# TABLE OF CONTENTS

**DRIVE BELT** ..... **05-02-1**
**APPLICATION CHART** ..... **05-02-1**
INSPECTION ..... 05-02-1
CHECKING NEUTRAL FUNCTION ..... 05-02-1
ROTATION DIRECTION ..... 05-02-1
DRIVE BELT HEIGHT MEASUREMENT AND ADJUSTMENT ..... 05-02-2
DRIVE BELT DEFLECTION MEASUREMENT (reference only) ..... 05-02-3

**DRIVE PULLEY** ..... **05-03-1**
**TRA III** ..... **05-03-1**
GENERAL ..... 05-03-2
REMOVAL ..... 05-03-2
DISASSEMBLY ..... 05-03-2
CLEANING ..... 05-03-4
INSPECTION ..... 05-03-4
ASSEMBLY ..... 05-03-4
INSTALLATION ..... 05-03-8
DRIVE PULLEY ADJUSTMENT ..... 05-03-8

**DRIVEN PULLEY** ..... **05-04-1**
**FORMULA VSA** ..... **05-04-1**
REMOVAL ..... 05-04-2
DISASSEMBLY ..... 05-04-2
CLEANING ..... 05-04-2
INSPECTION ..... 05-04-3
ASSEMBLY ..... 05-04-3
INSTALLATION ..... 05-04-3
ADJUSTMENT ..... 05-04-3
**HPV27 VSA** ..... **05-04-5**
REMOVAL ..... 05-04-6
DISASSEMBLY ..... 05-04-6
CLEANING ..... 05-04-6
INSPECTION ..... 05-04-6
ASSEMBLY ..... 05-04-7
INSTALLATION ..... 05-04-7
ADJUSTMENT ..... 05-04-7

**PULLEY DISTANCE AND ALIGNMENT** ..... **05-05-1**
GENERAL ..... 05-05-1
GENERAL PROCEDURE ..... 05-05-1
PULLEY ALIGNMENT AND DISTANCE SPECIFICATIONS CHART ..... 05-05-2

**BRAKE** ..... **05-06-1**
**HYDRAULIC BRAKE** ..... **05-06-1**
BRAKE FLUID TYPE ..... 05-06-2
CALIPER ..... 05-06-2
BRAKE PADS REPLACEMENT ..... 05-06-2
REMOVAL ..... 05-06-3
DISASSEMBLY ..... 05-06-4
CLEANING ..... 05-06-4
INSPECTION ..... 05-06-4
INSTALLATION ..... 05-06-4
ADJUSTMENT ..... 05-06-5
BLEEDING ..... 05-06-5

**CHAINCASE** ..... **05-07-1**
REMOVAL AND DISASSEMBLY ..... 05-07-2
INSPECTION ..... 05-07-2
GEAR RATIO MODIFICATION ..... 05-07-2
INSTALLATION AND ASSEMBLY ..... 05-07-3
DRIVE CHAIN ADJUSTMENT ..... 05-07-3
ADJUSTMENT ..... 05-07-4

**DRIVE CHAIN** ..... **05-08-1**
SILENT CHAIN ..... 05-08-1

# DRIVE BELT

## APPLICATION CHART

| MODEL | PART NUMBER | MINIMUM WIDTH (wear limit) mm (in) |
|---|---|---|
| All 593 HO engine equipped models | 417 300 197 | 33.35 (1.313) |
| All 793 engine equipped models | 417 300 166 | 34.70 (1.366) |

## INSPECTION

Inspect belt for cracks, fraying or abnormal wear (uneven wear, wear on one side, missing cogs, cracked fabric). If abnormal wear is noted, probable cause could be pulley misalignment, excessive RPM with frozen track, fast starts without warm-up period, burred or rusty sheave, oil on belt or distorted spare belt.

Check drive belt width. Replace the drive belt if width is under minimum recommended width (see table above).

