

DRIVEN PULLEY AND COUNTERSHAFT (550F AND 600 ACE)

SERVICE TOOLS

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ALIGNMENT BAR	529 036 157	4
DRIVEN PULLEY SPRING COMPRESSOR	529 036 182	7
ENGINE LIFTING TOOL	529 036 217	13
PRELOAD TESTER	529 036 164	5

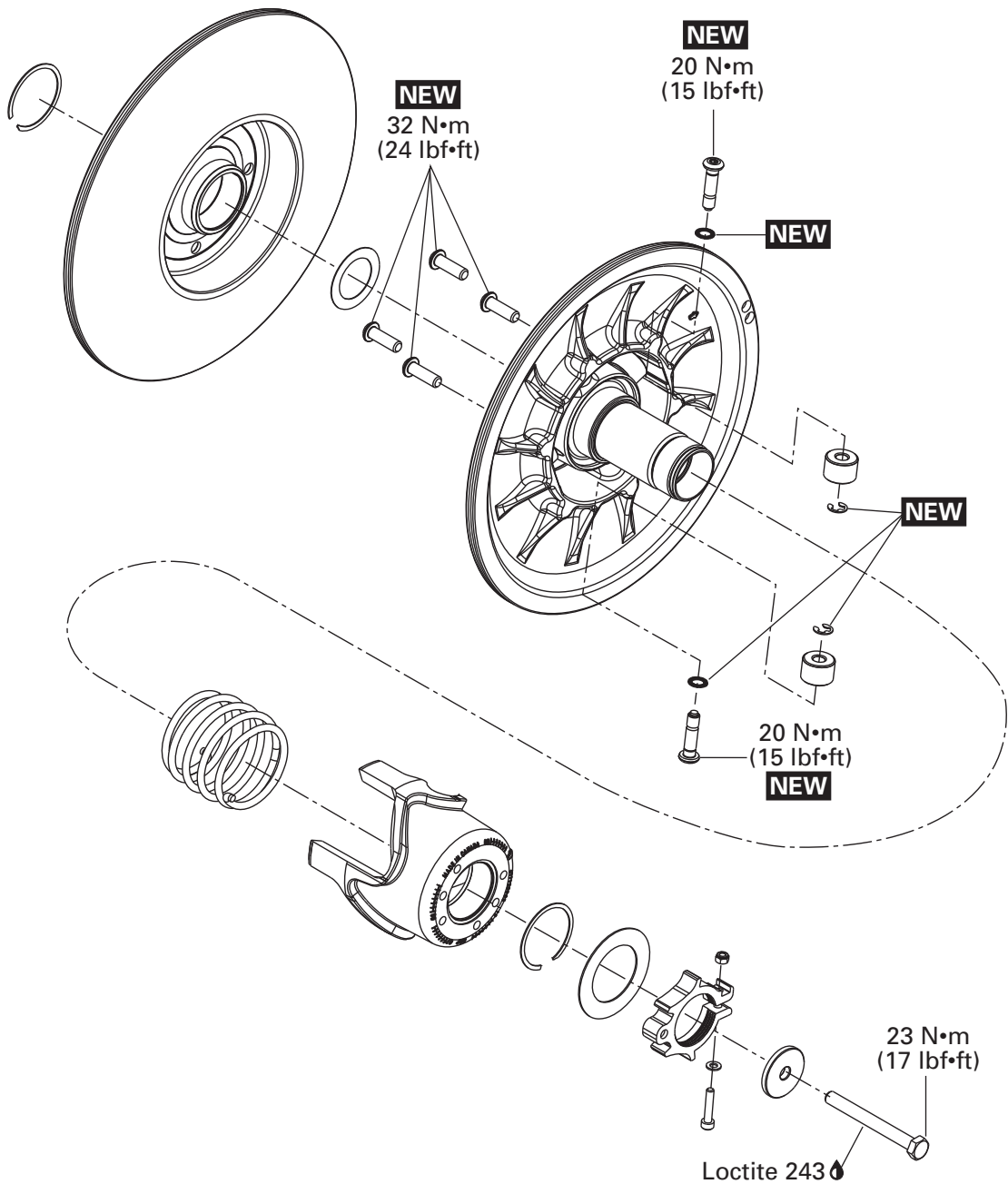
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
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SERVICE PRODUCTS

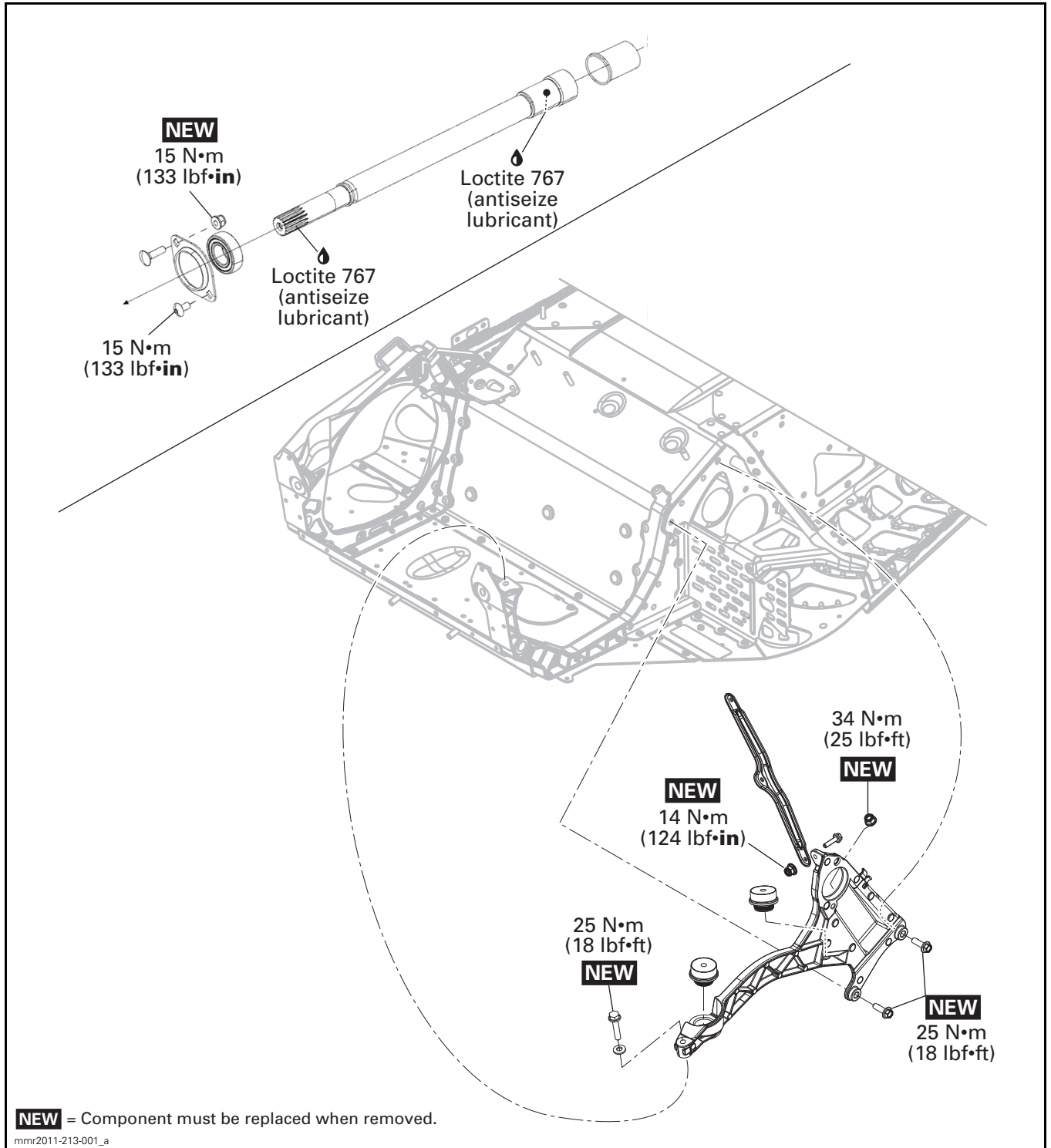
Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	11
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PULLEY FLANGE CLEANER	413 711 809	12

