 921	24
PISTON CIRCLIP INSTALLER	529 036 083	24
PISTON CIRCLIP INSTALLER	529 036 153	24
TDC DIAL INDICATOR	414 104 700	6
VALVE GUIDE INSTALLER	529 036 140	18
VALVE GUIDE INSTALLER	529 036 269	18
VALVE GUIDE REMOVER (6 MM)	529 036 074	18
VALVE GUIDE REMOVER 5 MM	529 035 924	18
VALVE SPRING COMPRESSOR CUP	529 035 764	14
VALVE SPRING COMPRESSOR CUP	529 036 270	14
VALVE SPRING COMPRESSOR	529 035 724	14

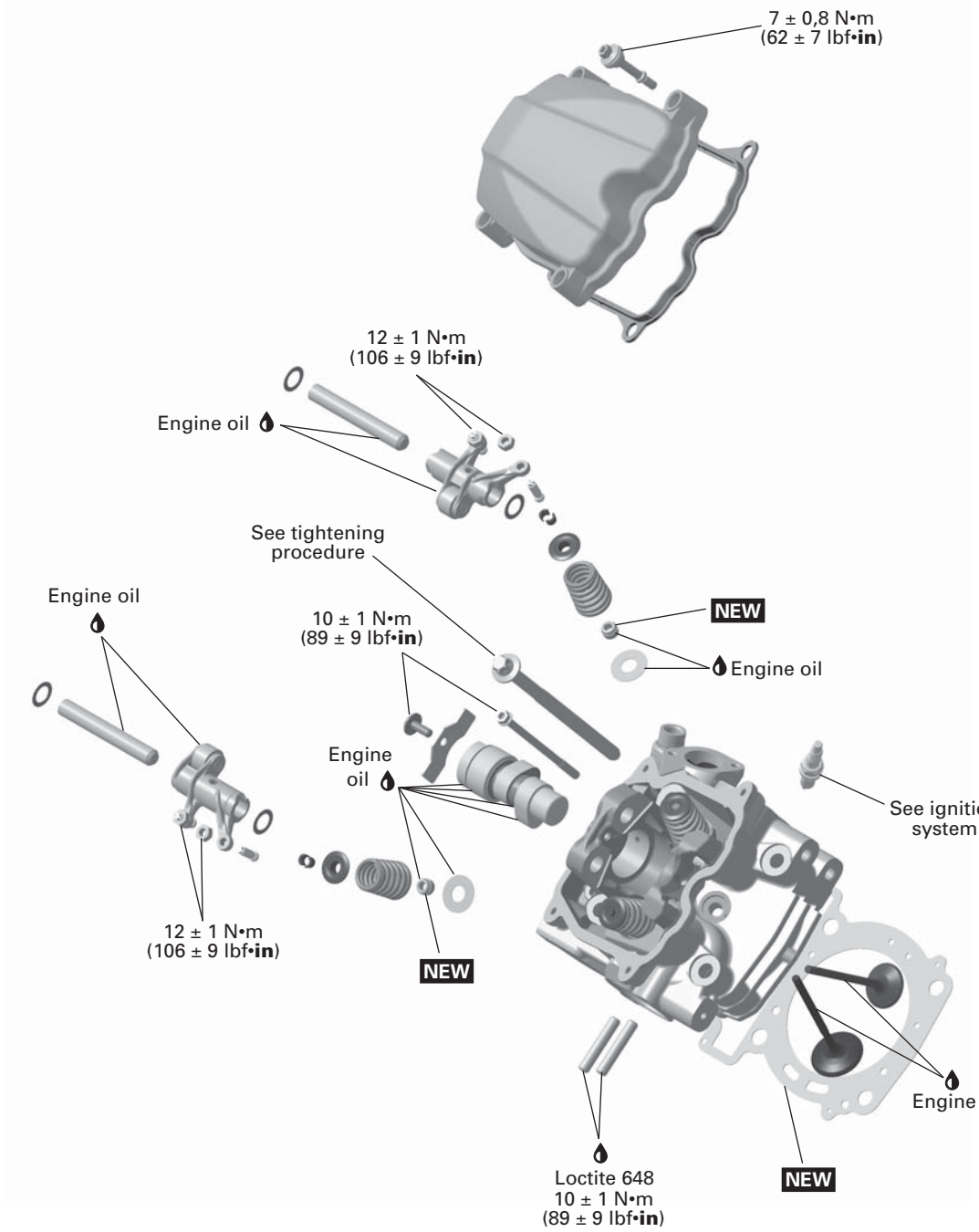
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SNAP-ON PLIERS	YA 8230	16

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	19

CYLINDER HEAD NO. 1



NEW = Component must be replaced when removed.

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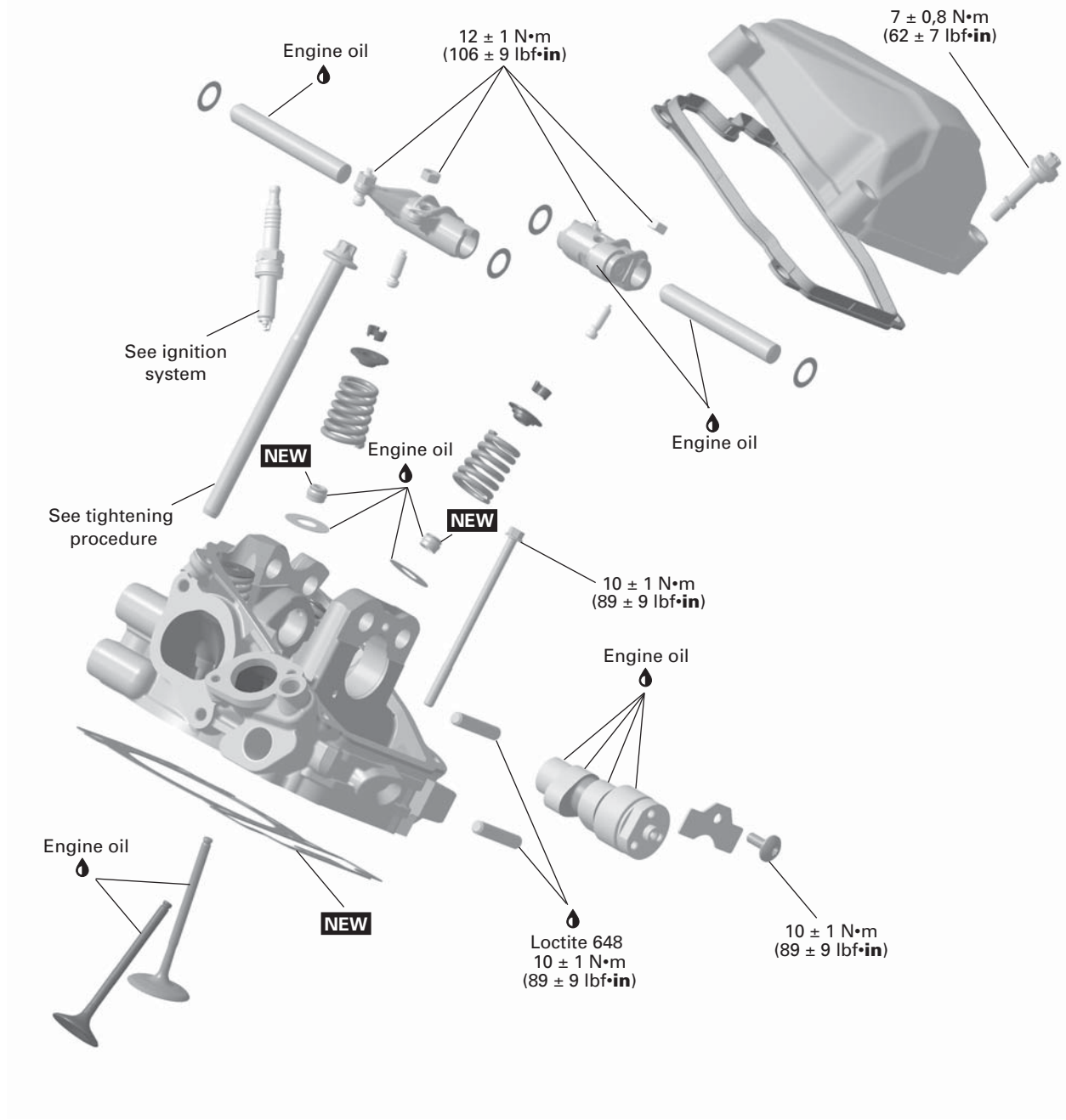
CYLINDER HEAD NO. 2



NEW = Component must be replaced when removed.

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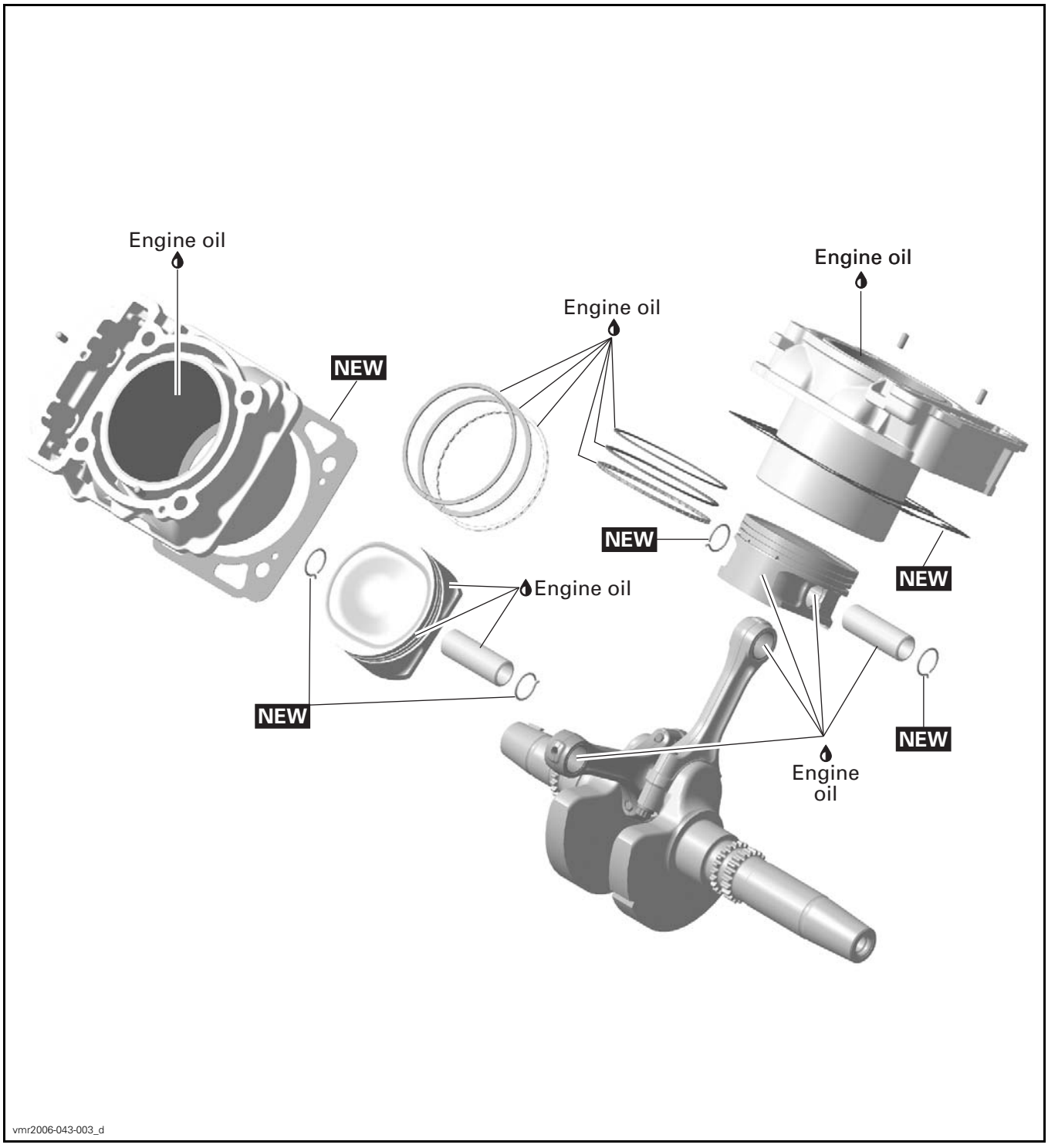
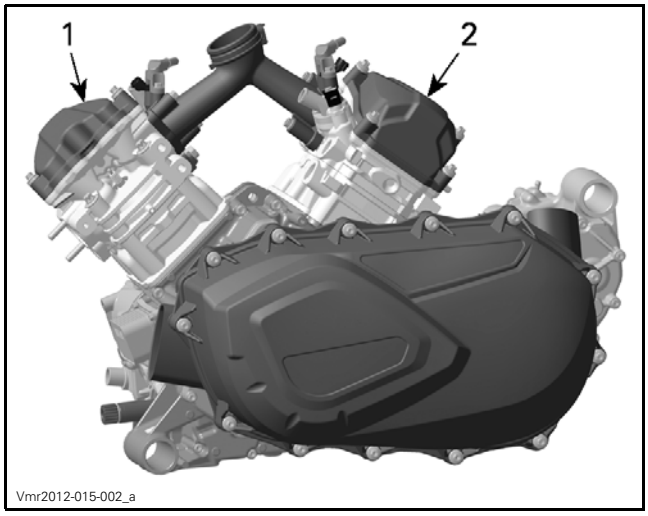
CYLINDERS AND PISTONS



GENERAL

Special reference are made in the text for procedures which are different for cylinder no. 1 and cylinder no. 2.



TYPICAL
1. *Cylinder 1 (front)*
2. *Cylinder 2 (rear)*

When diagnosing an engine problem, always perform a cylinder leak test.

NOTE: Even though the following procedures do not require the engine removal, many illustrations show the engine out of the vehicle for more clarity.

IMPORTANT: Note position of parts upon disassembly. This may help to find the root cause of a problem. A component that is not replaced should be reinstalled in the same position as originally mounted.

INSPECTION

LEAK TEST

Before performing the cylinder leak test, verify the following:

– Clamp(s) tightness
– Radiator and hoses.

NOTE: For best accuracy, the leak test should be done with the engine at normal operating temperature.

⚠ WARNING

Prevent burning yourself on hot engine parts.

Preparing the Leak Test

1. Disconnect battery.

⚠ WARNING

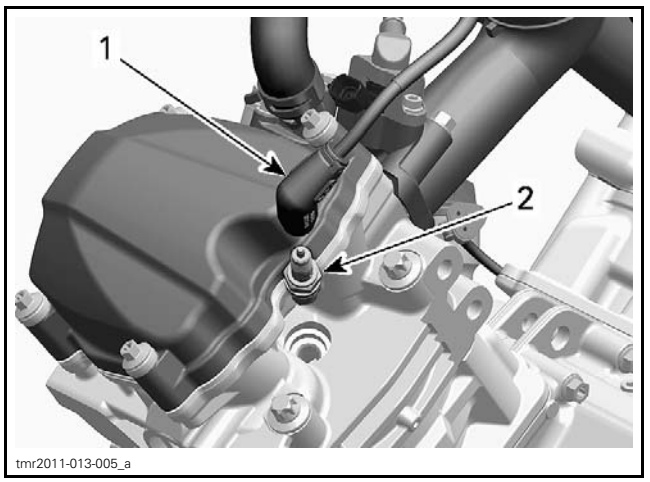
Always respect this order for disassembly; disconnect BLACK (-) cable first.

2. Remove radiator cap.

⚠ WARNING

To prevent being burned, ensure the radiator is cool and wear the appropriate safety equipment before removing the radiator cap.

3. Unplug spark plug cable.
4. Clean spark plug area and remove spark plug from cylinder head.



1. *Spark plug cable*
2. *Spark plug*

5. Remove *VALVE COVER*. See procedure in this subsection.
6. Rotate crankshaft until piston is at ignition TDC.
7. Turn crankshaft using one of the following two procedures.

First Procedure

Turn the drive pulley.

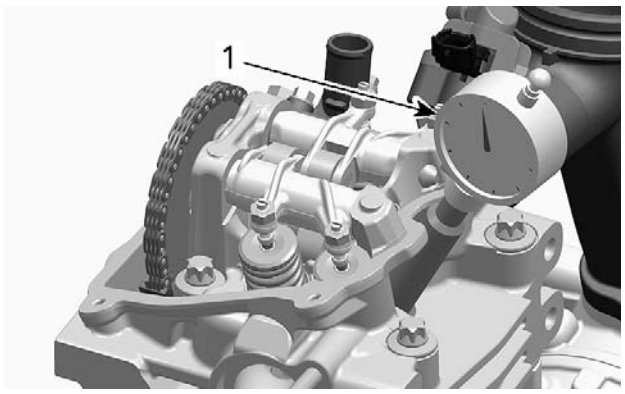
Second Procedure

1. Remove plug screw with O-ring from magneto cover.
2. Use a 14 mm Allen key and turn crankshaft.

NOTICE **Turn only clockwise to avoid loosening of magneto flywheel Allen screw.**

3. Set the piston to precisely ignition TDC.

ENGINE	REQUIRED TOOL	
All	TDC DIAL INDICATOR (P/N 414 104 700)	
850 and 1000R	DIAL INDICATOR ADAPTER (P/N 529 036 159)	

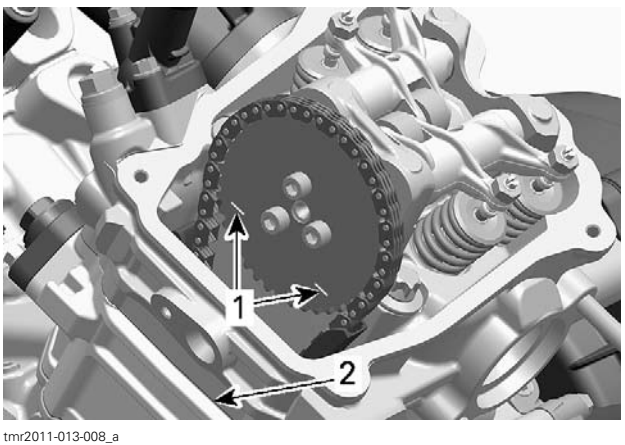


1. TDC dial indicator

NOTE: If a dial gauge is not available, use a screwdriver or another similarly suitable tool.

NOTICE Do not scratch or damage piston/cylinder surface.

NOTE: At ignition TDC the marks on the camshaft timing gear have to be parallel to cylinder head base as per following illustration.



1. Marks on camshaft timing gear
2. Cylinder head base

Leak Test

1. Install the gauge adapter in the spark plug hole.

REQUIRED TOOL	
ENGINE LEAK DOWN TEST KIT (P/N 529 035 661)	

2. Connect to an adequate air supply.
3. Set needle of measuring gauge to zero.

NOTE: All testers have specific instructions on gauge operation and required pressure.

4. Supply combustion chamber with air pressure.
5. Note the amount or percentage of leakage (depending on tester).

LEAKAGE PERCENTAGE	ENGINE CONDITION
0% to 15%	Excellent condition
16% to 25%	Good condition
26% to 40%	Fair condition; reduced engine performance
41% and higher	Poor condition, diagnose and repair engine

NOTE: To make sure there is no false reading due to a valve not being perfectly seated, tap each valve adjustment screw (on the rocker arm) using a soft hammer.

Diagnosis

Listen for air leaks.

– Air escaping in intake port/throttle body means leaking intake valve(s).
– Air escaping in exhaust port means leaking exhaust valve(s).
– Air bubbles in the coolant (radiator) means leaking cylinder head gasket.
– Air/coolant escaping from cylinder/head means damaged gasket(s) and/or loosened screws.
– Air escaping into crankcase area means excessively worn cylinder and/or broken piston rings.
– Air/oil escaping from crankcase means damaged gasket and/or loosened screws (refer to *BOTTOM END* subsection).

NOTE: For all checkpoints mentioned above, see appropriate engine section to diagnose and repair the engine.

Reassembly

Reverse the preparation procedure. Ensure to respect torque values and use of appropriate products/lubricants. Refer to exploded views in other subsections of this manual as required.

PROCEDURES

VALVE COVER

Valve Cover Access

Front Cylinder

Refer to *BODY* subsection and remove the following.
- Seat
- Console
- RH side panel
- RH inner fender panel

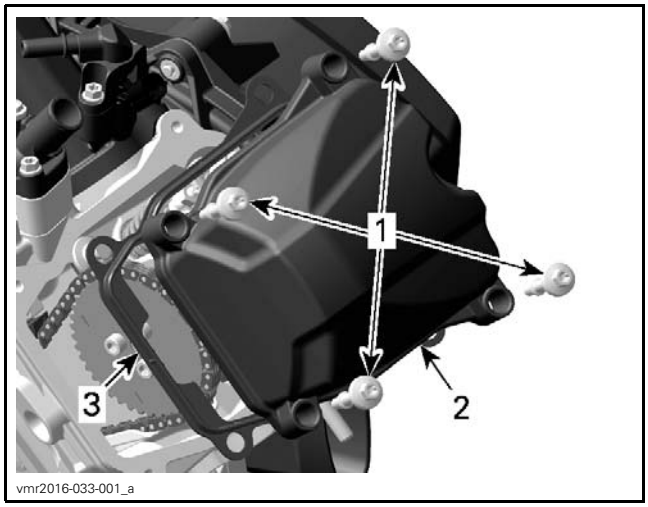
Rear Cylinder

Refer to *BODY* and remove:
- Seat
- Console
- RH side panel
- LH side panel.

Refer to *EXHAUST SYSTEM* and remove exhaust pipe.

Removing the Valve Cover

Remove:
- Valve cover screws
- Valve cover
- Gasket.



TYPICAL — FRONT CYLINDER SHOWN
1. *Valve cover screws*
2. *Valve cover*
3. *Gasket*

Inspecting the Valve Cover

Check the gasket on the valve cover if it is brittle, cracked or hard. If so, replace the gasket.

Installing the Valve Cover

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

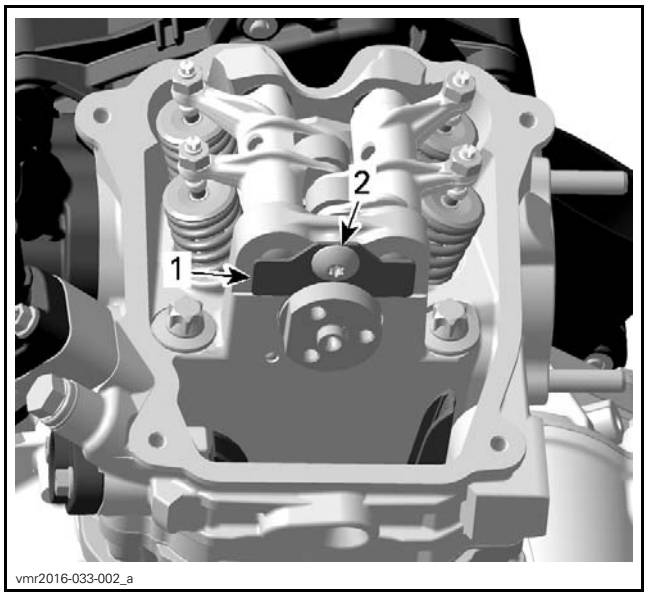
Tighten valve cover retaining screws to specified torque in a criss-cross sequence.

TIGHTENING TORQUE	
Valve cover retaining screws	7 N•m ± 0.8 N•m (62 lbf•**in** ± 7 lbf•**in**)

ROCKER ARM

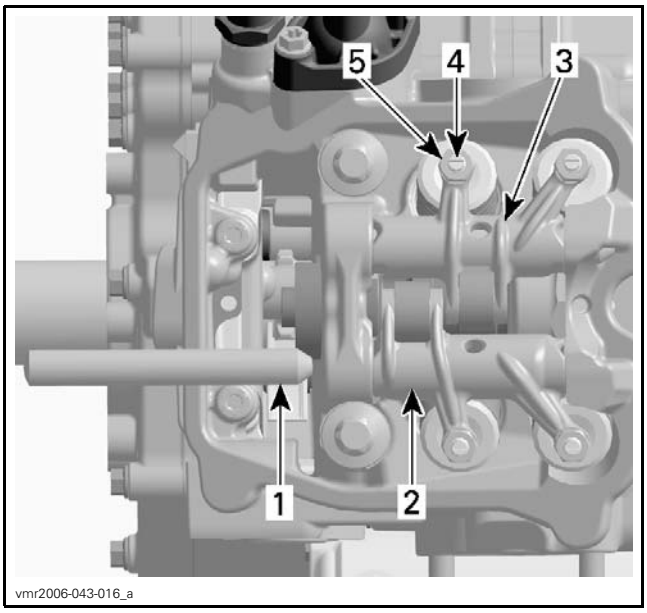
Removing the Rocker Arm

1. Remove *VALVE COVER*. See procedure in this subsection.
2. Refer to *TIMING CHAIN* subsection and remove following parts:
   - Timing chain tensioner
   - Camshaft timing gear.
3. Remove pan head screw and camshaft retaining plate.



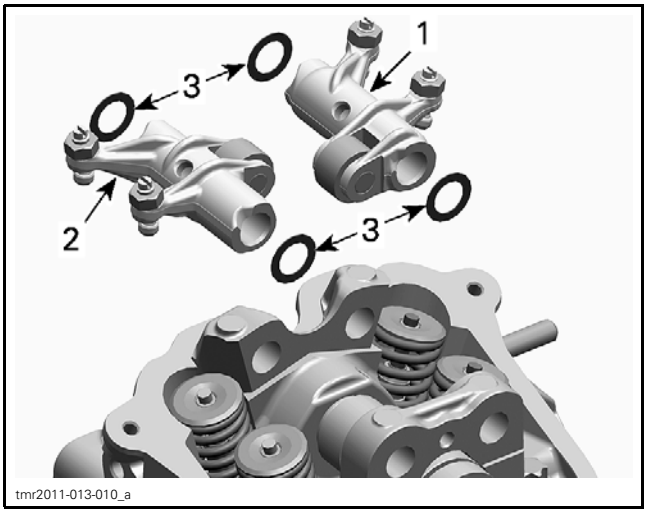
1. *Camshaft retaining plate*
2. *Pan head screw*

4. Remove rocker arm shafts.



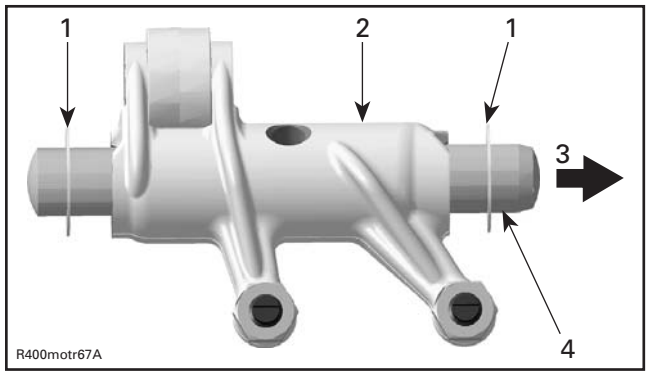
1. Rocker arm shaft
2. Rocker arm (exhaust side)
3. Rocker arm (intake side)
4. Adjustment screw
5. Lock nut

5. Remove rocker arm assembly (exhaust side and intake side) with adjustment screws and lock nuts.
6. Remove thrust washers.



1. Rocker arm (exhaust side)
2. Rocker arm (intake side)
3. Thrust washers

NOTICE Pay attention not to lose thrust washers or drop them into the timing chain compartment.

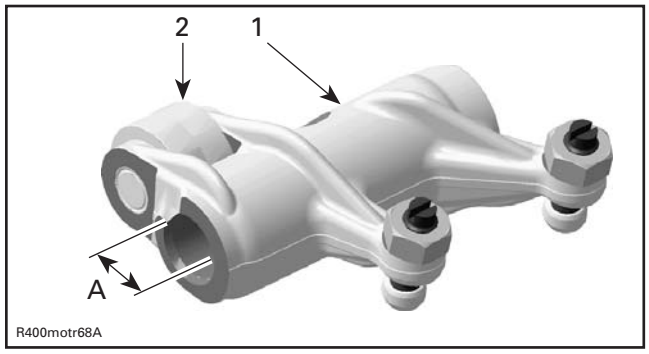


1. 2 thrust washers
2. Rocker arm (exhaust side)
3. Cylinder head (spark plug side)
4. Big taper to spark plug side

Inspecting the Rocker Arm

Inspect each rocker arm for cracks and scored friction surfaces. If so, replace rocker arm assembly.

Check the rocker arm rollers for free movement, wear and excessive radial play. Replace rocker arm assembly if necessary.

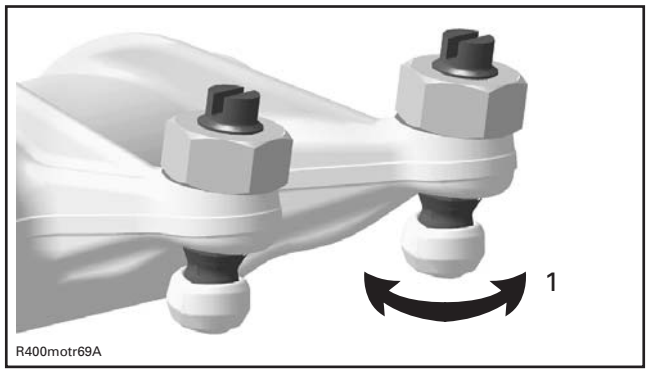


1. Rocker arm (exhaust side)
2. Roller
A. Bore for rocker arm shaft

Measure rocker arm bore diameter. If diameter is out of specification, change the rocker arm assembly.

ROCKER ARM BORE DIAMETER	
NEW	12.036 mm to 12.050 mm (.4739 in to .4744 in)
SERVICE LIMIT	12.060 mm (.4748 in)

Check adjustment screws for free movement, cracks and/or excessive play.

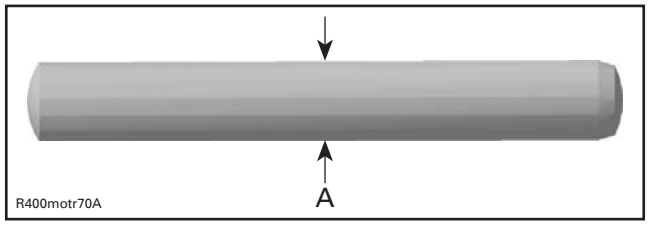


1. Free movement of adjustment screw top

Inspecting the Rocker Arm Shaft

Check for scored friction surfaces; if so, replace parts.

Measure rocker arm shaft diameter.



A. Measure rocker arm shaft diameter here

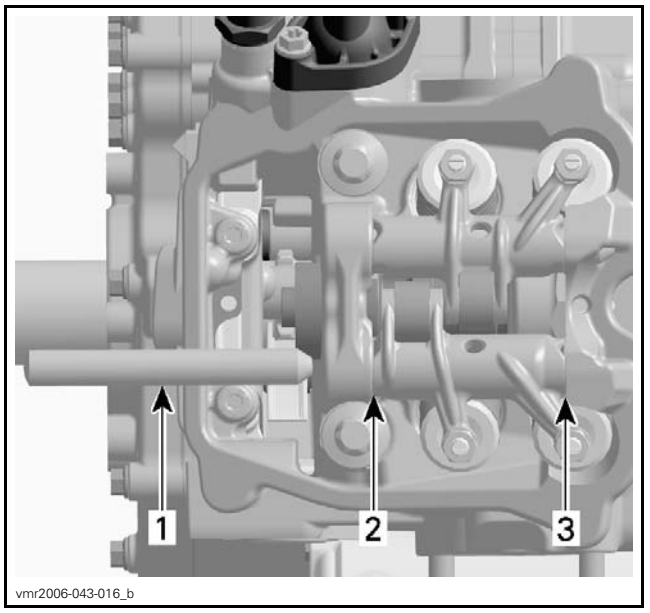
ROCKER ARM SHAFT DIAMETER	
NEW	12.000 mm to 12.018 mm (.4724 in to .4731 in)
SERVICE LIMIT	11.990 mm (.472 in)

Any area worn excessively will require parts replacement.

Installing the Rocker Arm

NOTE: Use the same procedure for exhaust and intake rocker arm.

1. Apply engine oil on rocker arm shaft.
2. Insert a rocker arm shaft with the chamfered edge first through rocker arm pin bore.
3. Install a thrust washer at timing chain side, then the proper rocker arm (exhaust side or intake side).
4. Push in rocker arm shaft until its chamfer reaches the end of rocker arm bore.

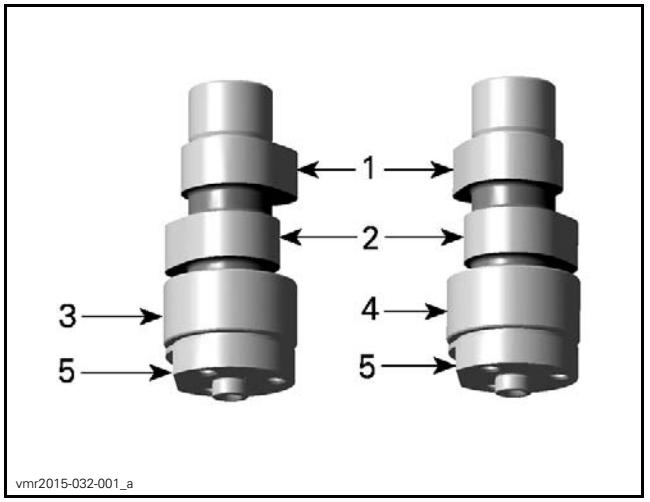


1. Rocker arm shaft
2. Thrust washer (timing chain side)
3. Thrust washer (spark plug side)

5. Place the other thrust washer and push rocker arm shaft to end position.
6. Install the camshaft retaining plate.
7. Adjust valve clearance, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

CAMSHAFT

NOTE: The engine is equipped with two different camshafts.



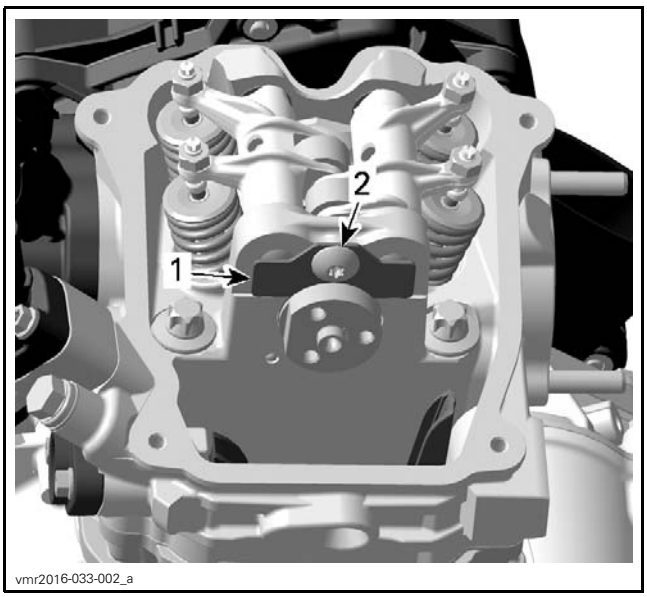
1. Intake cam
2. Exhaust cam
3. Camshaft of cylinder 1
4. Camshaft of cylinder 2
5. Flat spot

Removing the Camshaft

The removal procedure is the same for both camshafts.

NOTICE Each camshaft is different in design. Thus, it is important not to mix up any parts of the camshaft assembly with that of the other cylinder. Keep parts as a group.

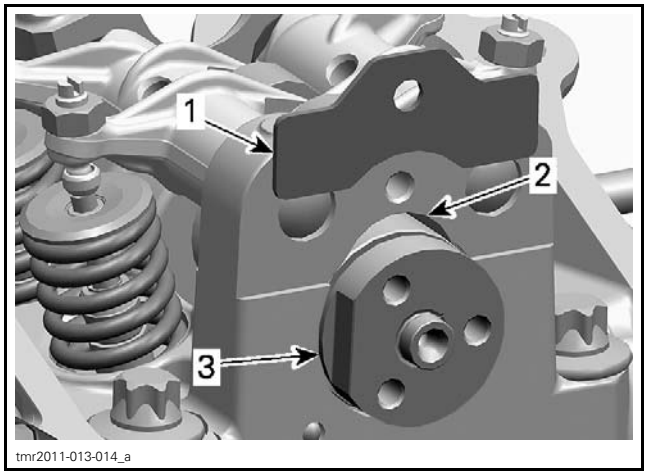
1. Remove valve cover (see *VALVE COVER* in this subsection).
2. Refer to the *TIMING CHAIN* subsection to remove the following parts:
   - Chain tensioner
   - Camshaft timing gear.
3. Remove the camshaft retaining plate.



1. Camshaft retaining plate
2. Pan head screw
3. Cylinder head

4. Remove rocker arms (see *ROCKER ARM* in this subsection).
5. Remove the camshaft.

NOTE: For removal rotate camshaft so that intake/exhaust lobe shows to upper side of cylinder head.



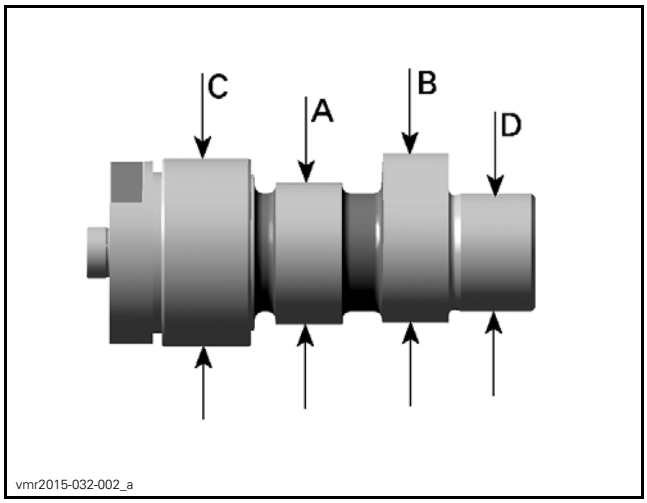
1. Camshaft retaining plate
2. Area for camshaft lobes
3. Camshaft

Inspecting the Camshaft

Inspecting the Camshaft Lobe

Check each lobe for scoring, scuffing, cracks or other signs of wear.

Measure camshaft lobe height using a micrometer.



A. Camshaft lobe (exhaust valves)
B. Camshaft lobe (intake valves)
C. Camshaft journal (timing chain side)
D. Camshaft journal (spark plug side)

CAMSHAFT LOBE (INTAKE)		
570 engine	NEW	31.830 mm to 32.030 mm (1.2531 in to 1.261 in)
	SERVICE LIMIT	31.810 mm (1.2524 in)

CAMSHAFT LOBE (INTAKE)		
850 engine	NEW	32.890 mm to 33.090 mm (1.2949 in to 1.3028 in)
	SERVICE LIMIT	32.870 mm (1.2941 in)
1000R engine	NEW	32.960 mm to 33.160 mm (1.2976 in to 1.3055 in)
	SERVICE LIMIT	32.940 mm (1.2969 in)

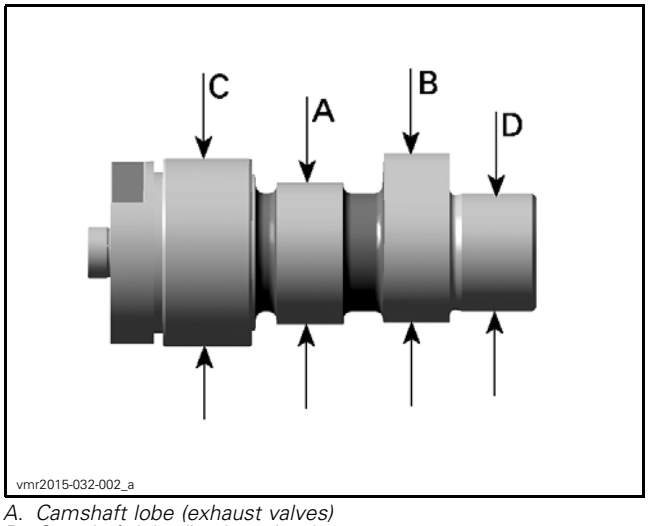
CAMSHAFT LOBE (EXHAUST)		
570 engine	NEW	31.730 mm to 31.930 mm (1.2492 in to 1.2571 in)
	SERVICE LIMIT	31.710 mm (1.2484 in)
850 engine	NEW	32.950 mm to 33.150 mm (1.2972 in to 1.3051 in)
	SERVICE LIMIT	32.930 mm (1.2965 in)
1000R engine	NEW	32.860 mm to 33.060 mm (1.2937 in to 1.3016 in)
	SERVICE LIMIT	32.840 mm (1.2929 in)

Measure camshaft bearing in cylinder head. Refer to *CYLINDER HEAD INSPECTION* in this subsection.

Inspecting the Camshaft Journal

Check each journal for scoring, scuffing, cracks or other signs of wear.

Measure camshaft journal using a micrometer.



A. Camshaft lobe (exhaust valves)
B. Camshaft lobe (intake valves)
C. Camshaft journal (timing chain side)
D. Camshaft journal (spark plug side)

CAMSHAFT JOURNAL (TIMING CHAIN SIDE)	
NEW	34.959 mm to 34.975 mm (1.3763 in to 1.377 in)
SERVICE LIMIT	34.950 mm (1.376 in)

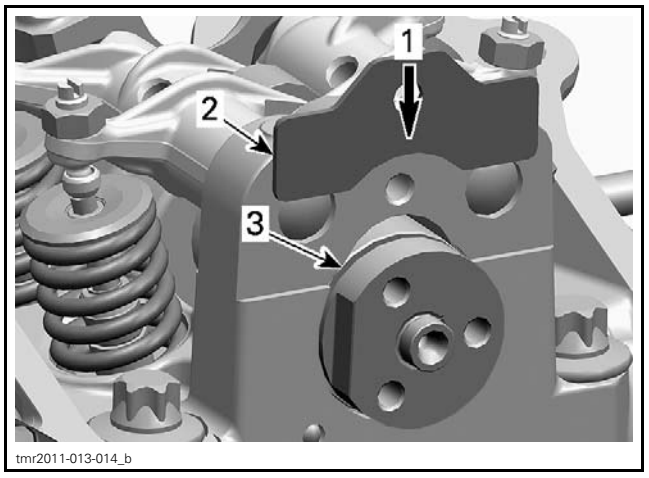
CAMSHAFT JOURNAL (SPARK PLUG SIDE)	
NEW	21.959 mm to 21.980 mm (.8645 in to .8654 in)
SERVICE LIMIT	21.950 mm (.8642 in)

Installing the Camshaft

Reverse the removal procedure. Pay attention to the following details.

NOTICE **The camshafts are not identical in design. Do not invert the camshafts during assembly. Any mix-up of the components will lead to engine damage.**

Place the camshaft retaining plate in the slot of the camshaft.



1. Direction of movement
2. Camshaft retaining plate
3. Slot retaining camshaft

For other parts, refer to proper installation procedure.

CYLINDER HEAD

Cylinder Head Access

Refer to *VALVE COVER* in this subsection.

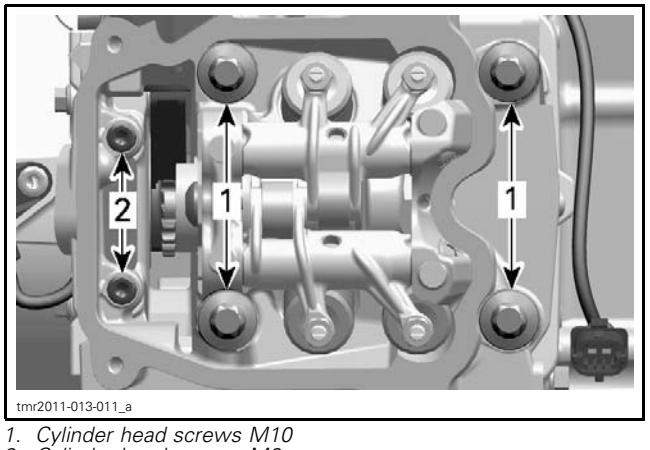
Removing the Cylinder Head

1. The removal procedure is the same for both cylinder heads.

2. Drain coolant (refer to *PERIODIC MAINTENANCE PROCEDURES* subsection).
3. Disconnect the coolant hose from the thermostat housing.

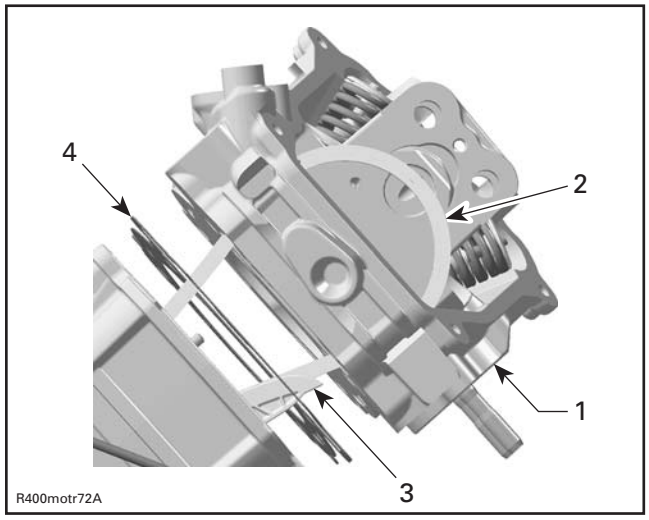
NOTE: Before removing cylinder head, blow out remaining coolant by air pressure. During cylinder head removal, the remaining coolant in cylinder head could overflow into the engine and a little quantity of coolant could drop into the engine. In this case, the engine oil will be contaminated.

4. Refer to *EXHAUST SYSTEM* subsection and disconnect exhaust system head pipe from cylinder head.
5. Disconnect spark plug wire.
6. Disconnect temperature sensor connector, located at rear cylinder head.
7. Remove the intake manifold. Refer to *INTAKE MANIFOLD* subsection.
8. Remove the valve cover and its gasket (see *VALVE COVER* in this subsection).
9. Refer to the *TIMING CHAIN* subsection to remove the following parts:
   – Chain tensioner
   – Camshaft timing gear.
10. First remove the M6 cylinder head screws, then the cylinder head screws M10.



1. Cylinder head screws M10
2. Cylinder head screws M6

11. Pull up cylinder head.
12. Remove timing chain guide (fixed).
13. Remove and discard the cylinder head gasket.



1. Cylinder head
2. Timing chain
3. Chain guide (fixed)
4. Cylinder head gasket

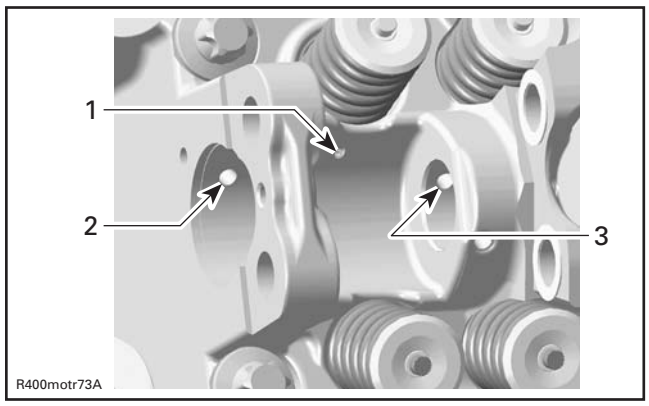
Inspecting the Cylinder Head

Inspect timing chain guide (fixed) for wear, cracks or other damages. Replace if necessary.

Check for cracks between valve seats, if so, replace cylinder head.

Check mating surface between cylinder and cylinder head for contamination. If so, clean both surfaces.

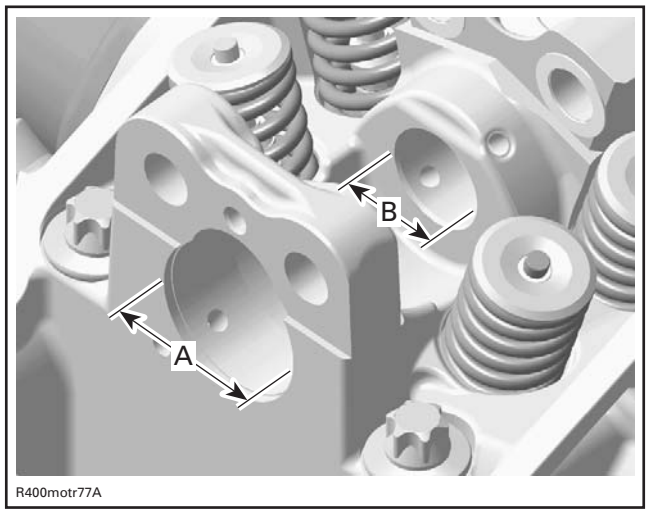
Clean oil support through the cylinder head from contamination.



1. Oil port to lubricate camshaft lobes intake/exhaust
2. Oil supply to camshaft bearing journal (timing chain side)
3. Oil supply to camshaft bearing journal (spark plug side)

Inspecting the Cylinder Head Camshaft Bearing

Measure camshaft bearing in cylinder head.



A. Camshaft bearing (timing chain side)
B. Camshaft bearing (spark plug side)

CAMSHAFT BEARING (TIMING CHAIN SIDE)	
NEW	35.000 mm to 35.025 mm (1.378 in to 1.3789 in)
SERVICE LIMIT	35.040 mm (1.3795 in)
CAMSHAFT BEARING (SPARK PLUG SIDE)	
NEW	22.000 mm to 22.021 mm (.8661 in to .867 in)
SERVICE LIMIT	22.040 mm (.8677 in)

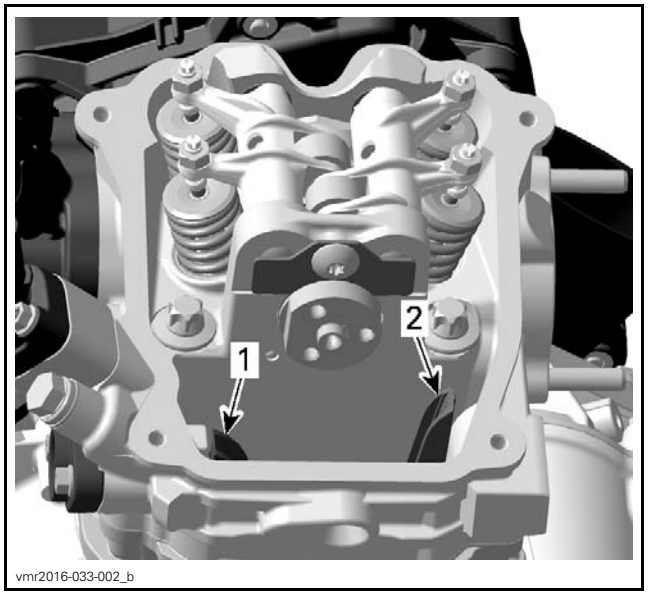
Installing the Cylinder Head

NOTE: Front and rear cylinder heads are not identical. Never interchange cylinder heads.

Reverse the removal procedure. Pay attention to the following details.

Ensure dowel pins are in place.

NOTICE Timing chain guide (fixed) has to be fixed between cylinder and cylinder head.

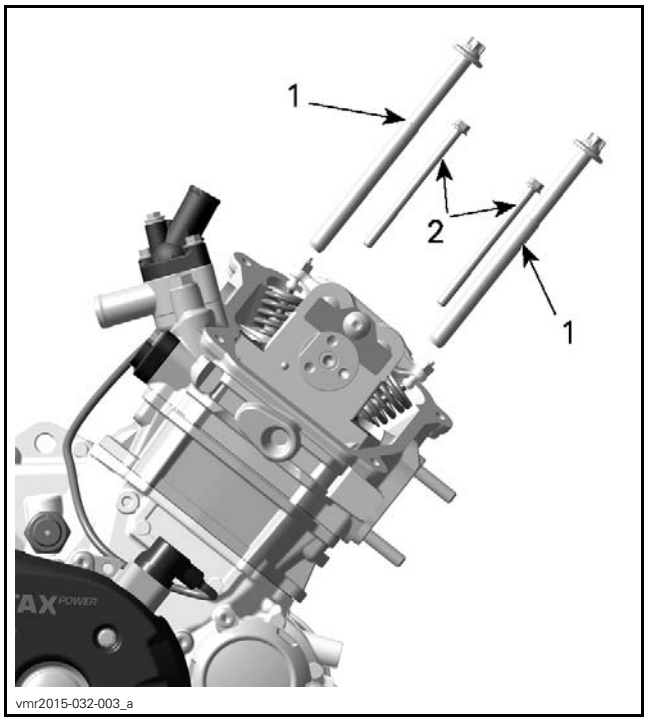


1. Timing chain guide (tensioner side) mounted in crankcase
2. Timing chain guide (fixed) between cylinder and cylinder head

Install a NEW cylinder head gasket.

Install cylinder head screws in correct position.

NOTICE Cylinder head screws have different sizes and lengths.

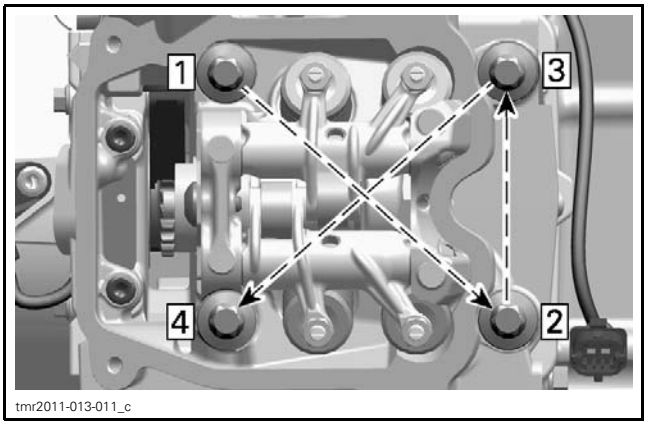


1. Location no. 1
2. Location no. 2

CYLINDER HEAD SCREW IDENTIFICATION		
570 and 850 engines	Location no. 1	M10 x 140
	Location no. 2	M6 x 85
1000R engine	Location no. 1	M10 x 159
	Location no. 2	M6 x 105

Tighten M10 cylinder head screws FIRST as per following specifications.

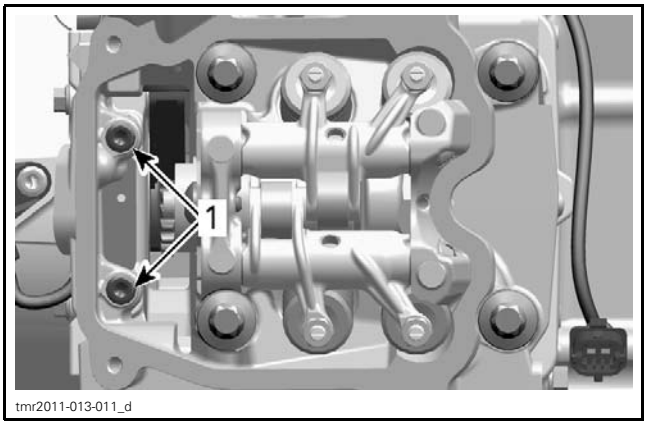
NOTE: Always perform one step on all M10 cylinder head screws before going to the next step.



TIGHTENING SEQUENCE - M10 CYLINDER HEAD SCREWS

TIGHTENING TORQUE		
M10 cylinder head screws	STEP A	20 N•m ± 1 N•m (15 lbf•ft ± 1 lbf•ft)
	STEP B	180° +/- 5°

Tighten M6 cylinder head screws as per following specification.



1. M6 Screws

TIGHTENING TORQUE	
M6 cylinder head screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Check timing chain guide (tensioner side) for movement.

Refer to applicable subsection for installation details of remaining removed parts.

VALVE SPRINGS

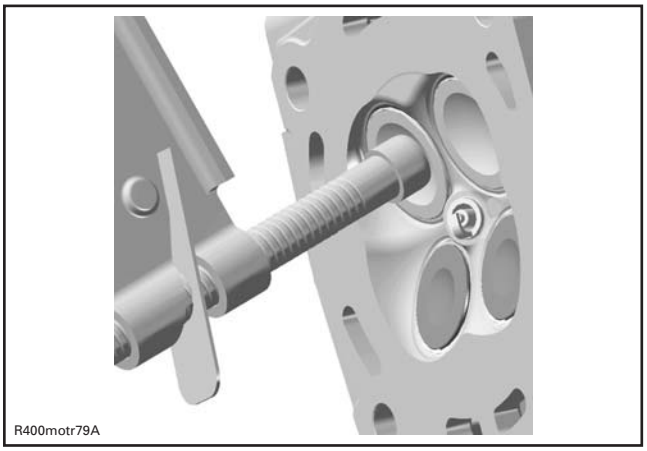
Removing the Valve Spring

1. Refer to following procedures in this subsection to remove:
   – *CAMSHAFT*
   – *CYLINDER HEAD*.
2. Remove valve spring.

ENGINE	REQUIRED TOOL	
All engines	VALVE SPRING COMPRESSOR (P/N 529 035 724)	
570 engine	VALVE SPRING COMPRESSOR CUP (P/N 529 035 764)	
850 and 1000R engines	VALVE SPRING COMPRESSOR CUP (P/N 529 036 270)	

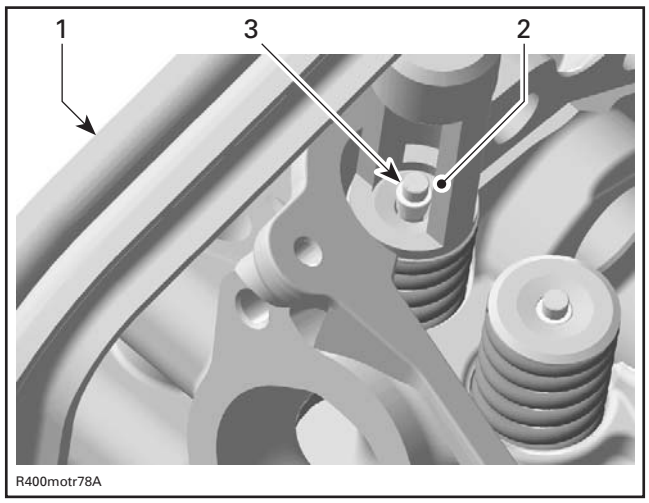
⚠ WARNING

Always wear safety glasses when disassembling valve springs. Be careful when unlocking valves. Components could fly away because of the strong spring preload.



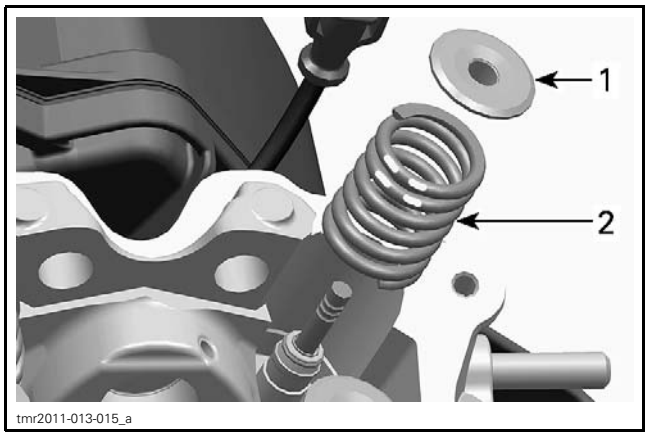
LOCATE VALVE SPRING COMPRESSOR CLAMP IN CENTER OF THE VALVE

3. Remove valve cotters.



1. Valve spring compressor clamp
2. Valve spring compressor cup
3. Valve cotter

4. Remove tools and withdraw valve spring retainer and valve spring.

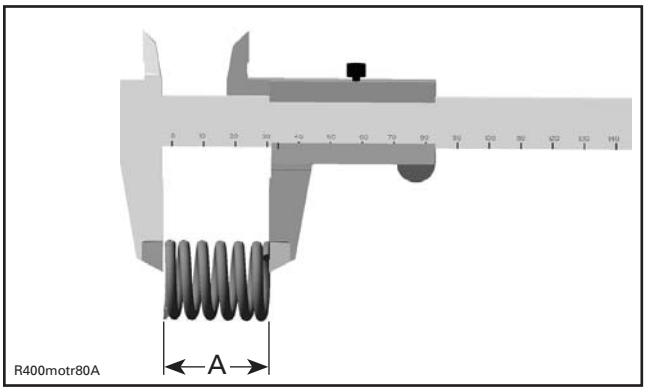


1. Valve spring retainer
2. Valve spring

Inspecting the Valve Spring

Check valve spring for visible damage. If so, replace valve spring.

Check valve spring for free length and straightness.



A. Valve spring length

VALVE SPRING FREE LENGTH		
570 ENGINE	NOMINAL NEW	40.81 mm (1.607 in)
850 AND 1000R ENGINES	NOMINAL NEW	40.41 mm (1.591 in)
ALL ENGINES	Service limit	39.00 mm (1.535 in)

Replace valve springs if not within specifications.

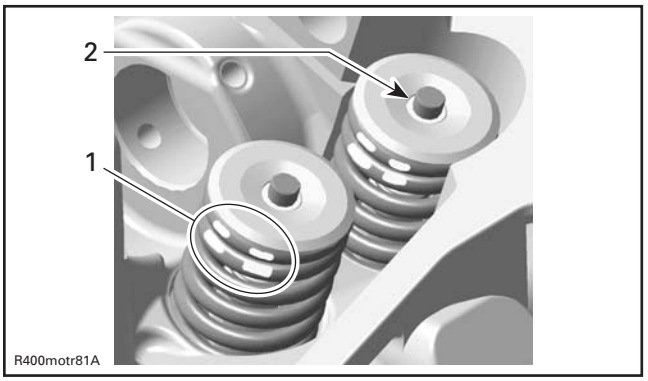
Installing the Valve Spring

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

Colored area of the valve spring must be placed on top.

To ease installation of cotters, apply oil or grease on them so that they remain in place while releasing the spring.

NOTE: Valve cotter must be properly engaged in valve stem grooves.



1. Position of the valve spring
2. Valve cotter

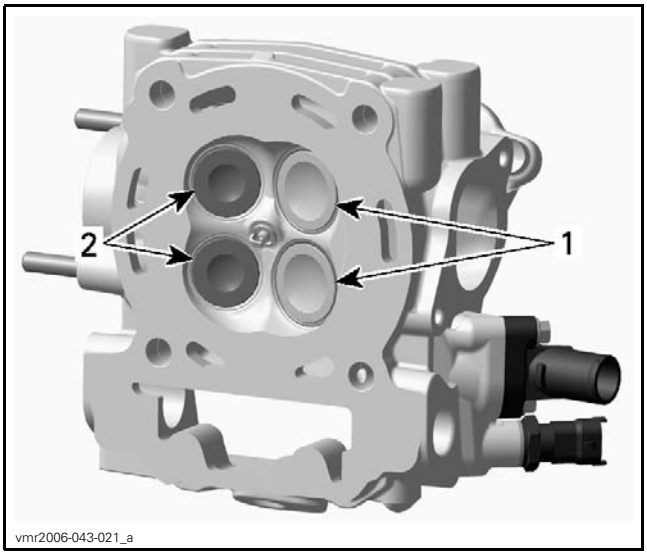
After spring is installed, ensure it is properly locked by tapping on valve stem end with a soft hammer so that valve opens and closes a few times.

NOTICE An improperly locked valve spring will cause engine damage.

VALVES

Removing the Valve

1. Remove valve spring, see *VALVE SPRING* in this subsection.
2. Push valve stem, then pull valves (intake and exhaust) out of valve guide.



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1. Intake valves 31 mm
2. Exhaust valves 27 mm

3. Remove valve stem seal and discard it.

REQUIRED TOOL
SNAP-ON PLIERS (P/N YA 8230)

vmr2006-043-023

Inspecting the Valve

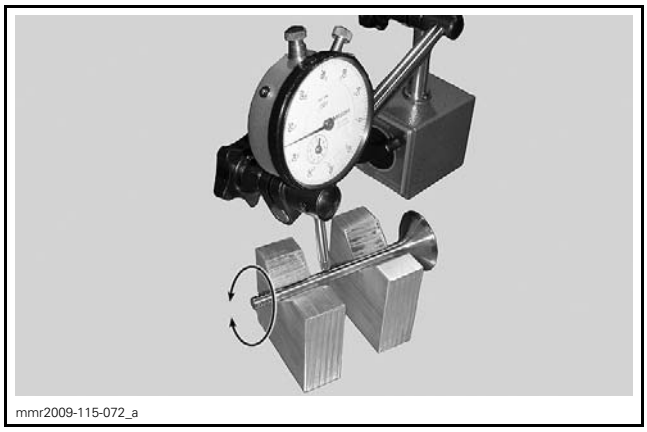
Whenever valves are removed always inspect valve guides. Refer to *VALVE GUIDES* in this subsection.

Valve Stem Seal

Always install **NEW** seals whenever valves are removed.

Inspecting the Valve

Inspect valve surface, check for abnormal stem wear and bending. If out of specification, replace by a new one.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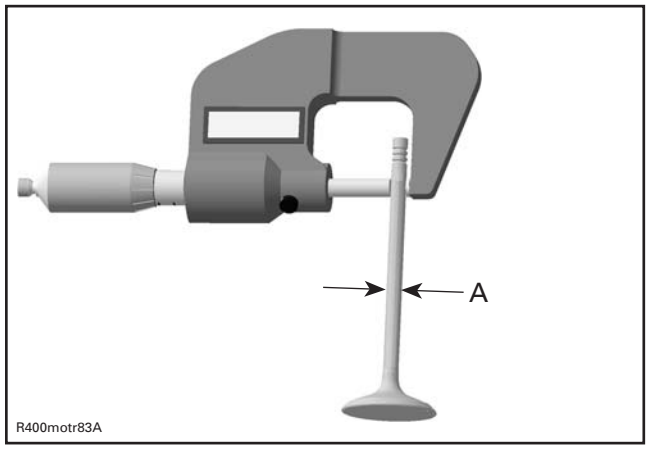
VALVE OUT OF ROUND (INTAKE AND EXHAUST VALVES)	
NEW	0.005 mm (.0002 in)
SERVICE LIMIT	0.06 mm (.0024 in)

Inspecting the Valve Stem

Measure valve stem in three places using a micrometer.

Replace valve if valve stem is out of specification or has other damages such as wear or friction surface.

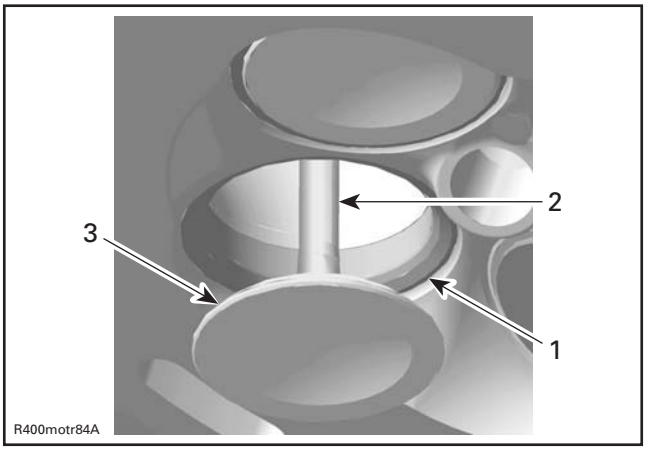


R400motr83A

A. Valve stem diameter

VALVE STEM DIAMETER		
EXHAUST VALVE		
570 engine	NEW	4.956 mm to 4.970 mm (.1951 in to .1957 in)
	SERVICE LIMIT	4.930 mm (.1941 in)
850 and 1000R engines	NEW	5.461 mm to 5.476 mm (.215 in to .2156 in)
	SERVICE LIMIT	5.440 mm (.2142 in)
INTAKE VALVE		
570 engine	NEW	4.966 mm to 4.980 mm (.1955 in to .1961 in)
	SERVICE LIMIT	4.930 mm (.1941 in)
850 and 1000R engines	NEW	5.472 mm to 5.486 mm (.2154 in to .216 in)
	SERVICE LIMIT	5.450 mm (.2146 in)

Inspecting the Valve Face and Seat



1. Valve seat
2. Exhaust valve contaminated area
3. Valve face (contact surface to valve seat)

Check valve face and seat for burning or pitting and replace valve or cylinder head if there are signs of damage.

Ensure to seat valves properly. Apply some lapping compound to valve face and work valve on its seat with a lapping tool (see *VALVE GUIDES* in this subsection).

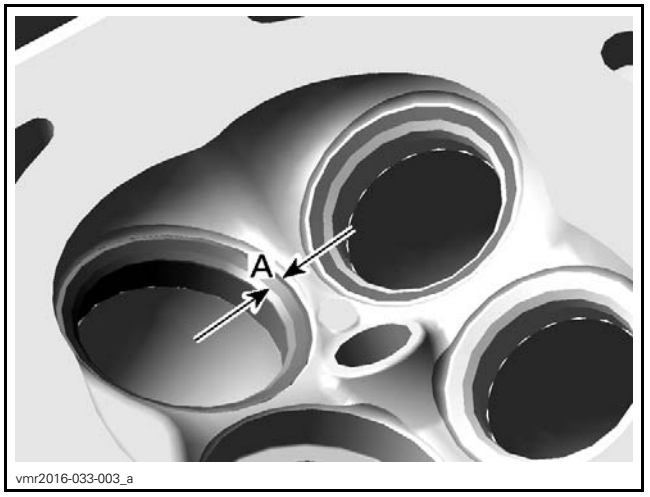
Measure valve face contact width.

NOTE: The location of contact area should be in center of valve seat.

Measure valve seat width using a caliper.

VALVE SEAT CONTACT WIDTH	
EXHAUST VALVE	
NEW	1.25 mm to 1.55 mm (.049 in to .061 in)
SERVICE LIMIT	2.00 mm (.079 in)
INTAKE VALVE	
NEW	1.05 mm to 1.35 mm (.041 in to .053 in)
SERVICE LIMIT	1.80 mm (.071 in)

If valve seat contact width is too wide or has dark spots, replace the cylinder head.



A. Valve seat contact width

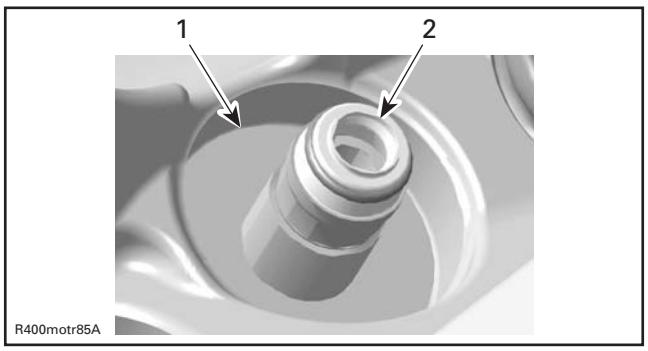
Installing the Valve

Reverse the removal procedure. Pay attention to the following details.

Install a NEW valve stem seal. Make sure thrust washer is installed before installing seal.

Apply engine oil on valve stem and install it.

NOTICE **Be careful when valve stem is passed through sealing lips of valve stem seal.**



1. Thrust washer
2. Sealing lips of valve stem seal

To ease installation of cotters, apply oil or grease on them so that they remain in place while releasing the spring.

After spring is installed, ensure it is properly locked by tapping on valve stem end with a soft hammer so that valve opens and closes a few times.

NOTICE **An improperly locked valve spring will cause engine damage.**

VALVE GUIDES

Inspecting the Valve Guide

Always replace valve stem seals whenever valve guides are removed.

Measure valve guide in three places using a small bore gauge.

NOTE: Clean valve guide to remove carbon deposits before measuring.

Replace valve guide if it is out of specification or has other damages such as wear or friction surface.

VALVE GUIDE DIAMETER (INTAKE AND EXHAUST VALVES)		
570 ENGINE	NEW	4.998 mm to 5.018 mm (.1968 in to .1976 in)
	SERVICE LIMIT	5.050 mm (.1988 in)
850 AND 1000R ENGINES	NEW	5.506 mm to 5.518 mm (.2168 in to .2172 in)
	SERVICE LIMIT	5.568 mm (.2192 in)

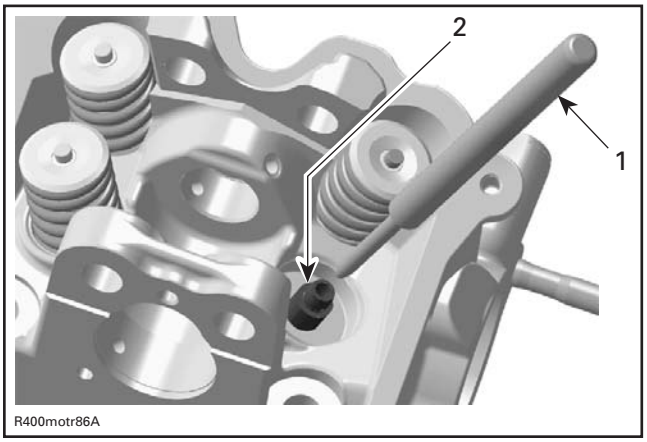
Removing the Valve Guide

1. Remove cylinder head (see *CYLINDER HEAD* in this subsection).
2. Remove valves (see *VALVES* in this subsection).

NOTE: Clean valve guide area from contamination before removal.

3. Drive valve guide out of cylinder head using specified tool.

ENGINE	REQUIRED TOOL	
570 engine	VALVE GUIDE REMOVER 5 MM (P/N 529 035 924)	
850 and 1000R engines	VALVE GUIDE REMOVER (6 MM) (P/N 529 036 074)	
All engines	Hammer	



1. Valve guide remover
2. Valve guide

Installing the Valve Guide

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

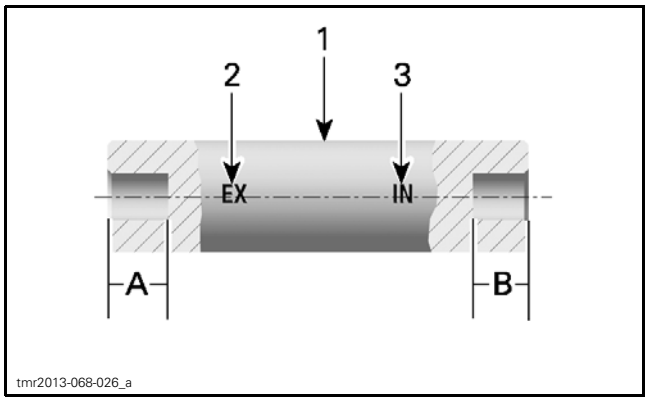
Clean the valve guide bore before reinstalling the valve guide into cylinder head.

Install valve guide.

ENGINE	REQUIRED TOOL	
570 engine	VALVE GUIDE INSTALLER (P/N 529 036 140)	
850 and 1000R engines	VALVE GUIDE INSTALLER (P/N 529 036 269)	

850 and 1000R Engines

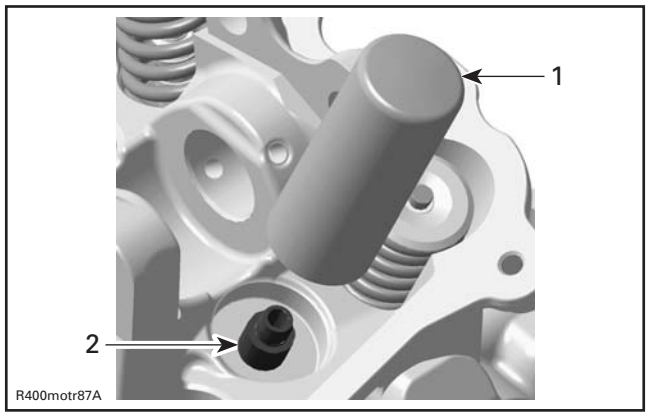
NOTICE **Valve guide installer is used for intake and exhaust valve guides. Choose proper side for installation.**



1. *Valve guide installer*
2. *Mark "EX" - exhaust valve guide installer*
3. *Mark "IN" - intake valve guide installer*

A. *14.5 mm (.571 in)*
B. *13.3 mm (.524 in)*

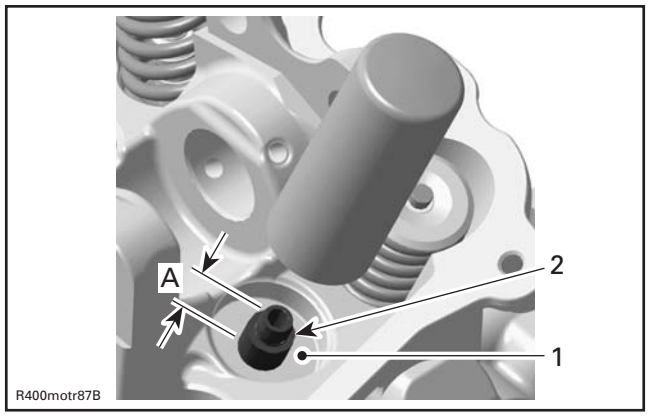
All Engines



1. *Valve guide installer*
2. *Valve guide*

NOTE: Apply LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070) on valve guide prior to install it into the cylinder head.

NOTICE Push valve guide in the cold cylinder head as per following illustration.

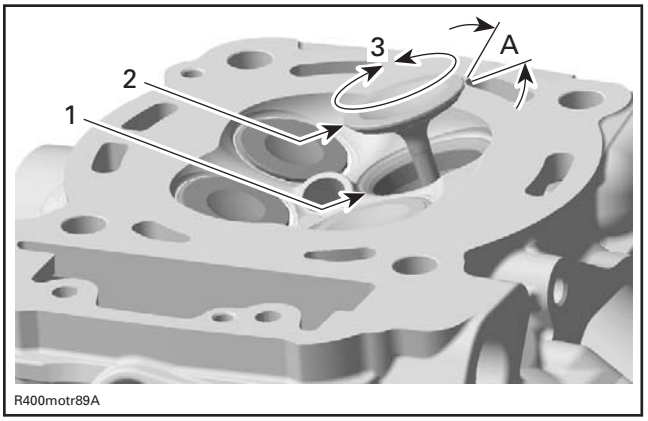


1. *Thrust surface of cylinder head*
2. *Valve guide*

A. *Measurement from thrust surface to valve guide top*

VALVE GUIDE (MEASUREMENT A)		
570 ENGINE	INTAKE and EXHAUST	14.00 mm to 14.40 mm (.5512 in to .5669 in)
850 AND 1000R ENGINES	INTAKE	13.1 mm to 13.5 mm (.5157 in to .5315 in)
	EXHAUST	14.3 mm to 14.7 mm (.563 in to .579 in)

Apply some lapping compound to valve face and work valve on its seat with a lapping tool.



1. *Valve seat*
2. *Valve face (contact surface to valve seat)*
3. *Turn valve while pushing against cylinder head*

A. *Valve seat angle 45°*

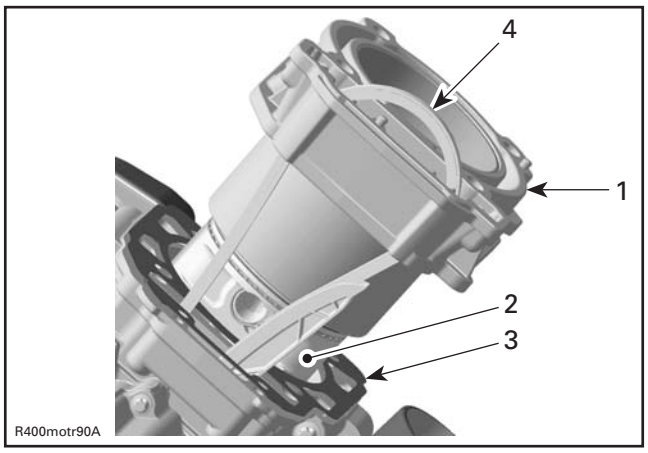
NOTE: Ensure to seat valves properly. Apply marking paste to ease checking contact pattern.

Repeat procedure until valve seat/valve face fits together.

CYLINDER

Removing the Cylinder

1. Refer to the *TIMING CHAIN* subsection to remove the following parts:
   - Chain tensioner
   - Camshaft timing gear.
2. Remove the cylinder head (see *CYLINDER HEAD* in this subsection).
3. Pull cylinder.
4. Discard cylinder base gaskets.



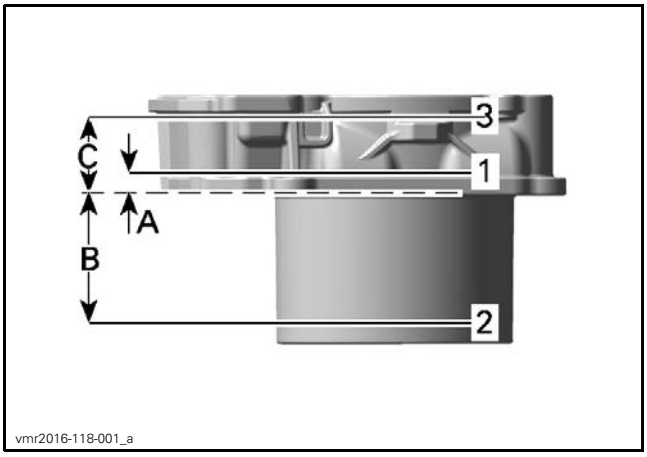
1. Cylinder
2. Piston assembly
3. Cylinder base gasket
4. Camshaft timing chain

Inspecting the Cylinder

Check cylinder for cracks, scoring and wear ridges on the top and bottom of the cylinder. If so, replace cylinder.

Cylinder Taper

Measure cylinder bore at recommended positions.



A. First measurement
B. Second measurement
C. Third measurement

CYLINDER TAPER MEASUREMENTS		
ENGINE	MEASUREMENT	SPECIFICATION
570 engine	A	5 mm (.197 in)
	B	58 mm (2.28 in)
	C	37 mm (1.46 in)
1000R engine	A	5 mm (.197 in)
	B	53 mm (2.09 in)
	C	57 mm (2.24 in)

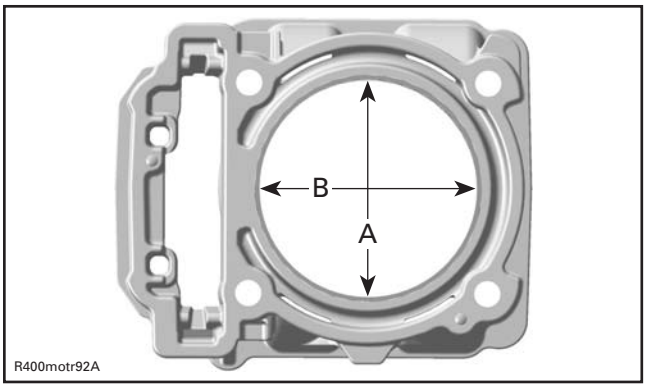
CYLINDER TAPER SPECIFICATION	
NEW (MAXIMUM)	0.038 mm (.0015 in)
SERVICE LIMIT	0.090 mm (.0035 in)

Distance between measurements should not exceed the service limit. Otherwise, replace cylinder and piston rings.

Cylinder Out of Round

Measure cylinder diameter:
– in piston axis
– perpendicular to piston axis.

NOTE: Use the same measuring points as described in *CYLINDER TAPER*.



A. Perpendicular to crankshaft axis
B. Parallel to crankshaft axis

CYLINDER OUT OF ROUND	
NEW (MAXIMUM)	0.015 mm (.0006 in)
SERVICE LIMIT	0.020 mm (.0008 in)

Installing the Cylinder

Reverse the removal procedure. Pay attention to the following details.

NOTICE **Always replace cylinder base gasket before installing the cylinder.**

NOTE: Make sure piston rings are properly spaced, refer to *PISTON RINGS* in this subsection.

Apply engine oil:
– In the bottom area of the cylinder bore
– On the piston rings
– On the piston ring compressor.

Compress piston rings.

REQUIRED TOOL
Piston ring compressor with band width of 15 mm to 20 mm (.59 in to .79 in)

First mount cylinder 2.

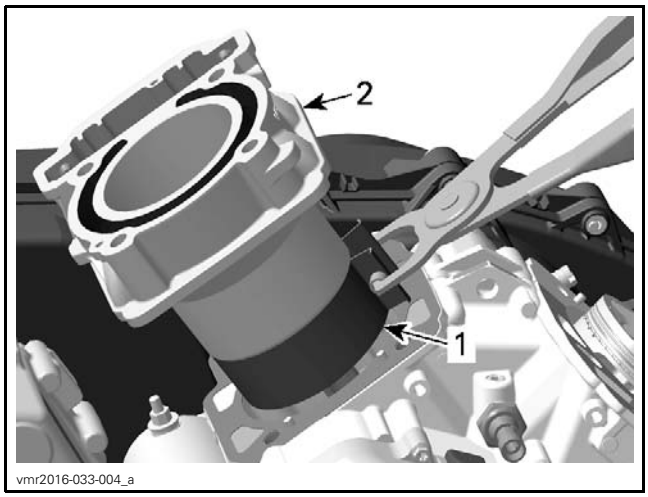
NOTE: The cylinder can not be pushed fully over the piston unless the piston is located at TDC.

Then remove the CRANKSHAFT LOCKING BOLT (P/N 529 035 617).

Crank the engine further and position piston 1 at TDC.

Mount cylinder 1.

Put timing chain through the chain passage, then slide cylinder over piston.



1. *Piston ring compressor*
2. *Cylinder*

NOTICE **Chain guide has to be fixed between cylinder and cylinder head.**

NOTE: After both cylinders are installed, turn crankshaft until piston of cylinder 2 is at TDC and lock crankshaft. Refer to *CRANKSHAFT* in the *BOTTOM END* subsection.

Install cylinder head and the other parts in accordance with the proper installation procedures.

PISTON

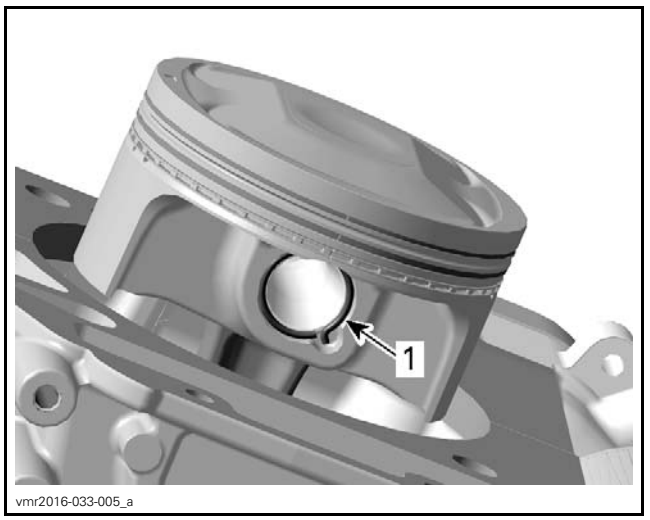
Removing the Piston

1. Refer to following procedures in this subsection and remove following parts:
   – Cylinder head
   – Cylinder.
2. Place a rag under piston and in the area of timing chain compartment.

⚠ WARNING

Piston circlips are spring loaded.

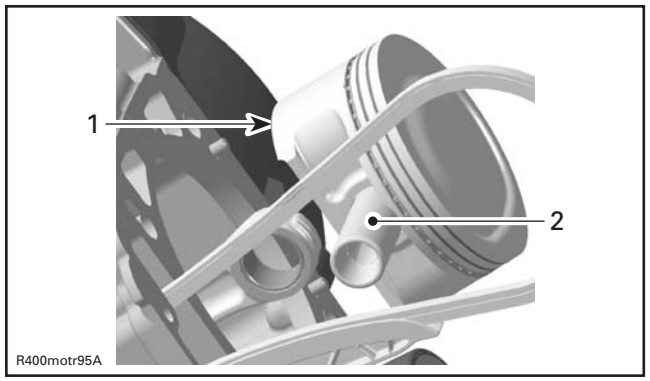
3. Remove one piston circlip and discard it.



1. *Piston circlip*

NOTE: The removal of both piston circlips is not necessary to remove piston pin.

4. Push piston pin out of piston.



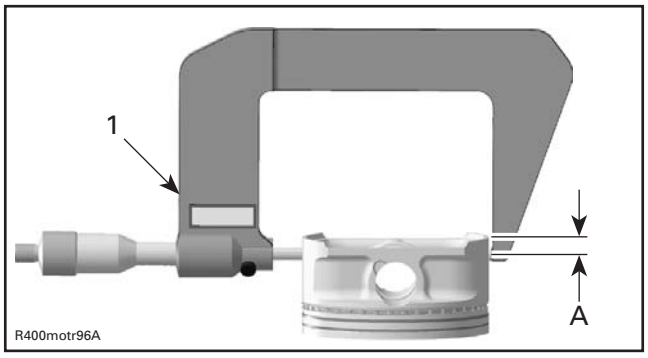
1. *Piston*
2. *Piston pin*

5. Detach piston from connecting rod.

Inspecting the Piston

Inspect piston for scoring, cracking or other damages. Replace piston and piston rings if necessary.

Using a micrometer, measure piston at 8 mm (.315 in) perpendicularly (90°) to piston pin.



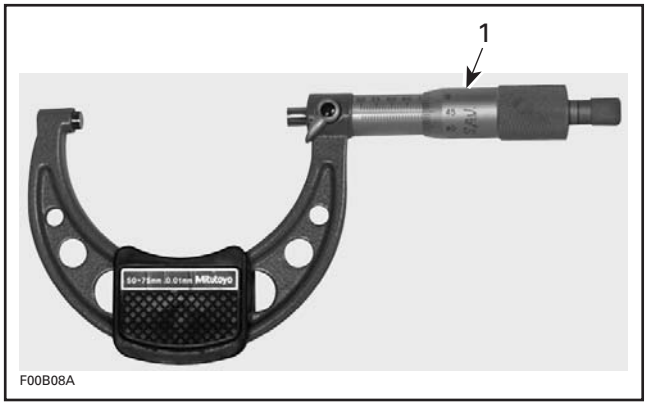
1. Measuring perpendicularly (90°) to piston pin
A. 8 mm (.315 in)

The measured dimension should be as described in the following tables. If not, replace piston.

PISTON MEASUREMENT		
570 ENGINE	NEW	83.950 mm to 83.966 mm (3.3051 in to 3.3057 in)
	SERVICE LIMIT	83.850 mm (3.3012 in)
850 ENGINE	NEW	93.950 mm to 93.966 mm (3.6988 in to 3.6994 in)
	SERVICE LIMIT	93.900 mm (3.6969 in)
1000R ENGINE	NEW	90.950 mm to 90.966 mm (3.5807 in to 3.5813 in)
	SERVICE LIMIT	90.900 mm (3.5787 in)

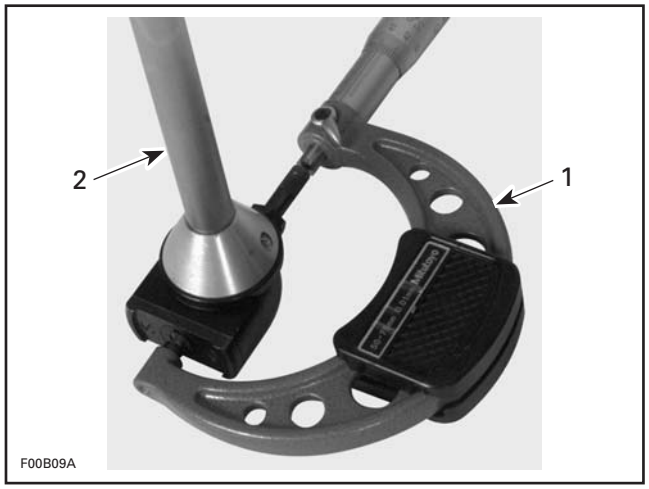
Piston/Cylinder Clearance

Adjust and lock a micrometer to the piston dimension.

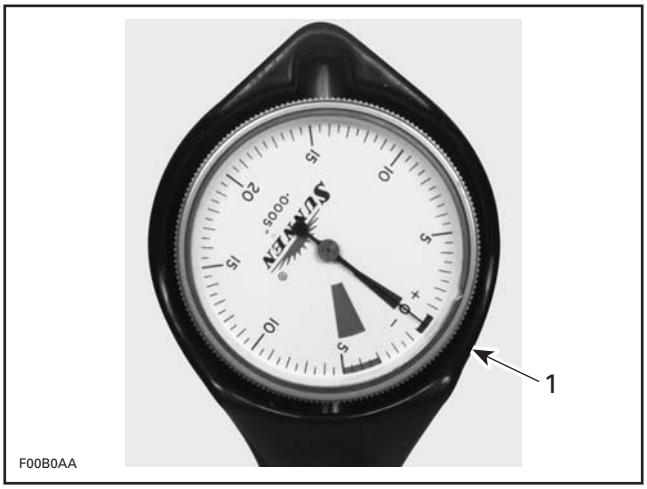


1. Micrometer set to the piston dimension

With the micrometer set to the dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0 (zero).



1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



TYPICAL
1. Indicator set to 0 (zero)

Position the dial bore gauge 20 mm (.787 in) above cylinder base, measuring perpendicularly (90°) to piston pin axis.

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance.

PISTON/CYLINDER CLEARANCE		
570 ENGINE	NEW	0.057 mm to 0.087 mm (.0022 in to .0034 in)
	SERVICE LIMIT	0.130 mm (.0051 in)
850 AND 1000R ENGINES	NEW	0.027 mm to 0.057 mm (.0011 in to .0022 in)
	SERVICE LIMIT	0.100 mm (.0039 in)

NOTE: Make sure used piston is not worn.

If clearance exceeds specified tolerance, replace piston by a new one and measure piston/cylinder clearance again.

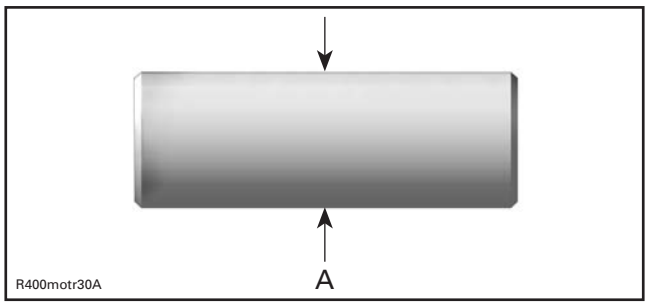
NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

Connecting Rod/Piston Pin Clearance

Using synthetic abrasive woven, clean piston pin from deposits.

Inspect piston pin for scoring, cracking or other damages.

Measure piston pin. See the following illustration for the proper measurement positions.

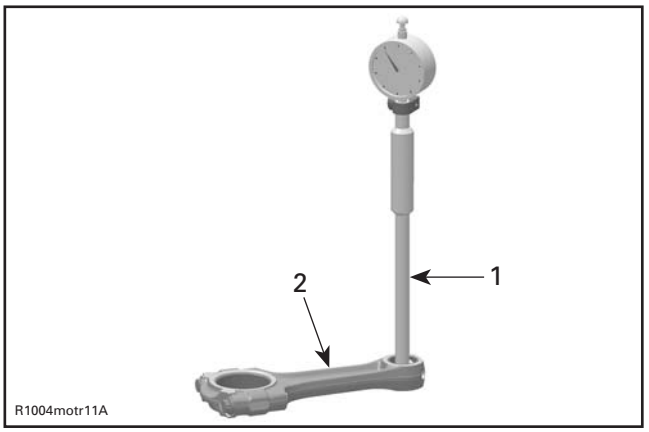


A. Piston pin diameter

PISTON PIN DIAMETER		
570 AND 850 ENGINES	NEW	19.996 mm to 20.000 mm (.7872 in to .7874 in)
	SERVICE LIMIT	19.980 mm (.7866 in)
1000R ENGINE	NEW	21.996 mm to 22.000 mm (.866 in to .866 in)
	SERVICE LIMIT	21.980 mm (.8654 in)

Replace piston pin if diameter is out of specifications.

Measure inside diameter of connecting rod small end bushing.



1. Bore gauge
2. Connecting rod

CONNECTING ROD SMALL END DIAMETER		
570 AND 850 ENGINES	NEW	20.010 mm to 20.020 mm (.7878 in to .7882 in)
	SERVICE LIMIT	20.060 mm (.7898 in)
1000R ENGINE	NEW	22.010 mm to 22.020 mm (.8665 in to .8669 in)
	SERVICE LIMIT	22.050 mm (.8681 in)

Replace connecting rod if diameter of connecting rod small end is out of specifications. Refer to *BOTTOM END* subsection for removal procedure.

Compare measurements to obtain the connecting rod/piston pin clearance.

CONNECTING ROD/ PISTON PIN CLEARANCE	
SERVICE LIMIT	0.080 mm (.0031 in)

Installing the Piston

Reverse the removal procedure. Pay attention to the following details.

Apply engine oil on the piston pin.

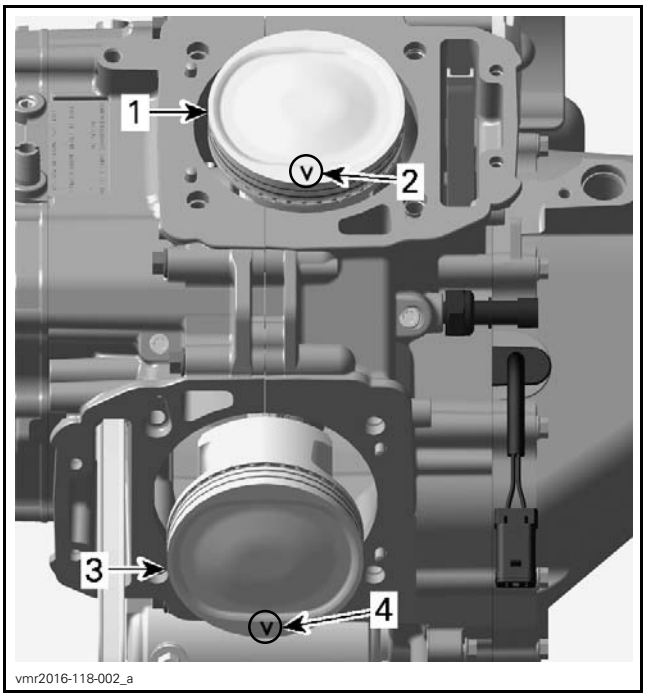
Insert piston pin into piston and connecting rod.

570, 850 and 1000R Engines

For each cylinder, install piston with the punched arrow on piston dome pointing towards the rear side of the engine.

Front cylinder: Mark on top of piston must show to intake side.

Rear cylinder: Mark on top of piston must show to exhaust side.



570 , 850 AND 1000R ENGINES
1. *Piston of cylinder 1 (front)*
2. *Mark on piston must show to intake side of cylinder 1*
3. *Piston of cylinder 2 (rear)*
4. *Mark on piston must show to exhaust side of cylinder 2*

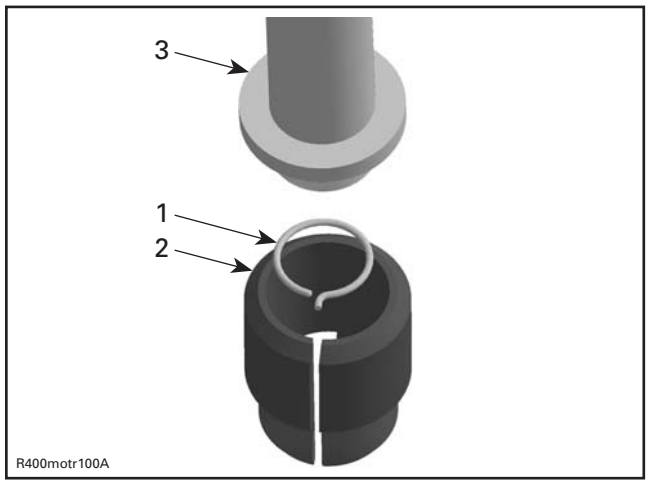
All Engines

Use the piston appropriate circlip installer to assemble the NEW piston circlip as per following procedure:

ENGINE	REQUIRED TOOL	
570	PISTON CIRCLIP INSTALLER (P/N 529 035 921)	
850	PISTON CIRCLIP INSTALLER (P/N 529 036 083)	
1000R	PISTON CIRCLIP INSTALLER (P/N 529 036 153)	

NOTICE Always replace disassembled piston circlip(s) by NEW ones. Place a rag on cylinder base to avoid dropping the circlip inside the engine.

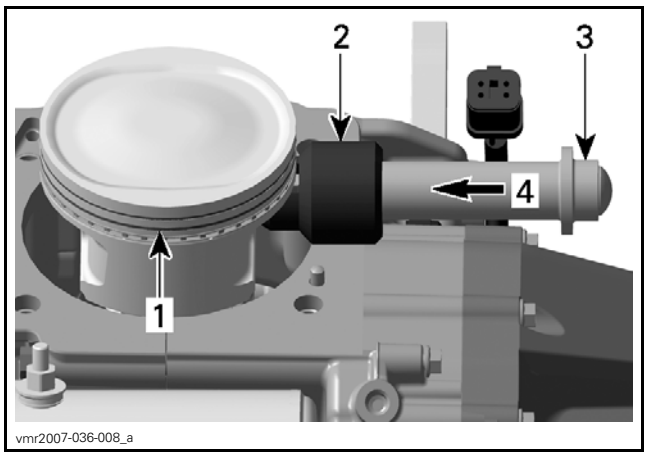
Place circlip in sleeve as per following illustration.



1. *Circlip*
2. *Sleeve*
3. *Assembly jig from piston clip installer*

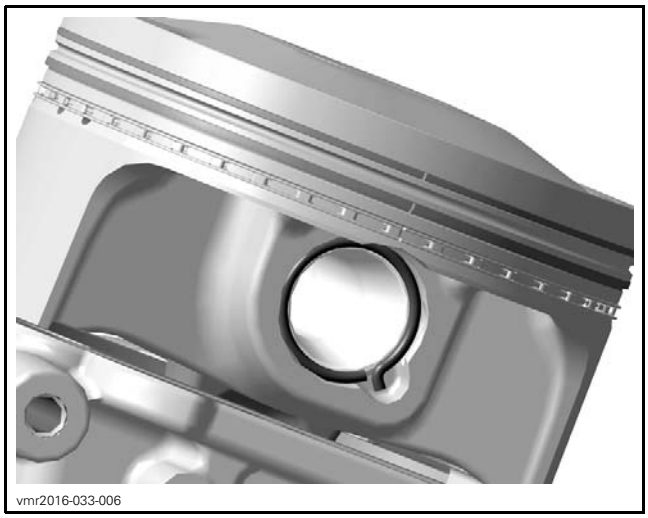
Push taper side of assembly jig until circlip reaches middle of sleeve.

Align sleeve with piston pin axis and push assembly jig until circlip engages in piston.



1. *Hold piston while pushing circlip in place*
2. *Sleeve*
3. *Assembly jig*
4. *Direction to push circlip*

NOTE: Take care that the hook of the piston circlip is positioned properly.



CORRECT POSITION OF THE PISTON CIRCLIP

PISTON RINGS

Removing the Piston Rings

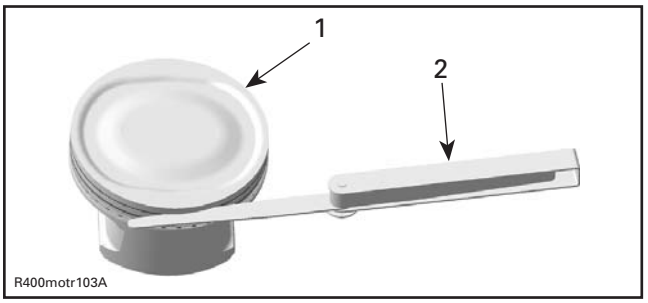
Remove the piston (see *PISTON* in this subsection).

Inspecting the Piston Rings

Ring/Piston Groove Clearance

Using a feeler gauge measure each ring/piston groove clearance. If the clearance is too large, the piston and the piston rings should be replaced.

RING/PISTON GROOVE CLEARANCE		
UPPER COMPRESSION RING		
570 engine	NEW	0.025 mm to 0.070 mm (.001 in to .0028 in)
	SERVICE LIMIT	0.100 mm (.0039 in)
850 and 1000R engines	NEW	0.030 mm to 0.070 mm (.0012 in to .0028 in)
	SERVICE LIMIT	0.150 mm (.0059 in)
LOWER COMPRESSION RING		
All engines	NEW	0.020 mm to 0.060 mm (.0008 in to .0024 in)
	SERVICE LIMIT	0.150 mm (.0059 in)
OIL SCRAPER RING		
All engines	NEW	0.010 mm to 0.180 mm (.0004 in to .0071 in)
	SERVICE LIMIT	0.250 mm (.0098 in)



1. Piston
2. Feeler gauge

Ring End Gap

RING END GAP		
UPPER COMPRESSION RING		
570 engine	NEW	0.10 mm to 0.30 mm (.004 in to .012 in)
	SERVICE LIMIT	0.50 mm (.02 in)
850 engine	NEW	0.20 mm to 0.35 mm (.008 in to .014 in)
	SERVICE LIMIT	0.60 mm (.024 in)
1000R engine	NEW	0.20 mm to 0.40 mm (.008 in to .016 in)
	SERVICE LIMIT	0.60 mm (.024 in)
LOWER COMPRESSION RING		
570 and 850 engines	NEW	0.35 mm to 0.55 mm (.014 in to .022 in)
	SERVICE LIMIT	0.85 mm (.033 in)
1000R engine	NEW	0.20 mm to 0.40 mm (.008 in to .016 in)
	SERVICE LIMIT	0.70 mm (.028 in)
OIL SCRAPER RING		
All engines	NEW	0.20 mm to 0.70 mm (.008 in to .028 in)
	SERVICE LIMIT	1.00 mm (.039 in)

To measure the ring end gap place the ring in the cylinder in the area of 8 mm to 16 mm (5/16 in to 5/8 in) from top of cylinder.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace ring if gap exceeds specified tolerance.

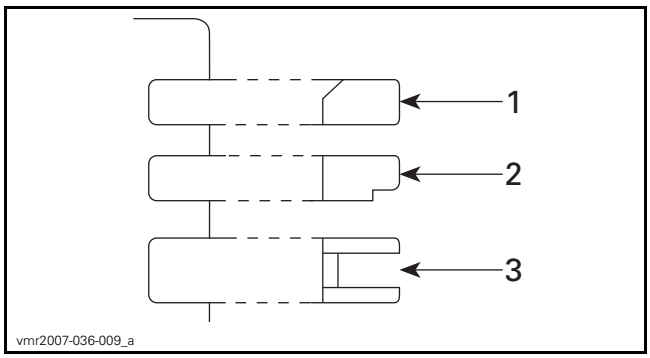
Installing the Piston Rings

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

NOTE: First install spring and then rings of oil scraper ring.

NOTE: Use a ring expander to prevent breakage during installation. The oil ring must be installed by hand.

Install the oil scraper ring first, then the lower compression ring with the word "N and TOP " facing up, then the upper compression ring with the word "N and TOP" facing up.

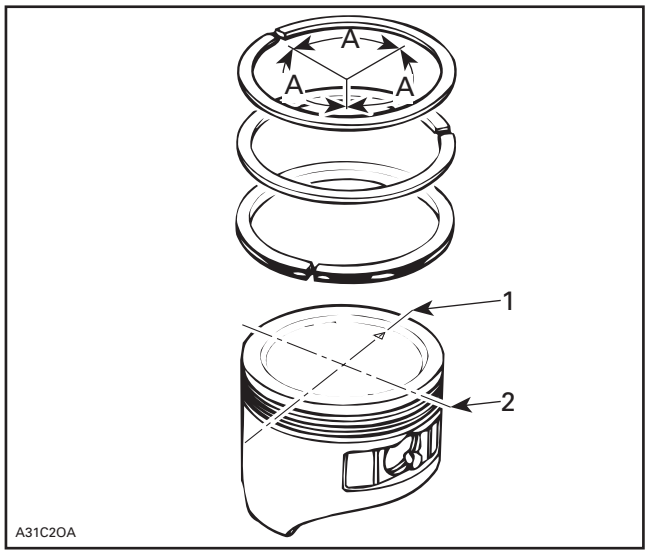


1. Upper compression ring
2. Lower compression ring
3. Oil scraper ring

NOTICE Ensure that top and second rings are not interchanged.

Check that rings rotate smoothly after installation.

Space the piston ring end gaps 120° apart and do not align the gaps with the piston pin bore or the thrust side axis.



1. DO NOT align ring gap with piston thrust side axis
2. DO NOT align ring gap with piston pin bore axis
A. 120°

CYLINDER HEAD

SERVICE TOOLS

Description	Part Number	Page
DIAL INDICATOR ADAPTER	529 036 159	6
ENGINE LEAK DOWN TEST KIT	529 035 661	6
PISTON CIRCLIP INSTALLER	529 035 921	25
PISTON CIRCLIP INSTALLER	529 036 083	25
PISTON CIRCLIP INSTALLER	529 036 153	25
TDC DIAL INDICATOR	414 104 700	6
VALVE GUIDE INSTALLER	529 036 140	19
VALVE GUIDE INSTALLER	529 036 269	19
VALVE GUIDE REMOVER (6 MM)	529 036 074	18
VALVE GUIDE REMOVER 5 MM	529 035 924	18
VALVE SPRING COMPRESSOR CUP	529 035 764	14
VALVE SPRING COMPRESSOR CUP	529 036 270	14
VALVE SPRING COMPRESSOR	529 035 724	14

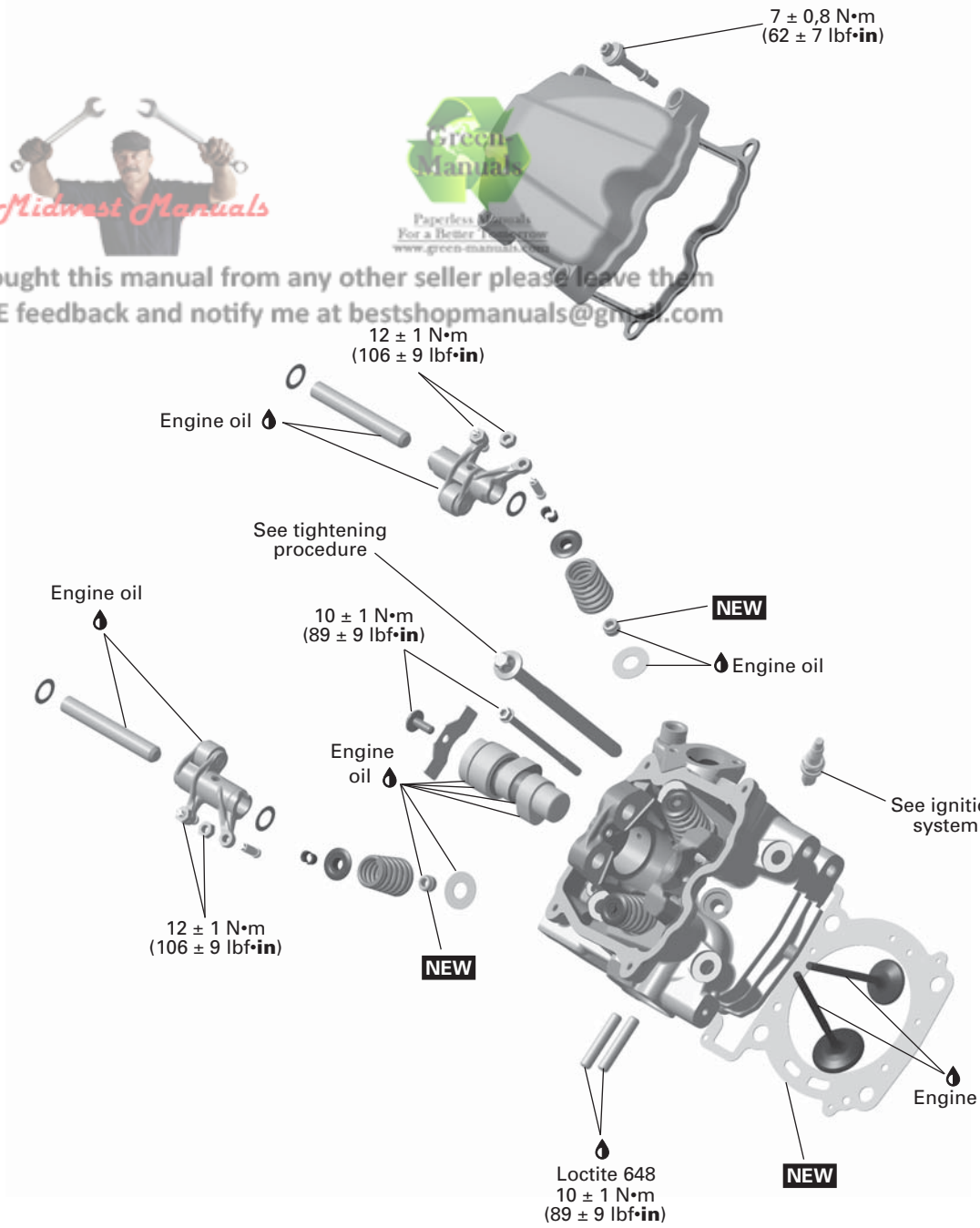
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SNAP-ON PLIERS	YA 8230	16

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	19

CYLINDER HEAD NO. 1



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NEW = Component must be replaced when removed.

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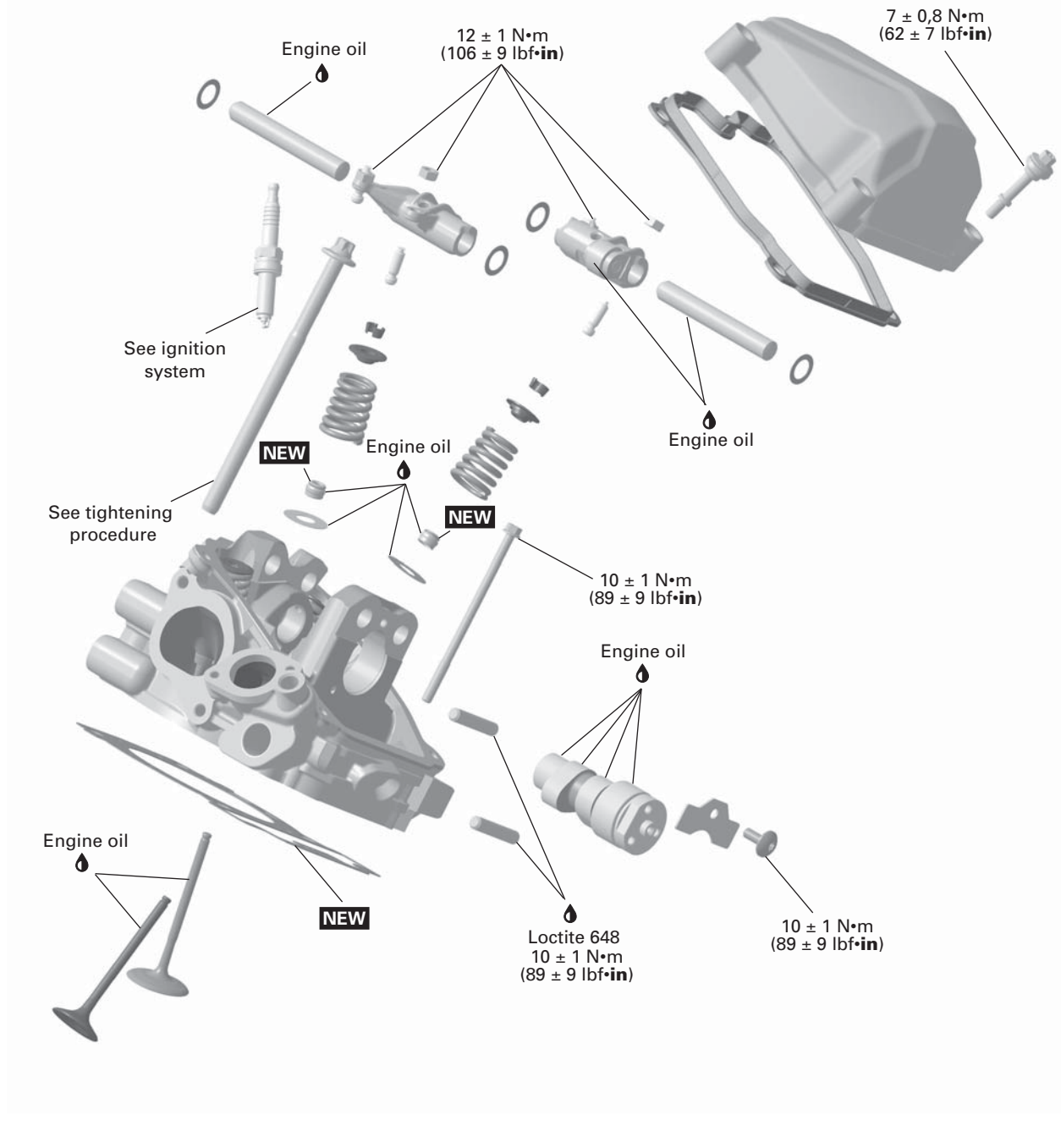
CYLINDER HEAD NO. 2



NEW = Component must be replaced when removed.

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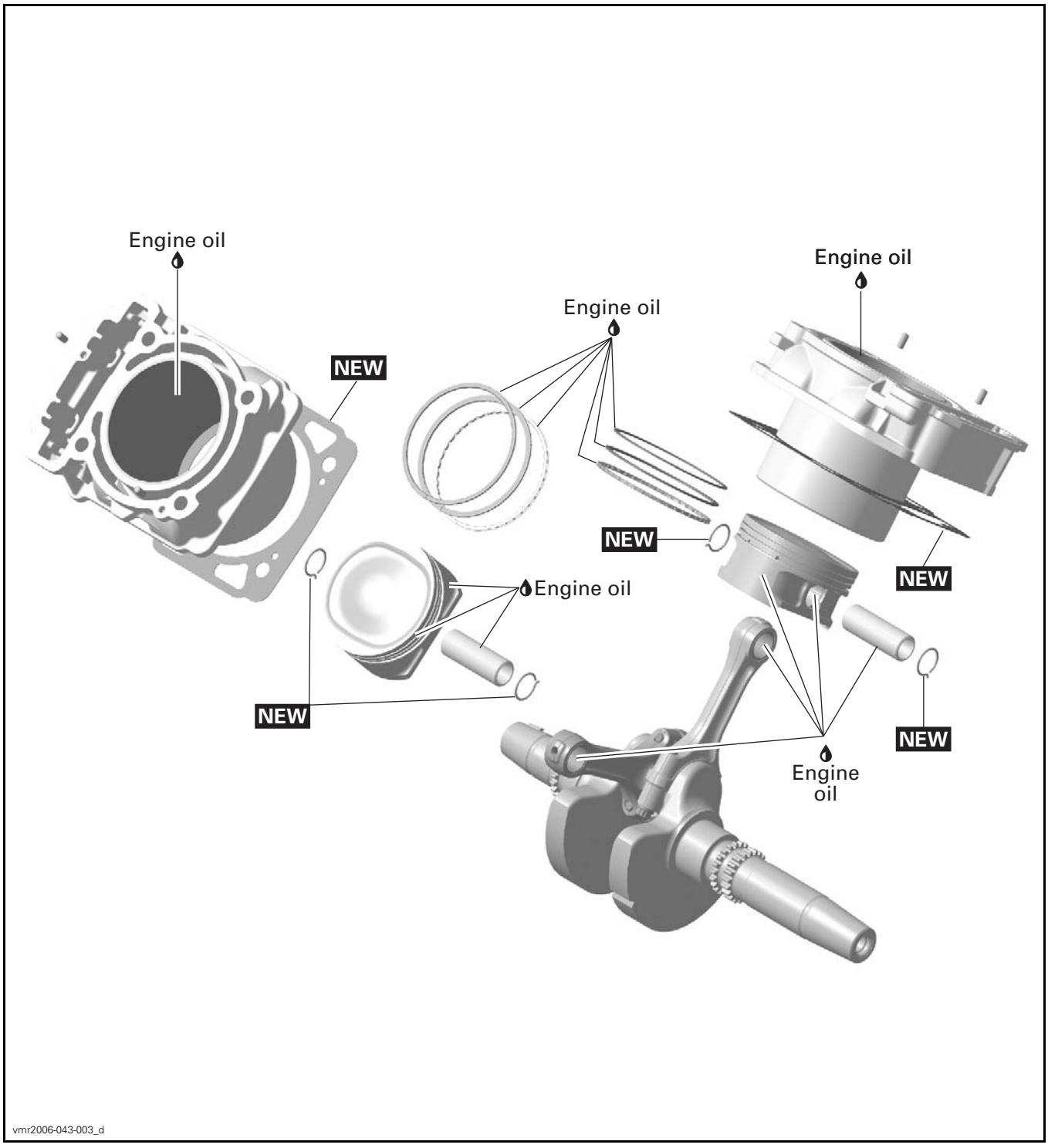
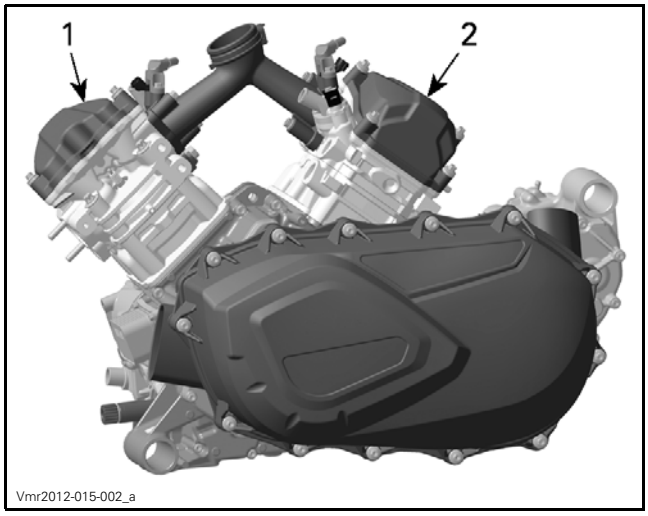
CYLINDERS AND PISTONS



GENERAL

Special reference are made in the text for procedures which are different for cylinder no. 1 and cylinder no. 2.



TYPICAL
1. Cylinder 1 (front)
2. Cylinder 2 (rear)

When diagnosing an engine problem, always perform a cylinder leak test.

NOTE: Even though the following procedures do not require the engine removal, many illustrations show the engine out of the vehicle for more clarity.

IMPORTANT: Note position of parts upon disassembly. This may help to find the root cause of a problem. A component that is not replaced should be reinstalled in the same position as originally mounted.

INSPECTION

LEAK TEST

Before performing the cylinder leak test, verify the following:

– Clamp(s) tightness
– Radiator and hoses.

NOTE: For best accuracy, the leak test should be done with the engine at normal operating temperature.

⚠ WARNING

Prevent burning yourself on hot engine parts.

Preparing the Leak Test

1. Disconnect battery.

⚠ WARNING

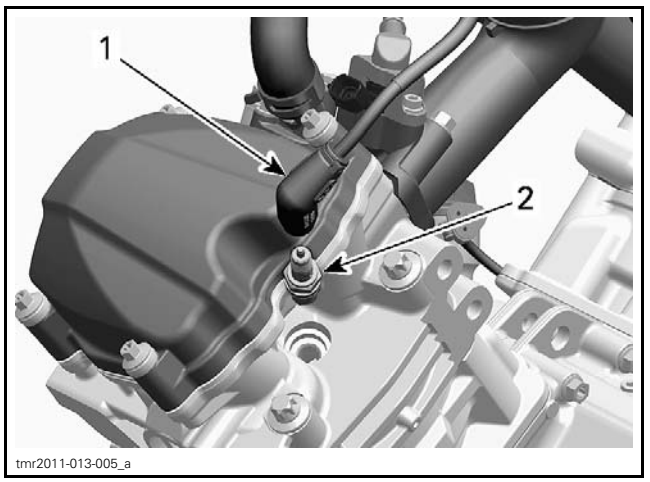
Always respect this order for disassembly; disconnect BLACK (-) cable first.

2. Remove radiator cap.

⚠ WARNING

To prevent being burned, ensure the radiator is cool and wear the appropriate safety equipment before removing the radiator cap.

3. Unplug spark plug cable.
4. Clean spark plug area and remove spark plug from cylinder head.



1. Spark plug cable
2. Spark plug

5. Remove *VALVE COVER*. See procedure in this subsection.
6. Rotate crankshaft until piston is at ignition TDC.
7. Turn crankshaft using one of the following two procedures.

First Procedure

Turn the drive pulley.

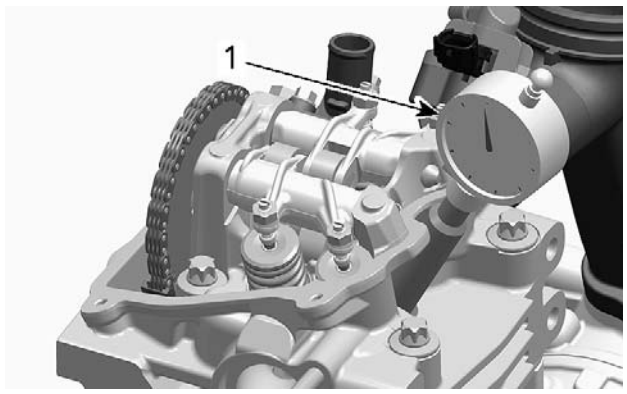
Second Procedure

1. Remove plug screw with O-ring from magneto cover.
2. Use a 14 mm Allen key and turn crankshaft.

NOTICE **Turn only clockwise to avoid loosening of magneto flywheel Allen screw.**

3. Set the piston to precisely ignition TDC.

ENGINE	REQUIRED TOOL
All	TDC DIAL INDICATOR (P/N 414 104 700)
850 1000R	DIAL INDICATOR ADAPTER (P/N 529 036 159)

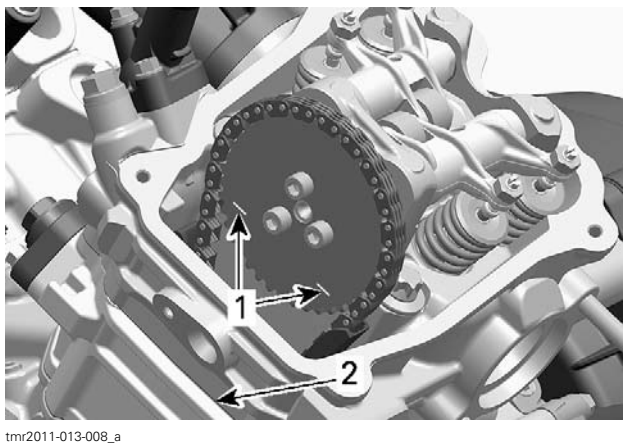


1. TDC dial indicator

NOTE: If a dial gauge is not available, use a screwdriver or another similarly suitable tool.

NOTICE Do not scratch or damage piston/cylinder surface.

NOTE: At ignition TDC the marks on the camshaft timing gear have to be parallel to cylinder head base as per following illustration.



1. Marks on camshaft timing gear
2. Cylinder head base

Leak Test

1. Install the gauge adapter in the spark plug hole.

REQUIRED TOOL
ENGINE LEAK DOWN TEST KIT (P/N 529 035 661)

2. Connect to an adequate air supply.
3. Set needle of measuring gauge to zero.

NOTE: All testers have specific instructions on gauge operation and required pressure.

4. Supply combustion chamber with air pressure.
5. Note the amount or percentage of leakage (depending on tester).

LEAKAGE PERCENTAGE	ENGINE CONDITION
0% to 15%	Excellent condition
16% to 25%	Good condition
26% to 40%	Fair condition; reduced engine performance
41% and higher	Poor condition, diagnose and repair engine

NOTE: To make sure there is no false reading due to a valve not being perfectly seated, tap each valve adjustment screw (on the rocker arm) using a soft hammer.

Diagnosis

Listen for air leaks.

- Air escaping in intake port/throttle body means leaking intake valve(s).
- Air escaping in exhaust port means leaking exhaust valve(s).
- Air bubbles in the coolant (radiator) means leaking cylinder head gasket.
- Air/coolant escaping from cylinder/head means damaged gasket(s) and/or loosened screws.
- Air escaping into crankcase area means excessively worn cylinder and/or broken piston rings.
- Air/oil escaping from crankcase means damaged gasket and/or loosened screws (refer to *BOTTOM END* subsection).

NOTE: For all checkpoints mentioned above, see appropriate engine section to diagnose and repair the engine.

Reassembly

Reverse the preparation procedure. Ensure to respect torque values and use of appropriate service product. Refer to exploded views in other subsections of this manual as required.

PROCEDURES

VALVE COVER

Valve Cover Access

Front Cylinder

Refer to *BODY* subsection and remove the following.
- Seat
- Console
- RH side panel
- RH side panel extension
- RH inner fender panel

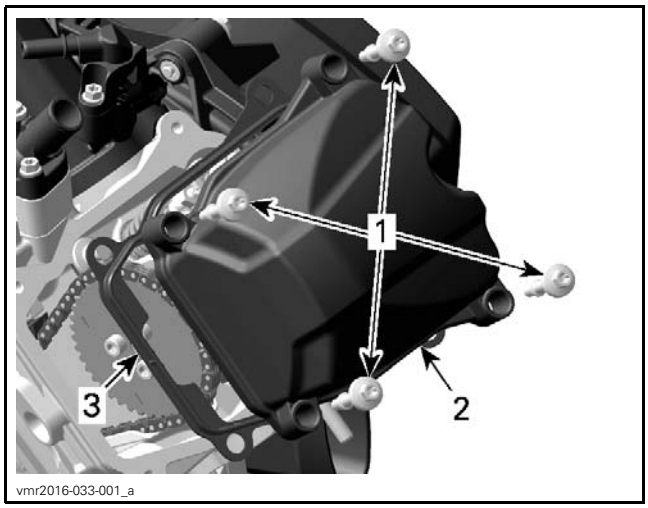
Rear Cylinder

Refer to *BODY* and remove:
- Seat
- Console
- RH side panel and extension(s)
- LH side panel and extension(s).

Refer to *EXHAUST SYSTEM* and remove exhaust pipe.

Removing the Valve Cover

Remove:
- Valve cover screws
- Valve cover
- Gasket.



TYPICAL — FRONT CYLINDER SHOWN
1. *Valve cover screws*
2. *Valve cover*
3. *Gasket*

Inspecting the Valve Cover

Check the gasket on the valve cover if it is brittle, cracked or hard. If so, replace the gasket.

Installing the Valve Cover

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

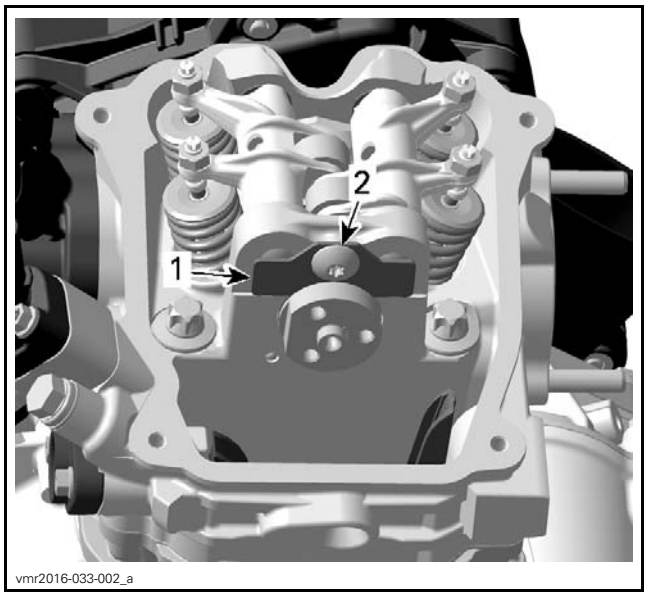
Tighten valve cover retaining screws to specified torque in a criss-cross sequence.

TIGHTENING TORQUE	
Valve cover retaining screws	7 N•m ± 0.8 N•m (62 lbf•**in** ± 7 lbf•**in**)

ROCKER ARM

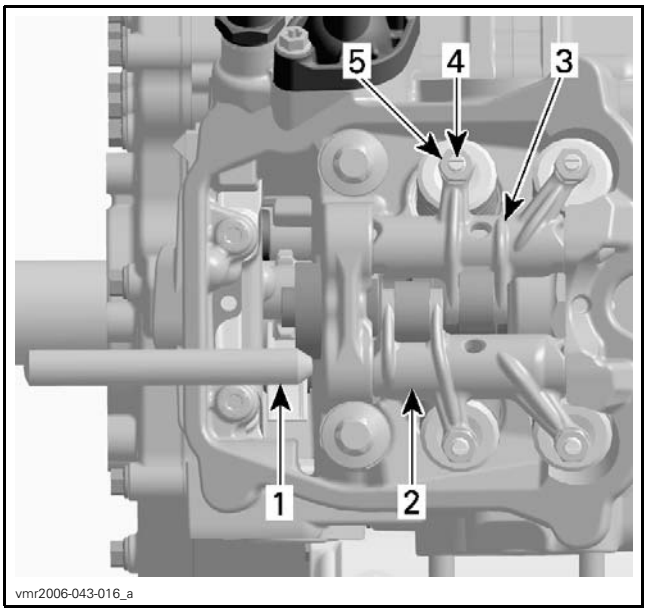
Removing the Rocker Arm

1. Remove *VALVE COVER*. See procedure in this subsection.
2. Refer to *TIMING CHAIN* subsection and remove following parts:
   - Timing chain tensioner
   - Camshaft timing gear.
3. Remove pan head screw and camshaft retaining plate.



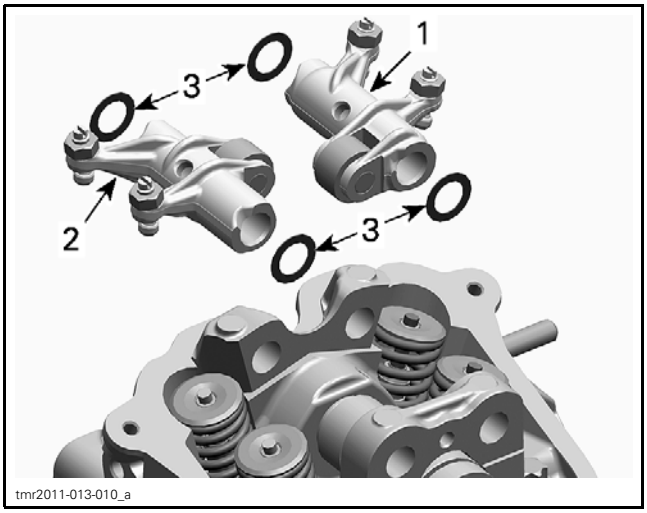
TYPICAL
1. *Camshaft retaining plate*
2. *Pan head screw*

4. Remove rocker arm shafts.



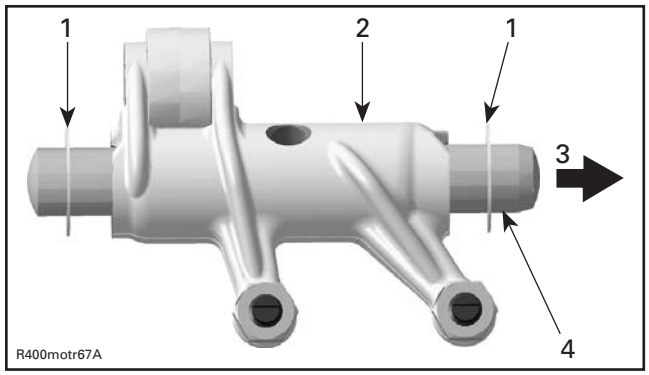
1. Rocker arm shaft
2. Rocker arm (exhaust side)
3. Rocker arm (intake side)
4. Adjustment screw
5. Lock nut

5. Remove rocker arm assembly (exhaust side and intake side) with adjustment screws and lock nuts.
6. Remove thrust washers.



1. Rocker arm (exhaust side)
2. Rocker arm (intake side)
3. Thrust washers

NOTICE Pay attention not to lose thrust washers or drop them into the timing chain compartment.

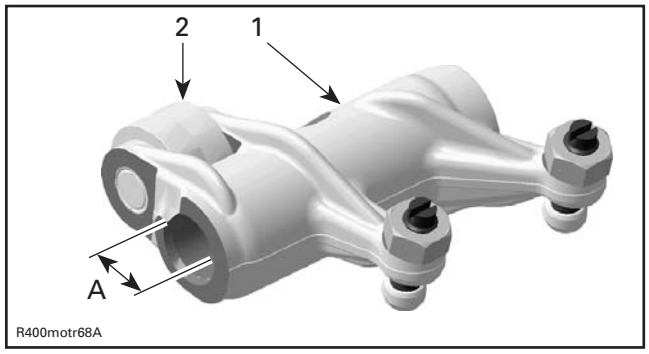


1. 2 thrust washers
2. Rocker arm (exhaust side)
3. Cylinder head (spark plug side)
4. Big taper to spark plug side

Inspecting the Rocker Arm

Inspect each rocker arm for cracks and scored friction surfaces. If so, replace rocker arm assembly.

Check the rocker arm rollers for free movement, wear and excessive radial play. Replace rocker arm assembly if necessary.

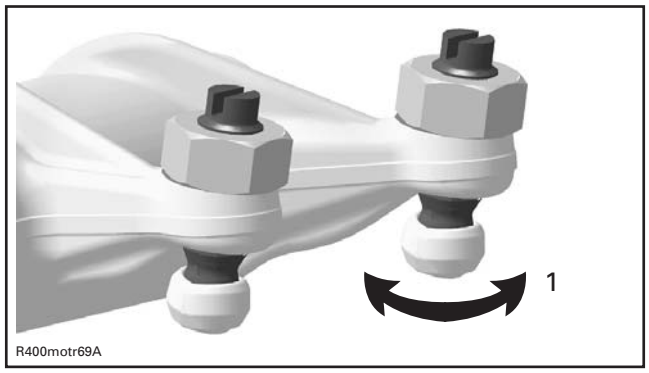


1. Rocker arm (exhaust side)
2. Roller
A. Bore for rocker arm shaft

Measure rocker arm bore diameter. If diameter is out of specification, change the rocker arm assembly.

ROCKER ARM BORE DIAMETER	
NEW	12.036 mm to 12.050 mm (.4739 in to .4744 in)
SERVICE LIMIT	12.060 mm (.4748 in)

Check adjustment screws for free movement, cracks and/or excessive play.

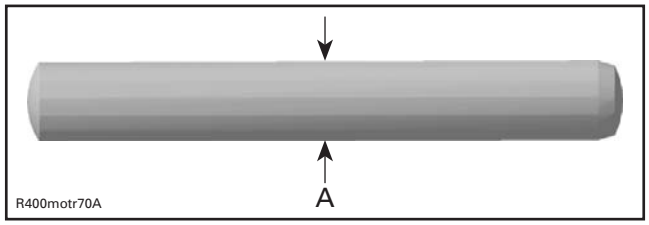


1. Free movement of adjustment screw top

Rocker Arm Shaft Inspection

Check for scored friction surfaces; if so, replace parts.

Measure rocker arm shaft diameter.



A. Measure rocker arm shaft diameter here

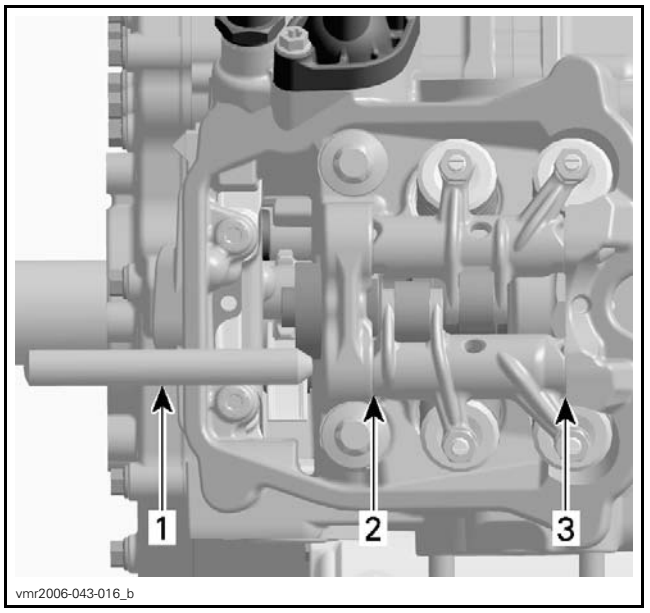
ROCKER ARM SHAFT DIAMETER	
NEW	12.000 mm to 12.018 mm (.4724 in to .4731 in)
SERVICE LIMIT	11.990 mm (.472 in)

Any area worn excessively will require parts replacement.

Installing the Rocker Arm

NOTE: Use the same procedure for exhaust and intake rocker arm.

1. Apply engine oil on rocker arm shaft.
2. Insert a rocker arm shaft with the chamfered edge first through rocker arm pin bore.
3. Install a thrust washer at timing chain side, then the proper rocker arm (exhaust side or intake side).
4. Push in rocker arm shaft until its chamfer reaches the end of rocker arm bore.

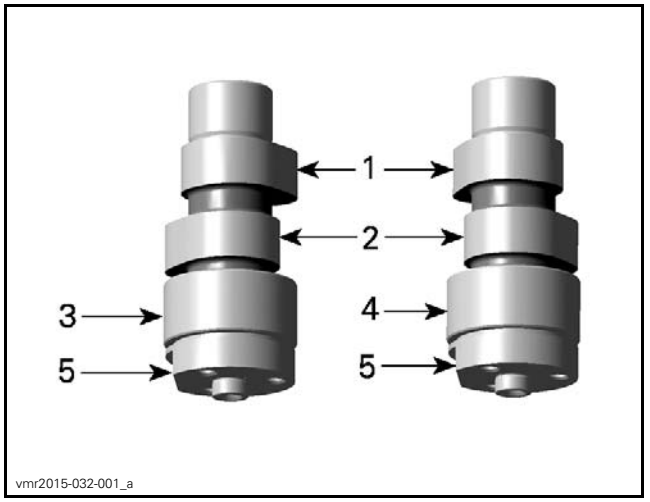


1. Rocker arm shaft
2. Thrust washer (timing chain side)
3. Thrust washer (spark plug side)

5. Place the other thrust washer and push rocker arm shaft to end position.
6. Install the camshaft retaining plate.
7. Adjust valve clearance, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

CAMSHAFT

NOTE: The engine is equipped with two different camshafts.



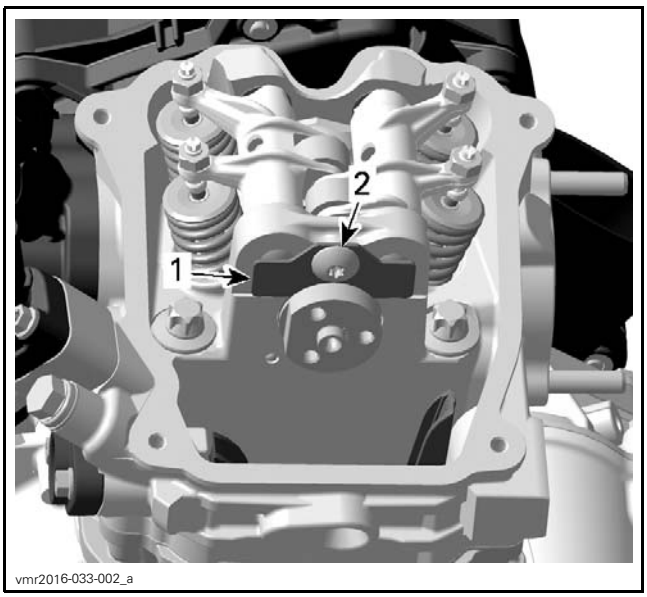
1. Intake cam
2. Exhaust cam
3. Camshaft of cylinder 1
4. Camshaft of cylinder 2
5. Flat spot

Removing the Camshaft

The removal procedure is the same for both camshafts.

NOTICE Each camshaft is different in design. Thus, it is important not to mix up any parts of the camshaft assembly with that of the other cylinder. Keep parts as a group.

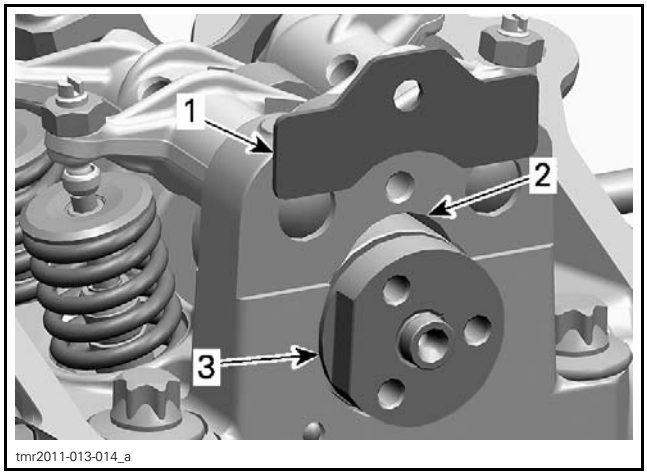
1. Remove valve cover (see *VALVE COVER* in this subsection).
2. Refer to the *TIMING CHAIN* subsection to remove the following parts:
   – Chain tensioner
   – Camshaft timing gear.
3. Remove the camshaft retaining plate.



1. Camshaft retaining plate
2. Pan head screw
3. Cylinder head

4. Remove rocker arms (see *ROCKER ARM* in this subsection).
5. Remove the camshaft.

NOTE: For removal rotate camshaft so that intake/exhaust lobe shows to upper side of cylinder head.



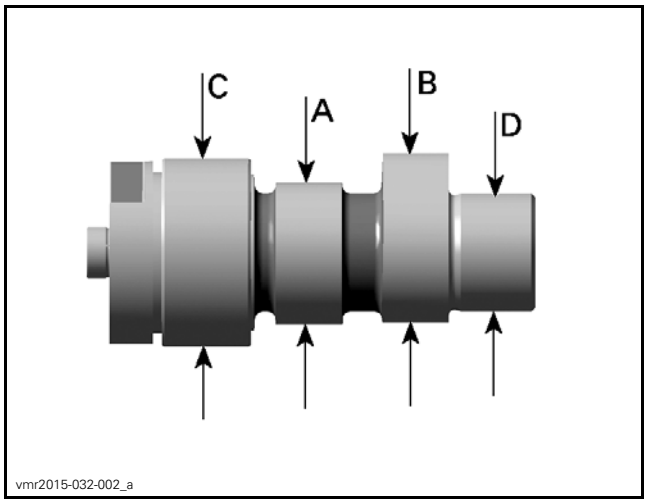
1. Camshaft retaining plate
2. Area for camshaft lobes
3. Camshaft

Inspecting the Camshaft

Inspecting the Camshaft Lobe

Check each lobe for scoring, scuffing, cracks or other signs of wear.

Measure camshaft lobe height using a micrometer.



A. Camshaft lobe (exhaust valves)
B. Camshaft lobe (intake valves)
C. Camshaft journal (timing chain side)
D. Camshaft journal (spark plug side)

CAMSHAFT LOBE (INTAKE)		
570	NEW	31.830 mm to 32.030 mm (1.2531 in to 1.261 in)
	SERVICE LIMIT	31.810 mm (1.2524 in)
650	NEW	32.110 mm to 32.310 mm (1.2642 in to 1.272 in)
	SERVICE LIMIT	32.090 mm (1.2634 in)

CAMSHAFT LOBE (INTAKE)		
850	NEW	32.890 mm to 33.090 mm (1.2949 in to 1.3028 in)
	SERVICE LIMIT	32.870 mm (1.2941 in)
1000 1000R	NEW	32.960 mm to 33.160 mm (1.2976 in to 1.3055 in)
	SERVICE LIMIT	32.940 mm (1.2969 in)

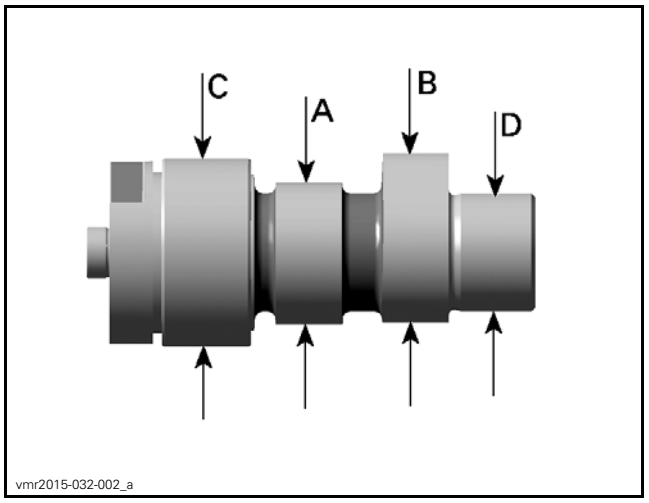
CAMSHAFT LOBE (EXHAUST)		
570	NEW	31.730 mm to 31.930 mm (1.2492 in to 1.2571 in)
	SERVICE LIMIT	31.710 mm (1.2484 in)
650	NEW	31.940 mm to 32.140 mm (1.2575 in to 1.2654 in)
	SERVICE LIMIT	31.920 mm (1.2567 in)
850	NEW	32.950 mm to 33.150 mm (1.2972 in to 1.3051 in)
	SERVICE LIMIT	32.930 mm (1.2965 in)
1000 1000R	NEW	32.860 mm to 33.060 mm (1.2937 in to 1.3016 in)
	SERVICE LIMIT	32.840 mm (1.2929 in)

Measure camshaft bearing in cylinder head. Refer to *INSPECTING THE CYLINDER HEAD* in this subsection.

Inspecting the Camshaft Journal

Check each journal for scoring, scuffing, cracks or other signs of wear.

Measure camshaft journal using a micrometer.



A. Camshaft lobe (exhaust valves)
B. Camshaft lobe (intake valves)
C. Camshaft journal (timing chain side)
D. Camshaft journal (spark plug side)

CAMSHAFT JOURNAL (TIMING CHAIN SIDE)	
NEW	34.959 mm to 34.975 mm (1.3763 in to 1.377 in)
SERVICE LIMIT	34.950 mm (1.376 in)

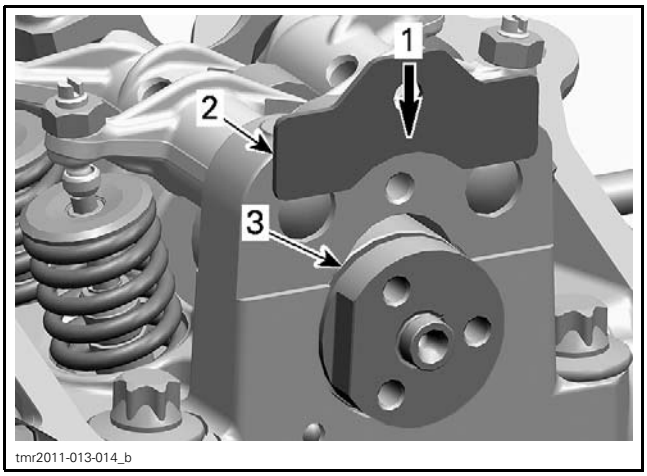
CAMSHAFT JOURNAL (SPARK PLUG SIDE)	
NEW	21.959 mm to 21.980 mm (.8645 in to .8654 in)
SERVICE LIMIT	21.950 mm (.8642 in)

Installing the Camshaft

Reverse the removal procedure. Pay attention to the following details.

NOTICE **The camshafts are not identical in design. Do not invert the camshafts during assembly. Any mix-up of the components will lead to engine damage.**

Place the camshaft retaining plate in the slot of the camshaft.



1. Direction of movement
2. Camshaft retaining plate
3. Slot retaining camshaft

For other parts, refer to proper installation procedure.

CYLINDER HEAD

Cylinder Head Access

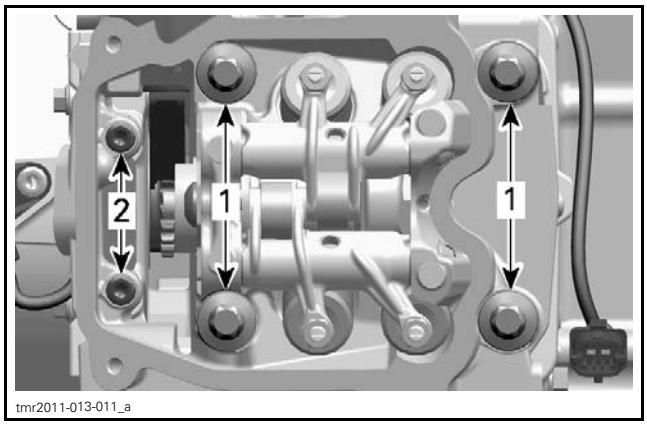
Refer to *VALVE COVER* in this subsection.

Removing the Cylinder Head

1. The removal procedure is the same for both cylinder heads.
2. Drain coolant (refer to *PERIODIC MAINTENANCE PROCEDURES* subsection).
3. Disconnect the coolant hose from the thermostat housing.

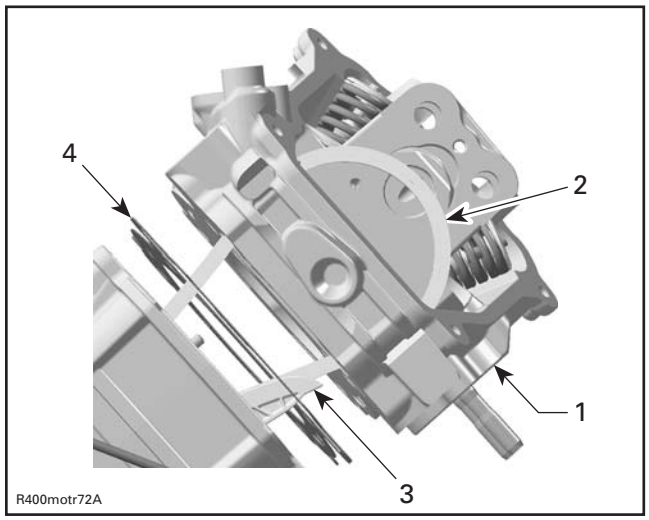
NOTE: Before removing cylinder head, blow out remaining coolant by air pressure. During cylinder head removal, the remaining coolant in cylinder head could overflow into the engine and a little quantity of coolant could drop into the engine. In this case, the engine oil will be contaminated.

4. Refer to *EXHAUST SYSTEM* subsection and disconnect exhaust system head pipe from cylinder head.
5. Disconnect spark plug wire.
6. Disconnect temperature sensor connector, located at rear cylinder head.
7. Remove the intake manifold. Refer to *INTAKE MANIFOLD* subsection.
8. Remove the valve cover and its gasket (see *VALVE COVER* in this subsection).
9. Refer to the *TIMING CHAIN* subsection to remove the following parts:
   – Chain tensioner
   – Camshaft timing gear.
10. First remove the M6 cylinder head screws, then the cylinder head screws M10.



1. Cylinder head screws M10
2. Cylinder head screws M6

11. Pull up cylinder head.
12. Remove timing chain guide (fixed).
13. Remove and discard the cylinder head gasket.



1. Cylinder head
2. Timing chain
3. Chain guide (fixed)
4. Cylinder head gasket

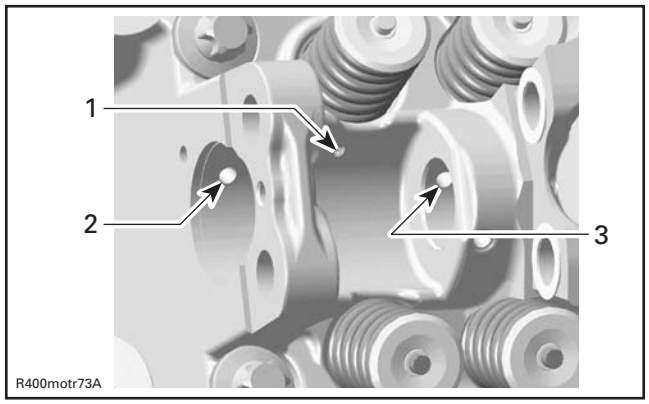
Inspecting the Cylinder Head

Inspect timing chain guide (fixed) for wear, cracks or other damages. Replace if necessary.

Check for cracks between valve seats, if so, replace cylinder head.

Check mating surface between cylinder and cylinder head for contamination. If so, clean both surfaces.

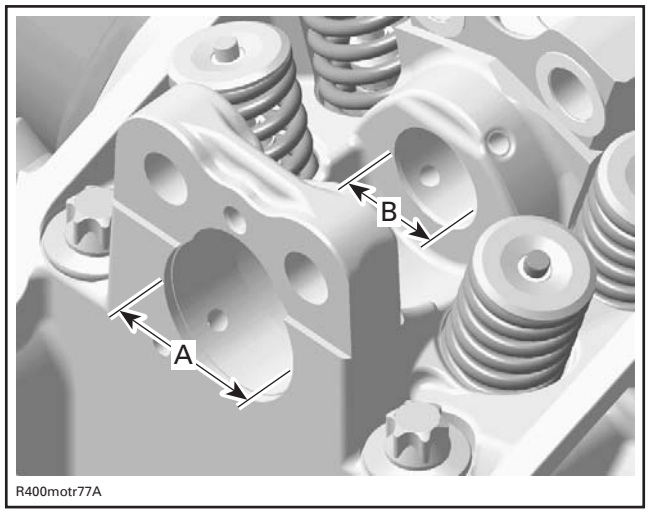
Clean oil support through the cylinder head from contamination.



1. Oil port to lubricate camshaft lobes intake/exhaust
2. Oil supply to camshaft bearing journal (timing chain side)
3. Oil supply to camshaft bearing journal (spark plug side)

Inspecting the Cylinder Head Camshaft Bearing

Measure camshaft bearing in cylinder head.



A. Camshaft bearing (timing chain side)
B. Camshaft bearing (spark plug side)

CAMSHAFT BEARING (TIMING CHAIN SIDE)	
NEW	35.000 mm to 35.025 mm (1.378 in to 1.3789 in)
SERVICE LIMIT	35.040 mm (1.3795 in)
CAMSHAFT BEARING (SPARK PLUG SIDE)	
NEW	22.000 mm to 22.021 mm (.8661 in to .867 in)
SERVICE LIMIT	22.040 mm (.8677 in)

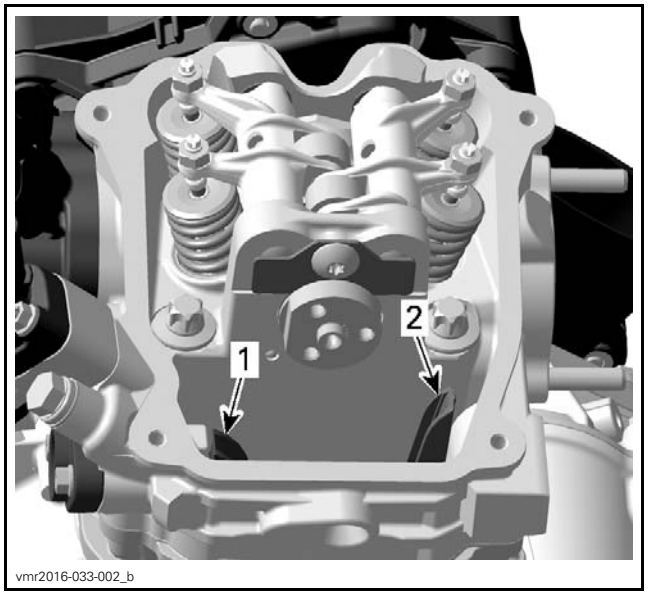
Installing the Cylinder Head

NOTE: Front and rear cylinder heads are not identical. **Never** interchange cylinder heads.

Reverse the removal procedure. Pay attention to the following details.

Ensure dowel pins are in place.

NOTICE **Timing chain guide (fixed) has to be fixed between cylinder and cylinder head.**

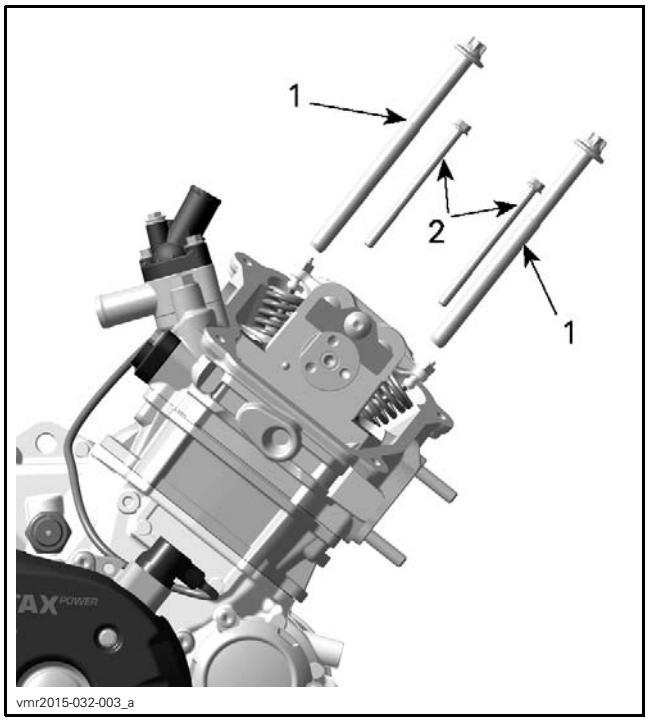


1. Timing chain guide (tensioner side) mounted in crankcase
2. Timing chain guide (fixed) between cylinder and cylinder head

Install a NEW cylinder head gasket.

Install cylinder head screws in correct position.

NOTICE **Cylinder head screws have different sizes and lengths.**

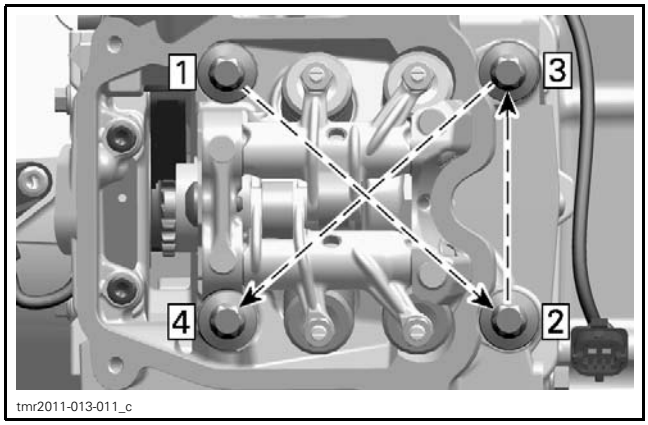


1. Location no. 1
2. Location no. 2

CYLINDER HEAD SCREW IDENTIFICATION		
570 650 850	Location no. 1	M10 x 140
	Location no. 2	M6 x 85
1000 1000R	Location no. 1	M10 x 159
	Location no. 2	M6 x 105

Tighten M10 cylinder head screws FIRST as per following specifications.

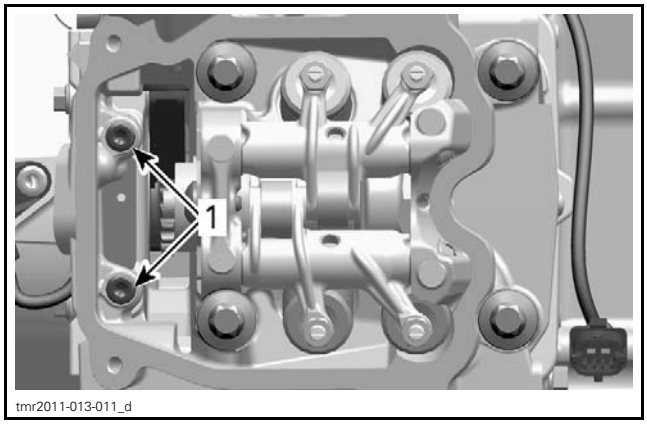
NOTE: Always perform one step on all M10 cylinder head screws before going to the next step.



TIGHTENING SEQUENCE - M10 CYLINDER HEAD SCREWS

TIGHTENING TORQUE		
M10 cylinder head screws	STEP A	20 N•m ± 1 N•m (15 lbf•ft ± 1 lbf•ft)
	STEP B	180° +/- 5°

Tighten M6 cylinder head screws as per following specification.



1. M6 Screws

TIGHTENING TORQUE	
M6 cylinder head screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Check timing chain guide (tensioner side) for movement.

Refer to applicable subsection for installation details of remaining removed parts.

VALVE SPRINGS

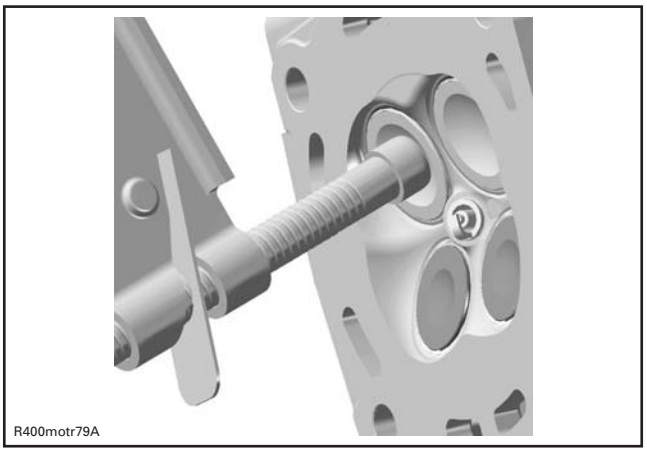
Removing the Valve Spring

1. Refer to following procedures in this subsection to remove:
   – *CAMSHAFT*
   – *CYLINDER HEAD*.
2. Remove valve spring.

ENGINE	REQUIRED TOOL
All	VALVE SPRING COMPRESSOR (P/N 529 035 724)
570 650 1000	VALVE SPRING COMPRESSOR CUP (P/N 529 035 764)
850 1000R	VALVE SPRING COMPRESSOR CUP (P/N 529 036 270)

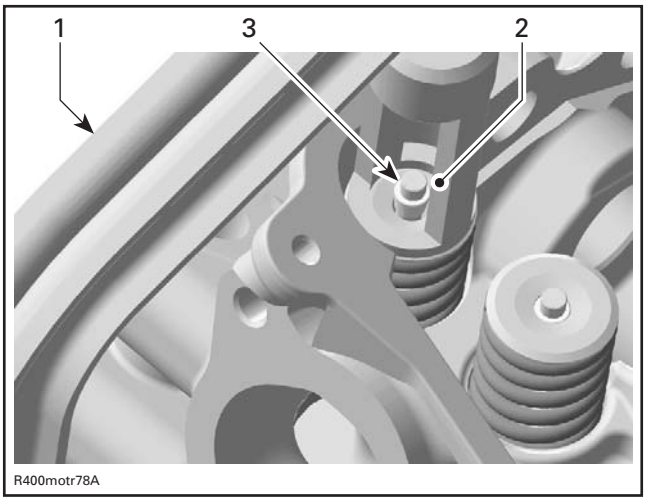
⚠ WARNING

Always wear safety glasses when disassembling valve springs. Be careful when unlocking valves. Components could fly away because of the strong spring preload.



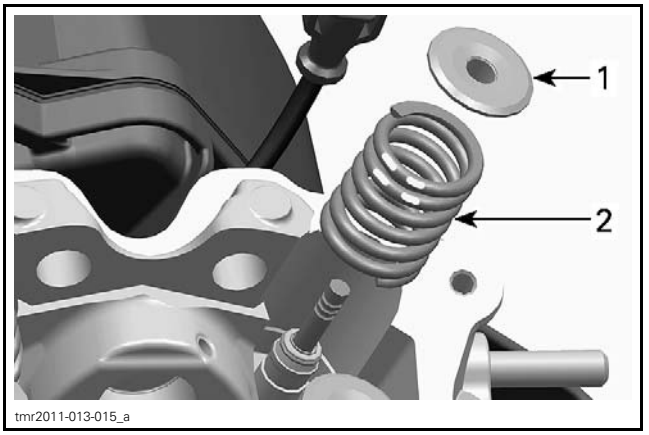
LOCATE VALVE SPRING COMPRESSOR CLAMP IN CENTER OF THE VALVE

3. Remove valve cotters.



1. *Valve spring compressor clamp*
2. *Valve spring compressor cup*
3. *Valve cotter*

4. Remove tools and withdraw valve spring retainer and valve spring.

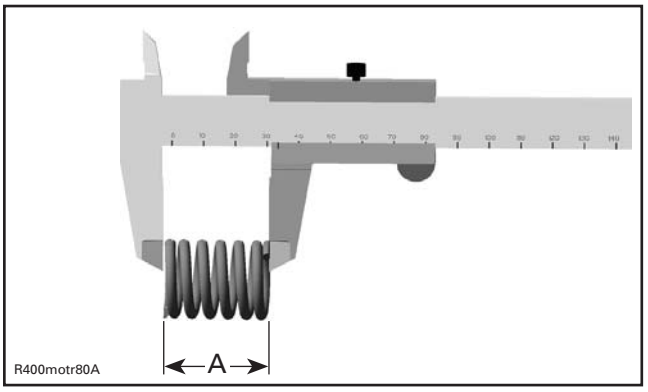


1. *Valve spring retainer*
2. *Valve spring*

Inspecting the Valve Spring

Check valve spring for visible damage. If so, replace valve spring.

Check valve spring for free length and straightness.



A. Valve spring length

VALVE SPRING FREE LENGTH		
570 650 1000	NOMINAL NEW	40.81 mm (1.607 in)
850 1000R		40.41 mm (1.591 in)
All	Service limit	39.00 mm (1.535 in)

Replace valve springs if not within specifications.

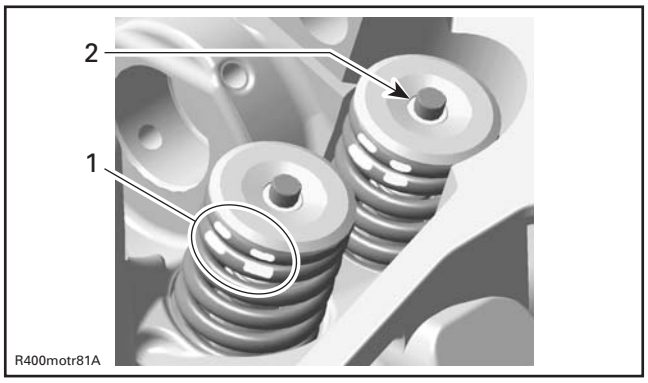
Installing the Valve Spring

The installation is the reverse of the removal procedure. However, pay attention to the following.

Colored area of the valve spring must be placed on top.

To ease installation of cotters, apply oil or grease on them so that they remain in place while releasing the spring.

NOTE: Valve cotter must be properly engaged in valve stem grooves.



1. Position of the valve spring
2. Valve cotter

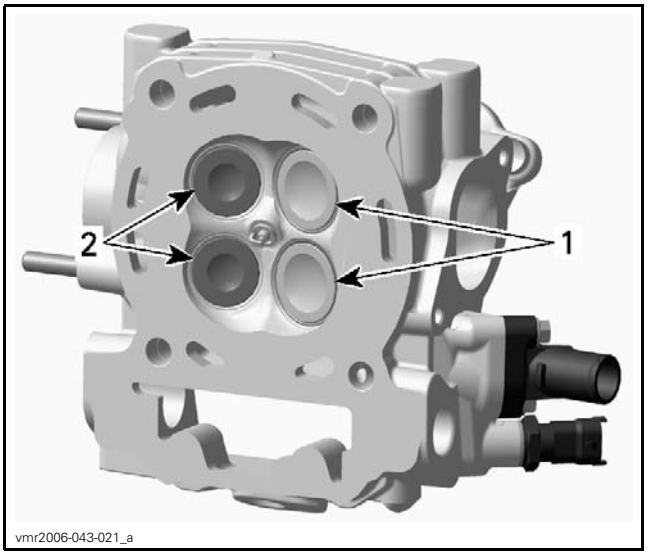
After spring is installed, ensure it is properly locked by tapping on valve stem end with a soft hammer so that valve opens and closes a few times.

NOTICE **An improperly locked valve spring will cause engine damage.**

VALVES

Removing the Valve

1. Remove valve spring, see *VALVE SPRING* in this subsection.
2. Push valve stem, then pull valves (intake and exhaust) out of valve guide.



1. Intake valves 31 mm
2. Exhaust valves 27 mm

3. Remove valve stem seal and discard it.

REQUIRED TOOL
SNAP-ON PLIERS (P/N YA 8230)

Inspecting the Valve

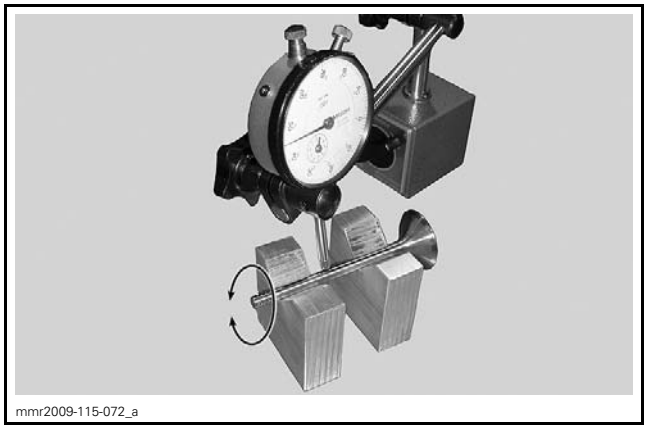
Whenever valves are removed always inspect valve guides. Refer to *VALVE GUIDES* in this subsection.

Valve Stem Seal

Always install NEW seals whenever valves are removed.

Inspecting the Valve

Inspect valve surface, check for abnormal stem wear and bending. If out of specification, replace by a new one.

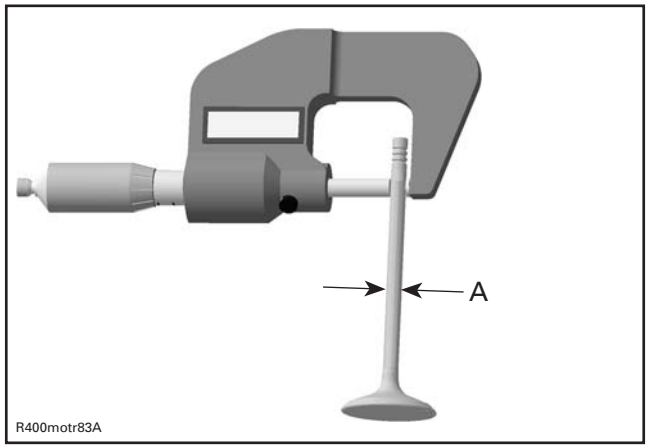


VALVE OUT OF ROUND (INTAKE AND EXHAUST VALVES)	
NEW	0.005 mm (.0002 in)
SERVICE LIMIT	0.06 mm (.0024 in)

Inspecting the Valve Stem

Measure valve stem in three places using a micrometer.

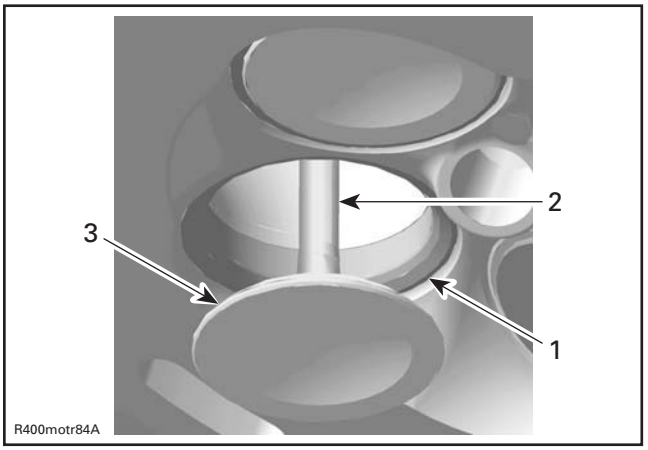
Replace valve if valve stem is out of specification or has other damages such as wear or friction surface.



A. Valve stem diameter

VALVE STEM DIAMETER		
EXHAUST VALVE		
570 650 1000	NEW	4.956 mm to 4.970 mm (.1951 in to .1957 in)
	SERVICE LIMIT	4.930 mm (.1941 in)
850 1000R	NEW	5.461 mm to 5.476 mm (.215 in to .2156 in)
	SERVICE LIMIT	5.440 mm (.2142 in)
INTAKE VALVE		
570 650 1000	NEW	4.966 mm to 4.980 mm (.1955 in to .1961 in)
	SERVICE LIMIT	4.930 mm (.1941 in)
850 1000R	NEW	5.472 mm to 5.486 mm (.2154 in to .216 in)
	SERVICE LIMIT	5.450 mm (.2146 in)

Inspecting the Valve Face and Seat



1. Valve seat
2. Exhaust valve contaminated area
3. Valve face (contact surface to valve seat)

Check valve face and seat for burning or pitting and replace valve or cylinder head if there are signs of damage.

Ensure to seat valves properly. Apply some lapping compound to valve face and work valve on its seat with a lapping tool (see *VALVE GUIDES* in this subsection).

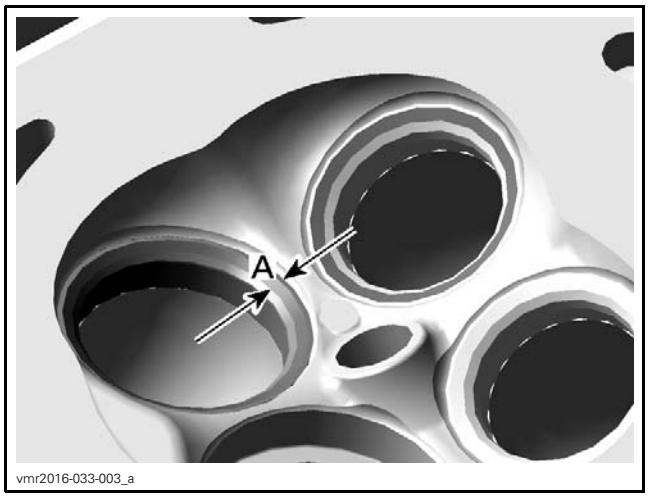
Measure valve face contact width.

NOTE: The location of contact area should be in center of valve seat.

Measure valve seat width using a caliper.

VALVE SEAT CONTACT WIDTH	
EXHAUST VALVE	
NEW	1.25 mm to 1.55 mm (.049 in to .061 in)
SERVICE LIMIT	2.00 mm (.079 in)
INTAKE VALVE	
NEW	1.05 mm to 1.35 mm (.041 in to .053 in)
SERVICE LIMIT	1.80 mm (.071 in)

If valve seat contact width is too wide or has dark spots, replace the cylinder head.



A. Valve seat contact width

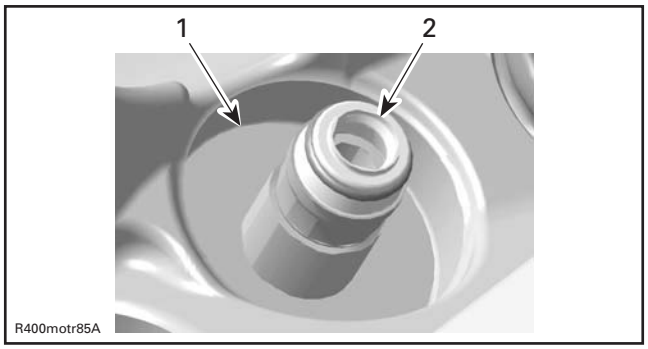
Installing the Valve

Reverse the removal procedure. Pay attention to the following details.

Install a NEW valve stem seal. Make sure thrust washer is installed before installing seal.

Apply engine oil on valve stem and install it.

NOTICE Be careful when valve stem is passed through sealing lips of valve stem seal.



1. Thrust washer
2. Sealing lips of valve stem seal

To ease installation of cotters, apply oil or grease on them so that they remain in place while releasing the spring.

After spring is installed, ensure it is properly locked by tapping on valve stem end with a soft hammer so that valve opens and closes a few times.

NOTICE An improperly locked valve spring will cause engine damage.

VALVE GUIDES

Inspecting the Valve Guide

Always replace valve stem seals whenever valve guides are removed.

Measure valve guide in three places using a small bore gauge.

NOTE: Clean valve guide to remove carbon deposits before measuring.

Replace valve guide if it is out of specification or has other damages such as wear or friction surface.

VALVE GUIDE DIAMETER (INTAKE AND EXHAUST VALVES)		
570 650 1000	New	4.998 mm to 5.018 mm (.1968 in to .1976 in)
	Service limit	5.050 mm (.1988 in)
850 1000R	New	5.506 mm to 5.518 mm (.2168 in to .2172 in)
	Service limit	5.568 mm (.2192 in)

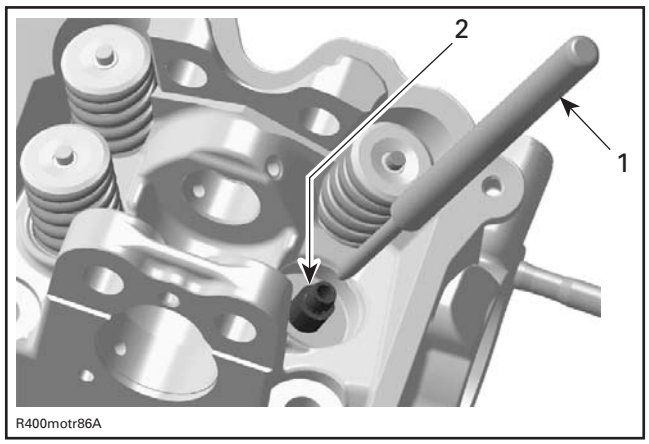
Removing the Valve Guide

1. Remove cylinder head (see *CYLINDER HEAD* in this subsection).
2. Remove valves (see *VALVES* in this subsection).

NOTE: Clean valve guide area from contamination before removal.

3. Drive valve guide out of cylinder head using specified tool.

ENGINE	REQUIRED TOOL	
570 650 1000	VALVE GUIDE REMOVER 5 MM (P/N 529 035 924)	
850 1000R	VALVE GUIDE REMOVER (6 MM) (P/N 529 036 074)	
All	Hammer	



1. *Valve guide remover*
2. *Valve guide*

Installing the Valve Guide

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

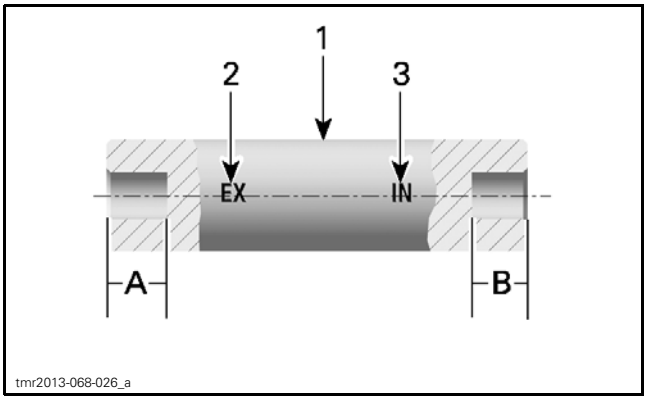
Clean the valve guide bore before reinstalling the valve guide into cylinder head.

Install valve guide.

ENGINE	REQUIRED TOOL	
570 650 1000	VALVE GUIDE INSTALLER (P/N 529 036 140)	
850 1000R	VALVE GUIDE INSTALLER (P/N 529 036 269)	

850 and 1000R Engines

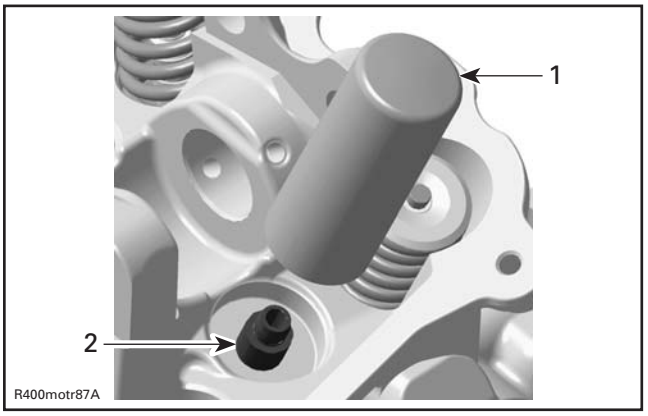
NOTICE Valve guide installer is used for intake and exhaust valve guides. Choose proper side for installation.



1. *Valve guide installer*
2. *Mark "EX" - exhaust valve guide installer*
3. *Mark "IN" - intake valve guide installer*

A. 14.5 mm (.571 in)
B. 13.3 mm (.524 in)

All Engines

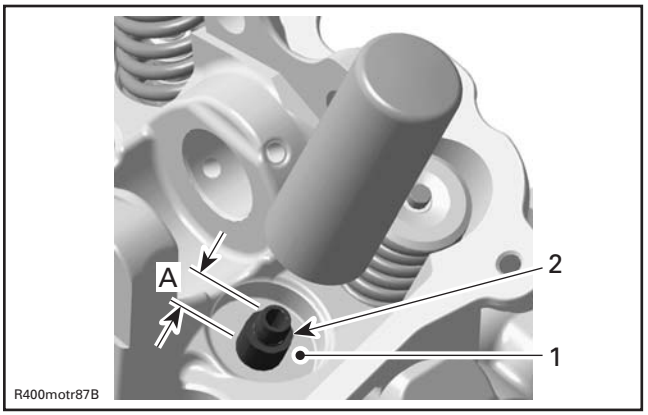


1. *Valve guide installer*
2. *Valve guide*

NOTE: Apply an antiseize lubricant on valve guide prior to install it into the cylinder head.

RECOMMENDED SERVICE PRODUCT
LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

NOTICE Push valve guide in the cold cylinder head as per following illustration.

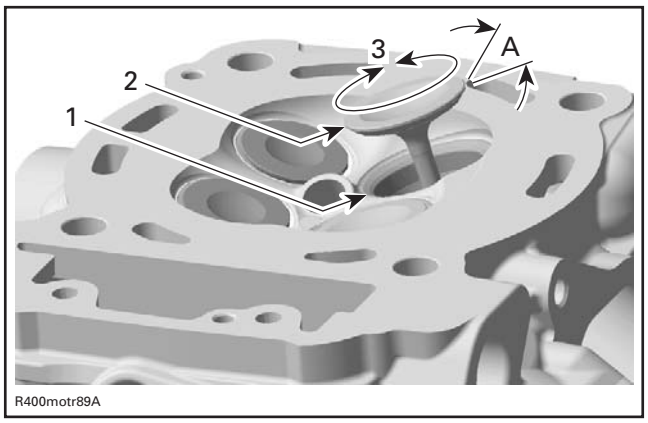


1. *Thrust surface of cylinder head*
2. *Valve guide*

A. Measurement from thrust surface to valve guide top

VALVE GUIDE (MEASUREMENT A)		
570 650 1000	Intake and Exhaust	14.00 mm to 14.40 mm (.5512 in to .5669 in)
850 1000R	Intake	13.1 mm to 13.5 mm (.5157 in to .5315 in)
	Exhaust	14.3 mm to 14.7 mm (.563 in to .579 in)

Apply some lapping compound to valve face and work valve on its seat with a lapping tool.



1. Valve seat
2. Valve face (contact surface to valve seat)
3. Turn valve while pushing against cylinder head
A. Valve seat angle 45°

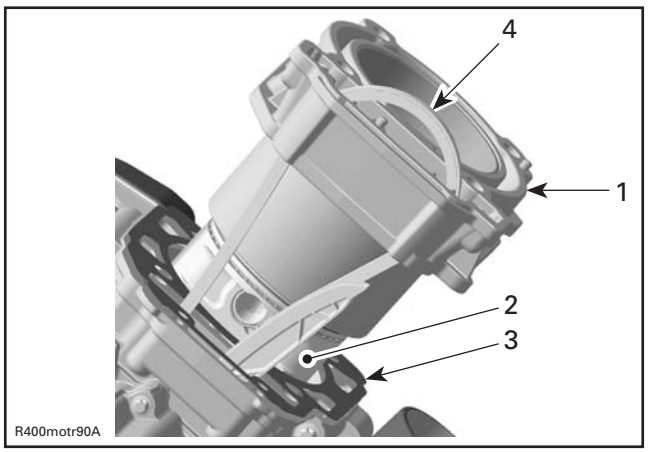
NOTE: Ensure to seat valves properly. Apply marking paste to ease checking contact pattern.

Repeat procedure until valve seat/valve face fits together.

CYLINDER

Removing the Cylinder

1. Refer to the *TIMING CHAIN* subsection to remove the following parts:
   – Chain tensioner
   – Camshaft timing gear.
2. Remove the cylinder head (see *CYLINDER HEAD* in this subsection).
3. Pull cylinder.
4. Discard cylinder base gaskets.



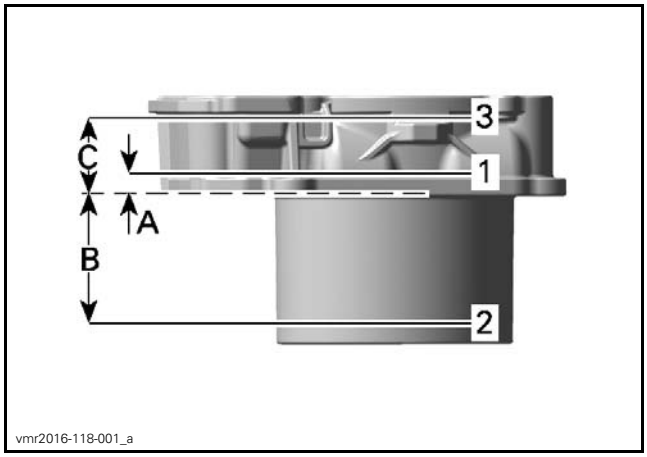
1. Cylinder
2. Piston assembly
3. Cylinder base gasket
4. Camshaft timing chain

Inspecting the Cylinder

Check cylinder for cracks, scoring and wear ridges on the top and bottom of the cylinder. If so, replace cylinder.

Cylinder Taper

Measure cylinder bore at recommended positions.



A. First measurement
B. Second measurement
C. Third measurement

CYLINDER TAPER MEASUREMENTS		
ENGINE	MEASUREMENT	SPECIFICATION
570 650 850	A	5 mm (.197 in)
	B	58 mm (2.28 in)
	C	37 mm (1.46 in)
1000 1000R	A	5 mm (.197 in)
	B	53 mm (2.09 in)
	C	57 mm (2.24 in)

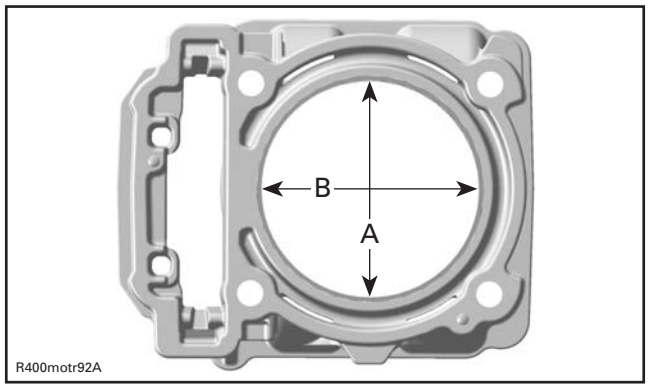
CYLINDER TAPER SPECIFICATION	
NEW (MAXIMUM)	0.038 mm (.0015 in)
SERVICE LIMIT	0.090 mm (.0035 in)

Distance between measurements should not exceed the service limit. Otherwise, replace cylinder and piston rings.

Cylinder Out of Round

Measure cylinder diameter:
– in piston axis
– perpendicular to piston axis.

NOTE: Use the same measuring points as described in *CYLINDER TAPER*.



A. Perpendicular to crankshaft axis
B. Parallel to crankshaft axis

CYLINDER OUT OF ROUND	
NEW (MAXIMUM)	0.015 mm (.0006 in)
SERVICE LIMIT	0.020 mm (.0008 in)

Installing the Cylinder

The installation is the reverse of the removal procedure. However, pay attention to the following.

NOTICE **Always replace cylinder base gasket before installing the cylinder.**

NOTE: Make sure piston rings are properly spaced, refer to *PISTON RINGS* in this subsection.

Apply engine oil:
– In the bottom area of the cylinder bore
– On the piston rings
– On the piston ring compressor.

Compress piston rings.

REQUIRED TOOL
Piston ring compressor with band width of 15 mm to 20 mm (.59 in to .79 in)

First mount cylinder 2.

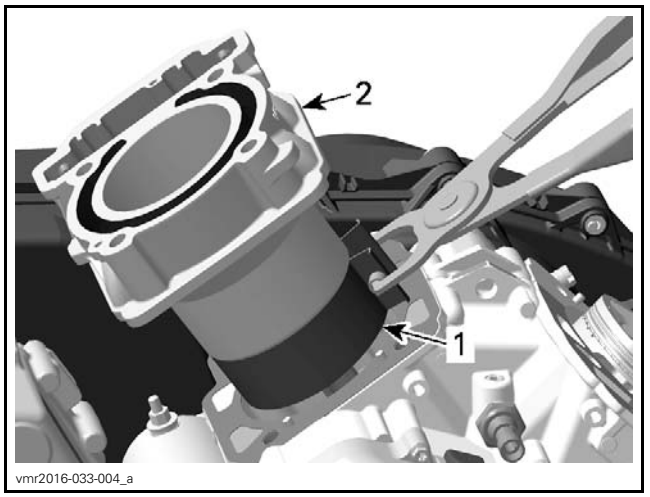
NOTE: The cylinder can not be pushed fully over the piston unless the piston is located at TDC.

Then remove the crankshaft locking bolt.

Crank the engine further and position piston 1 at TDC.

Mount cylinder 1.

Put timing chain through the chain passage, then slide cylinder over piston.



1. Piston ring compressor
2. Cylinder

NOTICE **Chain guide has to be fixed between cylinder and cylinder head.**

NOTE: After both cylinders are installed, turn crankshaft until piston of cylinder 2 is at TDC and lock crankshaft. Refer to *CRANKSHAFT* in the *BOTTOM END* subsection.

Install cylinder head and the other parts in accordance with the proper installation procedures.

PISTON

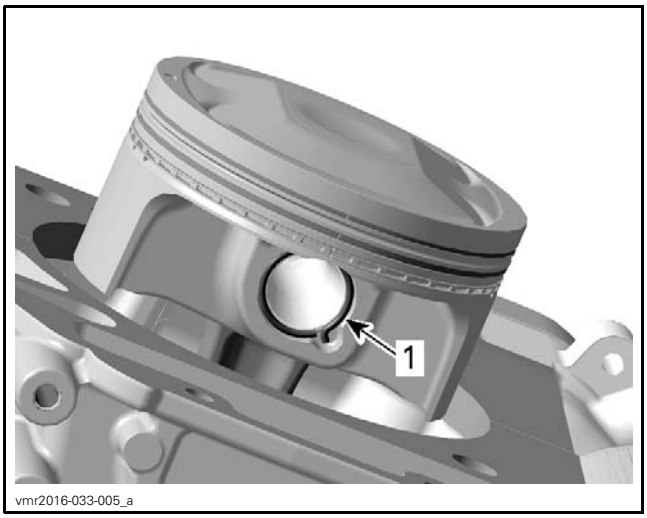
Removing the Piston

1. Refer to following procedures in this subsection and remove following parts:
   – Cylinder head
   – Cylinder.
2. Place a rag under piston and in the area of timing chain compartment.

⚠ WARNING

Piston circlips are spring loaded.

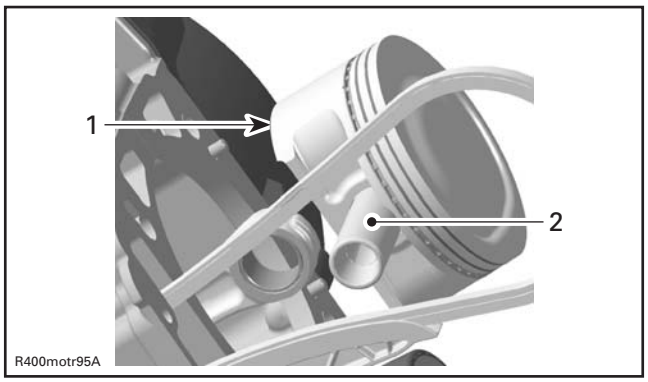
3. Remove one piston circlip and discard it.



1. Piston circlip

NOTE: The removal of both piston circlips is not necessary to remove piston pin.

4. Push piston pin out of piston.



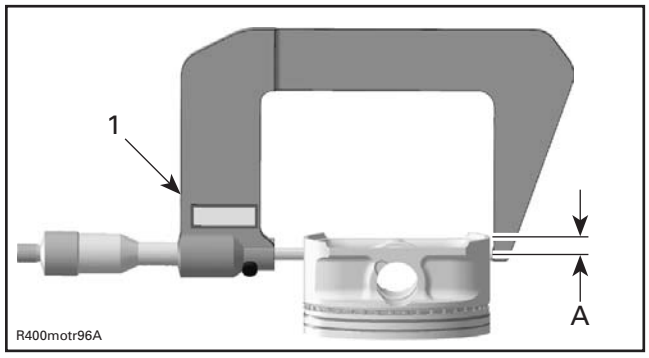
1. Piston
2. Piston pin

5. Detach piston from connecting rod.

Inspecting the Piston

Inspect piston for scoring, cracking or other damages. Replace piston and piston rings if necessary.

Using a micrometer, measure piston at 8 mm (.315 in) perpendicularly (90°) to piston pin.



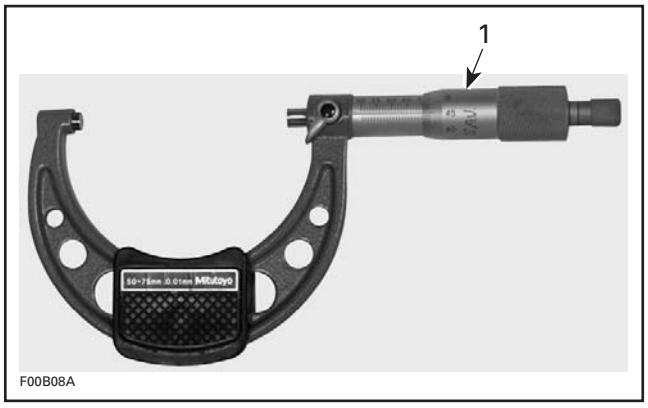
1. Measuring perpendicularly (90°) to piston pin
A. 8 mm (.315 in)

The measured dimension should be as described in the following tables. If not, replace piston.

PISTON MEASUREMENT		
570	New	83.950 mm to 83.966 mm (3.3051 in to 3.3057 in)
	Service limit	83.850 mm (3.3012 in)
650	New	81.950 mm to 81.966 mm (3.2264 in to 3.227 in)
	Service limit	81.850 mm (3.2224 in)
850	New	93.950 mm to 93.966 mm (3.6988 in to 3.6994 in)
	Service limit	93.900 mm (3.6969 in)
1000 1000R	New	90.950 mm to 90.966 mm (3.5807 in to 3.5813 in)
	Service limit	90.900 mm (3.5787 in)

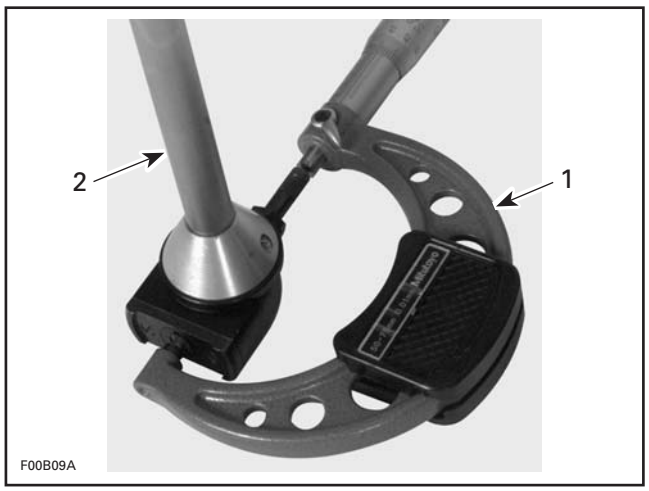
Piston/Cylinder Clearance

Adjust and lock a micrometer to the piston dimension.

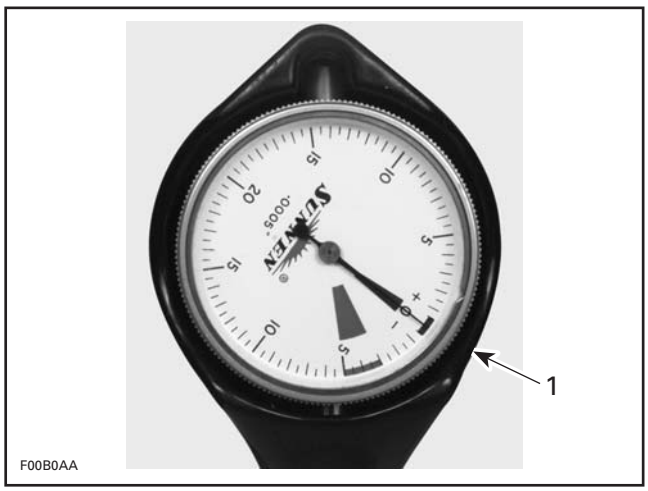


1. Micrometer set to the piston dimension

With the micrometer set to the dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0 (zero).



1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



TYPICAL
1. Indicator set to 0 (zero)

Position the dial bore gauge 20 mm (.787 in) above cylinder base, measuring perpendicularly (90°) to piston pin axis.

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance.

PISTON/CYLINDER CLEARANCE		
570 650	New	0.057 mm to 0.087 mm (.0022 in to .0034 in)
	Service limit	0.130 mm (.0051 in)
850 1000 1000R	New	0.027 mm to 0.057 mm (.0011 in to .0022 in)
	Service limit	0.100 mm (.0039 in)

NOTE: Make sure used piston is not worn.

If clearance exceeds specified tolerance, replace piston by a new one and measure piston/cylinder clearance again.

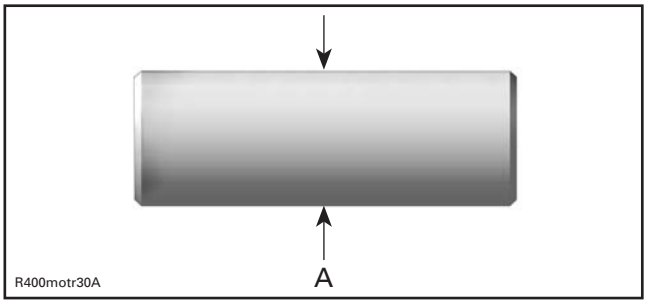
NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

Connecting Rod/Piston Pin Clearance

Using synthetic abrasive woven, clean piston pin from deposits.

Inspect piston pin for scoring, cracking or other damages.

Measure piston pin. See the following illustration for the proper measurement positions.

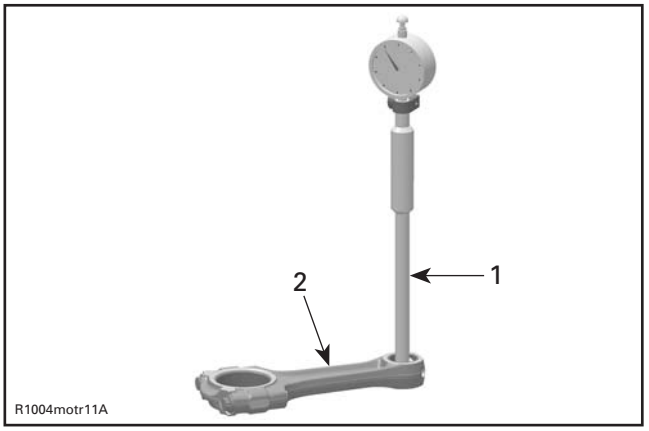


A. Piston pin diameter

PISTON/CYLINDER CLEARANCE		
570 650 850	New	19.996 mm to 20.000 mm (.7872 in to .7874 in)
	Service limit	19.980 mm (.7866 in)
1000 1000R	New	21.996 mm to 22.000 mm (.866 in to .866 in)
	Service limit	21.980 mm (.8654 in)

Replace piston pin if diameter is out of specifications.

Measure inside diameter of connecting rod small end bushing.



1. Bore gauge
2. Connecting rod

CONNECTING ROD SMALL END DIAMETER		
570 650 850	New	20.010 mm to 20.020 mm (.7878 in to .7882 in)
	Service limit	20.060 mm (.7898 in)
1000 1000R	New	22.010 mm to 22.020 mm (.8665 in to .8669 in)
	Service limit	22.050 mm (.8681 in)

Replace connecting rod if diameter of connecting rod small end is out of specifications. Refer to *BOTTOM END* subsection for removal procedure.

Compare measurements to obtain the connecting rod/piston pin clearance.

CONNECTING ROD/ PISTON PIN CLEARANCE	
SERVICE LIMIT	0.080 mm (.0031 in)

Installing the Piston

The installation is the reverse of the removal procedure. However, pay attention to the following.

Apply engine oil on the piston pin.

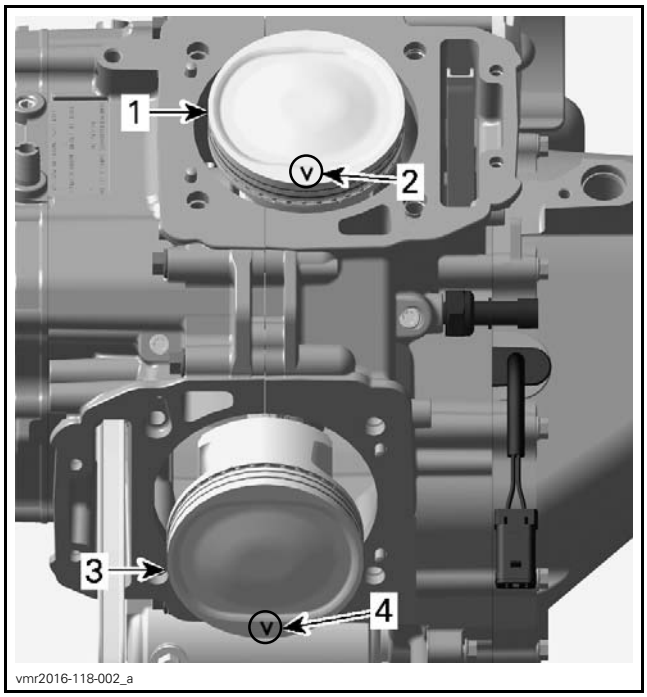
Insert piston pin into piston and connecting rod.

570, 850, 1000 and 1000R Engines

For each cylinder, install piston with the punched arrow on piston dome pointing towards the rear side of the engine.

Front cylinder: Mark on top of piston must show to intake side.

Rear cylinder: Mark on top of piston must show to exhaust side.



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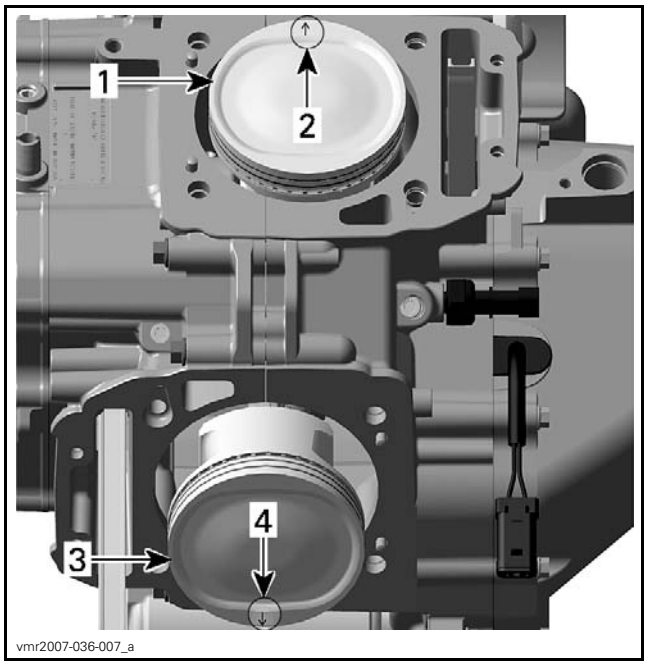
570 , 850, 1000 AND 1000R ENGINES
1. *Piston of cylinder 1 (front)*
2. *Mark on piston must show to intake side of cylinder 1*
3. *Piston of cylinder 2 (rear)*
4. *Mark on piston must show to exhaust side of cylinder 2*

650 Engines

For each cylinder, install the piston with the arrow on the piston dome pointing towards the exhaust side of the engine.

Front cylinder: Mark on top of piston must show to exhaust side.

Rear cylinder: Mark on top of piston must show to exhaust side.



650 ENGINE
1. *Piston of cylinder 1 (front)*
2. *Mark on piston must show to exhaust side of cylinder 1*
3. *Piston of cylinder 2 (rear)*
4. *Mark on piston must show to exhaust side of cylinder 2*

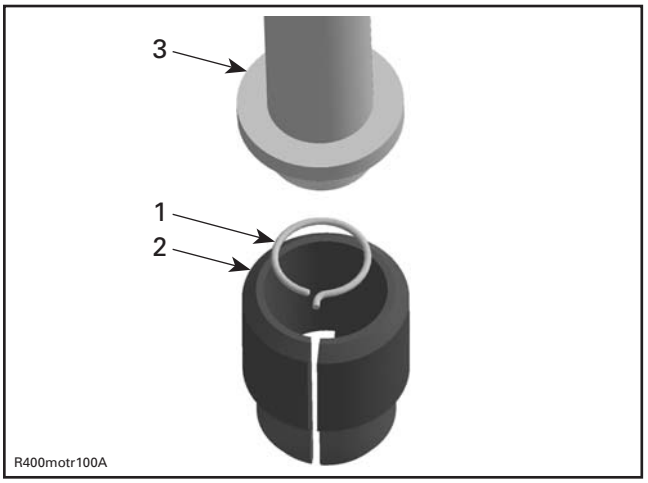
All Engines

Use the piston appropriate circlip installer to assemble the NEW piston circlip as per following procedure:

REQUIRED TOOL		
570 650	PISTON CIRCLIP INSTALLER (P/N 529 035 921)	
850	PISTON CIRCLIP INSTALLER (P/N 529 036 083)	
1000 1000R	PISTON CIRCLIP INSTALLER (P/N 529 036 153)	

NOTICE **Always replace disassembled piston circlip(s) by NEW ones. Place a rag on cylinder base to avoid dropping the circlip inside the engine.**

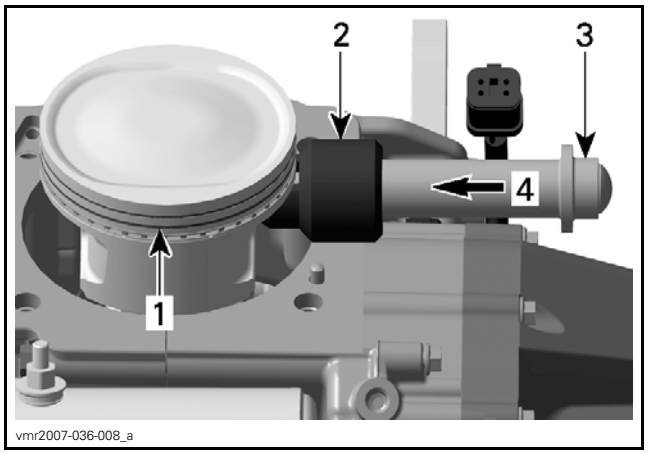
Place circlip in sleeve as per following illustration.



1. *Circlip*
2. *Sleeve*
3. *Assembly jig from piston clip installer*

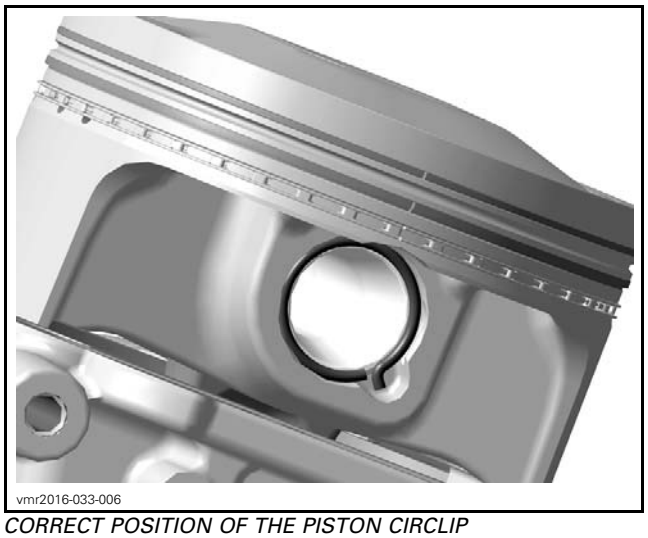
Push taper side of assembly jig until circlip reaches middle of sleeve.

Align sleeve with piston pin axis and push assembly jig until circlip engages in piston.



1. *Hold piston while pushing circlip in place*
2. *Sleeve*
3. *Assembly jig*
4. *Direction to push circlip*

NOTE: Take care that the hook of the piston circlip is positioned properly.


vmr2016-033-006

CORRECT POSITION OF THE PISTON CIRCLIP

PISTON RINGS

Removing the Piston Rings

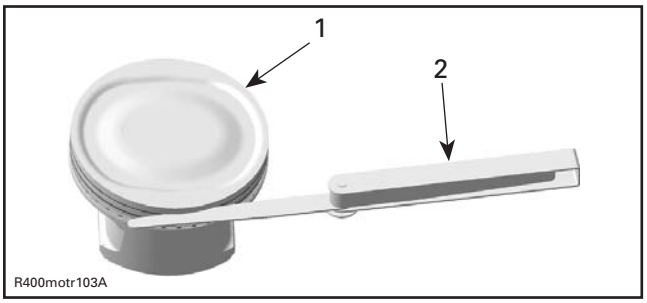
Remove the piston (see *PISTON* in this subsection).

Inspecting the Piston Rings

Ring/Piston Groove Clearance

Using a feeler gauge measure each ring/piston groove clearance. If the clearance is too large, the piston and the piston rings should be replaced.

RING/PISTON GROOVE CLEARANCE		
UPPER COMPRESSION RING		
570	NEW	0.025 mm to 0.070 mm (.001 in to .0028 in)
	SERVICE LIMIT	0.100 mm (.0039 in)
650 850 1000 1000R	NEW	0.030 mm to 0.070 mm (.0012 in to .0028 in)
	SERVICE LIMIT	0.150 mm (.0059 in)
LOWER COMPRESSION RING		
All	NEW	0.020 mm to 0.060 mm (.0008 in to .0024 in)
	SERVICE LIMIT	0.150 mm (.0059 in)
OIL SCRAPER RING		
All	NEW	0.010 mm to 0.180 mm (.0004 in to .0071 in)
	SERVICE LIMIT	0.250 mm (.0098 in)



1. Piston
2. Feeler gauge

Ring End Gap

RING END GAP		
UPPER COMPRESSION RING		
570	NEW	0.10 mm to 0.30 mm (.004 in to .012 in)
	SERVICE LIMIT	0.50 mm (.02 in)
850	NEW	0.20 mm to 0.35 mm (.008 in to .014 in)
	SERVICE LIMIT	0.60 mm (.024 in)
650 1000 1000R	NEW	0.20 mm to 0.40 mm (.008 in to .016 in)
	SERVICE LIMIT	0.60 mm (.024 in)
LOWER COMPRESSION RING		
570 850	NEW	0.35 mm to 0.55 mm (.014 in to .022 in)
	SERVICE LIMIT	0.85 mm (.033 in)
650 1000 1000R	NEW	0.20 mm to 0.40 mm (.008 in to .016 in)
	SERVICE LIMIT	0.70 mm (.028 in)
OIL SCRAPER RING		
All	NEW	0.20 mm to 0.70 mm (.008 in to .028 in)
	SERVICE LIMIT	1.00 mm (.039 in)

To measure the ring end gap place the ring in the cylinder in the area of 8 mm to 16 mm (5/16 in to 5/8 in) from top of cylinder.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. Replace ring if gap exceeds specified tolerance.

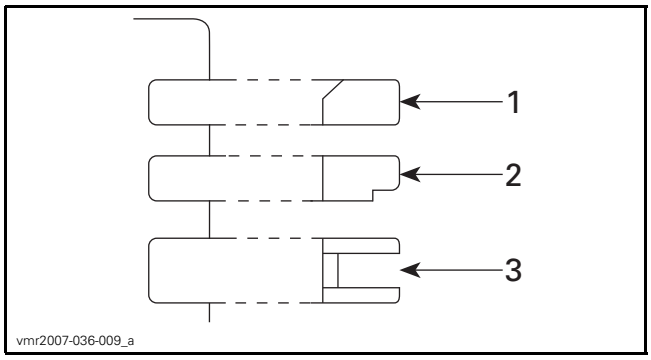
Installing the Piston Rings

The installation is the reverse of the removal procedure. However, pay attention to the following.

First, install spring and then rings of oil scraper ring.

NOTE: Use a ring expander to prevent breakage during installation. The oil ring must be installed by hand.

Install the oil scraper ring first, then the lower compression ring with the word "N and TOP " facing up, then the upper compression ring with the word "N and TOP" facing up.

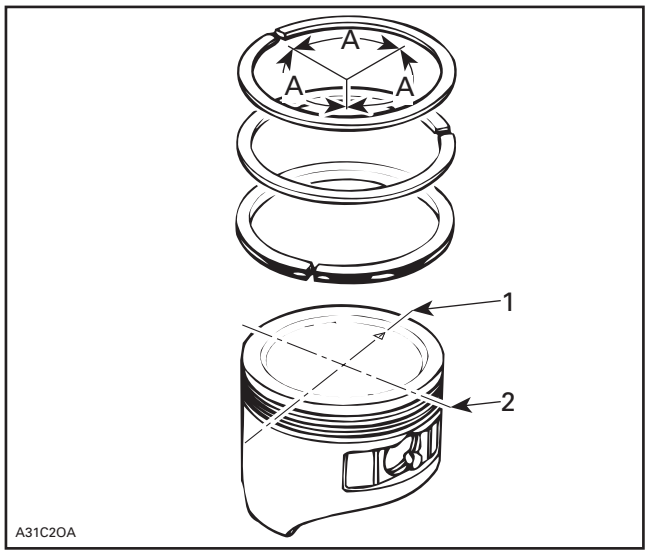


1. Upper compression ring
2. Lower compression ring
3. Oil scraper ring

NOTICE Ensure that top and second rings are not interchanged.

Check that rings rotate smoothly after installation.

Space the piston ring end gaps 120° apart and do not align the gaps with the piston pin bore or the thrust side axis.



1. DO NOT align ring gap with piston thrust side axis
2. DO NOT align ring gap with piston pin bore axis
A. 120°

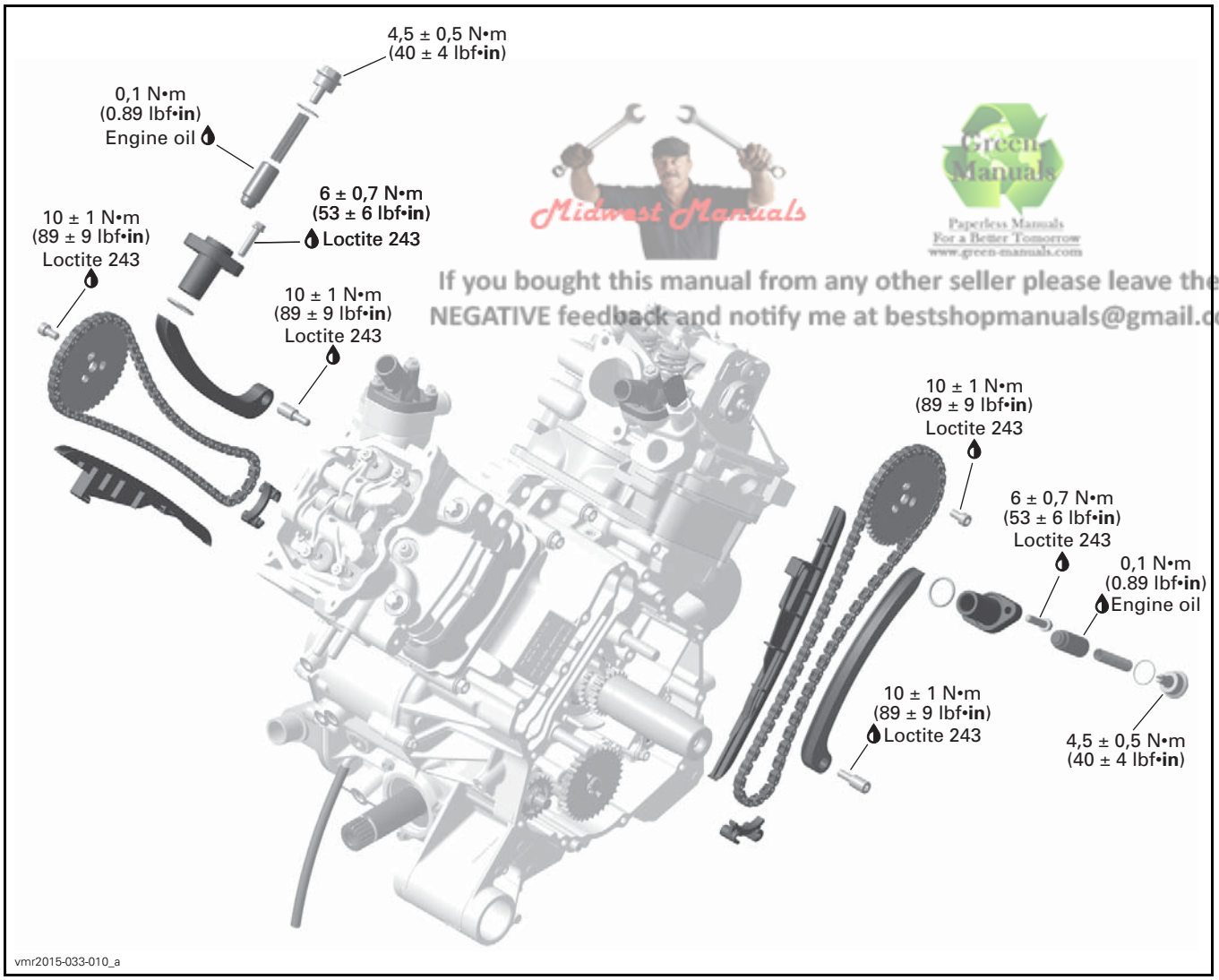
TIMING CHAIN

SERVICE TOOLS

Description	Part Number	Page
CAMSHAFT TIMING TOOL	529 036 268	5
CRANKSHAFT TDC POSITION TOOL	529 036 201	5, 9

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	6, 11



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TROUBLESHOOTING

UNUSUAL ENGINE NOISE OR VIBRATION

1. IMPROPER VALVE CLEARANCE ADJUSTMENT AND/OR WORN OUT ROCKER ARM(S)
   - *Readjust valve clearance and/or replace defective part(s), refer to TOP END subsection.*
2. DEFECTIVE CHAIN TENSIONER
   - *Replace chain tensioner.*
3. WORN OUT TIMING CHAIN GUIDE(S)
   - *Replace timing chain guide(s).*
4. STRETCHED TIMING CHAIN OR WORN OUT TIMING GEARS
   - *Replace timing chain and timing gears.*
5. LOOSE TIMING GEAR RETAINING SCREWS
   - *Retighten screws to recommended torque.*
6. INCORRECT CAMSHAFT TIMING
   - *Replace damaged components and readjust camshaft timing.*

ENGINE LACKS ACCELERATION OR POWER

1. INCORRECT CAMSHAFT TIMING
   - *Replace damaged components and readjust camshaft timing.*

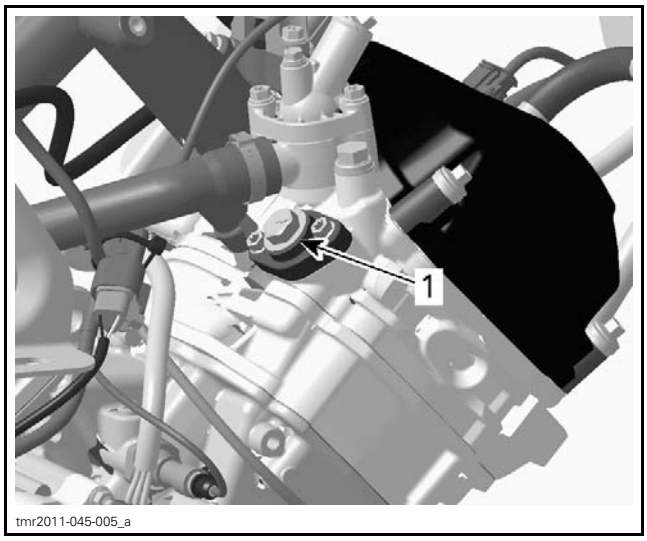
PROCEDURES

TIMING CHAIN TENSIONERS

Timing Chain Tensioner Location

570 Engine

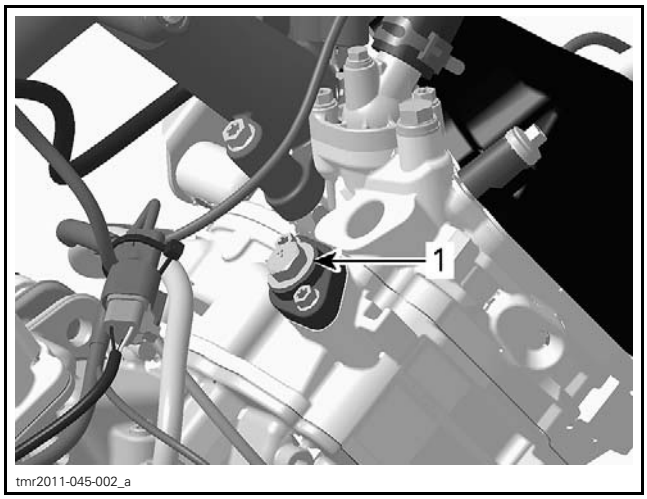
The timing chain tensioner is located on the back of each cylinder head.



570 ENGINE (FRONT CYLINDER SHOWN)
1. Timing chain tensioner

850 and 1000R Engines

The timing chain tensioner is located in the cylinder.



850 AND 1000R ENGINES (FRONT CYLINDER SHOWN)
1. Timing chain tensioner

Timing Chain Tensioner Access

For the front cylinder, the chain tensioner is accessible from the RH side.

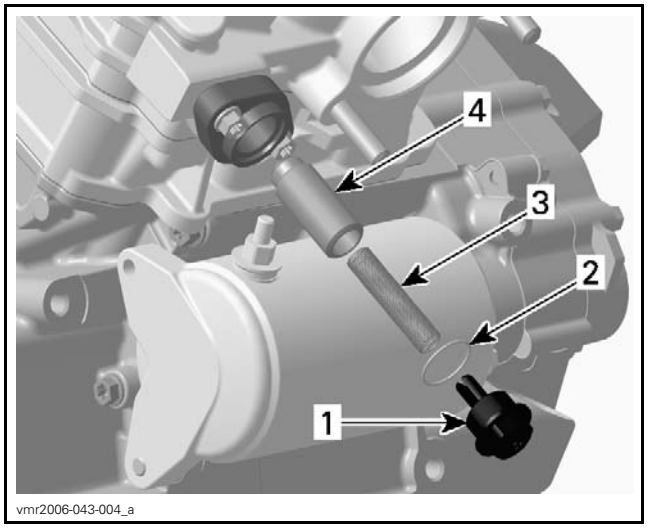
For the rear cylinder chain tensioner, remove the exhaust system outer heat shield. Refer to *EXHAUST SYSTEM* subsection.

Removing the Timing Chain Tensioner

1. Make sure the applicable piston is set to TDC ignition. Refer to *CAMSHAFT TIMING GEARS* in this subsection.
2. Carefully remove chain tensioner screw plug and release spring tension.

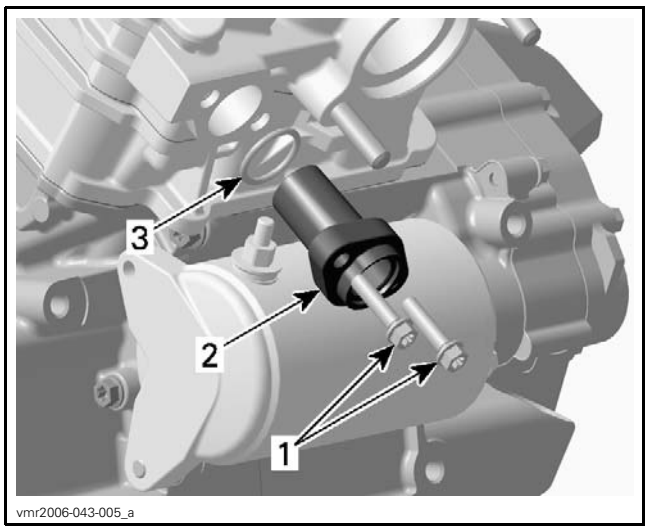
⚠ CAUTION Tensioner is spring loaded.

3. Remove:
   – O-ring
   – Spring
   – Chain tensioner plunger.



1. Chain tensioner screw plug
2. O-ring
3. Spring
4. Chain tensioner plunger

4. Remove:
   – Chain tensioner housing retaining screws
   – Chain tensioner housing
   – O-ring.



1. Screws
2. Chain tensioner housing
3. O-ring

Inspecting the Timing Chain Tensioner

Check chain tensioner housing and screw plug for cracks or other damages. Replace if necessary.

Check chain tensioner plunger for freedom of movement and/or scoring.

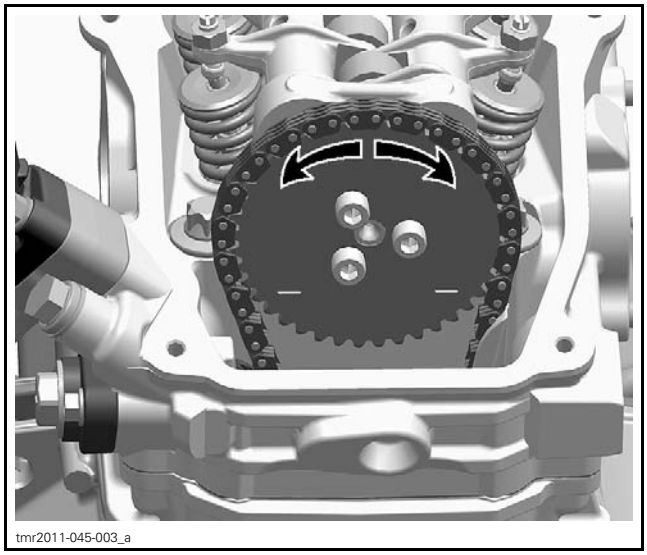
Ensure O-rings are not brittle, cracked or hard. Replace if necessary.

Check spring condition. Replace if bent, broken or worn.

Installing the Timing Chain Tensioner

Reverse the removal procedure. However, pay attention to the following.

NOTE: Before installing the chain tensioner, make sure the camshaft timing gear can be moved back and forth.



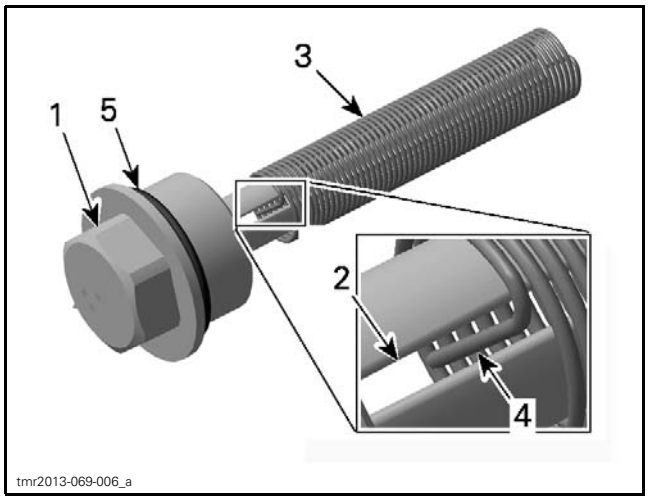
MOVE GEAR BACK AND FORTH

1. Apply engine oil on the chain tensioner plunger before installation.
2. Slightly turn the camshaft timing gear in order to move the timing chain excess play to the tensioner side.
3. Slightly screw in the plunger until the timing chain does not allow back and forth movement of the camshaft timing gear.
4. Screw the plunger in an additional 1/8 turn to obtain the required specified torque.

TIMING CHAIN TENSIONER ADJUSTMENT (TIGHTENING TORQUE)
0.1 N•m (.9 lbf•**in**)

NOTICE **Improper adjustment of the timing chain will lead to severe engine damage.**

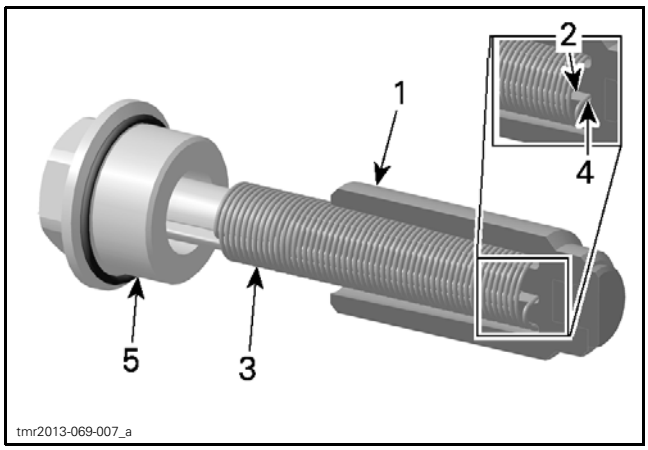
5. Place the O-ring on chain tensioner screw plug.
6. Fit the spring on one side into the slot of the chain tensioner screw plug.



1. Plug
2. Slot
3. Spring
4. Spring end
5. O-Ring

7. Fit the spring on the other side into the plunger.

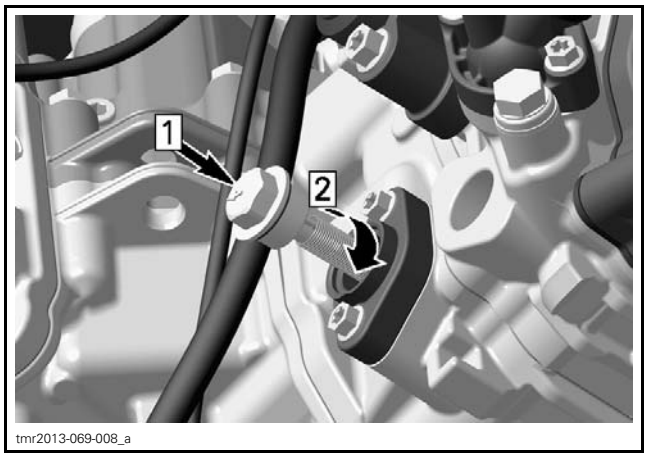
NOTE: Turn spring only clockwise in order to fit the spring end into the notch of the plunger to avoid loosening the plunger during spring installation. Do not preload the spring.



FOR CLARITY PARTS ARE REMOVED FROM CYLINDER
1. Plunger
2. Notch
3. Spring
4. Spring end
5. Plug with O-ring

8. Then compress the spring and screw the plug in.

NOTE: To avoid overstressed timing chain, the plug must engage into threads within the first full turn.



Step 1: Compress spring
Step 2: Screw in plug

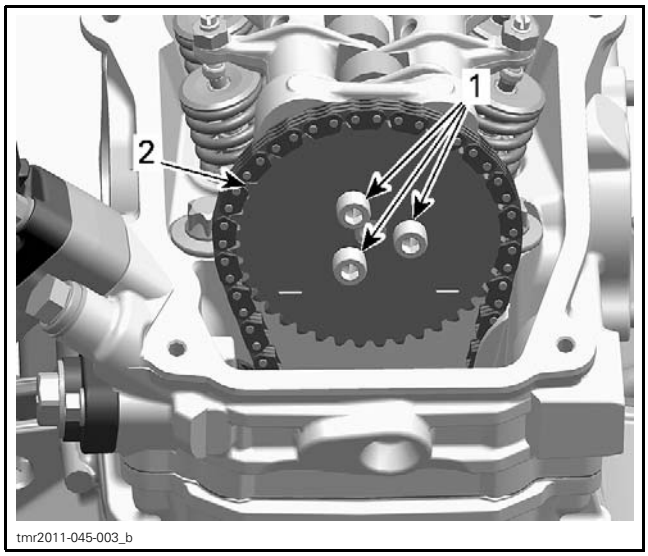
9. Remove locking tool and install all other removed parts.
10. Tighten the chain tensioner screw plug to specification.

TIGHTENING TORQUE	
Chain tensioner plug	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

CAMSHAFT TIMING GEARS

Removing the Camshaft Timing Gear

1. Remove valve cover, refer to *TOP END* subsection.
2. Set applicable piston to TDC ignition and lock magneto flywheel. Refer to *CAMSHAFT TIMING* in this subsection.
3. Remove timing chain tensioner. Refer to *TIMING CHAIN TENSIONERS* in this subsection.
4. Remove camshaft timing gear retaining screws.



TYPICAL
1. *Camshaft timing gear retaining screws*
2. *Camshaft timing gear*

5. Remove the camshaft timing gear.

NOTE: Secure timing chain with a piece of wire.

Inspecting the Camshaft Timing Gear

Check camshaft timing gear for wear or deterioration.

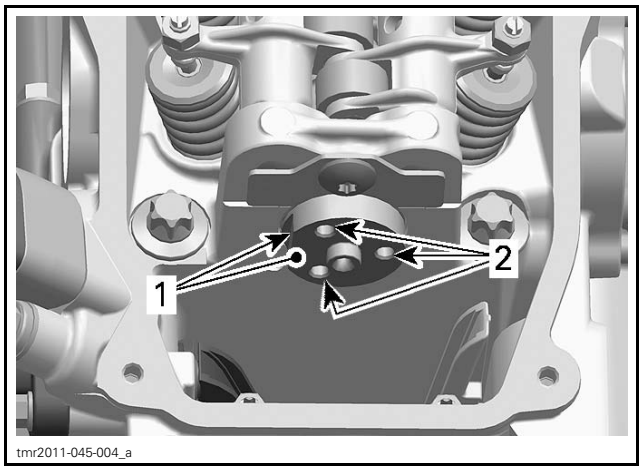
If timing gear is worn or damaged, replace it as a set with the timing chain.

For crankshaft gear inspection, refer to *CRANKSHAFT* in the *BOTTOM END* subsection.

Installing the Camshaft Timing Gear

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

1. Clean camshaft mating surface and threads prior to installing camshaft timing gear.



1. *Camshaft mating surface*
2. *Camshaft screw threads*

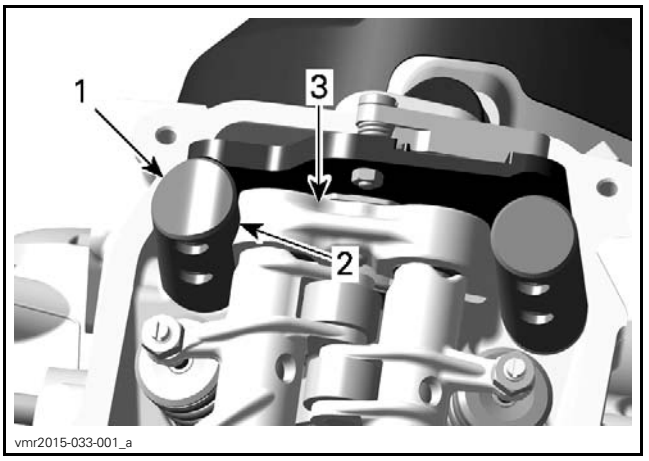
2. Set applicable piston to TDC ignition position and install the crankshaft position tool, refer to *CAMSHAFT TIMING* in this subsection.

REQUIRED TOOL	
CRANKSHAFT TDC POSITION TOOL (P/N 529 036 201)	

3. Install camshaft timing tool on the cylinder head.

REQUIRED TOOL	
CAMSHAFT TIMING TOOL (P/N 529 036 268)	

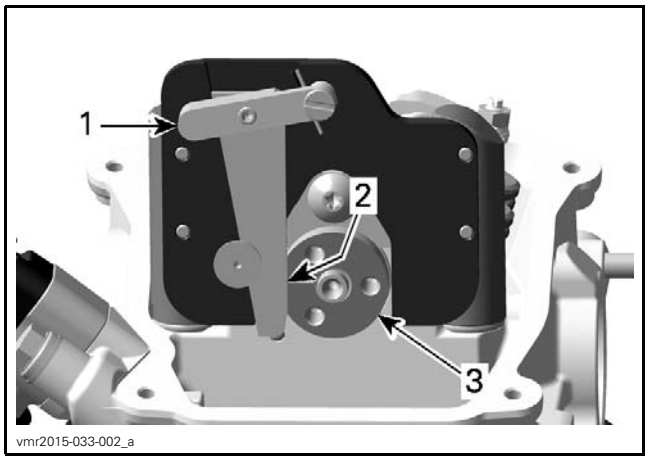
NOTE: Properly align tube of camshaft timing tool with machined radius on cylinder head.



CAMSHAFT TIMING TOOL INSTALLED
1. *Tube (camshaft timing tool)*
2. *Machined radius (camshaft timing tool)*
3. *Cylinder head*

4. Set camshaft to TDC ignition position by aligning the flat portion on the camshaft flange with the tool lever.

NOTE: In addition, to ensure proper camshaft timing, press camshaft timing tool lever downwards.

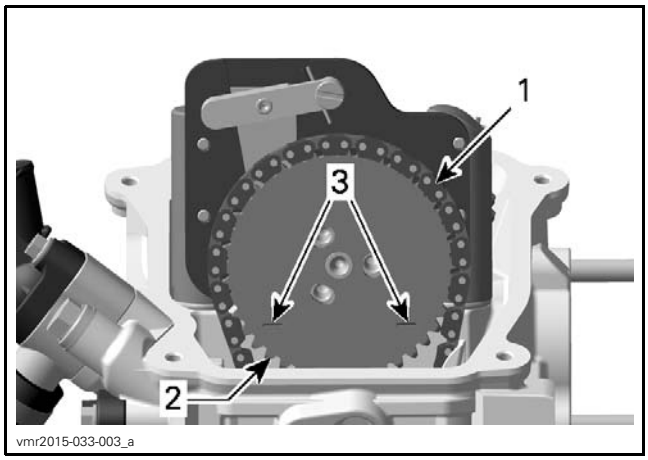


PRESS TOOL LEVER DOWN
1. *Lever*
2. *Flat portion*
3. *Camshaft*

NOTICE **Crankshaft and camshaft must be locked at TDC ignition position to place camshaft timing gear and timing chain in the proper position.**

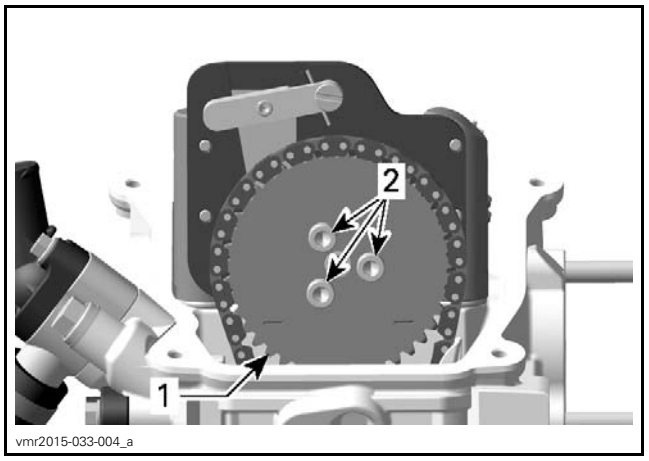
5. Place camshaft timing gear and timing chain on the camshaft.

NOTE: The printed marks on the camshaft timing gear must be parallel to the cylinder head base.



1. *Timing chain*
2. *Camshaft timing gear*
3. *Printed marks on camshaft timing gear*

6. Install and adjust timing chain tensioner, refer to *TIMING CHAIN TENSIONER* in this subsection.
7. Install and tighten camshaft timing gear retaining screws to specified torque.



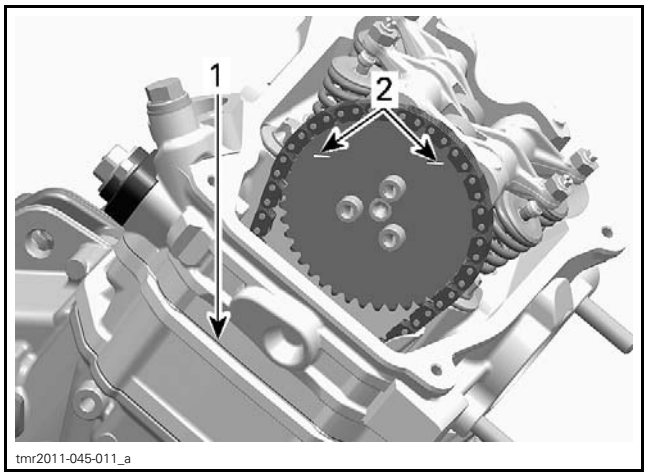
1. *Camshaft timing gear*
2. *Timing gear retaining screws*

TIGHTENING TORQUE	
Service product	LOCTITE 243 (BLUE) (P/N 293 800 060)
Camshaft timing gear retaining screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

8. Remove the camshaft timing tool.

Camshaft Timing

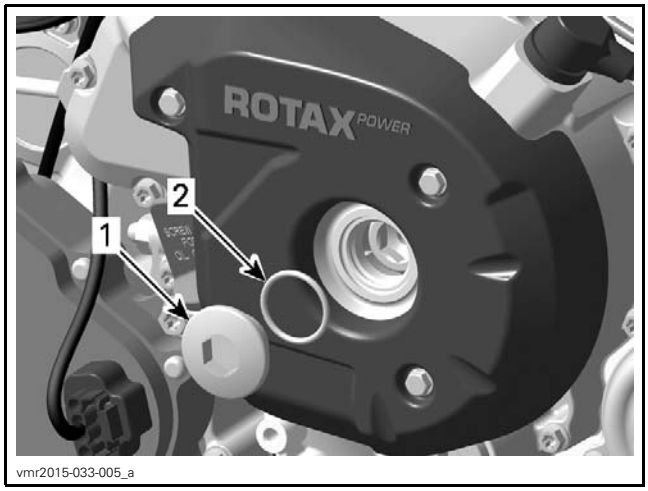
NOTE: If a piston (cylinder 1 or 2) is set to TDC ignition, the camshaft timing gear of the opposite cylinder must be in the following position.



TYPICAL
1. *Cylinder head base*
2. *Marks on timing gear of the opposite cylinder*

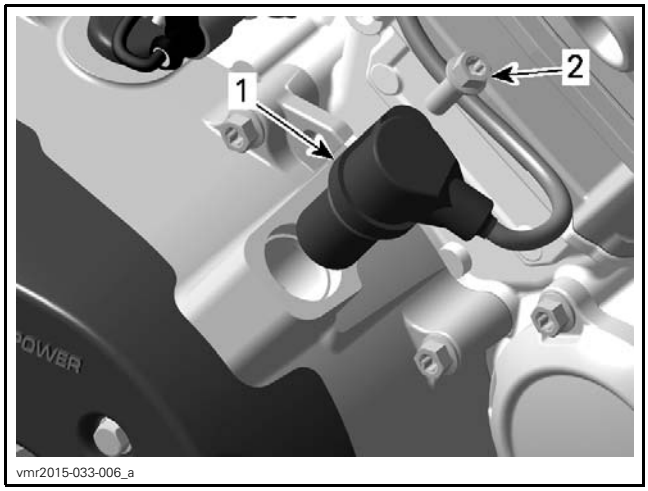
Camshaft Timing Piston No. 2 (rear)

1. Remove spark plugs of both cylinders.
2. Remove valve covers of both cylinders.
3. Remove the screw plug and O-ring from magneto cover.



1. Screw plug
2. O-ring

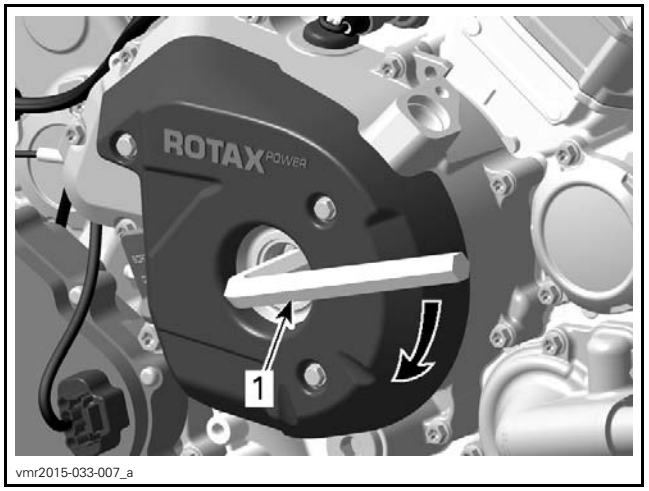
4. Remove the crankshaft position sensor (CPS).



1. CPS
2. Screw

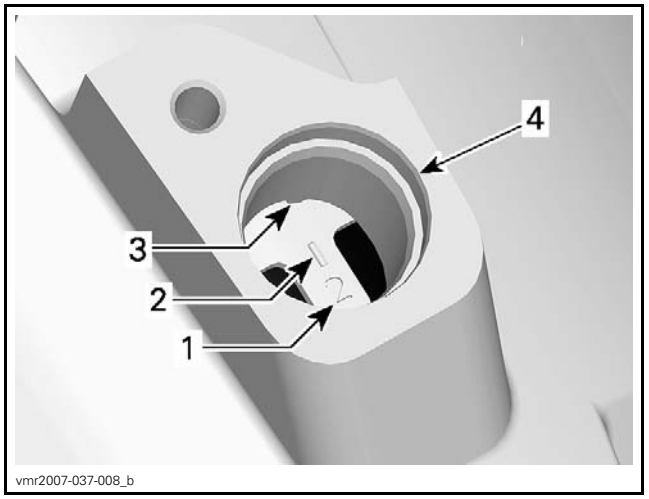
5. Set rear piston no. 2 to **TDC ignition** by turning the crankshaft clockwise.

REQUIRED TOOL
Allen key 14 mm



TURN CRANKSHAFT CLOCKWISE TO PISTON NO. 2 TDC
1. Allen key 14 mm

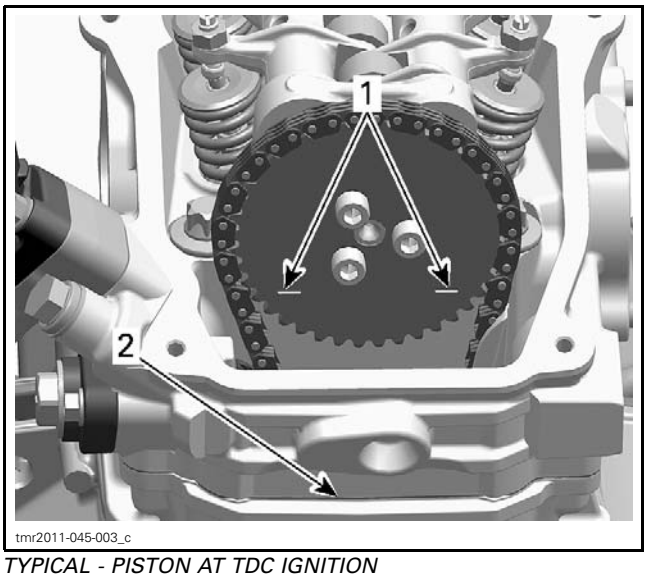
5.1 The rear piston is at TDC when it's index mark on the magneto flywheel is aligned with the notch in the magneto cover.



PISTON NO. 2 AT TDC
1. Piston no. 2 identifier
2. Index mark on magneto flywheel
3. Notch on magneto cover
4. CPS bore in magneto cover

5.2 Confirm printed marks on the camshaft timing gear are parallel with cylinder head base, in the lowest position. In this position the piston is set to **TDC ignition**.

NOTE: If marks on camshaft timing gear are not as specified, turn crankshaft 360°.



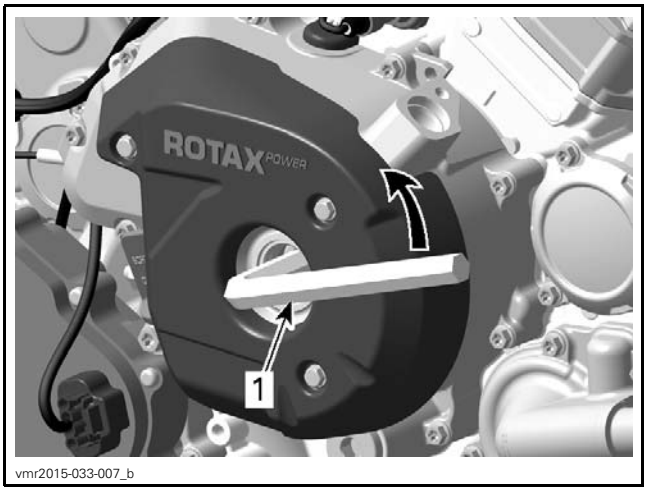
TYPICAL - PISTON AT TDC IGNITION
1. *Printed marks on camshaft timing gear*
2. *Cylinder head base*

6. Install the crankshaft TDC position tool to lock crankshaft in position. Refer to *CRANKSHAFT TDC POSITION TOOL* in this subsection.

Camshaft Timing Piston No. 1 (front)

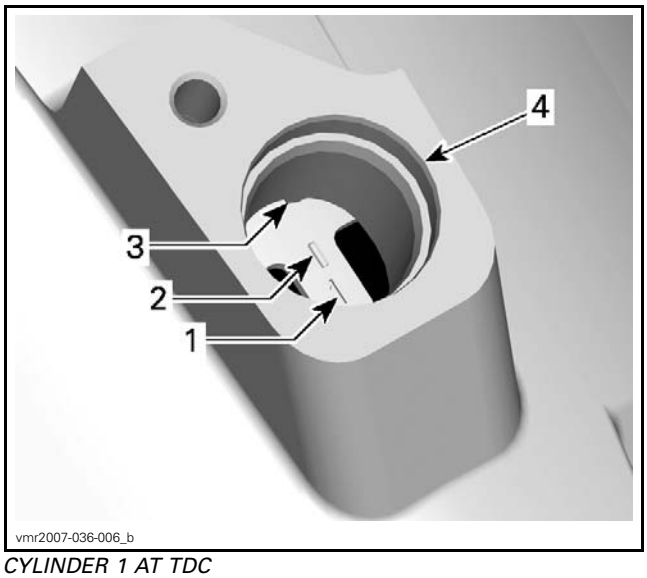
1. Set rear piston no. 2 to **TDC ignition**, see *CAMSHAFT TIMING PISTON NO. 2 (REAR)* in this subsection.
2. Remove crankshaft TDC position tool.
3. To set front piston no. 1 to **TDC ignition** turn crankshaft 280° **counterclockwise**.

REQUIRED TOOL
Allen key 14 mm



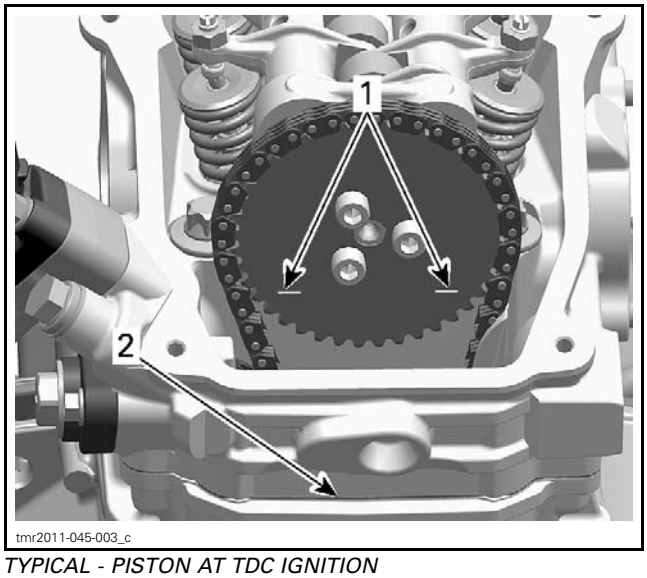
TURN COUNTERCLOCKWISE 280° TO NUMBER 1 PISTON TDC
1. *Allen key 14 mm*

3.1 The front piston is at TDC when it's index mark on the magneto flywheel is aligned with the notch in the magneto cover.



CYLINDER 1 AT TDC
1. *Number 1 piston identifier*
2. *Index mark "1" on magneto flywheel*
3. *Notch on magneto cover*
4. *Crankshaft position sensor bore*

3.2 Confirm printed marks on the camshaft timing gear are parallel with cylinder head base, in the lowest position. In this position the piston is set to **TDC ignition**.



TYPICAL - PISTON AT TDC IGNITION
1. *Printed marks on camshaft timing gear*
2. *Cylinder head base*

4. Insert the crankshaft TDC position tool to lock crankshaft in position. Refer to *CRANKSHAFT TDC POSITION TOOL INSTALLATION* in this subsection.

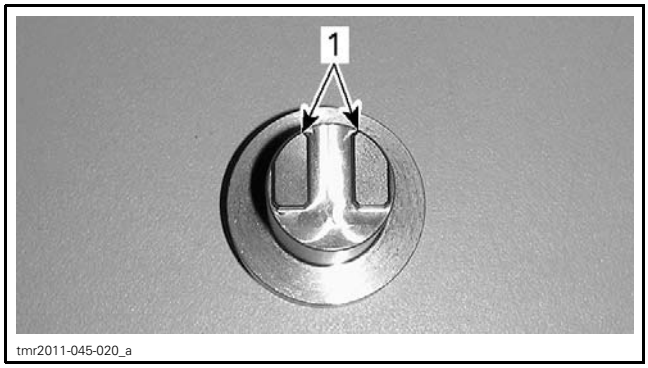
Crankshaft TDC Position Tool Installation

NOTICE **Never use crankshaft TDC position tool to remove or tighten drive CVT screw or rotor retaining screw. Damage to the teeth of the trigger wheel on the rotor will occur.**

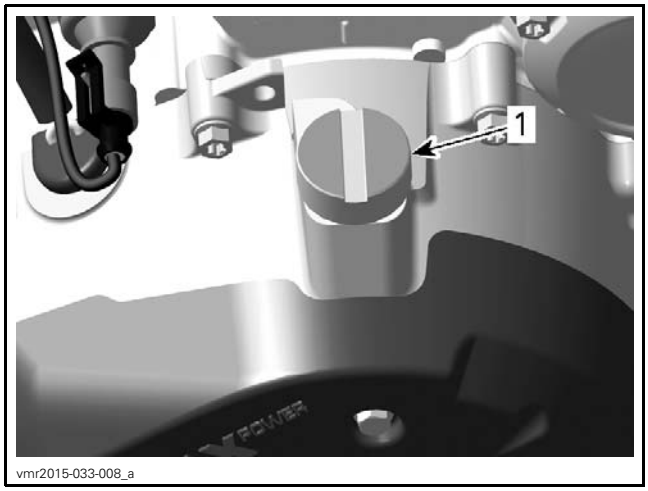
Install tool in magneto cover CPS bore.

REQUIRED TOOL	
CRANKSHAFT TDC POSITION TOOL (P/N 529 036 201)	

NOTE: Make sure to match the teeth on the crankshaft TDC position tool with the magneto rotor.

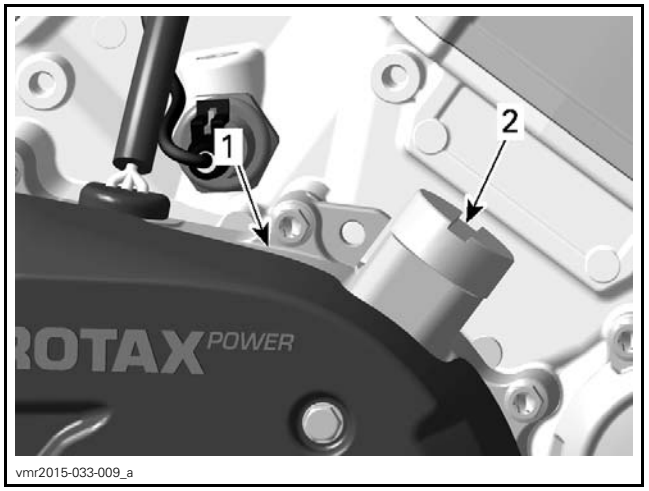


1. Crankshaft TDC position tool teeth (end view)



MAGNETO COVER
1. Crankshaft TDC position tool installed in CPS bore

NOTICE **Tool must be fully inserted.**



1. Magneto cover
2. TDC position tool

TIMING CHAIN

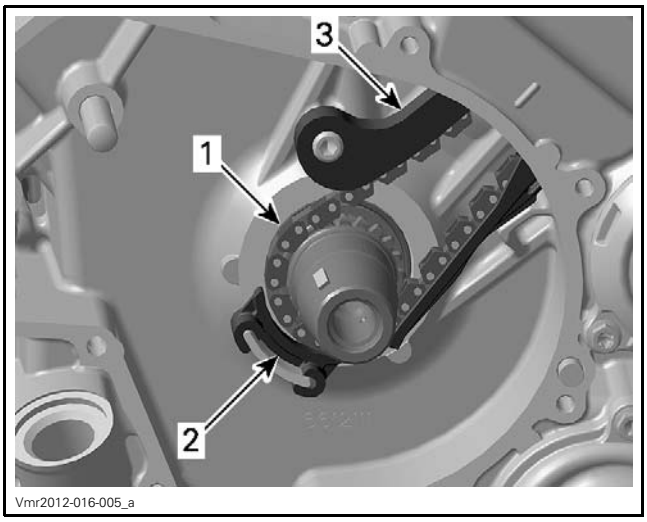
Timing Chain Location

The engine is equipped with two timing chains.

– MAG side timing chain is located behind the magneto cover.
– PTO side timing chain is located behind the PTO cover.

Removing the Timing Chain (MAG Side)

1. Refer to *MAGNETO AND STARTER* subsection and remove following parts:
   – Magneto cover
   – Rotor
   – Sprag clutch gear.
2. Refer to *TOP END* subsection and remove the following part:
   – Valve cover.
3. Refer to following procedures in this subsection and remove following parts:
   – Chain tensioner
   – Camshaft timing gear.
4. Remove timing chain guide (tensioner side) and lower timing chain guide.



Vmr2012-016-005_a

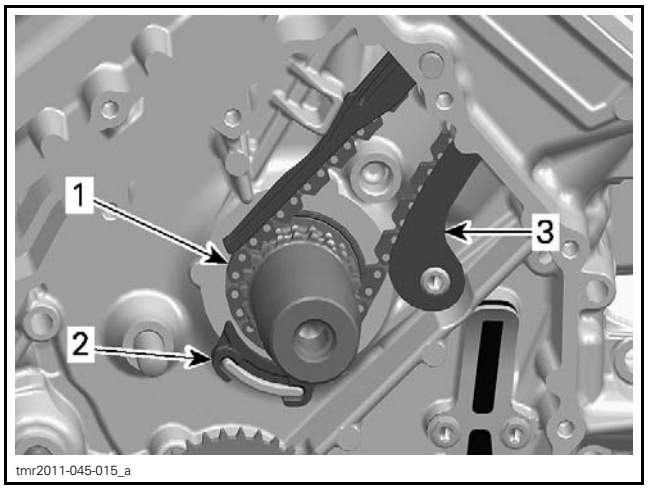
1. Timing chain
2. Lower timing chain guide
3. Timing chain guide (tensioner side)

NOTE: Mark the operating direction of the timing chain and check for excessive radial play before removal. Refer to *TIMING CHAIN INSPECTION*.

5. Carefully pull the timing chain downwards and sideways, then out of the crankcase.

Removing the Timing Chain (PTO Side)

1. Refer to *BOTTOM END* subsection and remove following parts:
   – PTO cover
   – Breather gear
   – Intermediate gear.
2. Refer to *TOP END* subsection and remove following part:
   – Valve cover.
3. Refer to applicable procedures in this subsection and remove following parts:
   – Chain tensioner
   – Camshaft timing gear.
4. Remove timing chain guide (tensioner side) and lower timing chain guide.



tmr2011-045-015_a

1. Timing chain
2. Lower timing chain guide
3. Timing chain guide (tensioner side)

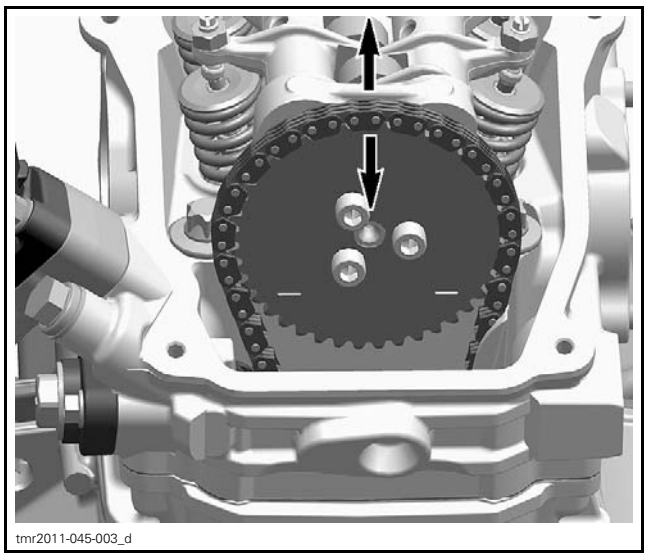
NOTE: Mark the operating direction of the timing chain and check for excessive radial play before removal. Refer to *TIMING CHAIN INSPECTION*.

5. Carefully pull the timing chain sideward and down from the crankcase.

Inspecting the Timing Chain

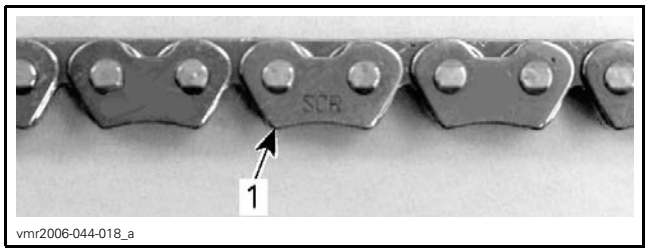
Inspection is the same for both timing chains.

Check timing chain on camshaft timing gear for excessive radial play.


tmr2011-045-003_d

CHECKING TIMING CHAIN RADIAL PLAY

Check chain condition for wear and teeth condition.



1. Timing chain

If chain is excessively worn or damaged, replace it as a set (camshaft timing gear and timing chain).

Check timing chain guides for wear, cracks or deformation. Replace as required.

NOTE: Check also the timing chain guide (tensioner side).

Installing the Timing Chain

The installation is essentially the reverse of the removal procedure however, pay attention to the following details.

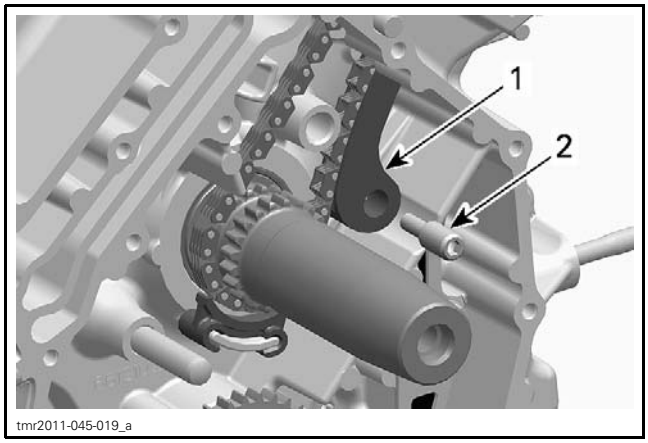
NOTE: Installation is the same for both timing chains.

Install timing chain with camshaft timing gear.

NOTE: Ensure to carry out proper valve timing, refer to *CAMSHAFT TIMING GEARS* in this subsection.

NOTICE **Improper valve timing will damage engine components.**

TIMING CHAIN GUIDE (TENSIONER SIDE)



1. Timing chain guide (tensioner side)
2. Bearing screw

Removing the Timing Chain Guide (Tensioner Side)

Refer to *TIMING CHAIN* in this subsection.

Inspecting the Timing Chain Guide (Tensioner Side)

Check timing chain guide for wear, cracks or deformation. Replace if necessary.

Installing the Timing Chain Guide (Tensioner Side)

The installation is the reverse of the removal procedure.

TIGHTENING TORQUE	
Service product	LOCTITE 243 (BLUE) (P/N 293 800 060)
Timing chain guide bearing screw	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

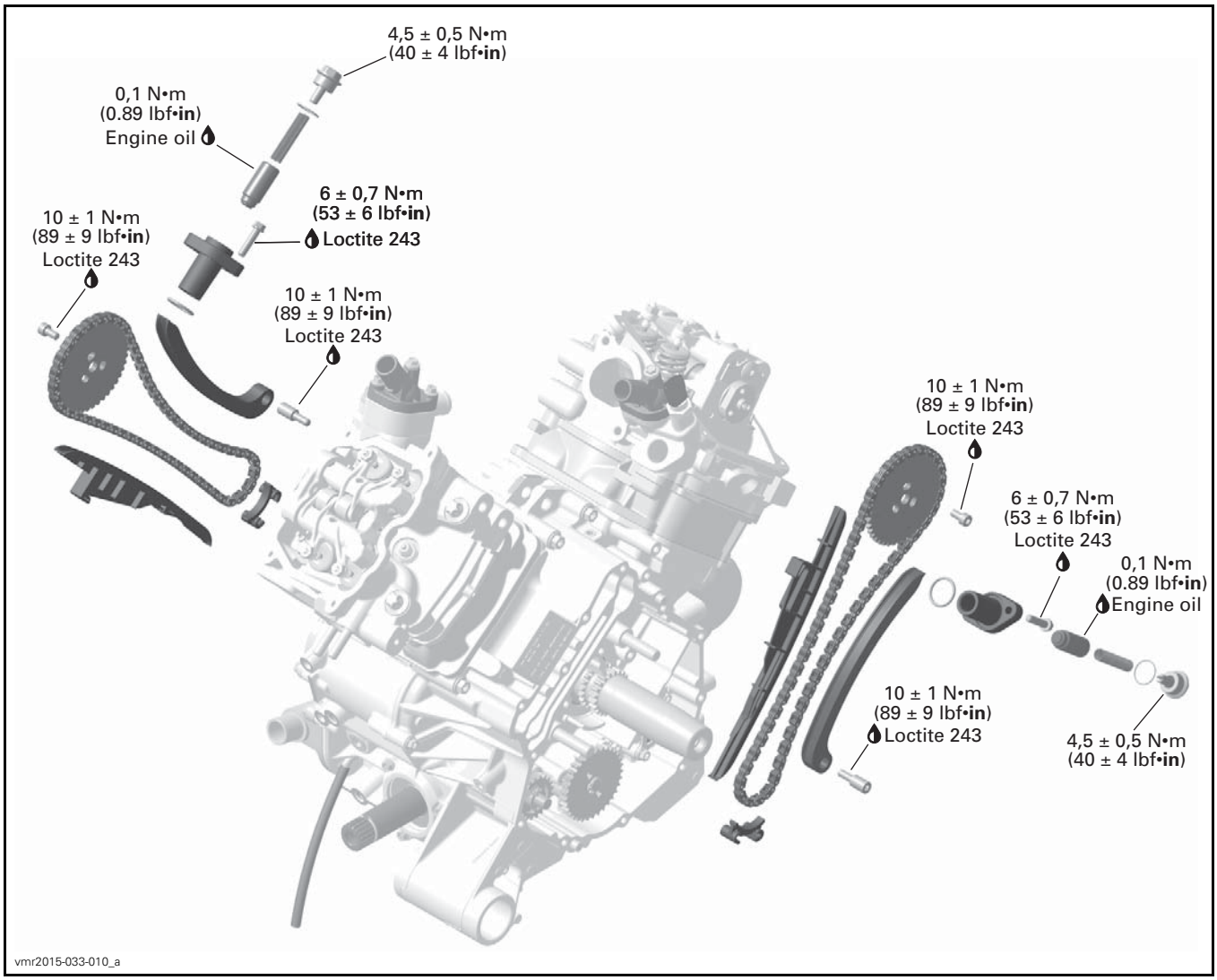
TIMING CHAIN

SERVICE TOOLS

Description	Part Number	Page
CAMSHAFT TIMING TOOL	529 036 268	6
CRANKSHAFT TDC POSITION TOOL	529 036 201	6, 9

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	7, 12



TROUBLESHOOTING

UNUSUAL ENGINE NOISE OR VIBRATION

1. IMPROPER VALVE CLEARANCE ADJUSTMENT AND/OR WORN OUT ROCKER ARM(S)
   - *Readjust valve clearance and/or replace defective part(s), refer to TOP END subsection.*
2. DEFECTIVE CHAIN TENSIONER
   - *Replace chain tensioner.*
3. WORN OUT TIMING CHAIN GUIDE(S)
   - *Replace timing chain guide(s).*
4. STRETCHED TIMING CHAIN OR WORN OUT TIMING GEARS
   - *Replace timing chain and timing gears.*
5. LOOSE TIMING GEAR RETAINING SCREWS
   - *Retighten screws to recommended torque.*
6. INCORRECT CAMSHAFT TIMING
   - *Replace damaged components and readjust camshaft timing.*

ENGINE LACKS ACCELERATION OR POWER

1. INCORRECT CAMSHAFT TIMING
   - *Replace damaged components and readjust camshaft timing.*

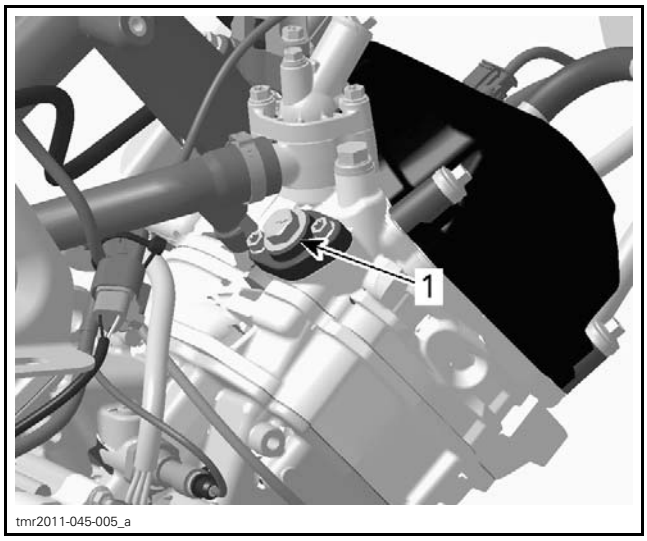
PROCEDURES

TIMING CHAIN TENSIONERS

Timing Chain Tensioner Location

570 and 650 Engines

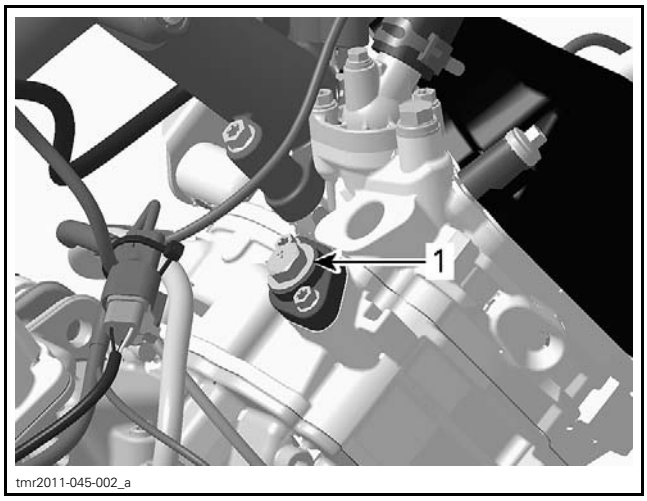
The timing chain tensioner is located on the back of each cylinder head.



570 AND 650 ENGINES (FRONT CYLINDER SHOWN)
1. Timing chain tensioner

850, 1000 and 1000R Engines

The timing chain tensioner is located in the cylinder.



850, 1000 AND 1000R ENGINES (FRONT CYLINDER SHOWN)
1. Timing chain tensioner

Timing Chain Tensioner Access

For the front cylinder chain tensioner, refer to *BODY* subsection and remove the following:

– Seat

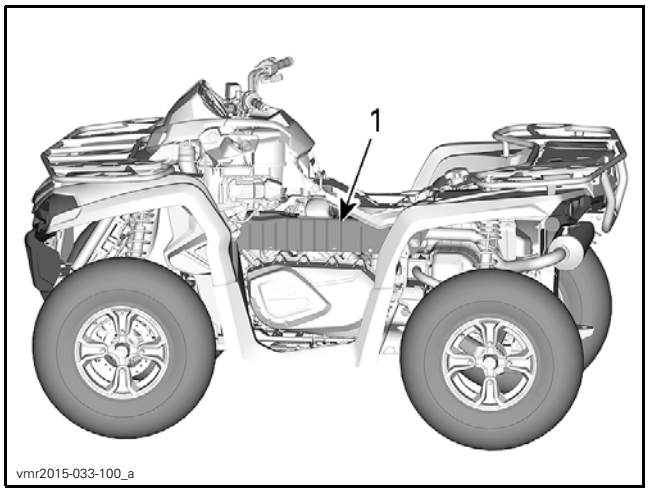
– RH side panel and extension.

For the rear cylinder chain tensioner, refer to *BODY* subsection and remove the following:

– Seat

– LH side panel and extension.

For the rear cylinder chain tensioner, also remove the outer exhaust system heat shield. Refer to *EXHAUST SYSTEM* subsection.



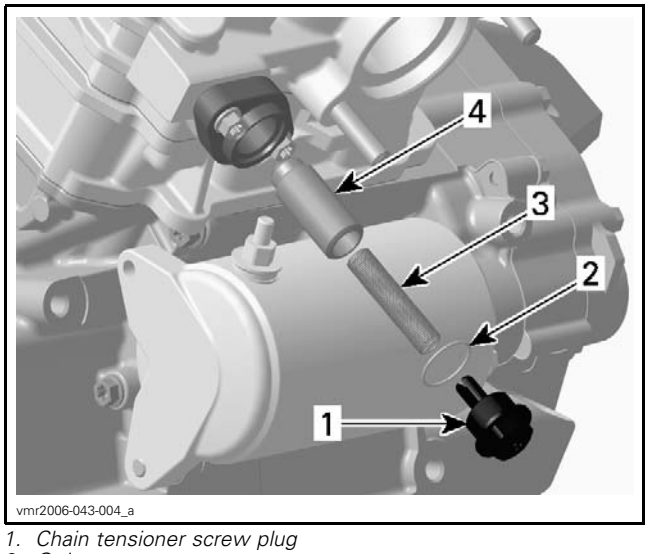
1. Heat shield to remove

Removing the Timing Chain Tensioner

1. Make sure the applicable piston is set to TDC ignition. Refer to *CAMSHAFT TIMING GEARS* in this subsection.
2. Carefully remove chain tensioner screw plug and release spring tension.

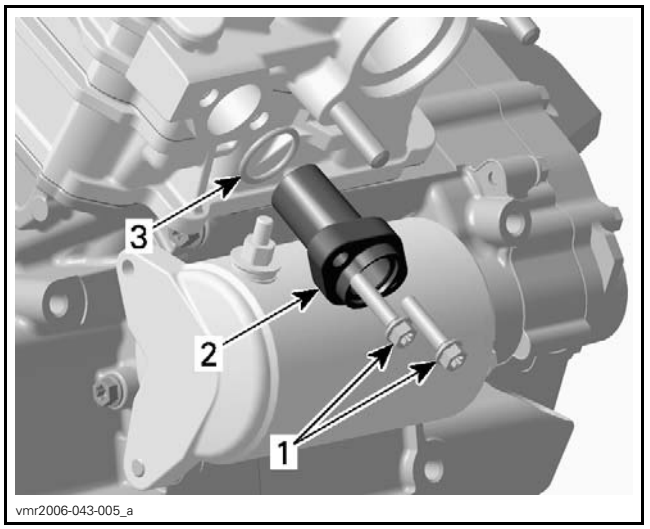
⚠ CAUTION Tensioner is spring loaded.

3. Remove:
   – O-ring
   – Spring
   – Chain tensioner plunger.



1. Chain tensioner screw plug
2. O-ring
3. Spring
4. Chain tensioner plunger

4. Remove:
   – Chain tensioner housing retaining screws
   – Chain tensioner housing
   – O-ring.



1. Screws
2. Chain tensioner housing
3. O-ring

Inspecting the Timing Chain Tensioner

Check chain tensioner housing and screw plug for cracks or other damages. Replace if necessary.

Check chain tensioner plunger for freedom of movement and/or scoring.

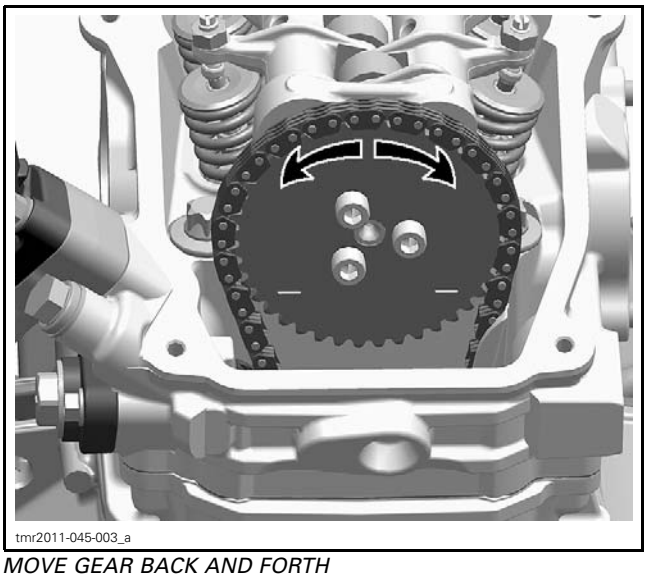
Ensure O-rings are not brittle, cracked or hard. Replace if necessary.

Check spring condition. Replace if bent, broken or worn.

Installing the Timing Chain Tensioner

Reverse the removal procedure. However, pay attention to the following.

NOTE: Before installing the chain tensioner, make sure the camshaft timing gear can be moved back and forth.



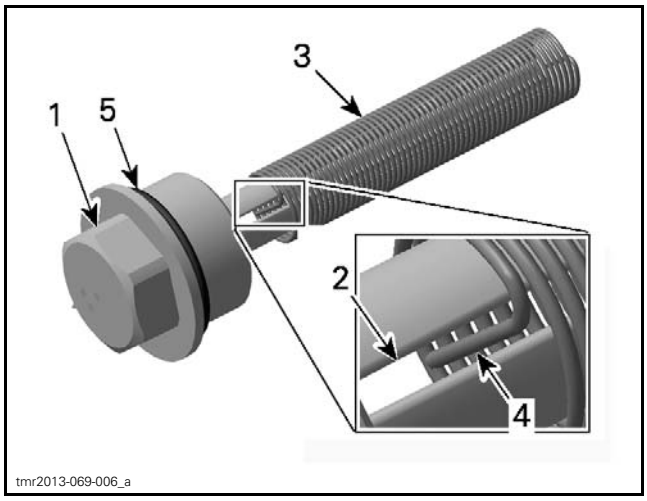
MOVE GEAR BACK AND FORTH

1. Apply engine oil on the chain tensioner plunger before installation.
2. Slightly turn the camshaft timing gear in order to move the timing chain excess play to the tensioner side.
3. Slightly screw in the plunger until the timing chain does not allow back and forth movement of the camshaft timing gear.
4. Screw the plunger in an additional 1/8 turn to obtain the required specified torque.

TIMING CHAIN TENSIONER ADJUSTMENT (TIGHTENING TORQUE)
0.1 N•m (.9 lbf•**in**)

NOTICE **Improper adjustment of the timing chain will lead to severe engine damage.**

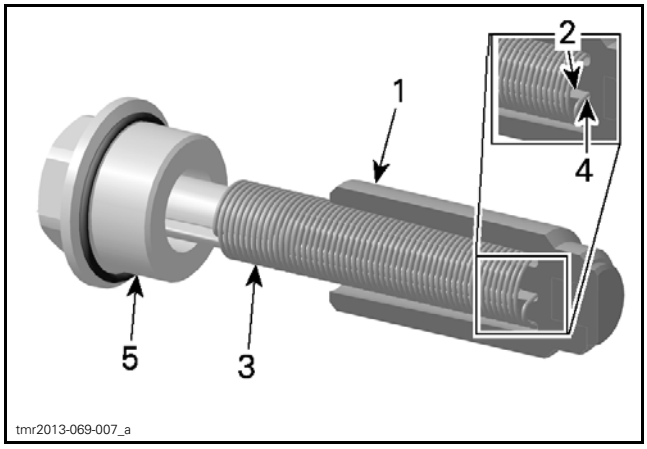
5. Place the O-ring on chain tensioner screw plug.
6. Fit the spring on one side into the slot of the chain tensioner screw plug.



1. Plug
2. Slot
3. Spring
4. Spring end
5. O-Ring

7. Fit the spring on the other side into the plunger.

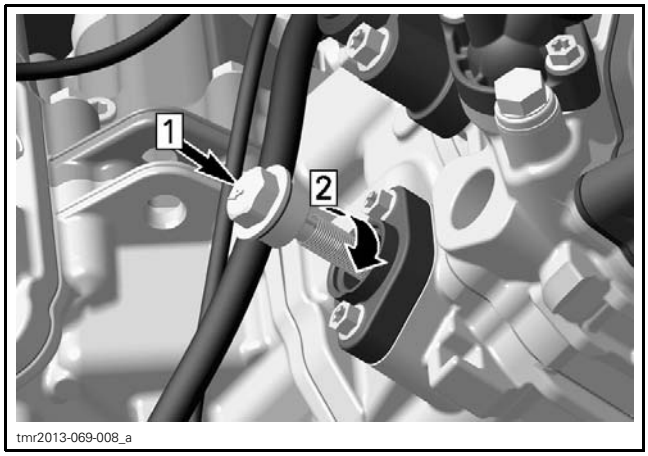
NOTE: Turn spring only clockwise in order to fit the spring end into the notch of the plunger to avoid loosening the plunger during spring installation. Do not preload the spring.



FOR CLARITY PARTS ARE REMOVED FROM CYLINDER
1. Plunger
2. Notch
3. Spring
4. Spring end
5. Plug with O-ring

8. Then compress the spring and screw the plug in.

NOTE: To avoid overstressed timing chain, the plug must engage into threads within the first full turn.



Step 1: Compress spring
Step 2: Screw in plug

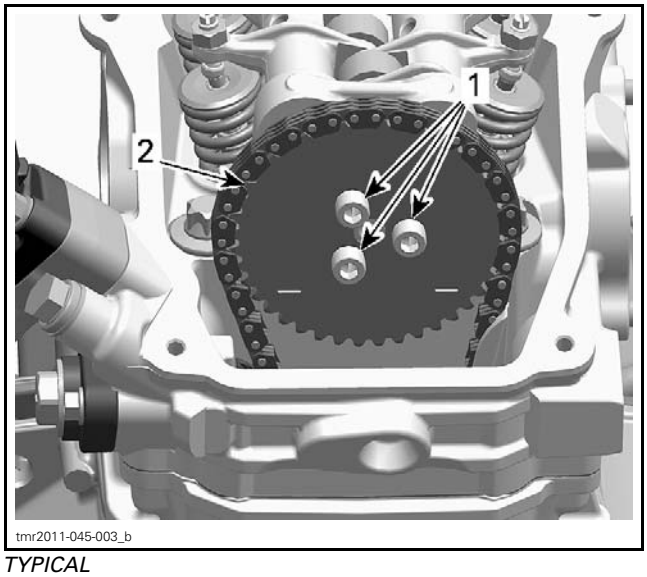
9. Remove locking tool and install all other removed parts.
10. Tighten the chain tensioner screw plug to specification.

TIGHTENING TORQUE	
Chain tensioner plug	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

CAMSHAFT TIMING GEARS

Removing the Camshaft Timing Gear

1. Remove valve cover, refer to *CYLINDER HEAD* subsection.
2. Set applicable piston to TDC ignition and lock magneto flywheel. Refer to *CAMSHAFT TIMING* in this subsection.
3. Remove timing chain tensioner. Refer to *TIMING CHAIN TENSIONERS* in this subsection.
4. Remove camshaft timing gear retaining screws.



TYPICAL
1. Camshaft timing gear retaining screws
2. Camshaft timing gear

5. Remove the camshaft timing gear.

NOTE: Secure timing chain with a piece of wire.

Inspecting the Camshaft Timing Gear

Check camshaft timing gear for wear or deterioration.

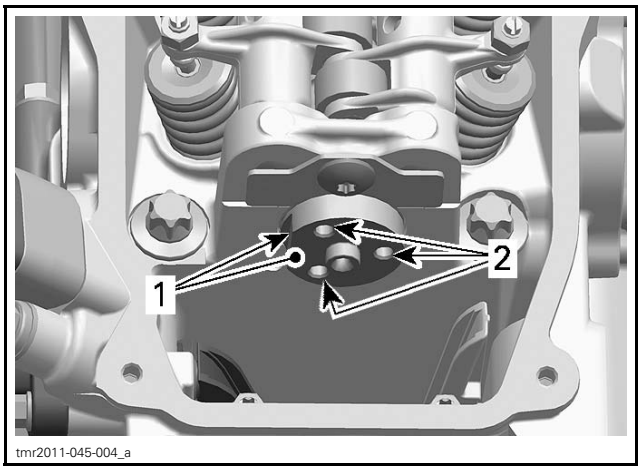
If timing gear is worn or damaged, replace it as a set with the timing chain.

For crankshaft gear inspection, refer to *CRANKSHAFT* in the *CYLINDER BLOCK* subsection.

Installing the Camshaft Timing Gear

The installation is the reverse of the removal procedure. However, pay attention to the following.

1. Clean camshaft mating surface and threads prior to installing camshaft timing gear.



1. Camshaft mating surface
2. Camshaft screw threads

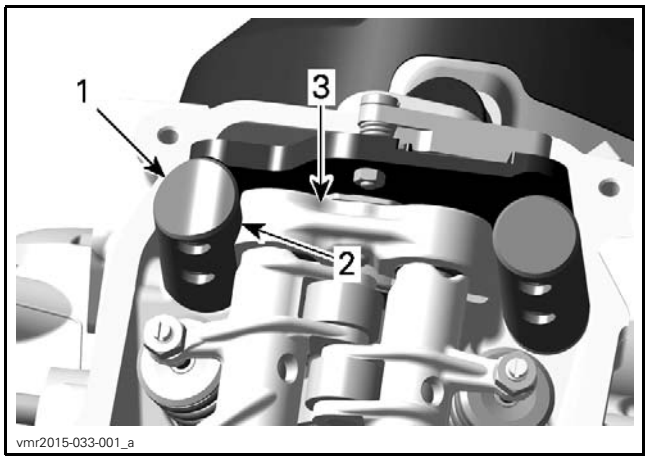
2. Set applicable piston to TDC ignition position and install the crankshaft position tool, refer to *CAMSHAFT TIMING* in this subsection.

REQUIRED TOOL	
CRANKSHAFT TDC POSITION TOOL (P/N 529 036 201)	

3. Install camshaft timing tool on the cylinder head.

REQUIRED TOOL	
CAMSHAFT TIMING TOOL (P/N 529 036 268)	

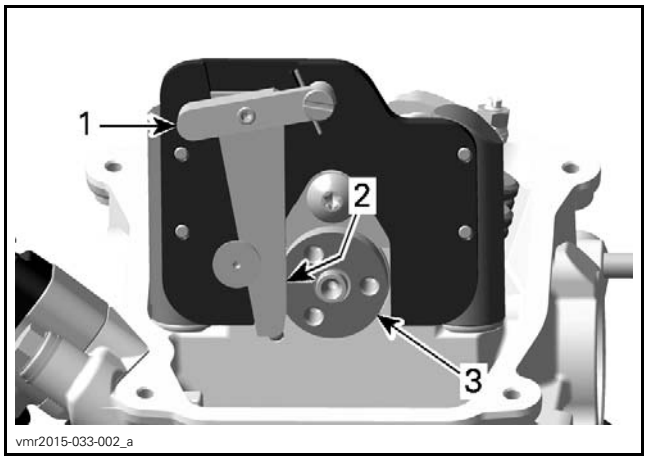
NOTE: Properly align tube of camshaft timing tool with machined radius on cylinder head.



CAMSHAFT TIMING TOOL INSTALLED
1. *Tube (camshaft timing tool)*
2. *Machined radius (camshaft timing tool)*
3. *Cylinder head*

4. Set camshaft to TDC ignition position by aligning the flat portion on the camshaft flange with the tool lever.

NOTE: In addition, to ensure proper camshaft timing, press camshaft timing tool lever downwards.

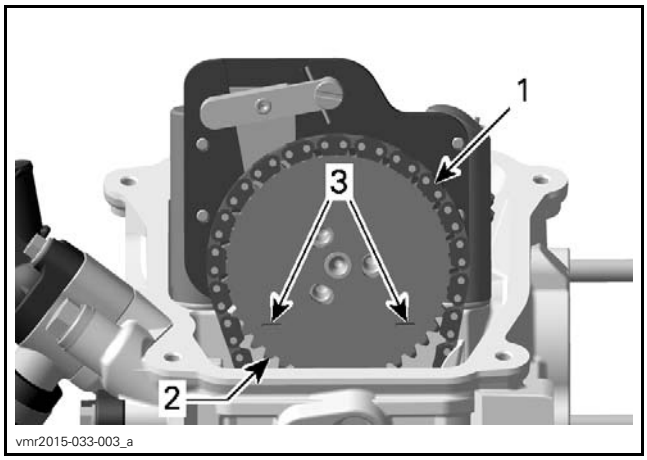


PRESS TOOL LEVER DOWN
1. *Lever*
2. *Flat portion*
3. *Camshaft*

NOTICE Crankshaft and camshaft must be locked at TDC ignition position to place camshaft timing gear and timing chain in the proper position.

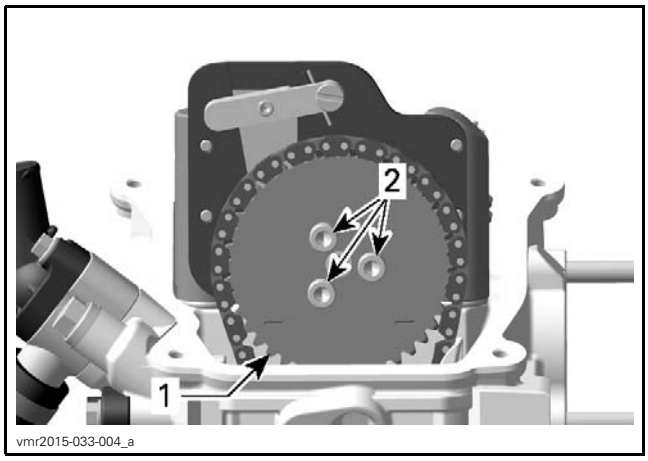
5. Place camshaft timing gear and timing chain on the camshaft.

NOTE: The printed marks on the camshaft timing gear must be parallel to the cylinder head base.



1. *Timing chain*
2. *Camshaft timing gear*
3. *Printed marks on camshaft timing gear*

6. Install and adjust timing chain tensioner, refer to *TIMING CHAIN TENSIONER* in this subsection.
7. Install and tighten camshaft timing gear retaining screws to specified torque.



vmr2015-033-004_a

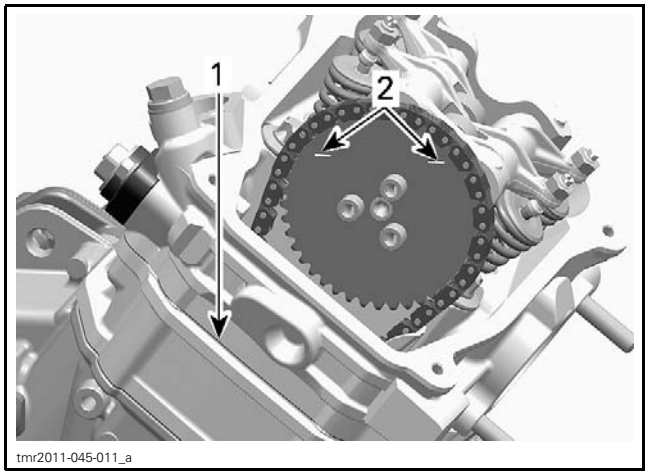
1. Camshaft timing gear
2. Timing gear retaining screws

TIGHTENING TORQUE	
Camshaft timing gear retaining screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**) + LOCTITE 243 (BLUE) (P/N 293 800 060)

8. Remove the camshaft timing tool.

Camshaft Timing

NOTE: If a piston (cylinder 1 or 2) is set to TDC ignition, the camshaft timing gear of the opposite cylinder must be in the following position.

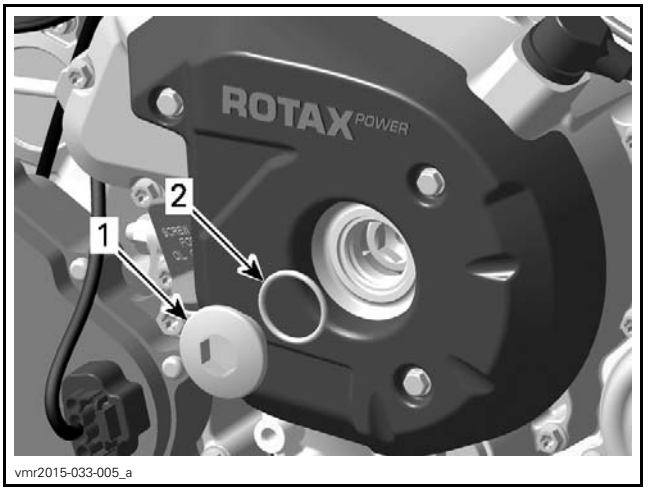


tmr2011-045-011_a

TYPICAL
1. Cylinder head base
2. Marks on timing gear of the opposite cylinder

Camshaft Timing Piston No. 2 (rear)

1. Remove spark plugs of both cylinders.
2. Remove valve covers of both cylinders.
3. Remove the screw plug and O-ring from magneto cover.



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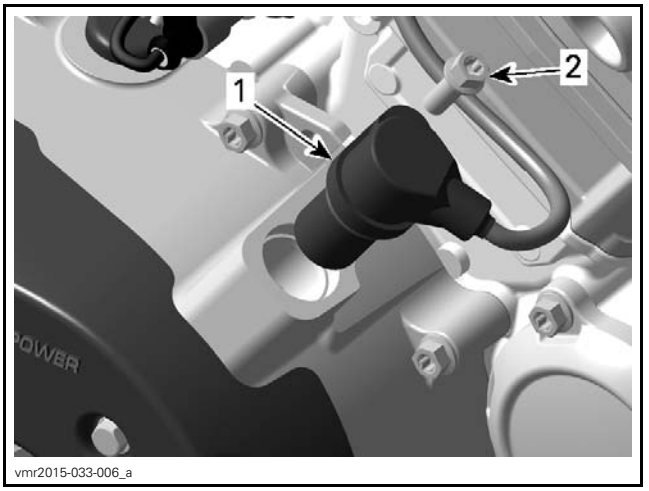
1. Screw plug
2. O-ring

4. Remove the crankshaft position sensor (CPS).

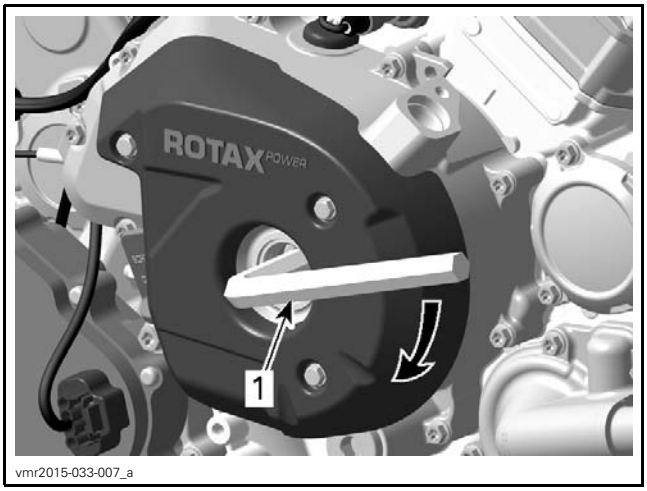


vmr2015-033-006_a

1. CPS
2. Screw

5. Set rear piston no. 2 to **TDC ignition** by turning the crankshaft clockwise.

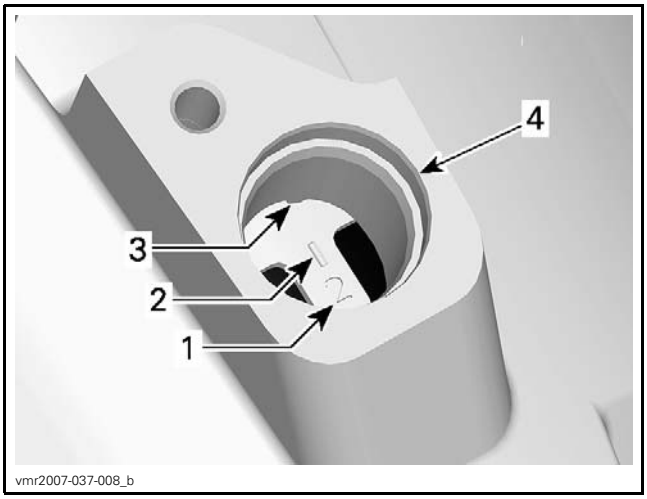
REQUIRED TOOL
Allen key 14 mm



vmr2015-033-007_a

TURN CRANKSHAFT CLOCKWISE TO PISTON NO. 2 TDC
1. Allen key 14 mm

5.1 The rear piston is at TDC when it's index mark on the magneto flywheel is aligned with the notch in the magneto cover.

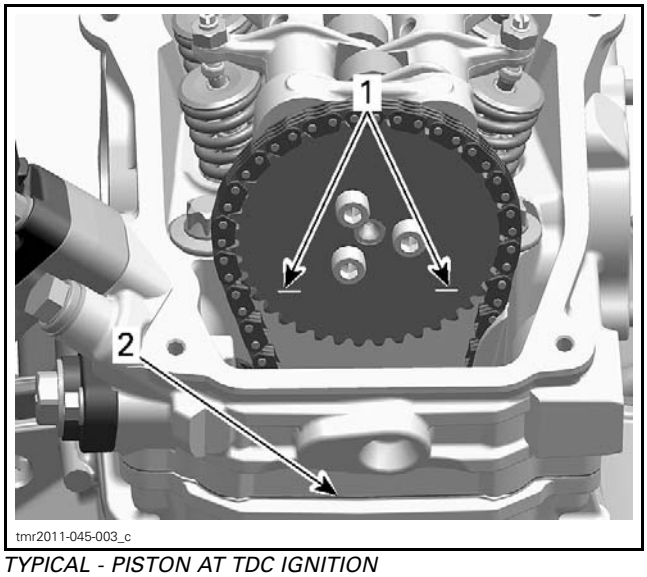


vmr2007-037-008_b

PISTON NO. 2 AT TDC
1. Piston no. 2 identifier
2. Index mark on magneto flywheel
3. Notch on magneto cover
4. CPS bore in magneto cover

5.2 Confirm printed marks on the camshaft timing gear are parallel with cylinder head base, in the lowest position. In this position the piston is set to **TDC ignition**.

NOTE: If marks on camshaft timing gear are not as specified, turn crankshaft 360°.



tmr2011-045-003_c

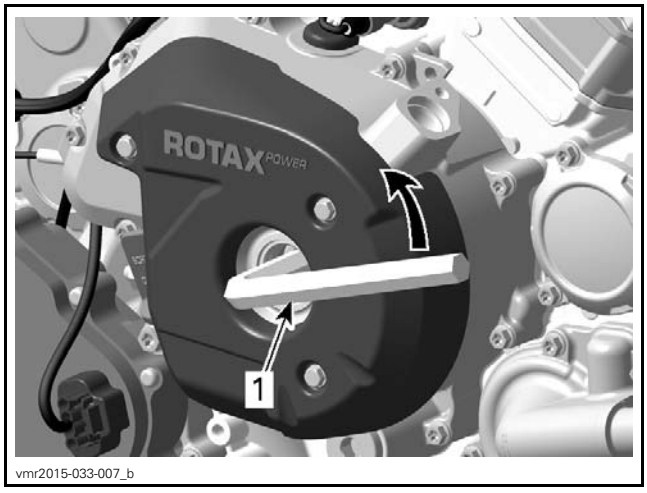
TYPICAL - PISTON AT TDC IGNITION
1. Printed marks on camshaft timing gear
2. Cylinder head base

6. Install the crankshaft TDC position tool to lock crankshaft in position. Refer to *CRANKSHAFT TDC POSITION TOOL* in this subsection.

Camshaft Timing Piston No. 1 (front)

1. Set rear piston no. 2 to **TDC ignition**, see *CAMSHAFT TIMING PISTON NO. 2 (REAR)* in this subsection.
2. Remove crankshaft TDC position tool.
3. To set front piston no. 1 to **TDC ignition** turn crankshaft 280° **counterclockwise**.

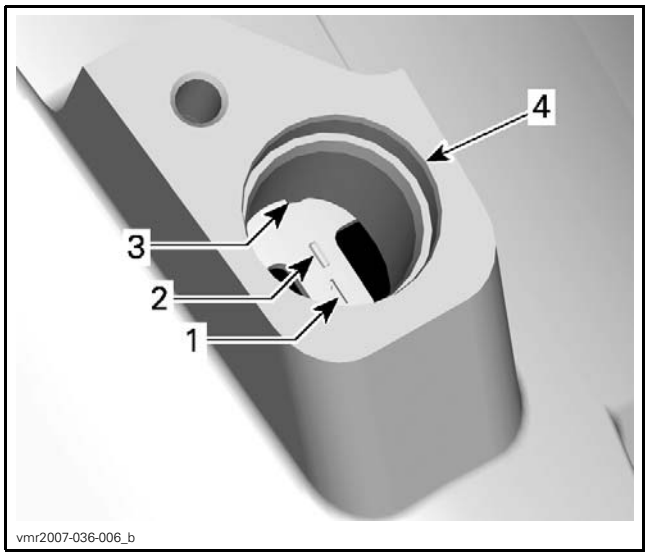
REQUIRED TOOL
Allen key 14 mm



vmr2015-033-007_b

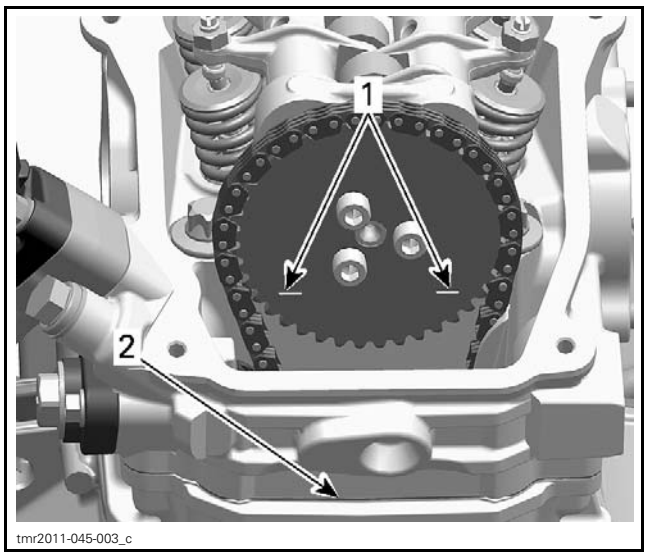
TURN COUNTERCLOCKWISE 280° TO NUMBER 1 PISTON TDC
1. Allen key 14 mm

3.1 The front piston is at TDC when it's index mark on the magneto flywheel is aligned with the notch in the magneto cover.



CYLINDER 1 AT TDC
1. *Number 1 piston identifier*
2. *Index mark "1" on magneto flywheel*
3. *Notch on magneto cover*
4. *Crankshaft position sensor bore*

3.2 Confirm printed marks on the camshaft timing gear are parallel with cylinder head base, in the lowest position. In this position the piston is set to **TDC ignition**.



TYPICAL - PISTON AT TDC IGNITION
1. *Printed marks on camshaft timing gear*
2. *Cylinder head base*

4. Insert the crankshaft TDC position tool to lock crankshaft in position. Refer to *CRANKSHAFT TDC POSITION TOOL INSTALLATION* in this subsection.

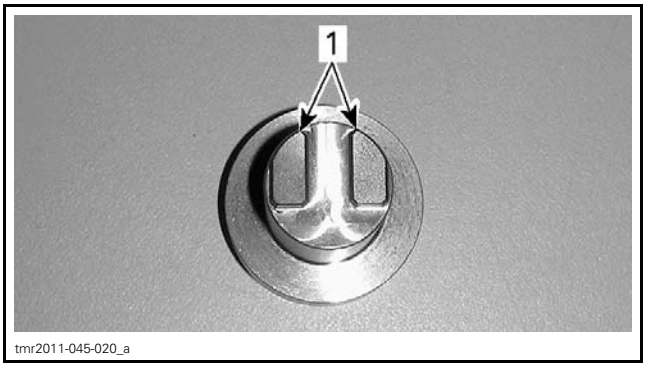
Crankshaft TDC Position Tool Installation

NOTICE **Never use crankshaft TDC position tool to remove or tighten drive CVT screw or rotor retaining screw. Damage to the teeth of the trigger wheel on the rotor will occur.**

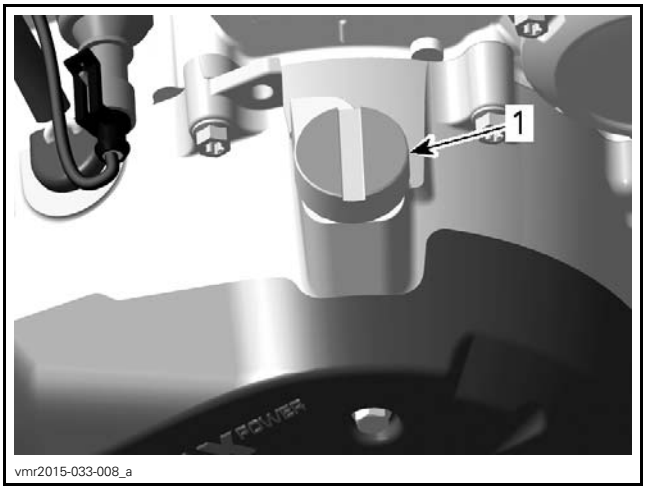
Install tool in magneto cover CPS bore.

REQUIRED TOOL	
CRANKSHAFT TDC POSITION TOOL (P/N 529 036 201)	

NOTE: Make sure to match the teeth on the crankshaft TDC position tool with the magneto rotor.

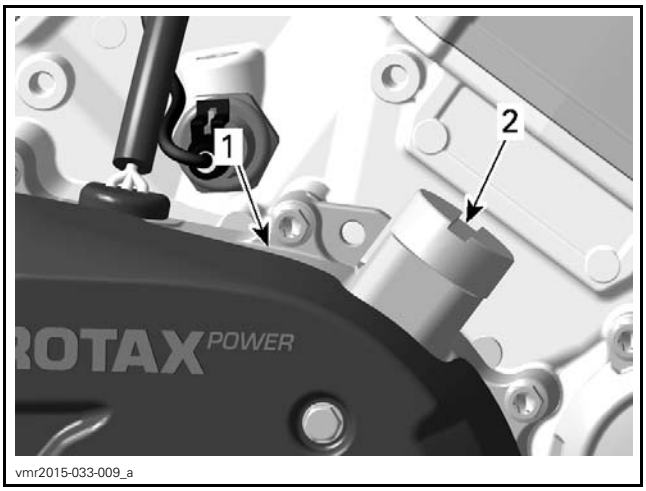


1. *Crankshaft TDC position tool teeth (end view)*



MAGNETO COVER
1. *Crankshaft TDC position tool installed in CPS bore*

NOTICE **Tool must be fully inserted.**



1. Magneto cover
2. TDC position tool

TIMING CHAIN

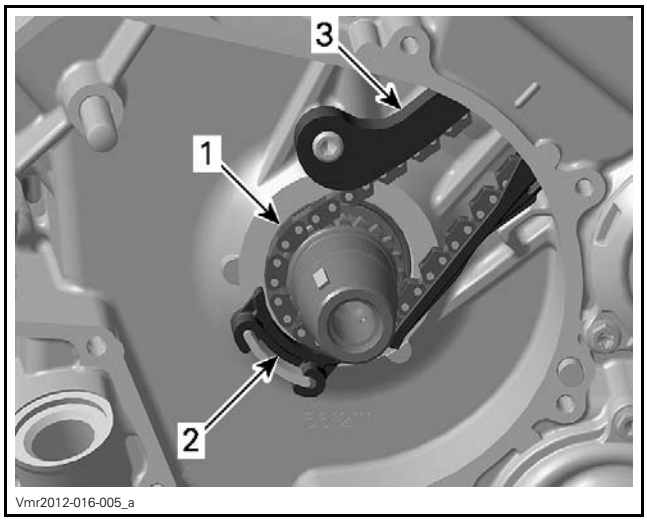
Timing Chain Location

The engine is equipped with two timing chains.

– MAG side timing chain is located behind the magneto cover.
– PTO side timing chain is located behind the PTO cover.

Removing the Timing Chain (MAG Side)

1. Refer to *MAGNETO AND STARTER* subsection and remove following parts:
   – Magneto cover
   – Rotor
   – Sprag clutch gear.
2. Refer to *CYLINDER HEAD* subsection and remove the following part:
   – Valve cover.
3. Refer to following procedures in this subsection and remove following parts:
   – Chain tensioner
   – Camshaft timing gear.
4. Remove timing chain guide (tensioner side) and lower timing chain guide.



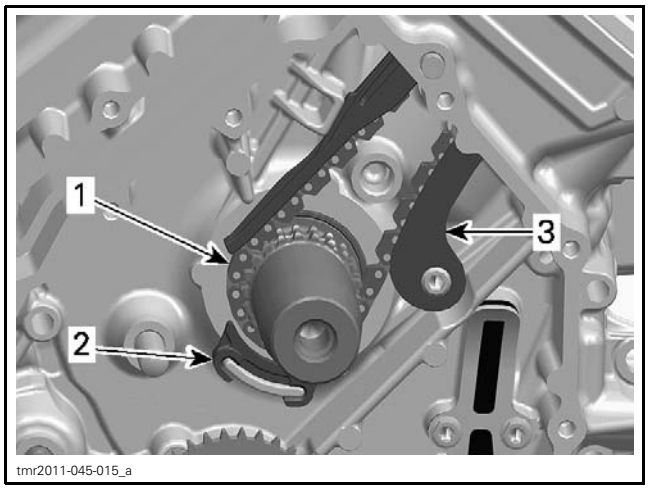
1. Timing chain
2. Lower timing chain guide
3. Timing chain guide (tensioner side)

NOTE: Mark the operating direction of the timing chain and check for excessive radial play before removal. Refer to *TIMING CHAIN INSPECTION*.

5. Carefully pull the timing chain downwards and sideways, then out of the crankcase.

Removing the Timing Chain (PTO Side)

1. Refer to *CYLINDER BLOCK* subsection and remove following parts:
   – PTO cover
   – Breather gear
   – Intermediate gear.
2. Refer to *CYLINDER HEAD* subsection and remove following part:
   – Valve cover.
3. Refer to applicable procedures in this subsection and remove following parts:
   – Chain tensioner
   – Camshaft timing gear.
4. Remove timing chain guide (tensioner side) and lower timing chain guide.



1. Timing chain
2. Lower timing chain guide
3. Timing chain guide (tensioner side)

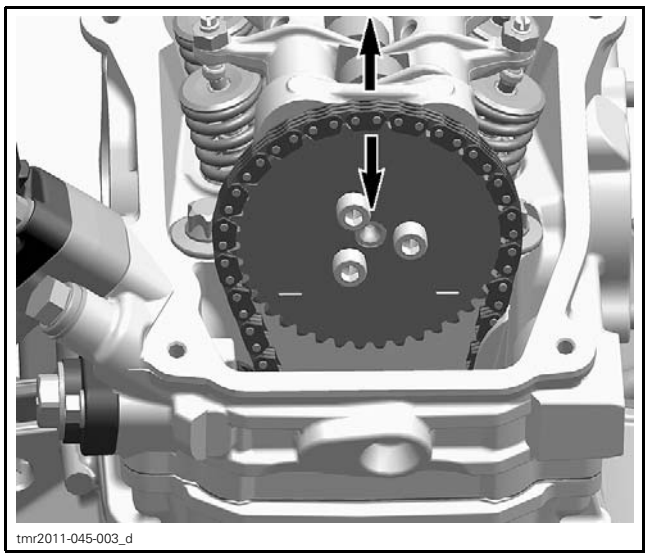
NOTE: Mark the operating direction of the timing chain and check for excessive radial play before removal. Refer to *TIMING CHAIN INSPECTION*.

5. Carefully pull the timing chain sideward and down from the crankcase.

Inspecting the Timing Chain

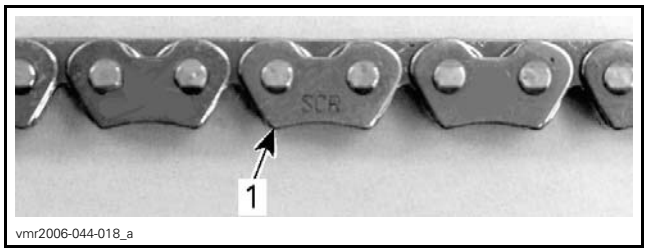
Inspection is the same for both timing chains.

Check timing chain on camshaft timing gear for excessive radial play.



CHECKING TIMING CHAIN RADIAL PLAY

Check chain condition for wear and teeth condition.



1. Timing chain

If chain is excessively worn or damaged, replace it as a set (camshaft timing gear and timing chain).

Check timing chain guides for wear, cracks or deformation. Replace as required.

NOTE: Check also the timing chain guide (tensioner side).

Installing the Timing Chain

The installation is the reverse of the removal procedure. However, pay attention to the following.

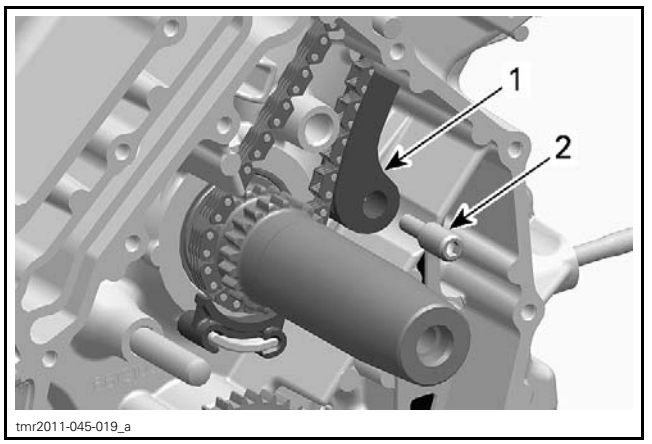
NOTE: Installation is the same for both timing chains.

Install timing chain with camshaft timing gear.

NOTE: Ensure to carry out proper valve timing, refer to *CAMSHAFT TIMING GEARS* in this subsection.

NOTICE **Improper valve timing will damage engine components.**

TIMING CHAIN GUIDE (TENSIONER SIDE)



1. Timing chain guide (tensioner side)
2. Bearing screw

Removing the Timing Chain Guide (Tensioner Side)

Refer to *TIMING CHAIN* in this subsection.

Inspecting the Timing Chain Guide (Tensioner Side)

Check timing chain guide for wear, cracks or deformation. Replace if necessary.

Installing the Timing Chain Guide (Tensioner Side)

The installation is the reverse of the removal procedure.

TIGHTENING TORQUE	
Timing chain guide bearing screw	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**) + LOCTITE 243 (BLUE) (P/N 293 800 060)

BOTTOM END

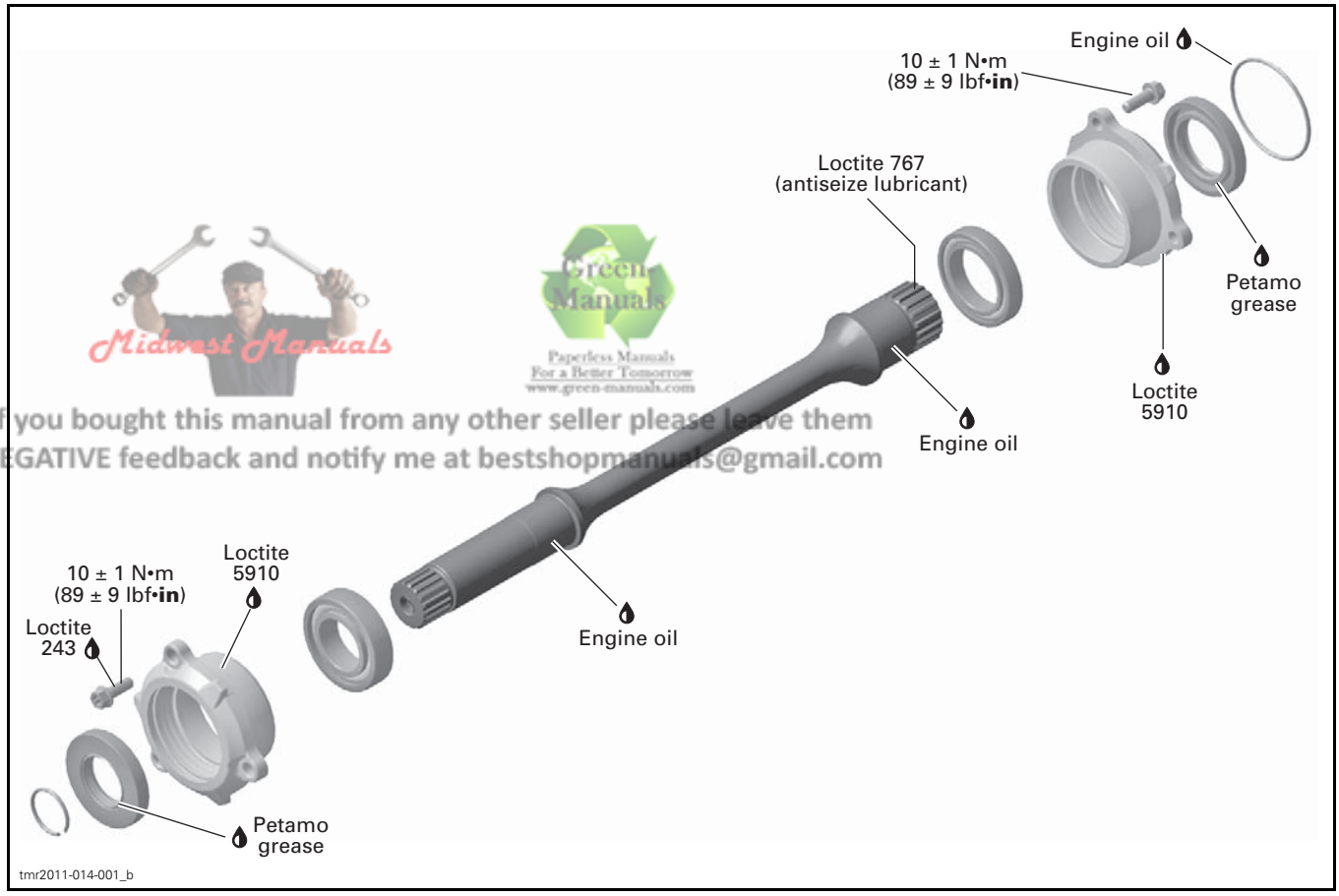
SERVICE TOOLS

Description	Part Number	Page
CRANKCASE SUPPORT MAG/PTO	529 036 031	14
CRANKSHAFT LOCKING BOLT	529 035 617	18
DRIVE SHAFT OIL SEAL INSTALLER	529 036 028	6–7
DRIVE SHAFT OIL SEAL PROTECTOR	529 036 029	5
PLAIN BEARING REMOVER/INSTALLER	529 035 917	14–15
PLAIN BEARING REMOVER/INSTALLER	529 036 032	9
PTO COVER OIL SEAL INSTALLER	529 036 033	8

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	6
LOCTITE 5910	293 800 081	5
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	5

ENGINE DRIVE SHAFT



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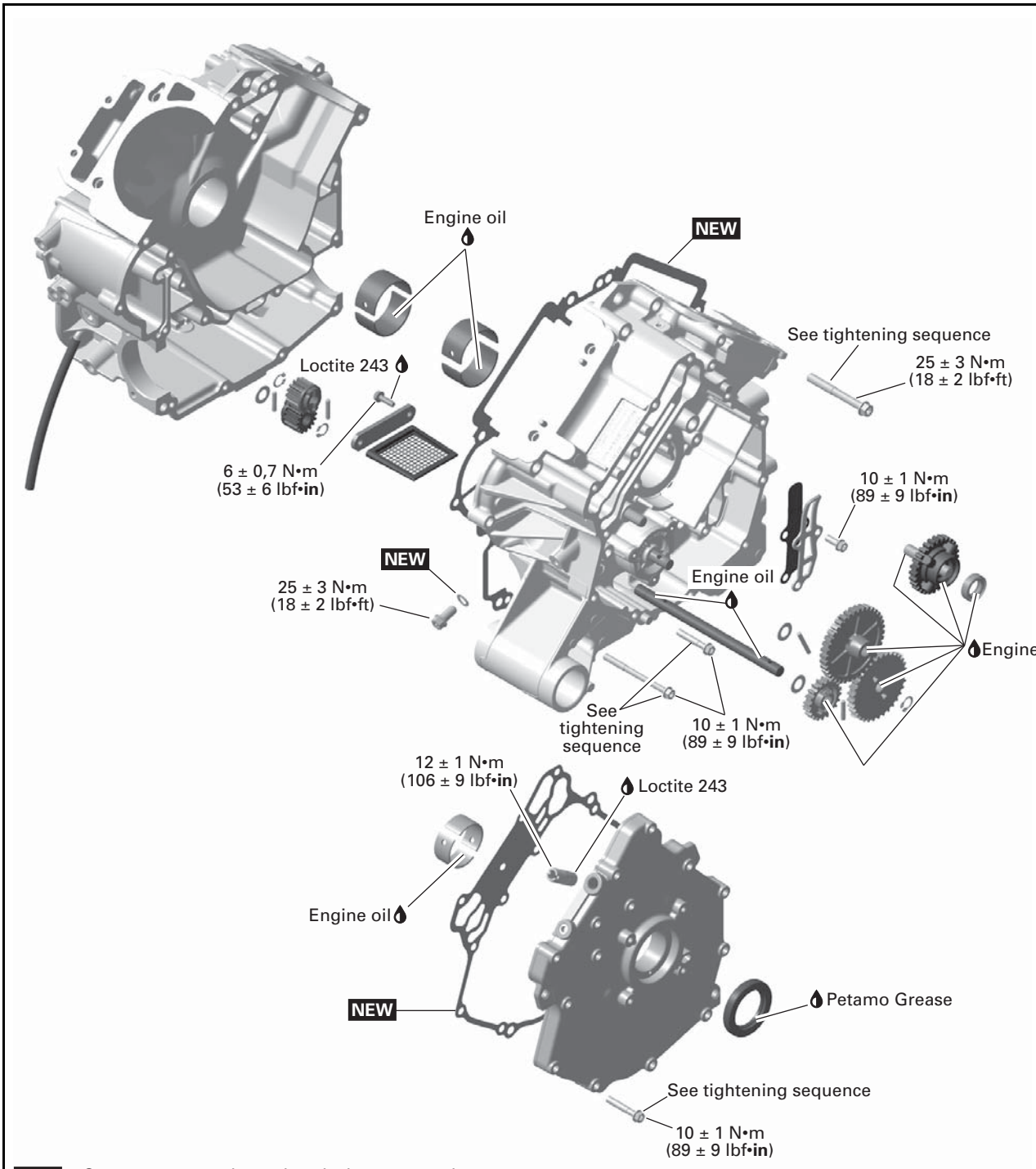
CRANKCASE AND PTO COVER



NEW = Component must be replaced when removed.

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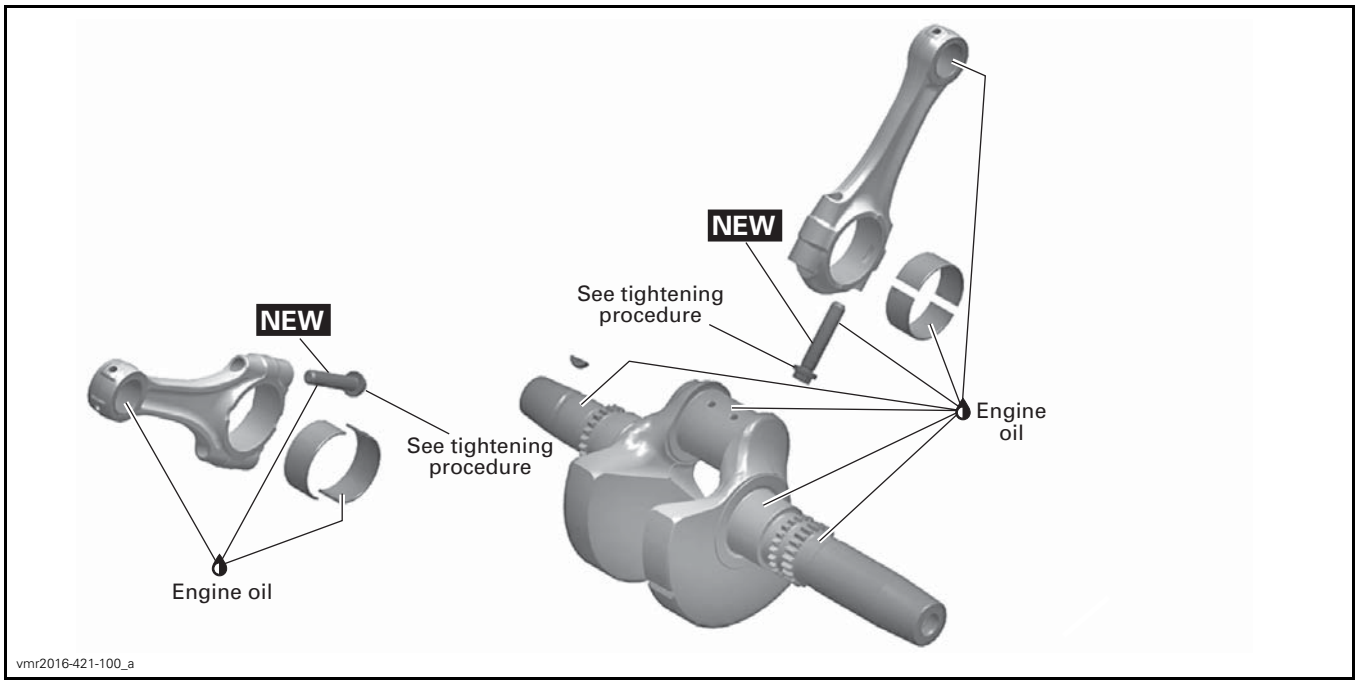
CRANKSHAFT


NEW
See tightening procedure
Engine oil
NEW
See tightening procedure
Engine oil
vmr2016-421-100_a

PROCEDURES

IMPORTANT: Note position of parts on disassembly. This may help to find the root cause of a problem. A component that is not replaced should be reinstalled in the same position as originally mounted.

ENGINE DRIVE SHAFT

NOTE: The engine drive shaft transmits the power from the gearbox to the front differential and is located inside the crankcase.

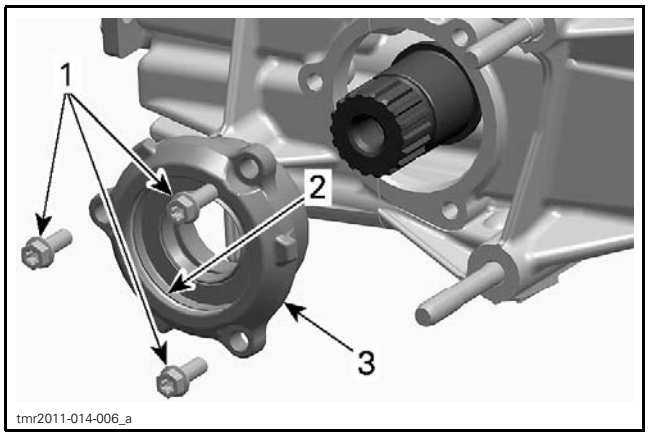
Removing the Engine Drive Shaft

Remove the engine. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.

Removing the Rear Bearing Cover

Detach gearbox from engine, refer to *GEARBOX AND 4X4 COUPLING UNIT* subsection.

At rear of engine, remove the bearing cover and its O-ring.

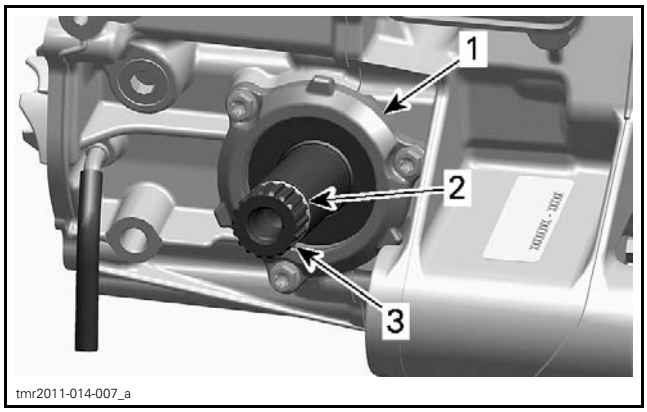


1. Bearing cover screws
2. O-ring
3. Bearing cover gearbox side

Removing the Front Bearing Cover

Remove the bearing cover at the front of the engine.

NOTICE Check ends of the circlip for sharp edges or burrs before removing the drive shaft, to avoid damaging the oil seal.

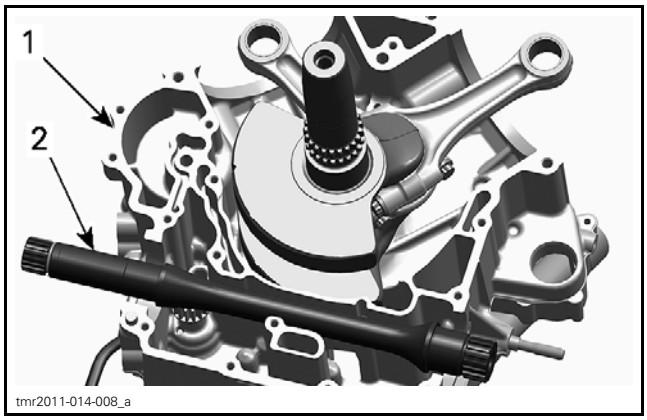


1. Bearing cover front drive side
2. Circlip
3. Drive shaft

Removing the Engine Drive Shaft

Split crankcase, refer to *CRANKCASE* in this subsection.

Remove engine drive shaft from the crankcase.

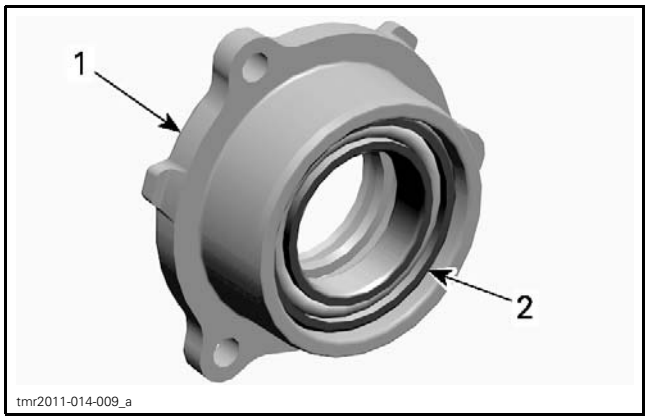


1. Crankcase MAG side
2. Engine drive shaft

Inspecting the Engine Drive Shaft

Replace oil seals and/or O-ring (bearing cover gearbox side) if they are brittle, hard or damaged.

Check drive shaft bearings for contamination and/or metal shavings. Check if bearings turn freely and smoothly. Replace if necessary.



1. Bearing cover
2. Drive shaft bearing

Check drive shaft for cracks, bend, pitting or other visible damages.

Check drive shaft splines for wear or damages.

Check oil seal running surface of the drive shaft for scratches. Replace if necessary.

Installing the Engine Drive Shaft

The installation is the reverse of removal procedure however, pay attention to the following details.

Clean all metal components in solvent.

Clean crankcase surfaces and bearing covers using a combination of LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500) and a brass brush. First brush in one direction then make the final brushing perpendicularly (90°) to the first pass.

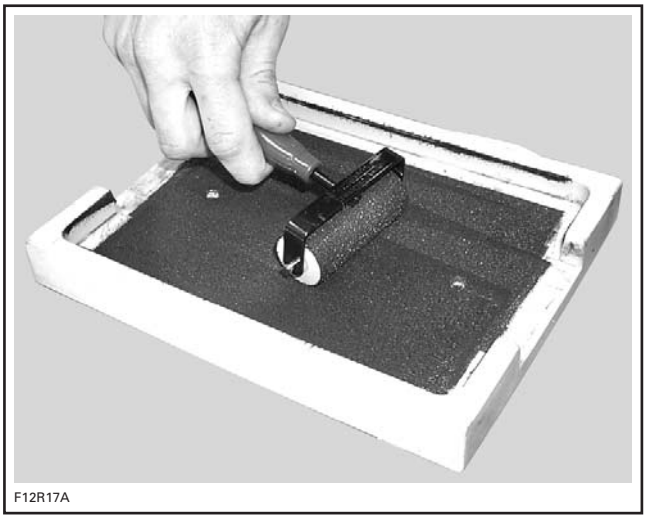
NOTICE **Do not wipe with rags. Use a new clean hand towel only.**

Use a suitable installer for installing bearings.

Use LOCTITE 5910 (P/N 293 800 081) on mating surfaces.

IMPORTANT: When beginning the application of the bearing cover sealant, the assembly and the first torquing should be done within 10 minutes. It is suggested to have all you need on hand to save time.

Use a plexiglass plate and apply some sealant on it. Use a soft rubber roller 50 mm - 75 mm (2 in - 3 in), available in arts products suppliers for printing, and roll the sealant to get a thin uniform coat on the plate (spread as necessary). When ready, apply the sealant on bearing cover surfaces.



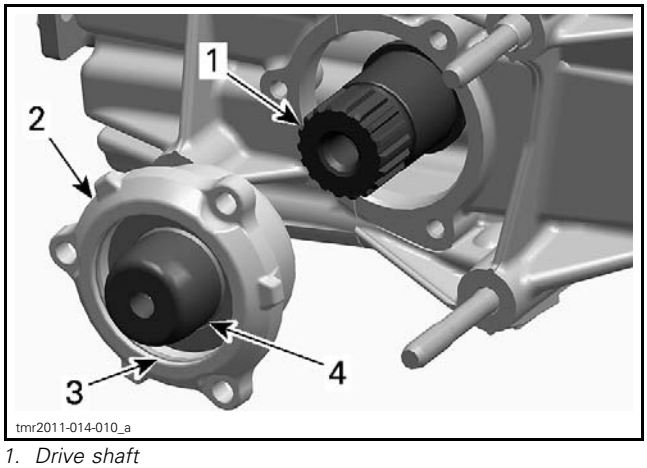
Do not apply in excess as it will spread out inside crankcase.

NOTE: It is recommended to apply this specific sealant as described here to get a uniform application without lumps. If you do not use the roller method, you may use your finger to uniformly distribute the sealant (using a finger will not affect the adhesion).

Installing the Rear Bearing Cover

For bearing cover installation on gearbox side, protect the oil seal to avoid damaging the sealing lip.

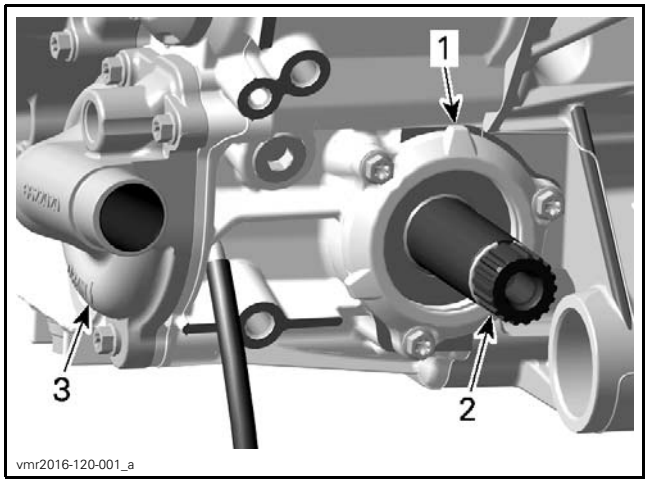
REQUIRED TOOL	
DRIVE SHAFT OIL SEAL PROTECTOR (P/N 529 036 029)	



1. Drive shaft
2. Bearing cover gearbox side
3. O-ring
4. Protection sleeve

TIGHTENING TORQUE	
Rear bearing cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Installing the Front Bearing Cover



FRONT OF ENGINE
1. *Bearing cover front side*
2. *Drive shaft*
3. *Water pump cover*

TIGHTENING TORQUE	
Service product	LOCTITE 243 (BLUE) (P/N 293 800 060)
Front bearing cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Installing the Engine Drive Shaft

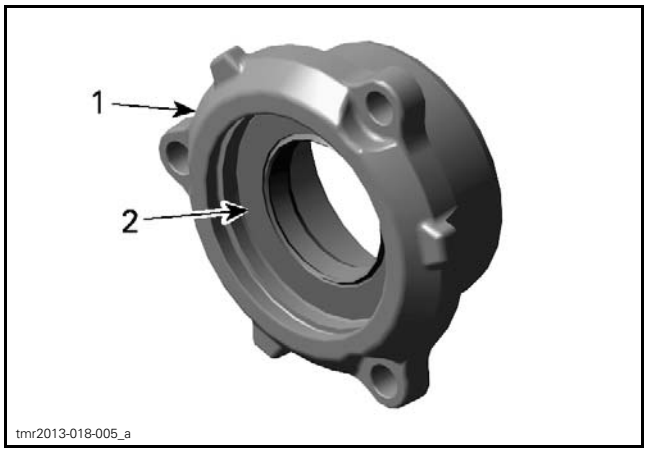
Finally check for axial play of the drive shaft.

FRONT OIL SEAL (ENGINE DRIVE SHAFT)

Replacing the Front Oil Seal (Engine Drive Shaft)

NOTE: The front oil seal can be replaced with the engine installed.

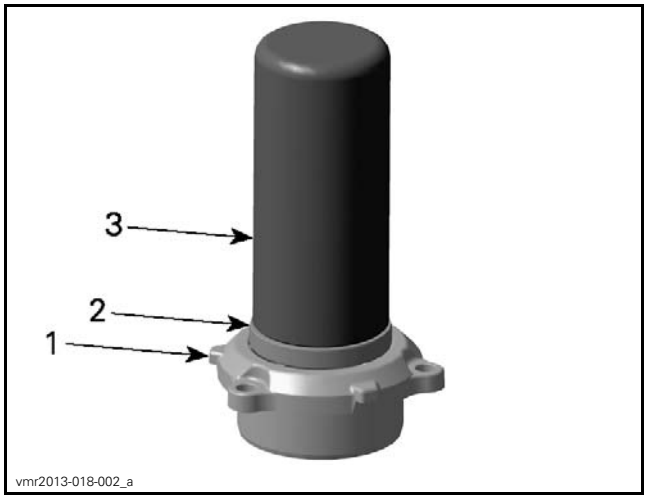
1. Remove front propeller shaft.
2. Remove adapter sleeve between propeller shaft and front engine drive shaft.
3. Remove the front bearing cover, refer to *ENGINE DRIVE SHAFT REMOVAL/INSTALLATION* in this subsection.
4. Remove drive shaft seal from bearing cover.



1. *Bearing cover*
2. *Oil seal*

5. Install drive shaft oil seal using the following tool.

REQUIRED TOOL	
DRIVE SHAFT OIL SEAL INSTALLER (P/N 529 036 028)	



1. *Bearing cover*
2. *Oil seal*
3. *Oil seal installer*

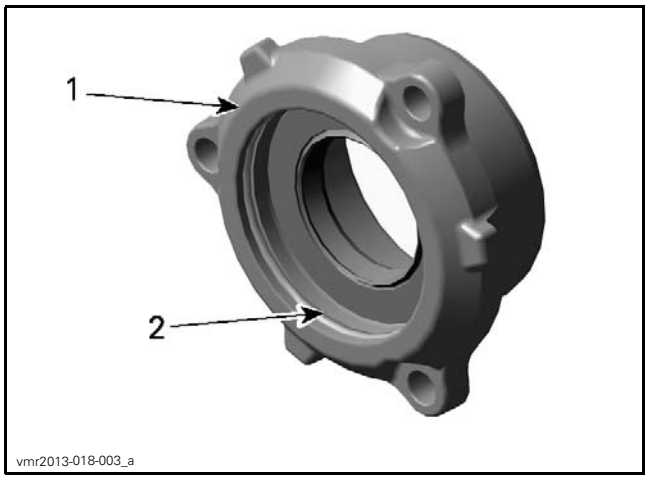
6. Reinstall remaining parts in the reverse order of removal.

REAR OIL SEAL (ENGINE DRIVE SHAFT)

Replacing the Rear Oil Seal (Engine Drive Shaft)

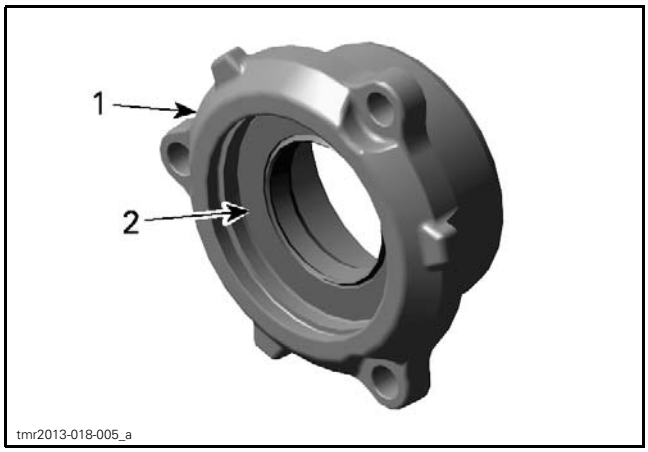
1. Remove gearbox from the engine, refer to *GEARBOX AND 4X4 COUPLING UNIT* subsection.

2. Remove rear bearing cover, refer to *ENGINE DRIVE SHAFT REMOVAL/INSTALLATION* in this subsection.
3. Remove O-ring from bearing cover.



1. Bearing cover
2. O-ring

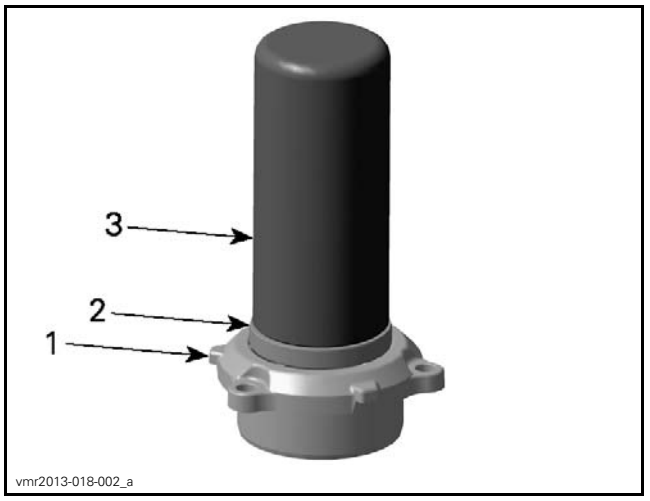
4. Remove drive shaft seal from bearing cover.



1. Bearing cover
2. Oil seal

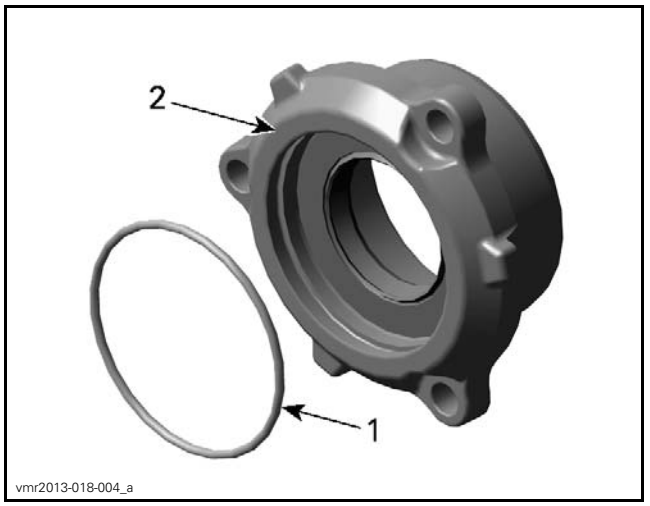
5. Install drive shaft oil seal using the following tool.

REQUIRED TOOL	
DRIVE SHAFT OIL SEAL INSTALLER (P/N 529 036 028)	



1. Bearing cover
2. Oil seal
3. Oil seal installer

6. Install O-ring in rear bearing cover.



1. O-ring
2. Bearing cover

7. Reinstall remaining parts in the reverse order of removal.

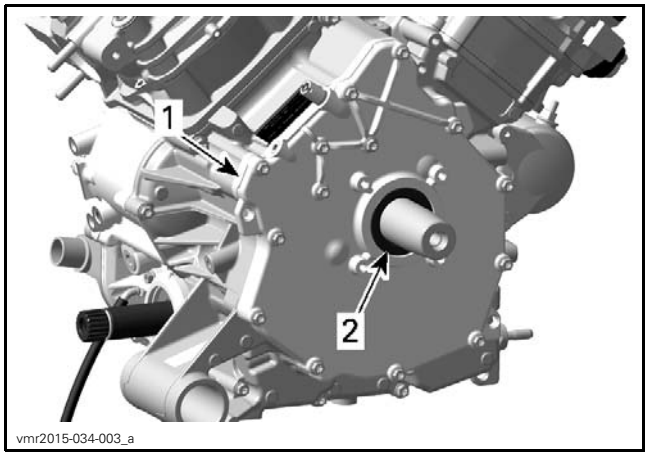
PTO COVER OIL SEAL

NOTE: To replace oil seal it is not necessary to remove engine from vehicle.

Removing the PTO Oil Seal

1. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection and remove the following parts:
   - CVT cover
   - Drive pulley
   - Driven pulley
   - CVT air guide.
2. Remove oil seal using a small flat screwdriver.

NOTICE Avoid scoring surfaces with tool.



1. PTO cover
2. Oil seal

Inspecting the PTO Oil Seal

Check oil seal running surface of crankshaft PTO side for grooves. Replace if necessary.

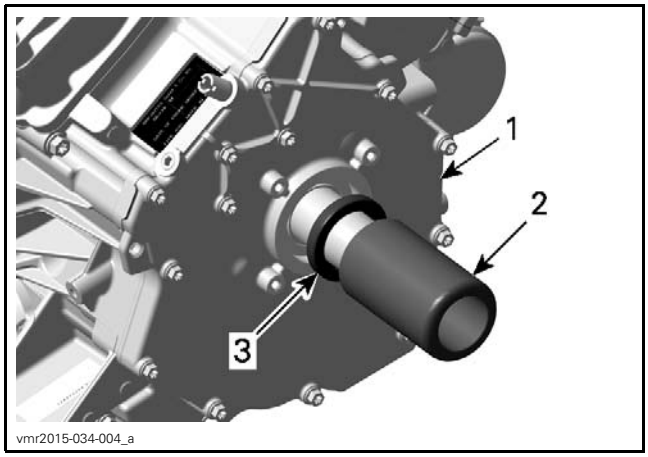
Installing the PTO Oil Seal

The installation is the reverse of the removal procedure however, pay attention to the following details.

NOTICE Oil seal must be installed with sealing lip toward the engine.

Push oil seal in place using the following tool.

REQUIRED TOOL	
PTO COVER OIL SEAL INSTALLER (P/N 529 036 033)	

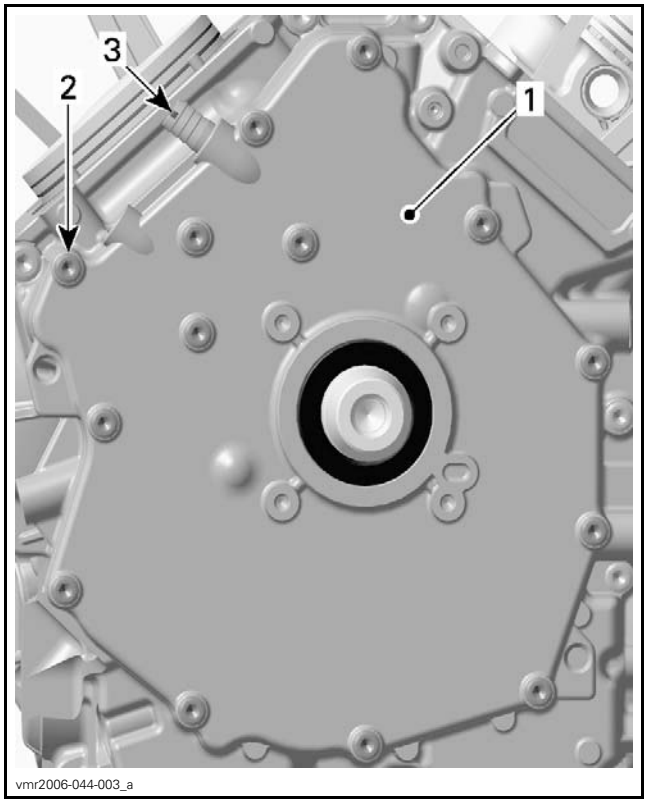


1. PTO cover
2. Oil seal installer
3. Oil seal

PTO COVER

Removing the PTO Cover

1. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection to remove the following parts:
   – CVT cover
   – Drive pulley
   – Driven pulley
   – CVT air guide.
2. Disconnect vent hose.
3. Remove PTO cover screws and pull on PTO cover to remove it.



1. PTO cover
2. PTO cover screws
3. Vent hose nipple

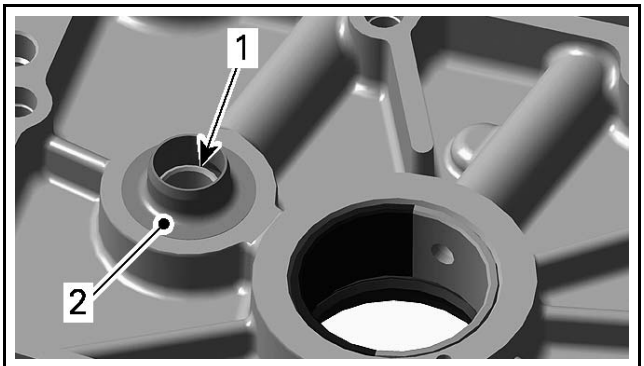
Inspecting the PTO Cover

1. Check the PTO cover for cracks or other damage.
2. Replace PTO cover if damaged.
3. Clean oil breather bore in PTO cover from contaminations with a parts cleaner then use pressurized air to dry it.

⚠ WARNING

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

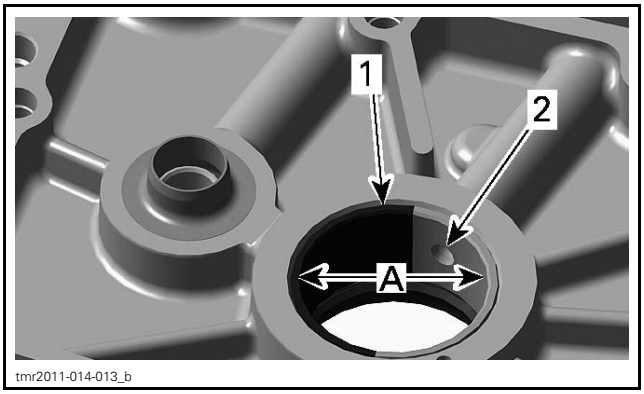
4. Check surface of sealing sleeve for wear or other damages. Replace PTO cover if damaged.



1. Oil breather bore
2. Surface of sealing sleeve

5. Check plain bearings for scoring or other damages.

NOTE: Measure plain bearing inside diameter (PTO cover) and compare to crankshaft bearing journal diameter (PTO cover bearing). Refer to *CRANKSHAFT* in this subsection. Replace if the measurement is out of specification.



1. Plain bearing
2. Oil bore

A. Measure plain bearing inside diameter

PLAIN BEARING INSIDE DIAMETER (PTO COVER)	
SERVICE LIMIT	34.120 mm (1.3433 in)

Replacing the Plain Bearing (PTO Cover)

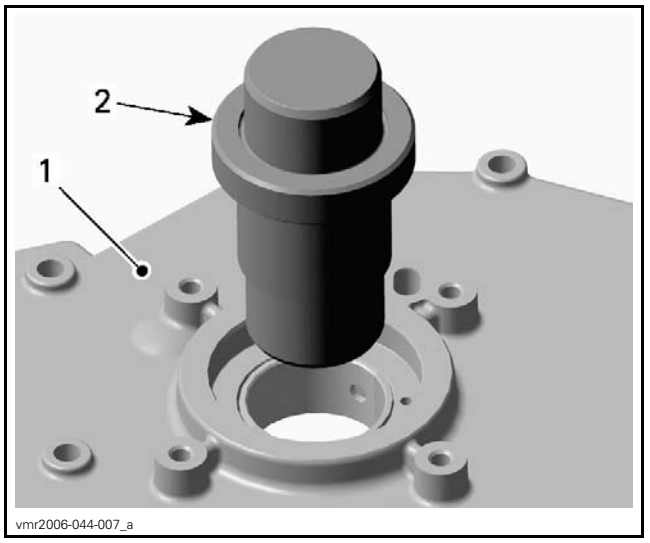
Removing the Plain Bearing

NOTICE Unless otherwise instructed, never use a hammer to install plain bearings. Always use a press.

1. Carefully remove the PTO oil seal with a screwdriver, without damaging the PTO cover.
2. Press out the plain bearings from the outside towards the inside.

REQUIRED TOOL	
PLAIN BEARING REMOVER/INSTALLER (P/N 529 036 032)	

NOTE: The PTO cover has to be supported from below on a suitable support with straight surface in order to prevent damage of the sealing surface.



1. PTO cover
2. Plain bearing remover/installer

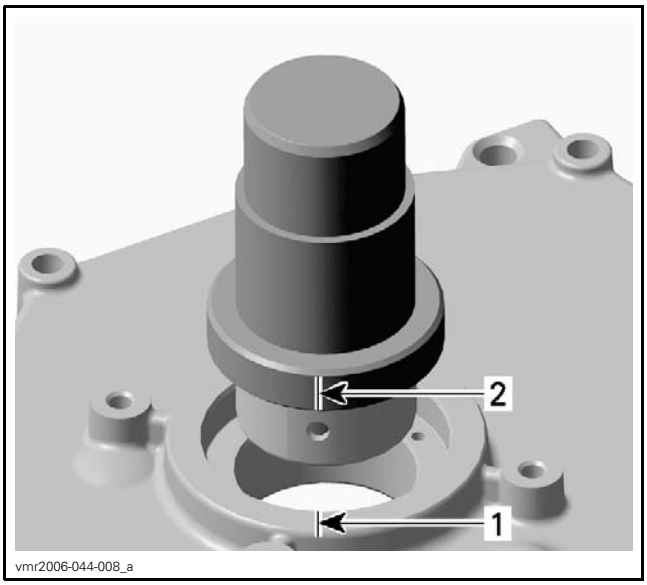
Installing the Plain Bearing

NOTE: Do not lubricate plain bearings or PTO cover for installation.

Install plain bearings in a cold PTO cover.

REQUIRED TOOL	
PLAIN BEARING REMOVER/INSTALLER (P/N 529 036 032)	

1. Mark position of oil bore on PTO cover and on plain bearing remover/installer.
2. Align mark on plain bearing remover/installer with mark on PTO cover.



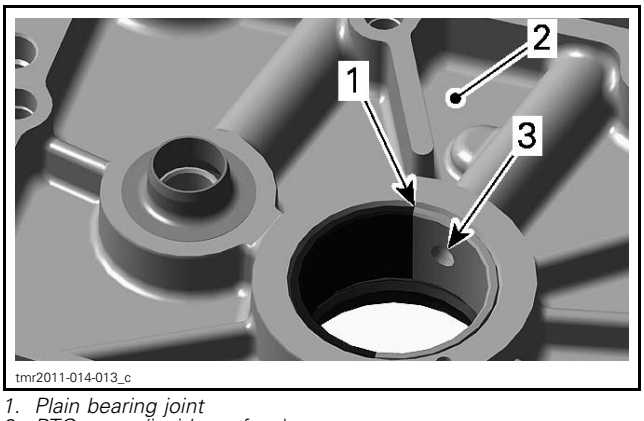
1. Mark position of oil bore on PTO cover
2. Mark position of oil bore on plain bearing remover/installer

NOTICE Misalignment of plain bearing and PTO cover oil bores will prevent proper oil supply to plain bearings.

3. Carefully press in the plain bearings in the same direction as during disassembly, from the outside towards the inside.

NOTE: Support PTO cover using a suitable support with a straight surface to prevent damage of the sealing surface.

NOTICE The joining surfaces of the plain bearings must be positioned near the oil bore in a counterclockwise direction.



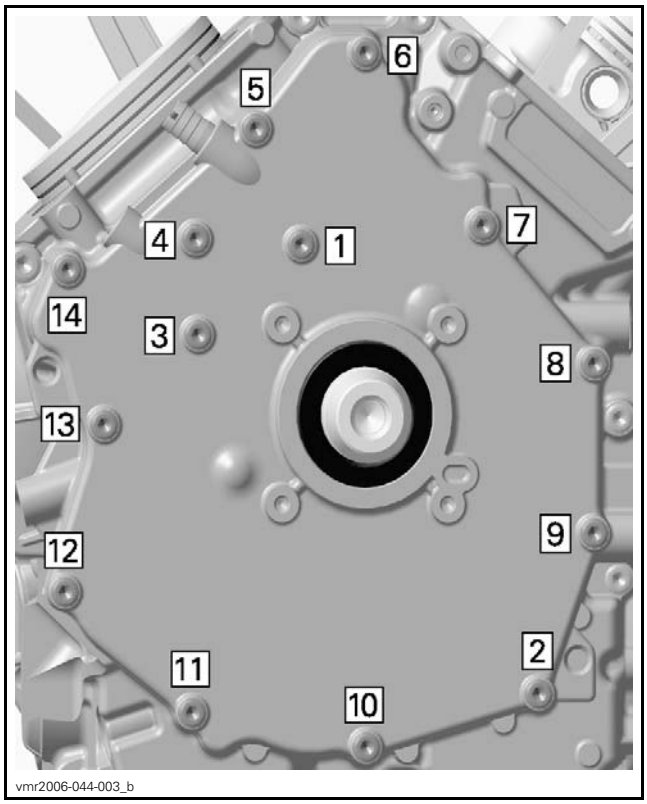
1. Plain bearing joint
2. PTO cover (inside surface)
3. Oil bore

Installing the PTO Cover

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

NOTE: At installation, replace PTO cover gasket and oil seal.

Tighten PTO cover screws following the sequence illustrated.



TIGHTENING SEQUENCE

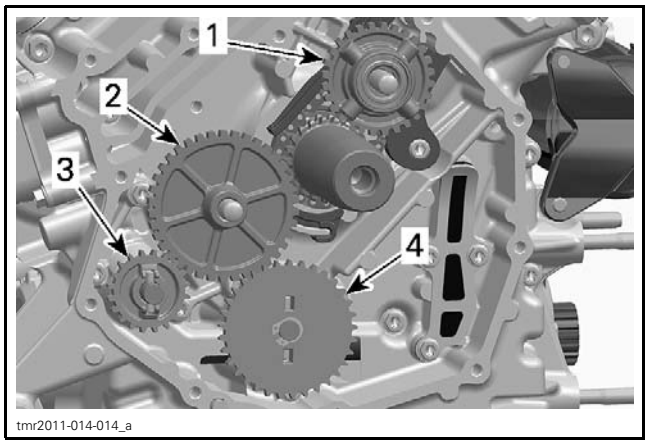
TIGHTENING TORQUE	
PTO cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

DRIVE GEARS

Drive Gears Location

The engine is equipped with a breather gear which prevents engine oil from seeping out through the breathing system into the air intake system.

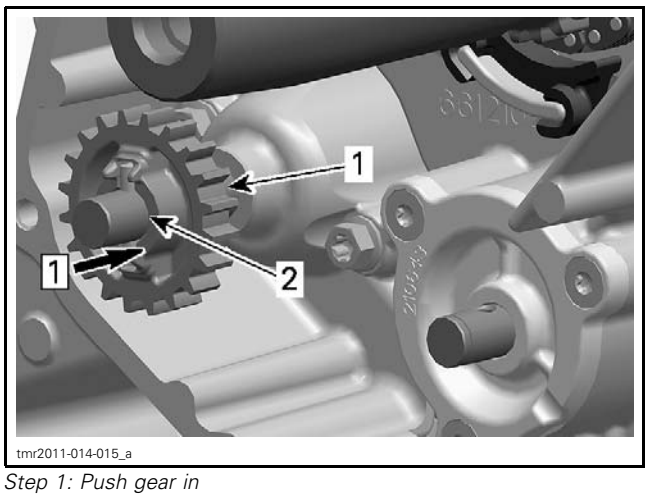
The drive gears are located on the engine PTO side behind the PTO cover.



1. *Breather gear*
2. *Intermediate gear*
3. *Water pump drive gear*
4. *Oil pump drive gear*

Removing the Drive Gears

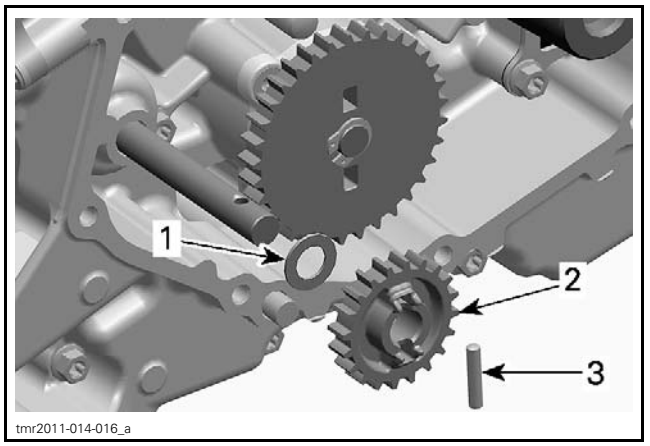
1. Remove PTO cover, refer to *PTO COVER* in this subsection.
2. Withdraw intermediate gear and breather gear.
3. Remove oil pump drive gear, refer to *OIL PUMP* in the *LUBRICATION SYSTEM* subsection.
4. To remove water pump drive gear, pull the shaft assembly slightly out and turn it about one tooth until it stays out.
5. Then push water pump drive gear in.



Step 1: Push gear in

1. *Water pump drive gear*
2. *Intermediate shaft*

6. Remove needle pin and pull water pump drive gear out.
7. Remove thrust washer from intermediate shaft.



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

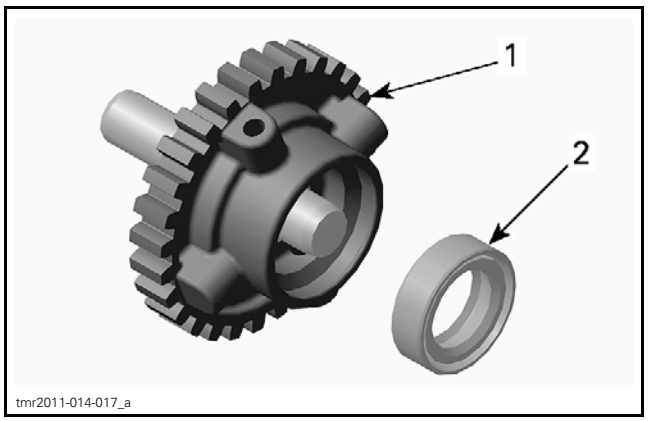
Inspecting the Drive Gears

Intermediate Gear/Oil Pump Drive Gear/Water Pump Drive Gear

Inspect gears for wear or other damage. Replace if damaged.

Breather Gear

Check if oil seal is brittle, hard or damaged. Replace if necessary.



1. *Breather gear*
2. *Oil seal*

Inspect gear for wear or other damage.

Check ball bearing for excessive play and smooth operation. Replace breather gear assembly if necessary.

Installing the Drive Gears

The installation is essentially the reverse of the removal procedure however, pay attention to the following.

Adequately oil the ball bearing of the breather gear.

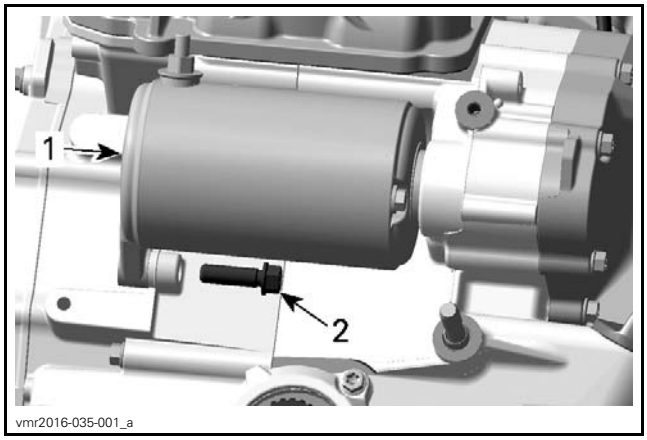
CRANKCASE

Disassembling the Crankcase

1. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection and carry out the following:
   1.1 Drain cooling system.
   1.2 Drain engine oil.
   1.3 Drain gearbox oil.
2. Lock crankshaft. Refer to *CRANKSHAFT LOCKING PROCEDURE* in the this subsection.
3. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection and remove the following parts:
   – CVT cover
   – Drive pulley
   – Driven pulley
   – CVT air guide.
4. Remove engine from vehicle. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.
5. Remove gearbox from engine.
6. Refer to *MAGNETO AND STARTER* subsection and remove the following parts:
   – Magneto cover
   – Rotor with sprag clutch gear
   – Starter drive gears.
7. Refer to applicable procedures in this subsection and remove the following parts:
   – PTO cover
   – Drive gears
   – Bearing covers of engine drive shaft.
8. Refer to *TIMING CHAIN* subsection and remove the following parts:
   – Chain tensioners
   – Camshaft timing gears
   – Timing chains
   – Timing chain guides.
9. Refer to *TOP END* subsection and remove the following parts:
   – Front cylinder head
   – Rear cylinder head
   – Cylinders.
10. Refer to *COOLING SYSTEM* subsection and remove the following parts:
    – Water pump housing.
11. Refer to *LUBRICATION SYSTEM* subsection and remove the following parts:
    – Oil filter
    – Oil cooler (if applicable)
    – Oil pump drive gear.

NOTE: Oil pump removal from crankcase is not necessary, but recommended to see condition of oil pump. Refer to *LUBRICATION SYSTEM* subsection.

12. Remove electric starter.

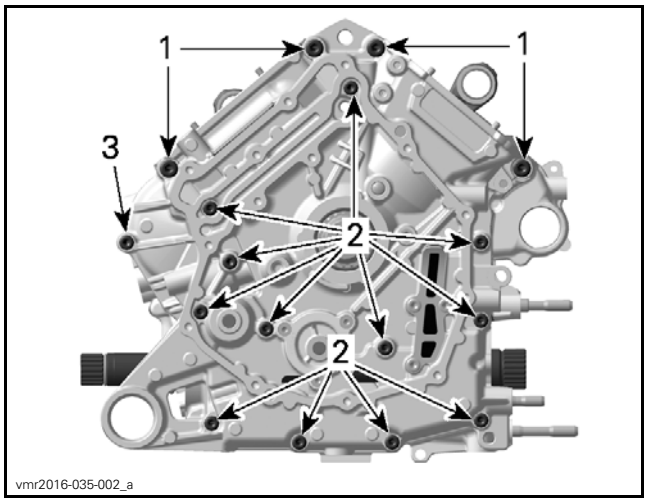


1. Electric starter
2. Screw

NOTE: Before splitting the crankcase, measure crankshaft axial play. Refer to *CRANKSHAFT* in this subsection.

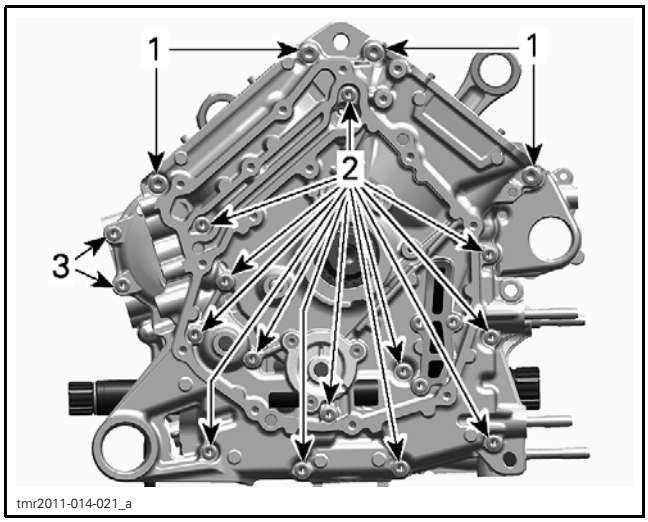
13. Remove crankcase retaining screws.

Models Without Oil Cooler



1. Four screws M8 x 65
2. 12 screws M6 x 75
3. One screw M6 x 25

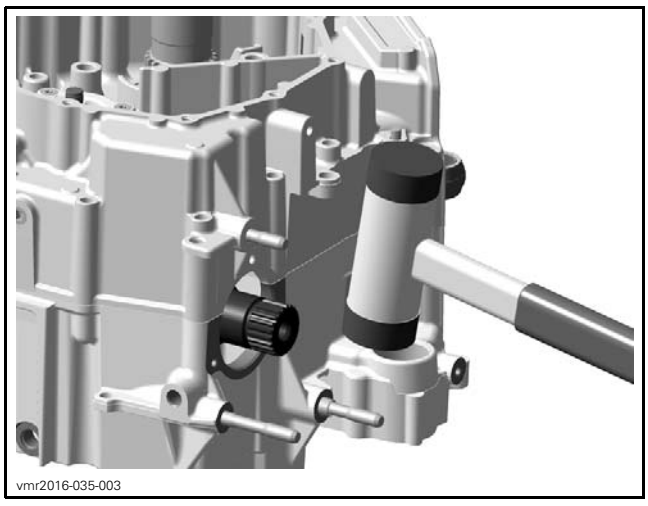
Models With Oil Cooler



1. Four screws M8 x 65
2. 13 screws M6 x 75
3. Two screw M6 x 25

All Models

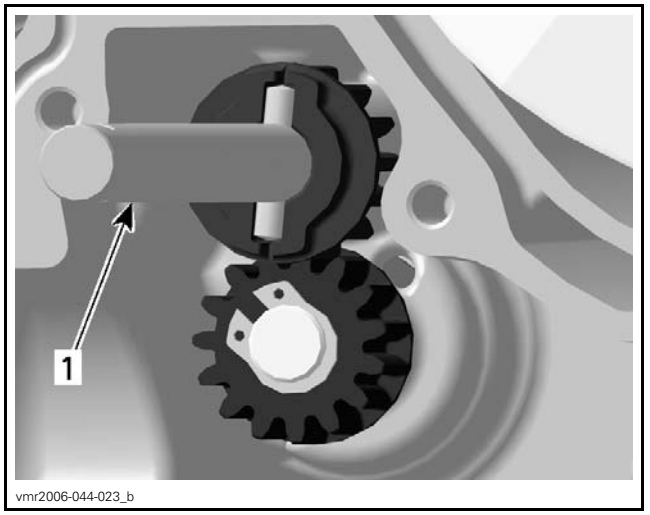
14. Carefully split crankcase halves using a screwdriver and a soft hammer.



NOTE: During disassembly, do not damage the sealing surfaces of the crankcase halves.

15. Pull crankshaft out of crankcase.

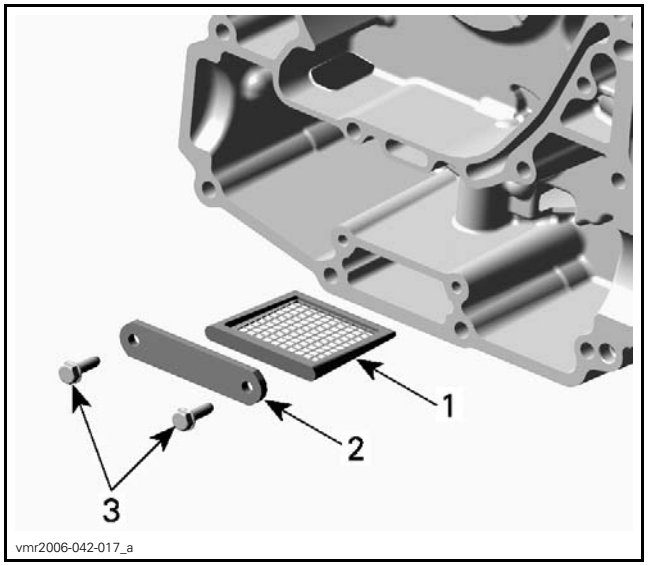
16. Remove the water pump intermediate shaft.



1. Water pump intermediate shaft

17. Remove engine oil strainer.

NOTE: Oil strainer removal for inspection and cleaning is recommended. Refer to *LUBRICATION SYSTEM* subsection.



1. Engine oil strainer
2. Retaining plate
3. Screws

Cleaning the Crankcase

⚠ WARNING

Use safety goggles to avoid eye injuries.

Clean crankcase using a part cleaner.

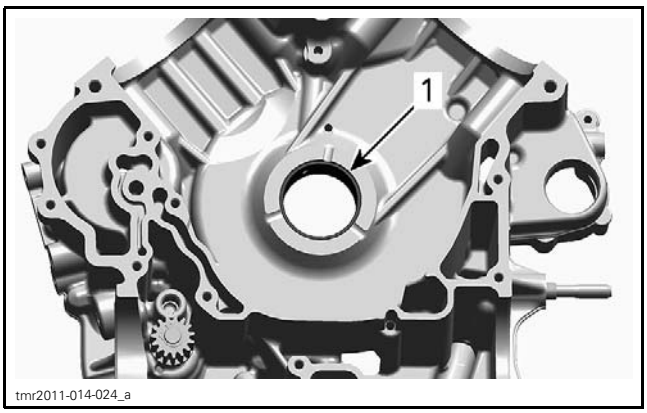
Dry crankcase using compressed air.

Blow low pressure filtered air through the oil supply lines.

Inspecting the Crankcase

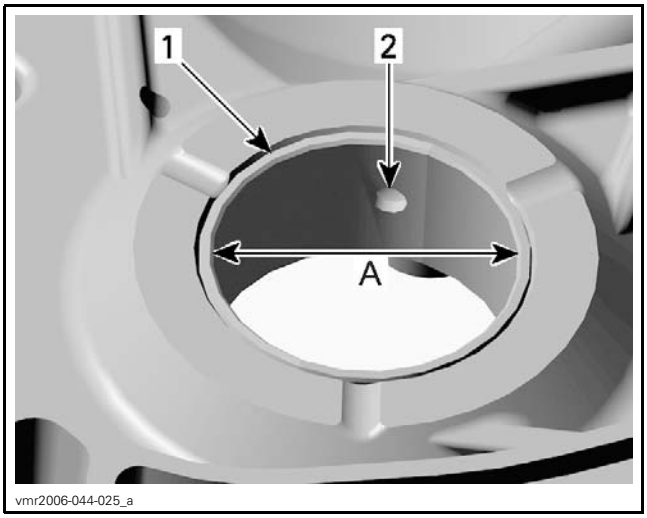
Check crankcase halves for cracks or other damage. Replace if damaged.

Check MAG and PTO plain bearings for scoring or other damages.



1. Plain bearing

Measure plain bearing inside diameter and compare to PTO/MAG main journal diameters of crankshaft, refer to *CRANKSHAFT* in this subsection. Replace if the measurements are out of specification.



1. Plain bearing
2. Oil bore
A. Measure plain bearing inside diameter

MAIN BEARING INSIDE DIAMETER (PTO/MAG)	
SERVICE LIMIT	42.100 mm (1.6575 in)

Replacing the Plain Bearing (Main)

Removing the Plain Bearing

NOTICE Always properly support crankcase halves when removing plain bearings. Damage to crankcase halves may occur if this procedure is not performed correctly.

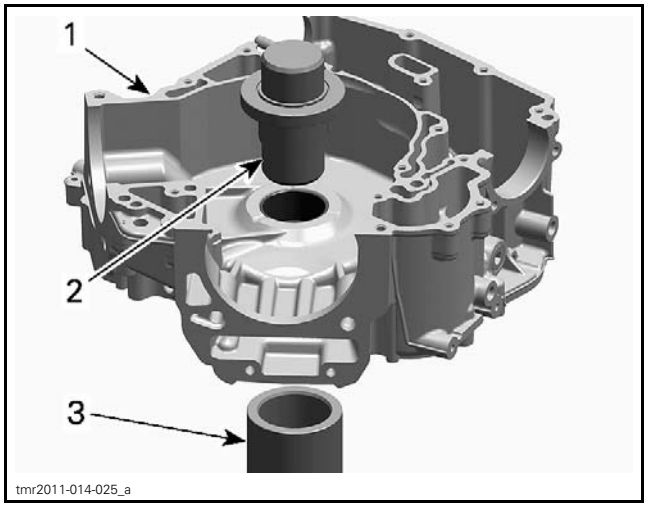
NOTE: Always use a press for removal of plain bearings.

Carefully press the plain bearings out from the crankcase half from the inside towards the outside.

NOTE: Place an appropriate support under crankcase halves before removing plain bearings.

REQUIRED TOOLS	
CRANKCASE SUPPORT MAG/PTO (P/N 529 036 031)	
PLAIN BEARING REMOVER/INSTALLER (P/N 529 035 917)	

NOTE: During disassembly, make sure not to damage the sealing surfaces of the crankcase halves.



PRESS PLAIN BEARINGS OUTSIDE
1. Crankcase half
2. Plain bearing remover/installer
3. Crankcase support sleeve (P/N 529 036 031)

Installing the Plain Bearing

NOTICE Unless otherwise instructed, never use a hammer to install plain bearings. Aways use a press.

During reassembly, make sure not to damage the sealing surfaces of the crankcase halves.

NOTE: Place the proper crankcase support sleeve under crankcase halves before installing the plain bearings, refer to *PLAIN BEARING REMOVAL PROCEDURE* in this subsection.

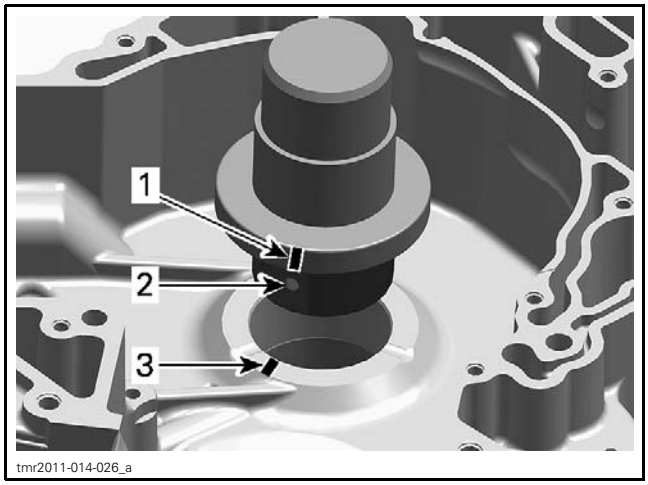
Install plain bearings in a cold crankcase.

NOTE: Do not lubricate plain bearings and/or crankcase for installation.

REQUIRED TOOL	
PLAIN BEARING REMOVER/INSTALLER (P/N 529 035 917)	

NOTE: Use an O-ring (Ø 42 x 1 mm to 1.5 mm (.04 in to .06 in) thickness) to hold plain bearings in place during installation. The O-ring will disappear in the groove of the plain bearing remover/installer.

1. Mark position of plain bearing oil bore on plain bearing remover/installer.
2. Mark position of oil bore on crankcase half.
3. Align mark on plain bearing remover/installer with mark on crankcase half.



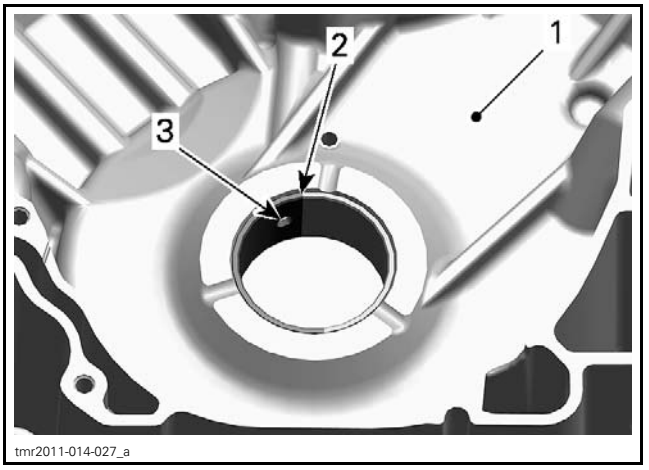
tmr2011-014-026_a

1. Oil bore position marked on plain bearing remover/installer
2. Plain bearing oil bore
3. Oil bore position marked on crankcase

NOTICE Misalignment of the plain bearing and crankcase oil bores will prevent proper oil supply to plain bearings.

4. Carefully press in the plain bearings from inside the crankcase towards the outside.

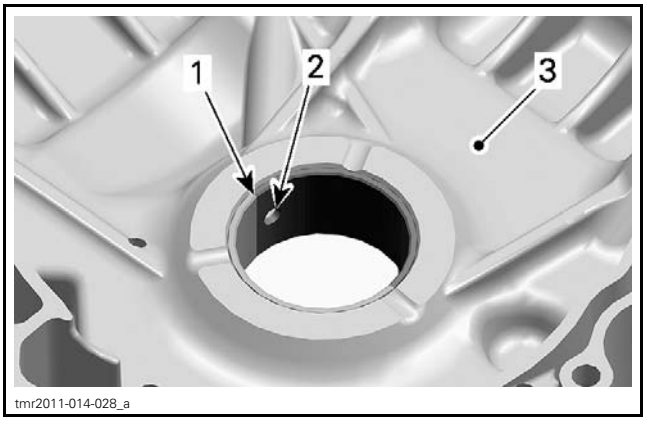
NOTICE The joint of the plain bearings in crankcase half MAG side must be positioned near the oil bore in a clockwise direction.



tmr2011-014-027_a

1. Crankcase half MAG (inside surface)
2. Partition
3. Oil bore

NOTICE The joint of the plain bearings in the crankcase half PTO side must be positioned near the oil bore in the counterclockwise direction.



tmr2011-014-028_a

1. Plain bearing joint
2. Oil bore
3. Crankcase half PTO (inside surface)

Assembling the Crankcase

The assembly of crankcase is essentially the reverse of removal procedure. However, pay attention to the following details.

Clean oil passages and make sure they are not clogged.

Clean all metal components in a solvent.

Install a NEW crankcase gasket.

Oil the plain bearings before mounting the crankshaft.

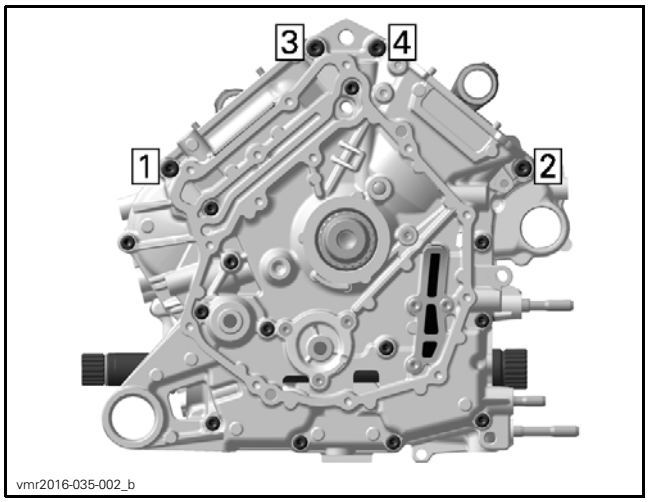
Reinstall crankshaft, see procedure in this subsection

Properly reinstall engine oil strainer and screws. Refer to *LUBRICATION SYSTEM* subsection.

Reinstall water pump intermediate shaft and gears, refer to *WATER PUMP GEARS* in the *COOLING SYSTEM* subsection.

Tighten crankcase retaining screws as per following sequence.

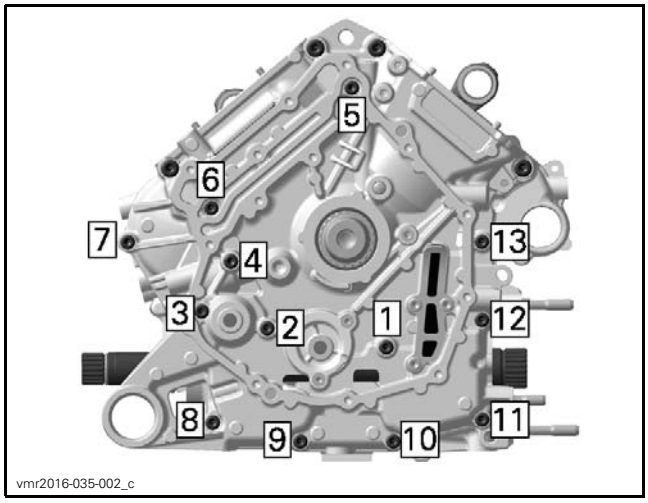
All Models



M8 SCREWS TIGHTENING SEQUENCE

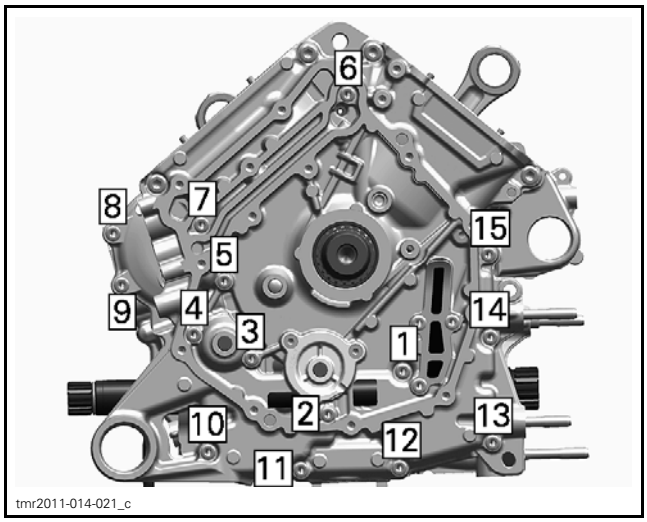
TIGHTENING TORQUE	
M8 crankcase screws	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

Models Without Oil Cooler



M6 SCREWS TIGHTENING SEQUENCE

Models With Oil Cooler

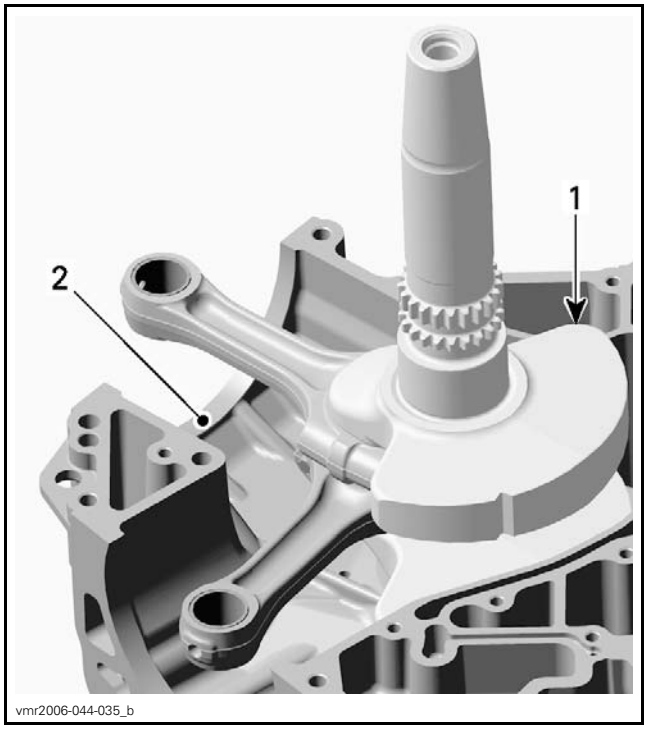


M6 SCREWS TIGHTENING SEQUENCE

All Models

TIGHTENING TORQUE	
M6 crankcase screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

CRANKSHAFT



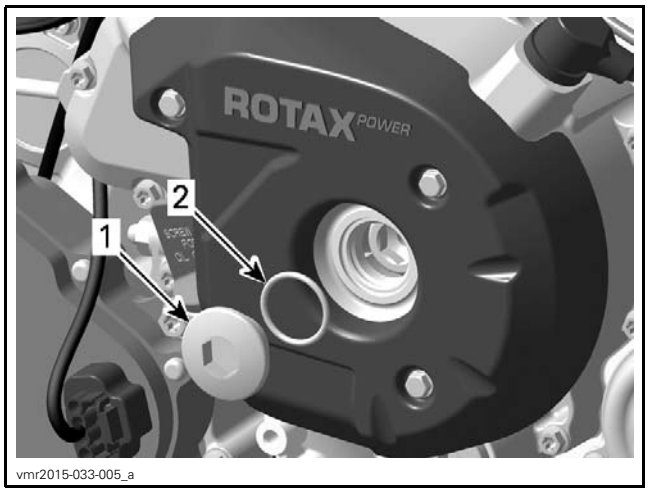
1. *Crankcase MAG*
2. *Crankshaft*

Crankshaft Locking Procedure

NOTE: When the crankshaft is locked, the rear piston no. 2 is at TDC (top dead center). The crankshaft cannot be locked with front piston no. 1 at TDC.

NOTICE To see if the rear piston no. 2 is at TDC ignition, refer to *CAMSHAFT TIMING GEAR* in the *TIMING CHAIN* subsection.

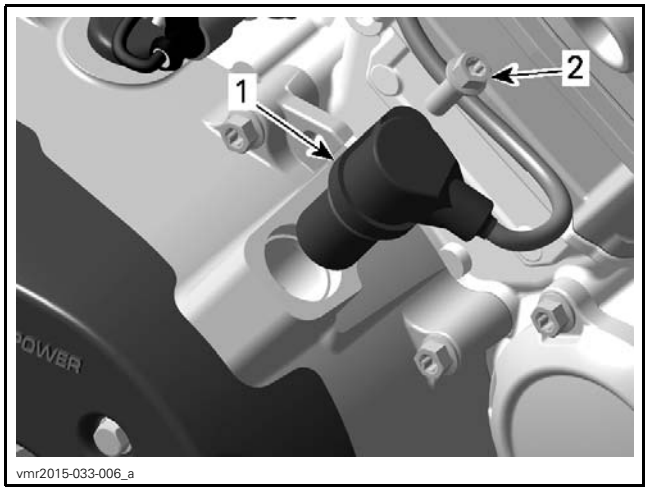
1. Remove spark plug cables and spark plugs from both cylinders.
2. Remove screw plug and O-ring from magneto cover.



vmr2015-033-005_a

1. Plug screw
2. O-ring

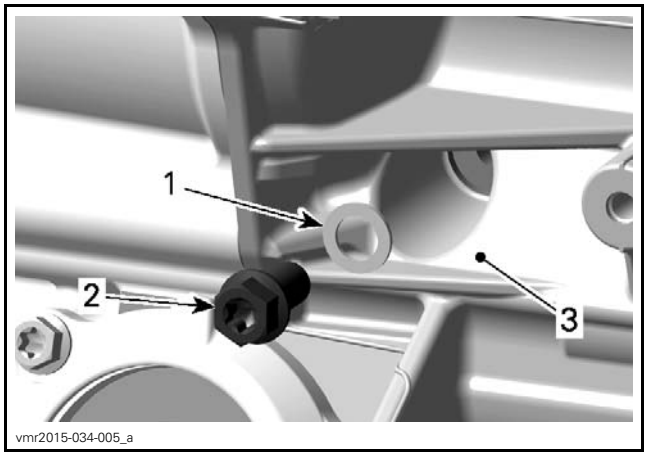
3. Remove crankshaft position sensor.



vmr2015-033-006_a

1. Crankshaft position sensor
2. Screw

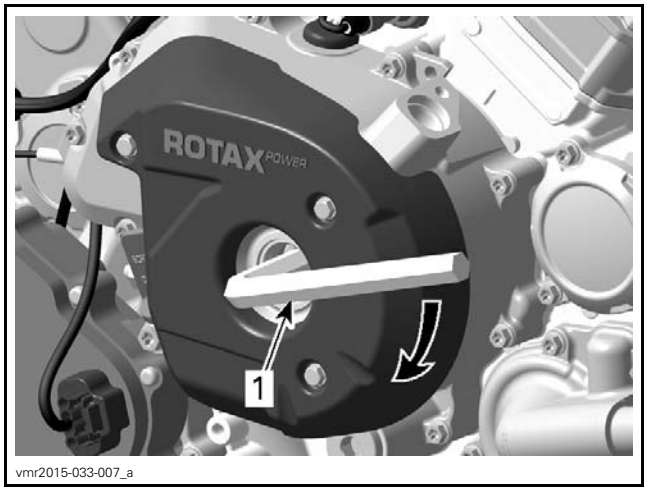
4. Remove screw plug and discard sealing ring.



vmr2015-034-005_a

1. Sealing ring
2. Plug screw
3. Crankcase PTO side, front side

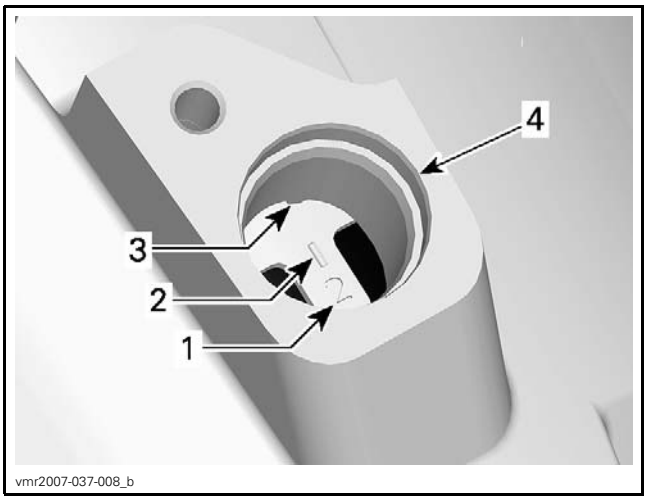
5. Use a 14 mm Allen key to turn crankshaft until the rear piston no. 2 is at TDC.



vmr2015-033-007_a

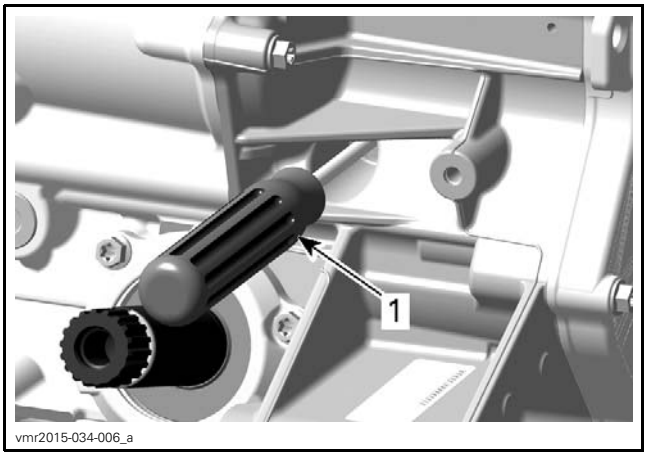
1. Allen key 14 mm

NOTE: When the piston no. 2 is at TDC, the number 2 piston index mark on the magneto flywheel and the notch on the magneto cover are aligned.



CYLINDER 2 AT TDC
1. *Number 2 piston identifier*
2. *Index mark on magneto flywheel*
3. *Notch on magneto cover*
4. *CPS bore in magneto cover*

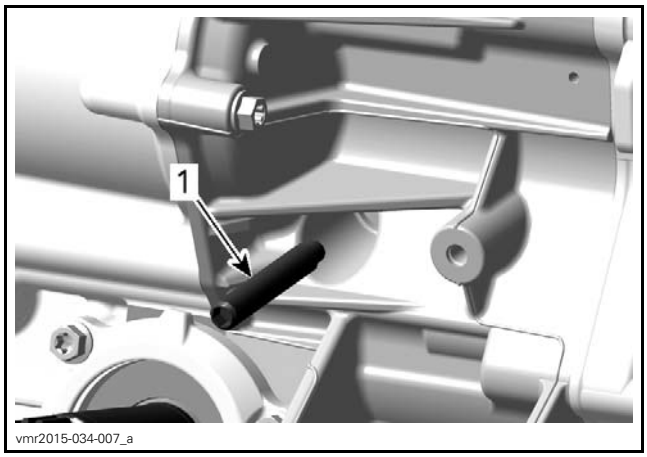
6. Use a screwdriver to check if the groove in the crankshaft is aligned with the crankshaft locking tool orifice.



1. *Screwdriver*

7. Lock crankshaft.

REQUIRED TOOL	
CRANKSHAFT LOCKING BOLT (P/N 529 035 617)	



1. *Crankshaft locking bolt*

8. Gradually insert the tool in the crankshaft groove. Make sure that the tool tip enters the groove and does not jam on the crankshaft balancer surface.

Removing the Crankshaft

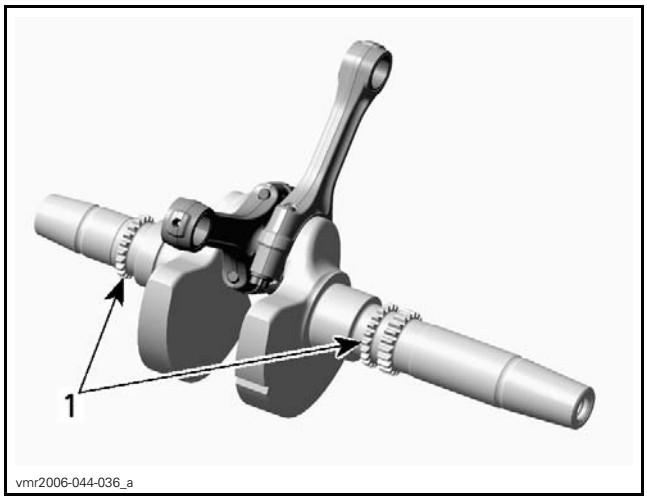
Refer to *CRANKCASE*.

Inspecting the Crankshaft

NOTE: Check each crankshaft bearing journal for scoring, scuffing, cracks or other signs of wear.

NOTE: Replace crankshaft if the crankshaft timing gears are worn or otherwise damaged.

NOTICE **Components out of specifications must always be replaced. If this is not observed, severe damage may be caused to the engine.**



1. *Crankshaft timing gears*

Crankshaft Axial Play

NOTE: Axial play must be measured before splitting the crankcase.

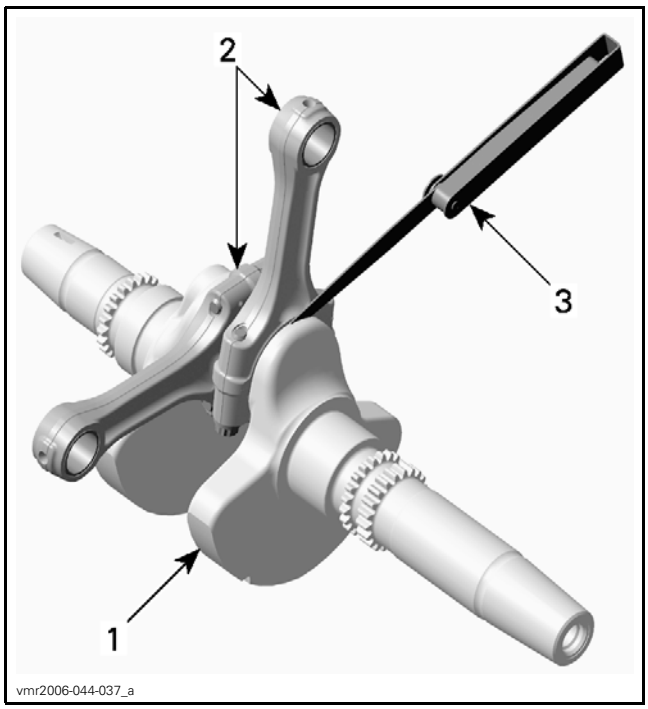
Measure axial play on PTO end of crankshaft using a dial indicator.

CRANKSHAFT AXIAL PLAY	
NEW	0.200 mm to 0.500 mm (.008 in to .02 in)
SERVICE LIMIT	0.600 mm (.024 in)

If axial play is out of specification, replace crankcase and/or crankshaft.

Connecting Rod Big End Axial Play

Using a feeler gauge, measure between face of connecting rods and crankshaft counterweight. If the measurement exceeds specified tolerance, replace the crankshaft.



1. *Crankshaft*
2. *Connecting rods*
3. *Feeler gauge*

CONNECTING ROD BIG END AXIAL PLAY		
570 AND 850 ENGINES	NEW	0.200 mm to 0.500 mm (.008 in to .02 in)
1000R ENGINE	NEW	0.250 mm to 0.550 mm (.0098 in to .0217 in)
All	SERVICE LIMIT	0.600 mm (.024 in)

Connecting Rod/Piston Pin Clearance

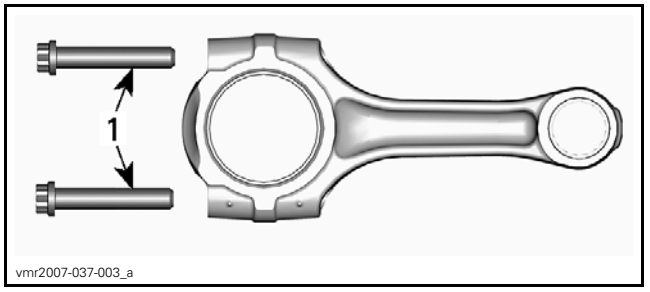
Refer to *TOP END* subsection.

Connecting Rod Big End Radial Play

NOTE: Prior to removing connecting rod from the crankshaft, mark big end halves together to ensure a correct reinstallation (cracked surface fits in only one position).

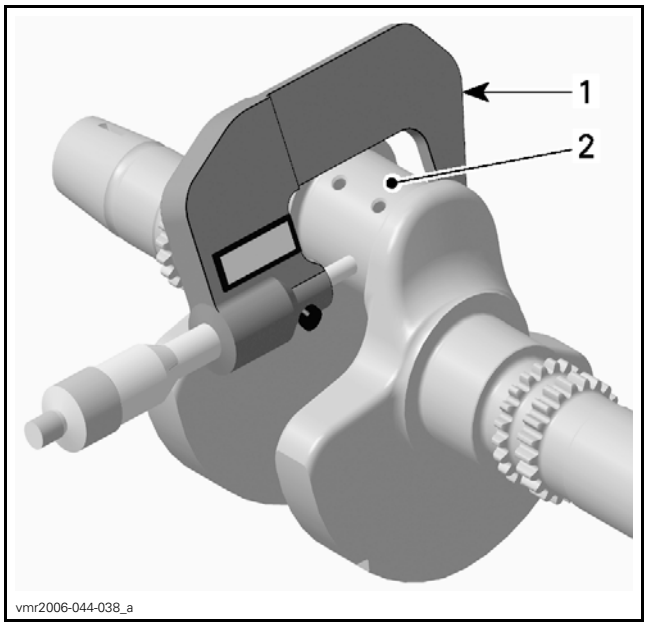
1. Remove connecting rods from crankshaft.

NOTICE **Connecting rod screws are not reusable. Always discard screws and replace with NEW ones. It is recommended to install new plain bearings when reinstalling connecting rods.**



1. *Connecting rod screws*

2. Measure crankpin. Compare to inside diameter of connecting rod big end.



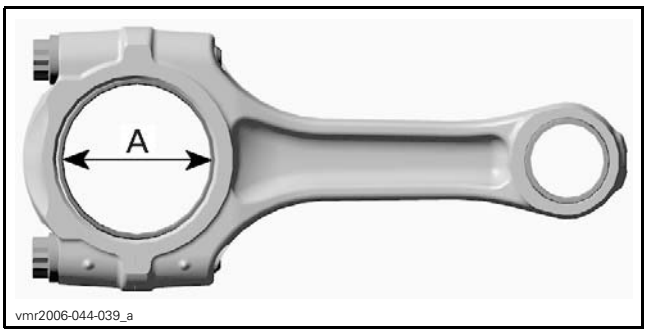
1. *Micrometer*
2. *Crankpin*

CRANK PIN DIAMETER		
570 AND 850 ENGINES	NEW	40.001 mm to 40.025 mm (1.5748 in to 1.5758 in)
	SERVICE LIMIT	39.990 mm (1.5744 in)
1000R ENGINE	NEW	41.986 mm to 42.010 mm (1.653 in to 1.6539 in)
	SERVICE LIMIT	41.967 mm (1.6522 in)

If the crank pin diameter is out of specification, replace crankshaft.

NOTE: To measure the connecting rod big end diameter, use the OLD connecting rod screws.

3. Install the OLD plain bearings as they were mounted initially.
4. Carry out the tightening procedure described in *CRANKSHAFT ASSEMBLY* in this subsection.



A. Connecting rod big end plain bearing

CONNECTING ROD BIG END DIAMETER		
570 AND 850 ENGINES	SERVICE LIMIT	40.100 mm (1.5787 in)
1000R ENGINE	SERVICE LIMIT	42.100 mm (1.6575 in)

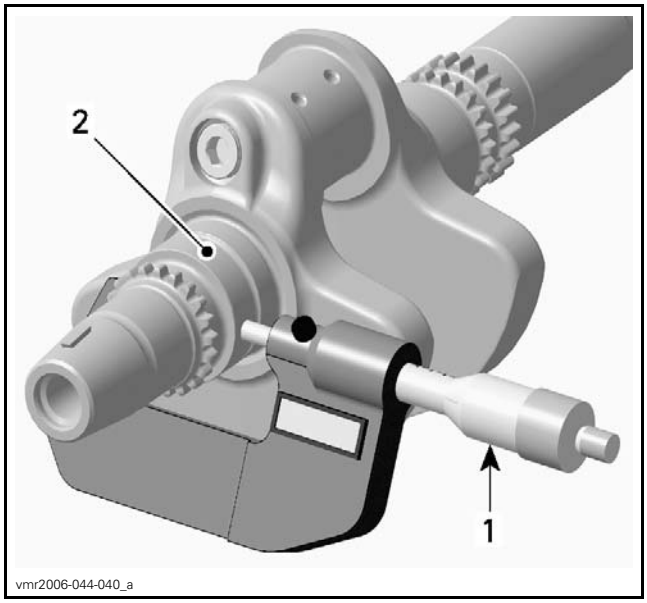
If connecting rod big end diameter is out of specification, replace plain bearings and recheck.

CONNECTING ROD BIG END RADIAL CLEARANCE	
SERVICE LIMIT	0.09 mm (.0035 in)

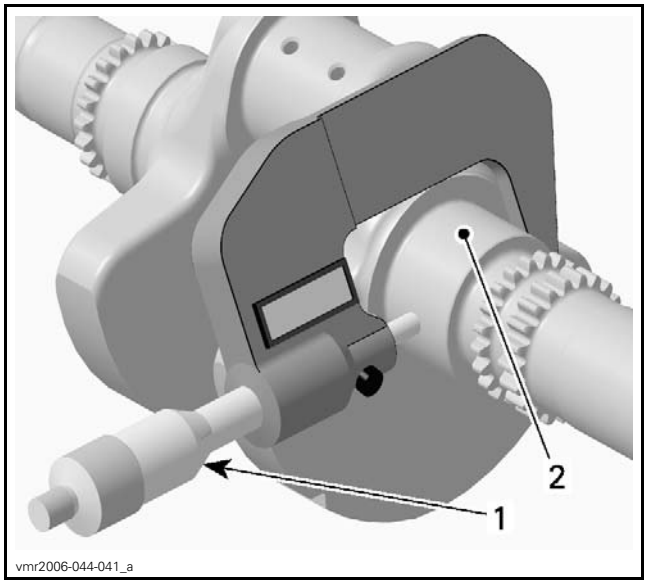
If connecting rod big end radial clearance is out of specification, replace plain bearings and recheck.

Crankshaft Radial Play MAG/PTO Side

Measure crankshaft main bearing journals on MAG and PTO sides. Compare to inside diameter of MAG and PTO plain bearings, refer to *CRANKCASE* in this subsection.



1. Micrometer
2. Crankshaft MAG side main bearing journal



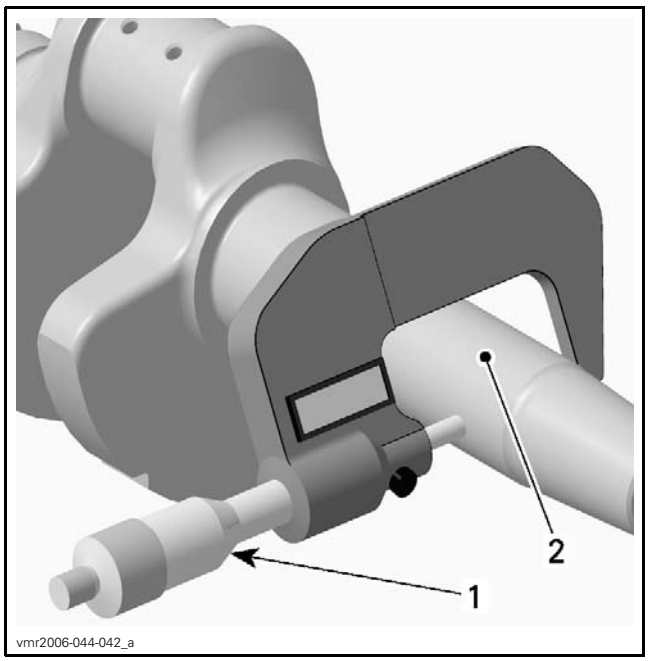
1. Micrometer
2. Crankshaft PTO side main bearing journal

CRANKSHAFT MAIN BEARING JOURNAL DIAMETER (MAG/PTO SIDE)	
NEW	42.016 mm to 42.040 mm (1.6542 in to 1.6551 in)
SERVICE LIMIT	42.000 mm (1.6535 in)

CRANKSHAFT RADIAL PLAY (MAG/PTO SIDE)	
SERVICE LIMIT	0.07 mm (.0028 in)

Crankshaft Radial Play (PTO Cover Bearing)

Measure crankshaft journal diameter (PTO cover bearing). Compare to plain bearing inside diameter (PTO cover). Refer to *PTO COVER* in this subsection.



1. Micrometer
2. Crankshaft journal (PTO support bearing)

CRANKSHAFT JOURNAL DIAMETER (PTO COVER BEARING)	
NEW	34.004 mm to 34.020 mm (1.3387 in to 1.3394 in)
SERVICE LIMIT	33.998 mm (1.3385 in)

CRANKSHAFT RADIAL PLAY (PTO COVER BEARING)	
SERVICE LIMIT	0.10 mm (.0039 in)

If crankshaft journal diameter is out of specification, replace crankshaft.

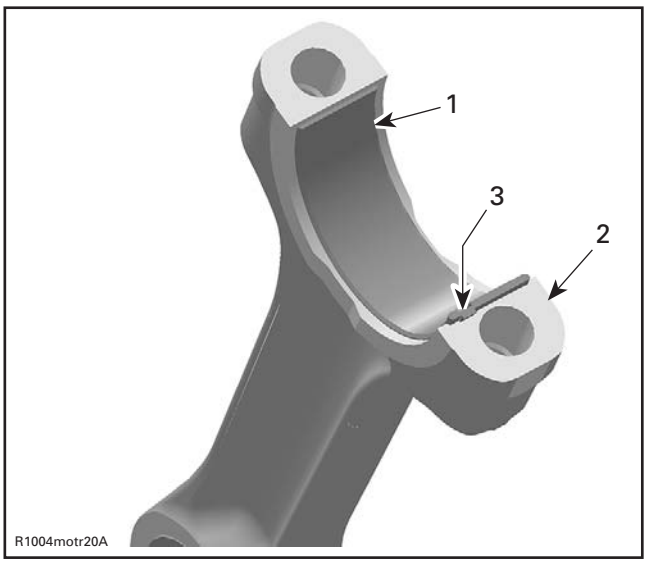
If crankshaft radial play (PTO cover bearing) is out of specification, replace plain bearings and recheck.

Assembling the Crankshaft

For assembly, reverse the disassembly procedure however, pay attention to following details.

Clean the split surface on both sides (cracked area) carefully with compressed air.

Insert plain bearings in the connecting rods as illustrated.



1. Half plain bearing of connecting rod big end
2. Mating surface of the connecting rod
3. Joining surface of plain bearing in line with connecting rod groove

Oil the plain bearing surface of the connecting rod and crankshaft pin before installation.

NOTICE **Lower cap and rod must match together since there is a cracked surface.**

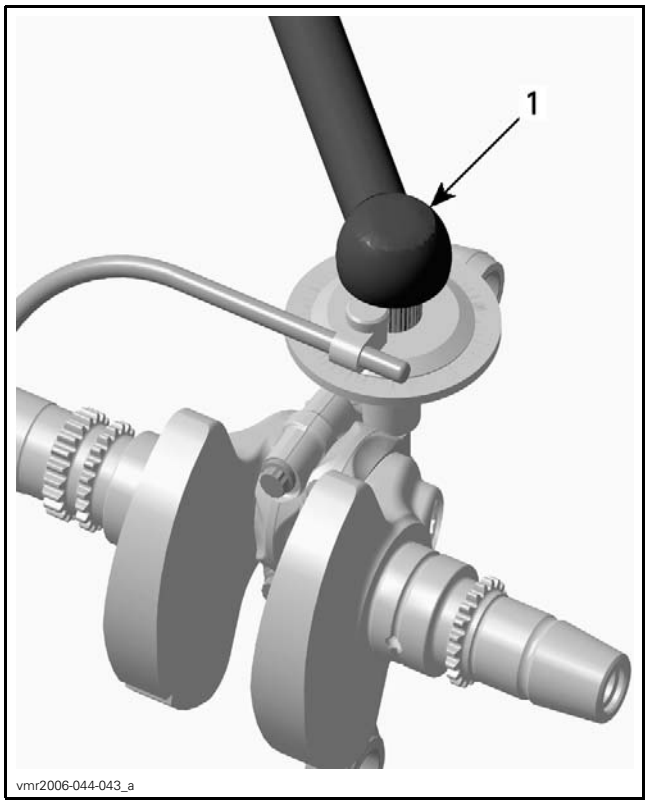
Oil NEW connecting rod screws.

Thread screws in the connecting rods, then tighten as per following procedure.

NOTICE **Strictly adhere following instructions:**

- Always use NEW connecting rod screws at final assembly. They are **not reusable**.
- Do not apply any thread locker.
- The running direction of the big end bearings and of the piston pins must not change.
- Always perform each step on both connecting rod screws before going to the next step.
- Failure to strictly follow procedure may cause connecting rod screws to loosen and lead to severe engine damage.

REQUIRED TOOLS
Torque wrench
Angle torque wrench



1. Angle torque wrench

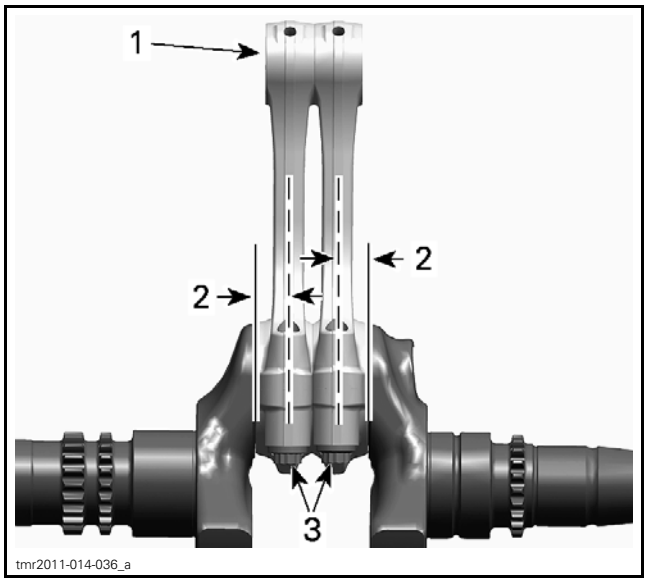
570 and 850 Engines

NEW connecting rods can be installed either way.

TIGHTENING TORQUE		
Connecting rod screws	Step A	Tighten to 1/2 of specified torque
	Step B	Tighten to 20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)
	Step C	Torque an additional 60 ± 5° turn using an angle torque wrench

1000R Engine

NOTICE Connecting rods are asymmetrical. There must be no gap between the small ends when they face each other.



1. Connecting rod small ends
2. Connecting rod offset
3. Connecting rod screws

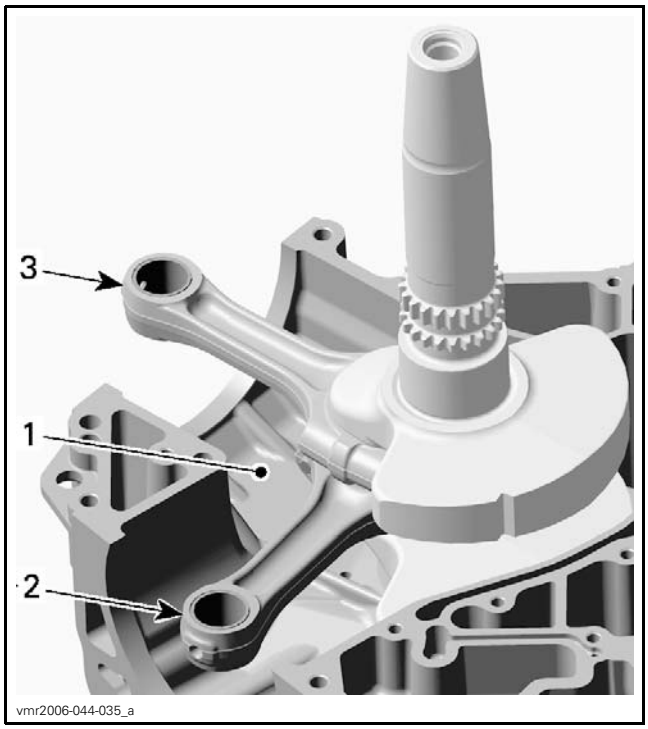
TIGHTENING TORQUE		
Connecting rod screws	Step A	Tighten to 1/2 of specified torque
	Step B	Tighten to 30 N•m ± 2 N•m (22 lbf•ft ± 1 lbf•ft)
	Step C	Torque an additional 90 ± 5° turn using an angle torque wrench

Installing the Crankshaft

For installation of crankshaft in crankcase reverse the removal procedure. However, pay attention to the following details.

Do not interchange the connecting rods of pistons 1 and 2 during installation.

NOTICE Observe the correct installation position when fitting the crankshaft with the connecting rods. The connecting rod MAG side has to face cylinder no. 1.



1. Crankcase half MAG side
2. Connecting rod cylinder 1
3. Connecting rod cylinder 2

CYLINDER BLOCK

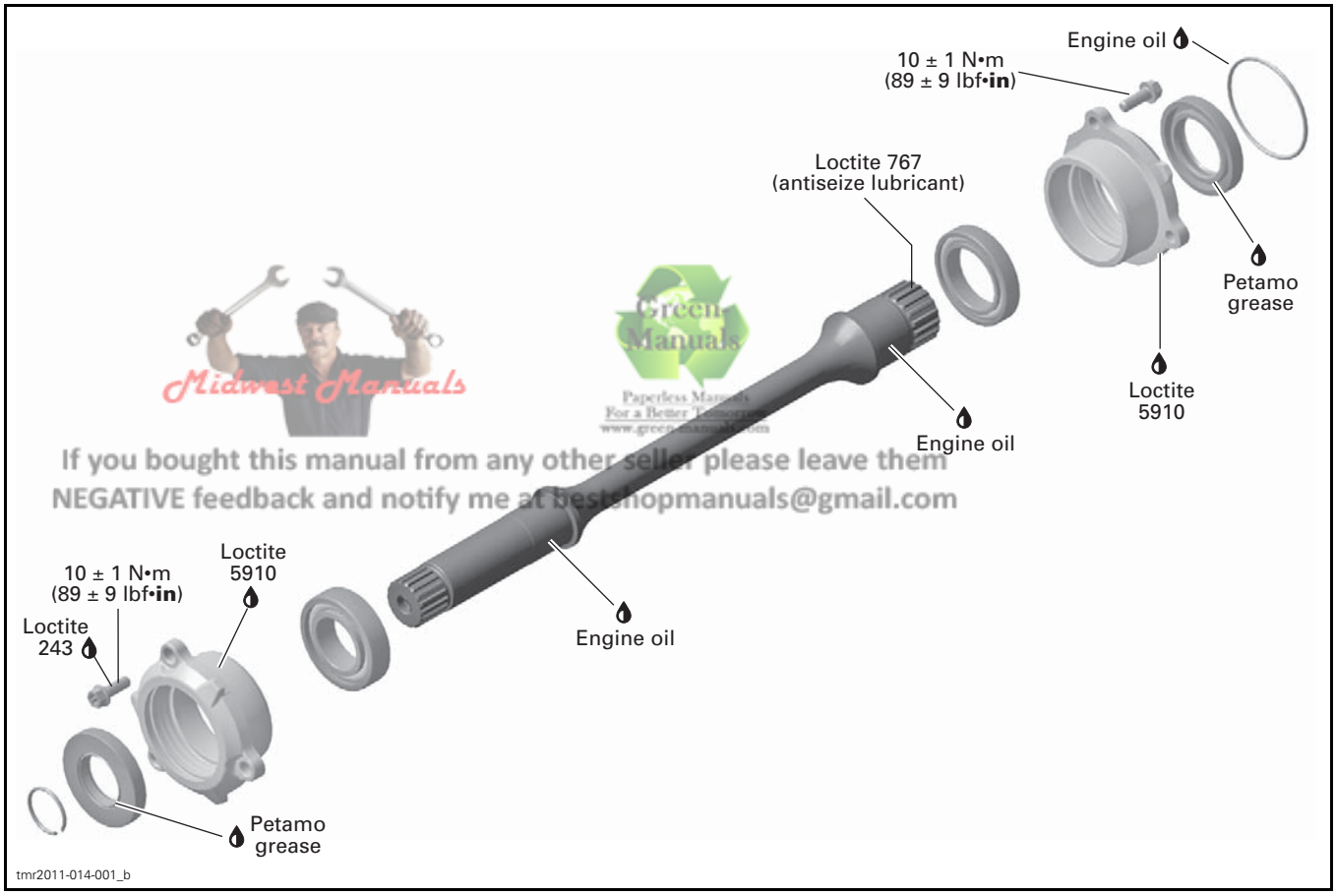
SERVICE TOOLS

Description	Part Number	Page
CRANKCASE SUPPORT MAG/PTO	529 036 031	14
CRANKSHAFT LOCKING BOLT	529 035 617	18
DRIVE SHAFT OIL SEAL INSTALLER	529 036 028	6–7
DRIVE SHAFT OIL SEAL PROTECTOR	529 036 029	5
PLAIN BEARING REMOVER/INSTALLER	529 035 917	14–15
PLAIN BEARING REMOVER/INSTALLER	529 036 032	9
PTO COVER OIL SEAL INSTALLER	529 036 033	8

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	6
LOCTITE 5910	293 800 081	5
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	5

ENGINE DRIVE SHAFT



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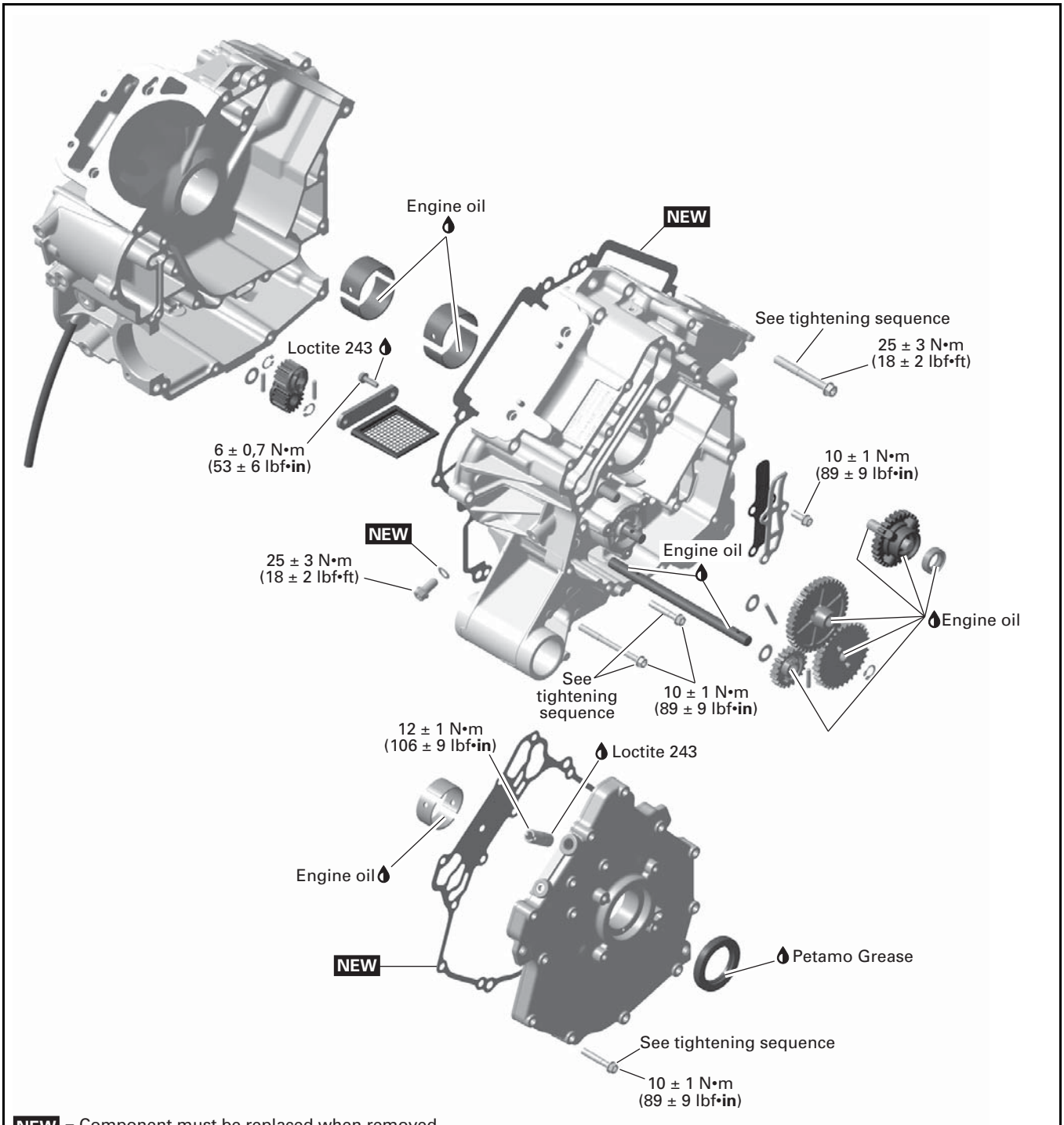
CRANKCASE AND PTO COVER



NEW = Component must be replaced when removed.

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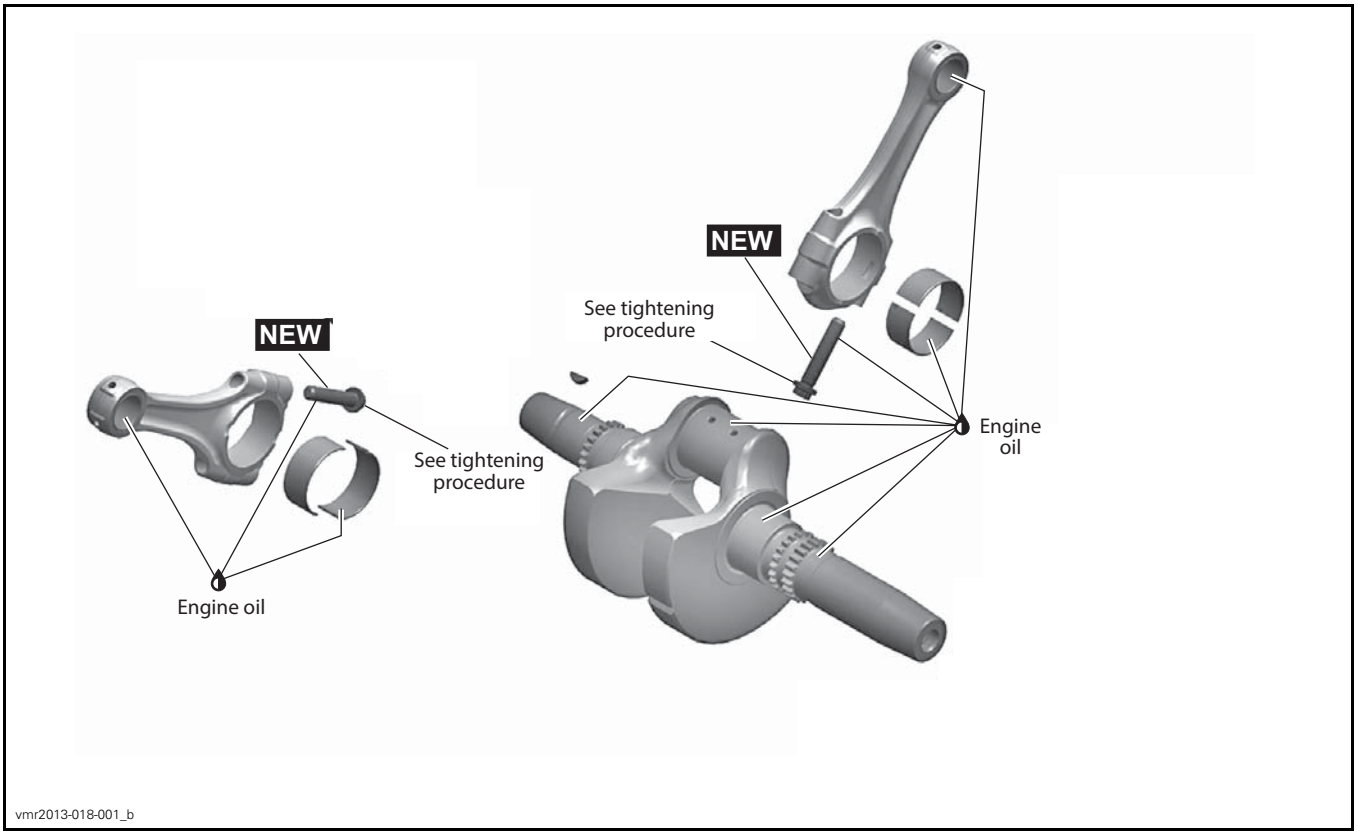
CRANKSHAFT


NEW
See tightening procedure
Engine oil
NEW
See tightening procedure
Engine oil
vmr2013-018-001_b

PROCEDURES

IMPORTANT: Note position of parts on disassembly. This may help to find the root cause of a problem. A component that is not replaced should be reinstalled in the same position as originally mounted.

ENGINE DRIVE SHAFT

NOTE: The engine drive shaft transmits the power from the gearbox to the front differential and is located inside the crankcase.

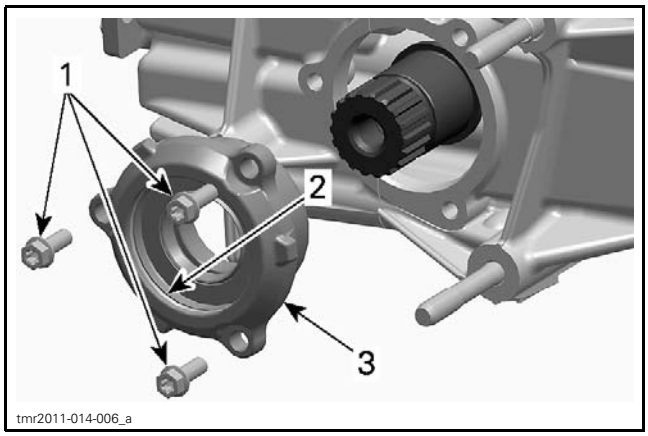
Removing the Engine Drive Shaft

Remove the engine. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.

Removing the Rear Bearing Cover

Detach gearbox from engine, refer to *GEARBOX AND 4X4 COUPLING UNIT* subsection.

At rear of engine, remove the bearing cover and its O-ring.

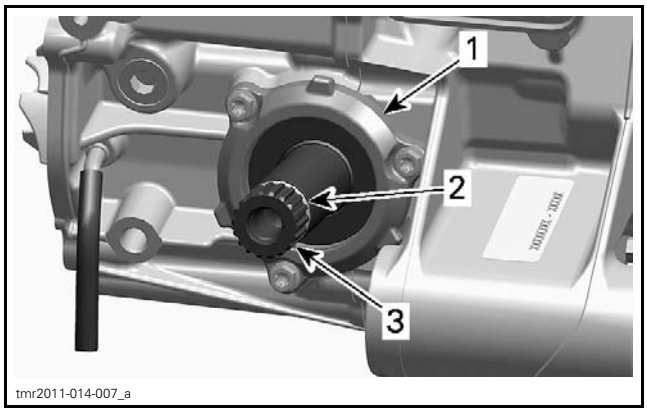


1. Bearing cover screws
2. O-ring
3. Bearing cover gearbox side

Removing the Front Bearing Cover

Remove the bearing cover at the front of the engine.

NOTICE Check ends of the circlip for sharp edges or burrs before removing the drive shaft, to avoid damaging the oil seal.

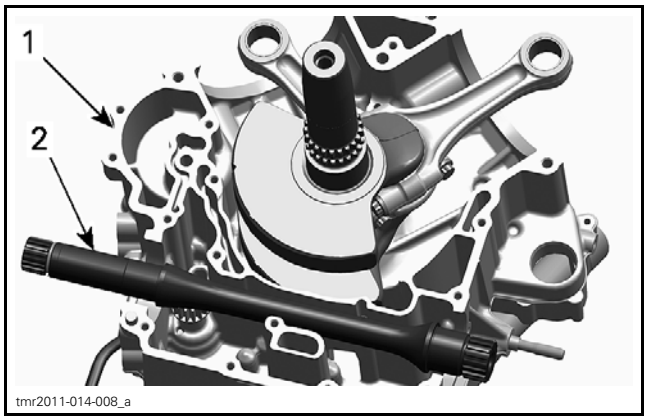


1. Bearing cover front drive side
2. Circlip
3. Drive shaft

Removing the Engine Drive Shaft

Split crankcase, refer to *CRANKCASE* in this subsection.

Remove engine drive shaft from the crankcase.

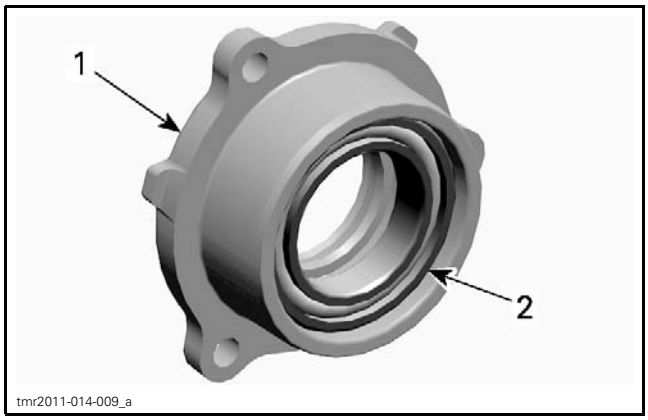


1. Crankcase MAG side
2. Engine drive shaft

Inspecting the Engine Drive Shaft

Replace oil seals and/or O-ring (bearing cover gearbox side) if they are brittle, hard or damaged.

Check drive shaft bearings for contamination and/or metal shavings. Check if bearings turn freely and smoothly. Replace if necessary.



1. Bearing cover
2. Drive shaft bearing

Check drive shaft for cracks, bend, pitting or other visible damages.

Check drive shaft splines for wear or damages.

Check oil seal running surface of the drive shaft for scratches. Replace if necessary.

Installing the Engine Drive Shaft

The installation is the reverse of the removal procedure. However, pay attention to the following.

Clean all metal components in solvent.

Clean crankcase surfaces and bearing covers.

First brush in one direction then make the final brushing perpendicularly (90°) to the first pass.

SERVICE PRODUCT
LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500) + Brass brush

NOTICE **Do not wipe with rags. Use a new clean hand towel only.**

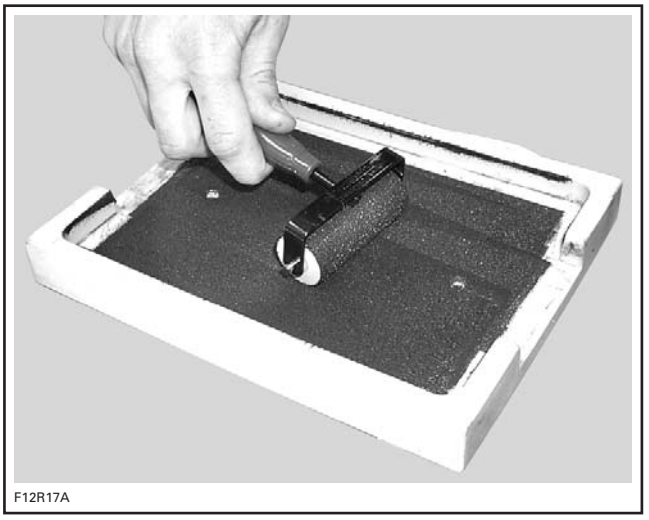
Use a suitable installer for installing bearings.

Apply sealant on mating surfaces.

SERVICE PRODUCT
LOCTITE 5910 (P/N 293 800 081)

IMPORTANT: When beginning the application of the bearing cover sealant, the assembly and the first torquing should be done within 10 minutes. It is suggested to have all you need on hand to save time.