## CHECKING NEUTRAL FUNCTION

**⚠ WARNING**

Always check neutral function when servicing.

Apply parking brake. Vehicle must be on the ground and on a plane level surface. No one should be in front of vehicle.

Attach vehicle tether cord to your clothing. Stand aside of vehicle, then start engine.

**⚠ WARNING**

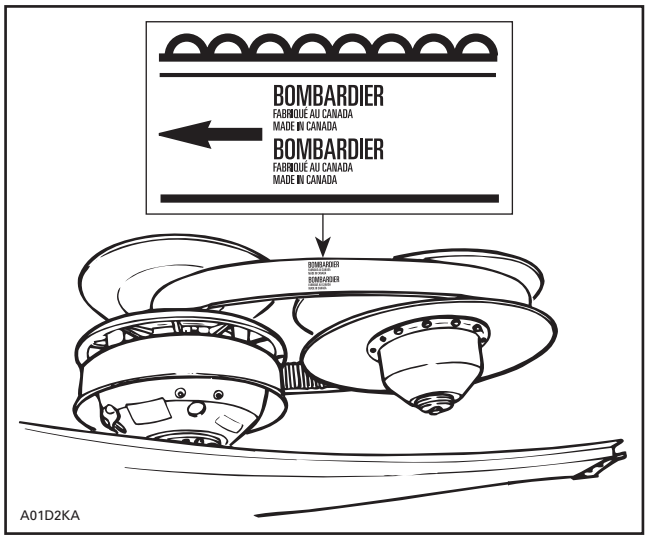
Do not sit on vehicle.

Release parking brake. Vehicle must not creep when engine is idling. Otherwise, make sure that:

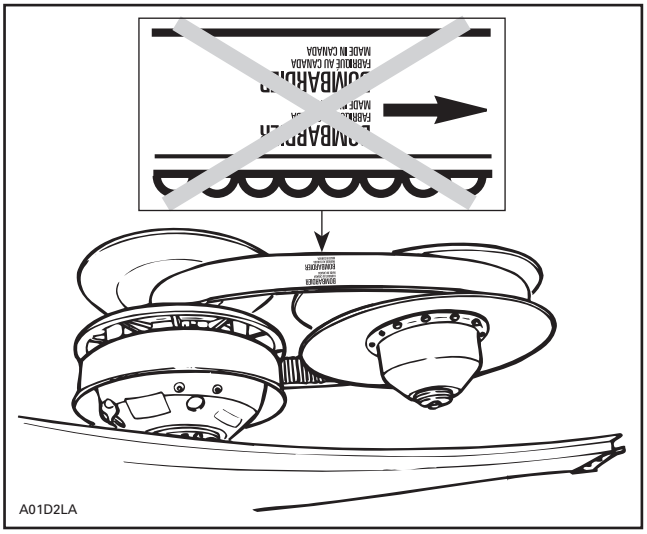
- idle speed is as specified
- proper belt is installed
- pulley center-to-center is as specified
- belt deflection is as specified.

## ROTATION DIRECTION

The maximum drive belt life span is obtained when the drive belt is installed as shown. This will ensure that correct direction of rotation is respected.




*CORRECT*




*INCORRECT*

NOTE: For used drive belt, mark and reinstall in the same position.

# DRIVE BELT HEIGHT MEASUREMENT AND ADJUSTMENT

## Measurement

NOTE: The drive belt height measurement must be performed each time a new drive belt is installed.