Subsection XX (DRIVEN PULLEY AND COUNTERSHAFT (550F AND 600 ACE))



NEW = Component must be replaced when removed.

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GENERAL

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

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

WARNING

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

WARNING

Never start engine when the pulley guard is removed.

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

ADJUSTMENT

DRIVEN PULLEY ALIGNMENT

- 1. Remove drive belt, refer to *DRIVE BELT* subsection.
- 2. Completely open driven pulley.
- 3. Insert ALIGNMENT BAR (P/N 529 036 157) between the pulley sheaves. The half moon recess must match the drive pulley fixed sheave shaft.

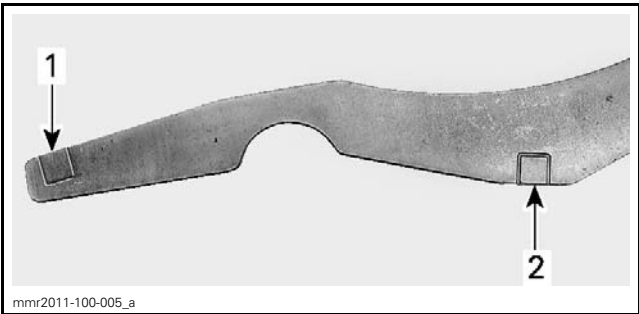


- 4. Close the driven pulley on the alignment bar. Make sure it stays against the pulley bottom.



1. Alignment bar

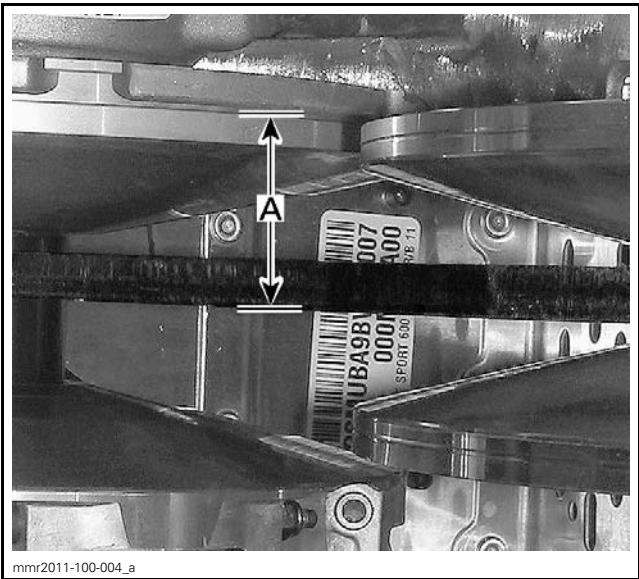
- 5. Locate the measurement points on the alignment bar.



1. Front measurement point
2. Aft measurement point

- 6. Measure "X" distance as per the following illustration.

NOTE: Always measure "X" distance from the farther alignment bar side to the fixed sheave inner edge (including alignment bar thickness).



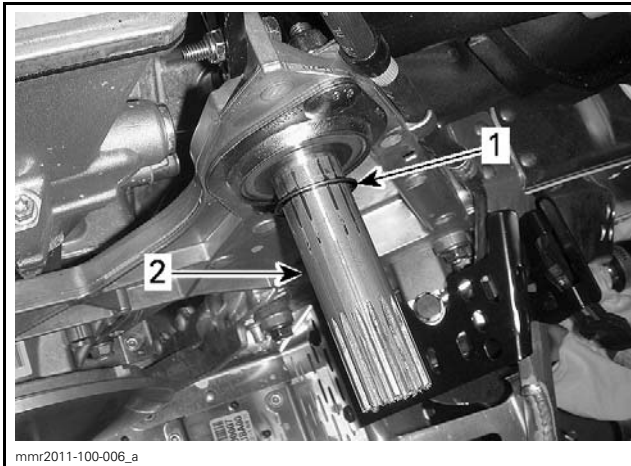
A. "X" distance

- 7. Compare the result to the specification.

"X" DISTANCE SPECIFICATION	
Minimum	36.7 mm (1.445 in)
Maximum	37.7 mm (1.484 in)

8. If an alignment is necessary:

- 8.1 Remove driven pulley, see *DRIVEN PULLEY REMOVAL* in this subsection.
- 8.2 Add or remove shim(s) to obtain the specified alignment.



1. Shim
2. Countershaft

8.3 Refer to the following table to use the proper shim thickness.

SHIM THICKNESS P/N	
504 112 000	0.42 mm \pm 0.05 mm (.017 in \pm .002 in)
417 300 265	1.02 mm \pm 0.10 mm (.04 in \pm .004 in)

NOTICE Total shim thickness must not exceed 3 mm (.118 in).

9. Install drive belt, refer to *DRIVE BELT INSTALLATION* in *DRIVE BELT* subsection.

PROCEDURES

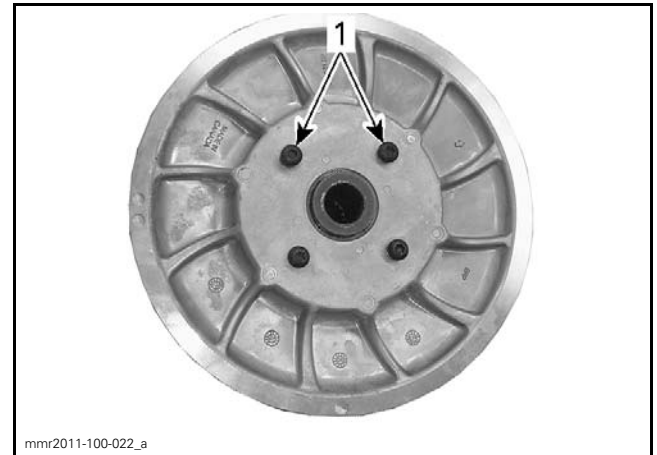
DRIVEN PULLEY

Driven Pulley Spring Preload Verification

1. Remove driven pulley, see procedure in this subsection.
2. Loosen 2 cam screws without removing them.

NOTE: Heat the cam screws to ease loosening.