Use a plexiglass plate and apply some sealant on it. Use a soft rubber roller 50 mm - 75 mm (2 in - 3 in), available in arts products suppliers for printing, and roll the sealant to get a thin uniform coat on the plate (spread as necessary). When ready, apply the sealant on bearing cover surfaces.



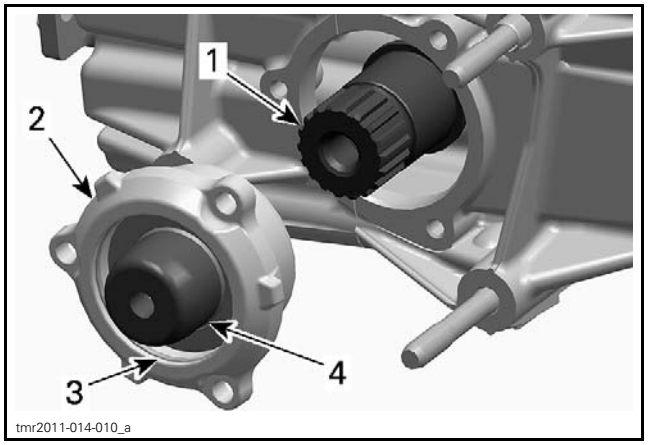
Do not apply in excess as it will spread out inside crankcase.

NOTE: It is recommended to apply this specific sealant as described here to get a uniform application without lumps. If you do not use the roller method, you may use your finger to uniformly distribute the sealant (using a finger will not affect the adhesion).

Installing the Rear Bearing Cover

For bearing cover installation on gearbox side, protect the oil seal to avoid damaging the sealing lip.

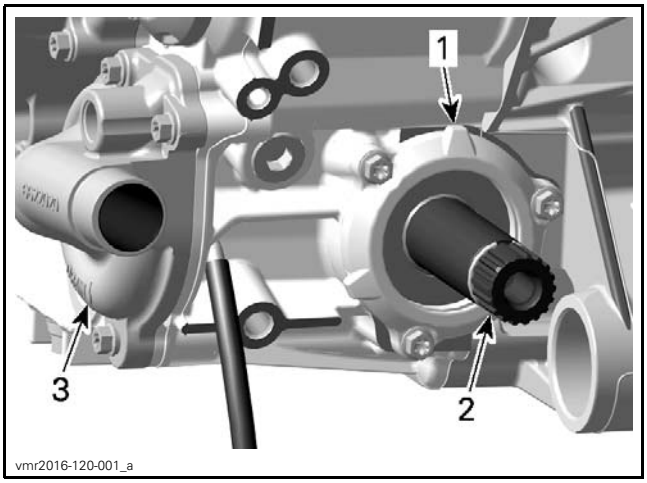
REQUIRED TOOL	
DRIVE SHAFT OIL SEAL PROTECTOR (P/N 529 036 029)	



1. Drive shaft
2. Bearing cover gearbox side
3. O-ring
4. Protection sleeve

TIGHTENING TORQUE	
Rear bearing cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Installing the Front Bearing Cover



FRONT OF ENGINE
1. *Bearing cover front side*
2. *Drive shaft*
3. *Water pump cover*

TIGHTENING TORQUE	
Front bearing cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**) + LOCTITE 243 (BLUE) (P/N 293 800 060)

Installing the Engine Drive Shaft

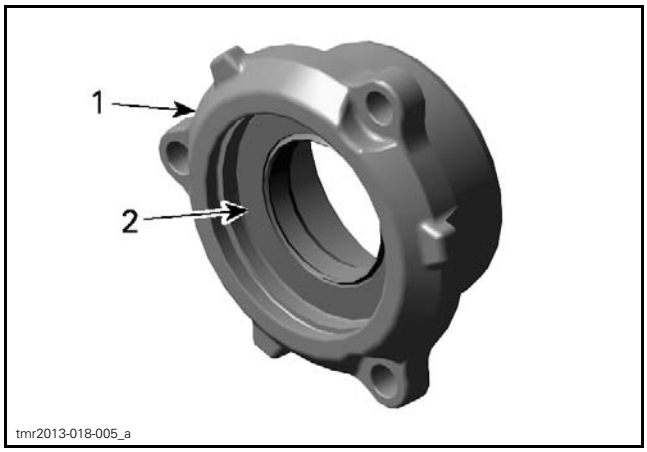
Finally check for axial play of the drive shaft.

FRONT OIL SEAL (ENGINE DRIVE SHAFT)

Replacing the Front Oil Seal (Engine Drive Shaft)

NOTE: The front oil seal can be replaced with the engine installed.

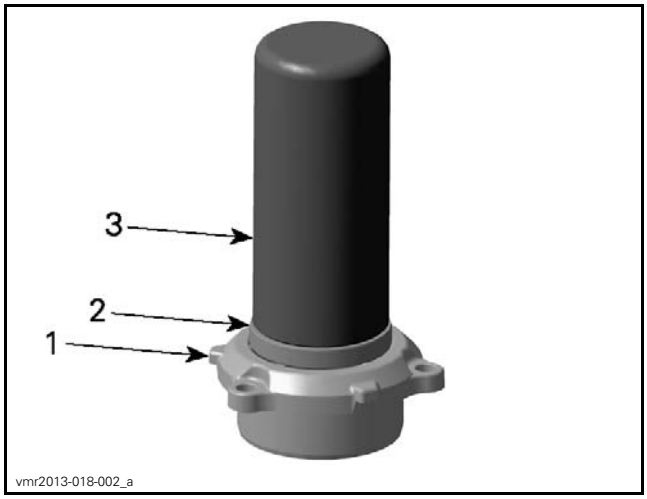
1. Remove front propeller shaft.
2. Remove adapter sleeve between propeller shaft and front engine drive shaft.
3. Remove the front bearing cover, refer to *REMOVING THE ENGINE DRIVE SHAFT* in this subsection.
4. Remove drive shaft seal from bearing cover.



1. *Bearing cover*
2. *Oil seal*

5. Install drive shaft oil seal using the following tool.

REQUIRED TOOL	
DRIVE SHAFT OIL SEAL INSTALLER (P/N 529 036 028)	



1. *Bearing cover*
2. *Oil seal*
3. *Oil seal installer*

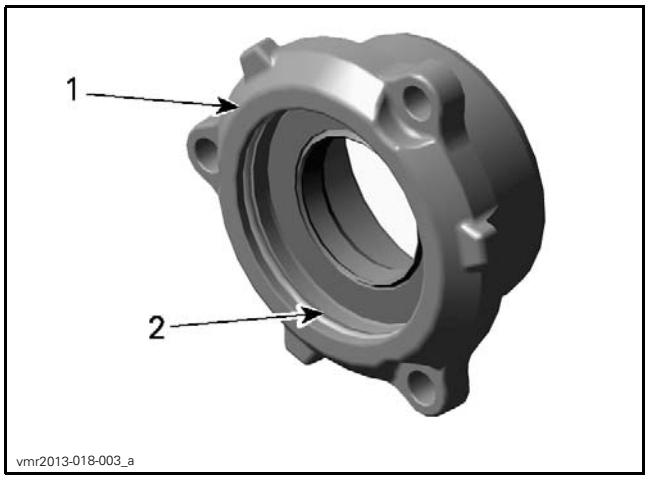
6. Reinstall remaining parts in the reverse order of removal.

REAR OIL SEAL (ENGINE DRIVE SHAFT)

Replacing the Rear Oil Seal (Engine Drive Shaft)

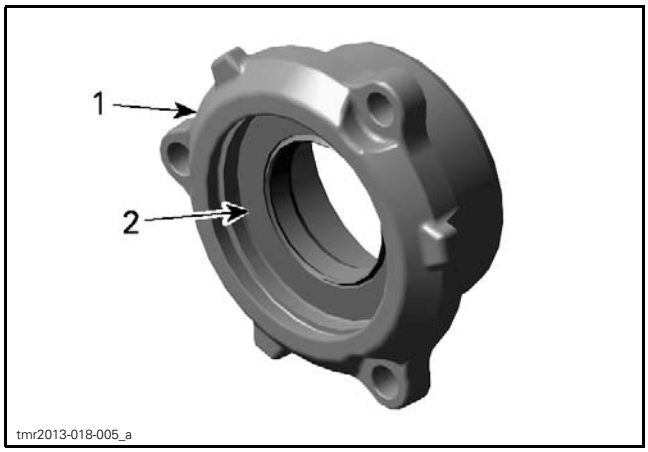
1. Remove gearbox from the engine, refer to *GEARBOX AND 4X4 COUPLING UNIT* subsection.

2. Remove rear bearing cover, refer to *REMOVING THE ENGINE DRIVE SHAFT* in this subsection.
3. Remove O-ring from bearing cover.



1. Bearing cover
2. O-ring

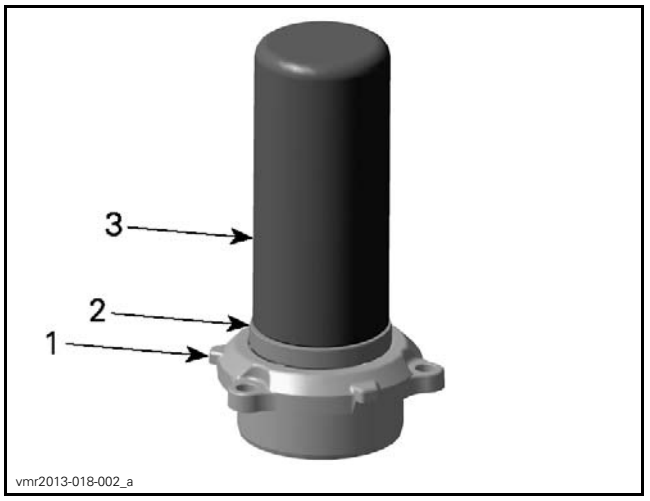
4. Remove drive shaft seal from bearing cover.



1. Bearing cover
2. Oil seal

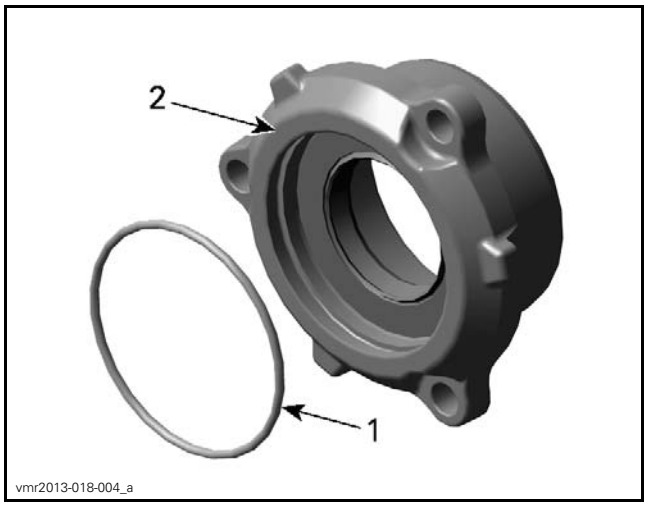
5. Install drive shaft oil seal using the following tool.

REQUIRED TOOL	
DRIVE SHAFT OIL SEAL INSTALLER (P/N 529 036 028)	



1. Bearing cover
2. Oil seal
3. Oil seal installer

6. Install O-ring in rear bearing cover.



1. O-ring
2. Bearing cover

7. Reinstall remaining parts in the reverse order of removal.

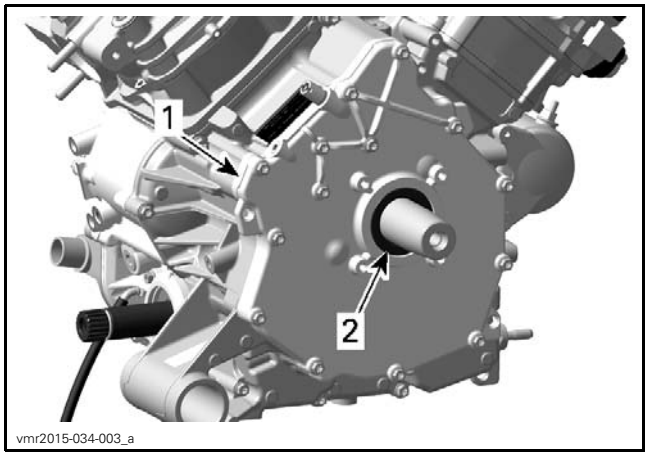
PTO COVER OIL SEAL

NOTE: To replace oil seal it is not necessary to remove engine from vehicle.

Removing the PTO Oil Seal

1. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection and remove the following parts:
   – CVT cover
   – Drive pulley
   – Driven pulley
   – CVT air guide.
2. Remove oil seal using a small flat screwdriver.

NOTICE Avoid scoring surfaces with tool.



1. PTO cover
2. Oil seal

Inspecting the PTO Oil Seal

Check oil seal running surface of crankshaft PTO side for grooves. Replace if necessary.

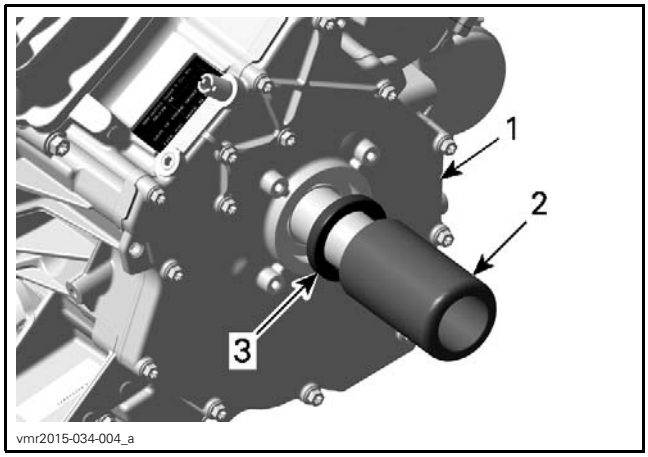
Installing the PTO Oil Seal

The installation is the reverse of the removal procedure however, pay attention to the following details.

NOTICE Oil seal must be installed with sealing lip toward the engine.

Push oil seal in place using the following tool.

REQUIRED TOOL	
PTO COVER OIL SEAL INSTALLER (P/N 529 036 033)	

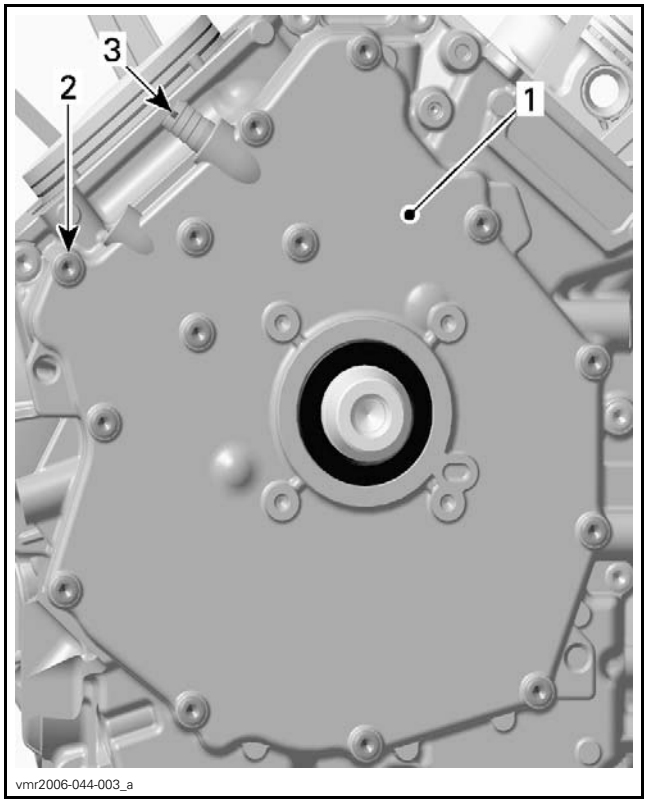


1. PTO cover
2. Oil seal installer
3. Oil seal

PTO COVER

Removing the PTO Cover

1. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection to remove the following parts:
   – CVT cover
   – Drive pulley
   – Driven pulley
   – CVT air guide.
2. Disconnect vent hose.
3. Remove PTO cover screws and pull on PTO cover to remove it.



1. PTO cover
2. PTO cover screws
3. Vent hose nipple

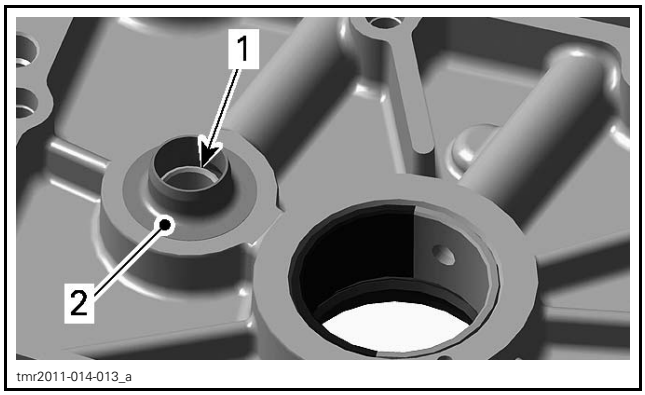
Inspecting the PTO Cover

1. Check the PTO cover for cracks or other damage.
2. Replace PTO cover if damaged.
3. Clean oil breather bore in PTO cover from contaminations with a parts cleaner then use pressurized air to dry it.

⚠ WARNING

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

4. Check surface of sealing sleeve for wear or other damages. Replace PTO cover if damaged.

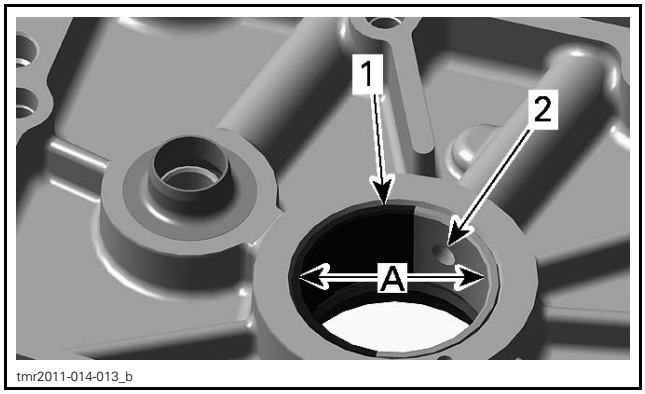


tmr2011-014-013_a

1. Oil breather bore
2. Surface of sealing sleeve

5. Check plain bearings for scoring or other damages.

NOTE: Measure plain bearing inside diameter (PTO cover) and compare to crankshaft bearing journal diameter (PTO cover bearing). Refer to *CRANKSHAFT* in this subsection. Replace if the measurement is out of specification.



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1. Plain bearing
2. Oil bore

A. Measure plain bearing inside diameter

PLAIN BEARING INSIDE DIAMETER (PTO COVER)	
SERVICE LIMIT	34.120 mm (1.3433 in)

Replacing the Plain Bearing (PTO Cover)

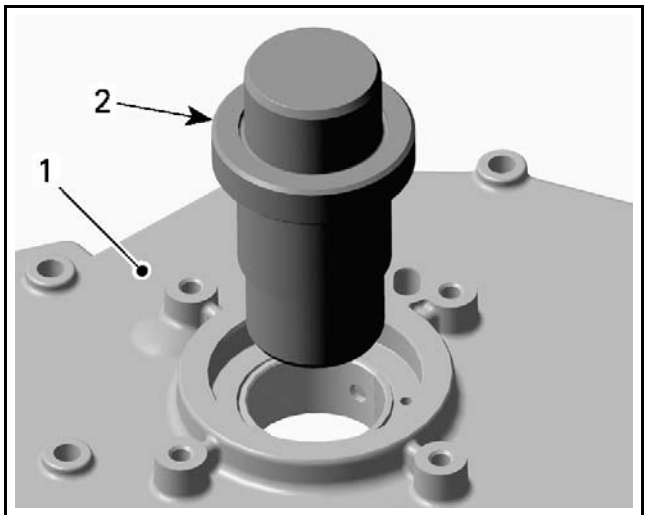
Removing the Plain Bearing

NOTICE Unless otherwise instructed, never use a hammer to install plain bearings. Always use a press.

1. Carefully remove the PTO oil seal with a screwdriver, without damaging the PTO cover.
2. Press out the plain bearings from the outside towards the inside.

REQUIRED TOOL	
PLAIN BEARING REMOVER/INSTALLER (P/N 529 036 032)	

NOTE: The PTO cover has to be supported from below on a suitable support with straight surface in order to prevent damage of the sealing surface.



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1. PTO cover
2. Plain bearing remover/installer

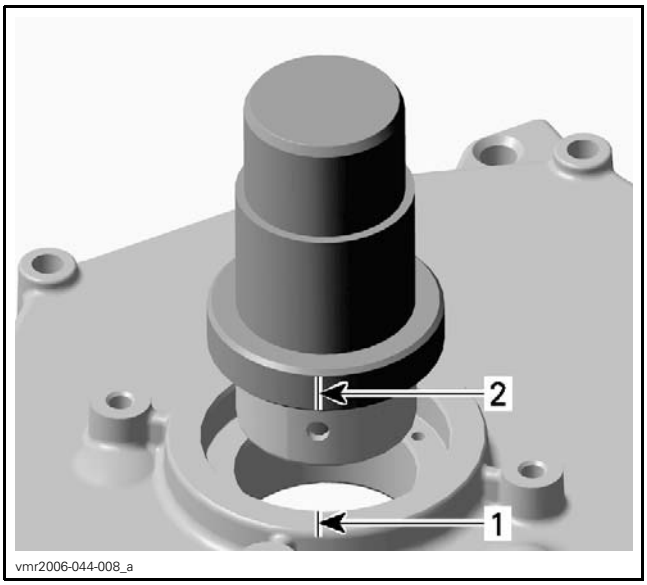
Installing the Plain Bearing

NOTE: Do not lubricate plain bearings or PTO cover for installation.

Install plain bearings in a cold PTO cover.

REQUIRED TOOL	
PLAIN BEARING REMOVER/INSTALLER (P/N 529 036 032)	

1. Mark position of oil bore on PTO cover and on plain bearing remover/installer.
2. Align mark on plain bearing remover/installer with mark on PTO cover.



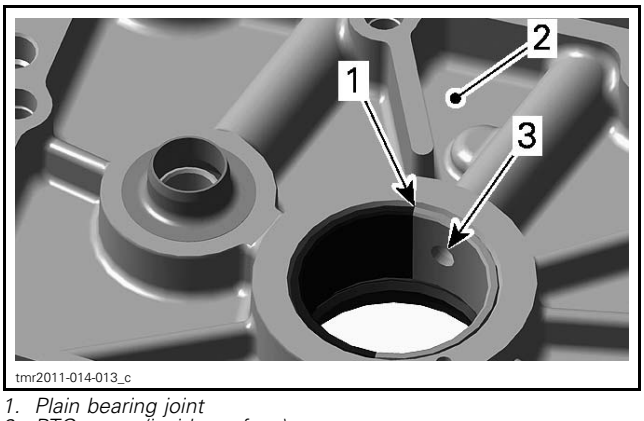
1. Mark position of oil bore on PTO cover
2. Mark position of oil bore on plain bearing remover/installer

NOTICE Misalignment of plain bearing and PTO cover oil bores will prevent proper oil supply to plain bearings.

3. Carefully press in the plain bearings in the same direction as during disassembly, from the outside towards the inside.

NOTE: Support PTO cover using a suitable support with a straight surface to prevent damage of the sealing surface.

NOTICE The joining surfaces of the plain bearings must be positioned near the oil bore in a counterclockwise direction.



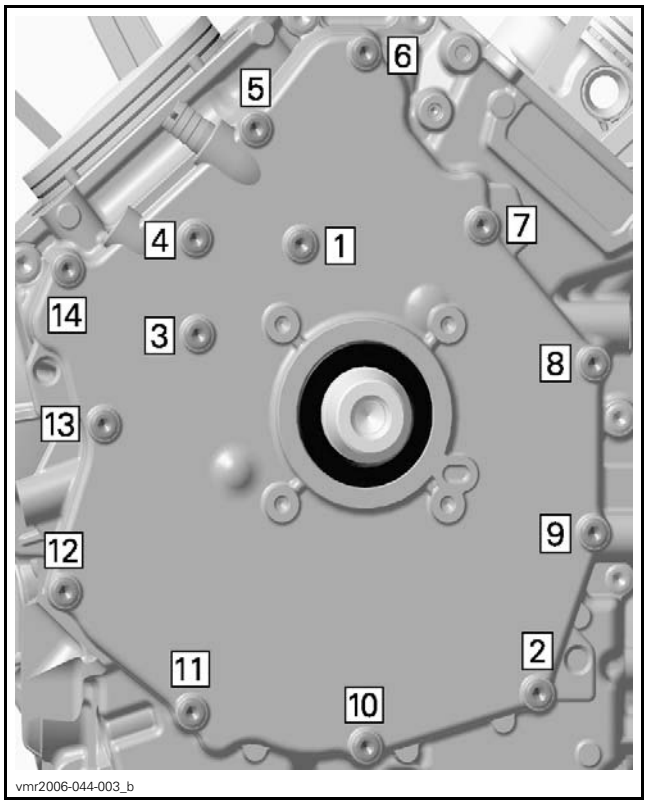
1. Plain bearing joint
2. PTO cover (inside surface)
3. Oil bore

Installing the PTO Cover

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

NOTE: At installation, replace PTO cover gasket and oil seal.

Tighten PTO cover screws following the sequence illustrated.



TIGHTENING SEQUENCE

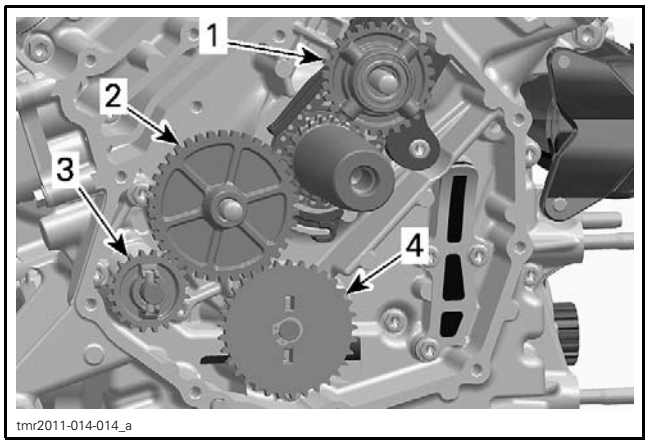
TIGHTENING TORQUE	
PTO cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

DRIVE GEARS

Drive Gears Location

The engine is equipped with a breather gear which prevents engine oil from seeping out through the breathing system into the air intake system.

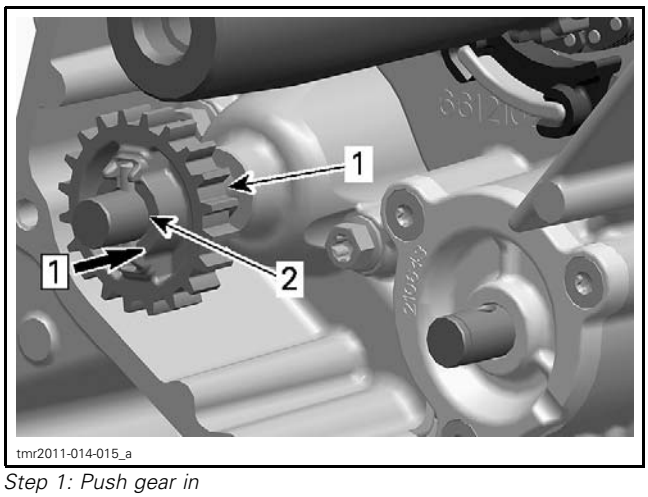
The drive gears are located on the engine PTO side behind the PTO cover.



1. Breather gear
2. Intermediate gear
3. Water pump drive gear
4. Oil pump drive gear

Removing the Drive Gears

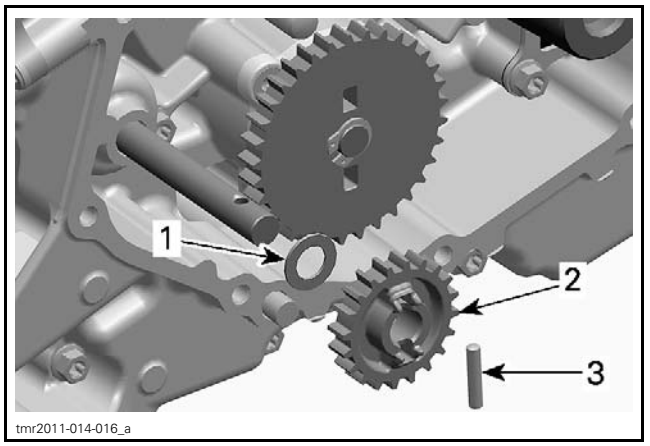
1. Remove PTO cover, refer to *PTO COVER* in this subsection.
2. Withdraw intermediate gear and breather gear.
3. Remove oil pump drive gear, refer to *OIL PUMP* in the *LUBRICATION SYSTEM* subsection.
4. To remove water pump drive gear, pull the shaft assembly slightly out and turn it about one tooth until it stays out.
5. Then push water pump drive gear in.



Step 1: Push gear in

1. Water pump drive gear
2. Intermediate shaft

6. Remove needle pin and pull water pump drive gear out.
7. Remove thrust washer from intermediate shaft.



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

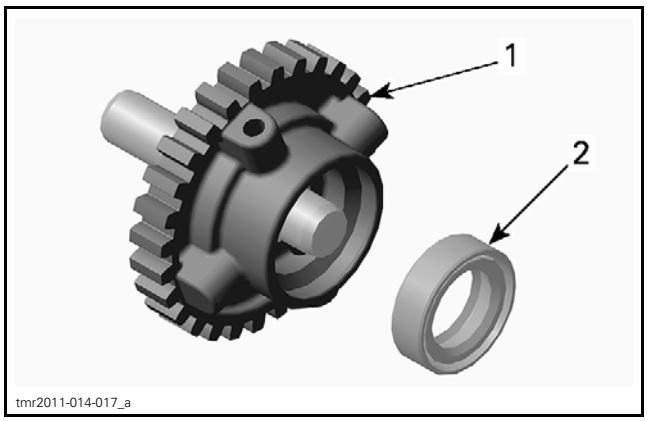
Inspecting the Drive Gears

Intermediate Gear/Oil Pump Drive Gear/Water Pump Drive Gear

Inspect gears for wear or other damage. Replace if damaged.

Breather Gear

Check if oil seal is brittle, hard or damaged. Replace if necessary.



1. Breather gear
2. Oil seal

Inspect gear for wear or other damage.

Check ball bearing for excessive play and smooth operation. Replace breather gear assembly if necessary.

Installing the Drive Gears

The installation is essentially the reverse of the removal procedure however, pay attention to the following.

Adequately oil the ball bearing of the breather gear.

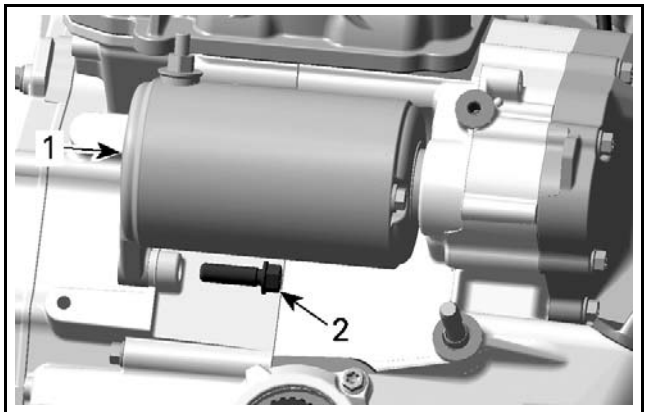
CRANKCASE

Disassembling the Crankcase

1. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection and carry out the following:
   1.1 Drain cooling system.
   1.2 Drain engine oil.
   1.3 Drain gearbox oil.
2. Lock crankshaft. Refer to *CRANKSHAFT LOCKING PROCEDURE* in the this subsection.
3. Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection and remove the following parts:
   – CVT cover
   – Drive pulley
   – Driven pulley
   – CVT air guide.
4. Remove engine from vehicle. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.
5. Remove gearbox from engine.
6. Refer to *MAGNETO AND STARTER* subsection and remove the following parts:
   – Magneto cover
   – Rotor with sprag clutch gear
   – Starter drive gears.
7. Refer to applicable procedures in this subsection and remove the following parts:
   – PTO cover
   – Drive gears
   – Bearing covers of engine drive shaft.
8. Refer to *TIMING CHAIN* subsection and remove the following parts:
   – Chain tensioners
   – Camshaft timing gears
   – Timing chains
   – Timing chain guides.
9. Refer to *CYLINDER HEAD* subsection and remove the following parts:
   – Front cylinder head
   – Rear cylinder head
   – Cylinders.
10. Refer to *COOLING SYSTEM* subsection and remove the following parts:
    – Water pump housing.
11. Refer to *LUBRICATION SYSTEM* subsection and remove the following parts:
    – Oil filter
    – Oil cooler (if applicable)
    – Oil pump drive gear.

NOTE: Oil pump removal from crankcase is not necessary, but recommended to see condition of oil pump. Refer to *LUBRICATION SYSTEM* subsection.

12. Remove electric starter.

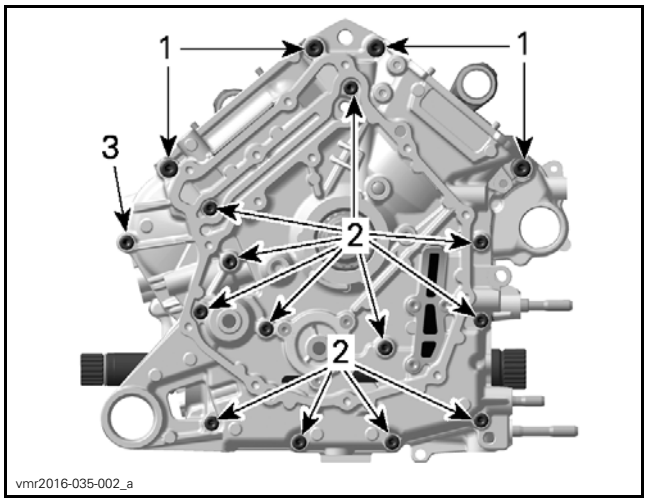


1. Electric starter
2. Screw

NOTE: Before splitting the crankcase, measure crankshaft axial play. Refer to *CRANKSHAFT* in this subsection.

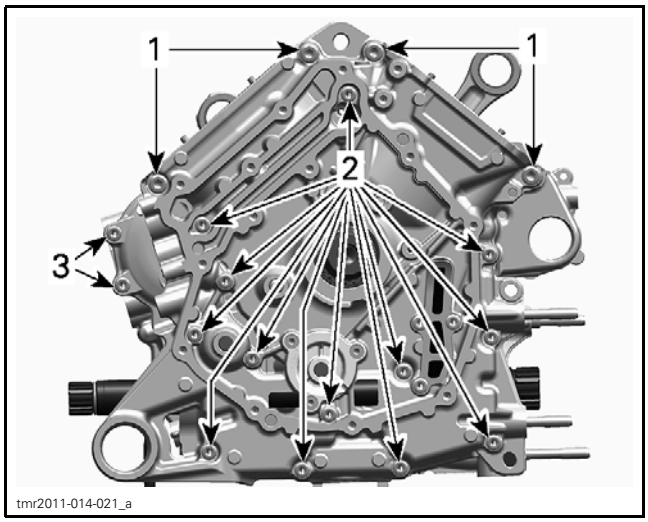
13. Remove crankcase retaining screws.

Models Without Oil Cooler



1. Four screws M8 x 65
2. 12 screws M6 x 75
3. One screw M6 x 25

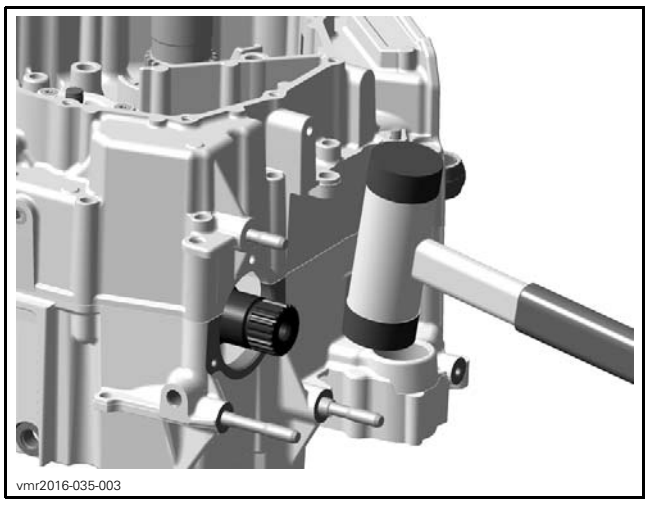
Models With Oil Cooler



1. Four screws M8 x 65
2. 13 screws M6 x 75
3. Two screw M6 x 25

All Models

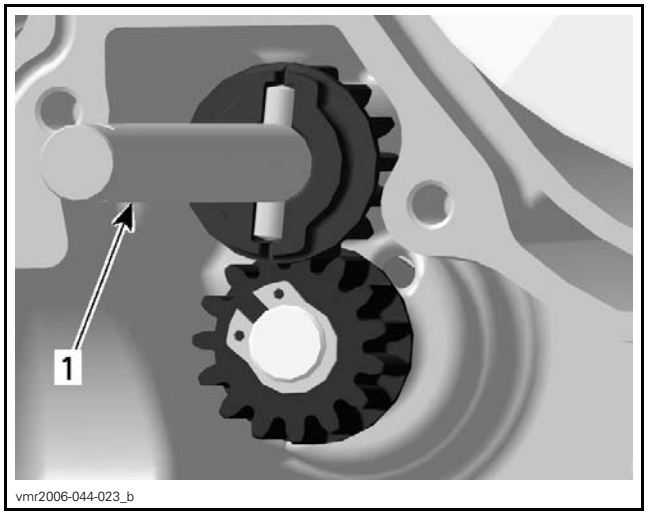
14. Carefully split crankcase halves using a screwdriver and a soft hammer.



NOTE: During disassembly, do not damage the sealing surfaces of the crankcase halves.

15. Pull crankshaft out of crankcase.

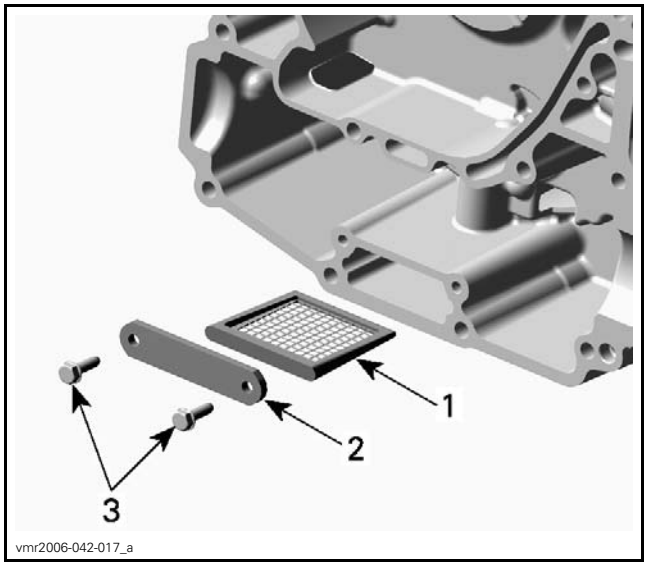
16. Remove the water pump intermediate shaft.



1. Water pump intermediate shaft

17. Remove engine oil strainer.

NOTE: Oil strainer removal for inspection and cleaning is recommended. Refer to *LUBRICATION SYSTEM* subsection.



1. Engine oil strainer
2. Retaining plate
3. Screws

Cleaning the Crankcase

⚠ WARNING

Use safety goggles to avoid eye injuries.

Clean crankcase using a part cleaner.

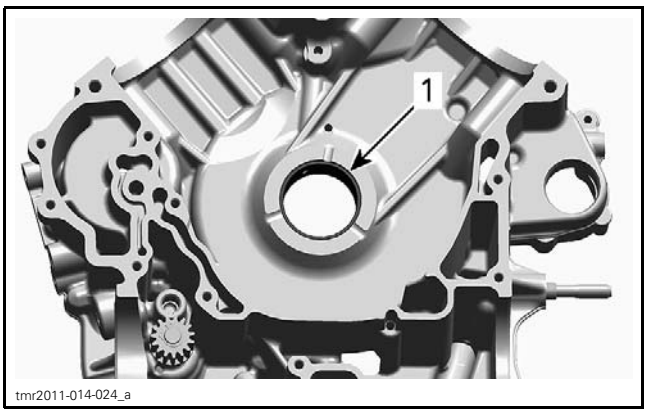
Dry crankcase using compressed air.

Blow low pressure filtered air through the oil supply lines.

Inspecting the Crankcase

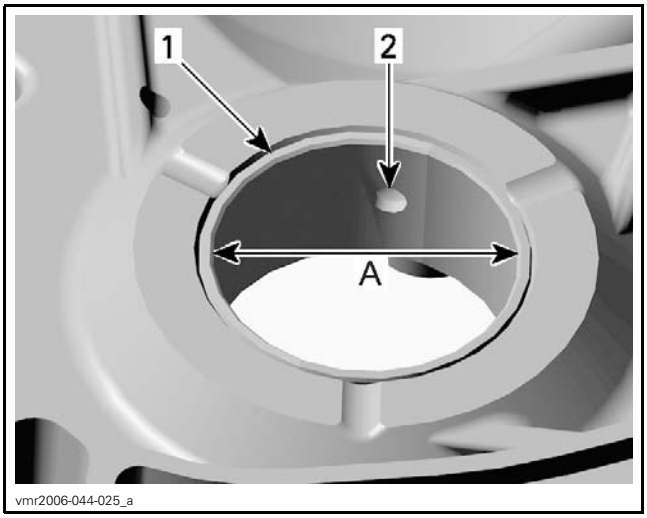
Check crankcase halves for cracks or other damage. Replace if damaged.

Check MAG and PTO plain bearings for scoring or other damages.



1. Plain bearing

Measure plain bearing inside diameter and compare to PTO/MAG main journal diameters of crankshaft, refer to *CRANKSHAFT* in this subsection. Replace if the measurements are out of specification.



1. Plain bearing
2. Oil bore
A. Measure plain bearing inside diameter

MAIN BEARING INSIDE DIAMETER (PTO/MAG)	
SERVICE LIMIT	42.100 mm (1.6575 in)

Replacing the Plain Bearing (Main)

Removing the Plain Bearing

NOTICE **Always properly support crankcase halves when removing plain bearings. Damage to crankcase halves may occur if this procedure is not performed correctly.**

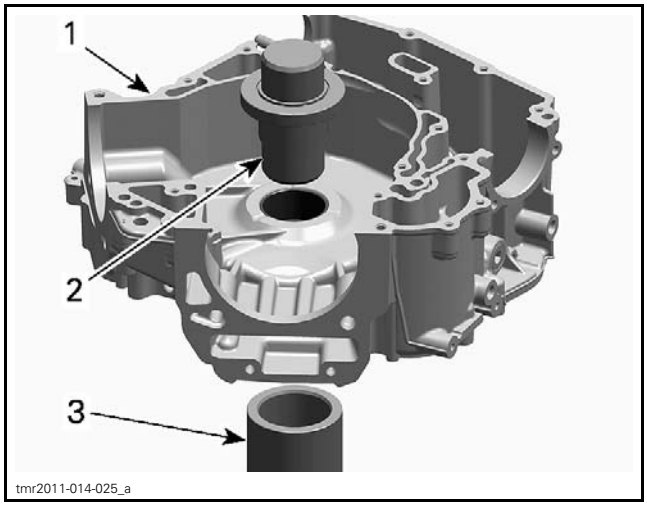
NOTE: Always use a press for removal of plain bearings.

Carefully press the plain bearings out from the crankcase half from the inside towards the outside.

NOTE: Place an appropriate support under crankcase halves before removing plain bearings.

REQUIRED TOOLS	
CRANKCASE SUPPORT MAG/PTO (P/N 529 036 031)	
PLAIN BEARING REMOVER/INSTALLER (P/N 529 035 917)	

NOTE: During disassembly, make sure not to damage the sealing surfaces of the crankcase halves.



PRESS PLAIN BEARINGS OUTSIDE
1. Crankcase half
2. Plain bearing remover/installer
3. Crankcase support sleeve (P/N 529 036 031)

Installing the Plain Bearing

NOTICE **Unless otherwise instructed, never use a hammer to install plain bearings. Aways use a press.**

During reassembly, make sure not to damage the sealing surfaces of the crankcase halves.

NOTE: Place the proper crankcase support sleeve under crankcase halves before installing the plain bearings, refer to *PLAIN BEARING REMOVAL PROCEDURE* in this subsection.

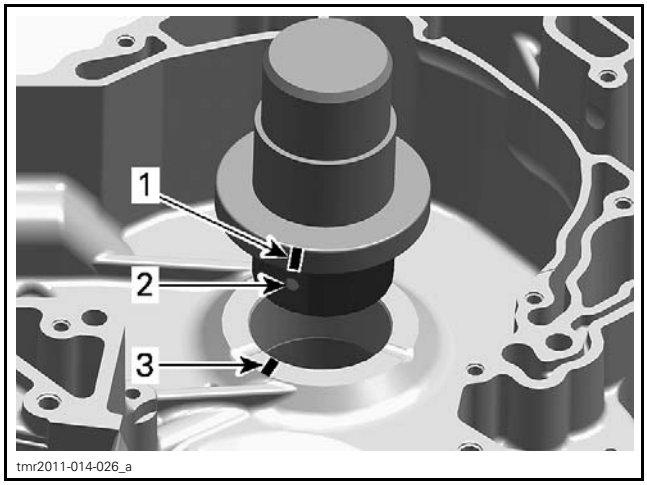
Install plain bearings in a cold crankcase.

NOTE: Do not lubricate plain bearings and/or crankcase for installation.

REQUIRED TOOL	
PLAIN BEARING REMOVER/INSTALLER (P/N 529 035 917)	

NOTE: Use an O-ring (Ø 42 x 1 mm to 1.5 mm (.04 in to .06 in) thickness) to hold plain bearings in place during installation. The O-ring will disappear in the groove of the plain bearing remover/installer.

1. Mark position of plain bearing oil bore on plain bearing remover/installer.
2. Mark position of oil bore on crankcase half.
3. Align mark on plain bearing remover/installer with mark on crankcase half.



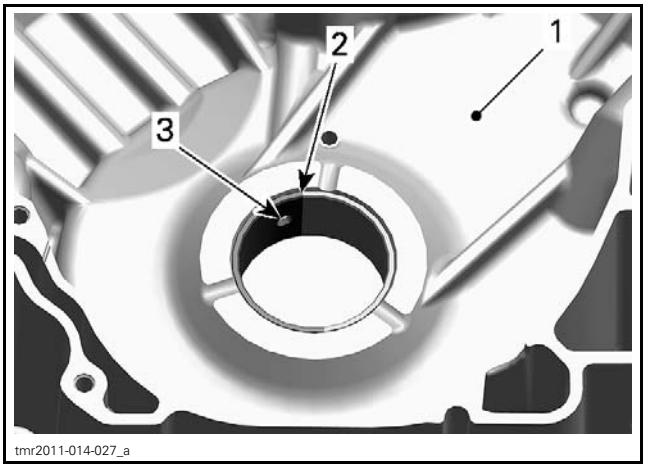
tmr2011-014-026_a

1. Oil bore position marked on plain bearing remover/installer
2. Plain bearing oil bore
3. Oil bore position marked on crankcase

NOTICE **Misalignment of the plain bearing and crankcase oil bores will prevent proper oil supply to plain bearings.**

4. Carefully press in the plain bearings from inside the crankcase towards the outside.

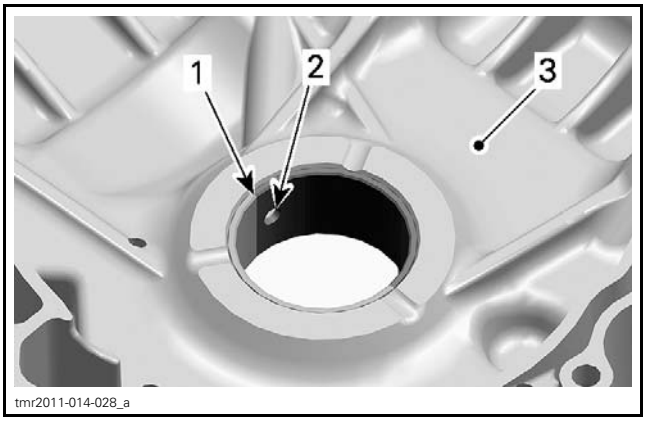
NOTICE **The joint of the plain bearings in crankcase half MAG side must be positioned near the oil bore in a clockwise direction.**



tmr2011-014-027_a

1. Crankcase half MAG (inside surface)
2. Partition
3. Oil bore

NOTICE **The joint of the plain bearings in the crankcase half PTO side must be positioned near the oil bore in the counterclockwise direction.**



tmr2011-014-028_a

1. Plain bearing joint
2. Oil bore
3. Crankcase half PTO (inside surface)

Assembling the Crankcase

The assembly of crankcase is the reverse of the removal procedure. However, pay attention to the following.

Clean oil passages and make sure they are not clogged.

Clean all metal components in a solvent.

Install a NEW crankcase gasket.

Oil the plain bearings before mounting the crankshaft.

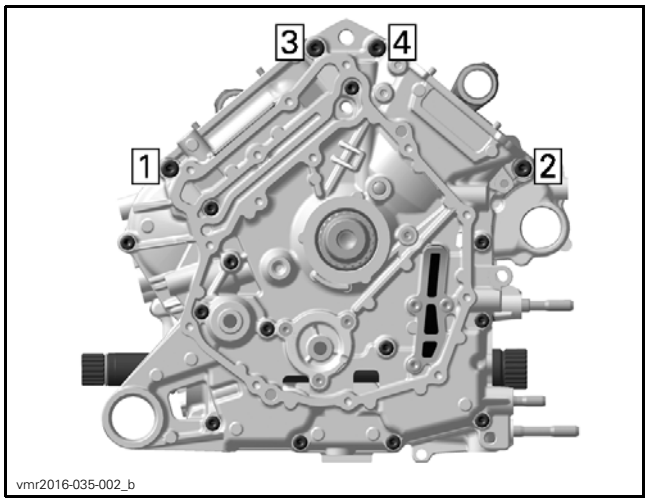
Reinstall crankshaft, see procedure in this subsection

Properly reinstall engine oil strainer and screws. Refer to *LUBRICATION SYSTEM* subsection.

Reinstall water pump intermediate shaft and gears, refer to *WATER PUMP GEARS* in the *COOLING SYSTEM* subsection.

Tighten crankcase retaining screws as per following sequence.

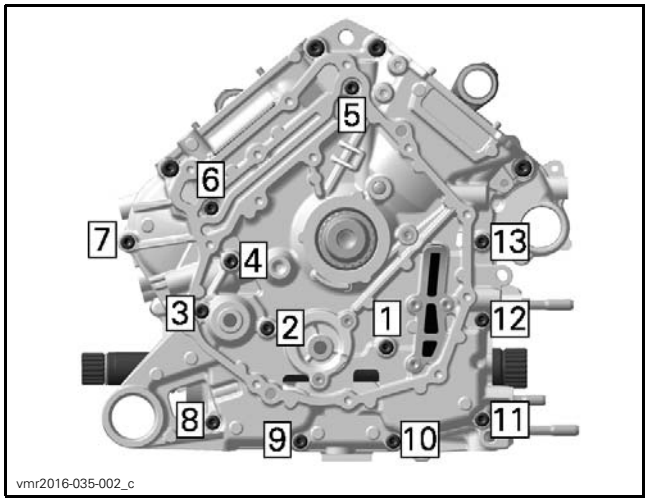
All Models



M8 SCREWS TIGHTENING SEQUENCE

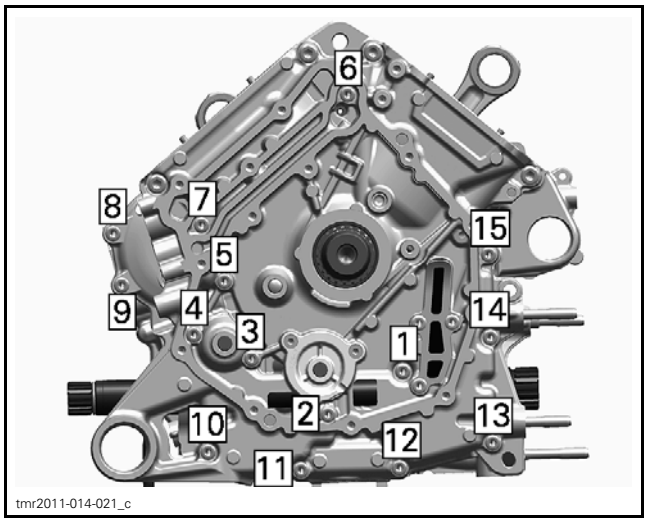
TIGHTENING TORQUE	
M8 crankcase screws	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

Models Without Oil Cooler



M6 SCREWS TIGHTENING SEQUENCE

Models With Oil Cooler

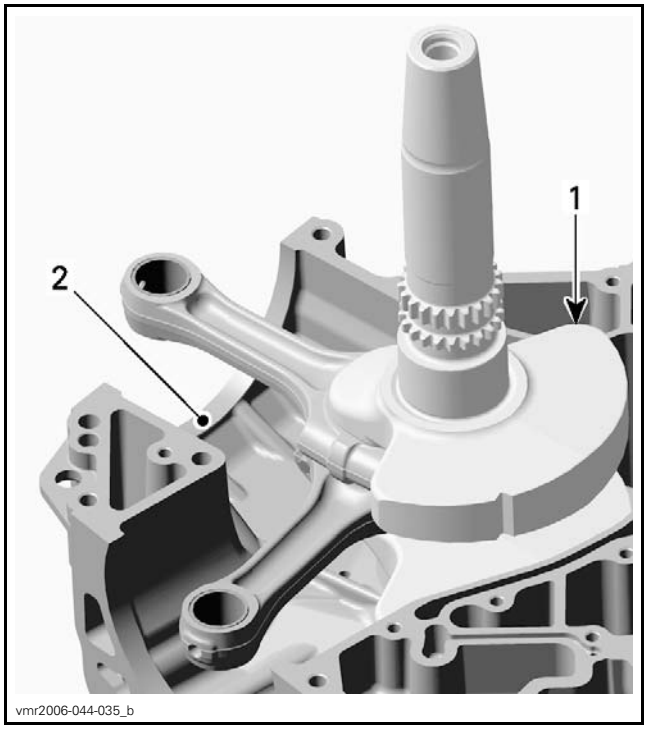


M6 SCREWS TIGHTENING SEQUENCE

All Models

TIGHTENING TORQUE	
M6 crankcase screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

CRANKSHAFT



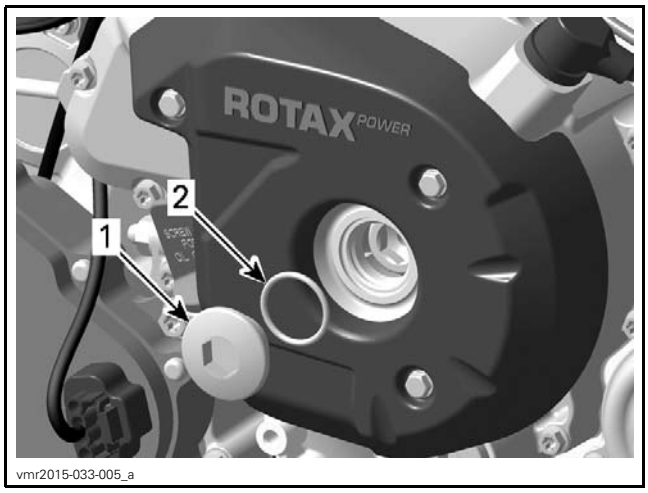
1. *Crankcase MAG*
2. *Crankshaft*

Crankshaft Locking Procedure

NOTE: When the crankshaft is locked, the rear piston no. 2 is at TDC (top dead center). The crankshaft cannot be locked with front piston no. 1 at TDC.

NOTICE To see if the rear piston no. 2 is at TDC ignition, refer to *CAMSHAFT TIMING GEAR* in the *TIMING CHAIN* subsection.

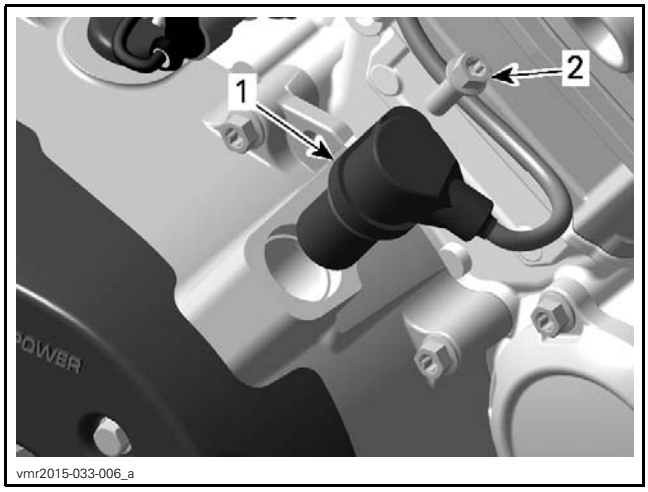
1. Remove spark plug cables and spark plugs from both cylinders.
2. Remove screw plug and O-ring from magneto cover.



vmr2015-033-005_a

1. Plug screw
2. O-ring

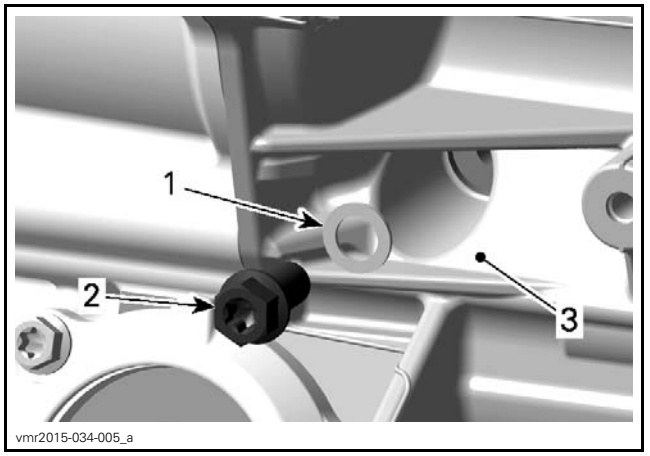
3. Remove crankshaft position sensor.



vmr2015-033-006_a

1. Crankshaft position sensor
2. Screw

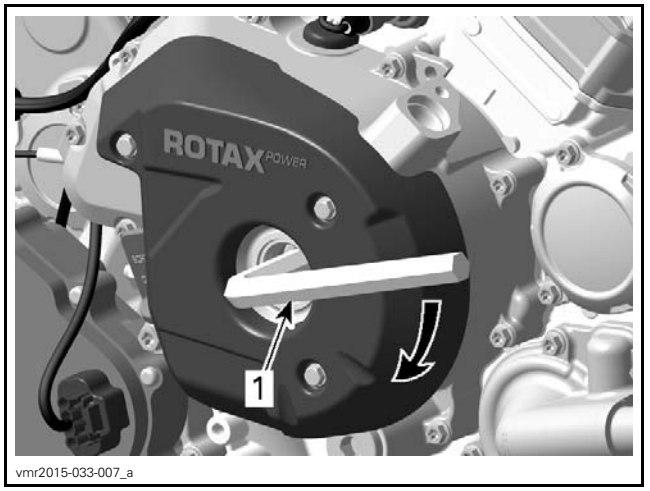
4. Remove screw plug and discard sealing ring.



vmr2015-034-005_a

1. Sealing ring
2. Plug screw
3. Crankcase PTO side, front side

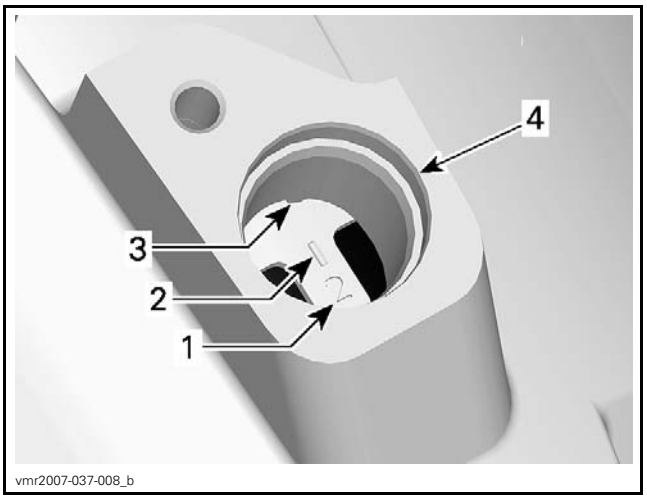
5. Use a 14 mm Allen key to turn crankshaft until the rear piston no. 2 is at TDC.



vmr2015-033-007_a

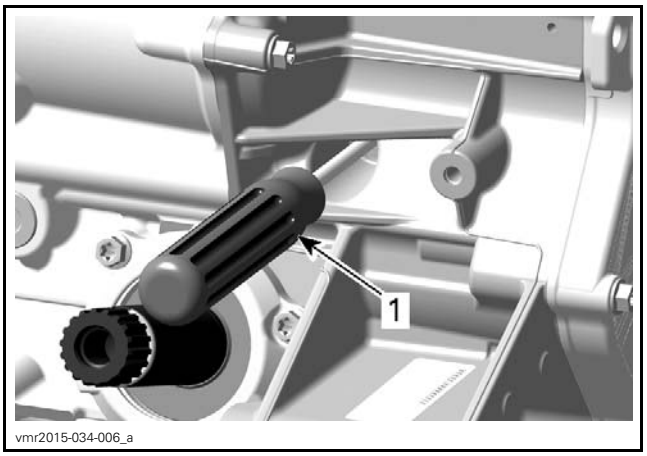
1. Allen key 14 mm

NOTE: When the piston no. 2 is at TDC, the number 2 piston index mark on the magneto flywheel and the notch on the magneto cover are aligned.



CYLINDER 2 AT TDC
1. *Number 2 piston identifier*
2. *Index mark on magneto flywheel*
3. *Notch on magneto cover*
4. *CPS bore in magneto cover*

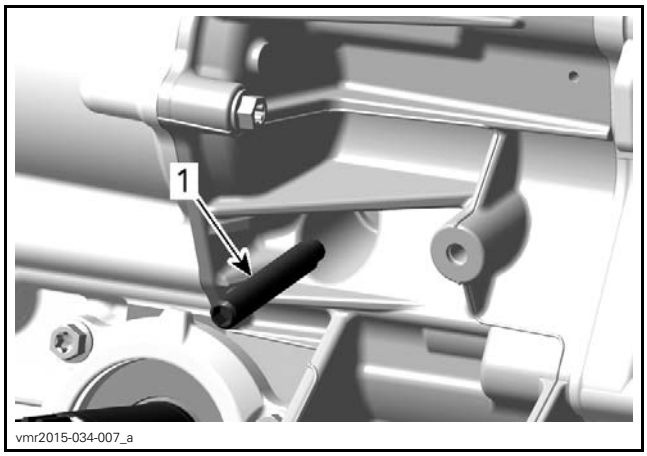
6. Use a screwdriver to check if the groove in the crankshaft is aligned with the crankshaft locking tool orifice.



1. *Screwdriver*

7. Lock crankshaft.

REQUIRED TOOL	
CRANKSHAFT LOCKING BOLT (P/N 529 035 617)	



1. *Crankshaft locking bolt*

8. Gradually insert the tool in the crankshaft groove. Make sure that the tool tip enters the groove and does not jam on the crankshaft balancer surface.

Removing the Crankshaft

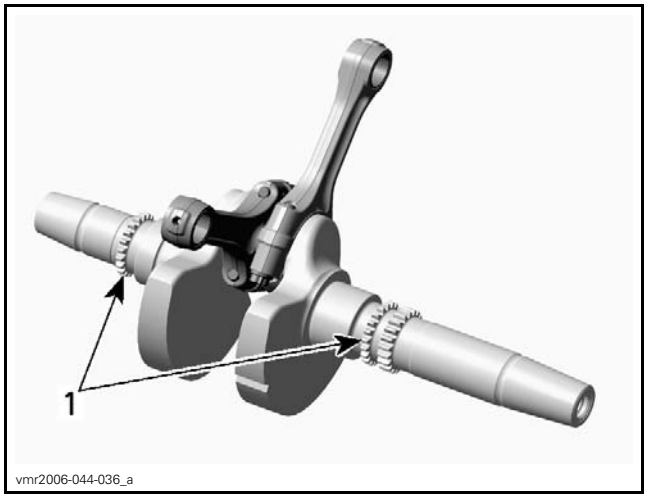
Refer to *CRANKCASE*.

Inspecting the Crankshaft

NOTE: Check each crankshaft bearing journal for scoring, scuffing, cracks or other signs of wear.

NOTE: Replace crankshaft if the crankshaft timing gears are worn or otherwise damaged.

NOTICE **Components out of specifications must always be replaced. If this is not observed, severe damage may be caused to the engine.**



1. *Crankshaft timing gears*

Crankshaft Axial Play

NOTE: Axial play must be measured before splitting the crankcase.

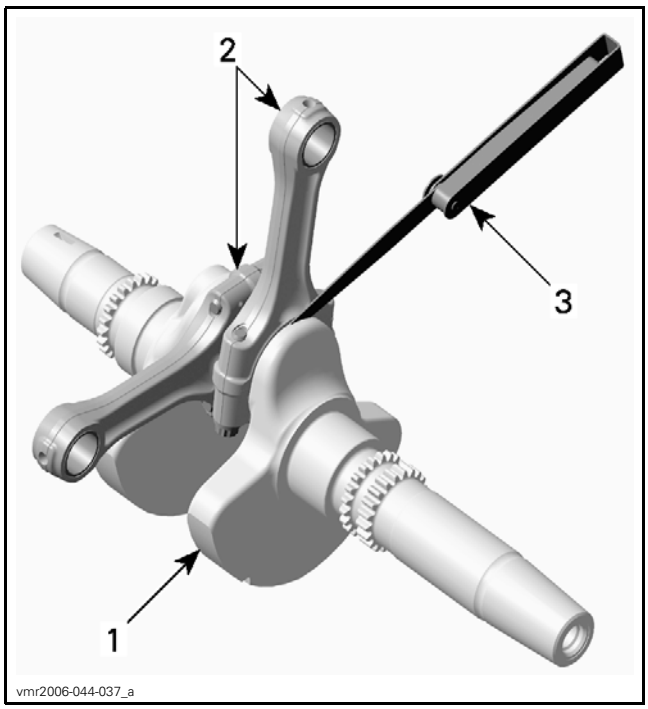
Measure axial play on PTO end of crankshaft using a dial indicator.

CRANKSHAFT AXIAL PLAY	
NEW	0.200 mm to 0.500 mm (.008 in to .02 in)
SERVICE LIMIT	0.600 mm (.024 in)

If axial play is out of specification, replace crankcase and/or crankshaft.

Connecting Rod Big End Axial Play

Using a feeler gauge, measure between face of connecting rods and crankshaft counterweight. If the measurement exceeds specified tolerance, replace the crankshaft.



1. *Crankshaft*
2. *Connecting rods*
3. *Feeler gauge*

CONNECTING ROD BIG END AXIAL PLAY		
570 650 850	NEW	0.200 mm to 0.500 mm (.008 in to .02 in)
1000 1000R	NEW	0.250 mm to 0.550 mm (.0098 in to .0217 in)
All	SERVICE LIMIT	0.600 mm (.024 in)

Connecting Rod/Piston Pin Clearance

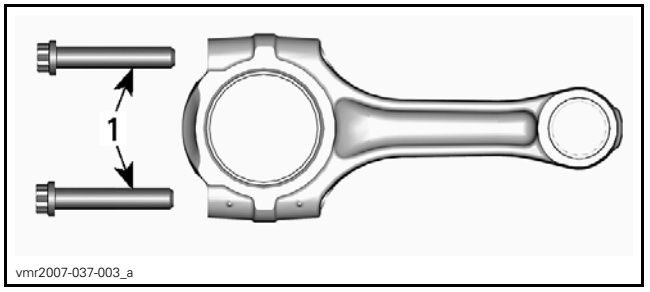
Refer to *CYLINDER HEAD* subsection.

Connecting Rod Big End Radial Play

Prior to removing connecting rod from the crankshaft, mark big end halves together to ensure a correct reinstallation (cracked surface fits in only one position).

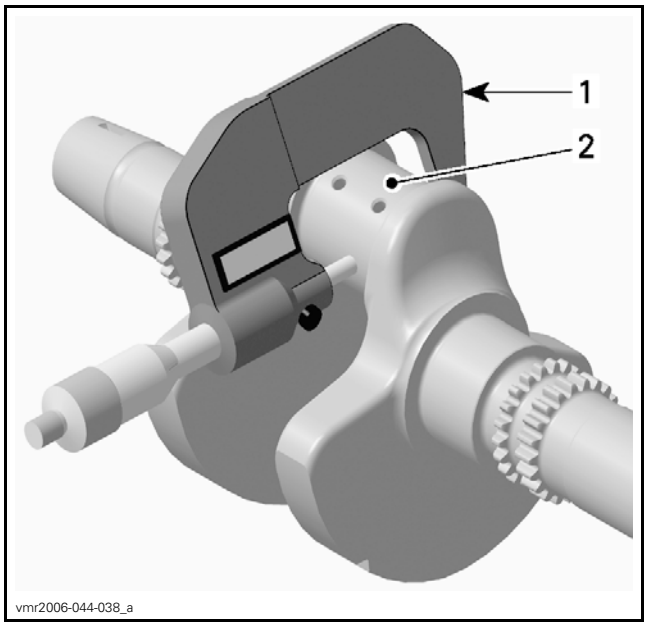
1. Remove connecting rods from crankshaft.

NOTICE **Connecting rod screws are not reusable. Always discard screws and replace with NEW ones. It is recommended to install new plain bearings when reinstalling connecting rods.**



1. *Connecting rod screws*

2. Measure crankpin. Compare to inside diameter of connecting rod big end.



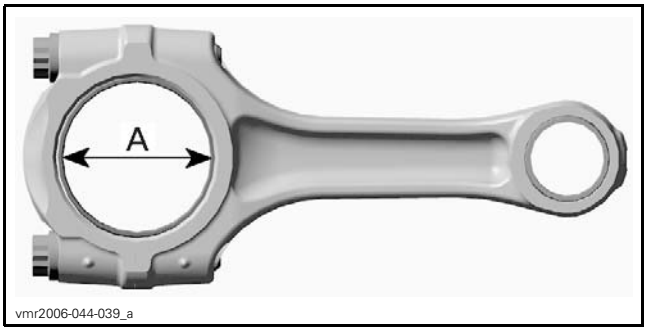
1. *Micrometer*
2. *Crankpin*

CRANK PIN DIAMETER		
570 650 850	NEW	40.001 mm to 40.025 mm (1.5748 in to 1.5758 in)
	SERVICE LIMIT	39.990 mm (1.5744 in)
1000 1000R	NEW	41.986 mm to 42.010 mm (1.653 in to 1.6539 in)
	SERVICE LIMIT	41.967 mm (1.6522 in)

If the crank pin diameter is out of specification, replace crankshaft.

NOTE: To measure the connecting rod big end diameter, use the OLD connecting rod screws.

3. Install the OLD plain bearings as they were mounted initially.
4. Carry out the tightening procedure described in *CRANKSHAFT ASSEMBLY* in this subsection.



A. Connecting rod big end plain bearing

CONNECTING ROD BIG END DIAMETER		
570 650 850	SERVICE LIMIT	40.100 mm (1.5787 in)
1000 1000R	SERVICE LIMIT	42.100 mm (1.6575 in)

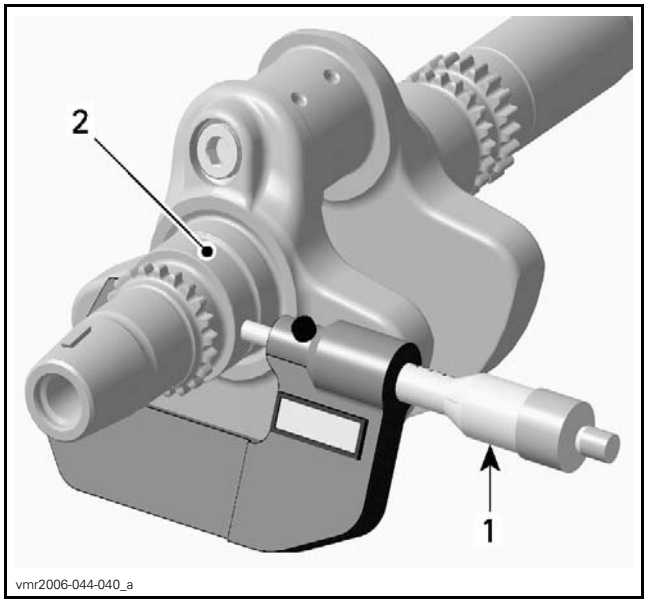
If connecting rod big end diameter is out of specification, replace plain bearings and recheck.

CONNECTING ROD BIG END RADIAL CLEARANCE	
SERVICE LIMIT	0.09 MM (.0035 IN)

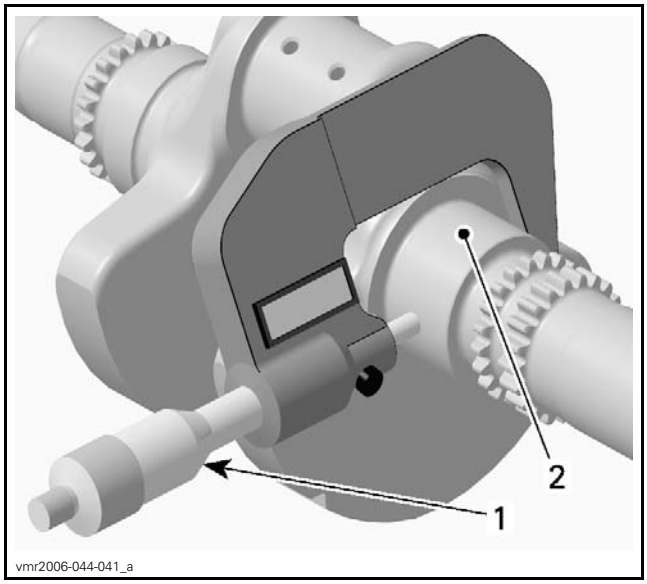
If connecting rod big end radial clearance is out of specification, replace plain bearings and recheck.

Crankshaft Radial Play MAG/PTO Side

Measure crankshaft main bearing journals on MAG and PTO sides. Compare to inside diameter of MAG and PTO plain bearings, refer to *CRANKCASE* in this subsection.



1. Micrometer
2. Crankshaft MAG side main bearing journal



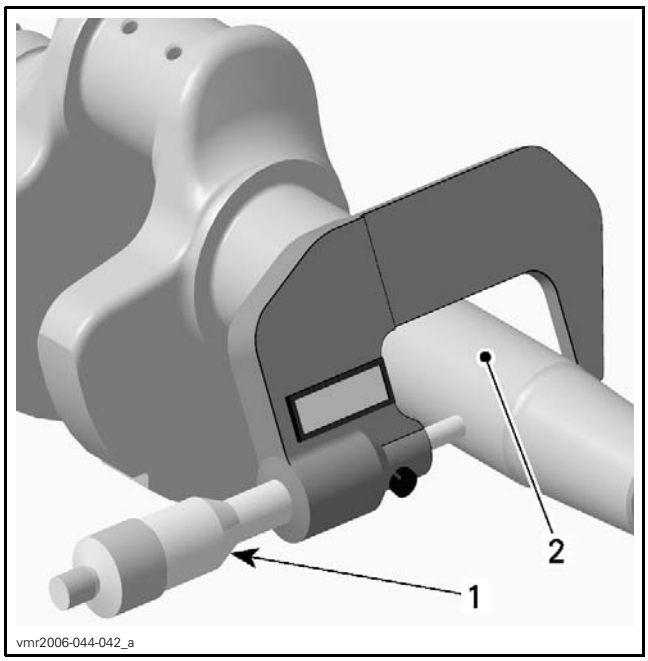
1. Micrometer
2. Crankshaft PTO side main bearing journal

CRANKSHAFT MAIN BEARING JOURNAL DIAMETER (MAG/PTO SIDE)	
NEW	42.016 mm to 42.040 mm (1.6542 in to 1.6551 in)
SERVICE LIMIT	42.000 mm (1.6535 in)

CRANKSHAFT RADIAL PLAY (MAG/PTO SIDE)	
SERVICE LIMIT	0.07 mm (.0028 in)

Crankshaft Radial Play (PTO Cover Bearing)

Measure crankshaft journal diameter (PTO cover bearing). Compare to plain bearing inside diameter (PTO cover). Refer to *PTO COVER* in this subsection.



1. Micrometer
2. Crankshaft journal (PTO support bearing)

CRANKSHAFT JOURNAL DIAMETER (PTO COVER BEARING)	
NEW	34.004 mm to 34.020 mm (1.3387 in to 1.3394 in)
SERVICE LIMIT	33.998 mm (1.3385 in)

CRANKSHAFT RADIAL PLAY (PTO COVER BEARING)	
SERVICE LIMIT	0.10 mm (.0039 in)

If crankshaft journal diameter is out of specification, replace crankshaft.

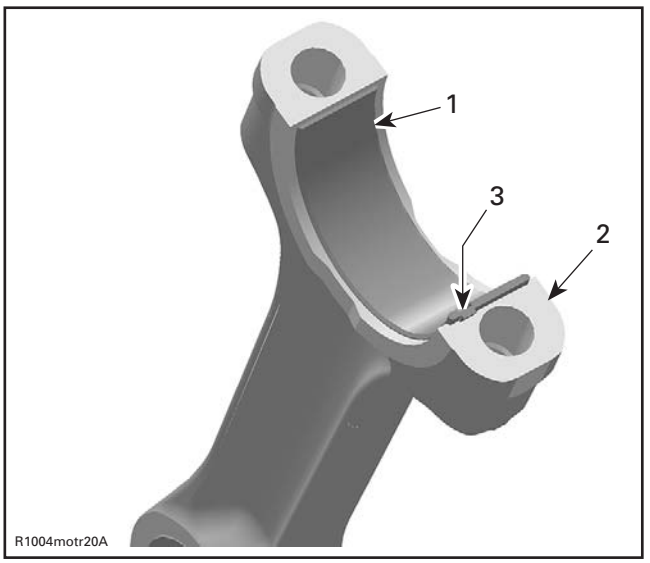
If crankshaft radial play (PTO cover bearing) is out of specification, replace plain bearings and recheck.

Assembling the Crankshaft

The assembly is the reverse of the disassembly procedure. However, pay attention to following.

Clean the split surface on both sides (cracked area) carefully with compressed air.

Insert plain bearings in the connecting rods as illustrated.



1. Half plain bearing of connecting rod big end
2. Mating surface of the connecting rod
3. Joining surface of plain bearing in line with connecting rod groove

Oil the plain bearing surface of the connecting rod and crankshaft pin before installation.

NOTICE Lower cap and rod must match together since there is a cracked surface.

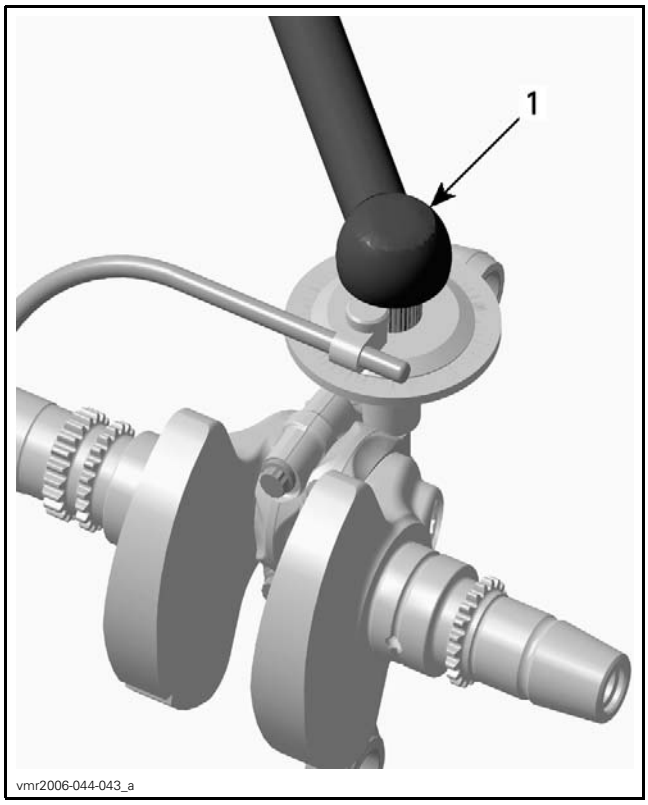
Oil NEW connecting rod screws.

Thread screws in the connecting rods, then tighten as per following procedure.

NOTICE Strictly adhere following instructions:

- Always use NEW connecting rod screws at final assembly. They are **not reusable**.
- Do not apply any thread locker.
- The running direction of the big end bearings and of the piston pins must not change.
- Always perform each step on both connecting rod screws before going to the next step.
- Failure to strictly follow procedure may cause connecting rod screws to loosen and lead to severe engine damage.

REQUIRED TOOLS
Torque wrench
Angle torque wrench



1. Angle torque wrench

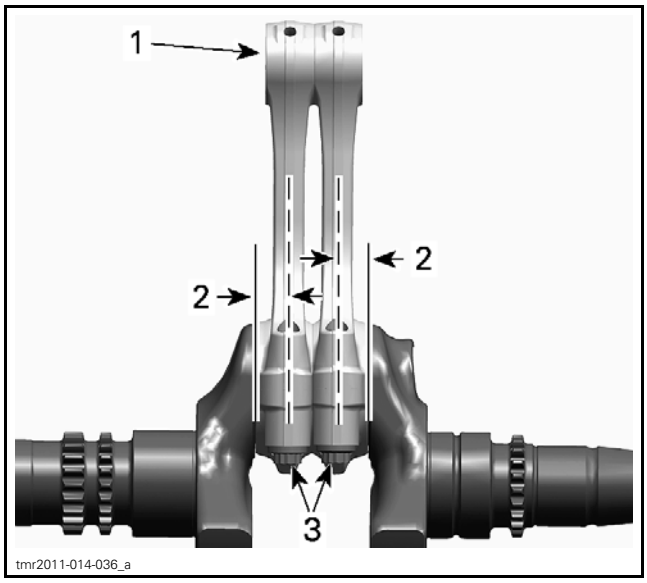
570, 650 and 850 Engines

NEW connecting rods can be installed either way.

TIGHTENING TORQUE		
Connecting rod screws	Step A	Tighten to 1/2 of specified torque
	Step B	Tighten to 20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)
	Step C	Torque an additional 60 ± 5° turn using an angle torque wrench

1000 and 1000R Engines

NOTICE Connecting rods are asymmetrical. There must be no gap between the small ends when they face each other.



1. Connecting rod small ends
2. Connecting rod offset
3. Connecting rod screws

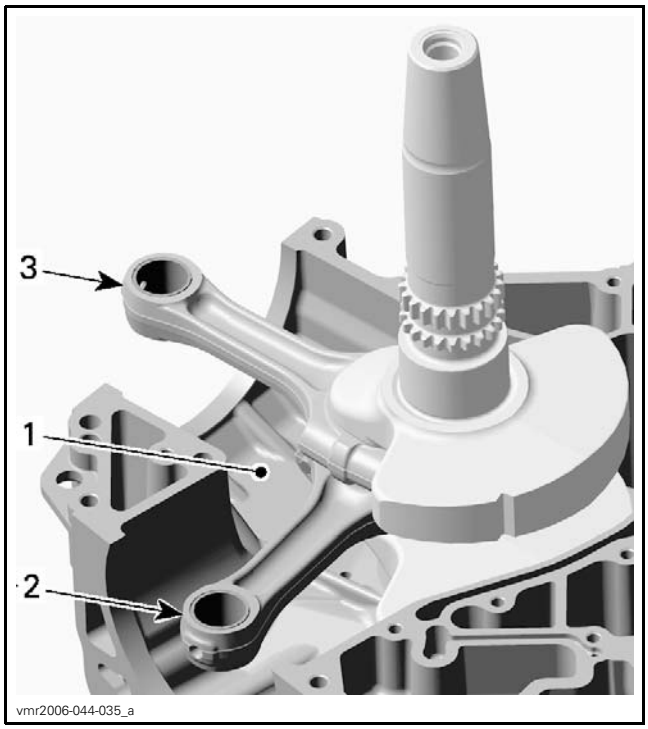
TIGHTENING TORQUE		
Connecting rod screws	Step A	Tighten to 1/2 of specified torque
	Step B	Tighten to 30 N•m ± 2 N•m (22 lbf•ft ± 1 lbf•ft)
	Step C	Torque an additional 90 ± 5° turn using an angle torque wrench

Installing the Crankshaft

The installation is the reverse of the removal procedure. However, pay attention to the following.

Do not interchange the connecting rods of pistons 1 and 2 during installation.

NOTICE Observe the correct installation position when fitting the crankshaft with the connecting rods. The connecting rod MAG side has to face cylinder no. 1.



1. Crankcase half MAG side
2. Connecting rod cylinder 1
3. Connecting rod cylinder 2

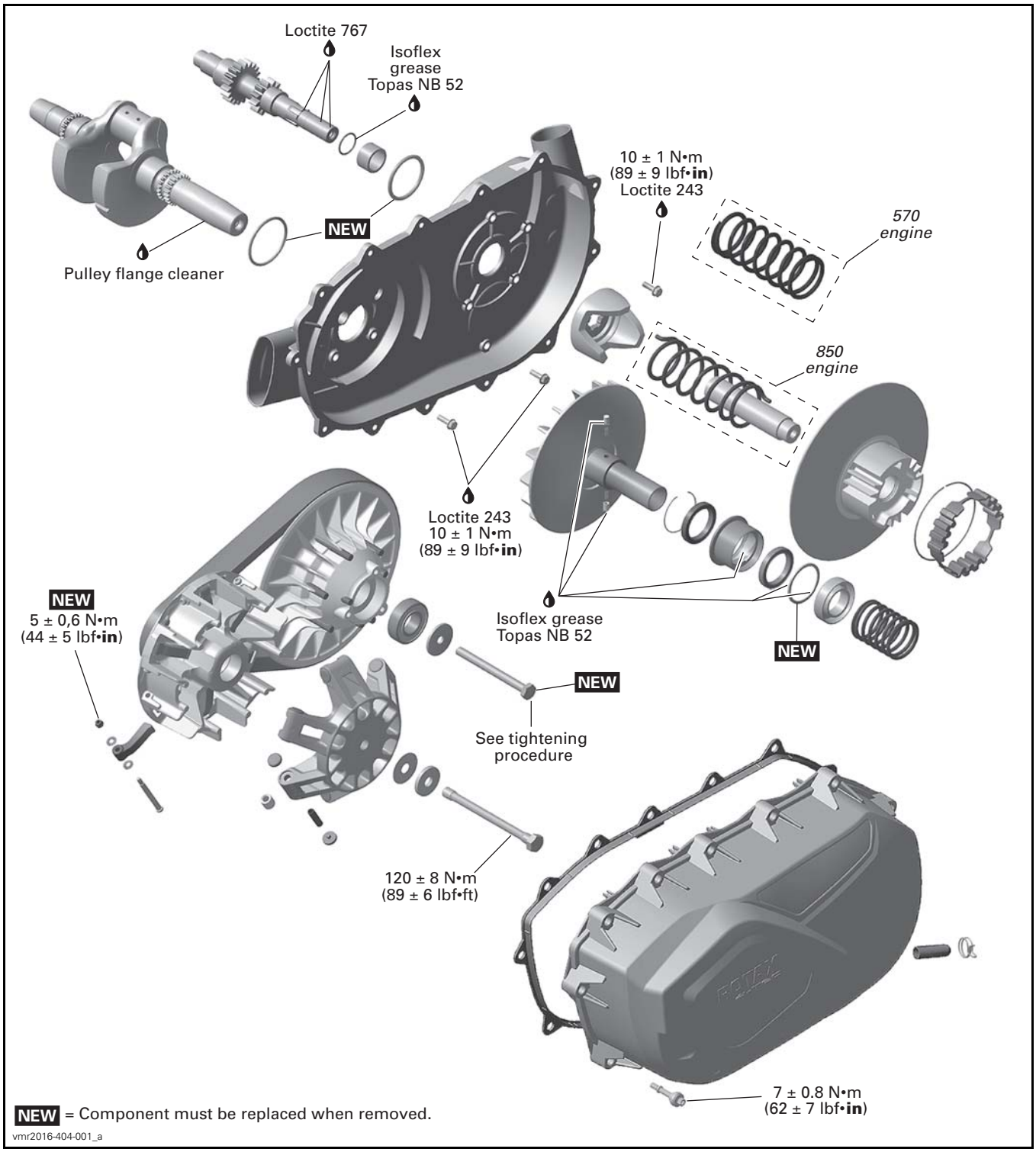
CONTINUOUSLY VARIABLE TRANSMISSION (CVT) (570/850)

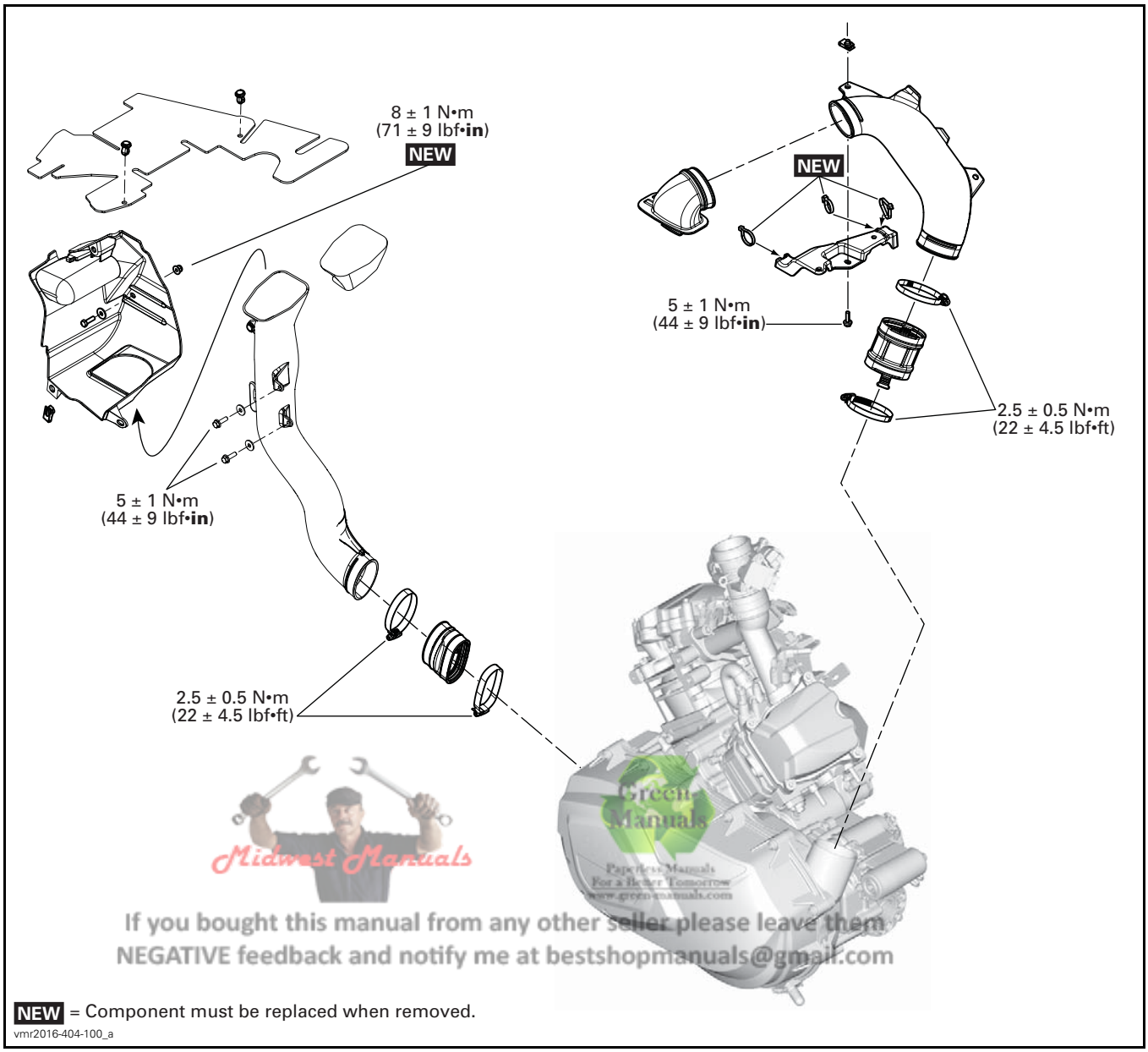
SERVICE TOOLS

Description	Part Number	Page
CLUTCH HOLDER	529 036 238	6, 14, 20–22
CLUTCH PULLER	529 035 746	6
PULLER/LOCKING TOOL	529 036 098	5, 19, 22

SERVICE PRODUCTS

Description	Part Number	Page
ISOFLEX GREASE TOPAS NB 52	293 550 021	12
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	19
PULLEY FLANGE CLEANER	413 711 809	9, 15–16, 18


Loctite 767
Isoflex grease Topas NB 52
10 ± 1 N•m (89 ± 9 lbf•in) Loctite 243
570 engine
850 engine
NEW
Pulley flange cleaner
Loctite 243 10 ± 1 N•m (89 ± 9 lbf•in)
NEW 5 ± 0,6 N•m (44 ± 5 lbf•in)
Isoflex grease Topas NB 52
NEW
NEW
See tightening procedure
120 ± 8 N•m (89 ± 6 lbf•ft)
7 ± 0.8 N•m (62 ± 7 lbf•in)
NEW = Component must be replaced when removed.
vmr2016-404-001_a



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NEW = Component must be replaced when removed.

vmr2016-404-100_a

GENERAL

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

⚠ WARNING

Never touch CVT while engine is running. Never drive vehicle when CVT cover is removed.

⚠ WARNING

Any drive pulley repairs must be performed by an authorized Can-Am dealer. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

⚠ WARNING

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly.

PROCEDURES

CVT COVER

CVT Cover Access

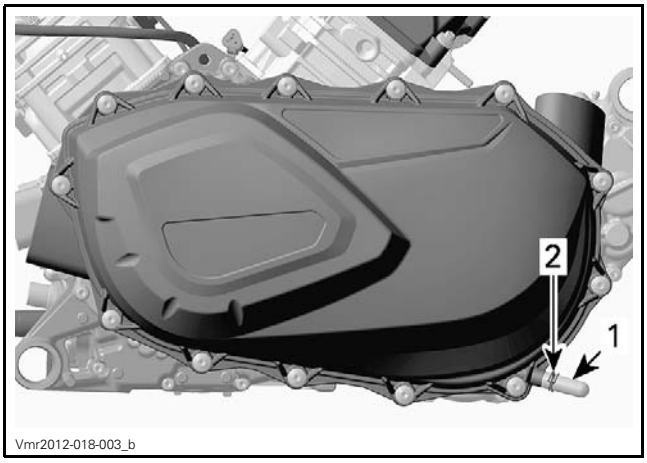
Refer to *BODY* subsection and remove the following:

– LH side and extension panels
– LH footboard panel.

Draining the CVT Cover

If water is present in CVT cover, it can be drained as follows:

1. Remove drain reservoir from CVT cover.



1. Drain reservoir
2. Spring clip

2. Let water drain from CVT cover.
3. Reinstall drain reservoir.

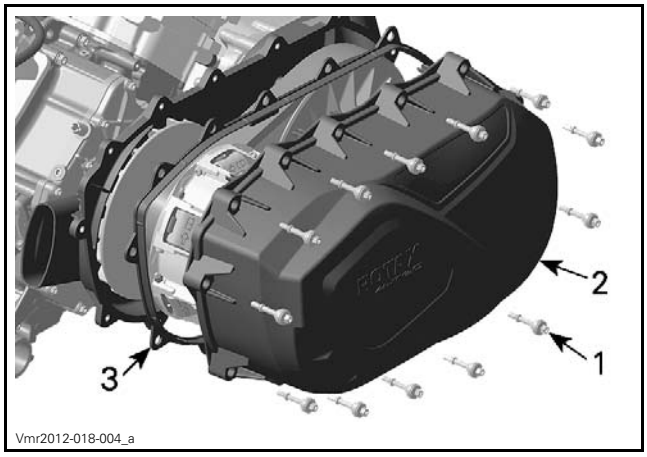
NOTICE **If an appreciable amount of water or any debris entered the CVT cover, CVT must be cleaned and inspected.**

Removing the CVT Cover

Remove CVT cover screws.

NOTE: Do not use and impact tool to remove CVT cover screws. To support the CVT cover remove the top center screw last.

Remove the CVT cover and its gasket.



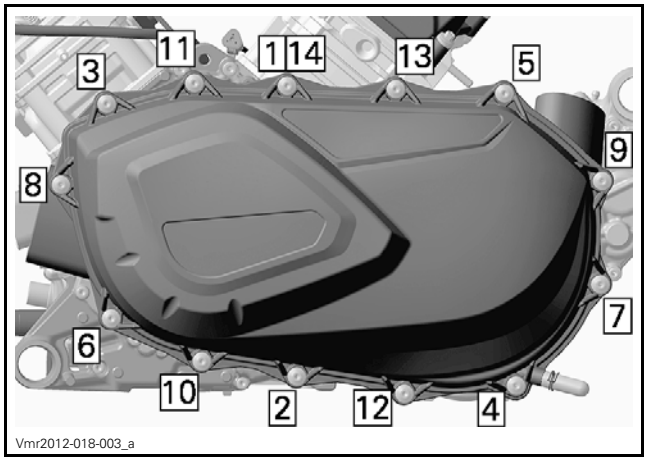
1. CVT cover screw
2. CVT cover
3. Gasket

Installing the CVT Cover

Install the top center screw of first.

NOTE: Do not use and impact tool to install CVT cover screws.

Tighten the CVT cover screws as per following sequence.



CVT COVER TIGHTENING SEQUENCE

TIGHTENING TORQUE	
CVT cover screws	7 N•m ± 0.8 N•m (62 lbf•**in** ± 7 lbf•**in**)

DRIVE BELT

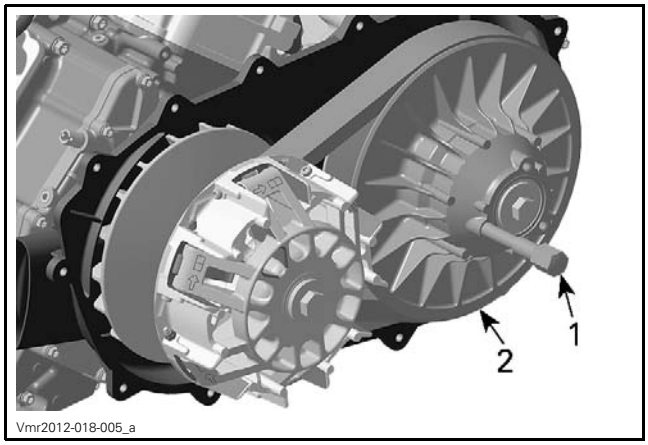
Removing the Drive Belt

NOTICE In case of a drive belt failure, the CVT, cover, drain reservoir and air outlet must be cleaned and inspected for obstruction.

1. Remove *CVT COVER*.
2. Open driven pulley.

REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	

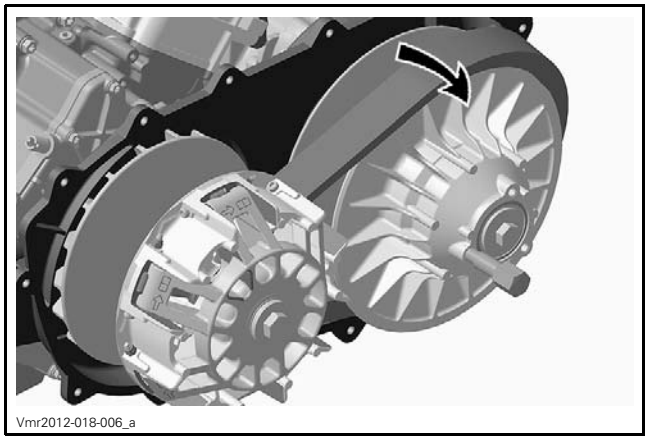
3. Screw tool in the threaded hole of driven pulley and tighten to open the pulley.



Vmr2012-018-005_a

1. Puller/locking tool
2. Fixed sheave of driven pulley

4. Slide the belt over the top edge of fixed sheave to remove it.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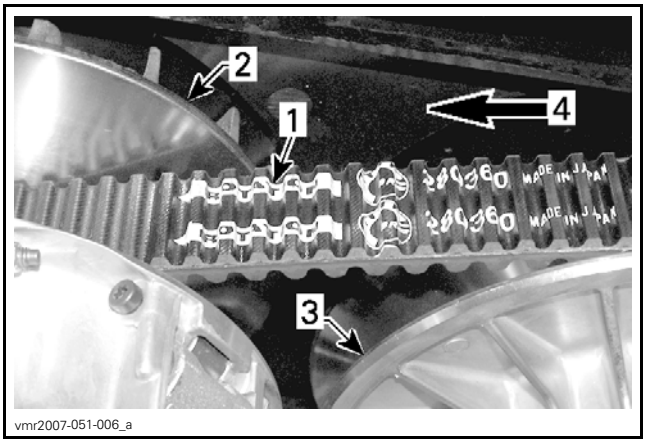
Inspecting the Drive Belt

For drive belt inspection refer to *DRIVE BELT INSPECTION* in the *PERIODIC MAINTENANCE PROCEDURES* subsection.

Installing the Drive Belt

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

The maximum drive belt life span is obtained when the drive belt has the proper rotation direction. Install it so that the arrow printed on belt is pointing towards front of the vehicle, viewed from top.



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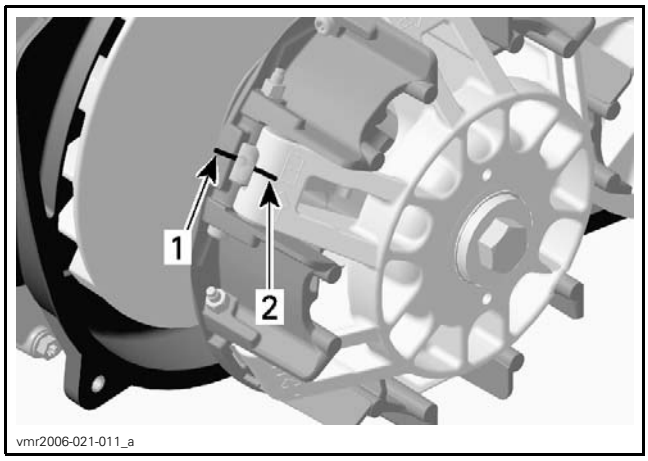
1. Arrow printed on belt
2. Drive pulley (front)
3. Driven pulley (rear)
4. Rotation direction

DRIVE PULLEY

Removing the Drive Pulley

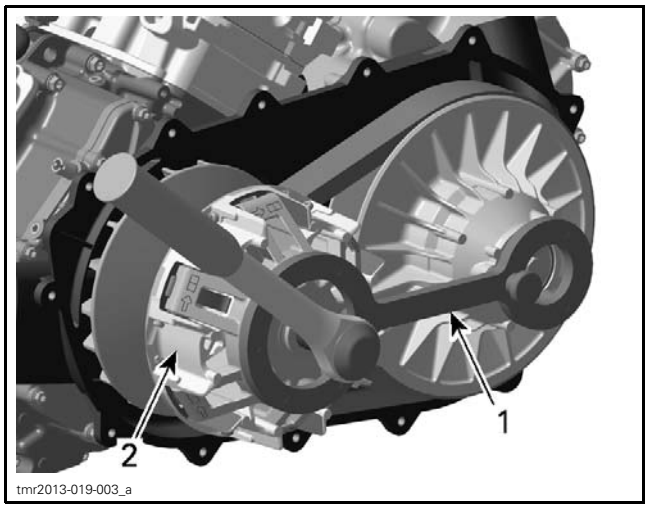
1. Remove *DRIVE BELT*, see procedure in this subsection.
2. Prior to removing the drive pulley, mark sliding sheave and governor cup to ensure correct indexation at reinstallation.



1. Mark on drive pulley sliding sheave
2. Mark on governor cup

3. Lock the drive pulley.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. Clutch holder
2. Drive pulley sliding sheave

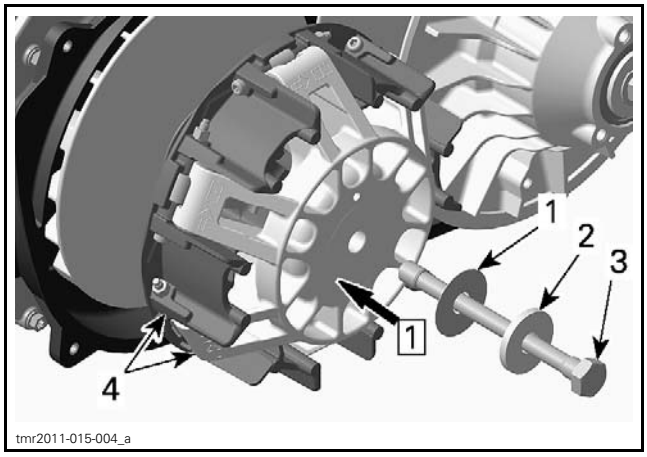
4. Loosen the drive pulley screw.

NOTICE Never use any type of impact wrench for drive pulley removal.

NOTE: Do not unscrew the drive pulley screw completely. If governor cup is stuck, hit it using a soft hammer.

5. Remove service tool.
6. Apply axial pressure with your hand on the sliding sheave and governor cup.
7. Remove drive pulley screw with its conical spring washer and thrust washer.

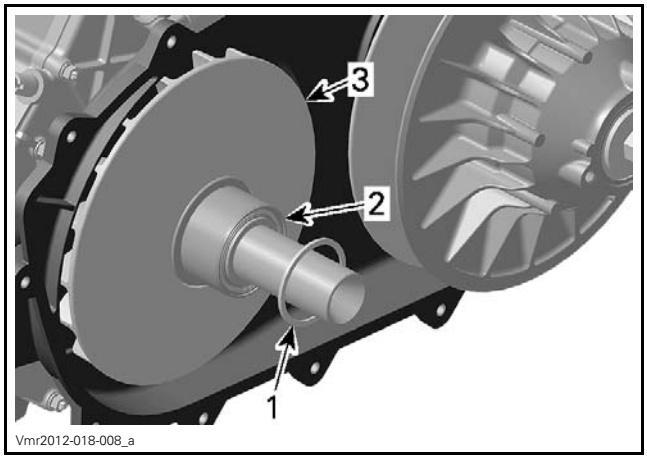
⚠ CAUTION Sliding sheave of drive pulley is spring loaded.



Step 1: Push

1. Thrust washer
2. Conical spring washer
3. Drive pulley screw
4. Sliding sheave with governor cup

8. Slowly release and remove sliding sheave.
9. Remove friction washer.

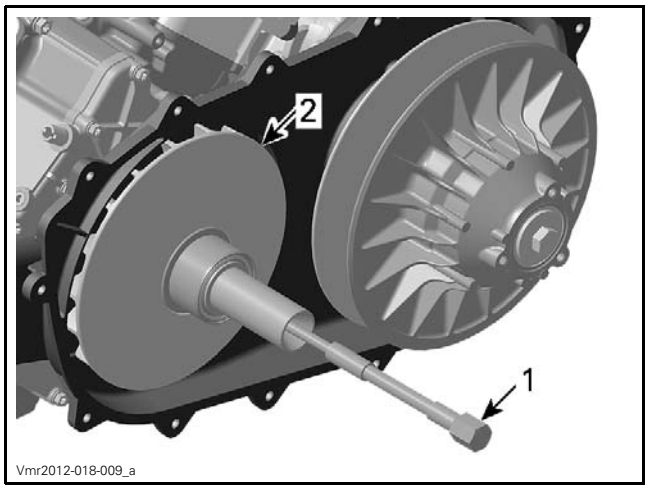


1. Friction washer
2. One way clutch
3. Drive pulley fixed sheave

10. Screw clutch puller in fixed sheave to remove fixed pulley.

NOTICE Use only recommended tool.

REQUIRED TOOL	
CLUTCH PULLER (P/N 529 035 746)	

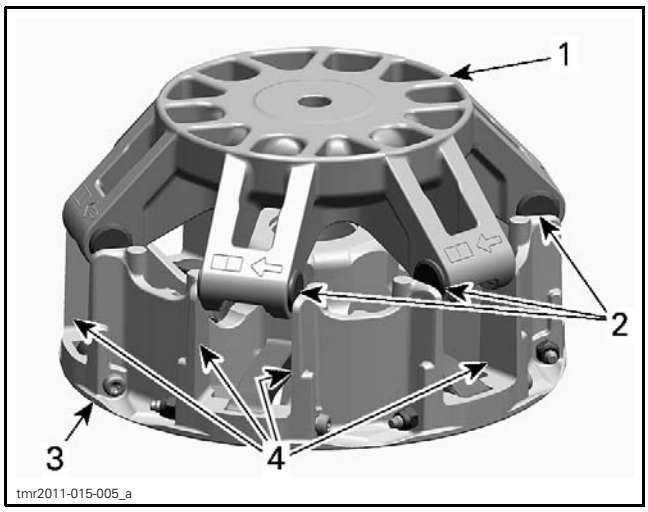


1. *Drive pulley puller*
2. *Fixed sheave*

Disassembling the Drive Pulley

Governor Cup

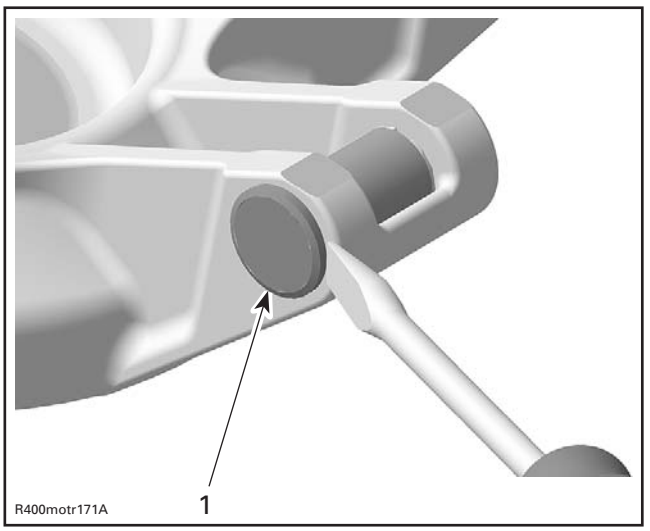
1. Carefully lift governor cup until slider shoes move to their highest position in the guides.



1. *Governor cup*
2. *Slider shoes*
3. *Sliding sheave*
4. *Guides*

NOTE: The following steps are not necessary except if roller must be removed. Refer to *INSPECTION* before proceeding.

2. Remove slider shoes from governor cup arm. Use a flat screwdriver if necessary.



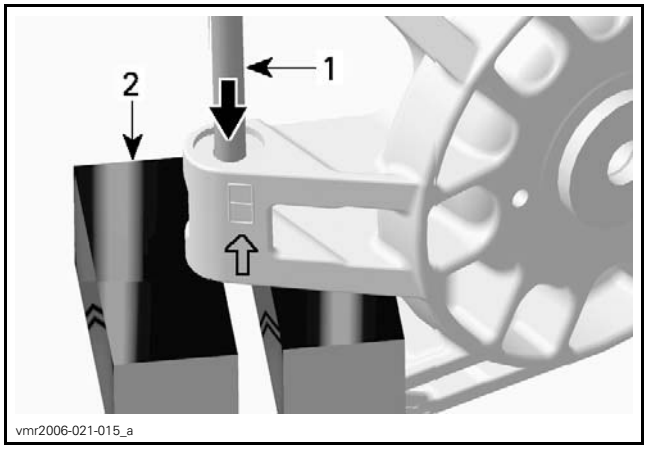
1. *Slider shoe*

3. Place the governor cup on a vice to push out the roller sleeve in the direction illustrated (against insertion arrow marked on governor cup arm). Use an appropriate punch (diameter of punch must be smaller than the diameter of the sleeve bore in the governor cup arm).

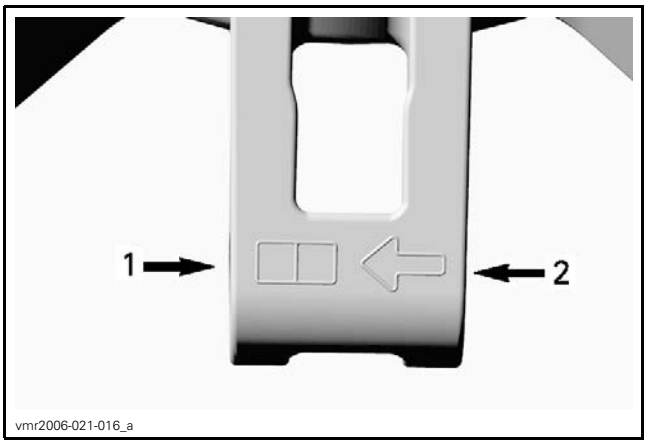
NOTICE **Do not clamp the governor cup in the vice to push out roller sleeve. Governor cup will be damaged.**

NOTE: Use protection plates to avoid marks and/or damages to the governor cup.

NOTICE **Always replace all rollers as a set. Partly worn rollers may cause damage to the CVT system.**

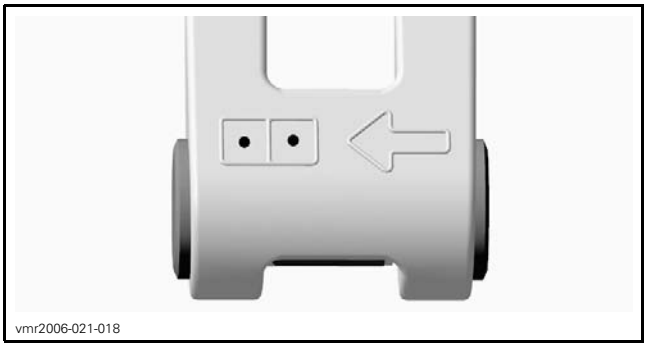


1. *Punch*
2. *Vice*



1. Removal direction
2. Assembly direction

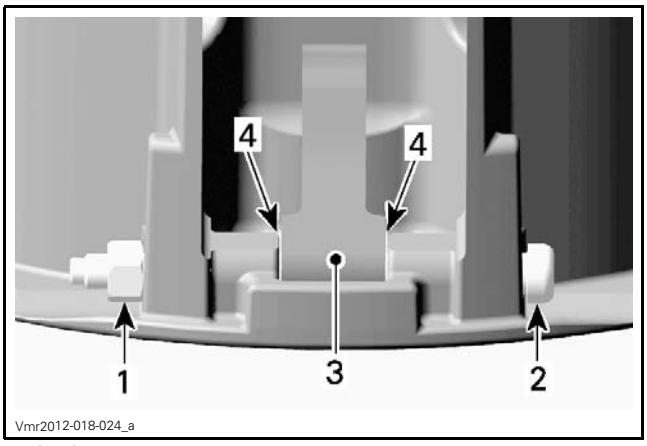
NOTE: Whenever removing a governor cup which already has two marked boxes, replace it by a new one.



Sliding Sheave

Unscrew lock nut and remove centrifugal lever pivot bolt. This drive pulley is equipped with 4 levers.

Remove centrifugal lever and both thrust washers.



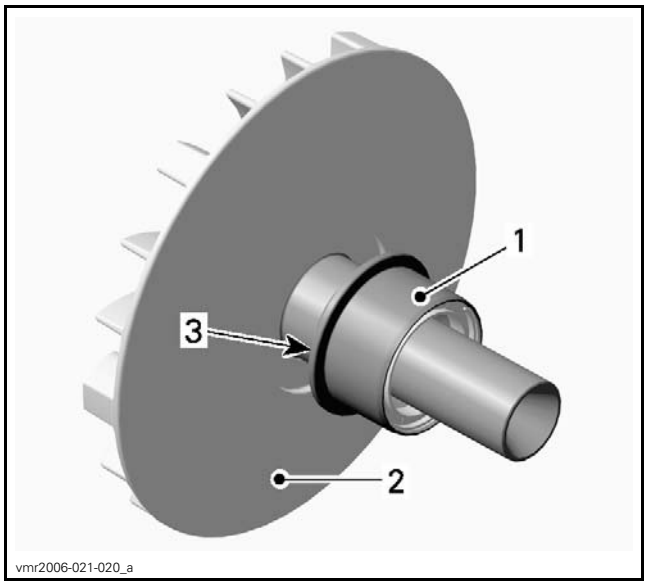
1. Lock nut
2. Centrifugal lever pivot bolt
3. Centrifugal lever
4. Thrust washers

Fixed Sheave

⚠ WARNING

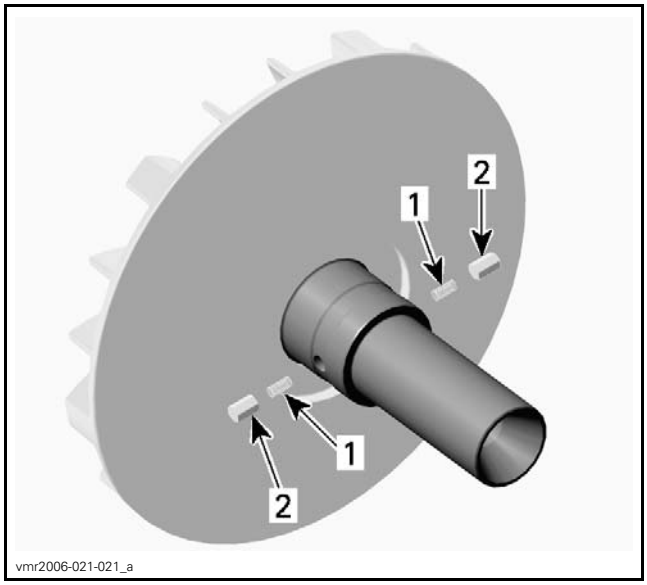
Always wear safety glasses to remove spring sleeves.

Pull and rotate one-way clutch slowly until the spring sleeves are visible.



1. One-way clutch
2. Fixed sheave
3. Spring sleeve area

Hold both spring sleeves with fingers and carefully remove them when the one-way clutch is disengaged.



1. Springs
2. Spring sleeves

Cleaning the Drive Pulley

Clean pulley faces and shaft with fine steel wool and a dry cloth.

Using a paper towel with the recommended cleaning solvent, clean:
- Crankshaft tapered end
- Taper inside the fixed sheave of the drive pulley
- Crankshaft threads
- Drive pulley screw threads.

REQUIRED PRODUCT
PULLEY FLANGE CLEANER (P/N 413 711 809)

NOTICE Avoid contact between cleaner and crankshaft seal as damage may occur.

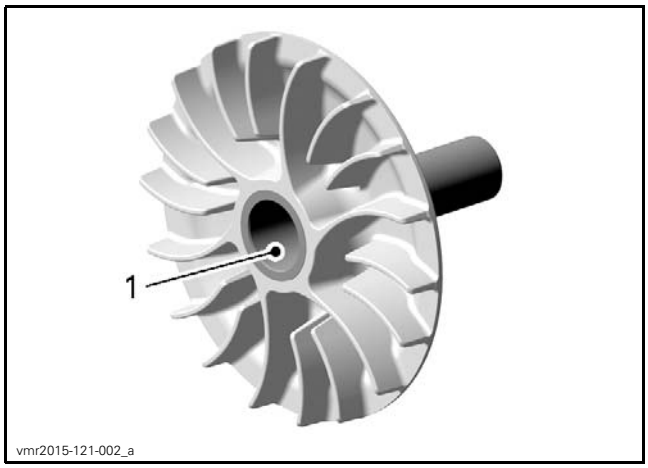
Remove all hardened oil deposits that have baked on the crankshaft and pulley tapered surfaces using coarse or medium steel wool, and/or sand paper no. 600.

NOTICE Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and PULLEY FLANGE CLEANER (P/N 413 711 809).

Wipe off the mounting surfaces with a clean, dry paper towel.

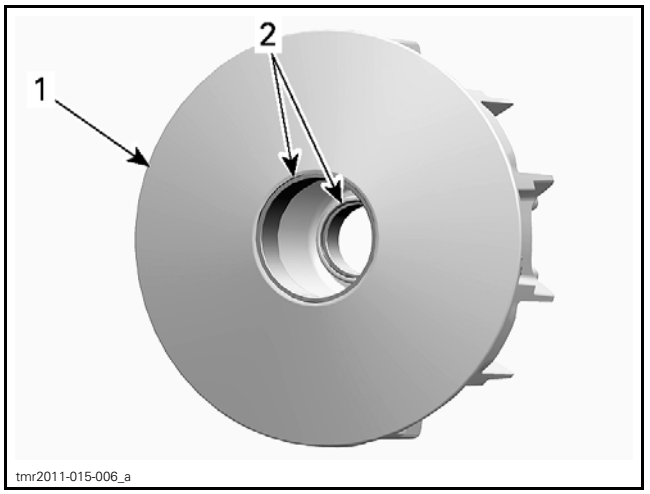
NOTICE Mounting surfaces must be free of any oil, cleaner or towel residue.



1. Taper of fixed sheave

Only use petrol base cleaner when cleaning sliding sheave bushings.

NOTICE Do not use acetone to clean bushing.



1. Sliding sheave
2. Bushings

Inspecting the Drive Pulley

Bushings

For bushing inspection, refer to *SLIDING SHEAVE* in this subsection.

Governor Cup

Check governor cup for cracks or other visible damage. Replace if necessary.

Roller and Slider Shoe

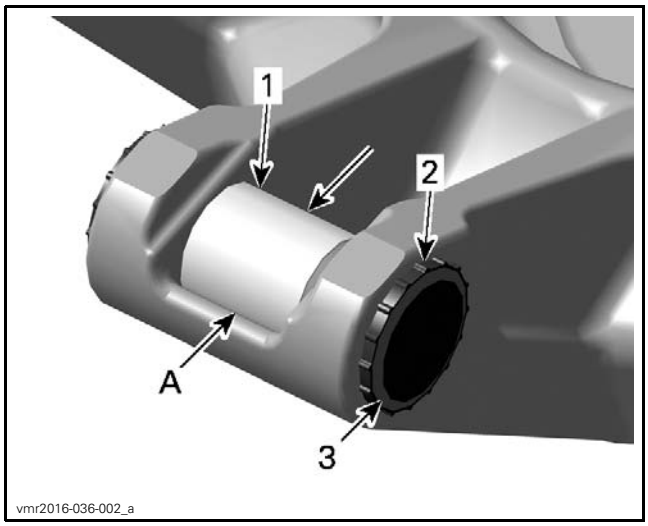
Check each roller for roundness of external diameter.

Check if rollers move freely.

NOTICE Whenever replacing rollers and slider shoes, always replace all rollers and slider shoes as a set.

Check slider shoes for visible wear. If chamfer is not present anymore, replace ALL slider shoes.

NOTE: If necessary, use a screwdriver to remove slider shoes.

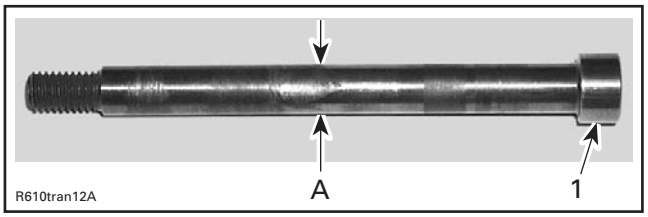


1. Roller
2. Slider shoe
3. Chamfer
A. Roller outer diameter

ROLLER OUTER DIAMETER	
NEW	13.80 mm to 14.00 mm (.543 in to .551 in)
SERVICE LIMIT	13.20 mm (.519 in)
ROLLER INNER DIAMETER	
NEW	8.025 mm to 8.175 mm (.316 in to .322 in)
SERVICE LIMIT	9.000 mm (.354 in)

Centrifugal Lever Pivot Bolt

Measure diameter of centrifugal lever pivot bolt; replace if out of specification.

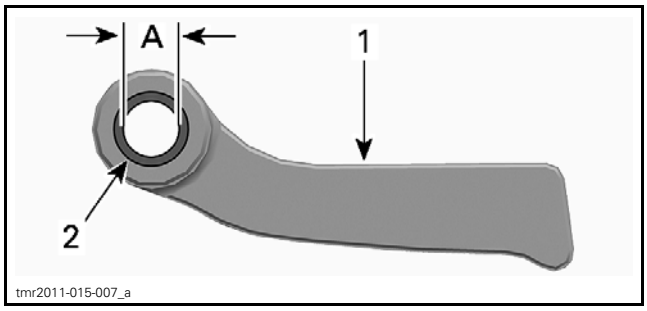


1. Centrifugal lever pivot bolt
A. Measure diameter here

CENTRIFUGAL LEVER PIVOT BOLT DIAMETER	
NEW	6.078 mm to 6.100 mm (.239 in to .24 in)
SERVICE LIMIT	6.000 mm (.236 in)

Centrifugal Lever

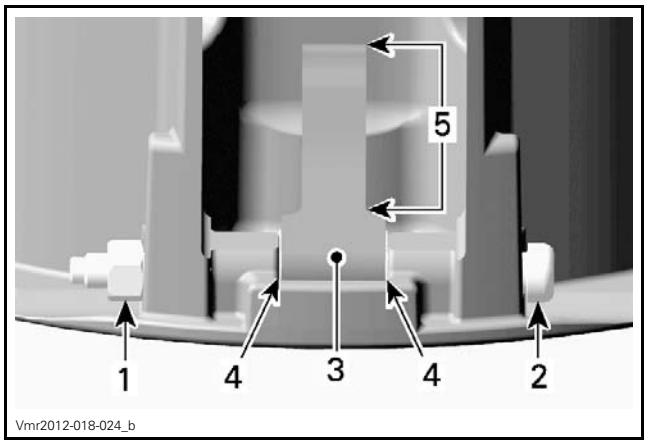
Check bushing diameter in the centrifugal lever for wear. Replace centrifugal lever if necessary.



1. Centrifugal lever
2. Bushing
A. Bushing inner diameter

CENTRIFUGAL LEVER BORE DIAMETER	
NEW	6.035 mm to 6.078 mm (.238 in to .239 in)
SERVICE LIMIT	6.200 mm (.244 in)

Inspect and replace as necessary the following items if their contact surfaces are heavy worn:
– Centrifugal lever
– Thrust washers
– Centrifugal lever pivot bolts
– Lock nuts.



1. Lock nut
2. Centrifugal lever pivot bolt
3. Centrifugal lever
4. Thrust washers
5. Contact surface to the roller

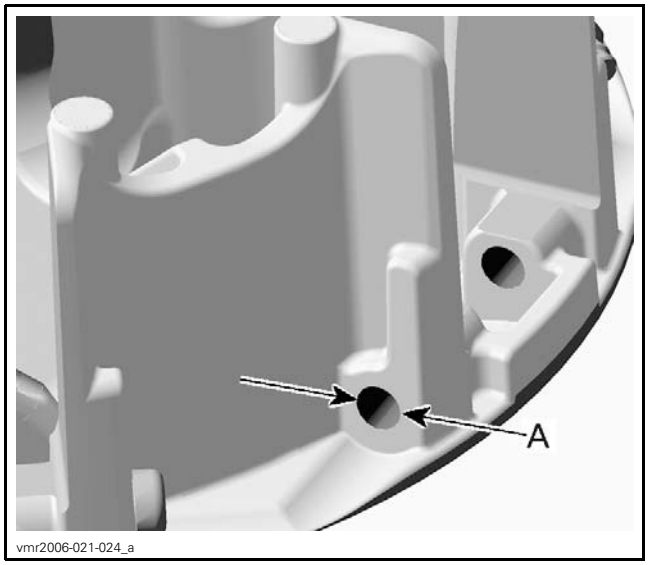
⚠ WARNING

Whenever replacing centrifugal levers, always replace all levers as a set. Otherwise, drive pulley unbalance will occur.

Sliding Sheave

Check sliding sheave for cracks and sliding contact surface for excessive wear. Replace sliding sheave if necessary.

Measure centrifugal lever pivot bolt bores. Replace sliding sheave if bores are out of specification or otherwise damaged.



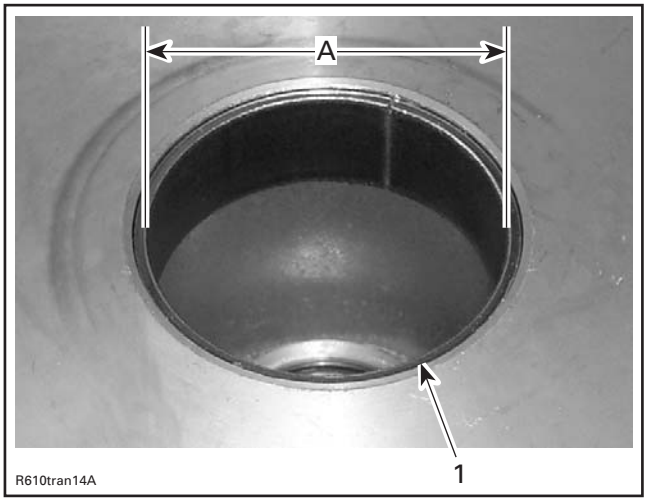
A. Centrifugal lever pivot bolt bore diameter

CENTRIFUGAL LEVER PIVOT BOLT BORE DIAMETER	
NEW	6.113 mm to 6.171 mm (.241 in to .243 in)
SERVICE LIMIT	6.300 mm (.248 in)

Measure bushing diameters of sliding sheave.

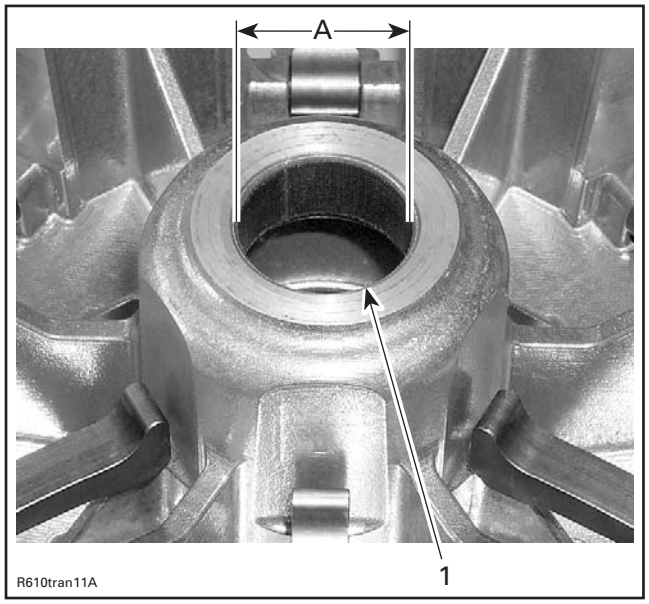
REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge



1. Bushing on fixed sheave side
A. Bore diameter of bushing

SLIDING SHEAVE LARGE BUSHING	
NEW	55.000 mm to 55.040 mm (2.165 in to 2.167 in)
SERVICE LIMIT	55.200 mm (2.173 in)



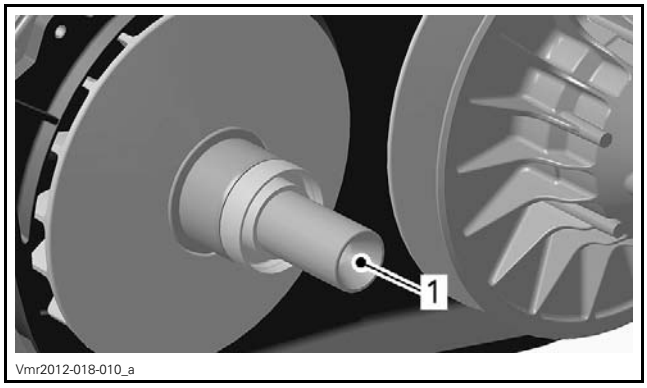
1. Bushing on governor cup side
A. Bore diameter of bushing

SLIDING SHEAVE SMALL BUSHING	
NEW	32.000 mm to 32.040 mm (1.26 in to 1.261 in)
SERVICE LIMIT	32.200 mm (1.268 in)

Replace sliding sheave if one of the bushings is out of specification. Visually inspect coatings for wear.

Fixed Sheave

Check fixed sheave contact surface to the governor cup for scratches or other damages. If damaged, replace fixed sheave.



1. Visually check here

Check for any marks on fixed sheave plate. Replace if necessary.

Spring

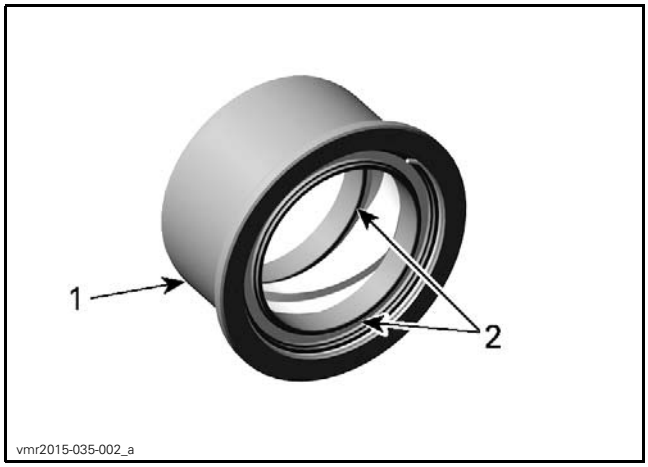
Measure spring free length and squareness. If spring is out of specification, replace by a new one.

CLUTCH SPRING FREE LENGTH		
570 ENGINE	SERVICE LIMIT	85 mm (3.346 in)
850 ENGINE	SERVICE LIMIT	95 mm (3.74 in)
CLUTCH SPRING SQUARENESS		
ALL ENGINES	SERVICE LIMIT	4 mm (.157 in)

One-Way Clutch

Check bearings for excessive play and smooth operation. Replace bearings if necessary.

NOTICE Be careful not to damage the inside of one-way clutch during bearing removal.



1. One-way clutch
2. Bearings

Measure length of spring sleeves and check if edges on top of the spring sleeve are excessively worn. If out of specification, replace both spring sleeves at the same time.

SPRING SLEEVE LENGTH	
NEW	9.2 mm to 9.4 mm (.362 in to .37 in)
SERVICE LIMIT	9.0 mm (.354 in)

Assembling the Drive Pulley

For assembly, reverse the disassembly procedure. Pay attention to following details.

One-Way Clutch

Clean parts.

Lubricate springs, spring sleeves and between one way clutch bearings using recommended product.

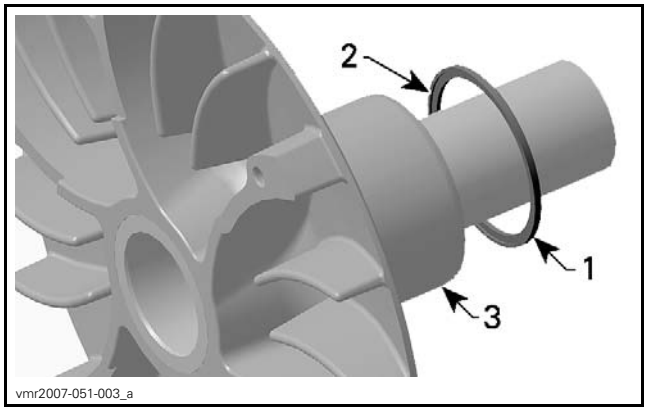
REQUIRED PRODUCT
ISOFLEX GREASE TOPAS NB 52 (P/N 293 550 021)

Friction Washer

NOTE: Apply recommended grease on both sides of friction washer.

REQUIRED PRODUCT
ISOFLEX GREASE TOPAS NB 52 (P/N 293 550 021)

NOTE: Friction washer must be assembled with collar towards one way clutch.



1. Friction washer
2. Collar
3. One way clutch

Sliding Sheave

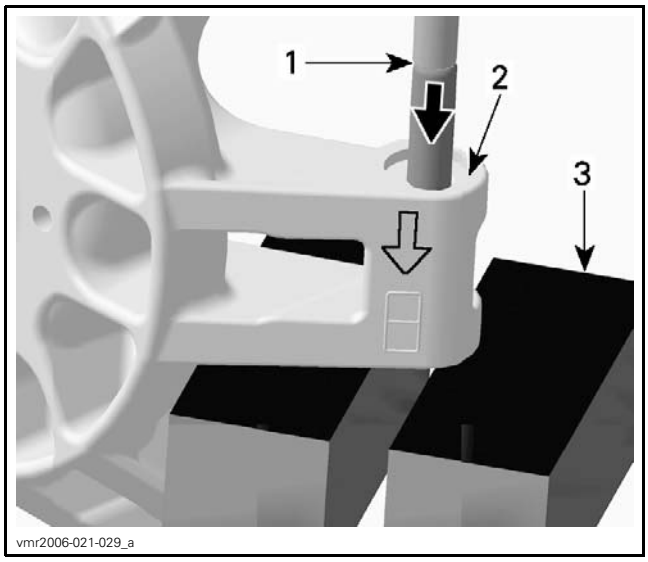
Install centrifugal levers with their thrust washers.

NOTICE Centrifugal levers must move easily after installation.

Governor Cup

Rebuild governor cup with new roller sleeves, rollers and slider shoes.

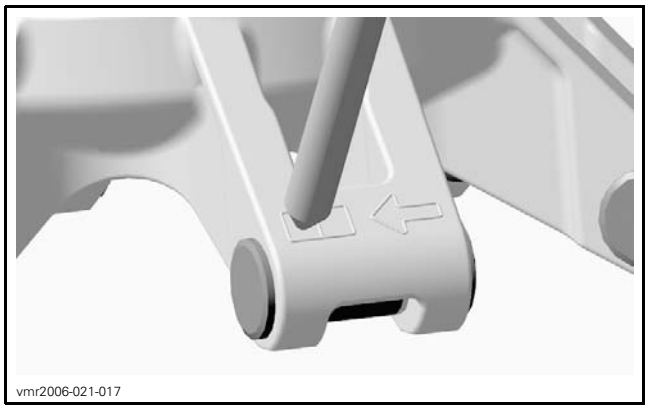
NOTICE Final position of roller sleeves must be flush with the sleeve bore in the governor cup arm (no protrusion).



1. *Top edge of roller sleeve*
2. *Mating surface of slider shoes*
3. *Vice*

Whenever replacing the roller sleeves, make a mark in the box on the governor arm using a punch.

NOTICE Do not tap too hard. Severe damage to the governor cup may appear.



NOTICE Rollers must move easily after installation.

Carefully press slider shoes in the governor cup arm so they **bottom out evenly** in the machined portion of the governor cup arm.

NOTICE Slider shoes must be pressed in evenly to ensure they are centered in the arm and slide properly in the guides.

Installing the Drive Pulley

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

⚠ WARNING

Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.

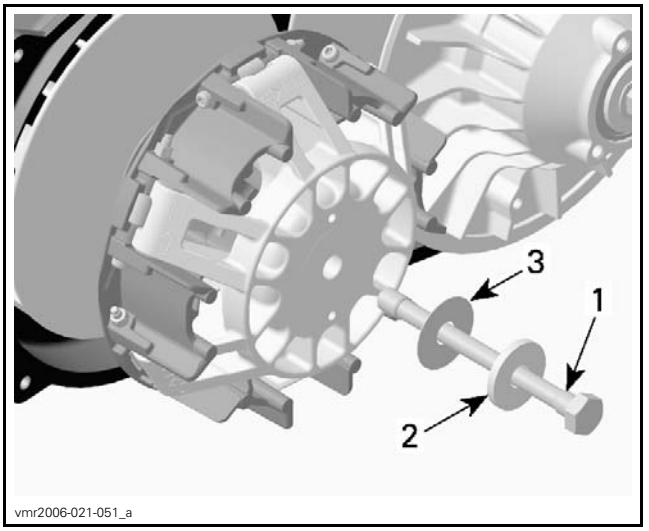
NOTICE Never use any type of impact wrench for drive pulley removal and installation.

Clean mounting surfaces as described in *DRIVE PULLEY CLEANING*.

Install drive pulley on crankshaft extension.

NOTICE Do not forget to install thrust washer and conical spring washer as per illustration that follows.

NOTE: Install conical spring washer with its concave side towards drive pulley.



1. *Drive pulley screw*
2. *Conical spring washer*
3. *Thrust washer*

⚠ WARNING

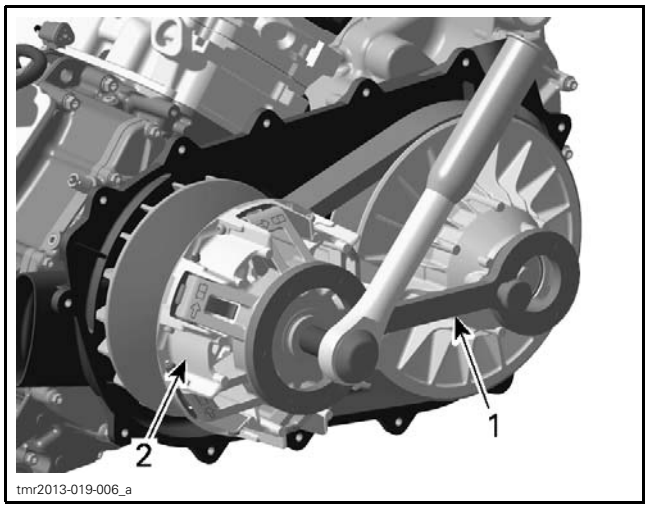
Never substitute conical spring washer and/or screw with aftermarket parts. Always use genuine BRP parts.

Lock the drive pulley as per removal procedure.

Tighten drive pulley screw to specification.

NOTICE Never use any type of impact wrench for drive pulley installation.

TIGHTENING TORQUE	
Drive pulley screw	120 N•m ± 8 N•m (89 lbf•ft ± 6 lbf•ft)



1. *Clutch holder (P/N 529 036 238)*
2. *Drive pulley*

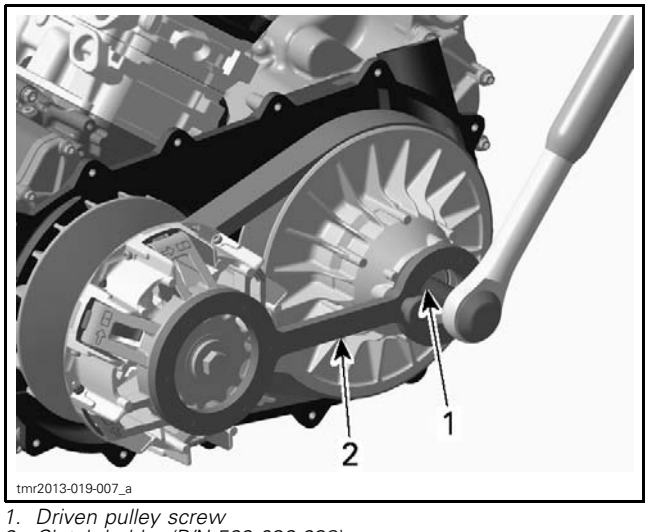
DRIVEN PULLEY

Removing the Driven Pulley

1. Remove drive belt, refer to *DRIVE BELT REMOVAL* in this subsection.
2. Hold the driven pulley and loosen the driven pulley screw.

NOTE: Do not completely remove the driven pulley screw.

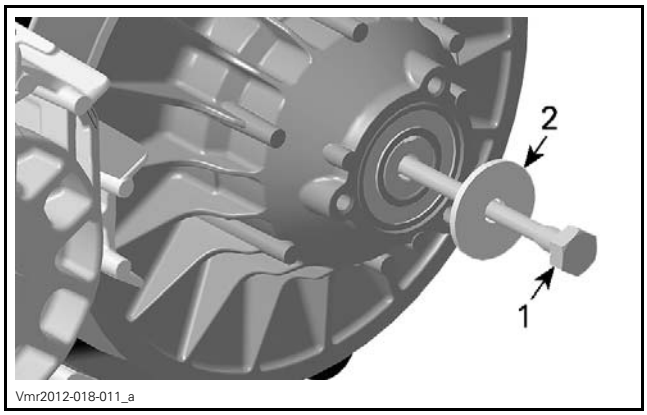
REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. *Driven pulley screw*
2. *Clutch holder (P/N 529 036 238)*

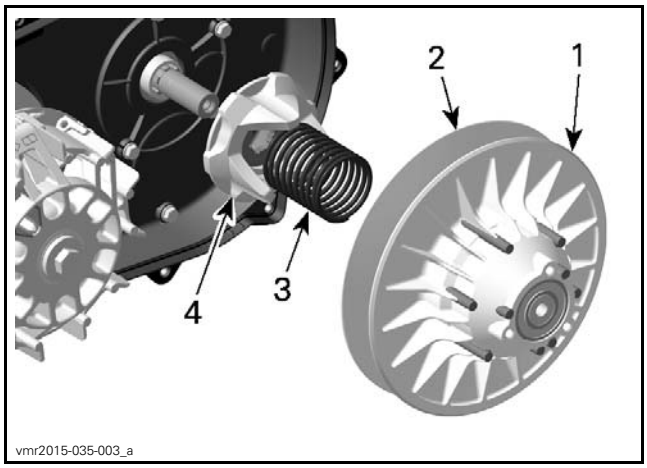
3. Remove service tool.
4. Apply axial pressure with your hand on driven pulley and maintain during screw removal.
5. Remove driven pulley screw and washer. Discard driven pulley screw.

⚠ CAUTION Driven pulley is spring loaded. Hold driven pulley tight and slowly remove the driven pulley screw to release spring tension.



1. *Driven pulley screw*
2. *Thrust washer*

6. Remove the driven pulley with the spring and the cam.

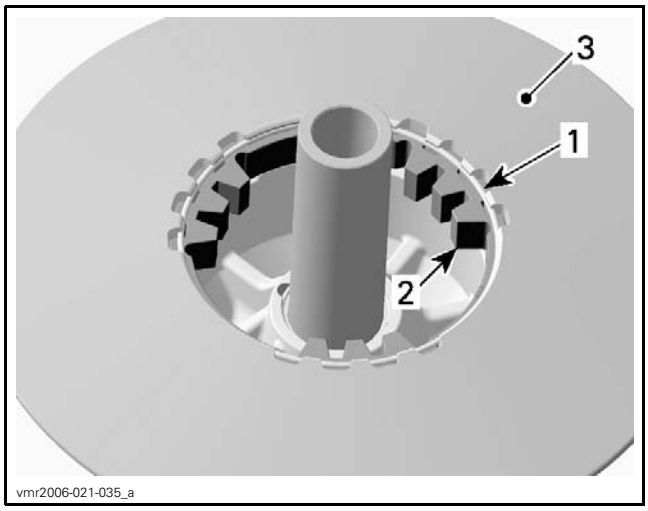


1. *Fixed sheave of driven pulley*
2. *Sliding sheave of driven pulley*
3. *Spring*
4. *Cam*

Disassembling the Driven Pulley

Fixed Sheave

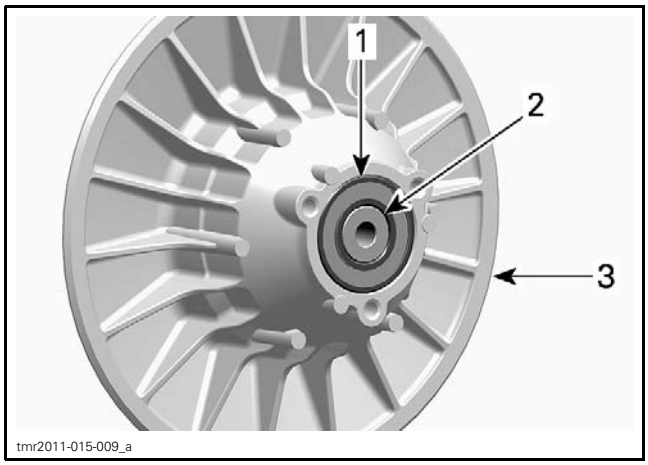
1. Remove retaining ring and lift torque gear.



1. *Retaining ring*
2. *Torque gear*
3. *Fixed sheave of driven pulley*

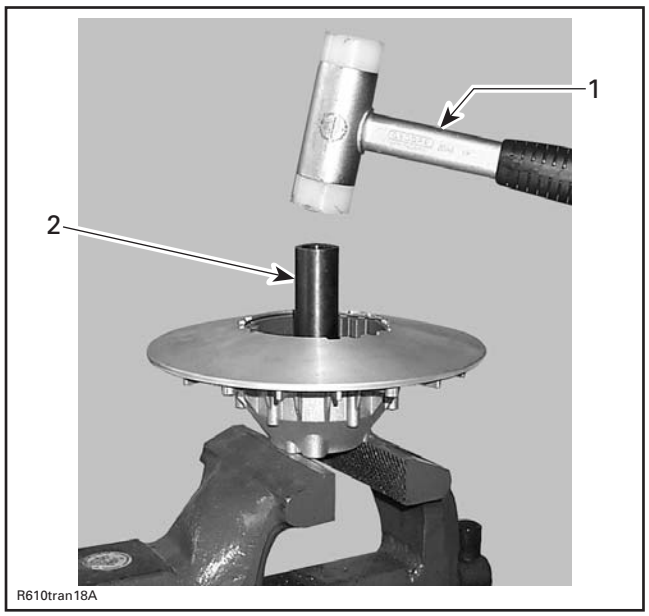
NOTE: The following procedure is not necessary except if ball bearing or shaft must be removed. Refer to *INSPECTION* before proceeding.

2. Heat ball bearing area up to 100°C (212°F) before removing ball bearing.



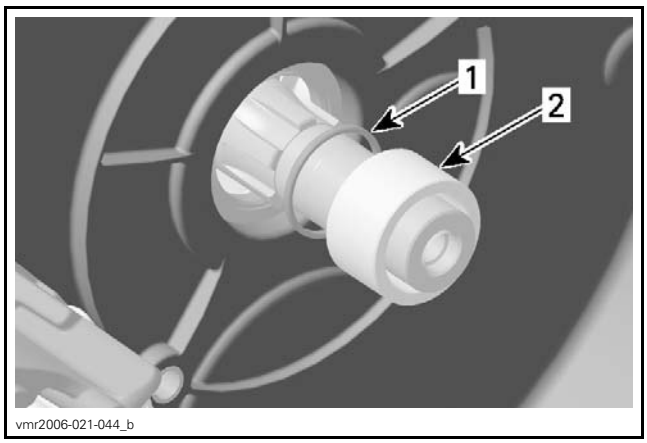
1. *Ball bearing*
2. *Shaft*
3. *Fixed sheave of driven pulley*

3. Use a soft hammer to push shaft and bearing out of fixed sheave.



1. *Soft hammer*
2. *Shaft*

4. Remove shaft from ball bearing.
5. Remove distance sleeve and O-ring from countershaft.
6. Replace O-ring if brittle, hard or damaged.



1. *O-ring*
2. *Distance sleeve*

Cleaning the Driven Pulley

When a dust deposit has to be removed from the cam or the shaft, use a dry cloth.

Clean pulley faces and shaft using fine steel wool and a dry cloth.

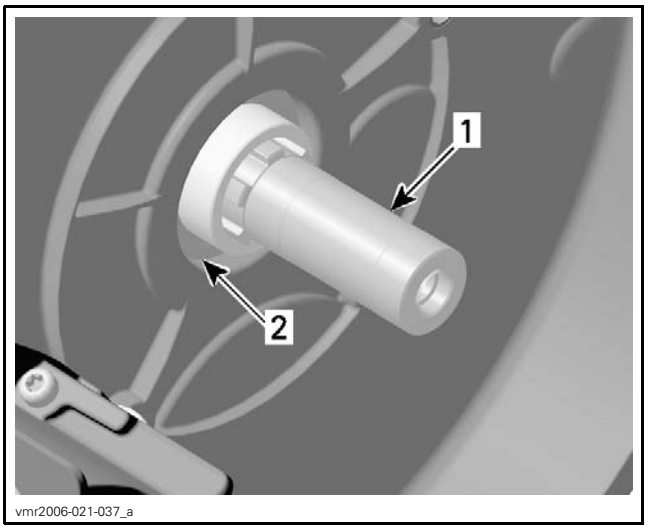
Clean driven pulley using the recommended product.

RECOMMENDED PRODUCT
PULLEY FLANGE CLEANER (P/N 413 711 809)

Clean the CVT air guide area from contamination.

Using a paper towel with PULLEY FLANGE CLEANER (P/N 413 711 809), clean countershaft end and shaft bore.

NOTICE To avoid damage, make sure cleaner does not contact the countershaft oil seal.



1. Countershaft support
2. Countershaft oil seal

Inspecting the Driven Pulley

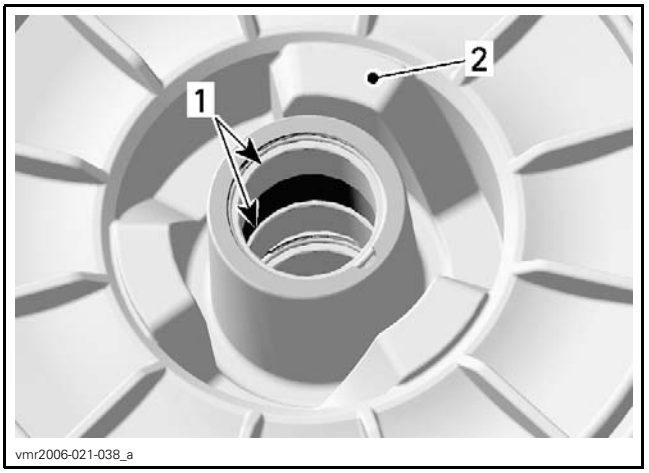
Sliding Sheave

Check sliding sheave for cracks and sliding contact surface for excessive wear. Replace sliding sheave if necessary.

Check bushings for cracks, scratches and for freedom of movement when assembled to sliding sheave.

Measure bushing inner diameter.

NOTE: Bushings cannot be replaced. Replace sliding sheave if bushings are out of specification. Visually inspect coatings.



1. Bushings
2. Backside of sliding sheave of driven pulley

REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge

BUSHING INNER DIAMETER	
NEW	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
SERVICE LIMIT	30.200 mm (1.189 in)

Fixed Sheave

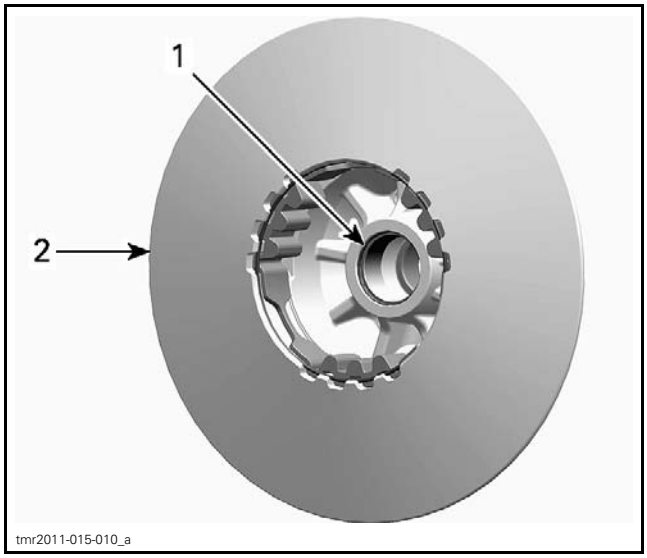
Check fixed sheave for cracks and excessive wear. Replace fixed sheave if necessary.

Check ball bearing for free play and smooth operation. Replace if necessary.

Check shaft for heavy wear or visible damage. Replace if necessary.

If the shaft is removed, measure bushing inner diameter.

NOTE: This bushing cannot be replaced. Replace fixed sheave if bushing is out of specification. Visually inspect coatings.



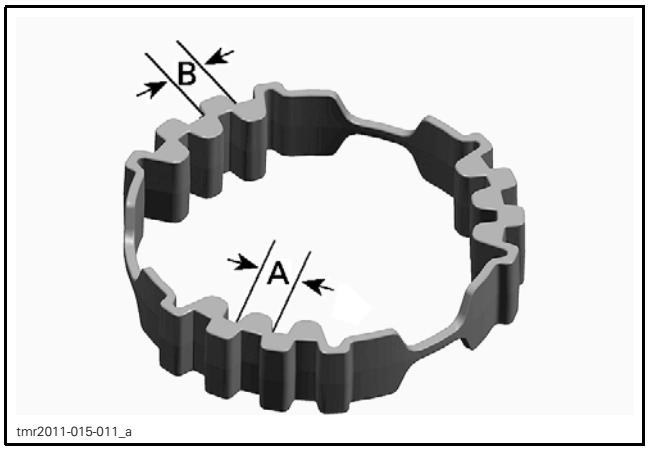
1. Bushing
2. Fixed sheave of driven pulley

REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge

BUSHING INNER DIAMETER	
NEW	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
SERVICE LIMIT	30.200 mm (1.189 in)

Check torque gear for visible damage and cracks. Measure for wear limit using a caliper.

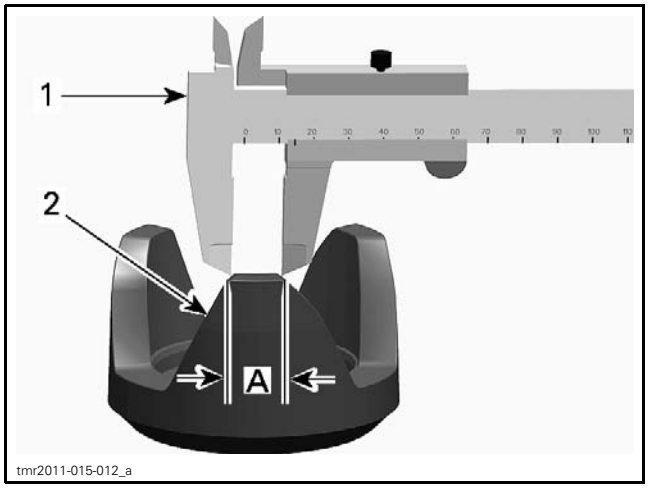


A. Measurement inside
B. Measurement outside

WEAR ON TEETH (BOTH SIDES)	
SERVICE LIMIT	7.500 mm (.295 in)

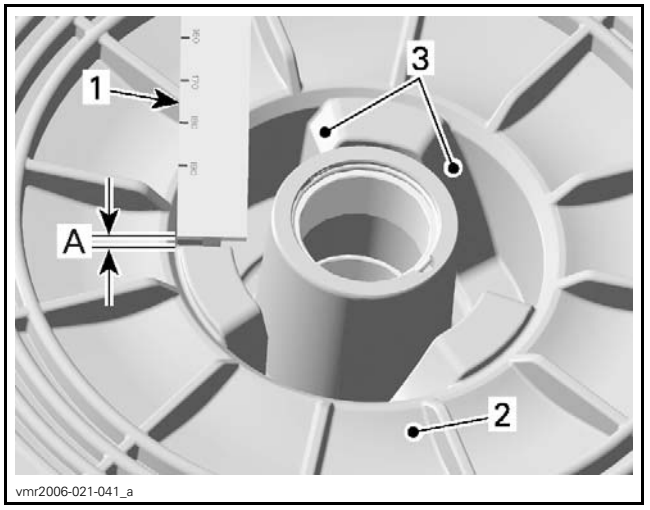
Cam

Check cam for visible damage and measure for wear using a caliper.



1. Caliper
2. Contact surface

WIDTH ON TOP SURFACE	
SERVICE LIMIT	16.0 mm (.63 in)

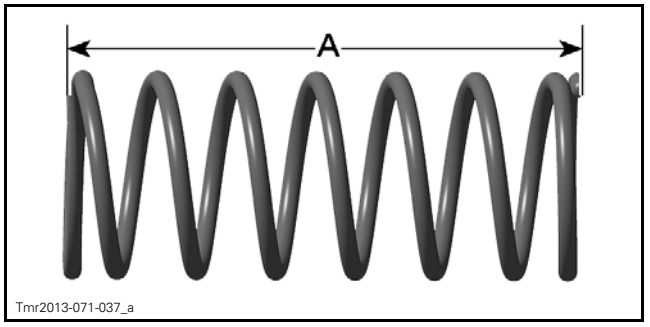


1. Caliper
2. Sliding sheave
3. Contact surface
A. Wear to be measured

WEAR ON CONTACT SURFACE	
SERVICE LIMIT	1.00 mm (.039 in)

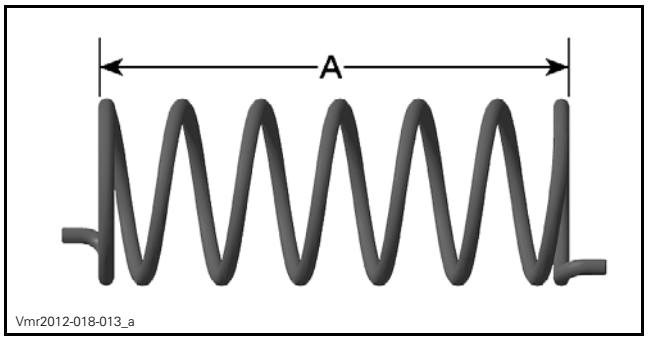
Spring

570 Engine



CVT DRIVEN SPRING
A. Spring free length

850 Engine



CVT DRIVEN SPRING
A. Spring free length

All Engines

Measure spring free length and squareness. If spring is out of specification, replace by a new.

SPRING FREE LENGTH		
ALL ENGINES	Service limit	125 mm (4.921 in)

CLUTCH SPRING SQUARENESS		
ALL ENGINES	Service limit	3.8 mm (.15 in)

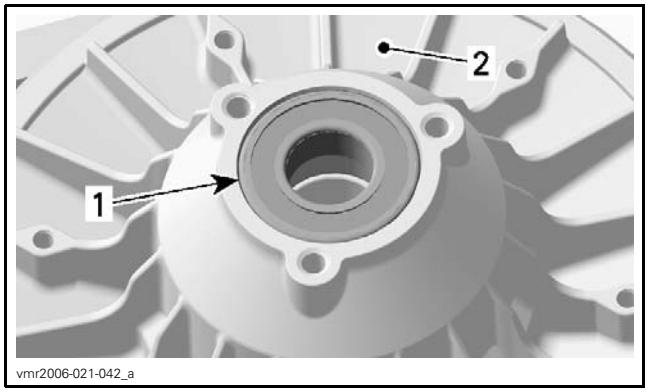
Assembling the Driven Pulley

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

Heat ball bearing area up to 100°C (212°F) before ball bearing installation.

NOTE: Place new ball bearing in a freezer for 10 minutes before installation.

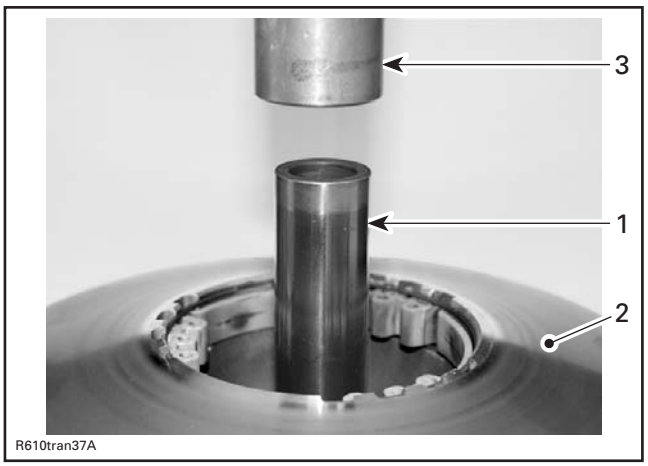
Install ball bearing with the writing on top and press it in using only the outer race.



vmr2006-021-042_a

1. Ball bearing
2. Fixed sheave of driven pulley

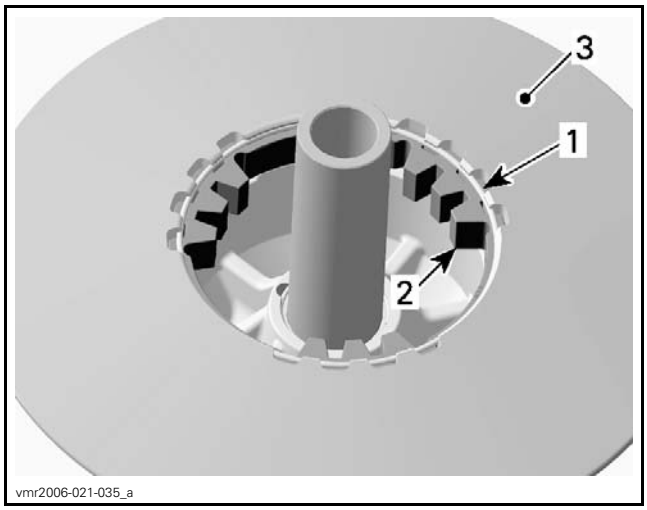
NOTICE Do not use a hammer, bearing must be pressed in only.



R610tran37A

1. Shaft
2. Fixed sheave
3. Press machine

Install torque gear then secure it with the retaining ring.



vmr2006-021-035_a

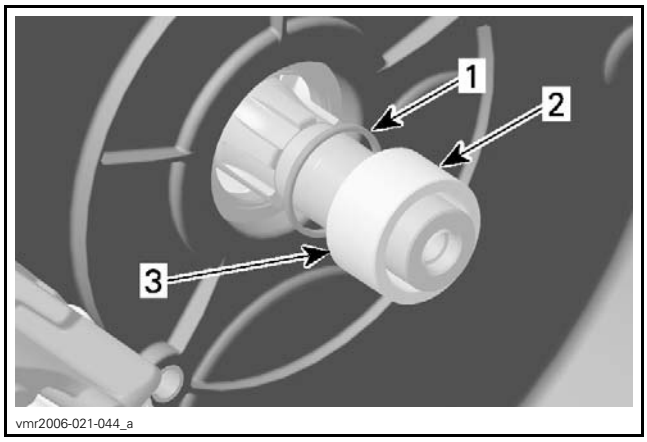
1. Retaining ring
2. Torque gear
3. Fixed sheave of driven pulley

Installing the Driven Pulley

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

Place O-ring on countershaft splines and move it and the distance sleeve into position.

NOTICE Chamfer on inside diameter of the distance sleeve must face to gearbox side.



vmr2006-021-044_a

1. O-ring
2. Distance sleeve
3. Chamfered area of distance sleeve

NOTICE Threads of gearbox countershaft and driven pulley screw must be free of oil and grease. Lubricants in threads will create too high preload to tightened driven pulley screw.

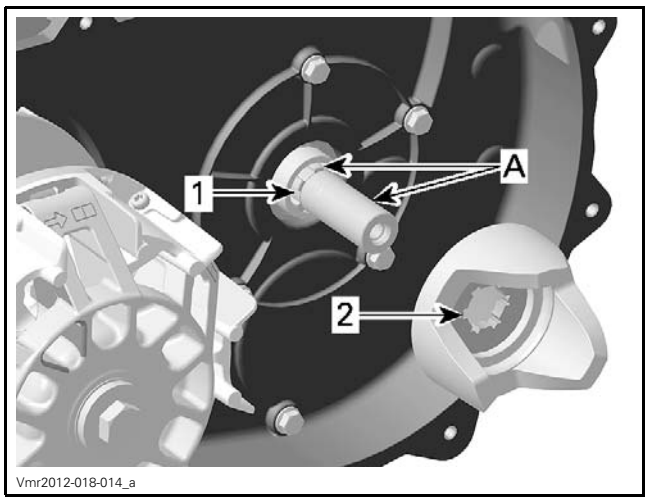
Clean threads using PULLEY FLANGE CLEANER (P/N 413 711 809).

570 Engine

Install cam on countershaft.

NOTICE Cam splines must engage on countershaft splines.

REQUIRED PRODUCT	
Countershaft splines and countershaft end	LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

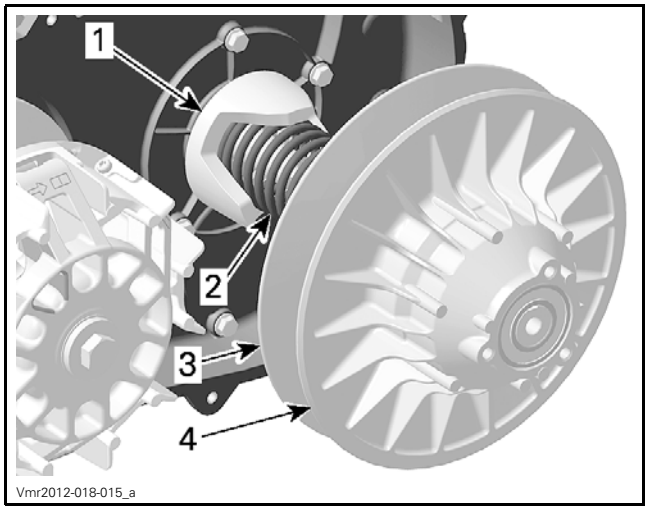


TYPICAL
1. *Countershaft splines*
2. *Cam splines*

A. Loctite 767 here

Insert sliding sheave in fixed sheave.

Place spring behind sliding sheave then align driven pulley with cam.



TYPICAL
1. *Cam*
2. *Spring*
3. *Sliding sheave*
4. *Fixed sheave*

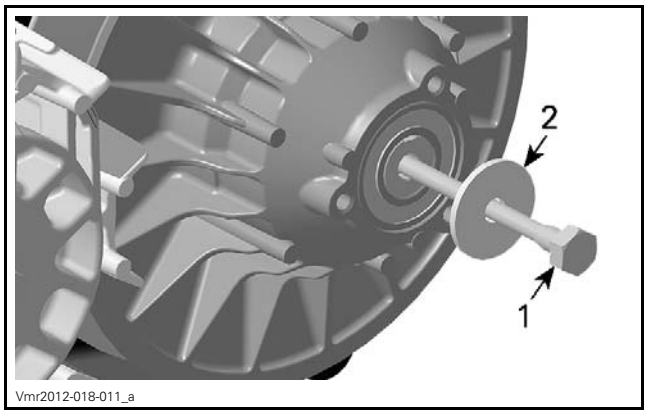
With your hand, push the driven pulley onto the shaft to compress the spring.

NOTICE A cam not correctly engaged will cause damage to the driven pulley and cam.

As you hold the pulley compressed, install a NEW driven pulley screw and thrust washer.

NOTICE This assembly uses a stretch screw. Always install a NEW screw.

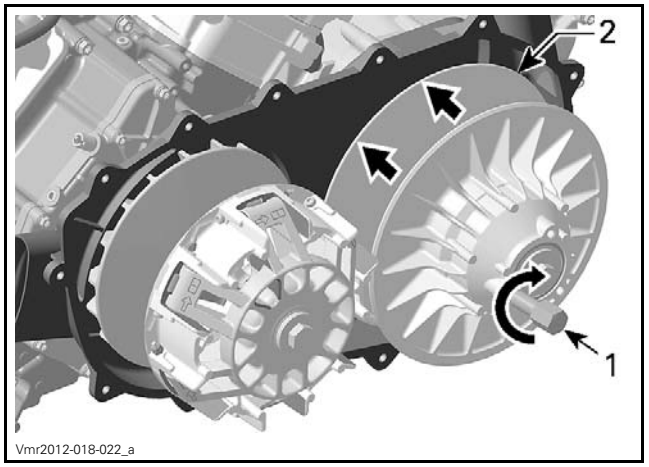
NOTE: Tighten the screw with your hand sufficiently for the cam to remain engaged.



1. *Driven pulley screw*
2. *Thrust washer*

Install drive belt. Refer to *DRIVE BELT* in this subsection.

REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	



1. *Puller/locking tool*
2. *Sliding sheave*

NOTE: If driven pulley sheaves cannot be opened when the service tool is screwed in, the cam is not correctly engaged in the sliding sheave.

Tighten driven pulley screw to specification.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	

TIGHTENING TORQUE		
Driven pulley screw	Step A	20 N•m ± 1 N•m (15 lbf•ft ± 1 lbf•ft)
	Step B	180° ± 5°

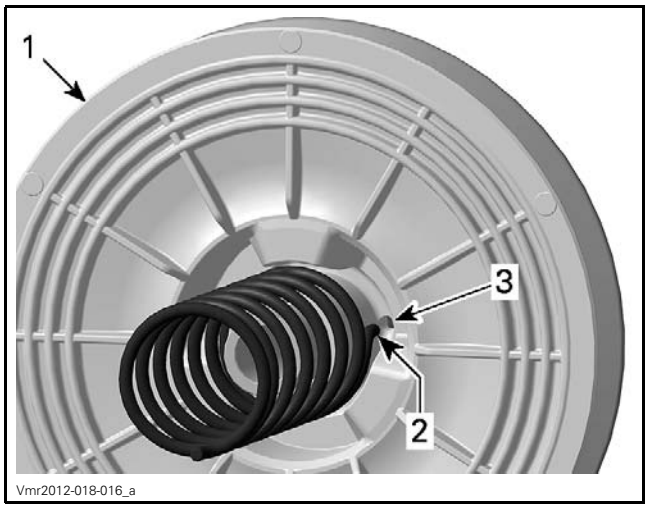
Check driven pulley end play.

SPECIFICATION	
Driven pulley end play	0 mm (0 in)

850 Engine

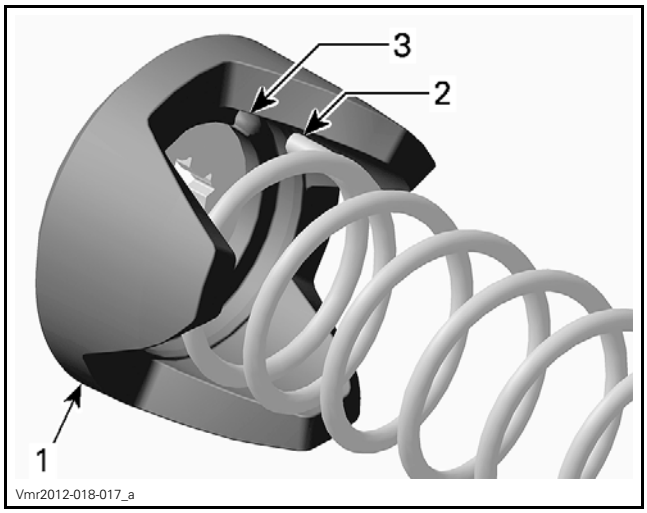
Insert the sliding sheave in the fixed sheave.

Place spring behind sliding sheave and engage spring end in the sliding sheave spring bore.



850 ENGINE
1. *Sliding sheave*
2. *Spring end*
3. *Spring bore*

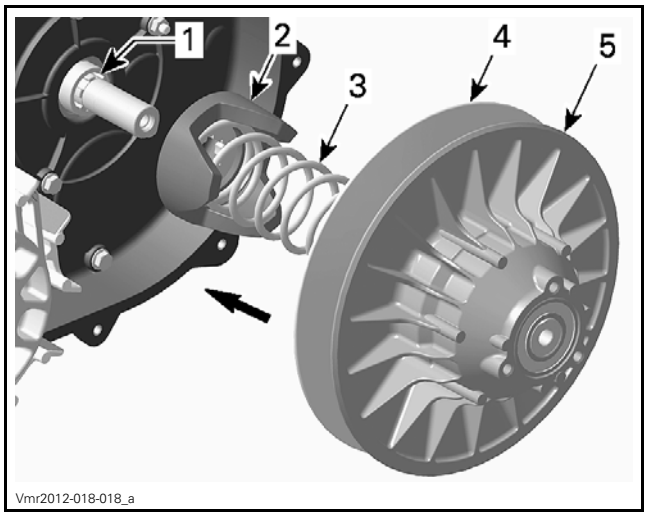
Place cam on the opposite end of the spring and engage the other spring end in the cam spring bore.



850 ENGINE
1. *Cam*
2. *Spring end*
3. *Spring bore*

Install pre-assembled cam with spring and driven pulley on countershaft end.

NOTICE Cam must engage on countershaft splines.



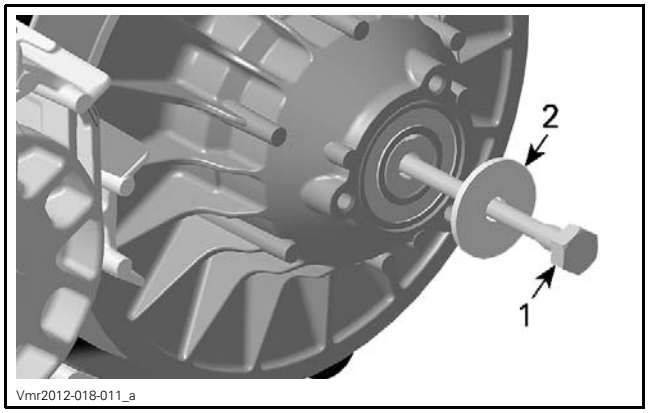
850 ENGINE
1. *Countershaft splines*
2. *Cam*
3. *Spring*
4. *Sliding sheave*
5. *Fixed sheave*

With your hand, push the driven pulley onto the shaft to compress the spring.

As you hold the pulley in, install a NEW driven pulley screw and thrust washer.

NOTICE This assembly uses a stretch screw. Always install a NEW screw.

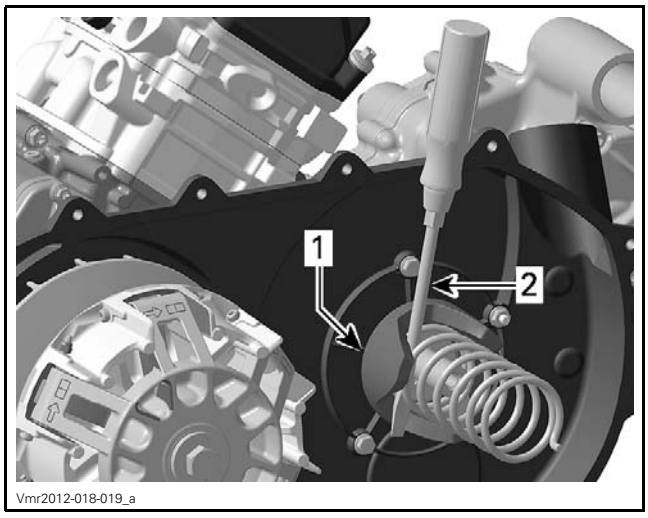
NOTE: Tighten the screw with your hand approximately 3 to 4 turns.



1. Driven pulley screw
2. Thrust washer

Insert a screwdriver of approximately 5 mm (.197 in) diameter in the cam.

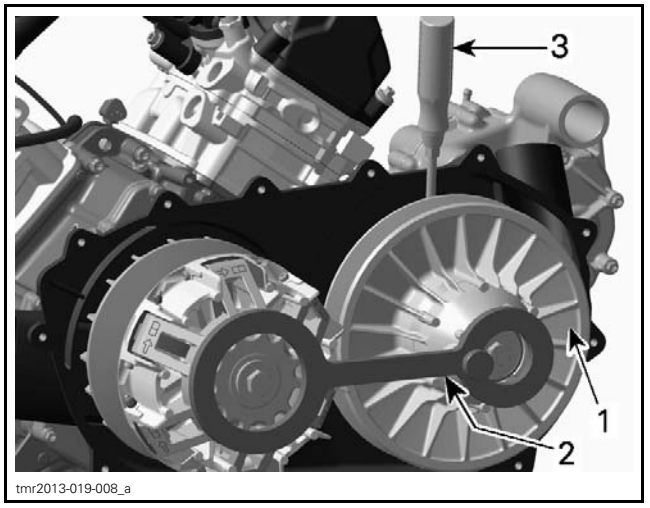
NOTE: For clarity of understanding, some parts not shown in the following illustration.



850 ENGINE
1. Cam
2. Screwdriver, diameter 5 mm (.197 in)

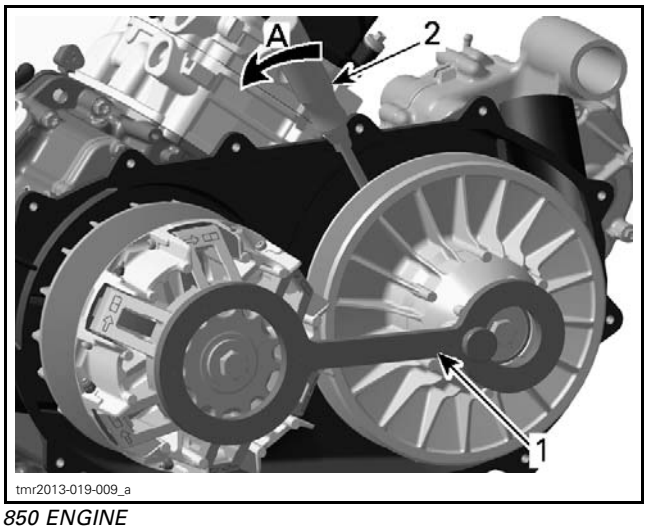
Hold the driven pulley in a fix position.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



850 ENGINE
1. Fixed sheave
2. Clutch holder
3. Screwdriver

Turn the screwdriver approximately 20° counterclockwise until cam engages in the driven pulley sliding sheave and hold it in this position (spring preload).



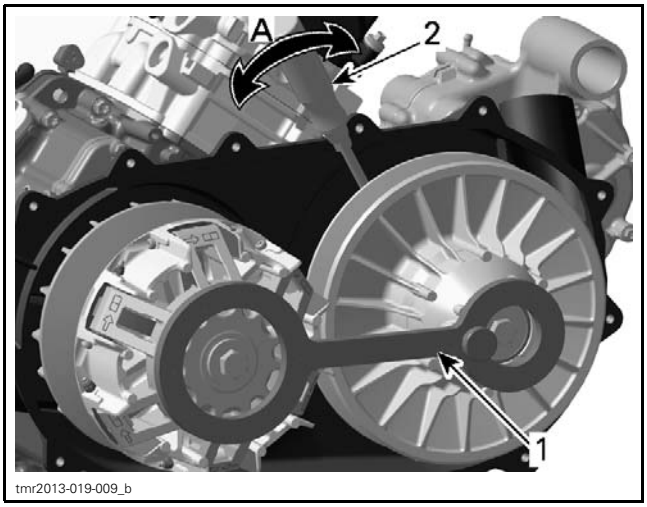
850 ENGINE
1. Clutch holder
2. Screwdriver
A. Turn counterclockwise

Using a socket and extension, hand tighten the driven pulley screw.

NOTE: Do not apply specified torque at this time.

Move the screwdriver back and forth to check cam for free movement.

NOTICE **A cam not correctly engaged will cause damage to the driven pulley and cam.**

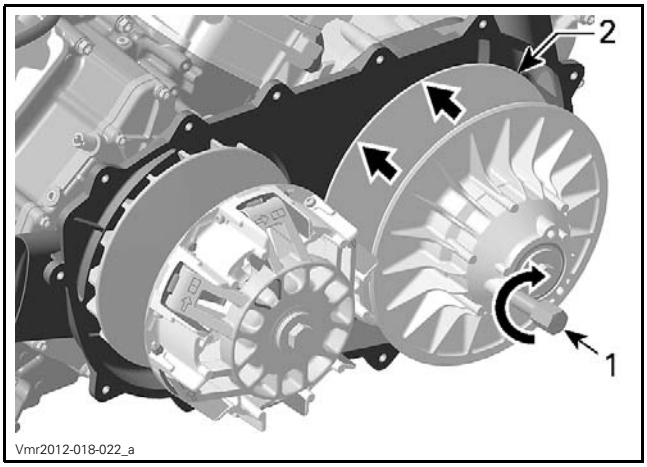


850 ENGINE
1. *Clutch holder*
2. *Screwdriver*

A. Cam freedom of movement

Install drive belt. Refer to *DRIVE BELT* in this subsection.

REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	



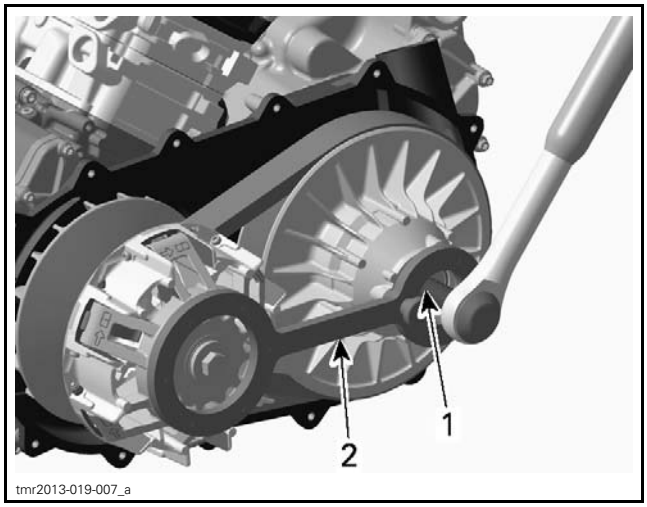
1. *Puller/locking tool*
2. *Sliding sheave*

NOTE: If driven pulley sheaves can to be opened when the service tool is screwed in, the cam is not correctly engaged in the sliding sheave.

Tighten driven pulley screw as specified.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	

TIGHTENING SEQUENCE (DRIVEN PULLEY SCREW)	
STEP 1	20 N•m ± 1 N•m (15 lbf•ft ± 1 lbf•ft)
STEP 2	180° ± 5°



1. *Driven pulley screw*
2. *Clutch holder*

Check driven pulley end play.

SPECIFICATION	
Driven pulley end play	0 mm (0 in)

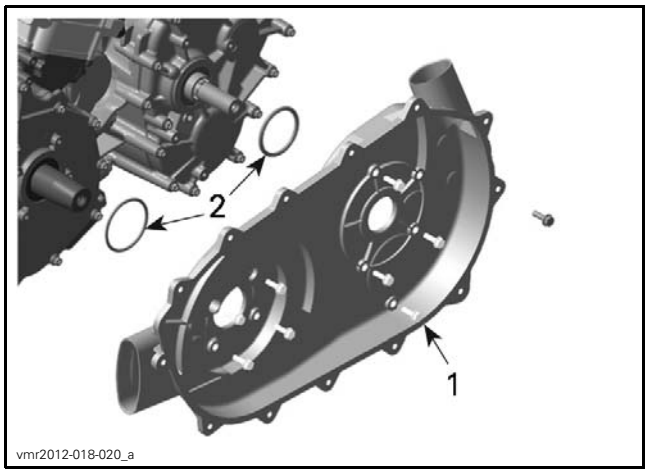
CVT AIR GUIDE

Removing the CVT Air Guide

1. Remove the *DRIVE PULLEY* and the *DRIVEN PULLEY*.
2. Unscrew the clamps retaining the CVT air hoses.
3. Remove CVT air guide.
4. Remove and discard O-rings.

Inspecting the CVT Air Guide

Clean CVT air guide from contamination.



1. CVT air guide
2. O-rings

Installing the CVT Air Guide

For installation reverse the removal procedure.

Always install **NEW** O-rings before installing the CVT air guide.

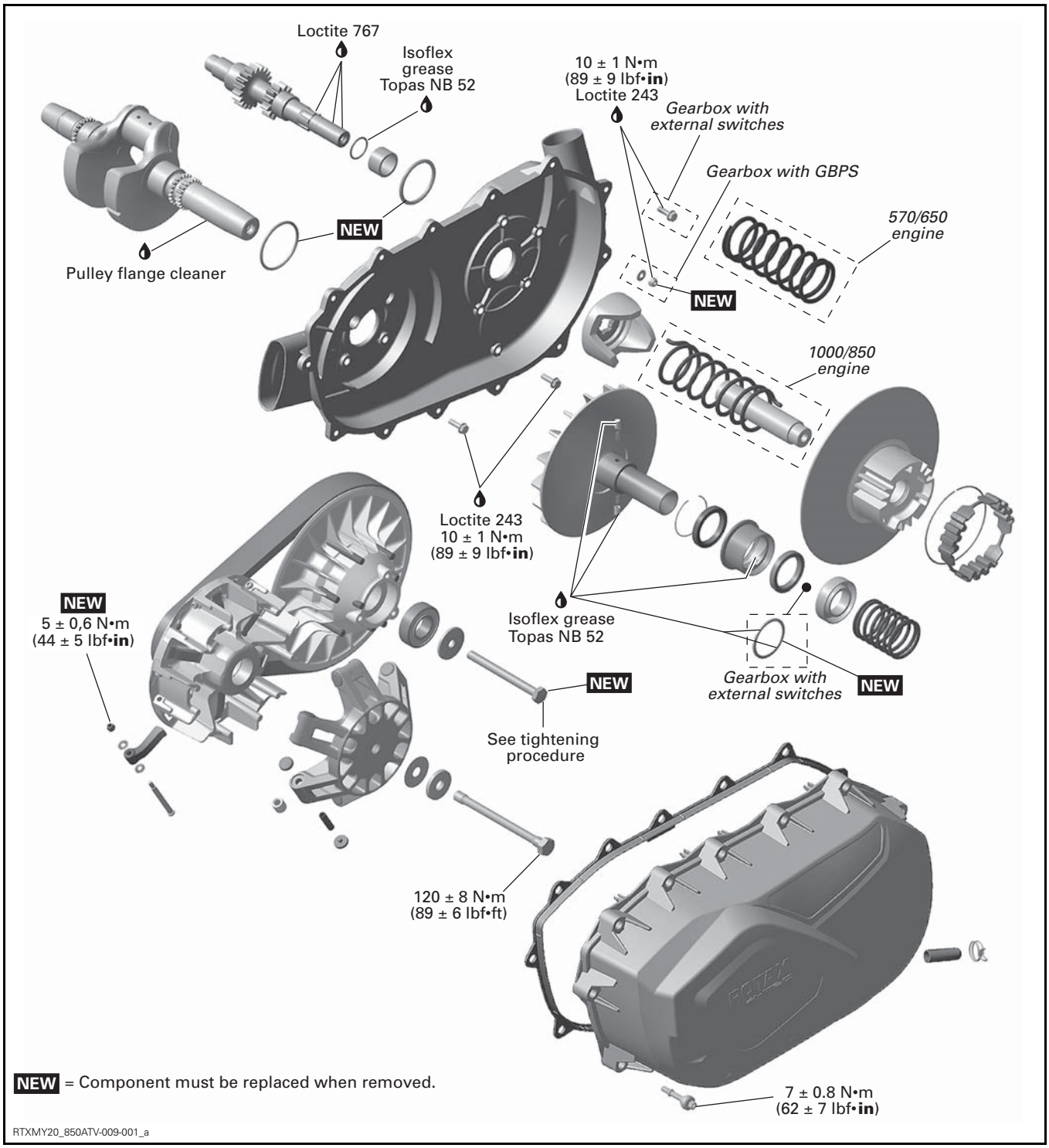
CONTINUOUSLY VARIABLE TRANSMISSION (CVT)

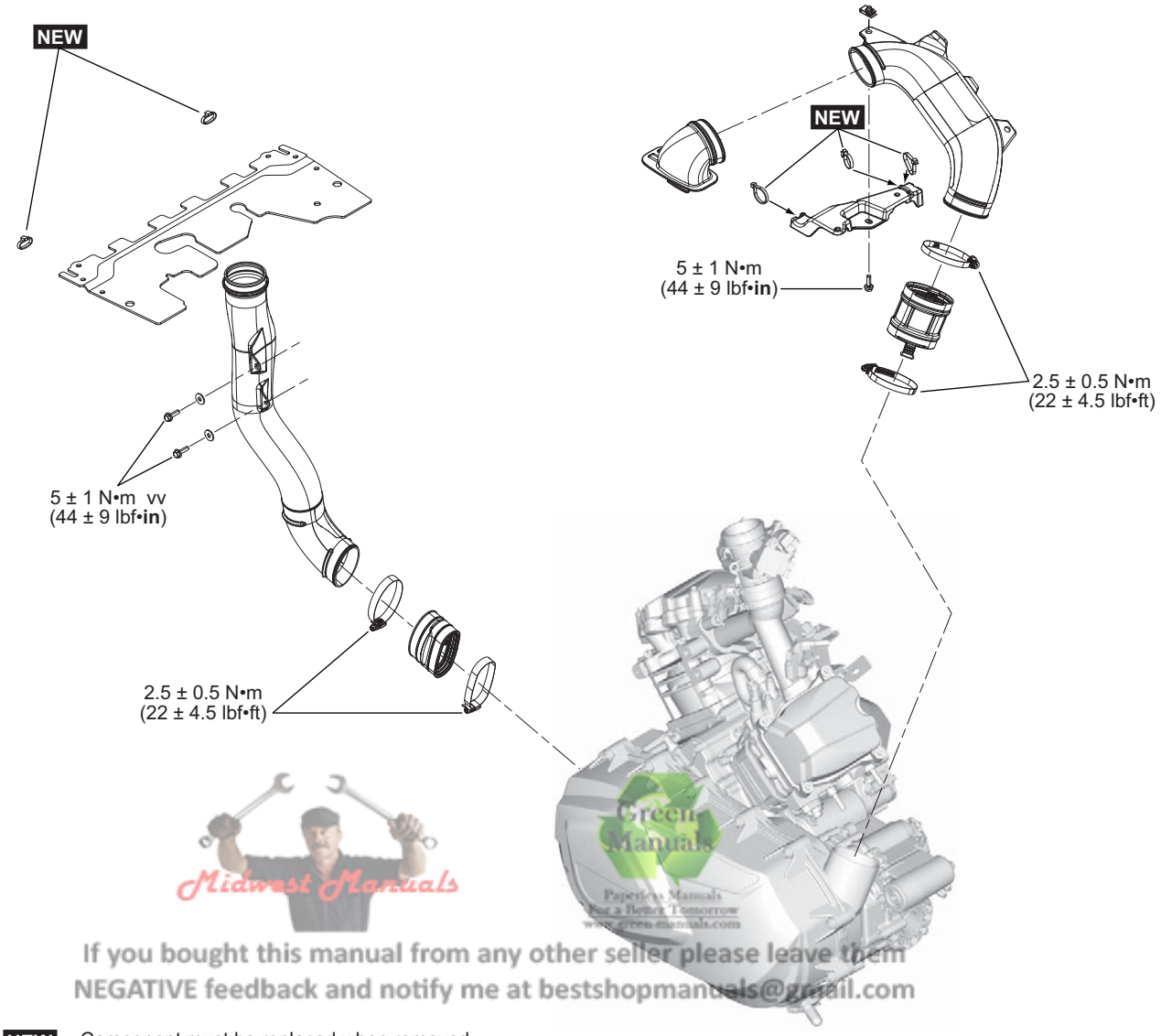
SERVICE TOOLS

Description	Part Number	Page
CLUTCH HOLDER	529 036 238	6, 14, 21–23
CLUTCH PULLER	529 035 746	6
PULLER/LOCKING TOOL	529 036 098	5, 20, 23

SERVICE PRODUCTS

Description	Part Number	Page
CLUTCH AND PULLEY FLANGE CLEANER PRO S1	779244	9, 12, 16, 20
ISOFLEX GREASE TOPAS NB 52	293 550 021	12–13
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	20
PULLEY FLANGE CLEANER (F)	619 600 022	9, 12, 16, 20


Loctite 767
Isoflex grease Topas NB 52
10 ± 1 N•m (89 ± 9 lbf•in) Loctite 243
Gearbox with external switches
Gearbox with GBPS
570/650 engine
NEW
Pulley flange cleaner
NEW
1000/850 engine
Loctite 243
10 ± 1 N•m
(89 ± 9 lbf•in)
NEW
5 ± 0,6 N•m
(44 ± 5 lbf•in)
Isoflex grease Topas NB 52
NEW
Gearbox with external switches
NEW
See tightening procedure
120 ± 8 N•m
(89 ± 6 lbf•ft)
7 ± 0.8 N•m
(62 ± 7 lbf•in)
NEW = Component must be replaced when removed.
RTXMY20_850ATV-009-001_a



Midwest Manuals
Green Manuals
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

NEW = Component must be replaced when removed.

RTXMY20_850ATV-009-100_a

GENERAL

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

⚠ WARNING

Never touch CVT while engine is running. Never drive vehicle when CVT cover is removed.

⚠ WARNING

Any drive pulley repairs must be performed by an authorized Can-Am dealer. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

⚠ WARNING

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly.

PROCEDURES

CVT COVER

CVT Cover Access

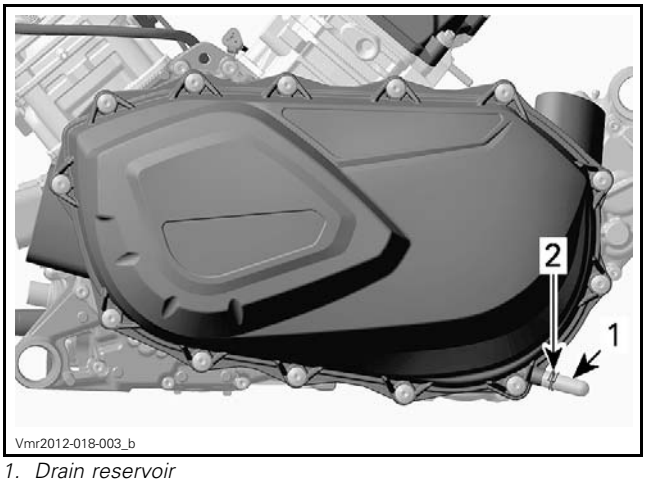
Refer to *BODY* subsection and remove the following:

– LH side and extension panels
– LH footboard panel.

Draining the CVT Cover

If water is present in CVT cover, it can be drained as follows:

1. Remove drain reservoir from CVT cover.



1. Drain reservoir
2. Spring clip

2. Let water drain from CVT cover.
3. Reinstall drain reservoir.

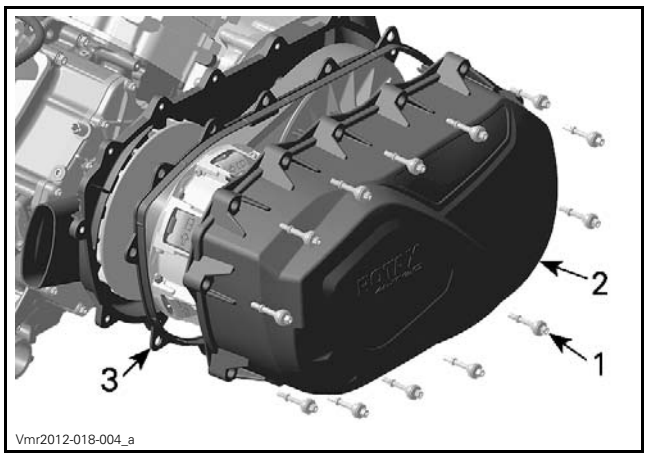
NOTICE **If an appreciable amount of water or any debris entered the CVT cover, CVT must be cleaned and inspected.**

Removing the CVT Cover

Remove CVT cover screws.

NOTE: Do not use and impact tool to remove CVT cover screws. To support the CVT cover remove the top center screw last.

Remove the CVT cover and its gasket.



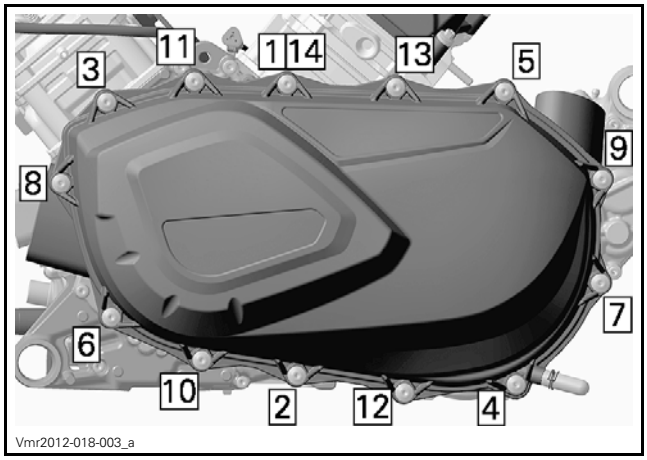
1. CVT cover screw
2. CVT cover
3. Gasket

Installing the CVT Cover

Install the top center screw of first.

NOTE: Do not use and impact tool to install CVT cover screws.

Tighten the CVT cover screws as per following sequence.



CVT COVER TIGHTENING SEQUENCE

TIGHTENING TORQUE	
CVT cover screws	7 N•m ± 0.8 N•m (62 lbf•**in** ± 7 lbf•**in**)

DRIVE BELT

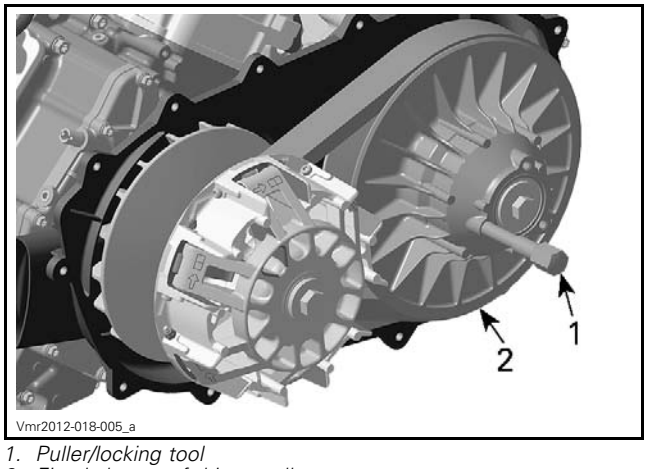
Removing the Drive Belt

NOTICE In case of a drive belt failure, the CVT, cover, drain reservoir and air outlet must be cleaned and inspected for obstruction.

1. Remove *CVT COVER*.
2. Open driven pulley.

REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	

3. Screw tool in the threaded hole of driven pulley and tighten to open the pulley.



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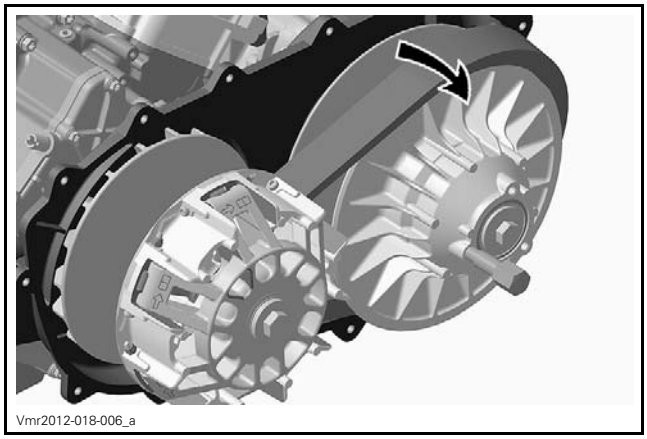
1. Puller/locking tool
2. Fixed sheave of driven pulley

4. Slide the belt over the top edge of fixed sheave to remove it.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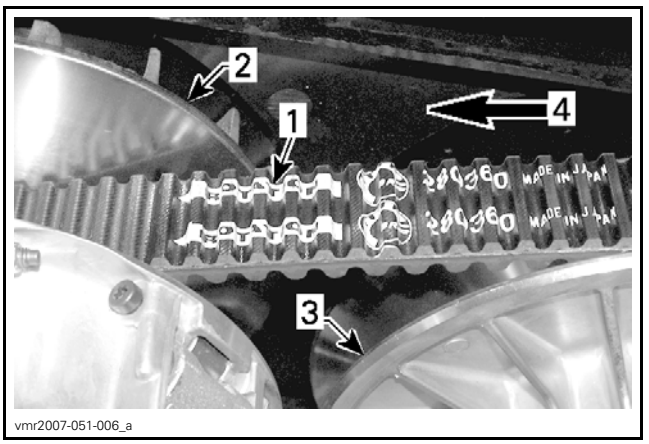
Inspecting the Drive Belt

For drive belt inspection refer to *DRIVE BELT INSPECTION* in the *PERIODIC MAINTENANCE PROCEDURES* subsection.

Installing the Drive Belt

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

The maximum drive belt life span is obtained when the drive belt has the proper rotation direction. Install it so that the arrow printed on belt is pointing towards front of the vehicle, viewed from top.



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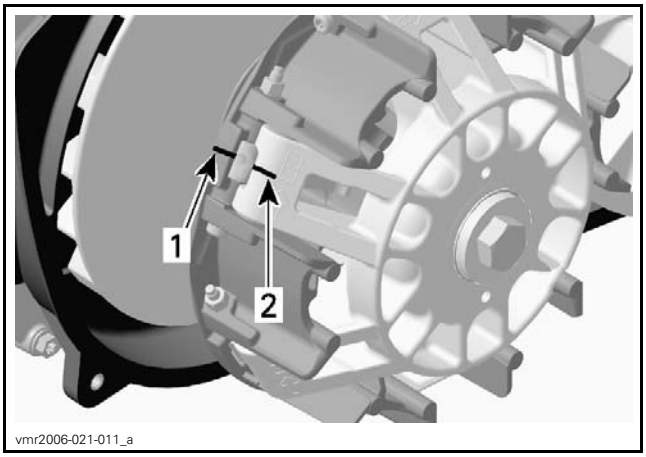
1. Arrow printed on belt
2. Drive pulley (front)
3. Driven pulley (rear)
4. Rotation direction

DRIVE PULLEY

Removing the Drive Pulley

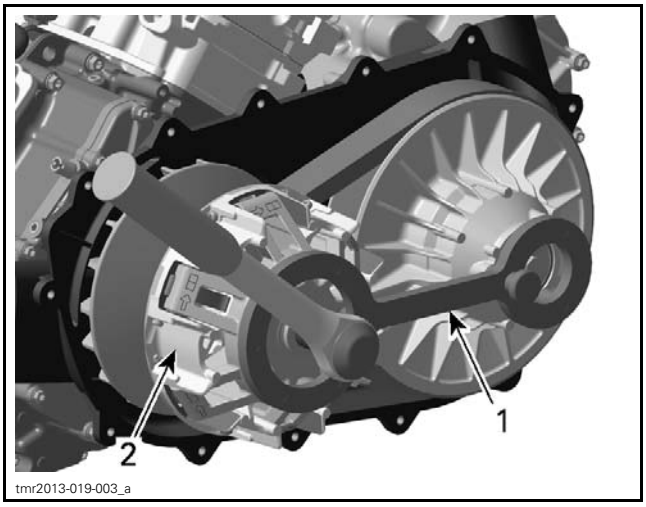
1. Remove *DRIVE BELT*, see procedure in this subsection.
2. Prior to removing the drive pulley, mark sliding sheave and governor cup to ensure correct indexation at reinstallation.



1. Mark on drive pulley sliding sheave
2. Mark on governor cup

3. Lock the drive pulley.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. Clutch holder
2. Drive pulley sliding sheave

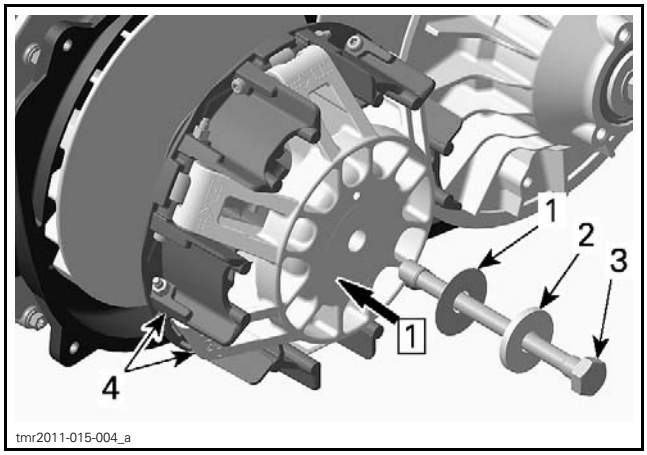
4. Loosen the drive pulley screw.

NOTICE Never use any type of impact wrench for drive pulley removal.

NOTE: Do not unscrew the drive pulley screw completely. If governor cup is stuck, hit it using a soft hammer.

5. Remove service tool.
6. Apply axial pressure with your hand on the sliding sheave and governor cup.
7. Remove drive pulley screw with its conical spring washer and thrust washer.

CAUTION Sliding sheave of drive pulley is spring loaded.



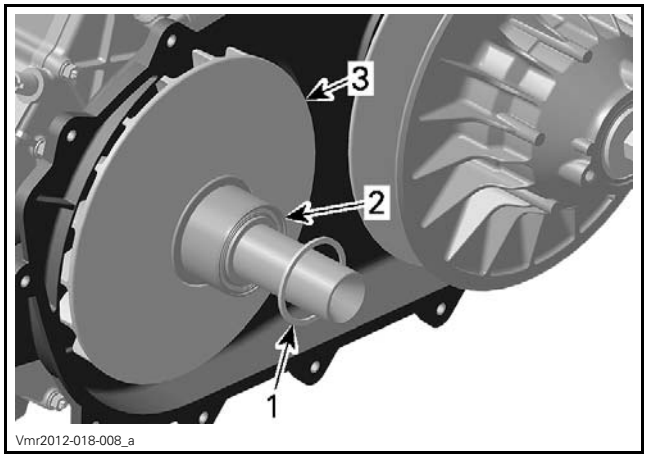
Step 1: Push

1. Thrust washer
2. Conical spring washer
3. Drive pulley screw
4. Sliding sheave with governor cup

8. Slowly release and remove sliding sheave.

Gearbox with external switches

9. Remove friction washer.



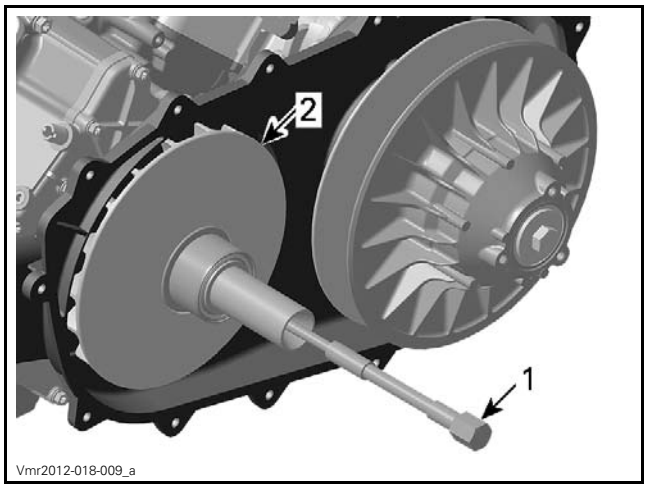
1. Friction washer
2. One way clutch
3. Drive pulley fixed sheave

All Models

10. Screw clutch puller in fixed sheave to remove fixed pulley.

NOTICE Use only recommended tool.

REQUIRED TOOL	
CLUTCH PULLER (P/N 529 035 746)	

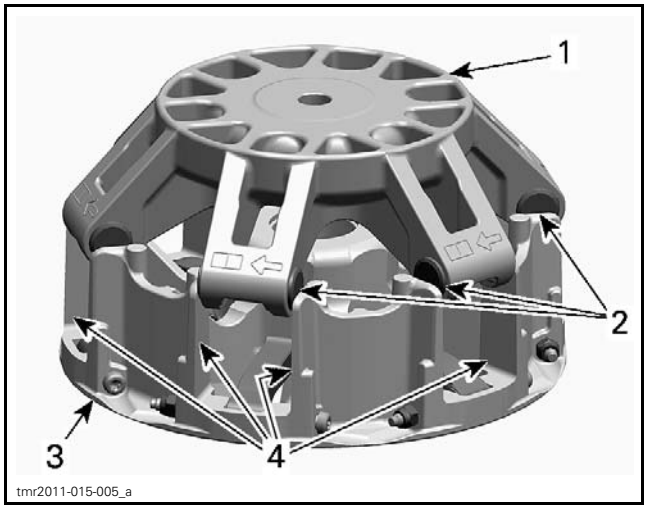


1. *Drive pulley puller*
2. *Fixed sheave*

Disassembling the Drive Pulley

Governor Cup

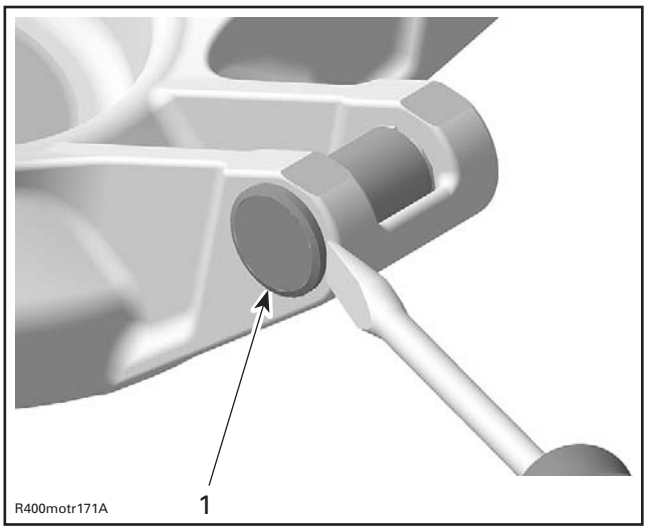
1. Carefully lift governor cup until slider shoes move to their highest position in the guides.



1. *Governor cup*
2. *Slider shoes*
3. *Sliding sheave*
4. *Guides*

NOTE: The following steps are not necessary except if roller must be removed. Refer to *INSPECTION* before proceeding.

2. Remove slider shoes from governor cup arm. Use a flat screwdriver if necessary.



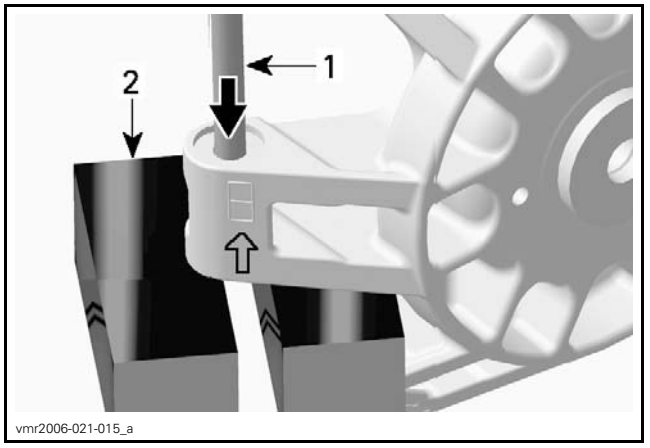
1. *Slider shoe*

3. Place the governor cup on a vice to push out the roller sleeve in the direction illustrated (against insertion arrow marked on governor cup arm). Use an appropriate punch (diameter of punch must be smaller than the diameter of the sleeve bore in the governor cup arm).

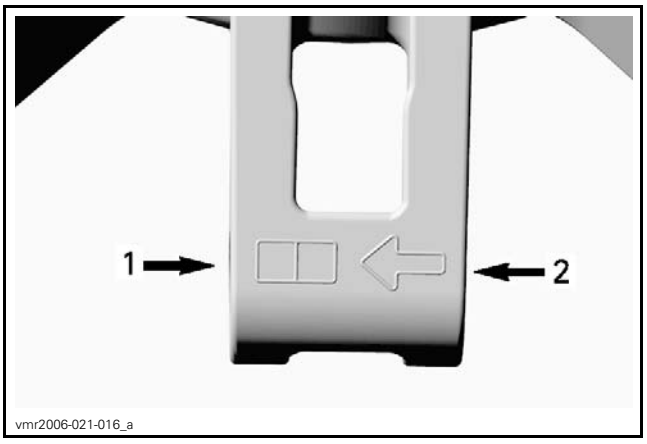
NOTICE **Do not clamp the governor cup in the vice to push out roller sleeve. Governor cup will be damaged.**

NOTE: Use protection plates to avoid marks and/or damages to the governor cup.

NOTICE **Always replace all rollers as a set. Partly worn rollers may cause damage to the CVT system.**

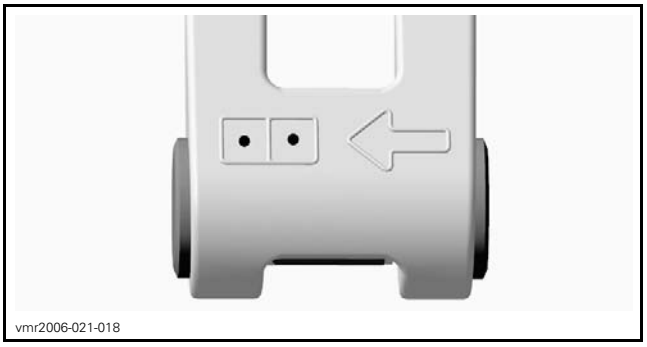


1. *Punch*
2. *Vice*



1. Removal direction
2. Assembly direction

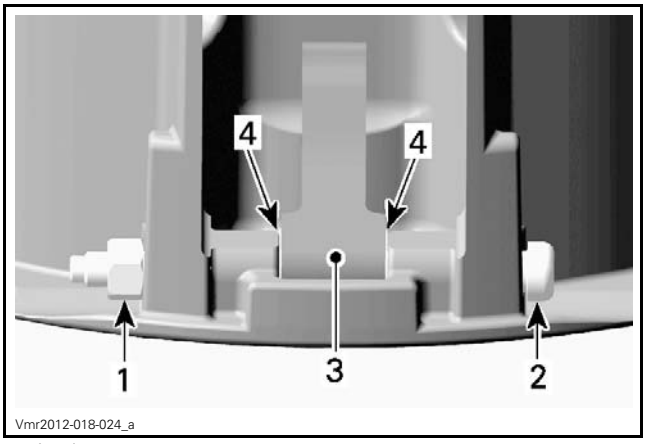
NOTE: Whenever removing a governor cup which already has two marked boxes, replace it by a new one.



Sliding Sheave

Unscrew lock nut and remove centrifugal lever pivot bolt. This drive pulley is equipped with 4 levers.

Remove centrifugal lever and both thrust washers.



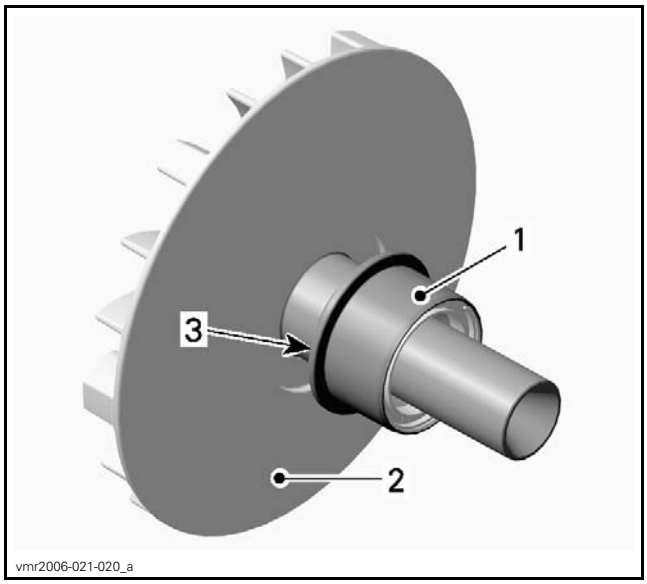
1. Lock nut
2. Centrifugal lever pivot bolt
3. Centrifugal lever
4. Thrust washers

Fixed Sheave

⚠ WARNING

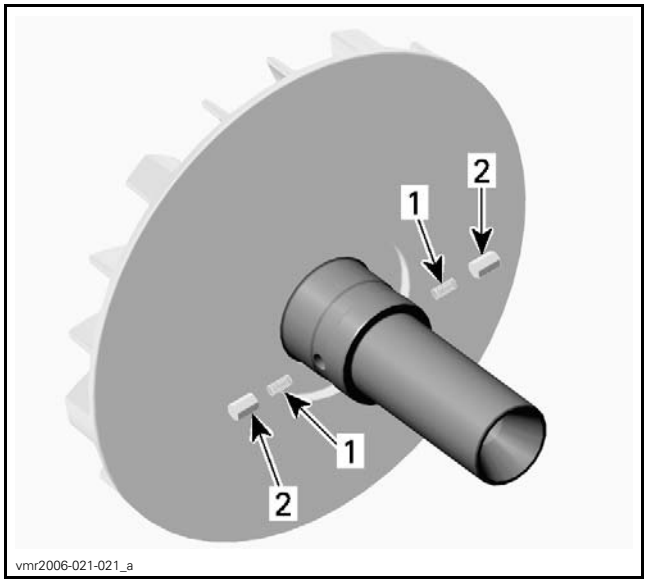
Always wear safety glasses to remove spring sleeves.

Pull and rotate one-way clutch slowly until the spring sleeves are visible.



1. One-way clutch
2. Fixed sheave
3. Spring sleeve area

Hold both spring sleeves with fingers and carefully remove them when the one-way clutch is disengaged.



1. Springs
2. Spring sleeves

Cleaning the Drive Pulley

Clean pulley faces and shaft with fine steel wool and a dry cloth.

Using a paper towel with the recommended cleaning solvent, clean:
- Crankshaft tapered end
- Taper inside the fixed sheave of the drive pulley
- Crankshaft threads
- Drive pulley screw threads.

SERVICE PRODUCTS	
Scandinavia	PULLEY FLANGE CLEANER (F) (P/N 619 600 022)
Other countries	CLUTCH AND PULLEY FLANGE CLEANER PRO S1 (P/N 779244)

NOTICE Avoid contact between cleaner and crankshaft seal as damage may occur.

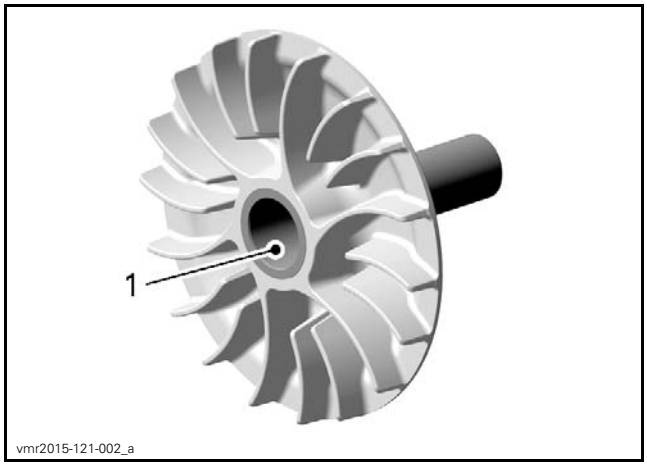
Remove all hardened oil deposits that have baked on the crankshaft and pulley tapered surfaces using coarse or medium steel wool, and/or sand paper no. 600.

NOTICE Do not use any other type of abrasive.

Reclean mounting surfaces.

Wipe off the mounting surfaces with a clean, dry paper towel.

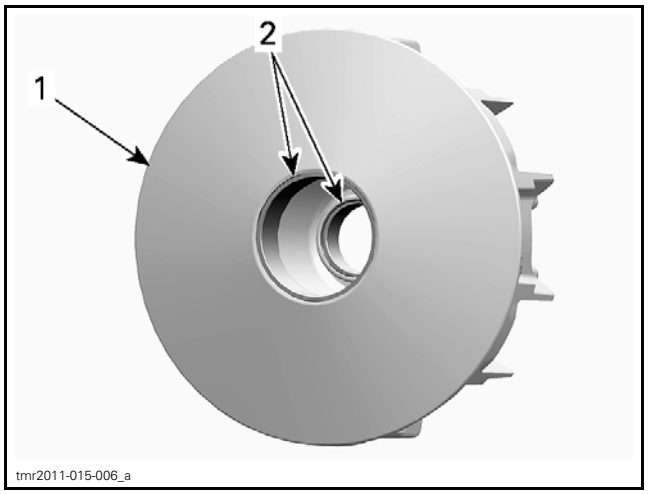
NOTICE Mounting surfaces must be free of any oil, cleaner or towel residue.



1. Taper of fixed sheave

Only use petrol base cleaner when cleaning sliding sheave bushings.

NOTICE Do not use acetone to clean bushing.



1. Sliding sheave
2. Bushings

Inspecting the Drive Pulley

Bushings

For bushing inspection, refer to *SLIDING SHEAVE* in this subsection.

Governor Cup

Check governor cup for cracks or other visible damage. Replace if necessary.

Roller and Slider Shoe

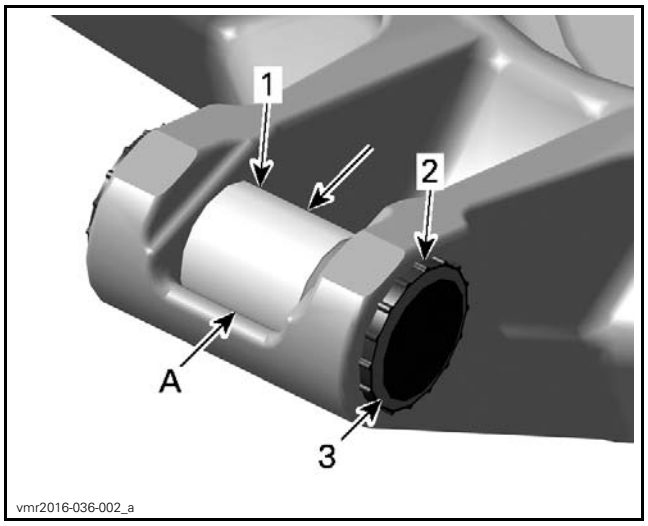
Check each roller for roundness of external diameter.

Check if rollers move freely.

NOTICE Whenever replacing rollers and slider shoes, always replace all rollers and slider shoes as a set.

Check slider shoes for visible wear. If chamfer is not present anymore, replace ALL slider shoes.

NOTE: If necessary, use a screwdriver to remove slider shoes.

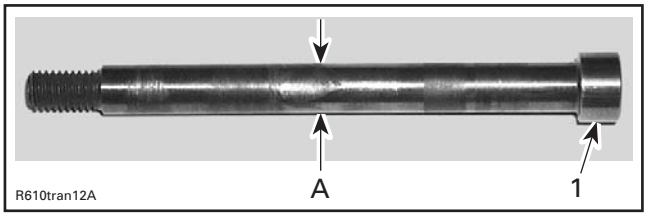


1. Roller
2. Slider shoe
3. Chamfer
A. Roller outer diameter

ROLLER OUTER DIAMETER	
NEW	13.80 mm to 14.00 mm (.543 in to .551 in)
SERVICE LIMIT	13.20 mm (.519 in)
ROLLER INNER DIAMETER	
NEW	8.025 mm to 8.175 mm (.316 in to .322 in)
SERVICE LIMIT	9.000 mm (.354 in)

Centrifugal Lever Pivot Bolt

Measure diameter of centrifugal lever pivot bolt; replace if out of specification.

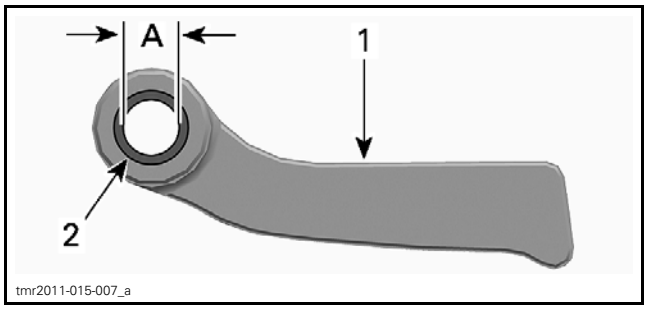


1. Centrifugal lever pivot bolt
A. Measure diameter here

CENTRIFUGAL LEVER PIVOT BOLT DIAMETER	
NEW	6.078 mm to 6.100 mm (.239 in to .24 in)
SERVICE LIMIT	6.000 mm (.236 in)

Centrifugal Lever

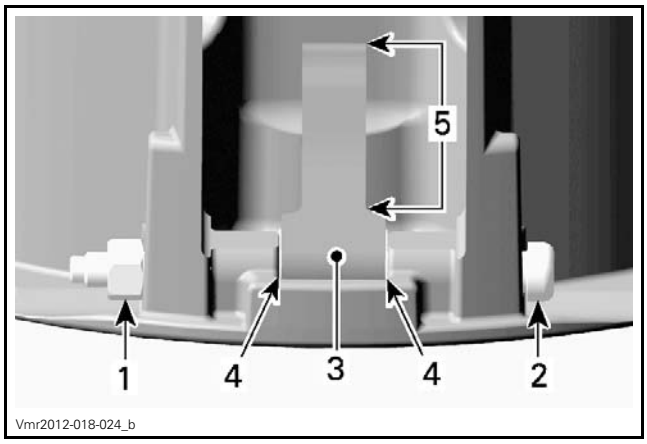
Check bushing diameter in the centrifugal lever for wear. Replace centrifugal lever if necessary.



1. Centrifugal lever
2. Bushing
A. Bushing inner diameter

CENTRIFUGAL LEVER BORE DIAMETER	
NEW	6.035 mm to 6.078 mm (.238 in to .239 in)
SERVICE LIMIT	6.200 mm (.244 in)

Inspect and replace as necessary the following items if their contact surfaces are heavy worn:
– Centrifugal lever
– Thrust washers
– Centrifugal lever pivot bolts
– Lock nuts.



1. Lock nut
2. Centrifugal lever pivot bolt
3. Centrifugal lever
4. Thrust washers
5. Contact surface to the roller

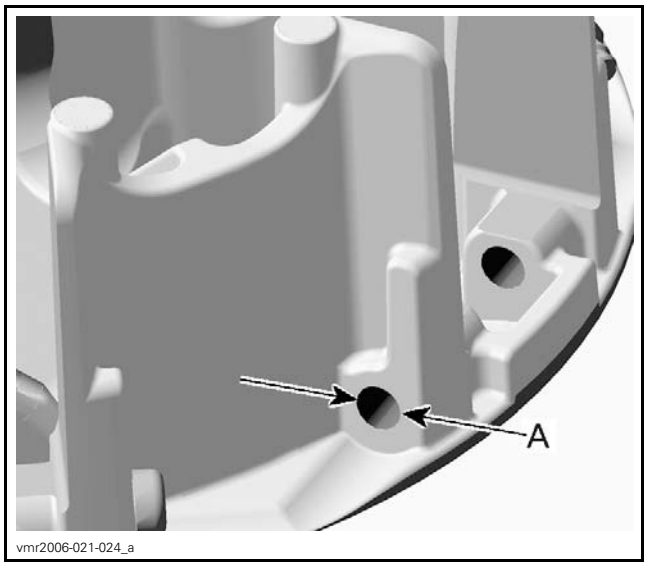
⚠ WARNING

Whenever replacing centrifugal levers, always replace all levers as a set. Otherwise, drive pulley unbalance will occur.

Sliding Sheave

Check sliding sheave for cracks and sliding contact surface for excessive wear. Replace sliding sheave if necessary.

Measure centrifugal lever pivot bolt bores. Replace sliding sheave if bores are out of specification or otherwise damaged.



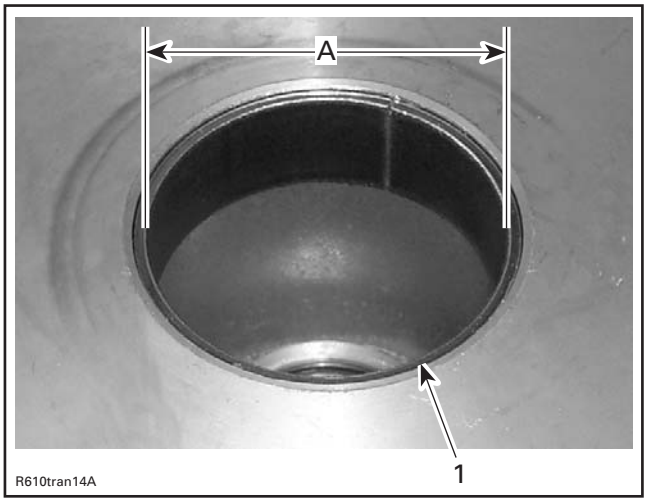
A. Centrifugal lever pivot bolt bore diameter

CENTRIFUGAL LEVER PIVOT BOLT BORE DIAMETER	
NEW	6.113 mm to 6.171 mm (.241 in to .243 in)
SERVICE LIMIT	6.300 mm (.248 in)

Measure bushing diameters of sliding sheave.

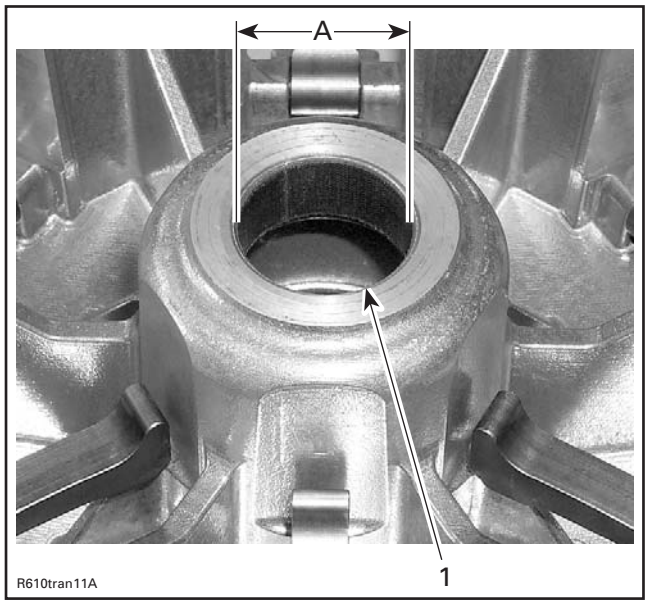
REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge



1. Bushing on fixed sheave side
A. Bore diameter of bushing

SLIDING SHEAVE LARGE BUSHING	
NEW	55.000 mm to 55.040 mm (2.165 in to 2.167 in)
SERVICE LIMIT	55.200 mm (2.173 in)



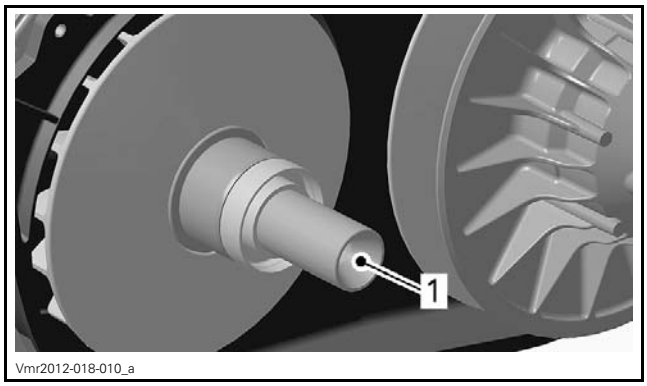
1. Bushing on governor cup side
A. Bore diameter of bushing

SLIDING SHEAVE SMALL BUSHING	
NEW	32.000 mm to 32.040 mm (1.26 in to 1.261 in)
SERVICE LIMIT	32.200 mm (1.268 in)

Replace sliding sheave if one of the bushings is out of specification. Visually inspect coatings for wear.

Fixed Sheave

Check fixed sheave contact surface to the governor cup for scratches or other damages. If damaged, replace fixed sheave.



1. Visually check here

Check for any marks on fixed sheave plate. Replace if necessary.

Spring

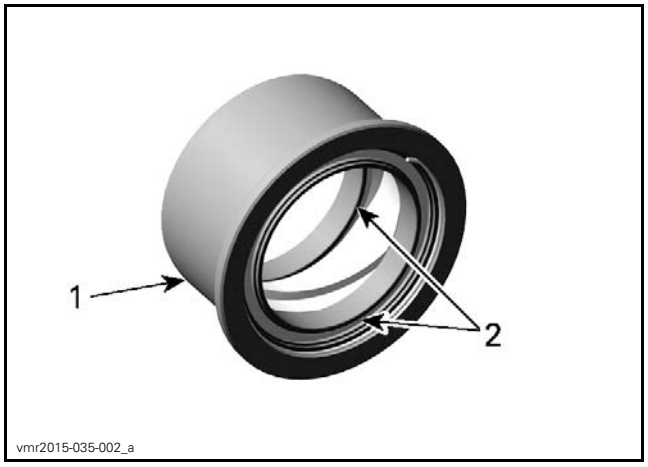
Measure spring free length and squareness. If spring is out of specification, replace by a new one.

CLUTCH SPRING FREE LENGTH		
570 650 1000	Service Limit	85 mm (3.346 in)
850	Service Limit	95 mm (3.74 in)
CLUTCH SPRING SQUARENESS		
All	Service Limit	4 mm (.157 in)

One-Way Clutch

Check bearings for excessive play and smooth operation. Replace bearings if necessary.

NOTICE Be careful not to damage the inside of one-way clutch during bearing removal.



1. *One-way clutch*
2. *Bearings*

Measure length of spring sleeves and check if edges on top of the spring sleeve are excessively worn. If out of specification, replace both spring sleeves at the same time.

SPRING SLEEVE LENGTH	
NEW	9.2 mm to 9.4 mm (.362 in to .37 in)
SERVICE LIMIT	9.0 mm (.354 in)

Assembling the Drive Pulley

For assembly, reverse the disassembly procedure. Pay attention to following details.

One-Way Clutch

Clean parts.

SERVICE PRODUCTS	
Scandinavia	PULLEY FLANGE CLEANER (F) (P/N 619 600 022)
Other countries	CLUTCH AND PULLEY FLANGE CLEANER PRO S1 (P/N 779244)

Lubricate springs, spring sleeves and between one way clutch bearings using recommended product.

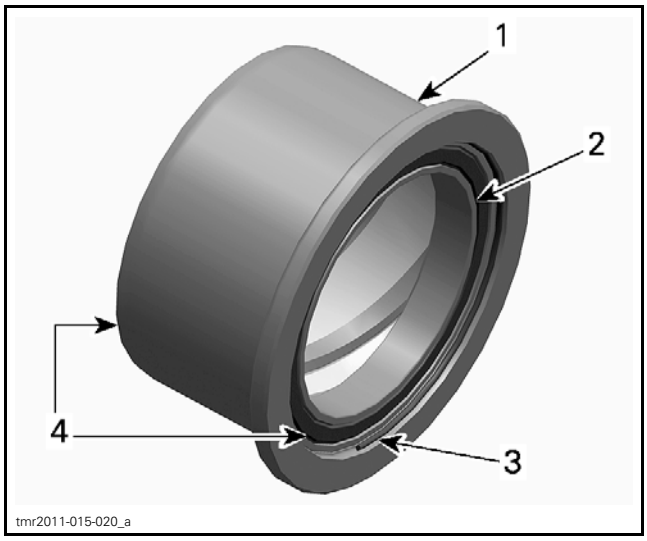
SERVICE PRODUCT
ISOFLEX GREASE TOPAS NB 52 (P/N 293 550 021)

One-Way Clutch Bearings

Some executions use ball bearings with a seal on one side only. Install bearings with the seal towards the outside of the one-way clutch.

Grease inside ball bearings to ensure adequate lubrication.

SERVICE PRODUCT
ISOFLEX GREASE TOPAS NB 52 (P/N 293 550 021)



1. *One-way clutch*
2. *Bearing*
3. *Retaining ring*
4. *Seal*

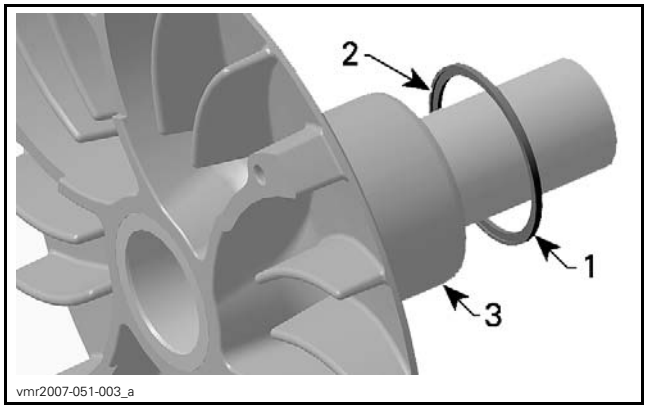
Friction Washer

Gearbox with external switches

Apply grease on both sides of friction washer.

SERVICE PRODUCT
ISOFLEX GREASE TOPAS NB 52 (P/N 293 550 021)

Install friction washer with collar towards one way clutch.



1. *Friction washer*
2. *Collar*
3. *One way clutch*

Sliding Sheave

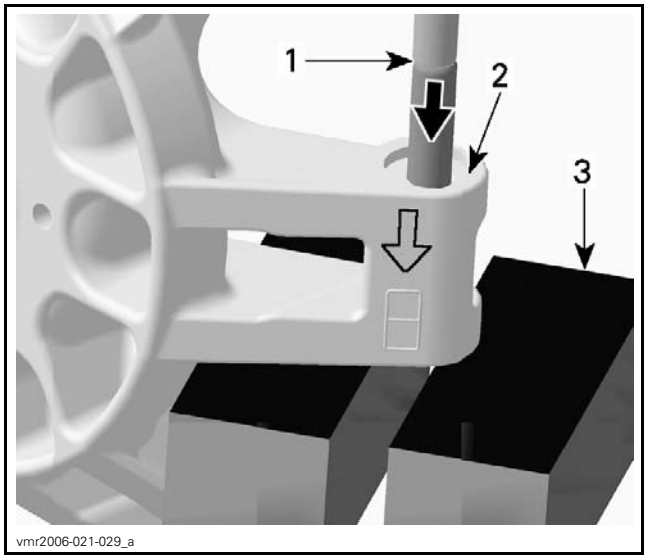
Install centrifugal levers with their thrust washers.

NOTICE Centrifugal levers must move easily after installation.

Governor Cup

Rebuild governor cup with new roller sleeves, rollers and slider shoes.

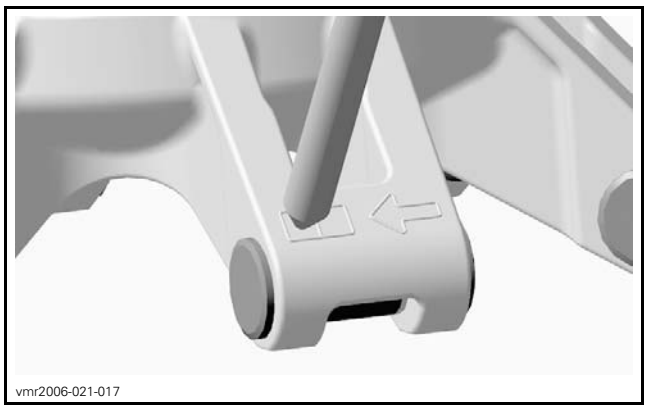
NOTICE Final position of roller sleeves must be flush with the sleeve bore in the governor cup arm (no protrusion).



1. *Top edge of roller sleeve*
2. *Mating surface of slider shoes*
3. *Vice*

Whenever replacing the roller sleeves, make a mark in the box on the governor arm using a punch.

NOTICE Do not tap too hard. Severe damage to the governor cup may appear.



NOTICE Rollers must move easily after installation.

Carefully press slider shoes in the governor cup arm so they **bottom out evenly** in the machined portion of the governor cup arm.

NOTICE Slider shoes must be pressed in evenly to ensure they are centered in the arm and slide properly in the guides.

Installing the Drive Pulley

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

⚠ WARNING

Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.

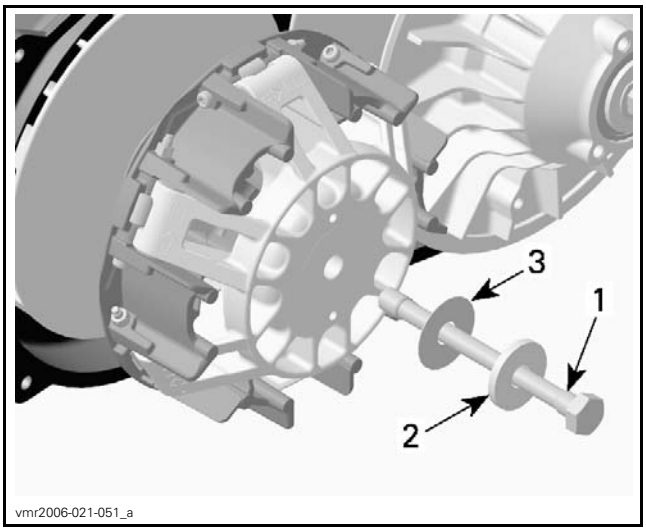
NOTICE Never use any type of impact wrench for drive pulley removal and installation.

Clean mounting surfaces as described in *DRIVE PULLEY CLEANING*.

Install drive pulley on crankshaft extension.

NOTICE Do not forget to install thrust washer and conical spring washer as per illustration that follows.

NOTE: Install conical spring washer with its concave side towards drive pulley.



1. Drive pulley screw
2. Conical spring washer
3. Thrust washer

⚠ WARNING

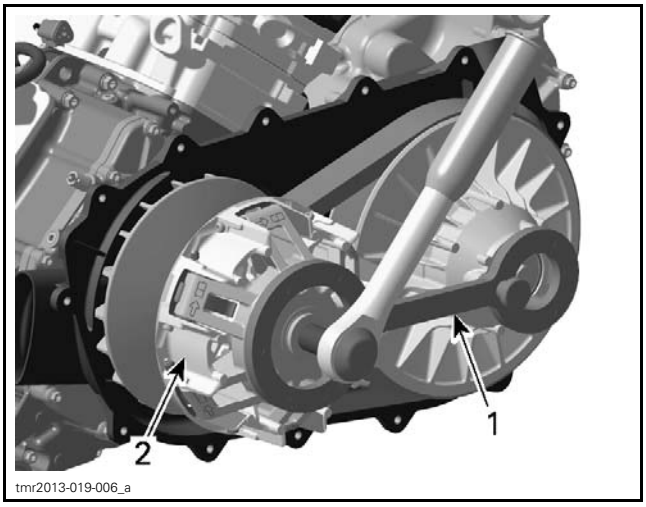
Never substitute conical spring washer and/or screw with aftermarket parts. Always use genuine BRP parts.

Lock the drive pulley as per removal procedure.

Tighten drive pulley screw to specification.

NOTICE **Never use any type of impact wrench for drive pulley installation.**

TIGHTENING TORQUE	
Drive pulley screw	120 N•m ± 8 N•m (89 lbf•ft ± 6 lbf•ft)



1. Clutch holder (P/N 529 036 238)
2. Drive pulley

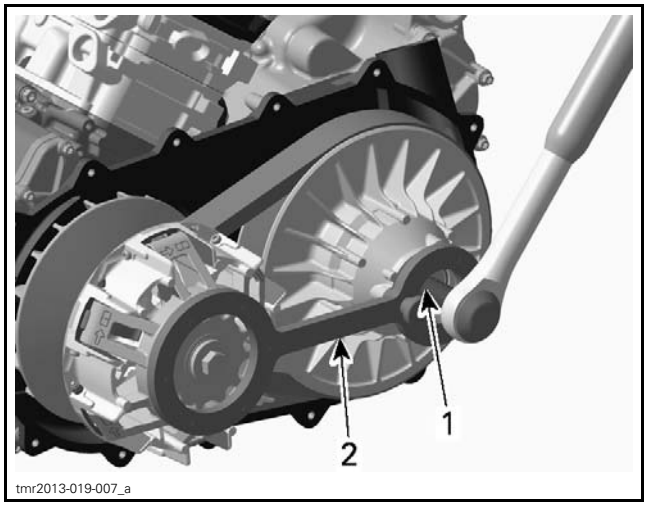
DRIVEN PULLEY

Removing the Driven Pulley

1. Remove drive belt, refer to *REMOVING THE DRIVE BELT* in this subsection.
2. Hold the driven pulley and loosen the driven pulley screw.

NOTE: Do not completely remove the driven pulley screw.

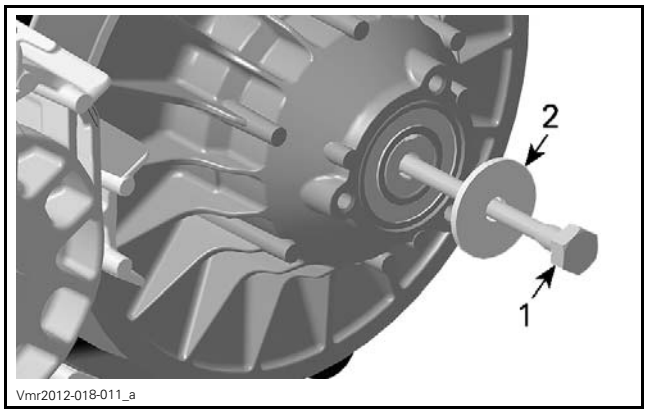
REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. Driven pulley screw
2. Clutch holder (P/N 529 036 238)

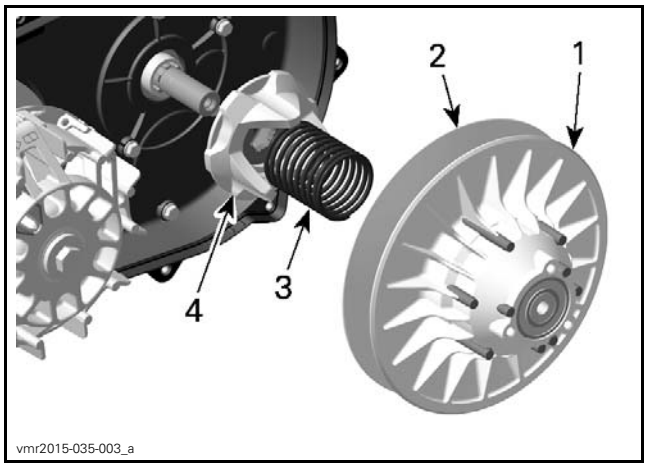
3. Remove service tool.
4. Apply axial pressure with your hand on driven pulley and maintain during screw removal.
5. Remove driven pulley screw and washer. Discard driven pulley screw.

⚠ CAUTION **Driven pulley is spring loaded. Hold driven pulley tight and slowly remove the driven pulley screw to release spring tension.**



1. Driven pulley screw
2. Thrust washer

6. Remove the driven pulley with the spring and the cam.

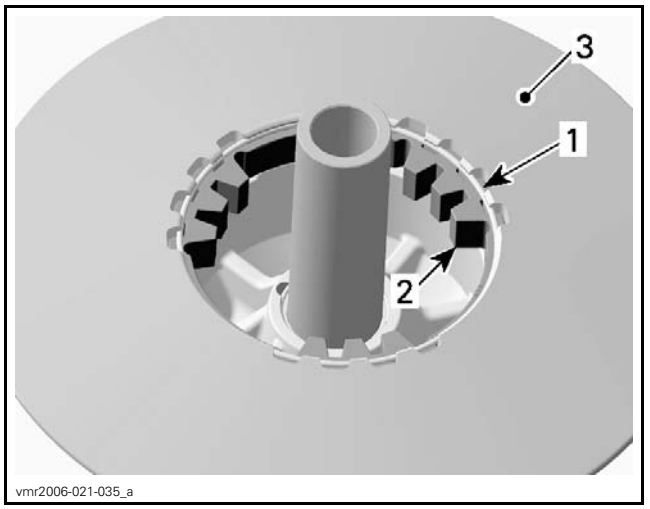


1. Fixed sheave of driven pulley
2. Sliding sheave of driven pulley
3. Spring
4. Cam

Disassembling the Driven Pulley

Fixed Sheave

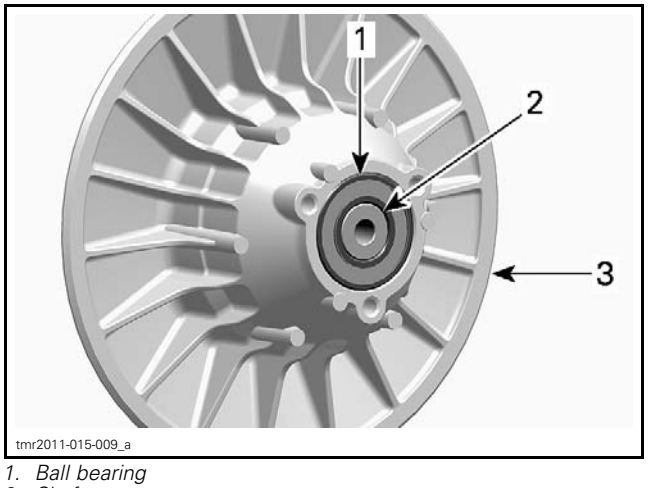
1. Remove retaining ring and lift torque gear.



1. Retaining ring
2. Torque gear
3. Fixed sheave of driven pulley

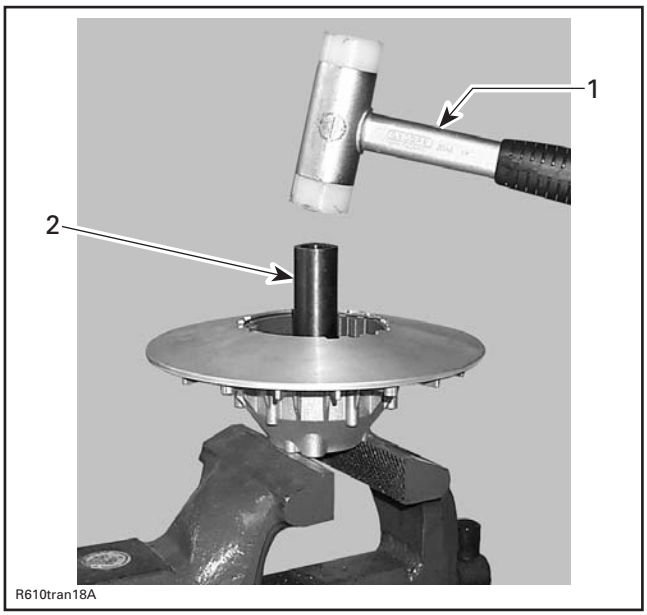
NOTE: The following procedure is not necessary except if ball bearing or shaft must be removed. Refer to *INSPECTION* before proceeding.

2. Heat ball bearing area up to 100°C (212°F) before removing ball bearing.



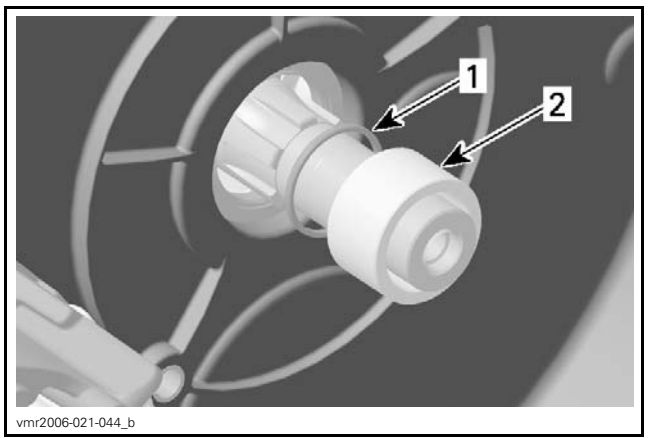
1. Ball bearing
2. Shaft
3. Fixed sheave of driven pulley

3. Use a soft hammer to push shaft and bearing out of fixed sheave.



1. Soft hammer
2. Shaft

4. Remove shaft from ball bearing.
5. Remove distance sleeve and O-ring from countershaft.
6. Replace O-ring if brittle, hard or damaged.



1. O-ring
2. Distance sleeve

Cleaning the Driven Pulley

When a dust deposit has to be removed from the cam or the shaft, use a dry cloth.

Clean pulley faces and shaft using fine steel wool and a dry cloth.

Clean driven pulley.

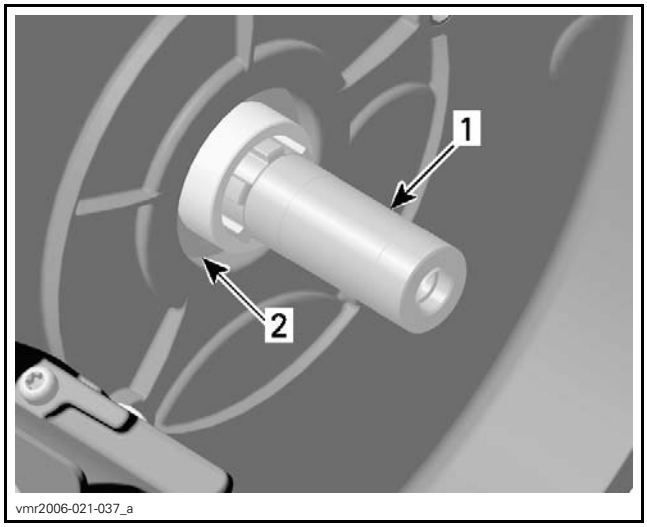
SERVICE PRODUCTS	
Scandinavia	PULLEY FLANGE CLEANER (F) (P/N 619 600 022)
Other countries	CLUTCH AND PULLEY FLANGE CLEANER PRO S1 (P/N 779244)

Clean the CVT air guide area from contamination.

Clean countershaft end and shaft bore.

SERVICE PRODUCTS	
Scandinavia	PULLEY FLANGE CLEANER (F) (P/N 619 600 022)
Other countries	CLUTCH AND PULLEY FLANGE CLEANER PRO S1 (P/N 779244)

NOTICE To avoid damage, make sure cleaner does not contact the countershaft oil seal.



1. Countershaft support
2. Countershaft oil seal

Inspecting the Driven Pulley

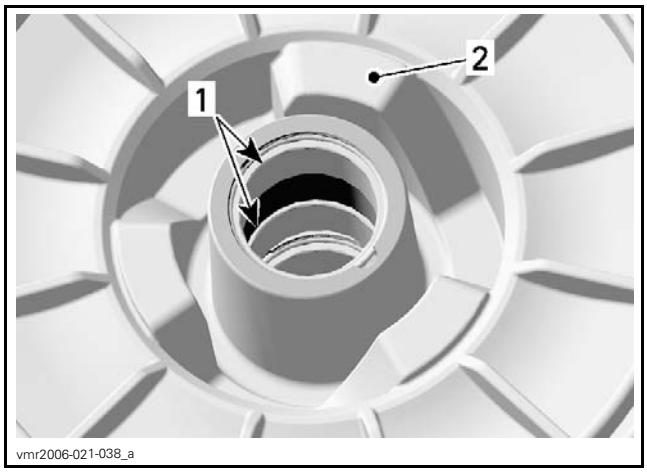
Sliding Sheave

Check sliding sheave for cracks and sliding contact surface for excessive wear. Replace sliding sheave if necessary.

Check bushings for cracks, scratches and for freedom of movement when assembled to sliding sheave.

Measure bushing inner diameter.

NOTE: Bushings cannot be replaced. Replace sliding sheave if bushings are out of specification. Visually inspect coatings.



1. Bushings
2. Backside of sliding sheave of driven pulley

REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge

BUSHING INNER DIAMETER	
New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
Service Limit	30.200 mm (1.189 in)

Fixed Sheave

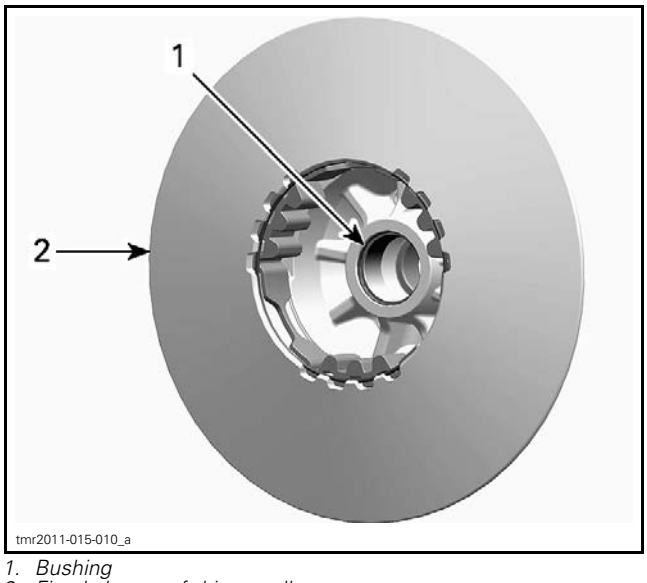
Check fixed sheave for cracks and excessive wear. Replace fixed sheave if necessary.

Check ball bearing for free play and smooth operation. Replace if necessary.

Check shaft for heavy wear or visible damage. Replace if necessary.

If the shaft is removed, measure bushing inner diameter.

NOTE: This bushing cannot be replaced. Replace fixed sheave if bushing is out of specification. Visually inspect coatings.



1. Bushing
2. Fixed sheave of driven pulley

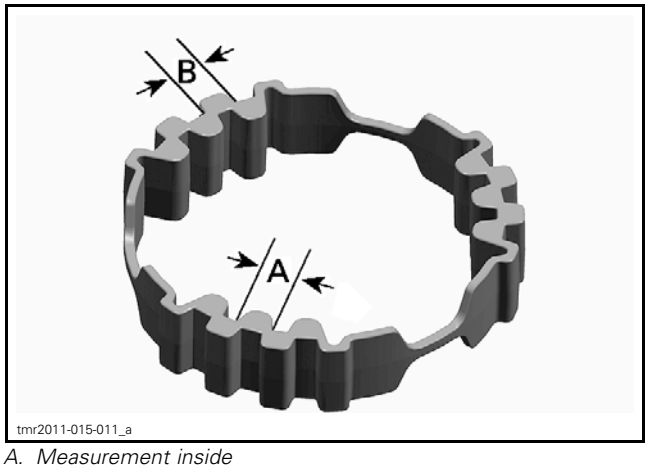
REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge

BUSHING INNER DIAMETER	
New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
Service Limit	30.200 mm (1.189 in)

Check torque gear for visible damage and cracks.

Measure for wear limit using a caliper.

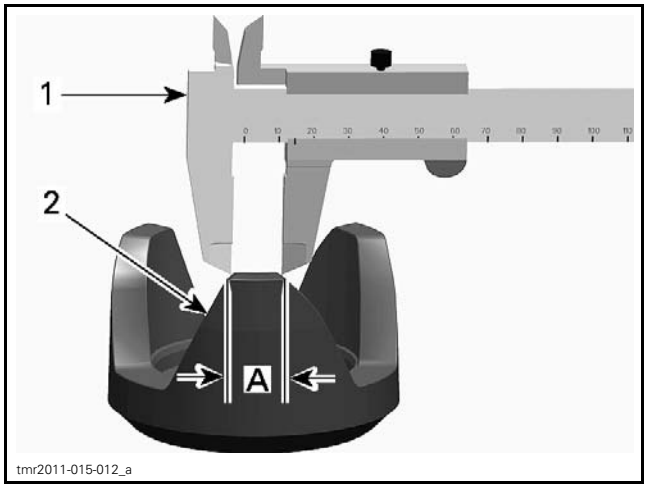


A. Measurement inside
B. Measurement outside

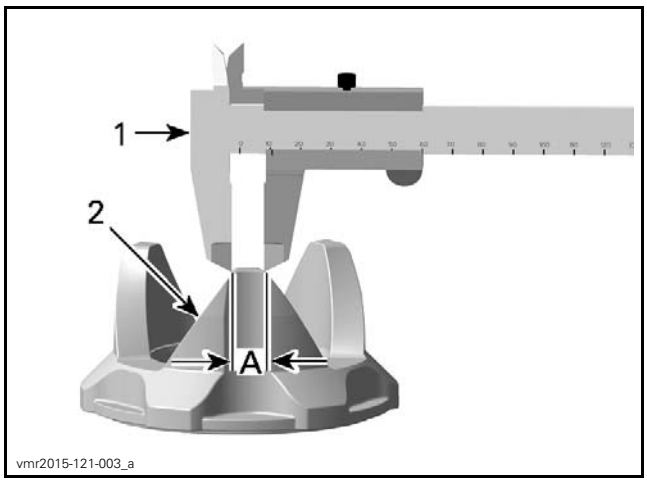
WEAR ON TEETH (BOTH SIDES)	
Service Limit	7.500 mm (.295 in)

Cam

Check cam for visible damage and measure for wear using a caliper.



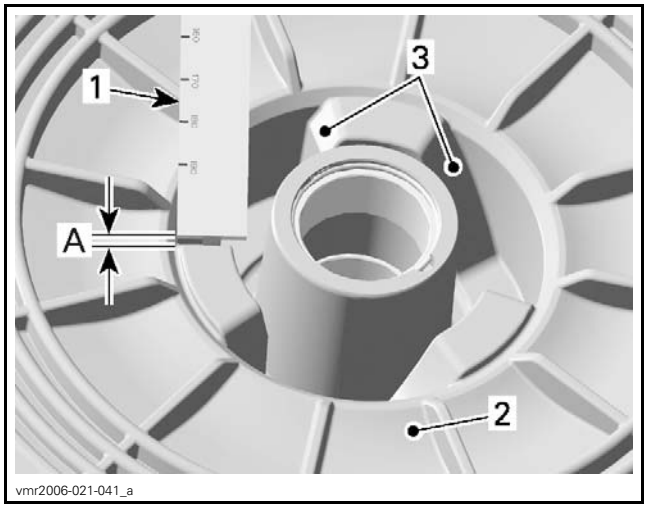
570, 850 AND 1000 ENGINE
1. *Caliper*
2. *Contact surface*



650 ENGINE
1. *Caliper*
2. *Contact surface*

A. Width to be measured due to wear on contact surface

WIDTH ON TOP SURFACE		
570 850	Service Limit	16.0 mm (.63 in)
650		4.5 mm (.177 in)
1000		9.0 mm (.354 in)



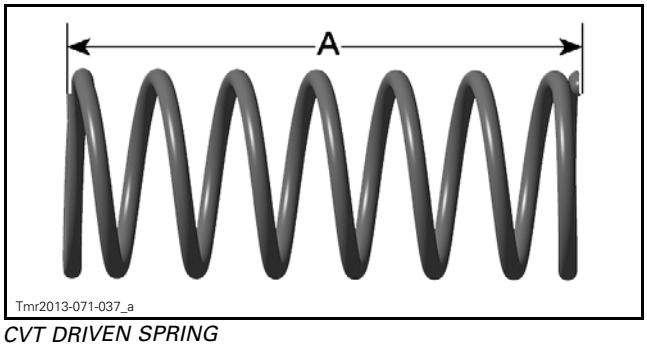
1. *Caliper*
2. *Sliding sheave*
3. *Contact surface*

A. Wear to be measured

WEAR ON CONTACT SURFACE	
SERVICE LIMIT	1.00 mm (.039 in)

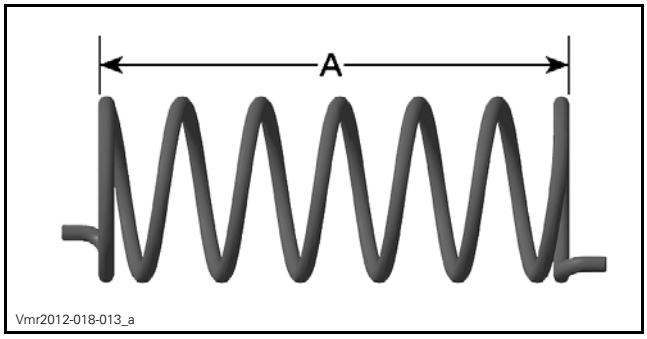
Spring

570 and 650 Engines



CVT DRIVEN SPRING
A. Spring free length

850 and 1000 Engines



CVT DRIVEN SPRING (850 AND 1000 ENGINES)
A. Spring free length

All Engines

Measure spring free length and squareness. If spring is out of specification, replace by a new.

SPRING FREE LENGTH		
ALL	Service limit	125 mm (4.921 in)

CLUTCH SPRING SQUARENESS		
ALL	Service limit	3.8 mm (.15 in)

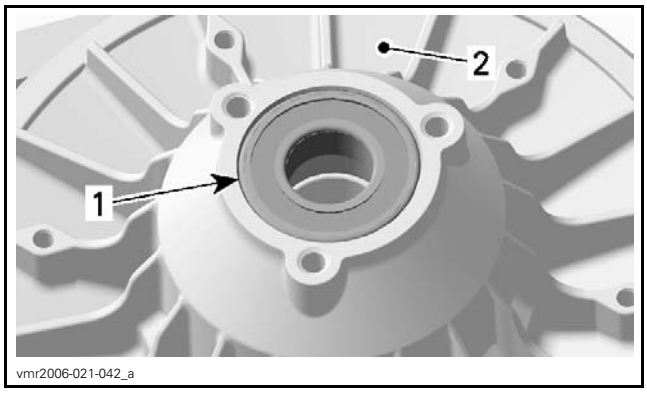
Assembling the Driven Pulley

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

Heat ball bearing area up to 100°C (212°F) before ball bearing installation.

NOTE: Place new ball bearing in a freezer for 10 minutes before installation.

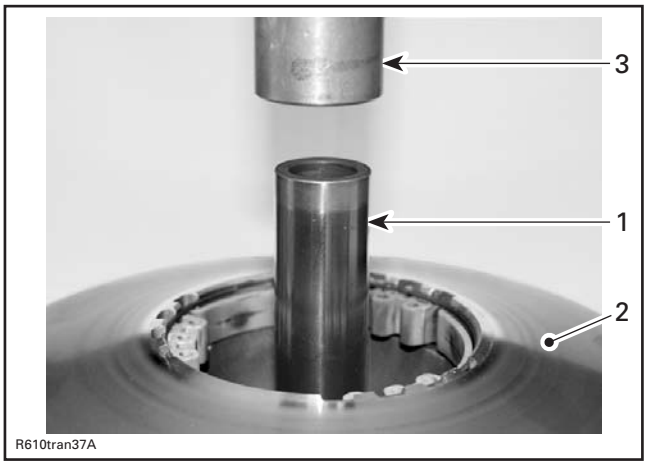
Install ball bearing with the writing on top and press it in using only the outer race.



vmr2006-021-042_a

1. Ball bearing
2. Fixed sheave of driven pulley

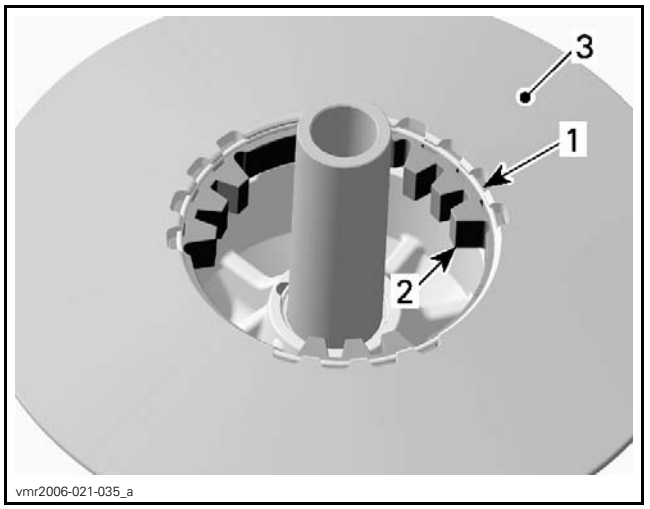
NOTICE Do not use a hammer, bearing must be pressed in only.



R610tran37A

1. Shaft
2. Fixed sheave
3. Press machine

Install torque gear then secure it with the retaining ring.



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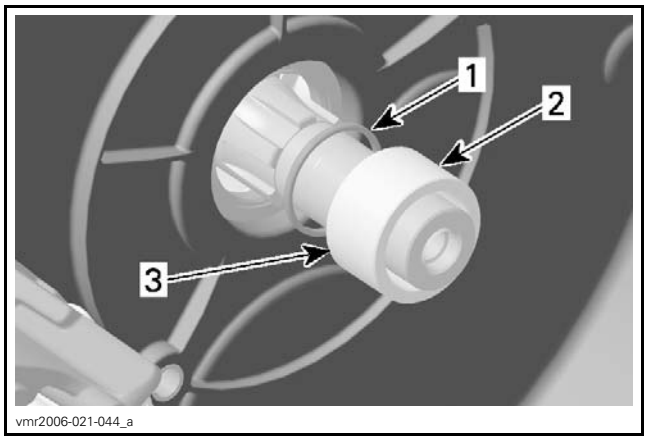
1. Retaining ring
2. Torque gear
3. Fixed sheave of driven pulley

Installing the Driven Pulley

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

Place O-ring on countershaft splines and move it and the distance sleeve into position.

NOTICE Chamfer on inside diameter of the distance sleeve must face to gearbox side.



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1. O-ring
2. Distance sleeve
3. Chamfered area of distance sleeve

NOTICE Threads of gearbox countershaft and driven pulley screw must be free of oil and grease. Lubricants in threads will create too high preload to tightened driven pulley screw.

Clean threads of gearbox countershaft and driven pulley screw.

SERVICE PRODUCTS	
Scandinavia	PULLEY FLANGE CLEANER (F) (P/N 619 600 022)
Other countries	CLUTCH AND PULLEY FLANGE CLEANER PRO S1 (P/N 779244)

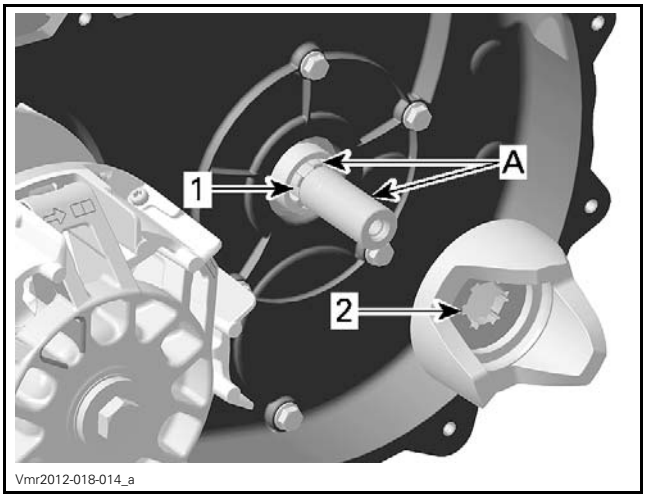
570 and 650 Engines

Install cam on countershaft.

NOTICE Cam splines must engage on countershaft splines.

Apply an antiseize lubricant on the countershaft splines and countershaft end

SERVICE PRODUCT
LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

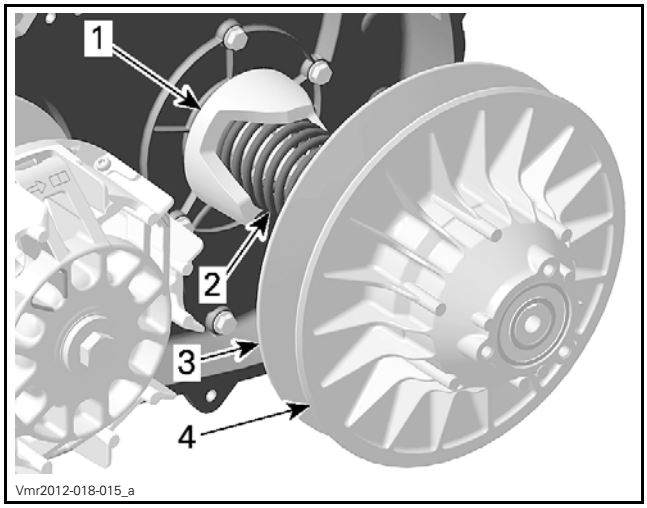


TYPICAL
1. *Countershaft splines*
2. *Cam splines*

A. Loctite 767 here

Insert sliding sheave in fixed sheave.

Place spring behind sliding sheave then align driven pulley with cam.



TYPICAL
1. *Cam*
2. *Spring*
3. *Sliding sheave*
4. *Fixed sheave*

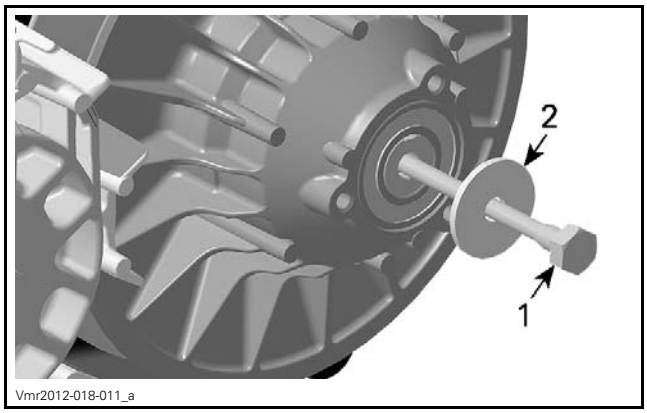
With your hand, push the driven pulley onto the shaft to compress the spring.

NOTICE A cam not correctly engaged will cause damage to the driven pulley and cam.

As you hold the pulley compressed, install a NEW driven pulley screw and thrust washer.

NOTICE This assembly uses a stretch screw. Always install a NEW screw.

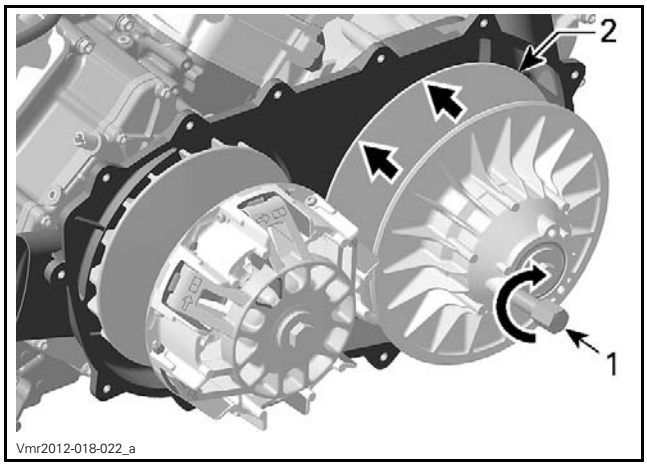
NOTE: Tighten the screw with your hand sufficiently for the cam to remain engaged.



1. *Driven pulley screw*
2. *Thrust washer*

Install drive belt. Refer to *DRIVE BELT* in this subsection.

REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	



1. Puller/locking tool
2. Sliding sheave

NOTE: If driven pulley sheaves cannot be opened when the service tool is screwed in, the cam is not correctly engaged in the sliding sheave.

Tighten driven pulley screw to specification.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	

TIGHTENING TORQUE		
Driven pulley screw	Step A	20 N•m ± 1 N•m (15 lbf•ft ± 1 lbf•ft)
	Step B	180° ± 5°

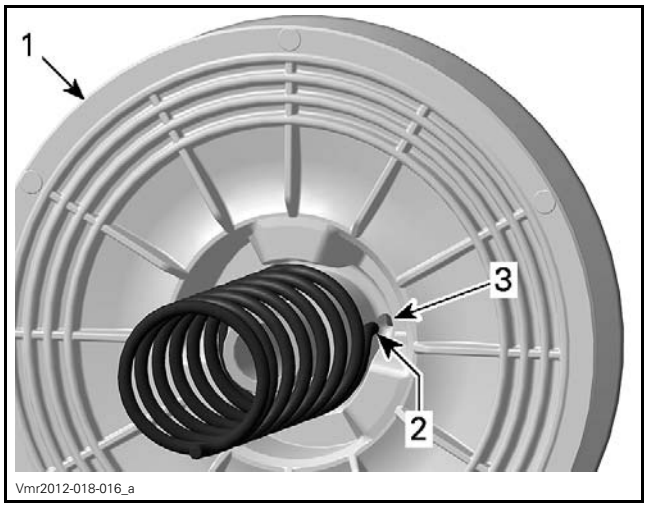
Check driven pulley end play.

SPECIFICATION	
Driven pulley end play	0 mm (0 in)

850 and 1000 Engines

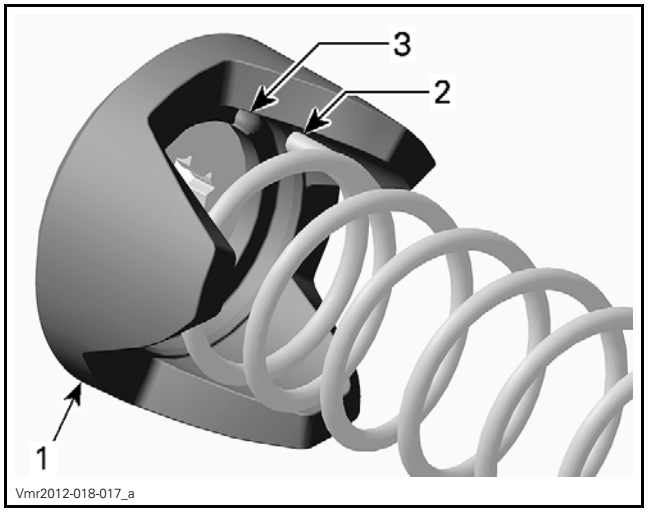
Insert the sliding sheave in the fixed sheave.

Place spring behind sliding sheave and engage spring end in the sliding sheave spring bore.



850 AND 1000 ENGINES
1. Sliding sheave
2. Spring end
3. Spring bore

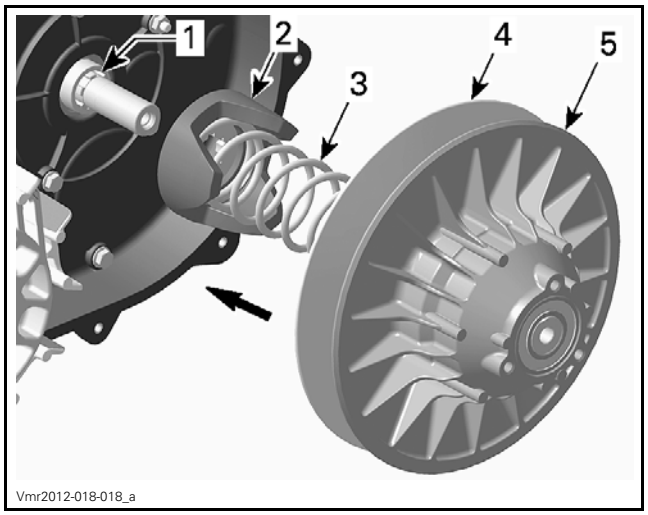
Place cam on the opposite end of the spring and engage the other spring end in the cam spring bore.



850 AND 1000 ENGINES
1. Cam
2. Spring end
3. Spring bore

Install pre-assembled cam with spring and driven pulley on countershaft end.

NOTICE Cam must engage on countershaft splines.



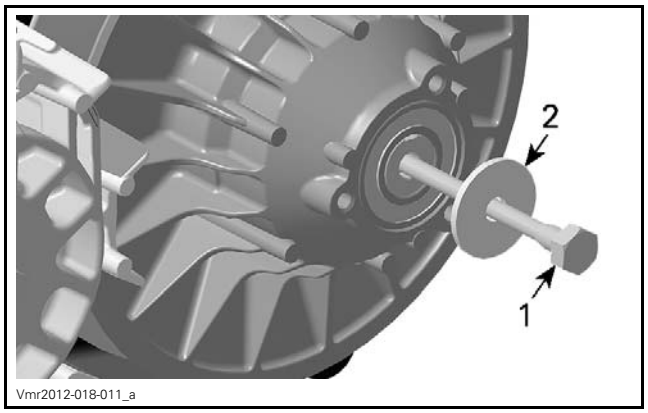
850 AND 1000 ENGINES
1. *Countershaft splines*
2. *Cam*
3. *Spring*
4. *Sliding sheave*
5. *Fixed sheave*

Push the driven pulley onto the shaft to compress the spring.

While holding the pulley in place, install a NEW driven pulley screw and thrust washer.

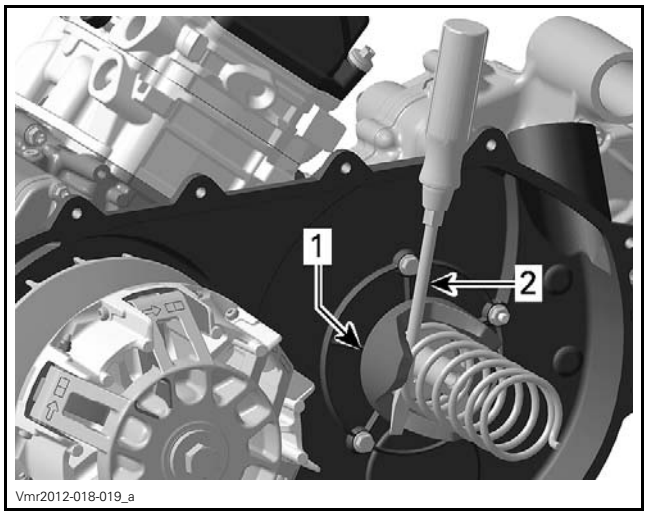
NOTICE This assembly uses a stretch screw. Always install a NEW screw.

Tighten the screw approximately 3 to 4 turns.



1. *Driven pulley screw*
2. *Thrust washer*

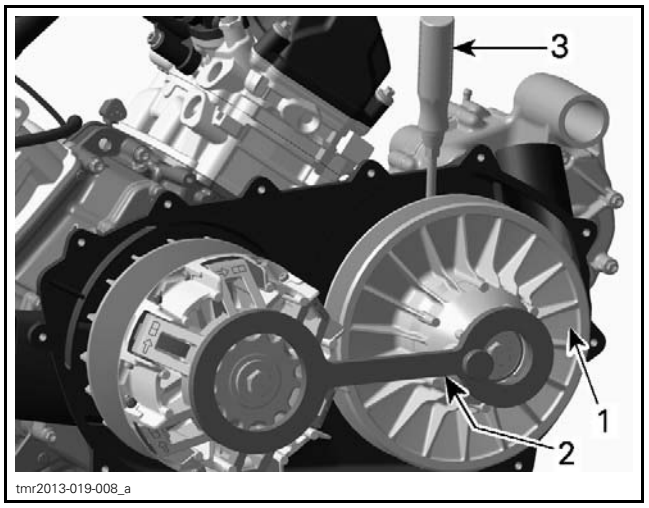
Insert a screwdriver of approximately 5 mm (.197 in) diameter in the cam.



850 AND 1000 ENGINES
1. *Cam*
2. *Screwdriver, diameter 5 mm (.197 in)*

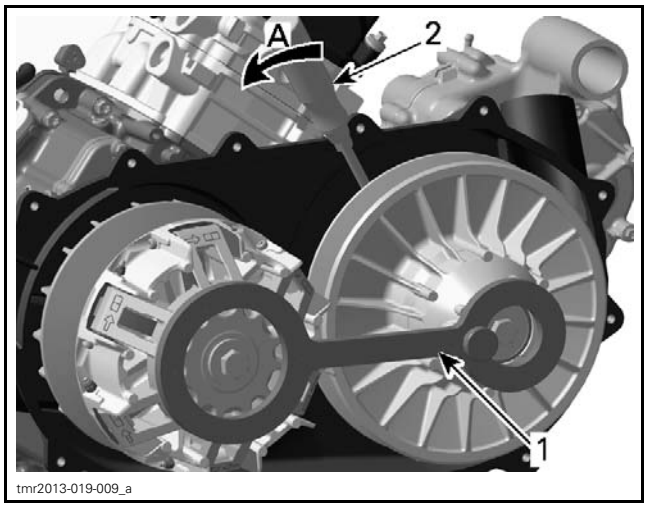
Hold the driven pulley in a fix position.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



850 AND 1000 ENGINES
1. *Fixed sheave*
2. *Clutch holder*
3. *Screwdriver*

Turn the screwdriver approximately 20° counterclockwise until cam engages in the driven pulley sliding sheave and hold it in this position (spring preload).



850 AND 1000 ENGINES
1. *Clutch holder*
2. *Screwdriver*

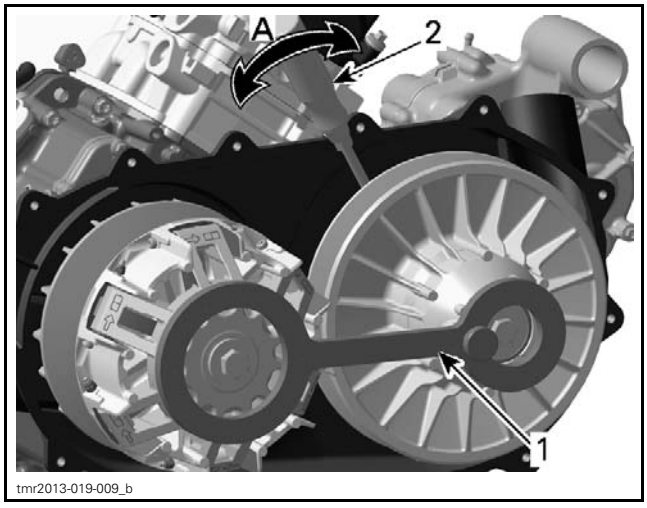
A. Turn counterclockwise

Using a socket and extension, hand tighten the driven pulley screw.

NOTE: **Do not** apply specified torque at this time.

Move the screwdriver back and forth to check cam for free movement.

NOTICE **A cam not correctly engaged will cause damage to the driven pulley and cam.**

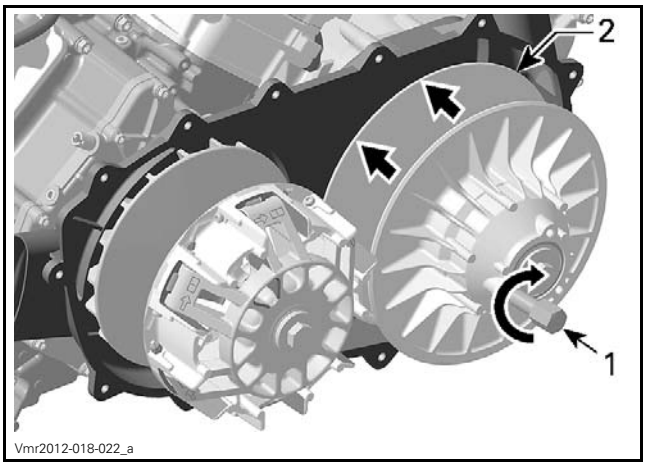


850 AND 1000 ENGINES
1. *Clutch holder*
2. *Screwdriver*

A. Cam freedom of movement

Install drive belt. Refer to *DRIVE BELT* in this subsection.

REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	



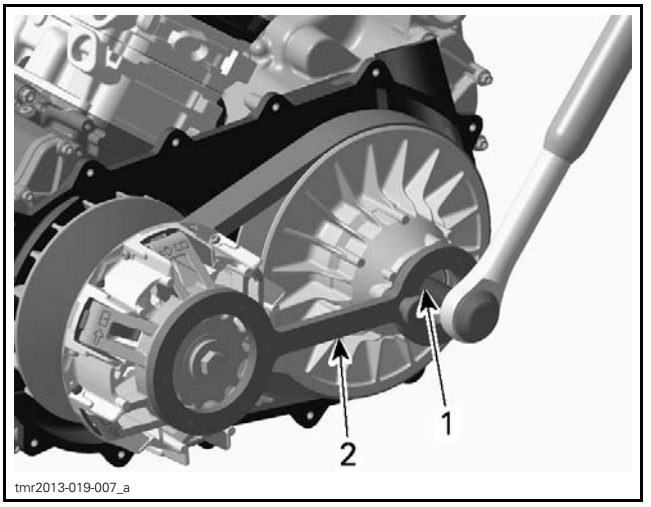
1. *Puller/locking tool*
2. *Sliding sheave*

NOTE: If driven pulley sheaves can not be opened when the service tool is screwed in, the cam is not correctly engaged in the sliding sheave.

Tighten driven pulley screw as specified.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	

TIGHTENING SEQUENCE	
Step 1	20 N•m ± 1 N•m (15 lbf•ft ± 1 lbf•ft)
Step 2	180° ± 5°



1. *Driven pulley screw*
2. *Clutch holder*

Check driven pulley end play.

SPECIFICATION	
Driven pulley end play	0 mm (0 in)

CVT AIR GUIDE

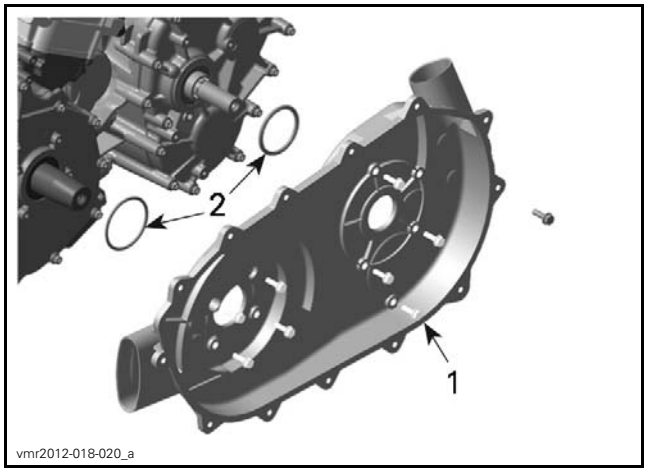
Removing the CVT Air Guide

1. Remove the *DRIVE PULLEY* and the *DRIVEN PULLEY*.
2. Unscrew the clamps retaining the CVT air hoses.
3. Remove CVT air guide.
4. Remove and discard O-rings.

Inspecting the CVT Air Guide

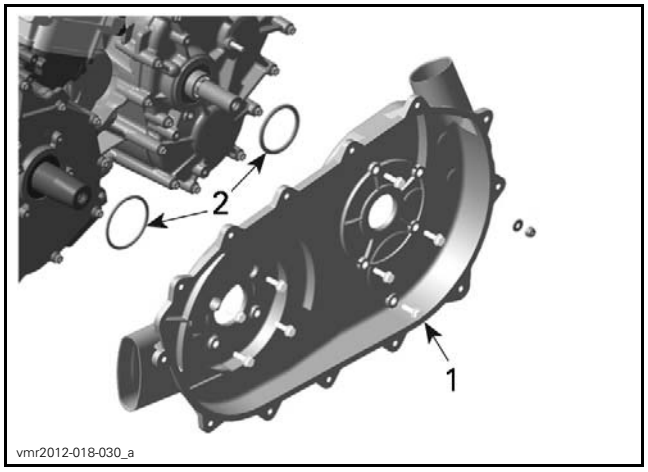
Clean CVT air guide from contamination.

Gearbox with external switches



1. CVT air guide
2. O-rings

Gearbox with GBPS



1. CVT air guide
2. O-rings

Installing the CVT Air Guide

For installation reverse the removal procedure.

Always install **NEW** O-rings before installing the CVT air guide.

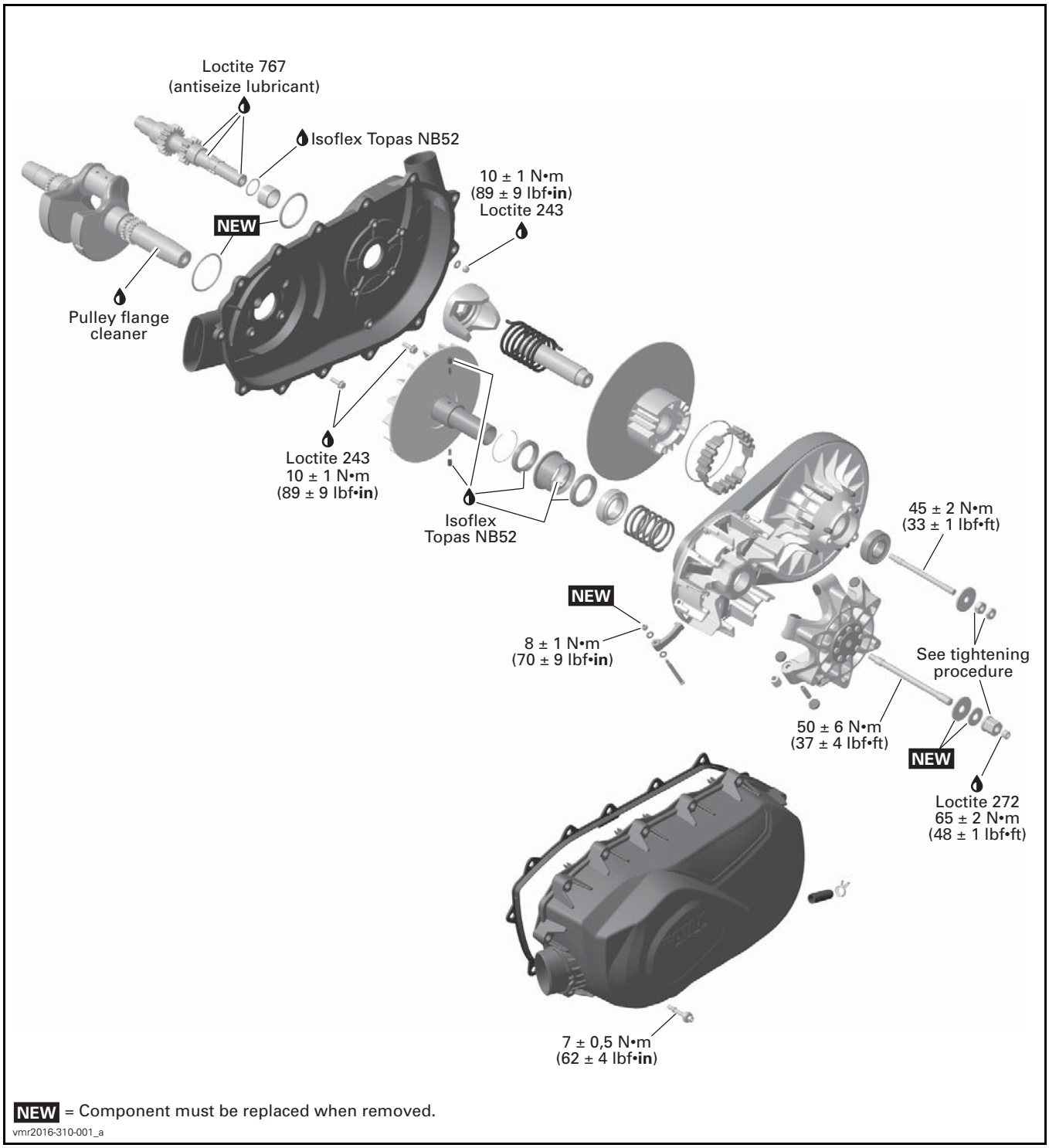
CONTINUOUSLY VARIABLE TRANSMISSION (CVT) (1000R)

SERVICE TOOLS

Description	Part Number	Page
CLUTCH HOLDER	529 036 238	6, 16, 25
CLUTCH PULLER	529 035 746	7
COUNTERSHAFT RETAINER TOOL	529 036 312	18, 23
DRIVEN PULLEY STUD TOOL	529 036 360	17, 23
PULLER/LOCKING TOOL	529 036 098	5, 25

SERVICE PRODUCTS

Description	Part Number	Page
ISOFLEX GREASE TOPAS NB 52	293 550 021	13
LOCTITE 272	420 899 526	16
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	23
XPS BRAKES AND PARTS CLEANER (USA)	219 701 705	9, 19
XPS BRAKES AND PARTS CLEANER	219 701 776	9, 19



NEW = Component must be replaced when removed.

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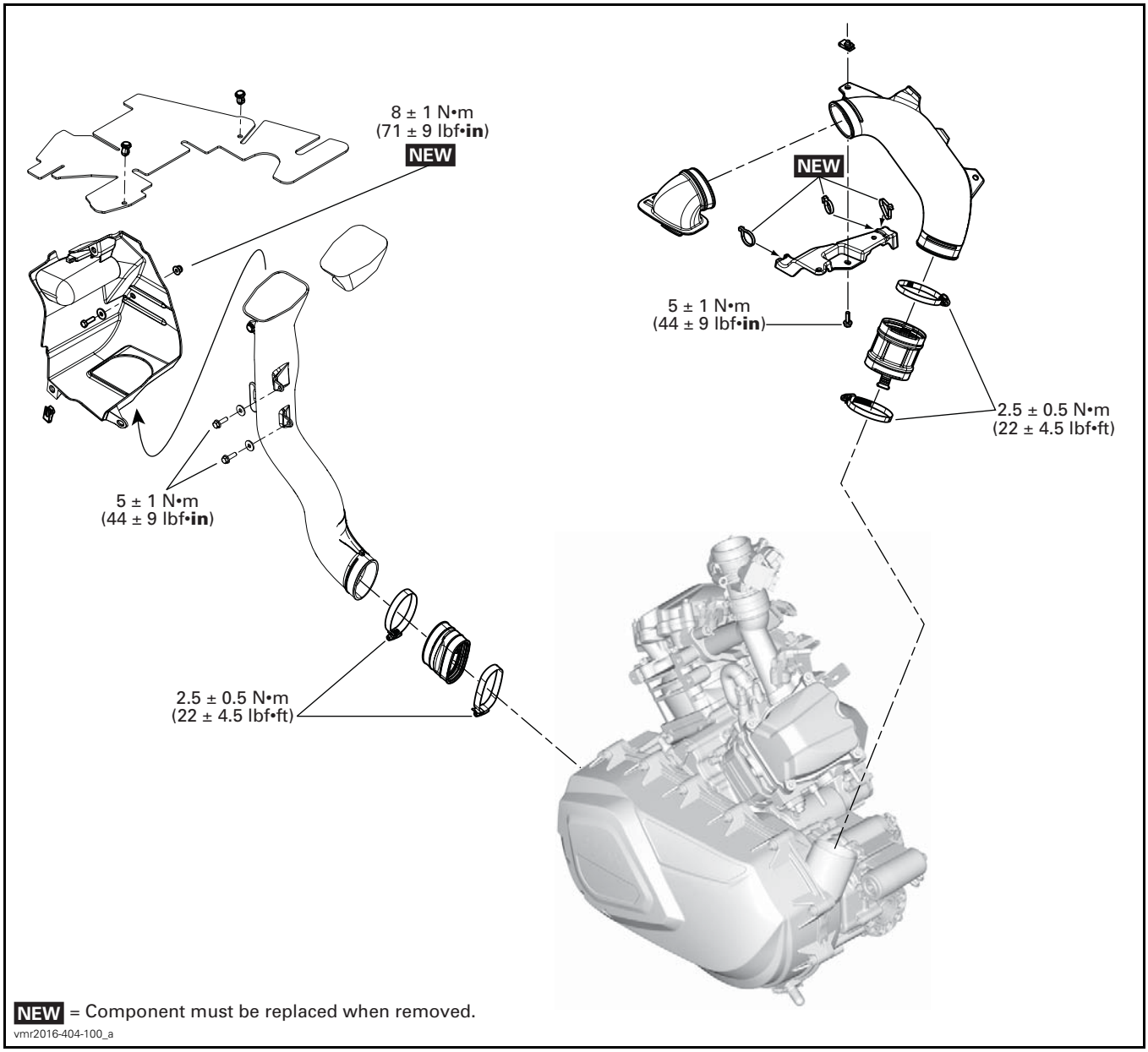

NEW = Component must be replaced when removed.

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GENERAL

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

This CVT is lubrication free. Never lubricate any components except drive pulley one-way clutch.

⚠ WARNING

Never touch CVT while engine is running. Never drive vehicle when CVT cover is removed.

⚠ WARNING

Any drive pulley repairs must be performed by an authorized Can-Am dealer. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

⚠ WARNING

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly.

PROCEDURES

CVT COVER

CVT Cover Access

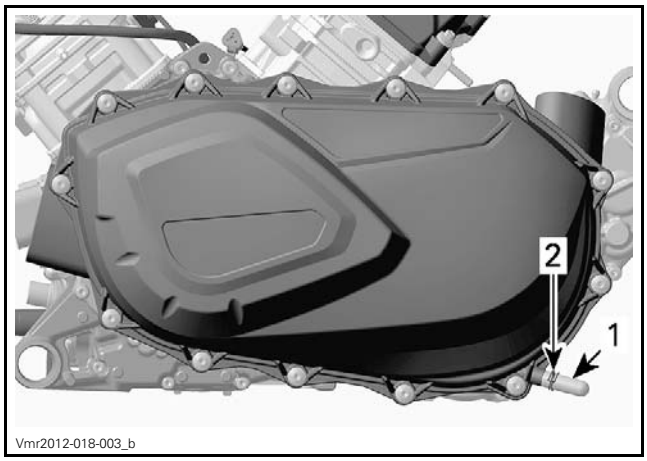
Refer to *BODY* subsection and remove the following:

– LH side and extension panels
– LH footboard panel.

Draining the CVT Cover

If water is present in CVT cover, it can be drained as follows:

1. Remove drain reservoir from CVT cover.



1. Drain reservoir
2. Spring clip

2. Let water drain from CVT cover.
3. Reinstall drain reservoir.

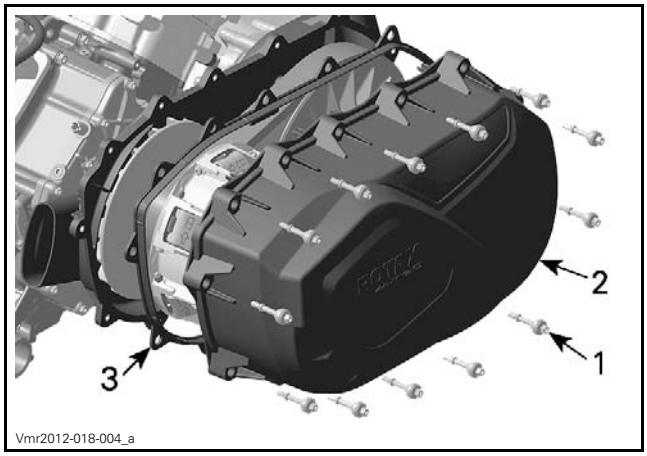
NOTICE **If an appreciable amount of water or any debris entered the CVT cover, CVT must be cleaned and inspected.**

Removing the CVT Cover

Remove CVT cover screws.

NOTE: Do not use and impact tool to remove CVT cover screws. To support the CVT cover remove the top center screw last.

Remove the CVT cover and its gasket.



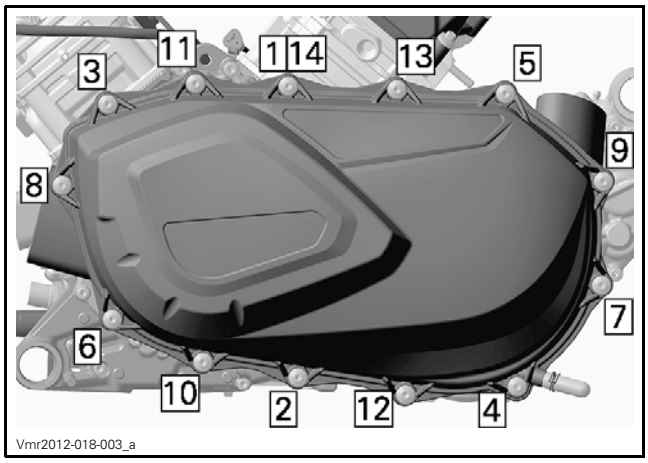
1. CVT cover screw
2. CVT cover
3. Gasket

Installing the CVT Cover

Install the top center screw of first.

NOTE: Do not use and impact tool to install CVT cover screws.

Tighten the CVT cover screws as per following sequence.



CVT COVER TIGHTENING SEQUENCE

TIGHTENING TORQUE	
CVT cover screws	7 N•m ± 0.8 N•m (62 lbf•**in** ± 7 lbf•**in**)

DRIVE BELT

Removing the Drive Belt

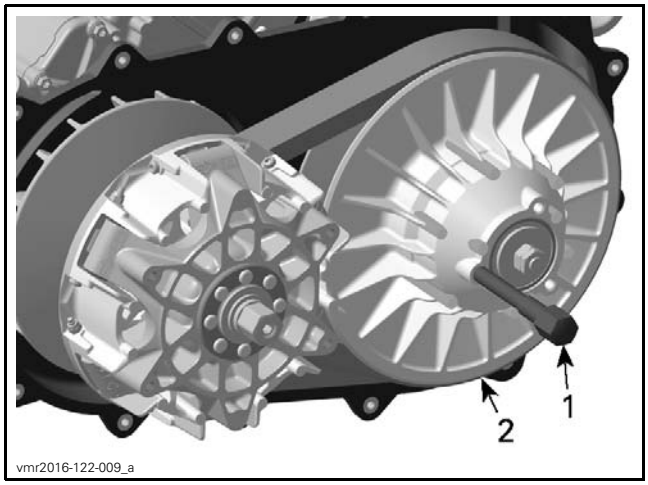
NOTICE In case of a drive belt failure, the CVT, cover and air outlet must be cleaned.

Remove *CVT COVER*.

Open driven pulley.

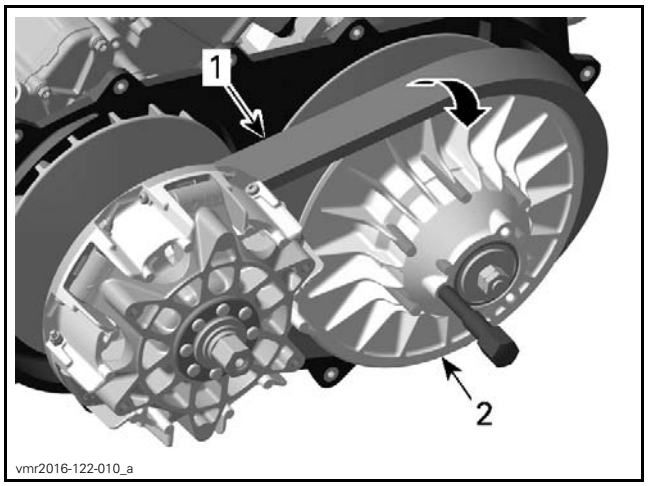
REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	

Screw tool in the threaded hole of driven pulley and tighten to open the pulley.



1. *Puller/locking tool*
2. *Fixed sheave of driven pulley*

To remove belt, slip the belt over the top edge of fixed sheave, as shown.



1. *Belt*
2. *Fixed sheave of driven pulley*

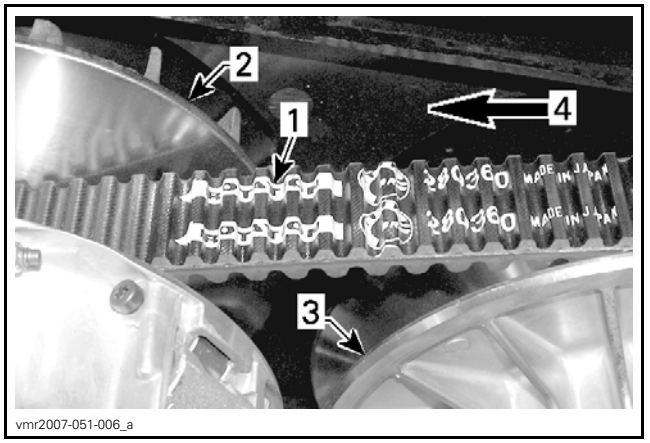
Inspecting the Drive Belt

For drive belt inspection refer to *DRIVE BELT INSPECTION* in the *PERIODIC MAINTENANCE PROCEDURES* subsection.

Installing the Drive Belt

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

The maximum drive belt life span is obtained when the drive belt has the proper rotation direction. Install it so that the arrow printed on belt is pointing towards front of the vehicle, viewed from top.



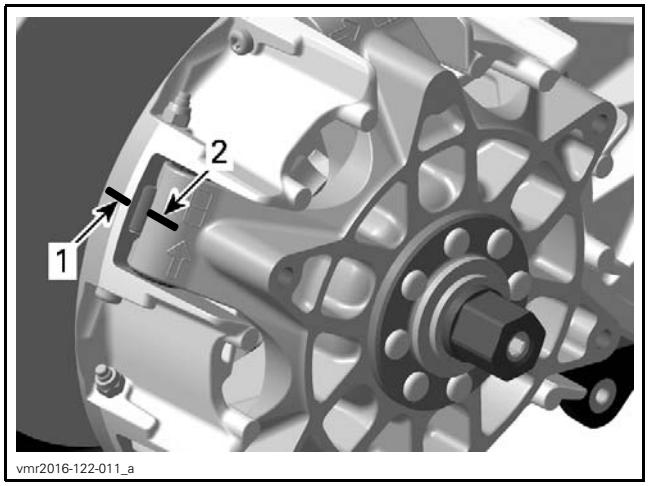
1. *Arrow printed on belt*
2. *Drive pulley (front)*
3. *Driven pulley (rear)*
4. *Rotation direction*

DRIVE PULLEY

Removing the Drive Pulley

Remove *DRIVE BELT*, see procedure in this subsection.

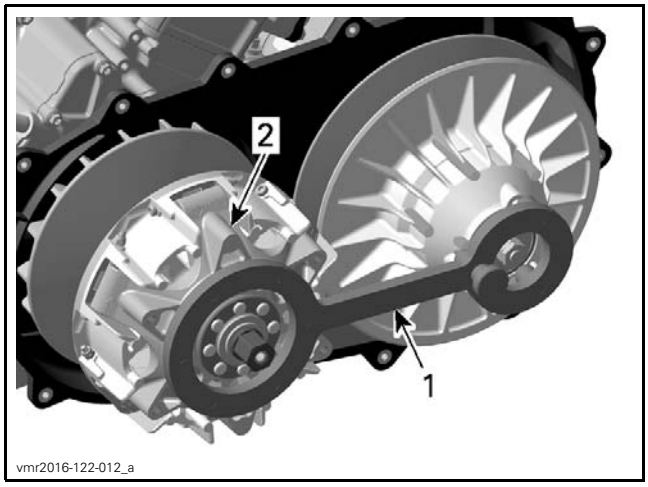
Prior to removing the drive pulley, mark sliding sheave and governor cup to ensure correct indexation at reinstallation.



1. *Mark on drive pulley sliding sheave*
2. *Mark on governor cup*

Lock the drive pulley.

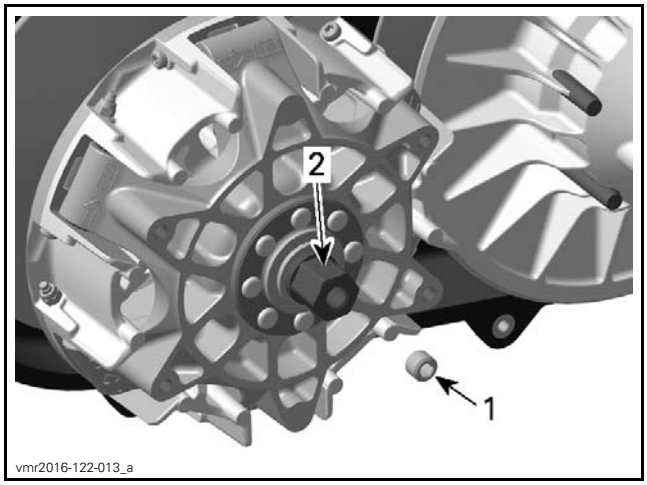
REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. *Clutch holder*
2. *Drive pulley sliding sheave*
3. *Governor cup*

Remove set screw.

NOTE: Heat set screw to break the threadlocker bond prior to removal.



1. *Set screw*
2. *Drive pulley nut*

Loosen the drive pulley nut.

NOTICE **Never use any type of impact wrench for drive pulley removal.**

NOTE: Do not unscrew the drive pulley nut completely. If governor cup is stuck, hit it using a soft hammer.

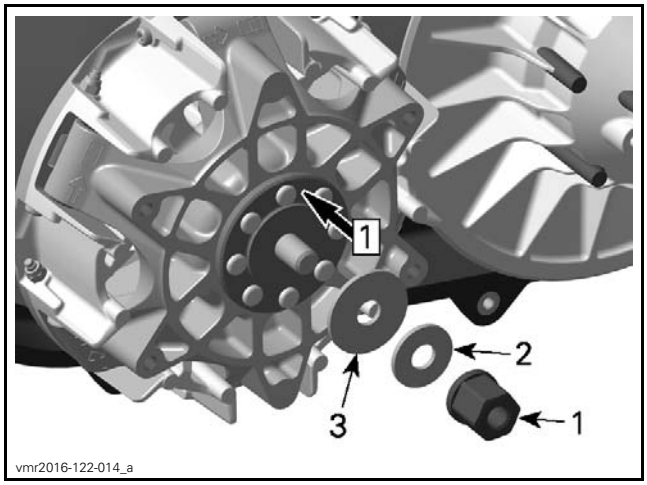
Remove service tool.

Apply axial pressure with your hand on the sliding sheave and governor cup.

Remove:

– Drive pulley nut
– Small thrust washer (discard it)
– Large thrust washer (discard it)

⚠ CAUTION **Sliding sheave of drive pulley is spring loaded.**



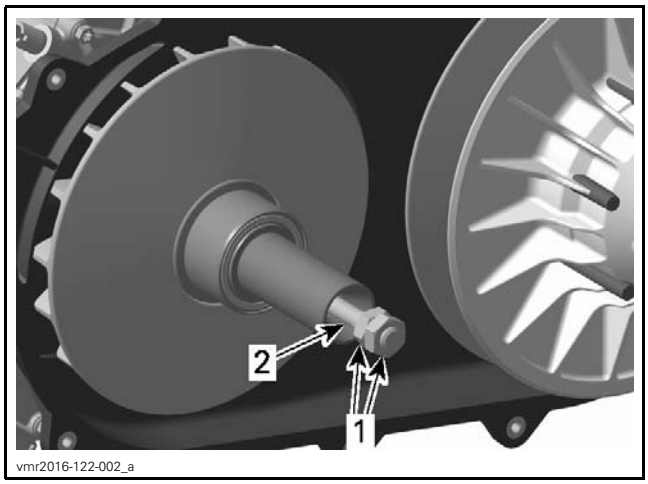
Step 1: Push governor cup

1. *Drive pulley nut*
2. *Small thrust washer (discard it)*
3. *Large thrust washer (discard it)*

Slowly release and remove sliding sheave.

Counter two M12 x 1.75 nuts for removing the stud.

NOTICE Do not use original installed nuts.



1. *Counter nuts*
2. *Stud*

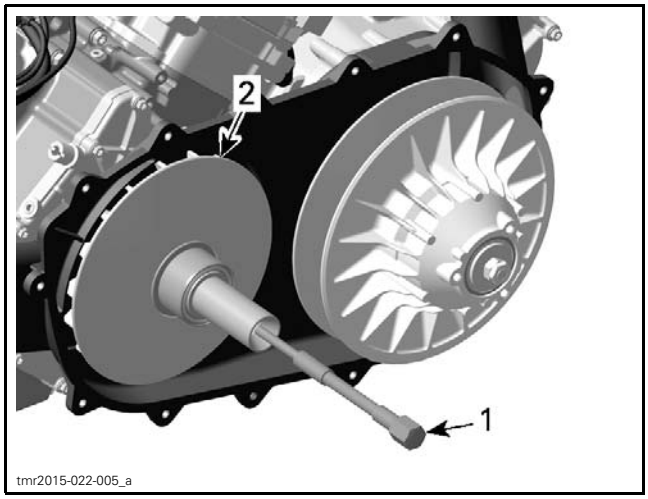
Lock crankshaft, refer to *CRANKSHAFT LOCKING PROCEDURE* in the *BOTTOM END* subsection.

Remove stud from PTO.

Remove fixed pulley.

NOTICE Use only recommended tool.

REQUIRED TOOL	
CLUTCH PULLER (P/N 529 035 746)	

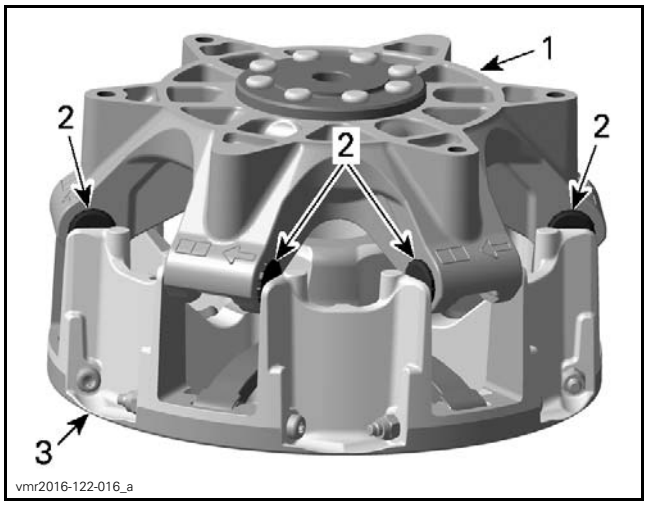


1. *Drive pulley puller*
2. *Fixed sheave*

Disassembling the Drive Pulley

Governor Cup

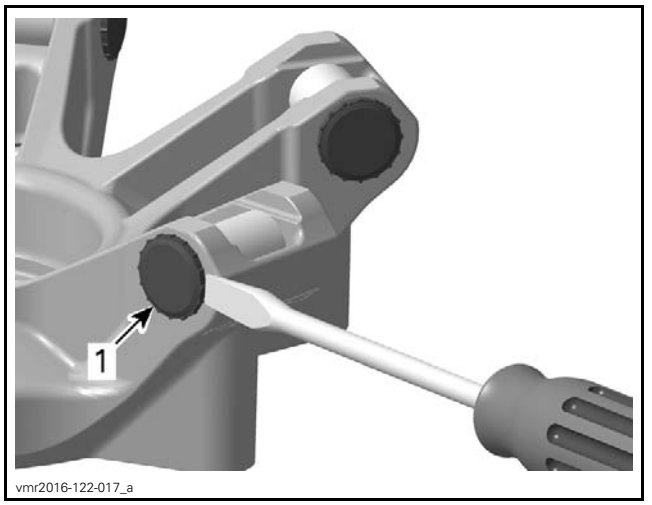
Carefully lift governor cup until slider shoes come at their highest position into guides.



1. *Governor cup*
2. *Slider shoes*
3. *Sliding sheave*

NOTE: The following procedure is not necessary except if slider shoe and/or roller must be removed. Refer to *INSPECTION* before proceeding.

Remove slider shoes.



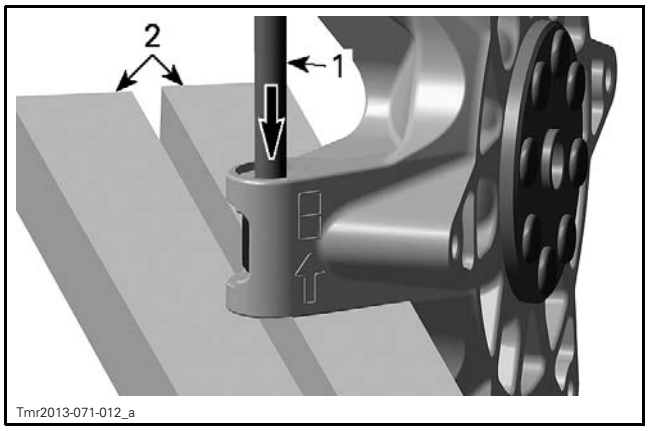
1. *Slider shoe*

Put governor cup on a vice to push out bearing sleeve of roller in the foreseen direction (against arrow).

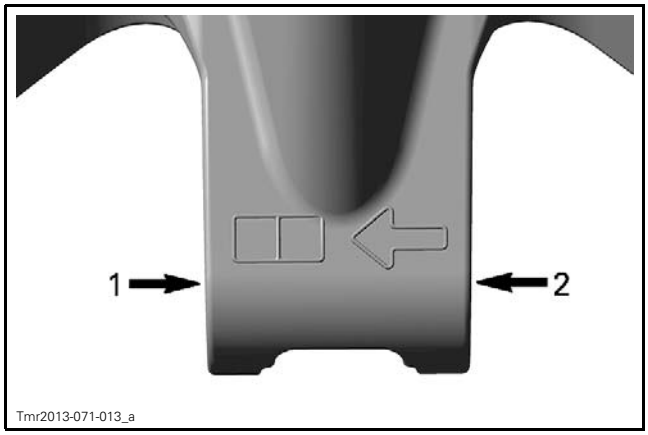
NOTICE Do not clamp the governor cup in the vice to push out bearing sleeve. Governor cup will be damaged.

NOTE: Use protection plates to avoid marks and/or damages to the governor cup.

NOTICE Always replace all rollers at the same time. Partly worn rollers may cause damage to the CVT system.

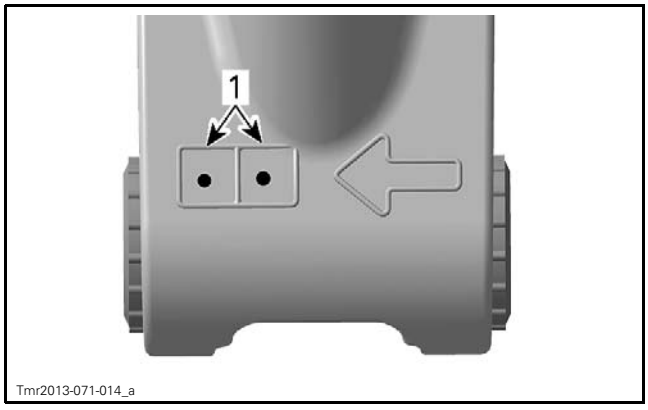


1. Punch
2. Vice



1. Removal direction
2. Assembly direction

NOTE: Whenever removing a governor cup with already two marked boxes replace it by a new one.



1. Marked boxes

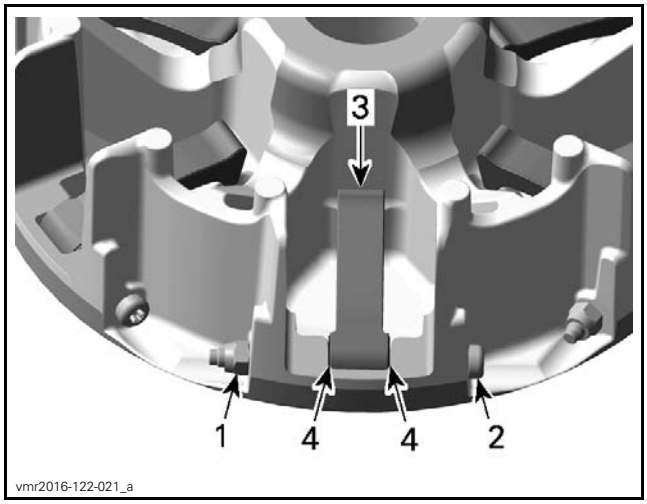
Sliding Sheave

This drive pulley is equipped with 6 levers.

NOTE: The following procedure is not necessary except if centrifugal lever must be removed. Refer to *INSPECTION* before proceeding.

To remove centrifugal levers remove:

– Lock nut
– Centrifugal lever pivot bolt
– Centrifugal lever
– Thrust washers.



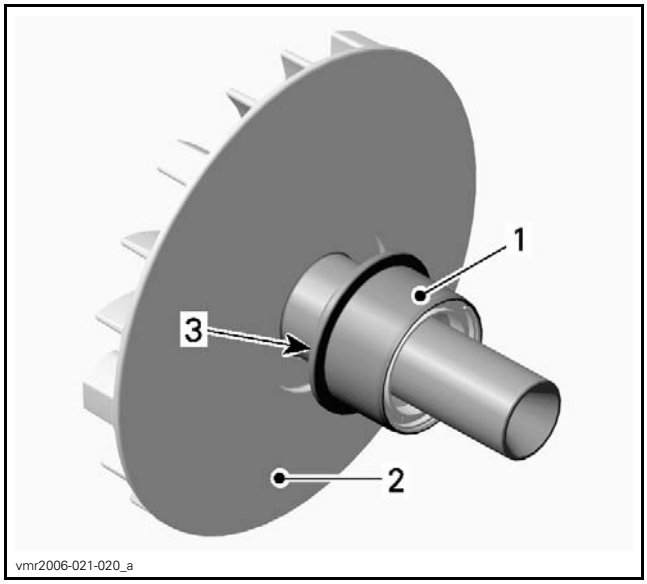
1. Lock nut
2. Centrifugal lever pivot bolt
3. Centrifugal lever
4. Thrust washers

Fixed Sheave

⚠ WARNING

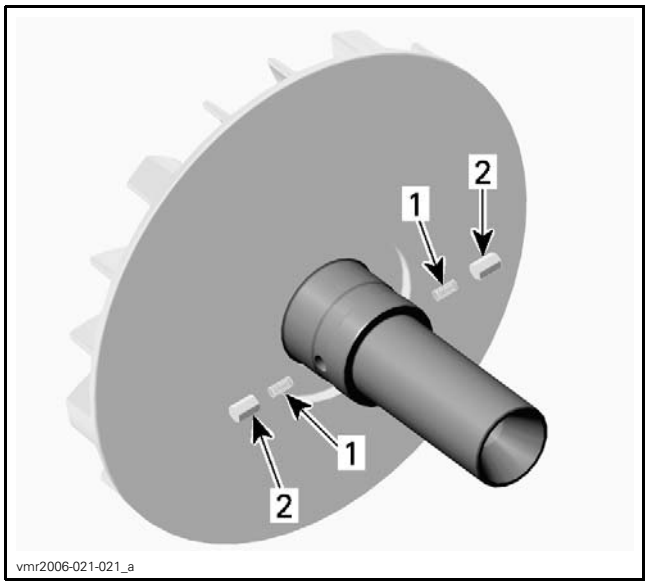
Always wear safety glasses to remove spring sleeves.

Pull and rotate one-way clutch slowly until the sheave of spring sleeves are visible.



1. One-way clutch
2. Fixed sheave
3. Spring sleeve area

Hold both spring sleeves with fingers and release when one-way clutch is disengaged.



1. Springs
2. Spring sleeves

Cleaning the Drive Pulley

Using a small brush, paper towel and parts cleaner , clean all the mounting surfaces and threads as shown.

REQUIRED PRODUCT
XPS BRAKES AND PARTS CLEANER (P/N 219 701 776) or XPS BRAKES AND PARTS CLEANER (USA) (P/N 219 701 705)

NOTICE Avoid contact between cleaner and crankshaft seal because damage may occur.

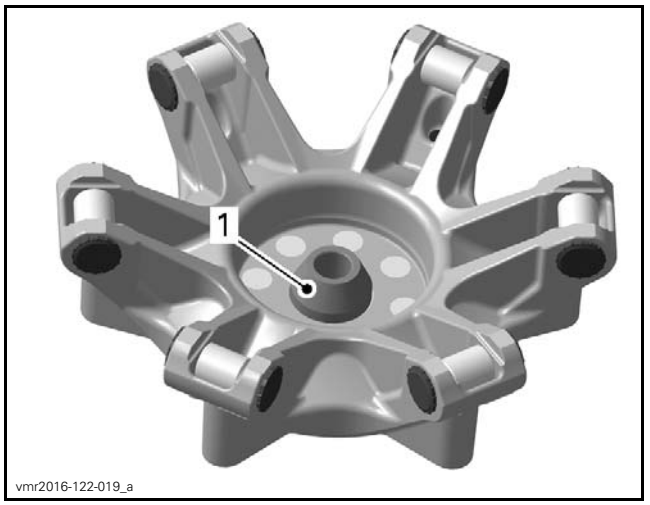
Remove all deposits that have baked on pulley tapered surfaces with medium steel wool and/or sand paper no. 600.

NOTICE Do not use any other type of abrasive.

Reclean surfaces after steel wool and/or sand paper use.

Blow compressed air on all cleaned parts and surfaces to remove any residue.

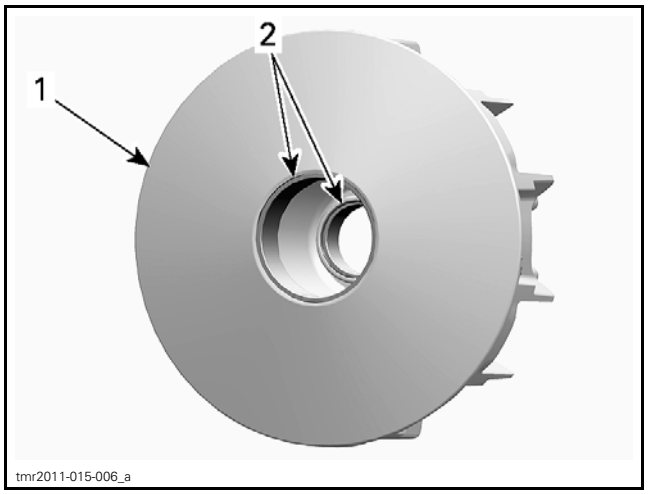
NOTICE Mounting surfaces and threads must be free of any oil, cleaner or towel residue.



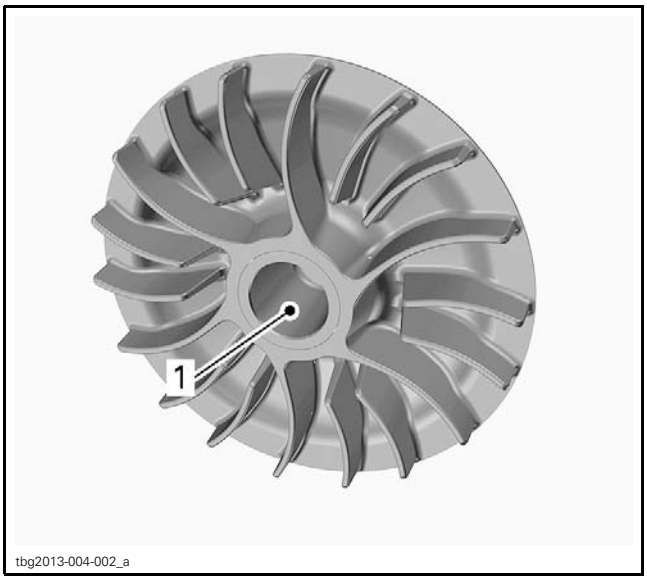
BACK OF GOVERNOR CUP
1. Tapered contact surface

Only use petrol base cleaner when cleaning bushings of sliding sheave.

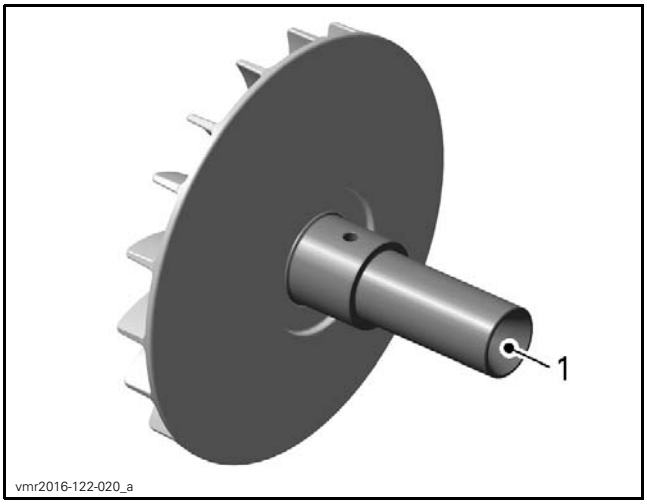
NOTICE Do not use acetone to clean bushing.



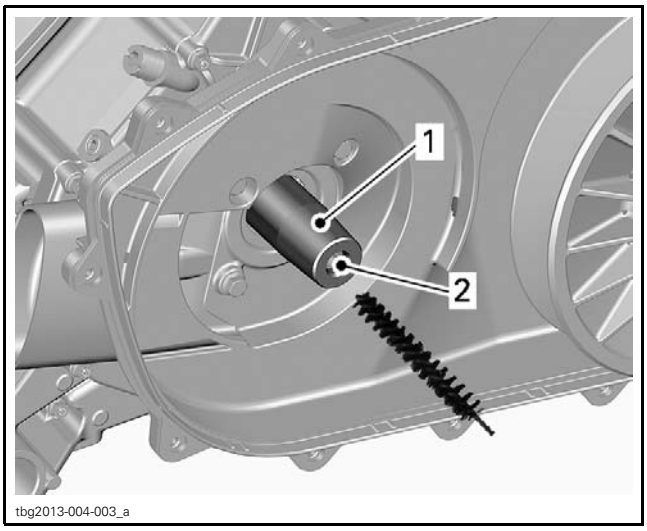
1. Sliding sheave
2. Bushings



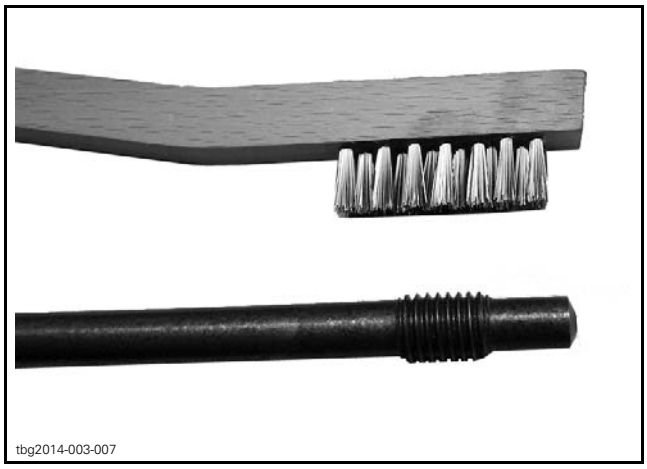
BACK OF FIXED SHEAVE
1. Tapered end of the Crankshaft side fixed sheave



1. Tapered end of fixed sheave shaft

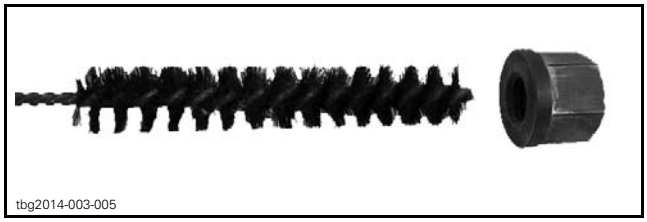


PTO
1. Tapered contact surface
2. PTO inner threads



PTO END OF STUD

STUD END RECEIVING NUT



M12 NUT

M12 SET SCREW

Inspecting the Drive Pulley

Bushings

For bushing inspection, refer to *SLIDING SHEAVE* in this subsection.

Governor Cup

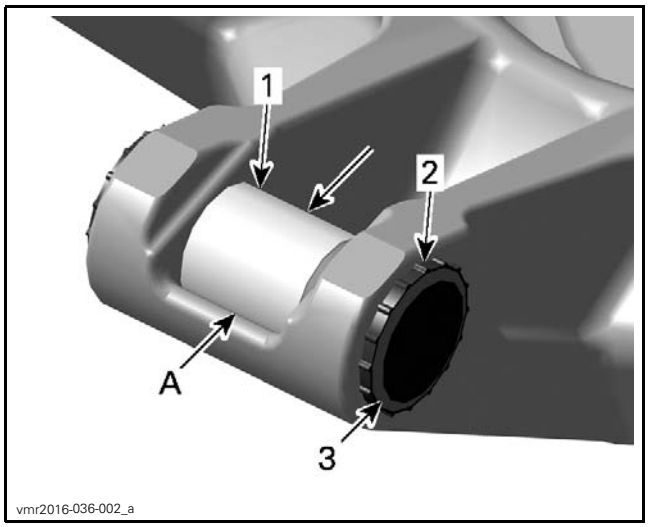
Check governor cup for cracks or other visible damage. Replace if necessary.

Roller and Slider Shoe

NOTICE **Always replace all rollers and slider shoes at the same time.**

Check if rollers move freely.

Check slider shoes for visible wear. If chamfer is not present anymore, replace **ALL** slider shoes.



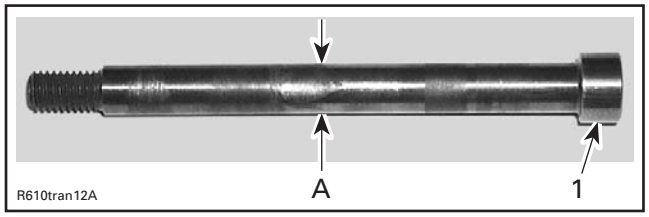
1. Roller
2. Slider shoe
3. Slider shoe chamfer
A. Roller outer diameter

Check roller outer and inner diameter, replace if it is out of specification.

ROLLER OUTER DIAMETER	
NEW	13.80 mm to 14.00 mm (.543 in to .551 in)
SERVICE LIMIT	13.20 mm (.519 in)
ROLLER INNER DIAMETER	
NEW	8.025 mm to 8.175 mm (.316 in to .322 in)
SERVICE LIMIT	9.000 mm (.354 in)

Centrifugal Lever Pivot Bolt

Measure diameter of centrifugal lever pivot bolt, replace if it is out of specification.

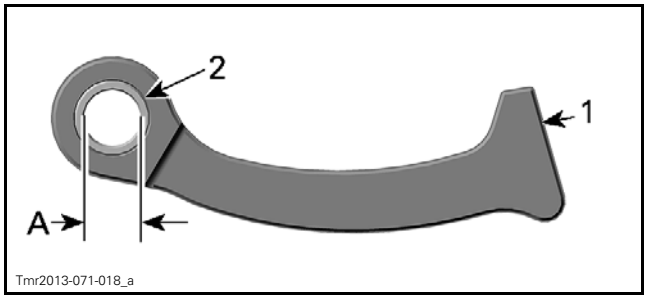


1. Centrifugal lever pivot bolt
A. Measure diameter here

CENTRIFUGAL LEVER PIVOT BOLT DIAMETER	
NEW	6.063 mm to 6.091 mm (.239 in to .24 in)
SERVICE LIMIT	6.00 mm (.236 in)

Centrifugal Lever

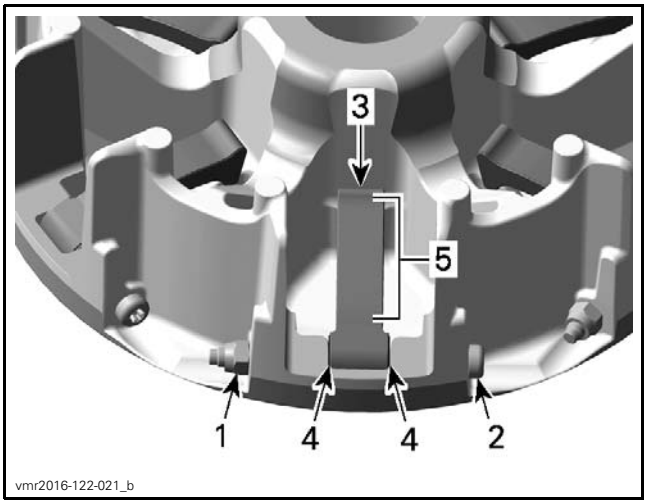
Check bushing diameter in the centrifugal lever for wear. Replace centrifugal lever if necessary.



1. Centrifugal lever
2. Bushing
A. Bushing inner diameter

CENTRIFUGAL LEVER BORE DIAMETER	
NEW	6.107 mm to 6.218 mm (.24 in to .245 in)
SERVICE LIMIT	6.300 mm (.248 in)

Replace centrifugal lever, thrust washers, centrifugal lever pivot bolts and lock nuts if the contact surfaces show heavy visible wear.



1. Lock nut
2. Centrifugal lever pivot bolt
3. Centrifugal lever
4. Thrust washers
5. Contact surface to the roller

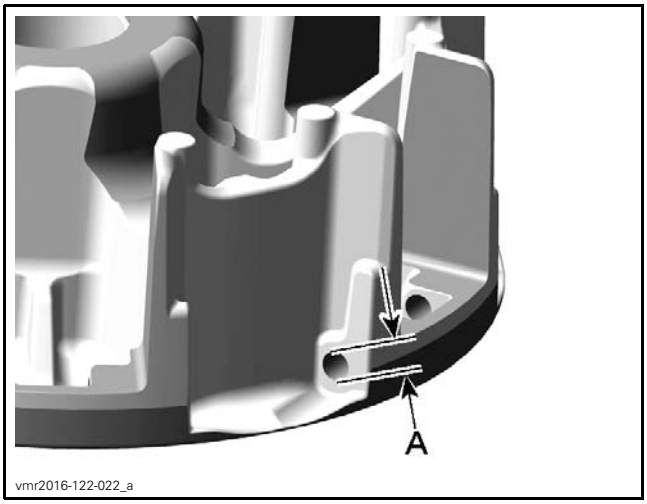
⚠ WARNING

Always replace ALL levers at the same time. Otherwise, unbalanced drive pulley will occur because of levers difference.

Sliding Sheave

Check sliding sheave for cracks and sliding contact surface for excessive wear. Replace sliding sheave if necessary.

Measure centrifugal lever pivot bolt bores. Replace sliding sheave if bores are out of specification or otherwise damaged.



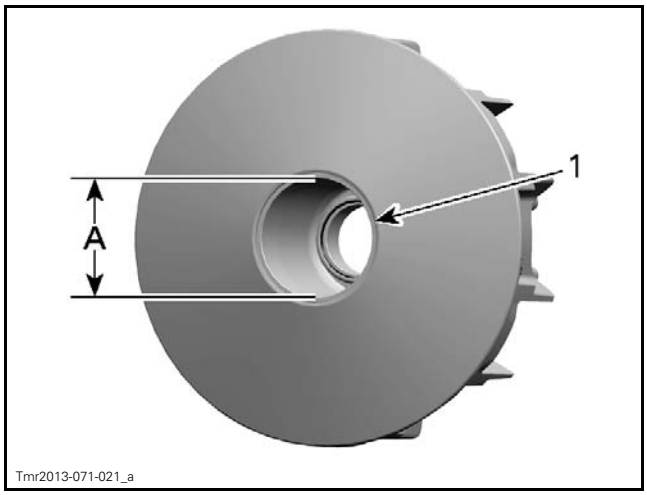
A. Centrifugal lever pivot bolt bore diameter

CENTRIFUGAL LEVER PIVOT BOLT BORE DIAMETER	
NEW	6.113 mm to 6.171 mm (.241 in to .243 in)
SERVICE LIMIT	6.300 mm (.248 in)

Measure bushing diameters of sliding sheave.

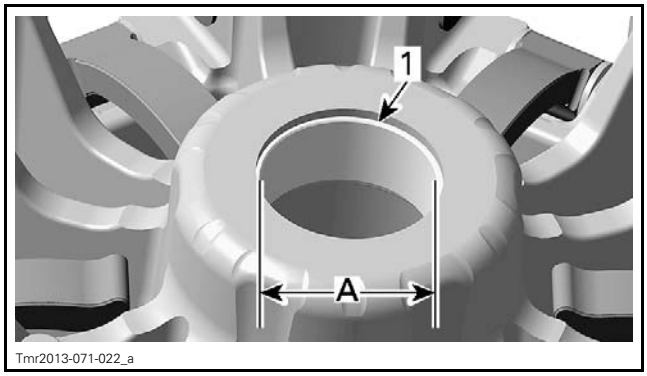
REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge



1. Bushing on fixed sheave side
A. Bore diameter of bushing

SLIDING SHEAVE LARGE BUSHING	
NEW	55.000 mm to 55.040 mm (2.165 in to 2.167 in)
SERVICE LIMIT	55.200 mm (2.173 in)



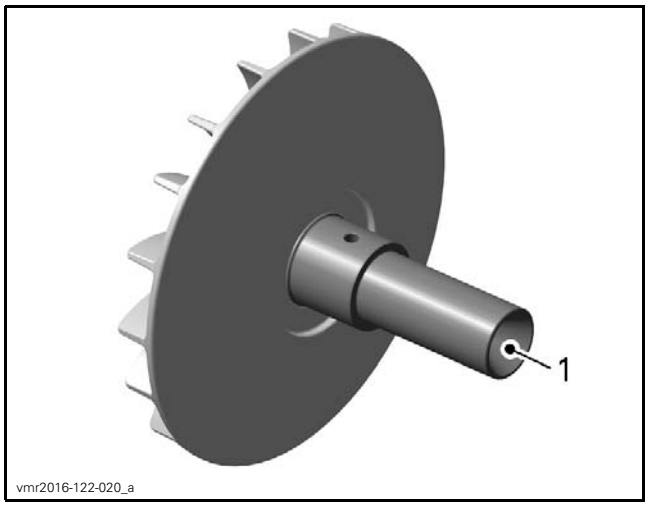
1. Bushing on governor cup side
A. Bore diameter of bushing

SLIDING SHEAVE SMALL BUSHING	
NEW	32.000 mm to 32.040 mm (1.26 in to 1.261 in)
SERVICE LIMIT	32.200 mm (1.268 in)

Replace sliding sheave if one of the bushings is out of specification. Visually inspect coatings.

Fixed Sheave

Check fixed sheave contact surface to the governor cup for scratches or other damages. If so, replace fixed sheave.



1. Visually check here

Check for any marks on fixed sheave plate. Replace if necessary.

Spring

Measure spring free length and squareness. If spring is out of specification, replace by a new one.

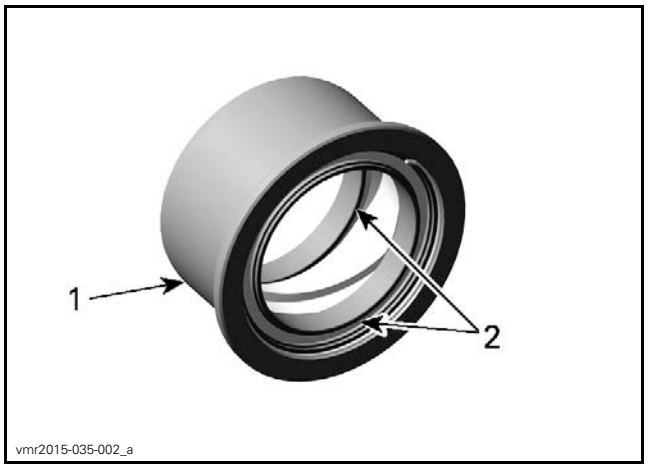
CLUTCH SPRING FREE LENGTH	
SERVICE LIMIT	95 mm (3.74 in)

CLUTCH SPRING SQUARENESS	
SERVICE LIMIT	4 mm (.157 in)

One-Way Clutch

Check bearings for excessive play and smooth operation. Replace one-way clutch bearings if necessary.

NOTICE **Be careful not to damage the inside of one-way clutch during bearing removal.**



1. One-way clutch
2. Bearings

Measure length of spring sleeves and check if edges on top of the spring sleeve are excessively worn. If they out of specifications, replace both spring sleeves at the same time.

SPRING SLEEVE LENGTH	
NEW	9.2 mm to 9.4 mm (.362 in to .37 in)
SERVICE LIMIT	9.0 mm (.354 in)

Assembling the Drive Pulley

For assembly, reverse the disassembly procedure. Pay attention to following details.

One-Way Clutch

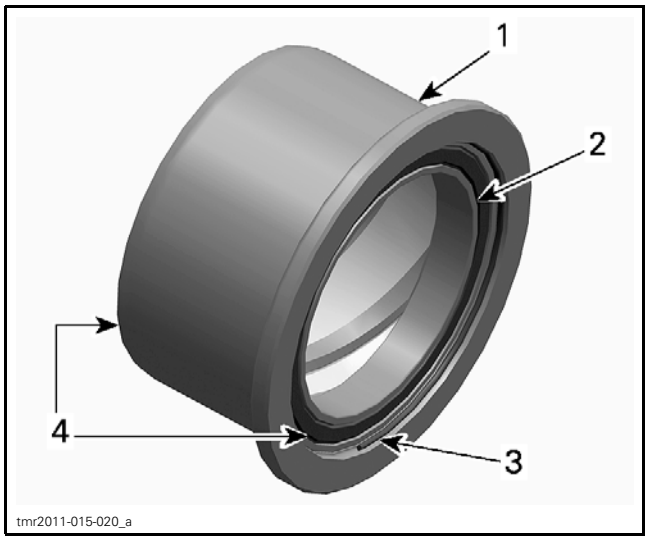
Clean parts.

Lubricate:

- Springs
- Spring sleeves
- Room between one-way clutch bearings
- Inside ball bearings to ensure adequate lubrication.

ONE-WAY CLUTCH LUBRICATION	
Service product	ISOFLEX GREASE TOPAS NB 52 (P/N 293 550 021)

NOTE: Ball bearings have a seal on one side only. Install bearings with the seal towards the outside of the one-way clutch.



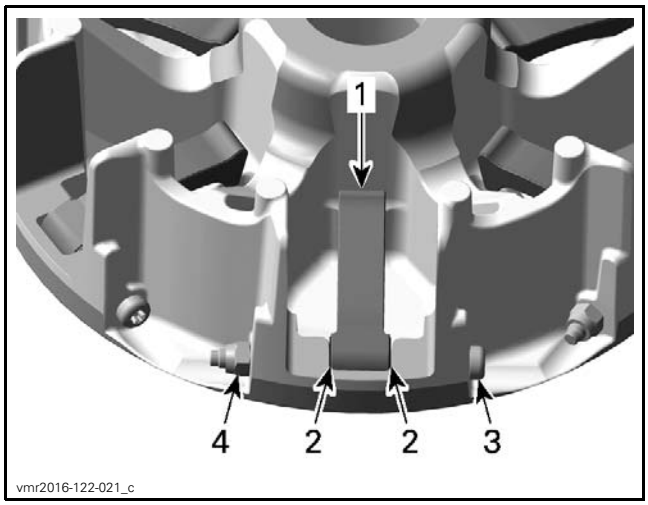
1. *One-way clutch*
2. *Bearing*
3. *Retaining ring*
4. *Seal*

Sliding Sheave

Install centrifugal levers with their thrust washers.

Install NEW lock nuts and tighten them to specification.

TIGHTENING TORQUE	
Lock nuts	8 N•m ± 1 N•m (71 lbf•**in** ± 9 lbf•**in**)



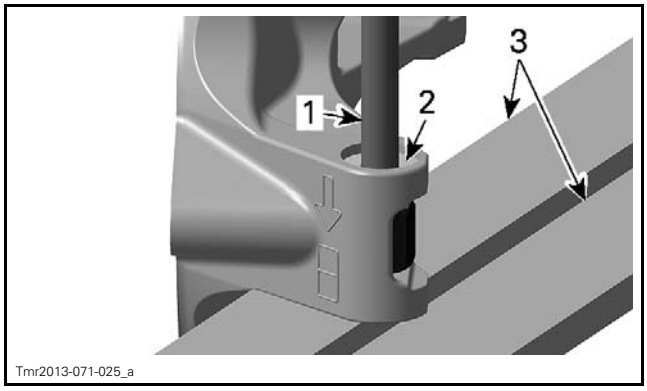
1. *Centrifugal lever*
2. *Thrust washers*
3. *Centrifugal lever pivot bolt*
4. *Lock nut*

NOTICE Centrifugal levers must move easily after installation.

Governor Cup

Rebuild governor cup with new bearing sleeves, thrust washers, rollers and slider shoes.

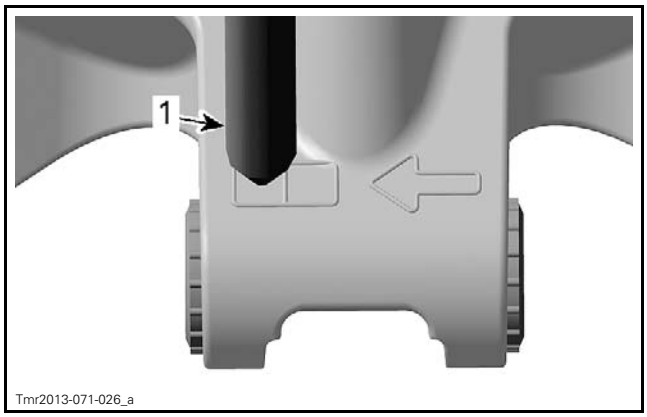
NOTICE Final position has to be aligned with the contact surface of the slider shoes (no protrusion).



1. *Punch*
2. *Mating surface of slider shoes*
3. *Vice*

Each time when replacing the bearing sleeves sign the foreseen box with a punch.

NOTICE Do not tap too hard. Violent damage of the governor cup may appear.



1. *Punch*

NOTICE Rollers must move easily after installation.

Insert slider shoes into governor cup to properly slide in guides.

Installing the Drive Pulley

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

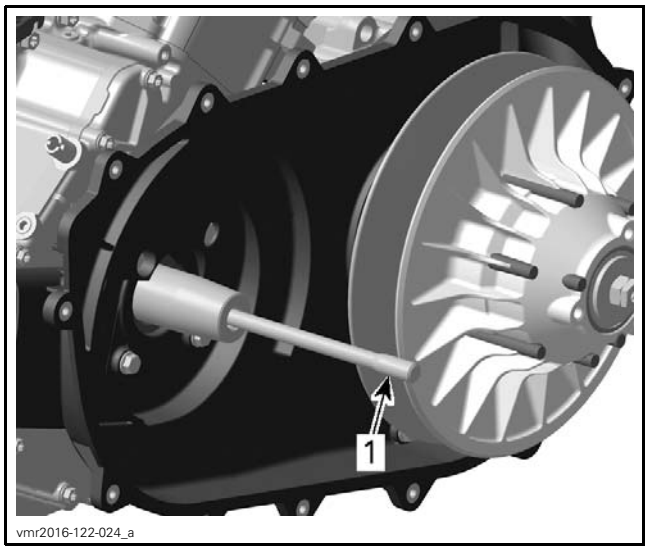
⚠ WARNING

Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.

NOTICE Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces and parts as described in *CLEANING THE DRIVE PULLEY* in this subsection.

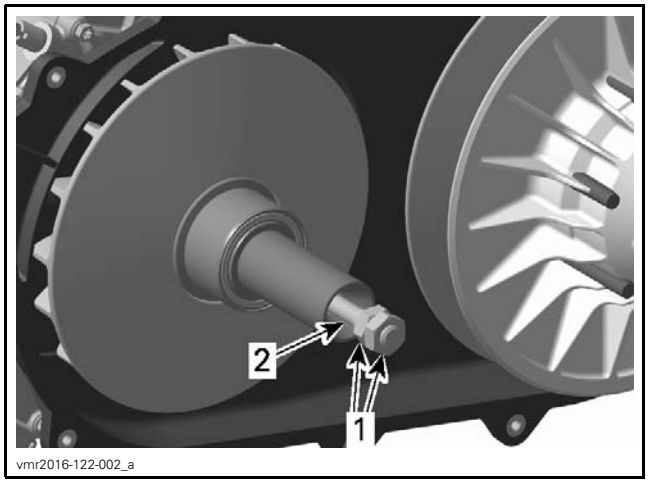
Hand tighten the threaded stud in the PTO.



1. Stud

Counter two M12 X 1.75 nuts for tightening the threaded stud.

NOTICE Do not use original installed nuts.



1. Counter nuts
2. Stud

Lock crankshaft, refer to *CRANKSHAFT LOCKING PROCEDURE* in the *BOTTOM END* subsection.

Tighten the threaded stud to specification.

TIGHTENING TORQUE	
Threaded stud	50 N•m ± 2 N•m (37 lbf•ft ± 1 lbf•ft)

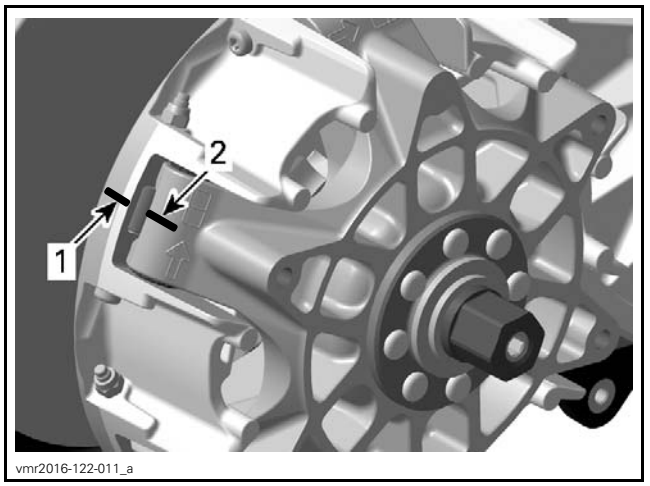
Remove both M12 counter nuts from the stud.

Remove tool from magneto side. Install plug and O-ring on magneto cover.

Install fixed sheave on PTO.

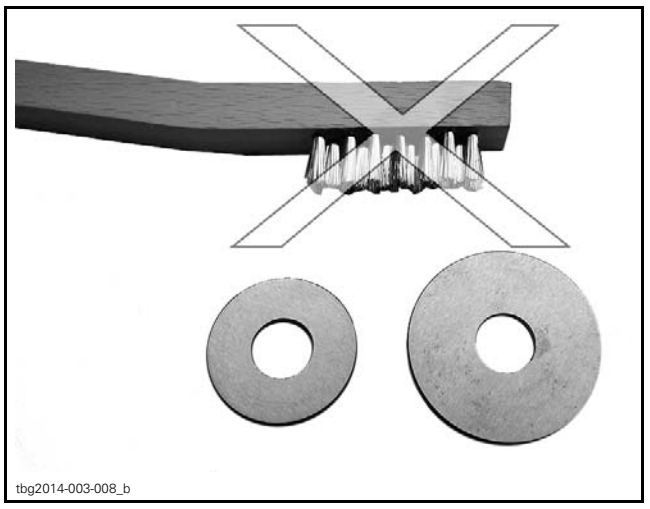
Install sliding sheave and governor cup.

NOTE: Make sure that sliding sheave and governor cup are properly aligned as marked before removal.

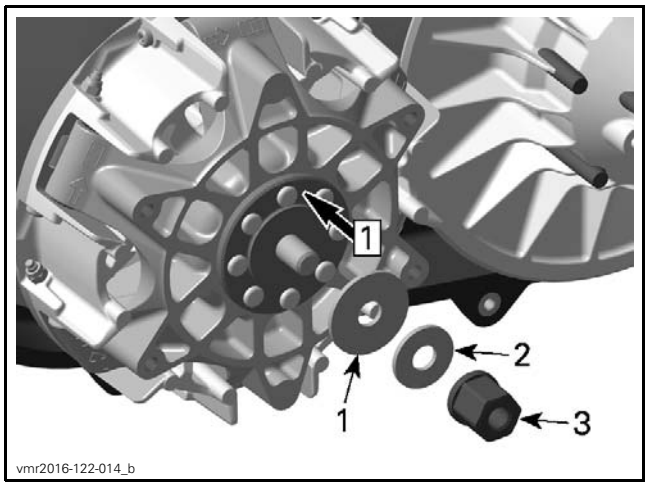


1. Mark on drive pulley sliding sheave
2. Mark on governor cup

NOTICE The washers are shipped with special coating. Do not clean washers using degreaser, abrasive products, etc; this could damage the special coating washers comes with.



Install NEW larger washer first, then NEW smaller washer and nut.



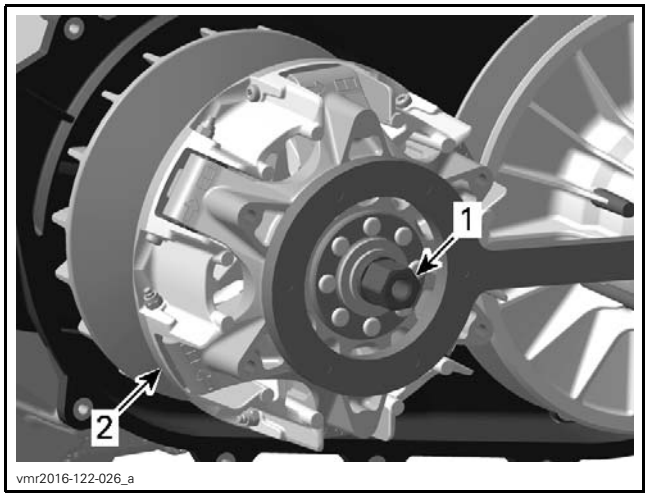
Step 1: Push

1. *Large thrust washer (*NEW*)*
2. *Small thrust washer (*NEW*)*
3. *Drive pulley nut*

Lock the drive pulley with clutch holder tool.

Tighten drive pulley nut to specification.

DRIVE PULLEY M12 FLANGE NUT		
Tightening procedure	STEP 1	80 N•m ± 1 N•m (59 lbf•ft ± 1 lbf•ft)
	STEP 2	90° ± 5°

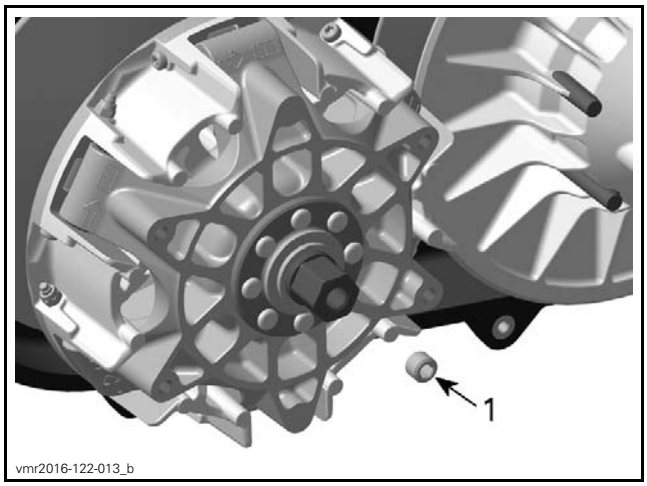


1. *Nut*
2. *Drive pulley*

Install M12 X 10 set screw in M12 nut and tighten the set screw to specification.

TIGHTENING TORQUE	
Service product	LOCTITE 272 (P/N 420 899 526)
M12 X 10 set screw	65 N•m ± 2 N•m (48 lbf•ft ± 1 lbf•ft)

NOTE: It is important to use the specified threadlocker: High temperatures are involved and this product is specifically designed for these temperatures. No other product should be used.



1. *Set screw*

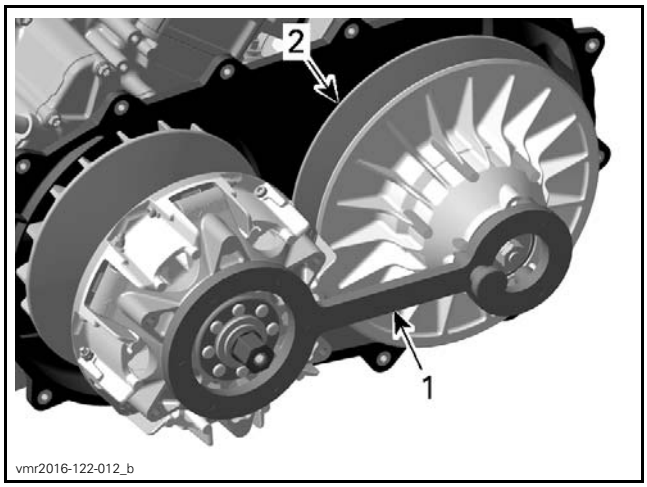
DRIVEN PULLEY

Removing the Driven Pulley

Remove *DRIVE BELT*.

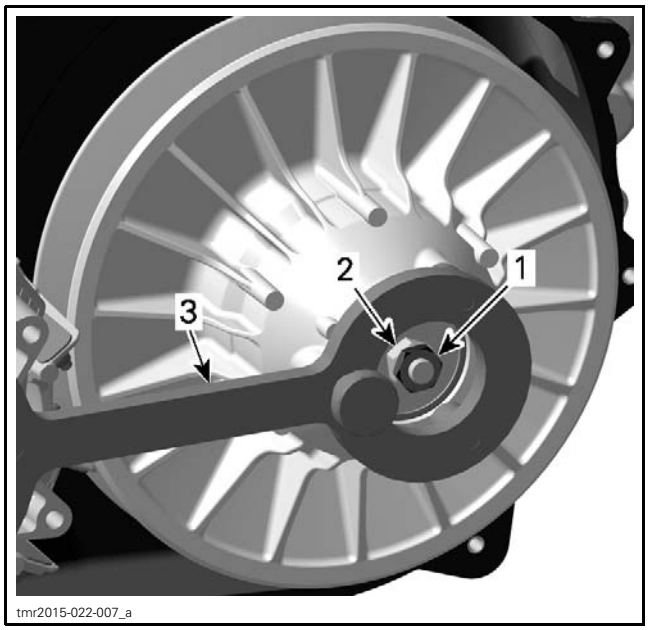
Lock the driven pulley.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. *Clutch holder*
2. *Driven pulley*

Remove the counter nut and discard it.

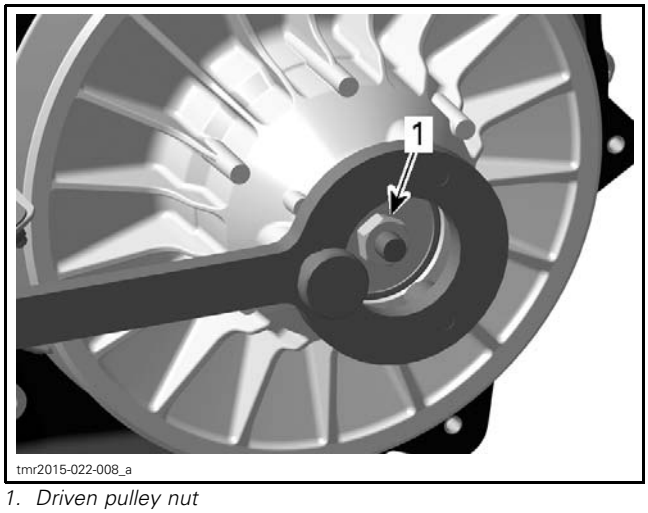


tmr2015-022-007_a

1. *Counter nut*
2. *Driven pulley nut*
3. *Clutch holder*

Loosen the driven pulley nut.

NOTE: Do not unscrew the driven pulley nut completely.



tmr2015-022-008_a

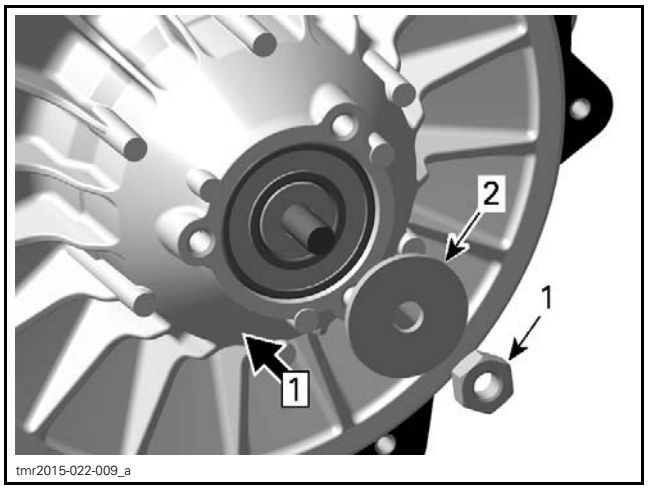
1. *Driven pulley nut*

Remove service tool.

Apply axial pressure with your hand on driven pulley and maintain during nut removal.

Remove driven pulley nut (discard) and washer.

⚠ CAUTION Driven pulley is spring loaded. Hold driven pulley tight and slowly remove the driven pulley nut to release spring tension.

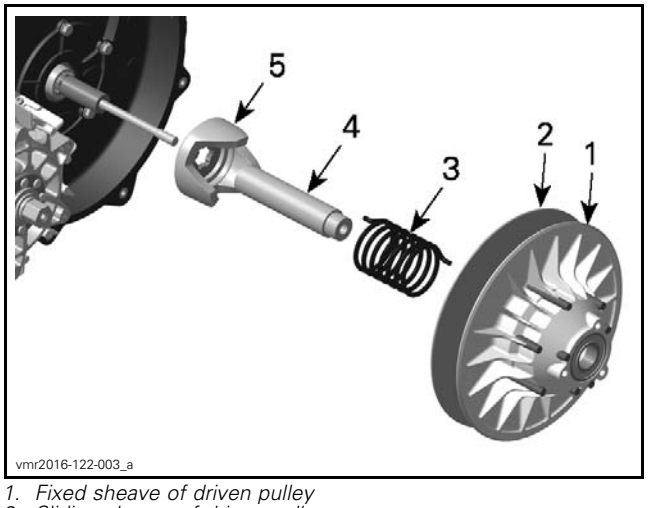


tmr2015-022-009_a

Step 1: Push

1. *Driven pulley nut (discard)*
2. *Thrust washer*

Remove:
- Driven pulley
- Spring
- Shaft
- Cam.

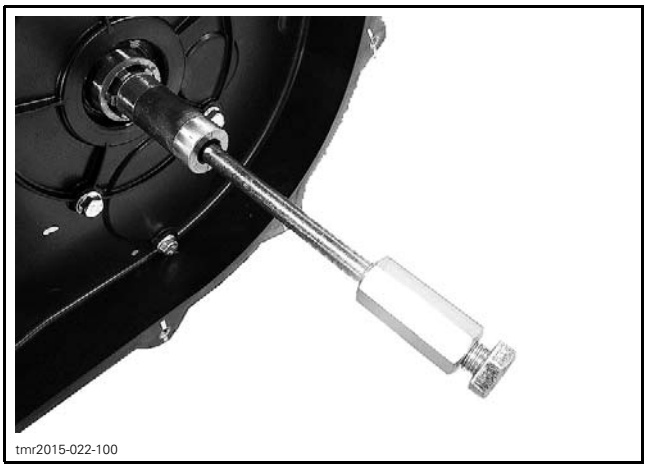


vmr2016-122-003_a

1. *Fixed sheave of driven pulley*
2. *Sliding sheave of driven pulley*
3. *Spring*
4. *Shaft*
5. *Cam*

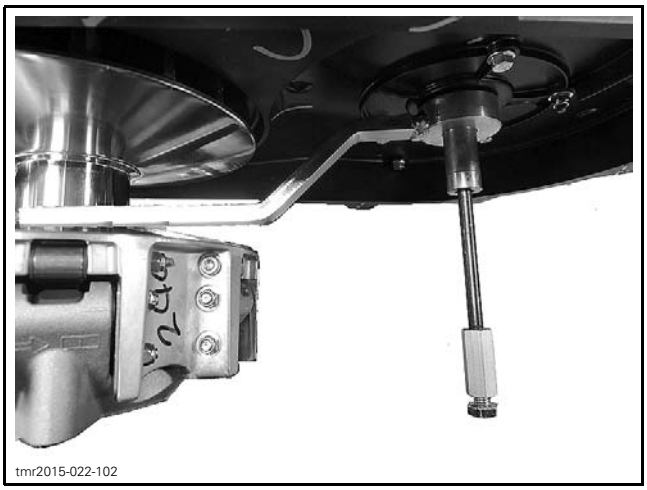
Install the tightening tool on the stud.

REQUIRED TOOL	
DRIVEN PULLEY STUD TOOL (P/N 529 036 360)	


tmr2015-022-100

Block countershaft.

REQUIRED TOOL	
COUNTERSHAFT RETAINER TOOL (P/N 529 036 312)	

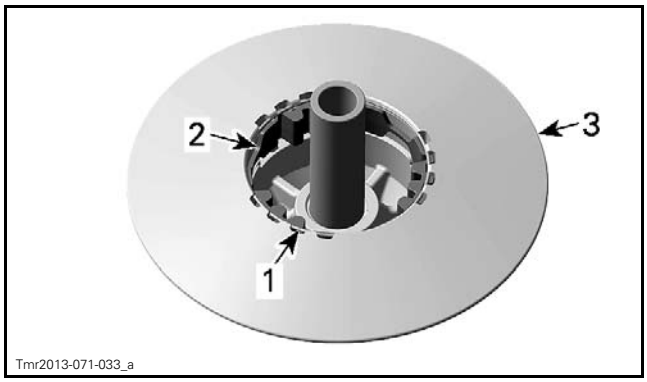

tmr2015-022-102

Remove stud.

Disassembling the Driven Pulley

Fixed Sheave

Remove retaining ring and lift torque gear.

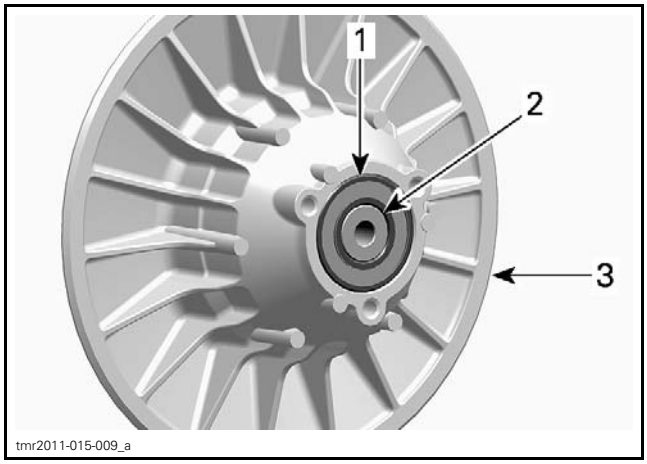


Tmr2013-071-033_a

1. Retaining ring
2. Torque gear
3. Fixed sheave of driven pulley

NOTE: The following procedure is not necessary except if ball bearing or shaft must be removed. Refer to *INSPECTION* before proceeding.

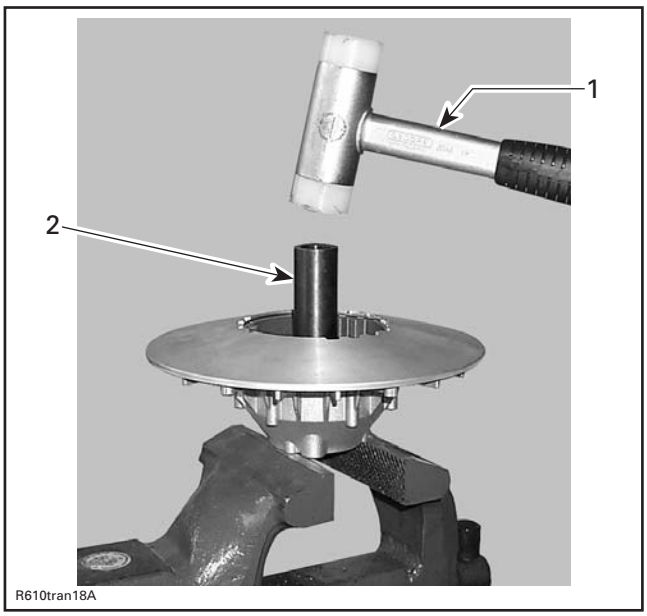
Heat ball bearing area up to 100°C (212°F) before removing ball bearing.



tmr2011-015-009_a

1. Ball bearing
2. Shaft
3. Fixed sheave of driven pulley

Use a soft hammer to push shaft with bearing out of fixed sheave.

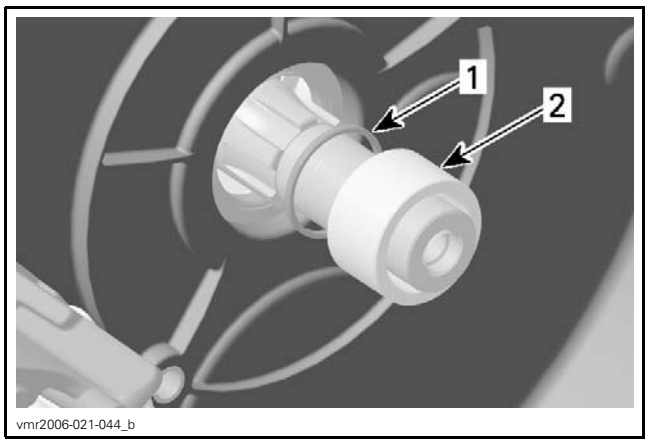


1. *Soft hammer*
2. *Shaft*

Remove shaft from ball bearing.

Remove distance sleeve and O-ring from countershaft.

Replace O-ring if brittle, hard or damaged.



1. *O-ring*
2. *Distance sleeve*

Cleaning the Driven Pulley

Clean the CVT air guide area from contamination.

Using a small brush, paper towel and parts cleaner, clean all the mounting surfaces and threads as shown.

REQUIRED PRODUCT
XPS BRAKES AND PARTS CLEANER (P/N 219 701 776) or XPS BRAKES AND PARTS CLEANER (USA) (P/N 219 701 705)

NOTICE Avoid contact between cleaner and countershaft oil seal or damage may occur.

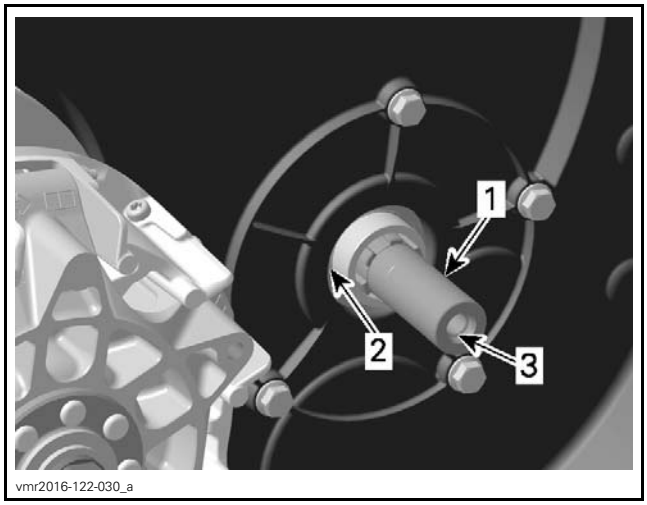
Remove all deposits that have baked on pulley tapered surfaces with medium steel wool and/or sand paper no. 600.

NOTICE Do not use any other type of abrasive.

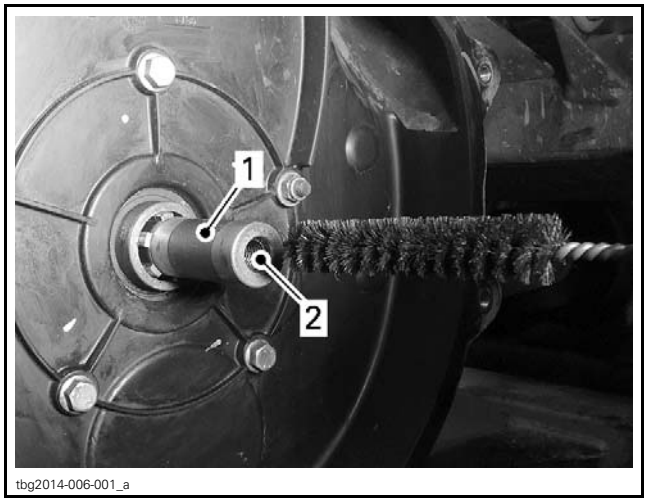
Reclean surfaces after steel wool use.

Blow compressed air on all cleaned parts and surfaces to remove any residue.

NOTICE Mounting surfaces and threads must be free of any oil, cleaner or towel residue.

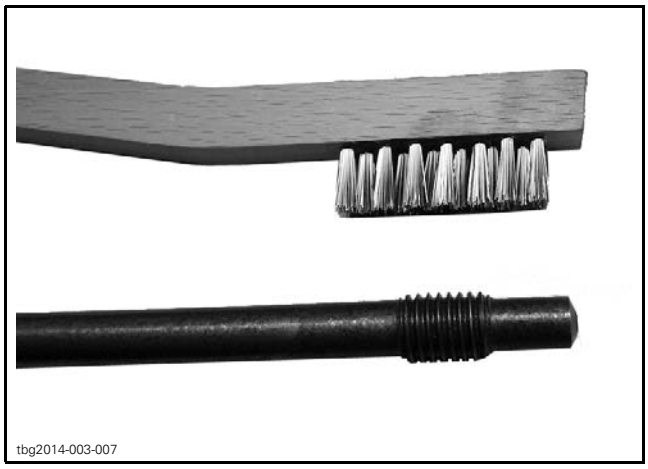


1. *Countershaft end*
2. *Countershaft oil seal*
3. *Countershaft inner threads*



GEARBOX COUNTERSHAFT

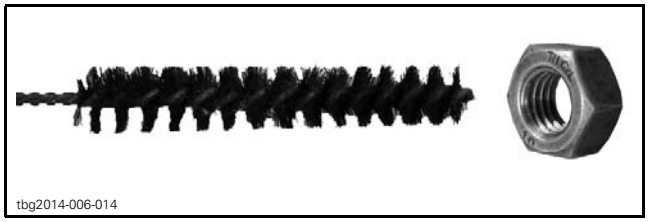
1. *Countershaft outer surface*
2. *Countershaft inner threads*


tbg2014-003-007

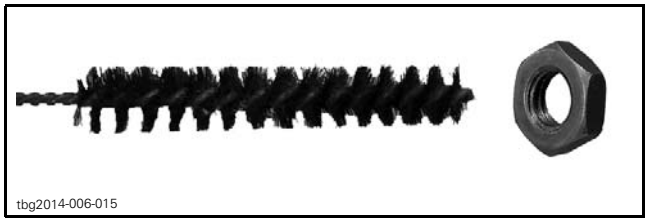
COUNTERSHAFT END OF STUD

tbg2014-003-006

STUD END RECEIVING COUNTER NUTS


tbg2014-006-014

THREADS OF DRIVEN PULLEY NUT


tbg2014-006-015

THREADS OF COUNTER NUT

Inspecting the Driven Pulley

Sliding Sheave

Check sliding sheave for cracks and sliding contact surface for excessive wear. Replace sliding sheave if necessary.

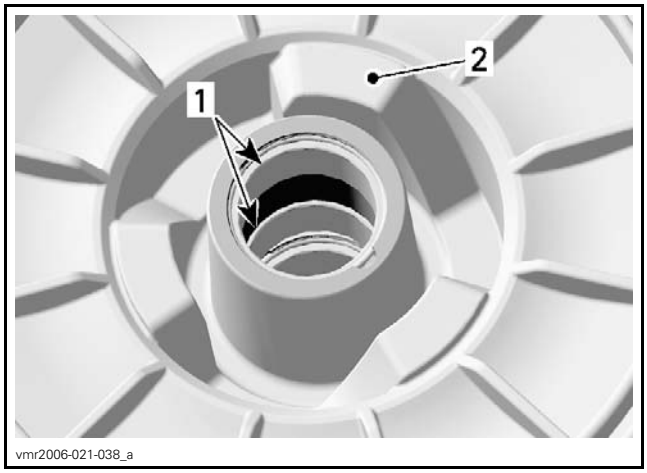
Check bushings for cracks, scratch and for free movement when assembled to sliding sheave.

Measure bushing diameter.

REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge

This bushing can not be replaced. Replace sliding sheave if bushings are out of specification. Visually inspect coatings.



vmr2006-021-038_a

1. Bushings
2. Backside of sliding sheave of driven pulley

BUSHINGS BORE DIAMETER	
NEW	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
SERVICE LIMIT	30.200 mm (1.189 in)

Fixed Sheave

Check fixed sheave for cracks and excessive wear. Replace fixed sheave if necessary.

Check ball bearing for free play and smooth operation. Replace if necessary.

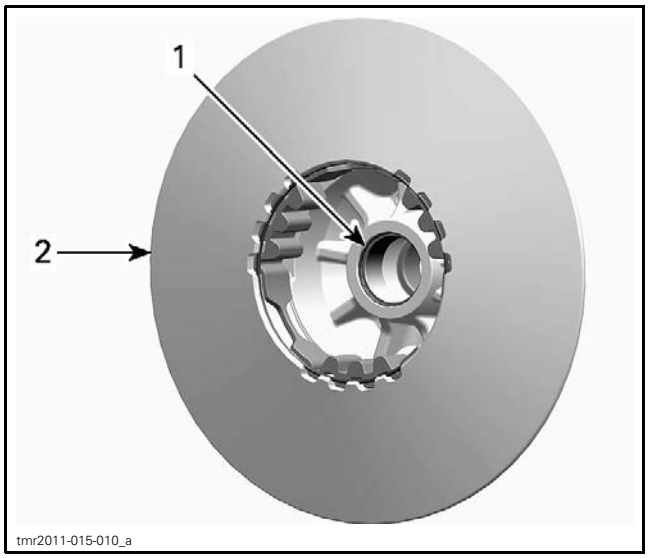
Check shaft for heavy wear or visible damage. Replace if necessary.

If the shaft is removed measure bushing diameter.

REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge

This bushing can not be replaced. Replace fixed sheave if bushing is out of specification. Visually inspect coatings.

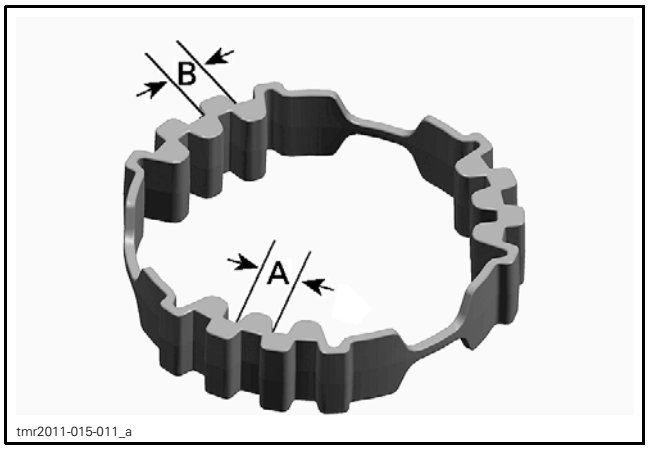


1. Bushing
2. Fixed sheave of driven pulley

BUSHING BORE DIAMETER	
NEW	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
SERVICE LIMIT	30.200 mm (1.189 in)

Check torque gear for visible damage and cracks.

Measure wear limit with a caliper.

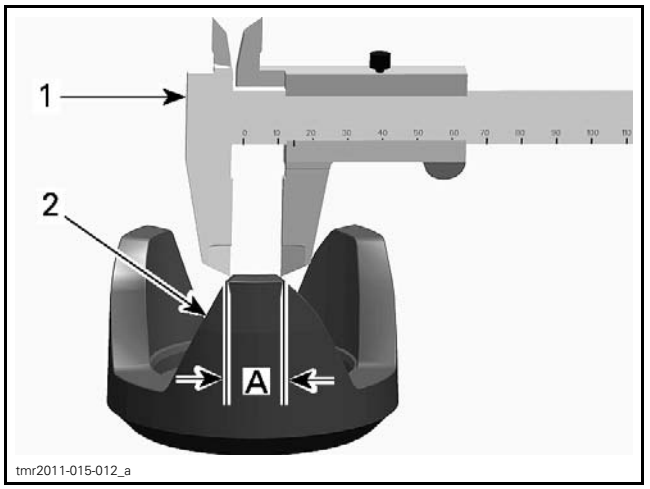


A. Measurement inside
B. Measurement outside

WEAR ON TEETH BOTH SIDES	
SERVICE LIMIT	7.500 mm (.295 in)

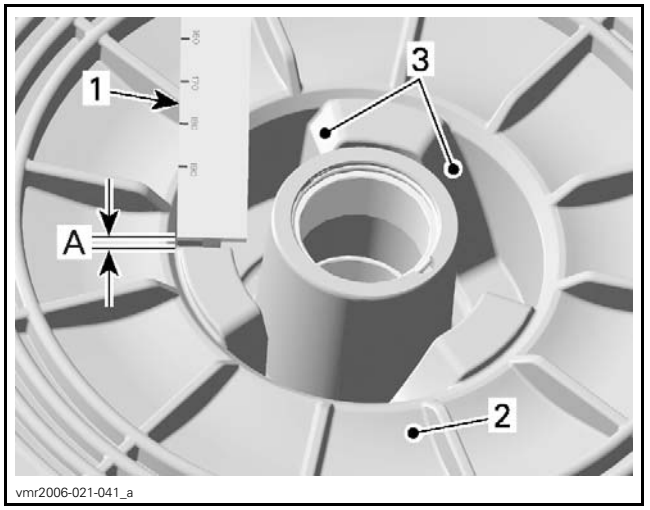
Cam

Check cam for visible damage and wear limit with a caliper.



1. Caliper
2. Contact surface
A. Width to be measured due to wear on contact surface

WIDTH ON TOP SURFACE	
SERVICE LIMIT	16.0 mm (.63 in)

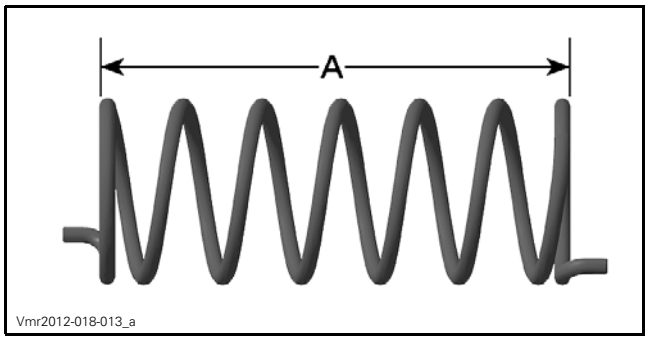


1. Caliper
2. Sliding sheave
3. Contact surface
A. Wear to be measured

WEAR ON CONTACT SURFACE	
SERVICE LIMIT	1.00 mm (.039 in)

Spring

Measure spring free length and squareness. If spring is out of specification, replace by a new.



CVT DRIVEN SPRING
A. Spring free length

SPRING FREE LENGTH	
SERVICE LIMIT	125 mm (4.921 in)
CLUTCH SPRING SQUARENESS	
SERVICE LIMIT	3.8 mm (.15 in)

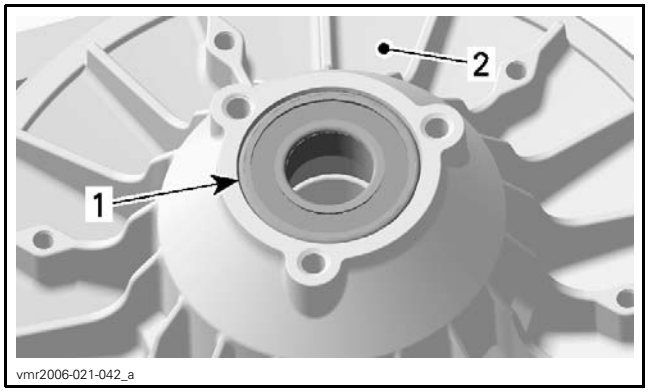
Assembling the Driven Pulley

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

Heat ball bearing area up to 100°C (212°F) before ball bearing installation.

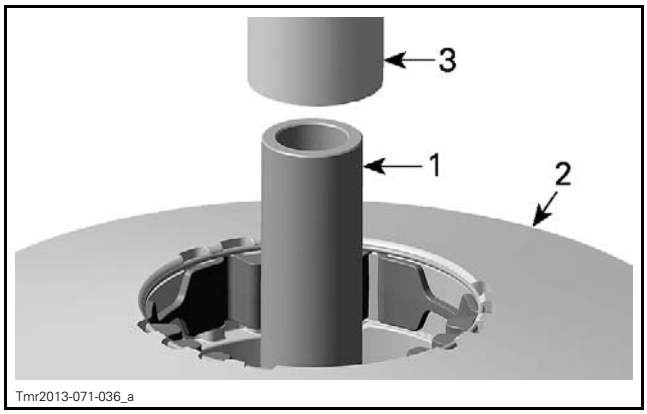
NOTE: Place new ball bearing in a freezer for 10 minutes before installation.

Install ball bearing with the writing on top and press in only on the outer ring.



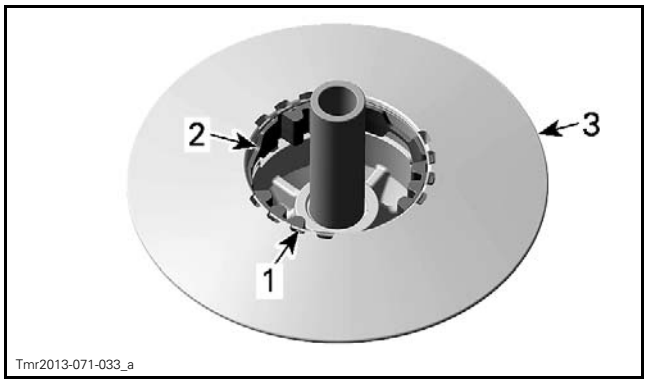
1. Ball bearing
2. Fixed sheave of driven pulley

NOTICE Do not use hammer, use press machine only.



1. Shaft
2. Fixed sheave
3. Press machine

Install torque gear then secure it with retaining ring.



1. Retaining ring
2. Torque gear
3. Fixed sheave of driven pulley

Installing the Driven Pulley

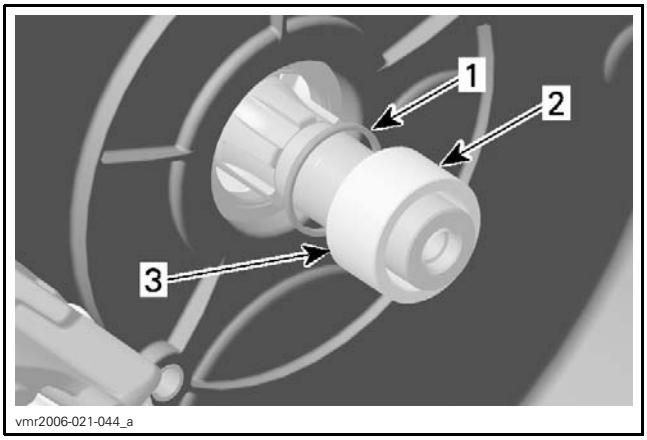
For installation, reverse the removal procedure. Pay attention to the following details.

NOTICE Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces and parts as described in *CLEANING THE DRIVEN PULLEY* in this subsection.

Place O-ring on countershaft splines and move it with distance sleeve in end position.

NOTICE Chamfer on inside diameter of the distance sleeve must face to gearbox side.



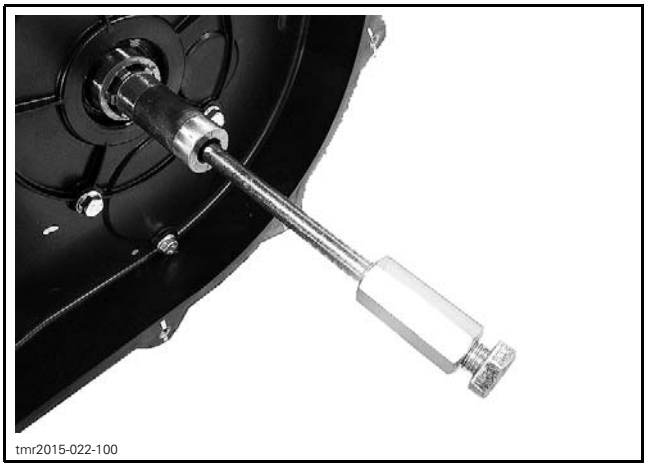
vmr2006-021-044_a

1. *O-ring*
2. *Distance sleeve*
3. *Chamfered area of distance sleeve*

Hand tighten the stud in the countershaft.

Install the tightening tool on the stud.

REQUIRED TOOL	
DRIVEN PULLEY STUD TOOL (P/N 529 036 360)	


tmr2015-022-100

Block countershaft.

REQUIRED TOOL	
COUNTERSHAFT RETAINER TOOL (P/N 529 036 312)	

tmr2015-022-101

Tighten the stud to specification.

TIGHTENING TORQUE	
Stud	45 N•m ± 2 N•m (33 lbf•ft ± 1 lbf•ft)

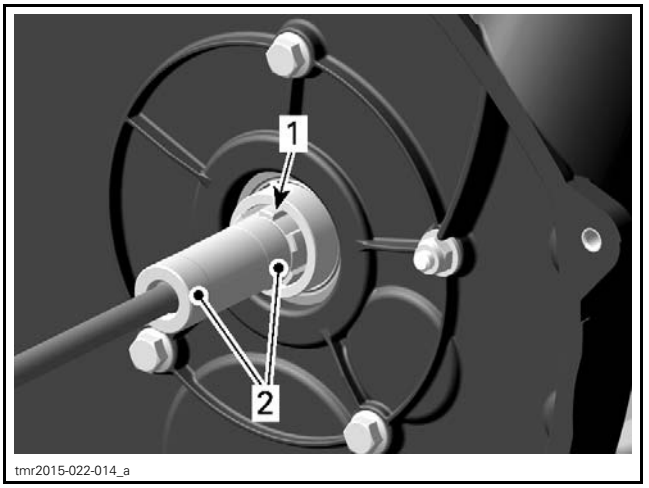
Remove the tightening tool from the stud.

Remove countershaft retainer tool.

Lubricate:

– Countershaft splines
– Countershaft outer surface.

SERVICE PRODUCT	
Countershaft splines and countershaft outer surface	LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)



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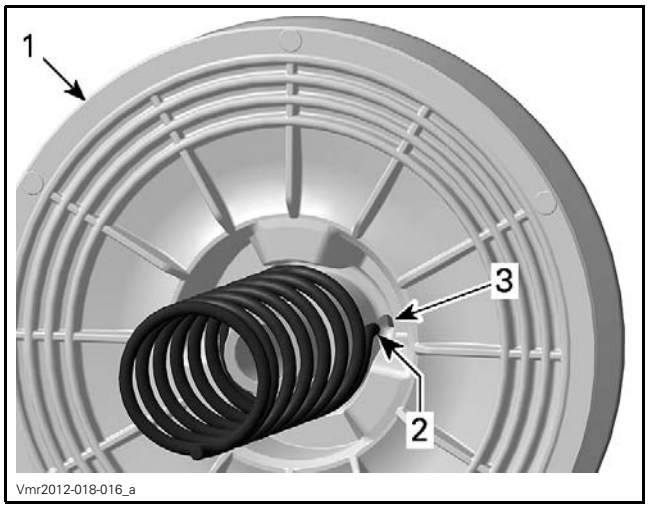
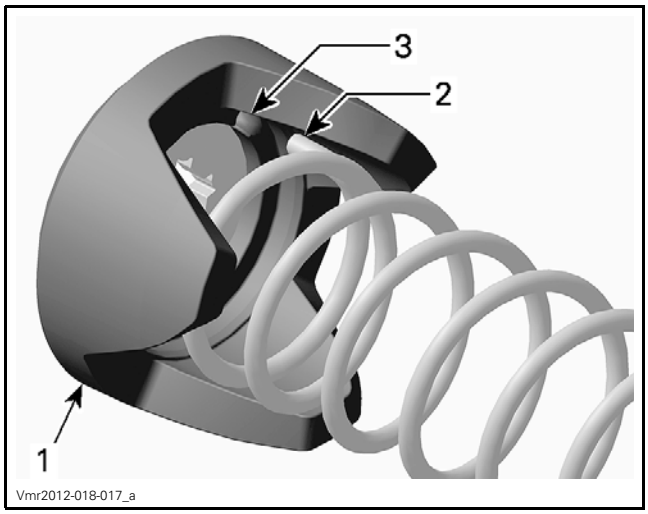
1. *Countershaft splines*
2. *Countershaft outer surface*

Place spring behind sliding sheave and engage spring end in the sliding sheave spring bore.



850 AND 1000 ENGINES
1. *Sliding sheave*
2. *Spring end*
3. *Spring bore*

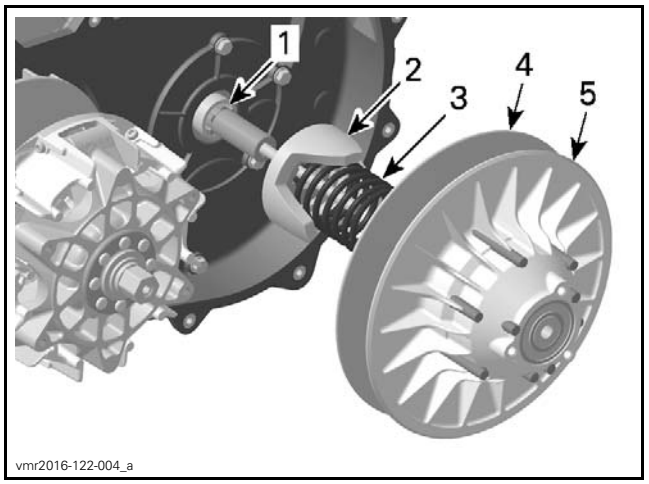
Place cam on the opposite end of the spring and engage the other spring end in the cam spring bore.



1. *Cam*
2. *Spring end*
3. *Spring bore*

Install pre-assembled cam with spring and driven pulley on countershaft end.

NOTICE Cam must engage on countershaft splines.



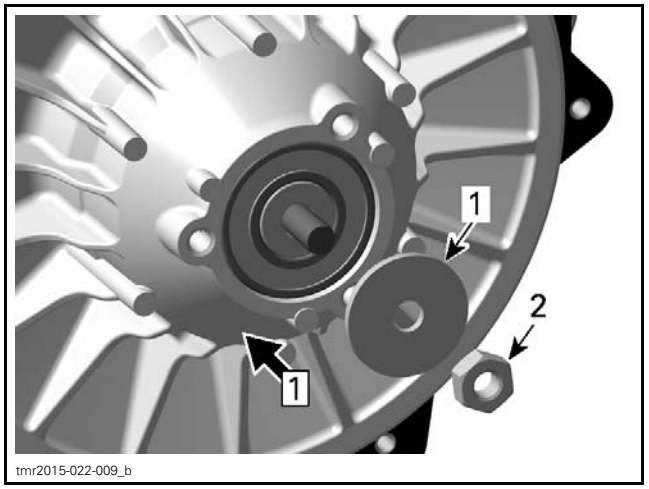
1. *Countershaft splines*
2. *Cam*
3. *Spring*
4. *Sliding sheave*
5. *Fixed sheave*

With your hand, push the driven pulley onto the shaft to compress the spring.

NOTICE A cam not correctly engaged will cause damage to the driven pulley and cam.

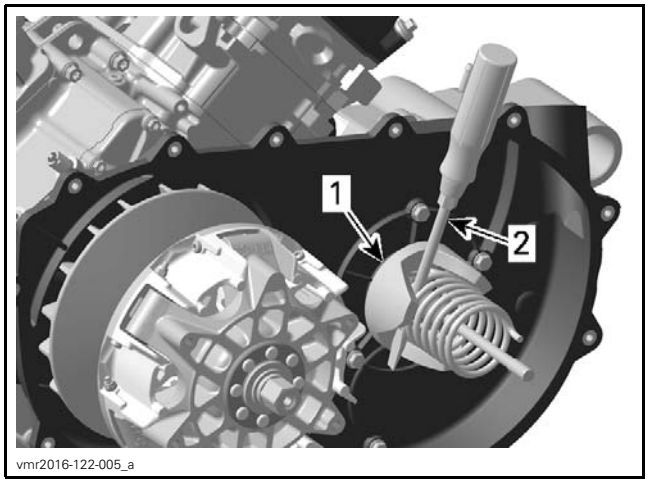
As you hold the pulley in, install thrust washer and a NEW driven pulley nut.

NOTE: Finger tighten the driven pulley nut sufficiently so that the cam remains engaged.



Step 1: Push
1. *Thrust washer*
2. *Driven pulley nut (*NEW*)*

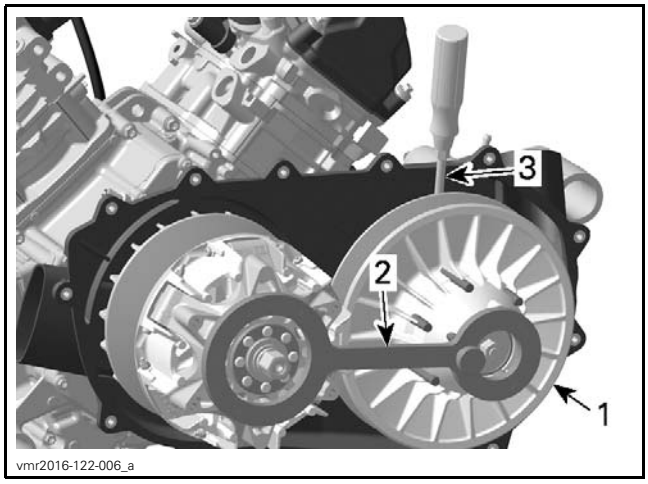
Insert a screwdriver of approximately 5 mm (.197 in) diameter in the cam.



FOR CLARITY OF UNDERSTANDING, SOME PARTS ARE NOT SHOWN
1. *Cam*
2. *Screwdriver, diameter 5 mm (.197 in)*

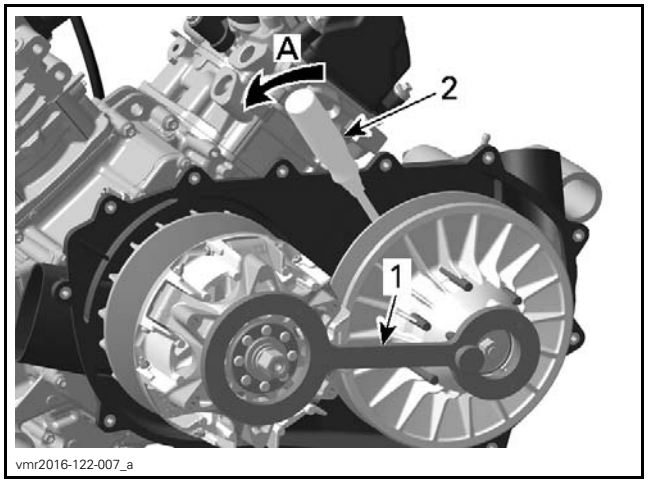
Hold the driven pulley in a fix position.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. *Fixed sheave*
2. *Clutch holder*
3. *Screwdriver*

Turn the screwdriver approximately 20° counterclockwise until cam engages in the driven pulley sliding sheave and hold it in this position (spring preload).



1. *Clutch holder*
2. *Screwdriver*

A. Turn counterclockwise

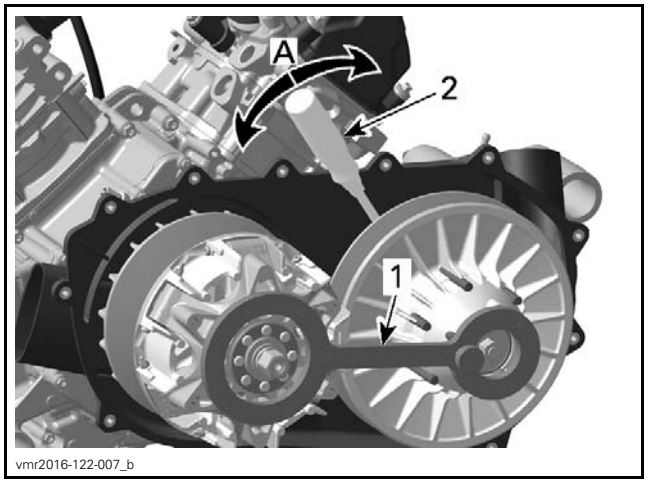
Tighten driven pulley nut as specified.

Using a socket and extension, hand tighten the driven pulley nut.

NOTE: Do not apply specified torque at this time.

Move the screwdriver back and forth to check cam for free movement.

NOTICE **A cam not correctly engaged will cause damage to the driven pulley and cam.**

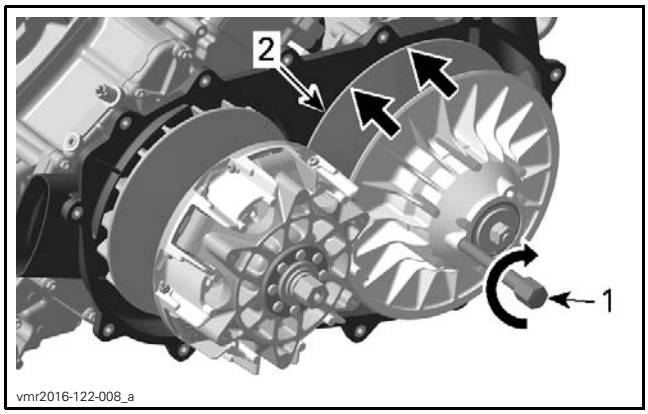


1. *Clutch holder*
2. *Screwdriver*

A. Cam freedom of movement

Install drive belt. Refer to *DRIVE BELT* in this subsection.

REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	

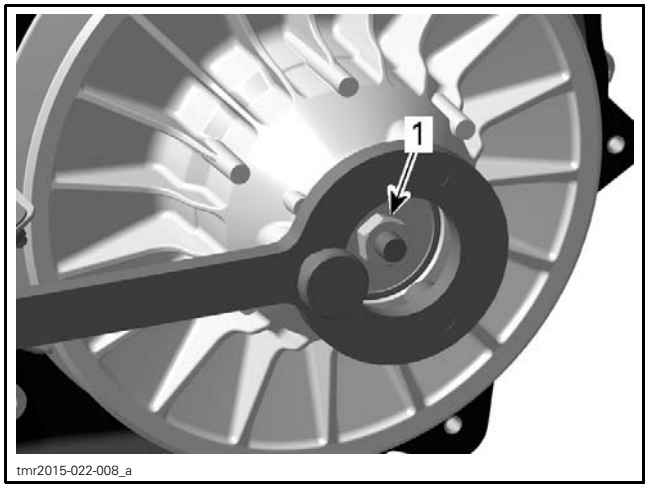


vmr2016-122-008_a

1. Puller/locking tool
2. Sliding sheave

NOTE: If driven pulley sheaves can to be opened when the service tool is screwed in, the cam is not correctly engaged in the sliding sheave.

TIGHTENING TORQUE		
Driven pulley nut	STEP 1	20 N•m ± 1 N•m (15 lbf•ft ± 1 lbf•ft)
	STEP 2	180° ± 5°



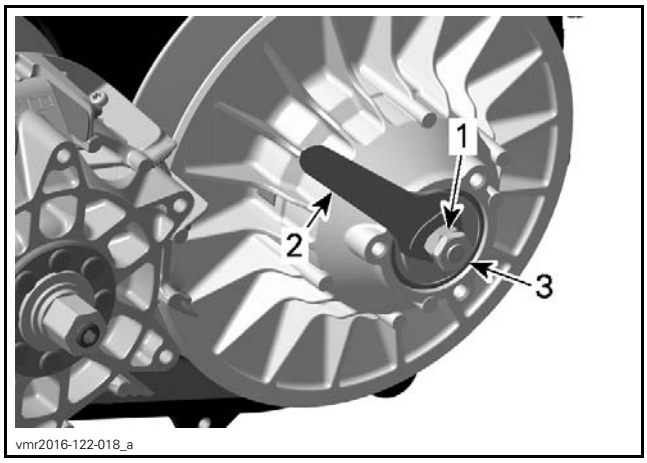
tmr2015-022-008_a

1. Driven pulley nut

Remove service tool.

Hold driven pulley nut using a spanner and tighten the NEW counter nut to specification.

TIGHTENING TORQUE	
Counter nut	35 N•m ± 1 N•m (26 lbf•ft ± 1 lbf•ft)

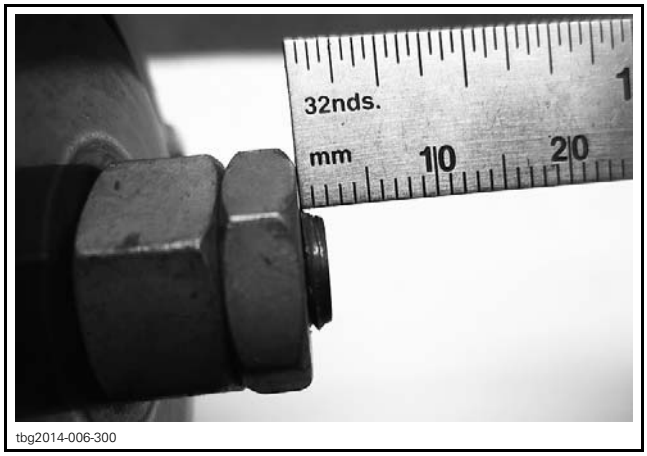


vmr2016-122-018_a

1. Driven pulley nut
2. Spanner
3. Counter nut

In order to confirm the cam is in the right position, measure the length of the stud out of the counter nut.

– If the distance between counter nut and the end of the stud is within specification, the pulley and cam are properly installed.
– Otherwise the cam might not correctly engaged. Remove the clutch except stud, and reinstall.
– If distance is still out of specification, please consult the *TST # 81274* on Knowledge Center for instructions.



tbg2014-006-300

MEASUREMENT	ACTION
Less than flush with the counter nut	Refer to TST # 81274 on Knowledge Center
0 to 3.6 mm	Installation is good. Install the drive belt to complete the procedure
3.7 mm and more	Refer to TST # 81274 on Knowledge Center

Check driven pulley end play.

SPECIFICATION	
Driven pulley end play	0 mm (0 in)

CVT AIR GUIDE

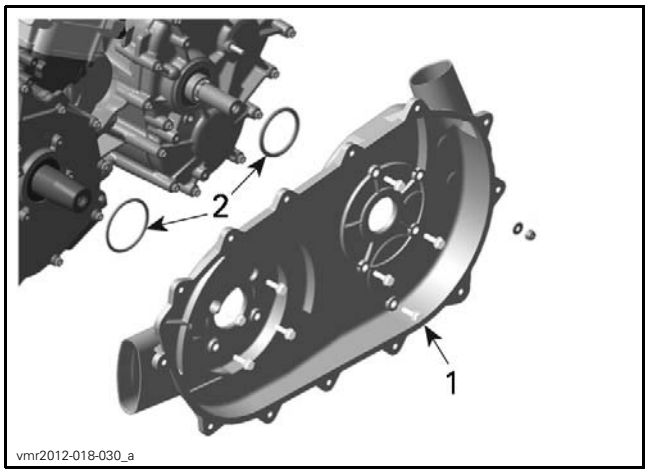
Removing the CVT Air Guide

Remove the *DRIVE PULLEY* and the *DRIVEN PULLEY*.

Unscrew the clamps retaining the CVT air hoses.

Remove CVT air guide.

Remove and discard O-rings.



1. CVT air guide
2. O-rings

Inspecting the CVT Air Guide

Clean CVT air guide from contamination

Installing the CVT Air Guide

For installation reverse the removal procedure.

Always install new O-rings before installing the CVT air guide.

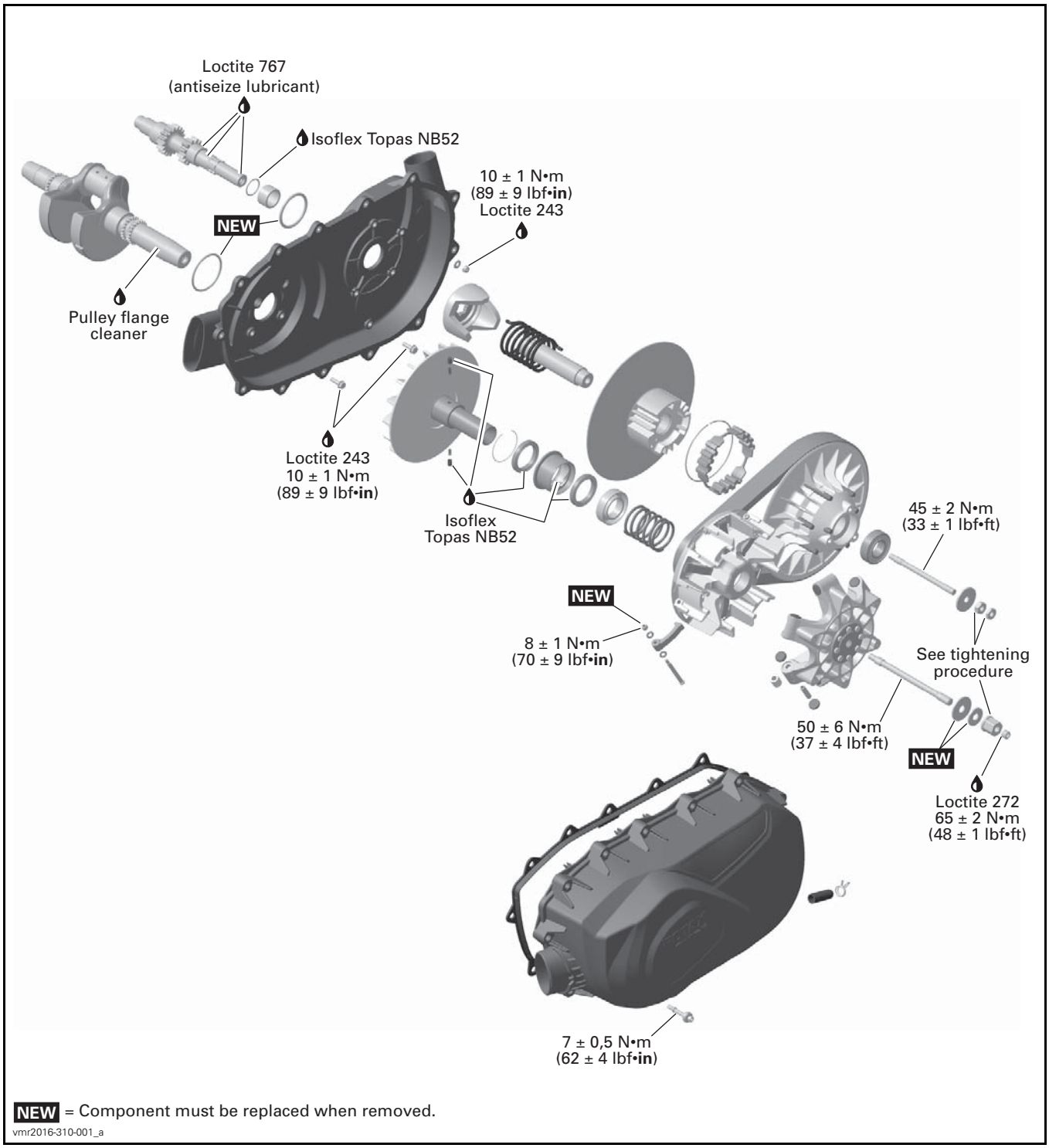
CONTINUOUSLY VARIABLE TRANSMISSION (CVT - 1000R XMR)

SERVICE TOOLS

Description	Part Number	Page
CLUTCH HOLDER	529 036 238	6, 17, 25
CLUTCH PULLER	529 035 746	7
COUNTERSHAFT RETAINER TOOL	529 036 312	18, 23
DRIVEN PULLEY STUD TOOL	529 036 360	18, 23
PULLER/LOCKING TOOL	529 036 098	5, 26

SERVICE PRODUCTS

Description	Part Number	Page
ISOFLEX GREASE TOPAS NB 52	293 550 021	14
LOCTITE 272	420 899 526	16
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	24
XPS BRAKES AND PARTS CLEANER (USA)	219 701 705	9, 19
XPS BRAKES AND PARTS CLEANER	219 701 776	9, 19



NEW = Component must be replaced when removed.

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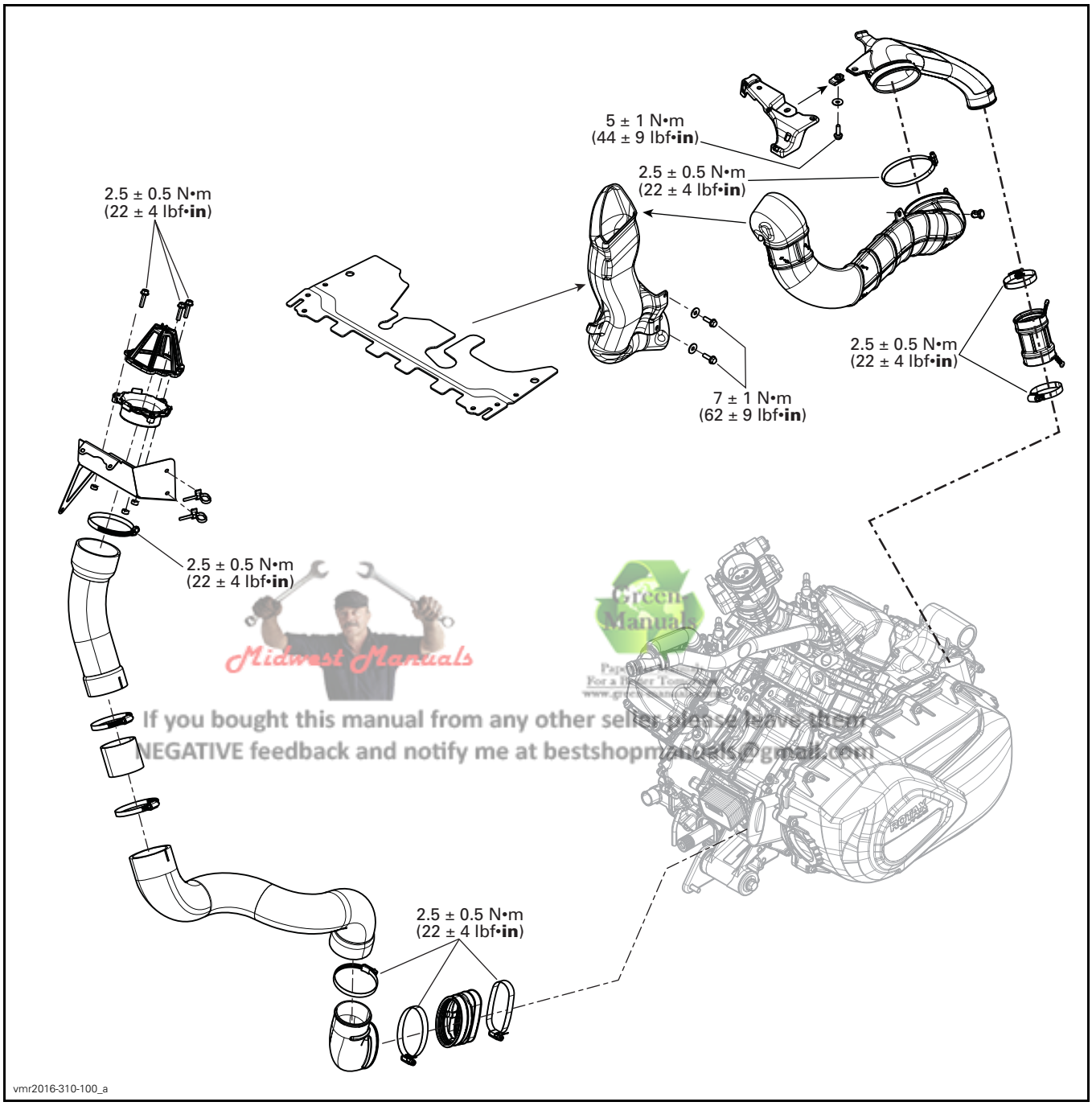

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Green Manuals
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GENERAL

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

This CVT is lubrication free. Never lubricate any components except drive pulley one-way clutch.

⚠ WARNING

Never touch CVT while engine is running. Never drive vehicle when CVT cover is removed.

⚠ WARNING

Any drive pulley repairs must be performed by an authorized Can-Am dealer. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

⚠ WARNING

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly.

PROCEDURES

CVT COVER

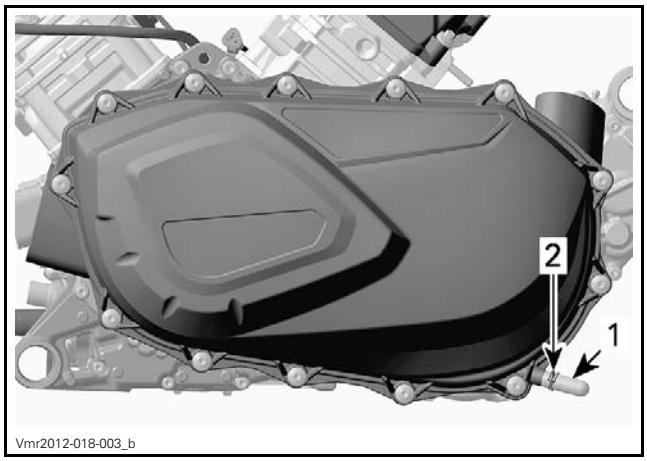
CVT Cover Access

Refer to *BODY* and remove:
- LH side and extension panels
- LH footboard panel.

Draining the CVT Cover

If water is present in CVT cover, it can be drained as follows:

Remove drain reservoir from CVT cover.



1. Drain reservoir
2. Spring clip

Let water drain from CVT cover.

Reinstall drain reservoir.

NOTICE **If any debris entered the CVT cover, CVT must be cleaned and inspected.**

Removing the CVT Cover

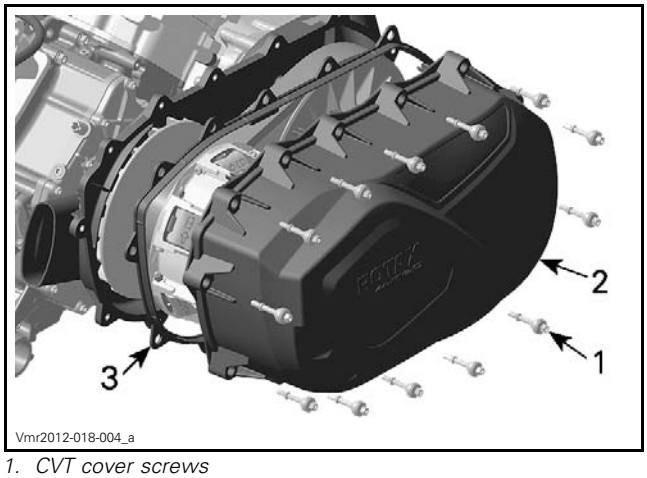
Loosen CVT inlet and outlet hose clamps.

Remove CVT cover screws.

NOTE: Remove the center top screw last to support the cover during removal.

NOTICE **Do not use and impact tool to remove CVT cover screws.**

Remove the CVT cover and its gasket.

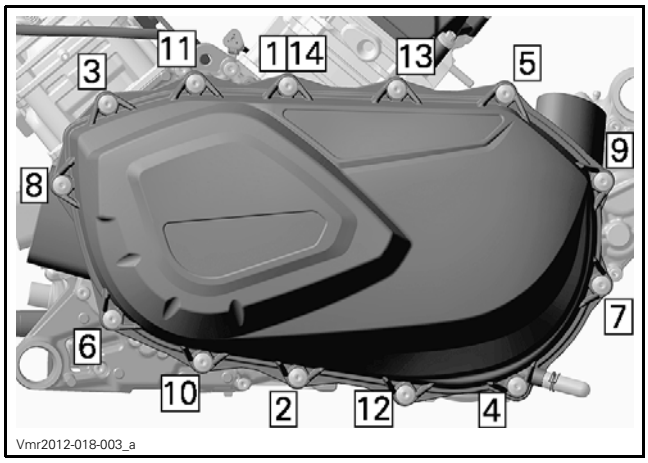


1. CVT cover screws
2. CVT cover
3. Gasket

Installing the CVT Cover

Install the center top screw of first.

Tighten the CVT cover screws as per following sequence.



CVT COVER TIGHTENING SEQUENCE

TIGHTENING TORQUE	
CVT cover screws	7 N•m ± 1 N•m (62 lbf•**in** ± 9 lbf•**in**)

Reinstall CVT inlet and outlet hoses.

TIGHTENING TORQUE	
CVT hose clamps	2.5 N•m ± 0.5 N•m (22 lbf•**in** ± 4 lbf•**in**)

DRIVE BELT

Removing the Drive Belt

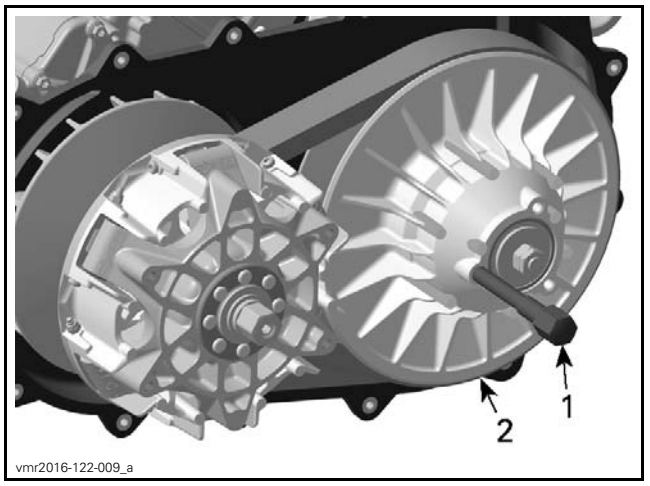
NOTICE In case of a drive belt failure, the CVT, cover and air outlet must be cleaned.

Remove *CVT COVER*.

Open driven pulley.

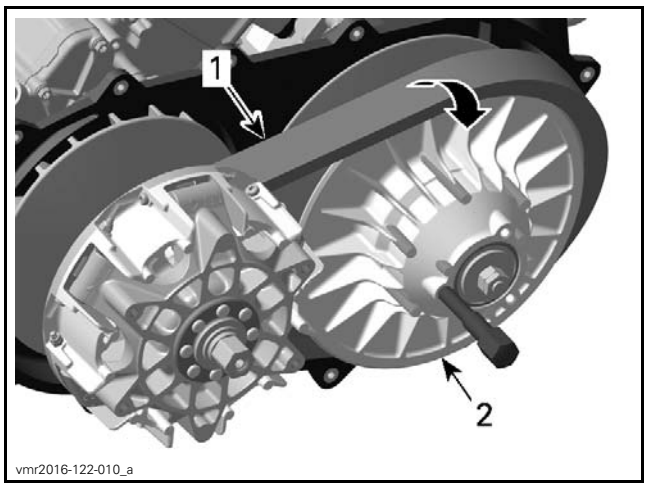
REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	

Screw tool in the threaded hole of driven pulley and tighten to open the pulley.



1. *Puller/locking tool*
2. *Fixed sheave of driven pulley*

To remove belt, slip the belt over the top edge of fixed sheave, as shown.



1. *Belt*
2. *Fixed sheave of driven pulley*

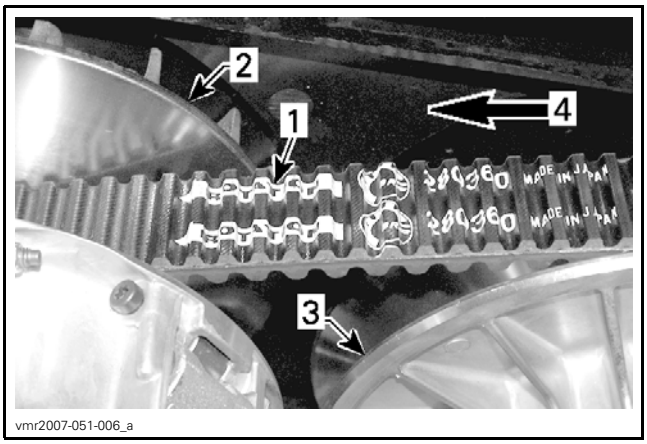
Inspecting the Drive Belt

For drive belt inspection refer to *DRIVE BELT INSPECTION* in the *PERIODIC MAINTENANCE PROCEDURES* subsection.

Installing the Drive Belt

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

The maximum drive belt life span is obtained when the drive belt has the proper rotation direction. Install it so that the arrow printed on belt is pointing towards front of the vehicle, viewed from top.



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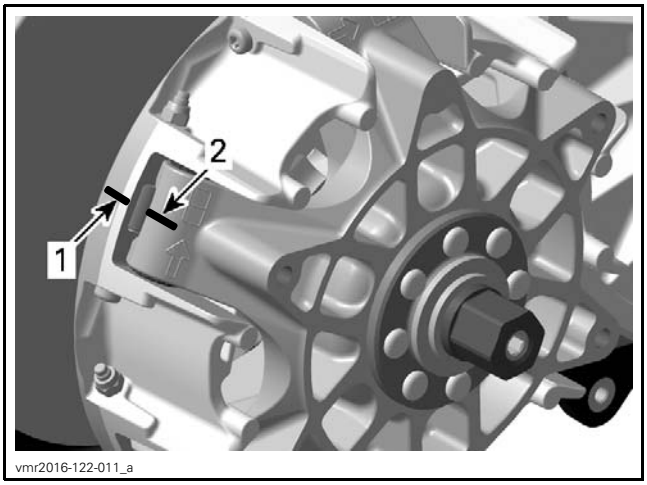
1. *Arrow printed on belt*
2. *Drive pulley (front)*
3. *Driven pulley (rear)*
4. *Rotation direction*

DRIVE PULLEY

Removing the Drive Pulley

Remove *DRIVE BELT*, see procedure in this subsection.

Prior to removing the drive pulley, mark sliding sheave and governor cup to ensure correct indexation at reinstallation.

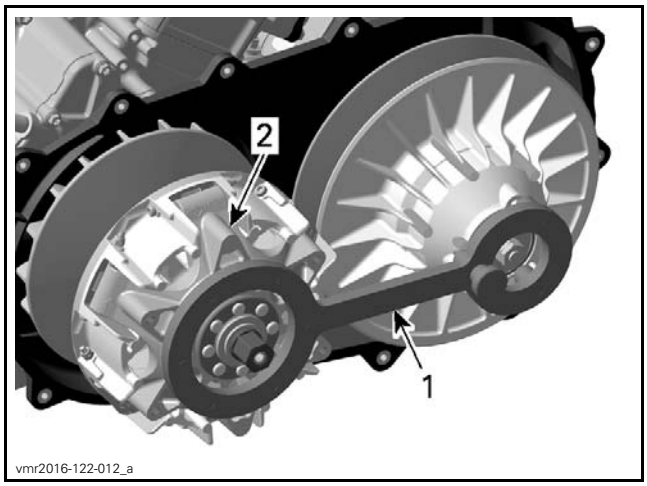


vmr2016-122-011_a

1. *Mark on drive pulley sliding sheave*
2. *Mark on governor cup*

Lock the drive pulley.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	

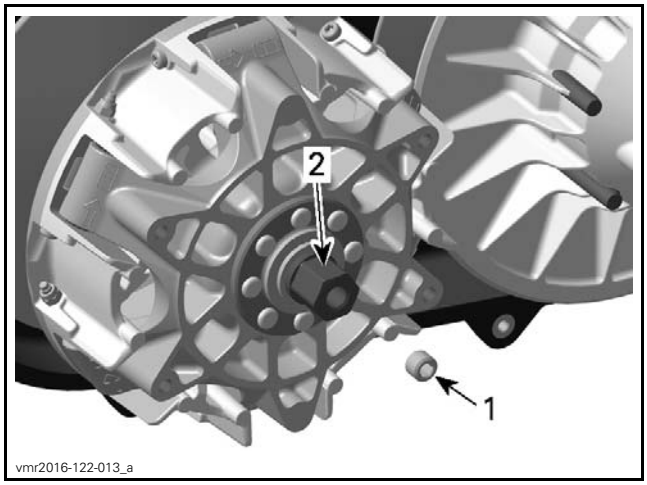


vmr2016-122-012_a

1. *Clutch holder*
2. *Drive pulley sliding sheave*
3. *Governor cup*

Remove set screw.

NOTE: Heat set screw to break the threadlocker bond prior to removal.



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1. *Set screw*
2. *Drive pulley nut*

Loosen the drive pulley nut.

NOTICE **Never use any type of impact wrench for drive pulley removal.**

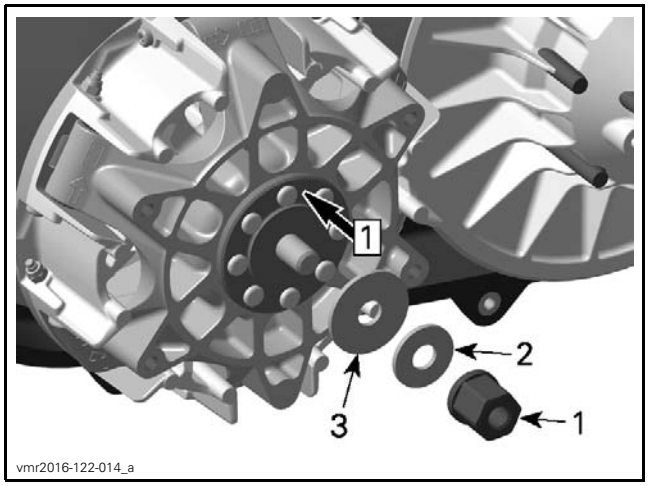
NOTE: Do not unscrew the drive pulley nut completely. If governor cup is stuck, hit it using a soft hammer.

Remove service tool.

Apply axial pressure with your hand on the sliding sheave and governor cup.

Remove:
- Drive pulley nut
- Small thrust washer (discard it)
- Large thrust washer (discard it)

⚠ CAUTION Sliding sheave of drive pulley is spring loaded.



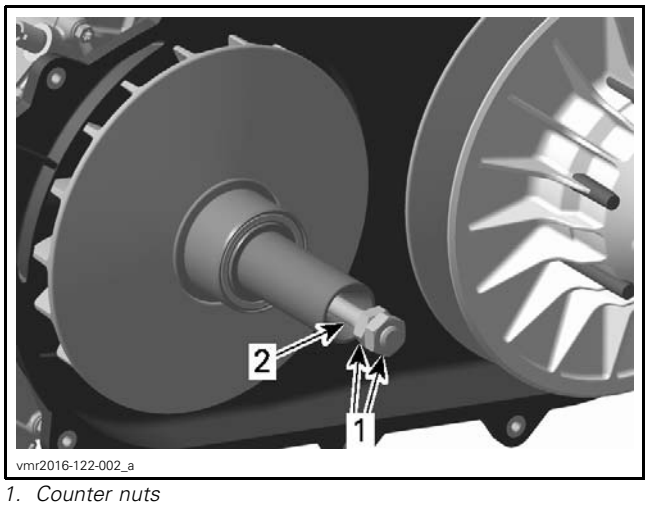
Step 1: Push governor cup

1. *Drive pulley nut*
2. *Small thrust washer (discard it)*
3. *Large thrust washer (discard it)*

Slowly release and remove sliding sheave.

Counter two M12 x 1.75 nuts for removing the stud.

NOTICE Do not use original installed nuts.



1. *Counter nuts*
2. *Stud*

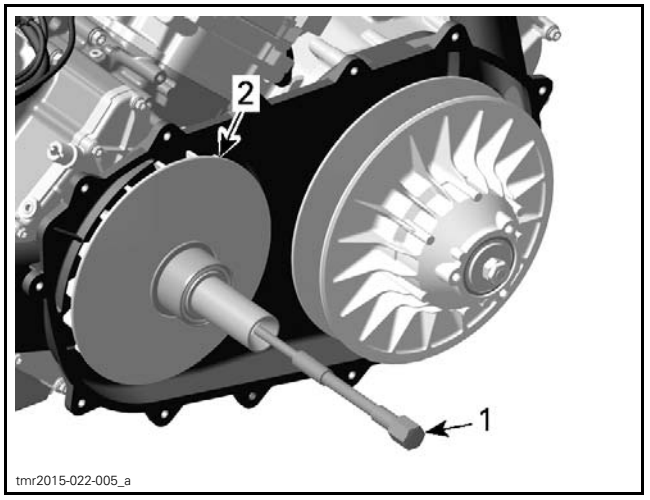
Lock crankshaft, refer to *CRANKSHAFT LOCKING PROCEDURE* in the *BOTTOM END* subsection.

Remove stud from PTO.

Remove fixed pulley.

NOTICE Use only recommended tool.