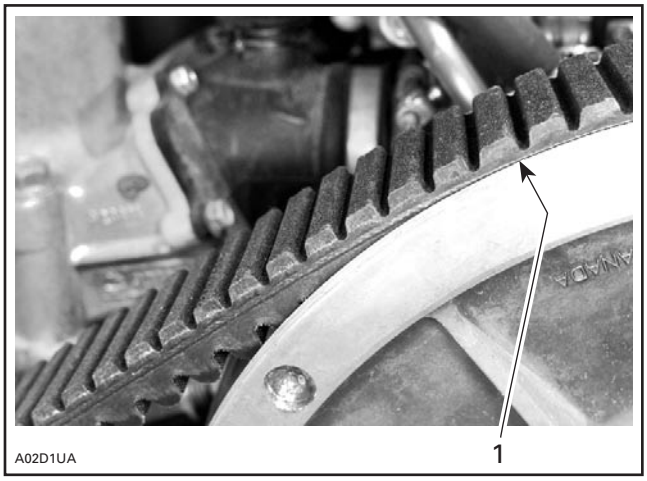
NOTE: To obtain an accurate drive belt height measurement, it is suggested to allow a break-in period of 50 km (30 m).

Before checking the belt height, ensure that a good-condition proper belt (refer to the *Application Chart*) is installed.

Adjust pulley distance and alignment. Refer to PULLEY DISTANCE AND ALIGNMENT.

To obtain maximum vehicle performance, the belt height must be adjusted according to specifications shown in the accompanying chart.

| MODEL | BELT HEIGHT |
|---|---|
| All models | Top edge of drive belt cord should be flush with driven pulley edge |




*1. Flush*

## Adjustment

Before adjusting the belt height, ensure that a good-condition proper belt (refer to the *Application Chart*) is installed.

Adjust pulley distance according to specification, refer to PULLEY DISTANCE AND ALIGNMENT.

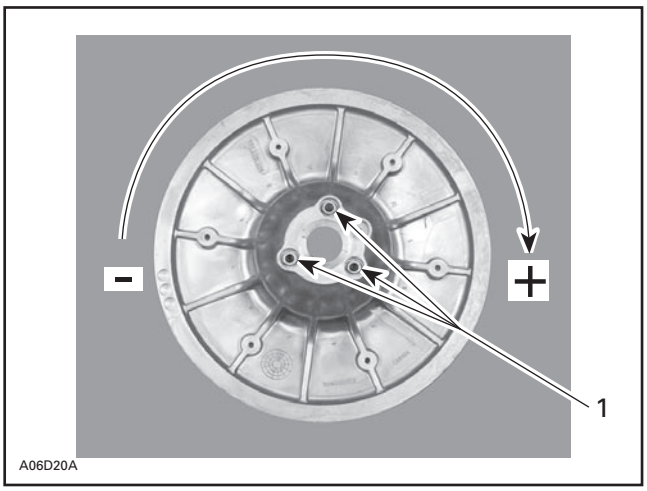
### *Models Equipped with Formula VSA Type Driven Pulley*

Adjust drive belt height using Allen screws, as shown.

To lower belt in driven pulley: turn Allen screws clockwise.

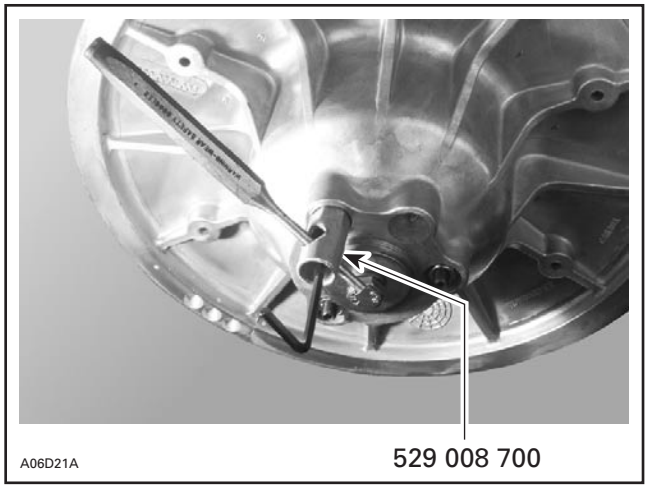
To raise belt in driven pulley: turn Allen screws counterclockwise.