NOTICE If screws are completely removed, they must be replaced.



1. Screws to be loosened

3. Install the specified service tool.

REQUIRED TOOL	
PRELOAD TESTER (P/N 529 036 164)	

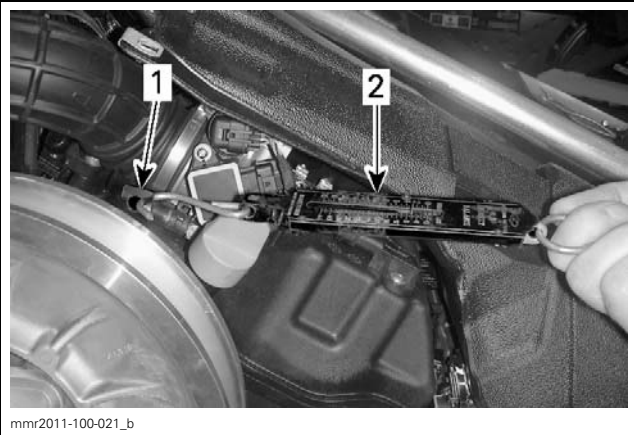


1. Preload tester

4. Install driven pulley.

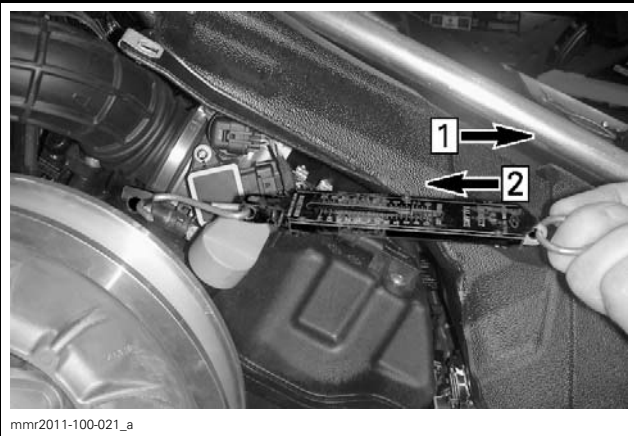
5. Hook a fish scale to the preload tester.

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1. Preload tester
2. Fish scale

6. Pull the preload tester using the fish scale, then read the torsion force as follows:
- 6.1 Take a 1st measurement when sliding sheave begins to turn.
 - 6.2 Hold fish scale in this position.
 - 6.3 Slowly release tension and take a 2nd measurement when sliding sheave begins to return.



Step 1: 1st measurement
Step 2: 2nd measurement

7. Calculate the average of the two readings.

$$\frac{\text{1ST MEASUREMENT (WHEN OPENING)} + \text{2ND MEASUREMENT (WHEN CLOSING)}}{2} = \text{SPRING PRELOAD}$$

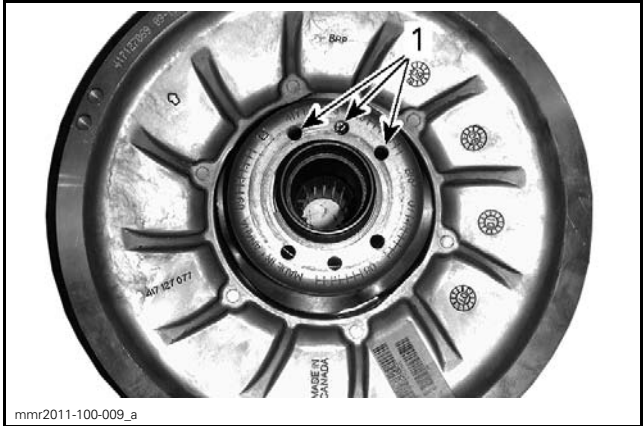
Example:

$$\frac{6.8 \text{ KG (15 LB) (WHEN OPENING)} + 6.4 \text{ KG (14 LB) (WHEN CLOSING)}}{2} = 6.6 \text{ KG (15 LB) ACTUAL SPRING PRELOAD}$$

8. Compare the result to the specifications.

SPRING PRELOAD SPECIFICATION	
Minimum	6.4 kg (14 lb)
Maximum	7.0 kg (15 lb)

If spring preload is out of specification, move the spring hook in another cam hole to increase or decrease preload.



1. Spring holes

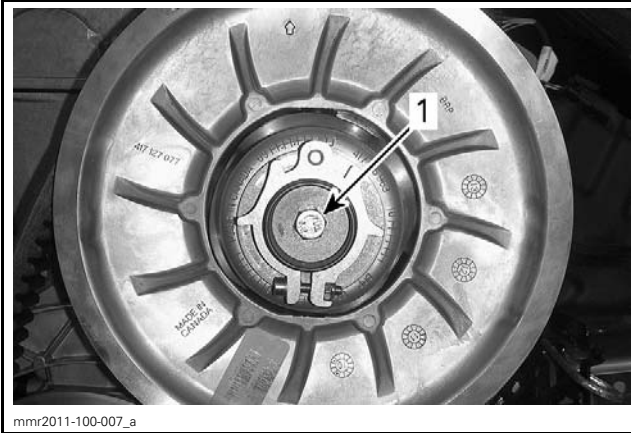
If correct spring preload is unattainable, use the fixed sheave holes.



TYPICAL
1. Fixed sheave holes

Driven Pulley Removal

- 1. Apply parking brake.
- 2. Remove drive belt, refer to *DRIVE BELT* sub-section.
- 3. Remove driven pulley retaining screw and shouldered washer.