REQUIRED TOOL	
CLUTCH PULLER (P/N 529 035 746)	

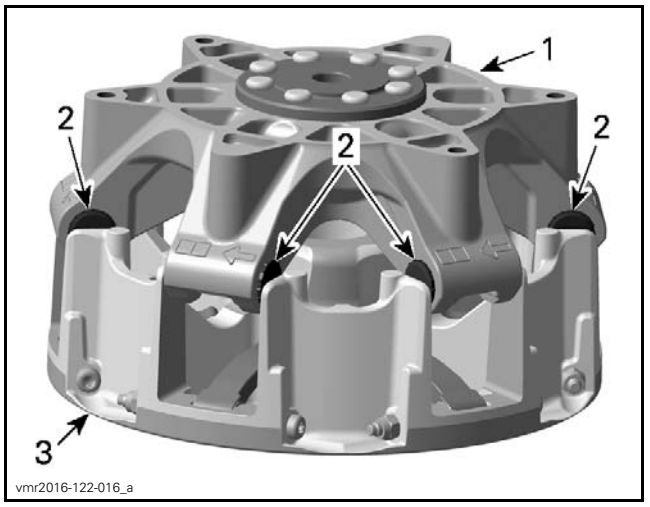


1. *Drive pulley puller*
2. *Fixed sheave*

Disassembling the Drive Pulley

Governor Cup

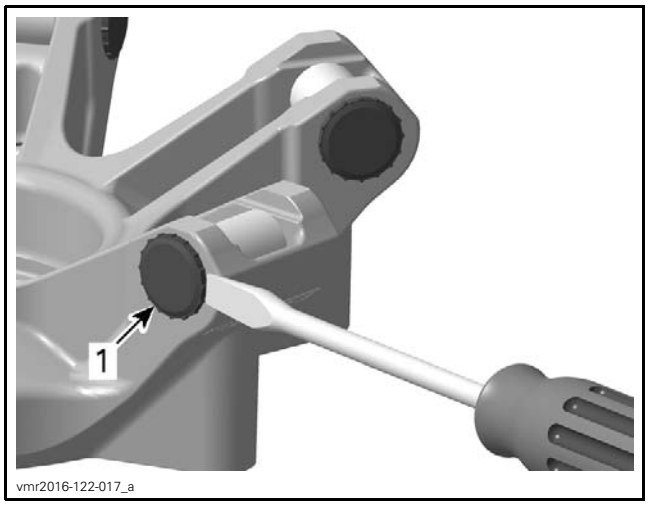
Carefully lift governor cup until slider shoes come at their highest position into guides.



1. *Governor cup*
2. *Slider shoes*
3. *Sliding sheave*

NOTE: The following procedure is not necessary except if slider shoe and/or roller must be removed. Refer to *INSPECTION* before proceeding.

Remove slider shoes.



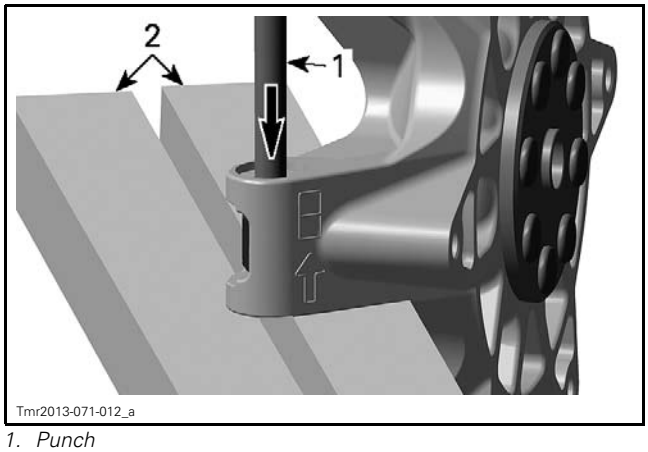
1. Slider shoe

Put governor cup on a vice to push out bearing sleeve of roller in the foreseen direction (against arrow).

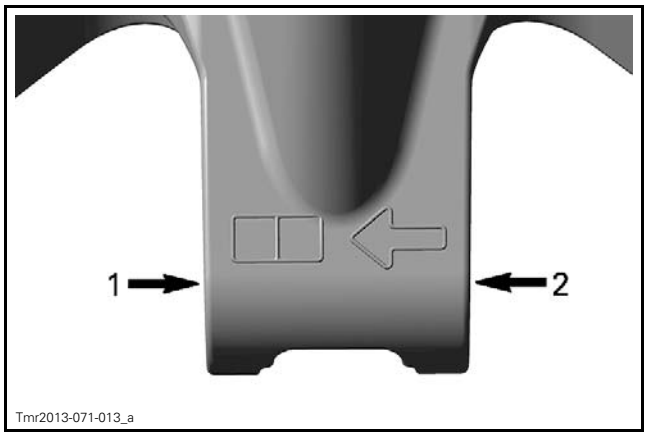
NOTICE Do not clamp the governor cup in the vice to push out bearing sleeve. Governor cup will be damaged.

NOTE: Use protection plates to avoid marks and/or damages to the governor cup.

NOTICE Always replace all rollers at the same time. Partly worn rollers may cause damage to the CVT system.

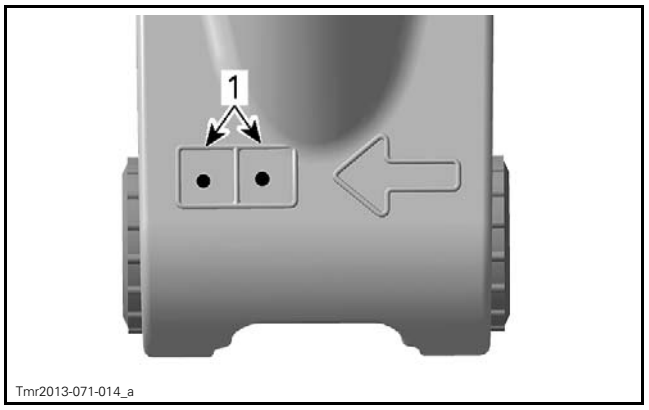


1. Punch
2. Vice



1. Removal direction
2. Assembly direction

NOTE: Whenever removing a governor cup with already two marked boxes replace it by a new one.



1. Marked boxes

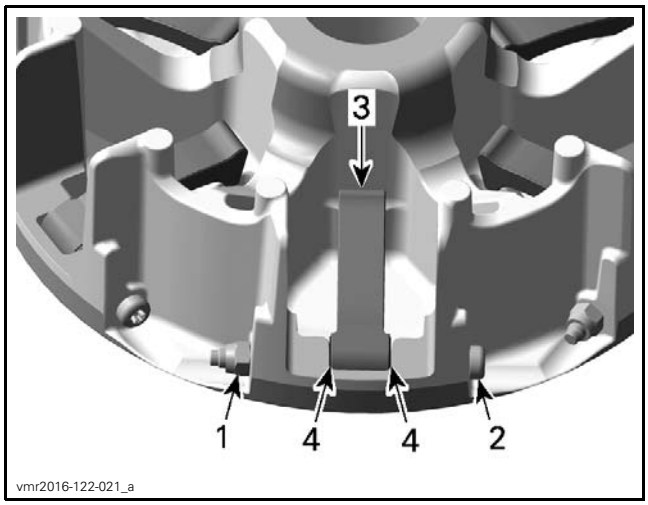
Sliding Sheave

This drive pulley is equipped with 6 levers.

NOTE: The following procedure is not necessary except if centrifugal lever must be removed. Refer to *INSPECTION* before proceeding.

To remove centrifugal levers remove:

– Lock nut
– Centrifugal lever pivot bolt
– Centrifugal lever
– Thrust washers.



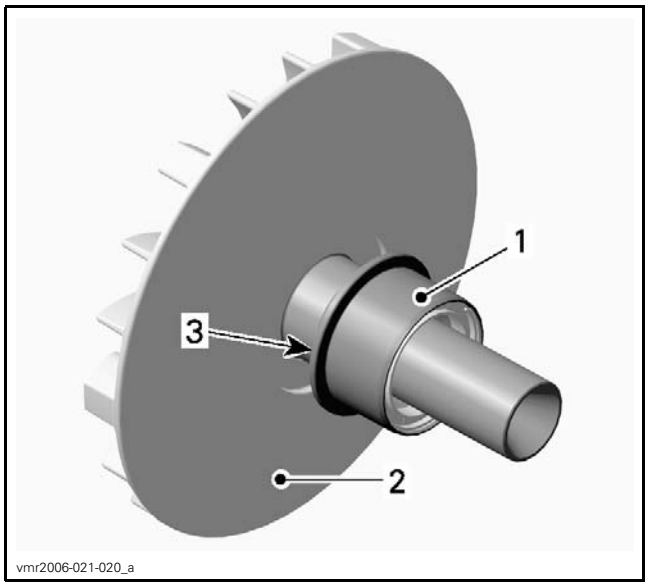
1. *Lock nut*
2. *Centrifugal lever pivot bolt*
3. *Centrifugal lever*
4. *Thrust washers*

Fixed Sheave

⚠ WARNING

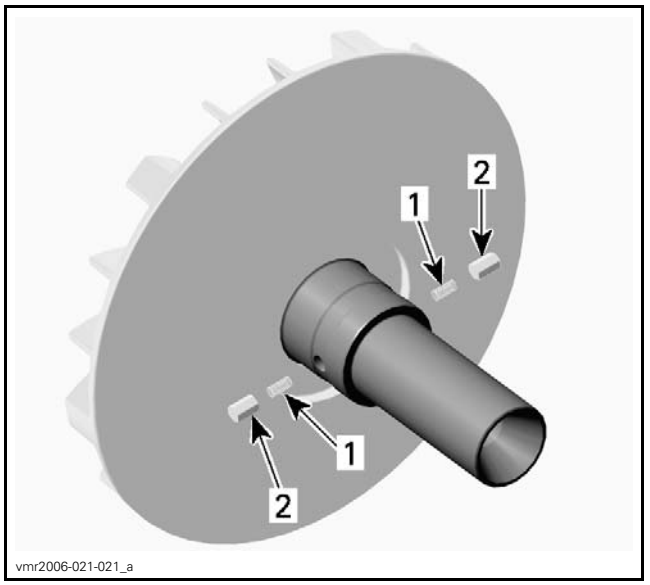
Always wear safety glasses to remove spring sleeves.

Pull and rotate one-way clutch slowly until the sheave of spring sleeves are visible.



1. *One-way clutch*
2. *Fixed sheave*
3. *Spring sleeve area*

Hold both spring sleeves with fingers and release when one-way clutch is disengaged.



1. *Springs*
2. *Spring sleeves*

Cleaning the Drive Pulley

Using a small brush, paper towel and parts cleaner , clean all the mounting surfaces and threads as shown.

REQUIRED PRODUCT
XPS BRAKES AND PARTS CLEANER (P/N 219 701 776) or XPS BRAKES AND PARTS CLEANER (USA) (P/N 219 701 705)

NOTICE **Avoid contact between cleaner and crankshaft seal because damage may occur.**

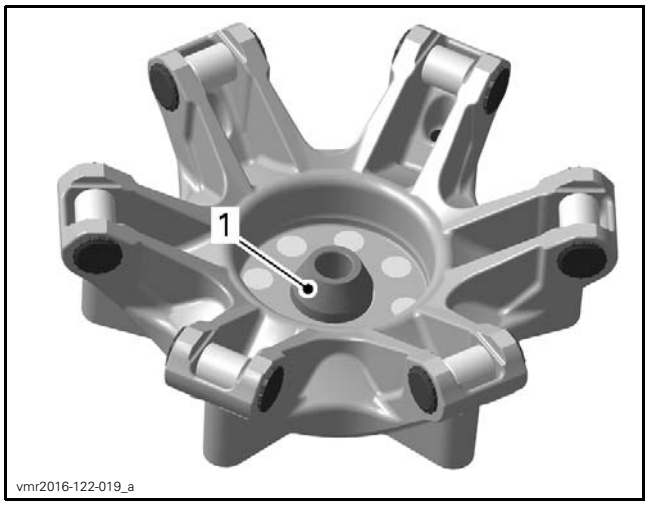
Remove all deposits that have baked on pulley tapered surfaces with medium steel wool and/or sand paper no. 600.

NOTICE **Do not use any other type of abrasive.**

Reclean surfaces after steel wool and/or sand paper use.

Blow compressed air on all cleaned parts and surfaces to remove any residue.

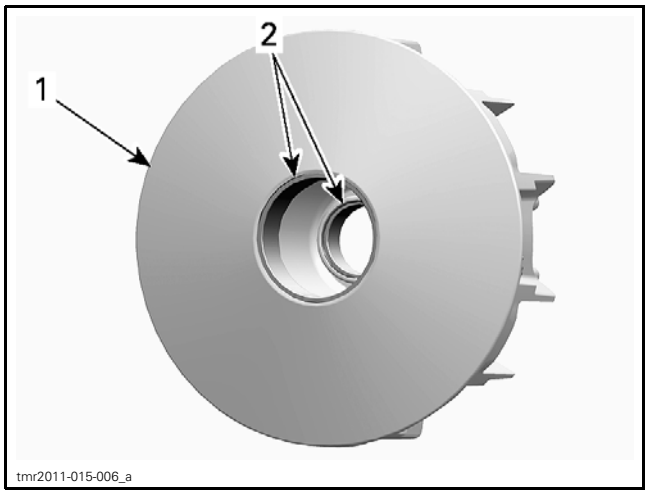
NOTICE **Mounting surfaces and threads must be free of any oil, cleaner or towel residue.**



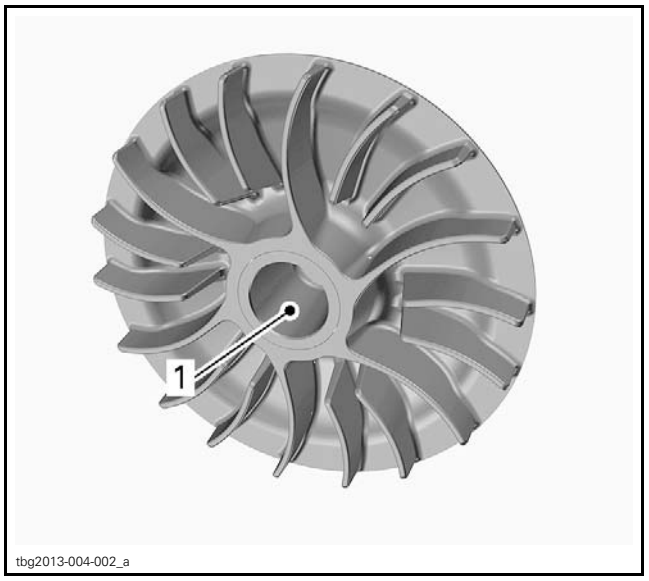
BACK OF GOVERNOR CUP
1. *Tapered contact surface*

Only use petrol base cleaner when cleaning bushings of sliding sheave.

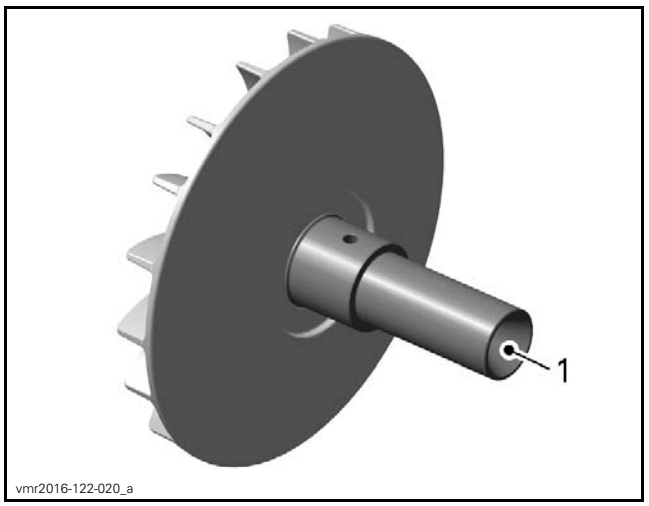
NOTICE Do not use acetone to clean bushing.



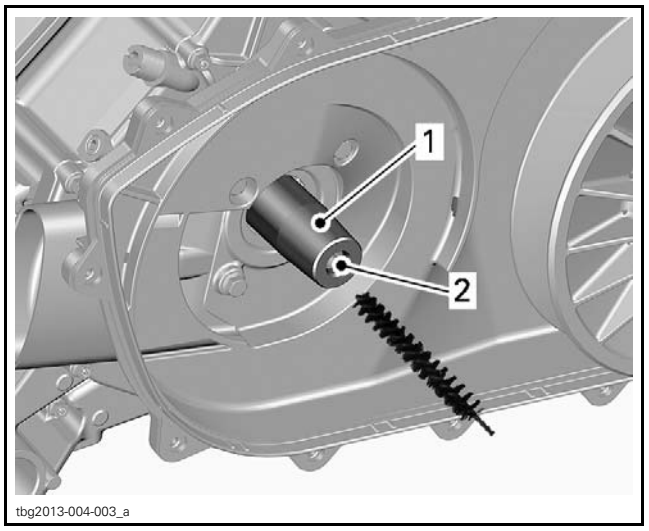
1. *Sliding sheave*
2. *Bushings*



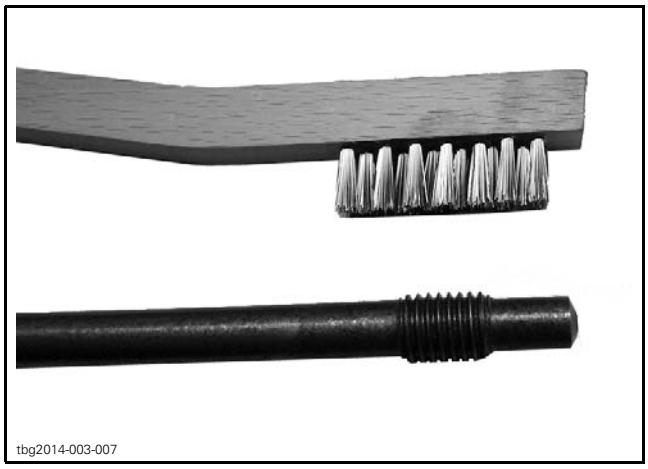
BACK OF FIXED SHEAVE
1. *Tapered end of the Crankshaft side fixed sheave*



1. *Tapered end of fixed sheave shaft*

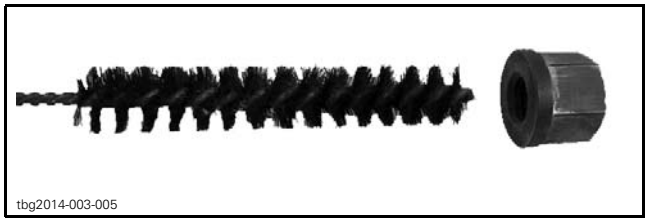


PTO
1. *Tapered contact surface*
2. *PTO inner threads*



PTO END OF STUD

STUD END RECEIVING NUT



M12 NUT

M12 SET SCREW

Inspecting the Drive Pulley

Bushings

For bushing inspection, refer to *SLIDING SHEAVE* in this subsection.

Governor Cup

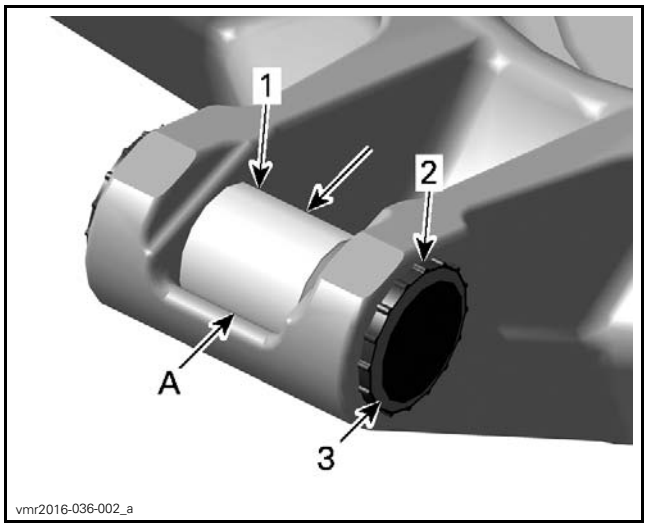
Check governor cup for cracks or other visible damage. Replace if necessary.

Roller and Slider Shoe

NOTICE **Always replace all rollers and slider shoes at the same time.**

Check if rollers move freely.

Check slider shoes for visible wear. If chamfer is not present anymore, replace ALL slider shoes.



1. *Roller*
2. *Slider shoe*
3. *Slider shoe chamfer*

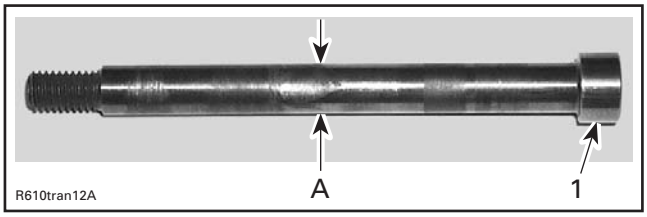
A. Roller outer diameter

Check roller outer and inner diameter, replace if it is out of specification.

ROLLER OUTER DIAMETER	
NEW	13.80 mm to 14.00 mm (.543 in to .551 in)
SERVICE LIMIT	13.20 mm (.519 in)
ROLLER INNER DIAMETER	
NEW	8.025 mm to 8.175 mm (.316 in to .322 in)
SERVICE LIMIT	9.000 mm (.354 in)

Centrifugal Lever Pivot Bolt

Measure diameter of centrifugal lever pivot bolt, replace if it is out of specification.

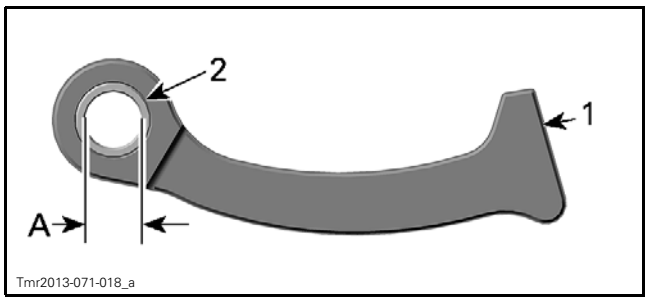


1. Centrifugal lever pivot bolt
A. Measure diameter here

CENTRIFUGAL LEVER PIVOT BOLT DIAMETER	
NEW	6.063 mm to 6.091 mm (.239 in to .24 in)
SERVICE LIMIT	6.00 mm (.236 in)

Centrifugal Lever

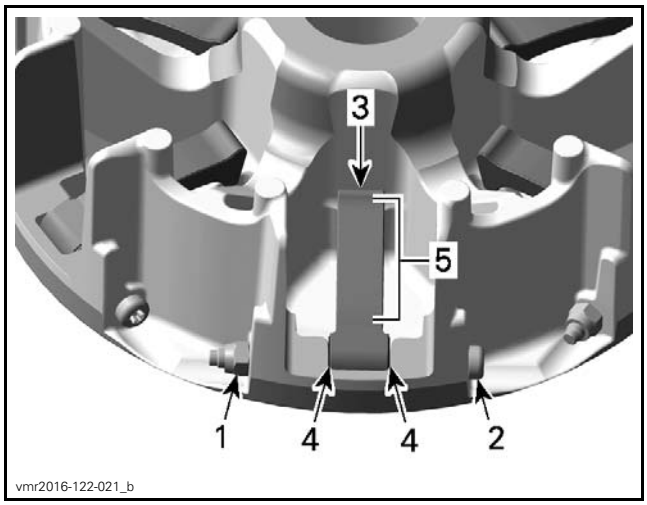
Check bushing diameter in the centrifugal lever for wear. Replace centrifugal lever if necessary.



1. Centrifugal lever
2. Bushing
A. Bushing inner diameter

CENTRIFUGAL LEVER BORE DIAMETER	
NEW	6.107 mm to 6.218 mm (.24 in to .245 in)
SERVICE LIMIT	6.300 mm (.248 in)

Replace centrifugal lever, thrust washers, centrifugal lever pivot bolts and lock nuts if the contact surfaces show heavy visible wear.



1. Lock nut
2. Centrifugal lever pivot bolt
3. Centrifugal lever
4. Thrust washers
5. Contact surface to the roller

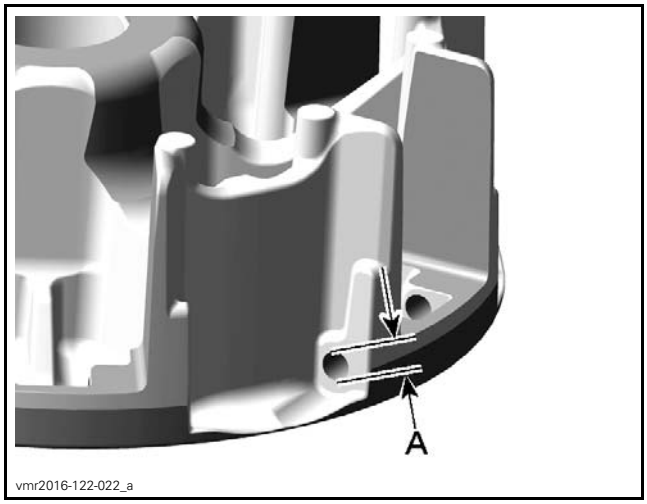
⚠ WARNING

Always replace ALL levers at the same time. Otherwise, unbalanced drive pulley will occur because of levers difference.

Sliding Sheave

Check sliding sheave for cracks and sliding contact surface for excessive wear. Replace sliding sheave if necessary.

Measure centrifugal lever pivot bolt bores. Replace sliding sheave if bores are out of specification or otherwise damaged.



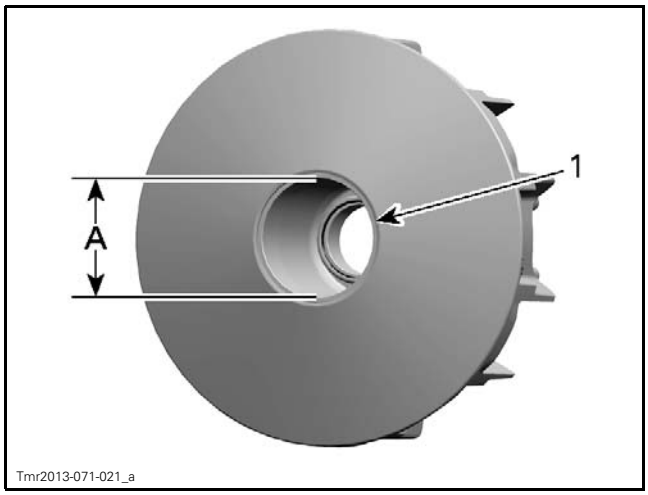
A. Centrifugal lever pivot bolt bore diameter

CENTRIFUGAL LEVER PIVOT BOLT BORE DIAMETER	
NEW	6.113 mm to 6.171 mm (.241 in to .243 in)
SERVICE LIMIT	6.300 mm (.248 in)

Measure bushing diameters of sliding sheave.

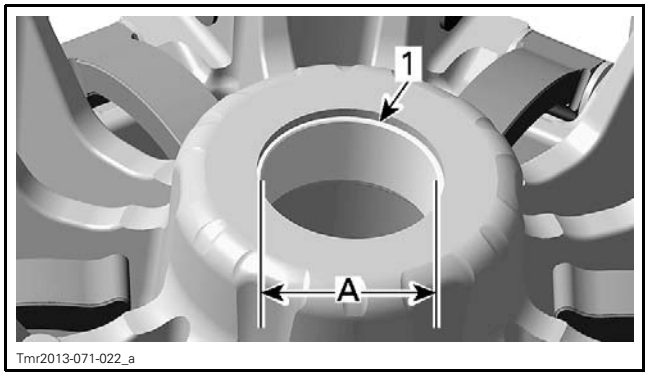
REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge



1. Bushing on fixed sheave side
A. Bore diameter of bushing

SLIDING SHEAVE LARGE BUSHING	
NEW	55.000 mm to 55.040 mm (2.165 in to 2.167 in)
SERVICE LIMIT	55.200 mm (2.173 in)



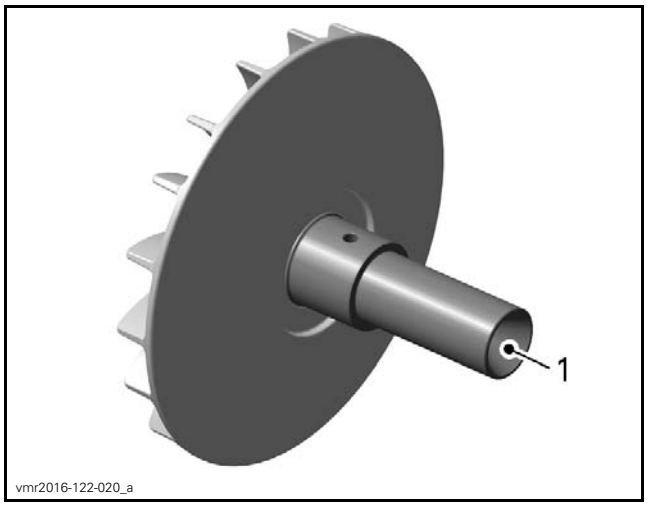
1. Bushing on governor cup side
A. Bore diameter of bushing

SLIDING SHEAVE SMALL BUSHING	
NEW	32.000 mm to 32.040 mm (1.26 in to 1.261 in)
SERVICE LIMIT	32.200 mm (1.268 in)

Replace sliding sheave if one of the bushings is out of specification. Visually inspect coatings.

Fixed Sheave

Check fixed sheave contact surface to the governor cup for scratches or other damages. If so, replace fixed sheave.



1. Visually check here

Check for any marks on fixed sheave plate. Replace if necessary.

Spring

Measure spring free length and squareness. If spring is out of specification, replace by a new one.

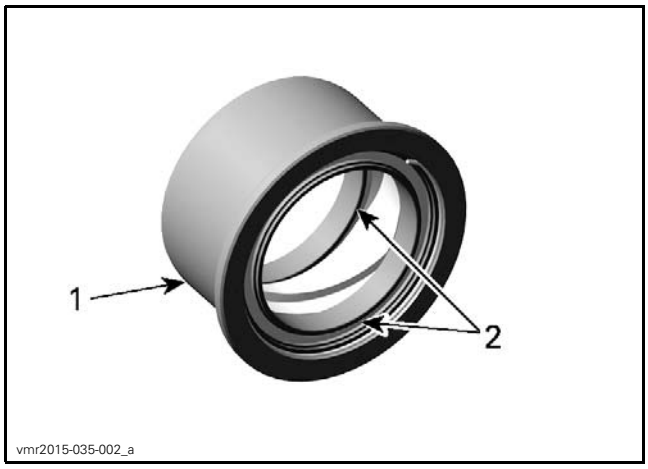
CLUTCH SPRING FREE LENGTH	
SERVICE LIMIT	95 mm (3.74 in)

CLUTCH SPRING SQUARENESS	
SERVICE LIMIT	4 mm (.157 in)

One-Way Clutch

Check bearings for excessive play and smooth operation. Replace one-way clutch bearings if necessary.

NOTICE Be careful not to damage the inside of one-way clutch during bearing removal.



1. One-way clutch
2. Bearings

Measure length of spring sleeves and check if edges on top of the spring sleeve are excessively worn. If they out of specifications, replace both spring sleeves at the same time.

SPRING SLEEVE LENGTH	
NEW	9.2 mm to 9.4 mm (.362 in to .37 in)
SERVICE LIMIT	9.0 mm (.354 in)

Assembling the Drive Pulley

For assembly, reverse the disassembly procedure. Pay attention to following details.

One-Way Clutch

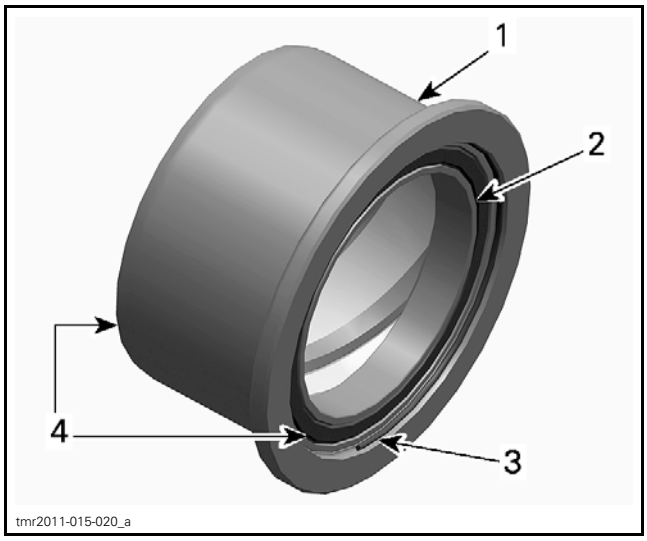
Clean parts.

Lubricate:

– Springs
– Spring sleeves
– Room between one-way clutch bearings
– Inside ball bearings to ensure adequate lubrication.

ONE-WAY CLUTCH LUBRICATION	
Service product	ISOFLEX GREASE TOPAS NB 52 (P/N 293 550 021)

NOTE: Ball bearings have a seal on one side only. Install bearings with the seal towards the outside of the one-way clutch.



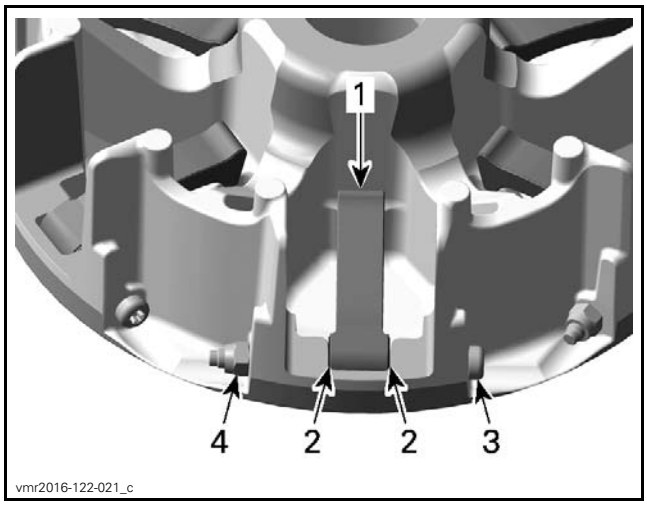
1. One-way clutch
2. Bearing
3. Retaining ring
4. Seal

Sliding Sheave

Install centrifugal levers with their thrust washers.

Install NEW lock nuts and tighten them to specification.

TIGHTENING TORQUE	
Lock nuts	8 N•m ± 1 N•m (71 lbf•**in** ± 9 lbf•**in**)



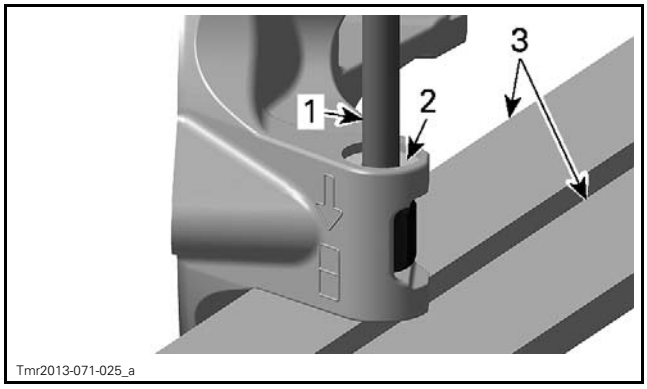
1. Centrifugal lever
2. Thrust washers
3. Centrifugal lever pivot bolt
4. Lock nut

NOTICE Centrifugal levers must move easily after installation.

Governor Cup

Rebuild governor cup with new bearing sleeves, thrust washers, rollers and slider shoes.

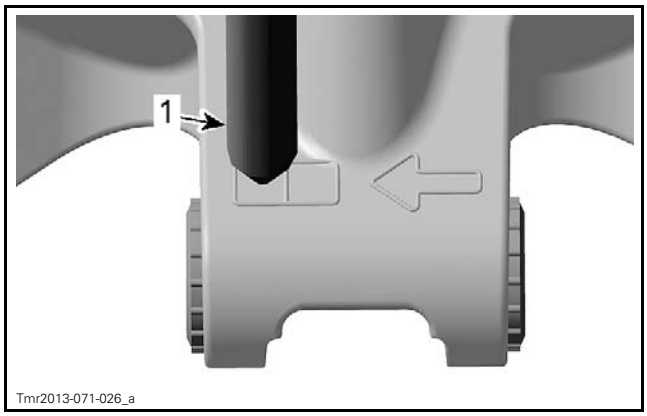
NOTICE Final position has to be aligned with the contact surface of the slider shoes (no protrusion).



1. *Punch*
2. *Mating surface of slider shoes*
3. *Vice*

Each time when replacing the bearing sleeves sign the foreseen box with a punch.

NOTICE Do not tap too hard. Violent damage of the governor cup may appear.



1. *Punch*

NOTICE Rollers must move easily after installation.

Insert slider shoes into governor cup to properly slide in guides.

Installing the Drive Pulley

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

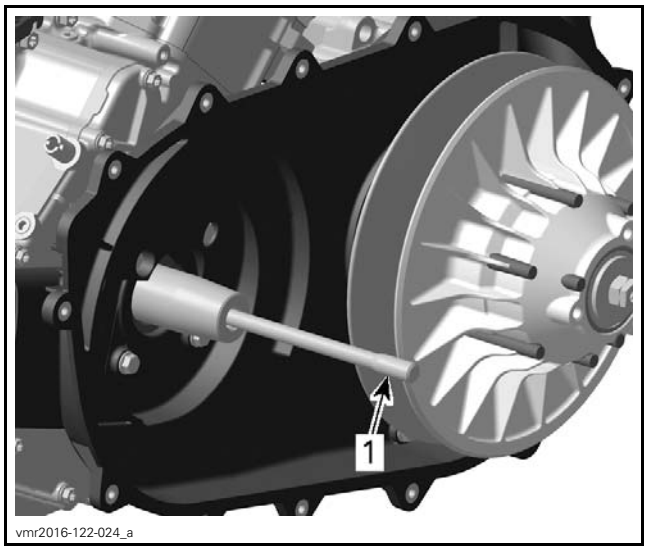
⚠ WARNING

Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.

NOTICE Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces and parts as described in *CLEANING THE DRIVE PULLEY* in this subsection.

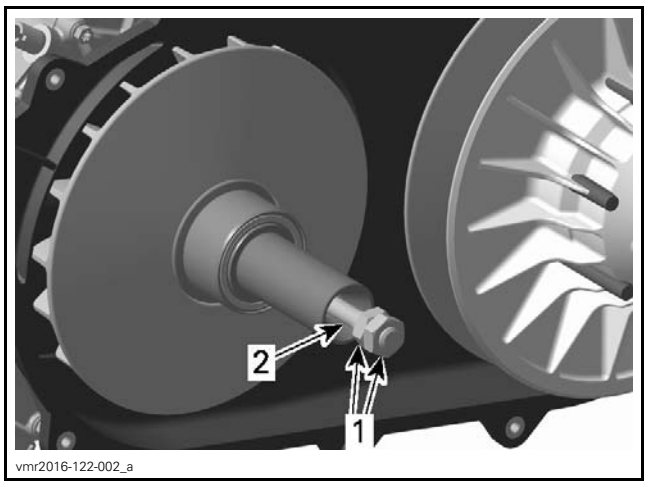
Hand tighten the threaded stud in the PTO.



1. *Stud*

Counter two M12 X 1.75 nuts for tightening the threaded stud.

NOTICE Do not use original installed nuts.



1. *Counter nuts*
2. *Stud*

Lock crankshaft, refer to *CRANKSHAFT LOCKING PROCEDURE* in the *BOTTOM END* subsection.

Tighten the threaded stud to specification.

TIGHTENING TORQUE	
Threaded stud	50 N•m ± 2 N•m (37 lbf•ft ± 1 lbf•ft)

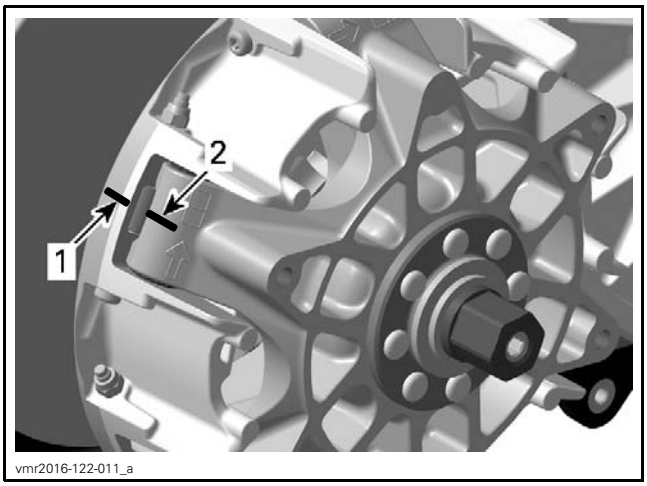
Remove both M12 counter nuts from the stud.

Remove tool from magneto side. Install plug and O-ring on magneto cover.

Install fixed sheave on PTO.

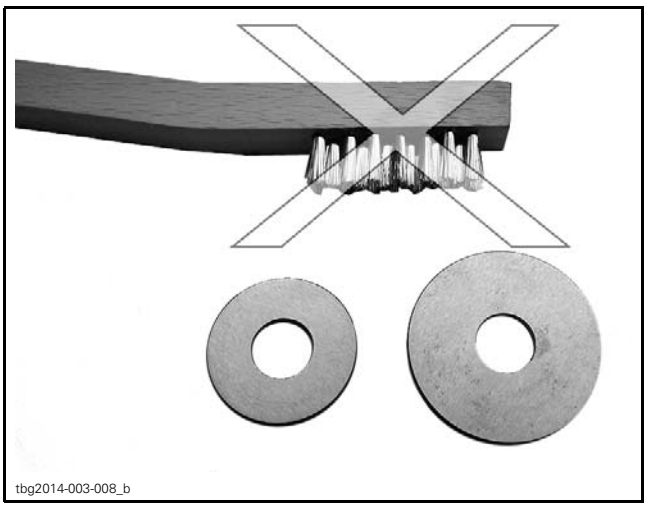
Install sliding sheave and governor cup.

NOTE: Make sure that sliding sheave and governor cup are properly aligned as marked before removal.

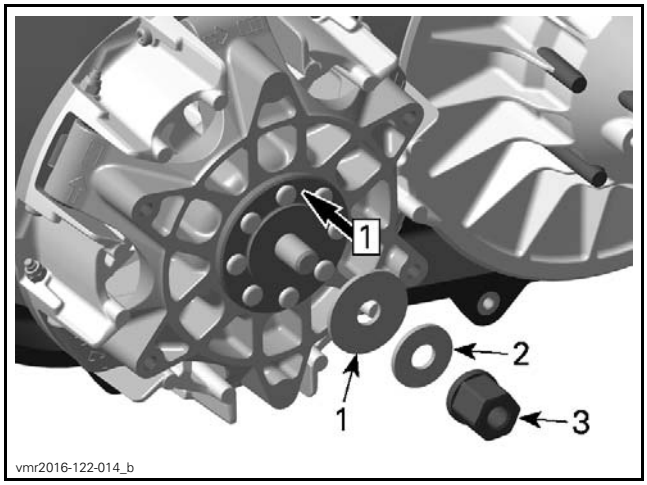


1. Mark on drive pulley sliding sheave
2. Mark on governor cup

NOTICE **The washers are shipped with special coating. Do not clean washers using degreaser, abrasive products, etc; this could damage the special coating washers comes with.**



Install NEW larger washer first, then NEW smaller washer and nut.

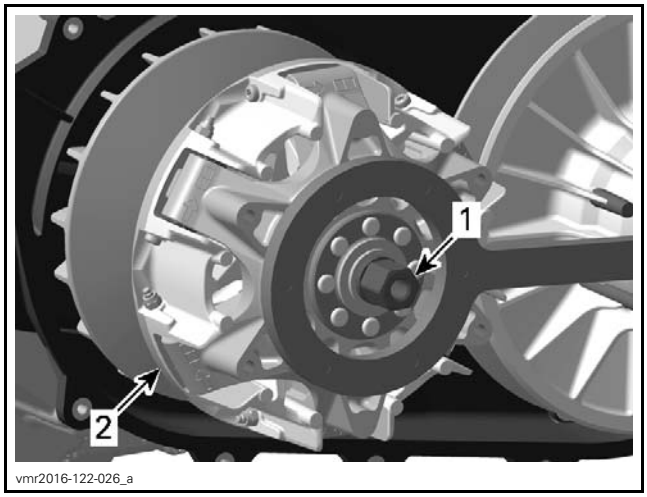


Step 1: Push
1. Large thrust washer (NEW)
2. Small thrust washer (NEW)
3. Drive pulley nut

Lock the drive pulley with clutch holder tool.

Tighten drive pulley nut to specification.

DRIVE PULLEY M12 FLANGE NUT		
Tightening procedure	STEP 1	80 N•m ± 1 N•m (59 lbf•ft ± 1 lbf•ft)
	STEP 2	90° ± 5°

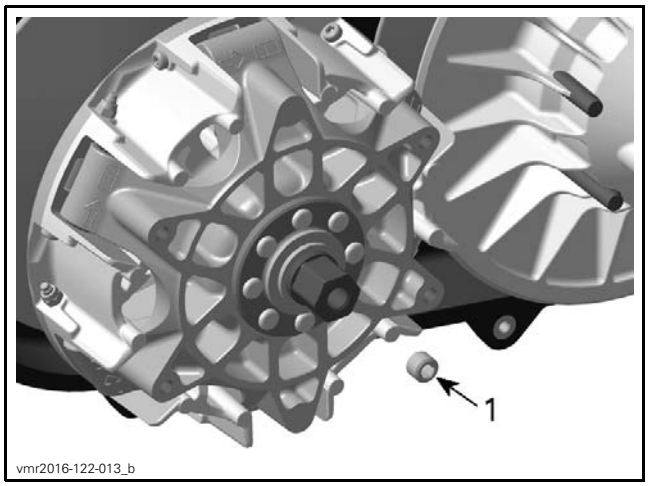


1. Nut
2. Drive pulley

Install M12 X 10 set screw in M12 nut and tighten the set screw to specification.

TIGHTENING TORQUE	
Service product	LOCTITE 272 (P/N 420 899 526)
M12 X 10 set screw	65 N•m ± 2 N•m (48 lbf•ft ± 1 lbf•ft)

NOTE: It is important to use the specified threadlocker: High temperatures are involved and this product is specifically designed for these temperatures. No other product should be used.



1. Set screw

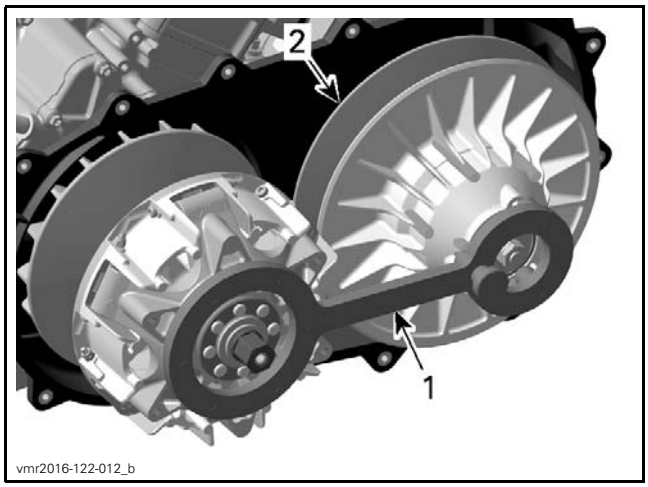
DRIVEN PULLEY

Removing the Driven Pulley

Remove *DRIVE BELT*.

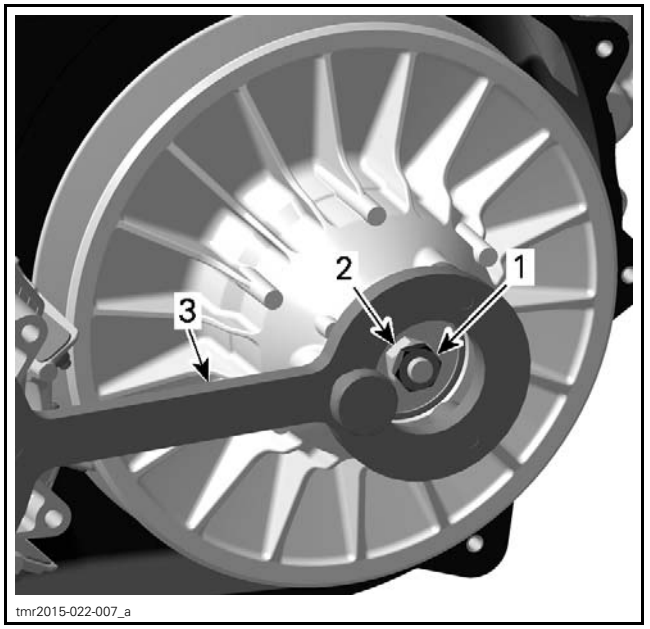
Lock the driven pulley.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. Clutch holder
2. Driven pulley

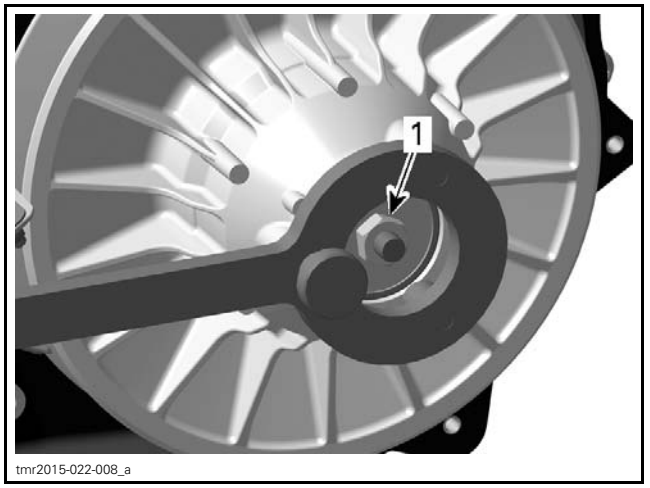
Remove the counter nut and discard it.



1. Counter nut
2. Driven pulley nut
3. Clutch holder

Loosen the driven pulley nut.

NOTE: Do not unscrew the driven pulley nut completely.



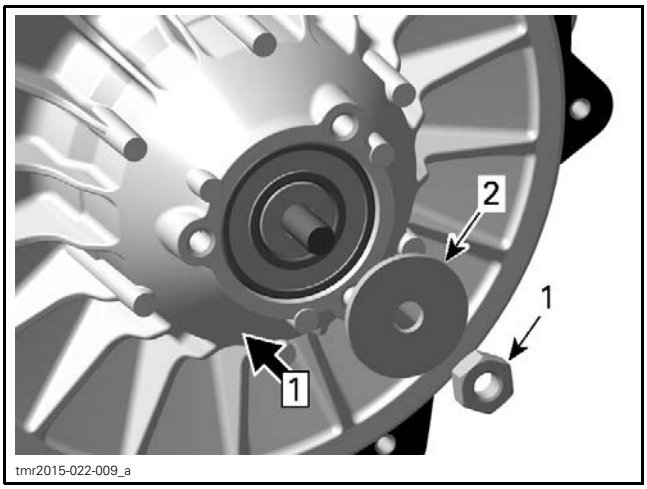
1. Driven pulley nut

Remove service tool.

Apply axial pressure with your hand on driven pulley and maintain during nut removal.

Remove driven pulley nut (discard) and washer.

⚠ CAUTION Driven pulley is spring loaded. Hold driven pulley tight and slowly remove the driven pulley nut to release spring tension.

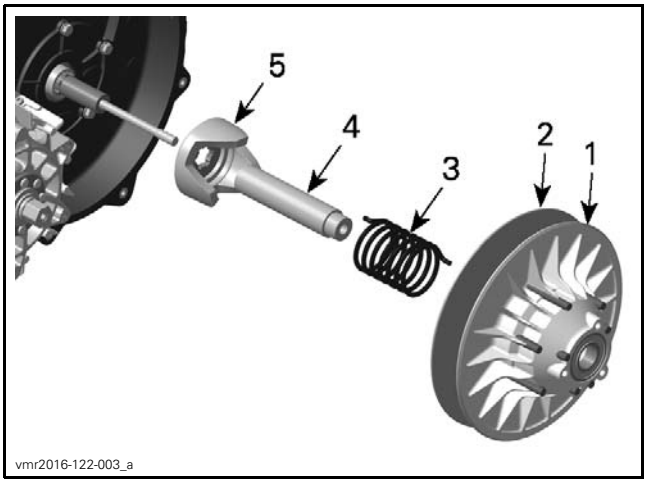


tmr2015-022-009_a

Step 1: Push

1. *Driven pulley nut (discard)*
2. *Thrust washer*

Remove:
- Driven pulley
- Spring
- Shaft
- Cam.



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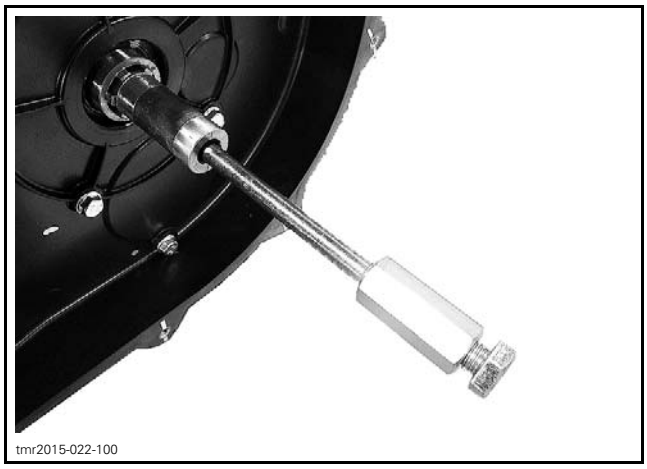
1. *Fixed sheave of driven pulley*
2. *Sliding sheave of driven pulley*
3. *Spring*
4. *Shaft*
5. *Cam*

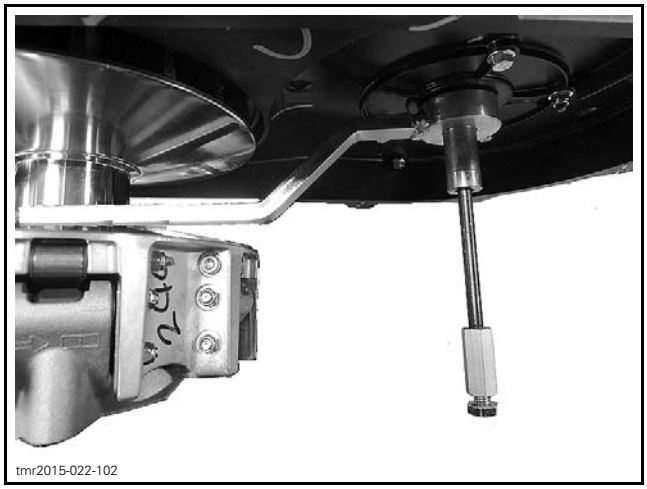
Install the tightening tool on the stud.

REQUIRED TOOL	
DRIVEN PULLEY STUD TOOL (P/N 529 036 360)	


tmr2015-022-100

Block countershaft.

REQUIRED TOOL	
COUNTERSHAFT RETAINER TOOL (P/N 529 036 312)	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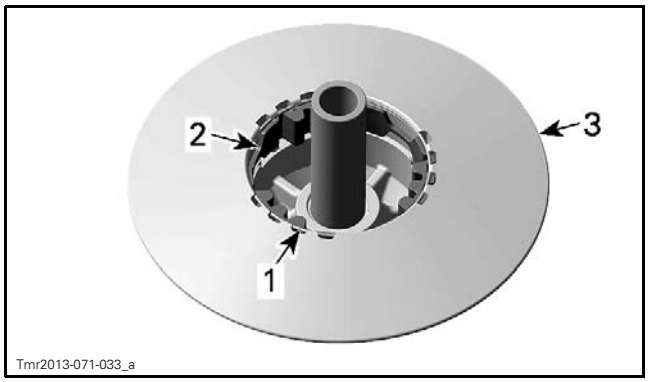
Remove stud.

Disassembling the Driven Pulley

Fixed Sheave

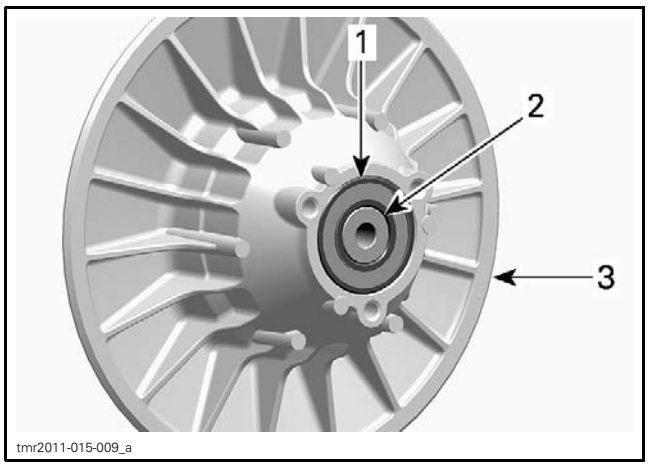
Remove retaining ring and lift torque gear.



1. *Retaining ring*
2. *Torque gear*
3. *Fixed sheave of driven pulley*

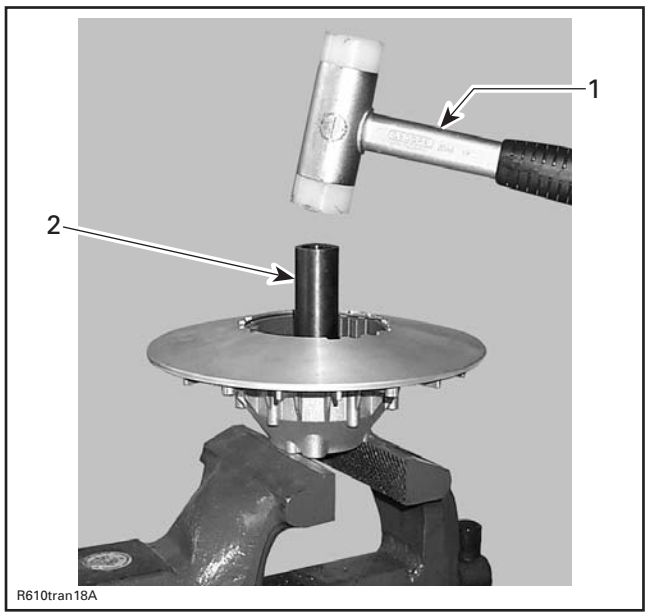
NOTE: The following procedure is not necessary except if ball bearing or shaft must be removed. Refer to *INSPECTION* before proceeding.

Heat ball bearing area up to 100°C (212°F) before removing ball bearing.



1. *Ball bearing*
2. *Shaft*
3. *Fixed sheave of driven pulley*

Use a soft hammer to push shaft with bearing out of fixed sheave.

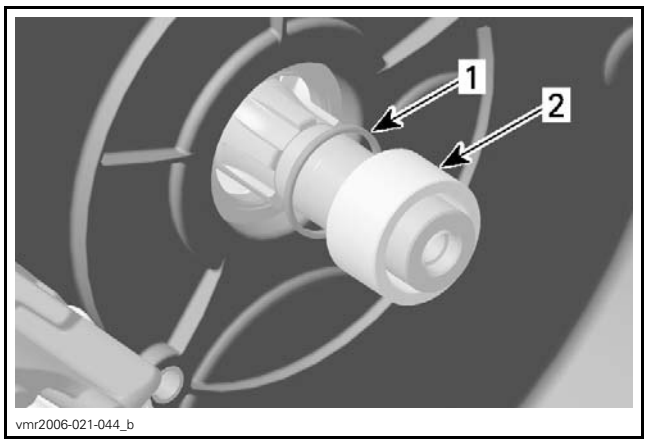


1. *Soft hammer*
2. *Shaft*

Remove shaft from ball bearing.

Remove distance sleeve and O-ring from counter-shaft.

Replace O-ring if brittle, hard or damaged.



1. *O-ring*
2. *Distance sleeve*

Cleaning the Driven Pulley

Clean the CVT air guide area from contamination.

Using a small brush, paper towel and parts cleaner, clean all the mounting surfaces and threads as shown.

REQUIRED PRODUCT
XPS BRAKES AND PARTS CLEANER (P/N 219 701 776) or XPS BRAKES AND PARTS CLEANER (USA) (P/N 219 701 705)

NOTICE Avoid contact between cleaner and countershaft oil seal or damage may occur.

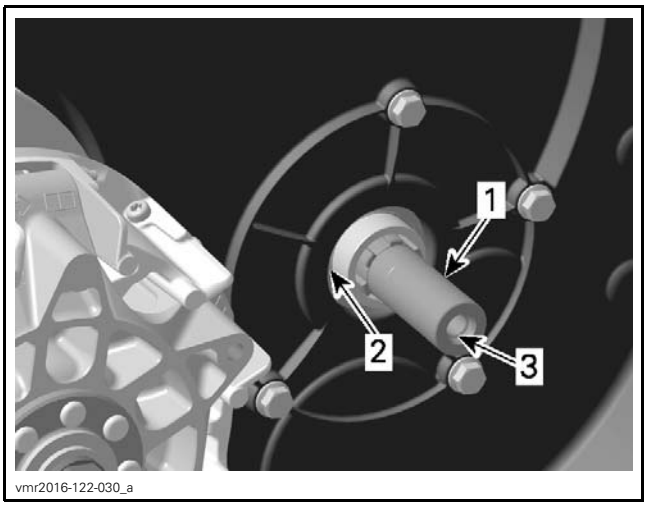
Remove all deposits that have baked on pulley tapered surfaces with medium steel wool and/or sand paper no. 600.

NOTICE Do not use any other type of abrasive.

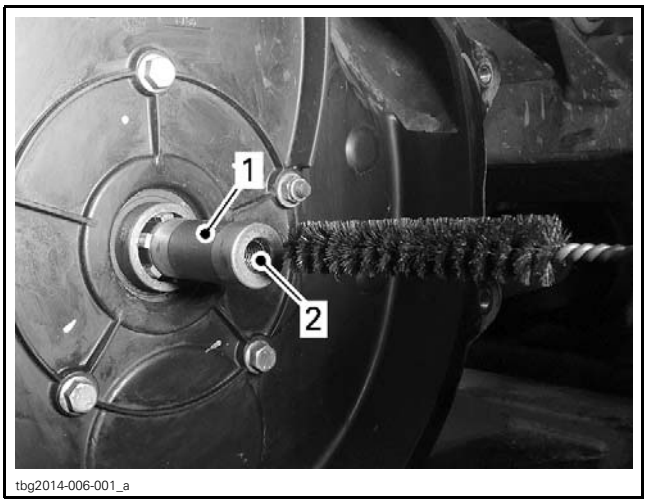
Reclean surfaces after steel wool use.

Blow compressed air on all cleaned parts and surfaces to remove any residue.

NOTICE Mounting surfaces and threads must be free of any oil, cleaner or towel residue.

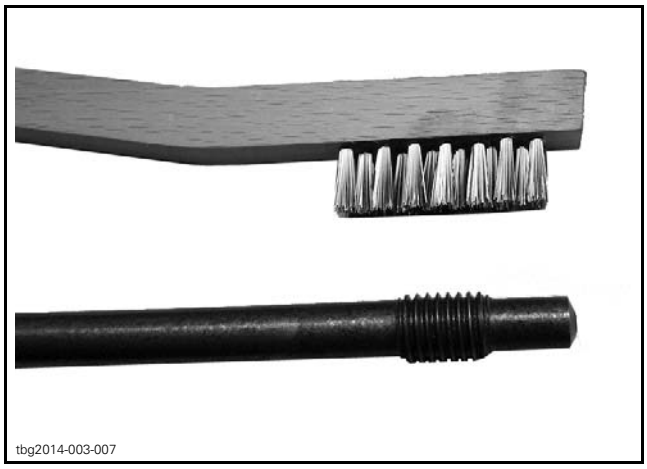


1. *Countershaft end*
2. *Countershaft oil seal*
3. *Countershaft inner threads*



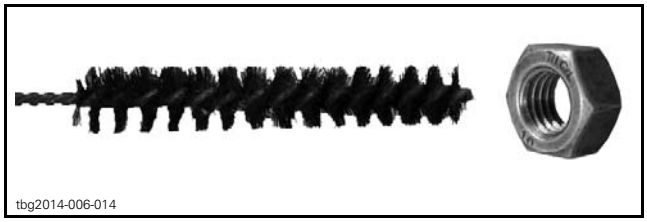
GEARBOX COUNTERSHAFT

1. *Countershaft outer surface*
2. *Countershaft inner threads*

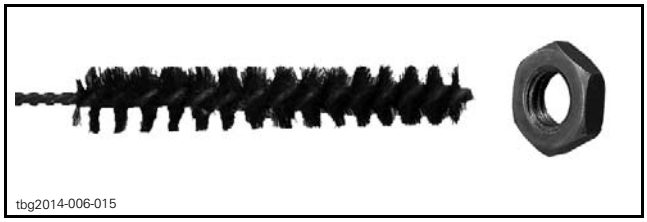


COUNTERSHAFT END OF STUD

STUD END RECEIVING COUNTER NUTS



THREADS OF DRIVEN PULLEY NUT



THREADS OF COUNTER NUT

Inspecting the Driven Pulley

Sliding Sheave

Check sliding sheave for cracks and sliding contact surface for excessive wear. Replace sliding sheave if necessary.

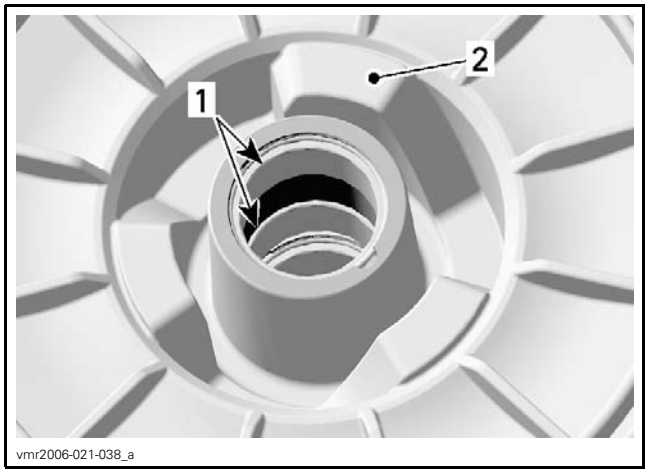
Check bushings for cracks, scratch and for free movement when assembled to sliding sheave.

Measure bushing diameter.

REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge

This bushing can not be replaced. Replace sliding sheave if bushings are out of specification. Visually inspect coatings.



1. Bushings
2. Backside of sliding sheave of driven pulley

BUSHINGS BORE DIAMETER	
NEW	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
SERVICE LIMIT	30.200 mm (1.189 in)

Fixed Sheave

Check fixed sheave for cracks and excessive wear. Replace fixed sheave if necessary.

Check ball bearing for free play and smooth operation. Replace if necessary.

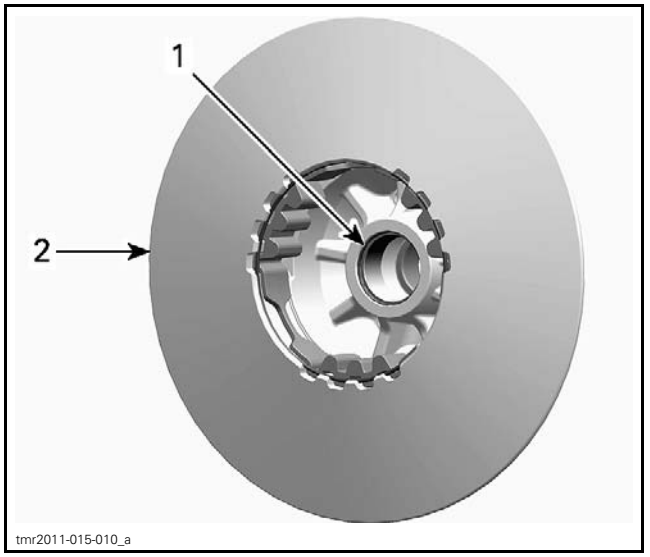
Check shaft for heavy wear or visible damage. Replace if necessary.

If the shaft is removed measure bushing diameter.

REQUIRED TOOL
Dial bore gauge

MEASURING POINT
At least 5 mm (1/4 in) from bushing edge

This bushing can not be replaced. Replace fixed sheave if bushing is out of specification. Visually inspect coatings.

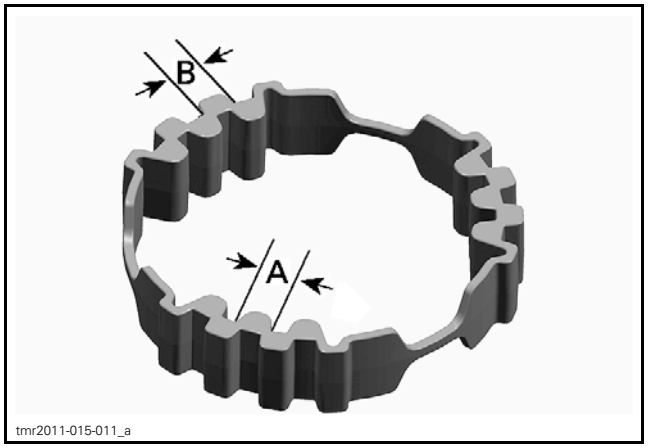


1. Bushing
2. Fixed sheave of driven pulley

BUSHING BORE DIAMETER	
NEW	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
SERVICE LIMIT	30.200 mm (1.189 in)

Check torque gear for visible damage and cracks.

Measure wear limit with a caliper.

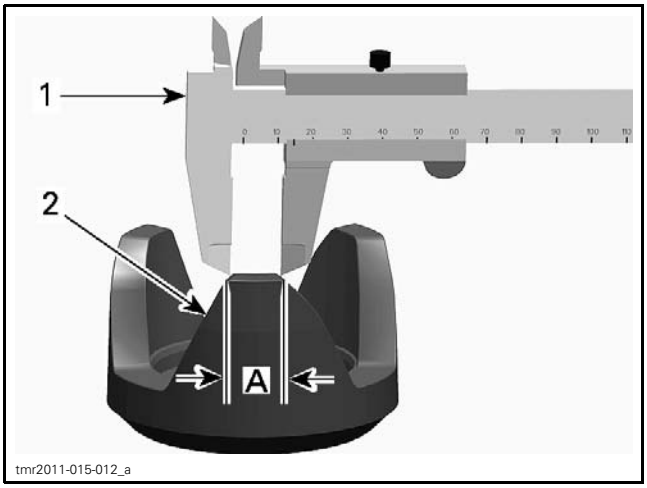


A. Measurement inside
B. Measurement outside

WEAR ON TEETH BOTH SIDES	
SERVICE LIMIT	7.500 mm (.295 in)

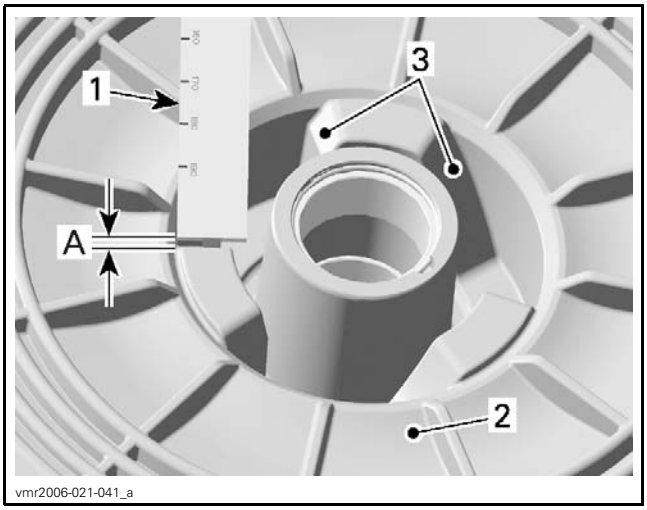
Cam

Check cam for visible damage and wear limit with a caliper.



1. Caliper
2. Contact surface
A. Width to be measured due to wear on contact surface

WIDTH ON TOP SURFACE	
SERVICE LIMIT	16.0 mm (.63 in)

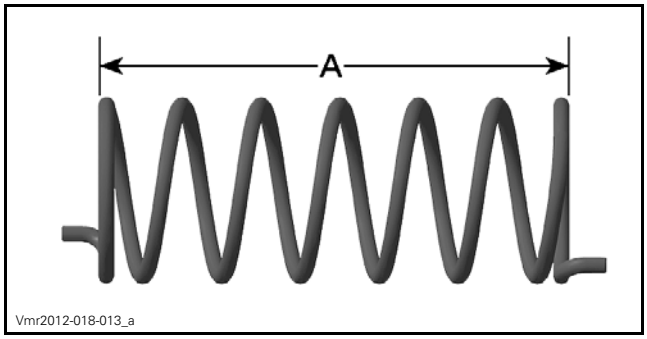


1. Caliper
2. Sliding sheave
3. Contact surface
A. Wear to be measured

WEAR ON CONTACT SURFACE	
SERVICE LIMIT	1.00 mm (.039 in)

Spring

Measure spring free length and squareness. If spring is out of specification, replace by a new.



CVT DRIVEN SPRING
A. Spring free length

SPRING FREE LENGTH	
SERVICE LIMIT	125 mm (4.921 in)
CLUTCH SPRING SQUARENESS	
SERVICE LIMIT	3.8 mm (.15 in)

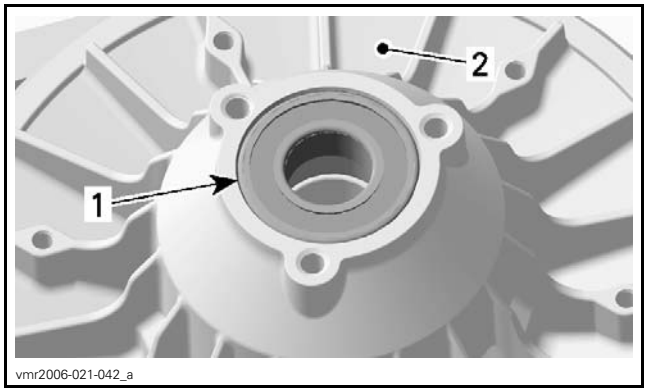
Assembling the Driven Pulley

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

Heat ball bearing area up to 100°C (212°F) before ball bearing installation.

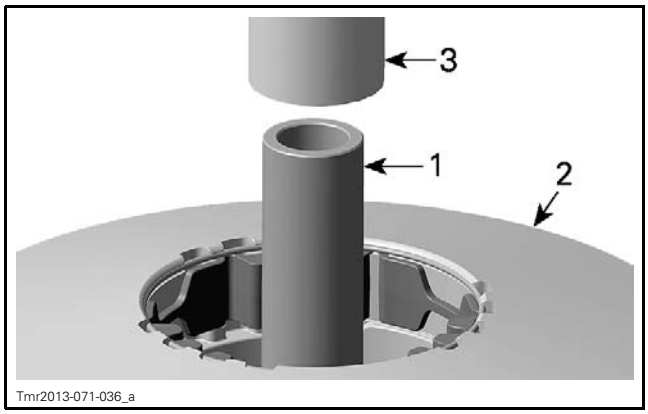
NOTE: Place new ball bearing in a freezer for 10 minutes before installation.

Install ball bearing with the writing on top and press in only on the outer ring.



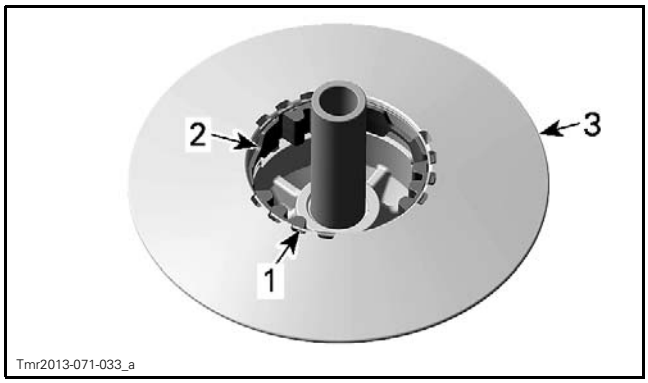
1. Ball bearing
2. Fixed sheave of driven pulley

NOTICE Do not use hammer, use press machine only.



1. *Shaft*
2. *Fixed sheave*
3. *Press machine*

Install torque gear then secure it with retaining ring.



1. *Retaining ring*
2. *Torque gear*
3. *Fixed sheave of driven pulley*

Installing the Driven Pulley

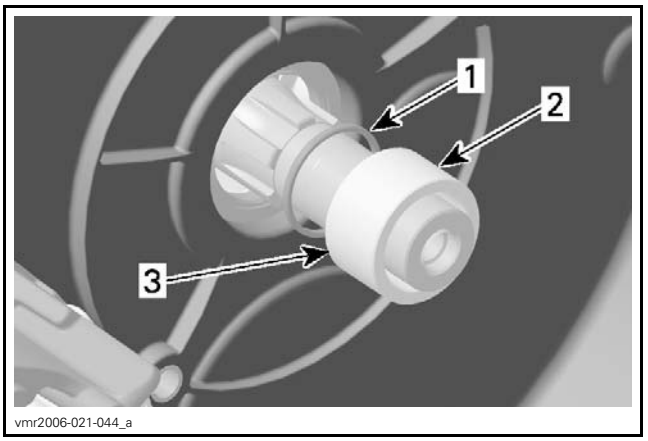
For installation, reverse the removal procedure. Pay attention to the following details.

NOTICE **Never use any type of impact wrench at drive pulley removal and installation.**

Clean mounting surfaces and parts as described in *CLEANING THE DRIVEN PULLEY* in this subsection.

Place O-ring on countershaft splines and move it with distance sleeve in end position.

NOTICE **Chamfer on inside diameter of the distance sleeve must face to gearbox side.**

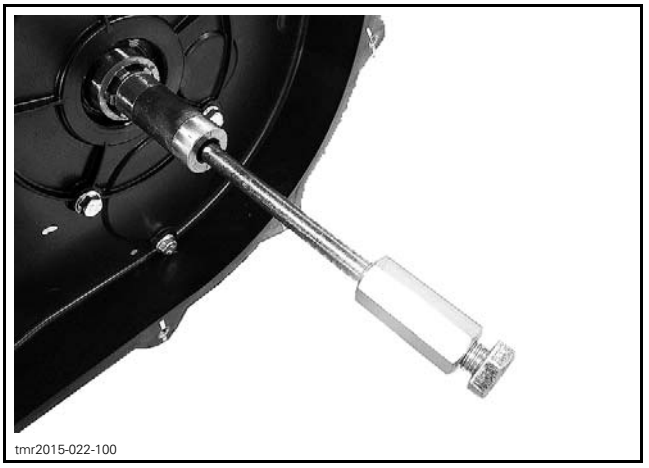


1. *O-ring*
2. *Distance sleeve*
3. *Chamfered area of distance sleeve*

Hand tighten the stud in the countershaft.

Install the tightening tool on the stud.

REQUIRED TOOL	
DRIVEN PULLEY STUD TOOL (P/N 529 036 360)	



Block countershaft.

REQUIRED TOOL	
COUNTERSHAFT RETAINER TOOL (P/N 529 036 312)	

tmr2015-022-101

Tighten the stud to specification.

TIGHTENING TORQUE	
Stud	45 N•m ± 2 N•m (33 lbf•ft ± 1 lbf•ft)

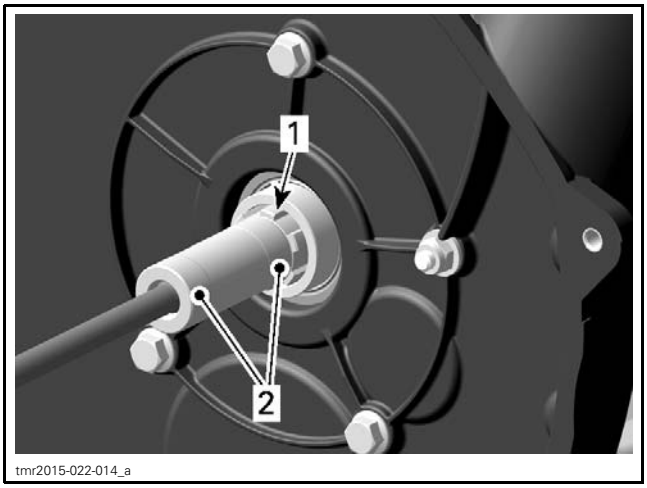
Remove the tightening tool from the stud.

Remove countershaft retainer tool.

Lubricate:

– Countershaft splines
– Countershaft outer surface.

SERVICE PRODUCT	
Countershaft splines and countershaft outer surface	LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)



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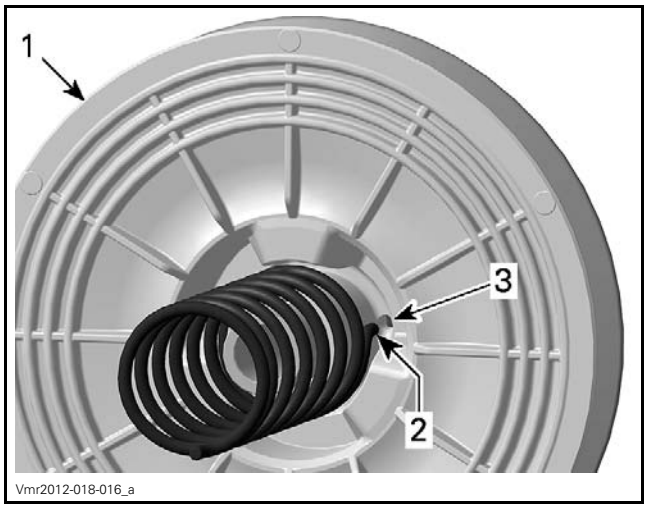
1. Countershaft splines
2. Countershaft outer surface

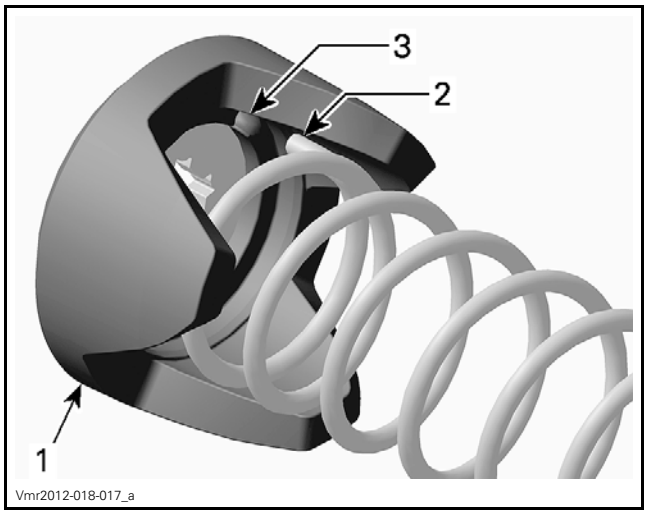
Place spring behind sliding sheave and engage spring end in the sliding sheave spring bore.



Vmr2012-018-016_a

850 AND 1000 ENGINES
1. Sliding sheave
2. Spring end
3. Spring bore

Place cam on the opposite end of the spring and engage the other spring end in the cam spring bore.

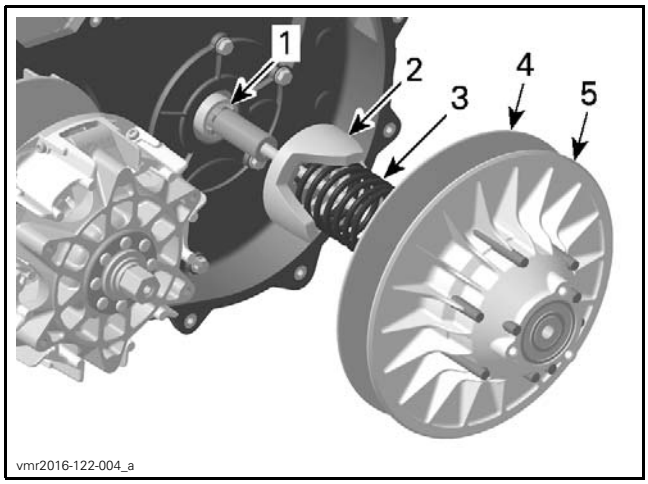


Vmr2012-018-017_a

1. Cam
2. Spring end
3. Spring bore

Install pre-assembled cam with spring and driven pulley on countershaft end.

NOTICE **Cam must engage on countershaft splines.**



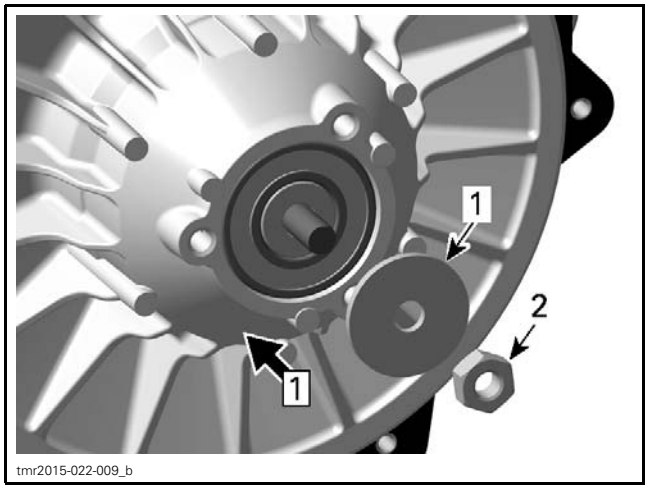
1. *Countershaft splines*
2. *Cam*
3. *Spring*
4. *Sliding sheave*
5. *Fixed sheave*

With your hand, push the driven pulley onto the shaft to compress the spring.

NOTICE **A cam not correctly engaged will cause damage to the driven pulley and cam.**

As you hold the pulley in, install thrust washer and a NEW driven pulley nut.

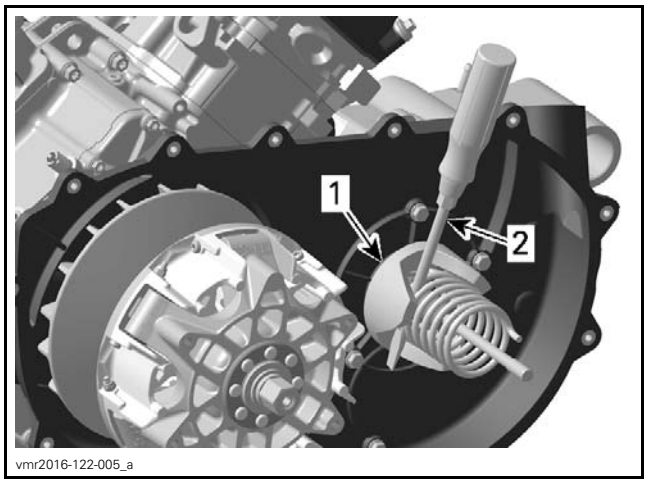
NOTE: Finger tighten the driven pulley nut sufficiently so that the cam remains engaged.



Step 1: Push

1. *Thrust washer*
2. *Driven pulley nut (*NEW*)*

Insert a screwdriver of approximately 5 mm (.197 in) diameter in the cam.

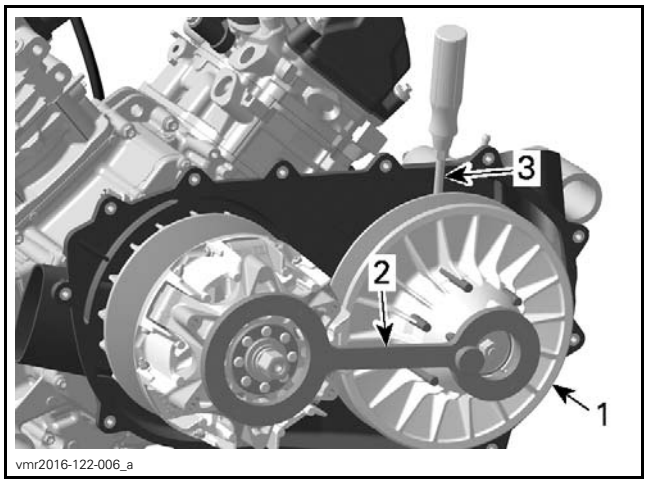


FOR CLARITY OF UNDERSTANDING, SOME PARTS ARE NOT SHOWN

1. *Cam*
2. *Screwdriver, diameter 5 mm (.197 in)*

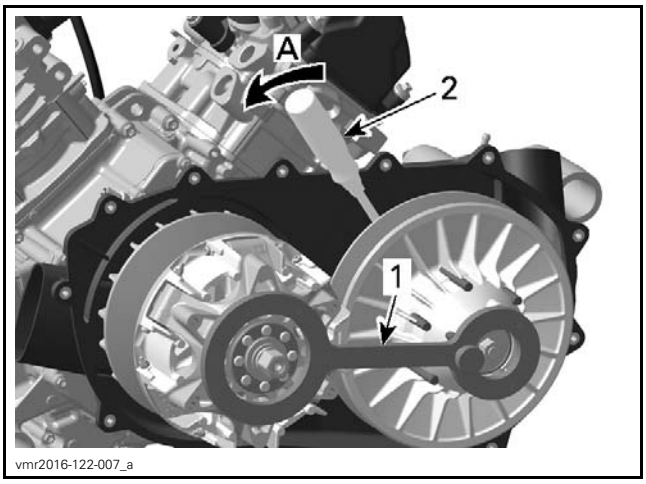
Hold the driven pulley in a fix position.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 238)	



1. *Fixed sheave*
2. *Clutch holder*
3. *Screwdriver*

Turn the screwdriver approximately 20° counterclockwise until cam engages in the driven pulley sliding sheave and hold it in this position (spring preload).



1. Clutch holder
2. Screwdriver
A. Turn counterclockwise

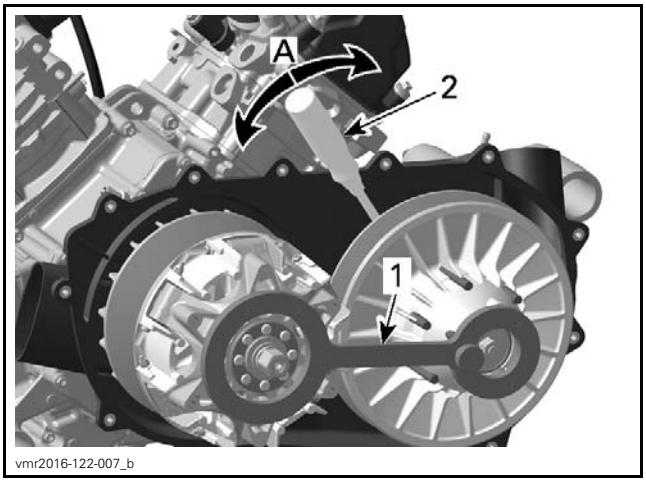
Tighten driven pulley nut as specified.

Using a socket and extension, hand tighten the driven pulley nut.

NOTE: Do not apply specified torque at this time.

Move the screwdriver back and forth to check cam for free movement.

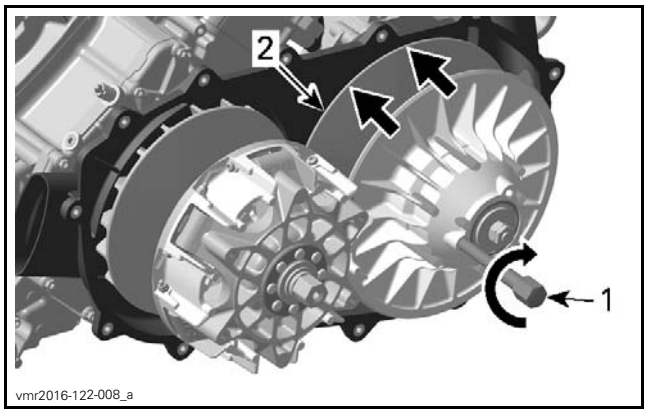
NOTICE A cam not correctly engaged will cause damage to the driven pulley and cam.



1. Clutch holder
2. Screwdriver
A. Cam freedom of movement

Install drive belt. Refer to *DRIVE BELT* in this subsection.

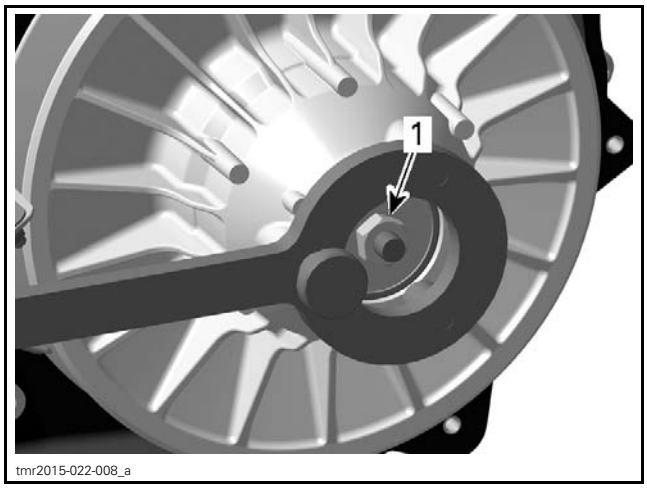
REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	



1. Puller/locking tool
2. Sliding sheave

NOTE: If driven pulley sheaves can to be opened when the service tool is screwed in, the cam is not correctly engaged in the sliding sheave.

TIGHTENING TORQUE		
Driven pulley nut	STEP 1	20 N•m ± 1 N•m (15 lbf•ft ± 1 lbf•ft)
	STEP 2	180° ± 5°

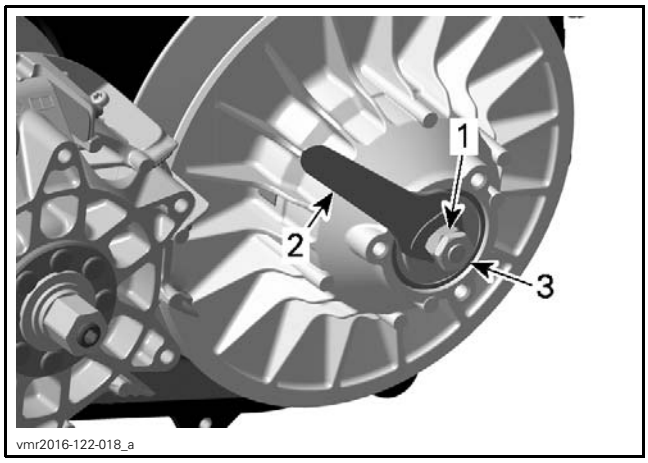


1. Driven pulley nut

Remove service tool.

Hold driven pulley nut using a spanner and tighten the NEW counter nut to specification.

TIGHTENING TORQUE	
Counter nut	35 N•m ± 1 N•m (26 lbf•ft ± 1 lbf•ft)



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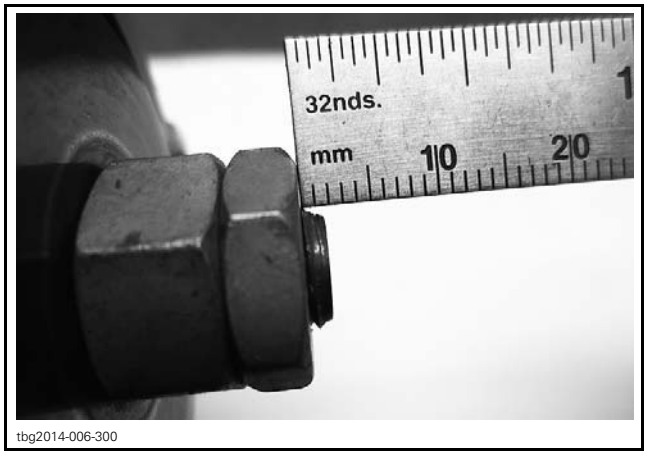
1. *Driven pulley nut*
2. *Spanner*
3. *Counter nut*

In order to confirm the cam is in the right position, measure the length of the stud out of the counter nut.

– If the distance between counter nut and the end of the stud is within specification, the pulley and cam are properly installed.
– Otherwise the cam might not correctly engaged. Remove the clutch except stud, and reinstall.
– If distance is still out of specification, please consult the *TST # 81274* on Knowledge Center for instructions.



tbg2014-006-300

MEASUREMENT	ACTION
Less than flush with the counter nut	Refer to TST # 81274 on Knowledge Center
0 to 3.6 mm	Installation is good. Install the drive belt to complete the procedure
3.7 mm and more	Refer to TST # 81274 on Knowledge Center

Check driven pulley end play.

SPECIFICATION	
Driven pulley end play	0 mm (0 in)

CVT AIR GUIDE

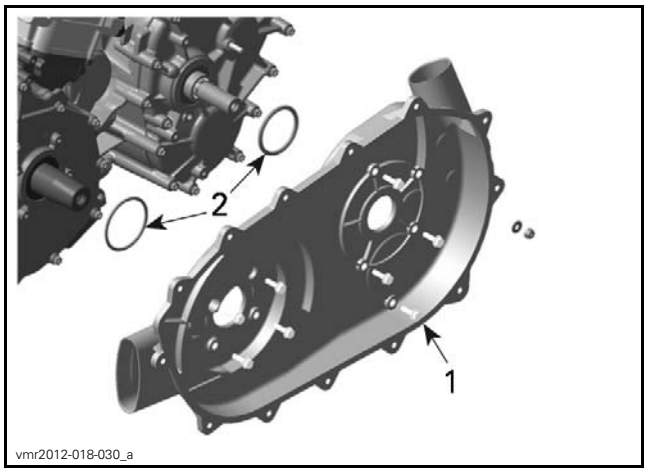
Removing the CVT Air Guide

Remove the *DRIVE PULLEY* and the *DRIVEN PULLEY*.

Unscrew the clamps retaining the CVT air hoses.

Remove CVT air guide.

Remove and discard O-rings.



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1. *CVT air guide*
2. *O-rings*

Inspecting the CVT Air Guide

Clean CVT air guide from contamination

Installing the CVT Air Guide

For installation reverse the removal procedure.

Always install new O-rings before installing the CVT air guide.

GEARBOX AND 4X4 COUPLING UNIT (WITH EXTERNAL SWITCHES)

SERVICE TOOLS

Description	Part Number	Page
BACKLASH MEASUREMENT TOOL	529 036 030	13
BEARING INSTALLER (GEARBOX)	529 035 763	29
BEARING INSTALLER (GEARBOX)	529 035 762	29
COUNTERSHAFT OIL SEAL PUSHER	529 036 222	11
DRIVE SHAFT OIL SEAL INSTALLER	529 036 028	12
FLUKE 115 MULTIMETER	529 035 868	5, 8
HANDLE	420 877 650	12, 29
OIL SEAL INSTALLER (GEARBOX)	529 035 758	12

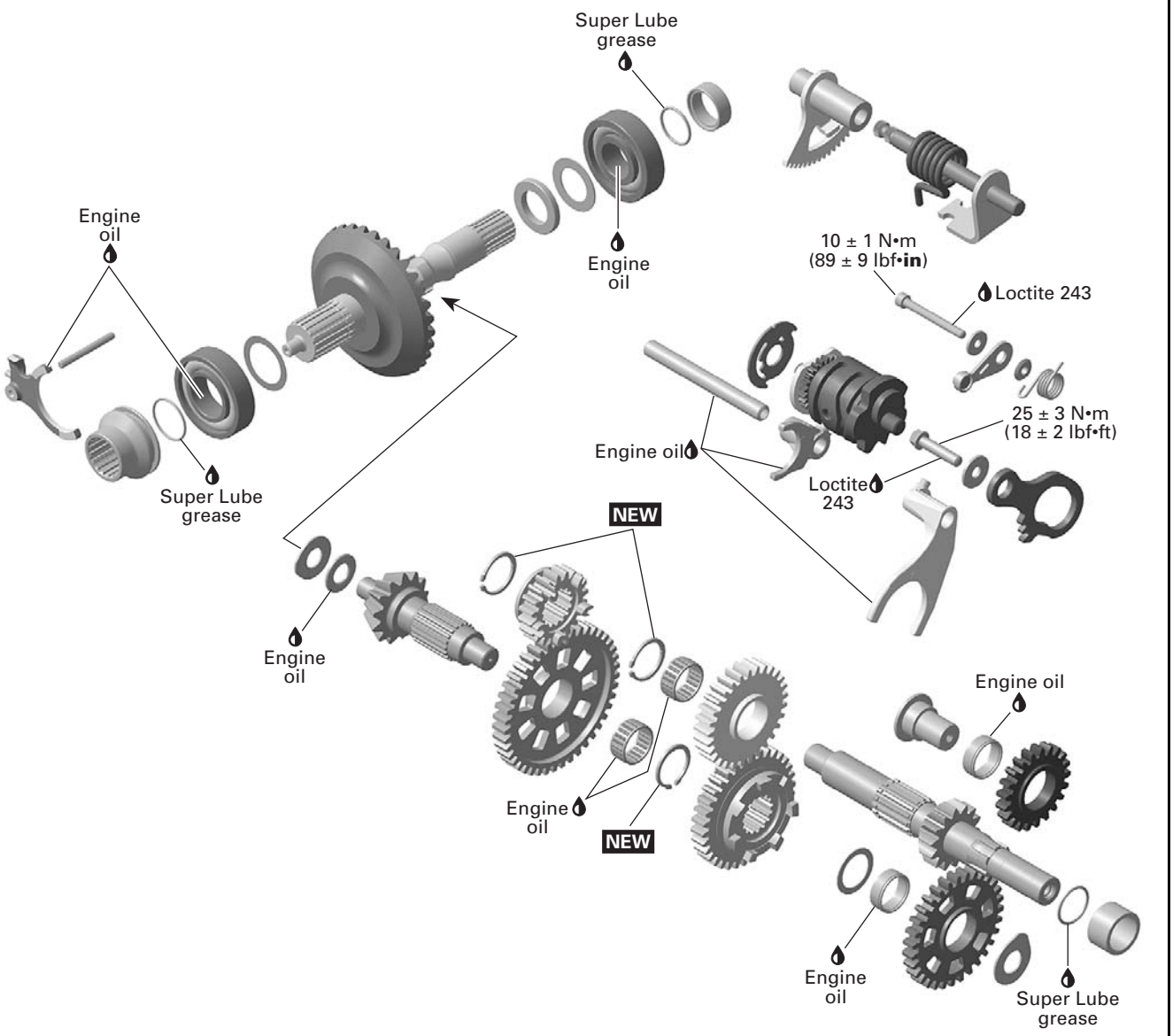
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
FLUKE RIGID BACK-PROBE	TP88	5–6

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	34
LOCTITE 5910	293 800 081	8, 16–17, 33
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	16, 25, 33
PETAMO GREASE GHY 133N	420 899 271	10
SUPER LUBE GREASE	293 550 030	6, 9, 17

GEARBOX COMPONENTS AND 4X4 COUPLING MECHANISM



NEW = Component must be replaced when removed.

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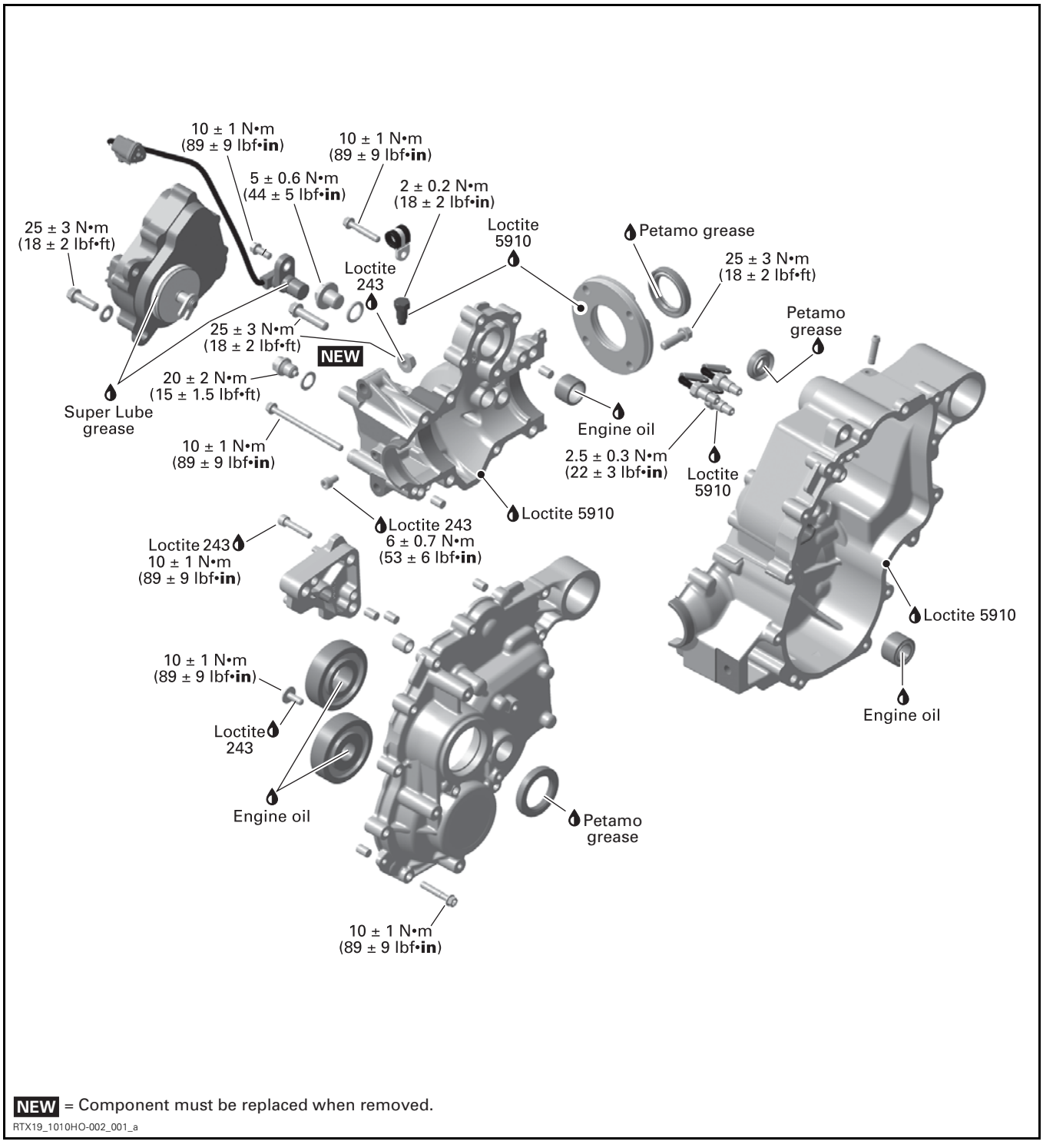
GEARBOX HOUSING AND 4X4 ACTUATOR UNIT



NEW = Component must be replaced when removed.

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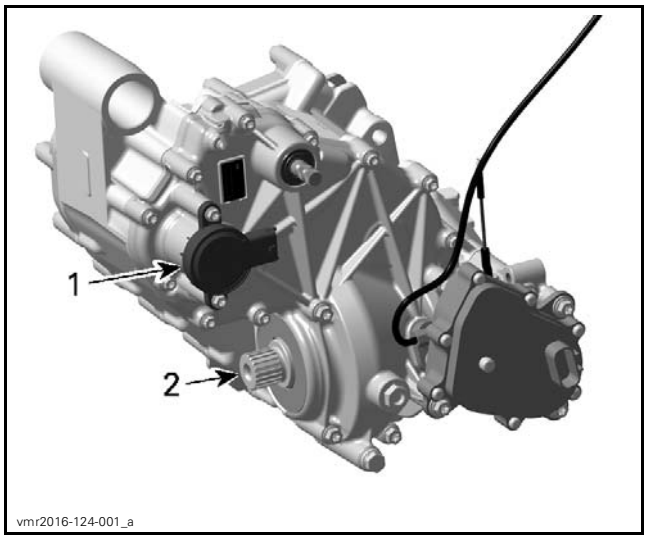
GENERAL

GEARBOX IDENTIFICATION

Gearbox with GBPS

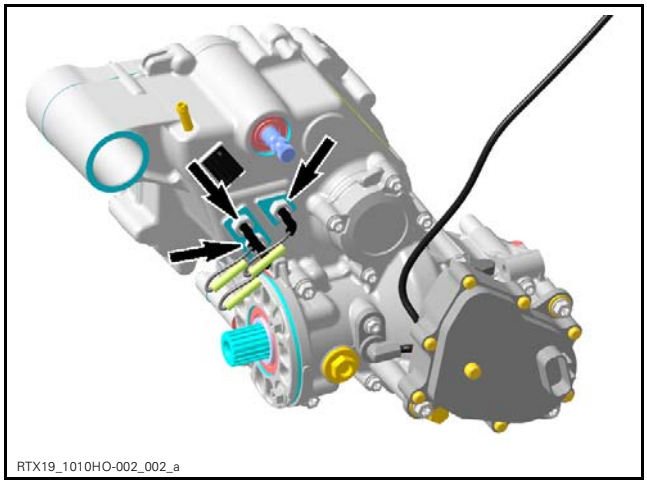
This gearbox is equipped with 1 gearbox position sensor.



GEARBOX, RIGHT HAND SIDE
1. *Gearbox position sensor*
2. *Output shaft*

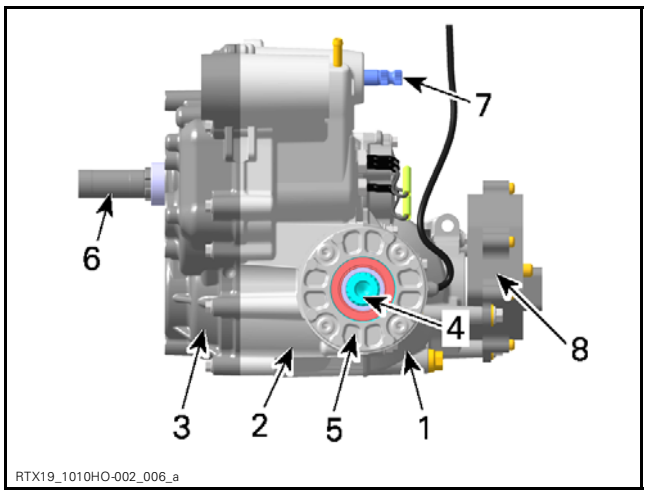
Gearbox with External Switches

This gearbox is equipped with 3 gearbox position indicator switches.



GEARBOX, RIGHT HAND SIDE

OVERVIEW



1. *Right housing*
2. *Center housing*
3. *Left housing*
4. *Output shaft*
5. *Bearing cover*
6. *Countershaft*
7. *Shift shaft*
8. *Actuator*

TROUBLESHOOTING

UNUSUAL GEARBOX NOISE AND/OR VIBRATIONS

1. Low oil level in gearbox.
   - *Oil leakage from gearbox. Replace damaged gasket(s) and/or oil seal(s).*
2. Defective bearings.
   - *Bearing(s) do(es) not turn smoothly. Replace bearing(s).*
3. Damaged or worn gears.
   - *Inspect gears for damages or missing teeth. Replace respective gears.*

GEAR INDICATION FAILS

1. Check contact screws on gear housing center.
   - *Contact(s) is (are) corroded and/or connectors to wiring harness got loose.*
   - *Damaged wires. Repair as required.*
   - *Shifting indicator switch(es) pin(s) is (are) worn and/or damaged. Replace shifting indicator switch(es).*

GEAR(S) IS (ARE) HARD TO SHIFT

1. Incorrect shift rod adjustment.
   - *Adjust shift rod (refer to SHIFT ROD in SHIFTER subsection).*

4 WHEEL DRIVE DOES NOT ENGAGE OR DISENGAGE

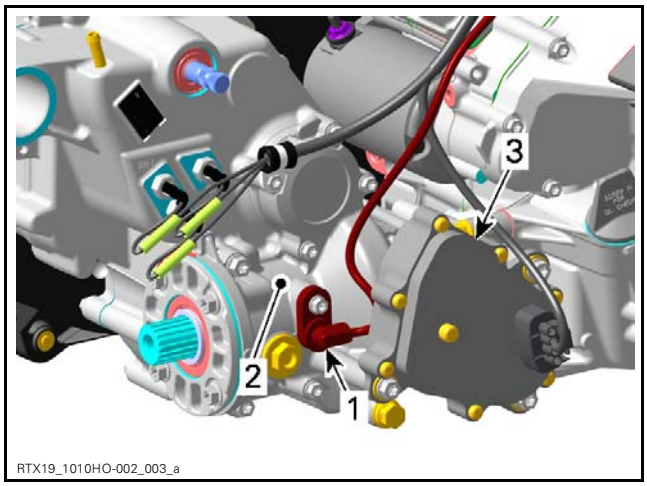
1. Defective actuator.
   - *Test actuator.*
2. Damaged or worn shifting fork or sleeve.
   - *Remove actuator and inspect shifting fork and sleeve.*

PROCEDURES

VEHICLE SPEED SENSOR (VSS)

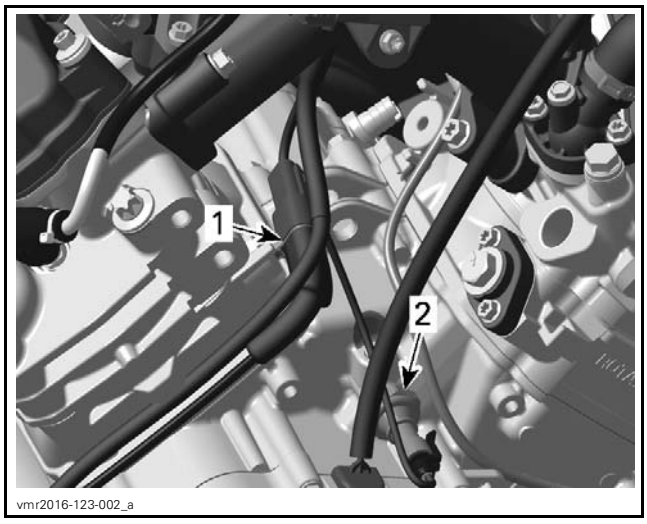
VSS Location

The vehicle speed sensor is located on the right housing of the gearbox behind the actuator.



1. *VSS (Vehicle Speed Sensor)*
2. *Right housing of gearbox*
3. *Actuator*

The VSS connector is located between the cylinders, behind the OPS cover.



1. *VSS connector*
2. *OPS (Oil Pressure Switch)*

VSS Wire Identification

FUNCTION	PIN - SENSOR CONNECTOR	PIN - WIRING HARNESS CONNECTOR
12-volt input from fuse F5	A	1
Speed signal (to ECM pin E1)	B	2
Ground (to ECM pin D4)	C	3

VSS Circuit Protection

CONDITION	CIRCUIT PROTECTION
Supplied with main relay activated	Fuse 5

Testing the VSS Input Voltage

1. Remove VSS connector cover.
2. Set multimeter to Vdc.

REQUIRED TOOL
FLUKE 115 MULTIMETER (P/N 529 035 868)

3. Turn ignition switch ON.
4. Set emergency engine stop switch to RUN.
5. Back-probe the VSS connector.

REQUIRED TOOL
FLUKE RIGID BACK-PROBE (P/N TP88)

1. *VSS connector*

6. Measure voltage as per following table.

VEHICLE SPEED SENSOR INPUT VOLTAGE TEST		
TEST PROBES		RESULT (KEY ON)
PIN 1	PIN 3	Battery voltage

If voltage is not as specified, test positive and ground circuits separately.

Testing the VSS Signal

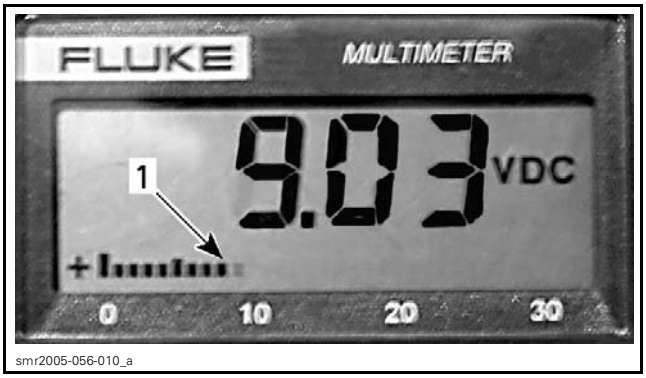
1. Lift rear of vehicle so that rear wheels are off the ground.
2. Set transmission to 2WD and to NEUTRAL.
3. Back-probe the VSS connector.

REQUIRED TOOL
FLUKE RIGID BACK-PROBE (P/N TP88)

4. Turn ignition switch ON.
5. Set emergency engine stop switch to RUN.
6. Set multimeter to Vdc.
7. Measure voltage while slowly rotating rear wheels by hand.

VEHICLE SPEED SENSOR SIGNAL TEST		
TEST PROBES		RESULT (WHILE ROTATING WHEELS)
PIN B	PIN C	Alternate reading between battery voltage and 0 Vdc

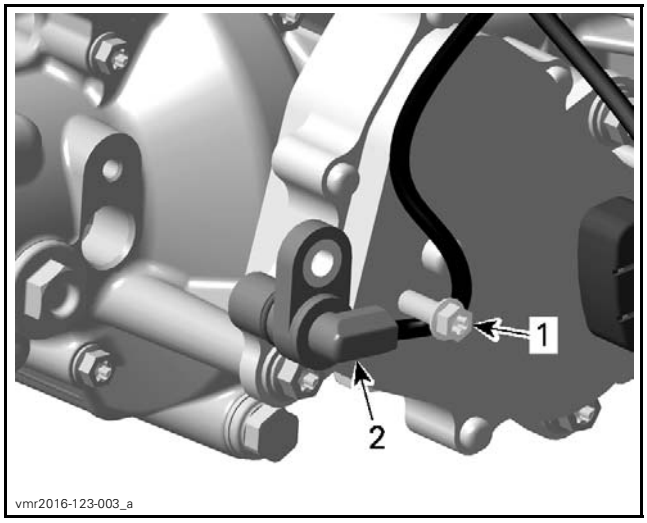
NOTE: Since we measure pulsating voltage, the numeric display will continuously change. The analog display may be easier to follow.



1. Analog display

Removing the VSS

Pull out the VSS after removing the retaining screws.



1. Screw
2. VSS

Installing the VSS

The installation is the reverse of the removal procedure. However, pay attention to the following.

Lubricate VSS O-ring.

VSS O-RING	
Service product	SUPER LUBE GREASE (P/N 293 550 030)

Tighten VSS retaining screw to specification.

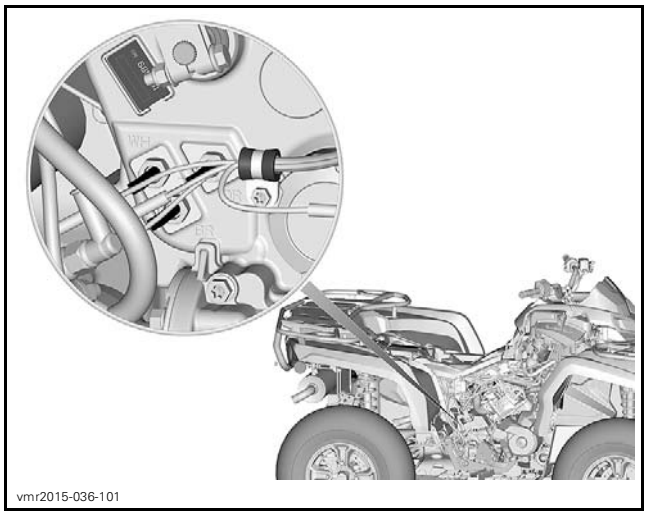
TIGHTENING TORQUE	
VSS retaining screw	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

GEARBOX POSITION INDICATOR SWITCHES

Gearbox Position Indicator Switch Access

Refer to *BODY* subsection and remove the following:

– Seat
– Console
– RH side panel and extension(s)
– RH footrest panel.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Testing the Gearbox Position Indicator Switch Continuity

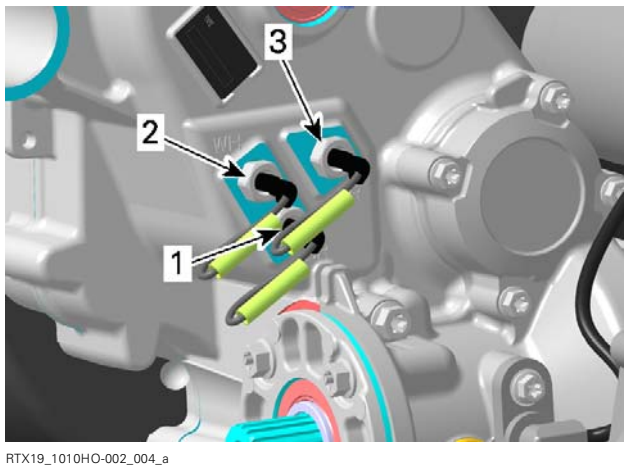
1. Remove parts required for access, refer to *GEARBOX POSITION INDICATOR SWITCH ACCESS* in this subsection.

NOTE: Take note of corresponding switch position and wire color.

2. Disconnect wires from switches.

NOTE: Remove insulating paint to obtain correct readings.

3. Using a multimeter, measure the resistance from the indicator switch to engine ground while selecting the gearbox to each position. Compare results with the logic table below.



RTX19_1010HO-002_004_a

1. *Gearbox position indicator switch - position 1 BROWN/GREY wire*
2. *Gearbox position indicator switch - position 2 WHITE/RED wire*
3. *Gearbox position indicator switch - position 3 ORANGE/GREY wire*

SHIFTER POSITION	CORRESPONDING SWITCH		
	BROWN/ GREY	WHITE/ RED	ORANGE/ GREY
	Position 1	Position 2	Position 3
L	X		X
H			X
N		X	X
R		X	
P	X	X	

An "X" indicates switch is making ground contact, thus there should be continuity (R is close to 0 Ohms).

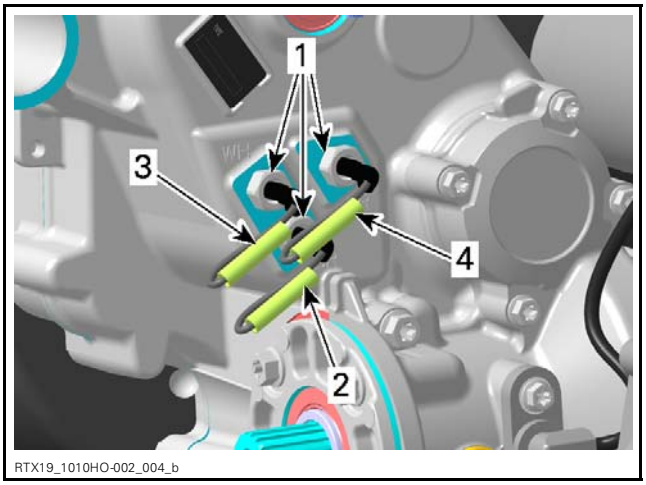
A blank space indicates switch is not making contact, there should be no continuity (R = infinite).

If the indicator switch is good, check the vehicle harness and/or indicator lights.

Removing the Gearbox Position Indicator Switch

NOTE: Clean area of dirt before removing gearbox indicator position switch(es). Take note of corresponding switch position and wire color.

Disconnect indicator switch from engine wiring harness.



RTX19_1010HO-002_004_b

1. *Gearbox position indicator switches*
2. *BROWN/GREY wire*
3. *WHITE/RED wire*
4. *ORANGE/GREY wire*

Unscrew switch.

Installing the Gearbox Position Indicator Switch

Reverse the removal procedure. However, pay attention to the following.

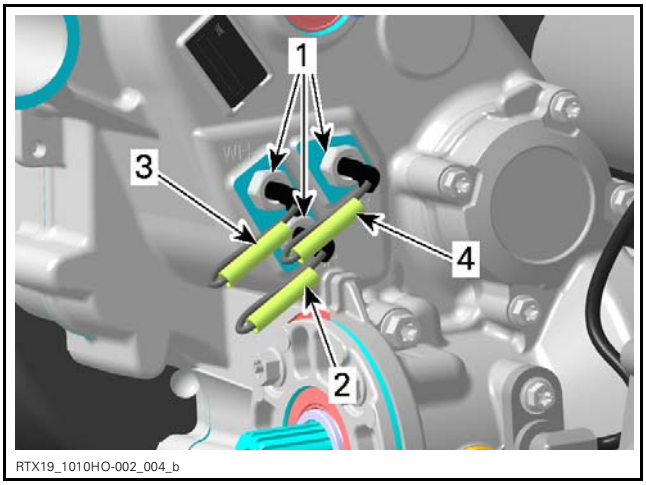
Take care to avoid damaging threads in switch bores during installation.

Carefully apply some sealant on threads of shift indicator switches.

NOTICE **Do not apply sealant on switch plunger as it will lead to switch malfunction.**

TIGHTENING TORQUE	
Indicator switches	2.5 N•m ± 0.3 N•m (22 lbf•**in** ± 3 lbf•**in**) + LOCTITE 5910 (P/N 293 800 081)

If all switches are removed, make sure to put the wires back in the correct location as noted prior to removal.



RTX19_1010HO-002_004_b

1. Gearbox position indicator switches
2. BROWN/GREY wire
3. WHITE/RED wire
4. ORANGE/GREY wire

4WD ACTUATOR

4WD Actuator Access

To access the actuator, refer to *BODY* subsection and remove the following parts:

– Seat
– Console
– RH side panel and extension(s)
– RH footrest panel.

Testing the 4WD Actuator Power Supply

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

1. Unplug 4WD actuator connector.
2. Turn ignition key ON.
3. Set emergency engine stop switch to RUN.
4. Measure voltage as follows.

SWITCH POSITION	SWITCH PIN		VOLTAGE
2WD	Pin 2	Pin 1	Battery voltage
4WD	Pin 3		

If the selector is out of specifications, check wires, connectors and replace the selector if necessary.

If the selector is good, check the vehicle harness.

If the vehicle harness is good, replace the actuator.

Testing the 4WD Indication Continuity

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

1. Turn ignition switch OFF.
2. Unplug:
   – 4WD Actuator connector
   – HIC connector.
3. Measure continuity.

4WD INDICATION CONTINUITY	
4WD Actuator	HIC
PIN 4	PIN B

4. Unplug the right steering switch connector (RSS).
5. Measure continuity.

4WD INDICATION CONTINUITY	
HIC	RSS
PIN B	PIN 3

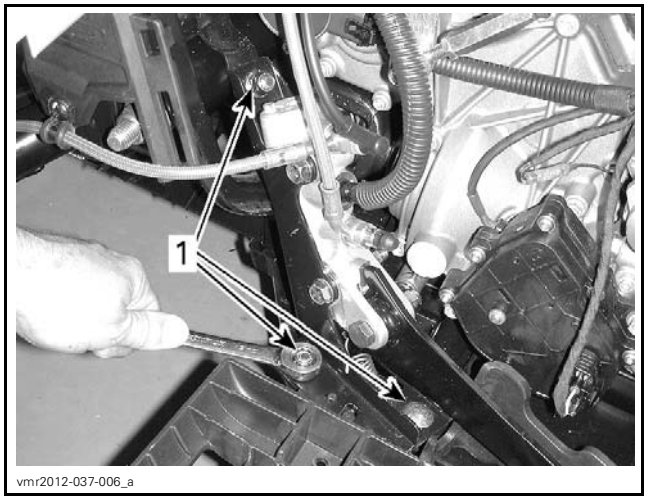
If continuity is good, replace 4WD Actuator.

If continuity is out of specification repair wires and or connectors.

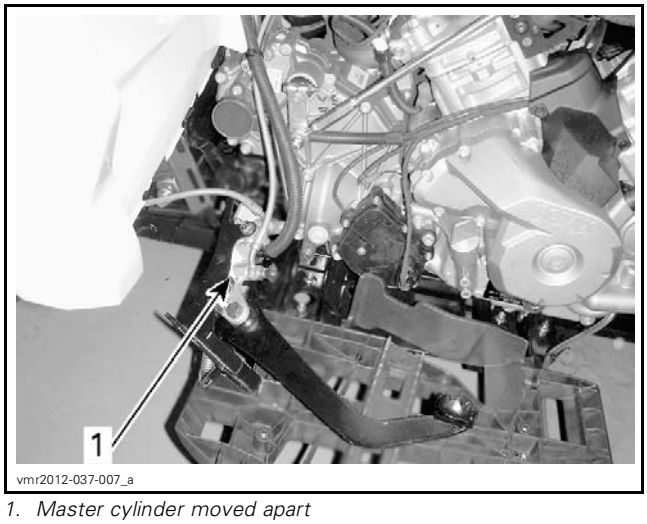
Removing the 4WD Actuator

NOTE: Before beginning any servicing on the actuator, make sure the vehicle is in 4WD position. No need to remove engine from vehicle.

1. Detach brake master cylinder from frame.

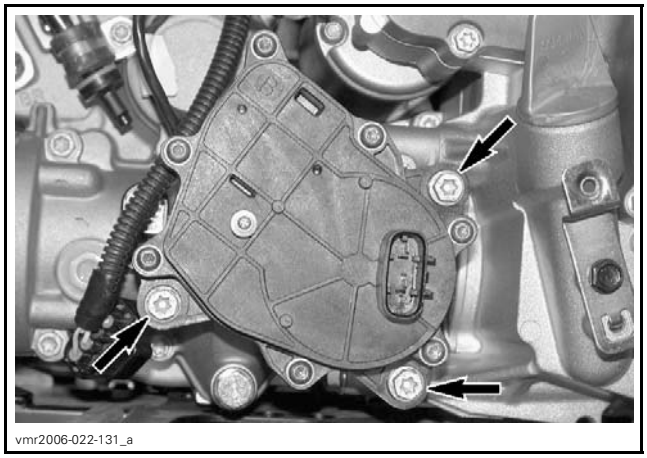


1. Remove retaining screws from master cylinder support



1. Master cylinder moved apart

2. Unplug actuator connector.
3. Place a drain pan under actuator.
4. Unscrew actuator bolts.

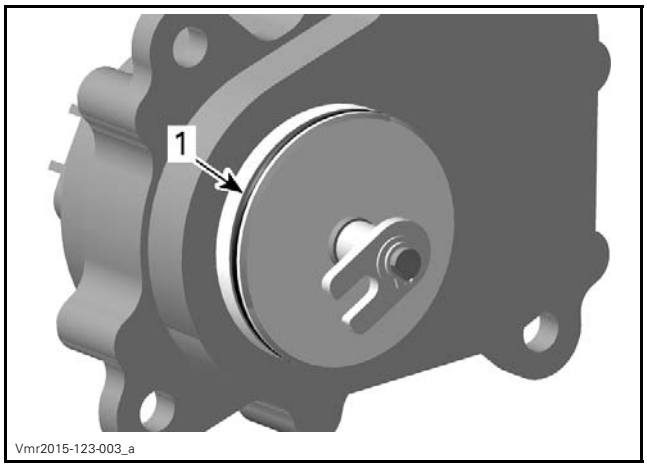


5. When all actuator bolts are removed, pull the actuator out of housing.

Installing the 4WD Actuator

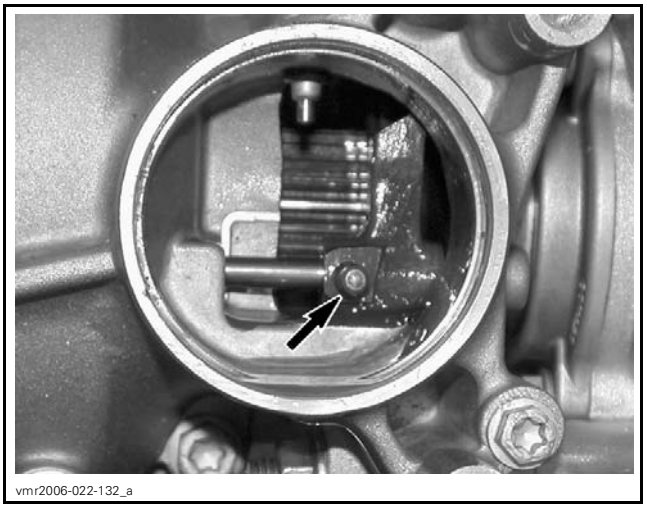
1. Lubricate actuator O-ring.

ACTUATOR O-RING	
Service product	SUPER LUBE GREASE (P/N 293 550 030)



1. Actuator O-ring

2. Verify if coupling fork is in 4WD position. The coupling fork should be positioned toward the front of vehicle.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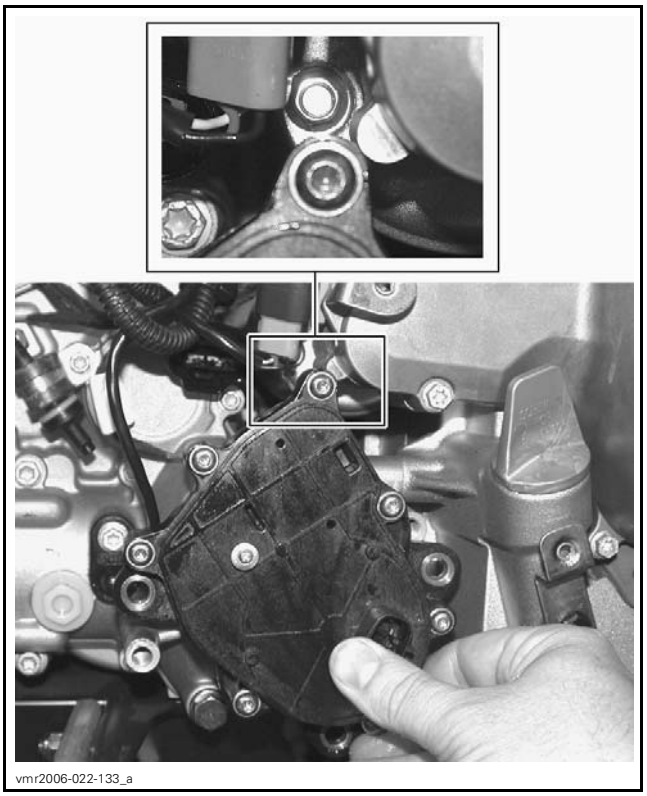
3. Align the actuator fork with the pin on coupling fork then push the actuator in the housing. See the following illustration to position the actuator correctly.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4. Rotate the actuator counterclockwise until it orients itself to mounting position.

NOTICE Do not cut or break the actuator O-ring.

5. Install all actuator bolts then torque them to specification.

TIGHTENING TORQUE	
Actuator screws	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

6. Connect actuator.
7. Lift the front of vehicle.
8. Turn front wheels. The front propeller shaft should not turn (the PARK position must be selected).

If the front propeller shaft turns, the actuator is not installed correctly. Remove actuator and reinstall it.

9. Set ignition switch to ON.
10. Set emergency engine stop switch to RUN.
11. Select the 2WD position.
12. Turn front wheel again. The front propeller shaft. The shaft should turn easily.

If the front propeller shaft does not turn, the actuator is not installed correctly. Remove actuator and reinstall it.

NOTICE Refill missing gearbox oil, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

13. Install all other removed parts.

GEARBOX OIL SEALS

Replacing the Gearbox Oil Seals

Replace oil seals if they are brittle, hard or damaged.

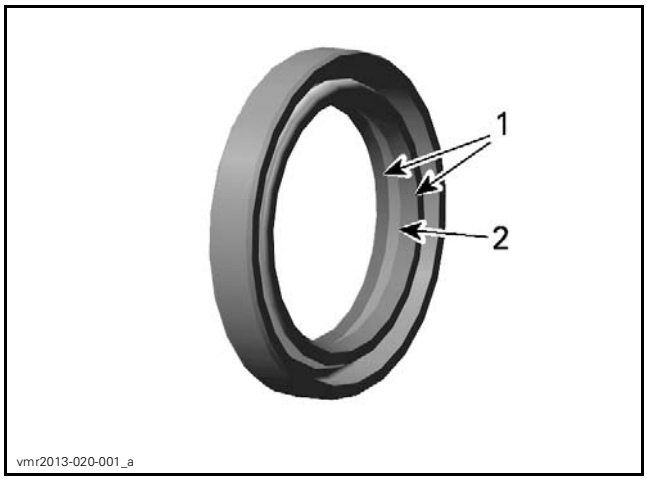
A small flat screwdriver can be used to remove most of these oil seals.

NOTICE Avoid scoring parts during oil seal removal.

When replacing an oil seal, take this opportunity to inspect the following:
– Check bearings behind each oil seal for contamination and/or metal shavings.
– Check oil seal running surfaces for scratches.

Lubricating the Oil Seal

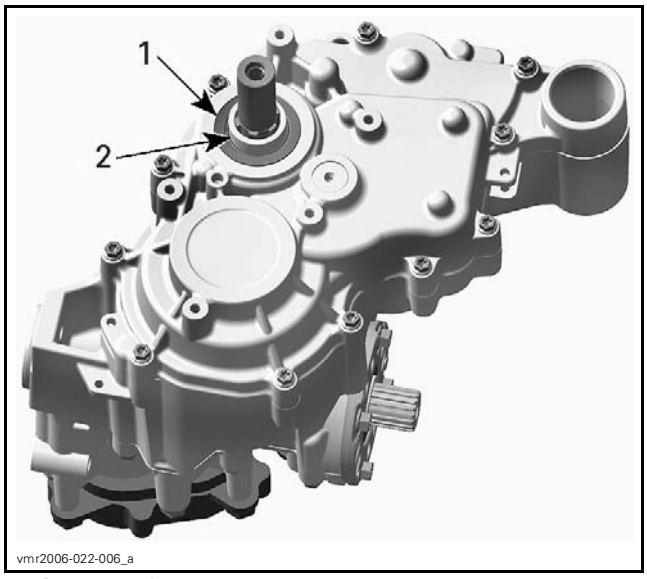
When installing or reinstalling oil seals, use PETAMO GREASE GHY 133N (P/N 420 899 271) to:
– Lubricate sealing lips all around.
– Fill up the room between sealing lips halfway around the perimeter.



1. Sealing lips
2. Room between sealing lips

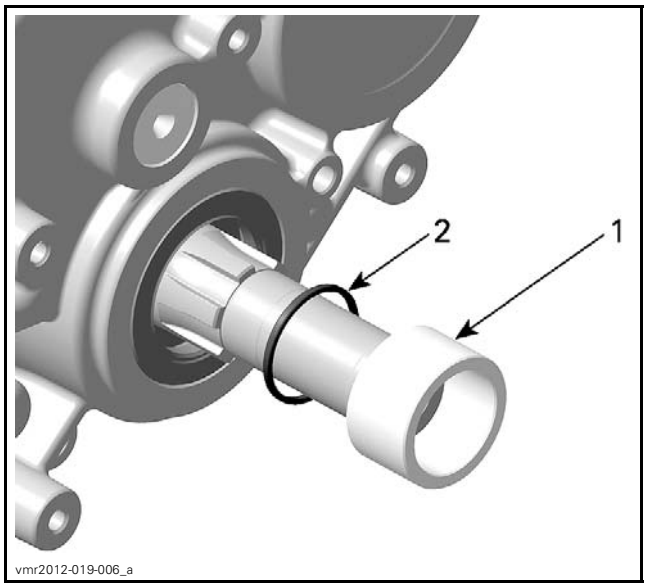
Countershaft Oil Seal

The countershaft oil seal can be removed without removing gearbox from vehicle. Remove drive and driven pulley and CVT air guide.



1. Countershaft oil seal
2. Distance sleeve

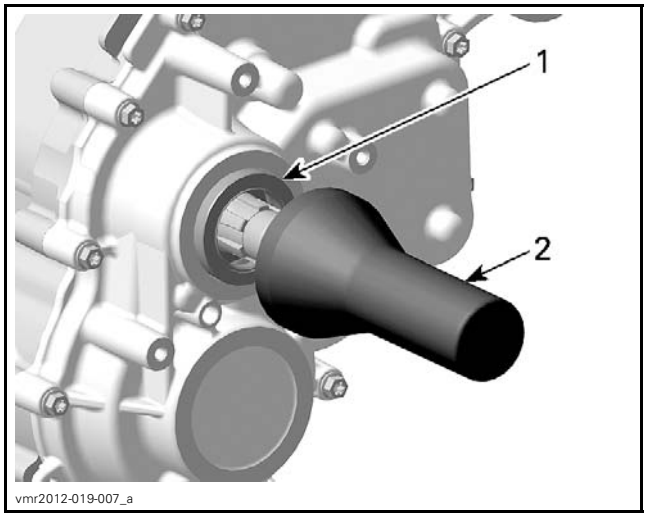
NOTE: When oil seal is removed also inspect O-ring.



1. Distance sleeve
2. O-ring

For countershaft oil seal installation use the following service tool.

REQUIRED TOOL	
COUNTERSHAFT OIL SEAL PUSHER (P/N 529 036 222)	



1. Countershaft oil seal
2. Oil seal pusher

Shift Shaft Oil Seal

The shift shaft oil seal can be removed without removing the gearbox from the vehicle.

To replace the shift shaft oil seal, refer to *BODY* subsection and remove:

– Seat
– Console
– RH side panel

– RH footrest panel
– Shift plate from shift shaft (refer to *SHIFTER* subsection.

Using a suitable tube with the proper diameter to install the shift shaft oil seal.

If gearbox housing is apart, the following tools can be used for shift shaft oil seal installation.

REQUIRED TOOL	
OIL SEAL INSTALLER (GEARBOX) (P/N 529 035 758)	
HANDLE (P/N 420 877 650)	

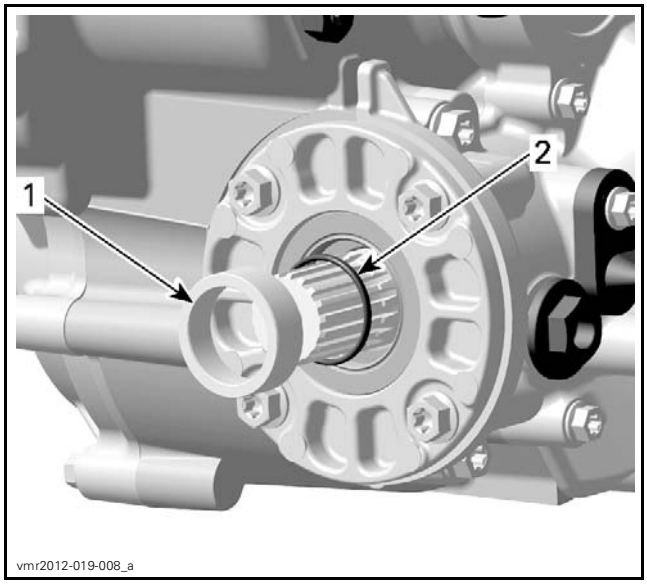
NOTICE Oil seal must be installed with sealing lip toward gearbox.

Output Shaft Oil Seal

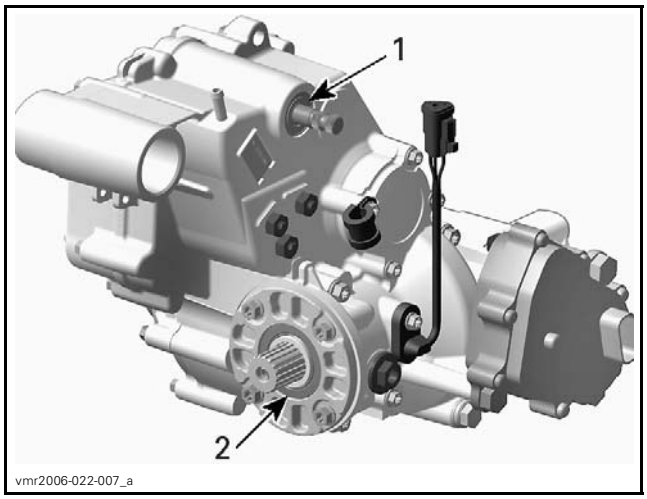
Remove propeller shaft. Refer to *REAR DRIVE* subsection.

Punch a sharp screwdriver through oil seal for removal.

NOTE: When oil seal is removed also inspect O-ring.



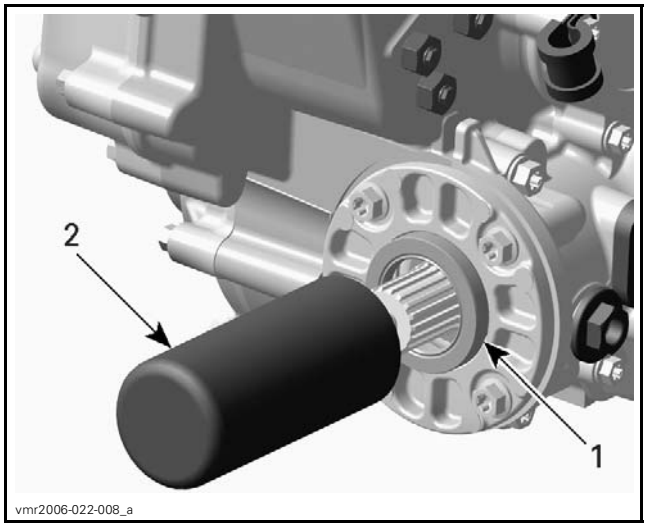
1. Distance sleeve
2. O-ring



1. Shift shaft oil seal
2. Output shaft oil seal

For output shaft oil seal installation use the following service tool.

REQUIRED TOOL	
DRIVE SHAFT OIL SEAL INSTALLER (P/N 529 036 028)	



1. Output shaft oil seal
2. Oil seal installer

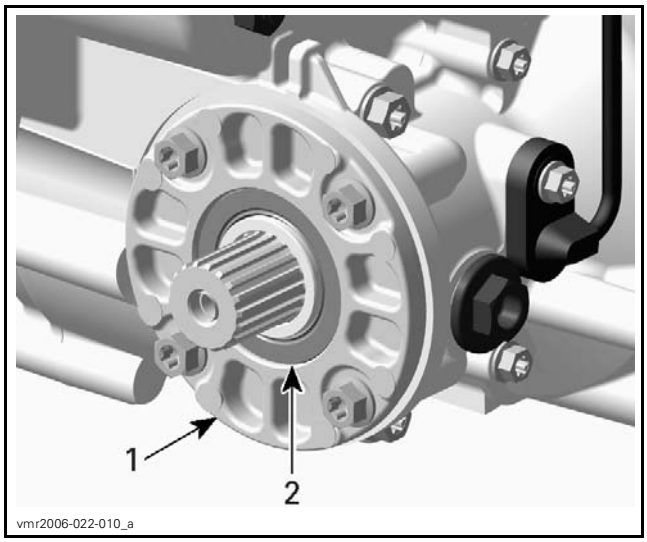
OUTPUT SHAFT AND COUPLING MECHANISM

Remove gearbox. Refer to *GEARBOX* in this subsection.

Before removing the right housing and output shaft measure the backlash on output shaft. This measure will indicate if output shaft adjustment is necessary.

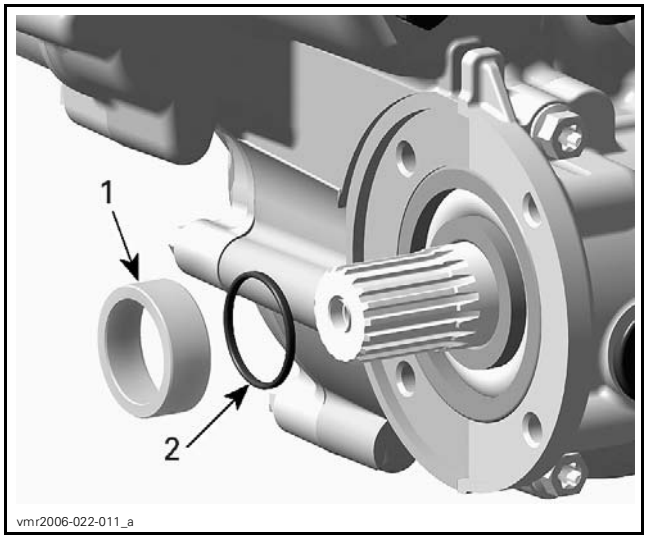
Output Shaft Backlash Procedure

1. Engage PARK position on the gear shaft to block gearbox.
2. Remove bearing cover with oil seal



1. Bearing cover
2. Oil seal

3. Remove:
   – Distance sleeve
   – O-ring.

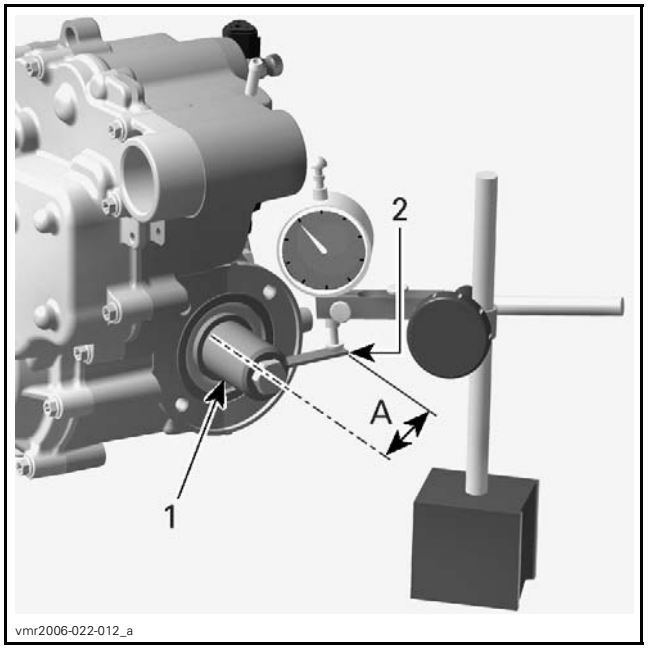


1. Distance sleeve
2. O-ring

4. Install the measurement tool at the end of output shaft.

REQUIRED TOOL	
BACKLASH MEASUREMENT TOOL (P/N 529 036 030)	

5. From center of tool bolt, measure 47 mm (1.85 in)and place a mark on the tab.



1. Backlash measurement tool
2. Mark on tab
A. 47 mm (1.85 in)

6. Position the head of the dial indicator, against the tab at a 90° angle and on the line. Then, gently rotate the output shaft.

This reading gives the backlash measurement. Refer to the following table for backlash specifications.

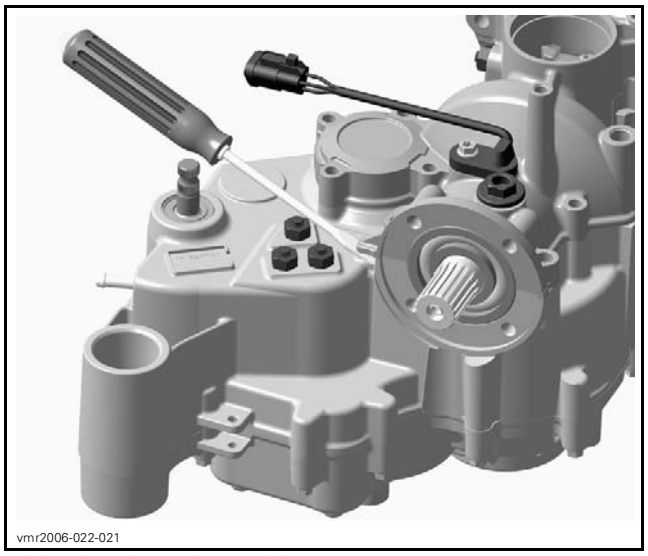
OUTPUT SHAFT BACKLASH	
NEW	0.10 mm to 0.20 mm (.0039 in to .0079 in)
SERVICE LIMIT	0.25 mm (.0098 in)

If backlash is not within the specification, remove the output shaft and select the next thicker or thinner shim to meet the specifications.

NOTE: Use next thicker shim to increase backlash and next thinner shim to reduce backlash.

Removing the Output Shaft and Coupling Mechanism

1. Remove actuator.
2. Remove the bearing cover with oil seal.
3. Unscrew all bolts retaining the right housing to the center housing.
4. To remove right housing, use 2 big screwdrivers.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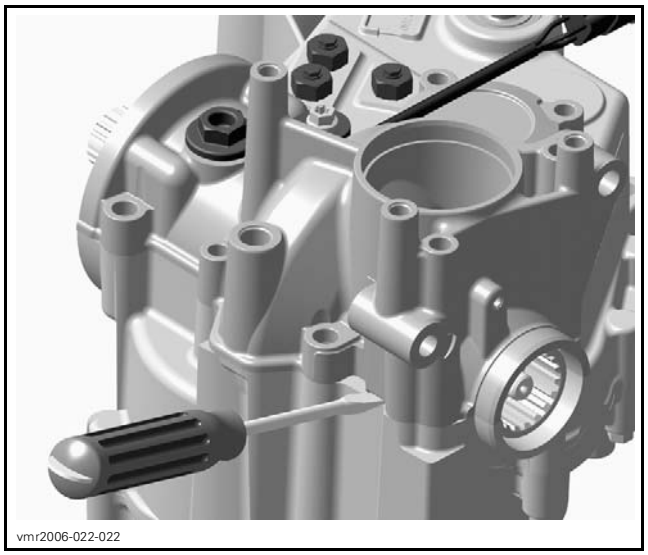
POSITION FOR BIG FLAT SCREWDRIVER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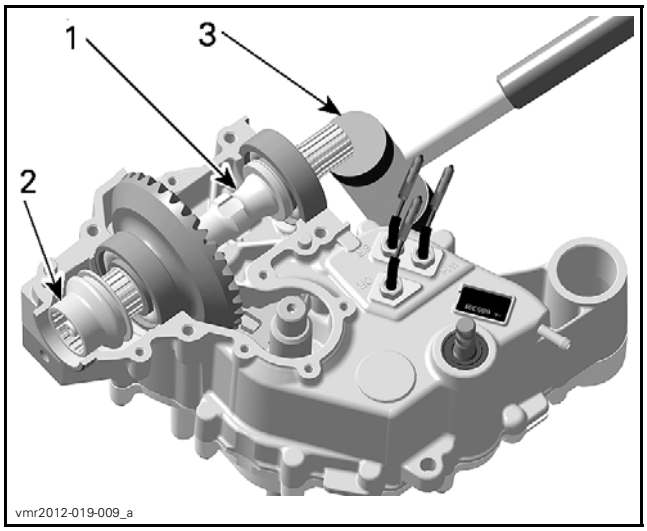
POSITION FOR BIG FLAT SCREWDRIVER

5. Remove output shaft.

REQUIRED TOOL
Soft hammer



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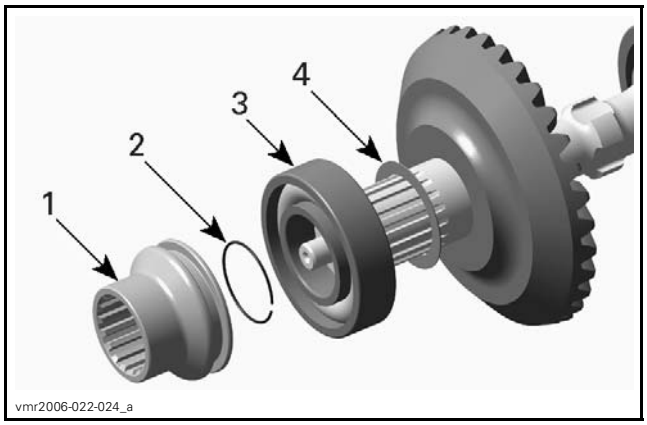
1. *Output shaft*
2. *Coupling sleeve*
3. *Soft hammer*

6. Remove:
   - Coupling sleeve
   - O-ring
   - Ball bearing
   - Thrust washer.



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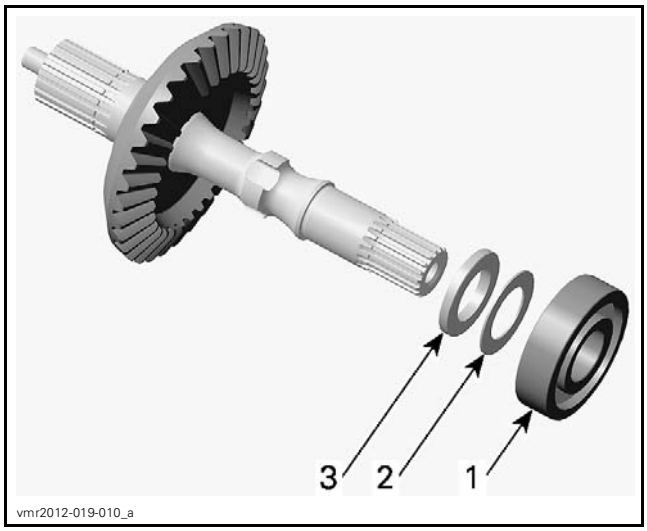
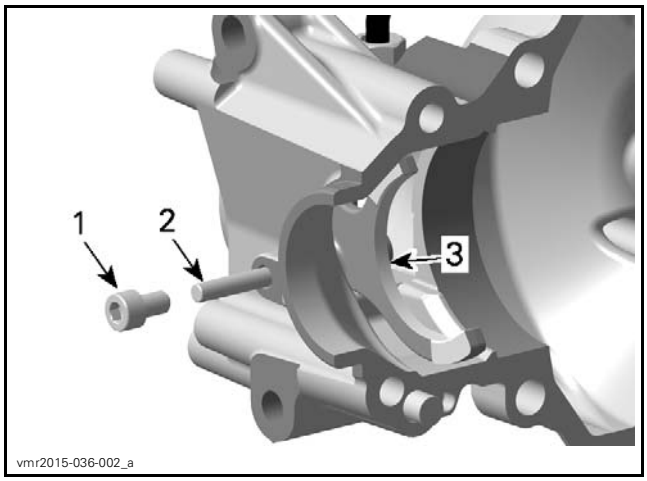
1. *Coupling sleeve*
2. *O-ring*
3. *Ball bearing*
4. *Thrust washer*

7. Remove:
   - Ball bearing
   - Thrust washer.



1. *Ball bearing*
2. *Thrust washer*
3. *Distance ring*

8. Remove:
   - Screw
   - Pin
   - Coupling fork.



1. *Screw*
2. *Pin*
3. *Coupling fork*

Inspecting the Output Shaft and Coupling Mechanism

Check output shaft and its gear for cracks, bend, pitting or other visible damages.

Check output shaft splines for wear or other damages.

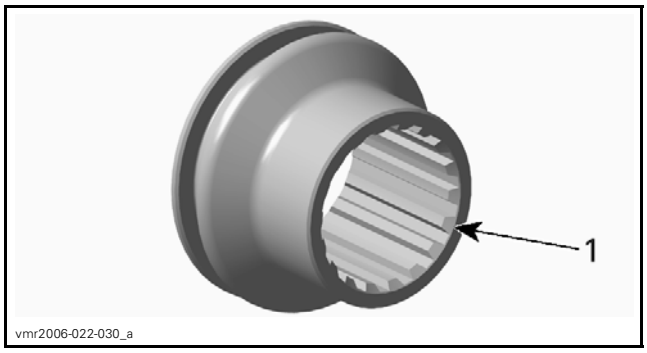
NOTICE **Always replace output shaft and bevel gear shaft at the same time. Adjust these components upon replacement.**

Check if the output shaft ball bearings turn freely and smoothly. Replace if necessary, refer to *GEARBOX ADJUSTMENT* in this subsection.

Replace oil seal if brittle, hard or damaged.

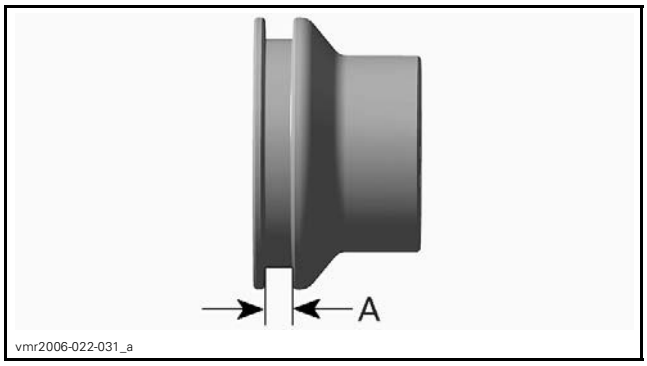
Replace O-rings if brittle, hard or damaged.

Check splines of coupling sleeve for wear or other damages.



1. *Inspect splines*

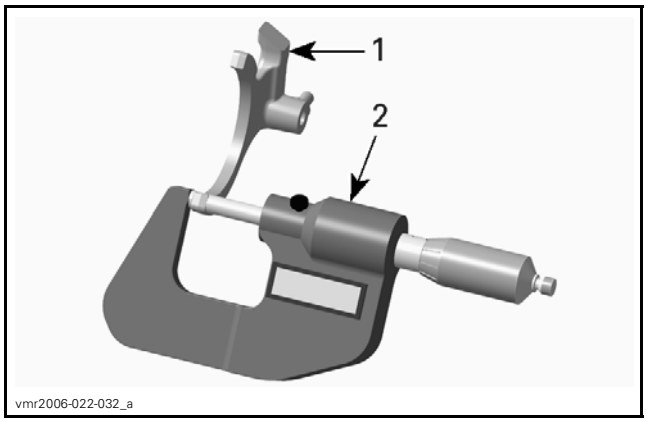
Measure the coupling sleeve groove width.



A. *Groove width*

COUPLING SLEEVE GROOVE WIDTH	
NEW	5.25 mm to 5.35 mm (.207 in to .211 in)
SERVICE LIMIT	5.50 mm (.217 in)

Check coupling fork claw thickness.



1. *Coupling fork*
2. *Micrometer*

COUPLING FORK CLAW THICKNESS	
NEW	4.95 mm to 5.05 mm (.195 in to .199 in)
SERVICE LIMIT	4.80 mm (.189 in)

Clean housing split surface and especially the bearing areas from metal particles or other contamination.

Installing the Output Shaft and Coupling Mechanism

The installation is the reverse of the removal procedure. However, pay attention to the following.

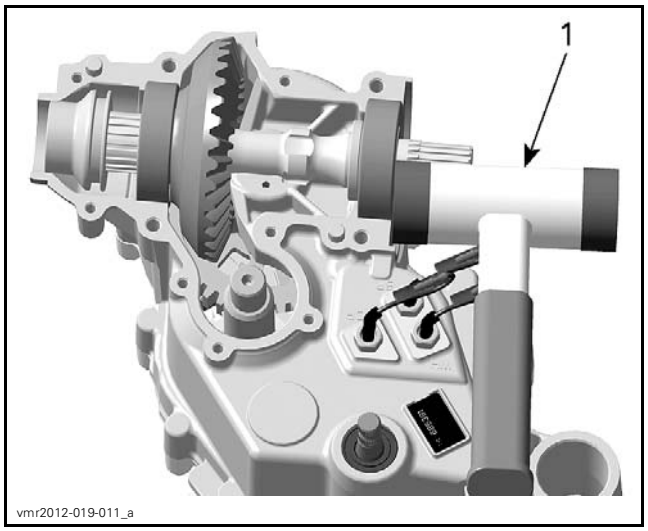
Install thrust washer, bearing, O-ring and coupling sleeve onto the output shaft.

Install distance ring, thrust washer and ball bearing.

NOTE: O-ring and distance sleeve are not installed at this time.

Place the output shaft into the center housing.

Use soft hammer to put bearing exactly in place against center housing.



1. Soft hammer

Clean the bearing cover location then attach bearing cover with oil seal to the housing.

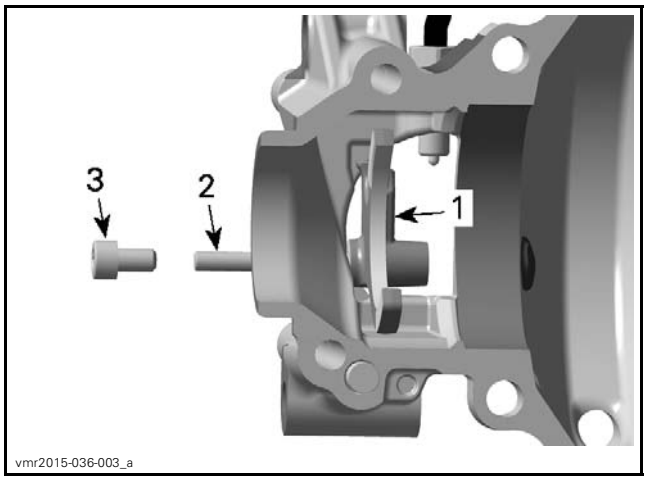
Temporarily install the right housing with the four (4) M8 TORX screws beside bearing seats.

NOTE: Prior to tightening the TORX screws, tap on the gear end of output shaft with a soft hammer to take up all gear free play.

Verify output shaft backlash. Refer to *OUTPUT SHAFT BACKLASH PROCEDURE* in this subsection. Adjust as required.

If backlash is within specifications, remove dial indicator, backlash measuring tool, bearing cover and right housing.

NOTE: Install coupling fork, pin and screw in right housing before applying sealant to the mating surface.



1. Coupling fork
2. Pin
3. Screw

Clean all metal components in a solvent.

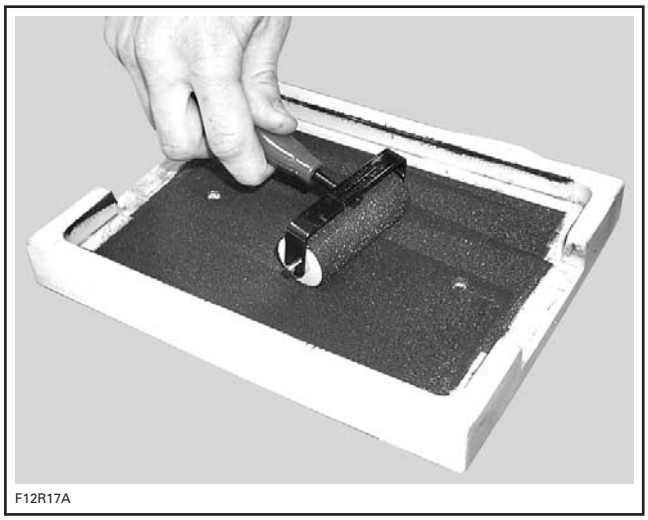
Housing mating surfaces are best cleaned using a combination of LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500) and a brass brush. Brush a first pass in one direction then make the final brushing perpendicularly (90°) to the first pass cross (hatch).

NOTICE **Do not wipe with rags. Use a new clean hand towel only.**

IMPORTANT: When beginning the application of sealant, the assembly and the first torquing should be done within 10 minutes. It is suggested to have all you need on hand to save time.

Use LOCTITE 5910 (P/N 293 800 081) on mating surfaces.

Use a plexiglass plate and apply some sealant on it. Use a soft rubber roller (50 - 75 mm (2 - 3 in)), available in arts products suppliers for printing, and roll the sealant to get a thin uniform coat on the plate (spread as necessary). When ready, apply the sealant on housing mating surfaces.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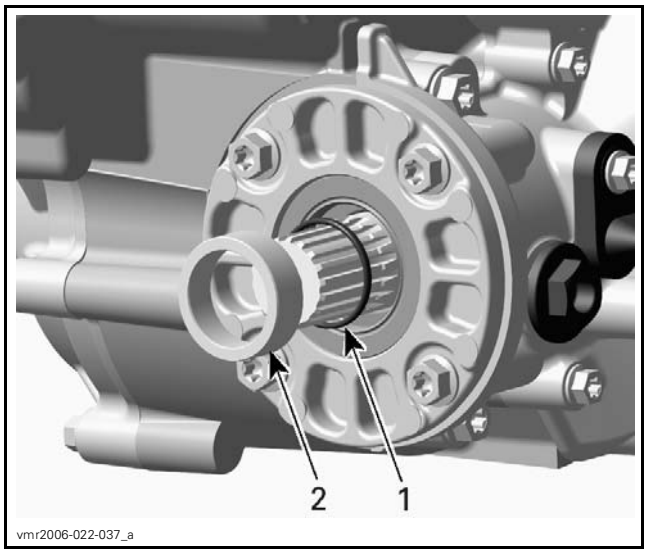
Do not apply in excess as it will spread out inside housings.

NOTE: It is recommended to apply this specific sealant as described here to get a uniform application without lumps. If you do not use the roller method, you may use your finger to uniformly distribute the sealant (using a finger will not affect the adhesion).

Install all other screws on right housing then the O-ring and the distance sleeve on end of output shaft. Chamfered bore of distance sleeve has to face the engine.



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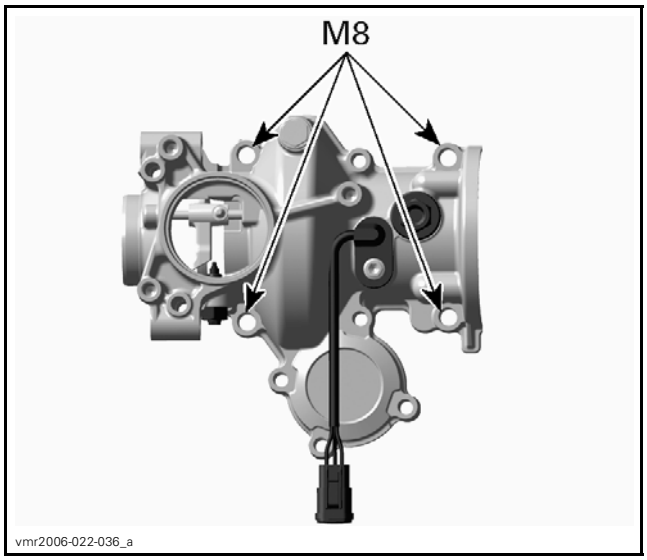
1. *O-ring*
2. *Distance sleeve*

NOTE: To install the right housing align the coupling fork with the groove in the coupling sleeve.

Torque the four (4) M8 Torx screws in a crisscross sequence to following specification.

TIGHTENING TORQUE		
Right housing M8 screws	Step A	Hand tightened
	Step B	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)



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Tighten all M6 Torx screws to specification

TIGHTENING TORQUE	
Right housing M6 screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Before installing bearing cover, apply LOCTITE 5910 (P/N 293 800 081) on the housing and SUPER LUBE GREASE (P/N 293 550 030) on oil seal.

Install the actuator, refer to *ACTUATOR* in this subsection.

Once this is done, complete final assembly.

GEARBOX

Removing the Gearbox

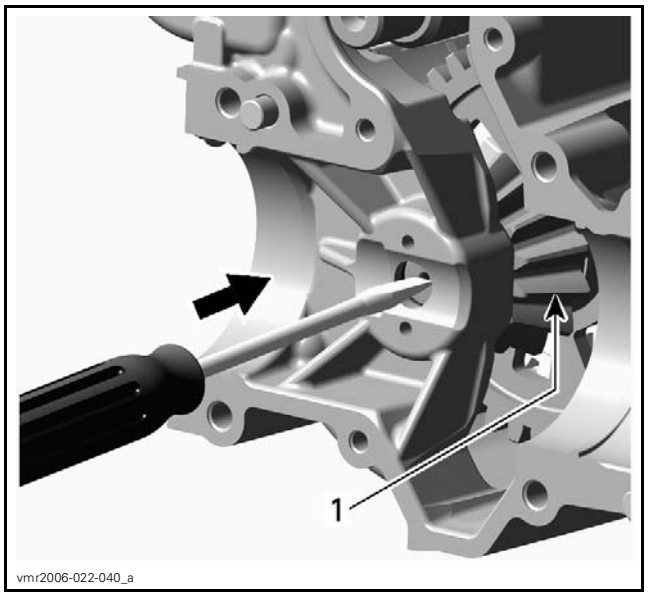
1. Remove engine from vehicle and place it on footrest support. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection for the procedure.
2. Drain gearbox. Refer to *GEARBOX OIL DRAINING PROCEDURE* in *PERIODIC MAINTENANCE PROCEDURES* subsection.
3. Remove drive and driven pulley and CVT air guide, refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection.
4. Unscrew the three (3) nuts that attach the gearbox to the engine.
5. Pull gearbox to separate it from engine.

Disassembling the Gearbox

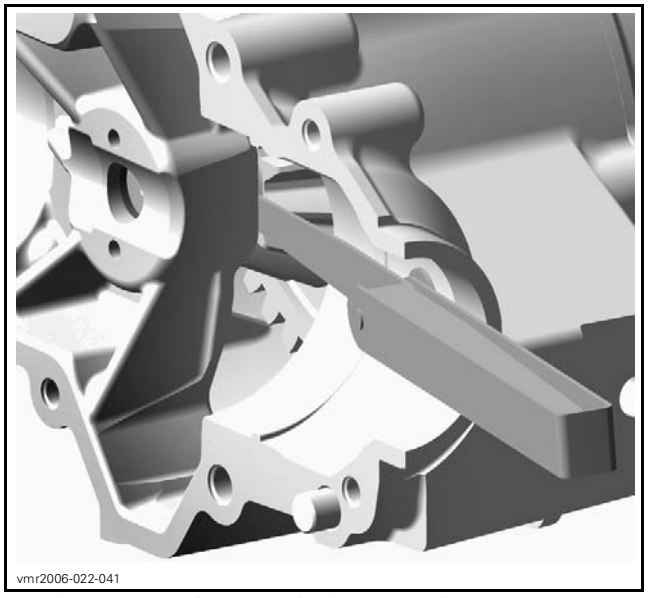
During gearbox disassembly, inspect the condition of each part closely.

1. Remove the output shaft. Refer to *OUTPUT SHAFT AND COUPLING MECHANISM* in this subsection.
2. Push bevel gear with a pin slightly down and measure the axial clearance of bevel gear with a feeler gauge.

NOTE: Bevel gear axial clearance must be measured before center and left housings separation.



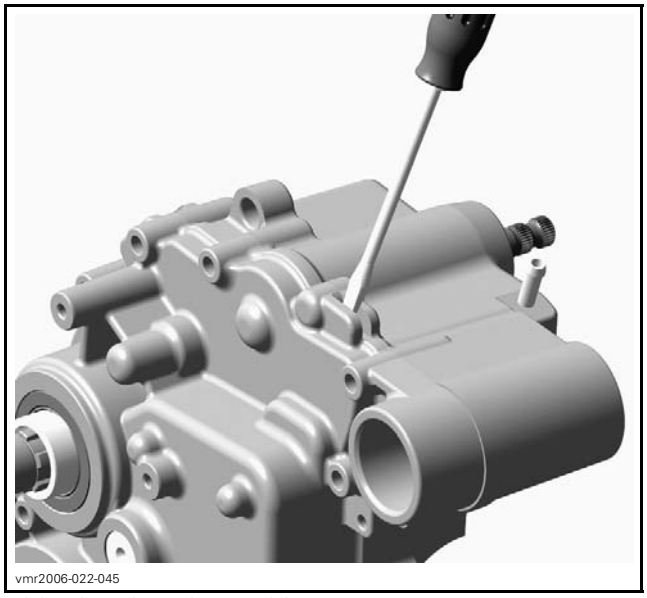
1. Bevel gear



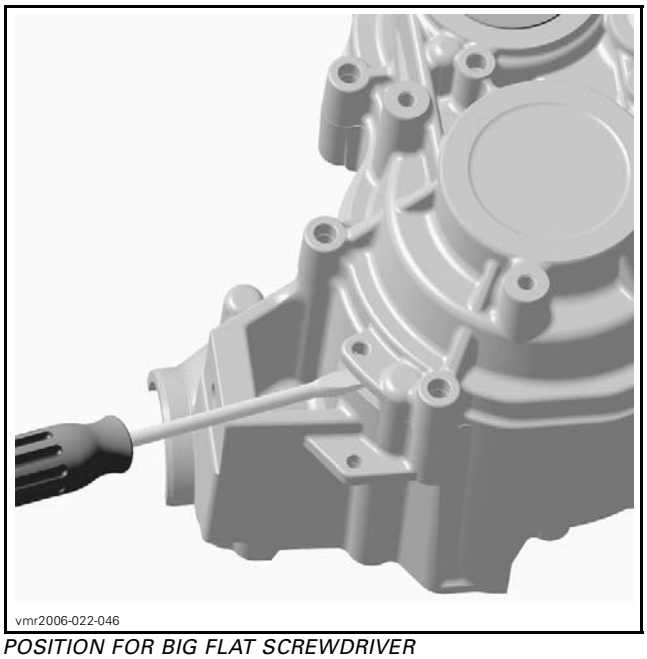
MEASURE AXIAL CLEARANCE OF BEVEL GEAR

BEVEL GEAR AXIAL CLEARANCE	
NEW	0.02 mm to 0.15 mm (.0008 in to .0059 in)
SERVICE LIMIT	0.19 mm (.0075 in)

3. Unscrew the left housing screws.
4. Place the left housing on a wood stand, center housing pointing upwards.
5. Using 2 big flat screwdrivers, lift the center housing.

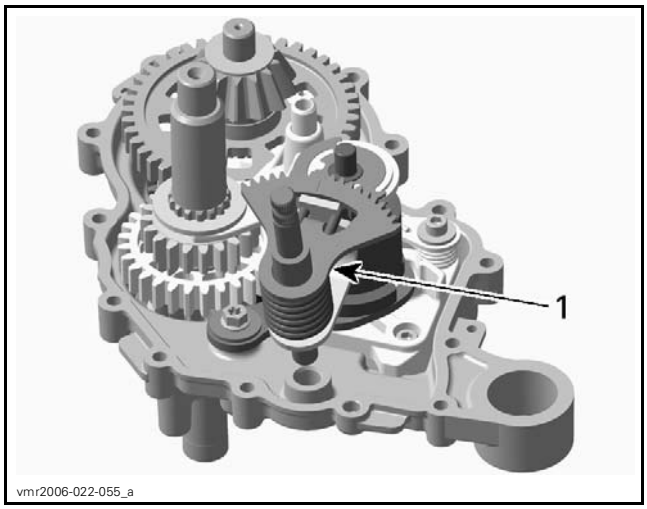


POSITION FOR BIG FLAT SCREWDRIVER



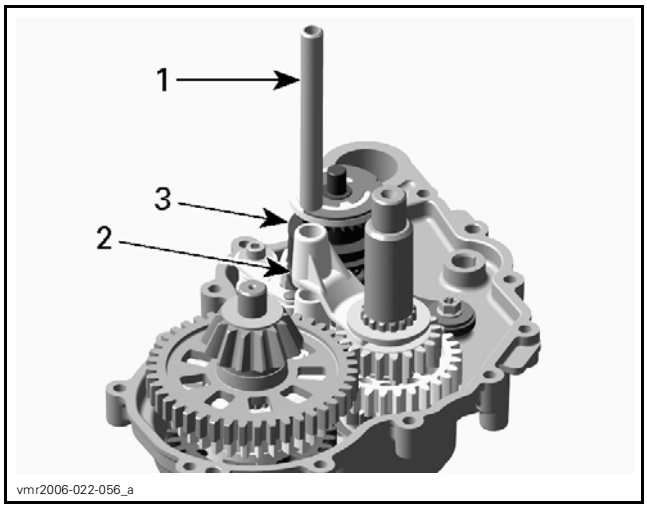
POSITION FOR BIG FLAT SCREWDRIVER

6. Remove center housing completely.
7. Remove shift shaft assembly.



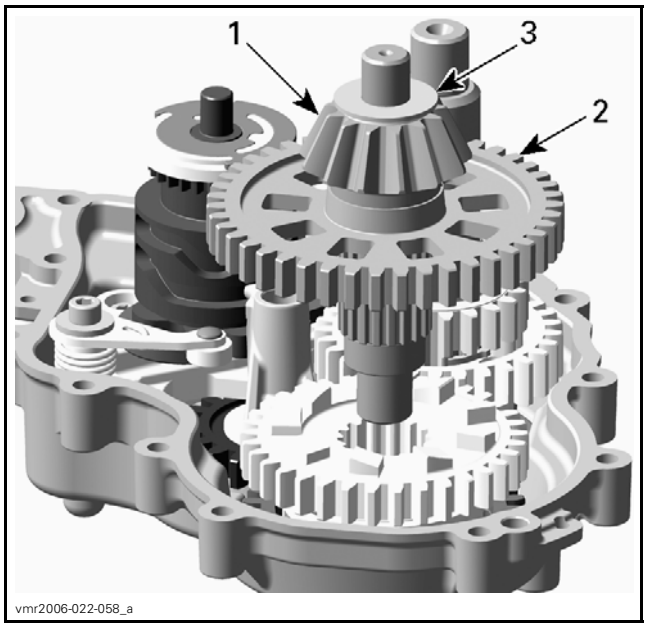
1. Shift shaft assembly

8. Remove shift fork shaft.
9. Disengage shift forks from shift drum and remove shift fork.



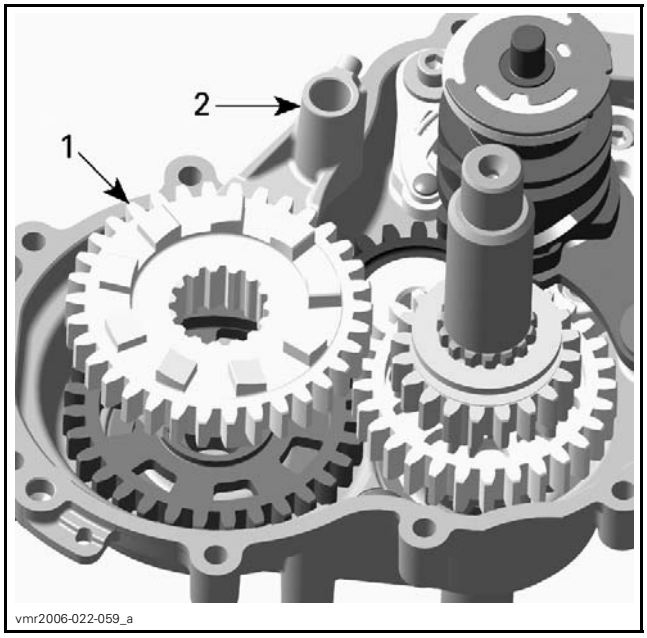
1. Shift fork shaft
2. Shift fork
3. Shift drum

10. Remove bevel gear shaft with low range gear assembly and shim.



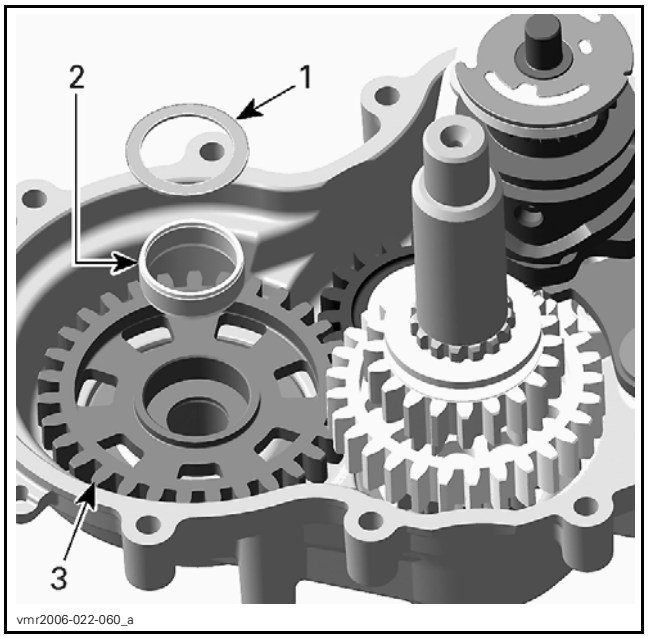
1. Bevel gear
2. Low range gear
3. Shim

11. Remove sliding gear with shift fork.



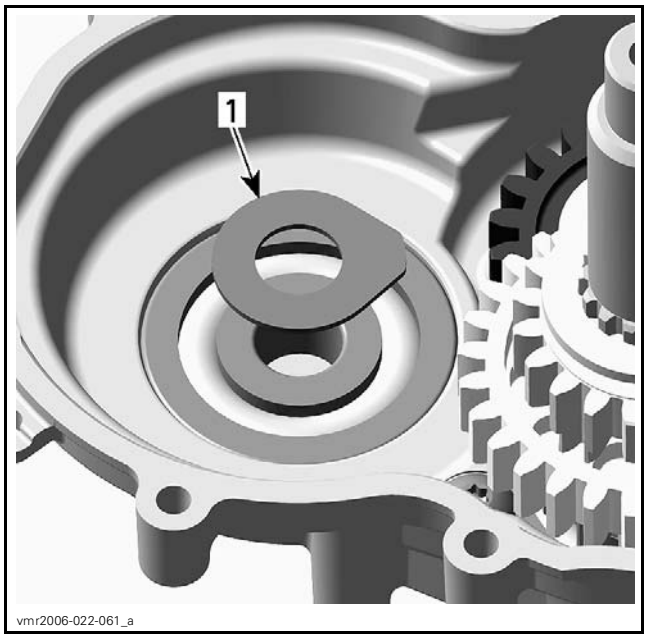
1. Sliding gear
2. Shift fork

12. Remove thrust washer, needle bearing and reverse gear.



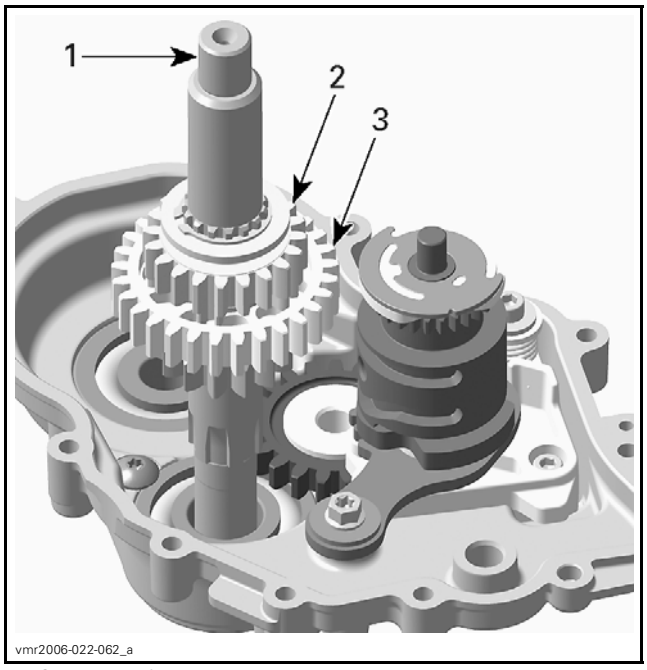
1. Thrust washer
2. Needle bearing
3. Reverse gear

13. Remove shim on CVT side.



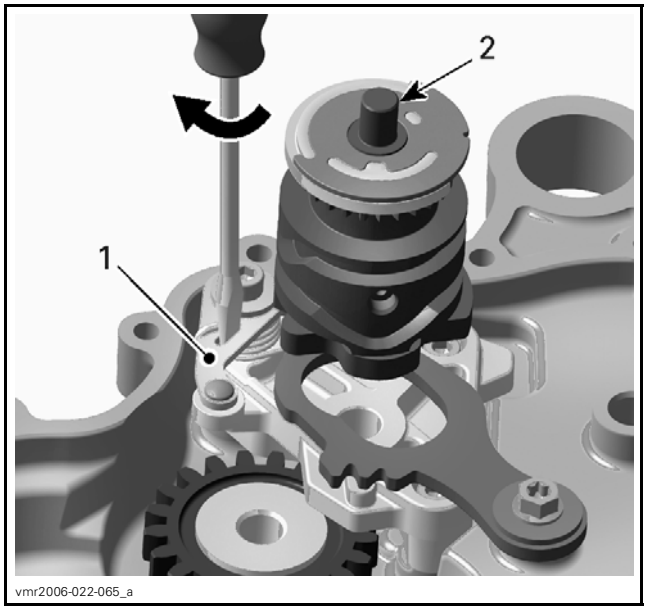
1. Shim on CVT side

14. Remove countershaft with low range gear and high range gear assembly.



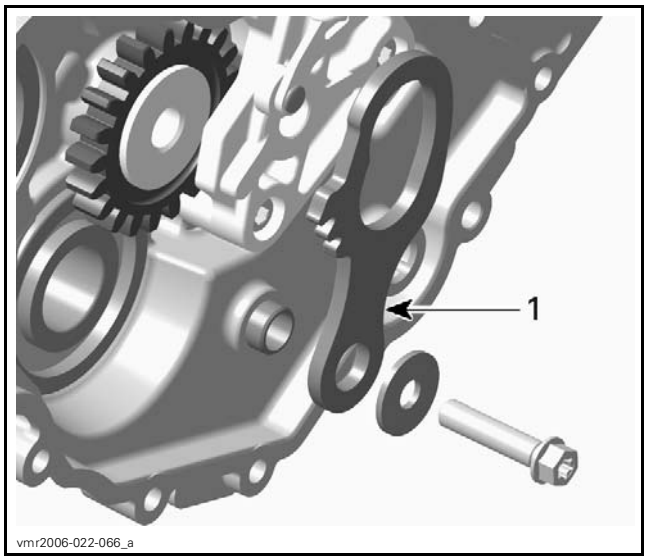
1. Countershaft
2. Low range gear
3. High range gear

15. Insert a flat screwdriver in the slot of index lever. Turn screwdriver clockwise and remove shift drum.



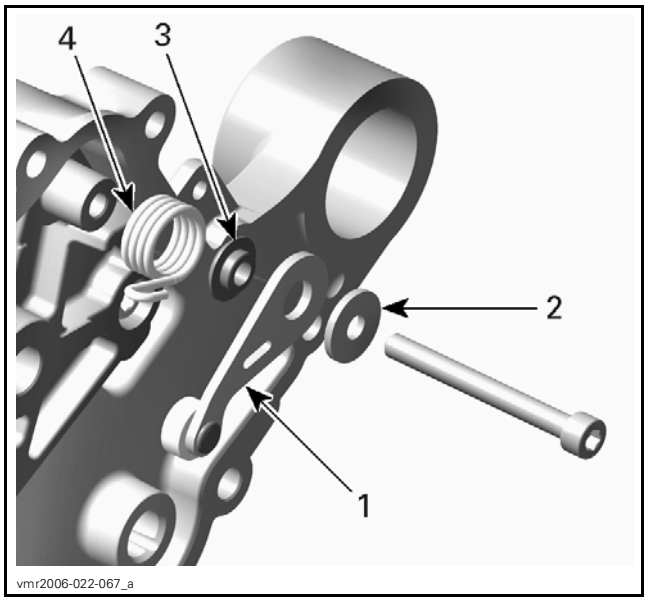
1. Index lever
2. Shift drum

16. Remove parking lock lever.



1. Parking lock lever

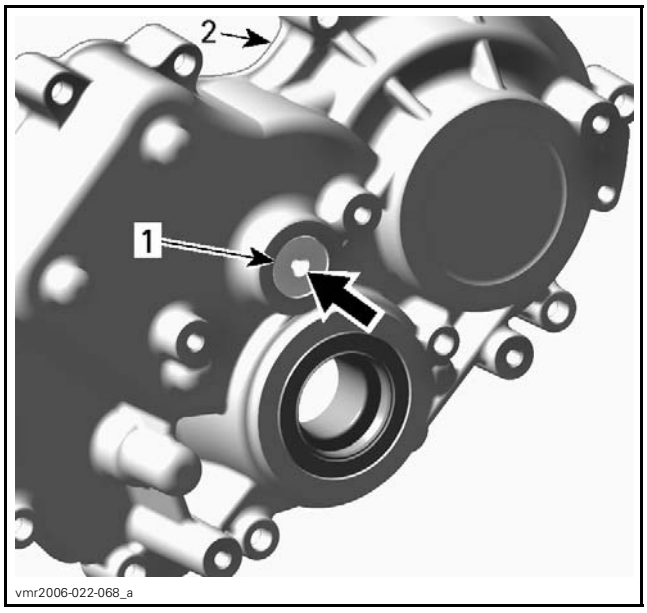
17. Remove index lever with washer, step ring and spring.



1. Index lever
2. Washer
3. Step ring
4. Index spring

18. Remove support flange.

NOTE: To remove intermediate gear and needle bearing, use a press bench to push out the intermediate gear shaft.



PRESS SHAFT IN THE DIRECTION AS SHOWN BY THE ARROW
1. Intermediate gear shaft
2. Left housing

Removing the Bearings

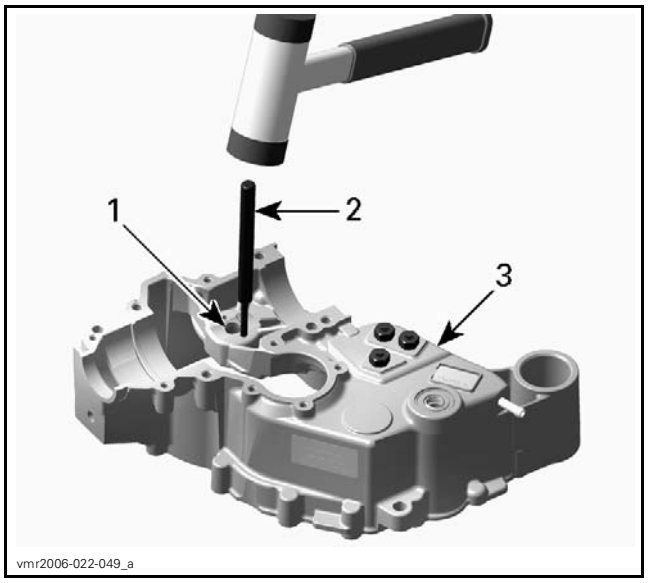
If necessary heat housing up to 100°C (212°F) before removing ball bearings or needle bearings.

⚠ WARNING

Clean oil, outside and inside, from housing before heating.

NOTICE **Always support gearbox housings properly when ball bearings or needle bearings are removed. Housing damages may occur if this procedure is not performed correctly.**

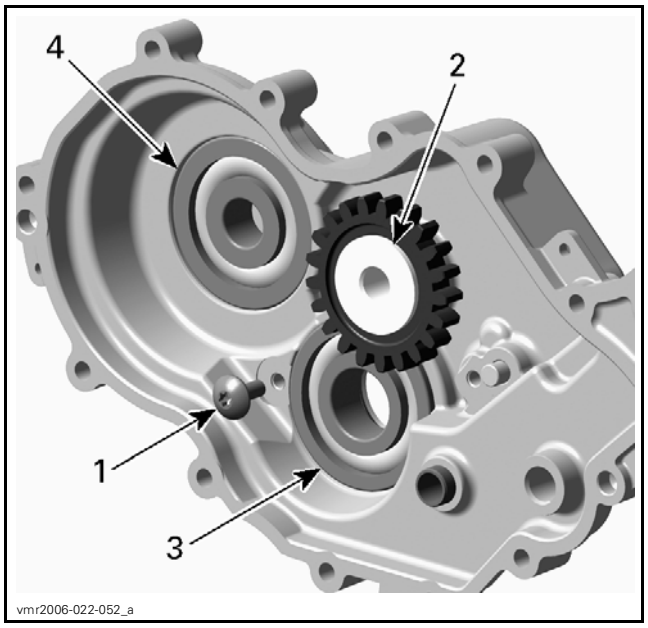
To remove bevel gear needle bearing use a punch.



1. Bevel gear needle bearing
2. Punch
3. Center housing

To remove ball bearings of bevel gear and needle bearing of countershaft, use a blind hole bearing puller.

For countershaft ball bearing, remove screw and intermediate gear shaft, then push with a suitable puller from outside in.



1. Screw
2. Intermediate gear shaft
3. Ball bearing countershaft
4. Bevel gear ball bearing

Inspecting the Gearbox

Always verify for the following when inspecting gearbox components:

– Gear teeth damage
– Worn or scoured bearing surfaces
– Worn or scoured shift fork
– Worn or scoured shift fork shaft
– Rounded engagement dogs and slots
– Bent shift forks
– Bent shift fork shaft
– Worn shift fork engagement pins
– Worn tracks on shift drum
– Worn shift fork engagement groove
– Worn splines on shafts and gears.

Bearings

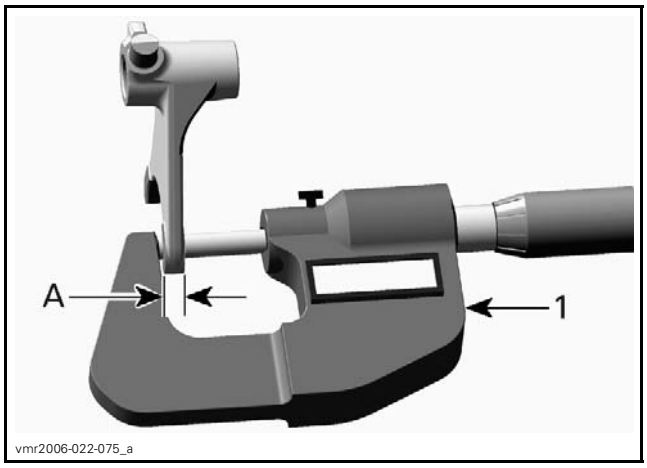
Check if ball bearings and needle bearings turn freely and smoothly.

Check all bearings, bearing points, tooth flanks, taper grooves and annular grooves. Annular grooves must have sharp edges.

Shift Forks

Check both shift forks for visible damage, wear or bent shift fork claws.

Measure the shift fork claw thickness.

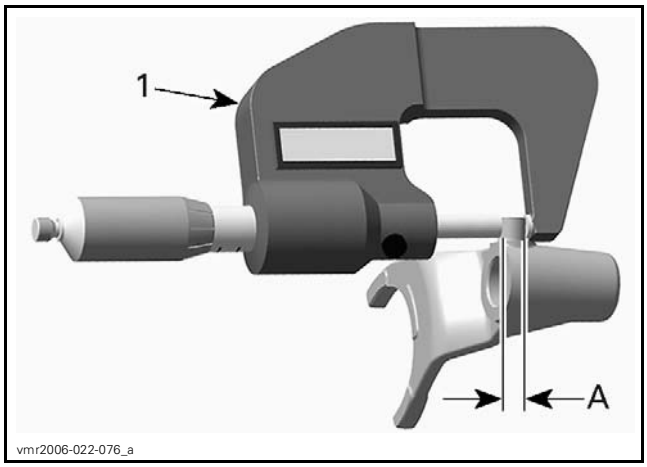


1. Micrometer
A. Shift fork claw thickness

SHIFT FORK CLAW THICKNESS (HIGH GEAR SHIFTING)	
NEW	4.80 mm to 4.90 mm (.189 in to .193 in)
SERVICE LIMIT	4.70 mm (.185 in)4.70 mm (.185 in)

SHIFT FORK CLAW THICKNESS (LOW/REVERSE GEAR SHIFTING)	
NEW	5.10 mm to 5.20 mm (.201 in to .205 in)
SERVICE LIMIT	5.00 mm (.197 in)

Measure shift fork pins.



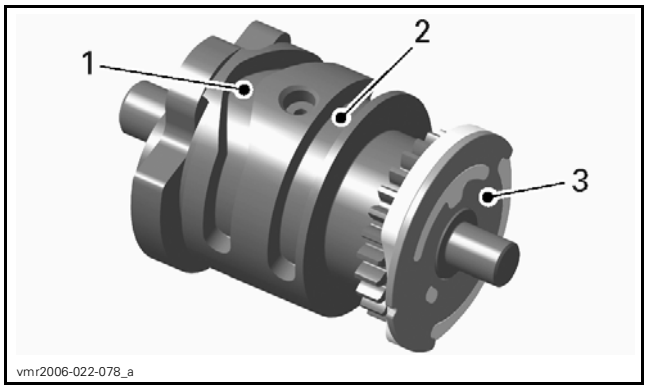
1. Micrometer
A. Shift fork pin diameter

SHIFT FORK PIN DIAMETER	
NEW	6.920 mm to 6.970 mm (.272 in to .274 in)
SERVICE LIMIT	6.850 mm (.27 in)

Shift Drum

Check shift drum tracks for scouring or heavy wear, like rounded engagement slots.

Replace isolating washer if there are signs of wear or visible damages.



1. Track for the low/reverse gear shift fork
2. Track for the high gear shift fork
3. Isolating washer on the shift drum

Levers

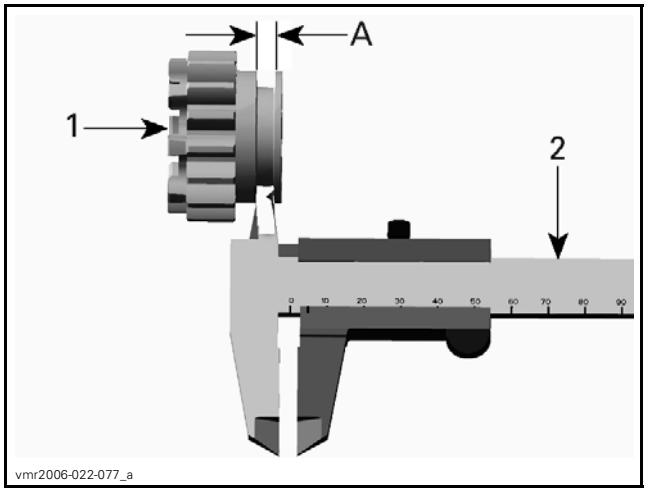
Check parking lever for cracks or other damages.

Index lever with roller must move freely.

Gears

NOTE: Replace gears only together with the corresponding meshing gears. Always replace circlips and use special pliers to install them.

Measure the width of shift fork engagement groove.

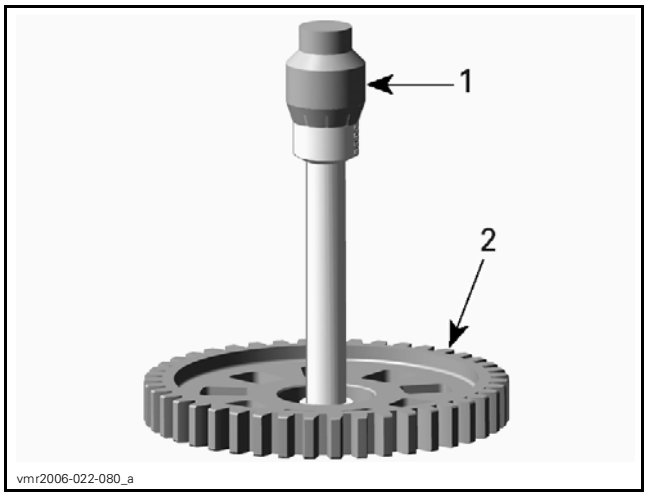


1. Main gear
2. Caliper
A. Width for engagement of shift fork

WIDTH OF SHIFT FORK ENGAGEMENT GROOVE (HIGH GEAR SHIFTING)	
NEW	5.00 mm to 5.10 mm (.197 in to .201 in)
SERVICE LIMIT	5.20 mm (.205 in)

WIDTH OF SHIFT FORK ENGAGEMENT GROOVE (LOW/REVERSE GEAR SHIFTING)	
NEW	5.30 mm to 5.40 mm (.209 in to .213 in)
SERVICE LIMIT	5.50 mm (.217 in)

Check free pinions for wear.



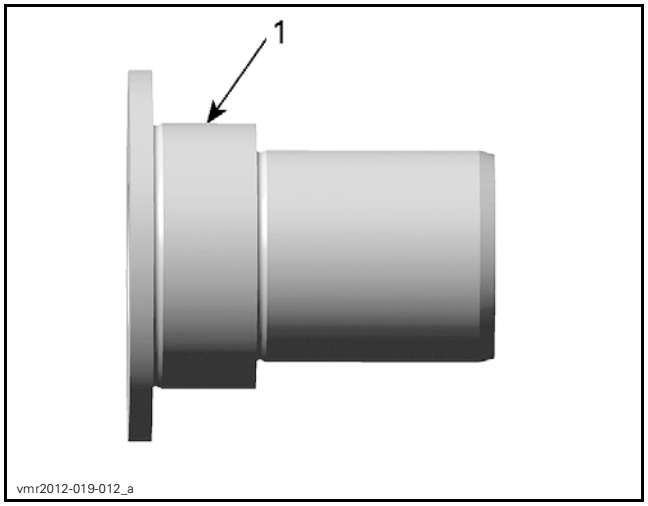
TYPICAL
1. *Micrometer*
2. *Free pinion*

DIAMETER FREE PINION	
NEW	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
SERVICE LIMIT	29.015 mm (1.1423 in)

Shafts

Check shift shaft for worn splines and gears.

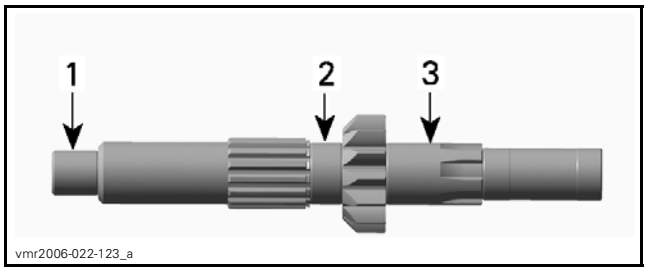
Check intermediate shaft for wear.



1. *Intermediate gear bearing*

INTERMEDIATE GEAR SHAFT	
NEW	24.979 mm to 25.000 mm (.9834 in to .9843 in)
SERVICE LIMIT	24.977 mm (.9833 in)

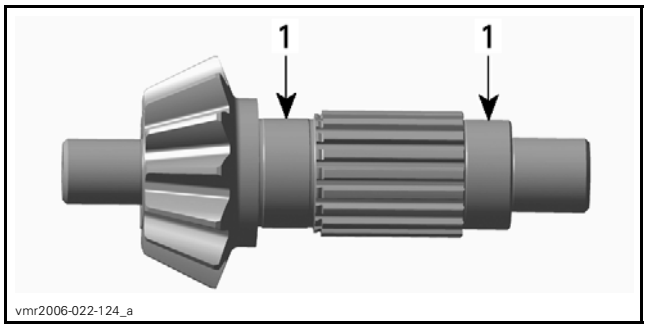
Check countershaft for wear.



1. *MAG side*
2. *Free pinion bearing*
3. *CVT side*

COUNTERSHAFT	
SERVICE LIMIT	
MAG SIDE	17.990 mm (.7083 in)
FREE PINION BEARING	24.970 mm (.9831 in)
CVT SIDE	24.970 mm (.9831 in)

Check bevel gear shaft.

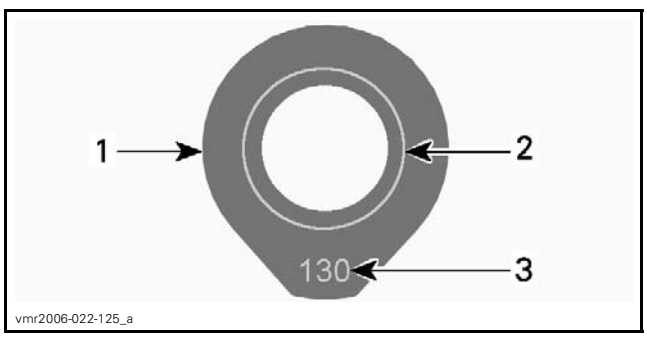


1. *Free pinion bearings*

BEVEL GEAR SHAFT	
SERVICE LIMIT	
FREE PINION BEARING	24.984 mm (.9836 in)

Shims

Always replace shim by a new one with the same thickness, when reassembling the gearbox with existing output shaft and bevel gear shaft.



1. *Shim for adjusting the bevel gear on center housing side*
2. *Area where wear signs appear*
3. *Thickness of the shim*

Adjusting the Gearbox

Bevel Gear

NOTE: Only necessary if the backlash and axial clearance of the bevel gear is out of specification or if parts are changed (output shaft, bevel gear shaft or housing).

There are 2 adjustments to perform on the bevel gear.

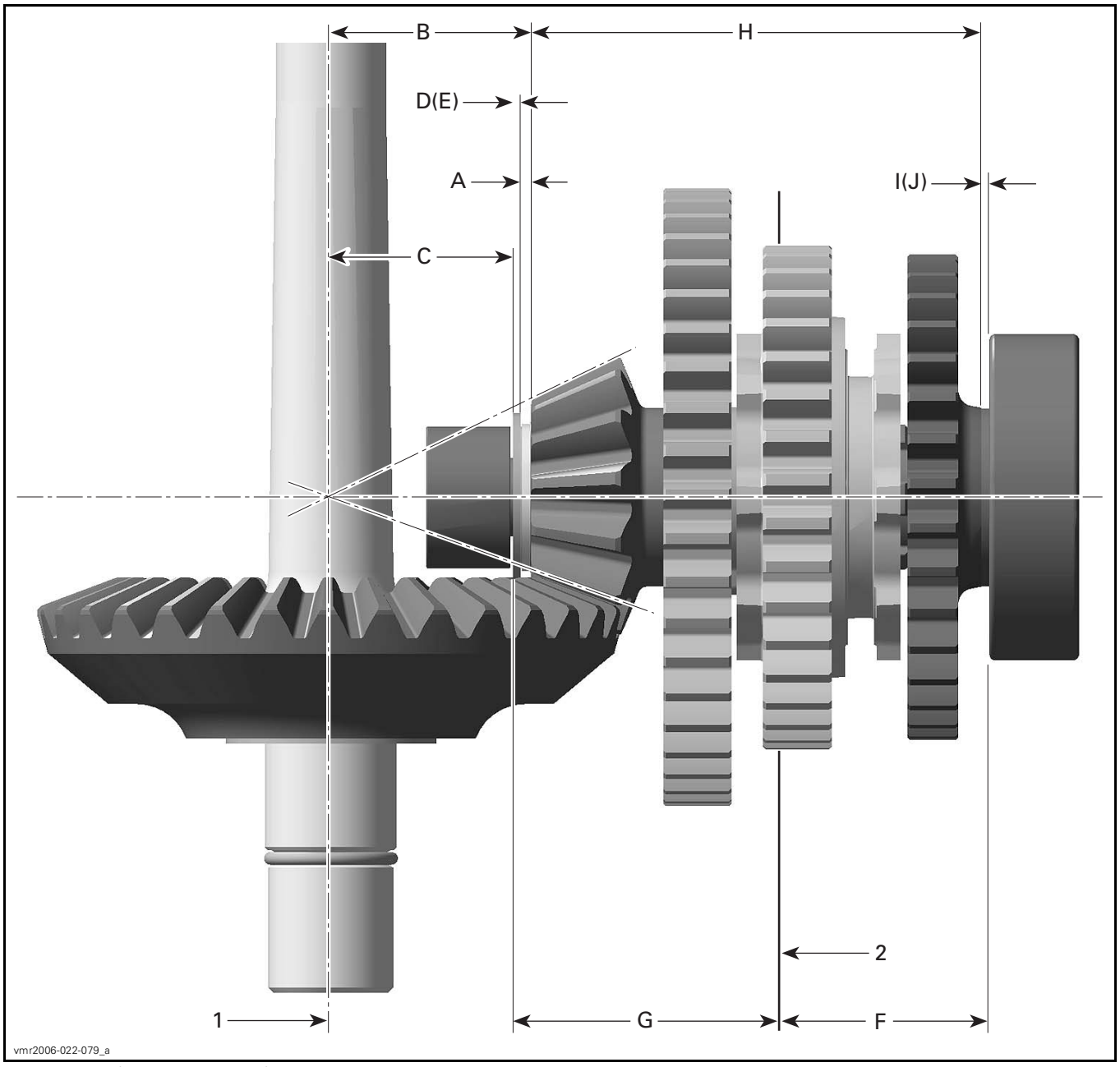
– Bevel gear backlash on center housing
– Bevel gear axial clearance on left housing.

The bevel gear backlash is adjusted by finding the proper shim thickness E as per following illustration.

The bevel gear axial clearance is adjusted by finding the proper shim thickness J as per following illustration.

Clean mating surface of housing before taking measurements using a combination of LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500) and a brass brush. Brush a first pass in one direction then make the final brushing perpendicularly (90°) to the first pass cross (hatch).

NOTICE Do not wipe with rags. Use a new clean hand towel only.



1. Mating surface — output shaft
2. Mating surface — left housing

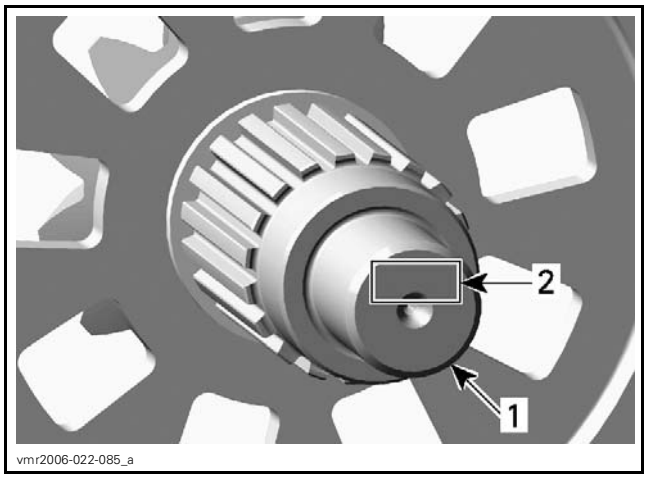
Bevel Gear Backlash Procedure

Use the following course of calculation to determine the theoretical shim thickness D:

D = B - C - A

B = The distance between the thrust surface of the bevel gear and the theoretical center of its taper. This is defined by manufacturer and is written on the bevel gear shaft.

This bevel gear reference number could be between - 10 and + 10.



1. Bevel gear
2. Bevel gear reference number

Use following formula to find out value B.

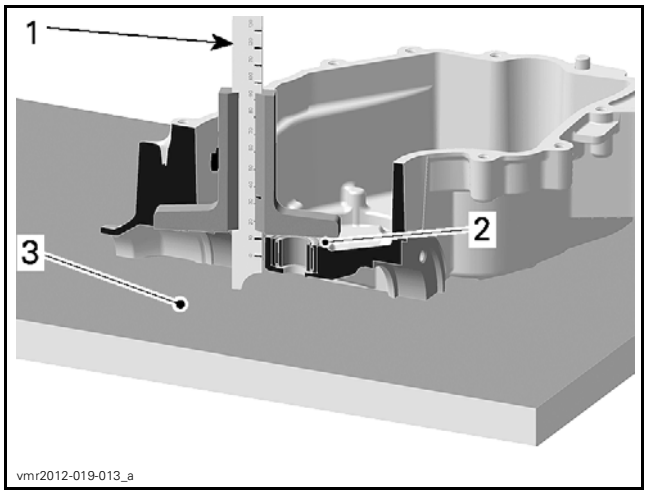
$$B = \left(\frac{\text{Bevel gear reference number}}{100}\right) + 37.8$$

For example: bevel gear reference number = - 3.

B = (- 3/100) + 37.8 = 37.77

C = Distance between the shim thrust surface in the center housing and the mating surface to right housing.

NOTE: For a better understanding following illustration is made as a cutaway.



1. Deep gauge — measurement **C**
2. Shim surface in center housing
3. Mating surface to right housing

A = 2 mm (.0787 in) nominal thickness of axial needle bearing.

When the measurements are taken, calculate the theoretical shim thickness (D) using the formula: (D = B - C - A).

Take the obtained theoretical shim thickness (D) and choose the corresponding shim number (E) according to the following table.

THEORETICAL SHIM THICKNESS -D-	SHIM NUMBER -E-
1.20 mm to 1.29 mm (.0472 in to .0508 in)	120
1.30 mm to 1.39 mm (.0512 in to .0547 in)	130
1.40 mm to 1.49 mm (.0551 in to .0587 in)	140
1.50 mm to 1.59 mm (.0591 in to .0626 in)	150
1.60 mm to 1.69 mm (.063 in to .0665 in)	160
1.70 mm to 1.79 mm (.0669 in to .0705 in)	170
1.80 mm to 1.89 mm (.0709 in to .0744 in)	180

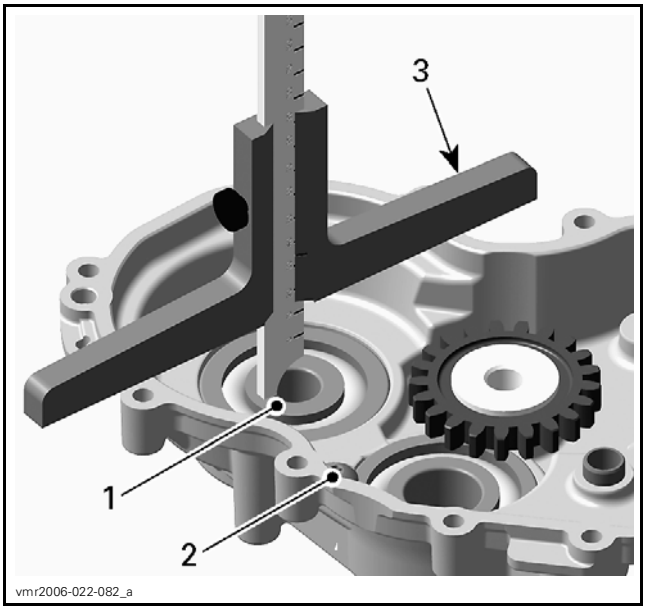
NOTE: For example, if the theoretical shim thickness (D) is 1.53 mm (.0602 in), choose the corresponding shim number 150 (E). The shim number 150 represents a nominal value equal to 1.50 mm (.0591 in).

Bevel Gear Axial Clearance Procedure

Use the following course of calculation to determine the theoretical shim thickness (I):

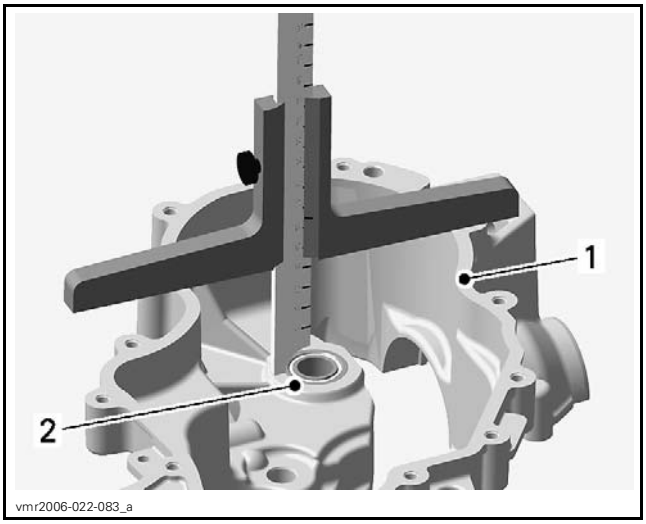
I = F + G - H - A - E

F = Distance between mating surface of left housing to ball bearing inner race.



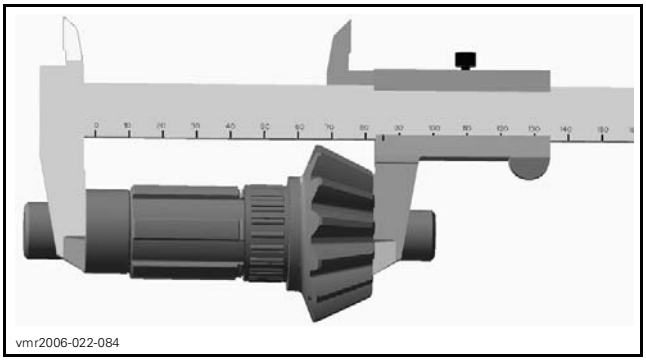
1. *Ball bearing inner race*
2. *Mating surface of left housing*
3. *Depth gauge*

G = Distance between mating surface of center housing and shim surface.



1. *Mating surface of center gear housing*
2. *Shim surface*

H = Distance between thrust surfaces of bevel gear shaft.



A = 2 mm (.0787 in) nominal thickness of axial needle bearing.

E = The shim number nominal value as found in the *BEVEL GEAR BACKLASH PROCEDURE*. For example, shim number 150 represents a value of 1.50 mm (.0591 in).

When the measurements are taken, calculate the theoretical shim thickness (I) using the formula: (I = F + G - H - A - E).

Take the obtained theoretical shim thickness (I) and choose the corresponding shim number (J) according to the following table.

THEORETICAL SHIM THICKNESS -I-	SHIM NUMBER -J-
1.22 mm to 1.31 mm (.048 in to .0516 in)	120
1.32 mm to 1.41 mm (.052 in to .0555 in)	130
1.42 mm to 1.51 mm (.0559 in to .0594 in)	140
1.52 mm to 1.61 mm (.0598 in to .0634 in)	150
1.62 mm to 1.71 mm (.0638 in to .0673 in)	160
1.72 mm to 1.81 mm (.0677 in to .0713 in)	170
1.82 mm to 1.91 mm (.0717 in to .0752 in)	180

For example, if the theoretical shim thickness (I) is 1.53 mm (.0602 in), choose the corresponding shim number 150 (J).

Bevel gear axial clearance of 0.02 mm to 0.11 mm (.0008 in to .0043 in) is included in the above table.

Assembling the Gearbox

Reverse the disassembly procedure. However, pay attention to the following details.

Installing the Bearings

Unless otherwise instructed, never use hammer to install ball bearings or needle bearings. Use press machine only.

If necessary heat housings up to 100°C (212°F) before installing ball bearings or needle bearings.

⚠ WARNING

Clean oil, outside and inside, from housing before heating.

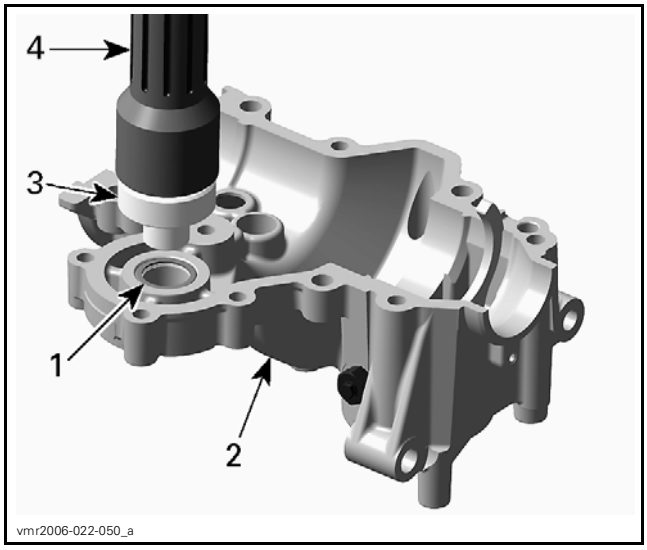
Place new bearing in freezer for 10 minutes before installation.

Use a suitable installer for installing ball bearings of countershaft and bevel gear.

NOTE: Place gearbox housings on a wood stand before installing ball bearings.

Install countershaft needle bearing in right housing.

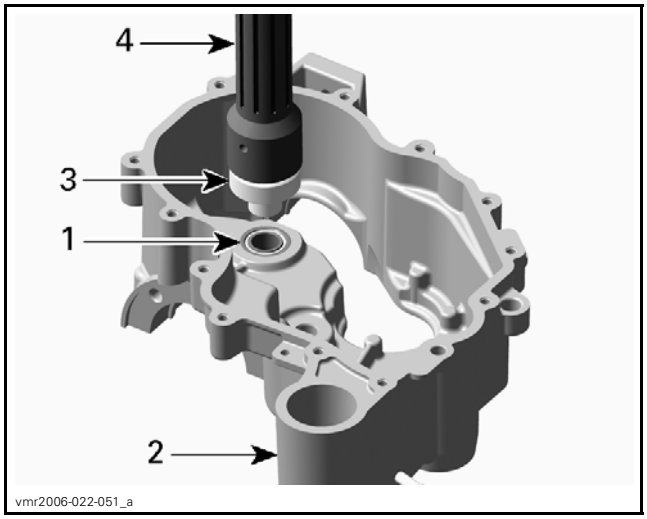
REQUIRED TOOL	
BEARING INSTALLER (GEARBOX) (P/N 529 035 762)	
HANDLE (P/N 420 877 650)	



1. *Countershaft needle bearing*
2. *Right housing*
3. *Needle bearing installer*
4. *Installer handle*

Install bevel gear needle bearing.

REQUIRED TOOL	
BEARING INSTALLER (GEARBOX) (P/N 529 035 763)	
HANDLE (P/N 420 877 650)	



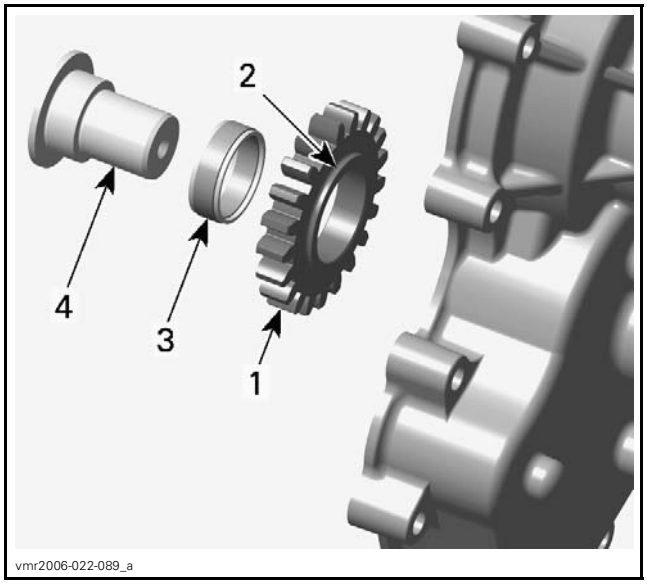
1. *Bevel gear needle bearing*
2. *Center housing*
3. *Needle bearing installer*
4. *Installer handle*

Install new oil seals with the proper installer (refer to *GEARBOX OIL SEALS* in this subsection).

Other Gearbox Components

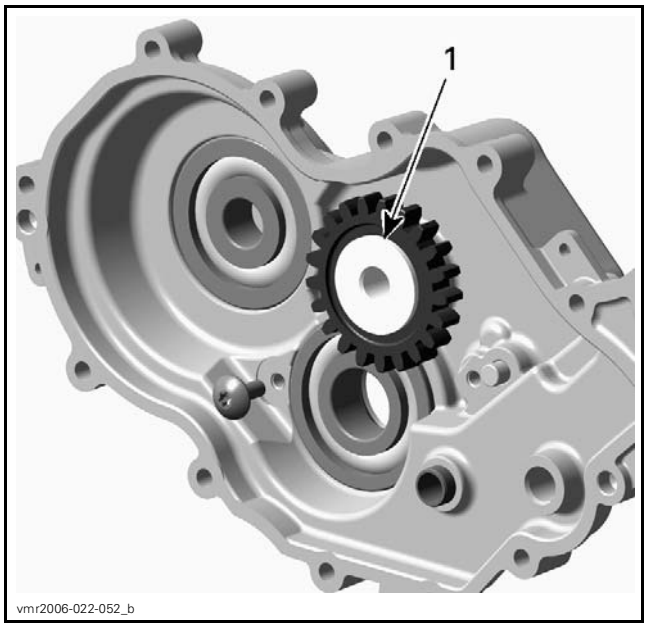
Fit intermediate gear with needle bearing on intermediate gear shaft.

NOTE: Fit gear with collar facing to housing side on the intermediate shaft.



1. *Intermediate gear*
2. *Collar facing housing*
3. *Needle bearing*
4. *Intermediate gear shaft*

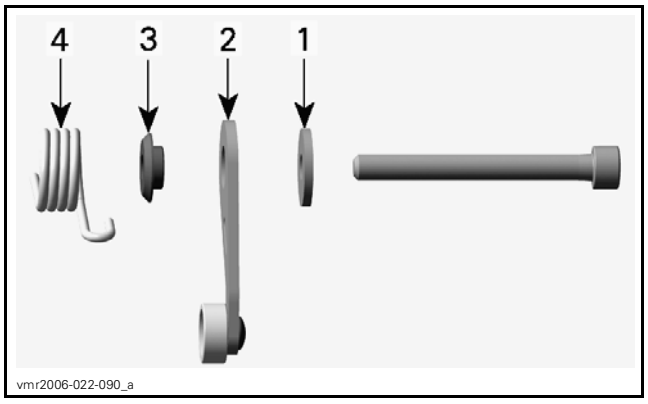
Press intermediate gear shaft in the left housing.



1. Intermediate gear shaft

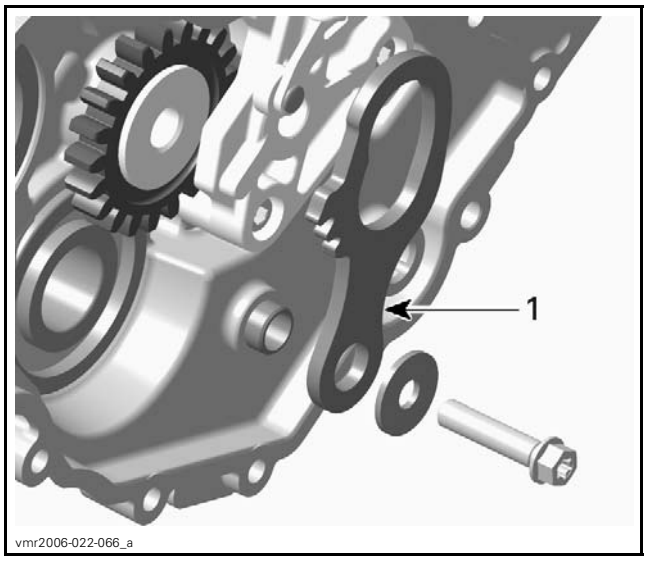
Fit support flange in the left housing and install index lever.

NOTE: Fit step ring into index lever.



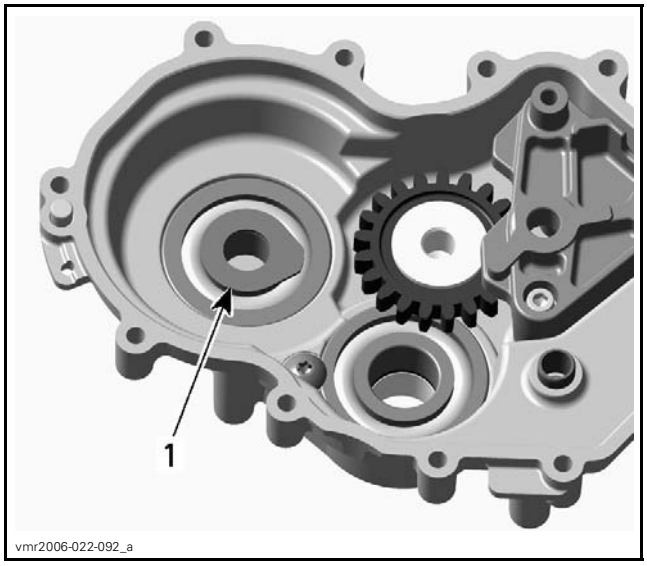
1. Washer
2. Index lever
3. Step ring
4. Index spring

Install parking lock lever, teeth showing to countershaft.



1. Parking lock lever

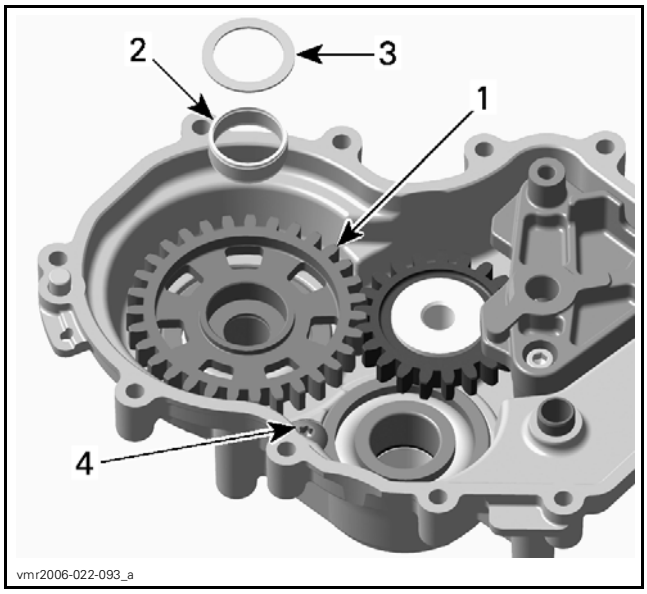
Place shim of CVT side on bearing.



1. Shim CVT side

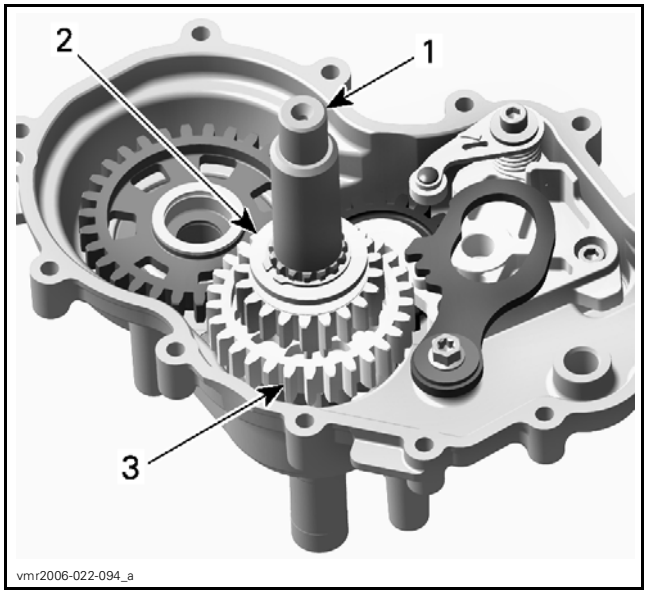
Place reverse gear with needle bearing and thrust washer.

NOTE: Check if the screw to secure countershaft bearing is installed.



1. *Reverse gear*
2. *Needle bearing*
3. *Thrust washer*
4. *Countershaft bearing screw*

Install countershaft with low gear and high gear assembly.

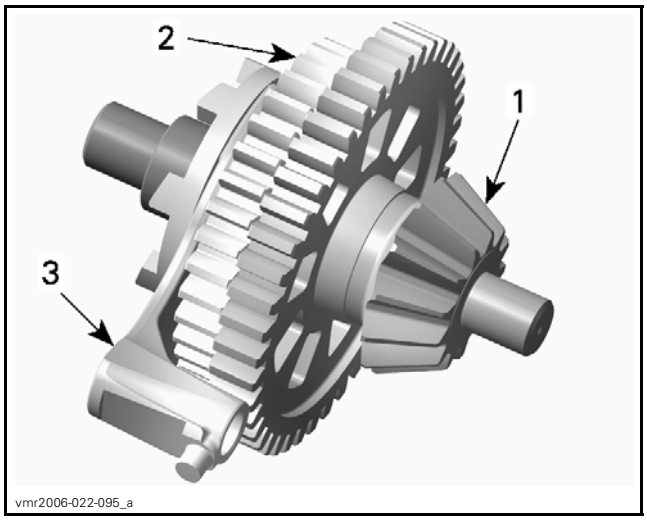


1. *Countershaft*
2. *Low gear*
3. *High gear*

Install a new shim onto bevel gear shaft, fork side.

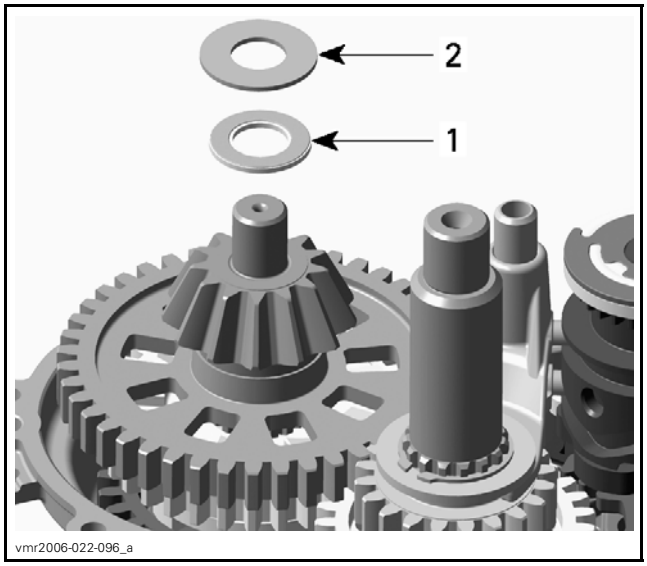
Install bevel gear with sliding gear assembly together with shift fork.

NOTE: If a new bevel gear and output shaft are used, it is necessary to verify the shim adjustment prior to finalize assembly. Refer to *ADJUSTMENT* in this subsection. If the existing bevel gear is used, it is mandatory to use a new shim with the same thickness, a new needle bearing and shim.



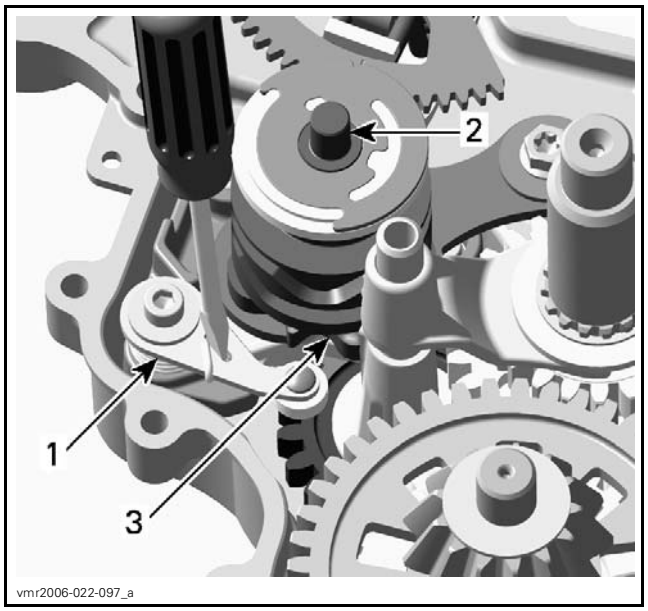
1. *Bevel gear*
2. *Sliding gear*
3. *Shift fork*

Install a new needle bearing and shim.

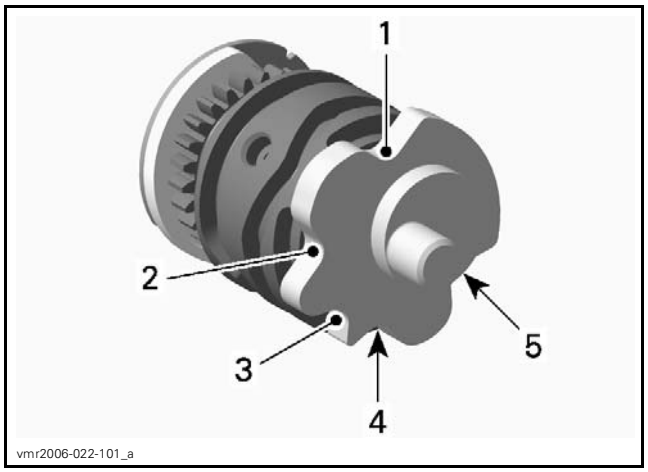


1. *Needle bearing*
2. *Shim*

Insert a flat screwdriver in the slot of the index lever, turn screwdriver clockwise and install shift drum on neutral position as per following illustration.



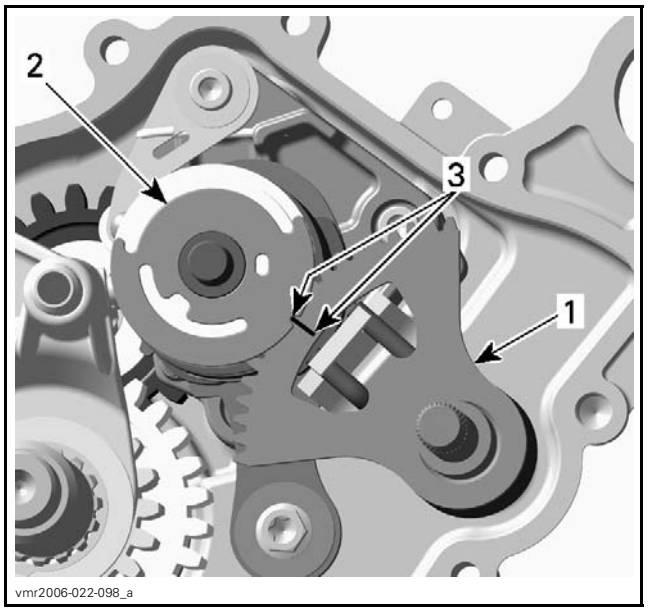
1. *Index lever*
2. *Shift drum*
3. *Neutral position*



1. *Parking stop location*
2. *Reverse stop location*
3. *Neutral stop location*
4. *High gear stop location*
5. *Low gear stop location*

Install shift shaft assembly.

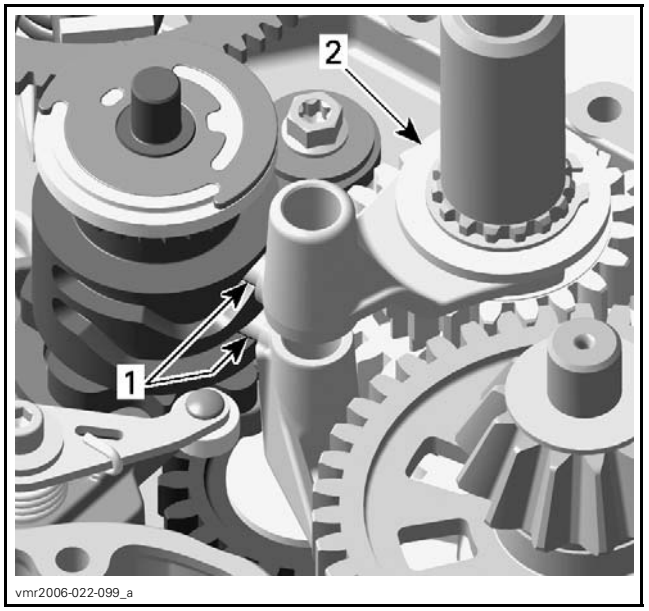
NOTE: Marks on shift drum/isolating washer and shift shaft must align.



1. *Shift shaft assembly*
2. *Isolating washer*
3. *Marks*

Install shift fork then engage both shift fork pins in their corresponding groove on the shift drum.

NOTE: Move sliding gears to facilitate engagement of pins inside grooves.



1. *Shift fork pins*
2. *Sliding gear*

Install shift fork shaft.

NOTE: Run all gears as a final function check before installing center housing.

Now, close the housings by doing the following:

Clean all metal components in a solvent.

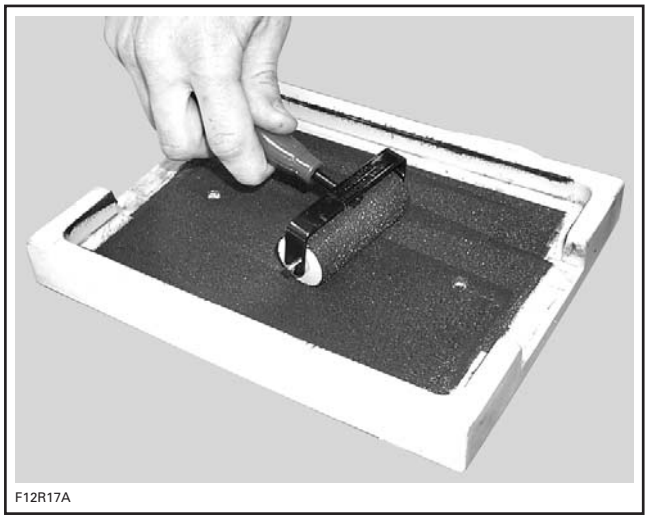
Gearbox housing mating surfaces are best cleaned using a combination of LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500) and a brass brush. Brush a first pass in one direction then make the final brushing perpendicularly (90°) to the first pass cross (hatch).

NOTICE **Do not wipe with rags. Use a new clean hand towel only.**

IMPORTANT: When beginning the application of the gear housing sealant, the assembly and the first torquing should be done within 10 minutes. It is suggested to have all you need on hand to save time.

Use LOCTITE 5910 (P/N 293 800 081) on mating surfaces.

Use a plexiglass plate and apply some sealant on it. Use a soft rubber roller (50 - 75 mm (2 - 3 in)), available in arts products suppliers for printing, and roll the sealant to get a thin uniform coat on the plate (spread as necessary). When ready, apply the sealant on gear housing mating surfaces.



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Do not apply in excess as it will spread out inside gear housing.

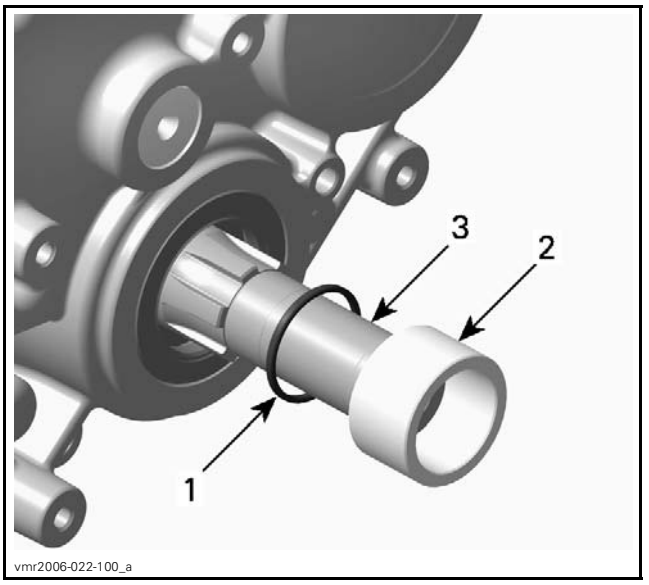
NOTE: It is recommended to apply this specific sealant as described here to get a uniform application without lumps. If you do not use the roller method, you may use your finger to uniformly distribute the sealant (using a finger will not affect the adhesion).

Tighten gear housing screws in a crisscross sequence.

TIGHTENING TORQUE		
Gear housing screws	Step A	Hand tightened
	Step B	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Install O-ring including distance sleeve on countershaft CVT side.

NOTICE **Place O-ring including distance sleeve right away. Chamfered bore of distance sleeve has to face the gearbox.**



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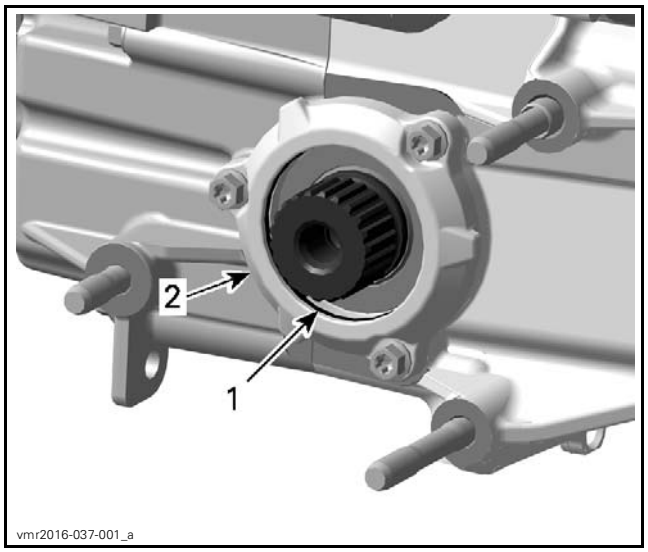
COUNTERSHAFT END CVT SIDE
1. *O-ring*
2. *Distance sleeve*
3. *Countershaft end CVT side*

Refer to *OUTPUT SHAFT AND COUPLING MECHANISM* to install these components. Measure the output shaft backlash.

Installing the Gearbox

The installation is the reverse of the removal procedure.

Before gearbox installation check O-ring in bearing cover if brittle, hard or damaged. Replace if necessary.



1. O-ring
2. Bearing cover

Tighten the three (3) nuts that attaching the gearbox to the engine.

TIGHTENING TORQUE	
Gearbox retaining nuts	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft) + LOCTITE 243 (BLUE) (P/N 293 800 060)

After installation refill gearbox oil, refer to *PERIODIC MAINTENANCE PROCEDURES*.

GEARBOX AND 4X4 COUPLING UNIT (WITH EXTERNAL SWITCHES)

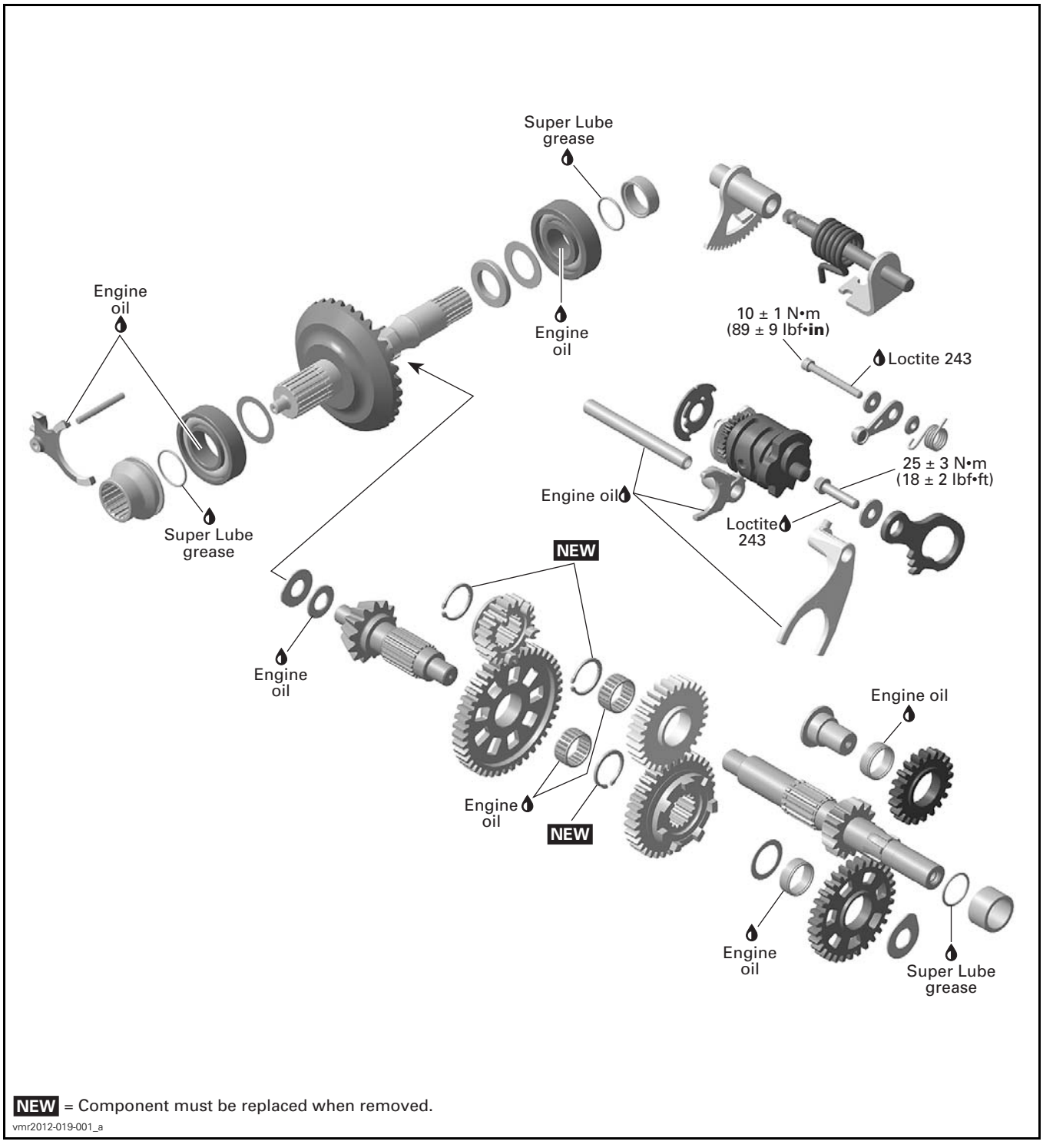
SERVICE TOOLS

Description	Part Number	Page
BACKLASH MEASUREMENT TOOL	529 036 030	13
BEARING INSTALLER (GEARBOX)	529 035 763	29
BEARING INSTALLER (GEARBOX)	529 035 762	29
COUNTERSHAFT OIL SEAL PUSHER	529 036 222	11
DRIVE SHAFT OIL SEAL INSTALLER	529 036 028	12
FLUKE 115 MULTIMETER	529 035 868	5
HANDLE	420 877 650	11, 29
OIL SEAL INSTALLER (GEARBOX)	529 035 758	11

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	34
LOCTITE 5910	293 800 081	8, 16–17, 33
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	16, 25, 33
PETAMO GREASE GHY 133N	420 899 271	10
SUPER LUBE GREASE	293 550 030	6, 9, 17

GEARBOX COMPONENTS AND 4X4 COUPLING MECHANISM



NEW = Component must be replaced when removed.

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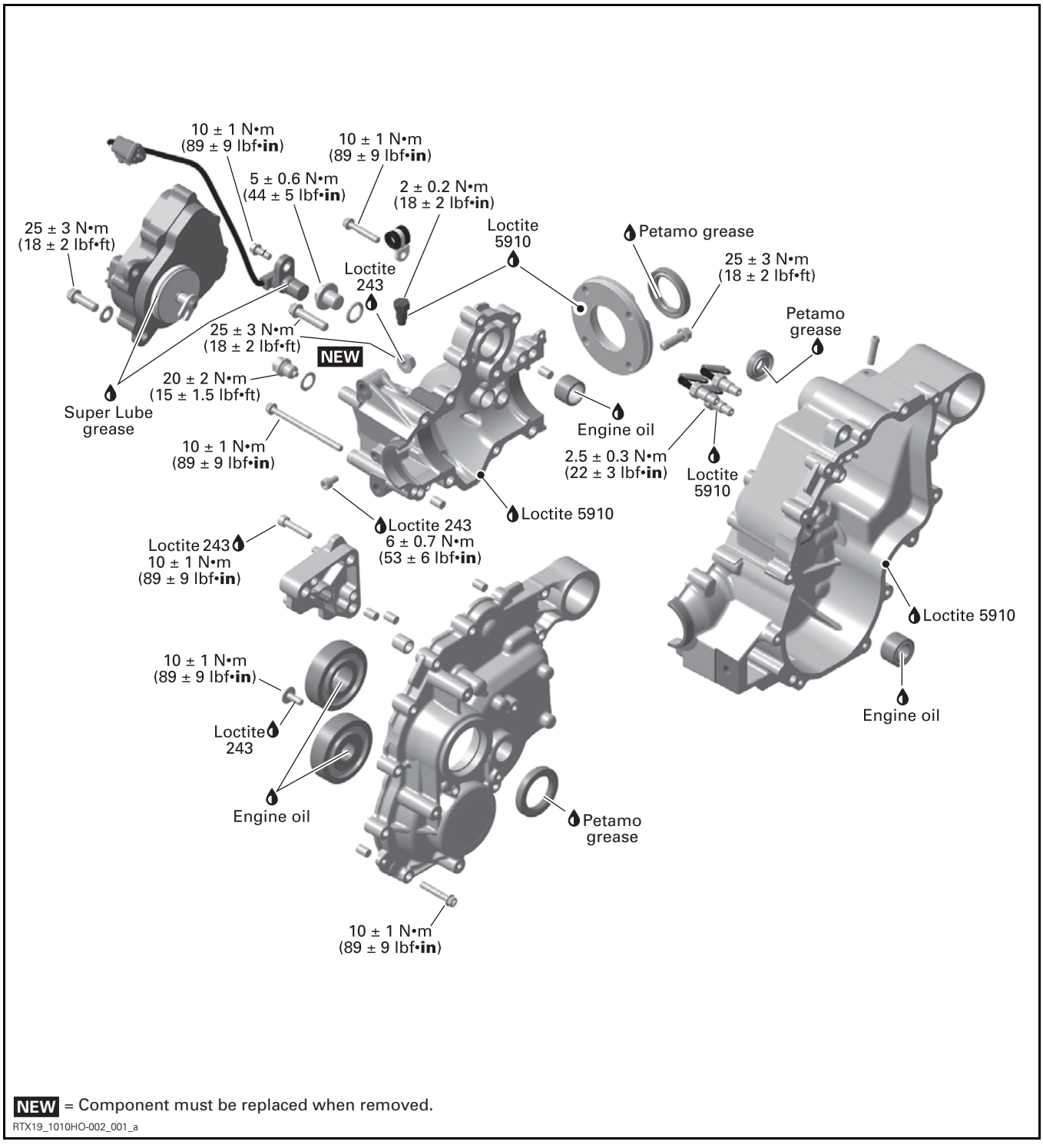
GEARBOX HOUSING AND 4X4 ACTUATOR UNIT



NEW = Component must be replaced when removed.

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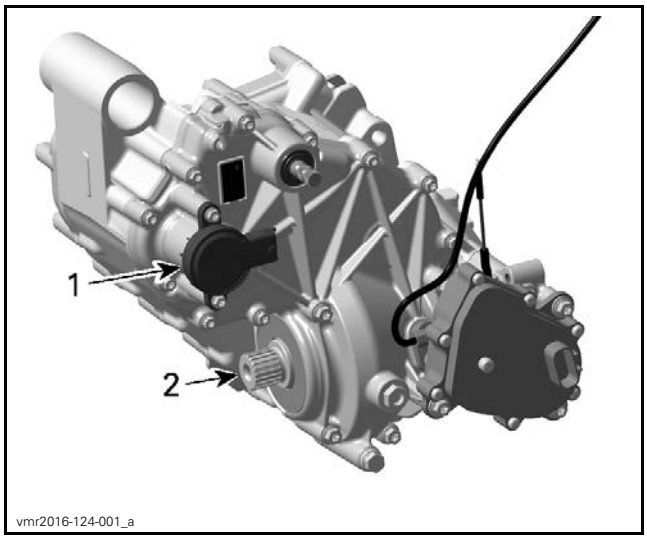
GENERAL

GEARBOX IDENTIFICATION

Gearbox with GBPS

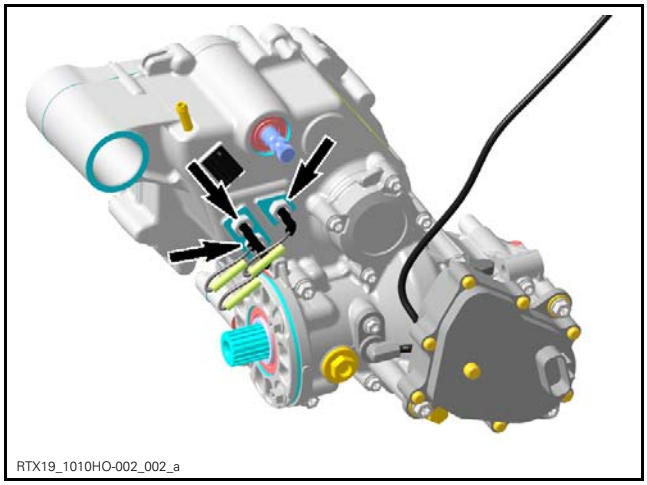
This gearbox is equipped with 1 gearbox position sensor.



GEARBOX, RIGHT HAND SIDE
1. *Gearbox position sensor*
2. *Output shaft*

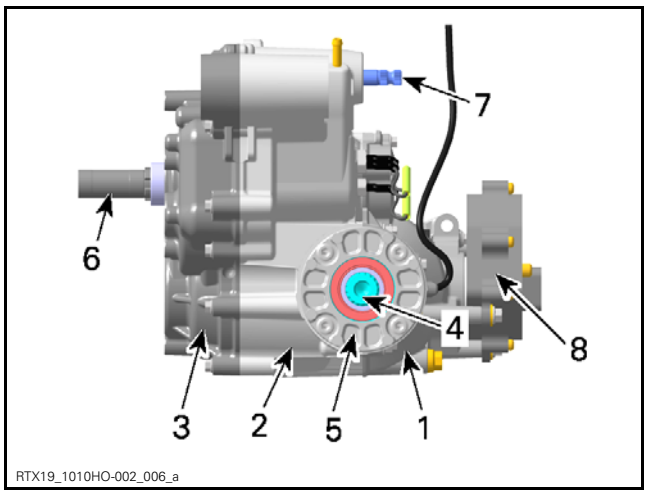
Gearbox with External Switches

This gearbox is equipped with 3 gearbox position indicator switches.



GEARBOX, RIGHT HAND SIDE

OVERVIEW



1. *Right housing*
2. *Center housing*
3. *Left housing*
4. *Output shaft*
5. *Bearing cover*
6. *Countershaft*
7. *Shift shaft*
8. *Actuator*

TROUBLESHOOTING

UNUSUAL GEARBOX NOISE AND/OR VIBRATIONS

1. Low oil level in gearbox.
   - *Oil leakage from gearbox. Replace damaged gasket(s) and/or oil seal(s).*
2. Defective bearings.
   - *Bearing(s) do(es) not turn smoothly. Replace bearing(s).*
3. Damaged or worn gears.
   - *Inspect gears for damages or missing teeth. Replace respective gears.*

GEAR INDICATION FAILS

1. Check contact screws on gear housing center.
   - *Contact(s) is (are) corroded and/or connectors to wiring harness got loose.*
   - *Damaged wires. Repair as required.*
   - *Shifting indicator switch(es) pin(s) is (are) worn and/or damaged. Replace shifting indicator switch(es).*

GEAR(S) IS (ARE) HARD TO SHIFT

1. Incorrect shift rod adjustment.
   - *Adjust shift rod (refer to SHIFT ROD in SHIFTER subsection).*

4 WHEEL DRIVE DOES NOT ENGAGE OR DISENGAGE

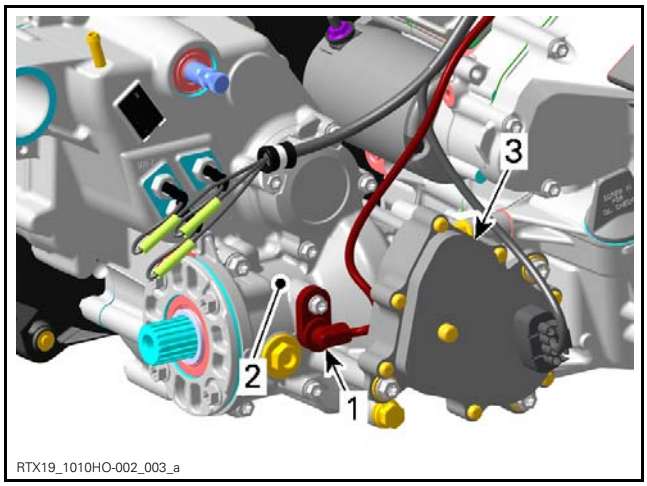
1. Defective actuator.
   - *Test actuator.*
2. Damaged or worn shifting fork or sleeve.
   - *Remove actuator and inspect shifting fork and sleeve.*

PROCEDURES

VEHICLE SPEED SENSOR (VSS)

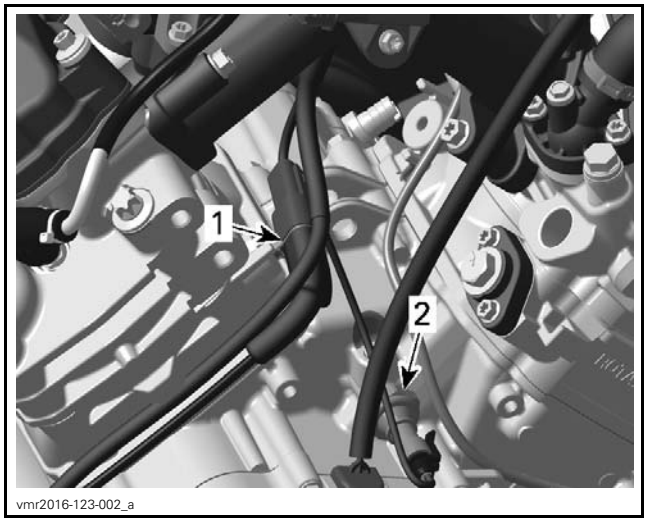
VSS Location

The vehicle speed sensor is located on the right housing of the gearbox behind the actuator.



1. *VSS (Vehicle Speed Sensor)*
2. *Right housing of gearbox*
3. *Actuator*

The VSS connector is located between the cylinders, behind the OPS cover.



1. *VSS connector*
2. *OPS (Oil Pressure Switch)*

VSS Wire Identification

FUNCTION	PIN - SENSOR CONNECTOR	PIN - WIRING HARNESS CONNECTOR
12-volt input from fuse F5	A	1
Speed signal (to ECM pin E1)	B	2
Ground (to ECM pin D4)	C	3

VSS Circuit Protection

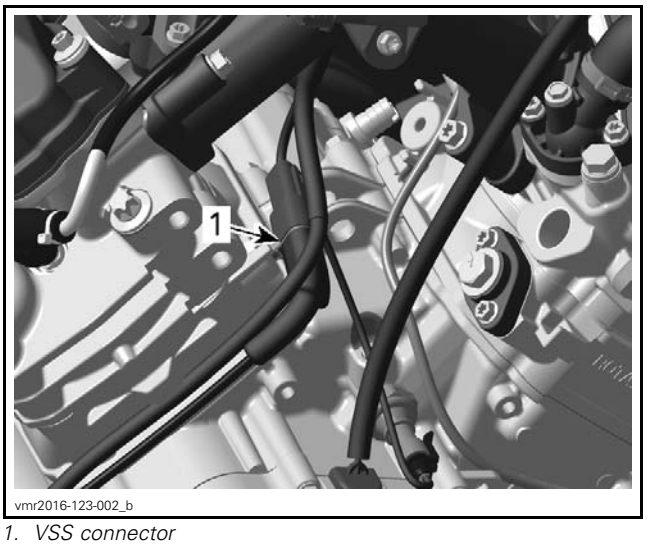
CONDITION	CIRCUIT PROTECTION
Supplied with main relay activated	Fuse 5

Testing the VSS Input Voltage

1. Remove VSS connector cover.
2. Set multimeter to Vdc.

REQUIRED TOOL
FLUKE 115 MULTIMETER (P/N 529 035 868)
Rigid back-probe

3. Turn ignition switch ON.
4. Set emergency engine stop switch to RUN.
5. Back-probe the VSS connector.



1. *VSS connector*

6. Measure voltage as per following table.

VEHICLE SPEED SENSOR INPUT VOLTAGE TEST		
TEST PROBES		MEASUREMENT (KEY ON)
PIN 1	PIN 3	Battery voltage

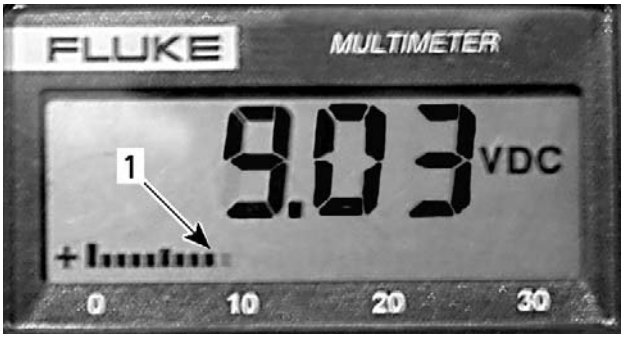
If voltage is not as specified, test positive and ground circuits separately.

Testing the VSS Signal

1. Lift rear of vehicle so that rear wheels are off the ground.
2. Set transmission to 2WD and to NEUTRAL.
3. Back-probe the VSS connector.
4. Turn ignition switch ON.
5. Set emergency engine stop switch to RUN.
6. Set multimeter to Vdc.
7. Measure voltage while slowly rotating rear wheels by hand.

VEHICLE SPEED SENSOR SIGNAL TEST		
TEST PROBES		MEASUREMENT (WHILE ROTATING WHEELS)
PIN B	PIN C	Alternate reading between battery voltage and 0 Vdc

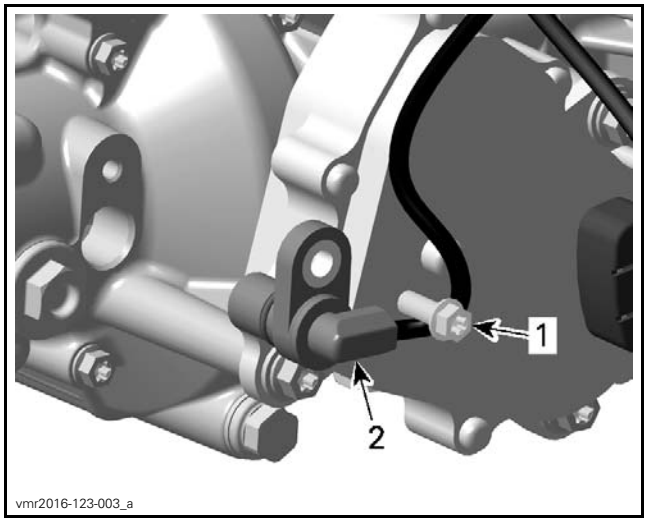
NOTE: Since we measure pulsating voltage, the numeric display will continuously change. The analog display may be easier to follow.



1. Analog display

Removing the VSS

Pull out the VSS after removing the retaining screws.



1. Screw
2. VSS

Installing the VSS

The installation is the reverse of the removal procedure. However, pay attention to the following.

Lubricate VSS O-ring.

SERVICE PRODUCT
SUPER LUBE GREASE (P/N 293 550 030)

Tighten VSS retaining screw to specification.

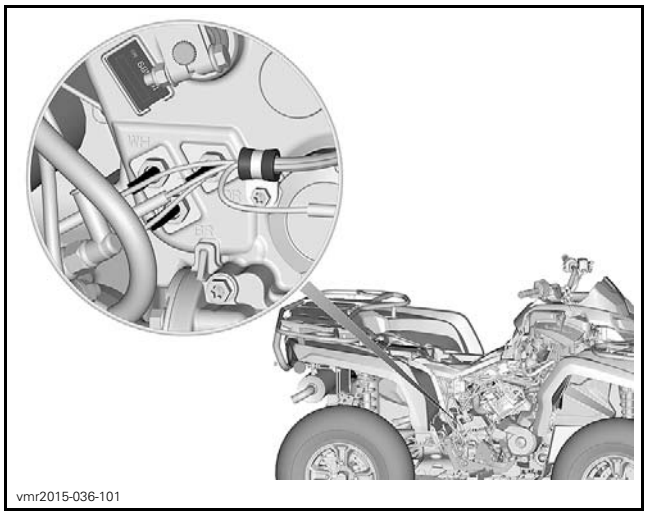
TIGHTENING TORQUE	
VSS retaining screw	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

GEARBOX POSITION INDICATOR SWITCHES

Gearbox Position Indicator Switch Access

Refer to *BODY* subsection and remove the following:

– Seat
– Console
– RH side panel and extension(s)
– RH footrest panel.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Testing the Gearbox Position Indicator Switch Continuity

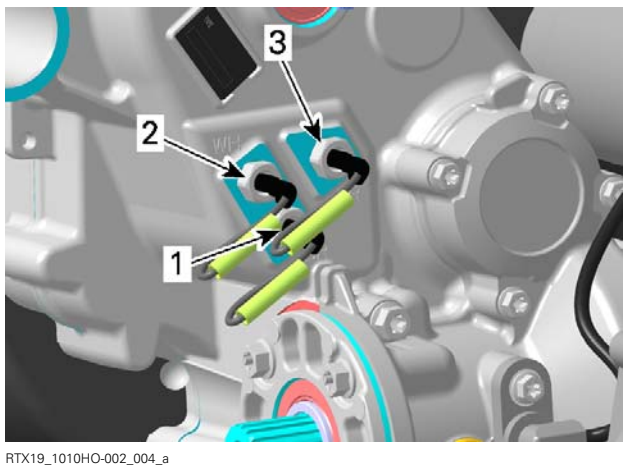
1. Remove parts required for access, refer to *GEARBOX POSITION INDICATOR SWITCH ACCESS* in this subsection.

NOTE: Take note of corresponding switch position and wire color.

2. Disconnect wires from switches.

NOTE: Remove insulating paint to obtain correct readings.

3. Using a multimeter, measure the resistance from the indicator switch to engine ground while selecting the gearbox to each position. Compare results with the logic table below.



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1. *Gearbox position indicator switch - position 1 BROWN/GREY wire*
2. *Gearbox position indicator switch - position 2 WHITE/RED wire*
3. *Gearbox position indicator switch - position 3 ORANGE/GREY wire*

SHIFTER POSITION	CORRESPONDING SWITCH		
	BROWN/ GREY	WHITE/ RED	ORANGE/ GREY
	Position 1	Position 2	Position 3
L	X		X
H			X
N		X	X
R		X	
P	X	X	

An "X" indicates switch is making ground contact, thus there should be continuity (R is close to 0 Ohms).

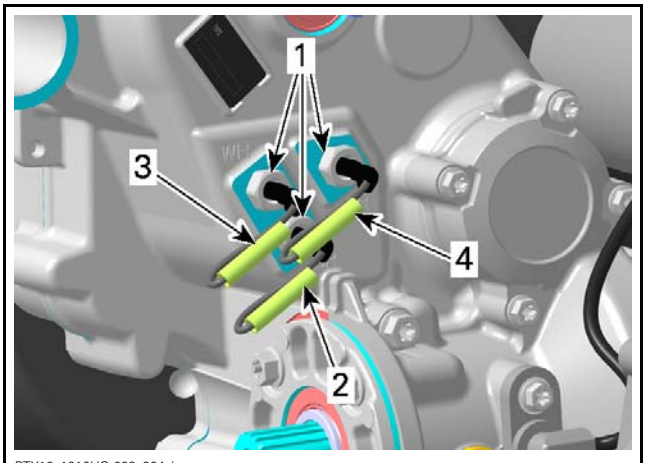
A blank space indicates switch is not making contact, there should be no continuity (R = infinite).

If the indicator switch is good, check the vehicle harness and/or indicator lights.

Removing the Gearbox Position Indicator Switch

NOTE: Clean area of dirt before removing gearbox indicator position switch(es). Take note of corresponding switch position and wire color.

Disconnect indicator switch from engine wiring harness.



RTX19_1010HO-002_004_b

1. *Gearbox position indicator switches*
2. *BROWN/GREY wire*
3. *WHITE/RED wire*
4. *ORANGE/GREY wire*

Unscrew switch.

Installing the Gearbox Position Indicator Switch

The installation is the reverse of the removal procedure. However, pay attention to the following.

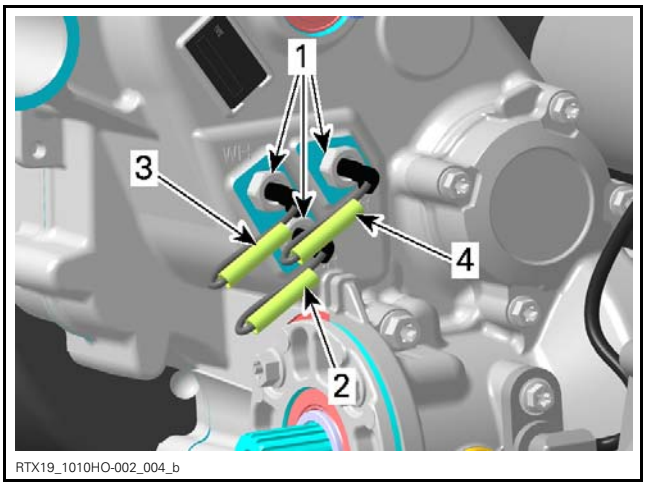
Take care to avoid damaging threads in switch bores during installation.

Carefully apply some sealant on threads of shift indicator switches.

NOTICE **Do not apply sealant on switch plunger as it will lead to switch malfunction.**

TIGHTENING TORQUE	
Indicator switches	2.5 N•m ± 0.3 N•m (22 lbf•**in** ± 3 lbf•**in**) + LOCTITE 5910 (P/N 293 800 081)

If all switches are removed, make sure to put the wires back in the correct location as noted prior to removal.



RTX19_1010HO-002_004_b

1. Gearbox position indicator switches
2. BROWN/GREY wire
3. WHITE/RED wire
4. ORANGE/GREY wire

4WD ACTUATOR

4WD Actuator Access

To access the actuator, refer to *BODY* subsection and remove the following parts:

– Seat
– Console
– RH side panel and extension(s)
– RH footrest panel.

Testing the Actuator Power Input

Unplug actuator connector.

Turn ignition key ON.

Set emergency engine stop switch to RUN.

Measure voltage as follows.

ACTUATOR HARNESS CONNECTOR		MEASUREMENT
Pin 1	Pin 2	Battery voltage

If the result is out of specifications, check power input circuit. Refer to wiring diagram.

If the result is good, check the 4WD circuit continuity.

Testing the 4WD Circuit Continuity

1. Turn ignition switch OFF.
2. Unplug:
   – Right steering switch (RSS)
   – 4WD Actuator connector
   – HIC connector.
3. Measure continuity.

VEHICLE HARNESS CONNECTOR		MEASUREMENT
RSS 3	HIC B	Close to 0 Ω
RSS 2	Frame (ground)	
CL 6	HIC H	

ENGINE HARNESS CONNECTOR		MEASUREMENT
4WD Actuator 3	HIC H	Close to 0 Ω
4WD Actuator 4	HIC B	

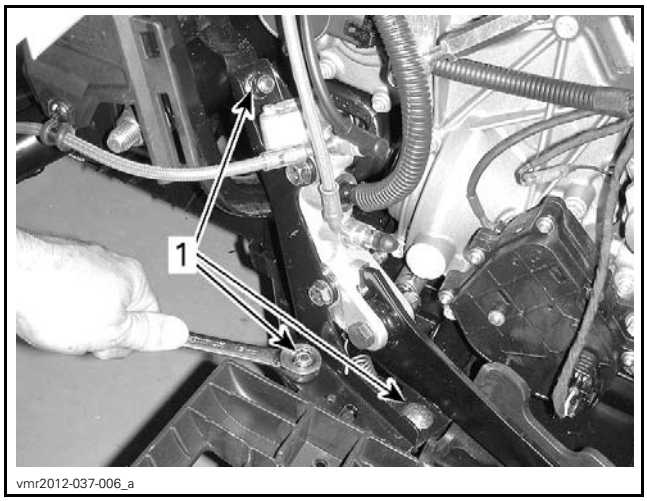
If continuity is good, replace 4WD Actuator.

If continuity is out of specification repair wires and / or connectors, or replace actuator switch.

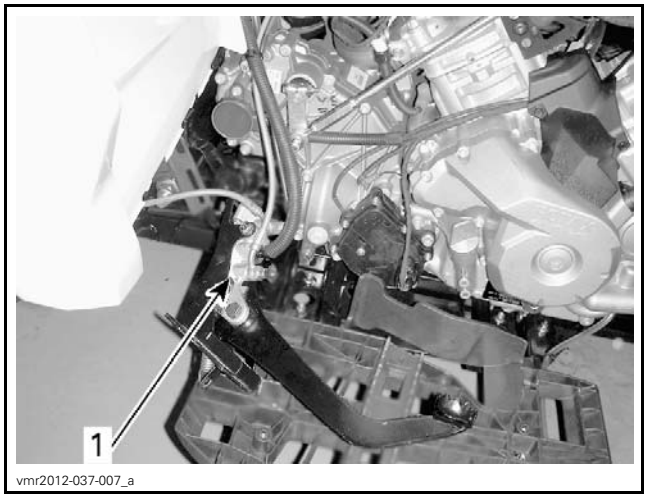
Removing the 4WD Actuator

NOTE: Before beginning any servicing on the actuator, make sure the vehicle is in 4WD position. No need to remove engine from vehicle.

1. Detach brake master cylinder from frame.

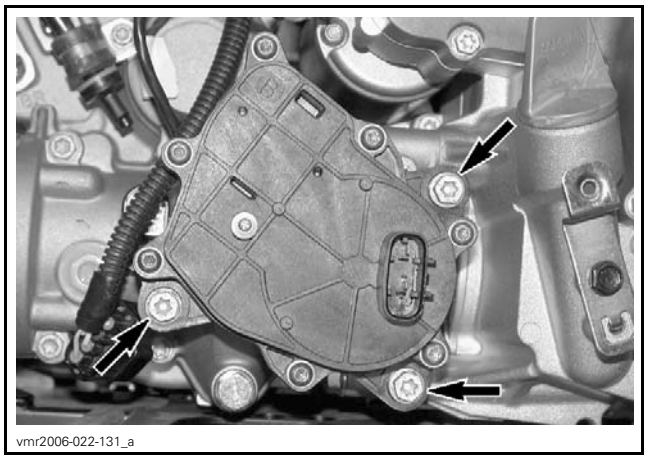


1. Remove retaining screws from master cylinder support



1. Master cylinder moved apart

2. Unplug actuator connector.
3. Place a drain pan under actuator.
4. Unscrew actuator bolts.

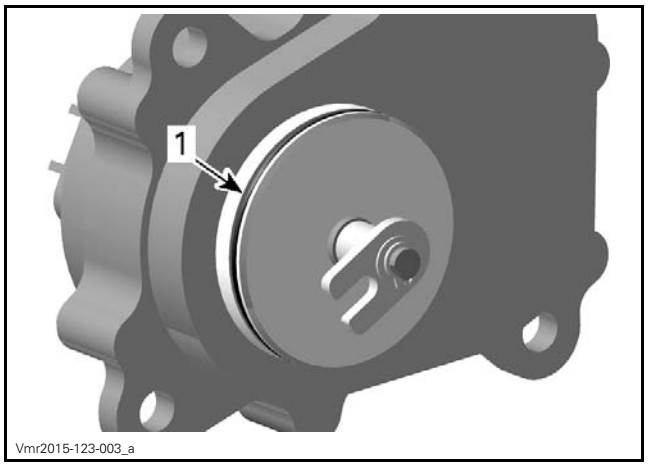


5. When all actuator bolts are removed, pull the actuator out of housing.

Installing the 4WD Actuator

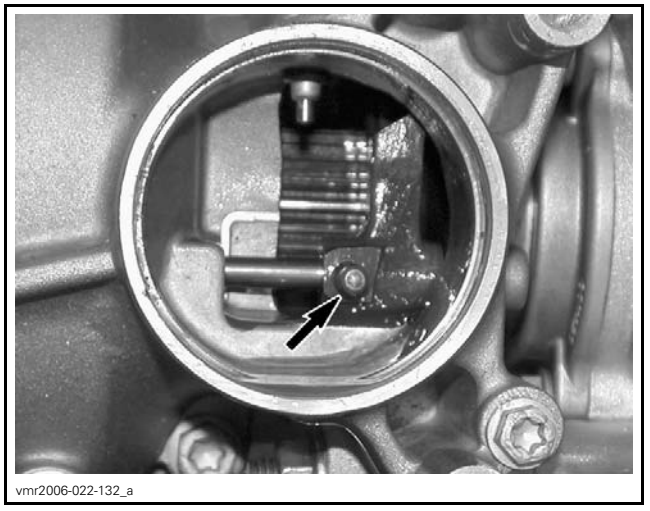
1. Lubricate actuator O-ring.

SERVICE PRODUCT
SUPER LUBE GREASE (P/N 293 550 030)

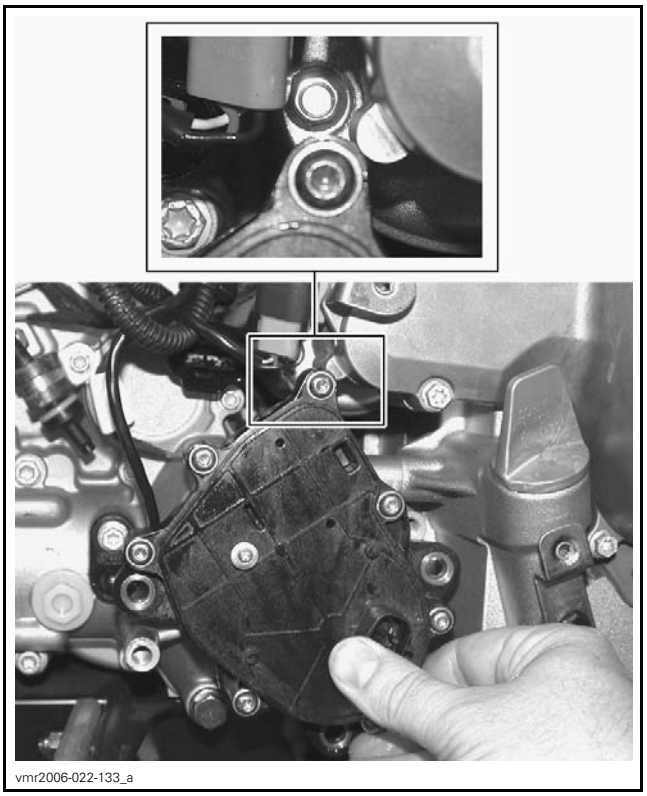


1. Actuator O-ring

2. Verify if coupling fork is in 4WD position. The coupling fork should be positioned toward the front of vehicle.



3. Align the actuator fork with the pin on coupling fork then push the actuator in the housing. See the following illustration to position the actuator correctly.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4. Rotate the actuator counterclockwise until it orients itself to mounting position.

NOTICE Do not cut or break the actuator O-ring.

5. Install all actuator bolts then torque them to specification.

TIGHTENING TORQUE	
Actuator screws	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

6. Connect actuator.
7. Lift the front of vehicle.
8. Turn front wheels. The front propeller shaft should not turn (the PARK position must be selected).

If the front propeller shaft turns, the actuator is not installed correctly. Remove actuator and reinstall it.

9. Set ignition switch to ON.
10. Set emergency engine stop switch to RUN.
11. Select the 2WD position.
12. Turn front wheel again. The front propeller shaft. The shaft should turn easily.

If the front propeller shaft does not turn, the actuator is not installed correctly. Remove actuator and reinstall it.

NOTICE Refill missing gearbox oil, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

13. Install all other removed parts.

GEARBOX OIL SEALS

Replacing the Gearbox Oil Seals

Replace oil seals if they are brittle, hard or damaged.

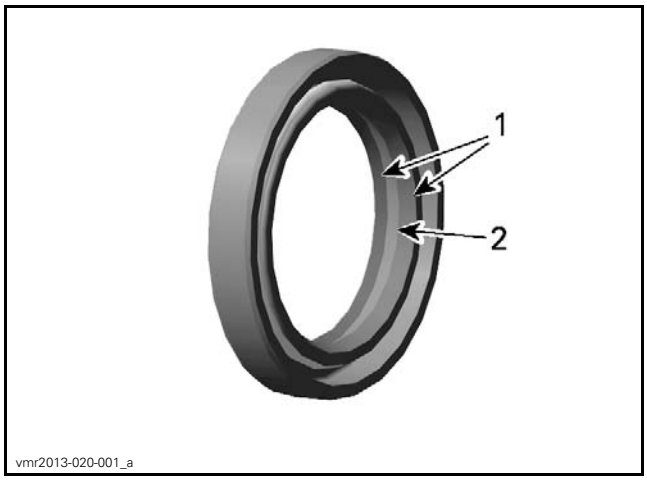
A small flat screwdriver can be used to remove most of these oil seals.

NOTICE Avoid scoring parts during oil seal removal.

When replacing an oil seal, take this opportunity to inspect the following:
- Check bearings behind each oil seal for contamination and/or metal shavings.
- Check oil seal running surfaces for scratches.

Lubricating the Oil Seal

When installing or reinstalling oil seals:
- Lubricate sealing lips all around.
- Fill up the room between sealing lips halfway around the perimeter.



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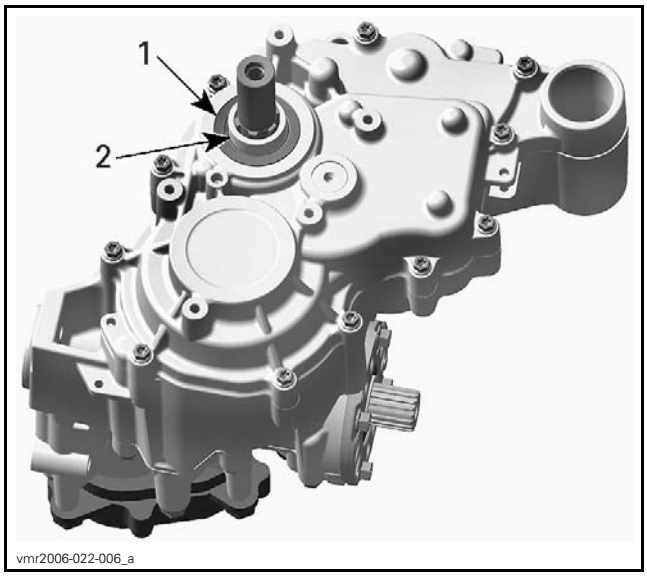
1. Sealing lips
2. Room between sealing lips

SERVICE PRODUCT
PETAMO GREASE GHY 133N (P/N 420 899 271)

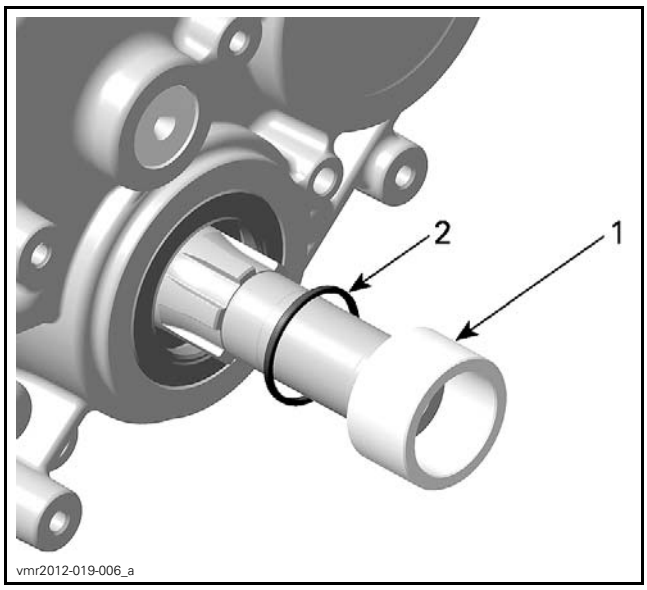
Countershaft Oil Seal

The countershaft oil seal can be removed without removing gearbox from vehicle. Remove drive and driven pulley and CVT air guide.



1. Countershaft oil seal
2. Distance sleeve

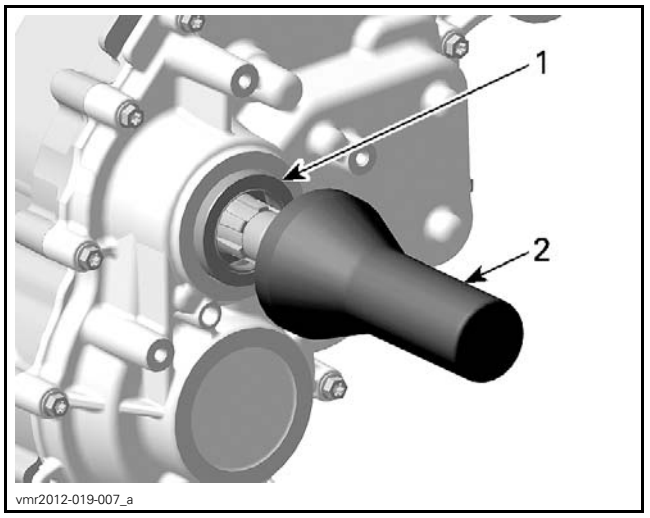
NOTE: When oil seal is removed also inspect O-ring.



1. Distance sleeve
2. O-ring

For countershaft oil seal installation use the following service tool.

REQUIRED TOOL	
COUNTERSHAFT OIL SEAL PUSHER (P/N 529 036 222)	



1. Countershaft oil seal
2. Oil seal pusher

Shift Shaft Oil Seal

The shift shaft oil seal can be removed without removing the gearbox from the vehicle.

To replace the shift shaft oil seal, refer to *BODY* subsection and remove:

- Seat
- Console
- RH side panel
- RH footrest panel
- Shift plate from shift shaft (refer to *SHIFTER* subsection.

Using a suitable tube with the proper diameter to install the shift shaft oil seal.

If gearbox housing is apart, the following tools can be used for shift shaft oil seal installation.

REQUIRED TOOL	
OIL SEAL INSTALLER (GEARBOX) (P/N 529 035 758)	
HANDLE (P/N 420 877 650)	

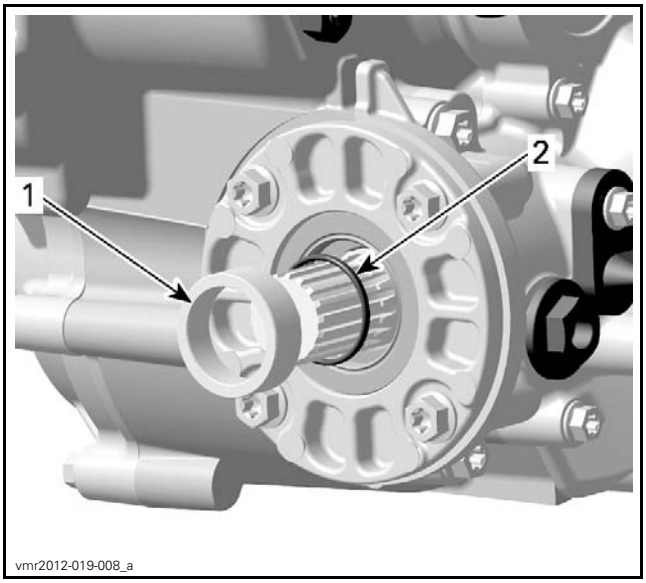
NOTICE **Oil seal must be installed with sealing lip toward gearbox.**

Output Shaft Oil Seal

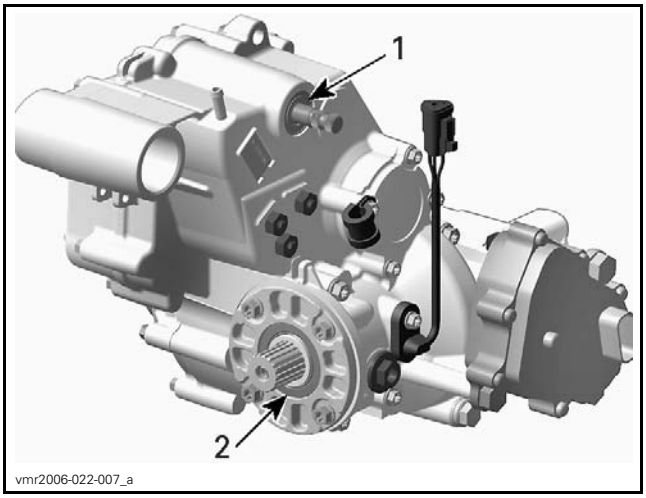
Remove propeller shaft. Refer to *REAR DRIVE* subsection.

Punch a sharp screwdriver through oil seal for removal.

NOTE: When oil seal is removed also inspect O-ring.



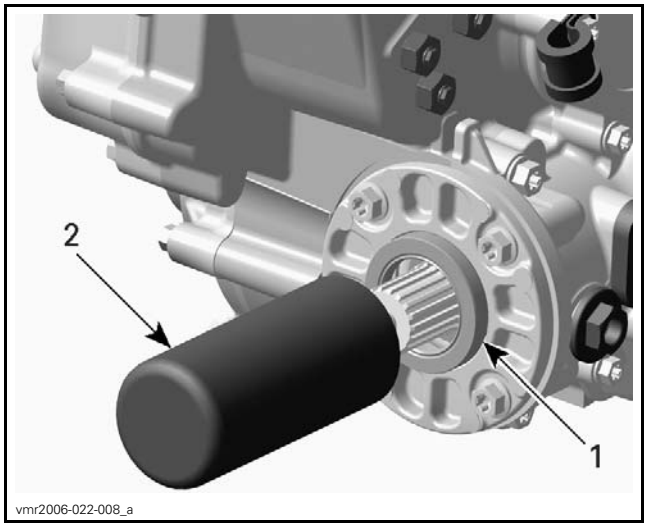
1. Distance sleeve
2. O-ring



1. Shift shaft oil seal
2. Output shaft oil seal

For output shaft oil seal installation use the following service tool.

REQUIRED TOOL	
DRIVE SHAFT OIL SEAL INSTALLER (P/N 529 036 028)	



1. Output shaft oil seal
2. Oil seal installer

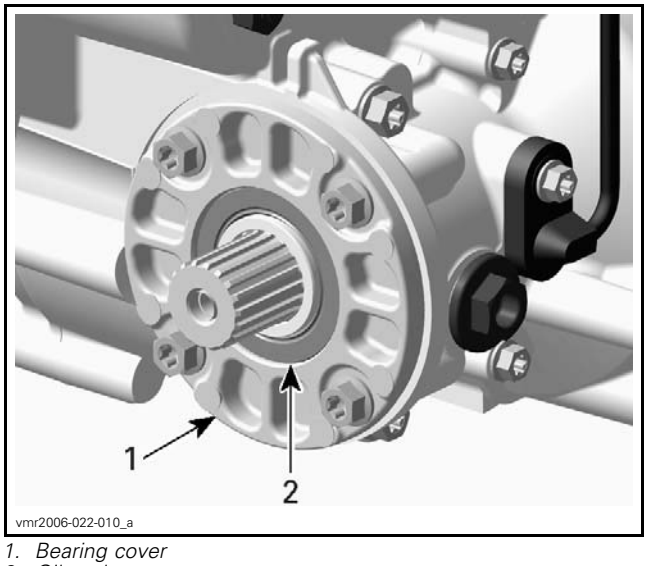
OUTPUT SHAFT AND COUPLING MECHANISM

Remove gearbox. Refer to *GEARBOX* in this subsection.

Before removing the right housing and output shaft measure the backlash on output shaft. This measure will indicate if output shaft adjustment is necessary.

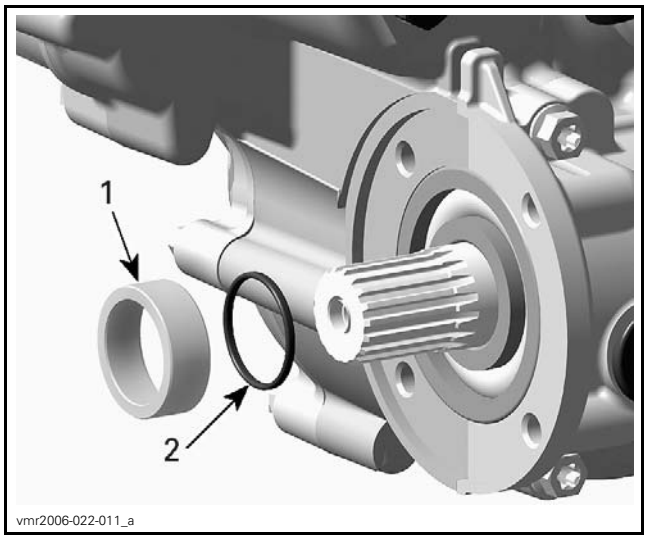
Output Shaft Backlash Procedure

1. Engage PARK position on the gear shaft to block gearbox.
2. Remove bearing cover with oil seal



1. Bearing cover
2. Oil seal

3. Remove:
   – Distance sleeve
   – O-ring.

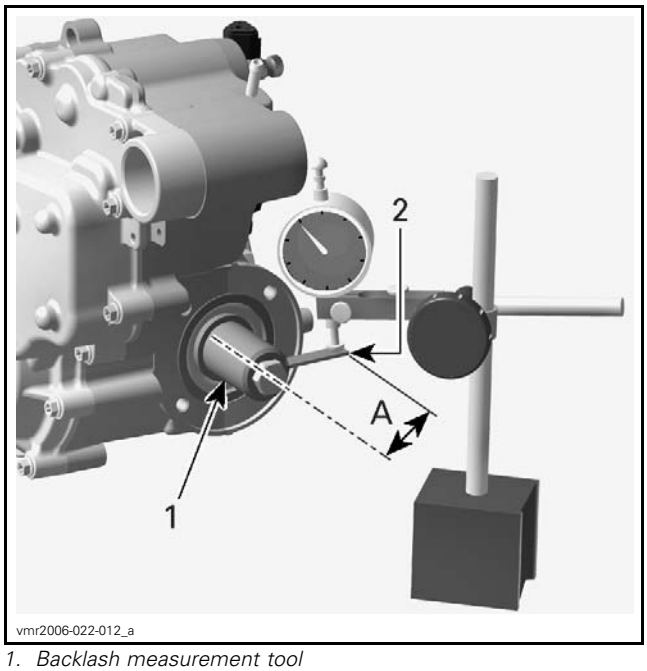


1. Distance sleeve
2. O-ring

4. Install the measurement tool at the end of output shaft.

REQUIRED TOOL	
BACKLASH MEASUREMENT TOOL (P/N 529 036 030)	

5. From center of tool bolt, measure 47 mm (1.85 in)and place a mark on the tab.



1. Backlash measurement tool
2. Mark on tab
A. 47 mm (1.85 in)

6. Position the head of the dial indicator, against the tab at a 90° angle and on the line. Then, gently rotate the output shaft.

This reading gives the backlash measurement. Refer to the following table for backlash specifications.

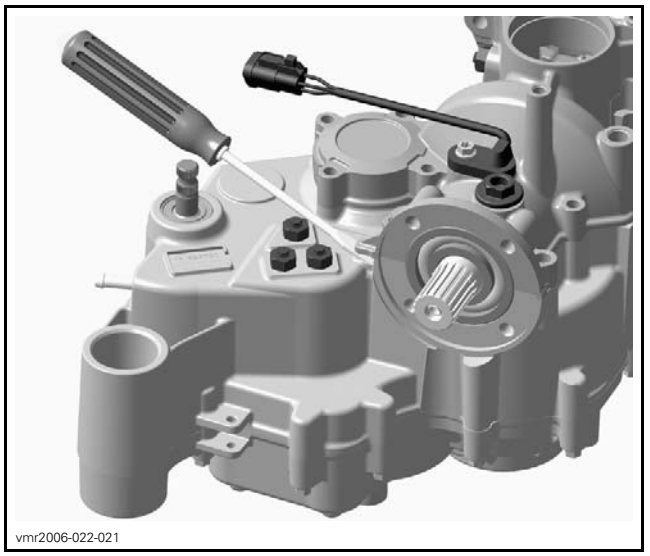
OUTPUT SHAFT BACKLASH	
NEW	0.10 mm to 0.20 mm (.0039 in to .0079 in)
SERVICE LIMIT	0.25 mm (.0098 in)

If backlash is not within the specification, remove the output shaft and select the next thicker or thinner shim to meet the specifications.

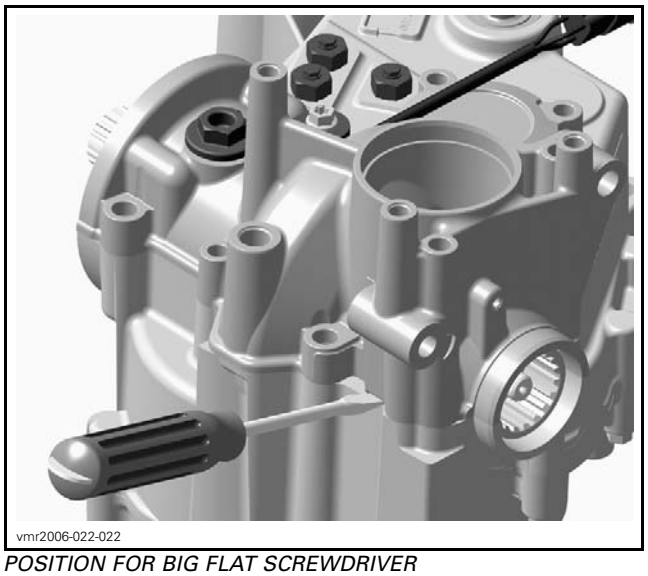
NOTE: Use next thicker shim to increase backlash and next thinner shim to reduce backlash.

Removing the Output Shaft and Coupling Mechanism

1. Remove actuator.
2. Remove the bearing cover with oil seal.
3. Unscrew all bolts retaining the right housing to the center housing.
4. To remove right housing, use 2 big screwdrivers.



POSITION FOR BIG FLAT SCREWDRIVER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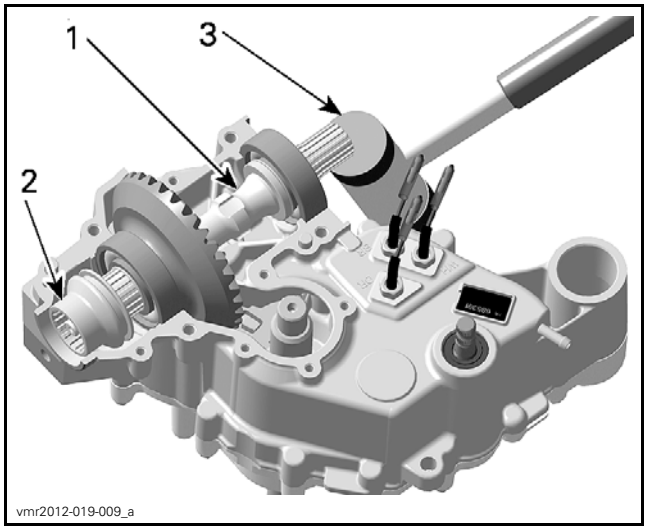
POSITION FOR BIG FLAT SCREWDRIVER

5. Remove output shaft.

REQUIRED TOOL
Soft hammer



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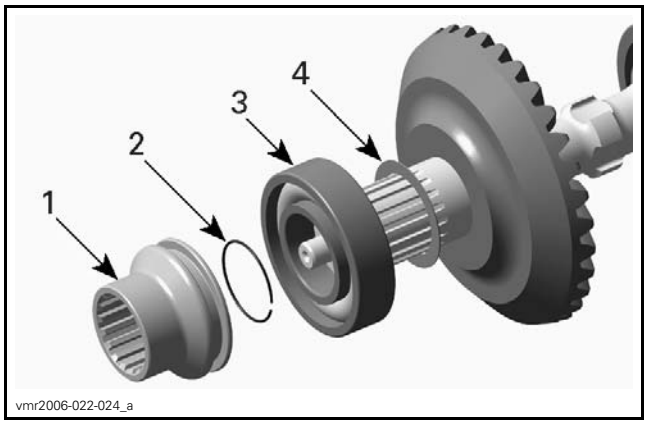
1. *Output shaft*
2. *Coupling sleeve*
3. *Soft hammer*

6. Remove:
   - Coupling sleeve
   - O-ring
   - Ball bearing
   - Thrust washer.



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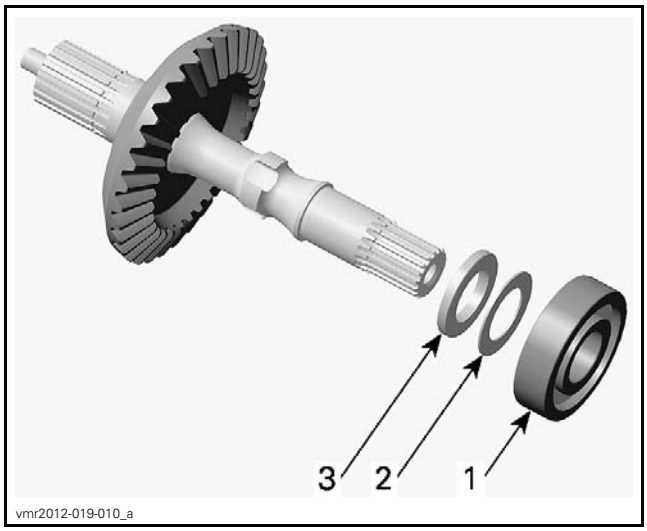
1. *Coupling sleeve*
2. *O-ring*
3. *Ball bearing*
4. *Thrust washer*

7. Remove:
   - Ball bearing
   - Thrust washer.



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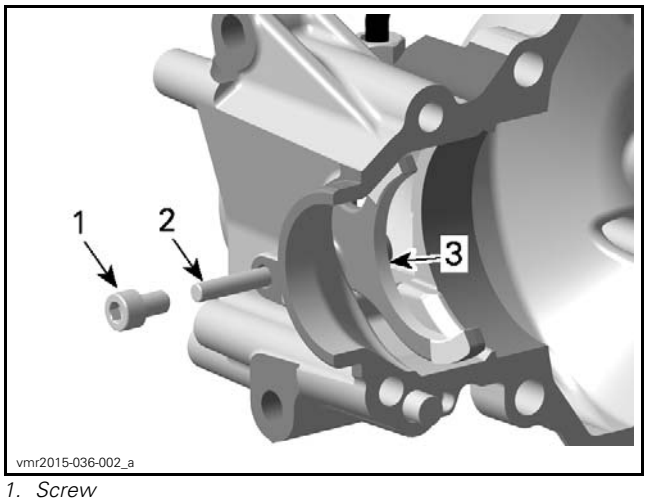
1. *Ball bearing*
2. *Thrust washer*
3. *Distance ring*

8. Remove:
   - Screw
   - Pin
   - Coupling fork.



1. Screw
2. Pin
3. Coupling fork

Inspecting the Output Shaft and Coupling Mechanism

Check output shaft and its gear for cracks, bend, pitting or other visible damages.

Check output shaft splines for wear or other damages.

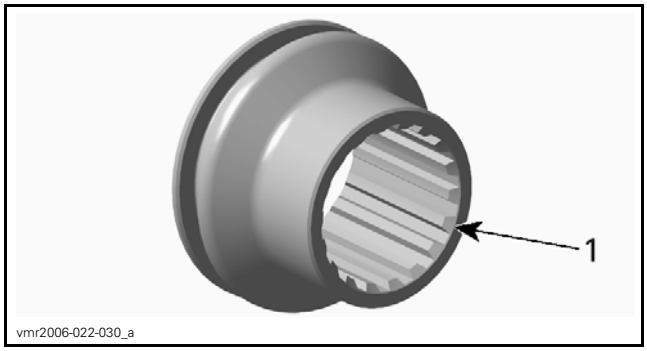
NOTICE **Always replace output shaft and bevel gear shaft at the same time. Adjust these components upon replacement.**

Check if the output shaft ball bearings turn freely and smoothly. Replace if necessary, refer to *GEARBOX ADJUSTMENT* in this subsection.

Replace oil seal if brittle, hard or damaged.

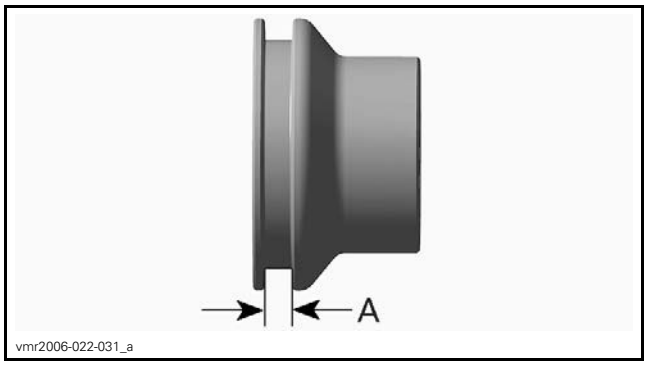
Replace O-rings if brittle, hard or damaged.

Check splines of coupling sleeve for wear or other damages.



1. Inspect splines

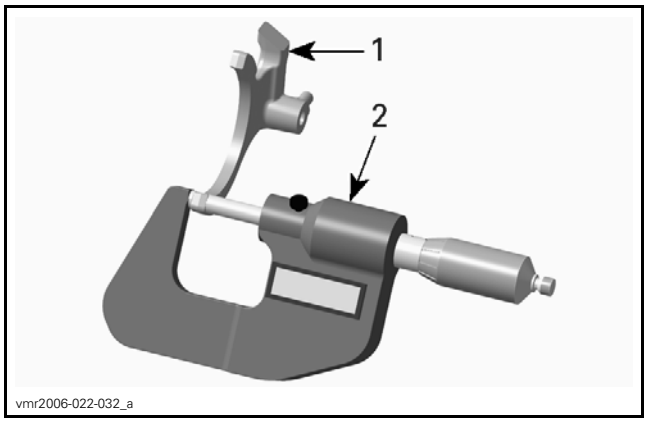
Measure the coupling sleeve groove width.



A. Groove width

COUPLING SLEEVE GROOVE WIDTH	
NEW	5.25 mm to 5.35 mm (.207 in to .211 in)
SERVICE LIMIT	5.50 mm (.217 in)

Check coupling fork claw thickness.



1. Coupling fork
2. Micrometer

COUPLING FORK CLAW THICKNESS	
NEW	4.95 mm to 5.05 mm (.195 in to .199 in)
SERVICE LIMIT	4.80 mm (.189 in)

Clean housing split surface and especially the bearing areas from metal particles or other contamination.

Installing the Output Shaft and Coupling Mechanism

The installation is the reverse of the removal procedure. However, pay attention to the following.

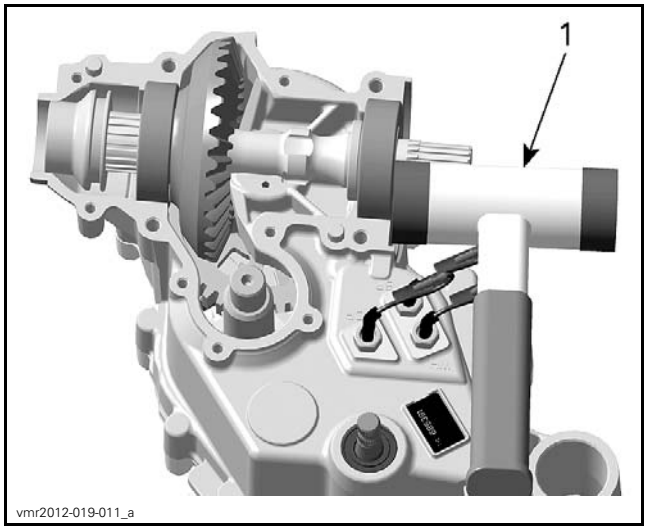
Install thrust washer, bearing, O-ring and coupling sleeve onto the output shaft.

Install distance ring, thrust washer and ball bearing.

NOTE: O-ring and distance sleeve are not installed at this time.

Place the output shaft into the center housing.

Use soft hammer to put bearing exactly in place against center housing.



1. Soft hammer

Clean the bearing cover location then attach bearing cover with oil seal to the housing.

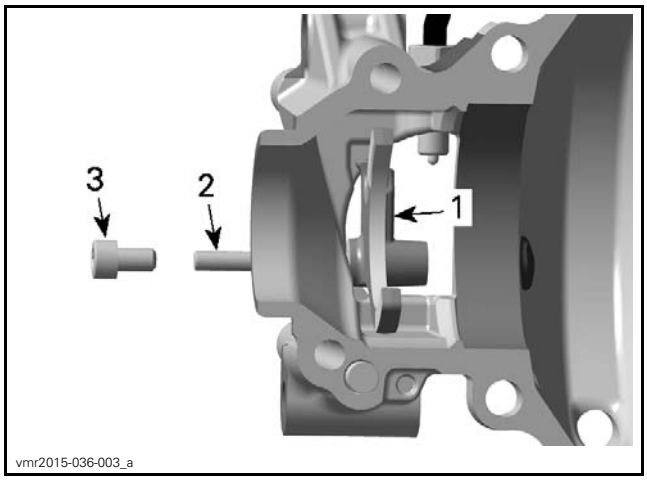
Temporarily install the right housing with the four (4) M8 TORX screws beside bearing seats.

NOTE: Prior to tightening the TORX screws, tap on the gear end of output shaft with a soft hammer to take up all gear free play.

Verify output shaft backlash. Refer to *OUTPUT SHAFT BACKLASH PROCEDURE* in this subsection. Adjust as required.

If backlash is within specifications, remove dial indicator, backlash measuring tool, bearing cover and right housing.

NOTE: Install coupling fork, pin and screw in right housing before applying sealant to the mating surface.



1. Coupling fork
2. Pin
3. Screw

Clean all metal components in a solvent.

Clean the housing mating surfaces using gasket remover and a brass brush.

Brush a first pass in one direction then make the final brushing perpendicularly (90°) to the first pass cross (hatch).

NOTICE **Do not wipe with rags. Use a new clean hand towel only.**

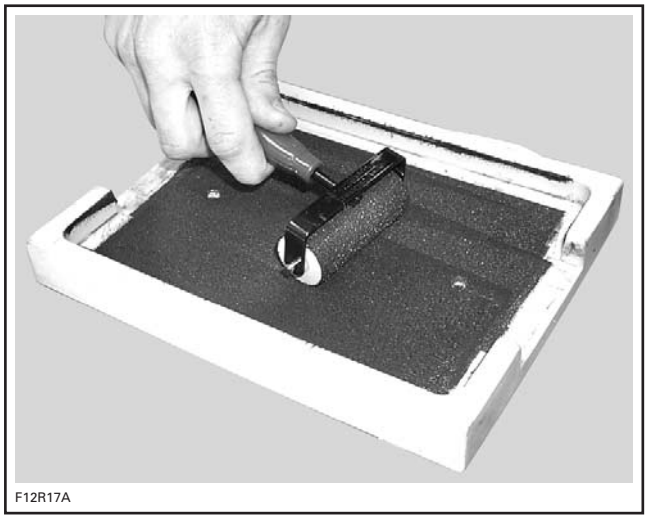
SERVICE PRODUCT
LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500)

IMPORTANT: When beginning the application of sealant, the assembly and the first torquing should be done within 10 minutes. It is suggested to have all you need on hand to save time.

Apply sealant on mating surfaces.

SERVICE PRODUCT
LOCTITE 5910 (P/N 293 800 081)

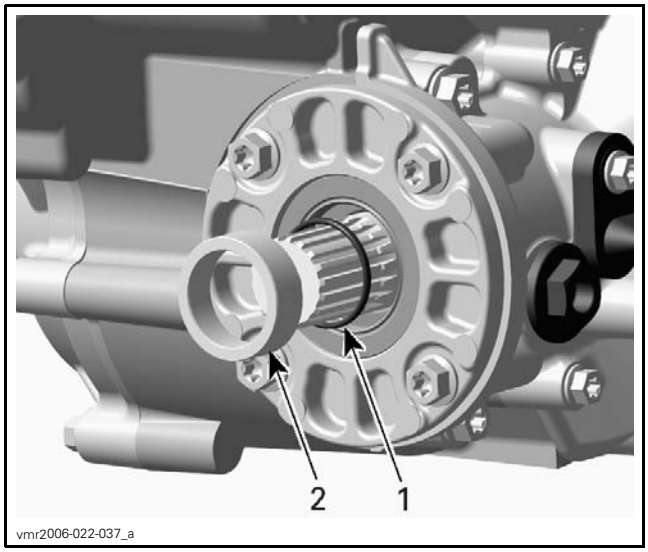
Use a plexiglass plate and apply some sealant on it. Use a soft rubber roller 50 mm to 75 mm (2 in to 3 in), available in arts products suppliers for printing, and roll the sealant to get a thin uniform coat on the plate (spread as necessary). When ready, apply the sealant on housing mating surfaces.


F12R17A

Do not apply in excess as it will spread out inside housings.

NOTE: It is recommended to apply this specific sealant as described here to get a uniform application without lumps. If you do not use the roller method, you may use your finger to uniformly distribute the sealant (using a finger will not affect the adhesion).

Install all other screws on right housing then the O-ring and the distance sleeve on end of output shaft. Chamfered bore of distance sleeve has to face the engine.



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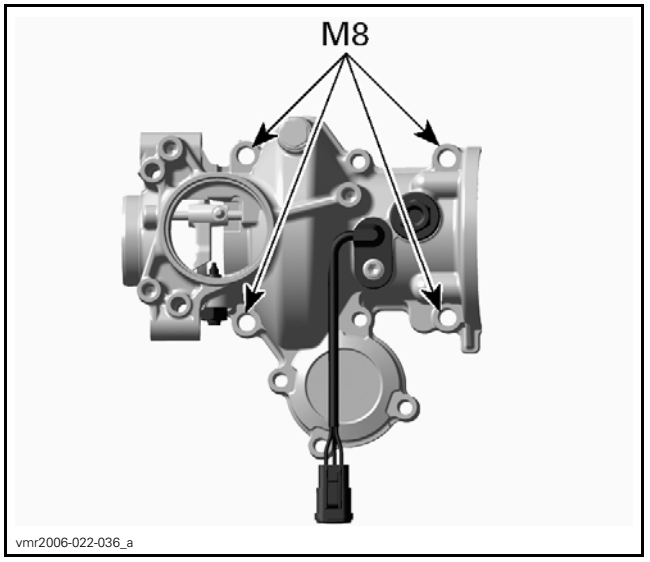
1. *O-ring*
2. *Distance sleeve*

NOTE: To install the right housing align the coupling fork with the groove in the coupling sleeve.

Torque the four (4) M8 Torx screws in a crisscross sequence to following specification.

TIGHTENING TORQUE		
Right housing M8 screws	Step A	Hand tightened
	Step B	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)



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Tighten all M6 Torx screws to specification

TIGHTENING TORQUE	
Right housing M6 screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Before installing bearing cover, apply sealant on the housing and grease on oil seal.

SERVICE PRODUCTS
LOCTITE 5910 (P/N 293 800 081)
SUPER LUBE GREASE (P/N 293 550 030)

Install the actuator, refer to *ACTUATOR* in this subsection.

Once this is done, complete final assembly.

GEARBOX

Removing the Gearbox

1. Remove engine from vehicle and place it on footrest support. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection for the procedure.
2. Drain gearbox. Refer to *GEARBOX OIL DRAINING PROCEDURE* in *PERIODIC MAINTENANCE PROCEDURES* subsection.
3. Remove drive and driven pulley and CVT air guide, refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection.

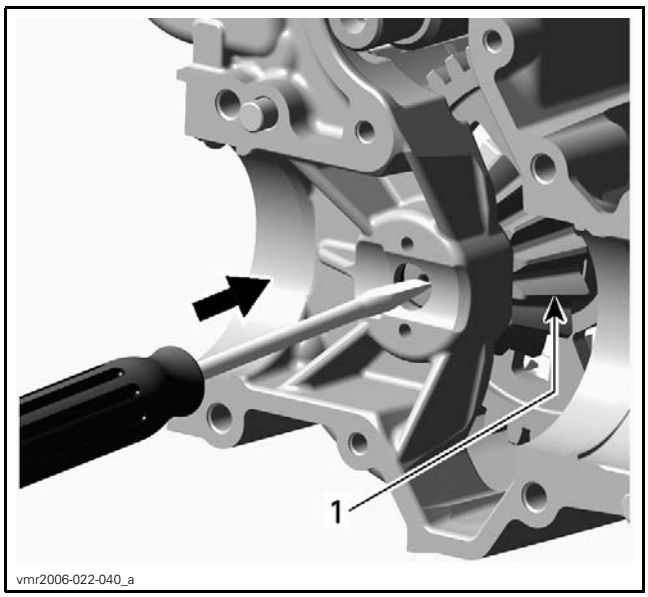
4. Unscrew the three (3) nuts that attach the gearbox to the engine.
5. Pull gearbox to separate it from engine.

Disassembling the Gearbox

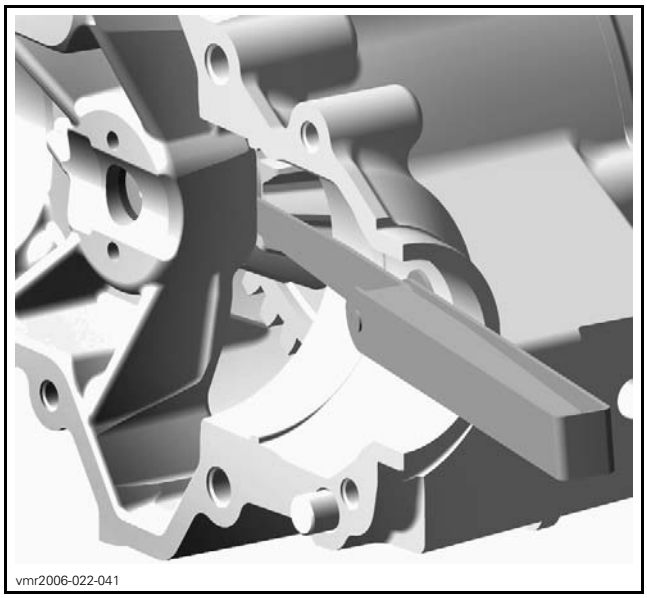
During gearbox disassembly, inspect the condition of each part closely.

1. Remove the output shaft. Refer to *OUTPUT SHAFT AND COUPLING MECHANISM* in this subsection.
2. Push bevel gear with a pin slightly down and measure the axial clearance of bevel gear with a feeler gauge.

NOTE: Bevel gear axial clearance must be measured before center and left housings separation.



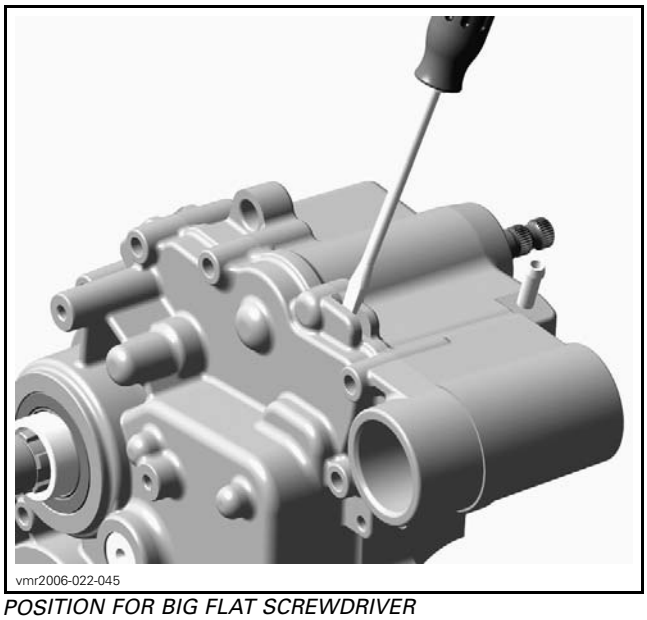
1. Bevel gear



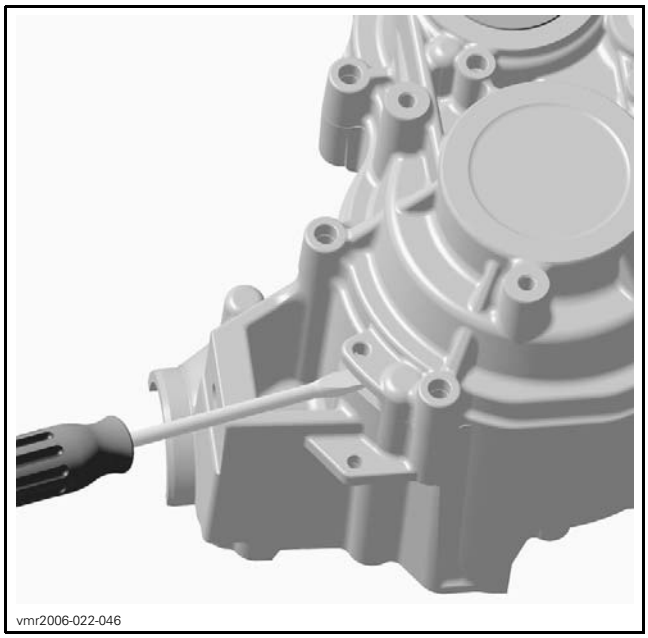
MEASURE AXIAL CLEARANCE OF BEVEL GEAR

BEVEL GEAR AXIAL CLEARANCE	
NEW	0.02 mm to 0.15 mm (.0008 in to .0059 in)
SERVICE LIMIT	0.19 mm (.0075 in)

3. Unscrew the left housing screws.
4. Place the left housing on a wood stand, center housing pointing upwards.
5. Using 2 big flat screwdrivers, lift the center housing.

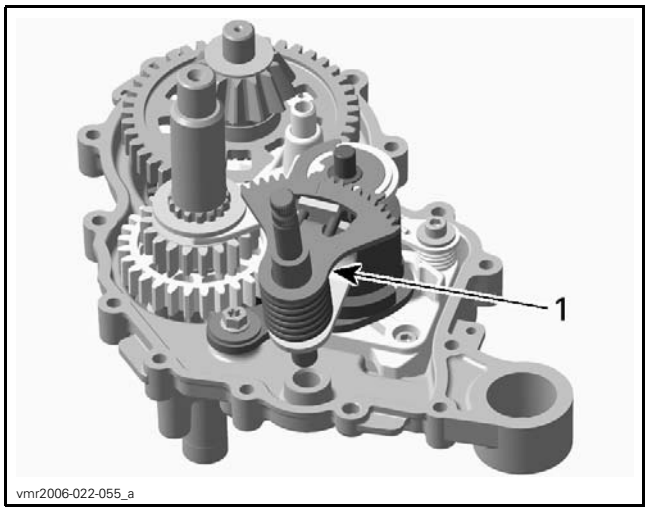


POSITION FOR BIG FLAT SCREWDRIVER



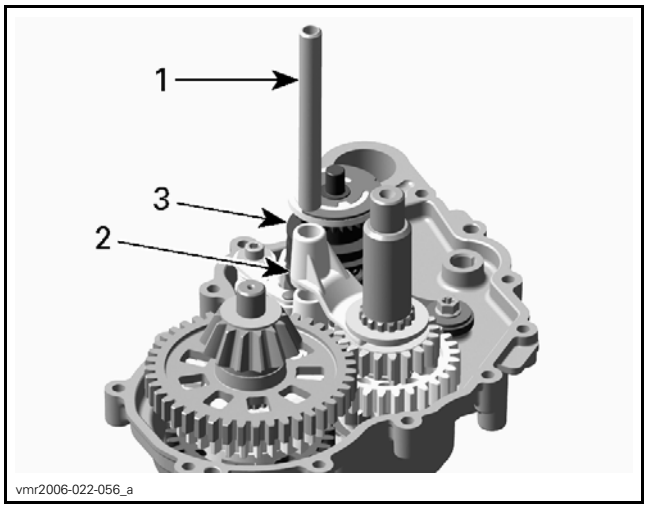
POSITION FOR BIG FLAT SCREWDRIVER

6. Remove center housing completely.
7. Remove shift shaft assembly.



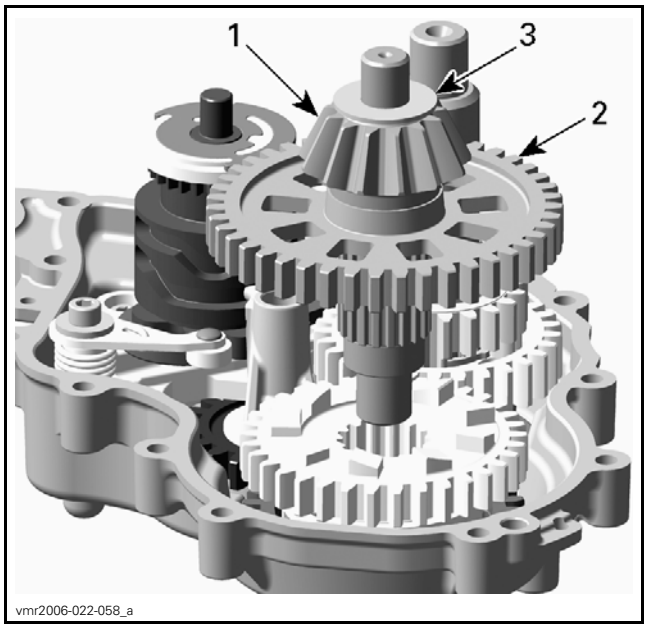
1. Shift shaft assembly

8. Remove shift fork shaft.
9. Disengage shift forks from shift drum and remove shift fork.



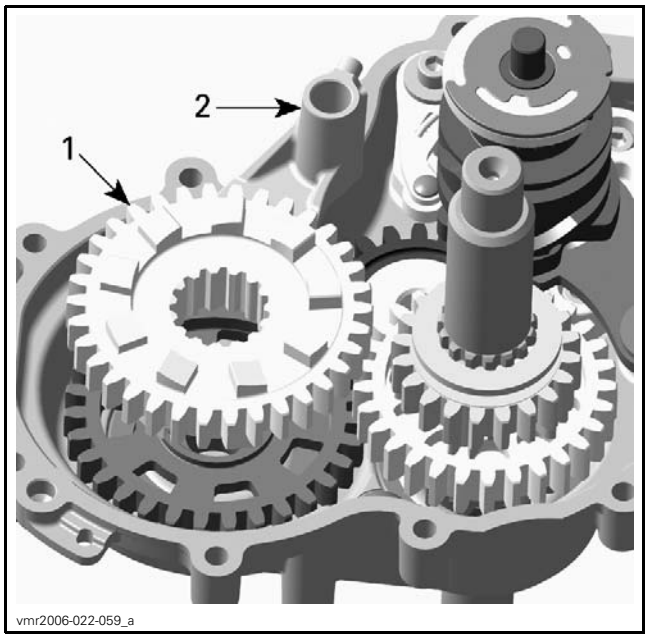
1. Shift fork shaft
2. Shift fork
3. Shift drum

10. Remove bevel gear shaft with low range gear assembly and shim.



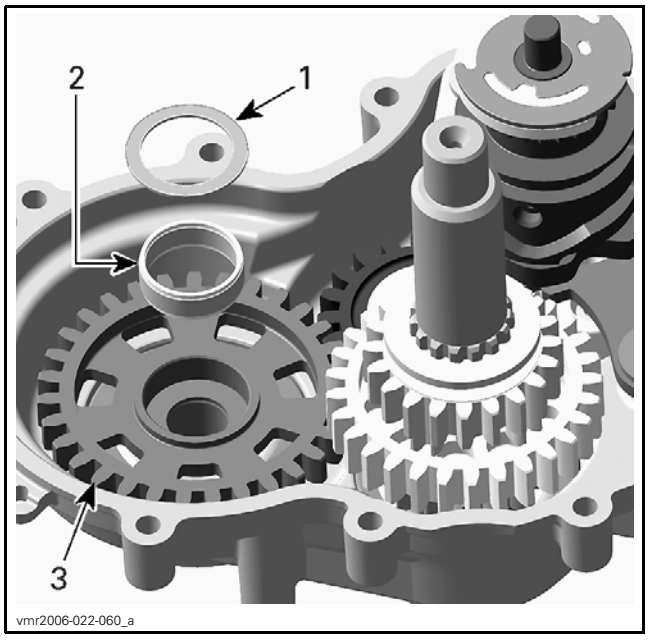
1. Bevel gear
2. Low range gear
3. Shim

11. Remove sliding gear with shift fork.



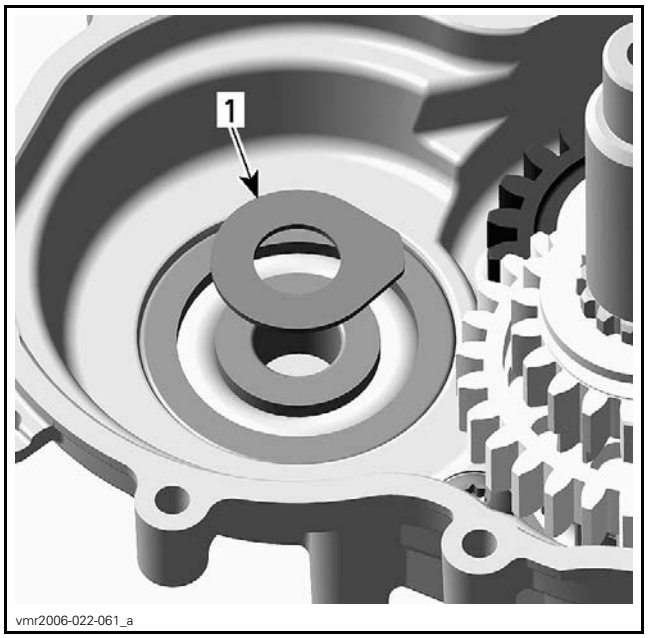
1. Sliding gear
2. Shift fork

12. Remove thrust washer, needle bearing and reverse gear.



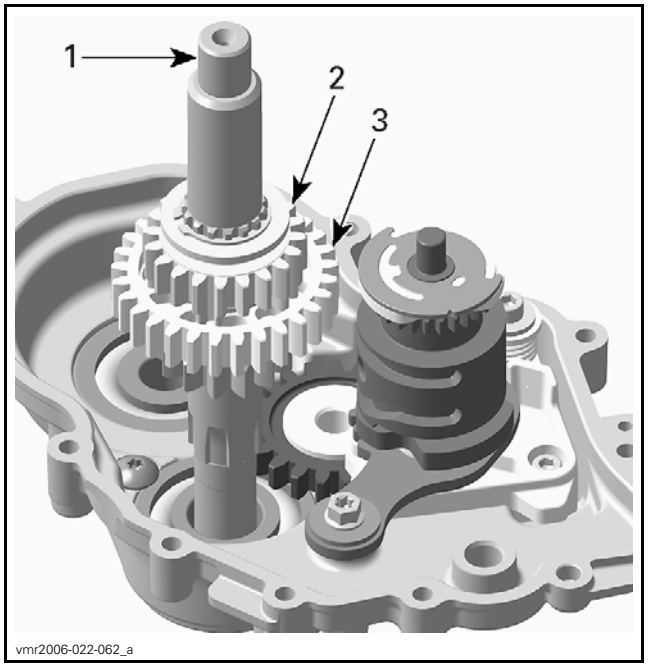
1. Thrust washer
2. Needle bearing
3. Reverse gear

13. Remove shim on CVT side.



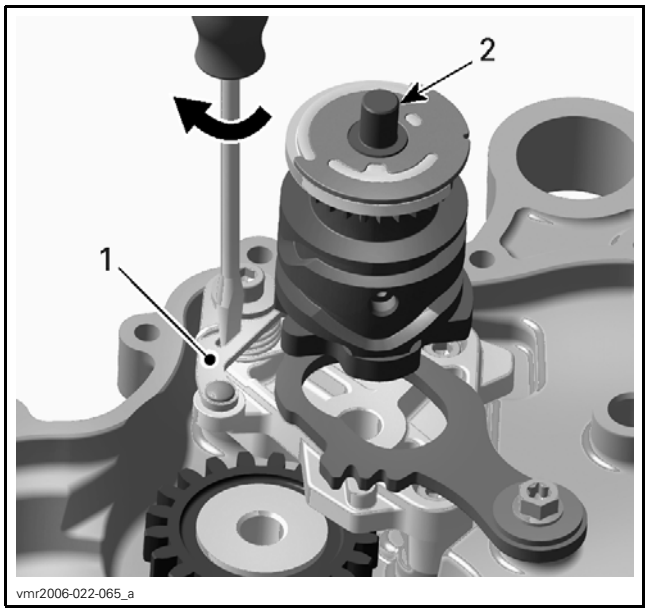
1. Shim on CVT side

14. Remove countershaft with low range gear and high range gear assembly.



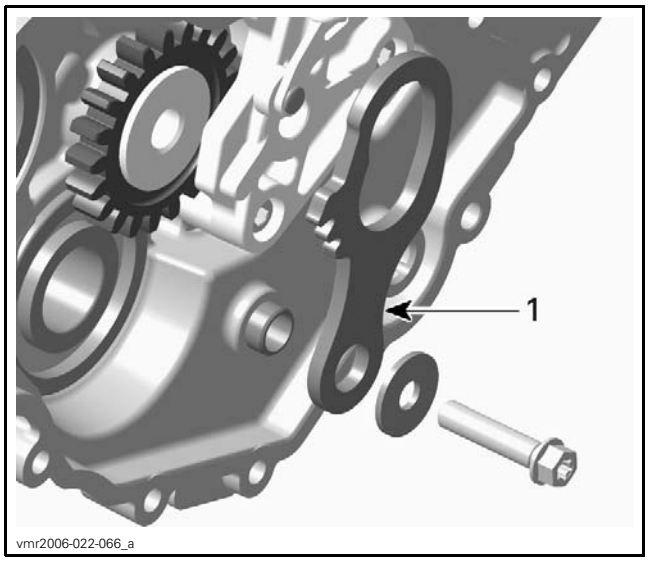
1. Countershaft
2. Low range gear
3. High range gear

15. Insert a flat screwdriver in the slot of index lever. Turn screwdriver clockwise and remove shift drum.



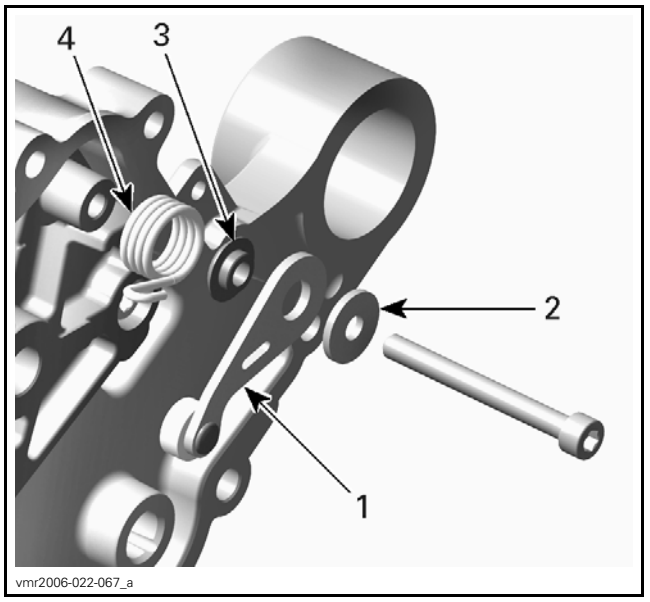
1. Index lever
2. Shift drum

16. Remove parking lock lever.



1. Parking lock lever

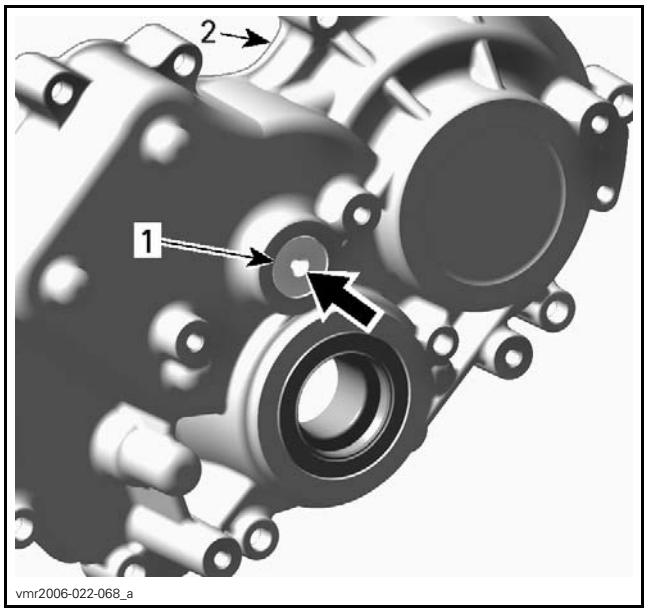
17. Remove index lever with washer, step ring and spring.



1. Index lever
2. Washer
3. Step ring
4. Index spring

18. Remove support flange.

NOTE: To remove intermediate gear and needle bearing, use a press bench to push out the intermediate gear shaft.



PRESS SHAFT IN THE DIRECTION AS SHOWN BY THE ARROW
1. Intermediate gear shaft
2. Left housing

Removing the Bearings

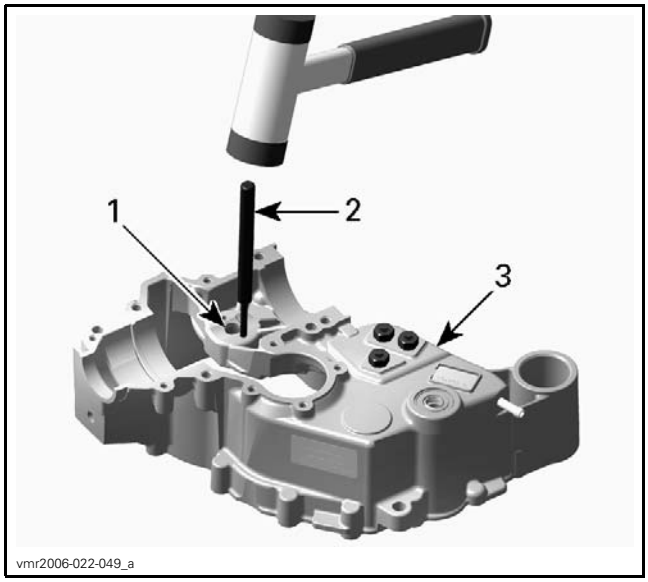
If necessary heat housing up to 100°C (212°F) before removing ball bearings or needle bearings.

⚠ WARNING

Clean oil, outside and inside, from housing before heating.

NOTICE Always support gearbox housings properly when ball bearings or needle bearings are removed. Housing damages may occur if this procedure is not performed correctly.

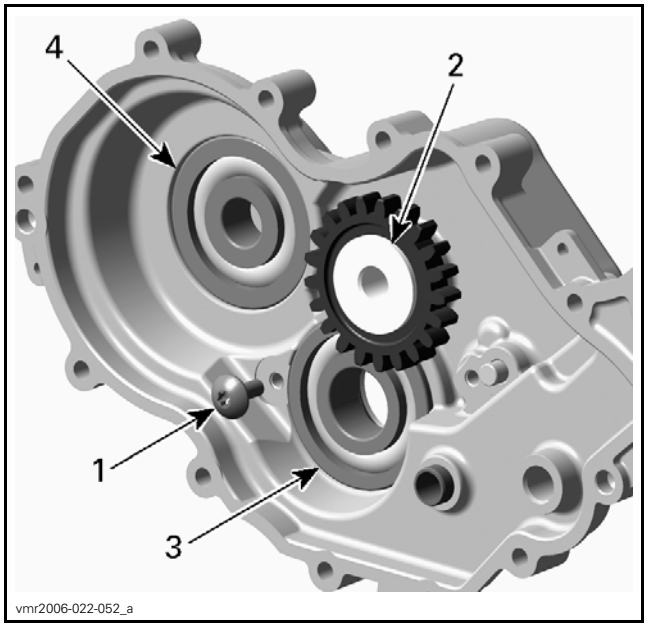
To remove bevel gear needle bearing use a punch.



1. *Bevel gear needle bearing*
2. *Punch*
3. *Center housing*

To remove ball bearings of bevel gear and needle bearing of countershaft, use a blind hole bearing puller.

For countershaft ball bearing, remove screw and intermediate gear shaft, then push with a suitable puller from outside in.



1. *Screw*
2. *Intermediate gear shaft*
3. *Ball bearing countershaft*
4. *Bevel gear ball bearing*

Inspecting the Gearbox

Always verify for the following when inspecting gearbox components:

- Gear teeth damage
- Worn or scoured bearing surfaces
- Worn or scoured shift fork
- Worn or scoured shift fork shaft
- Rounded engagement dogs and slots
- Bent shift forks
- Bent shift fork shaft
- Worn shift fork engagement pins
- Worn tracks on shift drum
- Worn shift fork engagement groove
- Worn splines on shafts and gears.

Bearings

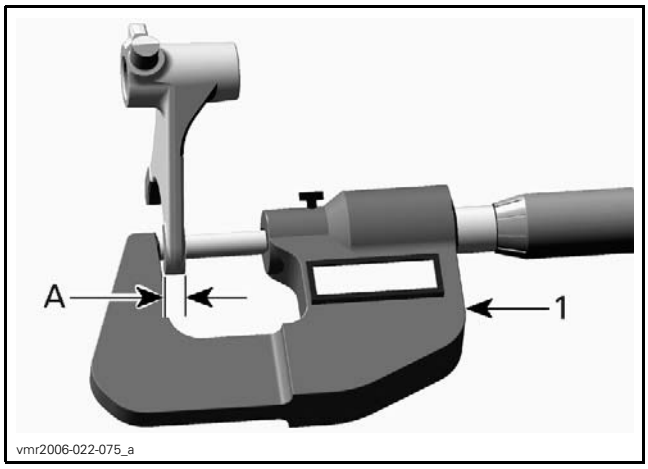
Check if ball bearings and needle bearings turn freely and smoothly.

Check all bearings, bearing points, tooth flanks, taper grooves and annular grooves. Annular grooves must have sharp edges.

Shift Forks

Check both shift forks for visible damage, wear or bent shift fork claws.

Measure the shift fork claw thickness.

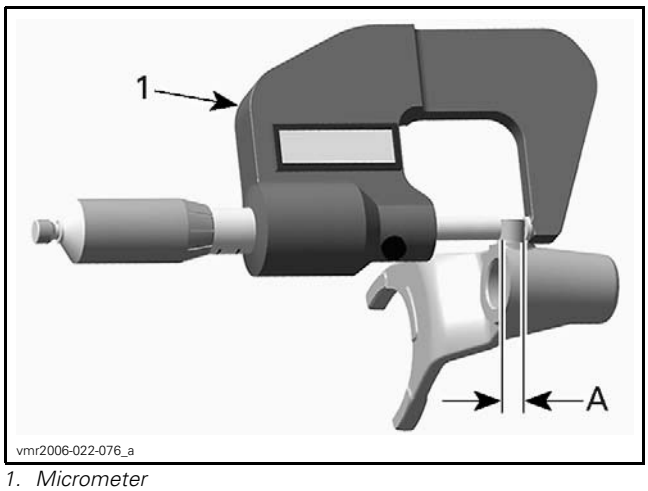


1. Micrometer
A. Shift fork claw thickness

SHIFT FORK CLAW THICKNESS (HIGH GEAR SHIFTING)	
NEW	4.80 mm to 4.90 mm (.189 in to .193 in)
SERVICE LIMIT	4.70 mm (.185 in)4.70 mm (.185 in)

SHIFT FORK CLAW THICKNESS (LOW/REVERSE GEAR SHIFTING)	
NEW	5.10 mm to 5.20 mm (.201 in to .205 in)
SERVICE LIMIT	5.00 mm (.197 in)

Measure shift fork pins.



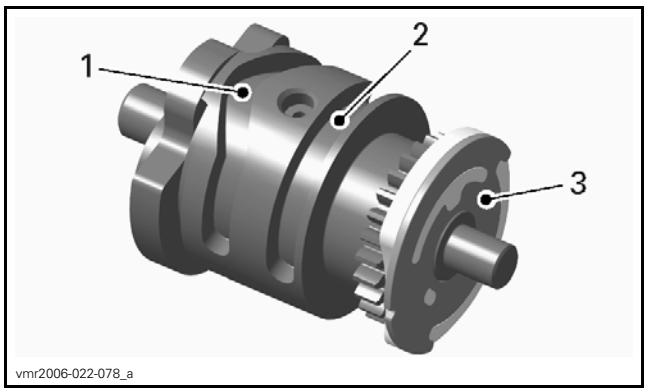
1. Micrometer
A. Shift fork pin diameter

SHIFT FORK PIN DIAMETER	
NEW	6.920 mm to 6.970 mm (.272 in to .274 in)
SERVICE LIMIT	6.850 mm (.27 in)

Shift Drum

Check shift drum tracks for scouring or heavy wear, like rounded engagement slots.

Replace isolating washer if there are signs of wear or visible damages.



1. Track for the low/reverse gear shift fork
2. Track for the high gear shift fork
3. Isolating washer on the shift drum

Levers

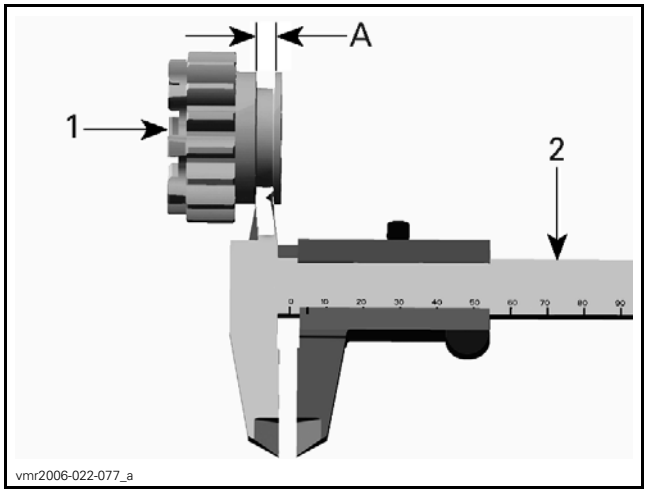
Check parking lever for cracks or other damages.

Index lever with roller must move freely.

Gears

NOTE: Replace gears only together with the corresponding meshing gears. Always replace circlips and use special pliers to install them.

Measure the width of shift fork engagement groove.

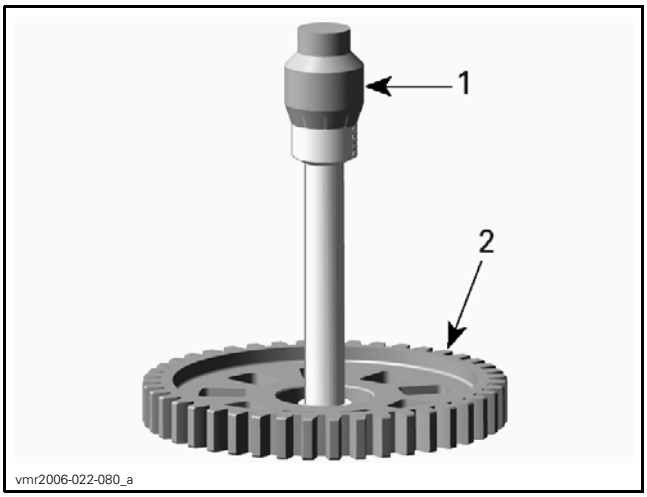


1. Main gear
2. Caliper
A. Width for engagement of shift fork

WIDTH OF SHIFT FORK ENGAGEMENT GROOVE (HIGH GEAR SHIFTING)	
NEW	5.00 mm to 5.10 mm (.197 in to .201 in)
SERVICE LIMIT	5.20 mm (.205 in)

WIDTH OF SHIFT FORK ENGAGEMENT GROOVE (LOW/REVERSE GEAR SHIFTING)	
NEW	5.30 mm to 5.40 mm (.209 in to .213 in)
SERVICE LIMIT	5.50 mm (.217 in)

Check free pinions for wear.



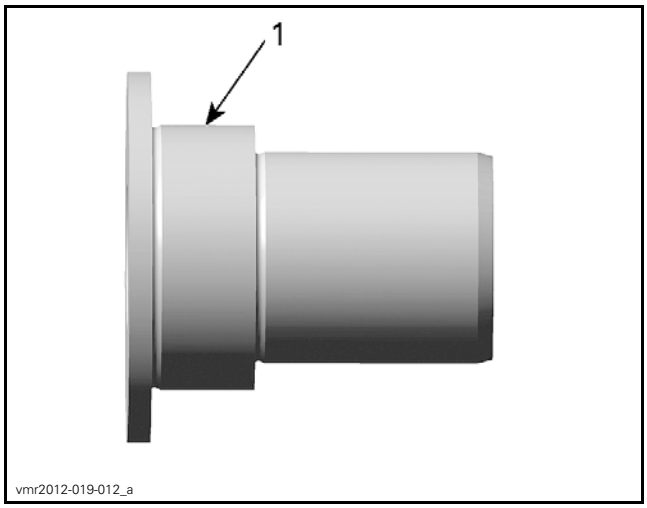
TYPICAL
1. *Micrometer*
2. *Free pinion*

DIAMETER FREE PINION	
NEW	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
SERVICE LIMIT	29.015 mm (1.1423 in)

Shafts

Check shift shaft for worn splines and gears.

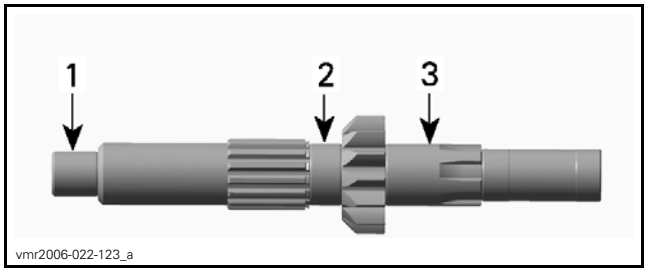
Check intermediate shaft for wear.



1. *Intermediate gear bearing*

INTERMEDIATE GEAR SHAFT	
NEW	24.979 mm to 25.000 mm (.9834 in to .9843 in)
SERVICE LIMIT	24.977 mm (.9833 in)

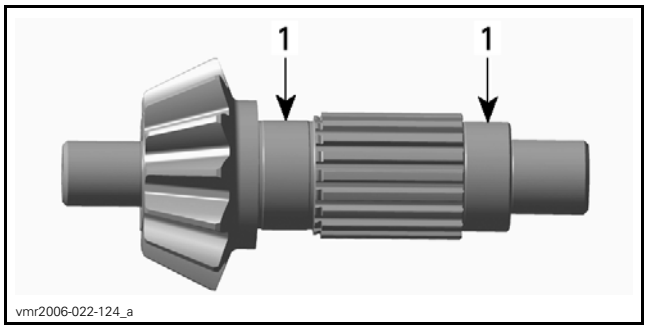
Check countershaft for wear.



1. *MAG side*
2. *Free pinion bearing*
3. *CVT side*

COUNTERSHAFT	
SERVICE LIMIT	
MAG SIDE	17.990 mm (.7083 in)
FREE PINION BEARING	24.970 mm (.9831 in)
CVT SIDE	24.970 mm (.9831 in)

Check bevel gear shaft.

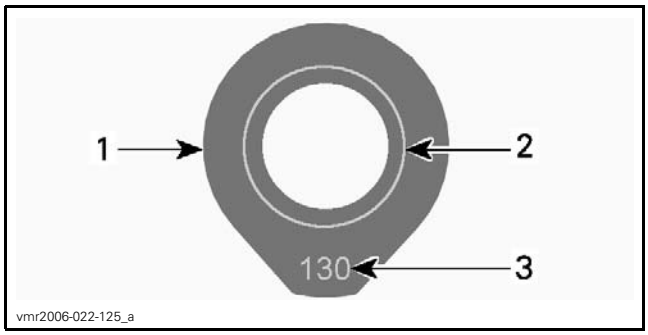


1. *Free pinion bearings*

BEVEL GEAR SHAFT	
SERVICE LIMIT	
FREE PINION BEARING	24.984 mm (.9836 in)

Shims

Always replace shim by a new one with the same thickness, when reassembling the gearbox with existing output shaft and bevel gear shaft.



1. Shim for adjusting the bevel gear on center housing side
2. Area where wear signs appear
3. Thickness of the shim

Adjusting the Gearbox

Bevel Gear

NOTE: Only necessary if the backlash and axial clearance of the bevel gear is out of specification or if parts are changed (output shaft, bevel gear shaft or housing).

There are 2 adjustments to perform on the bevel gear.

– Bevel gear backlash on center housing
– Bevel gear axial clearance on left housing.

The bevel gear backlash is adjusted by finding the proper shim thickness E as per following illustration.

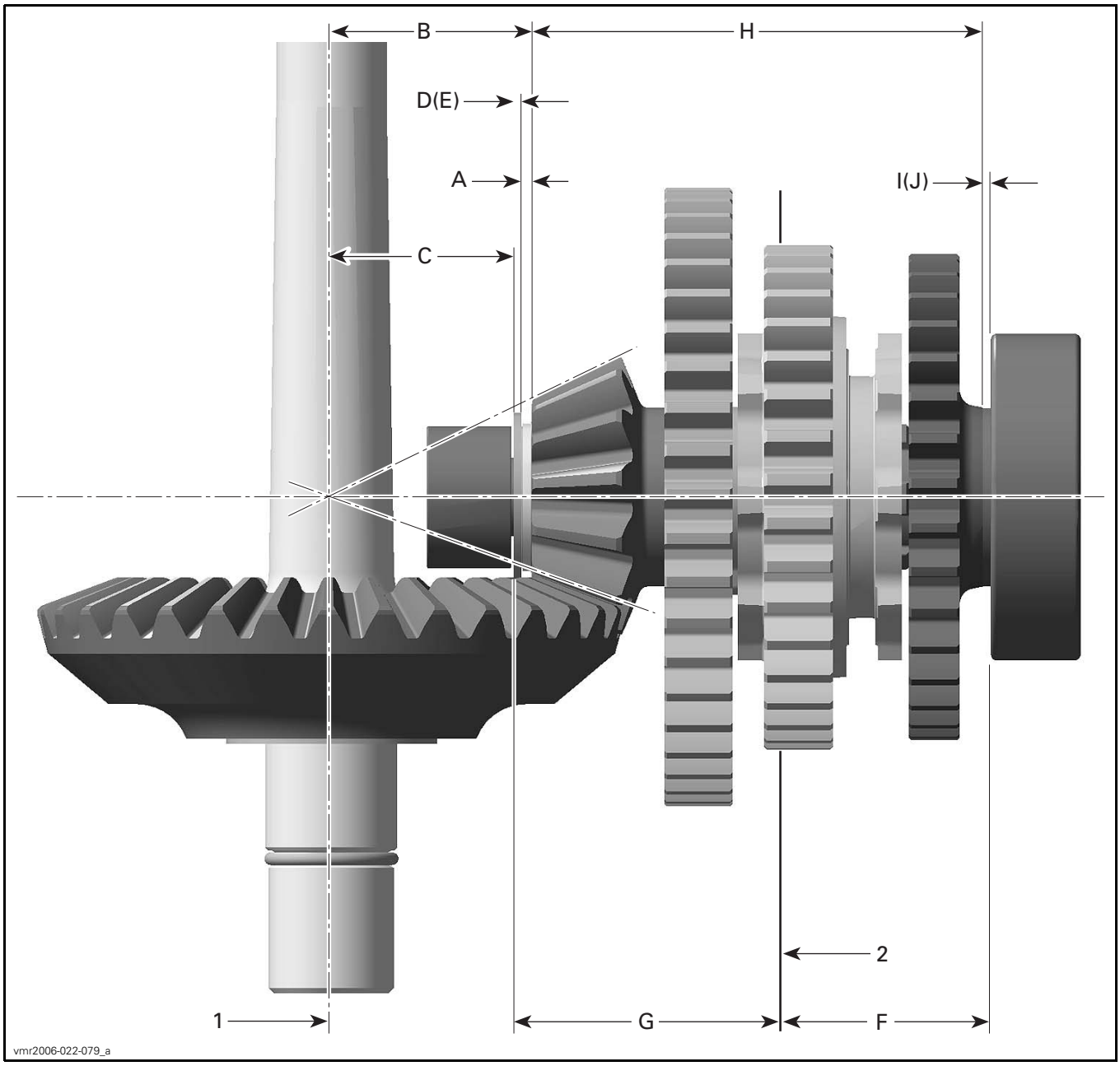
The bevel gear axial clearance is adjusted by finding the proper shim thickness J as per following illustration.

Clean mating surface of housing before taking measurements using gasket remover and a brass brush.

Brush a first pass in one direction then make the final brushing perpendicularly (90°) to the first pass cross (hatch).

NOTICE Do not wipe with rags. Use a new clean hand towel only.

SERVICE PRODUCT
LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500)



1. Mating surface — output shaft
2. Mating surface — left housing

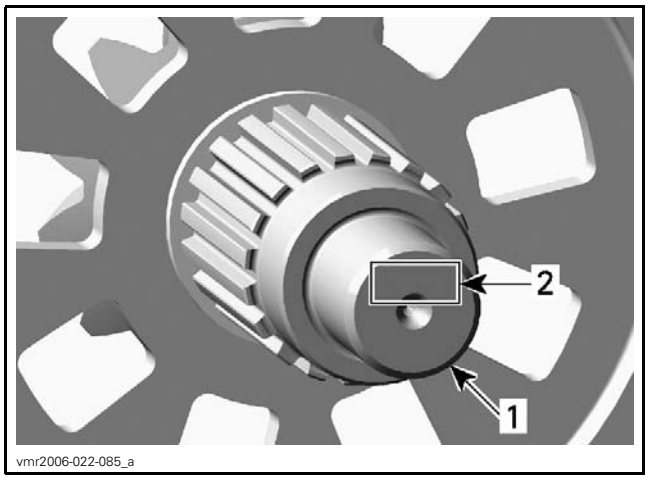
Bevel Gear Backlash Procedure

Use the following course of calculation to determine the theoretical shim thickness D:

D = B - C - A

B = The distance between the thrust surface of the bevel gear and the theoretical center of its taper. This is defined by manufacturer and is written on the bevel gear shaft.

This bevel gear reference number could be between - 10 and + 10.



1. Bevel gear
2. Bevel gear reference number

Use following formula to find out value B.

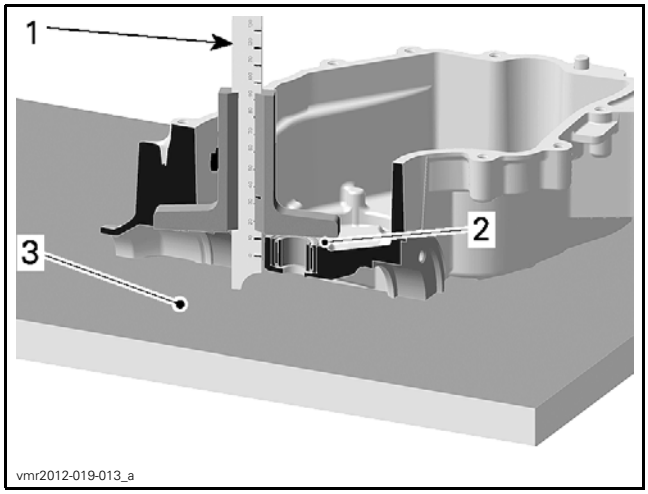
$$B = \left(\frac{\text{Bevel gear reference number}}{100}\right) + 37.8$$

For example: bevel gear reference number = - 3.

B = (- 3/100) + 37.8 = 37.77

C = Distance between the shim thrust surface in the center housing and the mating surface to right housing.

NOTE: For a better understanding following illustration is made as a cutaway.



1. Deep gauge — measurement **C**
2. Shim surface in center housing
3. Mating surface to right housing

A = 2 mm (.0787 in) nominal thickness of axial needle bearing.

When the measurements are taken, calculate the theoretical shim thickness (D) using the formula: (D = B - C - A).

Take the obtained theoretical shim thickness (D) and choose the corresponding shim number (E) according to the following table.

THEORETICAL SHIM THICKNESS -D-	SHIM NUMBER -E-
1.20 mm to 1.29 mm (.0472 in to .0508 in)	120
1.30 mm to 1.39 mm (.0512 in to .0547 in)	130
1.40 mm to 1.49 mm (.0551 in to .0587 in)	140
1.50 mm to 1.59 mm (.0591 in to .0626 in)	150
1.60 mm to 1.69 mm (.063 in to .0665 in)	160
1.70 mm to 1.79 mm (.0669 in to .0705 in)	170
1.80 mm to 1.89 mm (.0709 in to .0744 in)	180

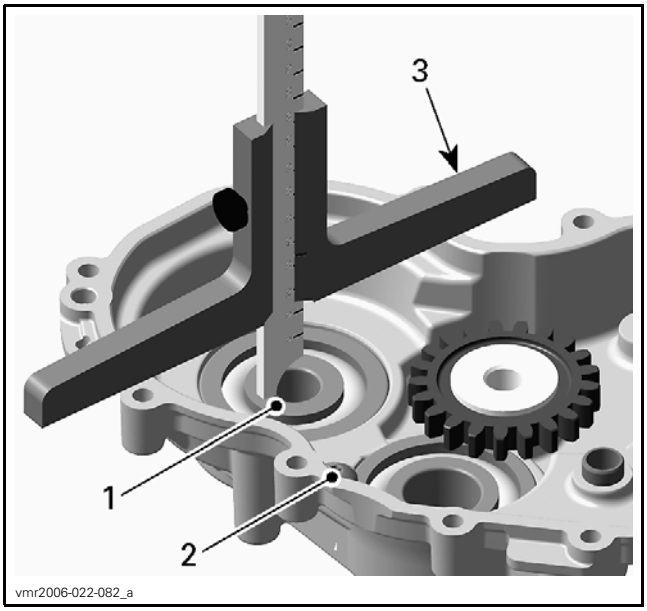
NOTE: For example, if the theoretical shim thickness (D) is 1.53 mm (.0602 in), choose the corresponding shim number 150 (E). The shim number 150 represents a nominal value equal to 1.50 mm (.0591 in).

Bevel Gear Axial Clearance Procedure

Use the following course of calculation to determine the theoretical shim thickness (I):

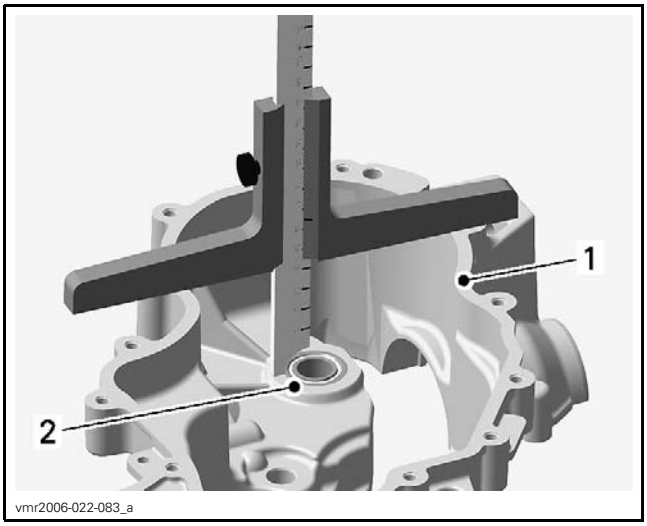
I = F + G - H - A - E

F = Distance between mating surface of left housing to ball bearing inner race.



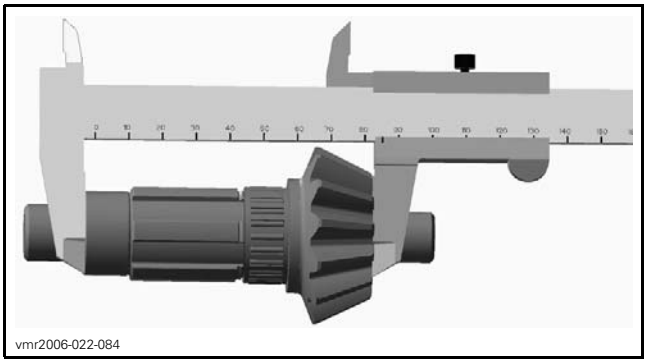
1. *Ball bearing inner race*
2. *Mating surface of left housing*
3. *Depth gauge*

G = Distance between mating surface of center housing and shim surface.



1. *Mating surface of center gear housing*
2. *Shim surface*

H = Distance between thrust surfaces of bevel gear shaft.



A = 2 mm (.0787 in) nominal thickness of axial needle bearing.

E = The shim number nominal value as found in the *BEVEL GEAR BACKLASH PROCEDURE*. For example, shim number 150 represents a value of 1.50 mm (.0591 in).

When the measurements are taken, calculate the theoretical shim thickness (I) using the formula: (I = F + G - H - A - E).

Take the obtained theoretical shim thickness (I) and choose the corresponding shim number (J) according to the following table.

THEORETICAL SHIM THICKNESS -I-	SHIM NUMBER -J-
1.22 mm to 1.31 mm (.048 in to .0516 in)	120
1.32 mm to 1.41 mm (.052 in to .0555 in)	130
1.42 mm to 1.51 mm (.0559 in to .0594 in)	140
1.52 mm to 1.61 mm (.0598 in to .0634 in)	150
1.62 mm to 1.71 mm (.0638 in to .0673 in)	160
1.72 mm to 1.81 mm (.0677 in to .0713 in)	170
1.82 mm to 1.91 mm (.0717 in to .0752 in)	180

For example, if the theoretical shim thickness (I) is 1.53 mm (.0602 in), choose the corresponding shim number 150 (J).

Bevel gear axial clearance of 0.02 mm to 0.11 mm (.0008 in to .0043 in) is included in the above table.

Assembling the Gearbox

Reverse the disassembly procedure. However, pay attention to the following details.

Installing the Bearings

Unless otherwise instructed, never use hammer to install ball bearings or needle bearings. Use press machine only.

If necessary heat housings up to 100°C (212°F) before installing ball bearings or needle bearings.

⚠ WARNING

Clean oil, outside and inside, from housing before heating.

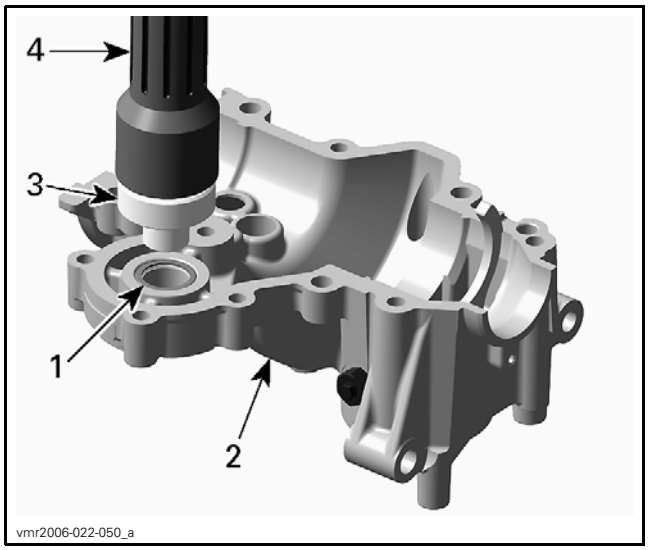
Place new bearing in freezer for 10 minutes before installation.

Use a suitable installer for installing ball bearings of countershaft and bevel gear.

NOTE: Place gearbox housings on a wood stand before installing ball bearings.

Install countershaft needle bearing in right housing.

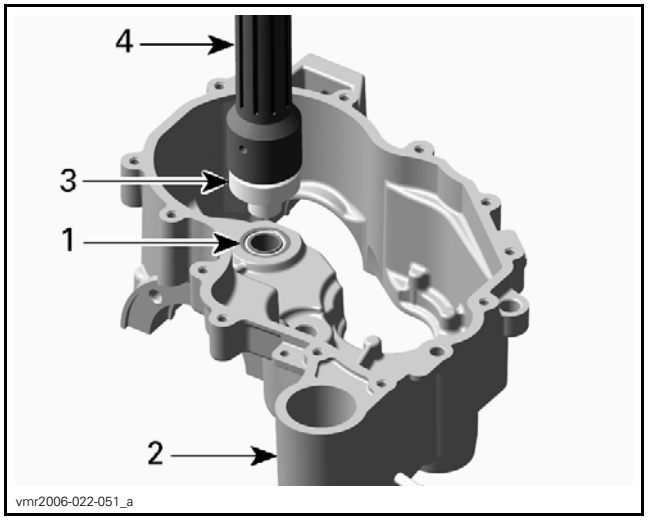
REQUIRED TOOL	
BEARING INSTALLER (GEARBOX) (P/N 529 035 762)	
HANDLE (P/N 420 877 650)	



1. *Countershaft needle bearing*
2. *Right housing*
3. *Needle bearing installer*
4. *Installer handle*

Install bevel gear needle bearing.

REQUIRED TOOL	
BEARING INSTALLER (GEARBOX) (P/N 529 035 763)	
HANDLE (P/N 420 877 650)	



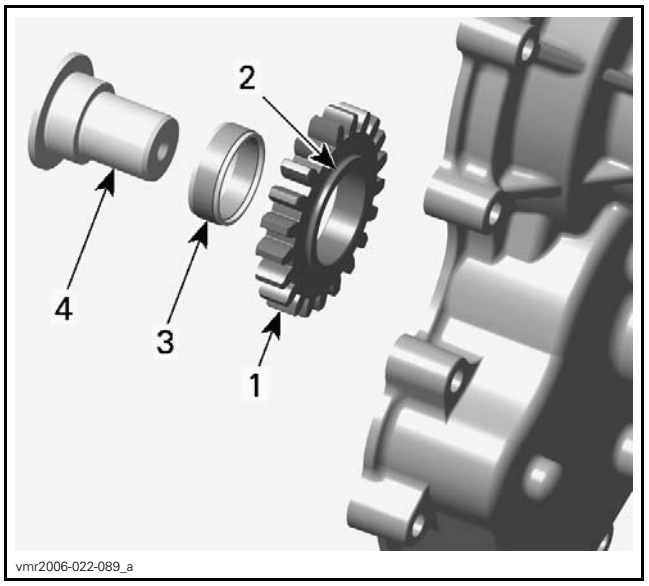
1. *Bevel gear needle bearing*
2. *Center housing*
3. *Needle bearing installer*
4. *Installer handle*

Install new oil seals with the proper installer (refer to *GEARBOX OIL SEALS* in this subsection).

Other Gearbox Components

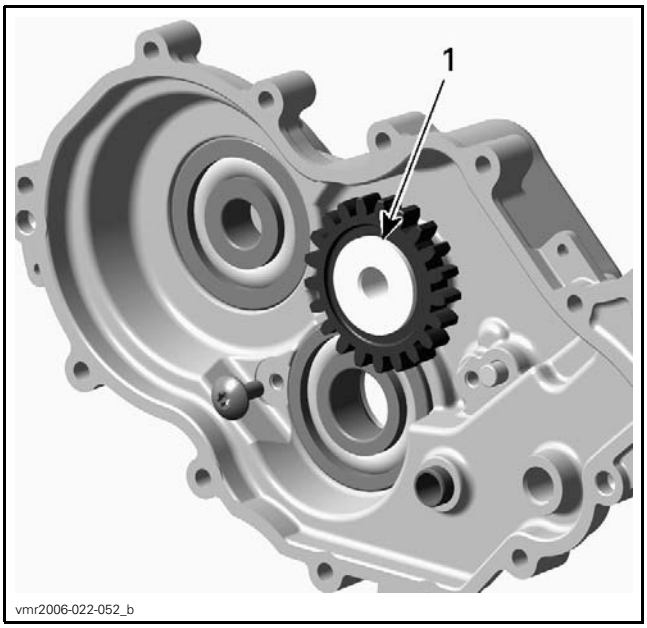
Fit intermediate gear with needle bearing on intermediate gear shaft.

NOTE: Fit gear with collar facing to housing side on the intermediate shaft.



1. *Intermediate gear*
2. *Collar facing housing*
3. *Needle bearing*
4. *Intermediate gear shaft*

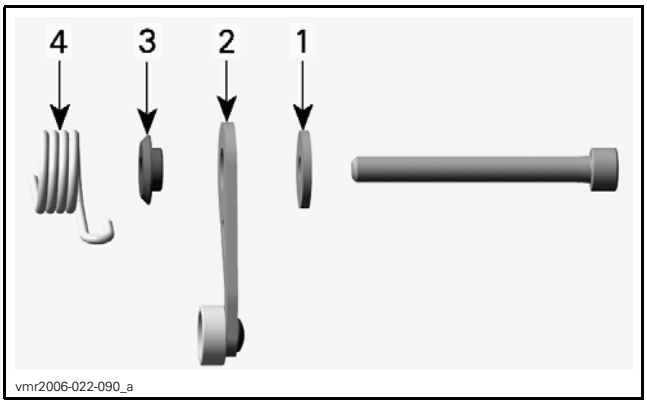
Press intermediate gear shaft in the left housing.



1. Intermediate gear shaft

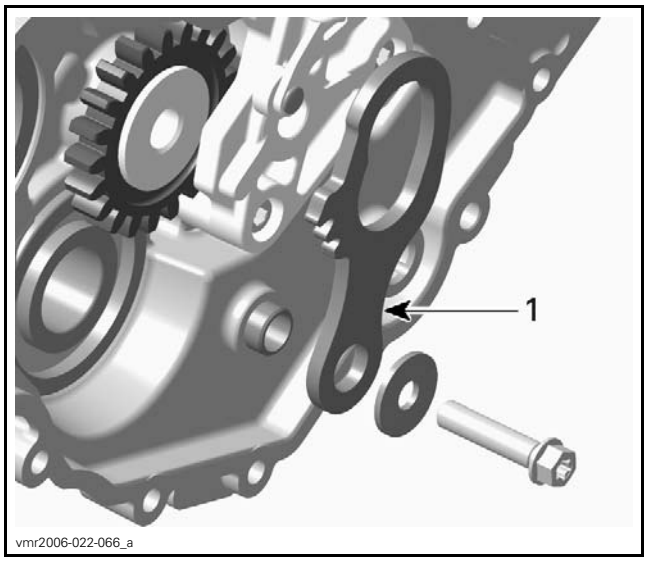
Fit support flange in the left housing and install index lever.

NOTE: Fit step ring into index lever.



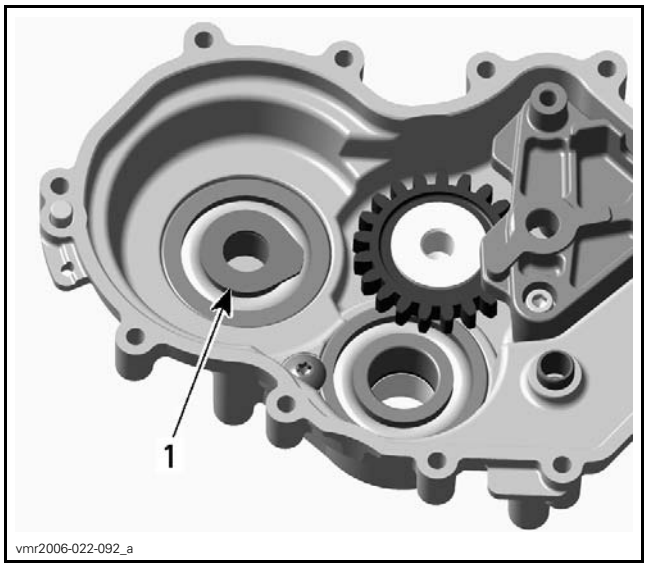
1. Washer
2. Index lever
3. Step ring
4. Index spring

Install parking lock lever, teeth showing to countershaft.



1. Parking lock lever

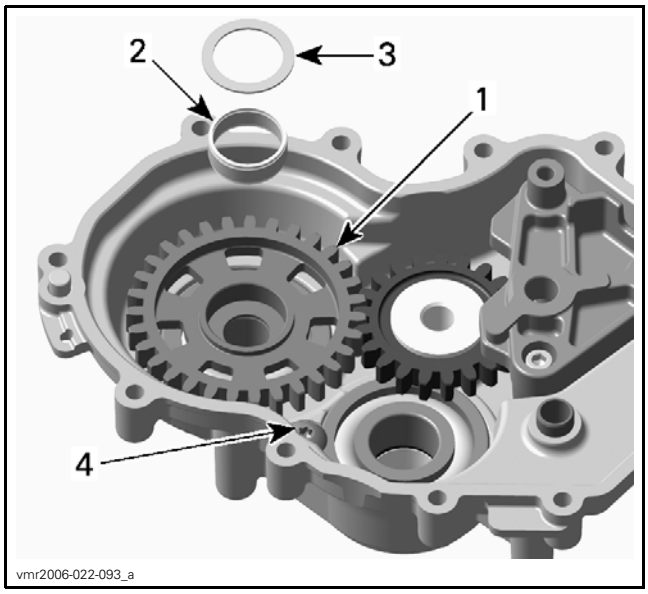
Place shim of CVT side on bearing.



1. Shim CVT side

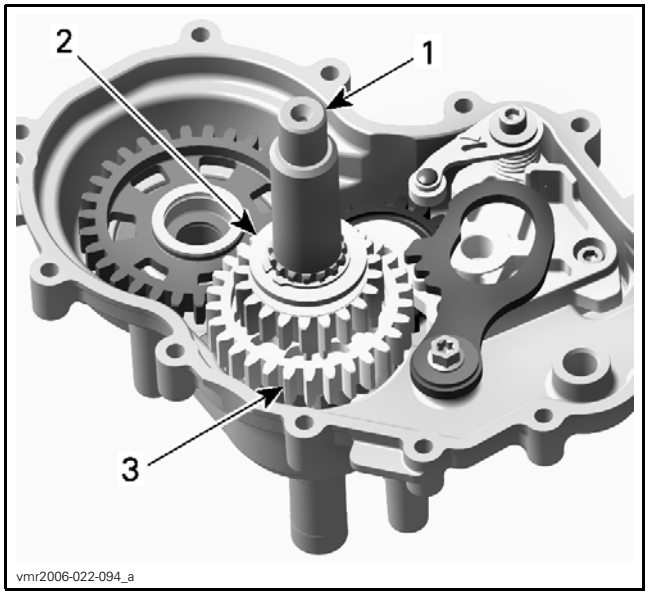
Place reverse gear with needle bearing and thrust washer.

NOTE: Check if the screw to secure countershaft bearing is installed.



1. *Reverse gear*
2. *Needle bearing*
3. *Thrust washer*
4. *Countershaft bearing screw*

Install countershaft with low gear and high gear assembly.

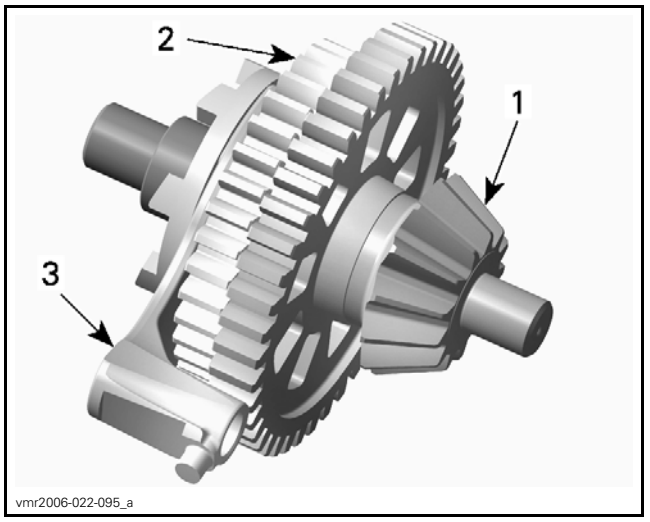


1. *Countershaft*
2. *Low gear*
3. *High gear*

Install a new shim onto bevel gear shaft, fork side.

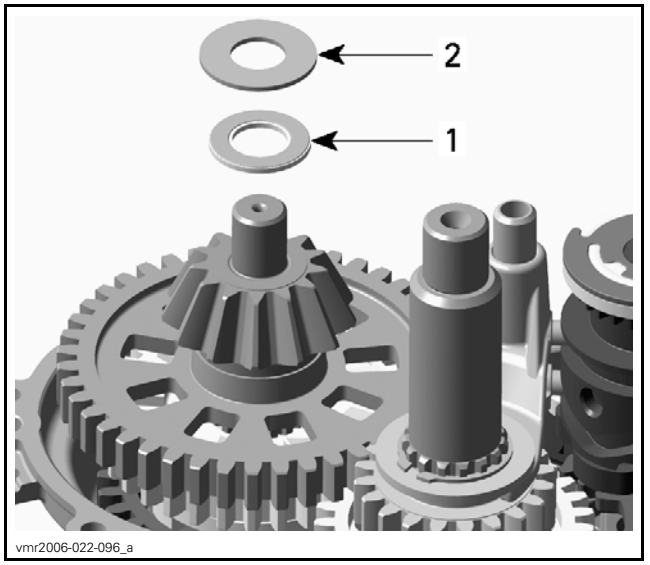
Install bevel gear with sliding gear assembly together with shift fork.

NOTE: If a new bevel gear and output shaft are used, it is necessary to verify the shim adjustment prior to finalize assembly. Refer to *ADJUSTMENT* in this subsection. If the existing bevel gear is used, it is mandatory to use a new shim with the same thickness, a new needle bearing and shim.



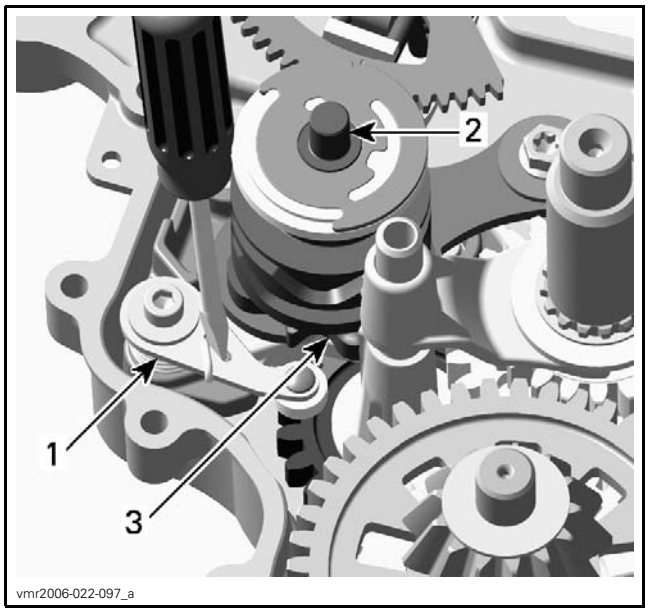
1. *Bevel gear*
2. *Sliding gear*
3. *Shift fork*

Install a new needle bearing and shim.

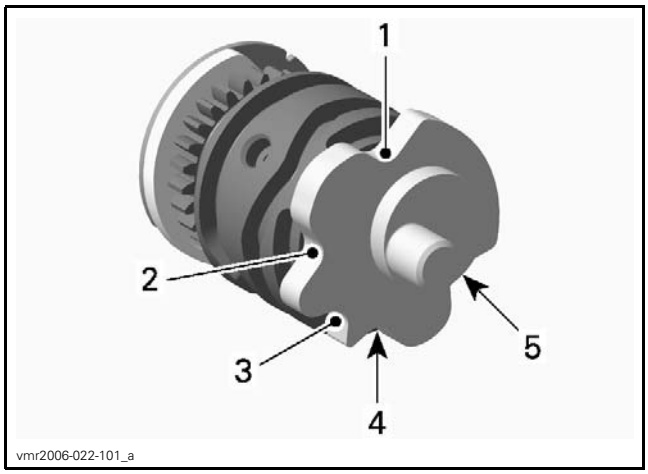


1. *Needle bearing*
2. *Shim*

Insert a flat screwdriver in the slot of the index lever, turn screwdriver clockwise and install shift drum on neutral position as per following illustration.



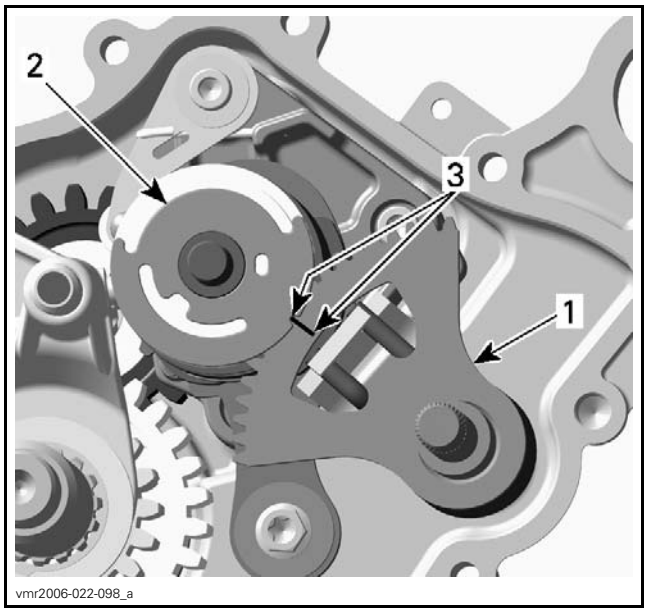
1. *Index lever*
2. *Shift drum*
3. *Neutral position*



1. *Parking stop location*
2. *Reverse stop location*
3. *Neutral stop location*
4. *High gear stop location*
5. *Low gear stop location*

Install shift shaft assembly.

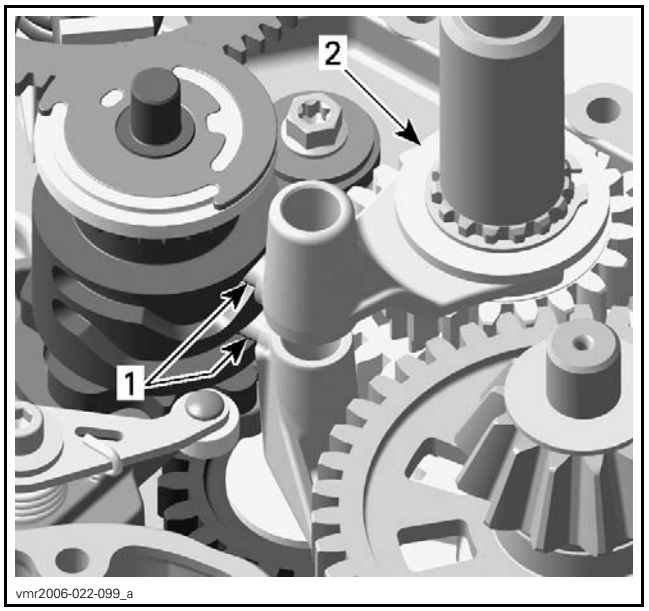
NOTE: Marks on shift drum/isolating washer and shift shaft must align.



1. *Shift shaft assembly*
2. *Isolating washer*
3. *Marks*

Install shift fork then engage both shift fork pins in their corresponding groove on the shift drum.

NOTE: Move sliding gears to facilitate engagement of pins inside grooves.



1. *Shift fork pins*
2. *Sliding gear*

Install shift fork shaft.

NOTE: Run all gears as a final function check before installing center housing.

Now, close the housings by doing the following:

Clean all metal components in a solvent.

Clean gearbox housing mating surfaces using gasket remover and a brass brush.

Brush a first pass in one direction then make the final brushing perpendicularly (90°) to the first pass cross (hatch).

NOTICE **Do not wipe with rags. Use a new clean hand towel only.**

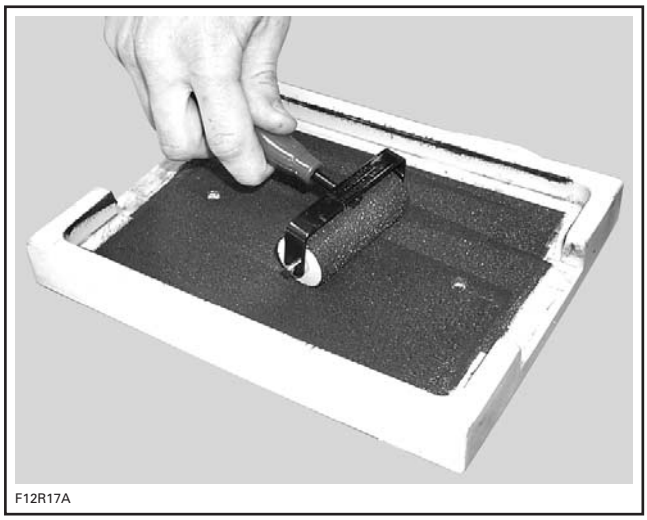
SERVICE PRODUCT
LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500)

IMPORTANT: When beginning the application of the gear housing sealant, the assembly and the first torquing should be done within 10 minutes. It is suggested to have all you need on hand to save time.

Apply sealant on mating surfaces.

SERVICE PRODUCT
LOCTITE 5910 (P/N 293 800 081)

Use a plexiglass plate and apply some sealant on it. Use a soft rubber roller (50 mm to 75 mm (2 in to 3 in)), available in arts products suppliers for printing, and roll the sealant to get a thin uniform coat on the plate (spread as necessary). When ready, apply the sealant on gear housing mating surfaces.


F12R17A

Do not apply in excess as it will spread out inside gear housing.

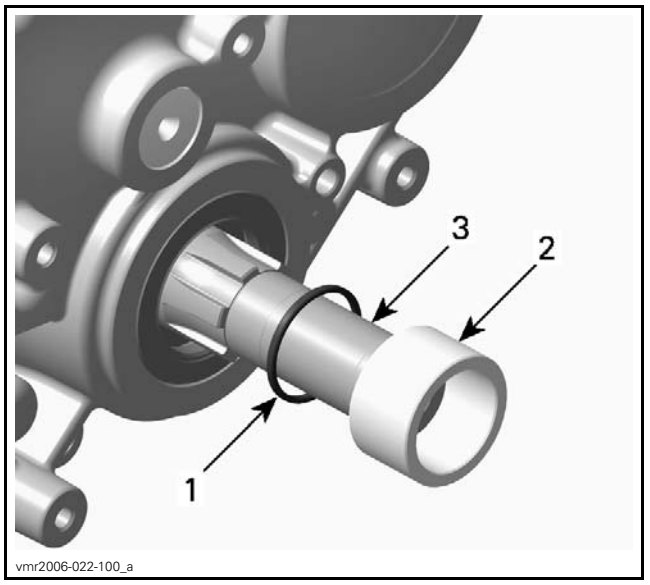
NOTE: It is recommended to apply this specific sealant as described here to get a uniform application without lumps. If you do not use the roller method, you may use your finger to uniformly distribute the sealant (using a finger will not affect the adhesion).

Tighten gear housing screws in a crisscross sequence.

TIGHTENING TORQUE		
Gear housing screws	Step A	Hand tightened
	Step B	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Install O-ring including distance sleeve on countershaft CVT side.

NOTICE **Place O-ring including distance sleeve right away. Chamfered bore of distance sleeve has to face the gearbox.**



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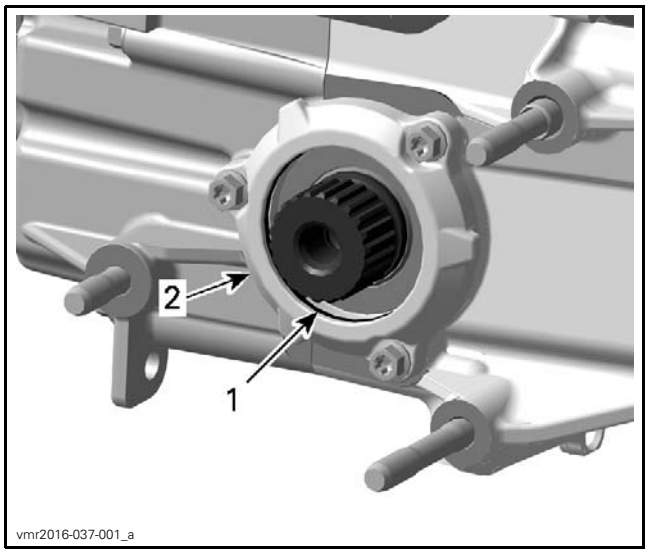
COUNTERSHAFT END CVT SIDE
1. *O-ring*
2. *Distance sleeve*
3. *Countershaft end CVT side*

Refer to *OUTPUT SHAFT AND COUPLING MECHANISM* to install these components. Measure the output shaft backlash.

Installing the Gearbox

The installation is the reverse of the removal procedure.

Before gearbox installation check O-ring in bearing cover if brittle, hard or damaged. Replace if necessary.



1. O-ring
2. Bearing cover

Tighten the three (3) nuts that attaching the gearbox to the engine.

TIGHTENING TORQUE	
Gearbox retaining nuts	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft) + LOCTITE 243 (BLUE) (P/N 293 800 060)

After installation refill gearbox oil, refer to *PERIODIC MAINTENANCE PROCEDURES*.

GEARBOX AND 4X4 COUPLING UNIT (WITH GBPS)

SERVICE TOOLS

Description	Part Number	Page
COUNTERSHAFT OIL SEAL PUSHER	529 036 222	11
ECM ADAPTER TOOL	529 036 166	7
FLUKE 115 MULTIMETER	529 035 868	5
HANDLE	420 877 650	12
OIL SEAL INSTALLER (GEARBOX)	529 035 758	12
OIL SEAL INSTALLER	529 036 204	12

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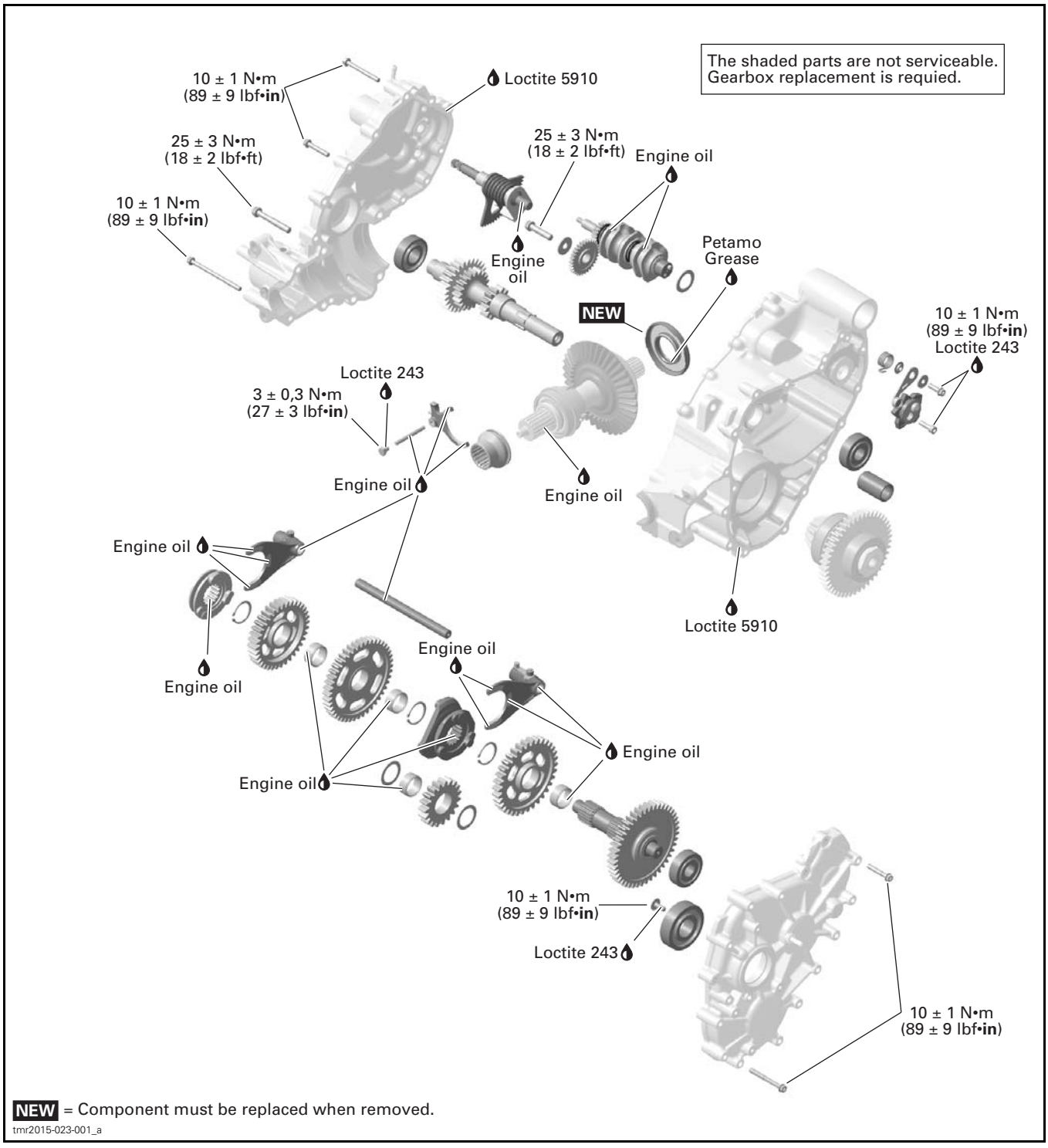
SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	26
LOCTITE 5910	293 800 081	24
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	24
PETAMO GREASE GHY 133N	420 899 271	11
SUPER LUBE GREASE	293 550 030	7, 9

GEARBOX COMPONENTS AND 4X4 COUPLING MECHANISM



NEW = Component must be replaced when removed.

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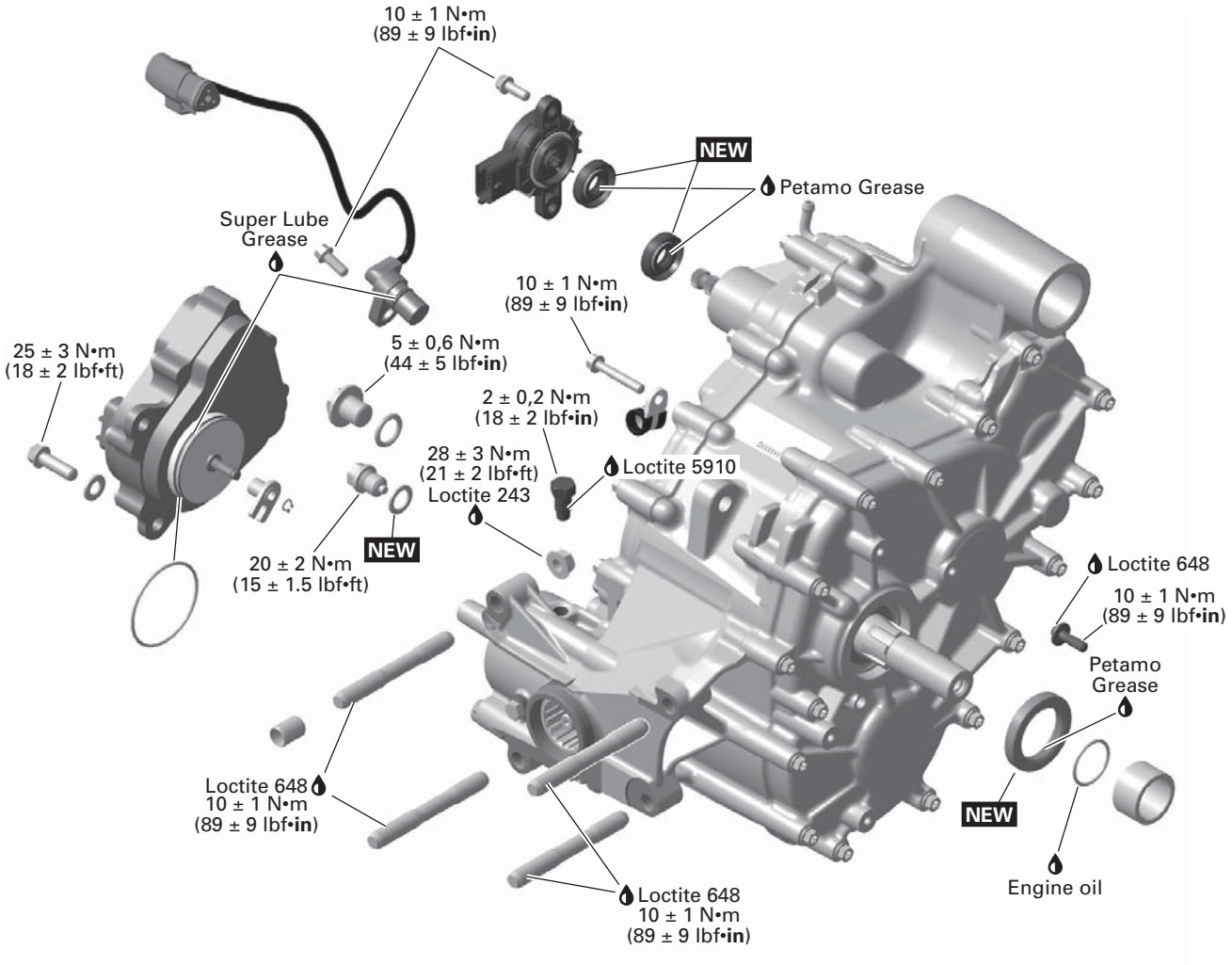
GEARBOX COMPONENTS AND 4X4 COUPLING MECHANISM



NEW = Component must be replaced when removed.

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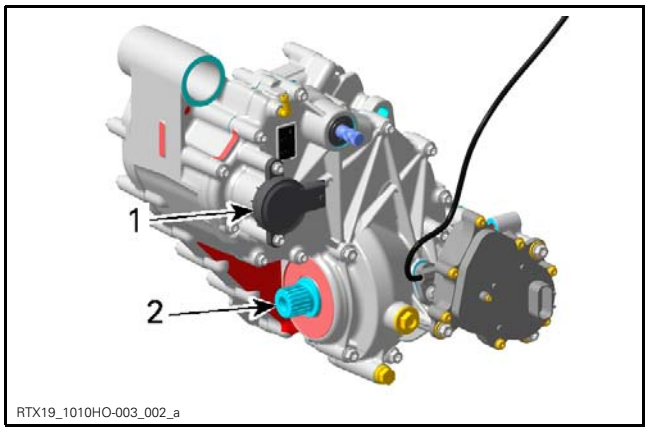
GENERAL

GEARBOX IDENTIFICATION

Gearbox with GBPS

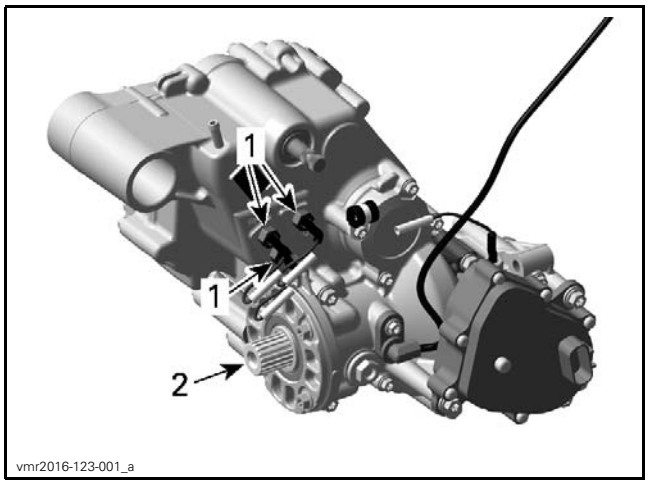
This gearbox is equipped with 1 gearbox position sensor.



GEARBOX, RIGHT HAND SIDE
1. *Gearbox position sensor*
2. *Output shaft*

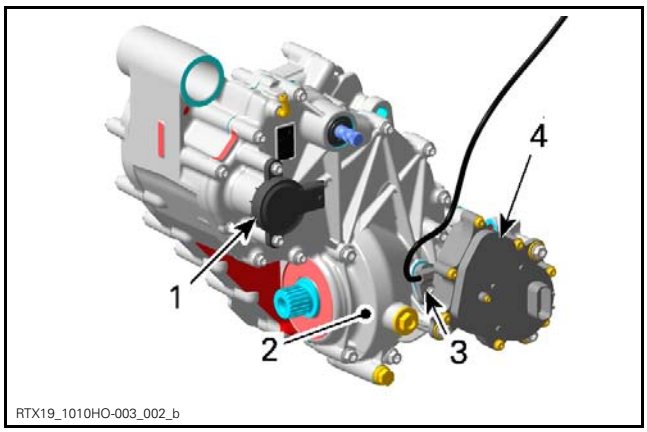
Gearbox with External Switches

This gearbox is equipped with 3 gearbox position indicator switches.

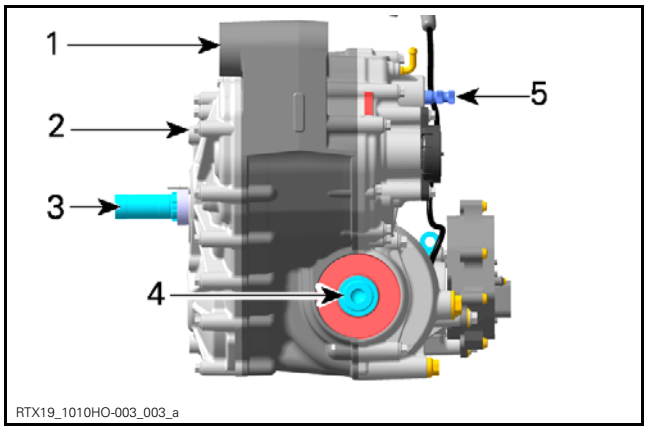


GEARBOX, RIGHT HAND SIDE
1. *Gearbox position indicator switches*
2. *Output shaft*

GEARBOX OVERVIEW



1. *Gearbox position sensor (GBPS)*
2. *Right cover*
3. *Vehicle speed sensor (VSS)*
4. *Actuator*



1. *Center housing*
2. *Left cover*
3. *Countershaft*
4. *Output shaft*
5. *Shift shaft*

TROUBLESHOOTING

UNUSUAL GEARBOX NOISE AND/OR VIBRATIONS

1. Low oil level in gearbox.
   - *Oil leakage from gearbox. Replace damaged gasket(s) and/or oil seal(s).*
2. Defective bearings.
   - *Bearing(s) do(es) not turn smoothly. Replace bearing(s).*
3. Damaged or worn gears.
   - *Inspect gears for damages or missing teeth. Replace respective gears.*

GEAR INDICATION FAILS

1. Defective gearbox position sensor (GBPS).
   - *Perform a gearbox position sensor test.*
   - *Damaged wires. Repair as required.*

GEAR(S) IS (ARE) HARD TO SHIFT

1. Incorrect shift rod adjustment.
   - *Adjust shift rod (refer to SHIFT ROD in SHIFTER subsection.*

4 WHEEL DRIVE DOES NOT ENGAGE OR DISENGAGE

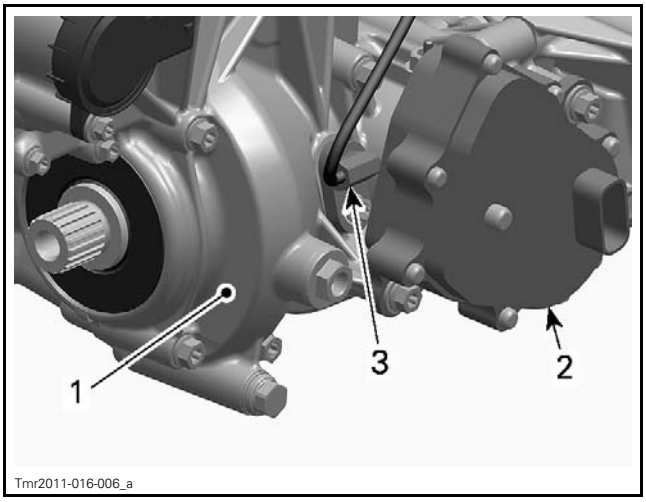
1. Defective actuator.
   - *Test actuator.*
2. Damaged or worn shifting fork or sleeve.
   - *Remove actuator and inspect shifting fork and sleeve.*

PROCEDURES

VEHICLE SPEED SENSOR (VSS)

VSS Location

The vehicle speed sensor is located on the right housing of the gearbox behind the actuator.



1. Right housing of gearbox
2. Actuator
3. VSS (Vehicle Speed Sensor)

VSS Access

To reach the VSS, refer to *BODY* subsection and remove the following parts:
– Seat
– Console
– RH side panel.

VSS Wire Identification

FUNCTION	PIN - SENSOR CONNECTOR	PIN - WIRING HARNESS CONNECTOR
12-volt input from fuse F5	A	1
Speed signal (to ECM pin E1)	B	2
Ground (to ECM pin D4)	C	3

VSS Circuit Protection

CONDITION	CIRCUIT PROTECTION
Supplied with main relay activated	Fuse 5

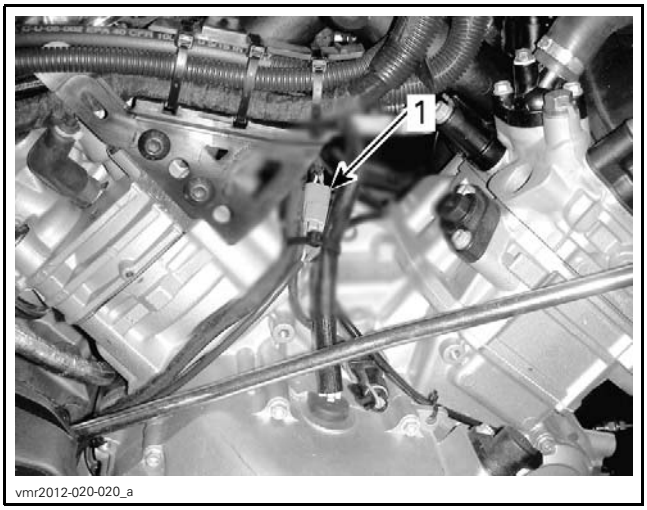
Testing the VSS Input Voltage

1. Remove VSS connector cover.
2. Set multimeter to Vdc.

REQUIRED TOOL
FLUKE 115 MULTIMETER (P/N 529 035 868)

3. Turn ignition switch ON.

4. Set emergency engine stop switch to RUN.
5. Back-probe the VSS connector.



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1. VSS connector

6. Measure voltage as per following table.

VEHICLE SPEED SENSOR INPUT VOLTAGE TEST		
TEST PROBES		MEASUREMENT (KEY ON)
PIN A	PIN C	Battery voltage

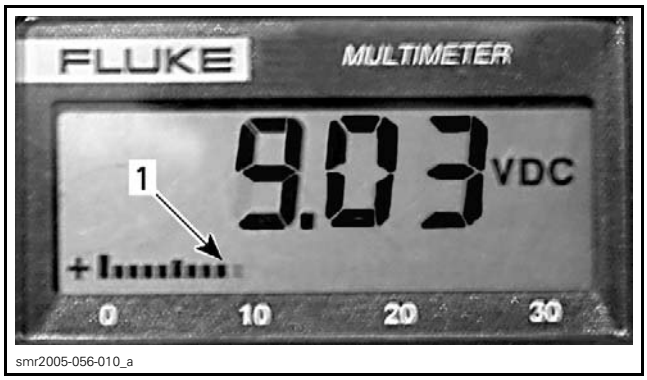
If voltage is not as specified, test positive and ground circuits separately.

Testing the VSS Signal

1. Lift rear of vehicle so that rear wheels are off the ground.
2. Set transmission to 2WD and to NEUTRAL.
3. Back-probe the VSS connector.
4. Turn ignition switch ON.
5. Set emergency engine stop switch to RUN.
6. Set multimeter to Vdc.
7. Measure voltage while slowly rotating rear wheels by hand.

VEHICLE SPEED SENSOR SIGNAL TEST		
TEST PROBES		MEASUREMENT (WHILE ROTATING WHEELS)
PIN B	PIN C	Alternate reading between battery voltage and 0 Vdc

NOTE: Since we measure pulsating voltage, the numeric display will continuously change. The analog display may be easier to follow.



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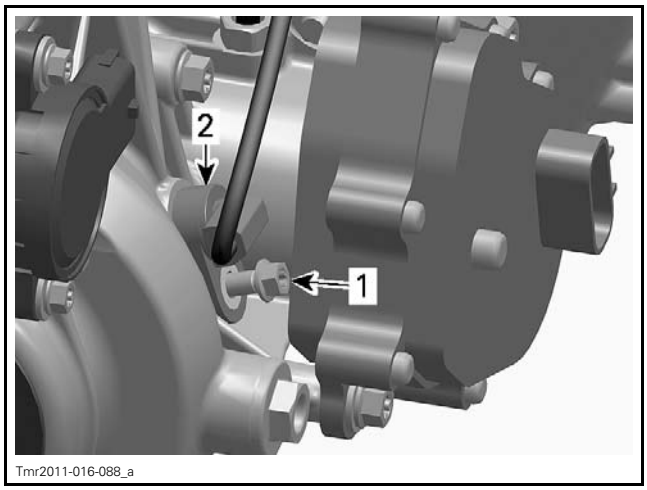
1. Analog display

Removing the VSS

Remove screw retaining the VSS.



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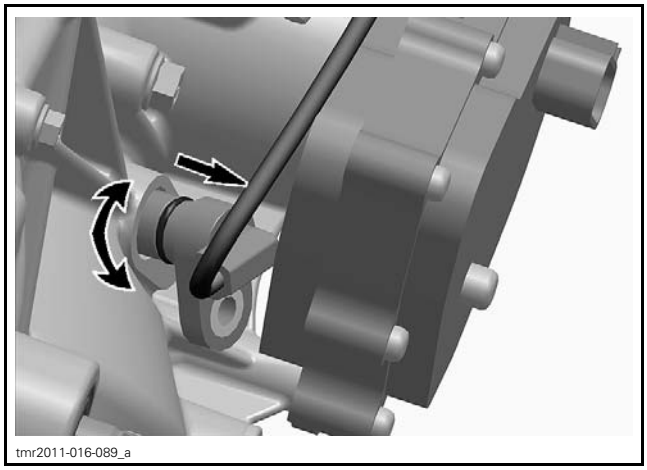
1. Screw
2. VSS

Turn sensor and weave it out of the gearbox right cover.



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Installing the VSS

The installation is the reverse of the removal procedure. However, pay attention to the following.

Lubricate VSS O-ring.

SERVICE PRODUCT
SUPER LUBE GREASE (P/N 293 550 030)

Tighten VSS retaining screw to specification.

TIGHTENING TORQUE	
VSS retaining screw	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

GEARBOX POSITION SENSOR (GBPS)

GBPS Reset

When replacing the gearbox position sensor (GBPS), it is required to reset (re-zero) its values for proper operation.

A reset must be carried out each time any of the following parts has been replaced:

– Gearbox assembly
– Shift drum
– GBPS
– ECM.

1. Connect the vehicle to the BRP diagnostic software (BUDS2).

NOTE: Ignition key must stay ON and emergency engine stop switch must remain to RUN during the reset procedure. Otherwise, the procedure must be carried out again.

2. In BUDS2, select the following:
   – **Settings** page
   – **ECM** button
   – **Settings** tab
   – **Reset Gearbox position sensor**.
3. Follow the on-screen instructions.
4. Close and disconnect BUDS2.

GBPS Location

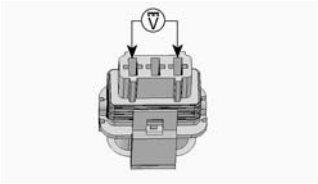
The GBPS is located on the rear right side of the gearbox, Behind the shift plate.

Testing the GBPS Input Voltage

NOTE: Prior to conduct testing, check fault codes in BUDS2.

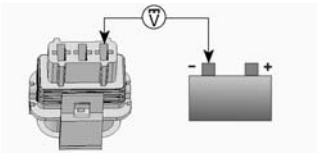
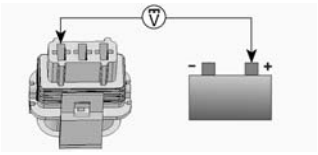
Back-probe the GBPS connector.

Test as follow:

MULTIMETER PROBE POSITIONS	MEASUREMENT
PIN 1 and PIN 3 of the GBPS connector 	5 volts

If voltage is adequate, check GBPS signal wire.

If there is no voltage, check each GBPS input as follows.

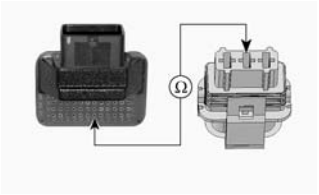
MULTIMETER PROBE POSITIONS	MEASUREMENT
GBPS connector (pin 1) and battery ground 	5 volts
GBPS connector (pin 3) and battery + terminal 	Battery voltage

If there is no voltage, check wires and connector pins. Replace or repair defective parts and reset fault codes.

Testing the GBPS Signal Wire Continuity

Unplug ECM connector and connect it to the adapter tool.

REQUIRED TOOL
ECM ADAPTER TOOL (P/N 529 036 166)

MULTIMETER PROBE POSITIONS	MEASUREMENT 20°C (68°F)
GBPS connector (pin 2) and ECM adapter tool (pin F4) 	Below 1 Ω

If resistance is out of specification, check wires and connectors. Repair and reset fault codes.

If resistance is good and the other tests succeeded, replace the GBPS and reset fault codes.

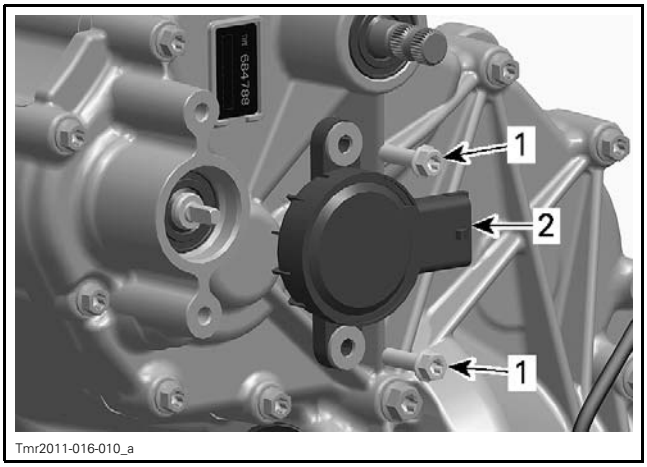
NOTE: The GBPS must be reset.

Removing the GBPS

Set shift lever in NEUTRAL position.

Unplug GBPS connector.

Remove screws and withdraw GBPS.



Tmr2011-016-010_a

1. Screws
2. Gearbox Position Sensor (GBPS)

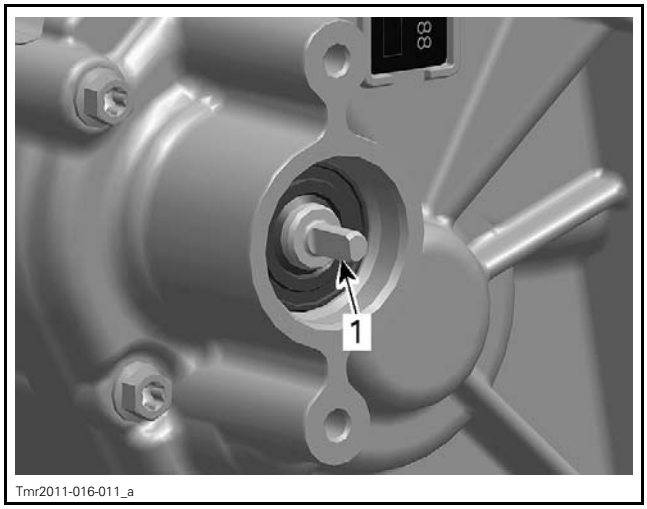
Installing the GBPS

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

Shift lever must be in the NEUTRAL position.

Align GBPS with the flat on the shift drum shaft.

IMPORTANT: Do not force to install GBPS if shaft flat is not properly aligned. If alignment is incorrect, check shift rod adjustment.



Tmr2011-016-011_a

1. Flat on shift drum shaft

TIGHTENING TORQUE	
GBPS retaining screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Reset the GBPS. Refer to *GBPS RESET* in this subsection.

ACTUATOR

Actuator Access

To access the actuator, refer to *BODY* and remove the following parts:

– Seat
– Console
– RH side panel
– RH footrest panel

Testing the Actuator Power Input

Unplug actuator connector.

Turn ignition key ON.

Set emergency engine stop switch to RUN.

Measure voltage as follows.

ACTUATOR HARNESS CONNECTOR		MEASUREMENT
Pin 1	Pin 2	Battery voltage

If the result is out of specifications, check power input circuit. Refer to wiring diagram.

If the result is good, check the 4WD circuit continuity.

Testing the 4WD Circuit Continuity

1. Turn ignition switch OFF.
2. Unplug:
   – Right steering switch (RSS)

– 4WD Actuator connector
– HIC connector.

3. Measure continuity.

VEHICLE HARNESS CONNECTOR		MEASUREMENT
RSS 3	HIC B	Close to 0 Ω
RSS 2	Frame (ground)	
CL 6	HIC H	

ENGINE HARNESS CONNECTOR		MEASUREMENT
4WD Actuator 3	HIC H	Close to 0 Ω
4WD Actuator 4	HIC B	

If continuity is good, replace 4WD Actuator.

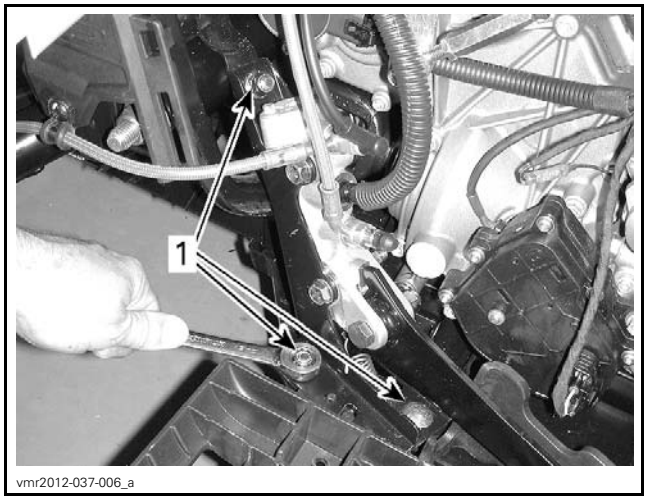
If continuity is out of specification repair wires and / or connectors, or replace actuator switch.

Removing the Actuator

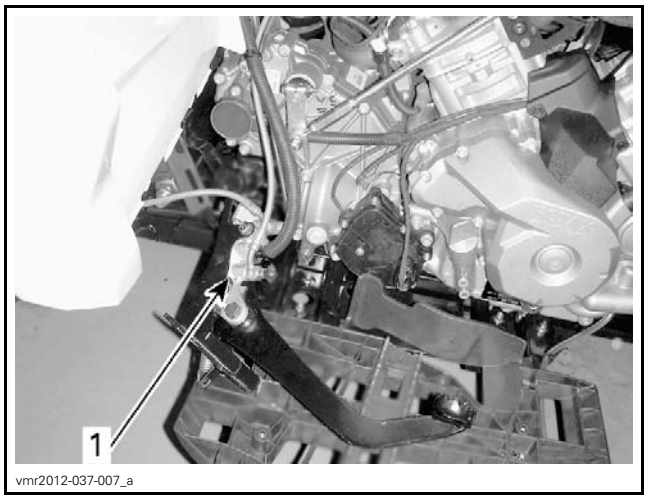
NOTE: Before beginning any servicing on the actuator, make sure the vehicle is in 4WD position. No need to remove engine from vehicle.

Place a drain pan under actuator.

Detach brake master cylinder from frame (Outlander only).

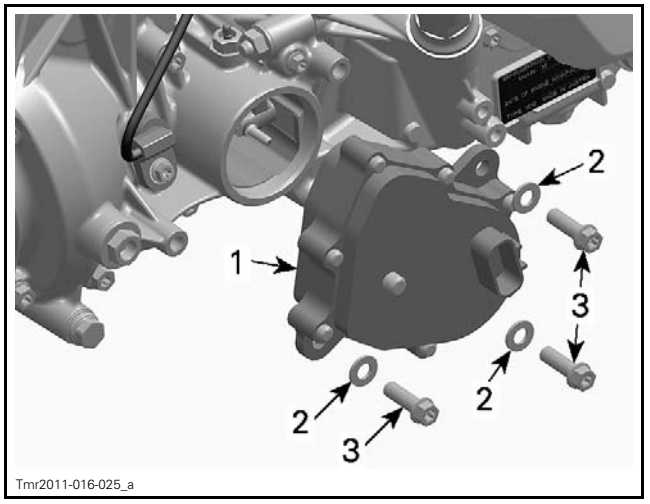


OUTLANDER ONLY
1. Remove retaining screws from master cylinder support



OUTLANDER ONLY
1. Master cylinder moved apart

Remove actuator screws.



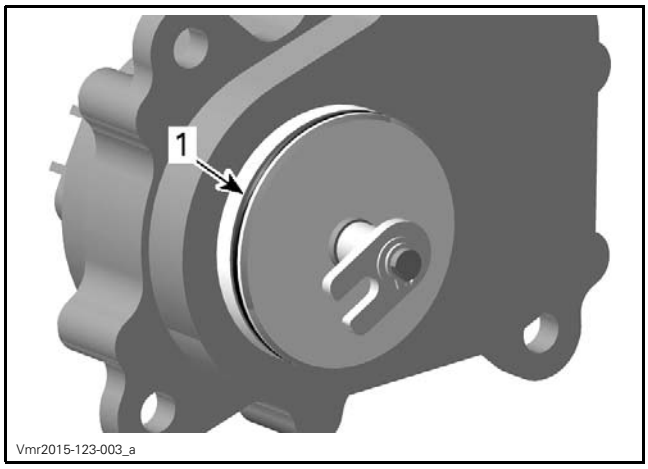
1. Actuator
2. Washer
3. Screw

Pull the actuator out of housing.

Installing the Actuator

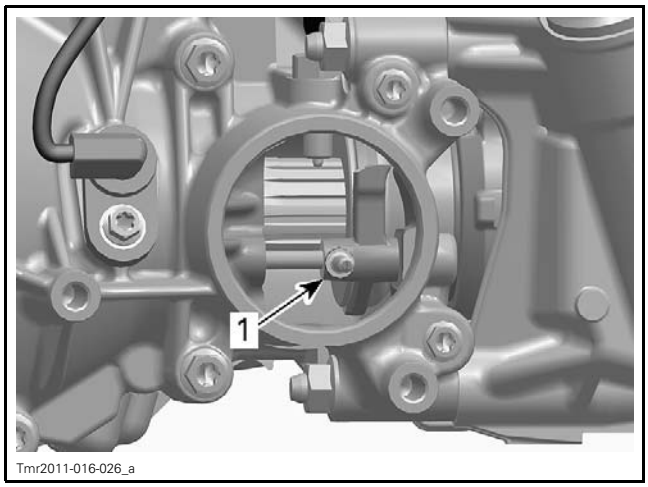
Lubricate actuator O-ring.

SERVICE PRODUCT
SUPER LUBE GREASE (P/N 293 550 030)



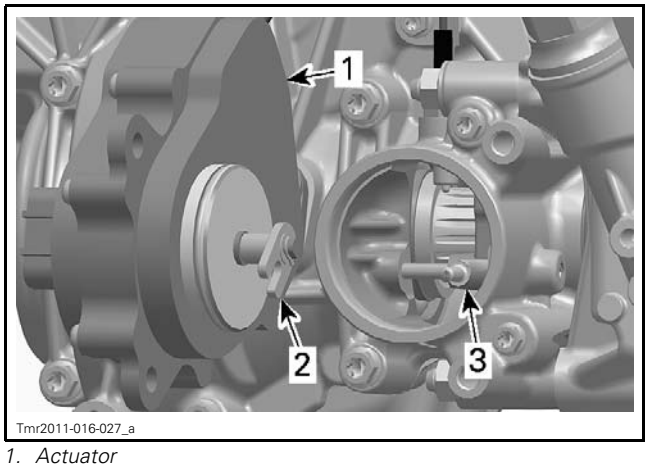
1. Actuator O-ring

Ensure coupling fork is in 4WD position (positioned toward the front of vehicle).



1. Coupling fork in 4WD position

Align the actuator fork with the pin on coupling fork then push the actuator in the housing. See the following illustration to position the actuator correctly.



1. Actuator
2. Actuator fork
3. Coupling fork

Rotate the actuator counterclockwise until it orients itself to mounting position.

NOTICE **Do not cut or break the actuator O-ring.**

Install all actuator screws and tighten them.

TIGHTENING TORQUE	
Actuator screws	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

Connect actuator.

Lift the front of vehicle.

Turn front wheels. The front propeller shaft should not turn (the PARK position must be selected).

If the front propeller shaft turns, the actuator is not installed correctly. Remove actuator and reinstall it.

Set ignition switch to ON.

Set emergency engine stop switch to RUN.

Select the 2WD position.

Turn front wheel again. The front propeller shaft should turn easily.

If the front propeller shaft does not turn, the actuator is not installed correctly. Remove actuator and reinstall it.

NOTICE **Refill gearbox, refer to *GEARBOX OIL FILLING PROCEDURE* in *PERIODIC MAINTENANCE PROCEDURES* subsection.**

Install all other removed parts.

GEARBOX OIL SEALS

Gearbox Oil Seal Replacement

Replace oil seals if they are brittle, hard or damaged.

A small flat screwdriver can be used to remove most of these oil seals.

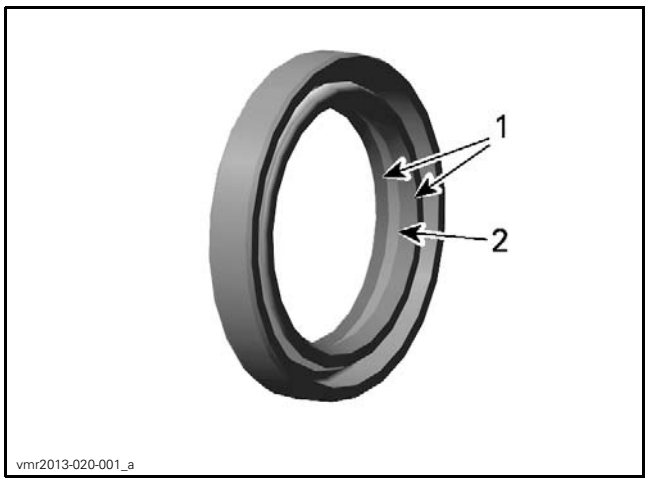
NOTICE **Avoid scoring parts during oil seal removal.**

When replacing an oil seal, take this opportunity to inspect the following:

– Check bearings behind each oil seal for contamination and/or metal shavings.
– Check oil seal running surfaces for scratches.

Oil Seal Lubrication

When installing or reinstalling oil seals:
– Lubricate sealing lips all around.
– Fill up the room between sealing lips halfway around the perimeter.



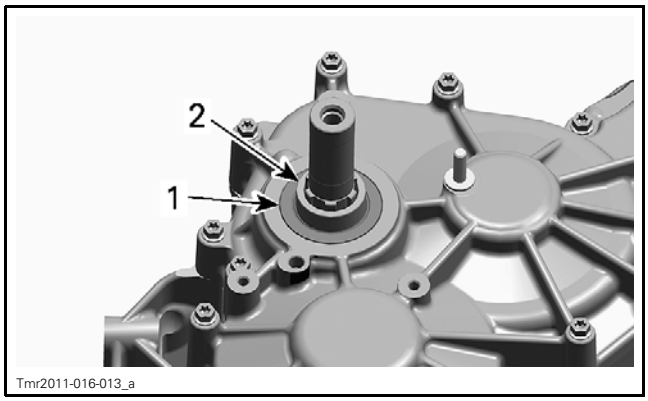
1. Sealing lips
2. Room between sealing lips

SERVICE PRODUCT
PETAMO GREASE GHY 133N (P/N 420 899 271)

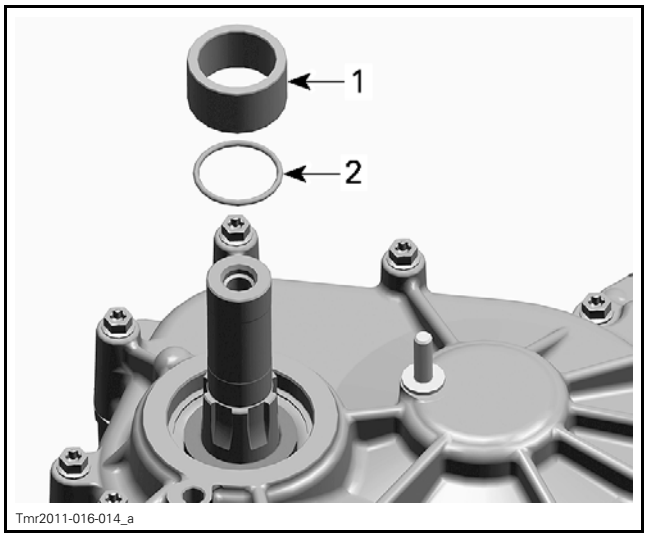
Countershaft Oil Seal

To replace the countershaft oil seal, remove:
– Drive and driven pulleys
– CVT air guide.

NOTE: When oil seal is removed also inspect O-ring behind distance sleeve.



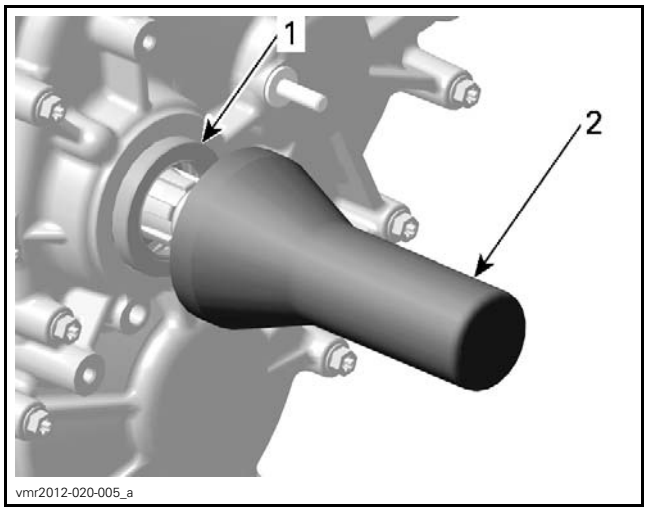
1. Countershaft oil seal
2. Distance sleeve



1. Distance sleeve
2. O-ring

Install countershaft oil seal tool.

REQUIRED TOOL	
COUNTERSHAFT OIL SEAL PUSHER (P/N 529 036 222)	



1. Countershaft oil seal
2. Oil seal pusher

Shift Shaft Oil Seal

The shift shaft oil seal can be removed without removing the gearbox from the vehicle.

To replace the shift shaft oil seal, refer to *BODY* and remove:
– Seat
– Console
– RH side panel
– RH footrest panel
– Shift plate from shift shaft (refer to *SHIFTER*).

Use a suitable tube with the proper diameter to install the oil seal.

If gearbox housing is apart, use following tools for shift shaft oil seal installation.

REQUIRED TOOL	
OIL SEAL INSTALLER (GEARBOX) (P/N 529 035 758)	
HANDLE (P/N 420 877 650)	

NOTICE Oil seal must be installed with sealing lip toward gearbox.

Shift Drum Shaft Oil Seal

To replace the shift drum shaft oil seal, remove the *GBPS (GEARBOX POSITION SENSOR)*. See procedure in this subsection.

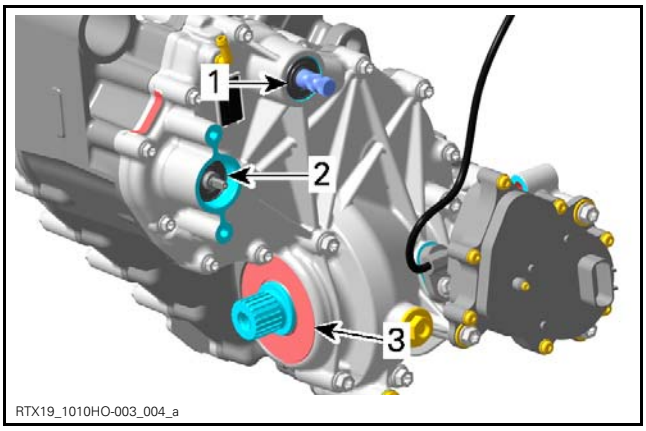
Use a suitable tube with the proper diameter to install the oil seal.

NOTICE Oil seal must be installed with sealing lip toward gearbox.

Output Shaft Oil Seal

To replace the output shaft oil seal, proceed as follows:

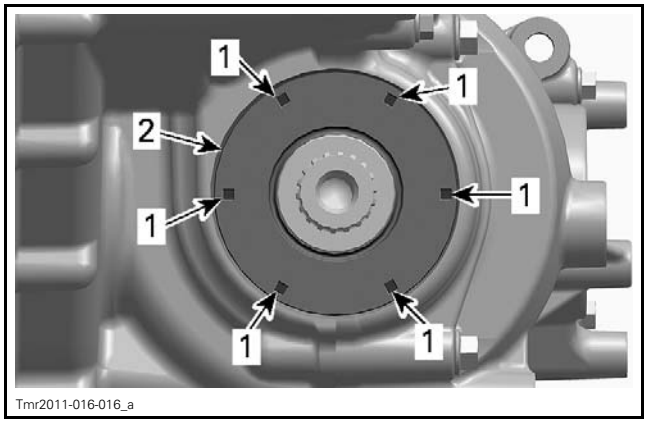
Remove propeller shaft. Refer to *REAR DRIVE* subsection.