NOTE: Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check height, repeat as required.



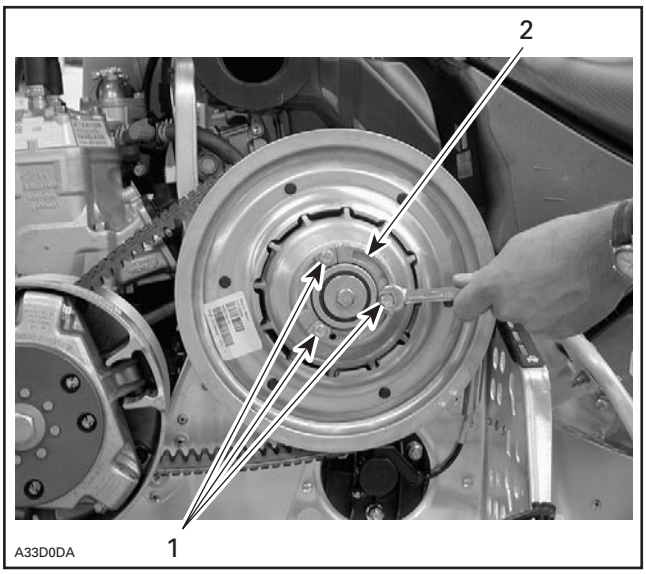

*TYPICAL*
*1. Allen screws with jam nuts*

Allen screws must be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 008 700).




*TYPICAL*

### *Models Equipped with HPV27 VSA Type Driven Pulley*

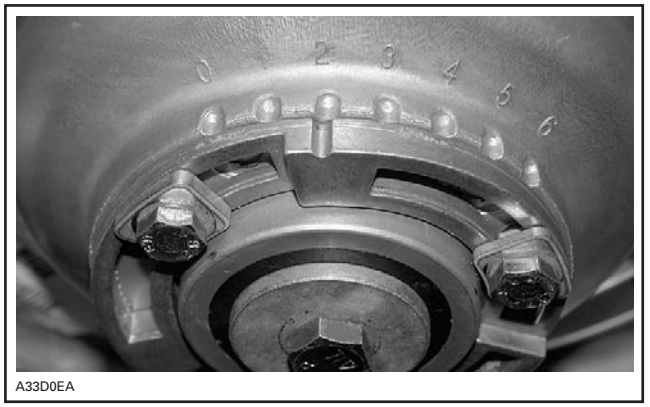



1. *Screws*
2. *Adjustment ring*

Loosen screws and turn adjustment ring as follows:

To lower belt in driven pulley: turn adjustment ring counterclockwise and tighten the screws.

To raise belt in driven pulley: turn ring clockwise and tighten the adjustment screws.




*DRIVEN PULLEY NOTCHES*

Turn the adjustment ring up to one notch, tighten the screws, then rotate driven pulley to allow drive belt to settle in pulley. Check height, if required the adjustment ring can be turned up to 1/4 or 1/2 the notch. Check height, repeat as required.

NOTE: Notches are there on the driven pulley for reference purpose only and the desired adjustment can be attained at any point.

## DRIVE BELT DEFLECTION MEASUREMENT (reference only)

NOTE: The drive belt deflection measurement must be performed each time a new drive belt is installed.

NOTE: To obtain an accurate drive belt deflection measurement, it is suggested to allow a break-in period of 50 km (30 m).

Before checking the belt deflection, ensure vehicle has the proper belt (refer to the *Application Chart*).

Adjust pulley distance and alignment. Refer to PULLEY DISTANCE AND ALIGNMENT.

To obtain maximum vehicle performance, the belt tension must be adjusted according to specifications shown in the accompanying chart.