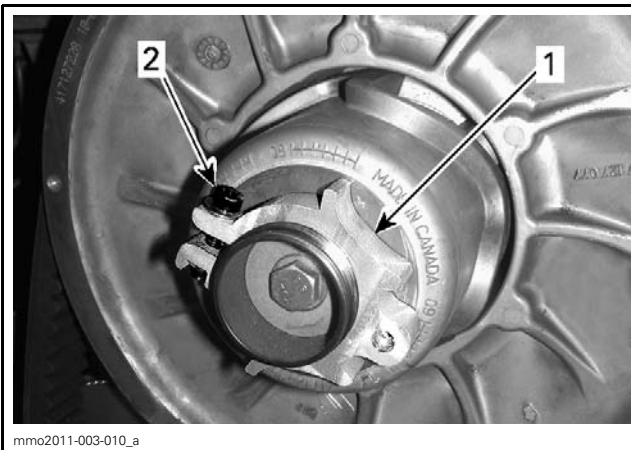
1. Driven pulley retaining screw

4. Remove driven pulley from countershaft.

Driven Pulley Disassembly

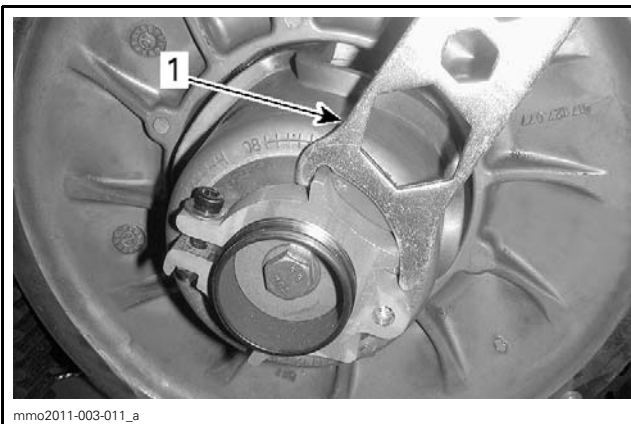
Cam and Spring Removal

1. Loosen the adjuster ring clamping screw.



1. Adjuster hub
2. Clamping screw

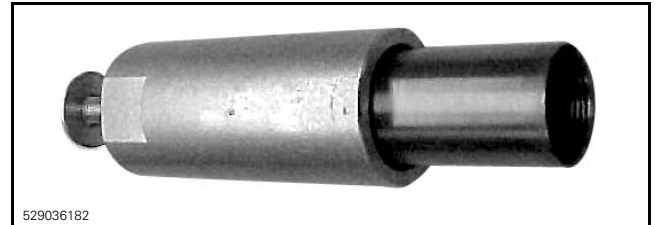
2. Unscrew the adjuster hub **clockwise**, using the suspension adjustment tool.



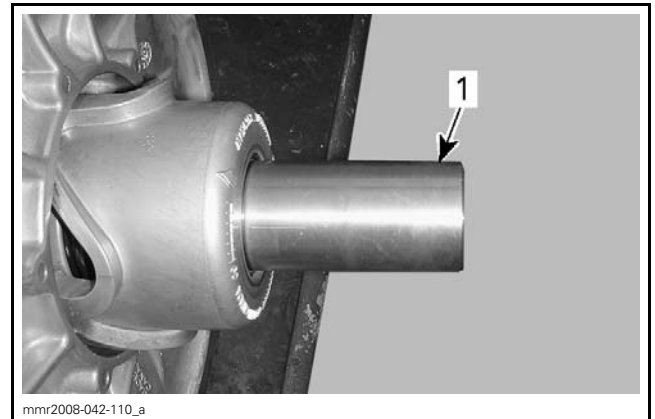
1. Suspension adjustment tool

NOTE: When reaching the end of the threads, slightly spread the adjuster ring to remove it from the pulley.

3. Install the threaded adapter of the DRIVEN PULLEY SPRING COMPRESSOR (P/N 529 036 182) on the driven pulley.

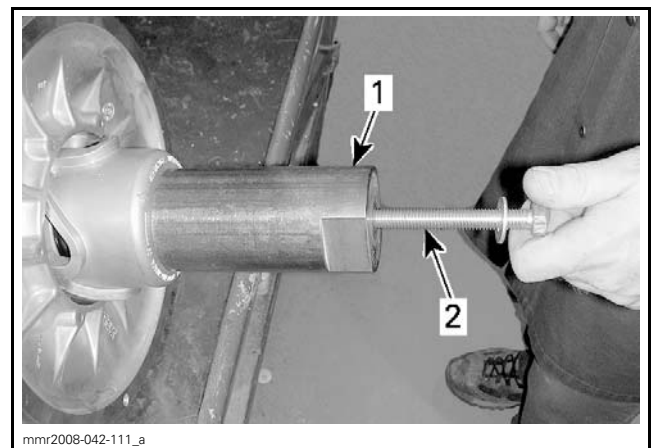


THREADED ADAPTER



1. Threaded adapter

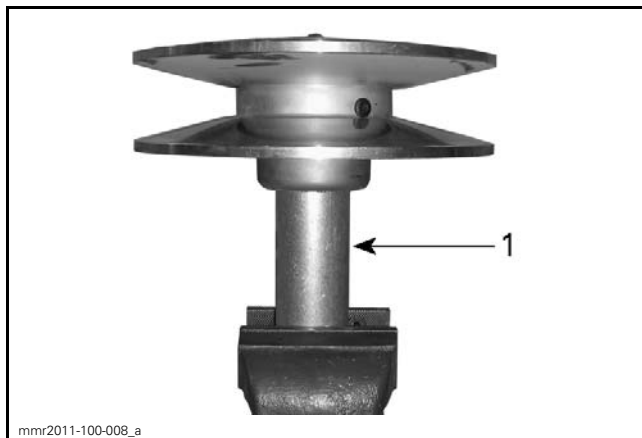
4. Install the external sleeve over the threaded adapter and secure sleeve with the tool screw.



1. External sleeve
2. Driven pulley spring compressor screw

5. Tighten the tool screw to compress the cam.
6. Install the tool in a vice.

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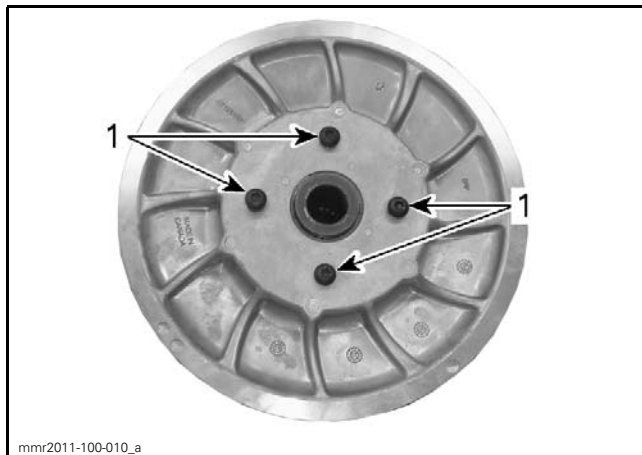
1. Driven pulley spring compressor

7. Note in which hole the spring hook is inserted in the cam.



1. Spring holes

8. Using a heat gun, heat cam screws to break the thread locker.



1. Heat cam screws

9. Remove and discard cam screws.
10. Remove the sliding sheave.
11. Unscrew the tool screw completely.

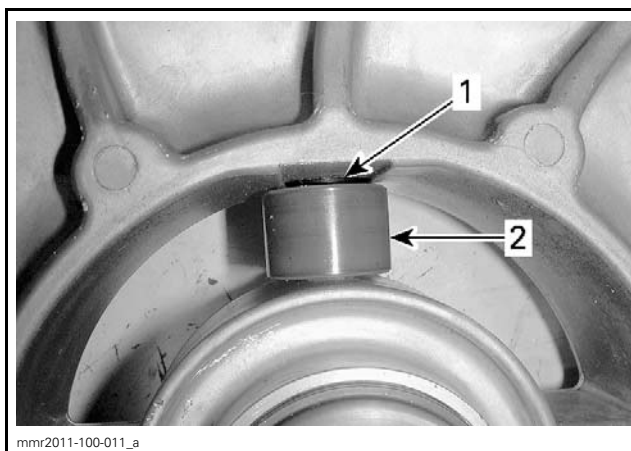
12. Note in which hole the spring hook is inserted to the fixed sheave.