1. *Shift shaft oil seal*
2. *Shift drum shaft oil seal*
3. *Output shaft oil seal*

Punch a sharp screwdriver through oil seal for removal.

NOTE: Position screwdriver only in marked areas to avoid damaging the ball bearing behind oil seal during removal.



1. *Marked areas for removal*
2. *Output shaft oil seal*

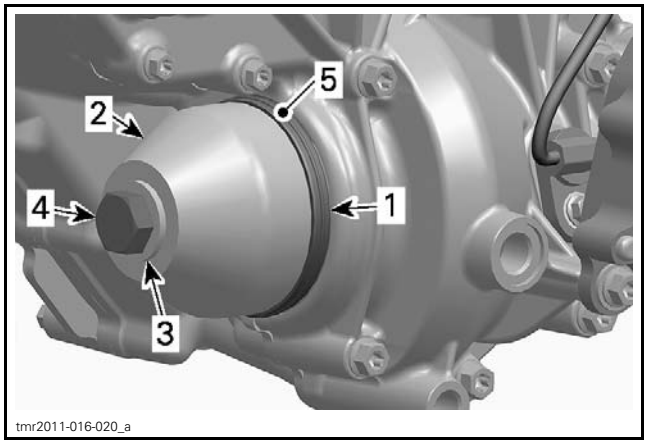
Before beginning the installation ensure gearbox is set to PARK position.

Lubricate sealing lips, refer to *OIL SEAL LUBRICATION* in this subsection.

Apply engine oil on outer diameter of oil seal to avoid damaging it during installation.

Place oil seal on output shaft and install it using the following tools.

REQUIRED TOOL	
OIL SEAL INSTALLER (P/N 529 036 204)	
Flat washer (P/N 250 200 102)	
M12 x 1.25 x 35 hexagonal screw	



1. *Output shaft oil seal*
2. *Oil seal installer*
3. *Flat washer (P/N 250 200 102)*
4. *M12 x 1.25 x 35 hexagonal screw*
5. *Apply engine oil on outer diameter of oil seal*

GEARBOX

Removing the Gearbox

Remove engine from vehicle. Refer to *ENGINE REMOVAL AND INSTALLATION* for the procedure.

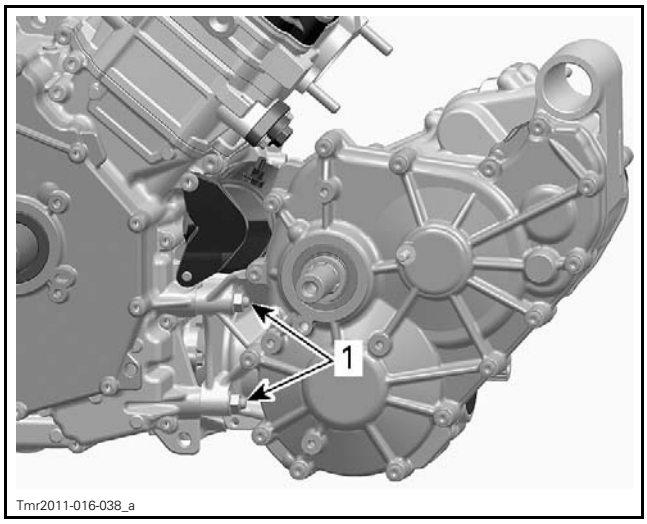
Refer to *CONTINUOUSLY VARIABLE TRANSMISSION (CVT)* subsection to remove following parts:

– CVT cover
– Drive and driven pulleys
– CVT air guide.

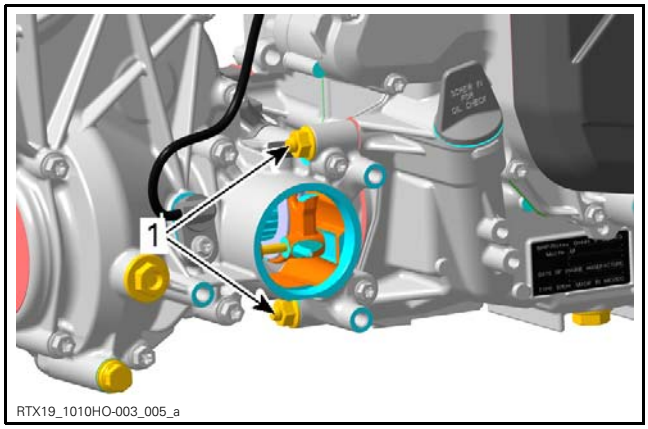
Drain gearbox. Refer to *GEARBOX OIL DRAINING PROCEDURE* in *PERIODIC MAINTENANCE PROCEDURES* subsection.

Remove *ACTUATOR*, see procedure in this subsection.

Unscrew the four (4) nuts that attach the gearbox to the engine.



LH SIDE OF ENGINE
1. Nut M8



RH SIDE OF ENGINE
1. Nut M8

Pull gearbox to separate it from engine.

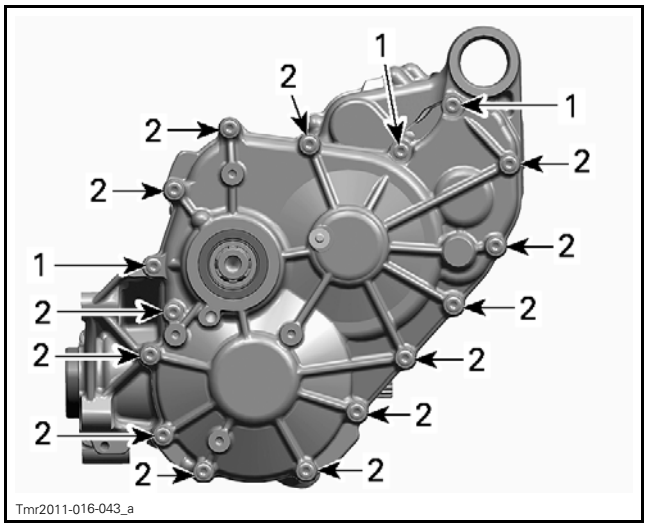
Disassembling the Gearbox

NOTE: During gearbox disassembly, inspect the condition of each part closely.

Gearbox Left Cover

Set gearbox to NEUTRAL position.

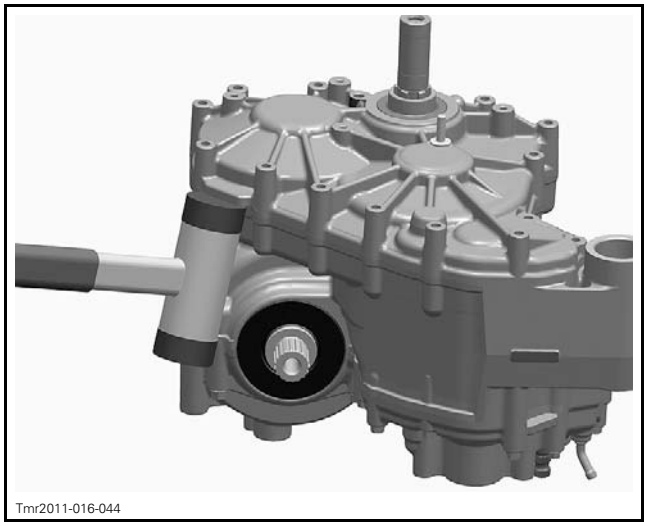
Unscrew all bolts retaining the gearbox left cover.



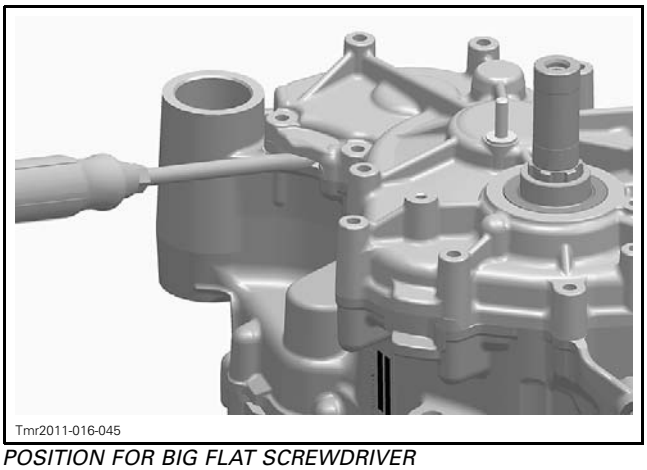
1. 3 screws M6 x 35
2. 13 screws M6 x 55

Place the center housing on a wood stand, left cover pointing upwards.

Using a big flat screwdriver and a soft hammer to lift the left cover.



POSITION FOR SOFT HAMMER

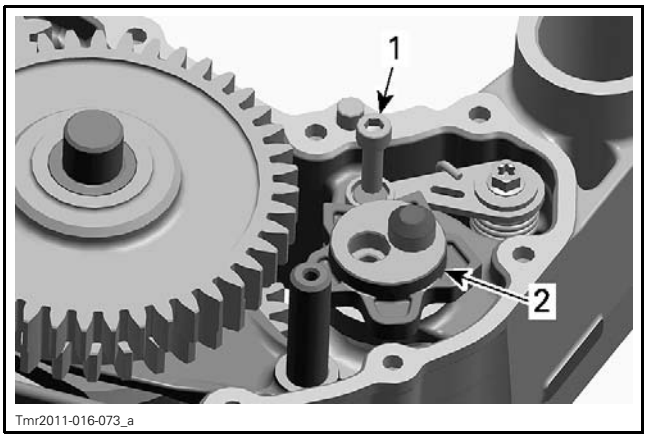

Tmr2011-016-045

POSITION FOR BIG FLAT SCREWDRIVER

Index Lever and Index Washer

Set gearbox to NEUTRAL position.

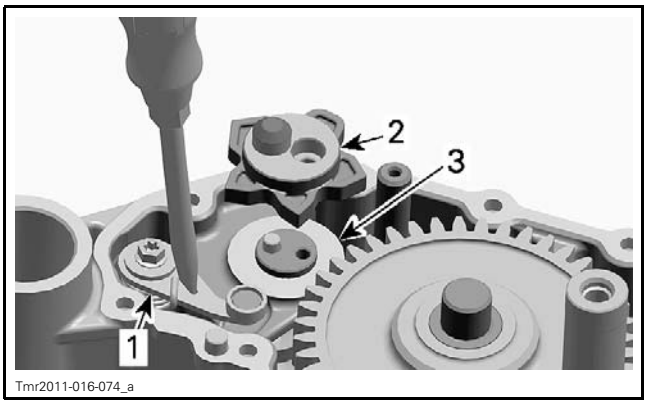
Remove screw retaining the index washer to the shift drum.



Tmr2011-016-073_a

1. *Screw*
2. *Index washer*

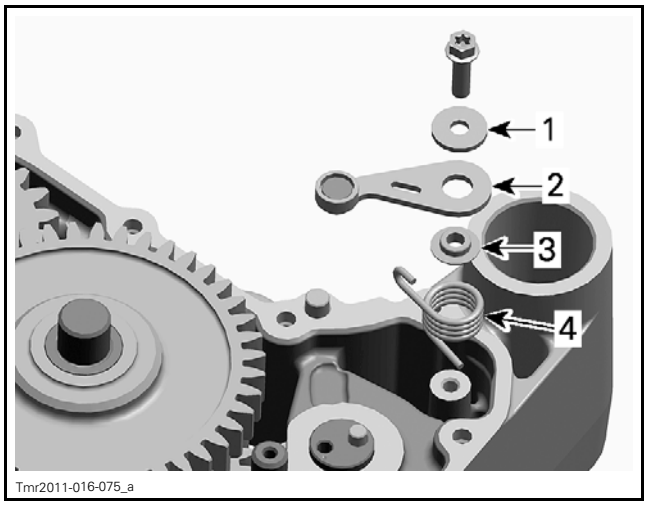
Insert a flat screwdriver in the slot of index lever. Turn screwdriver clockwise and remove index washer.



Tmr2011-016-074_a

1. *Index lever*
2. *Index washer*
3. *Shift drum*

Remove the index lever with washer, step ring and spring.



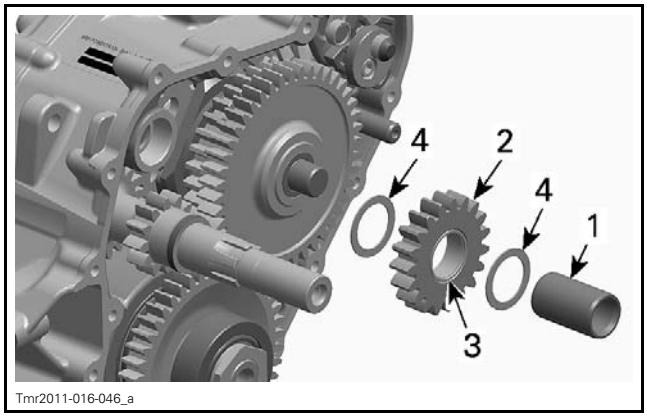
Tmr2011-016-075_a

1. *Washer*
2. *Index lever*
3. *Step ring*
4. *Index spring*

Main Shaft and Shift Forks

Remove bearing pin, reverse intermediate gear and thrust washers.

NOTE: Take care not to lose lower thrust washer during removal.

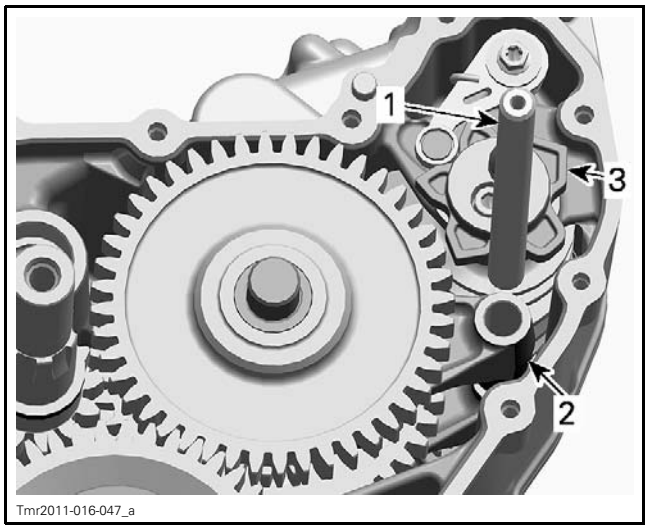


Tmr2011-016-046_a

1. *Bearing pin*
2. *Reverse intermediate gear*
3. *Needle bearing*
4. *Thrust washers*

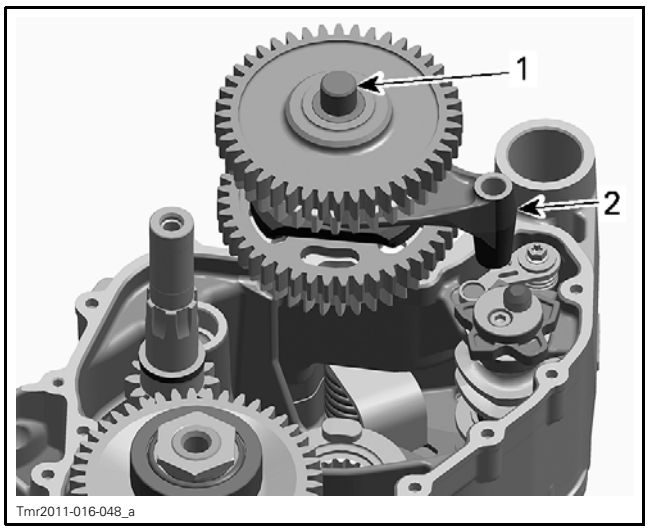
Remove shift fork shaft.

Disengage shift forks from shift drum.



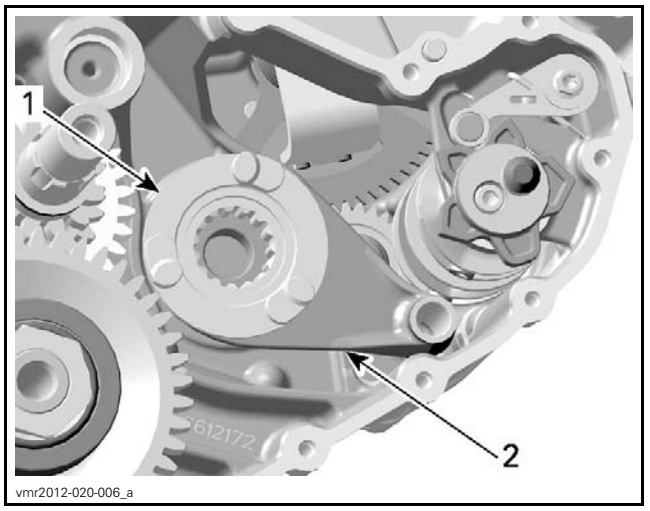
1. Shift fork shaft
2. Shift fork
3. Shift drum

Remove main shaft assembly with shift fork.



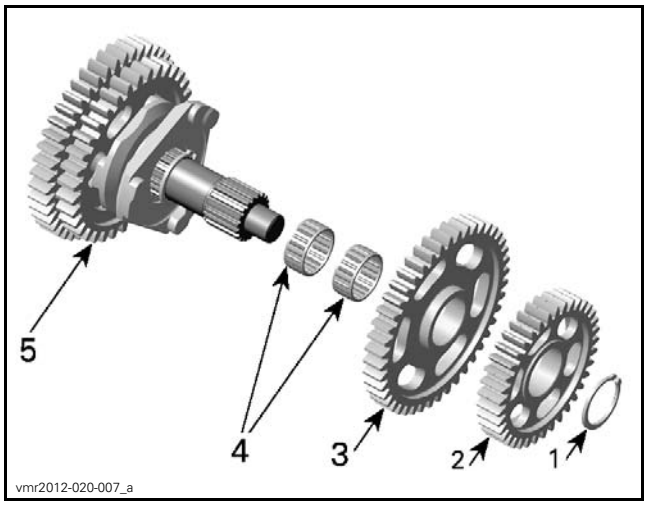
1. Main shaft assembly
2. Shift fork

Remove shifting sleeve (HIGH range gear) and shift fork.



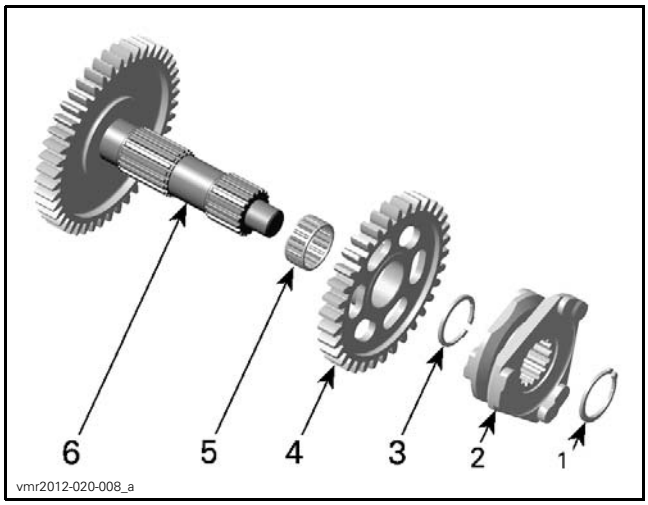
1. Shifting sleeve (HIGH range gear)
2. Shift fork

When required, remove from main shaft assembly:
- Snap ring (discard)
- HIGH range gear
- LOW range gear
- Needle bearings.



1. Snap ring
2. Free pinion (HIGH range gear)
3. Free pinion (LOW range gear)
4. Needle bearing
5. Main shaft assembly

Remove from main shaft assembly:
- Snap ring (discard)
- Shifting sleeve (LOW/REVERSE range gear)
- Snap ring (discard)
- REVERSE range gear
- Needle bearing.

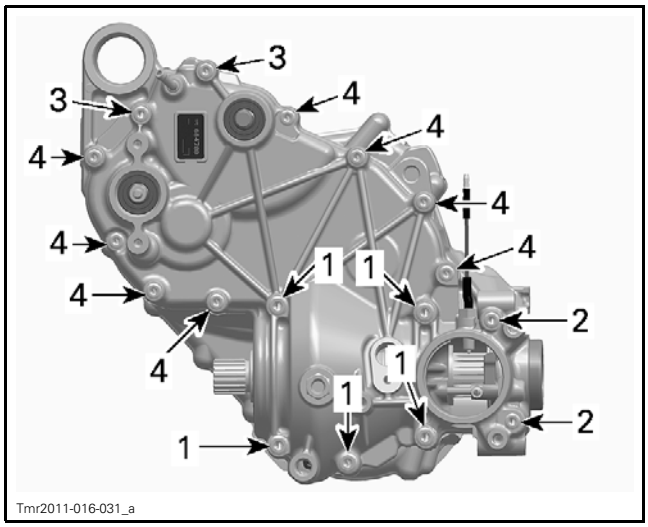


1. *Snap ring*
2. *Shifting sleeve (LOW/REVERSE range gear)*
3. *Snap ring*
4. *Free pinion (REVERSE range gear)*
5. *Needle bearing*
6. *Main shaft assembly*

Gearbox Right Cover

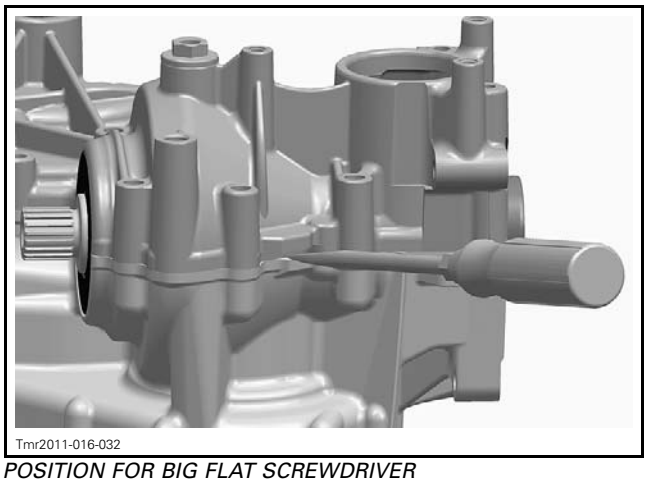
Remove *ACTUATOR* and *GBPS (GEARBOX POSITION SENSOR)*, see procedures in this subsection.

Unscrew all bolts retaining the gearbox right cover.

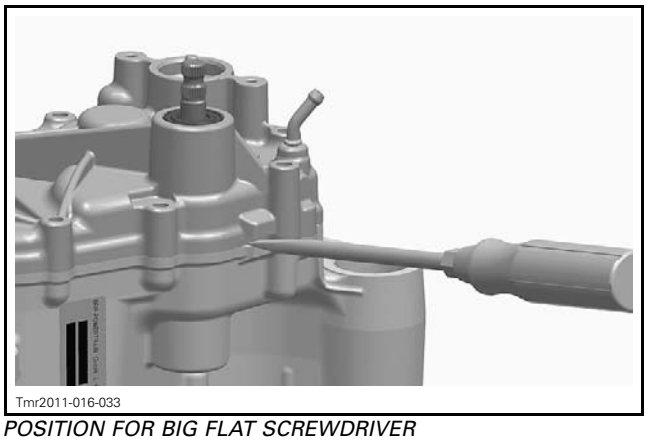


1. *5 screws M8 x 55*
2. *2 screws M6 x 85*
3. *2 screws M6 x 55*
4. *8 screws M6 x 35*

To remove cover, use 2 big screwdrivers.



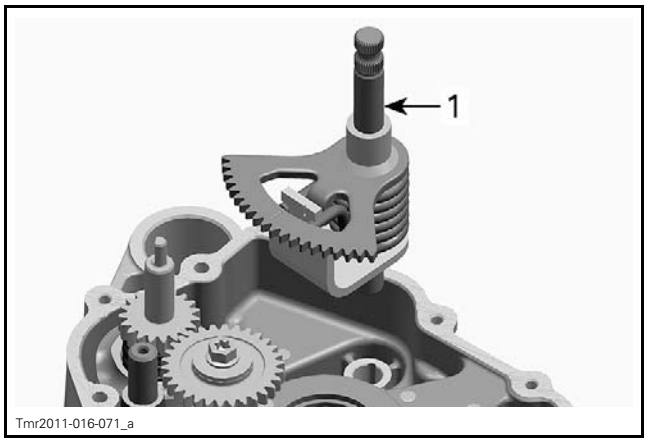
POSITION FOR BIG FLAT SCREWDRIVER



POSITION FOR BIG FLAT SCREWDRIVER

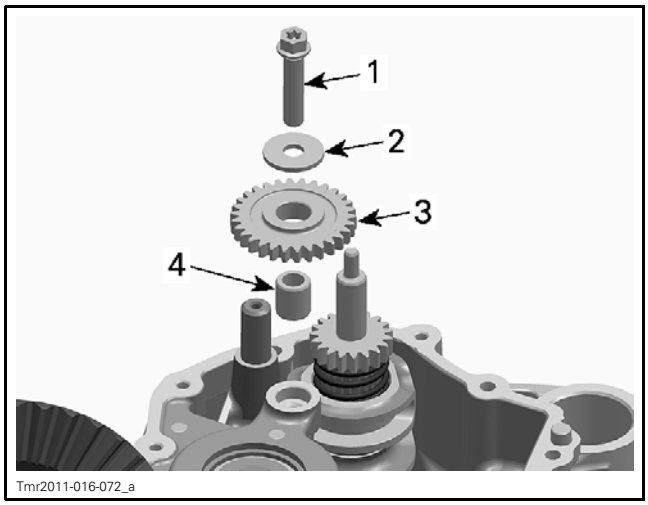
Shift Shaft and Shift Drum

Withdraw shift shaft assembly.



1. *Shift shaft assembly*

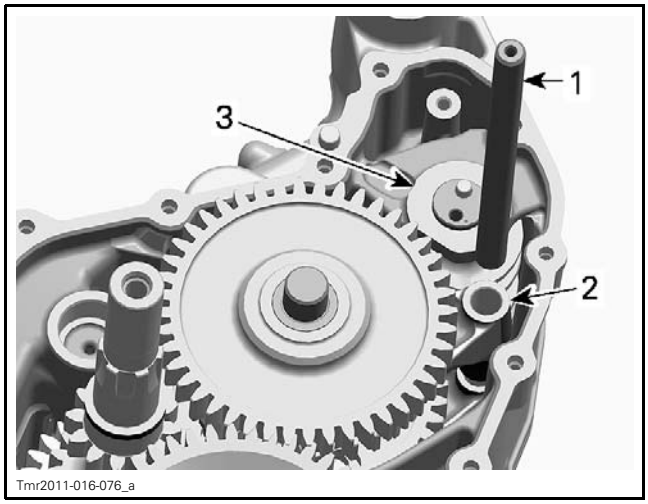
Remove screw retaining the shifting intermediate gear.



1. *Screw*
2. *Washer*
3. *Intermediate gear*
4. *Dowel pin*

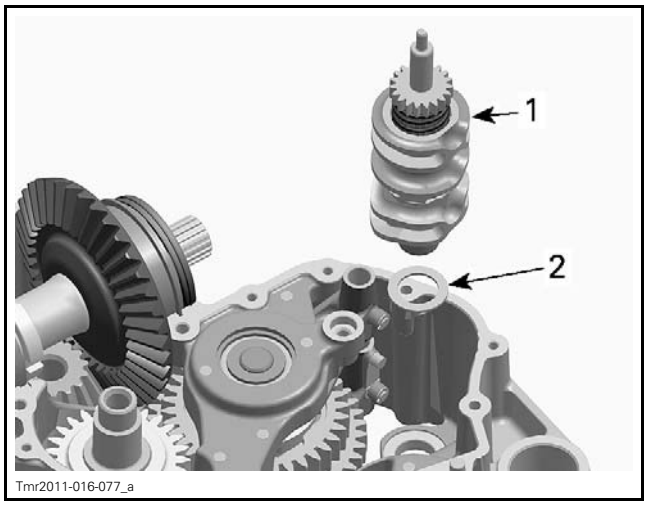
Remove shift fork shaft.

Disengage shift forks from shift drum.



1. *Shift fork shaft*
2. *Shift fork*
3. *Shift drum*

Remove shift drum and thrust washer.

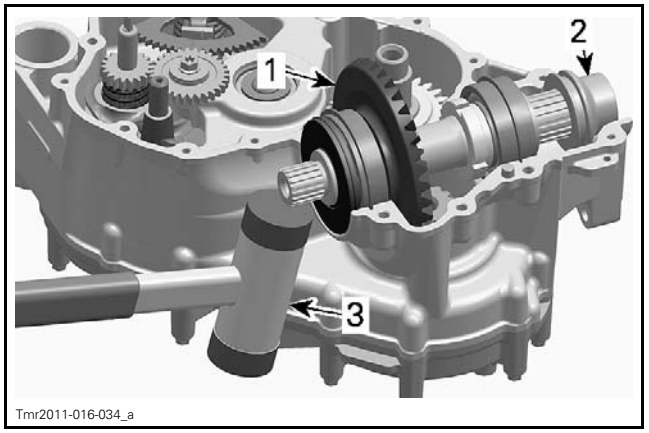


1. *Shift drum*
2. *Thrust washer*

Output Shaft and 4x4 Coupling Mechanism

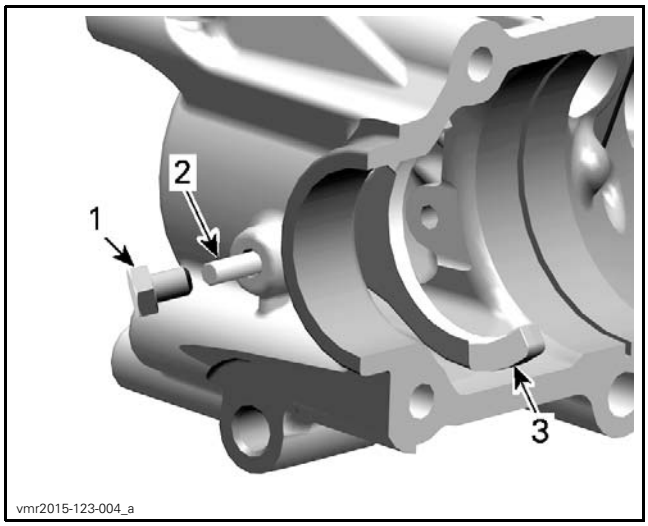
Remove output shaft from center housing and withdraw 4x4 coupling sleeve.

NOTICE **Use a soft hammer to remove output shaft.**



1. *Output shaft*
2. *4x4 coupling sleeve*
3. *Soft hammer*

Remove hexagonal screw, coupling fork shaft and coupling fork from right cover.

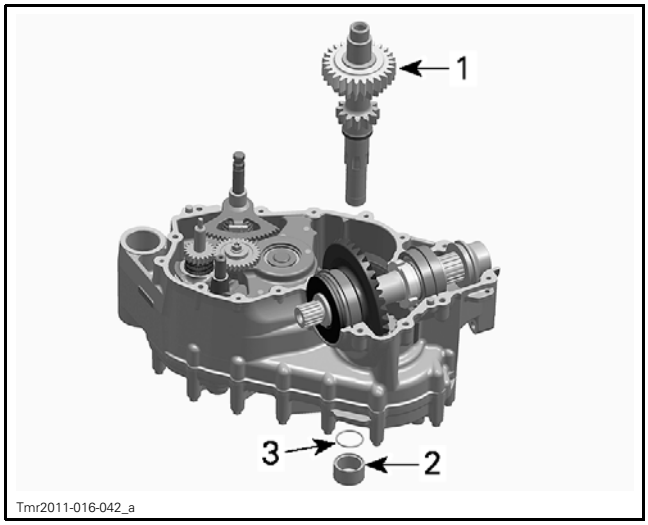


1. Hexagonal screw
2. Coupling fork shaft
3. Coupling fork

Countershaft

Use a soft hammer to push out countershaft from gearbox CVT side.

Remove distance sleeve and O-ring.



1. Countershaft
2. Distance sleeve
3. O-ring

Gearbox Bearings

If necessary heat housing up to 100°C (212°F) before removing ball bearings.

⚠ WARNING

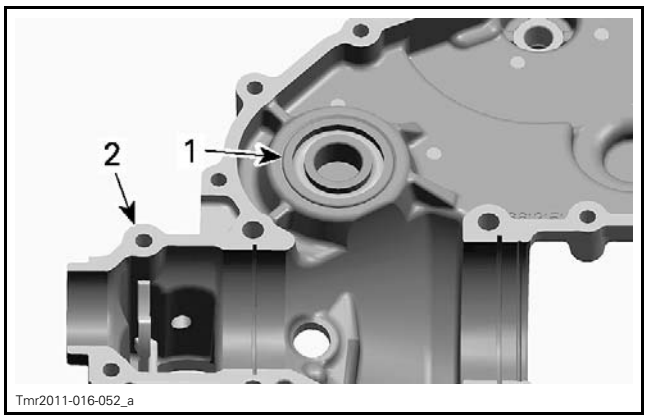
Clean oil, outside and inside, from housing before heating.

NOTICE **Always support gearbox housings properly when ball bearings are removed. Housing damages may occur if this procedure is not performed correctly.**

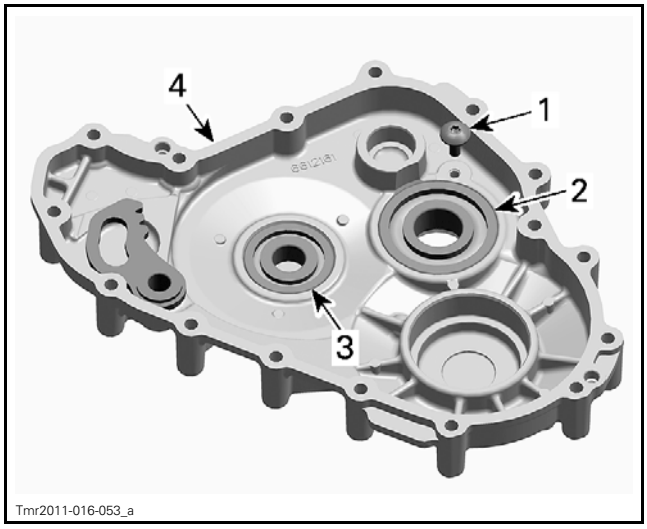
To remove ball bearings of countershaft (right cover) and main shaft (left cover) use a blind hole bearing puller.

Remove screw securing the countershaft bearing in the left cover.

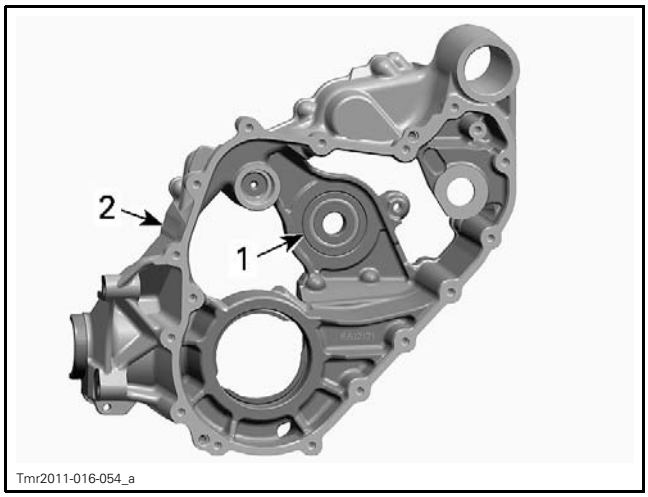
For ball bearings of countershaft (left cover) and main shaft (center housing) push with a suitable puller from outside in.



1. Ball bearing countershaft
2. Right cover



1. Screw
2. Ball bearing countershaft
3. Ball bearing main shaft
4. Left cover



1. Ball bearing main shaft
2. Center housing

Inspecting the Gearbox

Always verify for the following when inspecting gearbox components:

– Gear teeth damage
– Worn or scoured bearing surfaces
– Rounded engagement dogs and slots
– Worn shift fork engagement groove
– Worn splines on shafts and shifting sleeves.

Bearings

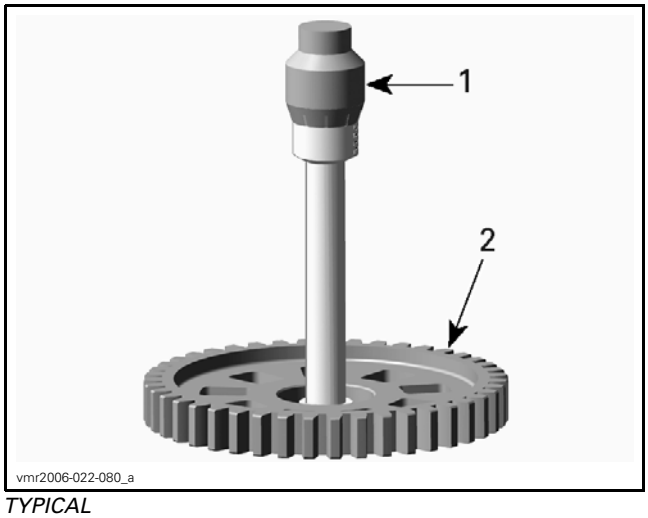
Check if ball bearings turn freely and smoothly.

Check all bearings, bearing points, tooth flanks and taper grooves.

Free Pinions

NOTE: Always replace snap rings and use special pliers to install them.

Check free pinions for wear.

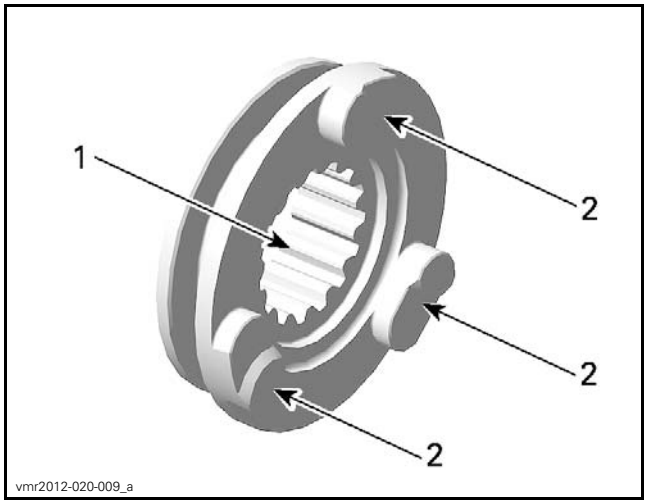


TYPICAL
1. Micrometer
2. Free pinion

DIAMETER FREE PINION	
NEW	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
SERVICE LIMIT	29.015 mm (1.1423 in)

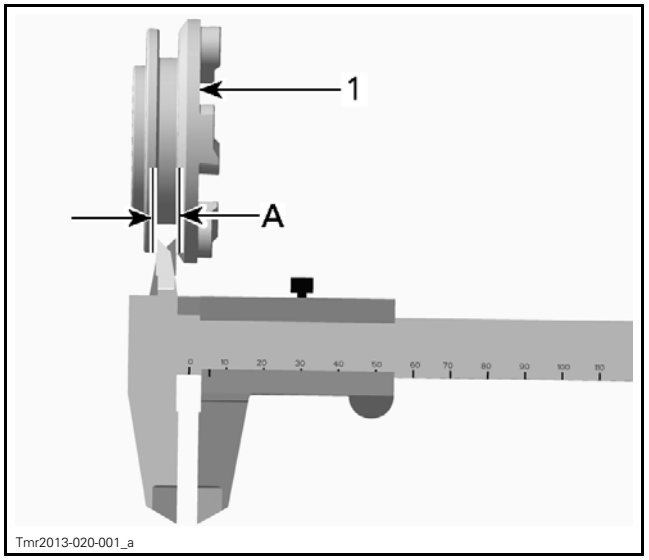
Shifting Sleeves

Check shifting sleeves for worn inner splines and rounded or damaged engagement dogs.



TYPICAL
1. Inner splines
2. Engagement dogs

Measure the width of shift fork engagement groove.

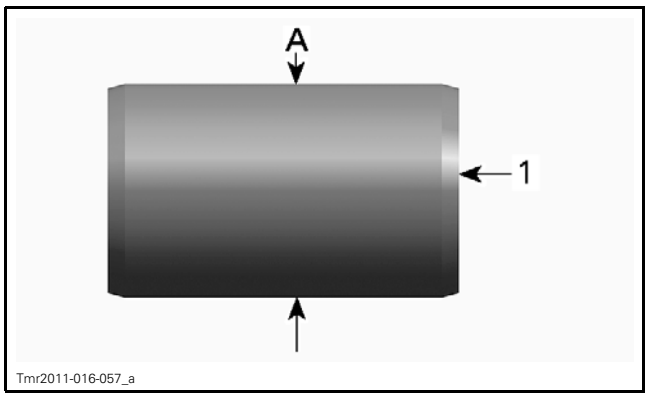


TYPICAL
1. Shifting sleeve
A. Width of shift fork engagement groove

WIDTH OF SHIFT FORK ENGAGEMENT GROOVE	
NEW	5.30 mm to 5.40 mm (.209 in to .213 in)
SERVICE LIMIT	5.50 mm (.217 in)

Shafts

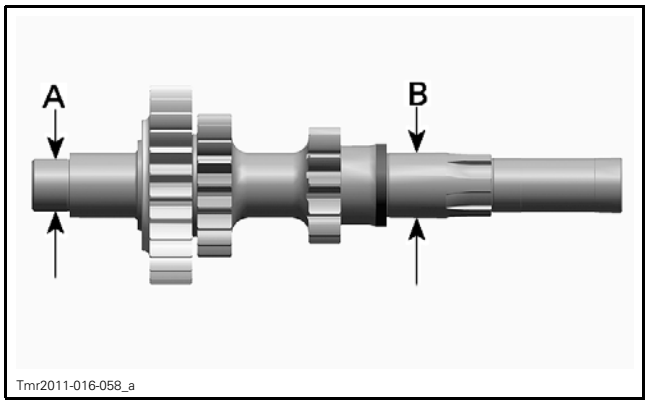
Check bearing pin of reverse intermediate gear for wear.



1. Bearing pin
A. Outer diameter

BEARING PIN OUTER DIAMETER	
NEW	24.987 mm to 25.000 mm (.984 in to .984 in)
SERVICE LIMIT	24.977 mm (.9833 in)

Check countershaft bearing journals for wear.

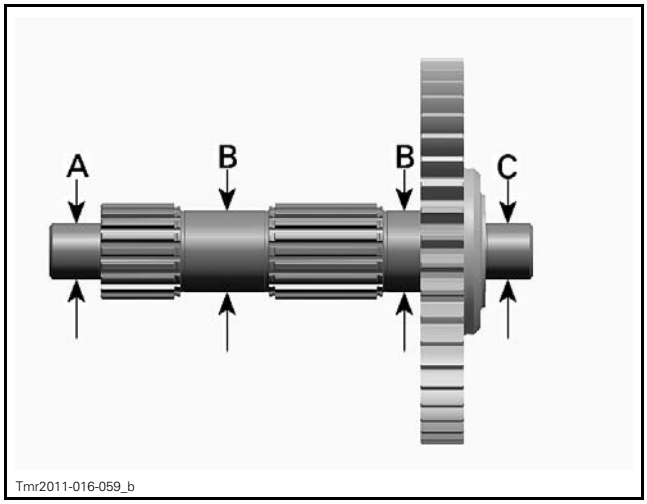


A. MAG side
B. Bearing journal CVT side

COUNTERSHAFT BEARING JOURNALS	
MAG SIDE	
NEW	19.977 mm to 19.990 mm (.786 in to .787 in)
SERVICE LIMIT	19.973 mm (.786 in)

COUNTERSHAFT BEARING JOURNALS	
MAG SIDE	
CVT SIDE	
NEW	24.977 mm to 24.990 mm (.983 in to .984 in)
SERVICE LIMIT	24.970 mm (.983 in)

Check main shaft for wear.



A. Bearing journal MAG side
B. Free pinion bearing
C. Bearing journal CVT side

MAIN SHAFT	
FREE PINION BEARING	
NEW	24.987 mm to 25.000 mm (.984 in to .984 in)
SERVICE LIMIT	24.984 mm (.984 in)
BEARING JOURNAL CVT/MAG SIDE	
NEW	16.980 mm to 16.991 mm (.669 in to .669 in)
SERVICE LIMIT	16.976 mm (.668 in)

Shift Shaft

Check shift shaft for worn splines and gears.

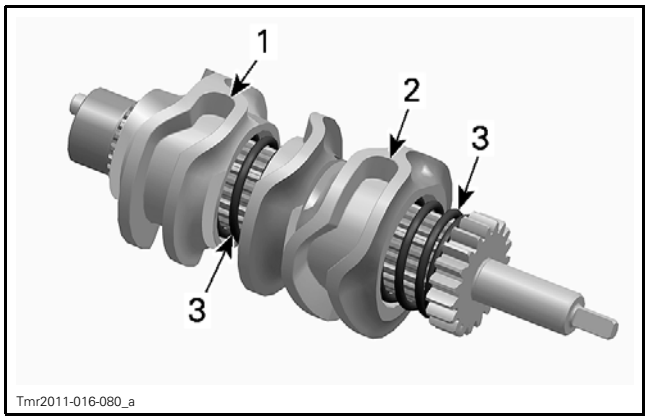
Check shift shaft spring for damages.

Shift Drum

NOTICE Do not disassemble shift drum.

Check if shifting gates move easily on shift drum splines and check condition of springs.

Check shift drum tracks for scouring or heavy wear, like rounded engagement slots.



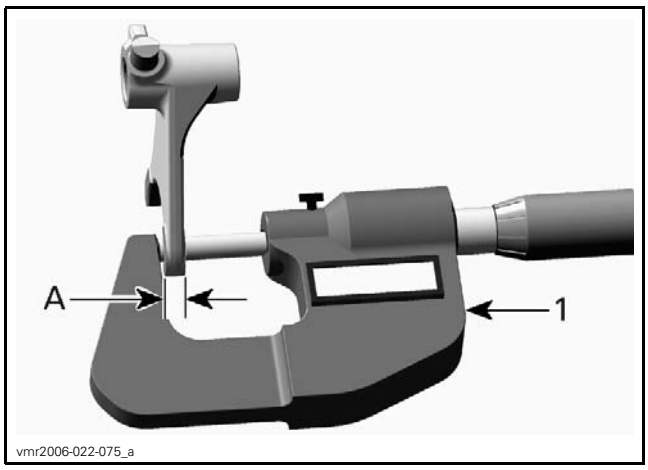
1. Track for the low/reverse range gear shift fork
2. Track for the high range gear shift fork
3. Springs

Shift Forks

Check both shift forks for visible damage, wear or bent shift fork claws.

Check engagement rollers for wear and smooth movement.

Measure the shift fork claw thickness.



1. Micrometer
A. Shift fork claw thickness

SHIFT FORK CLAW THICKNESS	
NEW	5.10 mm to 5.20 mm (.201 in to .205 in)
SERVICE LIMIT	5.00 mm (.197 in)

Shift Fork Shaft

Check shift fork shaft for visible damage or wear.

Check if shift fork shaft is straight.

Index Lever and Parking Lever

Index lever with roller must move freely.

Check parking lever for cracks or other damages.

Output Shaft

Check output shaft and its gear for cracks, bend, pitting or other visible damages.

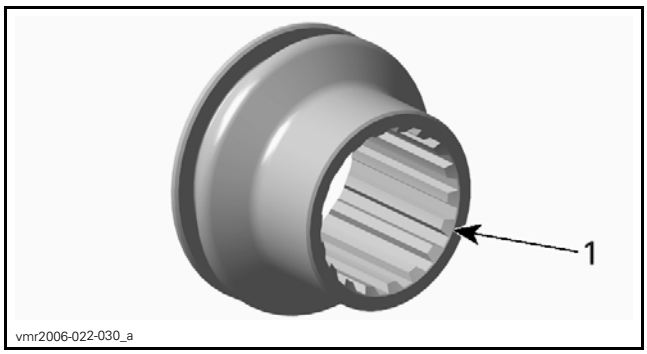
Check output shaft splines for wear or other damages.

Check if the output shaft bearings turn freely and smoothly.

Replace oil seal if brittle, hard or damaged.

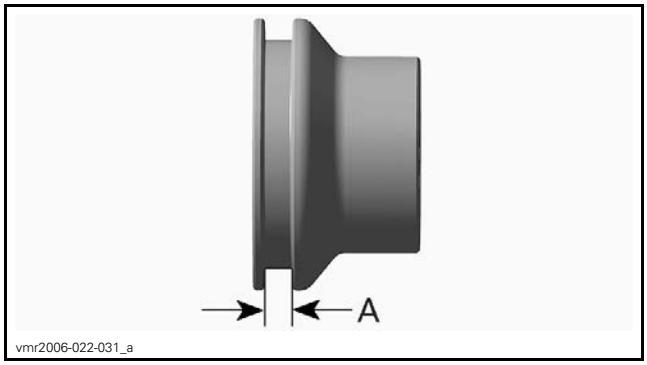
4x4 Coupling Sleeve

Check splines of coupling sleeve for wear or other damages.



1. Inspect splines

Measure the coupling sleeve groove width.



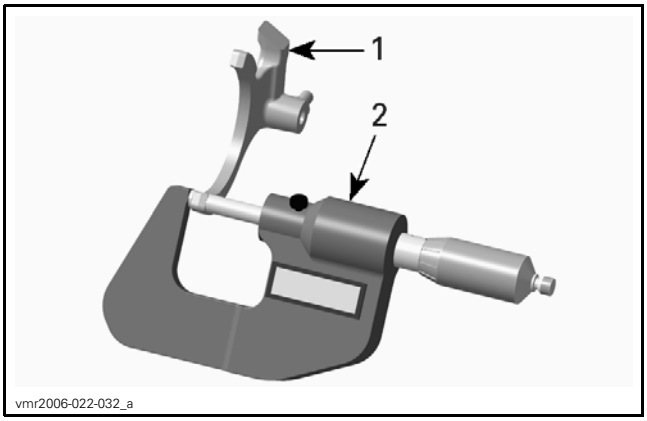
A. Groove width

COUPLING SLEEVE GROOVE WIDTH	
NEW	5.25 mm to 5.35 mm (.207 in to .211 in)
SERVICE LIMIT	5.50 mm (.217 in)

Coupling Fork

Check coupling fork for visible damage, wear or bent coupling fork claws.

Check coupling fork claw thickness.



1. Coupling fork
2. Micrometer

COUPLING FORK CLAW THICKNESS	
NEW	4.95 mm to 5.05 mm (.195 in to .199 in)
SERVICE LIMIT	4.80 mm (.189 in)

Assembling the Gearbox

The assembly of gearbox is essentially the reverse of disassembly procedure. However, pay attention to the following details.

Gearbox Bearings

Unless otherwise instructed, never use hammer to install ball bearings. Use press machine only.

If necessary heat housings up to 100°C (212°F) before installing ball bearings.

⚠ WARNING

Clean oil, outside and inside, from housing before heating.

Place new bearing in freezer for 10 minutes before installation.

Use a suitable installer for installing ball bearings of countershaft and main shaft.

NOTE: Place gearbox housings on a wood stand before installing ball bearings.

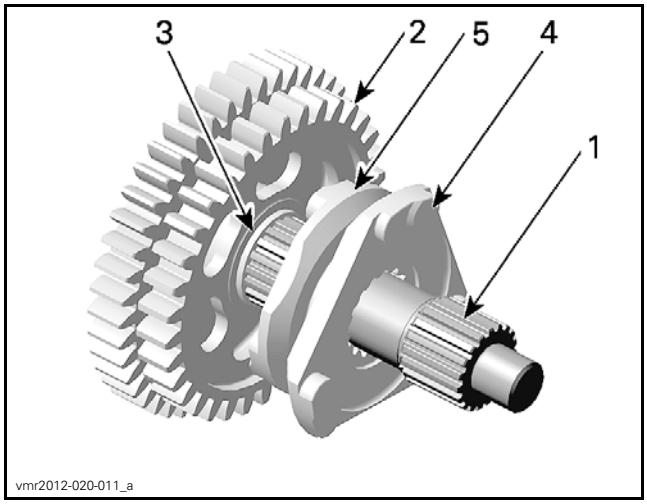
Install new oil seals with the proper installer (refer to *OIL SEALS* in this subsection).

Main Shaft and Shift Forks

Install NEW snap rings.

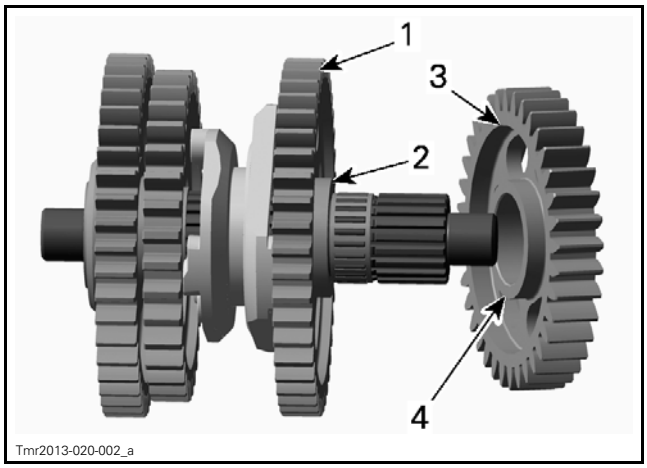
NOTE: Ensure snap rings are installed in the grooves properly.

Install free pinion (REVERSE range gear) and shifting sleeve (LOW/REVERSE range gear) properly.



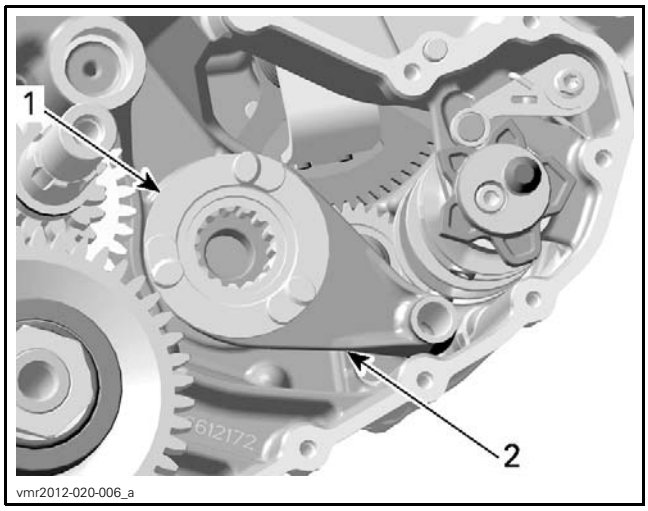
1. Main shaft
2. Free pinion (REVERSE range gear)
3. Snap ring
4. Shifting sleeve (LOW/REVERSE range gear)
5. Shifting dogs (REVERSE range gear)

Collars of free pinion (LOW range gear) and free pinion (HIGH range gear) must point together.



1. Free pinion (LOW range gear), 44 T
2. Collar
3. Free pinion (HIGH range gear), 36 T
4. Collar

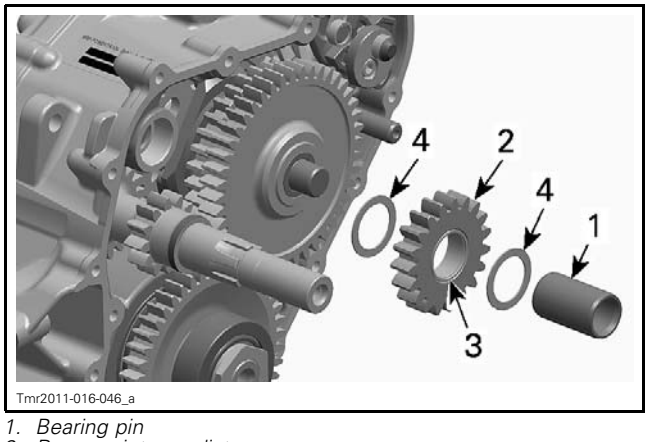
Place shifting sleeve (HIGH range gear) with shift fork in the center of on main shaft bearing in center housing.



1. Shifting sleeve (HIGH range gear)
2. Shift fork

Carefully fit main shaft assembly with shift fork (LOW/REVERSE range gear) into inner splines of shifting sleeve (HIGH range gear).

Install reverse intermediate gear.



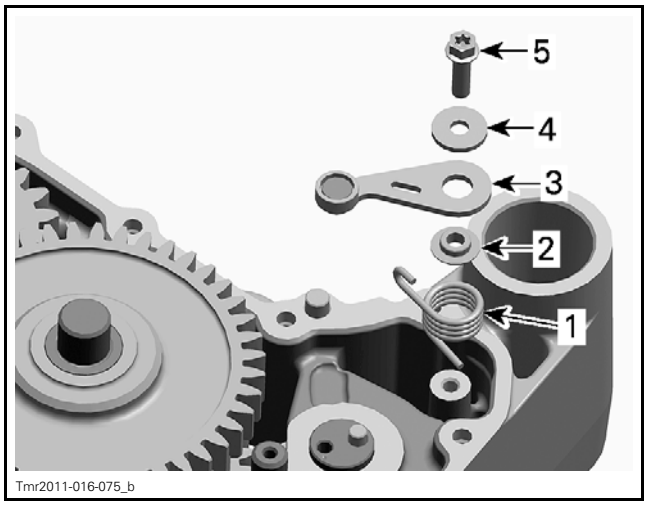
1. Bearing pin
2. Reverse intermediate gear
3. Needle bearing
4. Thrust washers

Finally engage shift forks in shift drum and install shift fork shaft.

NOTE: Run all gears as a final function check before installing left housing.

Index Lever and Index Washer

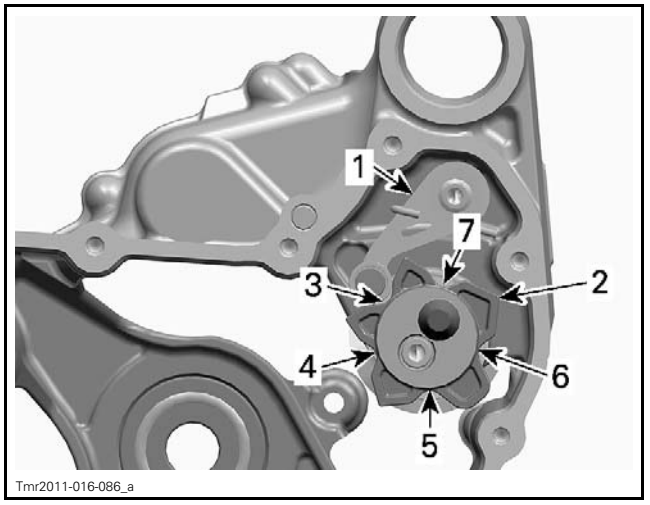
Fit step ring into index lever.



1. Index spring
2. Step ring
3. Index lever
4. Washer
5. Screw

Install index washer on shift drum.

Insert a flat screwdriver in the slot of the index lever, turn screwdriver clockwise and engage lever in index washer in NEUTRAL position as per following illustration.



1. Index lever
2. Index washer
3. Neutral position
4. High range gear position
5. Low range gear position
6. Parking position
7. Reverse range gear position

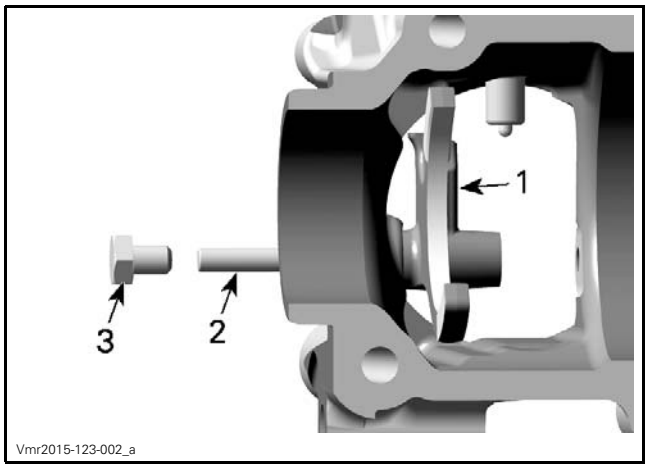
Output Shaft and 4x4 Coupling Mechanism

Install coupling sleeve onto the output shaft.

Place the output shaft with oil seal and coupling sleeve into the center housing.

NOTE: If same oil seal is installed, turn oil seal 90° offset to its original position to avoid leakage at housing mating surface.

Install coupling fork, coupling fork shaft and hexagonal screw in right cover before applying sealant to the mating surface.

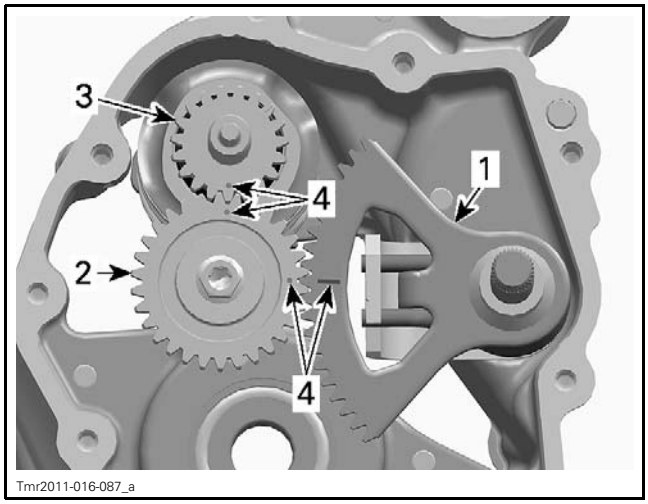


1. Coupling fork
2. Coupling fork shaft
3. Hexagonal screw

Shift Shaft and Shift Drum

Install shift drum and shift shaft.

Install shifting intermediate gear. Align its marks with the marks on shift drum gear and shift shaft.



1. Shift shaft assembly
2. Shifting intermediate gear
3. Shift drum gear
4. Marks

Engage both shift fork pins in their corresponding groove on the shift drum.

Install shift fork shaft.

NOTE: Turn gears to validate proper operation.

Sealing Compound Application

NOTE: Unless otherwise specify, the procedure to apply the sealant is the same for right or left cover.

Clean all metal components in a solvent.

Clean gearbox housing mating surfaces

SERVICE PRODUCT
LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500)

REQUIRED TOOL
Brass brush

Brush a first pass in one direction then make the final brushing perpendicularly (90°) to the first pass cross (hatch).

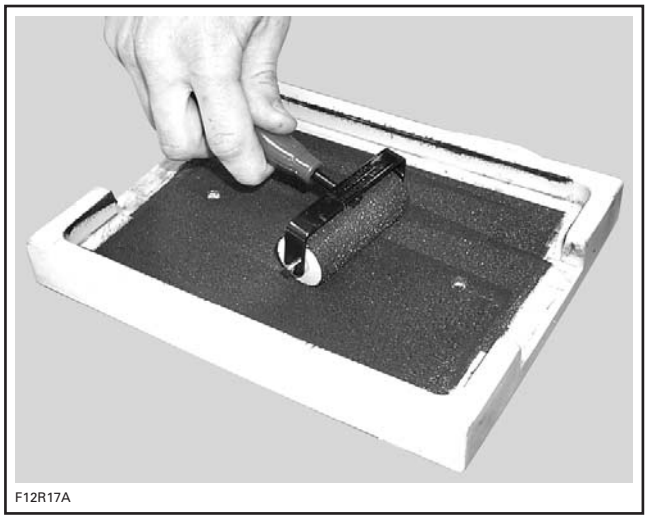
NOTICE **Do not wipe with rags. Use a new clean hand towel only.**

IMPORTANT: When beginning the application of the gear housing sealant, the assembly and the first torquing should be done within 10 minutes. It is suggested to have all you need on hand to save time.

Apply sealant on mating surfaces.

SERVICE PRODUCT
LOCTITE 5910 (P/N 293 800 081)

Use a plexiglass plate and apply some sealant on it. Use a soft rubber roller (50 mm - 75 mm (2 in - 3 in)), available in arts products suppliers for printing, and roll the sealant to get a thin uniform coat on the plate (spread as necessary). When ready, apply the sealant on gear housing mating surfaces.



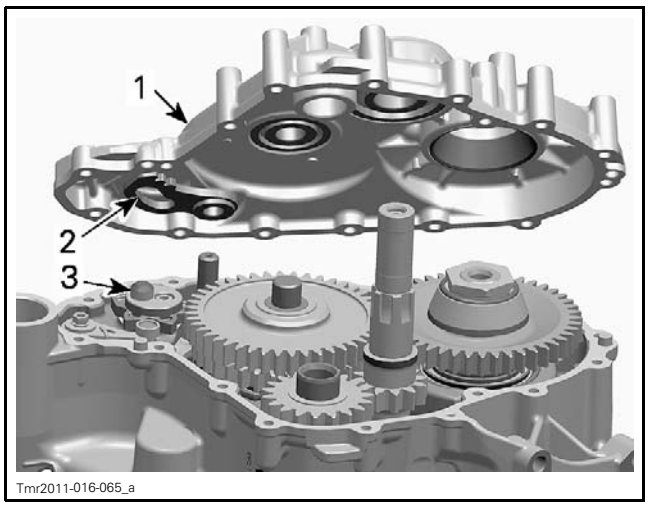
Do not apply in excess as it will spread out inside gear housing.

NOTE: It is recommended to apply this specific sealant as described here to get a uniform application without lumps. If you do not use the roller method, you may use your finger to uniformly distribute the sealant (using a finger will not affect the adhesion).

Left Cover

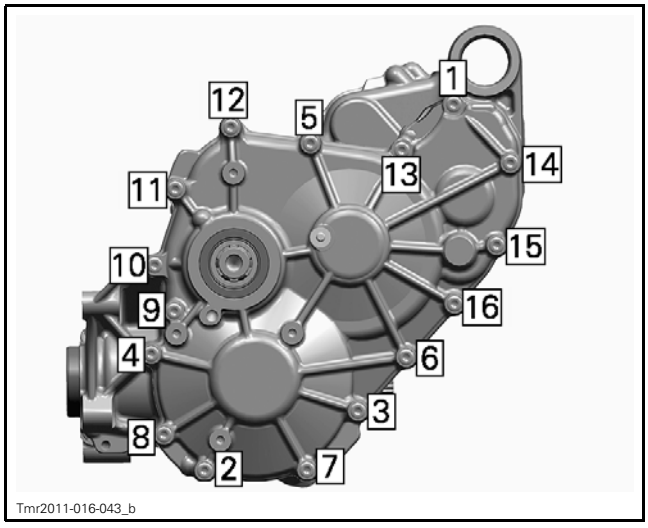
Apply sealing compound on mating surfaces of central housing. Refer to *SEALING COMPOUND APPLICATION*.

At installation of left cover, engage parking lock lever slot onto index washer pin.



1. Left cover
2. Parking lock lever slot
3. Index washer pin

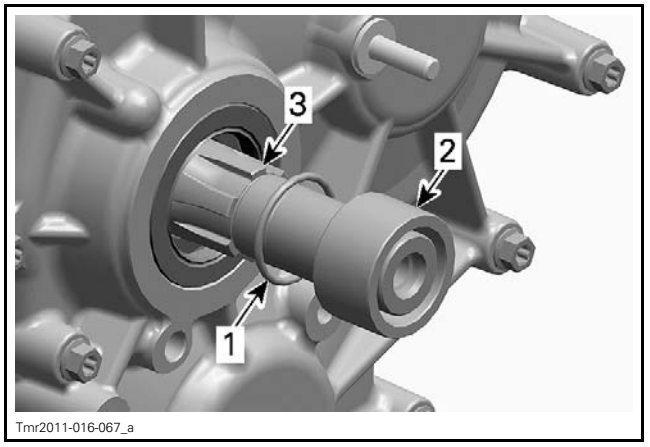
Install all screws on left cover and tighten them as per following sequence.



TIGHTENING TORQUE	
Left cover - M6 screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Install O-ring including distance sleeve on countershaft CVT side.

NOTICE **Place O-ring including distance sleeve right away. Chamfered bore of distance sleeve has to face the gearbox.**



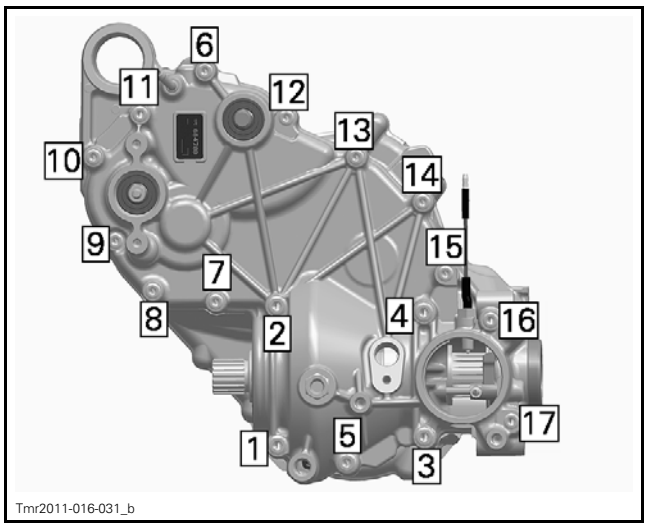
COUNTERSHAFT END CVT SIDE
1. O-ring
2. Distance sleeve
3. Countershaft end CVT side

Right Cover

Apply sealing compound on mating surfaces of central housing. Refer to *SEALING COMPOUND APPLICATION*.

To install the right cover align the coupling fork with the groove in the coupling sleeve.

Install all screws on right cover and tighten them as per following sequence.



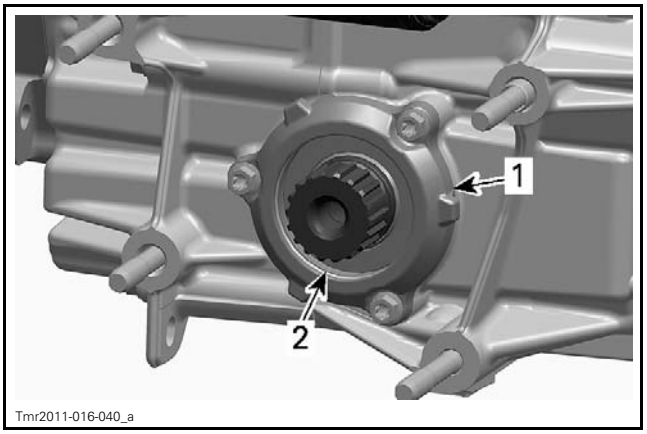
TIGHTENING TORQUE	
Right cover - M6 screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)
Right cover - M8 screws	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

Install the actuator, refer to *ACTUATOR*.

Installing the Gearbox

The installation is the reverse of the removal procedure. However, pay attention to following.

Before gearbox installation check O-ring in bearing cover if brittle, hard or damaged. Replace if necessary.



1. Bearing cover
2. O-ring

Tighten the four (4) nuts that attach the gearbox to the engine.

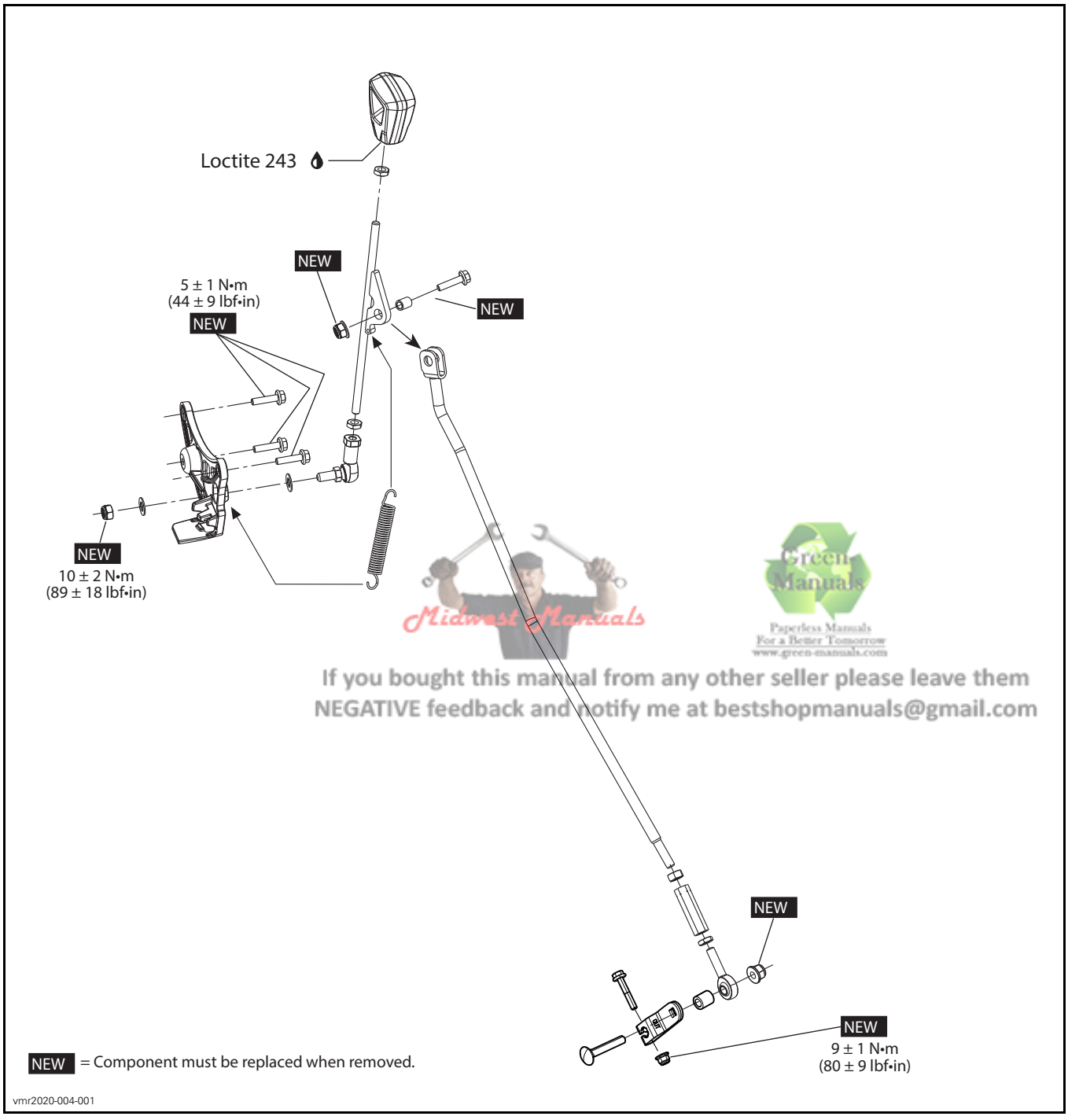
TIGHTENING TORQUE	
Gearbox retaining nuts	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft) + LOCTITE 243 (BLUE) (P/N 293 800 060)

After installation, refill gearbox oil. Refer to *PERIODIC MAINTENANCE PROCEDURES*.

SHIFTER (GEARBOX WITH EXTERNAL SWITCHES)

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	2



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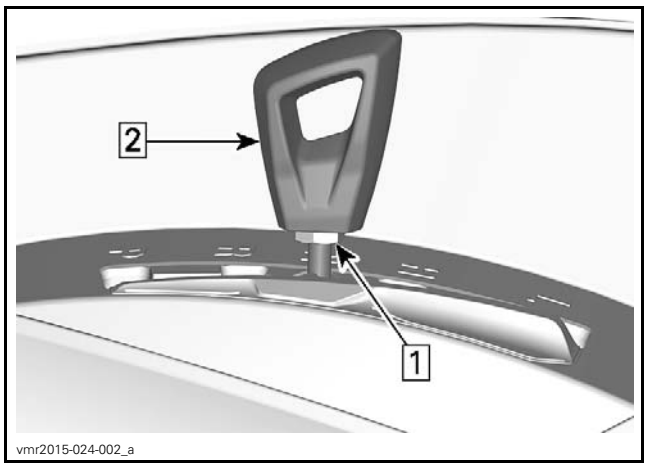
PROCEDURES

HANDLE

Removing the Handle



Step 1: Loosen lock nut
Step 2: Unscrew shift lever handle

Installing the Handle

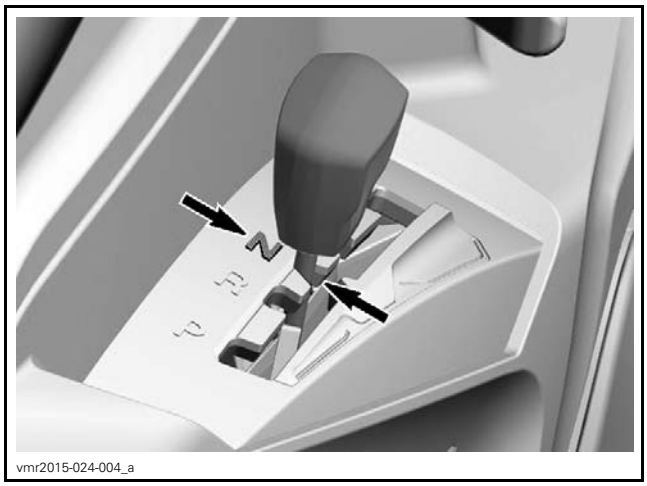
The installation is the reverse of the removal procedure.

RECOMMENDED SERVICE PRODUCT	
Shift lever threads	LOCTITE 243 (BLUE) (P/N 293 800 060)

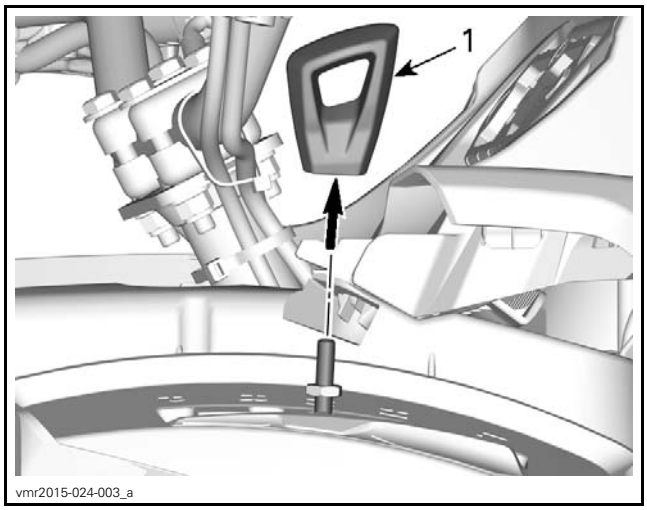
SHIFT LEVER

Removing the Shift Lever

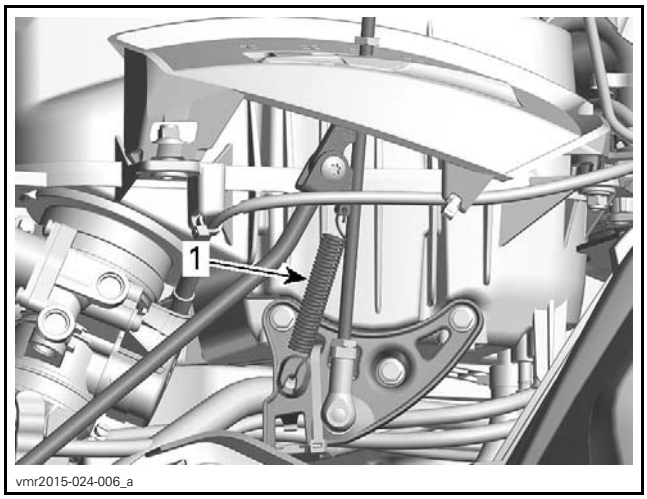
1. Remove body parts as required. Refer to *BODY* subsection.
2. Place shift lever in **NEUTRAL** position.



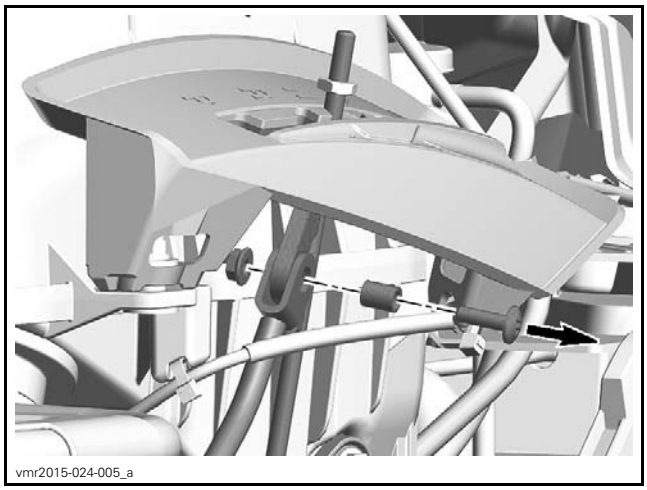
3. Secure vehicle using wheel chocks.
4. Remove parts as indicated in following illustrations.



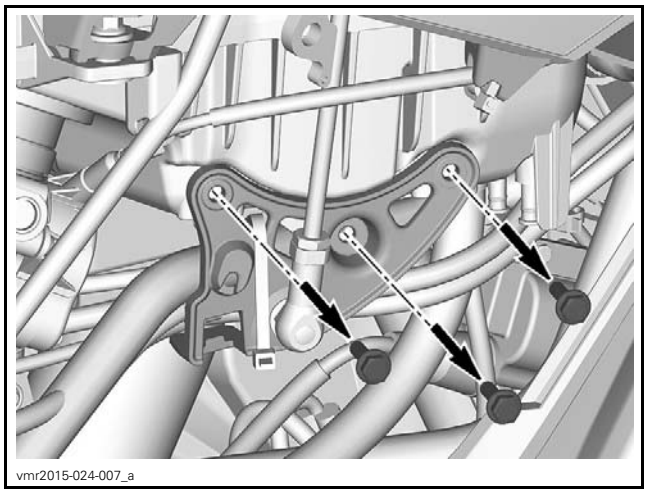
1. Shift lever handle



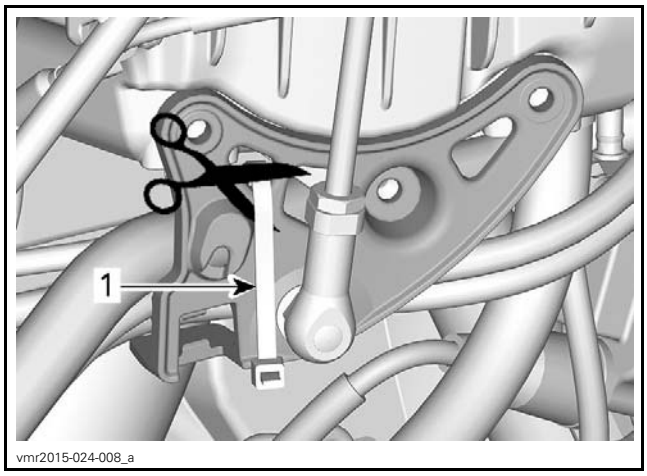
TYPICAL
1. Remove spring



TYPICAL


vmr2015-024-007_a

TYPICAL



vmr2015-024-008_a

TYPICAL
1. Locking tie to cut

5. Remove shift lever with shift lever support.

Inspecting the Shift Lever

Check shift lever for bending or cracks.

Check spring and bushing condition.

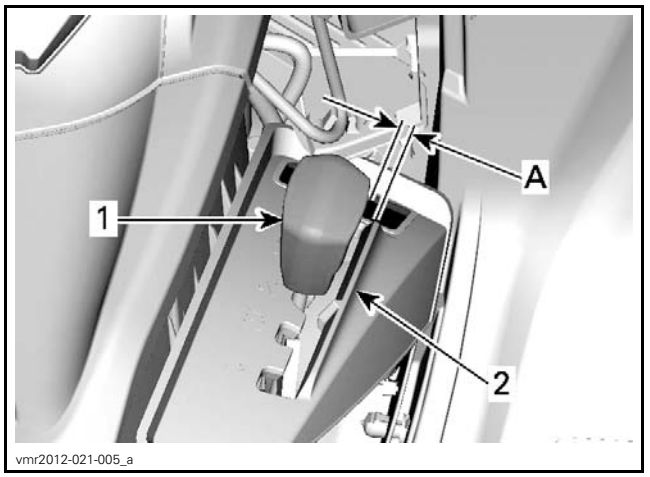
Check ball joint condition.

Replace all damaged parts.

Installing the Shift Lever

The installation is the reverse of the removal procedure. However, pay attention to the following.

Adjust shift lever handle as per following illustration.

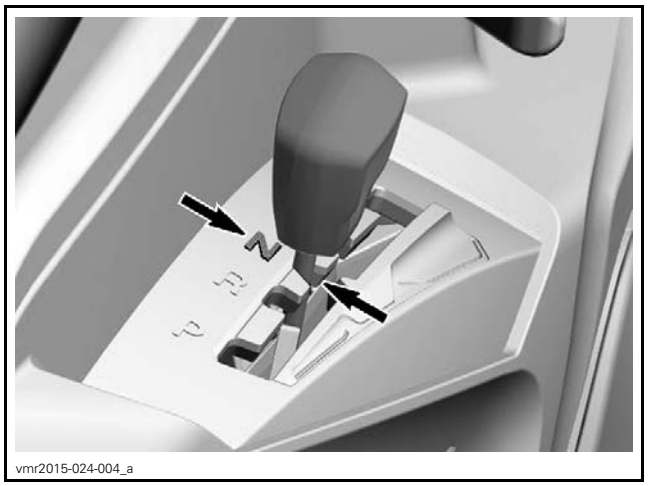


vmr2012-021-005_a

1. Handle
2. Ridge
A. Handle parallel with ridge

Check if shift lever works properly in all positions. Ensure throttle cable does not interfere with shift lever in all positions.

NOTE: Shift lever must be perfectly centered with the neutral position indicator when transmission is engaged in neutral.



vmr2015-024-004_a

If adjustment is required, refer to *ADJUSTING THE SHIFT ROD* in this subsection.

SHIFT ROD

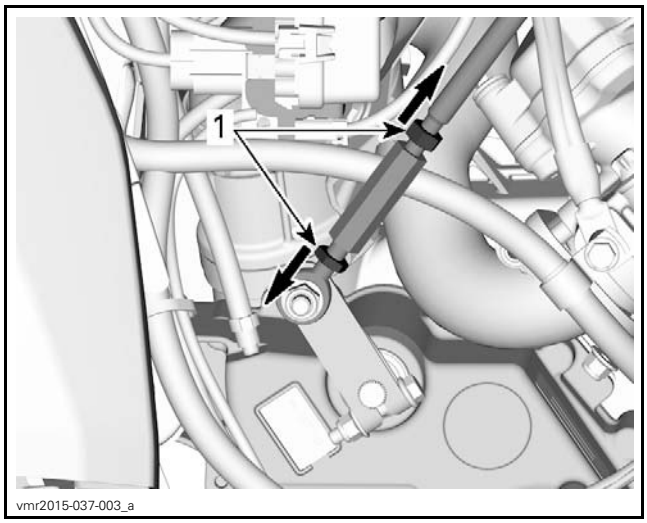
Adjusting the Shift Rod

1. Place shift lever in NEUTRAL position.

NOTICE **Move vehicle back and forth to ensure gearbox is set in neutral position.**

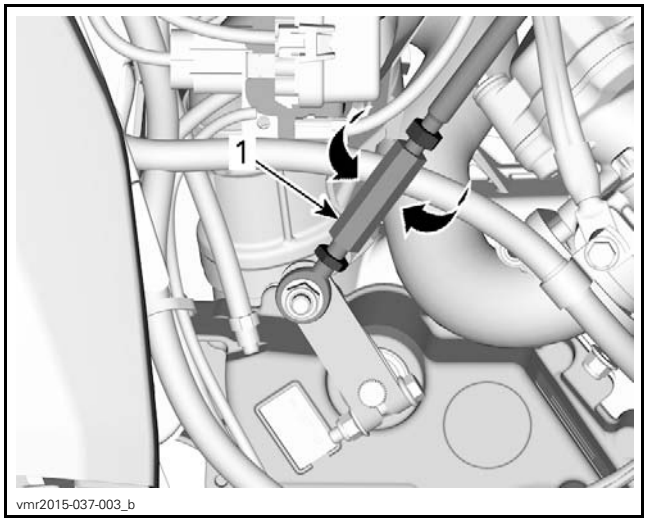
2. Secure vehicle using wheel chocks.
3. Remove body parts as required. Refer to *BODY* subsection.
4. Loosen shift rod adjustment nuts.

NOTE: Be aware that a nut has LH threads.

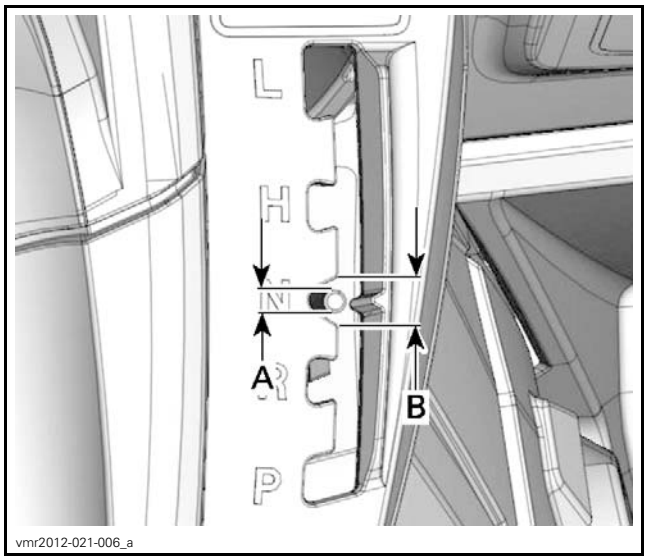


1. Adjustment nuts

5. Turn rod adjuster to center shift lever in neutral notch.

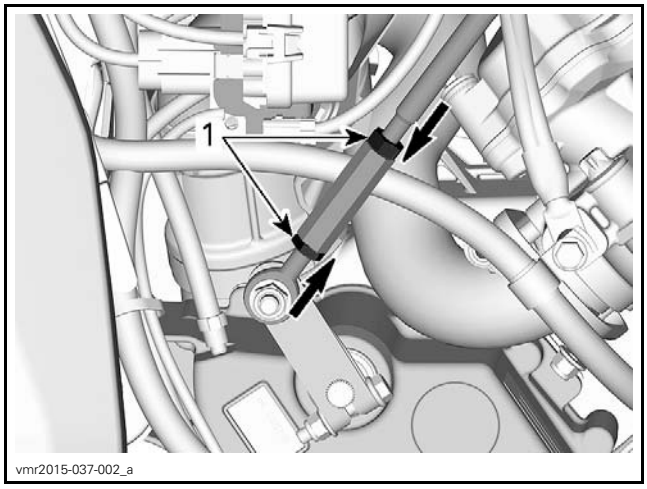


1. Shift rod adjuster



A. Shift lever
B. Neutral notch

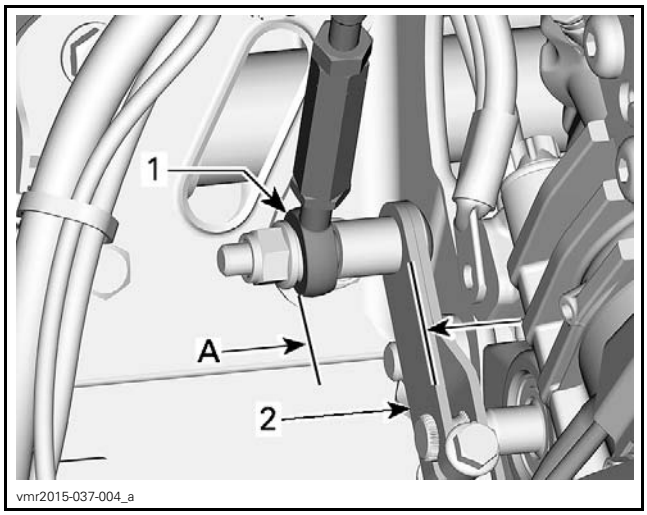
6. Move shift lever in R position then in H position.
7. Place shift lever in NEUTRAL position.
8. Check if shift lever is properly centered in neutral notch. Readjust as required.
9. Hold adjuster steady and tighten lock nuts.



1. Adjuster lock nuts tightened

10. Test the shifter to confirm that the system works properly in all positions.

NOTE: Ensure shift rod ball joint is parallel with shift plate. It may be necessary to realign shift rod ball joint to ensure freedom of movement.



1. Shift rod ball joint
2. Shift plate
A. Parallel within +/- 5°

⚠ WARNING

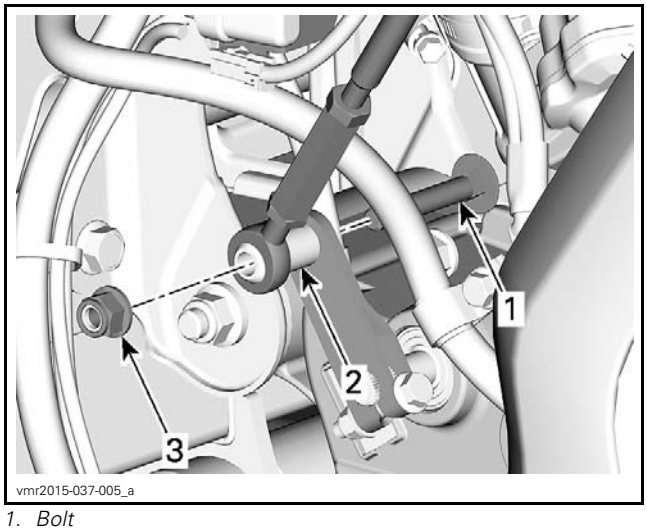
After adjustment, make sure the PARK position is also properly set.

SHIFT PLATE

Removing the Shift Plate

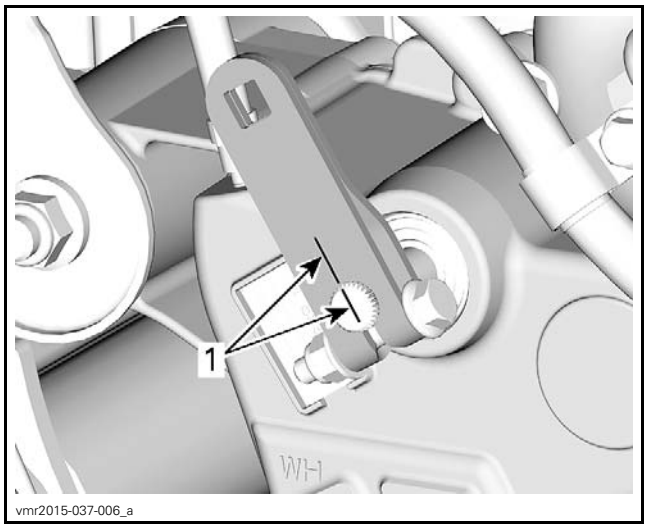
NOTE: Do not remove shift plate needlessly.

1. Remove body parts as required. Refer to *BODY* subsection.
2. Place shift lever in NEUTRAL position.
3. Remove shift rod from shift plate.



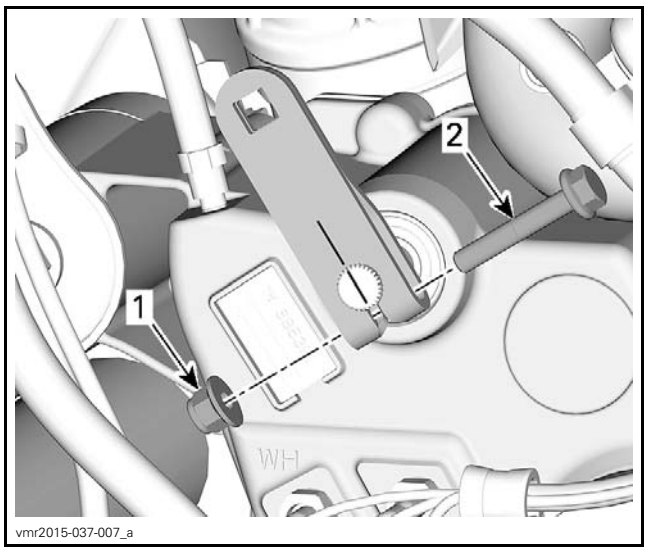
1. Bolt
2. Spacer
3. Nut

4. Trace an index mark on shift plate and shift shaft.



1. Trace a mark on both parts

5. Remove shift plate nut and bolt.



1. Shift plate nut
2. Bolt

6. Remove shift plate.

Inspecting the Shift Plate

Check shift plate for:
– Cracks
– Bending
– Spline condition.

Installing the Shift Plate

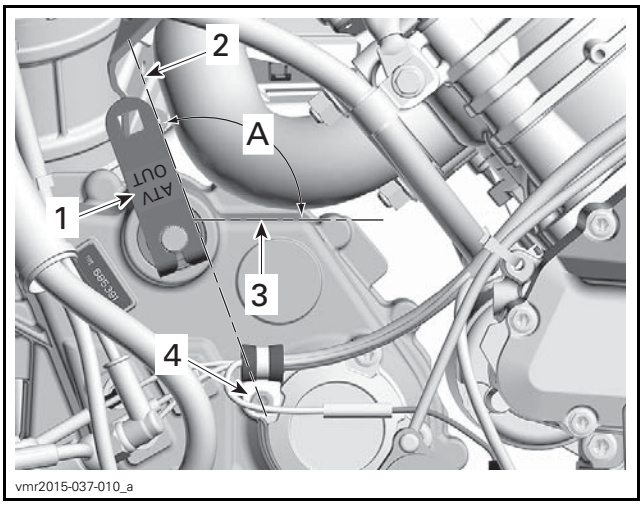
The installation is the reverse of the removal procedure. However, pay attention to the following.

Place gearbox in NEUTRAL position before shift plate installation.

Position shift plate with the marking "ATV OUT" visible outward.

Align shift plate using marks previously traced.

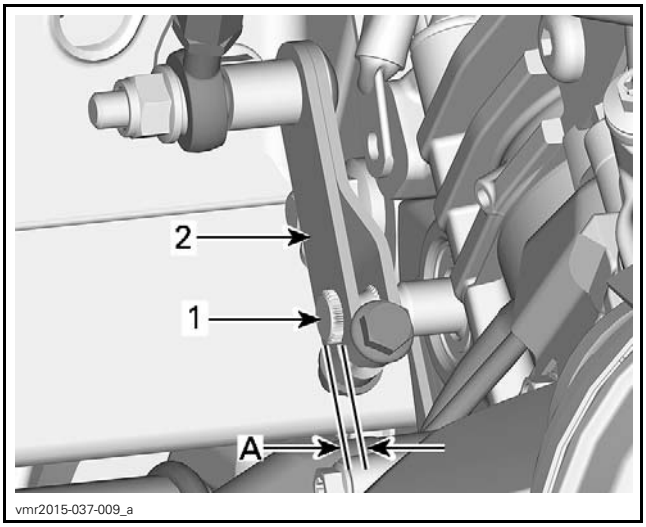
If there are no index marks, adjust shift plate as per following illustrations.



1. "ATV OUT" marking this side
2. Forward edge of shift plate
3. Horizontal plane (top forward surface crankcase)
4. Center of bolt (secondary alignment reference)

A. 110° +/- 2.5°

Ensure that shift shaft protrudes shift plate as per illustration.



1. Shift shaft end
2. Shift plate

A. 2.5 mm ± 1 mm (.1 in ± .040 in)

Adjust shift rod, refer to *ADJUSTING THE SHIFT ROD* in this subsection.

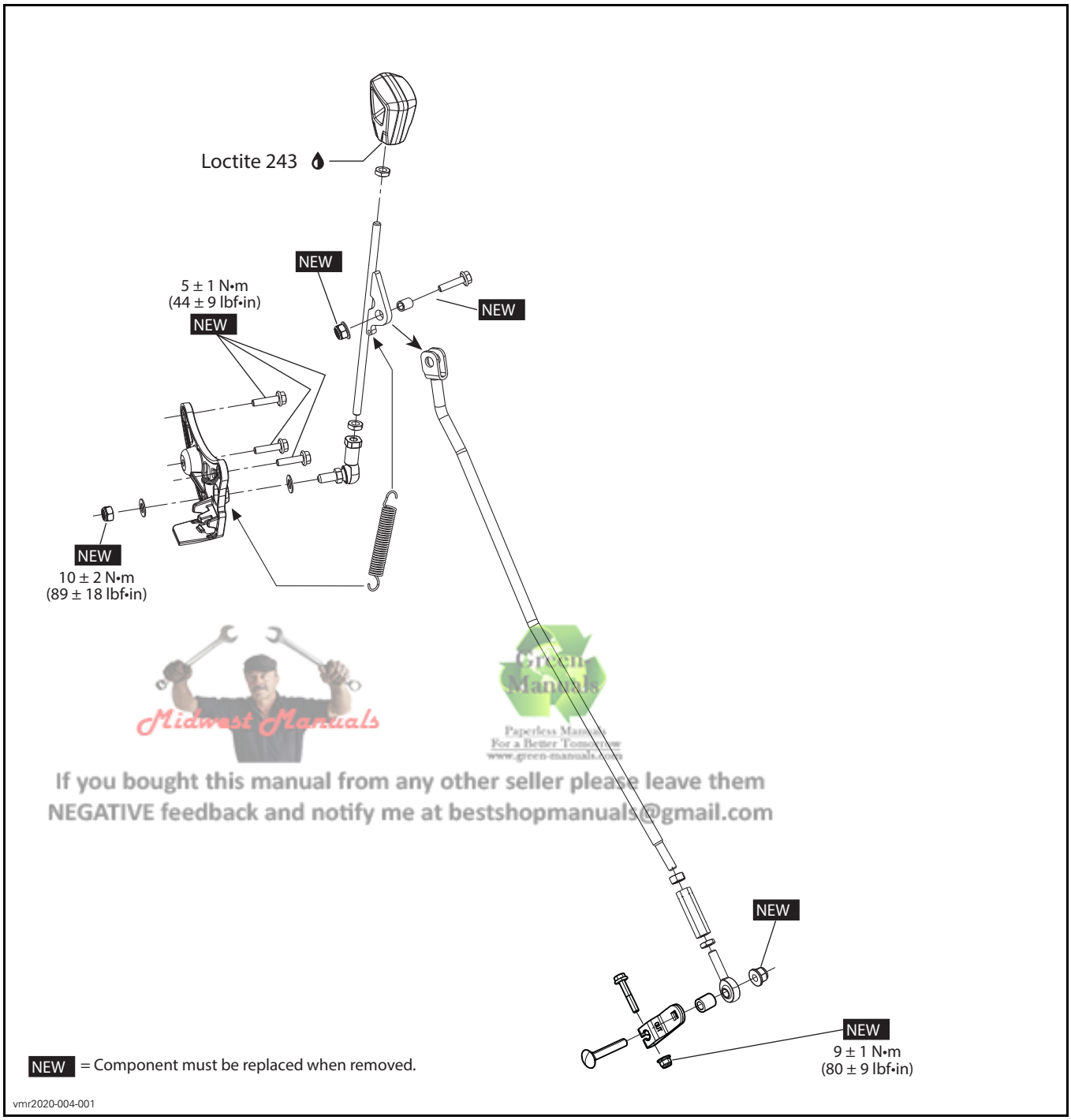
Tighten shift plate nut to specification.

TIGHTENING TORQUE	
Shift plate nut	9 N•m ± 1 N•m (80 lbf•**in** ± 9 lbf•**in**)

SHIFTER (GEARBOX WITH GBPS)

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	2



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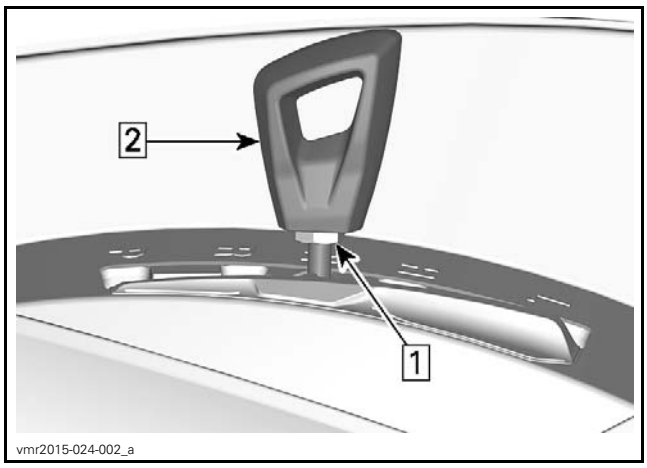
PROCEDURES

HANDLE

Removing the Handle



vmr2015-024-002_a

Step 1: Loosen lock nut
Step 2: Unscrew shift lever handle

Handle Installation

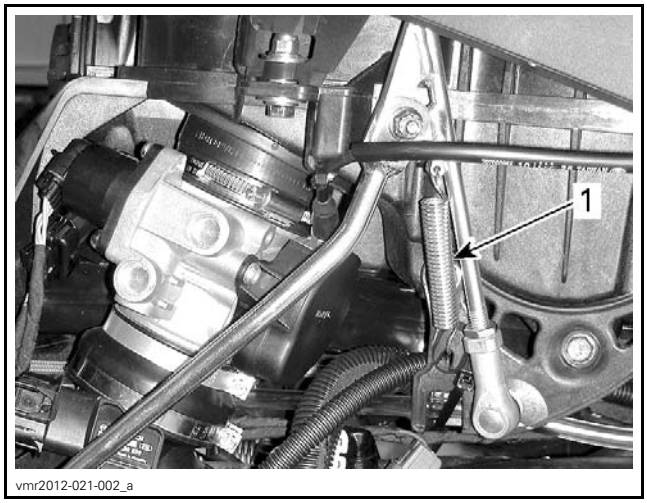
The installation is the reverse of the removal procedure.

RECOMMENDED SERVICE PRODUCT	
Shift lever threads	LOCTITE 243 (BLUE) (P/N 293 800 060)

SHIFT LEVER

Removing the Shift Lever

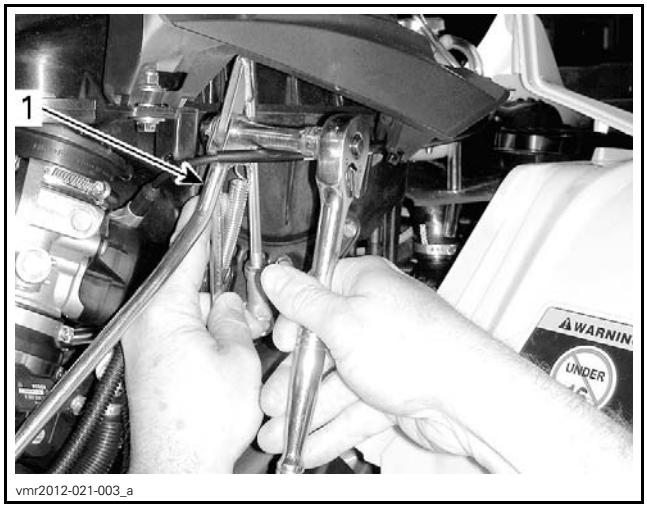
1. Remove body parts as required. Refer to *BODY* subsection.
2. Place shift lever in NEUTRAL position.
3. Secure vehicle using wheel chocks.
4. Unscrew shift lever handle.
5. Unhook spring.



vmr2012-021-002_a

1. Unhook

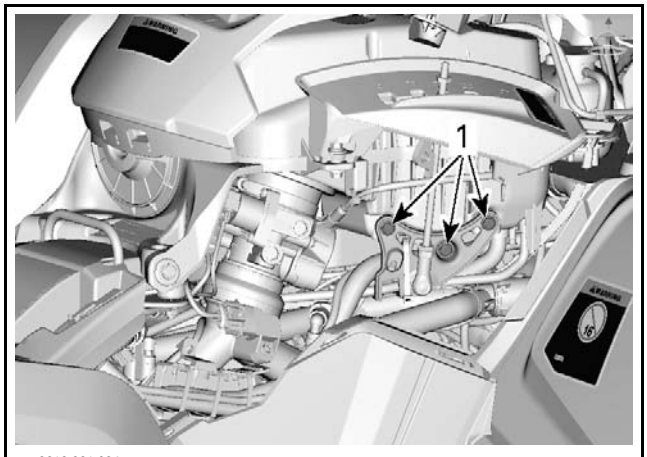
6. Detach shift rod from shift lever.



vmr2012-021-003_a

1. Detach

7. Detach shift lever support.



vmr2012-021-004_a

1. Remove bolts

8. Remove shift lever.

Inspecting the Shift Lever

Check shift lever for bending or cracks.

Check spring and bushing condition.

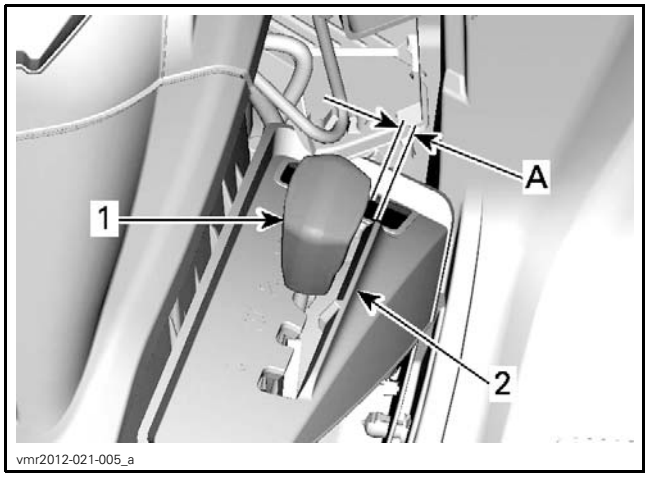
Check ball joint condition.

Replace all damaged parts.

Installing the Shift Lever

The installation is the reverse of the removal procedure. However, pay attention to the following.

Adjust shift lever handle as per the following illustration.



1. Handle
2. Ridge
A. Handle parallel with ridge

Check if shift lever works properly in all positions. Ensure throttle cable does not interfere with shift lever in all positions.

NOTE: Shift lever must be perfectly centered with the neutral mark when transmission is engaged in neutral.

If adjustment is required, refer to *ADJUSTING THE SHIFT ROD* in this subsection.

SHIFT ROD

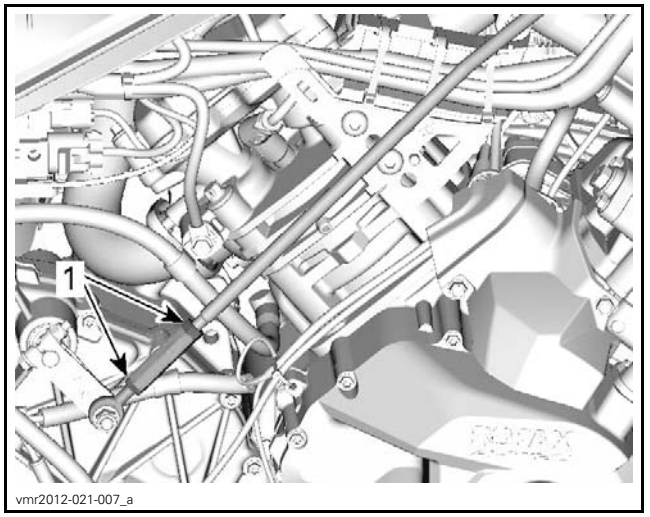
Adjusting the Shift Rod

1. Place shift lever in NEUTRAL position.

NOTICE **Move vehicle back and forth to ensure gearbox is set in neutral position.**

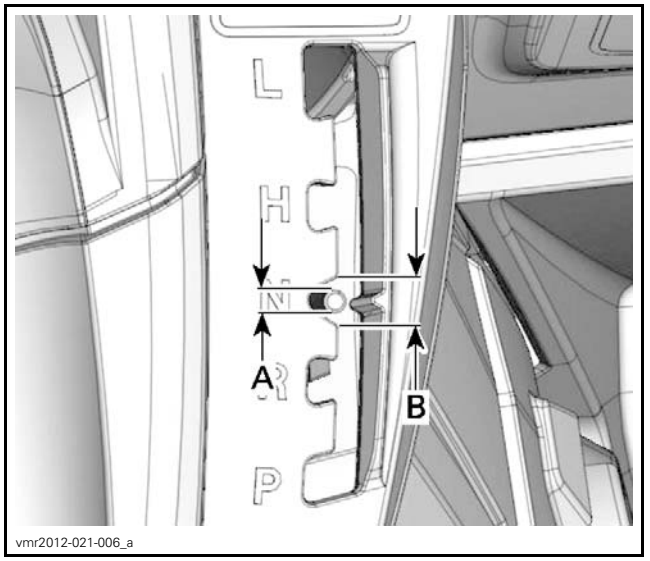
2. Secure vehicle using wheel chocks.
3. Remove body parts as required. Refer to *BODY* subsection.
4. Loosen shift rod adjustment nuts.

NOTE: Be aware that a nut has LH threads.



TYPICAL
1. Adjustment nuts

5. Turn rod adjuster to center shift lever in neutral notch.



A. Shift lever
B. Neutral notch

6. Move shift lever in R position then in H.
7. Place shift lever in NEUTRAL position.
8. Check if shift lever is properly centered in neutral notch. Readjust as required.
9. Hold adjuster steady and tighten lock nuts.
10. Test the shifter to confirm that the system works properly in all positions.

NOTE: Make sure the ball joint is properly aligned with the shift plate. It may be necessary to realign shift rod ball joints to allow easy movement.

⚠ WARNING

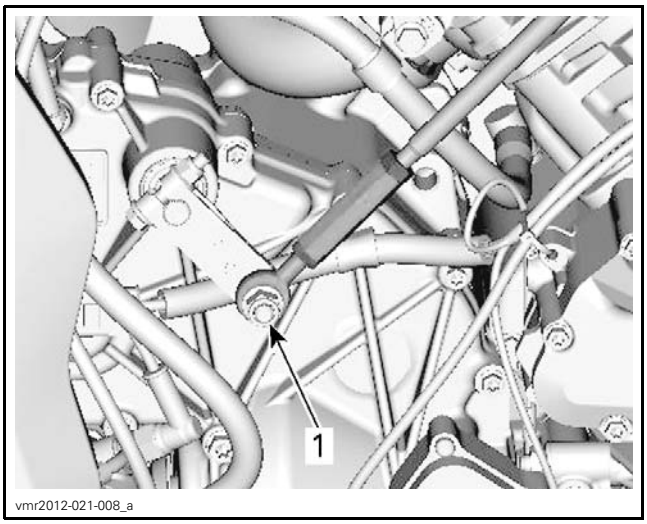
After adjustment, make sure that PARK position works properly.

SHIFT PLATE

Removing the Shift Plate

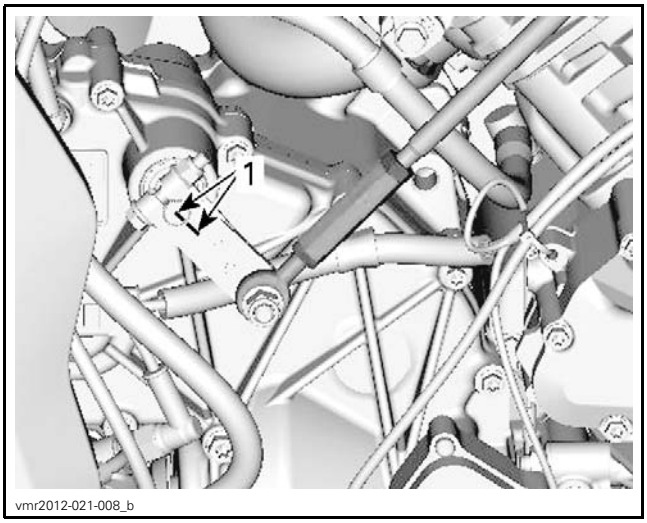
NOTE: Do not remove shift plate needlessly.

1. Remove body parts as required. Refer to *BODY* subsection.
2. Remove shift rod from shift plate.



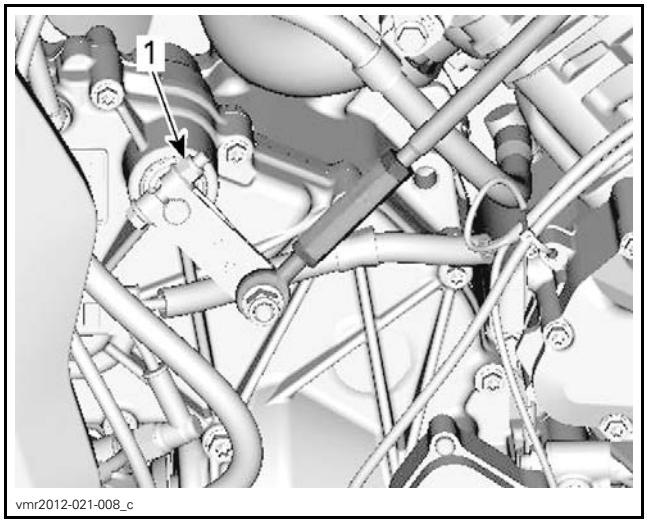
1. Remove nut

3. Trace an index mark on shift plate and shift shaft.



1. Trace a mark on both parts

4. Remove shift plate nut and bolt.



1. Shift plate nut

5. Remove shift plate.

Inspecting the Shift Plate

Check shift plate for:

– Cracks
– Bending
– Spline condition.

Installing the Shift Plate

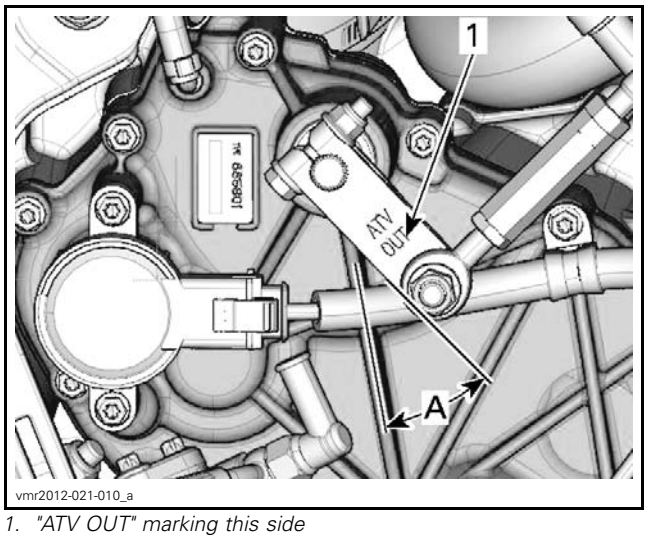
The installation is the reverse of the removal procedure. However, pay attention to the following.

Place gearbox in NEUTRAL position before shift plate installation.

Position shift plate with the marking "ATV OUT" visible outward.

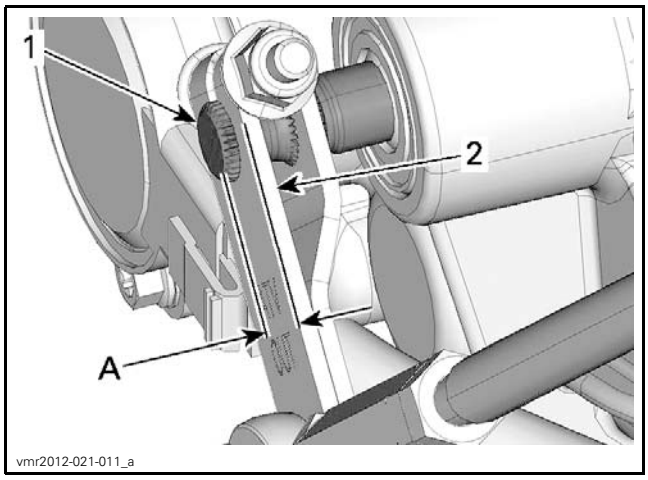
Align shift plate using marks previously traced.

If there is no mark, adjust shift plate as per following illustrations.



1. "ATV OUT" marking this side
A. 34°

Ensure that shift shaft protrudes shift plate as per illustration.



1. Shift shaft end
2. Shift plate
A. 2.5 mm ± 1 mm (.1 in ± .040 in)

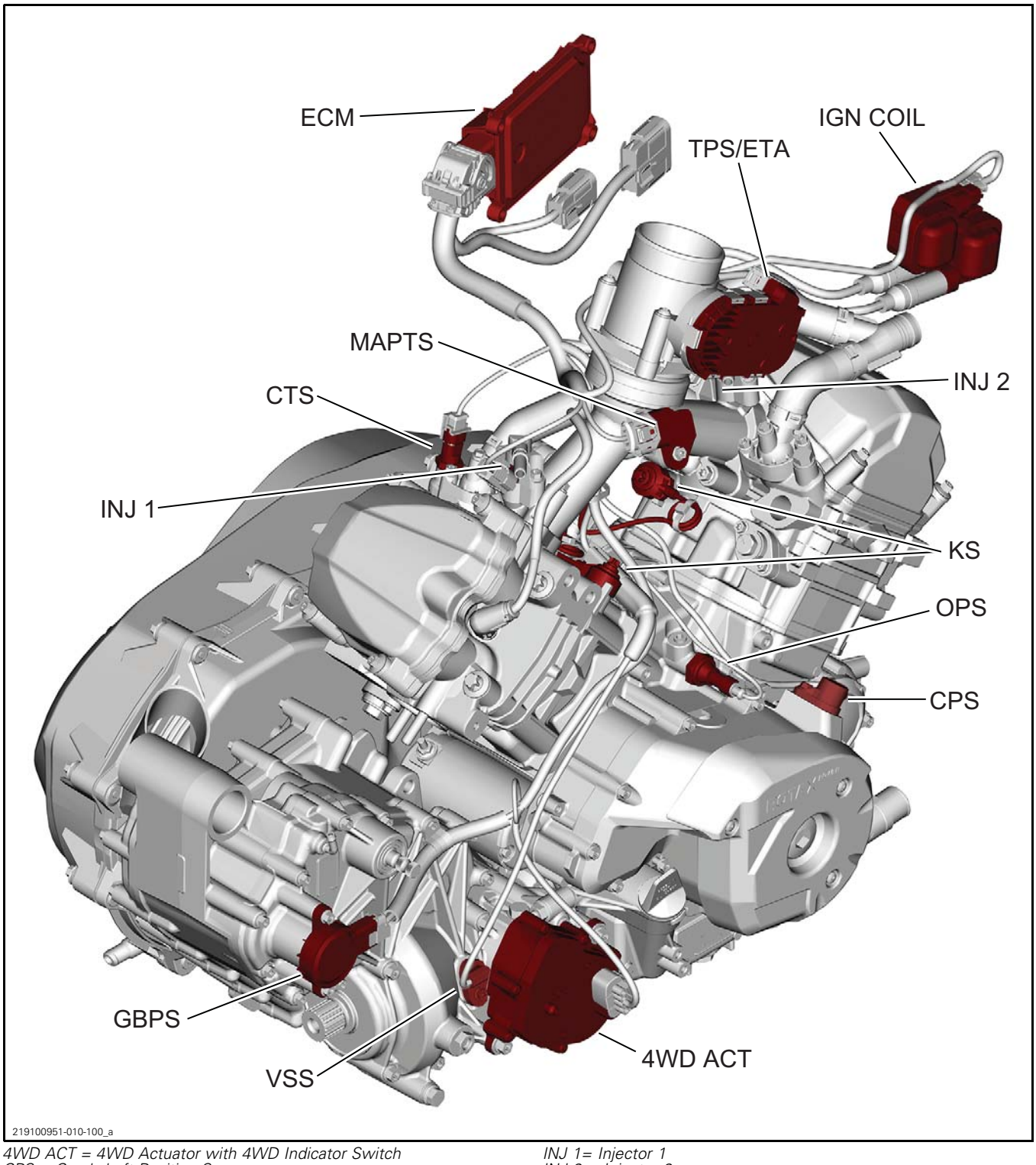
Adjust shift rod, refer to *ADJUSTING THE SHIFT ROD* in this subsection.

Tighten shift plate nut to specification.

TIGHTENING TORQUE	
Shift plate nut	9 N•m ± 1 N•m (80 lbf•**in** ± 9 lbf•**in**)

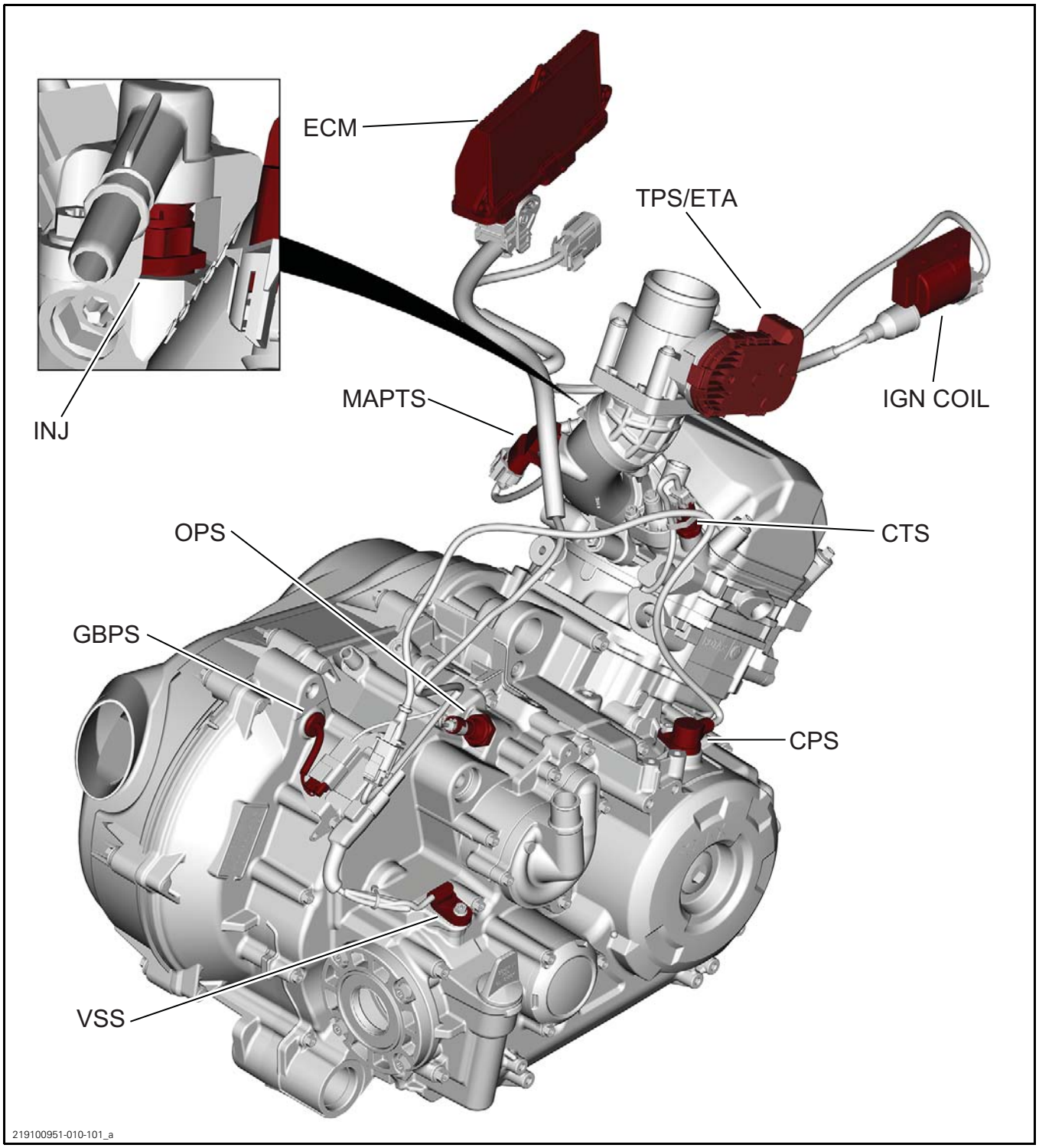
ENGINE MANAGEMENT SYSTEM (EMS) (with iTC)

Twin Cylinders



4WD ACT = 4WD Actuator with 4WD Indicator Switch
CPS = Crankshaft Position Sensor
CTS = Cooling Temperature Sensor
ECM = Engine Control Module
ETA = Electric Throttle Actuator
GBPS = Gearbox position sensor
IGN COIL = Ignition coil
INJ 1= Injector 1
INJ 2 = Injector 2
KS = Knock Sensor
MAPTS = Manifold Air Pressure and Temperature Sensor
OPS = Oil Pressure Switch
TPS = Throttle Position Sensor
VSS = Vehicle Speed Sensor

Single Cylinder



CPS = Crankshaft Position Sensor
CTS = Cooling Temperature Sensor
ECM = Engine Control Module
ETA = Electric Throttle Actuator
GBPS = Gearbox Position Sensor
IGN COIL = Ignition coil
INJ = Injector
MAPTS = Manifold Air Pressure and Temperature Sensor
OPS = Oil Pressure Switch
TPS = Throttle Position Sensor
VSS = Vehicle Speed Sensor

GENERAL

SYSTEM DESCRIPTION

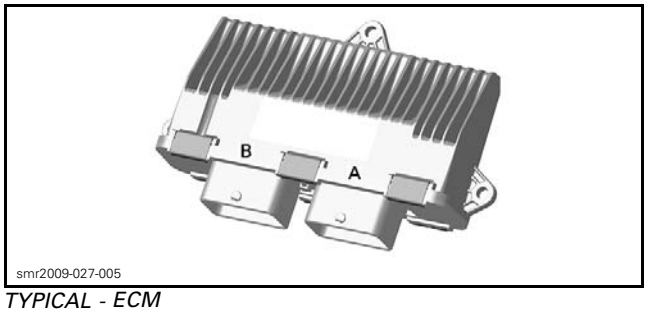
The ECM ensures a high power output with clean combustion.

There are 7 main systems that are controlled by the ECM:

1. Electronic Fuel Injection (EFI)
2. Intelligent throttle control
3. Cooling system (cooling fan)
4. Ignition system
5. Starting system
6. Fuel system

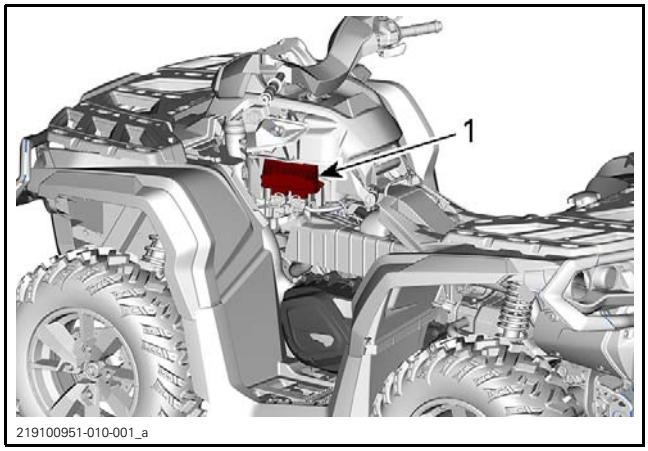
NOTE: For further information related to these systems, refer to the applicable subsection.

The ECM is the central point of the engine management system.



TYPICAL - ECM

The ECM is located behind the LH panel.



TYPICAL

The ECM reads input signals from various switches, controls, and sensors, that it compares to predetermined parameters, makes computations, and provides control signal outputs required for proper engine management.

The ECM also interacts through CAN bus with the gauge module for various functions, information exchange and display of messages. Refer to *CONTROLLER AREA NETWORK (CAN)* and *GAUGE* subsections.

The ECM also features a permanent memory that will store the information on the various ignition keys programmed to the vehicle, fault codes, customer information, and other engine information, even when the battery is removed from the vehicle.

Diagnostic Mode

The ECM features a self-diagnostic mode that is activated on system power up (ignition key ON) for certain systems and components, and when the engine is running for others. Refer to *DIAGNOSTIC AND FAULT CODES* subsection for more information.

Monitoring System

The MONITORING SYSTEM monitors various electrical and electronic components of the engine control systems such as the:

– ETA (Electric Throttle Actuator)
– TPS (Throttle Position Sensor)
– TAS (Throttle Accelerator Sensor)
– ECM (Engine Control Module).

The engine management system provides for redundancies in these components should a failure or partial failure occur to which it will adjust system operation to protect the vehicle and most of importantly, the driver.

Should the engine management system not respond (or not respond correctly) to a failure, then the monitoring system will react to ensure vehicle and driver safety.

The monitoring system therefore ensures the engine management system is functioning correctly.

Limp Home Mode

When a major component of the EMS is not operating properly, limp home mode will be set.

Engine RPM will be limited and/or engine behavior and control may be modified depending on the cause of the failure.

LIMP HOME will be displayed in the multifunction gauge and the CHECK ENGINE light symbol will be on in the gauge.

A failure of any of the following major components will force the vehicle into LIMP HOME MODE:

– TPS / ETC / TAS

– Injectors
– Low oil pressure
– High engine coolant temp
– MAPTS signal fault.

iCONTROL SYSTEM

GENERAL

iControl™ (intelligent Control systems) provides an environment whereby the operator can control many systems while constantly maintaining a proper grip on the handlebar.

All iControl inputs are at the operator's finger tips. The operator's attention can thus remain focused on driving.

One such system is the intelligent throttle control system (iTC). This system provides improved response to operator inputs and increased maneuverability and control.

iTC (INTELLIGENT THROTTLE CONTROL)

The iTC system uses a throttle accelerator sensor (TAS) at the throttle lever to provide command signals to the ECM (Engine Control Module).

The throttle body in this system encompasses a throttle position sensor (TPS) and an electric throttle actuator (ETA). The two together are known as the electronic throttle control (ETC).

The ECM compares the TAS signal to the TPS signal and provides appropriate control signals to the ETA to regulate the butterfly valve position. With this system, there is no need for a traditional throttle cable.

CONTROLLER AREA NETWORK (CAN)

GENERAL

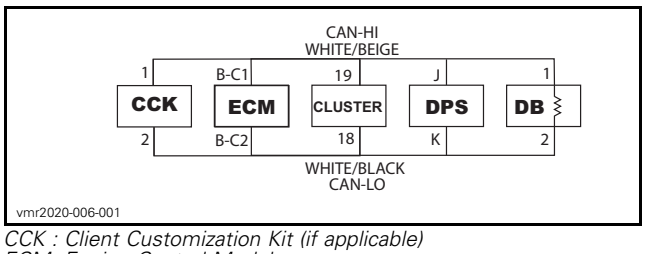
SYSTEM DESCRIPTION

The CAN (Controller Area Network) protocol is an ISO standard for serial data communication. The CAN bus links the ECM, multifunction gauge and DPS module together so that they can communicate to each other and interact as required. The components (modules) are connected together by 2 wires and are in constant communication at a rate of about every 20 milliseconds. CAN lines consist of a pair of wires (WHITE/BEIGE and WHITE/BLACK).

If a component or system malfunction is detected, a module (ECM, multifunction gauge or DPS) may generate a fault code, which it transmits through the CAN bus as a signal. The fault signal may be used for various functions such as triggering the display of an error message in the multifunction gauge cluster, turning on a fault indicator light, limiting or inhibiting vehicle or engine operation, or viewed using the BRP diagnostic software (BUDS2) for troubleshooting.

Using BUDS2, technicians may also communicate through the diagnostic connector (DB) with electronic modules (ECM, Cluster, DPS, CCK) for various reasons such as:

– Extracting data
– Programming a module
– Changing settings
– Viewing fault codes
– and for various other functions.



CCK : Client Customization Kit (if applicable)
ECM: Engine Control Module
CLUSTER: Multifunction Gauge
DPS: Dynamic Power Steering
DB: Diagnostic Connector
WHITE/BEIGE: (wire color code)
WHITE/BLACK: (wire color code)

COMMUNICATION TOOLS

SERVICE TOOLS

Description	Part Number	Page
DIAGNOSTIC CABLE	710 000 851	1
MPI-2 INTERFACE CARD	529 036 018	1
MPI-3 INTERFACE CARD	529 036 353	1

GENERAL

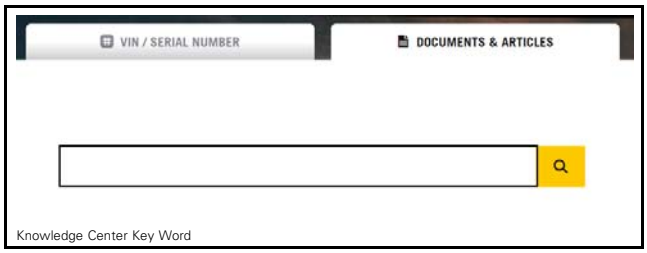
Connect vehicle to the BRP Diagnostic Software BUDS2.

Refer to the **B.U.D.S. directory** on *KNOWLEDGE CENTER* for all B.U.D.S. related information, including:

– Download link
– User manual (navigation through menus, programming keys, reading fault codes, writing data to modules etc.)
– Installation instructions.

Refer to the BRP B.U.D.S. chart to ensure you are using the appropriate hardware and tools.

Search keyword: "BUDS".



Knowledge Center Key Word

REQUIRED TOOLS

MANDATORY TOOLS
A personal computer (laptop or desktop)
MPI-2 INTERFACE CARD (P/N 529 036 018)
OR
MPI-3 INTERFACE CARD (P/N 529 036 353)

MANDATORY TOOLS
DIAGNOSTIC CABLE (P/N 710 000 851)
OPTIONAL TOOL
Extension cable available at electronic retail outlets. Do not exceed 7.5 m (25 ft)

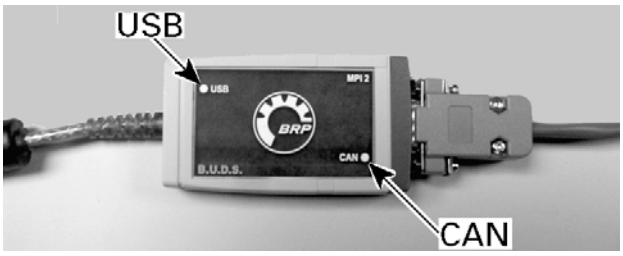
TROUBLESHOOTING

DIAGNOSTIC TIPS

Troubleshooting the MPI Connection

MPI Status Lights

The MPI card includes 2 status lights that indicate the connection condition: USB and CAN. Both lights must be GREEN to function properly. Otherwise, refer to the following charts.



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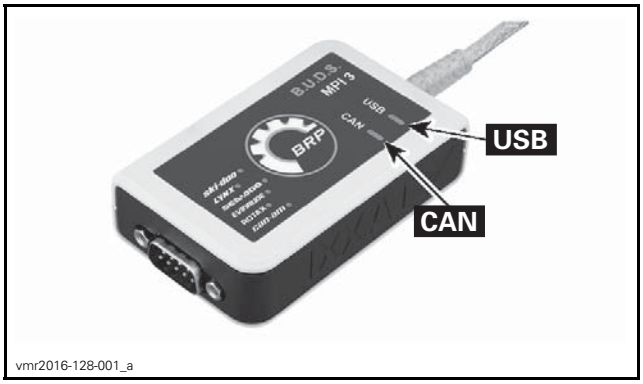
MPI-2 CARD



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MPI-3 CARD

Prerequisite for USB Communication:

– Computer turned on.
– MPI card connected to computer.

COMMUNICATION PROBLEM (USB)	
STATUS	WHAT TO DO
Light is OFF	Check USB connection between MPI card and computer. Check USB operation on computer (hardware or USB drivers)
Light is GREEN	Connections are GOOD. Communication can take place on USB side

Prerequisite for CAN Communication:

– MPI card connected to diagnostic connector on vehicle.
– Computer turned ON
– The D.E.S.S. key installed on the engine D.E.S.S. post (if applicable).
– ECM is powered.

COMMUNICATION PROBLEM (CAN)	
STATUS	WHAT TO DO
CAN Light is OFF	– BUDS2 does not communicate with the vehicle. – Check connections from computer to vehicle. – Check if BUDS2 is started. – Check if vehicle is powered: is cluster turned ON? If it is not ON, install the D.E.S.S. key on the D.E.S.S. post (if apllicable).
CAN Light is RED	This occurs when BUDS2 looses communication with vehicle. – Check connections from computer to vehicle. – Check if vehicle is powered: is cluster turned on ? If not, install the D.E.S.S. key on the D.E.S.S. post (if applicable).
CAN Light is GREEN	– Connections are GOOD. BUDS2 communicates normally with the vehicle.

PROCEDURES

MULTI-PURPOSE INTERFACE CARD (MPI-2 OR MPI-3)

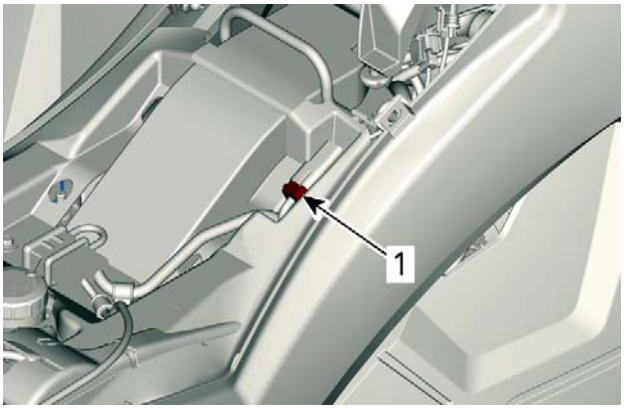
The MPI (Multi-Purpose Interface) in conjunction with the diagnostic cable is used with BUDS2 to communicate with the ECM (engine control module) and other modules.

MPI Card Power

The MPI card uses the power from the computer's USB port.

Diagnostic Connector Location

The 6-pin diagnostic connector is located under the seat.



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1. Diagnostic connector

DIAGNOSTIC AND FAULT CODES

GENERAL

MONITORING SYSTEM

The ECM features a monitoring system that self-diagnoses various electrical and electronic components. This mode becomes active when the ignition key is turned ON.

NOTE: Some components require the engine to be running to be monitored (fuel injectors for example).

The monitoring system continuously validates that the components (control modules, sensors and actuators) are not faulty or defective. When a malfunction is detected, the related electronic module(s):

– Sets an active fault code.
– Adapts the proper protection strategy according to the failure.
– Sends out signals to the multifunction gauge to inform the rider of a particular condition.

If a minor fault occurs, the engine and vehicle will continue to operate without noticeable loss of performance.

If a more important fault occurs, engine RPM may be limited. The engine/vehicle will continue to operate with reduced performance.

If a major component of the Engine Management System (EMS) fails, engine RPM will be limited as well as vehicle speed. Refer to *LIMP HOME MODE* in the *ENGINE MANAGEMENT SYSTEM* subsection.

These strategies are used to protect engine/electrical system from damage and to maintain safe operation of the vehicle. In extreme cases, the engine may also be completely shut down.

Messages in Gauge for Problematic Conditions

If an abnormal condition occurs, the gauge will display one of the following messages. It can be combined with a pilot lamp.

MESSAGE	DESCRIPTION
CHECK ENGINE	All active or previously activated faults that require attention. No engine limitation engaged.
LIMP HOME	Critical faults requiring diagnostic as soon as possible. An engine limitation is engaged and/or the engine behavior is modified.
LO BATT VOLT	Low battery voltage detected by ECM.
HIGH BATT VOLT	High battery voltage detected by ECM.
LOW OIL	Low oil pressure detected by the ECM.
D.E.S.S. KEY NOT RECOGNIZED	D.E.S.S. KEY is not recognized by ECM.
HI TEMP	High temperature detected by the ECM.
ECM CRC ERROR	Error message from ECM.
TPS FAULT	TPS (throttle position sensor) fault, generally followed by a Limp Home message.
BRAKE SWITCH FAULT	Brake signal fault.
ECM NOT RECOGNIZED	Message displayed when the gauge is unable to identify the ECM.

MESSAGE	DESCRIPTION
TRANSMISSION SIGNAL FAULT	Gearbox position sensor fault active. "E" is also displayed in the gear display.
PPS FAULT	When one or both sensor of the TAS (throttle accelerator sensor) is/are faulty, erratic or out of range or that the ratio between the two is incorrect, the message will be displayed and the check engine pilot lamp will be lit.
MANUAL LIMP HOME	When the TAS Limp Home (throttle accelerator sensor) is engaged, the message will be displayed.

Limp Home Mode

Refer to *LIMP HOME MODE* in the *ENGINE MANAGEMENT SYSTEM* subsection.

FAULT CODES

Fault Code Categories

A fault code consists of an alphanumeric designator followed by a hexadecimal number of 3 digits. The alphanumeric designator defines the category of the fault code while the hexadecimal number refers to a unique fault.

FAULT CODE CATEGORIES		
ALPHANUMERIC DESIGNATOR	MODULE/ SYSTEM	EXAMPLE OF FAULT CODE
From P0 to P3	Power train	P0116
From U0 to U3	Communication between module and sensors	U0073

RELATED MODULE AND FAULTS	
MODULE	FAULT CODE CATEGORY
ECM	P and U
Cluster	P and U
DPS	P and U

Fault Code States

Fault codes have 3 possible states:

– Active
– Occurred
– Inactive.

Active Fault Codes

An active fault code is an indication of a fault that is **currently triggered**.

The active fault may or may not compromise normal operation of the system(s). Service action should be taken to correct the problem that caused the fault code.

Once the fault condition(s) of the active fault is no longer present, its state will change to "occurred".

Occurred Fault Codes

An occurred fault code indicates a fault that was active, but **no longer** is.

The occurred fault does not presently affect system or component operation but is retained as a history of the faults that were detected.

The fault may have been generated due to a system or component that was momentarily operating outside normal parameters. Repeated occurred faults of this type should be considered when troubleshooting a problem, and may require that maintenance action be taken.

An occurred fault may also be generated when disconnecting and reconnecting a component, replacing a burnt fuse, when the software update of an electronic module has been carried out, or may be due to a momentary high or low voltage.

Inactive Fault Codes

An inactive fault code represents a fault code that is neither active, nor occurred. It is simply part of a list of all possible faults that can be monitored by the ECM and multifunction gauge, which may become active or occurred if the monitoring system detects an applicable fault. These codes can be viewed in BRP diagnostic software BUDS2.

Reading and Clearing Fault Codes

For more information pertaining to the faults code status and report, refer to BUDS2.

How to Read Fault Codes Using the Multifunction Gauge

Refer to the applicable *GAUGE* subsection.

NOTE: A fault code must be in an "Active" state to be displayed in the multifunction gauge. BRP diagnostic software BUDS2 must be used to read all fault codes states.

How to Find Fault Code Descriptions

Connect BUDS2 to the vehicle.

Navigate to the **Faults** page.

Browse lists of active/occurred and inactive fault codes.

FAULT CODE DIAGNOSTIC

Diagnostic Tips

To see the last two minutes of operating conditions, click on the **Summary** tab in BUDS2 and select **Statistics**.

NOTE: The page displays data whatever there is fault code(s) or not.

GENERAL GUIDELINES TO SOLVE FAULT CODES	
CONDITION	ACTION
Troubleshooting vehicle	Use BUDS2 to: Read fault codes. Display "Active" faults to see components currently not operating normally. Display "Occurred" faults to troubleshoot intermittent problems. Monitor system(s), sensor(s), switches and actual conditions. Activate component(s) for troubleshooting. Set components (resets etc). Know the last minute of operating conditions by using the "History" page. Know the operating conditions, if available, when a fault code occurred by using the "More details" button in the fault page.
New fault(s) appear after a vehicle maintenance or repair	Check sensor connections or mixed up connections. **Before** vehicle maintenance: Read the electronic modules with BUDS2 Save and print the BUDS2 file (keep faults option only). **After** vehicle maintenance: Read the electronic modules with BUDS2 Compare the fault code(s) before and after the maintenance using the printed copy and the current reading. Investigate only the newly fault codes. Clear all occurred faults
Sensor "Active" fault	Read the fault description in BUDS2
Low system voltage on one module. Power problem on sensor(s)	Check related fuse(s) and relay. Check related power and ground wires. Check for common power supply to several sensors/modules (refer to *POWER DISTRIBUTION AND GROUNDS)*. NOTE: Some sensors are supplied by the battery while others are supplied by a module.
Low system voltage on several modules (several communication faults will also appear)	Check battery condition and connections. Check related fuse(s) and relay. Check voltage regulator/rectifier.
High system voltage on several modules	A battery charger has likely been used to substitute the vehicle battery. Clear all occurred faults and check again. Check voltage regulator/rectifier.
When all modules report that a module is missing	Check the module that is reported as missing. Check related fuse(s) and relay. Check related power and ground wires.

GENERAL GUIDELINES TO SOLVE FAULT CODES	
CONDITION	ACTION
When several modules are in fault	Search for a common problem such as a faulty sensor.
CAN buss OFF	When several modules and sensors report that a module is missing. The missing module may report CAN bus off. Check related CAN wires (continuity, short to ground, short between CAN low and high). Check module pins and wiring terminals. Then, the other modules should stop reporting that module is missing.
Occurred fault(s)	May have been generated due to a system or component that was momentarily operating outside normal parameters.
	May be generated when disconnecting and reconnecting a component, replacing a burnt fuse, or may be due to a momentary high or low voltage.
	Before being "Occurred", a fault has always been "Active" for a certain time, indicating that an unexpected condition or problem has been present during the driving cycle. A frequent momentarily fault or an intermittent fault may never be seen as "Active" in BUDS2 while there is still a pending problem. This type of malfunctions can be discovered by looking at the "Occurred" faults and then by evaluating the fault count. As long as a fault is present, it is displayed as "Active".
Fault count (0 - 255)	**Low value:** Suggests handling problems (connections, terminal contact/ shape etc.). **High value:** Suggests a frequent and unsolved problem. The problem should be investigated.
Fault conditions	Look for abnormal, excessive values.
Hard to find problems	When the basic troubleshooting has been done and the fault code(s) persists, often the problem is related to the wiring harness, connections or electromechanical components. Short to ground, to battery or between wires. Wire splices, chafing, terminal problems (pulled out, bent, out of shape, corroded etc.). Bad contacts in switch or relay.

ECUs share information and their systems may interact with each other. Certain faults may cause more than one ECU to set a fault code or indication (pilot lamp or message) as the failure of some components may affect the operation of several systems.

SPECIFIC FAULTS

TPS Fault

A TPS fault may be considered to be a major fault as the TPS provides the most important feedback (2 signals) to the ECM on throttle position.

A TPS fault affects engine control as the throttle plate is moved by the ETA (electric throttle actuator) which, is controlled by the ECM (see *INTELLIGENT THROTTLE CONTROL (ITC)* subsection).

A TPS fault is generally followed by LIMP HOME mode and the engine is brought back to idle, or may be completely shutdown.

Low Battery Voltage Fault

If the battery voltage is low when the engine is running at idle RPM, the ECM will command an increase in RPM to a set value, thereby increasing the charging system output in order to prevent the battery from being discharged, and to allow normal system operation.

TAS Fault

If one TAS (throttle accelerator sensor) signal is missing, LIMP HOME MODE will be activated and the check engine light will come ON. Pressing and holding the OVERRIDE button will allow normal control of the accelerator pedal.

If both sensors in the TAS are at fault, a TAS FAULT message will appear in the gauge, the check engine light will come ON and the engine will run at idle. The accelerator pedal will not have any affect on engine RPM. However, the vehicle may be driven in LIMP HOME MODE by pressing the OVERRIDE button.

When limp home mode is engaged using the override button, a MANUAL LIMP HOME message will appear in the gauge. The OVERRIDE button can then be used as the accelerator, vehicle speed is controlled by pressing and/or releasing the button.

BRAKE ACTIVATION Fault Message in Gauge

If a brake signal is received continuously for 15 seconds above 5 km/h (3 MPH), a BRAKE message will be displayed in the gauge.

DIAGNOSTIC AND FAULT CODES

GENERAL

FAULT CODE TABLE

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
C2109	SCM-XMR	Release valve activation delay exceeded	Pressure did not drop to desired set point after predefined delay Release valve tube momentary blocked Blown valve fuse Damaged circuit wires or connectors Faulty valve block Faulty SCM	1- Go to Activations - SCM and start Rear Test routine. If the test passed, the system is working properly. Check the harness and connection to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. Mud, dust or water in the release tube may explain the fault code. If the Test status shows a Fail_release, proceed to next action step. 2-Verify the release tube (orange) for obstruction. If nothing is found go to next action step. 3- Unplug the valves block connector and measure that 12V is present between pin D of the connector on the SCM side and the battery negative post. If not, verify the valve fuse and relay (refer to schematics for more information). Verify the harness and the connection between the valve and the SCM. If everything is fine, go to next action step. 4- Verify the release valve activation by disconnecting the valve block electrical connector and applying 12V across pin D and H on valve connector. If the release valve is operating, change the SCM, otherwise change the valve block.

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PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
C2111	SCM-XMR	Auxiliary line pressure sensor value out of range	Too many values of the external sensor out of range (negative pressure) Sensor disconnect Damaged circuit wires or connectors Faulty auxiliary line sensor Faulty SCM	1- Go to Activations - SCM and start Rear Test routine. Verify that the Shock Absorber Pressure and the Auxiliary Line Pressure correlates in BUDS. If the test is done with no fault, the system is working properly. Check the harness and connection to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. If the Test Status shows a Fail_Comparison_Sensor_Test, verify for leak. If no leak found, verify the wiring and connector of the external sensor and the SCM. In the next action step, verify which of Shock absorber or Auxiliary Line Pressure sensors is defective. 2-Make sure to have no pressure in the system by activating the relief valve in Activation -SCM. Connect the supplied air hose into the compressor fitting and plug it to a known pressure supply in the range of 30 to 120 psi (as car tire) and compare it to the Shock absorber pressure and Auxiliary line pressure, it should be similar. If the Shock absorber pressure is off, change the SCM module. Go to next action step to perform Auxiliary Line Pressure sensor test. 3-Back probe the signal coming from the sensor between the pin 3 of the SCM electrical connector and the negative battery post (this action must be done with special probe to not damage the connector seal). The value must be between 0.9 and 8.3 Volts for a pressure range of 0 - 100 psi. If not go to next action step. If the value is in the range, the Auxiliary Line Pressure sensor is fine, change the SCM. 5- Unplug the Auxiliary Line Pressure sensor and make sure to have 12V between pin 3 and 1 on the connector coming from SCM. If 12V is present change the sensor, if not change the SCM.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
C21E0	SCM-XMR	System rear suspension pumping delay exceeded	Pressure did not reach to desired set point after predefined delay Leak in the system Jammed compressor intake tube Damaged circuit wires or connectors Blown compressor fuse Corroded or disconnected compressor GND Faulty relay Faulty compressor Jammed check valve Faulty SCM	1- Check for leaks. If no leak found go to next action step. 2- Go to Activations - SCM and start Rear Test routine. If the test is done with no fault, the system is working properly. Check the harness and connector to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. If the compressor is not starting check the compressor GND, harness and connection then continue to the next action step. If the compressor is running and the Test Status show a Fail_Pumping_Rear go to action step 6. 3-Test the compressor with an external power supply (as a 12V battery). If the compressor is functional go to next action step. 4-Unplug the relay and make sure to have 12V between battery negative post and relay pin 30. If not, check the compressor fuse and harness. If 12V is present, test the relay. If the relay is functional plug it back and go to next action step. 5- Disconnect the SCM, take a jumper wire and connect pin 8 to the battery negative post. If then the compressor starts, change the SCM. 6- Verify that the compressor intake tube (transparent) is not blocked or kinked. Unplug the SCM air tube (yellow) and start the compressor. If air blow out of the tube change the SCM. If not go to next action step. 7- During the Rear Test routine verify the pressure sensors value. If the Shock Absorber Pressure and Auxiliary Line Pressure is not going up verify the first check valve at the exit of the compressor. If only the Shock Absorber Pressure is not going up verify the second check valve after green tube.
C21E1	SCM-XMR	System rear suspension high leakage detected	Leak in the system	1- Verify suspension system for air leaks.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
C21E2	SCM-XMR	System rear suspension valve failure	Too many occurrence of pressure pumping and release in short delay Rear valve tube blocked Blown valve fuse Faulty valve block Damaged circuit wires or connectors Faulty SCM	1- Disconnect the air line to the rear shocks. Go to Activations - SCM and start Rear Test routine. If the air blows out the system is working properly. Check the harness and connection to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. If the air do not blow out continue to next action step. 2- Verify the air tube (black) from the valve to the rear suspension. If nothing found go to next action step. 3- Unplug the valve block electrical connector and verify that 12V is present between pin A and battery negative post. If not verify valve fuse, relay and harness (refer to schematics for more information). If 12V is read go to next action step. 4- Verify the rear valve activation by disconnecting the valve block electrical connector and applying 12V across pin A and E while compressor running (Go to Activations - SCM and start Rear Test routine). If the rear valve is opening and filling the shocks change the SCM. If the rear valve is not opening, change the block valve.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
C21F0	SCM-XMR	System front suspension pumping delay exceeded	Pressure did not reach to desired set point after predefined delay Leak in the system Jammed compressor intake tube Damaged circuit wires or connectors Blown compressor fuse Corroded or disconnected compressor GND Faulty relay Faulty compressor Jammed check valve Faulty SCM	1- Check for leaks. If no leak found go to next action step. 2- Go to Activations - SCM and start Rear Front routine. If the test is done with no fault, the system is working properly. Check the harness and connector to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. If the compressor is not starting check the compressor GND, harness and connection then continue to the next action step. If the compressor is running and the Test Status show a Fail_Pumping_Rear go to action step 6. 3-Test the compressor with an external power supply (as a 12V battery). If the compressor is functional go to next action step. 4-Unplug the relay and make sure to have 12V between battery negative post and relay pin 30. If not, check the compressor fuse and harness. If 12V is present, test the relay. If the relay is functional plug it back and go to next action step. 5- Disconnect the SCM, take a jumper wire and connect pin 8 to the battery negative post. If then the compressor starts, change the SCM. 6- Verify that the compressor intake tube (transparent) is not blocked or kinked. Unplug the SCM air tube (yellow) and start the compressor. If air blow out of the tube change the SCM. If not go to next action step. 7- During the Front Test routine verify the pressure sensors value. If the Shock Absorber Pressure and Auxiliary Line Pressure is not going up verify the first check valve at the exit of the compressor. If only the Shock Absorber Pressure is not going up verify the second check valve after green tube.
C21F1	SCM-XMR	System front suspension high leakage detected	Leak in the system	1- Verify suspension system for air leaks.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
C21F2	SCM-XMR	System front suspension valve failure	Too many occurrence of pressure pumping and release in short delay Front valve tube blocked Blown valve fuse Faulty valve block Damaged circuit wires or connectors Faulty SCM	1- Disconnect the air line from the front shocks. Go to Activations - SCM and start Front Test routine. If the air blows out of both shocks the system is working properly. Check the harness and connection to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. If the air does not blow out even from one shock continue to next action step. 2- Verify the air tubes (blue) from the valves to both front shocks. If clear go to next action step. 3- Unplug the valve block electrical connector and verify that 12V is present between pin B and battery negative post (right) / between pin C and battery negative post (left). If not verify valve fuse, relay and harness (refer to schematics for more information). If both 12V are read go to next action step. 4- Verify the front valves activation by disconnecting the valve block electrical connector and applying 12V across pin B and F (right) or C and G (wrong in wire diagram) (left) while compressor running (Go to Activations - SCM and start Front Test routine.). If the front valves are opening and filling the shocks change the SCM. If either of the front valves are not opening, change the block valve.
P0008	ECM	Lost of Synchronisation	Engine Synchronisation Check Failed	Check for Crankshaft Position Sensor fault Check for dirty Crankshaft Position Sensor. Check compression on engine

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0107	ECM	Manifold Air Pressure Sensor voltage too Low	Damaged sensor, damaged circuit wires, damaged connector or damaged ECM pins, ECM voltage supply Low	Make sure sensor connector is fully inserted. Measure voltage between harness connector pins 1 and 3 . (Expected value: 4.8 to 5.1 volts) Measure resistance from connector: ECM-F3 to MAPTS-2 (Expected value: < 2 ohms) Measure resistance from connector: ECM-A1 to MAPTS-3 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G2 to MAPTS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-F2 to MAPTS-4 (Expected value: < 2 ohms)
P0108	ECM	Manifold Air Pressure Sensor voltage too High	Damaged sensor, wires shorted to battery +, ECM voltage supply too High.	Make sure sensor connector is fully inserted. Measure voltage between harness connector pins 1 and 3 . (Expected value: 4.8 to 5.1 volts) Measure resistance from connector: ECM-F3 to MAPTS-2 (Expected value: < 2 ohms) Measure resistance from connector: ECM-A1 to MAPTS-3 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G2 to MAPTS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-F2 to MAPTS-4 (Expected value: < 2 ohms)
P0112	ECM	Intake Air Temperature Sensor 1 circuit Low	Damaged sensor, damaged circuit wires, damaged connector or damaged ECM pins, ECM voltage supply Low	Make sure sensor connector is fully inserted. Measure voltage between harness connector pins 1 and 3 . (Expected value: 4.8 to 5.1 volts) Measure resistance from connector: ECM-F3 to MAPTS-2 (Expected value: < 2 ohms) Measure resistance from connector: ECM-A1 to MAPTS-3 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G2 to MAPTS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-F2 to MAPTS-4 (Expected value: < 2 ohms)

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0113	ECM	Intake Air Temperature Sensor 1 circuit High	Damaged sensor, wires shorted to battery +, ECM voltage supply too High.	Make sure sensor connector is fully inserted. Measure voltage between harness connector pins 1 and 3 . (Expected value: 4.8 to 5.1 volts) Measure resistance from connector: ECM-F3 to MAPTS-2 (Expected value: < 2 ohms) Measure resistance from connector: ECM-A1 to MAPTS-3 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G2 to MAPTS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-F2 to MAPTS-4 (Expected value: < 2 ohms)
P0114	ECM	Intake Air Temperature Sensor Intermittent	Damaged sensor, damaged circuit wires, damaged connector or damaged ECM pins, ECM voltage supply	Make sure sensor connector is fully inserted. Measure voltage between harness connector pins 1 and 3 . (Expected value: 4.8 to 5.1 volts) Measure resistance from connector: ECM-F3 to MAPTS-2 (Expected value: < 2 ohms) Measure resistance from connector: ECM-A1 to MAPTS-3 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G2 to MAPTS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-F2 to MAPTS-4 (Expected value: < 2 ohms)
P0116	ECM	Engine Coolant Temperature Sensor 1 circuit range/performance	Damaged sensor, wires shorted to battery +, ECM voltage supply.	Disconnect the sensor. Measure resistance from connector: ECM-F4 to CTS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-C3 to CTS-2 (Expected value: < 2 ohms) Measure CTS resistance value (Expected value: 2280 to 2736 ohms at 19 to 21°C (66 to 70°F))
P0117	ECM	Engine Coolant Temperature Sensor 1 circuit Low	Engine temperature sensor or circuit wires shorted to ground.	Disconnect the sensor. Measure resistance from connector: ECM-F4 to CTS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-C3 to CTS-2 (Expected value: < 2 ohms) Measure CTS resistance value (Expected value: 2280 to 2736 ohms at 19 to 21°C (66 to 70°F))

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PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0118	ECM	Engine Coolant Temperature Sensor 1 circuit High	Disconnected sensor, or sensor resistance too High.	Disconnect the sensor. Measure resistance from connector: ECM-F4 to CTS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-C3 to CTS-2 (Expected value: < 2 ohms) Measure CTS resistance value (Expected value: 2280 to 2736 ohms at 19 to 21°C (66 to 70°F))
P011A	ECM	Engine Coolant Temperature Correlation Check failed	Correlation Check failed	Check for coolant fluid leak and coolant fluid level Check radiator condition Check for other fault, Check thermostat
P0122	ECM	Throttle Position Sensor (TPS) Short circuit to GND	Damaged circuit wires, damaged sensor or damaged ECM pins.	Make sure sensor connector is fully inserted. Measure resistance from connector: ECM-A1 to TPS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G3 to TPS-3 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G2 to TPS-2 (Expected value: < 2 ohms)
P0123	ECM	Throttle Position Sensor (TPS) shorted to battery +	Damaged circuit wires, damaged sensor or damaged ECM pins.	Make sure sensor connector is fully inserted. Measure resistance from connector: ECM-A1 to TPS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G3 to TPS-3 (Expected value: < 2 ohms) Measure resistance from connector: ECM-G2 to TPS-2 (Expected value: < 2 ohms)
P0217	ECM	Engine Coolant over temperature condition	Coolant fluid temperature too high	Check for coolant fluid leak and coolant fluid level Check radiator condition Check for other fault, Check thermostat
P0219	ECM	Engine Overspeed Condition detected	Engine speed too high	

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0231	ECM	Fuel Pump circuit shorted to ground, or open circuit	Blown fuse, damaged or disconnected fuel pump relay, damaged circuit wires, damaged connectors or damaged ECM output pins.	Check fuse Measure voltage between harness connector PF1-12B and ground (Expected value: 11 to 13 volts) Measure voltage between harness connector PF1-11B and ground (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-J1 to PF1-12A (Expected value: < 2 ohms) Measure resistance from harness connector: PF1-11A to FP-3 (Expected value: < 2 ohms) Measure resistance from harness connector: FP-4 to ground (Expected value: < 2 ohms)
P0232	ECM	Fuel Pump circuit shorted to battery +	Blown fuse, damaged or disconnected fuel pump relay, damaged circuit wires, damaged connectors or damaged ECM output pins.	Check fuse Measure voltage between harness connector PF1-12B and ground (Expected value: 11 to 13 volts) Measure voltage between harness connector PF1-11B and ground (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-J1 to PF1-12A (Expected value: < 2 ohms) Measure resistance from harness connector: PF1-11A to FP-3 (Expected value: < 2 ohms) Measure resistance from harness connector: FP-4 to ground (Expected value: < 2 ohms)
P0261	ECM	Cylinder 1 injector open circuit or shorted to ground	Blown fuse, damaged or disconnected injector, damaged or disconnected circuit wires, damaged ECM output pins.	Disconnect injector 1 Measure resistance between injector pin 1 and 2 (Expected value = 14 to15 ohms). Measure resistance from harness connector: INJ1-1 to INJ1-2 (Expected value: > OPEN) Measure voltage between harness connector INJ1-2 and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-K4 to INJ1-1 (Expected value: < 2 ohms)

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0262	ECM	Cylinder 1 injector shorted to battery +	Damaged injector, damaged circuit wires, damaged connector or damaged ECM output pins.	Disconnect injector 1 Measure resistance between injector pin 1 and 2 (Expected value = 14 to15 ohms). Measure resistance from harness connector: INJ1-1 to INJ1-2 (Expected value: > OPEN) Measure voltage between harness connector INJ1-2 and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-K4 to INJ1-1 (Expected value: < 2 ohms)
P0264	ECM	Cylinder 2 injector open circuit or shorted to ground	Blown fuse, damaged or disconnected injector, damaged or disconnected circuit wires, damaged ECM output pins.	Disconnect injector 2 Measure resistance between injector pin 1 and 2 (Expected value = 14 to15 ohms). Measure resistance from harness connector: INJ2-1 to INJ2-2 (Expected value: > OPEN) Measure voltage between harness connector INJ2-2 and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-L4 to INJ2-1 (Expected value: < 2 ohms)
P0265	ECM	Cylinder 2 injector shorted to battery +	Damaged injector, damaged circuit wires, damaged connector or damaged ECM output pins.	Disconnect injector 2 Measure resistance between injector pin 1 and 2 (Expected value = 14 to15 ohms). Measure resistance from harness connector: INJ2-1 to INJ2-2 (Expected value: > OPEN) Measure voltage between harness connector INJ2-2 and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-L4 to INJ2-1 (Expected value: < 2 ohms)
P0338	ECM	Crankshaft Position Sensor Spike detected	Damaged CPS, damaged circuit wires, damaged connector or damaged ECM output pins. Wrong mounting position of sensor	Make sure sensor connector is fully inserted. Measure resistance from connector: ECM-E1 to CPS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-D1 to CPS-2 (Expected value: < 2 ohms)
P0339	ECM	Crankshaft Position Sensor Intermittent	incorect nomber of tooth detecded Damaged CPS, damaged circuit wires, damaged connector or damaged ECM output pins. Wrong mounting position of sensor	Make sure sensor connector is fully inserted. Measure resistance from connector: ECM-E1 to CPS-1 (Expected value: < 2 ohms) Measure resistance from connector: ECM-D1 to CPS-2 (Expected value: < 2 ohms)

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0480	ECM	Radiator cooling fan relay	Blown fuse, damaged or disconnected relay, damaged circuit wires or connectors, damaged ECM output pins, damaged Relay.	Check fuse Disconnect relay. Measure resistance between terminals 85 and 86 on relay. (Expected value: 70 to 90 Ohms) Measure resistance between harness connector PF-1E and ground. (Expected value > OPEN). Measure resistance from harness connector: ECM-B3 to PF1-1E (Expected value: < 2 ohms)
P0500	DPS	Invalid or missing vehicle speed	No vehicle speed available & Vehicle is in (H or L Gear) with Engine RPM over 4000RPM. Damaged Vehicle Speed sensor circuit, Damaged sensor, Wrong mounting position of speed sensor.	Check if vehicle speed is available in Monitoring page in BUDS. Measure voltage between harness connector CV-A (red) and CV-C (ground black). (Expected value: 11 to 13 volts) Measure resistance from connector: CI-9 to CV-B (pink) (Expected value: < 5 ohms) on ATV
P0508	ECM	Idle Air Control System Circuit Low	Damaged IDLE, damaged circuit wires, damaged connector or damaged ECM output pins.	Make sure IDLE connector is fully inserted. Measure resistance from connector: ECM-D4 to IDLE-D (Expected value: < 2 ohms) Measure resistance from connector: ECM-D3 to IDLE-A (Expected value: < 2 ohms) Measure resistance from connector: ECM-E4 to IDLE-B (Expected value: < 2 ohms) Measure resistance from connector: ECM-C4 to IDLE-C (Expected value: < 2 ohms)
P0509	ECM	Idle Air Control System Circuit High	Damaged IDLE, damaged circuit wires, damaged connector or damaged ECM output pins.	Make sure IDLE connector is fully inserted. Measure resistance from connector: ECM-D4 to IDLE-D (Expected value: < 2 ohms) Measure resistance from connector: ECM-D3 to IDLE-A (Expected value: < 2 ohms) Measure resistance from connector: ECM-E4 to IDLE-B (Expected value: < 2 ohms) Measure resistance from connector: ECM-C4 to IDLE-C (Expected value: < 2 ohms)
P0513	ECM	Invalid Access Key Detected	A non stored access key was detected when key switch was turned to ON.	Use a stored access key to turn key switch. If no stored access keys are available program one and try again

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0523	ECM	Engine oil pressure sensor sticking	Damaged switch, damaged circuit wires, damaged connector, damaged ECM pins.	Measure resistance between harness connector OPS and ground When engine stopped. (Expected value < 2 ohms) Measure resistance between harness connector OPS and ground When engine running. (Expected value = open) Measure resistance from harness connector: OPS to ECM-E2 (Expected value: < 2 ohms)
P0524	ECM	Engine oil pressure too Low	Damaged switch, damaged circuit wires, damaged connector, damaged ECM pins.	Measure resistance between harness connector OPS and ground When engine stopped. (Expected value < 2 ohms) Measure resistance between harness connector OPS and ground When engine running. (Expected value = open) Measure resistance from harness connector: OPS to ECM-E2 (Expected value: < 2 ohms)
P0551	DPS	TORQUE_ SENSOR_ OPEN	Damaged DPS	External troubleshooting is not possible Replace the DPS.
P0552	DPS	TORQUE_ SENSOR_ SHORT_GND	Damaged DPS	External troubleshooting is not possible Replace the DPS.
P0553	DPS	TORQUE_ SENSOR_ SHORT_5V	Damaged DPS	External troubleshooting is not possible Replace the DPS.
P0562	DPS	System voltage low	Blown fuse, battery low (damaged magneto/regulator), damaged circuit wires or connection, intense winch usage	Check the two DPS fuses Validate that all the DPS connectors are secured Measure voltage between harness connector DPS2-A&B and ground. (Expected value = 11 to 13 volts) Measure battery voltage with engine stopped. (Expected value: 11 to 13 volts) Check ground and positive connections on battery.
P0562	ECM	System voltage low	Blown fuse FC, battery failure, voltage regulator failure, damaged circuit wires or connection, damaged magneto generator. An external battery charger may have been used. Intense winch usage	Measure battery voltage with engine stopped. (Expected value: 11 to 13 volts) Measure battery voltage with engine running. (Expected value: 13 to 14.7 volts) Check connections on voltage regulator. Check ground and positive connections on battery. Check ground on vehicle frame

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0563	DPS	system voltage high	Rectifier failure, damaged circuit wires or connection.	Measure battery voltage with engine stopped. (Expected value: 11 to 13 volts) Measure battery voltage with engine Running at 3500RPM. (Expected value: 13 to 14.7 volts) Check connections on voltage regulator. Check ground and positive connections on battery.
P0563	ECM	System voltage high	Damaged regulator. An external battery charger may have been used.	Measure battery voltage with engine stopped. (Expected value: 11 to 13 volts) Measure battery voltage with engine running. (Expected value: 13 to 14.7 volts) Check connections on voltage regulator. Check ground and positive connections on battery. Check ground on vehicle frame
P0601	DPS	CALIBRATION FAULT	DPS not calibrated or damage DPS	Try updating the DPS
P0601	SCM-XMR	Bad checksum of Calibration memory section	Lost of power on reflash	If an update file is available reflash the SCM, if not clear the fault, if it returns, replace the SCM.
P0615	ECM	Starter Relay circuit open	Damaged relay, Danaged start switch, damaged circuit wires, damaged connector, damaged ECM pins.	Check start button, Check Run/Stop button, check if free weeling diode is in the good way. Disconnect starter solenoid relay Measure resistance from harness connector: ECM-L3 to SS2 (Expected value: < 2 ohms) Measure resistance from harness connector: MG2-6 to SS1 (Expected value: < 2 ohms) Measure resistance between terminals SS1 and SS2. (Expected value: 3 to 6 ohms)
P0616	ECM	Starter Relay circuit shorted to ground	Damaged relay, Danaged start switch, damaged circuit wires, damaged connector, damaged ECM pins.	Check start button, Check Run/Stop button, check if free weeling diode is in the good way. Disconnect starter solenoid relay Measure resistance from harness connector: ECM-L3 to SS2 (Expected value: < 2 ohms) Measure resistance from harness connector: MG2-6 to SS1 (Expected value: < 2 ohms) Measure resistance between terminals SS1 and SS2. (Expected value: 3 to 6 ohms)

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0617	ECM	Starter Relay circuit shorted to battery +	Damaged relay, Danaged start switch, damaged circuit wires, damaged connector, damaged ECM pins.	Check start button, Check Run/Stop button, check if free weeling diode is in the good way. Disconnect starter solenoid relay Measure resistance from harness connector: ECM-L3 to SS2 (Expected value: < 2 ohms) Measure resistance from harness connector: MG2-6 to SS1 (Expected value: < 2 ohms) Measure resistance between terminals SS1 and SS2. (Expected value: 3 to 6 ohms)
P0636	DPS	MOTOR LOW CURRENT FAULT	Internal error or damaged DPS	External troubleshooting is not possible Replace the DPS.
P0637	DPS	MOTOR HIGH CURRENT FAULT	Internal error or damaged DPS	External troubleshooting is not possible Replace the DPS.
P0642	ECM	Sensor Reference Voltage Low	Damaged sensor connected to ECM voltage supply, Damaged ECM voltage supply output.	Measure voltage between harness connector ECM-A1 and ground. (Expected value: 4.8 to 5.1 volts) Check sensor connected to ECM voltage supply output
P0643	ECM	Sensor Reference Voltage High	Damaged sensor connected to ECM voltage supply, Damaged ECM voltage supply output.	Measure voltage between harness connector ECM-A1 and ground. (Expected value: 4.8 to 5.1 volts) Check sensor connected to ECM voltage supply output
P0658	DPS	PHASE A_LOW	DPS motor supply Damaged DPS	External troubleshooting is not possible Replace the DPS.
P0659	DPS	PHASE A_HIGH	DPS motor supply Damaged DPS	External troubleshooting is not possible Replace the DPS.
P0666	DPS	HIGH TEMPERATURE	High temperature of the DPS. Extreme usage of the unit.	Let the unit cool down.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0685	ECM	Accessory relay circuit	diagnosis related to Accessories or Light relay, Blown fuse, damaged or disconnected relay, damaged circuit wires, damaged connectors or damaged ECM output pins	Check fuse Disconnect Accessory relay and Lights relay & turn key switch (on w/lights) Measure voltage between harness connector PF1-10E and ground. (Expected value: 11 to 13 volts) Measure voltage between harness connector PF1-6D and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-K2 to PF1-12D (Expected value: < 2 ohms) Measure resistance from harness connector: ECM-K2 to PF1-7C (Expected value: < 2 ohms) Measure resistance between terminals 85 and 86 on the 2 relays. (Expected value: 70 to 90 ohms)
P0686	ECM	Accessory relay circuit shorted to ground or open circuit	diagnosis related to Accessories or Light relay, Blown fuse, damaged or disconnected relay, damaged circuit wires, damaged connectors or damaged ECM output pins	Check fuse Disconnect Accessory relay and Lights relay & turn key switch (on w/lights) Measure voltage between harness connector PF1-10E and ground. (Expected value: 11 to 13 volts) Measure voltage between harness connector PF1-6D and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-K2 to PF1-12D (Expected value: < 2 ohms) Measure resistance from harness connector: ECM-K2 to PF1-7C (Expected value: < 2 ohms) Measure resistance between terminals 85 and 86 on the 2 relays. (Expected value: 70 to 90 ohms)
P0687	ECM	Accessory relay circuit shorted to battery +	diagnosis related to Accessories or Light relay, Damaged relay, damaged circuit wires, damaged connector or damaged ECM output pins.	Check fuse Disconnect Accessory relay and Lights relay & turn key switch (on w/lights) Measure voltage between harness connector PF1-10E and ground. (Expected value: 11 to 13 volts) Measure voltage between harness connector PF1-6D and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-K2 to PF1-12D (Expected value: < 2 ohms) Measure resistance from harness connector: ECM-K2 to PF1-7C (Expected value: < 2 ohms) Measure resistance between terminals 85 and 86 on the 2 relays. (Expected value: 70 to 90 ohms)

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0691	ECM	Radiator fan circuit shorted to ground or open circuit	Blown fuse, damaged or disconnected fan relay, damaged circuit wires, damaged connectors or damaged ECM output pins.	Check fuse Disconnect radiator fan relay Measure voltage between harness connector PF1-3D and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-B3 to PF1-1E (Expected value: < 2 ohms) Measure resistance between terminals 85 and 86 on relay. (Expected value: 70 to 90 ohms)
P0692	ECM	Radiator fan circuit shorted to battery +	Damaged fan relay, damaged circuit wires, damaged connector or damaged ECM output pins.	Check fuse Disconnect radiator fan relay Measure voltage between harness connector PF1-3D and ground. (Expected value: 11 to 13 volts) Measure resistance from harness connector: ECM-B3 to PF1-1E (Expected value: < 2 ohms) Measure resistance between terminals 85 and 86 on relay. (Expected value: 70 to 90 ohms)
P0705	ECM	Subtransmission Internal switch Combinations error	Wrong Switch Combinations Damaged Switch, damaged circuit wires, damaged connectors or damaged ECM pins.	Check for disconnected transmission connector. Check for misplaced terminal on gearbox Measure resistance form each switch to ground in all position (PR & N) (Expected value if switch activated: < 2 ohms) Measure resistance from harness connector: ECM-J3 to PRN-1 (Expected value: < 2 ohms) Measure resistance from harness connector: ECM-H2 to PRN-2 (Expected value: < 2 ohms) Measure resistance from harness connector: ECM-H4 to PRN-3 (Expected value: < 2 ohms)
P0706	ECM	GBPS invalide gear position	GBPS position not plausible	Verify that gear position information change when you change the position of gear on vehicle. Disconnect GBPS Measure voltage between harness connector GBPS-1 and GBPS-3. (Expected value: 4.8 to 5.1 volts) Measure resistance from connector: ECM-D2 to GBPS-2 (Expected value: < 2 ohms) Measure resistance from connector: ECM-C3 to GBPS-3 (Expected value: < 2 ohms) Replace GBPS sensor

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PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P0707	ECM	Gear position sensor shorted to ground, or open circuit		Verify that gear position information change when you change the position of gear on vehicle. Disconnect GBPS Measure voltage between harness connector GBPS-1 and GBPS-3. (Expected value: 4.8 to 5.1 volts) Measure resistance from connector: ECM-D2 to GBPS-2 (Expected value: < 2 ohms) Measure resistance from connector: ECM-C3 to GBPS-3 (Expected value: < 2 ohms) Replace GBPS sensor
P0708	ECM	Gear position sensor circuit shorted to battery +		Verify that gear position information change when you change the position of gear on vehicle. Disconnect GBPS Measure voltage between harness connector GBPS-1 and GBPS-3. (Expected value: 4.8 to 5.1 volts) Measure resistance from connector: ECM-D2 to GBPS-2 (Expected value: < 2 ohms) Measure resistance from connector: ECM-C3 to GBPS-3 (Expected value: < 2 ohms) Replace GBPS sensor
P1562	ECM	System voltage low (from Key switch)	Blown fuse FC, battery failure, voltage regulator failure, damaged circuit wires or connection, damaged magneto generator. An external battery charger may have been used.	Measure battery voltage with engine stopped. (Expected value: 11 to 13 volts) Measure battery voltage with engine running. (Expected value: 13 to 14.7 volts) Check connections on voltage regulator. Check ground and positive connections on battery. Check ground on vehicle frame
P1563	ECM	System voltage high (from Key switch)	Damaged regulator. An external battery charger may have been used.	Measure battery voltage with engine stopped. (Expected value: 11 to 13 volts) Measure battery voltage with engine running. (Expected value: 13 to 14.7 volts) Check connections on voltage regulator. Check ground and positive connections on battery. Check ground on vehicle frame
P1619	ECM	TPS adaptation failure	Wrong throttle body mechanical position during reset of closed TPS or no initialization after ECM replacement.	Replace gauge if necessary.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P1F01	DPS	Power output overload	Motor short circuit or power output failed	Reset fault, If fault re-occur, replace DPS unit
P1F02	DPS	Power output overload (18V).	High voltage at the unit input.	Measure battery voltage with engine stopped. (Expected value: 11 to 13 volts) Measure battery voltage with engine running. (Expected value: 13 to 14.7 volts) test charging system as per shop manual
P1F03	DPS	Electronic Circuit Overheat	Hi temperature detected by on board temperature sensor.	Fault may become Active in extreme use situations. Reset fault and let DPS cool down. If fault re-occur in normal riding conditions, replace DPS unit
P1F05	DPS	Motor current sensor range/performance	Motor input vs output Current correlation check failed	External troubleshooting is not possible Replace the DPS.
P2300	ECM	Cyllinder 1 Ignition output shorted to ground	Damaged ignition coil, damaged circuit wires, damaged connector or damaged ECM output pins.	Open the ECM Activation page in BUDS Perform an ignition coil activation and check if ignition coil is reacting as expected Measure resistance from harness connector: ECM-M2 to BA-3 (Expected value: < 2 ohms) Measure voltage between harness connector BA-2 and ground. (Expected value: 11 to 13 volts) Refer to the service manual for detailed ignition coil testing procedure.
P2301	ECM	Cyllinder 1 Ignition output short to V +	Damaged ignition coil, damaged circuit wires, damaged connector or damaged ECM output pins.	Open the ECM Activation page in BUDS Perform an ignition coil activation and check if ignition coil is reacting as expected Measure resistance from harness connector: ECM-M2 to BA-3 (Expected value: < 2 ohms) Measure voltage between harness connector BA-2 and ground. (Expected value: 11 to 13 volts) Refer to the service manual for detailed ignition coil testing procedure.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P2303	ECM	Cyllinder 2 Ignition output shorted to ground	Damaged ignition coil, damaged circuit wires, damaged connector or damaged ECM output pins.	Open the ECM Activation page in BUDS Perform an ignition coil activation and check if ignition coil is reacting as expected Measure resistance from harness connector: ECM-M1 to BA-1 (Expected value: < 2 ohms) Measure voltage between harness connector BA-2 and ground. (Expected value: 11 to 13 volts) Refer to the service manual for detailed ignition coil testing procedure.
P2304	ECM	Cyllinder 2 Ignition output short to V +	Damaged ignition coil, damaged circuit wires, damaged connector or damaged ECM output pins.	Open the ECM Activation page in BUDS Perform an ignition coil activation and check if ignition coil is reacting as expected Measure resistance from harness connector: ECM-M1 to BA-1 (Expected value: < 2 ohms) Measure voltage between harness connector BA-2 and ground. (Expected value: 11 to 13 volts) Refer to the service manual for detailed ignition coil testing procedure.
P2670	DPS	PHASE B_LOW	DPS motor supply Damaged DPS	External troubleshooting is not possible Replace the DPS.
P2671	DPS	PHASE B_HIGH	DPS motor supply Damaged DPS	External troubleshooting is not possible Replace the DPS.
P280A	ECM	Gear position sensor adaptation not plausible	GBPS learning position failure Wrong transmission mechanical position during GBPS reset, No initialization after ECM replacement.	Using BUDS performe a GBPS initialization.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P3000	SCM-LTD	Auxiliary line pressure sensor value out of range	Too many values of the external sensor out of range (negative pressure) Sensor disconnect Damaged circuit wires or connectors Faulty auxiliary line sensor Faulty SCM	1- Go to Activations - SCM and start Test routine. Verify that the Shock Absorber Pressure and the Auxiliary Line Pressure correlates in BUDS. If the test is done with no fault, the system is working properly. Check the harness and connection to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. If the Test Status shows a Fail_Comparison_Sensor_Test, verify for leak. If no leak found, verify the wiring and connector of the external sensor and the SCM. In the next action step, verify which of Shock absorber or Auxiliary Line Pressure sensors is defective. 2-Make sure to have no pressure in the system by activating the relief valve in Activation -SCM. Connect the supplied air hose into the compressor fitting and plug it to a known pressure supply in the range of 30 to 120 psi (as car tire) and compare it to the Shock absorber pressure and Auxiliary line pressure, it should be similar. If the Shock absorber pressure is off, change the SCM module. Go to next action step to perform Auxiliary Line Pressure sensor test. 4-Back probe the signal coming from the sensor between the pin 3 of the SCM electrical connector and the negative battery post (this action must be done with special probe to not damage the connector seal). The value must be between 0.9 and 8.3 Volts for a pressure range of 0 - 100 psi. If not go to next action step. If the value is in the range, change the SCM. 5- Unplug the Auxiliary Line Pressure sensor and make sure to have 12V between pin 3 and 1 on the connector coming from SCM. If 12V is present change the sensor, if not change the SCM.

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PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P3001	SCM-LTD	System suspension pumping delay exceeded	Pressure did not reach to desired set point after predefined delay Leak in the system Jammed compressor intake tube Damaged circuit wires or connectors Blown compressor fuse Corroded or disconnected compressor GND Faulty relay Faulty compressor Jammed check valve Faulty SCM	1- Check for leaks. If no leak found go to next action step. 2- Go to Activations - SCM and start Test routine. If the test is done with no fault, the system is working properly. Check the harness and connector to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. If the compressor is not starting check the compressor GND, harness and connection then continue to the next action step. If the compressor is running and the Test Status show a Fail_Pumping go to action step 6. 3-Test the compressor with an external power supply (as a 12V battery). If the compressor is functional go to next action step. 4-Unplug the relay and make sure to have 12V between battery negative post and relay pin 30. If not, check the compressor fuse and harness. If 12V is present, test the relay. If the relay is functional plug it back and go to next action step. 5- Disconnect the SCM, take a jumper wire and connect pin 8 to the battery negative post. If then the compressor starts, change the SCM. 6- Verify that the compressor intake tube (transparent) is not blocked or kinked. Unplug the SCM air tube (yellow) and start the compressor. If air blow out of the tube change the SCM. If not go to next action step. 7- During the Test routine verify the pressure sensors value. If the Shock Absorber Pressure and Auxiliary Line Pressure is not going up verify the first check valve at the exit of the compressor. If only the Shock Absorber Pressure is not going up verify the second check valve after green tube.

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
P3002	SCM-LTD	Release valve activation delay exceeded	Pressure did not drop to desired set point after predefined delay Release valve momentary blocked Blown valve fuse Damaged circuit wires or connectors Faulty valve block Faulty SCM	1- Go to Activations - SCM and start Test routine. If the test passed, the system is working properly. Check the harness and connection to see a potential source of intermittent dysfunction, if nothing is found clear the occurred fault and no more actions have to be done. Mud, dust or water in the release valve may explain the fault code. If the Test status shows a Fail_release, proceed to next action step. 2-Verify the release valve for obstruction. If nothing is found go to next action step. 3- Unplug the valve connector and verify that 12V is present between pin 1 of the connector on the SCM side and the battery negative post. If not, verify the valve fuse and relay (refer to schematics for more information). Verify the harness and the connection between the valve and the SCM. If everything is fine, go to next action step. 4- Verify the release valve activation by disconnecting the valve block electrical connector and applying 12V across pin 1 and 2 on valve connector. If the release valve is operating, change the SCM, otherwise change the valve block.
P3003	SCM-LTD	System high leakage detected	Leak in the system	1- Verify suspension system for air leaks
P3004	SCM-LTD	Bad checksum of Calibration memory section	Lost of power on reflash	If an update file is available reflash the SCM, if not clear the fault, if it returns, replace the SCM.
P3005	SCM-LTD	Communication network disconnected	Lost of CAN communication	1- Verify if all the module are present in BUDS (under Module Menu), if they are the vehicle is working properly. 2- Check continuity between the cluster, ECM and SCM CAN network.
U0073	DPS	CAN bus off, no messages	Damaged circuit wires or damaged DPS pins.	Disconnect MPI2 from DB connector. Measure resistance between DB-1 and DB-2 (Expected value = 50 to 70 ohms). Measure resistance between DB-1 and DPS1-C (Expected value < 5 ohms). Measure resistance between DB-2 and DPS1-D (Expected value < 5 ohms).

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
U0073	ECM	CAN bus off, no messages	Damaged circuit wires or damaged CLUSTER pins.	Disconnect MPI2 from DB connector. Measure resistance between DB-1 and DB-2 (Expected value = 50 to 70 ohms). Measure resistance between DB-1 and ECM-B1 (Expected value < 2 ohms). Measure resistance between DB-2 and ECM-C1 (Expected value < 2 ohms).
U0100	DPS	Lost communication with ECM (lost of CAN ID's)	Damaged CAN Bus wires to ECM, damaged DPS/ECM pins.	Disconnect MPI2 from DB connector. Measure resistance between DB-1 and DB-2 (Expected value = 50 to 70 ohms). Measure resistance between DB-1 and ECM B1 (Expected value < 5 ohms). Measure resistance between DB-2 and ECM C1 (Expected value < 5 ohms).
U0155	DPS	Lost communication with CLUSTER	Damage CAN Bus wires to cluster Damaged circuit wires or damaged Cluster module pins.	Measure voltage between harness connector CL-17 and ground. (Expected value = 11 to 13 volts) Disconnect MPI2 from DB connector. Measure resistance between DB-1 and DB-2 (Expected value = 50 to 70 ohms). Measure resistance between DB-1 and CL-4 (Expected value < 5 ohms). Measure resistance between DB-2 and CL-19 (Expected value < 5 ohms).
U0155	ECM	Lost communication with CLUSTER	Missing CLUSTER CAN ID Module internal error Damaged circuit wires or damaged module pins.	Measure voltage between harness connector CL-17 and ground. (Expected value = 11 to 13 volts) Disconnect MPI2 from DB connector. Measure resistance between DB-1 and DB-2 (Expected value = 50 to 70 ohms). Measure resistance between DB-1 and ECM-B1 (Expected value < 2 ohms). Measure resistance between DB-2 and ECM-C1 (Expected value < 2 ohms). Measure resistance between DB-1 and CL-19 (Expected value < 2 ohms). Measure resistance between DB-2 and CL-18 (Expected value < 2 ohms).

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
U0155	ECM	Lost communication with CLUSTER (lost of CAN ID's)	Missing CAN ID Module internal error Damaged circuit wires or damaged module pins.	Check for Cluster fault or ECM fault Measure voltage between harness connector CL-17 and ground. (Expected value = 11 to 13 volts) Disconnect MPI2 from DB connector. Measure resistance between DB-1 and DB-2 (Expected value = 50 to 70 ohms). Measure resistance between DB-1 and ECMB-C1 (Expected value < 2 ohms). Measure resistance between DB-2 and ECMB-C2 (Expected value < 2 ohms). Measure resistance between DB-1 and CL-19 (Expected value < 2 ohms). Measure resistance between DB-2 and CL-18 (Expected value < 2 ohms).
U0155	SCM-XMR	Communication network disconnected	Lost of CAN communication	1- Verify if all the module are present in BUDS (under Module Menu), if they are the vehicle is working properly. 2- Check continuity between the cluster, ECM and SCM CAN network.
U0167	ECM	Lost communication with Vehicle Immobilizer Control Module	The Vehicle Immobilizer is reporting an electrical fault on the communication line.	Check for dirty or oxidized Key contact. Clean key contact if needed. Check for broke key contact Ensure sensor connector is fully inserted. Measure resistance between ECMB-A1 and CC-C (Expected value < 2 ohms). Measure resistance between ECMB-C2 and CC-E (Expected value < 2 ohms).
U0167	ECM	Lost communication with Vehicle Immobilizer Control Module	The Vehicle Immobilizer is reporting an electrical fault on the communication line.	Check for dirty or oxidized Key contact. Clean key contact if needed. Check for broke key contact Ensure sensor connector is fully inserted. Measure resistance between ECMB-A1 and CC-C (Expected value < 2 ohms). Measure resistance between ECMB-C2 and CC-E (Expected value < 2 ohms).
U0300	ECM	Invalid Security Exchange received	Incorrect ECM or CLUSTER, Incorrect software version.	Install the proper ECM or CLUSTER on vehicle. Update security coding using BUDS
U0400	DPS	Variant Coding failure Software incompatibility	Faulty variant coding Faulty programming	Check in the BUDS Tab "vehicle configuration" if the DPS option is checked. Reflash the DPS with the latest software

PCODE	MODULE	DESCRIPTION	CAUSE	ACTION
U0400	SCM-XMR	Variant coding failure	Faulty variant coding Faulty programming	1- Verify in Setting - Vehicle Configuration page is correctly set up. 2- If Update File is available reflash the SCM. If not, clear the fault, if it returns replace the SCM.
U0400	SCM-LTD	Variant coding failure	Faulty variant coding Faulty programming	1- Verify in Setting - Vehicle Configuration page is correctly set up. 2- If Update File is available reflash the SCM. If not, clear the fault, if it returns replace the SCM.
U0426	ECM	Invalid Data Received From Vehicle Immobilizer Control Module	The Vehicle Immobilizer could not read the number of the access key.	Check for dirty or oxidized Key contact. Clean key contact if needed. Check for broke key contact Ensure sensor connector is fully inserted. Measure resistance between ECMB-A1 and CC-C (Expected value < 2 ohms). Measure resistance between ECMB-C2 and CC-E (Expected value < 2 ohms).
U3001	DPS	Module improper shutdown	Lost of power on DPS that can be caused by damaged circuit wires or damaged DPS pins.	Check the two DPS fuses Ensure DPS connector is fully inserted. Check for Damaged tail light, DPS, Cluster circuit wires Check for damaged DPS pins.

INTELLIGENT THROTTLE CONTROL (iTC)

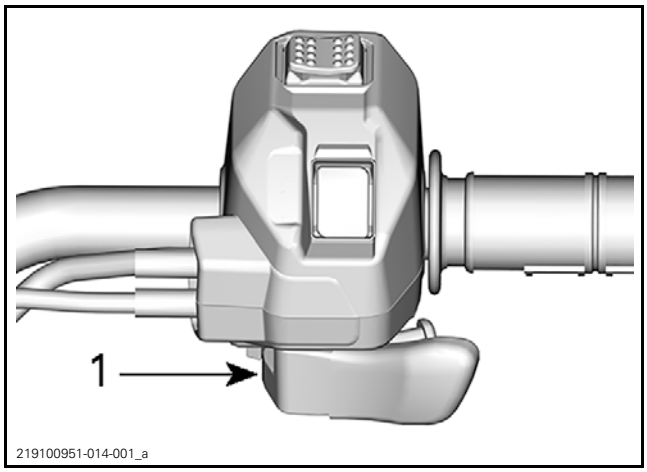
GENERAL

SYSTEM DESCRIPTION

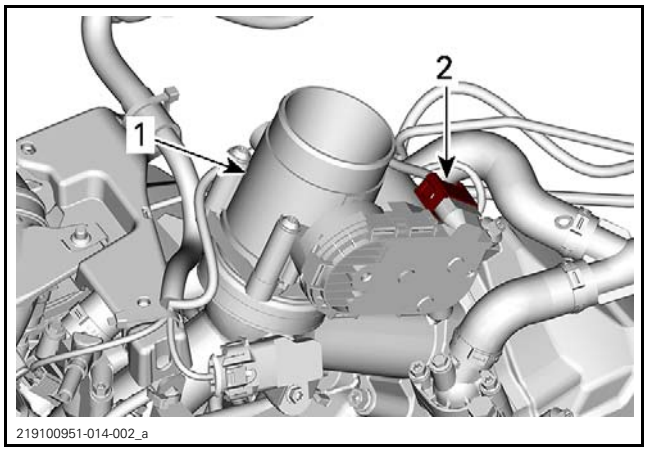
The iTC is an electronic throttle control system often referred to as a "throttle by wire" system.

This system recives information from the following components:

– Throttle Accelerator Sensor (TAS) - located in the throttle housing
– Electronic Throttle Actuator (ETA) - located on the throttle body
– Engine Control Module (ECM)



TYPICAL
1. Throttle lever



1. Throttle body
2. ETA connector

The ETA is an electric motor which controls the throttle opening.

The position of the throttle is measured with two potentiometers.

The ECM evaluates the throttle position with these two measures and controls the motor to reach the desired position.

These potentiometers are powered by the ECM with a voltage of 3.3 volts.

The signals given by these potentiometers vary from 0.33V to 2.97V for (SIGNAL 1) and 2.97V to 0.33V for (SIGNAL 2).

The relation between these two signals is (SIGNAL 1) + (SIGNAL 2) = 3.3V.

When ECM is woken up, throttle body will close completely to reinitialize. For both signals to be properly set at idle position.

If a problem occurs with any of these controls or signals then a diagnostic fault code will be generated.

Learning Key (If equipped)

The learning key limits the torque and speed of the vehicle, therefore enabling first time users and less experienced operators to learn how to operate while gaining the necessary confidence and control.

To adjust the speed limiter, Refer to *RADIO FREQUENCY DIGITALLY ENCODED SECURITY SYSTEM (RF D.E.S.S.)* subsection.

PROCEDURES

THROTTLE ACCELERATOR SENSOR (TAS)

General

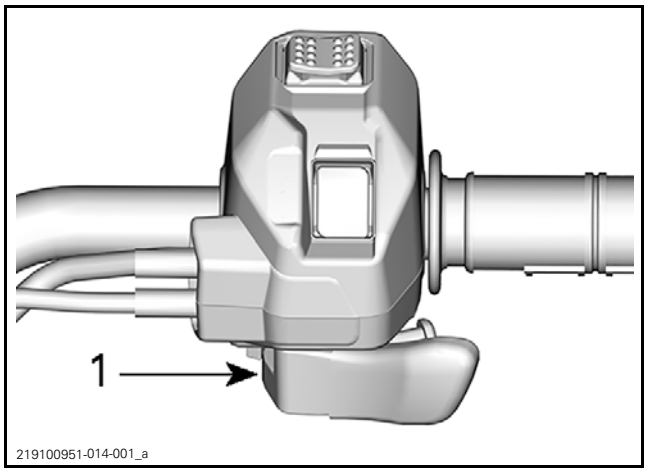
The throttle accelerator sensor (TAS) is a double hall effect sensor, which translates the position of the lever into two analog voltage and sends a signal to the ECM which is proportional to the throttle lever angle.

These Hall effect sensors are powered by the ECM with a voltage of 5.0 volts.

The signals given by these sensors vary from 0.53V to 3V for (SIGNAL 1) and 0.25V to 1.5V for (SIGNAL 2).

The relation between these two signals is (Signal 1) = (Signal 2) X 2.

If a problem occurs with any of these signals then a diagnostic fault code will be generated.

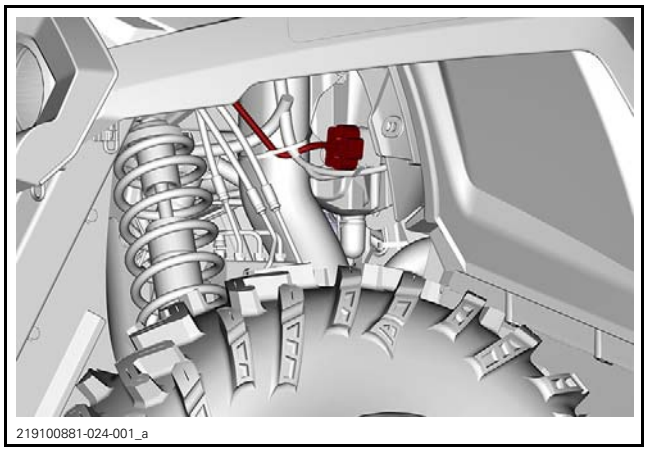


1. Throttle lever

First ensure the throttle lever functions adequately. Apply throttle lever fully then release it. It must reach the wide open position and return to the idle position freely when released. Otherwise, refer to *STEERING SYSTEM* for inspection.

Testing the TAS Voltage

Disconnect TAS connector and measure voltage on the main harness side.



TAS CONNECTOR TEST	
Pin	Measurement
B and A	5V
D and E	5V

If not 5V, ECM might be defective, oxidation might be present in circuits or terminals might not have good contact.

Reconnect TAS connector and backprobe to measure voltage.

If 2 for 1 relation is not met for signal 1 and 2 ratio, then TAS sensor is defective. Refer to *REPLACING THE TAS* in this subsection for replacement procedure.

Electronic Throttle Actuator (ETA)

The ETA is part of the throttle body.

The ETA is an electric motor that receives signals from the ECM to control the throttle plate opening.

NOTE: As a first troubleshooting step, always check for applicable fault codes using the BRP diagnostic software (BUDS2).

Testing the ETA Voltage

Disconnect ETA connector on throttle body and measure on the engine harness.

ETA CONNECTOR TEST		
Engine	Pin	Measurement
570, 650 and 1000	2 and 6	3.3V
450, 850 and 1000R	2 and 3	

If not 3.3V, ECM is might be defective, oxidation might be present in circuits or terminals might not have good contact.

Reconnect ETA connector and backprobe to measure voltage.

If (Signal 1) + (Signal 2) does not equal 3.3V, then the ETA is defective, replace throttle body. Refer to *THROTTLE BODY* in *EFI* subsection.

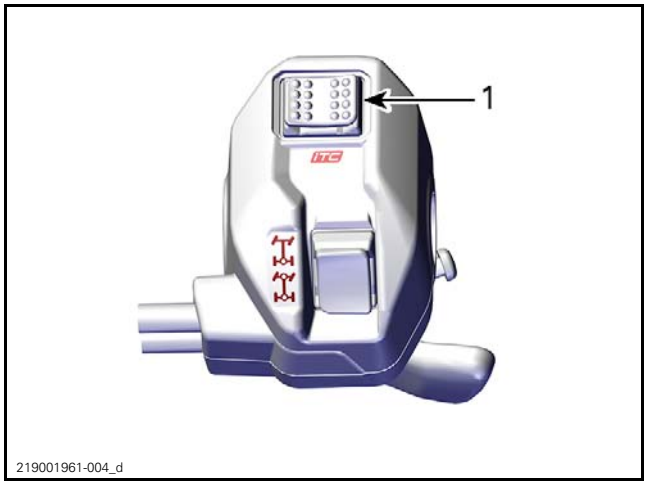
Replacing the ETA

The ETA comes assembled with the complete throttle body unit.

To replace throttle body assembly. Refer to *ELECTRONIC FUEL INJECTION (EFI)*.

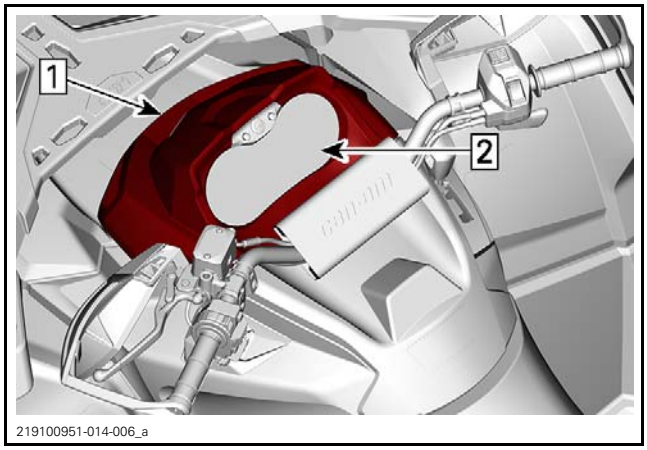
DRIVE MODE SWITCH (If equipped)

Testing the Drive Mode Switch Operation



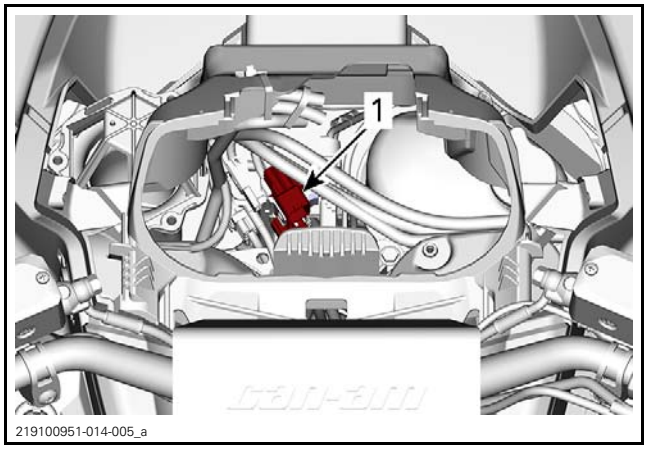
1. Drive mode switch

1. Remove gauge support and gauge.



Step 1: Remove gauge support
Step 2: Remove gauge

2. Disconnect RSS connector and measure on the switch connector side.



PARTS REMOVED FOR CLARITY
1. RSS connector

NOTE: The RSS connector will have red tape around it.

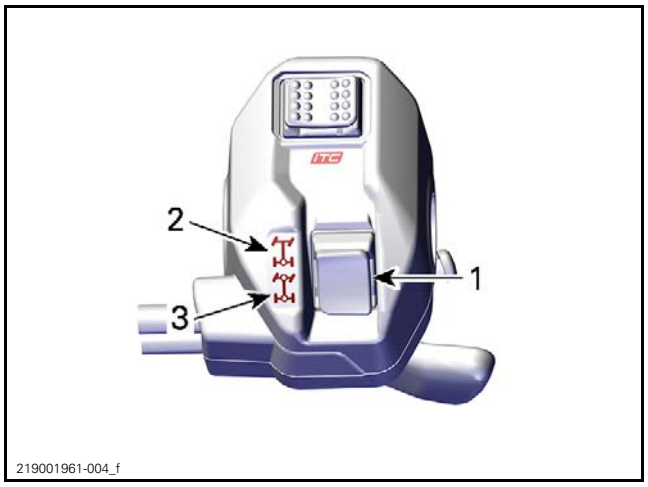
3. Set multimeter to Ω.
4. Test the drive mode switch for continuity as per following table.

DRIVE MODE SWITCH CONNECTOR TEST		
Position	Pin	Measurement
Left	4 and 5	0 Ω
Released	4 and 5	Infinite (OL)
Right	5 and 6	0 Ω
Released	5 and 6	Infinite (OL)

If the drive mode switch does not test as specified, replace the TAS assembly.

2WD/4WD SWITCH

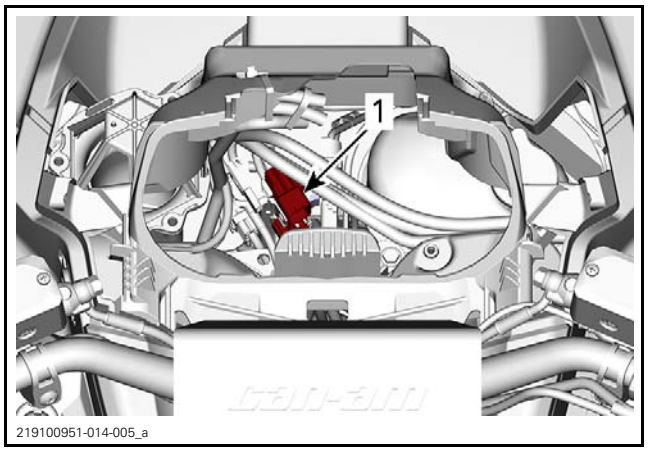
Testing the 2WD/4WD Switch Operation



4WD MODE - TYPICAL

TYPICAL
1. *2WD/4WD selector*
2. *2WD position*
3. *4WD position*

1. Disconnect RSS connector and measure on the switch connector side.



PARTS REMOVED FOR CLARITY
1. *RSS connector*

2. Set multimeter to Ω.
3. Test the 2WD/4WD switch for continuity as per following table.

2WD/4WD SWITCH CONNECTOR TEST (450 ENGINE)		
Position	Pin	Measurement
2 X 4	2 and 3	0 Ω
4 X 4	2 and 3	Infinite (OL)

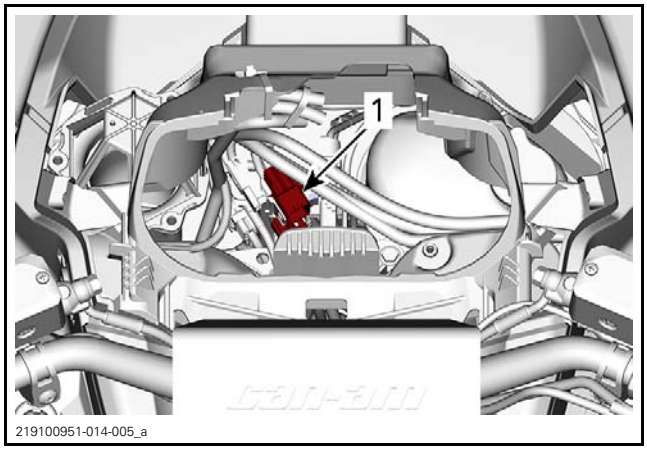
2WD/4WD SWITCH CONNECTOR TEST (OTHER ENGINES - WITHOUT DRIVING MODES)		
Position	Pin	Measurement
2 X 4	1 and 2	0 Ω
4 X 4	1 and 2	Infinite (OL)

2WD/4WD SWITCH CONNECTOR TEST (OTHER ENGINES WITH DRIVING MODES)		
Position	Pin	Measurement
2 X 4	2 and 3	Infinite (OL)
4 X 4	2 and 3	0 Ω

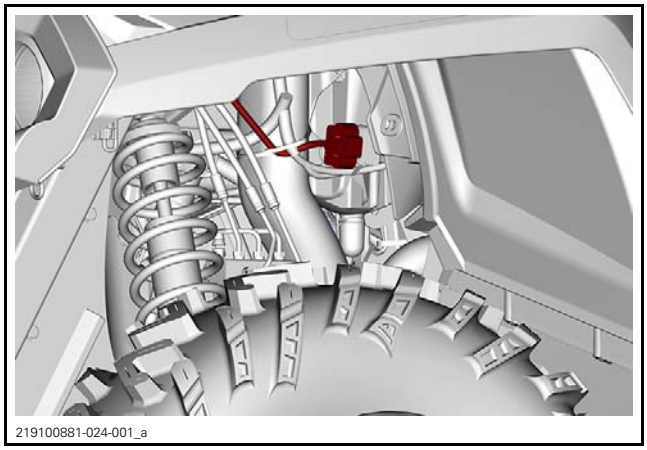
If the 2WD/4WD switch does not test as specified, replace the TAS assembly.

Replacing the TAS

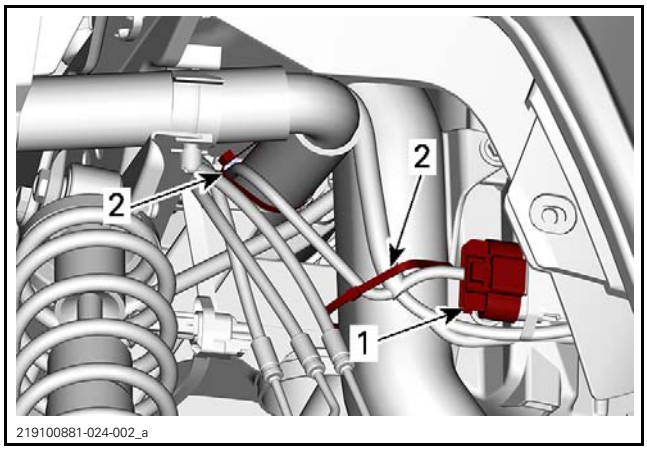
1. Refer to appropriate subsection and remove:
   - LH inner fender panel
   - Multifunction gauge.
2. Disconnect RSS and TAS connectors.



PARTS REMOVED FOR CLARITY
1. *RSS connector*

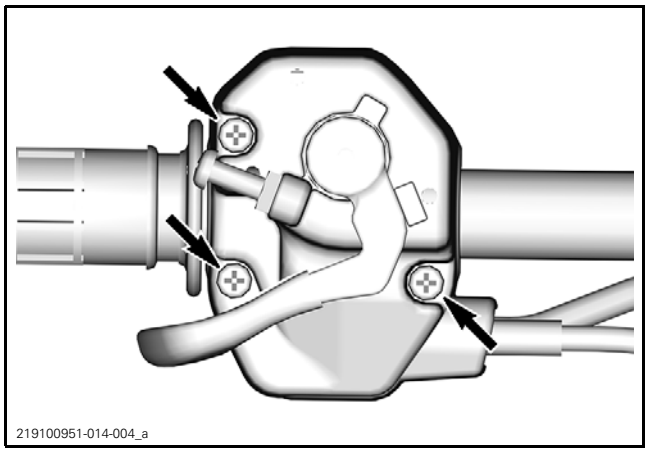


3. Cut locking ties securing TAS harness.



1. TAS connector
2. Locking tie

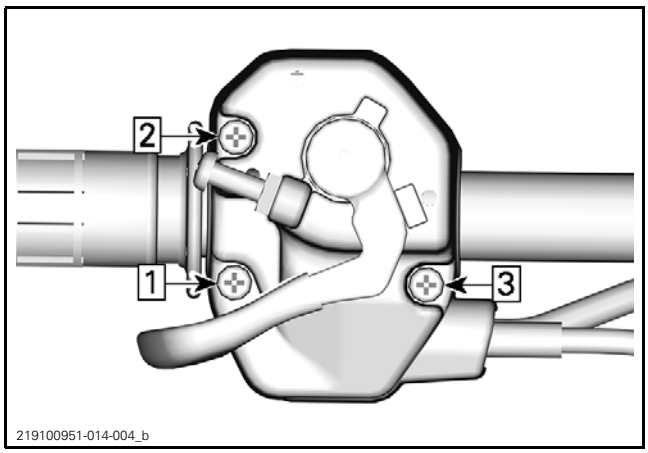
4. Remove TAS housing retaining screws.



Installing the TAS Housing

The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten TAS housing retaining screws to specification in the following order.



TIGHTENING TORQUE	
TAS housing retaining screws	3.5 N•m ± 0.5 N•m (31 lbf•**in** ± 4 lbf•**in**)

Turn handlebar completely from side to side making sure it does not exert unwanted tension on handlebar wires.

ELECTRONIC FUEL INJECTION (EFI)

SERVICE TOOLS

Description	Part Number	Page
ECM ADAPTER TOOL	529 036 166	4, 12–13, 15–16, 18
FLUKE 115 MULTIMETER	529 035 868	4, 7–8, 12, 14, 17–18

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	16
LOCTITE 767 (ANTI-SEIZE LUBRICANT)	293 800 070	18–19
SYNTHETIC GREASE	779162	13

GENERAL

⚠ WARNING

Fuel is flammable and explosive under certain conditions.
Ensure work area is well ventilated.
Do not smoke or allow open flames or sparks in the vicinity.
Fuel lines remain under pressure at all times.
Always proceed with care and use appropriate safety equipment when working on pressurized fuel system.
Wipe off any fuel spillage.
Do not allow fuel to spill on hot engine parts and/or on electrical connectors.
Replace any damaged, leaking or deteriorated fuel lines or connections.
Always, pressurize the fuel system if any fuel related component was disconnected or removed.
Proceed with care when removing/installing high pressure test equipment.

SYSTEM DESCRIPTION

The electronic fuel injection system (EFI) is comprised of various sensors used for detecting ongoing operating conditions of the engine and vehicle, and includes all the components that perform the required adjustments to the engine.

Electrical System

ECM (Electronic Control Module)

From input signals, the ECM acknowledges driver demands and converts them to an engine torque requirement through calculation of several variables. Then, the ECM controls the iTC, the injection system and the ignition system to meet the torque requirement.

The ECM manages the engine torque requirements and controls engine operation to ensure it is delivering optimum performance and fuel economy. The ECM also controls idle RPM and limits maximum engine speed through the iTC system.

EFI Sensors

The ECM reads the inputs from the sensors which it compares to predetermined parameters stored in the ECM, makes computations, and activates the outputs accordingly (injectors, ignition coils etc.).

Signals from sensors are used by the ECM to determine the injection and ignition parameters (referenced to fuel maps) as required to maintain the optimum air-fuel ratio.

Air Intake System

Air Filter

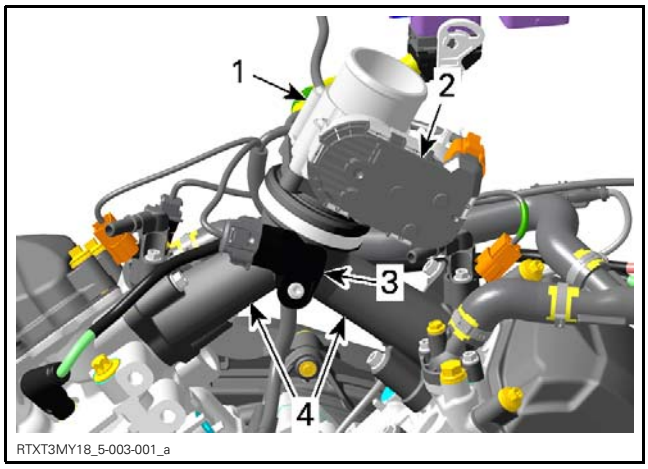
Air, drawn into the air filter housing, first passes through an inlet duct.

After it passes through the air filter, an air duct (intake adapter) is used to channel the air to the throttle body.

Throttle Body

The throttle body is mounted on the front end of the intake manifold, aft of the air filter housing.

Air for combustion, drawn in by the engine, flows through the air intake system, then through the throttle body where it is regulated by a throttle plate.



RTXT3MY18_5-003-001_a

1. *Throttle body*
2. *ETA and TPS*
3. *MAPTS (Manifold Air Pressure Temperature Sensor)*
4. *Air intake manifold*

Fitted on the throttle body, an electronic throttle actuator (ETA) allows the ECM to electronically control the throttle plate opening which regulates the amount of air that enters the engine, and therefore engine torque.

There is no idle air control valve (IACV).

The TPS is also incorporated in the throttle body. It provides a signal to the ECM of the actual throttle plate position.

Fuel System

Fuel Rail

Two fuel rails, one for each injector, are mounted on the intake manifold. The fuel rails, which are used to secure the injectors to the manifold, also provide to the injectors the fuel pressure that they receive from the fuel pump.

The fuel pressure applied to the fuel rails is regulated by the fuel pressure regulator located in the fuel pump module.

Fuel Injectors

The fuel injectors are used to inject fuel into the intake ports of the cylinder head. One injector is used per cylinder.

Fuel Pump

An electric fuel pump with an integrated pressure regulator and fuel system filters is used. For more details on the fuel pump unit, refer to *FUEL TANK AND FUEL PUMP* subsection.

ADJUSTMENT

IDLE SPEED

Idle speed is not adjustable. The ECM controls the idle speed of the engine primarily through control of the throttle plate position.

The vehicle multifunction gauge can provide an accurate digital readout of the engine's idle speed.

The engine RPM may also be verified using the BRP diagnostic software (BUDS2).

In BUDS2, go to:
– **Measurements** page
– **ECM** button.

NOTE: The multifunction gauge and the BRP diagnostic software (BUDS2) use the same signal to provide the engine RPM indication.

TROUBLESHOOTING

DIAGNOSTIC TIPS

Engine problems are not necessarily related to the fuel injection system.

It is important to ensure that the engine and propulsion system, fuel delivery and electrical systems are functioning normally.

For diagnostics purposes, use the BRP diagnostic software (BUDS2).

After a problem has been solved, be sure to clear the fault(s) in the ECM using the BRP diagnostic software.

⚠ WARNING

Electrical actuators and electronic modules may be powered up as soon as the ignition switch is set to ON. Always disconnect the battery prior to disconnecting any electrical or electronic parts.

Never use a battery charger to temporarily substitute the battery as it may cause the ECM to function erratically, or not at all.

Check related-circuit fuse solidity and condition with an ohmmeter. A visual inspection could lead to a false diagnosis.

Electrical Related Problems

It is important to check the following in the electrical system:
– Battery voltage
– Fuses

– Ground connections
– Wiring and connectors.

Ensure that all electronic components are genuine OEM. Any modification to the wiring harness may lead to poor system operation or generate fault codes.

Electrical Connections

Pay particular attention to ensure that terminals and pins are not out of their connectors, corroded, or out of shape.

When probing terminals, pay attention not to deform the terminals as this could cause a loose or intermittent connection that would be difficult to troubleshoot.

PROCEDURES

ENGINE CONTROL MODULE (ECM)

NOTE: As a first troubleshooting step, always check for applicable fault codes using the BRP diagnostic software (BUDS2).

Quick Test to Validate ECM Operation

Turn ignition key to ON.

NOTE: Setting the ignition switch to ON wakes up the ECM, which then turns on the following.

QUICK INDICATION THAT ECM IS FUNCTIONING (ASSUMING THE OBSERVED COMPONENT IS IN GOOD WORKING ORDER)
Multifunction gauge turns ON.
Fuel pump turns on for approx. 5 seconds.
Rear lights turn on.
Headlamps turn on (ignition key on with lights position).

ECM First Initialization

This procedure performs a reset of the following values in the ECM:
– TAS (Throttle Accelerator Sensor)
– TPS (Throttle Position sensor)
– GBPS (Gearbox Position Sensor).

This reset **must** be carried out whenever the ECM has been replaced.

This reset **may** be carried out whenever any of the following components have been replaced instead of their respective reset procedures:
– Throttle body (for TPS)
– GBPS (Gearbox Position Sensor).

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. In B.U.D.S., select the following:
   – **Setting** page
   – **ECM** button
   – **Initializations** tab
   – **ECM First Initialization**
3. In the **ECM first initialization** field, click on the **Reset** button.
4. Follow the instructions in the message boxes that appear.

If the operation is successful, a message will be displayed stating that the reset was successful.

If an error occurred or a component is out of range, a message may be displayed. Follow the instructions in the message and repeat the procedure.

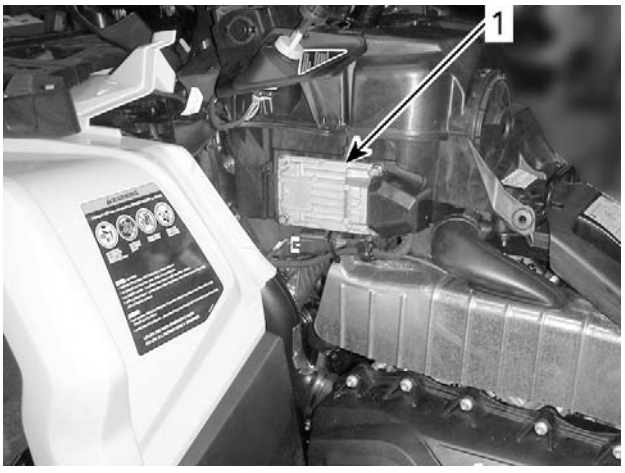
5. Check for fault codes.

If a fault code is generated, carry out the service actions, reset the fault and repeat the reset procedure.

6. Start engine and make sure it operates normally throughout its full engine RPM range.

ECM Access

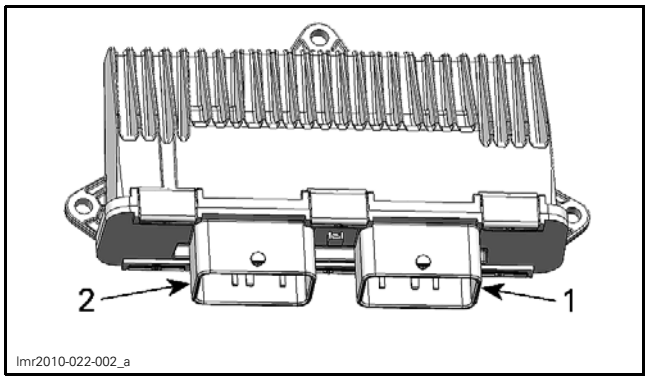
The ECM is located on the LH side of the air intake silencer.



LH PANEL REMOVED
1. ECM location

ECM Connector Identification

There are 2 connectors connected to the ECM:
- Engine harness connected to ECM-A
- Vehicle system control harness connected to ECM-B.



1. *Connector A*
2. *Connector B*

For connector information, cleaning and probing, refer to *WIRING HARNESS AND CONNECTORS* subsection.

ECM Testing Tools

To test and probe the ECM connector terminals, the following tools are required. The ECM replacement will be required if connectors or terminals are damaged.

REQUIRED TOOLS	
FLUKE 115 MULTIMETER (P/N 529 035 868)	
ECM ADAPTER TOOL (P/N 529 036 166)	

Testing the ECM Power Supply

1. Disconnect connector "B" from the ECM.
2. Install ECM connector "B" on the ECM adapter tool.
3. Install a jumper wire between B-H2 and B-M2 on the ECM adapter tool.
4. Turn the ignition switch to ON.
5. Set the multimeter to Vdc.
6. Check for voltage as follows.

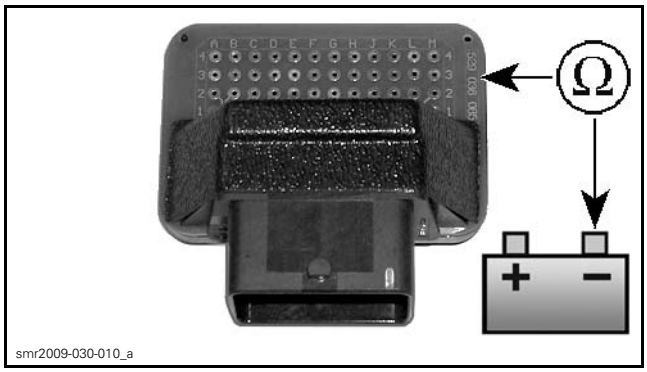
ECM ADAPTER	BATTERY	VOLTAGE
B-M4	Negative post	Battery voltage

If voltage is not measured, check the following:
- Main relay
- Wiring and connections, refer to the *WIRING DIAGRAM*.

Testing the Continuity of ECM Ground Circuits

1. Disconnect connector "B" from ECM.
2. Install the ECM-B connector on the ECM adapter tool.
3. Set the multimeter to Ω.
4. Probe adapter terminals as per following table.

ECM ADAPTER	BATTERY POST	RESISTANCE
Pins B-L1, B-M2 and B-M3	Ground	Close to 0 Ω (continuity)



If any measurement is out of specification, refer to *POWER DISTRIBUTION* and check all grounds.

Removing the ECM

NOTE: If a new ECM is to be installed, first read the procedures in *REPLACING THE ECM* in this subsection.

1. Disconnect battery cables.

NOTICE Always disconnect the BLACK negative (–) battery cable first, then disconnect RED positive (+) cable.

2. Disconnect both ECM connectors from ECM.
3. Unscrew all retaining screws and pull out ECM.

Installing the ECM

Reverse removal procedure however, pay attention to the following.

TIGHTENING TORQUE	
ECM screws	2 N•m ± 0.2 N•m (18 lbf•**in** ± 2 lbf•**in**)

1. Reconnect ECM connectors.
2. Reconnect battery cables.

NOTICE **Always reconnect the RED positive (+) battery cable first, then reconnect BLACK negative (–) cable.**

3. If a new ECM is installed, refer to *REPLACING THE ECM* in this subsection.

Replacing the ECM

Prior to replacing an ECM, ensure that all the recommendations in the general introduction of this section have been followed.

NOTE: Proceed with an *ECM FIRST INITIALIZATION* as it may resolve the problem.

If the ECM is replaced, data must be manually entered into the new ECM.

ECM Data Entry for ECM Replacement

Use one of the following 2 methods to collect the required information. The 1st being the easiest:

1. Use BUDS2 to obtain the data from a saved "*.buds2" file on your PC computer.
2. Collect the information from the vehicle and on the Knowledge Center.

Once the required information has been collected, refer to *ENTERING THE COLLECTED INFORMATION INTO THE ECM*.

1st Collecting Method: Obtaining the Data from a Saved .buds2 File

1. Start BUDS2.

NOTE: It is not necessary to perform any connection. The PC computer can be used alone.

2. In BUDS2, click on the **Open a BUDS2 file** button.

Make sure you are at: C:\Program Files(x86)\BRP\BUDS2\Files.

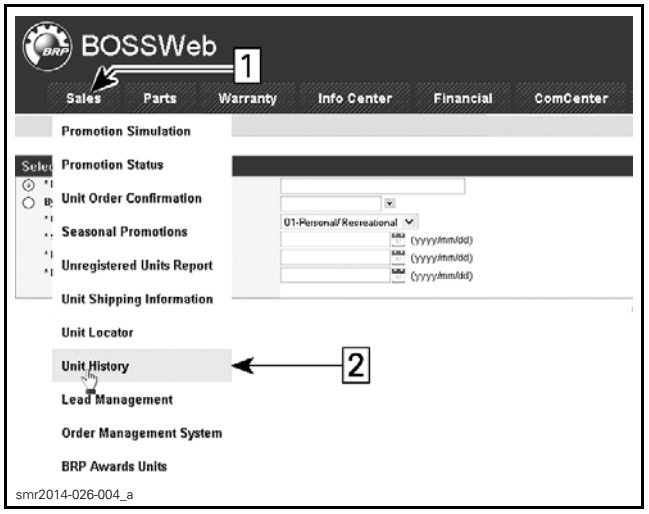
IMPORTANT: Be sure to use the file that specifically matches the vehicle you are servicing.

NOTE: The file name structure is as follows:
VIN_date read (yyyymmdd)_hour read (hhmmss).mpem
Example: **2BPSBK8C68V000168_20090206_111640.buds2** Therefore: VIN: 2BPSBK8C68V000168 Date: 2009 02 06 Hour: 11h 16m 40s

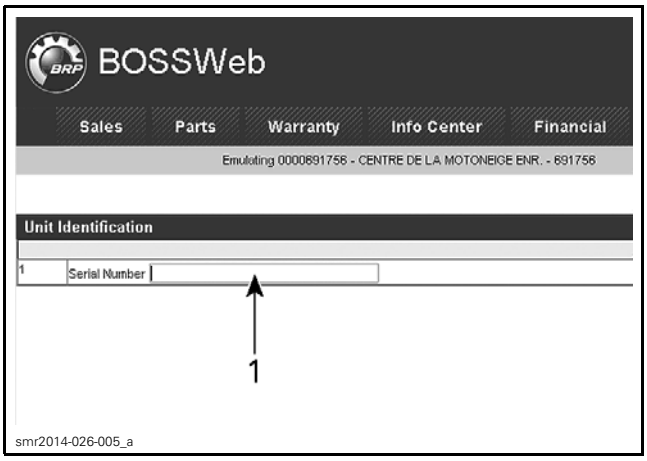
3. Select the **Summary** page then the **Vehicle** tab and record (write down) the following information.
   1. Vehicle serial number
   2. Engine serial number
   3. Vehicle model number
   4. Customer name.

2nd Collecting Method: Collect the Information from the Vehicle and BOSSWeb

1. Record engine serial number.
2. Record the following numbers from BOSSWeb. Look in **Sales** menu and choose **Unit history**.
   1. Vehicle serial number
   2. Vehicle model number
   3. Customer name.



SERVICE, UNIT HISTORY
1. Click on **SALES** *menu*
2. Select **Unit History**



1. Vehicle Serial Number here

3. Enter the recorded data in the new ECM as detailed in *ENTERING THE COLLECTED INFORMATION INTO THE ECM*.

Entering the Collected Information Into the ECM

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. In BUDS2, click the **Scan** button to read the new ECM.
3. Select:
   - **Summary** page
   - **Vehicle** button.
4. Write all of the following information you recorded previously.
   1. Vehicle serial number (VIN)
   2. Engine serial number
   3. Vehicle model number
   4. Customer name.

NOTICE **Enter only the appropriate product model number as obtained when gathering the information.**

NOTICE **Pay particular attention when typing the V.I.N. and model numbers. Once Write Data button is pressed, the data cannot be modified.**

5. Perform the *THROTTLE POSITION SENSOR INITIALIZATION* procedure, refer to *THROTTLE POSITION SENSOR (TPS)* in this subsection.
6. Start the engine and ensure proper operation.
7. Reinstall any remaining removed parts.

FUEL INJECTOR

Testing the Fuel Injector Operation Using BUDS2. (Dynamic)

NOTE: As a first troubleshooting step, always check for applicable fault codes using the BRP diagnostic software (BUDS2).

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. Start engine.
3. In BUDS2, select the following:
   - **Functions** page
   - **ECM** button.
4. Select an injector and press the **ACTIVE** button.
5. Repeat for all injectors.

If the engine RPM drops momentarily when clicking on a cylinder, the injector on this cylinder is functioning normally.

If the engine RPM does not drop momentarily when clicking on a cylinder, this cylinder is not functioning properly. Check the following:

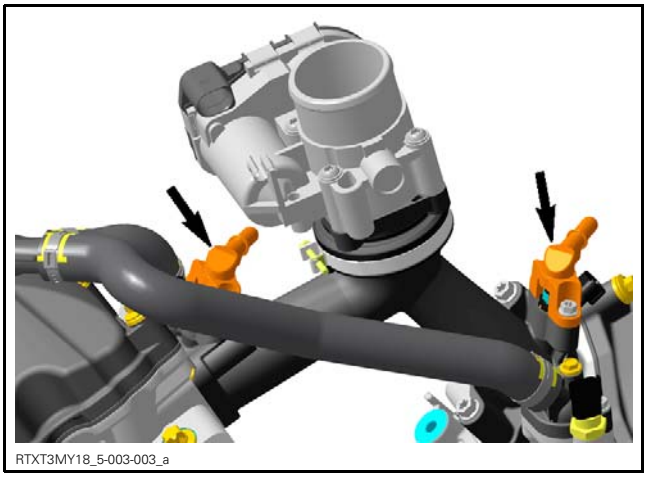
- Fuel injector operation. Refer to *TESTING THE FUEL INJECTOR BALANCE USING BUDS2*
- Spark plug and ignition coil. Refer to *IGNITION SYSTEM* subsection.
- Engine condition.

Testing the Fuel Injector Balance Using BUDS2

NOTICE **After fuel injector activation using BUDS2, always crank engine in drowned mode to ventilate engine and prevent a potential backfire due to fuel accumulation in engine.**

1. Install a fuel pressure gauge as described in *FUEL PUMP PRESSURE TEST* of *FUEL TANK AND FUEL PUMP* subsection.
2. Connect the vehicle to the BRP diagnostic software (BUDS2).
3. Turn the ignition key to ON.
4. In BUDS2, select the following:
   - **Functions** page
   - **ECM** button
   - **Activate Fuel Pump**.
5. Click on the **ACTIVATE** button to activate fuel pump.
6. Fuel pressure must be within specification. Refer to *FUEL TANK AND FUEL PUMP* subsection. Re-activate fuel pump as necessary.

7. In BUDS2, energize fuel injector **no. 1**.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CLICK ON INJECTOR TO ACTIVATE

8. Record the fuel pressure drop for injector **no. 1**.
9. Re-activate fuel pump.
10. Repeat the procedure for fuel injector **no. 2** and record the pressure drop.
11. The maximum fuel pressure drop between injectors should not exceed the following specification:

MAXIMUM FUEL PRESSURE DROP ALLOWED BETWEEN FUEL INJECTORS
10 kPa (1.5 PSI)

If pressure drop of any fuel injector is greater than the specification, replace injector then repeat the test.

12. Using the valve on the fuel pressure gauge, release the pressure in the system (if so equipped).
13. Remove fuel pressure gauge and reinstall removed parts.

Testing the Fuel Injector for Leaks

Carry out the *FUEL PUMP PRESSURE TEST* as detailed in the *FUEL TANK AND FUEL PUMP* subsection.

Testing the Fuel Injector Resistance

Disconnect connector "A" from the ECM.

Disconnect the engine connector (HIC). Refer to *WIRING HARNESS AND CONNECTORS* subsection.

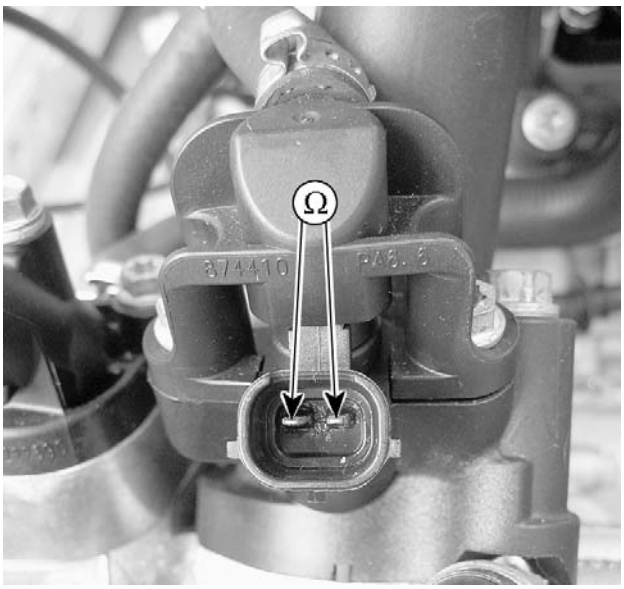
Check resistance value between terminals as follows.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

FUEL INJECTOR RESISTANCE TEST AT HIC CONNECTOR			
INJECTOR	**HIC CONNECTOR**	**ECM CONNECTOR "A"**	**RESISTANCE @ 20°C (68°F)**
FRONT	D	A-J1	11.4 - 12.6 Ω
REAR		A-K1	

If resistance value obtained is incorrect, remove injector connector and check resistance value between injector pins as follows.

FUEL INJECTOR RESISTANCE TEST AT INJECTOR CONNECTOR			
INJECTOR	**INJECTOR PIN**		**RESISTANCE @ 20°C (68°F)**
FRONT	1	2	11.4 - 12.6 Ω
REAR			



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TYPICAL

If readings are out of specifications, replace injector.

If readings are good, carry out *TESTING THE FUEL INJECTOR INPUT VOLTAGE*.

Testing the Fuel Injector Input Voltage

Disconnect the fuel injector connector.

NOTE: If the connector is hard to unlock, gently use a screwdriver to release connector.

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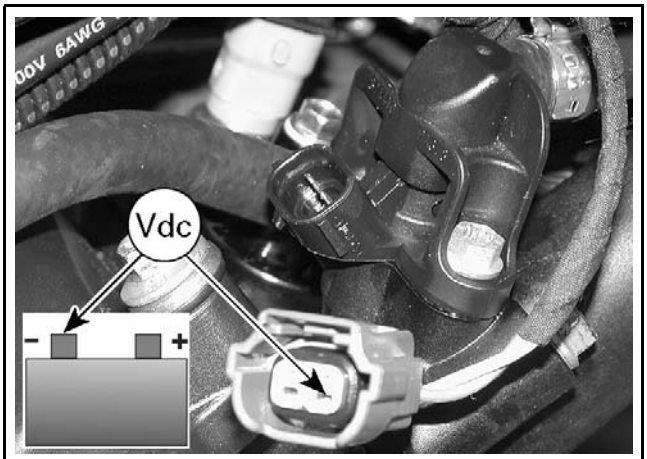
TYPICAL

NOTE: It is not necessary to activate the injector since it is continuously powered when the ignition key is set to ON.

Use a multimeter and set it to Vdc. Read voltage.

CYLINDER	INJECTOR CONNECTOR		MEASUREMENT
	WIRE		
FRONT	VIOLET/ BLUE	Battery ground	Battery voltage
REAR			



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TYPICAL

If supply voltage is not good, check continuity between fuse F5 and injector (see *WIRING DIAGRAMS*).

NOTE: Probe fuse exactly as shown. This validates fuse at the same time.

Set multimeter to Ω.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

CYLINDER	INJECTOR CIRCUIT		MEASUREMENT
	WIRE		
FRONT	VIOLET/ BLUE	Fuse F5	Close to 0 Ω
REAR			

If continuity is good, check relay and wiring from battery.

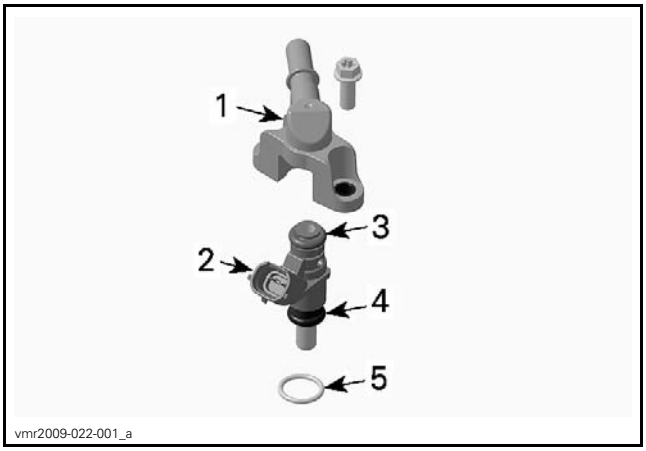
If continuity is faulty, check fuse and if OK, repair or replace wiring going to injector.

If supply voltage is good, check ground circuit between injector and ECM (see *WIRING DIAGRAMS*).

– If ground circuit is faulty, repair/replace wiring and connectors.
– If ground circuit is good, refer to *REPLACING THE ECM*.

Removing the Fuel Injector

Remove the fuel rail refer to *FUEL RAIL* for the procedure.



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TYPICAL - FUEL RAIL ASS'Y
1. *Fuel rail*
2. *Fuel injector*
3. *Injector top O-ring*
4. *Injector bottom O-ring*
5. *Manifold O-ring*

Pull fuel injector out of the fuel rail.

Installing the Fuel Injector

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

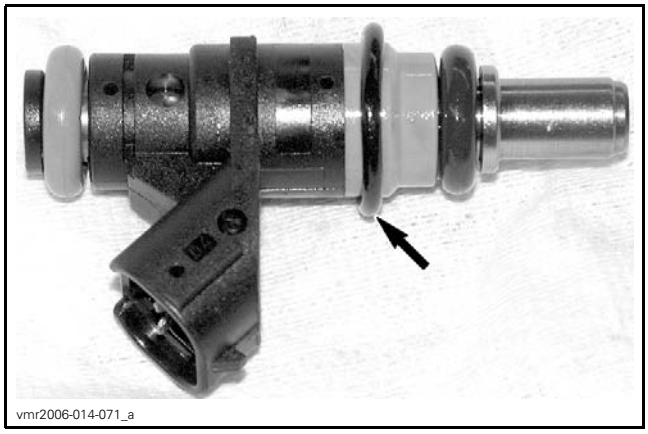
NOTICE If installing the removed injector(s), always install NEW O-rings.

Lubricate O-rings to ease insertion in rail.

FUEL INJECTOR O-RINGS	
Service product	Engine oil

Install fuel injector with your hand. Do not use any tool.

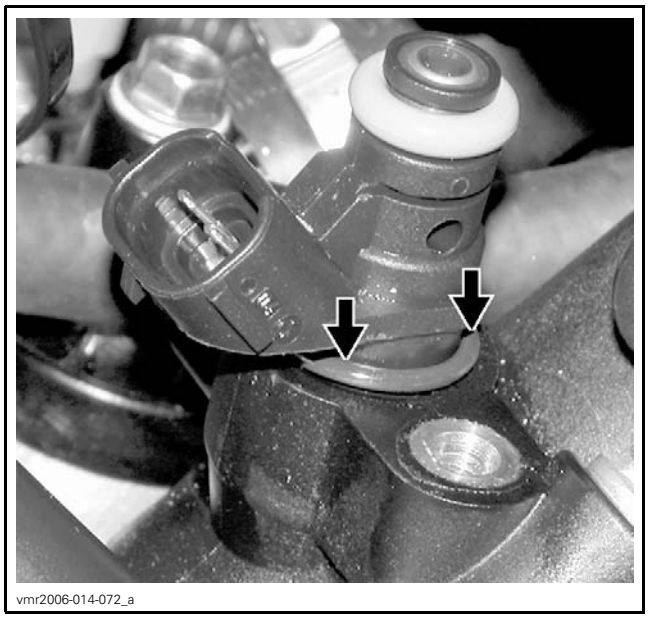
Position the manifold O-ring on injector as in following illustration.



TYPICAL - MANIFOLD O-RING POSITION

Carefully insert injector in manifold paying attention to the manifold O-ring.

NOTICE Gently push O-ring in evenly all around while inserting injector. O-ring must be completely inserted and not visible, before completing the insertion of the injector.



Firmly push injector until it bottoms out.

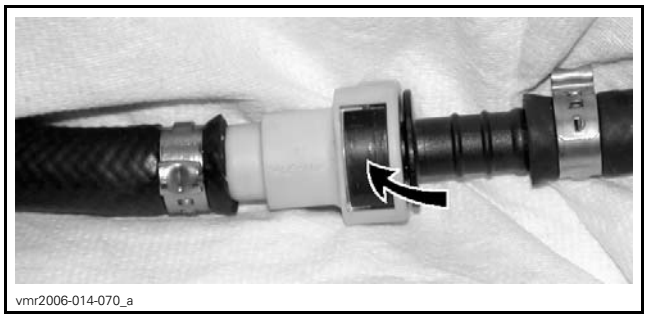
Reinstall fuel rail.

FUEL RAIL

Replacing the Fuel Rail

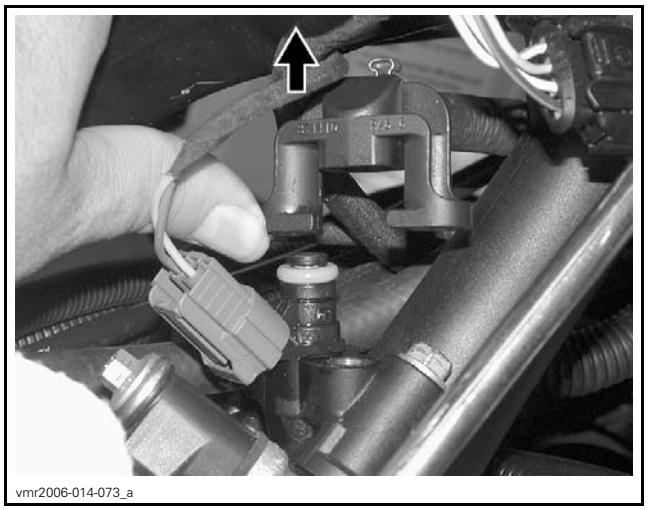
Removing the Fuel Rail

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. Go to this location and follow the instructions:
   - **Function** page
   - **ECM** button
   - **Execute Fuel Pressure Relief**.
3. Wrap a rag around the inlet hose and release the quick fitting.



TYPICAL

4. Unscrew rail retaining screws.
5. Gently pull rail off by hand.



TYPICAL

To disconnect fuel rail from hose, cut clamp on fuel hose. Refer to *FUEL TANK AND FUEL PUMP* for clamp removal/installation procedures.

NOTE: If fuel rail is removed for access to fuel injector, it is not necessary to cut hose clamp. Only to replace fuel rail.

Installing the Fuel Rail

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

Install new clamps using pliers as per removal (if fuel rail was replaced).

Apply a thin film of engine oil to injector O-rings to ease insertion in rail.

INJECTOR O-RINGS	
SERVICE PRODUCT	Lubricate with engine oil

Install fuel rail and evenly tighten screws a little at a time each side.

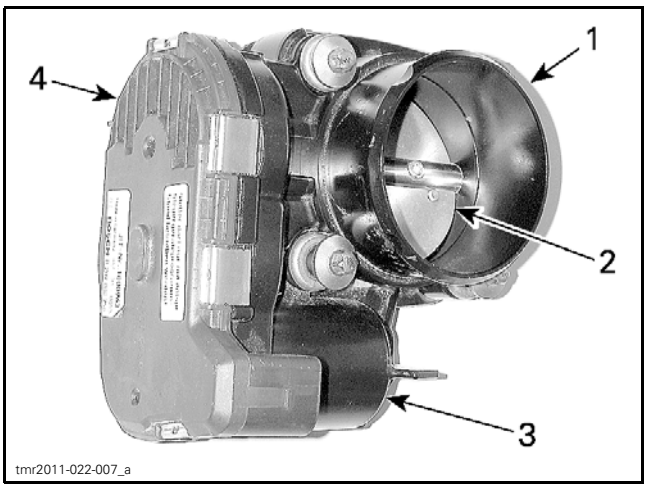
TIGHTENING TORQUE	
Fuel rail retaining screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

⚠ WARNING

Perform a fuel pressure test and ensure that there is no leak. Refer to *FUEL TANK AND FUEL PUMP*. Run engine and check for leaks.

THROTTLE BODY

Throttle Body Description



1. Throttle body
2. Throttle plate
3. Electronic throttle actuator (electric motor inside)
4. Throttle position sensor (TPS) (inside)

Throttle Body Access

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

Lubricating the Throttle Body

No lubrication is required.

Cleaning the Throttle Body

1. Remove air inlet hose from throttle body.
2. Check throttle body cleanliness using a flashlight. Fully open throttle plate and verify:
– Throttle body bore
– Throttle plate edge.

Look for:
– Dirt
– Oily surfaces
– Carbon and salt deposits on throttle plate and the surrounding bore.

3. Clean as necessary.
4. Use a throttle body cleaner such as GUNK INTAKE MEDIC or an equivalent.

NOTICE **Only use an appropriate throttle body cleaner that will not damage O-rings and EFI sensors.**

⚠ CAUTION Use the product in a well ventilated area. Refer to product manufacturer's warnings.

5. To avoid getting dirt into engine, spray cleaner on a clean rag then rub rag against throttle plate and bore. A toothbrush may also be used.

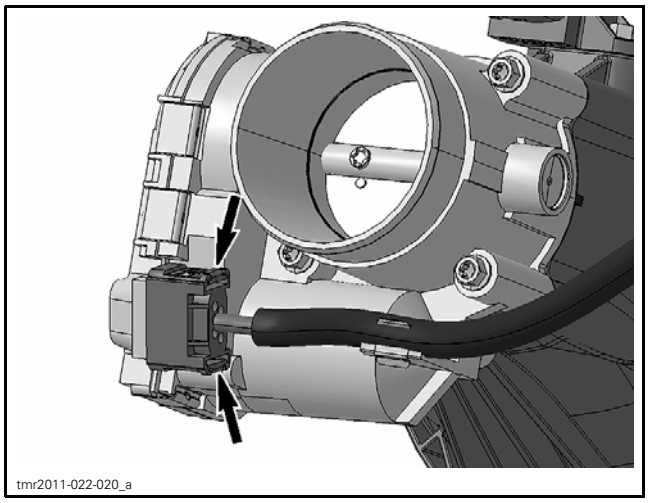
⚠ CAUTION Ensure ignition key is removed so that nobody can activate the electrical system, otherwise the ECM would turn on and the throttle actuator (ETA) would cycle. This could cause serious finger injury as the throttle plate moves quickly.

6. Gently open throttle plate and hold fully open to reach all surfaces.
7. To remove residual dirt, spray cleaner on throttle plate and on bore.
8. Reinstall removed parts.

Removing the Throttle Body

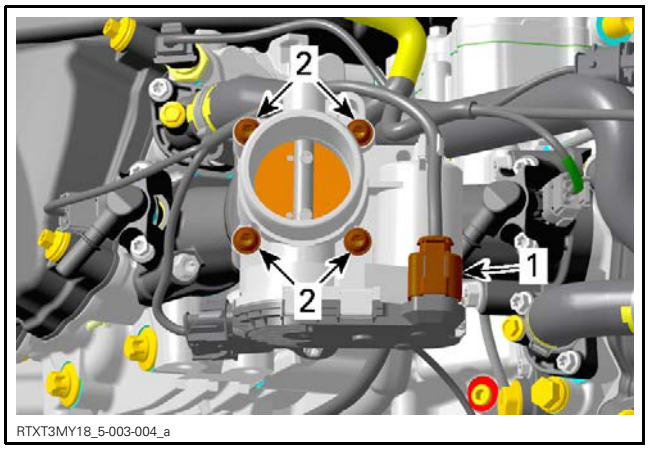
1. Disconnect air inlet hose from throttle body.
2. Disconnect throttle body connector.

To remove connector from throttle body, simultaneously press the end of both connector locking tabs illustrated.



THROTTLE BODY CONNECTOR- PRESS HERE TO UNLOCK

3. Remove screws retaining throttle body to intake socket.



1. Throttle body connector
2. Screws (4)

4. Pull throttle body off intake socket.

Installing the Throttle Body

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

TIGHTENING TORQUE	
Throttle body retaining screws	10 N•m ± 1.2 N•m (89 lbf•**in** ± 11 lbf•**in**)

1. Perform the *THROTTLE POSITION SENSOR INITIALIZATION* reset procedure. Refer to *THROTTLE POSITION SENSOR (TPS)* in this subsection.

THROTTLE POSITION SENSOR (TPS)

TPS Description

The TPS is part of the throttle body.

The throttle position sensor (TPS) is a double potentiometer that sends signals to the ECM that are proportional to the throttle plate angle.

NOTE: As a first troubleshooting step, always check for applicable fault codes using the BRP diagnostic software (BUDS2).

Throttle Position Sensor Initialization

NOTE: The TPS initialization procedure **must** be carried out whenever the throttle body is replaced, unless an ECM first initialization reset is carried out.

This operation performs a reset of the TPS basic values in the ECM. This reset is very important as the TPS values are part of the basic parameters for all fuel mapping calculations and control of several settings such as for idle speed, LIMP HOME mode and maximum RPM of the engine.

NOTICE **An improperly set TPS may lead to improper idle speed (too low or too high), poor engine performance, poor engine starting and engine stop on deceleration, fault codes and possible engine damage. Emission compliance may also be affected.**

1. Connect the vehicle to the BRP diagnostic software (BUDS2). Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. In BUDS2, select the following:
   – **Setting** page
   – **ECM** button
   – **Reset TPS**.
3. Ensure the throttle lever is fully released and at the idle position.
4. In the **Reset TPS** box, click on the **Reset** button.

A message will be displayed if the operation is successful.

If an error occurred or the TPS is not within the allowed range while resetting, the ECM will generate a fault code and will not accept the setting.

5. If a fault message is displayed, follow the instructions in the message(s).
6. Check for fault codes.
7. If a fault code is generated,
   – Carry out the service actions.

– Reset the fault.
– Repeat the reset procedure.

8. Start engine and make sure it operates normally throughout its full engine RPM range.

Testing the TPS Resistance

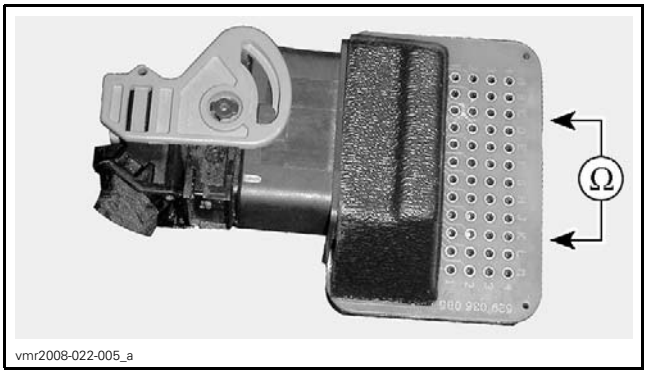
1. Ensure the throttle body connector is properly connected.
2. Disconnect ECM connector A from the ECM and install it on the ECM adapter tool..
3. Set multimeter to Ω.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	
ECM ADAPTER TOOL (P/N 529 036 166)	

4. Probe circuit as per following table while using your hand to manually move throttle plate.

ECM ADAPTER		FULLY CLOSED THROTTLE PLATE (1)		FULLY OPEN THROTTLE PLATE	
		RESISTANCE (Ω)			
PIN		MIN.	MAX.	MIN.	MAX.
A-A2	A-K4	875	1625	875	1625
A-A2	A-K3	954	1934	228	585
A-A2	A-F3	254	634	980	1983
A-K3	A-K4	228	585	954	1934
A-K3	A-F3	1385	2315	1385	2315
A-K4	A-F3	980	1983	254	634

(1) To obtain the fully closed position, it is necessary to push against the throttle plate in the throttle body with your hand and hold it in this position for the measurement.



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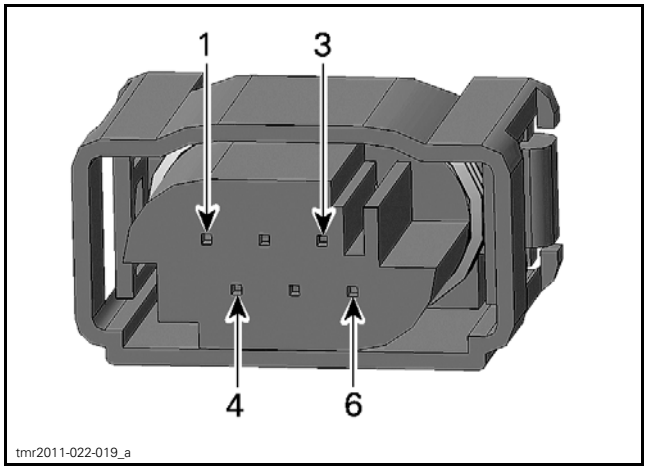
If any resistance value is incorrect, check wire continuity between ECM and throttle body before assuming the TPS is at fault. Refer to *WIRING DIAGRAM* subsection.



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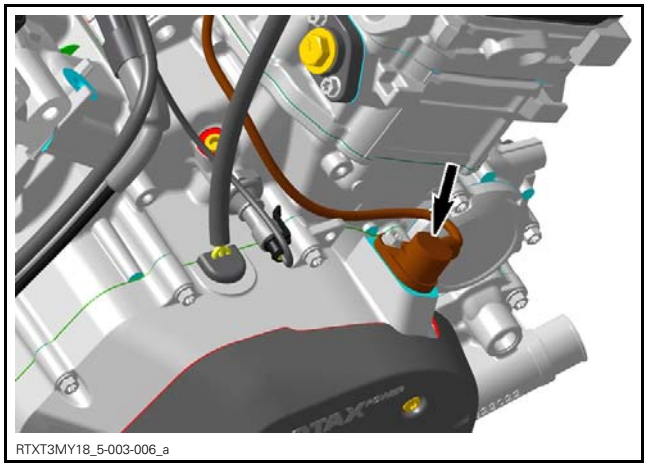
THROTTLE BODY CONNECTOR PIN-OUT

Replacing the TPS

The TPS cannot be replaced alone. It is part of the throttle body.

Carry out the *THROTTLE POSITION SENSOR INITIALIZATION* procedure as detailed in *THROTTLE BODY* of this subsection.

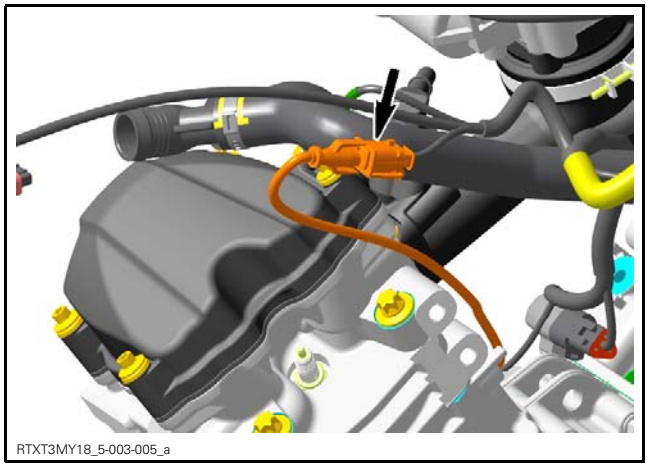
CRANKSHAFT POSITION SENSOR (CPS)


RTXT3MY18_5-003-006_a

Take into account that a CPS fault can be triggered by bent or missing encoder wheel teeth. First check fault codes using the BRP diagnostic software (BUDS2), then check the encoder wheel teeth condition if necessary (refer to *MAGNETO AND STARTER* subsection).

Testing the CPS Resistance

Disconnect CPS wiring harness connector.



TYPICAL - LH SIDE OF VEHICLE

Probe terminals as per following table.

CPS CONNECTOR		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
1	2	700 - 900 Ω

If resistance is not within specifications, replace the CPS.

If resistance tests good, **reconnect** the CPS connector and disconnect the connector "A" on the ECM.

Install ECM-A connector on ECM ADAPTER TOOL (P/N 529 036 166).

Using a multimeter, recheck resistance as per table.

ECM CONNECTOR		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
A-H1	A-K2	700 - 900 Ω

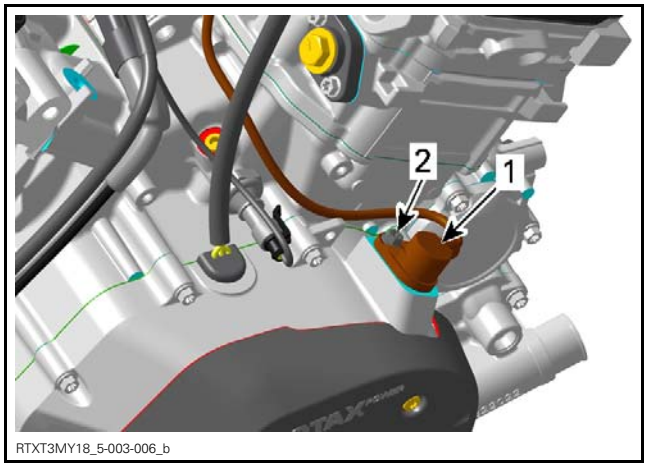
If resistance value is correct, refer to *REPLACING THE CTS*.

If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the CPS.

Replacing the CPS

Disconnect CPS connector and cut harness locking tie.

Remove CPS retaining screw and pull up on CPS to remove it.



1. *CPS*
2. *Retaining screw*

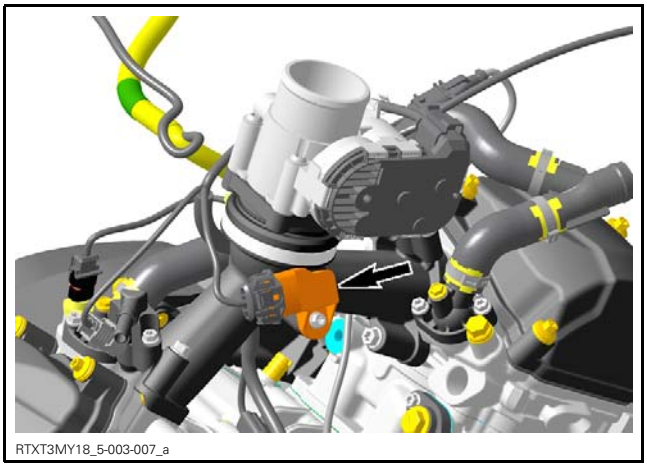
Lubricate O-ring of CPS.

O-RING	
Service product	SYNTHETIC GREASE (P/N 779162)

Install new CPS and secure harness with a new locking tie.

TIGHTENING TORQUE	
CPS retaining screw	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

MANIFOLD AIR PRESSURE AND TEMPERATURE SENSOR (MAPTS)



MANIFOLD AIR PRESSURE AND TEMPERATURE SENSOR (MAPTS)

NOTE: This sensor is a multifunction device.

MAPTS Pressure Function

Before the engine is started, when power is applied to the system, the sensor measures the ambient air atmospheric pressure. The ambient pressure is, at that moment, stored in the ECM. Thereafter, once the engine is started, it measures the air pressure in the inlet end of the intake manifold at operating RPMs.

The sensor must be correctly installed on intake manifold. Otherwise, the MAPTS could generate a fault code for an unexpected sensor range at idle when it reads the atmospheric pressure. If this is the case, remove sensor and check for oil or dirt on its end and if problem persists, check throttle plate condition/position and the wiring harness. Perform the following tests.

Testing the MAPTS Pressure Function Quick

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. In BUDS2, select the following:
   –
   – **Measurements** page
   – **ECM** button
   – **Custom** tab
   – **Manifold Pressure With Altitude Correction**.
3. Look for and take note of the MAPTS pressure reading while the engine is stopped.
4. Perform the same test with a new MAPTS and compare both readings.

Values have to be within ± 3.4 kPa (.5 PSI).

NOTE: 1 kPa = 10 hPa.

MAPTS PRESSURE FUNCTION QUICK TEST			
RESULT	SERVICE ACTION		
NO READING	Circuit Continuity Test of MAPTS Pressure Function	MAPTS Input Voltage Test	Repair or replace wiring
VALUE IS OUT OF RANGE	Replace MAPTS		

Testing the MAPTS Input Voltage

Check the voltage output from ECM to the pressure sensor.

1. Turn ignition key ON.
2. Remove electrical connector from MAPTS.
3. Measure for input voltage as per following table.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

MAPTS CONNECTOR		MEASUREMENT
PIN		VOLTAGE
1	3	5 Vdc

If voltage test is good, replace the MAPTS.

If voltage test is not good, carry out *TESTING THE MAPTS CIRCUIT CONTINUITY (PRESSURE FUNCTION)*.

Testing the MAPTS Circuit Continuity (Pressure Function)

1. Disconnect the ECM "A" connector.
2. Install ECM-A connector on ECM adapter tool.
3. Check continuity of the following circuits.

MAPTS CIRCUIT CONTINUITY TEST (PRESSURE FUNCTION)		
ECM-A	MAPTS CONNECTOR	RESISTANCE VALUE
Pin B4	Pin 3	Close to 0 Ω
Pin G4	Pin 4	
Pin H2	Pin 1	

If resistance is not within specification, repair or replace the wiring harness between ECM connector and the MAPTS.

MAPTS Temperature Function

The sensor monitors the temperature in the inlet of the intake manifold.

Testing the MAPTS (Temperature Function)

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. In BUDS2, select the following:
   – **Monitoring** page
   – **ECM** button
   – **Custom** tab.
3. Look for the **Intake Temperature** reading while the engine is stopped.
4. Perform the same test with a new MAPTS and compare both readings.

If the engine's MAPTS temperature reading is significantly different than the new MAPTS, replace it.

NOTE: Both sensors must measure the same ambient air temperature.

If there is no reading, carry out a *TESTING THE MAPTS RESISTANCE (TEMPERATURE FUNCTION)*.

Testing the MAPTS Resistance (Temperature Function)

Disconnect the connector from the MAPTS.

Check the resistance of the sensor itself as shown.

MAPTS		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
1	2	2280 - 2740

If resistance is not within specification, replace the MAPTS.

If resistance tests good, **reconnect** the MAPTS and disconnect the connector "A" from the ECM.

Install ECM-A connector on ECM ADAPTER TOOL (P/N 529 036 166).

Using a multimeter, recheck resistance value as per following table.

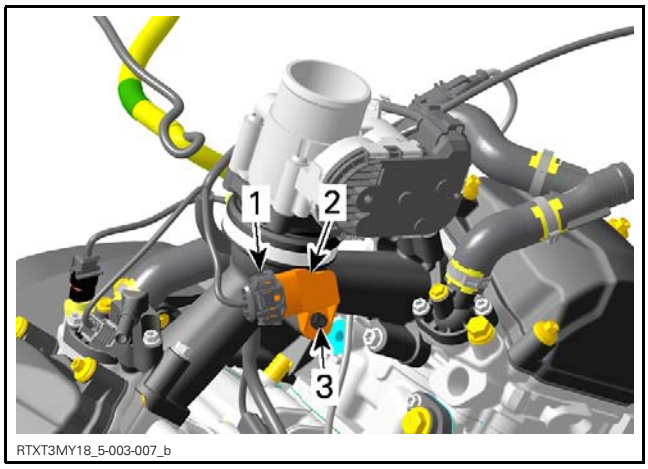
ECM CONNECTOR		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
A-H2	A-H3	2280 - 2740

MAPTS TEMPERATURE SENSOR TEST RESULTS			
RESULT	SERVICE ACTION		
NO READING	Circuit Continuity Test of MAPTS Temperature Function	MAPTS Input Voltage Test	Repair or replace wiring
INCORRECT RESISTANCE VALUE	Replace MAPTS		

Testing the MAPTS Circuit Continuity (Temperature Function)

MAPTS CIRCUIT CONTINUITY TEST (TEMPERATURE FUNCTION)		
ECM ADAPTER	MAPTS CONNECTOR	RESISTANCE VALUE
Pin H2	Pin 1	Close to 0 Ω
Pin H3	Pin 2	

Replacing the MAPTS



1. *MAPTS connector*
2. *MAPTS*
3. *Retaining screw*

Disconnect MAPTS connector and remove the MAPTS from the intake manifold.

Install new MAPTS as per following table.

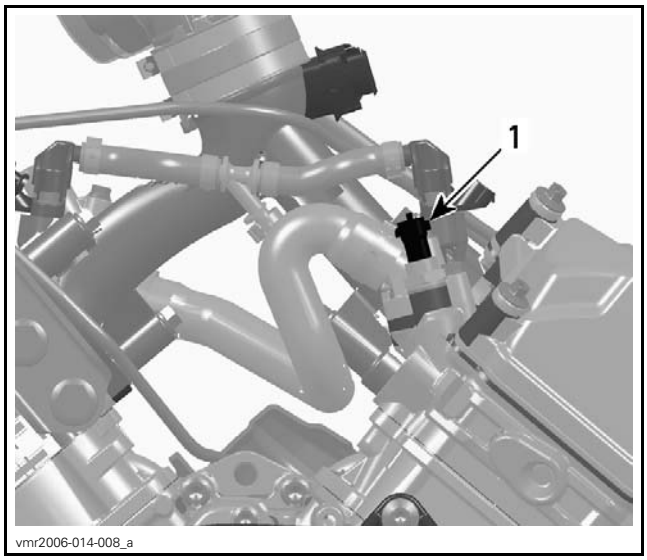
TIGHTENING TORQUE	
MAPTS retaining screw	6 N•m ± 0.7 N•m (53 lbf•**in** ± 6 lbf•**in**) + LOCTITE 243 (BLUE) (P/N 293 800 060)

COOLANT TEMPERATURE SENSOR (CTS)

CTS Access

The CTS is located on the LH of the engine, aft cylinder. To access it, remove the:

– Driver's seat
– LH lateral console panel.



LH SIDE OF THE ENGINE, REAR CYLINDER
1. *Coolant temperature sensor (CTS)*

Testing the CTS Resistance

1. Disconnect the plug connector from the CTS and check the resistance of the sensor itself.

CTS SENSOR		**MEASUREMENT**
PIN		RESISTANCE Ω @ 20°C (68°F)
1	2	2280 - 2740

CHECK SENSOR RESISTANCE

If resistance is out of specification, replace the CTS.

If resistance test is good,**reconnect** the CTS and disconnect the ECM connector "A" from the ECM.

2. Install ECM-A connector on ECM ADAPTER TOOL (P/N 529 036 166).

3. Using a multimeter, recheck resistance from the ECM connector as per table.

ECM ADAPTER		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
A1	J2	2280 - 2740

If resistance value is correct, refer to *ECM REPLACEMENT*.

If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the CTS.

Replacing the CTS

1. Disconnect CTS connector and remove CTS.
2. Install the new CTS and torque as specified.

TIGHTENING TORQUE	
CTS	16 N•m ± 2 N•m (142 lbf•**in** ± 18 lbf•**in**)

3. Reinstall remaining removed parts.
4. Refill and bleed the cooling system, refer to *COOLING SYSTEM* subsection.

HEATED OXYGEN SENSOR (HO_2S)

Oxygen Sensor Location

This vehicle is equipped with a heated oxygen sensor (HO_2S): The sensor is located on the exhaust pipe, between the rear cylinder and the muffler.

Oxygen Sensor General Precautions

Take the following precautions to avoid sensor malfunction:

– Do not use any product on sensor probe.
– Do not expose sensor to water, oil, windshield cleaner, anticorrosion oil, grease, terminal cleaner, etc.
– Do not drop or use an oxygen sensor that has been dropped.
– Do not use any compound on sensor threads unless labeled as compatible with oxygen sensor.
– Do not use impact wrench or conventional socket type wrench to install sensor.
– Do not allow sensor or wire to touch exhaust system or any other hot component.
– Do not route sensor wires to create tension in the wires. This could cause faults or sensor malfunction.

Oxygen Sensor Troubleshooting

Always use the BRP diagnostic software (BUDS2) to check for fault codes. Carry out service actions.

In BUDS2, also check oxygen sensor voltage and refer to following table.

OXYGEN SENSOR VOLTAGE IN BUDS2	
VOLTAGE READING	CONDITION
Varies 0.1 to 0.8 Volts	Normal oxygen sensor operation in closed loop
Constant 0.45 Volts	Oxygen sensor circuit open
Constant low voltage	Indicates fuel mixture too lean, possible oxygen sensor fault, possible fuel system fault, possible air leak
Constant high voltage	Indicates fuel mixture too rich, possible fuel system fault, possible fuel canister problem

Testing the Oxygen Sensor

Testing for Oxygen Sensor Input Voltage

NOTE: This test validates the heater element circuit.

1. Ensure main power relay (R2) in installed in fuse box 1.
2. Disconnect the oxygen sensor connector.
3. Turn ignition switch ON.
4. Using a multimeter set to Vdc, read the input voltage provided to the sensor heater.

REQUIRED TOOLS	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

OXYGEN SENSOR CONNECTOR (HARNESS SIDE)		MEASUREMENT
PIN		
C	Battery ground	Battery voltage

If Input voltage is good, refer to *TESTING THE RESISTANCE OF THE OXYGEN SENSOR HEATER* and *TESTING FOR OXYGEN SENSOR CIRCUIT CONTINUITY*.

If input voltage is not good, test the continuity of the power circuit from fuse F4 in fuse box 1. Refer to the applicable *WIRING DIAGRAM* for details.

If input voltage wire continuity is at fault, repair or replace wiring or connector.

Testing the Resistance of the Oxygen Sensor Heater

Test the resistance value of the oxygen sensor between the sensor pins as follows.

OXYGEN SENSOR PIN		RESISTANCE @ 20°C (68°F)
C	D	Approximately 7 - 11 Ω

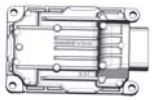
If reading is **not** within specification, replace the oxygen sensor.

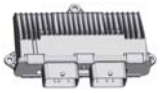
Testing for Oxygen Sensor Circuit Continuity

NOTE: This test validates the heater element circuit and the sensor circuits.

1. Remove main power relay (R2) in fuse box 1. Refer to *POWER DISTRIBUTION AND GROUNDS* subsection.
2. Disconnect ECM-B connector and install it on the ECM adapter tool.
3. Set the multimeter to "Ω". test for continuity between the oxygen sensor harness connector and the ECM adaptor as per following tables.
4. Test for continuity between the oxygen sensor harness connector and the ECM adaptor as per following tables.

REQUIRED TOOLS	
FLUKE 115 MULTIMETER (P/N 529 035 868)	
ECM ADAPTER TOOL (P/N 529 036 166)	

OXYGEN SENSOR CIRCUIT CONTINUITY TEST		
OXYGEN SENSOR PIN		RESISTANCE @ 20°C (68°F)
A	C3	Close to 0 Ω
B	G4	
C	L1	
D	L2	

OXYGEN SENSOR CIRCUIT CONTINUITY TEST		
OXYGEN SENSOR PIN		RESISTANCE @ 20°C (68°F)
A	J1	Close to 0 Ω
B	D2	
D	L2	

If a resistance value is NOT as specified, repair or replace the wiring and connectors.

Replacing the Oxygen Sensor

1. Remove main power relay (R2) in fuse box 1. Refer to *POWER DISTRIBUTION AND GROUNDS* subsection.

⚠ CAUTION Exhaust system and oxygen sensor may be hot. To avoid possible injury, allow exhaust system components time to cool before proceeding.

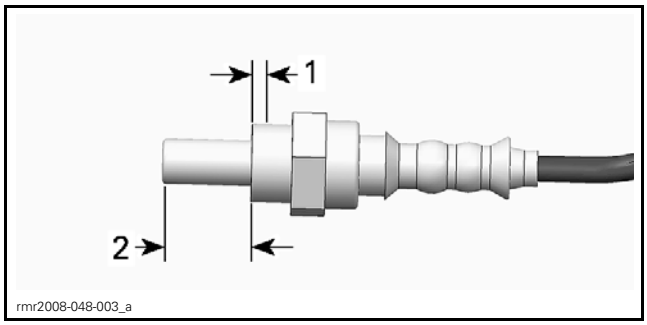
2. Disconnect oxygen sensor connector.
3. Cut locking tie securing oxygen sensor harness.
4. Unscrew oxygen sensor from exhaust pipe.

NOTICE Handle oxygen sensor with clean hands. Oxygen sensor probe must remain free of oil, grease, antiseize lubricant and any other foreign matter that could affect its operation.

If a new oxygen sensor is installed, its threads are already coated with an anti-seize product. Sensor is ready for installation.

If the same oxygen sensor is installed, apply LOCTITE 767 (ANTI-SEIZE LUBRICANT) (P/N 293 800 070) on its **first two threads**.

NOTICE Always use a product that is oxygen sensor safe.



TYPICAL
1. *Apply antiseize lubricant first two threads*
2. *Must be free of any product*

NOTICE Do not apply any antiseize lubricant to the sensor probe as it could affect its operation.

5. Screw sensor in exhaust pipe.

TIGHTENING TORQUE	
Oxygen sensor	50 N•m ± 10 N•m (37 lbf•ft ± 7 lbf•ft) + LOCTITE 767 (ANTI-SEIZE LUBRICANT) (P/N 293 800 070)

6. Install all other removed parts.

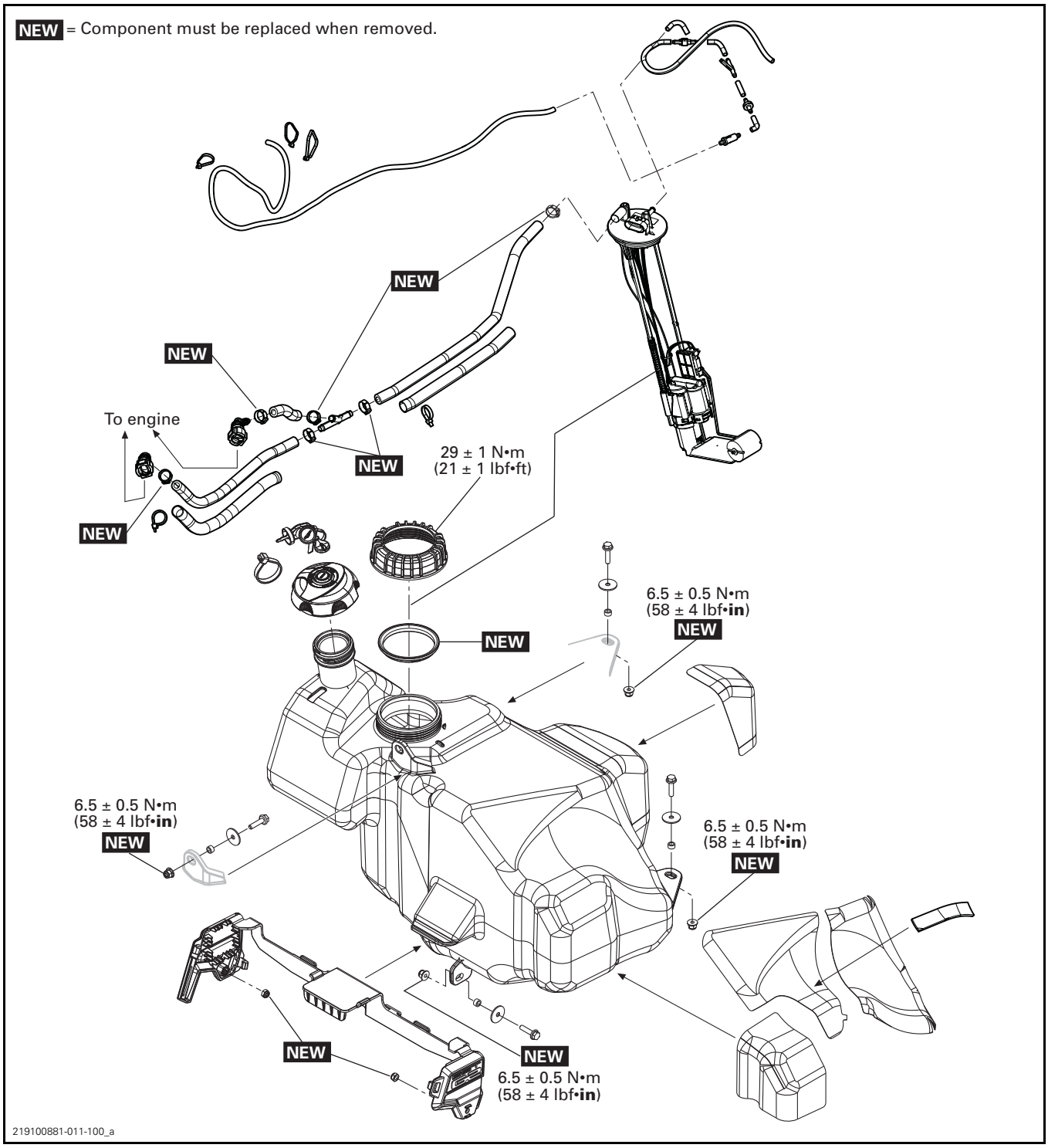
FUEL TANK AND FUEL PUMP

SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	12
FUEL HOSE ADAPTER	529 036 396	5
FUEL PUMP NUT TOOL	529 036 427	13
OETIKER PLIER	295 000 070	8
PRESSURE GAUGE	529 036 395	5
SMALL HOSE PINCHER	295 000 076	17
VACUUM/PRESSURE PUMP	529 021 800	4, 17

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
FLUKE RIGID BACK PROBE	TP88	12


NEW = Component must be replaced when removed.
NEW
NEW
To engine
NEW
29 ± 1 N•m
(21 ± 1 lbf•ft)
NEW
6.5 ± 0.5 N•m
(58 ± 4 lbf•in)
NEW
NEW
6.5 ± 0.5 N•m
(58 ± 4 lbf•in)
NEW
6.5 ± 0.5 N•m
(58 ± 4 lbf•in)
NEW
NEW
NEW
6.5 ± 0.5 N•m
(58 ± 4 lbf•in)
219100881-011-100_a

GENERAL

⚠ WARNING

Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

⚠ WARNING

Always disconnect battery prior disconnecting a fuel system pressure hose.

⚠ WARNING

Always proceed with care and use appropriate safety equipment when working on pressurized fuel system. Wear safety glasses.

⚠ WARNING

Do not allow fuel to spill on hot engine parts and/or on electrical connectors.

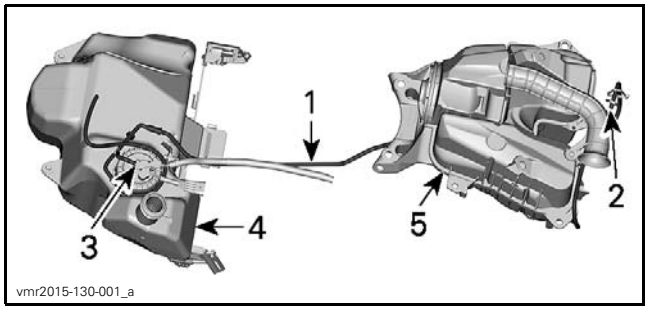
When the repair is completed, ensure that all hoses are connected and secured. Perform the *FUEL PRESSURE TEST* and the *FUEL TANK LEAK TEST* as explained in this subsection.

Fuel lines remain under pressure at all times. Proceed with care when removing/installing high pressure test equipment.

SYSTEM DESCRIPTION

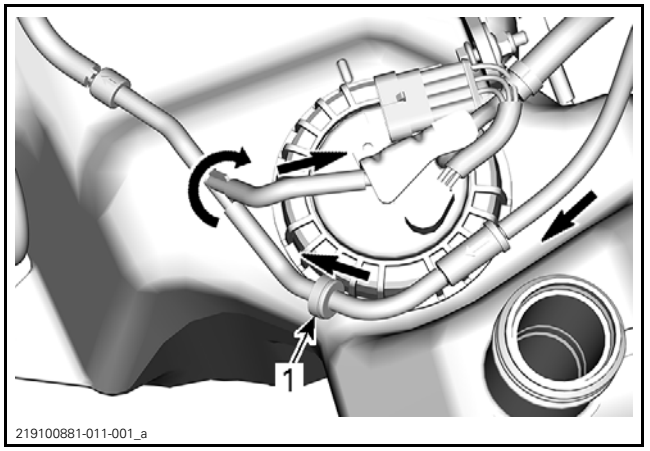
Fuel Tank Vent System

The fuel tank is equipped with a vent system that provides over pressure relief and negative pressure relief of the fuel tank.



TYPICAL - FUEL TANK VENT SYSTEM
1. *Vent hose*
2. *Vent system hose inlet*
3. *Vent system connected to fuel pump*
4. *Fuel tank*
5. *Engine air intake system*

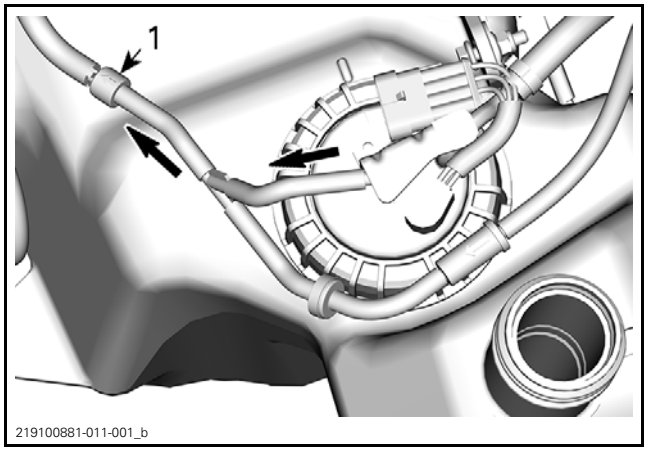
Air can enter the fuel tank at all times through the vent system INLET check valve. This prevents negative pressure within the fuel tank which could cause fuel starvation.



TYPICAL - AMBIENT AIR PRESSURE IN
1. *Vent inlet check valve*

The vent inlet check valve also prevents fuel from flowing out through the inlet of the vent system.

If the pressure in the fuel tank builds up and exceeds 2.5 kPa - 7.6 kPa (.36 PSI - 1.1 PSI), the pressure relief valve opens and lets the excess pressure evacuate through the vent system OUTLET hose.

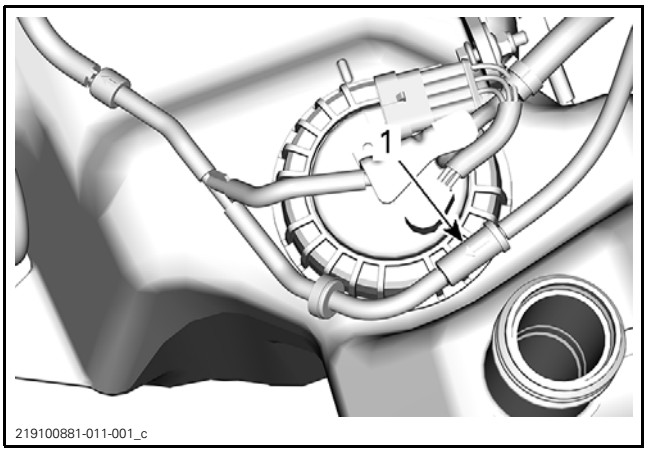


TYPICAL - OVER PRESSURE RELIEF
1. *Outlet pressure relief valve*

Fuel Tank Vent Breather Filter

The vent system is equipped with an in-line breather filter that prevents entry of particles such as dust or small insects. It is located next to the fuel pump, on the inlet hose, before the air inlet check valve.

To access the fuel tank vent breather filter, remove the rear body module.



TYPICAL
1. Fuel tank vent breather filter

Fuel Pump Module

The fuel pump module is inserted in the fuel tank. It provides fuel delivery for the EFI system and encompasses the following components:

– Electric fuel pump
– Fuel pump pre-filter
– Fuel pump filter
– Fuel pressure regulator
– Fuel level sender.

Fuel Filters

The system comprises two levels of filtration:

– A replaceable pre-filter element attached to the bottom of the fuel pump.
– A non-replaceable fine filter element that is integral to the fuel pump module.

Fuel Pump Pressure Regulator

The fuel pressure regulator is integral to the fuel pump module. The pressure regulator maintains proper fuel pressure for the EFI system.

INSPECTION

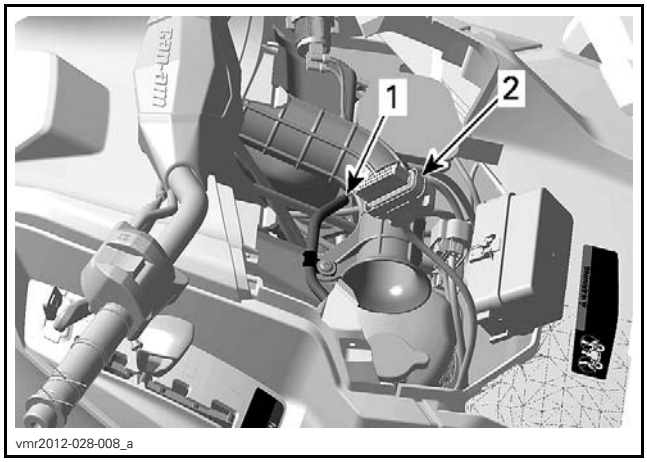
PERFORMING THE FUEL TANK LEAK TEST

⚠ WARNING

Always carry out a fuel tank leak test whenever the fuel tank shows signs of wear or damage which may cause a leak, or when the fuel pump has been removed or replaced, or if you suspect a leak. If the fuel tank is damaged, the fuel tank should be replaced even if no leak is present. Do not attempt to repair the fuel tank.

1. Refill fuel tank and ensure fuel tank cap is in good condition and properly installed.
2. Remove the gauge support for access to the fuel vent inlet hose.
3. Pressurize the fuel tank through the vent hose.

REQUIRED TOOL	
VACUUM/PRESSURE PUMP (P/N 529 021 800)	



1. Fuel tank vent inlet hose
2. Gauge connector

PRESSURE	TIME WITHOUT PRESSURE DROP
14 kPa (2 PSI)	3 minutes

If pressure drops, locate fuel leak(s) and repair or replace leaking component(s).

To locate a leak, check for a fuel smell or leaking fuel.

To ease locating leak(s), spray soapy water on all hose connections and components; bubbles will indicate the leak location(s).

NOTE: For access to the fuel tank vent system, refer to *FUEL PUMP ACCESS* in this subsection.

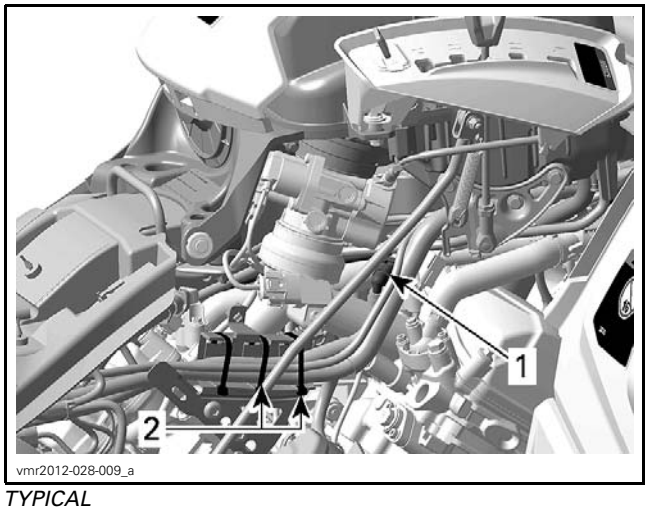
PERFORMING THE FUEL SYSTEM PRESSURE TEST

The pressure test will show the available pressure in the system. It validates the pressure regulator and the fuel pump, and allows for checking the fuel system for leaks (high pressure side).

NOTE: Refer to the *FUEL SYSTEM DIAGNOSTIC FLOW CHART* in this subsection to help diagnose a fuel system related problem.

1. Ensure the fuel level in the tank is sufficient.
2. Ensure the battery voltage is over 12 volts.
3. Remove seat.
4. Remove RH side body panel, refer to *BODY* subsection.
5. Disconnect the fuel pressure hose from the fuel injector fuel rail. Refer to *DISCONNECTING A FUEL PRESSURE HOSE* in *FUEL HOSE AND OETIKER CLAMPS*.
6. Remove the 2 most forward locking ties securing the fuel hose to the upper cable support.

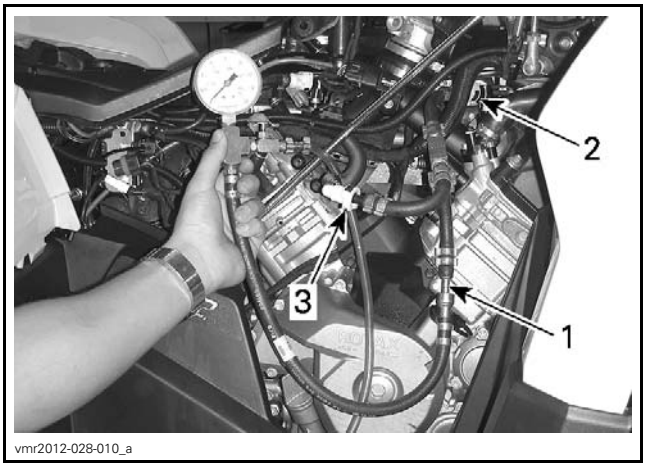
NOTE: This is required to provide more hose length for proper connection to test equipment.



TYPICAL
1. *Forward injector rail fitting*
2. *Locking ties*

7. Install the fuel pressure gauge and fuel hose adapter between the disconnected injector hose and fuel rail (in-line installation).

REQUIRED TOOLS	
PRESSURE GAUGE (P/N 529 036 395)	
FUEL HOSE ADAPTER (P/N 529 036 396)	



TYPICAL - PRESSURE GAUGE SETUP
1. *Pressure gauge to fuel hose adapter*
2. *Fuel hose adapter to fuel rail*
3. *Fuel hose adapter to fuel pump pressure hose*

8. Reinstall the fuel pump relay (R4) in the forward fuse box.
9. Turn ignition key ON and observe fuel pressure.

FUEL PRESSURE (Valid at 12v ± 0.1v)	350 kPa ± 10 kPa (51 PSI ± 1 PSI)

10. Start engine and observe fuel pressure.
11. Stop engine.
12. Remove test equipment and reconnect fuel hose to injector fuel rail by proceeding in the same manner as for its installation.

Test Conclusion

The fuel pressure should be within specification in static or dynamic tests.

Rapid Pressure Drop

If there is a rapid pressure drop after the engine is stopped, check for leakage at:

– A fuel hose
– A fuel rail.

NOTE: The fuel pump check valve integral to the fuel pump module may also be at fault.

If no leak is detected, replace fuel pump.

Slow Pressure Drop

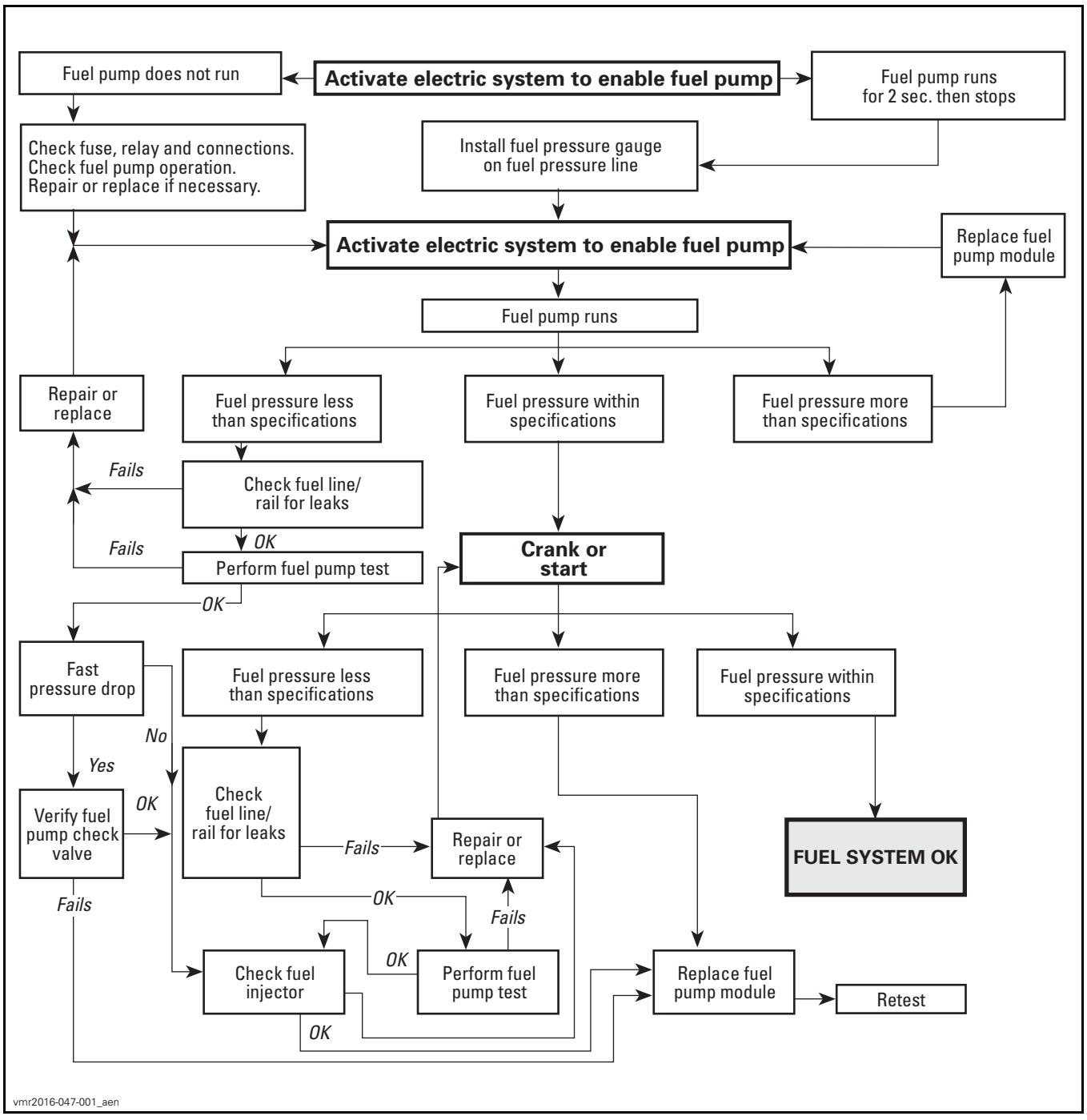
If there is a slow pressure drop after the engine is stopped, check for a fuel injector leak. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.

NOTE: The fuel pressure regulator or fuel pump check valve integral to the fuel pump module may also be at fault.

If no leak is detected, replace fuel pump.

TROUBLESHOOTING

FUEL SYSTEM DIAGNOSTIC FLOW CHART



PROCEDURES

FUEL HOSE AND OETIKER CLAMPS

Disconnecting a Fuel Pressure Hose

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. In BUDS2, go to:
   – **Function** page
   – **IO Control** button
   – **Execute Fuel Pressure Relief**
3. Carefully disconnect the fuel hose fitting from the injector fuel rail by pressing on the release tab of the quick disconnect fitting.

Replacing the Fuel Hose

When replacing fuel hoses, be sure to use hoses and clamps as available from BRP parts department. This will ensure continued proper and safe operation.

⚠ WARNING

Use of fuel lines other than those recommended by BRP may compromise fuel system integrity.

⚠ WARNING

Whenever removing a hose in the fuel system, always use new Oetiker clamps at assembly. Then validate fuel system tightness by performing a fuel pressure test.

Replacing the Oetiker Clamp

REQUIRED TOOL	
OETIKER PLIER (P/N 295 000 070)	

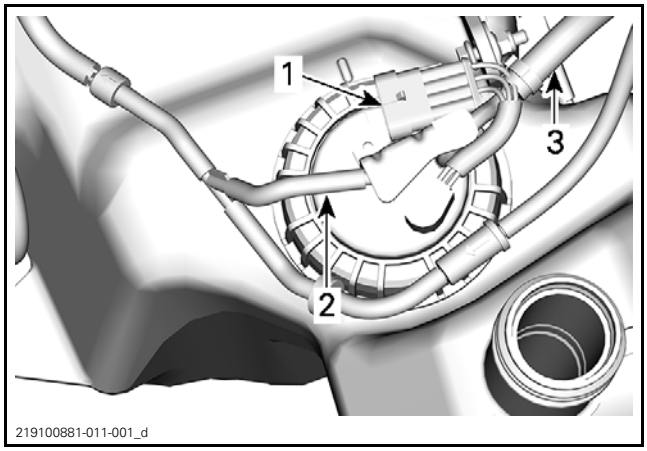
FUEL TANK

Draining the Fuel Tank

Remove fuel tank cap and siphon gas into an approved fuel container.

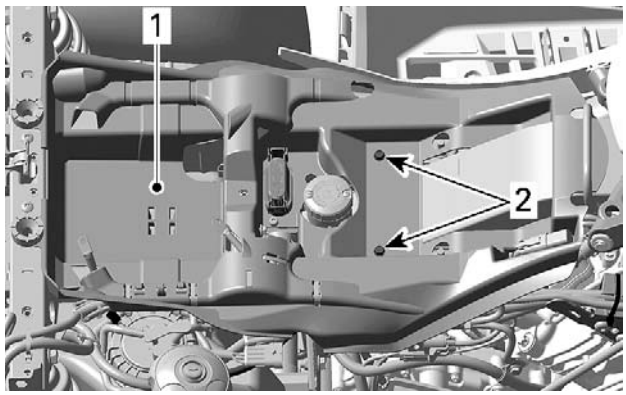
Removing the Fuel Tank

1. Drain fuel tank. Refer to *DRAINING FUEL TANK* in this subsection.
2. Disconnect the fuel pressure hose from the fuel injector fuel rail. Refer to *DISCONNECTING A FUEL PRESSURE HOSE* in *FUEL HOSE AND OETIKER CLAMPS*.
3. Disconnect and remove the battery, refer to *CHARGING SYSTEM* subsection.
4. Remove the rear body module, refer to *BODY* subsection.
5. Refer to *EXHAUST SYSTEM* and remove the following:
   – Muffler assembly
   – Muffler/exhaust pipe heat shield.
6. Remove rear frame. Refer to *FRAME* subsection.
7. Disconnect the following from the fuel pump module:
   – Fuel pump electric connector
   – Fuel system vent hose
   – Fuel pump pressure hose.



1. Fuel pump connector
2. Vent hose
3. High pressure fuel hose

8. Disconnect the RED (+) battery cable from the starter solenoid.
9. Remove the 2 screws that secure the front of the battery support.

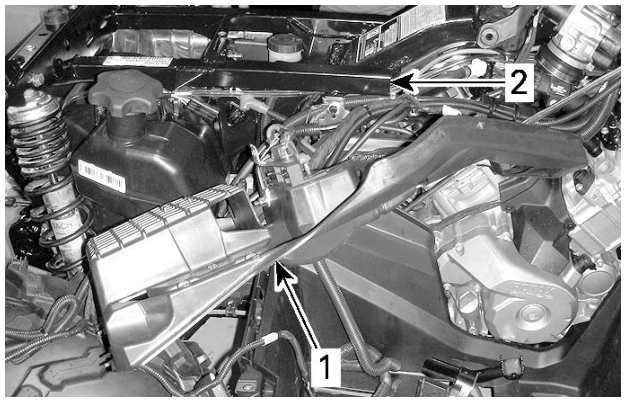


vmr2012-028-013_a

1. Battery support
2. Support retaining screws

NOTE: It is not necessary to remove the wiring harness or other components from the battery support.

10. Flip the battery support over towards the RH side of the vehicle for access to the rear frame extension.



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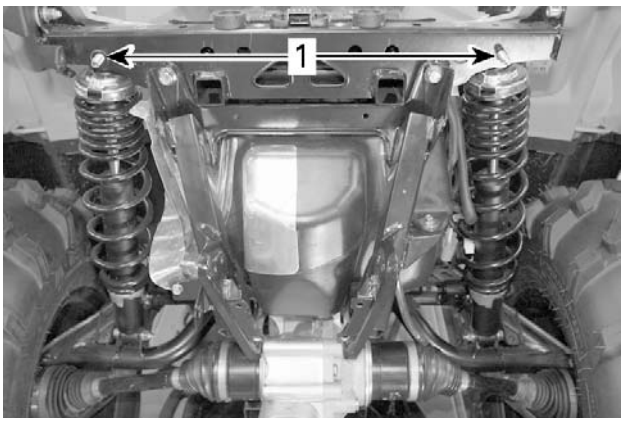
TYPICAL
1. Battery support
2. Rear frame extension

11. Remove the upper mounting bolt from both rear shock absorbers.



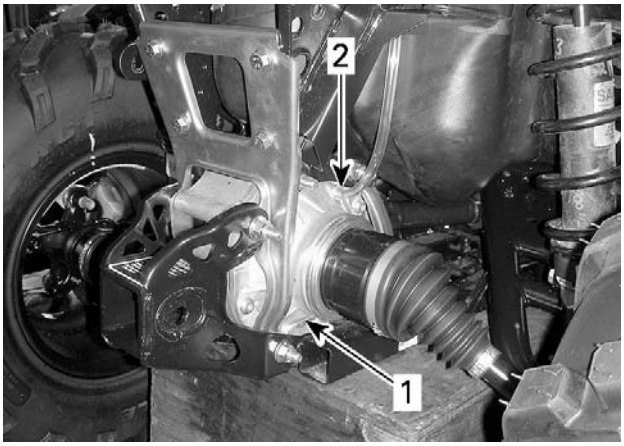
sfvmr2014-010-071_a

TYPICAL
1. Upper shock mounting bolts

12. Block the front wheels with wheel chocks.
13. Lift back end of vehicle and properly support under the lower rear portion of the frame, near the final drive.

⚠ CAUTION Before working on vehicle, ensure the vehicle is securely supported.

14. Remove vent tube from final drive.

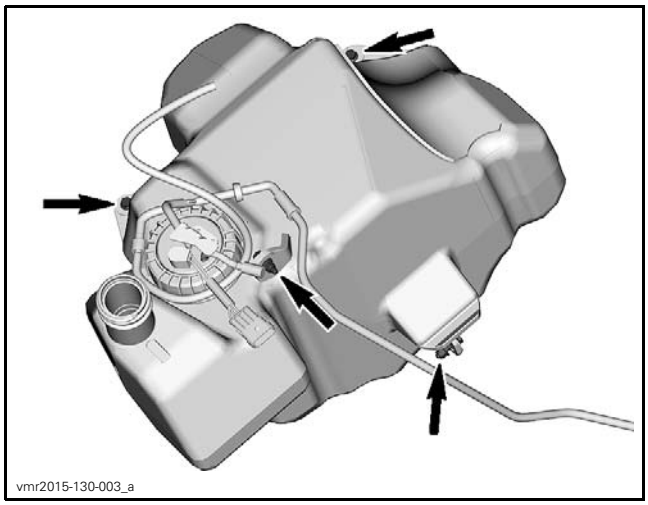


vmr2012-028-017_a

1. Final drive unit
2. Vent tube to remove

15. Remove fuel tank retaining screws (4).

NOTE: Note position of washers and bushings on each screw.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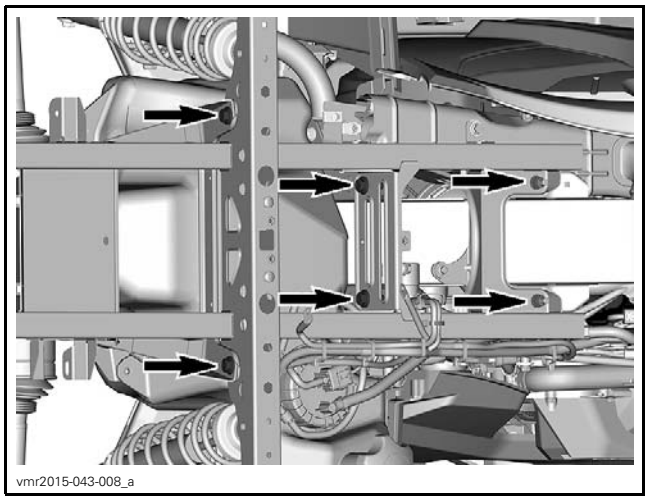
16. Loosen the front 2 nuts and remove the 4 bolts retaining the frame extension.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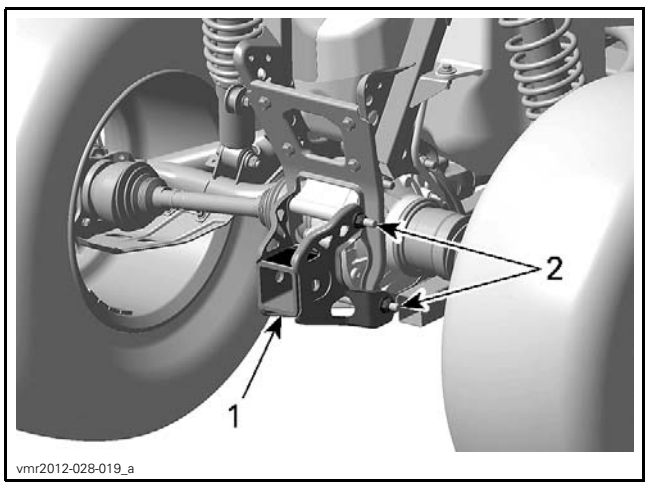
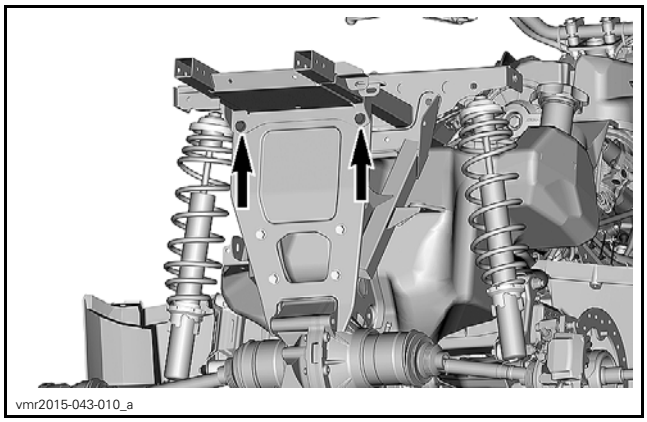
17. Remove nuts and screws securing trailer hitch/final drive protector and rear frame support to rear final drive.



vmr2012-028-019_a

TYPICAL
1. *Trailer hitch*
2. *Bolts to remove*

18. Remove 2 nuts and screws securing rear frame support to rear frame section.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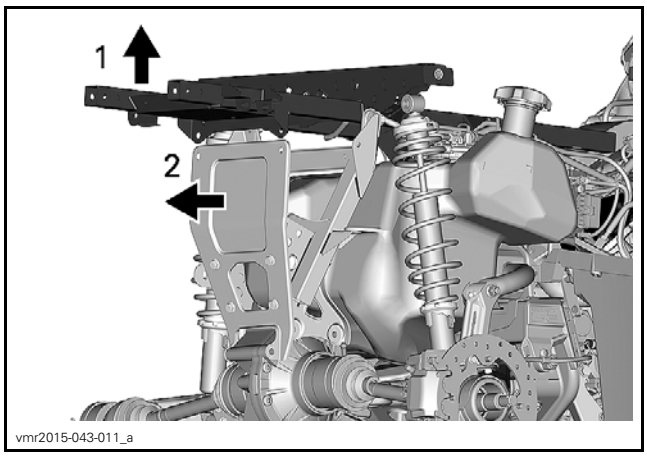

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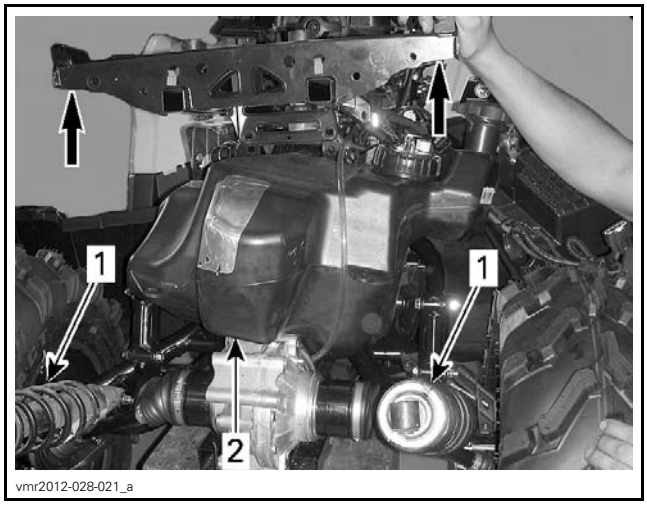
19. Lift up on frame extension and pull fuel tank out of vehicle.

NOTE: When lifting up on the frame extension, the shock absorbers will fall backwards.



vmr2012-028-021_a

TYPICAL
1. *Rear shock absorbers*
2. *Fuel tank*

Inspecting the Fuel Tank

Inspect fuel tank for any damages or cracks which may result in fuel leaks.

Inspect fuel tank and fuel tank protector on frame for damages.

Inspect protector for damages.

If cracks, gouges or other damages which may lead to a fuel leak, or damages to attachment points that could prevent the tank from being secure are found, replace fuel tank.

Installing the Fuel Tank

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

Install a bushing on each fuel tank mounting screw. The bushing inserts within the fuel tank screw hole cavity.

Be sure to install the washers between the fuel tank and the fastener as noted at removal.

Install **all** fuel tank fasteners loosely.

NOTICE **The fuel tank fasteners must not be tightened to specified torque until complete assembly in vehicle.**

Install all frame component fasteners loosely, then apply torque as specified in the *FRAME* subsection.

Apply specified torque to fuel tank retaining screws.

TIGHTENING TORQUE	
Fuel tank retaining screws	6.5 N•m ± 0.5 N•m (58 lbf•**in** ± 4 lbf•**in**)

Be sure to properly connect and route:
- Fuel tank vent tube
- Fuel pump pressure hose
- Electrical connectors.

Refuel tank and ensure there are no leaks by performing a *FUEL TANK LEAK TEST* and a *FUEL PUMP PRESSURE TEST* as described in this subsection.

FUEL PUMP

Performing the Fuel Pump Pressure Test

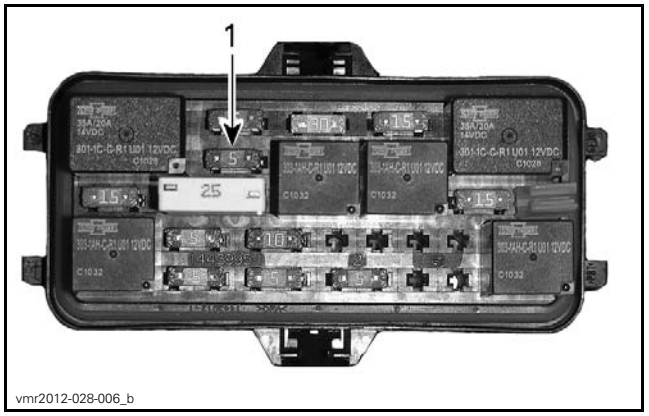
Refer to *INSPECTION* in this subsection.

Fuel Pump Quick Test

1. Turn ignition key to ON.
2. Listen for fuel pump operation.

NOTE: Fuel pump should come ON for a few seconds, then stop.

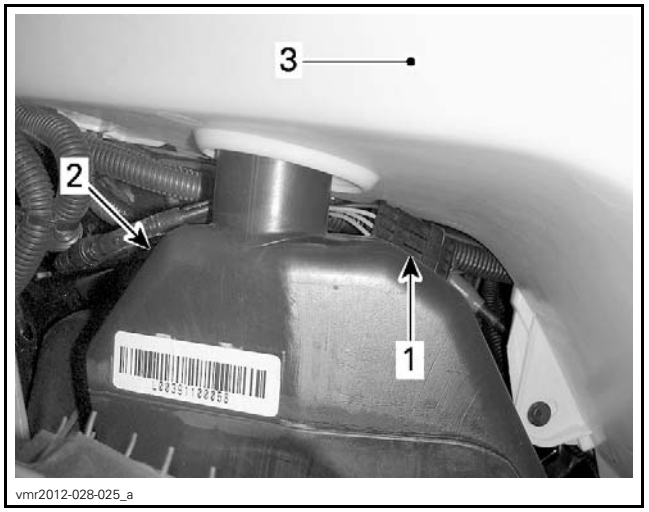
If fuel pump does not come ON, carry out the following:
- Check fuel pump relay fuse and fuel pump relay. Refer to *WIRING DIAGRAM*.
- Check in BRP diagnostic software (BUDS2) for applicable fault codes. Refer to *COMMUNICATION TOOLS* subsection.
- Carry out a fuel pump input voltage test.



TYPICAL
1. Fuel pump relay fuse

Accessing the Fuel Pump Connector

The fuel pump connector can be accessed from under the RH rear fender, just above the forward end of the fuel tank.



TYPICAL
1. Fuel pump connector
2. Fuel tank
3. Underside of RH rear fender

Testing the Fuel Pump Input Voltage

1. Disconnect the fuel pump connector.

2. Turn ignition key ON.
3. Read voltage as follows.

NOTE: The fuel pump voltage will be read only when the fuel pump is activated.

REQUIRED TOOLS	
FLUKE 115 MULTIMETER (P/N 529 035 868)	
FLUKE RIGID BACK PROBE (P/N TP88)	

FUEL PUMP INPUT VOLTAGE TEST		
TEST PROBES		VOLTAGE READING
Fuel pump connector Pin 3	Fuel pump connector Pin 4	Battery voltage

If battery voltage is read, carry out a fuel pump resistance test.

If battery voltage is not read, test fuel pump power input as follows.

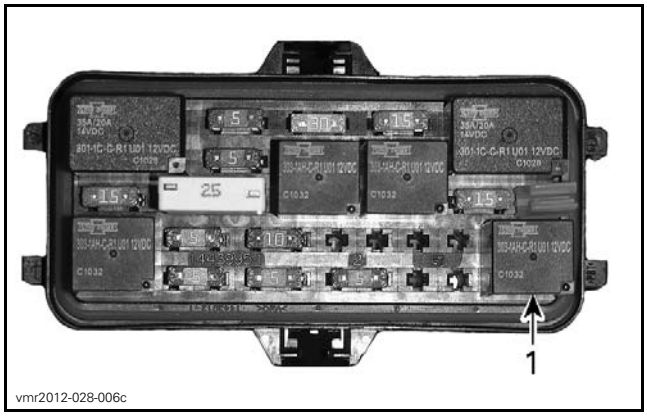
FUEL PUMP POWER WIRE TEST		
TEST PROBES		VOLTAGE READING
Fuel pump connector Pin 3	Battery ground	Battery voltage

If battery voltage is now read, check fuel pump ground circuit between fuel pump connector FP-4 and battery ground.

If battery voltage is still not read, check the following:
- Fuse (F15)
- Fuel pump relay (R4)
- Fuel pump relay input voltage (control and power circuits)
- Fuel pump relay control circuit continuity to ECM-J1
- Wiring and connectors.

Testing the Fuel Pump Resistance

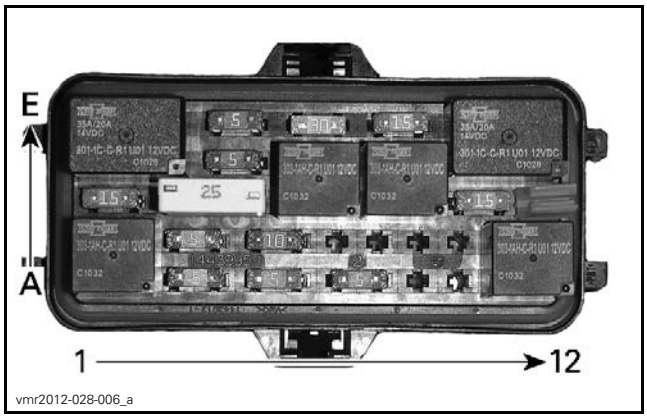
1. Ensure fuel pump connector is properly connected.
2. Remove fuel pump relay (R4).



1. Fuel pump relay

3. Measure fuel pump resistance as follows.

FUEL PUMP RESISTANCE TEST (AT FUSE BOX)		
TEST PROBES		RESISTANCE Ω @ 20°C (68°F)
Fuse box contact A11	Battery ground	Approximately 2 Ω



FUSE BOX COORDINATES

If resistance test failed, disconnect fuel pump connector and measure resistance at fuel pump connector.

FUEL PUMP RESISTANCE TEST (AT FUEL PUMP CONNECTOR)	
Pins 3 and 4	Approximately 2 Ω

If test failed at pump connector, replace fuel pump.

If test succeeded at pump connector, check wiring and connectors from:
- Fuse box to fuel pump
- Fuel pump to battery ground.

Repair or replace as necessary.

Accessing the Fuel Pump

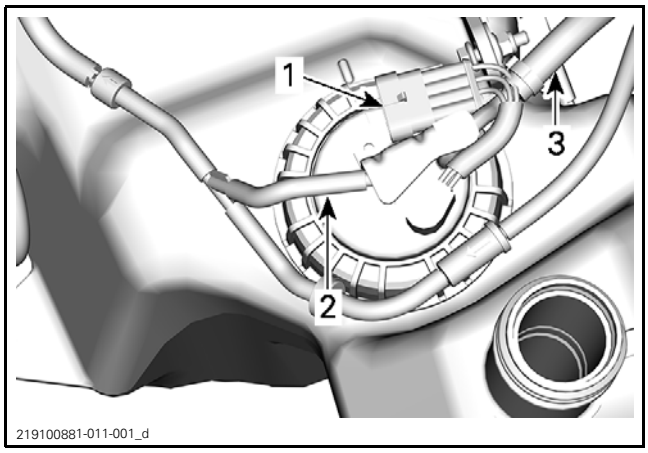
Remove rear body module, refer to *BODY* subsection.

Releasing the Fuel System Pressure

Refer to *DISCONNECTING A FUEL PRESSURE HOSE* in this subsection.

Removing the Fuel Pump

1. Release the pressure of the fuel system.
2. Disconnect the following from the fuel pump:
   – Fuel pump electric connector
   – Fuel system vent hose
   – Fuel pump pressure hose.



TYPICAL
1. *Fuel pump connector*
2. *Vent hose*
3. *High pressure fuel hose*

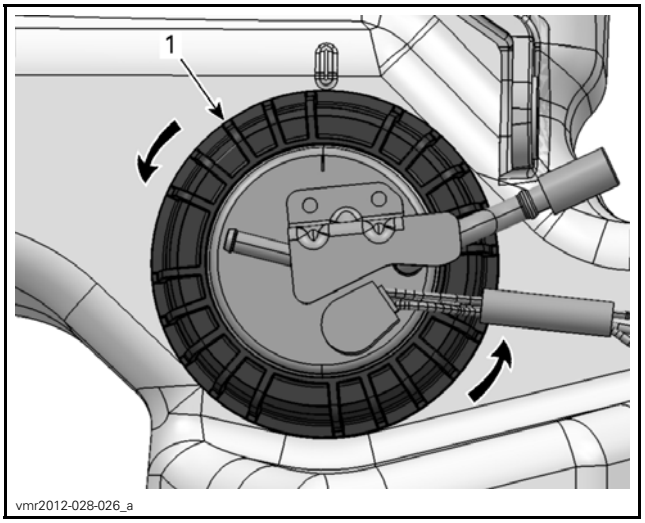
3. Remove fuel pump retaining nut.

⚠ WARNING

Fuel vapors are flammable and explosive under certain conditions. Use only non-sparking tools.

⚠ CAUTION Replace fuel pump gasket whenever fuel pump retaining nut is loosened.

REQUIRED TOOL	
FUEL PUMP NUT TOOL (P/N 529 036 427)	



TYPICAL - FUEL PUMP REMOVAL
1. *Fuel pump retaining nut*

4. Carefully pull out and rotate fuel pump as required.

NOTICE **Pay attention not to damage fuel sender and fuel pump prefilter.**

5. Discard gasket ring.
6. Wipe off any fuel spillage.

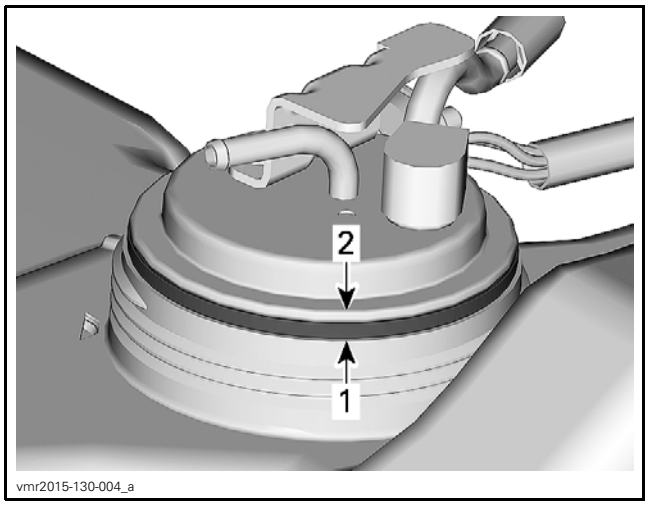
Installing the Fuel Pump

The installation is the reverse of the removal procedure. However, pay attention to the following.

Rotate fuel pump during insertion as per removal procedure.

⚠ CAUTION **Pay attention not to damage fuel sender and fuel pump pre-filter.**

1. Install a NEW gasket ring.
2. Place gasket so that it is properly located between fuel pump and fuel pump mounting neck on fuel tank.

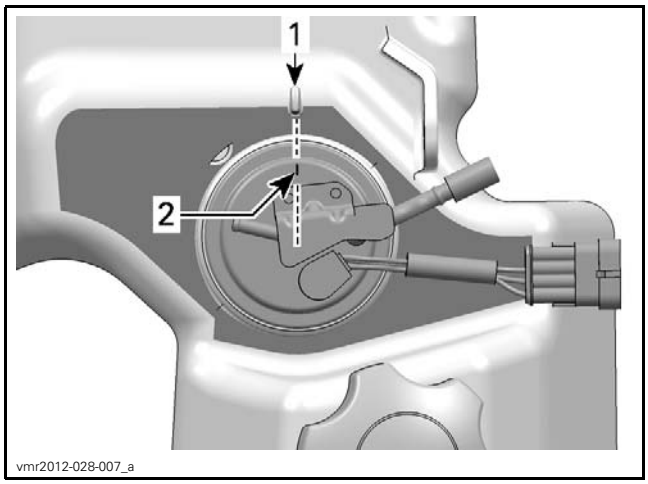


TYPICAL
1. *Gasket ring here*
2. *Fuel pump flange*

⚠ WARNING

Ensure gasket ring makes good contact all around fuel pump and fuel pump mounting neck on fuel tank.

3. Ensure proper fuel pump orientation as in following illustration.



1. *Fuel tank pump index*
2. *Fuel pump index*

4. Insert fuel pump retaining nut over the fuel pressure hose and electrical wiring connector.
5. While firmly holding pump against tank, engage fuel pump retaining nut on fuel tank flange.

NOTE: If necessary, move the pump in order to ensure the flange is sitting completely flat on the tank.

6. Tighten fuel pump retaining nut to specification.

NOTE: Ensure pump is properly aligned with index marks after nut is tightened to specification.

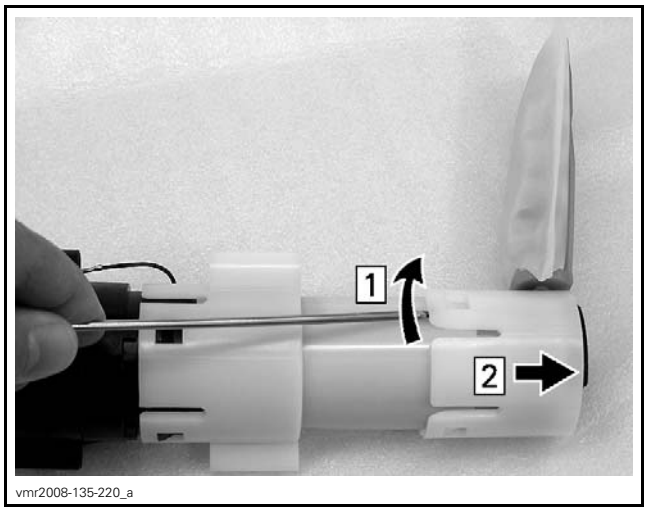
TIGHTENING TORQUE	
Fuel pump retaining nut	29 N•m ± 1 N•m (21 lbf•ft ± 1 lbf•ft)

7. Install fuel pressure hose on fuel pump using a **NEW** Oetiker clamp.
8. Install fuel vent tube on fuel pump.
9. Install electrical connector on fuel pump.
10. Install fuel pump relay (R4).
11. Refuel tank and ensure there are no leaks by performing a *FUEL TANK LEAK TEST* and a *FUEL PUMP PRESSURE TEST* as described in this subsection.
12. Check fuel level sender operation.

FUEL PUMP PRE-FILTER (STRAINER)

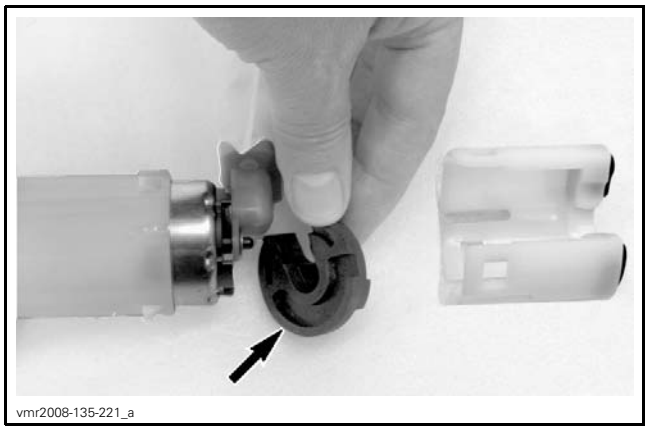
Replacing the Fuel Pump Pre-filter

1. Remove *FUEL PUMP*, see *REMOVING THE FUEL PUMP* in this subsection.
2. Unlock 3 tabs on strainer plastic ring.

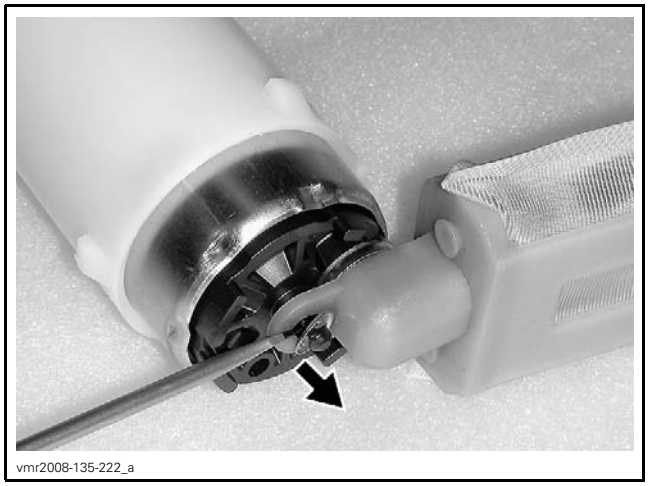


Step 1: Lift these tabs to unlock ring
Step 2: Pull ring off pump inlet

3. Remove rubber pad.


vmr2008-135-221_a

4. Remove push nut securing strainer to fuel pump. Be careful not to break the plastic pin.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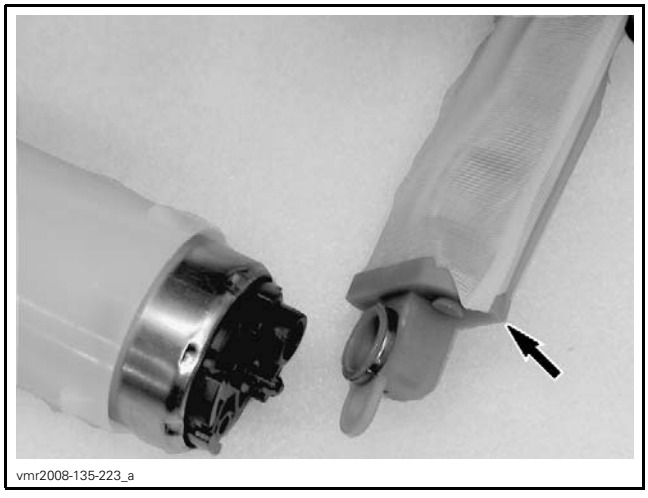
5. Pull strainer off fuel pump.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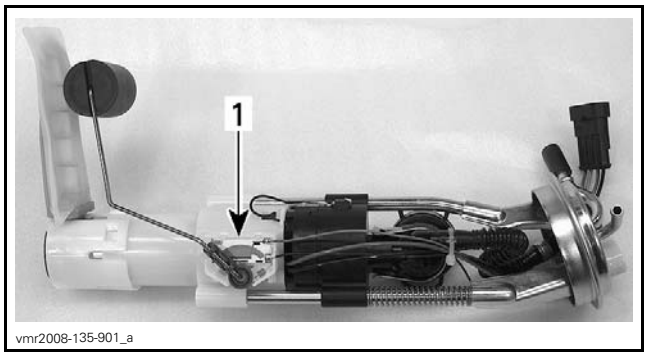
NOTE: A non-serviceable filter is located within the fuel pump module. If it is clogged, replace fuel pump.

6. Insert the new strainer on fuel pump making sure to press it in tightly against the fuel pump surface.
7. Press in a NEW push nut to secure strainer.
8. Reinstall remaining removed parts.

FUEL LEVEL SENDER

The fuel level sender is a float actuated variable resistance type that is part of the fuel pump.



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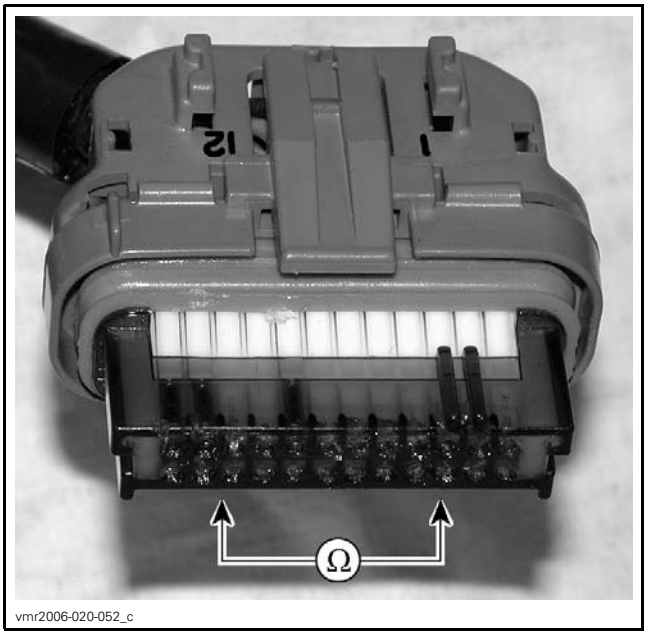
1. Fuel level sender

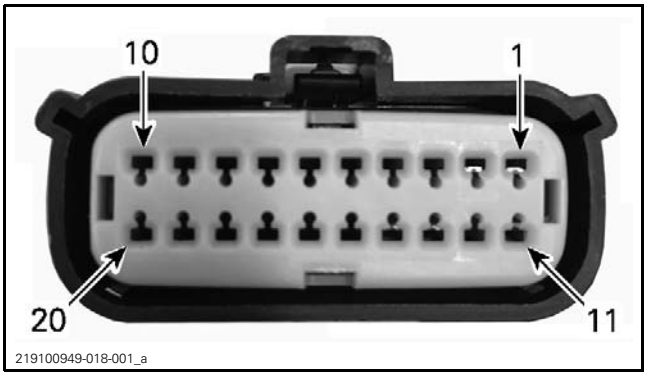
Testing the Fuel Level Sender Resistance (Fuel Pump Module Installed)

1. Disconnect multifunction gauge, refer to the appropriate *GAUGE* subsection.
2. Measure the resistance of the fuel level sender as follows.

FUEL LEVEL SENDER RESISTANCE TEST		
FUEL LEVEL	GAUGE CONNECTOR	RESISTANCE Ω @ 20°C (68°F)
Full	Pins 4 and 21	5 Ω ± 1
Empty		100 Ω ± 5



FUEL LEVEL SENDER RESISTANCE TEST		
FUEL LEVEL	4.5" DIGITAL DISPLAY GAUGE CONNECTOR	RESISTANCE Ω @ 20°C (68°F)
Full	Pins 3 and 8	5 Ω ± 1
Empty		100 Ω ± 5



MULTIFUNCTION 4.5" DIGITAL DISPLAY GAUGE CONNECTOR (PIN-OUT)

If readings are out of specification, refer to *TESTING THE FUEL LEVEL SENDER RESISTANCE (AT FUEL PUMP CONNECTOR)*.

If readings are as specified, refer to *TESTING THE FUEL LEVEL SENDER INPUT VOLTAGE*.

Testing the Fuel Level Sender Resistance (at Fuel Pump Connector)

FUEL LEVEL SENDER RESISTANCE TEST		
FUEL LEVEL	FUEL PUMP CONNECTOR	RESISTANCE Ω @ 20°C (68°F)
Full	Pins 1 and 2	5 Ω ± 1
Empty		100 Ω ± 5

If resistance test at fuel pump connector is failed, replace fuel pump module.

Testing the Fuel Level Sender Input Voltage

1. Set ignition switch to ON.
2. Disconnect fuel pump connector, refer to *FUEL PUMP CONNECTOR ACCESS* in this subsection.
3. Measure for input voltage as follows.

FUEL LEVEL SENDER INPUT VOLTAGE TEST		
FUEL PUMP CONNECTOR	BATTERY	VOLTAGE
Pin 2	Negative terminal	5V

TEST RESULT	SERVICE ACTION
5V is not read	Test wiring continuity between fuel level sender and multifunction gauge
Wiring continuity is good	Replace multifunction gauge
Wiring continuity is not obtained	Repair or replace wiring

Replacing the Fuel Level Sender

Replace fuel pump. Refer to *FUEL PUMP* in this subsection.

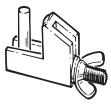
FUEL TANK VENT VALVES

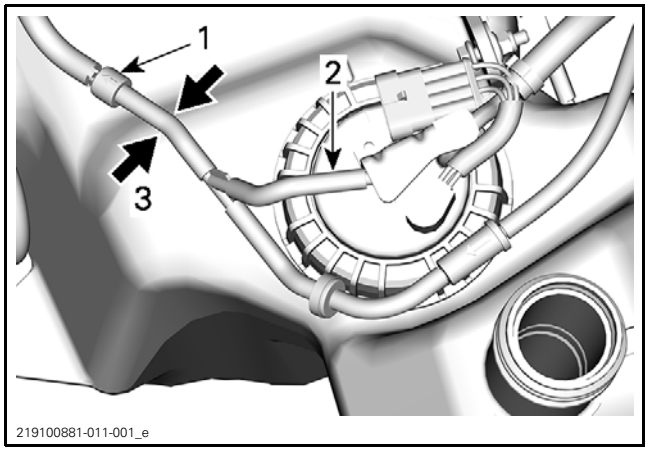
Testing the Fuel Tank Vent Valve

Testing the Inlet Check Valve

1. Remove rear body module, refer to *BODY* subsection.
2. Remove multifunction gauge for access to the vent system inlet hose, refer to the appropriate *GAUGE* subsection.

3. Install a small hose pincher between the vent pressure relief valve and the fuel pump vent inlet.

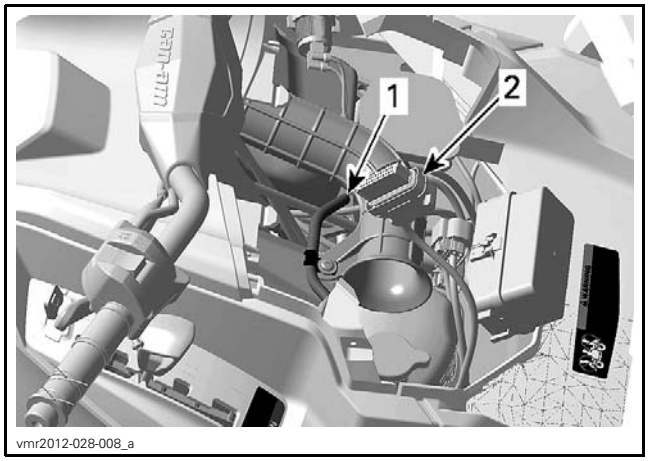
REQUIRED TOOL	
SMALL HOSE PINCHER (P/N 295 000 076)	



TYPICAL
1. *Pressure relief valve*
2. *Fuel pump vent inlet*
3. *Install small hose pincher here*

4. Connect the vacuum/pressure pump to the fuel tank vent hose inlet.

REQUIRED TOOL	
VACUUM/PRESSURE PUMP (P/N 529 021 800)	



TYPICAL
1. *Fuel tank vent hose inlet*
2. *Gauge connector*

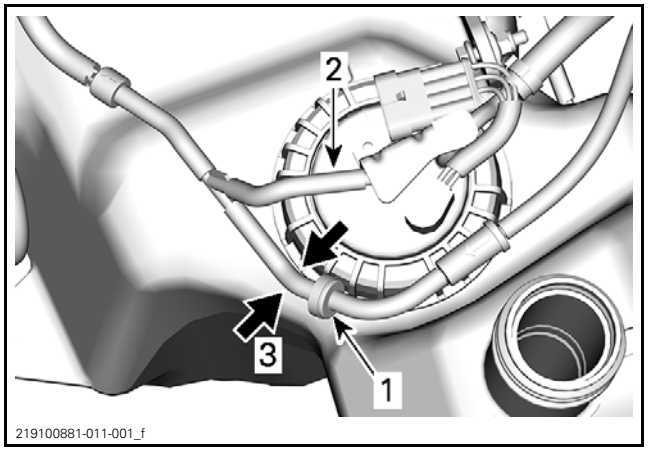
5. Remove fuel tank cap.

6. Set vacuum/pressure pump to **PRESSURE** and activate pump. The gauge on the pump **should not change in reading**.
7. Set vacuum/pressure pump to **VACUUM** and activate pump. The **gauge should increase in reading**.

If the test failed, carry out the following:
- Ensure breather filter is properly installed, refer to *PERIODIC MAINTENANCE PROCEDURES*.
- Ensure inlet check valve is properly installed, refer to *INSTALLING THE FUEL TANK VENT VALVE* in this subsection.
- Test inlet check valve separately. If good, replace the breather filter, refer to *PERIODIC MAINTENANCE PROCEDURES*.

Testing the Pressure Relief Valve

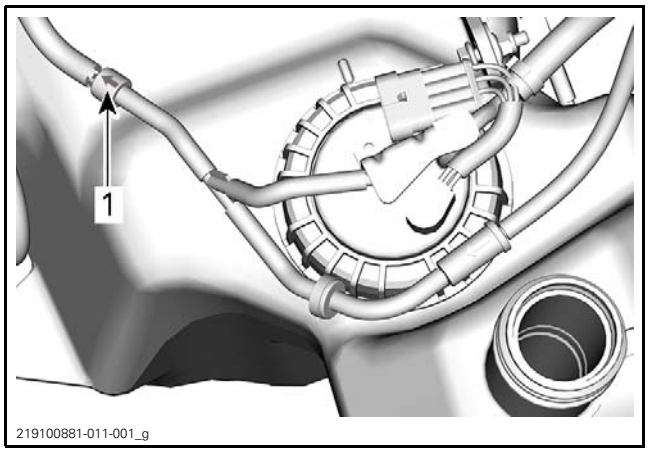
1. Install the small hose pincher between the inlet check valve and the fuel pump vent inlet fitting.



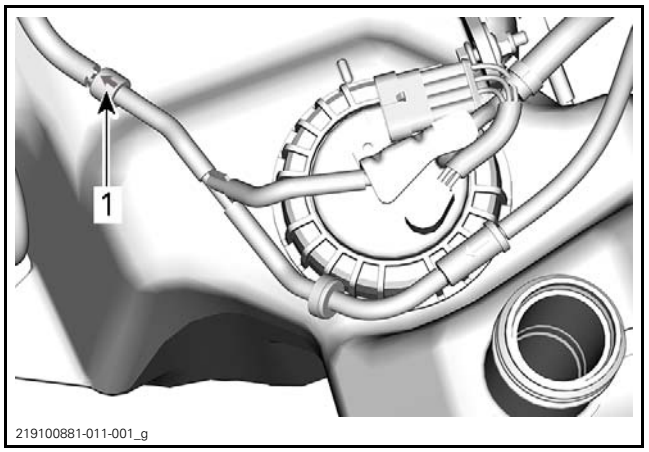
TYPICAL
1. *Inlet check valve*
2. *Fuel pump vent inlet fitting*
3. *Install small hose pincher here*

2. Set vacuum/pressure pump to **PRESSURE** and activate pump. The **gauge should increase in reading**.
3. Set vacuum/pressure pump to **VACUUM** and activate pump. The gauge on the pump **should not change in reading**.

If the test failed, carry out the following:
- Ensure pressure relief valve is properly installed, refer to *INSTALLING THE PRESSURE RELIEF VALVE* in this subsection.
- Replace pressure relief valve if it fails the test.



TYPICAL
1. Pressure relief valve flow direction arrow

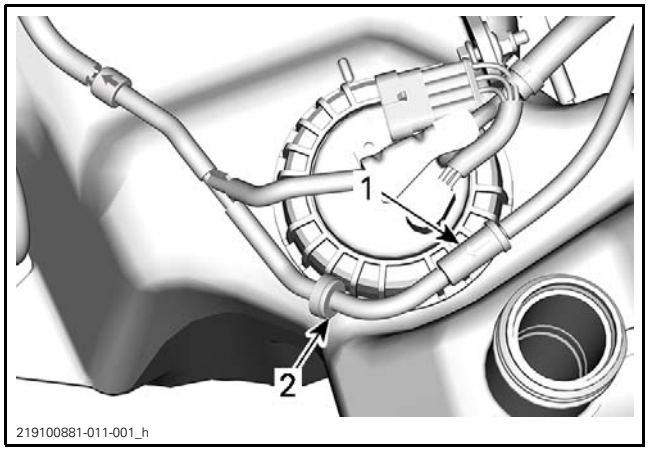


TYPICAL
1. Pressure relief valve flow direction arrow

Installing the Fuel Tank Vent Valve

Installing the Inlet Check Valve

Ensure white portion of inlet check valve is towards the vent breather filter.



TYPICAL
1. Vent breather filter
2. White portion of inlet check valve

Installing the Pressure Relief Valve

Ensure pressure relief valve flow arrow is pointing away from fuel pump vent fitting.

POWER DISTRIBUTION AND GROUNDS

GENERAL

OVERVIEW

The battery is the primary source of power for the electrical system, it is recharged by the magneto.

Some components are permanently connected to the battery (unswitched) while some require a relay or switch to be closed (switched). Refer to the color *WIRING DIAGRAM* on *KNOWLEDGE CENTER*.

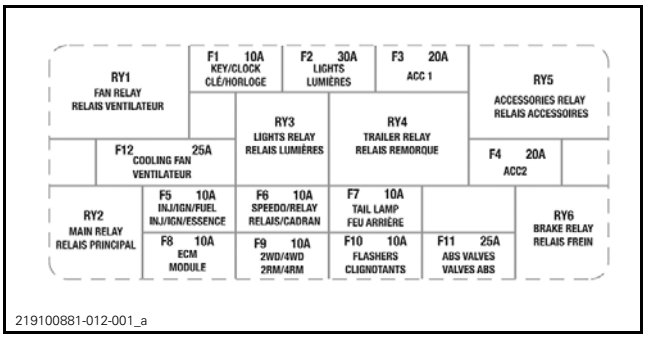
At high RPM if the magneto power is greater than the loads, the rectifier/regulator will regulate power as necessary.

The system uses an external voltage regulator/rectifier.

FUSES

Fuse Box #1

The fuse box #1 is located under the gauge support.

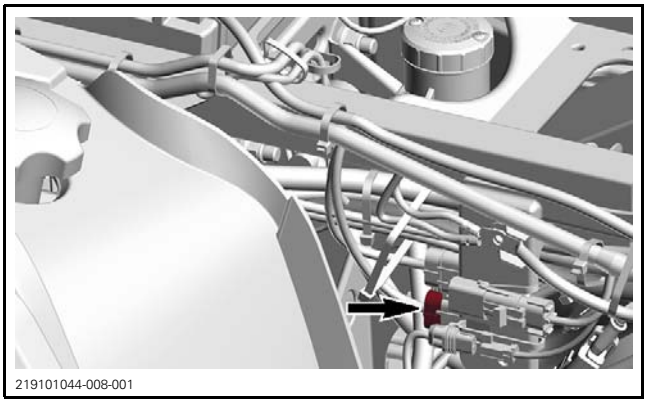


FUSE BOX 1 DECAL

F1	Start switch/Clock	10 A
F2	Lights	30 A
F3	Acc1	20 A
F4	Acc2	20 A
F5	Ignition coils/Injectors/Fuel pump	10 A
F6	DPS/Cluster/Relays	10 A
F7	Brake lights/Tail lights	10 A
F8	DESS key/ECM	10 A
F9	2WD/4WD	10 A
F10	Flashers	10 A
F11	ABS Valves	25 A
F12	Cooling Fan	25 A

Fuse Box #2

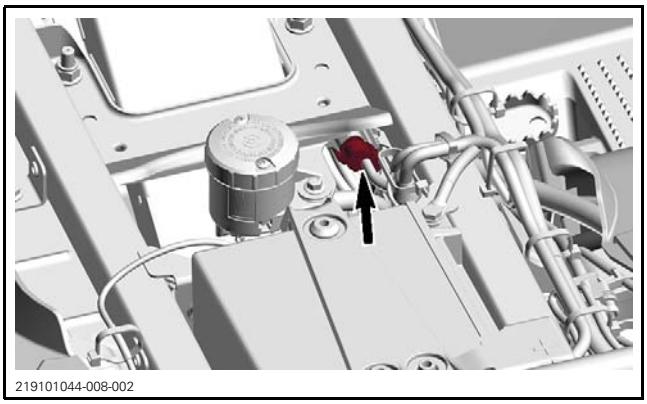
DPS (dynamic power steering)	40 A



219101044-008-001

Fuse Box #3

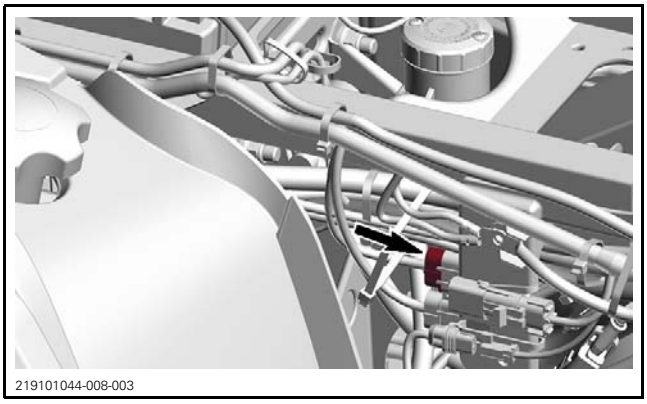
ABS pump	40 A



219101044-008-002

Fuse Box #4

Battery/Voltage regulator	40 A



219101044-008-003

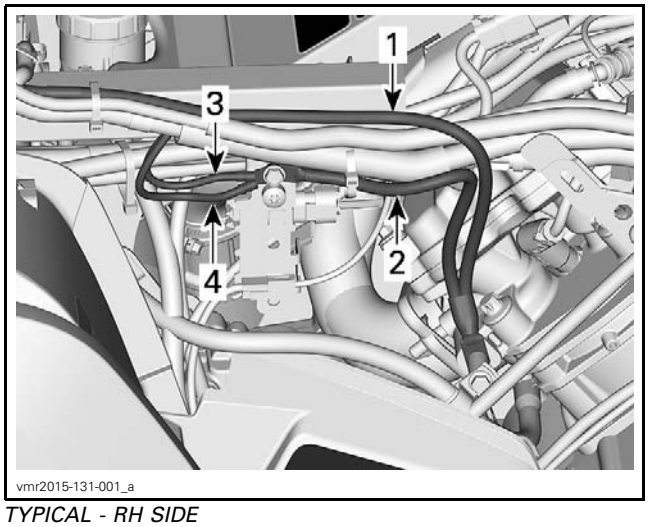
RELAYS

The relays are located in the fuse box #1.

RELAY IDENTIFICATION		RELAY STATE (ON)	RELAY STATE (OFF)
RY1	Cooling fan	See *COOLING SYSTEM*	
RY2	Main	When ignition key is turned ON AND Run/Stop switch is set to RUN	Approximately 30 seconds after ignition key is turned OFF
RY3	Lights	When ignition key is turned ON AND Run/Stop switch is set to RUN	When ignition key is turned OFF OR When engine speed is less than 1000 RPM for at least 50 minutes
RY4	Trailer Flasher Relay	When a trailer is plugged	When there is no trailer plugged
RY5	Accessories	When ignition key is turned ON AND Run/Stop switch is set to RUN	When ignition key is turned OFF OR When engine speed is less than 1000 RPM for at least 50 minutes
RY6	Brake	See *BRAKES*	

GROUNDS

All grounds are grouped at the same location on RH side of frame.



TYPICAL - RH SIDE
1. *Battery ground*
2. *Engine ground*
3. *DPS ground*
4. *Wiring harness ground*

WIRING HARNESS AND CONNECTORS

SERVICE TOOLS

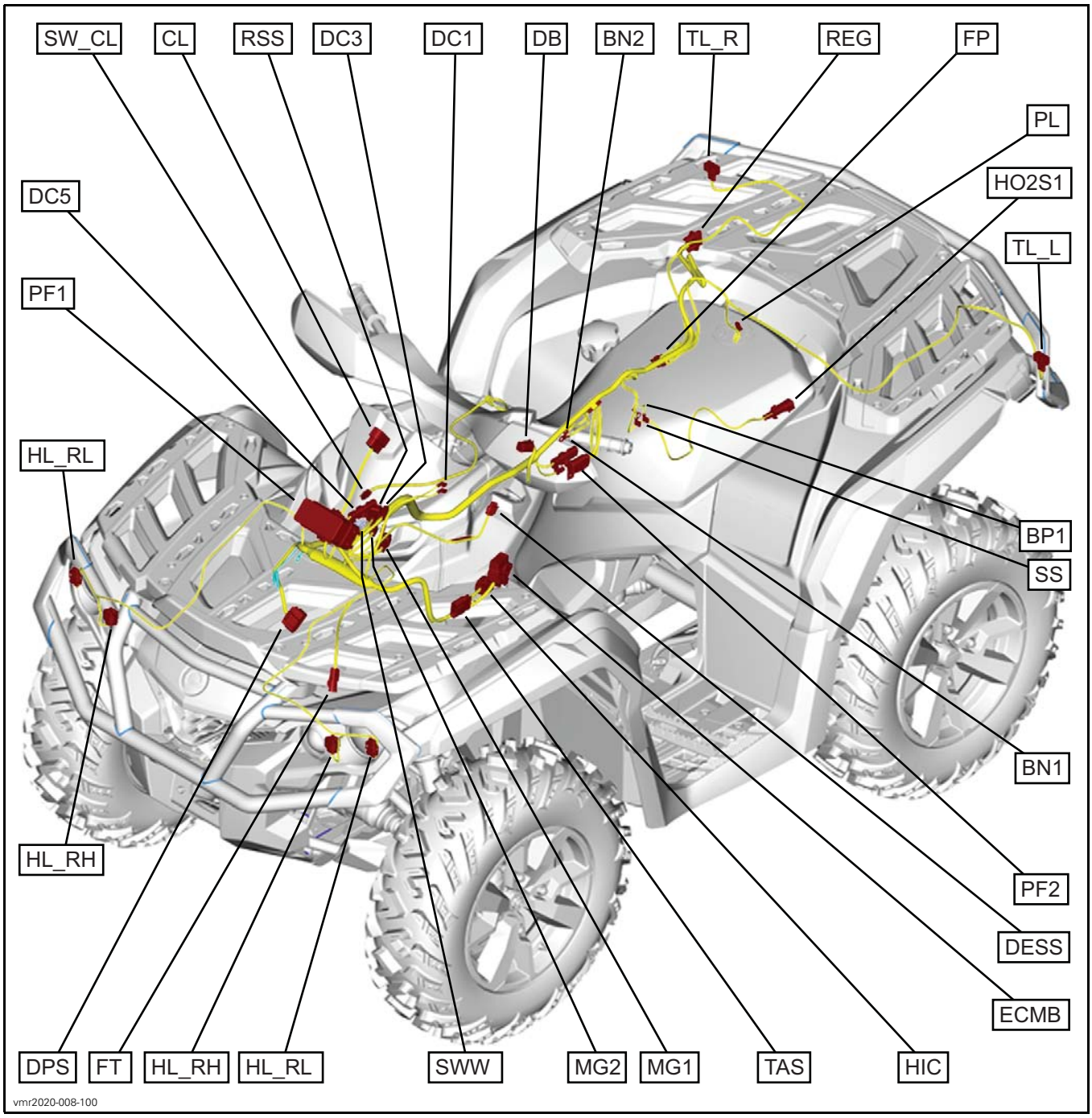
Description	Part Number	Page
ECM ADAPTER TOOL	529 036 166	11
ECM TERMINAL REMOVER 2.25	529 036 175	12
ECM TERMINAL REMOVER 3.36	529 036 174	12

GENERAL

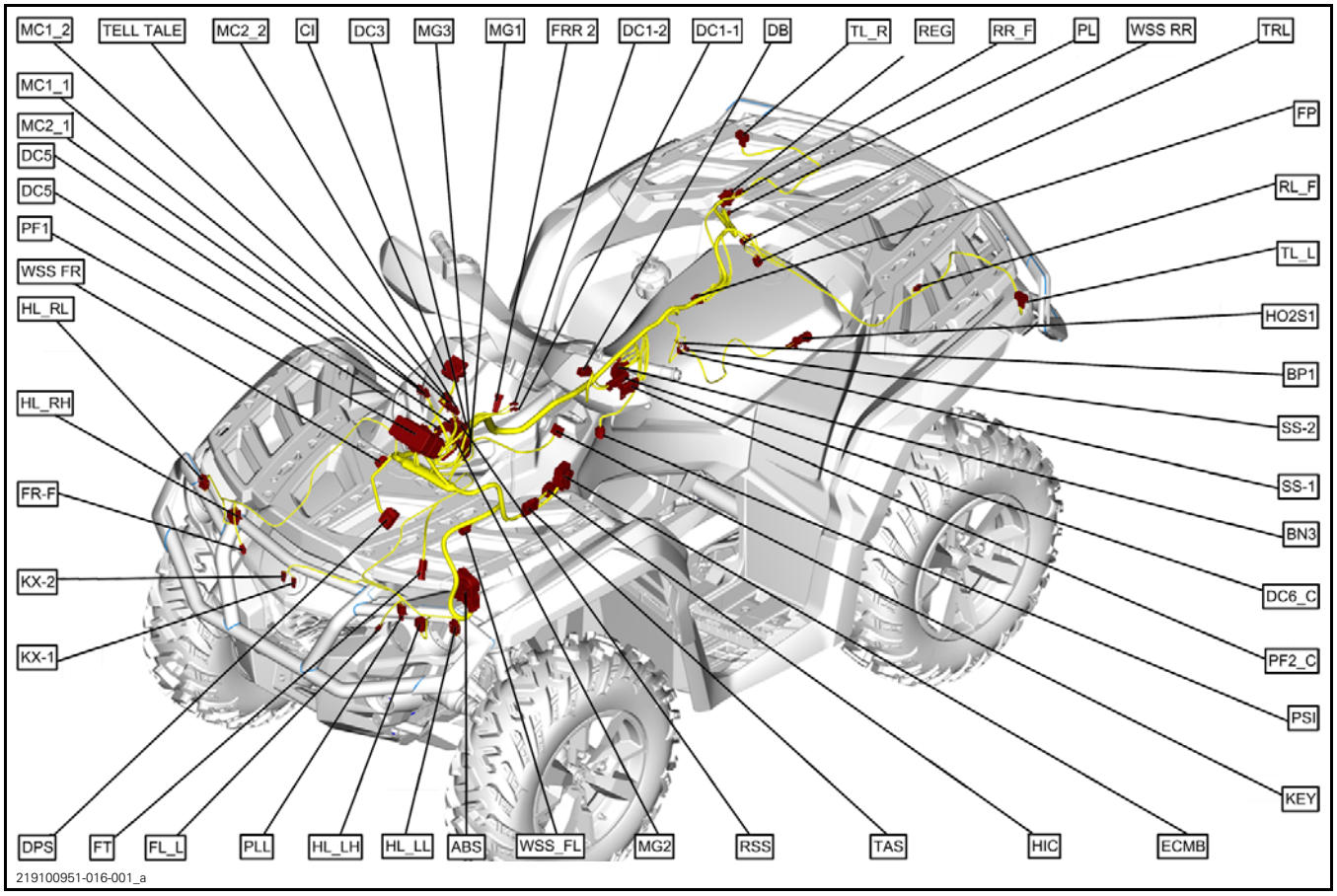
The illustrations in this subsection are typical. Several variants of the connector types, such as different number of pin cavities, are used on the vehicle.

MAIN HARNESS

Main Harness (Except T Category)

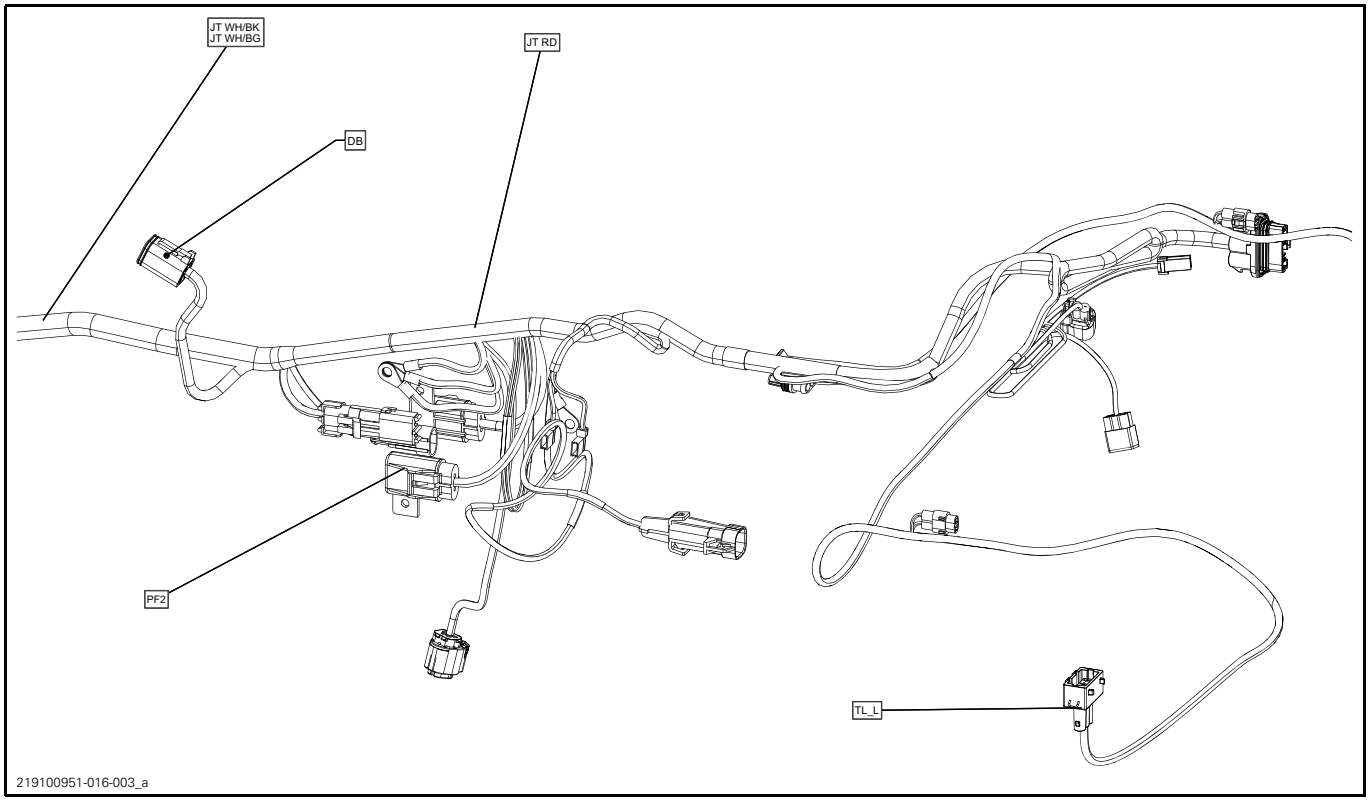


Main Harness (T Category)

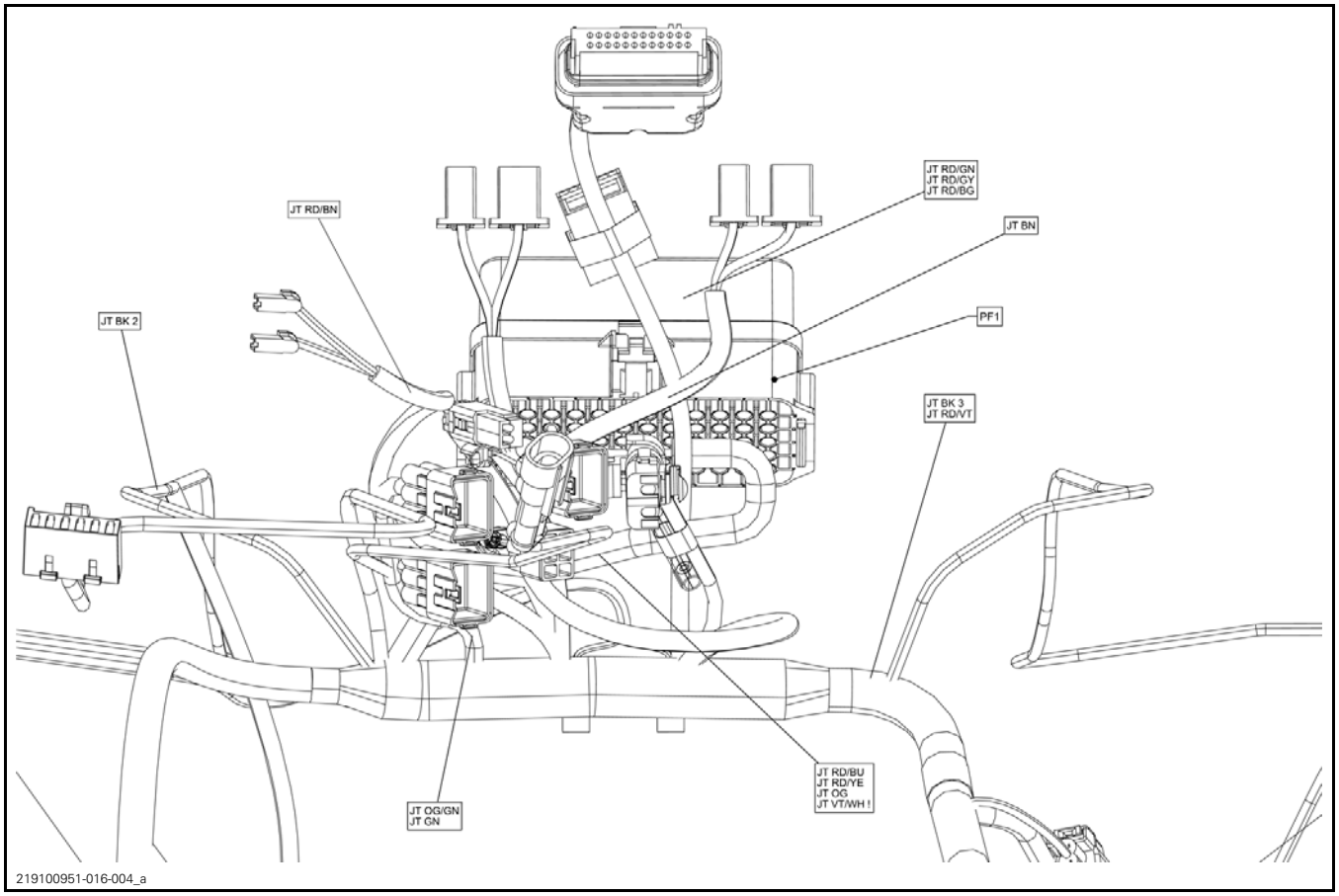


MAIN HARNESS SPLICE LOCATION

Main Harness (Rear Part)

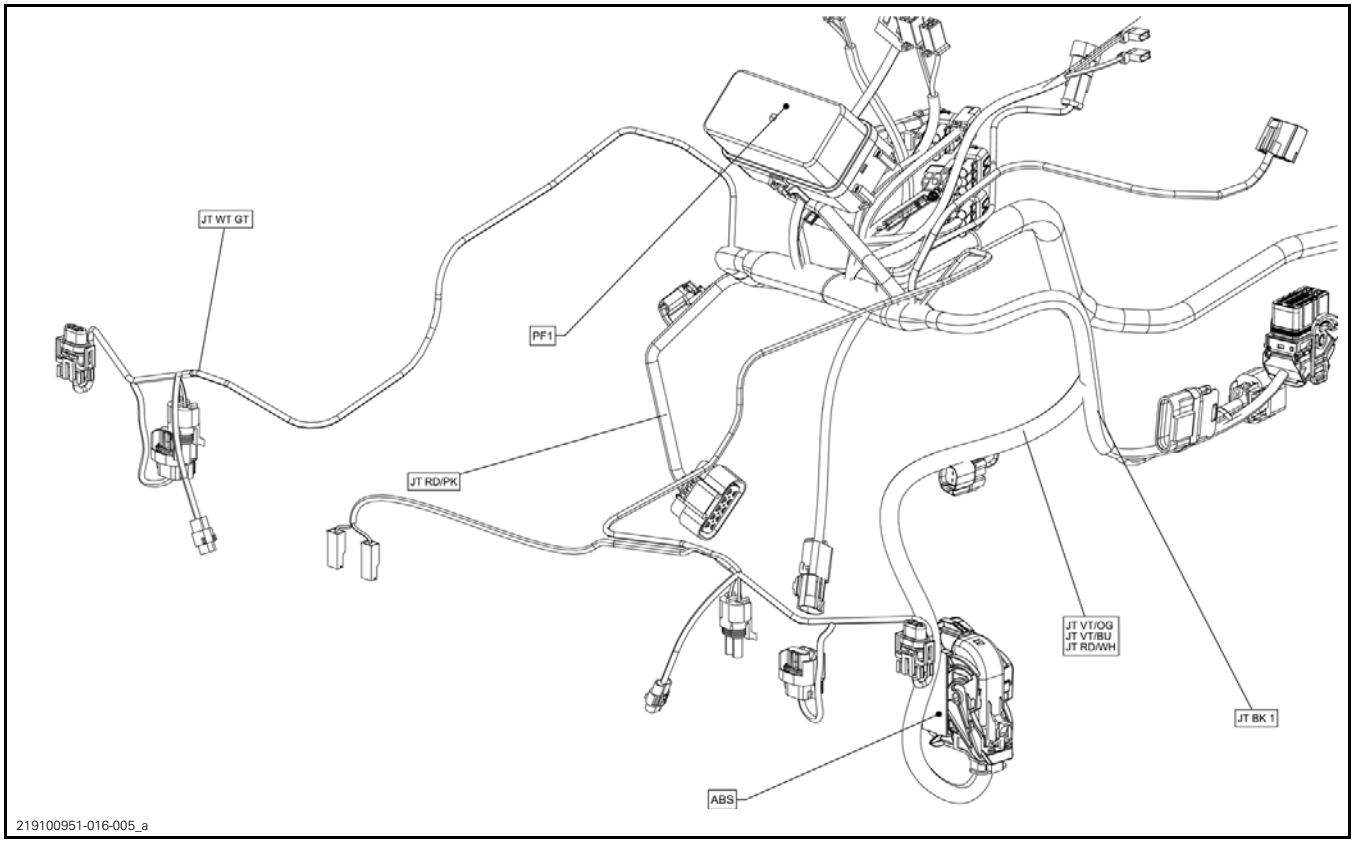


Main Harness (Front Part 1/2)



TYPICAL

Main Harness (Front Part 2/2)



CONNECTOR ABBREVIATION DESCRIPTION

ABBREVIATION	DESCRIPTION
ABS	Anti-lock braking system (If equipped)
BN	Ground terminal
BP	Positive terminal
CL	Cluster
DB	Diagnostic connector
DC	Accessory outlet
DPS	Dynamic power steering
ECMB	Engine Control Module (Connector B)
FL	Fuse link
FL F	Front Left Flasher
FP	Fuel pump
FR F	Front Right Flasher
FRR1	Rear brake light switch
FRR2	Brake lever switch (If ABS equipped)

ABBREVIATION	DESCRIPTION
FT	Cooling fan
HIC	Harness interconnect
H02S1	Oxygen sensor 1 (if equipped)
HL LL	LH LO beam headlight
HL LH	LH HI beam headlight
HL RL	RH LO beam headlight
HL RH	RH HI beam headlight
KEY	Ignition switch
KX	Horn
MC1	Vehicle Flasher Module
MC2	Trailer Flasher Module
MG	LH multifunction switch
PF	Fuse box
PLL	Left position light
PLR	Right position light
PSI	Pressure Sensor (If ABS equipped)
RL_F	Rear Left Flasher

ABBREVIATION	DESCRIPTION
REG	Voltage regulator/rectifier
RR_F	Rear Right Flasher
RSS	Right Steering Switch
SS	Starter solenoid
SW	Winch relay (If winch equipped)
SW_CL	Cluster Switch
SWW	Winch remote switch (If winch equipped)
TAS	Throttle Accelerator sensor
TELLTALE	Telltale
TL_L	Rear LH light
TL_R	Rear RH light
TRL	Trailer harness
WSS	Wheel Speed Sensor (If ABS equipped)

PROCEDURES

DEUTSCH CONNECTORS

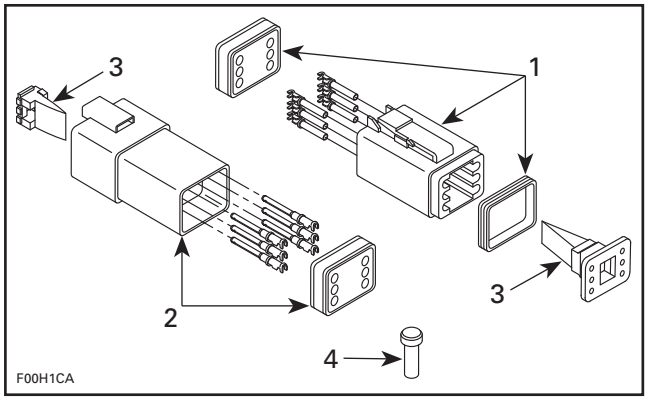
Deutsch Connector Application

A variety of Deutsch connectors are used on various systems:

– Diagnostic connector
– Vehicle speed sensor (VSS) connector.

The following procedures may be used on each as they are similar in construction.

Disassembling and Reassembling Deutsch Connector



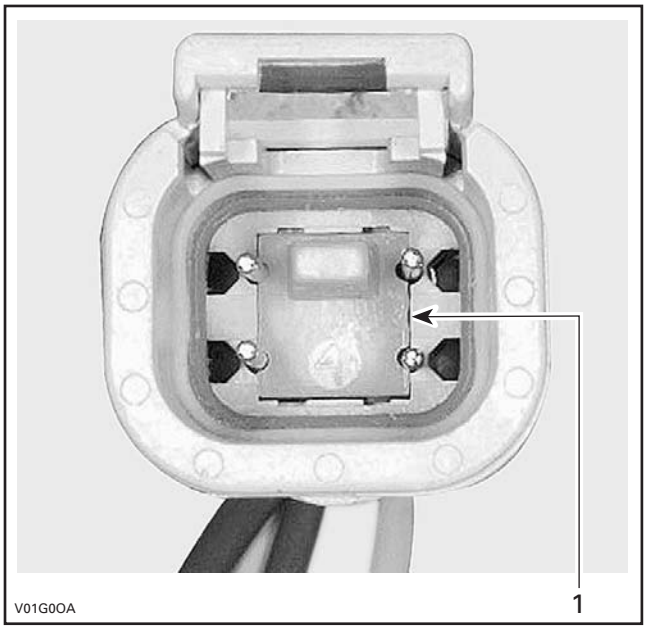
TYPICAL —DEUTSCH CONNECTOR
1. *Male connector*
2. *Female connector*
3. *Secondary lock*
4. *Sealing cap*

NOTICE Do not apply dielectric grease on terminal inside connector.

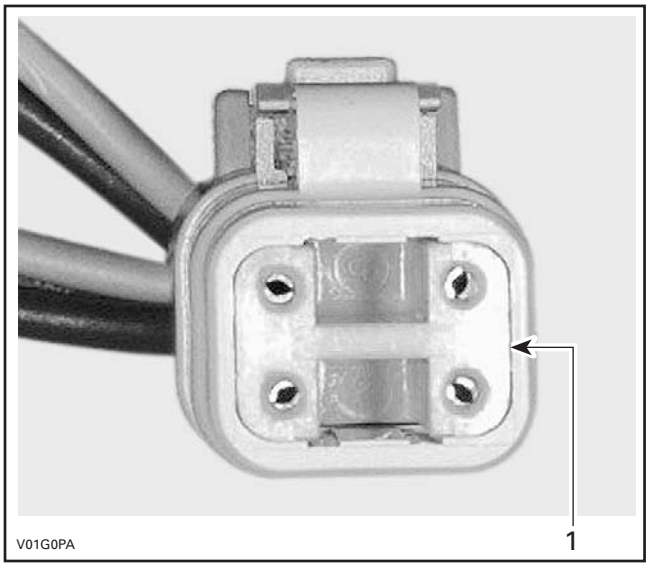
Removing Terminal

To remove terminals from connector, proceed as follows:

1. Using long nose pliers, pull out the secondary plastic lock from between the terminals.



TYPICAL — FEMALE CONNECTOR
1. *Female lock*

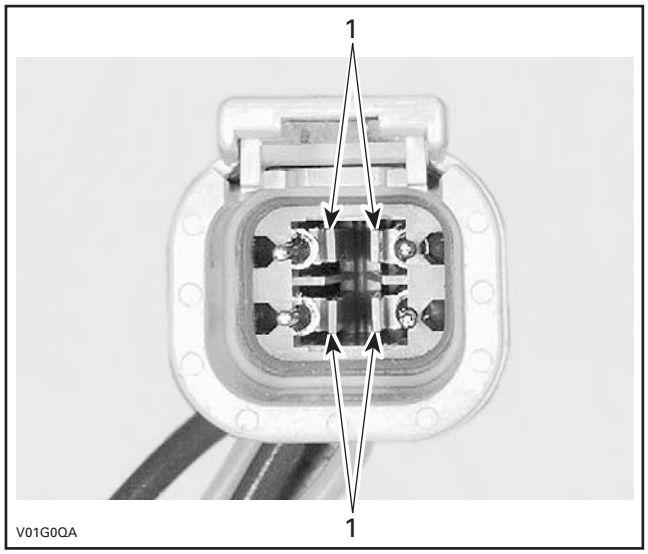


TYPICAL — MALE CONNECTOR
1. *Male lock*

NOTE: Before pin extraction, push wire forward to relieve pressure on retaining tab.

2. Insert a 4.8 mm (.189 in) wide screwdriver blade inside the front of the terminal cavity.

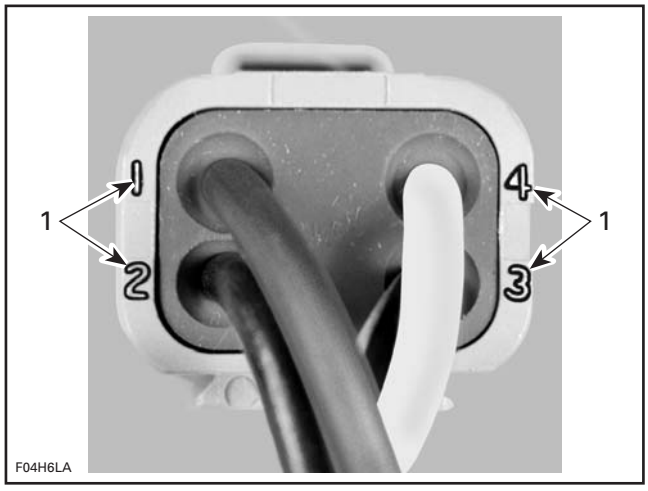
3. Pry the retaining tab away from the terminal while gently pulling the wire and terminal out of the back of the connector.



TYPICAL — FEMALE CONNECTOR
1. Retaining tabs

Inserting Terminal

1. For insertion of a terminal, ensure the secondary plastic lock is removed.
2. Insert terminal through the back of the connector in the appropriate position, and push it in as far as it will go. You should feel or hear the terminal lock engage.
3. Pull back on the terminal wire to be sure the retaining tabs are holding the terminal.
4. After all required terminals have been inserted, the lock must be installed.



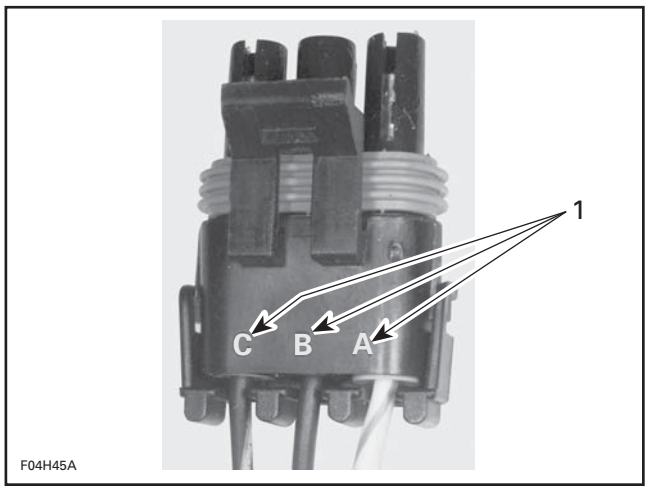
TYPICAL — CONNECTOR PIN-OUT
1. Terminal position identification numbers

PACKARD CONNECTORS

Packard Connector Application

Packard connectors are used to connect:
– Electrical harnesses
– Gauges.

3-Pin Packard Connector



VIEW OF A 3-PIN PACKARD CONNECTOR
1. Identification letters

NOTE: This type of connector also comes in other pin configurations.

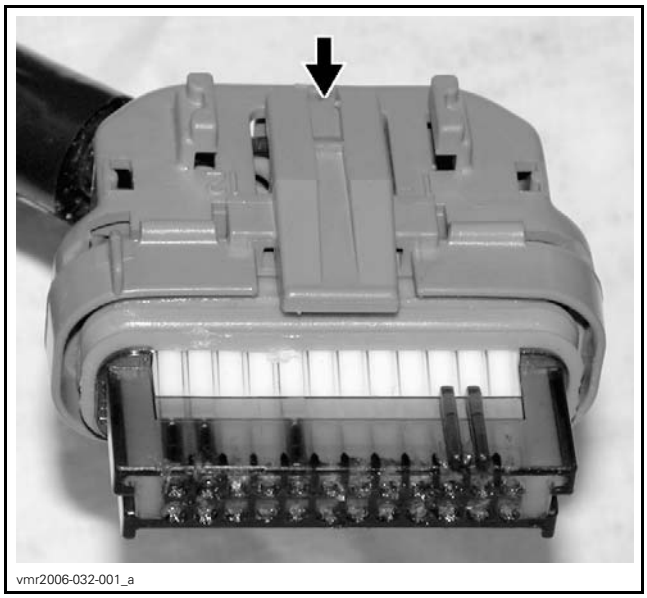
Use a terminal remover to remove a terminal from a 3-pin Packard connector.

⚠ WARNING

Ensure all terminals are properly crimped on wires and connectors are properly fastened.

PACKARD CONNECTOR (MULTIFUNCTION GAUGE)

Firmly push down tab and hold to unlock connector while pulling it out.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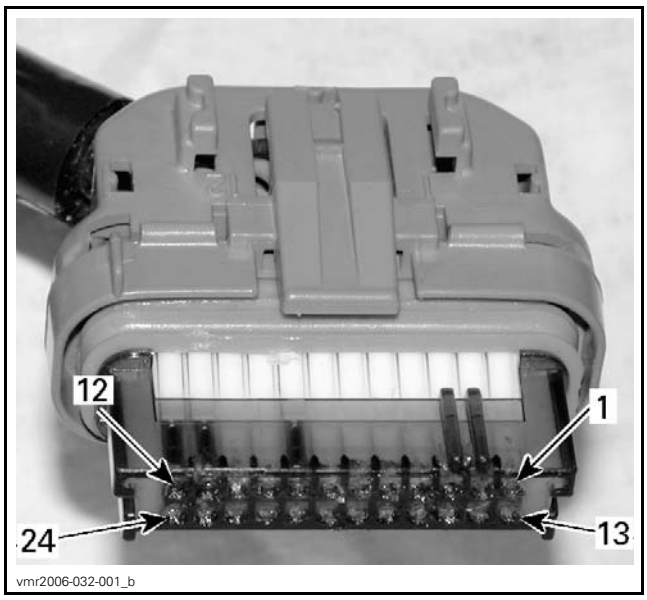

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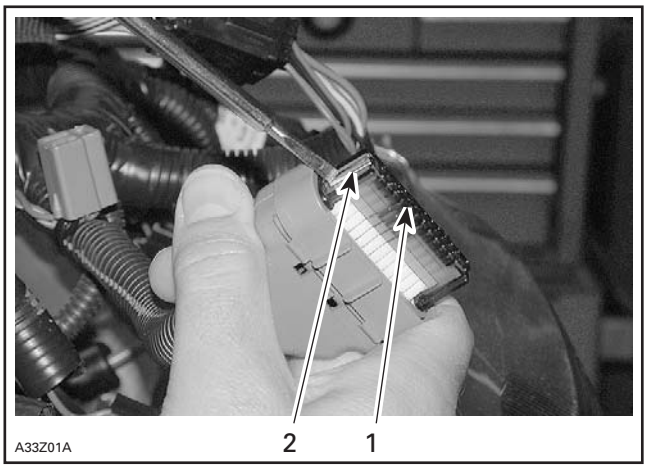
CONNECTOR PINOUT

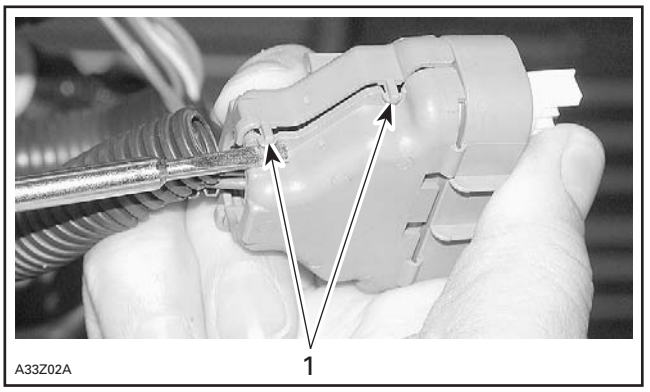
Push on both tabs to remove retainer.



A33Z01A

TYPICAL
1. Retainer
2. Tab (one on each side)

Open housing by lifting 4 tabs.



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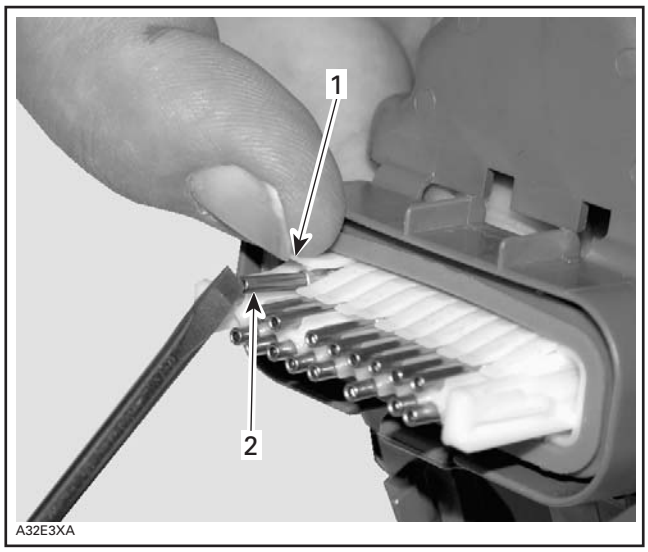
TYPICAL
1. Tabs (2 on each side)

Lift the top plastic lock of the female terminal to be removed and hold in position. Lift the female terminal to unlock from the housing and push out of housing.



TYPICAL
1. Lift and hold plastic lock
2. Lift to unlock and push out

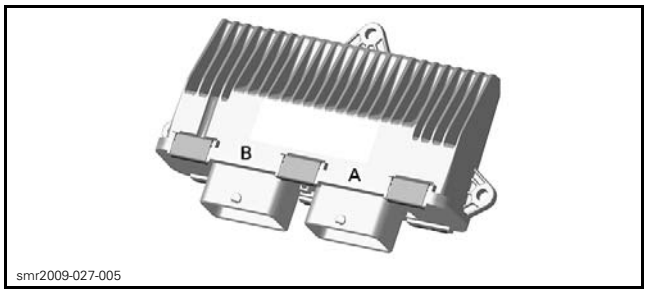
MOLEX CONNECTOR

There are 2 connectors on the ECM.

The engine wiring harness connector is connected to ECM connector "A". The vehicle wiring harness connector is connected to ECM connector "B".

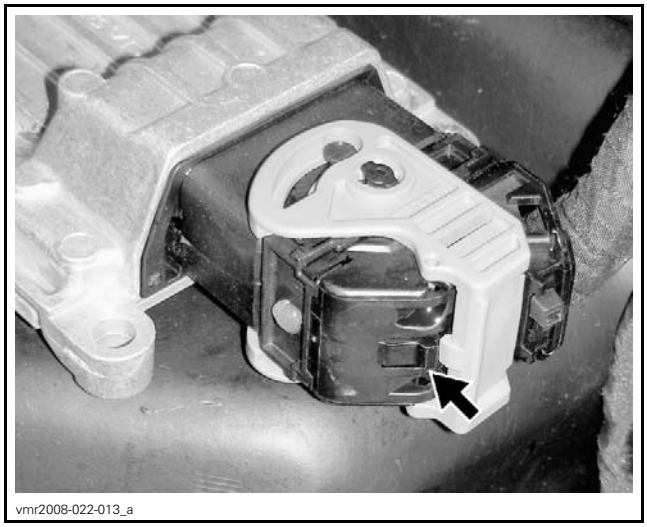
Each ECM connector has 48 pins however, connectors "A" and "B" are not interchangeable due to their specific keyways.

NOTE: If you need to remove the connector, be sure to not disconnect fuel quick-connector at ECM. If you need to remove the ECM or fuel quick connector, insure the ECM electrical connectors are securely in place and avoid fuel intrusion into connector/seal.

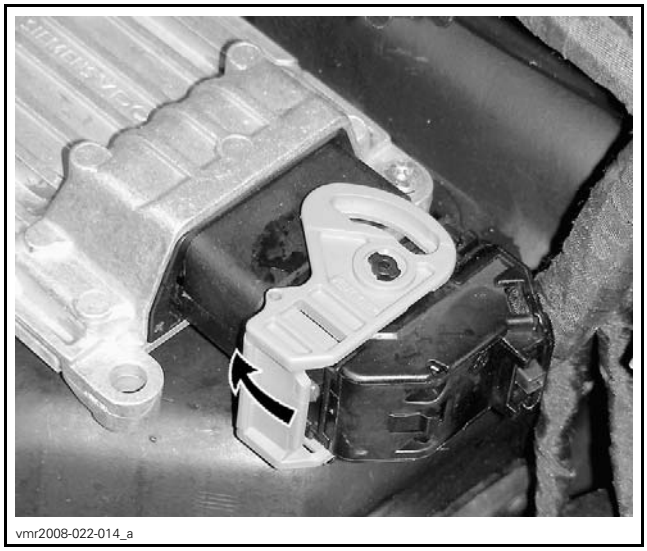


Removing Molex Connector

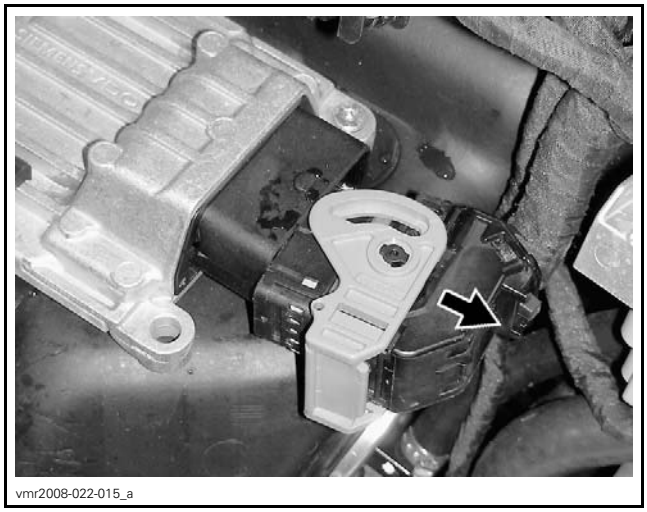
Push and hold the locking tab.



Rotate connector lock until it stops.

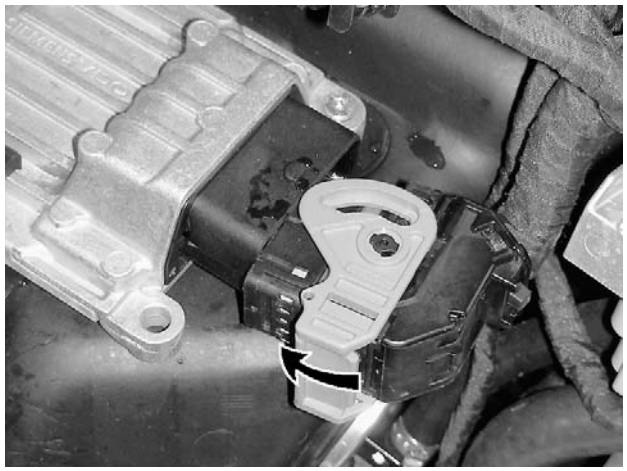


Pull out connector.



Installing Molex Connector

Fully open connector lock.



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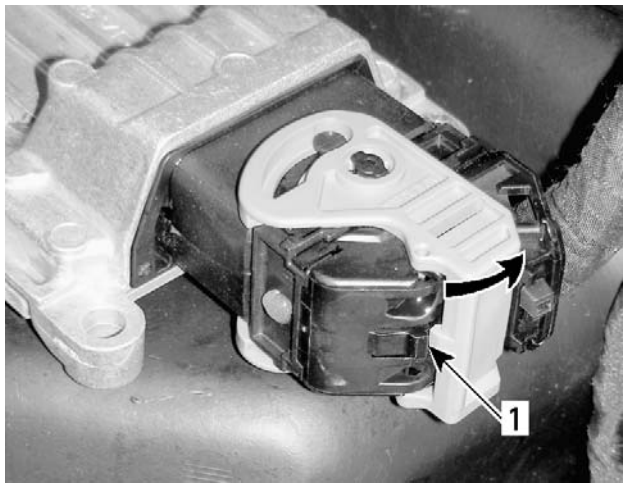
Install connector to ECM.

Rotate connector lock until it snaps locked.



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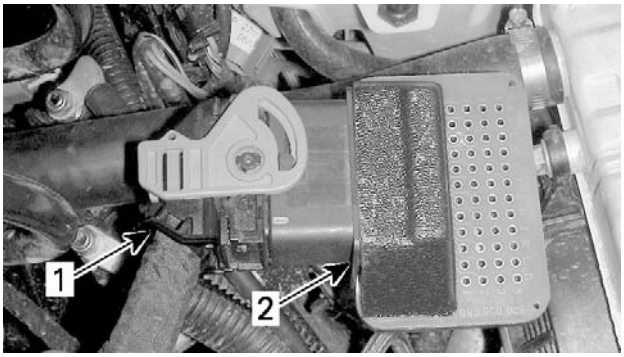
1. Locked here

Probing Molex Connector

The most recommended and safest method to probe ECM connector terminals is to use the ECM adapter tool. This tool will prevent deforming or enlarging terminals which would lead to bad ECM terminal contact creating intermittent or permanent problems.

REQUIRED TOOLS	
ECM ADAPTER TOOL (P/N 529 036 166)	

Disconnect the ECM connector and reconnect on the tool connector. Probe required terminals directly in the tool holes.



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1. ECM connector (harness side)
2. ECM adapter

NOTICE **Never probe directly on ECM harness connector. This could change the shape or enlarge the terminals and create intermittent or permanent contact problems.**

Inspecting Molex Connector

Before replacing an ECM, always check electrical connections.

1. Ensure connector locking mechanism is functioning properly.
2. Ensure all wire terminals (pins) are properly locked in the connector.
3. Ensure they are very tight, make good contact with the pins in the ECM.
4. Ensure the pins in the harness connector and the ECM connector are clean, shiny and corrosion-free.
5. Check wiring harness for signs of scoring.

NOTE: A "defective ECM module" could possibly be repaired simply by disconnecting and reconnecting it.

NOTICE **Do not apply any lubricant product to the pins of the ECM connector.**

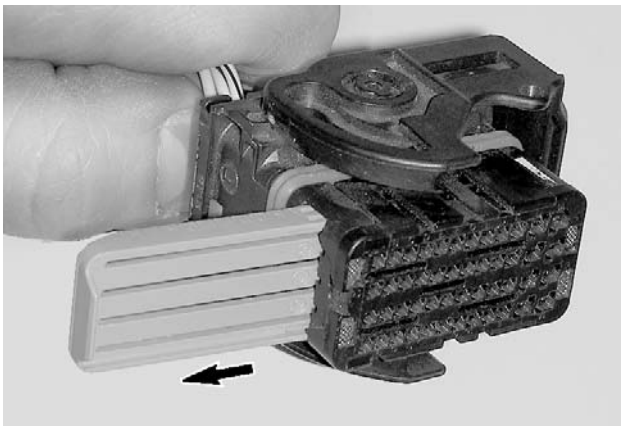
Removing the Molex Connector Terminal (Harness Connector)

To remove a signal terminal from the ECM harness connector, use the 2.25 terminal remover.

To remove a power terminal, use the 3.36 terminal remover.

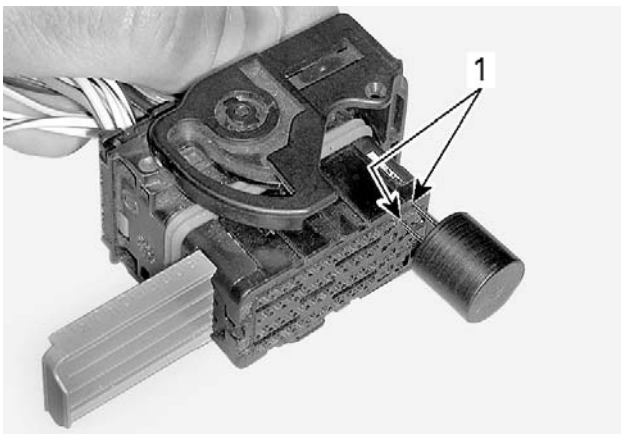
REQUIRED TOOLS	
ECM TERMINAL REMOVER 2.25 (P/N 529 036 175)	
ECM TERMINAL REMOVER 3.36 (P/N 529 036 174)	

1. Remove rear protector from connector.
2. Pull out the connector lock.



smr2009-045-025_a

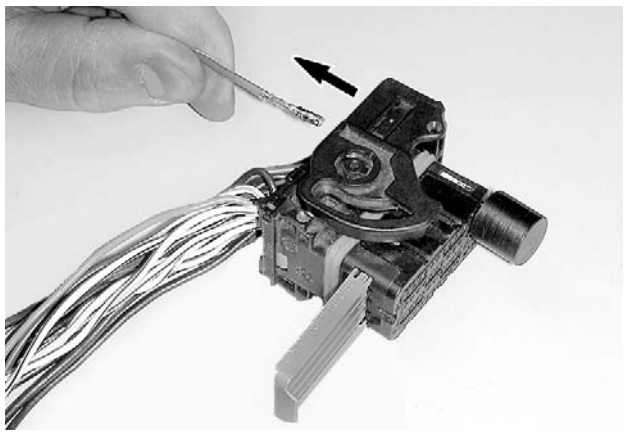
3. Insert tool to unlock terminal.



smr2009-045-026_a

1. Unlock here

4. Gently pull on the wire to extract the terminal out the back of the connector.



smr2009-045-027_a

NOTICE Before installing wire terminals in the connector, ensure all terminals are properly crimped on wires. After installation of wire terminals in the connectors, ensure they are properly locked by gently pulling on them as if to extract them.

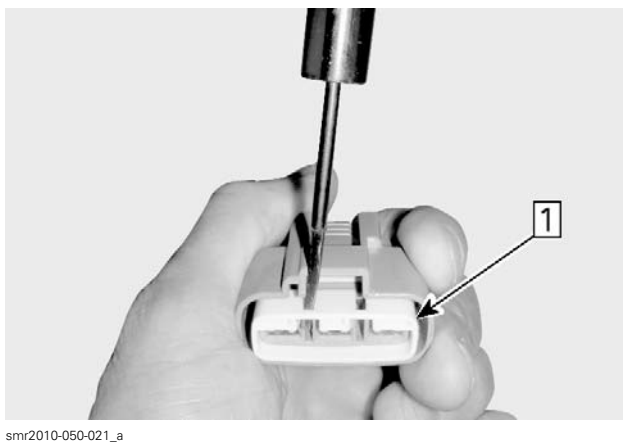
FURUKAWA CONNECTOR

Furukawa Connector Application

Voltage regulator/rectifier.

Removing the Terminal

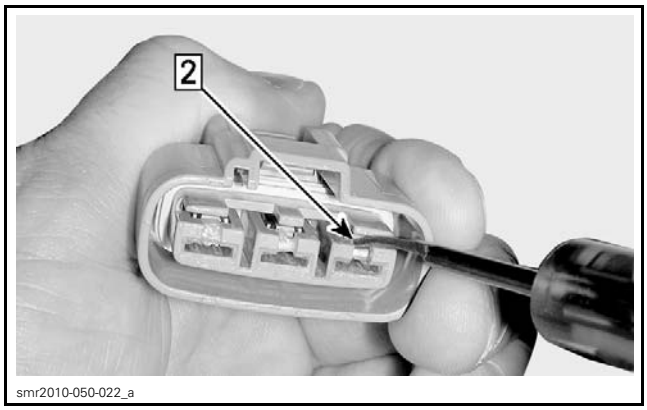
1. Remove the secondary lock (plastic insert).



smr2010-050-021_a

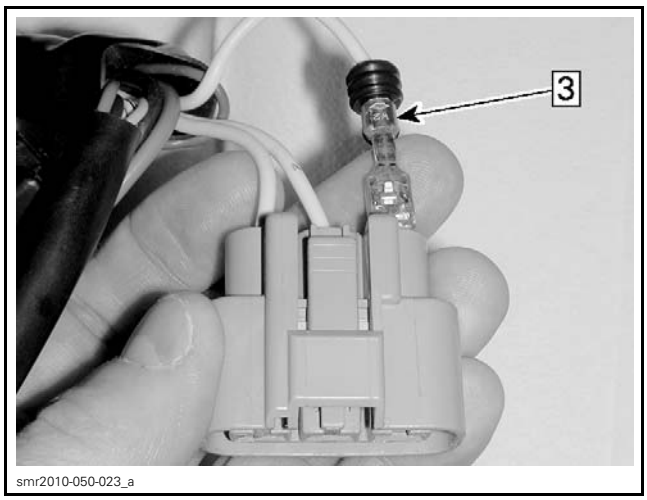
Step 1: Remove the secondary lock

2. Carefully insert a terminal extractor between the lock and the pin to release the pin.



Step 2: Insert GM terminal extractor tool

3. Gently pull on the wire to extract the pin out the back of the connector.



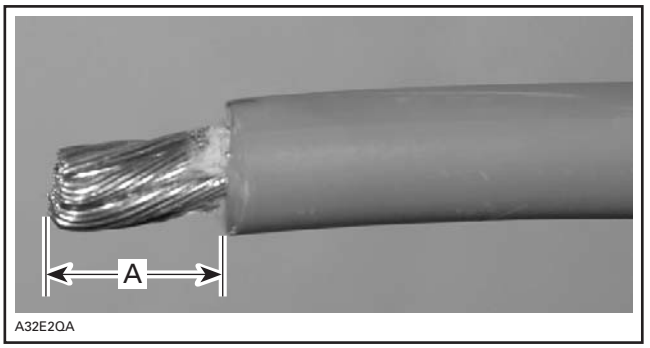
Step 3: Pull wire to extract pin

NOTICE Before installing terminals in the connectors, ensure all terminals are properly crimped on the wires. After installation of the wire terminals in the connectors, ensure they are properly locked by gently pushing on them as if to extract them.

BATTERY AND STARTER CABLE TERMINALS

Crimping Cable

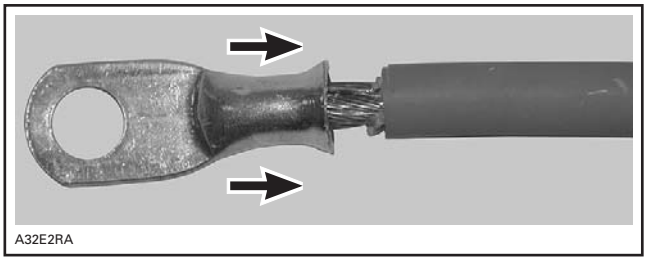
Carefully strip the wire approximately to 13 mm (1/2 in) in length, using a wire stripping tool or sharp blade/knife.



A. 10 mm (3/8 in)

NOTE: Make sure not to cut wire strands while stripping the wire.

Install the appropriate terminal on the wire according to the requirement. Refer to appropriate *PARTS CATALOG*.

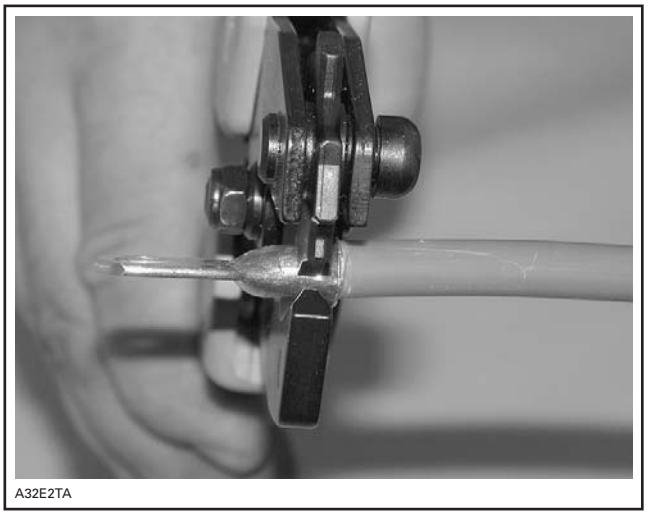


INSTALLATION OF TERMINAL

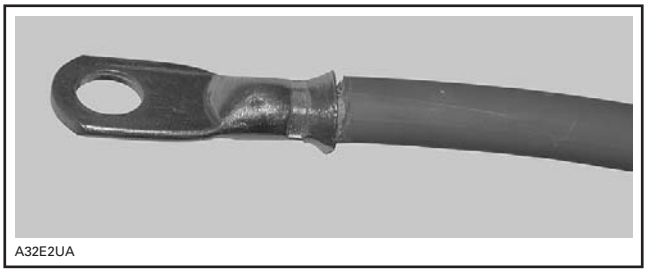
Follow the instructions provided with the crimping tool to select the proper position of the tool.

NOTE: Different wires require different crimping pliers settings.

After positioning the crimping pliers, crimp the terminal already installed on wire.



CRIMPING OF WIRE


A32E2UA

PROPERLY CRIMPED WIRE

To verify, if the wire is properly crimped, apply some pulling force on wire and the terminal at the same time from both directions.

NOTICE Never weld the wire to the terminal. Welding can change the property of the wire and it can become brittle and break.

Install the protective heat shrink rubber tube on the terminal. Heat the heat shrink rubber tube using the heat gun so that it grasps the wire and the terminal.

NOTICE Make sure that the protective heat shrink rubber tube has been properly installed and no part of wire is exposed.

SPLICES REPAIR PROCEDURE

Make sure to perform the usual tests described in *ELECTRICAL SYSTEM* sections before investigating the harness splices.

If an electrical issue can not be found with the usual tests, locate the main harness splice that is involved in the faulty circuit and repair it as per the *SPLICES REPAIR PROCEDURE*.

To repair a splice, we recommend the use of a tin solder meeting the followings requirements or an equivalent.

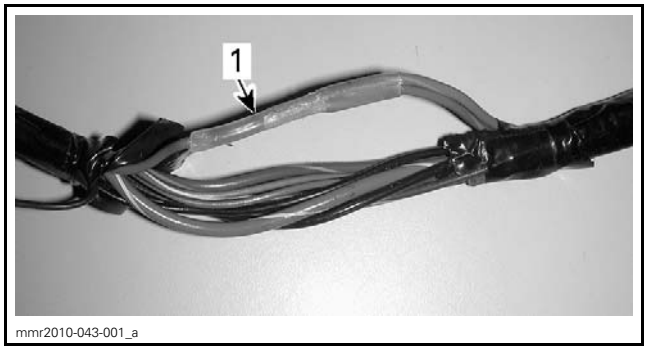
TIN SOLDER REQUIREMENTS
SN 60
PB 40
DIA 0.062
FLUX RA 2%

CASE 1: Wire Detached from Splice

⚠ WARNING

Repairs described in this section should never be performed on harness sections that can be exposed to water.

1. Locate splice. Refer to splices location diagrams.
2. Remove wires from protector tube.
3. Locate the shrink tube protecting the defective splice.



mmr2010-043-001_a

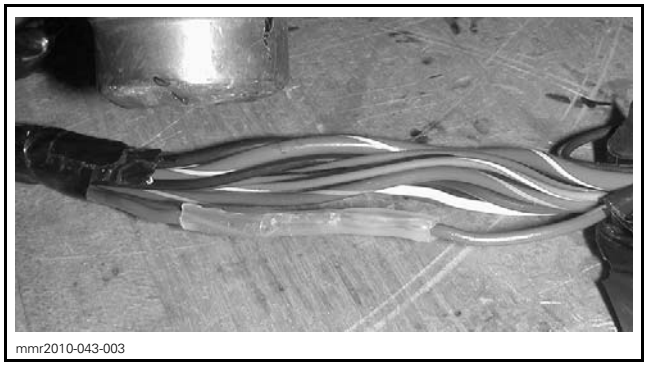
1. Shrink tube

4. Remove the shrink tube.
   4.1 Using a blade, cut the shrink tube.

   NOTICE Be careful with the blade to avoid cutting wires insulation.

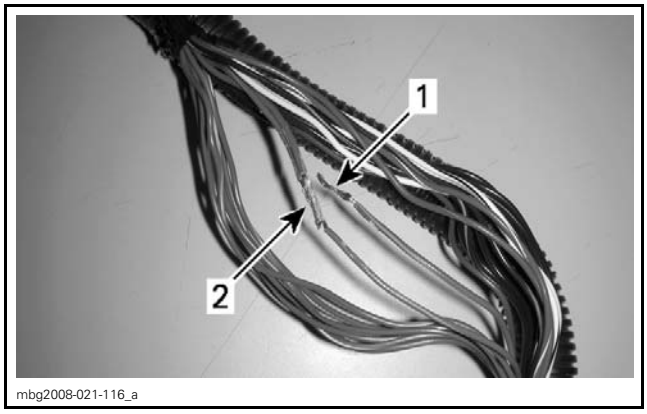
mmr2010-043-002

   4.2 Slightly heat the shrink tube using a heat gun.


mmr2010-043-003

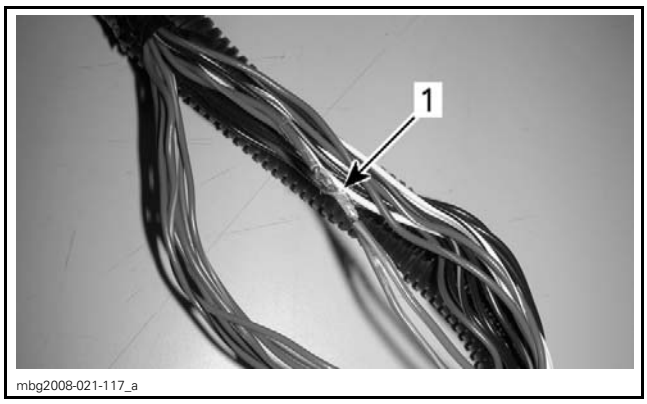
4.3 Remove the shrink tube with long nose pliers.

5. Locate detached wire from splice.



1. Detached wire
2. Splice

6. Twist detached wire around splice.



1. Twisted wire

7. Perform a tin solder on twisted wire.
8. Apply electrical tape to cover splice.

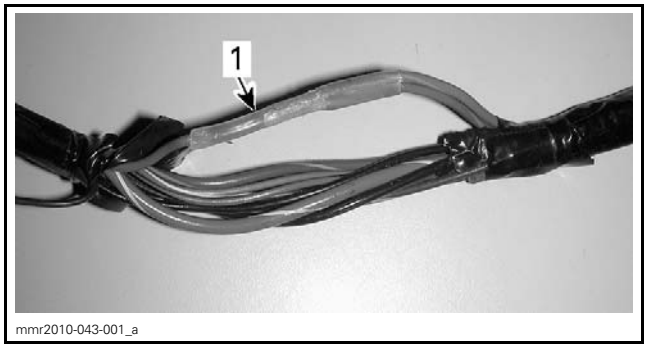
NOTE: Make sure tape overlaps on wire insulation, approximately 13 mm (1/2 in) each side.

9. Reinstall wires into protector tube.

CASE 2: Wire Broken from Splice

NOTICE **Repairs described in this section should never be performed on harness sections that can be exposed to water.**

1. Locate splice. Refer to splices location diagrams.
2. Remove wires from protector tube.
3. Locate the shrink tube protecting the defective splice.



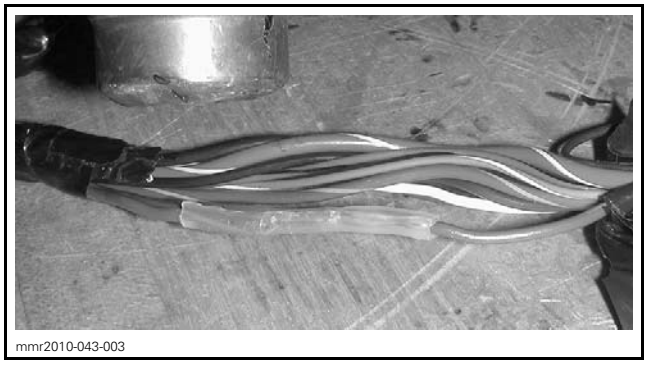
1. Shrink tube

4. Remove the shrink tube.

4.1 Using a blade, cut the shrink tube.

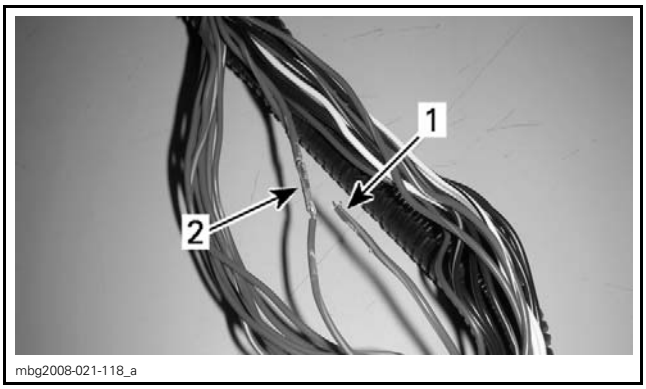
NOTICE **Be careful with the blade to avoid cutting wires insulation.**

4.2 Slightly heat the shrink tube using a heat gun.



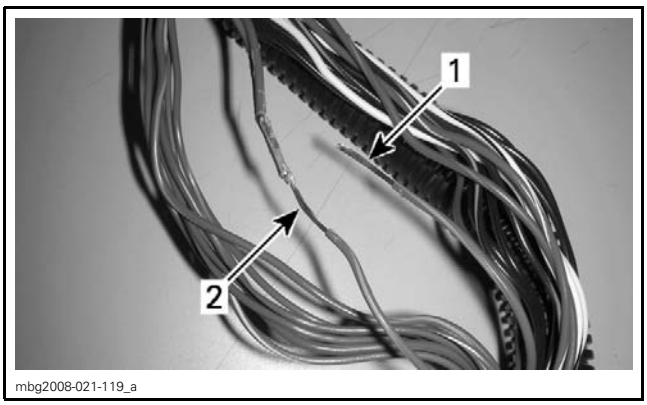
4.3 Remove the shrink tube with long nose pliers.

5. Locate broken wire from splice.



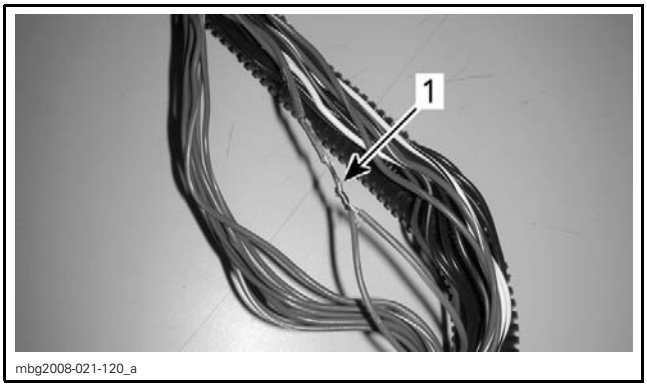
1. Broken wire
2. Splice

6. Strip wire insulation at the end of broken wire.
7. Strip wire insulation below the splice.



1. Broken wire stripped
2. Splice wire stripped

8. Twist wire around stripped wire.



1. Twisted wire

9. Perform a tin solder on twisted wire.
10. Apply electrical tape to cover splice.

NOTE: Make sure tape overlaps on wire insulation, approximately 13 mm (1/2 in) each side.

11. Reinstall wires into protector tube.

NOTE: Always perform a solder on a bigger wire (lower gage).

IGNITION SYSTEM

SERVICE TOOLS

Description	Part Number	Page
ECM ADAPTER TOOL	529 036 166	2, 4
FLUKE 115 MULTIMETER	529 035 868	3–4

GENERAL

SYSTEM DESCRIPTION

The battery supplies the primary side of ignition coils through the main relay (R2) while the ECM completes the circuit for each cylinder by switching it to ground at the right moment. The ECM can detect an open and short circuit in the primary winding but it does not check the secondary winding.

The Engine Management System (EMS) controls the ignition system. For more information, refer to *ENGINE MANAGEMENT* subsection.

Ignition Timing

Ignition timing is not adjustable.

TROUBLESHOOTING

It is good practice to check for fault codes using the BRP diagnostic software (BUDS2) as a first troubleshooting step. Refer to *DIAGNOSTIC AND FAULT CODES* subsection.

Always refer to the *WIRING DIAGRAM* when troubleshooting an electrical circuit.

Refer to *POWER DISTRIBUTION AND GROUNDS* for fuse and relay information.

Refer to *WIRING HARNESS AND CONNECTORS* for vehicle wiring harness layout and component locations.

Refer to *ENGINE MANAGEMENT SYSTEM (EMS)* for powertrain wiring harness layout and component locations.

DIAGNOSTIC GUIDELINES

The following is provided to help in diagnosing the probable cause of a problem. It is a guideline and should not be assumed to list all possible causes.

ENGINE WILL NOT START (ENGINE TURNS OVER)

1. Fouled or defective spark plug
   - *Replace.*
2. Defective CPS
   - *Check operation of CPS and replace if necessary. Refer to ELECTRONIC FUEL INJECTION (EFI) subsection.*
3. Defective trigger wheel
   - *Inspect trigger wheel. Refer to MAGNETO AND STARTER subsection.*
4. Defective ignition circuit
   - *Check fuse 5 of fuse box 1, ignition coil and wiring condition.*
5. Defective fuel pump
   - *Check fuel pump, refer to FUEL TANK AND FUEL PUMP subsection.*
6. Defective fuel injectors or circuit
   - *Check fuel injectors, refer to ENGINE MANAGEMENT SYSTEM subsection.*

ENGINE HARD TO START

1. Spark plug faulty, fouled or worn out
   - *Check spark plug condition. Replace if necessary.*
2. Low fuel pressure
   - *Test fuel pressure, refer to FUEL TANK AND FUEL PUMP subsection.*

ENGINE MISFIRES, RUNS IRREGULARLY

1. Fouled, defective, worn spark plugs
   - *Check/verify heat range/gap/replace.*
2. Damaged trigger wheel/loose CPS
   - *Inspect trigger wheel. Refer to MAGNETO AND STARTER subsection.*
3. Defective ignition circuit
   - *Check ignition coil, fuse 5, and wiring condition.*
4. Poor engine grounds
   - *Check/clean/repair.*

ENGINE CONTINUALLY BACKFIRES

1. Fouled, defective spark plugs
   - *Clean/replace spark plugs.*

2. Damaged trigger wheel/defective or loose CPS
   - *Inspect trigger wheel and CPS, refer to MAGNETO AND STARTER and ELECTRONIC FUEL INJECTION (EFI) subsections.*

PROCEDURES

IGNITION SWITCH

Ignition Switch Quick Test

Turn ignition switch to ON position.

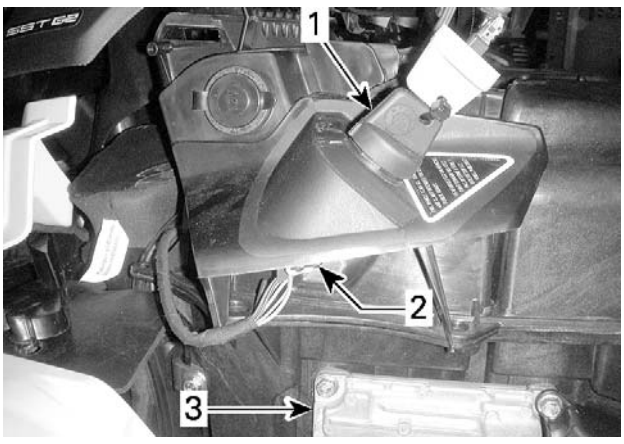
If multifunction gauge turns on (assuming it works), the ignition switch is good.

If multifunction gauge does not turn on, check the following in this order:

– Battery
– Fuse link 1
– Fuse 4, 5 and 8 of fuse box 1
– ECM is properly powered (refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection)
– Ignition switch
– Emergency engine stop switch.

Ignition Switch Access

Refer to *BODY* subsection and remove the LH side panel.

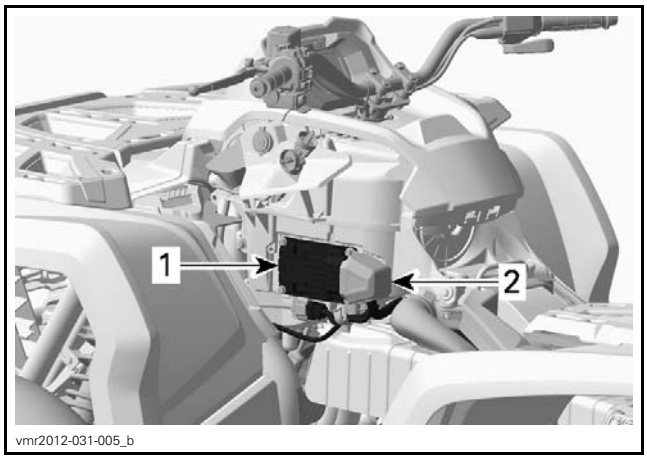


TYPICAL
1. *Ignition key*
2. *Ignition switch connector*
3. *ECM*

EMERGENCY ENGINE STOP SWITCH

Testing the Emergency Engine Stop Switch at ECM

1. Disconnect ECM connector and install it on the ECM adapter tool.



TYPICAL
1. *ECM*
2. *ECM connector cover*

REQUIRED TOOL	
ECM ADAPTER TOOL (P/N 529 036 166)	

2. Remove ignition key switch fuse (F8), refer to *POWER DISTRIBUTION AND GROUNDS* subsection.
3. Turn ignition key to ON position.
4. Test for continuity as per following table.

EMERGENCY ENGINE STOP SWITCH TEST AT ECM			
FUNCTION	FUSE BOX CONTACT	ECM ADAPTER	RESULT
RUN position	5E	A4	Close to 0 Ω
	—	G2 to K3	Open circuit
STOP position	5E	A4	
	—	G2 to K3	Close to 0 Ω

If switch fails the test, refer to *TESTING THE EMERGENCY ENGINE STOP SWITCH AT MULTIFUNCTION SWITCH CONNECTORS*.

Testing the Emergency Engine Stop Switch at Multifunction Switch Connectors

Refer to *WIRING HARNESS AND CONNECTORS* subsection for connector locations.

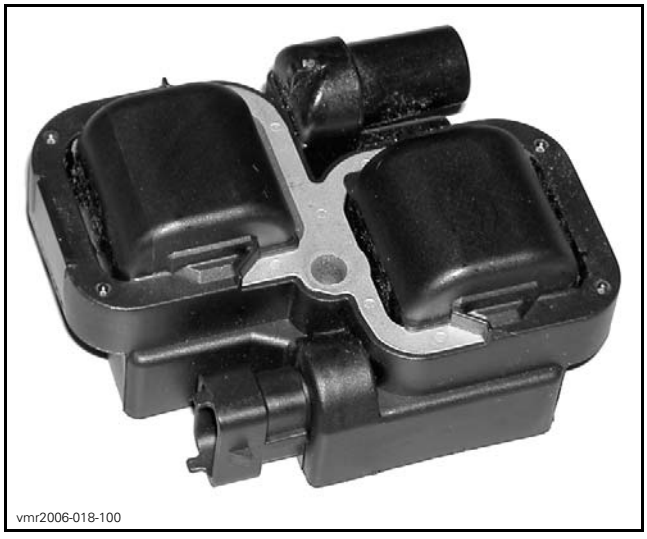
The emergency engine stop switch is wired into the LH multifunction switch connectors (MG1 and MG2).

1. Remove gauge support, refer to *GAUGE* subsection.
2. Disconnect MG1 and MG2 connectors.
3. Test switch continuity as per following table.

EMERGENCY ENGINE STOP SWITCH PIN-OUT		
FUNCTION	PROBE	RESULT
RUN position	MG1-3 to MG2-3	Open circuit
	MG1-1 to MG1-2	Close to 0 Ω
STOP position	MG1-3 to MG2-3	
	MG1-1 to MG1-2	Open circuit

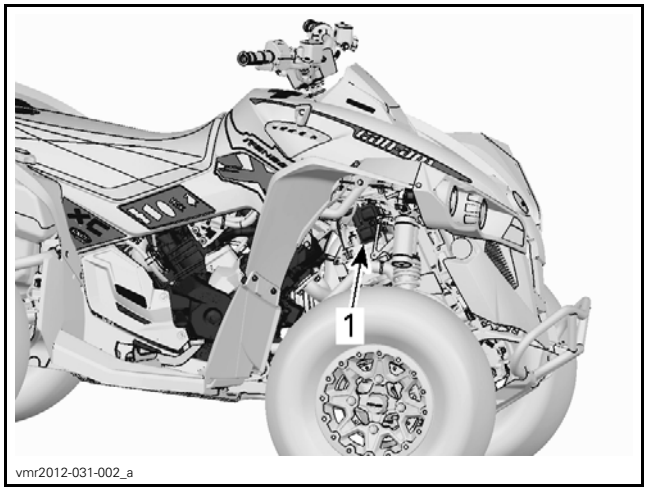
If switch tests good, test continuity of wiring. Refer to *WIRING DIAGRAM*.

IGNITION COIL



Ignition Coil Access

Refer to *BODY* subsection and remove RH inner fender panel(s) for access to the ignition coil.



TYPICAL
1. Ignition coil location

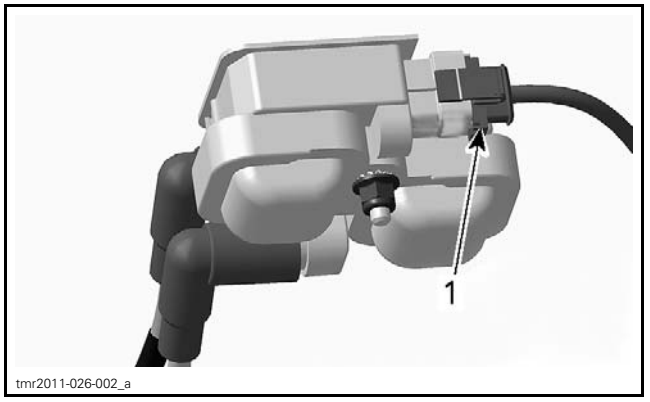
Installing the Ignition Coil

Install a new elastic nut and tighten to the specified torque.

TIGHTENING TORQUE	
Ignition coil retaining bolt	8 N•m ± 1 N•m (71 lbf•**in** ± 9 lbf•**in**)

Testing the Ignition Coil Input Voltage

1. Disconnect the 3-pin connector from the ignition coil. Refer to *IGNITION COIL ACCESS*.



1. Ignition coil connector

2. Set emergency engine stop switch to RUN.
3. Turn ignition switch to ON.
4. Read voltage as per following table.

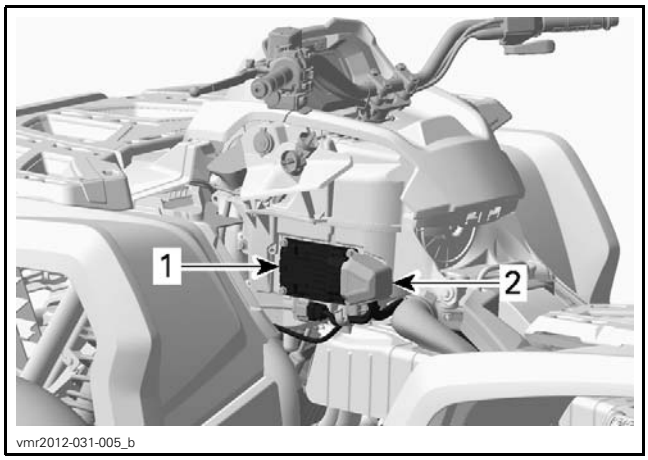
REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

IGNITION COIL INPUT VOLTAGE TEST	
CONNECTORS	VOLTAGE
Pin 2 with battery ground	Battery voltage

If battery voltage is NOT read, check continuity of ignition coil supply circuit. Refer to *WIRING DIAGRAM*.

Testing the Ignition Coil Ground Circuit Continuity

1. Disconnect the ECM connector and connect it to the ECM adapter tool. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.



TYPICAL
1. ECM
2. ECM connector cover

REQUIRED TOOLS	
ECM ADAPTER TOOL (P/N 529 036 166)	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Check wiring continuity as per following table.

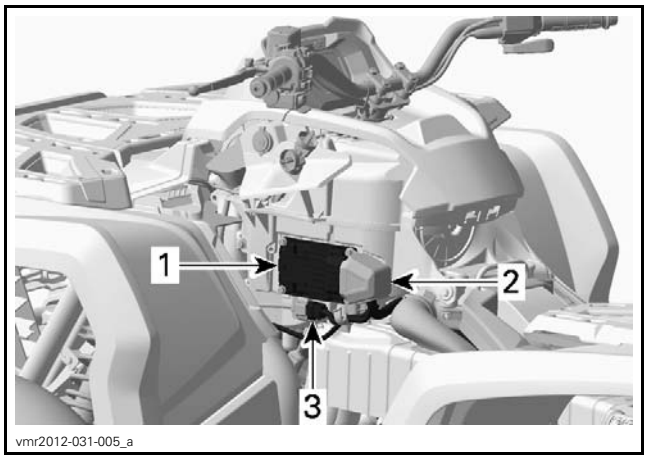
IGNITION COIL GROUND CIRCUIT CONTINUITY TEST		
COMPONENT	PIN (IGNITION COIL CONNECTOR)	PIN (ECM CONNECTOR)
Cylinder 1 (front)	1	M1
Cylinder 2 (rear)	3	M2

Testing the Ignition Coil Resistance

An ignition coil with good resistance measurement can still be faulty. Voltage leakage can occur at high voltage levels which is not detectable with an ohmmeter. Replacing the ignition coil may be necessary as a test.

Primary Windings

1. Disconnect HIC2 connector.



TYPICAL
1. ECM
2. ECM connector cover
3. HIC2 connector

2. Disconnect ECM connector and connect it to the ECM adapter tool.

REQUIRED TOOL	
ECM ADAPTER TOOL (P/N 529 036 166)	

3. Using a multimeter set to Ω, check resistance in primary windings as follows.

IGNITION COIL RESISTANCE TEST			
PRIMARY CIRCUIT	ENGINE CONNECTOR (HIC2)	ECM CONNECTOR	RESISTANCE @ 20°C (68°F)
Cylinder 1 (front)	Pin C	M1	.3 - .6 Ω
Cylinder 2 (rear)		M2	

If any resistance is not good, measure resistance directly on coil. If second test is ok, check wiring.

Secondary Windings

Due to the integrated diode, it is not possible to take any resistance measurement of the secondary winding.

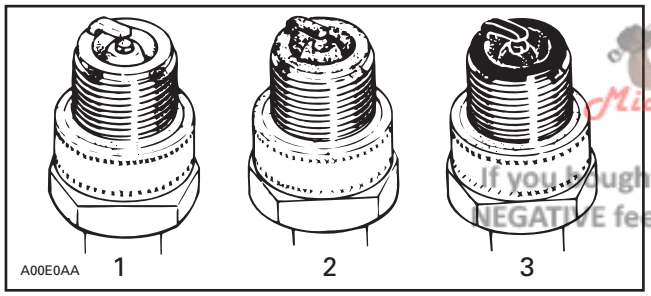
SPARK PLUG

For spark plug replacement procedure, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Troubleshooting Fouled Spark Plug

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling or low-speed riding, a clogged air filter, incorrect fuel, defective ignition system, incorrect spark plug gap, lubricating oil entering the combustion chamber, or too cold spark plug. The plug face of a fouled spark plug has either a wet black deposit or a black carbon fouling. Such coatings form a conductive connection between the center electrode and ground.

Spark Plug Analysis



TYPICAL
1. *Overheated (light grey, white)*
2. *Normal (light brown, brown)*
3. *Fouled (black, wet or dry, dark deposits, grey, melted coating)*

The plug face reveals the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug face (i.e. the part of the plug projecting into the combustion chamber).

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IGNITION SYSTEM

SERVICE TOOLS

Description	Part Number	Page
ECM ADAPTER TOOL	529 036 166	1
FLUKE 115 MULTIMETER	529 035 868	1

GENERAL

The following tools are required to test most of the electrical parts.

REQUIRED TOOLS	
FLUKE 115 MULTIMETER (P/N 529 035 868)	
ECM ADAPTER TOOL (P/N 529 036 166)	

SYSTEM DESCRIPTION

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Ignition timing is not adjustable.

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Refer to *POWER DISTRIBUTION AND GROUNDS* for fuse and relay information.

Refer to *WIRING HARNESS AND CONNECTORS* for vehicle wiring harness layout and component locations.

Refer to *ENGINE MANAGEMENT SYSTEM (EMS)* for powertrain wiring harness layout and component locations.

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1. Fouled or defective spark plug
   - *Replace.*
2. Defective CPS
   - *Check operation of CPS and replace if necessary. Refer to ELECTRONIC FUEL INJECTION (EFI) subsection.*
3. Defective trigger wheel
   - *Inspect trigger wheel. Refer to MAGNETO AND STARTER subsection.*
4. Defective ignition circuit
   - *Check fuse 5 of fuse box 1, ignition coil and wiring condition.*
5. Defective fuel pump
   - *Check fuel pump, refer to FUEL TANK AND FUEL PUMP subsection.*
6. Defective fuel injectors or circuit
   - *Check fuel injectors, refer to ENGINE MANAGEMENT SYSTEM subsection.*

ENGINE HARD TO START

1. Spark plug faulty, fouled or worn out
   - *Check spark plug condition. Replace if necessary.*
2. Low fuel pressure
   - *Test fuel pressure, refer to FUEL TANK AND FUEL PUMP subsection.*

ENGINE MISFIRES, RUNS IRREGULARLY

1. Fouled, defective, worn spark plugs
   - *Check/verify heat range/gap/replace.*

2. Damaged trigger wheel/loose CPS
   - *Inspect trigger wheel. Refer to MAGNETO AND STARTER subsection.*
3. Defective ignition circuit
   - *Check ignition coil, fuse 5, and wiring condition.*
4. Poor engine grounds
   - *Check/clean/repair.*

ENGINE CONTINUALLY BACKFIRES

1. Fouled, defective spark plugs
   - *Clean/replace spark plugs.*
2. Damaged trigger wheel/defective or loose CPS
   - *Inspect trigger wheel and CPS, refer to MAGNETO AND STARTER and ELECTRONIC FUEL INJECTION (EFI) subsections.*

PROCEDURES

IGNITION SWITCH

Ignition Switch Quick Test

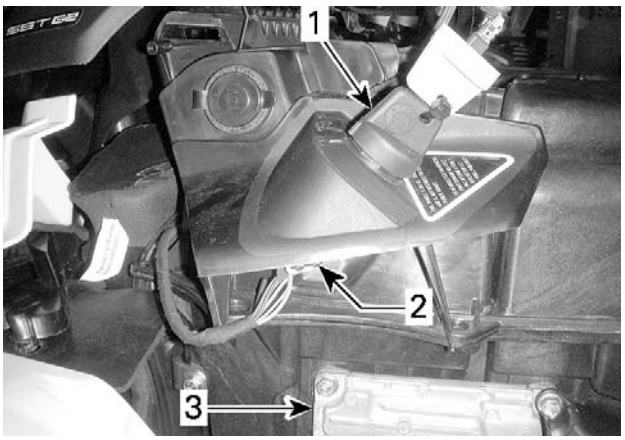
Turn ignition switch to ON position.

If multifunction gauge turns on (assuming it works), the ignition switch is good.

If multifunction gauge does not turn on, check the following in this order:
– Battery
– Fuse link 1
– Fuse 4, 5 and 8 of fuse box 1
– ECM is properly powered (refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection)
– Ignition switch
– Emergency engine stop switch.

Ignition Switch Access

Refer to *BODY* subsection and remove the LH side panel.



TYPICAL
1. *Ignition key*
2. *Ignition switch connector*
3. *ECM*

EMERGENCY ENGINE STOP SWITCH

Testing the Emergency Engine Stop Switch at ECM (with Ignition Switch)

1. Disconnect the ECM-B connector from ECM and install it on the ECM adapter tool.
2. Remove ignition key switch fuse (F1). Refer to *POWER DISTRIBUTION AND GROUNDS* subsection.
3. Turn ignition key to ON position.
4. Test for continuity as per following table.

EMERGENCY ENGINE STOP SWITCH TEST AT ECM			
SWITCH POSITION	ECM ADAPTER		MEASUREMENT
RUN	B-F2	B-E4	Close to 0 Ω
STOP	B-F2	B-E4	Open circuit

If switch fails the test, refer to *TESTING THE EMERGENCY ENGINE STOP SWITCH AT MULTIFUNCTION SWITCH CONNECTORS*.

Testing the Emergency Engine Stop Switch at ECM (with RF D.E.S.S. Key)

1. Disconnect the ECM-B connector from ECM and install it on the ECM adapter tool.
2. Disconnect the RF D.E.S.S. connector.
3. Remove ECM and RF D.E.S.S. power supply fuse (F8). Refer to *POWER DISTRIBUTION AND GROUNDS* subsection.

4. Test for continuity as per following table.

EMERGENCY ENGINE STOP SWITCH TEST AT ECM			
SWITCH POSITION	CONNECTOR PIN	ECM ADAPTER	MEASUREMENT
RUN	RFID-B*	B-E4	Close to 0 Ω
	FB-A3**	B-E4	Open circuit
STOP	RFID-B*	B-E4	
	FB-A3**	B-E4	Close to 0 Ω
* RF D.E.S.S. connector, pin B			
** Fuse box contact A3			

If switch fails the test, refer to *TESTING THE EMERGENCY ENGINE STOP SWITCH AT MULTIFUNCTION SWITCH CONNECTORS*.

Testing the Emergency Engine Stop Switch at Multifunction Switch Connectors (with Ignition Switch)

Refer to *WIRING HARNESS AND CONNECTORS* subsection for connector locations.

The emergency engine stop switch is wired into the LH multifunction switch connector (MG1).