13. Remove cam and spring.

14. Remove the tool threaded adapter.

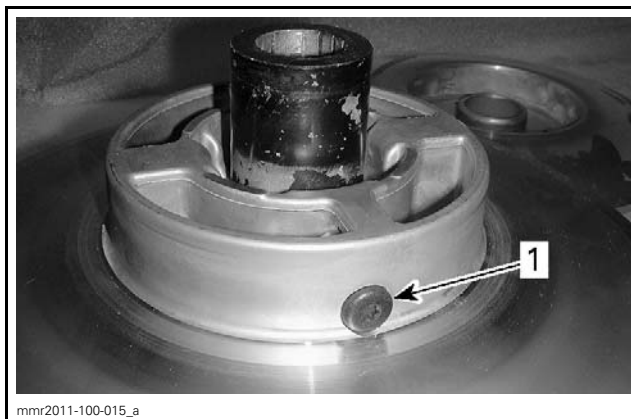
Driven Pulley Rollers Removal

1. Remove and discard the E-clips.



1. E-clip
2. Roller

2. Remove and discard pivot screws.



1. Pivot screw

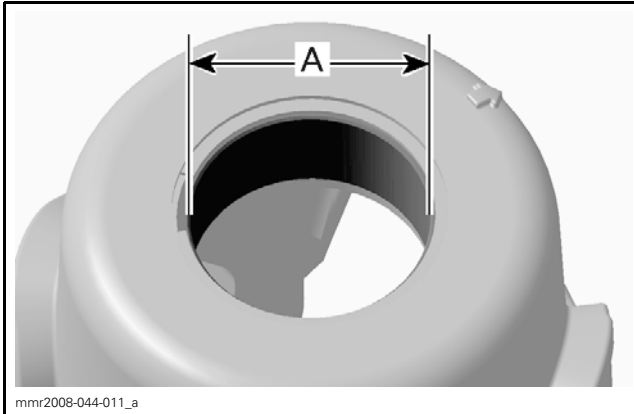
3. Remove rollers.

Driven Pulley Inspection

Cam and Spring

1. Verify contact surfaces of cam for visible damage. Ensure circlip properly locks the inner bushing. Replace part if necessary.
2. Using a dial bore gauge, measure the inner diameter of cam bushing. Measuring point must be at least 6 mm (1/4 in) from bushing edge.

Subsection XX (DRIVEN PULLEY AND COUNTERSHAFT (550F AND 600 ACE))



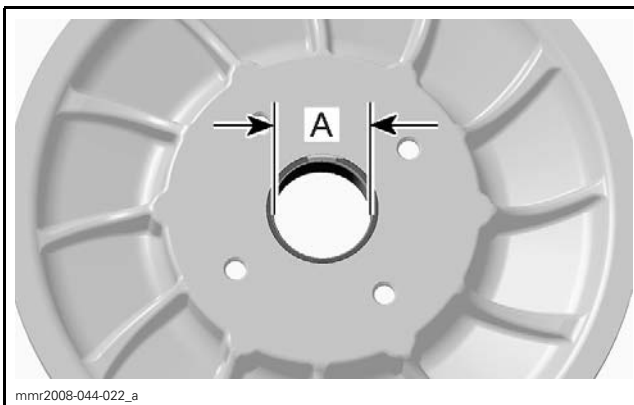
A. Inner diameter of cam bushing

BUSHING	SERVICE LIMIT
Cam bushing	41.5 mm (1.634 in)

3. Replace the cam if the inner diameter of bushing is out of specification.

Sliding Sheave

1. Inspect pulley sheave for marks or scratches.
2. Ensure circlip properly locks the inner bushing. Replace part if necessary.
3. Using a dial bore gauge, measure the inner diameter of sliding sheave bushing. Measuring point must be at least 6 mm (1/4 in) from bushing edge.



A. Inner diameter of sliding sheave bushing

BUSHING	SERVICE LIMIT
Sliding sheave bushing	41.5 mm (1.634 in)

4. Replace the sliding sheave if the inner diameter of bushing is out of specification.

Fixed Sheave

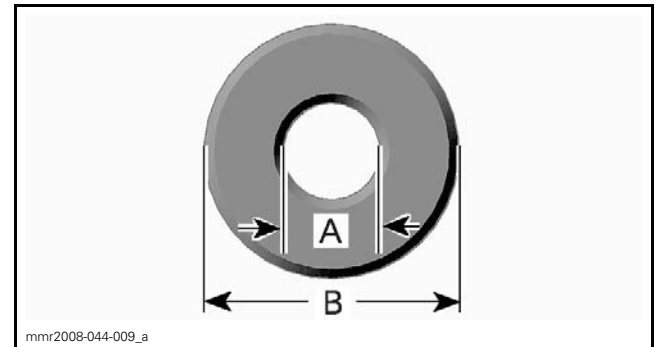
Replace fixed sheave and countershaft if one of the following problem is detected:

- Marks or scratches on pulley sheave

- Bent, twisted or otherwise damaged countershaft
- Defective splines and threads at the end of countershaft.

Driven Pulley Rollers

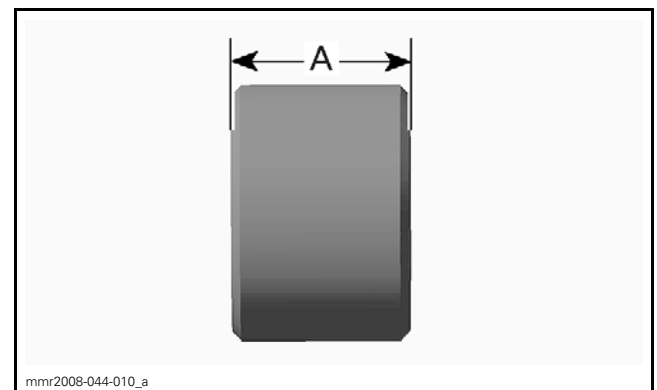
1. Check the rollers for flat spots, cracks or other visible damage. Replace if necessary (as a set).
2. Measure inner and outer diameter of rollers.