1. Remove gauge support, refer to *GAUGE* subsection.
2. Disconnect MG1 connector.
3. Test switch continuity as per following table.

EMERGENCY ENGINE STOP SWITCH PIN-OUT		
SWITCH POSITION	PROBE	MEASUREMENT
RUN	MG1-1 and MG1-2	Open circuit
	MG1-2 and MG1-3	Close to 0 Ω
STOP	MG1-1 and MG1-3	
	MG1-1 and MG1-2	Open circuit

If switch tests good, test continuity of wiring. Refer to *WIRING DIAGRAM*.

Testing the Emergency Engine Stop Switch at Multifunction Switch Connectors (with RF D.E.S.S. Key)

Refer to *WIRING HARNESS AND CONNECTORS* subsection for connector locations.

The emergency engine stop switch is wired into the LH multifunction switch connectors (MG1 and MG2).

1. Remove gauge support, refer to *GAUGE* subsection.
2. Disconnect MG1 and MG2 connectors.
3. Test switch continuity as per following table.

EMERGENCY ENGINE STOP SWITCH PIN-OUT		
SWITCH POSITION	PROBE	MEASUREMENT
RUN	MG1-3 and MG2-3	Open circuit
	MG1-1 and MG1-2	Close to 0 Ω
STOP	MG1-3 and MG2-3	
	MG1-1 and MG1-2	Open circuit

If switch tests good, test continuity of wiring. Refer to *WIRING DIAGRAM*.

If wiring continuity tests good, test RF D.E.S.S. post. Refer to *RF D.E.S.S.* subsection.

IGNITION COIL

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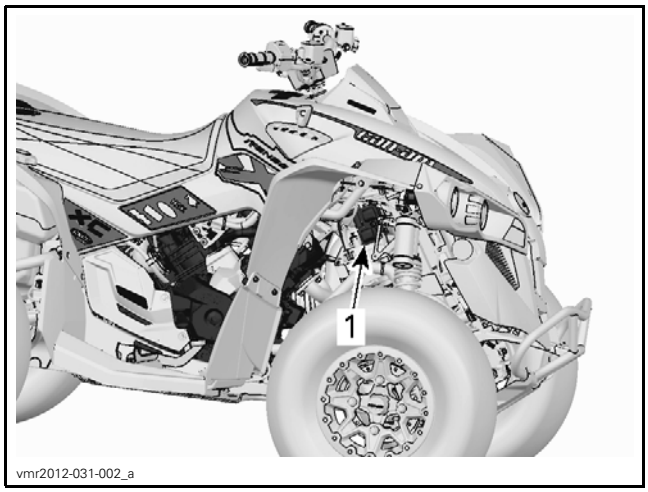
Ignition Coil Access

Refer to *BODY* subsection and remove RH inner fender panel(s) for access to the ignition coil.



TYPICAL
1. Ignition coil location

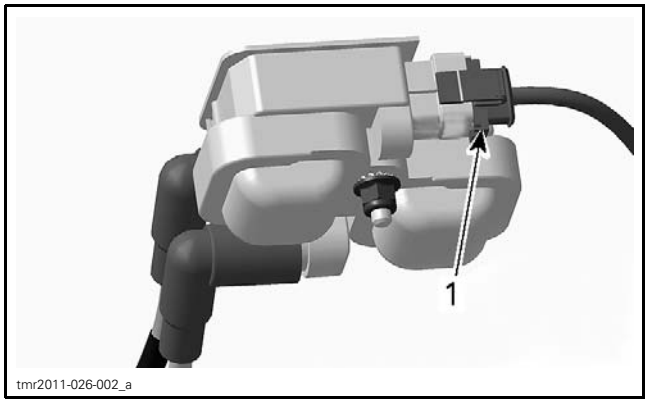
Installing the Ignition Coil

Tighten bolt to specification.

TIGHTENING TORQUE	
Ignition coil retaining bolt	9 N•m ± 1 N•m (80 lbf•**in** ± 9 lbf•**in**)

Testing the Ignition Coil Input Voltage

1. Disconnect the 3-pin connector from the ignition coil. Refer to *IGNITION COIL ACCESS*.



1. Ignition coil connector

2. Set emergency engine stop switch to RUN.
3. Install RF D.E.S.S. key on post.
4. Read voltage as per following table.

IGNITION COIL INPUT VOLTAGE TEST		
IGNITION COIL CONNECTOR PIN	BATTERY	MEASUREMENT
2	Negative post	Battery voltage

If battery voltage is NOT read, check continuity of ignition coil supply circuit. Refer to *WIRING DIAGRAM*.

Testing the Ignition Coil Ground Circuit Continuity

1. Disconnect the ECM-A connector from the ECM. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.
2. Connect the ECM-A connector to the ECM adapter tool.
3. Check wiring continuity as per following table.

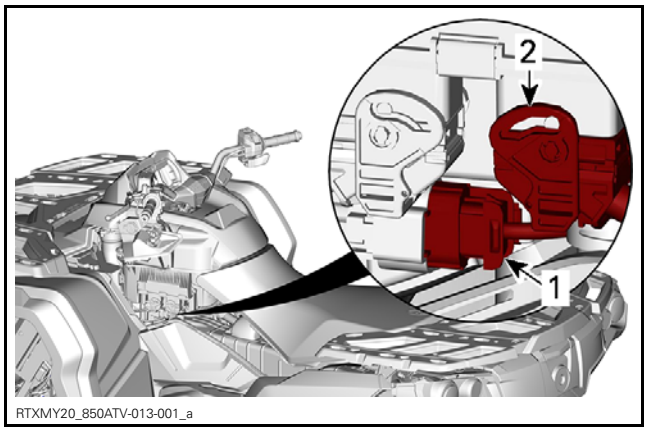
IGNITION COIL GROUND CIRCUIT CONTINUITY TEST			
CYL	IGN. COIL CONNECT. PIN	(ECM ADAPTER	MEASURE-MENT
1 (Front)	3	A-M1	Close to 0 Ω
2 (Rear)	1	A-M2	

Testing the Ignition Coil Resistance

An ignition coil with good resistance measurement can still be faulty. Voltage leakage can occur at high voltage levels which is not detectable with an ohmmeter. Replacing the ignition coil may be necessary as a test.

Primary Windings

1. Disconnect HIC connector.



TYPICAL
1. HIC connector
2. ECM-A connector

2. Disconnect the ECM-A connector and connect it to the ECM adapter tool.
3. Using a multimeter set to Ω, check resistance in primary windings as follows.

IGNITION COIL RESISTANCE TEST		
ENGINE CONNECTOR (HIC)	ECM ADAPTER	MEASUREMENT @ 20°C (68°F)
Pin E	M1 (Cylinder 1)	.3 - .6 Ω
	M2 (Cylinder 2)	

If any resistance is not good, measure resistance directly on coil. If second test is ok, check wiring.

Secondary Windings

Due to the integrated diode, it is not possible to take any resistance measurement of the secondary winding.

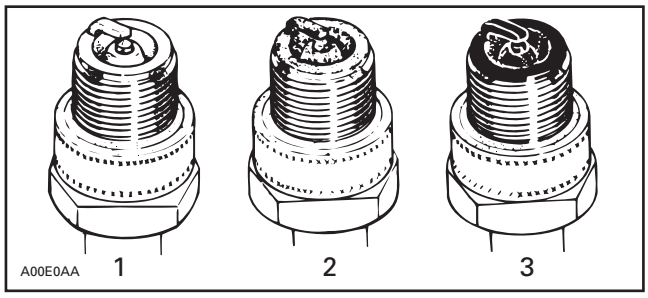
SPARK PLUG

For spark plug replacement procedure, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Troubleshooting Fouled Spark Plug

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling or low-speed riding, a clogged air filter, incorrect fuel, defective ignition system, incorrect spark plug gap, lubricating oil entering the combustion chamber, or too cold spark plug. The plug face of a fouled spark plug has either a wet black deposit or a black carbon fouling. Such coatings form a conductive connection between the center electrode and ground.

Spark Plug Analysis



TYPICAL
1. *Overheated (light grey, white)*
2. *Normal (light brown, brown)*
3. *Fouled (black, wet or dry, dark deposits, grey, melted coating)*

The plug face reveals the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug face (i.e. the part of the plug projecting into the combustion chamber).

CHARGING SYSTEM

GENERAL

SYSTEM DESCRIPTION

The purpose of the charging system is to keep the battery at a full state of charge.

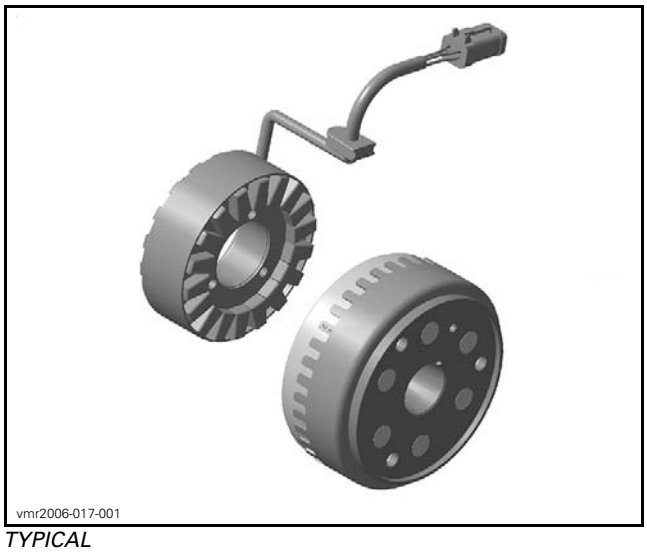
NOTE: For an overview of the vehicle electrical system, refer to *ENGINE MANAGEMENT SYSTEM* section.

Magneto

The magneto is the primary source of electrical energy. It transforms a magnetic field into electric current (AC).

The alternating current is regulated and transformed into direct current (DC) by the voltage regulator, and normally powers all of the vehicle's systems and accessories.

The magneto has a 3 phase delta wound stator.



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TYPICAL

Voltage Regulator

The regulator receives AC current from the magneto and transforms it into direct current (DC).

The voltage regulator output voltage is distributed as follows:

– Fuse links
– Battery.

The voltage regulator limits voltage to prevent any damage to electrical components.

COMPONENT	VOLTAGE Vdc
Voltage Regulator	Minimum 12.5
	Maximum 15

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TYPICAL

Battery

The battery supplies DC power to every electrical and electronic system in the vehicle as well as all accessories. At low engine RPM operation and high current load conditions, it supplements the magneto's output as required, and helps to maintain a steady system voltage.

INSPECTION

CHARGING SYSTEM OUTPUT

First ensure that battery is in good condition prior to performing the following tests.

Testing the Output Voltage.

1. Connect the vehicle to the BRP diagnostic software (BUDS2).

In BUDS2, go to:

– **Measurements** page
– **ECM** button
– **Battery voltage** (V)

2. Start engine.
3. Increase engine RPM as specified in the following table.

OUTPUT VOLTAGE TEST USING BUDS2	
ENGINE SPEED	VOLTAGE (DC)
4000 RPM	14.8 ± .4 Vdc

If voltage is above specification, replace voltage regulator/rectifier.

If voltage is below specification, check stator output and wiring harness prior to concluding that voltage regulator/rectifier is defective. Refer to *MAGNETO SYSTEM* subsection.

TROUBLESHOOTING

It is good practice to check for fault codes using the BRP diagnostic software (BUDS2) as a first troubleshooting step. Refer to *DIAGNOSTIC AND FAULT CODES* subsection.

BATTERY REGULARLY DISCHARGED OR WEAK

1. Loose or corroded battery cable connections.
   - *Tighten or repair battery cable connections.*
2. Worn or defective battery.
   - *Charge and test battery.*
3. Defective magneto stator.
   - *Test stator, refer to MAGNETO AND STARTER SYSTEM subsection.*
4. Defective regulator/rectifier.
   - *Test system voltage.*
5. Damaged magneto rotor or Woodruff key.
   - *Replace magneto rotor or Woodruff key, refer to MAGNETO AND STARTER SYSTEM subsection.*

PROCEDURES

Ensure battery is fully charged.

Refer to *WIRING HARNESS AND CONNECTORS* subsection for harness layout and connector locations on vehicle.

Refer to appropriate *WIRING DIAGRAM* for additional information.

The magneto is covered in *MAGNETO AND STARTER* subsection.

⚠ WARNING

Ensure vehicle is in PARK when performing charging system tests.

LOAD TESTING THE BATTERY

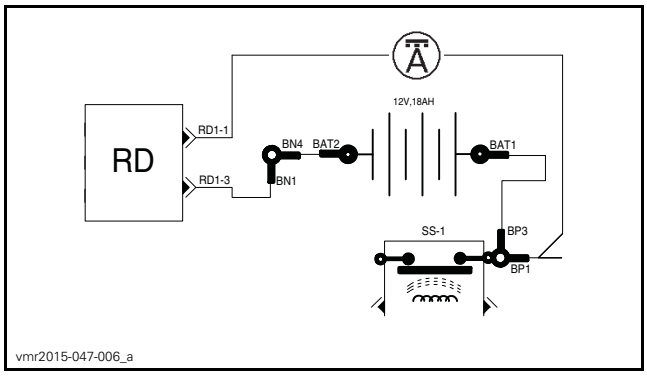
1. Remove seat.
2. Connect a battery load tester.
3. Ensure proper test conditions.

TEST CONDITIONS	
Initial battery voltage‡	Above 12.5 Vdc
Engine	OFF
Load	3 times the amp-hour (AH) rating
Time	15 seconds
‡ Required for accurate testing	

SPECIFICATION	
Battery	Above 9.6 Vdc

If battery voltage drops below specification during test, replace battery and perform a *CHARGING SYSTEM LOAD TEST*.

LOAD TESTING THE CHARGING SYSTEM

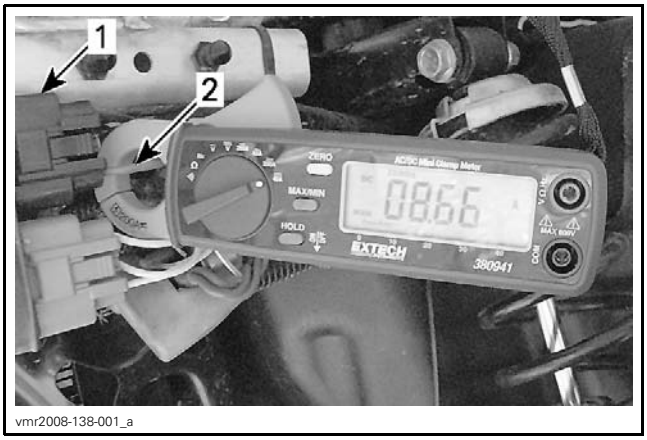


1. Remove seat.
2. Connect a battery load tester.
3. Start vehicle and read voltage on tester.

SPECIFICATION	
Voltage	12.5 - 15 Vdc

If voltage is **above** specification, replace regulator and continue *LOAD TESTING THE CHARGING SYSTEM*.

4. Connect an ammeter around RD1-1 wire.



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DC CURRENT TEST WITH INDUCTIVE AMMETER
1. *Output connector of voltage regulator*
2. *Ammeter clamped over RED wire*

5. Ensure proper test conditions.

TEST CONDITIONS	
Battery voltage at idle‡	Above 12.6 Vdc
Engine	Increase to 4000 RPM
Load	As required to decrease battery voltage to 12 Vdc
Time	15 seconds
‡ Required for accurate testing	

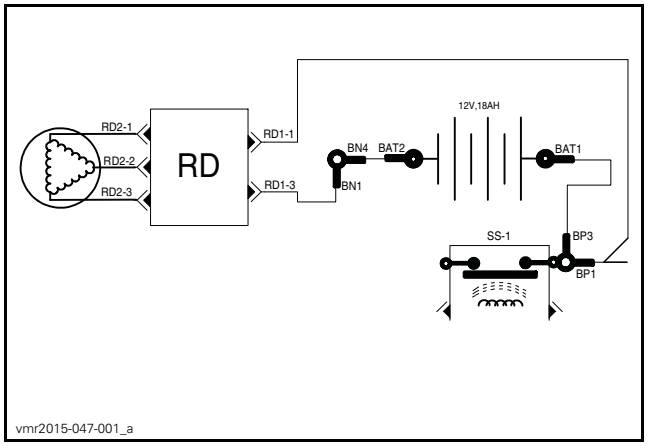
6. Read amperage on ammeter.

MODEL	SPECIFICATION
Base/DPS	41 ± 5 Amps
All other models	50 ± 5 Amps

NOTE: With a fully charged battery and no electrical loads, specification is less than 10A.

If amperage or voltage is not within specification, verify magneto and wires. Refer to *MAGNETO AND STARTER* subsection. Replace:
- Voltage regulator if magneto test is within specifications.
- Magneto if magneto test is not within specifications.

VOLTAGE REGULATOR (RD)



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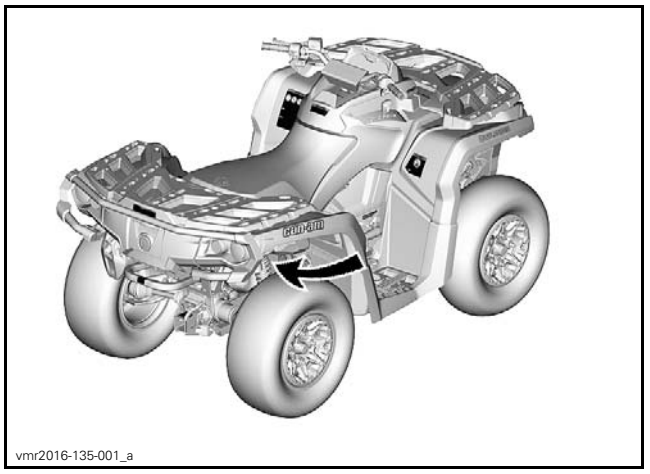
Testing Voltage Regulator Continuity

Due to internal circuitry, there is no static test available.

Testing Voltage Regulator Power

The voltage regulator/rectifier is accessible on the RH rear side of the vehicle.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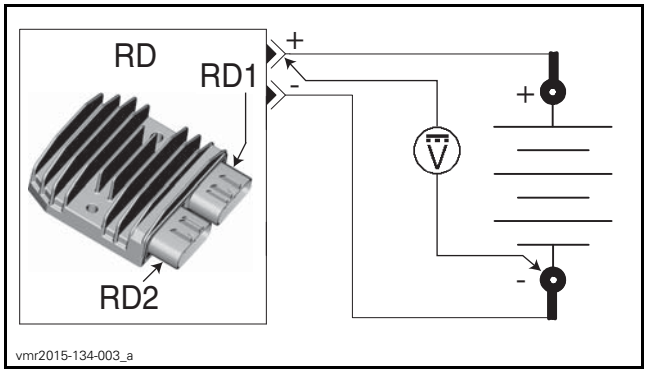
1. Check voltage at RD1-1.



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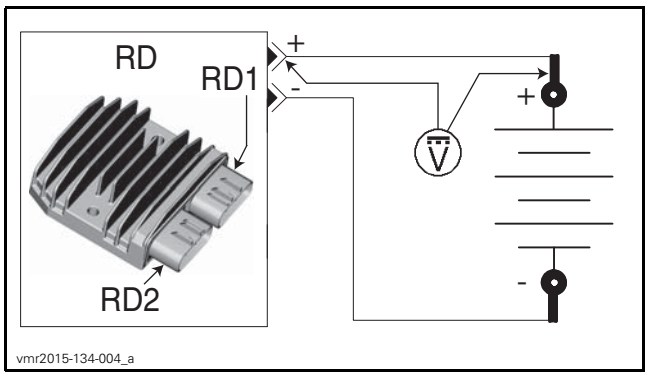
TEST CONDITIONS	
RD1-1	Hot at all times

BACKPROBE	PROBE	SPECIFICATION
RD1-1	BAT2 (-)	Battery voltage

2. Connect a battery load tester.
3. Start vehicle.
4. Ensure proper test conditions.

TEST CONDITIONS	
Battery voltage at idle‡	Above 12.6 Vdc
Engine	Increase to 4000 RPM
Load	As required to decrease battery voltage to 12 Vdc
Time	15 seconds
‡ Required for accurate testing	

5. Measure voltage drop.

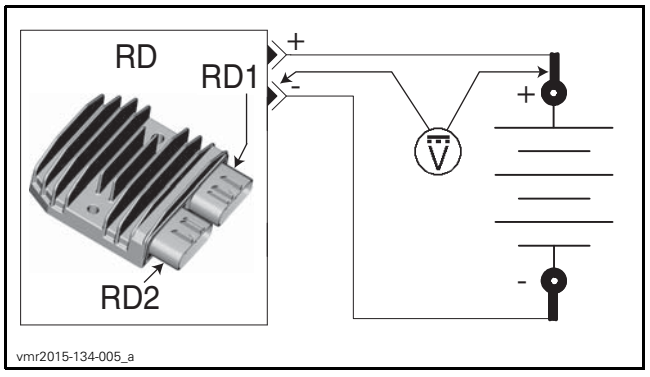


BACKPROBE	PROBE	SPECIFICATION
RD1-1	BAT1 (+)	Under 0.2 Vdc

If voltage drop is above specification, locate and repair damaged connector/wire.

Testing Voltage Regulator Ground

1. Check ground at RD1-3.



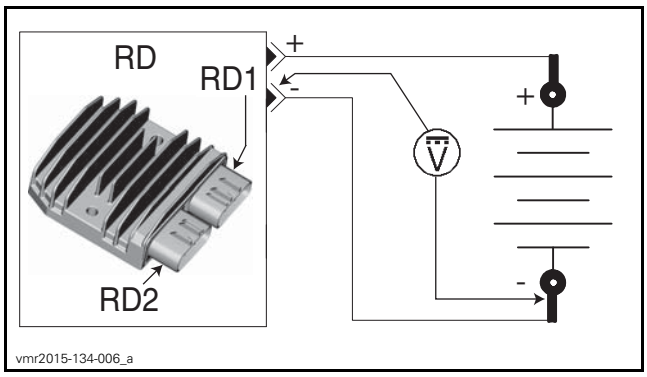
TEST CONDITIONS	
RD1-3	Permanent ground

BACKPROBE	PROBE	SPECIFICATION
RD1-3	BAT1 (+)	Battery voltage

2. Connect a battery load tester.
3. Start vehicle.
4. Ensure proper test conditions.

TEST CONDITIONS	
Battery voltage at idle‡	Above 12.6 Vdc
Engine	Increase to 4000 RPM
Load	As required to decrease battery voltage to 12 Vdc
Time	15 seconds
‡ Required for accurate testing	

5. Measure voltage drop.



BACKPROBE	PROBE	SPECIFICATION
RD1-3	BAT2 (-)	Under 0.4 Vdc

If voltage drop is above specification, locate and repair damaged connector/wire.

BATTERY

Battery Information

These vehicles are equipped with a VRLA battery (Valve Regulated Lead Acid). It is a maintenance-free type battery.

Refer to battery manufacturer's instructions for proper filling, activation and routine charging procedures.

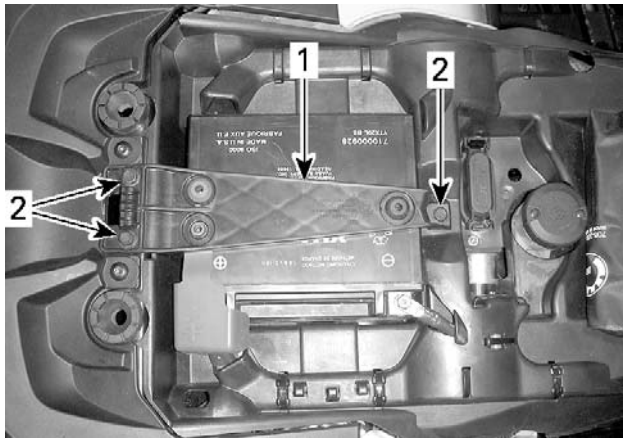
Removing the Battery

1. Remove seat.

2. Disconnect BLACK (-) cable first, then the RED (+) cable.

NOTICE Always respect this order for removal; disconnect BLACK (-) cable first.

3. Remove battery retaining plate.



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TYPICAL
1. *Battery retaining plate*
2. *Retaining plate screws (3)*

4. Remove battery.

Installing the Battery

NOTICE Always connect RED (+) cable first then BLACK (-) cable.

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

TIGHTENING TORQUE	
Battery retaining plate screws	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

STARTING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
ECM ADAPTER TOOL	529 036 166	1
FLUKE 115 MULTIMETER	529 035 868	1

GENERAL

The following tools are required to test most of the electrical parts.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	
ECM ADAPTER TOOL (P/N 529 036 166)	

STARTING SYSTEM OPERATION

When the START button is pressed, 12 Vdc is applied through the key switch (KEY) and the start button (MG2) to the starter solenoid coil and ECM.The ECM completes the starter solenoid control circuit by providing a ground. The starter solenoid then closes its contacts and battery power is applied to the starter for cranking the engine.

Engine Cranking Conditions

The following conditions must be met to allow engine cranking.

– Ignition switch turned ON
– Engine stop switch to RUN
– Transmission in Park, Neutral or a brake pedal/lever is applied
– Start button is pressed and held.

TROUBLESHOOTING

Check for fault codes. Refer to: *DIAGNOSTIC AND FAULT CODES* subsection.

ENGINE WILL NOT TURN

If the starter cranks over the engine with the brakes applied, check the following:

1. Shifter rod adjustment, (refer to appropriate *SHIFTER* subsection).
2. Gearbox position indicator switches or the gearbox position sensor (GBPS), (refer to appropriate *GEARBOX AND COUPLING UNIT* subsection).
3. Switches or sensor wires and connectors, (refer to appropriate *WIRING DIAGRAM*).

If the "Engine cranking conditions" are met and the starter will not crank the engine, check the following:

1. Battery and connections (refer to *CHARGING SYSTEM*).
2. Starter solenoid.
3. Start button switch.
4. Starter (refer to *MAGNETO AND STARTER* subsection).
5. Wiring and connections.

ENGINE TURNS

Starting system is OK.

1. Verify ignition system. Refer to *IGNITION SYSTEM* subsection.
2. Verify EFI systems. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.
3. Verify mechanical condition of engine. Refer to *ENGINE, CVT AND GEARBOX* section.

PROCEDURES

Ensure battery is fully charged.

Refer to applicable *WIRING HARNESS AND CONNECTORS* for harness layout and connector locations on vehicle.

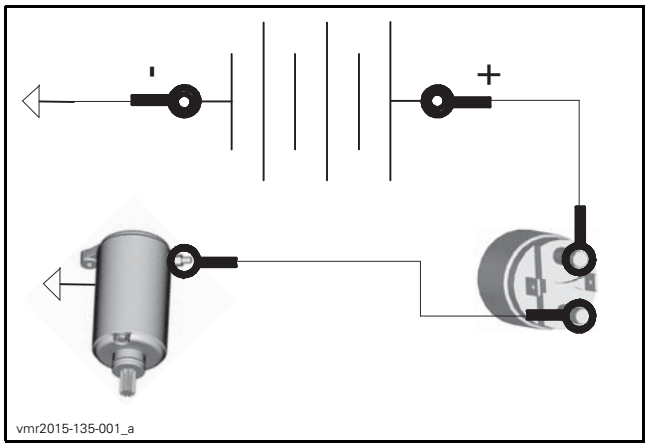
Refer to applicable *WIRING DIAGRAM* for additional information.

⚠ WARNING

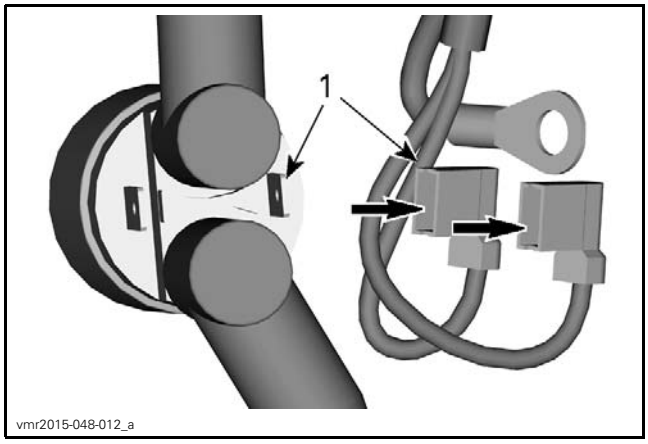
Ensure vehicle is in PARK when performing starting system tests.

STARTING SYSTEM TESTS

Starter Solenoid

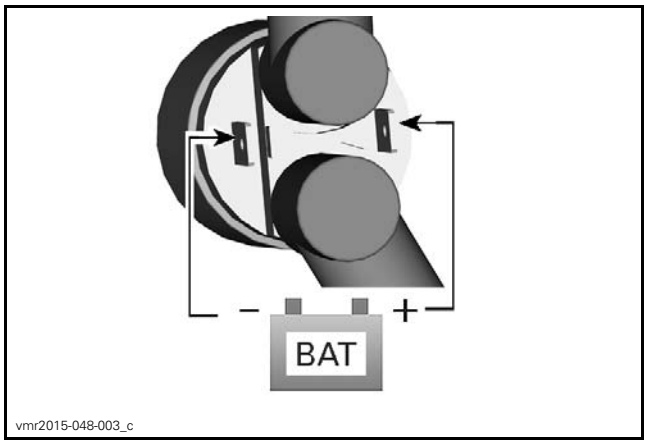


1. Disconnect SS+ and SS-



1. SS+

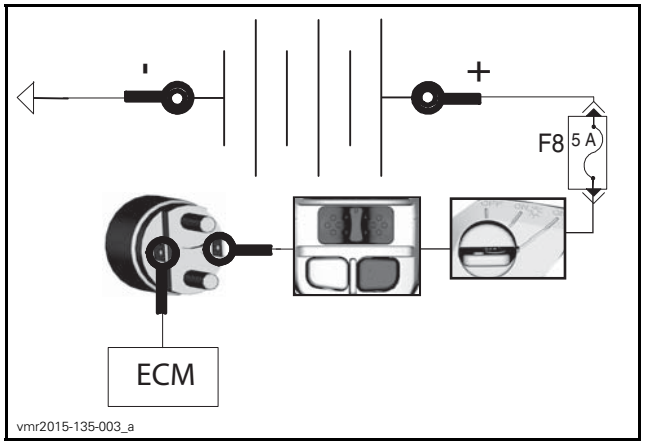
2. Activate the starter solenoid.
   2.1 Apply 12Vdc to SS+
   2.2 Ground SS-



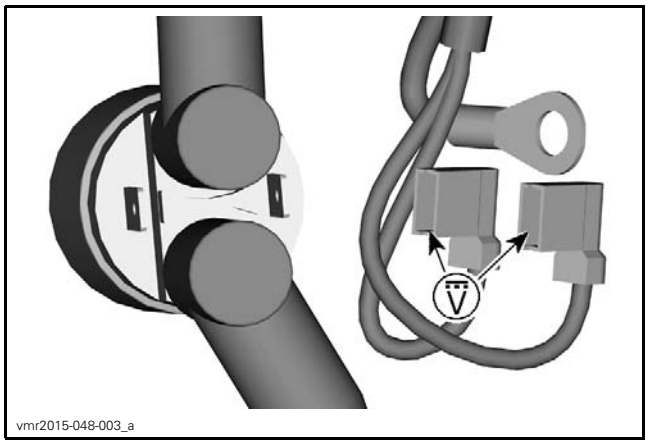
SS+ IS ON THE RIGHT

3. If starter turns, verify *STARTER SOLENOID CONTROL CIRCUIT*.
4. If starter does not turn, verify *STARTER SOLENOID CONTINUITY*.

Starter Solenoid Control Circuit



TEST CONDITION	
Engine stop switch	RUN
Ignition switch	ON
Start button	Pressed



SS+ IS ON THE RIGHT

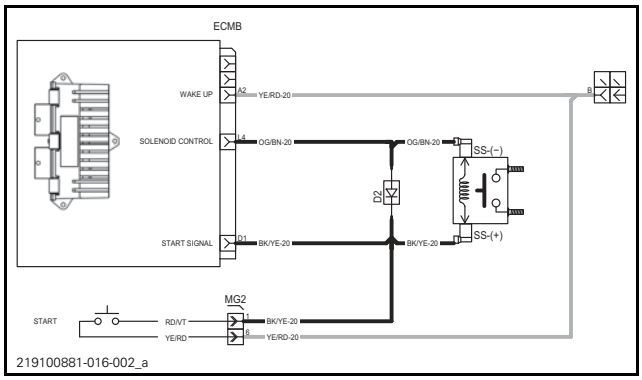
PROBE	PROBE	SPECIFICATION
SS+	SS-	Battery voltage
SS+	BAT -	Battery voltage
BAT +	SS-	Battery voltage

If voltage is as per specification replace starter solenoid.

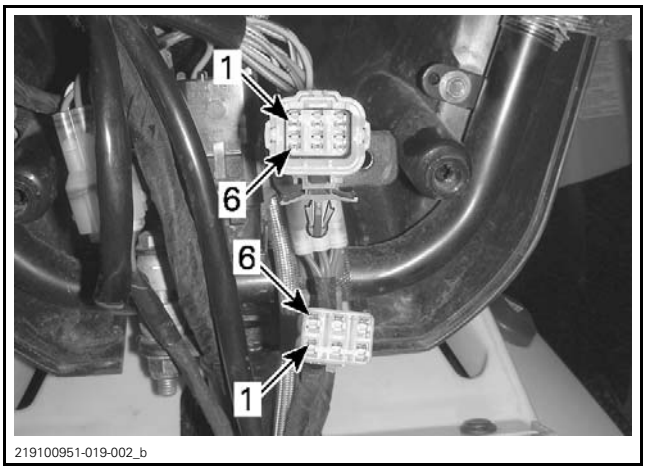
If voltage is not as per specification, verify *STARTER SOLENOID CONTROL POWER CIRCUIT* or *STARTER SOLENOID CONTROL GROUND CIRCUIT* as applicable.

Starter Solenoid Control Power Circuit

NOTE: This procedure also tests the start button.



1. Disconnect MG2 connector.



TYPICAL - MG2 STEERING HARNESS CONNECTOR PIN-OUT

TEST CONDITION	
Engine stop switch	RUN
Ignition switch	ON

PROBE	PROBE	SPECIFICATION
MG2-1	BAT -	Battery voltage.

2. If voltage is not as per specification:
   1. Check fuse(s).
   2. Test engine stop switch. Refer to *IGNITION SYSTEM* subsection.
   3. Test ignition switch Refer to *IGNITION SYSTEM* subsection.
3. Test start button.

TEST CONDITION	
Start button	Pressed

PROBE	PROBE	SPECIFICATION
MG2-1	MG2-6	Close to 0Ω

If start button does not test as specified, replace the multifunction switch assembly.

If start switch tests as specified, repair wire to starter solenoid SS+ terminal.

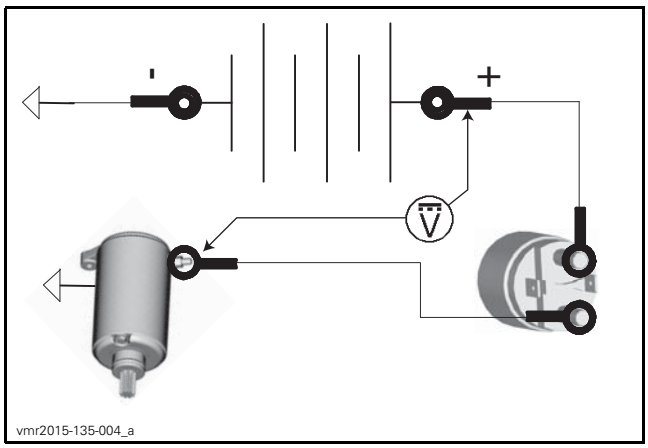
Starter Power Circuit Voltage Drop

NOTE: Engine must be in starting condition for this test. Do not perform on a «No Start» vehicle.

TEST CONDITION	
Fuse F10 / Fuse F3 (Europe and International Models)	Removed‡
Engine stop switch	RUN
Ignition switch	ON

TEST CONDITION	
Start button	Pressed
Engine	Cranking
‡ Will prevent engine from starting	

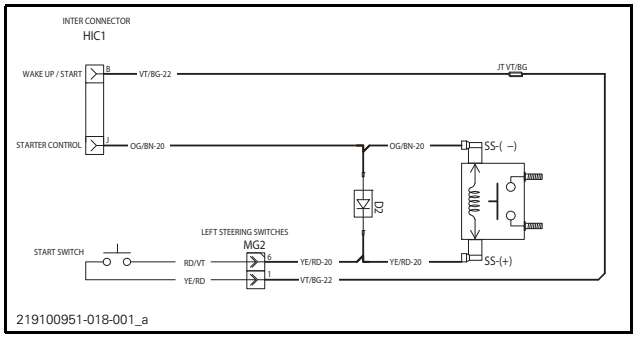
1. Measure voltage drop.



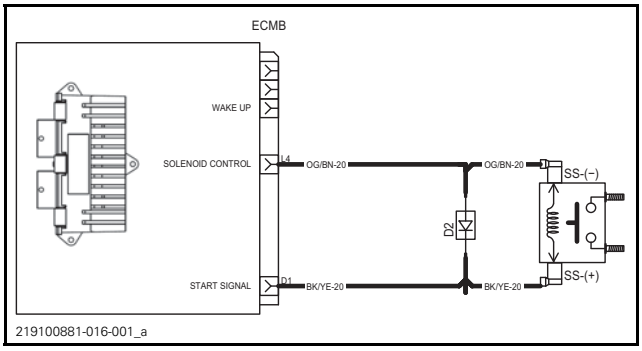
PROBE	PROBE	SPECIFICATION
BAT1	Starter B+ terminal	Below 0.4 Vdc

If voltage drop is above specification, repair or replace sources of high resistance in circuit.

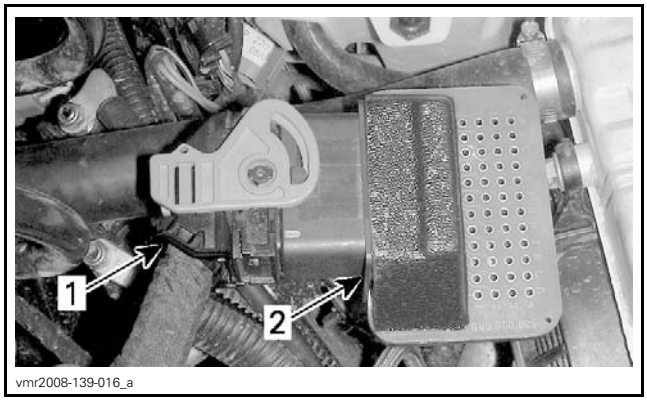
Starter Solenoid Control Ground Circuit



Europe and International Models



1. Disconnect SS-.
2. Install the ECM adapter onto the ECM connector.



1. ECM connector
2. ECM adapter tool

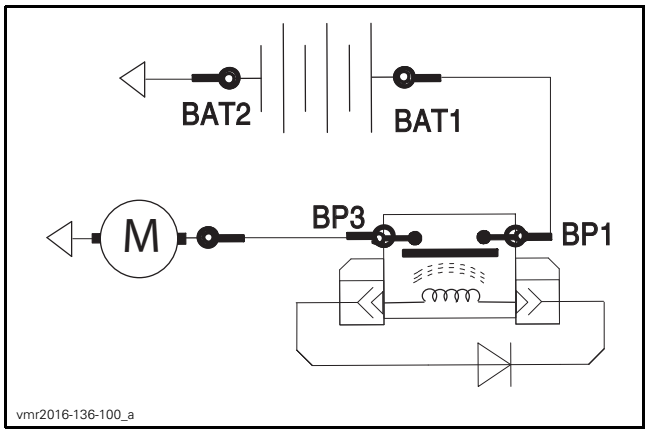
PROBE	PROBE	SPECIFICATION
SS-	ECM-HIC1 / ECM-L4 (Europe and International Models)	Close to 0Ω

If resistance is not as specified, repair or replace wiring/connections.

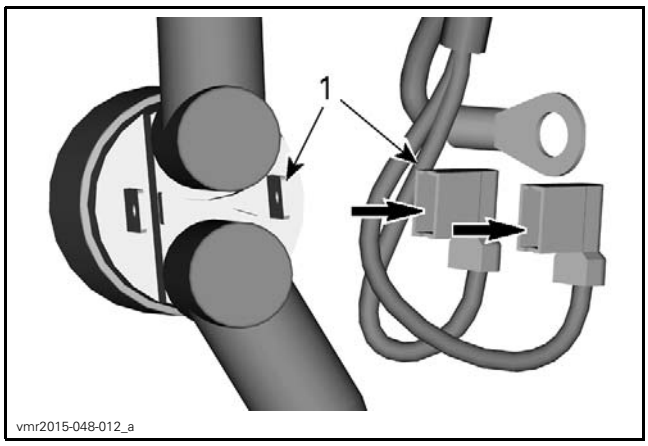
If solenoid power control circuit and ground control circuit both test good, test ECM ground circuits. Refer to *ELECTRONIC FUEL INJECTION (EFI)* subsection.

NOTE: Supply a ground with a jumper wire if you suspect that the ECM is not supplying a ground to the solenoid.

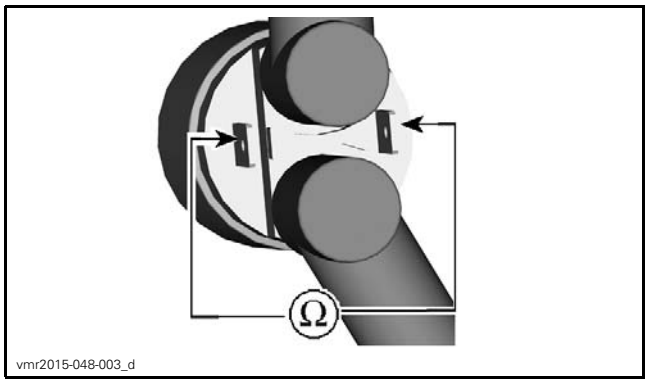
Starter Solenoid Continuity



1. Disconnect the BLACK (-) negative battery cable.
2. Disconnect SS+ and SS-.



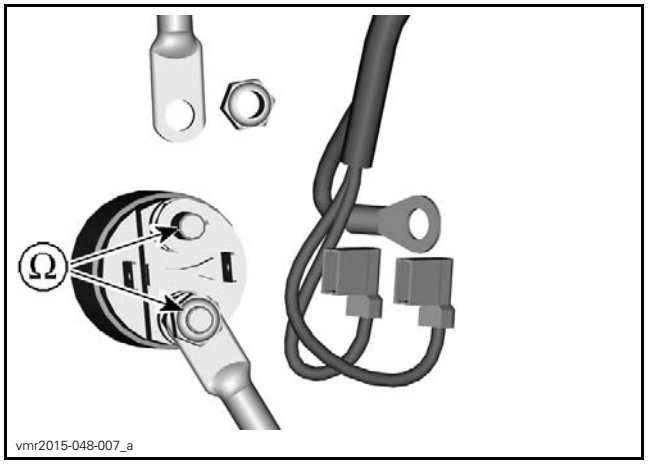
1. SS+



PROBE	PROBE	SPECIFICATION @ 20°C (68°F)
SS+	SS-	Close to 6Ω

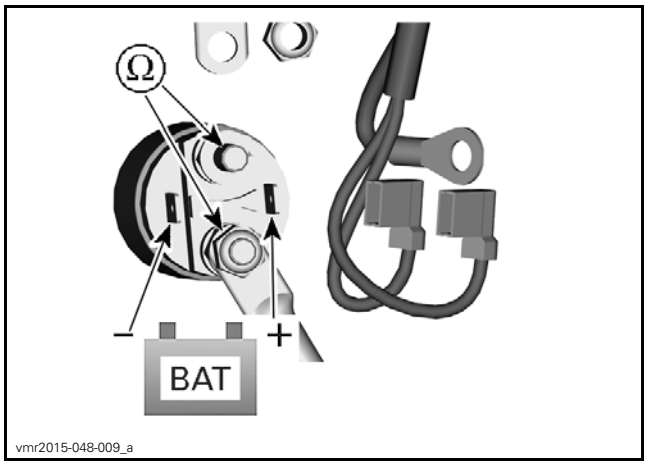
If resistance is not as per specification, replace the solenoid.

3. Disconnect BP1.



PROBE	PROBE	SPECIFICATION
BP1	Terminal to starter motor	O.L.

4. Jump starter solenoid.



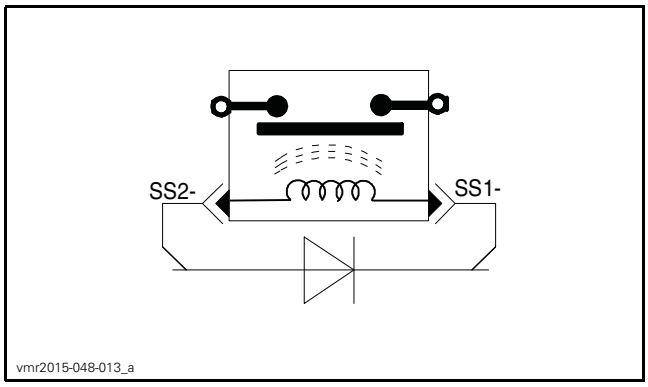
SS+ IS ON THE RIGHT

PROBE	PROBE	SPECIFICATION
BP1	Terminal to starter motor	Close to 0Ω

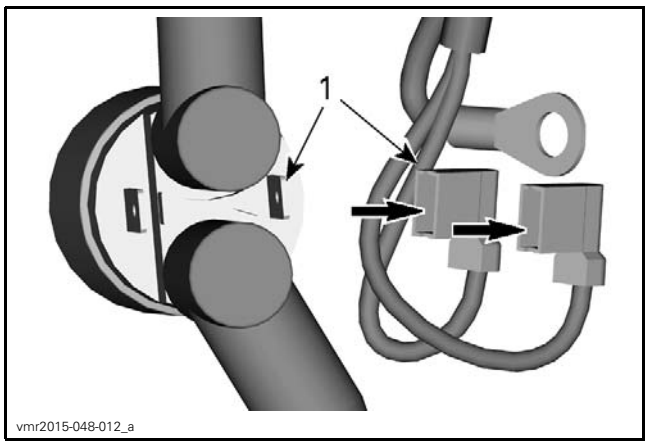
If resistance is not as per specification, replace the solenoid.

If starter power and ground circuits are good, refer to *MAGNETO AND STARTER* subsection for starter diagnosis and replacement.

Solenoid Diode Test

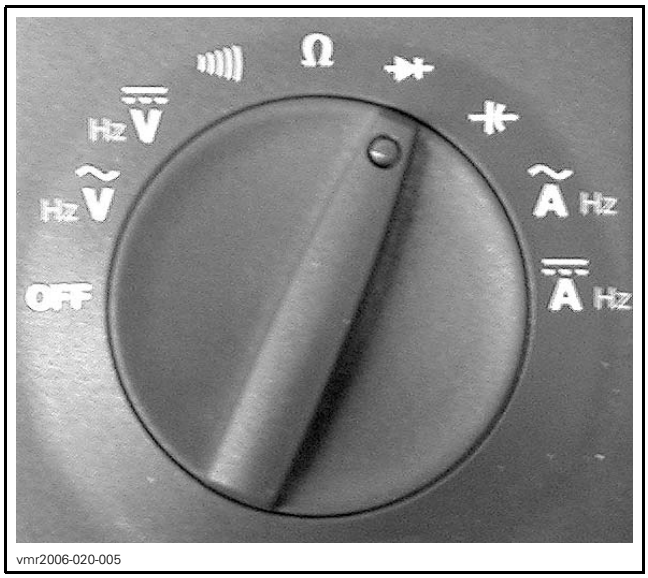


1. Disconnect SS+ and SS- from starter solenoid.

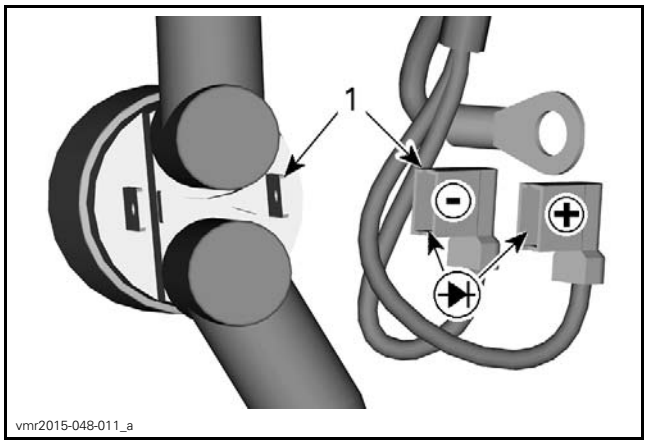


1. SS+

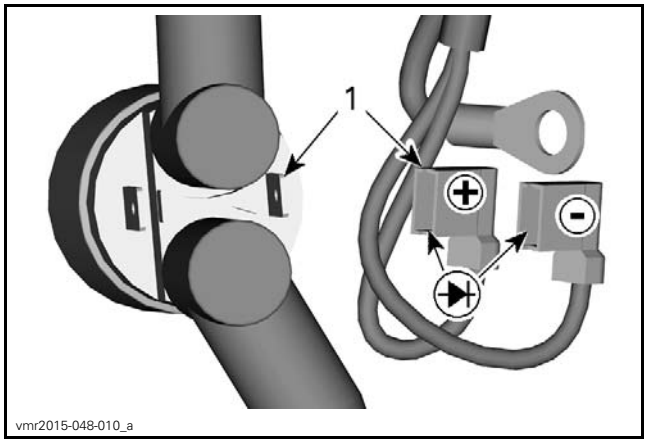
2. Set the multimeter to the diode symbol as shown.



3. Probe wires while paying attention to the diode polarity.



FORWARD POLARITY, MUST BE AROUND 0.5 V
1. SS-



REVERSE POLARITY, MUST BE OPEN CIRCUIT
1. SS+

If test failed, replace diode. Refer to *WIRING HARNESS AND CONNECTORS* for diode location.

NOTE: The diode is integrated in the harness near the starter solenoid.

DIGITALLY ENCODED SECURITY SYSTEM (D.E.S.S.)

GENERAL

SYSTEM DESCRIPTION

The ignition key contains a ROM chip with a unique digital code that is the equivalent of a unique teeth pattern on a conventional key.

When the ignition key is turned ON, the ECM reads the ignition key and, if it is not recognized, no engine starting will be possible.

NOTE: When a key is not recognized by the ECM, INVALID KEY will be displayed in the multifunction speedometer.

NOTE: All ignition keys have the same teeth pattern. Therefore, they can be used and turned in the switch of any D.E.S.S.-equipped vehicle. However, unless the D.E.S.S. system recognizes (in the ECM) a valid programmed key, the engine starting will not be allowed.

NOTE: Actually, it is the memory of the ECM that is programmed to recognize the digital code of the ignition key.

Up to 10 ignition keys may be programmed in the memory of the ECM. They can also be erased individually or all at once.

Note that the D.E.S.S. circuitry is already activated on all new ECM.

TROUBLESHOOTING

DIAGNOSTIC TIPS

NOTE: It is a good practice to check for fault codes using the BRP diagnostic software (BUDS2) as a first troubleshooting step.

If D.E.S.S. key is not recognized by the ECM, key is defective or there is a wiring problem, CHECK ENGINE light will turn on and a message will be displayed in the multifunction speedometer.

PROCEDURES

ADDING A KEY

1. Connect the vehicle to the BRP diagnostic software (BUDS2). Refer to *COMMUNICATION TOOLS* subsection.
2. Turn ignition switch to ON using any of the key provided with the vehicle. DO NOT start the engine.
3. Click on **Keys** page.
4. Turn ignition switch to OFF.
5. Remove the key.
6. Check the color of the key to be programmed.

KEY	KEY TYPE
BLACK key	Performance key
GRAY key	Normal key (30 km/h)
GRAY key	Normal key (40 km/h)

NOTE: A Black key can be programed as a normal key, however, it is recommended to have a different color key for different purpose. For example, having all black keys can be difficult to differentiate between a Performance key and a Normal 30 km/h key.

7. Insert the key to be programmed.
8. Turn ignition key to ON position.
9. Click on the appropriate **Add Key** button. The new key should be displayed in the table.
10. Repeat to program more keys if needed.

When new data is written in the ECM, a message that says "Remove key from vehicle" is displayed in the gauge. When this occurs, remove the key from ignition switch and wait until the message disappears.

11. Turn ignition key to ON position.
12. Erase occurred fault(s) in the fault tabs.
13. Turn ignition switch to OFF.

ERASING A KEY

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. Turn ignition switch to ON using the key to be erased. DO NOT start the engine.
3. Click on **Keys** page.
4. Click on **Erase Key**.

After approximately 10 seconds the following message will appear.

The key is now erased.

ERASING ALL KEYS

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. Turn ignition switch to ON using a key to be erased. DO NOT start the engine.
3. Click on **Keys** page.
4. Click on **Erase All Keys**.
5. When done, program at least one new key to the vehicle. Refer to *ADDING A KEY* in this subsection.

RADIO FREQUENCY DIGITALLY ENCODED SECURITY SYSTEM (RF D.E.S.S.)

GENERAL

SYSTEM DESCRIPTION

All Models (Except T Category Models)

This system limits engine or vehicle speed.

At startup the RF D.E.S.S. module attempts to read the key and sends a signal to the ECM. The ECM analyses the signal and determines if the key is:

– Performance
– Normal
– Work

SPEED/TORQUE LIMITED TO		
KEY	LIMIT	HOW
Performance	No D.E.S.S. imposed limit	Not applicable
Normal	Vehicle speed limited to 70 km/h (43 MPH)	By varying throttle opening (iTC)
Work	Vehicle speed limited to 40 km/h (25 MPH)	By varying throttle opening (iTC)
DESS key not recognized / Bad Key[1]	Engine will not start	ECM will not ground starter solenoid
[1] BUDS2 will display an error when trying to read key. Messages will scroll on gauge.		

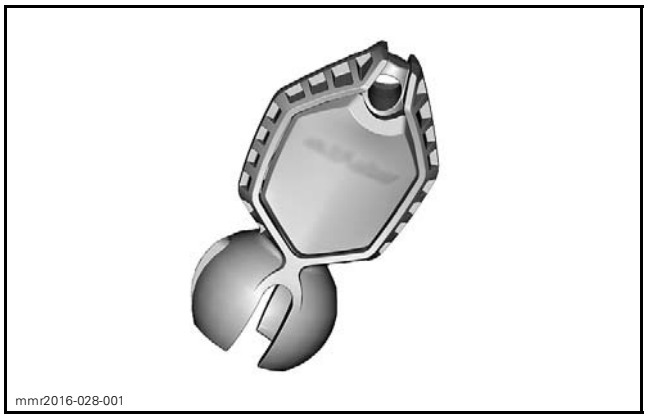
T Category Models

T category models are equipped with a mechanical D.E.S.S. key.

Troubleshooting and procedures remains the same for RF D.E.S.S. or mechanical D.E.S.S. keys

NOTE: Additional information on learning key modes and how an operator can modify engine torque and vehicle speed is available in the *OPERATOR'S GUIDE*.

RF D.E.S.S. KEY



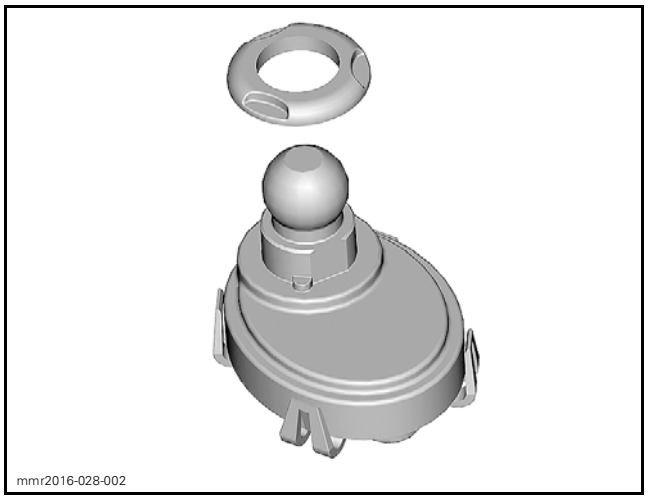
The RF D.E.S.S. key contains a magnet and a RFID chip.

– The magnet closes the hall effect switch inside the engine cut-off switch.
– The RFID chip contains a unique digital code. It is the equivalent of the tooth-pattern cut on a conventional ignition key.

RF D.E.S.S. keys are programmed in the ECM memory using BUDS2. The keys can also be erased individually.

NOTE: If desired, a RF D.E.S.S. key can be used on another vehicle equipped with the RF D.E.S.S. system. It only needs to be programmed for that vehicle.

RF D.E.S.S. MODULE / CUT-OFF SWITCH / D.E.S.S. POST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The hall effect switch (cut off switch) must be closed to start the engine.

The RF D.E.S.S. module emits an RF signal when the vehicle is powered up that activates the chip in the key, the module can then read the key.

The RF D.E.S.S. module does not determine the type of key, it only reads the chip for the ECM.

TROUBLESHOOTING

When starting the engine with a RF D.E.S.S. key on the engine cut-off switch, the key is identified by the ECM and RF D.E.S.S. signals will be issued according to the key recognition.

RF D.E.S.S. SIGNAL		DESCRIPTION	COMMENT
BEEPER	DISPLAYED MESSAGE		
2 shorts beeps	Can-Am	Welcome message, good key	Working RF D.E.S.S. key.
Short beeps repeating slowly	CHECK KEY	Unable to read key	– Make sure no accessory or accessory wires are near key or engine cut-off switch. – RPM limited to 2500. Vehicle cannot be driven – Check D.E.S.S. status in BUDS2 – No voltage at RFID connector pin D
Shorts beeps repeating rapidly	BAD KEY	Invalid key or key not programmed	– Use the proper key for this vehicle or have the key programmed. – RPM limited to 2500, Vehicle can not be driven.

PROCEDURES

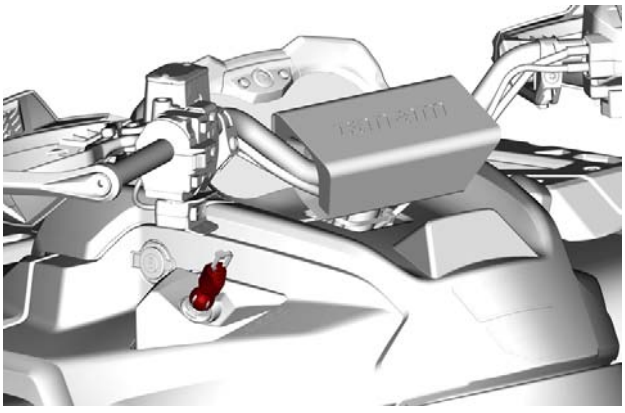
RF D.E.S.S. KEY

Programming RF D.E.S.S. Keys

1. Connect the vehicle to BRP diagnostic software (BUDS2). Refer to *COMMUNICATION TOOLS* subsection.

IMPORTANT: Ensure all connections have been made **before starting BUDS2** to allow proper operation.

2. Install the new key to be programmed on the engine cut-off switch.


219100951-019-001_a

3. In BUDS2, go to:
   – **Keys** page
   – In **Current Inserted Key**, **Read** the key to be programmed.
   – Select the **Key Type**
   – Then click on the **Add** button

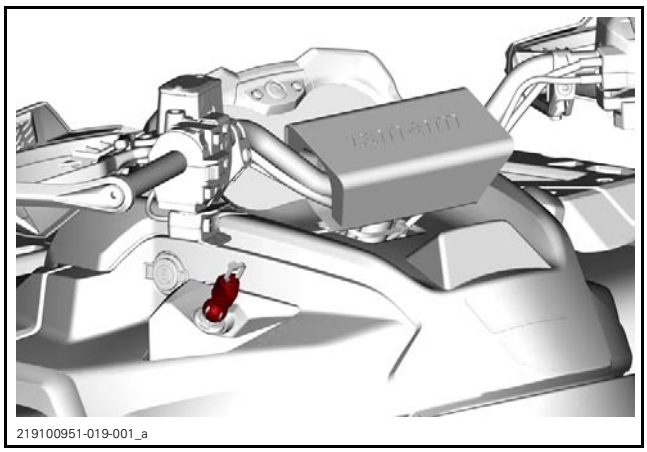
NOTE: Ensure that anti theft system is activated. If not, activate it before trying to add a key.

The D.E.S.S. key is now saved in the computer.

NOTE: To program other key(s), install a new key on the engine cut-off switch and repeat the procedure.

Erasing Keys

1. Install the key to be erased on the engine cut-off switch.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2. Connect the vehicle to the BRP diagnostic software (BUDS2), refer to *COMMUNICATION TOOLS* subsection.
3. In BUDS2, go to :
   – **Keys** page
   – In **Current Inserted Key**
   – Select **Erase key**

After approximately 10 seconds, a message will appear.

The key is now erased.

NOTE: This will only erase the key inserted in the engine cut-off switch.

Erasing All Keys

1. Connect the vehicle to the BRP diagnostic software (BUDS2), refer to *COMMUNICATION TOOLS* subsection.
2. In BUDS2, go to :
   – **Keys** page
   – In **Generic Settings**
   – Select **Erase All Keys**
3. When done, program at least one new key to the vehicle. Refer to *PROGRAMMING RF D.E.S.S. KEYS* in this subsection.

RF D.E.S.S. / ENGINE CUT-OFF OPERATION

Normal Operation

BUDS2 can read and recognize key type.

Vehicle starts.

Refer to *WIRING DIAGRAM*.

RFID CONNECTOR PIN	SPECIFICATIONS (DISCONNECTED RFID CONNECTOR) ECM AWAKE (PUSH START/STOP BUTTON)
A	Ground thru ECM
B	Ground to Stop Switch
C	0 Vdc (data signal to ECM)
D	12 Vdc

Key Not Recognized

The gauge scrolls the message: "Key not recognized".

Possible causes:
– Wrong key
– Damaged RFID chip
– No signal at RFID-C to ECM

Bad Key

The gauge scrolls the message: "Bad key".

Possible causes:
– Key not programmed to vehicle

Condition can be duplicated by installing a key that is not programmed to the vehicle.

Gauge and Vehicle Won't Stay Awake

The gauge powers off shortly after the start/stop button is pressed.

Possible causes:
– No key on D.E.S.S. post.
– Engine stop switch is in OFF position (if equipped).
– Magnet in key not closing hall effect switch in D.E.S.S. post.
– No voltage at RFID-D connector
– No voltage at RFID-B connector
– No ground at RFID-A connector

Condition can be duplicated by unplugging the RFID connector.

LIGHTS

SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	4

SERVICE PRODUCTS

Description	Part Number	Page
DEOXIT LUBRICANT	293 550 034	2
DIELECTRIC GREASE	293 550 004	2

GENERAL

NOTICE It is recommended to always disconnect the battery when replacing any electric or electronic parts. Always disconnect battery exactly in the specified order, BLACK (-) cable first.

TROUBLESHOOTING

DIAGNOSTIC TIPS

NOTE: It is a good practice to check for fault codes using the BRP diagnostic software (BUDS2) as a first troubleshooting step. Refer to *COMMUNICATION TOOLS* subsection.

IMPORTANT: When troubleshooting an electrical system fault, check battery condition, cables and connections first.

Testing a Circuit

Check the related-circuit fuse condition with a fuse tester or test lamp (a visual inspection could lead to a wrong conclusion).

NOTE: If the electrical system is left activated for a certain period of time, the accessory relay will shut down.

Inspecting an Electrical Connection

When replacing an electric or electronic component, always check electrical connections. Make sure they are tight, make good contact, and are corrosion-free. Dirty, loose or corroded contacts are poor conductors and are often the source of a system or component malfunction.

Pay particular attention to ensure that pins are not bent or pushed out of their connectors.

Ensure all wire terminals are properly crimped on wires, and connector housings are properly fastened.

Check for signs of moisture, corrosion or dullness. Clean pins properly with DEOXIT LUBRICANT (P/N 293 550 034) and coat them with DIELECTRIC GREASE (P/N 293 550 004) or other appropriate lubricant when reassembling them, except if otherwise specified such as for the ECM connector.

Pay attention to ground wires.

For wiring harness connector locations, refer to *WIRING HARNESS AND CONNECTORS* subsection.

DIAGNOSTIC GUIDELINES

LOW AND HIGH BEAM HEADLIGHTS WILL NOT COME ON SIMULTANEOUSLY (PLASTIC RACK MODELS)

1. Jumper JMP_F and/or JMP_M is open circuit or missing.
   - *Check JMP, located at MG2 Left handlebar switch connector. , refer to POWER DISTRIBUTION subsection.*

BRAKE LIGHTS WILL NOT COME ON WHEN BRAKES ARE APPLIED

1. Defective fuse.
   - *Check fuse, refer to the appropriate BRAKE LIGHT CIRCUIT PROTECTION in this subsection.*
2. Defective brake relay.
   - *Test brake relay (RY6), refer to POWER DISTRIBUTION subsection.*
3. Defective brake light switch(es).
   - *Refer to BRAKE LIGHT SWITCHES in the BRAKE subsection.*
4. Defective wiring/connectors.
   - *Test wiring continuity, refer to applicable WIRING DIAGRAM.*

TURN SIGNAL LIGHTS WILL NOT COME ON WHEN SELECTED

1. Defective fuse.
   - *Check fuse, refer to the appropriate TURN SIGNAL/HAZARD CIRCUIT PROTECTION in this subsection.*
2. Defective Flasher Module.
   - *Replace flasher module, refer to TURN SIGNALS/HAZARD in this subsection.*
3. Defective wiring/connectors.
   - *Test wiring continuity, refer to applicable WIRING DIAGRAM.*
4. Defective Turn Signal Switch.
   - *Test switch, refer to appropriate TURN SIGNALS/HAZARD in this subsection and to applicable WIRING DIAGRAM.*

HAZARD LIGHTS WILL NOT COME ON WHEN SELECTED

1. Defective fuse.
   - *Check fuse, refer to TURN SIGNAL/HAZARD CIRCUIT PROTECTION in this subsection.*
2. Hazard lights 12 Vdc input circuit open.
   - *Check wiring and connectors, refer to the appropriate TURN SIGNAL/HAZARD in this subsection. Refer to WIRING DIAGRAM.*

3. Hazard lights selector switch defective.
   - *Test switch, refer to the appropriate TURN SIGNAL/HAZARD in this subsection. Refer to WIRING DIAGRAM.*
4. Defective wiring/connector between hazard lights selector switch and flasher module.
   - *Refer to applicable WIRING DIAGRAM.*
5. Flasher module ground circuit open.
   - *Test wiring and connectors, refer to applicable WIRING DIAGRAM.*
6. Defective flasher module.
   - *Replace flasher module, refer to the appropriate TURN SIGNAL/HAZARD in this subsection.*

HAZARD LIGHTS COME ON WITHOUT BEING SELECTED

1. Hazard lights switch or wiring short circuit.
   - *Check for water in LH multifunction switch.*
   - *Test hazard light switch and wiring, refer to applicable WIRING DIAGRAM.*
2. Flasher module parallel Resistor is open.
   - *Test resistor (between hazard switch output and ground), refer to applicable WIRING DIAGRAM.*

TURN SIGNAL/HAZARD LIGHTS INDICATOR IN MULTIFUNCTION GAUGE WILL NOT COME ON WITH TURN SIGNAL OR HAZARD LIGHTS SELECTED ON, IGNITION SWITCH ON

1. Signal wire from flasher module to multifunction gauge open circuit.
   - *Test circuit continuity from flasher module (MC1_2–4) to multifunction gauge (C1–8).*
2. Defective flasher module.
   - *Replace flasher module, refer to the appropriate FLASHER MODULE in this subsection.*
3. Defective multifunction gauge.
   - *Replace multifunction gauge, refer to GAUGE subsection.*

HAZARD LIGHTS INDICATOR NOT WORKING WITH IGNITION SWITCH OFF

1. Diode D10 open circuit.
   - *Test diode, refer to applicable WIRING DIAGRAM.*

POSITION LIGHTS WILL NOT COME ON

1. Defective fuse.
   - *Check fuse, refer to the appropriate POSITION LIGHTS in this subsection.*
2. Power or ground circuit wiring.
   - *Check wiring continuity, refer to WIRING DIAGRAM.*
3. Defective light bulbs
   - *Test/replace light bulbs.*

TRAILER LAMPS WILL NOT COME ON

1. No trailer plugged.
   - *Plug a trailer.*
2. Trailer tail lamps are flashing at a higher frequency than normal.
   - *Make sure that the trailer circuits turn light/hazard trailers lamps are equivalent to 40 Watts.*

PROCEDURES

ACTIVATING THE ELECTRICAL SYSTEM

NOTICE Activating the electrical system repeatedly or using electrical equipment will discharge the battery and you may not be able to start the engine.

Turn the ignition key to the ON position

HEADLIGHTS

Headlight Wire Identification

HEADLIGHTS RELAY (RY3)	
FUNCTION	PIN
12 volt input from fuse F2 (headlights power)	D 6
12 volt input from fuse F1 (relay winding input, through Ignition switch)	C6
12 volt output to light switch	C5
Relay winding ground (from ECM G1)	D5

LIGHT SWITCH		
FUNCTION	PIN	COLOR
12 volt input from headlights relay	MG2-4	RD/BU
12 volt output to high beam headlights	MG2-5	BU
12 volt output to low beam headlights	MG2-2	GN

Headlights Circuit Protection

CONDITION	CIRCUIT PROTECTION
Unswitched	Fuse 2

Testing the Headlights

1. Disconnect LOW beam and HIGH beam headlight bulb connectors. Refer to *REPLACING THE HEADLIGHT BULB* in this subsection.
2. Turn the ignition key to the ON position.
3. Measure the voltage on headlight connector as follows.

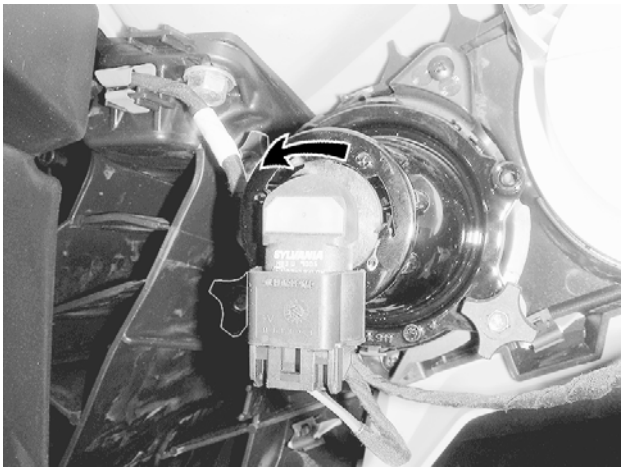
REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

LIGHT SWITCH POSITION	WIRE COLOR		VOLTAGE
LO beam	BU (Low beam connector)	BK	Battery voltage
HI beam			
HI beam	GN (Hi beam connector)		

Replacing the Headlight Bulb

NOTICE Never touch glass portion of a halogen bulb with bare fingers, it shortens its operating life. If glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

1. Unplug connector from bulb.
2. Rotate bulb.



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TYPICAL

3. Pull bulb out.
4. Properly reinstall removed parts in the reverse order of their removal.
5. Validate headlight operation.

HEADLAMP BEAM AIMING (ALL MODELS)

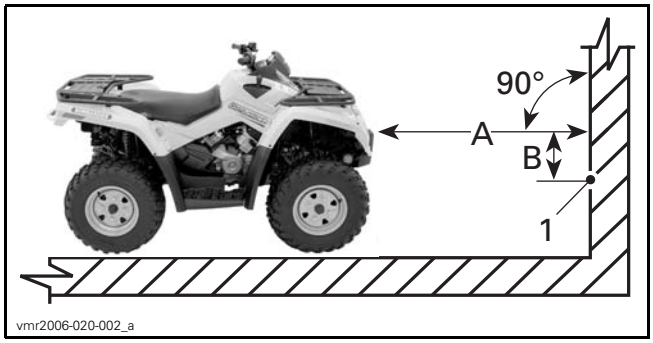
NOTE: Load vehicle as per normal use.

1. Position vehicle on a level surface 5 m (16 ft) in front of a test surface (wall or screen) as in first illustration.
2. Measure the distance from the center of each headlight to the ground (high beam and low beam).
3. Trace a line on the test surface parallel to the ground at each measured height (one for high beam and one for low beam).

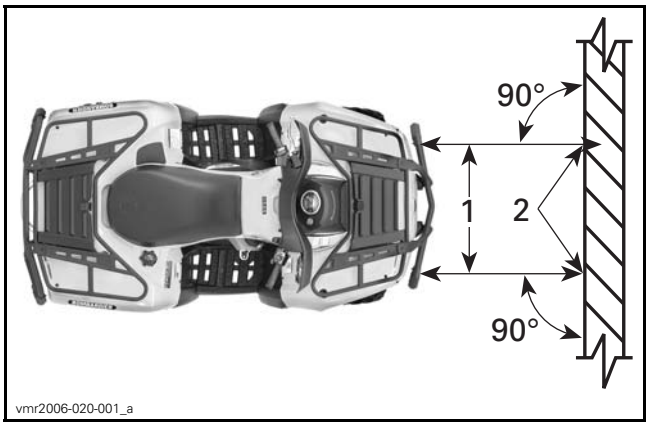
Low beam aiming is correct when the crest of the low beam is **below** the applicable horizontal center line traced on the test surface as per specification.

High beam aiming is correct when the center of the high beam (focus point) is **below** the applicable horizontal center line traced on the test surface as per specification.

SPECIFICATION	
Low beam crest (top of low beam)	25 mm to 125 mm (1 in to 5 in) **below** applicable line
High beam center (focus point)	



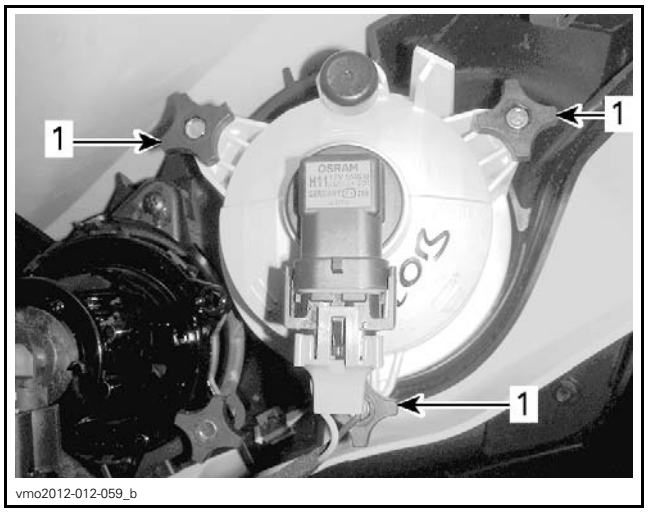
TYPICAL
1. Light beam center
A. 5 m (16 ft)
B. Beam aiming specification



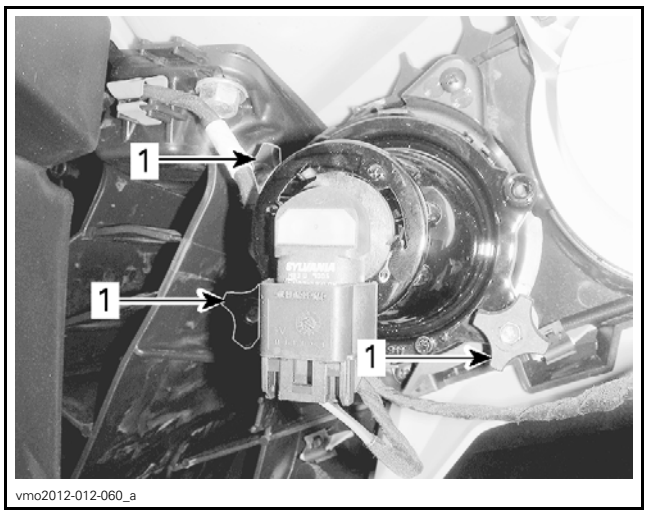
TYPICAL
1. Headlight center lines
2. Light beam center

Adjusting Beam Aiming

Turn adjustment knobs to adjust beam height and side orientation to specification.



OUTLANDER LOW BEAM
1. Adjustment knobs



OUTLANDER HIGH BEAM AND RENEGADE LOW BEAM/HIGH BEAM
1. Adjustment knobs

TAILLIGHTS/BRAKE LIGHTS

Brake Light Switch

For brake light switch location and testing, refer to *BRAKES* subsection.

Brake Light Wire Identification

BRAKE LIGHT RELAY (RY6)	
FUNCTION	PIN
12 volt input from fuse F7 (brake light power)	B12
12 volt input from F7 (relay winding input)	B11
12 volt output to LH and RH brake lights	A11
Relay winding ground (from brake light switch(es)) (Only on ABS version)	A12

Brake Light Circuit Protection

CONDITION	CIRCUIT PROTECTION
Supplied when: Main relay RY2 activated Brake relay RY6 activated	Fuse 7 (from Main relay RY2)

Taillight Wire Identification

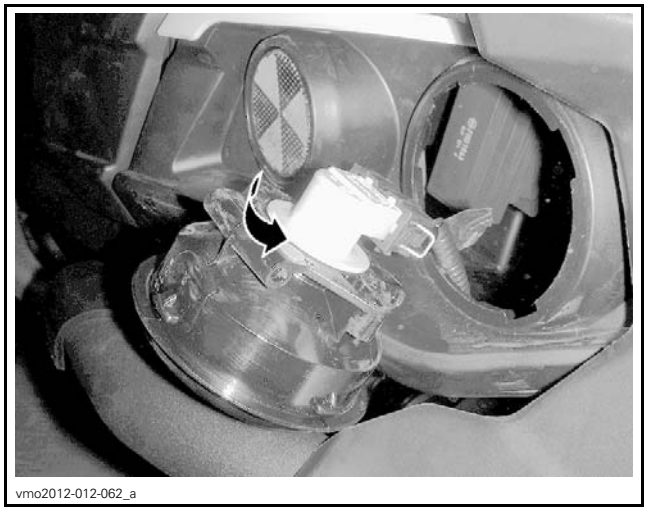
FUNCTION	PIN	CIRCUIT PROTECTION
Supplied when Main relay RY2 activated	3	VI/WT
Ground from BK20	2	BK

Taillight Circuit Protection

CONDITION	CIRCUIT PROTECTION
Supplied when Main relay RY2 activated	Fuse 7 (from Main relay RY2)

Taillight/Brake Light Bulb Replacement

1. Unplug connector from bulb.
2. Rotate light bulb counterclockwise to remove it from taillight.



ROTATE BULB COUNTERCLOCKWISE

3. Remove bulb socket from taillight.

Installation is the reverse of the removal procedure.

POSITION LIGHTS

Headlight Wire Identification

NOTE: The position lights and licence plate light are supplied whenever the light relay RY3 is activated.

LIGHT RELAY (RY3)	
FUNCTION	PIN
12 volt input from fuse F2	D6
12 volt input from F6 (relay winding input)	C6
12 volt output to lights	C5
Relay winding ground (from ECM G1)	D5

Position Light Circuit Protection

CONDITION	CIRCUIT PROTECTION
Supplied when relay RY3 is activated	Fuse 2 (from light relay RY3)

TURN SIGNALS/HAZARD

Turn Signal/Hazard Lights Wire Identification

FLASHER MODULE		
FUNCTION	PIN	COLOR
12 volt input from fuse F10 (unswitched)	MC1_2-1	RD/WH

FLASHER MODULE		
FUNCTION	PIN	COLOR
12 volt input from fuse F7 (switched)	MC1_1-5	VT/WH
RH turn 12 volt input from turn signal switch	MC1_1-1	BG/BN
LH turn 12 volt input from turn signal switch	MC1_1-2	BG/GY
Output to RH turn signal lights	MC1_2-2	BN
Output to LH turn signal lights	MC1_2-3	GY
Output to multifunction gauge (turn signal indicator)	MC1_2-4	WH/VT
Ground	MC1_1-4	BK
Hazard 12 volt input from hazard switch	MC1_1-6	BG/RD

TURN SIGNAL SWITCH (IN MULTIFUNCTION SWITCH)		
FUNCTION	PIN	COLOR
12 volt input from fuse F7 (unswitched)	MG3-3	RD/BK
RH turn 12 volt output to flasher module	MG3-1	BG/BN
LH turn 12 volt output to flasher module	MG3-2	BG/GY

HAZARD SWITCH		
FUNCTION	PIN	COLOR
12 volt input from fuse F10 (unswitched)	MG3-6	RD/WT
12 volt output to flasher module	MG3-5	BG/RD
12 volt output to TellTale		

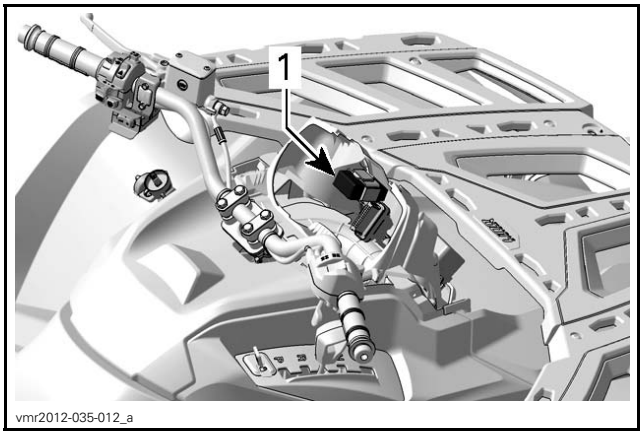
Turn Signal/Hazard Circuit Protection

TURN SIGNAL CIRCUIT	
CONDITION	CIRCUIT PROTECTION
Supplied with Main relay (RY2) activated	Fuse 7 (from Accessories relay RY3)
Battery power (continuous)	Fuse 10

HAZARD CIRCUIT	
CONDITION	CIRCUIT PROTECTION
Battery power (continuous)	Fuse 10

Flasher Module Access

Remove multifunction gauge.



TYPICAL
1. Flasher module location

TRAILER PLUG

Trailer Plug Wire Identification

TRAILER FLASHER MODULE		
FUNCTION	PIN	COLOR
Output to trailer adaptor to RH turn signal	MC2_2-2	GN
Output to trailer adaptor to LH turn signal	MC2_2-3	YE
12 volt input from fuse F10 (unswitched)	MC2_2-1	YE/RD
Indicator to tell tale	MC2_2-4	OG
Hazard 12 volt input from hazard switch	M2_1-6	BG/RD
12 volt input from fuse F7 (switched)	MC2_1-5	VT/WH
LH turn 12 volt input from flasher switch	MC2_1-2	BG/GY
RH turn 12 volt input from flasher switch	MC2_1-1	BG/BN
Ground	MC2_1-4	BK

COMPACT DIGITAL GAUGE

SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	7

SERVICE PRODUCTS

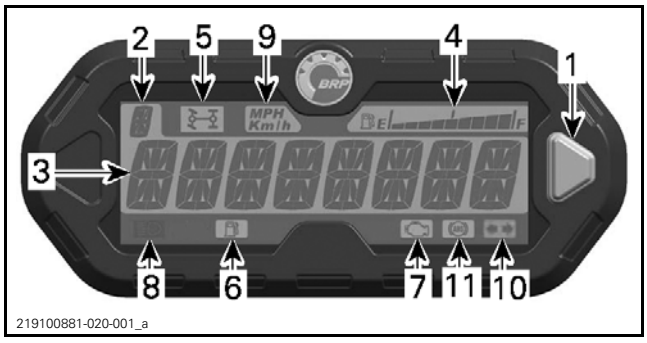
Description	Part Number	Page
DEOXIT LUBRICANT	293 550 034	5
DIELECTRIC GREASE	293 550 004	5

GENERAL

NOTICE It is recommended to always disconnect the battery when replacing any electric or electronic parts. Always disconnect battery exactly in the specified order, BLACK (-) cable first.

COMPACT DIGITAL MULTIFUNCTION GAUGE

Multifunction Gauge Description



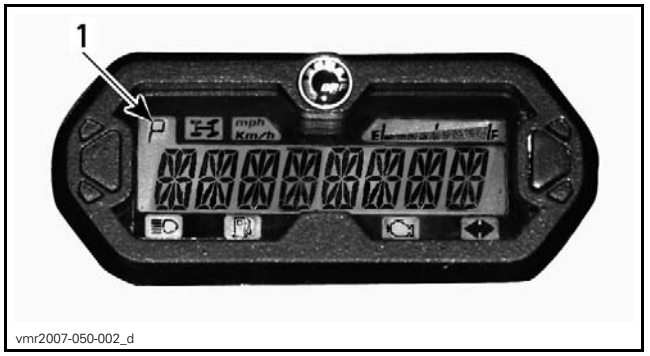
1. *Selector button*
2. *Transmission position display*
3. *Main screen*
4. *Fuel level display*
5. *4WD indicator lamp*
6. *Low fuel level indicator lamp*
7. *Check engine indicator lamp*
8. *High beam indicator lamp*
9. *MPH, Km/h indicator lamp*
10. *Signal lights/hazard lights indicator lamp*
11. *ABS indicator lamp*

1) Selector Button

The selector button is used to navigate or change settings in the multifunction gauge.

2) Transmission Position Display

This display will show transmission position.



1. *Transmission position*

DISPLAY	FUNCTION
P	Park
R	Reverse
N	Neutral
H	High range
L	Low range

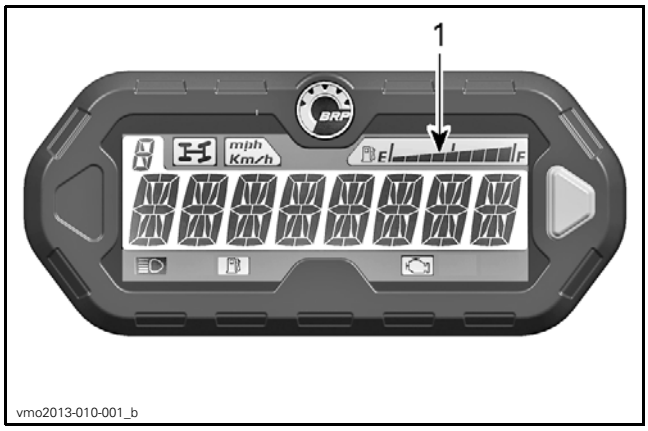
3) Main Screen

The main screen is used to display numerous functions of the multifunction gauge.

Refer to *MULTIFUNCTION DISPLAY MODES* for the available display modes.

4) Fuel Level Display

Bar gauge continuously indicates the level of fuel in the fuel tank while riding.



1. Fuel level display

5) 4WD Indicator Lamp

When this indicator is ON, it indicates the **4WD** system is activated.

6) Low Fuel Level Indicator Lamp

When this indicator is ON, it indicates that there is approximately 5 L (1.3 U.S. gal.) of fuel left in fuel tank.

7) Check Engine Indicator Lamp

When this indicator is ON, it indicates an engine fault code, look for a message in the main screen display.

When this indicator blinks, it indicates that **LIMP HOME** mode is activated.

8) High Beam Indicator Lamp

When this indicator is ON, it indicates that **high beam** is selected on the headlights switch and that the ignition key is in the "ON with lights" position.

9) KM/H or MPH Indicator Lamp

mph
Km/h

The applicable lamp turns on to indicate the active speedometer unit of display.

10) Turn signal/Hazard lights Indicator Lamp (If equipped)

When this indicator is ON, it indicates:
– A turn signal is activated, or
– The hazard lights are activated.

11) ABS Indicator Lamp (If equipped)

The applicable lamp turns on to indicate ABS system malfunction.

Multifunction Display Modes

Speed Mode

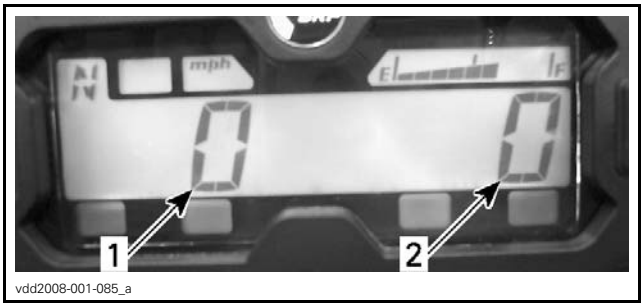
In this mode, the display shows the speed of the vehicle either in km/h or in MPH.

RPM Mode

In this mode, the display shows the engine RPM.

Combined Mode

In this mode, the display shows the speed of the vehicle and the engine RPM.



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1. *Vehicle speed*
2. *Engine RPM*

Odometer (OD)

Odometer records the total distance travelled either in miles or kilometers.

vsi2009-018-030

Clock

Shows current time.

vmo2011-008-001

Refer to *PROCEDURES* to set current time.

Trip Meter (TP)

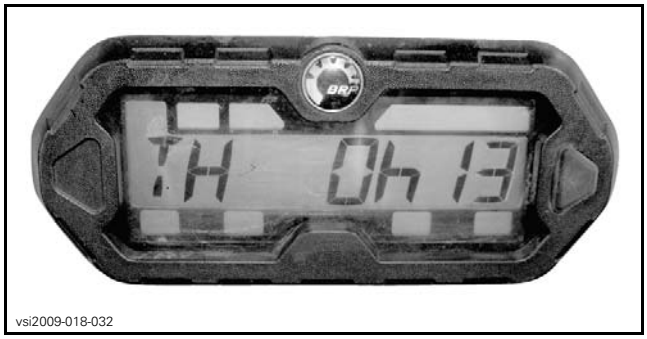
The trip meter records the travelled distance since it has been reset. Distance travelled is displayed either in kilometers or miles.

vsi2009-018-031

Press and HOLD the selector button for 2 seconds to reset the trip meter.

Trip Hour Meter (TH)

The trip hour meter records vehicle running time when the electrical system is activated. It can be used to establish traveling time between 2 places.



vsi2009-018-032

Press and HOLD the selector button for 2 seconds to reset the hour meter.

Engine Hour Meter (EH)

The engine hour meter records engine running time.

vsi2009-018-033

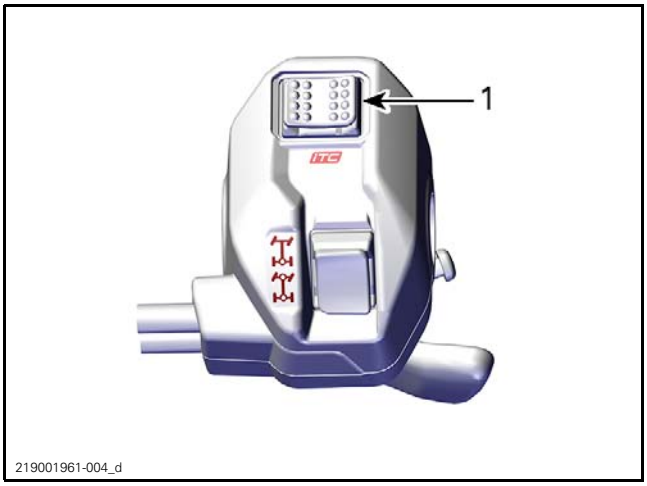
Message Display Mode

If an abnormal engine condition occurs, a message may scroll across the main screen in conjunction with a pilot lamp.

Refer to *DIAGNOSTIC AND FAULT CODES* subsection.

Driving Modes (If equipped)

Some models are equipped with a driving mode selector.



1. Driving mode selector

A message of the selected mode will be displayed at activation and deactivation as follow:

DRIVE MODE	MESSAGE AT ACTIVATION
Sport	SPORT MODE
Normal	NORMAL MODE
Work (If equipped)	WORK MODE
Eco (If equipped)	ECO MODE

Navigating the LCD Gauge

⚠ WARNING

Never adjust or set functions on the multi-function gauge while riding the vehicle.

Default Display Mode

After vehicle startup, the default display mode is either:

– Vehicle speed
– Engine revolutions per minute (RPM)
– Both parameters simultaneously (combined mode).

To change from one display to the other, proceed as follows.

1. Turn ignition key to ON to power-up the system.
2. Wait until the "greeting message" has been displayed.
3. Press and release selector button once to display OD (odometer).
4. Press the selector button again, this time for 2 seconds.

This will change the Mode to either Speed, RPM or Combined.

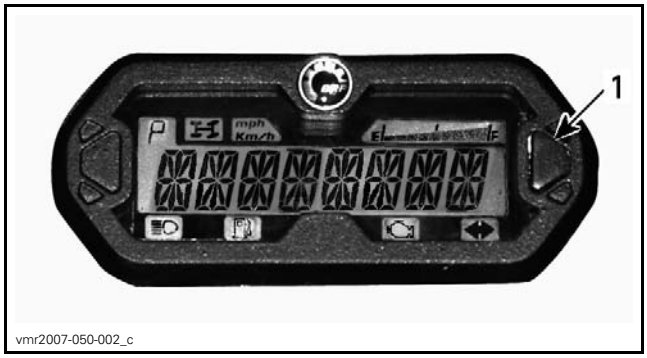
5. To select another mode, repeat steps 3 and 4 until the desired mode is displayed.

Temporary Display Mode

In the temporary display mode, the following functions are available:

– Odometer
– Clock
– Trip meter (resettable)
– Trip Hour meter (resettable)
– Engine hour meter.

Press and release selector button to change the default display mode to the temporary mode.



1. Selector button

The gauge will display the selected mode for 10 seconds then will return to the normal display mode.

While in a resettable mode, push and HOLD selector button for 2 seconds to reset it.

TROUBLESHOOTING

DIAGNOSTIC TIPS

NOTE: It is a good practice to check for fault codes using Use the BRP diagnostic software (BUDS2) as a first troubleshooting step. Refer to *COMMUNICATION TOOLS* subsection.

IMPORTANT: When troubleshooting an electrical system fault, check battery condition, cables and connections first.

Testing a Circuit

Check the related-circuit fuse condition with a fuse tester or test lamp (a visual inspection could lead to a wrong conclusion).

NOTE: If the ignition switch is left ON for a certain period of time, the accessory relay will shut down.

Inspecting an Electrical Connection

When replacing an electric or electronic component, always check electrical connections. Make sure they are tight, make good contact, and are corrosion-free. Dirty, loose or corroded contacts are poor conductors and are often the source of a system or component malfunction.

Pay particular attention to ensure that pins are not bent or pushed out of their connectors.

Ensure all wire terminals are properly crimped on wires, and connector housings are properly fastened.

Check for signs of moisture, corrosion or dullness. Clean pins properly with DEOXIT LUBRICANT (P/N 293 550 034) and coat them with DIELECTRIC GREASE (P/N 293 550 004) or other appropriate lubricant when reassembling them, except if otherwise specified such as for the ECM connector.

Pay attention to ground wires.

For wiring harness connector locations, refer to *WIRING HARNESS AND CONNECTORS* subsection.

DIAGNOSTIC GUIDELINES

MULTIFUNCTION GAUGE WILL NOT COME ON

1. Multifunction gauge not powered up.
   - *Check fuse(s), refer to CIRCUIT PROTECTION in this subsection.*
   - *Test multifunction gauge 12 Vdc input and ground circuits as per WIRING IDENTIFICATION in this subsection. Refer to applicable WIRING DIAGRAM.*
2. Defective Multifunction Gauge.
   - *Replace multifunction gauge.*

MULTIFUNCTION GAUGE COMMUNICATION ERROR

1. Multifunction gauge CAN circuit open.
   - *Ensure multifunction gauge is properly connected and powered up.*
   - *Check for applicable fault code using BUDS2, refer to DIAGNOSTIC AND FAULT CODES subsection.*
   - *Carry out TESTING THE CAN RESISTOR in this subsection.*
   - *Carry out a continuity test of the multifunction gauge CAN wires, refer to applicable WIRING DIAGRAM.*

NO FUEL QUANTITY INDICATION

1. Defective fuel level sender or wiring.
   - *Refer to FUEL TANK AND FUEL PUMP subsection.*
2. Defective Multifunction Gauge.
   - *Replace multifunction gauge, refer to PROCEDURES in this subsection.*

PROCEDURES

MULTIFUNCTION GAUGE

Resetting the "Maintenance Required" Message Using BUDS2

Connect the vehicle to the IBRP diagnostic software (BUDS2)..

Go to:
– **Summary** page
– **Vehicle** button

Click on the **Reset Service** button.

Resetting the "Maintenance Required" Message Using the Gauge Button

1. Select display and hold button as per following table:

GAUGE TYPE	DISPLAY	BUTTON (HOLD)
Analog / digital multifunction gauge	Odometer	SET (S)
Compact digital multifunction gauge	Default	Selector button

2. While holding the button, alternate between LOW beam and HIGH beam 3 times.

NOTE: Step 2 must be started on high beam and completed within **2 seconds**.

3. Release SET button.

Wiring Identification

FUNCTION	PIN
Switched 12 volt input from fuse F6 (1000R, T series and European models)	17
Switched 12 volt input from fuse F4 (All others)	
Unswitched 12 volt input from fuse F1 (1000R, T series and European models)	16
Unswitched 12 volt input from fuse F8 (All others)	
Ground	20
CAN LO	18
CAN HI	19
Fuel level gauge signal	4
Fuel level gauge ground	21
4WD ON	7
HI beam signal (+)	5
Overdrive ON	6
Flasher Signal	8

Circuit Protection

CONDITION	CIRCUIT PROTECTION
Supplied at all times	Fuse 1 of fuse block 1 (from fusible link 1)
Supplied with main relay activated	Fuse 6 of fuse block 1 (from main relay RY2 in fuse block 1)

Setting Using BUDS2

Connect the vehicle to the BRP diagnostic software (BUDS2).

Language Selection

Go to:
– **Settings** page
– **Cluster** button.
– **Configuration - Change Cluster Language** tab

Selecting Units

Go to:
– **Settings** page
– **Cluster** button.
– **Configuration - Change Cluster Units** tab

Setting the Clock

Go to:
– **Settings** page
– **Cluster** button.
– **Configuration - Change Real Time Clock** tab

Selecting Tire Size

Go to:
– **Settings** page
– **ECM** button.
– **Configuration - Change Tire Size** tab

Testing Using BUDS2

Connect the vehicle to the BRP diagnostic software (BUDS2)..

Wow Test

This function is used to check if the indicator lights, display and analog indicators (if applicable) are functional.

NOTE: This function does not test the signals or external circuits.

Go to:
– **Functions** page
– **Cluster** button.
– **Functions** tab.
– **Execute Cluster WOW test**

Monitoring Measurement Values

Connect the vehicle to the BRP diagnostic software (BUDS2).

In BUDS2, go to:
– **Measurements** page
– **Cluster** button
– **Preset** or **Custom** tab.

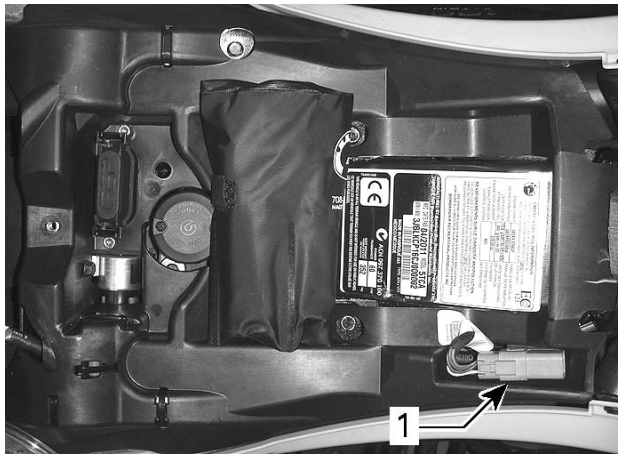
In **Preset** tab, select desired preset values (for example: Cluster Basic).

In **Custom** tab, a large list of measurements is displayed. It is possible to choose several values by clicking "Please Select".

Testing the CAN Resistor

Disconnect DPS connector. Refer to the appropriate *DYNAMIC POWER STEERING (DPS)* subsection.

1. Remove seat to access diagnostic link connector (DB).
2. Remove diagnostic link connector from its holder.



1. Diagnostic link connector (DB)

3. Measure the resistance of the CAN resistors as follows.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

CAN RESISTOR TEST	
DIAGNOSTIC LINK CONNECTOR	RESISTANCE
Pins 1 and 2	Approximately 60 Ω

NOTE: This tests both the ECM and the Cluster CAN resistors and wires.

TEST RESULT	
READING	POSSIBLE CAUSE
Approximately 60 Ω	ECM and CLUSTER CAN wires and resistors good
Approximately 120 Ω	CAN wire to CLUSTER open CAN wire to ECM open CLUSTER CAN resistor open ECM CAN resistor open
Infinite (open circuit)	CAN wire to DB connector open circuit

Removing the Multifunction Gauge (Outlander)

Remove gauge outer support.

– Push in on both sides of its leading edge to disengage it.
– Lift up and pull forward to remove.

NOTE: There are a total of 6 tabs that retain the gauge support.

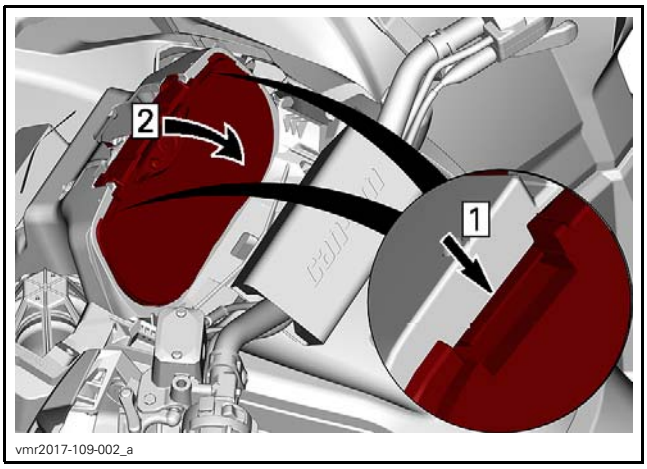
OUTER GAUGE SUPPORT REMOVAL
1. Push in and lift up here (both sides)

From the back of gauge support, rotate the gauge clockwise to release it from its support.

Analog / Digital Multifunction Gauge

Release tabs.

Tilt gauge rearward.

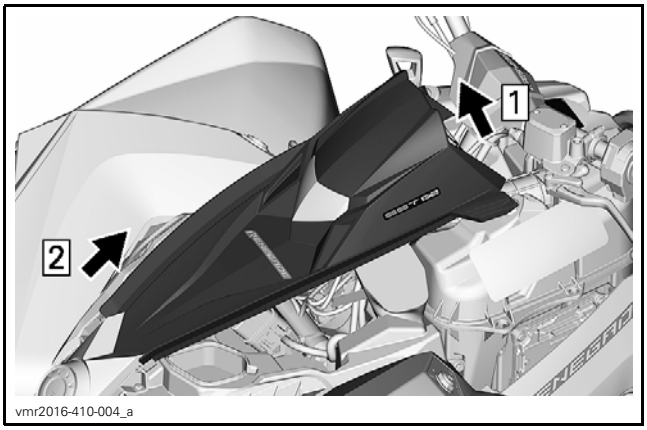


Disconnect the gauge connector.

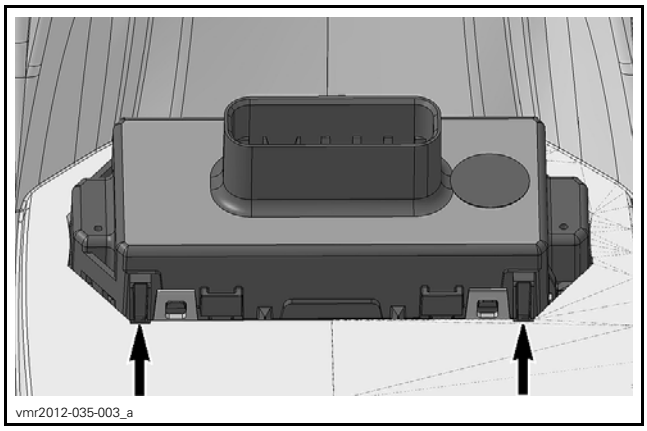
Remove gauge from the inner support by pulling it up.

Removing the Multifunction Gauge (Renegade)

1. Remove console panel, refer to *BODY* subsection.
2. Remove the gauge support as shown.



3. From the back of the gauge support, release the gauge retaining tabs and remove the gauge from its support.



GAUGE RELEASE TABS (4)

Installing the Multifunction Gauge

For the installation, reverse the removal procedure.

ACCESSORIES

SERVICE PRODUCTS

Description	Part Number	Page
DEOXIT LUBRICANT	293 550 034	1
DIELECTRIC GREASE	293 550 004	1

GENERAL

NOTICE It is recommended to always disconnect the battery when replacing any electric or electronic parts. Always disconnect battery exactly in the specified order, BLACK (-) cable first.

TROUBLESHOOTING

DIAGNOSTIC TIPS

NOTE: It is a good practice to check for fault codes using BRP diagnostic software (BUDS2) as a first troubleshooting step. Refer to *COMMUNICATION TOOLS* subsection.

IMPORTANT: When troubleshooting an electrical system fault, check battery condition, cables and connections first.

Testing a Circuit

Check the related-circuit fuse condition with a fuse tester or test lamp (a visual inspection could lead to a wrong conclusion).

NOTE: If the electrical system is left activated for a certain period of time, the accessory relay will shut down. See *ACTIVATING THE ELECTRICAL SYSTEM* in this subsection for details.

Inspecting an Electrical Connection

When replacing an electric or electronic component, always check electrical connections. Make sure they are tight, make good contact, and are corrosion-free. Dirty, loose or corroded contacts are poor conductors and are often the source of a system or component malfunction.

Pay particular attention to ensure that pins are not bent or pushed out of their connectors.

Ensure all wire terminals are properly crimped on wires, and connector housings are properly fastened.

Check for signs of moisture, corrosion or dullness. Clean pins properly with DEOXIT LUBRICANT (P/N 293 550 034) and coat them with DIELECTRIC GREASE (P/N 293 550 004) or other appropriate lubricant when reassembling them, except if otherwise specified such as for the ECM connector.

Pay attention to ground wires.

For wiring harness connector locations, refer to *WIRING HARNESS AND CONNECTORS* subsection.

PROCEDURES

ACTIVATING THE ELECTRICAL SYSTEM

NOTICE Activating the electrical system repeatedly or using electrical equipment will discharge the battery and you may not be able to start the engine.

Turn the ignition key to the ON position

12 VOLT POWER OUTLET

Removing and Installing a 12 Volt Power Outlet

Remove the gauge support, refer to *GAUGE* in this subsection.

Unplug the connectors of the power outlet.

Unscrew the retaining nut.

Reverse procedure for installation.

12 Volt Power Outlet Wire Identification

FUNCTION	PIN	COLOR
12 volt input from fuse F3 (iTC equipped models)	2	RD/BN
12 volt input from fuse F12 (All others)		
Ground (to ground terminal BK3)	1	BK

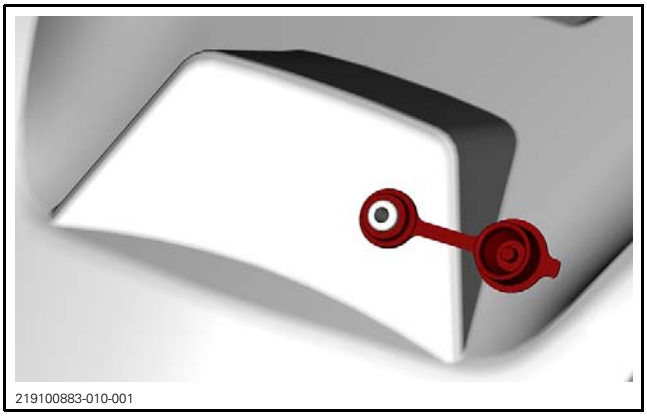
12 Volt Power Outlet Circuit Protection

CONDITION	CIRCUIT PROTECTION
Supplied with accessories relay (RY3 for iTC equipped models, RY5 for all others) activated	Fusible link 2 (FL2)

HEATED VISOR CONNECTORS

Removing and Installing the Front Heated Visor Connector

Unscrew the cap from the connector.

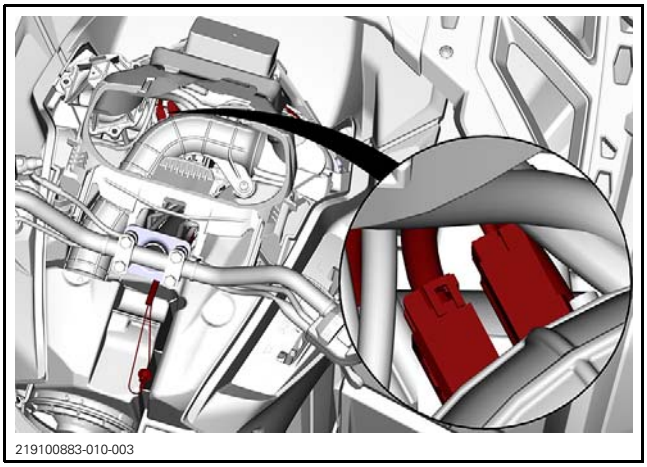


219100883-010-001

Refer to *GAUGE* and remove the gauge support.

Refer to *BODY* and remove:
- Windshield
- Console

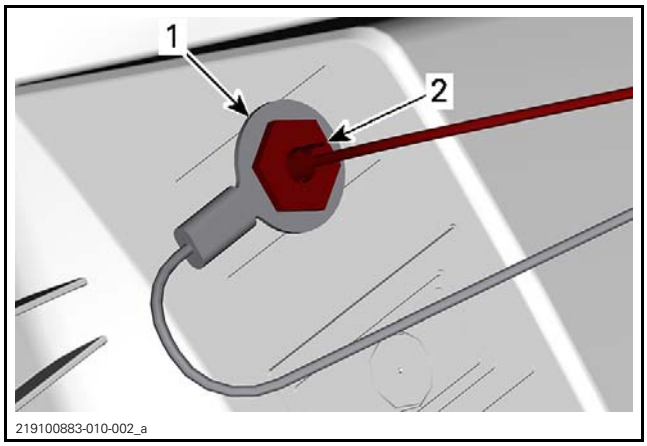
Disconnect the other end of the harness from the accessory connector.



219100883-010-003

The installation is the reverse of the removal procedure, however, pay attention to the following.

Install the negative wire eyelet between the console and the connector body.



219100883-010-002_a

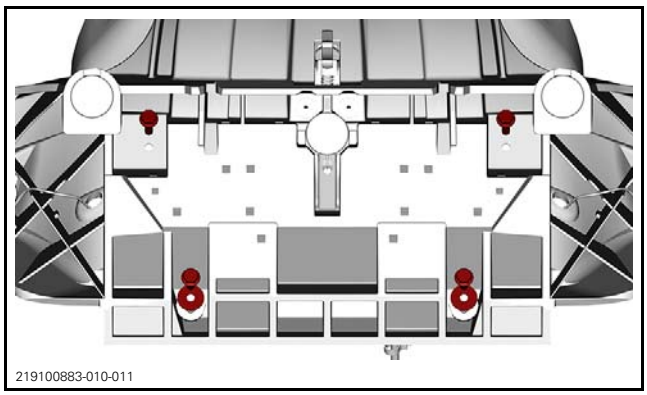
UNDERNEATH THE CONSOLE
1. *Negative eyelet*
2. *Connector body*

Removing and Installing the Rear Heated Visor Connector

Remove the rear seat.

Underneath, disconnect the seat harness connector.

Separate the seat cushion from the base.



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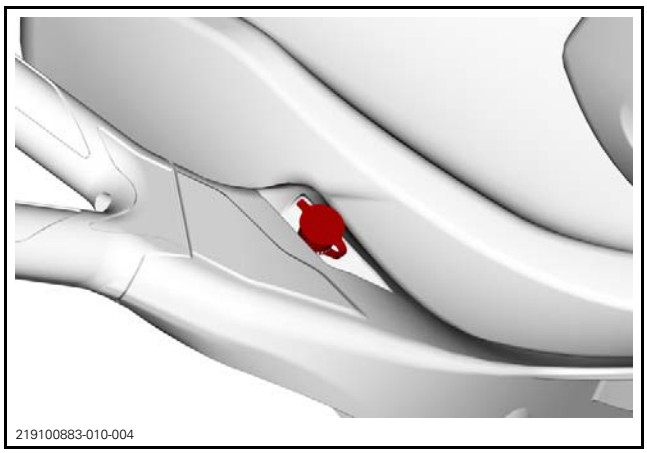
Remove the heated visor connector cap.

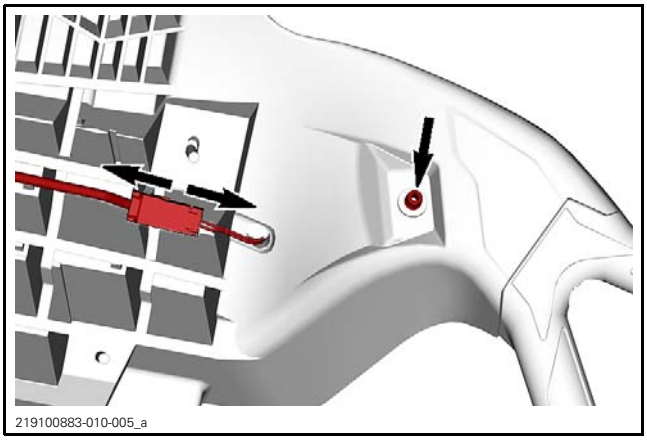


219100883-010-004

Cut the black wire near the eyelet.

Remove the heated visor connector from the handhold, then pass it through the openings.

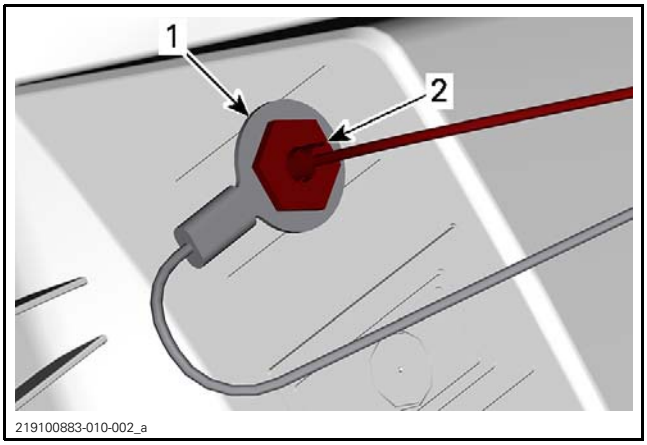
Disconnect the wires from the seat harness.



The installation is the reverse of the removal procedure, however, pay attention to the following.

Pass the wires through the openings, then crimp the new eyelet to the black wire.

Install the eyelet between the seat base and the connector body.



TYPICAL - UNDERNEATH THE SEAT BASE
1. *Negative eyelet*
2. *Connector body*

TIGHTENING TORQUE	
Seat cushion retaining screws	5 N•m ± 1 N•m (44 lbf•**in** ± 9 lbf•**in**)
Handhold retaining screws	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

Heated Visor Connectors Wire Identification

The heated visor connectors are connected to the DC3 accessory connector through an extension harness.

To verify the extension Harness, refer to *TESTING THE REAR EXTENSION HARNESS OUTPUT VOLTAGE* in *HEATED PASSENGER GRIPS*.

FUNCTION	PIN	COLOR
12 volt power supply from fuse F3	Welded	RD/BN
Ground (to ground terminal BK3)	Eyelet	BK

Heated Visor Connectors Circuit Protection

CONDITION	CIRCUIT PROTECTION
Accessories relay (RY3) activated	Fuse 3

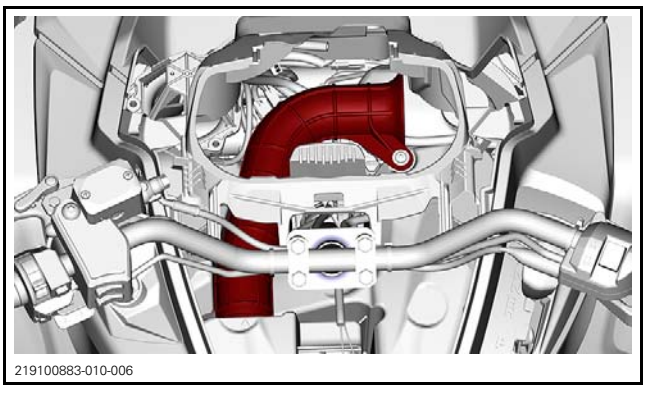
HEATED THROTTLE LEVER

Removing and Installing the Heated Throttle Lever

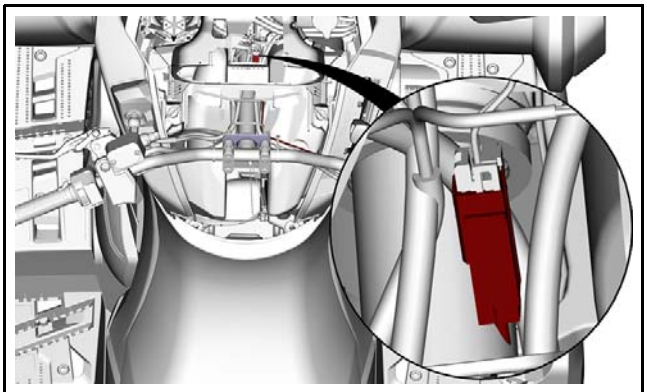
Refer to *GAUGE* and remove the gauge support.

Refer to *BODY* and remove:
- Windshield
- Console

Remove the air intake tube retaining screw.



Move the air intake tube aside, and disconnect the throttle lever wires from the accessories connector.


219100883-010-009

Note the wire routing and cable ties position.

Cut the cable ties.

Refer to *STEERING SYSTEM* and remove the throttle lever.

The installation is the reverse of the removal procedure, however, pay attention to the following.

TIGHTENING TORQUE	
Air intake tube retaining screw	1.6 N•m ± 0.4 N•m (14 lbf•**in** ± 4 lbf•**in**)

Heated Throttle Lever Wire Identification

The throttle lever heated element is connected to a switch which is to connected to connector DC5.

FUNCTION	PIN	COLOR
12 volt power supply to switch from fuse F4 (iTC equipped models)	B	RD/VT
12 volt power supply to switch from fuse F12 (450 engine)		
12 volt power supply to switch from fuse F14 (all others)		
Switch ground (to ground terminal BK3)	A	BK
Positive power supply to heating element (variable voltage)	2 Throttle lever side	OR
Heating element ground	1 Throttle lever side	BK

Heated Throttle Lever Circuit Protection

CONDITION	CIRCUIT PROTECTION
Accessories relay (RY5) activated (iTC equipped models)	F4
Accessories relay (RY3) activated (all others)	F12 (450 engine) F14 (all others)

Testing the Throttle Lever Heating Element

Refer to *REMOVING AND INSTALLING THE HEATED THROTTLE LEVER* for connector access.

Disconnect the heating element connector.

Measure the heating element resistance as per following table.

THROTTLE LEVER HEATING ELEMENT TEST		
HEATER WIRE		RESISTANCE @ 20°C (68°F)
OR	BK	21 to 26 Ω

If the resistance is out of specification, replace the throttle lever.

If resistance is good, carry out *TESTING THE THROTTLE LEVER HEATING ELEMENT INPUT VOLTAGE*.

Testing the Throttle Lever Heating Element Input Voltage

IMPORTANT: Make sure the switch power supply and ground are good before carrying out this test.

Refer to *REMOVING AND INSTALLING THE HEATED THROTTLE LEVER* for connector access.

Activate the electrical system or start engine.

Backprobe the heating element connector and measure voltage as per following table.

HEATING ELEMENT CONNECTOR		SELECTED HEAT LEVEL	VOLTAGE (APPROXIMATE)
OR wire	BK wire	1	3 to 3.5 Vdc
		2	6 to 7 Vdc
		3	9 to 10.5 Vdc
		4	12 to 14 Vdc

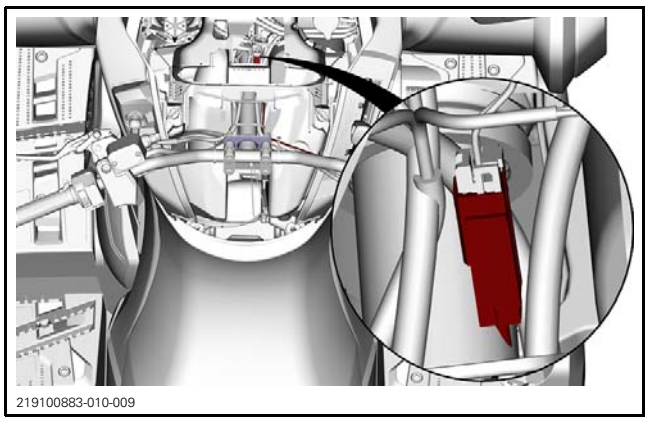
If voltage is out of specifications, replace the switch.

HEATED HANDLEBAR GRIPS

Removing and Installing the Heated Handlebar Grips

Refer to *BODY* and remove:
- Windshield
- Console
- Gauge support

Disconnect the heated grip wires from the switch harness.



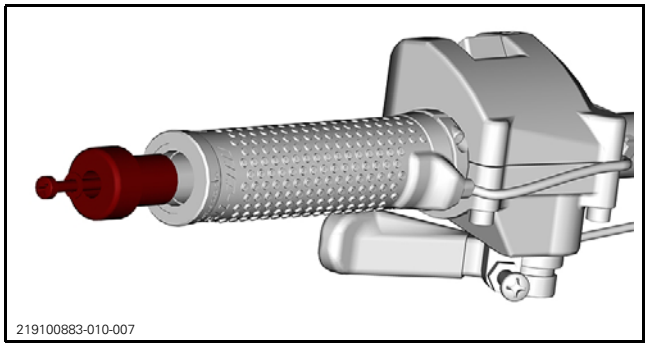
RH CONNECTOR SHOWN

Note the wire routing and cable ties position.

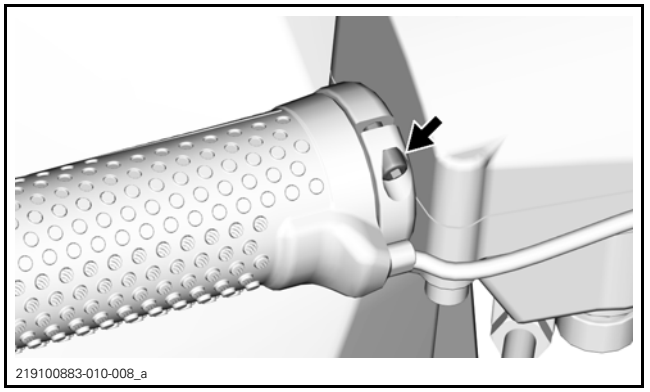
Cut the cable ties.

On the LH side, split the multifunction switch.

Remove the handlebar tip.



Loosen the grip clamping screw.



Remove the grip.

NOTE: If the grip does not come off, cut it lengthwise.

The installation is the reverse of the removal procedure, however, pay attention to the following.

TIGHTENING TORQUE	
Clamping screw	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)
Handlebar tip screw	0.4 N•m ± 0.1 N•m (4 lbf•**in** ± 1 lbf•**in**)

Heated Handlebar Grips Wire Identification

The heated handlebar grips switch is connected to connector DC5.

FUNCTION	PIN	COLOR
12 volt power supply to switch from fuse F4 (iTC equipped models)	B	WH
12 volt power supply to switch from fuse F12 (450 engine)		
12 volt power supply to switch from fuse F14 (all others)		
Switch ground (to ground terminal BK3)	A	BK
Positive power supply to heating element (variable voltage)	2 Switch side	RD
Heating element ground	1 Switch side	BK

Heated Handlebar Grips Circuit Protection

CONDITION	CIRCUIT PROTECTION
Accessories relay (RY5) activated (iTC equipped models)	F4
Accessories relay (RY3) activated (all others)	F12 (450 engine) Fuse 14 (all others)

Testing the Handlebar Grips Heating Element

If only one element is heating up, carry out this test.

If no element is heating up, carry out *TESTING THE HEATED HANDLEBAR GRIPS INPUT VOLTAGE*.

Refer to *REMOVING AND INSTALLING THE HEATED HANDLEBAR GRIPS* for connector access.

Disconnect the heating element connector.

Measure resistance as per following table.

GRIPS HEATING ELEMENT TEST		
HEATER WIRE		RESISTANCE @ 20°C (68°F)
RD	BK	8.5 to 10.5 Ω

If the resistance is out of specification, replace the grip.

If resistance is good, verify the accessory harness wiring continuity.

Testing the Heated Handlebar Grips Input Voltage

If no element is heating up, carry out this test.

If only one element is heating up, verify the accessory harness wiring continuity and carry out *TESTING THE HANDLEBAR GRIPS HEATING ELEMENT*.

IMPORTANT: Make sure the switch power supply and ground are good before carrying out this test.

Refer to *REMOVING AND INSTALLING THE HEATED HANDLEBAR GRIPS* for connector access.

Activate the electrical system or start engine.

Backprobe the heating element connector and measure voltage as per following table.

HEATING ELEMENT CONNECTOR		SELECTED HEAT LEVEL	VOLTAGE (APPROXIMATE)
OR wire	BK wire	1	3 to 3.5 Vdc
		2	6 to 7 Vdc
		3	9 to 10.5 Vdc
		4	12 to 14 Vdc

If voltage is out of specifications, replace the switch.

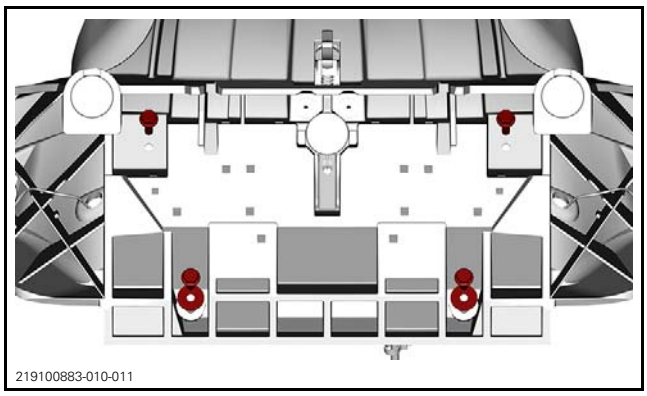
HEATED PASSENGER GRIPS

Removing and Installing the Heated Passenger Grips

Remove the rear seat.

Underneath, disconnect the seat harness connector.

Separate the seat cushion from the base.



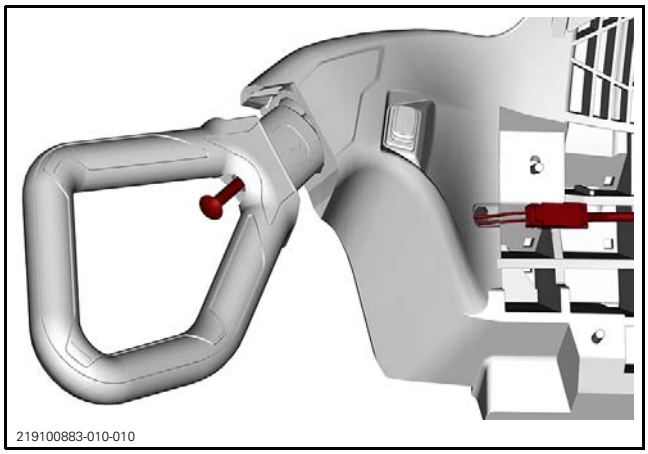
Note the wire routing.

Disconnect the wires from the seat harness.

Cut the heating element wires (on the handhold side).

Remove the handhold retaining screw.

Remove the handhold from the seat base.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The installation is the reverse of the removal procedure, however, pay attention to the following.

Once the wires are passed through the opening, insert and lock the terminals in the connector housing as per following table.

WIRE	CONNECTOR HOUSING PIN
GY	1
GN	2
RD	3

TIGHTENING TORQUE	
Seat cushion retaining screws	5 N•m ± 1 N•m (44 lbf•**in** ± 9 lbf•**in**)
Handhold retaining screws	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

Heated Passenger Grips Wire Identification

The heated passenger grips connector is connected to the DC3 accessory connector through an extension harness.

FUNCTION	COLOR
12 volt power supply to switch from fuse F12	RD/BK
12 volt power supply to heating element (HI)	RD
12 volt power supply to heating element (LO)	GN
Heating element ground (to ground terminal BK3)	GY

Heated Passenger Grips Circuit Protection

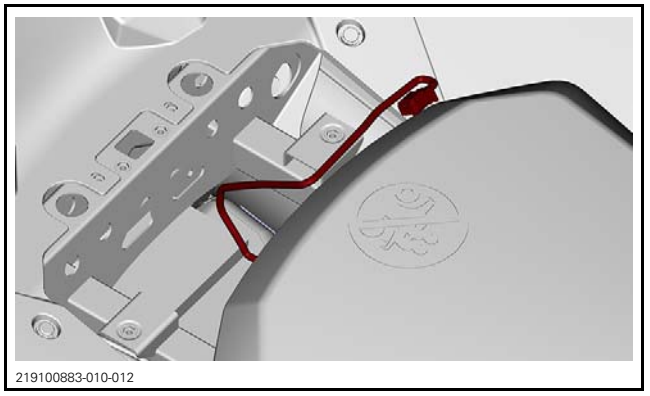
CONDITION	CIRCUIT PROTECTION
Accessories relay (RY3) activated	Fuse 12

Testing the Rear Extension Harness Output Voltage

Remove the rear seat.

Underneath, disconnect the seat harness connector.

REAR EXTENSION HARNESS CONNECTOR		VOLTAGE (APPROXIMATE)
RD/BR wire	BK wire	12 Vdc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Testing the Passenger Grips Switch Output

If no element is heating up, carry out this test.

If only one element is heating up, verify the accessory harness wiring continuity and carry out *TESTING THE PASSENGER GRIPS HEATING ELEMENT*.

IMPORTANT: Make sure the switch power supply is good before carrying out this test.

Backprobe the switch connector and measure voltage as per following table.

HEAT LEVEL	HEATED ELEMENT CONNECTOR		VOLTAGE (APPROXIMATE)
HI	RD wire	GY wire	12 Vdc
LO	GN wire		12 Vdc

If voltage is out of specifications, replace the switch.

If voltage is good, verify seat harness wiring continuity.

Testing the Passenger Grips Heating Element

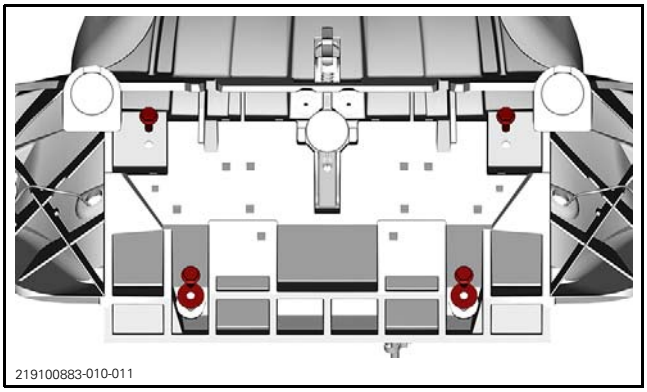
If only one element is heating up, carry out this test.

If no element is heating up, verify the accessory harness wiring continuity and carry out *TESTING THE PASSENGER GRIPS SWITCH OUTPUT*.

Remove the rear seat.

Underneath, disconnect the seat harness connector.

Separate the seat cushion from the base.



Disconnect the heating element connector.

Measure resistance as per following table.

GRIPS HEATING ELEMENT TEST		
HEATER WIRE		RESISTANCE @ 20°C (68°F)
GN	GY	13 to 17 Ω
RD		6 to 8 Ω

If the resistance is out of specification, replace the handhold.

HORN (IF EQUIPPED)

Horn Wire Identification

HORN SWITCH (IN MULTIFUNCTION SWITCH)		
FUNCTION	PIN	COLOR
12 volt input from fuse F10 (unswitched)	MG3-6	RD/WH
12 volt output to horn	MG3-4	BG/BK

HORN		
FUNCTION	PIN	COLOR
12 volt input from horn switch	2	BG/BK
Ground	1	BK

Horn Circuit Protection

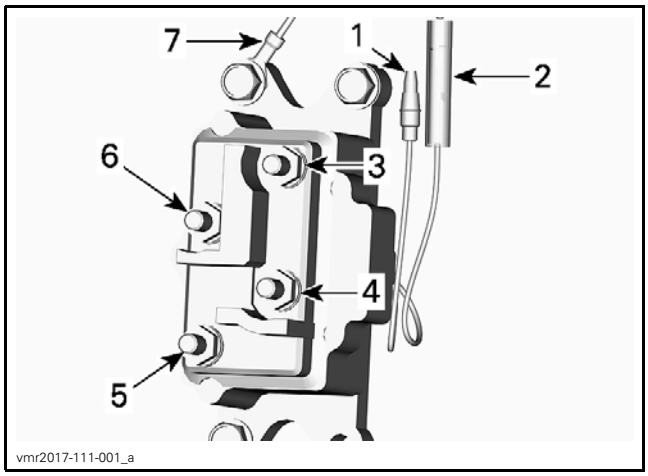
CONDITION	CIRCUIT PROTECTION
Battery power (unswitched)	Fuse 10

WINCH (IF EQUIPPED)

Winch Wire Identification

WINCH RELAY		
FUNCTION	PIN	COLOR
12 volt input from battery (winch power)	BP4	RD
Ground (Wire)	SW4	BK
Ground (Cable)	BN4	BK
12 volt input from switch (IN)	SW1	GN/BU
12 volt input from switch (OUT)	SW2	LT BU
Motor power (switches polarity depending on rotation direction)	SW3	RD (with blue sleeve)
Motor power (switches polarity depending on rotation direction)	SW5	RD (with yellow sleeve)

NOTE: The small black wire at terminal SW4 connected to the diodes is used to prevent electric arcs in the switch. It can also be connected to BN4.



WINCH RELAY
1. *To GN / BU wire*
2. *To LT BU wire*
3. *To winch motor cable with BLUE sleeve*
4. *To BK ground cable*
5. *To winch motor cable with YELLOW sleeve*
6. *To RD positive cable*
7. *BK ground wire (can also be connected with the ground cable)*

WINCH SWITCH		
FUNCTION	PIN	COLOR
12 volt input from fuse 7	A	RD/BK
12 volt output to relay winding (IN)	C	GN/BU
12 volt output to relay winding (OUT)	B	LT BU

NOTICE Before testing, make sure the winch is in FREESPOOL mode (Freespool clutch disengaged).

Winch Relay Access

Remove the RH inner fender panel. Refer to *BODY* subsection.

Winch Switch Circuit Protection

CONDITION	CIRCUIT PROTECTION
Supplied when accessories relay RY3 is activated	F9 (iTC models) F7 (all others)

Winch Motor Circuit Protection

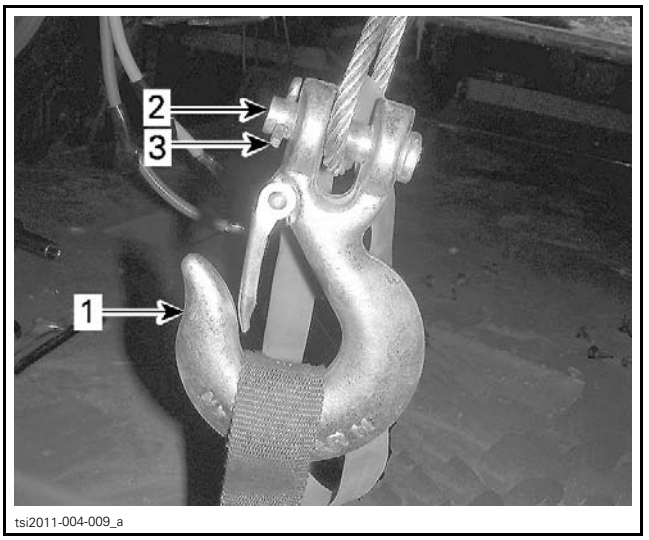
Two circuit breakers (50 A) are used to protect the winch motor in case of overheating.

Removing the Winch

1. Disconnect the battery BLACK (-) cable first, then the RED (+) cable.

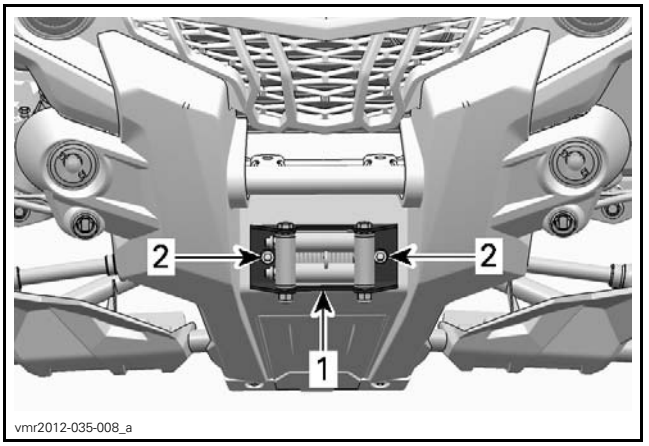
NOTICE Always respect this order for disassembly; disconnect BLACK (-) cable first.

2. Remove the hook.
   2.1 Remove and discard the cotter pin.
   2.2 Remove the hook pin.



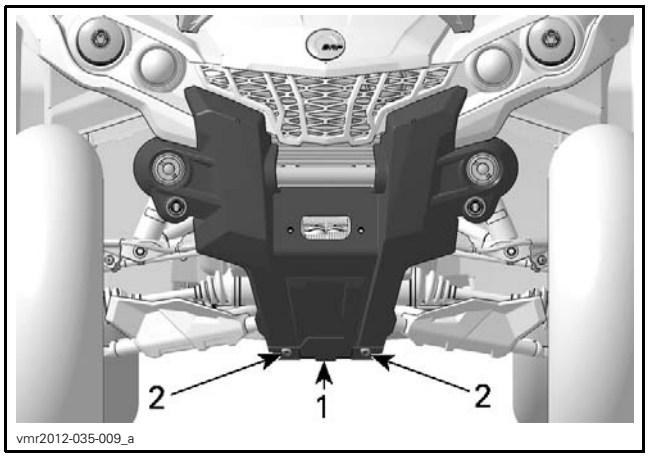
1. *Hook*
2. *Hook pin*
3. *Cotter pin*

3. Remove the winch cable fairlead.



TYPICAL
1. *Winch fairlead*
2. *Fairlead retaining screws*

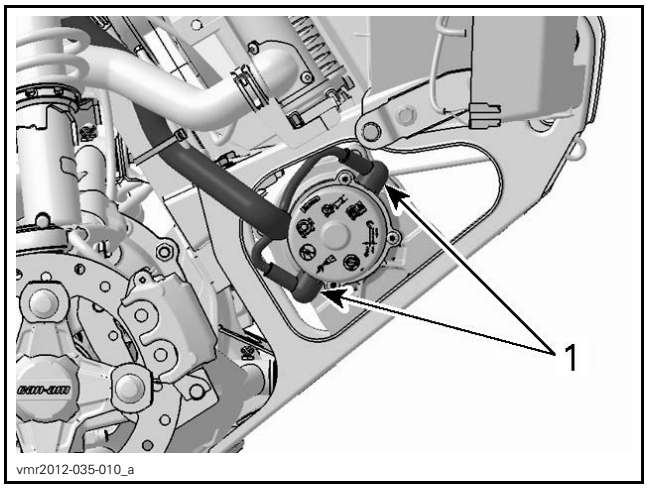
4. Remove the front skid plate.
5. Disconnect the turn signal lights and front marker lights (If equipped).



1. Front skid plate
2. Retaining screws

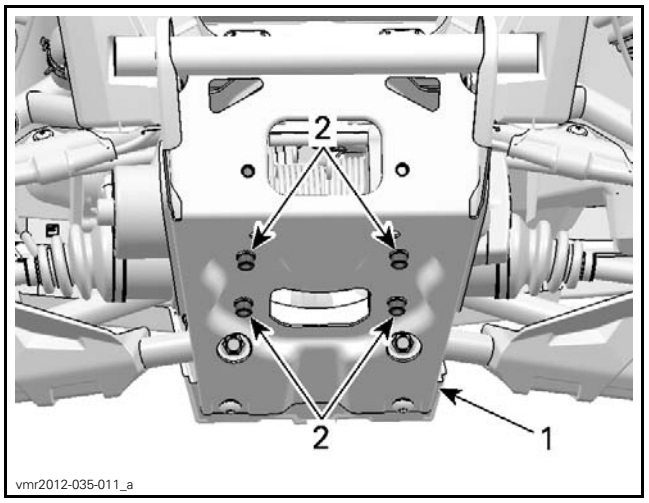
6. Disconnect both winch power cables.

NOTE: Note the position of the power cables for reinstallation.



TYPICAL
1. Winch power cables

7. Remove the four winch retaining screws from the front bumper support.



TYPICAL
1. Front bumper support
2. Winch retaining screws

8. Remove winch.

Installing the Winch

The installation is the reverse of the removal procedure. However, pay attention to the following.

Connect winch power cables as noted at removal.

NOTE: If the winch power cables are not connected correctly, the winch motor will operate in the reverse direction of selection.

TIGHTENING TORQUE	
Winch retaining screws	16 N•m ± 2 N•m (142 lbf•**in** ± 18 lbf•**in**)
Winch power cables	7 N•m ± .5 N•m (62 lbf•**in** ± 4 lbf•**in**)
Winch fairlead elastic nuts	16 N•m ± 2 N•m (142 lbf•**in** ± 18 lbf•**in**)

Install a **new** cotter pin on the hook pin.

WHEELS AND TIRES

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 767 (ANTI-SEIZE LUBRICANT)	293 800 070	3

PROCEDURES

TIRES

⚠ WARNING

Do not rotate tires. The front and rear tires have a different size. Respect direction of rotation when applicable.

Tire Pressure

⚠ WARNING

Tire pressure greatly affects vehicle handling and stability. Insufficient pressure may cause tire to deflate and rotate on wheel. Excessive pressure may burst the tire. Always follow recommended pressure.

Check pressure when tires are **cold** before using the vehicle. Tire pressure changes with temperature and altitude. Recheck pressure if one of these conditions has changed.

Refer to *TECHNICAL SPECIFICATIONS* for tire pressure table.

Tire Inspection

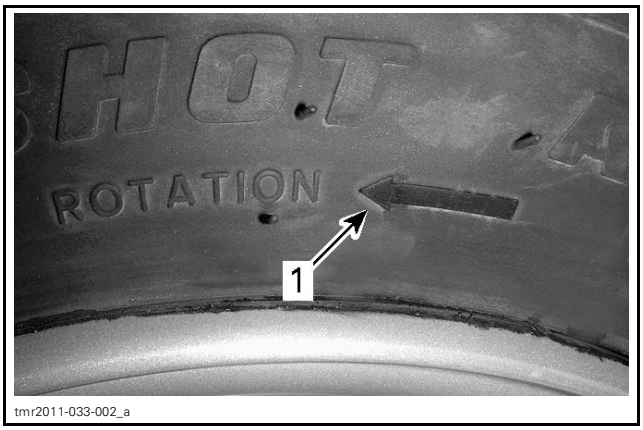
Check tire for presence of slits, bulges, wear or other damage. Replace if necessary.

Tire Replacement

Use an automotive tire changer to replace tires.

⚠ WARNING

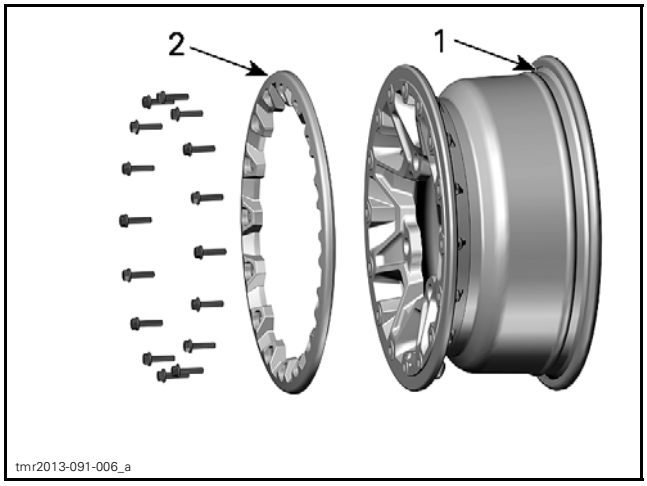
- Replace tires only with the same type and size as original tires.
- For unidirectional tread pattern, ensure that the tires are installed in the correct direction of rotation.



TYPICAL
1. Direction of rotation

Check for proper tire size

Tire Mounting on Beadlock Wheels



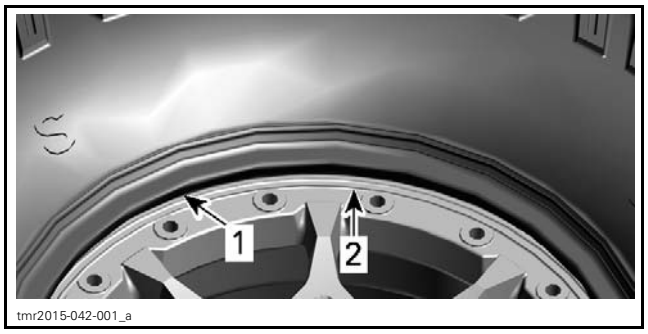
TYPICAL
1. Inner tire bead seat
2. Outer tire beadlock ring

NOTE: Tires should be mounted, by an experienced person, in accordance to good tire mounting practices using acceptable tire mounting equipment designed for the tire industry.

1. Mount the tire on wheel.
   1.1 On the opposite side of beadlock, apply the tire mounting lube on inner bead of tire and wheel to ensure proper seating when inflating.
   1.2 Mount the inner bead over the wheel.

NOTICE Mount tire from beadlock side only.

1.3 Seat the tire outer bead in the shoulder of the beadlock inner ring and center the tire.



1. Tire outer bead
2. Beadlock inner ring shoulder

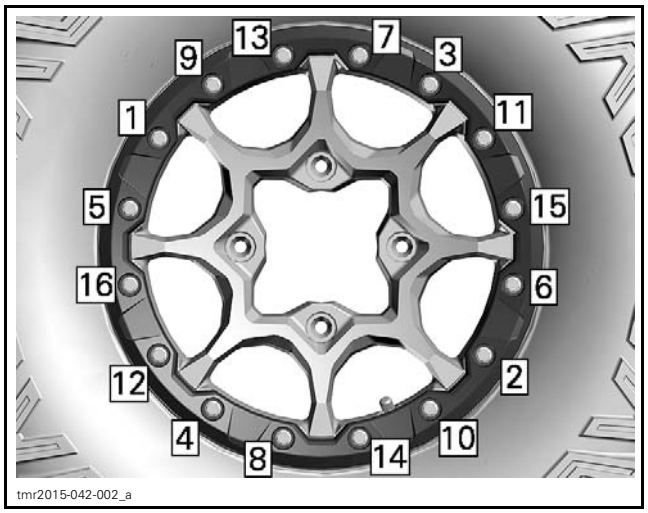
2. Install all beadlock screws. To avoid cross threading, start all screws by hand.

NOTICE Do not use an impact wrench for installing beadlock screws. The risk of screw breaking or screw stripping is high when using an impact wrench.

3. Tighten beadlock screws as per following specification and sequence.

NOTE: To ensure even pressure on the beadlock clamp ring, tighten screws **a few turns at a time**.

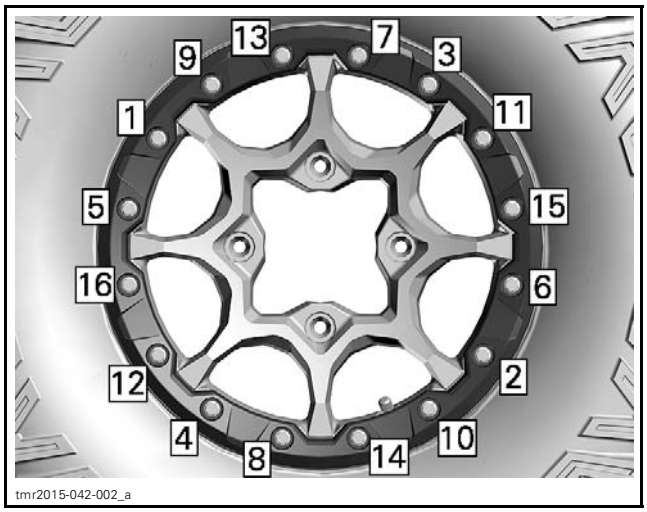
TIGHTENING TORQUE	
Beadlock screws (FIRST TORQUE)	3 N•m ± 1 N•m (27 lbf•**in** ± 9 lbf•**in**)



FIRST TIGHTENING SEQUENCE

4. At this time check if the tire is still centered on wheel. Reposition it if necessary.
5. Tighten beadlock screws as per the **second** torque using the same sequence.

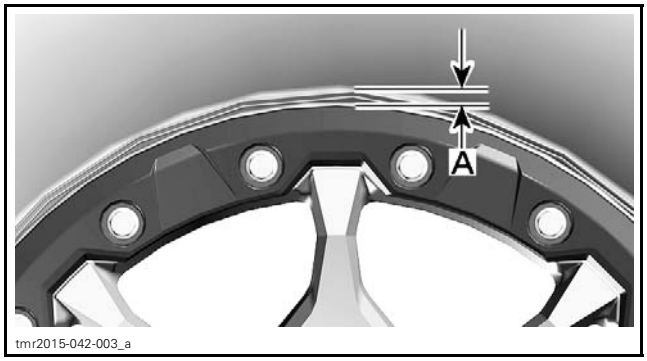
TIGHTENING TORQUE	
Beadlock screws (SECOND TORQUE)	8 N•m ± 1 N•m (71 lbf•**in** ± 9 lbf•**in**)



SECOND TIGHTENING SEQUENCE

NOTE: The beadlock clamp ring should be in contact with the beadlock inner ring. The beadlock clamp ring can flex slightly to match the tire bead. IT IS NORMAL.

6. Verify the gap between tire and beadlock clamp ring, it should be practically equal all around the ring.



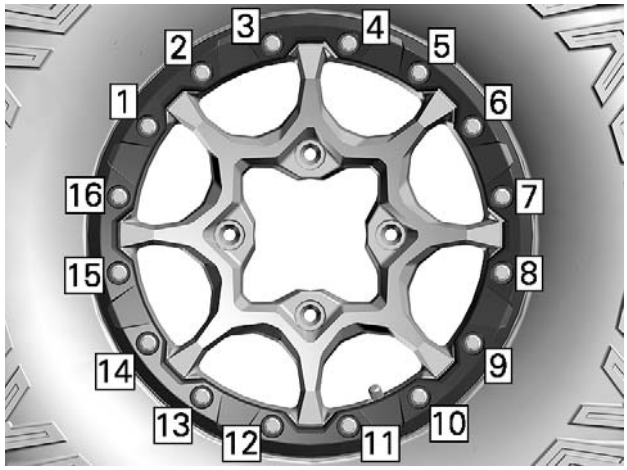
A. Gap equal all around beadlock clamp ring

If the gap is not acceptable:

– Loosen all screws.
– Check tire position on wheel and reposition it if necessary.
– Restart the tightening sequence as detailed.

7. Tighten beadlock screws a **final** time as per following specification and sequence.

TIGHTENING TORQUE	
Beadlock screws (FINAL TORQUE)	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)



FINAL TIGHTENING SEQUENCE

8. Inflate tire to seat the inner bead on wheel. Always use safe practices, such as a tire safety cage.

⚠ WARNING

Never exceed tire recommended maximum pressure for seating beads.

WHEELS

Removing the Wheel

Loosen nuts just enough to be able to unscrew them once the vehicle will be off the ground.

Lift and support the vehicle. Refer to *INTRODUCTION* subsection.

Remove nuts, then remove wheel.

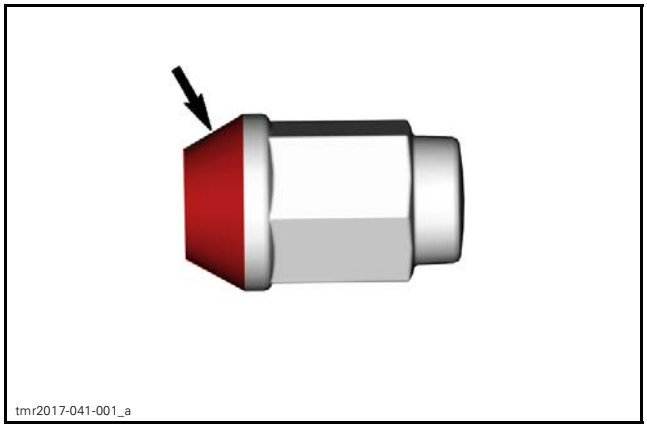
Inspecting the Wheel

Inspect wheel for wear or damage especially at the mounting holes.

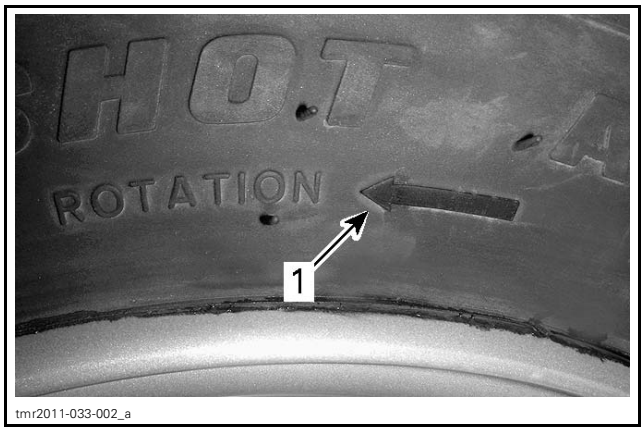
Installing the Wheel

At installation it is recommended to apply anti-seize lubricant on conical area **only**.

SERVICE PRODUCT
LOCTITE 767 (ANTI-SEIZE LUBRICANT) (P/N 293 800 070)



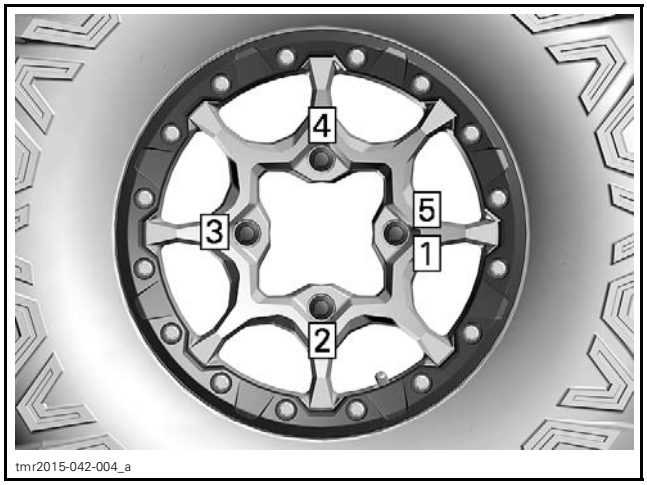
Check if tires are unidirectional.



TYPICAL
1. Direction of rotation

Tighten wheel lug nuts to the specified torque using the illustrated sequence.

TIGHTENING TORQUE	
Wheel lug nuts	80 N•m ± 5 N•m (59 lbf•ft ± 4 lbf•ft)



TIGHTENING SEQUENCE

NOTICE Always use the recommended wheel lug nuts for the type of wheel. Using a different lug nut could cause damages to the rim or studs.

FRONT DRIVE

SERVICE TOOLS

Description	Part Number	Page
BACKLASH MEASUREMENT TOOL	529 035 665	8
CV BOOT CLAMP PLIER	529 036 120	6
CV JOINT EXTRACTOR	529 036 005	6
DIFFERENTIAL NUT SOCKET 65MM	529 036 302	11
SPANNER SOCKET	529 035 649	11

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 271 (RED)	293 800 005	12
LOCTITE 648 (GREEN)	413 711 400	14
SYNTHETIC GREASE	779162	6, 12–14

FRONT DRIVE SHAFTS AND FRONT PROPELLER SHAFT (450 MODELS)

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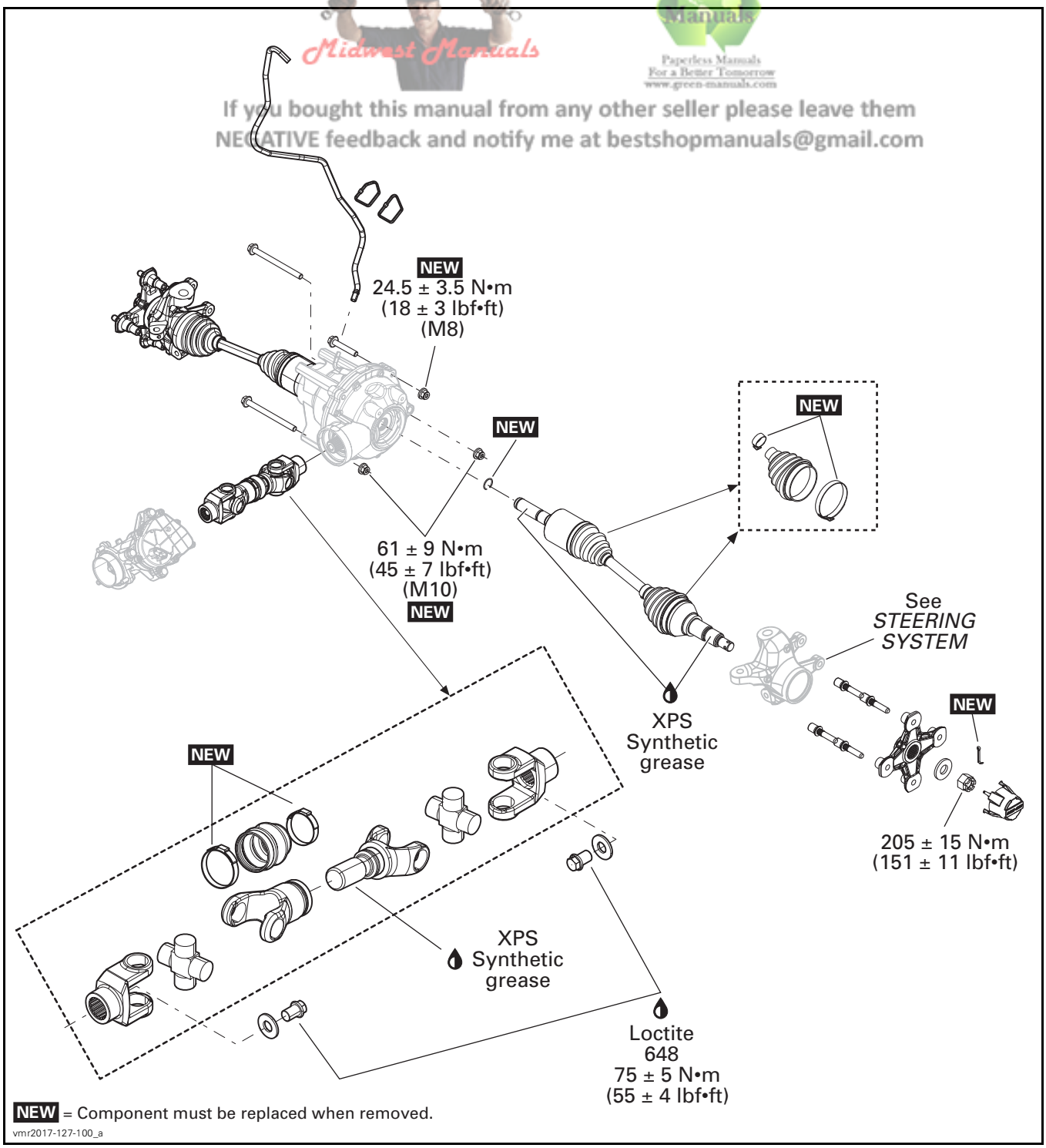

NEW = Component must be replaced when removed.

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FRONT DRIVE SHAFTS AND FRONT PROPELLER SHAFT (570, 650, 850, 1000 AND 1000R)

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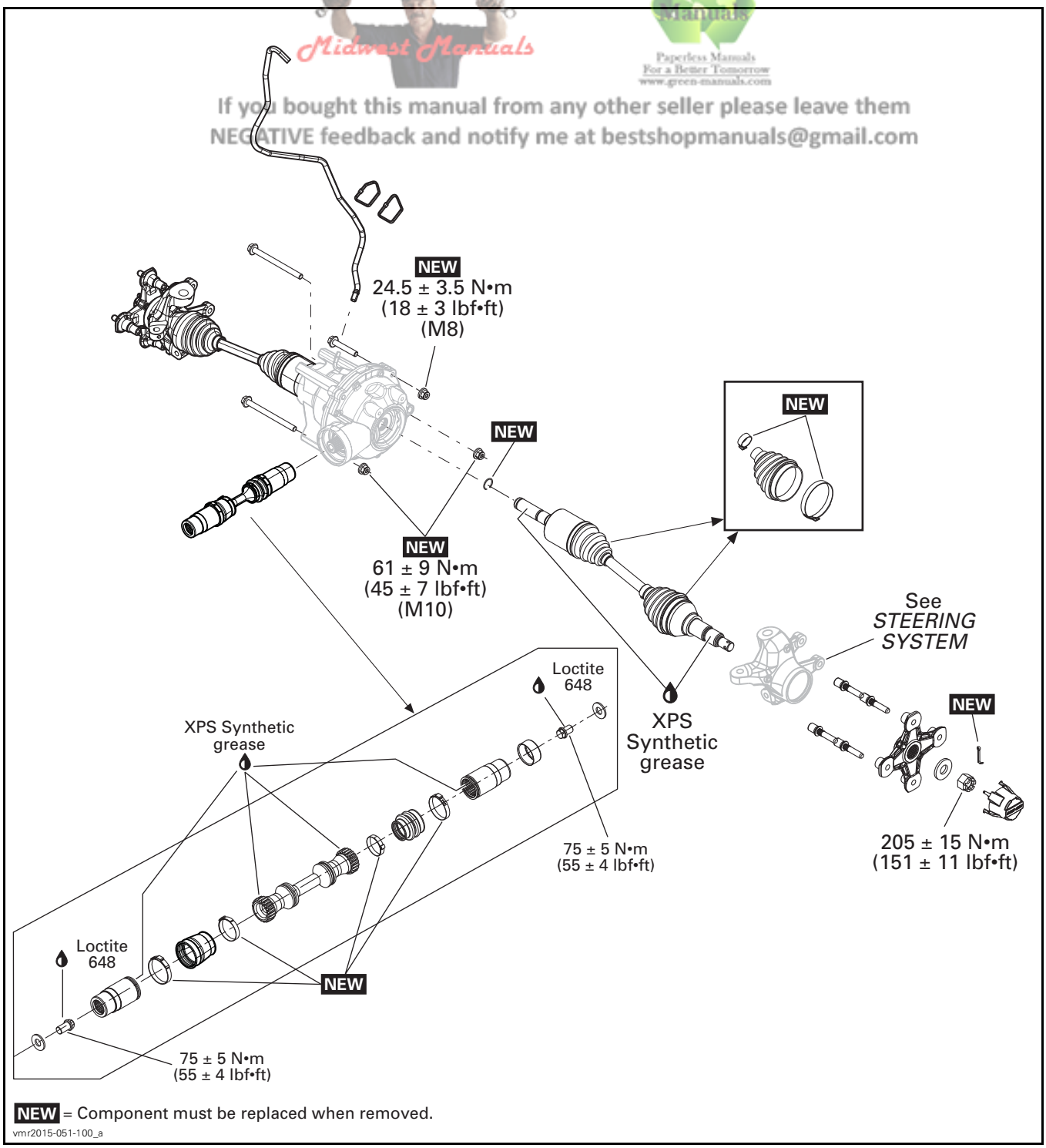

NEW = Component must be replaced when removed.

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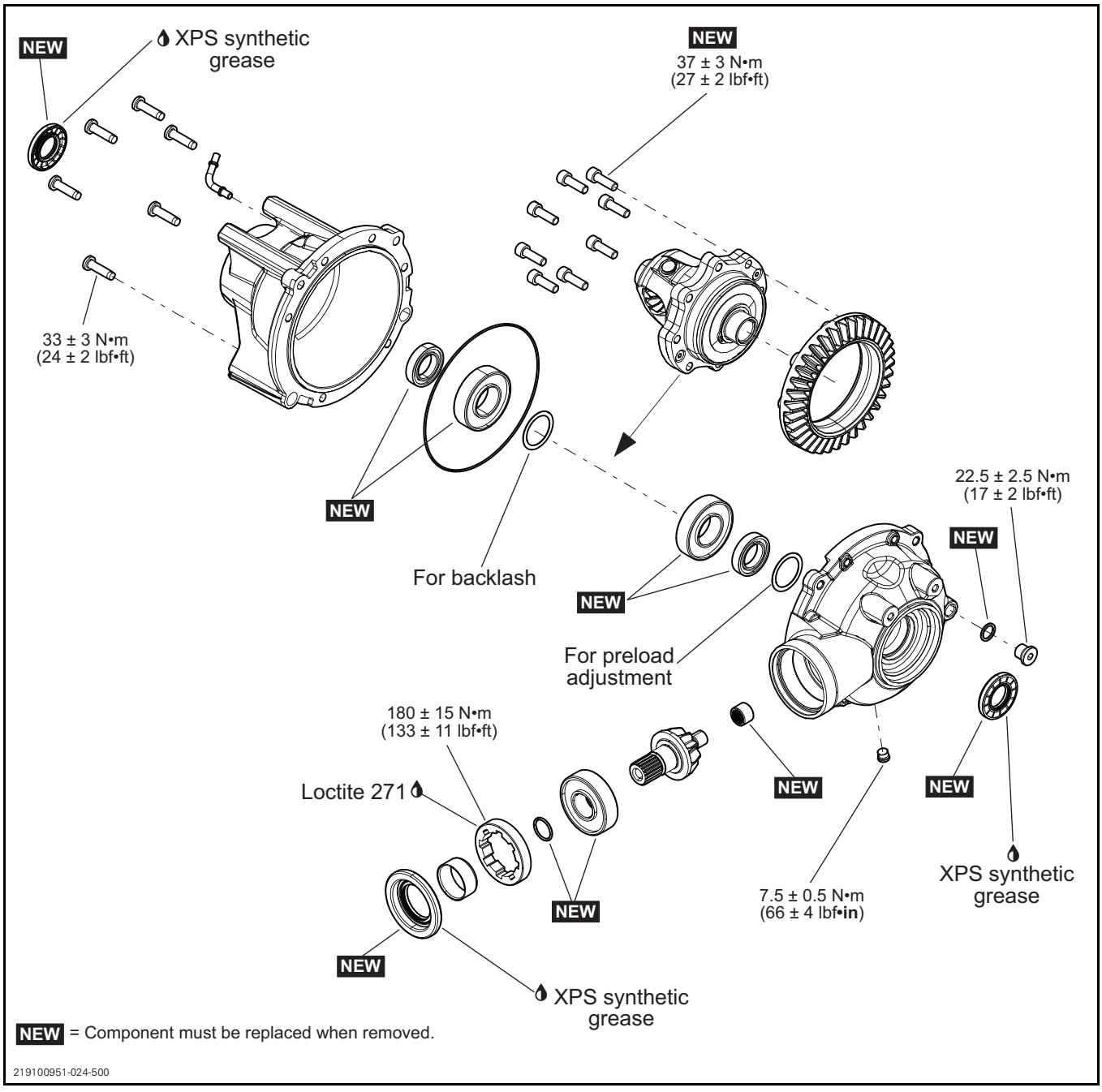
FRONT DIFFERENTIAL



GENERAL

The procedure explained below is the same for the RH and LH sides unless otherwise instructed.

NOTE: ABS equipped vehicles do not have a Visco-Lok® differential.

VISCO-LOK SYSTEM DESCRIPTION

The Visco-Lok® system constantly monitors front wheel speed and, if it detects one wheel spinning faster than its mate, it progressively sends more power to the wheel with the better traction.

The Visco-Lok system is comprised of two principal components, a shear pump and the controlled multi-plate clutch.

A unique feature of the shear pump is that it is self-contained and independent. It does not require an external source of hydraulic fluid. The self-contained viscous shear pump generates a pressure proportional to wheel speed differential - meaning the difference in rotational speed between the two wheels. This pressure engages the friction clutch via a piston to transmit the torque.

In the event of a failure, the Visco-Lok carrier/ring gear and pinion gear will have to be replaced.

NOTE: The Visco-Lok shear pump is not serviceable. If the pump is disassembled, the viscous fluid contained inside will be lost and it cannot be replaced.

PROCEDURES

WHEEL HUB

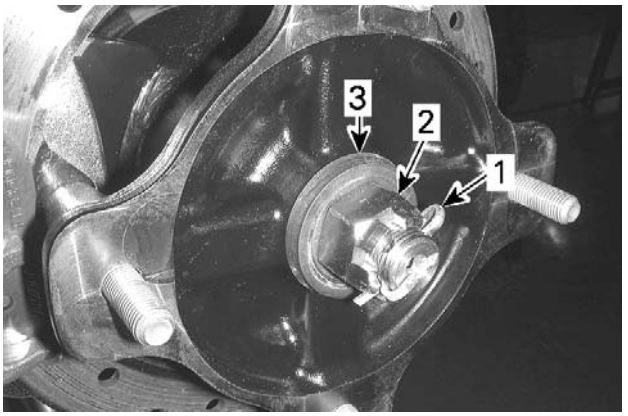
Removing the Wheel Hub

Lift and support vehicle.

Select the 4WD position and place the transmission lever on "P".

Remove caliper from knuckle. Refer to *BRAKES* subsection.

Remove the following parts:
- Wheel cap
- Cotter pin
- Castellated nut
- Belleville washer.



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TYPICAL
1. *Cotter pin*
2. *Castellated nut*
3. *Belleville washer*

Remove wheel hub.

Inspecting the Wheel Hub

Check wheel hub for cracks or other damages.

Check inner splines for wear or other damages.

If any damage is detected on wheel hub, replace it with a new one.

Installing the Wheel Hub

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install Belleville washer with its convex side outwards.

Tighten castellated nut to specification.

TIGHTENING TORQUE	
Castellated nut	205 N•m ± 15 N•m (151 lbf•ft ± 11 lbf•ft)

NOTE: Tighten further castellated nut if required to align grooves with drive shaft hole.

Install a NEW cotter pin.

tmr2011-032-005

FRONT DRIVE SHAFT

Removing the Front Drive Shaft

Lift and support vehicle.

Remove inner fender panel(s). Refer to *BODY* subsection.

Remove the *KNUCKLE*. Refer to *STEERING SYSTEM* subsection.

Remove shock absorber lower bolt.

Lift and attach the following parts to make room.
- Shock absorber
- Upper suspension arm.

Strongly pull drive shaft out of differential.

PULL DRIVE SHAFT

Discard the stop ring at the end of the shaft.

Inspecting the Front Drive Shaft

Inspect the condition of boots. If there is any damage or evidence of leaking lubricant, replace them. Refer to *DRIVE SHAFT BOOT* in this subsection.

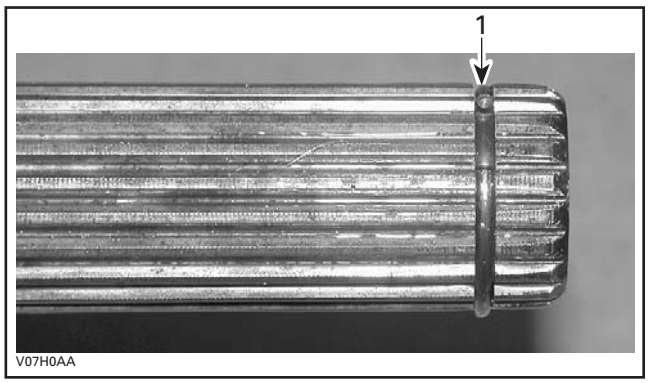
Check splines for excessive wear. Replace if necessary.

NOTE: If the splines on plunging joint are worn, a check of differential inner splines should be done.

Installing the Front Drive Shaft

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install a NEW stop ring.



TYPICAL
1. Stop ring

Apply SYNTHETIC GREASE (P/N 779162) on the splines.

Ensure that wear ring is close to the differential.

DRIVE SHAFT BOOT

Removing the Drive Shaft Boot

Remove *FRONT DRIVE SHAFT*. See procedure in this subsection.

Remove drive shaft boot clamps.

REQUIRED TOOL
CV BOOT CLAMP PLIER (P/N 529 036 120)

Dislodge the large end of the boot.

Separate the joint from the shaft. Two procedures can be done.

Without the Special Tool

Clamp joint housing in a vise.

Align shaft with joint.

Pull hard on shaft to remove from joint.

Remove boot from drive shaft.

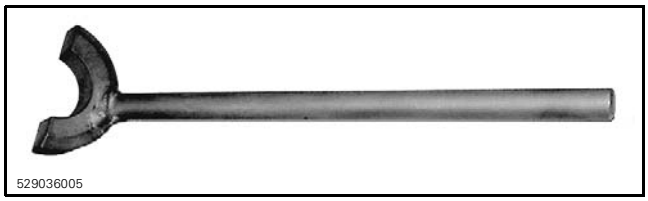
Remove and discard the circlip. A new one is included in the boot kit.

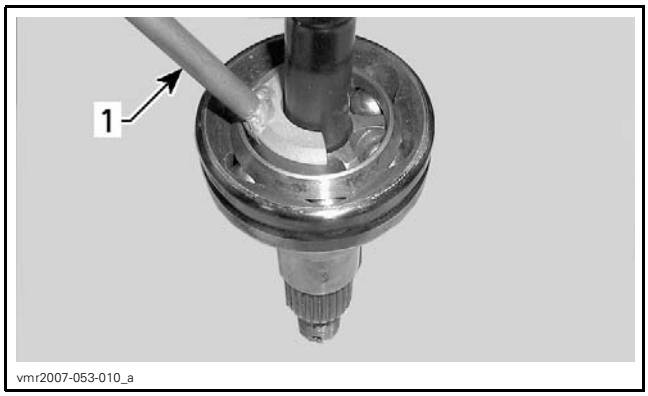
With the Special Tool

Place drive shaft in vice with the joint downward.

Install the tool on bearing.

REQUIRED TOOL
CV JOINT EXTRACTOR (P/N 529 036 005)





TYPICAL — CV JOINT SHOWN
1. Joint extractor tool

With an hammer, hit on the tool to separate joint from shaft.

When joint and shaft are separated, remove boot from drive shaft.

Remove and discard the circlip. A new one is included in the boot kit.

Installing the Drive Shaft Boot

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install the **NEW** circlip.

Pack bearing area with grease (included with the new boot kit).

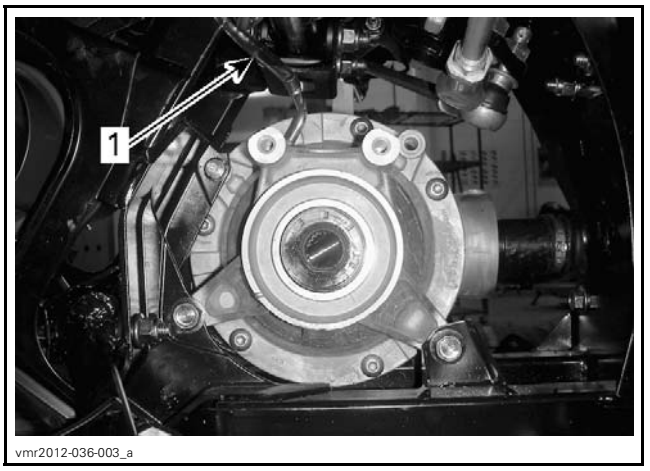
NOTE: Do not use or add other grease.

Install **NEW** drive shaft boot clamps.

FRONT DIFFERENTIAL

Removing the Front Differential

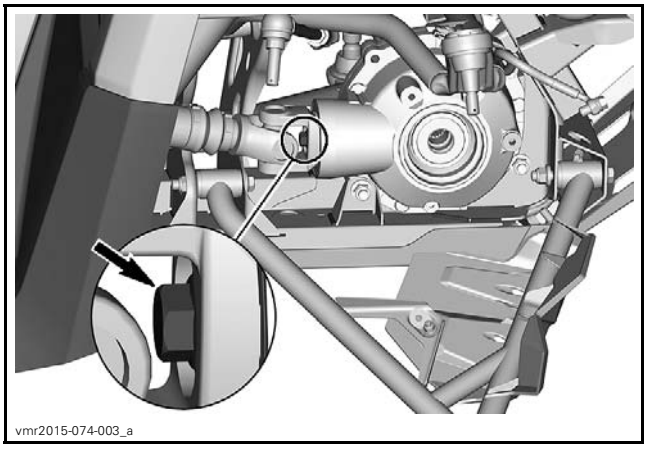
1. Drain front differential. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
2. Remove both front drive shafts. Refer to *FRONT DRIVE SHAFT* in this subsection.
3. Detach vent hose from front differential.



FROM LH SIDE
1. Vent hose

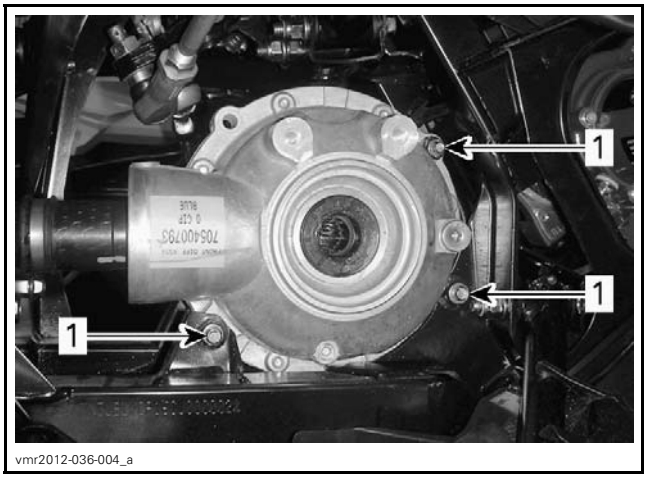
450 models

4. Remove screw securing the propeller shaft to the front differential.



NOTE: Heat screw to break the threadlocker bond prior to removal.

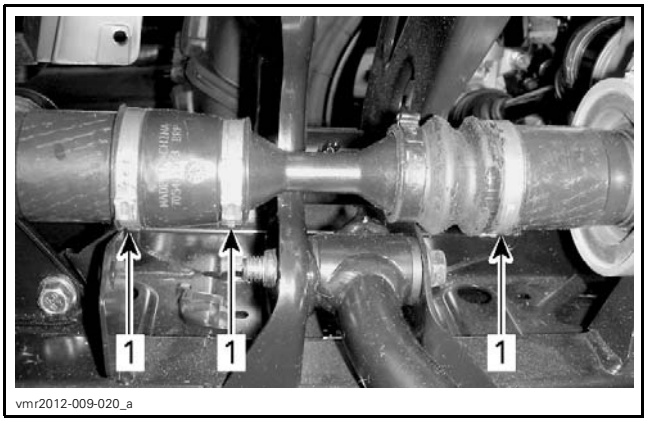
5. Remove bolts securing front differential to frame.



1. Bolts securing front differential to frame

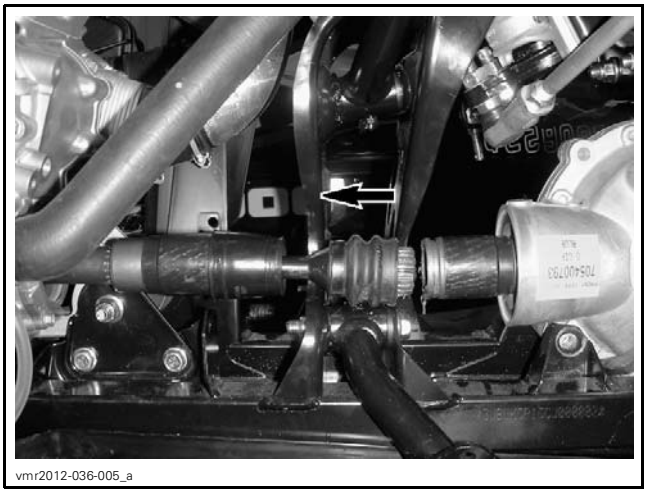
6. Remove the following Oetiker clamps from front propeller shaft.

570, 650, 850, 1000 and 1000R



1. Oetiker clamps

7. Detach front propeller shaft from front differential by moving it rearward.



FRONT PROPELLER SHAFT MOVED REARWARD

8. Remove front differential by pulling it from RH side.

NOTICE **Be careful not to knock or to bend vent hose fitting while removing front differential.**

Front Differential Inspection (Assembled)

Manually turn the pinion gear; it should turn smoothly. Repair if necessary.

Check if oil seals are brittle, hard or damaged. Replace if necessary.

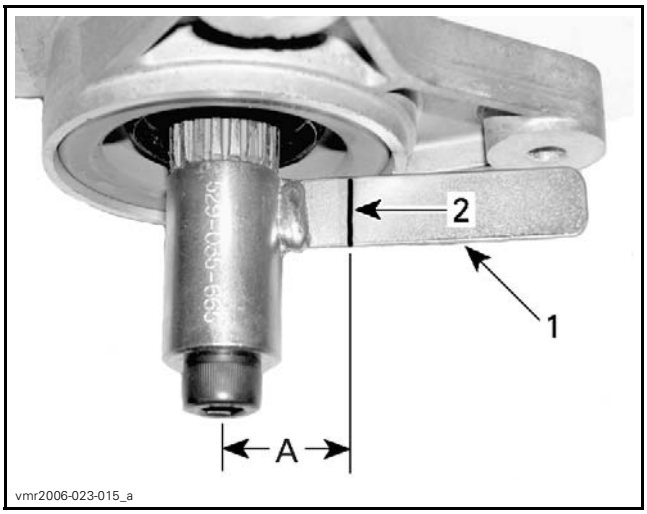
Backlash Inspection

When measuring backlash, the differential cover should be upside down to pull the ring gear out of mesh.

REQUIRED TOOL
BACKLASH MEASUREMENT TOOL (P/N 529 035 665)
DIAL INDICATOR

Place the backlash measurement tool at the end of pinion gear.

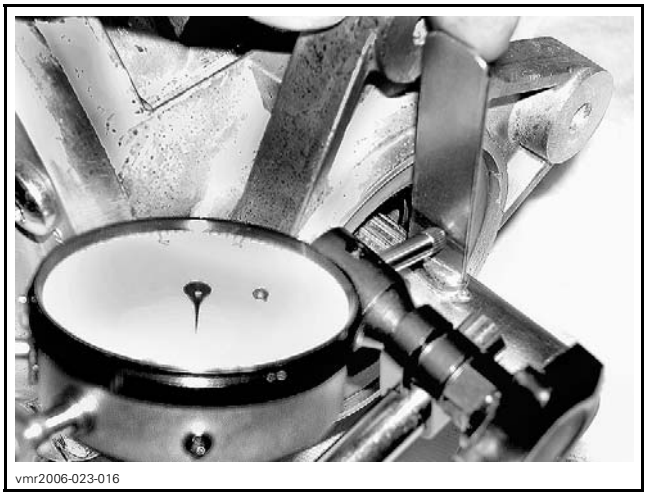
From center of tool bolt, measure 25.4 mm (1 in) and draw a mark on the tab.



1. Tab of backlash measurement tool
2. Mark on tab
A. 25.4 mm (1 in)

Position the dial indicator tip against the tab at a 90° angle and right on the previously drawn mark.

Gently, move the tool tab back and forth. Note the backlash result.



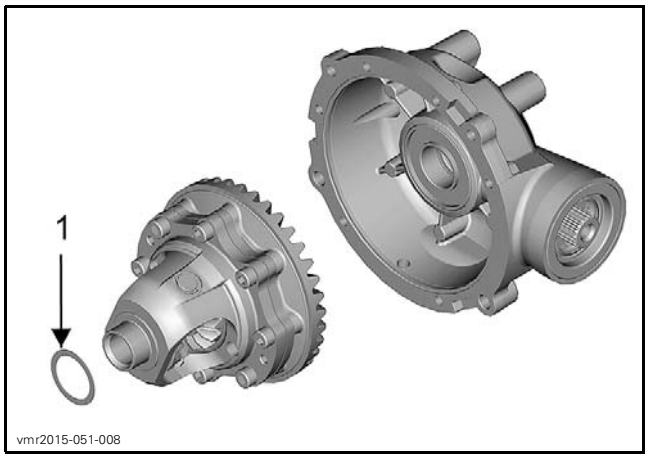
Rotate pinion gear 1/2 turn and recheck backlash. Note the result.

Rotate pinion gear 1 turn and recheck backlash.

BACKLASH SPECIFICATION
0.1 mm (.004 in) to 0.25 mm (.01 in)

If backlash is out of specification, split final drive housing, refer to *DISASSEMBLING THE FRONT DIFFERENTIAL* and adjust shim thickness as per following guideline.

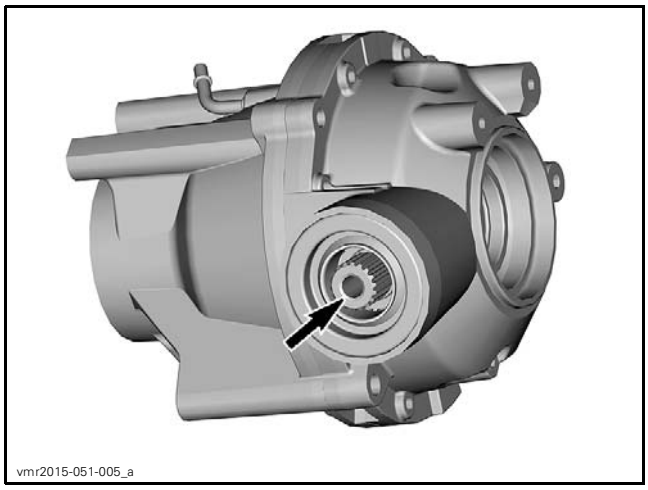
BACKLASH ADJUSTMENT GUIDELINE	
BACKLASH MEASUREMENT	WHAT TO DO
Below 0.1 mm (.004 in)	Remove shim(s) and recheck backlash
Above 0.25 mm (.01 in)	Add shim(s) and recheck backlash



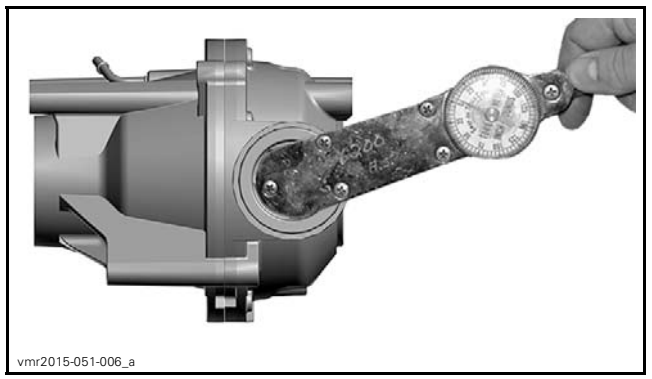
1. Backlash shim

Preload Inspection

Screw the propeller shaft screw in pinion gear.



Using a needle torque wrench, measure the preload.



PRELOAD SPECIFICATION
Maximum 1.50 N•m (13 lbf•**in**)

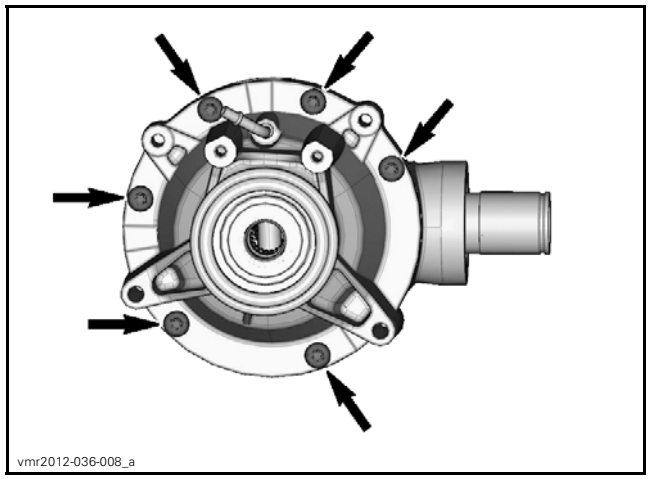
There should be close to zero resistance when turning pinion shaft by hand.

If preload is out of specification, split front differential housing, refer to *DISASSEMBLING THE FRONT DIFFERENTIAL* and carefully inspect all bearings conditions.

Disassembling the Front Differential

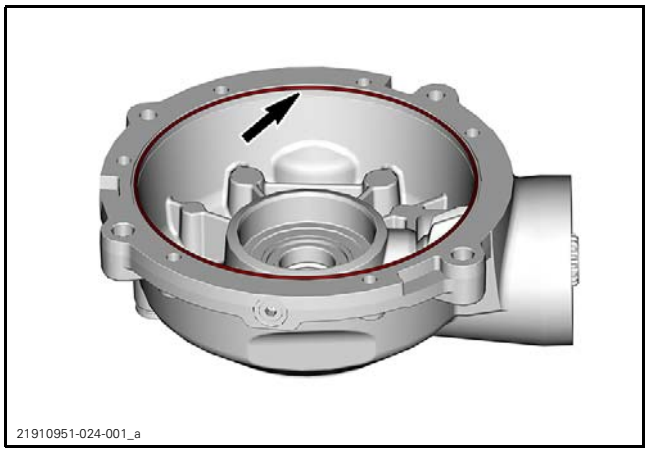
Differential Housing

Remove front differential housing screws.



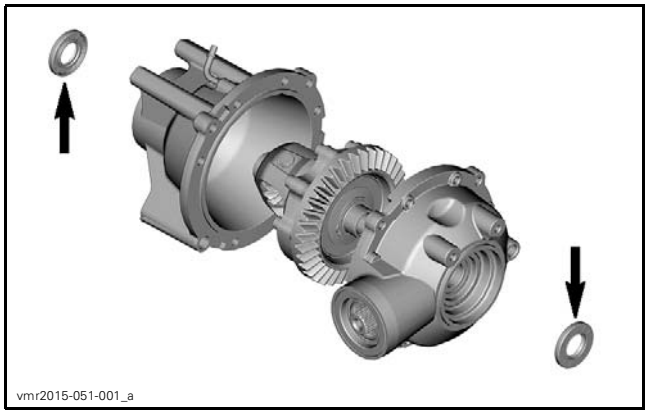
Separate half housings.

If opening the housing for backlash or preload adjustment, remove and set aside the cover O-ring.



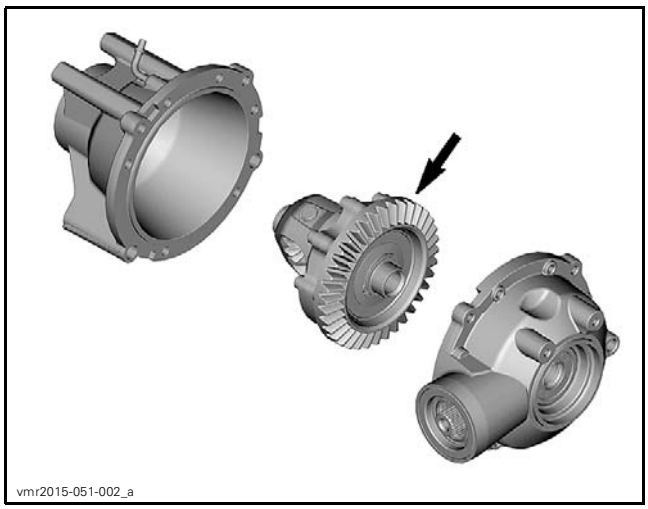
TYPICAL

Remove oil seals.



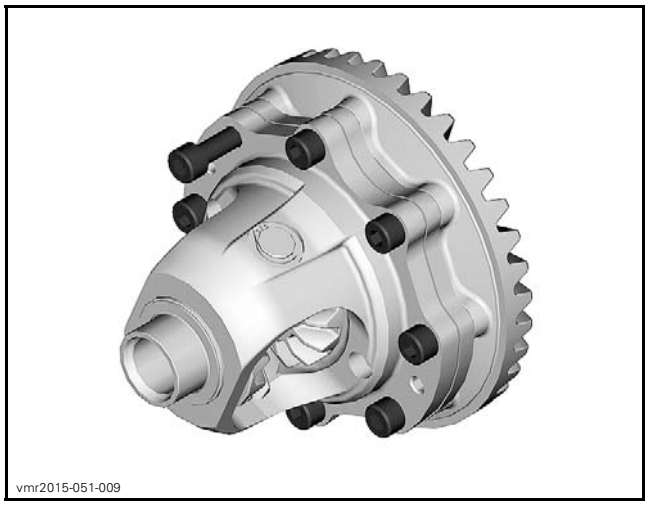
Visco-Lok Carrier/Ring Gear

Remove Visco-Lok carrier/ring gear out of half housing.

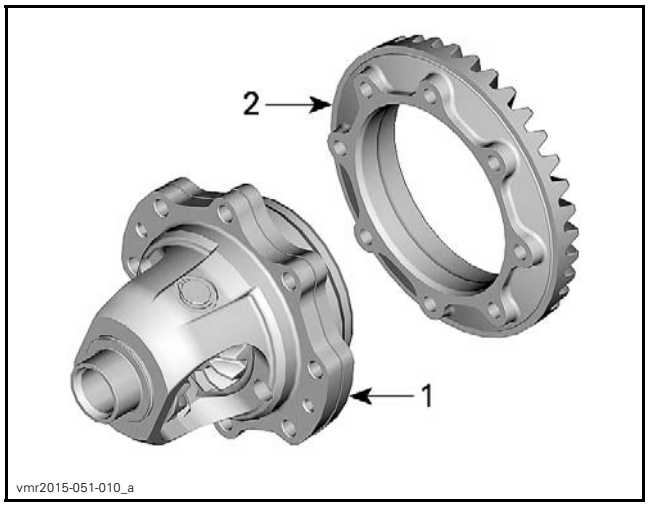


NOTE: Be careful to keep track of shims. Write down the thickness and position of every shim.

Remove screws securing ring gear to Visco-Lok unit.



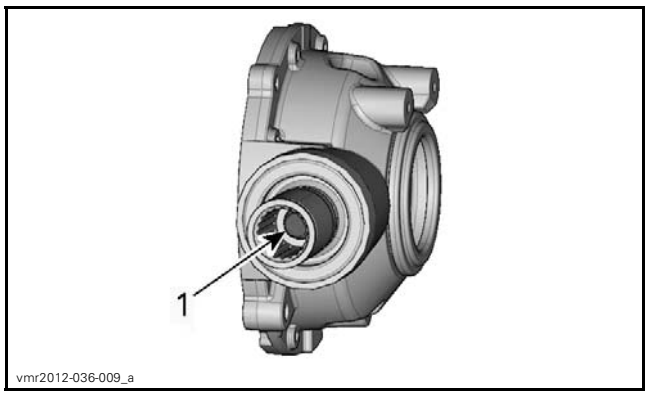
Separate ring gear from Visco-Lok unit.



1. *Visco-Lok unit*
2. *Ring gear*

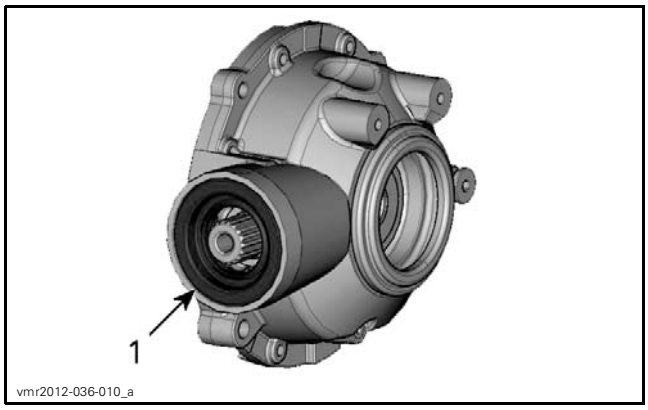
Pinion Gear

Remove screw retaining front propeller shaft adapter.



1. *Retaining screw*

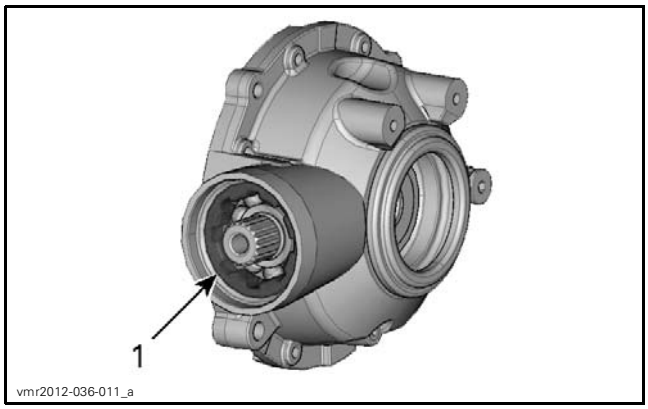
Remove and discard oil seal.



1. Oil seal

Unscrew the pinion nut.

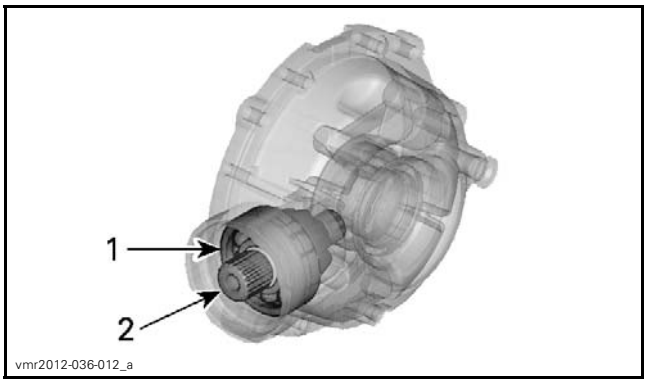
REQUIRED TOOL
SPANNER SOCKET (P/N 529 035 649)DIFFERENTIAL NUT SOCKET 65MM (P/N 529 036 302)



1. Pinion nut

Remove bearing and pinion gear together.

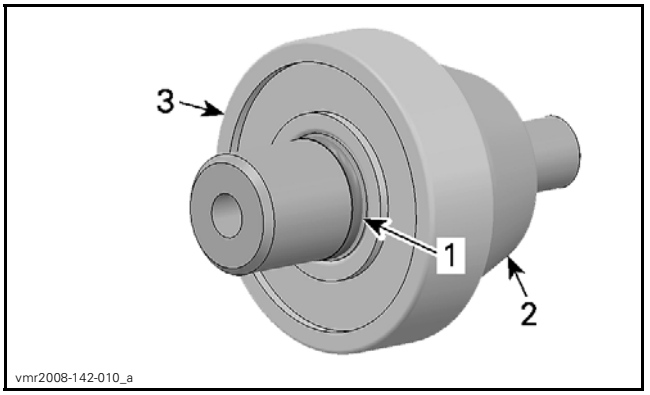
RECOMMENDED TOOLS	QTY
Pipe: 78 mm (3-1/16 in) diameter x 127 mm (5 in) in length	1
Threaded rod: M10 x 1.25, 178 mm (7 in) length	1
M10 x 1.25 nut	3
Flat bar	1



1. Bearing
2. Pinion gear

Remove and discard O-ring.

Remove bearing from pinion gear.



1. O-ring
2. Pinion gear
3. Bearing

Remove and discard the needle bearing.

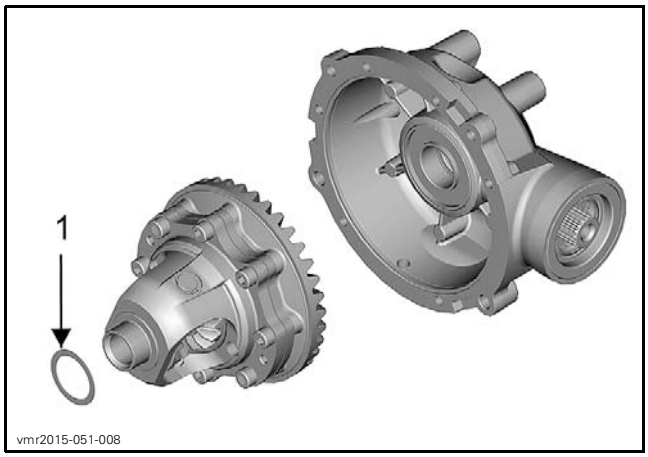
Assembling the Front Differential

Adjustment is required when any of the following part is changed.

– Pinion gear
– Ring gear
– Visco-lok unit
– Housing.

As a preliminary setup, install shim according to the following table.

RECOMMENDED SHIM THICKNESS	
BACKLASH	0.5 mm (.02 in) (as a preliminary adjustment)



1. Backlash shim

Prior to finalizing assembly, proceed in this order:
- Temporarily assemble final drive using recommended torques.
- Do not apply thread locker product.
- Do not install a new pinion nut.
- Do not install the cover O-ring
- Check backlash.
- Check preload.

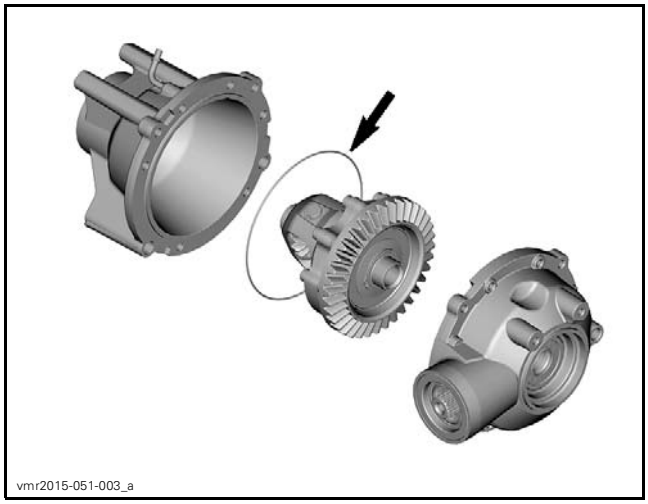
Visco-Lok Carrier/Ring Gear

The installation is the reverse of the removal procedure. However, pay attention to the following.

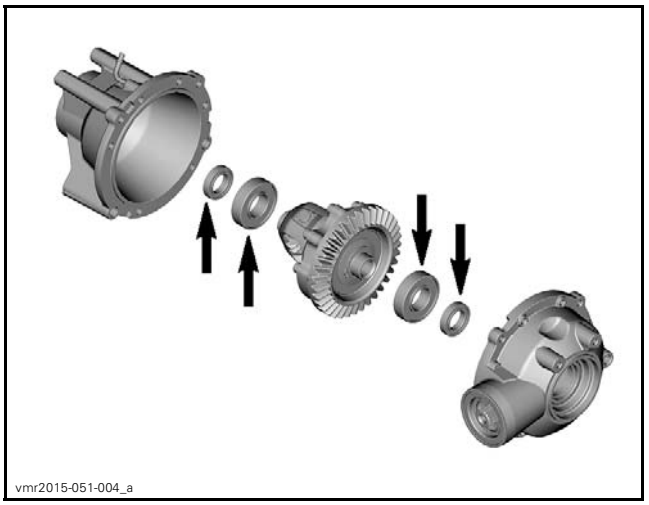
Tighten Visco-Lok / ring gear screws to specification.

TIGHTENING TORQUE	
Visco-Lok / ring gear screws	37 N•m ± 3 N•m (27 lbf•ft ± 2 lbf•ft)

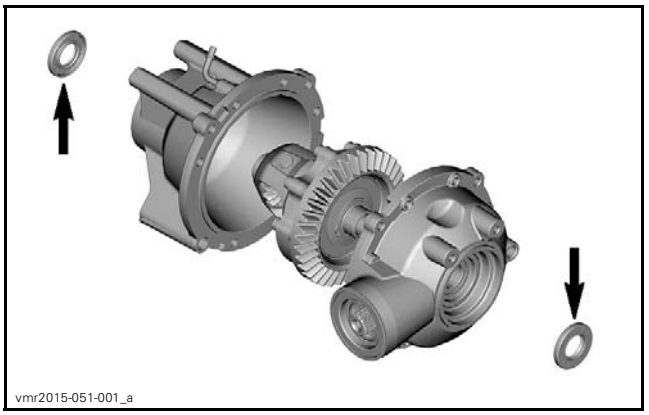
Check condition of O-ring before re installation. Replace if damaged.



Check bearings. Replace with **NEW** bearings if necessary.



Apply SYNTHETIC GREASE (P/N 779162) on **NEW** oil seals and install.



Tighten differential housing screws to specification.

TIGHTENING TORQUE	
Differential housing screws	23.5 N•m ± 3.5 N•m (17 lbf•ft ± 3 lbf•ft)

Pinion Gear

Install a **NEW** ball bearing.

Install a **NEW** O-ring.

Install a **NEW** needle bearing.

Apply LOCTITE 271 (RED) (P/N 293 800 005) to pinion nut.

Install and tighten the pinion nut to specification.

TIGHTENING TORQUE	
Pinion nut	180 N•m ± 15 N•m (133 lbf•ft ± 11 lbf•ft) **+** LOCTITE 271 (RED) (P/N 293 800 005)

Apply SYNTHETIC GREASE (P/N 779162) on **NEW** oil seal and install.

Tighten front propeller shaft adapter retaining screw to specification.

TIGHTENING TORQUE	
Front propeller shaft adapter retaining screw	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft)

Installing the Front Differential

The installation is the reverse of the removal procedure. However, pay attention to the following.

When inserting the small portion of propeller shaft into propeller shaft boot, make sure both parts of propeller shaft are well indexed.

TIGHTENING TORQUE	
M8 nut securing front differential to frame	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)
M10 nuts securing front differential to frame	61 N•m ± 9 N•m (45 lbf•ft ± 7 lbf•ft)

Install **NEW** Oetiker clamps.

Refill front differential with recommended oil. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

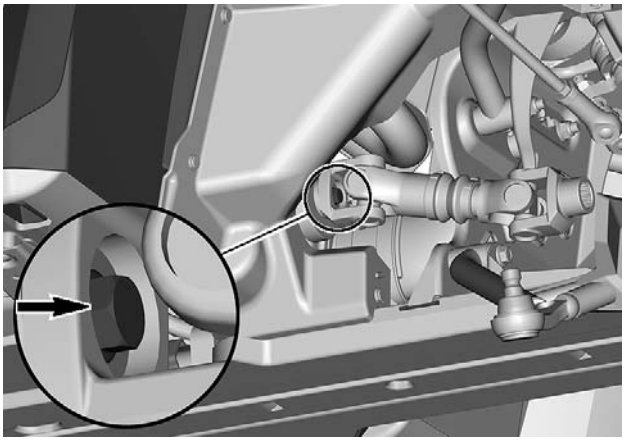
FRONT PROPELLER SHAFT

Removing the Front Propeller Shaft

1. Lift and support vehicle.
2. Remove front wheel. Refer to *WHEELS AND TIRES* subsection.
3. Remove inner fender panel(s). Refer to *BODY* subsection.
4. Remove front differential. Refer to *REMOVING THE FRONT DIFFERENTIAL* in this subsection.

450 models

5. Remove screw securing front propeller shaft to coupling unit.

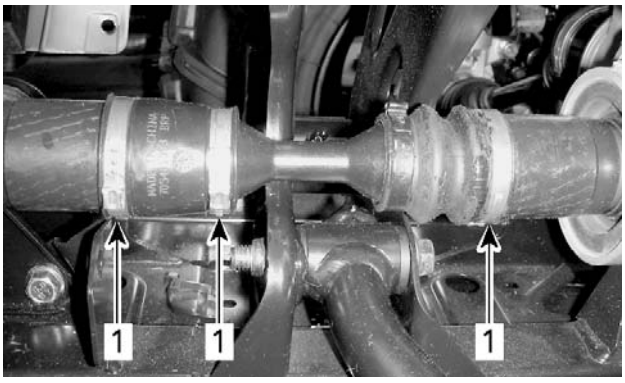

vmr2015-074-006_a

NOTE: Heat screw to break the threadlocker bond prior to removal.

6. Remove front propeller shaft by pulling it forward.

570, 650, 850, 1000 and 1000R models

7. Remove the following Oetiker clamps from front propeller shaft.



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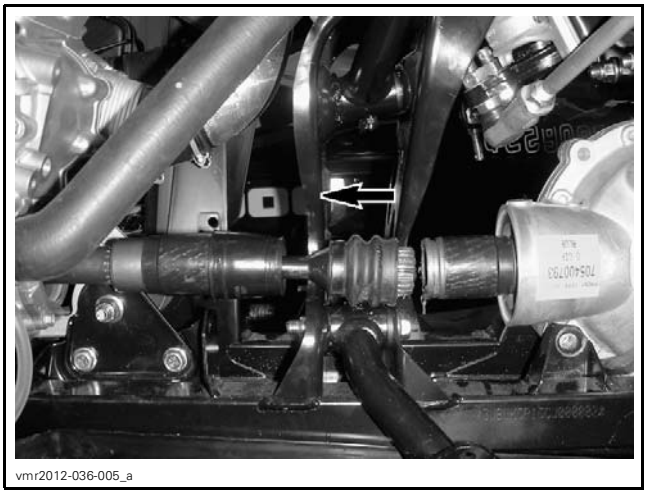
1. Oetiker clamps

8. Detach front propeller shaft from front differential by moving it rearward.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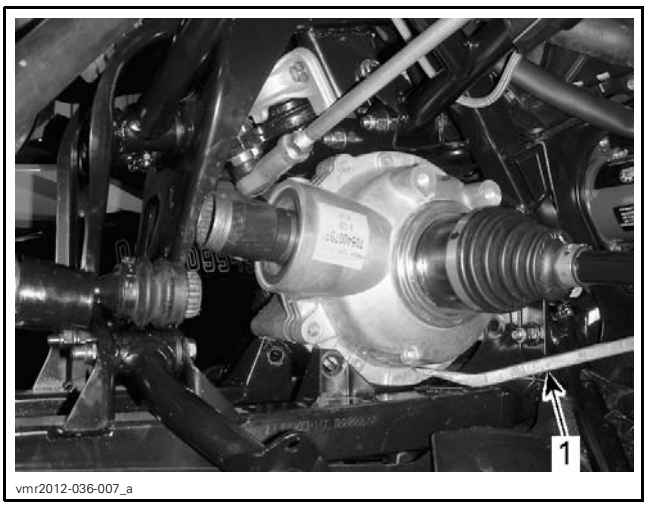
FRONT PROPELLER SHAFT MOVED REARWARD

9. Pry front differential upwards to make room.



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1. Pry bar

10. Remove front propeller shaft by pulling it forward.
11. Remove front propeller shaft adapters from engine and from front differential.

Inspecting the Front Propeller Shaft

Inspect if propeller shaft is not bent or twisted.

Check propeller shaft splines for wear or damage.

Check if propeller shaft bellows is pierced or brittle.

Installing the Front Propeller Shaft

The installation is the reverse of removal procedure. However, pay attention to the following.

Apply SYNTHETIC GREASE (P/N 779162) on splines.

Tighten propeller shaft adapter screw to specification.

450 models

TIGHTENING TORQUE	
Propeller shaft screws	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)

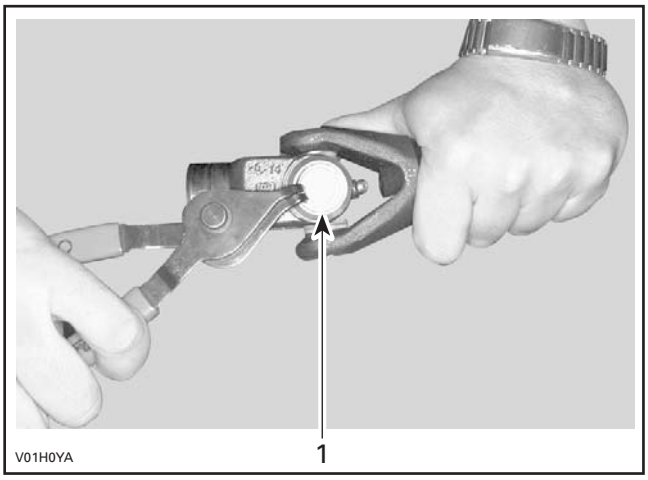
570, 650, 850, 1000 and 1000R models

TIGHTENING TORQUE	
Propeller shaft adapter screw **(differential side: M10x16)**	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)
Propeller shaft adapter screw **(engine side: M12x20)**	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)

PROPELLER SHAFT U-JOINTS

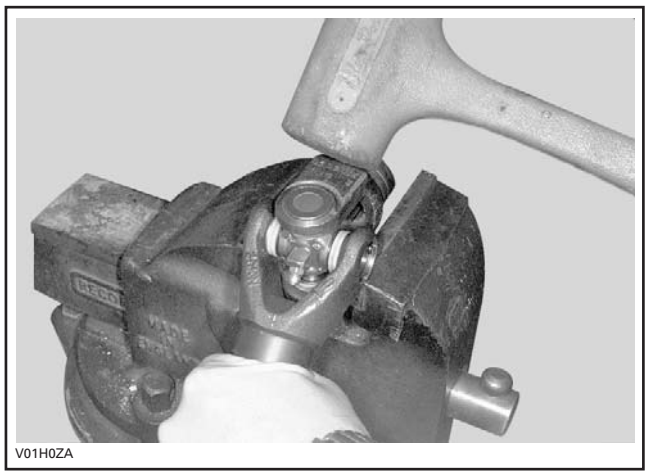
Removing the Propeller Shaft U-Joint

Remove internal snap ring from bearing caps.



1. Snap ring

Support inner yoke in vice and drive other yoke down with a soft hammer.

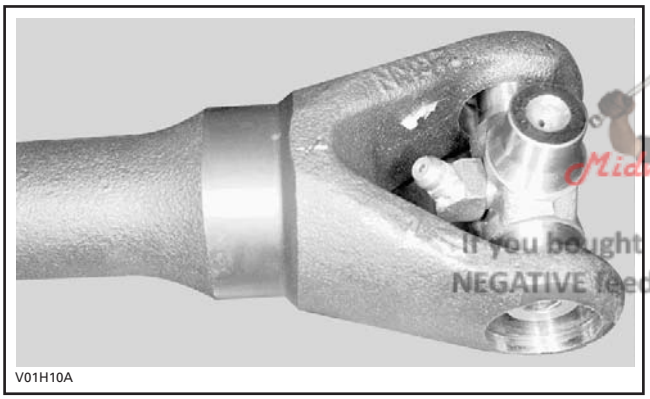

V01H0ZA

Support U-joint in vice and drive inner yoke down to remove remaining bearing caps.

Remove U-joint cross.

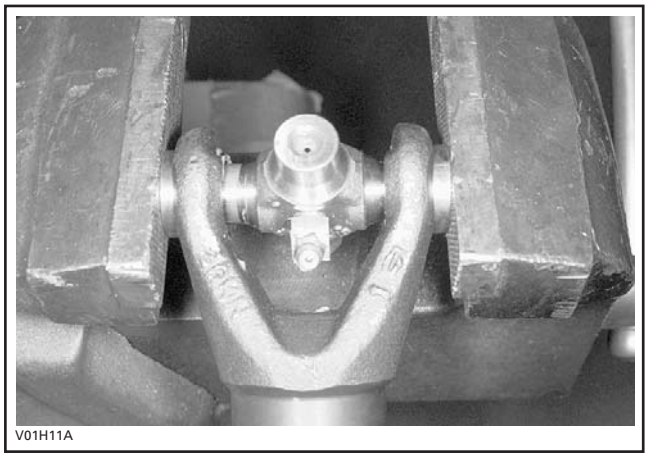
Installing the Propeller Shaft U-Joint

Install new U-joint in inner yoke.


V01H10A

TYPICAL

Install bearing caps. Use a vise to push bearing caps.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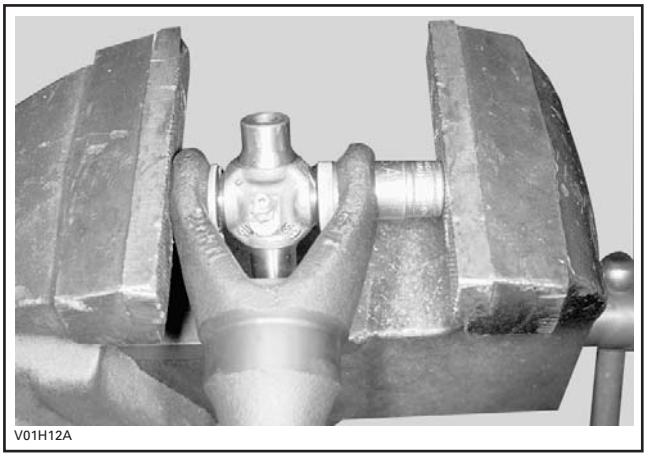
TYPICAL

Using a suitable pusher, fully seat bearing cap on one side.


V01H12A

TYPICAL

Install snap ring.

Complete installation for the other bearing caps.

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FRONT DRIVE (MODELS WITH ABS)

SERVICE TOOLS

Description	Part Number	Page
BACKLASH MEASUREMENT TOOL	529 035 665	7
CV BOOT CLAMP PLIER	529 036 120	5
CV JOINT EXTRACTOR	529 036 005	5
SPANNER SOCKET	529 035 649	9

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 277	293 800 073	11
LOCTITE 648 (GREEN)	413 711 400	13
XPS SYNTHETIC GREASE	293 550 010	5, 11–12

FRONT DRIVE SHAFTS AND FRONT PROPELLER SHAFT

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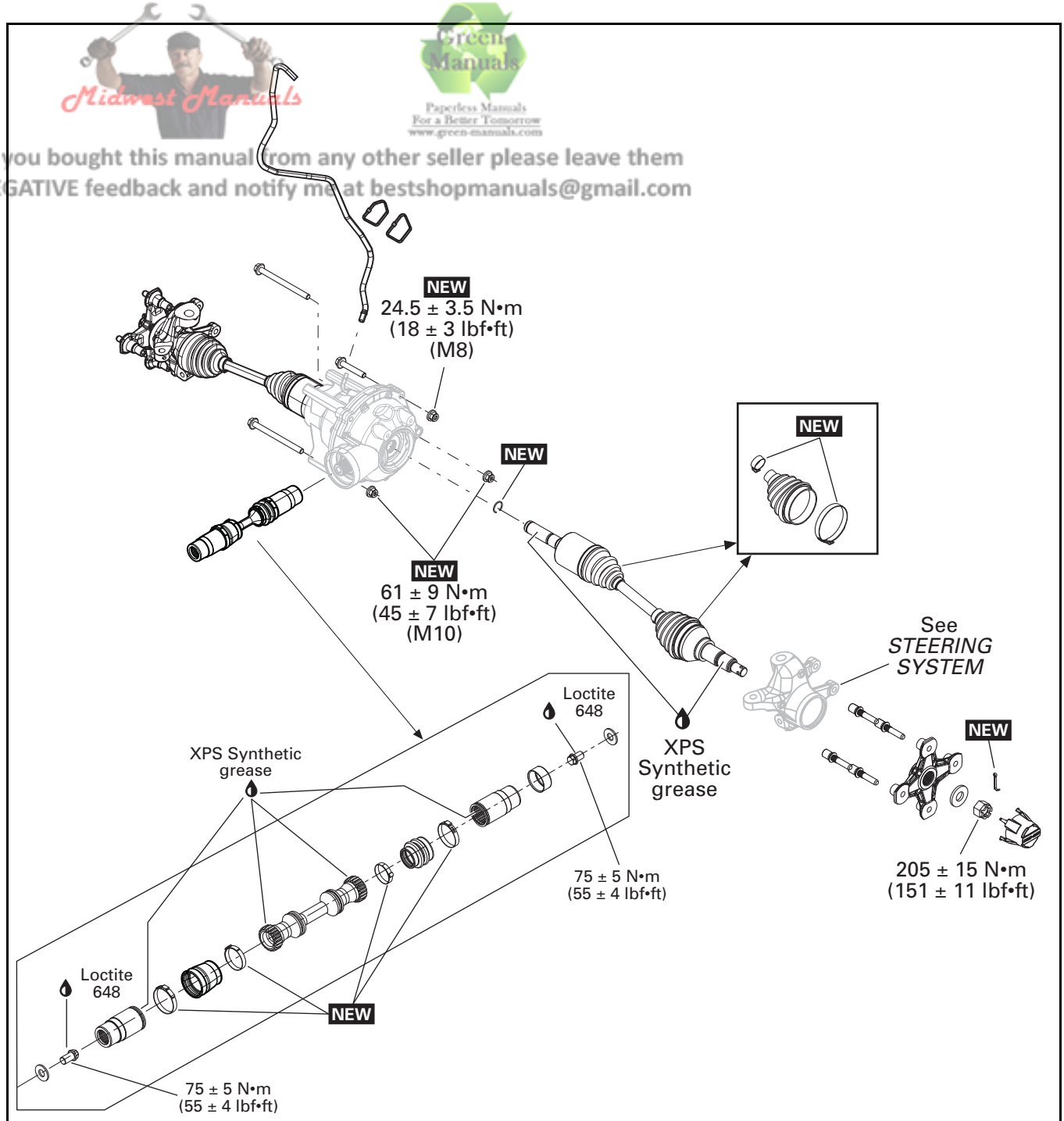

NEW = Component must be replaced when removed.

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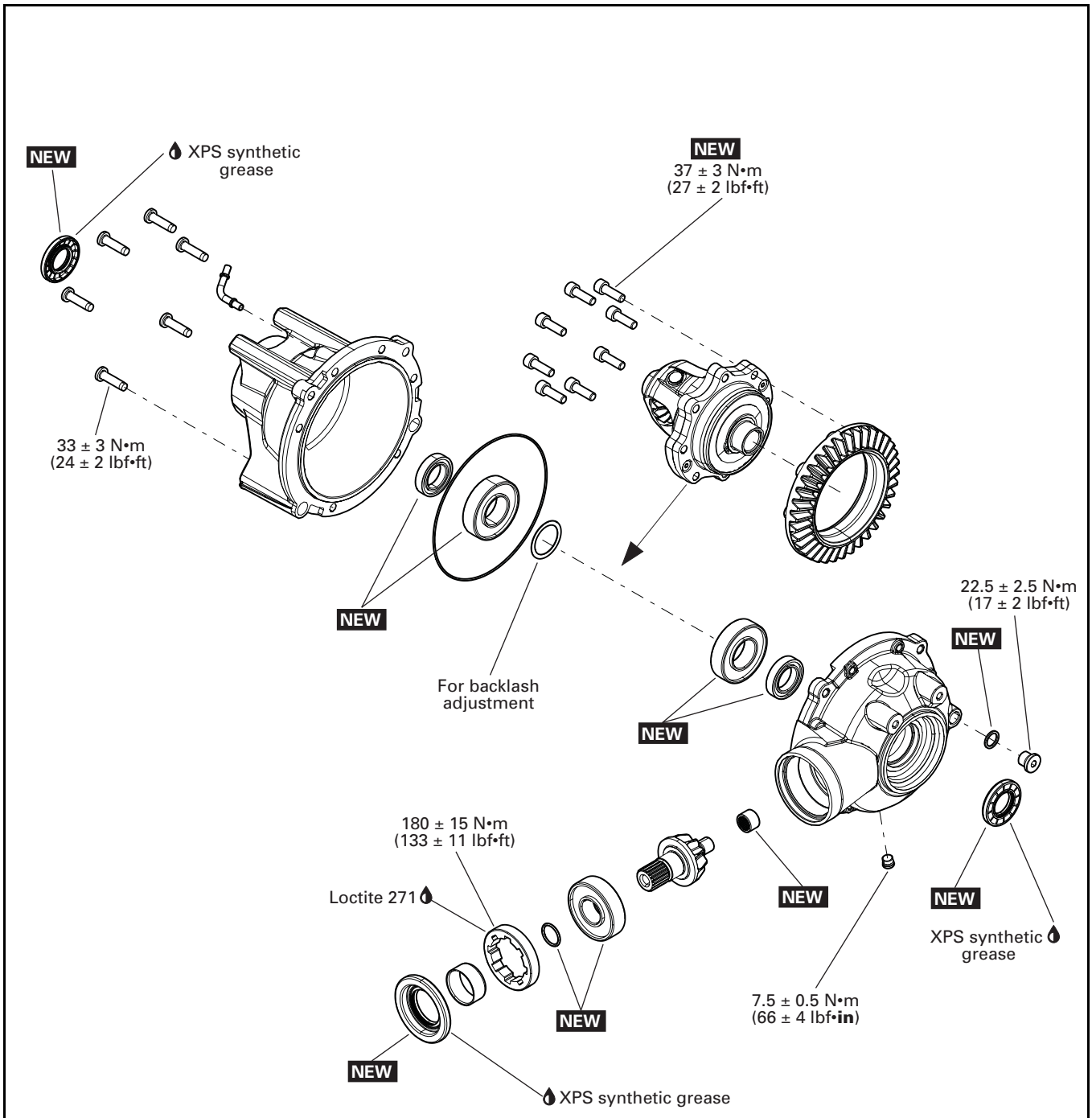
FRONT DIFFERENTIAL



NEW = Component must be replaced when removed.

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GENERAL

The procedure explained below is the same for the RH and LH sides unless otherwise instructed.

PROCEDURES

WHEEL HUB

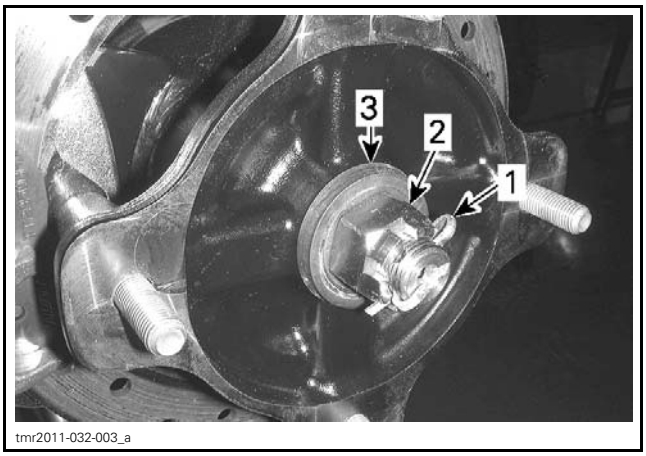
Removing the Wheel Hub

Lift and support vehicle.

Select the 4WD position and place the transmission lever on "P".

Remove caliper from knuckle. Refer to *BRAKES* subsection.

Remove the following parts:
– Wheel cap
– Cotter pin
– Castellated nut
– Belleville washer.



TYPICAL
1. *Cotter pin*
2. *Castellated nut*
3. *Belleville washer*

Remove wheel hub.

Inspecting the Wheel Hub

Check wheel hub for cracks or other damages.

Check inner splines for wear or other damages.

If any damage is detected on wheel hub, replace it with a new one.

Installing the Wheel Hub

The installation is the reverse of the removal procedure. However, pay attention to the following.

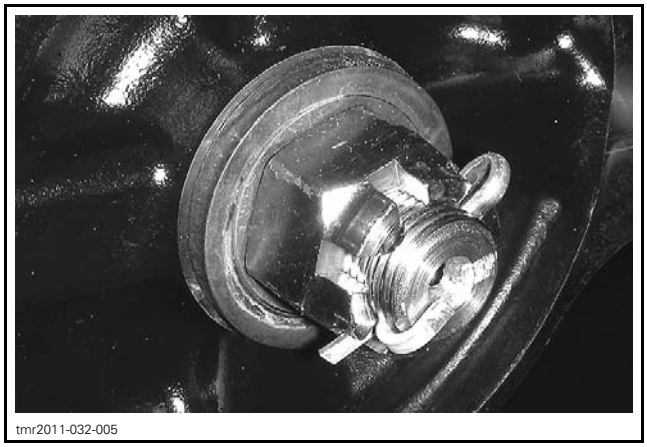
Install Belleville washer with its convex side outwards.

Tighten castellated nut to specification.

TIGHTENING TORQUE	
Castellated nut	205 N•m ± 15 N•m (151 lbf•ft ± 11 lbf•ft)

NOTE: Tighten further castellated nut if required to align grooves with drive shaft hole.

Install a NEW cotter pin.



FRONT DRIVE SHAFT

Removing the Front Drive Shaft

Lift and support vehicle.

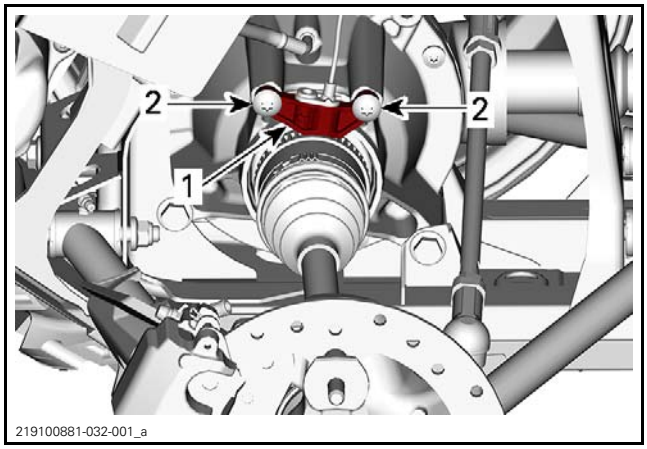
Remove inner fender panel(s). Refer to *BODY* subsection.

Remove the *KNUCKLE*. Refer to *STEERING SYSTEM* subsection.

Remove shock absorber lower bolt.

Lift and attach the following parts to make room.
– Shock absorber
– Upper suspension arm.

Remove the wheel speed sensor support and set aside.



1. *Wheel speed sensor support*
2. *Wheel speed sensor support retaining screws*

Strongly pull drive shaft out of differential .

TYPICAL - PULL DRIVE SHAFT

Discard the stop ring at the end of the shaft.

Inspecting the Front Drive Shaft

Inspect the condition of boots. If there is any damage or evidence of leaking lubricant, replace them. Refer to *DRIVE SHAFT BOOT* in this subsection.

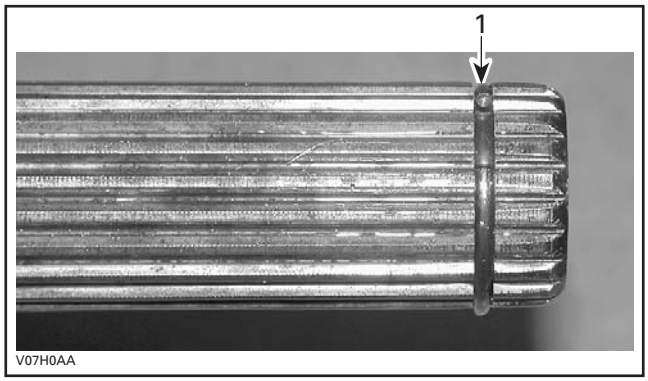
Check splines for excessive wear. Replace if necessary.

NOTE: If the splines on plunging joint are worn, a check of differential inner splines should be done.

Installing the Front Drive Shaft

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install a NEW stop ring.



TYPICAL
1. Stop ring

Apply XPS SYNTHETIC GREASE (P/N 293 550 010) on the splines.

Tighten the wheel speed sensor to specification.

TIGHTENING TORQUE	
Wheel speed sensor support screw	13.5 N•m ± 1.5 N•m (119 lbf•**in** ± 13 lbf•**in**)

DRIVE SHAFT BOOT

Removing the Drive Shaft Boot

Remove *FRONT DRIVE SHAFT*. See procedure in this subsection.

Remove drive shaft boot clamps.

REQUIRED TOOL
CV BOOT CLAMP PLIER (P/N 529 036 120)

Dislodge the large end of the boot.

Separate the joint from the shaft. Two procedures can be done.

Without the Special Tool

Clamp joint housing in a vise.

Align shaft with joint.

Pull hard on shaft to remove from joint.

Remove boot from drive shaft.

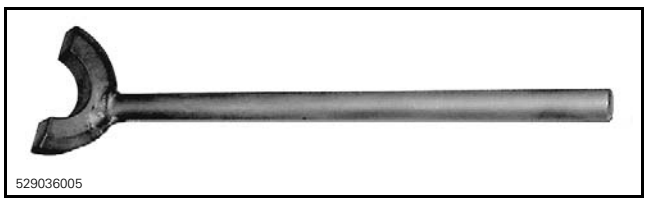
Remove and discard the circlip. A new one is included in the boot kit.

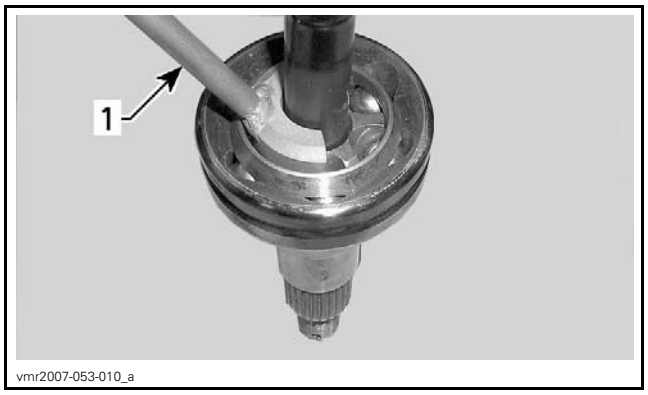
With the Special Tool

Place drive shaft in vice with the joint downward.

Install the tool on bearing.

REQUIRED TOOL
CV JOINT EXTRACTOR (P/N 529 036 005)





TYPICAL — CV JOINT SHOWN
1. Joint extractor tool

With an hammer, hit on the tool to separate joint from shaft.

When joint and shaft are separated, remove boot from drive shaft.

Remove and discard the circlip. A new one is included in the boot kit.

Installing the Drive Shaft Boot

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install the **NEW** circlip.

Pack bearing area with grease (included with the new boot kit).

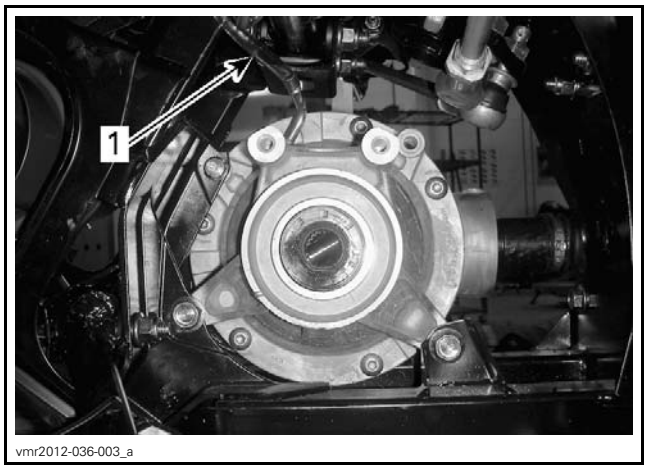
NOTE: Do not use or add other grease.

Install **NEW** drive shaft boot clamps.

FRONT DIFFERENTIAL

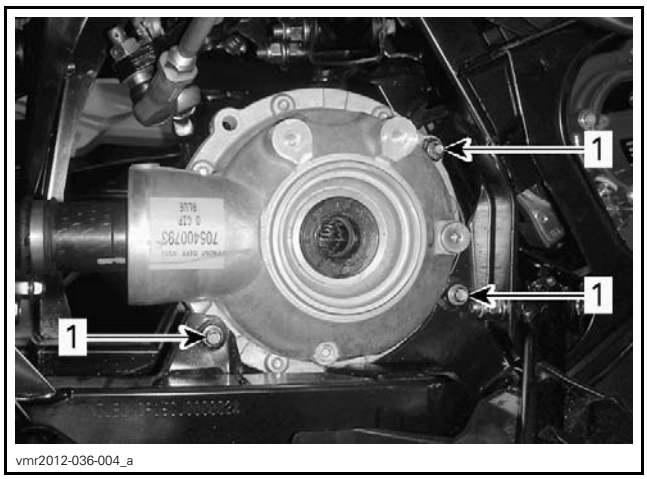
Removing the Front Differential

1. Drain front differential. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
2. Remove both front drive shafts. Refer to *FRONT DRIVE SHAFT* in this subsection.
3. Detach vent hose from front differential.



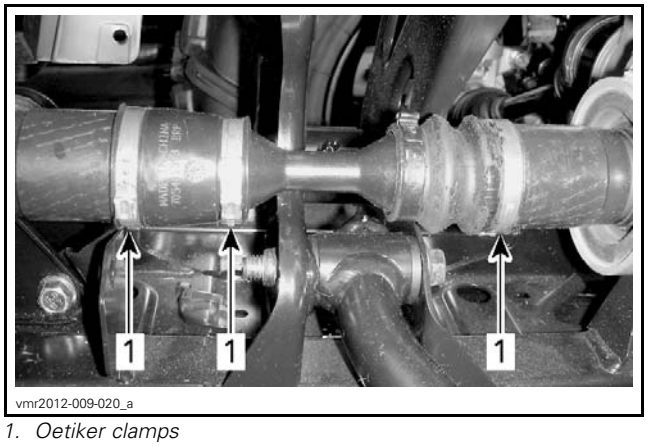
FROM LH SIDE
1. Vent hose

4. Remove bolts securing front differential to frame.



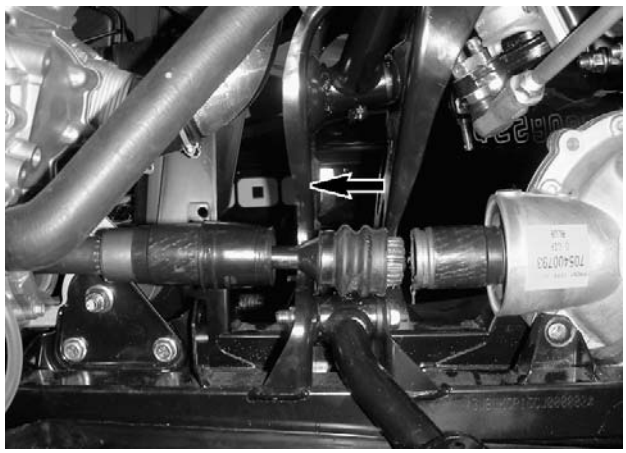
1. Bolts securing front differential to frame

5. Remove the following Oetiker clamps from front propeller shaft.



1. Oetiker clamps

6. Detach front propeller shaft from front differential by moving it rearward.


vmr2012-036-005_a

FRONT PROPELLER SHAFT MOVED REARWARD

7. Remove front differential by pulling it from RH side.

NOTICE **Be careful not to knock or to bend vent hose fitting while removing front differential.**

Front Differential Inspection (Assembled)

Manually turn the pinion gear; it should turn smoothly. Repair if necessary.

Check if oil seals are brittle, hard or damaged. Replace if necessary.

Backlash Inspection

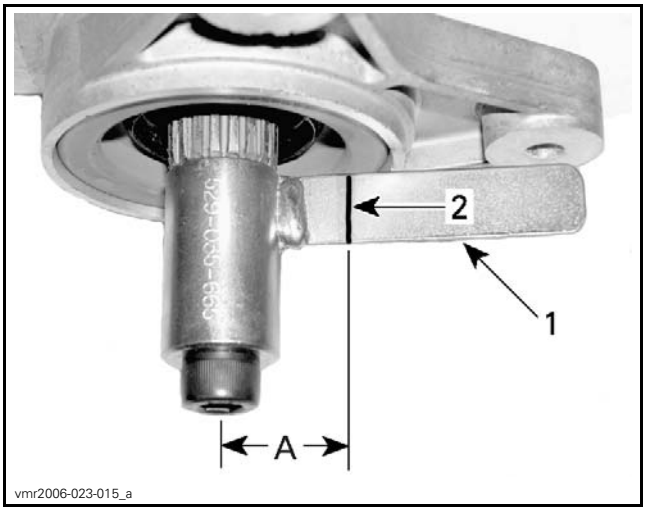
When measuring backlash, the differential cover should be upside down to pull the ring gear out of mesh.

Using a dial indicator and the backlash measurement tool, measure the backlash.

REQUIRED TOOL
BACKLASH MEASUREMENT TOOL (P/N 529 035 665)

Place the backlash measurement tool at the end of pinion gear.

From center of tool bolt, measure 25.4 mm (1 in) and scribe a mark on the tab.

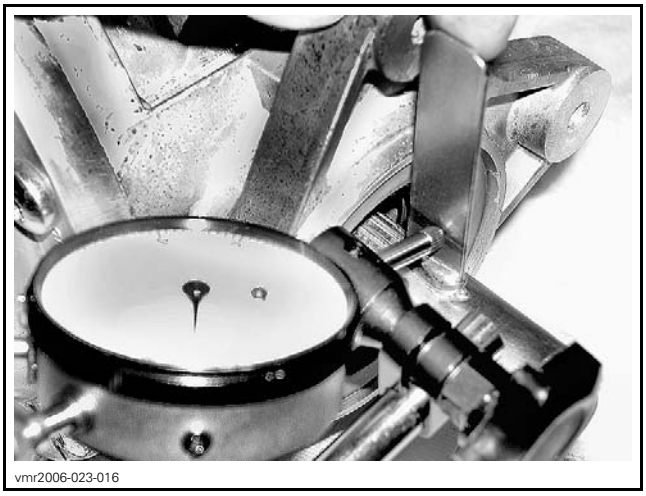


vmr2006-023-015_a

1. Tab of backlash measurement tool
2. Mark on tab
A. 25.4 mm (1 in)

Position the dial indicator tip against the tab at a 90° angle and right on the previously scribed mark.

Gently, move the tool tab back and forth. Note the backlash result.


vmr2006-023-016

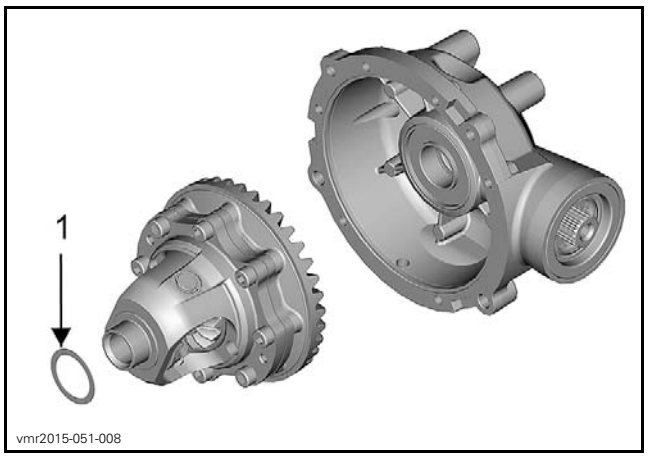
Rotate pinion gear 1/2 turn and recheck backlash. Note the result.

Rotate pinion gear 1 turn and recheck backlash.

BACKLASH SPECIFICATION
0.1 mm (.004 in) to 0.25 mm (.01 in)

If backlash is out of specification, split final drive housing and adjust shim thickness as per following guideline.

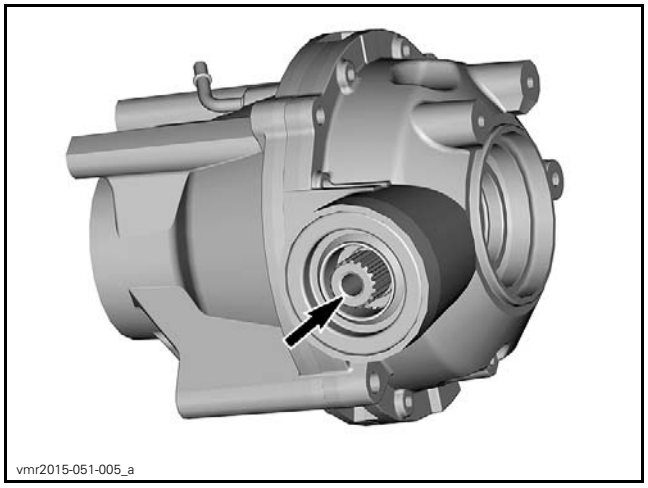
BACKLASH ADJUSTMENT GUIDELINE	
BACKLASH MEASUREMENT	WHAT TO DO
Below 0.1 mm (.004 in)	Remove shim(s) and recheck backlash
Above 0.25 mm (.01 in)	Add shim(s) and recheck backlash



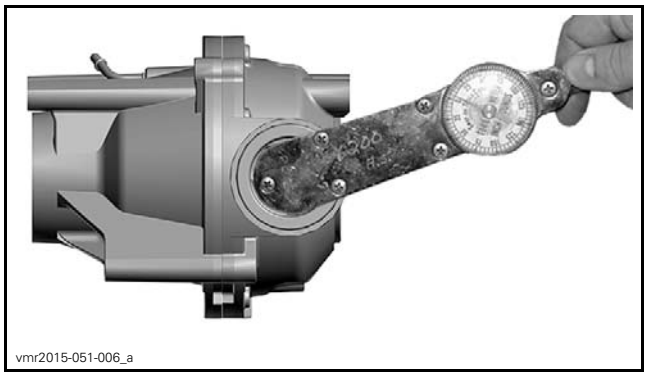
1. Backlash shim

Preload Inspection

Screw the propeller shaft screw in pinion gear.



Using a needle torque wrench, measure the preload.



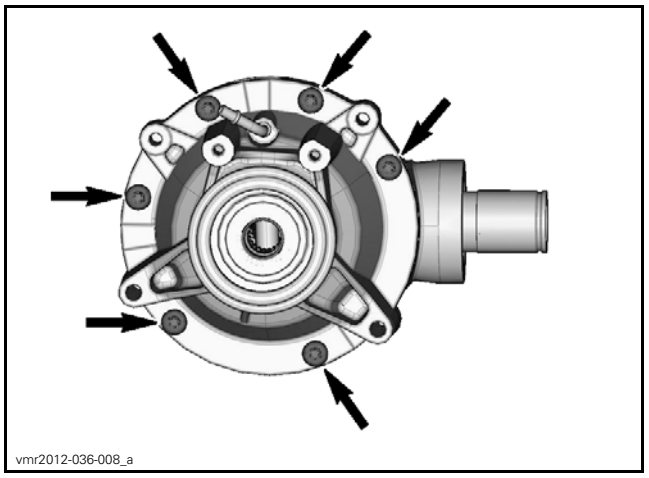
PRELOAD SPECIFICATION
Maximum 0.50 N•m (4 lbf•**in**)

If preload is out of specification, split front differential housing and check all bearings conditions.

Disassembling the Front Differential

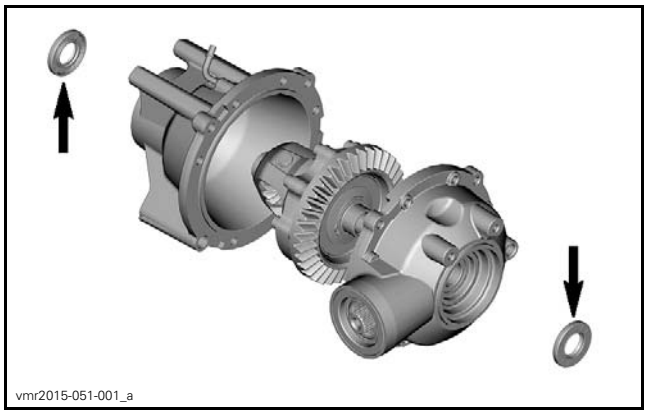
Differential Housing

Remove front differential housing screws.



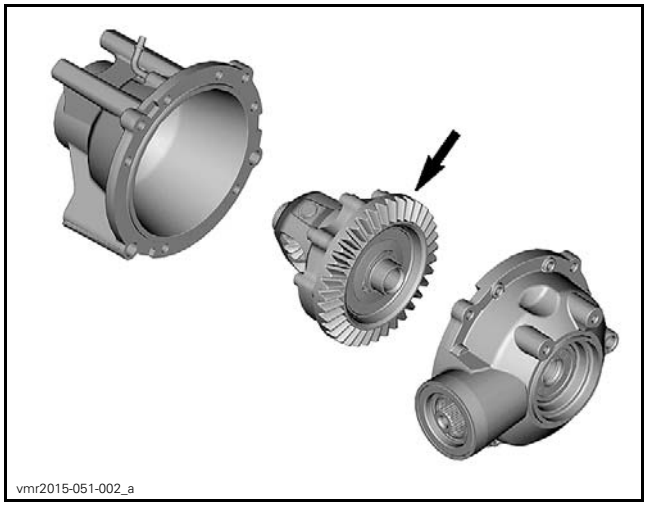
Separate half housings.

Remove oil seals.



Carrier/Ring Gear

Remove carrier/ring gear out of half housing.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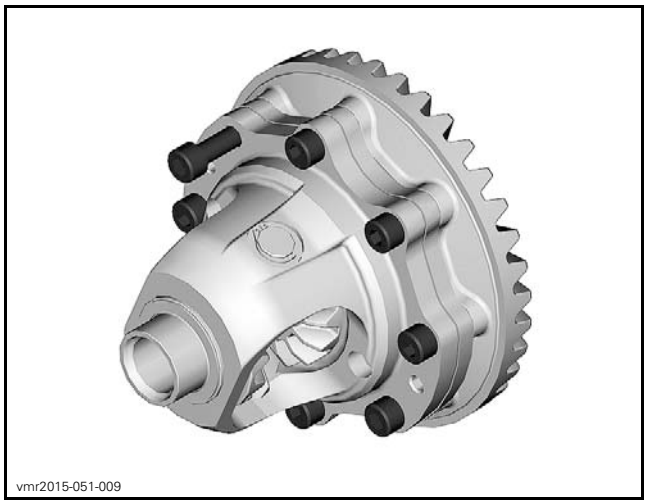
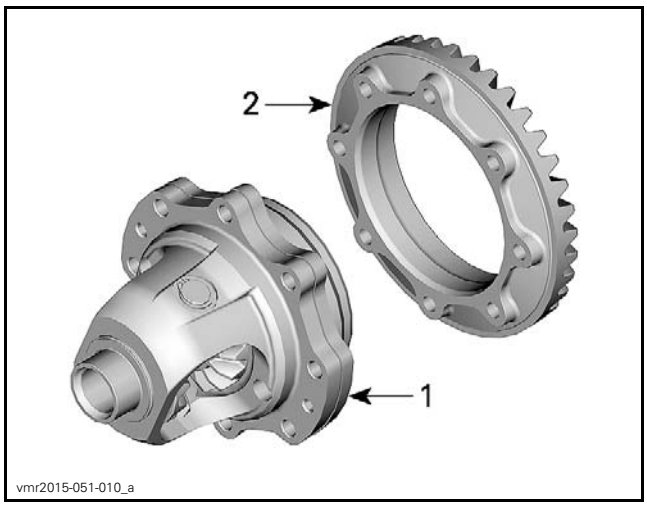
Remove screws securing ring gear to carrier.


vmr2015-051-009

Separate ring gear from carrier.

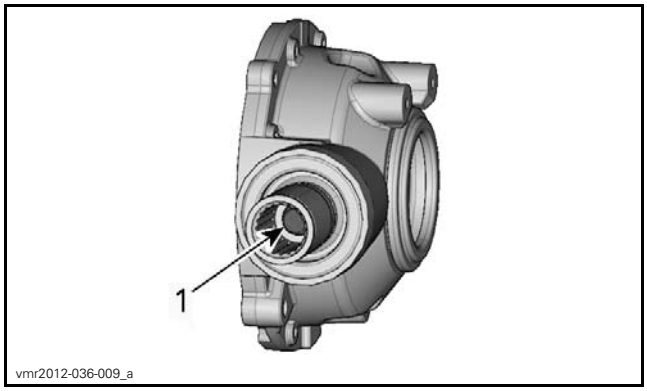


vmr2015-051-010_a

1. Carrier
2. Ring gear

Pinion Gear

Remove screw retaining front propeller shaft adapter.



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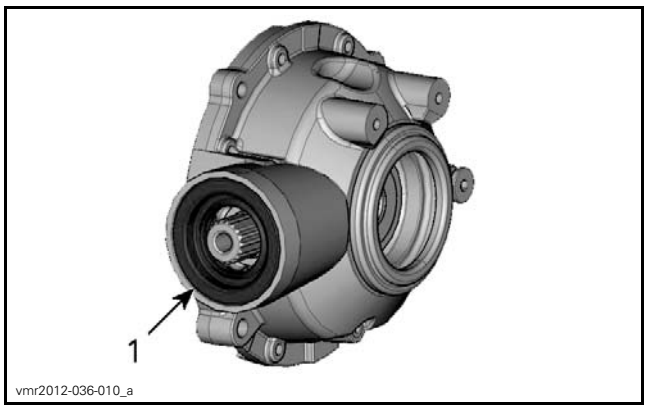
1. Retaining screw

Remove and discard oil seal.



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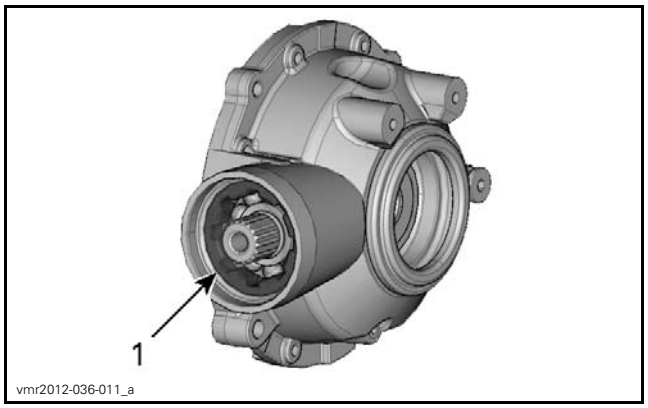
1. Oil seal

Unscrew the pinion nut.

REQUIRED TOOL
SPANNER SOCKET (P/N 529 035 649)

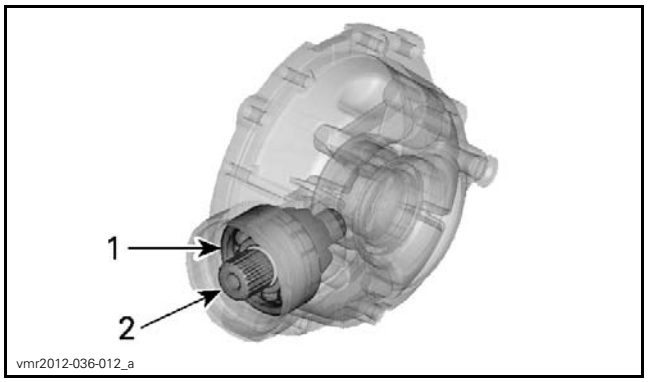
529035649



1. Pinion nut

Remove bearing and pinion gear together.

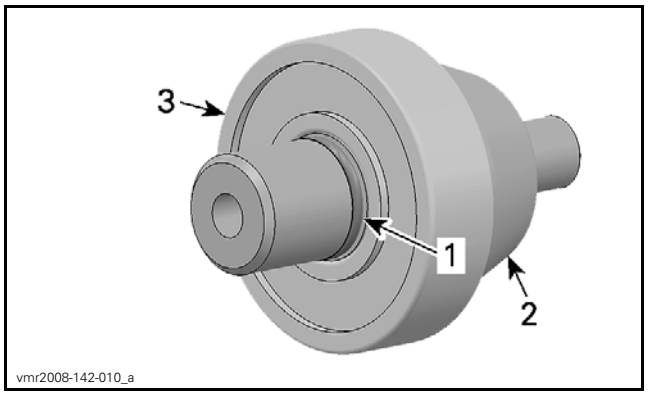
RECOMMENDED TOOLS	QTY
Pipe: 78 mm (3-1/16 in) diameter x 127 mm (5 in) in length	1
Threaded rod: M10 x 1.25, 178 mm (7 in) length	1
M10 x 1.25 nut	3
Flat bar	1



1. Bearing
2. Pinion gear

Remove and discard O-ring.

Remove bearing from pinion gear.



1. O-ring
2. Pinion gear
3. Bearing

Remove and discard the needle bearing.

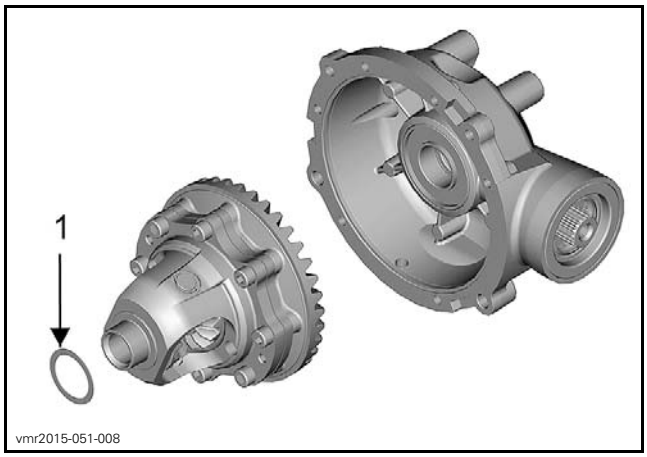
Assembling the Front Differential

Adjustment is required when any of the following part is changed.

– Pinion gear
– Ring gear
– Carrier
– Housing.

As a preliminary setup, install shim according to the following table.

RECOMMENDED SHIM THICKNESS	
BACKLASH	0.5 mm (.02 in) (as a preliminary adjustment)



1. Backlash shim

Prior to finalizing assembly, proceed in this order:

– Temporarily assemble final drive using recommended torques.
– Do not apply thread locker product.
– Do not install a new pinion nut.
– Check backlash.
– Check preload.

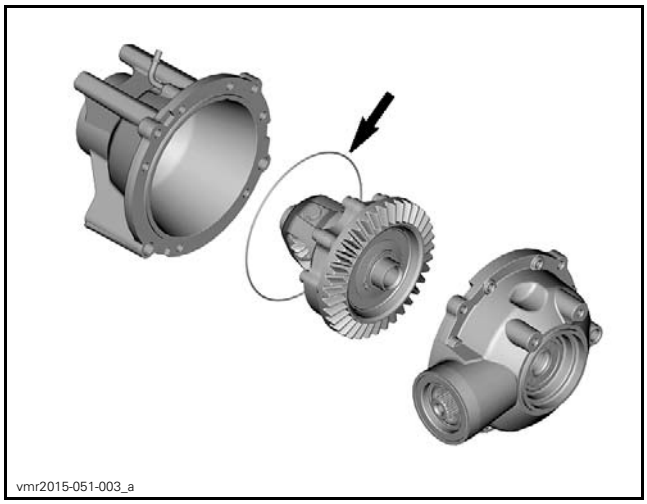
Carrier/Ring Gear

The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten carrier ring gear screws to specification.

TIGHTENING TORQUE	
Carrier ring gear screws	37 N•m ± 3 N•m (27 lbf•ft ± 2 lbf•ft)

Check condition of seal. Replace if damaged.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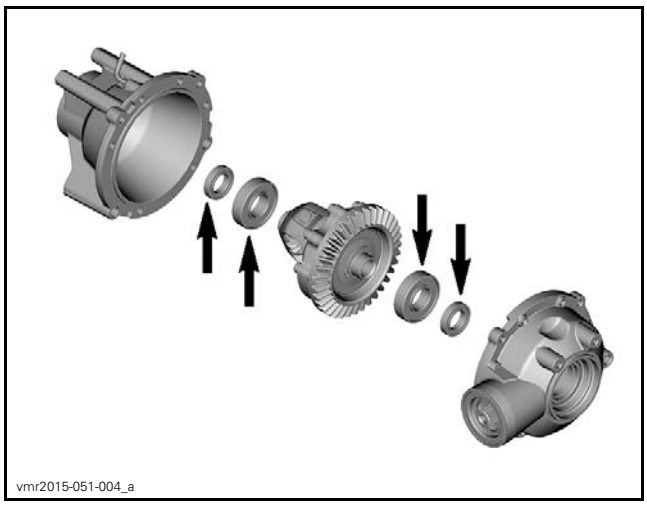
Check bearings. Replace with **NEW** bearings if necessary.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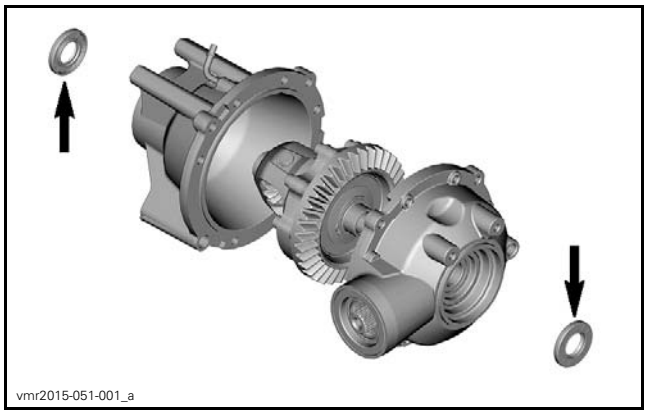
Apply XPS SYNTHETIC GREASE (P/N 293 550 010) on **NEW** oil seals and install.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Tighten differential housing screws to specification.

TIGHTENING TORQUE	
Differential housing screws	23.5 N•m ± 3.5 N•m (17 lbf•ft ± 3 lbf•ft)

Pinion Gear

Install a **NEW** ball bearing.

Install a **NEW** O-ring.

Install a **NEW** needle bearing.

Apply LOCTITE 277 (P/N 293 800 073) to pinion nut.

Install and tighten the pinion nut to specification.

TIGHTENING TORQUE	
Pinion nut	180 N•m ± 15 N•m (133 lbf•ft ± 11 lbf•ft) + LOCTITE 277 (P/N 293 800 073)

Apply XPS SYNTHETIC GREASE (P/N 293 550 010) on **NEW** oil seal and install.

Tighten front propeller shaft adapter retaining screw to specification.

TIGHTENING TORQUE	
Front propeller shaft adapter retaining screw	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft)

Installing the Front Differential

The installation is the reverse of the removal procedure. However, pay attention to the following.

When inserting the small portion of propeller shaft into propeller shaft boot, make sure both parts of propeller shaft are well indexed.

TIGHTENING TORQUE	
M8 nut securing front differential to frame	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)
M10 nuts securing front differential to frame	61 N•m ± 9 N•m (45 lbf•ft ± 7 lbf•ft)

Install **NEW** Oetiker clamps.

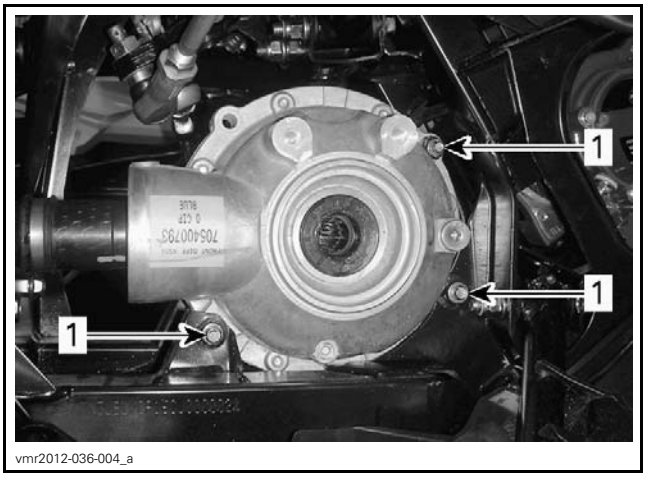
Refill front differential with recommended oil. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

FRONT PROPELLER SHAFT

Removing the Front Propeller Shaft

1. Lift and support vehicle.
2. Remove front wheel. Refer to *WHEELS AND TIRES* subsection.

3. Remove inner fender panel(s). Refer to *BODY* subsection.
4. Remove bolts securing front differential to frame.



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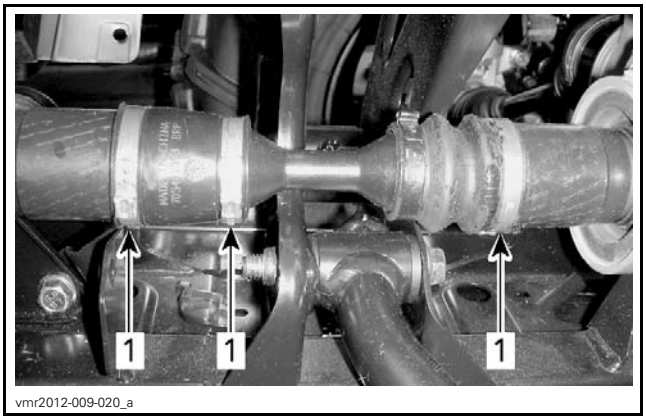
PARTS REMOVED FOR CLARITY
1. Bolts securing front differential to frame

5. Remove the following Oetiker clamps from front propeller shaft.



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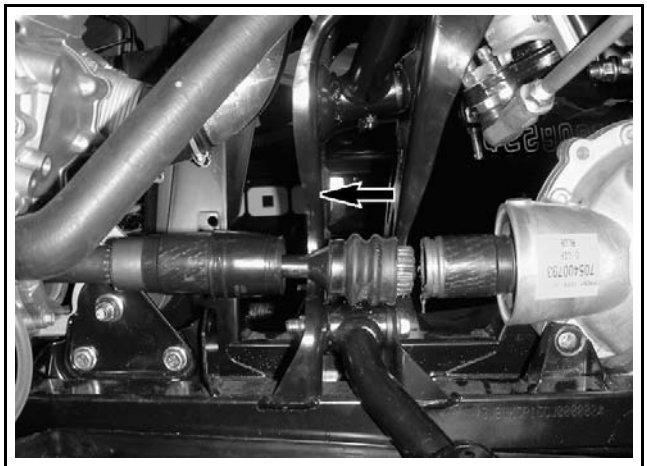
1. Oetiker clamps

6. Detach front propeller shaft from front differential by moving it rearward.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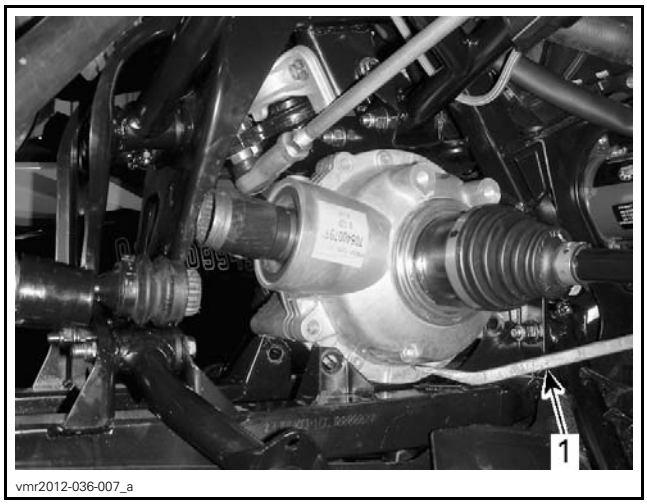
FRONT PROPELLER SHAFT MOVED REARWARD

7. Pry front differential upwards to make room.



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1. Pry bar

8. Remove front propeller shaft by pulling it forward.
9. Remove front propeller shaft adapters from engine and from front differential.

Inspecting the Front Propeller Shaft

Inspect if propeller shaft is not bent or twisted.

Check propeller shaft splines for wear or damage.

Check if propeller shaft bellows is pierced or brittle.

Installing the Front Propeller Shaft

The installation is the reverse of removal procedure. However, pay attention to the following.

Apply XPS SYNTHETIC GREASE (P/N 293 550 010) on splines.

Tighten propeller shaft adapter screw to specification.

TIGHTENING TORQUE	
Propeller shaft adapter screw **(differential side: M10x16)**	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) **+** LOCTITE 648 (GREEN) (P/N 413 711 400)
Propeller shaft adapter screw **(engine side: M12x20)**	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) **+** LOCTITE 648 (GREEN) (P/N 413 711 400)

FRONT DRIVE WITH VISCO-4LOK

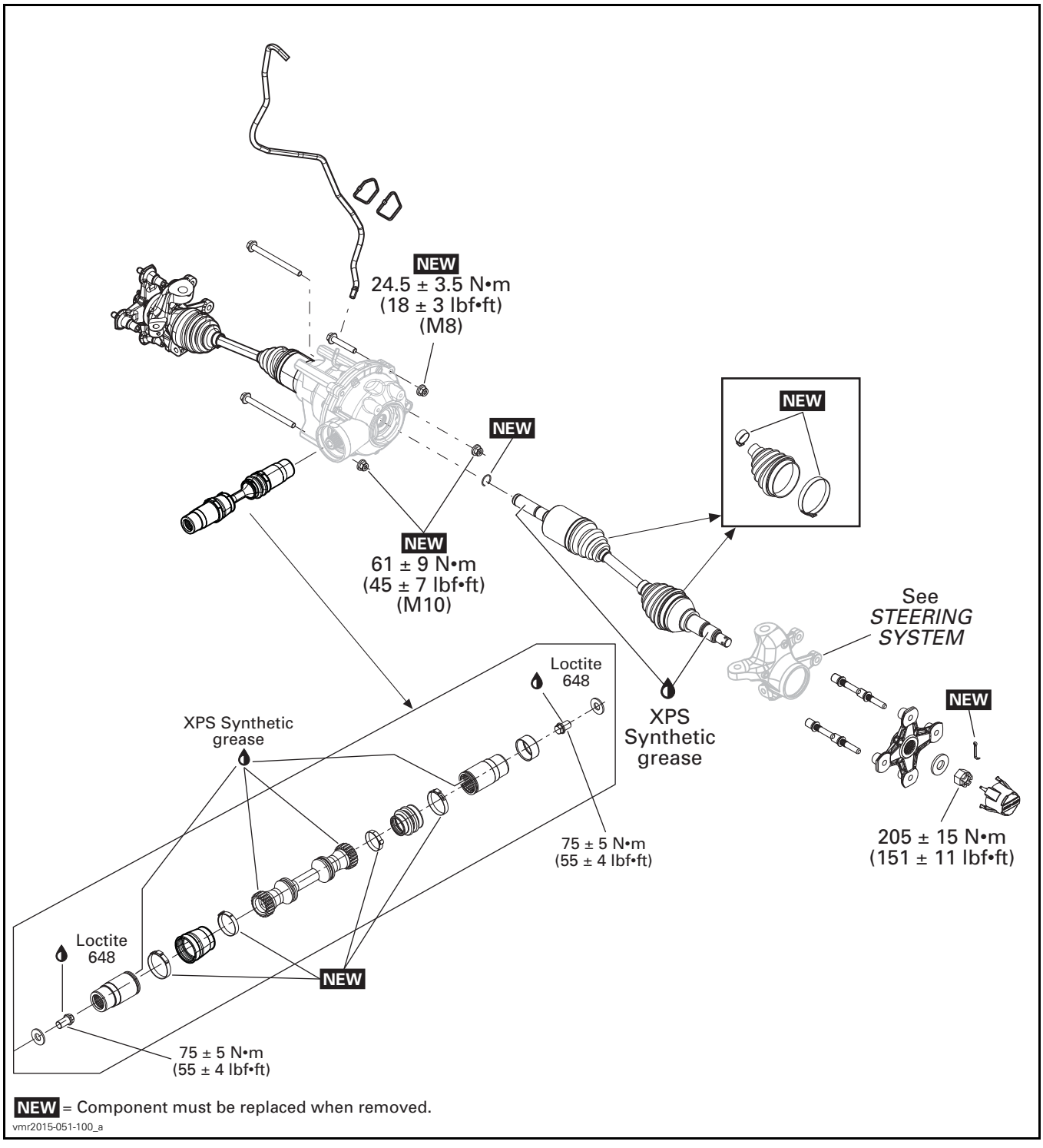
SERVICE TOOLS

Description	Part Number	Page
BACKLASH MEASUREMENT TOOL	529 035 665	8
BELLOWS CLAMP PLIERS	529 036 120	5
CV JOINT EXTRACTOR	529 036 005	6
DIFFERENTIAL NUT SOCKET 65MM	529 036 302	10

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 271 (RED)	293 800 005	11–12
LOCTITE 648 (GREEN)	413 711 400	13
SYNTHETIC GREASE	779162	5, 11–13

FRONT DRIVE SHAFTS AND FRONT PROPELLER SHAFT



NEW = Component must be replaced when removed.

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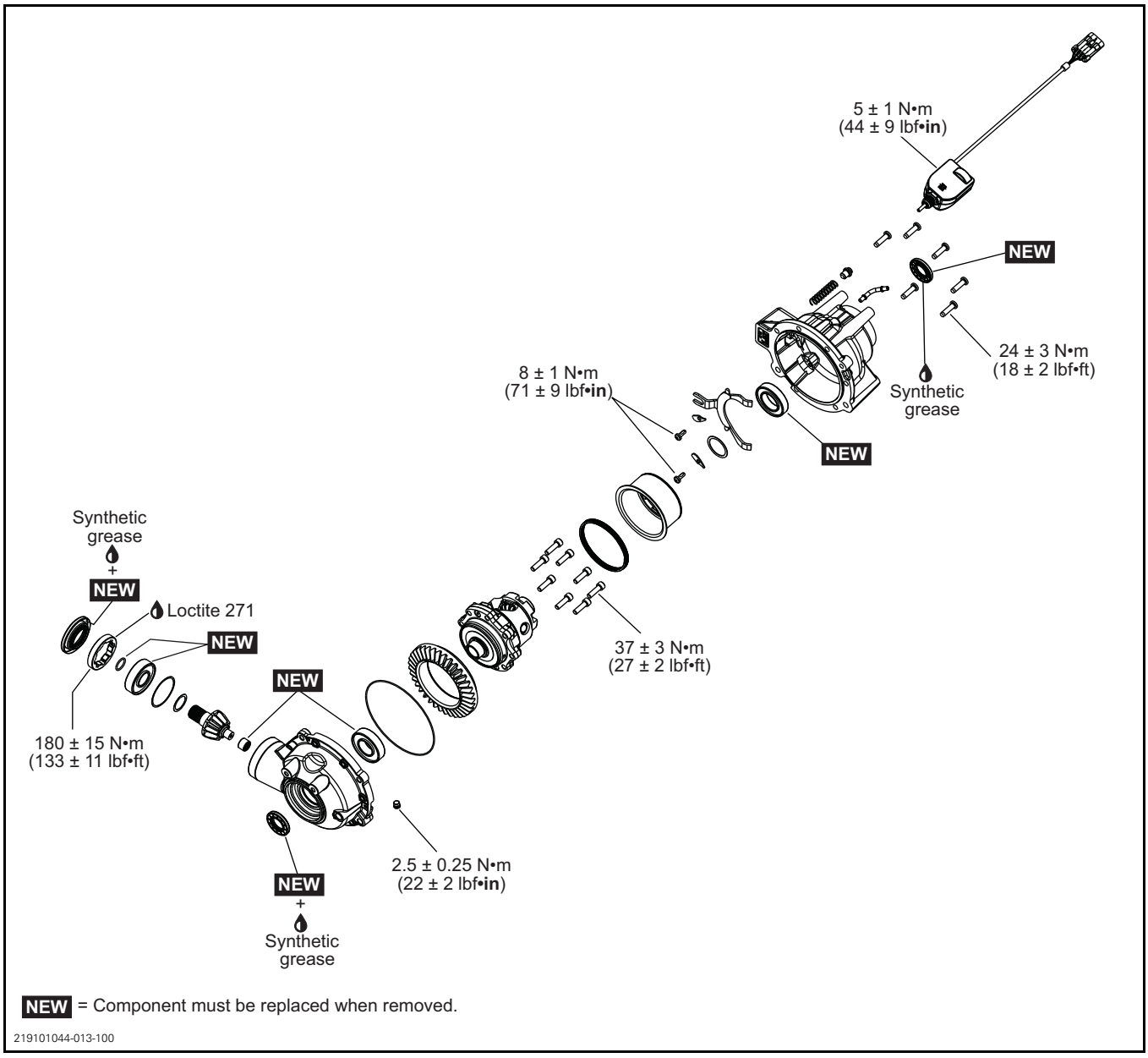
VISCO-4LOK DIFFERENTIAL



NEW = Component must be replaced when removed.

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GENERAL

The procedure explained below is the same for the RH and LH sides unless otherwise instructed.

SYSTEM DESCRIPTION

Visco-Lok Unit

The Visco-Lok® system constantly monitors front wheel speed and, if it detects one wheel spinning faster than its mate, it progressively sends more power to the wheel with the better traction.

The Visco-Lok system is comprised of two principal components, a shear pump and the controlled multi-plate clutch.

A unique feature of the shear pump is that it is self-contained and independent. It does not require an external source of hydraulic fluid. The self-contained viscous shear pump generates a pressure proportional to wheel speed differential - meaning the difference in rotational speed between the two wheels. This pressure engages the friction clutch via a piston to transmit the torque.

In the event of a failure, the Visco-Lok carrier/ring gear and pinion gear will have to be replaced.

NOTE: The Visco-Lok shear pump is not serviceable. If the pump is disassembled, the viscous fluid contained inside will be lost and it cannot be replaced.

Visco-4Lok System

An electronic actuator pushes a fork to move a collar.

The inner teeth of the collar are engaged into the recesses of the Visco-4Lok unit internal gears to lock both front wheels together.

The actuator is controlled by the ECM.

If all required conditions are fulfilled (speed and throttle opening), a signal is sent to activate or deactivate the 4WDLock mode.

When the 4WDLock is activated, the telltale on the throttle lever control housing and the icon in the digital display will turn on.

In 4WDLock mode, a speed limiter restricts the vehicle speed:

– 40 km/h (25 MPH) in forward
– 15 km/h (9 MPH) in reverse, same as the normal use.

.

The override mode will allow to reach an other speed limitation:

– 60 km/h (37 MPH) in HIGH or LOW gear
– 25 km/h (16 MPH) in reverse.

PROCEDURES

WHEEL HUB

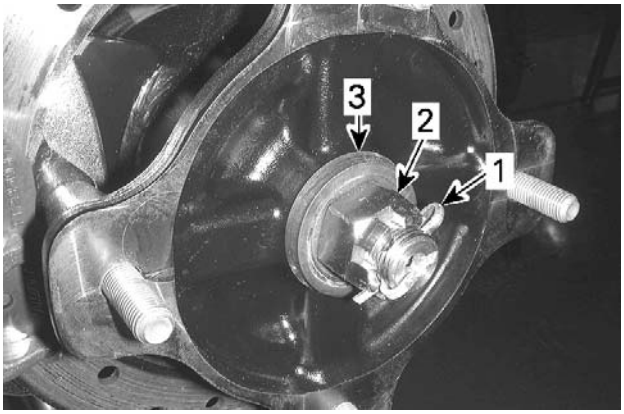
Removing the Wheel Hub

Lift and support vehicle.

Select the 4WD position and place the transmission lever on "P".

Remove caliper from knuckle. Refer to *BRAKES* subsection.

Remove the following parts.



TYPICAL
1. Cotter pin
2. Castellated nut
3. Belleville washer

Remove wheel hub.

Inspecting the Wheel Hub

Check wheel hub for cracks or other damages.

Check inner splines for wear or other damages.

If any damage is detected on wheel hub, replace it with a new one.

Installing the Wheel Hub

The installation is the reverse of the removal procedure. However, pay attention to the following.

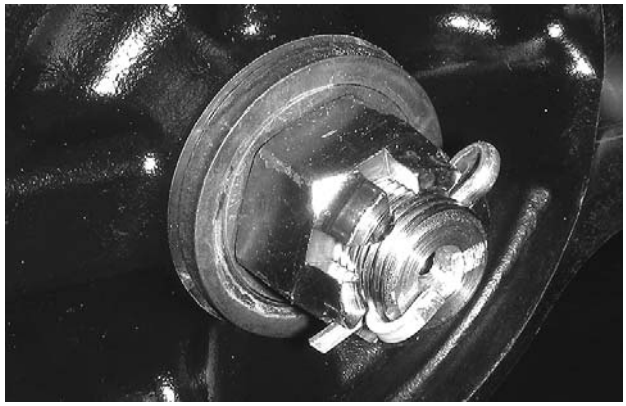
Install Belleville washer with its convex side outwards.

Tighten castellated nut to specification.

TIGHTENING TORQUE	
Castellated nut	205 N•m ± 15 N•m (151 lbf•ft ± 11 lbf•ft)

NOTE: Tighten further castellated nut if required to align grooves with drive shaft hole.

Install a NEW cotter pin.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FRONT DRIVE SHAFT

Removing the Front Drive Shaft

Lift and support vehicle.

Remove inner fender panel(s). Refer to *BODY* subsection.

Remove the *KNUCKLE*. Refer to *STEERING SYSTEM* subsection.

Remove shock absorber lower bolt.

Lift and attach the following parts to make room.
- Shock absorber
- Upper suspension arm.

Strongly pull drive shaft out of differential.

vmr2012-036-002_a

PULL DRIVE SHAFT

Discard the stop ring at the end of the shaft.

Inspecting the Front Drive Shaft

Inspect the condition of the bellows. If there is any damage or evidence of leaking lubricant, replace them. Refer to *DRIVE SHAFT BELLOW* in this subsection.

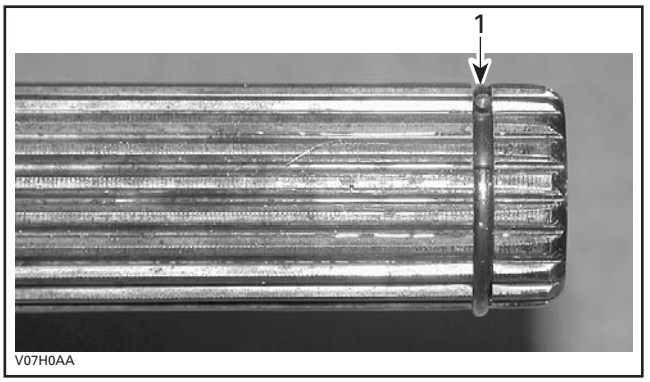
Check splines for excessive wear. Replace if necessary.

NOTE: If the splines on plunging joint are worn, a check of differential inner splines should be done.

Installing the Front Drive Shaft

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install a NEW stop ring.



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TYPICAL
1. Stop ring

Lubricate the drive shaft splines.

SERVICE PRODUCT
SYNTHETIC GREASE (P/N 779162)

Ensure that wear ring is close to the differential.

DRIVE SHAFT BELLOW

Removing the Drive Shaft Bellow

Remove *FRONT DRIVE SHAFT*. See procedure in this subsection.

Remove clamps from drive shaft bellows.

REQUIRED TOOL
BELLOWS CLAMP PLIERS (P/N 529 036 120)

529036120

Dislodge the large end of the bellow.

Separate the joint from the shaft. Two procedures can be used.

Without the Special Tool

Clamp joint housing in a vise.

Align shaft with joint.

Pull hard on shaft to remove from joint.

Remove the bellow from drive shaft.

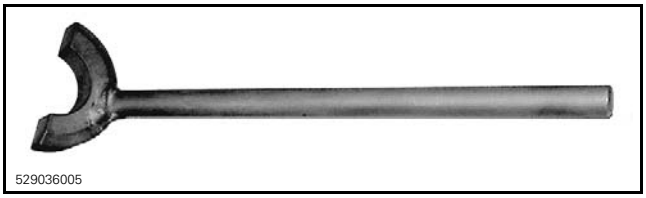
Remove and discard the circlip. A new one is included in the bellow kit.

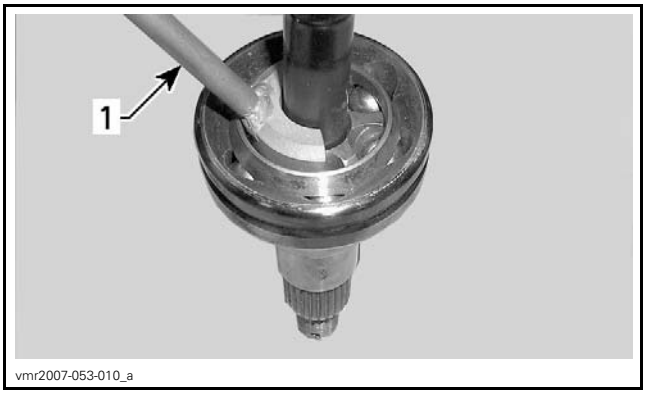
With the Special Tool

Place drive shaft in vice with the joint downward.

Install the tool on bearing.

REQUIRED TOOL
CV JOINT EXTRACTOR (P/N 529 036 005)





TYPICAL — CV JOINT SHOWN
1. Joint extractor tool

With an hammer, hit on the tool to separate joint from shaft.

When joint and shaft are separated, remove the bellow from drive shaft.

Remove and discard the circlip. A new one is included in the bellow kit.

Installing the Drive Shaft Bellow

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install the NEW circlip.

Pack bearing area with grease (included with the new bellow kit).

NOTE: Do not use or add other grease.

Install NEW drive shaft bellow clamps.

FRONT DIFFERENTIAL ACTUATOR

Testing the Front Differential Actuator

Using the BRP Diagnostic Software (BUDS2)

Connect the vehicle to the BRP Diagnostic software (BUDS).

Active the differential actuator through BUDS2.

If the actuator works, check the throttle handle.

Testing Differential Actuator Voltage

1. Apply parking brake and select the PARK position.
2. Start engine.
3. Unplug the actuator connector.
4. Measure voltage as per the following table.

VEHICLE HARNESS		MEASUREMENT
Pin B	Pin D	Battery voltage

If result is out of specification, repair the wiring harness wires or connectors.

If the result is good, test the continuity of the vehicle harness.

Testing the Continuity of the Differential Actuator Harness

1. Measure resistance between the following.

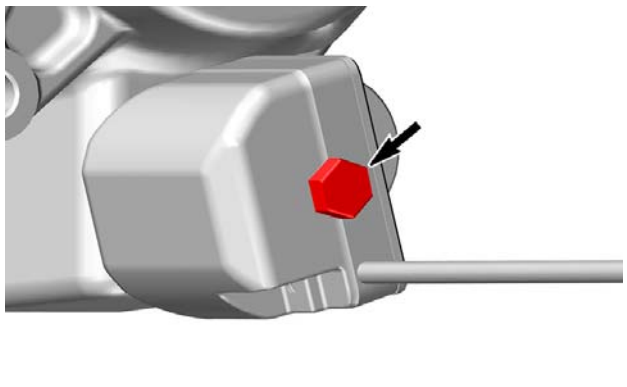
ACTUATOR	COMPONENT	MEASUREMENT
Pin A	Pin 4 multifunction gauge	0 Ω
Pin C	Pin J2 ECM	0 Ω

If result is out of specification, repair the wiring harness wires or connectors.

If the result is good, replace the actuator.

Replacing the Front Differential Actuator

1. Place the vehicle level.
2. Disconnect the actuator connector.
3. Using a socket of 15mm, remove the actuator.


219101044-013-010

4. Install the new actuator.

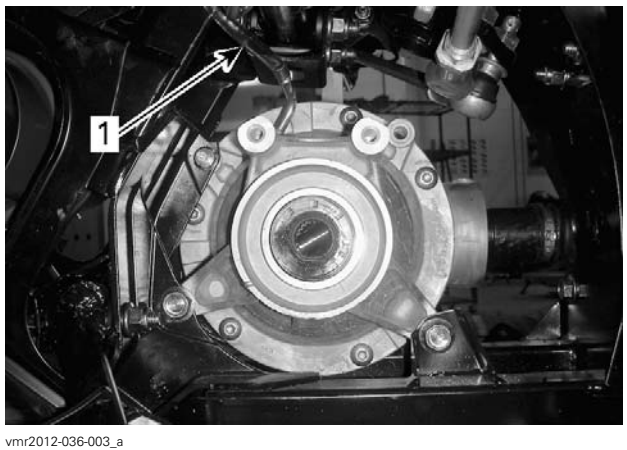
NOTICE **Screw the first threads manually to avoid damaging them.**

TIGHTENING TORQUE	
Actuator	5 N•m ± 1 N•m (44 lbf•**in** ± 9 lbf•**in**)

FRONT DIFFERENTIAL

Removing the Front Differential

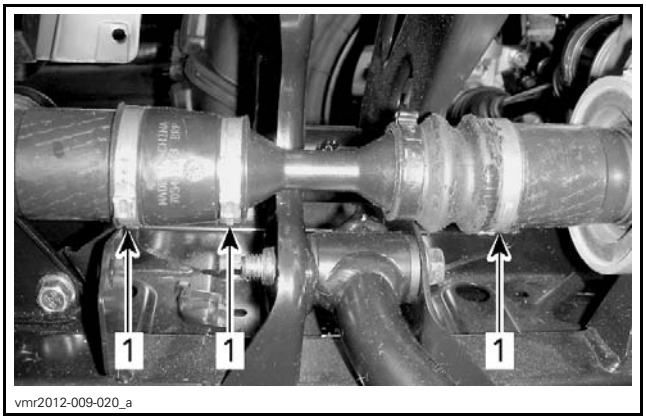
1. Drain front differential. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
2. Remove both front drive shafts. Refer to *FRONT DRIVE SHAFT* in this subsection.
3. Detach vent hose from front differential.



vmr2012-036-003_a

FROM LH SIDE
1. Vent hose

4. Disconnect the actuator connector.
5. Remove the following Oetiker clamps from the front propeller shaft.



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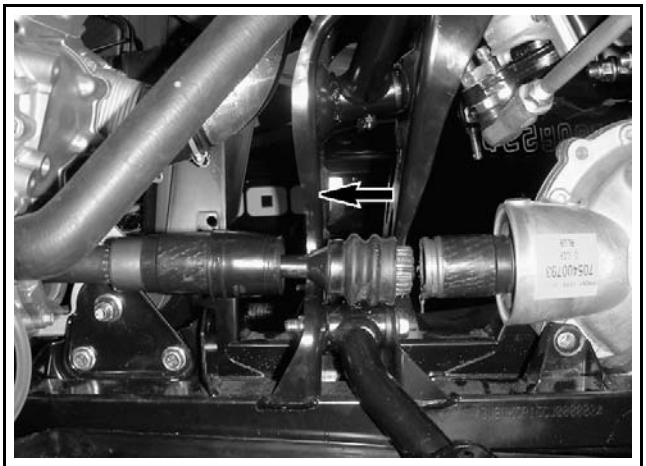
1. Oetiker clamps

6. Detach front propeller shaft from front differential by moving it rearward.


vmr2012-036-005_a

FRONT PROPELLER SHAFT MOVED REARWARD

7. Remove front differential by pulling it from RH side.

NOTICE **Be careful not to knock or to bend vent hose fitting while removing front differential.**

Front Differential Inspection (Assembled)

Manually turn the pinion gear; it should turn smoothly. Repair if necessary.

Check if oil seals are brittle, hard or damaged. Replace if necessary.

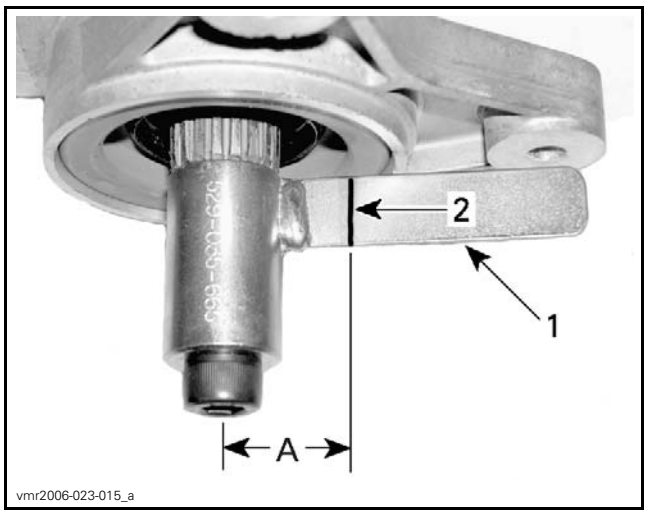
Backlash Inspection

When measuring backlash, the differential cover should be upside down to pull the ring gear out of mesh.

REQUIRED TOOL
BACKLASH MEASUREMENT TOOL (P/N 529 035 665)
DIAL INDICATOR

Place the backlash measurement tool at the end of pinion gear.

From center of tool bolt, measure 25.4 mm (1 in) and draw a mark on the tab.

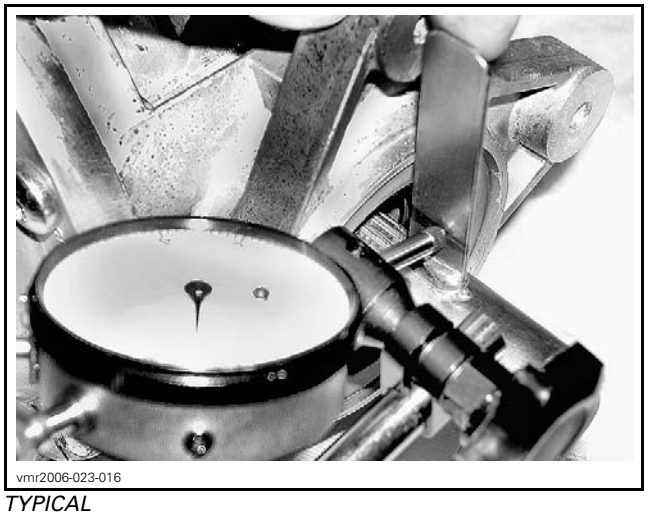


TYPICAL
1. *Tab of backlash measurement tool*
2. *Mark on tab*

A. 25.4 mm (1 in)

Position the dial indicator tip against the tab at a 90° angle and right on the previously drawn mark.

Gently, move the tool tab back and forth. Note the backlash result.



TYPICAL

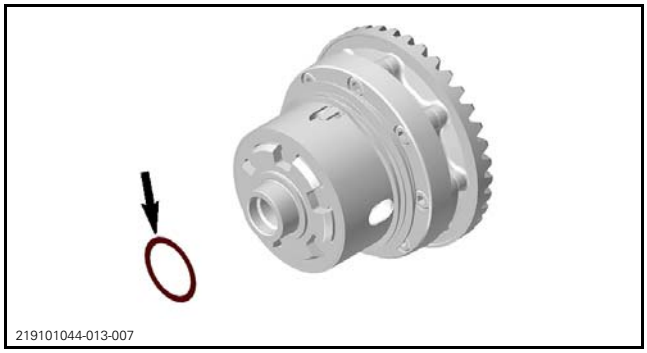
Rotate pinion gear 1/2 turn and recheck backlash. Note the result.

Rotate pinion gear 1 turn and recheck backlash.

BACKLASH SPECIFICATION
0.1 mm (.004 in) to 0.25 mm (.01 in)

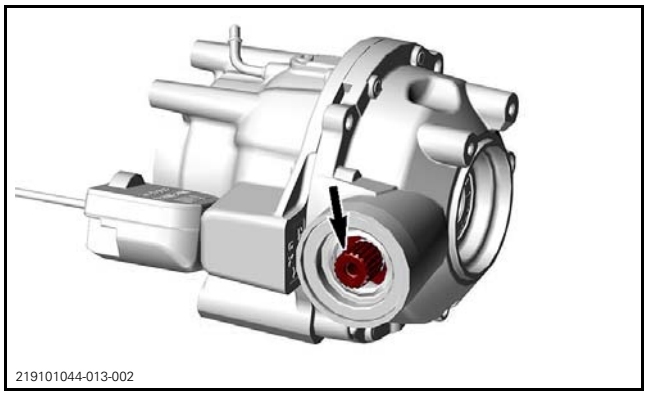
If backlash is out of specification, split final drive housing, refer to *DISASSEMBLING THE FRONT DIFFERENTIAL* and adjust shim thickness as per following guideline.

BACKLASH ADJUSTMENT GUIDELINE	
BACKLASH MEASUREMENT	WHAT TO DO
Below 0.1 mm (.004 in)	Remove shim(s) and recheck backlash
Above 0.25 mm (.01 in)	Add shim(s) and recheck backlash

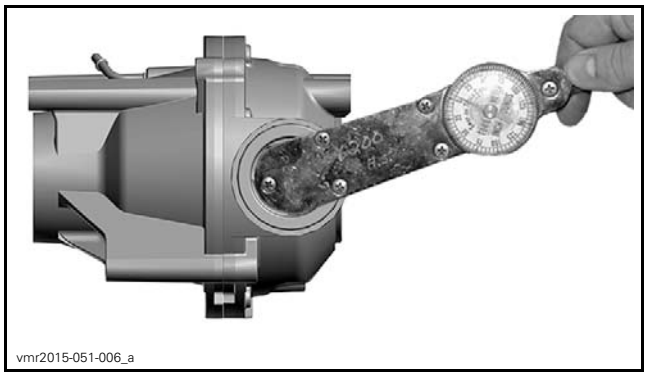


Preload Inspection

Screw the propeller shaft screw in pinion gear.



Using a needle torque wrench, measure the preload.



TYPICAL

PRELOAD SPECIFICATION
Maximum 1.50 N•m (13 lbf•**in**)

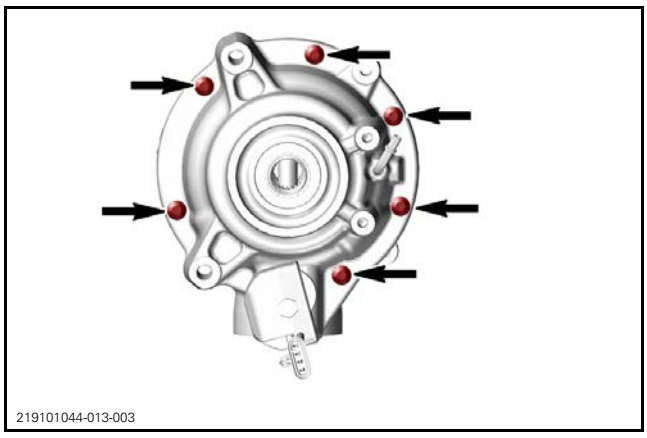
There should be close to zero resistance when turning pinion shaft by hand.

If preload is out of specification, split front differential housing, refer to *DISASSEMBLING THE FRONT DIFFERENTIAL* and carefully inspect all bearings conditions.

Disassembling the Front Differential

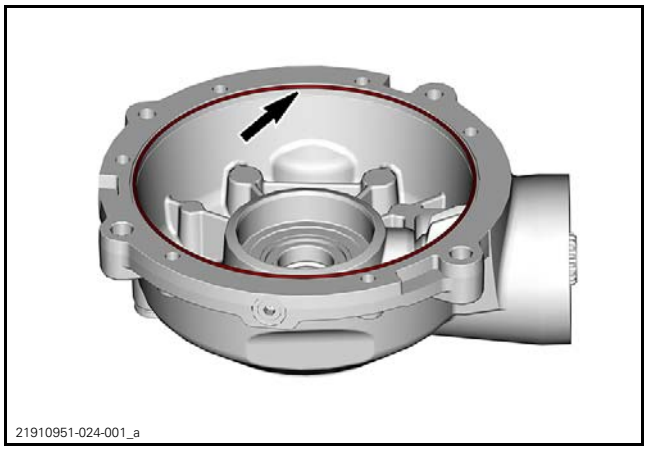
Differential Housing

Remove front differential housing screws.



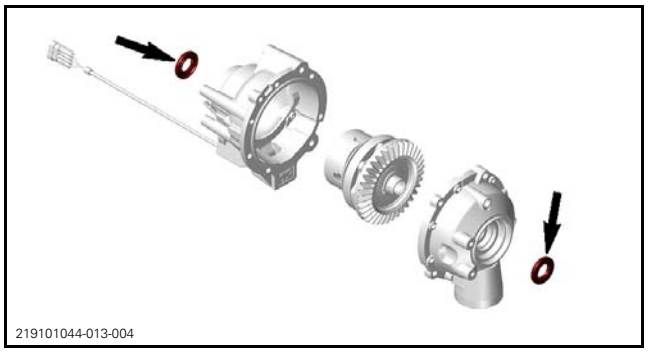
Separate half housings.

If opening the housing for backlash or preload adjustment, remove and set aside the cover O-ring.



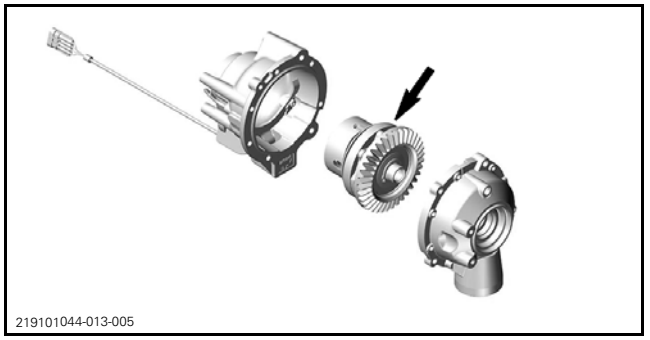
TYPICAL

Remove and discard oil seals.



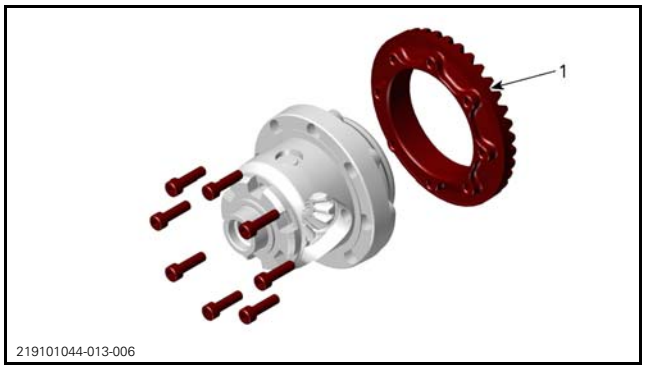
Visco-4Lok Carrier/Ring Gear

Remove Visco-4Lok carrier/ring gear out of half housing.



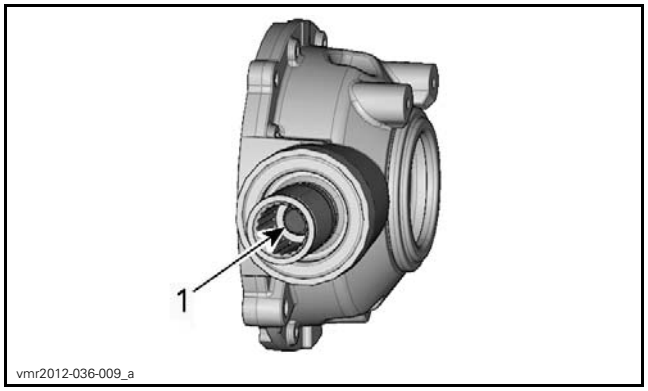
NOTE: Be careful to keep track of shims. Write down the thickness and position of every shim.

Separate ring gear from Visco-4Lok unit.



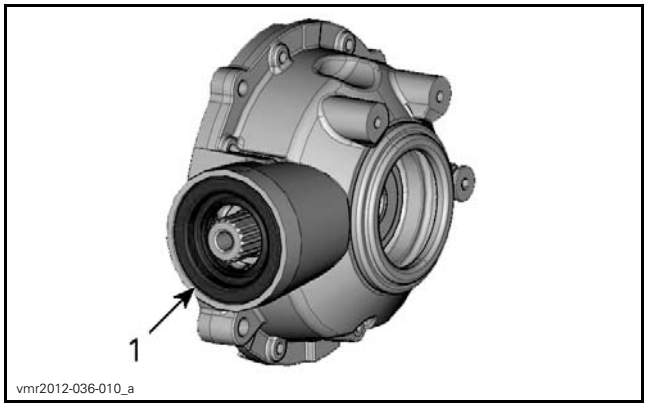
Pinion Gear

Remove screw retaining front propeller shaft adapter.



1. Retaining screw

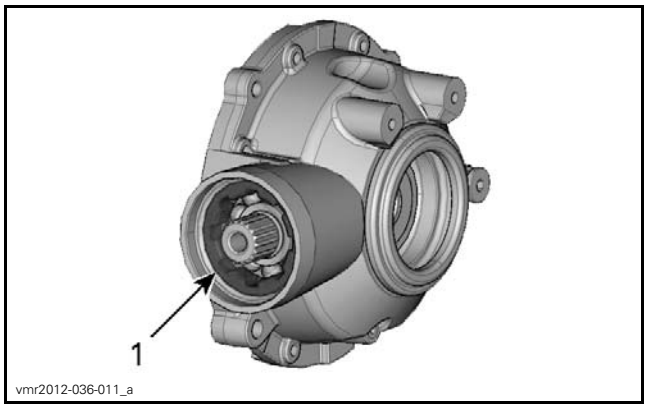
Remove and discard oil seal.



1. Oil seal

Unscrew the pinion nut.

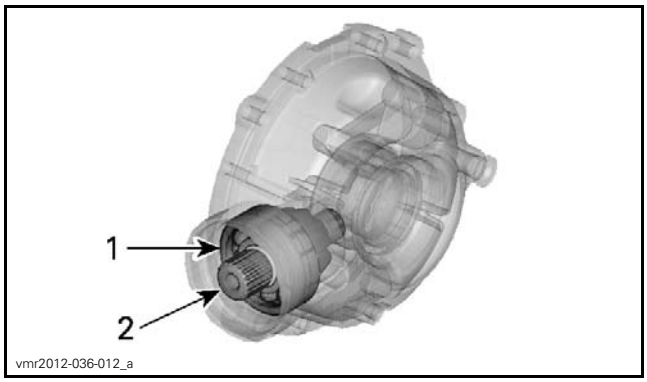
REQUIRED TOOL	
DIFFERENTIAL NUT SOCKET 65MM (P/N 529 036 302)	



1. Pinion nut

Remove bearing and pinion gear together.

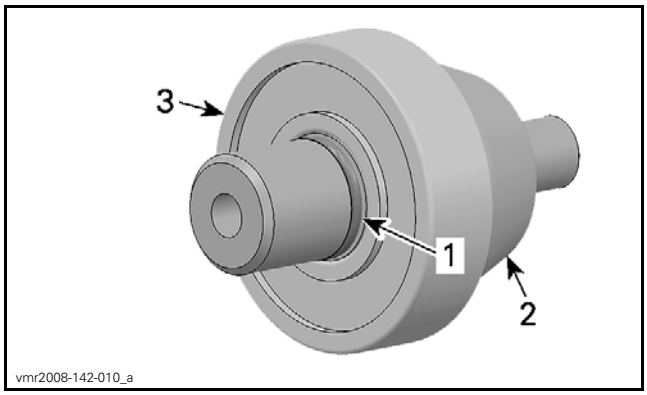
RECOMMENDED TOOLS	QTY
Pipe: 78 mm (3-1/16 in) diameter x 127 mm (5 in) in length	1
Threaded rod: M10 x 1.25, 178 mm (7 in) length	1
M10 x 1.25 nut	3
Flat bar	1



1. Bearing
2. Pinion gear

Remove and discard O-ring.

Remove bearing from pinion gear.



1. O-ring
2. Pinion gear
3. Bearing

Remove and discard the needle bearing.

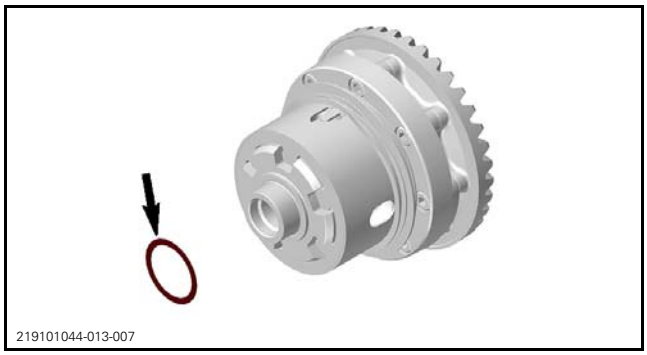
Assembling the Front Differential

Adjustment is required when any of the following part is changed.

- Pinion gear
- Ring gear
- Visco-4lok unit
- Housing.

As a preliminary setup, install shim according to the following table.

RECOMMENDED SHIM THICKNESS	
BACKLASH	0.5 mm (.02 in) (as a preliminary adjustment)



Prior to finalizing assembly, proceed in this order:

- Temporarily assemble final drive using recommended torques.
- Do not apply thread locker product.
- Do not install a new pinion nut.
- Do not install the cover O-ring
- Check backlash.
- Check preload.

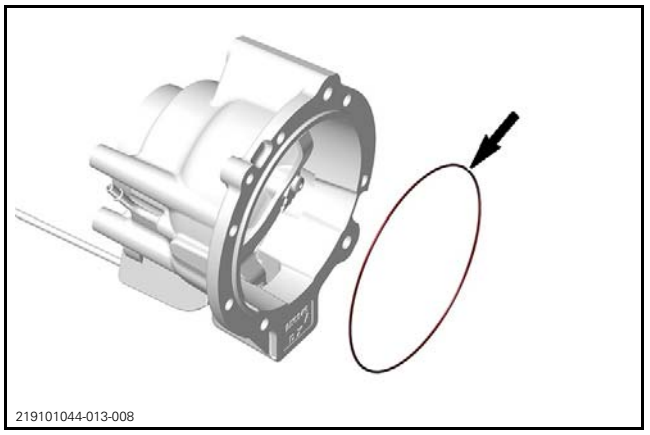
Visco-4Lok Carrier/Ring Gear

The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten Visco-4Lok / ring gear screws to specification.

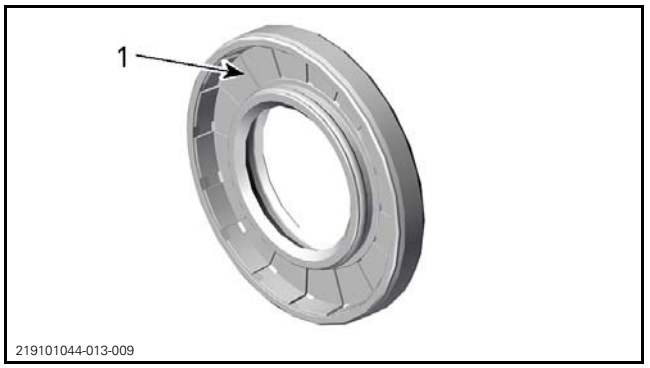
TIGHTENING TORQUE	
Visco-4Lok / ring gear screws	37 N•m ± 3 N•m (27 lbf•ft ± 2 lbf•ft)

Check condition of O-ring before re installation. Replace if damaged.



Check bearings in both half housings. Replace with NEW bearings if necessary.

Before installing the new oil seals, apply grease inside their inner lips.



1. Fill this cavity

SERVICE PRODUCT
SYNTHETIC GREASE (P/N 779162)

Tighten differential housing screws to specification.

TIGHTENING TORQUE	
Differential housing screws	23.5 N•m ± 3.5 N•m (17 lbf•ft ± 3 lbf•ft)

Pinion Gear

Install a NEW ball bearing.

Install a NEW O-ring.

Install a NEW needle bearing.

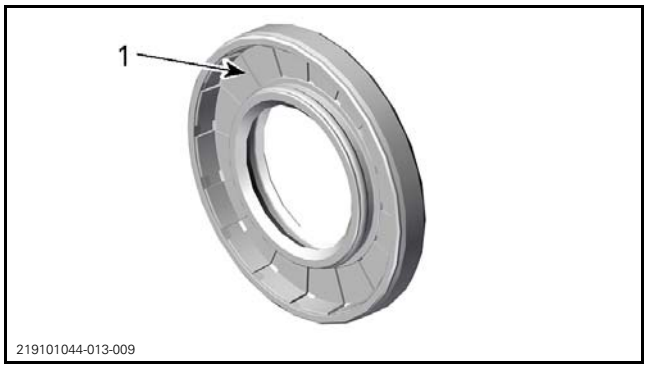
Apply a threadlocker product to pinion nut.

SERVICE PRODUCT
LOCTITE 271 (RED) (P/N 293 800 005)

Install and tighten the pinion nut to specification.

TIGHTENING TORQUE	
Pinion nut	180 N•m ± 15 N•m (133 lbf•ft ± 11 lbf•ft) + LOCTITE 271 (RED) (P/N 293 800 005)

Before installing the new oil seals, apply grease inside their inner lips.



1. Fill this cavity

SERVICE PRODUCT
SYNTHETIC GREASE (P/N 779162)

Tighten front propeller shaft adapter retaining screw to specification.

TIGHTENING TORQUE	
Front propeller shaft adapter retaining screw	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft)

Installing the Front Differential

The installation is the reverse of the removal procedure. However, pay attention to the following.

When inserting the small portion of propeller shaft into propeller shaft bellow, make sure both parts of propeller shaft are well indexed.

TIGHTENING TORQUE	
M8 nut securing front differential to frame	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)
M10 nuts securing front differential to frame	61 N•m ± 9 N•m (45 lbf•ft ± 7 lbf•ft)

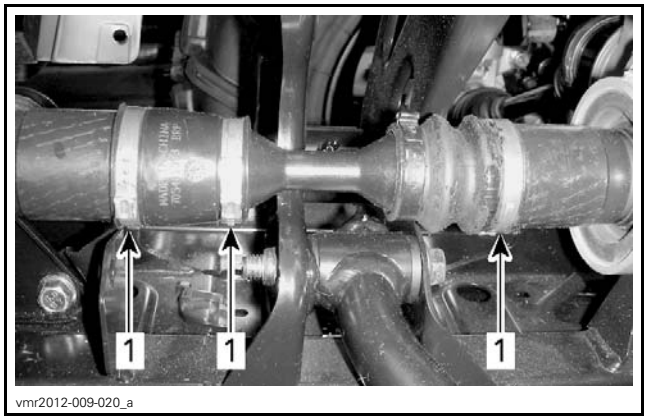
Install NEW Oetiker clamps.

Refill front differential with recommended oil. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

FRONT PROPELLER SHAFT

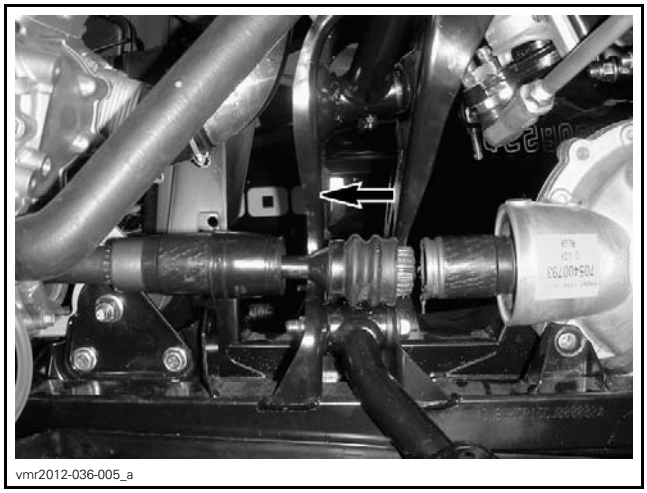
Removing the Front Propeller Shaft

1. Lift and support vehicle.
2. Remove front wheel. Refer to *WHEELS AND TIRES* subsection.
3. Remove inner fender panel(s). Refer to *BODY* subsection.
4. Remove front differential. Refer to *REMOVING THE FRONT DIFFERENTIAL* in this subsection.
5. Remove the following Oetiker clamps from front propeller shaft.



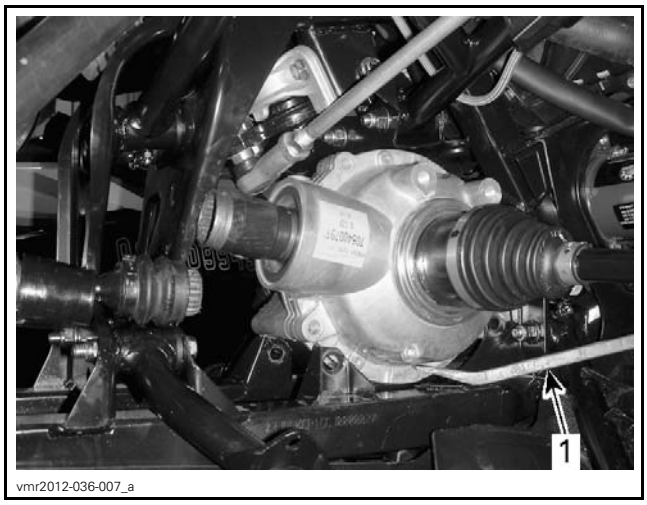
1. Oetiker clamps

6. Detach front propeller shaft from front differential by moving it rearward.



FRONT PROPELLER SHAFT MOVED REARWARD

7. Pry front differential upwards to make room.



1. Pry bar

8. Remove front propeller shaft by pulling it forward.
9. Remove front propeller shaft adapters from engine and from front differential.

Inspecting the Front Propeller Shaft

Inspect if propeller shaft is not bent or twisted.

Check propeller shaft splines for wear or damage.

Check if propeller shaft bellows is pierced or brittle.

Installing the Front Propeller Shaft

The installation is the reverse of removal procedure. However, pay attention to the following.

Apply SYNTHETIC GREASE (P/N 779162) on splines.

Tighten propeller shaft adapter screw to specification.

TIGHTENING TORQUE	
Propeller shaft adapter screw (differential side: M10x16)	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)
Propeller shaft adapter screw (engine side: M12x20)	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)

REAR DRIVE (450/570 EXCEPT T CATEGORY)

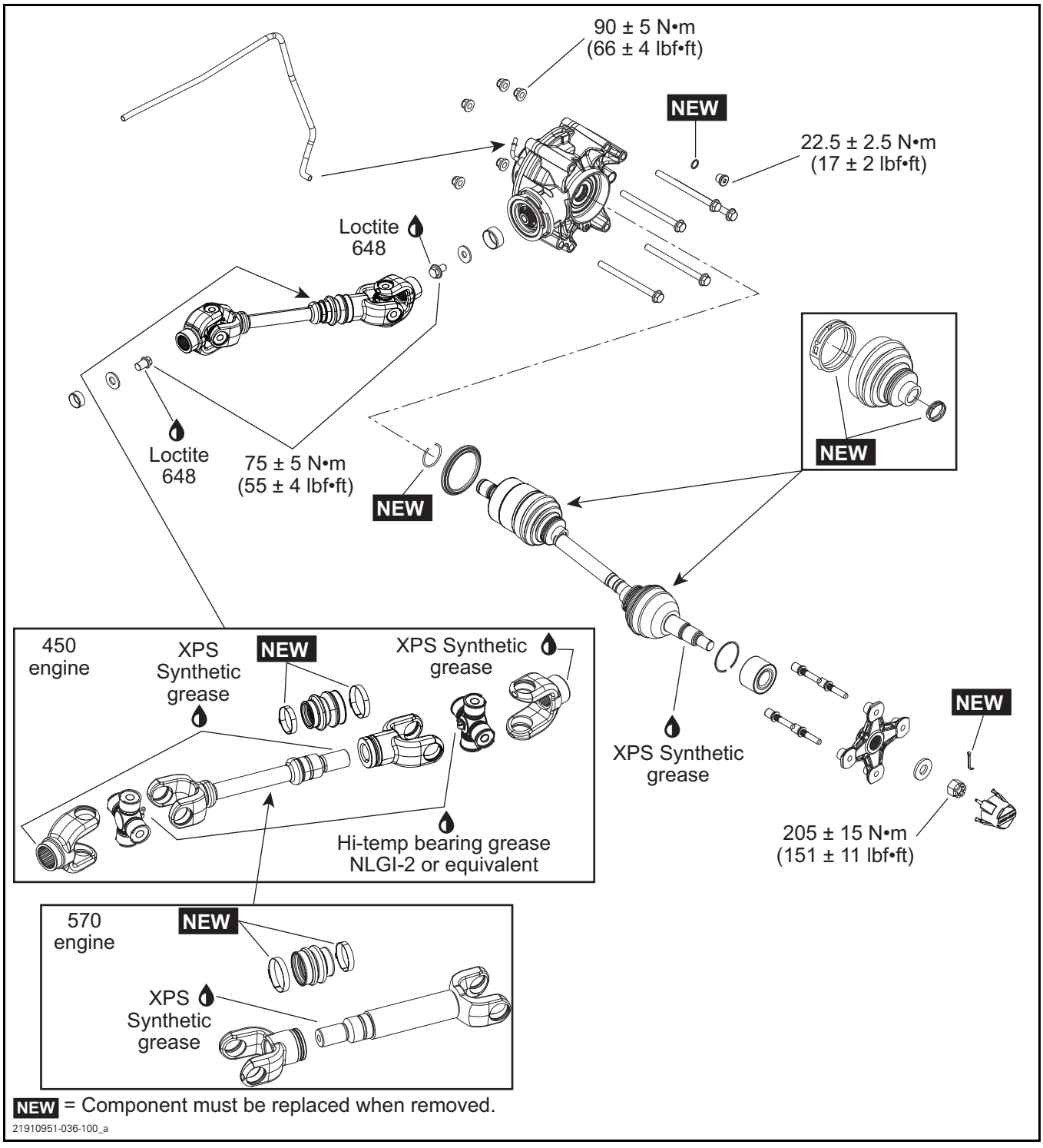
SERVICE TOOLS

Description	Part Number	Page
BACKLASH MEASUREMENT TOOL	529 035 665	10
CV BOOT CLAMP PLIER	529 036 120	5
CV JOINT EXTRACTOR	529 036 005	5
SPANNER SOCKET	529 035 649	12

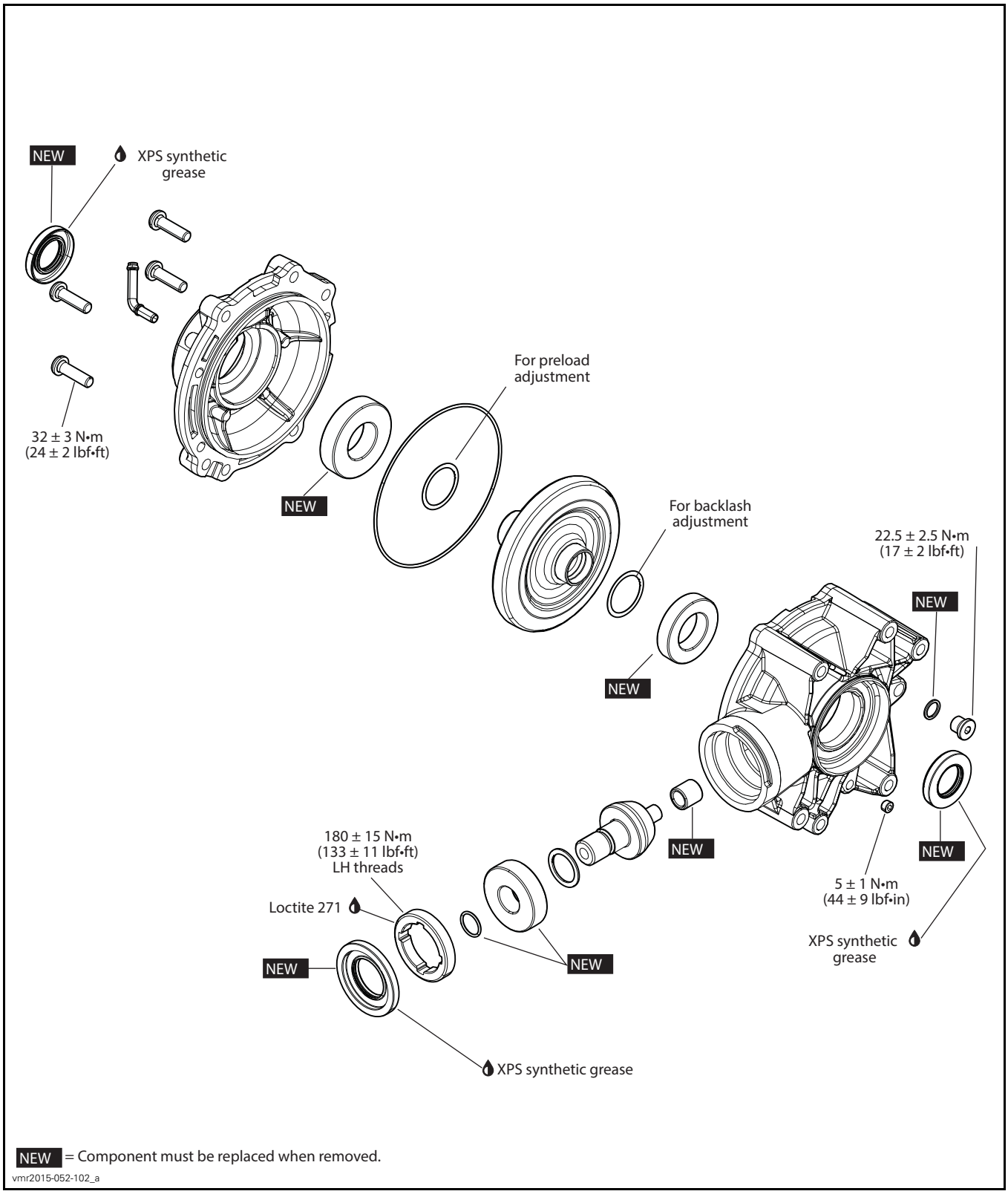
SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 271 (RED)	293 800 005	14–15
LOCTITE 648 (GREEN)	413 711 400	8
SYNTHETIC GREASE	779162	4, 7

DRIVE SHAFTS AND PROPELLER SHAFT



REAR FINAL DRIVE



PROCEDURES

WHEEL HUB

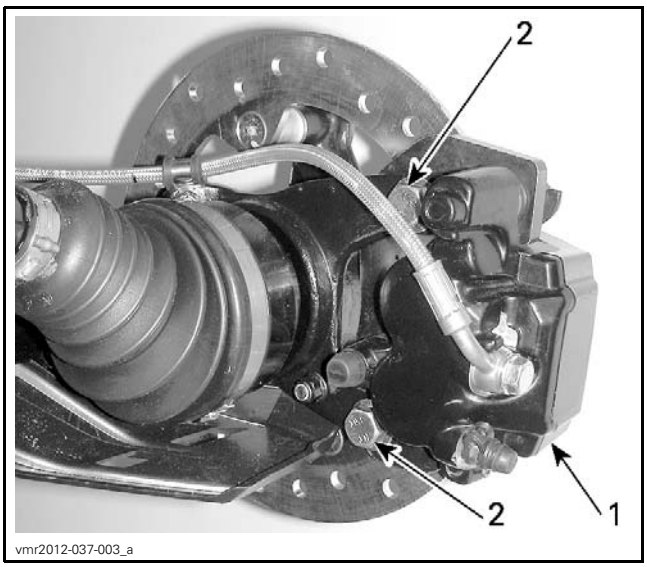
Removing the Wheel Hub

Lift and support vehicle.

Remove the wheel.

Remove the following parts:

– Caliper mounting bolts (if applicable), refer to *BRAKES* subsection
– Hub cap
– Cotter pin
– Wheel hub nut
– Belleville washer.



1. Caliper
2. Remove bolts

Remove wheel hub.

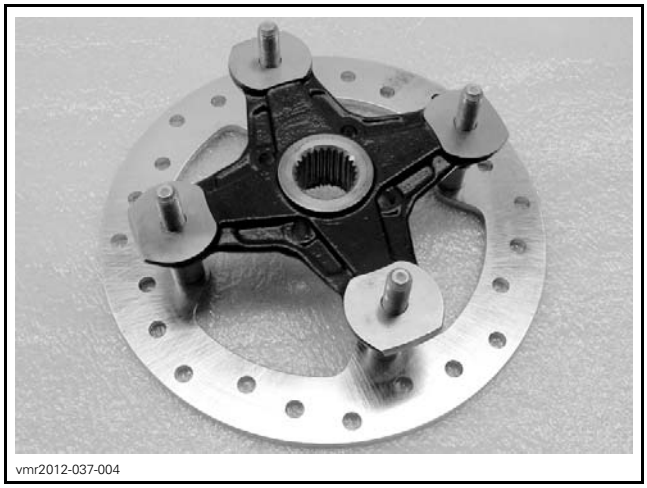
Inspecting the Wheel Hub

Remove disk from RH wheel hub as necessary.

Check wheel hub for cracks or other damages.

Check inner splines for wear or other damages.

If any damage is detected on wheel hub, replace it with a new one.

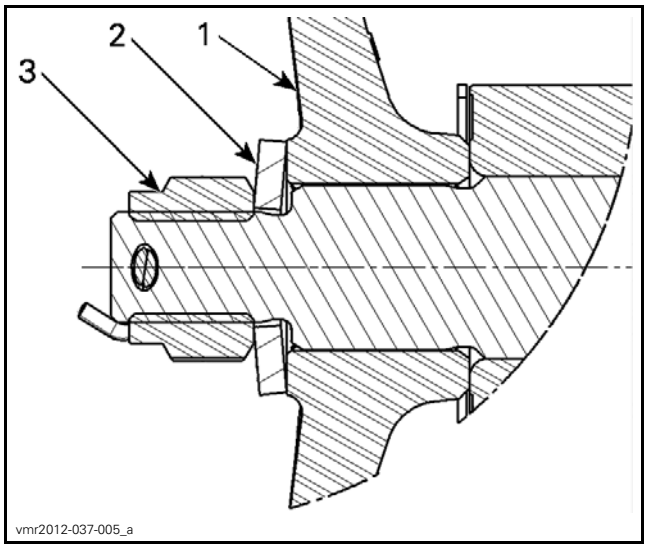


Installing the Wheel Hub

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

Apply SYNTHETIC GREASE (P/N 779162) on drive shaft splines.

Install Belleville washer with its convex side outward.

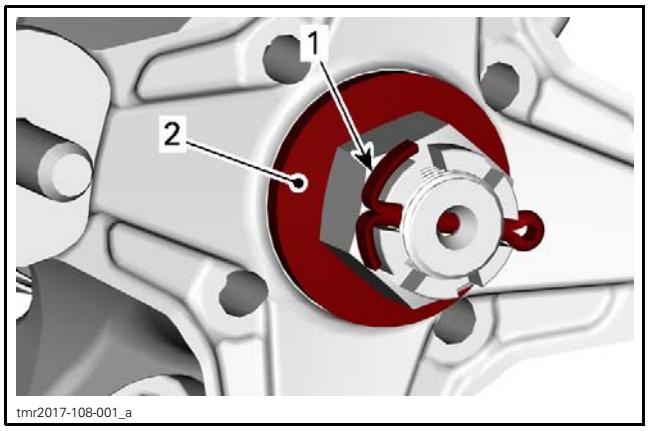


1. Wheel hub
2. Washer — Convex side here
3. Nut

TIGHTENING TORQUE	
Wheel hub nut	205 N•m ± 15 N•m (151 lbf•ft ± 11 lbf•ft)

NOTE: If required, tighten castle nut further to align grooves with drive shaft hole.

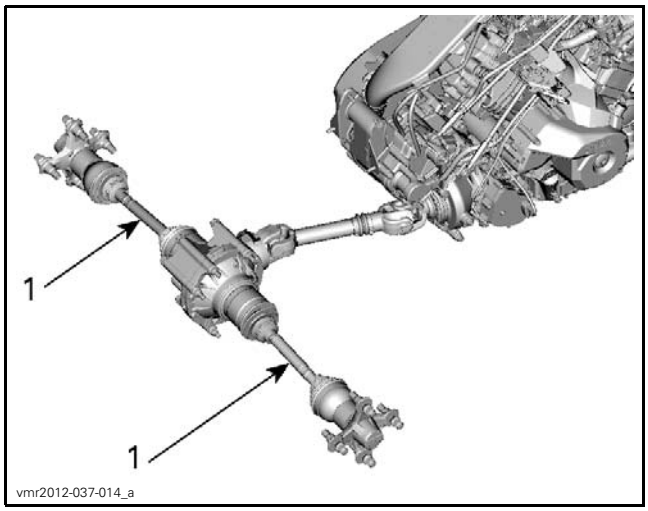
Install a NEW cotter pin, bend as shown.



1. Cotter pin correctly bent
2. Domed (convex) side here

DRIVE SHAFT

Removing the Drive Shaft



TYPICAL
1. Drive shafts

Lift and support vehicle.

Remove the wheel hub. See procedure in this subsection.

Remove trailing arm. Refer to *REAR SUSPENSION*.

Strongly pull drive shaft out of final drive.

Inspecting the Drive Shaft

Inspect the condition of boots. If there is any damage or evidence of leaking lubricant, replace them. Refer to *DRIVE SHAFT BOOT*.

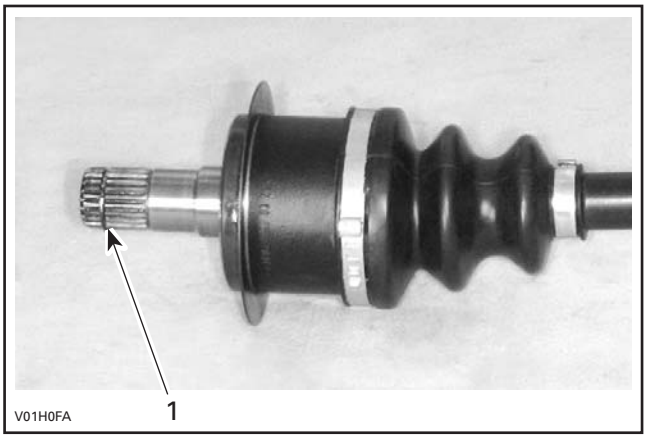
Check shaft splines. Replace drive shaft if necessary.

Check dust shield on drive shaft end. Replace if necessary.

Installing the Drive Shaft

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install a NEW stop ring.



TYPICAL
1. NEW stop ring

After drive shaft insertion in rear final drive, validate if properly locked.

DRIVE SHAFT BOOT

Removing the Drive Shaft Boot

Remove the drive shaft from vehicle. See procedure in this subsection.

Remove drive shaft boot clamps using the following tool:

REQUIRED TOOL	
CV BOOT CLAMP PLIER (P/N 529 036 120)	

Dislodge the large boot end.

Separate the joint from the shaft. Two procedures can be done.

Without the Special Tool

Clamp joint housing in a vise.

Align shaft with joint.

Pull hard on shaft to remove from joint.

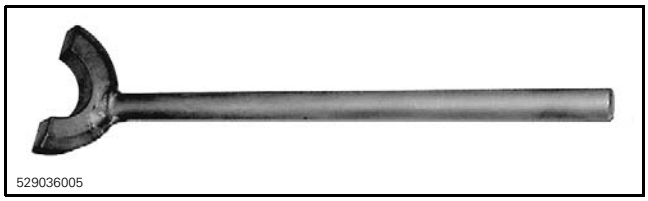
Remove boot from drive shaft.

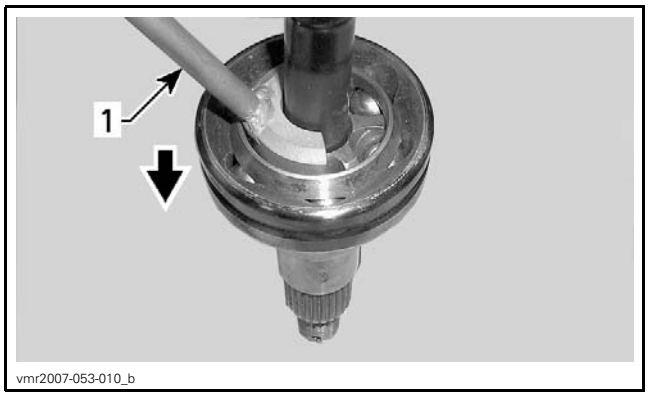
Remove and discard the circlip. A new one is included in the boot kit.

With the Special Tool

Place drive shaft in vice with the joint downward.

Install the CV JOINT EXTRACTOR (P/N 529 036 005) on bearing.





TYPICAL — CV JOINT SHOWN
1. Joint extractor tool

With an hammer, hit on the tool to separate joint from shaft.

When joint and shaft are separated, remove boot from drive shaft.

Remove and discard the circlip. A new one is included in the boot kit.

Remove drive shaft boot.

Installing the Drive Shaft Boot

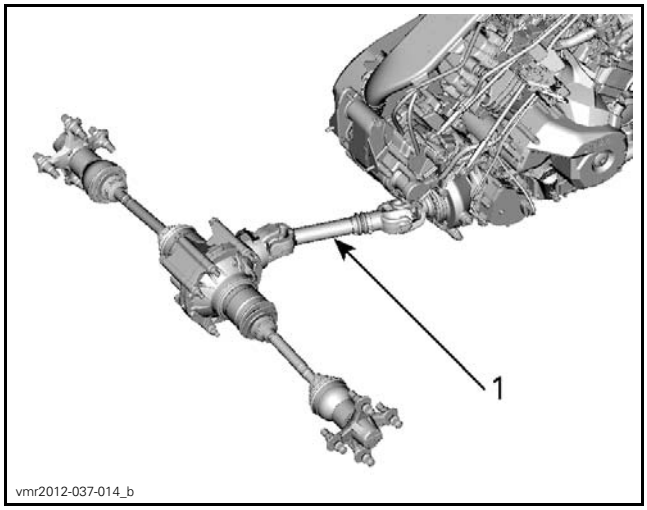
For installation, reverse the removal procedure. Pay attention to the following.

Pack bearing area with grease (included with the new boot kit).

NOTE: Do not use any other grease.

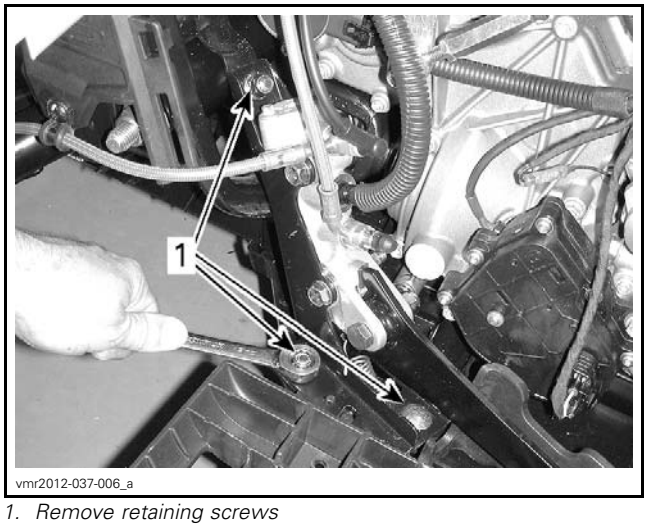
PROPELLER SHAFT

Removing the Propeller Shaft

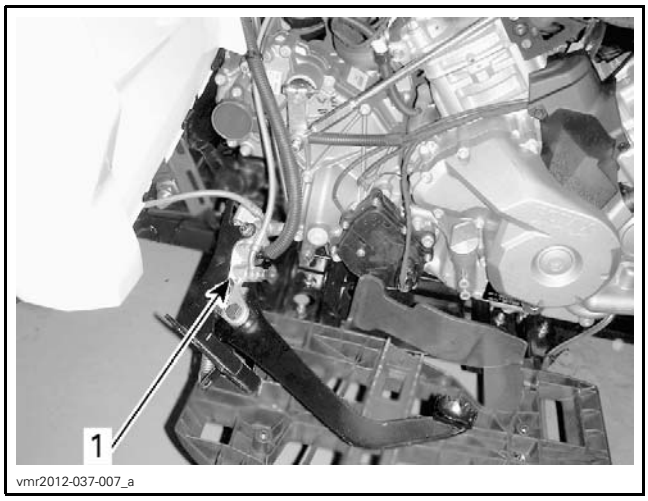


TYPICAL
1. Propeller shaft

1. Remove wheels. Refer to *WHEELS AND TIRES* subsection.
2. Drain oil from rear final drive. Refer to *PERIODIC MAINTENANCE PROCEDURES*.
3. Detach brake master cylinder from frame (Outlander only). Refer to *BRAKES* subsection.



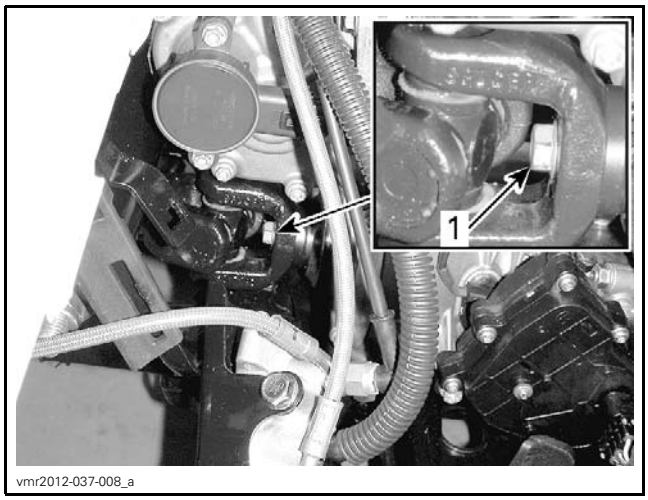
1. Remove retaining screws



1. Master cylinder moved apart

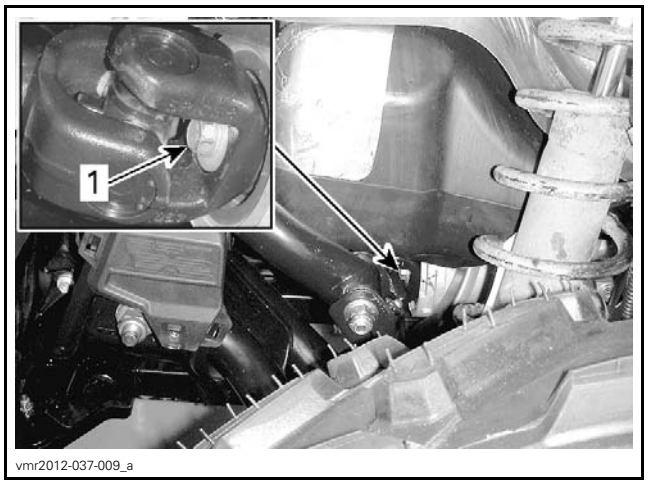
4. Lift and support vehicle.
5. From RH side of vehicle, remove propeller shaft screw from gearbox output shaft.

NOTE: Heat screw to break the threadlocker bond prior to removal.



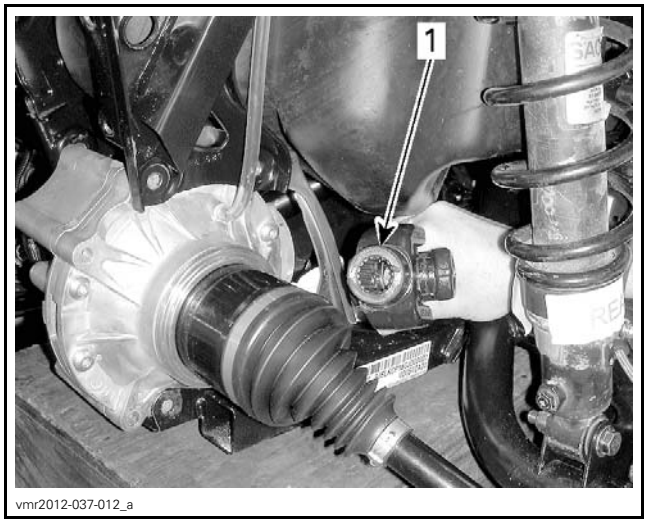
TYPICAL — RH SIDE OF VEHICLE
1. Remove screw

6. From LH side of vehicle, remove propeller shaft screw from rear final drive yoke.



TYPICAL — LH SIDE OF VEHICLE
1. Remove screw

7. Remove rear final drive retaining bolts. Refer to *REAR FINAL DRIVE* in this subsection.
8. Remove bolts from rear retaining plate. Refer to *REAR FINAL DRIVE* in this subsection.
9. Move the rear final drive rearward to allow dislodging the propeller shaft.
10. Dislodge the propeller shaft from the gearbox.
11. Remove the propeller shaft.



1. Pull out propeller shaft

Inspecting the Propeller Shaft

Inspect if propeller shaft is not bent or twisted.

Check propeller shaft splines for wear or damage.

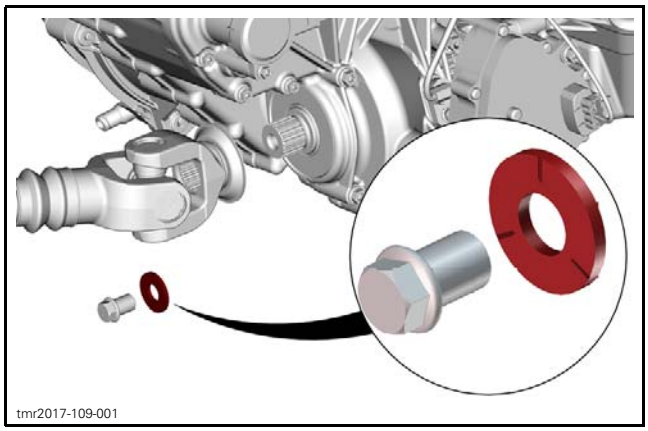
Check if propeller shaft bellow is cracked, pierced or brittle.

Installing the Propeller Shaft

Installation is essentially the reverse of removal procedure. Pay attention to the following details.

Apply SYNTHETIC GREASE (P/N 779162) to splines.

On the engine side, Install the Belleville with the notches towards the screw head.



TYPICAL

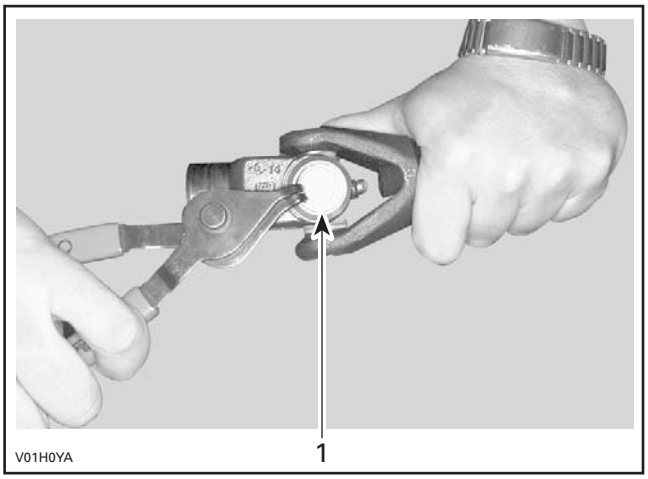
TIGHTENING TORQUE	
Propeller shaft screw (rear final drive side)	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft)
Propeller shaft screw (gearbox side)	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)

Refill rear final drive. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

PROPELLER SHAFT U-JOINTS

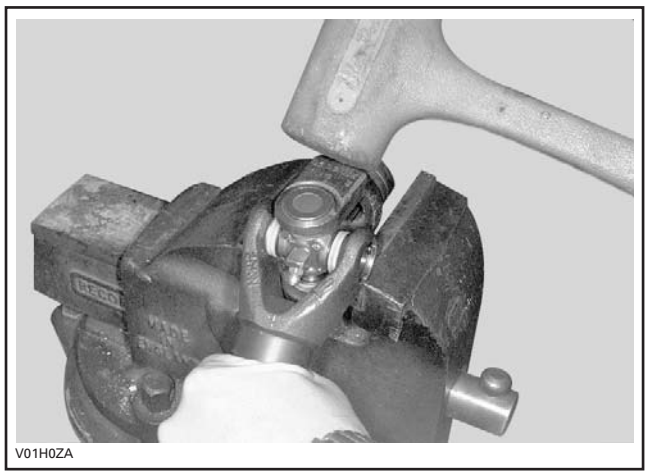
Removing the Propeller Shaft U-Joint

Remove internal snap ring from bearing caps.



1. Snap ring

Support inner yoke in vice and drive other yoke down with a soft hammer.



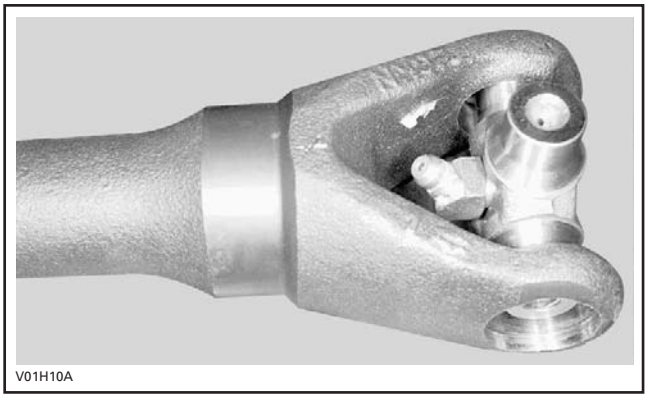
Support U-joint in vice and drive inner yoke down to remove remaining bearing caps.

Remove U-joint cross.

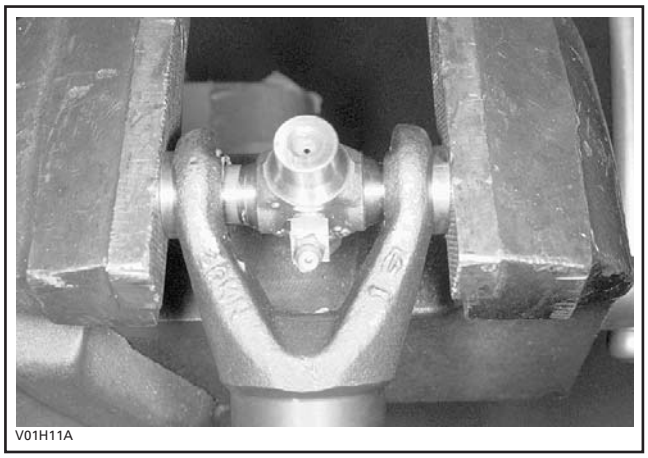
Installing the Propeller Shaft U-Joint

Install new U-joint in inner yoke.

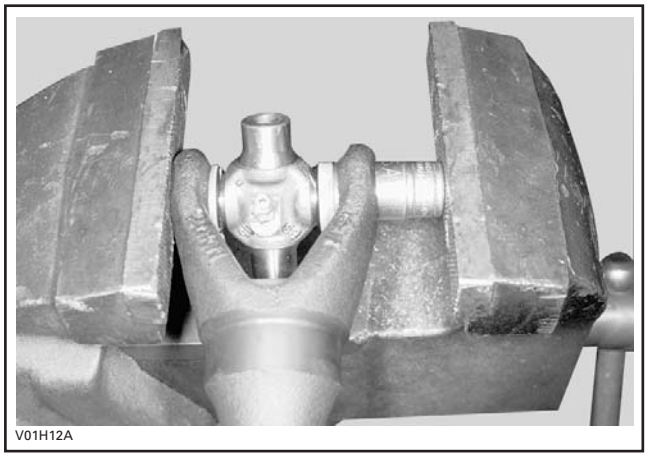
NOTE: Position propeller shaft U-joint as shown for proper grease fitting location.



Install bearing caps. Use a vise to push bearing caps.



Using a suitable pusher, fully seat bearing cap on one side.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Install snap ring.

Complete installation for the other bearing caps.

Grease U-joint. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

REAR FINAL DRIVE

Removing the Rear Final Drive

Drain oil. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

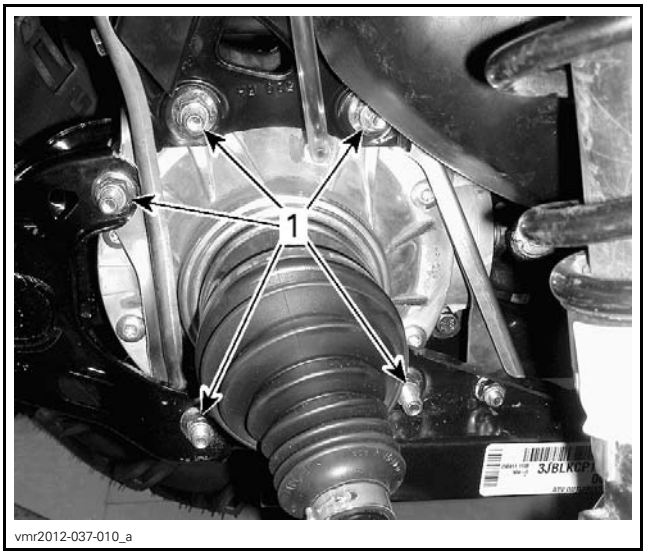
Lift and support vehicle.

Support rear bottom end of frame.

Remove drive shafts. See procedure in this subsection.

Remove rear propeller shaft screw from the rear final drive yoke. Refer to *PROPELLER SHAFT* in this subsection.

Remove rear final drive bolts.



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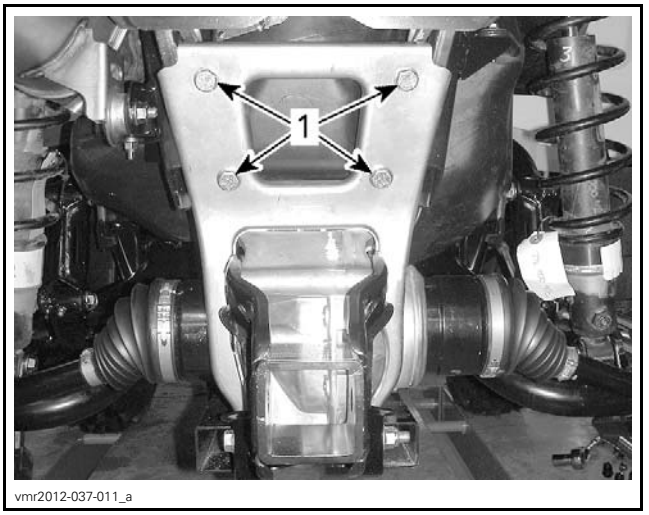
1. Remove bolts

Remove bolts from rear retaining plate.



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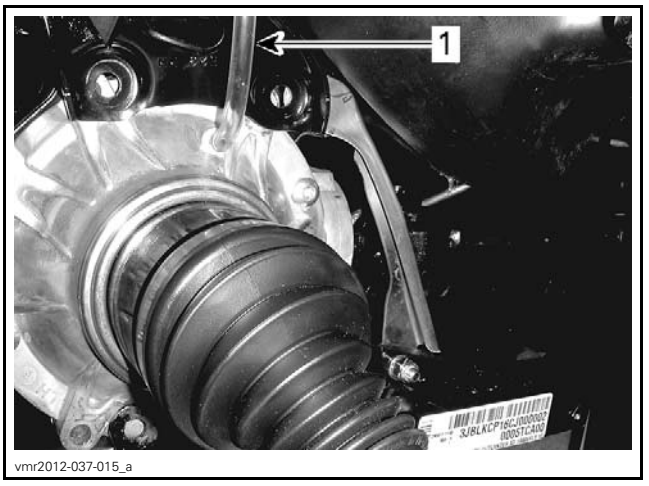
1. Remove bolts

Unplug the vent hose from final drive.



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1. Pull out

Remove the final drive.

Inspecting the Rear Final Drive (Assembled)

Manually turn rear final drive gear; it should turn smoothly. Repair if necessary.

Check if oil seals are brittle, hard or damaged. Replace if necessary.

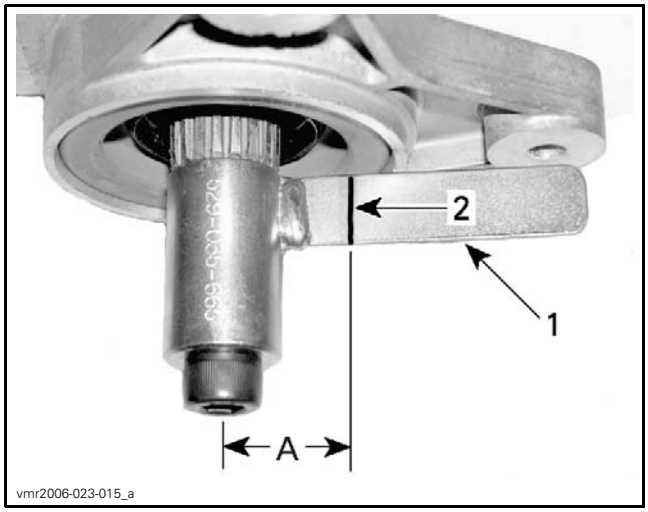
Measuring the Backlash

When measuring backlash, the differential cover should be upside down to pull the ring gear out of mesh.

REQUIRED TOOL
BACKLASH MEASUREMENT TOOL (P/N 529 035 665)
DIAL INDICATOR

Place the backlash measurement tool at the end of pinion gear.

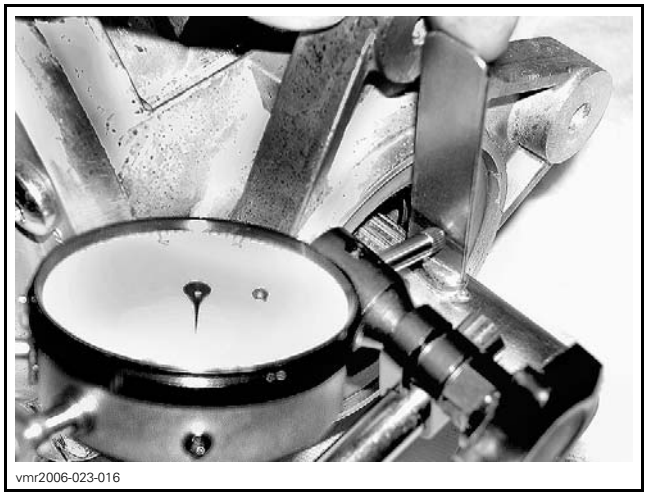
From center of tool bolt, measure 25.4 mm (1 in) and scribe a mark on the tab.



1. Tab of backlash measurement tool
2. Mark on tab
A. 25.4 mm (1 in)

Position the dial indicator tip against the tab at a 90° angle and right on the previously scribed mark.

Gently move the tool tab back and forth making sure the ring gear does not turn. Note the backlash result.



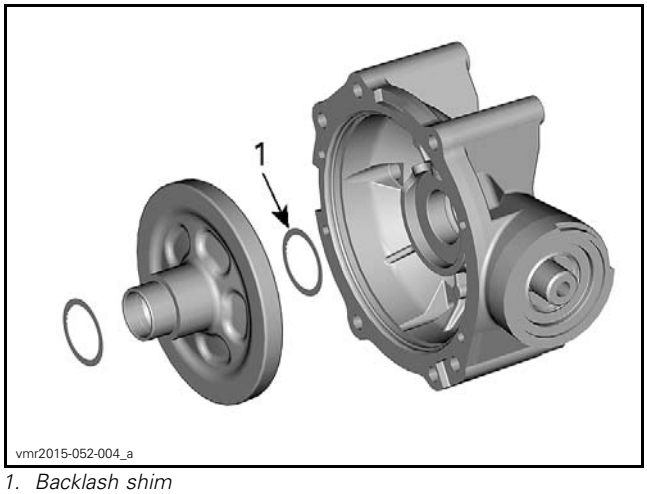
Rotate pinion gear 1/2 turn and recheck backlash. Note the result.

Rotate pinion gear 1 turn and recheck backlash.

BACKLASH SPECIFICATION
0.05 mm (.002 in) to 0.35 mm (.014 in)

If backlash is out of specification, split final drive housing, refer to *DISASSEMBLING THE REAR FINAL DRIVE* and adjust shim thickness as per following guideline.

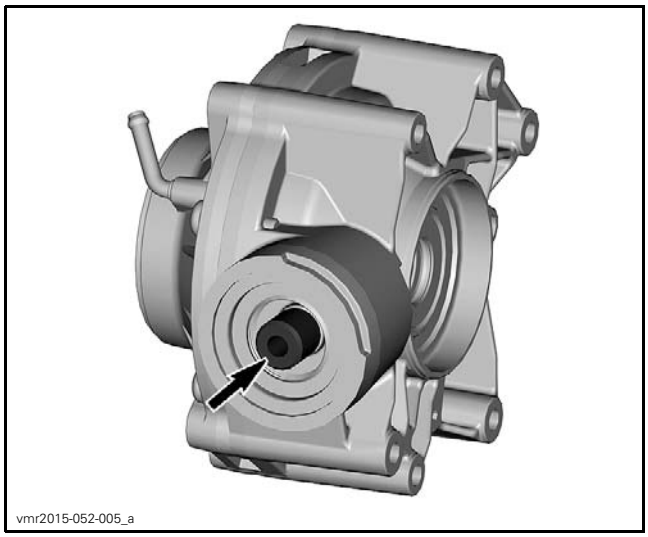
BACKLASH ADJUSTMENT GUIDELINE	
BACKLASH MEASUREMENT	WHAT TO DO
Below 0.05 mm (.002 in)	Add shim(s) and recheck backlash
Above 0.35 mm (.014 in)	Remove shim(s) and recheck backlash



1. Backlash shim

Measuring the Preload

Screw the propeller shaft screw in pinion gear.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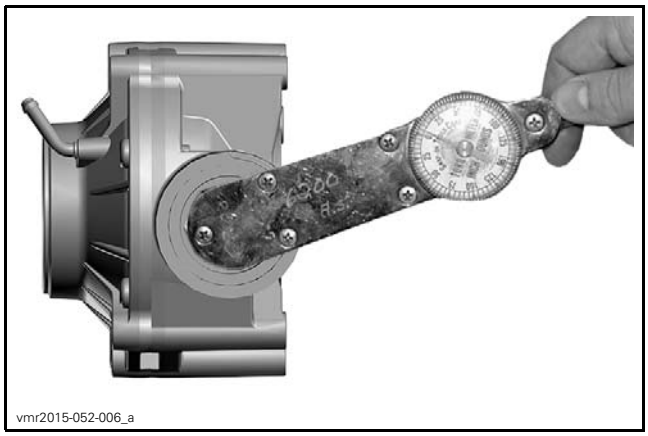
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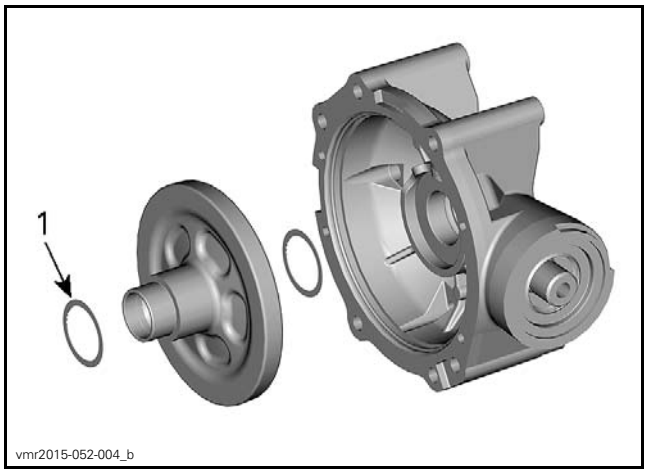
PRELOAD SPECIFICATION
Maximum 0.50 N•m (4 lbf•**in**)

There should be close to zero resistance when turning pinion shaft by hand.

If preload is out of specification, split final drive housing, refer to *DISASSEMBLING THE REAR FINAL DRIVE* and adjust shim thickness as per following guideline.

Carefully inspect all bearings condition.

PRELOAD GUIDELINE	
PRELOAD MEASUREMENT	WHAT TO DO
Below 0.06 N•m (.5 lbf•**in**)	Add shim(s) and recheck preload
Above 0.50 N•m (4 lbf•**in**)	Remove shim(s) and recheck preload



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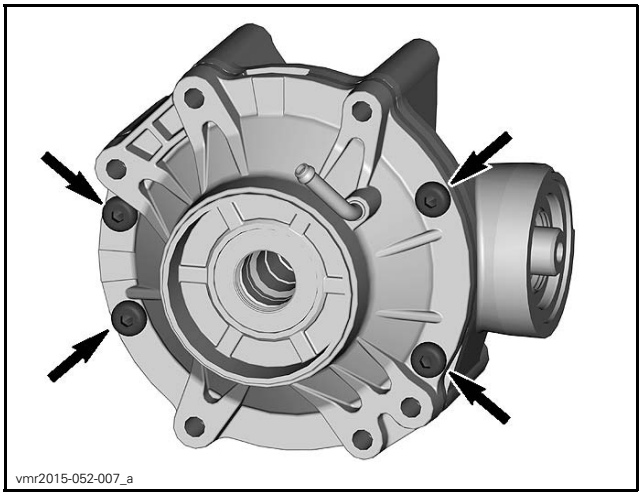
1. Preload shim

Disassembling the Rear Final Drive

Ring Gear

Remove the final drive housing screws.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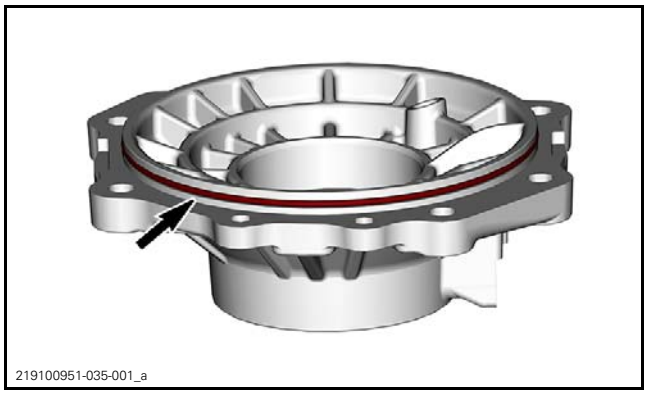
Split final drive housings.

If opening the housing for backlash or preload adjustment, remove and set aside the cover O-ring.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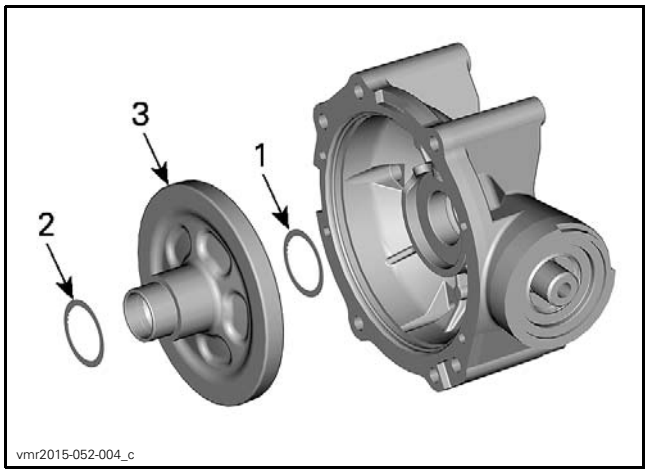


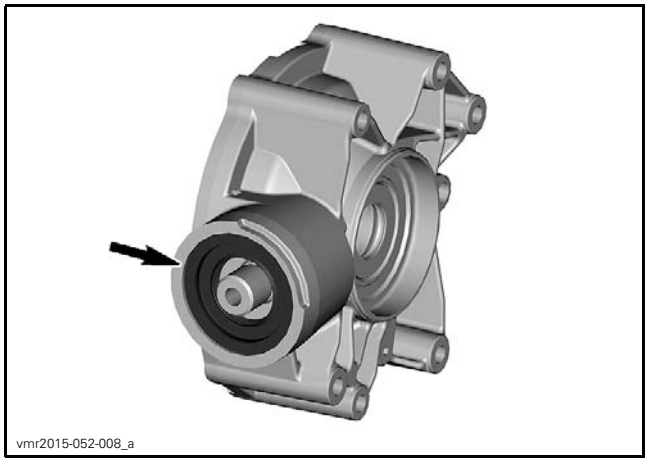
1. Backlash shim
2. Preload shim
3. Ring gear

Extract ring gear out of half housing.

NOTE: Be careful to keep track of shims. Write down the thickness and position of every shim.

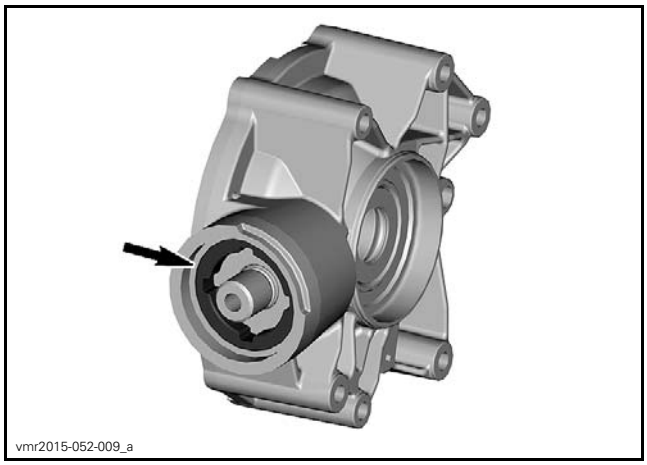
Pinion Gear

Remove and discard oil seal.



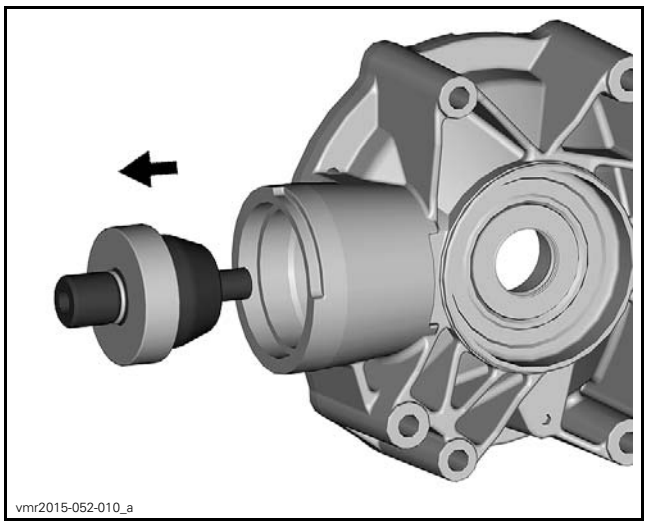
Unscrew the pinion nut. Use the required tool.

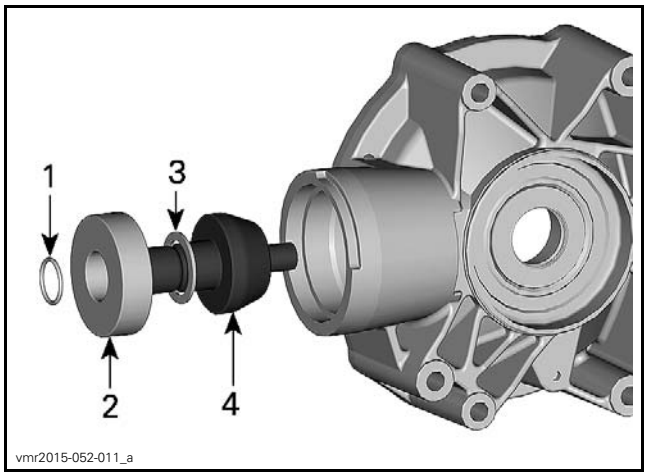
REQUIRED TOOL
SPANNER SOCKET (P/N 529 035 649)



NOTE: The pinion nut is left hand threaded. Unscrew by turning clockwise.

Remove the bearing along with the pinion gear. Be careful to keep track of shims. Discard bearing.



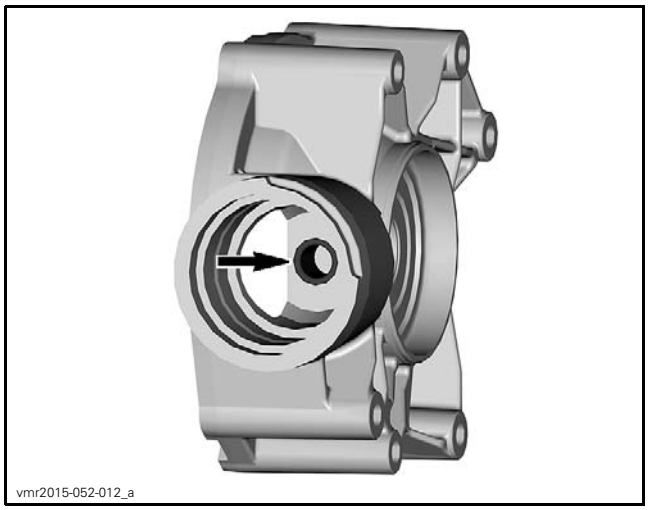


1. O-ring
2. Ball bearing
3. Pinion gear shim
4. Pinion gear

The pinion gear and bearing can be easily removed using the following suggested tool:

PART	QTY
Pipe: 83 mm (3-1/4 in) diameter x 127 mm (5 in)	1
Threaded rod: M10 x 1.25 x 178 mm (7 in)	1
M10 x 1.25 nut	3
Flat bar	1

Remove and discard the needle bearing.



Assembling the Rear Final Drive

Adjustment is required when any of the following part is changed.

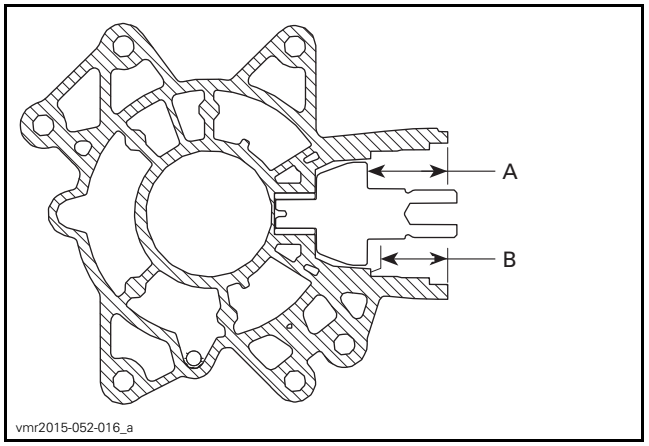
– Pinion gear
– Ring gear
– Housing.

As a preliminary setup, install shims according to the following table.

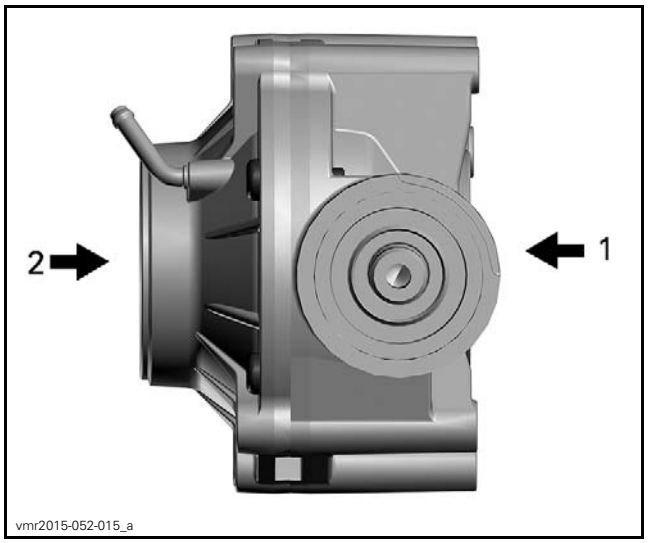
RECOMMENDED SHIM THICKNESS	
PINION GEAR	See procedure for pinion gear shim thickness
BACKLASH	0.5 mm (.02 in) (as a preliminary adjustment)
PRELOAD	

Procedure for pinion gear shim thickness:

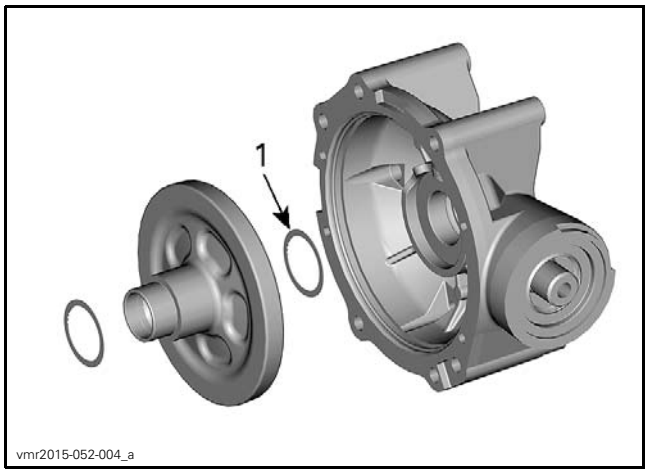
1. Remove the old pinion gear and install the new one without the ball bearing. The new pinion will be located at the "zero" location.
2. Measure the distance "A" between outside surface of the gear case and the shim surface of pinion.
3. Measure the distance "B" between outside surface of the gear case and the bearing shoulder of the gear case.
4. The shim thickness will be "A-B-0.53 mm (.021 in)".
5. Select the good combination of shim to match the thickness calculated on step 4.



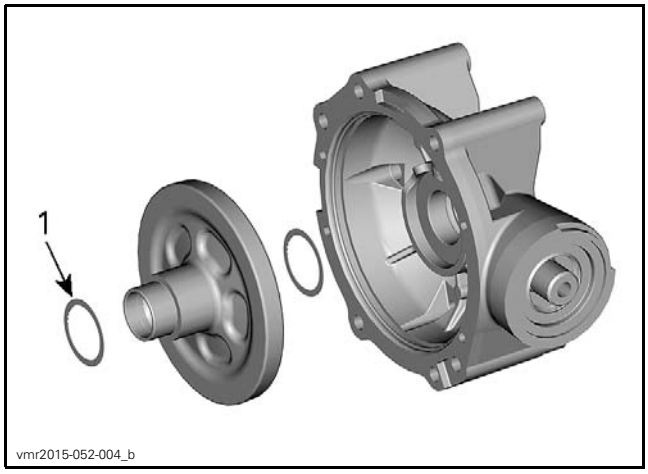
Install shims calculated in *INSPECTING THE REAR FINAL DRIVE (ASSEMBLED)* .



1. Backlash side
2. Preload side



1. Backlash shim



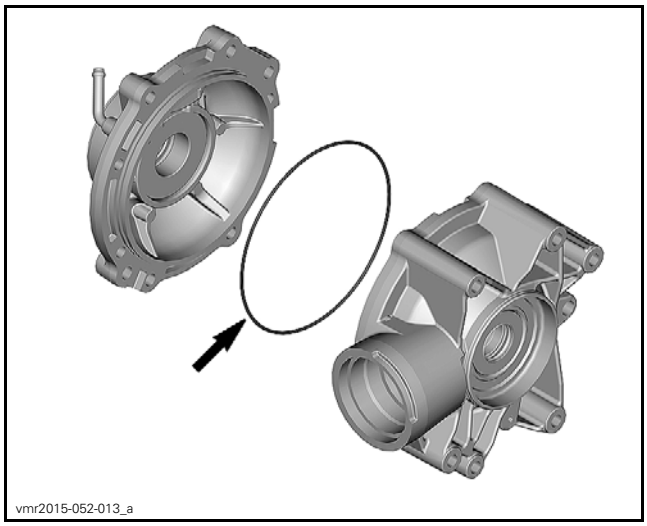
1. Preload shim

Prior to finalizing assembly, proceed in this order:
- Temporarily assemble final drive using recommended torques.
- Do not apply thread locker product.
- Do not install a new pinion nut.
- Check backlash.
- Check preload.

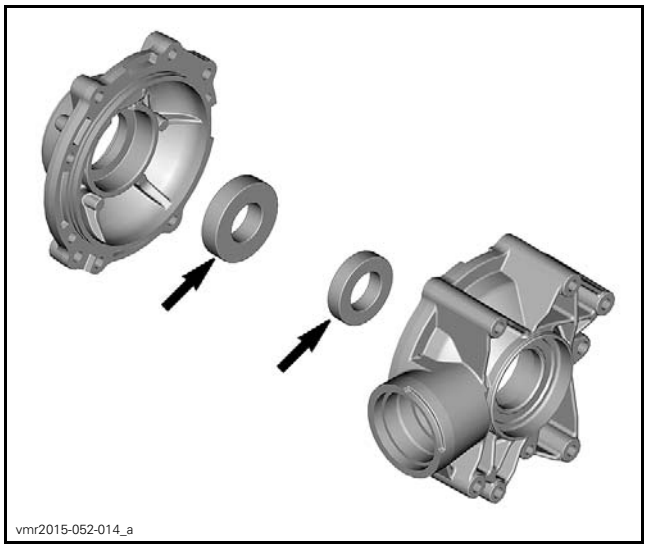
Ring Gear

The installation is the reverse of the removal procedure. However, pay attention to the following:

Check condition of seal. Replace if damaged.



Install NEW bearings.



Tighten final drive housing screws as per specification.

TIGHTENING TORQUE	
Final drive housing screws	32 N•m ± 3 N•m (24 lbf•ft ± 2 lbf•ft)

Pinion Gear

The installation is the reverse of the removal procedure. However, pay attention to the following:

Install a NEW needle bearing.

Install the shim(s) then a NEW ball bearing.

install a NEW O-ring.

Apply LOCTITE 271 (RED) (P/N 293 800 005) to pinion nut.

Install and tighten the pinion nut as per specification.

TIGHTENING TORQUE	
Pinion nut (LH THREADS)	180 N•m ± 15 N•m (133 lbf•ft ± 11 lbf•ft) + LOCTITE 271 (RED) (P/N 293 800 005)

Lubricate and install a NEW oil seal.

Installing the Rear Final Drive

The installation is the reverse of the removal procedure. However, pay attention to the following:

Install the lowest rear final drive retaining screws first.

Install all screws and nuts prior to tighten.

Tighten nuts to specification.

TIGHTENING TORQUE	
Final drive retaining nuts	90 N•m ± 5 N•m (66 lbf•ft ± 4 lbf•ft)

Refill the final drive with recommended oil. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

REAR DRIVE (650/850/1000/1000R AND ALL T CATEGORY)

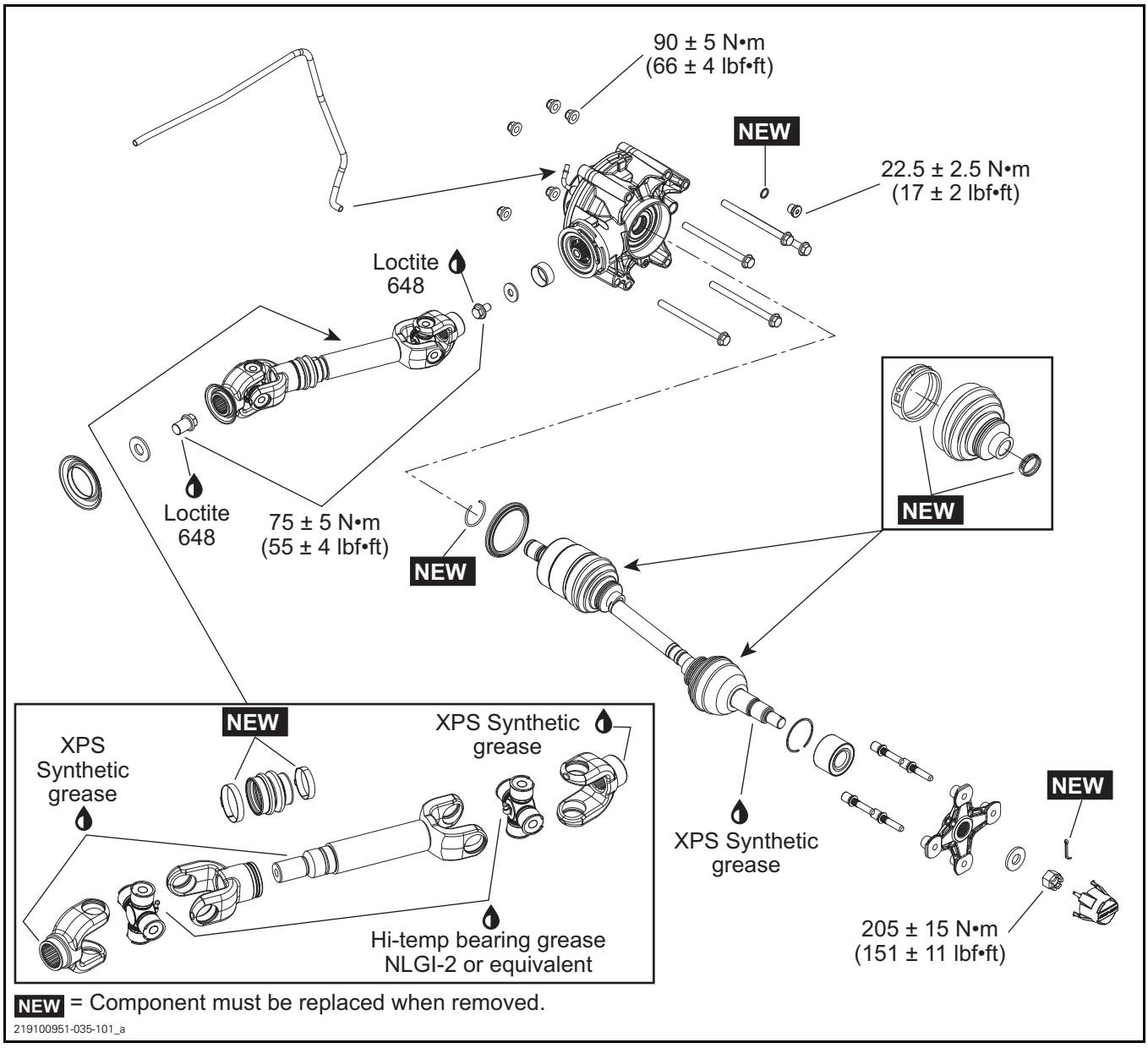
SERVICE TOOLS

Description	Part Number	Page
BACKLASH MEASUREMENT TOOL	529 035 665	9
CV BOOT CLAMP PLIER	529 036 120	5
CV JOINT EXTRACTOR	529 036 005	5
DIFFERENTIAL NUT SOCKET 65MM	529 036 302	12

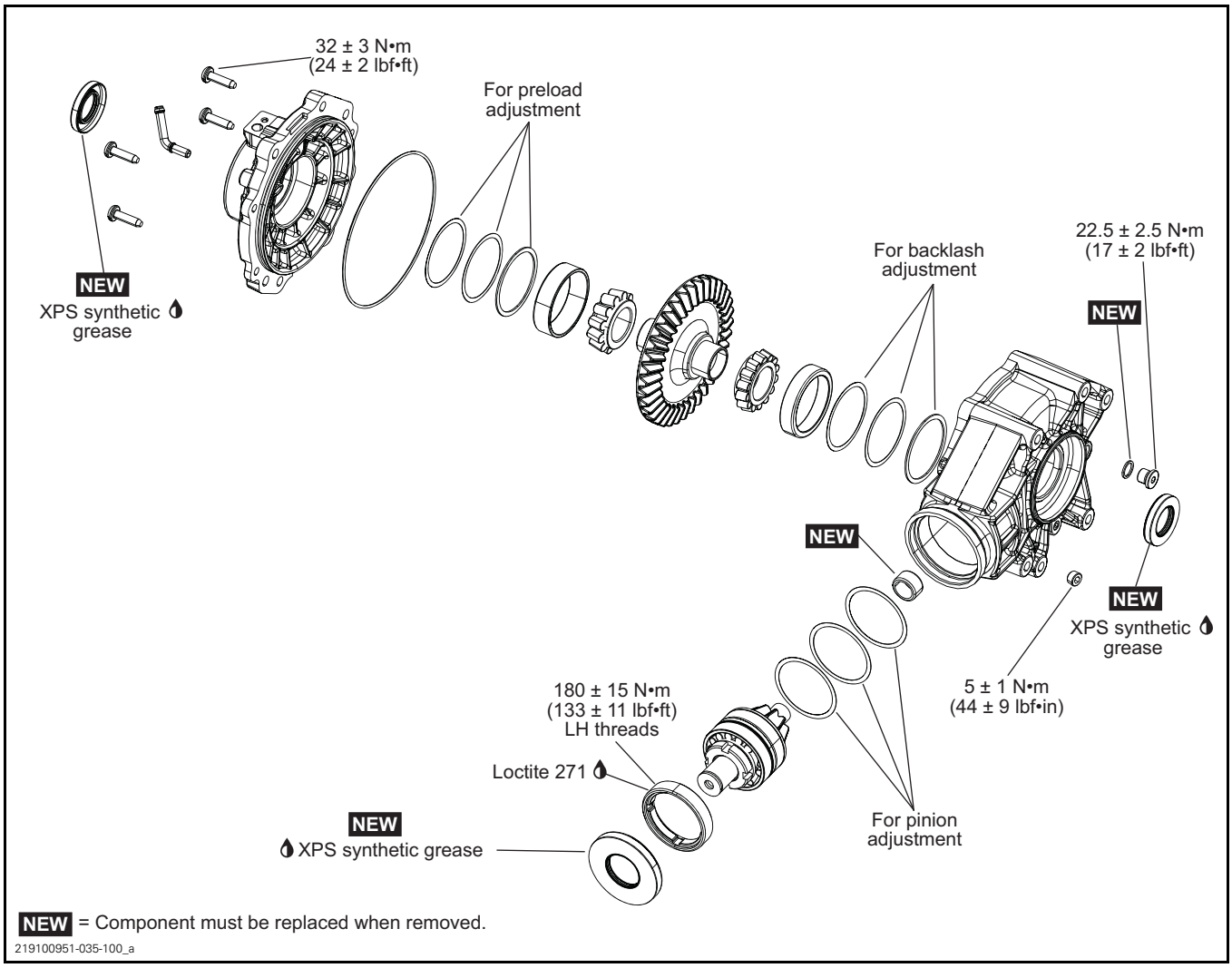
SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 271 (RED)	293 800 005	14
LOCTITE 648 (GREEN)	413 711 400	8
SYNTHETIC GREASE	779162	4, 7

DRIVE SHAFTS AND PROPELLER SHAFT



REAR FINAL DRIVE



PROCEDURES

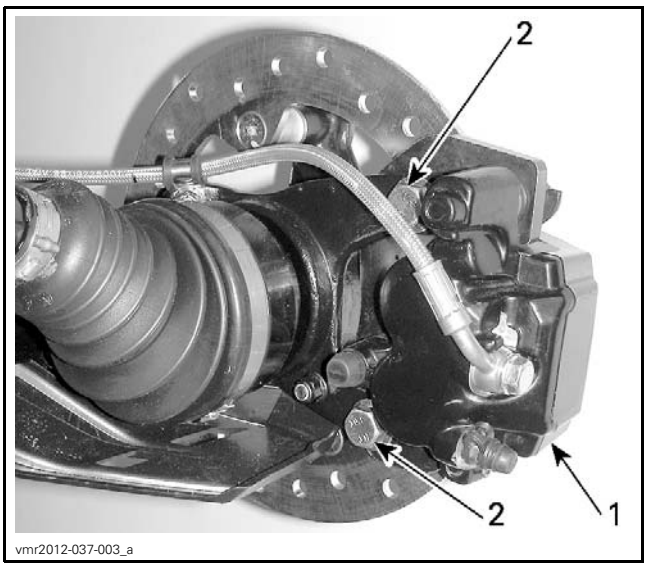
WHEEL HUB

Removing the Wheel Hub

Lift and support vehicle.

Remove the wheel.

Remove the following parts:
- Caliper mounting bolts (if applicable), refer to *BRAKES* subsection
- Hub cap
- Cotter pin
- Wheel hub nut
- Belleville washer.



1. Caliper
2. Remove bolts

Remove wheel hub.

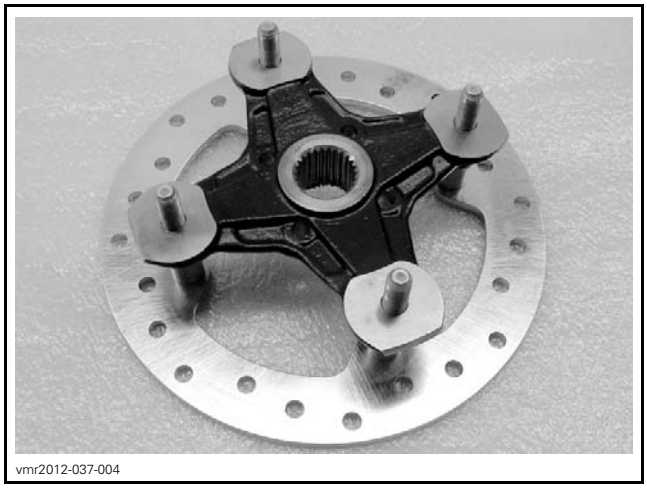
Inspecting the Wheel Hub

Remove disk from RH wheel hub as necessary.

Check wheel hub for cracks or other damages.

Check inner splines for wear or other damages.

If any damage is detected on wheel hub, replace it with a new one.

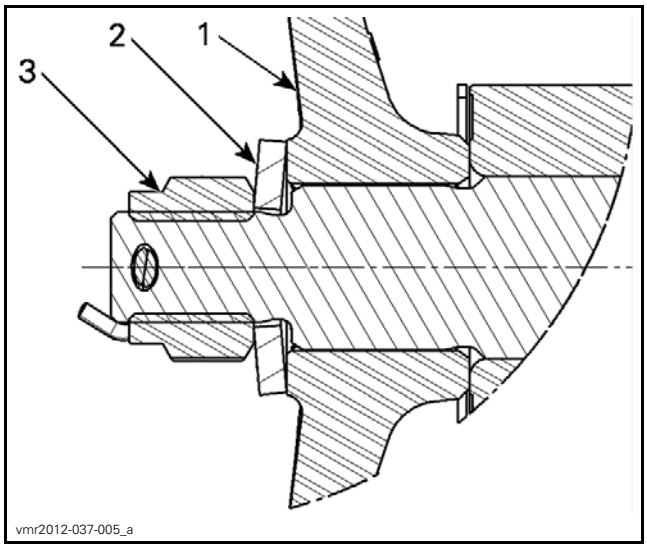


Installing the Wheel Hub

The installation is the reverse of the removal procedure. However, pay attention to the following:

Apply SYNTHETIC GREASE (P/N 779162) on drive shaft splines.

Install Belleville washer with its convex side outward.

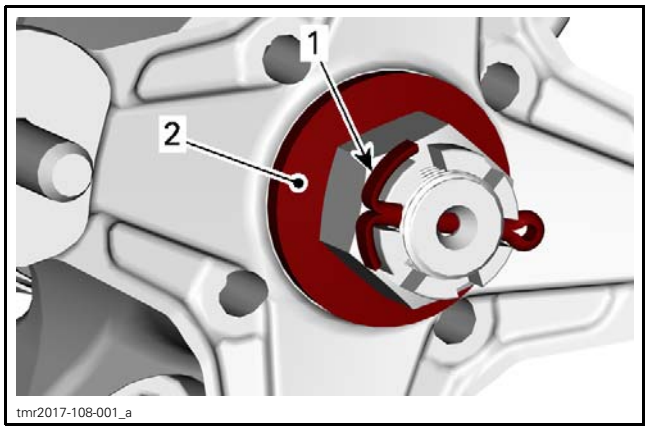


1. Wheel hub
2. Washer — Convex side here
3. Nut

TIGHTENING TORQUE	
Wheel hub nut	205 N•m ± 15 N•m (151 lbf•ft ± 11 lbf•ft)

NOTE: If required, tighten castle nut further to align grooves with drive shaft hole.

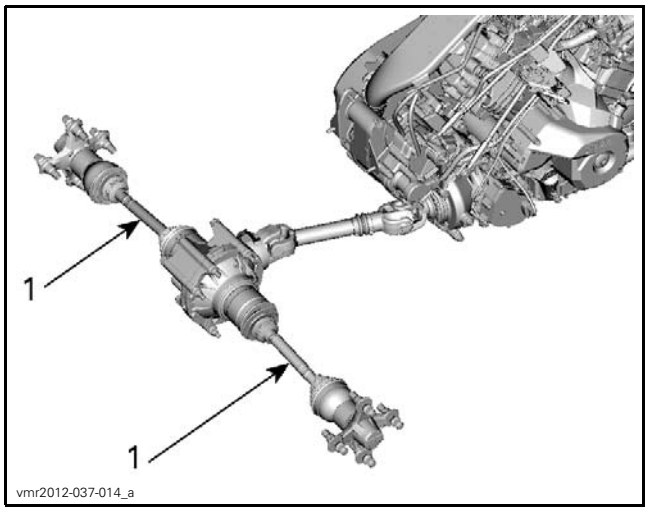
Install a NEW cotter pin, bend as shown.



1. *Cotter pin correctly bent*
2. *Domed (convex) side here*

DRIVE SHAFT

Removing the Drive Shaft



TYPICAL
1. *Drive shafts*

Lift and support vehicle.

Remove the wheel hub. See procedure in this subsection.

Remove trailing arm. Refer to *REAR SUSPENSION*.

Strongly pull drive shaft out of final drive.

Inspecting the Drive Shaft

Inspect the condition of boots. If there is any damage or evidence of leaking lubricant, replace them. Refer to *DRIVE SHAFT BOOT*.

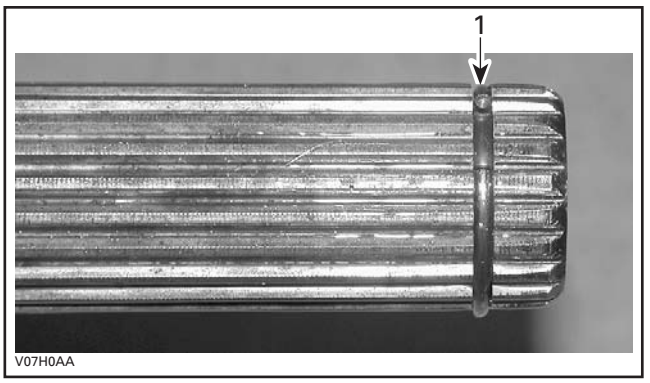
Check shaft splines. Replace drive shaft if necessary.

Check dust shield on drive shaft end. Replace if necessary.

Installing the Drive Shaft

The installation is the reverse of the removal procedure. However, pay attention to the following:

Install a NEW stop ring.



TYPICAL
1. *NEW stop ring*

After drive shaft insertion in rear final drive, validate if properly locked.

DRIVE SHAFT BOOT

Removing the Drive Shaft Boot

Remove the drive shaft from vehicle. See procedure in this subsection.

Remove drive shaft boot clamps using the following tool:

REQUIRED TOOL	
CV BOOT CLAMP PLIER (P/N 529 036 120)	

Dislodge the large boot end.

Separate the joint from the shaft. Two procedures can be done.

Without the Special Tool

Clamp joint housing in a vise.

Align shaft with joint.

Pull hard on shaft to remove from joint.

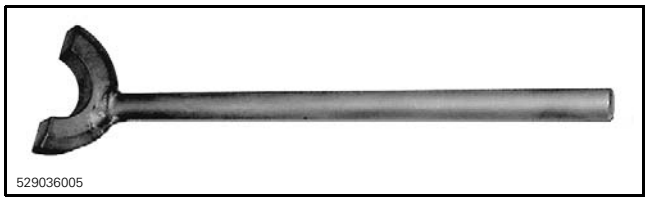
Remove boot from drive shaft.

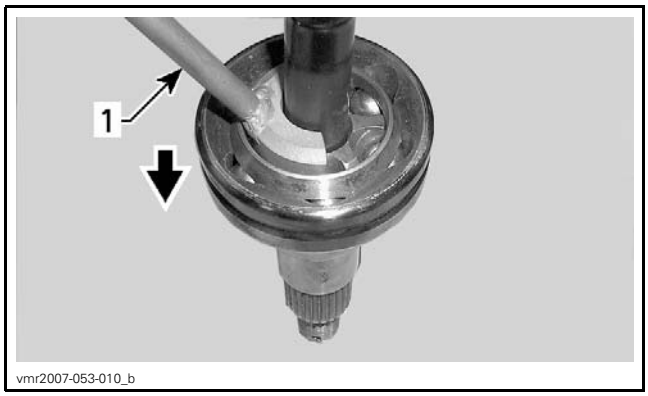
Remove and discard the circlip. A new one is included in the boot kit.

With the Special Tool

Place drive shaft in vice with the joint downward.

Install the CV JOINT EXTRACTOR (P/N 529 036 005) on bearing.





TYPICAL — CV JOINT SHOWN
1. Joint extractor tool

With an hammer, hit on the tool to separate joint from shaft.

When joint and shaft are separated, remove boot from drive shaft.

Remove and discard the circlip. A new one is included in the boot kit.

Remove drive shaft boot.

Installing the Drive Shaft Boot

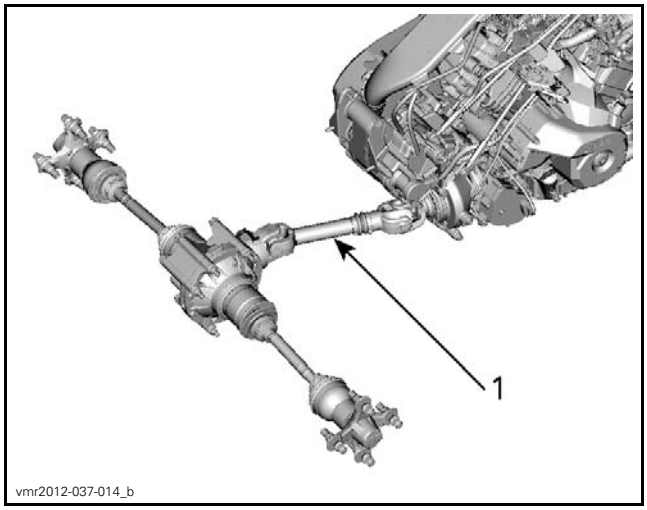
The installation is the reverse of the removal procedure. However, pay attention to the following:

Pack bearing area with grease (included with the new boot kit).

NOTE: Do not use any other grease.

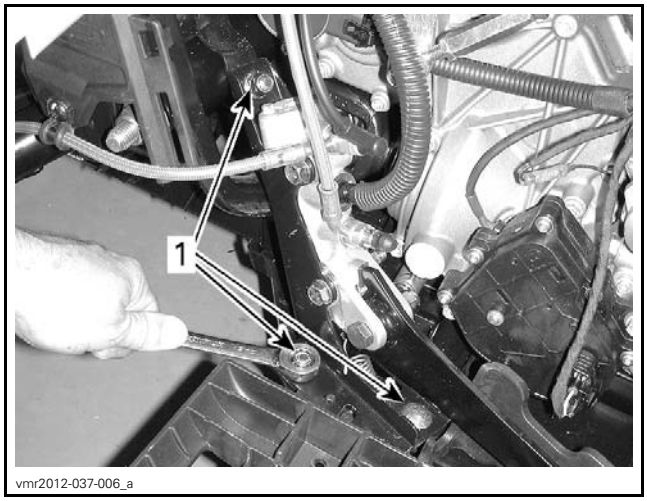
PROPELLER SHAFT

Removing the Propeller Shaft

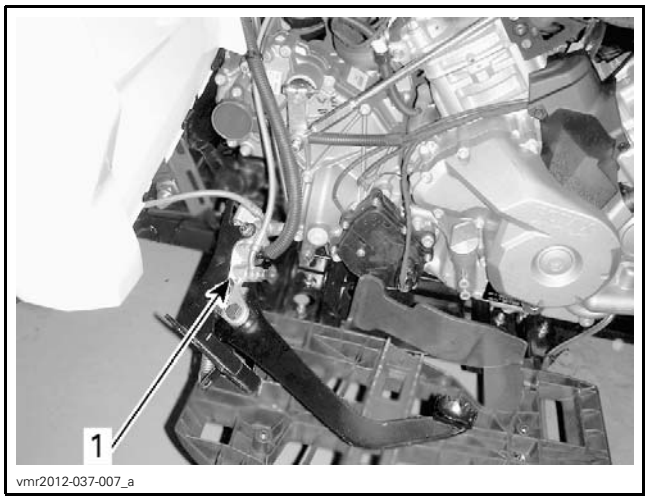


TYPICAL
1. Propeller shaft

1. Lift and support rear end of vehicle.
2. Remove wheels. Refer to *WHEELS AND TIRES* subsection.
3. Drain oil from rear final drive. Refer to *PERIODIC MAINTENANCE PROCEDURES*.
4. Detach brake master cylinder from frame. Refer to *BRAKES* subsection.



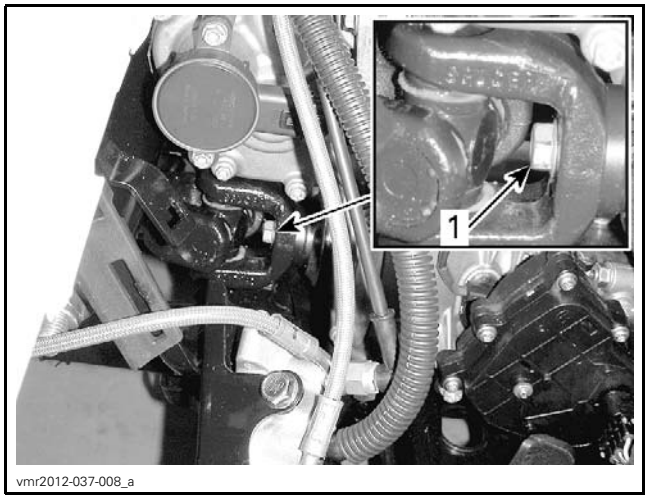
1. Remove retaining screws



1. Master cylinder moved apart

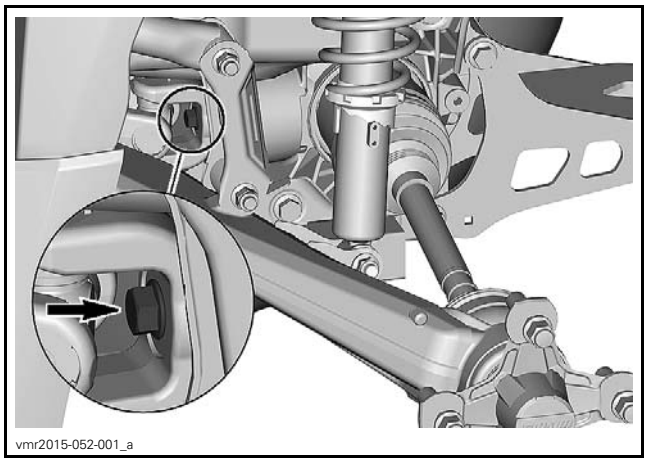
5. From RH side of vehicle, remove propeller shaft screw from gearbox output shaft.

NOTE: Heat screw to break the threadlocker bond prior to removal.



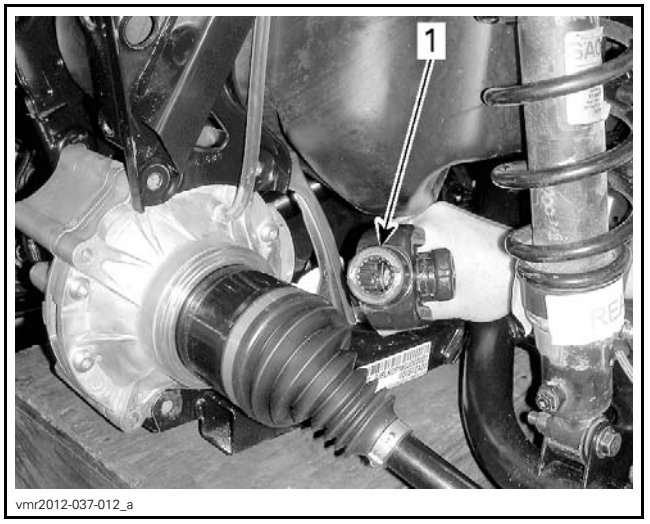
TYPICAL — RH SIDE OF VEHICLE
1. Remove screw

6. From LH side of vehicle, remove propeller shaft screw from rear final drive yoke.



LH SIDE OF VEHICLE

7. Remove rear final drive retaining bolts. Refer to *REAR FINAL DRIVE* in this subsection.
8. Remove bolts from rear retaining plate. Refer to *REAR FINAL DRIVE* in this subsection.
9. Move the rear final drive rearward to allow dislodging the propeller shaft.
10. Dislodge the propeller shaft from the gearbox.
11. Remove the propeller shaft.



1. Pull out propeller shaft

Inspecting the Propeller Shaft

Inspect if propeller shaft is not bent or twisted.

Check propeller shaft splines for wear or damage.

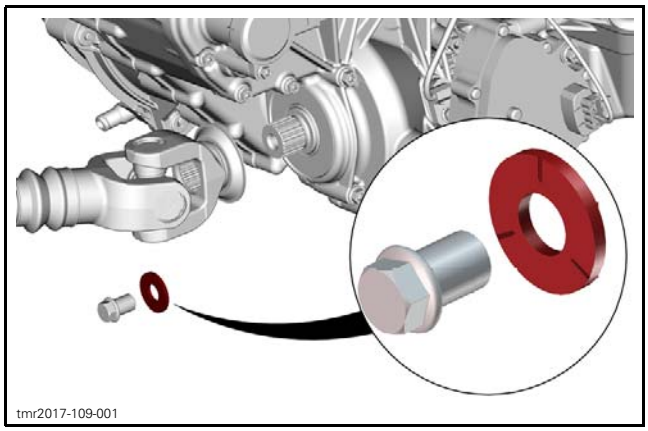
Check if propeller shaft bellow is cracked, pierced or brittle.

Installing the Propeller Shaft

The installation is the reverse of the removal procedure. However, pay attention to the following:

Apply SYNTHETIC GREASE (P/N 779162) to splines.

On the engine side, Install the Belleville with the notches towards the screw head.



TYPICAL

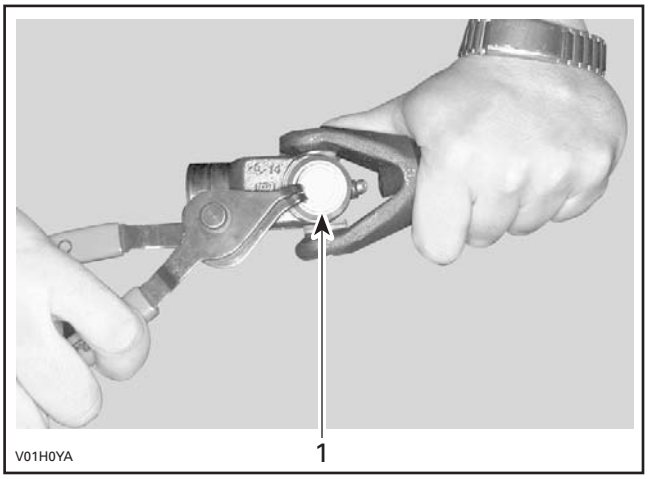
TIGHTENING TORQUE	
Propeller shaft screws	75 N•m ± 5 N•m (55 lbf•ft ± 4 lbf•ft) + LOCTITE 648 (GREEN) (P/N 413 711 400)

Refill rear final drive. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

PROPELLER SHAFT U-JOINTS

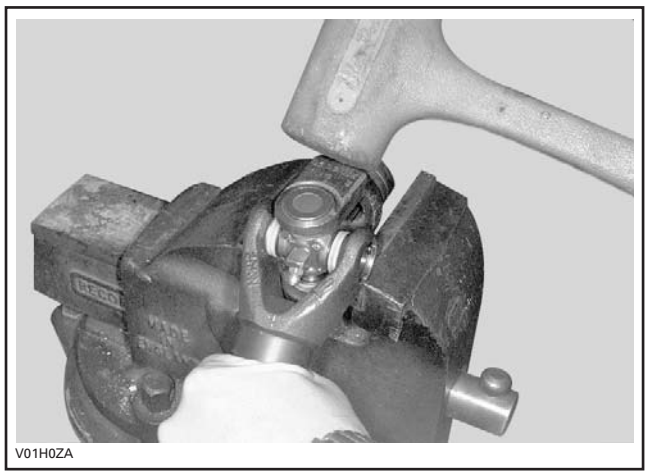
Removing the Propeller Shaft U-Joint

Remove internal snap ring from bearing caps.



1. Snap ring

Support inner yoke in vice and drive other yoke down with a soft hammer.



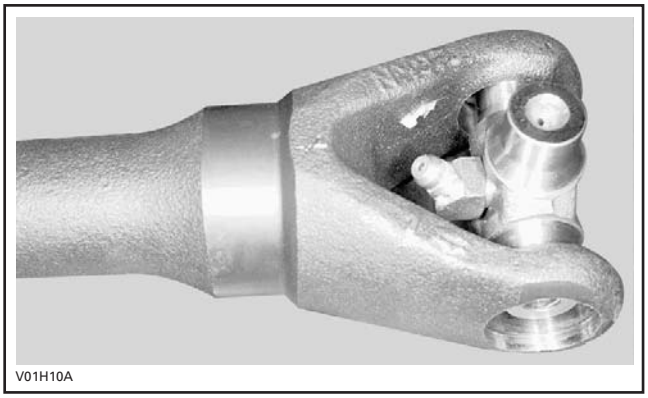
Support U-joint in vice and drive inner yoke down to remove remaining bearing caps.

Remove U-joint cross.

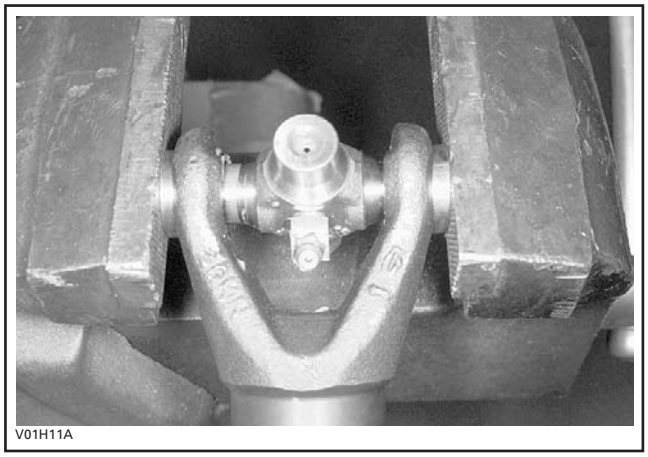
Installing the Propeller Shaft U-Joint

Install a NEW U-joint in inner yoke.

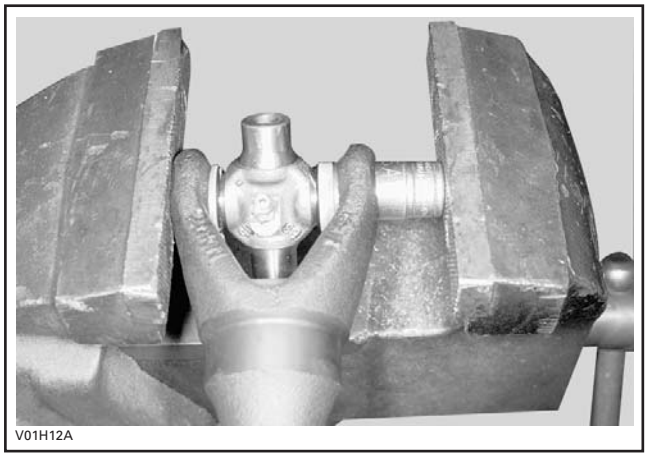
NOTE: Position propeller shaft U-joint as shown for proper grease fitting location.



Install bearing caps. Use a vise to push bearing caps.



Using a suitable pusher, fully seat bearing cap on one side.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Install snap ring.

Complete installation for the other bearing caps.

Grease U-joint. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

REAR FINAL DRIVE

Removing the Rear Final Drive

NOTE: The following procedures are for both straight and spiral gearsets.

Drain oil. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

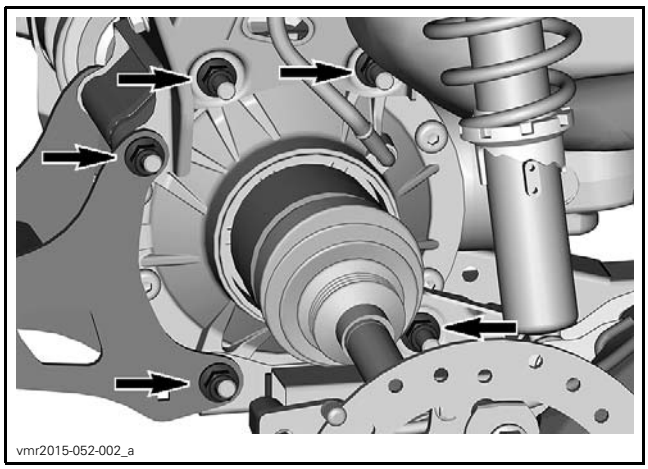
Lift and support vehicle.

Support rear bottom end of frame.

Remove drive shafts. See procedure in this subsection.

Remove rear propeller shaft screw from the rear final drive yoke. Refer to *PROPELLER SHAFT* in this subsection.

Remove rear final drive screws (5x).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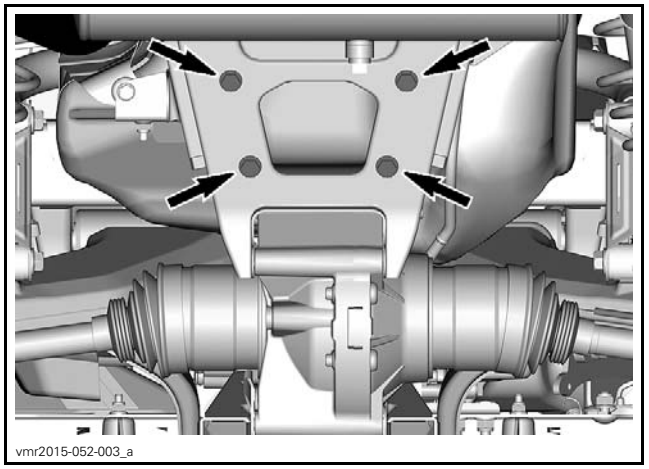
Remove bolts from rear retaining plate.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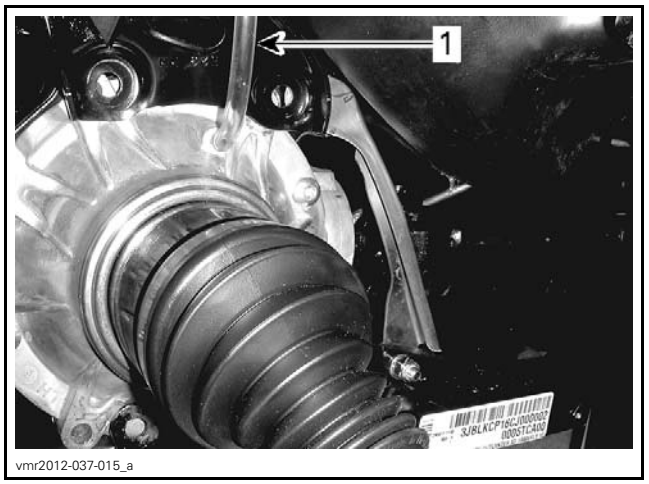
Unplug the vent hose from final drive.



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1. Pull out

Remove the final drive.

Inspecting the Rear Final Drive (Assembled)

Manually turn rear final drive gear; it should turn smoothly. Repair if necessary.

Check if oil seals are brittle, hard or damaged. Replace if necessary.

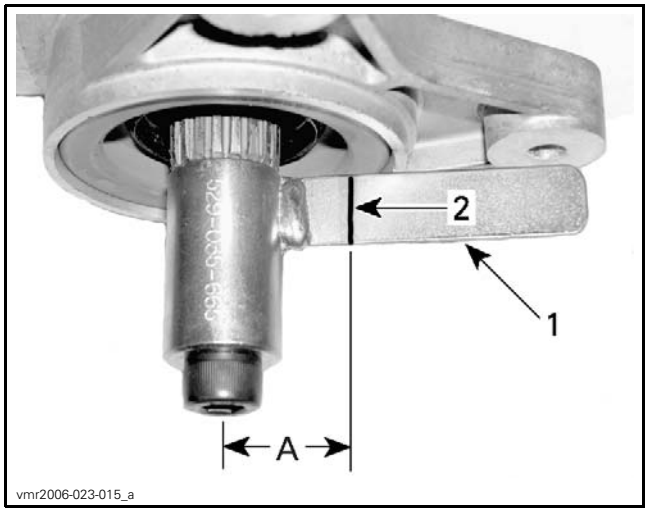
Measuring the Backlash

When measuring backlash, the differential cover should be upside down to pull the ring gear out of mesh.

REQUIRED TOOL
BACKLASH MEASUREMENT TOOL (P/N 529 035 665)
DIAL INDICATOR

Place the backlash measurement tool at the end of pinion gear.

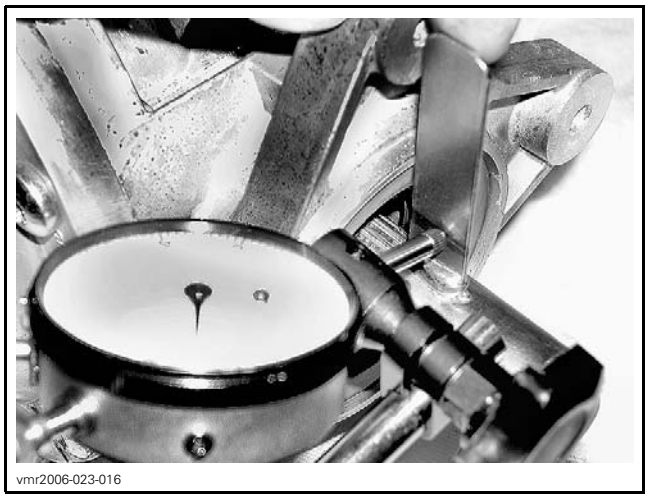
From center of tool bolt, measure 25.4 mm (1 in) and scribe a mark on the tab.



1. Tab of backlash measurement tool
2. Mark on tab
A. 25.4 mm (1 in)

Position the dial indicator tip against the tab at a 90° angle and right on the previously scribed mark.

Gently move the tool tab back and forth making sure the ring gear does not turn. Note the backlash result.



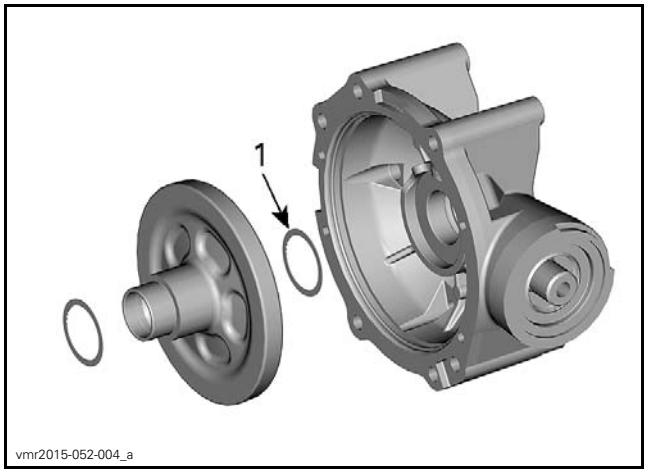
Rotate pinion gear 1/2 turn and recheck backlash. Note the result.

Rotate pinion gear 1 turn and recheck backlash.

BACKLASH SPECIFICATION
0.1 mm (.004 in) to 0.35 mm (.014 in)

If backlash is out of specification, split final drive housing, refer to *DISASSEMBLING THE REAR FINAL DRIVE* and adjust shim thickness as per following guideline.

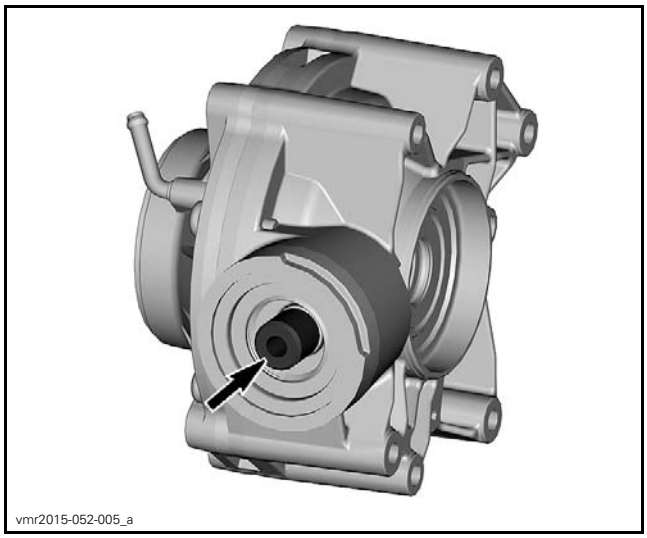
BACKLASH ADJUSTMENT GUIDELINE	
BACKLASH MEASUREMENT	WHAT TO DO
Below 0.1 mm (.004 in)	Add shim(s) and recheck backlash
Above 0.35 mm (.014 in)	Remove shim(s) and recheck backlash



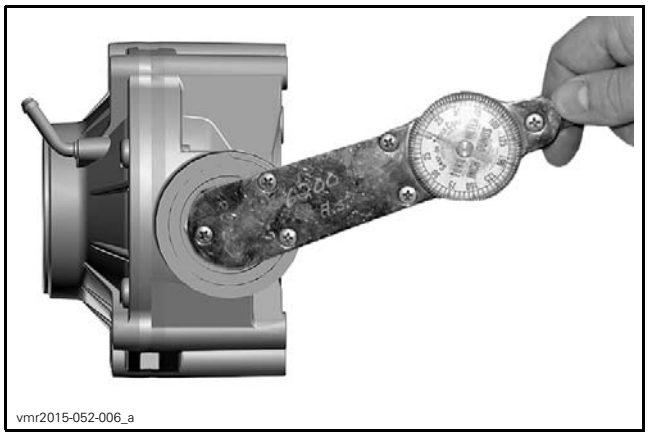
1. Backlash shim

Measuring the Preload

Screw the propeller shaft screw in pinion gear.



Using a needle torque wrench, measure the preload.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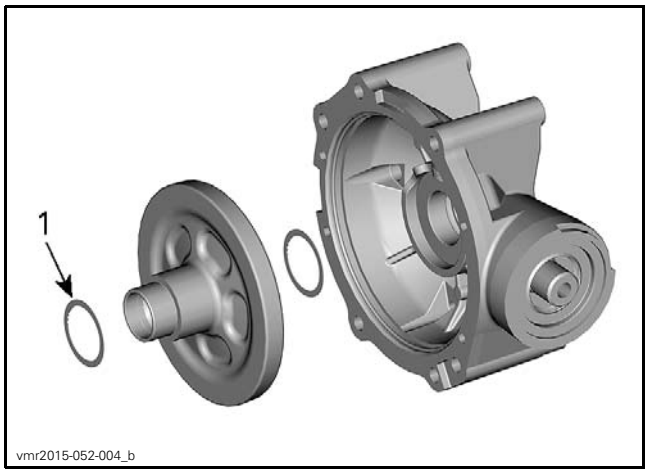
PRELOAD SPECIFICATION
Maximum 0.50 N•m (4 lbf•**in**)

There should be close to zero resistance when turning pinion shaft by hand.

If preload is out of specification, split final drive housing, refer to *DISASSEMBLING THE REAR FINAL DRIVE* and adjust shim thickness as per following guideline.

Carefully inspect all bearings condition.

PRELOAD GUIDELINE	
PRELOAD MEASUREMENT	WHAT TO DO
Below 0.06 N•m (.5 lbf•**in**)	Add shim(s) and recheck preload
Above 0.50 N•m (4 lbf•**in**)	Remove shim(s) and recheck preload



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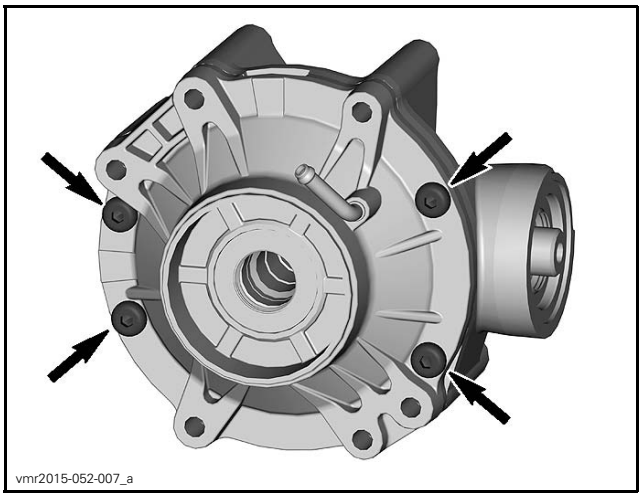
1. Preload shim

Disassembling the Rear Final Drive

Ring Gear

Remove the final drive housing screws.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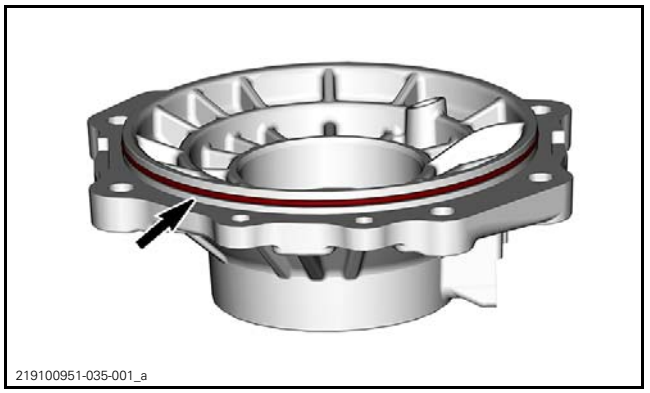
Split final drive housings.

If opening the housing for backlash or preload adjustment, remove and set aside the cover O-ring.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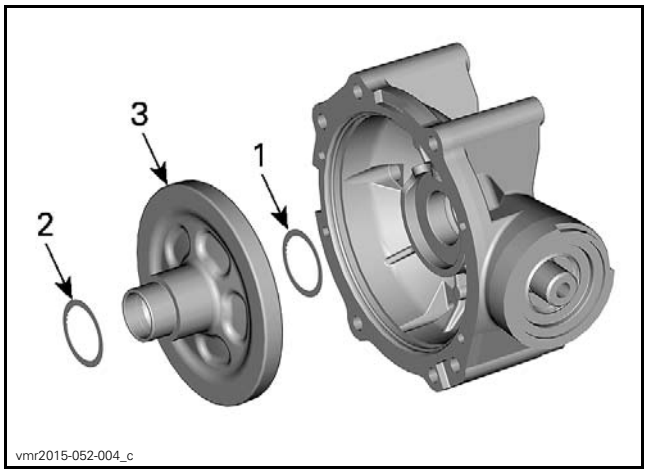

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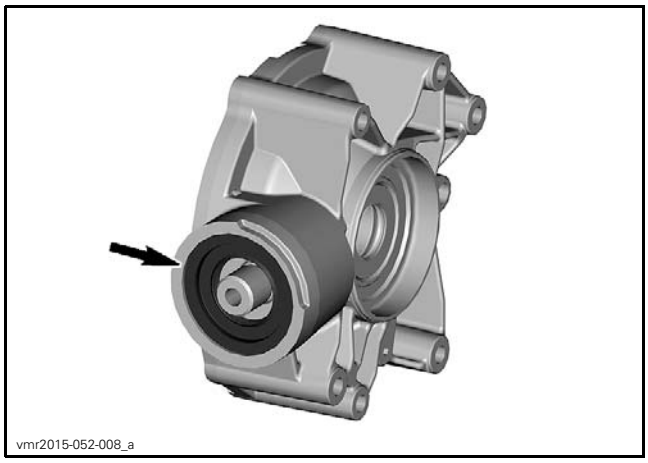
1. Backlash shim
2. Preload shim
3. Ring gear

Extract ring gear out of half housing.

NOTE: Be careful to keep track of shims. Write down the thickness and position of every shim.

Pinion Gear

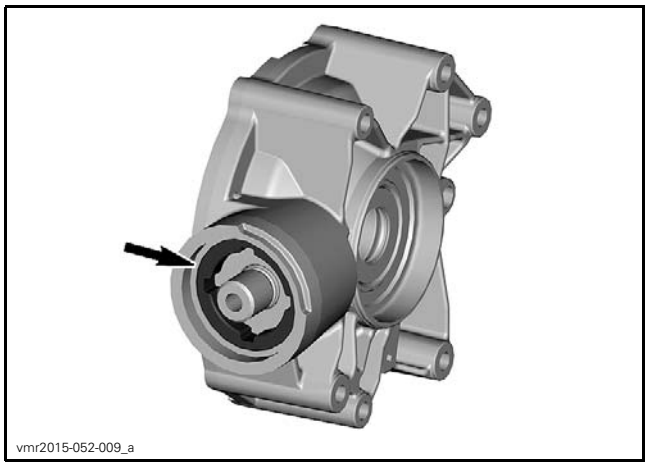
Remove and discard oil seal.



Unscrew the pinion nut..

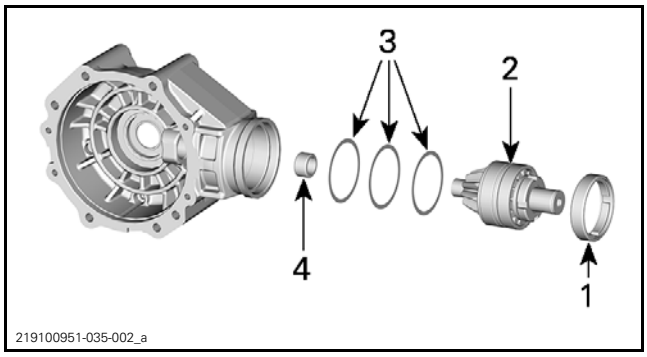
NOTE: Heating the nut may be necessary.

REQUIRED TOOL
DIFFERENTIAL NUT SOCKET 65MM (P/N 529 036 302)



NOTE: The pinion nut is left hand threaded. Unscrew by turning clockwise.

Remove the bearing along with the pinion gear. Be careful to keep track of shims..



1. M74x1.25 nut
2. Pinion gear assembly
3. Pinion gear shim
4. Needle bearing (discard)

NOTE: The replacement pinion comes preassembled.

Assembling the Rear Final Drive

Adjustment is required when any of the following part is changed.

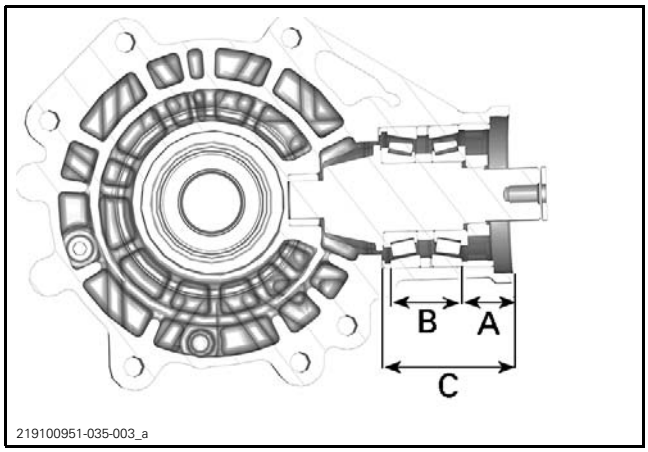
– Pinion gear
– Ring gear
– Housing.

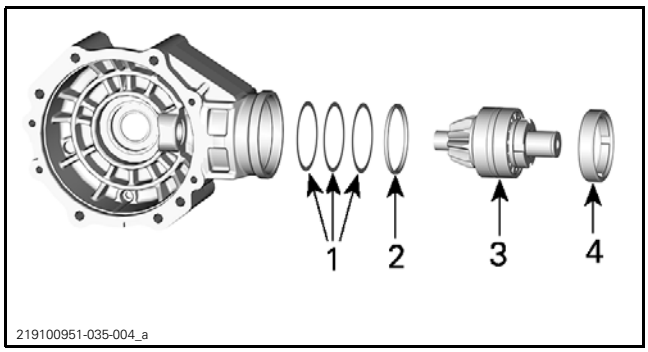
As a preliminary setup, install shims according to the following table.

RECOMMENDED SHIM THICKNESS	
PINION GEAR	See procedure for pinion gear shim thickness
BACKLASH	0.5 mm (.02 in) (as a preliminary adjustment)
PRELOAD	

Procedure for pinion gear shim thickness:

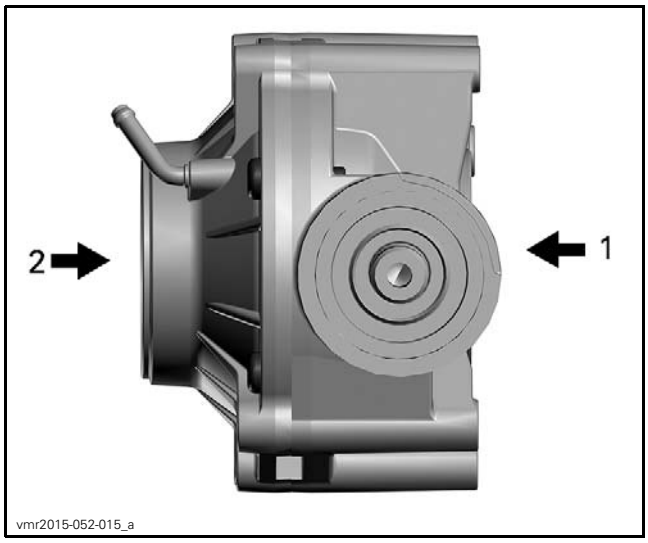
1. Measure the distance "B" on the new pinion gear set. This is the distance between both outer shells of the bearings.
2. Remove old pinion gear set.
3. Measure the distance "C" of the gear case. This is the distance between the shim surface of the case and outside surface of the case.
4. Install the new gear set without shims and washer, it will be located at the "zero" position.
5. Measure the distance "A" between outside surface of the gear case and the bearing shoulder of the gear case.
6. The shim thickness including the washer will be "C-A-B+0.78 mm (.031 in)".
7. Select the good combination of shim to match the thickness calculated on step 6.



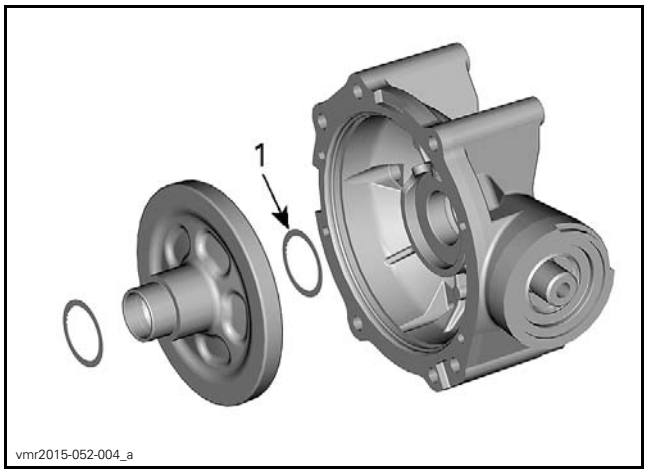


1. *Shims*
2. *Washer*
3. *Pinion assembly*
4. *Pinion nut*

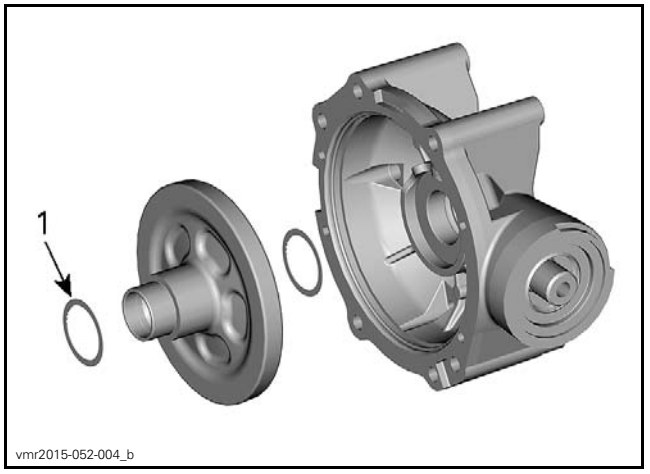
Install shims calculated in *INSPECTING THE REAR FINAL DRIVE (ASSEMBLED)* for preload and backlash.



1. *Backlash side*
2. *Preload side*



1. *Backlash shim*



1. *Preload shim*

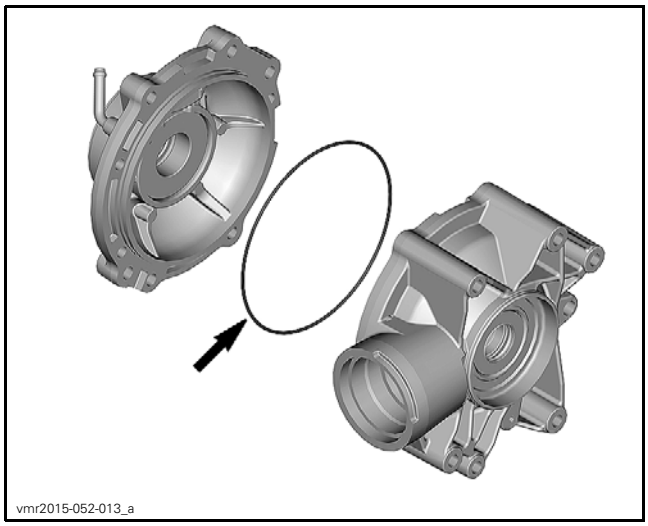
Prior to finalizing assembly, proceed in this order:

– Temporarily assemble final drive using recommended torques.
– Do not apply thread locker product.
– Do not install a new pinion nut.
– Do not install the cover O-ring
– Check backlash.
– Check preload.

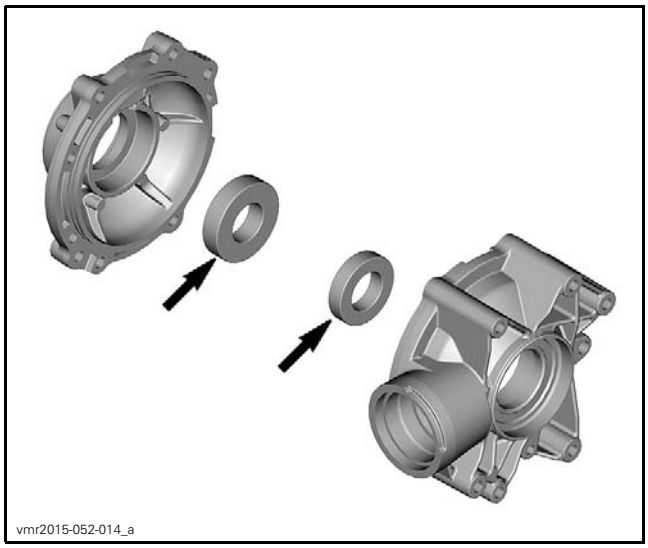
Ring Gear

The installation is the reverse of the removal procedure. However, pay attention to the following:

Check condition of O-ring before re installation. Replace if damaged.



Install NEW bearings.



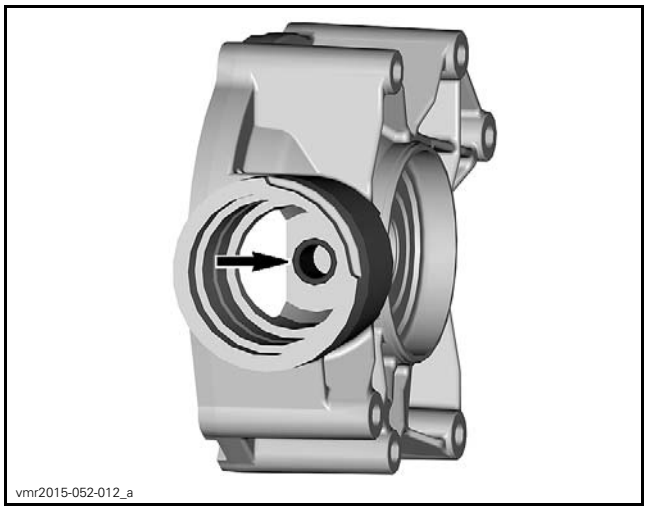
Tighten final drive housing screws as per specification.