A. Inner diameter
B. Outer diameter

ROLLER DIAMETER	SERVICE LIMIT
Inner diameter	8.5 mm (.335 in)
Outer diameter	21.5 mm (.846 in)

3. Measure the roller thickness.



A. Thickness of roller

ROLLER THICKNESS	
SERVICE LIMIT	14.75 mm (.581 in)

4. If a roller is out of specifications, replace both rollers at the same time.

Driven Pulley Assembly

Driven Pulley Rollers Installation

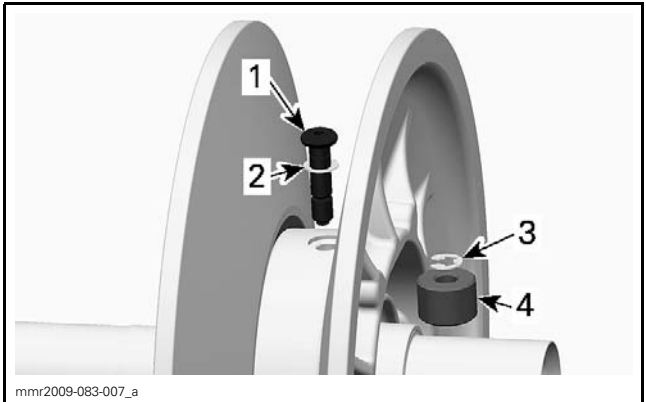
1. Using a screw tap, clean pivot screw threaded holes into fixed sheave.

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2. Install rollers into fixed sheave using **NEW** pivot screws with ribbed lock washers.

NOTICE Always use new pivot screws with pre-applied threadlocker.

3. Tighten pivot screws to the specified torque.

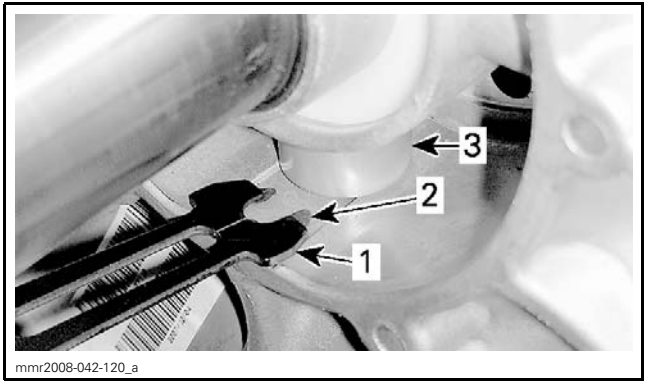


- TYPICAL**
- 1. Pivot screw
 - 2. Ribbed lock washer
 - 3. E-clip
 - 4. Roller

TIGHTENING TORQUE	
Pivot screws	20 N•m (15 lbf•ft)

4. Using a ROTOR CLIP® APPLICATOR (P/N A-150), install **NEW** E-clips to lock pivot screws.

NOTE: To purchase an applicator, contact Rotor Clip Company at www.rotorclip.com.



- 1. E-clip applicator
- 2. E-clip
- 3. Roller

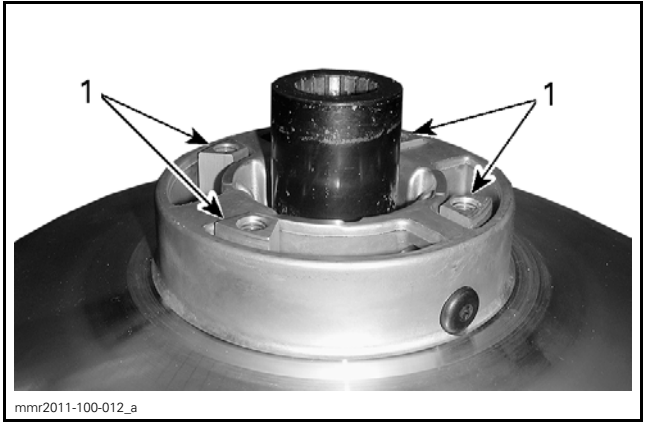
Cam and Spring Installation

- 1. Install the spring compressor threaded adapter on the fixed sheave.
- 2. Slide the cam over the tool threaded adapter.
- 3. Turn cam against the spring and align its arrow with the arrow on the fixed sheave.

NOTE: At the end of cam installation, the arrow on the cam should have moved clockwise (approximately 30°).



4. Compress spring until cam mounting holes exceed the fixed sheave.



- 1. Cam mounting holes

5. Install the sliding sheave on the cam using 4 **NEW** screws.

6. Tighten cam screws to the specified torque.

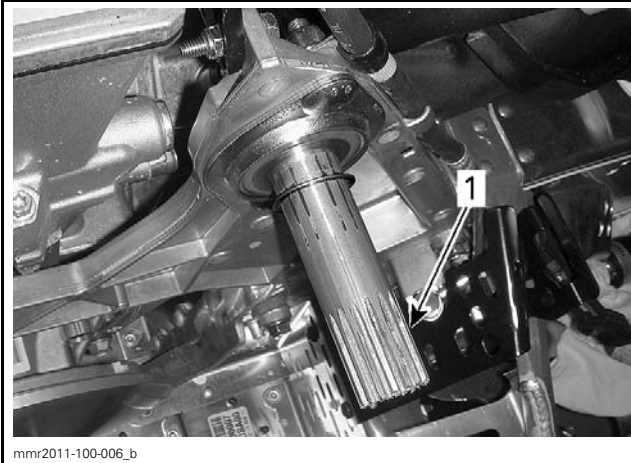
TIGHTENING TORQUE	
Cam screws	32 N•m (24 lbf•ft)

7. Remove the tool.

Driven Pulley Installation

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

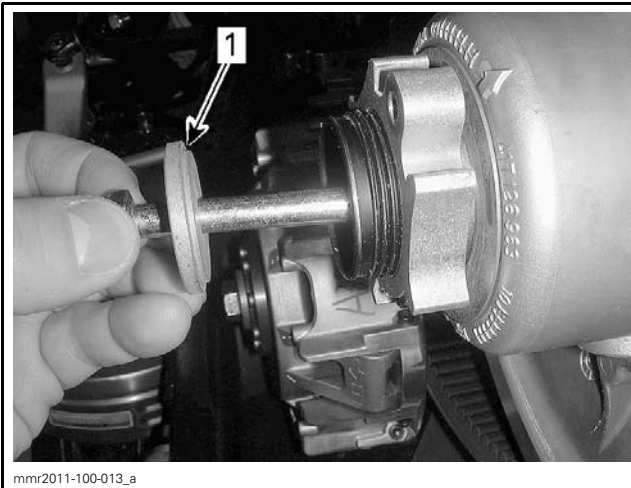
Apply **LOCTITE 767 (ANTISEIZE LUBRICANT)** (P/N 293 800 070) on countershaft splines.