TIGHTENING TORQUE	
Final drive housing screws	32 N•m ± 3 N•m (24 lbf•ft ± 2 lbf•ft)

Pinion Gear

The installation is the reverse of the removal procedure. However, pay attention to the following:

Install a NEW needle bearing.



install a NEW O-ring.

Apply LOCTITE 271 (RED) (P/N 293 800 005) to pinion nut.

Install and tighten the pinion nut as per specification.

TIGHTENING TORQUE	
Pinion nut (LH THREADS)	180 N•m ± 15 N•m (133 lbf•ft ± 11 lbf•ft) + LOCTITE 271 (RED) (P/N 293 800 005)

Lubricate and install a NEW oil seal.

Installing the Rear Final Drive

The installation is the reverse of the removal procedure. However, pay attention to the following:

Install the lowest rear final drive retaining screws first.

Install all screws and nuts prior to tighten.

Tighten nuts to specification.

TIGHTENING TORQUE	
Final drive retaining nuts	90 N•m ± 5 N•m (66 lbf•ft ± 4 lbf•ft)

Refill the final drive with recommended oil. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

STEERING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
STEERING ALIGNMENT TOOL	529 036 059	5

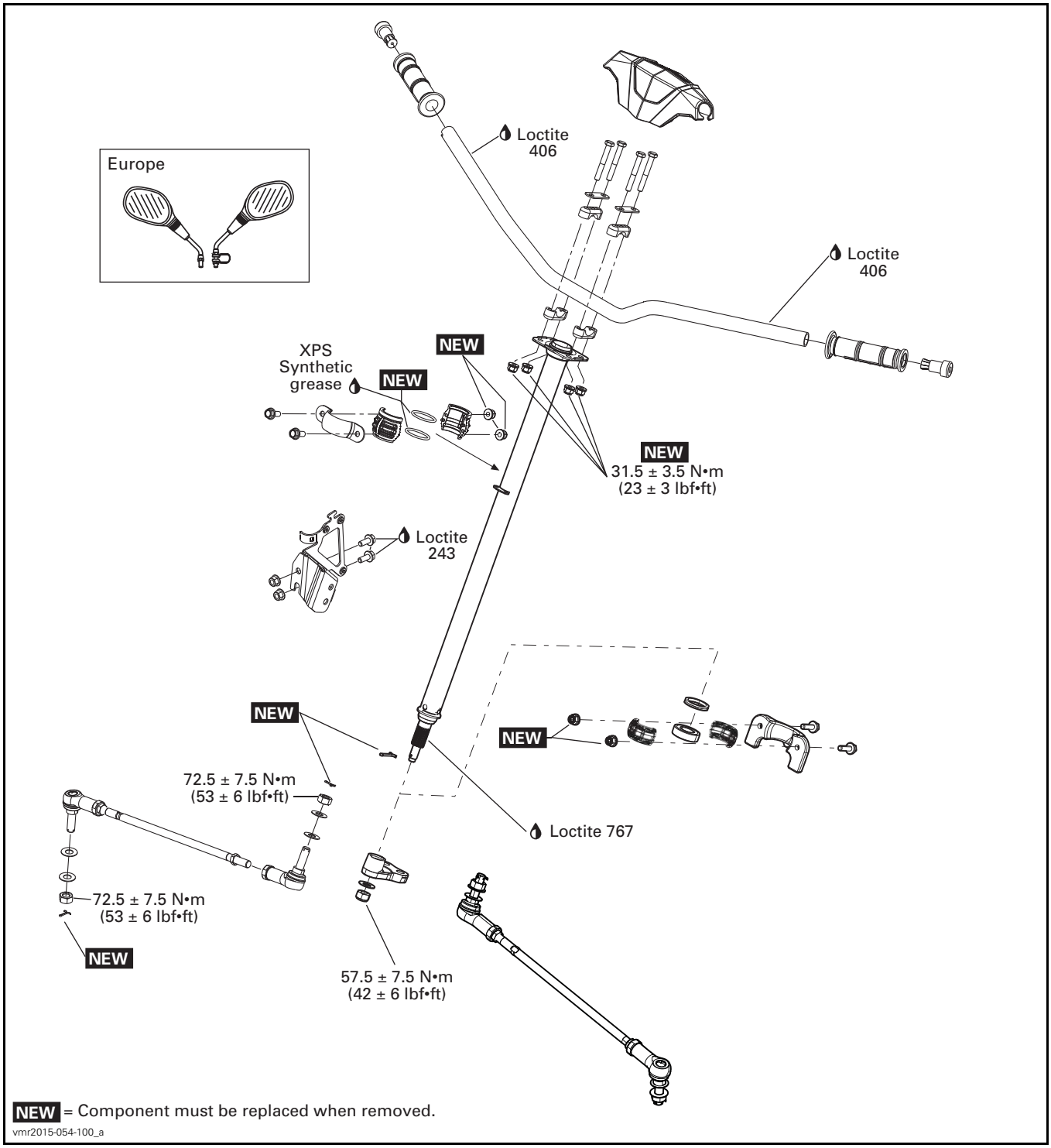
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SMOOTHFLOW™ TAPERED TIP	16 ga	6

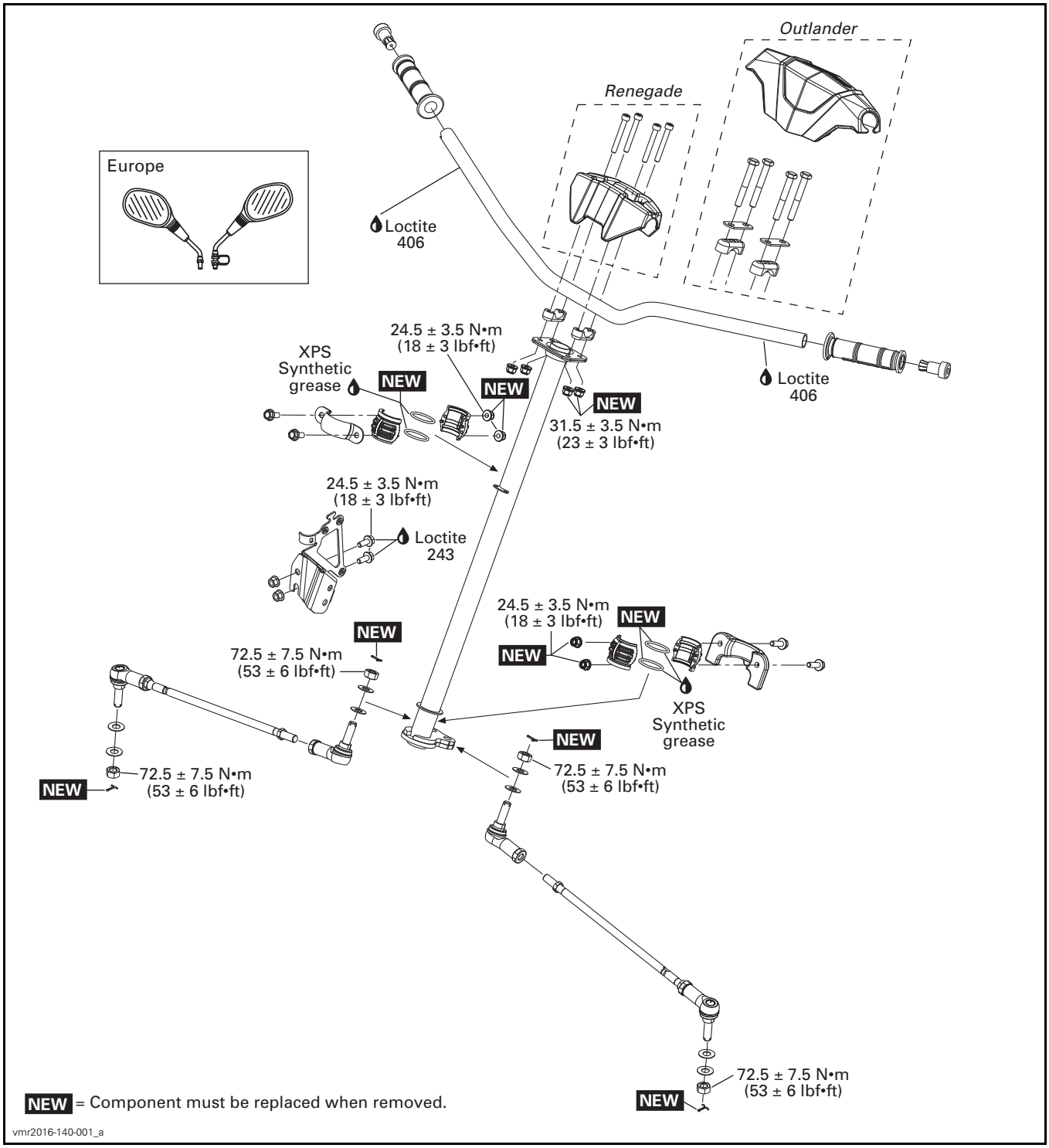
SERVICE PRODUCTS

Description	Part Number	Page
CLUTCH AND PULLEY FLANGE CLEANER PRO S1	779244	6
LOCTITE 406 (GLUE)	293 800 100	7
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	12, 15, 17
SYNTHETIC GREASE	779162	12, 16

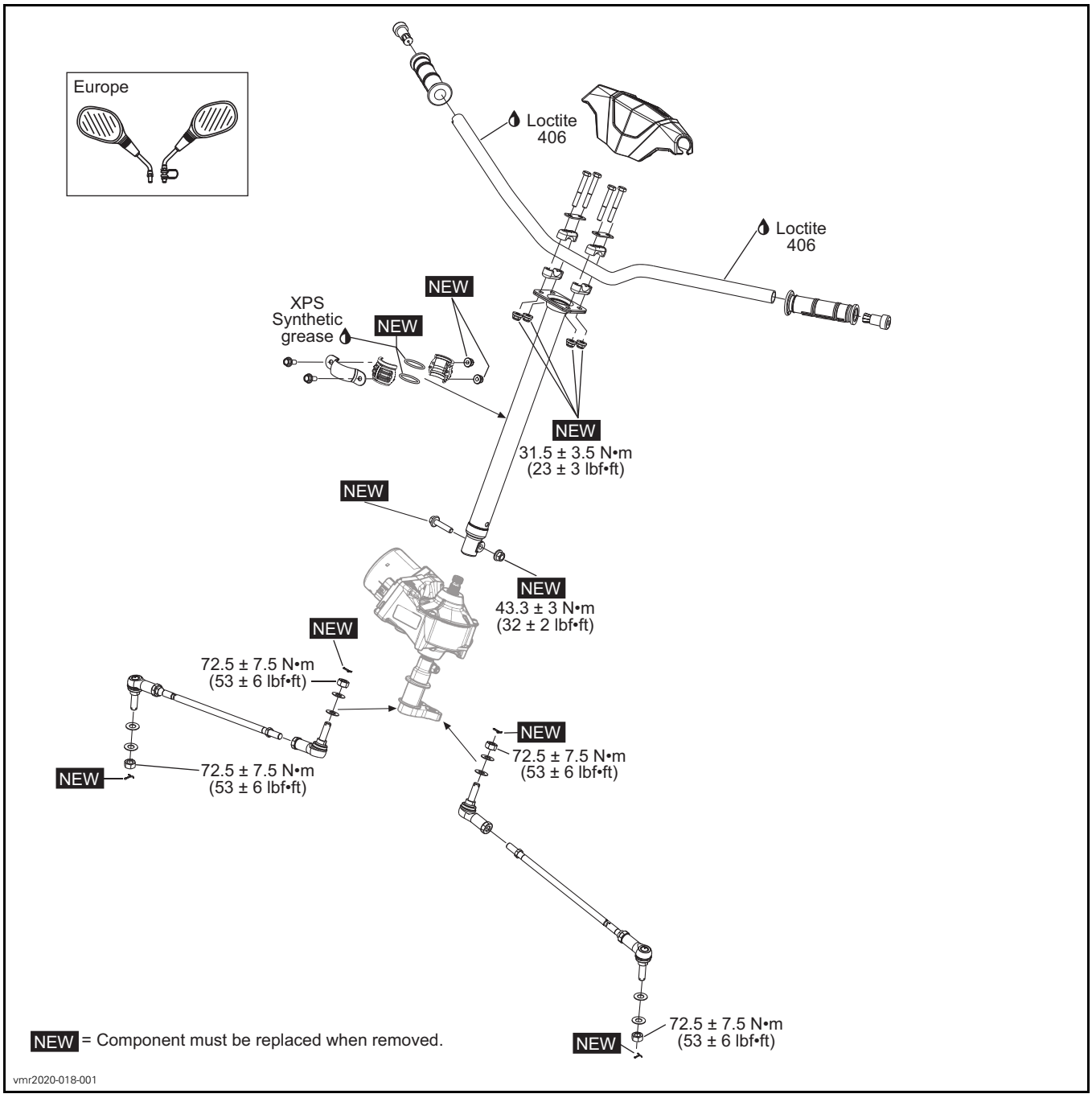
Outlander 450 and 570 Without DPS (except the 570 PRO)



Outlander 570 PRO, Outlander 650/850/1000R and Renegade Without DPS



With DPS


Europe
Loctite 406
Loctite 406
XPS Synthetic grease
NEW
NEW
NEW
31.5 ± 3.5 N•m (23 ± 3 lbf•ft)
NEW
NEW
43.3 ± 3 N•m (32 ± 2 lbf•ft)
NEW
72.5 ± 7.5 N•m (53 ± 6 lbf•ft)
NEW
72.5 ± 7.5 N•m (53 ± 6 lbf•ft)
NEW
72.5 ± 7.5 N•m (53 ± 6 lbf•ft)
NEW
72.5 ± 7.5 N•m (53 ± 6 lbf•ft)
NEW = Component must be replaced when removed.
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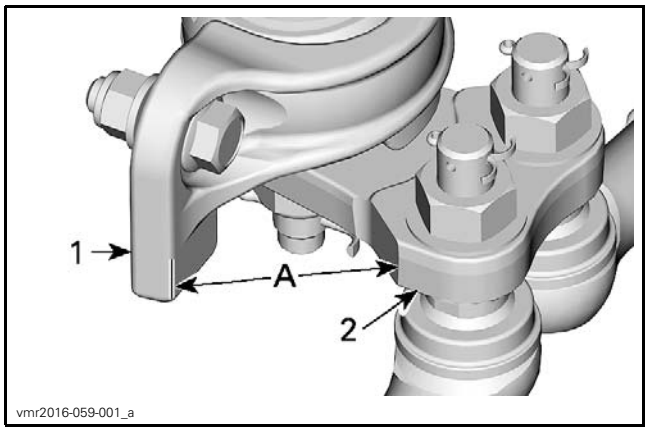
GENERAL

The procedures described below are the same for the RH and LH sides, unless otherwise instructed.

ADJUSTMENT

ALIGNING THE WHEELS

1. Place vehicle on a level surface.
2. Check pressure in each tire. Adjust to recommended pressure.
3. Lift and secure vehicle off the ground so that the suspension is fully extended.
4. Remove both inner fenders to have easy access to pitman arm.
5. Center pitman arm by measuring equal distances, ±1mm, between the edges as per the following illustration, on both sides of the pitman arm.



A. Equal distance ± 1 mm (1/32 in) on both sides
1. Steering column lower attach
2. Pitman arm

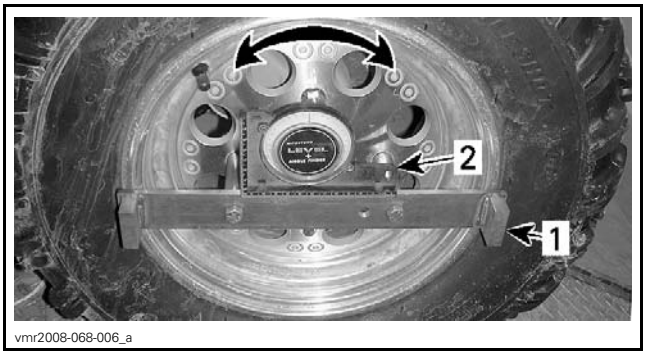
6. Secure handlebar without moving steering column.
7. Remove two wheel nuts on the LH rear wheel and install the steering alignment tool.

REQUIRED TOOL	
STEERING ALIGNMENT TOOL (P/N 529 036 059)	

8. Place a rope around all four tires using an elastic, link both ends together.

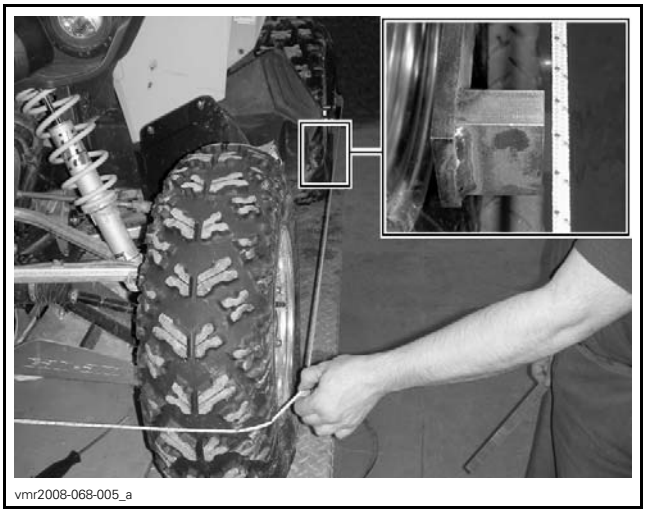
NOTE: The rope must be placed at the center of the wheels.

9. Rotate the front wheel to position the alignment tool level with the rope. Ensure rope passes over the spacer blocks on the alignment tool.



1. Steering adjustment tool
2. Angle gauge or level

10. At the LH front of wheel, near the front of the rim, pull on the rope so that it does not touch the first spacer block on the alignment tool.



TYPICAL

11. Slowly move rope back until it just makes contact with both spacers.

NOTE: Ensure rope remains in this position as you carry out the following steps.

TYPICAL

12. Measure the distance between the rope and the rim, at the front and at the rear of the wheel rim.

vmr2008-068-008

TYPICAL — FRONT OF WHEEL

vmr2008-068-009

TYPICAL — REAR OF WHEEL

13. Calculate the difference between the front and rear measurements and compare with following specifications.

MODELS	SPECIFICATION
All Outlanders	0 mm to 3 mm (0 in to .118 in) **toe-in**
All Renegades	3 mm to 5.6 mm (.118 in to .22 in) **toe-in**

14. If the wheel toe measurement is out of specification, carry out the following:

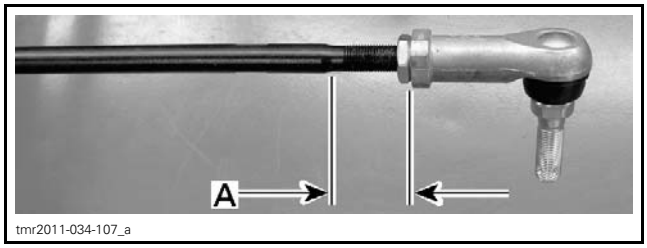
    14.1 Loosen tie-rod end lock nuts.

    14.2 Adjust tie-rod length.

    NOTE: For a toe-in adjustment, the distance must be longer at the front of the wheel. Lengthen tie-rod to increase toe-in, and vise-versa.

⚠ WARNING

The maximum unengaged tie-rod length must not exceed 32 mm (1.26 in) Tie rod unengaged length must be the same at both ends of the tie-rod.



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A. Maximum tie-rod end length

    14.3 Tighten tie-rod end lock nuts to specification.

TIGHTENING TORQUE	
Tie-rod end locking nut	34 N•m ± 2 N•m (25 lbf•ft ± 1 lbf•ft)

15. Repeat procedure for other front wheel.
16. Put the vehicle back on the ground.
17. Remove the handlebar securing device.
18. Place the front wheels in straight ahead position and adjust the handlebar in its center position by loosening the 4 bolts clamping the handlebar on the steering column.

PROCEDURES

HANDLEBAR GRIP

Removing the Handlebar Grip

1. Loosen the screw at the end of handlebar grip.
2. Remove the handlebar grip cap.
3. Cut and remove the handlebar grip.

Installing the Handlebar Grip

1. Remove all rubber residues of the old grip before installing the new.
2. Clean the handlebar with recommended cleaner or alcohol to remove any greasy matter on it.

SERVICE PRODUCT
CLUTCH AND PULLEY FLANGE CLEANER PRO S1 (P/N 779244)

3. Install handlebar grip by blowing compressed air between handle grip and handlebar.
4. Install a SMOOTHFLOW™ TAPERED TIP (P/N 16 GA) from Nordson EFD Inc on a bottle of glue.

SERVICE PRODUCT
LOCTITE 406 (GLUE) (P/N 293 800 100)

5. Lift a part of the grip using a small screwdriver and inject glue (about 4 spots per side).

NOTE: The glue dries quickly. Do not apply it before installing grip.

6. Apply pressure on the grip for approximately 30 seconds to set the glue.
7. Install the handlebar grip cap and tighten screws to specification.

TIGHTENING TORQUE	
Handlebar grip cap screw	0.4 N•m (3.5 lbf•**in**)

HANDLEBAR COVER

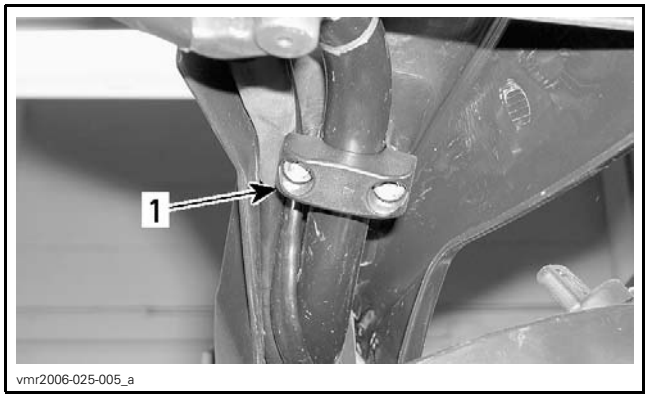
Removing the Handlebar Cover

Outlander

Pull on plastic handlebar cover to remove it from the handlebar.

Outlander XT

Unscrew both plastic U-clamps that attach handlebar cover to the handlebar.



TYPICAL
1. Plastic U-clamp

Renegade

Remove the fabric steering cover, then pull the protective foam from the handlebar.

Inspecting the Handlebar Cover

Check covers for cracks or other damages. Replace if necessary.

Installing the Handlebar Cover

The installation is the reverse of removal procedure.

Renegade X xc 1000

NOTE: Ensure handlebar "U" clamps in handlebar cover are tightened equally (equal distance on each side of clamps).

HANDLEBAR

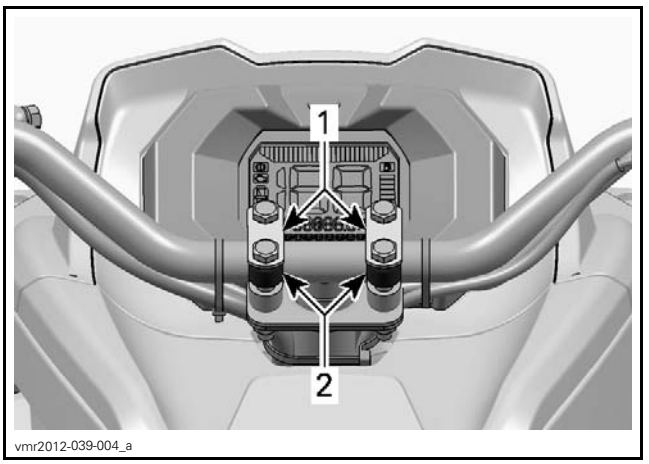
Removing the Handlebar

All Outlander Models

1. Remove handlebar cover.

NOTE: Remove handlebar grips, throttle handle, brake handle and multifunction switch only if the handlebar is defective and requires replacement.

2. Remove handlebar mounting bolts, stiffener and handlebar clamps.

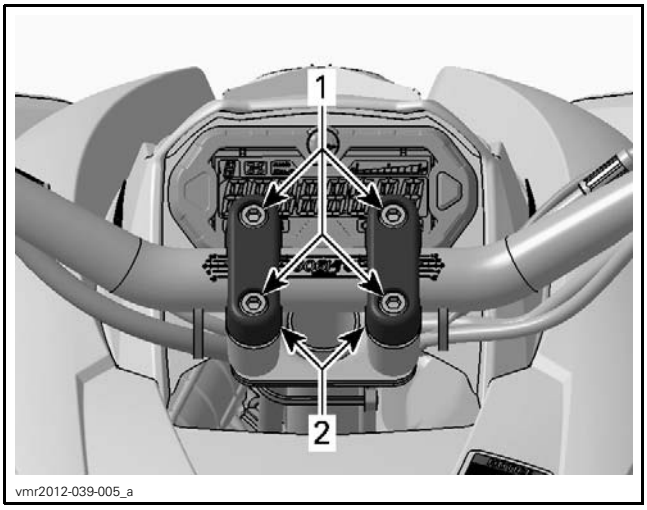


TYPICAL
1. Stiffeners
2. Handlebar clamps

3. Remove the handlebar.

Renegade Models

1. Remove fabric steering cover.
2. Pull foam protector from handlebar.
3. Remove the four socket screws, then remove the handlebar clamps.



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1. Socket screws
2. Handlebar clamps

Inspecting the Handlebar

Inspect the handlebar for damage, cracks or bending. Replace if any of these problems is detected.

Installing the Handlebar

For the installation, reverse the removal procedure.

NOTE: Ensure handlebar "U" clamps are tightened equally (equal distance on each side of clamps).

STEERING CONNECTORS

Steering Connector Access

1. Remove gauge support, refer to *GAUGE* subsection.

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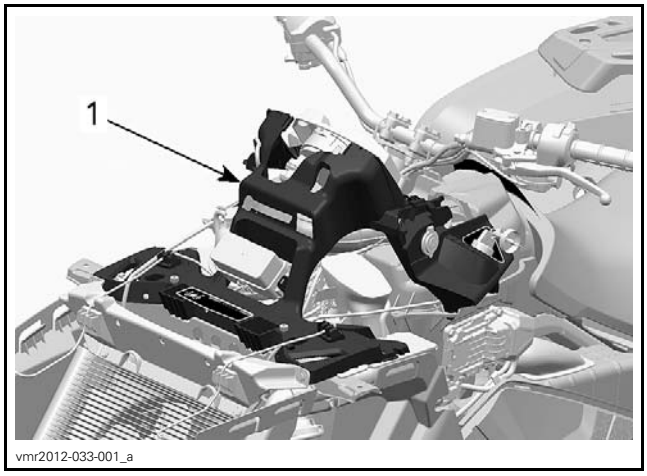
1. Gauge support

2. Remove front body module, refer to body subsection.
3. Remove dash board support.



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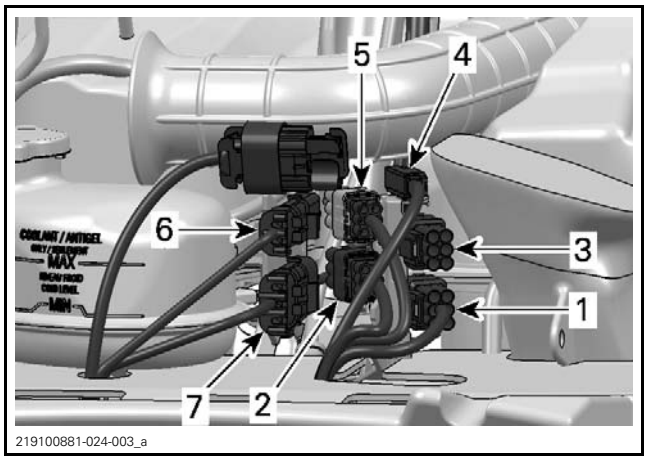
1. Dash board support

Steering Connector Identification



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STEERING CONNECTOR IDENTIFICATION
1. MG1 (LH multifunction switch)
2. MG2 (LH multifunction switch)
3. MG3 (LH multifunction switch)
4. DC3 (DC power connector)
5. HIC (Engine interconnect)
6. DC5 (DC Power Interconnect)
7. SWW (Switch winch, if equipped)

MULTIFUNCTION SWITCH

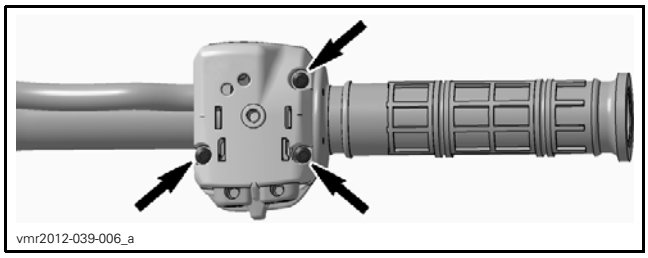
Removing the Multifunction Switch (From the Vehicle)

Remove gauge support. Refer to *GAUGE* subsection.

Carry out steps in *REMOVING THE MULTIFUNCTION SWITCH (AT HANDLEBAR)*.

Removing the Multifunction Switch (At Handlebar)

1. Remove multifunction switch screws.



TYPICAL - MULTIFUNCTION SWITCH

2. Separate multifunction switch from handlebar.
3. Disconnect multifunction switch steering connectors, refer to *STEERING CONNECTOR IDENTIFICATION* in this subsection:
   – MG1
   – MG2
   – MG3.
4. Take note of the positions of the locking ties securing the steering harness, then cut them and remove the multifunction switch steering harness from the vehicle.

Installing the Multifunction Switch

For installation, reverse the removal procedure.

NOTICE **Be sure to route and secure the multifunction switch steering harness as noted prior to removal.**

INTELLIGENT THROTTLE CONTROL (ITC) HOUSING

Removing and Installing the ITC Housing

Refer to *INTELLIGENT THROTTLE CONTROL (ITC)* subsection.

BRAKE LEVER

Removing the Brake Lever From the Vehicle

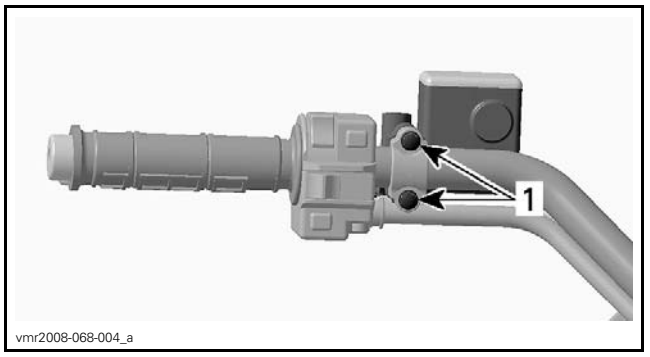
1. Carry out steps in *REMOVING THE BRAKE LEVER (AT HANDLEBAR)*.

NOTICE **Avoid spilling brake fluid on plastic, rubber or painted parts.**

2. Disconnect brake hose, refer to *BRAKES* subsection.

Removing the Brake Lever (At Handlebar)

1. Remove brake lever retaining screws.



TYPICAL
1. Remove these retaining screws

2. Separate brake lever from handlebar.

Installing the Brake Lever

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

TIGHTENING TORQUE	
Brake lever mounting screw	6 N•m ± 1 N•m (53 lbf•**in** ± 9 lbf•**in**)

⚠ WARNING

If brake hose was disconnected, bleed brake system. Refer to *BRAKES* subsection.

STEERING COLUMN BEARING

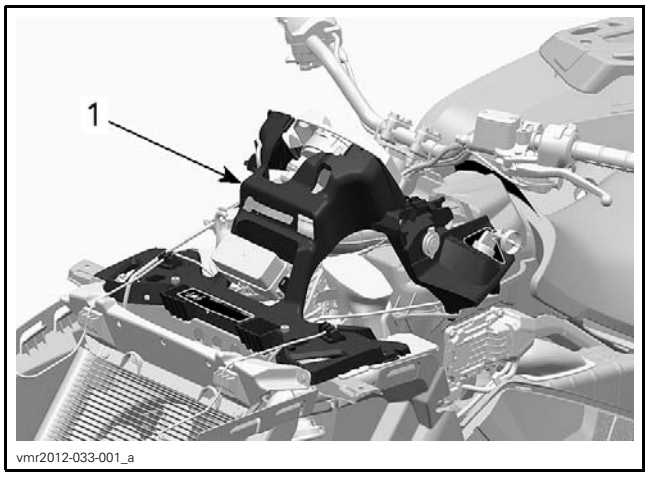
The steering column bearing(s) used on these vehicles are half bushings.

For inspection and replacement of steering column half bushings, refer to *STEERING COLUMN* in this subsection.

STEERING COLUMN

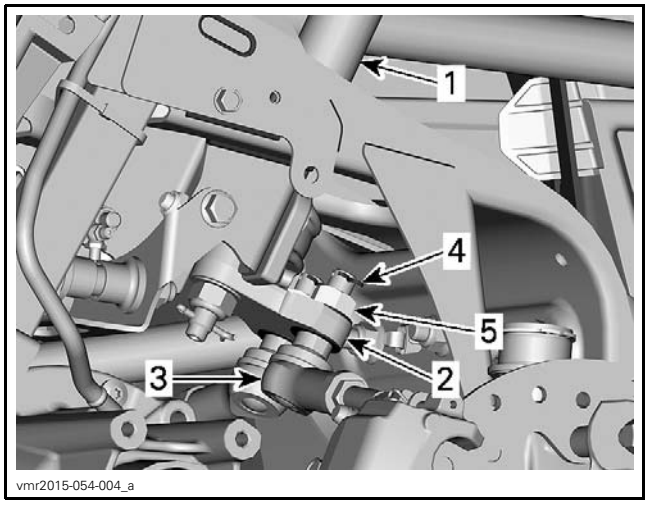
Removing the Steering Column (Without DPS)

1. Remove gauge support, refer to *GAUGE* subsection.
2. Refer to *BODY* subsection to remove the following:
   – Front body module
   – Inner fender panels
3. Remove dash board support.



1. Dash board support

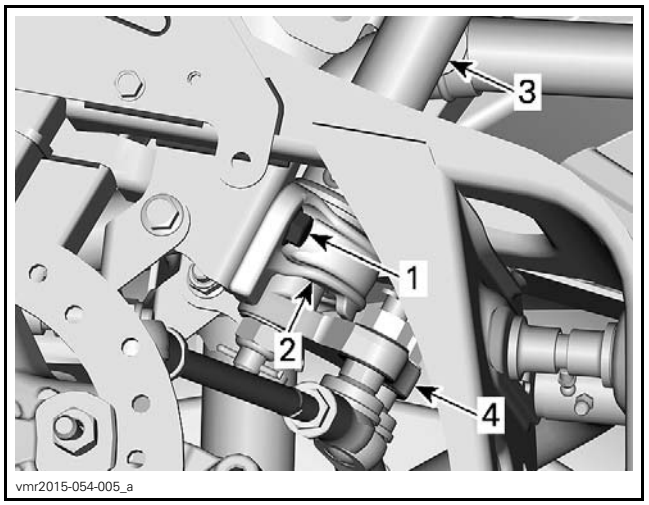
4. Remove the air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.
5. Remove handlebar, refer to *REMOVING THE HANDLEBAR* in this subsection. Also remove locking ties and separate wiring harnesses and hoses from the steering column.
6. Disconnect the tie-rods from the pitman arm at the bottom of the steering column. Refer to *TIE-ROD* in this subsection.



1. Steering column
2. Pitman arm
3. Tie-rod end
4. Cotter pin
5. Tie-rod retaining nut

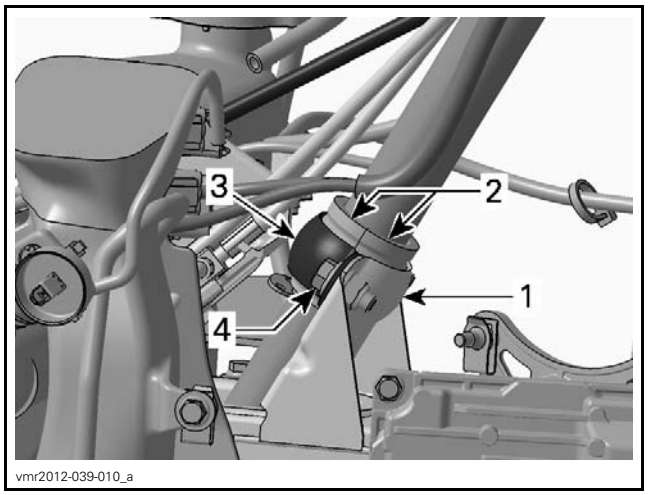
NOTE: When removing tie-rods from pitman arm, take note of positions of flat washers for installation.

7. Remove lower half bushing retaining screws and pull retainer off of half bushings.



1. Lower retainer mounting screws (2)
2. Lower half bushing retainer
3. Steering column
4. Pitman arm

8. Remove upper half bushing retaining screws and pull retainer off of half bushings.



1. Upper steering column support
2. Half bushings
3. Half bushing retainer
4. Retainer mounting screws (2)

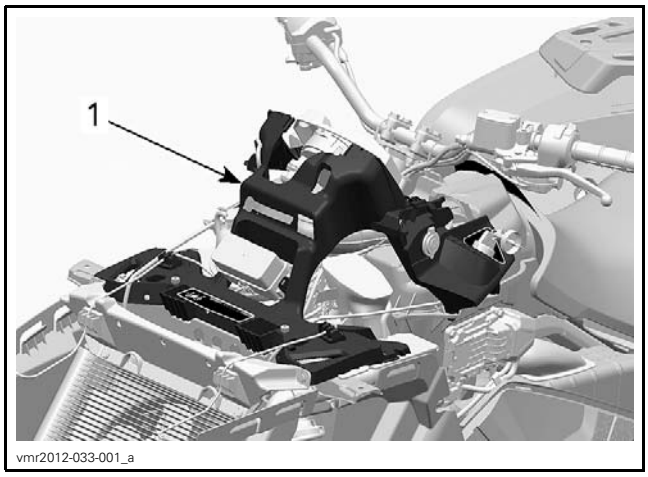
9. Pull steering column from vehicle.

Removing the Steering Column (With DPS)

1. Remove gauge support, refer to *GAUGE* subsection.
2. Remove the front body module, refer to *BODY* subsection.

Outlander Models

3. Remove dash board support.

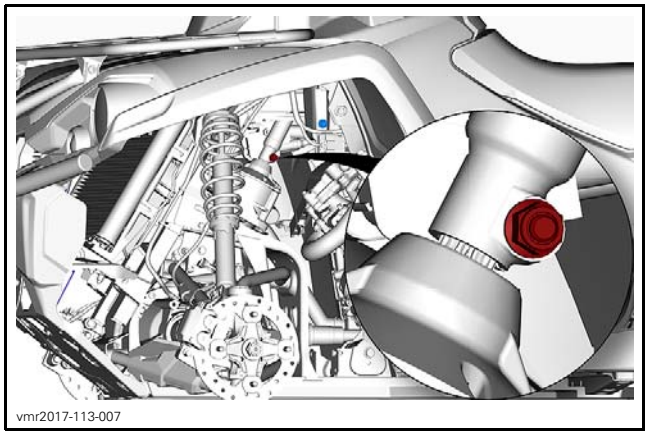


TYPICAL - OUTLANDER MODELS
1. Dash board support

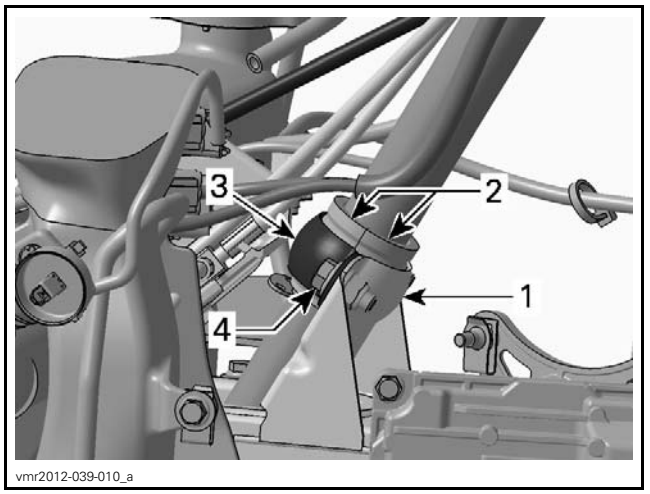
All Models

4. Remove the air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.
5. Remove handlebar, refer to *REMOVING THE HANDLEBAR* in this subsection. Also remove locking ties and separate wiring harnesses and hoses from the steering column.
6. Remove the pinch bolt.

NOTE: Some parts in following illustration not shown for clarity of illustration.



7. Remove upper half bushing retaining bolts and pull retainer off of half bushings.



TYPICAL
1. Upper steering column support
2. Half bushings
3. Half bushing retainer
4. Retainer mounting screws (2)

8. Pull steering column from vehicle.

Inspecting the Steering Column

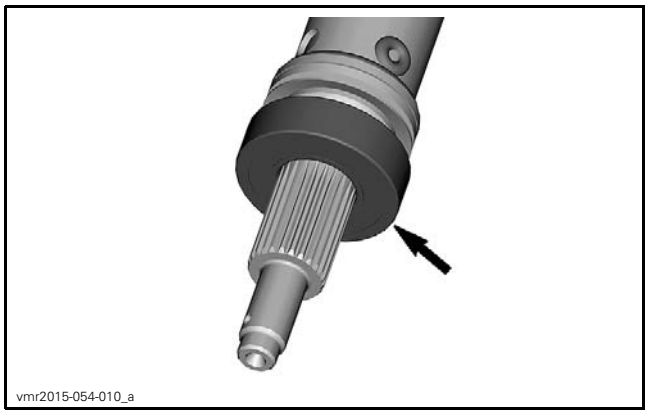
1. Inspect steering column for wear, cracks or bending. Replace if any of these problems is detected.
2. Check steering column O-rings for brittleness, hardness, wear or other damage. Replace if necessary.
3. Clean and check steering column half bushings. If they show signs of wear or cracking, replace them.

Models Without a DPS

4. Check if steering column lower ball bearing turns freely and smoothly. .
   – Outlander 450 and 570 Without DPS (except the 570 PRO) - Replace the bearing if necessary.
   – Outlander 570 PRO, Outlander 650/850/1000R and Renegade Without DPS - Replace steering column if necessary.

Replacing the Steering Column Lower Ball Bearing and Seal (Outlander 450 and 570 Without DPS (except the 570 PRO))

1. Remove the pitman arm. Refer to *PITMAN ARM* in this subsection.
2. Remove ball bearing.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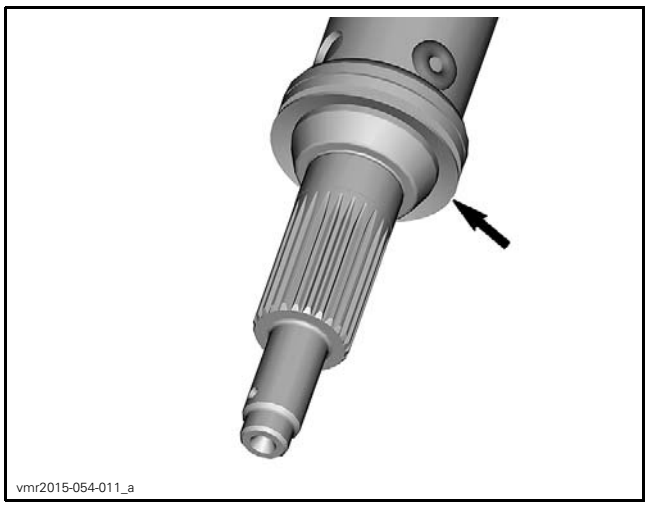
3. Remove seal.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4. Install a NEW seal.
5. Install a NEW ball bearing.

Installing the Steering Column

The installation is the reverse of the removal procedure. However, pay attention to the following:

SERVICE PRODUCTS	
O-rings and half bushings	SYNTHETIC GREASE (P/N 779162)
DPS input and output shaft splines	LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

Install NEW cotter pins (as applicable per model). Both ends of cotter pins must be folded.

Install NEW elastic nuts where used.

Torque all fasteners as specified in the applicable exploded view.

Carry out a steering alignment, refer to *ALIGNING THE WHEELS* in this subsection.

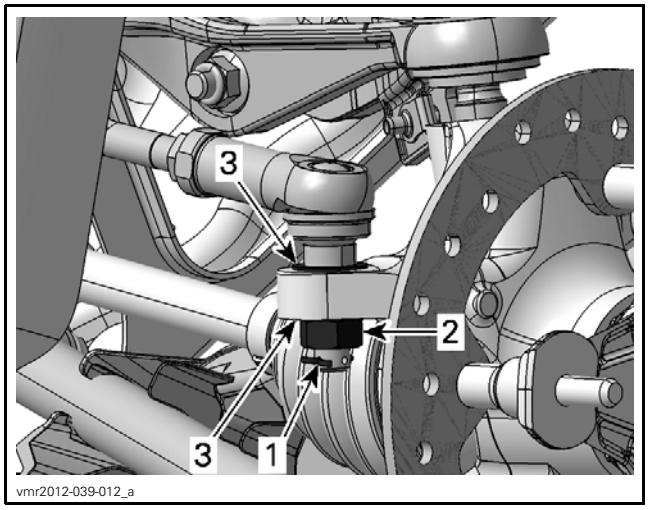
Reset the torque sensor offset, refer to *RESETTING THE TORQUE OFFSET* in the appropriate *DYNAMIC POWER STEERING (DPS)* subsection.

TIE-ROD

NOTE: Use the same procedure for RH and LH side.

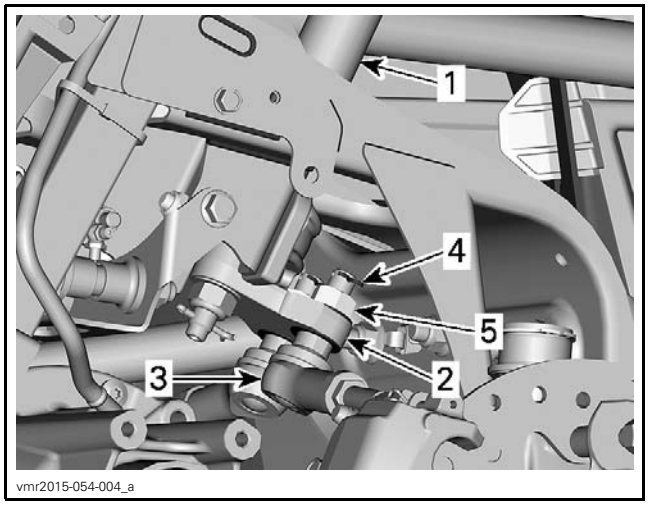
Removing the Tie-Rod

1. Place vehicle on jack stands and remove the applicable wheel.
2. Remove tie-rod end from steering knuckle by removing:
   – Cotter pin (discard)
   – Retaining nut
   – Hardened washers (note position).



TYPICAL - TIE ROD AT STEERING KNUCKLE
1. *Cotter pin*
2. *Elastic nut*
3. *Hardened washers*

3. If completely removing tie-rod from vehicle, repeat previous step at pitman arm.



TYPICAL
1. *Steering column*
2. *Pitman arm*
3. *Tie-rod end*
4. *Cotter pin*
5. *Tie-rod end retaining nut*

Inspecting the Tie-Rod

Inspect tie-rod for straightness, cracks and other damages. Replace as required.

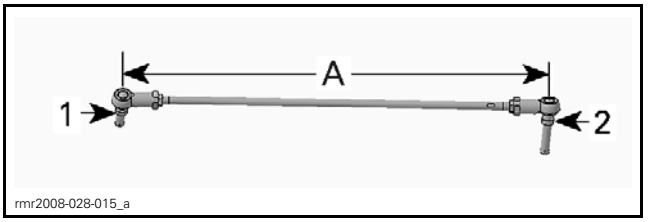
Inspect tie-rod ends for wear or excessive play. If excessive, replace the tie-rod end.

Installing the Tie-Rod

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

When installing a new tie-rod or tie-rod end, adjust tie-rod to nominal length.

TIE-ROD NOMINAL LENGTH		
Outlander with metal racks	Dimension "A" - center to center	416.4 mm (16.394 in)
Renegade and Outlander with plastic rack		438.3 mm (17.26 in)



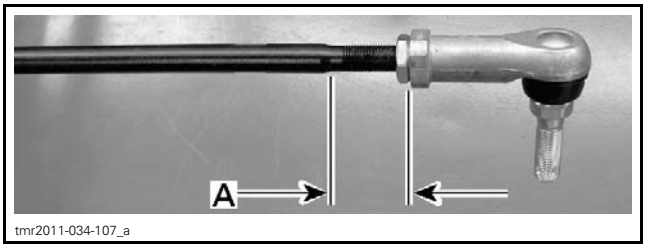
NOMINAL LENGTH
1. *Pitman arm side*
2. *Knuckle side*

A. Distance to measure

TIE-ROD MAXIMUM UNENGAGED LENGTH	
Dimension "A" - Shoulder to tie rod end face	32 mm (1.26 in)

⚠ WARNING

Maximum tie-rod unengaged length must not exceed specification. Both tie-rod ends must be engaged equally.



MAXIMUM TIE-ROD UNENGAGED LENGTH
A. 32 mm (1.26 in)

Install **NEW** cotter pins. Both ends of cotter pins must be folded.

Check the steering alignment, refer to *ALIGNING THE WHEELS* in this subsection.

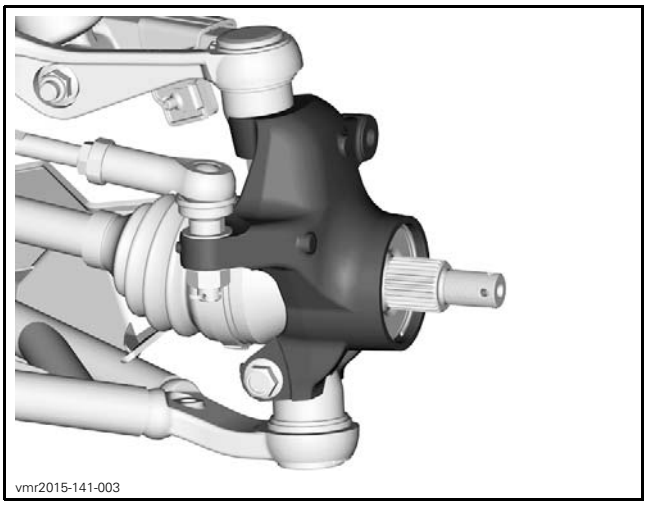
Apply specified torques.

TIGHTENING TORQUE	
Tie-rod lock nut	34 N•m ± 2 N•m (25 lbf•ft ± 1 lbf•ft)
Tie rod end retaining nut	72 N•m ± 7 N•m (53 lbf•ft ± 5 lbf•ft)

KNUCKLE

Removing the Knuckle

1. Safely lift and support the front of vehicle.
2. Remove front wheel.
3. Detach tie-rod end from knuckle, refer to *TIE-ROD* in this subsection.
4. Remove brake caliper, refer to *BRAKES* subsection.
5. Remove wheel hub, refer to the appropriate *FRONT DRIVE* subsection.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6. Detach upper suspension arm from knuckle, refer to *FRONT SUSPENSION*.
7. Detach lower suspension arm from knuckle, refer to *FRONT SUSPENSION*.
8. Remove knuckle from vehicle.

Inspecting the Knuckle

Check knuckle for cracks or other damages. Replace if necessary.

Check if wheel bearing turns freely and smoothly. See *WHEEL BEARINGS* in this subsection.

Installing the Knuckle

The installation is the reverse of removal procedure.

WHEEL BEARINGS

Inspecting the Wheel Bearing (Maintenance)

Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Inspecting the Wheel Bearing (During Component Removal)

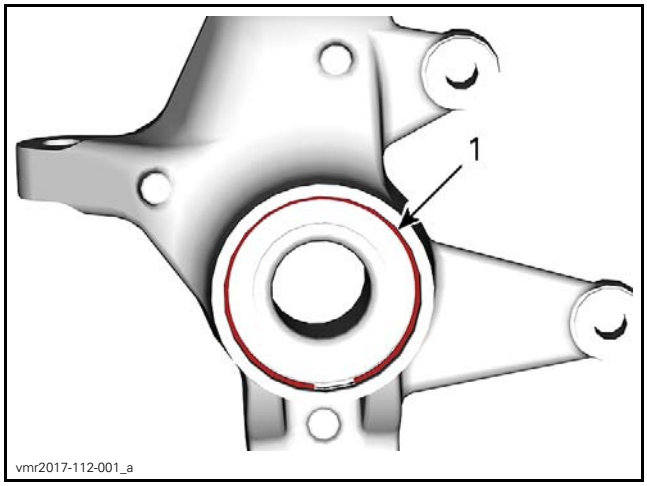
Whenever the drive axle or knuckle is removed, check wheel bearing as follows:

– Check if wheel bearing turns freely and smoothly.
– Check seal condition.

Replace if necessary.

Removing the Wheel Bearing

1. Remove knuckle from vehicle, refer to *REMOVING THE KNUCKLE* in this subsection.
2. Remove the circlip.



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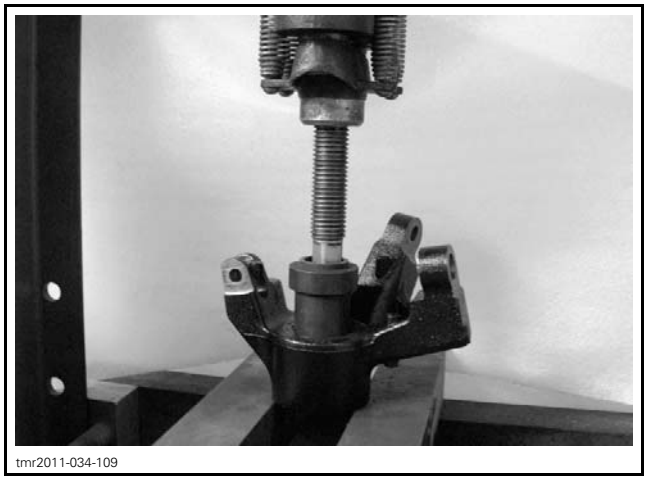
1. Circlip

3. Install knuckle on a press.
4. Remove bearing from knuckle using an appropriate bearing remover.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TYPICAL

NOTE: It may be necessary to heat the knuckle to remove bearing.

⚠ WARNING

Clean all grease from outside and inside of knuckle before heating it.

Installing the Wheel Bearing

The installation is the reverse of the removal procedure. However, pay attention to the following.

To ease wheel bearing installation:

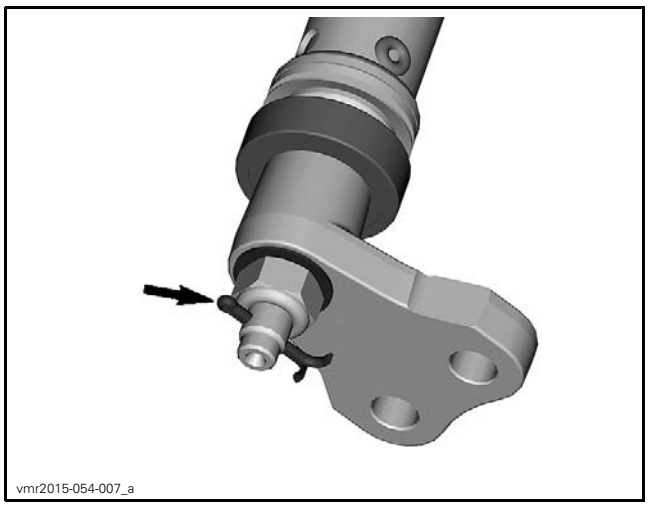
– Place bearing in a freezer for 10 minutes.
– Place knuckle in oven to 100°C (212°F) for 30 minutes maximum.

When knuckle is cooled down, install **NEW** circlip and **NEW** seal.

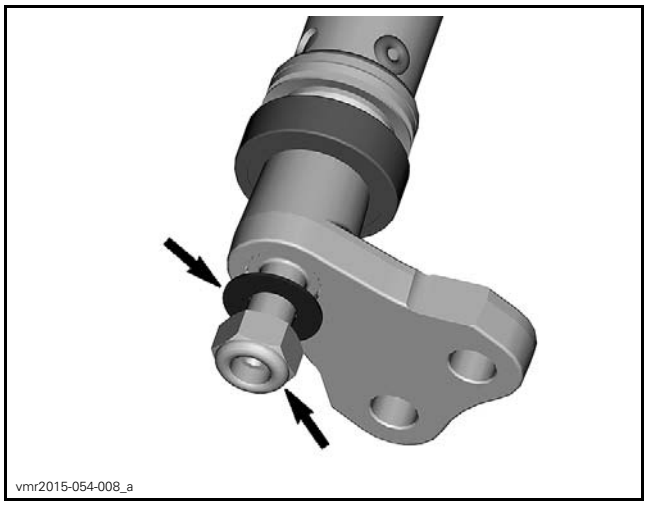
PITMAN ARM (WITHOUT DPS)

Removing the Pitman Arm

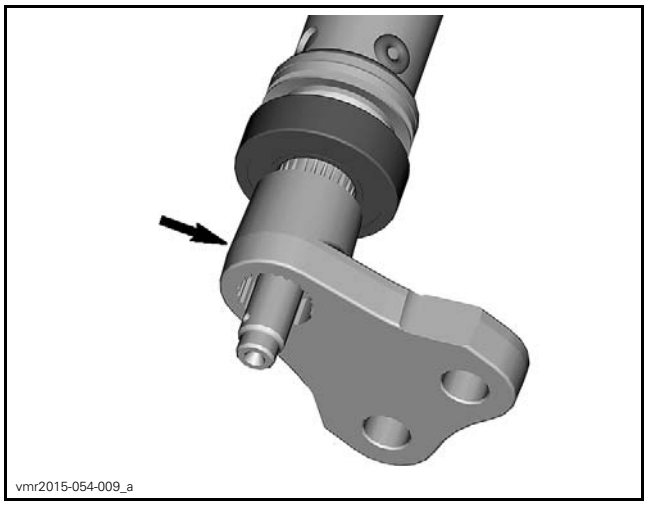
1. Remove tie rod ends from pitman arm. Refer to *TIE ROD* in this subsection.
2. Remove and discard cotter pin.



3. Remove pitman arm retaining nut and washer.



4. Remove pitman arm.



Inspecting the Pitman Arm

Inspect pitman arm for cracks or other damages. Replace if necessary.

Check pitman arm splines for excessive wear. Replace if necessary.

Installing the Pitman Arm

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

PRODUCT	
Steering column splines	LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

Tighten the pitman arm retaining nut to specification.

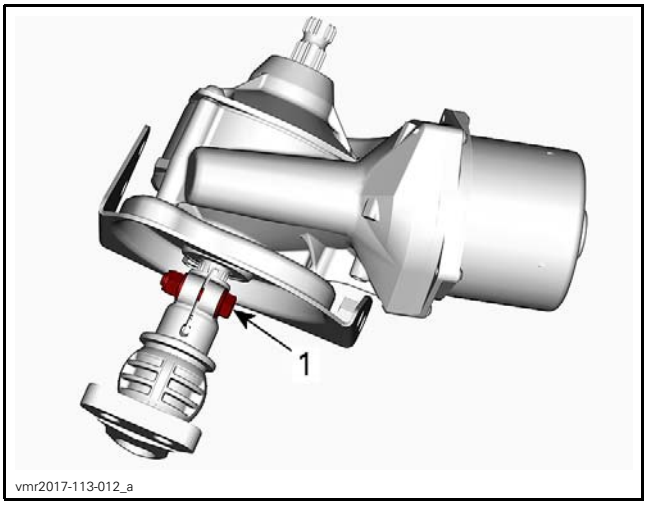
TIGHTENING TORQUE	
Pitman arm retaining nut	57.5 N•m ± 7.5 N•m (42 lbf•ft ± 6 lbf•ft)

Install a NEW cotter pin. Both ends of cotter pins must be folded.

PITMAN ARM (WITH DPS)

Removing the Pitman Arm

1. Remove tie rod ends from pitman arm. Refer to *TIE ROD* in this subsection.
2. Remove the pinch bolt.



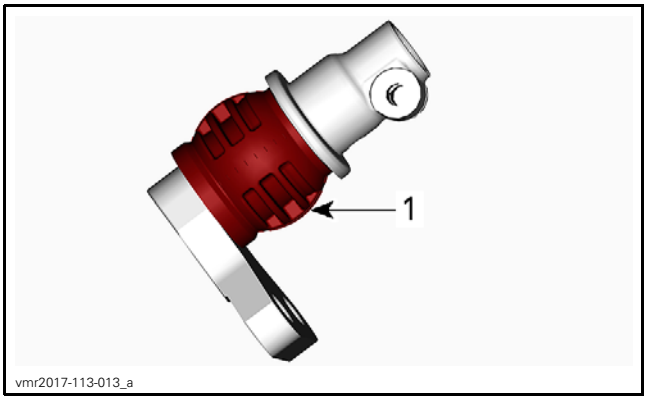
1. Pinch bolt

NOTE: There is no need to mark the parts indexation. There is a master spline on the assembly.

3. Remove the pitman arm by hand or using a soft hammer.

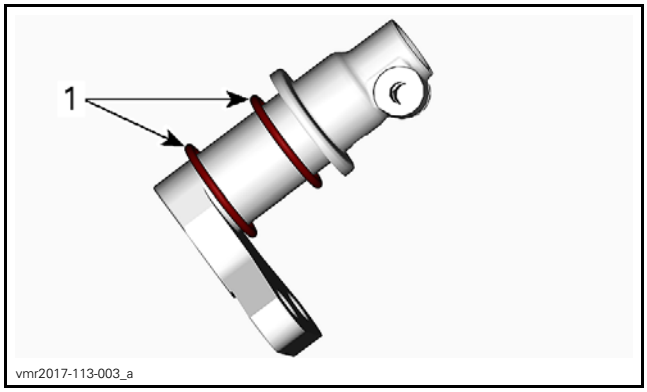
NOTICE Do not pry between the DPS unit and the pitman arm to avoid damage to the output shaft seal.

4. Remove the half bushings.



1. Half bushings

5. Inspect the O-rings and replace if required.

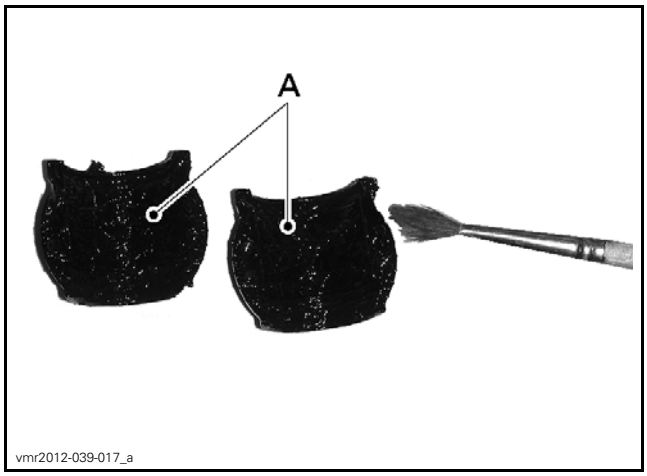


1. O-rings

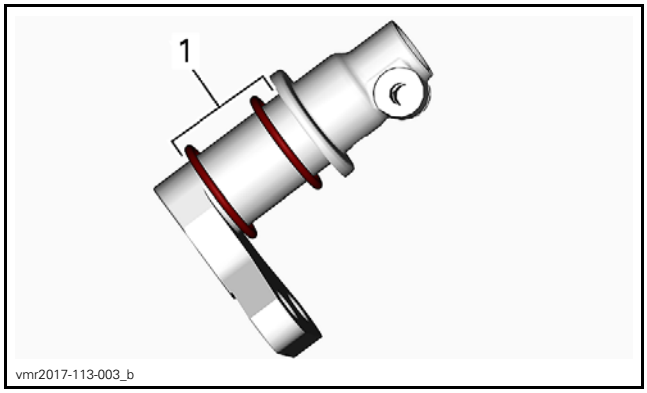
Installing the Pitman Arm

1. Apply synthetic grease to:
   – The inside half bushings
   – The pitman arm contact surface and "O" rings.

SERVICE PRODUCT
SYNTHETIC GREASE (P/N 779162)



A. Apply grease here



1. Apply grease here

2. Apply lubricant to the DPS outout shaft splines.

SERVICE PRODUCT
LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

3. Install pitman arm. Tighten the pinch bolt to the specified torque.

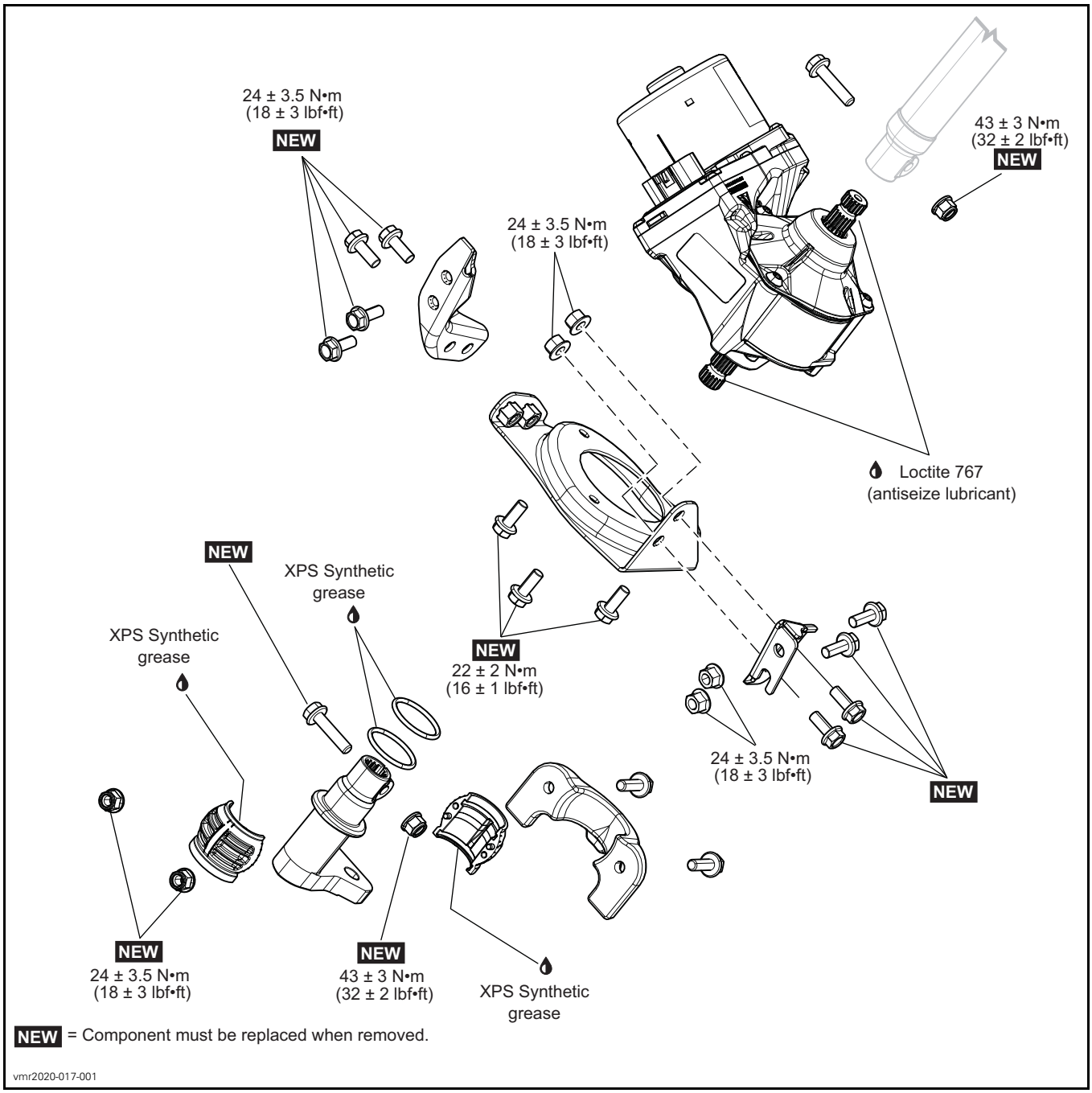
NOTE: Make sure to engage the pinch bolt in the DPS input shaft groove properly.

TIGHTENING TORQUE	
Steering column pinch bolt	43 N•m ± 3 N•m (32 lbf•ft ± 2 lbf•ft)

DYNAMIC POWER STEERING (DPS)

SERVICE PRODUCTS

Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	11
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	9

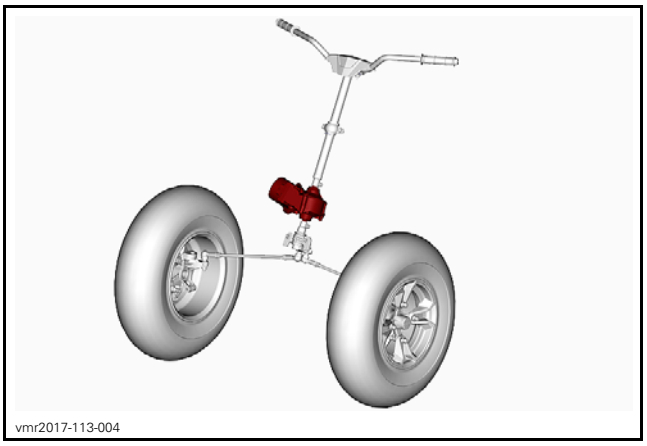


GENERAL

NOTICE Never perform arc welding in the DPS area. Otherwise, poor DPS operation might occur.

SYSTEM DESCRIPTION (FEATURES)

The Dynamic Power Steering (DPS) provides a computer controlled, variable power assist, achieved by an electric motor to optimize the amount of steering input required by the rider.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The DPS system uses the following parameters to determine how much steering assist it provides:

– Engine RPM
– Battery/electrical system voltage
– Vehicle speed
– DPS shaft torque sensor input.
– DPS internal temperature.

The amount of steering assist provided is dependent on the handlebar effort (steering torque), electrical power available, and vehicle speed.

The greater the handlebar effort (torque), the greater the assist will be.

The slower the vehicle speed, the greater the assist will be.

If the electrical system is activated but the engine is not running, DPS assist will be provided for approximately 30 seconds. DPS assist will resume once the engine is started.

After turning the ignition key OFF, DPS assist will be provided for approximately 20 seconds.

When the handlebar is in the straight ahead position, there is no steering assist.

Steering torque may also come from the wheels due to rough terrain. Steering kickback is reduced while providing feedback to the driver.

The greater the power steering assist, the greater the load on the electrical system.

When the electrical system is under high load (battery not at full charge, operating the vehicle for prolonged periods of time at slow speed and low RPM which, requires higher power steering assist), the battery power reserve will gradually decrease. This further increases the load on the charging system and the electrical system voltage will drop. As system voltage drops, so does power steering assist.

NOTE: It is important to maintain the battery at a full state of charge to ensure proper DPS operation. The magneto output is 650 watts to minimize battery drain and system voltage drop.

DPS Assist Mode

The DPS system provides three rider selectable modes of operation.

NOTE: The system automatically adjusts to the speed of the vehicle and driving conditions. the modes are designed to meet the preference of the rider.

The following DPS modes are preset in the vehicle.

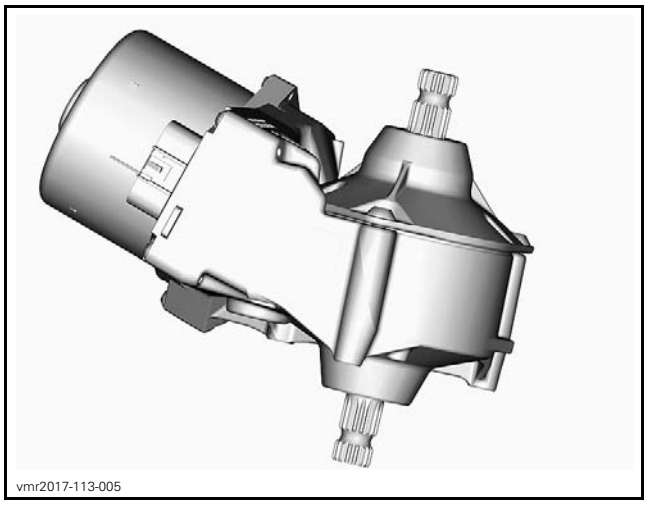
DPS MODE	
DPS MAX.	Maximum steering assist
DPS MED.	Medium steering assist
DPS MIN.	Minimum steering assist

A fourth mode of operation is available as an accessory to adjust the steering assist level for operation with an approved BRP track kit.

DPS SYSTEM DESCRIPTION (COMPONENTS)

DPS Unit

The DPS unit is a self contained unit that includes the steering gear, the DPS module, the DPS motor, and the torque sensor.



DPS UNIT

The DPS module provides DC power to the motor. The amount and duration of that DC power is determined by the inputs to the DPS module.

The DPS motor does not "spin", but rather turns in very small increments based on the amount, duration, and direction of DC power delivered by the DPS module.

NOTE: Should the DPS unit fail, the vehicle steering is still available with moderate increase in steering effort.

Steering Torque Sensor

The steering column is connected to the shaft on the DPS unit. A small area of the DPS shaft is magnetized. Inside the DPS unit, a torque sensor surrounds the magnetized area of the DPS shaft.

When the handlebar is turned, torque is applied to the shaft which tends to twist the shaft slightly, deforming the magnetic field in the shaft. The sensor detects the torque by measuring the deviation of the magnetic field.

The torque sensor is very sensitive and can detect very small changes in the magnetic field. The harder the handlebar is turned, the greater the magnetic deviation, the greater the power steering assist.

ADJUSTMENT

RESETTING THE TORQUE OFFSET

When replacing the following parts or adjusting steering alignment, the sensor torque offset MUST be reset to zero for proper system operation.

PART ADJUSTED OR REPLACED	WHAT TO DO
– DPS unit – Steering column half bushings – Steering column – Tie rod – Tie rod end – Knuckle – Wheel bearing – Ball joint – Front suspension arm (lower/upper) – Pitman arm – Steering alignment	Reset Torque Offset in Settings, DPS

1. Ensure steering alignment is correct, refer to *ALIGNING THE WHEELS* in the *STEERING SYSTEM* subsection.
2. Connect the vehicle to the BRP diagnostic software (BUDS2).
3. Check if an update is available and warranted for the DPS. Select:
   – Flash page.
   – DPS or Vehicle button.
   – Flash tab.
   .

If an update is available, install it before resetting the torque offset.

REQUIRED CONDITIONS TO ALLOW THE RESET PROCEDURE
DPS unit temperature above freezing point.
Steering wheel should be free and centered. There MUST NOT be any effort applied to the steering column.
Torque sensor value must be within offset threshold value of ± 10 Nm.
Engine not running.

4. To reset the torque offset, select:
   – Settings page.
   – DPS or Vehicle button.
   – Initialization tab.
5. Select Torque Sensor Offset.

NOTE: Torque reading must be stable and not exceeding 2 Nm during procedure. Torque sensor reset may not be possible if the torque value is over the 10Nm above the original setting.

With the steering wheel centered and no effort is applied, if the indicated Torque Sensor value is over the threshold value of 1.5Nm, a steering imbalance may be noticeable.

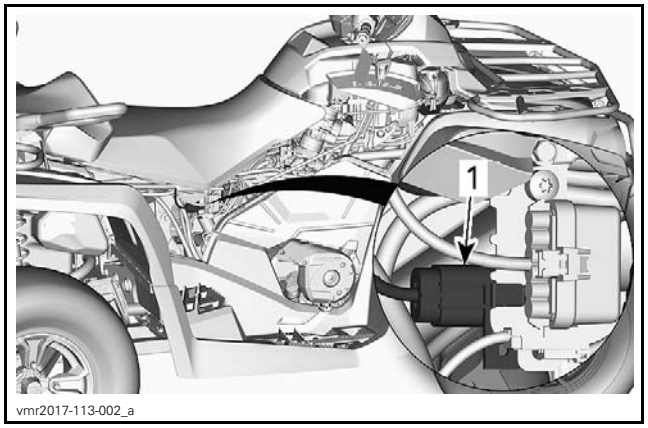
If all steering components are undamaged and in good working order, repeated torque offset reset procedures will not solve the problem if the torque offset is greater than ±10 Nm. DPS unit replacement may be required.

NOTICE Ensure handlebar is free and centered within ±10 degrees of center position. There MUST NOT be any effort applied to the steering column.

PROCEDURES

DPS UNIT

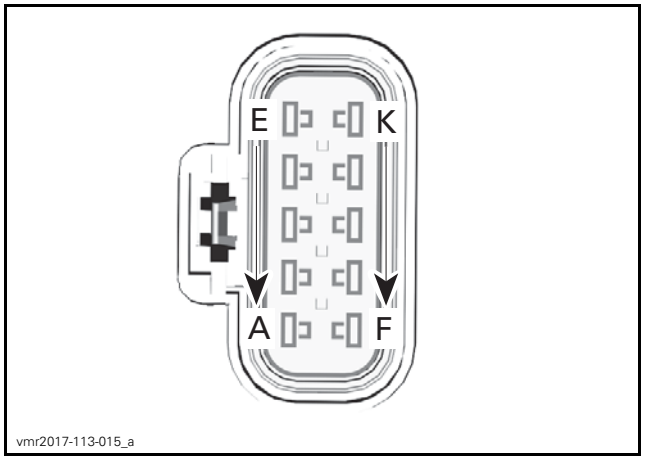
DPS Unit Fuse Location



1. DPS (F2) fuse

DPS Wire Identification

For circuit details, refer to *WIRING DIAGRAM*.

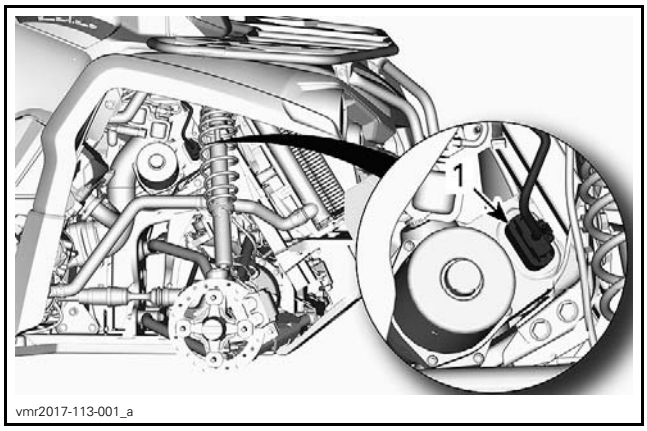


DPS CONNECTOR HARNESS SIDE

DPS CONNECTOR		
FUNCTION	PIN	COLOR
12 volt input (from fuse PF2)	C	RD/PK
12 volt input (from fuse PF2)	D	RD/PK
12 volt input (from fuse PF2)	E	RD/PK
12 volt switched input (from fuse F6)	G	OR/GN
CAN HI	J	WH/BE
CAN LO	K	WH/BK
Ground	A	BK
Ground	B	BK
Ground	F	BK

Testing the DPS Input Voltage

1. Disconnect the DPS connector.



1. DPS connector

2. Test for 12 Vdc DPS motor power at DPS connector as per following table.

MULTIMETER PROBE POSITIONS		VOLTAGE
DPS connector pin C	Battery ground	Battery voltage
DPS connector pin D		
DPS connector pin E		

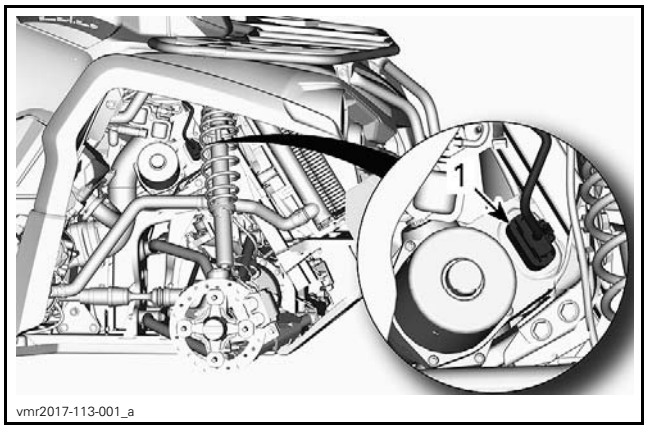
If NO voltage is measured, test the 40 A DPS fuse (PF2). If good, check wires and connector pins. Replace or repair defective parts and reset fault codes.

If battery voltage is measured, test the DPS ignition signal voltage.

NOTE: This test may also be carried out by connecting a 12 Vdc test light between connector pins (C, D and E), and the battery (-) negative terminal. The test light must come on bright.

Testing the DPS Ignition Signal Voltage

1. Disconnect DPS connector.



1. DPS connector

2. Set the ignition switch to ON.
3. Set the engine RUN/STOP switch to RUN.
4. Test for 12 Vdc power at the DPS connector as per following table.

MULTIMETER PROBE POSITIONS		VOLTAGE
DPS connector (harness side) pin G	Battery ground	Battery voltage

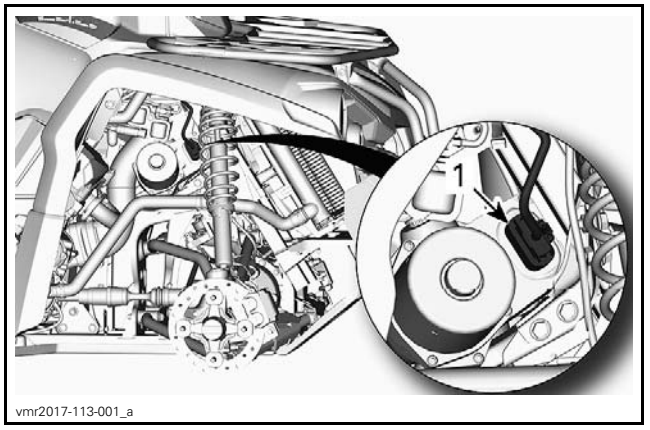
If NO voltage is measured, check wires and connector pins from the DPS unit to the fuse (F6) in the front fuse box (PF1-F6). Replace or repair defective parts and reset fault codes.

If battery voltage is measured, test the DPS ground circuit.

NOTE: This test may also be carried out by connecting a 12 Vdc test light between the DPS connector (pin G), and the battery (-) negative terminal. The test light must come on bright.

Testing the DPS Ground Circuit

1. Disconnect the DPS connector.



1. DPS connector

2. Test for continuity between DPS connector and battery ground.

MULTIMETER PROBE POSITIONS		READING
DPS connector (harness side) pin A	Battery ground	Continuity (close to 0 Ω)
DPS connector (harness side) pin B		
DPS connector (harness side) pin F		

If there is NO continuity or a high resistance is measured, check wires and connector pins from DPS unit to chassis ground post. Replace or repair defective parts and reset fault codes.

If there is good continuity, carry out: *TESTING THE DPS UNIT COMMUNICATION LINK (CAN) CONTINUITY*.

NOTE: This test may also be carried out by connecting a 12 Vdc test light between each GDN connector pin and the battery (+) positive terminal. The test light must come on bright.

Testing the DPS Communication Link (CAN) Continuity

NOTE: DPS unit must receive an RPM signal to provide power steering assist.

1. Disconnect the DPS connector and the diagnostic connector.
2. Test continuity of CAN Bus Wires as per following table.

MULTIMETER PROBE POSITIONS		RESISTANCE @ 20°C (68°F)
DPS CONNECTOR (HARNESS SIDE)	DIAGNOSTIC CONNECTOR	
Pin J	Pin 1	Less than 1 Ω
Pin K	Pin 2	

If resistance measured is out of specification, check wires and connector pins. Carry out repairs as required and reset fault codes using the BRP diagnostic software (BUDS2) software.

If resistance measured is good, replace the DPS unit and reset fault codes using BUDS2 software.

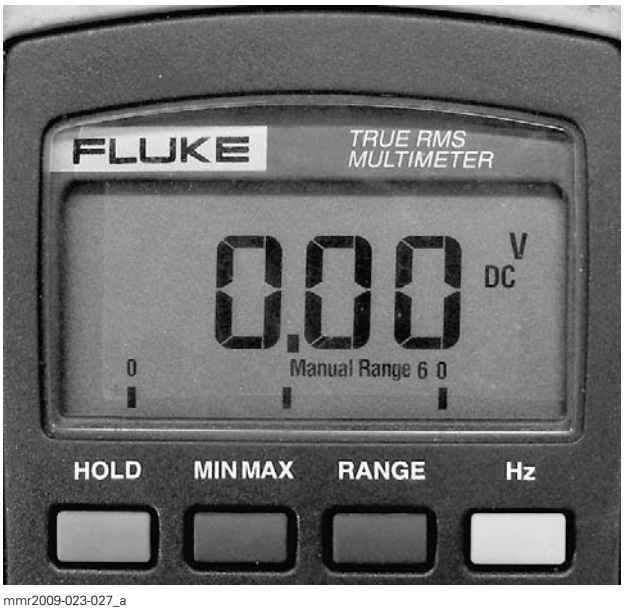
Testing the DPS System Load

If the charging system cannot sustain normal voltage when the DPS is operating, DPS ASSIST may be greatly reduced or nonexistent. Carry out the following steps.

1. Measure the battery voltage.

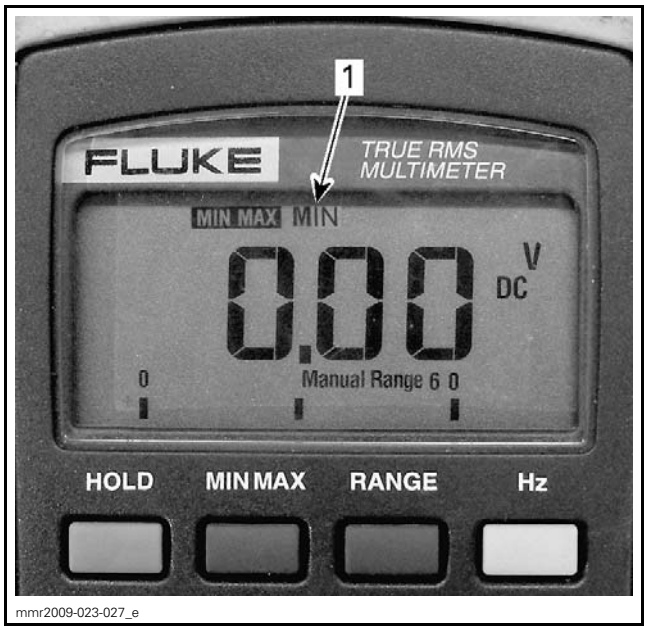
NOTE: If battery voltage is low, recharge battery.

2. Ensure the vehicle transmission is set to PARK.
3. Start the engine.
4. Note the voltage on the multimeter with the engine running (charging system voltage).
5. Press the RANGE button repeatedly to select Manual Range 6 0.



VDC SELECTED TO MANUAL RANGE 6 0

6. Press the MIN MAX button on the multimeter to engage the MIN function.



1. MIN function selected

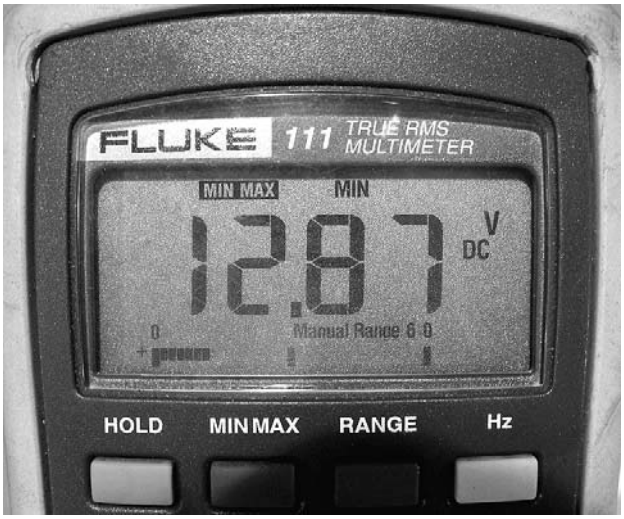
7. Turn the handlebar momentarily against the steering frame stops to each side.

NOTE: Do not hold steering against frame stops for an extended period of time.

8. Read the MIN charging system voltage recorded while the handlebar was turned against each stop.

DPS SYSTEM LOAD TEST			
PROBE POSITIONS		STEERING POSITION	VOLTAGE READING
Battery (-) terminal	DPS fuse holder pin B	LH stop	At least 12 Vdc
		RH stop	

NOTE: Turning the handlebar momentarily against the frame stops generates maximum DPS load (maximum current draw on electrical system). Electrical system must sustain at least 12 Vdc for proper DPS operation.



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If the electrical system cannot sustain at least 12 Vdc, check the following:

– Battery
– Battery connections
– DPS unit power and ground connections
– Charging system
– Chassis and engine ground studs.

If the previously listed items are correct, carry out: *TESTING THE DPS UNIT CURRENT*.

Testing the DPS Unit Current

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. Go to:
   – Measurements page.
   – DPS button.
   – Custom tab.
3. With the vehicle engine running in PARK and without any steering effort, the reading should be as per following table.

TORQUE SENSOR	DPS CURRENT
0 N•m ± 1 N•m (0 lbf•**in** ± 9 lbf•**in**)	0 Amp

4. Turn the steering wheel side to side, momentarily against each steering hard stop and observe the DPS Torque Sensor value. The torque value should increase with steering effort applied to the steering wheel.

The DPS Current value should increase proportionately to the torque applied, and decrease with the torque as steering assist is provided.

NOTE: The increase and decrease in torque and current readings is very brief as steering assist is quickly provided. Current draw should remain within green scale but may momentarily peak to or exceed 60 amps, then drop off close to 0 amps as torque applied is nulled out by steering assist. If steering is held against hard stops the torque and current readings will remain high.

If current draw tends to remain high, carry out the following:

– *RESETTING THE TORQUE OFFSET*
– DPS unit replacement.

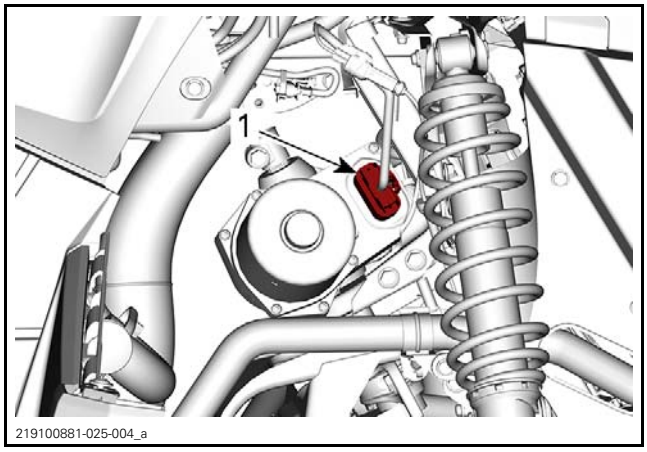
5. Turn steering to LH stop and hold at least 8 Nm. Note DPS current value.
6. Turn steering to RH stop and hold at least 8 Nm. Note DPS current value.
7. Repeat previous two steps while holding at (+ or -) 5 Nm. Note DPS current value.

LH and RH DPS current readings should be the same for the same applied torque.

If the *RESETTING THE TORQUE OFFSET* procedures has been carried out, and the current or steering imbalance is too great, the DPS unit will require replacement to resolve the problem.

Removing the DPS Unit

1. Lift and support the front of the vehicle.
2. Remove the front wheels.
3. Remove both inner fender panels.
4. Disconnect DPS electrical connector.



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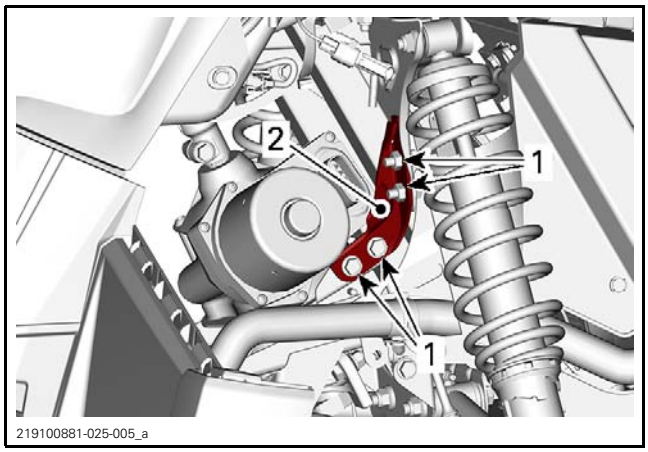
PARTS REMOVED FOR CLARITY
1. DPS electrical connector

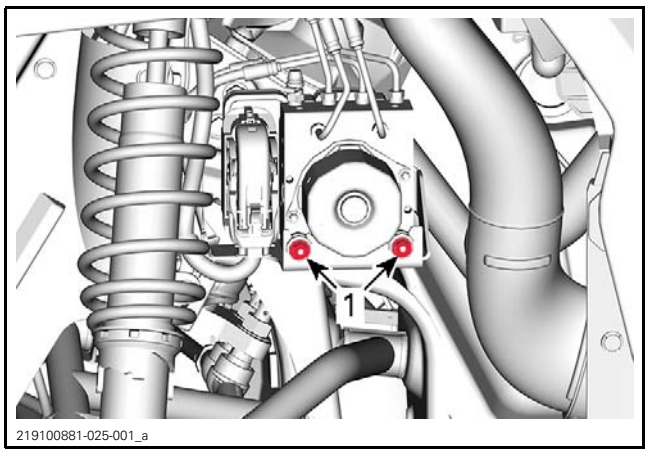
5. Remove DPS mounting bracket retaining screws.



PARTS REMOVED FOR CLARITY
1. *Retaining screws*
2. *DPS mounting bracket*

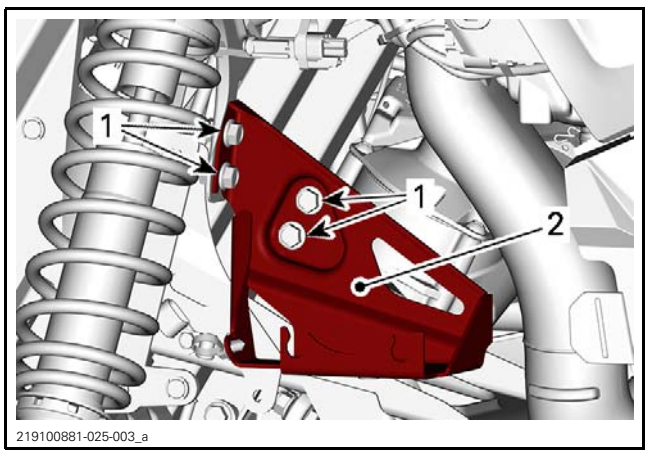
ABS equipped models

6. Disconnect ABS module.
7. Remove retaining screws and set aside ABS module.



1. *Retaining screw*

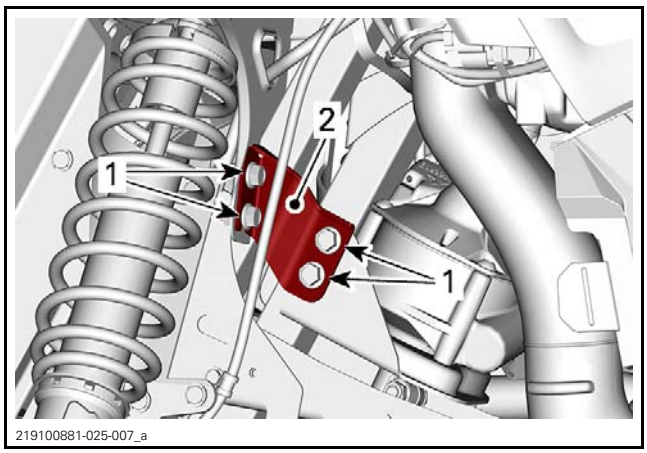
8. Remove ABS module mounting bracket.



PARTS REMOVED FOR CLARITY
1. *Retaining screws*
2. *ABS module mounting bracket*

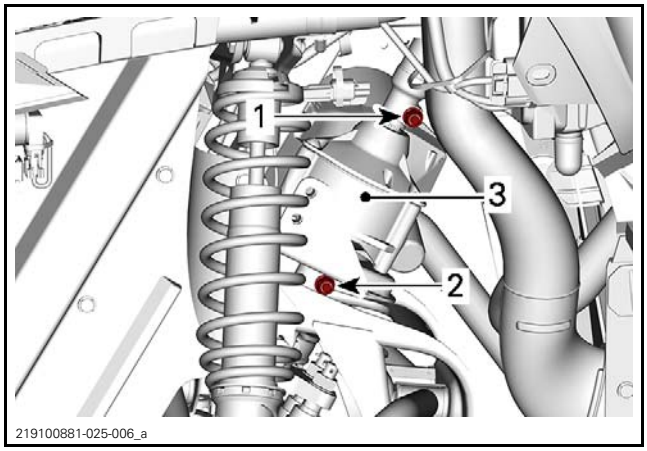
All models except ABS equipped

9. Remove DPS mounting bracket retaining screws.



PARTS REMOVED FOR CLARITY
1. *Retaining screws*
2. *DPS mounting bracket*

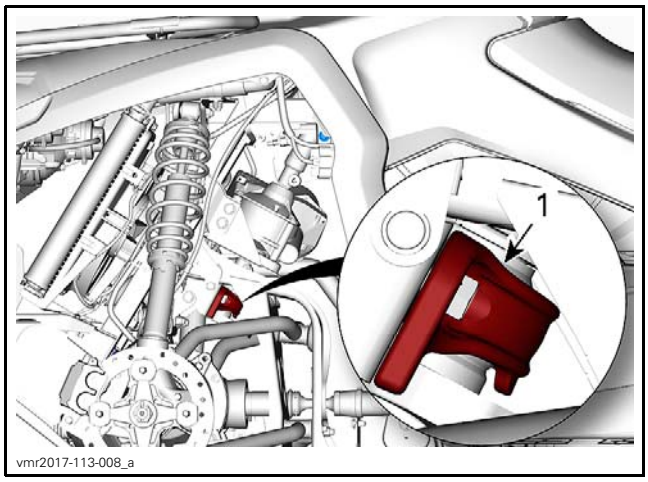
10. Remove the steering column and pitman arm pinch bolts.



PARTS REMOVED FOR CLARITY
1. *Steering column pinch bolt*
2. *Pitman arm pinch bolt*
3. *DPS*

NOTE: There is no need to mark the parts indexation. There is a master spline on the assembly.

11. Remove the half bushing retainer that secures the pitman arm to the chassis.



1. Half bushing retainer

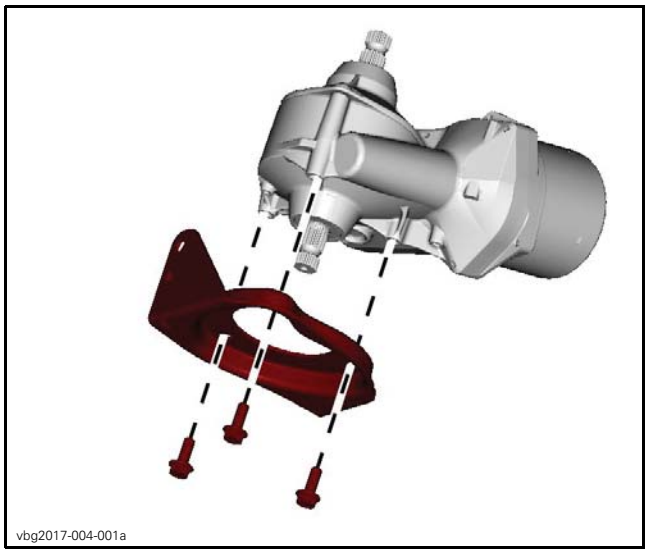
12. Disconnect the pitman arm from the DPS by lowering it, then remove the DPS from the steering column.

NOTE: Remove the unit by the left hand side of the vehicle.

If DPS unit is to be replaced, remove the lower support from it.

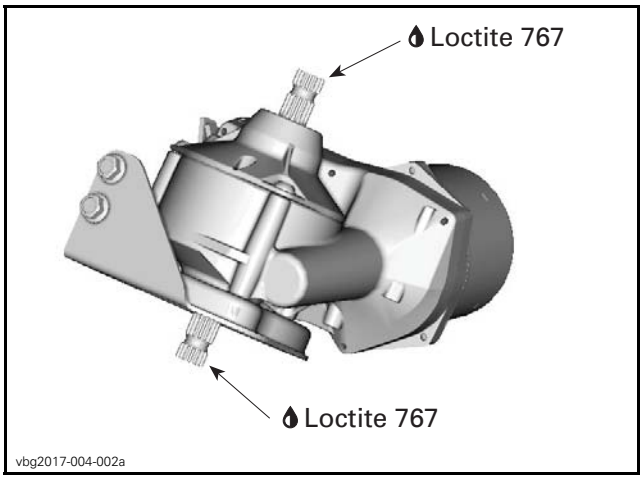
Installing the DPS

1. Install the lower support on DPS unit using NEW bolts.



TIGHTENING TORQUE	
Lower support screws	22 N•m ± 2 N•m (16 lbf•ft ± 1 lbf•ft)

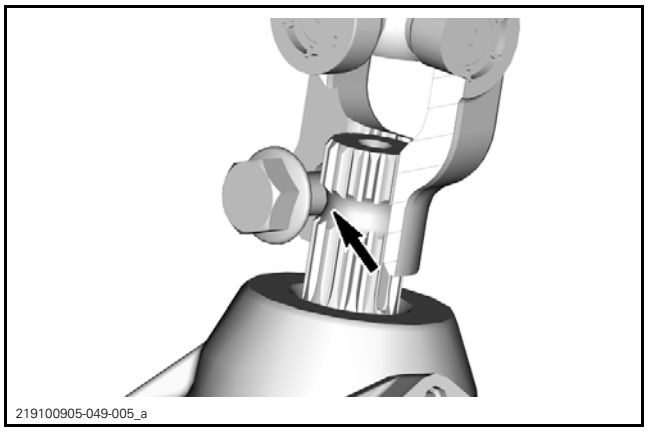
2. Apply lubricant to the entire visible portion of the DPS shafts.



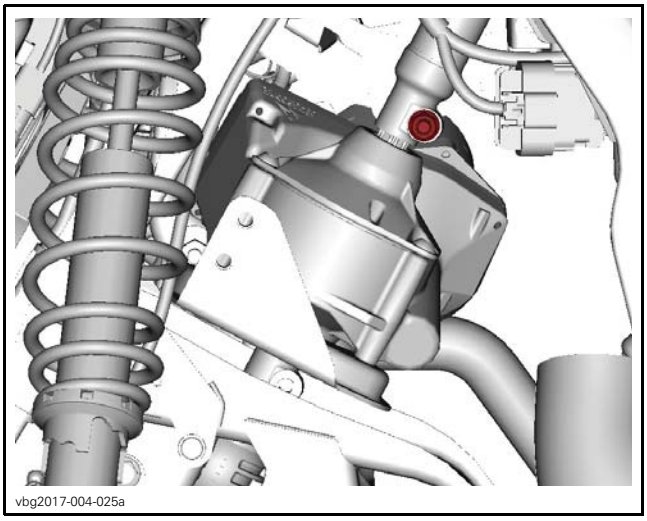
SERVICE PRODUCT
LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)

3. Engage the steering column on the input shaft.
4. Install the NEW pinch bolt and NEW flanged elastic nut. Hand tight only.

NOTICE **Make sure to properly engage the pinch bolt in the groove of the DPS shaft.**



TYPICAL - DPS SHAFT GROOVE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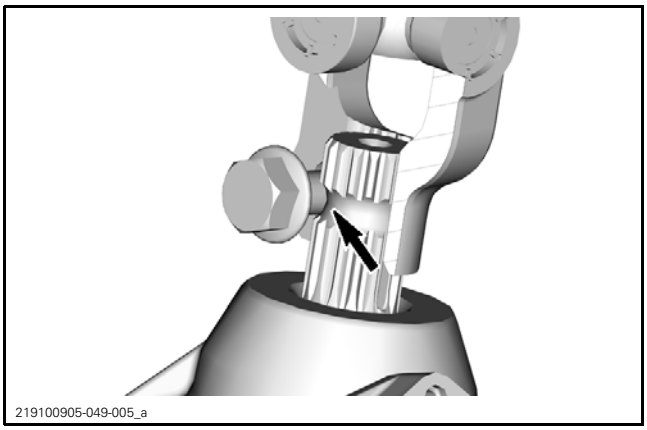
5. Position the DPS unit in the chassis and engage the output shaft in the pitman arm.
6. Install the NEW pitman arm pinch bolt and NEW flanged elastic nut. Hand tight only.

NOTICE Make sure to properly engage the pinch bolt in the groove of the DPS shaft.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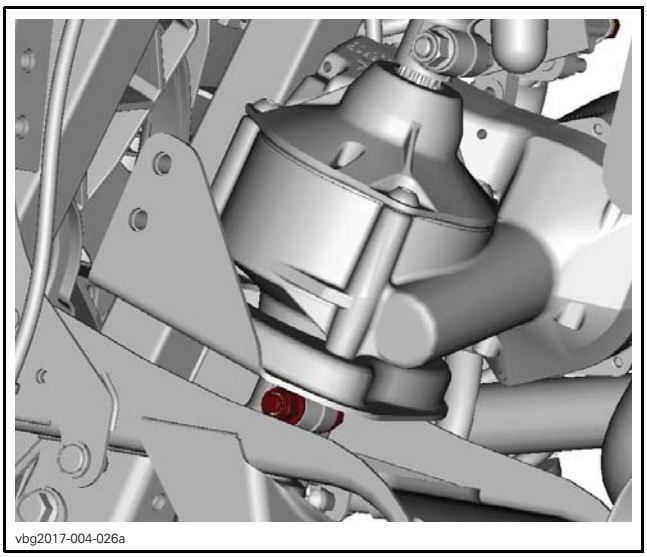
TYPICAL - DPS SHAFT GROOVE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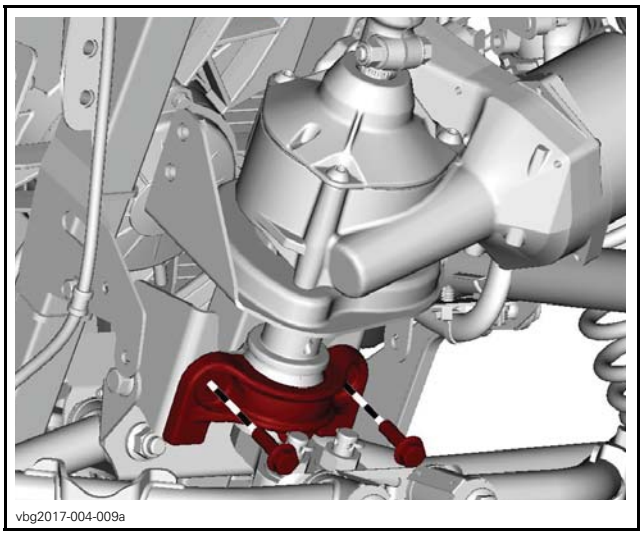
7. Install the half bushings retainer bolts and NEW flanged elastic nuts. Hand tight only.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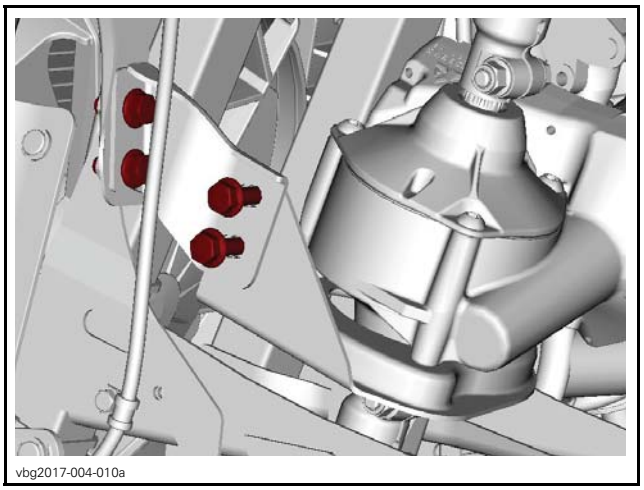
8. Install lateral mounting brackets.
   8.1 Install all bolts loosely.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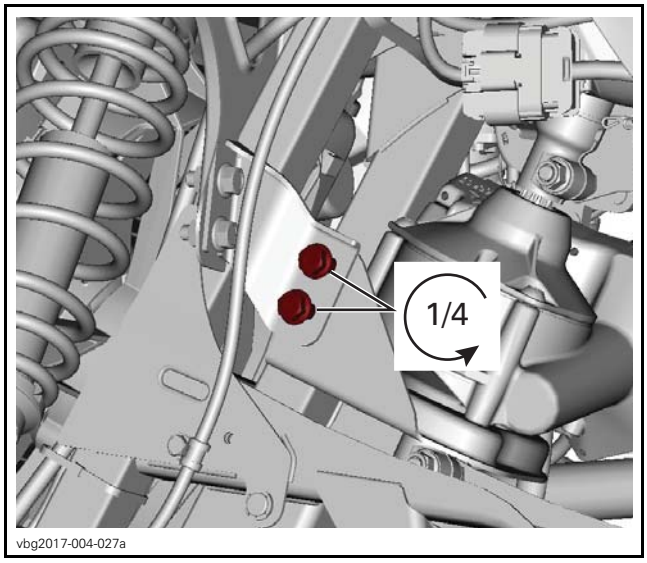
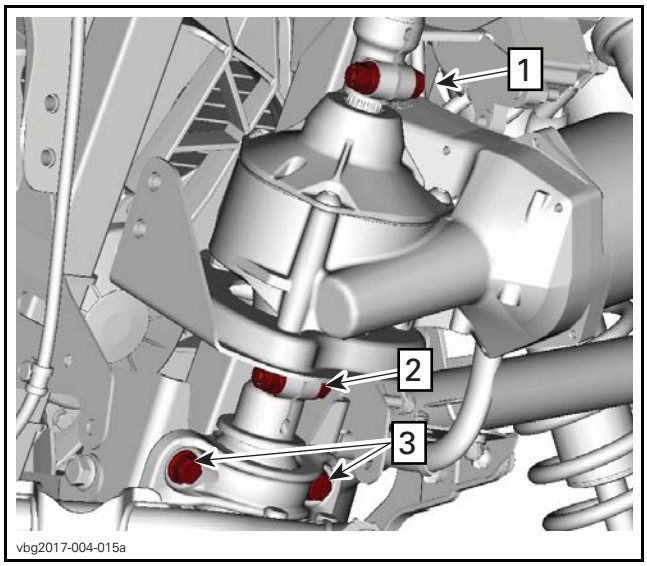
LH SIDE SHOWN, RH SIDE SIMILAR

   8.2 On both sides, tighten lateral bolts then unscrew them (1/4 turn), just enough so the support can move slightly into the slotted bracket.



NOTICE Tightening sequence must strictly be adhered to.

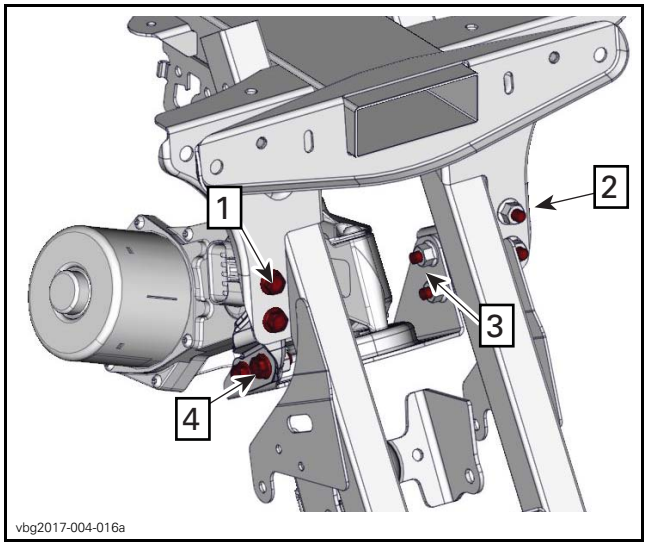
9. Tighten bolts as per the following sequences.



TIGHTENING SEQUENCE

NOTE: Tightening torque must be applied on the nut only.

TIGHTENING TORQUE	
Pinch bolt nut	43 N•m ± 3 N•m (32 lbf•ft ± 2 lbf•ft)
Half bushings retainer bolts	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)



TIGHTENING SEQUENCE

TIGHTENING TORQUE	
Front bolts	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)
Lateral bolts	

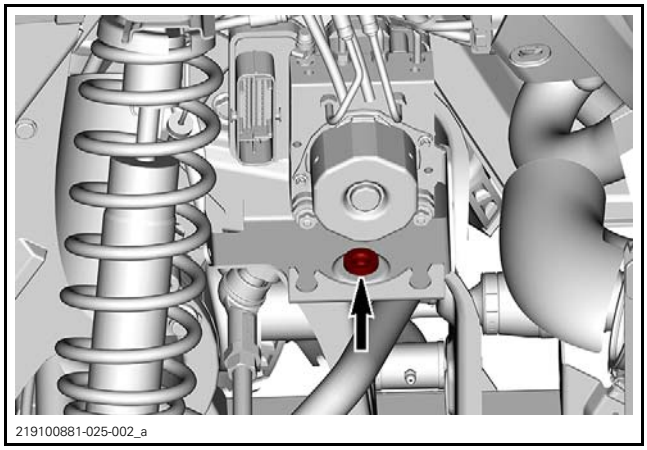
Apply dielectric grease on harness connector terminals.

SERVICE PRODUCT
DIELECTRIC GREASE (P/N 293 550 004)

10. Connect the electrical connector.

Models with ABS

11. Reinstall ABS module. Ensure the rubber stopper is correctly installed.



TIGHTENING TORQUE	
ABS module retaining screw	8 N•m ± 2 N•m (71 lbf•**in** ± 18 lbf•**in**)

All Models

12. Install previously removed parts.

13. Perform *UPDATING THE ELECTRONIC MODULE*.

Updating the Electronic Module

New DPS units do not come with the required software programmed into the unit. A DPS unit fault will be generated when the vehicle is powered up. The check engine light will come on and a DPS FAULT message will appear in the multifunction gauge.

The new DPS unit will require 2 mandatory updates. The first update is required for the DPS to recognize what type of vehicle it is installed in, the second to upload the software required for proper operation on that vehicle.

When DPS unit installation is complete, carry out the following steps.

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. Select the Flash page.
3. A message window will appear asking you if you would like to update the DPS module; select YES and follow the instructions. When a second window appears asking you the same question, select YES again.
4. Once the correct DPS software file is installed, go to the Faults page and clear the fault codes.
5. Carry out: *RESETTING THE TORQUE OFFSET* (if required) as described in this subsection.
6. Test drive the vehicle to ensure proper DPS operation.

SUSPENSION ADJUSTMENTS

GENERAL

The procedure described below is the same for the RH and LH sides, unless otherwise instructed.

⚠ WARNING

The left and right shock adjustment on front or rear suspension must always be set to the same position. Never adjust one shock only. Uneven adjustment can cause poor handling and loss of stability, which could lead to an accident.

ADJUSTMENT

Choice of suspension adjustments vary with vehicle load, personal preference, riding speed and terrain condition.

The best way to set up the suspension, is to start from factory settings, then customize each adjustment one at a time.

Front and rear adjustments are interrelated. It may be necessary to readjust the rear shock absorbers after adjusting front shock absorbers for instance.

Test run the vehicle under the same conditions; trail, speed, load, etc. Change one adjustment and retest. Proceed methodically until you are satisfied.

Following are guidelines to fine-tune suspension.

SPRING PRELOAD

NOTE: Spring preload affects ground clearance.

Shorten the spring for a firmer ride and rough riding condition or when pulling a trailer (if equipped with hitch).

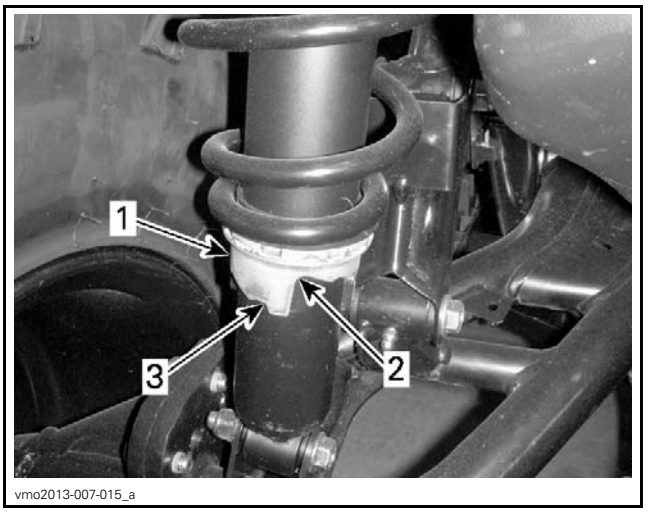
Lengthen the spring for a softer ride and smooth riding condition.

Lift the vehicle. Spring length should be measured without load on the wheels.

Do not increase the front/rear spring preload by more than 15 mm (.59 in) over the factory setting.

Shock Absorber With Adjustment Cam

Adjust spring preload by turning adjustment cam.

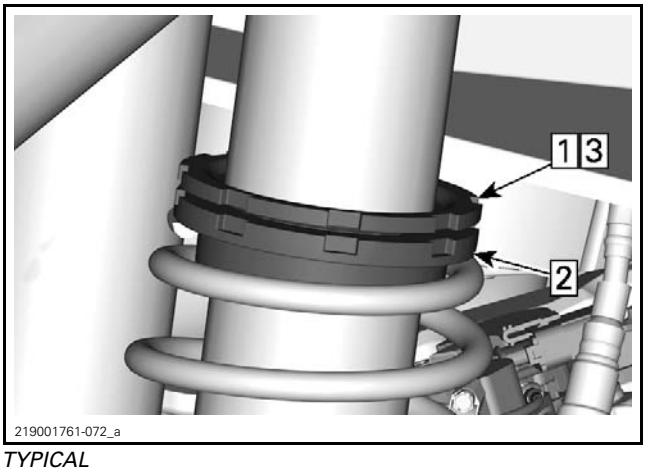


TYPICAL
1. *Adjustment cam*
2. *Softer adjustment*
3. *Firmer adjustment*

Shock Absorber With Adjustment Ring

Adjust spring preload by turning the adjuster ring.

NOTE: Do not increase preload on FOX shocks.



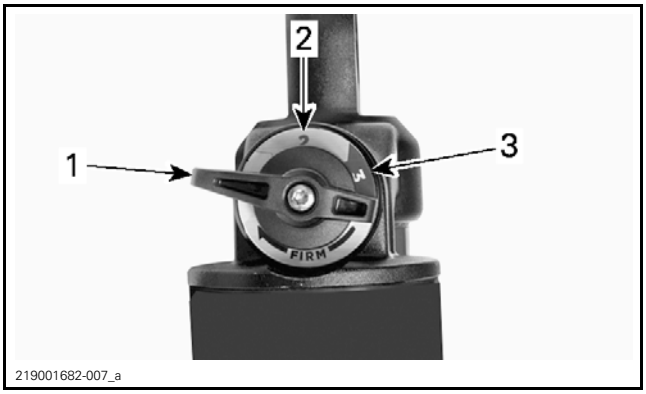
TYPICAL
Step 1: Loosen top locking ring
Step 2: Turn adjusting ring accordingly
Step 3: Tighten top locking ring

SHOCK DAMPING ADJUSTMENTS (IF EQUIPPED)

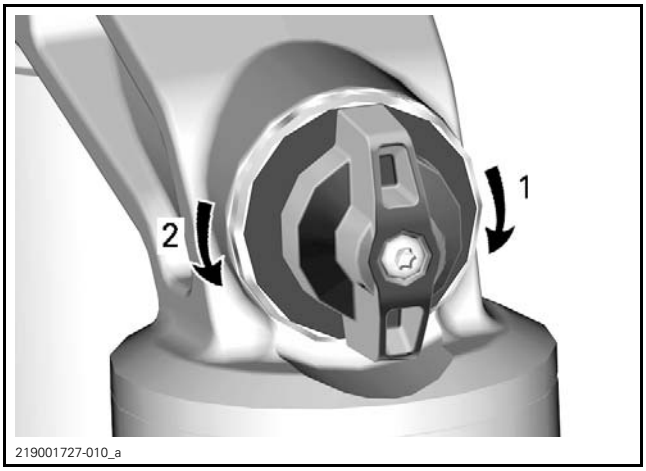
Adjusting the Compression Damping (with single adjustment)

Compression damping controls how the shock absorber reacts in compression when hitting a bump

POSITION	SETTING	RESULT ON BIG BUMPS
1	Soft	Softer compression damping
2	Medium (Factory)	Medium compression damping
3	Hard	Firmer compression damping



1. *Position 1*
2. *Position 2*
3. *Position 3*



COMPRESSION DAMPING
1. **Increases** *damping (firmer)*
2. **Decreases** *damping (softer)*

Turn adjuster clockwise to **increase** shock damping action (firmer).

Turn adjuster counterclockwise to **decrease** shock damping action (softer).

ACTION	RESULT
Increasing compression damping force	Firmer compression damping
Decreasing compression damping force	Softer compression damping

Adjusting the Compression Damping (with dual adjustements)

Perform adjustments **one** position (click) at a time. Test run the vehicle under the same conditions. Proceed methodically until you are satisfied.

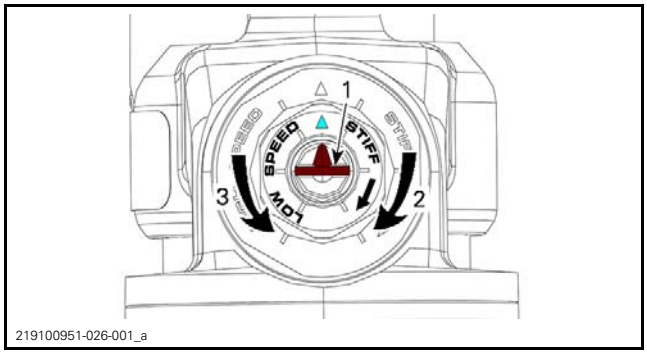
To adjust compression and rebound to factory settings, proceed as follows:

1. Turn adjuster clockwise until it stops.
2. Turn adjuster counterclockwise by the specified amount, see *SUSPENSION FACTORY SETTINGS* table in appropriate *TECHNICAL SPECIFICATION* section.

Low Speed Compression Damping

Low speed compression damping controls how the shock absorber reacts to a low suspension velocity (slow compression strokes, in most cases when riding at lower speeds).

ACTION	RESULT ON BIG BUMPS
Increasing low speed compression damping force	Firmer compression damping (slow compression)
Decreasing low speed compression damping force	Softer compression damping (slow compression)

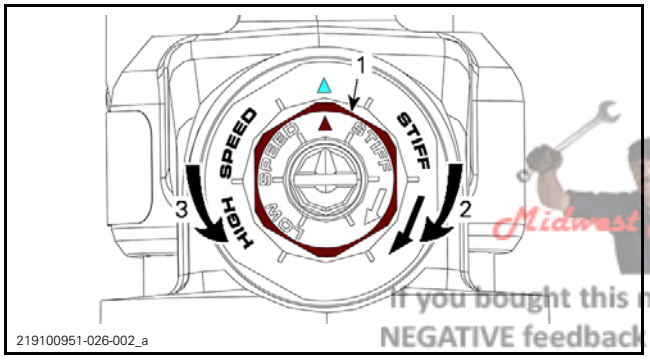


TYPICAL - LOW SPEED COMPRESSION DAMPING
1. *Adjustment screw*
2. **Increases** *damping (firmer)*
3. **Decreases** *damping (softer)*

High Speed Compression Damping

High speed compression damping controls how the shock absorber reacts to a high suspension velocity (quick compression strokes, in most cases when riding at higher speeds).

ACTION	RESULT ON SMALL BUMPS
Increasing high speed compression damping force	Firmer compression damping (fast compression)
Decreasing high speed compression damping force	Softer compression damping (fast compression)



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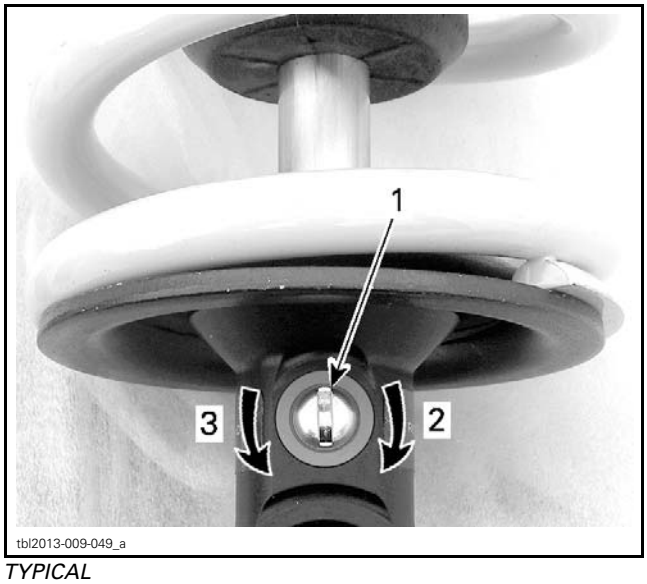
TYPICAL - HIGH SPEED COMPRESSION DAMPING (USE A 17 MM WRENCH)
1. *Adjustment screw*
2. **Increases** *damping (firmer)*
3. **Decreases** *damping (softer)*

Rebound Damping

Rebound damping controls how the shock absorber reacts in extension after hitting a bumps.

ACTION	RESULTS
Increasing rebound damping	Slower Extension
Decreasing rebound damping	Faster extension



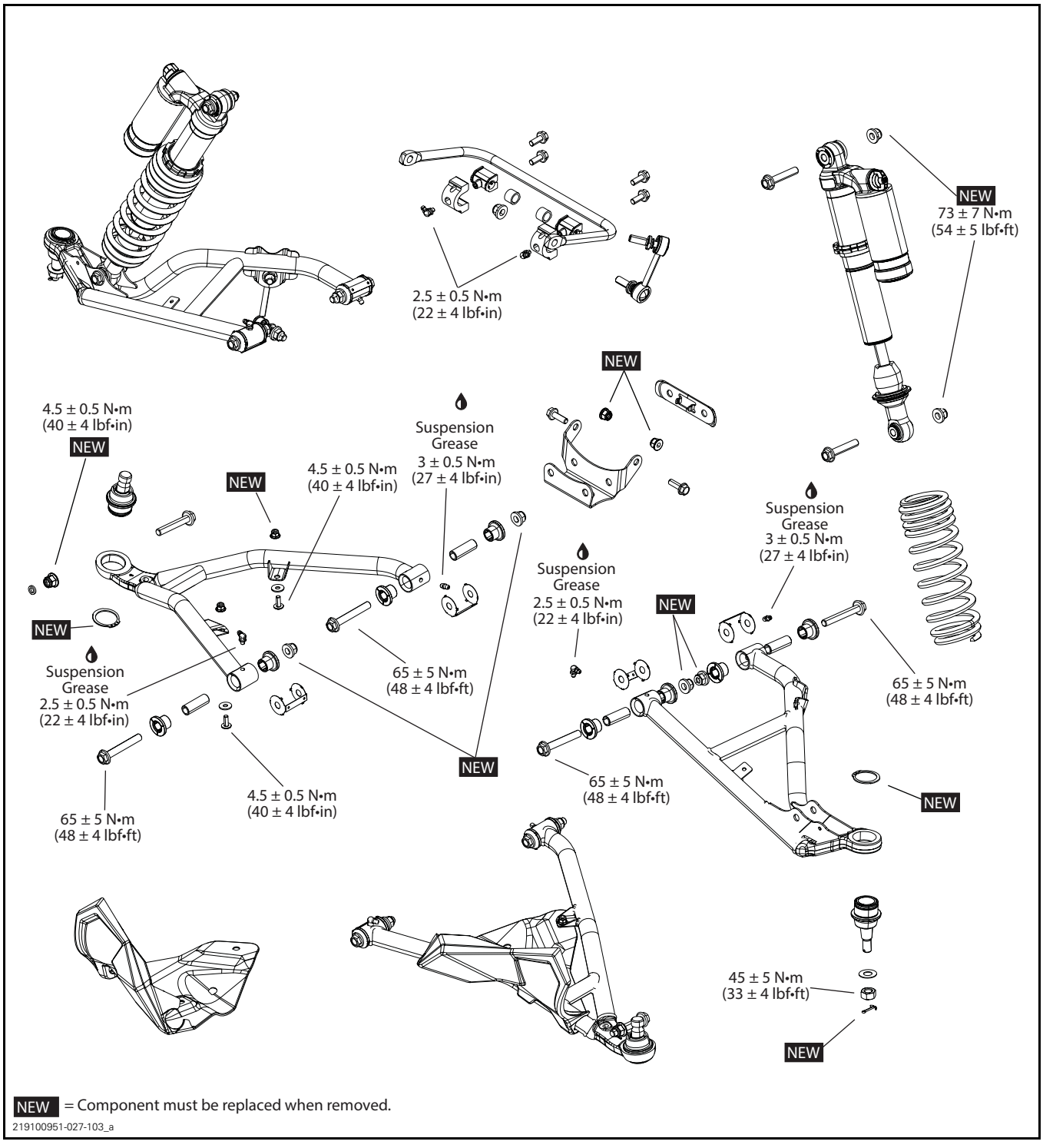
TYPICAL
1. *Rebound adjuster*
2. **Increases** *damping (slower extension)*
3. **Decreases** *damping (faster extension)*

FRONT SUSPENSION

SERVICE TOOLS

Description	Part Number	Page
BALL JOINT REMOVAL TOOL	529 036 310	7

SUSPENSION ARMS AND COMPONENTS



NEW = Component must be replaced when removed.

219100951-027-103_a

GENERAL

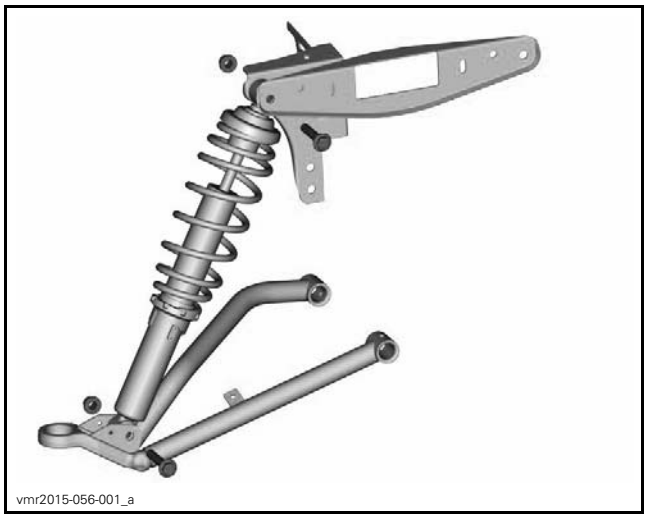
The procedure explained below is the same for the RH and LH sides unless otherwise noted.

PROCEDURES

SHOCK ABSORBER

Removing the Shock Absorber

1. Safely lift and support the vehicle off the ground.
2. Remove screws and nuts retaining the shock absorber.



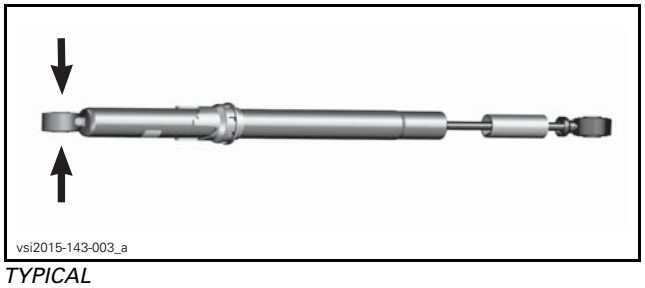
TYPICAL

3. Remove shock absorber.

Inspecting the Shock Absorber

Remove spring from shock absorber. Refer to *SPRINGS* in this subsection.

Secure the end of shock eyelet in a vise with its rod upward.



TYPICAL

NOTICE Do not clamp directly on shock body.

Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with its rod upward.

Check the following conditions that will denote a defective shock:

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Replace if any faults are present.

Installing the Shock Absorber

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install shock absorber screws from front towards rear of vehicle.

Tighten shock absorber nuts to specification. Refer to exploded views.

SHOCK ABSORBER BUSHINGS

Refer to *SHOCK ABSORBER BUSHINGS* in *REAR SUSPENSION* subsection for complete procedures.

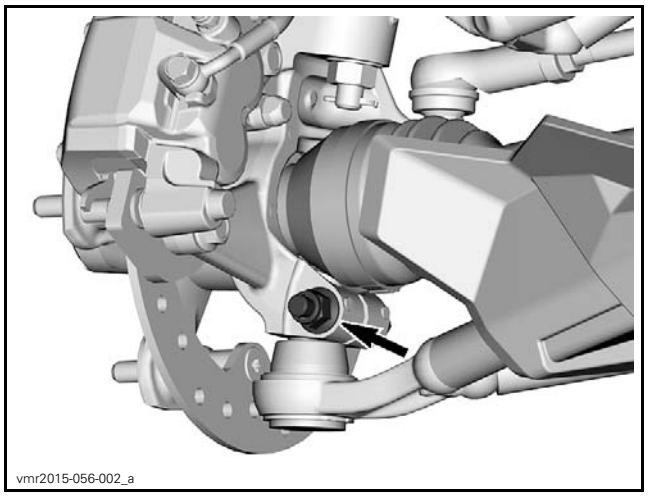
SPRINGS

Refer to *SPRINGS* in *REAR SUSPENSION* subsection for complete procedures.

LOWER SUSPENSION ARM

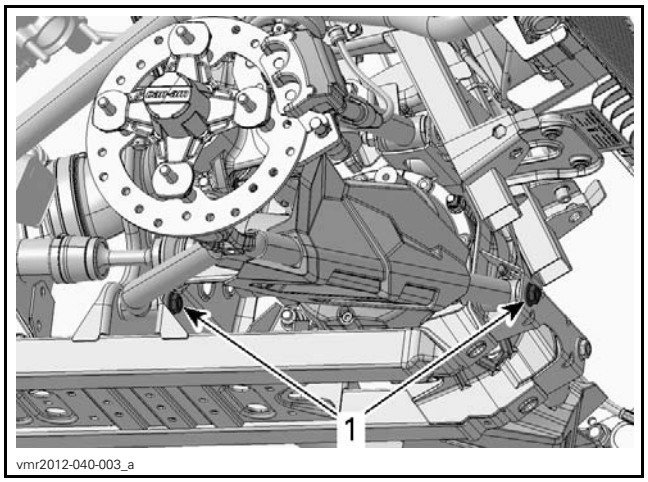
Removing the Lower Suspension Arm

1. Safely lift and support the vehicle off the ground.
2. Remove wheel, refer to *WHEELS AND TIRES* subsection.
3. Remove screw and nut securing lower ball joint to knuckle.


vmr2015-056-002_a

TYPICAL

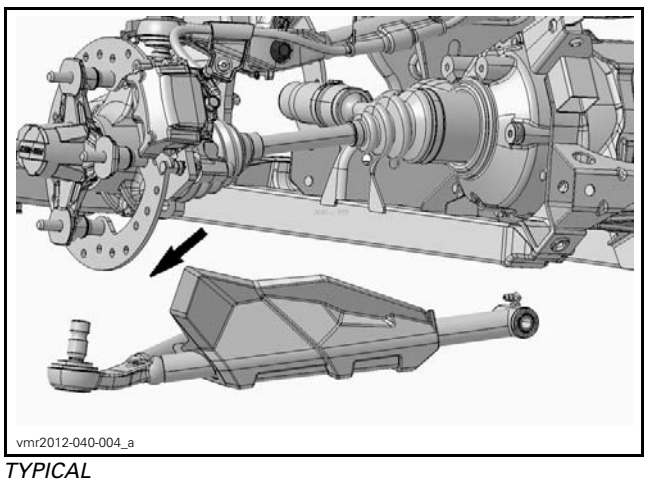
4. Remove screws and nuts securing suspension arm to frame.



vmr2012-040-003_a

TYPICAL
1. Suspension arm screws

5. Remove suspension arm.


vmr2012-040-004_a

TYPICAL
MOVE OUTWARDS

Installing Lower Suspension Arm

The installation is the reverse of the removal procedure. However, pay attention to the following.

Lubricate suspension arm. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

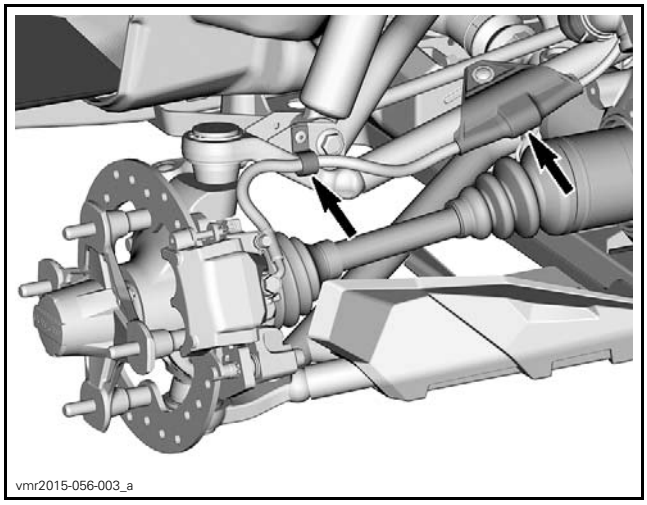
Tighten ball joint nut to specification. Refer to exploded views.

Perform steering alignment procedure. Refer to *STEERING ALIGNMENT* subsection.

UPPER SUSPENSION ARM

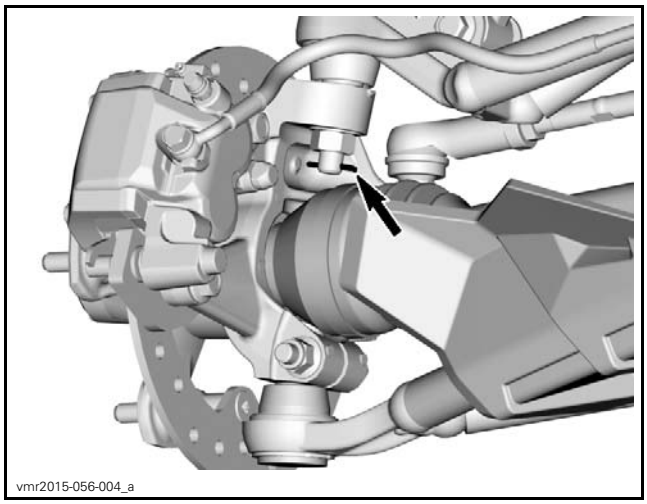
Removing the Upper Suspension Arm

1. Safely lift and support the vehicle off the ground.
2. Remove wheel, refer to *WHEELS AND TIRES* subsection.
3. Remove fasteners retaining brake hose to vehicle.


vmr2015-056-003_a

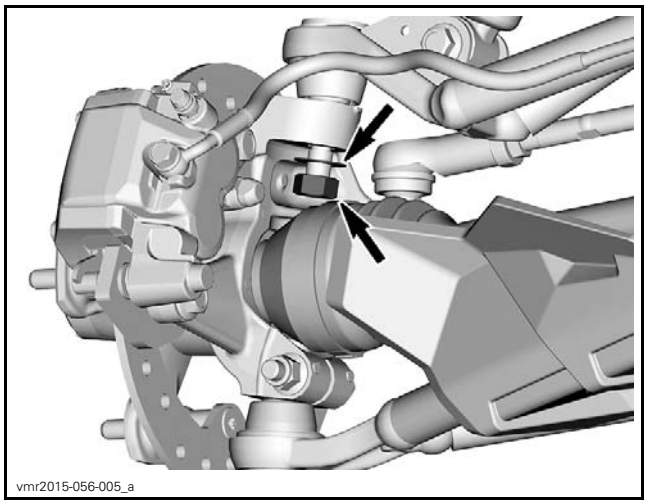
TYPICAL

4. Remove and discard cotter pin retaining ball joint.



TYPICAL

5. Remove ball joint nut and washer.



TYPICAL

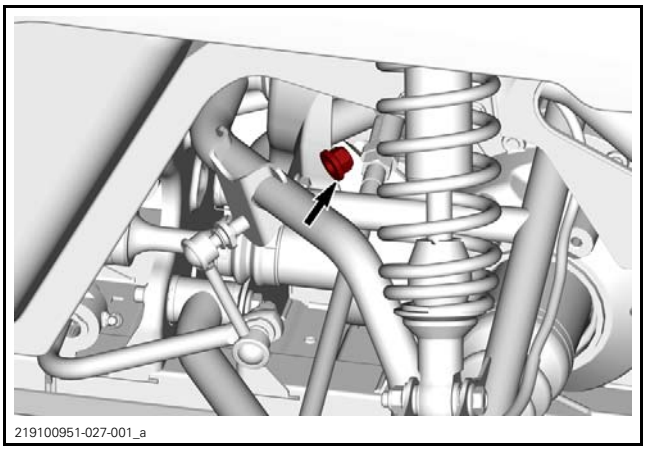
6. Carefully move brake hose aside.
7. Using a plastic hammer, carefully hit on the knuckle side to separate ball joint from knuckle.

NOTE: A ball joint remover can be used if the ball joint is jammed into knuckle.

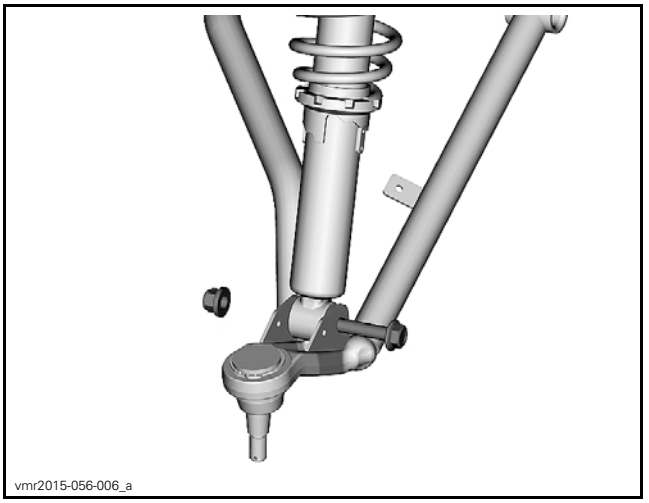
NOTICE Never hit on suspension arm to avoid damaging it permanently.

TYPICAL - CAREFULLY HIT ON KNUCKLE SIDE

8. Remove stabilizer bar link nut on both sides than move back the stabilizer bar from upper suspension arms.

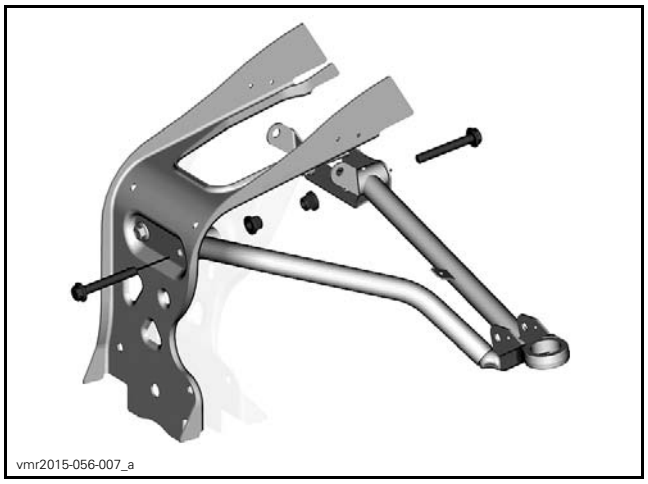


9. Remove screw and nut securing suspension arm to shock absorber.



TYPICAL

10. Remove screws and nuts securing suspension arm to frame.



TYPICAL

11. Remove suspension arm.

Installing the Upper Suspension Arm

The installation is the reverse of the removal procedure. However, pay attention to the following.

Lubricate suspension arm. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Install a **NEW** cotter pin to secure ball joint nut. Both end of cotter pin must be folded.

Tighten shock absorber nut to specification. Refer to exploded views.

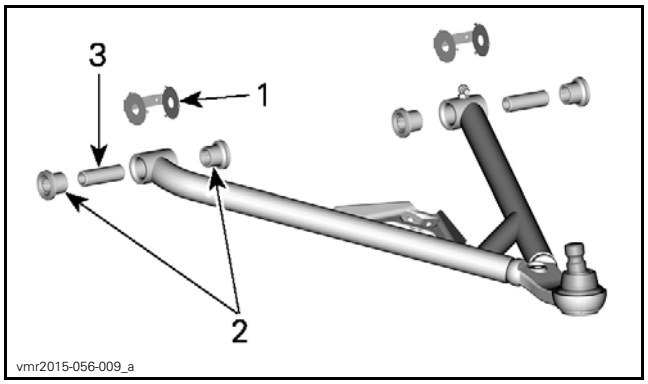
Tighten ball joint nut to specification. Refer to exploded views.

Perform steering alignment procedure. Refer to *STEERING ALIGNMENT* subsection.

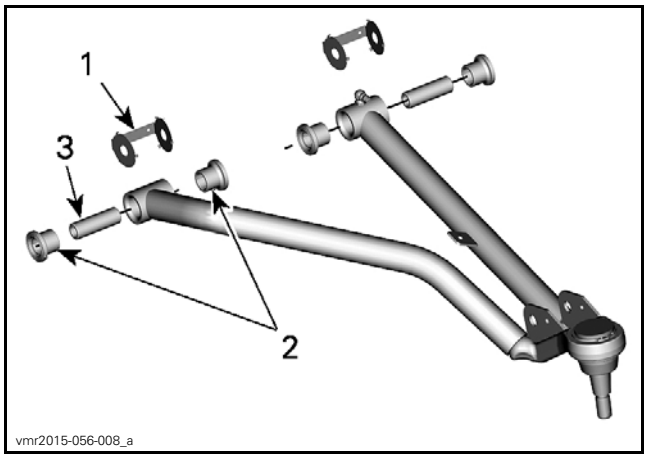
SUSPENSION ARM BUSHINGS

Removing the Suspension Arm Bushings

1. Remove wear plates, bushings and sleeves from suspension arm.



TYPICAL - LOWER SUSPENSION ARM
1. Wear plates
2. Bushings
3. Sleeves



TYPICAL - UPPER SUSPENSION ARM
1. Wear plates
2. Bushings
3. Sleeves

Installing Suspension Arm Bushings

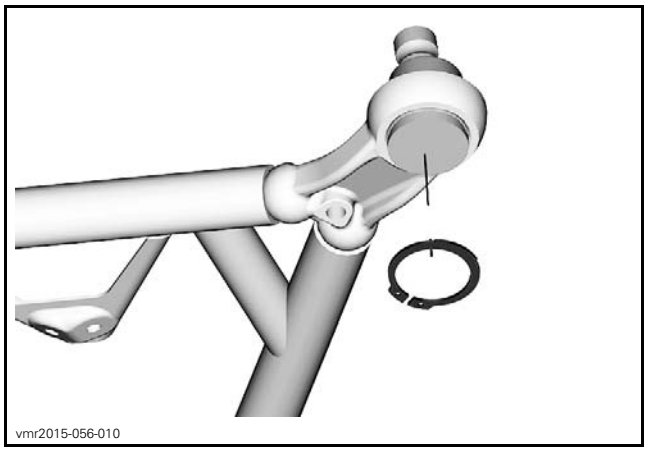
The installation is the reverse of the removal procedure. However, pay attention to the following.

Lubricate suspension arm. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

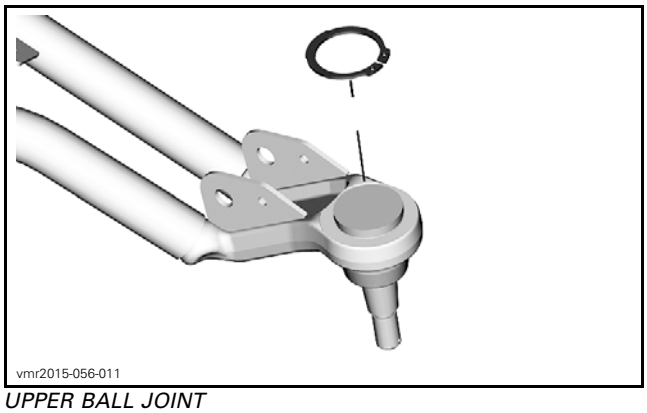
BALL JOINTS

Removing the Ball Joint

1. Remove suspension arm from vehicle. Refer to *REMOVING SUSPENSION ARM* in this subsection.
2. Remove circlip from ball joint.



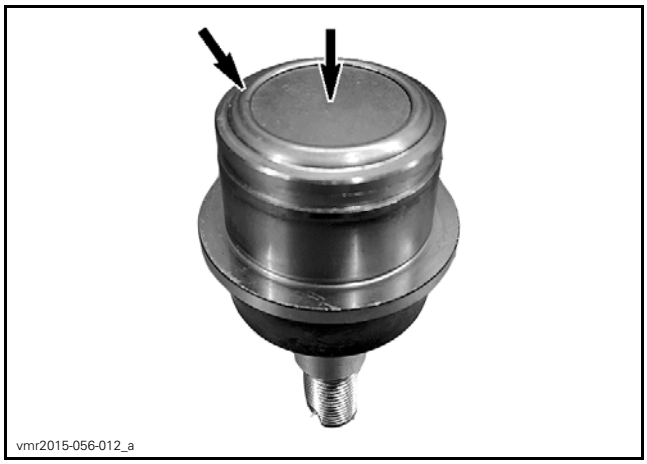
LOWER BALL JOINT



UPPER BALL JOINT

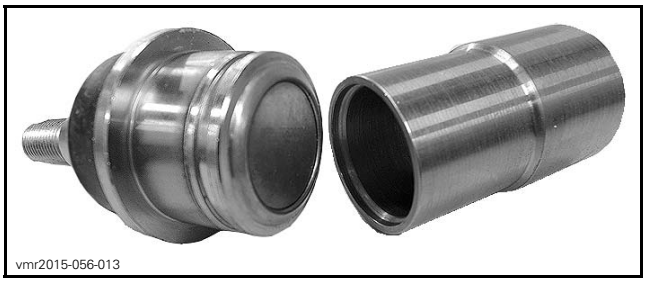
3. Install suspension arm on a press.

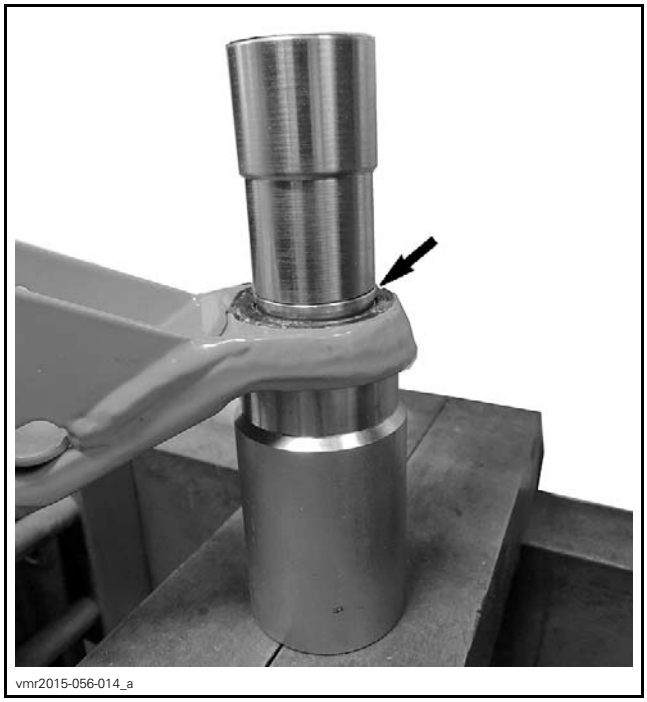
NOTICE Pressing on the center or on the lip of the ball joint will damage it.



DO NOT PRESS THERE

NOTE: The BALL JOINT REMOVAL TOOL (P/N 529 036 310) is design to apply force only on the outside edge of the ball joint.





CONTACT BETWEEN TOOL AND BALL JOINT ON THE OUTSIDE EDGE ONLY

4. Remove ball joint from suspension arm.

NOTICE Make sure that suspension arm is properly supported on the press during ball joint removal.

Installing Ball Joint

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install a NEW circlip to secure ball joint.

REAR SUSPENSION

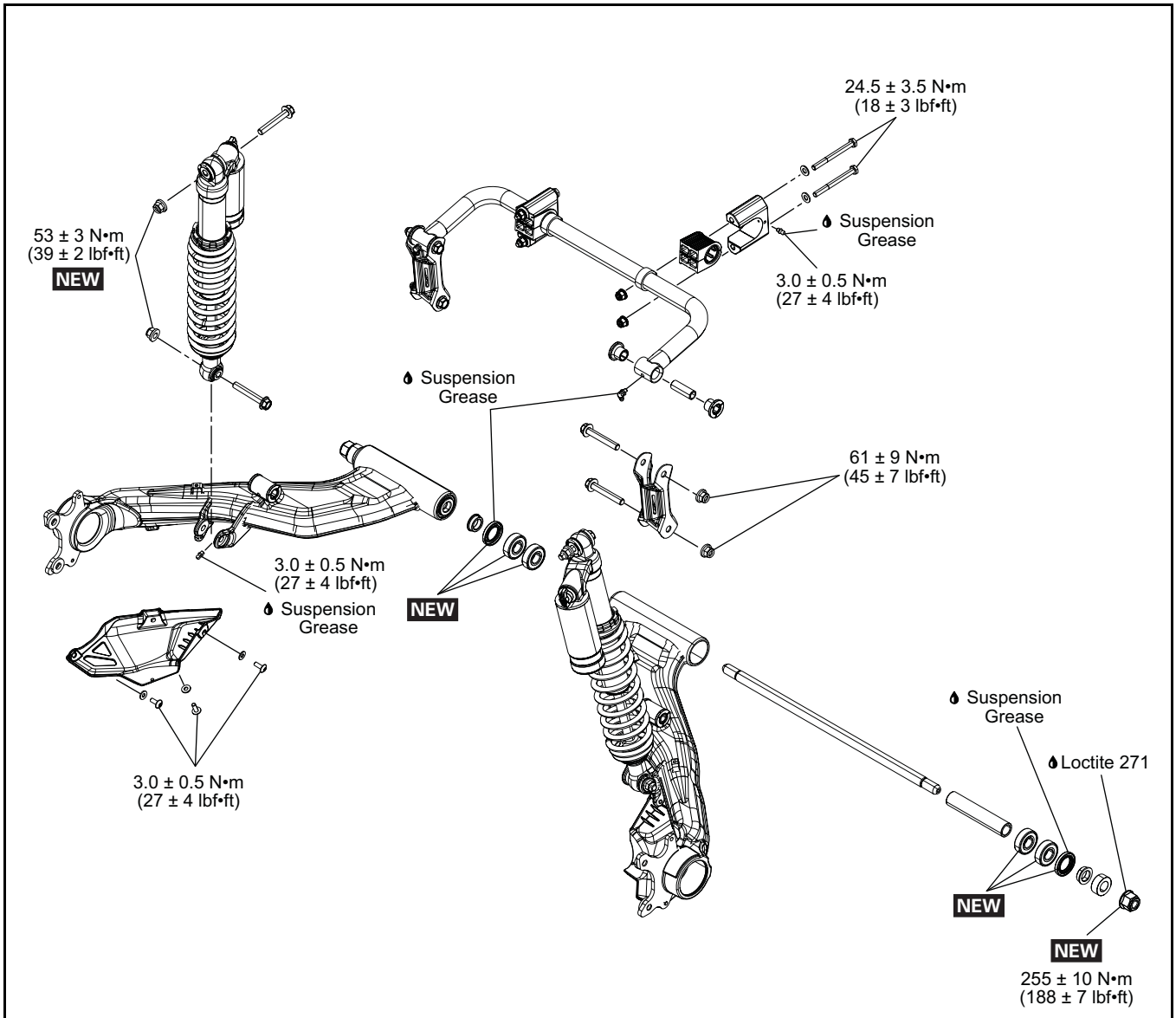
SERVICE TOOLS

Description	Part Number	Page
SPRING COMPRESSOR	529 036 184	3

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 271 (RED)	293 800 005	7
SYNTHETIC GREASE SUSPENSION	779163	6

TRAILING ARMS, STABILIZER BAR AND SHOCK ABSOBERS



NEW = Component must be replaced when removed.

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GENERAL

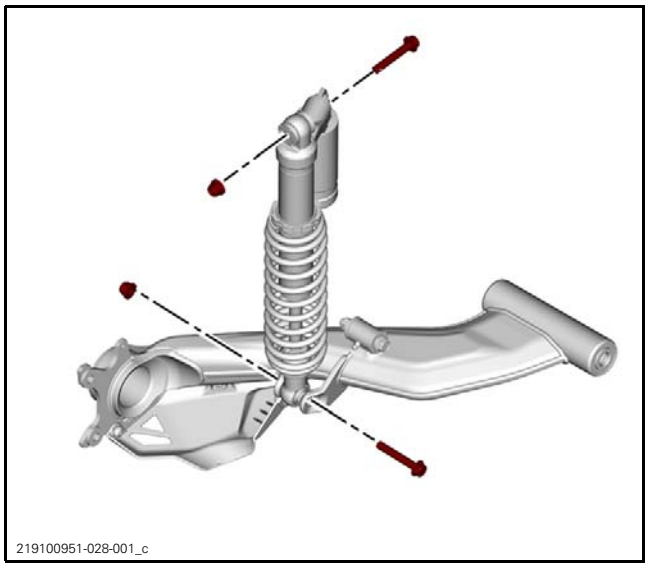
The procedure described below is the same for the RH and LH sides, unless otherwise instructed.

PROCEDURES

SHOCK ABSORBERS

Removing the Shock Absorber

1. Safely lift and support the vehicle off the ground.
2. Remove screws and nuts retaining shock absorber.



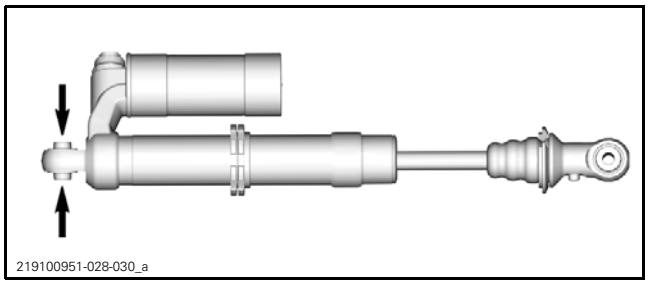
TYPICAL

3. Remove shock absorber.

Inspecting the Shock Absorber

Remove spring from shock absorber. Refer to *SPRINGS* in this subsection.

Secure the end of shock body in a vise with its rod upward.



TYPICAL

NOTICE Do not clamp directly on shock body.

Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with its rod upward.

Check the following conditions that will denote a defective shock:

– A skip or a hang back when reversing stroke at mid travel
– Seizing or binding condition except at extreme end of either stroke
– Oil leakage
– A gurgling noise, after completing one full compression and extension stroke.

Replace if any faults are present.

Installing the Shock Absorber

The installation is the reverse of the removal procedure. However, pay attention to the following.

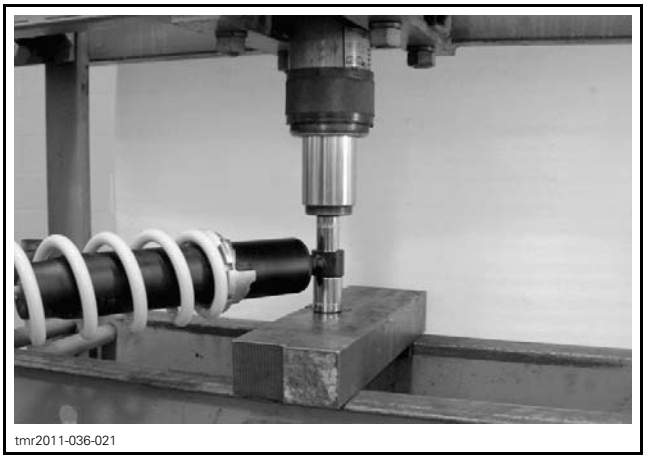
Tighten shock absorber nuts to specification.

TIGHTENING TORQUE	
Shock absorber screw	53 N•m ± 3 N•m (39 lbf•ft ± 2 lbf•ft)

SHOCK ABSORBER BUSHINGS

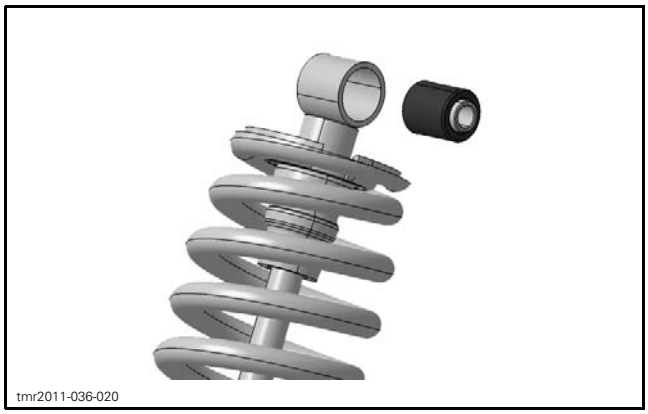
Replacing the Shock Absorber Bushing

1. Remove shock absorber from vehicle. Refer to *SHOCK ABSORBERS* in this subsection.
2. Install shock absorber on a press.
3. Use an appropriate socket to push bushing.



TYPICAL

4. Remove bushing from shock absorber.



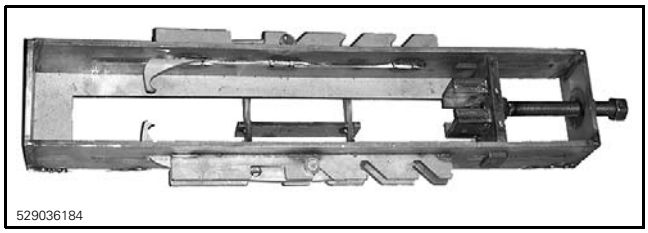
TYPICAL

5. Install a NEW bushing as the reverse of removal.
6. Install shock absorber on vehicle.

SPRINGS

Removing the Spring

1. Remove shock absorber from vehicle. Refer to *SHOCK ABSORBERS* in this subsection.
2. Place the SPRING COMPRESSOR (P/N 529 036 184) in a vise.



3. Position the shock absorber in the tool.
4. Install the spring compressor pins.
5. Tighten spring remover screw until the spring is sufficiently compressed to remove spring cap.
6. Remove spring cap from shock absorber.
7. Release spring remover screw.
8. Remove spring from shock absorber.

Inspecting the Spring

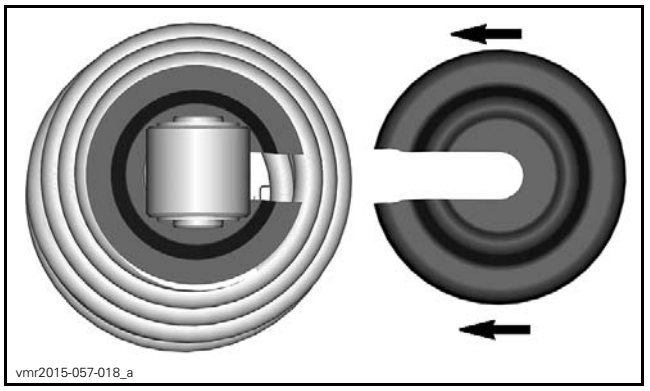
Inspect the spring for damage.

Replace if necessary.

Installing the Spring

The installation is the reverse of the removal procedure. However, pay attention to the following.

On applicable models, install spring cap opening at 180° from spring stopper opening.

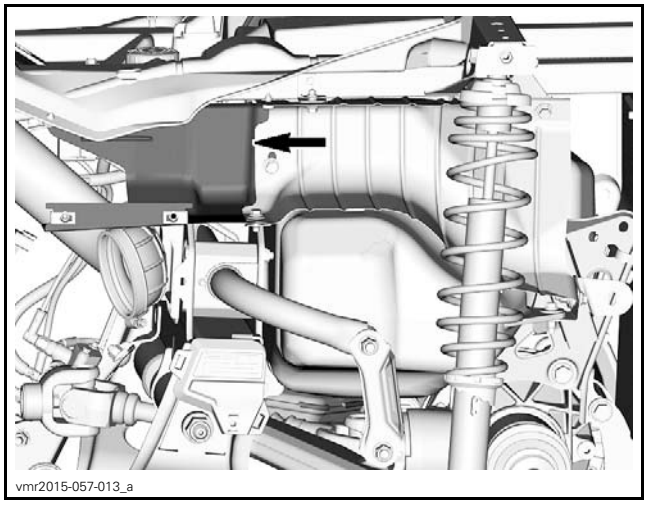


TYPICAL - CAP OPENING AT 180°

STABILIZER BAR

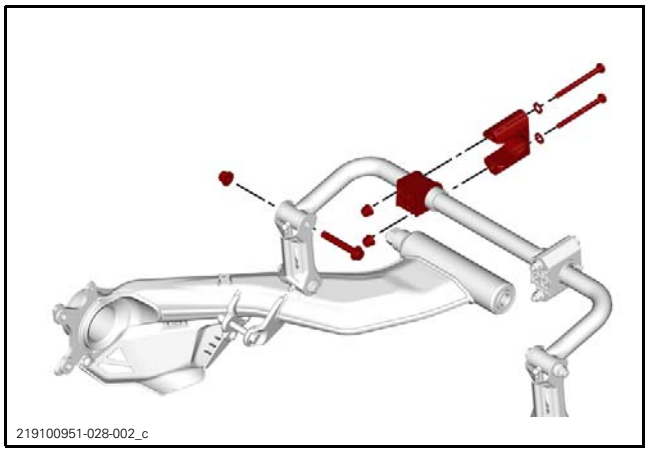
Removing the Stabilizer Bar

1. Safely lift and support the vehicle off the ground.
2. Remove rear wheels. Refer to *WHEELS AND TIRES* subsection.
3. Remove the muffler and the exhaust pipe. Refer to *EXHAUST SYSTEM* subsection.
4. Remove the following inner heat shield.



SOME PARTS REMOVED FOR CLARITY

5. Remove fasteners and stabilizer bar bushing holders.



6. Remove stabilizer bar.

Inspecting the Stabilizer Bar

Check stabilizer bar for cracks, bending or other damages.

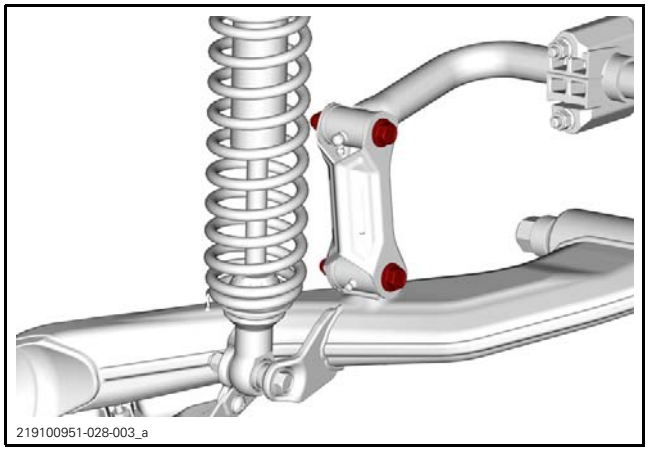
Replace if necessary.

Installing the Stabilizer Bar

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install all retaining screws of stabilizer bar loosely first.

Position link arm screws with their heads towards inside.



Tighten stabilizer bar retaining screws to specification.

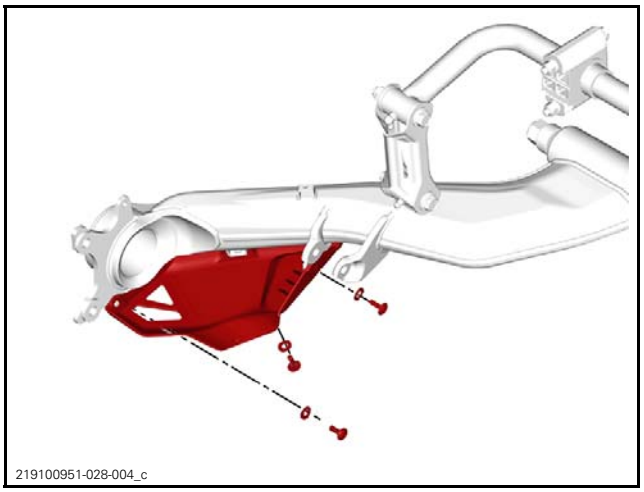
TIGHTENING TORQUE	
Screws securing stabilizer bar to frame	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)
Screws securing stabilizer bar to link arm	61 N•m ± 9 N•m (45 lbf•ft ± 7 lbf•ft)

Lubricate stabilizer bar. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

TRAILING ARM

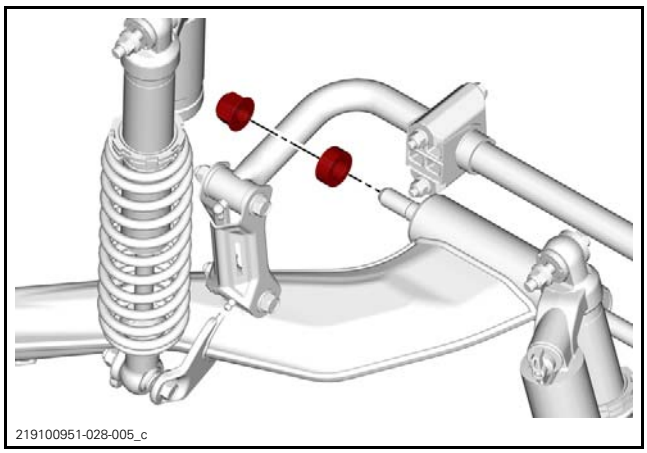
Removing the Trailing Arm

1. Safely lift and support the vehicle off the ground.
2. Remove wheel hub. Refer to *REAR DRIVE* subsection.
3. Remove protective plate from trailing arm.

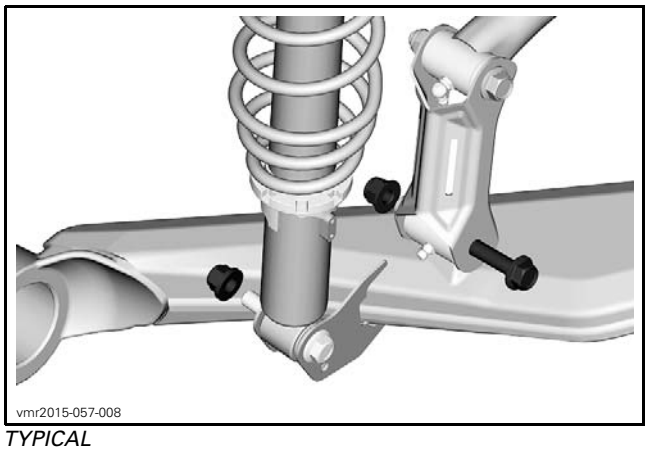


NOTE: If applicable, remove fasteners retaining brake hose to vehicle.

4. Remove nut and washer securing trailing arm pivot shaft.



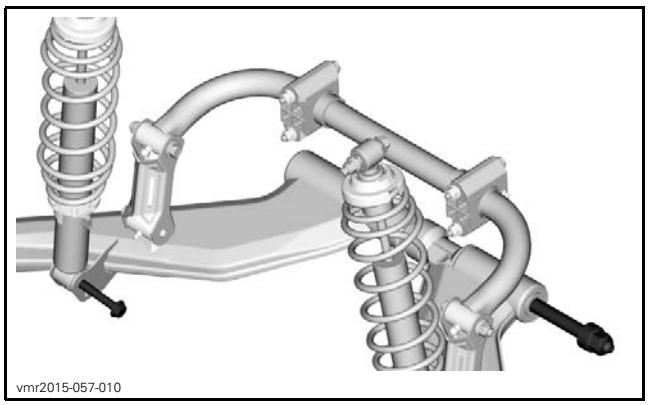
5. Detach trailing arm from link arm and remove lower nut retaining shock absorber.



TYPICAL

6. Firmly hold trailing arm then remove:
   – Shock absorber lower screw
   – Trailing arm pivot shaft (pull from opposite side).

NOTE: If only one trailing arm is removed, pull pivot shaft just enough to clear trailing arm.



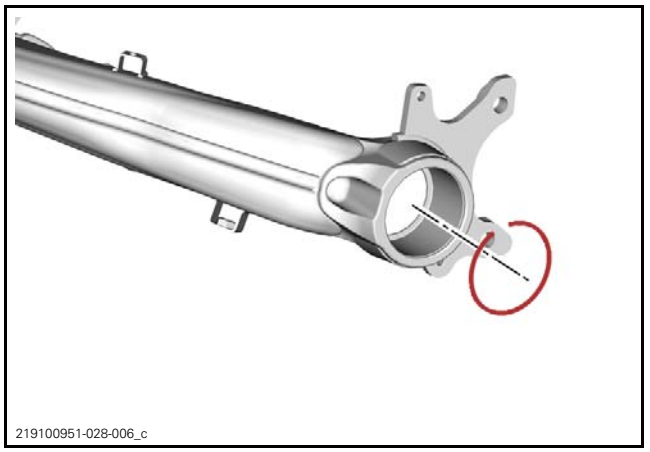
TYPICAL

7. Remove trailing arm from vehicle.

Disassembling the Trailing Arm

Removing the Drive Shaft Bearing

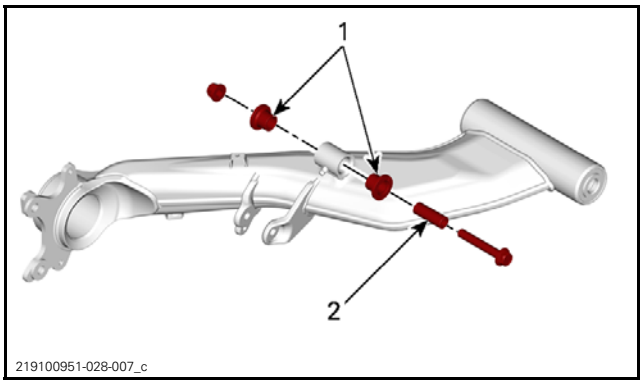
1. Remove circlip securing bearing into trailing arm.



2. Install trailing arm on a press.
3. Use an appropriate bearing remover.
4. Remove drive shaft bearing from trailing arm.

Removing the Link Arm Inner Bushing

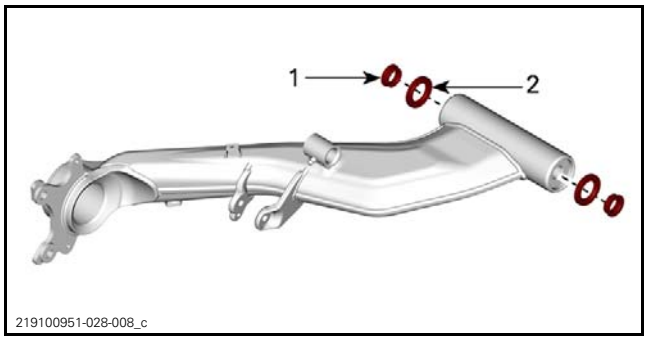
Remove both bushings and sleeve from trailing arm.



1. Bushings
2. Sleeve

Removing the Trailing Arm Pivot Bearing

1. Remove both spacers and seals from trailing arm pivot.

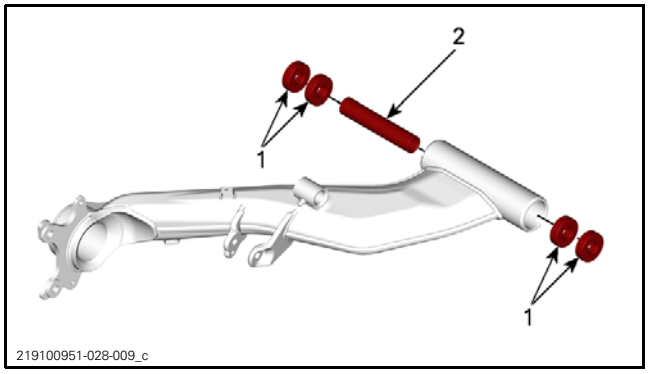


1. Spacer
2. Seal

2. Remove bearing with an appropriate bearing remover.

NOTE: Remove one bearing at a time.

3. Remove inner spacer from trailing arm.



1. Pivot bearings
2. Inner spacer

Inspecting the Trailing Arm

Check trailing arms for:
– Cracks
– Bending.

Check seals condition.

Check inner race of each pivot bearing with your finger. Bearings should turn smoothly and quietly.

Replace all damaged parts.

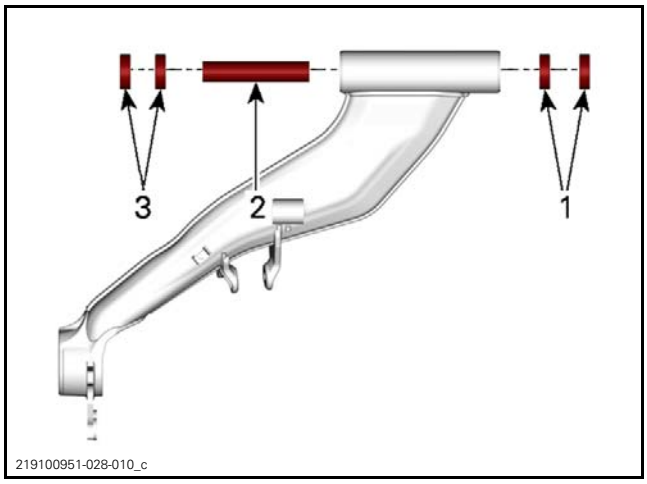
Assembling and Installing the Trailing Arm

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install the following NEW parts:
– Trailing arm pivot nuts
– Pivot bearings
– Pivot seals
– Circlip.

Use an appropriate shaft to center trailing arm inner spacer during pivot bearings installation.

Install pivot bearings and inner spacer as per the following sequence.

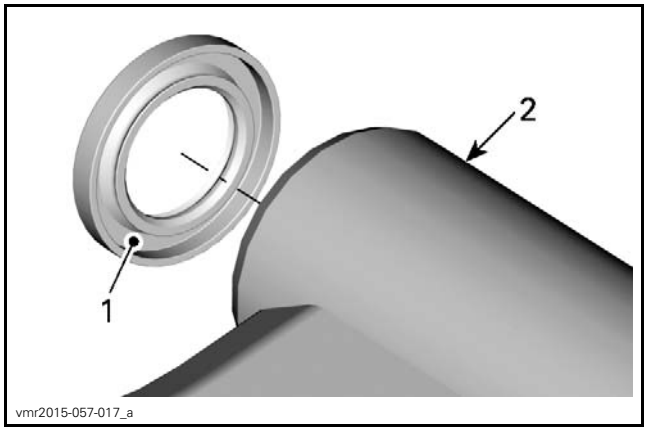


TYPICAL - LH TRAILING ARM
Step 1: Insert bearings on RH side
Step 2: Center inner spacer with RH side bearing using a shaft
Step 3: Insert bearings on LH side

Lubricate trailing arm pivot seals.

LUBRICATION	
Pivot seals	SYNTHETIC GREASE SUSPENSION (P/N 779163)

Install trailing arm pivot seal with its cavity facing inwards.



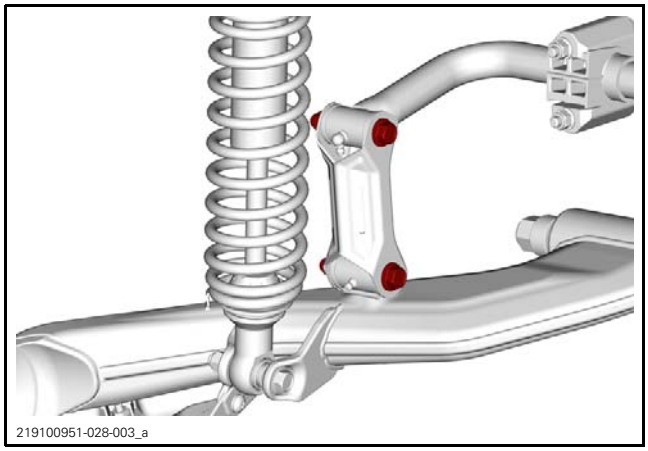
1. Seal cavity
2. Trailing arm

Center trailing arm pivot shaft.

Tighten trailing arm pivot nuts as per the following sequence.

TIGHTENING SEQUENCE		
Trailing arm pivot nuts	RH side nut	Apply LOCTITE 271 (RED) (P/N 293 800 005) on threads of nut. Tighten nut until it reaches end of threads
	LH side nut	255 N•m ± 10 N•m (188 lbf•ft ± 7 lbf•ft)

Position link arm bolts with their heads towards inside.



Tighten trailing arm fasteners to specification.

TIGHTENING TORQUE	
Bolts securing trailing arm to link arm	61 N•m ± 9 N•m (45 lbf•ft ± 7 lbf•ft)
Shock absorber nuts	53 N•m ± 3 N•m (39 lbf•ft ± 2 lbf•ft)
Protective plate retaining nuts	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

BRAKES

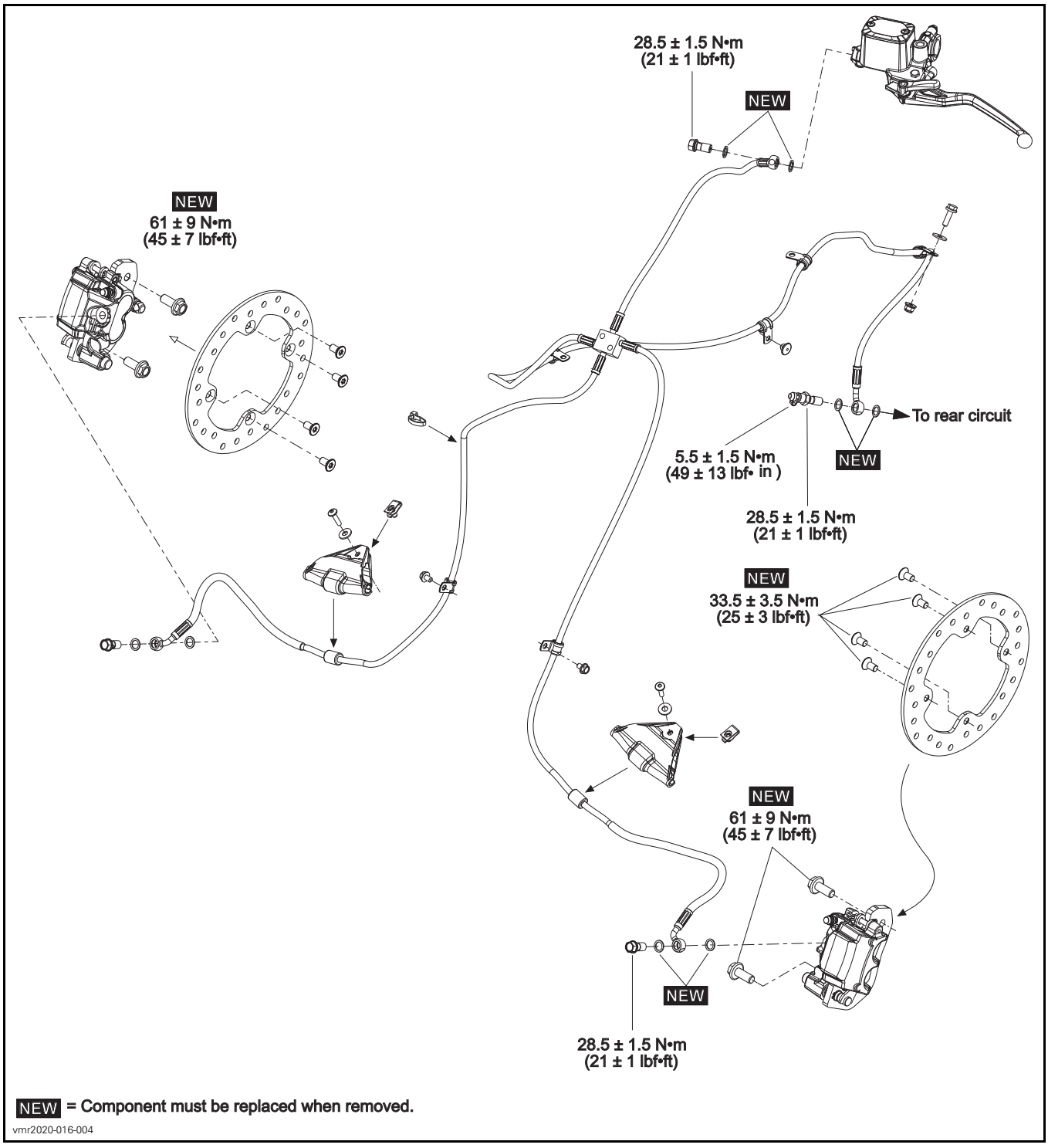
SERVICE TOOLS

Description	Part Number	Page
ECM ADAPTER TOOL	529 036 166	6

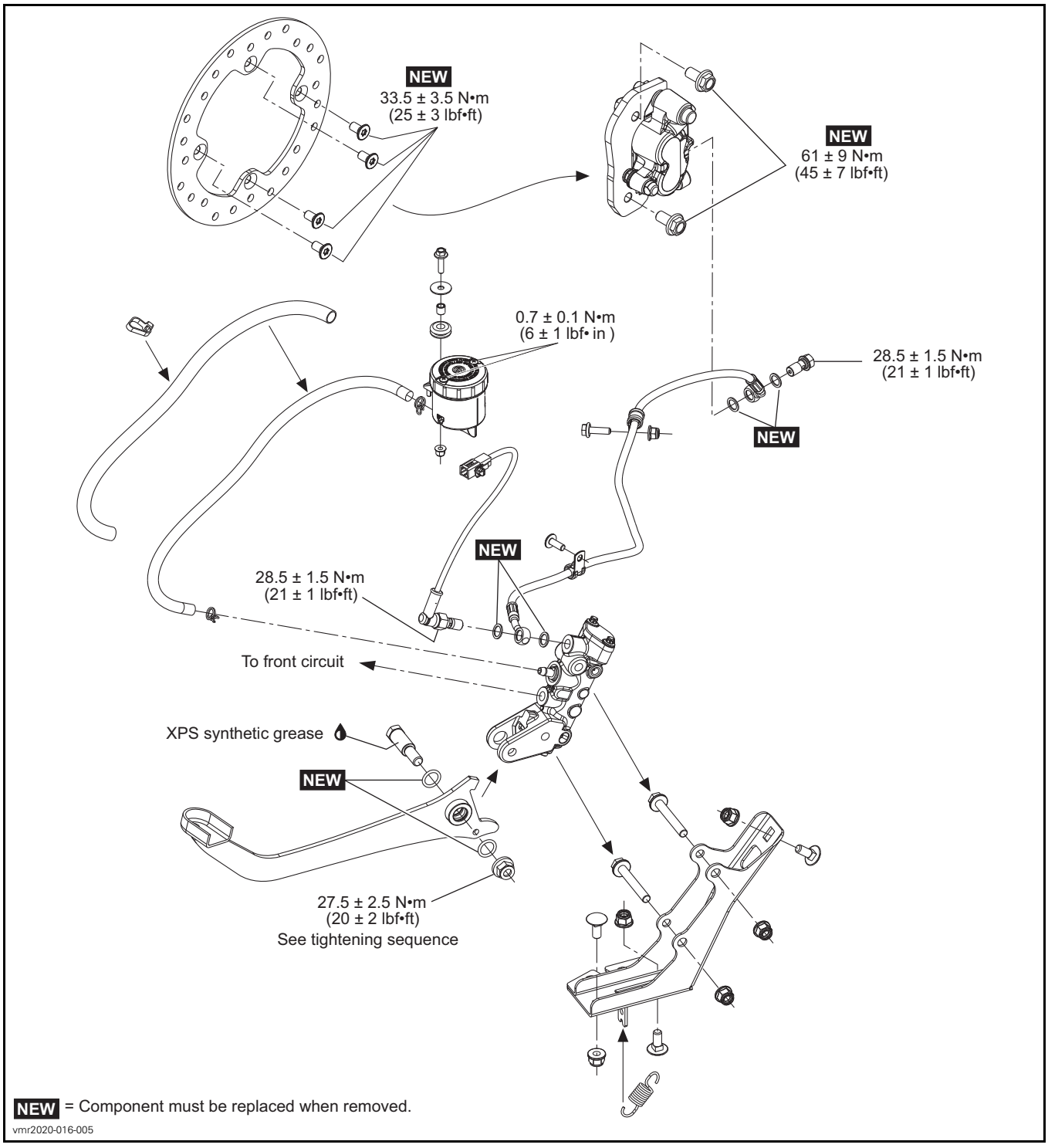
SERVICE PRODUCTS

Description	Part Number	Page
SYNTHETIC GREASE (EUR)	779231	7
SYNTHETIC GREASE	779162	7
XPS BRAKES AND PARTS CLEANER (USA)	219 701 705	9
XPS BRAKES AND PARTS CLEANER	219 701 776	9

FRONT CIRCUIT

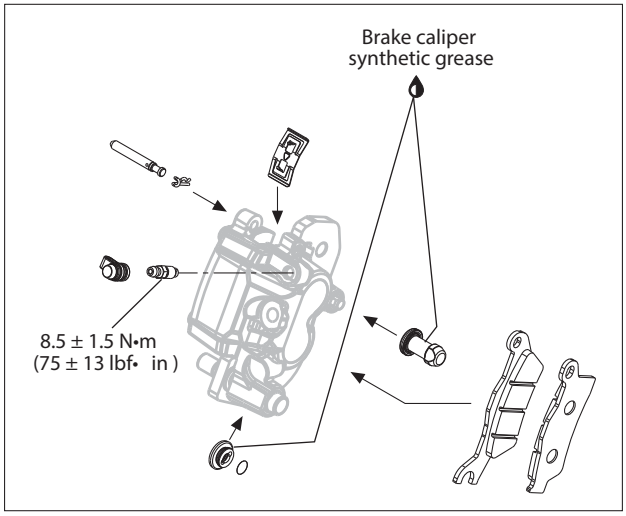


REAR CIRCUIT

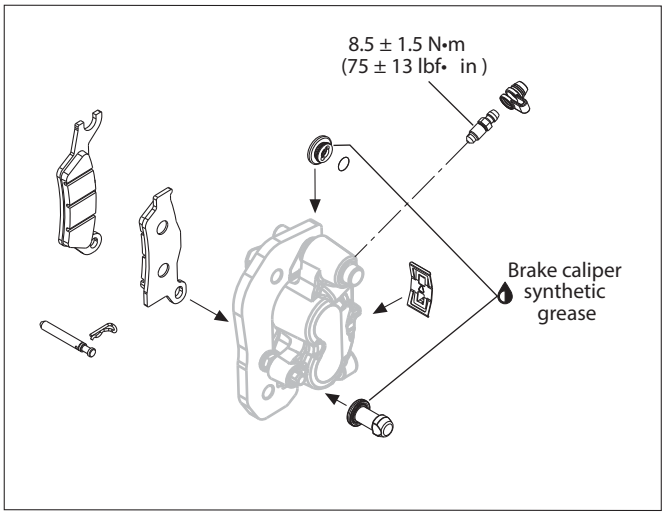


CALIPERS AND BRAKE LEVERS

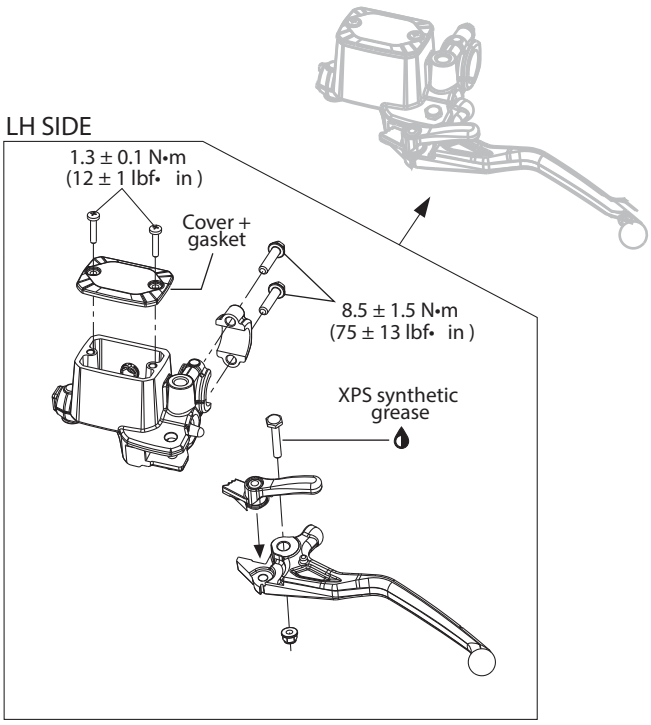
FRONT



REAR



LH SIDE



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GENERAL

⚠ WARNING

Always check brake system operation after removing or servicing a brake component.

NOTICE Avoid spilling brake fluid on plastic, rubber or painted parts. Protect these parts with a rag when servicing brake system.

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

NOTICE Always clean the area around a brake component before servicing.

SYSTEM DESCRIPTION

A disc brake system with twin-piston sliding calipers is used.

Disc Brake Configurations

NUMBER OF DISC BRAKES	
FRONT	REAR
2	1

Brake Controls and Circuit Configurations

LH BRAKE LEVER	BRAKE PEDAL
Controls front and rear brakes	Controls rear brake

INSPECTION

BRAKE SYSTEM PRESSURE VALIDATION

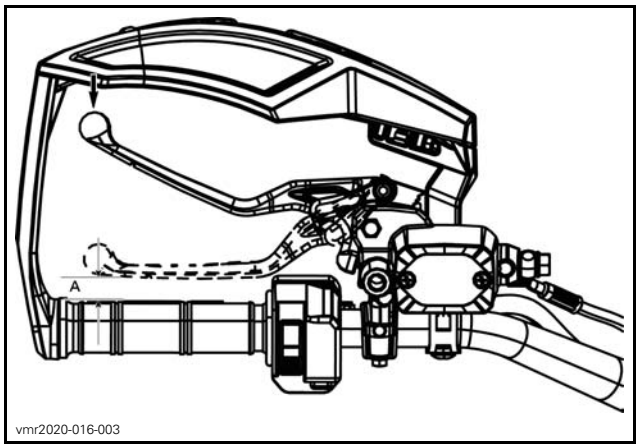
Required Tools

Use an appropriate compression force gauge and a ruler.

Brake Lever Verification

NOTE: Do not pump up the brakes repeatedly before doing the validation.

1. Position force gauge perpendicularly on brake lever edge.
2. Position a ruler perpendicularly to handlebar grip.
3. Push brake lever at distance A from handlebar grip using force gauge.



A. Distance from handlebar (refer to table)

4. Read load recorded by the force gauge.
5. Load reading must be as per the following table.

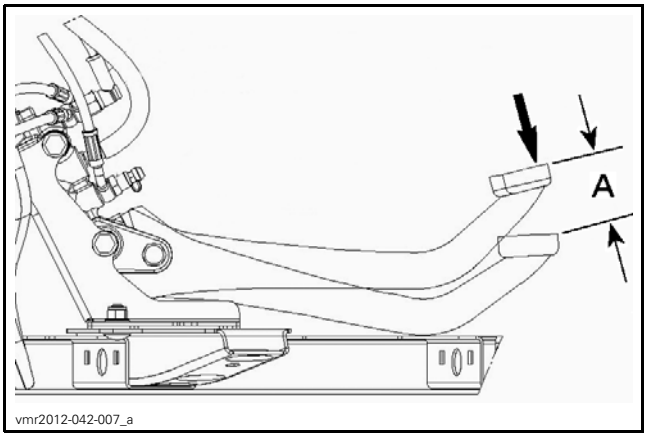
BRAKE LEVER VERIFICATION	
DISTANCE **A**	MINIMUM LOAD
25 mm (1 in)	150 N (34 lbf)

6. If load reading is not in accordance with the specification:
   - 6.1 Perform a brake system inspection and cleaning.
   - 6.2 Bleed brake system. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Brake Pedal Verification

NOTE: Do not pump up the brakes repeatedly before doing the validation.

1. Position force gauge perpendicularly on brake pedal edge.
2. Position a ruler perpendicularly to brake pedal.
3. Push brake pedal from distance A using force gauge.



A. Distance to push (refer to table)

4. Read load recorded by the force gauge.
5. Load reading must be as per the following table.

BRAKE PEDAL VERIFICATION	
DISTANCE **A**	MINIMUM LOAD
35 mm (1-3/8 in)	180 N (40 lbf)

6. If load reading is not in accordance with the specification:
   6.1 Perform a brake system inspection and cleaning.
   6.2 Bleed brake system.

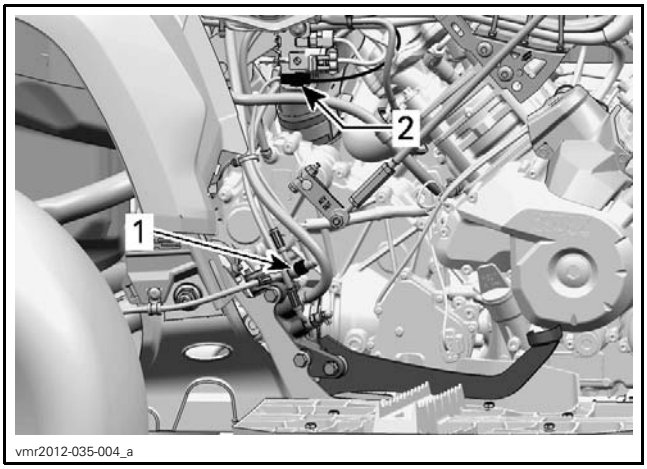
   NOTE: Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

PROCEDURES

BRAKE LIGHT SWITCH

Brake Light Switch Location

The brake switch is located on the brake pedal master cylinder.



1. Brake light switch
2. Brake light switch connector

Testing the Brake Light Switch Resistance

1. Disconnect brake light switch connector.
2. Check switch operation as follows.

BRAKE LIGHT SWITCH POSITION	PIN		RESISTANCE
Firmly pushed	1	2	Close to 0 Ω
Released			Infinite (OL)

If switch is defective, replace with a new one.

If the switch tests good, verify wire continuity between harness connector and ECM connector. Refer to *WIRING DIAGRAM*.

REQUIRED TOOL	
ECM ADAPTER TOOL (P/N 529 036 166)	

Replacing the Brake Light Switch

Brake Light Switch Located on Master Cylinder

1. Disconnect brake light switch connector.
2. Drain brake line.
3. Remove brake light switch.

NOTE: Use shop rags to catch any spilled brake fluid.

4. Install NEW sealing washers.
5. Install brake light switch.

TIGHTENING TORQUE	
Brake light switch	28.5 N•m ± 1.5 N•m (21 lbf•ft ± 1 lbf•ft)

6. Connect brake light switch connector.
7. Refill and bleed brake system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

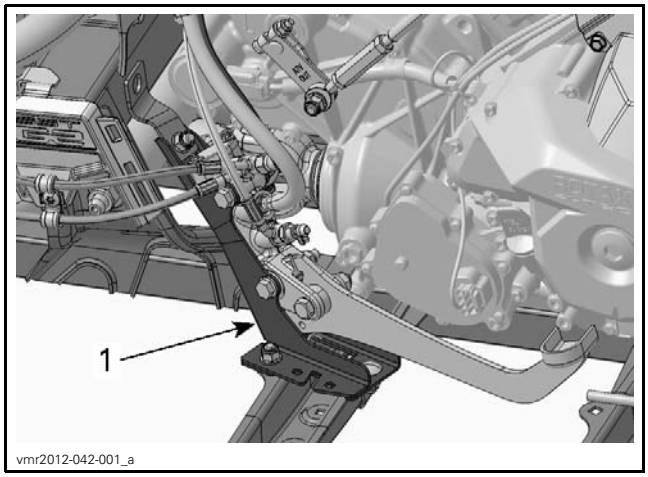
BRAKE PEDAL

Removing the Brake Pedal

1. Drain brake system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
2. Remove RH footrest panel. Refer to *BODY* subsection.

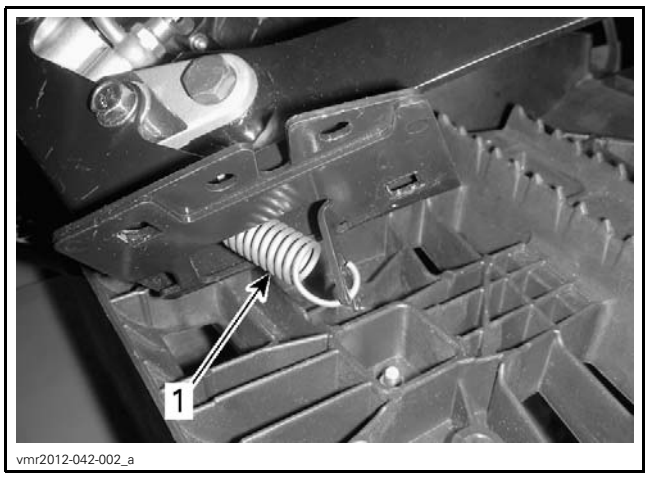
NOTE: Loosen brake pedal bolt before removing support from frame.

3. Remove master cylinder support from frame.



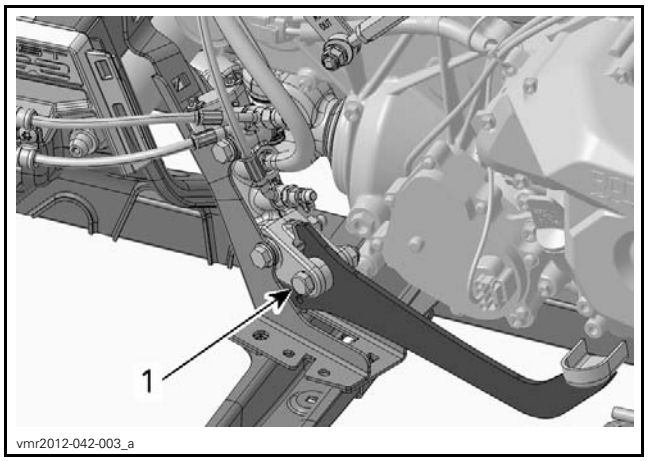
1. Master cylinder support

4. Remove brake pedal spring.



1. Brake pedal spring

5. Remove brake pedal.



1. Brake pedal pivot bolt

Installing the Brake Pedal

The installation is the reverse of the removal procedure. However, pay attention to the following.

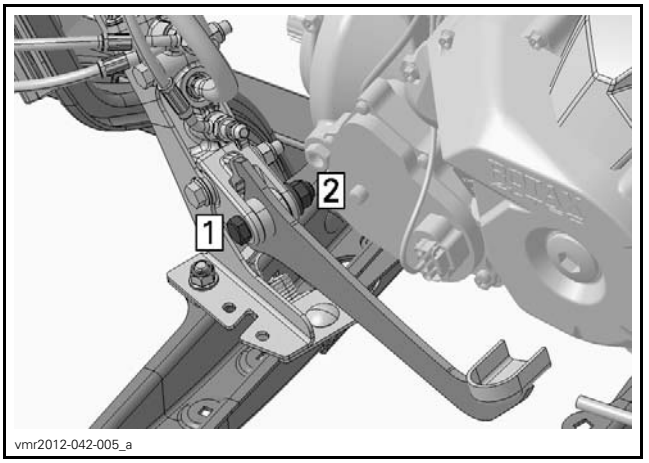
Install **NEW** brake pedal O-ring.

Lubricate brake pedal pivot.

SERVICE PRODUCT	
Scandinavia	SYNTHETIC GREASE (EUR) (P/N 779231)
Other Countries	SYNTHETIC GREASE (P/N 779162)

Tighten brake pedal nut as per the following sequence.

TIGHTENING SEQUENCE		
STEP 1	Brake pedal bolt (pivot)	10 N•m ± 2 N•m (89 lbf•**in** ± 18 lbf•**in**)
STEP 2	Brake pedal nut	27.5 N•m ± 2.5 N•m (20 lbf•ft ± 2 lbf•ft)



TIGHTENING SEQUENCE
Step 1: Tighten bolt
Step 2: Hold bolt then tighten nut

MASTER CYLINDER

Removing the Master Cylinder

1. Remove *BRAKE PEDAL*. See procedure in this subsection.
2. Remove master cylinder from support.

1. Master cylinder

3. Remove hoses and bleeder from master cylinder.

Inspecting the Master Cylinder

Check boot for crack.

Check rod for wear and scratch.

Check master cylinder housing for leak or damage.

Installing the Master Cylinder

The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten brake hoses and bleeder to specification.

TIGHTENING TORQUE	
Brake hose screw (banjo fitting)	28.5 N•m ± 1.5 N•m (21 lbf•ft ± 1 lbf•ft)
Bleeder	8.5 N•m ± 1.5 N•m (75 lbf•**in** ± 13 lbf•**in**)

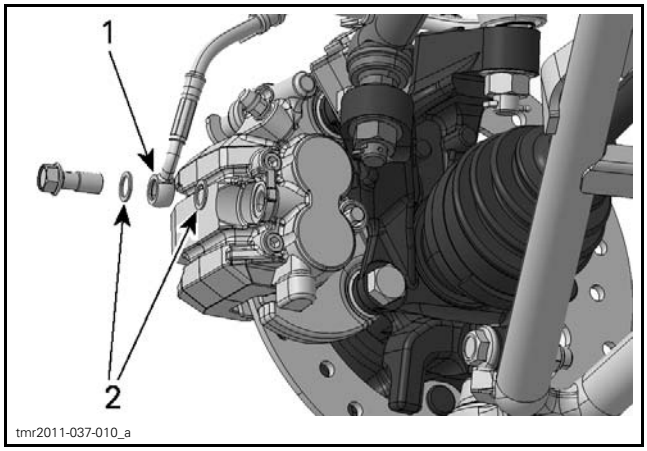
Install NEW sealing washers.

Refill and bleed brake system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

CALIPER

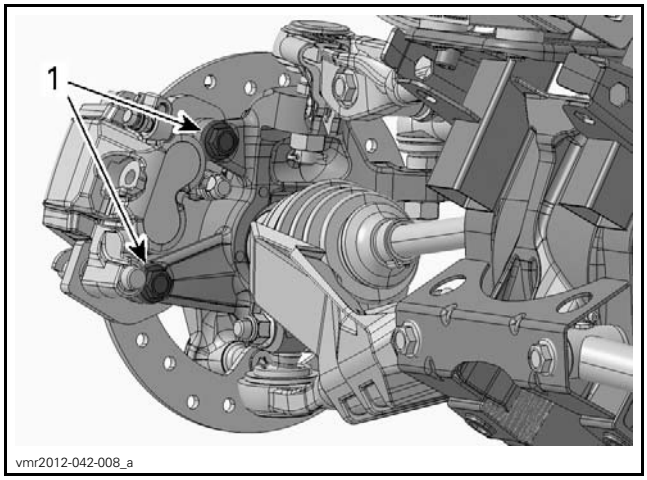
Removing the Caliper

1. Safely lift and support the vehicle.
2. Remove wheel, refer to *WHEELS AND TIRES* subsection.
3. If caliper is removed from vehicle for replacement:
   - 3.1 Drain brake system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
   - 3.2 Unscrew brake hose from caliper.



TYPICAL
1. Brake hose
2. Sealing washers

4. Remove fasteners retaining brake hose.
5. Remove screws securing caliper support.



TYPICAL
1. Caliper screws

6. Place caliper assembly onto a support.

NOTICE **Do not let caliper hangs by the hose and do not stretch or twist hose.**

Installing the Caliper

The installation is the reverse of the removal procedure. However, pay attention to the following.

If caliper was removed for replacement:

– Refill and bleed brake system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
– Install NEW sealing washers.

Install NEW caliper retaining screws.

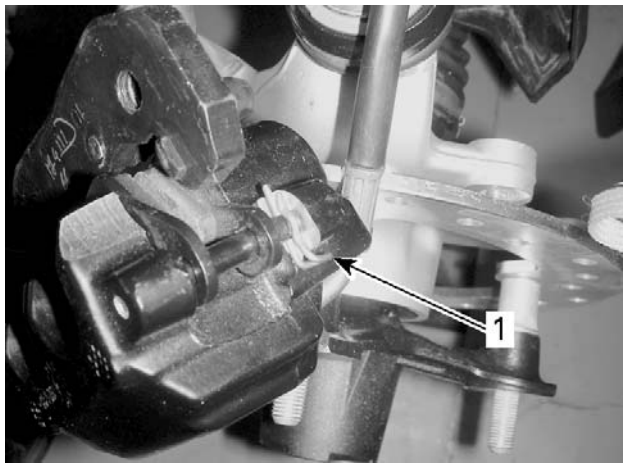
Tighten caliper retaining screws to specification.

TIGHTENING TORQUE	
Caliper retaining screws	61 N•m ± 9 N•m (45 lbf•ft ± 7 lbf•ft)

BRAKE PADS

Replacing the Brake Pads

1. Remove caliper, refer to *REMOVING THE CALIPER* in this subsection.
2. Remove pin retainer securing brake pad pin.



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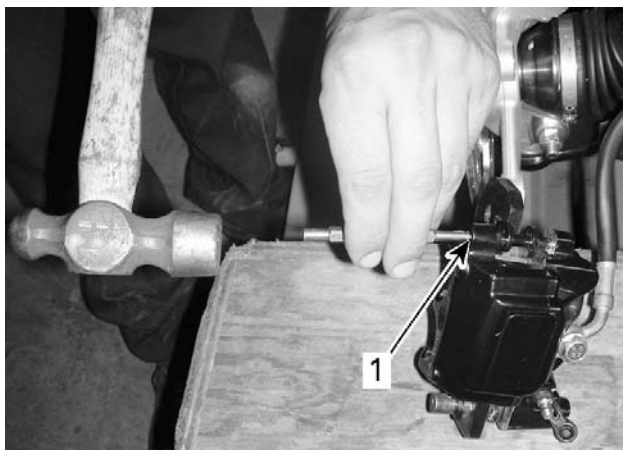
1. Pin retainer

3. Remove brake pad pin from caliper.



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TYPICAL
1. Brake pad pin

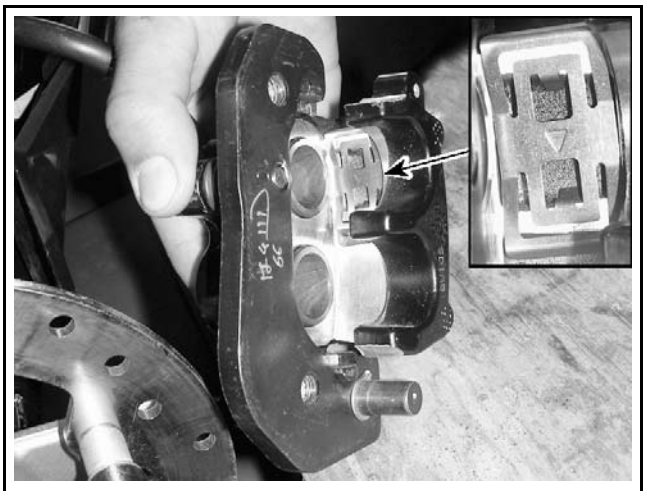
4. Carefully remove brake pads.
5. Clean pistons end using the following product or and equivalent.

SERVICE PRODUCT	
United States of America	XPS BRAKES AND PARTS CLEANER (USA) (P/N 219 701 705)
Other countries	XPS BRAKES AND PARTS CLEANER (P/N 219 701 776)

6. Push caliper pistons inward.

NOTE: To avoid damaging pistons, use an old pad to push it into the caliper using a C-clamp.

7. Ensure brake pad spring is properly positioned onto caliper and not damaged.



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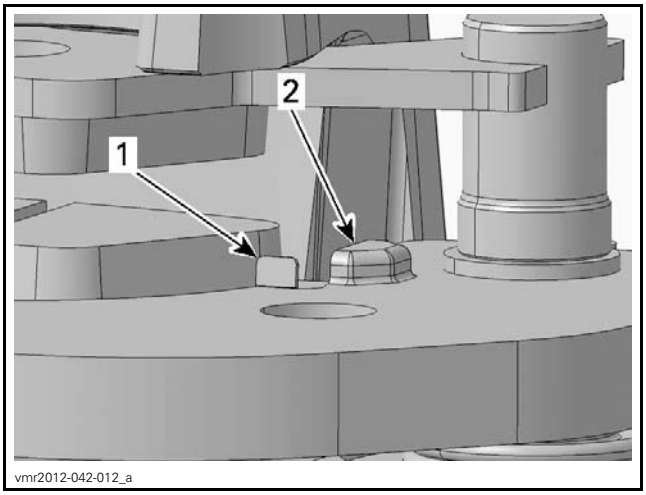
BRAKE PAD SPRING

8. Ensure pad stopper is properly aligned with caliper support protrusion.



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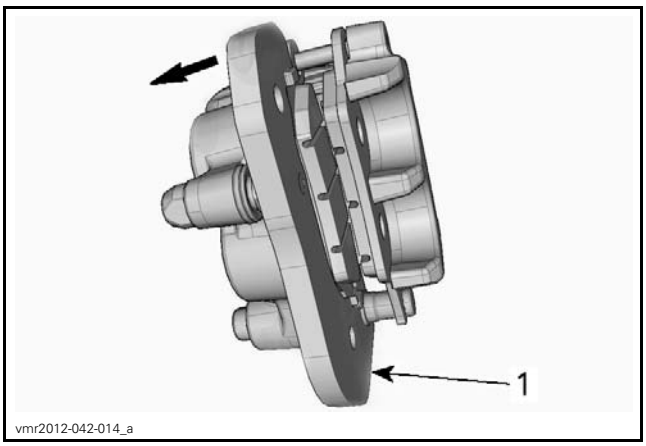
1. Pad stopper
2. Caliper support protrusion

NOTICE **Prior to installing brake pads, pad stopper must be properly positioned and not damaged.**

9. Install NEW brake pads.
10. Clean and install brake pad pin on caliper.
11. Install pin retainer to secure brake pad pin.
12. Slide caliper support completely into caliper.



1. Caliper support

13. Install caliper, refer to *INSTALLING THE CALIPER* in this subsection.

BRAKE DISC

Inspecting the Brake Disc

1. Check disc surfaces for scratches or grooves on both sides.
2. Measure thickness of the disc.

DISC MINIMUM THICKNESS	
FRONT	4.0 mm (.157 in)
REAR	4.0 mm (.157 in)

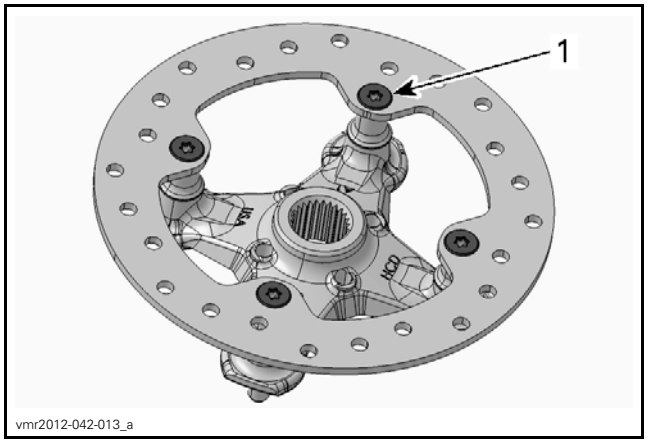
NOTICE **Brake discs must never be machined.**

3. Check warpage of the disc.

MAXIMUM DISC WARPAGE	
FRONT	0.2 mm (.01 in)
REAR	

Replacing the Brake Disc

1. Remove caliper, refer to *REMOVING THE CALIPER* in this subsection.
2. Remove wheel hub, refer to *FRONT DRIVE* or *REAR DRIVE* subsection.
3. Remove screws securing brake disc to wheel hub.



1. Brake disc screw

4. Replace brake disc.
5. Install NEW brake disc screws.
6. Tighten brake disc screws to specification.

TIGHTENING TORQUE	
Brake disc screws	33.5 N•m ± 3.5 N•m (25 lbf•ft ± 3 lbf•ft)

7. Install wheel hub then caliper.
8. Install NEW cotter pin to secure wheel hub nut.

BRAKES (ABS)

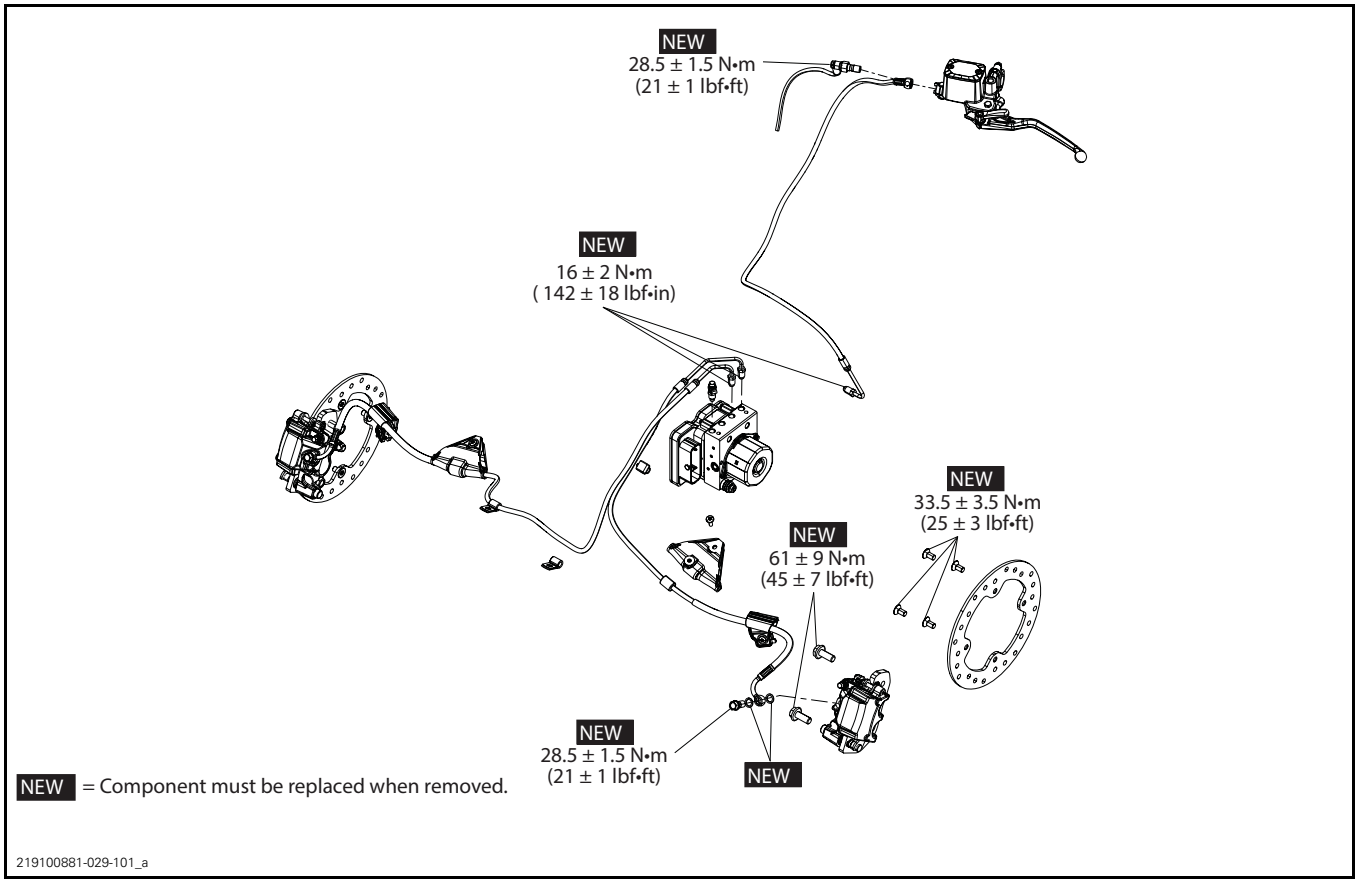
SERVICE TOOLS

Description	Part Number	Page
ECM ADAPTER TOOL	529 036 166	8

SERVICE PRODUCTS

Description	Part Number	Page
DEOXIT LUBRICANT	293 550 034	14
SYNTHETIC GREASE (EUR)	779231	9
SYNTHETIC GREASE	779162	9
XPS BRAKES AND PARTS CLEANER	219 701 776	11

FRONT BRAKES



REAR BRAKES

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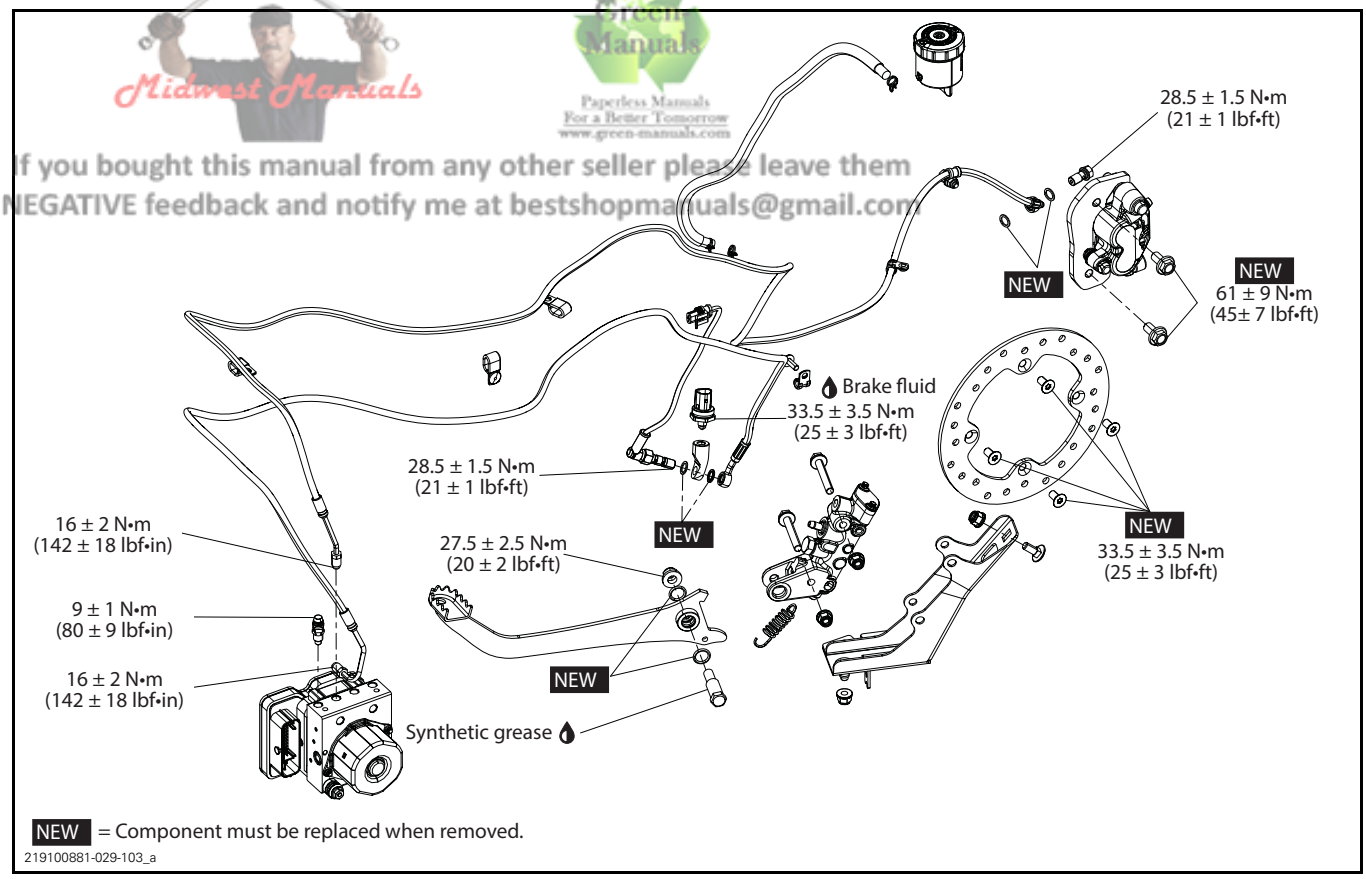

NEW = Component must be replaced when removed.

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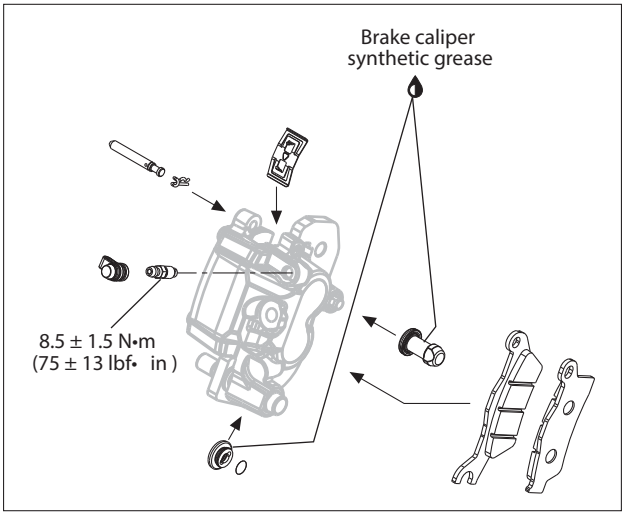
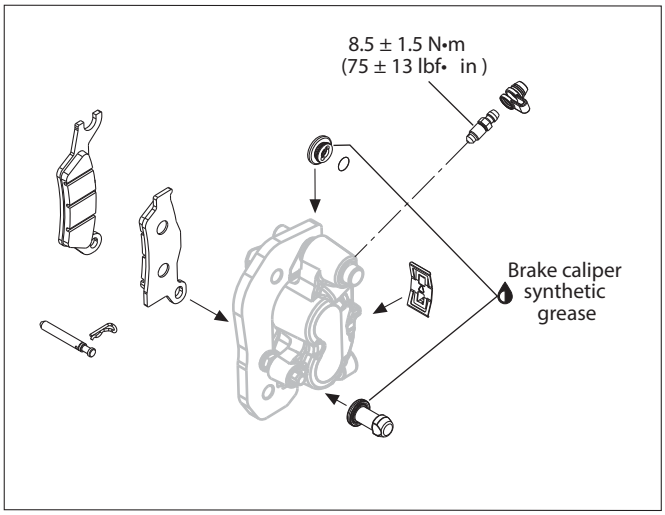
CALIPERS AND BRAKE LEVERS

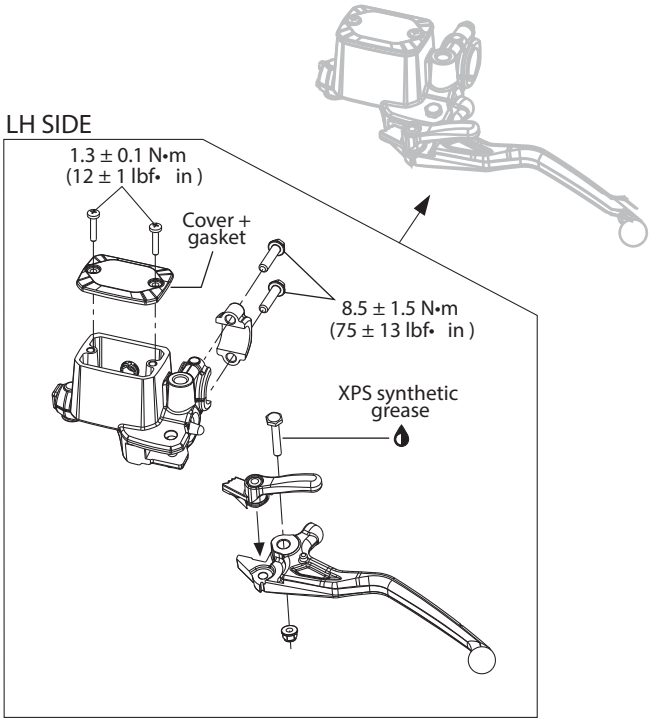
FRONT



REAR



LH SIDE



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GENERAL

⚠ WARNING

Always check brake system operation after removing or servicing a brake component.

NOTICE Avoid spilling brake fluid on plastic, rubber or painted parts. Protect these parts with a rag when servicing brake system.

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

NOTICE Always clean the area around a brake component before servicing.

SYSTEM DESCRIPTION

A disc brake system with twin-piston sliding calipers is used.

Anti-Lock Braking System (ABS)

The ABS prevents the wheels to lock while braking. The vehicle configuration allows a single brake point at the right foot or the left lever, to provide the optimal amount of hydraulic brake pressure on all brake discs, under a multitude of braking conditions. The result is maximizing vehicle control while allowing the wheels to remain available to generate steering control force in response to the rider's input.

Disc Brake Configurations

NUMBER OF DISC BRAKES	
Front	2
Rear	1

Brake Controls and Circuit Configurations

BRAKE CONTROLS	
LH brake lever	Controls front and rear brakes
Brake pedal	Controls front and rear brakes

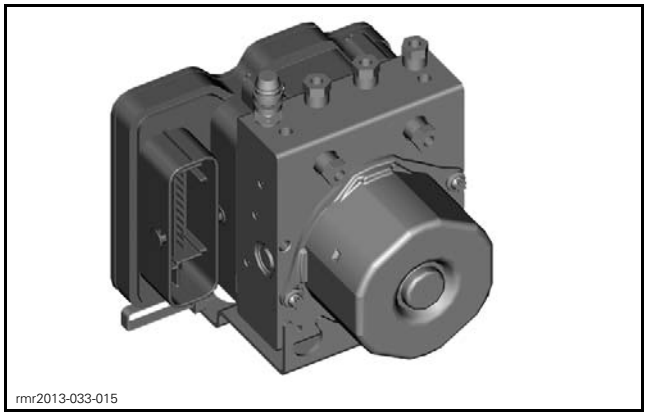
FAULT CODES

For any replacement of parts that involves brake bleeding, it is important to reset the fault codes using the BRP diagnostic software (BUDS2). Refer to *DIAGNOSTIC AND FAULT CODES* subsection.

SYSTEM COMPONENTS DESCRIPTION

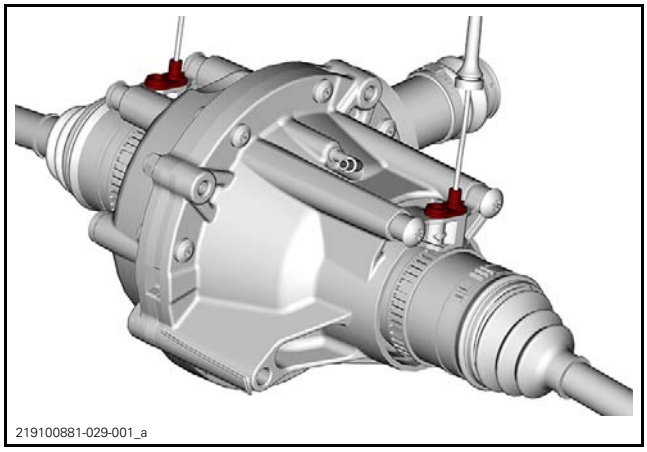
ABS Module

The ABS module is the heart of the vehicle anti-lock braking system (ABS). It contains 2 microprocessors, 2 hydraulic pumps, several solenoids and passageways to the 3 brake calipers.

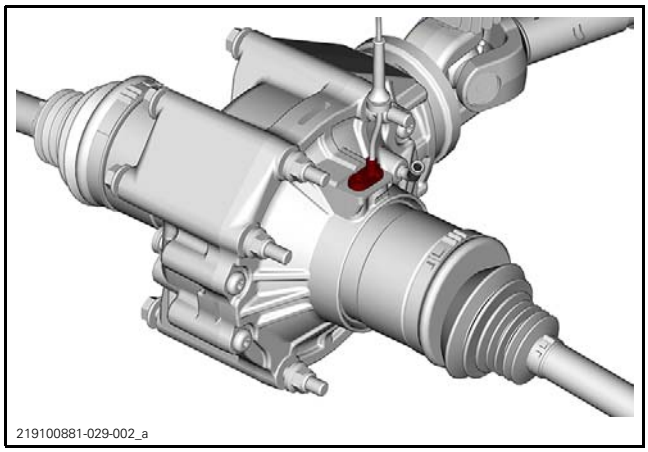


The ABS module receives inputs from wheel sensors (WSS) and performs calculations to cycle the pump and solenoids to apply or relieve hydraulic pressure to or from the vehicle brake calipers.

Wheel Speed Sensor (WSS)



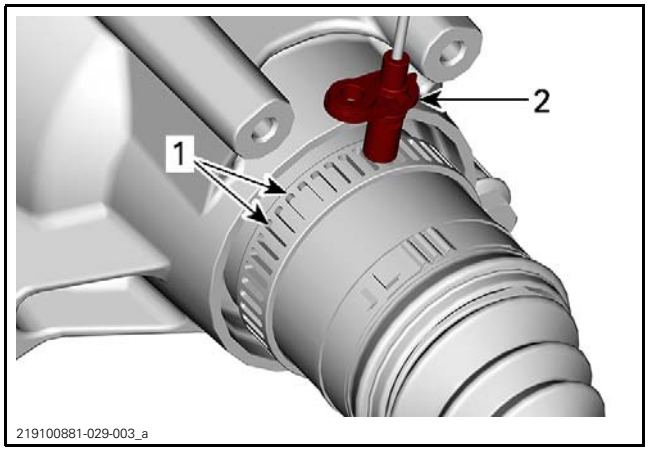
FRONT WHEEL SPEED SENSOR



REAR WHEEL SPEED SENSOR

There are 3 speed sensors on the vehicle, two on the front and one on the rear. The speed sensors are hall effect type sensors that send a digital signal to the ABS module.

As the wheel rotates, the teeth on the encoder wheel pass in front of the sensor. The output frequency of the sensor is proportional to the wheel rotation speed.

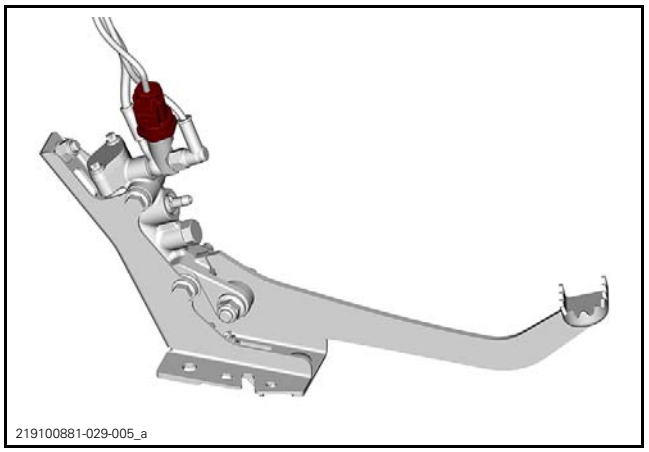


TYPICAL - PARTS REMOVED FOR CLARITY
1. *Extrusions on encoder wheel*
2. *Wheel speed sensor*

The signal from the wheel speed sensors are the main inputs looked at by the ABS module for the activation of ABS and other functions.

Brake Pressure Sensor (BPS)

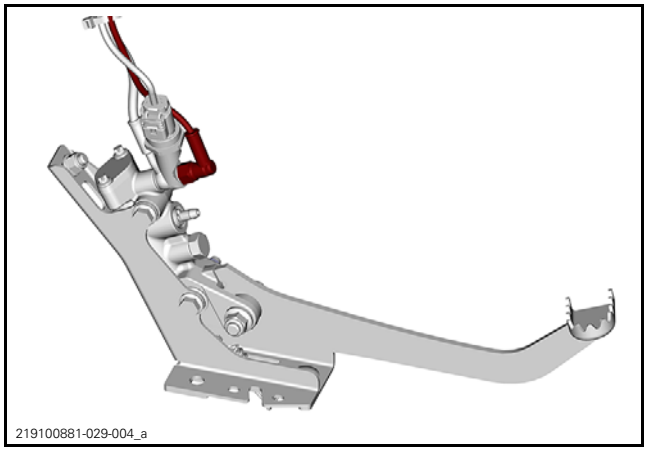
The brake pressure sensor reads the pressure applied on the brake pedal by the user. It sends the value directly to the ABS module. This input is used for precise control.



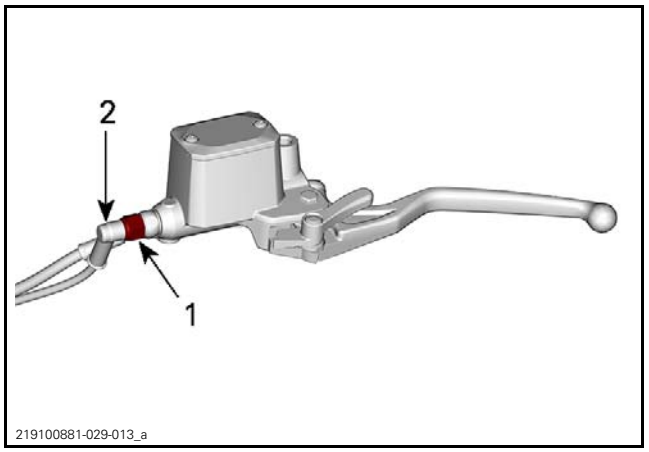
BRAKE PRESSURE SENSOR

Brake Light Switch (BLS)

The brake light switches (BLS) are located close to the master cylinder. They are activated by the brake pedal or the brake lever.



BRAKE LIGHT SWITCH



BRAKE LEVER MASTER CYLINDER
1. *Brake light switch*
2. *Brake light switch connector*

The BLS turns on the brake lights and supplies the ECM a signal that the operator is applying the brakes. Brake light switches are hard wired to the

ABS module. When the ABS module detect either one of the BLS, it sends a signal to the brake light relay to light up the brake light.

MAINTENANCE

BLEEDING THE BRAKE FLUID

⚠ WARNING

Failure to correctly bleed the braking system may reduce its performance and lead to a loss of control.

Anytime the brake system is opened, the bleeding procedure must be performed.

1. Ensure brake fluid is present in the entire system by topping off the front and rear master cylinders and:
   – Open the bleeder of the rear caliper until fluid drips out and close it.
   – Open the bleeder of the front RH caliper until fluid drips out and close it.
   – Open the bleeder of the front LH caliper until fluid drips out and close it.
2. Connect the vehicle to the BRP diagnostic software (BUDS2) and go to:
   – **Settings** page
   – **ABS** button
   – **Settings** tab
   – **Initializations - Execute bleeding**
3. Follow the on-screen instructions.
4. Ensure brake fluid is present in the entire system by topping off the front and rear master cylinders and:
   – Open the bleeder of the rear caliper until fluid drips out and close it.
   – Open the bleeder of the front RH caliper until fluid drips out and close it.
   – Open the bleeder of the front LH caliper until fluid drips out and close it.

INSPECTION

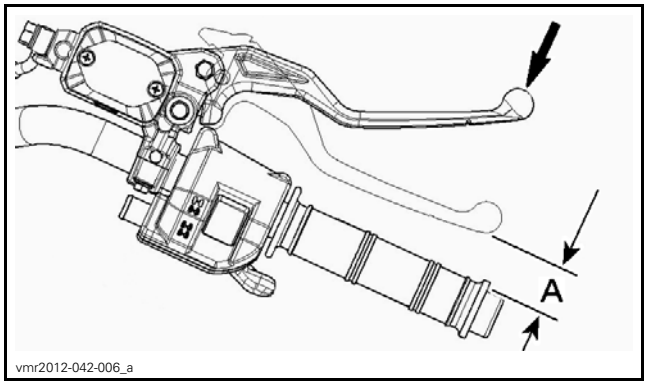
VERIFYING THE COMPRESSION FORCE

REQUIRED TOOL	
Compression force gauge	

Verifying the Brake Lever Compression Force

IMPORTANT: Do not pump up the brakes repeatedly before doing the validation.

1. Position force gauge perpendicularly on brake lever edge.
2. Position a ruler perpendicularly to handlebar grip.
3. Push brake lever at distance **A** from handlebar grip using force gauge.



A. Distance from handlebar (refer to table)

4. Read load recorded by the force gauge.
5. Load reading must be as per the following table.

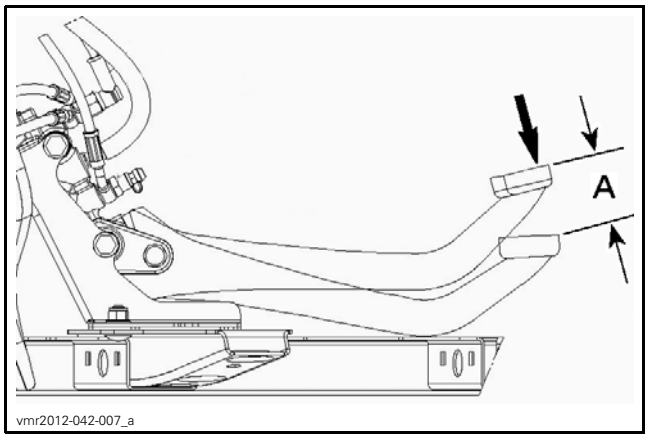
BRAKE LEVER		
LEVER	DISTANCE **A**	MINIMUM LOAD
LH side lever	25 mm (1 in)	150 N (34 lbf)

6. If load reading is not in accordance with the specification:
   6.1 Perform a brake system inspection and cleaning.
   6.2 Bleed brake system, refer to *BLEEDING THE BRAKE FLUID* in this subsection.

Verifying the Brake Pedal Compression Force

IMPORTANT: Do not pump up the brakes repeatedly before doing the validation.

1. Position force gauge perpendicularly on brake pedal edge.
2. Position a ruler perpendicularly to brake pedal.
3. Push brake pedal from distance **A** using force gauge.



A. Distance to push (refer to table)

4. Read load recorded by the force gauge.
5. Load reading must be as per the following table.

BRAKE PEDAL	
DISTANCE **A**	MINIMUM LOAD
35 mm (1-3/8 in)	180 N (40 lbf)

6. If load reading is not in accordance with the specification:
   - 6.1 Perform a brake system inspection and cleaning.
   - 6.2 Bleed brake system, refer to *BLEEDING THE BRAKE FLUID* in this subsection.

TROUBLESHOOTING

Refer to *POWER DISTRIBUTION AND GROUNDS* for fuses and relays information.

Always refer to the *WIRING DIAGRAM* when troubleshooting an electrical circuit.

Install a battery charger on battery terminals (under seat) for any tests that involve a prolonged "key ON" period. If battery voltage gets too low, the ABS module shuts off, some accessories are shut off by the ECM and test results can be altered.

NOTICE Never force a multimeter probe into an electrical terminal.

TROUBLESHOOTING TIPS

Start troubleshooting by checking fault codes using the BRP diagnostic software (BUDS2). Make sure fuses are good; follow the service actions in the fault codes section. Refer to *DIAGNOSTIC AND FAULT CODES*.

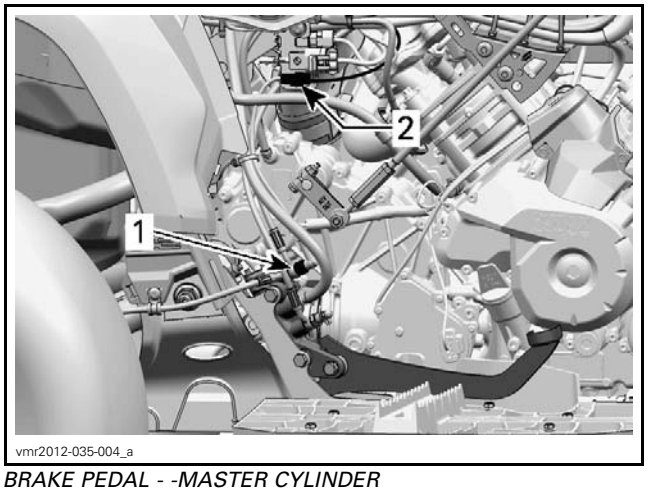
In BUDS2, the ABS module will not show up in the left menu if the ABS module does not communicate through CAN bus.

Carry out the tests in this subsection according to the fault codes informations. Refer to *DIAGNOSTIC AND FAULT CODES* subsection.

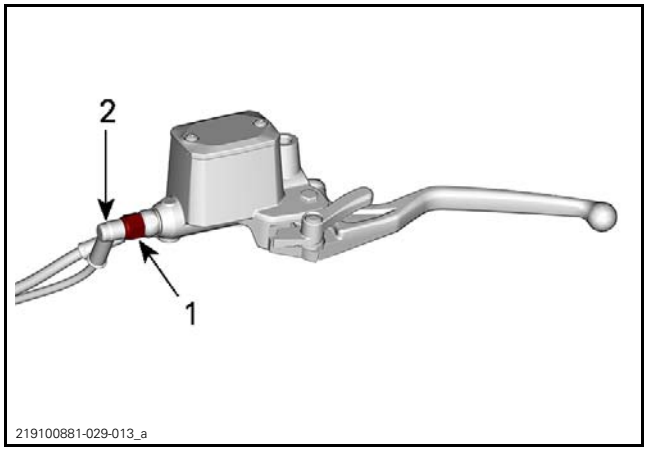
PROCEDURES

BRAKE LIGHT SWITCHES

Brake Light Switch Location



BRAKE PEDAL - -MASTER CYLINDER
1. Brake light switch
2. Brake light switch connector



BRAKE LEVER - -MASTER CYLINDER
1. Brake light switch
2. Brake light switch connector

Testing the Brake Light Switch

1. Connect the vehicle to the BRP diagnostic software (BUDS2) and go to:
   - – **Functions** page
   - – **ABS** button
   - – **Functions** tab

Do the **Routines - Brake Light Relay Test** to ensure the proper working of the system. If the brake lights don't light-up, continue testing.

2. Disconnect brake light switch connector.

3. Check switch operation as follows.

BRAKE LIGHT SWITCH POSITION	PIN		RESISTANCE
Firmly pushed	1	2	Close to 0 Ω
Released			Infinite (OL)

If switch is defective, replace with a new one.

If the switch tests good, verify wire continuity between harness connector and ECM connector. Refer to *WIRING DIAGRAM*.

REQUIRED TOOL	
ECM ADAPTER TOOL (P/N 529 036 166)	

Replacing the Brake Light Switch

Brake Light Switch Located on Brake Lever

1. Disconnect brake light switch connector.

2. Drain master cylinder.

NOTE: Use shop rags to catch any spilled brake fluid.

3. Replace brake light switch by a new one using **NEW** sealing washers.

4. Connect brake light switch connector.

5. Refill and bleed brake system, refer to *BLEEDING THE BRAKE FLUID* in this subsection.

Brake Light Switch Located on Master Cylinder

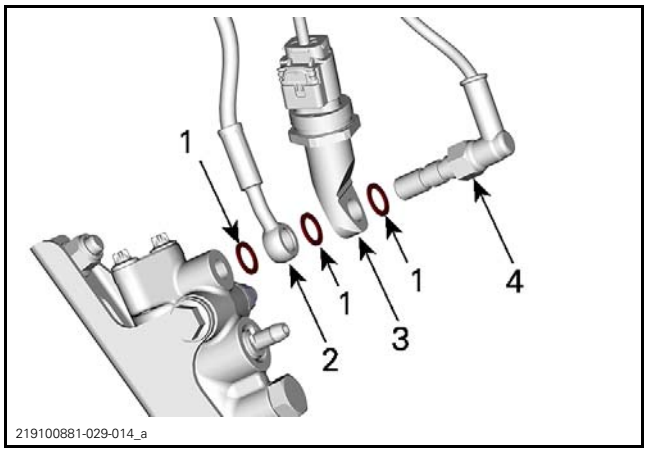
1. Disconnect brake light switch connector.

2. Drain brake line.

3. Remove brake light switch.

NOTE: Use shop rags to catch any spilled brake fluid.

4. Install the brake light switch using **NEW** sealing washers.



1. New sealing washer
2. Brake line banjo fitting
3. Pressure sensor banjo fitting
4. Brake light switch

TIGHTENING TORQUE	
Brake light switch	28.5 N•m ± 1.5 N•m (21 lbf•ft ± 1 lbf•ft)

5. Connect brake light switch connector.

6. Refill and bleed brake system, refer to *BLEEDING THE BRAKE FLUID* in this subsection.

BRAKE PEDAL

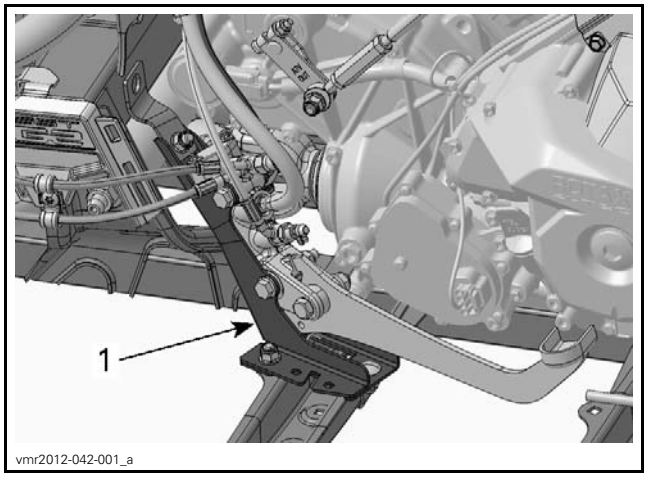
Removing the Brake Pedal

1. Drain brake system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

2. Remove RH footrest panel. Refer to *BODY* subsection.

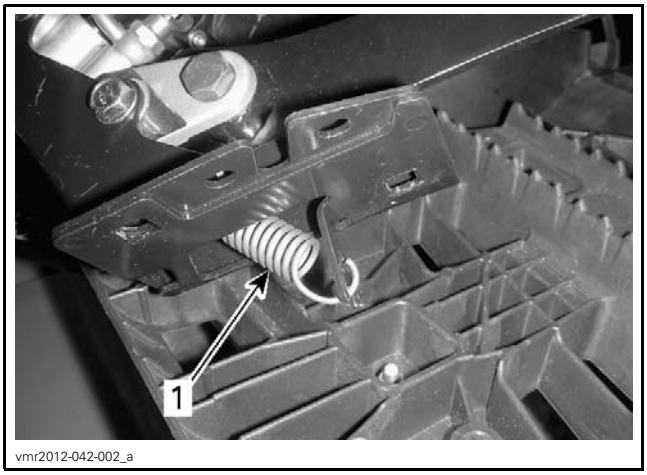
NOTE: Loosen brake pedal bolt before removing support from frame.

3. Remove master cylinder support from frame.



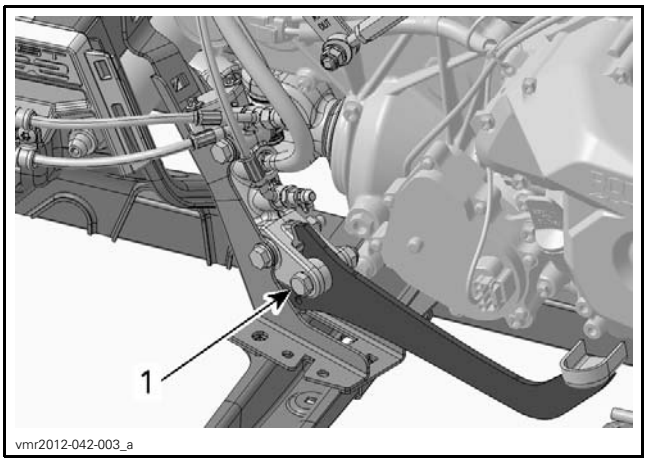
TYPICAL
1. Master cylinder support

4. Remove brake pedal spring.



1. Brake pedal spring

5. Remove brake pedal.



1. Brake pedal pivot bolt

Installing the Brake Pedal

The installation is the reverse of the removal procedure. However, pay attention to the following.

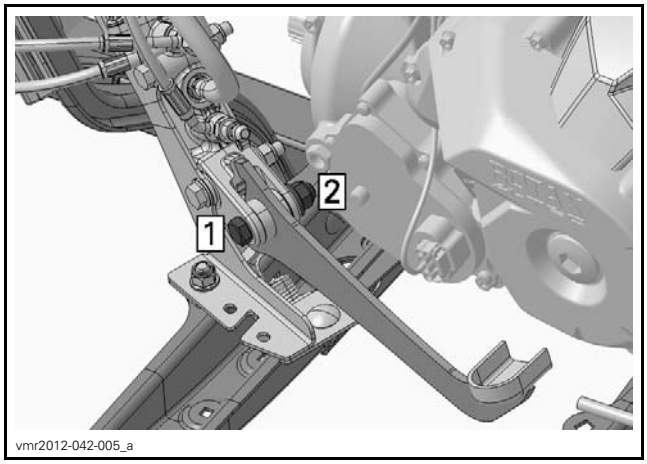
Install **NEW** brake pedal O-ring.

Lubricate brake pedal pivot.

RECOMMENDED SERVICE PRODUCT	
Scandinavia	SYNTHETIC GREASE (EUR) (P/N 779231)
All Other Countries	SYNTHETIC GREASE (P/N 779162)

Tighten brake pedal nut as per the following sequence.

TIGHTENING SEQUENCE		
STEP 1	Brake pedal bolt (pivot)	10 N•m ± 2 N•m (89 lbf•**in** ± 18 lbf•**in**)
STEP 2	Brake pedal nut	27.5 N•m ± 2.5 N•m (20 lbf•ft ± 2 lbf•ft)

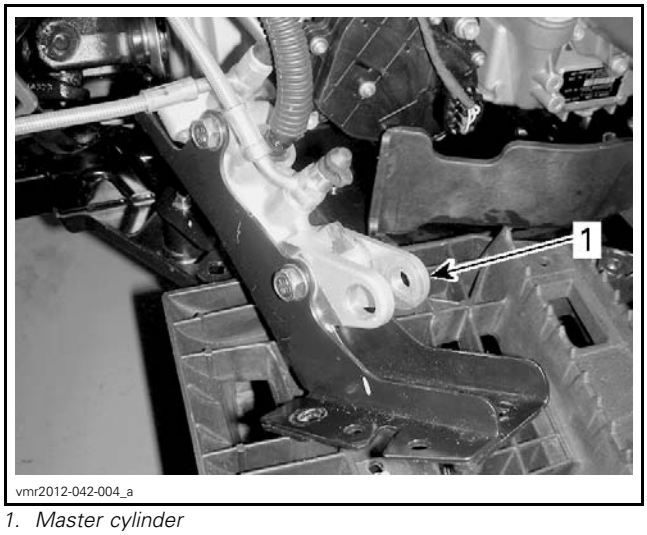


TIGHTENING SEQUENCE
Step 1: Tighten bolt
Step 2: Hold bolt then tighten nut

MASTER CYLINDER

Removing the Master Cylinder

1. Remove *BRAKE PEDAL*. See procedure in this subsection.
2. Remove master cylinder from support.



1. Master cylinder

3. Remove hoses and bleeder from master cylinder.
4. Discard sealing washers.

Inspecting the Master Cylinder

Check boot for crack.

Check rod for wear and scratch.

Check master cylinder housing for leak or damage.

Installing the Master Cylinder

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install NEW sealing washers.

Tighten brake hoses and bleeder to specification.

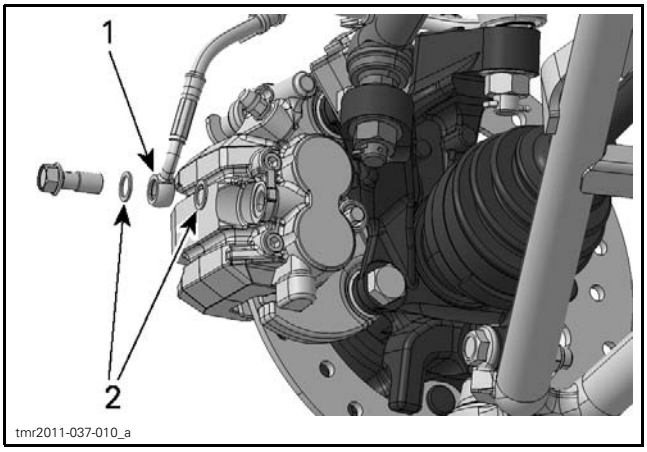
TIGHTENING TORQUE	
Brake hose screw (banjo fitting)	28.5 N•m ± 1.5 N•m (21 lbf•ft ± 1 lbf•ft)
Bleeder	8.5 N•m ± 1.5 N•m (75 lbf•**in** ± 13 lbf•**in**)

Refill and bleed brake system, refer to *BLEEDING THE BRAKE FLUID* in this subsection.

CALIPER

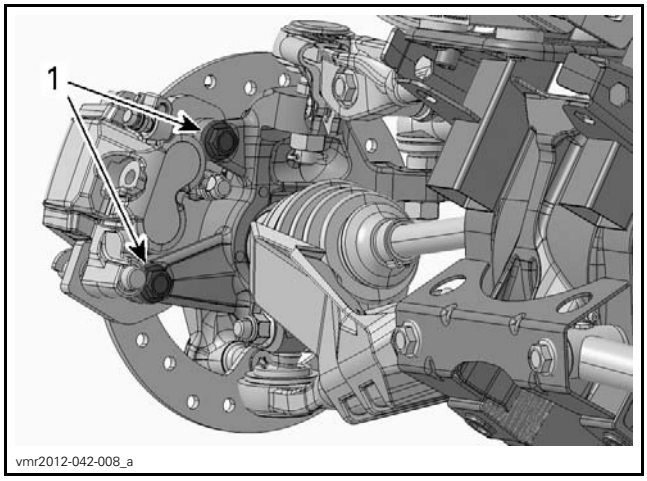
Removing the Caliper

1. Safely lift and support the vehicle.
2. Remove wheel, refer to *WHEELS AND TIRES* subsection.
3. If caliper is removed from vehicle for replacement:
   - 3.1 Drain brake system, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.
   - 3.2 Unscrew brake hose from caliper and discard sealing washers.



TYPICAL
1. Brake hose
2. Sealing washers (discard)

4. Remove fasteners retaining brake hose.
5. Remove and discard screws securing caliper support.



TYPICAL
1. Caliper screws (discard)

6. Place caliper assembly onto a support.

NOTICE **Do not let caliper hangs by the hose and do not stretch or twist hose.**

Installing the Caliper

The installation is the reverse of the removal procedure. However, pay attention to the following.

If caliper was removed for replacement:

– Install NEW sealing washers.
– Refill and bleed brake system, refer to *BLEEDING THE BRAKE FLUID* in this section.

Install NEW caliper retaining screws.

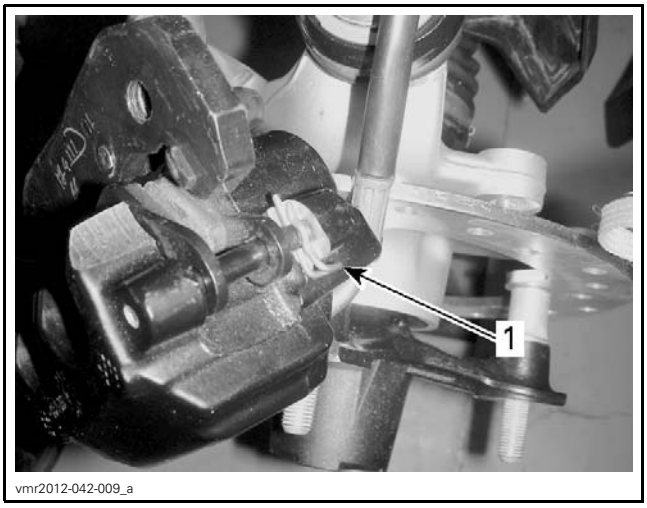
Tighten caliper retaining screws to specification.

TIGHTENING TORQUE	
Caliper retaining screws	61 N•m ± 9 N•m (45 lbf•ft ± 7 lbf•ft)

BRAKE PADS

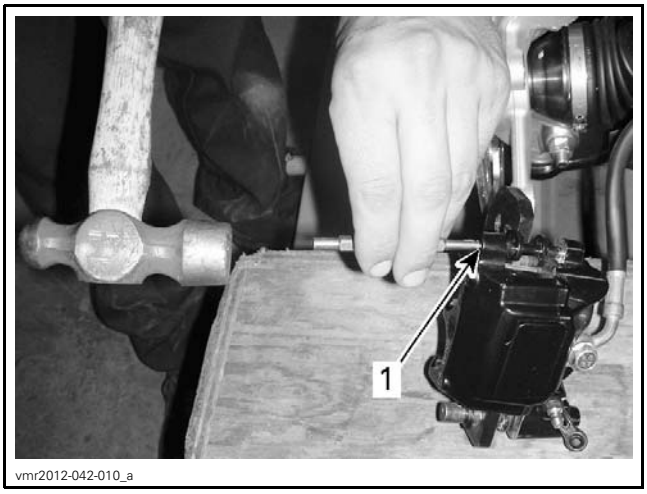
Replacing the Brake Pads

1. Remove caliper, refer to *REMOVING THE CALIPER* in this subsection.
2. Remove pin retainer securing brake pad pin.



1. Pin retainer

3. Remove brake pad pin from caliper.

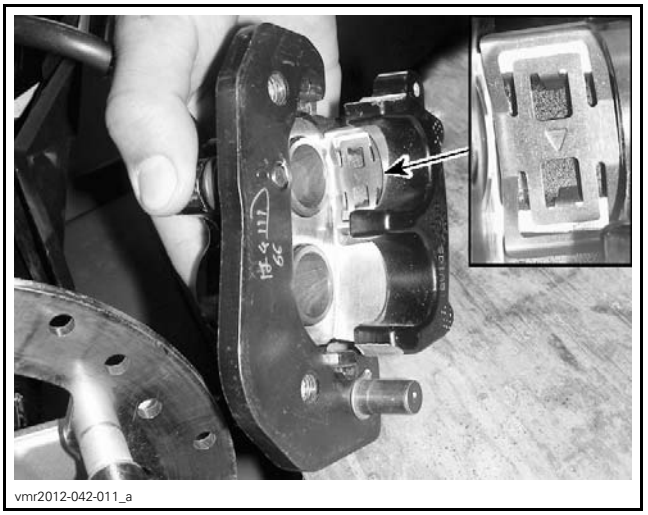


TYPICAL
1. Brake pad pin

4. Carefully remove brake pads.
5. Clean pistons end using the following product or and equivalent.

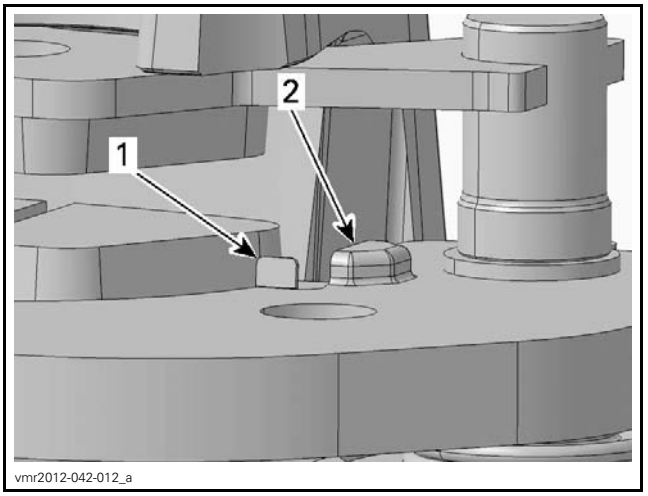
REQUIRED SERVICE PRODUCT
XPS BRAKES AND PARTS CLEANER (P/N 219 701 776)

6. Using an old pad and a C-clamp, push the caliper piston into the caliper.
7. Ensure brake pad spring is properly positioned onto caliper and not damaged.



BRAKE PAD SPRING

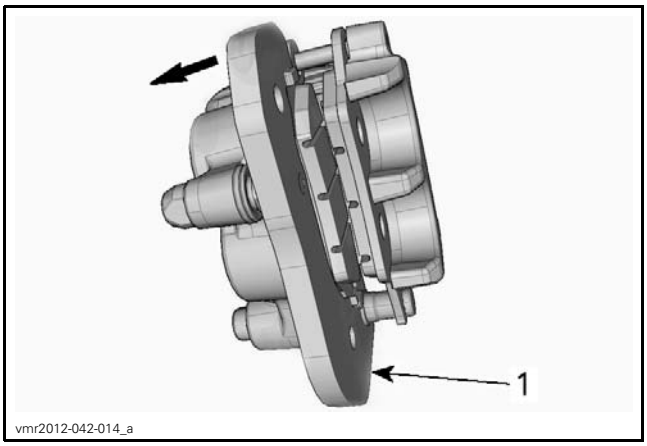
8. Ensure pad stopper is properly aligned with caliper support protrusion.



1. Pad stopper
2. Caliper support protrusion

NOTICE **Prior to installing brake pads, pad stopper must be properly positioned and not damaged.**

9. Install NEW brake pads.
10. Clean and install brake pad pin on caliper.
11. Install pin retainer to secure brake pad pin.
12. Slide caliper support completely into caliper.



1. Caliper support

13. Install caliper, refer to *INSTALLING THE CALIPER* in this subsection.

BRAKE DISC

Inspecting the Brake Disc

1. Check disc surfaces for scratches or grooves on both sides.
2. Measure thickness of the disc.

DISC MINIMUM THICKNESS	
FRONT	4.0 mm (.157 in)
REAR	

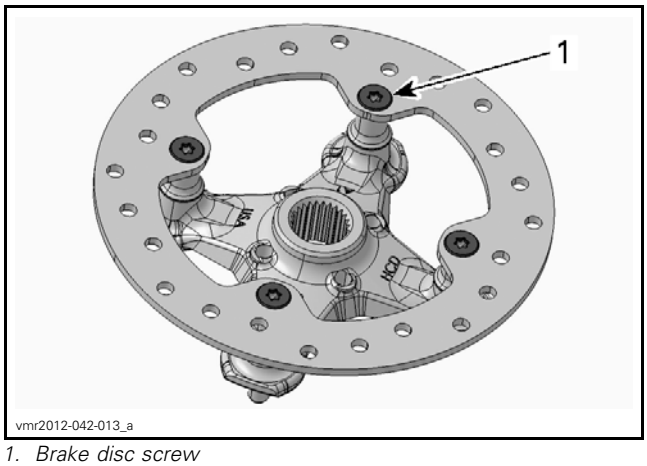
NOTICE Brake discs must never be machined.

3. Check warpage of the disc.

MAXIMUM DISC WARPAGE	
FRONT	0.2 mm (.01 in)
REAR	

Replacing the Brake Disc

1. Remove caliper, refer to *REMOVING THE CALIPER* in this subsection.
2. Remove wheel hub, refer to *FRONT DRIVE* or *REAR DRIVE* subsection.
3. Remove screws securing brake disc to wheel hub.



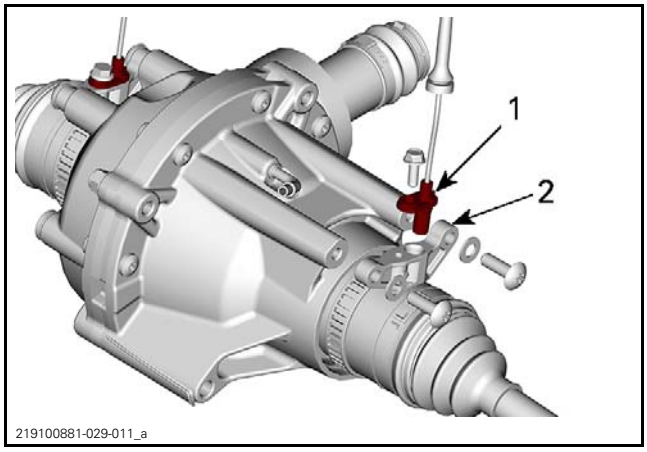
1. Brake disc screw

4. Replace brake disc.
5. Install NEW brake disc screws.

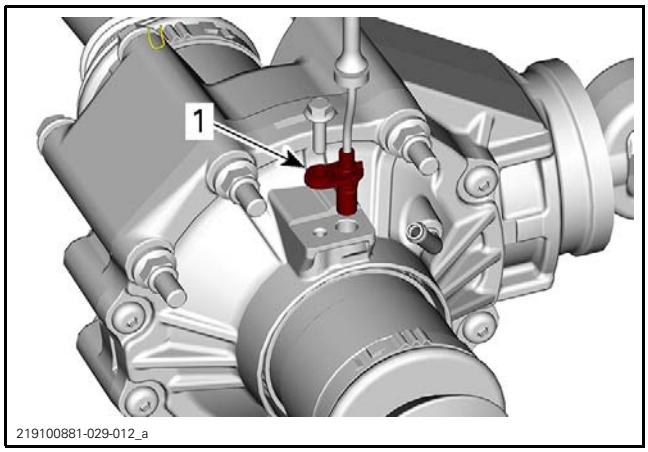
TIGHTENING TORQUE	
Brake disc screws	33.5 N•m ± 3.5 N•m (25 lbf•ft ± 3 lbf•ft)

6. Install wheel hub then caliper.
7. Install NEW cotter pin to secure wheel hub nut.

WHEEL SPEED SENSOR (WSS)



FRONT WHEEL SPEED SENSOR
1. Speed sensor
2. Speed sensor support



REAR WHEEL SPEED SENSOR
1. Speed sensor

Make sure that wheel sensors:
– Are securely fastened and undamaged.
– Are clean and free from debris.
– Support for the front speed sensors are securely fastened and undamaged.

Testing the WSS with BUDS2

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. Go to:
   – **Measurements** page
   – **ABS** button
3. Lift each wheel one at a time and manually rotate wheel.
4. Look in BUDS2 to see if the corresponding sensor needle moves.

Otherwise, perform the electrical tests.

If one of the sensor gauges does not respond to wheel rotation, refer to *TESTING THE WSS WIRING CONTINUITY* .

Testing the WSS Wiring Continuity

1. Disconnect the wheel speed sensor connector to be tested.
2. Disconnect ABS module connector, refer to *ABS MODULE CONNECTOR ACCESS* in this subsection.
3. Set multimeter to Ω.
4. Measure wiring resistance as follows.

NOTICE **To avoid damaging the connector, probe only the terminal tip.**

SENSOR	SENSOR TERMINAL	ABS MODULE CONNECTOR PIN	MEASUREMENT
Front LH	1	19	Close to 0 Ω (continuity)
	2	8	
Front RH	1	16	
	2	4	
Rear	1	17	
	2	29	

If continuity test failed, repair wiring or connectors.

If continuity test succeeded, try a new sensor.

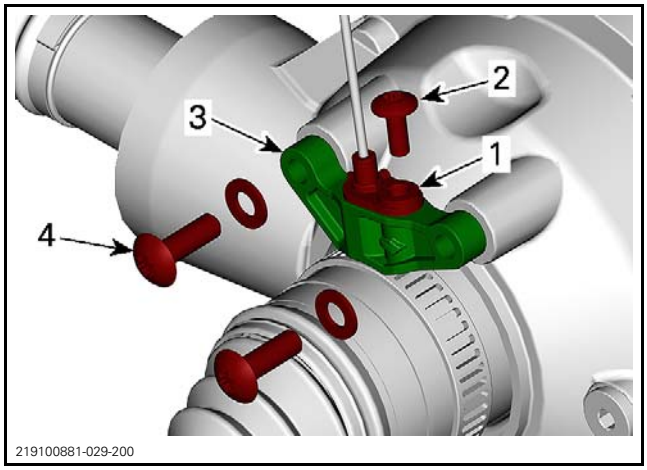
If problem persists, try a new ABS module.

Replacing the WSS

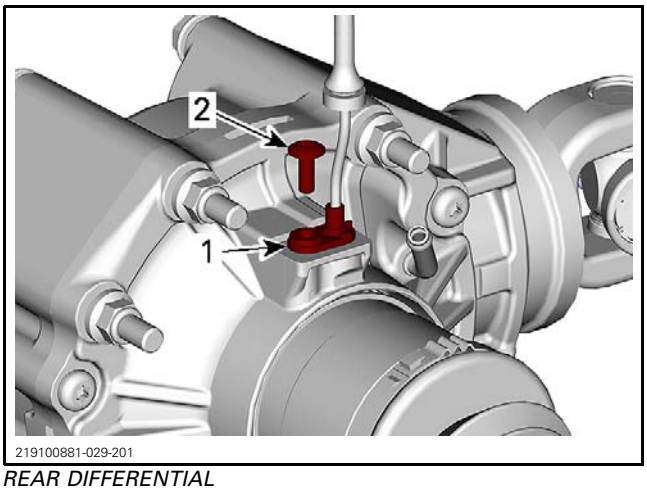
1. Unplug the WSS connector.
2. Remove screw securing the WSS on its support (front) or on the differential (rear).
3. Pull the WSS upwards to remove it.

The installation is the reverse of the removal procedure. However, pay attention to the following.

TIGHTENING TORQUE	
WSS retaining screw	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)
WSS support screw	13.5 N•m ± 1.5 N•m (119 lbf•**in** ± 13 lbf•**in**)

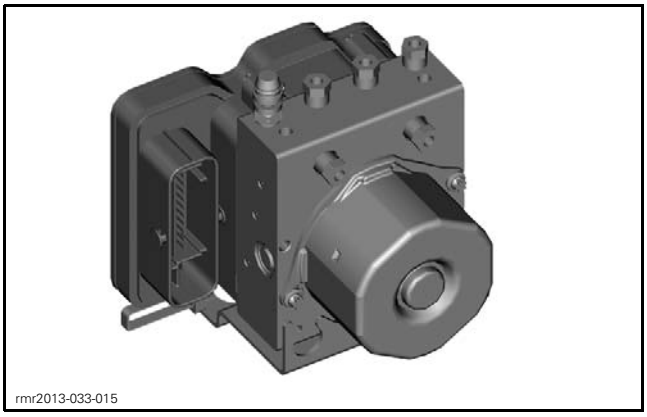


FRONT DIFFERENTIAL
1. WSS
2. WSS retaining screw
3. WSS support
4. WSS support screw



REAR DIFFERENTIAL
1. *WSS*
2. *WSS retaining screw*

ABS MODULE (ABS)



TYPICAL

Troubleshooting the ABS Module

A ABS module failure is not likely to occur. These modules have proven to be very reliable. Prior to replacing a suspected ABS module, take the following into account.

The problem can be related to a hydraulic function, check the following:

– Brake fluid level
– Brake line leaking, bent or pinched
– Brake caliper
– Master cylinder (including piston rod position).

The problem can be related to an electric function, check the following:

– Fault codes
– ABS module electrical connector.
– Wiring harness condition.

If pins or terminals are not clean, check ABS module harness connector seal condition and ensure connector mechanism properly locks connector seal against ABS module.

Try cleaning terminals with DEOXIT LUBRICANT (P/N 293 550 034) before reconnecting the ABS module connector to see if it "cures" the problem.

As a final test, try a new ABS module **without** disconnecting brake lines from the old ABS module. Proceed as follows:

IMPORTANT: Disconnecting brake lines would require the system bleeding.

1. Connect ABS module connector to a new ABS module.
2. Turn ignition switch ON.

NOTE: It is normal that some fault codes appear at this time.

3. Reset learned vehicle variant using BUDS2.
   – **Settings** page
   – **ABS** button
   – **Settings** tab
4. Turn ignition switch OFF for 30 seconds.
5. Turn ignition switch ON.
6. If problem persists, the trouble is elsewhere.
7. If problem is now solved, the ABS module in the vehicle is faulty. Install the new ABS module in the vehicle.

⚠ WARNING

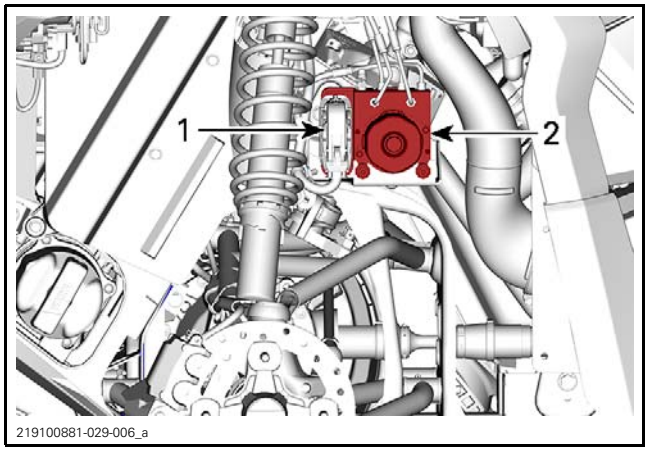
Never ride a vehicle with a ABS module temporarily installed.

ABS Module Connector Access

⚠ WARNING

The ABS module motor and valves are always powered. Always disconnect the battery prior to disconnecting ABS module connector.

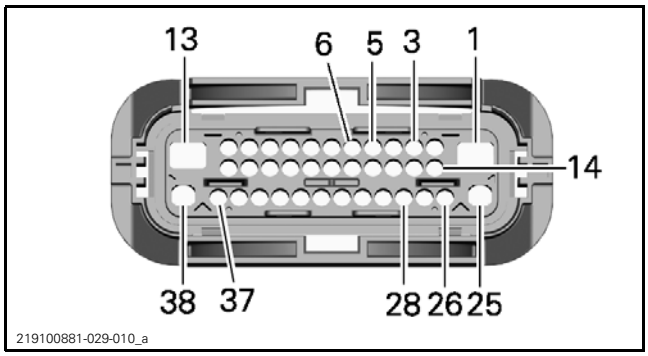
Connector can be accessed from the front LH side behind the inner fender as illustrated.



LH SIDE
1. *Connector*
2. *ABS module*

ABS Module Power Supply Pinout

FUNCTION	ABS MODULE CONNECTOR TERMINAL
Power from ignition switch	28
Hydraulic pump power	1
Hydraulic valves power	25
Hydraulic pump ground	13
ECM ground	38
Can high	26
Can low	14
Brake Light Output (to brake relay)	3
5V Output	5
Pressure Signal	37
Analog Ground	6



ABS MODULE HARNESS CONNECTOR PINOUT

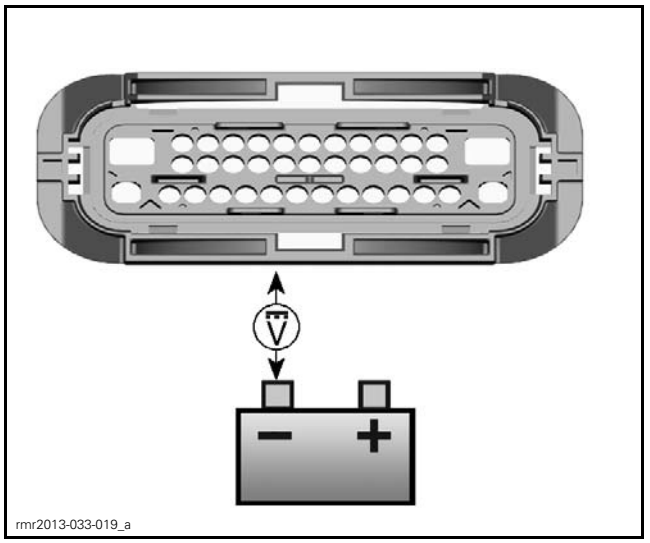
Testing the ABS Module Input Voltage

1. Disconnect ABS module connector.
2. Turn ignition switch ON.
3. Test for input voltage as follows.

NOTICE **To avoid damaging the connector, probe only the tip of the terminal.**

NOTE: Refer to *ABS MODULE POWER SUPPLY PINOUT* in this subsection for pin identification.

ABS MODULE CONNECTOR	BATTERY	VOLTAGE
Pin 28	Ground	Battery voltage



If voltage is not good, check wiring/connectors from battery through ignition switch to ABS module harness connector. Refer to *WIRING DIAGRAM*.

If voltage is good, test for input voltage as follows.

NOTE: Ignition switch can be either ON or OFF.

ABS MODULE CONNECTOR	BATTERY	VOLTAGE
Pin 1	Ground	Battery voltage
Pin 25	Ground	

If voltage is not good, check wiring/connectors from battery to ABS module harness connector. Refer to *WIRING DIAGRAM*.

If voltage is good, carry out the *TESTING THE ABS MODULE GROUND CIRCUIT* in this subsection.

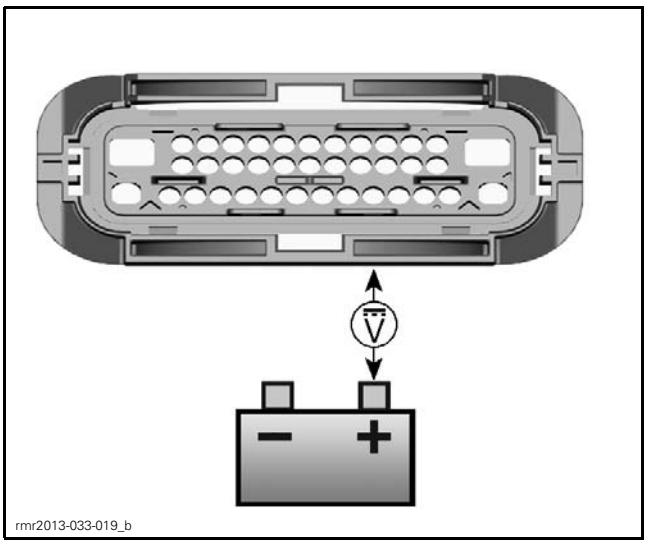
Testing the ABS Module Ground Circuit

1. Connect multimeter RED probe to a positive source such as the battery terminal of the starter solenoid.

2. Probe pin 13, then pin 38 of the ABS module connector with the BLACK (COM) probe of the multimeter.

NOTE: Refer to *ABS MODULE POWER SUPPLY PINOUT* in this subsection for pin identification.

ABS MODULE CONNECTOR	BATTERY	VOLTAGE
Pin 13	Positive source	Battery voltage
Pin 38	Positive source	



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If ground circuits are not good, check wiring from ABS module harness connector to chassis ground located on the front part of the frame. Refer to *WIRING DIAGRAM*.

If ground circuits are good, carry out the *TESTING THE ABS MODULE CAN LINE RESISTOR* in this subsection.

Testing the ABS Module CAN Line Continuity

Read wiring resistance between diagnostic link connector and ABS module.

NOTE: Refer to *ABS MODULE POWER SUPPLY PINOUT* in this subsection for pin identification.

NOTICE To avoid damaging the connector, probe only the terminal tip.

ABS MODULE CAN LINE			
CAN*	PROBES		RESULT
High	ABS module connector pin 26	Diagnostic link connector pin 1	Close to 0 Ω (continuity)
Low	ABS module connector pin 14	Diagnostic link connector pin 2	
* CAN: Serial data communication			

If continuity is not good, check wiring and connectors from diagnostic link connector (DLC) to ABS module connector. Refer to applicable *WIRING DIAGRAM*.

If everything tested good and ABS module does not work, try a new ABS module.

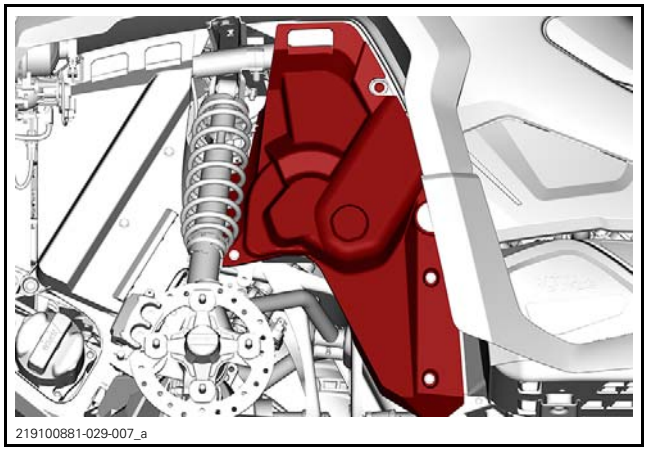
Removing the ABS Module

⚠ WARNING

Cleanliness is critical when working with the ABS module and brake lines. All precautions must be taken to prevent any foreign particle from entering the brake system.

NOTE: Before replacing the ABS module, make sure electrical and hydraulic systems are in good condition.

1. Disconnect battery. Refer to *CHARGING SYSTEM* subsection.
2. Remove wheel and inner fender panel.

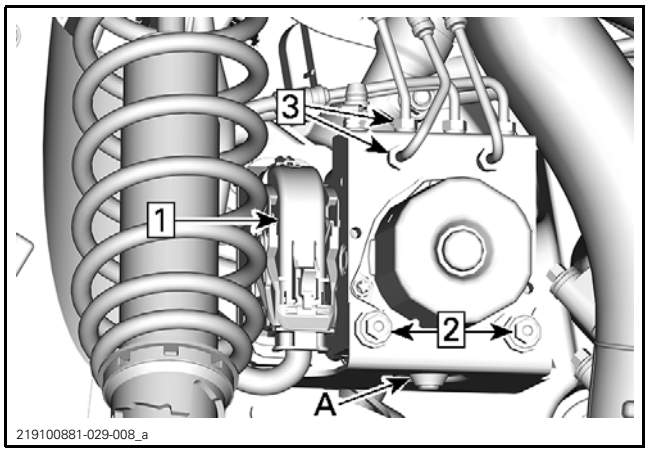

219100881-029-007_a

3. Using compressed air, clean:
   – The ABS module and brake line fittings
   – The area around the ABS module.

4. Use XPS Heavy Duty Cleaner to thoroughly clean the parts. Blow compressed air again and thoroughly dry the parts.

NOTICE Disconnect brake lines from the ABS module only just prior to installing the new ABS module. The shorter the time the brake lines are open, the lesser the possibility of brake system contamination.

5. Disconnect ABS module connector.
6. Disconnect brake lines.
7. Remove ABS module from frame.
8. Pull assembly out of position to dislodge grommet.



A. Rubber gromet

Step 1: Disconnect ABS module connector
Step 2: Remove retaining screws
Step 3: Disconnect brake lines

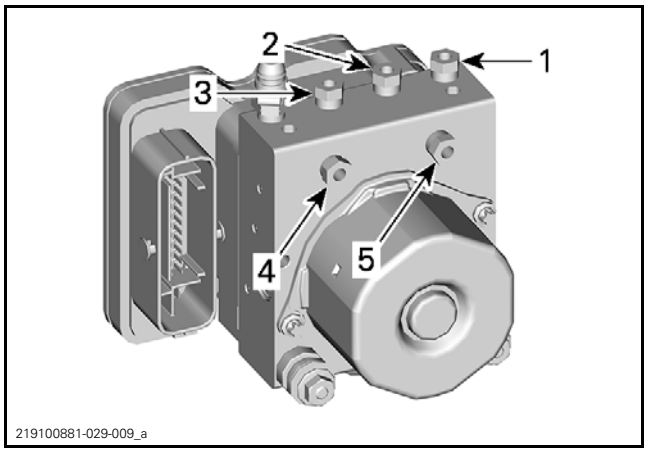
9. Pull grommet out of ABS module support and pull out ABS module towards the LH side of vehicle. Discard grommet.

Installing the ABS Module

NOTICE Keep the protective plugs on new ABS module until brake line installation.

The installation is the reverse of the removal procedure. However, pay attention to the following:

1. Install **NEW** grommet.
2. Remove protective plugs from ABS module brake line ports.
3. Make sure to reinstall brake lines as illustrated.



1. To LH front brake caliper
2. To RH front brake caliper
3. To rear brake caliper
4. From brake pedal
5. From brake handle

4. Tighten ABS module mounting screws to specification.

TIGHTENING TORQUE	
ABS module mounting screw	8 N•m ± 2 N•m (71 lbf•**in** ± 18 lbf•**in**)

5. Make sure the ABS module connector is properly installed and locked.
6. Bleed the ABS module, refer to *BLEEDING THE BRAKE FLUID*.

⚠ WARNING

Brake bleeding must be performed to remove any air trapped in the brake system. Refer to *BLEEDING THE BRAKE FLUID*.

After bleeding, refer to *DIAGNOSTIC AND FAULT CODES* and do the following:

– Check and clear fault codes
– Reset ABS module variant if ABS module is used.

BRAKE SYSTEM PRESSURE SENSOR

NOTICE Do not pump up the brake pedal repeatedly before doing the validation.

1. Connect the vehicle to the BRP diagnostic software (BUDS2).
2. Go to:
   – **Measurements** page
   – **ABS** button
   – **Presets** tab.

3. Look at **TI Front Pressure Sensor** and **TI Rear Pressure Sensor** for increased pressure when applying the brakes.
4. If no pressure is shown, perform *TESTING PRESSURE SENSOR WIRING CONTINUITY*.

Testing the Pressure Sensor Wiring Continuity

1. Disconnect the pressure sensor connector.
2. Disconnect ABS module connector, refer to *ABS MODULE CONNECTOR ACCESS* in this subsection.
3. Set multimeter to Ω.
4. Measure wiring resistance as follows.

NOTICE **To avoid damaging the connector, probe only the terminal tip.**

SENSOR TERMINAL	ABS MODULE CONNECTOR PIN	MEASUREMENT
PSI - 5	ABS - 5	5 V
PSI - 4	ABS - 37	Signal
PSI - 3	ABS - 6	Ground

If continuity test failed, repair wiring or connectors.

If continuity test succeeded, try a new sensor.

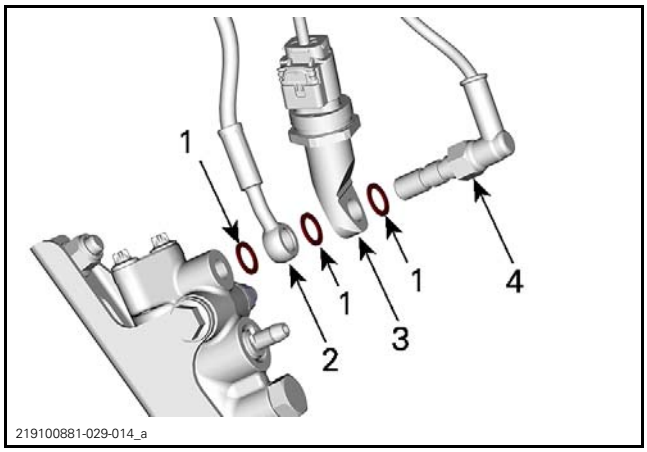
If problem persists, try a new ABS module.

Replacing the Pressure Sensor

1. Remove brake light switch, refer to *BRAKE LIGHT SWITCH LOCATED ON MASTER CYLINDER*.
2. Disconnect pressure sensor electrical connector.
3. Remove pressure sensor with its banjo fitting.
4. Put banjo fitting in a vise fitted with non-marring soft jaws.
5. Apply brake fluid on tip and threads of new sensor and install on banjo fitting.
6. Tighten sensor to specification.

TIGHTENING TORQUE	
Pressure sensor	32.5 N•m ± 2.5 N•m (24 lbf•ft ± 2 lbf•ft)

7. Remove banjo fitting from vise.
8. Install **NEW** sealing washers.
9. Install brake light switch.



1. Sealing washers
2. Brake line banjo fitting
3. Pressure sensor banjo fitting
4. Brake light switch

TIGHTENING TORQUE	
Brake light switch	28.5 N•m ± 1.5 N•m (21 lbf•ft ± 1 lbf•ft)

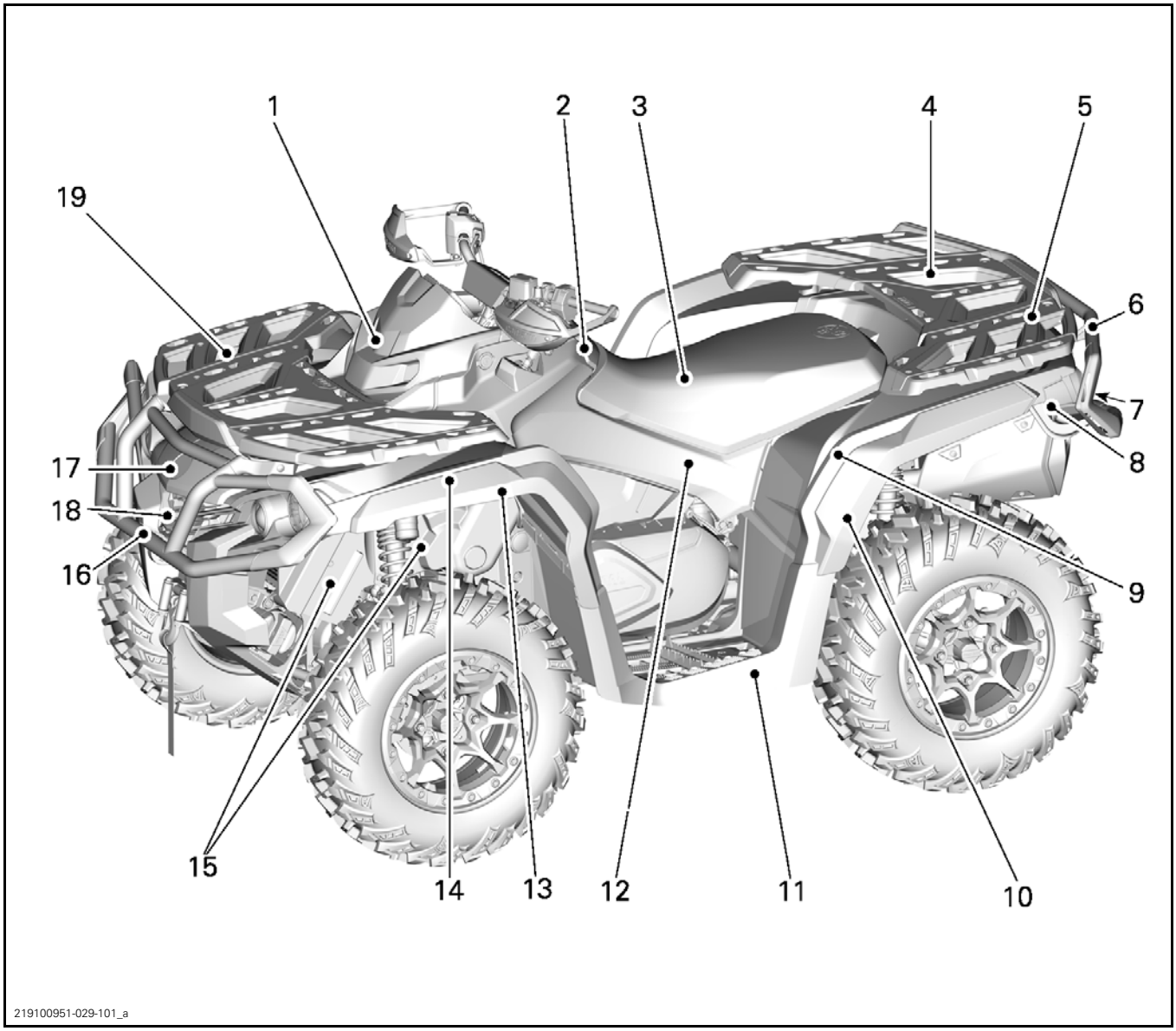
10. Connect brake light switch connector.
11. Refill and bleed brake system, refer to *BLEEDING THE BRAKE FLUID* in this subsection.
12. Reset the new sensor, connect the vehicle to the BRP diagnostic software (BUDS2) and go to:
    - **Settings** page
    - **ABS** button
    - **Settings** tab
    - **Initializations - Reset Offset External Pressure Sensor**
13. Follow the on-screen instructions.

BODY

SERVICE TOOLS

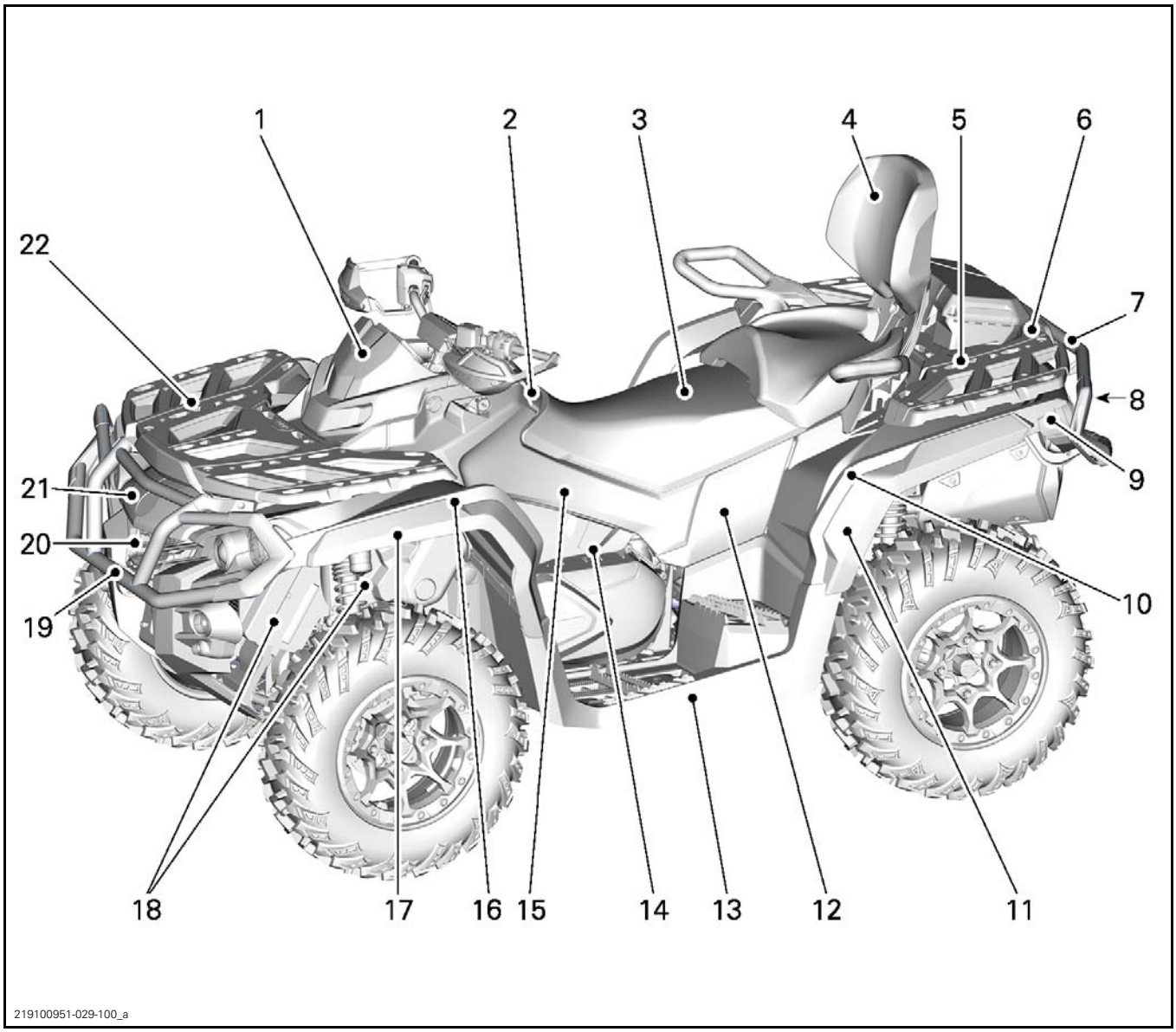
Description	Part Number	Page
OETIKER PLIER	295 000 070	11

BODY PARTS NOMENCLATURE (SHORT MODELS)



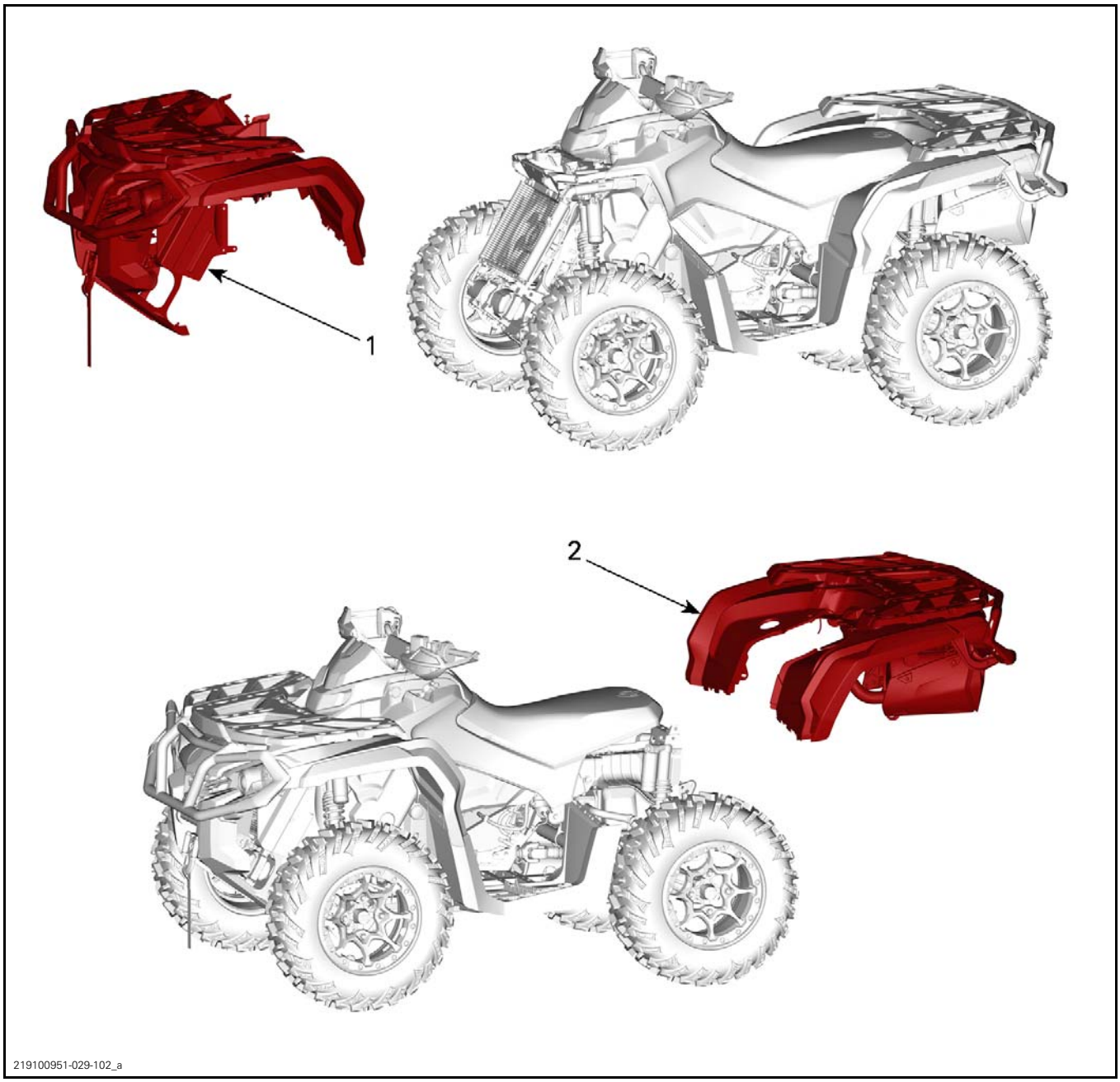
1. *Gauge support*
2. *Console*
3. *Seat*
4. *Rear top panel (under rear rack)*
5. *Rear rack*
6. *Rear bumper*
7. *Rear storage compartment*
8. *Rear fascia*
9. *Rear fender*
10. *Rear mud guard*
11. *Footrest*
12. *Side panel*
13. *Front mud guard*
14. *Front fender*
15. *Inner fender panels*
16. *Front bumper*
17. *Hood*
18. *Front fascia*
19. *Front rack*

BODY PARTS NOMENCLATURE (MAX MODELS)



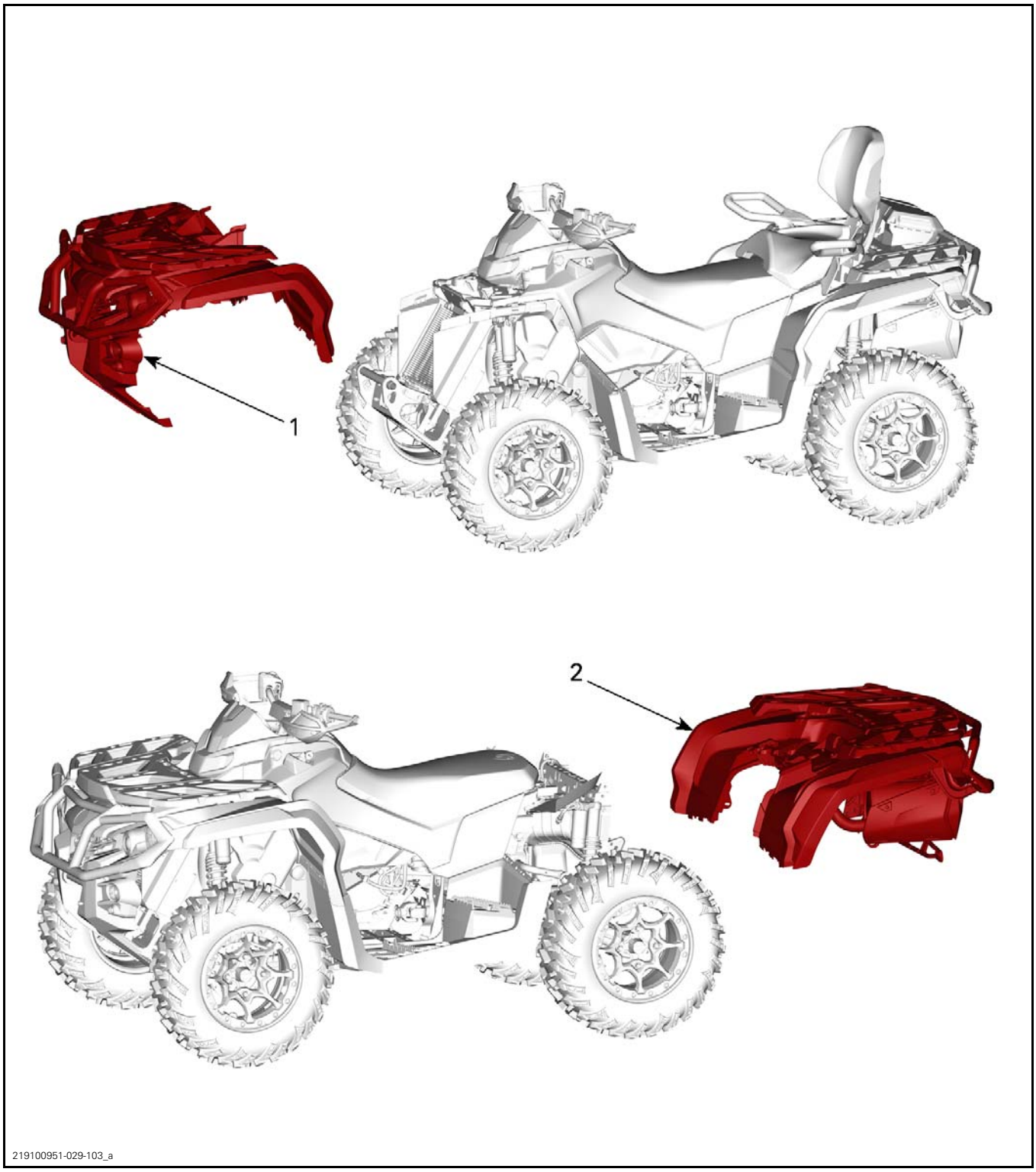
1. *Gauge support*
2. *Console*
3. *Seat*
4. *Passenger seat*
5. *Rear top panel (under rear rack)*
6. *Rear rack*
7. *Rear bumper*
8. *Rear storage compartment*
9. *Rear fascia*
10. *Rear Fender*
11. *Rear mud guard*
12. *Rear side panel extension*
13. *Footrest*
14. *Panel extension*
15. *Side panel*
16. *Front fender*
17. *Front mud guard*
18. *Inner fender panels*
19. *Front bumper*
20. *Front fascia*
21. *Hood*
22. *Front rack*

FRONT AND REAR BODY MODULES (SHORT MODELS)



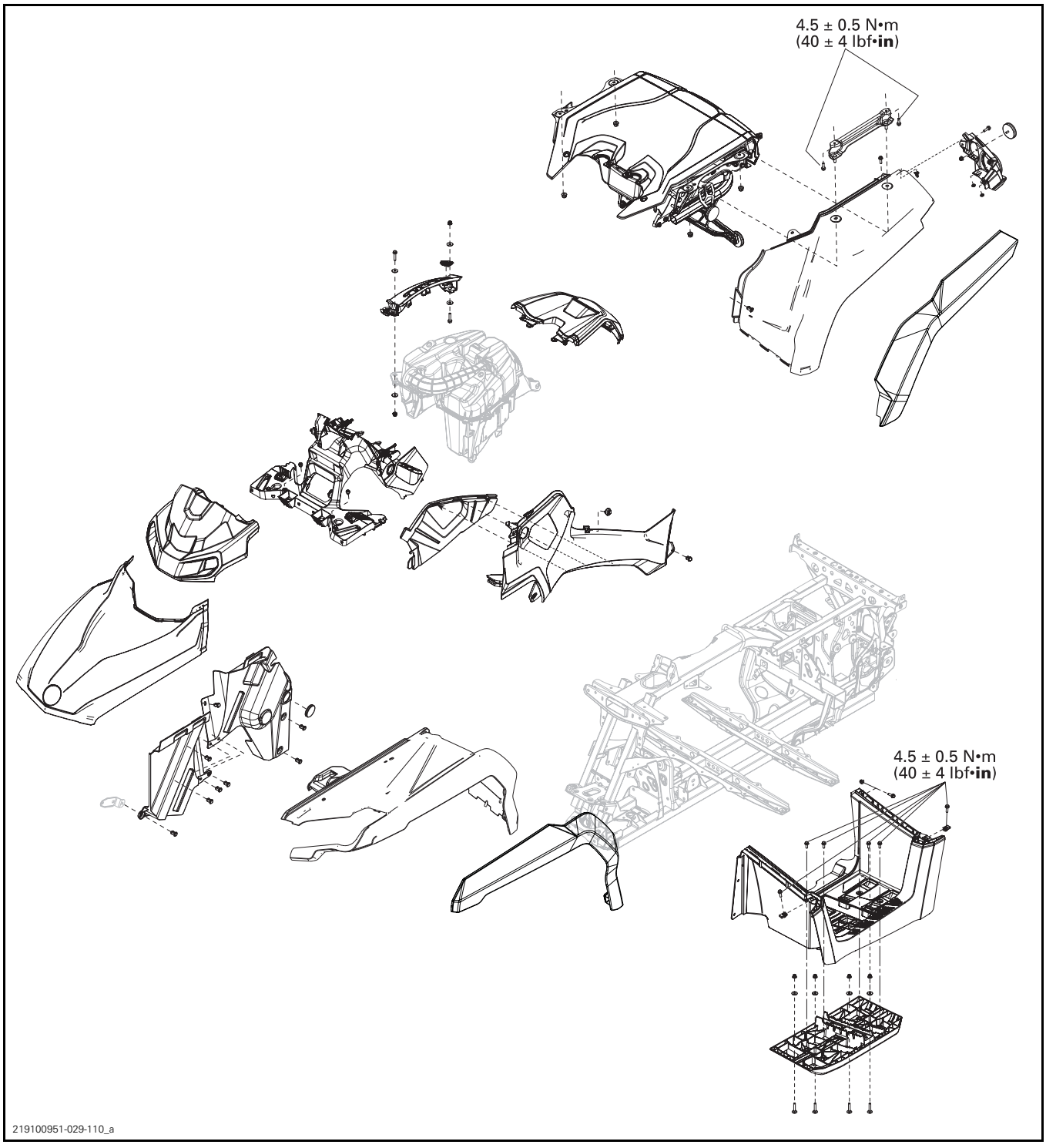
1. *Front body module*
2. *Rear body module*

FRONT AND REAR BODY MODULES (MAX MODELS)

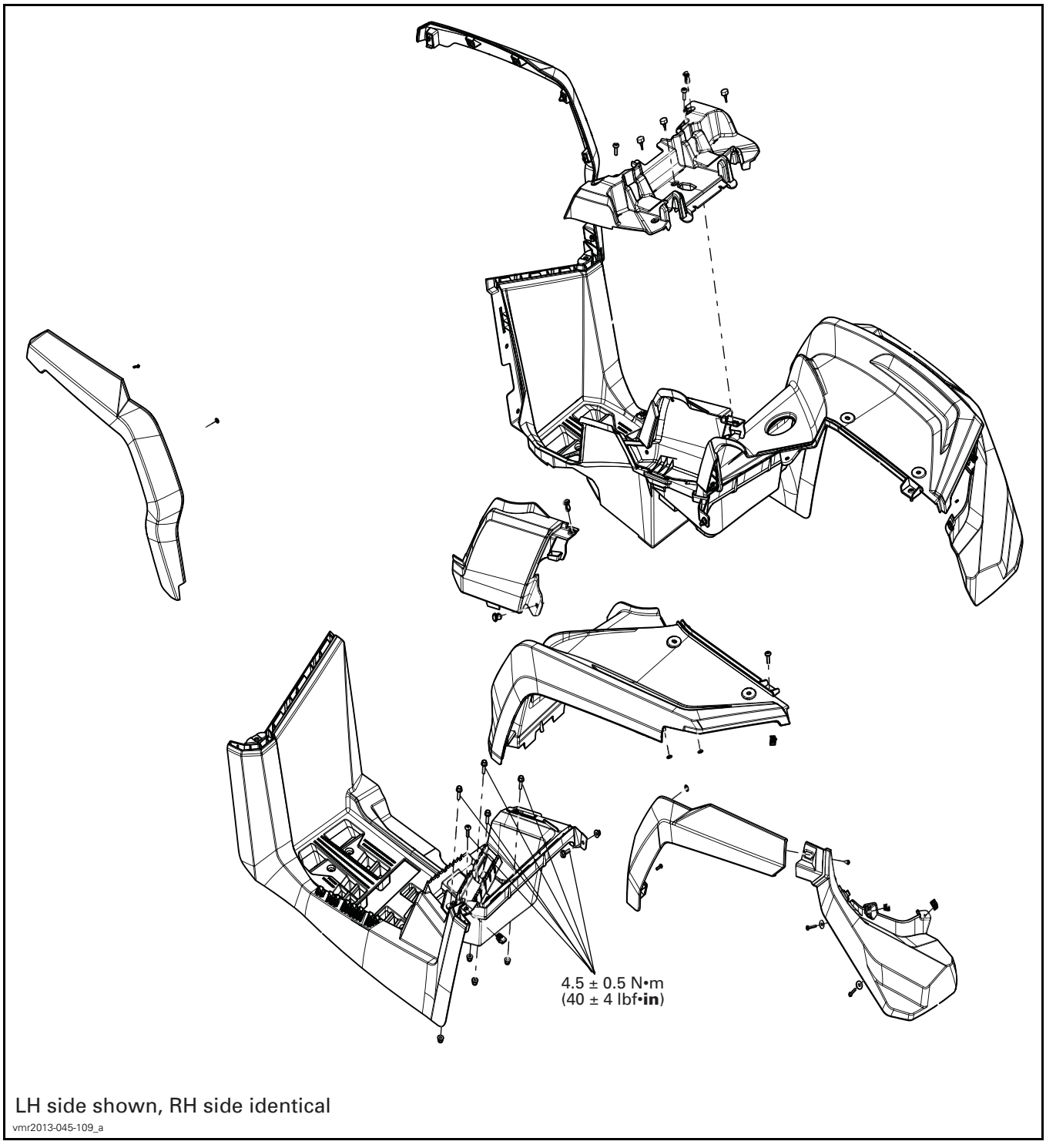


1. *Front body module*
2. *Rear body module*

BODY PARTS (SHORT MODELS)



BODY PARTS (MAX MODELS)



LH side shown, RH side identical

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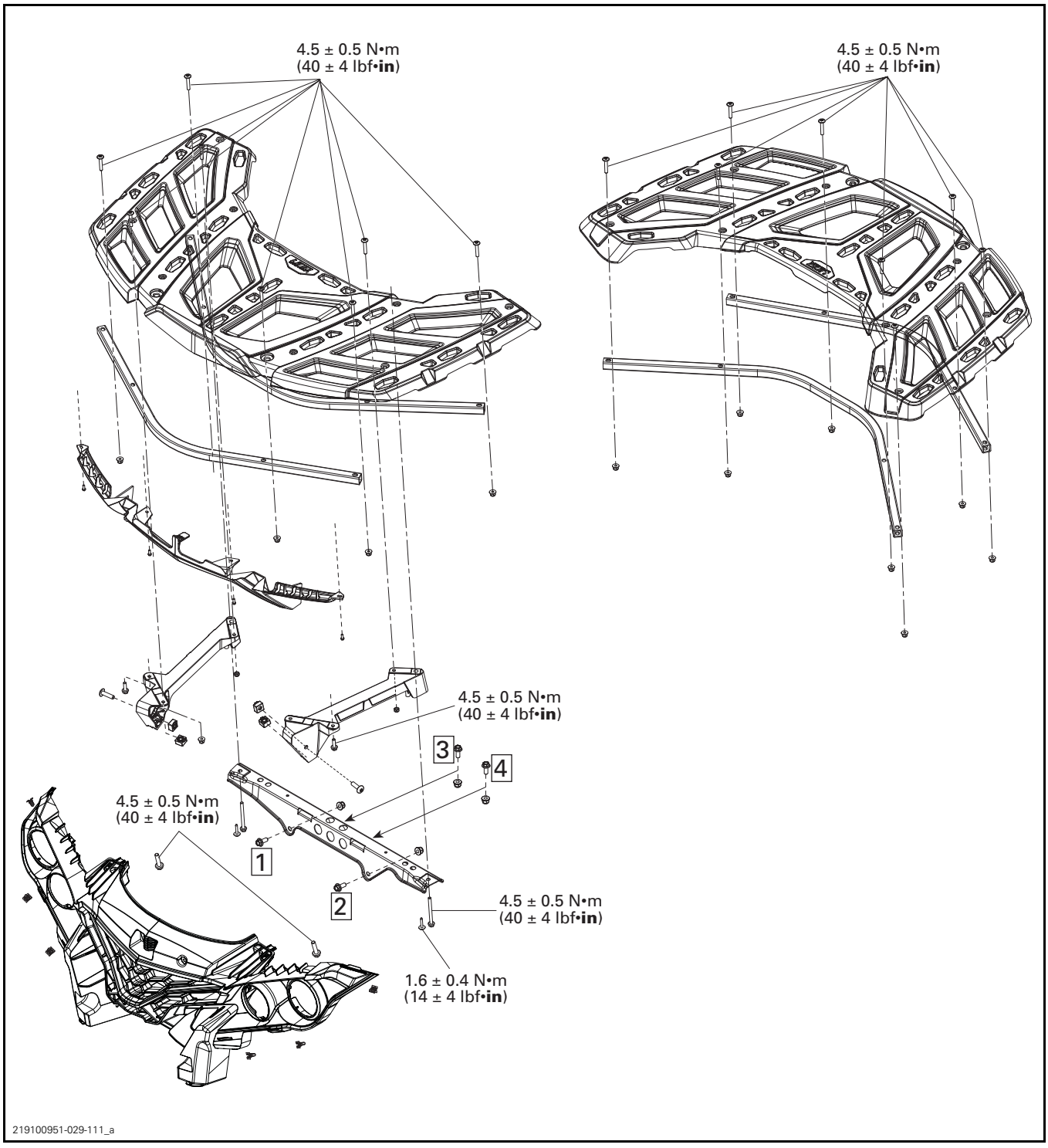
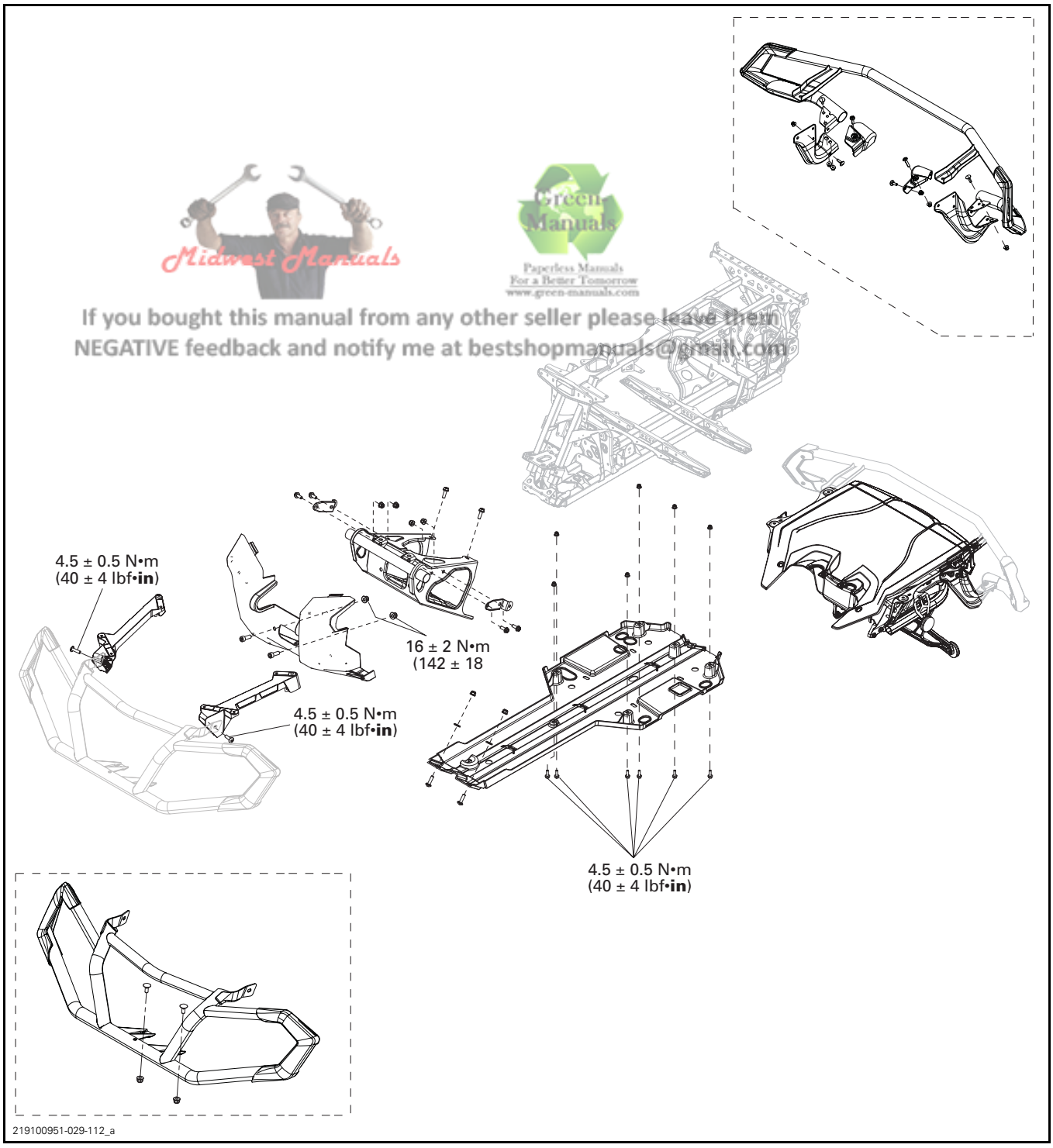
RACKS AND BODY PARTS



BUMPERS AND BODY PARTS



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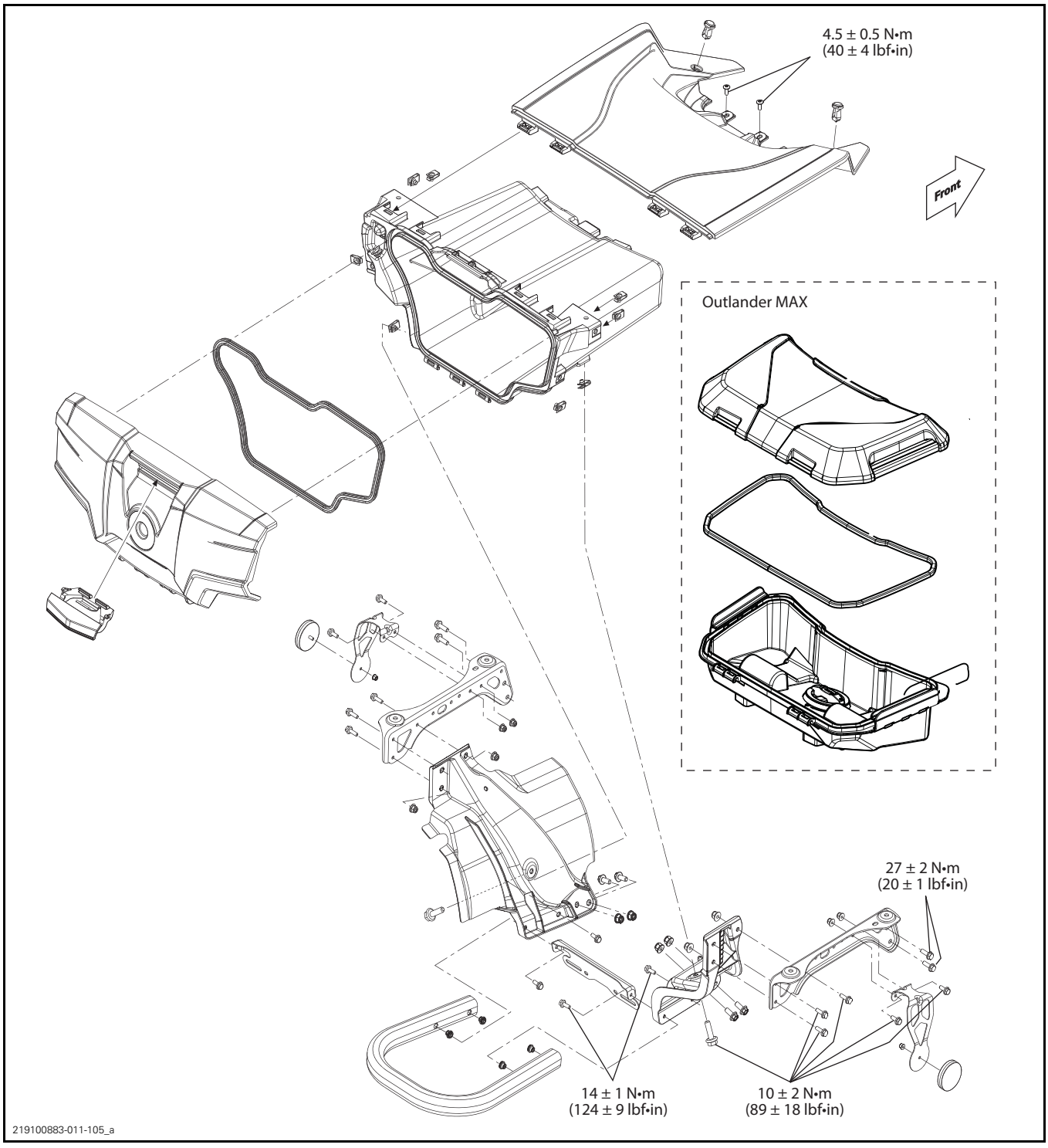
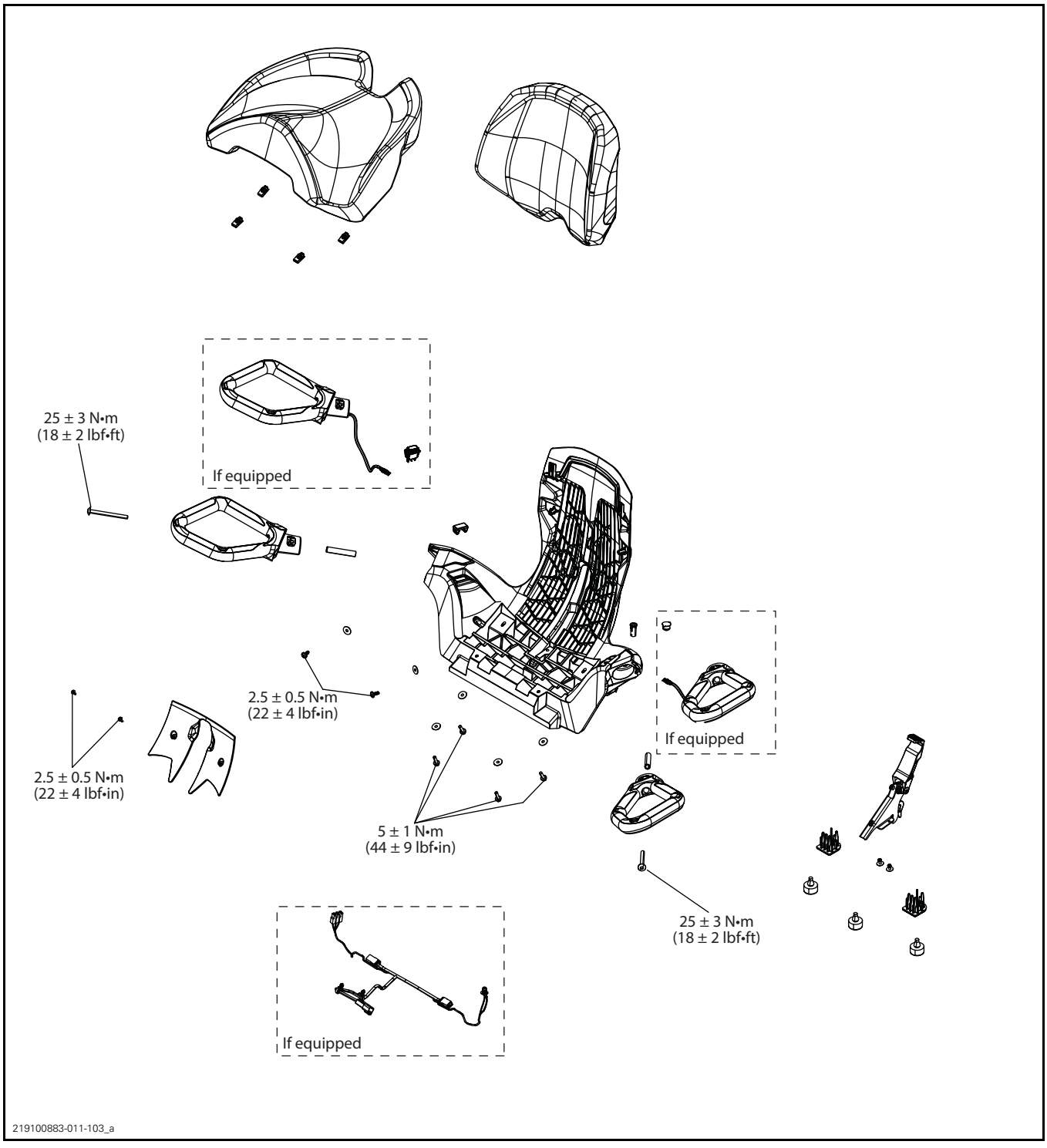
REAR STORAGE COMPARTMENT



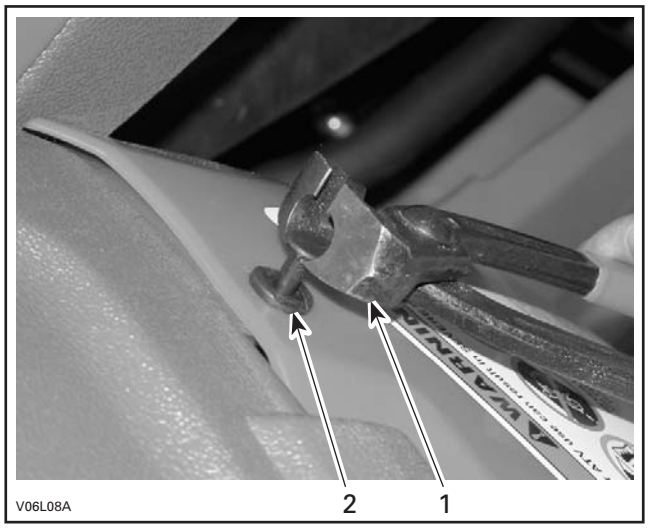
PASSENGER SEAT



PROCEDURES

PLASTIC RIVET

Plastic rivets are used in the riveting of the various body parts. Plastic rivets can be reused many times. Use the OETIKER PLIER (P/N 295 000 070) to remove them.



TYPICAL
1. *Pliers*
2. *Plastic rivet*

DECALS

Removing the Decal

Using a heat gun warm up one end of decal for a few seconds until decal can roll off when rubbing with your finger.

Pull decal slowly and when necessary apply more heat to ease removal on the area that has to be peeled off.

If decal tears while pulling off, it has to be heated for a few seconds longer. If decal tends to stretch while pulling off, stop heating and wait a few seconds to let it cool, then peel it off.

Installing the Decal

Using isopropyl alcohol, clean the surface and dry thoroughly.

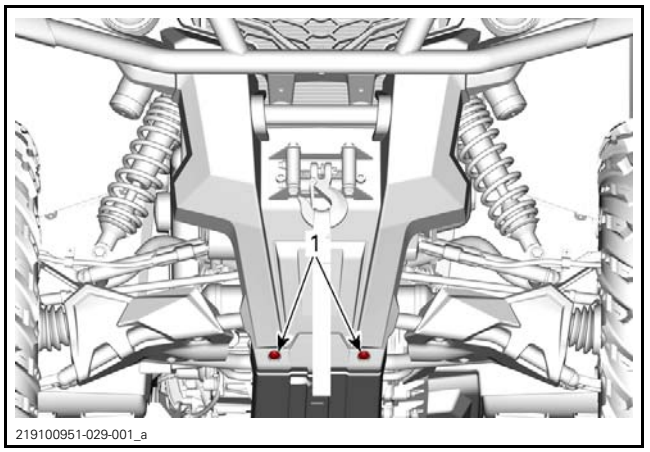
Apply liquid soap to new decal and carefully position it. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.

NOTICE **Do not apply isopropyl alcohol or solvent directly on decals. Use these products in a well ventilated area.**

FRONT BODY MODULE

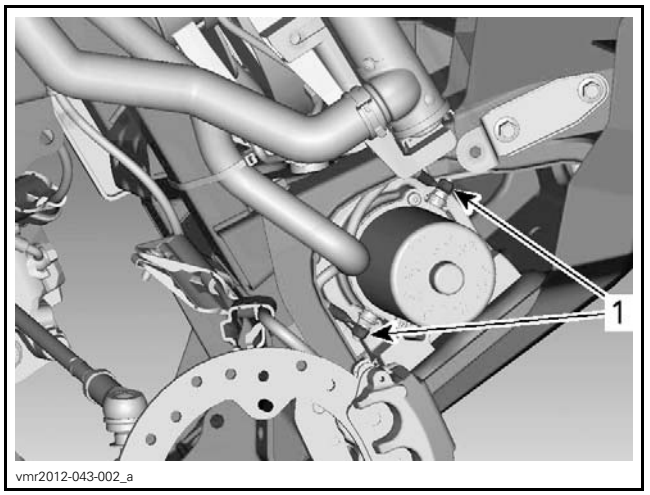
Removing the Front Body Module

1. Disconnect battery negative (-) cable.
2. Remove the side panels. Refer to *REMOVING THE SIDE PANEL*.
3. Remove the inner fender panels. Refer to *REMOVING AND INSTALLING THE INNER FENDER*
4. Remove front skid plate retaining screws.



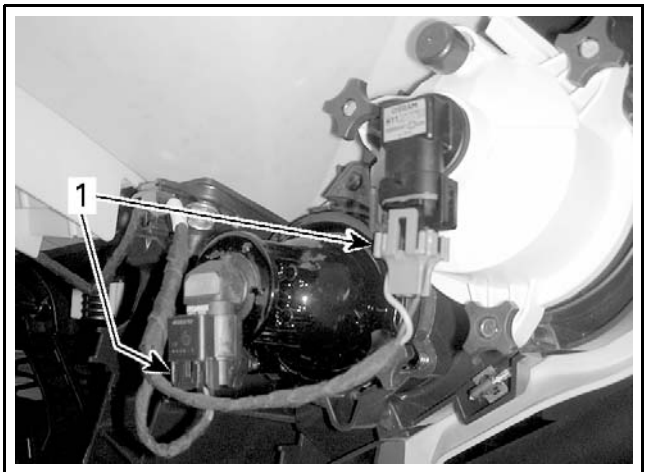
TYPICAL
1. *Front skid plate retaining screws*

5. On applicable models, disconnect winch connectors.



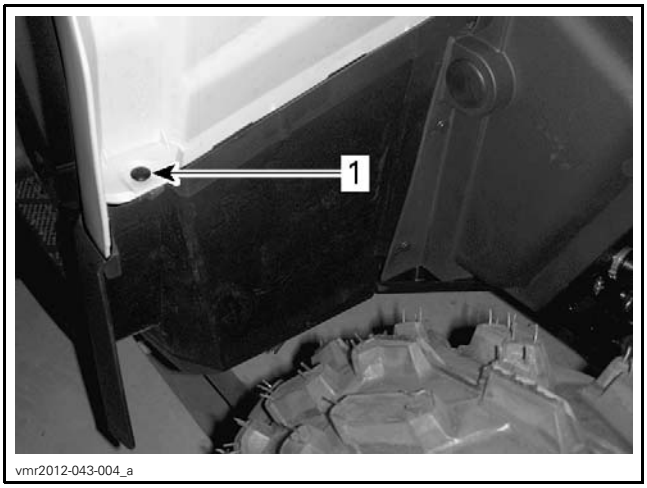
SOME PARTS REMOVED FOR CLARITY
1. *Winch connectors*

6. Disconnect headlights connectors.



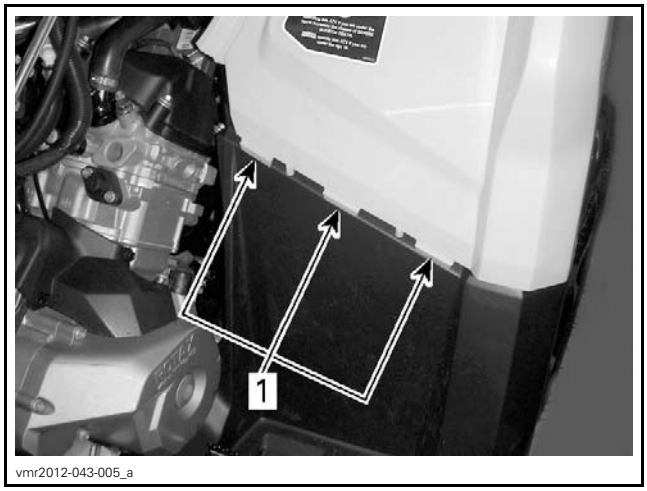
RH SIDE SHOWN
1. *Headlight connectors*

7. Remove screw securing front fender to footrest panel (on both sides).



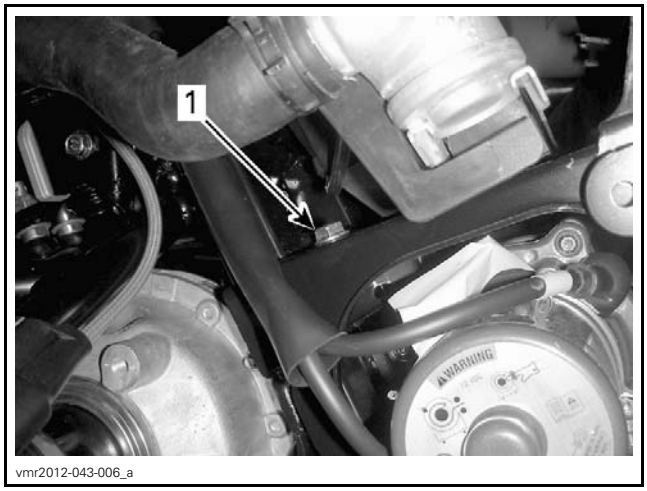
TYPICAL
1. *Screw securing front fender*

8. Detach front fender from footrest panel by releasing retaining tabs (on both sides).

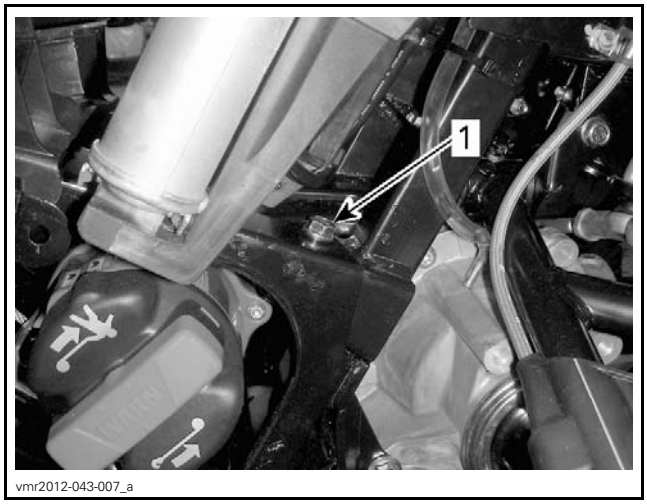


TYPICAL
1. *Front fender retaining tabs*

9. Remove screws securing front body module to frame.

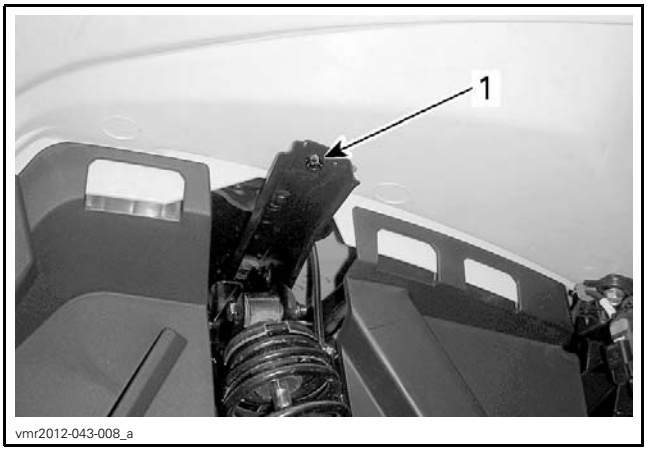


RH SIDE
1. *Front body module retaining screw*



LH SIDE
1. *Front body module retaining screw*

10. Remove screws securing front fenders to frame.



TYPICAL - RH SIDE SHOWN
1. Screw securing front fender

11. With the assistance of a person, pull front body module forward.
12. Install front body module on a stable and clean support.

Installing the Front Body Module

The installation is the reverse of the removal procedure. However, pay attention to the following.

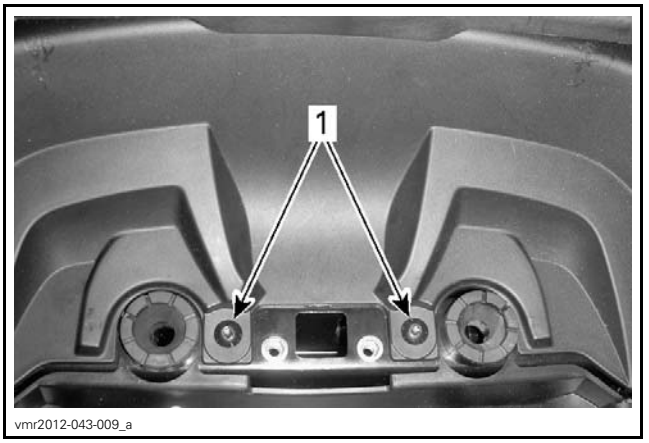
Tighten front fender screws to specification.

TIGHTENING TORQUE	
Screws securing footrest panels to front fenders	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)
Screws securing front fenders to frame	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

REAR BODY MODULE

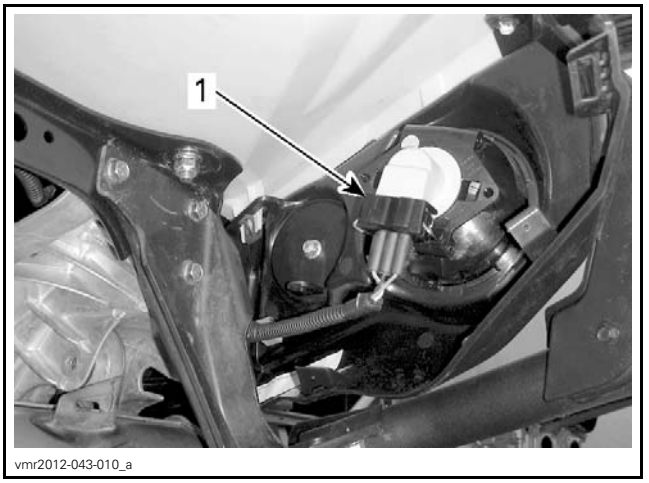
Removing the Rear Body Module

1. Remove seat.
2. Remove the following panels, see procedure in this section.
   - *LUGGAGE TRAY* ***(MAX MODELS)***
   - *SIDE PANEL*.
3. On **Short Models**, remove rear top panel retaining screws.



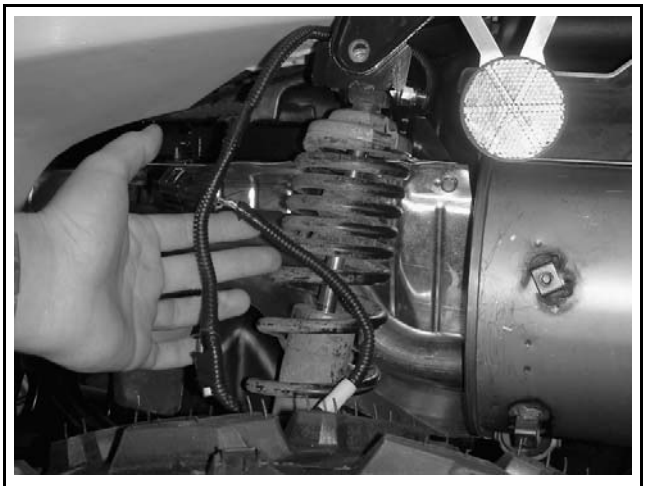
TYPICAL
1. Rear top panel retaining screws

4. Remove both rivets located in the crescent near previously removed retaining screws.
5. Disconnect taillights connectors.



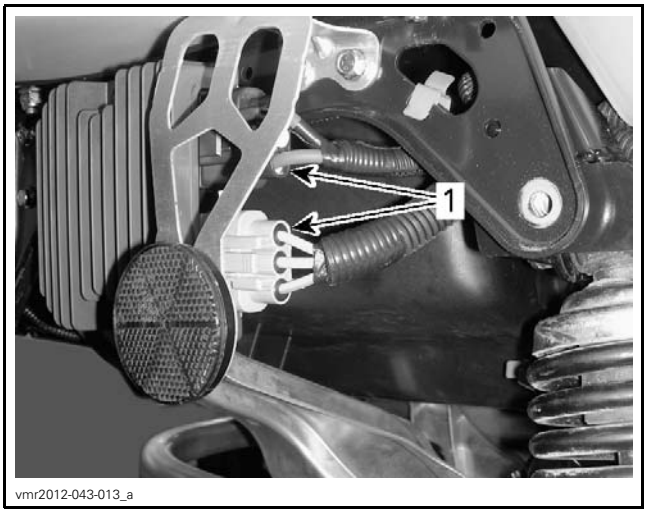
LH SIDE SHOWN
1. Taillight connector

6. Move aside taillight harness from rear body module (on both sides).



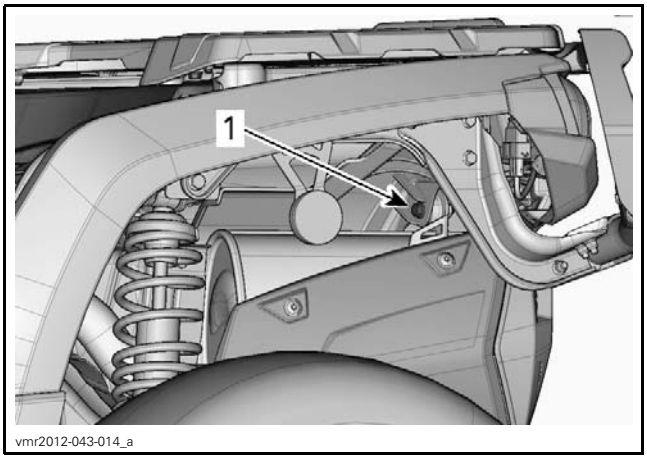
TYPICAL - LH SIDE TAILLIGHT HARNESS

7. Disconnect connectors from voltage regulator rectifier.



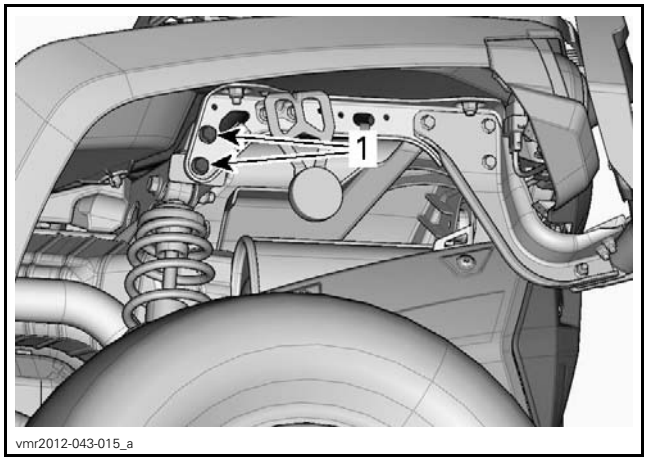
1. Voltage regulator rectifier connectors

8. Remove muffler upper retaining bolt.



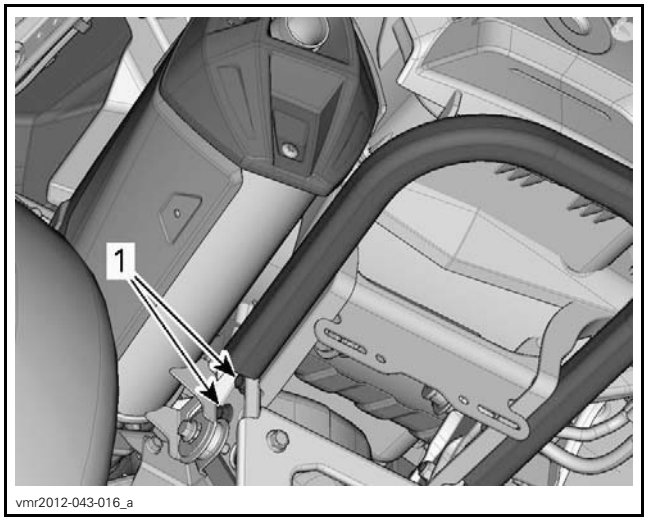
TYPICAL
1. Muffler upper retaining bolt

9. Remove rear body module upper retaining bolts.

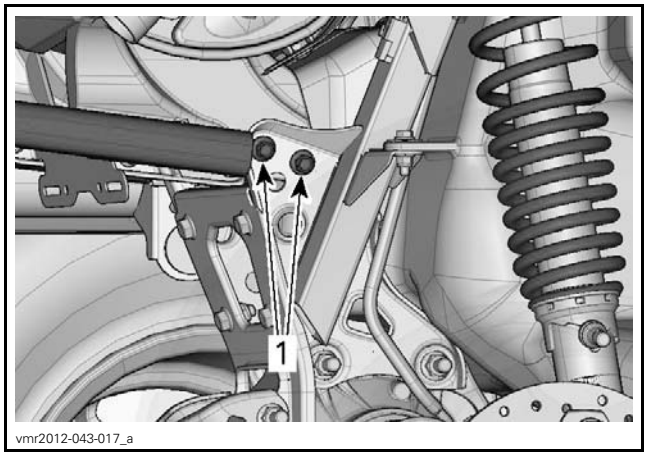


TYPICAL - LH SIDE SHOWN
1. Rear body module upper retaining bolts

10. Remove rear body module lower retaining bolts.



LH SIDE
1. Rear body module lower retaining bolts

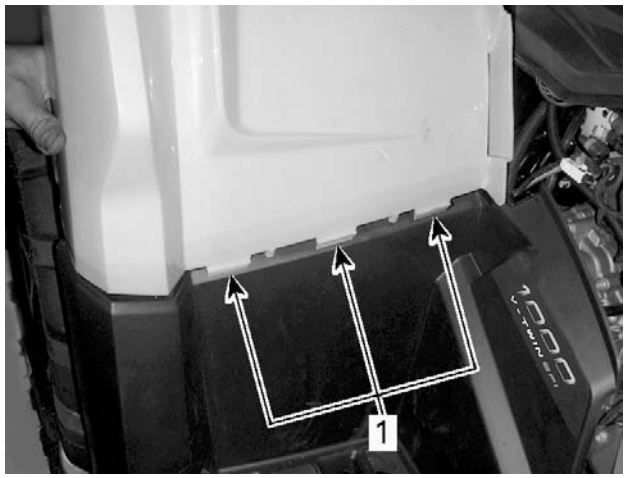


RH SIDE - SOME PARTS REMOVED FOR CLARITY
1. Rear body module lower retaining bolts

11. Remove screw securing rear fender to footrest panel (on both sides).

TYPICAL
1. Screw securing rear fender

12. Detach rear fender from footrest panel by releasing retaining tabs (on both sides).



TYPICAL
1. Rear fender retaining tabs

13. Remove fuel tank cap.
14. Place a **clean** rag into fuel tank filler tube.
15. With the assistance of a person, pull rear body module rearward.
16. Install rear body module on a stable and clean support.
17. Remove rag and reinstall fuel tank cap.

⚠ WARNING

Fuel vapors are flammable and explosive under certain conditions. Unless otherwise noted, the fuel tank cap must always be installed on vehicle.

Installing the Rear Body Module

The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten rear body module retaining bolts to specification.

TIGHTENING TORQUE	
Rear body module **upper** bolts	27 N•m ± 2 N•m (20 lbf•ft ± 1 lbf•ft)
Rear body module **lower** bolts	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)

Tighten rear fender screws to specification.

TIGHTENING TORQUE	
Screws securing footrest panels to rear fenders	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

Tighten rear top panel screws to specification.

TIGHTENING TORQUE	
Rear top panel screws	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

CONSOLE

Removing the Console

1. Remove seat.
2. Lift rear portion of console upwards.

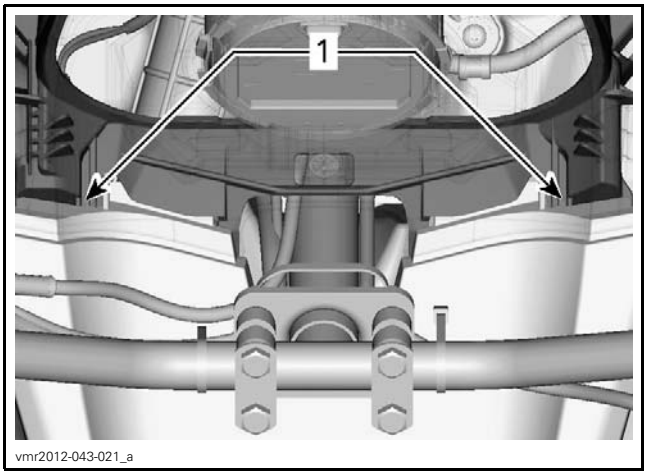
TYPICAL - LIFT REAR PORTION

3. Pull console rearwards.

Installing the Console

The installation is the reverse of the removal procedure. However, pay attention to the following.

Align console front tabs with slots, then push console forward.



SOME PARTS REMOVED FOR CLARITY
1. Console front tabs

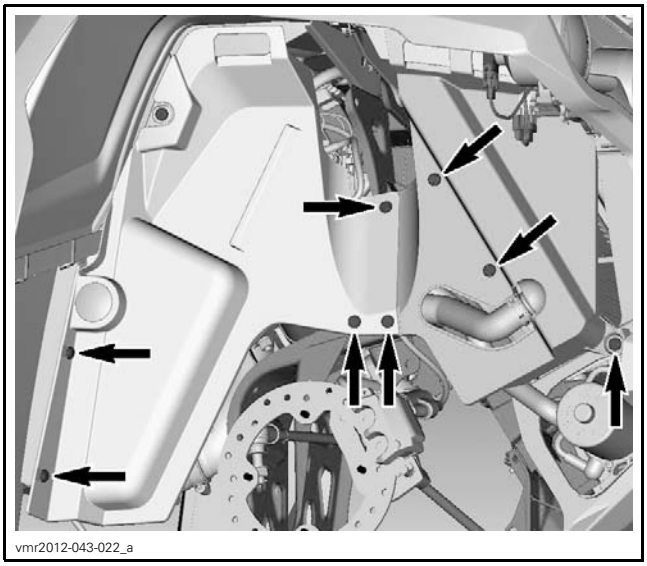
GAUGE SUPPORT

Refer to *GAUGE* subsection.

INNER FENDER PANELS

Removing and Installing the Inner Fender

Remove the following plastic rivets from inner fender panels.



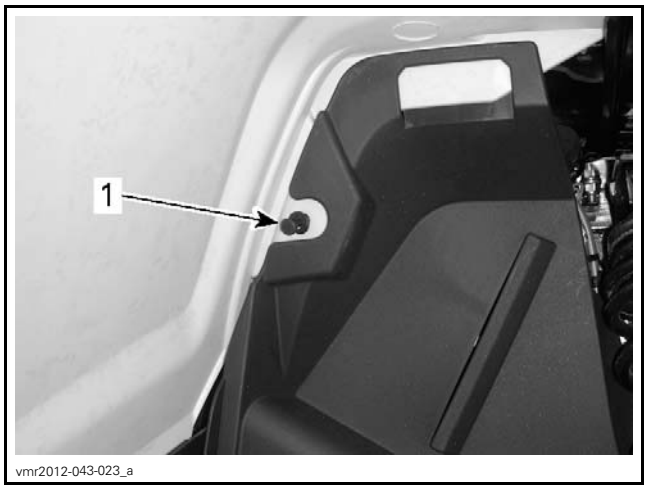
SOME PARTS REMOVED FOR CLARITY

The installation is the reverse of the removal procedure.

SIDE PANELS

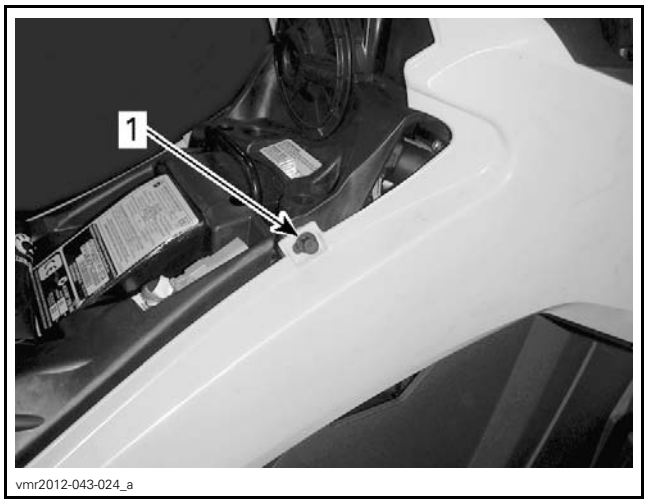
Removing the Side Panel

1. Remove console. Refer to *REMOVING THE CONSOLE*.
2. Remove plastic rivet securing side panel to inner fender panel.



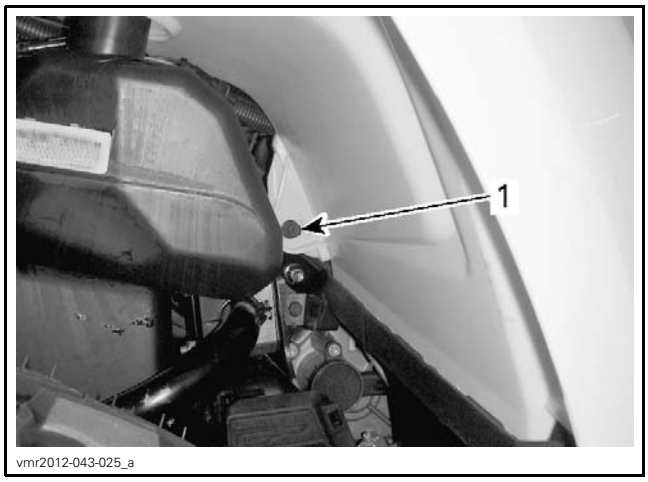
TYPICAL
1. Plastic rivet securing side panel

3. Remove plastic rivet securing side panel to air filter housing.



TYPICAL
1. Plastic rivet securing side panel

4. Remove plastic rivet securing side panel **(Short Models)** or rear side panel extension **(MAX Models)** to rear fender.



1. Plastic rivet securing side panel

5. Remove luggage tray. Refer to *LUGGAGE TRAY*.
6. Lift rear portion of side panel assembly then pull it towards outside.

NOTE: For **Short Models**, side panel assembly includes side panel and panel extension.

NOTE: For **MAX Models**, side panel assembly includes side panel, panel extension and rear side panel extension.

LIFT REAR PORTION

Installing the Side Panel

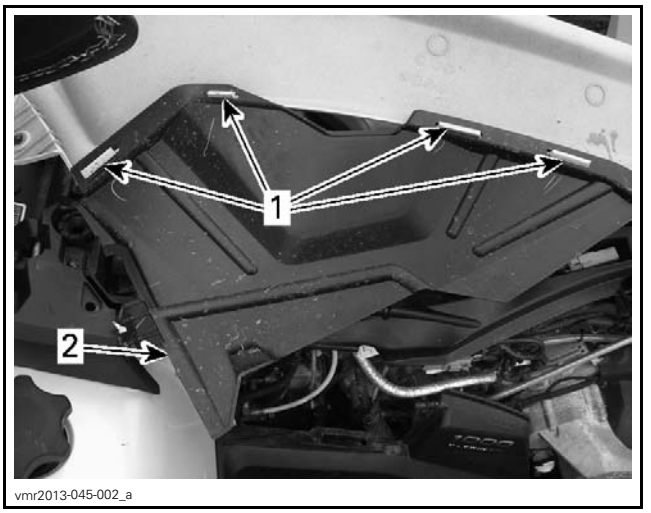
The installation is the reverse of the removal procedure. However, pay attention to the following.

Align side panel front tab with slot, then push side panel forward.

PANEL EXTENSIONS

Removing the Panel Extension

1. Remove seat.
2. Remove console. Refer to *REMOVING THE CONSOLE*.
3. Remove rear luggage tray. Refer to *LUGGAGE TRAY*.
4. Remove side panel assembly including side panel, panel extension and rear side panel extension. Refer to *REMOVING THE SIDE PANEL*.
5. Undo tabs securing panel extension to side panel.



1. Tabs securing panel extension to side panel
2. Side panel extension

6. Remove panel extension.

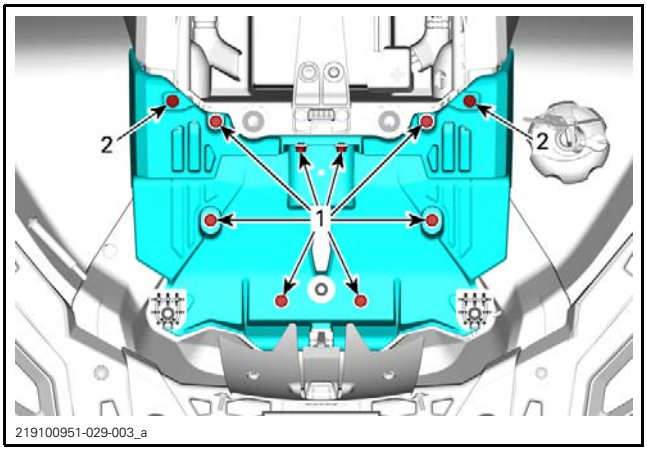
Installing the Panel Extension

Installation is the reverse of removal.

LUGGAGE TRAY (MAX MODELS)

Removing the Luggage Tray

1. Remove seat.
2. Remove retaining screws and rivets securing luggage tray.



1. *Retaining screws*
2. *Rivets*

Installing the Luggage Tray

Installation is the reverse of removal. However pay attention to the following:

TIGHTENING TORQUE	
Luggage tray retaining screws	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

REAR SIDE PANEL EXTENSIONS (MAX MODELS)

Removing the Rear Side Panel Extension

1. Remove seat.
2. Remove the side panels. Refer to *REMOVING THE SIDE PANEL*.
3. Remove the luggage tray. Refer to *REMOVING THE LUGGAGE TRAY*
4. Remove side panel assembly including side panel, panel extension and rear side panel extension. Refer to *REMOVING THE SIDE PANEL*.
5. Unclip retaining tabs securing rear side panel extension to side panel.

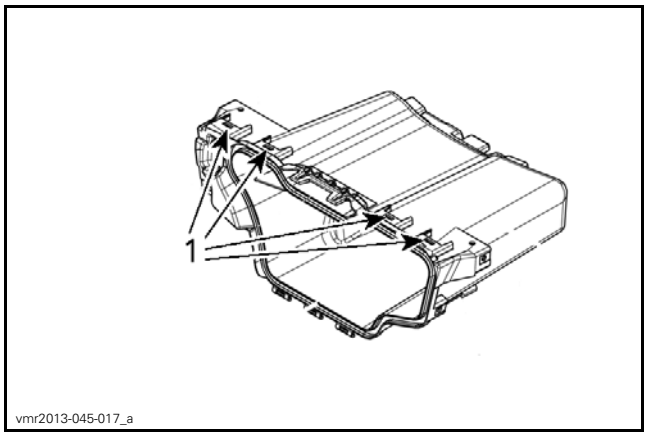
Installing the Rear Side Panel Extension

Installation is the reverse of removal.

REAR TOP PANEL

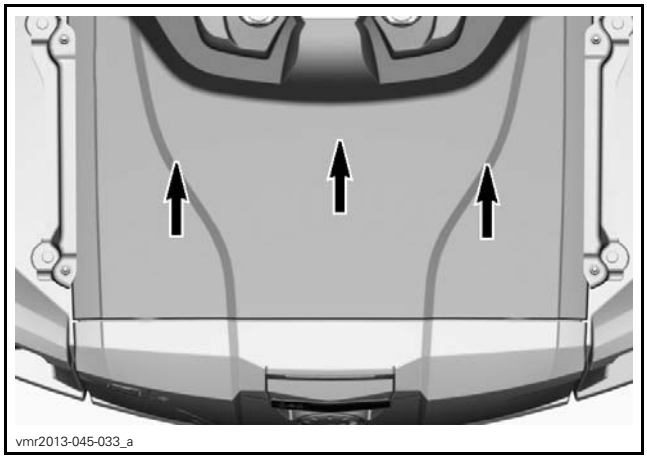
Removing the Rear Top Panel

1. Remove seat.
2. Remove rear body module. Refer to *REAR BODY MODULE*.
3. Remove rear rack. Refer to *REMOVING THE REAR RACK*.
4. Using a screwdriver, unclip retaining tabs securing rear top panel to rear storage compartment.



PARTS REMOVED FOR CLARITY
1. *Retaining tab locations*

5. Slide rear top panel forward to free it from rear storage compartment retaining tab.



TYPICAL - SLIDING REAR TOP PANEL TOWARDS FRONT

Installing the Rear Top Panel

Installation is the reverse of removal. However pay attention to the following:

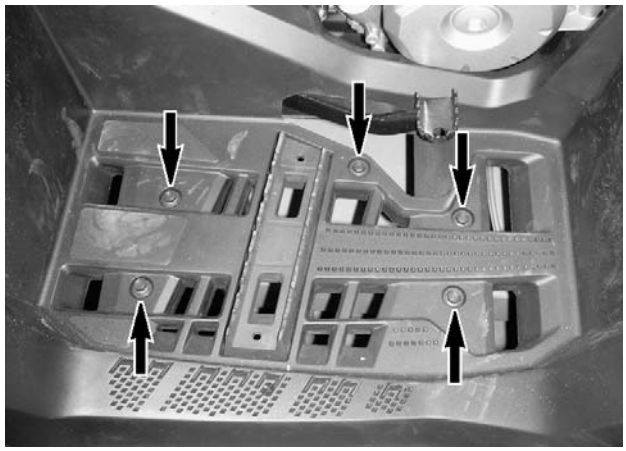
TIGHTENING TORQUE	
Rear top panel screws	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

FOOTREST PANELS

Removing the Footrest Panel

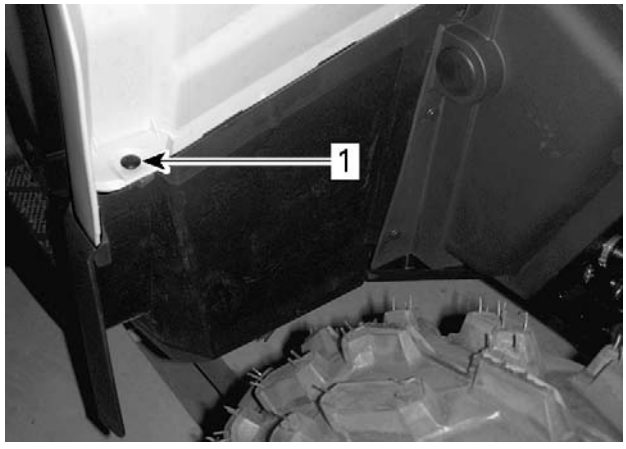
Short Models

1. Remove footrest panel retaining screws.


vmr2012-043-027_a

TYPICAL - FOOTREST PANEL RETAINING SCREWS

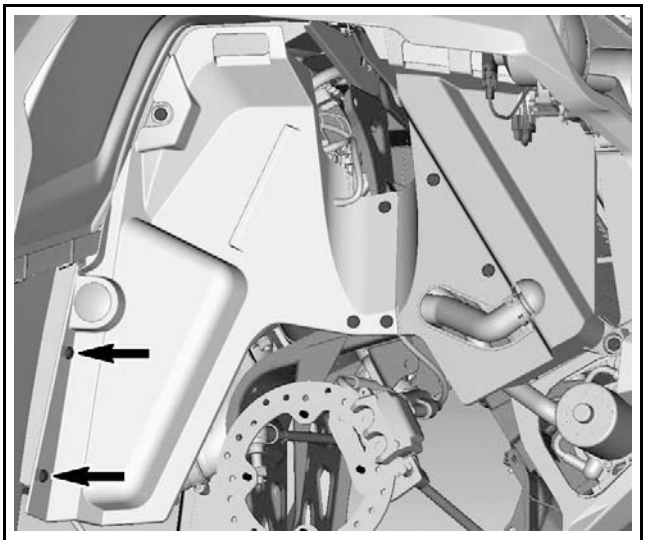
2. Remove screw securing front fender to footrest panel.



vmr2012-043-004_a

TYPICAL
1. Screw securing front fender

3. Remove both plastic rivet securing inner fender panel to footrest panel.


vmr2012-043-022_b

SOME PARTS REMOVED FOR CLARITY

4. Remove screw securing rear fender to footrest panel.

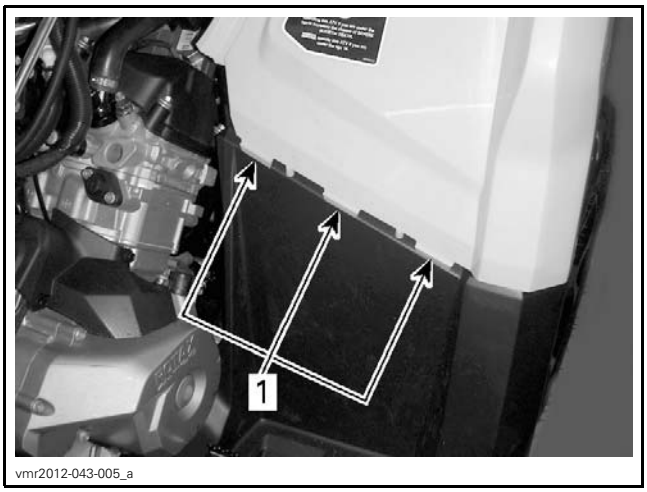
vmr2012-043-018_a

TYPICAL
1. Screw securing rear fender

5. Remove screw securing footrest panel to frame.

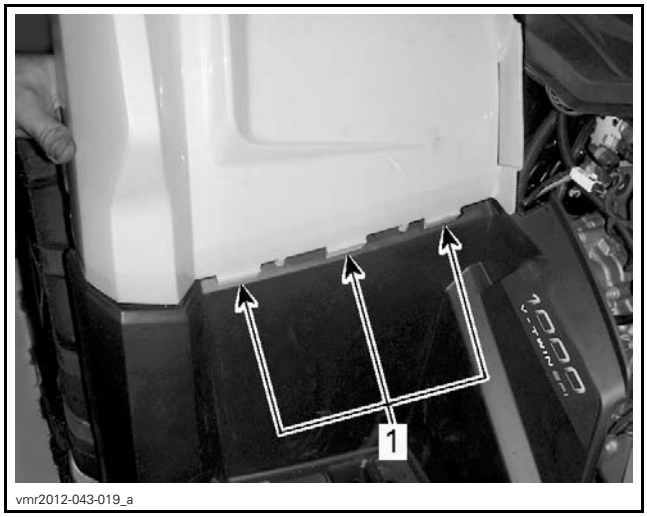
TYPICAL
1. Screw securing footrest panel

6. Detach front fender from footrest panel by releasing retaining tabs.



TYPICAL
1. Front fender retaining tabs

7. Detach rear fender from footrest panel by releasing retaining tabs.

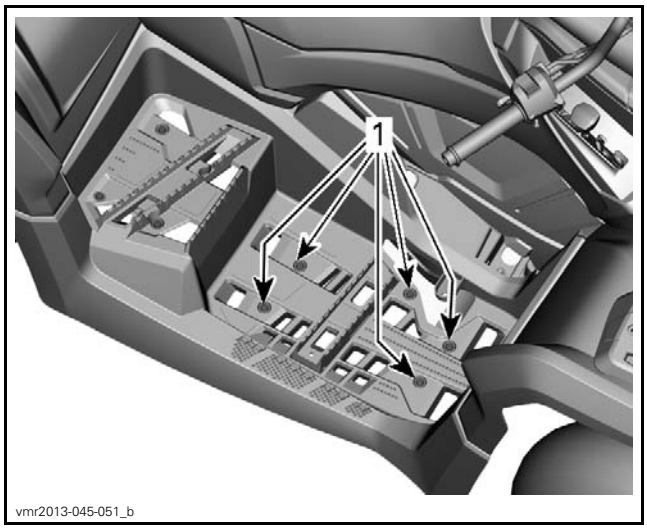


TYPICAL
1. Rear fender retaining tabs

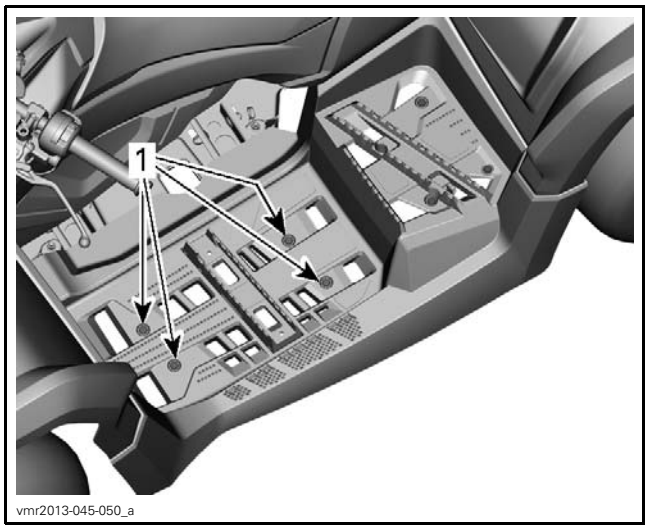
8. Remove footrest panel from vehicle.

MAX Models

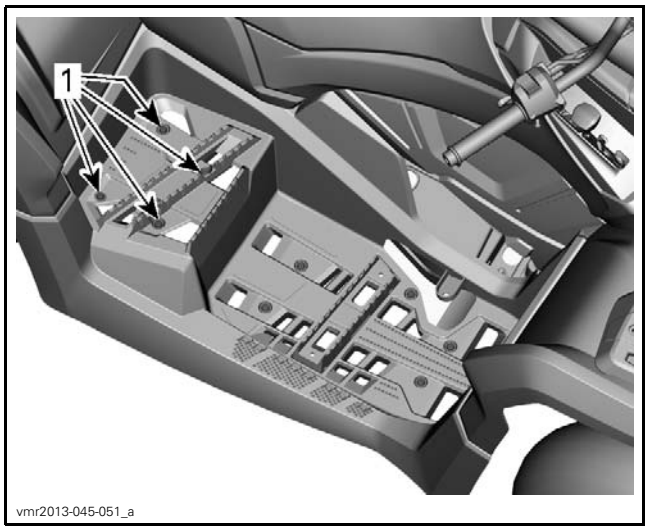
1. Remove footrest panel retaining screws.



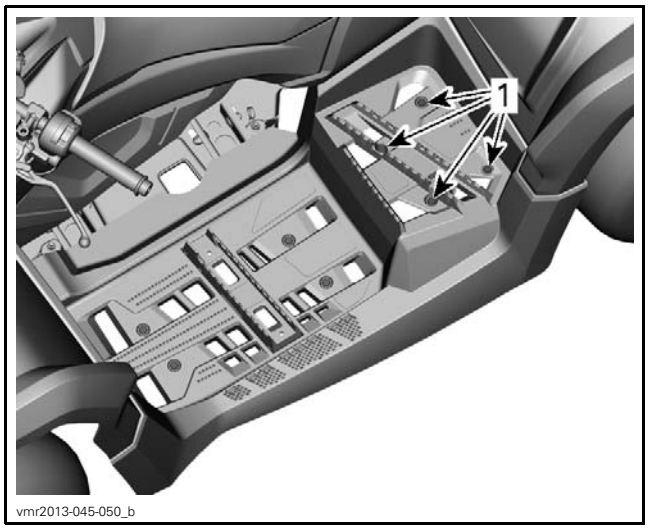
TYPICAL - RH SIDE DOWN
1. Footrest panel retaining screws



TYPICAL - RH SIDE DOWN
1. *Footrest panel retaining screws*

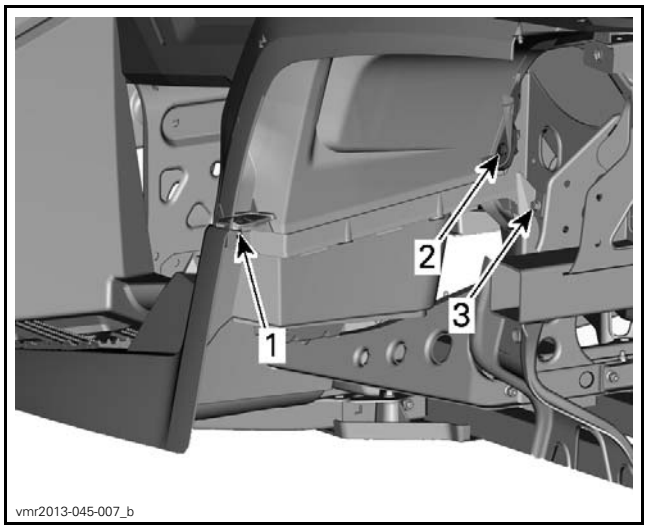


TYPICAL - LH SIDE SHOWN
1. *Footrest panel retaining screws*



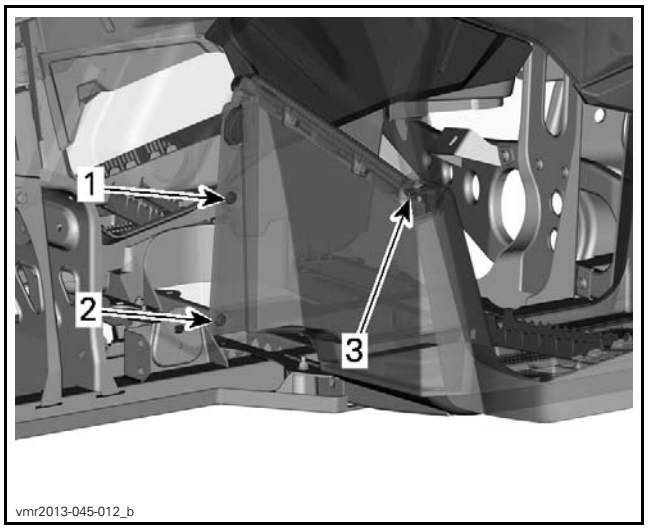
TYPICAL - LH SIDE SHOWN
1. *Footrest panel retaining screws*

2. Remove screw securing rear fender to footrest panel.
3. Remove plastic rivet securing footrest panel to rear side panel extension.
4. Remove plastic rivet securing footrest panel to frame.



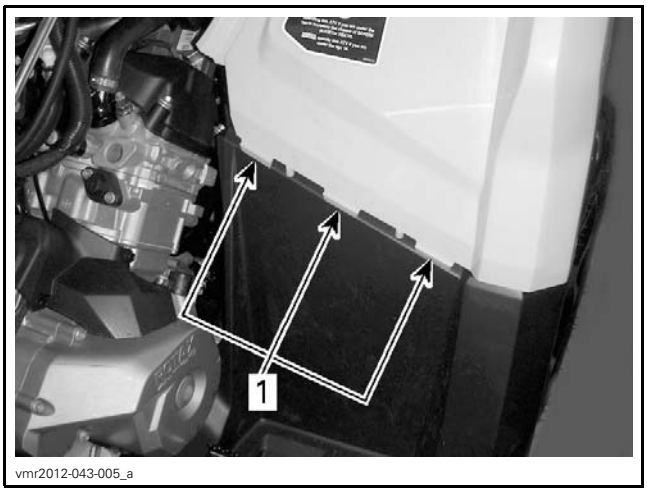
TYPICAL - PARTS REMOVED FOR CLARITY
1. *Plastic rivet securing footrest panel to inner fender*
2. *Plastic rivet securing footrest panel to rear side panel extension*
3. *Retaining screw securing footrest panel to frame*

5. Remove plastic rivet securing footrest panel to panel extension.
6. Remove plastic rivet securing footrest panel to frame.
7. Remove screw securing front fender to footrest panel.



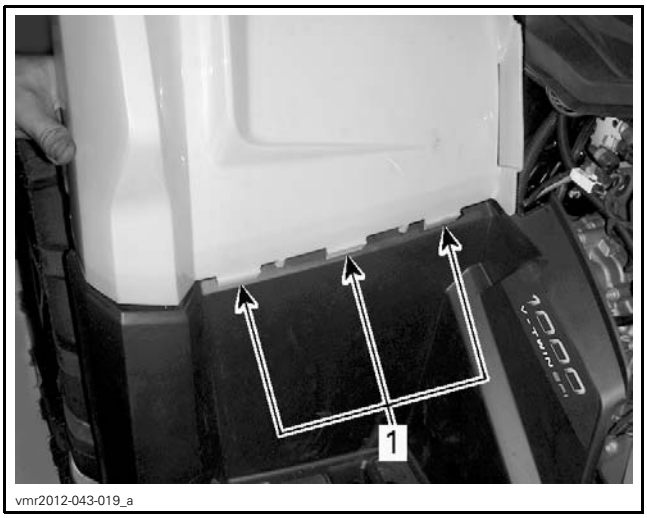
TYPICAL - PARTS REMOVED FOR CLARITY
1. *Plastic rivet securing footrest panel to panel extension*
2. *Plastic rivet securing footrest panel to frame*
3. *Retaining screw securing footrest panel to front fender*

8. Detach front fender from footrest panel by releasing retaining tabs.



TYPICAL
1. Front fender retaining tabs

9. Detach rear fender from footrest panel by releasing retaining tabs.



TYPICAL
1. Rear fender retaining tabs

10. Remove footrest panel from vehicle.

Installing the Footrest Panel

The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten footrest panel screws to specification.

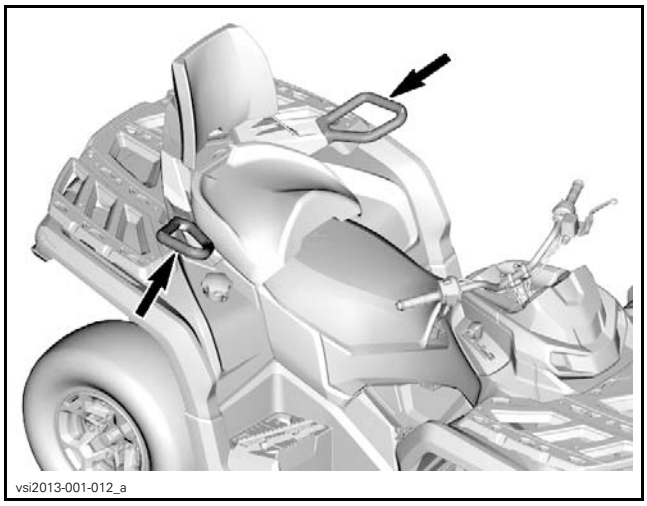
TIGHTENING TORQUE	
Footrest panel retaining screws	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)
Screws securing footrest panel to fenders	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

PASSENGER GRIPS

Removing the Passenger Grips

For models with heated passenger grips, refer to *ACCESSORIES* subsection.

1. Remove retaining screw securing passenger grips and remove passenger grips.



TYPICAL - REAR GRIP SCREWS

Installing the Passenger Grips

Installation is the reverse of removal. However pay attention to the following:

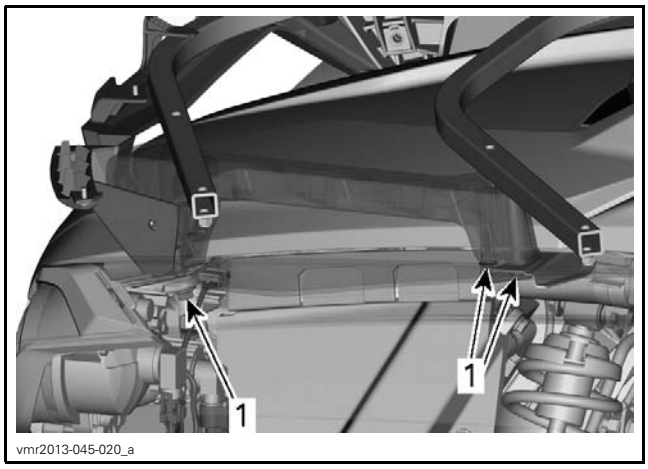
TIGHTENING TORQUE	
Passenger grips retaining screw	25 N•m ± 3 N•m (18 lbf•ft ± 2 lbf•ft)

RACK (FRONT AND REAR)

Removing the Front Rack

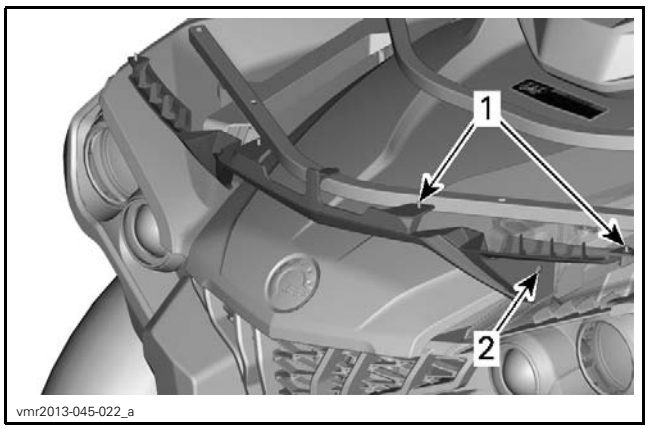
1. Remove retaining bolts securing rack assembly to frame.

NOTE: A small wrench will be needed to remove the retaining screw located between the rack support and fender.



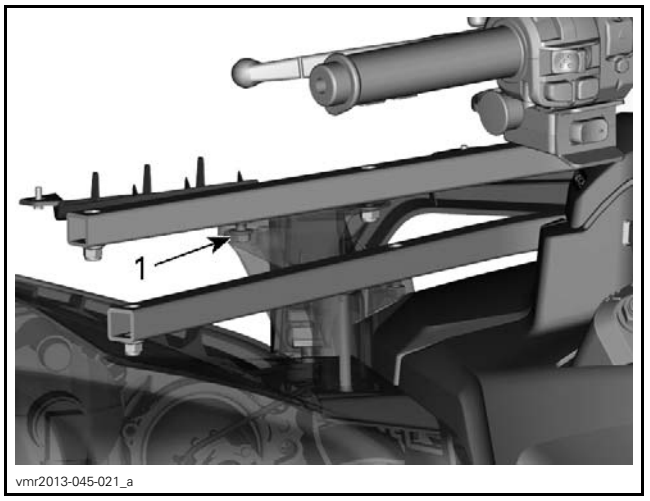
TYPICAL - PARTS REMOVED FOR CLARITY
1. *Retaining bolts locations*

2. Remove rack assembly from vehicle.
3. Remove the 4 retaining screws securing rack moulding to rack assembly.
4. Remove both retaining screws securing rack moulding to rack supports.



TYPICAL - LH SIDE OF ASSEMBLY SHOWN ON VEHICLE FOR CLARITY
1. *LH side retaining screws securing rack moulding to rack assembly*
2. *LH side retaining screw securing rack moulding to rack support*

5. Remove both retaining bolts securing rack supports to rails.



TYPICAL - LH SIDE OF ASSEMBLY SHOWN ON VEHICLE FOR CLARITY
1. *Retaining bolt securing rack support to rail*

6. Remove retaining screws securing rack to rails.

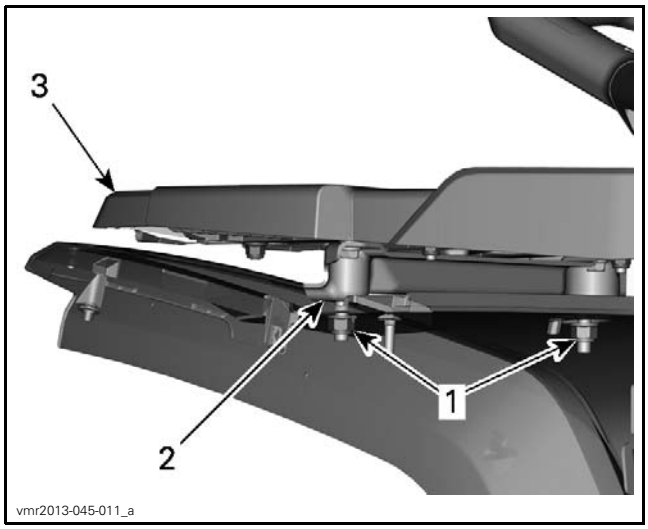
Installing the Front Rack

The installation is the reverse of the removal procedure. However, pay attention to the following.

TIGHTENING TORQUE	
Screws and nuts securing front rack to rail	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)
Bolts securing front rack assembly to frame	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)
Retaining screws securing fender to front rack assembly	1.6 N•m ± 0.4 N•m (14 lbf•**in** ± 4 lbf•**in**)
Screws securing rack moulding to rack assembly	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

Removing the Rear Rack

1. Remove retaining bolts and nuts securing rack assembly to frame.



1. Retaining nuts and bolts securing rack to frame
2. Frame
3. Rack assembly

2. Remove rack from vehicle.
3. Remove retaining screws securing rack to rail.

Installing the Rear Rack

The installation is the reverse of the removal procedure. However, pay attention to the following.

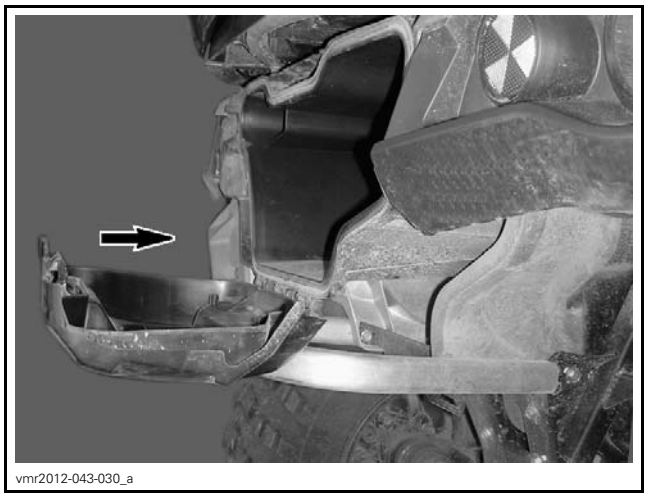
TIGHTENING TORQUE	
Screws and nuts securing rear rack to rail	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)
Screws an nuts securing rear rack assembly to frame	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

REAR STORAGE COMPARTMENT

REAR STORAGE COMPARTMENT COVER

Replacing the Rear Storage Compartment Cover

1. Open rear storage compartment cover.
2. Push rear storage compartment cover forward to release it from hinges.



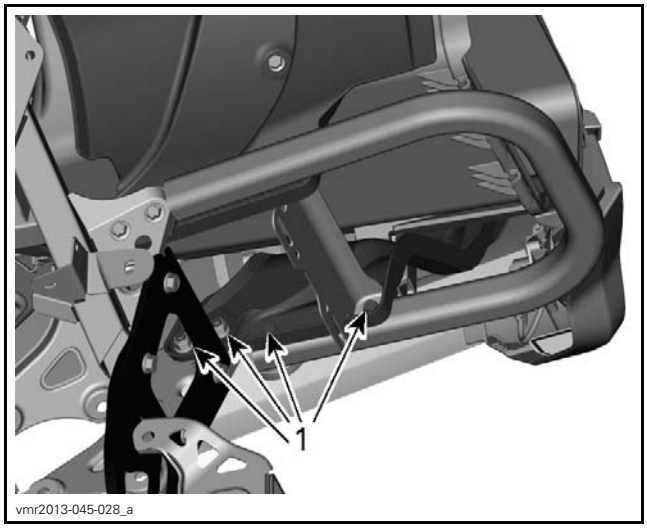
TYPICAL

3. Install a new rear storage compartment cover as the reverse of removal.

Rear Storage Compartment

Removing the Rear storage Compartment

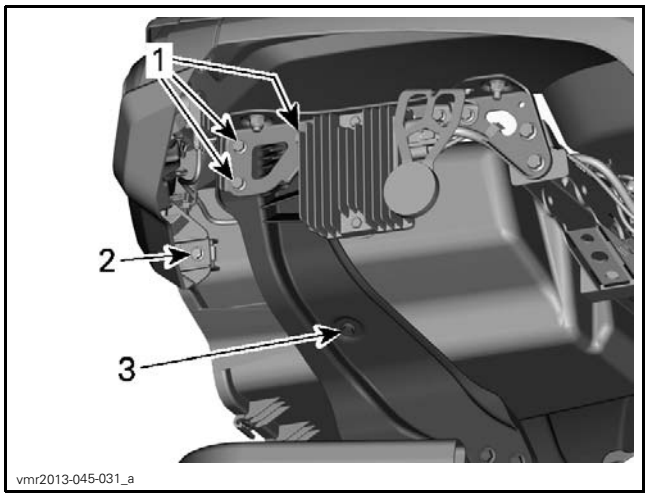
1. Remove rear body module. Refer to *REAR BODY MODULE*.
2. Remove rear rack. Refer to *REMOVING THE REAR RACK*.
3. Remove rear storage compartment cover. Refer to *REAR STORAGE COMPARTMENT COVER*.
4. Remove retaining screws securing bottom of RH rear storage compartment support.



1. Retaining screws securing bottom of RH rear storage compartment support

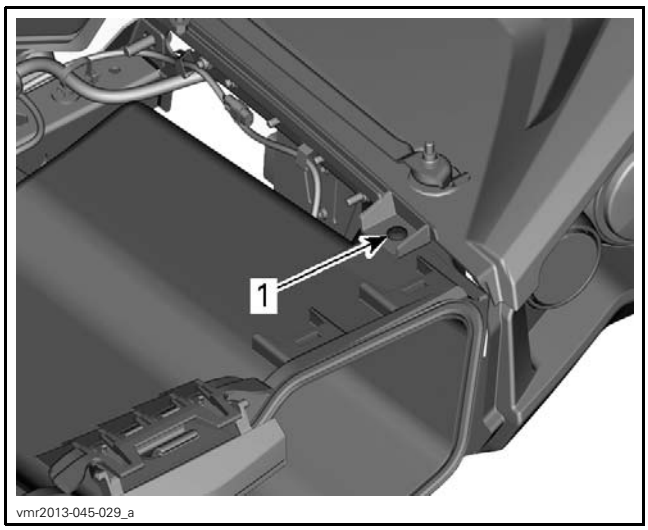
5. Remove retaining screws securing RH rear storage compartment support to RH support.
6. Remove retaining screw securing RH fender to rear storage compartment.

7. Remove retaining screw securing RH rear storage compartment support to rear storage compartment.



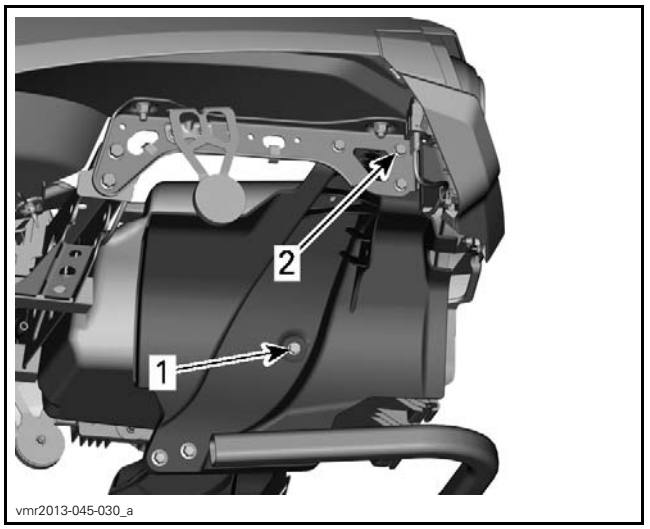
1. *Retaining screws securing RH rear storage compartment support to RH support*
2. *Retaining screw securing RH fender to rear storage compartment*
3. *Retaining screw securing RH rear storage compartment support to rear storage compartment*

8. Remove RH rear storage compartment support.
9. Remove retaining screw securing top of RH fender to top of rear storage compartment.



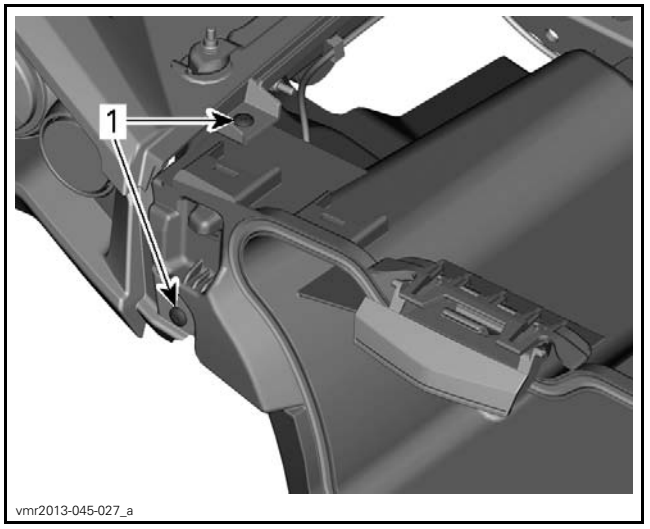
1. *Retaining screw securing top of RH fender to top of rear storage compartment*

10. Remove retaining screw securing LH rear storage compartment support to rear storage compartment.
11. Remove retaining screw securing LH support and LH rear storage compartment support to rear storage compartment.



1. *Retaining screw securing LH rear storage compartment support to rear storage compartment*
2. *Retaining screw securing LH support and LH rear storage compartment support to rear storage compartment*

12. Remove both retaining screws securing LH fender to rear storage compartment.



1. *Retaining screws securing LH fender to rear storage compartment*

13. Remove rear storage compartment.

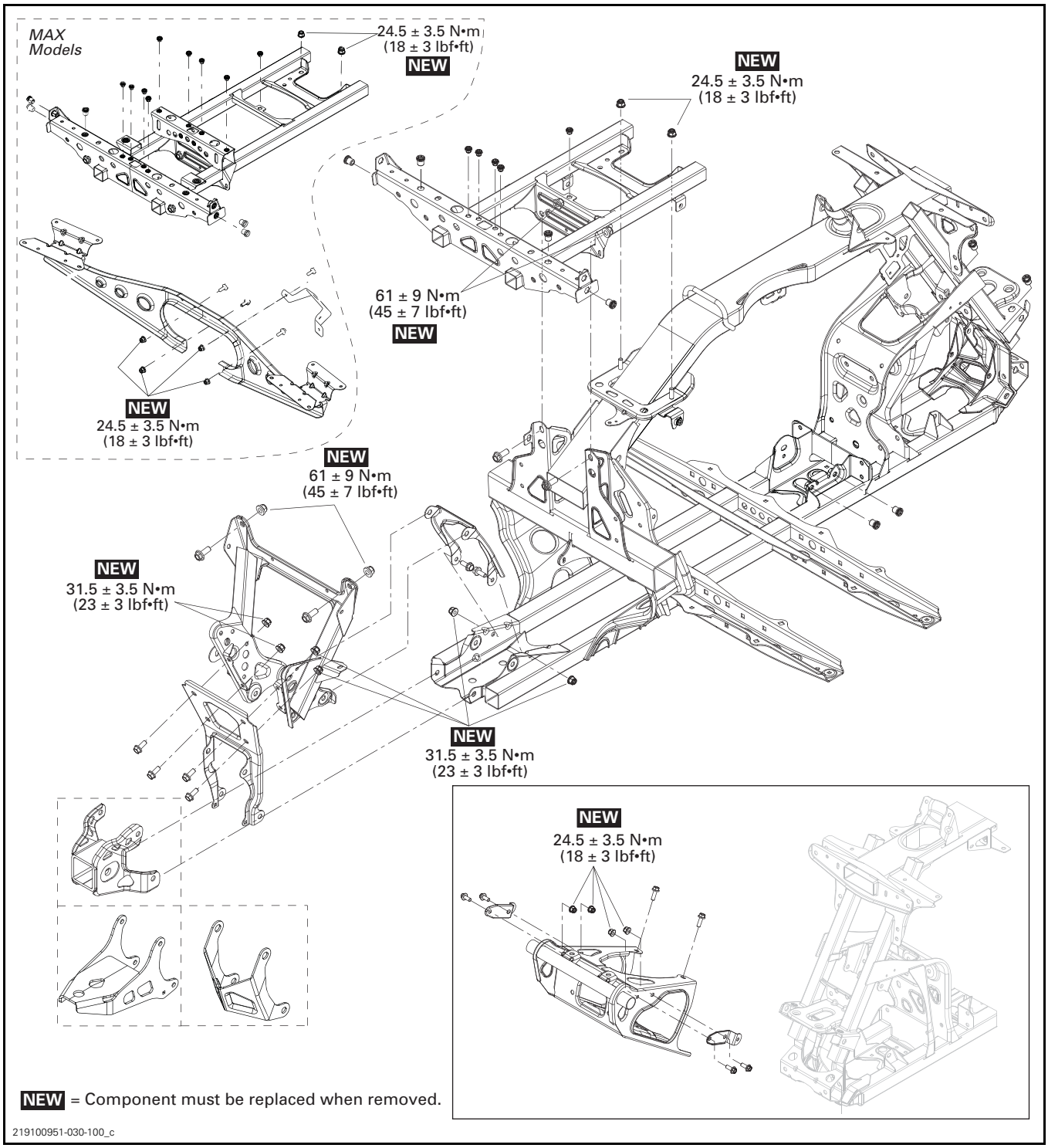
Installing the Rear Storage Compartment

Installation is the reverse of removal. However pay attention to the following:

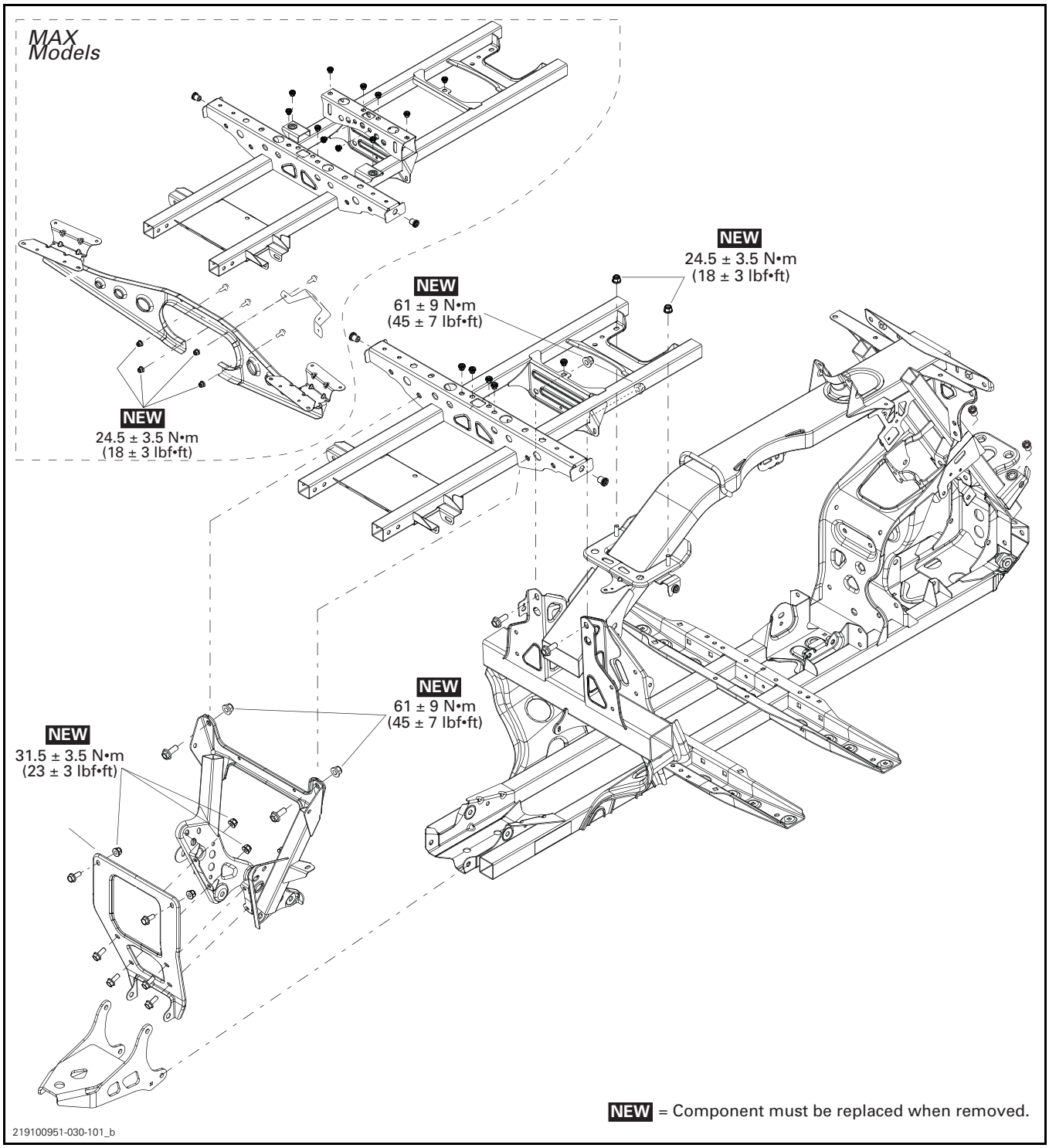
TIGHTENING TORQUE	
Rear top panel screws	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)
Rear storage compartment retaining screws	10 N•m ± 2 N•m (89 lbf•**in** ± 18 lbf•**in**)

FRAME

Models with Plastic Racks



Models with Metal Racks



PROCEDURES

FRAME

Inspecting the Frame

Check frame for bending, cracks, weld damages or any other damage. Replace frame as necessary.

Frame Welding

No welding should be done on frame except if mentioned or required on an approved BRP Bulletin.

Replacing a Frame Insert

To install a new blind threaded insert, use a blind threaded insert installer available at any automotive parts retailer.

tmr2011-039-004

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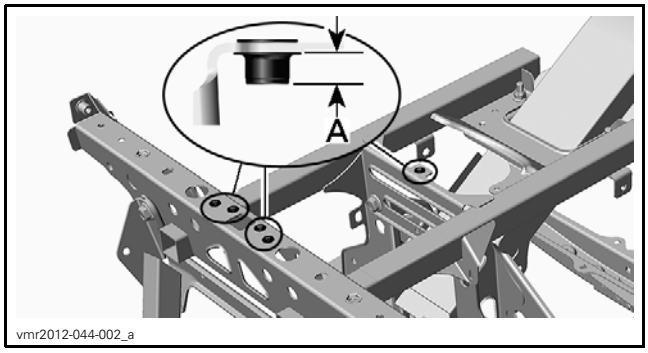
After insert installation, ensure insert can hold the torque applied to the screw it retains and measure the compressed length of the frame insert. Otherwise, install a new insert.

INSERT	COMPRESSED LENGTH
Insert for M6 bolt	9 mm ± 0.5 mm (.354 in ± .02 in)
Insert for M8 bolt	11.5 mm ± 0.5 mm (.453 in ± .02 in)



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INSERT FOR M6 BOLT SHOWN
A. 9 mm ± 0.5 mm (.354 in ± .02 in)

Replacing the Frame

Blind threaded inserts are not installed on replacement frames. Make sure to order enough inserts when replacing frame. Refer to *ELECTRONIC PARTS CATALOG*.

ENGINE 570

ENGINE			
Engine type			ROTAX® 570, 4-stroke, 2 cylinders (V-twin), liquid cooled
Valve train			4 valves/cylinder (mechanical adjustment), single over head camshaft (SOHC) with timing chain
Bore			84 mm (3.31 in)
Stroke			51.4 mm (2.02 in)
Displacement			570 cm³ (34.8 in³)
Compression ratio			10.6:1
Maximum HP RPM			8000 RPM
Exhaust system			Spark arrestor approved by USDA Forest Service
Air filter			Synthetic paper filter with foam
Intake valve opening			3° BTDC
Intake valve closing			34 ABDC
Exhaust valve opening			39° BBDC
Exhaust valve closing			2° BTDC
Valve clearance		Intake	0.06 mm to 0.14 mm (.0024 in to .0055 in)
		Exhaust	0.11 mm to 0.19 mm (.0043 in to .0075 in)
Valve stem diameter	Intake	New	4.966 mm to 4.980 mm (.1955 in to .1961 in)
		Service limit	4.930 mm (.1941 in)
	Exhaust	New	4.956 mm to 4.970 mm (.1951 in to .1957 in)
		Service limit	4.930 mm (.1941 in)
Valve out of round	Intake and exhaust	New	0.005 mm (.0002 in)
		Service limit	0.06 mm (.0024 in)
Valve guide diameter		New	4.998 mm to 5.018 mm (.1968 in to .1976 in)
		Service limit	5.050 mm (.1988 in)
Valve spring free length		New	40.81 mm (1.607 in)
		Service limit	39.00 mm (1.535 in)
Valve seat contact width	Intake	New	1.05 mm to 1.35 mm (.041 in to .053 in)
		Service limit	1.8 mm (.071 in)
	Exhaust	New	1.25 mm to 1.55 mm (.049 in to .061 in)
		Service limit	2 mm (.079 in)

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ENGINE			
Rocker arm bore diameter		New	12.036 mm to 12.050 mm (.4739 in to .4744 in)
		Service limit	12.060 mm (.4748 in)
Rocker arm shaft diameter		New	12.000 mm to 12.018 mm (.4724 in to .4731 in)
		Service limit	11.990 mm (.472 in)
Piston diameter		New	83.950 mm to 83.966 mm (3.3051 in to 3.3057 in)
		Service limit	83.850 mm (3.3012 in)
Piston/cylinder clearance		New	0.057 mm to 0.087 mm (.0022 in to .0034 in)
		Service limit	0.130 mm (.0051 in)
Piston ring type		1st	Upper compression ring, rectangular
		2nd	Lower compression ring, tapered face
		3rd	Oil scraper ring
Ring end gap	Rectangular	New	0.10 mm to 0.30 mm (.004 in to .012 in)
		Service limit	0.40 mm (.016 in)
	Tapered face	New	0.35 mm to 0.55 mm (.014 in to .022 in)
		Service limit	0.85 mm (.033 in)
	Oil scraper ring	New	0.20 mm to 0.70 mm (.008 in to .028 in)
		Service limit	1.00 mm (.039 in)
Ring/piston groove clearance	Rectangular	New	0.025 mm to 0.070 mm (.001 in to .0028 in)
		Service limit	0.100 mm (.0039 in)
	Tapered face	New	0.020 mm to 0.060 mm (.0008 in to .0024 in)
		Service limit	0.150 mm (.0059 in)
	Oil scraper ring	New	0.010 mm to 0.180 mm (.0004 in to .0071 in)
		Service limit	0.250 mm (.0098 in)
Cylinder bore		New	84.023 mm to 84.037 mm (3.308 in to 3.3085 in)
Cylinder taper		Maximum new	0.038 mm (.0015 in)
		Service limit	0.090 mm (.0035 in)
Cylinder out of round		Maximum new	0.015 mm (.0006 in)
		Service limit	0.020 mm (.0008 in)

ENGINE				
Camshaft main bearing journal		Timing chain side	New	34.959 mm to 34.975 mm (1.3763 in to 1.377 in)
			Service limit	34.950 mm (1.376 in)
		Spark plug side	New	21.959 mm to 21.980 mm (.8645 in to .8654 in)
			Service limit	21.950 mm (.8642 in)
Camshaft main bearing journal bore		Timing chain side	New	35.000 mm to 35.025 mm (1.378 in to 1.3789 in)
			Service limit	35.040 mm (1.3795 in)
		Spark plug side	New	22.000 mm to 22.021 mm (.8661 in to .867 in)
			Wear limit	22.040 mm (.8677 in)
Camshaft lobe	Intake valve		New	31.830 mm to 32.030 mm (1.2531 in to 1.261 in)
			Service limit	31.810 mm (1.2524 in)
	Exhaust valve		New	31.730 mm to 31.930 mm (1.2492 in to 1.2571 in)
			Service limit	31.710 mm (1.2484 in)
Crankshaft main bearing journal diameter (MAG/PTO side)			New	42.016 mm to 42.040 mm (1.6542 in to 1.6551 in)
			Service limit	42.000 mm (1.6535 in)
Crankshaft radial play (MAG/PTO side)			Service limit	0.07 mm (.0028 in)
Crankshaft bearing journal diameter (in PTO cover)			New	34.004 mm to 34.020 mm (1.3387 in to 1.3394 in)
			Service limit	33.998 mm (1.3385 in)
Crankshaft radial play (PTO cover bearing)			Service limit	0.10 mm (.0039 in)
Crankshaft axial play			New	0.200 mm to 0.500 mm (.0079 in to .0197 in)
			Service limit	0.600 mm (.0236 in)
Crankshaft pin diameter			New	40.001 mm to 40.025 mm (1.5748 in to 1.5758 in)
			Service limit	39.990 mm (1.5744 in)
Crankshaft deflection		MAG/PTO side	New	0.050 mm (.002 in)
Crankcase plain bearing		MAG/PTO side	Service limit	42.100 mm (1.6575 in)
PTO cover plain bearing			Service limit	34.120 mm (1.3433 in)
Connecting rod big end diameter			Service limit	40.100 mm (1.5787 in)
Connecting rod big end radial play			Service limit	0.09 mm (.0035 in)
Connecting rod big end axial play			New	0.200 mm to 0.500 mm (.008 in to .02 in)
			Service limit	0.600 mm (.024 in)

ENGINE			
Connecting rod small end diameter		New	20.010 mm to 20.020 mm (.7878 in to .7882 in)
		Service limit	20.060 mm (.7898 in)
Piston pin diameter		New	19.996 mm to 20.000 mm (.7872 in to .7874 in)
		Service limit	19.980 mm (.7866 in)
Connecting rod/piston pin clearance (radial play)		Service limit	0.080 mm (.0031 in)

LUBRICATION SYSTEM			
Type			Wet sump. Replaceable cartridge oil filter
Oil filter			Replaceable cartridge
Engine oil pressure		Minimum	300 kPa (44 PSI) at 6000 RPM
Engine oil	Capacity (oil change with filter)		2.0 L (2.1 qt (U.S. liq.))
	Recommended		For the summer season, use XPS 4-stroke synth. blend oil (P/N 293 600 121). For the all seasons, use XPS 4-stroke synthetic oil (P/N 293 600 112). If not available, use a 5W40 motor oil that meets the requirements for API service classification SG, SH or SJ

COOLING SYSTEM			
Coolant	Type	Finland, Norway and Sweden	Use Long life antifreeze (P/N 619 590 204)
		All other countries	Use long life antifreeze (P/N 219 702 685)
		Alternative, or if not available	Coolant specifically designed for aluminum engines Ethyl glycol/distilled water mix (50%/50%).
	Capacity		3.4 L (.9 U.S. gal.)
Thermostat		Starts to open	65°C (149°F)
		Fully open	75°C (167°F)

TRANSMISSION			
Type			CVT (Continuously Variable Transmission)
Engagement RPM			1800 RPM
Drive belt width		Service limit	30.00 mm (1.181 in)
Governor cup roller outer diameter		New	13.80 mm to 14.00 mm (.543 in to .551 in)
		Service limit	13.20 mm (.52 in)

TRANSMISSION		
Governor cup roller inner diameter	New	8.025 mm to 8.175 mm (.316 in to .322 in)
	Service limit	9.00 mm (.354 in)
Centrifugal lever pivot bolt diameter	New	6.078 mm to 6.100 mm (.239 in to .24 in)
	Service limit	6.000 mm (.236 in)
Centrifugal lever bore diameter	New	6.035 mm to 6.078 mm (.2376 in to .2393 in)
	Service limit	6.200 mm (.244 in)
Drive pulley sliding half centrifugal lever pivot bolt bore diameter	New	6.113 mm to 6.171 mm (.241 in to .243 in)
	Service limit	6.300 mm (.248 in)
Drive pulley sliding half large bushing	New	55.000 mm to 55.040 mm (2.165 in to 2.167 in)
	Service limit	55.200 mm (2.173 in)
Drive pulley sliding half small bushing	New	32.000 mm to 32.040 mm (1.26 in to 1.261 in)
	Service limit	32.200 mm (1.268 in)
Drive pulley spring free length	Service limit	85 mm (3.35 in)
Drive pulley spring free squareness	Service limit	4 mm (.157 in)
Spring sleeve length	New	9.2 mm to 9.4 mm (.362 in to .37 in)
	Service limit	9.0 mm (.354 in)
Driven pulley sliding half bushing	New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
	Service limit	30.200 mm (1.189 in)
Driven pulley sliding fixed bushing	New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
	Service limit	30.200 mm (1.189 in)
Torque gear on driven pulley	Service limit	7.500 mm (.295 in)
Driven pulley spring free length	Service limit	125 mm (4.92 in)
Driven pulley spring free squareness	Service limit	3.8 mm (.15 in)
Cam width in top surface	Service limit	4.50 mm (.177 in)

GEARBOX			
Type			Dual range (HI-LO) with park, neutral and reverse
Gear ratios	PRO	Angle drive sub-transmission	37/15 = 2.467
		Intermediate	45/40 = 1.125
		High	36/27 = 1.33
		Low	46/17 = 2.706
		Reverse	34/12 = 2.833
	All other	Angle drive sub-transmission	32/13 = 2.462
		High	38/28 = 1.357
		Low	46/20 = 2.300
		Reverse	31/14 = 2.214
Overall gear ratio	PRO	High	3.700
		Low	7.509
		Reverse	7.863
	All other	High	3.341
		Low	5.662
		Reverse	5,451
Gearbox oil	Capacity		Approximately 450 ml (15.2 U.S. oz)
	Recommended		XPS synthetic gear oil (75W 140) (P/N 293 600 140) or a 75W140 API GL-5 synthetic gear oil
Output shaft backlash		New	0.10 mm to 0.20 mm (.004 in to .008 in)
		Service limit	0.25 mm (.01 in)
Coupling sleeve groove width		New	5.25 mm to 5.35 mm (.207 in to .211 in)
		Service limit	5.50 mm (.217 in)
Coupling fork claw thickness		New	4.95 mm to 5.05 mm (.195 in to .199 in)
		Service limit	4.80 mm (.189 in)
Shift fork claw thickness (high gear shift fork)		New	4.80 mm to 4.90 mm (.189 in to .193 in)
		Service limit	4.70 mm (.185 in)
Shift fork claw thickness (low and reverse gear shift fork)		New	5.10 mm to 5.20 mm (.201 in to .205 in)
		Service limit	5.0 mm (.197 in)
Shift fork pin diameter		New	6.92 mm to 6.97 mm (.272 in to .274 in)
		Service limit	6.85 mm (.27 in)

GEARBOX			
Width of shift fork engagement groove (low and reverse gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Width of shift fork engagement groove (high gear)		New	5.00 mm to 5.10 mm (.197 in to .201 in)
		Service limit	5.20 mm (.205 in)
Diameter free pinions		New	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
		Service limit	29.015 mm (1.1423 in)
Intermediate gear shaft		New	24.979 mm to 25.000 mm (.9834 in to .9843 in)
		Service limit	24.977 mm (.983 in)
Countershaft	MAG side	New	N.A.
		Service limit	17.990 mm (.7083 in)
	CVT side	New	N.A.
		Service limit	24.970 mm (.9831 in)
	Free pinion bearing	New	N.A.
		Service limit	24.970 mm (.9831 in)
Bevel gear shaft	Free pinion bearing	Service limit	24.984 mm (.9836 in)

ELECTRICAL SYSTEM		
Magneto generator output	Without DPS	400 W @ 6000 RPM
	With DPS	500 W @ 6000 RPM
	CE version	500 W @ 6000 RPM
Stator resistance (20°C (68°F))		0.15 to 0.30 Ω
Ignition system type		IDI (Inductive Discharge Ignition)
Ignition timing		Not adjustable
Spark plug	Quantity	2
	Make and type	NGK DCPR8E
	Gap	0.7 mm to 0.8 mm (.028 in to .031 in)
Engine RPM limiter setting	Forward	8000 RPM
	Reverse	15 km/h (9 MPH) without Override)

FUEL SYSTEM	
Fuel delivery	Electronic Fuel Injection (EFI), 46 mm throttle body, 1 injector per cylinder
Idle speed	1400 ± 50 (not adjustable)

ENGINE 650

ENGINE			
Engine type			ROTAX 660, 4-stroke, 2 cylinders (V-twin), liquid cooled
Valve train			4 valves/cylinder (mechanical adjustment), single over head camshaft (SOHC) with timing chain
Bore			82 mm (3.23 in)
Stroke			61.5 mm (2.42 in)
Displacement			650 cm³ (39.7 in³)
Compression ratio			10.3:1
Maximum HP RPM			8000 RPM
Exhaust system			Spark arrestor approved by USDA Forest Service
Air filter			Synthetic paper filter with foam
Intake valve opening			5° BTDC
Intake valve closing			45° ABDC
Exhaust valve opening			50° BBDC
Exhaust valve closing			0° ATDC
Valve clearance	Intake		0.06 mm to 0.14 mm (.0024 in to .0055 in)
	Exhaust		0.11 mm to 0.19 mm (.0043 in to .0075 in)
Valve stem diameter	Intake	New	4.966 mm to 4.980 mm (.1955 in to .1961 in)
		Service limit	4.930 mm (.1941 in)
	Exhaust	New	4.956 mm to 4.970 mm (.1951 in to .1957 in)
		Service limit	4.930 mm (.1941 in)
Valve out of round	Intake and Exhaust	New	0.005 mm (.0002 in)
		Service limit	0.06 mm (.0024 in)
Valve guide diameter	Intake and Exhaust	New	4.998 mm to 5.018 mm (.1968 in to .1976 in)
		Service limit	5.050 mm (.1988 in)
Valve spring free length		New	40.81 mm (1.607 in)
		Service limit	39.00 mm (1.535 in)
Valve seat contact width	Intake	New	1.05 mm to 1.35 mm (.041 in to .053 in)
		Service limit	1.8 mm (.071 in)
	Exhaust	New	1.25 mm to 1.55 mm (.049 in to .061 in)
		Service limit	2 mm (.079 in)
Rocker arm bore diameter		New	12.036 mm to 12.050 mm (.4739 in to .4744 in)
		Service limit	12.060 mm (.4748 in)
Rocker arm shaft diameter		New	12.000 mm to 12.018 mm (.4724 in to .4731 in)
		Service limit	11.990 mm (.472 in)

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ENGINE				
Piston diameter			New	81.950 mm to 81.966 mm (3.2264 in to 3.227 in)
			Service limit	81.850 mm (3.2224 in)
Piston/cylinder clearance			New	0.057 mm to 0.087 mm (.0022 in to .0034 in)
			Service limit	0.130 mm (.0051 in)
Piston ring type			1st	Upper compression ring, rectangular
			2nd	Lower compression ring, tapered face
			3rd	Oil scraper ring
Ring end gap	Rectangular		New	0.20 mm to 0.40 mm (.008 in to .016 in)
			Service limit	0.60 mm (.024 in)
	Tapered face		New	0.20 mm to 0.40 mm (.008 in to .016 in)
			Service limit	0.70 mm (.028 in)
	Oil scraper ring		New	0.20 mm to 0.70 mm (.008 in to .028 in)
			Service limit	1.00 mm (.039 in)
Ring/piston groove clearance	Rectangular		New	0.03 mm to 0.07 mm (.0012 in to .0028 in)
			Service limit	0.15 mm (.0059 in)
	Tapered face		New	0.02 mm to 0.06 mm (.0008 in to .0024 in)
			Service limit	0.15 mm (.0059 in)
	Oil scraper ring		New	0.01 mm to 0.18 mm (.0004 in to .0071 in)
			Service limit	0.25 mm (.0098 in)
Cylinder bore			New	82.023 mm to 82.037 mm (3.2293 in to 3.2298 in)
Cylinder taper			Maximum New	0.038 mm (.0015 in)
			Service limit	0.090 mm (.0035 in)
Cylinder out of round			Maximum New	0.015 mm (.0006 in)
			Service limit	0.020 mm (.0008 in)
Camshaft main bearing journal		Timing chain side	New	34.959 mm to 34.975 mm (1.3763 in to 1.377 in)
			Service limit	34.950 mm (1.376 in)
		Spark plug side	New	21.959 mm to 21.980 mm (.8645 in to .8654 in)
			Service limit	21.950 mm (.8642 in)
Camshaft main bearing journal bore		Timing chain side	New	35.000 mm to 35.025 mm (1.378 in to 1.3789 in)
			Service limit	35.040 mm (1.3795 in)
		Spark plug side	New	22.000 mm to 22.021 mm (.8661 in to .867 in)
			Wear limit	22.040 mm (.8677 in)

ENGINE				
Camshaft lobe	Intake valve		New	32.110 mm to 32.310 mm (1.2642 in to 1.272 in)
			Service limit	32.090 mm (1.2634 in)
	Exhaust valve		New	31.940 mm to 32.140 mm (1.257 in to 1.265 in)
			Service limit	31.920 mm (1.2567 in)
Crankshaft main bearing journal diameter (MAG/PTO side)			New	42.016 mm to 42.040 mm (1.6542 in to 1.6551 in)
			Service limit	42.000 mm (1.6535 in)
Crankshaft radial play (MAG/PTO side)			Service limit	0.07 mm (.0028 in)
Crankshaft bearing journal diameter (in PTO cover)			New	34.004 mm to 34.020 mm (1.3387 in to 1.3394 in)
			Service limit	33.998 mm (1.3385 in)
Crankshaft radial play (PTO cover bearing)			Service limit	0.10 mm (.0039 in)
Crankshaft axial play			New	0.200 mm to 0.500 mm (.0079 in to .0197 in)
			Service limit	0.600 mm (.0236 in)
Crankshaft pin diameter			New	40.001 mm to 40.025 mm (1.5748 in to 1.5758 in)
			Service limit	39.990 mm (1.5744 in)
Crankshaft deflection		MAG/PTO side	New	0.050 mm (.002 in)
Crankcase plain bearing		MAG/PTO side	Service limit	42.100 mm (1.6575 in)
PTO cover plain bearing			Service limit	34.120 mm (1.3433 in)
Connecting rod big end diameter			Service limit	40.100 mm (1.5787 in)
Connecting rod big end radial play			Service limit	0.09 mm (.0035 in)
Connecting rod big end axial play			New	0.200 mm to 0.500 mm (.008 in to .02 in)
			Service limit	0.600 mm (.024 in)
Connecting rod small end diameter			New	20.010 mm to 20.020 mm (.7878 in to .7882 in)
			Service limit	20.060 mm (.7898 in)
Piston pin diameter			New	19.996 mm to 20.000 mm (.7872 in to .7874 in)
			Service limit	19.980 mm (.787 in)
Connecting rod/piston pin clearance (radial play)			Service limit	0.080 mm (.0031 in)

LUBRICATION SYSTEM	
Type	Wet sump. Replaceable cartridge oil filter
Oil filter	BRP Rotax paper type, replaceable

LUBRICATION SYSTEM			
Engine oil pressure		Minimum	300 kPa (44 PSI) at 6000 RPM
Engine oil	Capacity (oil change with filter)		2.0 L (2.1 qt (U.S. liq.))
	Recommended		For the summer season, use XPS 4-stroke synth. blend oil (P/N 293 600 121). For the winter season, use XPS 4-stroke synthetic oil (P/N 293 600 112). If not available, use a 5W40 motor oil that meets the requirements for API service classification SG, SH or SJ

COOLING SYSTEM			
Coolant	Type		Ethyl glycol/water mix (50% coolant, 50% water). Use BRP Long life antifreeze or coolant specifically designed for aluminum engines
	Capacity		3.4 L (.9 U.S. gal.)
Thermostat		Starts to open	65°C (149°F)
		Fully open	75°C (167°F)

TRANSMISSION		
Type		CVT (Continuously Variable Transmission), sub-transmission with L/H/N/R/P, standard engine braking
Engagement RPM		1650 ± 100 RPM
Drive belt width	Service limit	30.00 mm (1.181 in)
Governor cup roller outer diameter	New	13.80 mm to 14.00 mm (.543 in to .551 in)
	Service limit	13.20 mm (.52 in)
Governor cup roller inner diameter	New	8.025 mm to 8.175 mm (.316 in to .322 in)
	Service limit	9.000 mm (.354 in)
Centrifugal lever pivot bolt diameter	New	6.078 mm to 6.100 mm (.239 in to .24 in)
	Service limit	6.000 mm (.236 in)
Centrifugal lever bore diameter	New	6.035 mm to 6.078 mm (.2376 in to .2393 in)
	Service limit	6.200 mm (.244 in)
Drive pulley sliding half centrifugal lever pivot bolt bore diameter	New	6.113 mm to 6.171 mm (.241 in to .243 in)
	Service limit	6.300 mm (.248 in)
Drive pulley sliding half large bushing	New	55.000 mm to 55.040 mm (2.165 in to 2.167 in)
	Service limit	55.200 mm (2.173 in)
Drive pulley sliding half small bushing	New	32.000 mm to 32.040 mm (1.26 in to 1.261 in)
	Service limit	32.200 mm (1.268 in)
Drive pulley spring free length	Service limit	85 mm (3.346 in)
Drive pulley spring free squareness	Service limit	4 mm (.157 in)

TRANSMISSION		
Spring sleeve length	New	9.2 mm to 9.4 mm (.362 in to .37 in)
	Service limit	9.0 mm (.354 in)
Driven pulley sliding half bushing	New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
	Service limit	30.200 mm (1.189 in)
Driven pulley sliding fixed bushing	New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
	Service limit	30.200 mm (1.189 in)
Torque gear on driven pulley	Service limit	7.500 mm (.295 in)
Cam width on top surface	Service limit	4.5 mm (.177 in)
Driven pulley sliding sheave - wear on cam contact surface	Service limit	1.0 mm (.039 in)
Driven pulley spring free length		125 mm (4.921 in)
Driven pulley spring free squareness	Service limit	3.8 mm (.15 in)

GEARBOX WITH EXTERNAL SWITCHES		
Type		Dual range (HI-LO) with park, neutral and reverse
Gear ratios	Angle drive sub-transmission	32/13 = 2.462
	High	35/28 = 1.250
	Low	46/20 = 2.300
	Reverse	31/14 = 2.214
Overall gear ratios	High	3,078
	Low	5.662
	Reverse	5.451
Gearbox oil	Capacity	400 ml (13.5 U.S. oz)
	Recommended	XPS synthetic gear oil (75W 140) (P/N 293 600 140) or a 75W140 API GL-5 synthetic gear oil
Output shaft backlash	New	0.10 mm to 0.20 mm (.004 in to .008 in)
	Service limit	0.25 mm (.01 in)
Coupling sleeve groove width	New	5.25 mm to 5.35 mm (.207 in to .211 in)
	Service limit	5.50 mm (.217 in)
Coupling fork claw thickness	New	4.95 mm to 5.05 mm (.195 in to .199 in)
	Service limit	4.80 mm (.189 in)
Shift fork claw thickness (high gear shift fork)	New	4.80 mm to 4.90 mm (.189 in to .193 in)
	Service limit	4.70 mm (.185 in)
Shift fork claw thickness (low and reverse gear shift fork)	New	5.10 mm to 5.20 mm (.201 in to .205 in)
	Service limit	5.0 mm (.197 in)
Shift fork pin diameter	New	6.92 mm to 6.97 mm (.272 in to .274 in)
	Service limit	6.85 mm (.27 in)

GEARBOX WITH EXTERNAL SWITCHES			
Width of shift fork engagement groove (low and reverse gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Width of shift fork engagement groove (high gear)		New	5.00 mm to 5.10 mm (.197 in to .201 in)
		Service limit	5.20 mm (.205 in)
Diameter free pinions		New	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
		Service limit	29.015 mm (1.1423 in)
Intermediate gear shaft		New	24.979 mm to 25.000 mm (.9834 in to .9843 in)
		Service limit	24.977 mm (.983 in)
Countershaft	MAG side	New	N.A.
		Service limit	17.990 mm (.7083 in)
	CVT side	New	N.A.
		Service limit	24.970 mm (.9831 in)
	Free pinion bearing	New	N.A.
		Service limit	24.970 mm (.9831 in)
Bevel gear shaft	Free pinion bearing	Service limit	24.984 mm (.9836 in)

GEARBOX WITH GBPS		
Type		Dual range (HI-LO) with park, neutral and reverse
Gear ratios	Angle drive sub-transmission	37/15 = 2.467
	Intermediate	45/40 = 1.125
	High	36/27 = 1.333
	Low	46/17 = 2.706
	Reverse	34/12 = 2.833
Overall gear ratios	High	3.700
	Low	7.510
	Reverse	7.863
Gearbox oil	Capacity	450 ml (15.22 U.S. oz)
	Recommended	XPS synthetic gear oil (75W 140) (P/N 293 600 140) or a 75W140 API GL-5 synthetic gear oil
Coupling sleeve groove width	New	5.25 mm to 5.35 mm (.207 in to .211 in)
	Service limit	5.50 mm (.217 in)
Coupling fork claw thickness	New	4.95 mm to 5.05 mm (.195 in to .199 in)
	Service limit	4.80 mm (.189 in)
Shift fork claw thickness (high gear shift fork)	New	5.10 mm to 5.20 mm (.201 in to .205 in)
	Service limit	5.0 mm (.197 in)

GEARBOX WITH GBPS			
Shift fork claw thickness (low and reverse gear shift fork)		New	5.10 mm to 5.20 mm (.201 in to .205 in)
		Service limit	5.0 mm (.197 in)
Width of shift fork engagement groove (low and reverse gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Width of shift fork engagement groove (high gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Diameter free pinions		New	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
		Service limit	29.015 mm (1.1423 in)
Intermediate gear shaft		New	24.979 mm to 25.000 mm (.9834 in to .9843 in)
		Service limit	24.977 mm (.983 in)
Countershaft	MAG side	New	19.977 mm to 19.990 mm (.7865 in to .787 in)
		Service limit	19.973 mm (.7863 in)
	CVT side	New	24.977 mm to 24.990 mm (.9833 in to .9839 in)
		Service limit	24.970 mm (.9831 in)
Main shaft	Free pinion bearing	New	24.987 mm to 25.000 mm (.9837 in to .9843 in)
		Service limit	24.984 mm (.9836 in)
	Bearing journal MAG/CVT side	New	16.980 mm to 16.991 mm (.6685 in to .6689 in)
		Service limit	16.976 mm (.6683 in)

ELECTRICAL SYSTEM		
Magneto generator output	Without DPS	400 W @ 6000 RPM
	With DPS	625 W @ 6000 RPM
Stator resistance (20°C (68°F))		0.15 to 0.30 Ω
Ignition system type		IDI (Inductive Discharge Ignition)
Ignition timing		Not adjustable
Spark plug	Quantity	2
	Make and type	NGK DCPR8E
	Gap	0.7 mm to 0.8 mm (.028 in to .031 in)
Engine RPM limiter setting	Forward	8000 RPM
	Reverse	15 km/h (9 MPH) (without override)

FUEL SYSTEM	
Fuel delivery	Electronic Fuel Injection (EFI), 46 mm throttle body, 1 injector per cylinder
Idle speed	1250 RPM ± 50 (not adjustable)

ENGINE 850

ENGINE			
Engine type			ROTAX 850, 4-stroke, 2 cylinders (V-twin), liquid cooled
Valve train			4 valves/cylinder (mechanical adjustment), single over head camshaft (SOHC) with timing chain
Bore			94 mm (3.7 in)
Stroke			61.5 mm (2.42 in)
Displacement			854 cm³ (52.1 in³)
Compression ratio			10.5:1
Maximum HP RPM			7000 RPM
Exhaust system			Spark arrestor approved by USDA Forest Service
Air filter			Synthetic paper filter with foam
Intake valve opening			5° BTDC
Intake valve closing			45° ABDC
Exhaust valve opening			55° BBDC
Exhaust valve closing			5° ATDC
Valve clearance		Intake	0.06 mm to 0.14 mm (.0024 in to .0055 in)
		Exhaust	0.11 mm to 0.19 mm (.0043 in to .0075 in)
Valve stem diameter	Intake	New	5.472 mm to 5.486 mm (.2154 in to .216 in)
		Service limit	5.450 mm (.2146 in)
	Exhaust	New	5.461 mm to 5.476 mm (.215 in to .2156 in)
		Service limit	5.440 mm (.2142 in)
Valve out of round	Intake and Exhaust	New	0.005 mm (.0002 in)
		Service limit	0.06 mm (.0024 in)
Valve guide diameter	Intake and Exhaust	New	5.506 mm to 5.518 mm (.2168 in to .2172 in)
		Service limit	5.568 mm (.2192 in)
Valve spring free length		New	40.41 mm (1.591 in)
		Service limit	39.00 mm (1.535 in)
Valve seat contact width	Intake	New	1.05 mm to 1.35 mm (.041 in to .053 in)
		Service limit	1.8 mm (.071 in)
	Exhaust	New	1.25 mm to 1.55 mm (.049 in to .061 in)
		Service limit	2 mm (.079 in)
Rocker arm bore diameter		New	12.036 mm to 12.050 mm (.4739 in to .4744 in)
		Service limit	12.060 mm (.4748 in)
Rocker arm shaft diameter		New	12.000 mm to 12.018 mm (.4724 in to .4731 in)
		Service limit	11.990 mm (.472 in)

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ENGINE				
Piston diameter			New	93.950 mm to 93.966 mm (3.6988 in to 3.6994 in)
			Service limit	93.900 mm (3.6969 in)
Piston/cylinder clearance			New	0.027 mm to 0.057 mm (.0011 in to .0022 in)
			Service limit	0.100 mm (.0039 in)
Piston ring type			1st	Upper compression ring, rectangular
			2nd	Lower compression ring, tapered face
			3rd	Oil scraper ring
Ring end gap	Rectangular		New	0.20 mm to 0.35 mm (.008 in to .014 in)
			Service limit	0.60 mm (.024 in)
	Tapered face		New	0.35 mm to 0.55 mm (.014 in to .022 in)
			Service limit	0.85 mm (.033 in)
	Oil scraper ring		New	0.20 mm to 0.70 mm (.008 in to .028 in)
			Service limit	1.00 mm (.039 in)
Ring/piston groove clearance	Rectangular		New	0.03 mm to 0.07 mm (.0012 in to .0028 in)
			Service limit	0.15 mm (.0059 in)
	Tapered face		New	0.02 mm to 0.06 mm (.0008 in to .0024 in)
			Service limit	0.15 mm (.0059 in)
	Oil scraper ring		New	0.01 mm to 0.18 mm (.0004 in to .0071 in)
			Service limit	0.25 mm (.0098 in)
Cylinder bore			New	93.993 mm to 94.007 mm (3.7005 in to 3.7011 in)
Cylinder taper			Maximum New	0.038 mm (.0015 in)
			Service limit	0.090 mm (.0035 in)
Cylinder out of round			Maximum New	0.015 mm (.0006 in)
			Service limit	0.020 mm (.0008 in)
Camshaft main bearing journal		Timing chain side	New	34.959 mm to 34.975 mm (1.3763 in to 1.377 in)
			Service limit	34.950 mm (1.376 in)
		Spark plug side	New	21.959 mm to 21.980 mm (.8645 in to .8654 in)
			Service limit	21.950 mm (.8642 in)
Camshaft main bearing journal bore		Timing chain side	New	35.000 mm to 35.025 mm (1.378 in to 1.3789 in)
			Service limit	35.040 mm (1.3795 in)
		Spark plug side	New	22.000 mm to 22.021 mm (.8661 in to .867 in)
			Wear limit	22.040 mm (.8677 in)

ENGINE				
Camshaft lobe	Intake valve		New	32.890 mm to 33.090 mm (1.2949 in to 1.3028 in)
			Service limit	32.870 mm (1.2941 in)
	Exhaust valve		New	32.950 mm to 33.150 mm (1.2972 in to 1.3051 in)
			Service limit	32.930 mm (1.2965 in)
Crankshaft main bearing journal diameter (MAG/PTO side)			New	42.016 mm to 42.040 mm (1.6542 in to 1.6551 in)
			Service limit	42.000 mm (1.6535 in)
Crankshaft radial play (MAG/PTO side)			Service limit	0.07 mm (.0028 in)
Crankshaft bearing journal diameter (in PTO cover)			New	34.004 mm to 34.020 mm (1.3387 in to 1.3394 in)
			Service limit	33.998 mm (1.3385 in)
Crankshaft radial play (PTO cover bearing)			Service limit	0.10 mm (.0039 in)
Crankshaft axial play			New	0.200 mm to 0.500 mm (.0079 in to .0197 in)
			Service limit	0.600 mm (.0236 in)
Crankshaft pin diameter			New	40.001 mm to 40.025 mm (1.5748 in to 1.5758 in)
			Service limit	39.990 mm (1.5744 in)
Crankshaft deflection		MAG/PTO side	New	0.050 mm (.002 in)
Crankcase plain bearing		MAG/PTO side	Service limit	42.100 mm (1.6575 in)
PTO cover plain bearing			Service limit	34.120 mm (1.3433 in)
Connecting rod big end diameter			Service limit	40.100 mm (1.5787 in)
Connecting rod big end radial play			Service limit	0.09 mm (.0035 in)
Connecting rod big end axial play			New	0.200 mm to 0.500 mm (.008 in to .02 in)
			Service limit	0.600 mm (.024 in)
Connecting rod small end diameter			New	20.010 mm to 20.020 mm (.7878 in to .7882 in)
			Service limit	20.060 mm (.7898 in)
Piston pin diameter			New	19.996 mm to 20.000 mm (.7872 in to .7874 in)
			Service limit	19.980 mm (.787 in)
Connecting rod/piston pin clearance (radial play)			Service limit	0.080 mm (.0031 in)

LUBRICATION SYSTEM	
Type	Wet sump. Replaceable cartridge oil filter
Oil filter	BRP Rotax paper type, replaceable

LUBRICATION SYSTEM			
Engine oil pressure		Minimum	300 kPa (44 PSI) at 6000 RPM
Engine oil	Capacity (oil change with filter)		2.0 L (2.1 qt (U.S. liq.))
	Recommended		For the summer season, use XPS 4-stroke synthetic blend 5W 40 oil. For the winter season, use XPS 4-stroke synthetic blend 0W 40 oil. If not available, use a 5W40 motor oil that meets the requirements for API service classification SG, SH or SJ

COOLING SYSTEM			
Coolant	Type		Ethyl glycol/water mix (50% coolant, 50% water). Use BRP Long life antifreeze or coolant specifically designed for aluminum engines
	Capacity		3.4 L (.9 U.S. gal.)
Thermostat		Starts to open	65°C (149°F)
		Fully open	75°C (167°F)
Radiator cap opening pressure			110 kPa (16 PSI)

TRANSMISSION		
Type		CVT (Continuously Variable Transmission), sub-transmission with L/H/N/R/P, standard engine braking
Engagement RPM		1650 ± 100 RPM
Drive belt width	Service limit	30.00 mm (1.181 in)
Governor cup roller outer diameter	New	13.80 mm to 14.00 mm (.543 in to .551 in)
	Service limit	13.20 mm (.52 in)
Governor cup roller inner diameter	New	8.025 mm to 8.175 mm (.316 in to .322 in)
	Service limit	9.000 mm (.354 in)
Centrifugal lever pivot bolt diameter	New	6.078 mm to 6.100 mm (.239 in to .24 in)
	Service limit	6.000 mm (.236 in)
Centrifugal lever bore diameter	New	6.035 mm to 6.078 mm (.2376 in to .2393 in)
	Service limit	6.200 mm (.244 in)
Drive pulley sliding half centrifugal lever pivot bolt bore diameter	New	6.113 mm to 6.171 mm (.241 in to .243 in)
	Service limit	6.300 mm (.248 in)
Drive pulley sliding half large bushing	New	55.000 mm to 55.040 mm (2.165 in to 2.167 in)
	Service limit	55.200 mm (2.173 in)
Drive pulley sliding half small bushing	New	32.000 mm to 32.040 mm (1.26 in to 1.261 in)
	Service limit	32.200 mm (1.268 in)
Drive pulley spring free length	Service limit	95 mm (3.74 in)
Drive pulley spring free squareness	Service limit	4 mm (.157 in)

TRANSMISSION		
Spring sleeve length	New	9.2 mm to 9.4 mm (.362 in to .37 in)
	Service limit	9.0 mm (.354 in)
Driven pulley sliding half bushing	New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
	Service limit	30.200 mm (1.189 in)
Driven pulley sliding fixed bushing	New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
	Service limit	30.200 mm (1.189 in)
Torque gear on driven pulley	Service limit	7.500 mm (.295 in)
Cam width on top surface	Service limit	16.0 mm (.63 in)
Driven pulley sliding sheave - wear on cam contact surface	Service limit	1.0 mm (.039 in)
Driven pulley spring free length		125 mm (4.921 in)
Driven pulley spring free squareness	Service limit	3.8 mm (.15 in)

GEARBOX WITH EXTERNAL SWITCHES			
Type			Dual range (HI-LO) with park, neutral and reverse
Gear ratios	All	Angle drive sub-transmission	32/13 = 2.462
	Outlander (except XMR) and Renegade	High	34/29 = 1.173
	Outlander XMR	High	35/28 = 1.250
	All	Low	46/20 = 2.300
	All	Reverse	31/14 = 2.214
Overall gear ratios	Outlander (except XMR) and Renegade	High	2,886
	Outlander XMR	High	3.078
	All	Low	5.662
	All	Reverse	5.451
Gearbox oil		Capacity	400 ml (13.5 U.S. oz)
		Recommended	XPS 75W 140 synthetic gear oil or a 75W140 API GL-5 synthetic gear oil
Output shaft backlash		New	0.10 mm to 0.20 mm (.004 in to .008 in)
		Service limit	0.25 mm (.01 in)
Coupling sleeve groove width		New	5.25 mm to 5.35 mm (.207 in to .211 in)
		Service limit	5.50 mm (.217 in)
Coupling fork claw thickness		New	4.95 mm to 5.05 mm (.195 in to .199 in)
		Service limit	4.80 mm (.189 in)
Shift fork claw thickness (high gear shift fork)		New	4.80 mm to 4.90 mm (.189 in to .193 in)
		Service limit	4.70 mm (.185 in)
Shift fork claw thickness (low and reverse gear shift fork)		New	5.10 mm to 5.20 mm (.201 in to .205 in)
		Service limit	5.0 mm (.197 in)

GEARBOX WITH EXTERNAL SWITCHES			
Shift fork pin diameter		New	6.92 mm to 6.97 mm (.272 in to .274 in)
		Service limit	6.85 mm (.27 in)
Width of shift fork engagement groove (low and reverse gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Width of shift fork engagement groove (high gear)		New	5.00 mm to 5.10 mm (.197 in to .201 in)
		Service limit	5.20 mm (.205 in)
Diameter free pinions		New	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
		Service limit	29.015 mm (1.1423 in)
Intermediate gear shaft		New	24.979 mm to 25.000 mm (.9834 in to .9843 in)
		Service limit	24.977 mm (.983 in)
Countershaft	MAG side	New	N.A.
		Service limit	17.990 mm (.7083 in)
	CVT side	New	N.A.
		Service limit	24.970 mm (.9831 in)
	Free pinion bearing	New	N.A.
		Service limit	24.970 mm (.9831 in)
Bevel gear shaft	Free pinion bearing	Service limit	24.984 mm (.9836 in)

GEARBOX WITH GBPS		
Type		Dual range (HI-LO) with park, neutral and reverse
Gear ratios	Angle drive sub-transmission	37/15 = 2.467
	Intermediate	45/44 = 1.023
	High	37/33 = 1.121
	Low	46/17 = 2.706
	Reverse	34/12 = 2.833
Overall gear ratios	High	2.829
	Low	6.829
	Reverse	7.149
Gearbox oil	Capacity	450 ml (15.22 U.S. oz)
	Recommended	XPS 75W 140 synthetic gear oil or a 75W140 API GL-5 synthetic gear oil
Coupling sleeve groove width	New	5.25 mm to 5.35 mm (.207 in to .211 in)
	Service limit	5.50 mm (.217 in)
Coupling fork claw thickness	New	4.95 mm to 5.05 mm (.195 in to .199 in)
	Service limit	4.80 mm (.189 in)

GEARBOX WITH GBPS			
Shift fork claw thickness (high gear shift fork)		New	5.10 mm to 5.20 mm (.201 in to .205 in)
		Service limit	5.0 mm (.197 in)
Shift fork claw thickness (low and reverse gear shift fork)		New	5.10 mm to 5.20 mm (.201 in to .205 in)
		Service limit	5.0 mm (.197 in)
Width of shift fork engagement groove (low and reverse gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Width of shift fork engagement groove (high gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Diameter free pinions		New	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
		Service limit	29.015 mm (1.1423 in)
Intermediate gear shaft		New	24.979 mm to 25.000 mm (.9834 in to .9843 in)
		Service limit	24.977 mm (.983 in)
Countershaft	MAG side	New	19.977 mm to 19.990 mm (.7865 in to .787 in)
		Service limit	19.973 mm (.7863 in)
	CVT side	New	24.977 mm to 24.990 mm (.9833 in to .9839 in)
		Service limit	24.970 mm (.9831 in)
Main shaft	Free pinion bearing	New	24.987 mm to 25.000 mm (.9837 in to .9843 in)
		Service limit	24.984 mm (.9836 in)
	Bearing journal MAG/CVT side	New	16.980 mm to 16.991 mm (.6685 in to .6689 in)
		Service limit	16.976 mm (.6683 in)

ELECTRICAL SYSTEM		
Magneto generator output	Without DPS	400 W @ 6000 RPM
	With DPS	625 W @ 6000 RPM
Stator resistance (20°C (68°F))		0.15 to 0.30 Ω
Ignition system type		IDI (Inductive Discharge Ignition)
Ignition timing		Not adjustable
Spark plug	Quantity	2
	Make and type	NGK LMAR8D-J
	Gap	0.7 mm to 0.9 mm (.028 in to .035 in)
Engine RPM limiter setting	Forward	8000 RPM
	Reverse	15 km/h (9 MPH) (without override)

FUEL SYSTEM	
Fuel delivery	Electronic Fuel Injection (EFI), 54 mm throttle body, 1 injector per cylinder
Idle speed	1400 ± 50 (not adjustable)

ENGINE 1000R

ENGINE			
Engine type			ROTAX® 1010HO, 4-stroke, 2 cylinders (V-twin), liquid cooled
Valve train			4 valves/cylinder (mechanical adjustment), single over head camshaft (SOHC) with timing chain
Bore			91 mm (3.58 in)
Stroke			75 mm (2.95 in)
Displacement			976 cm³ (59.6 in³)
Compression ratio			10.6:1
Maximum HP RPM			7250 RPM
Exhaust system			Spark arrestor approved by USDA Forest Service
Air filter			Synthetic paper filter with foam
Intake valve opening			8° BTDC
Intake valve closing			57° ABDC
Exhaust valve opening			58° BBDC
Exhaust valve closing			2° ATDC
Valve clearance		Intake	0.06 mm to 0.14 mm (.0024 in to .0055 in)
		Exhaust	0.11 mm to 0.19 mm (.0043 in to .0075 in)
Valve stem diameter	Intake	New	5.472 mm to 5.486 mm (.2154 in to .216 in)
		Service limit	5.450 mm (.2146 in)
	Exhaust	New	5.461 mm to 5.476 mm (.215 in to .2156 in)
		Service limit	5.440 mm (.2142 in)
Valve out of round	Intake and exhaust	New	0.005 mm (.0002 in)
		Service limit	0.06 mm (.0024 in)
Valve guide diameter	Intake and Exhaust	New	5.506 mm to 5.518 mm (.2168 in to .2172 in)
		Service limit	5.568 mm (.2192 in)
Valve spring free length		New	40.41 mm (1.591 in)
		Service limit	39.00 mm (1.535 in)
Valve seat contact width	Intake	New	1.05 mm to 1.35 mm (.041 in to .053 in)
		Service limit	1.8 mm (.071 in)
	Exhaust	New	1.25 mm to 1.55 mm (.049 in to .061 in)
		Service limit	2 mm (.079 in)

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ENGINE			
Rocker arm bore diameter		New	12.036 mm to 12.050 mm (.4739 in to .4744 in)
		Service limit	12.060 mm (.4748 in)
Rocker arm shaft diameter		New	12.000 mm to 12.018 mm (.4724 in to .4731 in)
		Service limit	11.990 mm (.472 in)
Piston diameter		New	90.950 mm to 90.966 mm (3.5807 in to 3.5813 in)
		Service limit	90.900 mm (3.5787 in)
Piston/cylinder clearance		New	0.027 mm to 0.057 mm (.0011 in to .0022 in)
		Service limit	0.100 mm (.0039 in)
Piston ring type	1st		Upper compression ring, rectangular
	2nd		Lower compression ring, tapered face
	3rd		Oil scraper ring
Ring end gap	Rectangular	New	0.20 mm to 0.40 mm (.008 in to .016 in)
		Service limit	0.60 mm (.024 in)
	Tapered face	New	0.20 mm to 0.40 mm (.008 in to .016 in)
		Service limit	0.70 mm (.028 in)
	Oil scraper ring	New	0.20 mm to 0.70 mm (.008 in to .028 in)
		Service limit	1.00 mm (.039 in)
Ring/piston groove clearance	Rectangular	New	0.03 mm to 0.07 mm (.0012 in to .0028 in)
		Service limit	0.15 mm (.0059 in)
	Tapered face	New	0.02 mm to 0.06 mm (.0008 in to .0024 in)
		Service limit	0.15 mm (.0059 in)
	Oil scraper ring	New	0.01 mm to 0.18 mm (.0004 in to .0071 in)
		Service limit	0.25 mm (.0098 in)
Cylinder bore		New	90.993 mm to 91.007 mm (3.5824 in to 3.583 in)
Cylinder taper		Maximum New	0.038 mm (.0015 in)
		Service limit	0.090 mm (.0035 in)
Cylinder out of round		Maximum New	0.015 mm (.0006 in)
		Service limit	0.020 mm (.0008 in)

ENGINE			
Camshaft main bearing journal	Timing chain side	New	34.959 mm to 34.975 mm (1.3763 in to 1.377 in)
		Service limit	34.950 mm (1.376 in)
	Spark plug side	New	21.959 mm to 21.980 mm (.8645 in to .8654 in)
		Service limit	21.950 mm (.8642 in)
Camshaft main bearing journal bore	Timing chain side	New	35.000 mm to 35.025 mm (1.378 in to 1.3789 in)
		Service limit	35.040 mm (1.3795 in)
	Spark plug side	New	22.000 mm to 22.021 mm (.8661 in to .867 in)
		Wear limit	22.040 mm (.8677 in)
Camshaft lobe	Intake valve	New	32.960 mm to 33.160 mm (1.2976 in to 1.3055 in)
		Service limit	32.940 mm (1.2969 in)
	Exhaust valve	New	32.860 mm to 33.060 mm (1.2937 in to 1.3016 in)
		Service limit	32.840 mm (1.2929 in)
Crankshaft main bearing journal diameter (MAG/PTO side)		New	42.016 mm to 42.040 mm (1.6542 in to 1.6551 in)
		Service limit	42.000 mm (1.6535 in)
Crankshaft radial play (MAG/PTO side)		Service limit	0.07 mm (.0028 in)
Crankshaft bearing journal diameter (in PTO cover)		New	34.004 mm to 34.020 mm (1.3387 in to 1.3394 in)
		Service limit	33.998 mm (1.3385 in)
Crankshaft radial play (PTO cover bearing)		Service limit	0.10 mm (.0039 in)
Crankshaft axial play		New	0.200 mm to 0.500 mm (.0079 in to .0197 in)
		Service limit	0.600 mm (.0236 in)
Crankshaft pin diameter		New	41.986 mm to 42.010 mm (1.653 in to 1.6539 in)
		Service limit	41.967 mm (1.6522 in)
Crankshaft deflection	MAG/PTO side	New	0.050 mm (.002 in)
Crankcase plain bearing	MAG/PTO side	Service limit	42.100 mm (1.6575 in)
PTO cover plain bearing		Service limit	34.120 mm (1.3433 in)
Connecting rod big end diameter		Service limit	42.100 mm (1.6575 in)
Connecting rod big end radial play		Service limit	0.09 mm (.0035 in)
Connecting rod big end axial play		New	0.250 mm to 0.550 mm (.0098 in to .0217 in)
		Service limit	0.600 mm (.024 in)

ENGINE		
Connecting rod small end diameter	New	22.010 mm to 22.020 mm (.8665 in to .8669 in)
	Service limit	22.050 mm (.8681 in)
Piston pin diameter	New	21.996 mm to 22.000 mm (.866 in to .866 in)
	Service limit	21.980 mm (.8654 in)
Connecting rod/piston pin clearance (radial play)	Service limit	0.080 mm (.0031 in)

LUBRICATION SYSTEM		
Type		Wet sump. Replaceable cartridge oil filter
Oil filter		BRP Rotax paper type, replaceable
Engine oil pressure	Minimum	300 kPa (44 PSI) at 6000 RPM
Engine oil	Capacity (oil change with filter)	2.0 L (2.1 qt (U.S. liq.))
	Recommended	For the summer season, use 4T 5W40 Synthetic blend oil. For the winter season, use 4T 0W40 Synthetic oil. If BRP engine oil is not available, use a 4-stroke SAE 5W40 engine oil that meets or exceeds the requirements for API service classification SJ, SL, SM or SN.