1. Apply antiseize lubricant here

Check pulley alignment, refer to *DRIVEN PULLEY ALIGNMENT* in this subsection.

Install driven pulley shouldered washer as per illustration.



Apply LOCTITE 243 (BLUE) (P/N 293 800 060) on driven pulley retaining screw threads.

Tighten driven pulley retaining screw to the specified torque.

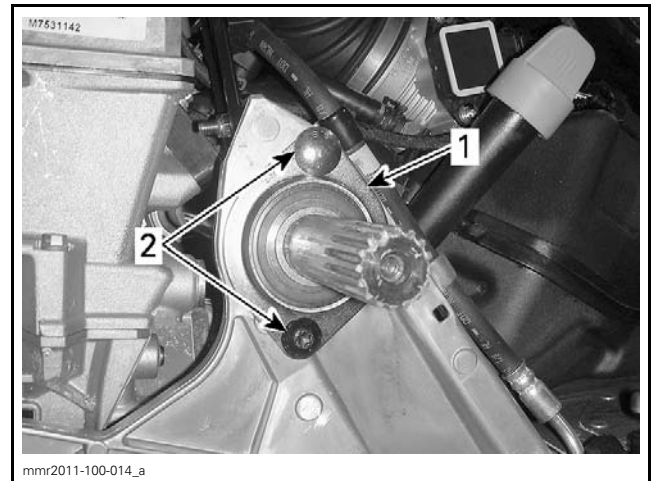
TIGHTENING TORQUE	
Driven pulley retaining screw	23 N•m (17 lbf•ft)

NOTICE Driven pulley alignment must always be checked whenever pulleys have been removed, disassembled or replaced.

COUNTERSHAFT

Countershaft Removal

1. Remove side panels, refer to *BODY* subsection.
2. Remove driven pulley, see *DRIVEN PULLEY REMOVAL* in this subsection.
3. Remove countershaft bearing flange as follows:
 - 3.1 Remove retaining fasteners.



1. Countershaft bearing flange
2. Retaining fasteners

- 3.2 Be careful not to loose the brake hose retainer.
- 3.3 Remove countershaft bearing flange from support.
4. Install drive pulley.
5. Firmly grab the drive pulley and pull the assembly out.



REMOVE PULLEY AND COUNTERSHAFT AS AN ASSEMBLY

6. Remove pulley from countershaft.

Countershaft Inspection

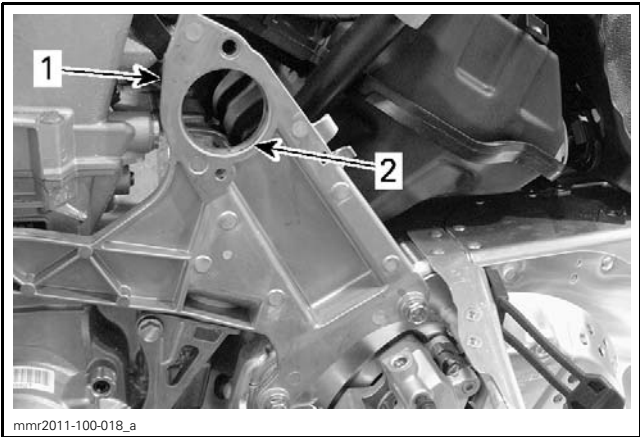
Replace countershaft if one of the following problem is detected:

- Bent, twisted or otherwise damaged countershaft.
- Defective splines and threads at the end of countershaft.

Countershaft Installation

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

Remove any rust on bearing shoulder of countershaft bearing support using sand paper (600-grit or 1000-grit) or steel wool.



- 1. Bearing shoulder
- 2. Countershaft bearing support

Apply LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070):

- Bearing shoulder
- Countershaft internal splines (gearbox end).

Ensure countershaft bearing is installed properly into the countershaft bearing support.

Secure the brake hose using the upper flange retaining bolt.

Tighten countershaft bearing flange bolts to the specified torque.

TIGHTENING TORQUE	
Countershaft bearing fasteners	25 N•m (18 lbf•ft)

Install driven pulley. Refer to *DRIVEN PULLEY INSTALLATION* in this subsection.

COUNTERSHAFT BEARING

Countershaft Bearing Removal

1. Proceed with *COUNTERSHAFT REMOVAL*, see procedure in this subsection.

2. Install an appropriate puller on the countershaft bearing.

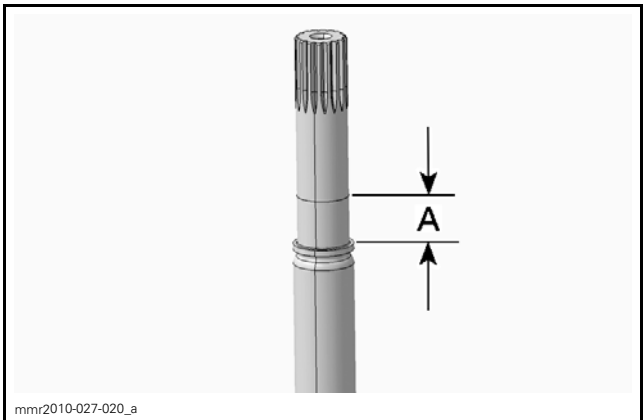


TYPICAL

3. Tighten puller to extract the bearing.
4. Discard the bearing.

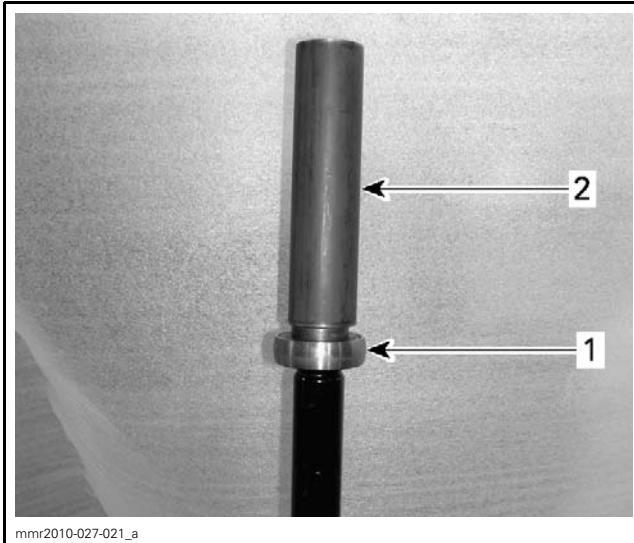
Countershaft Bearing Installation

1. Clean residues on countershaft bearing area using PULLEY FLANGE CLEANER (P/N 413 711 809).

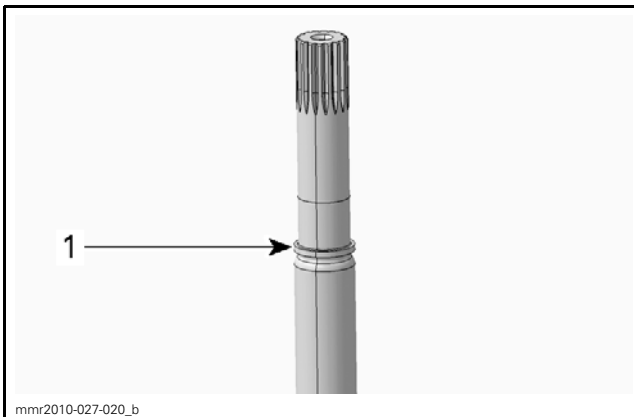


A. Countershaft bearing area

2. Apply LOCTITE 609 (P/N 413 703 100) on countershaft bearing area.
3. Install a **NEW** bearing on countershaft using a press and a pipe with the proper diameter.