COOLING SYSTEM		
Coolant	Type	Ethyl glycol/water mix (50% coolant, 50% water). Use BRP Long life antifreeze or coolant specifically designed for aluminum engines
	Capacity	3.5 L (.9 U.S. gal.)
Thermostat	Starts to open	65°C (149°F)
	Fully open	75°C (167°F)
Radiator cap opening pressure		110 kPa (16 PSI)

TRANSMISSION		
Type		CVT (Continuously Variable Transmission), sub-transmission with L/H/N/R/P, standard engine braking
Engagement RPM		1650 ± 100 RPM
Drive belt width	Service limit	30.00 mm (1.181 in)
Governor cup roller outer diameter	New	13.80 mm to 14.00 mm (.543 in to .551 in)
	Service limit	13.20 mm (.52 in)

TRANSMISSION		
Governor cup roller inner diameter	New	8.025 mm to 8.175 mm (.316 in to .322 in)
	Service limit	9.000 mm (.354 in)
Centrifugal lever pivot bolt diameter	New	6.078 mm to 6.100 mm (.239 in to .24 in)
	Service limit	6.000 mm (.236 in)
Centrifugal lever bore diameter	New	6.035 mm to 6.078 mm (.2376 in to .2393 in)
	Service limit	6.200 mm (.244 in)
Drive pulley sliding half centrifugal lever pivot bolt bore diameter	New	6.113 mm to 6.171 mm (.241 in to .243 in)
	Service limit	6.300 mm (.248 in)
Drive pulley sliding half large bushing	New	55.000 mm to 55.040 mm (2.165 in to 2.167 in)
	Service limit	55.200 mm (2.173 in)
Drive pulley sliding half small bushing	New	32.000 mm to 32.040 mm (1.26 in to 1.261 in)
	Service limit	32.200 mm (1.268 in)
Drive pulley spring free length	Service limit	95 mm (3.74 in)
Drive pulley spring free squareness	Service limit	4 mm (.157 in)
Spring sleeve length	New	9.2 mm to 9.4 mm (.362 in to .37 in)
	Service limit	9.0 mm (.354 in)
Driven pulley sliding half bushing	New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
	Service limit	30.200 mm (1.189 in)
Driven pulley sliding fixed bushing	New	30.060 mm to 30.100 mm (1.183 in to 1.185 in)
	Service limit	30.200 mm (1.189 in)
Torque gear on driven pulley	Service limit	7.500 mm (.295 in)
Cam width on top surface	Service limit	16.0 mm (.63 in)
Driven pulley sliding sheave - wear on cam contact surface	Service limit	1.0 mm (.039 in)
Driven pulley spring free length	Service limit	125 mm (4.921 in)
Driven pulley spring free squareness	Service limit	3.8 mm (.15 in)

GEARBOX WITH EXTERNAL SWITCHES		
Type		Dual range (HI-LO) with park, neutral and reverse
Gear ratios	Angle drive sub-transmission	32/13 = 2.462
	High	34/29 = 1.173
	Low	46/20 = 2.300
	Reverse	31/14 = 2.214

GEARBOX WITH EXTERNAL SWITCHES			
Overall gear ratios	High		2,886
	Low		5.662
	Reverse		5.451
Gearbox oil		Capacity	400 ml (13.5 U.S. oz)
		Recommended	XPS 75W140 Synthetic gear oil or a 75W140 API GL-5 synthetic gear oil
Output shaft backlash		New	0.10 mm to 0.20 mm (.004 in to .008 in)
		Service limit	0.25 mm (.01 in)
Coupling sleeve groove width		New	5.25 mm to 5.35 mm (.207 in to .211 in)
		Service limit	5.50 mm (.217 in)
Coupling fork claw thickness		New	4.95 mm to 5.05 mm (.195 in to .199 in)
		Service limit	4.80 mm (.189 in)
Shift fork claw thickness (high gear shift fork)		New	4.80 mm to 4.90 mm (.189 in to .193 in)
		Service limit	4.70 mm (.185 in)
Shift fork claw thickness (low and reverse gear shift fork)		New	5.10 mm to 5.20 mm (.201 in to .205 in)
		Service limit	5.0 mm (.197 in)
Shift fork pin diameter		New	6.92 mm to 6.97 mm (.272 in to .274 in)
		Service limit	6.85 mm (.27 in)
Width of shift fork engagement groove (low and reverse gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Width of shift fork engagement groove (high gear)		New	5.00 mm to 5.10 mm (.197 in to .201 in)
		Service limit	5.20 mm (.205 in)
Diameter free pinions		New	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
		Service limit	29.015 mm (1.1423 in)
Intermediate gear shaft		New	24.979 mm to 25.000 mm (.9834 in to .9843 in)
		Service limit	24.977 mm (.983 in)

GEARBOX WITH EXTERNAL SWITCHES			
Countershaft	MAG side	New	N.A.
		Service limit	17.990 mm (.7083 in)
	CVT side	New	N.A.
		Service limit	24.970 mm (.9831 in)
	Free pinion bearing	New	N.A.
		Service limit	24.970 mm (.9831 in)
Bevel gear shaft	Free pinion bearing	Service limit	24.984 mm (.9836 in)

GEARBOX WITH GBPS			
Type			Dual range (HI-LO) with park, neutral and reverse
Gear ratios	Angle drive sub-transmission		37/15 = 2.467
	Intermediate		45/40 = 1.125
	High		36/27 = 1.333
	Low		46/17 = 2.706
	Reverse		34/12 = 2.833
Overall gear ratios	High		3.700
	Low		7.510
	Reverse		7.863
Gearbox oil		Capacity	450 ml (15.22 U.S. oz)
		Recommended	XPS 75W140 Synthetic gear oil or a 75W140 API GL-5 synthetic gear oil
Coupling sleeve groove width		New	5.25 mm to 5.35 mm (.207 in to .211 in)
		Service limit	5.50 mm (.217 in)
Coupling fork claw thickness		New	4.95 mm to 5.05 mm (.195 in to .199 in)
		Service limit	4.80 mm (.189 in)
Shift fork claw thickness (high gear shift fork)		New	5.10 mm to 5.20 mm (.201 in to .205 in)
		Service limit	5.0 mm (.197 in)
Shift fork claw thickness (low and reverse gear shift fork)		New	5.10 mm to 5.20 mm (.201 in to .205 in)
		Service limit	5.0 mm (.197 in)
Width of shift fork engagement groove (low and reverse gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)
Width of shift fork engagement groove (high gear)		New	5.30 mm to 5.40 mm (.209 in to .213 in)
		Service limit	5.50 mm (.217 in)

GEARBOX WITH GBPS			
Diameter free pinions		New	29.000 mm to 29.013 mm (1.1417 in to 1.1422 in)
		Service limit	29.015 mm (1.1423 in)
Intermediate gear shaft		New	24.979 mm to 25.000 mm (.9834 in to .9843 in)
		Service limit	24.977 mm (.983 in)
Countershaft	MAG side	New	19.977 mm to 19.990 mm (.7865 in to .787 in)
		Service limit	19.973 mm (.7863 in)
	CVT side	New	24.977 mm to 24.990 mm (.9833 in to .9839 in)
		Service limit	24.970 mm (.9831 in)
Main shaft	Free pinion bearing	New	24.987 mm to 25.000 mm (.9837 in to .9843 in)
		Service limit	24.984 mm (.9836 in)
	Bearing journal MAG/CVT side	New	16.980 mm to 16.991 mm (.6685 in to .6689 in)
		Service limit	16.976 mm (.6683 in)

ELECTRICAL SYSTEM		
Magneto generator output	Without DPS	400 W @ 6000 RPM
	With DPS	625 W @ 6000 RPM
Stator resistance (20°C (68°F))		0.15 to 0.30 Ω
Ignition system type		IDI (Inductive Discharge Ignition)
Ignition timing		Not adjustable
Spark plug	Quantity	2
	Make and type	NGK LMAR8D-J
	Gap	0.7 mm to 0.9 mm (.028 in to .035 in)
Engine RPM limiter setting	Forward	8000 RPM
	Reverse	15 km/h (9 MPH) (without override)

FUEL SYSTEM		
Fuel delivery		Electronic Fuel Injection (EFI), 54 mm throttle body, 1 injector per cylinder
Fuel pump	Type	Electrical (in fuel tank)
	Operating pressure	350 kPa ± 10 kPa (51 PSI ± 1 PSI)
Idle speed		1400 ± 50 (not adjustable)

RENEGADE

COOLING SYSTEM			
Coolant	Type		Extended life pre-mixed coolant or coolant specifically formulated for aluminum engines
	Capacity	570 650	3.4 L (.9 U.S. gal.)
		850 1000R	3.5 L (.92 U.S. gal.)
Radiator cap opening pressure			110 kPa (16 PSI)

EXHAUST SYSTEM	
Exhaust system	Spark arrestor approved by USDA Forest Service Catalyst on NRMM models (1)
(1) For NRMM models identification, refer to *INTRODUCTION* section.	

ELECTRICAL SYSTEM (1000R AND NRMM MODELS (1))			
Battery	Type		Maintenance free
	Voltage		12 volts
	Nominal rating		18 A•h
	Power starter output		0.7 KW
Headlight	High		2 x 60 W (HB3)
	Low		2 x 60 W (HB3)
Taillight			2 X 5/21 W
Fusible links	Main	FL-1	16 gauge
	Cooling fan Accessories	FL-2	16 gauge
Fuse holder	DPS (Dynamic Power Steering)	-	40 A
Relays	Fan Relay	RY1	-
	Main Relay	RY2	-
	Lights Relay	RY3	-
	Accessories	RY5	-
	Brake Relay	RY6	-

ELECTRICAL SYSTEM (1000R AND NRMM MODELS (1))			
Fuses	Start Switch	F1	10 A
	Lights	F2	30 A
	Accessories 1	F3	20 A
	Accessories 2	F4	20 A
	Injectors Ignition coils Fuel Pump	F5	10 A
	Relays DPS Gauge	F6	10 A
	Brake lights	F7	10 A
	DESS Key, ECM	F8	5 A
	2WD/4WD	F9	10 A
	DC Outlet	F12	25 A
(1) For NRMM models identification, refer to *INTRODUCTION* section.			

ELECTRICAL SYSTEM (ALL OTHER MODELS)			
Battery	Type		Maintenance free
	Voltage		12 volts
	Nominal rating		18 A•h
	Power starter output		0.7 KW
Headlight	High		2 x 60 W (HB3)
	Low		2 x 60 W (HB3)
Taillight			2 X 5/21 W
Fusible links	Main	FL-1	16 gauge
	Cooling fan Accessories	FL-2	16 gauge
Fuse holder	DPS (Dynamic Power Steering)	-	40 A
Relays	Fan Relay	RY1	-
	Main Relay	RY2	-
	Accessories Relay	RY3	-
	Fuel Pump Relay	RY4	-
	Lights Relay	RY5	-
	Brake Relay	RY8	-

ELECTRICAL SYSTEM (ALL OTHER MODELS)			
Fuses	Relays DPS Gauge (Speedo)	F4	5 A
	Injectors/Ignition	F5	5 A
	ECM 2WD/4WD	F6	5 A
	Winch (X mr)	F7	5 A
	Key switch/starter solenoid	F8	5 A
	Resetable cooling fan (X mr) Cooling fan (except X mr)	F9	25 A
	Clock (X mr)	F10	5 A
	Lights	F11	30 A
	DC Outlet	F12	15 A
	Taillight Accessories 2 (Except X mr) ACC (X mr)	F14	15 A
	Fuel Pump	F15	5 A

FUEL SYSTEM			
Fuel delivery	Type	570 650	Electronic Fuel Injection (EFI), 46 mm throttle body, 1 injector per cylinder
		850 1000R	Electronic Fuel Injection (EFI), 54 mm throttle body, 1 injector per cylinder
Fuel pump	Type		Electrical (in fuel tank)
	Operating pressure		350 kPa (51 PSI)
Fuel	Type	570 650 850	Regular unleaded gasoline
	Recommended octane rating		87 Pump Posted AKI (92 RON or 95 E10 RON)
	Type	1000R	Premium unleaded gasoline
	Recommended octane rating		91 Pump Posted AKI (95 E10 RON)
	Minimum octane rating		87 Pump Posted AKI (92 RON or 95 E10 RON)
Fuel tank capacity			20.5 L (5.4 U.S. gal.)
Fuel remaining when low fuel light turns ON			± 5 L (1.3 U.S. gal.)

DRIVE SYSTEM		
Front drive	Base	Visco-lok † auto-locking front differential
	X mr X xc	Visco-lok† QE auto-locking front differential
Front drive ratio		3.6:1

DRIVE SYSTEM		
Rear drive		Straight bevel gear / Shaft driven final drive
Rear drive ratio		3.6:1
Front differential oil	Capacity	500 ml (17 U.S. oz)
	Recommended	75W90 Synthetic gear oil API GL-5
Rear final drive oil	Capacity	250 ml (8.45 U.S. oz)
	Type	75W140 Synthetic gear oil API GL-5
CV joint grease		CV joint grease or an equivalent
Propeller shaft grease for spline connections		Propeller shaft grease or an equivalent

STEERING		
Turning radius	Base X xc	2 129 mm (83.8 in)
	X mr	3 043 mm (119.8 in)
Total toe (vehicle on the ground)		0.5° **toe-in**
Camber angle (vehicle on the ground)		0°
Tie-rod maximum length unengaged threads		370 mm (14.57 in)

FRONT SUSPENSION			
Suspension type			Double suspension-arm with dive-control geometry and external stabilizer bar
Suspension travel		Base X xc	23.3 cm (9.2 in)
		X mr	N/A
Shock absorber	Qty		2
	Type	Base 570	Oil
		Base 850 Base 1000R X mr 570	FOX IFP
		X mr 1000R	Fox QS3† shocks with piggyback reservoir, quick switch 3 positions
		X xc	Fox RC2 shock with piggyback reservoir, dual speed compression damping adjustment and rebound adjustment.
Preload adjustment type		Base 570	5 positions cam
		All other models	Threaded

REAR SUSPENSION			
Suspension type			Torsional Trailing arm Independent (TTI) with external stabilizer bar
Suspension travel		X mr	N/A
		All other models	251.5 mm (9.9 in)
Shock absorber	Qty		2
	Type	Base 570	Oil
		Base 850 Base 1000R X mr 570	FOX IFP
		X mr 1000R	Fox QS3† shocks with piggyback reservoir, quick switch 3 positions
		X xc	Fox RC2 shock with piggyback reservoir, dual speed compression damping adjustment and rebound adjustment.
Preload adjustment type		Base 570	5 position cam
		All other models	Threaded

SUSPENSION FACTORY SETTINGS			
Spring preload	Front	Base 570	Cam position 3
		X mr 1000R	60.6 mm (2.386 in)
		X xc	42.6 mm (1.677 in)
		All other models	46.6 mm (1.835 in)
	Rear	Base 570	Cam position 3
		Base 850 X mr 570	63.1 mm (2.484 in)
		X mr 1000R	35.8 mm (1.409 in)
		X xc	59 mm (2.323 in)

BRAKES		
Front brake	Qty	2
	Type	214 mm cross drilled disc brakes with hydraulic twin-piston calipers
Rear brake	Qty	1
	Type	214 mm cross drilled disc brake with hydraulic twin-piston caliper
Brake fluid	Capacity	260 ml (8.8 U.S. oz)
	Type	DOT 4
Caliper piston diameter		2 x 26 mm

BRAKES		
Brake pad material	X mr	Metallic
	All other models	Organic
Minimum brake pad thickness		1 mm (.04 in)
Minimum brake disc thickness		4.0 mm (.157 in)
Maximum brake disc warpage		0.2 mm (.01 in)

TIRES			
Pressure	Front		48.3 kPa (7 PSI)
	Rear		48.3 kPa (7 PSI)
Minimum tire thread depth			3 mm (.118 in)
Size	Front	X mr 570	711 x 203 x 305 mm (28 x 8 x 12 in.)
		X mr 1000R	762 x 229 x 355 mm (30 x 9 x 14 in)
		All other models	635 x 203 x 305 mm (25 x 8 x 12 in)
	Rear	X mr 570	711 x 254 x 305 mm (28 x 10 x 12 in.)
		X mr 1000R	762 x 229 x 355 mm (30 x 9 x 14 in)
		All other models	635 x 254 x 305 mm (25 x 10 x 12 in)

WHEELS			
Type		Base	Cast aluminium
		X mr X xc	Aluminium with beadlocks
Rim size	Front	X mr 1000R	355 x 165 mm (14 x 6.5 in)
		All other models	305 x 152 mm (12 x 6 in)
	Rear	X mr 1000R	355 x 165 mm (14 x 6.5 in)
		All other models	305 x 191 (12 x 7.5 in)
Wheel nut torque			80 N•m ± 5 N•m (59 lbf•ft ± 4 lbf•ft)

DIMENSIONS		
Overall length	Base X xc	218.4 cm (86 in)
	X mr	224 cm (83 in)
Overall width	Base X xc	121.9 cm (48 in)
	X mr	127 cm (50 in)

DIMENSIONS			
Overall height		Base X xc	124 cm (49 in)
		X mr	131 cm (56 in)
Wheelbase			129.5 cm (51 in)
Wheel track	Front	Base X xc	102 cm (40.2 in)
		X mr	103.5 cm (40.7 in)
	Rear	Base X xc	97.5 cm (38.4 in)
		X mr	100.6 cm (39.61 in)
Ground clearance		Base X xc	26.7 cm (11 in)
		X mr 570	30.5 cm (12 in)
		X mr 1000R	31.8 cm (13 in)

WEIGHT AND LOADING CAPACITY		
Dry weight	Base 570	286 kg (628 lb)
	X xc 650	290 kg (639 lb)
	Base 850 X xc 850	312 kg (686 lb)
	Base 1000R X xc 1000R	323 kg (710 lb)
	X mr 570	393 kg (865 lb)
	X mr 1000R	450 kg (991 lb)
Rear cargo area capacity		16 kg (35 lb)
Total vehicle load allowed (including driver, passenger, all other loads and added accessories)		141 kg (310 lb)
Towing capacity		590 kg (1,300 lb)
Tongue capacity		13 kg (30 lb)
Rear load (including rear cargo area and tongue load if applicable)		23 kg (50 lb)

WIRING DIAGRAM INFORMATION

GENERAL

WIRING DIAGRAM LOCATION

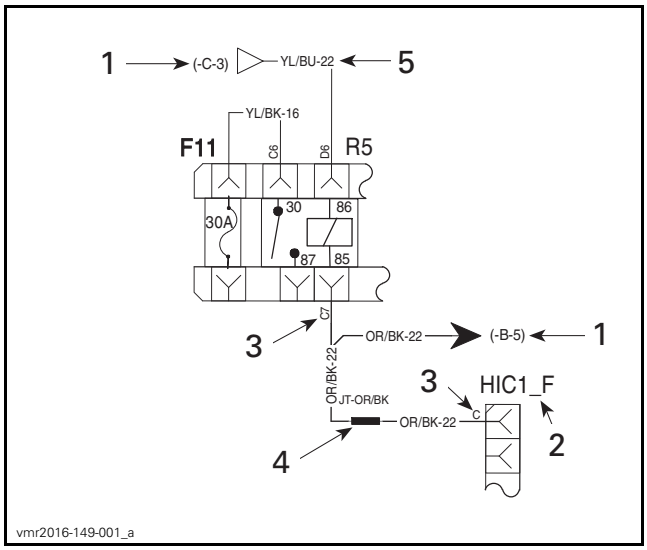
Wiring diagrams are found in the *WIRING DIAGRAM BOOKLET*.

WIRING DIAGRAM WITH COLORED LINES

The wiring diagram on the *KNOWLEDGE CENTER* is in color.

WIRING DIAGRAM CODES

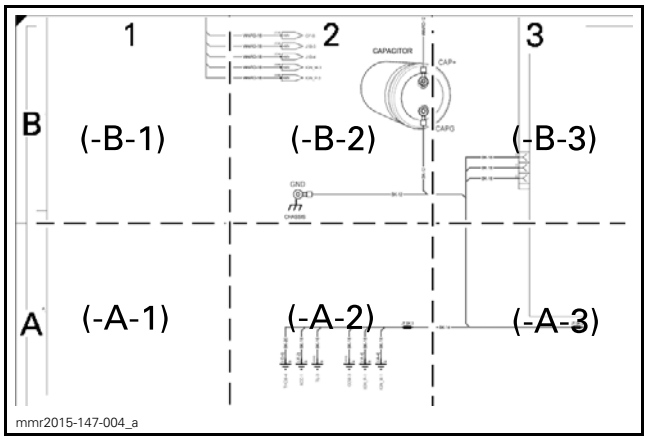
The wiring diagrams use the following codes.



1. *Wiring diagram index*
2. *Connector code*
3. *Connector pin*
4. *Splice*
5. *Color and size*

Wiring Diagram Index

The wiring diagram is separated by rows (letters) and columns (numbers).



WIRING DIAGRAM INDEX

Connector Code

The wire connects to the indicated connector.

Connector Pin

The wire is the indicated pin in the connector.

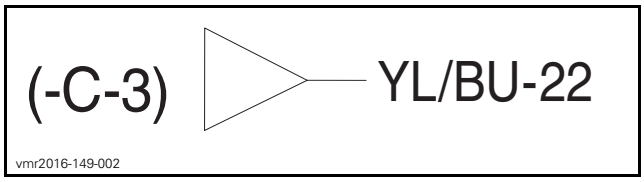
NOTE: Could be identified by either a number or by a letter depending on the type of connector used.

FOLLOWING A CIRCUIT

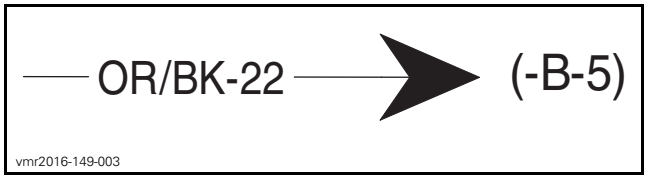
To follow a circuit, search the in section of the wiring diagram shown in the wiring diagram index.

NOTE: The arrow indicates the direction of the power in the circuit.

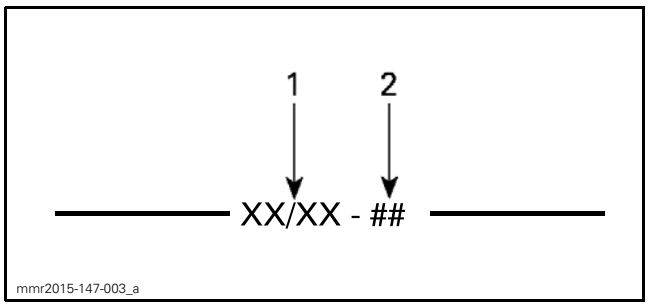
In this example, the power comes **from** section (-C-3).



In following example, the power goes **to** the section (-B-5).



WIRE COLORS AND SIZES



1. Wire color
2. Wire gauge (AWG)

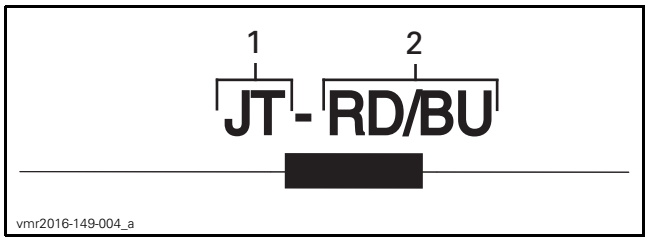
The first color of a wire is the main color, second color is the stripe.

Example: YE/BK is a YELLOW wire with a BLACK stripe.

COLOR CODE					
BG	—	BEIGE	OG	—	ORANGE
BK	—	BLACK	RD	—	RED
BU	—	BLUE	VT	—	VIOLET
BN	—	BROWN	WH	—	WHITE
GN	—	GREEN	YE	—	YELLOW
GY	—	GRAY	PK	—	PINK
LT prefix means a "light" color. E.g: LT GN = Light green.					

SPLICES IN WIRING HARNESS

Splices in wiring harness are indicated on the wiring diagram as follows.

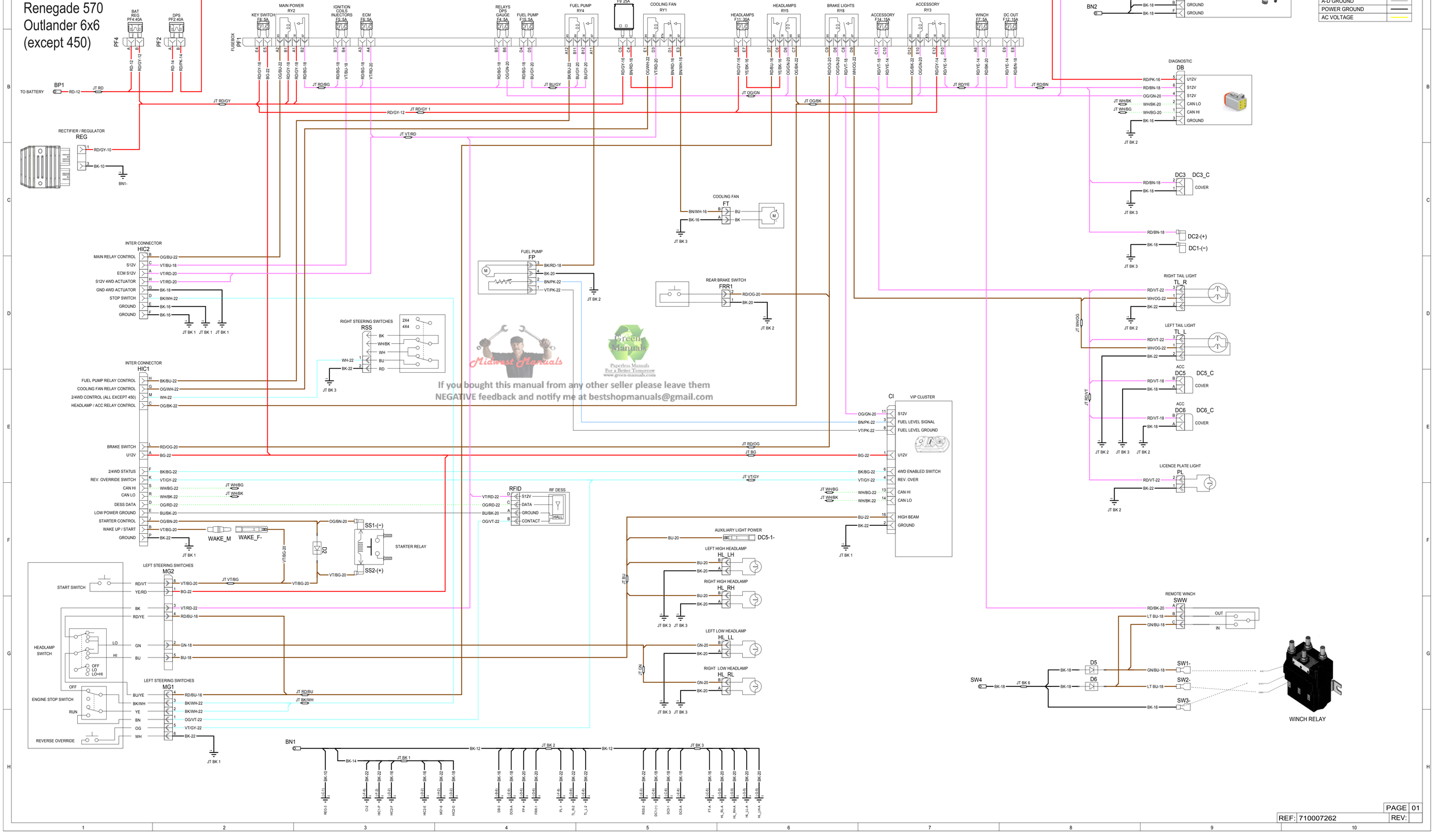


1. JT: Splice indication
2. Spliced wire color

2021

MAIN HARNESS

Outlander 570 - North America
Renegade 570
Outlander 6x6
(except 450)



LINE TYPES	
55 / 60 VOLTS	
12 VOLTS SWITCHED	
12 VOLTS UNSWITCHED	
5 OR 3.3 VOLTS	
DIGITAL SIGNAL	
POWER CONTROL	
ANALOG SIGNAL	
COMMUNICATION	
A-D GROUND	
POWER GROUND	
AC VOLTAGE	

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2021 Outlander 650/850/1000R (digital display) Renegade 650/850/1000R (digital display)

MAIN HARNESS

Models without Visco4Lok front differential

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LINE TYPES

55 / 60 VOLTS	
12 VOLTS SWITCHED	
12 VOLTS UNSWITCHED	
5 OR 3.3 VOLTS	
DIGITAL SIGNAL	
POWER CONTROL	
ANALOG SIGNAL	
COMMUNICATION	
A-D GROUND	
POWER GROUND	
AC VOLTAGE	

2021

Main harness

X mr models with Visco4Lok front differential

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LINE TYPES

55 / 60 VOLTS
12 VOLTS SWITCHED
12 VOLTS UNSWITCHED
5 OR 3.3 VOLTS
DIGITAL SIGNAL
POWER CONTROL
ANALOG SIGNAL
COMMUNICATION
A-D GROUND
POWER GROUND
AC VOLTAGE

FUSEBOX PF1
MAIN RY2
DESS KEY F8: 10A
DPS CLUSTER RELAYS F6: 10A
LIGHTS F2: 30A
LIGHTS RY3
START SWITCH F1: 10A
IGNITION COIL INJECTOR FUEL PUMP F5: 10A
4WD ACTUATOR F9: 10A
ACCESSORY RY5
F12: 25A
COOLING FAN RY1
ACC 1 F3: 20A
ACC 2 F4: 20A
BRAKE LIGHTS F7: 10A
BRAKE RY6

BP1 — RD-12 — JT RD
BAT PF4: 40A — PF4 — RD-12 — RD/GY-12
RECTIFIER / REGULATOR — REG — RD/GY-10 — BK-10 — BNT-
DPS FUSE PF2: 40A — PF2 — RD-14 — RD/PK-14
JT RD/GY — RD-12 — JT RD/GY 1
JT RD/BG
JT OG/GN
JT RD/YE

LICENSE PLATE LIGHT — PL — VT/WH-20 — BK-20
RIGHT TAIL LIGHT — TL_R — WH/OG-20 — VT/WH-20 — BK-20
LEFT TAIL LIGHT — TL_L — WH/OG-20 — VT/WH-20 — BK-20
JT WH/OG — JT VT/WH 1
JT BK 4

ACCESSORY DC5 DC5_C — COVER — RD/VT-18 — BK-18 — JT BK 3
ACCESSORY DC6 DC6_C — COVER — RD/VT-18 — BK-18 — JT BK 4
JT RD/VT
ACCESSORY DC3 DC3_C — COVER — RD/BN-18 — BK-18 — JT BK 3
JT RD/BN
DC2-(+) — DC1-(–)

COOLING FAN FT — BN/WH-16 — BK-16 — BU — BK — JT BK 2
JT VT/BU

DIAGNOSTIC CONNECTOR DB
OG/GN-18 — S12V
RD/PK-16 — U12V
WH/VT-20 — WAKE UP
WH/BK-20 — CAN LO
WH/BG-20 — CAN HI
BK-16 — GROUND
JT WH/BK — JT WH/BG — JT BK 4

REAR BRAKE SWITCH FRR1 — RD/OG-20 — BK-20 — JT BK 4

DPS — POWER STEERING
JT RD/PK
OG/GN-20 — S12V
RD/PK-18 — U12V
RD/PK-18 — U12V
RD/PK-18 — U12V
WH/BG-20 — CAN HI
WH/BK-20 — CAN LO
BK-18 — GROUND
BK-18 — GROUND
BK-18 — GROUND
JT WH/BG — JT WH/BK
BN2

ECM CONNECTOR B — ECMB
MAIN RELAY CONTROL — H2 — OG/BU-20
LIGHTS/ACC. RELAY CONTROL — G1 — OG-20 — JT OG
COOLING FAN RELAY CONTROL — J4 — OG/WH-20
BRAKE SIGNAL INPUT — C3 — WH/OG-20
WAKE UP — A2 — WH/VT-20
JT VT/BU

For vehicule with O2 sensor only — OXYGEN SENSOR — HO2S1
FROM F5 — JT VT/BU — VT/BU-18
OXYGEN SENSOR HEATER CONTROL — L2 — BN/GN-20
OXYGEN SENSOR SIGNAL — D2 — WH/PK-20
D GND — J1 — BK/PK-20 — SENSOR

THROTTLE ACCELERATOR SENSOR — TAS
5V SENSOR 2 — J3 — GY/VT-22
GROUND SENSOR 2 — B3 — GY/BK-22
SIGNAL SENSOR 2 — A3 — GY/GN-22
5V SENSOR 1 — K1 — OG/VT-22
GROUND SENSOR 1 — K3 — OG/BK-22
SIGNAL SENSOR 1 — E1 — OG/PK-22
HALL
CAN HI — C1 — WH/BG-20 — JT WH/BG
CAN LO — C2 — WH/BK-20 — JT WH/BK
FRONT DIFFLOCK ACT. — J2 — BU/YE-20
MODE SWITCH POS. 1 — D4 — YE/BK-20
GROUND MODE SWITCH — H4 — BK/GY-20
MODE SWITCH POS. 2 — C4 — YE/RD-20
FUEL PUMP CONTROL — M1 — BK/BU-18
SOLENOID CTRL — L4 — OG/BN-20 — D2 — OG/BN-20 — SS1-(–) — STARTER RELAY — SS2-(+) — BK/YE-20
START SIGNAL — D1 — BK/YE-20

TO ENGINE HARNESS — HIC
S12V COILS — D — VT/BU-18
S12V INJECTORS — E — VT/BU-18
S12V 4WD ACTUATOR — F — VT/GN-20
4WD STATUS — H — BK/BG-20
4X4 ENABLE — B — WH/BU-20
DIFFLOCK SWITCH — A — BU/RD-20
GROUND — G — BK-20 — JT BK 4
JT VT/GN

LOCK_ACT
S12V LOCK ACTUATOR — D — VT/GN-20
LOCK FEEDBACK — A — GN/YE-20
LOCK CONTROL — C — BU/YE-20
GROUND — B — BK-20 — JT BK 4

RIGHT STEERING SWITCH — RSS — 4WD/2WD LOCK SWITCH
WH/BU-20 — WH — 2x4 / 4x4
BU/RD-20 — BN — 2x4 / 4x4 Lock
BK-20 — BK — JT BK 3
YE/BK-20 — YE/GN — Left
BK/GY-20 — GY — DRIVE MODE
YE/RD-20 — YE/RD — Right

FUEL PUMP — FP
BK/BU-18
VT/BU-18
BN/PK-20
VT/PK-20

DIGITAL DISPLAY — CI
BN/PK-20 — FUEL LEVEL SIGNAL
VT/PK-20 — FUEL LEVEL GROUND
BK/BG-20 — 4WD STATUS
GN/YE-20 — LOCK FEEDBACK
OG/GN-20 — S12V
BG/WH-20 — U12V
OG/RD-20 — DIFFLOCK LED
BK/BU-20 — MENU/TRIP
BK/OG-20 — GROUND
YE/BU-20 — NOT USED
WH/BG-20 — CAN HI
WH/BK-20 — CAN LO
BU-20 — HIGH BEAM
BK-20 — GROUND
JT BK 1

REMOTE WINCH — SWW
VT/GN-18 — A
LT BU-18 — B — OUT
GN/BU-18 — C — IN
SW4 — BK-18 — JT BK 6
D5 — BK-18 — GN/BU-18 — SW1-
D6 — BK-18 — LT BU-18 — SW2-
BK-18 — SW3-
WINCH RELAY

LOCK LED — 750 OHM — 2 KOHM — OG/GN-20 — OG/RD-20

SW_CL — SW_CL
MENU / TRIP
SW1- — YE/GN-20 — JT YE/GN — YE/GN-20 — YE/GN-20
SW2- — BK/BU-20 — BK/BU-20 — BK/OG-20
SW3- — YE/BU-20 — R1 680R — YE/GN-20 — YE/BU-20

LEFT STEERING SWITCHES — MG1
OVERRIDE/ DPS MODE — TBD — WH — OG — VT/OG-20 — VT/GY-20
ENGINE STOP SWITCH — OFF — RUN — BK/WH — YE — BN — BU/YE — YE-20 — YE-20 — BN-20 — RD/BU-18
LEFT STEERING SWITCHES — MG2
START SWITCH — BK — RD/VT — YE/RD — RD/YE — BG-20 — BK/YE-20 — BG/WH-20 — RD/BU-18
JT BG/WH — JT RD/BU
HEADLAMP SWITCH — OFF — LO — LO+HI — LO — HI — GN — BU — GN-18 — BU-18 — JT GN — JT BU
MG1EX — VT/YE-20
ENGINE STOP / DESS SWITCH — E4 — YE-20 — JT YE
D GND — B1 — VT/GY-20
OVR SIGNAL (OVR) — F3 — VT/OG-20
OVR SIGNAL (FREE) — D3 — VT/YE-20
GROUND — M2 — BK-18
GROUND — M3 — BK-18
GROUND — L1 — BK-18
JT BK 1 JT BK 1 JT BK 1

RFID — DESS KEY
S12V — M4 — BG-20 — JT BG — BG-20 — S12V
DATA — B2 — WH/GY-20 — WH/GY-20 — DATA
D GND — F2 — BK/GN-20 — BK/GN-20 — GROUND
BN-20 — CONTACT
HALL

HEADLIGHT LEFT LOW — HL_LL — GN-20 — BK-20 — JT BK 2
HEADLIGHT RIGHT LOW — HL_RL — GN-20 — BK-20 — JT BK 4
HEADLIGHT LEFT HIGH — HL_LH — BU-20 — BK-20 — JT BK 2
HEADLIGHT RIGHT HIGH — HL_RH — BU-20 — BK-20 — JT BK 4
AUX LIGHTS POWER — DC5_1-

BN1 — BK-12 — BK-14 — JT BK 1 — JT BK 2 — BK-12 — JT BK 3 — BK-16 — JT BK 4
RFG-3 — BK-10
C-2 — BK-20
ECMB-B1-1 — BK-18
ECMB-M3 — BK-18
ECMB-M2 — BK-18
F1-A — BK-18
HL_LH-A — BK-20
HL_LL-A — BK-20
RSS-1 — BK-20
DCT-(–) — BK-18
DCT-1 — BK-18
DCT-2 — BK-18
HL_RL-A — BK-20
HL_RH-A — BK-20
HIC-G — BK-16
DB-3 — BK-18
DCS-A — BK-20
PL-1 — BK-20
TL_L-2 — BK-20
TL_R-2 — BK-20
FRR-1 — BK-20
LOCK_ACT-B — BK-20

2021 Engine Harness 570/650 (except 6x6)

(gearbox with external switches)

LINE TYPES

55 / 60 VOLTS	
12 VOLTS SWITCHED	
12 VOLTS UNSWITCHED	
5 OR 3.3 VOLTS	
DIGITAL SIGNAL	
POWER CONTROL	
ANALOG SIGNAL	
COMMUNICATION	
A-D GROUND	
POWER GROUND	
AC VOLTAGE	

SPEED SENSOR — HALL — VSS — A VT/BU-18 — B PK-18 — C GN/BN-18

COOLANT TEMPERATURE SENSOR — CTS — 2 GN/BN-18 — 1 BG/OG-18

FUEL INJECTOR 1 — INJ1 — 2 VT/BU-18 — 1 BK/RD-18

FUEL INJECTOR 2 — INJ2 — 2 VT/BU-18 — 1 BN/BU-18

CRANKSHAFT POSITION SENSOR — CPS — 1 BU/YE-18 — 2 YE/WH-18

OIL PRESSURE SWITCH — OPS — 1 LT BU-18 — ENGINE

BR / WH / OR — GPBS-1 BN/GY-18 — GPBS-2 WH/RD-18 — GPBS-3 OG/GY-18

THROTTLE POSITION SENSOR — TPS — SIGNAL 1 WH/BN-18 — GROUND 2 BU/BK-18 — 5V 3 BU/RD-18

MANIFOLD PRESSURE AND AIR TEMPERATURE SENSOR — MAPTS — 5V 3 BU/RD-18 — PRESSURE 4 GY/BU-18 — TEMPERATURE 2 WH/GY-18 — GROUND 1 BU/BK-18

JT 1 BU/BK-18 — JT 2 BU/RD-18 — JT 3 GN/BN-18 — JT 4 VT/BU-18

ECM — ELECTRONIC CONTROL MODULE

ECM		
C3	SGND	
F4	COOLANT TEMP. SIGNAL	
K4	INJ-A	
L4	INJ-B	
E1	CPS (+)	
D1	CPS (-)	
E2	OIL PRESSURE SWITCH	
J3	GEAR SWITCH 1	
H2	GEAR SWITCH 2	
H4	GEAR SWITCH 3	
G3	TPS SIGNAL	
A1	5V	
F2	PRESSURE SIGNAL	
F3	TEMPERATIRE SIGNAL	
G2	LOW POWER GROUND	

ECM		
M1	IGN-A	BN/OG-16
M2	IGN-B	BN/BK-16
L2		BN/GY-18
G4		WH/OG-18
K1	POWER RELAY CONTROL	OG/BU-18
L1	S12V POWER	VT/BU-16 (JT 5)
K3	STOP SWITCH	BK-18
M4	GROUND	BK-16
M3	GROUND	BK-16
D3	WINDING 1	GY/WH-18
E4	WINDING 2	GY/GN-18
C4	WINDING 2	GY/BK-18
D4	WINDING 1	GY/VT-18
J1	FUEL PUMP RELAY CONTROL	BK/BU-18
B3	COOLING FAN RELAY CONTROL	OG/WH-18
K2	HEADLAMP / ACC RELAY CONTROL	OG/BK-18
J4	BRAKE SWITCH	RD/OG-18
B4	U12V	BG-20
F1	REV. OVERRIDE SWITCH	VT/GY-18
B1	CAN HI	WH/BG-18
C1	CAN LO	BG/GN-18
H1	DESS DATA	OG/RD-18
G1	SEL_MOD	PK/BK-18
L3	STARTER CONTROL	OG/BN-16
A4	RUN SWITCH	VT/BG-18

IGNITION COIL — COIL — 1 BN/OG-16 — 2 VT/BU-16 — 3 BN/BK-16

OXYGEN SENSOR* — HO2S1 — D BN/GY-18 — C VT/BU-16 — B WH/OG-18 — A GN/BN-18 — SENSOR

* 264797 AND 864699 ONLY

IDLE AIR CONTROL VALVE — IACV — A GY/WH-18 — B GY/GN-18 — C GY/BK-18 — D GY/VT-18

4WD ACTUATOR — 2X4_ACT — 2 VT/OG-18 — 1 BK-18 — 4 WH-18 — 3 BK/BG-18

HIC2

B	POWER RELAY CONTROL	OG/BU-18
C	S12V	VT/BU-16
A	S12V	VT/BU-16
H	S12V (2X4)	VT/OG-18
G	GROUND (2X4)	BK-18
D	STOP SWITCH	BK-18
F	GROUND	BK-16
E	GROUND	BK-16

HIC1

H	FUEL PUMP RELAY CONTROL	BK/BU-18
G	COOLING FAN RELAY CONTROL	OG/WH-18
M	2X4 CONTROL	WH-18
C	HEADLAMP / ACC RELAY CONTROL	OG/BK-18
L	BRAKE SWITCH	RD/OG-18
A	U12V	BG-20
N	SPEED SENSOR SIGNAL	PK-18
F	2X4 SWITCH	BK/BG-18
K	REV. OVERRIDE SWITCH	VT/GY-18
S	CAN HI	WH/BG-18
R	CAN LO	BG/GN-18
D	DESS DATA	OG/RD-18
P	SEL_MOD	PK/BK-18
E	LOW POWER GROUND	BU/BK-18
J	STARTER CONTROL	OG/BN-16
B	RUN SWITCH	VT/BG-18

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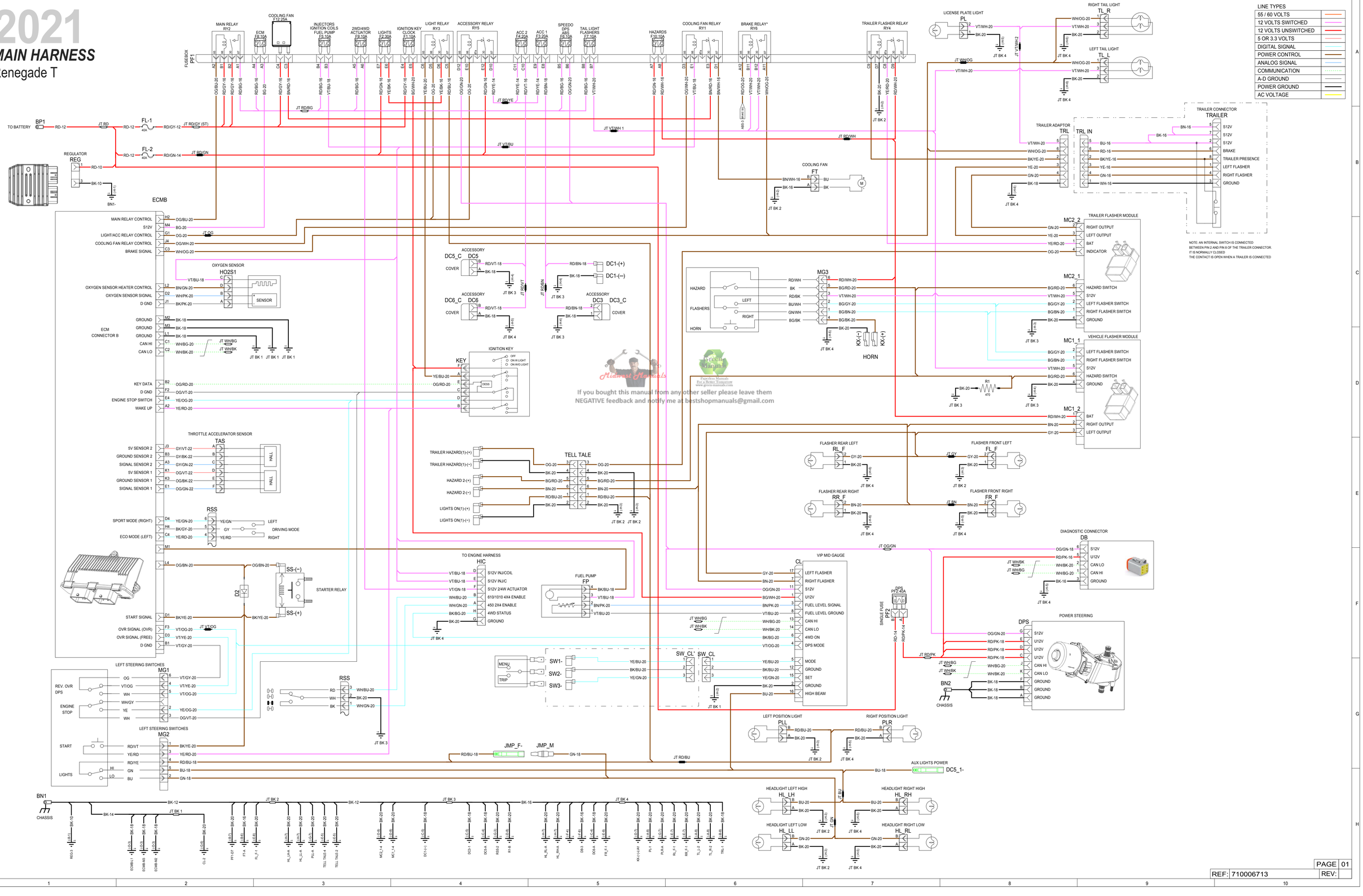
2021
MAIN HARNESS
Renegade T



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PAGE 01

REF: 710006713 REV:

2021 *Engine Harness 850/1000R* (gearbox with GBPS)

Models without Visco4Lok front differential

SPEED SENSOR
VSS
HALL
1 VT/BU-18
2 WH-18
3 BK/GN-18

ECMA
ECM CONNECTOR A
E1 SPEED SIGNAL
D4 GROUND

GEARBOX POSITION SENSOR
GBPS
HALL
1 C4
2 F4
3 G1

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MANIFOLD AIR PRESSURE
AND TEMPERATURE SENSOR
MAPTS
PRESSURE 4 GY/BU-18 G4 PRESSURE SIGNAL
5V 3 PK/BU-18 B4 5 VOLTS
TEMPERATURE 2 WH/GY-18 H3 TEMP. SIGNAL
GROUND 1 BK/BN-18 H2 GROUND

COOLANT TEMPERATURE SENSOR
CTS
1 BG/OG-18 A1 TEMPERATURE SIGNAL (+)
2 BK/OG-18 J2 TEMPERATURE SIGNAL (-)

CRANKSHAFT
POSITION SENSOR
CPS
1 BU/YE-18 H1 CPS (+)
2 YE/WH-18 K2 CPS (-)

KNOCK SENSOR 1
KNOCK1
1 YE/BU-18 G2 KNOCK SIGNAL (+)
2 BG/BU-18 C3 KNOCK SIGNAL (-)

KNOCK SENSOR 2
KNOCK2
1 YE/PK-18 D2 KNOCK SIGNAL (+)
2 BG/PK-18 B1 KNOCK SIGNAL (-)

OIL PRESSURE SWITCH
OPS
1 LT BU-18 E3 OIL PRESSURE SWITCH

ECMA
M2 BN/OG-16
M1 BN/BK-16
J1 RD/BK-18
K1 BU/BK-18
MOTOR (-) L2 BG/BK-18
GROUND A2 BG/GY-18
3.3 VOLTS K4 BG/YE-18
MOTOR (+) L1 BG/RD-18
SIGNAL 2 K3 BG/GN-18
SIGNAL 1 F3 BG/WH-18

JT VT/BU

HARNESS INTER CONNECTOR
HIC
VT/BU-16 D S12V
VT/BU-16 E S12V

4WD ACTUATOR
2X4_ACT
M
1 BK-18 G GROUND
2 VT/OG-18 F S12V
3 BK/BG-18 H 4WD STATUS
4 WH-18 B 610/1000 4X4 ENABLE

IGNITION COILS
COIL
M2 BN/OG-16 1
VT/BU-16 2
M1 BN/BK-16 3

FUEL INJECTOR 1
INJ_1
VT/BU-18 2
J1 RD/BK-18 1

FUEL INJECTOR 2
INJ_2
VT/BU-18 2
K1 BU/BK-18 1

ELECTRONIC THROTTLE CONTROL
ETC
MOTOR (-) 1
GROUND 2
3.3 VOLTS 3
MOTOR (+) 4
SIGNAL 2 5
SIGNAL 1 6

LINE TYPES

55 / 60 VOLTS
12 VOLTS SWITCHED
12 VOLTS UNSWITCHED
5 OR 3.3 VOLTS
DIGITAL SIGNAL
POWER CONTROL
ANALOG SIGNAL
COMMUNICATION
A-D GROUND
POWER GROUND
AC VOLTAGE

2021 *Engine Harness 850/1000R* (gearbox with external switches)

Models without Visco4Lok front differential

SPEED SENSOR
VSS
HALL
1 VT/BU-18
2 WH-18
3 BK/GN-18
E1 SPEED SIGNAL
D4 GROUND

ECMA
ECM CONNECTOR A

BR
WH
OR
BN/GY-18 D3 GEAR SWITCH 1
WH/RD-18 F4 GEAR SWITCH 2
OG/GY-18 F1 GEAR SWITCH 3

MANIFOLD AIR PRESSURE
AND TEMPERATURE SENSOR
MAPTS
PRESSURE 4 GY/BU-18 G4 PRESSURE SIGNAL
5V 3 PK/BU-18 B4 5 VOLTS
TEMPERATURE 2 WH/GY-18 H3 TEMP. SIGNAL
GROUND 1 BK/BN-18 H2 GROUND

COOLANT TEMPERATURE SENSOR
CTS
1 BG/OG-18 A1 TEMPERATURE SIGNAL (+)
2 BK/OG-18 J2 TEMPERATURE SIGNAL (-)

CRANKSHAFT
POSITION SENSOR
CPS
1 BU/YE-18 H1 CPS (+)
2 YE/WH-18 K2 CPS (-)

KNOCK SENSOR 1
KNOCK1
1 YE/BU-18 G2 KNOCK SIGNAL (+)
2 BG/BU-18 C3 KNOCK SIGNAL (-)

KNOCK SENSOR 2
KNOCK2
1 YE/PK-18 D2 KNOCK SIGNAL (+)
2 BG/PK-18 B1 KNOCK SIGNAL (-)

OIL PRESSURE SWITCH
OPS
1 LT BU-18 E3 OIL PRESSURE SWITCH

ECMA
M2 BN/OG-16
M1 BN/BK-16
J1 RD/BK-18
K1 BU/BK-18
MOTOR (-) L2 BG/BK-18
GROUND A2 BG/GY-18
3.3 VOLTS K4 BG/YE-18
MOTOR (+) L1 BG/RD-18
SIGNAL 2 K3 BG/GN-18
SIGNAL 1 F3 BG/WH-18

JT VT/BU

HARNESS INTER CONNECTOR
HIC
VT/BU-16 D S12V
VT/BU-16 E S12V

4WD ACTUATOR
2X4_ACT
M
1 BK-18 G GROUND
2 VT/OG-18 F S12V
3 BK/BG-18 H 4WD STATUS
4 WH-18 B 610/1000 4X4 ENABLE

IGNITION COILS
COIL
1
VT/BU-16 2
3

FUEL INJECTOR 1
INJ_1
VT/BU-18 2
1

FUEL INJECTOR 2
INJ_2
VT/BU-18 2
1

ELECTRONIC THROTTLE CONTROL
ETC
1 MOTOR (-)
2 GROUND
3 3.3 VOLTS
4 MOTOR (+)
5 SIGNAL 2
6 SIGNAL 1

LINE TYPES

55 / 60 VOLTS	
12 VOLTS SWITCHED	
12 VOLTS UNSWITCHED	
5 OR 3.3 VOLTS	
DIGITAL SIGNAL	
POWER CONTROL	
ANALOG SIGNAL	
COMMUNICATION	
A-D GROUND	
POWER GROUND	
AC VOLTAGE	

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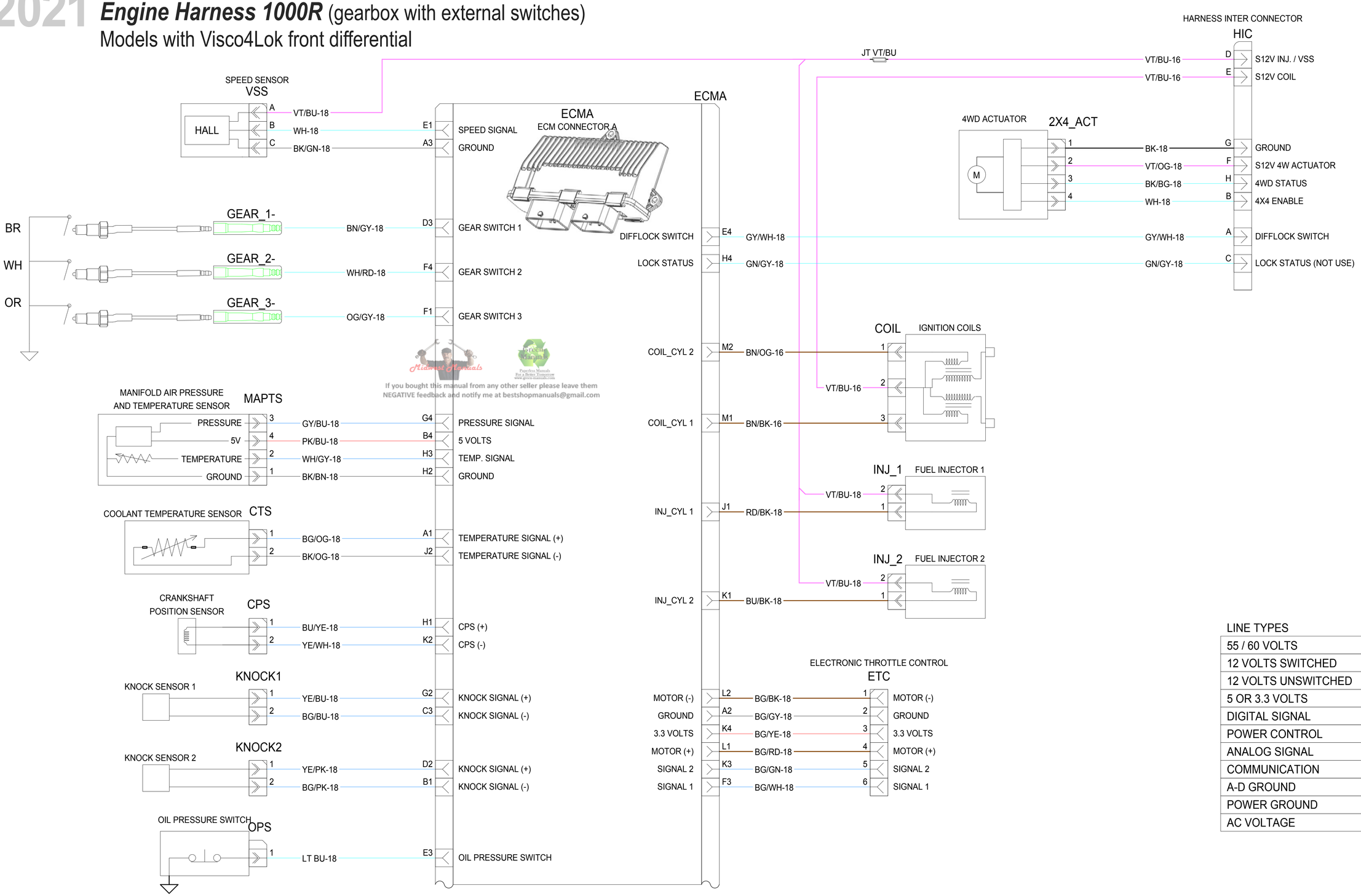
2021 *Engine Harness 1000R* (gearbox with external switches)

Models with Visco4Lok front differential



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LINE TYPES

55 / 60 VOLTS	
12 VOLTS SWITCHED	
12 VOLTS UNSWITCHED	
5 OR 3.3 VOLTS	
DIGITAL SIGNAL	
POWER CONTROL	
ANALOG SIGNAL	
COMMUNICATION	
A-D GROUND	
POWER GROUND	
AC VOLTAGE	

2021 *Engine Harness 1000R* (gearbox with GBPS)

Models with Visco4Lok front differential

SPEED SENSOR
VSS
HALL
A — VT/BU-18
B — WH-18
C — BK/GN-18
E1 — SPEED SIGNAL
A3 — GROUND

GEAR BOX POSITION SENSOR
GBPS
HALL
1 — BU/RD-18
2 — WH/GY-18
3 — GN/BN-18
C4 — +5V
F4 — IN_GBPS
G1 — GND

MANIFOLD AIR PRESSURE AND TEMPERATURE SENSOR
MAPTS
PRESSURE — 3 — GY/BU-18 — G4 — PRESSURE SIGNAL
5V — 4 — PK/BU-18 — B4 — 5 VOLTS
TEMPERATURE — 2 — WH/GY-18 — H3 — TEMP. SIGNAL
GROUND — 1 — BK/BN-18 — H2 — GROUND

COOLANT TEMPERATURE SENSOR
CTS
1 — BG/OG-18 — A1 — TEMPERATURE SIGNAL (+)
2 — BK/OG-18 — J2 — TEMPERATURE SIGNAL (-)

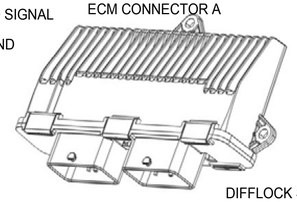
CRANKSHAFT POSITION SENSOR
CPS
1 — BU/YE-18 — H1 — CPS (+)
2 — YE/WH-18 — K2 — CPS (-)

KNOCK SENSOR 1
KNOCK1
1 — YE/BU-18 — G2 — KNOCK SIGNAL (+)
2 — BG/BU-18 — C3 — KNOCK SIGNAL (-)

KNOCK SENSOR 2
KNOCK2
1 — YE/PK-18 — D2 — KNOCK SIGNAL (+)
2 — BG/PK-18 — B1 — KNOCK SIGNAL (-)

OIL PRESSURE SWITCH
OPS
1 — LT BU-18 — E3 — OIL PRESSURE SWITCH

ECMA
ECM CONNECTOR A



ECMA
DIFFLOCK SWITCH — E4 — GY/WH-18
LOCK STATUS — H4 — GN/GY-18
COIL_CYL 2 — M2 — BN/OG-16
COIL_CYL 1 — M1 — BN/BK-16
INJ_CYL 1 — J1 — RD/BK-18
INJ_CYL 2 — K1 — BU/BK-18
MOTOR (-) — L2 — BG/BK-18
GROUND — A2 — BG/GY-18
3.3 VOLTS — K4 — BG/YE-18
MOTOR (+) — L1 — BG/RD-18
SIGNAL 2 — K3 — BG/GN-18
SIGNAL 1 — F3 — BG/WH-18

JT VT/BU

HARNESS INTER CONNECTOR
HIC
VT/BU-16 — D — S12V INJ. / VSS
VT/BU-16 — E — S12V COIL
GY/WH-18 — A — DIFFLOCK SWITCH
GN/GY-18 — C — LOCK STATUS (NOT USE)
BK-18 — G — GROUND
VT/OG-18 — F — S12V 4W ACTUATOR
BK/BG-18 — H — 4WD STATUS
WH-18 — B — 610/1000 4X4 ENABLE

4WD ACTUATOR
2X4_ACT
M
1 — BK-18
2 — VT/OG-18
3 — BK/BG-18
4 — WH-18

COIL
IGNITION COILS
1
2 — VT/BU-16
3

INJ_1
FUEL INJECTOR 1
VT/BU-18 — 2 — 1

INJ_2
FUEL INJECTOR 2
VT/BU-18 — 2 — 1

ELECTRONIC THROTTLE CONTROL
ETC
MOTOR (-) — 1
GROUND — 2
3.3 VOLTS — 3
MOTOR (+) — 4
SIGNAL 2 — 5
SIGNAL 1 — 6

LINE TYPES

55 / 60 VOLTS	
12 VOLTS SWITCHED	
12 VOLTS UNSWITCHED	
5 OR 3.3 VOLTS	
DIGITAL SIGNAL	
POWER CONTROL	
ANALOG SIGNAL	
COMMUNICATION	
A-D GROUND	
POWER GROUND	
AC VOLTAGE	

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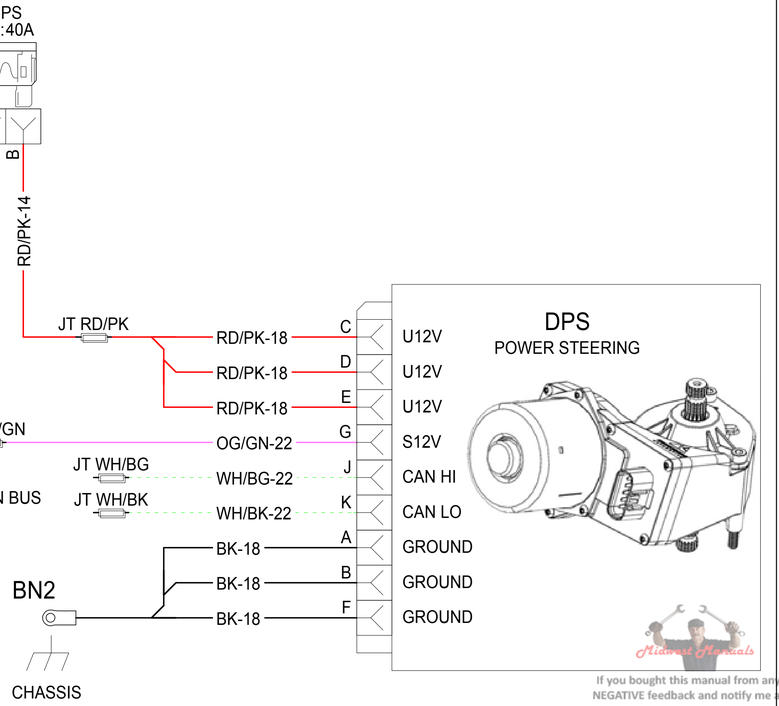
2021 *DPS SYSTEM*

NORTH AMERICA
Outlander DPS 850



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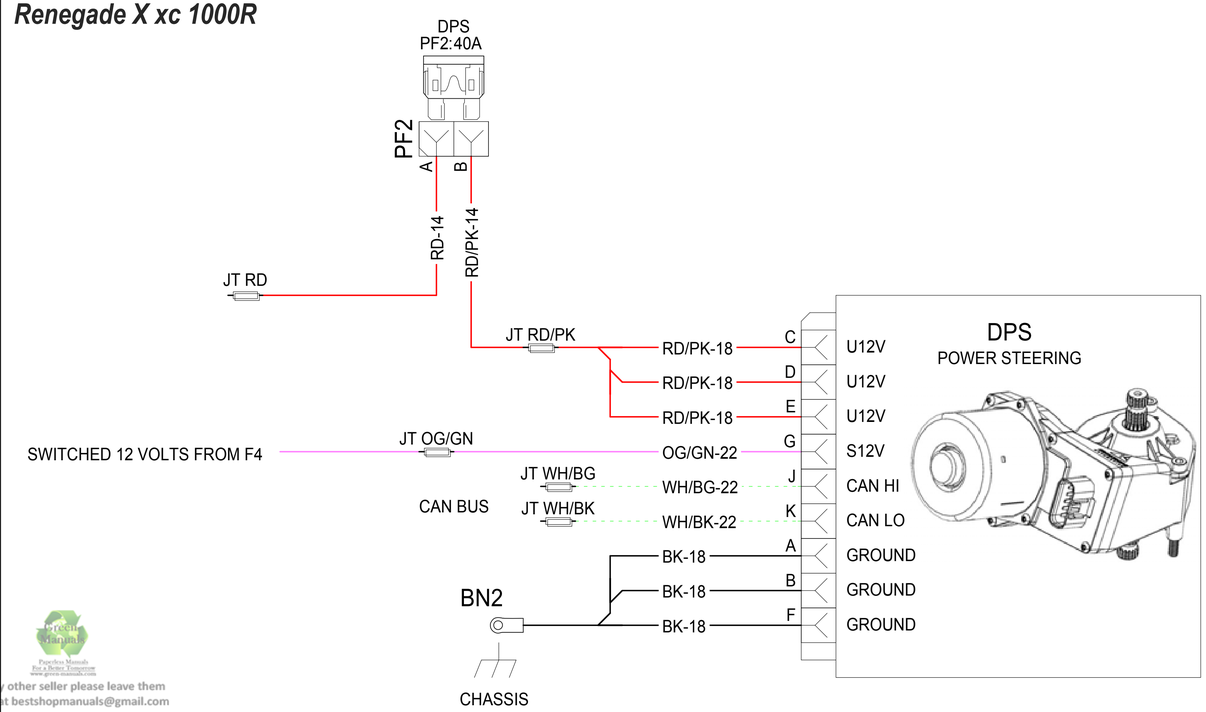
OUTSIDE NORTH AMERICA
Outlander X mr 570 with analog gauge
Outlander X xc 1000R
Outlander MAX 450 DPS with analog gauge
Outlander MAX 570 DPS with analog gauge
Renegade X xc 650
Renegade X xc 1000R



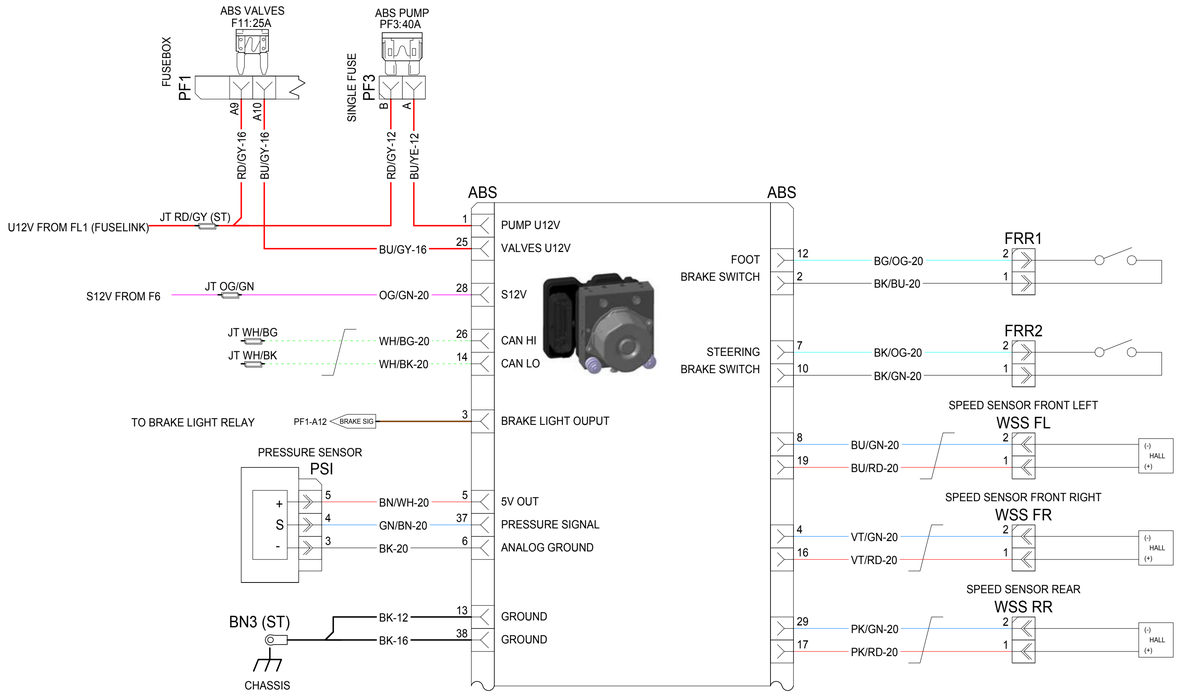
LINE TYPES

55 / 60 VOLTS	
12 VOLTS SWITCHED	
12 VOLTS UNSWITCHED	
5 OR 3.3 VOLTS	
DIGITAL SIGNAL	
POWER CONTROL	
ANALOG SIGNAL	
COMMUNICATION	
A-D GROUND	
POWER GROUND	
AC VOLTAGE	

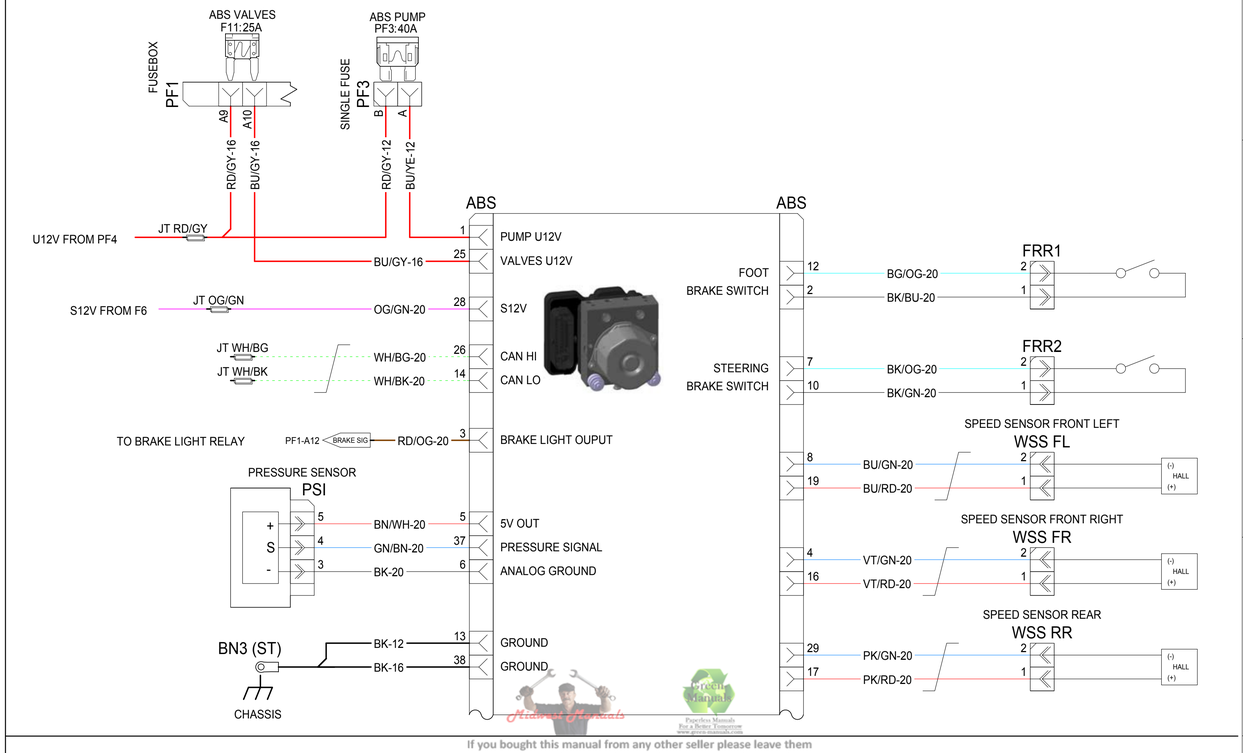
For all other models, refer to specific Main Harness diagrams

2021 ABS SYSTEM

Outlander T 450



Outlander T (except 450)



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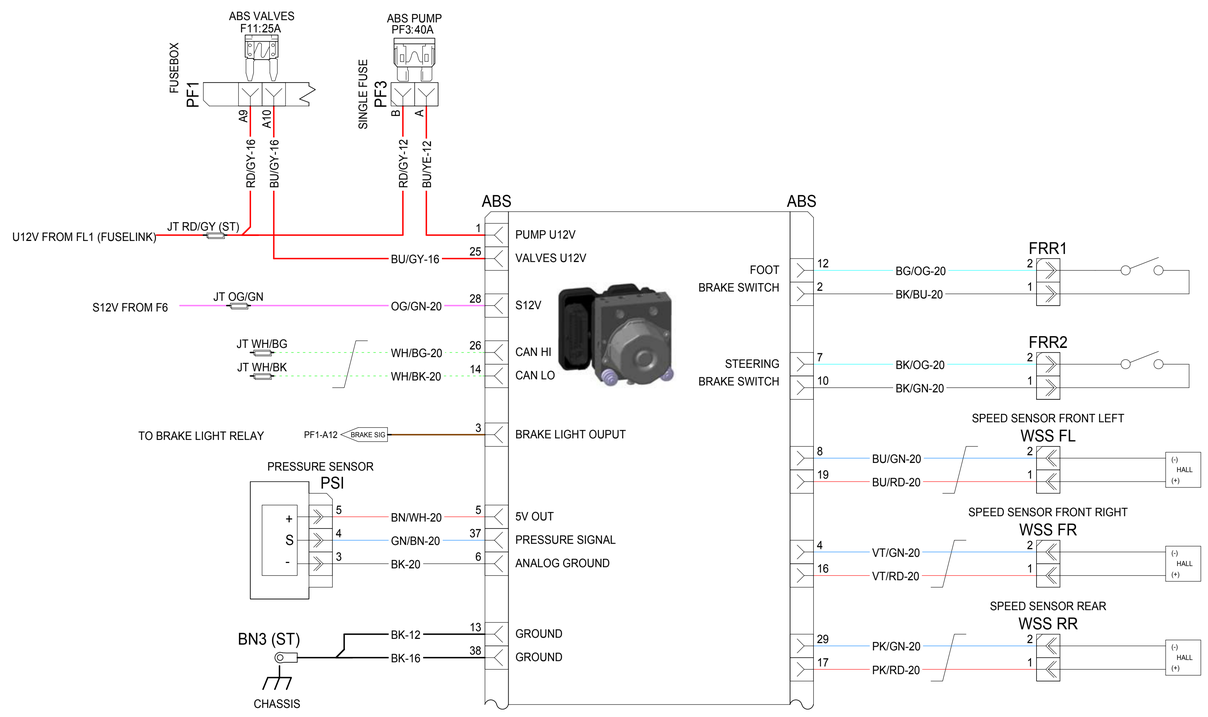
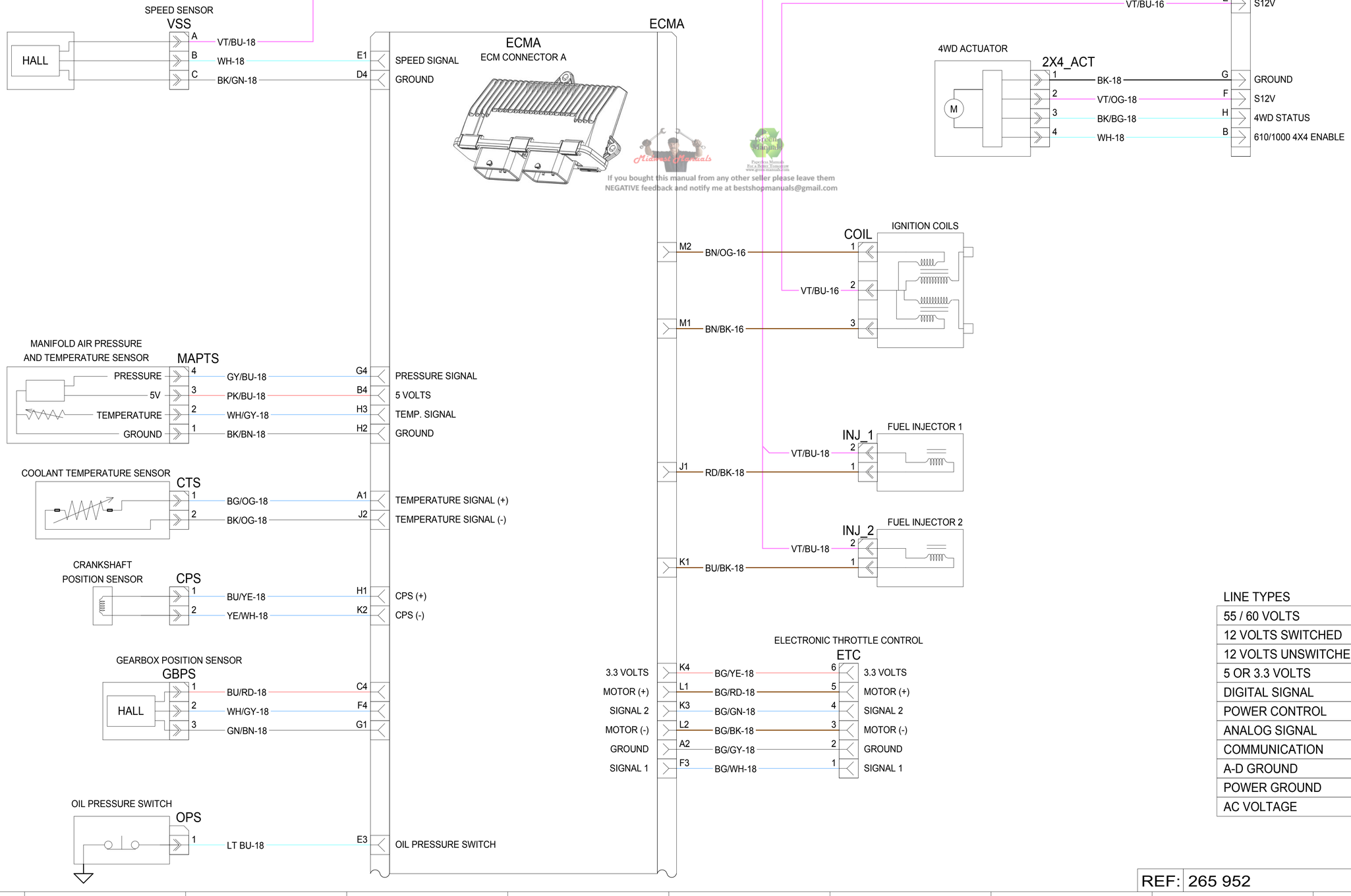
Renegade T



LINE TYPES

55 / 60 VOLTS	
12 VOLTS SWITCHED	
12 VOLTS UNSWITCHED	
5 OR 3.3 VOLTS	
DIGITAL SIGNAL	
POWER CONTROL	
ANALOG SIGNAL	
COMMUNICATION	
A-D GROUND	
POWER GROUND	
AC VOLTAGE	

2021 *Engine Harness 650 and 1000*
(6x6)



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LINE TYPES

55 / 60 VOLTS
12 VOLTS SWITCHED
12 VOLTS UNSWITCHED
5 OR 3.3 VOLTS
DIGITAL SIGNAL
POWER CONTROL
ANALOG SIGNAL
COMMUNICATION
A-D GROUND
POWER GROUND
AC VOLTAGE

Flat rate times are what the manufacturer pays the authorized dealer for warranty work, the times listed are usually unrealistic for even the most experienced mechanic and will take longer to actually complete.

Because of this dealers will usually charge more than the times posted.

I cannot be held responsible for any errors BRP has made in these service flat rate or parts manuals.

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Our goal is to be one of the BEST sellers on the internet by providing you with the BEST customer service and the BEST manuals on the market.

Thank you for choosing us.

INTRODUCTION

This publication governs all warranty labor allowances for 2021 BRP ATV.

1. HOW DOES IT WORK

We follow the procedures detailed in the BRP *ATV Shop Manual*. The flat rate time is the maximum time allowed for a repair involving any given part. FLAT RATE TIME IS NOT CUMULATIVE. You must use the flat rate time given for the longest lasting operation.

NOTE: The *Flat Rate Time Schedule* was prepared by skilled mechanics using the hand tool usually found in workshops and all the special tools mentioned in the *Shop Manual*.

2. COMPILATION

The *Flat Rate Time Schedule* is compiled as follows:

The actual required time to perform the repair plus (+) 30% correction factor up to 3.0 hours or (+) 15% over 3.0 hours time to take into account, among others:

- Vehicle handling
- Obtaining the parts
- Diagnosis
- Cleaning
- Special compensation (rusted bolts).

3. HOW TO USE IT

Refer to the system you need, locate part of series of parts replaced. List JOB CODE in the appropriate column on claim.

SYSTEM		PAGE
01	ENGINE	5
02	CARBURETOR AND FUEL SYSTEM	21
03	IGNITION SYSTEM	24
04	STARTER	26
05	TRANSMISSION SYSTEM	27
06	BRAKE SYSTEM	33
07	STEERING SYSTEM AND FRONT SUSPENSION	35
08	REAR SUSPENSION SYSTEM AND TRACK	41
09	BODY	46
10	ELECTRICAL SYSTEM	57

NOTE: Unless otherwise specified, dismantling order is: top to bottom, exterior to interior, front to rear.

All fractions of hours are in tenths:

0.1 = 6 minutes
0.2 = 12 minutes, and so on

LEGEND:

* REQUIRES PRIOR AUTHORIZATION BY DISTRIBUTOR.
** INDICATE LABOUR TIME ON LINE “LABOUR ONLY“ OF CLAIM.
*** INDICATE $$$ AMOUNT ON “SUB-CONTRACTED LABOUR“ OF CLAIM.

IMPORTANT: Always use the longest flat rate time applicable to the repair performed.

4. JOB REQUIREMENTS

All the flat rate times mentioned in the following pages include the required operations such as: engine timing (rotary valve and ignition), connecting rod(s) alignment, cylinder head(s) torque or use of parallel bar, use of ignition tester, piston clearance/ring end gap measurement, crankshaft to crankcase measurement, cylinder honing, engine leak test.

5. ILLUSTRATIONS

The illustrations contained in this manual do not necessarily show every components of a given system as *Parts Catalog* do. Their purpose is to facilitate recognition of parts related to a flat rate time. Item numbers on illustrations correspond to the four digit Job Code.

6. FLAT RATE TIME SUGGESTION

SEND A WARRANTY CASE ON BOSSWeb INFO CENTER

In the case, you must provide the following information:

Section *Subject*:

- Flat rate time suggestion

Section *Your Question*:

- Model year;
- Model description;
- Description job code;
- Job code;
- Present flat rate;
- Suggested flat rate;
- Detailed repair procedure;

To ensure that your case will be promptly and efficiently processed please indicate the step by step repair procedure you performed.

INTRODUCTION

Cette publication détermine le temps de main-d'oeuvre couvert par la garantie pour les VTT BRP 2021.

1. UTILISATION DU MANUEL

En procédant de la façon indiquée dans le *Manuel de réparation VTT* BRP, chaque temps donné représente le maximum permis pour une réparation portant sur cette pièce. LES TEMPS NE SONT PAS CUMULATIFS. On doit inscrire le temps donné pour l'opération qui prend le plus de temps.

REMARQUE: Le *Barème de temps à taux fixe* a été préparé par des mécaniciens compétents utilisant les outils que l'on retrouve normalement dans les ateliers de réparation, en plus de tous les outils spéciaux mentionnés dans le *Manuel de réparation*.

2. COMPILATION

Le *Barème de temps à taux fixe* a été établi en compilant le temps nécessaire pour faire la réparation plus (+) un facteur de correction de 30% lorsqu'un travail dure 3.0 heures et moins, ou (+) 15% lorsqu'un travail dure plus de 3.0 heures. Cette compilation comprend, entre autres, les étapes suivantes:

– Manutention du véhicule
– Nettoyage
– Aller chercher les pièces, essais physiques
– Compensation spéciale (boulons rouillés)
– Diagnostic.

3. UTILISATION DU BARÈME

Se reporter à la section désirée, repérer la pièce ou l'ensemble de pièces remplacées et inscrire le CODE DE TRAVAIL dans la colonne appropriée sur la formule de réclamation.

SYSTÈME		PAGE
01	MOTEUR	5
02	CARBURATEUR ET SYSTÈME D'ALIMENTATION D'ESSENCE	21
03	SYSTÈME D'ALLUMAGE	24
04	DÉMARREUR	26
05	SYSTÈME DE TRANSMISSION	27
06	SYSTÈME DE FREIN	33
07	SYSTÈME DE DIRECTION ET SUSPENSION AVANT	35
08	SYSTÈME DE SUSPENSION ARRIÈRE ET CHENILLE	41
09	CARROSSERIE	46
10	SYSTÈME ÉLECTRIQUE	57

REMARQUE: Sauf indication contraire, le démontage doit s'effectuer de haut en bas, de l'extérieur vers l'intérieur, de l'avant vers l'arrière.

Toutes les fractions d'heures sont exprimées en dixièmes:

0.1 = 6 minutes
0.2 = 12 minutes, et ainsi de suite

LÉGENDE:

* AUTORISATION REQUISE AVANT LE REMPLACEMENT.
** INSCRIRE LE TEMPS À LA LIGNE «MAIN-D'OEUVRE SEULEMENT».
*** INSCRIRE LE MONTANT $$$ À LA LIGNE «OUVRAGE SOUS-CONTRACTÉ».

IMPORTANT: Toujours utiliser le temps donné à l'opération qui nécessite le plus de temps.

4. TRAVAUX REQUIS

Tous les temps mentionnés dans les pages suivantes incluent les opérations telles que: réglage du moteur (valve rotative et allumage), alignement de la ou des bielles, couple de serrage de la ou des culasses ou l'utilisation de barres parallèles, utilisation du vérificateur d'allumage, mesure du jet des pistons/jeu en bout des segments, mesure de l'écart entre le vilebrequin et le carter, rectification du cylindre, vérification de fuite du moteur.

5. ILLUSTRATIONS

Contrairement aux *Catalogues de pièces*, les illustrations de ce manuel ne montrent pas nécessairement chacune des pièces qu'elles représentent, leur raison d'être étant plutôt de faciliter la reconnaissance des pièces reliées à un barème de temps à taux fixe. **Les numéros d'items sur les illustrations correspondent aux quatre derniers chiffres du code de travail.**

6. SUGGESTION DE BARÈME DE TEMPS À TAUX FIXE

ENVOYEZ UNE REQUÊTE GARANTIE BOSSWeb DEPUIS LA SECTION INFO CENTRE

Dans cette requête, vous devez fournir les informations suivantes:

Section *Objet*:

– Suggestion de barème de temps à taux fixe

Section *Votre Question*:

– L'année modèle;
– Description du modèle;
– Description du code de travail;
– Code de travail;
– Temps actuel;
– Temps suggéré;
– Détails de la marche à suivre;

Pour s'assurer que votre demande sera traitée dans les plus brefs délais et efficacement, s.v.p. nous fournir toutes les étapes de réparation dans les détails de la marche à suivre

2021
ATV / VTT

TABLE	DESCRIPTION	MODEL/ MODÈLE	ENGINE TYPE/ TYPE DE MOTEUR
6	OUTLANDER 650	2NMA/2NMB	650 CVT
	OUTLANDER DPS 650	2BMA/2BMB	
	OUTLANDER MOS 650	4NMA/4NMB	
	OUTLANDER XT 650	2PMA/2PMB 2PMC/2PMD 2PME/2PMF 2PMG/2PMH	
	OUTLANDER XU 650	3PMB/3RMA	
7	OUTLANDER 850	2HMA/2HMB	850 CVT
	OUTLANDER DPS 850	2AMF/2AMG	
	OUTLANDER XT 850	2JMA/2JMB 2JMC/2JME 2JMF/2JMG	
	OUTLANDER XTP 850	5RMB	
	OUTLANDER WIN 850	5GMB	
8	OUTLANDER DPS 1000	5TLA/5TLB 5TLE/5TLG	1000R CVT
	OUTLANDER XT 1000	5XLA	
	OUTLANDER XTP 1000	5XMA/5XMC	
	OUTLANDER XXC 1000	1XMF/1XMG 1UMA	
9	OUTLANDER MAX DPS 650	2DMA/2DMB	650 CVT
	OUTLANDER MAX XT 650	2SMA/2SMB 2SMC/2SMD 2SME/2SMG 2SMH/2SMJ 2SMK/2SML 2SMM	
	OUTLANDER MAX XTP 650	3DMA	
	OUTLANDER MAX XU 650	3TMA	
10	OUTLANDER MAX XT 850	2LMA/2LMB 2LMC/2LMD 2LME/2MLF 2LMG	850 CVT
	OUTLANDER MAX XTP 850	5FMA/5FMB 5FMC	
	OUTLANDER MAX WIN 850	5HMB	

TABLE	DESCRIPTION	MODEL/ MODÈLE	ENGINE TYPE/ TYPE DE MOTEUR
11	OUTLANDER MAX DPS 1000	4PMA/4VMA	1000R CVT
	OUTLANDER MAX XT 1000	5UMA/5UMB 5UMC/5UMD	
	OUTLANDER MAX LTD 1000	5WMA/5WMB 5WMC/5WMD	
	OUTLANDER MAX XTP 1000	5JMA/5JMB 5JMC/5JMD	
	OUTLANDER MAX XU 1000	3UMA	
12	OUTLANDER XMR 650	5EMB/5EMC	650 CVT
13	OUTLANDER XMR 850	4KMC/4KMD	850 CVT
14	OUTLANDER XMR 1000	5KMC/5KMD 5KME/5KMF 5KMH	1000R CVT
15	RENEGADE 570	4EMA/4EMC	570 CVT
16	RENEGADE XXc 650	4UMA	650 CVT
17	RENEGADE 850	4BMA/4BMB	850 CVT
	RENEGADE XXc 850	4DMA/4DMB	
18	RENEGADE XXc 1000	5VMB/5VMD 5VME/5VMF 5MMA	1000R CVT
19	RENEGADE XMR 570	4TMC	570 CVT
20	RENEGADE XMR 1000	4FMC/4FMD 4FME/4FMF	1000R CVT

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
01	**00**	**NO LABOR INVOLVED AUCUNE MAIN D'OEUVRE**	**0**	**0**	**0**	**0**	**0**
01 *	01	REMOVE AND REPLACE ENGINE (ASS'Y) REMPLACEMENT DU MOTEUR (COMPLET)	4.7	4.7	5.0	4.4	4.4
01	03	OIL PRESSURE SWITCH INTERRUPTEUR DE PRESSION D'HUILE	0.3	0.3	0.3	0.3	0.3
01	04	HEAT SHIELD AND/OR RUBBER MOUNT DÉFLECTEUR DE CHALEUR ET/OU BUTÉE DE CAOUTCHOUC	0.4	0.4	0.4	0.4	0.4
01	08	FAN AND/OR FAN SUPPORT VENTILATEUR ET/OU SUPPORT DE VENTILATEUR	1.3	1.3	0.6	1.1	1.1
01	17	CYLINDERS AND/OR GASKETS (ALL) CYLINDRES ET/OU JOINTS D'ÉTANCHÉITÉ (TOUS)	4.5	4.5	4.5	4.5	4.5
01	18	SENDER TEMPERATURE (ENGINE) CAPTEUR DE TEMPÉRATURE (MOTEUR)	0.9	0.9	0.9	0.9	0.9
01	19	THERMOSTAT THERMOSTAT	0.5	0.5	0.5	0.5	0.5
01	37	RADIATOR INLET HOSE BOYAU D'ENTRÉ DU RADIATEUR	0.5	0.5	0.5	0.5	0.5
01	38	WATER PUMP SHAFT (ALL PARTS) ARBRE DE POMPE À L'EAU (TOUTES LES PIÈCES)	5.5	5.5	5.5	5.2	5.2
01	45	ENGINE DAMPERS (1 OR ALL) TAMPONS ANTI-VIBRATION (1 OU TOUS)	4.0	4.0	4.0	3.8	3.8
01	46	RADIATOR AND/OR GROMMMET RADIATEUR ET/OU PASSE-FILS	1.6	1.6	1.0	1.4	1.4
01	50	CRANKSHAFT AND/OR BEARINGS (FRONT/REAR) VILEBREQUIN ET/OU ROULEMENTS (AVANT/ARRIÈRE)	7.0	7.0	7.3	6.7	6.7
01	56	CRANKCASE COVER GASKET JOINT DE COUVERCLE DE CARTER	1.3	1.3	1.3	1.3	1.3
01	57	PTO CRANKCASE COVER COUVERCLE DE CARTER PDM	1.3	1.3	1.3	1.3	1.3
01	58	INTAKE OR EXHAUST VALVE GUIDE (1) GUIDE DE SOUPAPE D'ADMISSION OU D'ÉCHAPPEMENT (1)	2.8	2.8	2.8	2.8	2.8
01	59	INTAKE OR EXHAUST VALVE GUIDES (2) GUIDES DE SOUPAPE D'ADMISSION OU D'ÉCHAPPEMENT (2)	2.9	2.9	2.9	2.9	2.9
01	70	MUFFLER AND/OR EXHAUST GASKET AND/OR CLAMP SILENCIEUX D'ÉCHAPPEMENT ET/OU JOINT D'ÉCHAPPEMENT ET/OU BRIDE DE SERRAGE	0.3	0.3	0.3	0.3	0.3
01	73	EXHAUST MANIFOLD (REAR) CONNECTEUR D'ÉCHAPPEMENT (ARRIÈRE)	0.5	0.5	0.5	0.5	0.5
01	77	RUBBER ISOLATOR ISOLATEUR DE CAOUTCHOUC	1.0	1.0	1.0	1.0	1.0

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
01	79	COOLANT HOSE (ENGINE TO TANK) BOYAU DU SYSTÈME DE REFROIDISSEMENT (RÉSERVOIR AU MOTEUR)	0.4	0.4	0.4	0.4	0.4
01	83	EXHAUST MANIFOLD (FRONT) CONNECTEUR D'ÉCHAPPEMENT (AVANT)	0.5	0.5	0.5	0.5	0.5
01	84	TUNE PIPE HEAT SHIELD (1) DÉFLECTEUR DE CHALEUR TUYAU D'ÉCHAPPEMENT (1)	0.3	0.3	0.3	0.3	0.3
01	85	TUNE PIPE HEAT SHIELD (2) DÉFLECTEUR DE CHALEUR TUYAU D'ÉCHAPPEMENT (2)	0.4	0.4	0.4	0.4	0.4
01	86	TUNE PIPE HEAT SHIELD (3) DÉFLECTEUR DE CHALEUR TUYAU D'ÉCHAPPEMENT (3)	0.4	0.4	0.4	0.4	0.4
01	88	RUBBER MOUNT (MUFFLER) TAMPON D'ANCRAGE (SILENCIEUX)	0.3	0.3	0.3	0.3	0.3
01	90	ENGINE OIL FILTER FILTRE À HUILE DU MOTEUR	0.3	0.3	0.3	0.3	0.3
01	96	OIL SIEVE AND/OR O-RING AND/OR COLLECTOR AND/OR RUBBER RING AND/OR COVER CRIBLE D'HUILE ET/OU JOINT TORIQUE ET/OU COLLECTEUR ET/OU ANNEAU DE CAOUTCHOUC ET/OU COUVERCLE	6.7	6.7	7.0	6.4	6.4
01	98	COOLING RESERVOIR RÉSERVOIR D'ANTIGEL	1.0	1.0	1.0	1.0	1.0
01	100	RADIATOR OUTLET HOSE BOYAU DE SORTIE DU RADIATEUR	0.4	0.4	0.4	0.4	0.4
01	101	PISTON, PIN, CIRCLIP, RINGS (1) PISTON, GOUPILLE, CIRCLIP, SEGMENTS (1)	3.0	3.0	3.0	3.0	3.0
01	102	PISTONS, PINS, CIRCLIPS, RINGS (2) PISTONS, GOUPILLES, CIRCLIPS, SEGMENTS (2)	4.7	4.7	4.7	4.7	4.7
01	109	VALVE COVER AND/OR GASKET COUVERCLE DE SOUPAPE ET/OU JOINT D'ÉTANCHÉITÉ	0.5	0.5	0.5	0.5	0.5
01	111	TIMING GEAR PIGNON DE DISTRIBUTION	1.2	1.2	1.2	1.2	1.2
01	113	ROCKER ARM AND/OR PUSH ROD AND/OR ROCKER ARM SHAFT CULBUTEUR ET/OU TIGE POUSSOIR ET/OU ARBRE DE CULBUTEUR	1.3	1.3	1.3	1.3	1.3
01	114	CYLINDER HEAD CULASSE	3.5	3.5	3.5	3.5	3.5
01	116	EXHAUST AND/OR INLET VALVE AND/OR SPRING AND/OR SEAL VALVE ADMISSION ET/OU ÉCHAPPEMENT ET/OU RESSORT ET/OU ANNEAU D'ÉTANCHÉITÉ	2.7	2.7	2.7	2.7	2.7
01	117	CYLINDER AND/OR GASKET CYLINDRE ET/OU JOINT D'ÉTANCHÉITÉ	2.8	2.8	2.8	2.8	2.8
01	119	WATER PUMP HOUSING AND/OR IMPELLER CARTER DE LA POMPE À EAU ET/OU ROUE À AILETTES	0.4	0.4	0.4	0.4	0.4
01	132	OIL PUMP GEAR ENGRENAGE DE LA POMPE À HUILE	1.5	1.5	1.5	1.5	1.5

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
01	134	CAMSHAFT ARBRE À CAME	2.3	2.3	2.3	2.3	2.3
01	137	OIL PUMP COVER AND/OR SHAFT AND/OR ROTOR COUVERCLE DE LA POMPE À HUILE ET/OU ARBRE ET/OU ROTOR	1.5	1.5	1.5	1.5	1.5
01	138	CRANKCASE RESEAL OR GASKET RECELLEMENT DU CARTER ET/OU JOINT D'ÉTANCHÉITÉ	6.9	6.9	7.2	6.6	6.6
01	139	CRANKCASE REPLACEMENT REMPLACEMENT DU CARTER	7.2	7.2	7.5	6.9	6.9
01	152	DRIVE SHAFT AND/OR BEARINGS AND/OR SEALS ARBRE D'ENTRAÎNEMENT ET/OU ROULEMENT À BILLES ET/OU ANNEAUX D'ÉTANCHÉITÉ	6.9	6.9	7.2	6.6	6.6
01	154	TIMING CHAIN CHAÎNE D'ENGRENAGE	3.1	3.1	3.1	3.1	3.1
01	179	CHAIN GUIDE GUIDE DE CHAÎNE	1.0	1.0	1.0	1.0	1.0
01	182	OIL RADIATOR AND/OR O-RING RADIATEUR D'HUILE ET/OU JOINT TORIQUE	1.7	1.7	1.7	1.7	1.7
01	191	CHAIN TENSION GUIDE GUIDE DE TENSION DE CHAÎNE	3.1	3.1	3.1	3.1	3.1
01	192	CHAIN TENSIONER (ASS'Y) TENDEUR DE CHAÎNE (COMPLET)	0.3	0.3	0.3	0.3	0.3
01	196	HEAT SHIELD (RH OR LH) DÉFLECTEUR DE CHALEUR (DR OU GA)		0.5	0.5		
01	200	WATER PUMP GEAR ENGRENAGE DE LA POMPE À EAU	1.6	1.6	1.6	1.6	1.6
01	205	REAR OUTPUT SHAFT SEAL ANNEAU D'ÉTANCHÉITÉ DE L'ARBRE DE SORTIE ARRIÈRE	5.2	5.2	5.5	4.9	4.9
01	215	OIL DIPSTICK JAUGE À HUILE	0.3	0.3	0.3	0.3	0.3
01	216	PRESSURE CAP BOUCHON À PRESSION	0.3	0.3	0.3	0.3	0.3
01	217	ENGINE BRACKET AND/OR RUBBER MOUNT ATTACHE MOTEUR ET/OU TAMPON D'ANCRAGE	0.3	0.3	0.3	0.3	0.3
01	220	MAIN DRIVE GEAR AND/OR PIN ROUAGE D'ENTRAÎNEMENT PRINCIPALE ET/OU GOUPILLE	1.6	1.6	1.6	1.6	1.6
01	221	INTERMEDIATE GEAR AND/OR PIN AND/OR THRUST WASHER ROUAGE INTERMEDIAIRE ET/OU GOUPILLE ET/OU RONDELLE D'APPUI	1.6	1.6	1.6	1.6	1.6
01	223	FRONT OUTPUT SHAFT SEAL ANNEAU ÉTANCHÉITÉ ARBRE SORTIE AVANT	2.7	2.7	2.7	2.7	2.7
01	245	OUTPUT CRANKSHAFT SEAL (PTO SIDE) ANNEAU ÉTANCHÉITÉ SORTIE VILBREQUIN (CÔTÉ PDM)	0.6	0.6	0.6	0.6	0.6

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
01	246	WATER PUMP GEAR AND/OR SEAL ARBRE POMPE À EAU ET/OU JOINT ÉTANCHÉITÉ	5.5	5.5	5.8	5.2	5.2
01	247	REED VALVE AND/OR STOPPER SOUPAPE À CLAPET ET/OU BUTOIR	1.6	1.6	1.6	1.6	1.6
01	248	BREATHER GEAR AND/OR V-RING RENIFLARD ET/OU ANNEAU ÉTANCHÉITÉ EN «V»	1.6	1.6	1.6	1.6	1.6
01	249	CAMSHAFT POSITION SENSOR CAPTEUR DE POSITION DE L'ARBRE À CAME	0.3	0.3	0.3	0.3	0.3
01	250	CRANKSHAFT POSITION SENSOR (CPS) CAPTEUR DE POSITION DU VILEBREQUIN (CPV)	0.3	0.3	0.3	0.3	0.3
01	255	EXHAUST AND/OR INLET VALVES AND/OR SPRINGS AND/OR SEALS (4) ÉCHAPPEMENT ET/OU VALVES ADMISSION ET/OU RESSORTS ET/OU ANNEAUX D'ÉTANCHÉITÉ (4)	3.3	3.3	3.3	3.3	3.3
01	256	EXHAUST AND/OR INLET VALVES AND/OR SPRINGS AND/OR SEALS (8) ÉCHAPPEMENT ET/OU VALVES ADMISSION ET/OU RESSORTS ET/OU ANNEAUX D'ÉTANCHÉITÉ (8)	6.4	6.4	6.1	6.1	6.1
01	261	TIMING CHAIN (MAG SIDE) CHAÎNE D'ENGRENAGE (CÔTÉ MAG)	2.8	2.8	2.8	2.8	2.8
01	264	LONG BLOCK ENSEMBLE CARTER - CYLINDRE - CULASSE	6.7	6.7	7.0	6.4	6.4
01	301	WATER PUMP DYNAMIC SEAL AND/OR OIL SEAL ANNEAU D'ÉTANCHÉITÉ DYNAMIQUE DE LA POMPE À EAU	2.1	2.1	2.1	2.1	2.1
01	303	TIMING CHAINS (ALL) CHAÎNES D'ENGRENAGE (TOUTES)	5.3	5.3	5.3	5.3	5.3
01	304	CHAINS TENSION GUIDE (ALL) GUIDE DE TENSION DE CHAÎNES (TOUS)	5.3	5.3	5.3	5.3	5.3
01	305	CHAINS GUIDE (ALL) GUIDE DE CHAÎNES (TOUS)	1.8	1.8	1.8	1.8	1.8
01	307	VALVE COVERS AND/OR GASKETS (2) COUVERCLES SOUPAPE ET/OU JOINTS D'ÉTANCHÉITÉ (2)	0.9	0.9	0.9	0.9	0.9
01	308	CYLINDER HEAD GASKET (1) JOINT D'ÉTANCHÉITÉ DE LA CULASSE (1)	1.4	1.4	1.4	1.4	1.4
01	309	CYLINDER HEAD GASKETS (2) JOINTS D'ÉTANCHÉITÉ DE LA CULASSE (2)	2.3	2.3	2.3	2.3	2.3
01	316	MUFFLER END CAP EMBOUT DE SILENCIEUX	0.3	0.3	0.3	0.3	0.3
01	318	RADIATOR SUPPORT SUPPORT DE RADIATEUR			0.4		
01	324	FAN SUPPORT SUPPORT DU VENTILATEUR			0.5		
01	333	RADIATOR COVER COUVERCLE DE RADIATEUR			0.3		

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
01	334	FILLER NECK AND/OR HOSE GOULOT REMPLISSAGE ET/OU BOYAU			1.1		
01	336	COOLANT HOSE (ENGINE INLET) BOYAU DE REFROIDISSEMENT (ENTRÉE DU MOTEUR)	0.4	0.4	0.4	0.4	0.4
01	340	PLUG SCREW BOUCHON FILETÉ	0.5	0.5	0.5	0.5	0.5
01	352	OXYGEN SENSOR CAPTEUR D'OXYGÈNE	0.3	0.3	0.3	0.3	0.3
01	353	INJECTORS (ALL) INJECTEURS (TOUS)	1.9	1.9	1.9	1.6	1.6

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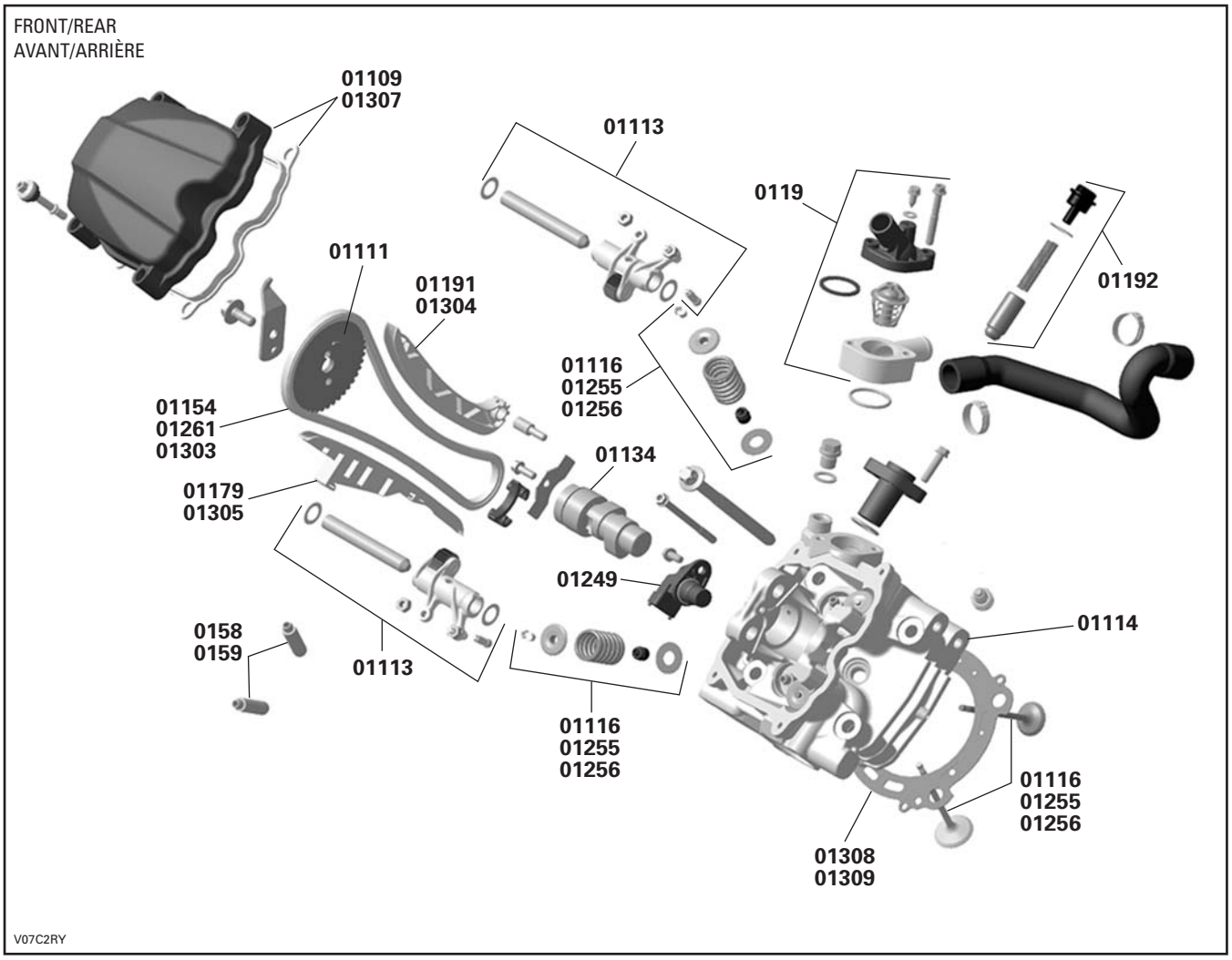
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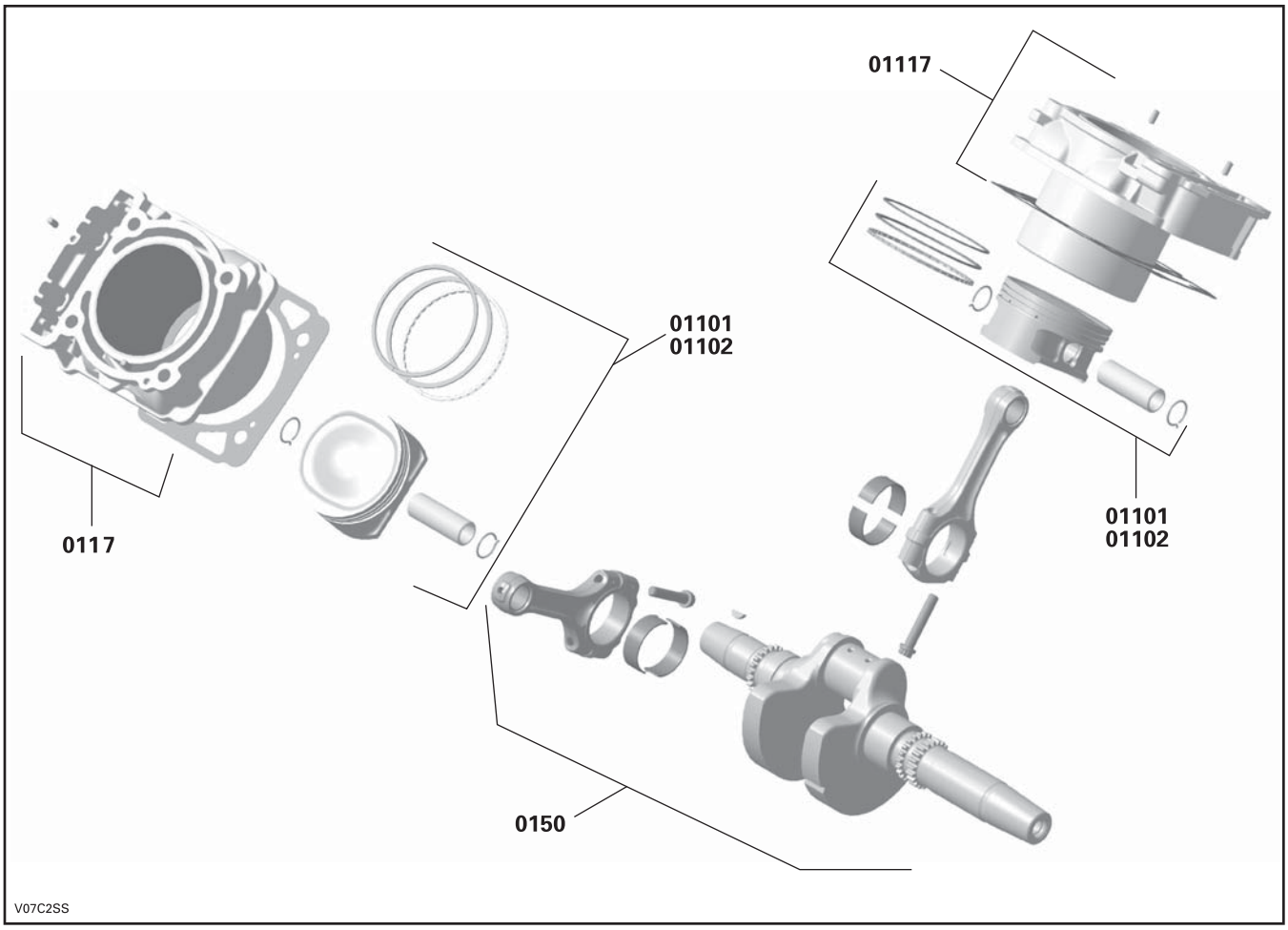
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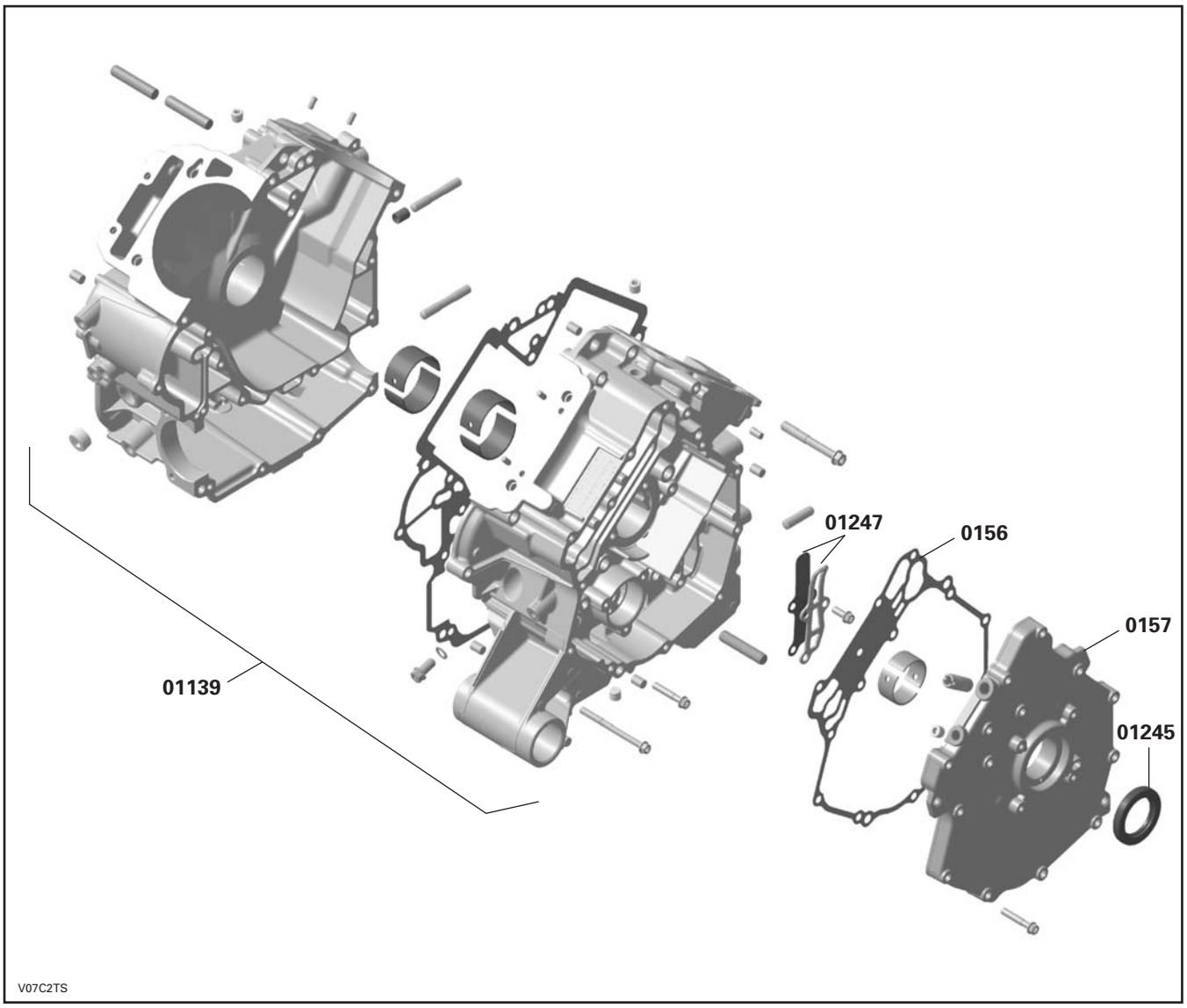
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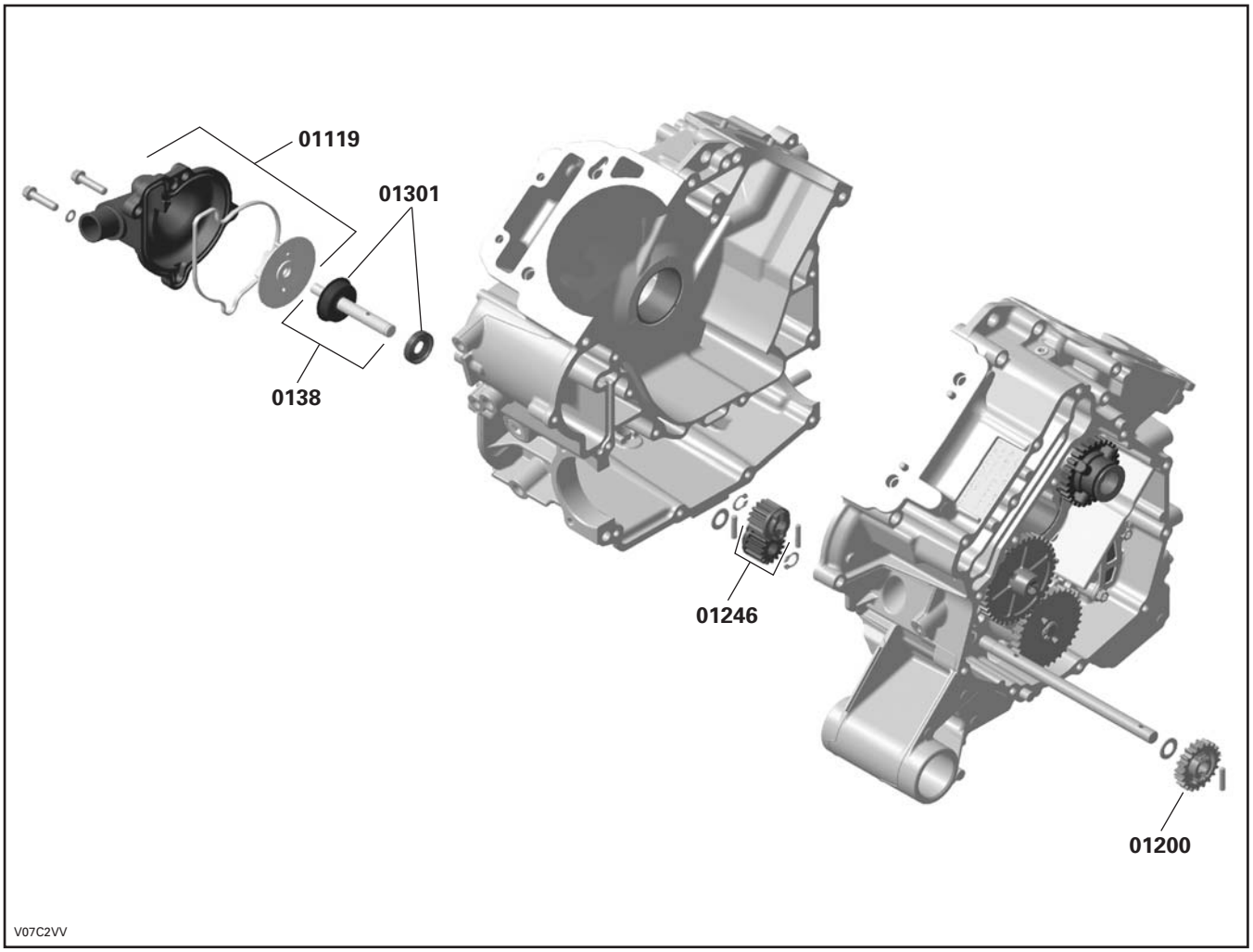
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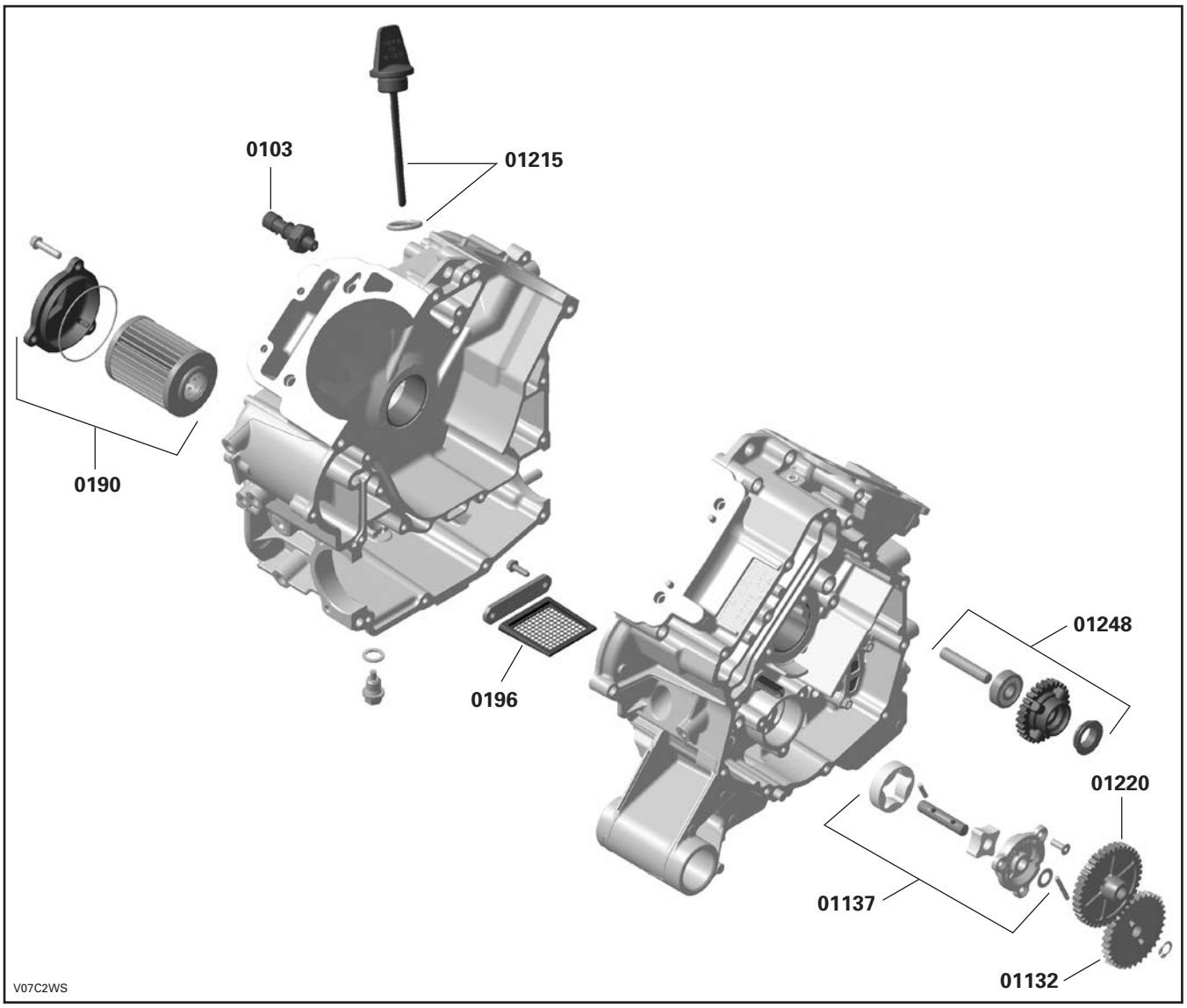
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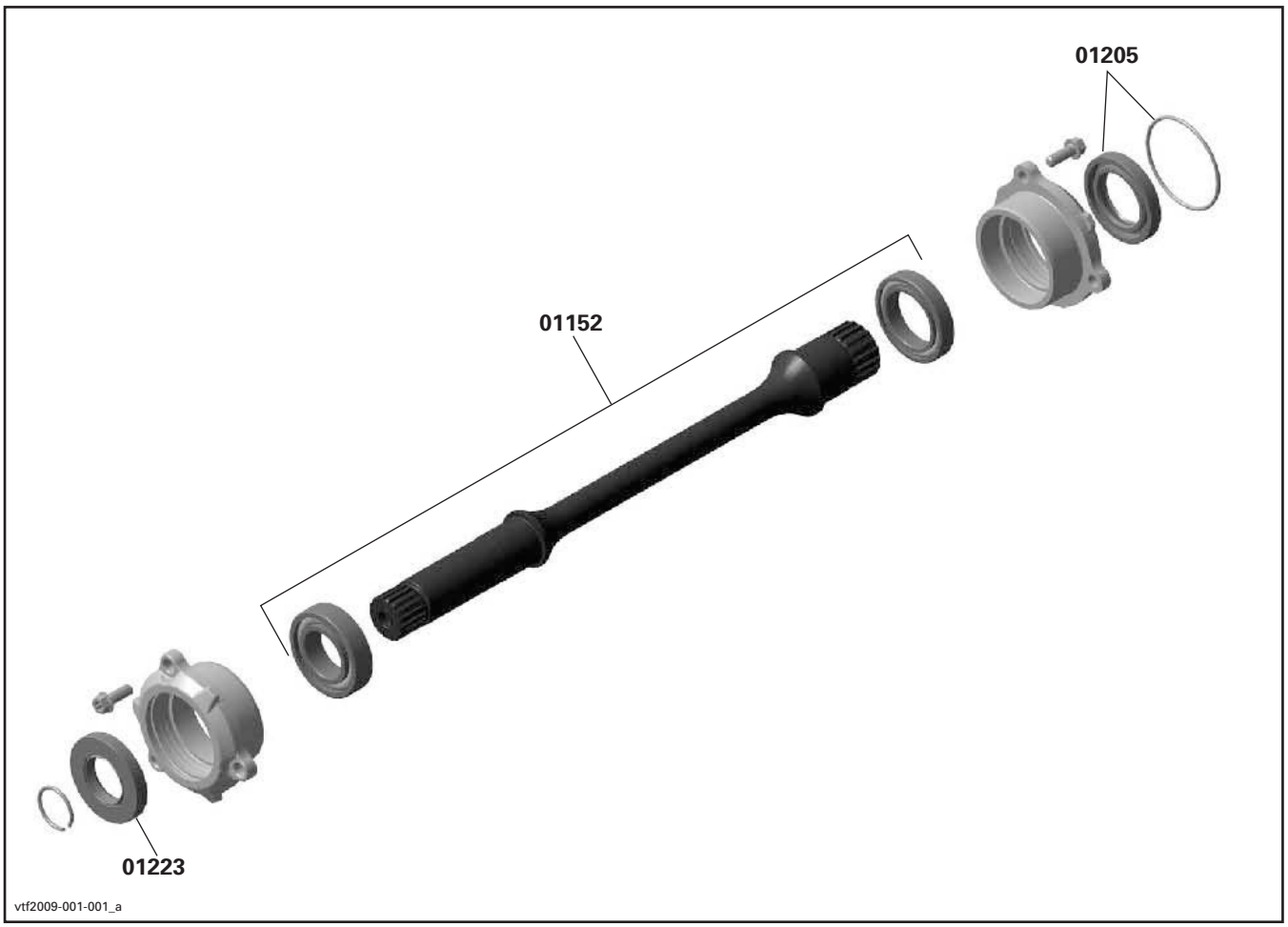
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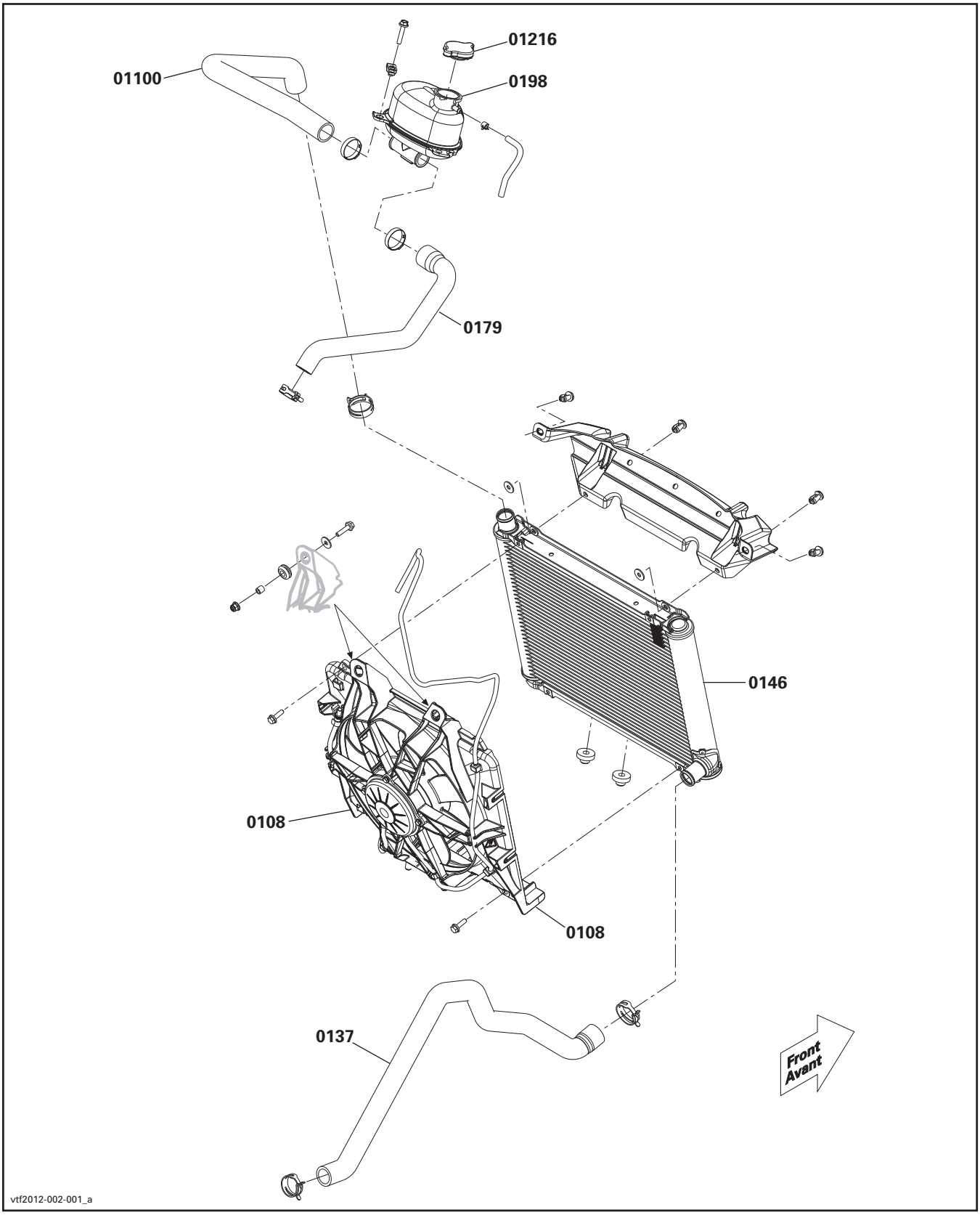
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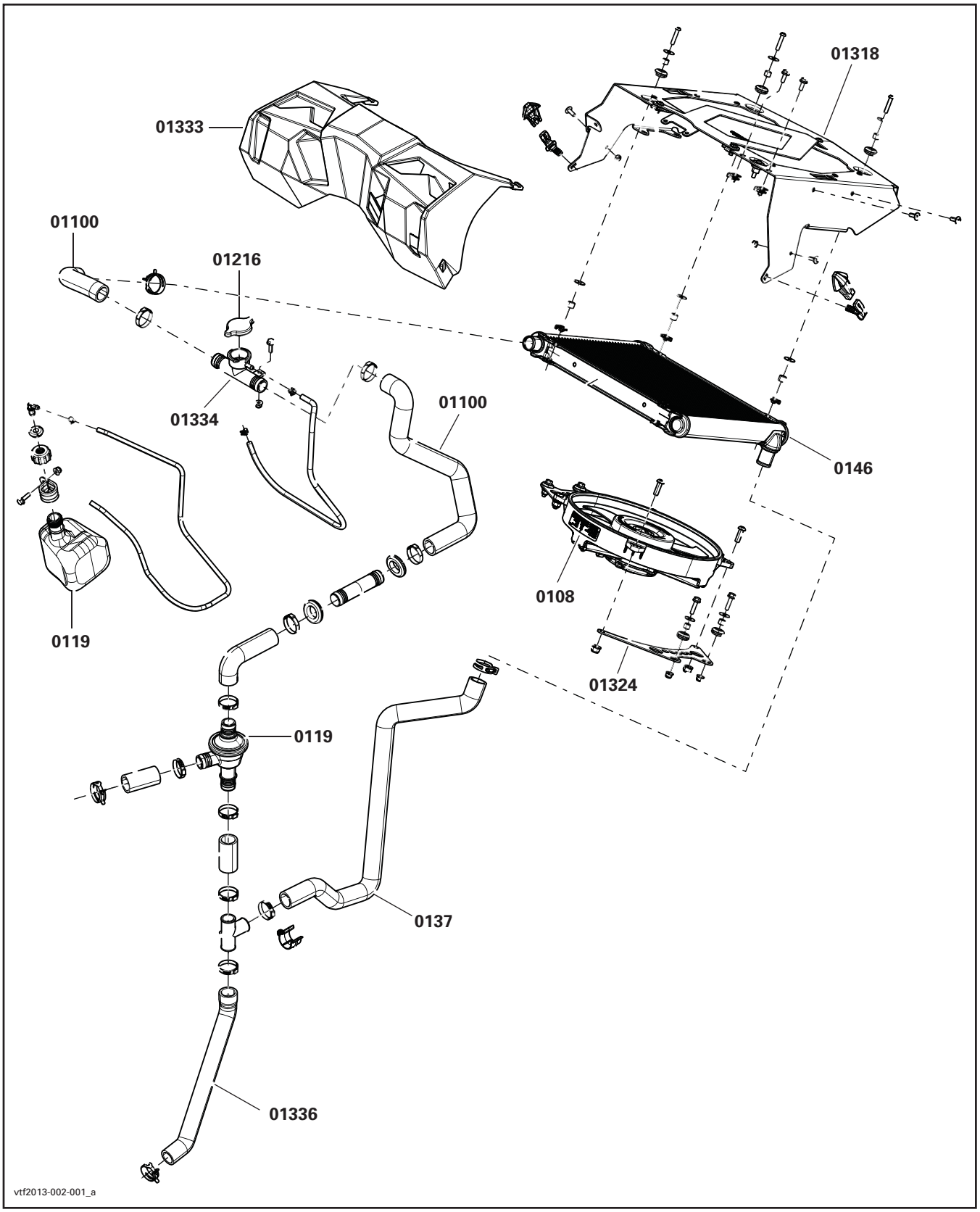
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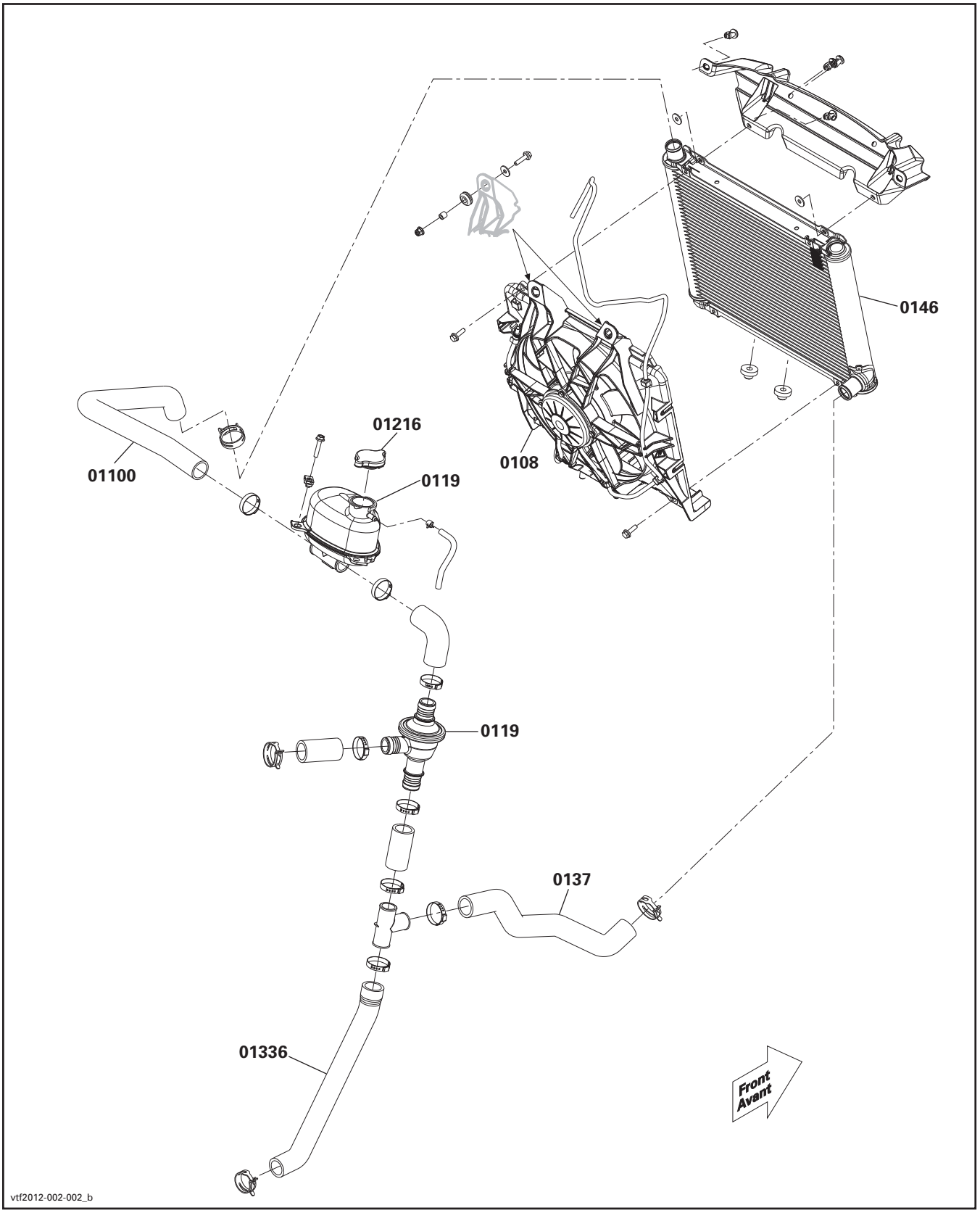
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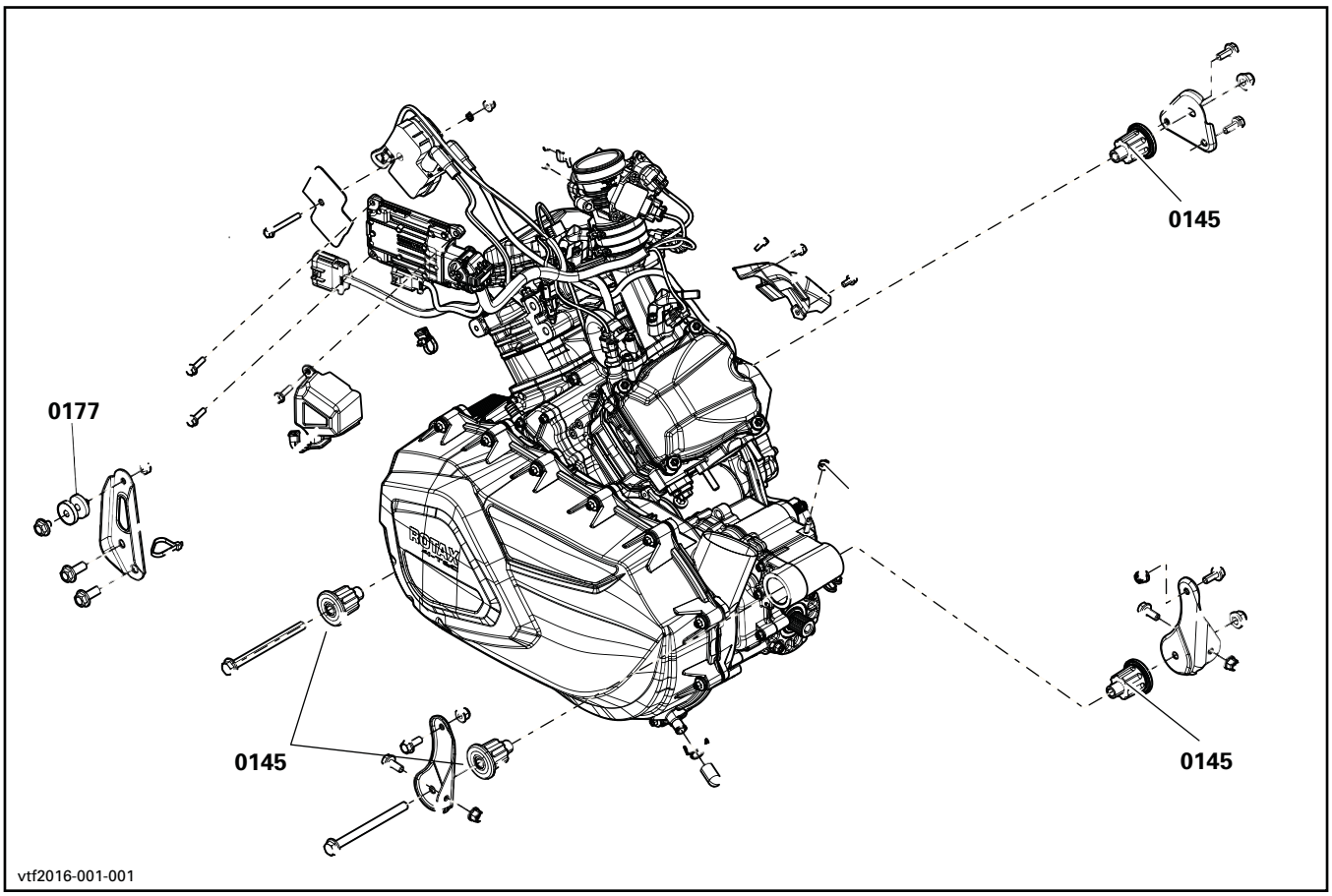
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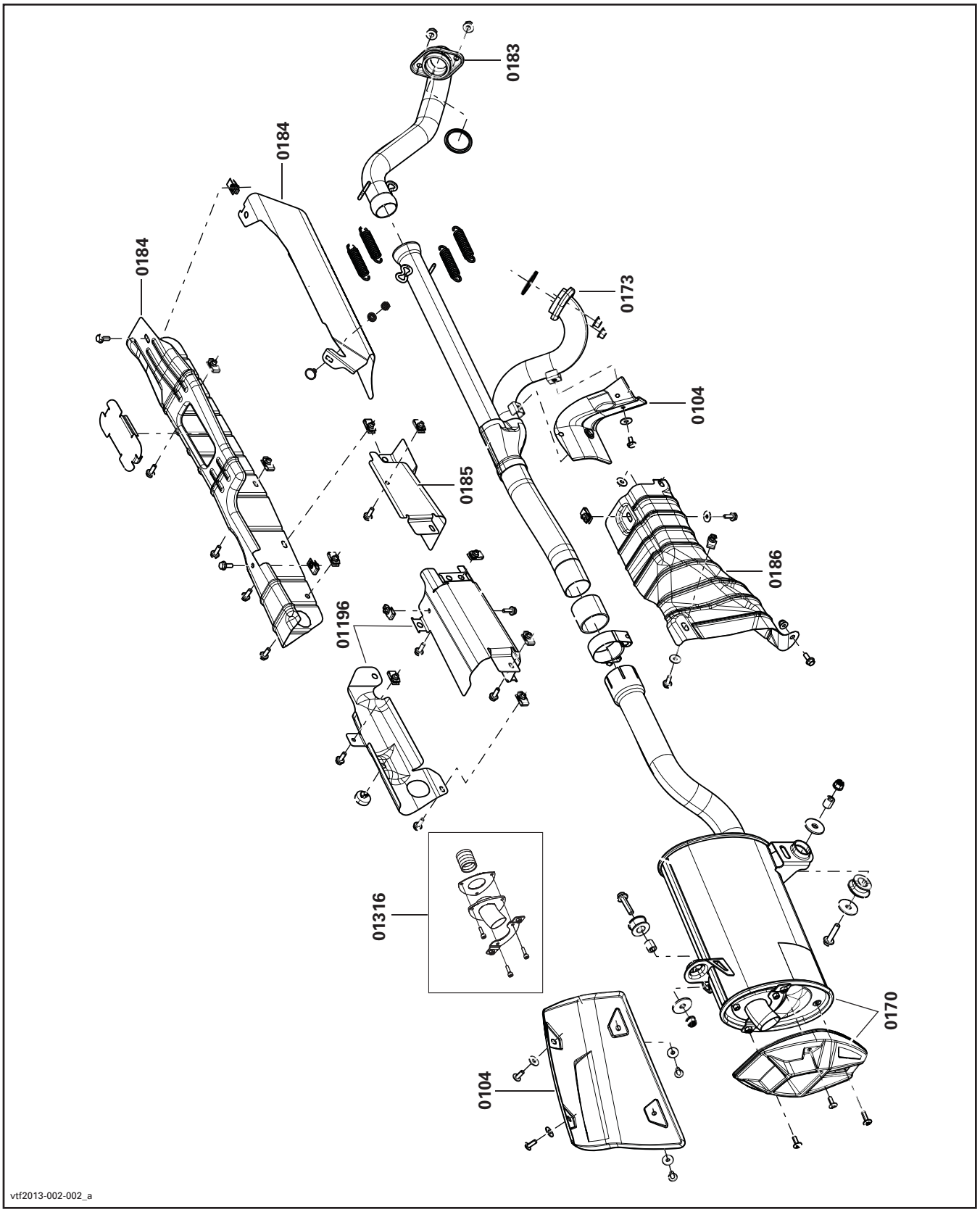
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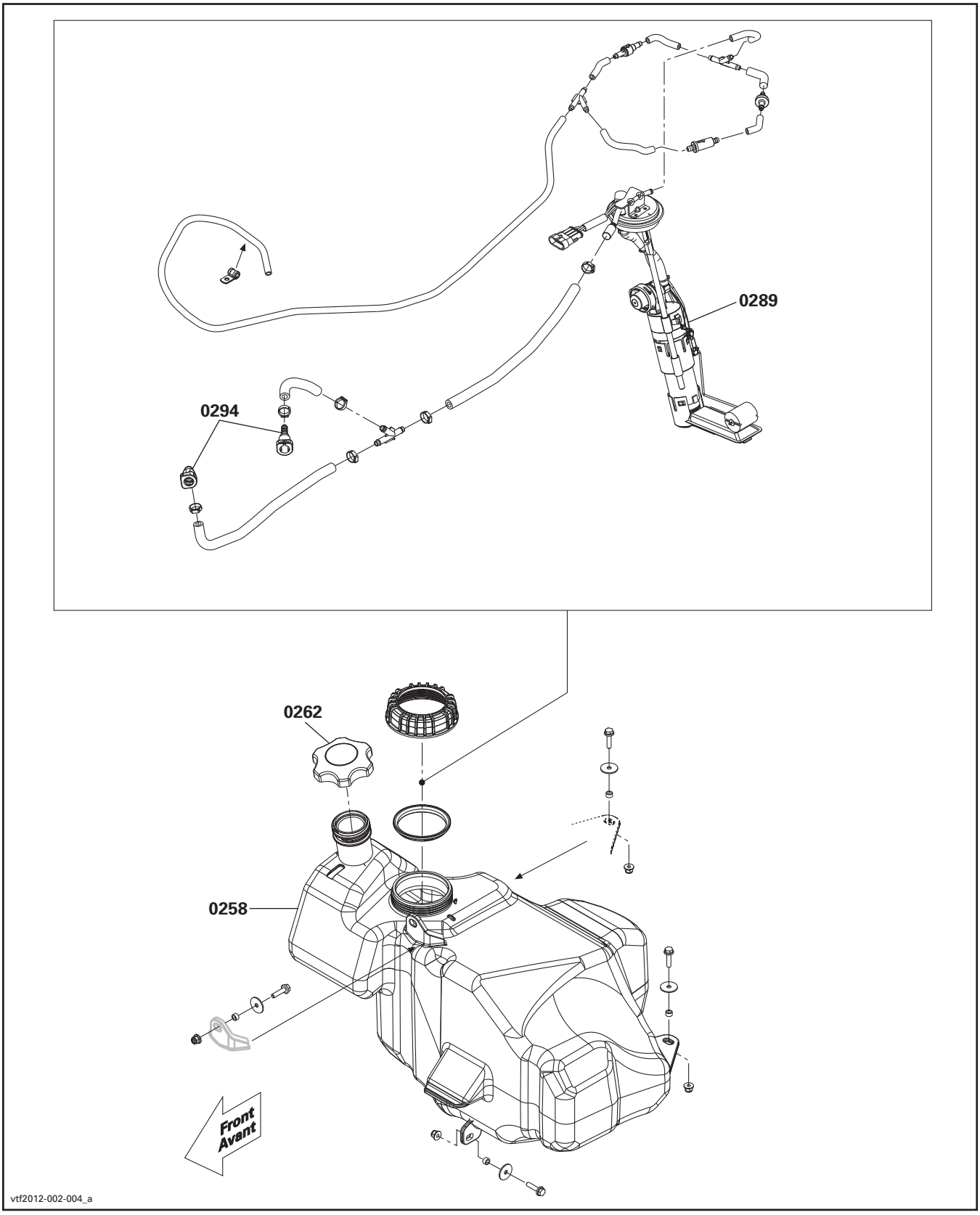
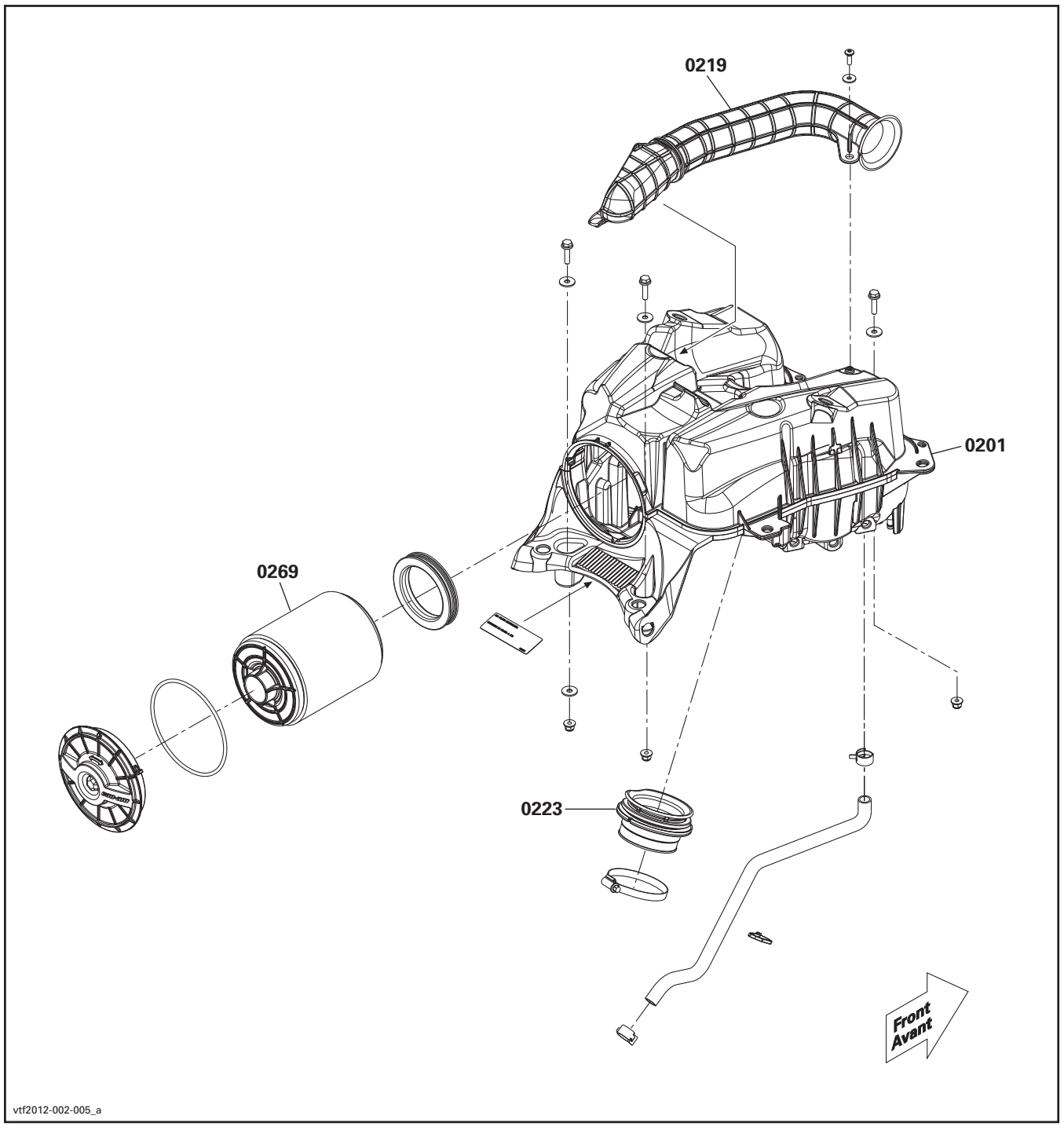
SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
02	**00**	**NO LABOR INVOLVED AUCUNE MAIN D'OEUVRE**	**0**	**0**	**0**	**0**	**0**
02	01	AIR INTAKE SILENCER (ASS'Y) SILENCIEUX D'ADMISSION D'AIR (COMPLET)	1.8	1.8	1.8	1.5	1.5
02	06	THROTTLE CABLE CÂBLE D'ACCÉLÉRATEUR	0.6	0.6	0.6	0.6	0.6
02	16	INTAKE ADAPTOR ADAPTATEUR D'ADMISSION	1.0	1.0	1.0	1.0	1.0
02	19	AIR INTAKE TUBE TUYAU D'ADMISSION D'AIR	1.0	1.0	1.3	1.0	1.0
02	23	REAR AIR INTAKE TUBE AND/OR SLEEVE TUYAU D'ADMISSION D'AIR ARRIÈRE ET/OU DOUILLE	1.8	1.8	2.2	1.5	1.5
02	46	AIR TEMPERATURE SENSOR CAPTEUR DE TEMPÉRATURE D'AIR	0.3	0.3	0.3	0.3	0.3
02	57	FUEL FILTER FILTRE À ESSENCE	1.0	1.0	1.0	1.0	1.0
02	58	FUEL TANK RÉSERVOIR D'ESSENCE	1.6	1.6	1.6	1.6	1.6
02	59	INTAKE COVER AND/OR SEAL COUVERCLE D'ADMISSION ET/OU JOINT D'ÉTANCHÉITÉ	0.3	0.3	0.3	0.3	0.3
02	60	FUEL CAP BOUCHON DU RÉSERVOIR À ESSENCE	0.3	0.3	0.3	0.3	0.3
02	69	AIR FILTER FILTRE À AIR	0.3	0.3	0.3	0.3	0.3
02	72	INTAKE MANIFOLD CONNECTEUR D'ADMISSION	1.9	1.9	1.9	1.6	1.6
02	79	FUEL RAIL (1 OR 2) RAMPE D'ESSENCE (1 OU 2)	1.9	1.9	1.9	1.6	1.6
02	81	THROTTLE BODY (ASS'Y) CARTER ACCÉLÉRATEUR (COMPLET)	1.7	1.7	2.0	1.4	1.4
02	82	THROTTLE SENSOR CAPTEUR POSITION D'ACCÉLÉRATEUR	1.5	1.5	1.5	1.2	1.2
02	84	IDLE BY-PASS VALVE VALVE DU RALENTI	1.5	1.5	1.5	1.2	1.2
02	89	FUEL PUMP MODULE MODULE POMPE À ESSENCE	1.0	1.0	1.0	1.0	1.0
02	94	FEMALE QUICK FITTING CONNECTEUR RAPIDE FEMELLE	0.4	0.4	0.4	0.4	0.4
02	99	FUEL INJECTION HOSE (ASS'Y) BOYAU À INJECTION D'ESSENCE (COMPLET)	0.4	0.4	0.4	0.4	0.4

CARBURETOR AND FUEL SYSTEM
CARBURATEUR ET SYSTÈME D'ALIMENTATION D'ESSENCE

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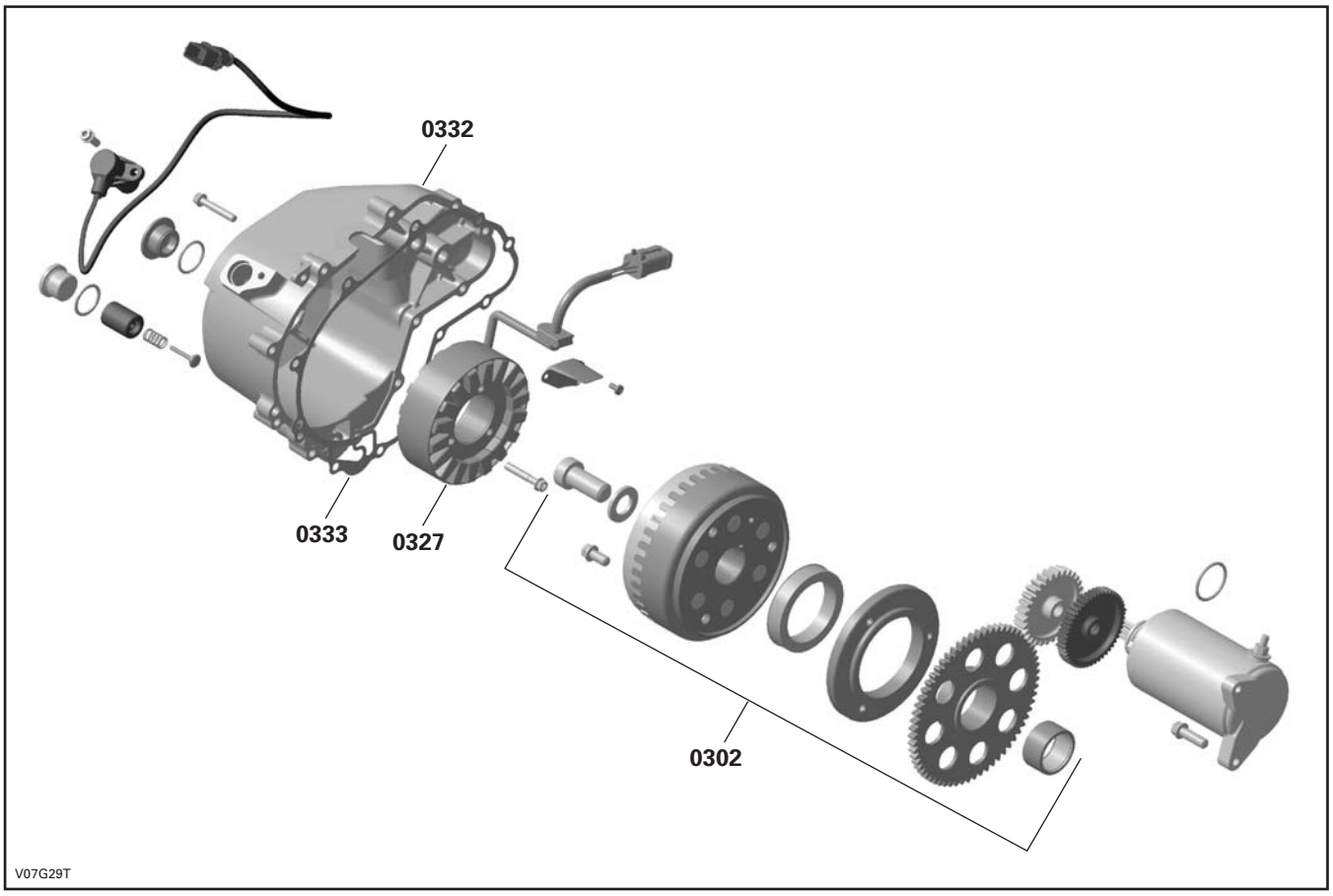
IGNITION SYSTEM
SYSTÈME D'ALLUMAGE

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
03	**00**	**NO LABOR INVOLVED AUCUNE MAIN D'OEUVRE**	**0**	**0**	**0**	**0**	**0**
03	02	MAGNETO (ASS'Y) MAGNÉTO (COMPLET)	2.3	2.3	2.3	2.3	2.3
03	08	IGNITION COIL (EACH) BOBINE D'ALLUMAGE (CHAQUE)	0.5	0.5	0.5	0.5	0.5
03	10	IGNITION CABLE CÂBLE D'ALLUMAGE	0.5	0.5	0.5	0.5	0.5
03	27	STATOR (ASS'Y) STATOR (COMPLET)	2.0	2.0	2.0	2.0	2.0
03	29	REAR SPARK PLUG BOUGIE D'ALLUMAGE ARRIÈRE	0.3	0.3	0.3	0.3	0.3
03	30	FRONT SPARK PLUG BOUGIE D'ALLUMAGE AVANT	0.3	0.3	0.3	0.3	0.3
03	31	SPARK PLUGS (2) BOUGIE D'ALLUMAGE (2)	0.3	0.3	0.3	0.3	0.3
03	32	MAGNETO COVER COUVERCLE DE MAGNÉTO	2.1	2.1	2.1	2.1	2.1
03	33	MAGNETO COVER GASKET JOINT D'ÉTANCHÉITÉ COUVERCLE DE MAGNÉTO	2.0	2.0	2.0	2.0	2.0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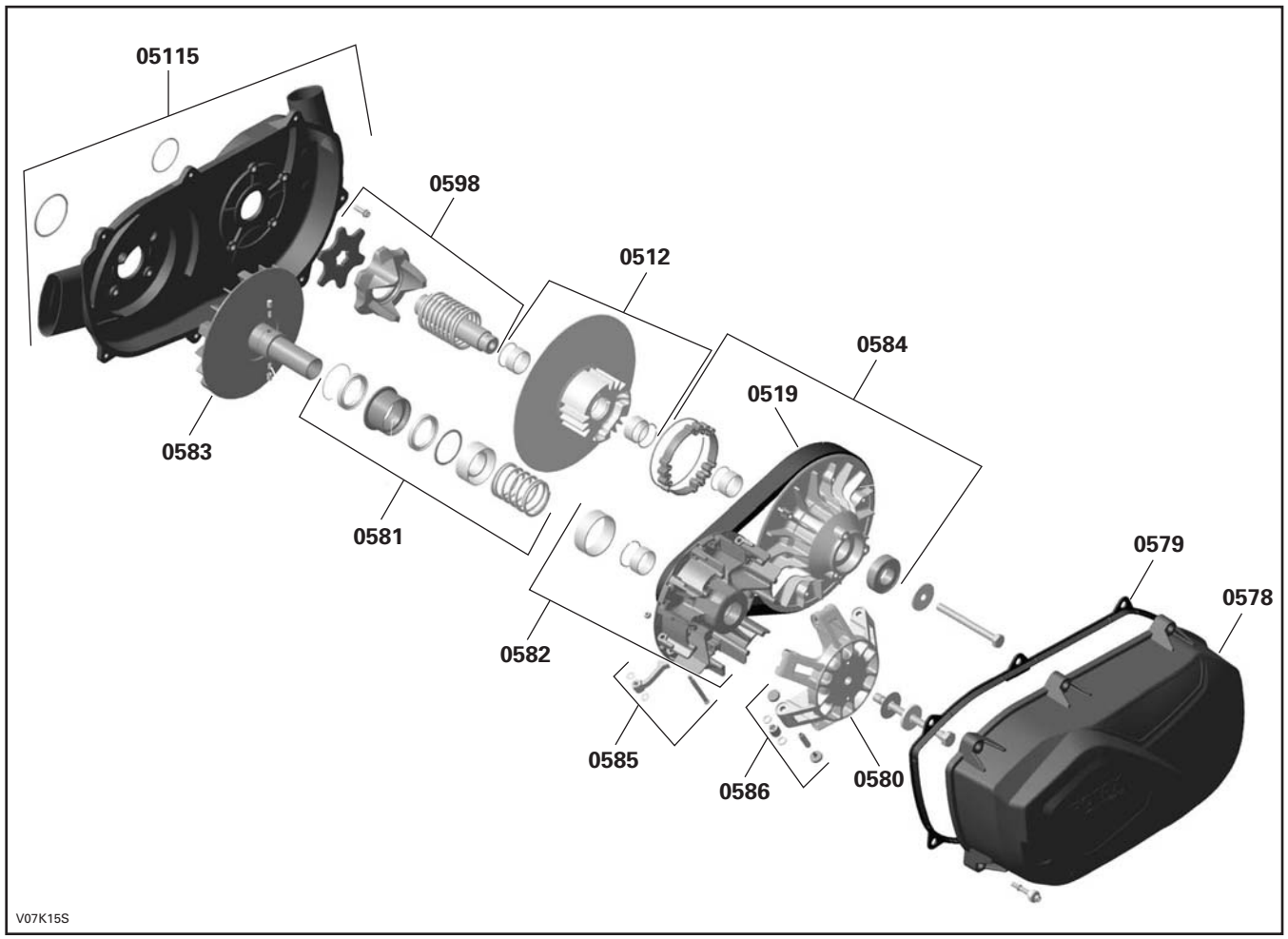
STARTER SYSTEM
SYSTÈME DE DÉMARREUR

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
04	**00**	**NO LABOUR INVOLVED AUCUNE MAIN-D'OEUVRE**	**0**	**0**	**0**	**0**	**0**
04	02	ELECTRIC STARTER (ASS'Y) DÉMARREUR (COMPLET)	1.6	1.6	1.6	1.6	1.6
04	03	STARTER RELAY SOLÉNOÏDE DE DÉMARRAGE	0.3	0.3	0.3	0.3	0.3
04	19	STARTER DRIVE LANCEUR DÉMARREUR	1.9	1.9	1.9	1.9	1.9

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
05	**00**	**NO LABOR INVOLVED AUCUNE MAIN-D'OEUVRE IMPLIQUÉE**	**0**	**0**	**0**	**0**	**0**
05	12	DRIVEN PULLEY SLIDING HALF DEMI-POULIE MENÉE COULISSANTE	0.5	0.6	0.6	0.5	0.5
05	19	BELT COURROIE	0.4	0.5	0.5	0.4	0.4
05	55	LEVER BUTTON BOUTON DE LEVIER	0.3	0.3	0.3	0.3	0.3
05	56	LEVER (ASS'Y) AND/OR LEVER SPRING LEVIER (COMPLET) ET/OU RESSORT DE LEVIER	0.3	0.3	0.3	0.3	0.3
05	59	SPEED SENSOR CAPTEUR DE VITESSE	0.6	0.6	0.6	0.6	0.6
05	77	LEVER LEVIER	0.7	0.7	0.7	0.7	0.7
05	78	CVT COVER COUVERCLE CVC	0.3	0.4	0.4	0.3	0.3
05	79	GASKET JOINT D'ÉTANCHÉITÉ	0.3	0.4	0.4	0.3	0.3
05	80	GOVERNOR CUP COUPOLE RÉGULATEUR	0.6	0.7	0.7	0.6	0.6
05	81	ONE WAY CLUTCH, FLANGE, RING, SPRING EMBRAYAGE À ROUE LIBRE, FLASQUE, ANNEAU, RESSORT	0.6	0.7	0.7	0.6	0.6
05	82	DRIVE PULLEY (ASS'Y) POULIE MOTRICE (COMPLET)	0.7	0.8	0.8	0.7	0.7
05	83	DRIVE PULLEY FIXED HALF POULIE MOTRICE FIXE	0.7	0.8	0.8	0.7	0.7
05	84	DRIVEN PULLEY OUTER CAM AND/OR SPRING CAME DE POULIE MENÉE EXTERNE ET/OU RESSORT	0.5	0.6	0.6	0.5	0.5
05	85	CENTRIFUGAL LEVER LEVIER CENTRIFUGE	0.8	0.9	0.9	0.8	0.8
05	86	SLIDER SHOES GLISSIÈRES	0.7	0.8	0.8	0.7	0.7
05	87	LEVER SPRING LEVIER À RESSORT	0.3	0.3	0.3	0.3	0.3
05	89	REMOVE AND REPLACE TRANSMISSION (ASS'Y) REMPLACEMENT DE LA TRANSMISSION (COMPLET)	5.1	5.1	5.4	4.8	4.8
05	91	MAIN SHAFT (ASS'Y) ARBRE DE RENVOI (COMPLET)	6.7	6.7	7.0	6.7	6.7
05	95	AIR INTAKE (CVT) ENTRÉE D'AIR (CVT)	0.3	0.3	0.4	0.3	0.3
05	96	AIR OUTLET (CVT) SORTIE D'AIR (CVT)	0.3	0.3	0.4	0.3	0.3

TRANSMISSION AND LINKAGE SYSTEM
SYSTÈME DE TRANSMISSION ET DE TRINGLERIE

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
05	97	FLEXIBLE ADAPTOR ADAPTATEUR FLEXIBLE	0.3	0.3	0.3	0.3	0.3
05	98	CAM, PLATE, DRIVEN SHAFT, SPRING CAME, PLAQUE, ARBRE POULIE MENÉE, RESSORT	0.5	0.6	0.6	0.5	0.5
05	99	OUTPUT SHAFT ARBRE DE SORTIE	5.9	5.9	6.2	5.6	5.6
05	100	REAR OUTPUT SHAFT SEALS ANNEAUX ÉTANCHÉITÉ DE L'ARBRE DE SORTIE ARRIÈRE	2.2	2.2	2.2	2.2	2.2
05	101	GEARS KIT/MAIN SHAFT ENSEMBLE D'ENGRENAGES/ARBRE PRINCIPAL	6.0	6.0	6.3	5.7	5.7
05	102	SHIFT SHAFT (ASS'Y) ARBRE D'EMBRAYAGE (COMPLET)	6.0	6.0	6.3	5.7	5.7
05	103	SHIFT DRUM TAMBOUR D'EMBRAYAGE	6.0	6.0	6.3	5.7	5.7
05	104	INDEX LEVER (ASS'Y) LEVIER D'INDEXATION (COMPLET)	6.0	6.0	6.3	5.7	5.7
05	105	MAIN SHAFT SEAL JOINT D'ÉTANCHÉITÉ DE L'ARBRE PRINCIPAL	0.9	0.9	0.9	0.9	0.9
05	106	LH HOUSING GEAR AND/OR BEARINGS AND/OR GEAR LOGEMENT DE TRANSMISSION GAUCHE ET/OU ROULEMENT À BILLE ET/OU ENGRENAGE	6.0	6.0	6.3	5.7	5.7
05	107	SPACER AND/OR O-RING ENTRETOISE ET/OU JOINT TORIQUE	0.9	0.9	0.9	0.9	0.9
05	108	ACTUATOR AND/OR FORK AND/OR SEAL ACTUATEUR ET/OU FOURCHETTE ET/OU JOINT D'ÉTANCHÉITÉ	0.5	0.5	0.5	0.5	0.5
05	109	FORK AND/OR PIN FOURCHETTE ET/OU GOUPILLE	0.7	0.7	0.7	0.7	0.7
05	110	CENTER HOUSING GEAR AND/OR BEARING LOGEMENT DE TRANSMISSION CENTRE ET/OU ROULEMENT	6.0	6.0	6.3	5.7	5.7
05	111	RH HOUSING GEAR AND/OR BEARING LOGEMENT DE TRANSMISSION DROIT ET/OU ROULEMENT	5.9	5.9	6.2	5.6	5.6
05	113	SHIFTING SWITCH INTERRUPTEUR D'EMBRAYAGE	0.3	0.3	0.3	0.3	0.3
05	114	SHIFT SHAFT SEAL JOINT D'ÉTANCHÉITÉ D'ARBRE D'EMBRAYAGE	0.7	0.7	0.7	0.7	0.7
05	115	CVT AIR GUIDE AND/OR O-RINGS GUIDE D'AÉRATION ET/OU JOINT D'ÉTANCHÉITÉ	0.8	0.8	0.8	0.8	0.8
05	120	GEARBOX POSITION SENSOR CAPTEUR DE POSITION D'ENGRENAGE	0.4	0.4	0.4	0.4	0.4
05	166	SHIFT ARM BASE BASE DU BRAS D'EMBRAYAGE	0.5	0.5	0.5	0.5	0.5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TRANSMISSION AND LINKAGE SYSTEM
SYSTÈME DE TRANSMISSION ET DE TRINGLERIE

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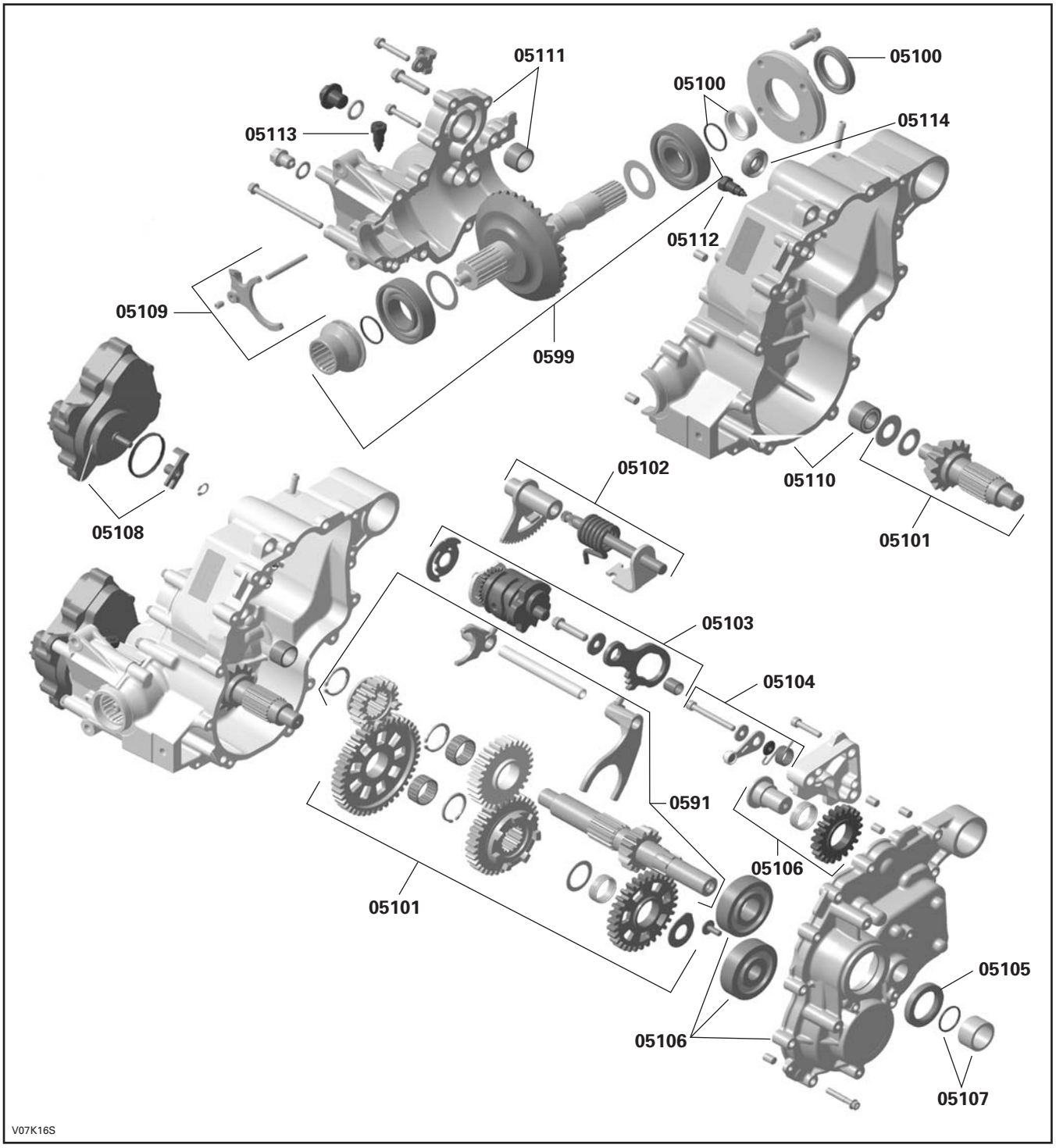

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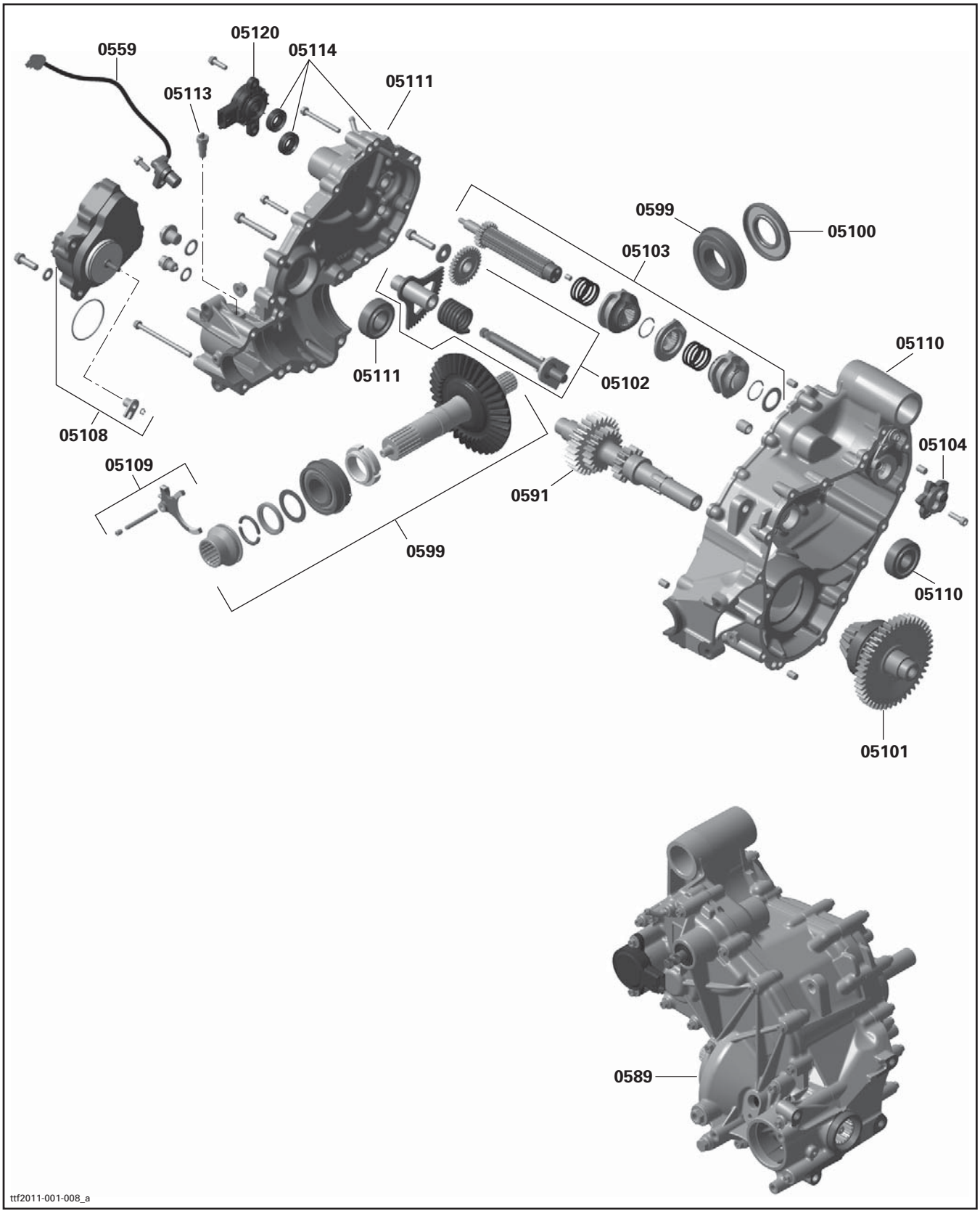
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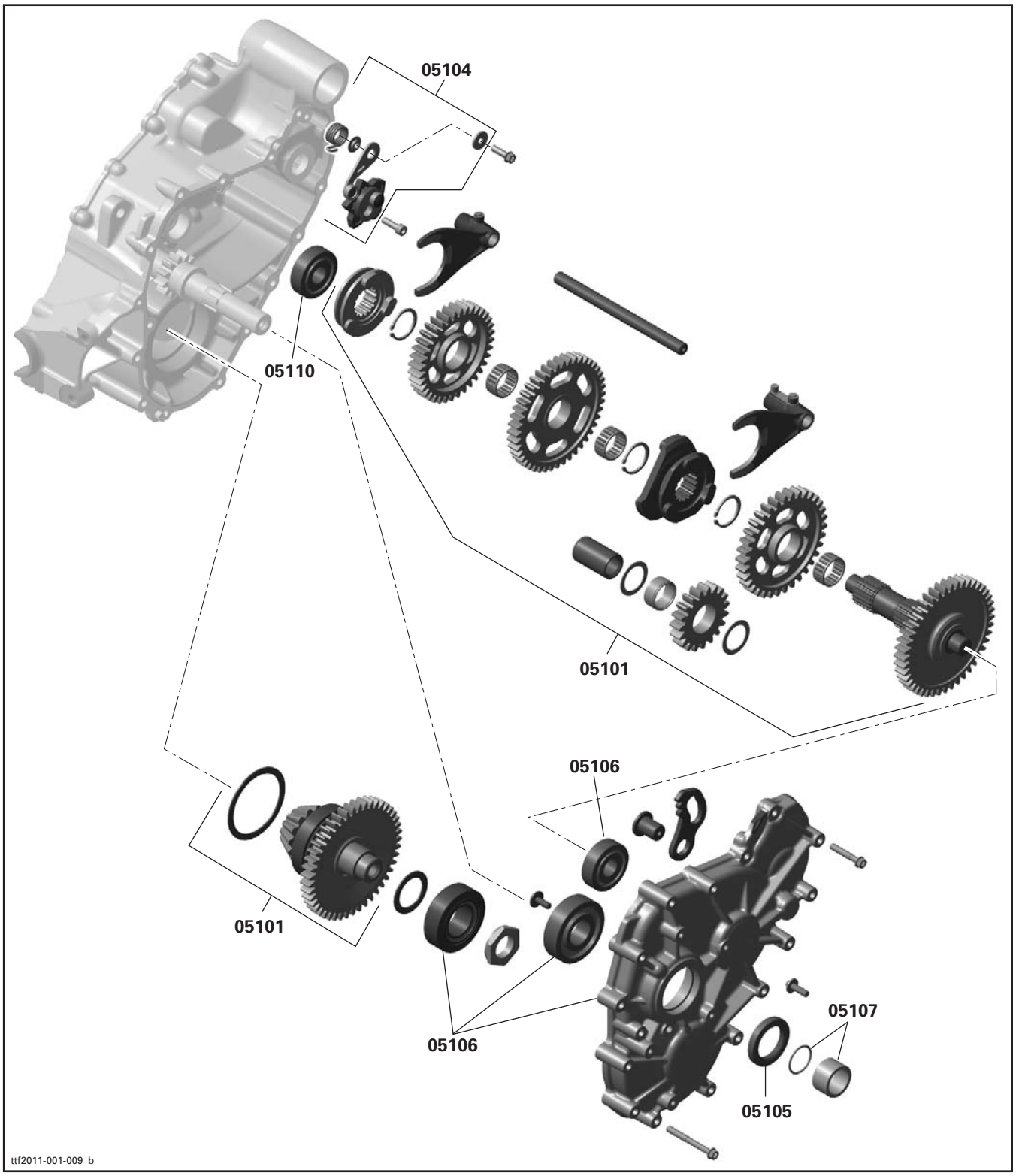
TRANSMISSION AND LINKAGE SYSTEM
SYSTÈME DE TRANSMISSION ET DE TRINGLERIE

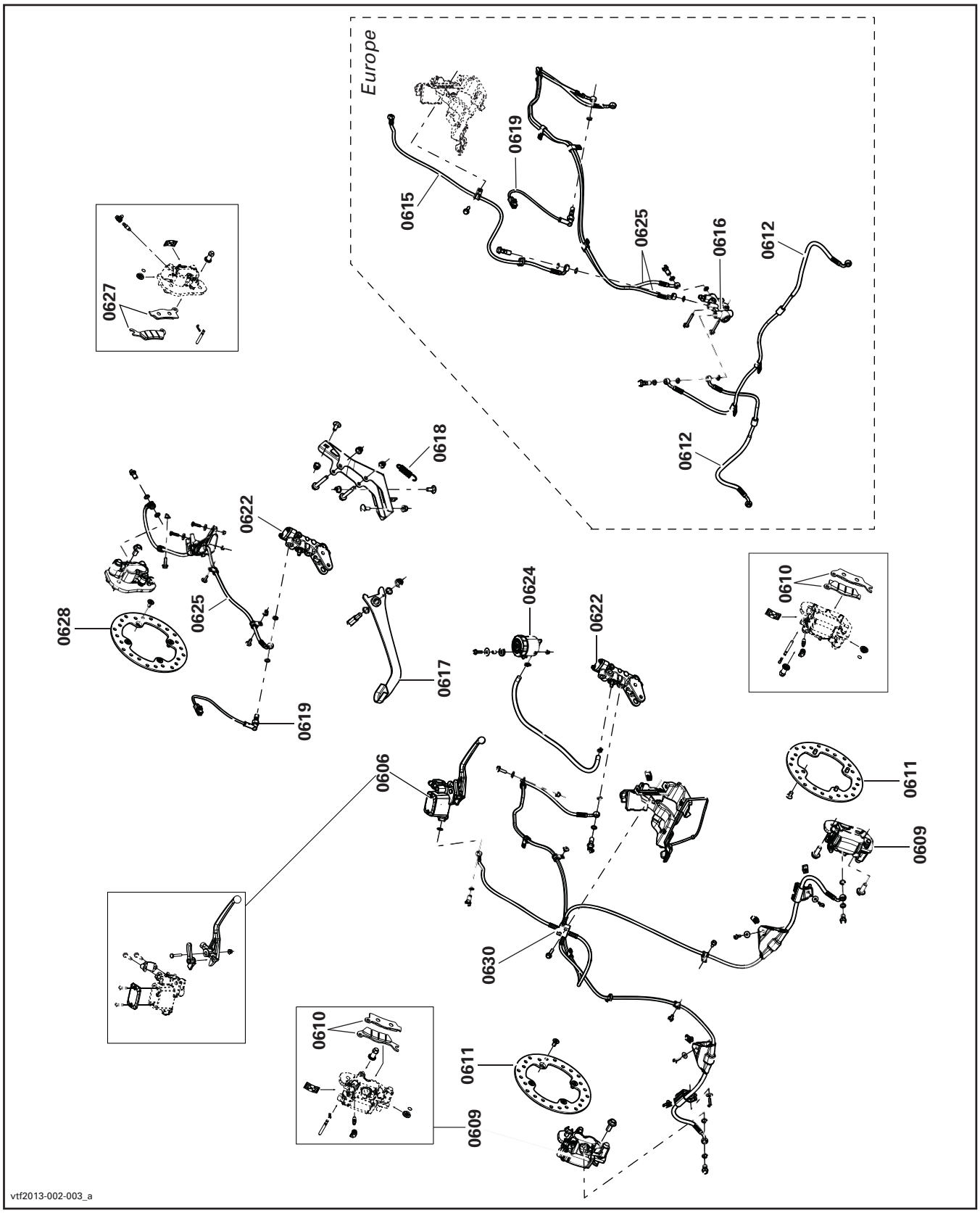
V1000



SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
06	**00**	**NO LABOR INVOLVED AUCUNE MAIN-D'OEUVRE**	**0**	**0**	**0**	**0**	**0**
06	06	MASTER CYLINDRE MAÎTRE-CYLINDRE	0.3	0.3	0.3	0.3	0.3
06	09	FRONT CALIPER (RH OR LH) ÉTRIER AVANT (DROIT OU GAUCHE)	0.4	0.4	0.4	0.4	0.4
06	10	FRONT BRAKE PAD (RH OR LH) PLAQUETTE DE FREIN AVANT (DROIT OU GAUCHE)	0.3	0.3	0.3	0.3	0.3
06	11	FRONT BRAKE DISC (RH OR LH) DISQUE DE FREIN AVANT (DROIT OU GAUCHE)	0.5	0.5	0.5	0.5	0.5
06	12	FRONT FLEXIBLE BRAKE HOSE BOYAU FLEXIBLE DE FREIN AVANT	0.6	0.6	0.6	0.6	0.6
06	15	FRONT BRAKE HANDLE HOSE BOYAU DE FREIN DE LA MANETTE AVANT	0.6	0.6	0.6	0.6	0.6
06	16	FRONT MASTER CYLINDER MAÎTRE-CYLINDRE AVANT	0.8	0.8	0.8	0.8	0.8
06	17	REAR BRAKE PEDAL PÉDALE DE FREIN ARRIÈRE	0.4	0.4	0.4	0.4	0.4
06	18	REAR BRAKE PEDAL SPRING RESSORT DE LA PÉDALE DE FREIN ARRIÈRE	0.3	0.3	0.3	0.3	0.3
06	19	BRAKE SWITCH INTERRUPTEUR DE FREIN	0.5	0.6	0.6	0.5	0.5
06	22	REAR MASTER CYLINDER MAÎTRE-CYLINDRE ARRIÈRE	0.7	0.7	0.7	0.7	0.7
06	23	REAR OIL HOUSING HOSE BOYAU CARTER D'HUILE ARRIÈRE	0.6	0.6	0.6	0.6	0.6
06	24	REAR OIL HOUSING CARTER D'HUILE ARRIÈRE	0.3	0.3	0.3	0.3	0.3
06	25	REAR BRAKE HOSE BOYAU DE FREIN ARRIÈRE	0.6	0.6	0.6	0.6	0.6
06	26	REAR CALIPER ÉTRIER ARRIÈRE	0.4	0.4	0.4	0.4	0.4
06	27	REAR BRAKE PAD PLAQUETTE DE FREIN ARRIÈRE	0.3	0.3	0.3	0.3	0.3
06	28	REAR BRAKE DISC AND/OR HUB DISQUE DE FREIN ARRIÈRE ET/OU MOYEU	0.5	0.5	0.5	0.5	0.5
06	30	BRAKE LINE BOYAU DE FREIN	3.5	3.5	3.8	3.5	3.5

BRAKE SYSTEM
SYSTÈME DE FREIN

Europe



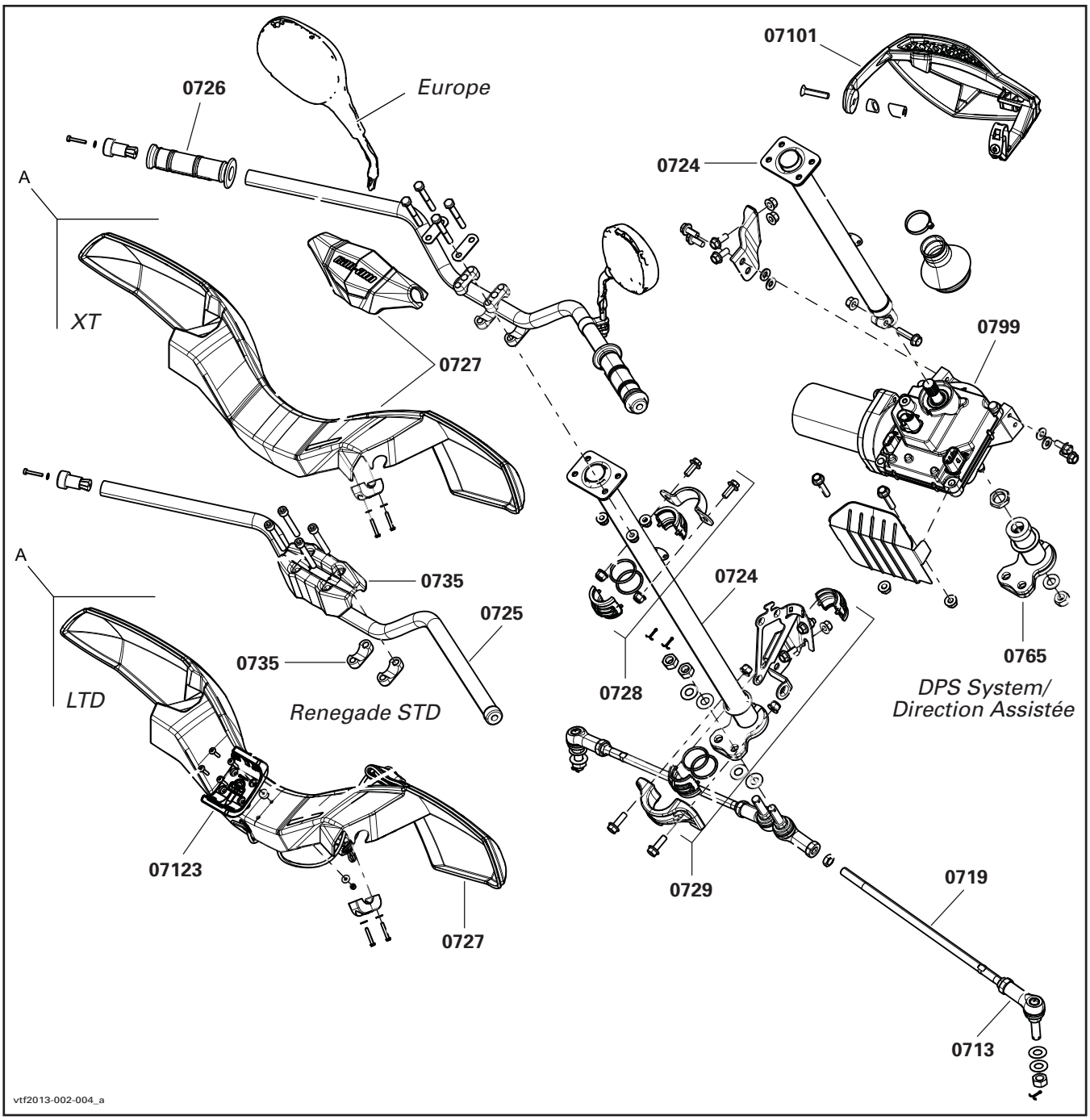
SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
07	**00**	**NO LABOR INVOLVED AUCUNE MAIN-D'OEUVRE**	**0**	**0**	**0**	**0**	**0**
07	04	ARM PROTECTOR (RH OR LH) PROTECTEUR DE BRAS (DROIT OU GAUCHE)	0.3	0.3	0.3	0.3	0.3
07	05	STEERING CLAMP AND/OR STEERING COVER SUPPORT BRIDE DE DIRECTION ET/OU SUPPORT DU COUVRE-GUIDON	0.4	0.4	0.4	0.4	0.4
07	12	INTERNAL BALL JOINT (RH OR LH) JOINT À ROTULE INTERNE (DROIT AU GAUCHE)	0.9	0.9	0.9	0.9	0.9
07	13	EXTERNAL BALL JOINT (RH OR LH) JOINT À ROTULE EXTERNE (DROIT OU GAUCHE)	0.8	0.8	0.8	0.8	0.8
07	19	TIE ROD (RH OR LH) BARRE D'ACCOUPLEMENT (DROIT OU GAUCHE)	0.9	0.9	0.9	0.9	0.9
07	24	MAIN TUBE TUBE PRINCIPAL	2.6	2.6	3.0	2.6	2.6
07	25	HANDLEBAR GUIDON	1.1	1.1	1.1	1.1	1.1
07	26	HANDLEBAR GRIP KIT (RH AND/OR LH) ENSEMBLE DE GAINE DE GUIDON (DROIT ET/OU GAUCHE)	0.3	0.3	0.3	0.3	0.3
07	27	STEERING COVER COUVRE-GUIDON	0.3	0.3	0.3	0.3	0.3
07	28	HALF HOUSING AND HOUSING BUSHING DEMI-LOGEMENT ET DOUILLE DE LOGEMENT	2.1	2.1	2.4	2.1	2.1
07	29	LOWER STEERING MAIN TUBE BUSHING DOUILLE INFÉRIEURE DE LA COLONNE DE DIRECTION	1.0	1.0	1.0	1.0	1.0
07	32	LOWER ARM AND/OR BALL JOINT (RH OR LH) BRAS INFÉRIEUR ET/OU JOINT À ROTULE (DROIT OU GAUCHE)	0.7	0.7	0.7	0.7	0.7
07	33	UPPER ARM (RH OR LH) BRAS DE SUSPENSION SUPÉRIEUR (DROIT OU GAUCHE)	0.8	0.8	0.8	0.8	0.8
07	35	HANDLE STEERING SUPPORT (ALL) SUPPORT DE GUIDON (TOUS)	0.3	0.3	0.3	0.3	0.3
07	37	FRONT SHOCK AND/OR SPRING AND/OR STOPPER AND/OR PROTECTOR AND/OR SEAT (RH OR LH) AMORTISSEUR AVANT ET/OU RESSORT ET/OU BUTÉE ET/OU SIÈGE ET/OU PROTECTEUR (DROIT OU GAUCHE)	0.7	0.7	0.7	0.7	0.7
07	40	FRONT DIFFERENTIEL (ASS'Y) DIFFÉRENTIEL AVANT (COMPLET)	2.4	2.4	2.4	2.4	2.4
07	42	FRONT PROPELLER SHAFT (ASS'Y) ARBRE DE PROPULSION AVANT (COMPLET)	1.3	1.3	1.3	1.3	1.3
07	45	CV JOINT (RH OR LH) JOINT HOMOCINÉTIQUE (DROIT OU GAUCHE)	0.8	0.8	0.8	0.8	0.8
07	46	FRONT WHEEL HUB (SEAL AND/OR BEARING) (RH OR LH) MOYEU DE ROUE AVANT (JOINT ET/OU ROULEMENT) (DROIT OU GAUCHE)	0.5	0.5	0.5	0.5	0.5
07	47	KNUCKLE (RH OR LH) PORTE-FUSÉE (DROIT OU GAUCHE)	0.8	0.8	0.8	0.8	0.8

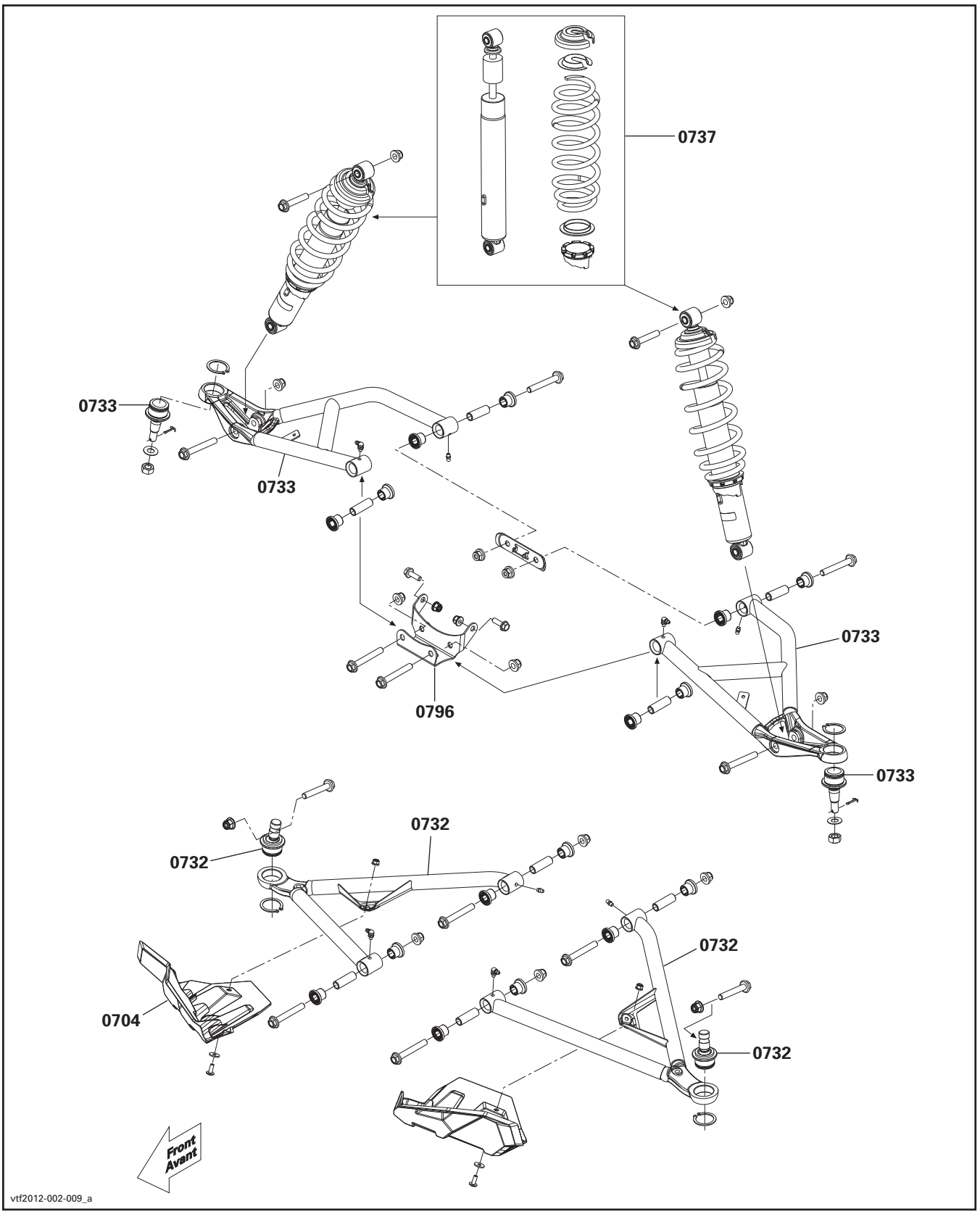
STEERING - FRONT DRIVE SYSTEM AND SUSPENSION
DIRECTION - SYSTÈME D'ENTRAÎNEMENT AVANT ET SUSPENSION

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
07	50	FRONT RIM AND/OR TIRE JANTE AVANT ET/OU PNEU	0.4	0.4	0.4	0.4	0.4
07	56	THROTTLE HANDLE MANETTE D'ACCÉLÉRATEUR	0.3	0.3	0.3	0.3	0.3
07	65	PITMAN ARM LEVIER DE DIRECTION	2.6	2.6	2.6	2.6	2.6
07	72	INTERNAL BUSHING AND/OR CUSHION (LOWER AND/OR UPPER ARM) (RH OR LH) DOUILLE INTERNE ET/OU COUSSIN (BRAS INFÉRIEUR ET/OU SUPÉRIEUR) (DROIT OU GAUCHE)	0.4	0.4	0.4	0.4	0.4
07	73	BALL JOINTS REPLACEMENT (2) REMPLACEMENT DES JOINTS A ROTULE (2)	1.0	1.0	1.0	1.0	1.0
07	80	FRONT RIM JANTE AVANT	0.4	0.4	0.4	0.4	0.4
07	82	RADIAL BALL BEARINGS ROULEMENTS À BILLE RADIALES	0.8	0.8	0.8	0.8	0.8
07	85	RING GEAR AND/OR CARRIER AND/OR SHIM COURONNE DE LANCEMENT ET/OU SUPPORT ET/OU CALE	3.0	3.0	3.0	3.0	3.0
07	88	RING GEAR DRIVE GEAR AND/OR BEARING AND/OR SHIM PIGNON DE COMMANDE DE LA COURONNE ET/OU ROULEMENT À BILLE ET/OU CALE	2.7	2.7	2.7	2.7	2.7
07	89	COVER AND/OR PINION COVER AND/OR SEAL AND/OR BEARING COUVERCLE ET/OU COUVERCLE DE PIGNON ET/OU JOINT D'ÉTANCHÉITÉ ET/OU ROULEMENT À BILLE	3.0	3.0	3.0	3.0	3.0
07	90	BOOT WHEEL KIT AND/OR CV JOINT (RH OR LH) ENSEMBLE DE SOUFFLET DE ROUE ET/OU JOINT CV (DROIT OU GAUCHE)	0.8	0.8	0.8	0.8	0.8
07	91	BOOT DIFFERENTIAL KIT AND/OR PLUNGING JOINT (RH OR LH) ENSEMBLE DE SOUFFLET DE DIFFÉRENCIEL ET/OU JOINT PLONGEANT (DROIT OU GAUCHE)	0.8	0.8	0.8	0.8	0.8
07	92	SLEEVE AND/OR WEARRING MANCHON ET/OU BAGUE D'USURE	1.3	1.3	1.3	1.3	1.3
07	94	UNIT PACK KIT ENSEMBLE JOINT CARDAN	2.3	2.3	2.3	2.3	2.3
07	96	UPPER ARM BRACKET ATTACHE BRAS SUPÉRIEUR	2.2	2.2	2.2	2.2	2.2
07	99	POWER STEERING SERVODIRECTION	1.9	1.9	1.9	1.9	1.9
07	101	DEFLECTOR (LH OR RH) DÉFLECTEUR (GA OU DR)	0.3	0.3	0.3	0.3	0.3
07	103	DIFFERENTIAL SEAL (1) JOINT D'ÉTANCHÉITÉ DU DIFFÉRENTIEL (1)	0.8	0.8	0.8	0.8	0.8
07	104	DIFFERENTIAL SEALS (2) JOINTS D'ÉTANCHÉITÉ DU DIFFÉRENTIEL (2)	1.5	1.5	1.5	1.5	1.5
07	119	DIFFERENTIAL BELLOW SOUFFLET DU DIFFÉRENTIEL	0.3	0.3	0.3	0.3	0.3

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
07	120	DIFFERENTIAL OIL SEAL ANNEAU D'ÉTANCHÉITÉ DU DIFFÉRENTIEL	2.6	2.6	2.6	2.6	2.6
07	123	GPS SUPPORT SUPPORT DU GPS	0.3	0.3			

STEERING - FRONT DRIVE SYSTEM AND SUSPENSION
DIRECTION - SYSTÈME D'ENTRAÎNEMENT AVANT ET SUSPENSION

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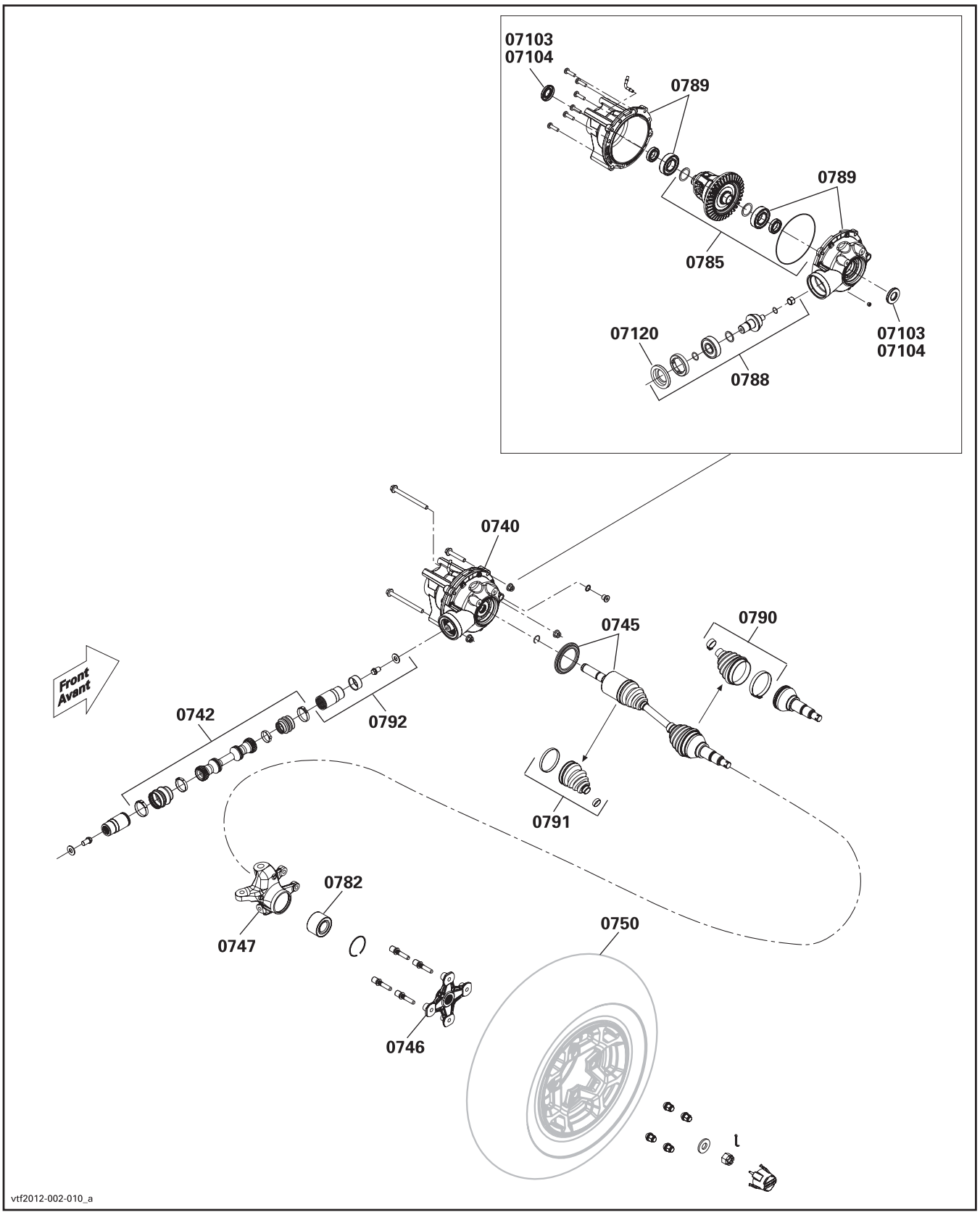
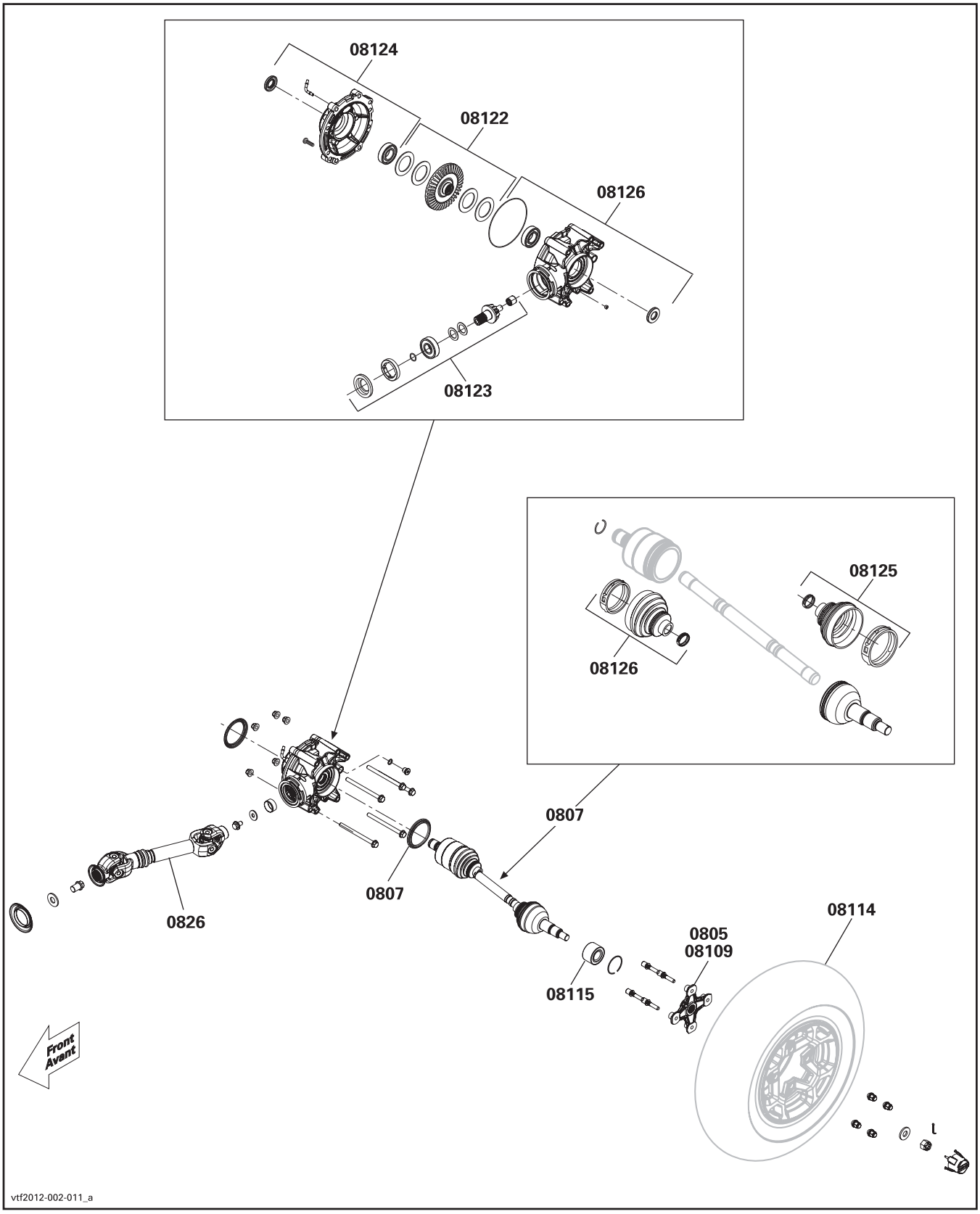
STEERING - FRONT DRIVE SYSTEM AND SUSPENSION
DIRECTION - SYSTÈME D'ENTRAÎNEMENT AVANT ET SUSPENSION



SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
08	00	**NO LABOR INVOLVED AUCUNE MAIN D'OEUVRE**	0	0	0	0	0
08	05	REAR WHEEL HUB (RH) MOYEU DE ROUE ARRIÈRE (DROIT)	0.5	0.5	0.5	0.5	0.5
08	07	REAR DIFFERENTIAL (ASS'Y) DIFFÉRENTIEL ARRIÈRE (COMPLET)	1.8	1.8	1.8	1.8	1.8
08	26	REAR PROPELLER SHAFT (ASS'Y) ARBRE DE PROPULSION ARRIÈRE (COMPLET)	1.5	1.5	1.5	1.5	1.5
08	62	SWING ARM BRAS OSCILLANT	1.2	1.2	1.2	1.2	1.2
08	101	LH PROTECTOR PROTECTEUR GAUCHE	0.3	0.3	0.3	0.3	0.3
08	102	RH PROTECTOR PROTECTEUR DROIT	0.3	0.3	0.3	0.3	0.3
08	109	REAR WHEEL HUB (LH) MOYEU DE ROUE ARRIÈRE (GAUCHE)	0.3	0.3	0.3	0.5	0.5
08	111	REAR SHOCK (RH OR LH) AMORTISSEUR ARRIÈRE (DROIT OU GAUCHE)	0.4	0.4	0.4	0.4	0.4
08	114	REAR RIM AND/OR TIRE JANTE ARRIÈRE ET/OU PNEU	0.4	0.4	0.4	0.4	0.4
08	115	BALL BEARING ROULEMENT À BILLE	0.5	0.5	0.5	0.5	0.5
08	120	CV JOINT (RH OR LH) JOINT HOMOCINÉTIQUE (DROIT OU GAUCHE)	0.8	0.8	0.8	0.8	0.8
08	121	STABILIZER BAR BARRE STABILISATRICE	2.3	2.3	2.3	2.3	2.3
08	122	RING GEAR AND/OR SHIM COURONNE DE LANCEMENT ET/OU CALE	3.1	3.1	3.1	3.1	3.1
08	123	RING GEAR DRIVE GEAR AND/OR BEARING AND/OR SHIM PIGNON DE COMMANDE DE LA COURONNE ET/OU ROULEMENT À BILLE ET/OU CALE	3.1	3.1	3.1	3.1	3.1
08	124	COVER AND/OR PINION COVER AND/OR SEAL AND/OR BEARING COUVERCLE ET/OU COUVERCLE DE PIGNON ET/OU JOINT D'ÉTANCHÉITÉ ET/OU ROULEMENT À BILLE	3.3	3.3	3.3	3.3	3.3
08	125	BOOT WHEEL KIT AND/OR CV JOINT (RH OR LH) ENSEMBLE DE SOUFFLET DE ROUE ET/OU JOINT CV (DROIT OU GAUCHE)	0.9	0.9	0.9	0.9	0.9
08	126	BOOT DIFFERENTIAL KIT AND/OR PLUNGING JOINT (RH OR LH) ENSEMBLE DE SOUFFLET DE DIFFÉRENTIEL ET/OU JOINT PLONGENT (DROIT OU GAUCHE)	0.9	0.9	0.9	0.9	0.9
08	127	RADIAL BALL BEARINGS ROULEMENTS À BILLE RADIALES	1.0	1.0	1.0	1.0	1.0

REAR DRIVE SYSTEM AND SUSPENSION
SYSTÈME D'ENTRAÎNEMENT ARRIÈRE ET SUSPENSION

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
08	128	UNIT PACK KIT ENSEMBLE DE JOINT CARDAN	1.7	1.7	1.7	1.7	1.7
08	129	UNIT PACK KIT (2) ENSEMBLE DE JOINT CARDAN (2)	1.8	1.8	1.8	1.8	1.8
08	134	DIFFERENTIAL SEAL (1) JOINT D'ÉTANCHÉITÉ DU DIFFÉRENTIEL (1)	0.9	0.9	0.9	0.9	0.9
08	135	DIFFERENTIAL SEALS (2) JOINTS D'ÉTANCHÉITÉ DU DIFFÉRENTIEL (2)	1.8	1.8	1.8	1.8	1.8
08	148	DIFFERENTIAL OIL SEAL ANNEAU D'ÉTANCHÉITÉ DU DIFFÉRENTIEL	1.9	1.9	1.9	1.9	1.9
08	149	AXIAL PIVOT AXE DE PIVOT	0.5	0.5	0.5	0.5	0.5
08	173	SWAY BAR LINK ARM BRAS DE LIAISON DE LA BARRE STABILISATRICE	0.3	0.3	0.3	0.3	0.3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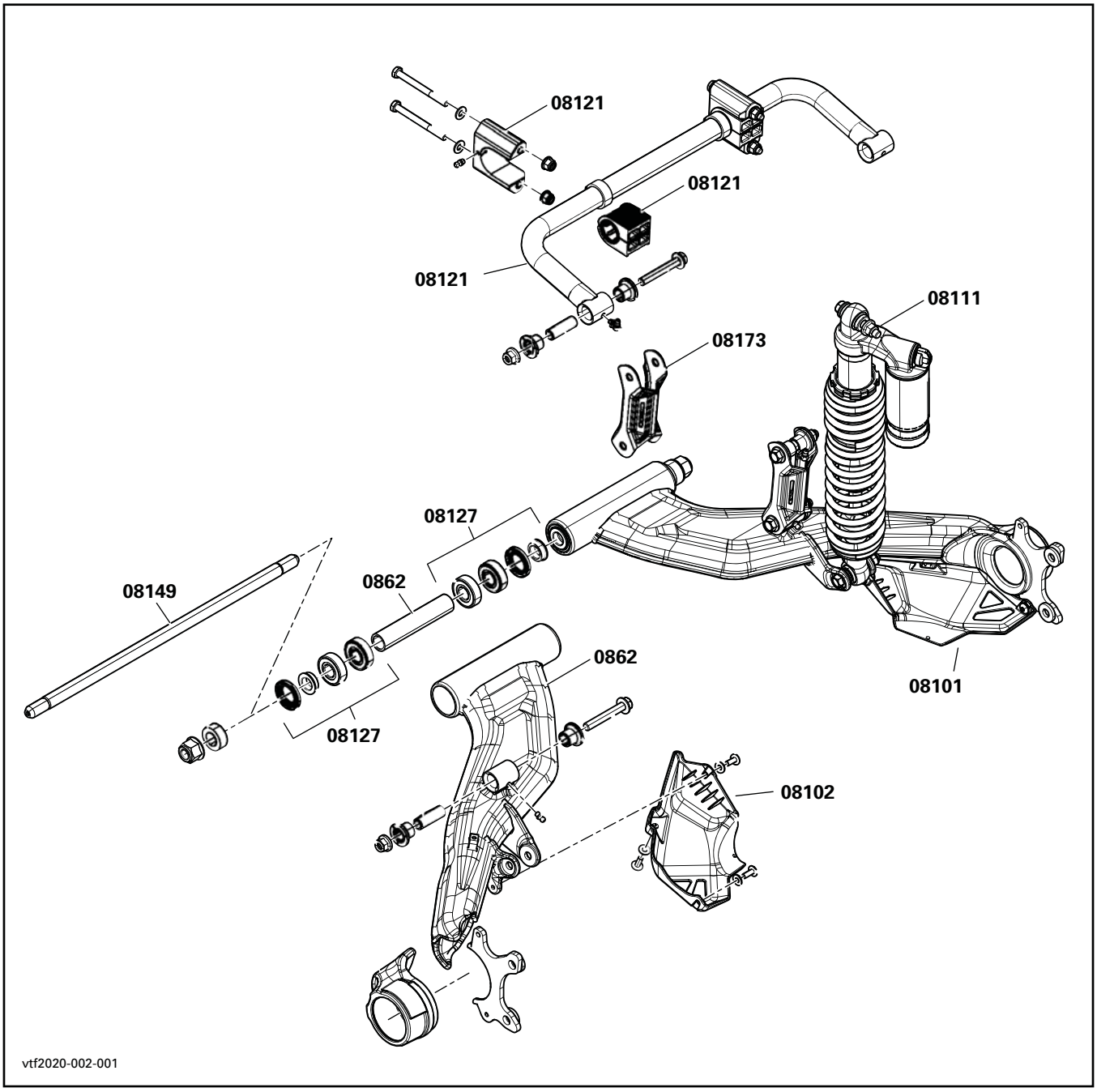
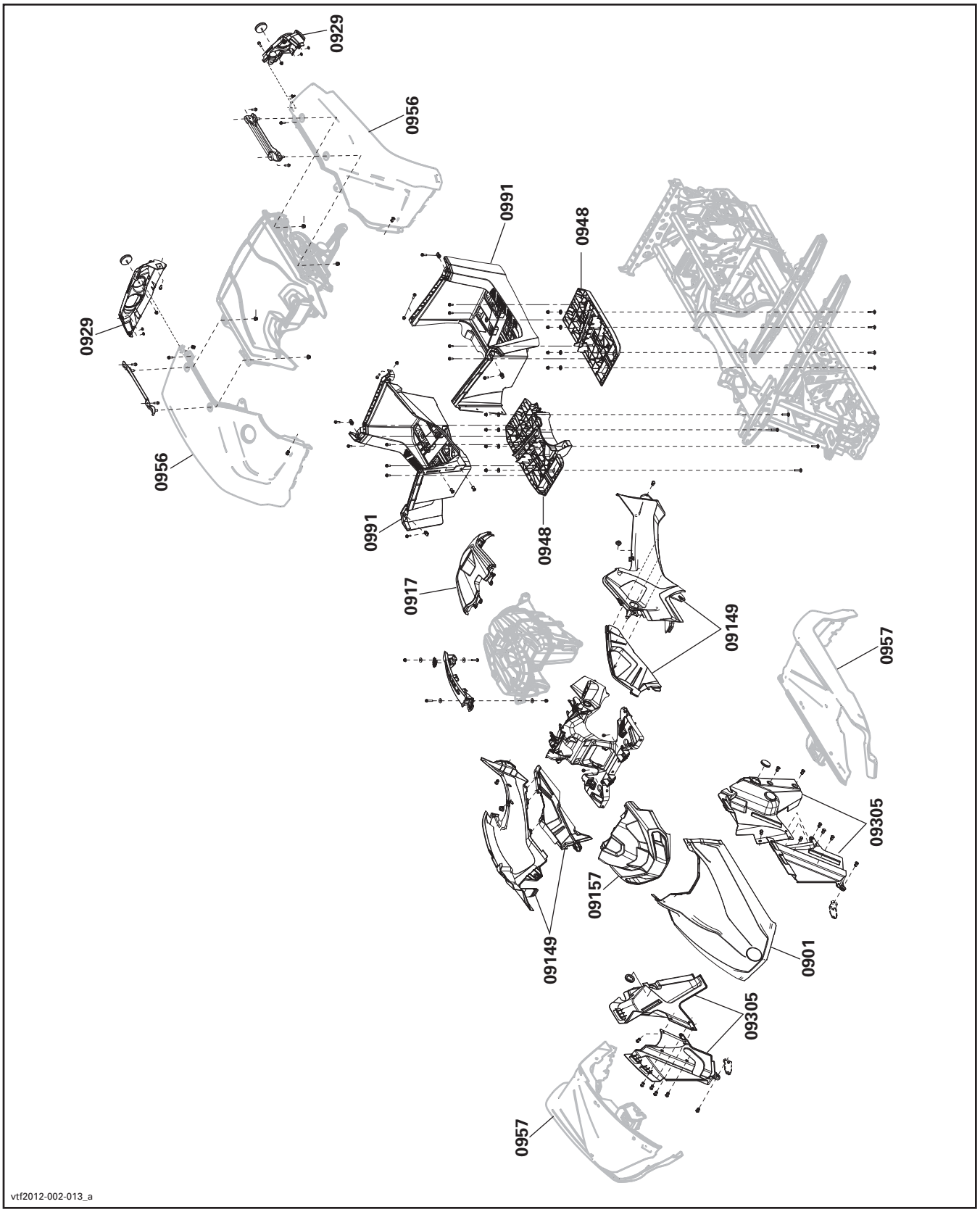
REAR DRIVE SYSTEM AND SUSPENSION
SYSTÈME D'ENTRAÎNEMENT ARRIÈRE ET SUSPENSION



SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
09	**00**	**NO LABOR INVOLVED AUCUNE MAIN D'OEUVRE IMPLIQUÉE**	**0**	**0**	**0**	**0**	**0**
09	01	HOOD CAPOT	0.3	0.3	0.3		
09	09	WINDSHIELD PARE-BRISE	0.3	0.3			
09	13	LUGGAGE RACK KIT (FRONT OR REAR) ENSEMBLE DE PORTE-BAGAGES (AVANT OU ARRIÈRE)	0.5	0.5	0.5		
09	17	CONSOLE CONSOLE	0.3	0.3	0.3	0.3	0.3
09	21	SEAT SIÈGE	0.3	0.3	0.3	0.3	0.3
09	22	SEAT COVER HOUSSE DE SIÈGE	1.0	1.0	1.0	1.0	1.0
09	26	FRONT BUMPER PARE-CHOCS AVANT	0.9	0.9	0.9	0.7	0.7
09	27	WINCH LATCH ATTACHE DE TREUIL	0.3	0.3	0.3	0.3	0.3
09	28	FRONT FASCIA FASCIA AVANT	0.9	0.9	0.9	0.7	0.7
09	29	REAR FASCIA FASCIA ARRIÈRE	0.3	0.3	0.3	0.3	0.3
09	34	REAR BUMPER PARE-CHOCS ARRIÈRE	0.3	0.3	0.3	0.4	0.4
09	39	FRONT OR REAR MUDGUARD KIT (RH OR LH) GARDE DE BOUE AVANT/ARRIÈRE (DROIT OU GAUCHE)	0.3	0.3	0.3		
09	45	REAR HANDLE (RH OR LH) POIGNÉE ARRIÈRE (GAUCHE OU DROITE)		0.3			
09	48	FOOTREST (RH OR LH) MARCHEPIED (DROIT OU GAUCHE)	0.4	0.5	0.5	0.4	0.4
09 *	49	FRAME CHÂSSIS	13.0	14.0	14.0	12.5	13.0
09	52	SIDE BRACKET (RH OR LH) SUPPORT LATÉRAL (DROIT OU GAUCHE)	0.6	0.6	0.6		
09	56	REAR FENDER AILE ARRIÈRE	0.9	0.9	0.9	0.8	0.8
09	57	FRONT FENDER AND/OR SUPPORT (RH OR LH) AILE AVANT ET/OU SUPPORT (DROIT OU GAUCHE)	1.0	1.0	1.0	1.5	1.5
09	74	FOOTREST SUPPORT (RH OR LH) SUPPORT DE REPOSE PIED (DROIT OU GAUCHE)	0.4	0.5	0.5	0.4	0.4
09	84	AIR INTAKE DEFLECTOR DÉFLECTEUR ADMISSION AIR			0.3		

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
09	85	STORAGE SUPPORT SUPPORT DU COFFRE	0.7	0.7	0.7		
09	91	FOOTWELL (RH OR LH) REPOSE-PIED (DROIT OU GAUCHE)	0.3	0.4	0.4	0.3	0.3
09	93	PROTECTION PLATE PLAQUE DE PROTECTION	0.5	0.5	0.5		
09	95	EACH DECAL (1) CHAQUE AUTOCOLLANT (1)	0.3	0.3	0.3	0.3	0.3
09	108	REAR SEAT ASS'Y SIÈGE ARRIÈRE ASS.		0.4			
09	120	FRONT LIGHT FASCIA FASCIA DE LUMIÈRE AVANT				0.4	0.4
09	138	HAND PROTECTOR PROTÈGE MAIN	0.3	0.3	0.3	0.3	0.3
09	149	ENGINE SIDE PANELS (2) PANNEAUX MOTEUR (2)	0.3	0.3	0.3	0.3	0.3
09	157	UPPER CONSOLE CONSOLE SUPÉRIEURE	0.3	0.3	0.3	0.3	0.3
09	158	FRONT FENDER SUPPORT SUPPORT D'AILE AVANT	1.0	1.0	1.0	1.6	1.6
09	161	REAR BUMPER (XT) PARE-CHOC ARRIÈRE (XT)	0.3	0.3	0.3		
09	162	FRONT BUMPER (XT) PARE-CHOC AVANT (XT)	0.3	0.3	0.3		0.3
09	198	BACKREST PARTS PIÈCES DU DOSSIER		0.4			
09	199	REAR SEAT BASE A/O ALL PARTS BASE SIÈGE ARRIÈRE ET/OU TOUTES LES PIÈCES		1.0			
09	200	REAR FENDER SUPPORT SUPPORT D'AILE ARRIÈRE	1.9	1.9	1.9	1.5	1.5
09	203	REAR SEAT COVER HOUSSE DE SIÈGE ARRIÈRE		1.0			
09	210	FRONT FASCIA (RH OR LH) FASCIA AVANT (DROIT OU GAUCHE)				0.4	0.4
09	244	CONSOLE SUPPORT SUPPORT DE CONSOLE	0.5	0.5	0.8	0.5	0.5
09	249	WINDSHILED SUPPORT SUPPORT DE PARE-BRISE	0.3	0.3			
09	283	REAR BOX COFFRE ARRIÈRE	1.1	1.1	1.1		
09	284	BOX DOOR PORTE DE COFFRE	0.3	0.3	0.3		

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
09	304	REAR SUPPORT SUPPORT ARRIÈRE	1.9	1.9	1.9		
09	305	INNER FENDER (RH OR LH) FAUSSE AILE (DROIT OU GAUCHE)	0.3	0.3	0.3	0.3	0.3
09	316	HITCH ATTACHE	0.3	0.3	0.3		
09	336	CENTRAL SKID PLAT PLAQUE DE PROTECTION CENTRALE	0.4	0.4	0.4	0.4	0.4
09	367	LOCK VERROU	0.3	0.3	0.3		
09	389	REAR STORAGE COVER COUVERCLE DU COFFRE ARRIÈRE	0.7	0.7	0.7		
09	390	FOOTREST (RIGHT OR LEFT) APPUI-PIEDS (DROIT OU GAUCHE)			0.3		
09	398	BUMPER (RH OR LH) PARE-CHOC (DROIT OU GAUCHE)			0.4		
09	478	UPPER INLET ENTRÉE D'AIR SUPÉRIEUR					0.4
09	479	UPPER OULET SORTIE D'AIR SUPÉRIEUR					0.4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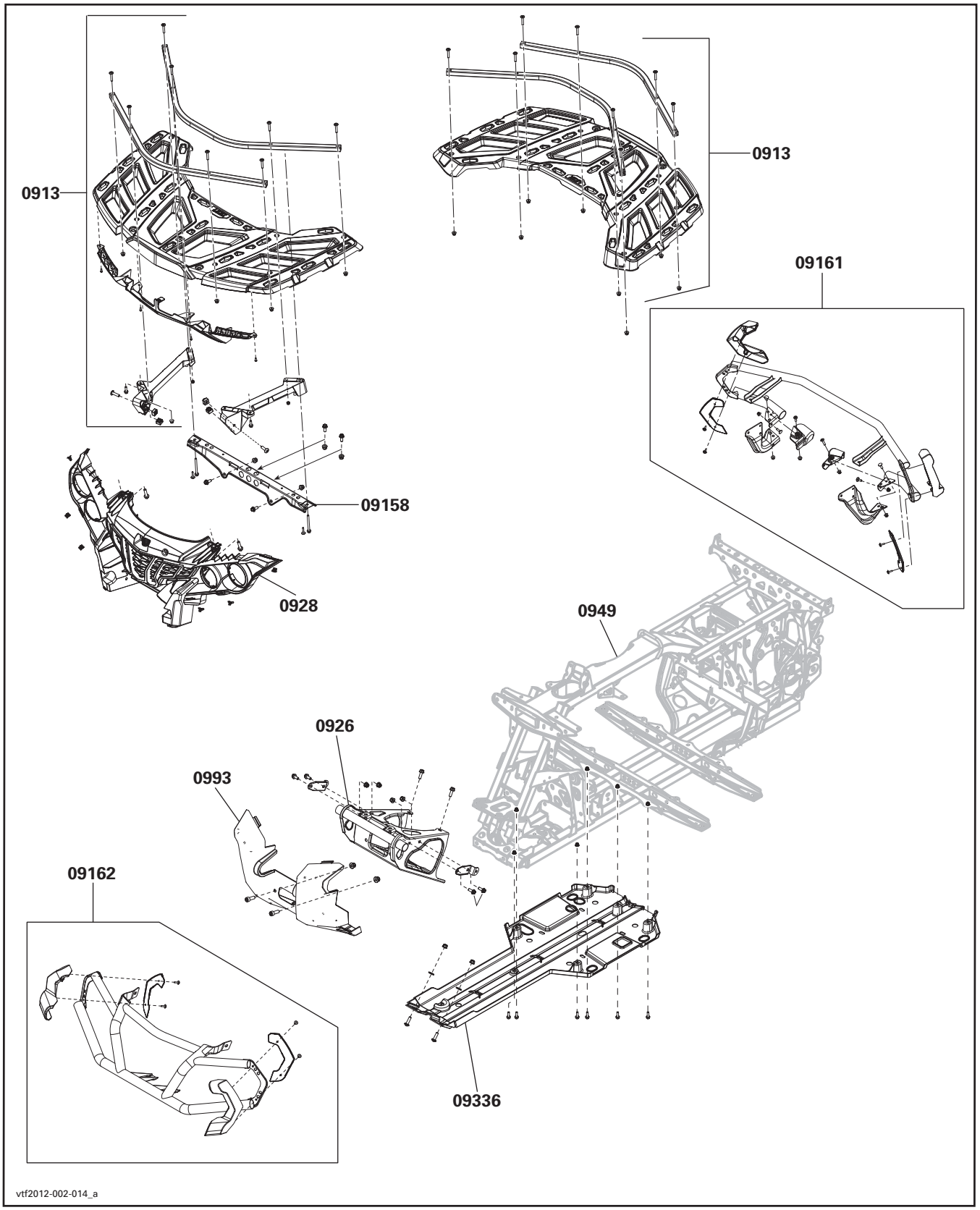
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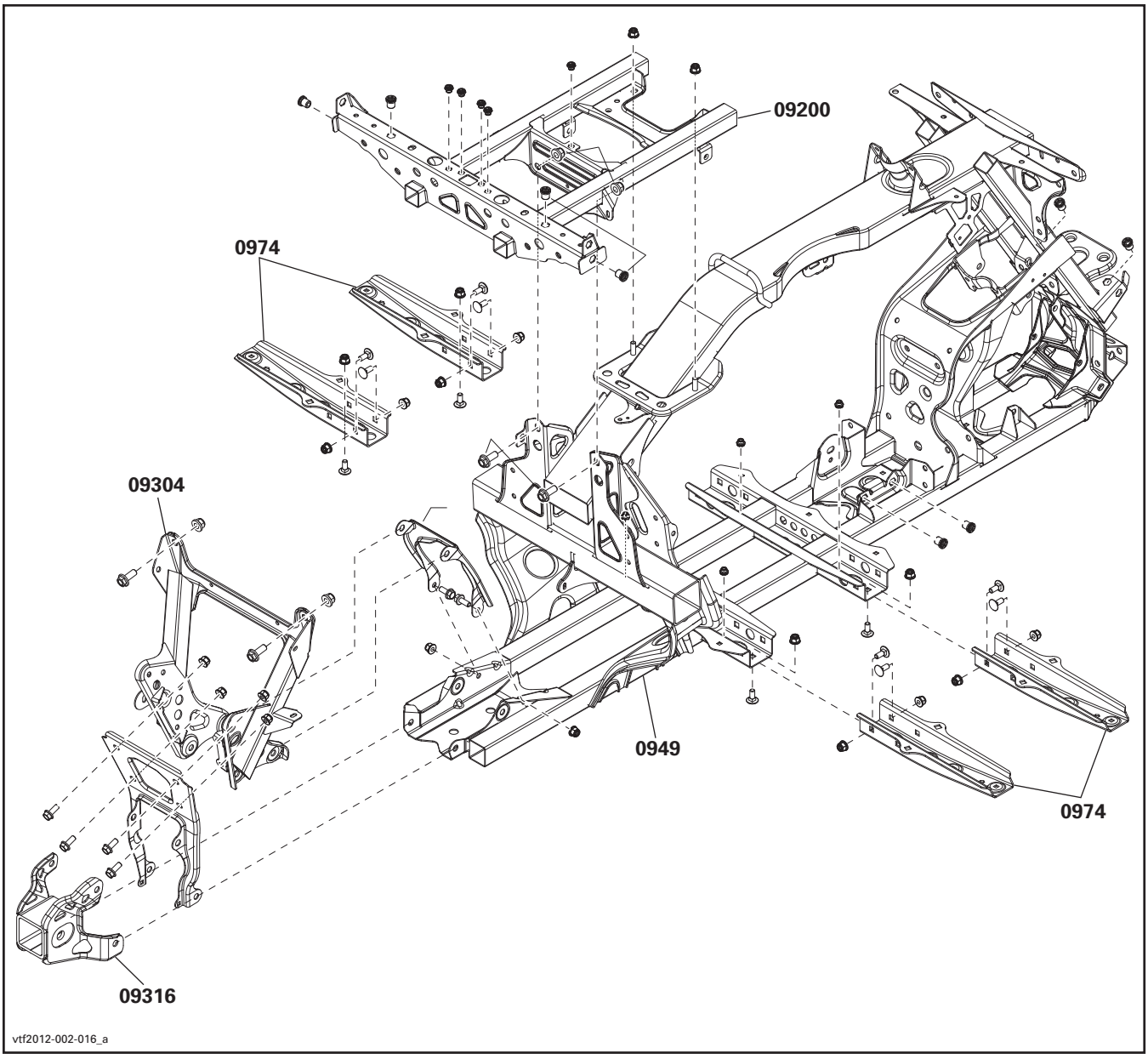
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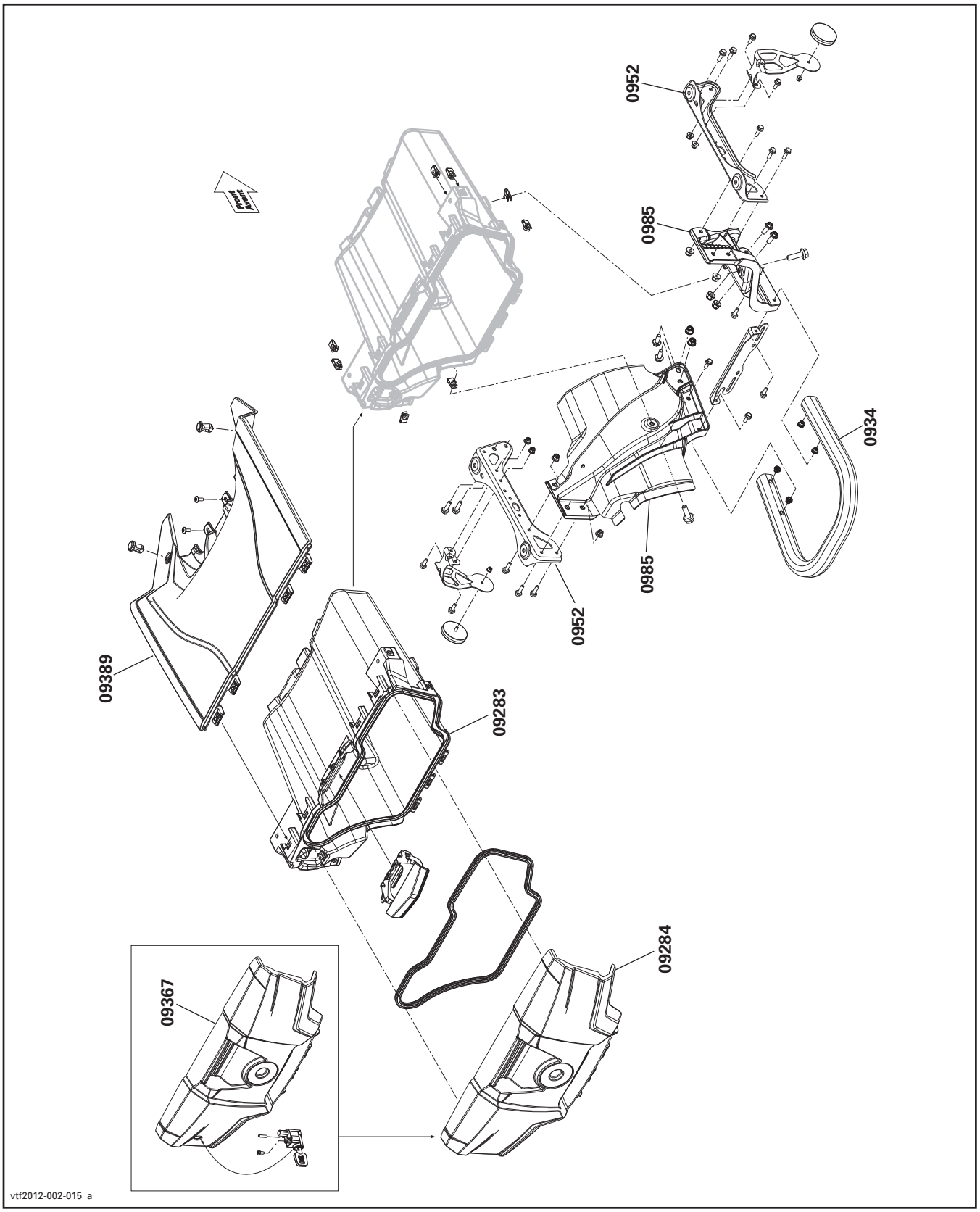
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BODY AND ACCESSORIES
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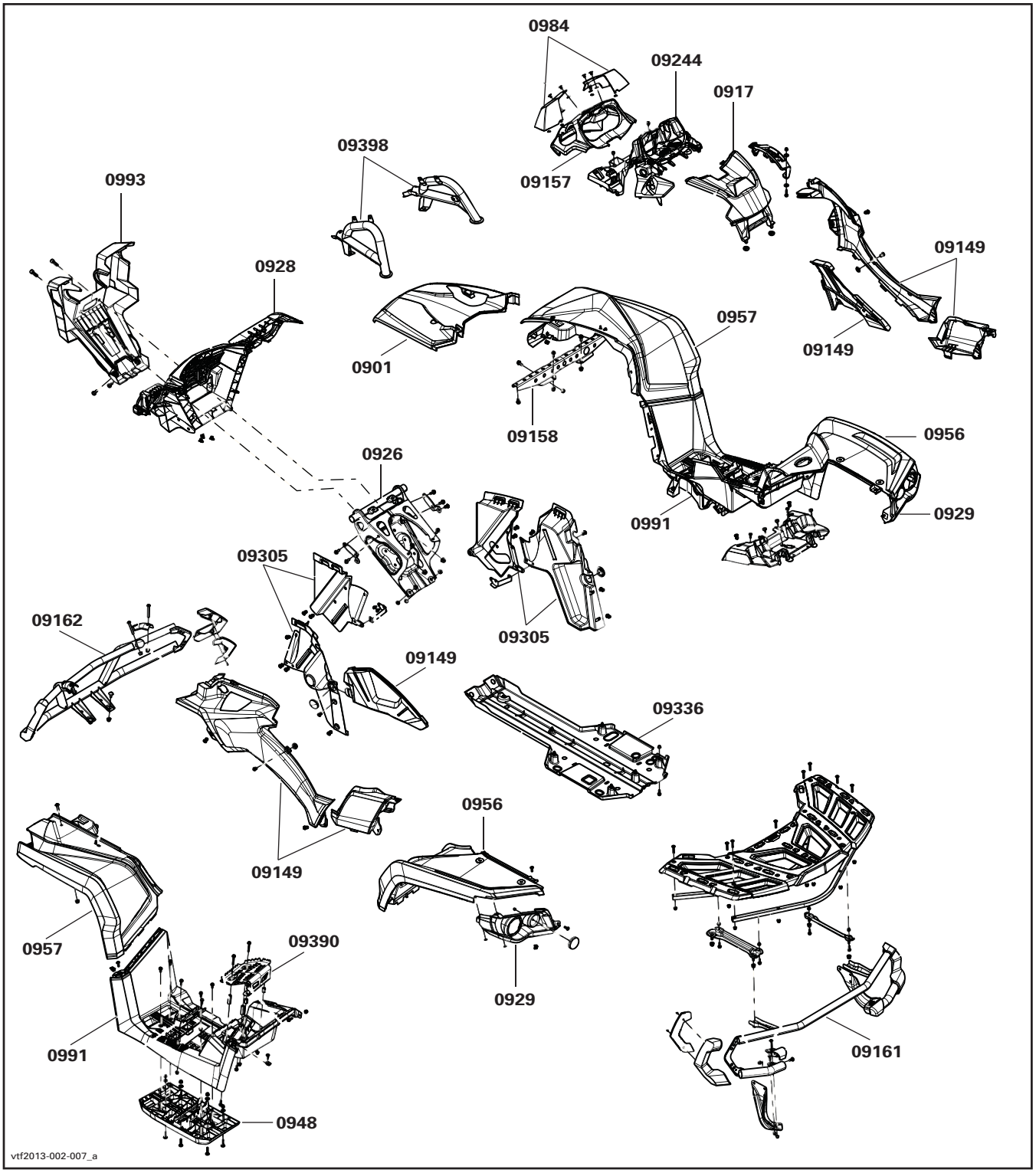

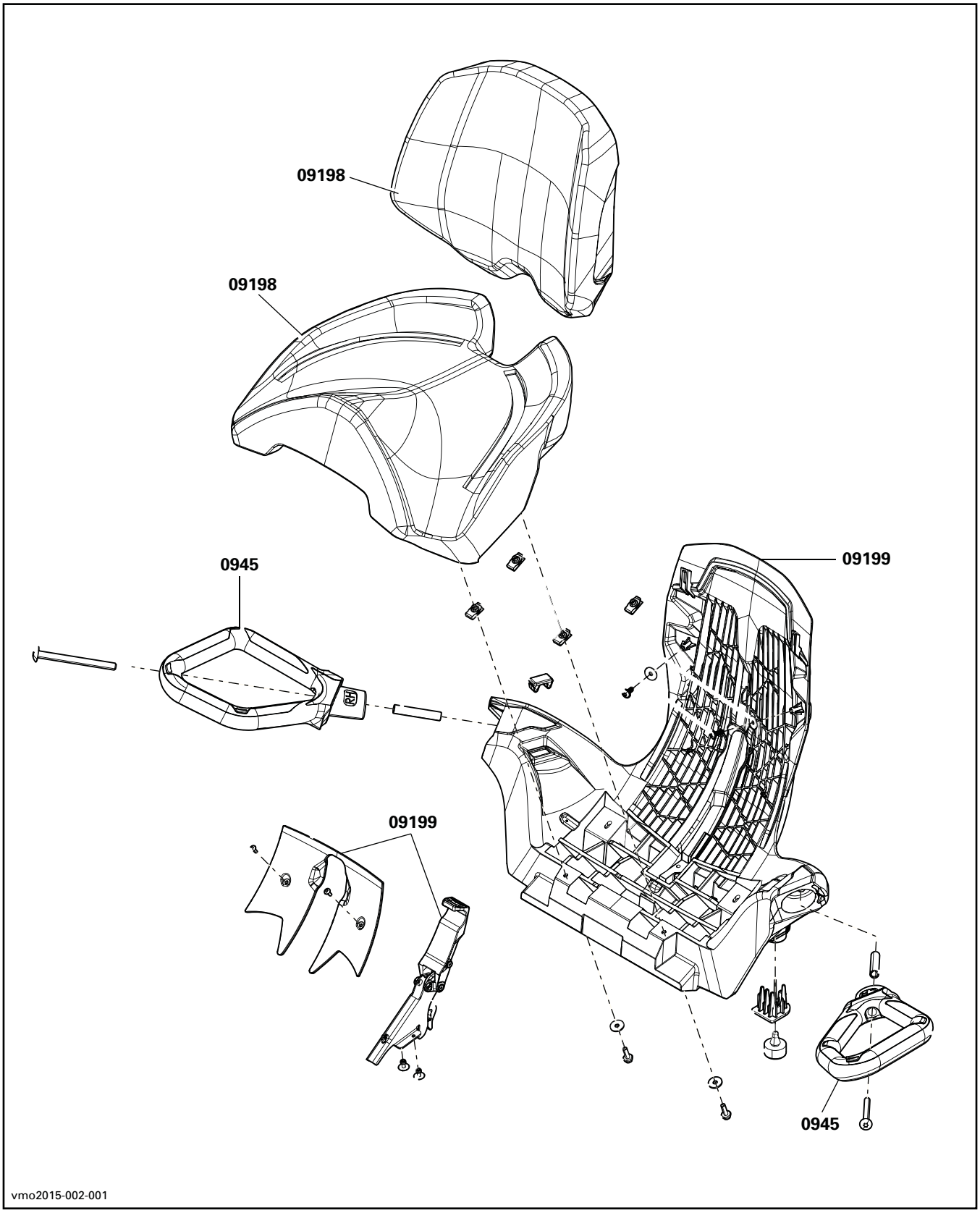
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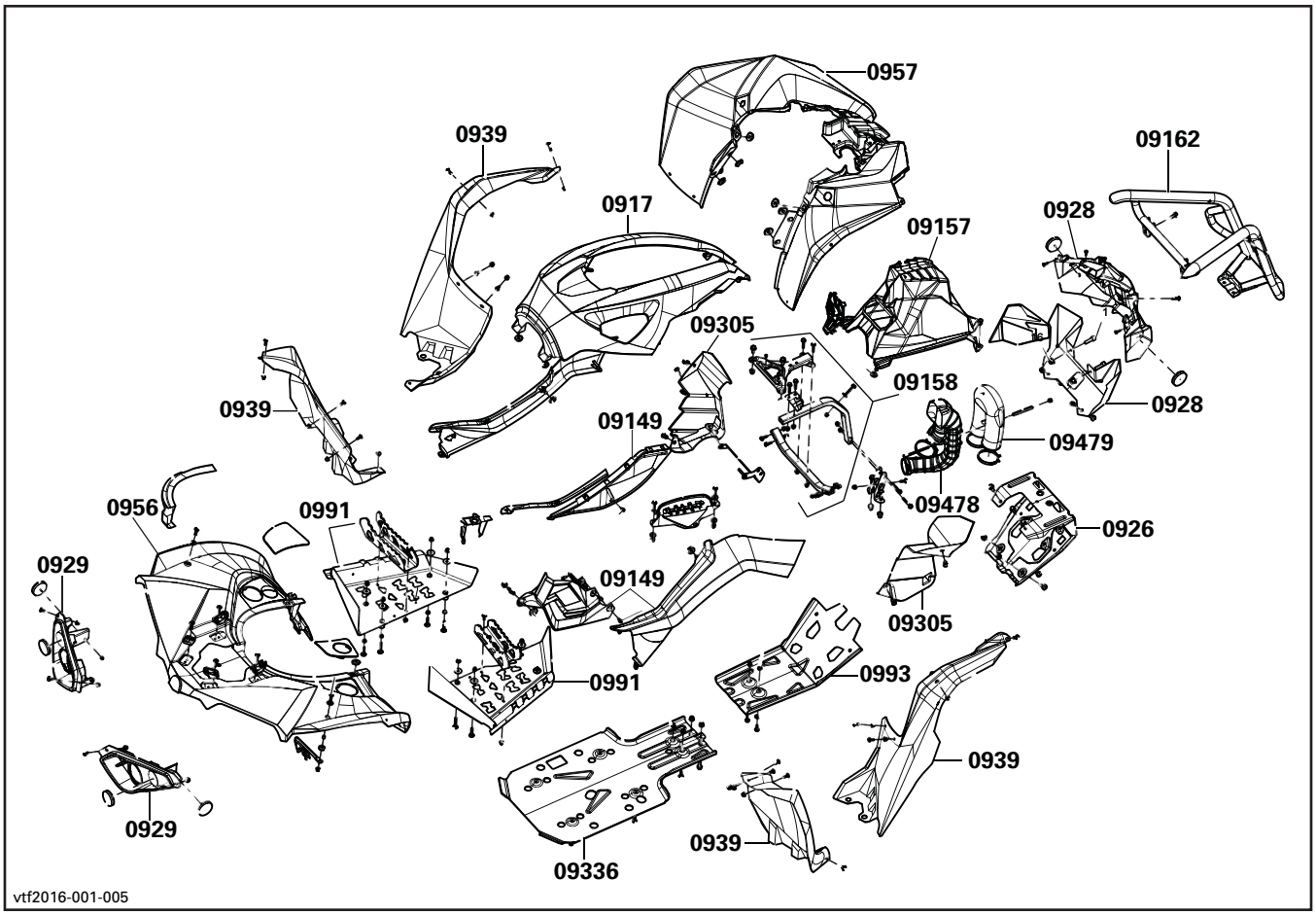
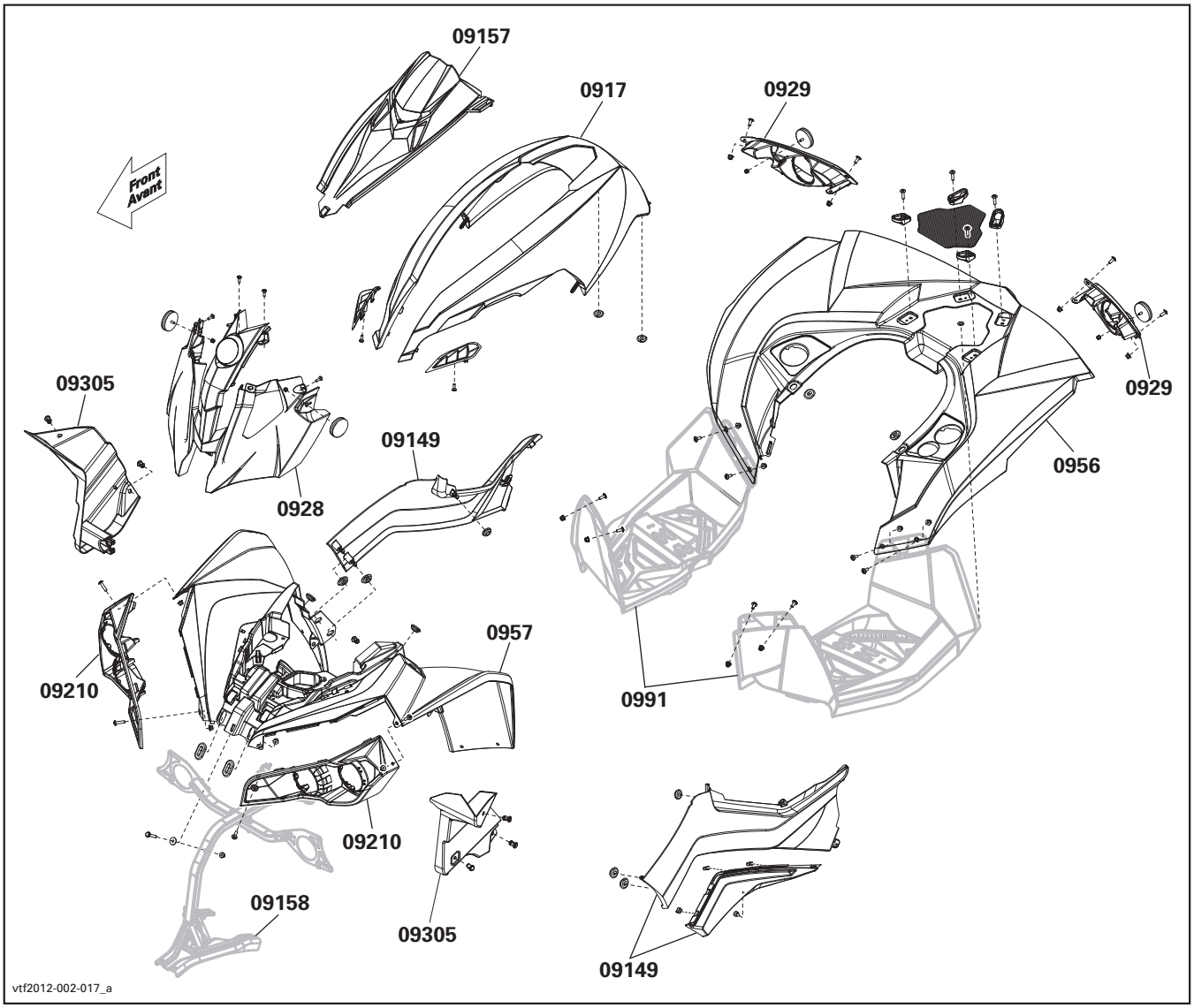
BODY AND ACCESSORIES
CARROSSERIE ET ACCESSOIRES

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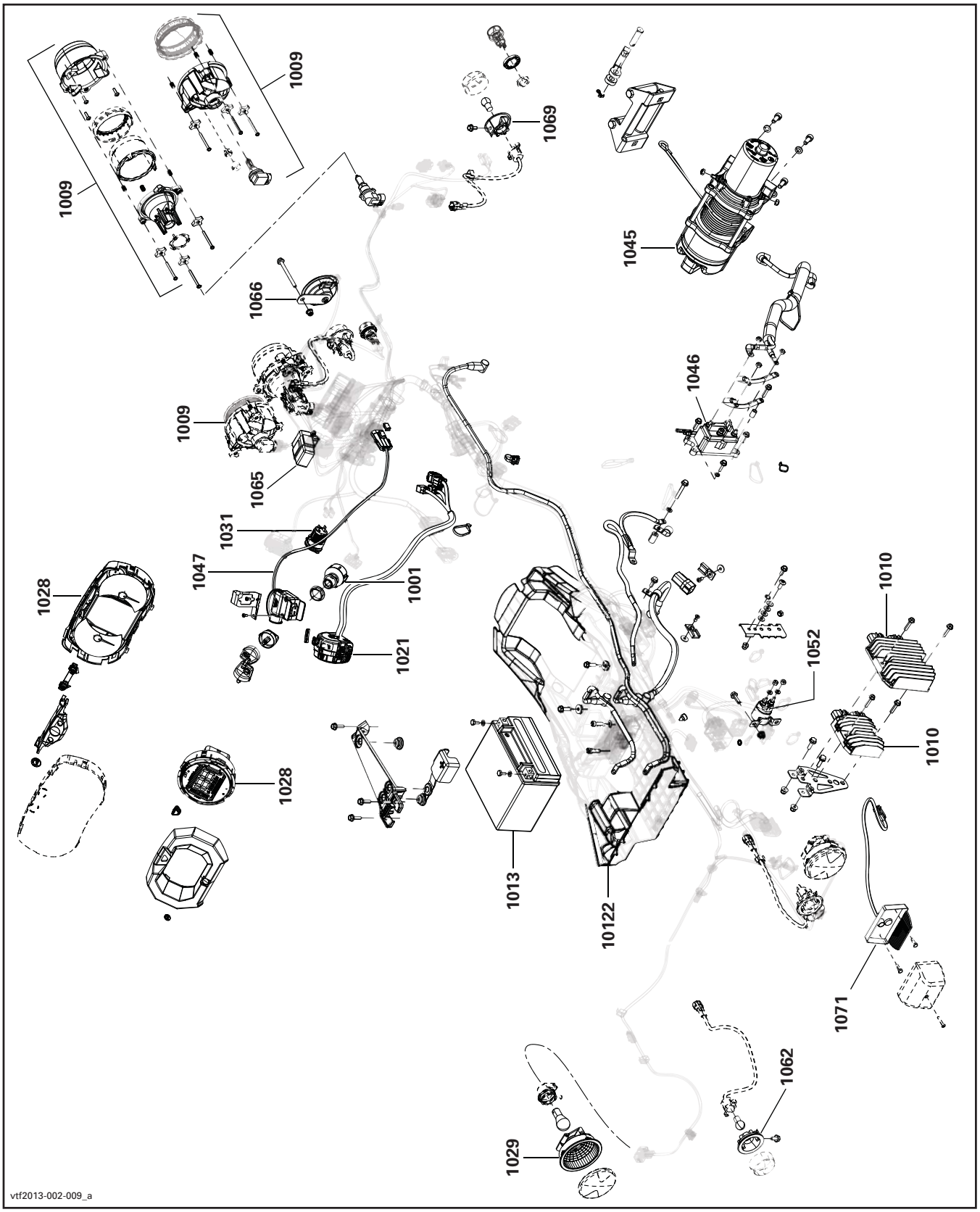
SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
10	**00**	**NO LABOR INVOLVED AUCUNE MAIN-D'OEUVRE**	**0**	**0**	**0**	**0**	**0**
10	01	IGNITION SWITCH INTERRUPTEUR D'ALLUMAGE	0.3	0.3	0.3	0.3	0.3
10	09	HEADLAMP AND/OR HEADLAMP SUPPORT (ASS'Y) (RH OR LH) PHARE AVANT ET/OU SUPPORT (COMPLET) (DROIT OU GAUCHE)	0.3	0.3	0.3	0.3	0.3
10	10	VOLTAGE REGULATOR RÉGULATEUR DE TENSION	0.3	0.3	0.3	0.3	0.3
10	13	BATTERY BATTERIE	0.3	0.3	0.3	0.3	0.3
10	15	HEATED GRIP (1) POIGNÉE CHAUFFANTE (1)	0.5	0.5			
10	16	BULB AMPOULE	0.3	0.3	0.3	0.3	0.3
10	21	MULTIFUNCTION SWITCH INTERRUPTEUR MULTIFONCTION	0.8	0.8	1.1	0.3	0.3
10	28	SPEEDOMETER/TACHOMETER INDICATEUR DE VITESSE/COMPTE-TOURS	0.3	0.3	0.3	0.3	0.3
10	29	TAIL LAMP HOUSING (ASS'Y) BOÎTIER DE FEU ARRIÈRE (COMPLET)	0.3	0.3	0.3	0.3	0.3
10	31	DC OUTLET PLUG PRISE D'ACCESSOIRE DC	0.3	0.3	0.3	0.3	0.3
10	34	ELECTRONIC MODULE MODULE ÉLECTRONIQUE	0.4	0.4	0.4	0.4	0.4
10	41	ENGINE HARNESS CÂBLAGE DU MOTEUR	1.4	1.4	1.4	1.3	1.3
10	45	WINCH (ASS'Y) (XT) TREUIL (COMPLET) (XT)	0.4	0.4	0.4		0.4
10	46	WINCH SOLENOID (XT) SOLÉNOÏDE DE TREUIL (XT)	0.5	0.5	0.5		0.5
10	47	WINCH SWITCH (XT) INTERRUPTEUR DE TREUIL (XT)	0.4	0.4	0.4		0.4
10	50	HEATED GRIPS (2) POIGNÉES CHAUFFANTE (2)	0.9	0.9			
10	51	MAIN WIRE HARNESS CÂBLAGE PRINCIPAL	2.5	2.7	3.0	2.2	2.2
10	52	STARTING RELAY RELAIS DE DÉMARRAGE	0.3	0.3	0.3	0.3	0.3
10	61	FRONT FLASHERS 1 OR 2 (**CE** ONLY) CLIGNOTANTS AVANT 1 OU 2 (**CE** SEULEMENT)	0.3	0.3		0.3	0.3
10	62	REAR FLASHERS 1 OR 2 (**CE** ONLY) CLIGNOTANTS ARRIÈRE 1 OU 2 (**CE** SEULEMENT)	0.3	0.3		0.3	0.3

SYSTEM SYSTÈME	CODE	DESCRIPTION	OUTLANDER	OUTLANDER MAX	OUTLANDER X MR	RENEGADE	RENEGADE XMR
			6-7-8	9-10-11	12-13	15-16-17-18	19-20
10	65	12 VOLT RELAY (CE ONLY) RELAIS 12 VOLT (CE SEULEMENT)	0.3	0.3	0.3	0.3	0.3
10	66	HORN AVERTISSEUR	0.3	0.3	0.3	0.3	0.3
10	67	RELAY RELAIS	0.3	0.3	0.3	0.3	0.3
10	68	ANY BULBS TOUTES LES AMPOULES	0.6	0.6	0.6	0.6	0.6
10	71	LICENSE LIGHT (ASS'Y) (**CE** ONLY) LUMIÈRE D'IMMATRICULATION (COMPLET) (**CE** SEULEMENT)	0.3	0.3		0.3	0.3
10	101	MULTIFONCTION SWITCH (RH) INTERRUPTEUR MULTIFONCTION (DR)	0.3	0.3	0.3	0.3	0.3
10	113	REMOTE CONTROL COMMENDE À DISTANCE	0.3	0.3	0.3		
10	114	WINCH CONNECTOR CONNECTEUR DE TREUIL	0.4	0.4	0.4		0.4
10	122	BATTERY SUPPORT SUPPORT DE BATTERIE	0.5	0.5	0.5	0.5	0.5

ELECTRICAL SYSTEM
SYSTÈME ÉLECTRIQUE



can-am

2021 Can-Am ATV Technical Presentation

June, 2020

Simon Boucher

BRP ADVENTURE BY DESIGN

NEW COLORATIONS & DS 90X WHEELS

Tundra Green

Phoenix Orange & Carbon Black

Granite Gray

Desert Tan

Oxford Blue

PLATFORM IDENTIFICATION

G2L

Metal racks

G2

Composite racks

G2S

Sport

TECHNICAL CHANGES : ALL PLATFORMS

G2L

G2

G2S

G2L, G2 & G2S – 2021 COMMON CHANGES OVERVIEW

System	Description	Retrofit	Model Application
PDI	**No regular key from factory** (Units with D.E.S.S.)	N/A	G2L G2 G2S
Drivetrain	New **knuckle**, **wheel hub & wheel stud**	NO	G2L G2 G2S
Steering	Revised **DPS pinch bolt design**	YES	G2L G2 G2S
Engine	**Spark plug** standardization to **solid terminal**	NO	G2L G2 G2S
Exhaust	**CARB** (California) units equipped with **O2 sensor**	NO	G2L G2 G2S
Electric	Fuse links replaced by **ATO fuse**	NO	G2L G2 G2S
Electric	Wider use of the **4.5" Digital Display**	NO	G2L G2 G2S
Electric	**CAN-AM HD winch & solenoid**	Yes	G2L G2 G2S

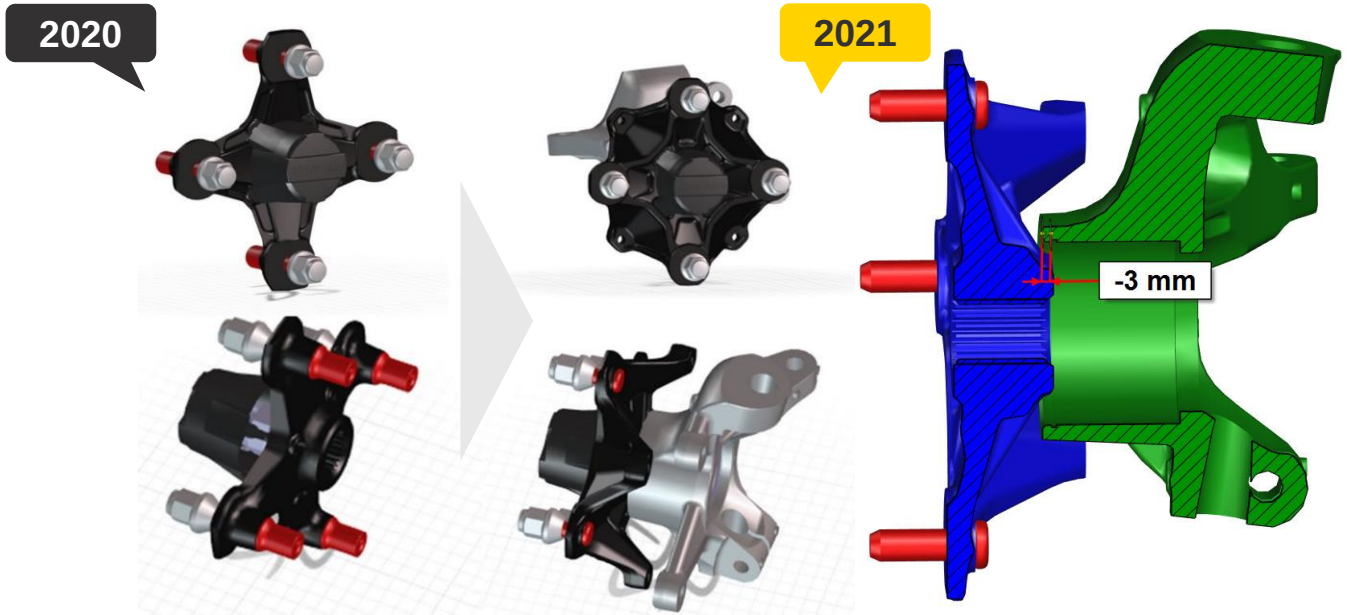
NO MORE REGULAR KEY PROVIDED FROM FACTORY

Description	Retrofit	Model Application
Units equipped with D.E.S.S. will be provided one single key.	N/A	D.E.S.S. G2L G2 G2S

Regular key is available through PAC

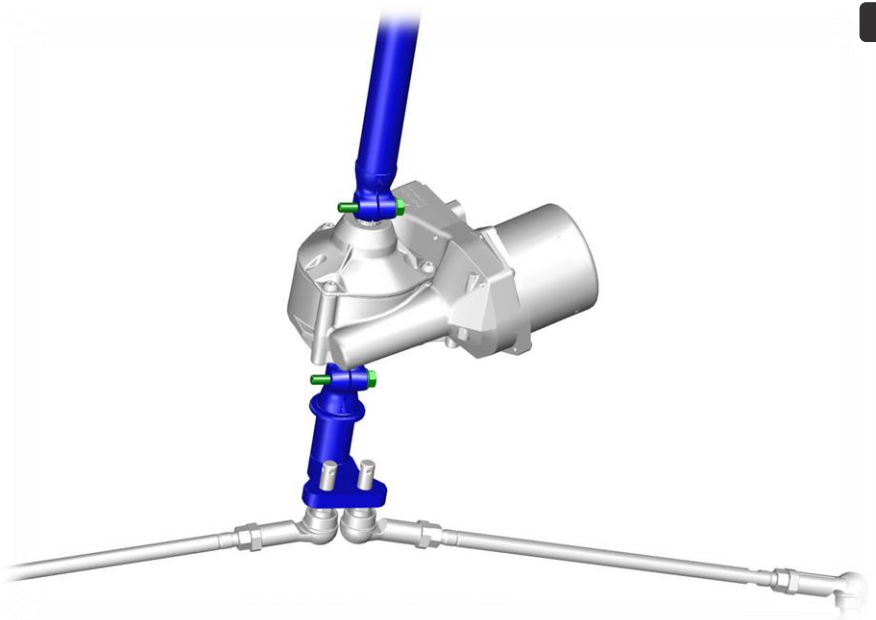
NEW KNUCKLE, WHEEL HUB & WHEEL STUD

Description	Retrofit	Model Application
A **new wheel hub** is implemented on all 2021 units. • Allows the disc brake to bolt to the hub • Uses a **new wheel stud** • Requires a slight dimensional change to the spindle for clearance with new hub	ONLY the **Knuckle** will substitute prior model years	All **G2L** **G2** **G2S**



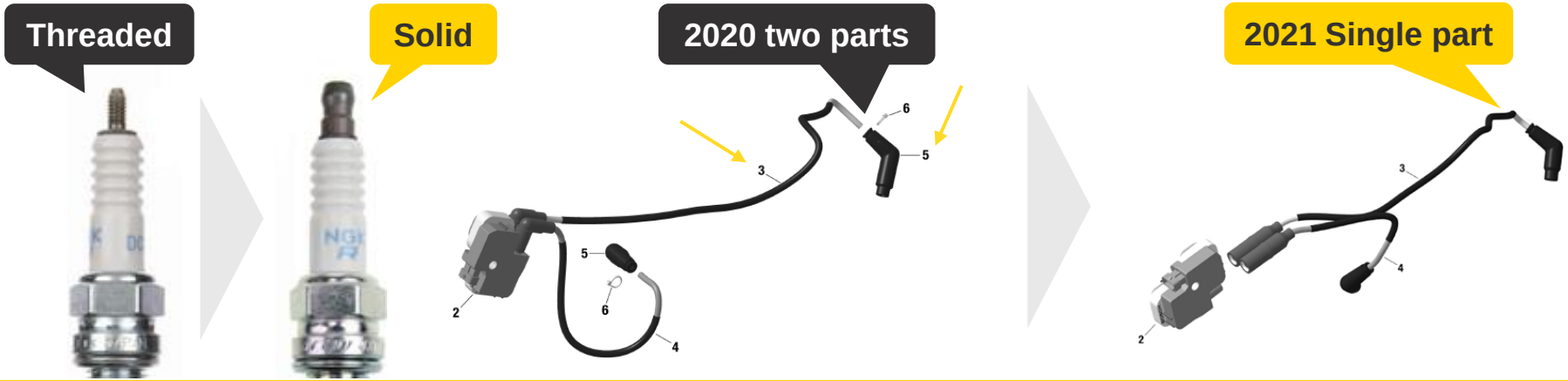
REVISED DPS PINCH BOLT DESIGN

Description	Retrofit	Model Application
A **revised pinch bolt design** for DPS input & output shaft is implemented for 2021 • **New steering column** for units equipped with DPS • **New pitman arm** for units equipped with DPS • **New longer bolt**	YES The new longer bolt will be included in a “kit” when ordering either the column or pitman arm.	DPS **G2L** **G2** **G2S**



SPARK PLUG STANDARDIZATION TO SOLID TERMINAL

Description	Retrofit	Model Application
DCPR8E spark plugs with M4 **threaded** terminals are **replaced by** DCPR8E spark plugs with **solid** terminals.	NO	570,650 ,1000 G2L G2 G2S
New ignition wires with matching **solid** terminal connectors are introduced. • The new ignition wires are also a **single part** design compared to the current **two parts** design. • The new ignition wires will also be **standard on ALL V-Twins**	NO	570,650,850,1000,1000R G2L G2 G2S



QUICK REFERENCE CHART

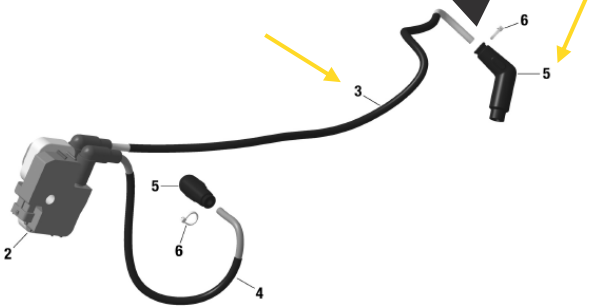
	Model Year 2020			---->	Model Year 2021		
Engine	**Spark Plugs**	**Ignition wires**	**Terminal type**	**What changes**	**Spark Plugs**	**Ignition wires**	**Terminal type**
450	LMAR8D-J	2 parts	Solid	no change	LMAR8D-J	2 part design	Solid
570	DCPR8E	2 parts	Threaded	Spark plug & ign. wires	DCPR8E	Single Part	Solid
650	DCPR8E	2 parts	Threaded	Spark plug & ign. wires	DCPR8E	Single Part	Solid
850	LMAR8D-J	2 parts	Solid	Ignition wires only	LMAR8D-J	Single Part	Solid
1000	DCPR8E	2 parts	Threaded	Spark plug & ign. wire	DCPR8E	Single Part	Solid
1000R	LMAR8D-J	2 parts	Solid	Ignition wires only	LMAR8D-J	Single Part	Solid

Changed for MY21

Threaded

Solid

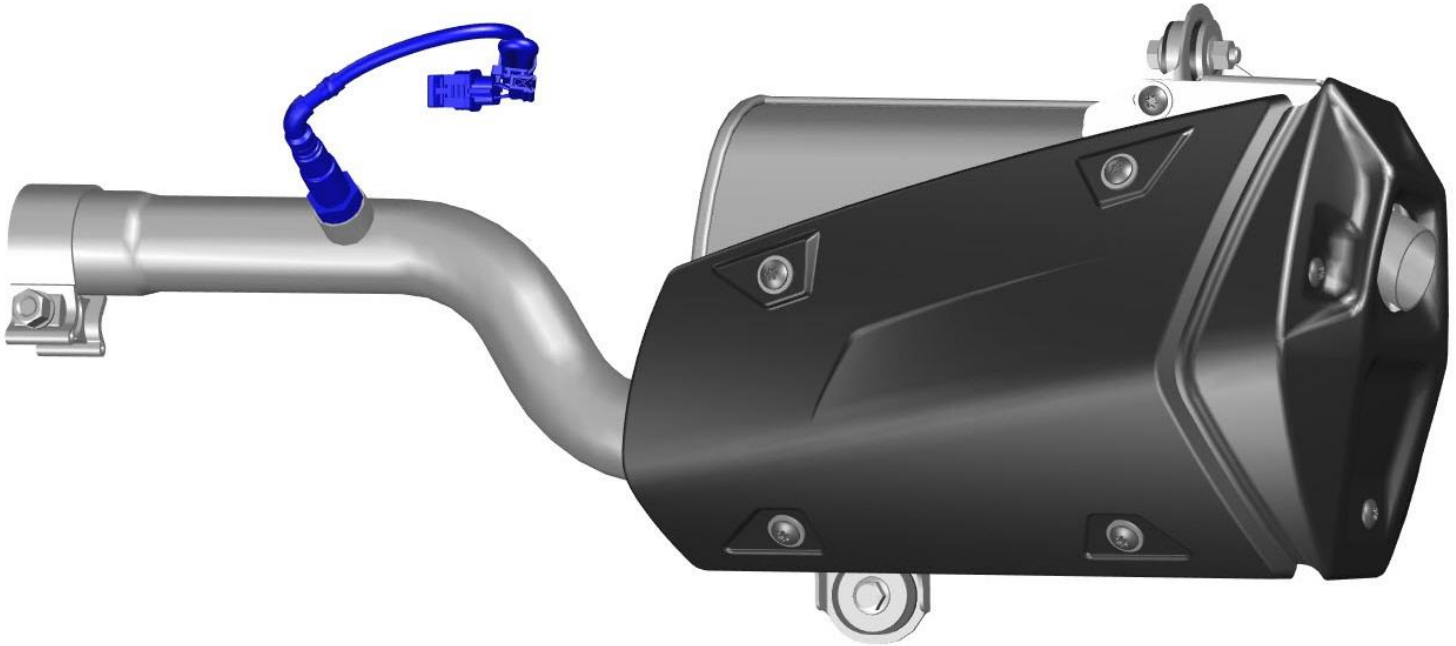
2020 two parts



2021 Single part

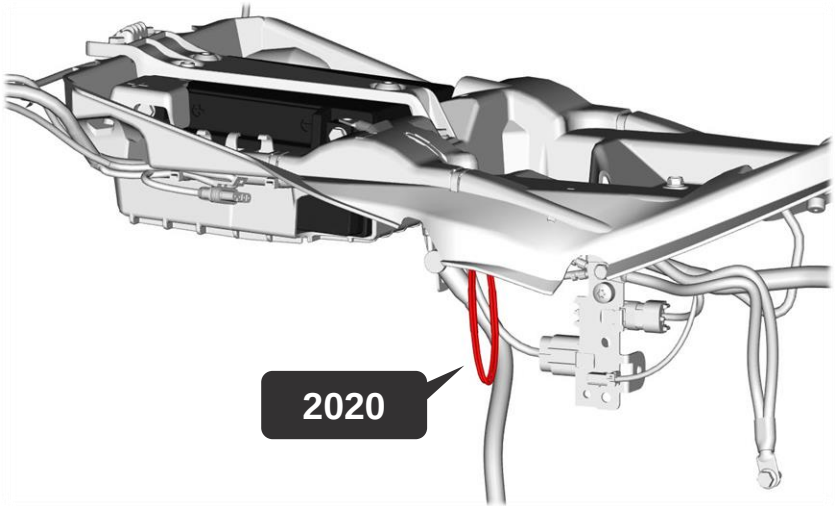
CARB (CALIFORNIA) UNITS EQUIPPED WITH O2 SENSOR

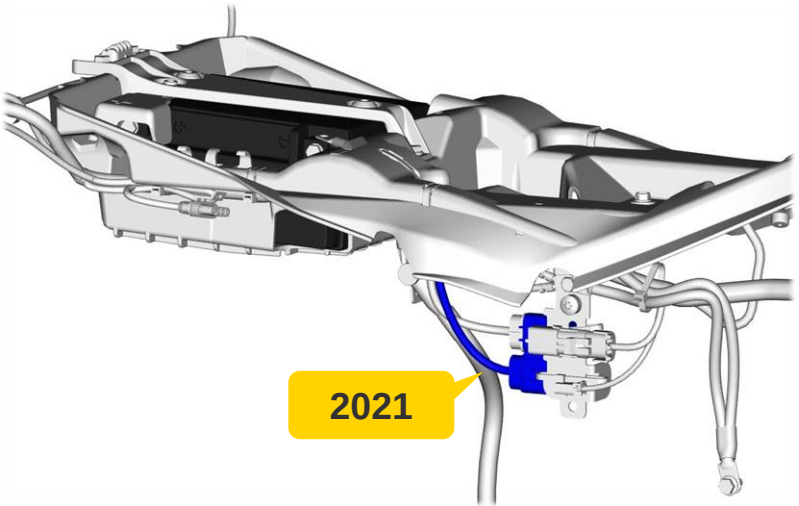
Description	Retrofit	Model Application
CARB (California) units will be fitted with an O2 sensor	NO	CARB G2L G2 G2S



FUSE LINKS REPLACED BY ATO FUSE

Description	Retrofit	Model Application
The fuse links built in the harness will be replaced by an ATO fuse. The new fuse will protect the voltage regulator from accidental battery connection with reversed polarity.	NO	Most G2L G2 G2S





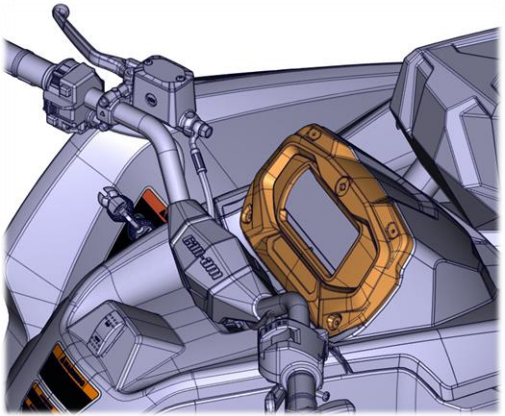
A few 2021 models will still use the 2020 harness.

WIDER USE OF THE 4.5” DIGITAL DISPLAY

Description	Retrofit	Model Application
Most models previously using the old style, square or rectangle clusters, will now be fitted with the 4.5” Digital Display. This required new cluster bezels and new electrical harnesses.	NO	Most G2L G2 G2S

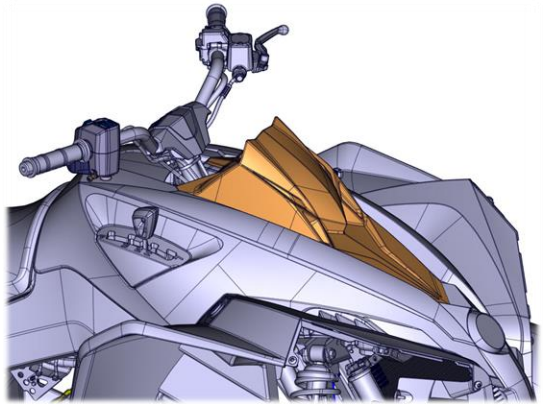
G2 & G2L

New bezel for 2021



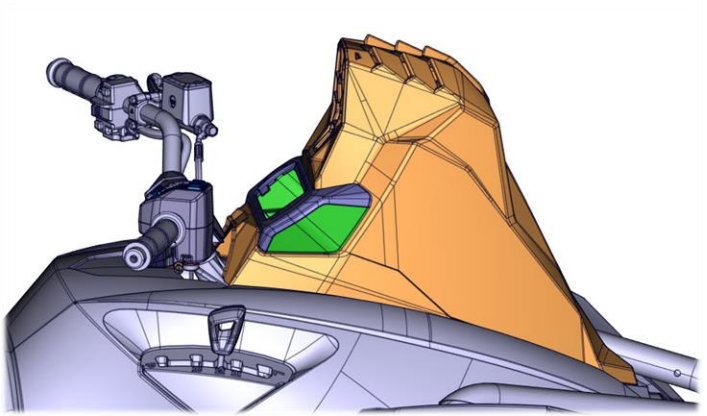
G2S

New in 2021



G2S XMR

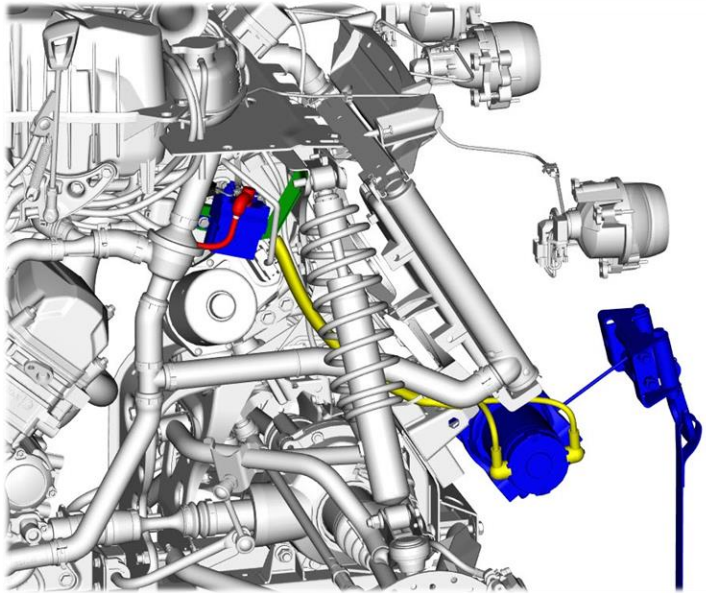
New in 2021



A few 2021 models will still use the rectangular or square clusters.

CAN-AM HD WINCH & SOLENOID

Description	Retrofit	Model Application
Units with factory installed winches will now be fitted with the CAN-AM HD 3500 winch and CAN-AM HD winch solenoid. • The new Can Am HD Winch and Solenoid offers improved durability under severe conditions. • A new solenoid mounting bracket was required.	More details coming soon	All G2L G2 G2S



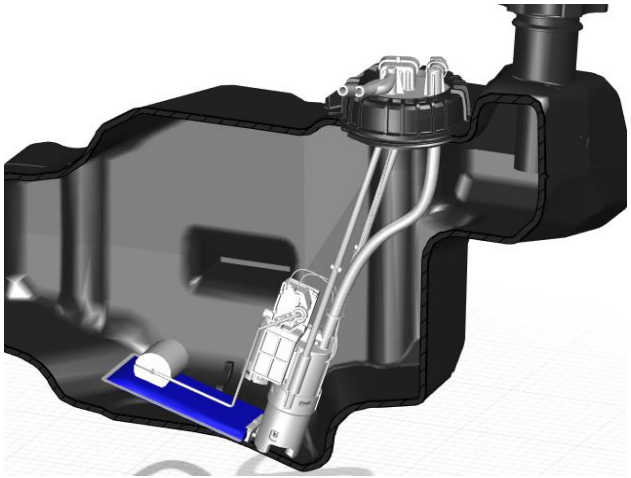
TECHNICAL CHANGES : G2L PLATFORM

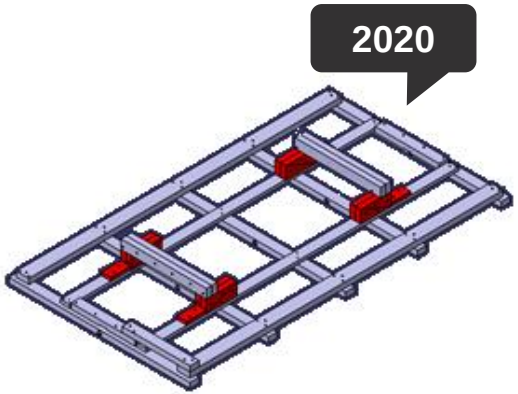
G2L

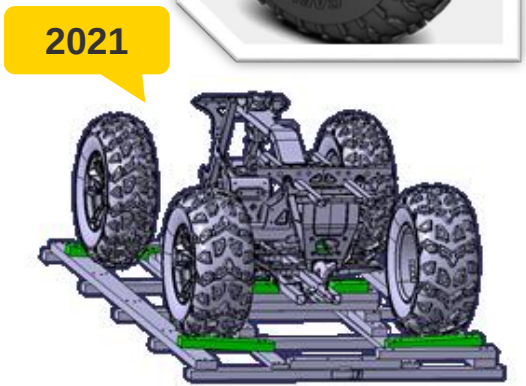
G2L – 2021 CHANGES

G2L

Description	Retrofit
Revised crate base improves unit positioning to reduce crate damages	N/A
XT package now fitted with Carlisle Trail Wolf tire	YES
Larger fuel pump prefilter	YES







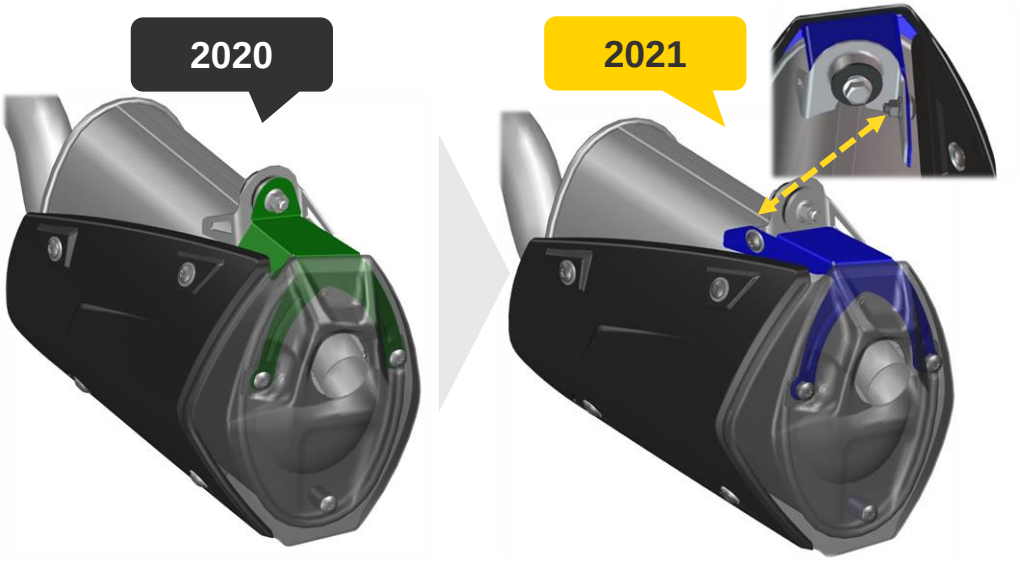
TECHNICAL CHANGES : G2 PLATFORM

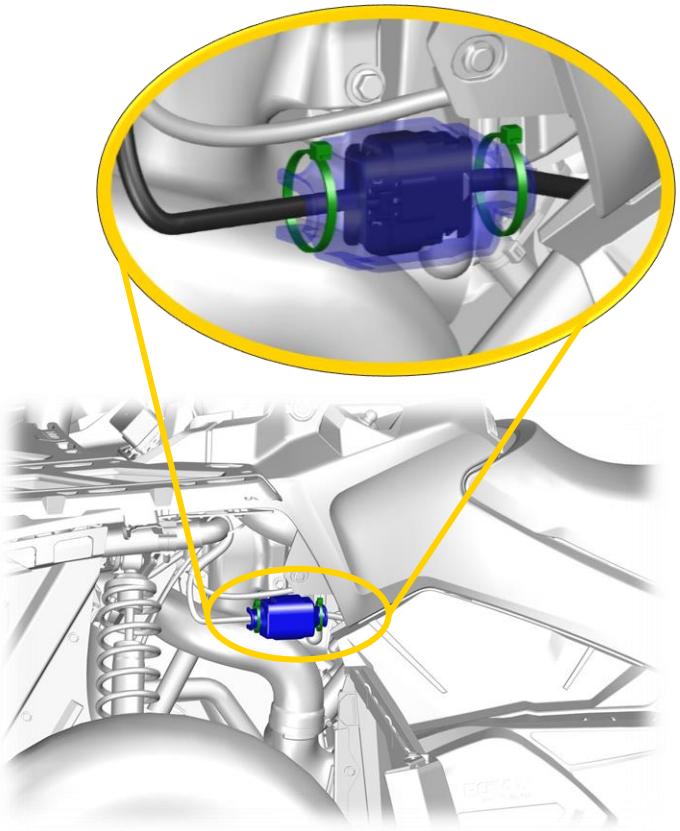
G2

G2 – 2021 CHANGES

G2

Description	Retrofit
Revised heat shield between muffler and cargo box	YES
New protection sleeve for : • HIC connector on MTC (Mechanical throttle control) units • TAS connector for ETC (Electronic throttle control) units	Can be fitted





TECHNICAL CHANGES : G2 & G2S PLATFORMS

G2

G2S

G2 & G2S – 2021 CHANGES

G2 G2S

Description	Retrofit
Revised front upper A-arms.	YES Substitute 2019 / 2020

BRP

ski-doo LYNX SEA-DOO EVINRUDE ROTAX can-am

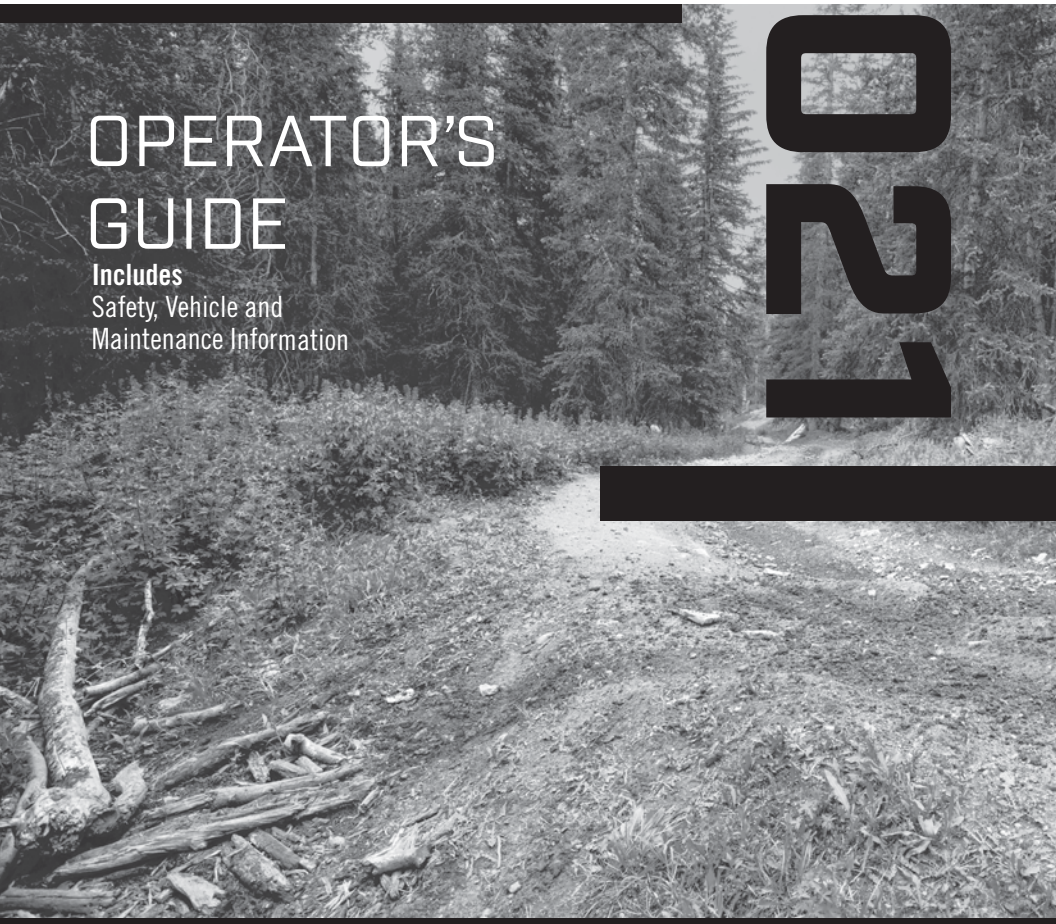
can-am

RENEGADE® Series

2021

OPERATOR'S GUIDE

Includes
Safety, Vehicle and
Maintenance Information



⚠ WARNING

Read this guide thoroughly.
It contains important safety information.
Minimum recommended age: Operator: 16 years old.
Keep this Operator's Guide in the vehicle.

219 002 095

Original Instructions

⚠ WARNING

YOUR VEHICLE CAN BE HAZARDOUS TO OPERATE. A collision or rollover can occur quickly, if you fail to take proper precautions, even during routine maneuvers such as turning and driving on hills or over obstacles.
For your safety, understand and follow all the warnings contained in this Operator's Guide and on the labels on your vehicle. **Failure to follow these warnings can result in SEVERE INJURY OR DEATH!**
Keep this Operator's Guide with the vehicle at all times.

⚠ WARNING

Disregarding any of the safety precautions and instructions contained in this Operator's Guide, *SAFETY VIDEO* and on-product safety labels could result in an injury including the possibility of death!

⚠ WARNING

This vehicle may exceed the performance of other vehicles you may have ridden in the past. Take time to familiarize yourself with your new vehicle.

CALIFORNIA PROPOSITION 65 WARNING

⚠ **WARNING:** Operating, servicing and maintaining an off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. For more information go to www.p65warnings.ca.gov/products/passenger-vehicle.

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Can-Am® D.E.S.S.™ DPS™ Renegade™ Rotax® TTI™ X™ XPS™

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FOREWORD

OPERATOR'S GUIDE 2021

Renegade 570
Renegade 850
Renegade X xc 650
Renegade X xc 850
Renegade X xc 1000R

Deutsch	Dieses Handbuch ist möglicherweise in Ihrer Landessprache verfügbar. Bitte wenden Sie sich an Ihren Händler oder besuchen Sie: www.operatorsguides.brp.com
English	This guide may be available in your language. Check with your dealer or go to: www.operatorsguides.brp.com
Español	Es posible que este manual esté disponible en su idioma. Consulte a su distribuidor o visite: www.operatorsguides.brp.com
Français	Ce guide peut être disponible dans votre langue. Vérifier avec votre concessionnaire ou aller à: www.operatorsguides.brp.com
Italiano	Questa guida potrebbe essere disponibile nella propria lingua. Contattare il concessionario o consultare: www.operatorsguides.brp.com
中文	本手册可能有您的语种的翻译版本。请向经销商问询，或者登录 www.operatorsguides.brp.com 查询。
日本語	このガイドは、言語によって翻訳版が用意されています。. ディーラーに問い合わせるか、次のアドレスでご確認ください： www.operatorsguides.brp.com
Nederlands	Deze handleiding kan beschikbaar zijn in uw taal. Vraag het aan uw dealer of ga naar: www.operatorsguides.brp.com
Norsk	Denne boken kan finnes tilgjengelig på ditt eget språk. Kontakt din forhandler eller gå til: www.operatorsguides.brp.com
Português	Este manual pode estar disponível em seu idioma. Fale com sua concessionária ou visite o site: www.operatorsguides.brp.com
Русский	Воспользуйтесь руководством на вашем языке. Узнайте о его наличии у дилера или на странице по адресу www.operatorsguides.brp.com
Suomi	Käyttöohjekirja voi olla saatavissa omalla kielelläsi. Tarkista jälleenmyyjältä tai käy osoitteessa: www.operatorsguides.brp.com
Svenska	Denna bok kan finnas tillgänglig på ditt språk. Kontakta din återförsäljare eller gå till: www.operatorsguides.brp.com

Congratulations on your purchase of a new Can-Am® ATV. It is backed by the BRP warranty and a network of authorized Can-Am dealers ready to provide the parts, service or accessories you may require.

Your dealer is committed to your satisfaction. He has taken training to perform the initial setup and inspection of your vehicle as well as completed the final adjustment before you took possession. If you need more complete servicing information, please ask your dealer.

At delivery, you were also informed of the warranty coverage and signed the *PREDELIVERY CHECK LIST* to ensure your new vehicle was prepared to your entire satisfaction.

Know Before you Go

To learn how to reduce the risk for you or bystanders being injured or killed, read this Operator's Guide before you operate the vehicle.

Also, read all safety labels on your ATV and watch attentively the *SAFETY VIDEO* located at https://can-am.brp.com/off-road/safety.

This vehicle is for off road use only. It is mainly for general recreational use but it may also be used for utility purposes.

Failure to follow the warnings contained in this Operator's Guide can result in SERIOUS INJURY or DEATH.

Age Recommendation

This vehicle is a category S, always follow this age recommendation:

– A person under 16 years old should never operate this vehicle.
– This vehicle is for recreational use by experienced operator's only.

⚠ WARNING

This is a high performance ATV. Inexperienced riders may overlook risks and be surprised by the specific behavior of this ATV in any riding condition.

Training Course

Never operate this vehicle without proper instruction. **Take a training course.** All operators should receive training from a certified instructor.

For more information about ATV safety, contact an authorized Can-Am dealer to find out about available training courses nearest you.

In the United States, call the Specialty Vehicle Institute of America (SVIA) at 1 800 887–2887 or in Canada, the Canada Safety Council (CSC) at 1 613 739–1535.

Safety Messages

The types of safety messages, what they look like and how they are used in this guide are explained as follows:

The safety alert symbol ⚠ indicates a potential injury hazard.

⚠ WARNING

Indicates a potential hazard, if not avoided, could result in serious injury or death.

⚠ CAUTION Indicates a hazard situation which, if not avoided, could result in minor or moderate injury.

NOTICE Indicates an instruction which, if not followed, could severely damage vehicle components or other property.

About this Operator's Guide

This Operator's Guide has been prepared to acquaint the owner/operator of a new vehicle with the various vehicle controls, maintenance and safe operating instructions. It is indispensable for the proper use of the product.

Note that this guide is available in several languages. In the event of any discrepancy, the English version shall prevail.

Keep this Operator's Guide in the vehicle as you can refer to it for things such as maintenance, troubleshooting and instructing others.

If you want to view and/or print an extra copy of your Operator's Guide, simply visit the following website **www.operatorsguides.brp.com**.

The information contained in this document are correct at the time of publication. However, BRP maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured. Due to late changes, some differences between the manufactured product and the descriptions and/or specifications in this guide may occur. BRP reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring any obligation upon itself.

This Operator's Guide should remain with the vehicle when it is sold.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

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SAFETY INFORMATION

Avoid Carbon Monoxide Poisoning

All engine exhaust contains carbon monoxide, a deadly gas. Breathing carbon monoxide can cause headaches, dizziness, drowsiness, nausea, confusion and eventually death.

Carbon monoxide is a colorless, odorless, tasteless gas that may be present even if you do not see or smell any engine exhaust. Deadly levels of carbon monoxide can collect rapidly, and you can quickly be overcome and unable to save yourself. Also, deadly levels of carbon monoxide can linger for hours or days in enclosed or poorly ventilated areas. If you experience any symptoms of carbon monoxide poisoning, leave the area immediately, get fresh air and seek medical treatment.

To prevent serious injury or death from carbon monoxide:

– Never run the vehicle in poorly ventilated or partially enclosed areas such as garages, carports or barns. Even if you try to ventilate engine exhaust with fans or open windows and doors, carbon monoxide can rapidly reach dangerous levels.
– Never run the vehicle outdoors where engine exhaust can be drawn into a building through openings such as windows and doors.

Avoid Gasoline Fires and Other Hazards

Gasoline is extremely flammable and highly explosive. Fuel vapors can spread and be ignited by a spark or flame many feet away from the engine. To reduce the risk of fire or explosion, follow these instructions:

– Use only an approved red gasoline container to store fuel.
– Never fill a gasoline container on the vehicle. An electrical static discharge may ignite the fuel.
– For refueling, strictly adhere to instructions in *FUEL*.
– Never start or operate the engine if the fuel cap is not properly installed.

Gasoline is poisonous and can cause injury or death.

– Never siphon gasoline by mouth.
– If you swallow gasoline, get any in your eye(s), or inhale gasoline vapor, see your doctor immediately.

If gasoline spills on you, wash with soap and water and change your clothes.

Avoid Burns from Hot Parts

Certain components become hot during operation. Avoid contact with those parts during and shortly after operation to avoid burns.

Accessories and Modifications

Any modifications or addition of accessories may affect the handling of your vehicle. It is important to take the time to get familiar with the vehicle once modifications are made to understand how to adapt your driving behavior accordingly.

Do not tamper with unauthorized modifications or install equipment not specifically certified by BRP for the vehicle. These modifications have not been tested by BRP and they may increase the risk of injury or loss of control, or render the vehicle illegal to ride. As an example, tampering with tire specifications may affect the behavior of the vehicle and increase the risk of a loss of control.

Ask your authorized BRP dealer for suitable available accessories for your vehicle.

SPECIAL SAFETY MESSAGES

THIS VEHICLE IS NOT A TOY AND CAN BE HAZARDOUS TO OPERATE.

– This vehicle handles differently from other vehicles including motorcycles and cars. A collision or rollover can occur quickly, if you fail to take proper precautions, even during routine maneuvers such as turning and driving on hills or over obstacles.

SEVERE INJURY OR DEATH can result if you do not follow these instructions:

– Read this Operator's Guide and all on-product safety labels carefully and follow the operating procedures described. Watch and pay attention to the *SAFETY VIDEO* before operating the vehicle.

– This is a high performance ATV for off-road use only. Inexperienced riders may overlook risks and be surprised by the specific behavior of this ATV in any terrain condition.

– Always follow this age recommendation: A person under 16 years old should never operate this vehicle.

– Never operate this vehicle without wearing an approved helmet of the proper size and other required riding gears. Refer to *RIDING GEAR* in the *RIDING THE VEHICLE* for detailed information.

– Never carry a passenger on this vehicle. This vehicle is designed for an operator only. Do not make any modifications to accommodate a passenger or use racks to carry a passenger. Passenger(s) affect balance and steering and increase risk of losing control.

– This vehicle is not designed to ride on paved surfaces; if you must shortly use the vehicle on such surfaces, avoid abrupt inputs to steering, accelerator and brakes. Reduce your speed.

– This vehicle is not designed for riding on roads or highways (in most places it is an illegal practice). Riding your vehicle on roads or highways could cause a collision with another vehicle.

– Never use this vehicle if you are tired, ill or with drugs or alcohol. Your reaction time and judgement is greatly affected under these conditions.

– Never attempt wheelies, jumps, or other stunts.

– Never operate at excessive speeds. Always go at a speed that is proper for the terrain, visibility, and operating conditions, and your experience.

– Always go slowly and be extra careful when operating on unfamiliar terrain. Always be alert to changing terrain conditions when operating this vehicle.

– Never operate on excessively rough, slippery or loose terrain until you have learned and practiced the skills necessary to control this vehicle on such terrain. Always be especially cautious on these kinds of terrain.

– Always follow proper procedures for turning as described in *RIDING TECHNIQUES* in this Operator's Guide. Practice turning at low speeds before attempting to turn at faster speeds. Do not turn at excessive speed.

– Never operate this vehicle on hills too steep for the vehicle or for your abilities.

– Always follow proper procedures for climbing hills as described in *RIDING TECHNIQUES*. Check the terrain carefully before you start up any hill. Never climb hills with excessively slippery or loose surfaces. Never go over the top of any hill at high speed.

- Always follow proper procedures for going down hills and for braking on hills as described in *RIDING TECHNIQUES*. Check the terrain carefully before you start down any hill. Never go down a hill at high speed. Avoid going down a hill at an angle that would cause the vehicle to lean sharply to one side. Go straight down the hill where possible.
- Always follow proper procedures for crossing the side of a hill as described in *RIDING TECHNIQUES*. Avoid hills with excessively slippery or loose surfaces. Never attempt to turn the vehicle around on any hill until you have mastered the turning technique on level ground. Avoid crossing the side of a steep hill if possible.
- Always use proper procedures if you stall or roll backwards when climbing a hill. To avoid stalling, use proper gear and maintain a steady speed when climbing a hill. If you stall or roll backwards, follow the driving technique procedures as described in *RIDING TECHNIQUES*.
- Always check for obstacles before operating in a new area. Never attempt to operate over large obstacles, such as large rocks or fallen trees. Always follow proper procedures when operating over obstacles as described in *RIDING TECHNIQUES*.
- Always be careful when skidding or sliding. Learn to safely control skidding or sliding by practicing at low speeds and on level smooth terrain. On extremely slippery surfaces, such as ice, go slowly and be very cautious in order to reduce the chance of skidding out of control.
- Never operate this vehicle through deep or fast flowing water. Water should never exceed footrests. Remember that wet brakes may have reduced stopping ability. Test your brakes after leaving water, mud or snow. If necessary, apply them several times to let friction dry out the pads. Allow greater distance for braking.
- Always keep in mind that braking distance is readily affected by but not limited to; weather and terrain conditions, braking system and tire conditions, vehicle speed and attitude, and vehicle load including towing. Remember to adjust your driving accordingly.
- Never exceed the stated load limits for this vehicle including operator, all other loads and added accessories. Cargo should be properly distributed and securely attached. Reduce speed and follow instructions in this guide for carrying cargo or pulling a trailer. Allow greater distance for braking.
- Always inspect and confirm the safe operating condition of your vehicle prior to ride. Refer to *PRE-RIDE INSPECTION*. Always follow the maintenance schedules as described in this Operator's Guide. Refer to *MAINTENANCE*.
- Always maintain proper tire pressure. When replacing tires, use only the recommended tire size and type. For tire information, refer to *SPECIFICATIONS*.
- Riding your vehicle too fast for the conditions may result in injury. Apply only enough throttle to proceed safely. Statistics show that mishaps and injury usually result from high speed turns. Always remember that this vehicle is heavy! Its pure weight alone may entrap you should it fall resulting in injury.
- This vehicle is not designed for jumping, nor can it fully absorb the high impact energy generated during manoeuvres such as jumping which, can be passed on to you, the operator. Performing wheelies can cause the vehicle to flip over onto you. Both practices have a high risk for you and should be avoided at all times.
- The tires of this vehicle are not suited for paved road use.

OPERATION WARNINGS

The following warning and their format have been requested by the United States Consumer Product Safety Commission and are required to be in the Operator's Guide for all ATVs.

NOTE: The following illustrations are general representations only. Your model may differ.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle without proper instruction.

WHAT CAN HAPPEN

The risk of an accident is greatly increased if the operator does not know how to operate this vehicle properly in different situations and on different types of terrain.

HOW TO AVOID THE HAZARD

Beginners and inexperienced operators should complete a training course. They should then regularly practice the skills learned during the course as well as the operating techniques described in this Operator's Guide.

For more information about a training course, contact an authorized Can-Am dealer.

⚠ WARNING

V00A1AQ

POTENTIAL HAZARD

Failure to follow the age recommendations for this vehicle.

WHAT CAN HAPPEN

A lack of respect for this age recommendation can lead to severe injury or death of the child.

Even though a child may be within the age group for which this vehicle is recommended, he may not have the skills, abilities, or judgment needed to operate this vehicle safely and may be involved in a serious accident.

HOW TO AVOID THE HAZARD

No one under 16 should operate this vehicle.

⚠ WARNING

V00A02Q

POTENTIAL HAZARD

Carrying a passenger on this vehicle.

WHAT CAN HAPPEN

Greatly reduces your ability to balance and control this vehicle.

Could cause an accident, resulting in harm to you and/or your passenger.

HOW TO AVOID THE HAZARD

Never carry passenger. Even with a long seat that provides unrestricted operator movement, it is not designed nor intended to carry passenger(s).

⚠ WARNING

V00A2DQ

POTENTIAL HAZARD

Allowing passenger to sit in any location on this vehicle.

WHAT CAN HAPPEN

Allowing a passenger could:

– Impair vehicle stability which could lead to a loss of control.
– Result in injury to passenger from impact on hard surfaces.
– Cause an accident, resulting in harm to you and/or your passenger.

HOW TO AVOID THE HAZARD

This vehicle is designed for an operator only. Never allow any passenger on this vehicle.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle on public streets, roads or highways.

WHAT CAN HAPPEN

You can collide with another vehicle.

HOW TO AVOID THE HAZARD

Never operate this vehicle on any public street, road or highway, even a dirt or gravel one. In many states it is illegal to operate this vehicle on public streets, roads and highways.

⚠ WARNING

POTENTIAL HAZARD

Riding this vehicle without wearing an approved helmet, eye protection and protective gear.

WHAT CAN HAPPEN

– Riding without an approved helmet increases the chances of a severe head injury or death in the event of an accident.
– Riding without eye protection can result in an accident and increases the chances of a severe injury in the event of an accident.
– Riding without protective gear increases the chances of severe injury in the event of an accident.

HOW TO AVOID THE HAZARD

Always wear an approved helmet that fits properly. You should also wear:

– Eye protection (goggles or face shield)
– Rigid chin guard
– Gloves and boots
– Long sleeved shirt or jacket
– Long pants.

⚠ WARNING

V00A07Q

POTENTIAL HAZARD

Using this vehicle with drugs or alcohol.

WHAT CAN HAPPEN

Could seriously affect your judgment.

Could cause you to react more slowly.

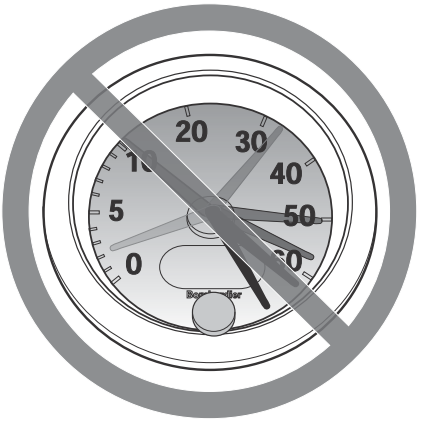
Could affect your balance and perception.

Could result in an accident or death.

HOW TO AVOID THE HAZARD

Never use this vehicle with drugs or alcohol.

⚠ WARNING



V00A08Q

POTENTIAL HAZARD

Operating this vehicle at excessive speeds.

WHAT CAN HAPPEN

Increases your chances of losing control of the vehicle, which can result in an accident.

HOW TO AVOID THE HAZARD

Always travel at a speed which is appropriate for the terrain, visibility and operating conditions, and your experience.

⚠ WARNING

POTENTIAL HAZARD

Attempting wheelies, jumps and other stunts.

WHAT CAN HAPPEN

Increases the chance of an accident, including an overturn.

HOW TO AVOID THE HAZARD

Never attempt stunts, such as wheelies or jumps. Do not try to show off.

⚠ WARNING

POTENTIAL HAZARD

Failure to inspect the vehicle before operating.

Failure to properly maintain the vehicle.

WHAT CAN HAPPEN

Increases the possibility of an accident or equipment damage.

HOW TO AVOID THE HAZARD

Always inspect your vehicle prior to ride to make sure the vehicle is in safe operating condition.

Always follow the maintenance schedule described in this Operator's Guide.

⚠ WARNING

POTENTIAL HAZARD

Riding on frozen waterways.

WHAT CAN HAPPEN

Breaking through the ice can lead to severe injury or death.

HOW TO AVOID THE HAZARD

Never ride this vehicle on a frozen surface before you are sure the ice is thick enough and sound enough to support the vehicle and its load, as well as the force that is created by a moving vehicle.

⚠ WARNING

POTENTIAL HAZARD

Removing hands from handlebars or feet from the footrests during operation.

WHAT CAN HAPPEN

Removing even one hand or foot can reduce your ability to control the vehicle or could cause you to lose your balance and fall off the vehicle. If you remove a foot from the footrests, your foot or leg may come into contact with the rear wheels, which could injure you or cause an accident.

HOW TO AVOID THE HAZARD

Operator must always keep both hands on the handlebars and both feet on the footrests during vehicle operation.

⚠ WARNING

POTENTIAL HAZARD

Failure to use extra care when operating this vehicle on unfamiliar terrain.

WHAT CAN HAPPEN

You can come upon hidden rocks, bumps, or holes, without enough time to react.

Could result in the vehicle overturning or loss of control.

HOW TO AVOID THE HAZARD

Go slowly and be extra careful when operating on unfamiliar terrain.

Always be alert to changing terrain conditions when operating the vehicle.

⚠ WARNING

POTENTIAL HAZARD

Failure to use extra care when operating on excessively rough, slippery or loose terrain.

WHAT CAN HAPPEN

Could cause loss of traction or vehicle control, which could result in an accident, including an overturn.

HOW TO AVOID THE HAZARD

Do not operate on excessively rough, slippery or loose terrain until you have learned and practiced the skills necessary to control this vehicle on such terrain.

Always be especially cautious on these kinds of terrain.

⚠ WARNING

POTENTIAL HAZARD

Turning improperly.

WHAT CAN HAPPEN

Vehicle could go out of control, causing a collision or an overturn.

HOW TO AVOID THE HAZARD

Always follow proper procedures for turning as described in this Operator's Guide. Practice turning at low speeds before attempting to turn at faster speeds.

Do not turn at excessive speed.

⚠ WARNING

POTENTIAL HAZARD

Operating on excessively steep hills.

WHAT CAN HAPPEN

The vehicle can overturn more easily on extremely steep hills than on level surfaces or small hills.

HOW TO AVOID THE HAZARD

Never operate this vehicle on hills too steep for the vehicle or for your abilities.

Practice on smaller hills before attempting larger hills.

⚠ WARNING

POTENTIAL HAZARD

Climbing hills improperly.

WHAT CAN HAPPEN

Could cause loss of control or cause vehicle to overturn.

HOW TO AVOID THE HAZARD

Always follow proper procedures for climbing hills as described in this Operator's Guide.

Always check the terrain carefully before you start up any hill.

Never climb hills with excessively slippery or loose surfaces.

Shift your weight forward.

Never open the throttle suddenly or make sudden gear changes. The vehicle could flip over backwards.

Never go over the top of any hill at high speed. An obstacle, a sharp drop, or another vehicle or person could be on the other side of the hill.

⚠ WARNING

POTENTIAL HAZARD

Going down a hill improperly.

WHAT CAN HAPPEN

Could cause loss of control or cause vehicle to overturn.

HOW TO AVOID THE HAZARD

Always follow proper procedures for going down hills as described in this Operator's Guide.

NOTE: A special technique is required when braking as you go down a hill.

Always check the terrain carefully before you start down any hill.

Shift your weight backward.

Never go down a hill at high speed.

Avoid going down a hill at an angle which would cause the vehicle to lean sharply to one side. Go straight down the hill where possible.

⚠ WARNING

POTENTIAL HAZARD

Improperly crossing hills or turning on hills.

WHAT CAN HAPPEN

Could cause loss of control or cause vehicle to overturn.

HOW TO AVOID THE HAZARD

Never attempt to turn the vehicle around on any hill until you have mastered the turning technique as described in this Operator's Guide on level ground. Be very careful when turning on any hill.

Avoid crossing the side of a steep hill if possible.

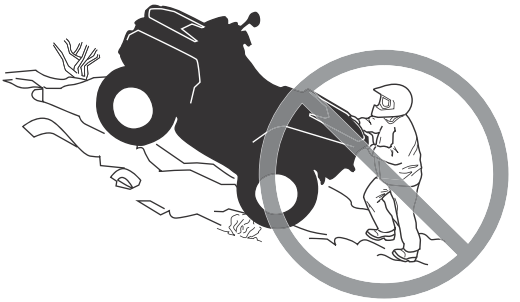
When crossing the side of a hill:

Always follow proper procedures as described further in this Operator's Guide.

Avoid hills with excessively slippery or loose surfaces.

Operator must shift weight to the uphill side of the vehicle.

⚠ WARNING



POTENTIAL HAZARD

Stalling, rolling backwards or improperly dismounting while climbing a hill.

WHAT CAN HAPPEN

Could result in vehicle overturning.

HOW TO AVOID THE HAZARD

Use proper gear and maintain steady speed when climbing a hill.

If you lose all forward speed:

Keep your weight uphill. Never open the throttle suddenly or make sudden gear changes. The vehicle could flip over backwards.

Apply brakes gradually.

Lock parking brake after you have stopped.

Dismount on uphill side, or to a side if pointed straight uphill.

If you begin rolling backwards:

Keep your weight uphill. Never open the throttle suddenly or make sudden gear changes. The vehicle could flip over backwards.

Apply brakes gradually.

When fully stopped, apply brakes and lock parking brake.

Dismount on uphill side, or to a side if pointed straight uphill.

Turn the vehicle around and remount, following the procedure described in this Operator's Guide.

⚠ WARNING

POTENTIAL HAZARD

Improperly operating over obstacles.

WHAT CAN HAPPEN

Could cause loss of control, or a collision.

Could cause the vehicle to overturn.

HOW TO AVOID THE HAZARD

Before operating in a new area, check for obstacles.

Never attempt to ride over large obstacles, such as large rocks or fallen trees.

When you go over obstacles, always follow proper procedures as described in this Operator's Guide.

⚠ WARNING

POTENTIAL HAZARD

Skidding or sliding improperly.

WHAT CAN HAPPEN

You may lose control of this vehicle.

You may also regain traction unexpectedly, which may cause the vehicle to overturn.

HOW TO AVOID THE HAZARD

Learn to safely control skidding or sliding by practicing at low speeds and on level smooth terrain.

On extremely slippery surfaces, such as ice, go slowly and be very cautious in order to reduce the chance of skidding or sliding out of control.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle through deep or fast flowing water.

WHAT CAN HAPPEN

Tires may float, causing loss of traction and loss of control, which could lead to an accident.

HOW TO AVOID THE HAZARD

Never operate this vehicle in fast flowing water or in deep water.

Check water depth and current before you attempt to cross any water. Water should not go above footrests.

Remember that wet brakes may have reduced stopping ability. Test your brakes after leaving water. If necessary, apply them several times to let friction dry out the pads.

⚠ WARNING

POTENTIAL HAZARD

Improperly operating in reverse.

WHAT CAN HAPPEN

You could hit an obstacle or person behind the vehicle, resulting in serious injury.

HOW TO AVOID THE HAZARD

When you select reverse gear, make sure there are no obstacles or people behind the vehicle. When it is safe to proceed, go slowly.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle with improper tires, or with improper or uneven tire pressure.

WHAT CAN HAPPEN

Use of improper tires on this vehicle, or operation of this vehicle with improper or uneven tire pressure, may cause loss of control, tire blow outs, tire to move around on its rim, and increases the risk of an accident.

HOW TO AVOID THE HAZARD

Always use the size and type of tires specified in this Operator's Guide for this vehicle.

Always maintain proper tire pressure as described in this Operator's Guide.

Always replace wheels or tires that are damaged.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle with improper modifications.

WHAT CAN HAPPEN

Improper installation of accessories or modification of this vehicle may cause changes in handling which in some situations could lead to an accident.

HOW TO AVOID THE HAZARD

Never modify this vehicle through improper installation or use of accessories. All parts and accessories added to this vehicle should be approved by BRP and should be installed and used according to instructions. If you have questions, consult an authorized Can-Am dealer.

NEVER install a passenger seat or use the racks to carry a passenger.

Modification of the vehicle to increase speed and performance may violate the terms and conditions of your vehicle limited warranty. In addition, certain modifications including the removal of engine or exhaust components are illegal under most laws.

⚠ WARNING

POTENTIAL HAZARD

Overloading this vehicle, carrying or towing cargo improperly.

WHAT CAN HAPPEN

Could cause changes in vehicle handling which could lead to an accident.

HOW TO AVOID THE HAZARD

Never exceed the stated load capacity for this vehicle including operator as well as other loads and added accessories.

Cargo should be properly distributed and securely attached.

Reduce speed when carrying cargo or pulling a trailer. Allow greater distance for braking.

Always follow the instructions in this Operator's Guide for carrying cargo or pulling a trailer.

⚠ WARNING

V03M01Q

POTENTIAL HAZARD

Transporting flammable or dangerous material can lead to explosions.

WHAT CAN HAPPEN

This can cause serious injury or death.

HOW TO AVOID THE HAZARD

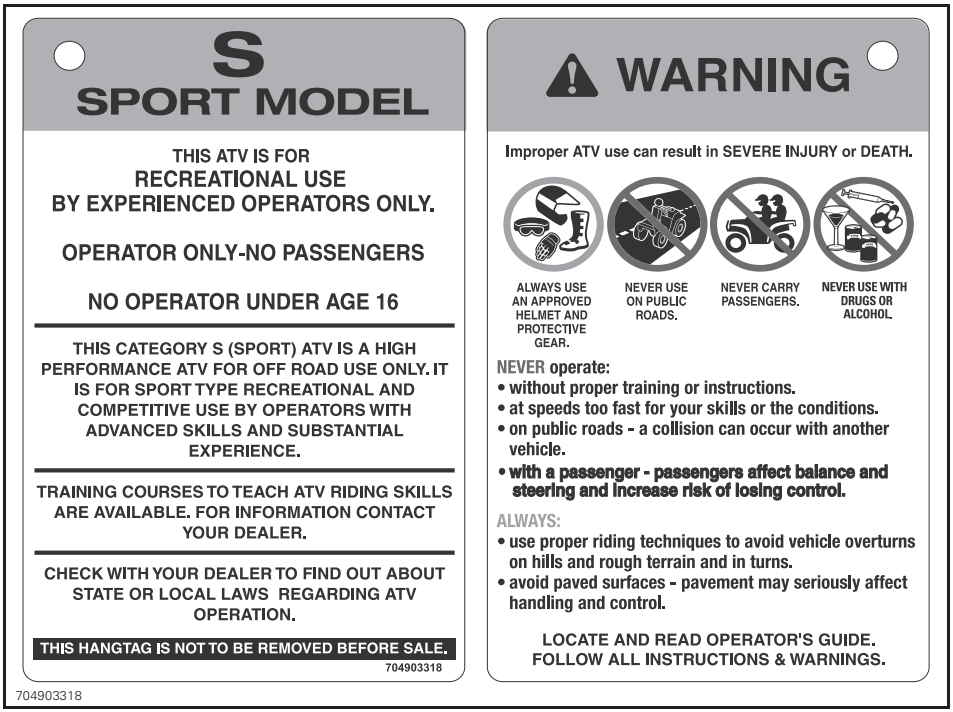
Never transport flammable or dangerous material.

IMPORTANT ON-PRODUCT LABELS (CANADA/UNITED STATES)

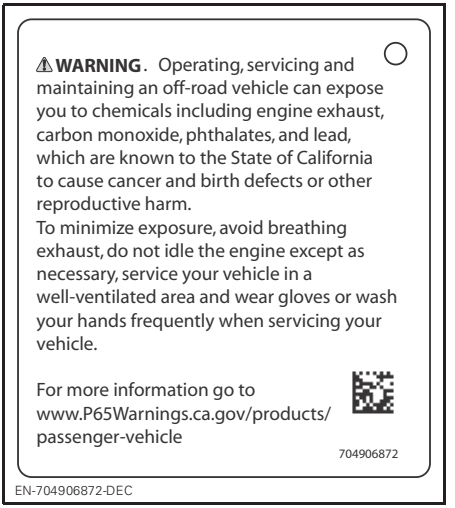
Canada/United States

Hang Tag

This vehicle comes with a hang tag and labels containing important safety and emission informations.



TYPICAL


⚠ WARNING. Operating, servicing and maintaining an off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle.
For more information go to www.P65Warnings.ca.gov/products/passenger-vehicle
704906872
EN-704906872-DEC

VEHICLE ENGINE DESCRIPTION:
XXXXX
EPA CERTIFIED
NER (NORMALIZED EMISSION RATE) = X
ON A 0 TO 10 SCALE, 0 BEING THE CLEANEST
*NOT TO BE REMOVED PRIOR TO SALE
BRP
704901107
vmo2006-005-009_en

TYPICAL

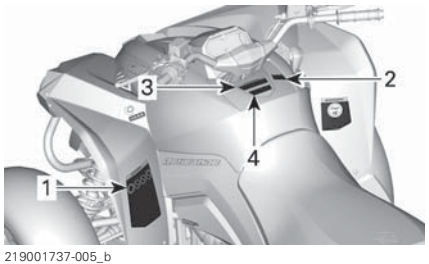
Vehicle Safety Labels

Read and understand all the safety labels on your vehicle.

These labels are affixed to the vehicle for the safety of the operator or bystanders.

The safety labels on your vehicle should be considered permanent parts of the vehicle. If missing or damaged, they can be replaced free of charge. See an authorized Can-Am dealer.

NOTE: In the event of any discrepancy between this guide and the vehicle, the safety labels on the vehicle have precedence over the labels in this guide.



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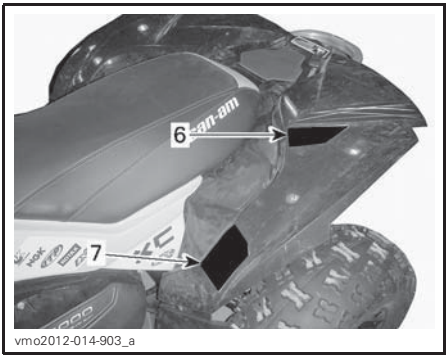

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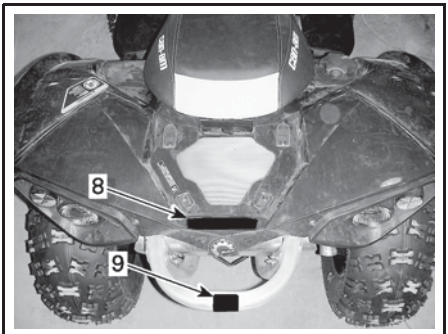

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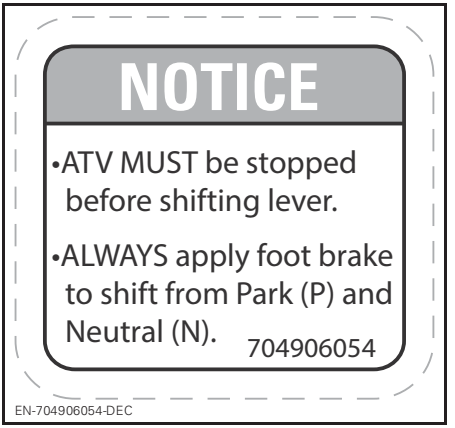
LABEL 1



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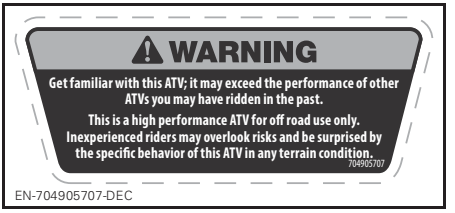

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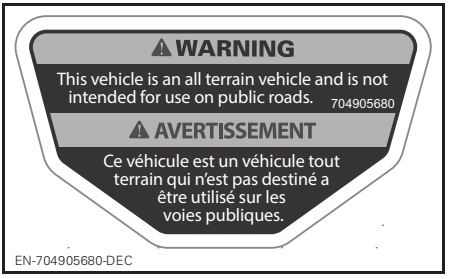

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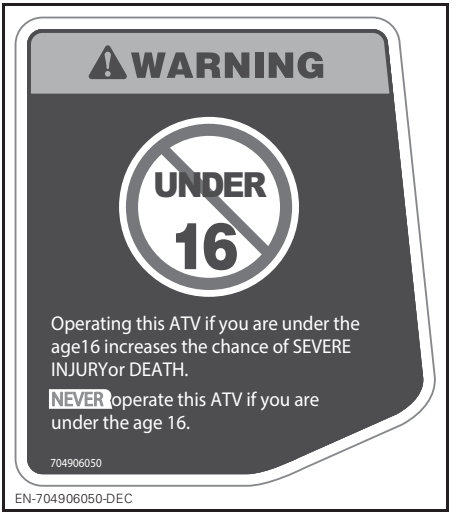
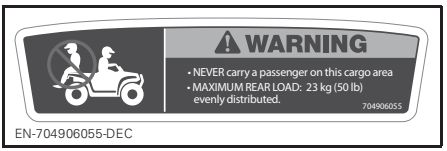


LABEL 5

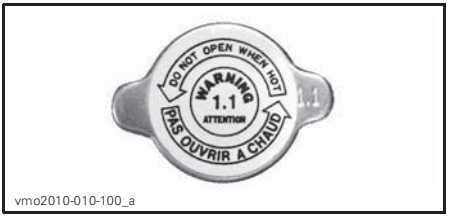
LABEL 6

LABEL 7 (REFER TO SPECIFICATIONS FOR VALUES)



LABEL 8

LABEL 9

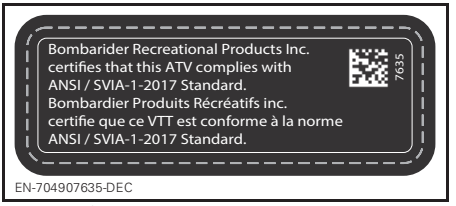


LABEL 10

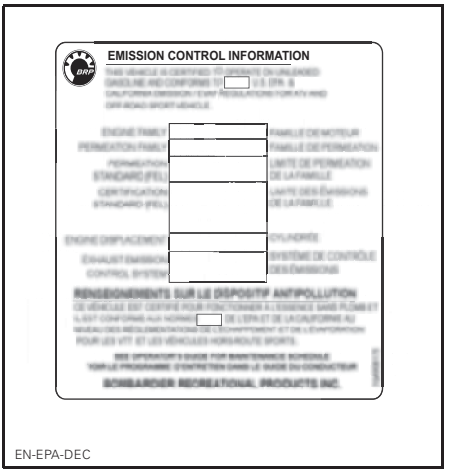
LABEL 11 - LOCATED ON COOLANT RESERVOIR

Compliance Labels

These labels indicate vehicle's compliance.

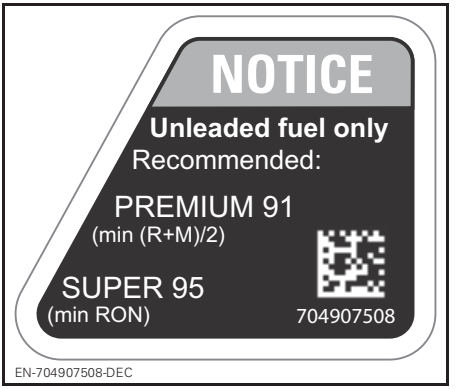


UNDER SEAT

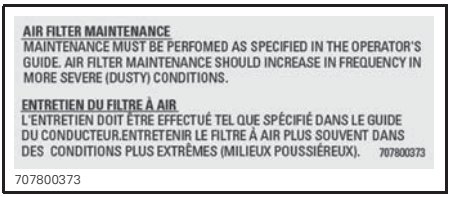


TYPICAL - UNDER SEAT APPLICABLE WHEN EQUIVALENT TO A MODEL CERTIFIED TO US EPA STANDARDS

Technical Information Labels



LOCATED NEAR GAS CAP OF 1000R ENGINES



UNDER SEAT

IMPORTANT ON-PRODUCT LABELS (ALL COUNTRIES EXCEPT CANADA/UNITED STATES)

All Countries Except Canada/United States

Vehicle Safety Labels

Read and understand all the safety labels on your vehicle. These labels are affixed to your vehicle for the safety of the operator or bystanders.

These labels are affixed to the vehicle for the safety of the operator or bystanders.

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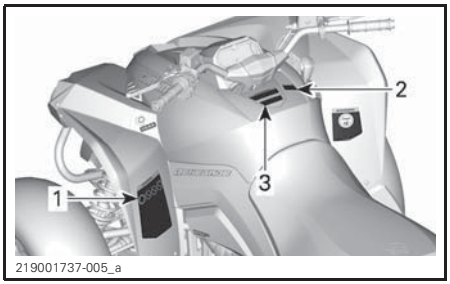

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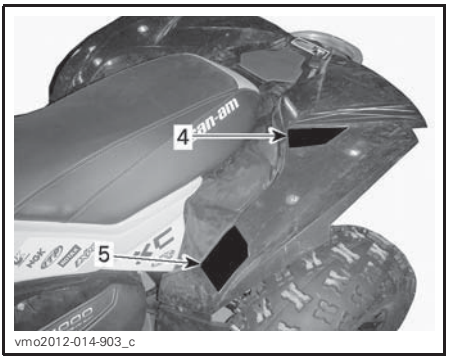

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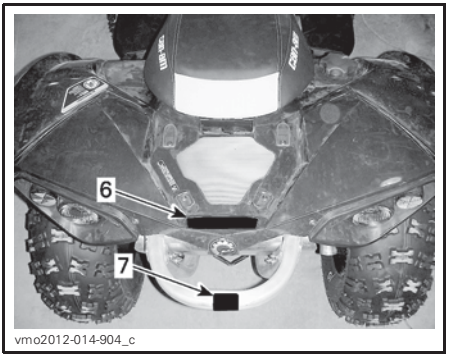

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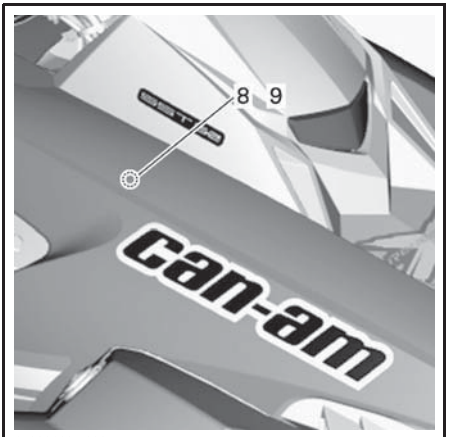

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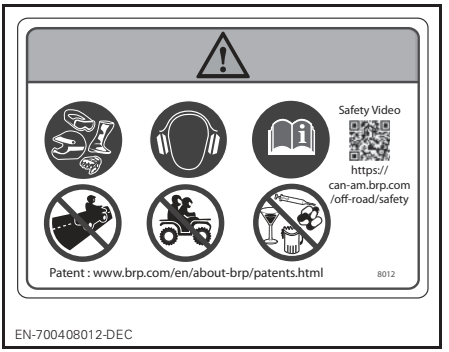
Label 1

⚠ WARNING

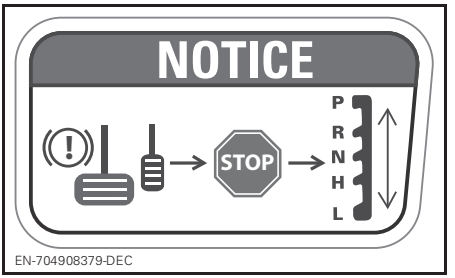
- Always use an approved helmet and protective gear.
- Always wear ear protection.
- Locate and read operator's guide. Improper ATV use can result in SEVERE INJURY or DEATH. Follow all instructions and warnings.
- Never use on public roads.
- Never carry a passenger.
- Never use with drugs or alcohol.



LABEL 1

Label 2

NOTICE This vehicle must be stopped before shifting lever. ALWAYS apply foot brake to shift from Park (P) and Neutral (N).

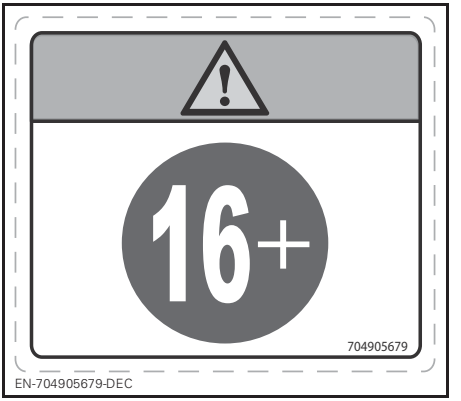


LABEL 2

Label 3

⚠ WARNING

Operating this ATV if you are under the age of 16 increases the chance of SEVERE INJURY or DEATH to the operator. NEVER operate this ATV if you are under age 16.

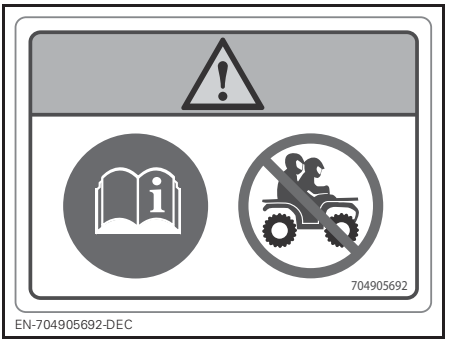


LABEL 3

Label 4

⚠ WARNING

- Locate and read operator's guide.
- NEVER carry a passenger.

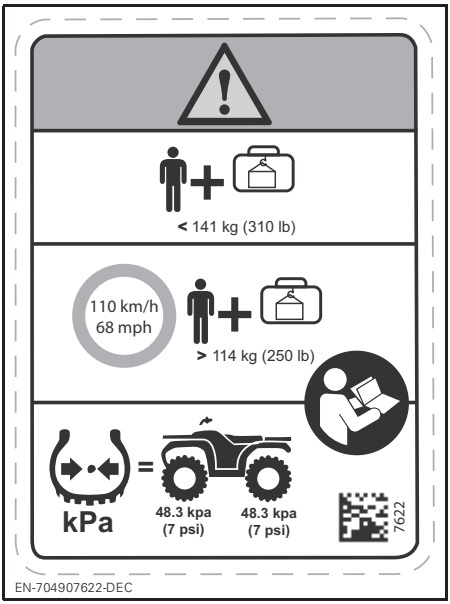


LABEL 4

Label 5

⚠ WARNING

- Locate and read operator's guide. Improper tire pressure and overloading can cause loss of control, resulting in SEVERE INJURY or DEATH.
- ALWAYS maintain proper tire pressure as shown.
- NEVER exceed the load capacity of 141 kg (310 lb) including weight of operator, cargo, and accessories (and including trailer tongue weight if applicable).
- NEVER exceed 110 km/h (68 MPH) when the total load of (114 kg (250 lb)) is reached.

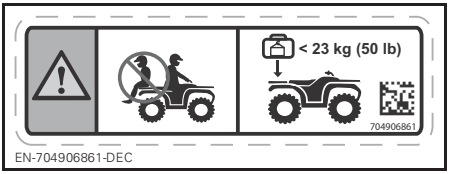


LABEL 5 (REFER TO SPECIFICATIONS FOR VALUES)

Label 6

⚠ WARNING

- NEVER carry a passenger on this carrier.
- MAXIMUM REAR LOAD: 23 kg (50 lb) evenly distributed (including trailer tongue weight if applicable).



LABEL 6

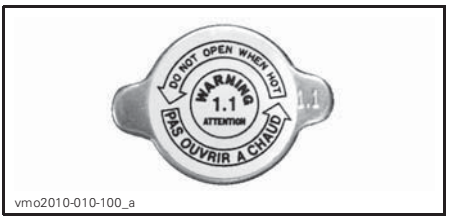
Label 7

⚠ WARNING

NEVER attach here or on the luggage rack to pull a load This can cause the vehicle to tip over. ALWAYS use the trailer hitch (if applicable) or the recovery hook to pull a load.

LABEL 7

Label 8



LABEL 8

Label 9

⚠ WARNING

Do not open when hot.

LABEL 9

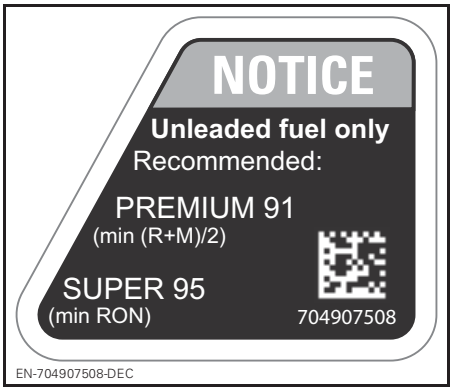
Compliance Labels

These labels indicate vehicle's compliance.

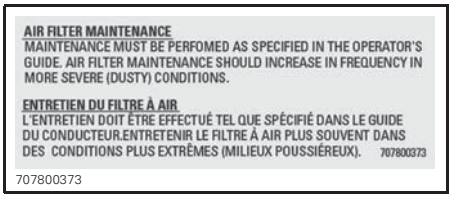
TYPICAL: WHEN APPLICABLE - UNDER SEAT

NEAR GAS CAP

Technical Information Labels



LOCATED NEAR GAS CAP OF 1000R ENGINES



UNDER SEAT

REPORTING SAFETY DEFECTS

In Canada, if you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform Transport Canada in addition to notifying Bombardier Recreational Products Inc.

If Transport Canada receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, Transport Canada cannot become involved in any individual problems between you, your dealer or Bombardier Recreational Products Inc.

TO CONTACT TRANSPORT CANADA:

819-994-3328 (Gatineau-Ottawa area or internationally)
Toll free : 1 800-333-0510 (in Canada)

Transport Canada - ASFAD
330 Sparks Street
Ottawa, ON
K1A 0N5

https://www.tc.gc.ca/recalls

PRE-RIDE INSPECTION

⚠ WARNING

Perform a pre-ride inspection before each ride to detect any potential problem that could occur during operation. The pre-ride inspection can help you monitor component wear and deterioration before they become a problem. Correct any problem that you discover to reduce the risk of a breakdown or crash.

Before using this vehicle, the operator should always perform the following pre-ride inspection check list.

Pre-Ride Inspection Check List

What to Do Before Starting the Engine (Unpowered Electrical System)

ITEMS TO BE INSPECTED	INSPECTION TO PERFORM	✔
Engine oil	Check engine oil level.	
Coolant	Check coolant level.	
Brake fluid	Check brake fluid level.	
Leaks	Check for any leaks under vehicle	
Throttle lever	Activate throttle lever several times to ensure it operates freely. It must return to idle position when released	
Parking brake	Apply parking brake and check if it operates properly	
Tires	Check tire pressure and condition. Refer to *SPECIFICATIONS* for values and adjust according to load.	
Wheels	Check wheels for damage and for abnormal play. Check that lug nuts and beadlock screws are tightened. Refer to *WHEELS AND TIRES* in *MAINTENANCE PROCEDURES* for torque specification.	
Radiator	Check cleanliness of the radiator	
Drive shaft boots	Check drive shaft boots and protectors condition	
Seat	Check if operator seat is in place and properly latched	
Cargo	If you transport a cargo, respect the load capacity. Refer to *LOADING THE CARGO RACKS*. Ensure cargo is properly secured to the rack	
	If you are pulling a trailer or another equipment: – Check hitch (if applicable) and trailer ball condition – Respect the tongue capacity (if applicable) and towing capacity as indicated on the label affixed to the hitch or refer to *SPECIFICATIONS*. – Ensure trailer is properly secured to hitch (if applicable).	
Chassis and suspension	Check underneath vehicle for any debris on chassis or suspension components and clean them properly	
Engine air filter	Inspect and clean engine air filter	
CVT air filter	Inspect and clean CVT air filter	

What to Do Before Starting the Engine (Electrical System Powered)

ITEMS TO BE INSPECTED	INSPECTION TO PERFORM	✔
Multifunction gauge	Check operation of indicator lamps in multifunction gauge (during first few seconds of key ON)	
	Check for messages on multifunction gauge	
Lights	Check operation and cleanliness of headlights and taillight	
	Check operation of low and high beams	
	Check operation of brake light	
Fuel level	Check the fuel level.	

What to Do After the Engine is Started

ITEMS TO BE INSPECTED	INSPECTION TO PERFORM	✔
Steering	Check if steering operates freely by completely turning it from side to side	
Shift lever	Check operation of shift lever (P, R, N, H and L)	
2WD/4WD selector	Check operation of 2WD/4WD selector	
Brakes	Drive forward slowly a few feet and apply brake lever and brake pedal individually. The brakes must fully apply. Lever and pedal must fully return when released	
Engine stop switch	Check that the engine stop switch is working properly	
RF D.E.S.S. Post	Check if D.E.S.S. post is working properly by pulling the D.E.S.S. key from the D.E.S.S. post and stopping the engine	

RIDING THE VEHICLE

To fully appreciate the pleasures and excitement of riding this vehicle, there are some basic rules and tips that you MUST follow. Some may be new to you while others may be common sense or obvious.

Please take the time to study this Operator's Guide and all on-product safety labels as well as the *SAFETY VIDEO* located at https://can-am.brp.com/off-road/safety. They more completely describe what you should know about this vehicle before riding it.

Whether you are a new user or an experienced rider, it is important for your personal safety that you know the controls and features of this vehicle. Equally important is knowing how to properly ride.

This is a high performance ATV for off-road use only. Inexperienced riders may overlook risks and be surprised by the specific behavior of this ATV in any terrain condition.

We recommend following the age recommendation indicated on the safety label affixed on the unit. Even though a person may be within the age group for which this vehicle is recommended, he may not have the skills, abilities, or judgment needed to operate this vehicle safely and may be involved in a serious accident.

Individuals with cognitive or physical impairments or who are high risk takers have an increased exposure to overturns or collisions which may result in injury including death.

Not all vehicles are the same. Each has its own unique performance characteristics, controls and features. Each will ride and handle differently.

Become completely familiar with the operational controls and the general operation of the vehicle before venturing into off road conditions. Practice driving in a suitable area free of hazards and feel the response of each control. Drive at low speeds. Higher speeds require greater experience, knowledge and suitable riding conditions.

Riding conditions vary from place to place. Each is subject to weather conditions which may radically change from time to time and from season to season.

Riding on sand is different than riding on snow or through forests or marshes. Each location may require a greater degree of awareness and skill. Show good judgement. Always proceed with caution. Please do not take any unnecessary risks that could leave you stranded or possibly injured.

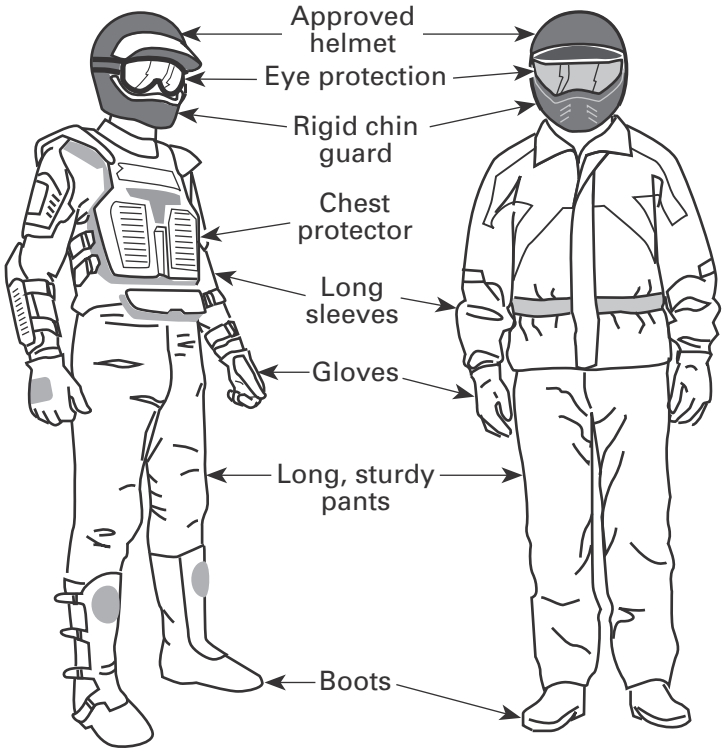
Never assume that the vehicle will go everywhere safely. Sudden changes in terrain caused by holes, depressions, banks, softer or harder "ground" or other irregularities may cause the vehicle to topple or become unstable. To avoid this, slow down and always observe the terrain ahead. If the vehicle does begin to topple or tip over, the best advice is to immediately get off AWAY from the direction of the tip over!

We encourage you to have an Annual Safety Inspection of your vehicle. Please contact an authorized BRP dealer for further details. Though not required, it is recommended that an authorized BRP dealer performs the preseason preparation of your vehicle. Each visit to your authorized BRP dealer is a great opportunity for your dealer to verify if your vehicle is included in any safety campaign. We also urge you to visit your authorized BRP dealer in a timely manner if you become aware of any safety related campaigns.

See an authorized BRP dealer for available accessories you may require.

Riding Gear

Actual weather conditions should help you decide how to dress. Dress for the coldest weather expected. Thermal underwear next to the skin also provides a good insulation. It is important that the operator always wears the appropriate protective riding gear and apparel, including an approved helmet, eye protection, boots, gloves, a long sleeved shirt and pants. This type of clothing will provide you protection from some of the minor hazards you may encounter en route. The operator must never wear loose clothing such as a scarf that may get entangled in the vehicle or on tree branches and shrubs. Depending on conditions, anti-fogging goggles or sunglasses may be required. Different colored lenses available for goggles or sunglasses help you distinguish terrain variations. Sunglasses should only be worn during the daytime.



V00A0RN

Riders with appropriate riding gear

Recreational Riding

Respect the rights and limitations of others. Stay away from areas designated for other types of off road use. This includes snowmobile trails, equestrian trails, cross country ski trails, mountain bike trails, etc. Never assume there are no other

users on the trail. Always stay to the complete right of the trail and do not zigzag to one side of the trail then the other. Be prepared to stop or pull off to the side if another trail user appears in front of you.

Join a local ATV club. It will provide you with a map and advice or inform you where you can ride. If a club does not exist in your area, help to start one. Group riding and club activities provide a pleasurable, social experience.

Always keep a safe distance from other riders. Your judgment of speed, terrain conditions, weather, mechanical condition of your vehicle and the "trust in judgment" you have in others around you will help you make a better choice of appropriate safe distance. This vehicle, like any other motorized vehicle, cannot stop "on a dime". Allow greater distance for braking.

Before you ride, tell someone where you are planning to travel and your expected time of return.

Depending on the length of your ride, carry additional tools , drinking water, food and emergency equipment. Find out where you can get additional gasoline and oil. Be prepared for the possible conditions you may encounter.

First aid kit	Adjustable wrench
Mobile phone	Knife
Friction tape	Flashlight
A rope	Colored lens goggles
Spare light bulbs	Trail map
Provided tool kit	Snack

Environment

One of the benefits of this vehicle is that it can take you off the beaten path away from most communities. However, you should always respect nature and the rights of others to enjoy it. Do not ride in environmentally sensitive areas. Do not drive over forest crops or shrubs nor cut down trees or take down fencing nor spin your wheels and destroy the terrain. "Tread Lightly".

This vehicle can cause OHV wildfires if debris builds up near the exhaust or other engine hot spots and ignites then falls off into dry grass. Avoid riding in wet areas, through muskeg or tall grass, where debris can build up. Should you ride in those areas, inspect and remove all debris from your engine and hot spots.

Chasing wildlife is in many areas illegal. Wildlife can die of exhaustion after being chased by a motorized vehicle. If you encounter animals on the trail, stop and observe quietly and with caution. It will be one of the better memories of your life.

Observe the rule "what you take in, carry out". Do not litter. Do not start campfires unless you have permission to do so and then only away from dry areas. The hazards you may create on the trail may cause injury to others or yourself, even at a later date.

Respect farm lands. Always obtain the permission of the landowner before riding on private land. Respect crops, farm animals and property lines. If you come to a closed gate, close it again behind you.

Finally, do not pollute streams, lakes or rivers and do not modify the engine or exhaust system, or remove any of its components.

Design Limitation

Although the vehicle is exceptionally rugged for its class, it is still a light vehicle by definition and its operation must be restricted to its proper purpose.

The addition of weight to any part of the vehicle changes its gravitational stability and modifies its performance.

Off-Road Operation

The very nature of off-road operation is dangerous. Any terrain, which has not been specially prepared to carry vehicles, presents an inherent danger where angularity, terrain substance and exact steepness are unpredictable. The terrain itself presents a continual element of danger, which must be knowingly accepted by anyone venturing over it.

An operator who takes a vehicle off-road should always exercise the utmost care in selecting the safest path and keeping close watch on the terrain ahead of him. On no account should the vehicle be operated by anyone who is not completely familiar with the driving instructions applicable to the vehicle, nor should it be operated on steep or treacherous terrain.

Riding Techniques

Information in this guide is limited. Increase your knowledge and improve your skills by following a certified training course.

Care, caution, experience and driving skill are the best precautions against the hazards of vehicle operation.

Respect and follow all posted trail signs. They are there to help you and others.

When driving on hills or slopes two things are highly important be prepared for slippery surfaces or terrain variations and obstacles and use proper body positioning.

Whenever there is the slightest doubt that the vehicle can safely negotiate an obstacle or a particular piece of terrain, always choose an alternate route.

In off-road operation, power and traction, not speed, are important. Never drive faster than visibility and your own ability to select a safe route permits.

Constantly watch the terrain ahead for sudden changes in slopes or obstacles, such as rocks or stumps, that may cause loss of stability, resulting in tip over or rollover.

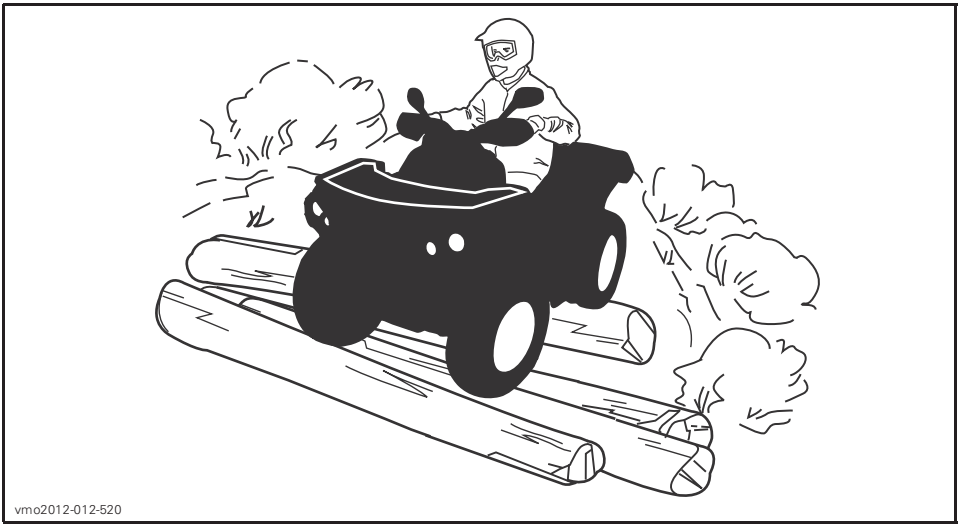
Never operate the vehicle if the controls do not function normally.

When stopped or parked, always set the shift lever to PARK position apply the parking brake. This is especially important when parking on a slope. On very steep inclines or if the vehicle is carrying cargo, the wheels should be blocked using rocks or bricks.

Always use proper riding techniques to avoid vehicle overturns on hills and rough terrain and in turns.

Body Position

To maintain proper control, it is strongly advised that you keep your hands on the handlebar and within easy reach of all controls. The same holds true for your feet on the foot pegs. To minimize the possibility of a leg or foot injury, keep your feet on the foot pegs at all times. Do not direct your toes outwards nor extend your feet out to assist in turning as they can be hit or be snagged on passing obstacles, or may come into contact with the wheels.



Even though there is a suspension on this vehicle, there are "washboard" or rough terrain conditions that will make you feel uncomfortable and can even cause a back injury. "Posting" or riding in a crouched position will often be required. Slow down and allow your flexed legs to absorb part of the impact energy.

Crossing Roads

If you have to cross a road, the lead driver should get off his vehicle, then observe and give directions to the other riders. The last person after crossing then assists the lead driver to cross. Do not travel on sidewalks. They are designated for pedestrian use.

Turning

Practice turning at low speeds before attempting to turn at faster speeds.

Keep both hands on handlebars and feet on foot pegs.

Maintain a constant speed or a slight acceleration during turn.

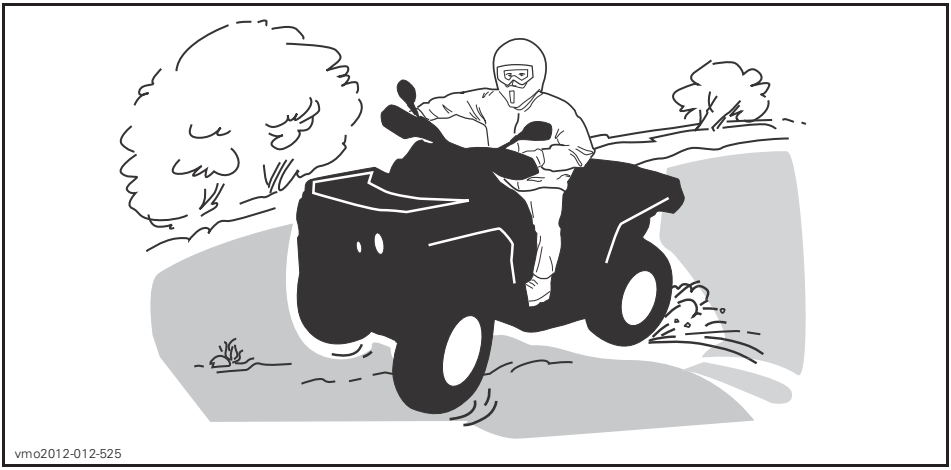
To reduce the risk of rollovers:

– Use care when turning.
  - Do not turn the handlebar too far or too fast for your speed and environment. Adjust steering inputs accordingly.
  - Slow down before entering a turn. Avoid hard braking during a turn.
  - Avoid sudden or hard acceleration when turning, even from a stop or low speed.
– Never attempt donuts, skids, slides, fishtails, jumps, or other stunts. If vehicle starts to skid or slide, steer in the direction of the skid or slide. Never slam the brakes and lock the wheels.
– Avoid paved surfaces. This vehicle is not designed to operate on paved surfaces and is more likely to roll over. If you must drive on pavement, turn gradually, go slowly, and avoid abrupt acceleration and braking.

Avoid sudden inputs to steering, throttle or brakes while turning.

⚠ WARNING

Do not attempt turns at excessive speed.



If you do get into a slide or skid, it may help to turn the handlebar in the direction of the skid until you regain control. Never jam the brakes and lock the wheels.

⚠ WARNING

The tires of this vehicle are not suited for paved road use. Also this vehicle is not equipped with a rear differential (rear wheels are always turning at the same speed). For these reasons, pavement may seriously affect the handling and control of the vehicle.

Braking

Always keep both hands on handlebars and feet on foot pegs when braking.

Practice braking to get familiar with the brake response.

– Do it at low speed first, then increase the speed.
– Practice braking in straight line at different speeds and different braking force.
– Practice emergency braking; optimal braking is obtained in straight line, with high force applied, without locking the wheels.

Remember, braking distance depends on vehicle speed, load and the type of surface. Also, the tires and brakes conditions play a major role.

NOTE: If going forward the vehicle weight is transferred to the front wheels when braking. To obtain greater stopping efficiency, the brake system distributes more braking force to the front wheels. This will affect vehicle handling and steering control when braking vigorously. Take it into account when braking.

Reverse Operation

When operating in reverse, check that the path behind the vehicle is free of people or obstacles. Proceed slowly and avoid sharp turns.

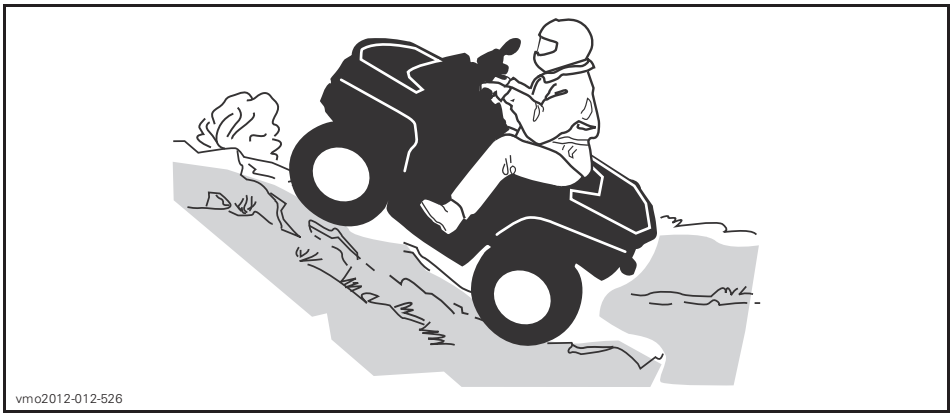
We recommend sitting on your ATV when operating in reverse. Avoid standing up. Your weight could shift forward against throttle lever, causing an unexpected acceleration.

Obstacles

Obstacles in the "trail" should be traversed with caution. This includes loose rocks, fallen trees, slippery surfaces, fences, posts, and embankments and depressions. You should avoid them whenever possible. Remember that some obstacles are too large or dangerous to cross and should be avoided. Small rocks or fallen trees may be safely crossed approach at a 90° angle. Stand on the footrests while keeping your knees flexed. Adjust speed without losing momentum and do not "gun" the throttle. Hold handlebar firmly. Place operator body weight rearwards and proceed. Do not try to lift the vehicle front wheels off the ground. Be aware that the object may be slippery or may move while crossing.

Uphill Driving

Before trying to climb a hill, keep these things in mind. Hill Climbing should only be attempted by experienced operators. Start on shallow slopes. Always drive straight uphill and keep your body weight forward towards the top of the hill. Keep your feet on the footrests, shift your ATV into a lower gear and accelerate before you start to climb. Try to keep a steady speed and go easy on the throttle to avoid acceleration. Abrupt slope or terrain variation or rolling one wheel over an obstacle could have a big impact on the stability as it will lift the front of the vehicle increasing the risk of tipping over. Some hills are too steep to safely stop or recover from after an unsuccessful climbing attempt. Try to avoid steep inclines. If you're not careful, you could tip over when going up hills. If the hill is too steep and you cannot proceed or the vehicle begins to roll backwards, apply the brake, being careful not to slide, put the parking brake. Dismount on the left side then use the "K" turn (while walking back, next to the vehicle on the up hill side and with a hand on the brake lever, slowly back the rear of the vehicle toward the top of the hill then drive downhill). Always walk or dismount on the upside of the slope while keeping clear of the vehicle and its rotating wheels. Do not try to hold on to the vehicle if it begins to topple. Stay clear. Do not ride over the crest of the hill at high speed. Obstacles, including sharp drop-offs, may exist.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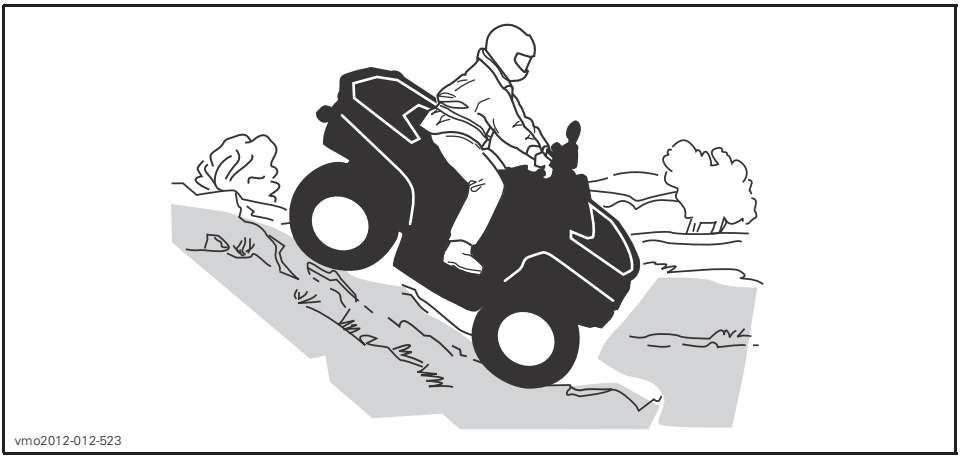
Downhill Driving

This vehicle can climb slopes that are steeper than it can safely descend. Therefore, it is essential to ensure that a safe route exists to descend a slope before you climb it.

Decelerating while negotiating a slippery downhill slope could "toboggan" the vehicle. Maintain steady speed and/or accelerate slightly to regain control.

Keep your body weight rearwards. Apply the brake gradually to prevent skidding. Do not "coast" down the slope using solely engine compression or in neutral gear. Try to avoid steep inclines. If you're not careful, you could tip over when going down hills.



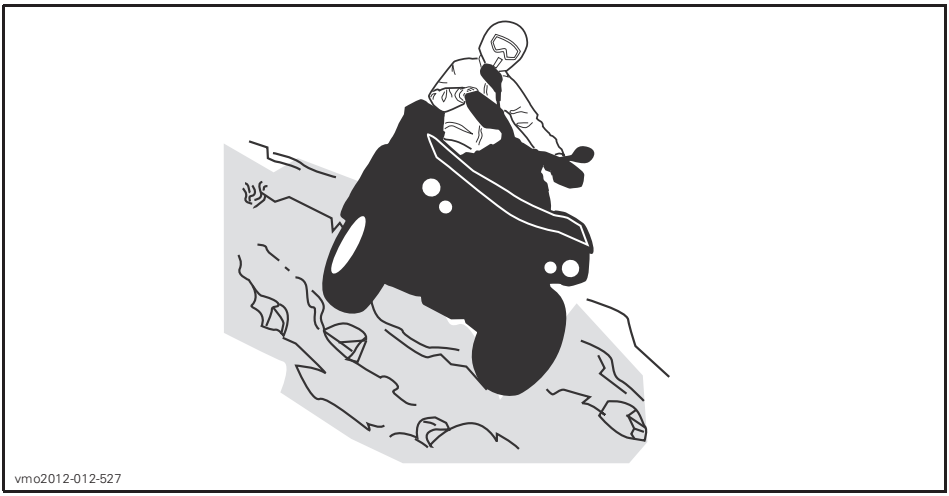
Side Hilling

This is one of the **most risky** types of riding since it may drastically change the balance of the vehicle. It should be avoided whenever possible. However, if it is necessary to do so , it is important that you ALWAYS keep your body weight on the upside of the slope and be prepared to dismount on that side should the vehicle begin to topple. **Do not try to stop or save the vehicle from damage.**

Avoid all objects or depressions that will intensify the raising of one side of the vehicle higher than the other, thus causing rollover.

⚠ WARNING

Be careful when loading and transporting liquid reservoirs. They can affect vehicle stability when side hilling by pulling downhill and increasing the risk of a roll over.



Drop-Offs

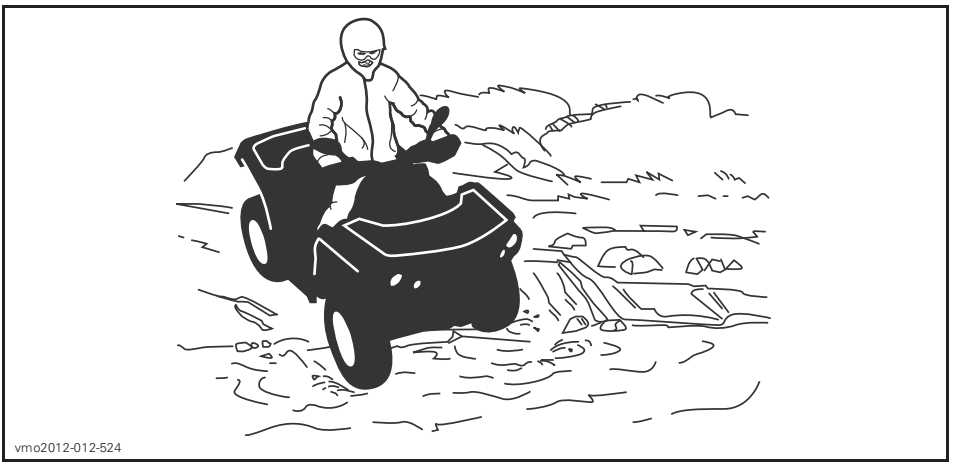
This vehicle will "bottom-out" and usually stop if either the front or rear wheels are driven over a drop-off. If the drop is sharp or deep, the vehicle will nose dive and tip over.

⚠ WARNING

Avoid negotiating drop-offs. Reverse and select an alternate route.

Crossing Water

Water can be a unique hazard. If it is too deep the vehicle may "float" and topple. Check the water depth and current before you attempt to cross any water. Water should not go above the footrest. Be wary of slippery surfaces such as rocks, grass, logs, etc., both in the water and on its banks. A loss of traction may occur. Do not attempt to enter the water at high speed. The water will act as a brake and could throw you off the vehicle, on the ground.



Wet brakes will affect the braking ability of your vehicle. Make sure you dry the brakes by applying them several times after the vehicle leaves the water, mud or snow. Allow greater distance for braking.

Mud or marsh lands may be encountered near water. Be prepared for sudden "holes" or changes in depth. Similarly so, be watchful of hazards such as rocks, logs, etc., partially covered by vegetation.

Riding on Ice

If your route crosses frozen waterways, make sure the ice is thick enough and sound enough to support the total weight of yourself, the vehicle and its load. Be ever watchful of open water it is a sure indication that the ice thickness will vary.

Ice will also affect the control of the vehicle. Slow down and do not "gun" the throttle. This will only result in spinning of the tires and possible tip over of the vehicle. Avoid rapid braking. This again will possibly result in an uncontrolled slide and tip over of the vehicle. Slush should be avoided at all times since it could block the operation or controls of the vehicle.

Riding on Snow Covered Surfaces

When performing the pre-ride inspection, pay special attention to locations on the vehicle where snow and/or ice accumulations may obstruct visibility of the taillight and reflectors, clog ventilation openings, block the radiator and fan, and interfere with the movement of control levers, switches and brake pedal. Before starting with your ATV check the steering, throttle and brake lever and pedal controls for interference free operation.

Whenever an ATV is ridden on a snow covered drive path the tire grip is generally reduced causing the vehicle to react differently to control inputs from the operator. On low grip surfaces, the steering responses are not as crisp and precise, stopping distances are lengthened and acceleration becomes sluggish. Slow down and do not "gun" the throttle. This will only result in spinning of the tires and possibly in an over steering slide of the vehicle. Avoid hard braking. This will possibly result in a straight line slide of the vehicle. Again, the best advice is to safely reduce speed in anticipation of a maneuver so to give yourself time and distance to regain total vehicle control before it spins out of your control.

As you drive your ATV over a loose snow covered surface, snow dust will be picked up in the wake turbulence of the moving vehicle and transported to contact and accumulate or melt on some exposed components including rotating parts like brake discs. Water, snow or ice may affect the response time of the brake system of your ATV. Even when not required to reduce vehicle speed apply brakes frequently to prevent ice or snow accumulation and to dry brake pads and discs. While doing so in low risk driving situations you will test for grip level and keep yourself alerted to how the vehicle reacts to your control inputs. Always keep brake pedal, footrests, floor boards, brake and throttle levers free of snow and ice. Frequently wipe snow off seat, hand grips, headlights, taillights and reflectors.

The depth of the snow cover may hide rocks, tree stumps or other objects and if it is wet may totally impede the driveability as the vehicle becomes bogged down or completely looses traction in slushy snow. Look far ahead and always be watchful of any visible clues that might indicate the presence of such obstacles. In doubt steer clear. Avoid driving on any frozen body of water before checking that the ice will safely support the ATV, its riders and its load of cargo. Remember that a given thickness of ice may be sufficient to support a snowmobile but not an ATV of an identical weight because of the smaller load bearing surface of the four tire contact patches as compared to that of a snowmobile track and skis.

To maximize comfort and avoid frostbite, always wear clothing and ATV protective equipment appropriate for the weather conditions you will be exposed to during your ride.

At the end of each ride it is a good practice to clean the vehicle body and all moving components (brakes, steering components, drivelines, controls, radiator fan etc.) from any snow or ice accumulations. Wet snow will turn to ice during the shut down period and become more difficult to remove at the next pre-ride inspection.

Riding in snow may reduce the brakes stopping capability. Safely reduce speed and allow greater distance for braking. Snow projection may cause ice build up or snow accumulation on brake components and controls. Apply brakes frequently to prevent ice or snow accumulation.

Riding on Sand

Riding on sand, sand dunes or on snow is another unique experience, but there are some basic precautions that should be observed. Wet, deep or fine sand/snow may create a loss of traction and cause the vehicle to slide, drop off or become "bogged" down. If this occurs look for a firmer base. Again, the best advice is to slow down and be watchful of the conditions.

When riding in sand dunes it is advisable to equip the vehicle with an antenna type safety flag. This will help make your location more visible to others over the next sand dune. Proceed carefully should you see another safety flag ahead. Since the antenna type safety flag can snag and rebound on your body if caught, do not use it in areas where there are low hanging branches or obstacles.

Riding on Loose Stones

Riding on loose stones or gravel is very similar to riding on ice. They will affect the steering of vehicle possibly causing it to slide or tip over especially at high speeds. In addition, braking distance may be affected. Remember that "gunning" the throttle or sliding may cause loose stones to be ejected rearwards into the path of another rider. Never do it deliberately.

MOVING LOADS AND DOING WORK

Working with your Vehicle

Your vehicle can help you perform a number of different LIGHT tasks ranging from snow removal to pulling wood or carrying cargo. A variety of accessories are available from your authorized Can-Am dealer. To prevent possible injury, follow the instructions and warnings that accompany the accessory. Always respect the load limits of the vehicle. Overloading the vehicle can overstress the components and cause failure. Avoid overexerting yourself if you lift or pull heavy loads or manually push the vehicle.

Carrying Loads

Any load carried on the vehicle will affect the handling, stability and braking distance of the vehicle. Do not exceed the total load allowed for this vehicle, including the weight of operator and passenger cargo, accessories and trailer tongue weight. Refer to *SPECIFICATIONS*. Always make sure the cargo is secured, properly distributed and cannot interfere with your controls or lights. Always be aware that the cargo may slide or fall off and cause an accident. Avoid loads that may protrude sideways and get snagged or caught in brush or other obstacles.

⚠ WARNING

Never overload, tow or carry cargo improperly. Safely reduce speed according to terrain conditions when carrying cargo or pulling a trailer, and avoid hills and rough terrain. Allow greater distance for braking, especially on inclined surfaces. Always secure cargo as low as possible to reduce the effect of a higher center of gravity. Failure to follow the recommendations here could cause changes in vehicle handling which could lead to an accident.

MAXIMUM LOAD TABLE		
TOTAL LOAD ALLOWED	141 kg (310 lb)	Includes weight of operator, cargo, accessories and trailer tongue weight.
MAX REAR LOAD	23 kg (50 lb)	Includes rear cargo area and tongue load (if applicable).
MAX REAR CARGO LOAD	16 kg (35 lb)	Includes rear cargo area only.

The following is an example of suitable load distribution:

EXAMPLE OF LOAD DISTRIBUTION				
TOTAL VEHICLE LOAD	OPERATOR	CARGO LOAD	ACCESSORIES	TONGUE WEIGHT
141 kg (310 lb)	108 kg (238 lb)	9 kg (20 lb)	10 kg (22 lb)	13 kg (30 lb)

Loading the Rear Cargo Area

Load cargo as low as possible – a higher load can raise the vehicle's center of gravity, which can reduce stability. Position cargo on the rack as evenly distributed as possible.

Secure the load on the rear cargo area. Do not secure cargo to other parts of the vehicle. If it is not properly secured, a load may slide or fall off, possibly striking occupants or bystanders; or it may shift during riding, affecting the handling of the vehicle.

Objects that are high may affect visibility for the driver and may act as projectiles in case of an accident. Loads that protrude sideways can get snagged or caught in bush, branches or other obstacles. Avoid covering and obstructing the brake lights with the cargo. Ensure no cargo protrudes outside the cargo area and that cargo will not interfere with your visibility or control of the vehicle.

NOTICE Do not exceed the cargo racks capacity. Refer to *SPECIFICATIONS*.

Never carry gasoline container(s) or any dangerous liquids on the rear cargo area.

⚠ WARNING

Never overload, tow or carry cargo improperly. Safely reduce speed according to terrain conditions when carrying cargo or pulling a trailer, and avoid hills and rough terrain. Allow greater distance for braking. Always secure cargo as low as possible to reduce the effect of a higher center of gravity. Failure to follow the recommendations here could cause changes in vehicle handling which could lead to an accident.

Hauling a Load
(if Equipped with Hitch)

Never pull a load by attaching it to the bumper, rear cargo area or any other parts or accessories; this can cause the vehicle to tip over. Use only the trailer hitch (if installed) or winch to pull a load.

In an emergency situation, use the recovery hook to recover a stuck vehicle. Refer to *RECOVERY HOOK* in *EQUIPMENT*.

When pulling loads with a chain or cable, ensure that there is no slack before starting and maintain tension while pulling.

When pulling loads with a chain or cable, be sure to brake progressively. The inertia of the load could lead to an impact.

When hauling a load, respect the maximum . See *PULLING A TRAILER* in this section.

⚠ WARNING

A slack in the chain or cable can cause it to break and snap back.

When pulling another vehicle, be sure that someone is controlling the pulled vehicle. They must brake and steer to prevent the vehicle from going out of control.

Before pulling loads with a winch, refer to the winch manufacturer's instructions.

Reduce your speed when hauling a load and turn gradually. Avoid hills and rough terrain. Never attempt steep hills. Allow more distance for braking, especially on inclined surfaces. Be careful not to skid or slide.

Pulling a Trailer (If Equipped with a Hitch)

NOTICE A BRP approved rear hitch must be properly installed on the vehicle for hauling trailers.

Riding this vehicle with a trailer substantially increases the risk of toppling, especially on inclined slopes. If a trailer is used behind the vehicle make sure that its hitch is compatible with the one installed on the vehicle as an accessory. Make sure the trailer is horizontal with the vehicle. (In some instances a special extension may have to be installed on the vehicle hitch). Use security chains or cables to secure the trailer with the vehicle.

Reduce your speed when pulling a trailer and turn gradually. Avoid hills and rough terrain. Never attempt steep hills. Allow more distance for braking, especially on inclined surfaces. Be careful not to skid or slide.

Improperly loading a trailer may cause a loss of control.

Do not exceed the towing capacity or tongue capacity. Refer to *SPECIFICATIONS*.

Make sure there is at least some weight on the tongue.

Always make sure load is evenly distributed and safely secured on the trailer; an evenly balanced trailer is easier to control.

Always put the shift lever to L (low range) for hauling a trailer – in addition to providing more torque, operating in low range helps account for the increased load on the rear tires.

When stopped or parked, block the vehicle and trailer wheels from possible movement.

Use caution when disconnecting a loaded trailer; it or its load may topple on you or others.

When hauling a trailer, respect the following maximum hauling capacity.

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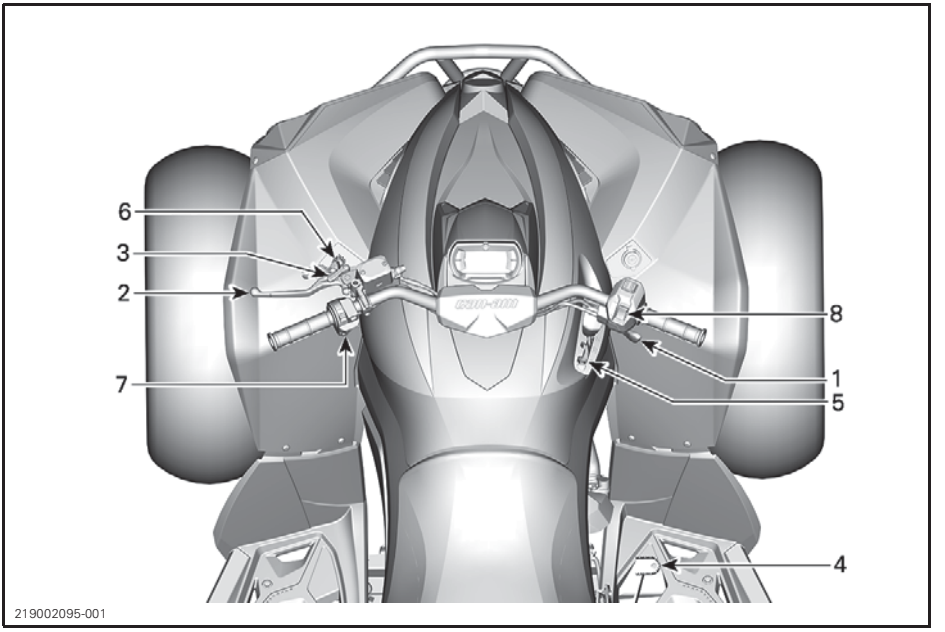
VEHICLE INFORMATION



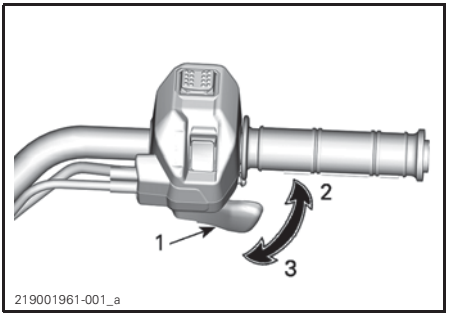
1) Throttle Lever

The throttle lever is located on the RH side of the handlebar.

The throttle lever controls the engine speed.

To increase or maintain vehicle speed, press the throttle lever with your right thumb.

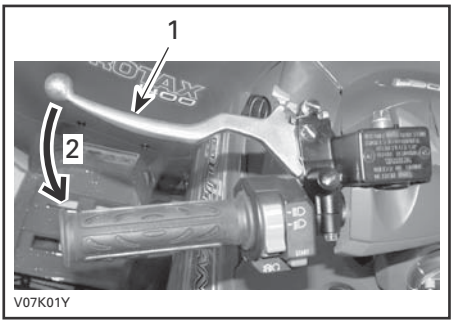
To decrease vehicle speed, release the throttle lever.



TYPICAL
1. *Throttle lever*
2. *To accelerate*
3. *To decelerate*

2) LH Brake Lever

The LH brake lever is located on the LH side of the handlebar.



TYPICAL
1. *Brake lever*
2. *To apply brakes*

The LH brake lever function is to slow down or stop the vehicle.

When the brake lever is compressed, the front and rear brakes are applied.

Braking effect is proportional to the force applied on the lever.

3) Parking Brake Lever

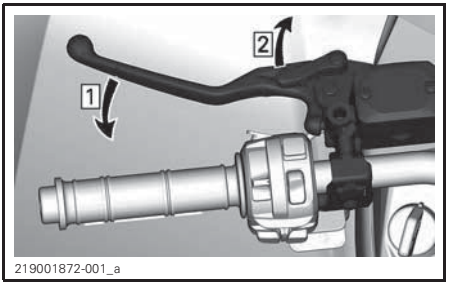
The parking brake lever is located on the LH side of the handlebar.

The parking brake function is to maintain brake to all wheels to prevent vehicle from moving when parked.

⚠ WARNING

Always use the parking brake and engage the PARK position on the shift lever when the vehicle is not in operation.

To engage the parking brake proceed as shown:



Step 1: Apply brakes
Step 2: Lock brakes

NOTE: The parking brake lever can be set in several positions.

⚠ WARNING

Ensure when the parking brake is applied that the vehicle stays securely in place.

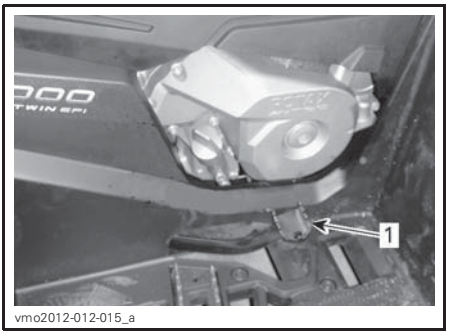
To release the parking brake, simply squeeze the brake lever. It should return to the rest position.

⚠ WARNING

Make sure parking brake is released before operating the vehicle. If parking brake is left ON while riding, it may cause damage to the brake system and cause loss of braking capacity and/or fire.

4) Brake Pedal

The brake pedal is located on the RH side of the vehicle near engine.



1. *Brake pedal*

The brake pedal function is to slow down or stop the vehicle.

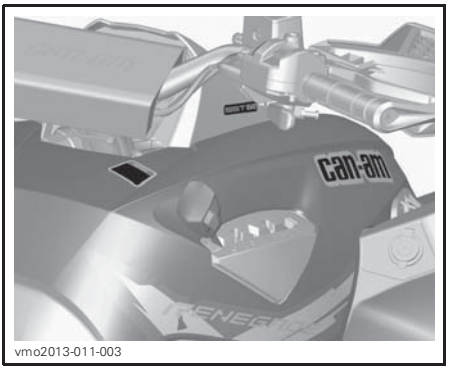
When the brake pedal is pressed down, **only** the rear brake is applied.

Braking effect is proportional to the force applied on the pedal.

NOTE: The brake will have also an effect on front wheels through the drive train when 4WD is engaged.

5) Shift Lever

The shift lever is located on the RH side of the vehicle near steering column.



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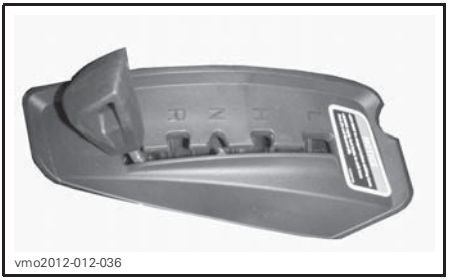
SHIFT LEVER LOCATION

The shift lever is used to change the gearbox position.

The shift lever has 5 positions:

SHIFT LEVER POSITIONS	
POSITION	GEAR
P	Park
R	Reverse
N	Neutral
H	High range (forward)
L	Low range (forward)



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SHIFT PATTERN

The vehicle must be stopped and brakes applied prior to selecting any gear.

NOTICE **This gearbox is not designed to shift while vehicle is moving.**

P: Park

The park position locks the gearbox to help prevent vehicle movement.

⚠ WARNING

Always use the PARK (P) position when the vehicle is not in operation. The vehicle can roll if the shift lever is not set to P (PARK).

R: Reverse

The reverse position allows the vehicle to go backwards.

NOTE: In reverse operation, the engine's RPM is limited, thus limiting the vehicle reverse speed.

⚠ WARNING

When driving downhill in reverse, gravity can increase the vehicle speed above the set limited reverse speed.

Neutral

The neutral position disengages the gearbox.

⚠ WARNING

Always use the PARK (P) position when the vehicle is not in operation. The vehicle can roll if the shift lever is set to N (NEUTRAL).

High Range (Forward)

This position selects the high speed range of the gearbox. It is the normal driving speed range. It allows the vehicle to reach its maximum speed.

Low Range (Forward)

This position selects the low speed range of the gearbox. It allows the vehicle to move slowly with maximum torque at the wheels.

NOTICE **Use the low speed range to pull a trailer, carry heavy cargo, go over obstacles or drive uphill and downhill.**

6) Keys

D.E.S.S. Key

Digitally Encoded Security System (D.E.S.S.)

The ignition keys contain an electronic circuit that gives it a unique electronic serial number.

The D.E.S.S. system reads the key code and allows engine starting for keys it recognizes.

This vehicle can be operated using 2 different types of key programming:

– Normal

– Performance

Refer to your dealer for complete information.

The vehicle is delivered with 1 performance key.

NOTE: Additional keys are available from your dealer as an accessory.

⚠ WARNING

Rollovers, tipovers, collisions and loss of control resulting in serious injury or death are possible with the performance or normal key. Using the normal key is not a substitute for the operator being prepared, qualified, and operating with care.

Performance Key

The performance key allows the user to access the full torque of the engine as well as the top speed of the vehicle.

This may be useful for riders who prefer crisper throttle response, and for environments where higher speeds and greater acceleration are appropriate. For example, in wide-open straight trails, operators may prefer the performance key.

Normal Key

The normal key limits the vehicle rate of acceleration and/or the vehicle speed to 70 km/h (43 MPH).

⚠ WARNING

On steep downhills, the engine speed limiter may not prevent the vehicle from accelerating beyond this speed.

This key may be useful for riders who prefer more gradual acceleration, or for riding in environments where full speed and high acceleration are not desirable. For example, in narrow, winding trails, operators may prefer a normal key.

D.E.S.S. Flexibility

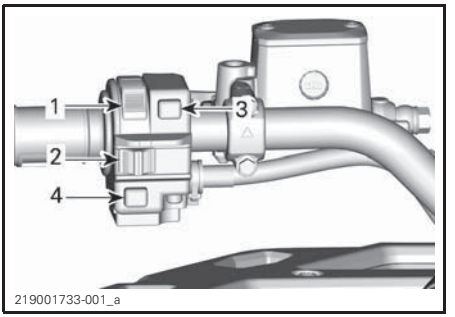
The D.E.S.S. of your vehicle can be programmed by your authorized Can-Am dealer to accept up to 8 different keys.

If you have more than one D.E.S.S. equipped Can-Am vehicle, each can be programmed by your authorized Can-Am dealer to accept the other vehicle D.E.S.S. keys.

7) Multifunction Switch

The multifunction switch is located on the LH side of the handlebar.

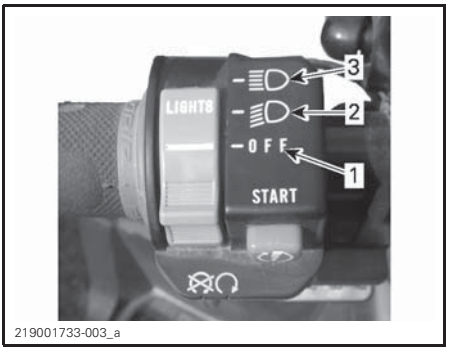
The controls located on this multifunction switch are:



TYPICAL — MULTIFUNCTION SWITCH
1. *Headlight switch*
2. *Engine stop switch*
3. *Engine start button*
4. *Override/DPS button (if applicable)*

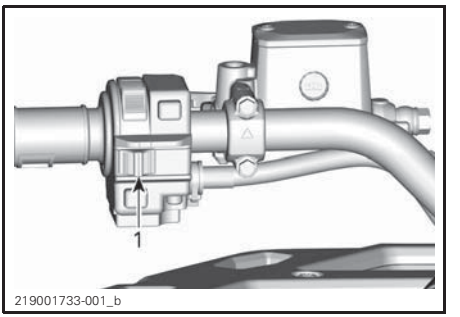
Low/High/OFF Headlight Switch

This switch is used to select either the headlights low or high beams or to turn lights OFF.



HEADLIGHT SWITCH FUNCTIONS
1. *Lights OFF*
2. *Low beam*
3. *High beam*

Engine Stop Switch



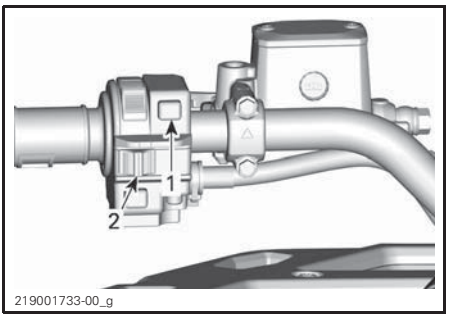
TYPICAL
1. *Engine stop switch*

This switch can be used to stop the engine and as an emergency control.

To stop engine, set the engine stop switch to the STOP position.

NOTE: Engine can be stopped by setting the engine stop switch to the STOP position.

Engine Start Button



TYPICAL
1. *Engine start button*
2. *Engine stop switch*

When engine start button is pressed and held, it starts the engine.

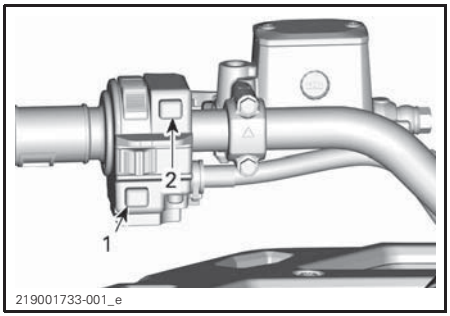
NOTE: To allow engine starting, the D.E.S.S. key must be securely installed on the D.E.S.S. post and the engine stop button set to RUN.

To power up the vehicle without starting the engine, refer to *WAKING UP THE ELECTRICAL SYSTEM*.

Override/DPS Button

Depending on the vehicle model, this button has up to 2 functions.

Override Function



TYPICAL
1. *Override button*
2. *Engine start button*

The override switch main function is to bypass the engine speed limiter in reverse operation by allowing maximum engine torque.

⚠ WARNING

Use the "override" mode only if the vehicle is caught in mud or other soft terrain and the "low range" is not enough. Make sure the area is secure before using the "override" mode. Do not use the "override" mode when driving normally in reverse, this would result in excessive speed.

To engage the override function, proceed as follows:

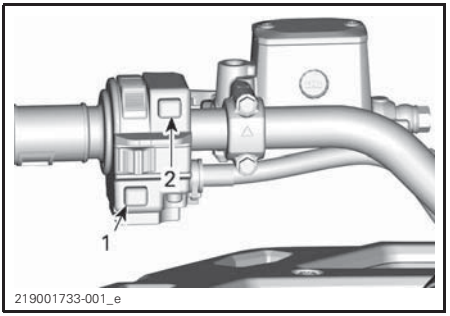
While the shift lever is set to REVERSE position.

1. Ensure that the vehicle is stopped.
2. Press and hold the override/DPS button then press the throttle lever gradually.

NOTE: When using the override function, the gauge will scroll an OVERRIDE message to confirm that the function is activated.

3. To disengage the override function, simply release the override/DPS button.

DPS Function (Renegade X xc Model)



TYPICAL
1. *DPS button*
2. *Engine start button*

The DPS function is used to change the DPS (Dynamic Power Steering) mode.

For complete information on DPS modes, refer to *TUNE YOUR RIDE*.

8) 2WD/4WD and Driving Modes (if equipped) Selector Switch

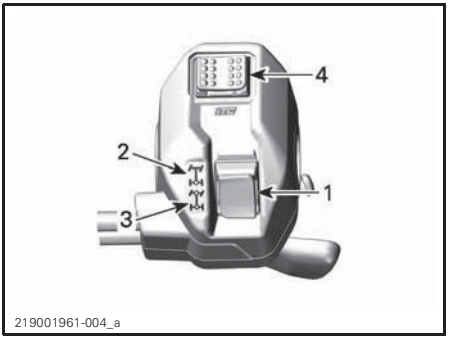
The 2WD/4WD and Driving Modes selector switch is located on the RH side of the handlebar.

This switch is used to select the 2WD or 4WD modes.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.



TYPICAL
1. *2WD/4WD Selector*
2. *2WD position*
3. *4WD position*
4. *Driving modes selector*

Bring the vehicle to a complete stop with the engine idling before changing between 2WD and 4WD modes or the opposite.

NOTICE **Mechanical damage may occur if the 2WD/4WD selector switch is used while vehicle is moving. The vehicle must be stopped when changing between 2WD and 4WD**

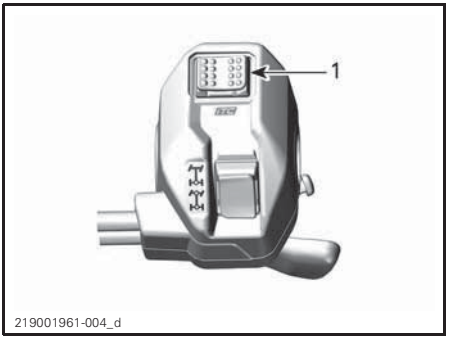
To engage the 4WD mode, press the switch down.

TYPICAL - 4WD MODE

To engage the 2WD mode, press the switch up.

TYPICAL - 2WD MODE

This switch is used to select the driving modes. (If equipped)



1. *Driving modes selector*

Activate SPORT or ECO mode by pushing the selector on the left or right.

The SPORT mode provides a crisper throttle response. Press LEFT to activate, RIGHT to deactivate.

NOTE: The SPORT mode can be activated with all key types and provides the maximum power with the used key.

The ECO mode provides a smoother throttle response and is limited to a maximum speed of 70 km/h (43 MPH). Press LEFT to activate, RIGHT to deactivate.

While reading this Operator's Guide, remember that:

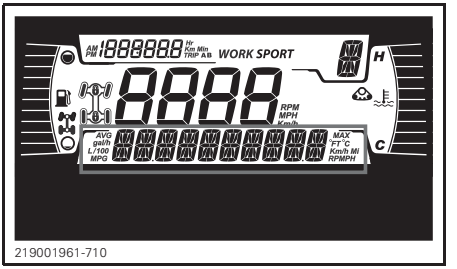
⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

4.5" DIGITAL DISPLAY

Multifunction Display

Lower Display



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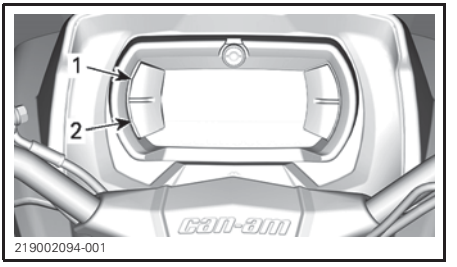
May display the following:
- RPM
- Speed
- Engine Temperature
- Battery Voltage
- Settings
- Messages

Use LOWER (MENU) button to change the displayed information.

The SPEED display shows the Maximum and the averaged speed. Hold LOWER (MENU) button for 1 second to reset (850 and 1000R models).

NOTE: Hold LOWER (MENU) button for 1 second to change DPS mode (570 models).



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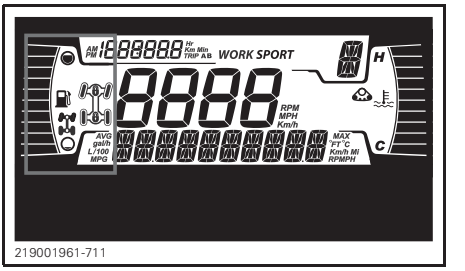
1. *Upper button*
2. *Lower button*

Left Lateral Display



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The left lateral display includes:
- Fuel level indicator
- 2X4 / 4X4 telltale

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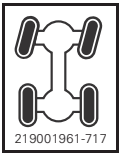
4X4 ICON FOR EUROPEAN COMMUNITY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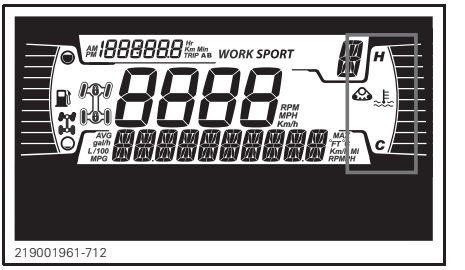
4X4 ICON FOR ALL OTHER COUNTRIES

Right Lateral Display



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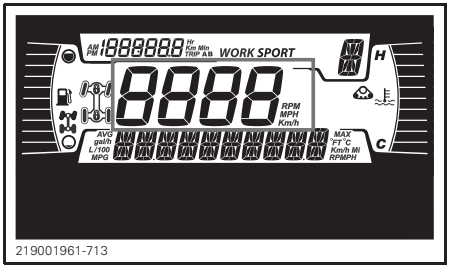
The right lateral display includes:
- Engine Temperature
- Track Kit active

When a track kit is installed, a message will scroll in the lower display.

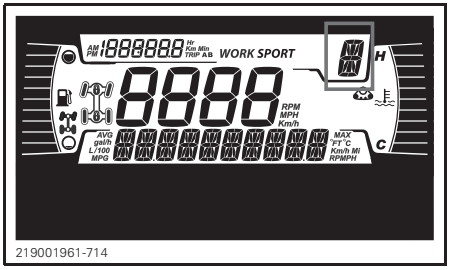
Central Display



219001961-713

Display the vehicle speed in Km/h or MPH.

Transmission Position Display

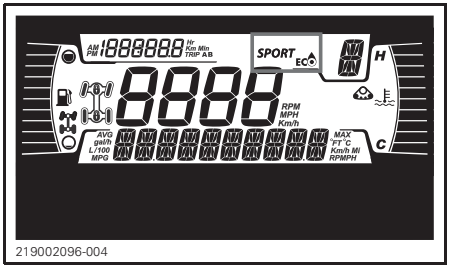


219001961-714

This display shows gear position of gearbox:

- P (Park)
- R (Reverse)
- N (Neutral)
- H (High Range)
- L (Low Range)
- – (Invalid Range)

MODE Display



219002096-004

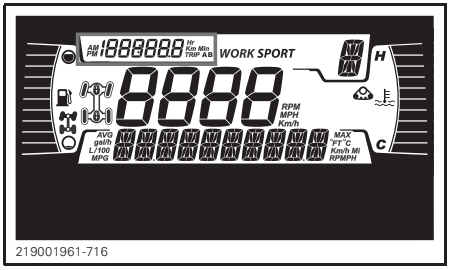
The MODE display indicates the selected mode of operation:

- SPORT
- ECO

A message of the selected mode will be displayed on the lower display at activation and deactivation as follow:

DRIVE MODE	MESSAGE AT ACTIVATION	MESSAGE AT DEACTIVATION
Sport	Sport	Sport OFF
ECO	ECO	ECO OFF

Trip Display



219001961-716

This display shows trip informations:

- Cumulative distance odometer
- Trip A
- Trip B
- Cumulative hours
- Clock

Use UPPER (TRIP) button to change the displayed information.

Hold UPPER (TRIP) button to reset Trip A/B meters.

Warning Lamps and Indicators

The following indicator lamps will alert you to a vehicle condition that may become serious. Some lamps will illuminate when starting the vehicle to make sure they work. If any lamps remain on after starting the vehicle, refer to the respective system warning lamp for further information.

NOTE: Some warning indicators appear in the display of the multifunction gauge and function the same as an indicator lamp but do not display when starting the vehicle.

Telltale Lights - Lower Bar

LIGHTS	DESCRIPTION
	ORANGE - Vehicle malfunction
	BLUE - The high beam are selected
	RED - The engine temperature is too high.
	RED - Parking brake is engaged or malfunction of the brake system
	Green - Neutral
	RED - The battery voltage too low or problem with the electrical system
	RED - Low engine oil pressure Normally ON when engine is OFF
	ORANGE - Low fuel level
	ORANGE Turn on: Malfunction of the vehicle emissions control system Blink: Engine problems, the limp home mode is activated. Have the vehicle serviced immediately.

Icons and Indicators - Multifunction Display

ICONS AND INDICATORS	
SPORT	Denotes SPORT mode is selected.
WORK	Denotes WORK mode is selected.
	Track kit active (If equipped)

Settings

The buttons to navigate through menus are located on the left side of the LCD display.

Setup

Using LOWER (MENU) button, Select SETTINGS and hold to enter setting menu.

Maintenance Reset

NOTE: Only when the maintenance icon is displayed.

Using LOWER (MENU) button, Select RES MAINT and hold to reset maintenance.

Fault Codes

NOTE: Only when codes are actives.

Using LOWER (MENU) button, Select CODES and hold to see actives and occurred fault codes. Fault codes will be scrolled on the Lower Display.

Unit Selection

This multifunction gauge is factory preset in Imperial units but it is possible to change it to Metric units.

Using LOWER (MENU) button, Select UNITS and hold button to change units.

Reset Stats

Using LOWER (MENU) button, select RESET STAT and hold to reset.

Setting Brightness

The brightness of the LCD display can be adjusted.

Using LOWER (MENU) button, select BRIGHTNESS and hold button to change brightness.

Using LOWER (MENU) button, adjust brightness then push and hold LOWER (MENU) button to acknowledge selection.

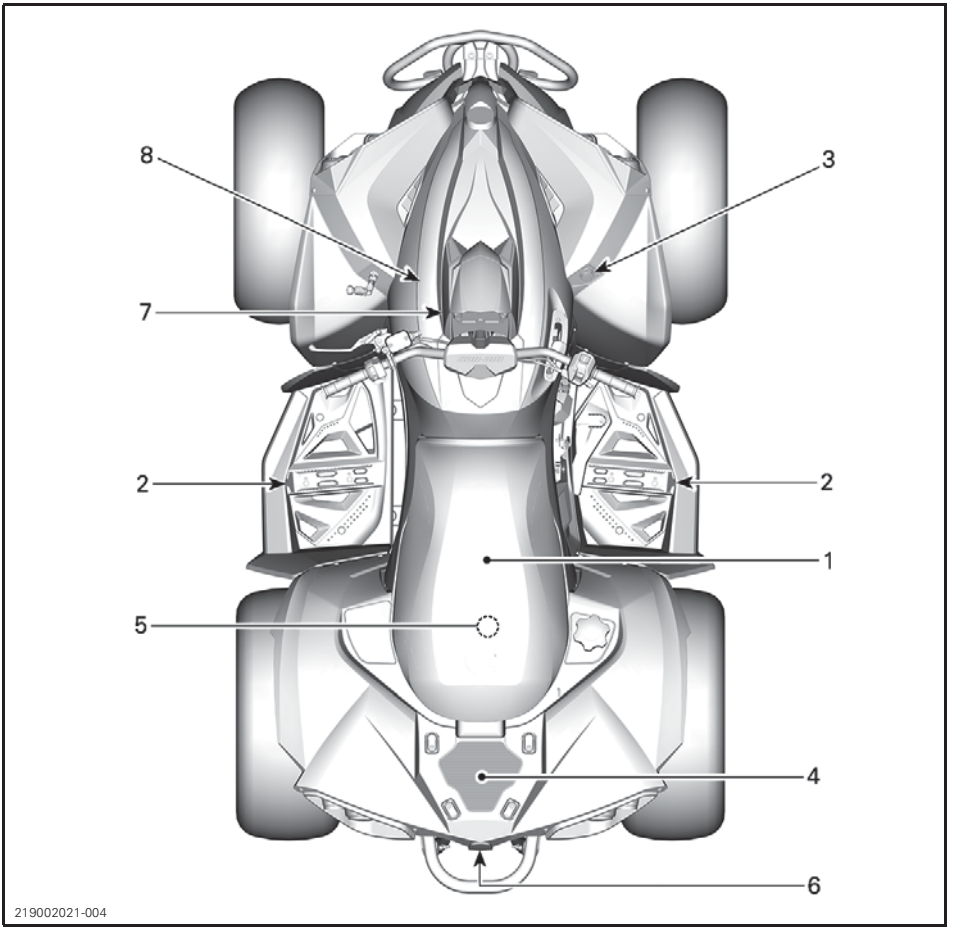
Setting Clock

Using LOWER (MENU) button, Select CLOCK and hold to change units.

1. Press LOWER (MENU) button to select clock display.
2. Push and hold LOWER (MENU) button for 1 second.
3. Press LOWER (MENU) button to select 12:00 AM PM or 24:00 time base (time flash).
4. Push and hold LOWER (MENU) button to acknowledge selection.
5. Press LOWER (MENU) button to change hours (hours flash).
6. Press LOWER (MENU) to acknowledge hour selection.
7. Press LOWER (MENU) button to change minutes (minutes flash).
8. Press LOWER (MENU) button to acknowledge minutes.

Setting Language

The gauge display language can be changed. Refer to an authorized Can-Am dealer for language availability and to setup the gauge to your preference.


8
3
7
2
2
1
5
4
6
219002021-004

1) Seat

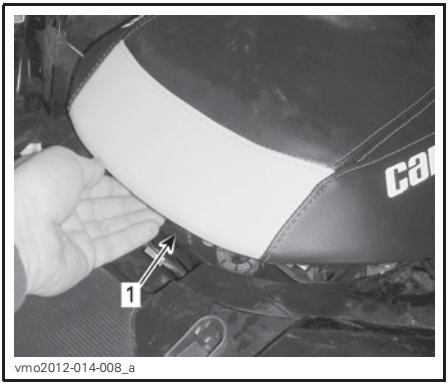
The seat is designed for an operator only.

⚠ WARNING

Never allow anyone to seat as a passenger on this vehicle.

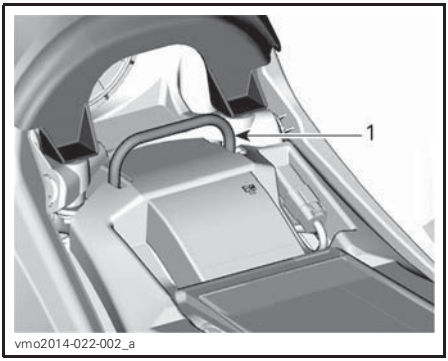
Seat Removal

To remove the seat, push its latch forward. This latch is located underneath the rear of seat.



1. Seat latch

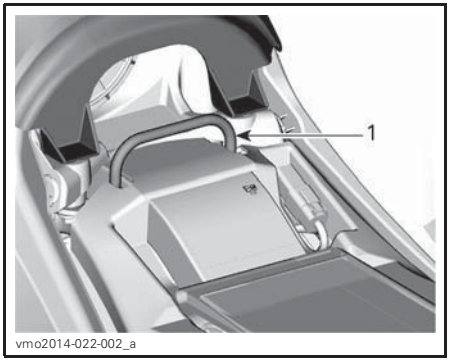
Pull seat rearward. Continue lifting movement until you can release the front retaining device under the seat from the retaining bar, then completely remove seat.



1. Retaining bar

Seat Installation

Position front end of seat so that the front retaining device under the seat engages with the retaining bar. When seat rests in its position, firmly push seat down to latch.



1. Retaining bar

NOTE: A distinctive snap will be felt. Double check that the seat is secure by giving it a tug to confirm proper latching.

⚠ WARNING

Confirm that the operator's seat is properly locked in position by pulling back and up several times.

2) Footpegs

The footpegs are located on the RH and LH footrests.

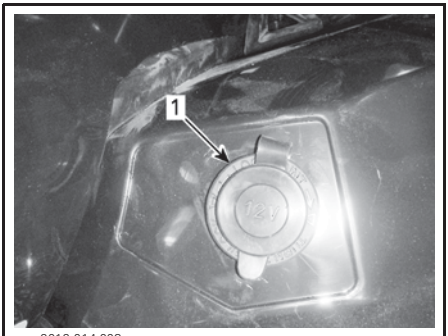
TYPICAL
1. *RH footpeg*

⚠ WARNING

Operator must have both feet on footpegs at all times during vehicle operation.

3) 12-Volt Power Outlet

Convenient for handheld spotlight or other portable equipment.



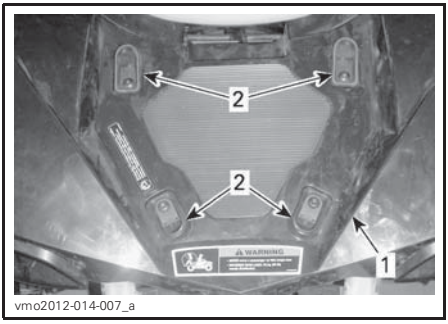
1. *12V power outlet*

Remove protective cap to use. Always reinstall it after use to protect against weather.

4) Rear Cargo Area

Rear cargo area is convenient for carrying small articles.

Secure cargo using the eyelets.



1. *Cargo area*
2. *Plastic eyelets*

⚠ WARNING

MAXIMUM load for cargo area is 16 kg (35 lb).

⚠ WARNING

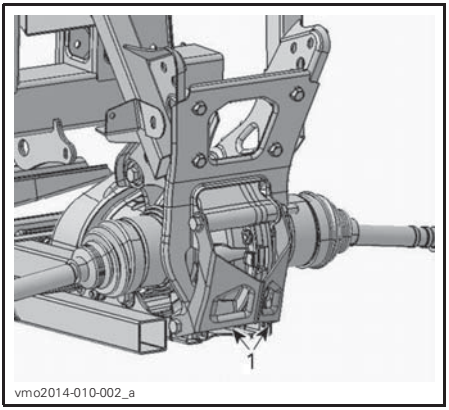
- Never carry a passenger on the rear cargo area.
- Cargo must never interfere with the driver's line of sight or reduce his ability to steer the vehicle.
- Cargo must be secured and should not protrude the cargo area.

5) Tool Kit

The tool kit is located under seat. It contains tools for basic maintenance.

6) Recovery Hook

Convenient hook that can be used to recover a stuck ATV.

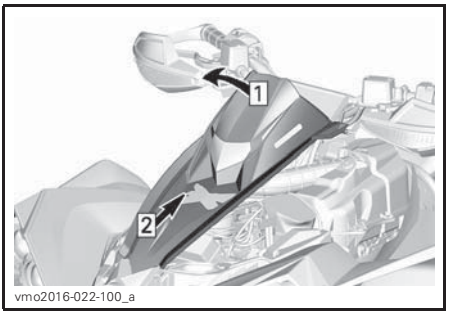


1. Recovery hook

7) Gauge Support

Gauge Support Removal

1. Pull the rear of gauge support up to release the lugs from the grommets.
2. Slide the gauge support backwards to release it from the console.



Step 1: Pull up
Step 2: Slide rearwards

3. Disconnect the gauge connector.

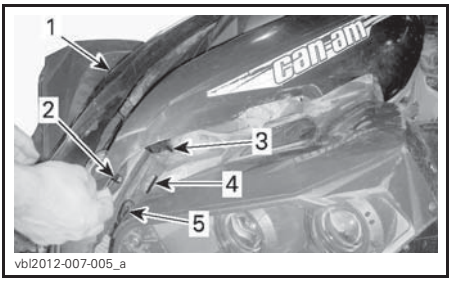
Gauge Support Installation

Reverse the removal procedure.

8) Console

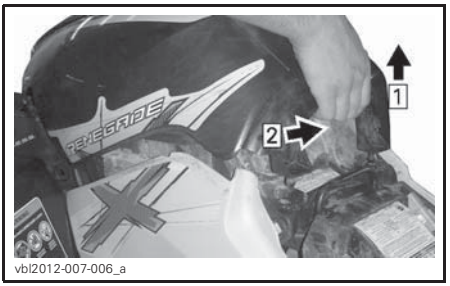
Console Removal

1. See procedures in this section and remove:
   – Seat
   – Gauge support
2. At front of console, pull both lugs out of their grommets.
3. Pull both hooks out of their slots.



1. Console
2. Lug
3. Hook
4. Slot
5. Grommet

4. Pull the rear of console up to release the lugs from the grommets.
5. Remove console by pulling it rearwards.



Step 1: Pull up
Step 2: Pull rearwards

Console Installation

Reverse the removal procedure.

Fuel Requirements

NOTICE Always use fresh gasoline. Gasoline will oxidize; the result is loss of octane, volatile compounds, and the production of gum and varnish deposits which can damage the fuel system.

Alcohol fuel blending varies by country and region. Your vehicle has been designed to operate using the recommended fuels, however, be aware of the following:

– Use of fuel containing alcohol above the percentage specified by government regulations is not recommended and can result in the following problems in the fuel system components:
  - Starting and operating difficulties.
  - Deterioration of rubber or plastic parts.
  - Corrosion of metal parts.
  - Damage to internal engine parts.
– Inspect frequently for the presence of fuel leaks or other fuel system abnormalities if you suspect the presence of alcohol in gasoline exceeds the current government regulations.
– Alcohol blended fuels attract and hold moisture which may lead to fuel phase separation and can result in engine performance problems or engine damage.

Recommended Fuel

For 570, 650 and 850 engines, use common unleaded gasoline with an AKI (R+M)/2 octane rating of 87, or a RON octane rating of 92.

For 1000R engines, use premium unleaded gasoline with an AKI (R+M)/2 octane rating of 91, or a RON octane rating of 95.

Use unleaded gasoline containing MAXIMUM 10% ethanol.

NOTICE Never experiment with other fuels. Engine or fuel system damages may occur with the use of an inadequate fuel.

NOTICE Do NOT use fuel from fuel pumps labeled E85.

Use of fuel labeled E15 is prohibited by U.S. EPA Regulations.

Vehicle Fueling Procedure

⚠ WARNING

– Fuel is flammable and explosive under certain conditions.
– Never use an open flame to check fuel level.
– Never smoke or allow flame or spark in vicinity.
– Always work in a well-ventilated area.

1. Stop engine.

⚠ WARNING

Always stop engine before refueling.

2. Have operator get off vehicle.

⚠ WARNING

Do not allow anyone to remain on the vehicle while fueling. If there is a fire or explosion during fueling, a vehicle occupant could be unable to quickly leave the area.

3. Unscrew slowly the fuel reservoir cap counterclockwise to remove it.

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1. Fuel reservoir cap

⚠ WARNING

If a differential pressure condition is noticed (whistling sound heard when loosening fuel reservoir cap) have vehicle inspected and/or repaired before further operation.

4. Insert the spout into the filler neck.
5. Pour fuel slowly so that air can escape from the tank and prevent fuel flow back. Be careful not to spill fuel.
6. Stop filling when the fuel reaches the bottom of filler neck. **Do not overfill.**

⚠ WARNING

Never top up the fuel tank before placing the vehicle in a warm area. As temperature increases, fuel expands and may overflow.

7. Fully tighten fuel reservoir cap clockwise.

⚠ WARNING

Always wipe off any fuel spillage from the vehicle.

BREAK-IN PERIOD

Operation During Break-In

A break-in period of 300 km (200 mi) or 10 operating hours is required for the vehicle.

Engine

During the break-in period:

– Avoid full throttle operation
– Maximum throttle should not exceed 3/4
– Avoid sustained accelerations
– Avoid prolonged cruising speeds
– Avoid engine overheating.

However, brief accelerations and speed variations contribute to a good break-in.

NOTE: It is normal that the engine will not operate at its maximum efficiency until the break-in period is completed.

Brakes

⚠ WARNING

New brakes will not operate at their maximum efficiency until their break-in is completed. Use extra caution.

Drive Belt

A new drive belt requires a break in period of 50 km (30 mi).

During the break-in period:

– Avoid strong acceleration and deceleration
– Avoid pulling a load
– Avoid high speed cruising.

Starting the Engine

The shift lever must be set to PARK or NEUTRAL.

NOTE: For your convenience, an override mode allows the engine to be started with the shift lever in any position. Press and hold the brake lever or the brake pedal while pressing the engine start button.

Ensure D.E.S.S. key is installed on D.E.S.S. post.

Set the engine stop switch to RUN.

Press the engine start button and hold until the engine starts.

Release the engine start button immediately when the engine has started.

NOTICE If engine does not start after a few seconds, do not hold the engine start button more than 10 seconds. Refer to *TROUBLESHOOTING*.

Waking Up the Electrical System

Press and release the START button for less than half a second and the electrical system will turn ON:

- For 30 seconds, **without** powering any equipment, if the DESS key is **NOT** installed on the DESS post **OR** if the Engine Stop switch is set to the STOP position;
- For 10 minutes, powering equipment, if the DESS key is installed on the DESS post **AND** Engine Stop is set to the RUN position. The electrical system will be shutdown after 30 seconds if either the DESS key is removed **OR** the Engine Stop is set to the STOP position.

NOTICE Waking up the electrical system repeatedly or using electrical equipment will discharge the battery and you may not be able to start the engine.

Changing Gear Selection

Apply brakes and immobilize vehicle, then select the desired shift lever position.

Release brakes.

NOTICE When changing gear selection, always completely stop the vehicle and apply the brakes prior to moving the shift lever. Damage to the gearbox may occur.

Gradually press the throttle lever to increase engine speed and thus engaging the continuously variable transmission (CVT).

At the opposite, when the throttle lever is released, the engine speed decreases.