1. New bearing
2. Pipe with the proper diameter
4. Press bearing until it is properly seated on countershaft flange.



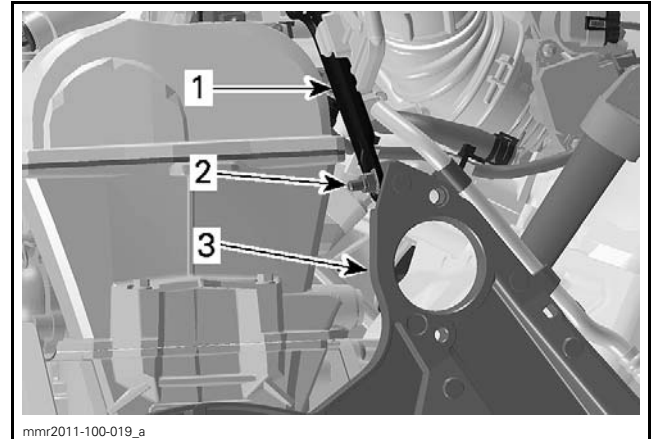
1. Countershaft flange
5. Clean the surplus of Loctite with a rag to avoid having Loctite on sliding sheave bushing.

NOTICE Always use a press, never tap on countershaft bearing installer with an hammer to avoid damaging bearing and countershaft. Always apply force on the inner race of the bearing.

COUNTERSHAFT BEARING SUPPORT

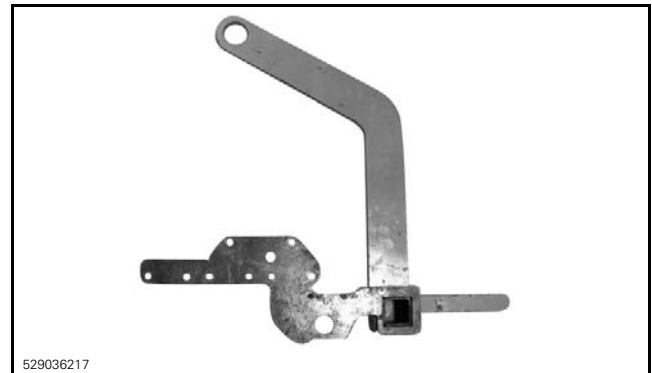
Countershaft Bearing Support Removal

1. Remove countershaft, see *COUNTERSHAFT REMOVAL* in this subsection.
2. Remove the bolt attaching the upper frame member to the countershaft bearing support.

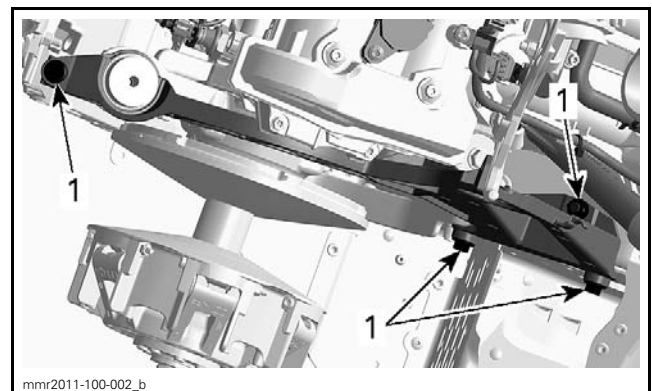


- TYPICAL**
1. Upper frame member
 2. Bolt
 3. Countershaft bearing support

3. Install the ENGINE LIFTING TOOL (P/N 529 036 217) in order to support the LH side of the engine. Refer to *ENGINE REMOVAL AND INSTALLATION*.



4. Remove the bolts securing the engine to the LH rubber mounts.
5. Remove the countershaft bearing support retaining fasteners.

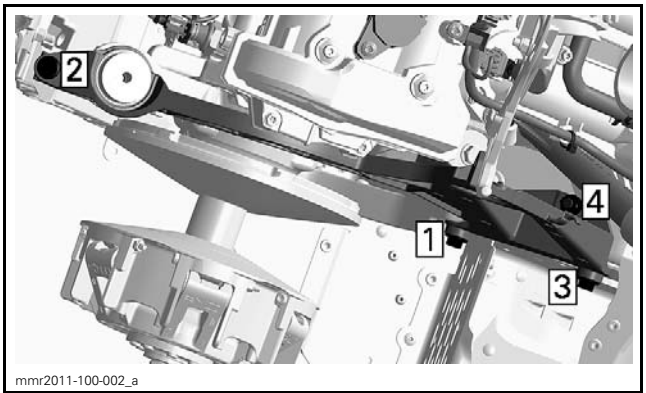


- TYPICAL**
1. Countershaft bearing support retaining fasteners

6. Remove the countershaft bearing support.

Countershaft Bearing Support Installation

- 1. Thread the fasteners retaining the bearing support to the chassis and both engine rubber mounts screws without tightening yet.
- 2. Tighten the retaining fasteners to the specified torque following the illustrated sequence.



BEARING SUPPORT TIGHTENING SEQUENCE

COUNTERSHAFT BEARING SUPPORT FASTENERS TIGHTENING TORQUE	
Bearing support to side of tunnel screws	25 N•m (18 lbf•ft)
Front of bearing support retaining screw	25 N•m (18 lbf•ft)
Bearing support to top of tunnel nut	34 N•m (25 lbf•ft)

- 3. Tighten the rear engine rubber mount screw to the specified torque.

TIGHTENING TORQUE	
Rear rubber mount screw	25 N•m (18 lbf•ft)

- 4. Tighten the front engine rubber mount screw to the specified torque.

TIGHTENING TORQUE	
Front rubber mount bolt	25 N•m (18 lbf•ft)

- 5. Install the upper frame member to the bearing support and tighten bolt to the specified torque.

TIGHTENING TORQUE	
Bearing support to upper frame member bolt	14 N•m (124 lbf•in)

- 6. Install all other removed parts.