Stopping the Engine and Parking the Vehicle

⚠ WARNING

Avoid parking on steep slope as the vehicle may roll away.

⚠ WARNING

Always put the vehicle in PARK when stopped or parked to prevent rolling.

⚠ WARNING

Avoid parking in places where hot parts can start a fire.

When stopped or parked always bring shift lever to park position. This is especially important when parking on a slope.

Select the flattest terrain available for parking.

Release throttle and use brakes to completely stop the vehicle.

Set shift lever in PARK position.

Apply the parking brake.

Push the engine stop switch to OFF position.

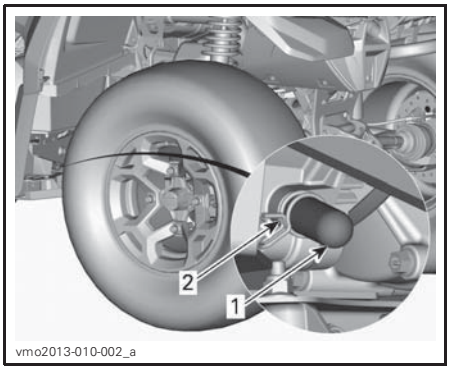
Remove D.E.S.S. from D.E.S.S. post.

If you must park on a steep incline or if the vehicle is carrying cargo, block the wheels using rocks or bricks.

What to Do if Water Entered the CVT

Remove the CVT drain plug located on the rear portion of the CVT cover. It is accessible from the rear LH fender.

Inspect the CVT drain plug to validate if water is present.



1. drain plug
2. Spring clamp

NOTICE If water is present in the CVT, it could result in belt slippage. The engine will accelerate but the vehicle will remain still.

If water is present, remove CVT drain plug to expel water.

NOTICE See an authorized Can-Am dealer to have the CVT inspected and cleaned.

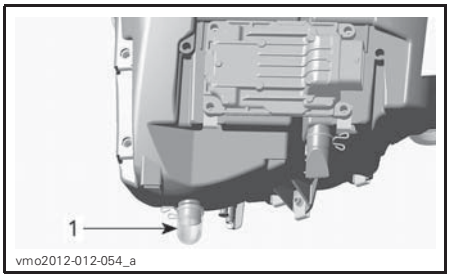
Reinstall the drain plug and secure it using the spring clamp.

NOTE: Make sure hose is properly inserted on CVT cover nipple.

What to Do if Water Entered the Air Filter Housing

Remove the LH side panel.

Inspect the drain reservoir underneath the air filter housing to validate if water is present.



TYPICAL
1. Air filter housing drain reservoir

If water is present, press clamp and remove reservoir to drain water from air filter housing.

If one of the following conditions is met, bring the vehicle to your nearest authorized Can-Am dealer to have the vehicle serviced:

– If more than 50 ml (2 U.S. oz) of water (approximately 5 drain reservoirs) is found in the air filter housing.
– If any deposits are present in the drain reservoir.

In such a case, the vehicle must be serviced for:

– Vents
– CVT air filter cleaning
– CVT cleaning
– Fuel tank breather replacement
– Lubricant inspection and replacement as required (engine, gearbox and rear final drive).

NOTICE Failure to have vehicle serviced may lead to permanent damage to the following components but not limited to:

– Engine and gearbox
– Fuel pump
– CVT
– Front differential
– Rear final drive.

What to Do if Vehicle is Turned Over

When vehicle is turned over or stays tilted on the side, put the vehicle back on its wheel. Inspect vehicle for damages.

⚠ WARNING

Never operate the vehicle if damaged. Refer to an authorized Can-Am dealer.

If vehicle has no damage, refer to *MAINTENANCE PROCEDURES* and inspect the following.

- Inspect air filter housing for oil accumulation, if any oil is found, clean air filter and air filter housing.
- Check engine oil level and refill if necessary.
- Check engine coolant level and refill if necessary.
- Check gearbox oil level and refill if necessary.
- Check rear final drive oil level and refill if necessary.
- Start engine. If the oil pressure light stays on, stop engine immediately. See an authorized Can-Am dealer.

Whenever the vehicle is turned over, it should be inspected by an authorized Can-Am dealer.

What to Do if Vehicle is Immersed in Water

Should the vehicle become immersed, immediately stop the engine. Do not use any electrical equipment while vehicle is immersed. It will be necessary to take the vehicle to an authorized Can-Am dealer as soon as possible. NEVER ATTEMPT TO START THE ENGINE!

NOTICE **Immersion of the vehicle can cause serious damage if the correct restart procedure is not followed.**

As soon as vehicle is pulled out of water, carry out the following:

- Drain CVT. Refer to *WHAT TO DO IF WATER ENTERED THE AIR FILTER HOUSING* in this section.
- Drain CVT. Refer to *WHAT TO DO IF WATER ENTERED THE CVT* in this section.

NOTICE **The vehicle should be serviced as soon as possible by an authorized Can-Am dealer.**

⚠ WARNING

Suspension adjustment could affect vehicle handling. Always take time to familiarize yourself with the vehicle's behavior after any suspension adjustment have been made.

Suspension Adjustments

Suspension adjustment and loading can have an effect on your vehicle handling and comfort.

Choice of suspension adjustments vary with driver's weight, personal preference, riding speed and field condition.

Perform adjustments one position (click) at a time. Test run the vehicle under the same conditions; trail, speed, driver riding position, etc. Proceed methodically until you are satisfied.

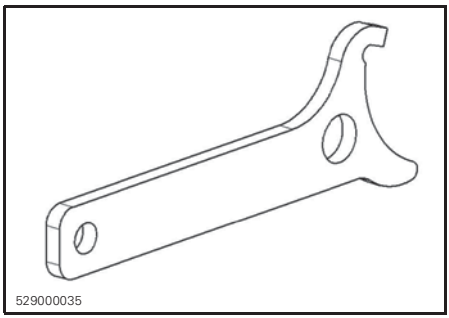
NOTE: Factory settings are suitable for almost all conditions. Take into consideration that an increase in ground clearance can affect the handling of the vehicle.

NOTE: Do not increase preload on FOX shock.

FRONT SUSPENSION FACTORY PRELOAD SETTINGS		
ADJUSTMENT	MODEL	FACTORY SETTING
Spring preload	570	Cam position 3
	850 / 1000R	46.6 mm
	All X xc	42.6 mm

REAR SUSPENSION FACTORY PRELOAD SETTINGS		
ADJUSTMENT	MODEL	FACTORY SETTING
Spring preload	570	Cam position 3
	850 / 1000R	63.1 mm
	All X xc	59 mm

Following are guidelines to fine-tune suspension. Use suspension adjustment tool provided in the tool kit.



SUSPENSION ADJUSTMENT TOOL

Spring Preload Adjustment

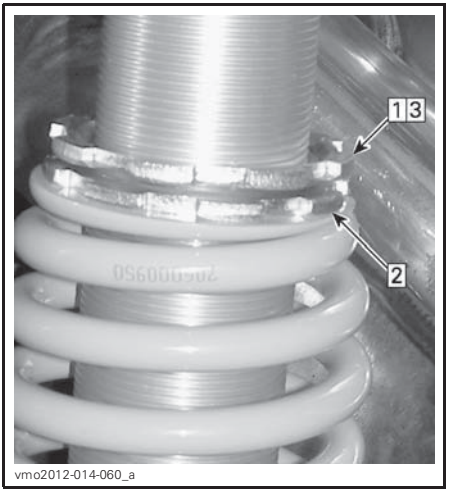
⚠ WARNING

The left and right shock adjustment on front or rear suspension must always be set to the same position. Uneven adjustment can cause poor handling and loss of stability, which could lead to an accident.

Shorten the springs for a firmer ride and rough conditions.

Lengthen the springs for a softer ride and smooth conditions.

Adjust spring preload by turning the adjuster ring.



TYPICAL
Step 1: Loosen top locking ring
Step 2: Turn adjusting ring accordingly
Step 3: Tighten top locking ring

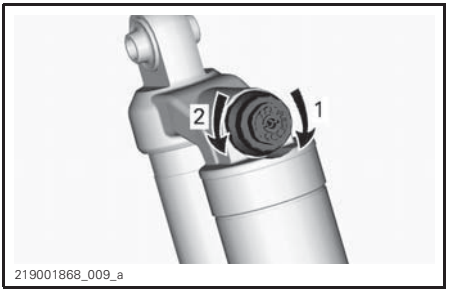
Shock Absorber Damping X xc Model

FRONT SUSPENSION DAMPING FACTORY SETTINGS	
Rebound	12 clicks CCW from full stop
High Speed Compression	2.25 turn CCW from full stop
Slow Speed Compression	2.25 turn CCW from full stop

REAR SUSPENSION DAMPING FACTORY SETTINGS	
Rebound	12 clicks CCW from full stop
High Speed Compression	2.25 turn CCW from full stop
Slow Speed Compression	2.25 turn CCW from full stop

Shock Damping Compression Damping Adjustments (X xc Models)

Compression damping controls how the shock absorber restrains the compression stroke.



COMPRESSION DAMPING - TOP OF SHOCK ABSORBER
1. Increase *(firmer)*
2. Decreases *(softer)*

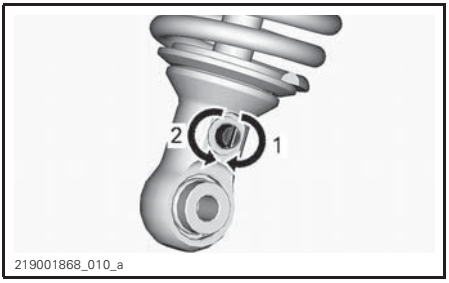
ACTION	RESULT
Increasing compression damping force	Firmer compression damping
Decreasing compression damping force	Softer compression damping

⚠ WARNING

Make sure compression damping setting is the same on both sides.

Shock Absorber Rebound Damping X xc Model

Rebound damping controls how the shock absorber restrains the extension stroke.



REBOUND DAMPING - BOTTOM OF SHOCK ABSORBER
1. Increase *(firmer)*
2. Decreases *(softer)*

Dynamic Power Steering (DPS) Assist Level Adjustment (X xc Models)

The Tri-Mode Dynamic Power Steering (DPS) offers easy steering assistance to the rider. The level of assistance will automatically adapt according to the vehicle's speed and rider's demand, in order to provide maximum steering power at lower speed where the demand is normally higher. As speed increases, the assistance is progressively reduced to keep maximum steering feel and precision to the rider.

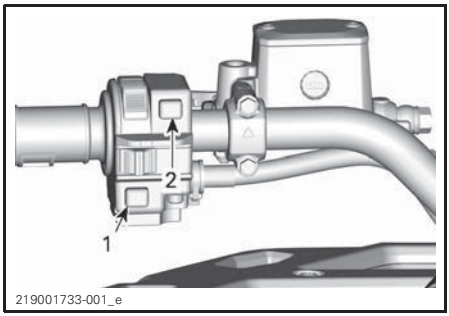
It is possible to choose between three modes of assistance: Minimum, Medium and Maximum. Each mode will continue to automatically adapt to the vehicle's speed and rider's demand, so it does not require to be changed when riding. These modes are used to set the level of assistance to match each rider's preferences.

The following DPS modes are preset in the vehicle.

DPS MODE	
DPS MAX.	Maximum steering assist
DPS MED.	Medium steering assist
DPS MIN.	Minimum steering assist

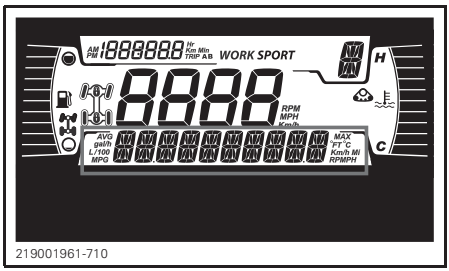
To show the active DPS mode, proceed as follows:

1. Press and release **Override/DPS** button.



TYPICAL
1. *DPS button*
2. *Engine start button*

2. Check the multifunction gauge to confirm the current DPS mode.



4.5" DIGITAL DISPLAY

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

To change the DPS mode, proceed as follows:

1. Press and hold **Override/DPS** button for 2 seconds to go to the next setting.
2. Release **Override/DPS** button.
3. Repeat until desired setting is selected.

NOTE: The DPS assist adjustment is not available in reverse.

570 models

The DPS adjustment will not be possible by Override/DPS button if the vehicle does not run. It is possible to change that by using the cluster, proceed as follows:

1. Hold LOWER (MENU) button for 1 second to change DPS mode.
2. Repeat until desired setting is selected.

TRANSPORTING THE VEHICLE

When contacting a towing or transporting service, be sure to ask if they have a flatbed trailer, loading ramp or power ramp to safely lift the vehicle and tie-down straps. Ensure the vehicle is properly transported as specified in this section.

NOTICE Do not tow this vehicle — towing can seriously damage the vehicle's drive system.

NOTICE Avoid using chains to tie the vehicle — they may damage the surface finish or plastic components.

⚠ WARNING

Make sure no loose objects are present inside vehicle during vehicle transportation.

⚠ WARNING

Always transport the vehicle facing forward to avoid damaging the windshield or other components. Parts may detach during transport.

⚠ WARNING

Before attempting to mount vehicle onto a platform or a trailer, make sure to respect the following safety precautions.

SAFETY PRECAUTIONS	
Carrying equipment	The carrying item (platform or trailer or flat bed) must be of appropriate dimensions and capacity to safely support and transport the vehicle.
Hauling vehicle	Do not exceed vehicle hauling capacity and specifications. Ensure the trailer or platform is properly secured to the hauling vehicle hitch.
Visibility	Ensure you have a good visibility during the entire maneuver.
Terrain	The hauling vehicle and trailer must be on a leveled surface. Use wheel chocks on trailer and hauling vehicle to avoid any movement.
Ramps	Use ramps with proper rating and secure ramps to the trailer or platform. Avoid steep ramps.
Bystanders	Always make sure bystanders are not close to the vehicle or the trailering equipment while climbing up.

Using vehicle power to climb onto trailering equipment

When vehicle can climb on its own power, proceed as follows;

Wear protective gear.

Use low gear only (if equipped).

If vehicle has 4wd (or 6wd) option, use it.

When driving remain seated at all times.

Ensure proper alignment on rails or platform.

1. Start from a sufficient distance from the trailer to align the vehicle in a straight line with the ramps. Never attempt to turn while getting closer to the ramp. Rear wheels might not be aligned once you get to the ramp and vehicle may fall off.
2. Slowly climb the front wheels onto the ramp to verify alignment.

3. Back off the vehicle, verify ramps are still secure, then proceed at proper speed.
4. Carefully drive vehicle onto platform or trailer. Use sufficient speed to climb without spinning or abruptly accelerating. Avoid acceleration while on ramps to prevent ramps movement.
5. If trailer is inclined towards front, simply let vehicle roll in without acceleration.
6. Once vehicle is climbed, put shift lever to Park. Apply parking brake.

When vehicle cannot move on its own power, or in case overshooting is a risk or if any dangerous condition prevents for embarking on its own power, proceed using a winch;

Using a winch to pull vehicle onto trailering equipment

When vehicle cannot climb on its own power, proceed as follows;

⚠ WARNING

Have the help of an assistant. One person should be in vehicle to have access to vehicle steering, brakes and winch switch, while the other person controls the environment and safety of the maneuver.

⚠ WARNING

Ensure the winch hook can be safely attached to a proper anchoring point. Use proper rigging.

NOTE: If vehicle can be started safely, let engine idle during winching to avoid draining the battery.

1. Place shift lever to NEUTRAL (N).
2. If the vehicle is equipped with a winch, use the winch to roll the vehicle on the platform.
3. If the vehicle is not equipped with a winch, proceed as follows:
   - 3.1 Attach strap to lower front bumper anchor.
   - 3.2 Attach the strap to the winch cable of the towing vehicle.
   - 3.3 Pull the vehicle on the flatbed trailer with the winch.
4. Put shift lever to Park. Apply parking brake.

Securing vehicle for transport

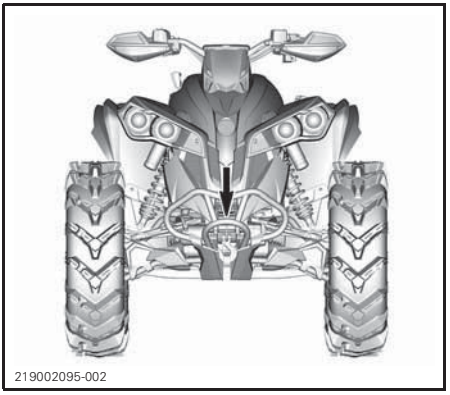
When transporting this vehicle, secure it to a trailer or in pickup box with suitable tie-downs. Use of ordinary ropes is not recommended.

⚠ WARNING

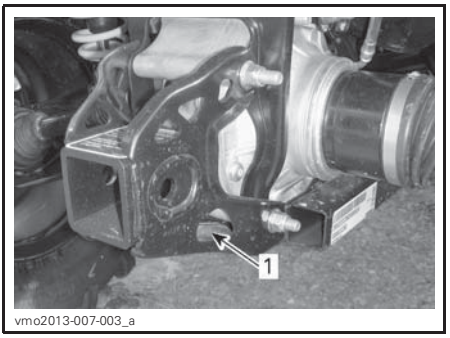
Do not tow this vehicle behind a car or other vehicle. Use a trailer. Never tip this vehicle on end for transporting. The vehicle must be in its normal operating position (on all wheels).

Remember to:

- Unload vehicle racks before transportation.
- Set shift lever to PARK position.
- Set the parking brake.
- Secure the vehicle by the front and rear tie-down points.



FRONT TIE-DOWN POINT LOCATION



TYPICAL
1. Rear tie-down point location

NOTICE Securing vehicle at other locations may damage the vehicle.

Getting vehicle out of trailer

⚠ WARNING

Vehicle may have moved during transport. Ensure vehicle is properly aligned with ramps before proceeding.

⚠ WARNING

Visibility will be greatly reduced when backing off from the trailer. Have the help of an assistant to ensure proper alignment and safe environment.

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MAINTENANCE

MAINTENANCE SCHEDULE

Maintenance is very important for keeping your vehicle in safe operating condition. The vehicle should be serviced as per the maintenance schedule.

The maintenance schedule does not exempt the pre-ride inspection.

⚠ WARNING

Failure to properly maintain the vehicle according to the maintenance schedule and procedures can make it unsafe to operate.

EPA Regulation - Canadian and USA Vehicles

A repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems. These instructions do not require components or service by BRP or authorized Can-Am Off-Road dealers.

Although an authorized Can-Am Off-Road dealer has an in-depth technical knowledge and tools to service your vehicle, the emission-related warranty is not conditioned on the use of an authorized Can-Am Off-Road dealer or any other establishment with which BRP has a commercial relationship.

Proper maintenance is the owner's responsibility. A warranty claim may be denied if, among other things, the owner or operator caused the problem through improper maintenance or use.

For emission-related warranty claims, BRP is limiting the diagnosis and repair of emission-related parts to the authorized Can-Am Off-Road dealers. For more information, please refer to the *US EPA EMISSION-RELATED WARRANTY* contained in the *WARRANTY* section.

You must follow the instructions for fuel requirements in the fueling section of this manual. Even if gasoline containing greater than ten volume percent ethanol is readily available, the US EPA issued a prohibition against the use of gasoline containing greater than 10 vol% ethanol that applies to this vehicle. The use of gasoline containing greater than 10 vol% ethanol with this engine may harm the emission control system.

The maintenance schedule does not exempt the pre-ride inspection.

SEVERE DUSTY CONDITIONS

Engine Air Filter Maintenance Guideline

Air filter maintenance should be adjusted according to riding conditions.

Air filter maintenance must be increased in frequency in the following dusty conditions:

– Riding on dry sand
– Riding on dry dirt covered surfaces
– Riding on dry gravel roads or similar conditions.

NOTE: Riding in a group in these conditions would increase even more the air filter maintenance.

MAINTENANCE SCHEDULE LEGEND

Operation in trail riding conditions
Operation in severe riding conditions (dusty or muddy) or carrying heavy loads condition

MAINTENANCE SCHEDULE

Make sure to perform proper maintenance at recommended intervals as indicated in the tables. Some items of the maintenance schedule must be performed in function of the calendar, regardless of the distance or time of operation.

EVERY 1 500 KM (1,000 MI) OR 50 HOURS (whichever comes first)
EVERY 750 KM (500 MI) OR 25 HOURS (whichever comes first)
Verify and clean engine air filter. Replace as needed
Verify battery connections
Lubricate rear propeller shaft joint
Inspect tie rod ends and ball joints for play and boots condition
Lubricate front suspension arm bushings
Lubricate front and rear stabilizer bar bushings
Inspect the drive shaft boots and protectors
Inspect brake pads. Replace as needed
Inspect wheel bearings for abnormal play
Inspect and clean CVT air filter. Replace as needed. (If equipped)
Tighten wheel beadlock bolts (If equipped)
Lubricate lower shock absorber spherical bearings (Renegade X xc)

EVERY 3 000 KM (2,000 MI) OR 100 HOURS (whichever comes first)
EVERY 1 500 KM (1,000 MI) OR 50 HOURS (whichever comes first)
Adjust valve clearance
Clean muffler spark arrester
Verify and clean throttle body
Replace fuel vent breather filter
Verify CVT drive belt and clean CVT pulleys
Lubricate the one way bearing of the drive pulley
The following must be performed at least once a year:
Change engine oil and filter

EVERY 3 000 KM (2,000 MI) OR 100 HOURS (whichever comes first)
EVERY 1 500 KM (1,000 MI) OR 50 HOURS (whichever comes first)
Lubricate throttle cable (Renegade 570 only)
Inspect and clean brake system
Inspect battery condition
Verify steering system for abnormal play
Verify front differential and rear final drive oil level and look for contamination
Verify gearbox oil level and look for contamination

PERFORM AT THE FIRST 3 000 KM (2,000 MI) AND AT 6 000 KM (4,000 MI) THEN FOLLOW THE REGULAR SCHEDULE
PERFORM AT THE FIRST 1 500 KM (1,000 MI) AND AT 3 000 KM (2,000 MI) THEN FOLLOW THE REGULAR SCHEDULE
Replace gearbox oil
Clean the vehicle speed sensor (VSS)

EVERY 6 000 KM (4,000 MI) OR 200 HOURS (whichever comes first)
EVERY 3 000 KM (2,000 MI) OR 100 HOURS (whichever comes first)
Verify the cooling system
Test engine coolant strength
Verify fuel system for leaks
Verify fuel pump pressure
Replace spark plugs
Replace front differential oil
Replace rear final drive oil
Replace gearbox oil
Inspect input and output shaft seals (gearbox, differential and final drive)
Clean vehicle speed sensor
Clean and lubricate lower and upper steering column half bushings
The following must be performed every 2 years:
Replace the brake fluid

EVERY 12 000 KM (8,000 MI) OR 5 YEARS (whichever comes first)
EVERY 6 000 KM (4,000 MI) OR 5 YEARS (whichever comes first)
Replace engine coolant

This section includes instructions for basic maintenance procedures.

⚠ WARNING

Unless otherwise indicated, always remove D.E.S.S. key before performing any maintenance.

⚠ WARNING

Should removal of a locking device be required (e.g. lock tab, self-locking fastener, etc.), always replace it with a new one.

Air Filter

Air Filter Maintenance Guideline

As with any ATV, air filter maintenance is critical to ensure proper engine performance and life span.

Air filter maintenance should be adjusted according to riding conditions.

Air filter maintenance must be increased in frequency and oil must be added to the foam filter for the following dusty conditions:

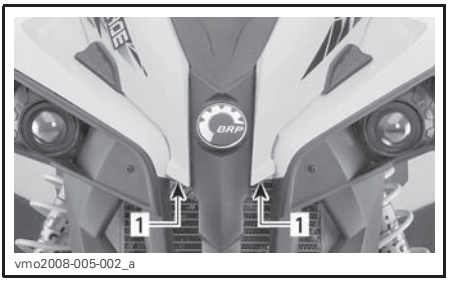
- Riding on dry sand.
- Riding on dry dirt covered surfaces.
- Riding on dry gravel trails or similar conditions.

NOTE: Riding in a group in these conditions would increase even more the air filter maintenance. Refer to *AIR FILTER CLEANING AND OILING* in this section for maintenance procedure.

Engine Air Filter Removal

NOTICE Never remove or modify any component in the air filter housing. Otherwise, engine performance degradation or damage can occur. The engine is calibrated to operate specifically with these components.

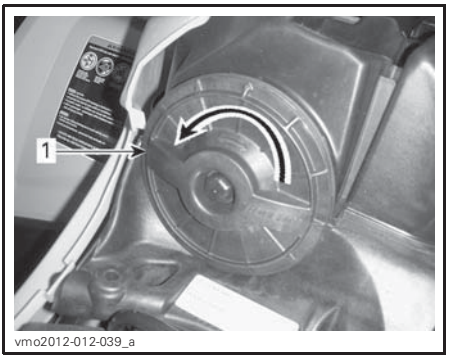
1. Remove seat.
2. Lift the front part of the central panel.



TYPICAL
1. Lift here

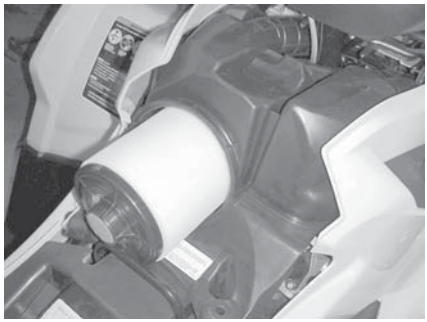
3. Remove console. Refer to *EQUIPMENT*.
4. Rotate air filter cover counterclockwise to remove it.

NOTE: A socket wrench may be used to remove the filter cover.



1. Air filter cover

5. Remove air filter.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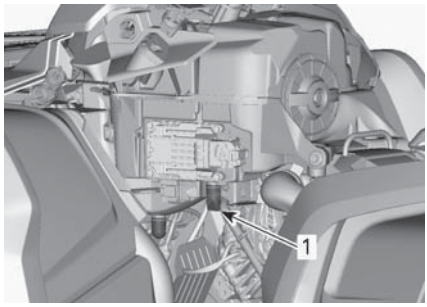
AIR FILTER REMOVAL

Engine Air Filter Housing Inspection and Draining

1. Remove LH side panel.
2. Drain air filter housing inlet drain tube.



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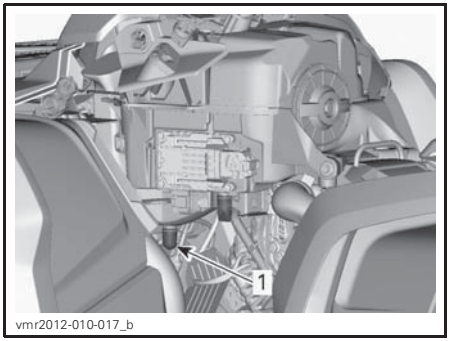
TYPICAL - SOME PARTS REMOVED FOR CLARITY
1. Air filter housing inlet drain tube

3. Check air filter dirty chamber for cleanliness.
   – If any debris or water are found, clean air filter chamber using a vacuum cleaner.

NOTICE Do not blow compressed air into air filter chamber.

4. Check air filter drain tube (clean chamber).
   – If any debris or water are found, refer to *SPECIAL PROCEDURES*.
   – Investigate for contamination source.



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TYPICAL - SOME PARTS REMOVED FOR CLARITY
1. Air filter drain tube

Air Filter Cleaning and Oiling

Paper Filter Cleaning

1. Remove the foam filter from paper filter.
2. Tap out heavy dust from the paper filter.

This will allow dirt and dust to get out of the paper filter.

NOTE: Paper filter have a limited life span; replace filter if too dirty or clogged.

NOTICE It is not recommended to blow compressed air on the paper filter; this could damage the paper fibers and reduce its filtration ability when used in dusty environments.

NOTICE Do not wash the paper filter with any cleaning solution.

Foam Filter Cleaning

CAUTION Always wear appropriate skin and eye protection. Chemicals can cause a skin rash and eye injury.

1. Spray the foam filter inside and out with a good air filter cleaner and follow manufacturer's instructions.

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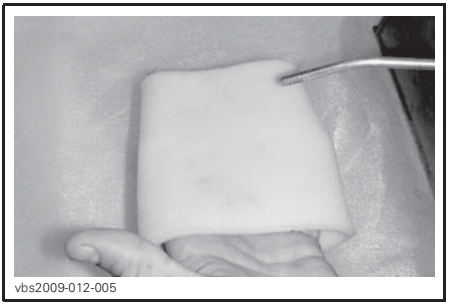
TYPICAL - SPRAY THE FOAM FILTER

2. Dry the foam filter completely.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TYPICAL - DRY

NOTE: A second application may be necessary for heavily soiled elements.

Foam Filter Oiling

1. Spray AIR FILTER OIL (P/N 219 700 340) or equivalent on the foam filter.

219700340

AIR FILTER OIL (P/N 219 700 340)

vbs2009-012-014

TYPICAL - OIL THE FOAM FILTER

2. Let stand for 3 to 5 minutes.
3. Remove any excess of oil that could transfer to the paper filter by wrapping the foam filter into an absorbent cloth and squeezing gently. This will also ensure a full oil coverage on foam filter.

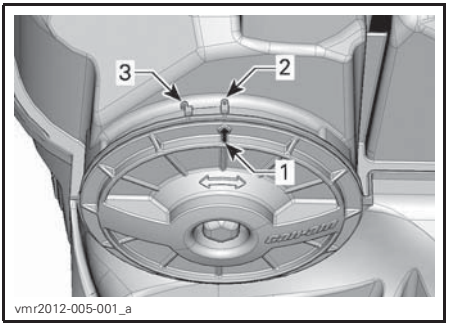
Air Filter Installation

Reinstall oiled foam filter on paper air filter.

Slightly grease O-ring seal and plastic body of air filter.

Install air filter as the reverse of removal.

Ensure air filter cover is properly locked onto the air filter housing. See indications on filter cover and housing.



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1. *Cover position arrow*
2. *Locked*
3. *Unlocked*

Reinstall:

– Console

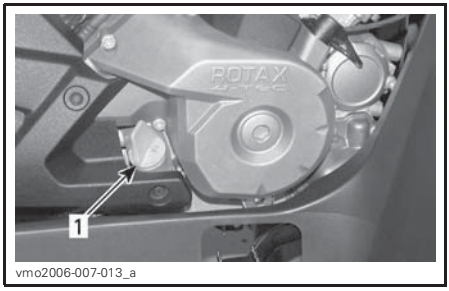
– Gauge support
– Seat.

Engine Oil

Engine Oil Level

NOTICE Check level frequently and refill if necessary. **Do not overfill.** Operating the engine/gearbox with an improper level may severely damage engine/gearbox. Wipe off any spillage.

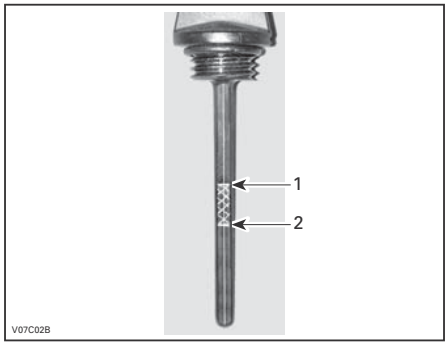
NOTE: While checking the oil level, visually inspect engine area for leaks.



TYPICAL - RH SIDE OF ENGINE
1. Dipstick

With vehicle on a level surface and engine cold, not running, check the oil level as follows:

1. Unscrew dipstick then remove it and wipe clean.
2. Reinstall dipstick, screw in it completely.
3. Remove and check oil level. It should be near or equal to the upper mark.



TYPICAL
1. Full
2. Add

To add oil, remove dipstick. Place a funnel into the dipstick tube to avoid spillage.

Add a small amount of recommended oil and recheck oil level.

Repeat the above procedures until oil level reaches the dipstick's upper mark. Do not overfill.

Properly tighten dipstick.

Recommended Engine Oil

Rotax® engines were developed and validated using the XPS™ oil. BRP recommends the use of its XPS engine oil or an equivalent at all time. Damages caused by the use of an oil not suitable for the engine may not be covered by the BRP Limited Warranty.

XPS RECOMMENDED ENGINE OIL	
General purpose	**Scandinavia:** 4T 5W40 SYNTHETIC BLEND OIL (EUR) (P/N 779290) **Other Countries:** 4T 5W40 SYNTHETIC BLEND OIL (P/N 779133)
Cold temperature	**Scandinavia:** 4T 0W40 SYNTHETIC OIL (EUR) (P/N 779286) **Other Countries:** 4T 0W40 SYNTHETIC OIL (P/N 779139)
Warm temperature	**Scandinavia:** 4T 10W50 SYNTHETIC OIL (EUR) (P/N 779240) **Other Countries:** 4T 10W50 SYNTHETIC OIL (P/N 779234)
IF THE RECOMMENDED XPS ENGINE OIL IS NOT AVAILABLE	
Use a 4-stroke SAE engine oil meeting or exceeding the following lubricant industry specifications. Always check the API service label certification on the oil container, it must contain at least one of the indicated standards. – **API service classification SJ, SL, SM or SN**	

Engine Oil Change

⚠ CAUTION The engine oil can be very hot. Wait until engine oil is warm.

NOTICE Engine oil and oil filter must be replaced at the same time.

Bring engine to its normal operating temperature.

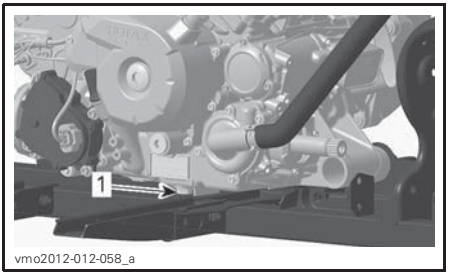
Ensure vehicle is on a level surface.

Remove dipstick.

Clean the oil drain plug area.

Place a drain pan under the oil drain plug area.

Unscrew oil drain plug.



1. Drain plug

Allow enough time for oil to flow out of oil filter.

Replace the oil filter. Refer to *OIL FILTER* in this section.

Change gasket on oil drain plug.

Clean gasket area on engine and oil drain plug then reinstall plug.

Refill engine at the proper level with the recommended oil.

Refer to *SPECIFICATIONS* for oil capacity.

Start engine and let idle for a few minutes.

Ensure oil filter area and oil drain plug areas are not leaking.

Stop engine.

Wait a while to allow oil to flow down to crankcase then check oil level.

Refill as necessary.

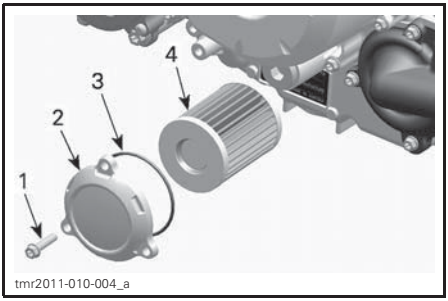
Dispose of oil as per your local environmental regulations.

Oil Filter

Oil Filter Replacement

Remove the right engine cover.

Unscrew the oil filter cover.



1. *Oil filter screw*
2. *Oil filter cover*
3. *O-ring*
4. *Oil filter*

NOTICE **Pay attention to avoid pinching the O-ring during filter and cover installation.**

Remove the oil filter and replace with a new filter.

Install a NEW O-ring on oil filter cover.

Install the new filter into the cover.

Apply engine oil on O-ring and on end of filter.

Screw oil filter cover in place.

Tighten oil filter cover screws to recommended specification.

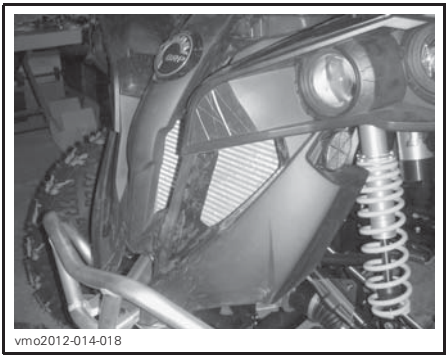
TIGHTENING TORQUE	
Oil filter cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Wipe out any oil spillage on engine.

Radiator

Radiator Inspection

Periodically check the radiator area for cleanliness.



TYPICAL

Inspect radiator and hoses for leaks or any damage.

Inspect radiating fins. They must be clean, free of mud, dirt, leaves and any other deposit that would prevent the radiator to cool properly.

Remove as much deposits as you can with your hands. If water is available in proximity, try rinsing the radiating fins.

If available, use a garden hose to rinse the radiating fins.

⚠ CAUTION **Never clean radiator with your hands when it is hot. Let the radiator cool down before cleaning.**

NOTICE **Be careful not to damage the radiating fins when cleaning. Do not use any object/tool that could damage the fins. The fins are purposely thin parts to allow efficient cooling. WHEN RINSING, USE LOW PRESSURE ONLY, NEVER USE A HIGH PRESSURE WASHER.**

See an authorized Can-Am dealer, repair shop or person of your own choosing to check the performance of the cooling system.

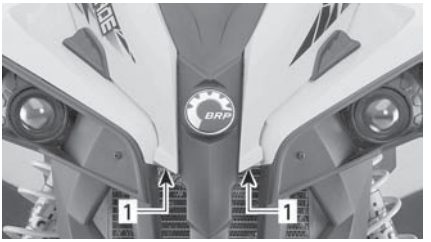
Engine Coolant

Engine Coolant Level Verification

⚠ WARNING

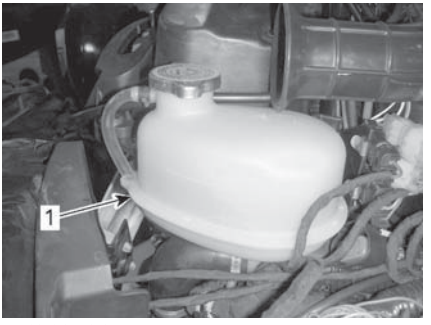
Check coolant level with engine cold. Never add coolant in cooling system when engine is hot.

1. Place vehicle on a level surface.
2. Remove seat.
3. Lift the front part of the central panel.



TYPICAL
1. Lift here

4. Remove console. Refer to *EQUIPMENT*.
5. Remove engine coolant reservoir cap.
6. With vehicle on a level surface, liquid should be between MIN. and MAX. level marks of coolant reservoir.



1. Engine coolant reservoir

NOTE: When checking level at temperature lower than 20°C (68°F), it may be slightly lower than MIN. mark.

7. Add coolant if required.

⚠ WARNING

Do not remove the coolant reservoir cap if engine is hot.

8. Use a funnel to avoid spillage. Do not overfill.
9. Properly reinstall and tighten reservoir cap.

⚠ WARNING

In order to avoid potential burns, do not remove the radiator cap if the engine is hot.

NOTE: A cooling system that frequently requires coolant is the indication of leaks or engine problems. See an authorized Can-Am dealer.

Reinstall:
- Console
- Gauge support
- Seat.

Recommended Engine Coolant

COUNTRY	RECOMMENDED COOLANT
Scandinavia	EXTENDED LIFE PRE-MIXED COOLANT (EUR) (P/N 779223)
All other countries	EXTENDED LIFE PRE-MIXED COOLANT (P/N 779150)
Alternative, or if not available	Distilled water and antifreeze solution (50% distilled water, 50% antifreeze)

NOTICE Always use ethylene-glycol antifreeze containing corrosion inhibitors specifically for internal combustion aluminum engines.

Engine Coolant Replacement

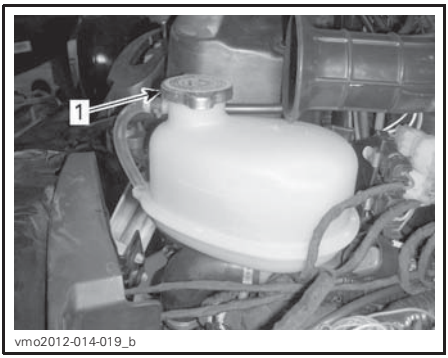
Cooling System Draining

Remove console. Refer to *EQUIPMENT*.

Remove the coolant reservoir cap.

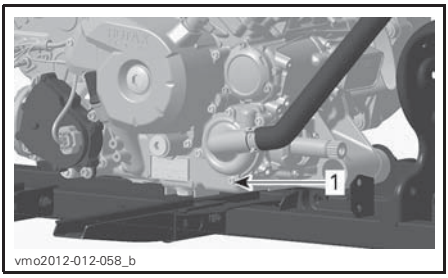
⚠ WARNING

Do not remove the coolant reservoir cap if engine is hot.



1. Engine coolant reservoir cap

Unscrew the coolant drain plug and drain the coolant into a suitable container.



1. Coolant drain plug

NOTE: Do not unscrew the coolant drain plug completely.

570 and 650 Models

Disconnect the lower radiator hose and drain the remaining coolant into a suitable container.

NOTE: Take note of hose clamp position on the lower radiator hose.

Reinstall lower radiator hose.

Position the radiator hose clamp as noted during removal.

All Models

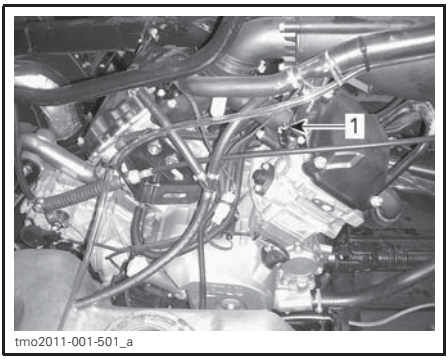
Install cooling system drain plug with a new sealing ring and tighten to specification.

TIGHTENING TORQUE	
Cooling system drain plug	9 N•m to 11 N•m (80 lbf•**in** to 97 lbf•**in**)

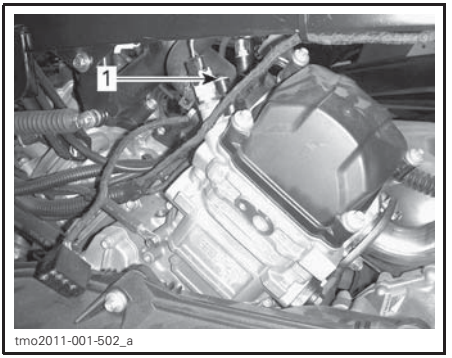
Bleed cooling system, refer to *COOLING SYSTEM BLEEDING*.

Cooling System Bleeding

1. Unscrew bleed screws on both front and rear cylinders.



TYPICAL
1. Front cylinder bleed screw



TYPICAL
1. Rear cylinder bleed screw

2. Remove the pressure cap.
3. Fill the cooling system until coolant comes out of the bleed screw(s).
4. Install the bleed screws using NEW gasket rings and tighten to specification.

TIGHTENING TORQUE	
Bleed screw	4.4 N•m to 5.6 N•m (39 lbf•**in** to 50 lbf•**in**)

5. Add coolant until system is full up to the pressure cap seat.
6. Start engine.

NOTE: Do not install pressure cap.

7. Run engine at idle until coolant fan turns ON.

NOTE: Monitor coolant level during engine warm-up and add coolant as required.

8. Depress the throttle lever two or three times; check coolant level.
9. Stop the engine and let it cool down.
10. Inspect cooling system for leaks.
11. Check coolant level in the reservoir. Add coolant as required.
12. Install pressure cap.

Reinstall:
– Console
– Gauge support
– Seat.

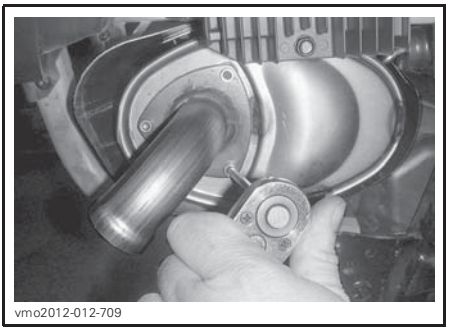
Muffler Spark Arrester

Muffler Spark Arrester Cleaning and Inspection

NOTE: Spark arrester screen replacement is required only when damaged.

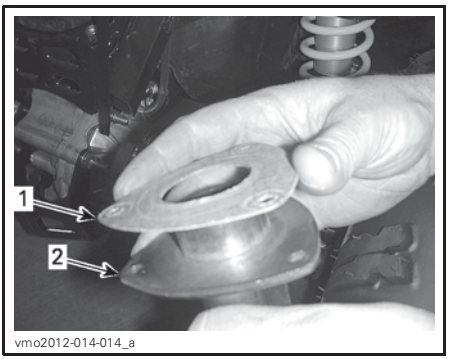
⚠ CAUTION Let exhaust system cool down before proceeding with cleaning and inspection.

Remove and discard the tail pipe retaining screws.



TYPICAL - REMOVE TAIL PIPE

Remove exhaust tail pipe, gasket (discard) and spark arrester.

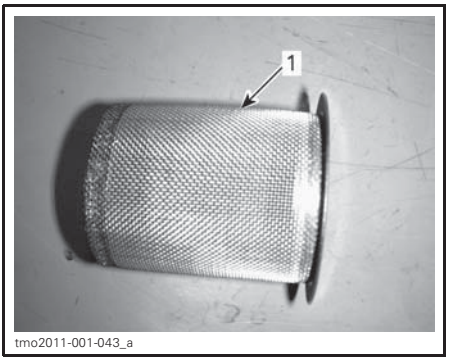


TYPICAL
1. Gasket
2. Exhaust tail pipe

Remove carbon deposits from the spark arrester using a brush.

NOTICE Use a soft brush and be careful to avoid damaging spark arrester mesh.

⚠ CAUTION Wear eye protection and gloves.



1. Clean spark arrester

Inspect mesh of spark arrester for any damage. Replace as required.

Inspect spark arrester chamber in muffler. Clean any debris as required.

Install new gasket, tail pipe and new retaining screws.

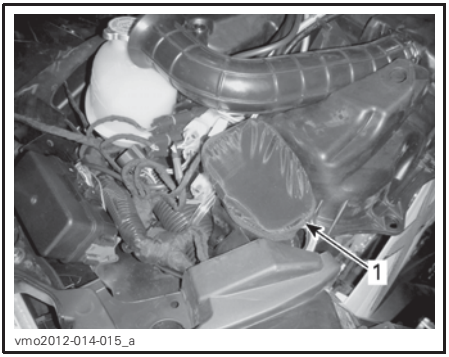
Reinstall muffler cover with new retaining screws. Tighten to specification.

TIGHTENING TORQUE	
Tail pipe retaining screws	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)
Cover retaining screws	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)

CVT Air Filter

CVT Air Filter Removal

1. Remove gauge support. Refer to *EQUIPMENT*.
2. Remove air filter from CVT air inlet by stretching its sides.



1. CVT air filter

CVT Air Filter Cleaning

1. Inspect filter and replace if damaged.
2. Gently clean filter using a solution of soft soap and tap water, then rinse thoroughly.
3. Dry filter completely.
4. Clean inside the CVT air inlet duct.

CVT Air Filter Installation

1. Install air filter on CVT inlet by stretching its sides.
2. Reinstall gauge support. Refer to *EQUIPMENT*.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

Gearbox Oil

Gearbox Oil Level Verification

NOTICE Check level and refill if necessary. **Do not overfill.** Operating the gearbox with an improper level may severely damage gearbox. Wipe off any spillage.

Place the vehicle on a level surface.

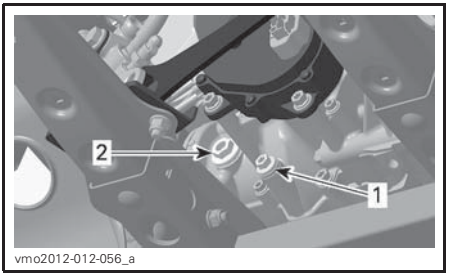
Select NEUTRAL position.

Apply parking brake.

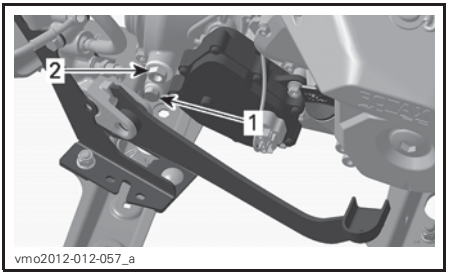
NOTE: Check the gearbox oil level when engine is cold and not running.

Clean the oil level plug area.

Remove the oil level plug.



TYPICAL - 570/650/850 ENGINE
1. *Drain plug*
2. *Oil level plug*



TYPICAL - 1000R ENGINE
1. *Drain plug*
2. *Oil level plug*

The oil should be level with the bottom of the oil level hole.

Refill as required until gearbox oil level flows through oil level hole.

Recommended Gearbox Oil

RECOMMENDED GEARBOX OIL	
Scandinavia	75W140 SYNTHETIC GEAR OIL (EUR) (P/N 779215)
All other countries	75W140 SYNTHETIC GEAR OIL (P/N 779160)

NOTE: The XPS oil is specially formulated to meet the lubrication requirements of this gearbox. BRP strongly recommends the use of its XPS oil. However, if the XPS synthetic gear oil is not available, use the following lubricant:

GEARBOX OIL REQUIREMENT
75W 140 API GL-5 synthetic gear oil

NOTICE Do not use another types of oil when servicing. Do not mix with other types of oil.

Gearbox Oil Change

NOTE: When replacing the gearbox oil, it is recommended to clean the vehicle speed sensor (VSS) at the same time.

Place the vehicle on a level surface.

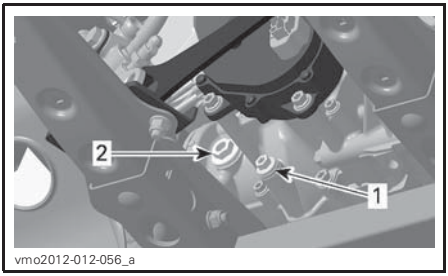
Clean the drain plug area.

Clean the oil level plug area.

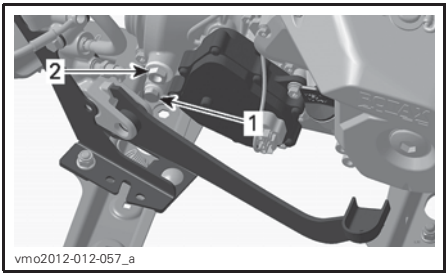
Place a drain pan underneath the oil drain plug.

Remove the oil level plug.

Remove the drain plug.



TYPICAL - 570/850 ENGINE
1. *Drain plug*
2. *Oil level plug*



TYPICAL - 1000R ENGINE
1. *Drain plug*
2. *Oil level plug*

Let oil completely drain from gearbox.

Clean the drain plug from any metallic particles.

Install the drain plug and tighten to specification.

TIGHTENING TORQUE	
Drain plug	20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)

Refill gearbox.

NOTICE Use ONLY the recommended type of oil.

The oil should be level with the bottom of the oil level orifice.

NOTICE Do not overfill.

Reinstall oil level plug and tighten to specification.

TIGHTENING TORQUE	
Oil level plug	5 N•m ± 0.6 N•m (44 lbf•**in** ± 5 lbf•**in**)

Wipe off any spillage.

Dispose gearbox oil as per your local environmental regulations.

Throttle Body

Throttle Body Inspection

1. Remove the following:
   – Air filter housing
   – Adapter hose between air filter housing and throttle body.
2. Visually inspect throttle plate and throttle body venturi for cleanliness.
3. Clean inside throttle body using a common throttle body cleaner if necessary.

Throttle Body Lubrication

No lubrication is required.

Throttle Body Cleaning

1. Remove air inlet hose from throttle body.
2. Check throttle body cleanliness using a flashlight. Fully open throttle plate and verify:
   – Throttle body bore
   – Throttle plate edge.

   Look for:
   – Dirt
   – Oily surfaces
   – Carbon and salt deposits on throttle plate and the surrounding bore.
3. Clean as necessary.
4. Use a throttle body cleaner such as GUNK INTAKE MEDIC or an equivalent.

NOTICE Only use an appropriate throttle body cleaner that will not damage O-rings and EFI sensors.

⚠ CAUTION Use the product in a well ventilated area. Refer to product manufacturer's warnings.

5. To avoid getting dirt into engine, spray cleaner on a clean rag then rub rag against throttle plate and bore. A toothbrush may also be used.

⚠ CAUTION Ensure key is removed so that nobody can activate the electrical system, otherwise the ECM would turn on. This could cause serious finger injury as the throttle plate moves quickly.

6. Gently open throttle plate and hold fully open to reach all surfaces.
7. To remove residual dirt, spray cleaner on throttle plate and on bore.
8. Reinstall removed parts.

Throttle Cable (if equipped)

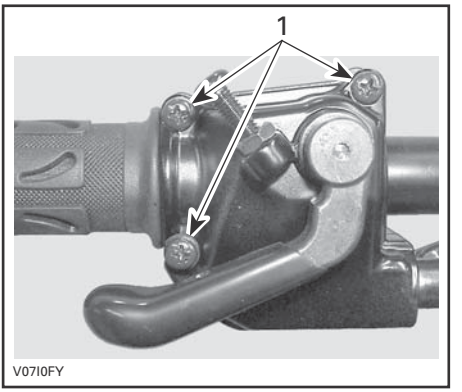
Throttle Cable Lubrication

The throttle cable must be lubricated with a silicone based lubricant or an equivalent.

⚠ WARNING

Always use a silicone-based lubricant. Using another lubricant (like a water-based lubricant) could cause the throttle lever/cable to become sticky and stiff.

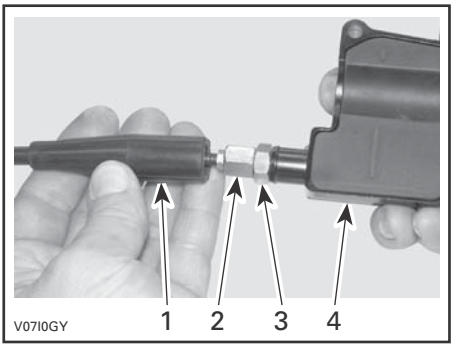
Open the throttle lever housing.



1. Remove these screws

Separate the housing.

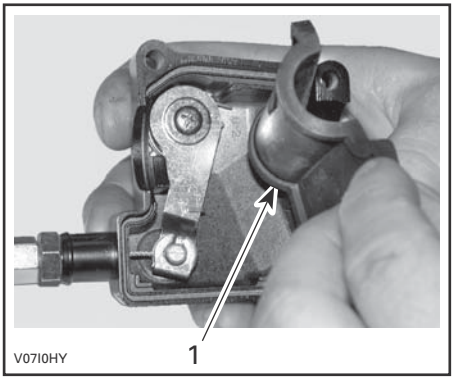
Slide rubber protector back to expose throttle cable adjuster.



1. Cable protector
2. Throttle cable adjuster
3. Lock nut
4. Throttle lever housing

Screw in the throttle cable adjuster.

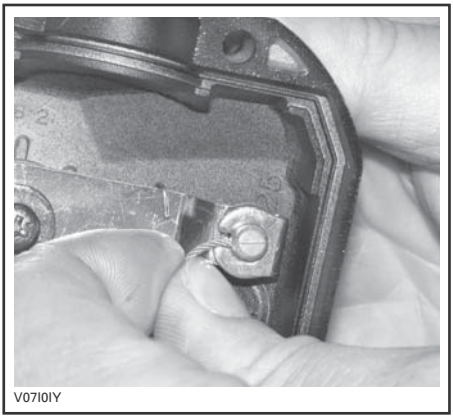
Remove inner housing protector.



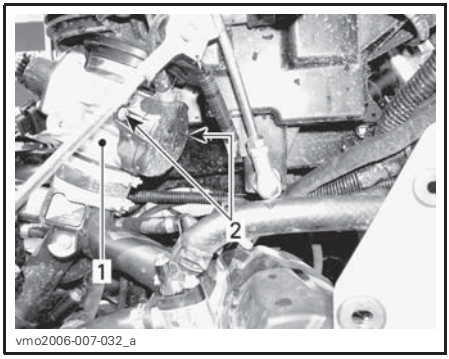
1. Inner housing protector

Remove the cable from the throttle lever housing.

NOTE: Slide cable in clip slot and remove the end of cable from clip.



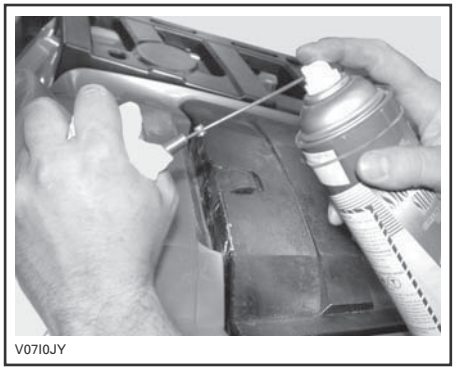
Remove the throttle body side cover.



1. Throttle body
2. Side cover screws

Insert the needle of the lubricant can in the end of throttle cable adjuster.

⚠ CAUTION Always wear appropriate skin and eye protection. Chemicals can cause a skin rash and eye injury.



TYPICAL

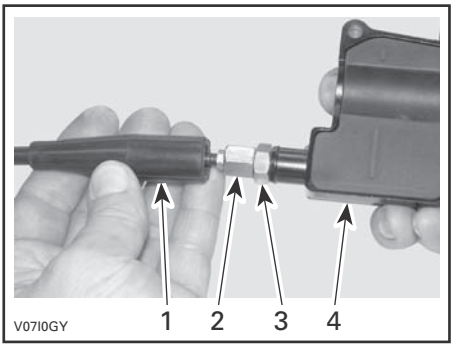
NOTE: Place a rag around the throttle cable adjuster to prevent the lubricant from splashing.

Add lubricant until it runs out at throttle body end of the throttle cable.

Reinstall and adjust the cable.

Throttle Cable Adjustment

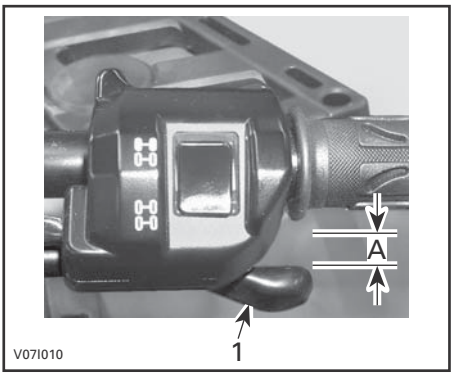
Slide rubber protector back to expose throttle cable adjuster.



1. Cable protector
2. Throttle cable adjuster
3. Lock nut
4. Throttle lever housing

Loosen lock nut then turn the adjuster to obtain correct throttle lever free play.

NOTE: Measure throttle free play at the tip of throttle lever.



1. Throttle lever
A. 2 mm (.079 in)

Tighten lock nut and reinstall protector.

With the shift lever on PARK position, start the engine.

Check if the throttle cable is adjusted correctly by turning handlebar fully to the right then fully to the left. If the engine RPM increases, readjust the throttle lever free play.

Spark Plugs

Spark Plug Access

Remove side panels.

Unplug spark plug cables.

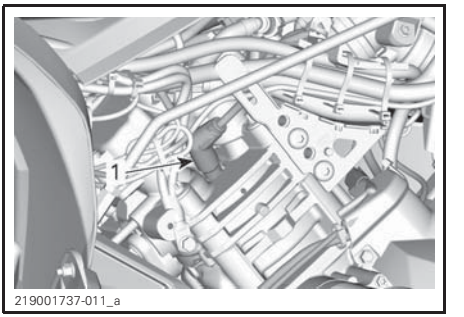
Spark Plug Removal

Unscrew spark plugs one turn.

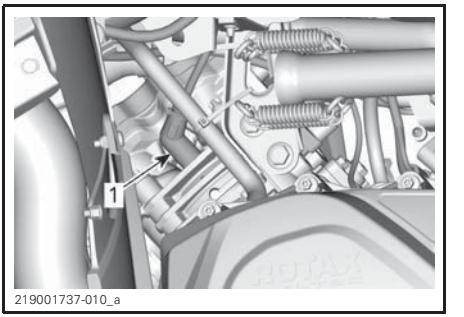
⚠ CAUTION Always wear safety goggles when using pressurized air.

Clean spark plugs and cylinder heads with pressurized air if possible.

Unscrew spark plugs completely using a spark plug socket, then remove them.



RH SIDE — REAR CYLINDER
1. Spark plug



LH SIDE — FRONT CYLINDER
1. Spark plug

Spark Plug Installation

Prior to installation, make sure that contact surfaces of cylinder heads and spark plugs are free of grime.

Using a feeler gauge, set the spark plug gap.

SPARK PLUG GAP	
570 650	0.8 mm to 0.9 mm (.031 in to .035 in)
850 1000R	0.7 mm to 0.9 mm (.028 in to .035 in)

Apply a small amount of copper-based anti-seize lubricant over spark plug threads to prevent a possible seizure.

Screw spark plugs into cylinder heads by hand and tighten with a torque wrench and a proper socket.

⚠ CAUTION Do not overtighten spark plugs, engine damage can occur.

TIGHTENING TORQUE	
Spark plug (570 and 650)	20 N•m ± 2.4 N•m (15 lbf•ft ± 2 lbf•ft)
Spark plug (850 and 1000R)	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)

CVT Cover

NOTE: For a better understanding, some illustrations are taken with engine out of vehicle. To perform the following instructions, it is not necessary to remove engine.

This CVT is lubrication free. Never lubricate any components except drive pulley bearing.

⚠ WARNING

Never touch CVT while engine is running. Never drive vehicle when CVT cover is removed.

⚠ WARNING

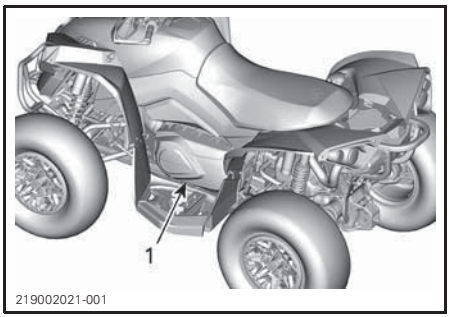
Engine must be cool before cover is removed. Always wear protective gloves when removing cover.

Place the vehicle on a level surface. Select PARK position.

CVT Cover Access

The CVT cover is located on the LH side of the vehicle.

Remove the following:
- LH side and extension panels
- LH footboard panel.



TYPICAL
1. CVT cover

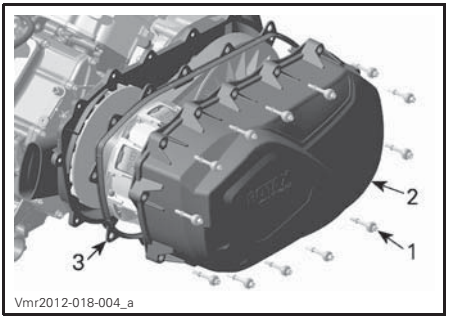
CVT Cover Removal

Remove all CVT cover retaining screws.

Remove the center top screw last to support the cover during removal.

NOTICE Do not use an impact tool to remove CVT cover screws.

Remove the CVT cover and its gasket.



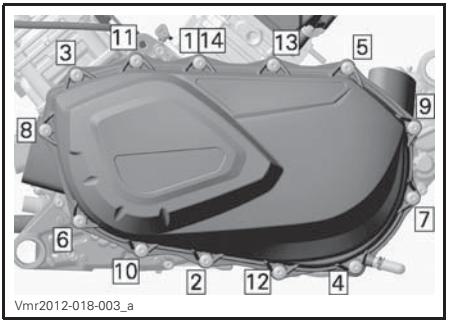
1. *CVT cover screw*
2. *CVT cover*
3. *Gasket*

CVT Cover Installation

Install the center top screw of first.

NOTE: Do not use and impact tool to install CVT cover screws.

Tighten the CVT cover screws as per following sequence.



CVT COVER TIGHTENING SEQUENCE

TIGHTENING TORQUE	
CVT cover screws	7 N•m ± 0.8 N•m (62 lbf•**in** ± 7 lbf•**in**)

Drive Belt

Drive Belt Removal

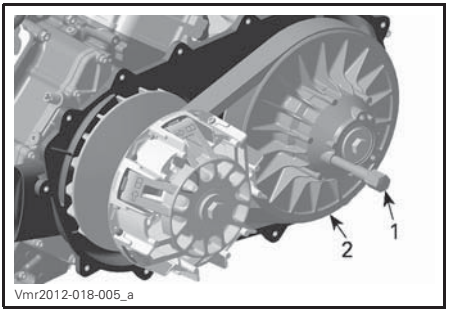
NOTICE In case of a drive belt failure, the CVT, cover, drain reservoir and air outlet must be cleaned and inspected for obstruction.

Remove *CVT COVER*.

Open driven pulley.

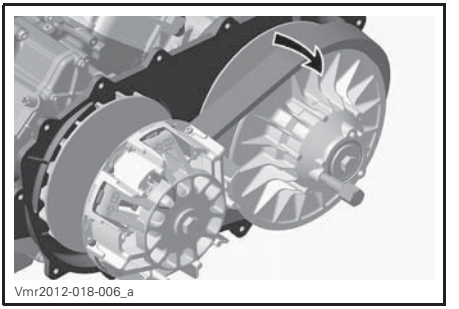
REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	

Screw tool in the threaded hole of driven pulley and tighten to open the pulley.



1. *Puller/locking tool*
2. *Fixed sheave of driven pulley*

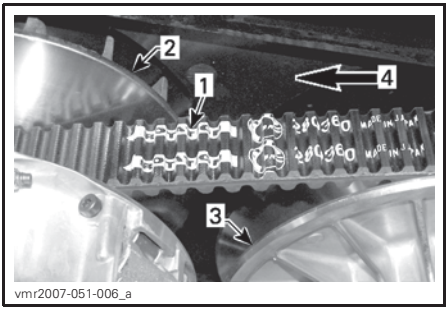
Slide the belt over the top edge of fixed sheave to remove it.



Drive Belt Installation

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

The maximum drive belt life span is obtained when the drive belt has the proper rotation direction. Install it so that the arrow printed on belt is pointing towards front of the vehicle, viewed from top.



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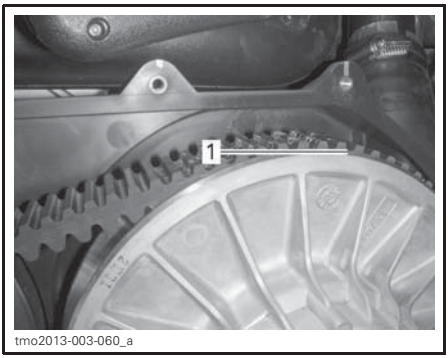
1. *Arrow printed on belt*
2. *Drive pulley (front)*
3. *Driven pulley (rear)*
4. *Rotation direction*

Turn the driven pulley until the lowest portion of the cogs on the external surface of drive belt is even with the driven pulley edge.



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1. *Lowest portion of cogs even with external surface of drive belt*

Drive and Driven Pulleys

Drive and Driven Pulleys Inspection

This inspection must be performed by an authorized Can-Am dealer, repair shop, or person of your own choosing for maintenance, repair, or replacement.

Drive Pulley

Inspect the bushings of the sliding sheave of the drive pulley, replace worn parts.

Driven Pulley

Inspect the bushings of the cam and of the sliding sheave of the driven pulley, replace worn parts.

Battery

⚠ CAUTION Never charge a battery while installed in vehicle.

These vehicles are equipped with a VRLA battery (Valve Regulated Lead Acid). It is a maintenance-free type battery, there is no need to add water to adjust electrolyte level.

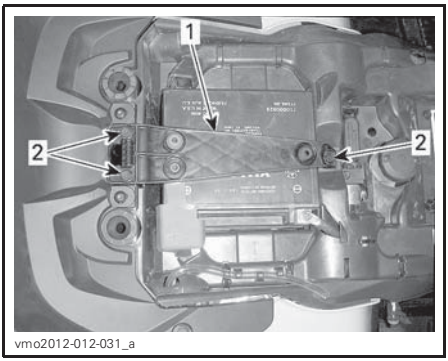
NOTICE Never remove the battery sealing cap.

Battery Removal

Disconnect BLACK (-) cable first then RED (+) cable.

NOTICE Always disconnect BLACK (-) battery cable first.

Remove retaining screws, battery holding strap then pull the battery out of frame.



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1. *Battery holding strap*
2. *Retaining screws*

Battery Cleaning

Clean battery, battery casing and battery posts using a solution of baking soda and water.

Remove corrosion from battery cable terminals and battery posts using a firm wire brush.

Battery Installation

Battery installation is the reverse of the removal procedure.

NOTICE Always connect RED (+) battery cable first.

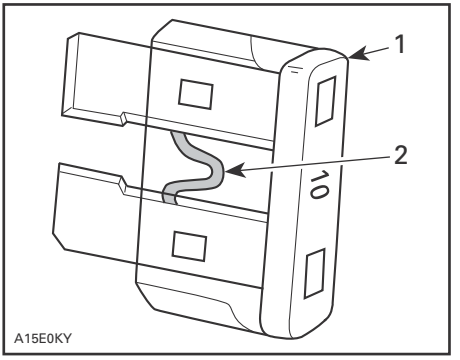
Fuses

CAUTION Always remove key from D.E.S.S. post before replacing a defective fuse.

Fuse Inspection

Check if filament is melted.

If filament is melted, replace damaged fuse, refer to *FRONT FUSE BOX DESCRIPTION* for proper rating.

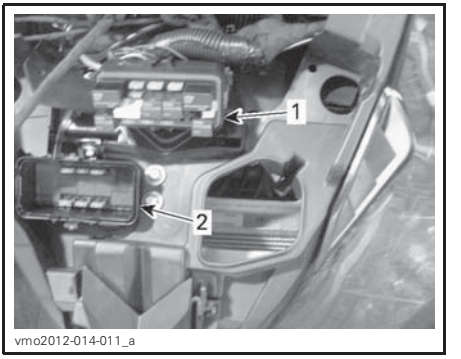


TYPICAL
1. *Fuse*
2. *Check if melted*

NOTICE Do not use a higher rated fuse as this can cause severe damage.

Front Fuse Box Access

Remove the gauge support. Refer to *EQUIPMENT*.



1. *Front fuse box*
2. *Front fuse box cover*

NOTE: Check inside fuse box cover to know fuses location.

NOTICE Do not store any objects in the front service compartment.

Front Fuse Box Description

All models except 850, 1000R and NRMM models

FRONT FUSE BOX		
NO.	DESCRIPTION	RATING
R1	Fan Relay	-
R2	Main Relay	-
R3	Accessories Relay	-
R4	Fuel Pump Relay	-
R5	Lights Relay	-
R8	Brake Relay	-
F4	Relays Gauge (Speedo)	5 A
F5	Injectors/Ignition	5 A
F6	ECM / 2WD/4WD / DESS	5 A
F7	Winch (X mr models)	5 A
F8	Key Switch, Starter Solenoid	5 A
F9	Cooling Fan	25 A
F11	Lights	30 A
F12	DC Outlet	15 A
F14	Taillight Accessories 2	15 A
F15	Fuel Pump	5 A

850, 1000R and NRMM models

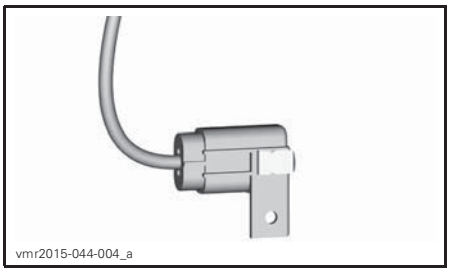
FRONT FUSE BOX		
NO.	DESCRIPTION	RATING
RY1	Fan Relay	-
RY2	Main Relay	-
RY3	Lights Relay	-
RY5	Accessories	-
RY6	Brake Relay	-

FRONT FUSE BOX		
NO.	DESCRIPTION	RATING
F1	Key Clock	10 A
F2	Lights	30 A
F3	Accessories 1	20 A
F4	Accessories 2	20 A
F5	Injectors Ignition coils Fuel Pump	10 A
F6	Relays Gauge	10 A
F7	Brake lights	10 A
F8	ECM	10 A
F9	2WD/4WD	10 A
F12	Cooling Fan	25 A

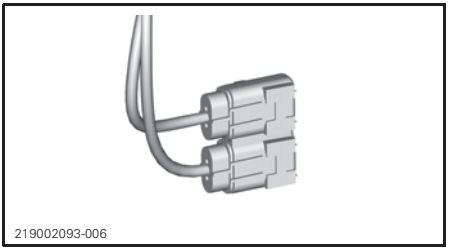
Rear Fuse Holder

Except NRMM compliant models

The fusible links and rear fuse holder are located behind the RH side panel.



REAR FUSE HOLDER



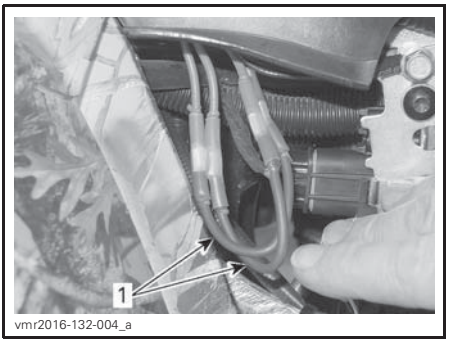
FUSE BOX 2

FUSE HOLDER	
DESCRIPTION	Rating
DPS (Dynamic Power Steering)	40 A
Main	40 A

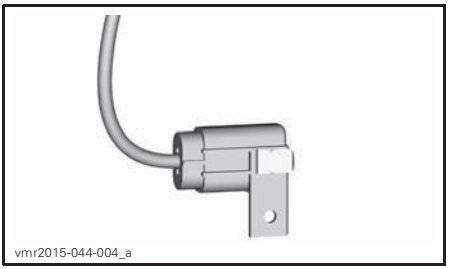
Rear Fuse Holder and Fusible Links

NRMM compliant models

The rear fuse holder is located under seat near battery.



1. Fuse links



FUSE BOX 2

Rear Fuse Identification

FUSE LINK IDENTIFICATION			
Fusible links	1	Main	16 awg
	2	Fan/accessories	16 awg
FUSE IN FUSE BOX 2 IDENTIFICATION			
Fuse	3	DPS (dynamic power steering)	40 A

Lights

⚠ CAUTION Always turn the ignition switch to OFF position before replacing a defective bulb.

Always check light operation after replacement.

Headlight Bulb Replacement

NOTICE Never touch glass portion of a halogen bulb with bare fingers, it shortens its operating life. If glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

Unplug connector from bulb.

Rotate light bulb counterclockwise to release it from light housing.

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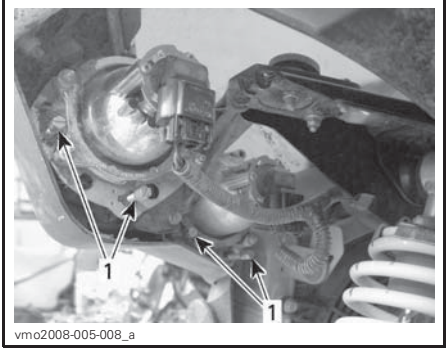
Pull out bulb.

Properly reinstall removed parts in the reverse order of their removal.

Validate headlights operation.

Headlight Beam Aiming

Turn adjustment screws to adjust beam height to your convenience. Adjust headlights evenly.



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TYPICAL
1. Adjustment screws

Taillight Bulbs Replacement

Unplug taillight connector.

Rotate taillight counterclockwise to remove it from taillight housing.

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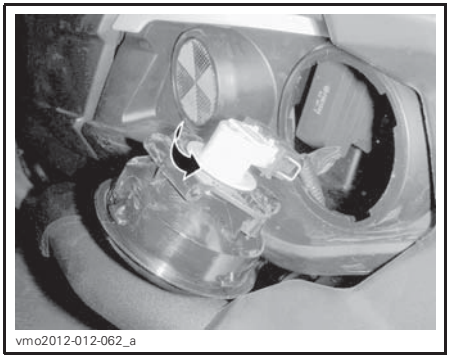
Disconnect the light bulb connector.

Rotate light bulb counterclockwise to remove it from taillight.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Installation is the reverse of the removal procedure.

Drive Shaft Boot and Protector

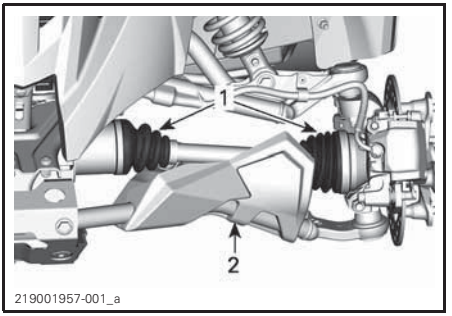
Drive Shaft Boot and Protector Inspection

Visually inspect drive shaft protectors and boots conditions.

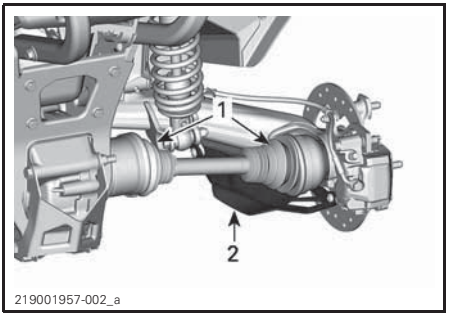
Check protectors for damage or rubbing against shafts.

Check boots for cracks, tears, leaking grease etc.

Repair or replace damaged parts as necessary.



TYPICAL — FRONT OF VEHICLE
1. *Drive shaft boots*
2. *Drive shaft protector*



TYPICAL — REAR OF VEHICLE
1. *Drive shaft boots*
2. *Drive shaft protector*

Wheel Bearing

Wheel Bearing Inspection

Place vehicle on a level surface.

Apply parking brake.

Lift and support vehicle.

Secure vehicle on jack stands.

Push and pull the wheels from the upper edge to feel the play.

See an authorized Can-Am dealer if there is an abnormal play.

TYPICAL

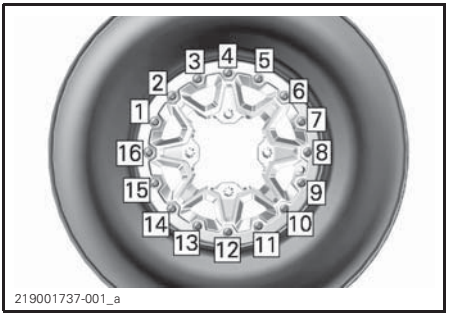
Wheel Beadlock Inspection (If equipped)

Wheel Beadlock Retightening

NOTICE Do not use an impact wrench for tightening beadlock screws in order to avoid to damage them.

1. Tighten all screws to specification and according to the following tightening sequence.

TIGHTENING TORQUE	
Beadlock screws	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)



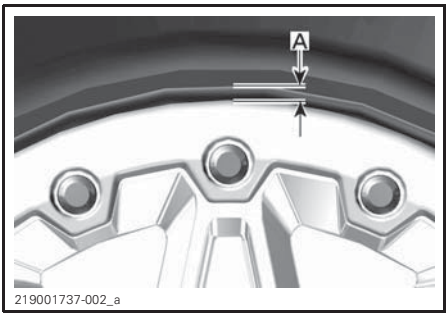
TYPICAL - FINAL TIGHTENING SEQUENCE

2. Tighten screws **a few turns at a time** to ensure even pressure on the beadlock clamp ring.

NOTE: It is normal that the beadlock clamp ring flexes slightly to match the tire bead.

Wheel Beadlock Gap Verification

1. Verify the gap between tire and beadlock clamp ring, it should be practically equal all around the ring.



TYPICAL
A. Gap between tire and ring

If the gap is not acceptable, see *TIRE REPLACEMENT*.

Wheels and Tires

Tire Pressure

⚠ WARNING

Tire pressure greatly affects vehicle handling and stability. Insufficient pressure may cause tire to deflate and rotate on wheel. Overpressure may burst the tire. Always follow recommended pressure. NEVER set tire pressure below minimum. It could cause the tire to dislodge from the rim. Since tires are low-pressure types, a manual pump should be used.

Check pressure when tires are cold before using the vehicle. Tire pressure changes with temperature and altitude. Recheck pressure if one of these conditions has changed.

For your convenience, a pressure gauge is supplied in tool kit.

Refer to *SPECIFICATIONS* for values.

Although the tires are specifically designed for off-road use, a flat may still occur. Therefore, it is recommended to carry a tire pump and a repair kit.

Tire Inspection

Check tire for damage and wear. Replace if necessary.

Do not rotate tires. The front and rear tires have a different size. The tires are directional and their rotation must be kept in a specific direction for proper operation.

Tire Replacement

Tires replacement should be performed by an authorized Can-Am dealer.

⚠ WARNING

- Replace tires only with the same type and size as original tires.
- For unidirectional tread pattern, ensure that the tires are installed in the correct direction of rotation.
- Tires should be replaced, by an experienced person, in accordance with tire industry standards and tools.

While reading this Operator's Guide, remember that:

⚠ WARNING

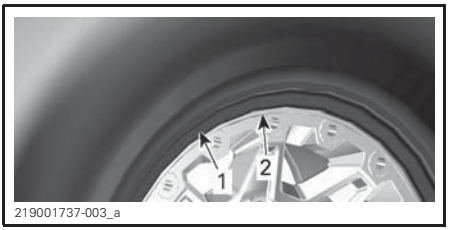
Indicates a potential hazard that, if not avoided, could result in serious injury or death.

Tire Mounting on Beadlock Wheels (If equipped)

1. Mount the tire on wheel.
   1.1 On the opposite side of beadlock, apply tire mounting lube on inner bead of tire and wheel to ensure proper seat when inflating. Mount the inner bead over the wheel like normal.

   NOTICE Mount tire from beadlock side only.

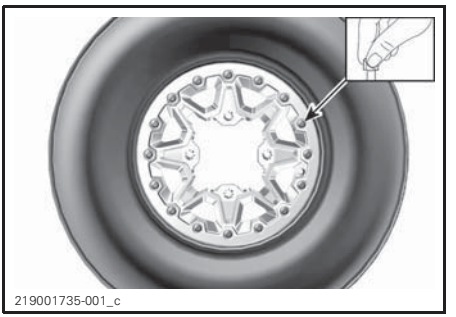
   1.2 Seat tire outer bead in the shoulder of the beadlock inner ring and center the tire.



TYPICAL
1. *Tire outer bead*
2. *Beadlock inner ring shoulder*

2. Install all beadlock screws. To avoid cross threading, start all screws by hand.

NOTICE Do not use an impact wrench for installing beadlock screws. The risk of screw breaking or screw stripping is high when using an impact wrench.

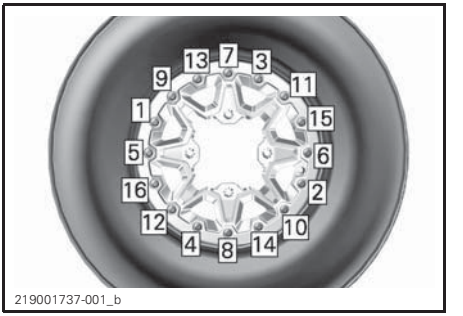


TYPICAL

3. Tighten beadlock screws as per following specification and sequence.

NOTE: To ensure even pressure on the beadlock clamp ring, tighten screws **a few turns at a time**.

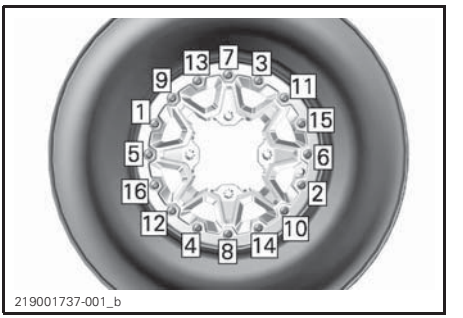
TIGHTENING TORQUE	
Beadlock screws (FIRST SEQUENCE)	3 N•m ± 1 N•m (27 lbf•**in** ± 9 lbf•**in**)



TYPICAL - TIGHTENING SEQUENCE

4. At this time check if the tire is still centered on wheel. Reposition it if necessary.
5. Tighten beadlock screws as per the **second** torque using the same sequence.

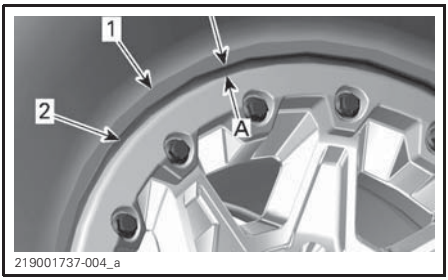
TIGHTENING TORQUE	
Beadlock screws (SECOND SEQUENCE)	8 N•m ± 1 N•m (71 lbf•**in** ± 9 lbf•**in**)



TYPICAL - TIGHTENING SEQUENCE

NOTE: The beadlock clamp ring can flex slightly to match the tire bead. IT IS NORMAL.

6. Verify the gap between tire and beadlock clamp ring, it should be practically equal all around the ring.



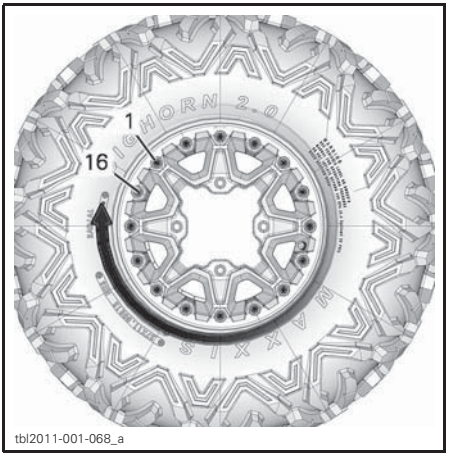
1. Tire
2. Beadlock clamp ring edge
A. Gap equal all around beadlock clamp ring

If the gap is not acceptable,

– Loosen all screws.
– Check tire position on wheel and reposition it if necessary.
– Restart the torquing sequence as detailed.

7. Torque beadlock screws a **final** time following the indicated sequence.

TIGHTENING TORQUE	
Beadlock screws (FINAL SEQUENCE)	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)



TYPICAL - FINAL TIGHTENING SEQUENCE

8. Inflate tire to seat the inner bead on wheel. Always use safe practices, such as a tire safety cage.

⚠ WARNING

Never exceed tire's recommended maximum pressure for seating beads.

Wheel Removal

Place vehicle on a level surface.

Engage 4WD mode.

Apply the parking brake.

Loosen lug nuts then lift vehicle.

Secure vehicle on jack stands.

Remove lug nuts then remove wheel.

Wheel Installation

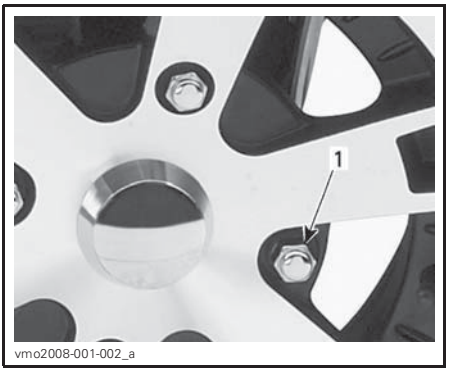
At installation, it is recommended to apply anti-seize lubricant on threads.

If tires are unidirectional, make sure to install wheel according to tire rotation.

Carefully tighten lug nuts in a criss-cross sequence then apply final torque.

TIGHTENING TORQUE	
Wheel lug nut	80 N•m ± 5 N•m (59 lbf•ft ± 4 lbf•ft)

NOTICE Always use the recommended wheel nuts according to the type of wheel. Using a different lug nut could cause damage to the rim or studs.



TYPICAL — ALUMINUM WHEEL
1. Wheel lug nut (closed end type)

Steering

Steering Inspection

Tie-rod Ends

Place vehicle on a level surface.

Apply parking brake.

Lift vehicle.

Secure vehicle on jack stands.

Inspect tie-rods boot for cracks.

Push and pull the wheels from the front or rear edge to feel the play.

See an authorized Can-Am dealer if there is an abnormal play or the boot is cracked.

⚠ WARNING

The tie-rod end must be replaced if the boot is cracked. The steering system must be inspected if abnormal play is detected. See an authorized Can-Am dealer.

Suspension

Front Suspension Lubrication

Lubricate front stabilizer bar bushings and suspension arms at grease fittings.

SUSPENSION GREASE	
Scandinavia	SYNTHETIC SUSPENSION GREASE (EUR) (P/N 779226)
All other countries	SYNTHETIC SUSPENSION GREASE (P/N 779163)

Rear Suspension Lubrication

Lubricate rear stabilizer bar links and pivot bushing at grease fittings.

SUSPENSION GREASE	
Scandinavia	SYNTHETIC SUSPENSION GREASE (EUR) (P/N 779226)
All other countries	SYNTHETIC SUSPENSION GREASE (P/N 779163)

Suspension Inspection

Shock Absorbers

Inspect shock absorber for oil leaks or other damage.

Check tightness of fasteners.

See an authorized Can-Am dealer as necessary.

Ball Joints

Place vehicle on a level surface.

Apply parking brake.

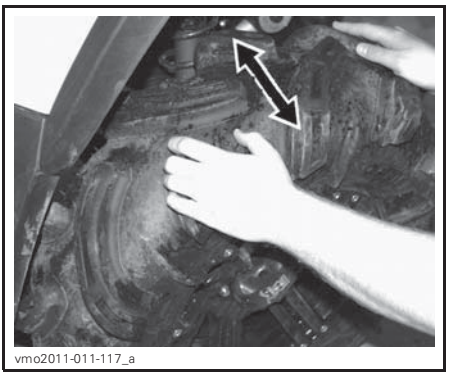
Lift vehicle.

Secure vehicle on jack stands.

Inspect ball joints boot for cracks.

Push and pull the wheels from the upper and lower edge to feel the play.

See an authorized Can-Am dealer if there is an abnormal play or the boot is cracked.



TYPICAL

⚠ WARNING

The ball joint must be replaced if the boot is cracked or it shows an abnormal play. See an authorized Can-Am dealer.

Front Suspension Arms

Check suspension arms for cracks, bending or other damage.

See an authorized Can-Am dealer as necessary.

Rear Trailing Arms

Check trailing arms for distortion, cracks or bending.

See an authorized Can-Am dealer if any problem is detected.

Brakes

Brake Fluid Reservoir Level Verification

With vehicle on a level surface, check brake fluid in reservoirs for proper level.

NOTE: A low level may indicate leaks or worn brake pads.

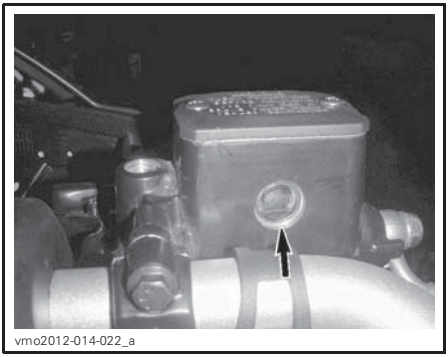
Front Brake Reservoir Level Verification

Turn steering in the straight-ahead position to ensure reservoir is level.

Check the brake fluid level, the reservoir is full when the fluid reaches of the top of window.

Visually inspect lever boot condition.

Check for cracks, tears, etc. Replace if damaged.

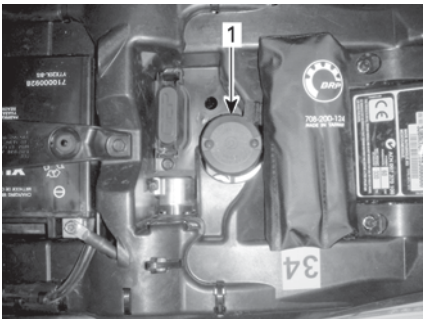


TYPICAL

Rear Brake Reservoir Level Verification

Remove the seat.

With vehicle on a level surface, liquid should be between MIN. and MAX. level marks of brake pedal fluid reservoir.



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1. Rear brake fluid reservoir

Adding Brake FLuid

Clean filler cap.

⚠ WARNING

Clean filler cap before removing.

Remove screws retaining the reservoir cap.

Remove reservoir cap.

Add fluid as required using a clean funnel. **Do not overfill.**

NOTICE **Brake fluid can damage plastic and painted surface. Wipe off and clean any spillage.**

Reinstall reservoir cap and tighten screws.

NOTE: Ensure filler cap diaphragm is pushed inside the cap before closing the brake fluid reservoir.

Recommended Brake Fluid

Always use DOT 4 brake fluid from a sealed container.

⚠ WARNING

To avoid damage to the braking system, do not use other brake fluid types.

Brake Inspection

⚠ CAUTION **The brakes can be very hot after prolonged use of the vehicle and can cause burns. Wait for the brakes to cool down.**

The brake inspection, maintenance and repair should be performed by an authorized Can-Am dealer.

However, verify the following between visits to your dealer:

– Brake fluid level
– Brake system for fluid leaks
– Brake cleanliness.

⚠ WARNING

The brake fluid replacement or brake system maintenance and repairs should be performed by an authorized Can-Am dealer.

Post-Operation Care

When vehicle is used in salt-water environment (beach area, launching and loading boats etc.), rinsing the vehicle with fresh water is necessary to preserve vehicle and its components. Metallic parts lubrication is highly recommended. Use LUBRICANT AND ANTI-CORROSIVE (P/N 779168) or an equivalent. This must be performed at the end of each operating day.

When vehicle is operated in muddy conditions, rinsing the vehicle is recommended to preserve vehicle and its components and to keep lights clean.

Vehicle Cleaning

NOTICE Never use a high pressure washer to clean the vehicle. USE LOW PRESSURE ONLY (like a garden hose).

Pay attention to certain areas where mud or debris can accumulate and potentially cause wear, interferences or promote corrosion.

Wash the vehicle with a soapy water solution.

NOTICE Never clean polypropylene body parts with any petroleum base cleaning products, as it will alter the glossy finish.

Non Compatible Cleaning Products

MATERIAL TYPE	NON-COMPATIBLE CLEANING PRODUCTS
Polypropylene (body parts)	ANY PETROLEUM BASE CLEANING PRODUCTS
	XPS ATV FINISHING SPRAY (P/N 219 701 704)
	XPS ATV CLEANING KIT (P/N 219 701 713) (it contains the above XP-S ATV Finishing Spray)

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DO NOT USE ON POLYPROPYLENE

Compatible Cleaning Products

MATERIAL TYPE	COMPATIBLE CLEANING PRODUCT
Polypropylene (body parts)	XPS ATV WASH (P/N 219 701 702)
	Soapy water

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SAFE FOR POLYPROPYLENE

STORAGE AND PRESEASON PREPARATION

When a vehicle is not in use for more than four (4) months, proper storage is a necessity.

When using your vehicle after storage, a preparation is required.

See an authorized Can-Am dealer, repair shop or person of your own choosing to have your vehicle prepared for either storage or the preseason.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

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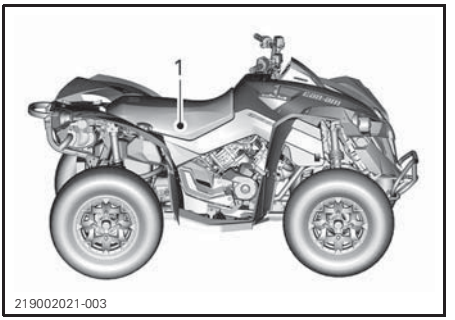
TECHNICAL INFORMATION

VEHICLE IDENTIFICATION

The main components of your vehicle (engine and frame) are identified using different serial numbers. It may sometimes become necessary to locate these numbers for warranty purposes or to trace your vehicle in the event of loss. These numbers are also required by the authorized Can-Am dealer to complete warranty claims properly. We strongly recommend that you take note of all the serial numbers on your vehicle and supply them to your insurance company.

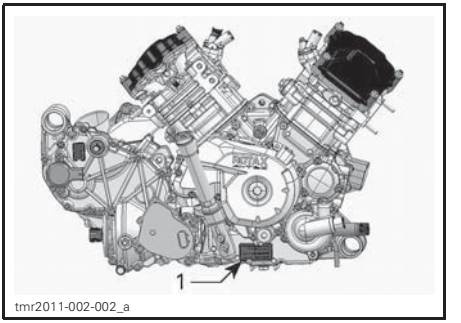
Vehicle Identification Number



TYPICAL
1. VIN Label - On the frame under the seat

TYPICAL - VIN LABEL

Engine Identification Number (EIN)

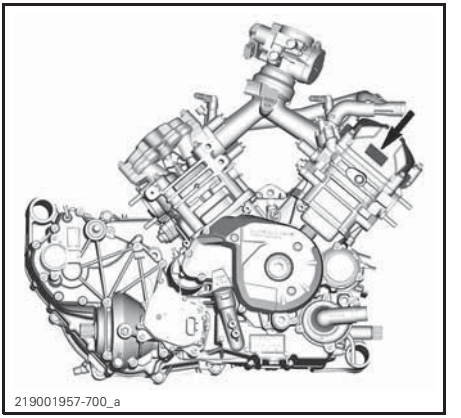


TYPICAL - RH SIDE OF ENGINE
1. Engine Identification Number (EIN)

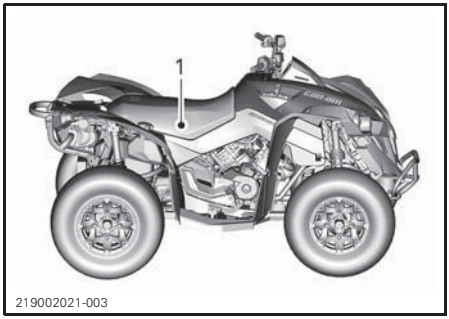
Compliance Label

Regulation (EU) 2016/1628 applicable for Non-Road Mobile Machineries

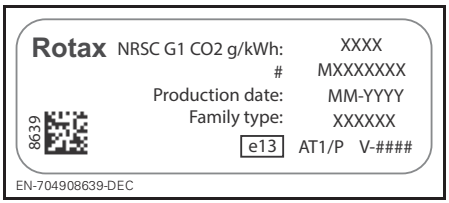
Vehicles who comply to Regulation (EU) 2016/1628 (NRMM) are identified on the engine valve cover and under the seat.



TYPICAL



TYPICAL
1. NRMM Label - On the frame under the seat



TYPICAL - NRMM IDENTIFICATION LABEL

NOTE: Tampering with the engine or its components voids the EU type-approval of that particular engine.

Radio Frequency Digitally Encoded Security System (RF D.E.S.S. key)

This device complies with FCC Part 15 and Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IC Registration Number: 12006A-M01456

FCC ID: 2ACERM01456

We, the party responsible for compliance, declare under our sole responsibility that the device is in conformity with the provisions of the following Council Directive: 2014/53/EU. To which this declaration relates is in conformity with the essential requirements and other relevant requirements. The product is in conformity with the following directives, harmonized standards and regulations: Radio Equipment Directive (RED) 2014/53/EU and Harmonized Standards: EN 300 330-2, EN 60950-1.

NOISE EMISSION CONTROL SYSTEM REGULATION (CANADA/UNITED STATES)

Tampering with Noise Control System Is Prohibited!

U.S. Federal law and Canadian provincial laws may prohibit the following acts or the causing there of:

1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use or
2. The use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those Acts Presumed to Constitute Tampering Are the Acts Listed Below:

1. Removal or alteration or the puncturing of the muffler or any engine component which conducts removal of engine exhaust gases.
2. Removal or alteration or the puncturing of any part of the intake system.
3. Replacing any moving parts of the vehicle or parts of the exhaust or intake system, with parts other than those specified by the manufacturer.
4. Lack of proper maintenance.

NOISE EMISSION AND VIBRATION VALUES (ALL COUNTRIES EXCEPT CANADA/UNITED STATES)

NOISE EMISSION AND VIBRATION VALUES[1]			
Noise	Sound pressure (L_{pA})	570	82 dB(A) @ 4000 RPM (Uncertainty (K_{pA}) 3dB(A))
		650	78 dB(A) @ 3600 RPM (Uncertainty (K_{pA}) 3 dB(A))
		850 1000R	84 dB(A) @ 3500 RPM (Uncertainty (K_{pA}) 3dB(A))
	Sound power level (L_{WA})	570	93 dB(A) @ 4000 RPM (Uncertainty (K_{WA}) 3dB(A))
		850 1000R	94 dB(A) @ 3500 RPM (Uncertainty (K_{WA}) 3dB(A))
Vibration	Hand-arm system	570	<2.5 m/s^2 @ 4000 RPM
		650	3.5 m/s^2 @ 3600 RPM (Uncertainty 1.715 m/s^2)
		850 1000R	3.5 m/s^2 @ 3500 RPM
	Whole body at seat	570	<0.5 m/s^2 @ 4000 RPM
		650	<0.5 m/s^2 @ 3600 RPM
		850 1000R	<0.5 m/s2 @ 3500 RPM

[1]: Noise emission and Vibration values are measured in accordance with Standard EN 15997:2011 on a paved surface, at Neutral.

EC-DECLARATION OF CONFORMITY

565 de la Montagne Street
Valcourt (Québec) J0E 2L0
Canada

www.brp.com

BRP ADVENTURE BY DESIGN

EU Declaration of Conformity

Authorized Representative: BRP Europe N.V., Skaldenstraat 125, Gent, Belgium, 9042

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The undersigned, representing the manufacturer, hereby declares that model year **2021 All Terrain Vehicles (ATVs)** marked with the CE mark and a 17-character vehicle identification number (VIN) structured as **3JBxxxxxxMxxxxxxx** under commercial names **Can-am Outlander** and **Can-am Renegade** comply with all the relevant provisions of the following Directives and Regulations:

Machinery Directive 2006/42/EC as amended up to and including Reg. 2019/1243/EU	ISO 12100:2010 & EN 15997:2011
Non-Road Mobile Machinery (NRMM) Regulation (EU) 2016/1628 on gaseous pollutants	Category ATS, Stage V emissions limits.
Electromagnetic Compatibility (EMC) Directive 2014/30/EU as amended up to and including Reg. (EU) 2018/1139	CISPR 12:2007/A1:2009 & IEC 61000-6-1:2005 or UN R10.04 or later version
Battery Directive 2006/66/EC as amended up to and including Dir. (EU) 2018/849	
Radio Equipment (RED) Directive 2014/53/EU as amended up to and including Reg. 2018/1139 (If fitted with radio frequency (RF) D.E.S.S. key)	EN 300 330-2 & EN 60950-1

Renald Plante, Eng.
Director, Product Development, Can-Am ATV & Spyder
Bombardier Recreational Products Inc.

Valcourt, QC, Canada

January 29th, 2020

ski-doo LYNX SEA-DOO EVINRUDE ROTAX can-am

DoC_ATV_MY21-EN 15997

EAC DECLARATION OF CONFORMITY

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SPECIFICATIONS

ENGINE		
Engine type	570	ROTAX® 570, 4-stroke, 2 cylinders (V-twin), liquid cooled
	650	ROTAX® 650, 4-stroke, 2 cylinders (V-twin), liquid cooled
	850	ROTAX® 850, 4-stroke, 2 cylinders (V-twin), liquid cooled
	1000R	ROTAX®, 1000R, 4-stroke, 2 cylinders (V-twin), liquid cooled
Valve train		4 valves/cylinder (mechanical adjustment), single over head camshaft (SOHC) with timing chain
Valve clearance	Intake	0.06 mm to 0.14 mm (.0024 in to .0055 in)
	Exhaust	0.11 mm to 0.19 mm (.0043 in to .0075 in)
Bore	570	84 mm (3.31 in)
	650	82 mm (3.23 in)
	850	94 mm (3.7 in)
	1000R	91 mm (3.58 in)
Stroke	570	51.4 mm (2.02 in)
	650	61.5 mm (2.42 in)
	850	61.5 mm (2.42 in)
	1000R	75 mm (2.95 in)
Displacement	570	570 cm^3 (34.8 in^3)
	650	650 cm^3 (39.7 in^3)
	850	854 cm^3 (52.1 in^3)
	1000R	976 cm^3 (59.6 in^3)
Exhaust system		Spark arrestor approved by USDA Forest Service Catalyst on NRMM models
Air filter		Synthetic paper filter with foam

LUBRICATION SYSTEM	
Type	Wet sump. Replaceable cartridge oil filter
Oil filter	BRP Rotax paper type, replaceable

LUBRICATION SYSTEM		
Engine oil	Capacity (oil change with filter)	2.0 L (2.1 qt (U.S. liq.))
	Recommended oil Scandinavia	4T 10W50 SYNTHETIC OIL (EUR) (P/N 779240). or 4T 5W40 SYNTHETIC BLEND OIL (EUR) (P/N 779290) or 4T 0W40 SYNTHETIC OIL (EUR) (P/N 779286)
	Recommended oil All other countries	4T 10W50 SYNTHETIC OIL (P/N 779234) or 4T 5W40 SYNTHETIC BLEND OIL (P/N 779133) or 4T 0W40 SYNTHETIC OIL (P/N 779139)
	Alternate oil if XPS products are not available	10W50 motor oil that meets the requirements for API service classification SJ, SL, SM or SN Refer to *RECOMMENDED ENGINE OIL*

COOLING SYSTEM			
Coolant	Type		Scandinavia: EXTENDED LIFE PRE-MIXED COOLANT (EUR) (P/N 779223) All other countries: EXTENDED LIFE PRE-MIXED COOLANT (P/N 779150) or coolant specifically designed for aluminum engines
	Capacity	570 650	3.4 L (.9 U.S. gal.)
		850 1000R	3.5 L (.92 U.S. gal.)

TRANSMISSION		
Type		CVT (Continuously Variable Transmission), sub-transmission with L/H/N/R/P, standard engine braking
Engagement RPM	570 650	1800 RPM
	850/1000R	1800 RPM

GEARBOX		
Type		Dual range (HI-LO) with park, neutral and reverse
Gearbox oil	Capacity	450 ml (15.22 U.S. oz)
	Recommended	Scandinavia: 75W140 SYNTHETIC GEAR OIL (EUR) (P/N 779215) All other countries: 75W140 SYNTHETIC GEAR OIL (P/N 779160) or a 75W140 API GL-5 synthetic gear oil

ELECTRICAL SYSTEM			
Magneto generator output		Without DPS	400 W @ 6000 RPM
		With DPS	625 W @ 6000 RPM
Ignition system type			IDI (Inductive Discharge Ignition)
Ignition timing			Not adjustable
Spark plug	570 650	Quantity	2
		Make and type	NGK DCPR8E or equivalent
		Gap	0.8 mm to 0.9 mm (.031 in to .035 in)
	850 1000R	Quantity	2
		Make and type	NGK LMAR8D-J or equivalent
		Gap	0.7 mm to 0.9 mm (.028 in to .035 in)
Engine RPM limiter setting		Forward	8000 rpm
Battery		Type	Maintenance free
		Voltage	12 volts
		Nominal rating	18 A•h
		Power starter output	0.7 KW
Headlights		High	2 x 60 W (HB3)
		Low	2 x 60 W (HB3)
Taillights			2 x 5/21 W
Fuses			Refer to *FUSES* in *MAINTENANCE PROCEDURES*

FUEL SYSTEM			
Fuel delivery	Type	570/650	Electronic Fuel Injection (EFI), 46 mm throttle body, 1 injector per cylinder
		850/1000R	Electronic Fuel Injection (EFI), 54 mm throttle body, 1 injector per cylinder
Fuel pump	Type		Electrical (in fuel tank)
Idle speed			1400 rpm (not adjustable)
Fuel	Type	570/650/850	Regular unleaded gasoline Refer to *FUEL REQUIREMENTS*
	Minimum octane rating		87 Pump Posted AKI (92 RON or 95 E10 RON)
	Type	1000R	Premium unleaded gasoline Refer to *FUEL REQUIREMENTS*
	Recommended octane rating		91 Pump Posted AKI (95 E10 RON)
	Minimum octane rating		87 Pump Posted AKI (92 RON or 95 E10 RON)
Fuel tank capacity			20.5 L (5.4 U.S. gal.)
Fuel remaining when low fuel light turns ON			± 5 L (1.3 U.S. gal.)

DRIVE SYSTEM		
Drive system type		Selectable 2WD/4WD
Front drive	Renegade Base	Visco-lok† auto-locking front differential
	All other models	Visco-lok † QE auto-locking front differential
Front drive ratio		3.6:1
Rear drive		Straight bevel gear / Shaft driven final drive
Rear drive ratio		3.6:1
Front differential oil	Capacity	500 ml (17 U.S. oz)
	Type	Scandinavia:75W90 SYNTHETIC GEAR OIL (EUR) (P/N 779212) All other countries:75W90 SYNTHETIC GEAR OIL (P/N 779158) or synthetic gear oil 75W90 API GL-5

DRIVE SYSTEM		
Rear final drive oil	Capacity	250 ml (8.45 U.S. oz)
	Type	Scandinavia: 75W140 SYNTHETIC GEAR OIL (EUR) (P/N 779215) All other countries: 75W140 SYNTHETIC GEAR OIL (P/N 779160) or synthetic gear oil 75W140 API GL-5
CV joint grease		CV JOINT GREASE (P/N 293 550 062) or an equivalent
Propeller shaft grease		PROPELLER SHAFT GREASE (P/N 293 550 063) or an equivalent

FRONT SUSPENSION			
Suspension type			Double suspension-arm with dive-control geometry and external stabilizer bar
Suspension travel			23.3 cm (9.2 in)
Shock absorber	Renegade X xc 650/850/ 1000R	Qty	2
		Type	Fox RC2 shock with piggyback reservoir, dual speed compression damping adjustment and rebound adjustment.
	Renegade Base 850	Qty	2
		Type	FOX HPG
	Renegade Base 570/650	Qty	2
		Type	Motion Control
Preload adjustment type	570		5 positions cam
	All other models		Threaded

REAR SUSPENSION	
Suspension type	Torsional Trailing arm Independent (TTI) with external stabilizer bar
Suspension travel	25.1 cm (9.9 in)

REAR SUSPENSION			
Shock absorber	Renegade X xc 650/850/ 1000R	Qty	2
		Type	Fox RC2 shock with piggyback reservoir, dual speed compression damping adjustment and rebound adjustment.
	Renegade Base 850	Qty	2
		Type	FOX HPG
	Renegade Base 570/650	Qty	2
		Type	Motion Control
Preload adjustment type	570		5 position cam
	All other models		Threaded

BRAKES		
Front brake	Qty	2
	Type	214 mm cross drilled disc brakes with hydraulic twin-piston calipers
Rear brake	Qty	1
	Type	214 mm cross drilled disc brake with hydraulic twin-piston caliper
Brake fluid	Capacity	260 ml (8.8 U.S. oz)
	Type	DOT 4
Caliper		Floating twin pistons (2 x 26 mm)
Brake pad material		Organic
Minimum brake pad thickness		1 mm (.04 in)
Minimum brake disc thickness		4.0 mm (.157 in)
Maximum brake disc warpage		0.2 mm (.01 in)

TIRES		
Front Tire Pressure		48.3 kPa (7 PSI)
Rear Tire Pressure		48.3 kPa (7 PSI)
Minimum tire thread depth		3 mm (.118 in)
Size	Front	205/80-12 (25x8-12)
	Rear	255/65-12 (25x10-12)

WHEELS			
Type		Renegade Base	Cast aluminum
		Renegade X xc	Aluminum with beadlocks
Rim size	Front		30,5 x 15,2 cm (12 x 6 in)
	Rear		30,5 x 19,1 cm (12 x 7.5 in)
Wheel nut torque			80 N•m ± 5 N•m (59 lbf•ft ± 4 lbf•ft)
Wheel offset		Front	41.6 mm (1.6 in)
		Rear	51 mm (2 in)

DIMENSIONS		
Overall length		218.4 cm (86 in)
Overall width		121.9 cm (48 in)
Overall height		124 cm (49 in)
Wheelbase		129.5 cm (51 in)
Wheel track	Front	102 cm (40.2 in)
	Rear	97.5 cm (38.4 in)
Ground clearance		26.7 cm (10.5 in)

WEIGHT AND LOADING CAPACITY		
Dry weight	570	286 kg (628 lb)
	650	312 kg (688 lb)
	850	312 kg (686 lb)
	1000R	323 kg (710 lb)
Rear cargo area capacity		16 kg (35 lb)
Rear storage compartment loading capacity		No rear storage compartment available
Total vehicle load allowed (including driver, all other loads and added accessories)		141 kg (310 lb)
Towing capacity		590 kg (1,300 lb)
Rear load (including rear cargo area and tongue load if applicable)		23 kg (50 lb)

TROUBLESHOOTING

TROUBLESHOOTING GUIDELINES

ENGINE DOES NOT TURN

1. Engine stop switch.
   – *Make sure that engine stop switch is in ON position.*
2. D.E.S.S. key is not installed on D.E.S.S. post.
   – *Securely install key on D.E.S.S. post.*
3. Transmission is not set on PARK or NEUTRAL.
   – *Set transmission either in PARK or in NEUTRAL (Only 570) or press the brake lever.*
4. Burnt fuse.
   – *Check main fuse condition.*
5. Weak battery or loose connections.
   – *Check charging system.*
   – *Check connections and terminals condition.*
   – *Have the battery checked.*
   – *Contact an authorized Can-Am dealer.*
6. Wrong D.E.S.S. key, multifunction gauge display shows BAD KEY.
   – *Use the proper key for this vehicle.*
7. Weak starter or loose connections.
   – *Check starter connections.*
   – *Check starter relay.*
8. Vehicle wakes up when START button is pressed.
   – *Seek service from an authorized Can-Am dealer, repair shop, or person of your own choosing for maintenance, repair, or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE TURNS OVER BUT FAILS TO START

1. No fuel to the engine (spark plug dry when removed).
   – *Check fuel tank level.*
   – *A failure of the fuel pump may have occurred.*
   – *Check fuel pump fuse and relay.*
   – *If engine does not start, seek service from an authorized Can-Am dealer, repair shop, or person of your own choosing for maintenance, repair, or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE TURNS OVER BUT FAILS TO START (cont'd)

2. Flooded engine (spark plug wet when removed).
   – *(Drowned mode) If the engine does not start and it is fuel-flooded, this special mode can be activated to prevent fuel injection and to cut ignition while cranking. Proceed as follows:*
   • *Install key on D.E.S.S. post.*
   • *Press completely and HOLD throttle lever.*
   • *Press the engine START button.*
   The engine should be cranked for 20 seconds. Release engine START button.
   Release throttle lever and start/crank engine again to allow starting.
   If it does not work:
   • *Clean the spark plug caps area then remove them.*
   • *Remove the spark plugs.*
   • *Unplug injector electrical connector.*
   • *Crank engine several times.*
   • *Install new spark plugs if possible or clean and dry spark plugs.*
   • *Start engine as explained above.*
   If engine continues to flood, see an authorized Can-Am dealer.
   NOTE: *Make sure to verify that there is no fuel in engine oil, if so, replace engine oil.*
3. Spark plug/ignition (no spark).
   – *Check injectors/ignition fuse condition.*
   – *Remove spark plug then reconnect to ignition coil.*
   – *Unplug injector electrical connector and start engine with spark plug grounded to the engine away from spark plug hole. If no spark appears, replace spark plug.*
   – *If trouble persists, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*
4. Multifunction gauge CHECK ENGINE indicator lamp is on and display shows CHECK ENGINE.
   – *Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*
5. Engine is under a protection (limp home) mode.
   – *Multifunction gauge CHECK ENGINE indicator lamp is on and display shows CHECK ENGINE, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE LACKS ACCELERATION OR POWER

1. Fouled or defective spark plug.
   – *Refer to ENGINE TURNS OVER BUT FAILS TO START.*

ENGINE LACKS ACCELERATION OR POWER (cont'd)

2. Lack of fuel to engine.
   – *Refer to ENGINE TURNS OVER BUT FAILS TO START.*
3. Engine is overheating. (CHECK ENGINE indicator light will turn on and HI TEMP will appear in the multifunction display.)
   – *Refer to ENGINE OVERHEATS.*
4. Air filter/housing clogged or dirty.
   – *Check air filter and clean if necessary.*
   – *Check deposits in air filter housing drain.*
   – *Check the position of the air intake tube.*
5. CVT dirty or worn-out.
   – *Contact an authorized Can-Am dealer.*
6. Engine is under a protection (limp home) mode.
   – *Check multifunction gauge display for messages.*
   – *Multifunction gauge CHECK ENGINE indicator lamp is on and display shows CHECK ENGINE or LIMP HOME, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE OVERHEATS

1. Low coolant in cooling system.
   – *Check engine coolant, refer to ENGINE COOLANT in MAINTENANCE PROCEDURES.*
2. Dirty radiator fins.
   – *Clean radiator fins, refer to RADIATOR in MAINTENANCE PROCEDURES.*
3. Cooling fan inoperative.
   – *Check cooling fan fuse or relay, refer to FUSES in MAINTENANCE PROCEDURES. If the fuse is good, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE BACKFIRE

1. Exhaust system leakage.
   – *Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*
2. Engine is running too hot.
   – *Refer to ENGINE LACKS ACCELERATION OR POWER.*

ENGINE BACKFIRE (cont'd)

3. Ignition timing is incorrect or there is an ignition system failure.
   – *Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE MISFIRE

1. Fouled/defective/worn spark plug.
   – *Clean/verify spark plug and heat range. Replace as required.*
2. Water in fuel.
   – *Drain fuel system and refill with fresh fuel.*

VEHICLE CANNOT REACH FULL SPEED

1. Engine.
   – *Refer to ENGINE LACKS ACCELERATION OR POWER.*
2. Parking brake.
   – *Ensure parking brake is completely removed.*
3. Air filter/housing plugged or dirty.
   – *Check air filter and clean if necessary.*
   – *Check deposits in air filter housing drain.*
   – *Check the position of the air intake tube.*
4. CVT dirty or worn-out.
   – *Contact an authorized Can-Am dealer.*
5. Engine is under a protection (limp home) mode.
   – *Check multifunction gauge display for messages.*
   – *Multifunction gauge CHECK ENGINE indicator lamp is on and display shows CHECK ENGINE or LIMP HOME, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

SHIFT LEVER IS HARD TO MOVE

1. Transmission gears are in a position that prevents the shift lever to work.
   – *Rock the vehicle back and forth to move the gears in the transmission and allow the shift lever to be set.*
2. CVT dirty or worn-out.
   – *Contact an authorized Can-Am dealer.*

THE RPM INCREASES BUT THE VEHICLE DOES NOT MOVE

1. The transmission is on PARK or NEUTRAL position.
   – *Select the R, HI or LO position.*
2. CVT dirty or worn-out.
   – *Contact an authorized Can-Am dealer.*

THE RPM INCREASES BUT THE VEHICLE DOES NOT MOVE (cont'd)

3. Water in the CVT housing.
   – *Contact an authorized Can-Am dealer.*

REDUCED POWER STEERING ASSIST

1. When DPS is subjected to sustained severe steering conditions, the assistance provided by the DPS motor may be reduced to protect the system.
   – *Once the load is reduced, the normal steering assistance will return.*
2. CHECK ENGINE INDICATOR LAMP is ON and display shows CHECK DPS
   – *Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement.*

MULTIFUNCTION GAUGE MESSAGES

MESSAGE	PILOT LAMP(S) ON	DESCRIPTION
BAD KEY	Check engine	Indicates that you have used the wrong key, use the proper key for this vehicle. It is also possible that the key has a bad contact, remove and clean key.
DESS KEY NOT RECOGNIZED	Check engine	Indicates that there possibly is a bad contact, remove and clean key.
PARK BRAKE	None	Message displayed when brake is applied for more than 15 seconds (while riding).
LO BATT VOLT	Check engine	Low battery voltage, check battery voltage and charging system.
HIGH BATT VOLT	Check engine	High battery voltage, check battery voltage and charging system.
LOW OIL (1)	Check engine	Engine low oil pressure, stop engine immediately.
HI TEMP	Check engine	Engine is overheating, refer to *ENGINE OVERHEATS* in *TROUBLESHOOTING*.
LIMP HOME	Check engine	Serious fault on the engine that can change the normal operation of the engine, CHECK ENGINE indicator lamp will also blink, refer to *TROUBLESHOOTING*.
CHECK ENGINE	Check engine	Engine fault, CHECK ENGINE indicator lamp will also be ON, refer to *TROUBLESHOOTING*.
ECM NOT RECOGNIZED	Check engine	Communication error between speedometer and engine control module (ECM).
CHECK DPS	Check engine	Indicates that the DPS (Dynamic Power Steering) does not work properly. See an authorized Can-Am dealer.
MAINTENANCE REQUIRED (2)	None	Displayed in gauge when vehicle is due for a maintenance
TPS FAULT PRESS OVERRIDE BUTTON TO LIMP HOME	Check engine	Throttle position sensor does not work properly. Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA Emissions-related warranty contained herein for information about warranty claims.

NOTICE (1) If the message and the check engine light stay on after engine starting, stop engine. Check engine oil level. Refill if necessary. If the oil level is good, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA Emissions-related warranty contained herein for information about warranty claims. Do not use the vehicle until repaired.

(2) To erase the MAINTENANCE REQUIRED message, proceed as follows:

1. From main display (vehicle speed), press SET and HOLD.
2. Alternate between LOW beam and HIGH beam 3 times.

NOTE: Step 2 must be completed within **2 seconds**.

3. Release SET button.

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WARRANTY

BRP LIMITED WARRANTY USA AND CANADA: 2021 CAN-AM® ATV

SCOPE OF THE LIMITED WARRANTY

Bombardier Recreational Products Inc. ("BRP")* warrants its 2021 Can-Am ATV sold by authorized Can-Am ATV dealers (as hereinafter defined) in the United States of America ("USA") and in Canada from defects in material or workmanship for the period and under the conditions described below. This limited warranty will become null and void if: (1) the ATV was used for racing or any other competitive activity, at any point, even by a previous owner; or (2) the ATV has been altered or modified in such a way so as to adversely affect its operation, performance or durability, or has been altered or modified to change its intended use.

Non-factory installed parts and accessories are not covered under this limited warranty. Please refer to the applicable parts and accessories limited warranty text.

LIMITATIONS OF LIABILITY

THIS WARRANTY IS EXPRESSLY GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT THAT THEY CANNOT BE DISCLAIMED, THE IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM COVERAGE UNDER THIS WARRANTY SOME STATES/PROVINCES DO NOT ALLOW FOR THE DISCLAIMERS, LIMITATIONS AND EXCLUSIONS IDENTIFIED ABOVE, AS A RESULT, THEY MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC RIGHTS, AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH MAY VARY FROM STATE TO STATE, OR PROVINCE TO PROVINCE.

Neither the distributor, any BRP dealer nor any other person has been authorized to make any affirmation, representation or warranty regarding the product, other than those contained in this limited warranty, and if made, shall not be enforceable against BRP. BRP reserves the right to modify this limited warranty at any time, being understood that such modification will not alter the warranty conditions applicable to the products sold while this warranty is in effect.

EXCLUSIONS – ARE NOT WARRANTED

The following are not warranted under any circumstances:

- Normal wear and tear;
- Routine maintenance items, tune ups, adjustments;
- Damage caused by failure to provide proper maintenance and/or storage, as described in the Operator's Guide;
- Damage resulting from removal of parts, improper repairs, service, maintenance, modifications or use of parts not manufactured or approved by BRP or resulting from repairs done by a person that is not an authorized servicing Can-Am ATV dealer;
- Damage caused by abuse, abnormal use, neglect or operation of the product in a manner inconsistent with the recommended operation described in the Can-Am ATV Operator's Guide;
- Damage resulting from accident, submersion, fire, theft, vandalism or any act of God;

– Operation with fuels, oils or lubricants which are not suitable for use with the product (see the Operator's Guide);
– Damages from rust, corrosion or exposure to the elements;
– Damage resulting from water or snow ingestion;
– Incidental or consequential damages, or damages of any kind including without limitation towing, storage, telephone, rental, taxi, inconvenience, insurance coverage, loan payments, loss of time, loss of income.

WARRANTY COVERAGE PERIOD

This limited warranty will be in effect from (1) the date of delivery to the first retail consumer or (2) the date the product is first put into use, whichever occurs first and for the applicable period below:

SIX (6) CONSECUTIVE MONTHS, for private use or commercial use owners. For emission-related components; please also refer to the *US EPA EMISSION-RELATED WARRANTY* contained herein.

The repair or replacement of parts or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date.

CONDITIONS TO HAVE WARRANTY COVERAGE

This warranty coverage is available **only** if **each** of the following conditions has been fulfilled:

– The 2021 Can-Am ATV must be purchased as new and unused by its first owner from a Can-Am ATV dealer authorized to distribute Can-Am ATVs in the country in which the sale occurred ("Can-Am ATV dealer");
– The BRP specified pre-delivery inspection process must be completed and documented and signed by the purchaser;
– The 2021 Can-Am ATV must have undergone proper registration by an authorized Can-Am ATV dealer;
– The 2021 Can-Am ATV must be purchased in the country in which the purchaser resides;
– Routine maintenance outlined in the Operator's Guide must be timely performed in order to maintain warranty coverage. BRP reserves the right to make warranty coverage contingent upon proof of proper maintenance.

BRP will not honor this limited warranty to any private use owner or commercial use owner if one of the preceding conditions has not been met. Such limitations are necessary in order to allow BRP to preserve both the safety of its products, and also that of its consumers and the general public.

WHAT TO DO TO OBTAIN WARRANTY COVERAGE

The customer must cease using the Can-Am ATV upon the appearance of an anomaly. The customer must notify a servicing BRP dealer within three (3) days of the appearance of a defect, and provide it with reasonable access to the product and reasonable opportunity to repair it. The customer must also present to the authorized BRP dealer, proof of purchase of the product and must sign the repair/work order prior to starting the repair in order to validate the warranty repair. All parts replaced under this limited warranty become the property of BRP.

WHAT BRP WILL DO

BRP's obligations under this warranty are limited to, at its sole discretion, repairing parts found defective under normal use, maintenance and service, or replacing such parts with new genuine Can-Am ATV parts without charge for parts and labor, at any authorized BRP dealer during the warranty coverage period under the conditions described herein. No claim of breach of warranty shall be cause for cancellation or rescission of the sale of the Can-Am ATV to the owner.

In the event that service is required outside of the country of original sale, the owner will bear responsibility for any additional charges due to local practices and conditions, such as, but not limited to, freight, insurance, taxes, license fees, import duties, and any and all other financial charges, including those levied by governments, states, territories and their respective agencies.

BRP reserves the right to improve or modify products from time to time without assuming any obligation to modify products previously manufactured.

ADDITIONAL SUPPLIER WARRANTIES

A GPS receiver may be supplied by BRP as standard equipment on certain 2021 Can-Am ATV's. The GPS receiver is covered under BRP's limited warranty policy. Additional warranty coverage if offered by the GPS receiver "supplier" that is longer than BRP's limited warranty is to be dealt by the dealer or consumer directly with the GPS receiver "supplier".

TRANSFER

If the ownership of a product is transferred during the warranty coverage period, this limited warranty, subject to its terms and conditions, shall also be transferred and be valid for the remaining coverage period provided BRP or an authorized Can-Am ATV Distributor/Dealer receives a proof that the former owner agreed to the transfer of ownership, in addition to the co-ordinates of the new owner.

CONSUMER ASSISTANCE

In the event of a controversy or a dispute in connection with this limited warranty, BRP suggests that you try to resolve the issue at the dealership level. We recommend discussing the issue with the authorized dealer's service manager or owner.

If the matter still remains unresolved, contact BRP by filling out the customer contact form at www.brp.com or contact BRP by mail at one of the addresses listed under the *CONTACT US* section of this guide.

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US EPA EMISSION-RELATED WARRANTY

Bombardier Recreational Products Inc. ("BRP")** warrants to the ultimate purchaser and each subsequent purchaser that this new vehicle, including all parts of its exhaust emission control system and its evaporative emission control system, meets two conditions:

1. It is designed, built, and equipped so it conforms at the time of sale to the ultimate purchaser with the requirements of 40 CFR 1051 and 40 CFR 1060.
2. It is free from defects in materials and workmanship that may keep it from meeting the requirements of 40 CFR 1051 and 40 CFR 1060.

Where a warrantable condition exists, BRP will repair or replace, as it elects, any part or component with a defect in materials or workmanship that would increase the engine's emissions of any regulated pollutant within the stated warranty period at no cost to the owner, including expenses related to diagnosing and repairing or replacing emission-related parts. All defective parts replaced under this warranty become the property of BRP.

For all emission-related warranty claims, BRP is limiting the diagnosis and repair of emission-related parts to the authorized Can-Am dealers, unless for emergency repairs as required by item 2 of the following list.

As a certifying manufacturer, BRP will not deny emission-related warranty claims based on any of the following:

1. Maintenance or other service BRP or BRP's authorized facilities performed.
2. Engine/equipment repair work that an operator performed to correct an unsafe, emergency condition attributable to BRP as long as the operator tries to restore the engine/equipment to its proper configuration as soon as possible.
3. Any action or inaction by the operator unrelated to the warranty claim.
4. Maintenance that was performed more frequently than BRP specify.
5. Anything that is BRP fault or responsibility.
6. The use of any fuel that is commonly available where the equipment operates unless BRP written maintenance instructions state that this fuel would harm the equipment's emission control system and operators can readily find the proper fuel. See maintenance information section and fuel requirements of fueling section.

Emission-Related Warranty Period

The emission-related warranty is valid for the following period whichever comes first:

	HOURS	MONTHS	KILOMETERS
Exhaust emission-related components	500	30	5000
Evaporative emission-related components	N/A	24	N/A

Components Covered

The emission-related warranty covers all components whose failure would increase an engine's emissions of any regulated pollutant, including the following listed components:

1. For exhaust emissions, emission-related components include any engine parts related to the following systems:
   - Air-induction system
   - Fuel system
   - Ignition system
   - Exhaust gas recirculation systems
2. The following parts are also considered emission-related components for exhaust emissions:
   - Aftertreatment devices
   - Crankcase ventilation valves
   - Sensors
   - Electronic control units
3. The following parts are considered emission-related components for evaporative emissions:
   - Fuel tank
   - Fuel cap
   - Fuel line
   - Fuel line fittings
   - Clamps*
   - Pressure relief valves*
   - Control valves*
   - Control solenoids*
   - Electronic controls*
   - Vacuum control diaphragms*
   - Control cables*
   - Control linkages*
   - Purge valves
   - Vapor hoses
   - Liquid/vapor separator
   - Carbon canister
   - Canister mounting brackets
   - Carburetor purge port connector
4. Emission-related components also include any other part whose only purpose is to reduce emissions or whose failure will increase emissions without significantly degrading engine/equipment performance.

*As related to the evaporative emission control system

Limited Applicability

As a certifying manufacturer, BRP may deny emission-related warranty claims for failures that have been caused by the owner's or operator's improper maintenance or use, by accidents for which the manufacturer has no responsibility, or by acts of God. For example, an emission-related warranty claim need not be honored for failures that have been directly caused by the operator's abuse of the engine/equipment or the operator's use of the engine/equipment in a manner for which it was not designed and are not attributable to the manufacturer in any way.

If you have any question regarding your warranty rights and responsibility, you should contact Bombardier Recreational Products at 1-888-272-9222.

** In the USA, products are distributed and serviced by BRP US Inc.

BRP INTERNATIONAL LIMITED WARRANTY: 2021 CAN-AM® ATV

1) SCOPE OF THE LIMITED WARRANTY

Bombardier Recreational Products Inc. ("BRP")* warrants its 2021 Can-Am ATV sold by Can-Am ATV distributors or dealers authorized by BRP to distribute Can-Am ATVs ("Can-Am ATV Distributor/Dealer") outside of the United States of America ("USA"), Canada, member states of the European Economic Area (which is comprised of the states of the European Union plus the United Kingdom, Norway, Iceland and Liechtenstein) ("EEA"), Turkey, member states of the Commonwealth of the Independent States (including Ukraine and Turkmenistan) ("CIS") and Turkey, from defects in material or workmanship for the period and under the conditions described below.

Non-factory installed parts and accessories are not covered under this limited warranty. Please refer to the applicable parts and accessories limited warranty text.

This limited warranty will become null and void if: (1) The ATV was used for racing or any other competitive activity, at any point, even by a previous owner; or (2) the ATV has been altered or modified in such a way so as to adversely affect its operation, performance or durability, or has been altered or modified to change its intended use.

2) LIMITATIONS OF LIABILITY

TO THE EXTENT PERMITTED BY LAW, THIS WARRANTY IS EXPRESSLY GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TO THE EXTENT THAT THEY CANNOT BE DISCLAIMED, THE IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM COVERAGE UNDER THIS WARRANTY. SOME JURISDICTIONS DO NOT ALLOW FOR THE DISCLAIMERS, LIMITATIONS AND EXCLUSIONS IDENTIFIED ABOVE, AS A RESULT, THEY MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC RIGHTS AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH MAY VARY FROM COUNTRY TO COUNTRY. (FOR PRODUCTS PURCHASED IN AUSTRALIA SEE CLAUSE 4 BELOW).

Neither the Can-Am ATV Distributor/Dealer nor any other person has been authorized to make any affirmation, representation or warranty regarding the product, other than those contained in this limited warranty, and if made, shall not be enforceable against BRP.

BRP reserves the right to modify this warranty at any time, being understood that such modification will not alter the warranty conditions applicable to the products sold while this warranty is in effect.

3) EXCLUSIONS – ARE NOT WARRANTED

The following are not warranted under this limited warranty under any circumstances:

- Normal wear and tear;
- Routine maintenance items, tune ups, adjustments;
- Damage caused by negligence or failure to provide proper maintenance and/or storage, as described in the Operator's Guide;

– Damage resulting from removal of parts, improper repairs, service, maintenance, modifications or use of parts or accessories not manufactured or approved by BRP which in its reasonable judgement are either incompatible with the product or adversely affect its operation, performance and durability, or resulting from repairs done by a person that is not an authorized servicing Can-Am ATV Distributor/Dealer;
– Damage caused by abuse, abnormal use, neglect, racing or operation of the product in a manner inconsistent with the recommended operation described in the Operator's Guide;
– Damage resulting from accident, submersion, fire, snow or water ingestion, theft, vandalism or any act of God;
– Operation with fuels, oils or lubricants which are not suitable for use with the product (see the Operator's Guide);
– Damage resulting from rust, corrosion or exposure to the elements;
– Incidental or consequential damages, or damages of any kind including without limitation towing, storage, transportation expenses, telephone, rental, taxi, inconvenience, insurance coverage, loan payments, loss of time, loss of income; or time missed for downtime experience due to service work.

4) WARRANTY COVERAGE PERIOD

This warranty will be in effect from (1) the date of delivery to the first retail consumer or (2) the date the product is first put into use, whichever occurs first and for a period of:

SIX (6) CONSECUTIVE MONTHS for private use or commercial use.

In AUSTRALIA and NEW-ZEALAND only, this warranty will be in effect from (1) the date of delivery to the first retail consumer or (2) the date the product is first put into use, whichever occurs first, and for a period of (1) TWENTY-FOUR (24) CONSECUTIVE MONTHS or (2) a total use of FIFTEEN THOUSAND (15 000) kilometers, whichever occurs first, for private use or commercial use.

The repair or replacement of parts or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date.

Note that the duration and any other modalities of the warranty coverage are subject to the applicable national or local legislation in the customer's country.

FOR PRODUCTS SOLD IN AUSTRALIA ONLY

Nothing in these Warranty terms and conditions should be taken to exclude, restrict or modify the application of any condition, warranty, guarantee, right or remedy conferred or implied under the Competition and Consumer Act 2010 (Cth), including the Australian Consumer Law or any other law, where to do so would contravene that law, or cause any part of these terms and conditions to be void. The benefits given to you under this limited warranty are in addition to other rights and remedies that you have under Australian law.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

5) CONDITIONS TO HAVE WARRANTY COVERAGE

This warranty coverage is available **only** if **each** of the following conditions has been fulfilled:

- The 2021 Can-Am ATV must be purchased as new and unused by its first owner from a Can-Am ATV Distributor/Dealer authorized to distribute Can-Am ATVs in the country in which the sale occurred;
- The BRP specified pre-delivery inspection process must be completed and documented;
- The product must have undergone proper registration by an authorized Can-Am ATV Distributor/Dealer;
- The 2021 Can-Am ATV must be purchased in the country or union of countries in which the purchaser resides; and
- Routine maintenance outlined in the Operator's Guide must be timely performed in order to maintain warranty coverage. BRP reserves the right to make warranty coverage contingent upon proof of proper maintenance.

BRP will not honour this limited warranty to any private use owner or commercial use owner if one of the preceding conditions has not been met. Such limitations are necessary in order to allow BRP to preserve both the safety of its products, and also that of its consumers and the general public.

6) WHAT TO DO TO OBTAIN WARRANTY COVERAGE

The customer must cease using the ATV upon the appearance of an anomaly. The customer must notify a servicing Can-Am ATV Distributor/Dealer within two (2) days of the appearance of a defect, and provide it with reasonable access to the product and reasonable opportunity to repair it. The customer must also present to the authorized Can-Am ATV Distributor/Dealer proof of purchase of the product and must sign the repair/work order prior to starting the repair in order to validate the warranty repair. All parts replaced under this limited warranty become the property of BRP.

Note that the notification period is subject to the applicable national or local legislation in customer's country.

7) WHAT BRP WILL DO

To the extent permitted by law, BRP's obligations under this warranty are limited to, at its sole discretion, repairing parts found defective under normal use, maintenance and service, or replacing such parts with new genuine Can-Am ATV parts without charge for parts and labour, at any authorized Can-Am ATV Distributor/Dealer during the warranty coverage period under the conditions described herein. BRP's responsibility is limited to making the required repairs or replacements of parts. No claim of breach of warranty shall be cause for cancellation or rescission of the sale of the Can-Am ATV to the owner. You may have other legal rights which may vary from country to country.

In the event that service is required outside of the country of original sale, the owner will bear responsibility for any additional charges due to local practices and conditions, such as, but not limited to, freight, insurance, taxes, license fees, import duties, and any and all other financial charges, including those levied by governments, states, territories and their respective agencies.

BRP reserves the right to improve or modify products from time to time without assuming any obligation to modify products previously manufactured.

8) TRANSFER

If the ownership of a product is transferred during the warranty coverage period, this warranty shall also be transferred and be valid for the remaining coverage period provided BRP or an authorized Can-Am ATV Distributor/Dealer receives a proof that the former owner agreed to the transfer of ownership, in addition to the co-ordinates of the new owner.

9) CONSUMER ASSISTANCE

In the event of a controversy or a dispute in connection with this limited warranty, BRP suggests that you try to resolve the issue at the Can-Am ATV Distributor/Dealer level. We recommend discussing the issue with the authorized Can-Am ATV Distributor/Dealer's service manager or owner.

If the matter still remains unresolved, contact BRP by filling out the customer contact form at www.brp.com or contact BRP by mail at one of the addresses listed under the *CONTACT US* section of this guide.

* For the territory covered by this limited warranty, products are distributed and serviced by Bombardier Recreational Products Inc. or its affiliates.

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BRP LIMITED WARRANTY FOR THE EUROPEAN ECONOMIC AREA, THE COMMONWEALTH OF THE INDEPENDENT STATES AND TURKEY ECONOMIC AREA: 2021 CAN-AM® ATV

1) SCOPE OF THE LIMITED WARRANTY

Bombardier Recreational Products Inc. ("BRP")* warrants its 2021 Can-Am ATVs sold by distributors or dealers authorized by BRP to distribute Can-Am ATVs ("Can-Am ATV Distributor/Dealer") in member states of the European Economic Area (which is comprised of the member states of the European Union plus the United Kingdom, Norway, Iceland and Liechtenstein) ("EEA"), in member states of the Commonwealth of the Independent States (including Ukraine and Turkmenistan) ("CIS") and Turkey from defects in material or workmanship for the period and under the conditions described below.

Non-factory installed parts and accessories are not covered under this limited warranty. Please refer to the applicable parts and accessories limited warranty text.

This limited warranty will become null and void if: (1) The ATV was used for racing or any other competitive activity, at any point, even by a previous owner; or (2) the ATV has been altered or modified in such a way so as to adversely affect its operation, performance or durability, or has been altered or modified to change its intended use.

2) LIMITATIONS OF LIABILITY

TO THE EXTENT PERMITTED BY LAW, THIS WARRANTY IS EXPRESSLY GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TO THE EXTENT THAT THEY CANNOT BE DISCLAIMED, THE IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM COVERAGE UNDER THIS WARRANTY. SOME JURISDICTIONS DO NOT ALLOW FOR THE DISCLAIMERS, LIMITATIONS AND EXCLUSIONS IDENTIFIED ABOVE, AS A RESULT, THEY MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC RIGHTS AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH MAY VARY FROM COUNTRY TO COUNTRY.

Neither the Can-Am ATV Distributor/Dealer nor any other person has been authorized to make any affirmation, representation or warranty regarding the product, other than those contained in this limited warranty, and if made, shall not be enforceable against BRP.

BRP reserves the right to modify this warranty at any time, being understood that such modification will not alter the warranty conditions applicable to the products sold while this warranty is in effect.

3) EXCLUSIONS – ARE NOT WARRANTED

The following are not warranted under this limited warranty under any circumstances:

– Normal wear and tear;
– Routine maintenance items, tune ups, adjustments;

– Damage caused by negligence or failure to provide proper maintenance and/or storage, as described in the Operator's Guide;
– Damage resulting from removal of parts, improper repairs, service, maintenance, modifications or use of parts or accessories not manufactured or approved by BRP which in its reasonable judgement are either incompatible with the product or adversely affect its operation, performance and durability, or resulting from repairs done by a person that is not an authorized servicing Can-Am ATV Distributor/Dealer;
– Damage caused by abuse, abnormal use, neglect, racing or operation of the product in a manner inconsistent with the recommended operation described in the Operator's Guide;
– Damage resulting from accident, submersion, fire, snow or water ingestion, theft, vandalism or any act of God;
– Operation with fuels, oils or lubricants which are not suitable for use with the product (see the Operator's Guide);
– Damage resulting from rust, corrosion or exposure to the elements;
– Incidental or consequential damages, or damages of any kind including without limitation towing, transportation expenses, storage, telephone, rental, taxi, inconvenience, insurance coverage, loan payments, loss of time, loss of income or time missed for downtime experience due to service work.

4) WARRANTY COVERAGE PERIOD

This warranty will be in effect from (1) the date of delivery to the first retail consumer or (2) the date the product is first put into use, whichever occurs first and for a period of:

TWENTY-FOUR (24) CONSECUTIVE MONTHS for private use.

SIX (6) CONSECUTIVE MONTHS for commercial use or rental use.

The product is used commercially when it is used in connection with any work or employment that generates income during any part of the warranty period. The product is also used commercially when, at any point during the warranty period, it is licensed for commercial use.

The repair or replacement of parts or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date.

Note that the duration and any other modalities of the warranty coverage are subject to the applicable national or local legislation in the customer's country.

5) CONDITIONS TO HAVE WARRANTY COVERAGE

This warranty coverage is available **only** if **each** of the following conditions has been fulfilled:
– The 2021 Can-Am ATV must be purchased as new and unused by its first owner from a Can-Am ATV Distributor/Dealer authorized to distribute Can-Am ATVs in the country in which the sale occurred;
– The BRP specified pre-delivery inspection process must be completed and documented;
– The product must have undergone proper registration by an authorized Can-Am ATV Distributor/Dealer;

– The 2021 Can-Am ATV must be purchased within the EEA by an EEA resident, in the CIS for residents of the countries comprised in such area and in Turkey for residents of Turkey; and
– Routine maintenance outlined in the Operator's Guide must be timely performed in order to maintain warranty coverage. BRP reserves the right to make warranty coverage contingent upon proof of proper maintenance.

BRP will not honour this limited warranty to any private use owner or commercial use owner if one of the preceding conditions has not been met. Such limitations are necessary in order to allow BRP to preserve both the safety of its products, and also that of its consumers and the general public.

6) WHAT TO DO TO OBTAIN WARRANTY COVERAGE

The customer must cease using the ATV upon the appearance of an anomaly. The customer must notify a servicing Can-Am ATV Distributor/Dealer within two (2) months of the appearance of a defect and provide it with reasonable access to the product and reasonable opportunity to repair it. The customer must also present to the authorized Can-Am ATV Distributor/Dealer, proof of purchase of the product and must sign the repair/work order prior to starting the repair in order to validate the warranty repair. All parts replaced under this limited warranty become the property of BRP.

Note that the notification period is subject to the applicable national or local legislation in customer's country.

7) WHAT BRP WILL DO

To the extent permitted by law, BRP's obligations under this warranty are limited to, at its sole discretion, repairing parts found defective under normal use, maintenance and service, or replacing such parts with new genuine Can-Am ATV parts without charge for parts and labour, at any authorized Can-Am ATV Distributor/Dealer during the warranty coverage period under the conditions described herein. BRP's responsibility is limited to making the required repairs or replacements of parts. No claim of breach of warranty shall be cause for cancellation or rescission of the sale of the Can-Am ATV to the owner. You may have other legal rights which may vary from country to country.

In the event that service is required outside of the EEA, CIS or Turkey, the owner will bear responsibility for any additional charges due to local practices and conditions, such as, but not limited to, freight, insurance, taxes, license fees, import duties, and any and all other financial charges, including those levied by governments, states, territories and their respective agencies.

BRP reserves the right to improve or modify products from time to time without assuming any obligation to modify products previously manufactured.

8) TRANSFER

If the ownership of a product is transferred during the warranty coverage period, this warranty shall also be transferred and be valid for the remaining coverage period provided BRP or an authorized Can-Am ATV Distributor/Dealer receives a proof that the former owner agreed to the transfer of ownership, in addition to the co-ordinates of the new owner.

9) CONSUMER ASSISTANCE

In the event of a controversy or a dispute in connection with this limited warranty, BRP suggests that you try to resolve the issue at the Can-Am ATV Distributor/Dealer level. We recommend discussing the issue with the authorized Can-Am ATV Distributor/Dealer's service manager or owner.

If the matter still remains unresolved, contact BRP by filling out the customer contact form at www.brp.com or contact BRP by mail at one of the addresses listed under the *CONTACT US* section of this guide.

* In the EEA, products are distributed and serviced by BRP European Distribution S.A. and other affiliates or subsidiaries of BRP.

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ADDITIONAL TERMS AND CONDITIONS FOR FRANCE ONLY

The following terms and conditions are applicable to products sold in France only:

The seller shall deliver goods that are complying with the contract and shall be responsible for defects existing upon delivery. The seller shall also be responsible for defects resulting from packaging, assembling instructions or the installation when it is its responsibility per the contract or if accomplished under its responsibility. To be compliant with the contract, the good shall:

1. Be fit for normal use for goods similar thereto and, if applicable:
   - Correspond to the description provided by the seller and have the qualities presented to the buyer though sample or model;
   - Have the qualities that a buyer may legitimately expect considering the public declarations of the seller, the manufacturer of its representative, including in advertising or labeling; or
2. Have the characteristics mutually agreed upon as between the parties or be fit for the specific use intended by the buyer and brought to the attention of the seller and which accepted by the seller.

The action for failure to comply is prescribed after two years after delivery of the goods. The seller is responsible for the warranty for hidden defects of the good sold if such hidden defects are rendering the good unfit for the intended use, or if they diminish its use in such a way that the buyer would not have acquired the good or would have given a lesser price, had he known. The action for such hidden defects shall be taken by the buyer within 2 years of the discovery of the defect.

MAINTENANCE RECORDS

Send photocopy of maintenance record to BRP if needed.

PREDELIVERY	
Serial number:	Signature/Print:
Mileage / km:	
Hours:	
Date:	
Dealer no:	
Notes:	
Refer to vehicle Pre-Delivery Bulletin for detailed installation procedures	

FIRST INSPECTION	
Mileage / km:	Signature/Print:
Hours:	
Date:	
Dealer no:	
Notes:	
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km:	Signature/Print:
Hours:	
Date:	
Dealer no:	
Notes:	
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km: _____ Hours: _____ Date: _____ Dealer no: _____ Notes: _____	Signature/Print:
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km: _____ Hours: _____ Date: _____ Dealer no: _____ Notes: _____	Signature/Print:
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km: _____ Hours: _____ Date: _____ Dealer no: _____ Notes: _____	Signature/Print:
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km:	Signature/Print:
Hours:	
Date:	
Dealer no:	
Notes:	
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km:	Signature/Print:
Hours:	
Date:	
Dealer no:	
Notes:	
For maintenance schedule refer to Maintenance Information section of this operator's guide	

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CUSTOMER INFORMATION

PRIVACY INFORMATION

BRP wishes to inform you that your coordinates will be used for safety and warranty related purposes. Furthermore, BRP and its affiliates may use its customer list to distribute marketing and promotional information about BRP and related products.

To exercise your right to consult or correct your data, or to be removed from the addressee-list for direct marketing, please contact BRP.

By E-mail: privacyofficer@brp.com

By mail: BRP
Senior Legal Counsel-Privacy Officer
726 St-Joseph
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China 200020

21F Shinagawa East One Tower
2-16-1 Konan, Minatoku-ku,
Tokyo 108-0075
Japan

Europe

Skaldenstraat 125
B-9042 Gent
Belgium

Itterpark 11
D-40724 Hilden
Germany

ARTEPARC Bâtiment B
Route de la côte d'Azur, Le Canet
13590 Meyreuil
France

Ingvald Ystgaardsvei 15
N-7484 Trondeim
Norway

Isoaavantie 7
PL 8040
96101 Rovaniemi

Spinnvägen 15
903 61 Umeå
Sweden

Avenue d'Ouchy 4-6
1006 Lausanne
Switzerland

North America

565 de la Montagne Street
Valcourt (Québec) J0E 2L0
Canada

Sa De Cv, Av. Ferrocarril 202
Parque Ind. Querétaro, Lote2-B
76220
Santa Rosa Jáuregui, Qro., Mexico

Sturtevant, Wisconsin, U.S.A.
10101 Science Drive
Sturtevant, Wisconsin
53177
U.S.A.

Oceania

6 Lord Street
Lakes Business Park
Botany, NSW 2019
Australia

3B Echelon Place, East Tamaki,
Auckland 2013,
New Zealand

South America

Rua James Clerck Maxwell, 230
TechnoPark Campinas SP 13069-380
Brazil

CHANGE OF ADDRESS/OWNERSHIP

If your address has changed or if you are the new owner of the ATV, be sure to notify BRP by either:

– Notifying an authorized Can-Am dealer.
– North America Only: calling at 1 888 272-9222.
– Mailing one of the change of address cards on the following pages at one of the BRP addresses indicated in the *CONTACT US* section of this guide.

In case of change of ownership, please join a proof that the former owner agreed to the transfer.

Notifying BRP, even after the expiration of the limited warranty, is very important as it enables BRP to reach the ATV owner if necessary, like when safety recalls are initiated. It is the owner's responsibility to notify BRP.

STOLEN UNITS: If your personal ATV is stolen, you should notify BRP or an authorized Can-Am dealer. We will ask you to provide your name, address, phone number, the vehicle identification number and the date it was stolen.

CHANGE OF ADDRESS ☐ CHANGE OF OWNERSHIP ☐

VEHICLE IDENTIFICATION NUMBER

Model Number | Vehicle Identification Number (V.I.N.)

OLD ADDRESS OR PREVIOUS OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

NEW ADDRESS OR NEW OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

E-MAIL ADDRESS

V00A2F

CHANGE OF ADDRESS ☐ CHANGE OF OWNERSHIP ☐

VEHICLE IDENTIFICATION NUMBER

Model Number | Vehicle Identification Number (V.I.N.)

OLD ADDRESS OR PREVIOUS OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

NEW ADDRESS OR NEW OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

E-MAIL ADDRESS

V00A2F

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CHANGE OF ADDRESS ☐ CHANGE OF OWNERSHIP ☐

VEHICLE IDENTIFICATION NUMBER

Model Number | Vehicle Identification Number (V.I.N.)

OLD ADDRESS OR PREVIOUS OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

NEW ADDRESS OR NEW OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

E-MAIL ADDRESS

V00A2F

CHANGE OF ADDRESS ☐ CHANGE OF OWNERSHIP ☐

VEHICLE IDENTIFICATION NUMBER

Model Number | Vehicle Identification Number (V.I.N.)

OLD ADDRESS OR PREVIOUS OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

NEW ADDRESS OR NEW OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

E-MAIL ADDRESS

V00A2F

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NOTES

NOTES

ATV MODEL No. _____

VEHICLE
IDENTIFICATION NUMBER (V.I.N.) _____

ENGINE
IDENTIFICATION NUMBER (E.I.N.) _____

Owner: _____
NAME

_____
No. STREET APT

_____
CITY STATE/PROVINCE ZIP/POSTAL CODE

Purchase Date _____ | | | | |
YEAR MONTH DAY

Warranty Expiry Date _____ | | | | |
YEAR MONTH DAY

To be completed by the dealer at the time of the sale.

DEALER IMPRINT AREA

V00A2IL

Please verify with your dealer to ensure your vehicle has been registered with BRP.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

⚠ WARNING

THIS VEHICLE CAN BE HAZARDOUS TO OPERATE.
A collision or rollover can occur quickly, even during routine maneuvers such as turning and driving on hills or over obstacles, if you fail to take proper precautions.

SEVERE INJURY OR DEATH
can result if you do not follow these instructions:

- **BEFORE YOU OPERATE THIS VEHICLE, READ THIS OPERATOR'S GUIDE, ALL ON PRODUCT SAFETY LABELS AND WATCH THE SAFETY VIDEO.**

- **NEVER OPERATE THIS VEHICLE WITHOUT PROPER INSTRUCTIONS.**
  Complete a certified training course.
- **DO NOT EXCEED VEHICLE SEATING CAPACITY**
- **FOR 1UP MODELS, NEVER CARRY A PASSENGER.**
  You increase your risk of losing control if you carry a passenger.
- **NEVER OPERATE THIS VEHICLE ON A PAVED SURFACE.**
  You increase your risk of losing control if you operate this vehicle on pavement.
- **NEVER OPERATE THIS VEHICLE ON PUBLIC ROADS.**
  You can collide with another vehicle if you operate this vehicle on a public road.
- **OPERATOR SHOULD ALWAYS WEAR AN APPROVED HELMET,** eye protection and protective clothing.
- **NEVER USE WITH DRUGS OR ALCOHOL.**
  They slow reaction time and impair judgment.
- **NEVER OPERATE THIS VEHICLE AT EXCESSIVE SPEEDS.**
  You increase your risk of losing control if you operate this vehicle at speeds too fast for the terrain, visibility conditions, or your experience.
- **NEVER ATTEMPT WHEELIES, JUMPS, OR OTHER STUNTS.**

219 002 095
OPERATOR'S GUIDE RENEGADE Series / ENGLISH
GUIDE DU CONDUCTEUR Séries RENEGADE / ANGLAIS

FAIT AU / MADE IN CANADA

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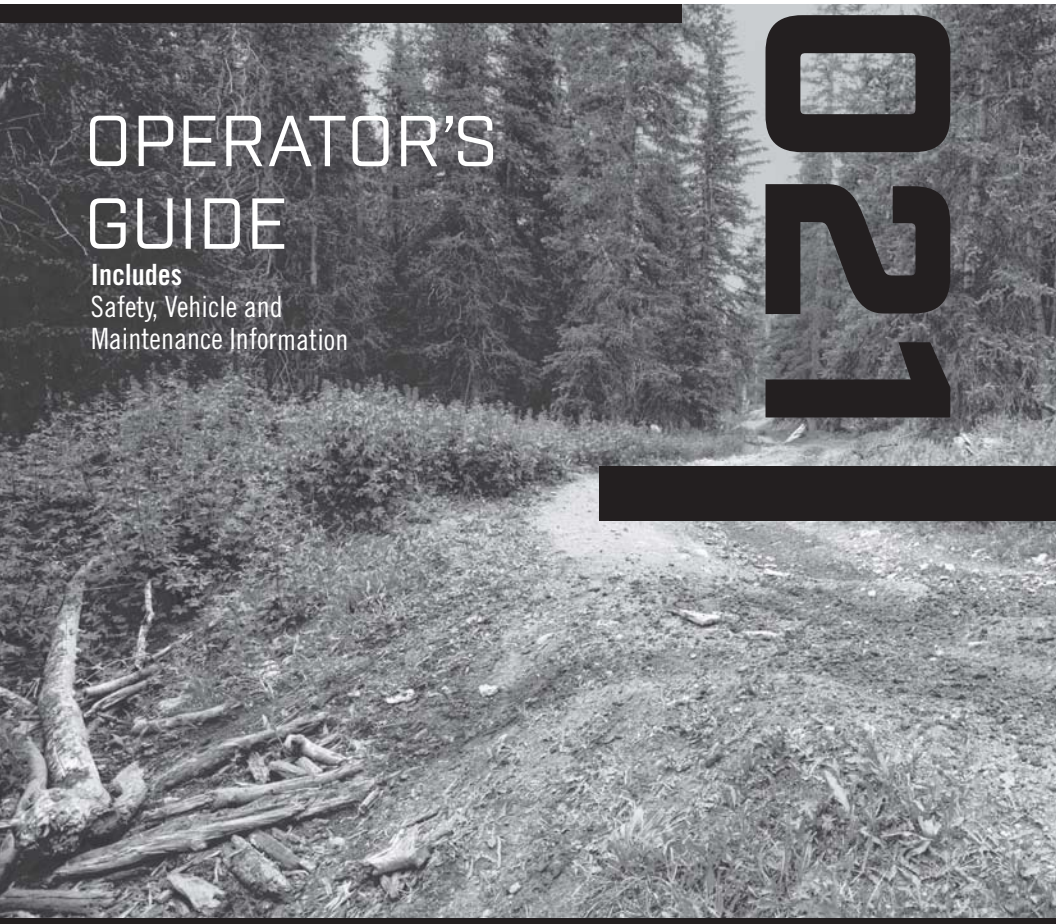
can-am

RENEGADE® X™ mr

2021

OPERATOR'S GUIDE

Includes
Safety, Vehicle and
Maintenance Information



⚠ WARNING

Read this guide thoroughly.
It contains important safety information.
Minimum recommended age: Operator: 16 years old.
Keep this Operator's Guide in the vehicle.

219 002 096

Original Instructions

⚠ WARNING

YOUR VEHICLE CAN BE HAZARDOUS TO OPERATE. A collision or rollover can occur quickly, if you fail to take proper precautions, even during routine maneuvers such as turning and driving on hills or over obstacles.
For your safety, understand and follow all the warnings contained in this Operator's Guide and on the labels on your vehicle. **Failure to follow these warnings can result in SEVERE INJURY OR DEATH!**
Keep this Operator's Guide with the vehicle at all times.

⚠ WARNING

Disregarding any of the safety precautions and instructions contained in this Operator's Guide, *SAFETY VIDEO* and on-product safety labels could result in an injury including the possibility of death!

⚠ WARNING

This vehicle may exceed the performance of other vehicles you may have ridden in the past. Take time to familiarize yourself with your new vehicle.

CALIFORNIA PROPOSITION 65 WARNING

⚠ **WARNING:** Operating, servicing and maintaining an off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. For more information go to www.p65warnings.ca.gov/products/passenger-vehicle.

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FOREWORD

OPERATOR'S GUIDE 2021

Renegade X mr 570
Renegade X mr 1000R

Deutsch	Dieses Handbuch ist möglicherweise in Ihrer Landessprache verfügbar. Bitte wenden Sie sich an Ihren Händler oder besuchen Sie: www.operatorsguides.brp.com
English	This guide may be available in your language. Check with your dealer or go to: www.operatorsguides.brp.com
Español	Es posible que este manual esté disponible en su idioma. Consulte a su distribuidor o visite: www.operatorsguides.brp.com
Français	Ce guide peut être disponible dans votre langue. Vérifier avec votre concessionnaire ou aller à: www.operatorsguides.brp.com
Italiano	Questa guida potrebbe essere disponibile nella propria lingua. Contattare il concessionario o consultare: www.operatorsguides.brp.com
中文	本手册可能有您的语种的翻译版本。请向经销商问询，或者登录 www.operatorsguides.brp.com 查询。
日本語	このガイドは、言語によって翻訳版が用意されています。. ディーラーに問い合わせるか、次のアドレスでご確認ください： www.operatorsguides.brp.com
Nederlands	Deze handleiding kan beschikbaar zijn in uw taal. Vraag het aan uw dealer of ga naar: www.operatorsguides.brp.com
Norsk	Denne boken kan finnes tilgjengelig på ditt eget språk. Kontakt din forhandler eller gå til: www.operatorsguides.brp.com
Português	Este manual pode estar disponível em seu idioma. Fale com sua concessionária ou visite o site: www.operatorsguides.brp.com
Русский	Воспользуйтесь руководством на вашем языке. Узнайте о его наличии у дилера или на странице по адресу www.operatorsguides.brp.com
Suomi	Käyttöohjekirja voi olla saatavissa omalla kielelläsi. Tarkista jälleenmyyjältä tai käy osoitteessa: www.operatorsguides.brp.com
Svenska	Denna bok kan finnas tillgänglig på ditt språk. Kontakta din återförsäljare eller gå till: www.operatorsguides.brp.com

Congratulations on your purchase of a new Can-Am® ATV. It's backed by the BRP limited warranty and a network of authorized Can-Am dealers ready to provide the parts, accessories or service you may require.

At delivery, you were informed of the warranty coverage and signed the *PREDELIVERY CHECK LIST* to ensure your new vehicle was prepared to your entire satisfaction.

Your dealer is committed to your satisfaction. If you need more information, please ask your dealer.

Know Before you Go

To learn how to reduce the risk for you or bystanders being injured or killed, read this Operator's Guide before you operate the vehicle.

Also, read all safety labels on your ATV and watch attentively the *SAFETY VIDEO* located at https://can-am.brp.com/off-road/safety.

This vehicle is a category S, always follow this age recommendation: A person under 16 years old should never operate this vehicle.

This vehicle is for recreational use by experienced operators only.

We highly recommend that you take a safety riding course. Refer to *SPECIAL SAFETY MESSAGES* for details.

Failure to follow the warnings contained in this Operator's Guide can result in SERIOUS INJURY or DEATH.

Safety Messages

The types of safety messages, what they look like and how they are used in this guide are explained as follows:

The safety alert symbol ⚠ indicates a potential injury hazard.

⚠ WARNING

Indicates a potential hazard, if not avoided, could result in serious injury or death.

⚠ CAUTION Indicates a hazard situation which, if not avoided, could result in minor or moderate injury.

NOTICE Indicates an instruction which, if not followed, could severely damage vehicle components or other property.

About This Operator's Guide

This Operator's Guide has been prepared to acquaint the owner/operator of a new vehicle with the various vehicle controls, maintenance and safe operating instructions. It is indispensable for the proper use of the product.

Keep this Operator's Guide in the vehicle as you can refer to it for things such as maintenance, troubleshooting and instructing others.

Note that this guide is available in several languages. In the event of any discrepancy, the English version shall prevail.

If you want to view and/or print an extra copy of your Operator's Guide, simply visit the following website **www.operatorsguides.brp.com**.

The informations contained in this document are correct at the time of publication. However, BRP maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured. Due to late changes, some differences between the manufactured product and the descriptions and/or specifications

in this guide may occur. BRP reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring any obligation upon itself.

This Operator's Guide should remain with the vehicle when it is sold.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

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SAFETY INFORMATION

Avoid Carbon Monoxide Poisoning

All engine exhaust contains carbon monoxide, a deadly gas. Breathing carbon monoxide can cause headaches, dizziness, drowsiness, nausea, confusion and eventually death.

Carbon monoxide is a colorless, odorless, tasteless gas that may be present even if you do not see or smell any engine exhaust. Deadly levels of carbon monoxide can collect rapidly, and you can quickly be overcome and unable to save yourself. Also, deadly levels of carbon monoxide can linger for hours or days in enclosed or poorly ventilated areas. If you experience any symptoms of carbon monoxide poisoning, leave the area immediately, get fresh air and seek medical treatment.

To prevent serious injury or death from carbon monoxide:

– Never run the vehicle in poorly ventilated or partially enclosed areas such as garages, carports or barns. Even if you try to ventilate engine exhaust with fans or open windows and doors, carbon monoxide can rapidly reach dangerous levels.
– Never run the vehicle outdoors where engine exhaust can be drawn into a building through openings such as windows and doors.

Avoid Gasoline Fires and Other Hazards

Gasoline is extremely flammable and highly explosive. Fuel vapors can spread and be ignited by a spark or flame many feet away from the engine. To reduce the risk of fire or explosion, follow these instructions:

– Use only an approved gasoline container to store fuel.
– Strictly adhere to instructions in *FUEL*.
– Never start or operate the engine if the fuel cap is not properly installed.

Gasoline is poisonous and can cause injury or death.

– Never siphon gasoline by mouth.
– If you swallow gasoline, get any in your eye(s), or inhale gasoline vapor, see your doctor immediately.

If gasoline spills on you, wash with soap and water and change your clothes.

Avoid Burns from Hot Parts

Certain components become hot during operation. Avoid contact with those parts during and shortly after operation to avoid burns.

Accessories and Modifications

Any modifications or addition of accessories may affect the handling of your vehicle. It is important to take the time to get familiar with the vehicle once modifications are made to understand how to adapt your driving behavior accordingly.

Do not tamper with unauthorized modifications or install equipment not specifically certified by BRP for the vehicle. These modifications have not been tested by BRP and they may increase the risk of injury or loss of control, or render the vehicle illegal to ride. As an example, tampering with tire specifications may affect the behavior of the vehicle and increase the risk of a loss of control.

Ask your authorized BRP dealer for suitable available accessories for your vehicle.

SPECIAL SAFETY MESSAGES

THIS VEHICLE IS NOT A TOY AND CAN BE HAZARDOUS TO OPERATE.

– This vehicle handles differently from other vehicles. A collision or rollover can occur quickly, if you fail to take proper precautions, even during routine maneuvers such as turning and driving on hills or over obstacles.

SEVERE INJURY OR DEATH can result if you do not comply with the following instructions:

– Read this Operator's Guide and all on-product safety labels carefully and follow the operating procedures described. Watch and pay attention to the *SAFETY VIDEO* before operating the vehicle.
– Always follow this age recommendation: A person under 16 years old should never operate this vehicle.
– Never carry a passenger on this vehicle. Passenger(s) affect balance and steering and increase risk of losing control.
– Never operate this vehicle on any paved surfaces, including sidewalks, driveways, parking lots and streets.
– Never operate this vehicle on any public street, road or highway, even a dirt or gravel one.
– Never take place on this vehicle without wearing an approved helmet that fits properly. You should also wear eye protection (goggles or face shield), gloves, boots, long sleeved shirt or jacket, and long pants.
– Never use this vehicle if you are tired, ill or with drugs or alcohol. Your reaction time and judgement is greatly affected under these conditions.
– Never operate at excessive speeds. Always go at a speed that is proper for the terrain, visibility, and operating conditions, and your experience.
– Never attempt wheelies, jumps, or other stunts.
– Always inspect and confirm the safe operating condition of your vehicle prior to ride. Always follow the inspection and maintenance procedures and schedules described in this Operator's Guide.
– Always keep both hands on the handlebars and both feet on the footrests of the vehicle during operation.
– Always go slowly and be extra careful when operating on unfamiliar terrain. Always be alert to changing terrain conditions when operating this vehicle.
– Never operate on excessively rough, slippery or loose terrain until you have learned and practiced the skills necessary to control this vehicle on such terrain. Always be especially cautious on these kinds of terrain.
– Always follow proper procedures for turning as described further in this Operator's Guide. Practice turning at low speeds before attempting to turn at faster speeds. Do not turn at excessive speed.
– Never operate this vehicle on hills too steep for the vehicle or for your abilities. Practice on smaller hills before attempting larger hills.
– Always follow proper procedures for climbing hills as described further in this Operator's Guide. Check the terrain carefully before you start up any hill. Never climb hills with excessively slippery or loose surfaces. Shift your weight forward. Never open the throttle suddenly or make sudden gear changes. Never go over the top of any hill at high speed.
– Always follow proper procedures for going down hills and for braking on hills as described further in this Operator's Guide. Check the terrain carefully before you start down any hill. Shift your weight backward.

- Always follow proper procedures for crossing the side of a hill as described further in this Operator's Guide. Avoid hills with excessively slippery or loose surfaces. Shift your weight to the uphill side of the vehicle.
- Always use proper procedures if you stall or roll backwards when climbing a hill. To avoid stalling, use proper range and maintain a steady speed when climbing a hill. If you stall or roll backwards, follow the special procedure for braking described in this Operator's Guide. Put the parking brake and dismount on the uphill side or to the left side to access the brake lever if pointed straight uphill. Turn the vehicle around and remount, following the procedure described further in this Operator's Guide.
- Always check for obstacles before operating in a new area. Never attempt to operate over large obstacles, such as large rocks or fallen trees. Always follow proper procedures when operating over obstacles as described further in this Operator's Guide.
- Always be careful when skidding or sliding. Learn to safely control skidding or sliding by practicing at low speeds and on level smooth terrain. On extremely slippery surfaces, such as ice, go slowly and be very cautious in order to reduce the chance of skidding out of control.
- Never operate this vehicle in fast flowing water or in water deeper than that specified in this Operator's Guide. Remember that wet brakes may have reduced stopping ability. Test your brakes after leaving water, mud or snow. If necessary, apply them several times to let friction dry out the pads.
- Always keep in mind that braking distance is readily affected by but not limited to; weather and terrain conditions, braking system and tire conditions, vehicle speed and attitude, and vehicle load including towing. Remember to adjust your driving accordingly.
- Always be sure there are no obstacles or people behind the vehicle when you operate in reverse. When it is safe to proceed in reverse, go slowly.
- BRP recommends sitting on your ATV when operating in reverse. Avoid standing up. Your weight could shift forward against throttle lever, causing an unexpected acceleration and loss of control.
- Always use the size and type tires specified further in this Operator's Guide. Always maintain proper tire pressure as described further in this Operator's Guide.
- Never modify this vehicle through improper installation or use of accessories. Only use BRP's approved accessories. NEVER install passenger seat or use the cargo area to carry a passenger.
- Never exceed the stated load limits for this vehicle including operator, all other loads and added accessories. Cargo should be properly distributed and securely attached. Reduce speed and follow instructions in this manual for carrying cargo or pulling a trailer. Allow greater distance for braking.
- Never operate the vehicle if the controls do not function normally.

Training Course

Never operate this vehicle without proper instruction. **Take a training course.** All operators should receive training from a certified instructor.

FOR MORE INFORMATION ABOUT ATV SAFETY, contact an authorized Can-Am dealer to find out about available training courses nearest you.

In the United States, call the Specialty Vehicle Institute of America (SVIA) at 1 800 887–2887 or in Canada, the Canada Safety Council (CSC) at 1 613 739–1535.

OPERATION WARNINGS

The following warning and their format have been requested by the United States Consumer Product Safety Commission and are required to be in the Operator's Guide for all ATVs.

NOTE: The following illustrations are general representations only. Your model may differ.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle without proper instruction.

WHAT CAN HAPPEN

The risk of an accident is greatly increased if the operator does not know how to operate this vehicle properly in different situations and on different types of terrain.

HOW TO AVOID THE HAZARD

Beginners and inexperienced operators should complete a training course. They should then regularly practice the skills learned during the course as well as the operating techniques described in this Operator's Guide.

For more information about the training course, contact an authorized Can-Am dealer.

⚠ WARNING

V00A1AQ

POTENTIAL HAZARD

Failure to follow the age recommendations for this vehicle.

WHAT CAN HAPPEN

A lack of respect for this age recommendation can lead to severe injury or death of the child.

Even though a child may be within the age group for which this vehicle is recommended, he may not have the skills, abilities, or judgment needed to operate this vehicle safely and may be involved in a serious accident.

HOW TO AVOID THE HAZARD

No one under 16 should operate this vehicle.

⚠ WARNING

V00A02Q

POTENTIAL HAZARD

Carrying a passenger on this vehicle.

WHAT CAN HAPPEN

Greatly reduces your ability to balance and control this vehicle.

Could cause an accident, resulting in harm to you and/or your passenger.

HOW TO AVOID THE HAZARD

Never carry passenger. Even with a long seat that provides unrestricted operator movement, it is not designed nor intended to carry passenger(s).

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle on paved surfaces.

WHAT CAN HAPPEN

The tires are designed for off-road use only, not for use on pavement. Paved surfaces may seriously affect handling and control of this vehicle, and may cause the vehicle to go out of control.

HOW TO AVOID THE HAZARD

Never operate this vehicle on any paved surfaces, including sidewalks, driveways, parking lots and streets.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle on public streets, roads or highways.

WHAT CAN HAPPEN

You can collide with another vehicle.

HOW TO AVOID THE HAZARD

Never operate this vehicle on any public street, road or highway, even a dirt or gravel one. In many states or provinces it is illegal to operate this vehicle on public streets, roads or highways.

⚠ WARNING

POTENTIAL HAZARD

Riding this vehicle without wearing an approved helmet, eye protection and protective clothing.

WHAT CAN HAPPEN

The following items concern all ATV's operator:

– Riding without an approved helmet increases the chances of a severe head injury or death in the event of an accident.
– Riding without eye protection can result in an accident and increases the chances of a severe injury in the event of an accident.
– Riding without protective clothing increases the chances of severe injury in the event of an accident.

HOW TO AVOID THE HAZARD

Always wear an approved helmet that fits properly. You should also wear:

– Eye protection (goggles or face shield)
– Gloves and boots
– Long sleeved shirt or jacket
– Long pants.

⚠ WARNING

V00A07Q

POTENTIAL HAZARD

Using this vehicle with drugs or alcohol.

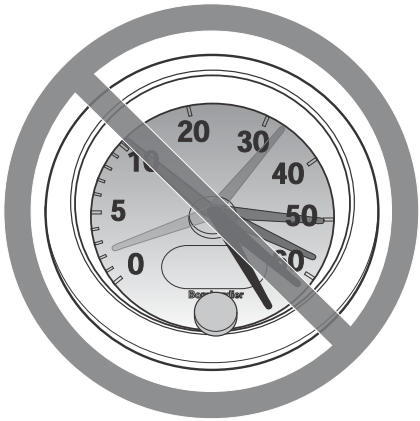
WHAT CAN HAPPEN

Could seriously affect your judgment.
Could cause you to react more slowly.
Could affect your balance and perception.
Could result in an accident or death.

HOW TO AVOID THE HAZARD

Never use this vehicle with drugs or alcohol.

⚠ WARNING



V00A08Q

POTENTIAL HAZARD

Operating this vehicle at excessive speeds.

WHAT CAN HAPPEN

Increases your chances of losing control of the vehicle, which can result in an accident.

HOW TO AVOID THE HAZARD

Always travel at a speed which is appropriate for the terrain, visibility and operating conditions, and your experience.

⚠ WARNING

POTENTIAL HAZARD

Attempting wheelies, jumps and other stunts.

WHAT CAN HAPPEN

Increases the chance of an accident, including an overturn.

HOW TO AVOID THE HAZARD

Never attempt stunts, such as wheelies or jumps. Do not try to show off.

⚠ WARNING

POTENTIAL HAZARD

Failure to inspect the vehicle before operating.

Failure to properly maintain the vehicle.

WHAT CAN HAPPEN

Increases the possibility of an accident or equipment damage.

HOW TO AVOID THE HAZARD

Always inspect your vehicle prior to every time you use it to make sure the vehicle is in safe operating condition.

Always follow the inspection and maintenance procedures and schedules described further in this Operator's Guide.

⚠ WARNING

POTENTIAL HAZARD

Riding on frozen waterways.

WHAT CAN HAPPEN

Breaking through the ice can lead to severe injury or death.

HOW TO AVOID THE HAZARD

Never ride this vehicle on a frozen surface before you are sure the ice is thick enough and sound enough to support the vehicle and its load, as well as the force that is created by a moving vehicle.

⚠ WARNING

POTENTIAL HAZARD

Removing hands from handlebar or feet from the footrests during operation.

WHAT CAN HAPPEN

Removing even one hand or foot can reduce your ability to control the vehicle or could cause you to lose your balance and fall off the vehicle. If you remove a foot from the footrests, your foot or leg may come into contact with the rear wheels, which could injure you or cause an accident.

HOW TO AVOID THE HAZARD

Always keep both hands on the handlebar and both feet on the footrests during vehicle operation.

⚠ WARNING

POTENTIAL HAZARD

Failure to use extra care when operating this vehicle on unfamiliar terrain.

WHAT CAN HAPPEN

You can come upon hidden rocks, bumps, or holes, without enough time to react.

Could result in the vehicle overturning or loss of control.

HOW TO AVOID THE HAZARD

Go slowly and be extra careful when operating on unfamiliar terrain.

Always be alert to changing terrain conditions when operating the vehicle.

⚠ WARNING

POTENTIAL HAZARD

Failure to use extra care when operating on excessively rough, slippery or loose terrain.

WHAT CAN HAPPEN

Could cause loss of traction or vehicle control, which could result in an accident, including an overturn.

HOW TO AVOID THE HAZARD

Do not operate on excessively rough, slippery or loose terrain until you have learned and practiced the skills necessary to control this vehicle on such terrain.

Always be especially cautious on these kinds of terrain.

⚠ WARNING

POTENTIAL HAZARD

Turning improperly.

WHAT CAN HAPPEN

Vehicle could go out of control, causing a collision or overturn.

HOW TO AVOID THE HAZARD

Always follow proper procedures for turning as described further in this Operator's Guide. Practice turning at low speeds before attempting to turn at faster speeds.

Do not turn at excessive speed.

⚠ WARNING

POTENTIAL HAZARD

Operating on excessively steep hills.

WHAT CAN HAPPEN

The vehicle can overturn more easily on extremely steep hills than on level surfaces or small hills.

HOW TO AVOID THE HAZARD

Never operate this vehicle on hills too steep for the vehicle or for your abilities.

Practice on smaller hills before attempting larger hills.

⚠ WARNING

POTENTIAL HAZARD

Climbing hills improperly.

WHAT CAN HAPPEN

Could cause loss of control or cause vehicle to overturn.

HOW TO AVOID THE HAZARD

Always follow proper procedures for climbing hills as described further in this Operator's Guide.

Always check the terrain carefully before you start up any hill.

Never climb hills with excessively slippery or loose surfaces.

Shift your weight forward.

Never open the throttle suddenly or make sudden gear changes. The vehicle could flip over backwards.

Never go over the top of any hill at high speed. An obstacle, a sharp drop, or another vehicle or person could be on the other side of the hill.

⚠ WARNING

POTENTIAL HAZARD

Going down a hill improperly.

WHAT CAN HAPPEN

Could cause loss of control or cause vehicle to overturn.

HOW TO AVOID THE HAZARD

Always follow proper procedures for going down hills as described further in this Operator's Guide.

NOTE: A special technique is required when braking as you go down a hill.

Always check the terrain carefully before you start down any hill.

Shift your weight backward.

Never go down a hill at high speed.

Avoid going down a hill at an angle which would cause the vehicle to lean sharply to one side. Go straight down the hill where possible.

⚠ WARNING

POTENTIAL HAZARD

Improperly crossing hills or turning on hills.

WHAT CAN HAPPEN

Could cause loss of control or cause vehicle to overturn.

HOW TO AVOID THE HAZARD

Never attempt to turn the vehicle around on any hill until you have mastered the turning technique as described further in this Operator's Guide on level ground. Be very careful when turning on any hill.

Avoid crossing the side of a steep hill if possible.

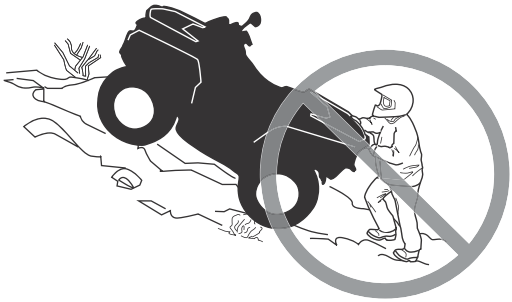
When crossing the side of a hill:

Always follow proper procedures as described further in this Operator's Guide.

Avoid hills with excessively slippery or loose surfaces.

Shift your weight to the uphill side of the vehicle.

⚠ WARNING



POTENTIAL HAZARD

Stalling, rolling backwards or improperly dismounting while climbing a hill.

WHAT CAN HAPPEN

Could result in vehicle overturning.

HOW TO AVOID THE HAZARD

Use proper range and maintain steady speed when climbing a hill.

If you lose all forward speed:

Keep your weight uphill. Never open the throttle suddenly or make sudden gear changes. The vehicle could flip over backwards.

Apply the brakes.

Lock parking brake after you have stopped.

Dismount on uphill side, or to a side if pointed straight uphill.

If you begin rolling backwards:

Keep your weight uphill. Never open the throttle suddenly or make sudden gear changes. The vehicle could flip over backwards.

Never apply the rear brake while rolling backwards.

Apply the front brake gradually.

When fully stopped, apply rear brake as well and lock parking brake.

Dismount on uphill side, or to a side if pointed straight uphill.

Turn the vehicle around and remount, following the procedure described further in this Operator's Guide.

⚠ WARNING

POTENTIAL HAZARD

Improperly operating over obstacles.

WHAT CAN HAPPEN

Could cause loss of control or a collision.

Could cause the vehicle to overturn.

HOW TO AVOID THE HAZARD

Before operating in a new area, check for obstacles.

Never attempt to ride over large obstacles, such as large rocks or fallen trees.

When you go over obstacles, always follow proper procedures as described further in this Operator's Guide.

⚠ WARNING

POTENTIAL HAZARD

Skidding or sliding improperly.

WHAT CAN HAPPEN

You may lose control of this vehicle.

You may also regain traction unexpectedly, which may cause the vehicle to overturn.

HOW TO AVOID THE HAZARD

Learn to safely control skidding or sliding by practicing at low speeds and on level smooth terrain.

On extremely slippery surfaces, such as ice, go slowly and be very cautious in order to reduce the chance of skidding or sliding out of control.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle through deep or fast flowing water.

WHAT CAN HAPPEN

Tires may float, causing loss of traction and loss of control, which could lead to an accident.

HOW TO AVOID THE HAZARD

Never operate this vehicle in fast flowing water or in water deeper than that specified further in this Operator's Guide.

Check water depth and current before you attempt to cross any water. Water level should not go above tires.

Remember that wet brakes may have reduced stopping ability. Test your brakes after leaving water. If necessary, apply them several times to let friction dry out the pads.

⚠ WARNING

POTENTIAL HAZARD

Improperly operating in reverse.

WHAT CAN HAPPEN

You could hit an obstacle or person behind the vehicle, resulting in serious injury.

HOW TO AVOID THE HAZARD

When you select reverse gear, make sure there are no obstacles or people behind the vehicle. When it is safe to proceed, go slowly.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle with improper tires, or with improper or uneven tire pressure.

WHAT CAN HAPPEN

Use of improper tires on this vehicle, or operation of this vehicle with improper or uneven tire pressure, may cause loss of control, tire blow outs, tire to move around on its rim and increases the risk of an accident.

HOW TO AVOID THE HAZARD

Always use the size and type of tires specified further in this Operator's Guide for this vehicle.

Always maintain proper tire pressure as described further in this Operator's Guide.

Always replace wheels or tires that are damaged.

⚠ WARNING

POTENTIAL HAZARD

Operating this vehicle with improper modifications.

WHAT CAN HAPPEN

Improper installation of accessories or modification of this vehicle may cause changes in handling which in some situations could lead to an accident.

HOW TO AVOID THE HAZARD

Never modify this vehicle through improper installation or use of accessories. All parts and accessories added to this vehicle should be approved by BRP and should be installed and used according to instructions. If you have questions, consult an authorized Can-Am dealer.

NEVER install passenger seat or use the cargo area to carry a passenger.

Modification of the vehicle to increase speed and performance may violate the terms and conditions of your vehicle's limited warranty. In addition, certain modifications including the removal of engine or exhaust components are illegal under most laws.

⚠ WARNING

POTENTIAL HAZARD

Overloading this vehicle, carrying or towing cargo improperly.

WHAT CAN HAPPEN

Could cause changes in vehicle handling which could lead to an accident.

HOW TO AVOID THE HAZARD

Never exceed the stated load capacity for this vehicle including operator, as well as other loads and added accessories.

Cargo should be properly distributed and securely attached.

Reduce speed when carrying cargo or pulling a trailer. Allow greater distance for braking.

Always follow the instructions in this Operator's Guide for carrying cargo or pulling a trailer.

⚠ WARNING

V03M01Q

POTENTIAL HAZARD

Transporting flammable or dangerous material can lead to explosions.

WHAT CAN HAPPEN

This can cause serious injury or death.

HOW TO AVOID THE HAZARD

Never transport flammable or dangerous material.

RIDING THE VEHICLE

To fully appreciate the pleasures and excitement of riding this vehicle, there are some basic rules and tips that you MUST follow. Some may be new to you while others may be common sense or obvious.

Please take the time to study this Operator's Guide and all on-product safety labels as well as the *SAFETY VIDEO* located at https://can-am.brp.com/off-road/safety. They more completely describe what you should know about this vehicle before riding it.

Whether you are a new user or an experienced rider, it is important for your personal safety that you know the controls and features of this vehicle. Equally important is knowing how to properly ride.

This is a high performance ATV for off-road use only. Inexperienced riders may overlook risks and be surprised by the specific behavior of this ATV in any terrain condition.

Information in this Operator's Guide is limited. It is strongly recommended that you obtain further information and training from your local authorities, ATV clubs, a recognized ATV training organization or contact an authorized Can-Am dealer.

We recommend following the age recommendation indicated on the safety label affixed on the unit. Even though a person may be within the age group for which this vehicle is recommended, he may not have the skills, abilities, or judgment needed to operate this vehicle safely and may be involved in a serious accident.

Individuals with cognitive or physical impairments or who are high risk takers have an increased exposure to overturns or collisions which may result in injury including death.

This vehicle is designed specifically to carry an operator only. Even with a long seat that provides unrestricted operator movements, it is not designed nor intended to carry passenger(s).
NEVER install passenger seat or use the cargo area to carry passenger(s). Carrying passenger(s) may affect the stability and your control of the vehicle.

Not all vehicles are the same. Each has its own unique performance characteristics, controls and features. Each will ride and handle differently.

Become completely familiar with the operational controls and the general operation of the vehicle before venturing into off road conditions. Practice driving in a suitable area free of hazards and feel the response of each control. Drive at low speeds. Higher speeds require greater experience, knowledge and suitable riding conditions.

Riding conditions vary from place to place. Each is subject to weather conditions which may radically change from time to time and from season to season.

Riding on sand is different than riding on snow or through forests or marshes. Each location may require a greater degree of awareness and skill. Show good judgement. Always proceed with caution. Please do not take any unnecessary risks that could leave you stranded or possibly injured.

Never assume that the vehicle will go everywhere safely. Sudden changes in terrain caused by holes, depressions, banks, softer or harder "ground" or other irregularities may cause the vehicle to topple or become unstable. To avoid this, slow

down and always observe the terrain ahead. If the vehicle does begin to topple or tip over, the best advice is to immediately get off, AWAY from the direction of the tip over!

We encourage you to have an Annual Safety Inspection of your vehicle. Please contact an authorized BRP dealer for further details. Though not required, it is recommended that an authorized BRP dealer performs the preseason preparation of your vehicle. Each visit to your authorized BRP dealer is a great opportunity for your dealer to verify if your vehicle is included in any safety campaign. We also urge you to visit your authorized BRP dealer in a timely manner if you become aware of any safety related campaigns.

See an authorized BRP dealer for available accessories you may require.

Pre-Ride Inspection

⚠ WARNING

Perform a pre-ride inspection before each ride to detect any potential problem that could occur during operation. The pre-ride inspection can help you monitor component wear and deterioration before they become a problem. Correct any problem that you discover to reduce the risk of a breakdown or crash.

Before using this vehicle, the operator should always perform the following pre-ride inspection check list.

Pre-Ride Inspection Check List

What to Do Before Starting the Engine (Key OFF)

ITEMS TO BE INSPECTED	INSPECTION TO PERFORM	✔
Engine oil	Check engine oil level.	
Coolant	Check coolant level.	
Brake fluid	Check brake fluid level.	
Leaks	Check for any leaks under vehicle.	
Throttle lever	Activate throttle lever several times to ensure it operates freely. It must return to idle position when released.	
Parking brake	Apply parking brake and check if it operates properly.	
Tires	Check tire pressure and condition. Refer to *SPECIFICATIONS* for values and adjust according to load.	
Wheels	Check wheels for damage and for abnormal play, and check lug nuts are tightened. Refer to *WHEELS AND TIRES* in *MAINTENANCE PROCEDURES* for torque specification.	
Radiator	Check cleanliness of the radiator.	

ITEMS TO BE INSPECTED	INSPECTION TO PERFORM	✔
Drive shaft boots	Check drive shaft boots and protectors condition.	
Seat	Check if operator seat is in place and properly latched.	
Cargo	If you transport a cargo, respect the load capacity. Refer to *LOADING THE CARGO RACKS*. Ensure cargo is properly secured to the rear cargo area.	
	If you are pulling a trailer or an other equipment: – Check hitch and trailer ball condition. – Respect the tongue capacity and towing capacity as indicated on the label affixed to the hitch or refer to *SPECIFICATIONS*. – Ensure trailer is properly secured to hitch.	
Chassis and suspension	Check underneath vehicle for any debris on chassis or suspension and components clean them properly.	
Engine air filter	Inspect and clean engine air filter	
CVT air filter	Inspect and clean CVT air filter	

What to Do Before Starting the Engine (Key ON)

ITEMS TO BE INSPECTED	INSPECTION TO PERFORM	✔
Multifunction gauge	Check operation of indicator lamps in multifunction gauge (during first few seconds of key ON).	
	Check for messages on multifunction gauge.	
Lights	Check operation and cleanliness of headlights and taillight.	
	Check operation of high and low beam.	
	Check operation of brake light.	
Fuel level	Check the fuel level.	

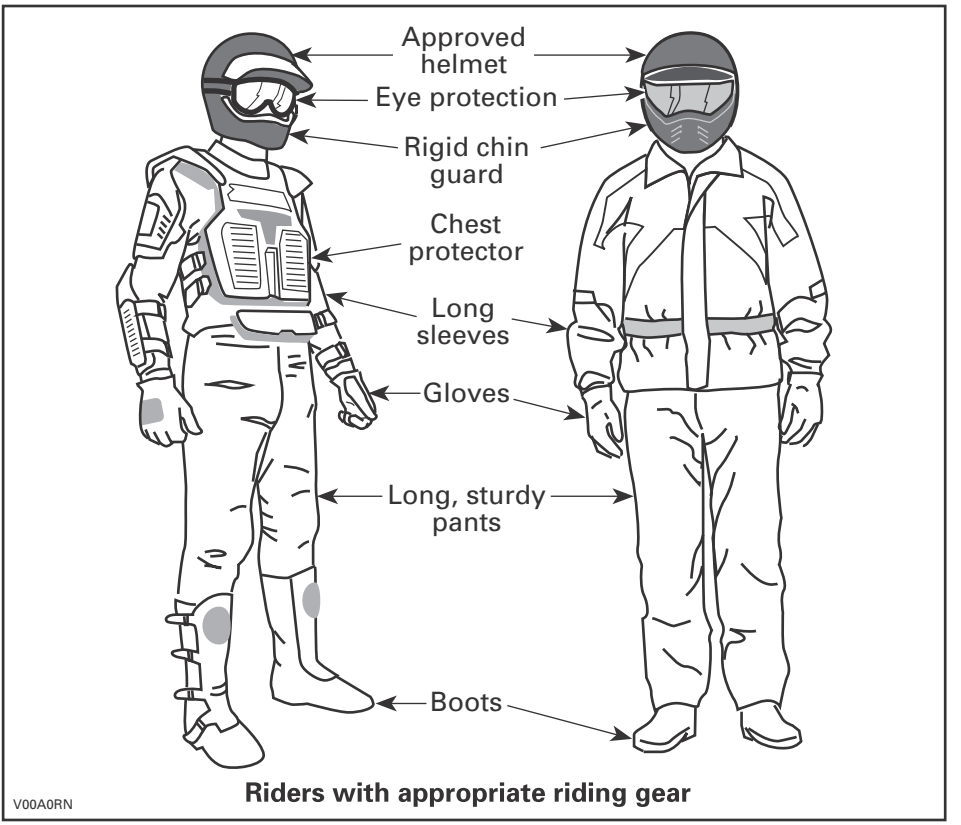
What to Do After the Engine Is Started

ITEMS TO BE INSPECTED	INSPECTION TO PERFORM	✔
Steering	Check if steering operates freely by completely turning it from side to side.	
Shift lever	Check operation of shift lever (P, R, N, H and L).	
2WD/4WD selector	Check operation of 2WD/4WD selector.	

ITEMS TO BE INSPECTED	INSPECTION TO PERFORM	✔
Brakes	Drive forward slowly a few feet and apply brakes individually to test them. The brakes must fully apply. Lever and pedal must fully return when released.	
Engine stop switch	Check that the engine stop switch is working properly.	
RF D.E.S.S. post	Check if D.E.S.S. post is working properly by pulling the D.E.S.S. key from the D.E.S.S. post to stop engine.	

Riding Gear

Actual weather conditions should help you decide how to dress. Dress for the coldest weather expected. Thermal underwear next to the skin also provides a good insulation. It is important that the operator always wears the appropriate protective clothing and apparel, including an approved helmet, eye protection, boots, gloves, a long sleeved shirt and pants. This type of clothing will provide you protection from some of the minor hazards you may encounter en route. The operator must never wear loose clothing such as a scarf that may get entangled in the vehicle or on tree branches and shrubs. Depending on conditions, anti-fogging goggles or sunglasses may be required. Different colored lenses available for goggles or sunglasses help you distinguish terrain variations. Sunglasses should only be worn during the daytime.



Riders with appropriate riding gear

Carrying a Passenger is Prohibited

This vehicle is designed specifically to carry an operator only. Even with a long seat, this vehicle is not designed nor intended to carry passenger(s). NEVER install passenger seat or use the cargo area to carry passenger(s). Carrying passenger(s) may affect the stability and your control of the vehicle.

Carrying Loads

Any load carried on the vehicle will affect the handling, stability and braking distance of the vehicle. Do not exceed the total load allowed for this vehicle, including the weight of operator and passenger cargo, accessories and trailer tongue weight. Refer to *SPECIFICATIONS*. Always make sure the cargo is secured, properly distributed and cannot interfere with your controls or lights. Always be aware that the cargo may slide or fall off and cause an accident. Avoid loads that may protrude sideways and get snagged or caught in brush or other obstacles.

⚠ WARNING

Never overload, tow or carry cargo improperly. Safely reduce speed according to terrain conditions when carrying cargo or pulling a trailer, and avoid hills and rough terrain. Allow greater distance for braking, especially on inclined surfaces. Always secure cargo as low as possible to reduce the effect of a higher center of gravity. Failure to follow the recommendations here could cause changes in vehicle handling which could lead to an accident.

MAXIMUM LOAD TABLE		
TOTAL LOAD ALLOWED	141 kg (310 lb)	Includes driver, all other loads, tongue weight and added accessories.
REAR LOAD	**16 kg (35 lb)**	Includes rear cargo area only.
	13 kg (30 lb)	Includes tongue load only.
	23 kg (50 lb)	Includes rear cargo area and tongue load (if applicable).

The following is an example of suitable load distribution:

EXAMPLE OF LOAD DISTRIBUTION				
TOTAL VEHICLE LOAD	OPERATOR	CARGO LOAD	ACCESSORIES	TONGUE WEIGHT
141 kg (310 lb)	108 kg (238 lb)	9 kg (20 lb)	10 kg (22 lb)	13 kg (30 lb)

Loading the Rear Cargo Area

Load cargo as low as possible – a higher load can raise the vehicle's center of gravity, which can reduce stability. Position cargo on the rack as evenly distributed as possible.

Secure the load on the rear cargo area. Do not secure cargo to other parts of the vehicle. If it is not properly secured, a load may slide or fall off, possibly striking occupants or bystanders; or it may shift during riding, affecting the handling of the vehicle.

Objects that are high may affect visibility for the driver and may act as projectiles in case of an accident. Loads that protrude sideways can get snagged or caught in bush, branches or other obstacles. Avoid covering and obstructing the brake lights with the cargo. Ensure no cargo protrudes outside the cargo area and that cargo will not interfere with your visibility or control of the vehicle.

NOTICE Do not exceed the cargo racks capacity. Refer to *SPECIFICATIONS*.

Never carry gasoline container(s) or any dangerous liquids on the rear cargo area.

⚠ WARNING

Never overload, tow or carry cargo improperly. Safely reduce speed according to terrain conditions when carrying cargo or pulling a trailer, and avoid hills and rough terrain. Allow greater distance for braking. Always secure cargo as low as possible to reduce the effect of a higher center of gravity. Failure to follow the recommendations here could cause changes in vehicle handling which could lead to an accident.

Hauling a Load (if Equipped with Hitch)

Never pull a load by attaching it to the bumper or any other parts or accessories; this can cause the vehicle to tip over. Use only the trailer hitch (if installed) to pull a load.

In an emergency situation, use the recovery hook to recover a stuck vehicle. Refer to *RECOVERY HOOKS* in *EQUIPMENT*.

When pulling loads with a chain or cable, ensure that there is no slack before starting and maintain tension while pulling.

When pulling loads with a chain or cable, be sure to brake progressively. The inertia of the load could lead to an impact.

When hauling a load, respect the maximum hauling capacity. See *PULLING A TRAILER* in this section.

⚠ WARNING

A slack in the chain or cable can cause it to break and snap back.

When pulling another vehicle, be sure that someone is controlling the pulled vehicle. They must brake and steer to prevent the vehicle from going out of control.

Reduce your speed when hauling a load and turn gradually. Avoid hills and rough terrain. Never attempt steep hills. Allow more distance for braking, especially on inclined surfaces. Be careful not to skid or slide.

Pulling a Trailer (if Equipped with Hitch)

NOTICE A BRP approved rear hitch must be properly installed on the vehicle for hauling trailers.

Riding this vehicle with a trailer substantially increases the risk of toppling, especially on inclined slopes. If a trailer is used behind the vehicle make sure that its hitch is compatible with the one on the vehicle. Make sure the trailer is horizontal with the vehicle. (In some instances a special extension may have to be installed on the vehicle hitch). Use security chains or cables to secure the trailer with the vehicle.

Reduce your speed when pulling a trailer and turn gradually. Avoid hills and rough terrain. Never attempt steep hills. Allow more distance for braking, especially on inclined surfaces. Be careful not to skid or slide.

Improperly loading a trailer may cause a loss of control.

Do not exceed the towing capacity or tongue capacity. Refer to *SPECIFICATIONS*.

Make sure there is at least some weight on the tongue.

Always make sure load is evenly distributed and safely secured on the trailer; an evenly balanced trailer is easier to control.

This vehicle may require additional stopping distance if hauling heavy loads, especially on inclined surfaces.

Always put the shift lever to L (low range) for hauling a trailer – in addition to providing more torque, operating in low range helps account for the increased load on the rear tires.

Keep vehicle speed at a slow pace, especially for turning. Be careful not to skid or slide.

When stopped or parked, block the vehicle and trailer wheels from possible movement.

Use caution when disconnecting a loaded trailer; it or its load may topple on you or others.

When hauling a trailer, respect the maximum hauling capacity indicated on the label on the hitch.

Working with your Vehicle

Your vehicle can help you perform a number of different LIGHT tasks ranging from snow removal to pulling wood or carrying cargo. A variety of accessories are available from your authorized Can-Am dealer. However, always respect the load and capacities of the vehicle. Overloading of the vehicle can overstress the components and cause failure. To prevent possible injury, it is equally important to follow the instructions and warnings that accompany the accessory. Avoid any physical exertion through lifting or pulling of heavy loads or man powering the vehicle. (Continue to read *RECREATIONAL RIDING* below).

Recreational Riding

This vehicle is designed specifically to perform in mud riding, the ground clearance being increased for such riding conditions. The ground clearance as well as the type of tires may substantially decrease the handling, traction and stability of the vehicle in some trail riding conditions. Reduce your speed in such conditions.

Respect the rights and limitations of others. Stay away from areas designated for other types of off road use. This includes snowmobile trails, equestrian trails, cross country ski trails, mountain bike trails, etc. Never assume there are no other

users on the trail. Always stay to the complete right of the trail and do not zig zag to one side of the trail then the other. Be prepared to stop or pull off to the side if another trail user appears in front of you.

Join a local ATV club. It will provide you with a map and advice or inform you where you can ride. If a club does not exist in your area, help to start one. Group riding and club activities provide a pleasurable, social experience.

Always keep a safe distance from other riders. Your judgment of speed, terrain conditions, weather, mechanical condition of your vehicle and the "trust in judgment" you have in others around you will help you make a better choice of appropriate safe distance. This vehicle, like any other motorized vehicle, cannot stop "on a dime".

Before you ride, tell someone where you are planning to travel and your expected time of return.

Depending on the length of your ride, carry additional tools , drinking water, food and emergency equipment. Find out where you can get additional gasoline and oil. Be prepared for the possible conditions you may encounter.

First aid kit	Adjustable wrench
Mobile phone	Knife
Friction tape	Flashlight
A rope	Colored lens goggles
Spare light bulbs	Trail map
Provided tool kit	Snack

Mud Riding

This vehicle is designed specifically for mud riding and unless ridden in ATV trails, it should be run in low range.

Although this vehicle is built for rough terrain, extreme conditions and improper use may lead to premature wear or even failure of certain vehicle components. Avoid jerking steering and/or full steering stroke in very thick mud under high throttle demand.

Inspection and maintenance schedule need to be followed rigorously.

NOTE: Refer to *SUSPENSION ADJUSTMENT* in *TUNE YOUR RIDE* for suspension setting information.

Environment

One of the benefits of this vehicle is that it can take you off the beaten path away from most communities. However, you should always respect nature and the rights of others to enjoy it. Do not ride in environmentally sensitive areas. Do not drive over forest crops or shrubs, nor cut down trees or take down fencing, nor spin your wheels and destroy the terrain. "Tread Lightly".

This vehicle can cause OHV wildfires if debris builds up near the exhaust or other engine hot spots and ignites then falls off into dry grass. Avoid riding in wet areas, through muskeg or tall grass, where debris can build up. Should you ride in those areas, inspect and remove all debris from your engine and hot spots.

Chasing wildlife is in many areas illegal. Wildlife can die of exhaustion after being chased by a motorized vehicle. If you encounter animals on the trail, stop and observe quietly and with caution. It will be one of the better memories of your life.

Observe the rule: "what you take in, carry out". Do not litter. Do not start campfires unless you have permission to do so, and then only away from dry areas. The hazards you may create on the trail may cause injury to others or yourself, even at a later date.

Respect farm lands. Always obtain the permission of the landowner before riding on private land. Respect crops, farm animals and property lines. If you come to a closed a gate, close it again behind you.

Finally, do not pollute streams, lakes or rivers and do not modify the engine or exhaust system, or remove any of its components.

Design Limitation

Although the vehicle is exceptionally rugged for its class, it is still a light vehicle by definition and its operation must be restricted to its proper purpose.

The addition of weight to any part of the vehicle changes its gravitational stability and modifies its performance.

Off-Road Operation

The very nature of off-road operation is dangerous. Any terrain, which has not been specially prepared to carry vehicles, presents an inherent danger where terrain substance and exact steepness are unpredictable. The terrain itself presents a continual element of danger, which must be knowingly accepted by anyone venturing over it.

An operator who takes a vehicle off-road should always exercise the utmost care in selecting the safest path and keeping close watch on the terrain ahead of him. On no account should the vehicle be operated by anyone who is not completely familiar with the driving instructions applicable to the vehicle, nor should it be operated on steep or treacherous terrain.

General Operating and Safety Precautions

Care, caution, experience and driving skill are the best precautions against the hazards of vehicle operation.

Whenever there is the slightest doubt that the vehicle can safely negotiate an obstacle or a particular piece of terrain, always choose an alternate route.

In off-road operation, power and traction, not speed, are important. Never drive faster than visibility and your own ability to select a safe route permit.

Constantly watch the terrain ahead for sudden changes in slopes or obstacles, such as rocks or stumps, that may cause loss of stability, resulting in tip over or rollover.

Never operate the vehicle if the controls do not function normally.

When operating in reverse, check that the path behind the vehicle is free of people or obstacles. Proceed slowly and avoid sharp turns.

When stopped or parked, always set the shift lever to the PARK position and apply the parking brake. This is especially important when parking on a slope. On very steep inclines or if the vehicle is carrying cargo, the wheels should be blocked using rocks or bricks.

Reverse Operation

When operating in reverse, check that the path behind the vehicle is free of people or obstacles. Proceed slowly and avoid sharp turns.

We recommend sitting on your ATV when operating in reverse. Avoid standing up. Your weight could shift forward against throttle lever, causing an unexpected acceleration.

Uphill Driving

Due to configuration, this vehicle has excellent climbing ability, so much so that it is possible to tip over before traction is lost. For example, it is common to encounter terrain situations where the top of the hill has eroded to a point that the hill peak rises very sharply. The vehicle can readily negotiate such a condition, however, in doing so, when the front of the vehicle is driven to a point that the vehicle's balance moves rearward, a tip over can occur.

The same situation may apply if an embedded object causes the front of the vehicle to climb more than desired. If such a situation occurs take an alternate route. Be aware of side hilling dangers when doing so.

It is also wise to know the terrain condition on the other side of the hill or bank. All too often there exists a sharp drop-off that is impossible to negotiate or descend.

Downhill Driving

This vehicle can climb slopes that are steeper than it can safely descend. Therefore, it is essential to assure that a safe route exists to descend a slope before you climb it.

Decelerating while negotiating a slippery downhill slope could "toboggan" the vehicle. Maintain steady speed and/or accelerate slightly to regain control.

Side Hilling

Whenever possible, such operation should be avoided. If necessary, do so with extreme caution. Side hilling on steep inclines could result in rollover. In addition, slippery or loose surfaces could result in uncontrollable side sliding. Do not attempt to turn the vehicle downhill with the slide. Avoid all objects or depressions that will intensify the raising of one side of the vehicle higher than the other, thus causing rollover.

Drop-Offs

This vehicle will "bottom-out" and usually stop if either the front or rear wheels are driven over a drop-off. If the drop is sharp or deep, the vehicle will nose dive and tip over.

⚠ WARNING

Avoid negotiating drop-offs. Reverse and select an alternate route.

Riding on Snow Covered Surfaces

When performing the pre-ride inspection, pay special attention to locations on the vehicle where snow and/or ice accumulations may obstruct visibility of the taillight and reflectors, clog ventilation openings, block the radiator and fan, and interfere with the movement of control levers, switches and brake pedal. Before starting with your ATV check the steering, throttle and brake lever and pedal controls for interference free operation.

Whenever an ATV is ridden on a snow covered drive path the tire grip is generally reduced causing the vehicle to react differently to control inputs from the operator. On low grip surfaces, the steering responses are not as crisp and precise, stopping distances are lengthened and acceleration becomes sluggish. Slow down and do not "gun" the throttle. This will only result in spinning of the tires and possibly in an over steering slide of the vehicle. Avoid hard braking. This will possibly result in a straight line slide of the vehicle. Again, the best advice is to safely reduce speed in anticipation of a maneuver so to give yourself time and distance to regain total vehicle control before it spins out of your control.

As you drive your ATV over a loose snow covered surface, snow dust will be picked up in the wake turbulence of the moving vehicle and transported to contact and accumulate or melt on some exposed components including rotating parts like brake discs. Water, snow or ice may affect the response time of the brake system of your ATV. Even when not required to reduce vehicle speed apply brakes frequently to prevent ice or snow accumulation and to dry brake pads and discs. While doing so in low risk driving situations you will test for grip level and keep yourself alerted to how the vehicle reacts to your control inputs. Always keep brake pedal, footrests, floor boards, brake and throttle levers free of snow and ice. Frequently wipe snow off seat, hand grips, headlights, taillights and reflectors.

The depth of the snow cover may hide rocks, tree stumps or other objects and if it is wet may totally impede the drivability as the vehicle becomes bogged down or completely looses traction in slushy snow. Look far ahead and always be watchful of any visible clues that might indicate the presence of such obstacles. In doubt steer clear. Avoid driving on any frozen body of water before checking that the ice will safely support the ATV, its riders and its load of cargo. Remember that a given thickness of ice may be sufficient to support a snowmobile but not an ATV of an identical weight because of the smaller load bearing surface of the four tire contact patches as compared to that of a snowmobile track and skis.

To maximize comfort and avoid frostbite, always wear clothing and ATV protective equipment appropriate for the weather conditions you will be exposed to during your ride.

At the end of each ride it is a good practice to clean the vehicle body and all moving components (brakes, steering components, drivelines, controls, radiator fan etc.) from any snow or ice accumulations. Wet snow will turn to ice during the shut down period and become more difficult to remove at the next pre-ride inspection.

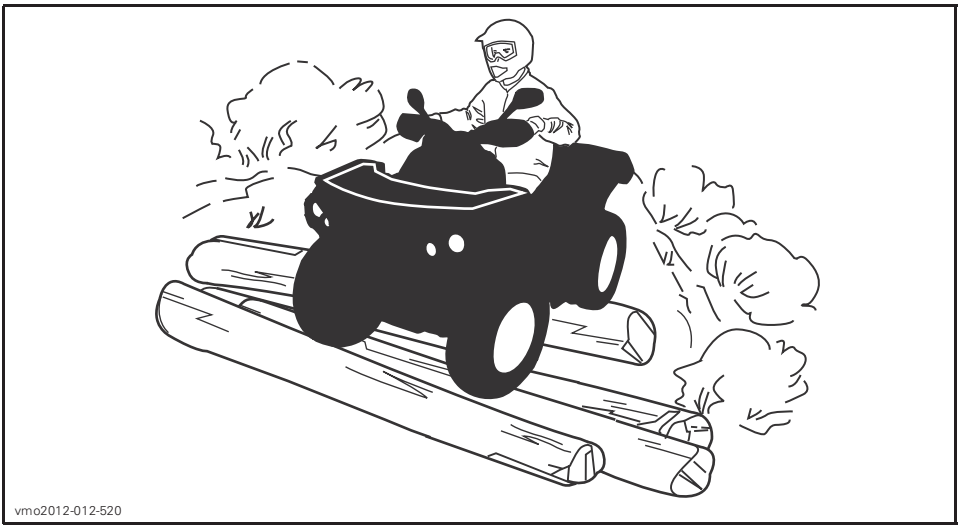
Riding Techniques

Riding your vehicle too fast for the conditions may result in injury. Apply only enough throttle to proceed safely. Statistics show that mishaps and injury usually result from high speed turns. Always remember that this vehicle is heavy! Its pure weight alone may entrap you should it fall and pin you down.

This vehicle is not designed for jumping, nor can it fully absorb the high impact energy generated during manoeuvres such as jumping which, can be passed on to you, the operator. Performing wheelies can cause the vehicle to flip over onto you. Both practices have a high risk for you and should be avoided at all times.

To maintain proper control it is strongly advised that you keep your hands on the handlebar and within easy reach of all controls. The same holds true for your feet. To minimize the possibility of a leg or foot injury, keep your feet on the footrests at all times. Do not direct your toes outwards nor extend your feet out to assist in turning as they can be hit or be snagged on passing obstacles, or may come into contact with the wheels.

Always use proper riding techniques to avoid vehicle overturns on hills and rough terrain and in turns.



Even though there is an adequate suspension system on this vehicle there are "washboard" or rough terrain conditions that will make you feel uncomfortable and can even cause a back injury. "Posting" or riding in a crouched position will often be required. Slow down and allow your flexed legs to absorb part of the impact energy.

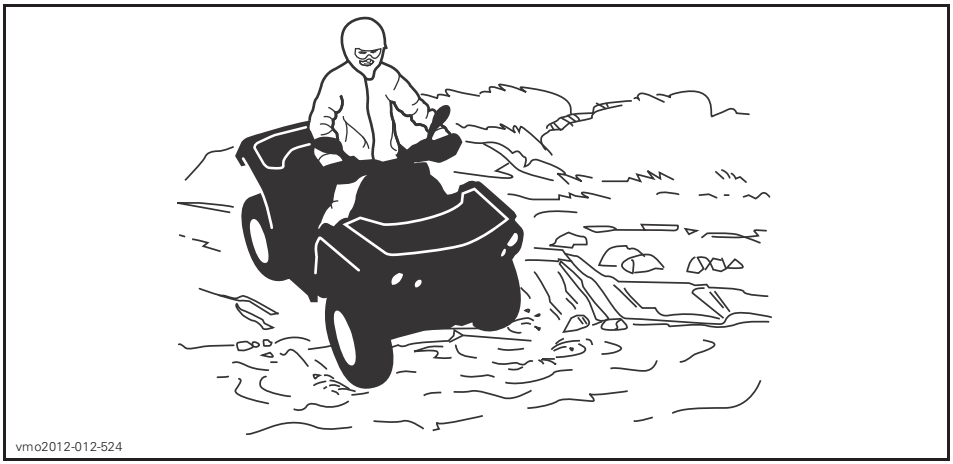
This vehicle is not designed for riding on roads or highways. (In most places it is an illegal practice). Riding your vehicle on roads or highways could cause a collision to occur with another vehicle.

The tires of this vehicle are not suited for paved road use. Also this vehicle is not equipped with a rear differential (rear wheels are always turning at the same speed). For these reasons, pavement may seriously affect the handling and control of the vehicle.

Riding on roads or soft shoulders may confuse other road users, especially if your lights are on.

If you have to cross a road, the lead driver should get off his vehicle, then observe and give directions to the other riders. The last person after crossing then assists the lead driver to cross. Do not travel on sidewalks. They are designated for pedestrian use.

Water can be a unique hazard. If it is too deep the vehicle may "float" and topple. Check the water depth and current before you attempt to cross any water. Water level should not go above the tires. Be wary of slippery surfaces such as rocks, grass, logs, etc., both in the water and on its banks. A loss of traction may occur. Do not attempt to enter the water at high speed. The water will act as a brake and could throw you off the vehicle, on the ground.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Water will affect the braking ability of your vehicle. Make sure you dry the brakes by applying them several times after the vehicle leaves the water.

Mud or marsh lands may be encountered near water. Be prepared for sudden "holes" or changes in depth. Similarly so, be watchful of hazards such as rocks, logs, etc., partially covered by vegetation.

If your route crosses frozen waterways, make sure the ice is thick enough and sound enough to support the total weight of yourself, the vehicle and its load. Be ever watchful of open water, it is a sure indication that the ice thickness will vary. If in doubt, do not attempt to cross.

Ice will also affect the control of the vehicle. Slow down and do not "gun" the throttle. This will only result in spinning of the tires and possible tip over of the vehicle. Avoid rapid braking. This again will possibly result in an uncontrolled slide and tip over of the vehicle. Slush should be avoided at all times since it could block the operation or controls of the vehicle.

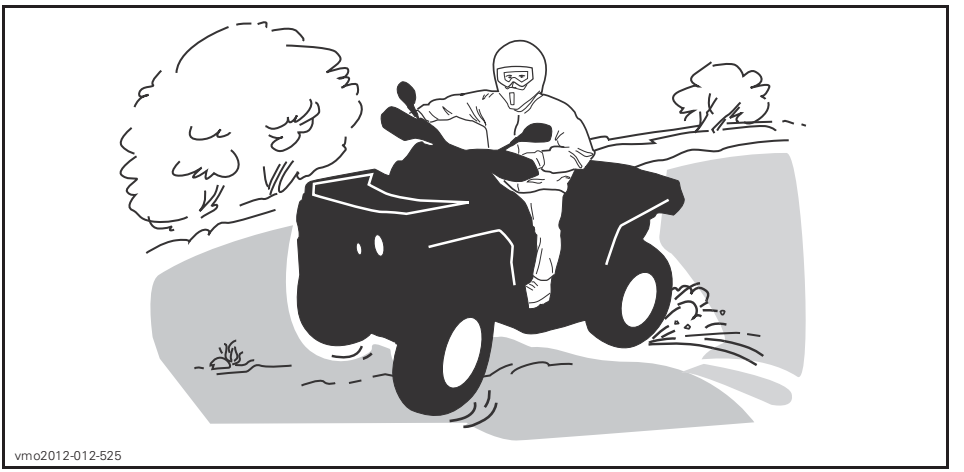
Riding in snow may reduce the brakes stopping capability. Safely reduce speed and allow greater distance for braking. Snow projection may cause ice build up or snow accumulation on brake components and controls. Apply brakes frequently

to prevent ice or snow accumulation. Refer to *GENERAL OPERATING AND SAFETY PRECAUTIONS* in this section for more detailed information regarding riding on snow covered surfaces.

Riding on sand, sand dunes or on snow is another unique experience, but there are some basic precautions that should be observed. Wet, deep or fine sand/snow may create a loss of traction and cause the vehicle to slide, drop off or become "bogged" down. If this occurs look for a firmer base. Again, the best advice is to slow down and be watchful of the conditions.

When riding in sand dunes it is advisable to equip the vehicle with an antenna type safety flag. This will help make your location more visible to others over the next sand dune. Proceed carefully should you see another safety flag ahead. Since the antenna type safety flag can snag and rebound on your body if caught, do not use it in areas where there are low hanging branches or obstacles.

Riding on loose stones or gravel is very similar to riding on ice. They will affect the steering of vehicle, possibly causing it to slide and tip over especially at high speeds. In addition, braking distance may be affected. Remember that "gunning" the throttle or sliding may cause loose stones to be ejected rearwards into the path of another rider. Never do it deliberately.



If you do get into a slide or skid, it may help to turn the handlebar in the direction of the skid until you regain control. Never jam the brakes and lock the wheels.

Respect and follow all posted trail signs. They are there to help you and others.

Obstacles in the "trail" should be traversed with caution. This includes loose rocks, fallen trees, slippery surfaces, fences, posts, and embankments and depressions. You should avoid them whenever possible. Remember that some obstacles are too large or dangerous to cross and should be avoided. Small rocks or fallen trees may be safely crossed, approach at a 90° angle. Stand on the footrests while keeping your knees flexed. Adjust speed without losing momentum and do not "gun" the throttle. Hold handlebar firmly. Place your body weight rearwards and proceed. Do not try to lift the vehicle front wheels off the ground. Be aware that the object may be slippery or may move while crossing.

When driving on hills or slopes two things are highly important. Be prepared for slippery surfaces or terrain variations and obstacles and use proper body positioning.

When stopped or parked always apply the parking device. This is especially important when parking on a slope. On very steep inclines or if the ATV is carrying cargo, the wheels should be blocked using rocks or bricks.

Uphill

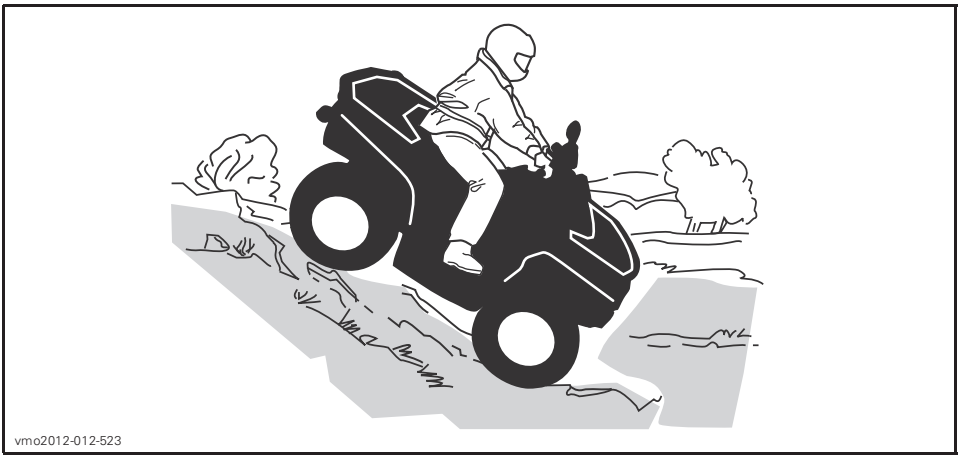
Before trying to climb a hill, keep these things in mind. Hill Climbing should only be attempted by experienced operators. Start on shallow slopes. Always drive straight uphill and keep your body weight forward towards the top of the hill. Keep your feet on the footrests, shift your ATV into a lower gear and accelerate before you start to climb. Try to keep a steady speed and go easy on the throttle to avoid acceleration. Abrupt slope or terrain variation or rolling one wheel over an obstacle could have a big impact on the stability as it will lift the front of the vehicle increasing the risk of tipping over. Some hills are too steep to safely stop or recover from after an unsuccessful climbing attempt. Try to avoid steep inclines. If you're not careful, you could tip over when going up hills. If the hill is too steep and you cannot proceed or the vehicle begins to roll backwards, apply the brake, being careful not to slide, put the parking brake. Dismount on the left side then use the "K" turn (while walking back, next to the vehicle on the up hill side and with a hand on the brake lever, slowly back the rear of the vehicle toward the top of the hill then drive downhill). Always walk or dismount on the upside of the slope while keeping clear of the vehicle and its rotating wheels. Do not try to hold on to the vehicle if it begins to topple. Stay clear. Do not ride over the crest of the hill at high speed. Obstacles, including sharp drop-offs, may exist.

vmo2012-012-526

Downhill

Keep your body weight rearwards. Stay seated. Apply the brake gradually to prevent skidding. Do not "coast" down the slope using solely engine compression or in neutral gear.

Decelerating while negotiating a slippery downhill slope could "toboggan" the vehicle. Maintain steady speed and/or accelerate slightly to regain control. Try to avoid steep inclines. If you're not careful, you could tip over when going down hills.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Side Hilling

This is one of the **most risky** types of riding since it may drastically change the balance of the vehicle. It should be avoided wherever possible. However, if it is necessary to do so , it is important that you ALWAYS keep your body weight on the upside of the slope and be prepared to dismount on that side should the vehicle begin to topple.

⚠ WARNING

Do not try to stop or save the vehicle from damage.

⚠ WARNING

Be careful when loading and transporting liquid reservoirs. They can affect vehicle stability when side hilling by pulling downhill and increasing the risk of a roll over.

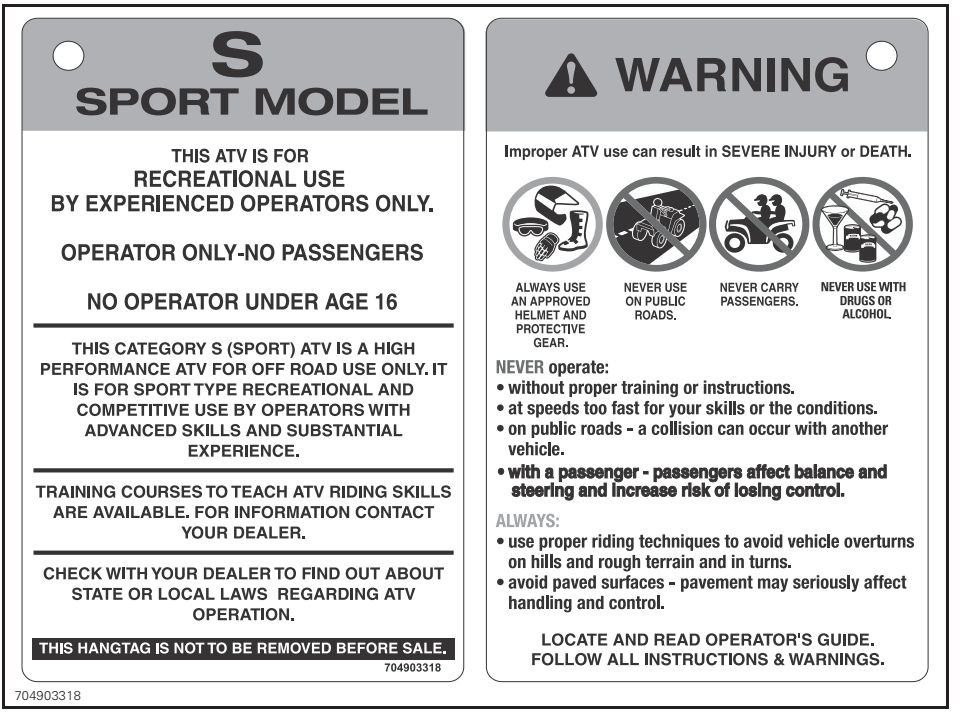
vmo2012-012-527

IMPORTANT ON-PRODUCT LABELS (CANADA/UNITED STATES)

Canada/United States

Hang Tag

This vehicle comes with a hang tag and labels containing important safety and emission informations.



TYPICAL

TYPICAL

⚠ **WARNING**. Operating, servicing and maintaining an off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle.

For more information go to www.P65Warnings.ca.gov/products/passenger-vehicle

704906872

EN-704906872-DEC

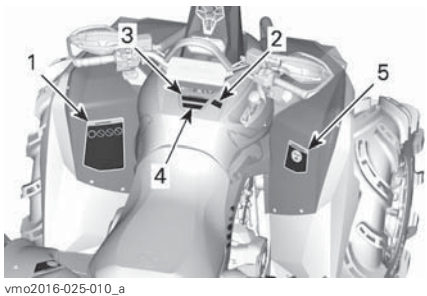
Vehicle Safety Labels

Read and understand all the safety labels on your vehicle.

These labels are affixed to the vehicle for the safety of the operator or bystanders.

The safety labels on your vehicle should be considered permanent parts of the vehicle. If missing or damaged, they can be replaced free of charge. See an authorized Can-Am dealer.

NOTE: In the event of any discrepancy between this guide and the vehicle, the safety labels on the vehicle have precedence over the labels in this guide.



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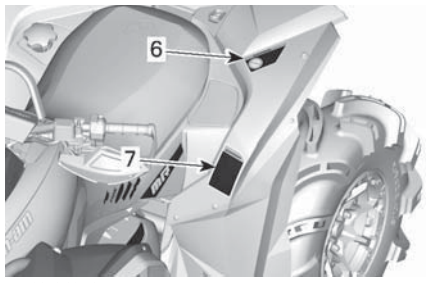

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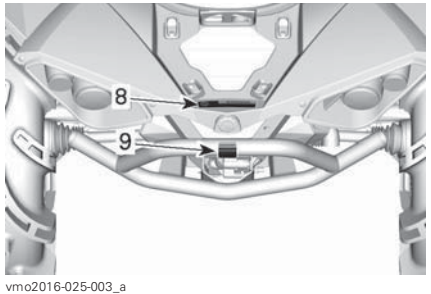

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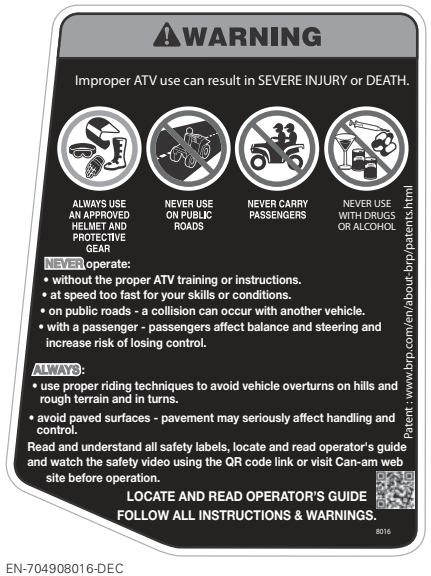

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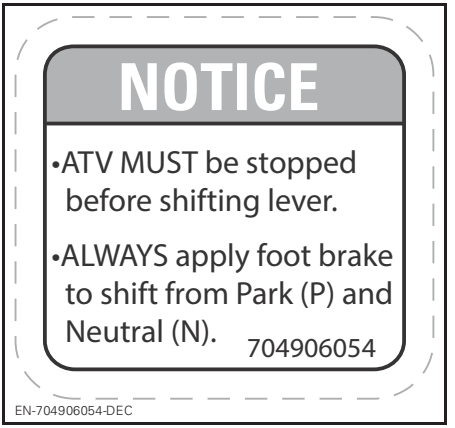

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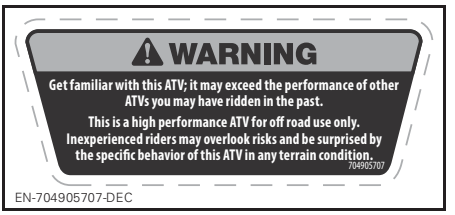

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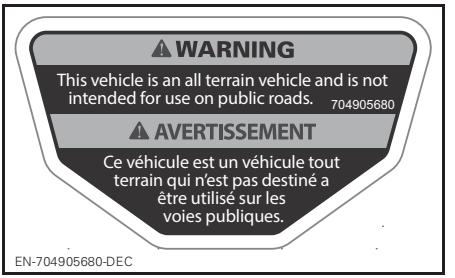

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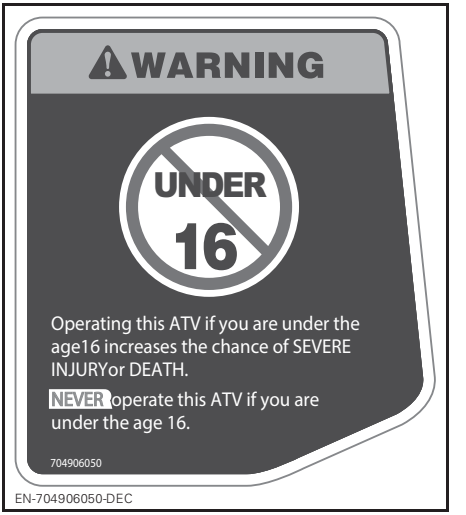
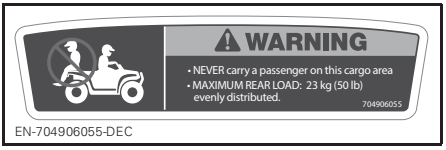


LABEL 5

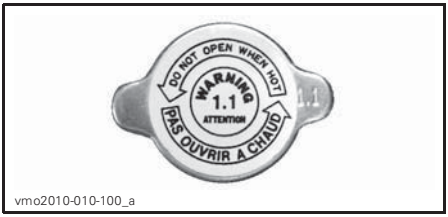
LABEL 6

LABEL 7 (REFER TO SPECIFICATIONS FOR VALUES)



LABEL 8

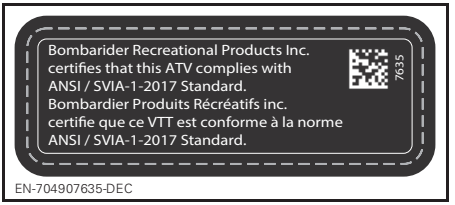
LABEL 9

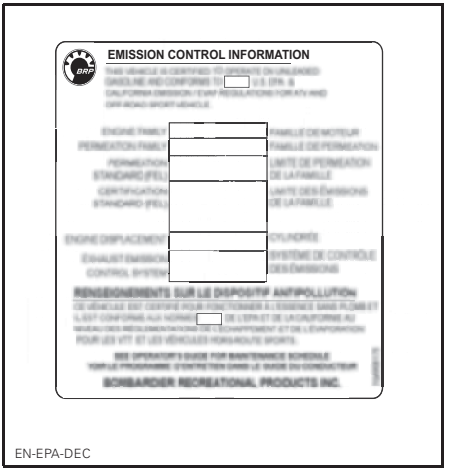


LABEL 10

LABEL 11 - LOCATED ON COOLANT RESERVOIR

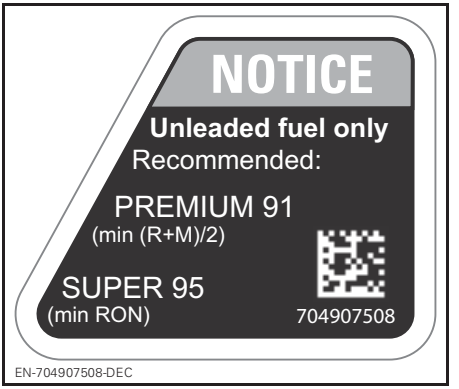
Compliance Labels



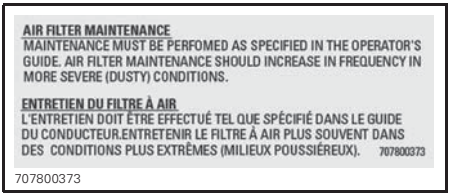


TYPICAL - UNDER SEAT APPLICABLE WHEN EQUIVALENT TO A MODEL CERTIFIED TO US EPA STANDARDS

Technical Information Labels



LOCATED NEAR GAS CAP OF 1000R ENGINES



UNDER SEAT

IMPORTANT ON-PRODUCT LABELS (ALL COUNTRIES EXCEPT CANADA/UNITED STATES)

All Countries Except Canada/United States

Vehicle Safety Labels

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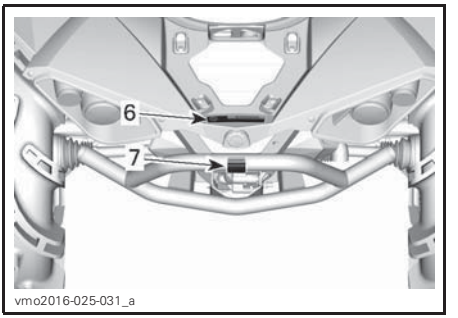

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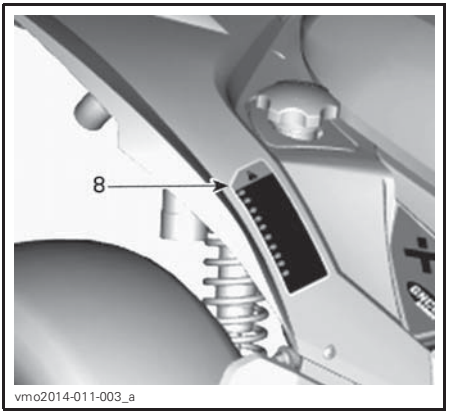

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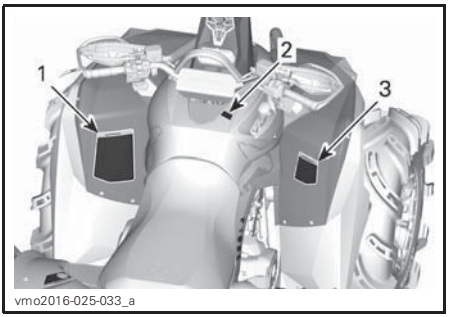

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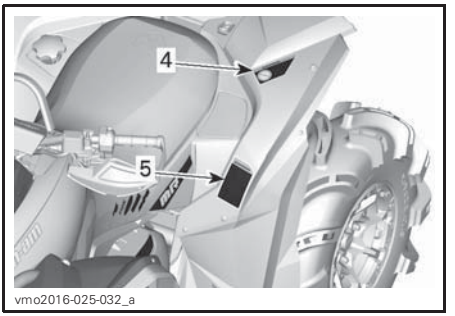

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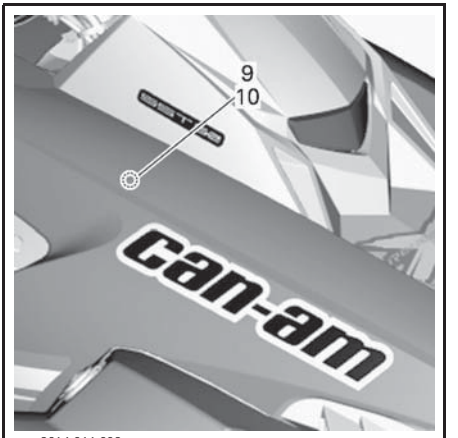

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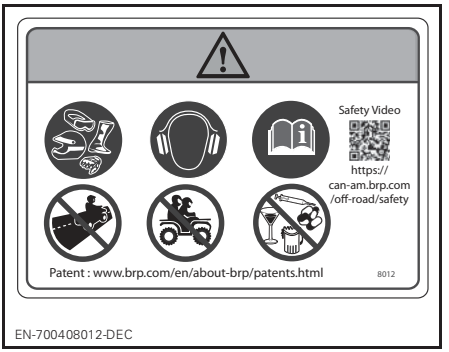
Label 1

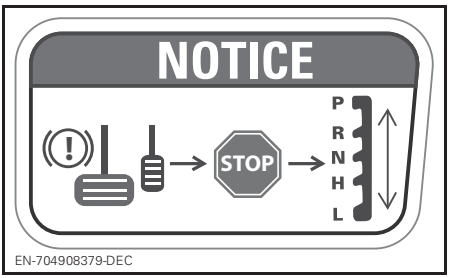
⚠ WARNING

- Locate and read operator's guide. Improper ATV use can result in SEVERE INJURY or DEATH. Follow all instructions and warnings.
- Always wear ear protection.
- Always use an approved helmet and protective gear.
- Never use on public roads.
- Never carry a passenger.
- Never use with drugs or alcohol.



LABEL 1

Label 2

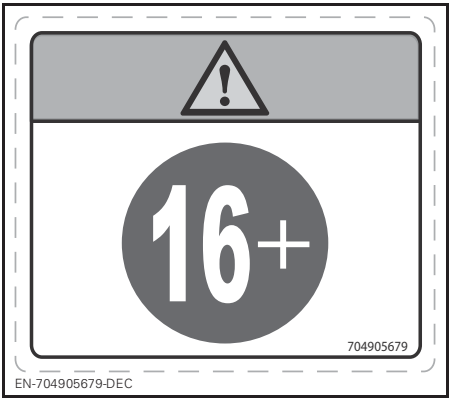


LABEL 2

Label 3

⚠ WARNING

Operating this ATV if you are under the age of 16 increases the chance of SEVERE INJURY or DEATH to the operator. NEVER operate this ATV if you are under age 16.

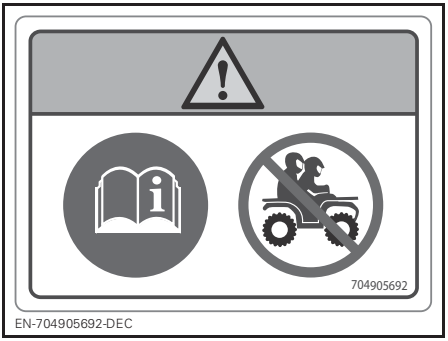


LABEL 3

Label 4

⚠ WARNING

- Locate and read operator's guide.
- NEVER carry a passenger.

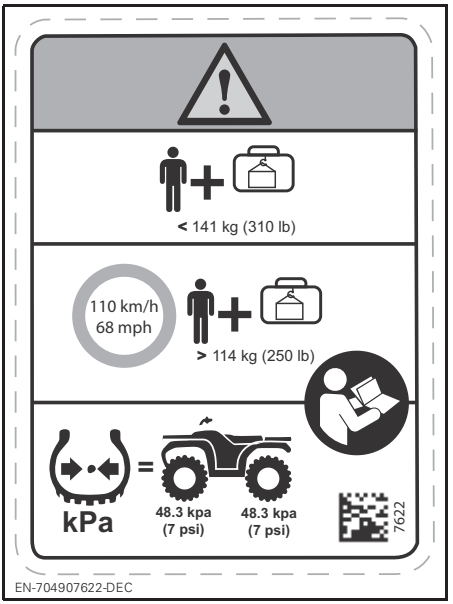


LABEL 4

Label 5

⚠ WARNING

- Locate and read operator's guide. Improper tire pressure and overloading can cause loss of control, resulting in SEVERE INJURY or DEATH.
- ALWAYS maintain proper tire pressure as shown.
- NEVER exceed the load capacity of 141 kg (310 lb) including weight of operator, cargo, and accessories (and including trailer tongue weight if applicable).
- NEVER exceed 110 km/h (68 MPH) when the total load (141 kg (310 lb)) is reached.

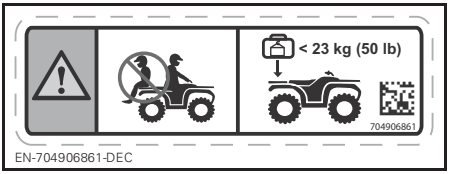


LABEL 5 (REFER TO SPECIFICATIONS FOR VALUES)

Label 6

⚠ WARNING

- NEVER carry a passenger on this carrier.
- MAXIMUM REAR LOAD: 23 kg (50 lb) evenly distributed (including trailer tongue weight if applicable).

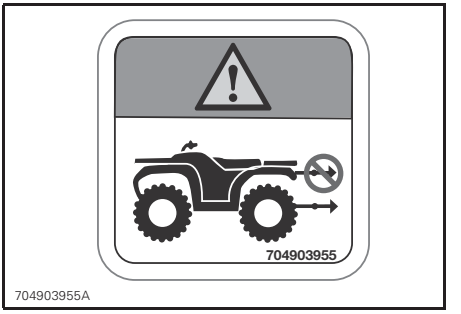


LABEL 6

Label 7

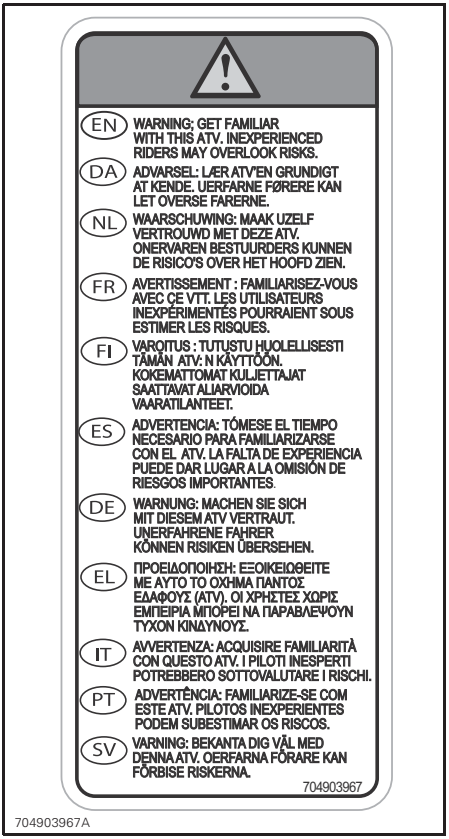
⚠ WARNING

NEVER attach here or on the luggage rack to pull a load This can cause the vehicle to tip over. ALWAYS use the trailer hitch (if applicable) or the recovery hook to pull a load.



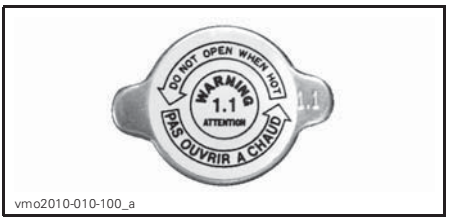
LABEL 7

Label 8



LABEL 8

Label 9



LABEL 9

Label 10

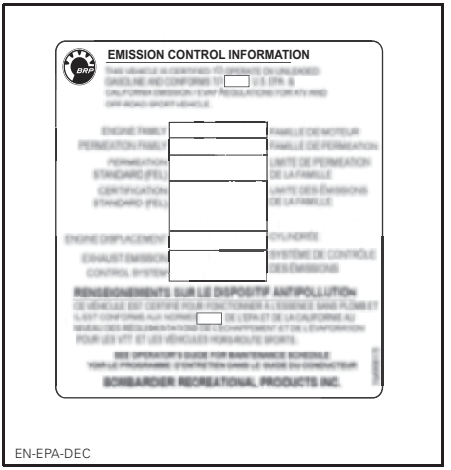
⚠ WARNING

Do not open when hot.

LABEL 10

Compliance Labels

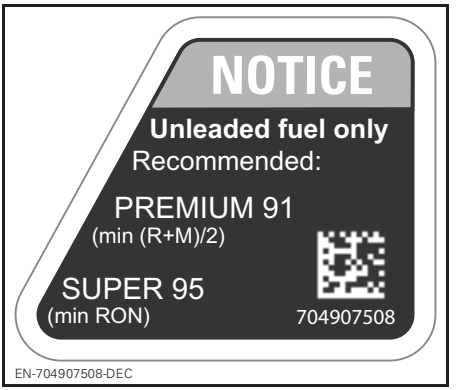
These labels indicate vehicle's compliance.



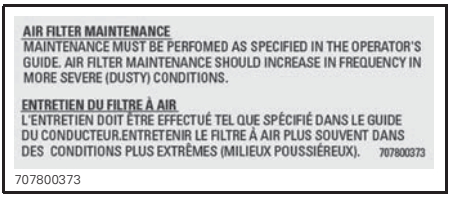
TYPICAL: WHEN APPLICABLE - UNDER SEAT

NEAR GAS CAP

Technical Information Labels



LOCATED NEAR GAS CAP OF 1000R ENGINES



UNDER SEAT

REPORTING SAFETY DEFECTS

In Canada, if you believe that your vehicle has a defect which could cause a crash or could cause injury or death, you should immediately inform Transport Canada in addition to notifying Bombardier Recreational Products Inc.

If Transport Canada receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, Transport Canada cannot become involved in any individual problems between you, your dealer or Bombardier Recreational Products Inc.

TO CONTACT TRANSPORT CANADA:

819-994-3328 (Gatineau-Ottawa area or internationally)
Toll free : 1 800-333-0510 (in Canada)

Transport Canada - ASFAD
330 Sparks Street
Ottawa, ON
K1A 0N5

https://www.tc.gc.ca/recalls

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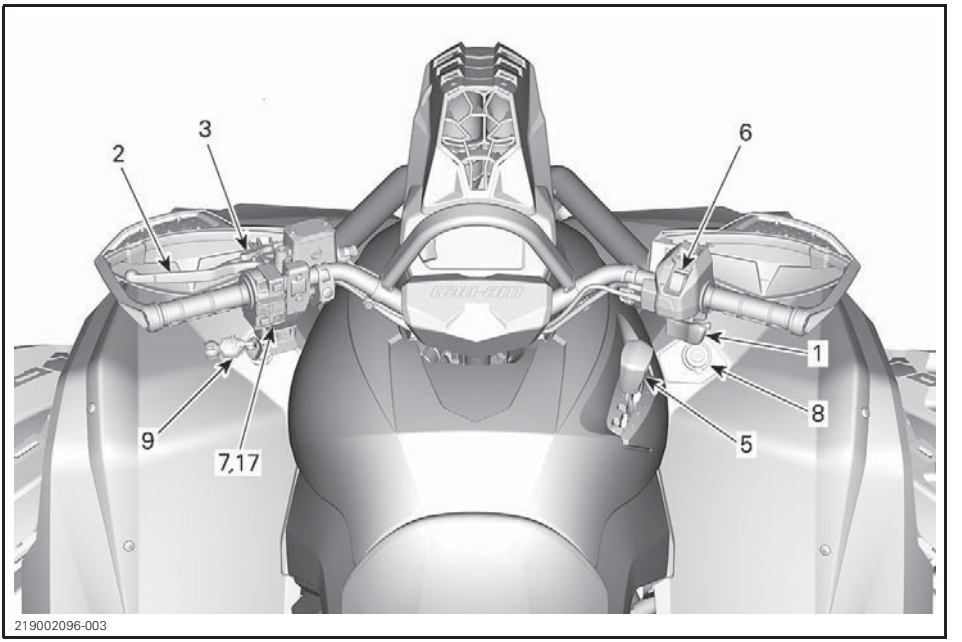
VEHICLE INFORMATION

CONTROLS/INSTRUMENTS/EQUIPMENT

NOTE: Some controls/instruments/equipment are optional.



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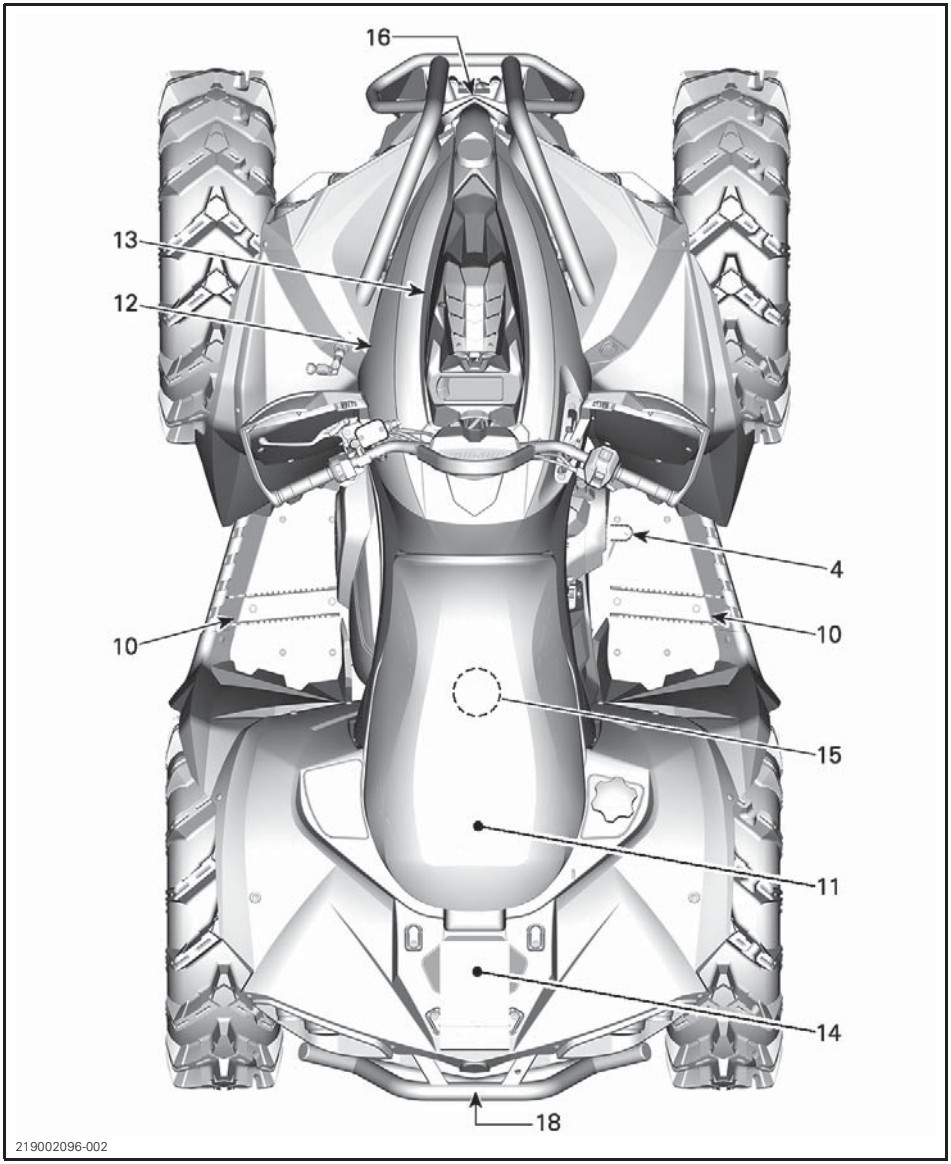
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13
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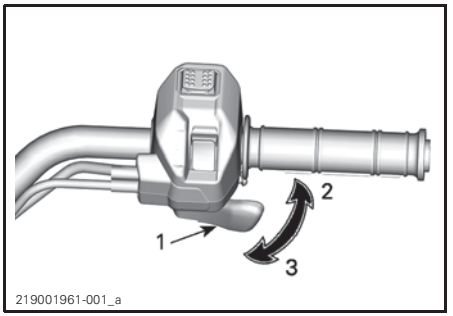
219002096-002

1) Throttle Lever

The throttle lever is located on the RH side of the handlebar.

When pushed forward, it increases the engine speed and allows engagement of the transmission on the selected range.

When released, the engine speed should automatically return to idle and the vehicle will gradually slow down.



TYPICAL
1. *Throttle lever*
2. *To accelerate*
3. *To decelerate*

2) LH Brake Lever

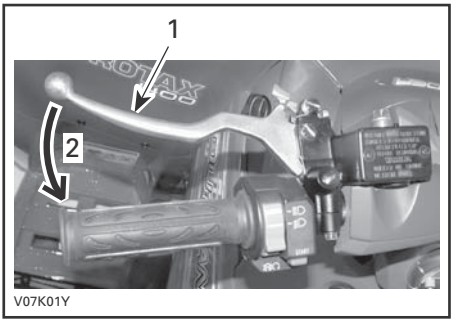
The LH brake lever function is to slow down or stop the vehicle.

When the brake lever is compressed, the front and rear brakes are applied.

When released the brake lever should automatically return to its original position.

Braking effect is proportional to the force applied on the lever.

NOTE: As on other wheeled vehicles, the vehicle weight is transferred to the front wheels when braking. To obtain greater stopping efficiency, the brake system distributes more braking force to the front wheels. This will affect vehicle handling and steering control when braking vigorously. Take it into account when braking.



TYPICAL
1. *Brake lever*
2. *To apply brakes*

3) Parking Brake Lever

The parking brake lever is located on the LH side of the handlebar.

The parking brake function is to maintain brake to all wheels to prevent vehicle from moving when parked.

⚠ WARNING

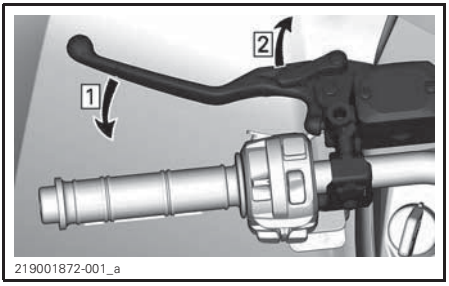
Always use the parking brake and engage the PARK position on the shift lever when the vehicle is not in operation.

To engage the parking brake proceed as shown:

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.



Step 1: Apply brakes
Step 2: Lock brakes

NOTE: The parking brake lever can be set in different positions to compensate for the brake lever stroke.

⚠ WARNING

Ensure when the parking brake is applied that the vehicle stays securely in place.

To release the parking brake, simply squeeze the brake lever. It should return to the rest position.

⚠ WARNING

Make sure parking brake is fully disengaged before operating the vehicle. When you ride the vehicle, brakes that are caused to drag by a continuous pressure on the lever may cause damage to the brake system and cause loss of braking capacity and/or fire.

4) Brake Pedal

The brake pedal is located on the RH side of the vehicle near engine.

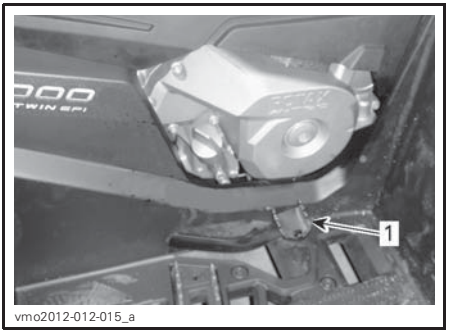
When the brake pedal is pressed down, the rear brakes are applied.

When released, the brake pedal should return to its original position.

Braking effect is proportional to the force applied on the pedal.

NOTE: The brake will have also an effect on front wheels through the drive train when 4WD is engaged.

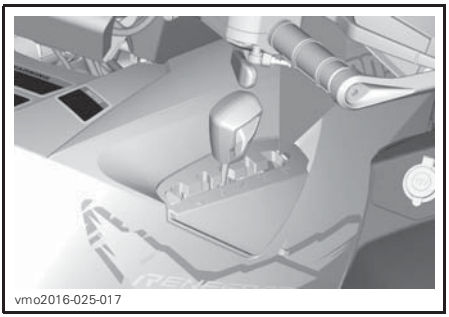
The brake pedal applies the rear brake only. Should the brake lever system fail, the rear brake can be activated by depressing the brake pedal.



1. Brake pedal

5) Shift Lever

The shift lever is located on the RH side of the vehicle near steering column.



SHIFT LEVER LOCATION

The shift lever is used to change the gearbox position.

The shift lever has 5 positions:

SHIFT LEVER POSITIONS	
POSITION	GEAR
P	Park
R	Reverse
N	Neutral
H	High range (forward)
L	Low range (forward)

SHIFT PATTERN

The vehicle must be stopped and brakes applied prior to selecting any gear.

NOTICE **This gearbox is not designed to shift while vehicle is moving.**

P: Park

The park position locks the gearbox to help prevent vehicle movement.

⚠ WARNING

Always use the PARK (P) position when the vehicle is not in operation. The vehicle can roll if the shift lever is not set to P (PARK).

R: Reverse

The reverse position allows the vehicle to go backwards.

NOTE: In reverse operation, the engine's RPM is limited, thus limiting the vehicle reverse speed.

⚠ WARNING

When driving downhill in reverse, gravity can increase the vehicle speed above the set limited reverse speed.

Neutral

The neutral position disengages the gearbox.

⚠ WARNING

Always use the PARK (P) position when the vehicle is not in operation. The vehicle can roll if the shift lever is set to N (NEUTRAL).

High Range (Forward)

This position selects the high speed range of the gearbox. It is the normal driving speed range. It allows the vehicle to reach its maximum speed.

Low Range (Forward)

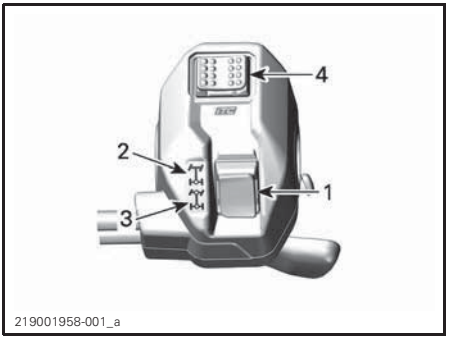
This position selects the low speed range of the gearbox. It allows the vehicle to move slowly with maximum torque at the wheels.

NOTICE **Use the low speed range to pull a trailer, carry heavy cargo, go over obstacles or drive uphill and downhill.**

6) 2WD/4WD and Driving Modes (if equipped) Selector Switch

The 2WD/4WD and Driving Modes selector switch is located on the RH side of the handlebar.

This switch is used to select the 2WD or 4WD modes.



TYPICAL
1. *2WD/4WD Selector*
2. *2WD position*
3. *4WD position*
4. *Driving modes selector*

Bring the vehicle to a complete stop with the engine idling before changing between 2WD and 4WD modes or the opposite.

NOTICE **Mechanical damage may occur if the 2WD/4WD selector switch is used while vehicle is moving. The vehicle must be stopped when changing between 2WD and 4WD**

To engage the 4WD mode, press the switch down.

TYPICAL - 4WD MODE

To engage the 2WD mode, press the switch up.

TYPICAL - 2WD MODE

This switch is used to select the driving modes. (If equipped)

1. Driving modes selector

Choose between SPORT and ECO modes by pushing the selector on the left or right.

The SPORT mode provides a crisper throttle response. Press LEFT to activate, RIGHT to deactivate.

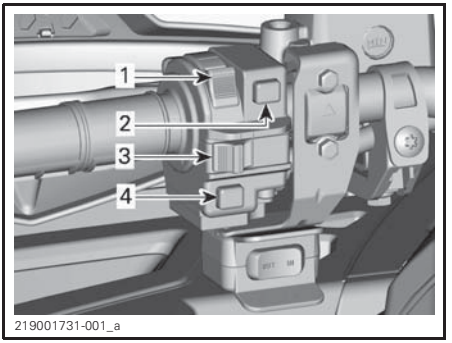
NOTE: The SPORT mode can be activated with all key types and provides the maximum power with the used key.

The ECO mode provides a smoother throttle response and is limited to a maximum speed of 70 km/h (43 MPH). Press LEFT to activate, RIGHT to deactivate.

7) Multifunction Switch

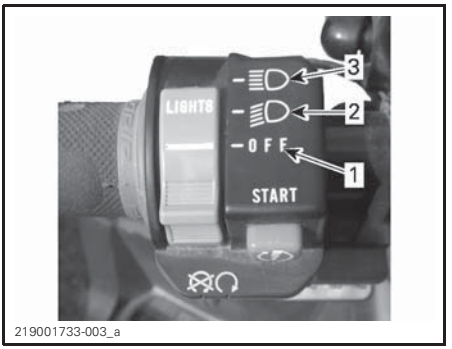
The multifunction switch is located on the LH side of the handlebar.

The controls located on this multifunction switch are:



TYPICAL — MULTIFUNCTION SWITCH
1. *Headlight switch*
2. *Engine start button*
3. *Engine stop switch*
4. *Override/DPS button*

Headlight Switch



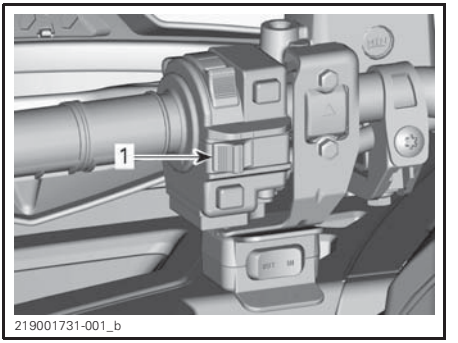
HEADLIGHT SWITCH FUNCTIONS
1. *Lights OFF*
2. *Low beam and taillight*
3. *High beam and taillight*

Engine Stop Switch

This switch can be used to stop the engine and as an emergency control.

To stop engine, fully release throttle lever then set the engine stop switch to the STOP position.

NOTE: While the engine can be stopped by removing D.E.S.S. key from D.E.S.S. post, we recommend the engine be stopped by setting the engine stop switch to the STOP position.

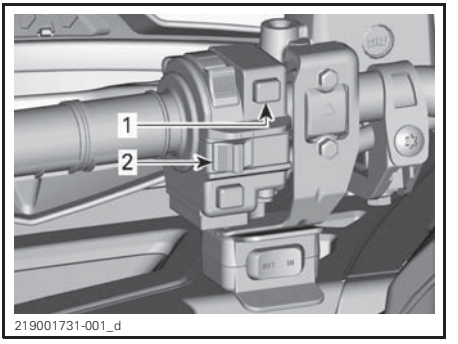


TYPICAL
1. *Engine stop switch*

Engine Start Button

To start engine, place the engine stop switch to RUN.

Press and hold the engine start button. Release immediately after engine is started.

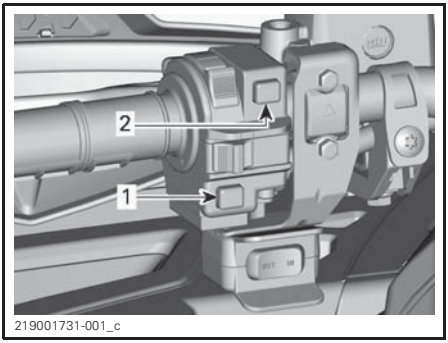


TYPICAL
1. *Engine start button*
2. *Engine stop switch*

NOTE: The engine will not turn over if the engine stop switch is turned to the OFF position.

Override/DPS Button

This button has 2 functions.



TYPICAL
1. *Override/DPS button*
2. *Engine start button*

Override Function

The override switch main function is to bypass the engine speed limiter in reverse operation by allowing maximum engine torque.

⚠ WARNING

Use the "override" mode only if the vehicle is caught in mud or other soft terrain and the "low range" is not enough. Make sure the area is secure before using the "override" mode. Do not use the "override" mode when driving normally in reverse, this would result in excessive speed.

To engage the override function, proceed as follows:

While the shift lever is set to REVERSE position.

1. Ensure that the vehicle is stopped.
2. Press and hold the override/DPS button then press the throttle lever gradually.

NOTE: When using the override function, the gauge will scroll an OVERRIDE message to confirm that the function is activated.

3. To disengage the override function, simply release the override/DPS button.

DPS Function

This button is also used to change the DPS (Dynamic Power Steering) mode.

For complete information on DPS modes, refer to *TUNE YOUR RIDE*.

8) 12-Volt Power Outlet

Convenient for handheld spotlight or other portable equipment.

Remove protective cap to use. Always reinstall it after use to protect against weather.

9) Keys

D.E.S.S. Key

Digitally Encoded Security System (D.E.S.S.)

The ignition keys contain an electronic circuit that gives it a unique electronic serial number.

The D.E.S.S. system reads the key code and allows engine starting for keys it recognizes.

This vehicle can be operated using 2 different types of key programming:

– Normal
– Performance

Refer to your dealer for complete information.

The vehicle is delivered with 1 performance key.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

NOTE: Additional keys are available from your dealer as an accessory.

⚠ WARNING

Rollovers, tipovers, collisions and loss of control resulting in serious injury or death are possible with the performance or normal key. Using the normal key is not a substitute for the operator being prepared, qualified, and operating with care.

Performance Key

The performance key allows the user to access the full torque of the engine as well as the top speed of the vehicle.

This may be useful for riders who prefer crisper throttle response, and for environments where higher speeds and greater acceleration are appropriate. For example, in wide-open straight trails, operators may prefer the performance key.

Normal Key

The normal key limits the vehicle rate of acceleration and/or the vehicle speed to 70 km/h (43 MPH).

⚠ WARNING

On steep downhills, the engine speed limiter may not prevent the vehicle from accelerating beyond this speed.

This key may be useful for riders who prefer more gradual acceleration, or for riding in environments where full speed and high acceleration are not desirable. For example, in narrow, winding trails, operators may prefer a normal key.

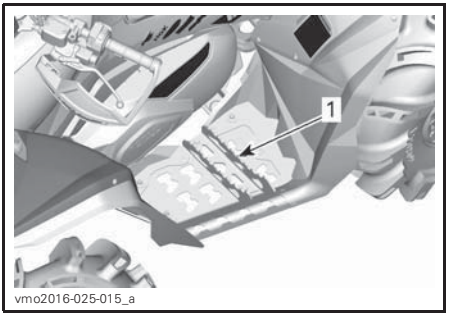
D.E.S.S. Flexibility

The D.E.S.S. of your vehicle can be programmed by your authorized Can-Am dealer to accept up to 8 different keys.

If you have more than one D.E.S.S. equipped Can-Am vehicle, each can be programmed by your authorized Can-Am dealer to accept the other vehicle D.E.S.S. keys.

10) Footpegs

The footpegs are located on the RH and LH .



TYPICAL
1. RH footpeg

⚠ WARNING

Operator must have both feet on footpegs at all times during vehicle operation.

11) Seat

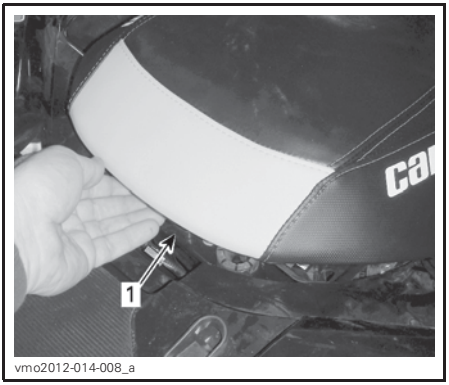
The seat is designed for an operator only.

⚠ WARNING

Never allow anyone to sit as a passenger on this vehicle.

Seat Removal

To remove the seat, pull its latch forward. This latch is located underneath the rear of seat.



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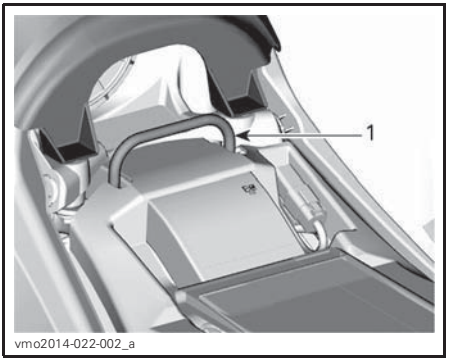
1. Seat latch

Pull seat rearward. Continue lifting movement until you can release the front retaining device under the seat from the retaining bar, then completely remove seat.



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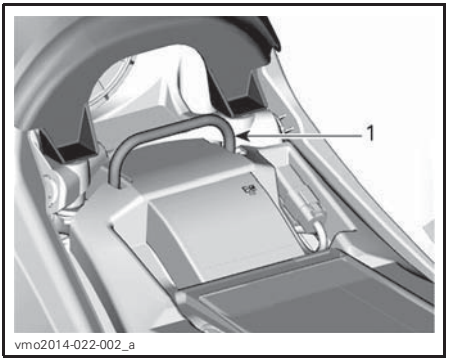
1. Retaining bar

Seat Installation

Position front end of seat so that the front retaining device under the seat engages with the retaining bar. When seat rests in its position, firmly push seat down to latch.



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1. Retaining bar

NOTE: A distinctive snap will be felt. Double check that the seat is secure by giving it a tug to confirm proper latching.

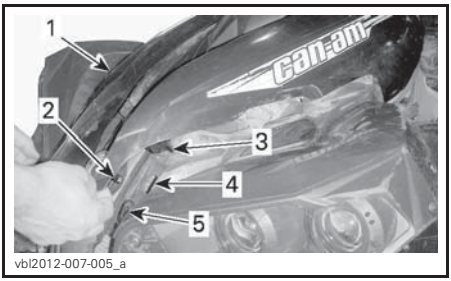
⚠ WARNING

Verify the operator's seat is properly locked in position by pulling back and up several times.

12) Console

Console Removal

1. See procedures in this section and remove the seat.
2. At front of console, pull both lugs out of their grommets.
3. Pull both hooks out of their slots.



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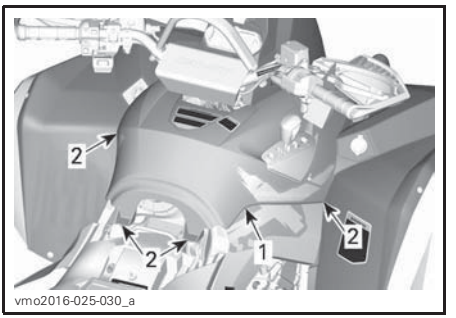
1. Console
2. Lug
3. Hook
4. Slot
5. Grommet

4. Pull the rear of console up to release the lugs from the grommets.



1. *Rear of console*
2. *Lugs*

5. Remove console by pulling it rearwards.

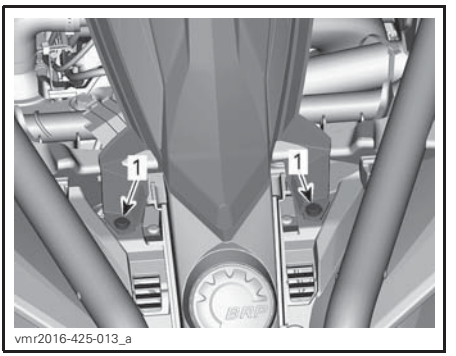
Console Installation

Reverse the removal procedure

13) Snorkel Cover

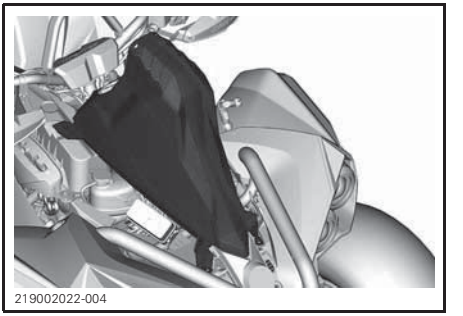
Snorkel Cover Removal

1. See procedures in this section and remove:
   – Seat
   – Console
2. At front, remove the plastic rivets.



1. *Plastic rivets*

3. Pull the rear of snorkel cover up to release the lugs from the grommets.



4. Disconnect the gauge connector.

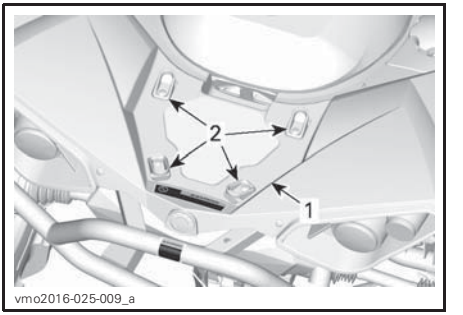
Snorkel Cover Installation

Reverse the removal procedure

14) Rear Cargo Area

Rear cargo area is convenient for carrying small articles.

Secure cargo using the eyelets.



1. *Cargo area*
2. *Plastic eyelets*

⚠ WARNING

Do not exceed the load capacity. Refer to *SPECIFICATIONS*

⚠ WARNING

- Never carry a passenger on the rear cargo area.
- Cargo must never interfere with the driver's line of sight or reduce his ability to steer the vehicle.
- Cargo must be secured and should not protrude the cargo area.

15) Tool kit

The tool kit is located under the seat. It contains tools for basic maintenance.

16) Winch (If Equipped)

The winch can be actuated using the winch control switch or with the remote control (sold separately).

NOTE: Using the winch intensively over a long period of time may discharge the battery.

The following tips will help to reduce the risk of discharging the battery:

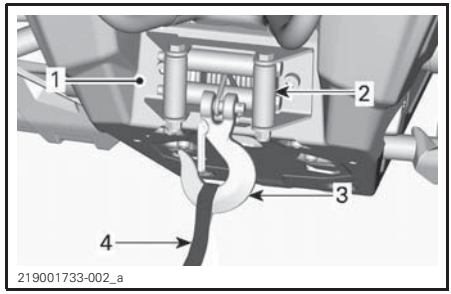
Unwind manually: Unlock the cable using the handle then pull on the hook strap to unreel.

It is recommended to let the engine run while winching or rewinding. Do not stop the engine immediately after winching to let battery recharge.

Also, when winching for more than 30 seconds, it is recommended to increase engine RPM in the range of 3000 RPM to increase charging power to the battery.

NOTE: Make sure vehicle is in NEUTRAL (N) before increasing engine RPM.

A roller fairlead is installed to prevent damage to the vehicle and to guide the wire rope into the winch.



TYPICAL
1. *Winch*
2. *Roller fairlead*
3. *Winch hook*
4. *Hook strap*

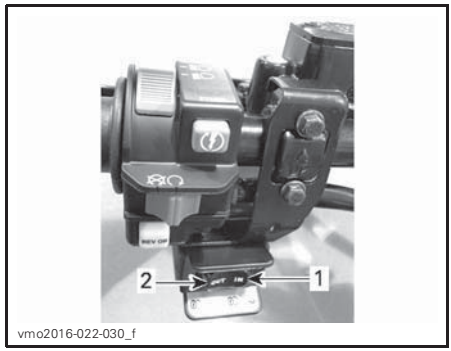
Refer to the *WINCHING GUIDE*, supplied with the vehicle, for more information about the winch.

17) Winch Control Switch (If Equipped)

Use this switch to unwind or rewind the rope.

To unwind the rope, press the left side of switch.

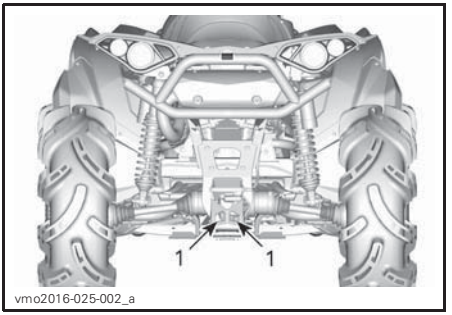
To rewind the rope, press the right side of switch.



TYPICAL
1. *In*
2. *Out*

18) Recovery Hook

Convenient hook that can be used to recover a stuck ATV.

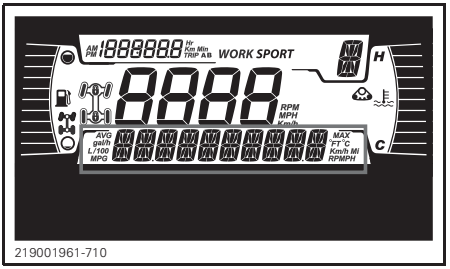


TYPICAL
1. Recovery hook

4.5" DIGITAL DISPLAY

Multifunction Display

Lower Display



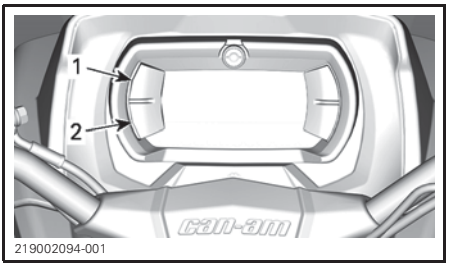
219001961-710

May display the following:
- RPM
- Speed
- Engine Temperature
- Battery Voltage
- Settings
- Messages

Use LOWER (MENU) button to change the displayed information.

The SPEED display shows the Maximum and the averaged speed. Hold LOWER (MENU) button for 1 second to reset (1000R models).

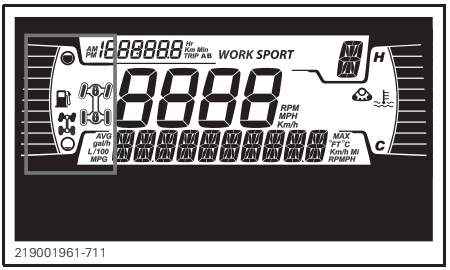
NOTE: Hold LOWER (MENU) button for 1 second to change DPS mode (570 models).



219002094-001

1. Upper button
2. Lower button

Left Lateral Display

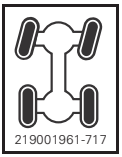


219001961-711

The left lateral display includes:
- Fuel level indicator
- 2X4 / 4X4 telltale

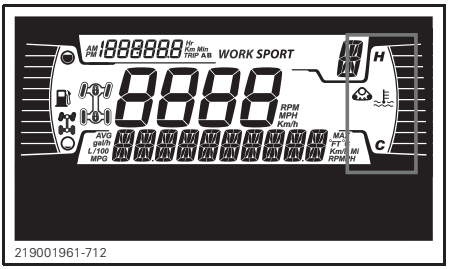
219001961-718

4X4 ICON FOR EUROPEAN COMMUNITY


219001961-717

4X4 ICON FOR ALL OTHER COUNTRIES

Right Lateral Display

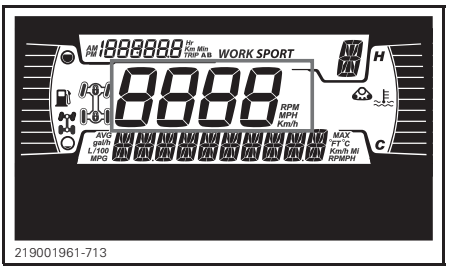


219001961-712

The right lateral display includes:
- Engine Temperature
- Track Kit active

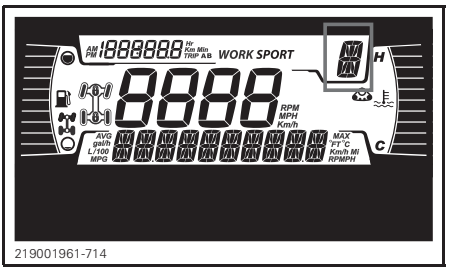
When a track kit is installed, a message will scroll in the lower display.

Central Display



Display the vehicle speed in Km/h or MPH.

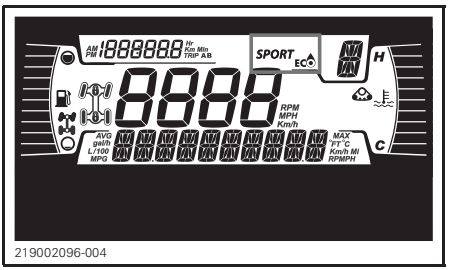
Transmission Position Display



This display shows gear position of gearbox:

– P (Park)
– R (Reverse)
– N (Neutral)
– H (High Range)
– L (Low Range)
– – (Invalid Range)

MODE Display



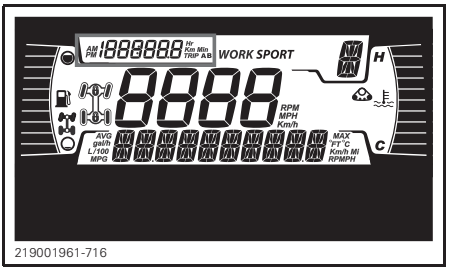
The MODE display indicates the selected mode of operation:

– SPORT
– ECO

A message of the selected mode will be displayed on the lower display at activation and deactivation as follow:

DRIVE MODE	MESSAGE AT ACTIVATION	MESSAGE AT DEACTIVATION
Sport	Sport	Sport OFF
ECO	ECO	ECO OFF

Trip Display



This display shows trip informations:

– Cumulative distance odometer
– Trip A
– Trip B
– Cumulative hours
– Clock

Use UPPER (TRIP) button to change the displayed information.

Hold UPPER (TRIP) button to reset Trip A/B meters.

Warning Lamps and Indicators

The following indicator lamps will alert you to a vehicle condition that may become serious. Some lamps will illuminate when starting the vehicle to make sure they work. If any lamps remain on after starting the vehicle, refer to the respective system warning lamp for further information.

NOTE: Some warning indicators appear in the display of the multifunction gauge and function the same as an indicator lamp but do not display when starting the vehicle.

Telltale Lights - Lower Bar

LIGHTS	DESCRIPTION
!	ORANGE - Vehicle malfunction
	BLUE - The high beam are selected
	RED - The engine temperature is too high.
	RED - Parking brake is engaged or malfunction of the brake system
N	Green - Neutral
− +	RED - The battery voltage too low or problem with the electrical system
	RED - Low engine oil pressure Normally ON when engine is OFF
	ORANGE - Low fuel level
	ORANGE Turn on: Malfunction of the vehicle emissions control system Blink: Engine problems, the limp home mode is activated. Have the vehicle serviced immediately.

Icons and Indicators - Multifunction Display

ICONS AND INDICATORS	
SPORT	Denotes SPORT mode is selected.
WORK	Denotes WORK mode is selected.
	Track kit active (If equipped)

Settings

The buttons to navigate through menus are located on the left side of the LCD display.

Setup

Using LOWER (MENU) button, Select SETTINGS and hold to enter setting menu.

Maintenance Reset

NOTE: Only when the maintenance icon is displayed.

Using LOWER (MENU) button, Select RES MAINT and hold to reset maintenance.

Fault Codes

NOTE: Only when codes are actives.

Using LOWER (MENU) button, Select CODES and hold to see actives and occurred fault codes. Fault codes will be scrolled on the Lower Display.

Unit Selection

This multifunction gauge is factory preset in Imperial units but it is possible to change it to Metric units.

Using LOWER (MENU) button, Select UNITS and hold button to change units.

Reset Stats

Using LOWER (MENU) button, select RESET STAT and hold to reset.

Setting Brightness

The brightness of the LCD display can be adjusted.

Using LOWER (MENU) button, select BRIGHTNESS and hold button to change brightness.

Using LOWER (MENU) button, adjust brightness then push and hold LOWER (MENU) button to acknowledge selection.

Setting Clock

Using LOWER (MENU) button, Select CLOCK and hold to change units.

1. Press LOWER (MENU) button to select clock display.
2. Push and hold LOWER (MENU) button for 1 second.
3. Press LOWER (MENU) button to select 12:00 AM PM or 24:00 time base (time flash).
4. Push and hold LOWER (MENU) button to acknowledge selection.
5. Press LOWER (MENU) button to change hours (hours flash).
6. Press LOWER (MENU) to acknowledge hour selection.
7. Press LOWER (MENU) button to change minutes (minutes flash).
8. Press LOWER (MENU) button to acknowledge minutes.

Setting Language

The gauge display language can be changed. Refer to an authorized Can-Am dealer for language availability and to setup the gauge to your preference.

Fuel Requirements

NOTICE Always use fresh gasoline. Gasoline will oxidize; the result is loss of octane, volatile compounds, and the production of gum and varnish deposits which can damage the fuel system.

Alcohol fuel blending varies by country and region. Your vehicle has been designed to operate using the recommended fuels, however, be aware of the following:

– Use of fuel containing alcohol above the percentage specified by government regulations is not recommended and can result in the following problems in the fuel system components:
  - Starting and operating difficulties.
  - Deterioration of rubber or plastic parts.
  - Corrosion of metal parts.
  - Damage to internal engine parts.
– Inspect frequently for the presence of fuel leaks or other fuel system abnormalities if you suspect the presence of alcohol in gasoline exceeds the current government regulations.
– Alcohol blended fuels attract and hold moisture which may lead to fuel phase separation and can result in engine performance problems or engine damage.

Recommended Fuel

For 570 engines use common unleaded gasoline with an AKI (R+M)/2 octane rating of 87, or an RON octane rating of 92.

For 1000R engines use premium unleaded gasoline with an AKI (R+M)/2 octane rating of 91, or a RON octane rating of 95.

Use unleaded gasoline containing MAXIMUM 10% ethanol.

NOTICE Never experiment with other fuels. Engine or fuel system damages may occur with the use of an inadequate fuel.

NOTICE Do NOT use fuel from fuel pumps labeled E85.

Use of fuel labeled E15 is prohibited by U.S. EPA Regulations.

Fueling Procedure

⚠ WARNING

– Fuel is flammable and explosive under certain conditions.
– Never use an open flame to check fuel level.
– Never smoke or allow a flame or spark in the vicinity.
– Always work in a well-ventilated area.

NOTICE Always clean the surrounding of the fuel cap of any debris, dust, sand to avoid contaminating fuel.

1. Stop engine.

⚠ WARNING

Always stop engine before refueling.

2. Do not allow anyone to remain seated on the vehicle while fuelling.
3. Slowly unscrew fuel tank cap counterclockwise to remove it.

⚠ WARNING

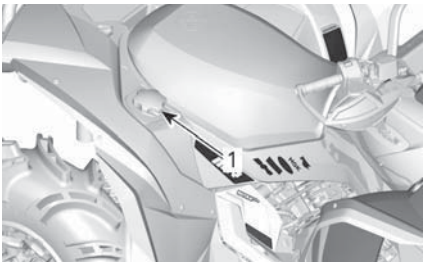
If a differential pressure condition is noticed (whistling sound heard when loosening fuel tank cap) have vehicle inspected and/or repaired before further operation.

4. Insert the spout in the filler neck.
5. Pour fuel slowly to allow time for the air in the tank to escape and prevent fuel flow back. Be careful not to spill fuel.
6. Stop fuelling when the fuel reaches the bottom of filler neck. **Do not overfill.**

⚠ WARNING

Always wipe off any fuel spillage from the vehicle.

7. Fully tighten fuel tank cap clockwise.



TYPICAL
1. Fuel tank cap

⚠ WARNING

Never top up the fuel tank before placing the vehicle in a warm area. As temperature increases, fuel expands and may overflow.

BREAK-IN PERIOD

Operation During Break-In

A break-in period of 10 operating hours or 300 km (200 mi) is required for the vehicle.

Engine

During the break-in period:

– Avoid full throttle operation.
– Maximum throttle should not exceed 3/4.
– Avoid sustained accelerations.
– Avoid prolonged cruising speeds.
– Avoid engine overheating.

However, brief accelerations and speed variations contribute to a good break-in.

Brakes

⚠ WARNING

New brakes will not operate at their maximum efficiency until their break-in is completed. Use extra caution.

Drive Belt

A new drive belt requires a break in period of 50 km (30 mi).

During the break-in period:

– Avoid strong acceleration and deceleration (throttle should not exceed 3/4).
– Avoid pulling a load.
– Avoid high speed cruising.

Starting the Engine

The shift lever must be set to PARK or NEUTRAL.

NOTE: For your convenience, an override mode allows the engine to be started with the shift lever in any position. Press and hold the brake lever(s) or the brake pedal while pressing the engine start button.

Install D.E.S.S. key on D.E.S.S. post

Set the engine stop switch to RUN.

Press the engine start button and hold until the engine starts.

NOTICE **If engine does not start after a few seconds, do not hold the engine start button more than 10 seconds. Refer to *TROUBLESHOOTING*.**

Release the engine start button immediately when the engine has started.

NOTE: If the battery is dead, engine cannot be started. Have the battery recharged or replaced.

Waking Up the Electrical System

Press and release the START button for less than half a second and the electrical system will turn ON:

- For 30 seconds, **without** powering any equipment, if the DESS key is **NOT** installed on the DESS post **OR** if the Engine Stop switch is set to the STOP position;
- For 10 minutes, powering equipment, if the DESS key is installed on the DESS post **AND** Engine Stop is set to the RUN position. The electrical system will be shutdown after 30 seconds if either the DESS key is removed **OR** the Engine Stop is set to the STOP position.

NOTICE **Waking up the electrical system repeatedly or using electrical equipment will discharge the battery and you may not be able to start the engine.**

Changing Gear Selection

Apply brakes and select the desired shift lever position.

Release brakes.

NOTICE **When changing gear selection, always completely stop the vehicle and apply the brakes prior to moving the shift lever. Otherwise, damage to the gearbox may occur.**

Gradually press the throttle lever to increase engine speed and thus engaging the continuously variable transmission (CVT).

Stopping the Engine and Parking the Vehicle

⚠ WARNING

Avoid parking on slope as the vehicle may roll away.

⚠ WARNING

Always put the vehicle in PARK when stopped or parked to prevent rolling.

⚠ WARNING

Avoid parking in places where hot parts can start a fire.

When stopped or parked, always bring shift lever to PARK position. This is especially important when parking on a slope. On very steep inclines or if the vehicle is carrying a cargo, the wheels should be blocked using rocks or bricks.

Select the flattest terrain available for parking.

Release throttle and completely stop the vehicle.

Set shift lever in PARK position.

Apply the parking brake.

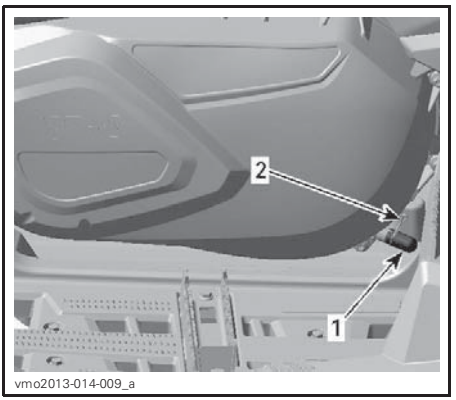
Push the engine stop switch to OFF position.

Remove D.E.S.S. key from D.E.S.S. post.

What to Do if Water Entered the CVT

The CVT drain plug is located on the rear portion of the CVT cover. It is accessible from the rear LH fender.

Inspect the CVT drain plug to validate if water is present.



NEAR LH FOOTREST
1. *Drain plug*
2. *Spring clamp*

NOTICE If water entered your CVT while in a muddy environment, limit vehicle usage and bring your vehicle to your nearest authorized Can-Am dealer for a proper CVT cleaning procedure.

If water is present, remove CVT drain plug to expel water.

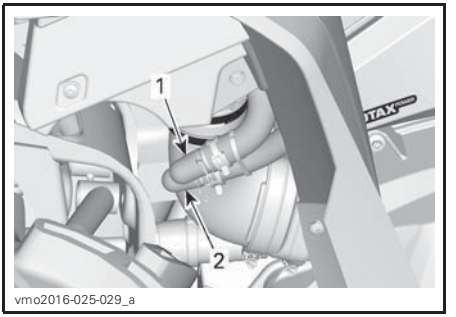
Reinstall the drain plug and secure it using the spring clamp.

NOTE: Make sure drain plug is properly inserted on CVT cover nipple.

NOTICE See an authorized Can-Am dealer to have the CVT inspected and cleaned.

What to Do if Water Entered the Air Filter Housing

Inspect the drain reservoirs in the back of the front left wheel inner fender to validate if water is present.



TYPICAL
1. *Clean air filter housing drain reservoir*
2. *Dirty air filter housing drain reservoir*

If water is present, press clamps and remove reservoirs to drain water from air filter housing.

If one of the following conditions is met, bring the vehicle to your nearest authorized Can-Am dealer to have the vehicle serviced:

- If more than 50 ml (2 U.S. oz) of water (approximately 5 drain reservoirs) is found in the clean chamber drain hose.
- If any deposits are present in the clean chamber drain reservoir.
- If either hose is obstructed.

In such a case, the vehicle must be serviced for:

- Air filter housing cleaning
- Vents (radiator cooling fan, water pump, coolant reservoir, fuel tank, gearbox, front differential and rear final drive)
- CVT air filter cleaning
- CVT cleaning
- Lubricant inspection and replacement as required (engine, gearbox, front differential and rear final drive).

NOTICE Failure to have vehicle serviced may lead to permanent damage to the following components but not limited to:

- Engine and gearbox
- Fuel pump
- CVT
- Cooling fan
- Front differential
- Rear final drive.

What to Do if Vehicle is Turned Over

When vehicle is turned over or stays tilted on the side, put the vehicle back on its wheels. Inspect vehicle for damages.

⚠ WARNING

Never operate the vehicle if damaged. Refer to an authorized Can-Am dealer.

If vehicle has no damage, refer to *MAINTENANCE PROCEDURES* and inspect the following.

- Inspect air filter housing for oil accumulation, if any oil is found, clean air filter and air filter housing.
- Check engine oil level and refill if necessary.
- Check engine coolant level and refill if necessary.
- Check gearbox oil level and refill if necessary.
- Check rear final drive oil level and refill if necessary.
- Check front differential level and refill if necessary.
- Start engine. If the oil pressure light stays on, stop engine immediately. See an authorized Can-Am dealer.

Whenever the vehicle is turned over, it should be inspected by an authorized Can-Am dealer.

What to Do if Vehicle is Immersed in Water

Should the vehicle become immersed, immediately stop the engine. Do not use:

- Any electrical equipments
- Winch.

It will be necessary to take the vehicle to an authorized Can-Am dealer as soon as possible. NEVER ATTEMPT TO START THE ENGINE!

NOTICE **Immersion of the vehicle can cause serious damage if the correct restart procedure is not followed.**

As soon as vehicle is pulled out of water, carry out the following:

- Drain air filter housing. Refer to *WHAT TO DO IF WATER ENTERED THE AIR FILTER HOUSING* in this section.
- Drain CVT. Refer to *WHAT TO DO IF WATER ENTERED THE CVT* in this section.

NOTICE **The vehicle should be serviced as soon as possible by an authorized Can-Am dealer.**

⚠ WARNING

Suspension adjustment could affect vehicle handling. Always take time to familiarize yourself with the vehicle's behavior after any suspension adjustment have been made.

Suspension Adjustment

Suspension adjustment and loading can have an effect on your vehicle handling and comfort.

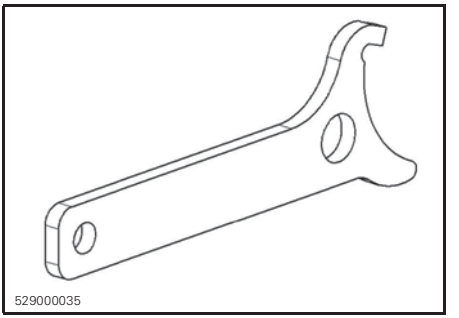
Choice of suspension adjustments vary with driver's weight, personal preference, riding speed and field condition.

NOTE: Factory settings are suitable for almost all conditions. Take into consideration that an increase in ground clearance can affect the handling of the vehicle.

FRONT SUSPENSION FACTORY PRELOAD SETTINGS		
ADJUSTMENT	MODEL	FACTORY SETTING
Spring preload	570	46.6 mm
	1000R	60.6 mm

REAR SUSPENSION FACTORY PRELOAD SETTINGS		
ADJUSTMENT	MODEL	FACTORY SETTING
Spring preload	570	63.1 mm
	1000R	35.8 mm

Following are guidelines to fine-tune suspension. Use suspension adjustment tool provided in the tool kit.



SUSPENSION ADJUSTMENT TOOL

Spring Preload Adjustment

⚠ WARNING

The left and right shock adjustment on front or rear suspension must always be set to the same position. Never adjust one only. Uneven adjustment can cause poor handling and loss of stability, which could lead to an accident.

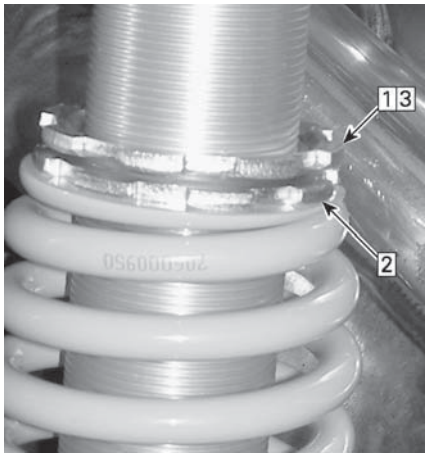
Shorten the springs for a firmer ride and rough conditions.

Lengthen the springs for a softer ride and smooth conditions.

Adjust spring preload by turning the adjuster ring.

NOTE: Spring preload affects ground clearance.

NOTE: Do not increase preload on FOX shocks.

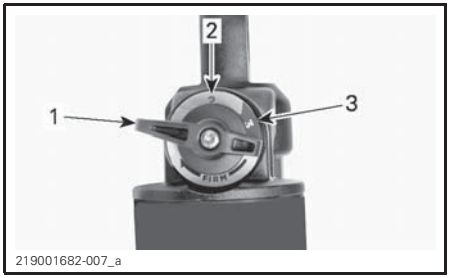


TYPICAL
Step 1: Loosen top locking ring
Step 2: Turn adjusting ring accordingly
Step 3: Tighten top locking ring

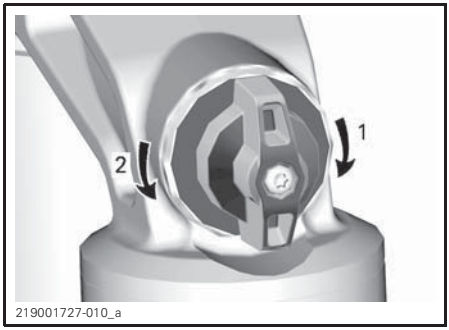
Shock Damping Adjustments (1000R Models)

Compression damping controls how the shock absorber reacts when riding.

POSITION	SETTING	RESULT ON BIG BUMPS
1	Soft	Softer compression damping
2	Medium (Factory)	Medium compression damping
3	Hard	Firmer compression damping



1. *Position 1*
2. *Position 2*
3. *Position 3*



COMPRESSION DAMPING
1. **Increases** *damping (stiffer)*
2. **Decreases** *damping (softer)*

Turn adjuster clockwise to **increase** shock damping action (stiffer).

Turn adjuster counterclockwise to **decrease** shock damping action (softer).

ACTION	RESULT
Increasing compression damping force	Firmer compression damping
Decreasing compression damping force	Softer compression damping

⚠ WARNING

Make sure compression damping setting is the same on both sides.

Dynamic Power Steering (DPS) Assist Level Adjustment

The Tri-Mode Dynamic Power Steering (DPS) offers easy steering assistance to the rider. The level of assistance will automatically adapt according to the vehicle's speed and rider's demand, in order to provide maximum steering power at lower speed where the demand is normally higher. As speed increases, the assistance is progressively reduced to keep maximum steering feel and precision to the rider.

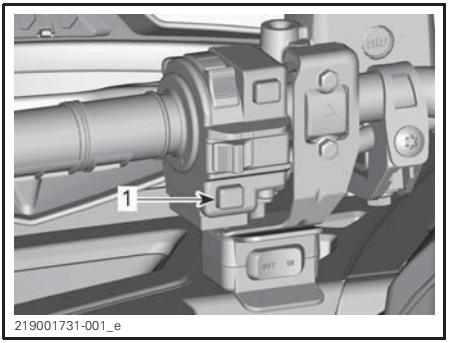
It is possible to choose between three modes of assistance: Minimum, Medium and Maximum. Each mode will continue to automatically adapt to the vehicle's speed and rider's demand, so it does not require to be changed when riding. These modes are used to set the level of assistance to match each rider's preferences.

The following DPS modes are preset in the vehicle.

DPS MODE	
DPS MAX.	Maximum steering assist
DPS MED.	Medium steering assist
DPS MIN.	Minimum steering assist

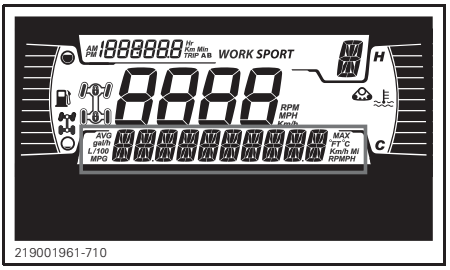
To show the active DPS mode, proceed as follows:

1. Press and release **Override/DPS** button.



1. Override/DPS button

2. Check the multifunction gauge to confirm the active DPS mode.



4.5" DIGITAL DISPLAY

To change the DPS mode, proceed as follows:

1. Press and hold **Override/DPS** button for 2 seconds to go to the next setting.
2. Release **Override/DPS** button.
3. Repeat until desired setting is selected.

NOTE: The DPS adjustment will not be possible if the vehicle transmission is set to **REVERSE**.

570 models

The DPS adjustment will not be possible by Override/DPS button if the vehicle does not run. It is possible to change that by using the cluster, proceed as follows:

1. Hold LOWER (MENU) button for 1 second to change DPS mode.

2. Repeat until desired setting is selected.

TRANSPORTING THE VEHICLE

When contacting a towing or transporting service, be sure to ask if they have a flatbed trailer, loading ramp or power ramp to safely lift the vehicle and tie-down straps. Ensure the vehicle is properly transported as specified in this section.

NOTICE Do not tow this vehicle — towing can seriously damage the vehicle's drive system.

NOTICE Avoid using chains to tie the vehicle — they may damage the surface finish or plastic components.

⚠ WARNING

Make sure no loose objects are present inside vehicle during vehicle transportation.

⚠ WARNING

Always transport the vehicle facing forward to avoid damaging the windshield or other components. Parts may detach during transport.

⚠ WARNING

Before attempting to mount vehicle onto a platform or a trailer, make sure to respect the following safety precautions.

SAFETY PRECAUTIONS	
Carrying equipment	The carrying item (platform or trailer or flat bed) must be of appropriate dimensions and capacity to safely support and transport the vehicle.
Hauling vehicle	Do not exceed vehicle hauling capacity and specifications. Ensure the trailer or platform is properly secured to the hauling vehicle hitch.
Visibility	Ensure you have a good visibility during the entire maneuver.
Terrain	The hauling vehicle and trailer must be on a leveled surface. Use wheel chocks on trailer and hauling vehicle to avoid any movement.
Ramps	Use ramps with proper rating and secure ramps to the trailer or platform. Avoid steep ramps.
Bystanders	Always make sure bystanders are not close to the vehicle or the trailering equipment while climbing up.

Using vehicle power to climb onto trailering equipment

When vehicle can climb on its own power, proceed as follows;

Wear protective gear.

Use low gear only (if equipped).

If vehicle has 4wd (or 6wd) option, use it.

When driving remain seated at all times.

Ensure proper alignment on rails or platform.

1. Start from a sufficient distance from the trailer to align the vehicle in a straight line with the ramps. Never attempt to turn while getting closer to the ramp. Rear wheels might not be aligned once you get to the ramp and vehicle may fall off.
2. Slowly climb the front wheels onto the ramp to verify alignment.

3. Back off the vehicle, verify ramps are still secure, then proceed at proper speed.
4. Carefully drive vehicle onto platform or trailer. Use sufficient speed to climb without spinning or abruptly accelerating. Avoid acceleration while on ramps to prevent ramps movement.
5. If trailer is inclined towards front, simply let vehicle roll in without acceleration.
6. Once vehicle is climbed, put shift lever to Park. Apply parking brake.

When vehicle cannot move on its own power, or in case overshooting is a risk or if any dangerous condition prevents for embarking on its own power, proceed using a winch;

Using a winch to pull vehicle onto trailering equipment

When vehicle cannot climb on its own power, proceed as follows;

⚠ WARNING

Have the help of an assistant. One person should be in vehicle to have access to vehicle steering, brakes and winch switch, while the other person controls the environment and safety of the maneuver.

⚠ WARNING

Ensure the winch hook can be safely attached to a proper anchoring point. Use proper rigging.

NOTE: If vehicle can be started safely, let engine idle during winching to avoid draining the battery.

1. Place shift lever to NEUTRAL (N).
2. If the vehicle is equipped with a winch, use the winch to roll the vehicle on the platform.
3. If the vehicle is not equipped with a winch, proceed as follows:
   - 3.1 Attach strap to lower front bumper anchor.
   - 3.2 Attach the strap to the winch cable of the towing vehicle.
   - 3.3 Pull the vehicle on the flatbed trailer with the winch.
4. Put shift lever to Park. Apply parking brake.

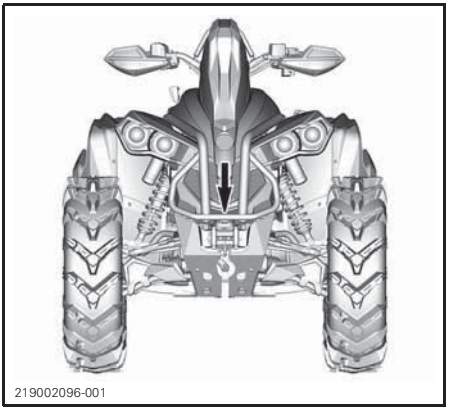
Securing vehicle for transport

When transporting this vehicle, secure it to a trailer or in pickup box with suitable tie-downs. Use of ordinary ropes is not recommended.

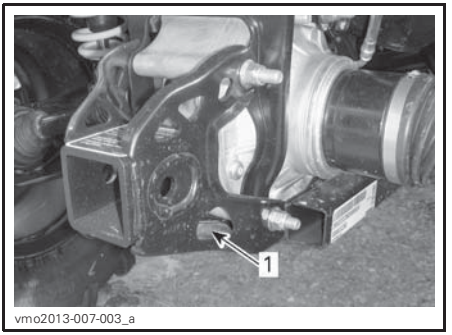
⚠ WARNING

Do not tow this vehicle behind a car or other vehicle. Use a trailer. Never tip this vehicle on end for transporting. The vehicle must be in its normal operating position (on all wheels).

Remember to:
- Unload vehicle racks before transportation.
- Set shift lever to PARK position.
- Set the parking brake.
- Secure the vehicle by the front and rear tie-down points.



FRONT TIE-DOWN POINT LOCATION



TYPICAL
1. Rear tie-down point location

NOTICE Securing vehicle at other locations may damage the vehicle.

Getting vehicle out of trailer

⚠ WARNING

Vehicle may have moved during transport. Ensure vehicle is properly aligned with ramps before proceeding.

⚠ WARNING

Visibility will be greatly reduced when backing off from the trailer. Have the help of an assistant to ensure proper alignment and safe environment.

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MAINTENANCE

MAINTENANCE SCHEDULE

Maintenance is very important for keeping your vehicle in safe operating condition. The vehicle should be serviced as per the maintenance schedule.

The maintenance schedule does not exempt the pre-ride inspection or post operation care.

⚠ WARNING

Failure to properly maintain the vehicle according to the maintenance schedule and procedures can make it unsafe to operate.

EPA Regulation - Canadian and USA Vehicles

A repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems. These instructions do not require components or service by BRP or authorized Can-Am Off-Road dealers.

Although an authorized Can-Am Off-Road dealer has an in-depth technical knowledge and tools to service your vehicle, the emission-related warranty is not conditioned on the use of an authorized Can-Am Off-Road dealer or any other establishment with which BRP has a commercial relationship.

Proper maintenance is the owner's responsibility. A warranty claim may be denied if, among other things, the owner or operator caused the problem through improper maintenance or use.

For emission-related warranty claims, BRP is limiting the diagnosis and repair of emission-related parts to the authorized Can-Am Off-Road dealers. For more information, please refer to the *US EPA EMISSION-RELATED WARRANTY* contained in the *WARRANTY* section.

You must follow the instructions for fuel requirements in the fueling section of this manual. Even if gasoline containing greater than ten volume percent ethanol is readily available, the US EPA issued a prohibition against the use of gasoline containing greater than 10 vol% ethanol that applies to this vehicle. The use of gasoline containing greater than 10 vol% ethanol with this engine may harm the emission control system.

The maintenance schedule does not exempt the pre-ride inspection.

Follow the appropriate maintenance intervals according to the environment where the vehicle is used: normal environment or extreme environment (mud, water, dust).

POST OPERATION CARE AFTER EACH USE IN AN EXTREME ENVIRONMENT
Rinse the vehicle and its components with fresh water
Clean the CVT air filter (refer to *MAINTENANCE PROCEDURES*)
Drain the CVT compartment (and clean if any water or mud is found)
Inspect and clean engine air filter. Clean if any water or mud is found (refer to *MAINTENANCE PROCEDURES*)
Inspect and drain the air filter housing (and clean if any water or mud is found) (refer to *MAINTENANCE PROCEDURES*)

POST OPERATION CARE AFTER EACH USE IN AN EXTREME ENVIRONMENT
Clean radiator (refer to *MAINTENANCE PROCEDURES*)
Visually inspect for any water accumulation in the vent hoses (fuel tank, gearbox, front differential and rear final drive). If there is water, bring the vehicle to your nearest authorized Can-Am dealer for inspection and servicing of main components related to the vents
Carefully clean front and rear shock absorbers to prevent seal damage from dust or dirt

SEVERE DUSTY CONDITIONS

Engine Air Filter Maintenance Guideline

Air filter maintenance should be adjusted according to riding conditions.

Air filter maintenance must be increased in frequency in the following dusty conditions:

– Riding on dry sand
– Riding on dry dirt covered surfaces
– Riding on dry gravel roads or similar conditions.

NOTE: Riding in a group in these conditions would increase even more the air filter maintenance.

MAINTENANCE SCHEDULE LEGEND

Operation in severe riding conditions (dusty or muddy) or carrying heavy loads condition
Operation in trail riding conditions

MAINTENANCE SCHEDULE

Make sure to perform proper maintenance at recommended intervals as indicated in the tables. Some items of the maintenance schedule must be performed in function of the calendar, regardless of the distance or time of operation.

EVERY 750 KM (500 MI) OR 25 HOURS (whichever comes first)
EVERY 1 500 km (1,000 mi) OR 50 HOURS (whichever comes first)
Verify and clean engine air filter. Replace as needed
Verify battery connections
Inspect front differential and rear final drive oil level and look for contamination. Replace if necessary
Lubricate rear propeller shaft joints
Inspect tie rod ends and ball joints for play and boots condition
Lubricate front suspension arm bushings
Lubricate front and rear stabilizer bar bushings

EVERY 750 KM (500 MI) OR 25 HOURS (whichever comes first)
EVERY 1 500 km (1,000 mi) OR 50 HOURS (whichever comes first)
Inspect the drive shaft boots and protectors
Inspect brake pads. Replace as needed
Inspect wheel bearings for abnormal play
Verify gearbox oil level and look for contamination
Inspect and clean CVT air filter. Replace as needed. (If equipped)
Tighten wheel beadlock bolts
Lubricate lower shock absorber spherical bearings
Verify front differential and rear final drive oil level and look for contamination

EVERY 1 500 KM (1,000 MI) OR 50 HOURS (whichever comes first)
EVERY 3 000 km (2,000 mi) OR 100 HOURS (whichever comes first)
Adjust valve clearance
Clean muffler spark arrester
Verify and clean throttle body
Replace fuel vent breather filter
Verify CVT drive belt and clean CVT pulleys
Lubricate the one way bearing of the drive pulley
The following must be performed at least once a year:
Change engine oil and filter
Lubricate throttle cable (Renegade 570 only)
Inspect and clean brake system
Inspect battery condition
Verify steering system for abnormal play
Verify gearbox oil level and look for contamination

PERFORM AT THE FIRST 1 500 KM (1,000 MI) AND AT 3 000 KM (2,000 MI) THEN FOLLOW THE REGULAR SCHEDULE
PERFORM AT THE FIRST 3 000 km (2,000 mi) AND AT 6 000 km (4,000 mi) THEN FOLLOW THE REGULAR SCHEDULE
Replace gearbox oil
Clean the vehicle speed sensor (VSS)

EVERY 3 000 KM (2,000 MI) OR 100 HOURS (whichever comes first)
EVERY 6 000 km (4,000 mi) OR 200 HOURS (whichever comes first)
Verify the cooling system
Test engine coolant strength
Verify fuel system for leaks
Verify fuel pump pressure
Replace spark plugs
Replace front differential oil
Replace rear final drive oil
Replace gearbox oil
Inspect input and output shaft seals (gearbox, differential and final drive)
Clean vehicle speed sensor
Clean and lubricate lower and upper steering column half bushings
The following must be performed every 2 years:
Replace the brake fluid

EVERY 6 000 KM (4,000 MI) OR 5 YEARS (whichever comes first)
EVERY 12 000 km (8,000 mi) OR 5 YEARS (whichever comes first)
Replace engine coolant

This section includes instructions for basic maintenance procedures.

⚠ WARNING

Turn off the engine and follow these maintenance procedures when performing maintenance. If you do not follow proper maintenance procedures you can be injured by hot parts, moving parts, electricity, chemicals or other hazards.

⚠ WARNING

Should removal of a locking device be required (e.g. lock tab, self-locking fastener, etc.), always replace it with a new one.

Air Filter

Air Filter Maintenance Guideline

As with any ATV, air filter maintenance is critical to ensure proper engine performance and life span.

Air filter maintenance should be adjusted according to riding conditions.

Air filter maintenance must be increased in frequency and oil must be added to the foam filter element for the following dusty conditions:

– Riding on dry sand
– Riding on dry dirt covered surfaces
– Riding on dry gravel roads or similar conditions.

NOTE: Riding in a group in these conditions would increase even more the air filter maintenance. Refer to *AIR FILTER CLEANING AND OILING* in this section for maintenance procedure.

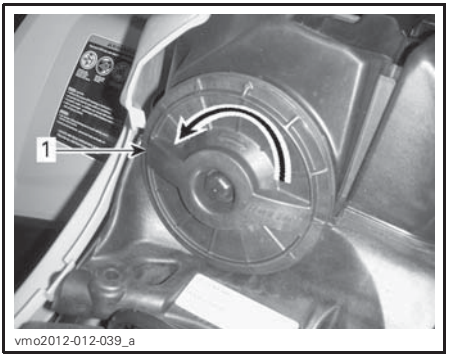
NOTE: An accessory pre-filter for "dusty conditions" may be used. Contact an authorized Can-Am dealer for details.

Engine Air Filter Removal

NOTICE Never remove or modify any component in the air filter housing. Otherwise, engine performance degradation or damage can occur. The engine is calibrated to operate specifically with these components.

1. Refer to *CONTROLS/INSTRUMENTS/EQUIPMENT* and remove:
   – Seat
   – Console
   – Snorkel cover
2. Rotate air filter cover counterclockwise to remove it.

NOTE: A socket wrench may be used to remove the filter cover.



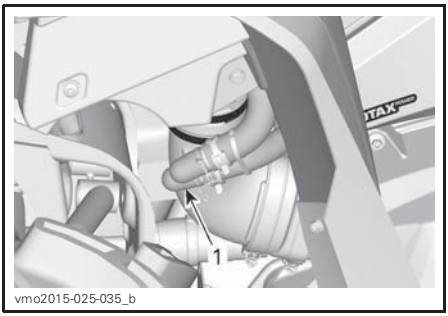
1. Air filter cover

3. Remove air filter.

AIR FILTER REMOVAL

Engine Air Filter Housing Inspection and Draining

1. Drain air filter housing inlet drain tube.

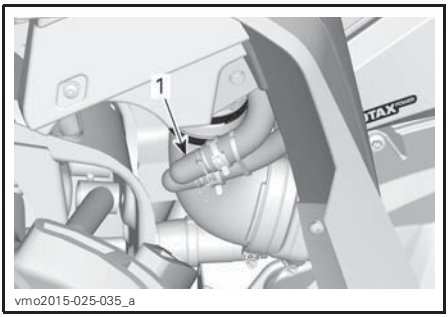


TYPICAL
1. Air filter housing inlet drain tube

2. Check air filter dirty chamber for cleanliness.
   – If any debris or water are found, clean air filter chamber using a vacuum cleaner.

NOTICE **Do not blow compressed air into air filter chamber.**

3. Check air filter drain tube (clean chamber).
   – If any debris or water are found, refer to *SPECIAL PROCEDURES*.
   – Investigate for contamination source.



TYPICAL
1. Air filter drain tube

Air Filter Cleaning and Oiling

⚠ CAUTION **Always wear appropriate skin and eye protection. Chemicals can cause a skin rash and eye injury.**

Paper Filter Cleaning

1. Remove the foam filter from paper filter.
2. Tap out heavy dust from the paper element.

This will allow dirt and dust to get out of the paper filter.

NOTE: Paper filter have a limited life span; replace filter if too dirty or clogged.

NOTICE **It is not recommended to blow compressed air on the paper filter; this could damage the paper fibers and reduce its filtration ability when used in dusty environments.**

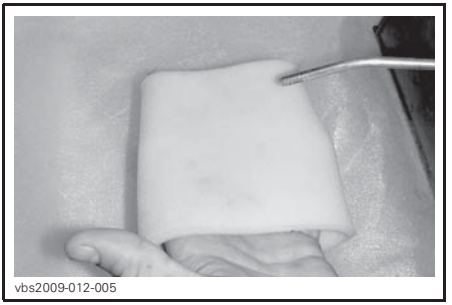
NOTICE **Do not wash the paper filter with any cleaning solution.**

Foam Filter Element Cleaning

1. Spray the foam filter element inside and out with a good air filter cleaner and follow manufacturer's instructions .

TYPICAL - SPRAY THE FOAM FILTER

2. Dry the foam element completely.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TYPICAL - DRY

NOTE: A second application may be necessary for heavily soiled elements.

Foam Filter Element Lubrication

1. Make sure filter is clean. Refer to *FOAM FILTER CLEANING*.
2. Spray AIR FILTER OIL (P/N 219 700 340) or equivalent on the foam filter element previously dried.

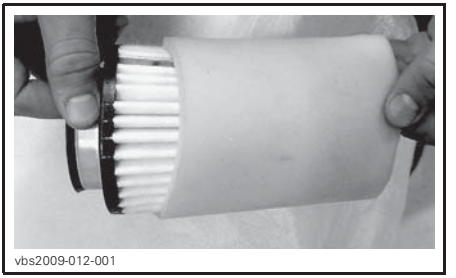
219700340

AIR FILTER OIL (P/N 219 700 340)

vbs2009-012-014

TYPICAL - OIL THE FOAM FILTER ELEMENT

3. Let stand for 3 to 5 minutes.
4. Remove any excess of oil that could transfer to the paper filter by wrapping the foam filter element into an absorbent cloth and squeezing gently. This will also ensure a full oil coverage on foam filter.
5. Reinstall the foam filter element over the paper filter.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TYPICAL

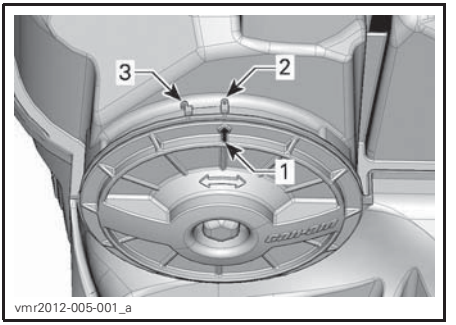
Air Filter Installation

Reinstall oiled foam filter on paper air filter.

Slightly grease O-ring seal and plastic body of air filter.

Install air filter as the reverse of removal.

Ensure air filter cover is properly locked onto the air filter housing. See indications on filter cover and housing.



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1. *Cover position arrow*
2. *Locked*
3. *Unlocked*

Reinstall:

– Snorkel cover

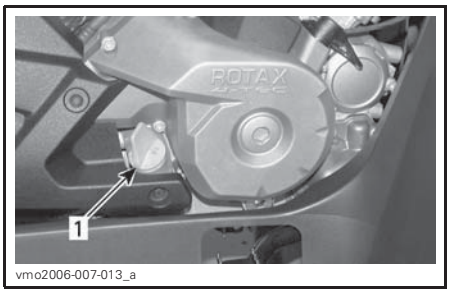
– Console
– Seat

Engine Oil

Engine Oil Level

NOTICE Check level frequently and refill if necessary. **Do not overfill.** Operating the engine/gearbox with an improper level may severely damage engine/gearbox. Wipe off any spillage.

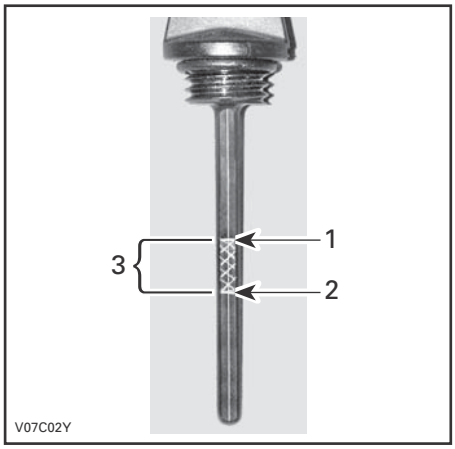
NOTE: While checking the oil level, visually inspect engine area for leaks.



RH SIDE OF ENGINE
1. Dipstick

With vehicle on a level surface and engine cold, not running, check the oil level as follows:

1. Unscrew dipstick then remove it and wipe clean.
2. Reinstall dipstick, screw in it completely.
3. Remove and check oil level. It should be near or equal to the upper mark.



TYPICAL
1. Full
2. Add
3. Operating range

To add oil, remove dipstick. Place a funnel into the dipstick tube to avoid spillage.

Add a small amount of recommended oil and recheck oil level.

Repeat the above procedures until oil level reaches the dipstick's upper mark. **Do not overfill.**

Properly tighten dipstick.

Recommended Engine Oil

Rotax® engines were developed and validated using the XPS™ oil. BRP recommends the use of its XPS engine oil or an equivalent at all time. Damages caused by the use of an oil not suitable for the engine may not be covered by the BRP Limited Warranty.

XPS RECOMMENDED ENGINE OIL	
General purpose	**Scandinavia:** 4T 5W40 SYNTHETIC BLEND OIL (EUR) (P/N 779290) **Other Countries:** 4T 5W40 SYNTHETIC BLEND OIL (P/N 779133)
Cold temperature	**Scandinavia:** 4T 0W40 SYNTHETIC OIL (EUR) (P/N 779286) **Other Countries:** 4T 0W40 SYNTHETIC OIL (P/N 779139)
Warm temperature	**Scandinavia:** 4T 10W50 SYNTHETIC OIL (EUR) (P/N 779240) **Other Countries:** 4T 10W50 SYNTHETIC OIL (P/N 779234)
IF THE RECOMMENDED XPS ENGINE OIL IS NOT AVAILABLE	
Use a 4-stroke SAE engine oil meeting or exceeding the following lubricant industry specifications. Always check the API service label certification on the oil container, it must contain at least one of the indicated standards. – **API service classification SJ, SL, SM or SN**	

Engine Oil Change

⚠ CAUTION The engine oil can be very hot. Wait until engine oil is warm.

Oil and filter are to be replaced at the same time.

Bring engine to its normal operating temperature.

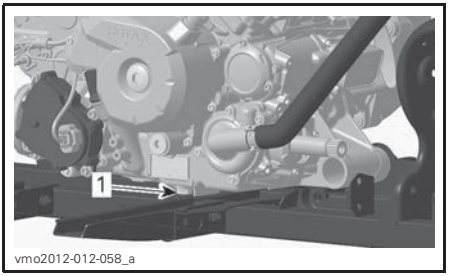
Ensure vehicle is on a level surface.

Remove dipstick.

Clean the oil drain plug area.

Place a drain pan under the oil drain plug area.

Unscrew oil drain plug.



TYPICAL - PARTS REMOVED FOR CLARITY
1. Drain plug

Allow enough time for oil to flow out of oil filter.

Replace the oil filter. Refer to *OIL FILTER* in this section.

Change gasket on oil drain plug.

Clean gasket area on engine and oil drain plug then reinstall plug.

Refill engine at the proper level with the recommended oil.

Refer to *SPECIFICATIONS* for oil capacity.

Start engine and let idle for a few minutes.

Ensure oil filter area and oil drain plug areas are not leaking.

Stop engine.

Wait a while to allow oil to flow down to crankcase then check oil level.

Refill as necessary.

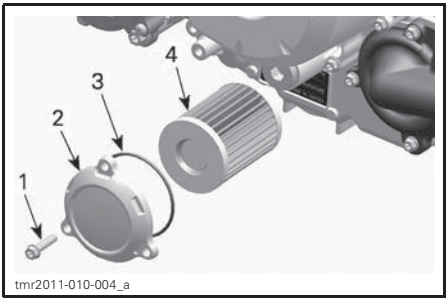
Dispose of oil as per your local environmental regulations.

Oil Filter

Oil Filter Replacement

Remove the right engine cover.

Unscrew the oil filter cover.



1. *Oil filter screw*
2. *Oil filter cover*
3. *O-ring*
4. *Oil filter*

NOTICE **Pay attention to avoid pinching the O-ring during filter and cover installation.**

Remove the oil filter and replace with a new filter.

Install a NEW O-ring on oil filter cover.

Install the new filter into the cover.

Apply engine oil on O-ring and on end of filter.

Screw oil filter cover in place.

Tighten oil filter cover screws to recommended specification.

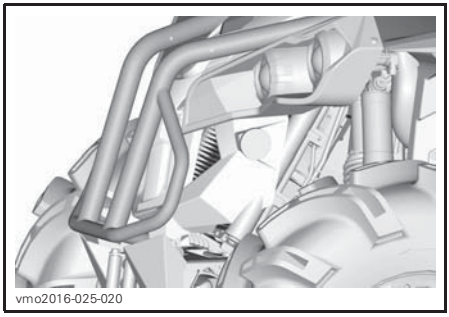
TIGHTENING TORQUE	
Oil filter cover screws	10 N•m ± 1 N•m (89 lbf•**in** ± 9 lbf•**in**)

Wipe out any oil spillage on engine.

Radiator

Radiator Inspection and Cleaning

Periodically check the radiator area for cleanliness.



TYPICAL

Inspect radiator and hoses for leaks or any damage.

Inspect radiating fins. They must be clean, free of mud, dirt, leaves and any other deposit that would prevent the radiator to cool properly.

Remove as much deposits as you can with your hands. If water is available in proximity, try rinsing the radiating fins.

If available, use a garden hose to rinse the radiating fins.

⚠ **CAUTION** **Never clean radiator with your hands when it is hot. Let the radiator cool down before cleaning.**

NOTICE **Be careful not to damage the radiating fins when cleaning. Do not use any object/tool that could damage the fins. The fins are purposely thin parts to allow efficient cooling. WHEN RINSING, USE LOW PRESSURE ONLY, NEVER USE A HIGH PRESSURE WASHER.**

See an authorized Can-Am dealer, repair shop or person of your own choosing to check the performance of the cooling system.

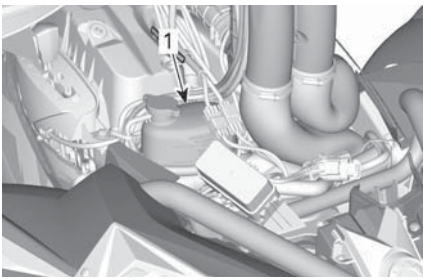
Engine Coolant

Engine Coolant Level Verification

⚠ WARNING

Check coolant level with engine cold. Never add coolant in cooling system when engine is hot.

1. Place vehicle on a level surface.
2. Refer to *CONTROLS/INSTRUMENTS/EQUIPMENT* and remove the console.
3. Remove coolant reservoir cap.
4. With vehicle on a level surface, liquid should be between MIN. and MAX. level marks of coolant reservoir.



1. Engine coolant reservoir

NOTE: When checking level at temperature lower than 20°C (68°F), it may be slightly lower than MIN. mark.

5. Add coolant if required.

⚠ WARNING

Do not remove the coolant reservoir cap if engine is hot.

6. Use a funnel to avoid spillage. **Do not overfill.**
7. Properly reinstall and tighten reservoir cap.

⚠ WARNING

In order to avoid potential burns, do not remove the radiator cap if the engine is hot.

NOTE: A cooling system that frequently requires coolant is the indication of leaks or engine problems. See an authorized Can-Am dealer.

8. Reinstall:
   - Console
   - Seat.

Recommended Engine Coolant

COUNTRY	RECOMMENDED COOLANT
Scandinavia	EXTENDED LIFE PRE-MIXED COOLANT (EUR) (P/N 779223)
All other countries	EXTENDED LIFE PRE-MIXED COOLANT (P/N 779150)
Alternative, or if not available	Distilled water and antifreeze solution (50% distilled water, 50% antifreeze)

NOTICE **Always use ethylene-glycol antifreeze containing corrosion inhibitors specifically for internal combustion aluminum engines.**

Engine Coolant Replacement

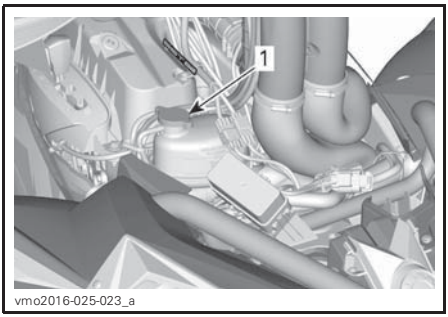
Cooling System Draining

Remove the console. Refer to *CONTROLS/INSTRUMENTS/EQUIPMENT*.

Remove the coolant reservoir cap.

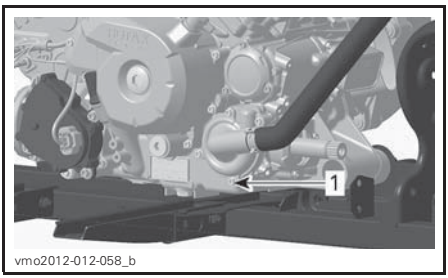
⚠ WARNING

Warning: Do not remove the coolant reservoir cap if engine is hot.



1. Engine coolant reservoir cap

Unscrew the coolant drain plug and drain the coolant into a suitable container.



1. Coolant drain plug

NOTE: Do not unscrew the coolant drain plug completely.

570 Models

Disconnect the lower radiator hose and drain the remaining coolant into a suitable container.

NOTE: Take note of hose clamp position on the lower radiator hose.

Reinstall lower radiator hose.

Position the radiator hose clamp as noted during removal.

All Models

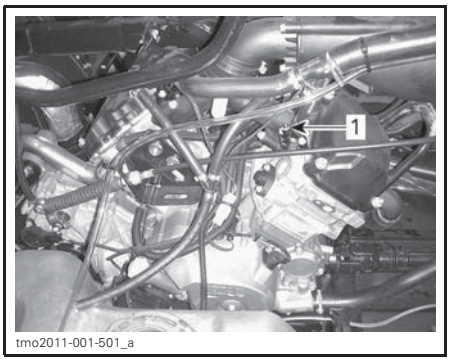
Install cooling system drain plug with a new sealing ring and tighten to specification.

TIGHTENING TORQUE	
Cooling system drain plug	9 N•m to 11 N•m (80 lbf•**in** to 97 lbf•**in**)

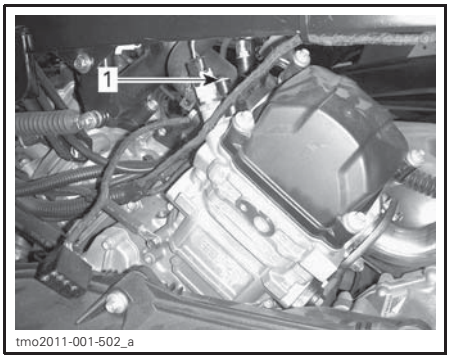
Bleed cooling system, refer to *COOLING SYSTEM BLEEDING*.

Cooling System Bleeding

1. Unscrew bleed screws on both front and rear cylinders.



TYPICAL
1. Front cylinder bleed screw



TYPICAL
1. Rear cylinder bleed screw

2. Remove the pressure cap.
3. Fill the cooling system until coolant comes out of the bleed screw(s).

4. Install the bleed screws using NEW gasket rings and tighten to specification.

TIGHTENING TORQUE	
Bleed screw	4.4 N•m to 5.6 N•m (39 lbf•**in** to 50 lbf•**in**)

5. Add coolant until system is full up to the pressure cap seat.
6. Start engine.

NOTE: Do not install pressure cap.

7. Run engine at idle until coolant fan turns ON.

NOTE: Monitor coolant level during engine warm-up and add coolant as required.

8. Depress the throttle lever two or three times; check coolant level.
9. Stop the engine and let it cool down.
10. Inspect cooling system for leaks.
11. Check coolant level in the reservoir. Add coolant as required.
12. Install pressure cap.
13. Reinstall:
    - Console
    - Seat.

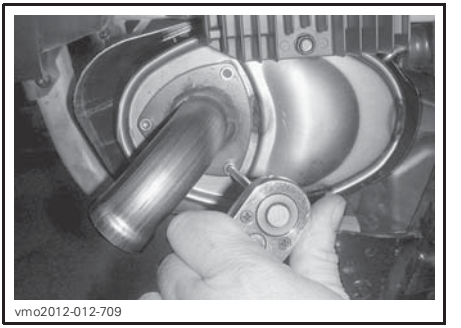
Muffler Spark Arrester

Muffler Spark Arrester Cleaning and Inspection

NOTE: Spark arrester screen replacement is required only when damaged.

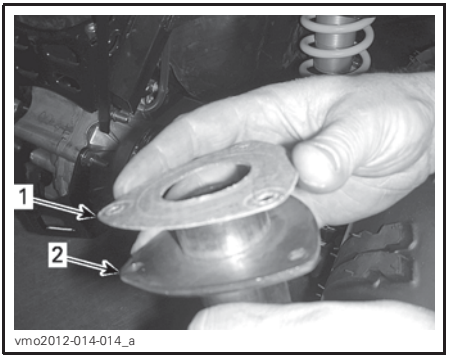
CAUTION Let exhaust system cool down before proceeding with cleaning and inspection.

Remove and discard the tail pipe retaining screws.



TYPICAL - REMOVE TAIL PIPE

Remove exhaust tail pipe, gasket (discard) and spark arrester.

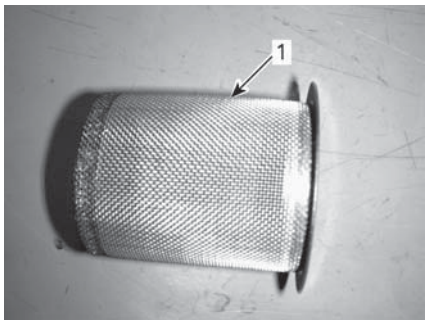


TYPICAL
1. *Gasket*
2. *Exhaust tail pipe*

Remove carbon deposits from the spark arrester using a brush.

NOTICE Use a soft brush and be careful to avoid damaging spark arrester mesh.

CAUTION Wear eye protection and gloves.



1. Clean spark arrester

Inspect mesh of spark arrester for any damage. Replace as required.

Inspect spark arrester chamber in muffler. Clean any debris as required.

Install new gasket, tail pipe and new retaining screws.

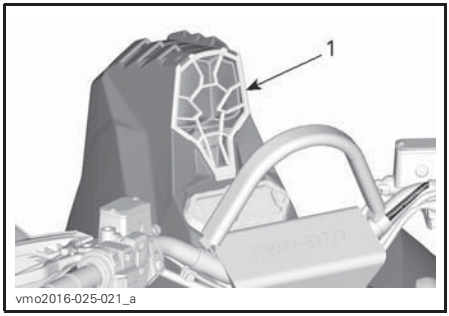
Reinstall muffler cover with new retaining screws. Tighten to specification.

TIGHTENING TORQUE	
Tail pipe retaining screws	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)
Cover retaining screws	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)

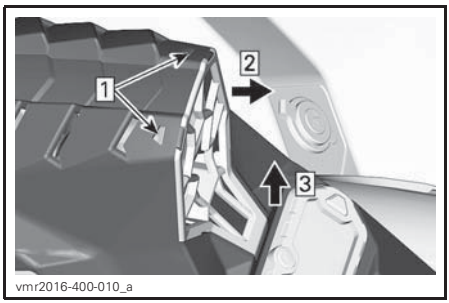
CVT Air Filter

CVT Air Filter Removal

1. Remove air filter from the snorkel cover as shown.



1. CVT air filter



Step 1: Push down on tabs
Step 2: Gently pull top of grille out
Step 3: Pull bottom of grille up

CVT Air Filter Cleaning

1. Inspect filter and replace if damaged.
2. Gently clean filter using a solution of soft soap and tap water, then rinse thoroughly.
3. Dry filter completely.
4. Clean inside the CVT air inlet duct

CVT Air Filter Installation

1. Securely reinstall the air filter on the snorkel cover.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

Gearbox Oil

Gearbox Oil Level Verification

NOTICE Check level and refill if necessary. **Do not overfill.** Operating the gearbox with an improper level may severely damage gearbox. Wipe off any spillage.

Place the vehicle on a level surface.

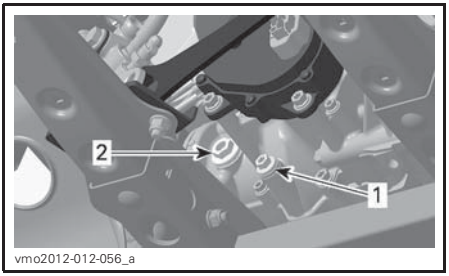
Select NEUTRAL position.

Apply parking brake.

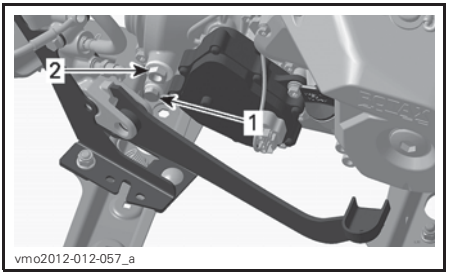
NOTE: Check the gearbox oil level when engine is cold and not running.

Clean the oil level plug area.

Remove the oil level plug.



TYPICAL - 570 ENGINE
1. *Drain plug*
2. *Oil level plug*



TYPICAL - 1000R ENGINE
1. *Drain plug*
2. *Oil level plug*

The oil should be level with the bottom of the oil level hole.

Refill as required until gearbox oil level flows through oil level hole.

Recommended Gearbox Oil

RECOMMENDED GEARBOX OIL	
Scandinavia	75W140 SYNTHETIC GEAR OIL (EUR) (P/N 779215)
All other countries	75W140 SYNTHETIC GEAR OIL (P/N 779160)

NOTE: The XPS oil is specially formulated to meet the lubrication requirements of this gearbox. BRP strongly recommends the use of its XPS oil. However, if the XPS synthetic gear oil is not available, use the following lubricant:

GEARBOX OIL REQUIREMENT
75W 140 API GL-5 synthetic gear oil

NOTICE Do not use another types of oil when servicing. Do not mix with other types of oil.

Gearbox Oil Change

NOTE: When replacing the gearbox oil, it is recommended to clean the vehicle speed sensor (VSS) at the same time.

Place the vehicle on a level surface.

NOTE: Check the gearbox oil level when engine is cold and not running.

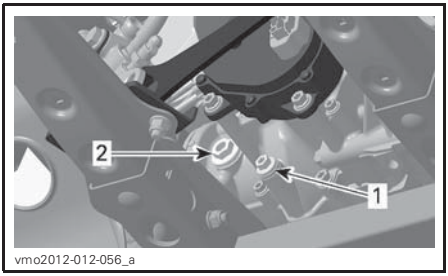
Clean the drain plug area.

Clean the oil level plug area.

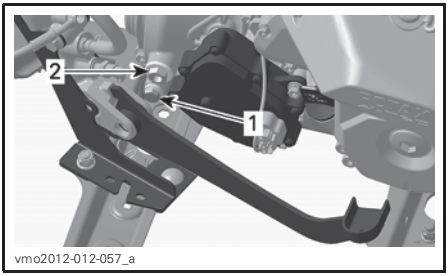
Place a drain pan underneath the drain plug.

Remove the oil level plug.

Remove the drain plug.



TYPICAL - 570 ENGINE
1. *Drain plug*
2. *Oil level plug*



TYPICAL - 1000R ENGINE
1. *Drain plug*
2. *Oil level plug*

Let oil completely drain from gearbox.

Clean the drain plug from any metallic particles.

Install the drain plug and tighten to specification.

TIGHTENING TORQUE	
Drain plug	20 N•m ± 2 N•m (15 lbf•ft ± 1 lbf•ft)

Refill gearbox.

NOTICE Use ONLY the recommended type of oil.

The oil should be level with the bottom of the oil level orifice.

NOTICE Do not overfill.

Reinstall oil level plug.

TIGHTENING TORQUE	
Oil level plug	5 N•m ± 0.6 N•m (44 lbf•**in** ± 5 lbf•**in**)

Wipe off any spillage.

Dispose gearbox oil as per your local environmental regulations.

Throttle Body

Throttle Body Inspection

1. Remove the following:
   – Air filter housing
   – Adapter hose between air filter housing and throttle body.
2. Visually inspect throttle plate and throttle body venturi for cleanliness.
3. Clean inside throttle body using a common throttle body cleaner if necessary.

Throttle Body Lubrication

No lubrication is required.

Throttle Body Cleaning

1. Remove air inlet hose from throttle body.
2. Check throttle body cleanliness using a flashlight. Fully open throttle plate and verify:
   – Throttle body bore
   – Throttle plate edge.

   Look for:
   – Dirt
   – Oily surfaces
   – Carbon and salt deposits on throttle plate and the surrounding bore.
3. Clean as necessary.
4. Use a throttle body cleaner such as GUNK INTAKE MEDIC or an equivalent.

NOTICE Only use an appropriate throttle body cleaner that will not damage O-rings and EFI sensors.

⚠ CAUTION Use the product in a well ventilated area. Refer to product manufacturer's warnings.

5. To avoid getting dirt into engine, spray cleaner on a clean rag then rub rag against throttle plate and bore. A toothbrush may also be used.

⚠ CAUTION Ensure key is removed so that nobody can activate the electrical system, otherwise the ECM would turn on. This could cause serious finger injury as the throttle plate moves quickly.

6. Gently open throttle plate and hold fully open to reach all surfaces.
7. To remove residual dirt, spray cleaner on throttle plate and on bore.
8. Reinstall removed parts.

Throttle Cable (if equipped)

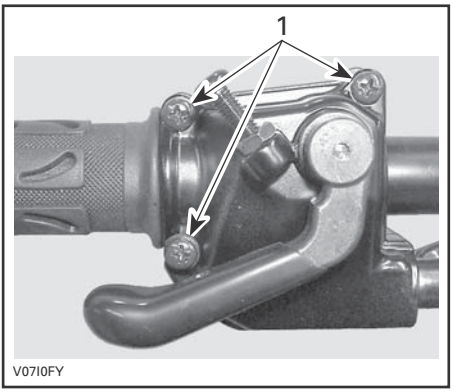
Throttle Cable Lubrication

The throttle cable must be lubricated with a silicone based lubricant or an equivalent.

⚠ WARNING

Always use a silicone-based lubricant. Using another lubricant (like a water-based lubricant) could cause the throttle lever/cable to become sticky and stiff.

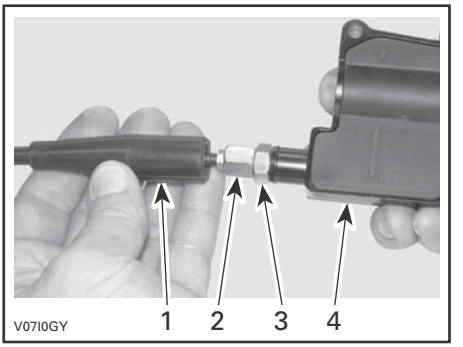
Open the throttle lever housing.



1. Remove these screws

Separate the housing.

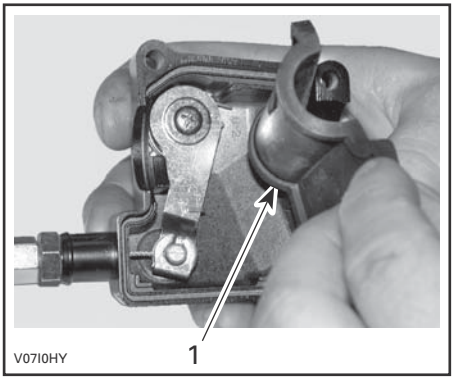
Slide rubber protector back to expose throttle cable adjuster.



1. Cable protector
2. Throttle cable adjuster
3. Lock nut
4. Throttle lever housing

Screw in the throttle cable adjuster.

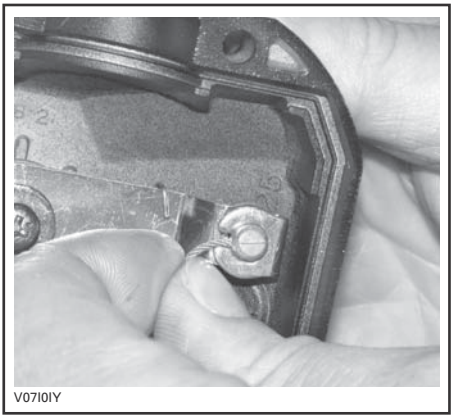
Remove inner housing protector.



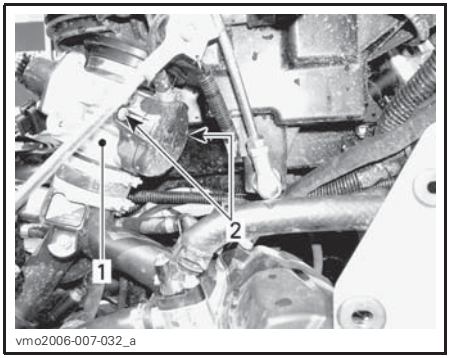
1. Inner housing protector

Remove the cable from the throttle lever housing.

NOTE: Slide cable in clip slot and remove the end of cable from clip.



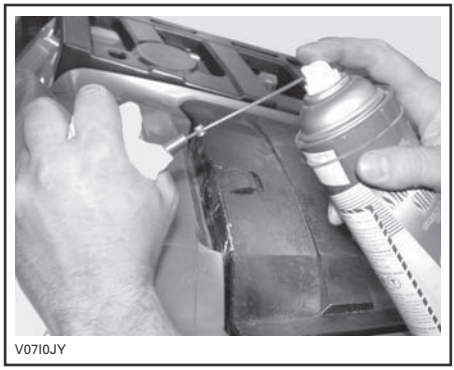
Remove the throttle body side cover.



1. Throttle body
2. Side cover screws

Insert the needle of the lubricant can in the end of throttle cable adjuster.

⚠ CAUTION Always wear appropriate skin and eye protection. Chemicals can cause a skin rash and eye injury.



TYPICAL

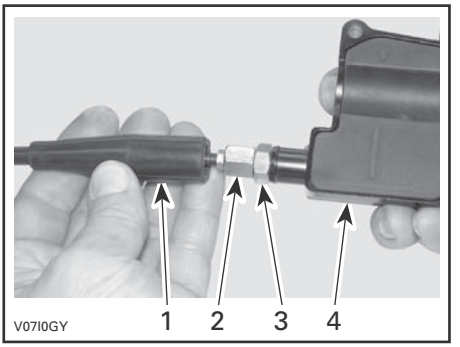
NOTE: Place a rag around the throttle cable adjuster to prevent the lubricant from splashing.

Add lubricant until it runs out at throttle body end of the throttle cable.

Reinstall and adjust the cable.

Throttle Cable Adjustment

Slide rubber protector back to expose throttle cable adjuster.

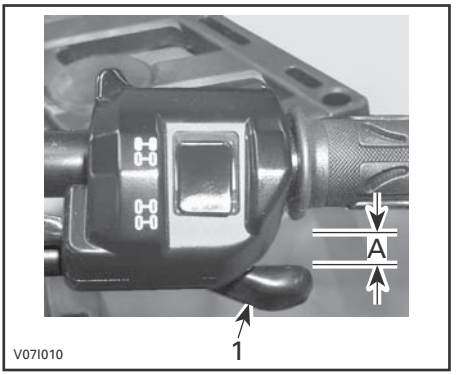


1. Cable protector
2. Throttle cable adjuster
3. Lock nut
4. Throttle lever housing

Loosen lock nut then turn the adjuster to obtain correct throttle lever free play.

NOTE: Measure throttle free play at the tip of throttle lever.

Tighten lock nut and reinstall protector.



1. Throttle lever
A. 2 mm (.079 in)

With the shift lever on PARK position, start the engine.

Check if the throttle cable is adjusted correctly by turning handlebar fully to the right then fully to the left. If the engine revolutions per minute (RPM) increases, readjust the throttle lever free play.

Spark Plugs

Spark Plug Access

Remove side panels.

Unplug spark plug cables.

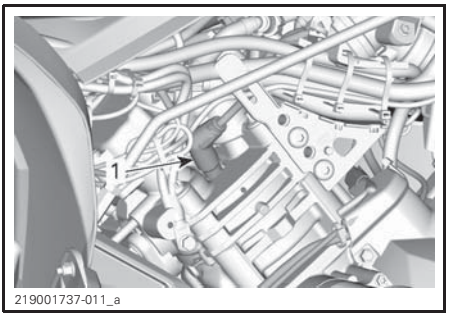
Spark Plug Removal

⚠ CAUTION Always wear safety goggles when using pressurized air.

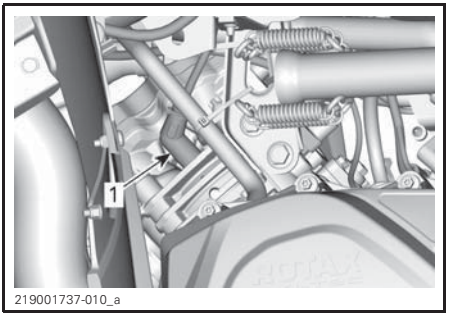
Unscrew spark plugs one turn.

Clean spark plugs and cylinder heads with pressurized air if possible.

Unscrew spark plugs completely using a spark plug socket, then remove them.



RH SIDE — REAR CYLINDER
1. Spark plug



LH SIDE — FRONT CYLINDER
1. Spark plug

Spark Plug Installation

Prior to installation, make sure that contact surfaces of cylinder heads and spark plugs are free of grime.

Using a feeler gauge, set the spark plug gap.

SPARK PLUG GAP	
570	0.8 mm to 0.9 mm (.031 in to .035 in)
1000R	0.7 mm to 0.9 mm (.028 in to .035 in)

Apply a small amount of copper-based anti-seize lubricant over spark plug threads.

Screw spark plugs into cylinder heads by hand and tighten with a torque wrench and a proper socket.

⚠ CAUTION Do not overtighten spark plugs, engine damage can occur.

TIGHTENING TORQUE	
Spark Plug (570)	20 N•m ± 2.4 N•m (15 lbf•ft ± 2 lbf•ft)
Spark Plug (1000R)	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)

CVT Cover

NOTE: For a better understanding, some illustrations are taken with engine out of vehicle. To perform the following instructions, it is not necessary to remove engine.

This CVT is lubrication free. Never lubricate any components except drive pulley bearing.

⚠ WARNING

Never touch CVT while engine is running. Never drive vehicle when CVT cover is removed.

⚠ WARNING

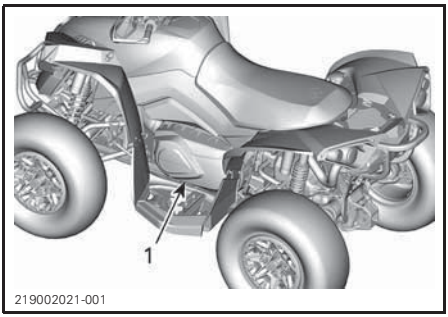
Engine must be cool before cover is removed. Always wear protective gloves when removing cover.

Place the vehicle on a level surface. Select PARK position.

CVT Cover Access

The CVT cover is located on the LH side of the vehicle.

Remove the following:
- LH side and extension panels
- LH footboard panel.



TYPICAL
1. CVT cover

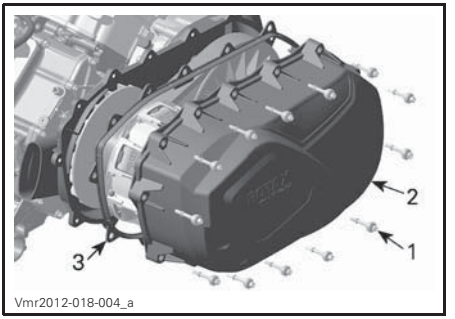
CVT Cover Removal

Remove all CVT cover retaining screws.

Remove the center top screw last to support the cover during removal.

NOTICE Do not use an impact tool to remove CVT cover screws.

Remove the CVT cover and its gasket.



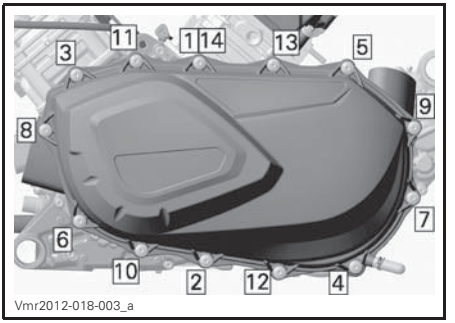
1. *CVT cover screw*
2. *CVT cover*
3. *Gasket*

CVT Cover Installation

Install the center top screw of first.

NOTE: Do not use and impact tool to install CVT cover screws.

Tighten the CVT cover screws as per following sequence.



CVT COVER TIGHTENING SEQUENCE

TIGHTENING TORQUE	
CVT cover screws	7 N•m ± 0.8 N•m (62 lbf•**in** ± 7 lbf•**in**)

Drive Belt

Drive Belt Removal

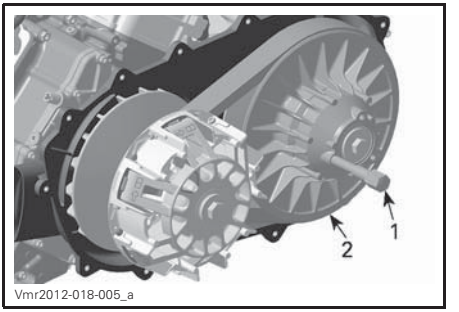
NOTICE **In case of a drive belt failure, the CVT, cover, drain reservoir and air outlet must be cleaned and inspected for obstruction.**

Remove *CVT COVER*.

Open driven pulley.

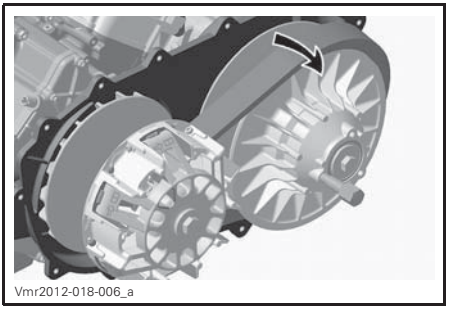
REQUIRED TOOL	
PULLER/LOCKING TOOL (P/N 529 036 098)	

Screw tool in the threaded hole of driven pulley and tighten to open the pulley.



1. *Puller/locking tool*
2. *Fixed sheave of driven pulley*

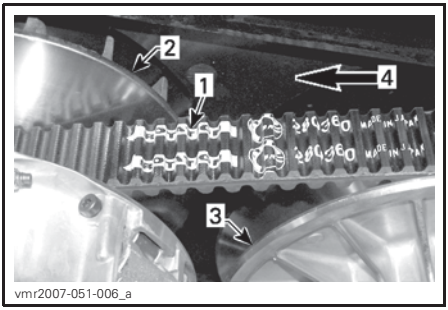
Slide the belt over the top edge of fixed sheave to remove it.



Drive Belt Installation

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

The maximum drive belt life span is obtained when the drive belt has the proper rotation direction. Install it so that the arrow printed on belt is pointing towards front of the vehicle, viewed from top.



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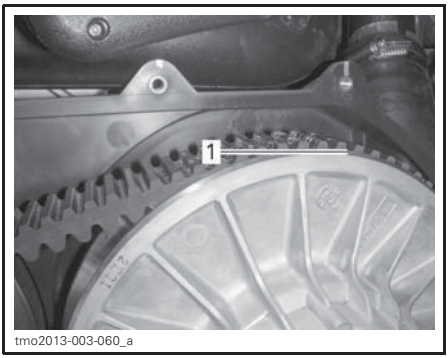
1. *Arrow printed on belt*
2. *Drive pulley (front)*
3. *Driven pulley (rear)*
4. *Rotation direction*

Turn the driven pulley until the lowest portion of the cogs on the external surface of drive belt is even with the driven pulley edge.



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1. *Lowest portion of cogs even with external surface of drive belt*

Drive and Driven Pulleys

Drive and Driven Pulleys Inspection

This inspection must be performed by an authorized Can-Am dealer, repair shop, or person of your own choosing for maintenance, repair, or replacement.

Drive Pulley

Inspect the bushings of the sliding sheave of the drive pulley, replace worn parts.

Driven Pulley

Inspect the bushings of the cam and of the sliding sheave of the driven pulley, replace worn parts.

Battery

⚠ WARNING

Unless otherwise indicated, always remove D.E.S.S. key from D.E.S.S. post before performing any maintenance or repair on electrical system.

⚠ CAUTION **Never charge a battery while installed in vehicle.**

These vehicles are equipped with a VRLA battery (Valve Regulated Lead Acid). It is a maintenance-free type battery, there is no need to add water to adjust electrolyte level.

NOTICE **Never remove the battery sealing cap.**

Battery Access

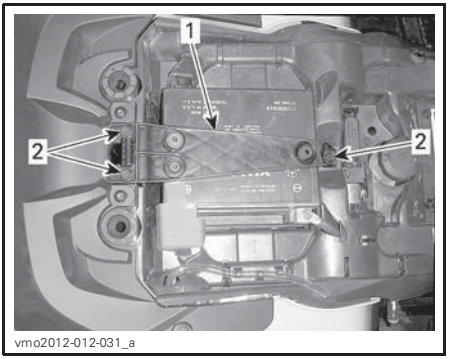
Refer to *CONTROLS/INSTRUMENTS/EQUIPMENT* and remove seat.

Battery Removal

NOTICE **Always disconnect BLACK (-) battery cable first.**

Disconnect BLACK (-) cable first then RED (+) cable.

Remove the retaining screws and the battery holder, then pull the battery out of frame.



1. Battery holder
2. Retaining screws

Battery Cleaning

Clean battery, battery casing and battery posts using a solution of baking soda and water.

Remove corrosion from battery cable terminals and battery posts using a firm wire brush.

Battery Installation

Reinstall battery in vehicle.

Tighten the support screws to specified torque.

TIGHTENING TORQUE	
Battery support screws	4.5 N•m ± 0.5 N•m (40 lbf•**in** ± 4 lbf•**in**)

NOTICE Always connect RED (+) battery cable first.

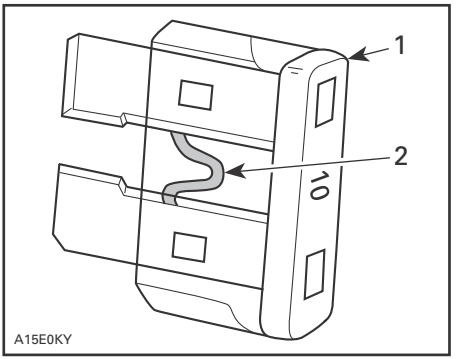
Fuses

CAUTION Always remove D.E.S.S. key from D.E.S.S. post before replacing a defective fuse.

Fuse Inspection

Check if filament is melted.

If filament is melted, replace damaged fuse, refer to *FRONT FUSE BOX DESCRIPTION* for proper rating.

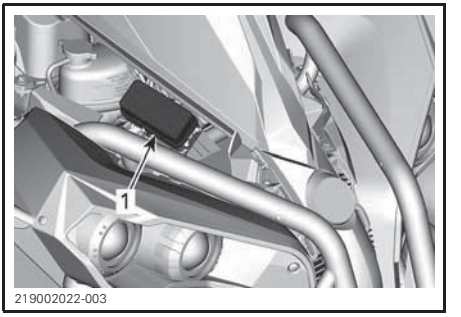


TYPICAL
1. Fuse
2. Check if melted

NOTICE Do not use a higher rated fuse as this can cause severe damage.

Front Fuse Access

Refer to *CONTROLS/INSTRUMENTS/EQUIPMENT* and remove the console.



1. Front fuse box

NOTE: The fuses location is marked inside the fuse box cover.

NOTICE Do not store any objects in the front service compartment.

Front Fuse Box Description

570 models

FRONT FUSE BOX		
NO.	DESCRIPTION	RATING
RY1	Fan relay	-
RY2	Main relay	-
RY3	Accessories relay	-
RY4	Fuel pumps relay	-
RY5	Lights relay	-
RY8	Brake relay	-
F4	Relays Speedometer	5 A
F5	Injectors/ignition	5 A
F6	Engine control module (ECM) / 2WD/4WD / DESS	5 A
F7	Winch	5 A
F8	Key switch/starter solenoid	5 A
F9	Resetable cooling fan	25 A
F11	Lights	30 A
F12	DC outlet	15 A
F14	Taillight ACC	15 A
F15	Fuel pump	5 A

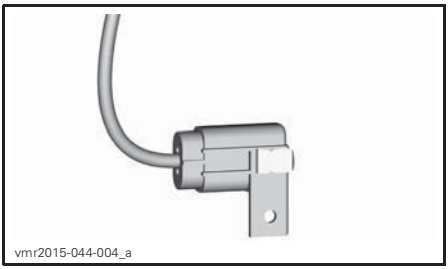
1000R models

FRONT FUSE BOX		
NO.	DESCRIPTION	RATING
RY1	Fan Relay	-
RY2	Main Relay	-
RY3	Lights Relay	-
RY5	Accessories	-
RY6	Brake Relay	-

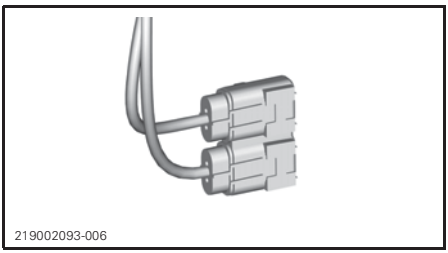
FRONT FUSE BOX		
NO.	DESCRIPTION	RATING
F1	Start Switch	10 A
F2	Lights	30 A
F3	Accessories 1	20 A
F4	Accessories 2	20 A
F5	Injectors Ignition coils Fuel Pump	10 A
F6	Relays Gauge	10 A
F7	Brake lights	10 A
F8	ECM	10 A
F9	2WD/4WD	10 A
F12	DC Outlet	25 A

Rear Fuse Holder

The fusible links and rear fuse holder are located behind the RH side panel.



REAR FUSE HOLDER



FUSE BOX 2

FUSE HOLDER	
DESCRIPTION	Rating
DPS (Dynamic Power Steering)	40 A
Main	40 A

Lights

CAUTION Always remove D.E.S.S. key from D.E.S.S. post before replacing a defective bulb.

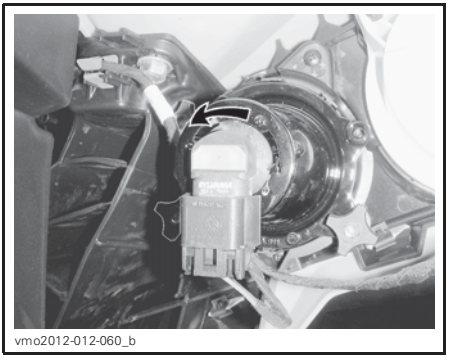
Always check light operation after replacement.

Headlight Bulb Replacement

NOTICE Never touch glass portion of a halogen bulb with bare fingers, it shortens its operating life. If glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

Unplug connector from bulb.

Rotate light bulb counterclockwise to release it from light housing.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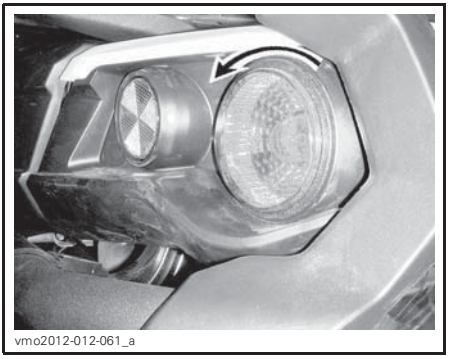
Pull out bulb.

Properly reinstall removed parts in the reverse order of their removal.

Validate headlights operation.

Taillight/Brake Light Bulb Replacement

Rotate taillight counterclockwise to remove it from taillight housing.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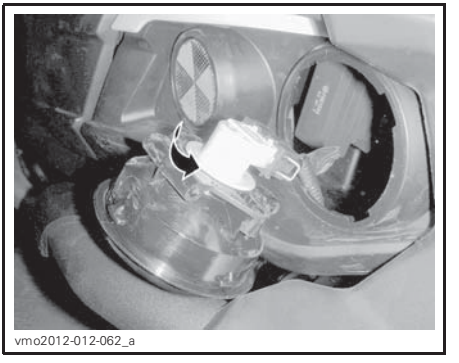
Disconnect the light bulb connector.

Rotate light bulb counterclockwise to remove it from taillight.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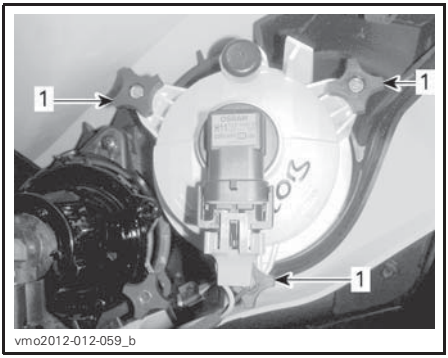
Installation is the reverse of the removal procedure.

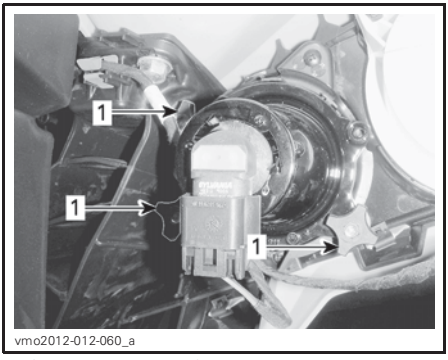
Headlight Beam Aiming

Turn adjustment knobs to adjust beam height to your convenience.

NOTE: Adjust headlights evenly.



LOW BEAM ADJUSTMENT
1. *Adjustment knobs*



HIGH BEAM ADJUSTMENT
1. *Adjustment knobs*

Drive Shaft Boot and Protector

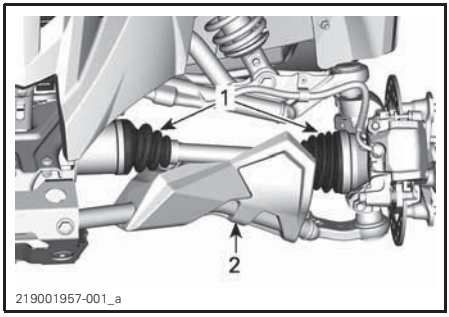
Drive Shaft Boot and Protector Inspection

Visually inspect drive shaft protectors and boots conditions.

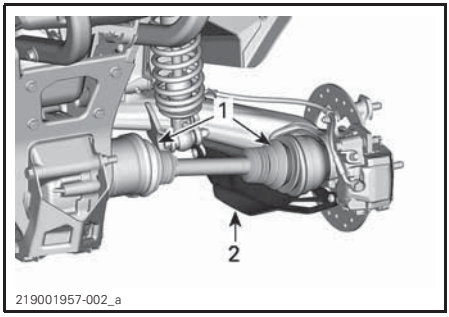
Check protectors for damage or rubbing against shafts.

Check boots for cracks, tears, leaking grease etc.

Repair or replace damaged parts as necessary.



TYPICAL — FRONT OF VEHICLE
1. *Drive shaft boots*
2. *Drive shaft protector*



TYPICAL — REAR OF VEHICLE
1. *Drive shaft boots*
2. *Drive shaft protector*

Wheel Bearing Inspection

Place vehicle on a level surface.

Apply parking brake.

Lift vehicle.

Secure vehicle on jack stands.

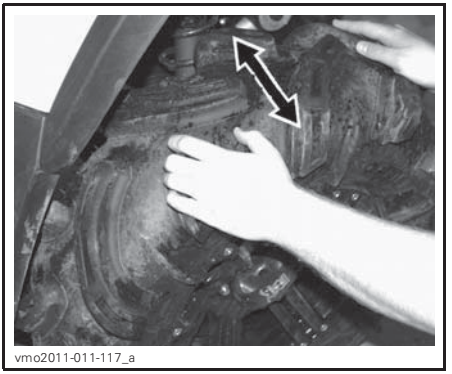
Push and pull the wheels from the upper edge to feel the play.

See an authorized Can-Am dealer if there is an abnormal play.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.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TYPICAL

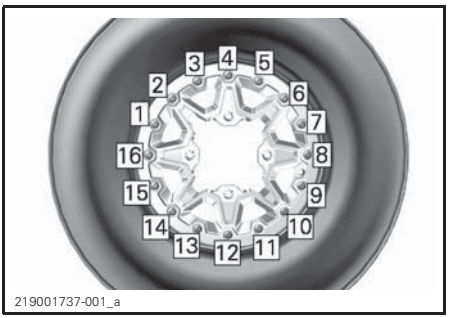
Wheel Beadlock Inspection

Wheel Beadlock Retightening

NOTICE Do not use an impact wrench for tightening beadlock screws in order to avoid to damage them.

1. Tighten all screws to specification and according to the following tightening sequence.

TIGHTENING TORQUE	
Beadlock screws	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)



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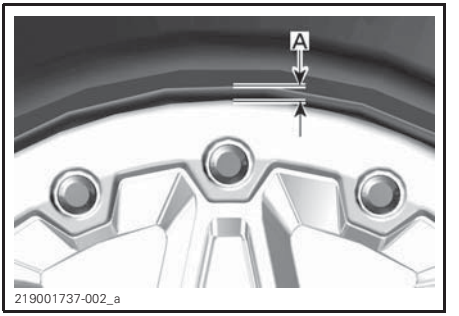
TYPICAL - FINAL TIGHTENING SEQUENCE

2. Tighten screws **a few turns at a time** to ensure even pressure on the beadlock clamp ring.

NOTE: It is normal that the beadlock clamp ring flexes slightly to match the tire bead.

Wheel Beadlock Gap Verification

1. Verify the gap between tire and beadlock clamp ring, it should be practically equal all around the ring.



219001737-002_a

TYPICAL
A. Gap between tire and ring

If the gap is not acceptable, see *TIRE REPLACEMENT*.

Wheels and Tires

Tire Pressure

⚠ WARNING

Tire pressure greatly affects vehicle handling and stability. Insufficient pressure may cause tire to deflate and rotate on wheel. Overpressure may burst the tire. Always follow recommended pressure. NEVER set tire pressure below minimum. It could cause the tire to dislodge from the rim. Since tires are low-pressure types, a manual pump should be used.

Check pressure when tires are **cold** before using the vehicle. Tire pressure changes with temperature and altitude. Recheck pressure if one of these conditions has changed.

For your convenience, a pressure gauge is supplied in tool kit.

Refer to *SPECIFICATIONS* for values.

Although the tires are specifically designed for off-road use, a flat may still occur. Therefore, it is recommended to carry a tire pump and a repair kit.

Tire Inspection

Check tire for damage and wear. Replace if necessary.

The tires are directional and their rotation must be kept in a specific direction for proper operation.

Tire Replacement

Tires replacement should be performed by an authorized Can-Am dealer.

⚠ WARNING

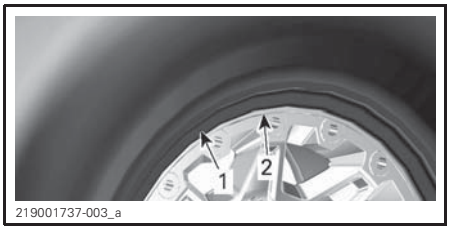
- When the tires are replaced, never install a bias tire with a radial tire. Such a combination could create handling and/or stability problems.
- Do not mix tires of different size and/or design on the same axle.
- Front and rear tire pairs must have an identical model and manufacturer.
- For unidirectional tread pattern, ensure that the tires are installed in the correct direction of rotation.
- The radial tires must be installed as a complete set.

Tire Mounting on Beadlock Wheels

1. Mount the tire on wheel.
   1.1 On the opposite side of beadlock, apply tire mounting lube on inner bead of tire and wheel to ensure proper seat when inflating. Mount the inner bead over the wheel like normal.

   NOTICE Mount tire from beadlock side only.

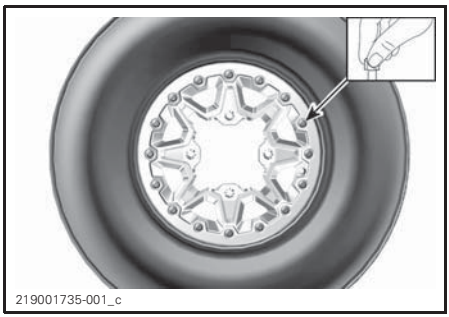
   1.2 Seat tire outer bead in the shoulder of the beadlock inner ring and center the tire.



TYPICAL
1. Tire outer bead
2. Beadlock inner ring shoulder

2. Install all beadlock screws. To avoid cross threading, start all screws by hand.

NOTICE Do not use an impact wrench for installing beadlock screws. The risk of screw breaking or screw stripping is high when using an impact wrench.

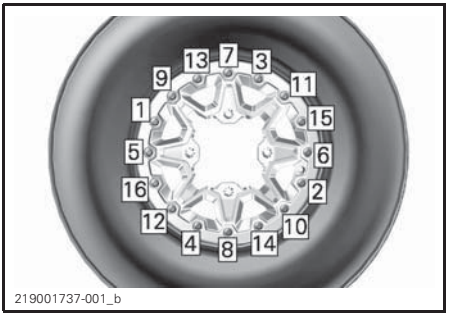


TYPICAL

3. Tighten beadlock screws as per following specification and sequence.

NOTE: To ensure even pressure on the beadlock clamp ring, tighten screws **a few turns at a time**.

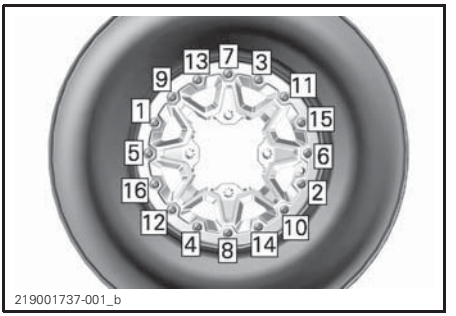
TIGHTENING TORQUE	
Beadlock screws (FIRST SEQUENCE)	3 N•m ± 1 N•m (27 lbf•**in** ± 9 lbf•**in**)



TYPICAL - TIGHTENING SEQUENCE

4. At this time check if the tire is still centered on wheel. Reposition it if necessary.
5. Tighten beadlock screws as per the **second** torque using the same sequence.

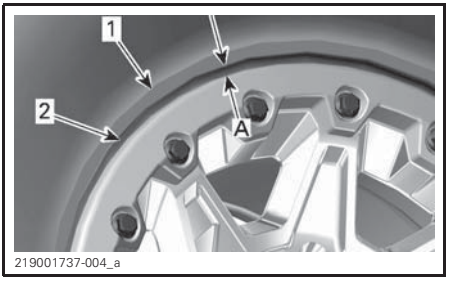
TIGHTENING TORQUE	
Beadlock screws (SECOND SEQUENCE)	8 N•m ± 1 N•m (71 lbf•**in** ± 9 lbf•**in**)



TYPICAL - TIGHTENING SEQUENCE

NOTE: The beadlock clamp ring can flex slightly to match the tire bead. IT IS NORMAL.

6. Verify the gap between tire and beadlock clamp ring, it should be practically equal all around the ring.

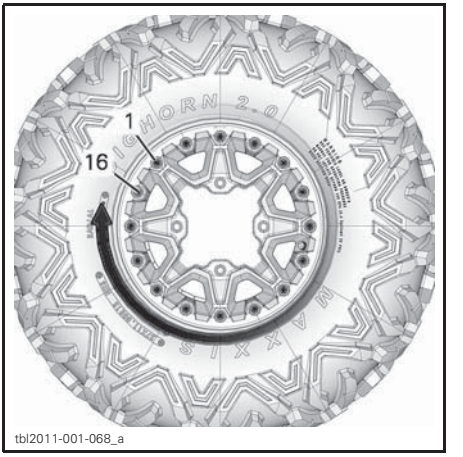


1. Tire
2. Beadlock clamp ring edge
A. Gap equal all around beadlock clamp ring

If the gap is not acceptable,
- Loosen all screws.
- Check tire position on wheel and reposition it if necessary.
- Restart the torquing sequence as detailed.

7. Torque beadlock screws a **final** time following the indicated sequence.

TIGHTENING TORQUE	
Beadlock screws (FINAL SEQUENCE)	11 N•m ± 1 N•m (97 lbf•**in** ± 9 lbf•**in**)



TYPICAL - FINAL TIGHTENING SEQUENCE

8. Inflate tire to seat the inner bead on wheel. Always use safe practices, such as a tire safety cage.

⚠ WARNING

Never exceed tire's recommended maximum pressure for seating beads.

Wheel Removal

Place vehicle on a level surface.

Engage 4WD mode.

Apply the parking brake.

Loosen lug nuts then lift vehicle.

Secure vehicle on jack stands.

Remove lug nuts then remove wheel.

Wheel Installation

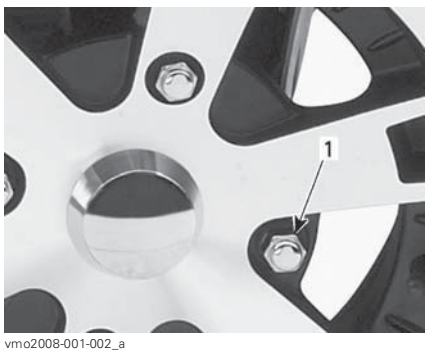
At installation, it is recommended to apply anti-seize lubricant on threads.

If tires are unidirectional, make sure to install wheel according to tire rotation.

Carefully tighten lug nuts in a criss-cross sequence then apply final torque.

TIGHTENING TORQUE	
Wheel lug nut	80 N•m ± 5 N•m (59 lbf•ft ± 4 lbf•ft)

NOTICE Always use the recommended wheel lug nuts according to the type of wheel. Using a different nut could cause damage to the rim or studs.



TYPICAL — ALUMINUM WHEEL
1. Wheel lug nut (closed end type)

Steering

Steering Inspection

Tie-rod Ends

Place vehicle on a level surface.

Apply parking brake.

Lift and support the front of vehicle.

Secure vehicle on jack stands.

Inspect tie-rods boot for cracks.

Push and pull the wheels from the front or rear edge to feel the play.

See an authorized Can-Am dealer if there is an abnormal play or the boot is cracked.

⚠ WARNING

The tie-rod end must be replaced if the boot is cracked. The steering system must be inspected if abnormal play is detected. See an authorized Can-Am dealer.

Suspension

Front Suspension Lubrication

Lubricate front stabilizer bar bushings and suspension arms at grease fittings.

SUSPENSION GREASE	
Scandinavia	SYNTHETIC SUSPENSION GREASE (EUR) (P/N 779226)
All other countries	SYNTHETIC SUSPENSION GREASE (P/N 779163)

Rear Suspension Lubrication

Lubricate rear stabilizer bar links and pivot bushing at grease fittings.

SUSPENSION GREASE	
Scandinavia	SYNTHETIC SUSPENSION GREASE (EUR) (P/N 779226)
All other countries	SYNTHETIC SUSPENSION GREASE (P/N 779163)

Suspension Inspection

Shock Absorbers

Inspect shock absorber for oil leaks or other damage.

Check tightness of fasteners.

See an authorized Can-Am dealer as necessary.

Ball Joints

Place vehicle on a level surface.

Apply parking brake.

Lift vehicle.

Secure vehicle on jack stands.

Inspect ball joint boots for cracks.

Push and pull the wheels from the upper and lower edge to feel the play.

See an authorized Can-Am dealer if there is an abnormal play or the boot is cracked.

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TYPICAL

⚠ WARNING

The ball joint must be replaced if the boot is cracked or it shows an abnormal play. See an authorized Can-Am dealer.

Front Suspension Arms

Check suspension arms for cracks, bending or other damage.

See an authorized Can-Am dealer as necessary.

Rear Trailing Arms

Check trailing arms for distortion, cracks or bending.

See an authorized Can-Am dealer if any problem is detected.

Brakes

⚠ WARNING

New brakes will not operate at their maximum efficiency until their break-in is completed. Braking performance may be reduced, so use extra caution.

Brake Fluid Reservoir Level Verification

NOTE: A low level may indicate leaks or worn brake pads. See an authorized Can-Am dealer.

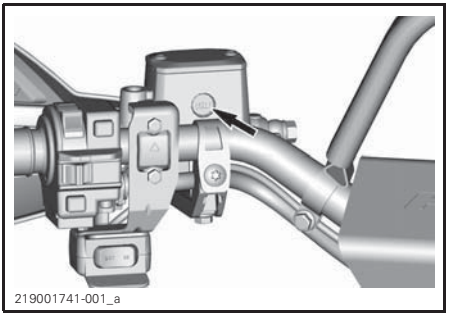
Brake Lever Fluid Reservoir(s)

Turn steering in the straight-ahead position to ensure reservoir is level.

Check the brake fluid level. The reservoir is full when the fluid reaches the top of window.

Visually inspect lever boot condition.

Check for cracks, tears, etc. Replace if damaged.

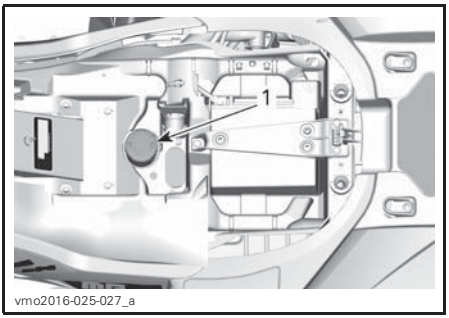


TYPICAL

Rear Brake Reservoir Level Verification

Refer to *CONTROLS/INSTRUMENTS/EQUIPMENT* and remove the seat.

With vehicle on a level surface, liquid should be between MIN. and MAX. level marks of brake pedal fluid reservoir.



1. Rear brake fluid reservoir

Adding Brake Fluid

Clean filler cap.

⚠ WARNING

Clean filler cap before removing.

Remove screws retaining the reservoir cap.

Remove reservoir cap.

Add fluid as required using a clean funnel. **Do not overfill.**

NOTICE **Brake fluid can damage plastic and painted surface. Wipe off and clean any spillage.**

Reinstall reservoir cap and tighten screws.

NOTE: Ensure filler cap diaphragm is pushed inside the cap before closing the brake fluid reservoir.

Recommended Brake Fluid

Always use DOT 4 brake fluid from a sealed container.

⚠ WARNING

To avoid damage to the braking system, do not use other brake fluid types.

Brake Inspection

⚠ CAUTION **The brakes can be very hot after prolonged use of the vehicle and can cause burns. Wait for the brakes to cool down.**

The brake inspection, maintenance and repair should be performed by an authorized Can-Am dealer.

However, verify the following between visits to your dealer:

- Brake fluid level
- Brake system for fluid leaks
- Brake cleanliness.

⚠ WARNING

The brake fluid replacement or brake system maintenance and repairs should be performed by an authorized Can-Am dealer.

Post-Operation Care

When vehicle is used in salt-water environment (beach area, launching and loading boats etc.), rinsing the vehicle with fresh water is necessary to preserve vehicle and its components. Metallic parts lubrication is highly recommended. Use LUBRICANT AND ANTI-CORROSIVE (P/N 779168) or an equivalent. This must be performed at the end of each operating day.

When vehicle is operated in muddy conditions, rinsing the vehicle is recommended to preserve vehicle and its components and to keep lights clean.

Vehicle Cleaning

NOTICE Never use a high pressure washer to clean the vehicle. USE LOW PRESSURE ONLY (like a garden hose).

Pay attention to certain areas where mud or debris can accumulate and potentially cause wear, interferences or promote corrosion.

Wash the vehicle with a soapy water solution.

NOTICE Never clean polypropylene body parts with any petroleum base cleaning products, as it will alter the glossy finish.

Non Compatible Cleaning Products

MATERIAL TYPE	NON-COMPATIBLE CLEANING PRODUCTS
Polypropylene (body parts)	ANY PETROLEUM BASE CLEANING PRODUCTS
	XPS ATV FINISHING SPRAY (P/N 219 701 704)
	XPS ATV CLEANING KIT (P/N 219 701 713) (it contains the above XP-S ATV Finishing Spray)

DO NOT USE ON POLYPROPYLENE

Compatible Cleaning Products

MATERIAL TYPE	COMPATIBLE CLEANING PRODUCT
Polypropylene (body parts)	XPS ATV WASH (P/N 219 701 702)
	Soapy water

vbs2012-006-001

SAFE FOR POLYPROPYLENE

STORAGE AND PRESEASON PREPARATION

⚠ WARNING

Have an authorized Can-Am dealer inspect fuel system integrity as specified in *MAINTENANCE SCHEDULE*.

When a vehicle is not in use for more than four (4) months, proper storage is a necessity.

When using your vehicle after storage, a preparation is required.

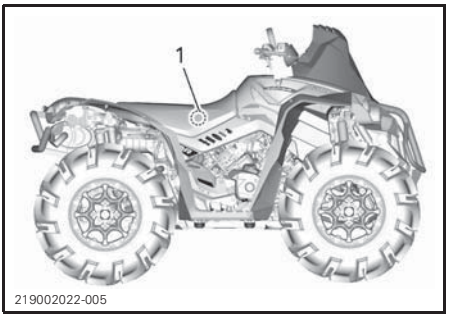
See an authorized Can-Am dealer, repair shop or person of your own choosing to have your vehicle prepared for either storage or the preseason.

TECHNICAL INFORMATION

VEHICLE IDENTIFICATION

The main components of your vehicle (engine and frame) are identified using different serial numbers. It may sometimes become necessary to locate these numbers for warranty purposes or to trace your vehicle in the event of loss. These numbers are also required by the authorized Can-Am dealer to complete warranty claims properly. We strongly recommend that you take note of all the serial numbers on your vehicle and supply them to your insurance company.

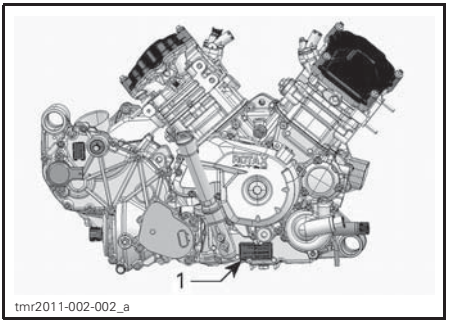
Vehicle Identification Number



TYPICAL
1. VIN Label - On the frame under the seat

TYPICAL - VIN LABEL

Engine Identification Number

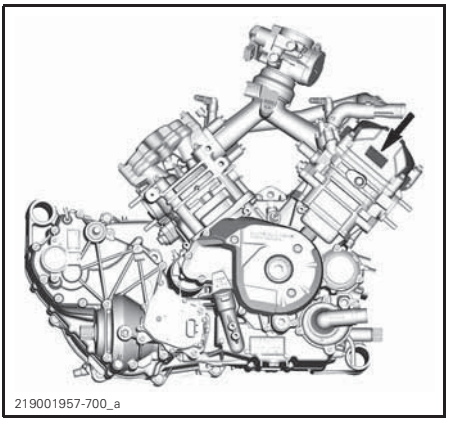


TYPICAL — RH SIDE OF ENGINE
1. EIN (Engine Identification Number)

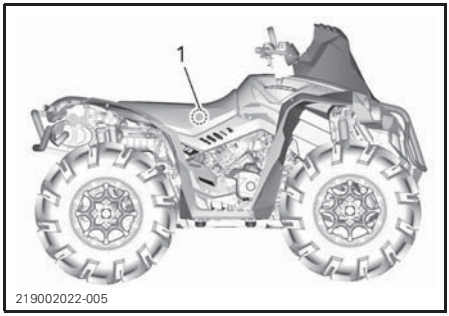
Compliance Label

Regulation (EU) 2016/1628 applicable for Non-Road Mobile Machineries

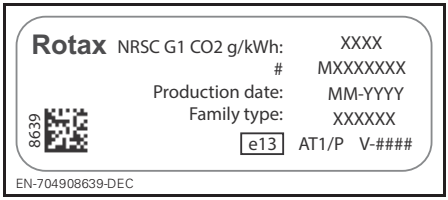
Vehicles who comply to Regulation (EU) 2016/1628 (NRMM) are identified on the engine valve cover as well as under the seat.



TYPICAL



TYPICAL
1. NRMM Label - On the frame under the seat



TYPICAL - NRMM IDENTIFICATION LABEL

NOTE: Tampering with the engine or its components voids the EU type-approval of that particular engine.

Radio Frequency Digitally Encoded Security System (RF D.E.S.S. key)

This device complies with FCC Part 15 and Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IC Registration Number: 12006A-M01456

FCC ID: 2ACERM01456

We, the party responsible for compliance, declare under our sole responsibility that the device is in conformity with the provisions of the following Council Directive: 2014/53/EU. To which this declaration relates is in conformity with the essential requirements and other relevant requirements. The product is in conformity with the following directives, harmonized standards and regulations: Radio Equipment Directive (RED) 2014/53/EU and Harmonized Standards: EN 300 330-2, EN 60950-1.

NOISE EMISSION CONTROL SYSTEM REGULATION (CANADA/UNITED STATES)

Tampering with Noise Control System is Prohibited!

U.S. Federal law and Canadian provincial laws may prohibit the following acts or the causing there of:

1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use or
2. The use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those Acts Presumed to Constitute Tampering Are the Acts Listed Below:

1. Removal or alteration or the puncturing of the muffler or any engine component which conducts removal of engine exhaust gases.
2. Removal or alteration or the puncturing of any part of the intake system.
3. Replacing any moving parts of the vehicle or parts of the exhaust or intake system, with parts other than those specified by the manufacturer.
4. Lack of proper maintenance.

NOISE EMISSION AND VIBRATION VALUES (ALL COUNTRIES EXCEPT CANADA/UNITED STATES)

MODEL		Renegade X mr 570	Renegade X mr 1000R
NOISE EMISSION AND VIBRATION VALUES[1]			
Noise	Sound pressure (L_{pA})	82 dB(A) @ 4000 RPM (Uncertainty (K_{pA}) 3 dB(A))	87 dB(A) @ 3500 RPM (Uncertainty (K_{pA}) 3 dB(A))
	Sound power level (L_{WA})	93 dB(A) @ 4000 RPM (Uncertainty (K_{WA}) 3 dB(A))	94 dB(A) @3500 RPM (Uncertainty (K_{WA}) 3 dB(A))
Vibration	Hand-arm system	<2,5 m/s^2 @ 4000 RPM	5 m/s^2 @ 3500 RPM
	Whole body at seat	<0,5 m/s^2 @ 4000 RPM	<0,5 m/s^2 @ 3500 RPM

[1]: Noise emission and Vibration values are measured in accordance with Standard EN 15997:2011 on a paved surface, at Neutral.

EC-DECLARATION OF CONFORMITY

565 de la Montagne Street
Valcourt (Québec) J0E 2L0
Canada

www.brp.com

BRP ADVENTURE BY DESIGN

EU Declaration of Conformity

Authorized Representative: BRP Europe N.V., Skaldenstraat 125, Gent, Belgium, 9042

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The undersigned, representing the manufacturer, hereby declares that model year **2021 All Terrain Vehicles (ATVs)** marked with the CE mark and a 17-character vehicle identification number (VIN) structured as **3JBxxxxxxMxxxxxxx** under commercial names **Can-am Outlander** and **Can-am Renegade** comply with all the relevant provisions of the following Directives and Regulations:

Machinery Directive 2006/42/EC as amended up to and including Reg. 2019/1243/EU	ISO 12100:2010 & EN 15997:2011
Non-Road Mobile Machinery (NRMM) Regulation (EU) 2016/1628 on gaseous pollutants	Category ATS, Stage V emissions limits.
Electromagnetic Compatibility (EMC) Directive 2014/30/EU as amended up to and including Reg. (EU) 2018/1139	CISPR 12:2007/A1:2009 & IEC 61000-6-1:2005 or UN R10.04 or later version
Battery Directive 2006/66/EC as amended up to and including Dir. (EU) 2018/849	
Radio Equipment (RED) Directive 2014/53/EU as amended up to and including Reg. 2018/1139 (If fitted with radio frequency (RF) D.E.S.S. key)	EN 300 330-2 & EN 60950-1

Renald Plante, Eng.
Director, Product Development, Can-Am ATV & Spyder
Bombardier Recreational Products Inc.

Valcourt, QC, Canada

January 29th, 2020

ski-doo LYNX SEA-DOO EVINRUDE ROTAX can-am

DoC_ATV_MY21-EN 15997

EAC DECLARATION OF CONFORMITY

Left blank for Eurasian Conformity mark where applicable

SPECIFICATIONS

570 Engine

ENGINE		570
Engine type		ROTAX® 570, 4-stroke, 2 cylinders (V-twin), liquid cooled
Valve train		4 valves/cylinder (mechanical adjustment), single over head camshaft (SOHC) with timing chain
Valve clearance	Intake	0.06 mm to 0.14 mm (.0024 in to .0055 in)
	Exhaust	0.11 mm to 0.19 mm (.0043 in to .0075 in)
Bore		84 mm (3.31 in)
Stroke		51.4 mm (2.02 in)
Displacement		570 cm^3 (34.8 in^3)
Exhaust system		Spark arrestor approved by USDA Forest Service Catalyst on NRMM models
Air filter		Synthetic paper filter with foam

1000R Engine

ENGINE		1000R
Engine type		ROTAX®, 4-stroke, 2 cylinders (V-twin), liquid cooled
Valve train		4 valves/cylinder (mechanical adjustment), single over head camshaft (SOHC) with timing chain
Valve clearance	Intake	0.06 mm to 0.14 mm (.0024 in to .0055 in)
	Exhaust	0.11 mm to 0.19 mm (.0043 in to .0075 in)
Bore		91 mm (3.58 in)
Stroke		75 mm (2.95 in)
Displacement		976 cm^3 (59.6 in^3)
Exhaust system		Spark arrestor approved by USDA Forest Service Catalyst on NRMM models
Air filter		Synthetic paper filter with foam

Vehicles

LUBRICATION SYSTEM		
Type		Wet sump. Replaceable cartridge oil filter
Oil filter		BRP Rotax paper type, replaceable
Engine oil	Capacity (oil change with filter)	2.0 L (2.1 qt (U.S. liq.))
	Recommended oil Scandinavia	4T 10W50 SYNTHETIC OIL (EUR) (P/N 779240) or 4T 5W40 SYNTHETIC BLEND OIL (EUR) (P/N 779290). or 4T 0W40 SYNTHETIC OIL (EUR) (P/N 779286)
	Recommended oil All other countries	4T 10W50 SYNTHETIC OIL (P/N 779234) or 4T 5W40 SYNTHETIC BLEND OIL (P/N 779133) or 4T 0W40 SYNTHETIC OIL (P/N 779139)
	Alternate oil if XPS products are not available	5W40 or 10W50 motor oil that meets the requirements for API service classification SJ, SL, SM or SN

COOLING SYSTEM			
Coolant	Type		Scandinavia: EXTENDED LIFE PRE-MIXED COOLANT (EUR) (P/N 779223) All other countries: EXTENDED LIFE PRE-MIXED COOLANT (P/N 779150) or coolant specifically designed for aluminum engines
	Capacity	570	3.4 L (.9 U.S. gal.)
		1000R	3.5 L (.92 U.S. gal.)

TRANSMISSION		
Type		CVT (Continuously Variable Transmission), sub-transmission with L/H/N/R/P, standard engine braking
Engagement RPM	570	1800 RPM
	1000R	1800 RPM

GEARBOX		
Type		Dual range (HI-LO) with park, neutral and reverse
Gearbox oil	Capacity	450 ml (15.22 U.S. oz)
	Recommended	Scandinavia: 75W140 SYNTHETIC GEAR OIL (EUR) (P/N 779215) All other countries: 75W140 SYNTHETIC GEAR OIL (P/N 779160) or a 75W140 API GL-5 synthetic gear oil

ELECTRICAL SYSTEM			
Magneto generator output		1000R	625 W @ 6000 RPM
		570	500 W @ 6000 RPM
Ignition system type			IDI (Inductive Discharge Ignition)
Ignition timing			Not adjustable
Spark plug	570	Quantity	2
		Make and type	NGK DCPR8E or equivalent
		Gap	0.8 mm to 0.9 mm (.031 in to .035 in)
	1000R	Quantity	2
		Make and type	NGK LMAR8D-J or equivalent
		Gap	0.7 mm to 0.9 mm (.028 in to .035 in)
Engine RPM limiter setting		Forward	8000 RPM
		Reverse	15 km/h (9 MPH) (without override)
Battery		Type	Maintenance free
		Voltage	12 volts
		Nominal rating	18 A•h
		Power starter output	0.7 KW
Headlights		High	2 x 60 W (HB3)
		Low	2 x 60 W (HB3)
Taillights			2 x 5/21 W
Fuses			Refer to *FUSES* in *MAINTENANCE PROCEDURE*

FUEL SYSTEM		
Fuel delivery	570	Electronic Fuel Injection (EFI), 46 mm throttle body, 1 injector per cylinder
	1000R	Electronic Fuel Injection (EFI), 54 mm throttle body, 1 injector per cylinder
Fuel pump	Type	Electrical (in fuel tank)

FUEL SYSTEM		
Idle speed		1400 RPM (not adjustable)
Fuel	Type for 570	Regular unleaded gasoline Refer to *FUEL REQUIREMENTS*
	Minimum octane rating	87 Pump Posted AKI (92 RON or 95 E10 RON)
	Type for 1000R	Premium unleaded gasoline Refer to *FUEL REQUIREMENTS*
	Minimum octane rating	91 Pump Posted AKI (95 E10 RON)
Fuel tank capacity		20.5 L (5.4 U.S. gal.)
Fuel remaining when low fuel light turns ON		± 5 L (1.3 U.S. gal.)

DRIVE SYSTEM		
Drive system type		Selectable 2WD/4WD
Front drive		Visco-lok † QE auto-locking front differential
Front drive ratio		3.6:1
Rear drive		Straight bevel gear / Shaft driven final drive
Rear drive ratio		3.6:1
Front differential oil	Capacity	500 ml (17 U.S. oz)
	Type	Scandinavia:75W90 SYNTHETIC GEAR OIL (EUR) (P/N 779212) All other countries:75W90 SYNTHETIC GEAR OIL (P/N 779158)75W90 SYNTHETIC GEAR OIL (P/N 779158) or synthetic gear oil 75W90 API GL-5
Rear final drive oil	Capacity	250 ml (8.45 U.S. oz)
	Type	Scandinavia: 75W140 SYNTHETIC GEAR OIL (EUR) (P/N 779215) All other countries: 75W140 SYNTHETIC GEAR OIL (P/N 779160) or synthetic gear oil 75W140 API GL-5
CV joint grease		CV JOINT GREASE (P/N 293 550 062) or an equivalent
Propeller shaft grease		PROPELLER SHAFT GREASE (P/N 293 550 063) or an equivalent

FRONT SUSPENSION			
Suspension type			Double suspension-arm with dive-control geometry and external stabilizer bar
Shock absorber	570	Qty	2
		Type	FOX HPG
	1000R	Qty	2
		Type	Fox QS3† shocks with piggyback reservoir, quick switch 3 positions
Preload adjustment type			Threaded

REAR SUSPENSION			
Suspension type			Torsional Trailing arm Independent (TTI) with external stabilizer bar
Shock absorber	570	Qty	2
		Type	FOX HPG
	1000R	Qty	2
		Type	Fox QS3† shocks with piggyback reservoir, quick switch 3 positions
Preload adjustment type			Threaded

BRAKES		
Front brake	Qty	2
	Type	214 mm cross drilled disc brakes with hydraulic twin-piston calipers
Rear brake	Qty	1
	Type	214 mm cross drilled disc brake with hydraulic twin-piston caliper
Brake fluid	Capacity	260 ml (8.8 U.S. oz)
	Type	DOT 4
Caliper		Floating twin pistons (2 x 26 mm)
Brake pad material		Metallic
Minimum brake pad thickness		1 mm (.04 in)
Minimum brake disc thickness		4.0 mm (.157 in)
Maximum brake disc warpage		0.2 mm (.01 in)

TIRES	
Front Tire Pressure	48.3 kPa (7 PSI)
Rear Tire Pressure	48.3 kPa (7 PSI)
Minimum tire thread depth	3 mm (.118 in)

TIRES			
Size	Front	570	28x9-12
		1000R	30x9-14
	Rear	570	28x11-12
		1000R	30x9-14

WHEELS			
Type			Cast aluminum with beadlocks
Rim size	Front	570	30,5 x 15,2 cm (12 x 6 in)
		1000R	35,5 x 16,5 cm (14 x 6.5 in)
	Rear	570	30,5 x 19,1 cm (12 x 7.5 in)
		1000R	35,5 x 16,5 cm (14 x 6.5 in)
Wheel nut torque			80 N•m ± 5 N•m (59 lbf•ft ± 4 lbf•ft)
Wheel offset	570	Front	41.2 mm (1.6 in)
		Rear	51 mm (2 in)
	1000R		32 mm (1.3 in)

DIMENSIONS		
Overall length		224 cm (83 in)
Overall width		127 cm (50 in)
Overall height		131 cm (56 in)
Wheelbase		129.5 cm (51 in)
Wheel track	Front	103.5 cm (40.75 in)
	Rear	100.6 cm (39.61 in)
Ground clearance	570	30.5 cm (12 in)
	1000R	31.8 cm (12.5 in)

WEIGHT AND LOADING CAPACITY		
Dry weight	570	393 kg (865 lb)
	1000R	450 kg (991 lb)
Rear cargo area capacity		16 kg (35 lb)
Total vehicle load allowed (including driver, all other loads and added accessories)		141 kg (310 lb)
Towing capacity		590 kg (1,300 lb)
Tongue capacity		13 kg (30 lb)

TROUBLESHOOTING

TROUBLESHOOTING GUIDELINES

ENGINE DOES NOT TURN

1. D.E.S.S. key is not installed on D.E.S.S. post.
   – *Securely install key to D.E.S.S. post.*
2. Engine stop switch.
   – *Make sure that engine stop switch is in ON position.*
3. Transmission is not set on PARK or NEUTRAL.
   – *Set transmission either in PARK or in NEUTRAL (Only 570) or press the brake lever(s).*
4. Burnt fuse.
   – *Check main fuse condition.*
5. Weak battery or loose connections.
   – *Check charging system.*
   – *Check connections and terminals condition.*
   – *Have the battery checked.*
   – *Contact an authorized Can-Am dealer.*
6. Wrong D.E.S.S. key, multifunction gauge display shows BAD KEY.
   – *Use the proper key for this vehicle.*
7. Weak starter or loose connections.
   – *Check starter connections.*
   – *Check starter relay.*

ENGINE TURNS OVER BUT FAILS TO START

1. Flooded engine (spark plug wet when removed).
   – *If the engine does not start and it fuel-flooded, the drowned mode can be activated to prevent fuel injection and to cut ignition while cranking. Proceed as follows:*
   • Install key on D.E.S.S. post
   • Press completely and HOLD throttle lever.
   • Press the engine START button.
   The engine should be cranked for 20 seconds. Release engine START button.
   Release throttle lever and start/crank engine again to allow starting.
   If it does not work:
   • Clean the spark plug caps area then remove them.
   • Remove the spark plugs.
   • Unplug injector electrical connector.
   • Crank engine several times.
   • Install new spark plugs if possible or clean and dry spark plugs.
   • Start engine as explained above.
   If engine continues to flood, see an authorized Can-Am dealer.
   NOTE: *Make sure to verify that there is no fuel in engine oil, if so, replace engine oil.*

ENGINE TURNS OVER BUT FAILS TO START (cont'd)

2. No fuel to the engine (spark plug dry when removed).
   - *Check fuel tank level.*
   - *A failure of the fuel pump may have occurred.*
   - *Check fuel pump fuse and relay.*
   - *If engine does not start, seek service from an authorized Can-Am dealer, repair shop, or person of your own choosing for maintenance, repair, or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*
3. Spark plug/ignition (no spark).
   - *Check injectors/ignition fuse condition.*
   - *Remove spark plug then reconnect to ignition coil.*
   - *Check that ignition switch and/or engine stop switch is the ON position.*
   - *Start engine with spark plug grounded to the engine away from spark plug hole. If no spark appears, replace spark plug.*
   - *If trouble persists, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*
4. Multifunction gauge CHECK ENGINE indicator lamp is on and display shows CHECK ENGINE.
   - *Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*
5. Engine is under a protection mode.
   - *Multifunction gauge CHECK ENGINE indicator lamp is on and display shows CHECK ENGINE, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE LACKS ACCELERATION OR POWER

1. Fouled or damaged spark plug.
   - *Check item ENGINE TURNS OVER BUT FAILS TO START.*
2. Lack of fuel to engine.
   - *Check item ENGINE TURNS OVER BUT FAILS TO START.*
3. Engine is overheating.
   - *Check ENGINE OVERHEATS.*
4. Air filter/housing plugged or dirty.
   - *Check air filter and clean if necessary.*
   - *Check deposits in air filter housing drain.*
   - *Check the position of the air intake tube.*
5. CVT dirty or worn-out.
   - *Contact an authorized Can-Am dealer.*

ENGINE LACKS ACCELERATION OR POWER (cont'd)

6. Engine is under a protection mode.
   - *Check multifunction gauge display for messages.*
   - *Multifunction gauge CHECK ENGINE indicator lamp is on and display shows CHECK ENGINE or LIMP HOME, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE OVERHEATS

1. Low coolant in cooling system.
   - *Check engine coolant, refer to MAINTENANCE PROCEDURES.*
2. Dirty radiator fins.
   - *Clean radiator fins, refer to RADIATOR in MAINTENANCE PROCEDURES.*
3. Cooling fan inoperative.
   - *Check cooling fan fuse or relay, refer to MAINTENANCE PROCEDURES. If the fuse is good, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE BACKFIRE

1. Exhaust system leakage.
   - *Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*
2. Engine is running too hot.
   - *See ENGINE LACKS ACCELERATION OR POWER.*
3. Ignition timing is incorrect or there is an ignition system failure.
   - *Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

ENGINE MISFIRE

1. Fouled/damaged/worn spark plug.
   - *Clean/verify spark plug and heat range. Replace as required.*
2. Water in fuel.
   - *Drain fuel system and refill with fresh fuel.*

VEHICLE CANNOT REACH FULL SPEED

1. Engine.
   - *See ENGINE LACKS ACCELERATION OR POWER.*

VEHICLE CANNOT REACH FULL SPEED (cont'd)

2. Parking brake.
   – *Ensure parking brake is completely removed.*
3. Air filter/housing plugged or dirty.
   – *Check air filter and clean if necessary.*
   – *Check deposits in air filter housing drain.*
   – *Check the position of the air intake tube.*
4. CVT dirty or worn-out.
   – *Contact an authorized Can-Am dealer.*
5. Engine is under a protection mode.
   – *Check multifunction gauge display for messages.*
   – *Multifunction gauge CHECK ENGINE indicator lamp is on and display shows CHECK ENGINE or LIMP HOME, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA EMISSION-RELATED WARRANTY contained herein for information about warranty claims.*

SHIFT LEVER IS HARD TO MOVE

1. Transmission gears are in a position that prevents the shift lever to work.
   – *Rock the vehicle back and forth to move the gears in the transmission and allow the shift lever to be set.*
2. CVT dirty or worn-out.
   – *Contact an authorized Can-Am dealer.*

THE RPM INCREASES BUT THE VEHICLE DOES NOT MOVE

1. The transmission is on PARK or NEUTRAL position.
   – *Select the R, HI or LO position.*
2. CVT dirty or worn-out.
   – *Contact an authorized Can-Am dealer.*
3. Water in the CVT.
   – *See SPECIAL PROCEDURES.*

REDUCED POWER STEERING ASSIST

1. When DPS is subjected to sustained severe steering conditions, the assistance provided by the DPS motor may be reduced to protect the system.
   – *Once the load is reduced, the normal steering assistance will return.*
2. CHECK ENGINE INDICATOR LAMP is ON and display shows CHECK DPS
   – *Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement.*

MULTIFUNCTION GAUGE MESSAGES

MESSAGE	PILOT LAMP(S) ON	DESCRIPTION
BAD KEY	Check engine	Indicates that you have used the wrong D.E.S.S. key, use the proper key for this vehicle.
DESS KEY NOT RECOGNIZED	Check engine	Indicates that there possibly is a bad contact, remove and clean key.
PARK BRAKE	None	Message displayed when brake is applied for more than 15 seconds (while riding).
LO BATT VOLT	Check engine	Low battery voltage, check battery voltage and charging system.
HIGH BATT VOLT	Check engine	High battery voltage, check battery voltage and charging system.
LOW OIL (1)	Check engine	Engine low oil pressure, stop engine immediately.
HI TEMP	Check engine	Engine is overheating, refer to *ENGINE OVERHEATS* in *TROUBLESHOOTING*.
LIMP HOME	Check engine	Serious fault on the engine that can change the normal operation of the engine, CHECK ENGINE indicator lamp will also blink, refer to *TROUBLESHOOTING*.
CHECK ENGINE	Check engine	Engine fault, CHECK ENGINE indicator lamp will also be ON, refer to *TROUBLESHOOTING*.
ECM NOT RECOGNIZED	Check engine	Communication error between speedometer and engine control module (ECM).
CHECK DPS	Check engine	Indicates that the DPS (Dynamic Power Steering) does not work properly. See an authorized Can-Am dealer.
MAINTENANCE REQUIRED (2)	None	Displayed in gauge when vehicle is due for a maintenance
TPS FAULT PRESS OVERRIDE BUTTON TO LIMP HOME	Check engine	Throttle position sensor does not work properly. Seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA Emissions-related warranty contained herein for information about warranty claims.

NOTICE (1) If the message and the check engine light stay on after engine starting, stop engine. Check engine oil level. Refill if necessary. If the oil level is good, seek service from an authorized Can-Am dealer, repair shop or person of your own choosing for maintenance, repair or replacement. Please refer to the US EPA Emissions-related warranty contained herein for information about warranty claims. Do not use the vehicle until repaired.

(2) To erase the MAINTENANCE REQUIRED message, proceed as follows:

1. From main display (vehicle speed), press SET and HOLD.
2. Alternate between LOW beam and HIGH beam 3 times.

NOTE: Step 2 must be completed within **2 seconds**.

3. Release SET button.

WARRANTY

BRP LIMITED WARRANTY USA AND CANADA: 2021 CAN-AM® ATV

SCOPE OF THE LIMITED WARRANTY

Bombardier Recreational Products Inc. ("BRP")* warrants its 2021 Can-Am ATV sold by authorized Can-Am ATV dealers (as hereinafter defined) in the United States of America ("USA") and in Canada from defects in material or workmanship for the period and under the conditions described below. This limited warranty will become null and void if: (1) the ATV was used for racing or any other competitive activity, at any point, even by a previous owner; or (2) the ATV has been altered or modified in such a way so as to adversely affect its operation, performance or durability, or has been altered or modified to change its intended use.

Non-factory installed parts and accessories are not covered under this limited warranty. Please refer to the applicable parts and accessories limited warranty text.

LIMITATIONS OF LIABILITY

THIS WARRANTY IS EXPRESSLY GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT THAT THEY CANNOT BE DISCLAIMED, THE IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM COVERAGE UNDER THIS WARRANTY SOME STATES/PROVINCES DO NOT ALLOW FOR THE DISCLAIMERS, LIMITATIONS AND EXCLUSIONS IDENTIFIED ABOVE, AS A RESULT, THEY MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC RIGHTS, AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH MAY VARY FROM STATE TO STATE, OR PROVINCE TO PROVINCE.

Neither the distributor, any BRP dealer nor any other person has been authorized to make any affirmation, representation or warranty regarding the product, other than those contained in this limited warranty, and if made, shall not be enforceable against BRP. BRP reserves the right to modify this limited warranty at any time, being understood that such modification will not alter the warranty conditions applicable to the products sold while this warranty is in effect.

EXCLUSIONS – ARE NOT WARRANTED

The following are not warranted under any circumstances:

- Normal wear and tear;
- Routine maintenance items, tune ups, adjustments;
- Damage caused by failure to provide proper maintenance and/or storage, as described in the Operator's Guide;
- Damage resulting from removal of parts, improper repairs, service, maintenance, modifications or use of parts not manufactured or approved by BRP or resulting from repairs done by a person that is not an authorized servicing Can-Am ATV dealer;
- Damage caused by abuse, abnormal use, neglect or operation of the product in a manner inconsistent with the recommended operation described in the Can-Am ATV Operator's Guide;
- Damage resulting from accident, submersion, fire, theft, vandalism or any act of God;

– Operation with fuels, oils or lubricants which are not suitable for use with the product (see the Operator's Guide);
– Damages from rust, corrosion or exposure to the elements;
– Damage resulting from water or snow ingestion;
– Incidental or consequential damages, or damages of any kind including without limitation towing, storage, telephone, rental, taxi, inconvenience, insurance coverage, loan payments, loss of time, loss of income.

WARRANTY COVERAGE PERIOD

This limited warranty will be in effect from (1) the date of delivery to the first retail consumer or (2) the date the product is first put into use, whichever occurs first and for the applicable period below:

SIX (6) CONSECUTIVE MONTHS, for private use or commercial use owners. For emission-related components; please also refer to the *US EPA EMISSION-RELATED WARRANTY* contained herein.

The repair or replacement of parts or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date.

CONDITIONS TO HAVE WARRANTY COVERAGE

This warranty coverage is available **only** if **each** of the following conditions has been fulfilled:

– The 2021 Can-Am ATV must be purchased as new and unused by its first owner from a Can-Am ATV dealer authorized to distribute Can-Am ATVs in the country in which the sale occurred ("Can-Am ATV dealer");
– The BRP specified pre-delivery inspection process must be completed and documented and signed by the purchaser;
– The 2021 Can-Am ATV must have undergone proper registration by an authorized Can-Am ATV dealer;
– The 2021 Can-Am ATV must be purchased in the country in which the purchaser resides;
– Routine maintenance outlined in the Operator's Guide must be timely performed in order to maintain warranty coverage. BRP reserves the right to make warranty coverage contingent upon proof of proper maintenance.

BRP will not honor this limited warranty to any private use owner or commercial use owner if one of the preceding conditions has not been met. Such limitations are necessary in order to allow BRP to preserve both the safety of its products, and also that of its consumers and the general public.

WHAT TO DO TO OBTAIN WARRANTY COVERAGE

The customer must cease using the Can-Am ATV upon the appearance of an anomaly. The customer must notify a servicing BRP dealer within three (3) days of the appearance of a defect, and provide it with reasonable access to the product and reasonable opportunity to repair it. The customer must also present to the authorized BRP dealer, proof of purchase of the product and must sign the repair/work order prior to starting the repair in order to validate the warranty repair. All parts replaced under this limited warranty become the property of BRP.

WHAT BRP WILL DO

BRP's obligations under this warranty are limited to, at its sole discretion, repairing parts found defective under normal use, maintenance and service, or replacing such parts with new genuine Can-Am ATV parts without charge for parts and labor, at any authorized BRP dealer during the warranty coverage period under the conditions described herein. No claim of breach of warranty shall be cause for cancellation or rescission of the sale of the Can-Am ATV to the owner.

In the event that service is required outside of the country of original sale, the owner will bear responsibility for any additional charges due to local practices and conditions, such as, but not limited to, freight, insurance, taxes, license fees, import duties, and any and all other financial charges, including those levied by governments, states, territories and their respective agencies.

BRP reserves the right to improve or modify products from time to time without assuming any obligation to modify products previously manufactured.

ADDITIONAL SUPPLIER WARRANTIES

A GPS receiver may be supplied by BRP as standard equipment on certain 2021 Can-Am ATV's. The GPS receiver is covered under BRP's limited warranty policy. Additional warranty coverage if offered by the GPS receiver "supplier" that is longer than BRP's limited warranty is to be dealt by the dealer or consumer directly with the GPS receiver "supplier".

TRANSFER

If the ownership of a product is transferred during the warranty coverage period, this limited warranty, subject to its terms and conditions, shall also be transferred and be valid for the remaining coverage period provided BRP or an authorized Can-Am ATV Distributor/Dealer receives a proof that the former owner agreed to the transfer of ownership, in addition to the co-ordinates of the new owner.

CONSUMER ASSISTANCE

In the event of a controversy or a dispute in connection with this limited warranty, BRP suggests that you try to resolve the issue at the dealership level. We recommend discussing the issue with the authorized dealer's service manager or owner.

If the matter still remains unresolved, contact BRP by filling out the customer contact form at www.brp.com or contact BRP by mail at one of the addresses listed under the *CONTACT US* section of this guide.

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US EPA EMISSION-RELATED WARRANTY

Bombardier Recreational Products Inc. ("BRP")** warrants to the ultimate purchaser and each subsequent purchaser that this new vehicle, including all parts of its exhaust emission control system and its evaporative emission control system, meets two conditions:

1. It is designed, built, and equipped so it conforms at the time of sale to the ultimate purchaser with the requirements of 40 CFR 1051 and 40 CFR 1060.
2. It is free from defects in materials and workmanship that may keep it from meeting the requirements of 40 CFR 1051 and 40 CFR 1060.

Where a warrantable condition exists, BRP will repair or replace, as it elects, any part or component with a defect in materials or workmanship that would increase the engine's emissions of any regulated pollutant within the stated warranty period at no cost to the owner, including expenses related to diagnosing and repairing or replacing emission-related parts. All defective parts replaced under this warranty become the property of BRP.

For all emission-related warranty claims, BRP is limiting the diagnosis and repair of emission-related parts to the authorized Can-Am dealers, unless for emergency repairs as required by item 2 of the following list.

As a certifying manufacturer, BRP will not deny emission-related warranty claims based on any of the following:

1. Maintenance or other service BRP or BRP's authorized facilities performed.
2. Engine/equipment repair work that an operator performed to correct an unsafe, emergency condition attributable to BRP as long as the operator tries to restore the engine/equipment to its proper configuration as soon as possible.
3. Any action or inaction by the operator unrelated to the warranty claim.
4. Maintenance that was performed more frequently than BRP specify.
5. Anything that is BRP fault or responsibility.
6. The use of any fuel that is commonly available where the equipment operates unless BRP written maintenance instructions state that this fuel would harm the equipment's emission control system and operators can readily find the proper fuel. See maintenance information section and fuel requirements of fueling section.

Emission-Related Warranty Period

The emission-related warranty is valid for the following period whichever comes first:

	HOURS	MONTHS	KILOMETERS
Exhaust emission-related components	500	30	5000
Evaporative emission-related components	N/A	24	N/A

Components Covered

The emission-related warranty covers all components whose failure would increase an engine's emissions of any regulated pollutant, including the following listed components:

1. For exhaust emissions, emission-related components include any engine parts related to the following systems:
   - Air-induction system
   - Fuel system
   - Ignition system
   - Exhaust gas recirculation systems
2. The following parts are also considered emission-related components for exhaust emissions:
   - Aftertreatment devices
   - Crankcase ventilation valves
   - Sensors
   - Electronic control units
3. The following parts are considered emission-related components for evaporative emissions:
   - Fuel tank
   - Fuel cap
   - Fuel line
   - Fuel line fittings
   - Clamps*
   - Pressure relief valves*
   - Control valves*
   - Control solenoids*
   - Electronic controls*
   - Vacuum control diaphragms*
   - Control cables*
   - Control linkages*
   - Purge valves
   - Vapor hoses
   - Liquid/vapor separator
   - Carbon canister
   - Canister mounting brackets
   - Carburetor purge port connector
4. Emission-related components also include any other part whose only purpose is to reduce emissions or whose failure will increase emissions without significantly degrading engine/equipment performance.

*As related to the evaporative emission control system

Limited Applicability

As a certifying manufacturer, BRP may deny emission-related warranty claims for failures that have been caused by the owner's or operator's improper maintenance or use, by accidents for which the manufacturer has no responsibility, or by acts of God. For example, an emission-related warranty claim need not be honored for failures that have been directly caused by the operator's abuse of the engine/equipment or the operator's use of the engine/equipment in a manner for which it was not designed and are not attributable to the manufacturer in any way.

If you have any question regarding your warranty rights and responsibility, you should contact Bombardier Recreational Products at 1-888-272-9222.

** In the USA, products are distributed and serviced by BRP US Inc.

BRP INTERNATIONAL LIMITED WARRANTY: 2021 CAN-AM® ATV

1) SCOPE OF THE LIMITED WARRANTY

Bombardier Recreational Products Inc. ("BRP")* warrants its 2021 Can-Am ATV sold by Can-Am ATV distributors or dealers authorized by BRP to distribute Can-Am ATVs ("Can-Am ATV Distributor/Dealer") outside of the United States of America ("USA"), Canada, member states of the European Economic Area (which is comprised of the states of the European Union plus the United Kingdom, Norway, Iceland and Liechtenstein) ("EEA"), Turkey, member states of the Commonwealth of the Independent States (including Ukraine and Turkmenistan) ("CIS") and Turkey, from defects in material or workmanship for the period and under the conditions described below.

Non-factory installed parts and accessories are not covered under this limited warranty. Please refer to the applicable parts and accessories limited warranty text.

This limited warranty will become null and void if: (1) The ATV was used for racing or any other competitive activity, at any point, even by a previous owner; or (2) the ATV has been altered or modified in such a way so as to adversely affect its operation, performance or durability, or has been altered or modified to change its intended use.

2) LIMITATIONS OF LIABILITY

TO THE EXTENT PERMITTED BY LAW, THIS WARRANTY IS EXPRESSLY GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TO THE EXTENT THAT THEY CANNOT BE DISCLAIMED, THE IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM COVERAGE UNDER THIS WARRANTY. SOME JURISDICTIONS DO NOT ALLOW FOR THE DISCLAIMERS, LIMITATIONS AND EXCLUSIONS IDENTIFIED ABOVE, AS A RESULT, THEY MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC RIGHTS AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH MAY VARY FROM COUNTRY TO COUNTRY. (FOR PRODUCTS PURCHASED IN AUSTRALIA SEE CLAUSE 4 BELOW).

Neither the Can-Am ATV Distributor/Dealer nor any other person has been authorized to make any affirmation, representation or warranty regarding the product, other than those contained in this limited warranty, and if made, shall not be enforceable against BRP.

BRP reserves the right to modify this warranty at any time, being understood that such modification will not alter the warranty conditions applicable to the products sold while this warranty is in effect.

3) EXCLUSIONS – ARE NOT WARRANTED

The following are not warranted under this limited warranty under any circumstances:

- Normal wear and tear;
- Routine maintenance items, tune ups, adjustments;
- Damage caused by negligence or failure to provide proper maintenance and/or storage, as described in the Operator's Guide;

– Damage resulting from removal of parts, improper repairs, service, maintenance, modifications or use of parts or accessories not manufactured or approved by BRP which in its reasonable judgement are either incompatible with the product or adversely affect its operation, performance and durability, or resulting from repairs done by a person that is not an authorized servicing Can-Am ATV Distributor/Dealer;
– Damage caused by abuse, abnormal use, neglect, racing or operation of the product in a manner inconsistent with the recommended operation described in the Operator's Guide;
– Damage resulting from accident, submersion, fire, snow or water ingestion, theft, vandalism or any act of God;
– Operation with fuels, oils or lubricants which are not suitable for use with the product (see the Operator's Guide);
– Damage resulting from rust, corrosion or exposure to the elements;
– Incidental or consequential damages, or damages of any kind including without limitation towing, storage, transportation expenses, telephone, rental, taxi, inconvenience, insurance coverage, loan payments, loss of time, loss of income; or time missed for downtime experience due to service work.

4) WARRANTY COVERAGE PERIOD

This warranty will be in effect from (1) the date of delivery to the first retail consumer or (2) the date the product is first put into use, whichever occurs first and for a period of:

SIX (6) CONSECUTIVE MONTHS for private use or commercial use.

In AUSTRALIA and NEW-ZEALAND only, this warranty will be in effect from (1) the date of delivery to the first retail consumer or (2) the date the product is first put into use, whichever occurs first, and for a period of (1) TWENTY-FOUR (24) CONSECUTIVE MONTHS or (2) a total use of FIFTEEN THOUSAND (15 000) kilometers, whichever occurs first, for private use or commercial use.

The repair or replacement of parts or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date.

Note that the duration and any other modalities of the warranty coverage are subject to the applicable national or local legislation in the customer's country.

FOR PRODUCTS SOLD IN AUSTRALIA ONLY

Nothing in these Warranty terms and conditions should be taken to exclude, restrict or modify the application of any condition, warranty, guarantee, right or remedy conferred or implied under the Competition and Consumer Act 2010 (Cth), including the Australian Consumer Law or any other law, where to do so would contravene that law, or cause any part of these terms and conditions to be void. The benefits given to you under this limited warranty are in addition to other rights and remedies that you have under Australian law.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

5) CONDITIONS TO HAVE WARRANTY COVERAGE

This warranty coverage is available **only** if **each** of the following conditions has been fulfilled:

- The 2021 Can-Am ATV must be purchased as new and unused by its first owner from a Can-Am ATV Distributor/Dealer authorized to distribute Can-Am ATVs in the country in which the sale occurred;
- The BRP specified pre-delivery inspection process must be completed and documented;
- The product must have undergone proper registration by an authorized Can-Am ATV Distributor/Dealer;
- The 2021 Can-Am ATV must be purchased in the country or union of countries in which the purchaser resides; and
- Routine maintenance outlined in the Operator's Guide must be timely performed in order to maintain warranty coverage. BRP reserves the right to make warranty coverage contingent upon proof of proper maintenance.

BRP will not honour this limited warranty to any private use owner or commercial use owner if one of the preceding conditions has not been met. Such limitations are necessary in order to allow BRP to preserve both the safety of its products, and also that of its consumers and the general public.

6) WHAT TO DO TO OBTAIN WARRANTY COVERAGE

The customer must cease using the ATV upon the appearance of an anomaly. The customer must notify a servicing Can-Am ATV Distributor/Dealer within two (2) days of the appearance of a defect, and provide it with reasonable access to the product and reasonable opportunity to repair it. The customer must also present to the authorized Can-Am ATV Distributor/Dealer proof of purchase of the product and must sign the repair/work order prior to starting the repair in order to validate the warranty repair. All parts replaced under this limited warranty become the property of BRP.

Note that the notification period is subject to the applicable national or local legislation in customer's country.

7) WHAT BRP WILL DO

To the extent permitted by law, BRP's obligations under this warranty are limited to, at its sole discretion, repairing parts found defective under normal use, maintenance and service, or replacing such parts with new genuine Can-Am ATV parts without charge for parts and labour, at any authorized Can-Am ATV Distributor/Dealer during the warranty coverage period under the conditions described herein. BRP's responsibility is limited to making the required repairs or replacements of parts. No claim of breach of warranty shall be cause for cancellation or rescission of the sale of the Can-Am ATV to the owner. You may have other legal rights which may vary from country to country.

In the event that service is required outside of the country of original sale, the owner will bear responsibility for any additional charges due to local practices and conditions, such as, but not limited to, freight, insurance, taxes, license fees, import duties, and any and all other financial charges, including those levied by governments, states, territories and their respective agencies.

BRP reserves the right to improve or modify products from time to time without assuming any obligation to modify products previously manufactured.

8) TRANSFER

If the ownership of a product is transferred during the warranty coverage period, this warranty shall also be transferred and be valid for the remaining coverage period provided BRP or an authorized Can-Am ATV Distributor/Dealer receives a proof that the former owner agreed to the transfer of ownership, in addition to the co-ordinates of the new owner.

9) CONSUMER ASSISTANCE

In the event of a controversy or a dispute in connection with this limited warranty, BRP suggests that you try to resolve the issue at the Can-Am ATV Distributor/Dealer level. We recommend discussing the issue with the authorized Can-Am ATV Distributor/Dealer's service manager or owner.

If the matter still remains unresolved, contact BRP by filling out the customer contact form at www.brp.com or contact BRP by mail at one of the addresses listed under the *CONTACT US* section of this guide.

* For the territory covered by this limited warranty, products are distributed and serviced by Bombardier Recreational Products Inc. or its affiliates.

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BRP LIMITED WARRANTY FOR THE EUROPEAN ECONOMIC AREA, THE COMMONWEALTH OF THE INDEPENDENT STATES AND TURKEY: 2021 CAN-AM® ATV

1) SCOPE OF THE LIMITED WARRANTY

Bombardier Recreational Products Inc. ("BRP")* warrants its 2021 Can-Am ATVs sold by distributors or dealers authorized by BRP to distribute Can-Am ATVs ("Can-Am ATV Distributor/Dealer") in member states of the European Economic Area (which is comprised of the member states of the European Union plus the United Kingdom, Norway, Iceland and Liechtenstein) ("EEA"), in member states of the Commonwealth of the Independent States (including Ukraine and Turkmenistan) ("CIS") and Turkey from defects in material or workmanship for the period and under the conditions described below.

Non-factory installed parts and accessories are not covered under this limited warranty. Please refer to the applicable parts and accessories limited warranty text.

This limited warranty will become null and void if: (1) The ATV was used for racing or any other competitive activity, at any point, even by a previous owner; or (2) the ATV has been altered or modified in such a way so as to adversely affect its operation, performance or durability, or has been altered or modified to change its intended use.

2) LIMITATIONS OF LIABILITY

TO THE EXTENT PERMITTED BY LAW, THIS WARRANTY IS EXPRESSLY GIVEN AND ACCEPTED IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TO THE EXTENT THAT THEY CANNOT BE DISCLAIMED, THE IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXCLUDED FROM COVERAGE UNDER THIS WARRANTY. SOME JURISDICTIONS DO NOT ALLOW FOR THE DISCLAIMERS, LIMITATIONS AND EXCLUSIONS IDENTIFIED ABOVE, AS A RESULT, THEY MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC RIGHTS AND YOU MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH MAY VARY FROM COUNTRY TO COUNTRY.

Neither the Can-Am ATV Distributor/Dealer nor any other person has been authorized to make any affirmation, representation or warranty regarding the product, other than those contained in this limited warranty, and if made, shall not be enforceable against BRP.

BRP reserves the right to modify this warranty at any time, being understood that such modification will not alter the warranty conditions applicable to the products sold while this warranty is in effect.

3) EXCLUSIONS – ARE NOT WARRANTED

The following are not warranted under this limited warranty under any circumstances:

– Normal wear and tear;
– Routine maintenance items, tune ups, adjustments;

– Damage caused by negligence or failure to provide proper maintenance and/or storage, as described in the Operator's Guide;
– Damage resulting from removal of parts, improper repairs, service, maintenance, modifications or use of parts or accessories not manufactured or approved by BRP which in its reasonable judgement are either incompatible with the product or adversely affect its operation, performance and durability, or resulting from repairs done by a person that is not an authorized servicing Can-AmCan-Am ATV Distributor/Dealer;
– Damage caused by abuse, abnormal use, neglect, racing or operation of the product in a manner inconsistent with the recommended operation described in the Operator's Guide;
– Damage resulting from accident, submersion, fire, snow or water ingestion, theft, vandalism or any act of God;
– Operation with fuels, oils or lubricants which are not suitable for use with the product (see the Operator's Guide);
– Damage resulting from rust, corrosion or exposure to the elements;
– Incidental or consequential damages, or damages of any kind including without limitation towing, transportation expenses, storage, telephone, rental, taxi, inconvenience, insurance coverage, loan payments, loss of time, loss of income or time missed for downtime experience due to service work.

4) WARRANTY COVERAGE PERIOD

This warranty will be in effect from (1) the date of delivery to the first retail consumer or (2) the date the product is first put into use, whichever occurs first and for a period of:

TWENTY-FOUR (24) CONSECUTIVE MONTHS for private use.

SIX (6) CONSECUTIVE MONTHS for commercial use or rental use.

The product is used commercially when it is used in connection with any work or employment that generates income during any part of the warranty period. The product is also used commercially when, at any point during the warranty period, it is licensed for commercial use.

The repair or replacement of parts or the performance of service under this warranty does not extend the life of this warranty beyond its original expiration date.

Note that the duration and any other modalities of the warranty coverage are subject to the applicable national or local legislation in the customer's country.

5) CONDITIONS TO HAVE WARRANTY COVERAGE

This warranty coverage is available **only** if **each** of the following conditions has been fulfilled:
– The 2021 Can-Am ATV must be purchased as new and unused by its first owner from a Can-Am ATV Distributor/Dealer authorized to distribute Can-Am ATVs in the country in which the sale occurred;
– The BRP specified pre-delivery inspection process must be completed and documented;
– The product must have undergone proper registration by an authorized Can-Am ATV Distributor/Dealer;

– The 2021 Can-Am ATV must be purchased within the EEA by an EEA resident, in the CIS for residents of the countries comprised in such area and in Turkey for residents of Turkey; and
– Routine maintenance outlined in the Operator's Guide must be timely performed in order to maintain warranty coverage. BRP reserves the right to make warranty coverage contingent upon proof of proper maintenance.

BRP will not honour this limited warranty to any private use owner or commercial use owner if one of the preceding conditions has not been met. Such limitations are necessary in order to allow BRP to preserve both the safety of its products, and also that of its consumers and the general public.

6) WHAT TO DO TO OBTAIN WARRANTY COVERAGE

The customer must cease using the ATV upon the appearance of an anomaly. The customer must notify a servicing Can-Am ATV Distributor/Dealer within two (2) months of the appearance of a defect and provide it with reasonable access to the product and reasonable opportunity to repair it. The customer must also present to the authorized Can-Am ATV Distributor/Dealer, proof of purchase of the product and must sign the repair/work order prior to starting the repair in order to validate the warranty repair. All parts replaced under this limited warranty become the property of BRP.

Note that the notification period is subject to the applicable national or local legislation in customer's country.

7) WHAT BRP WILL DO

To the extent permitted by law, BRP's obligations under this warranty are limited to, at its sole discretion, repairing parts found defective under normal use, maintenance and service, or replacing such parts with new genuine Can-Am ATV parts without charge for parts and labour, at any authorized Can-Am ATV Distributor/Dealer during the warranty coverage period under the conditions described herein. BRP's responsibility is limited to making the required repairs or replacements of parts. No claim of breach of warranty shall be cause for cancellation or rescission of the sale of the Can-Am ATV to the owner. You may have other legal rights which may vary from country to country.

In the event that service is required outside of the EEA, CIS or Turkey, the owner will bear responsibility for any additional charges due to local practices and conditions, such as, but not limited to, freight, insurance, taxes, license fees, import duties, and any and all other financial charges, including those levied by governments, states, territories and their respective agencies.

BRP reserves the right to improve or modify products from time to time without assuming any obligation to modify products previously manufactured.

8) TRANSFER

If the ownership of a product is transferred during the warranty coverage period, this warranty shall also be transferred and be valid for the remaining coverage period provided BRP or an authorized Can-Am ATV Distributor/Dealer receives a proof that the former owner agreed to the transfer of ownership, in addition to the co-ordinates of the new owner.

9) CONSUMER ASSISTANCE

In the event of a controversy or a dispute in connection with this limited warranty, BRP suggests that you try to resolve the issue at the Can-Am ATV Distributor/Dealer level. We recommend discussing the issue with the authorized Can-Am ATV Distributor/Dealer's service manager or owner.

If the matter still remains unresolved, contact BRP by filling out the customer contact form at www.brp.com or contact BRP by mail at one of the addresses listed under the *CONTACT US* section of this guide.

* In the EEA, products are distributed and serviced by BRP European Distribution S.A. and other affiliates or subsidiaries of BRP.

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ADDITIONAL TERMS AND CONDITIONS FOR FRANCE ONLY

The following terms and conditions are applicable to products sold in France only:

The seller shall deliver goods that are complying with the contract and shall be responsible for defects existing upon delivery. The seller shall also be responsible for defects resulting from packaging, assembling instructions or the installation when it is its responsibility per the contract or if accomplished under its responsibility. To be compliant with the contract, the good shall:

1. Be fit for normal use for goods similar thereto and, if applicable:
   - Correspond to the description provided by the seller and have the qualities presented to the buyer though sample or model;
   - Have the qualities that a buyer may legitimately expect considering the public declarations of the seller, the manufacturer of its representative, including in advertising or labeling; or
2. Have the characteristics mutually agreed upon as between the parties or be fit for the specific use intended by the buyer and brought to the attention of the seller and which accepted by the seller.

The action for failure to comply is prescribed after two years after delivery of the goods. The seller is responsible for the warranty for hidden defects of the good sold if such hidden defects are rendering the good unfit for the intended use, or if they diminish its use in such a way that the buyer would not have acquired the good or would have given a lesser price, had he known. The action for such hidden defects shall be taken by the buyer within 2 years of the discovery of the defect.

MAINTENANCE RECORDS

Send photocopy of maintenance record to BRP if needed.

PREDELIVERY	
Serial number:	Signature/Print:
Mileage / km:	
Hours:	
Date:	
Dealer no:	
Notes:	
Refer to vehicle Pre-Delivery Bulletin for detailed installation procedures	

FIRST INSPECTION	
Mileage / km:	Signature/Print:
Hours:	
Date:	
Dealer no:	
Notes:	
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km:	Signature/Print:
Hours:	
Date:	
Dealer no:	
Notes:	
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km: _____ Hours: _____ Date: _____ Dealer no: _____ Notes: _____	Signature/Print:
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km: _____ Hours: _____ Date: _____ Dealer no: _____ Notes: _____	Signature/Print:
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km: _____ Hours: _____ Date: _____ Dealer no: _____ Notes: _____	Signature/Print:
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km:	Signature/Print:
Hours:	
Date:	
Dealer no:	
Notes:	
For maintenance schedule refer to Maintenance Information section of this operator's guide	

SERVICE	
Mileage / km:	Signature/Print:
Hours:	
Date:	
Dealer no:	
Notes:	
For maintenance schedule refer to Maintenance Information section of this operator's guide	

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CUSTOMER INFORMATION

PRIVACY INFORMATION

BRP wishes to inform you that your coordinates will be used for safety and warranty related purposes. Furthermore, BRP and its affiliates may use its customer list to distribute marketing and promotional information about BRP and related products.

To exercise your right to consult or correct your data, or to be removed from the addressee-list for direct marketing, please contact BRP.

By E-mail: privacyofficer@brp.com

By mail: BRP
Senior Legal Counsel-Privacy Officer
726 St-Joseph
Valcourt QC
Canada
J0E 2L0

CONTACT US

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Tokyo 108-0075
Japan

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Belgium

Itterpark 11
D-40724 Hilden
Germany

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Norway

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Sweden

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Australia

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Auckland 2013,
New Zealand

South America

Rua James Clerck Maxwell, 230
TechnoPark Campinas SP 13069-380
Brazil

CHANGE OF ADDRESS/OWNERSHIP

If your address has changed or if you are the new owner of the ATV, be sure to notify BRP by either:

– Notifying an authorized Can-Am dealer.
– North America Only: calling at 1 888 272-9222.
– Mailing one of the change of address cards on the following pages at one of the BRP addresses indicated in the *CONTACT US* section of this guide.

In case of change of ownership, please join a proof that the former owner agreed to the transfer.

Notifying BRP, even after the expiration of the limited warranty, is very important as it enables BRP to reach the ATV owner if necessary, like when safety recalls are initiated. It is the owner's responsibility to notify BRP.

STOLEN UNITS: If your personal ATV is stolen, you should notify BRP or an authorized Can-Am dealer. We will ask you to provide your name, address, phone number, the vehicle identification number and the date it was stolen.

CHANGE OF ADDRESS ☐ CHANGE OF OWNERSHIP ☐

VEHICLE IDENTIFICATION NUMBER

Model Number | Vehicle Identification Number (V.I.N.)

OLD ADDRESS OR PREVIOUS OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

NEW ADDRESS OR NEW OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

E-MAIL ADDRESS

V00A2F

CHANGE OF ADDRESS ☐ CHANGE OF OWNERSHIP ☐

VEHICLE IDENTIFICATION NUMBER

Model Number | Vehicle Identification Number (V.I.N.)

OLD ADDRESS OR PREVIOUS OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

NEW ADDRESS OR NEW OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

E-MAIL ADDRESS

V00A2F

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CHANGE OF ADDRESS ☐ CHANGE OF OWNERSHIP ☐

VEHICLE IDENTIFICATION NUMBER

Model Number | Vehicle Identification Number (V.I.N.)

OLD ADDRESS OR PREVIOUS OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

NEW ADDRESS OR NEW OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

E-MAIL ADDRESS

V00A2F

CHANGE OF ADDRESS ☐ CHANGE OF OWNERSHIP ☐

VEHICLE IDENTIFICATION NUMBER

Model Number | Vehicle Identification Number (V.I.N.)

OLD ADDRESS OR PREVIOUS OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

NEW ADDRESS OR NEW OWNER:

NAME

NO. STREET APT

CITY STATE/PROVINCE ZIP/POSTAL CODE

COUNTRY TELEPHONE

E-MAIL ADDRESS

V00A2F

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NOTES

NOTES

NOTES

NOTES

ATV MODEL No. _____

VEHICLE
IDENTIFICATION NUMBER (V.I.N.) _____

ENGINE
IDENTIFICATION NUMBER (E.I.N.) _____

Owner: _____
NAME

_____
No. STREET APT

_____
CITY STATE/PROVINCE ZIP/POSTAL CODE

Purchase Date _____ | | | | |
YEAR MONTH DAY

Warranty Expiry Date _____ | | | | |
YEAR MONTH DAY

To be completed by the dealer at the time of the sale.

DEALER IMPRINT AREA

V00A2IL

Please verify with your dealer to ensure your vehicle has been registered with BRP.

While reading this Operator's Guide, remember that:

⚠ WARNING

Indicates a potential hazard that, if not avoided, could result in serious injury or death.

⚠ WARNING

THIS VEHICLE CAN BE HAZARDOUS TO OPERATE.
A collision or rollover can occur quickly, even during routine maneuvers such as turning and driving on hills or over obstacles, if you fail to take proper precautions.

SEVERE INJURY OR DEATH
can result if you do not follow these instructions:

- **BEFORE YOU OPERATE THIS VEHICLE, READ THIS OPERATOR'S GUIDE, ALL ON PRODUCT SAFETY LABELS AND WATCH THE SAFETY VIDEO.**

- **NEVER OPERATE THIS VEHICLE WITHOUT PROPER INSTRUCTIONS.**
  Complete a certified training course.
- **DO NOT EXCEED VEHICLE SEATING CAPACITY**
- **FOR 1UP MODELS, NEVER CARRY A PASSENGER.**
  You increase your risk of losing control if you carry a passenger.
- **NEVER OPERATE THIS VEHICLE ON A PAVED SURFACE.**
  You increase your risk of losing control if you operate this vehicle on pavement.
- **NEVER OPERATE THIS VEHICLE ON PUBLIC ROADS.**
  You can collide with another vehicle if you operate this vehicle on a public road.
- **OPERATOR SHOULD ALWAYS WEAR AN APPROVED HELMET,** eye protection and protective clothing.
- **NEVER USE WITH DRUGS OR ALCOHOL.**
  They slow reaction time and impair judgment.
- **NEVER OPERATE THIS VEHICLE AT EXCESSIVE SPEEDS.**
  You increase your risk of losing control if you operate this vehicle at speeds too fast for the terrain, visibility conditions, or your experience.
- **NEVER ATTEMPT WHEELIES, JUMPS, OR OTHER STUNTS.**

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OPERATOR'S GUIDE RENEGADE X mr / ENGLISH
GUIDE DU CONDUCTEUR Séries RENEGADE X mr / ANGLAIS

FAIT AU / MADE IN CANADA

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