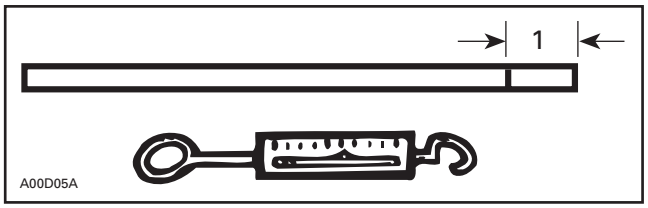
| MODEL | DEFLECTION† mm (in) | FORCE kg (lb) |
|---|---|---|
| All models | 32 ± 5 (1.260 ± .197) | 11.5 (25) |

*† FOR REFERENCE ONLY*

### To Check Tension

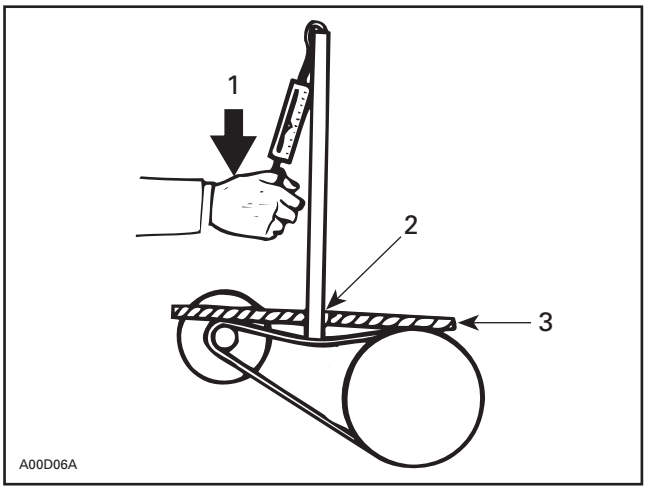
Position a reference rule on drive belt.

### Wooden Stick and Spring Scale Method



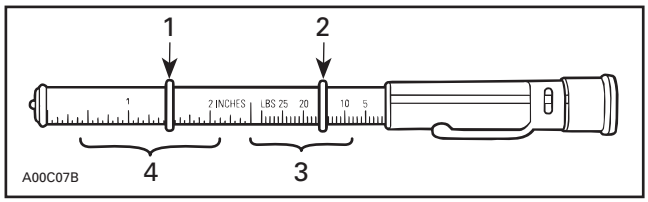

*1. Mark specified deflection*

Using spring scale and stick, apply specified force on drive belt halfway between pulleys as shown.



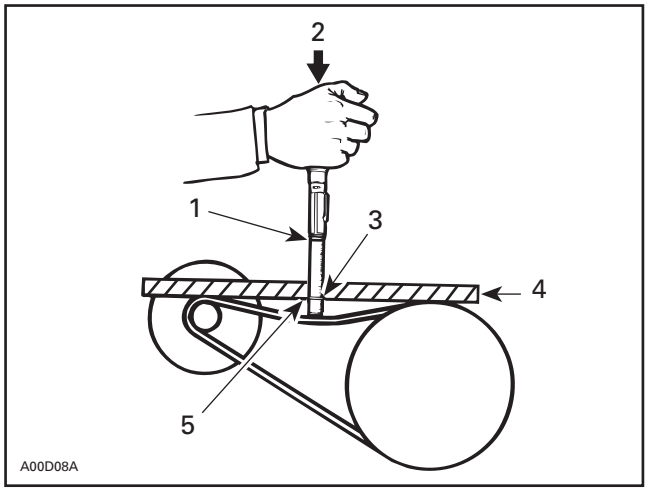

*1. Force*
*2. Read deflection here*
*3. Reference rule*

Or use the belt tension tester (P/N 414 348 200).




*1. Lower O-ring*
*2. Upper O-ring*
*3. Force (read down)*
*4. Deflection (read up)*

1. Slide lower O-ring of deflection scale to specified measure.
2. Slide upper O-ring to 0 (zero) on the force scale.
3. Apply pressure until lower O-ring is flush with edge of rule and read force on the upper scale at top edge of O-ring.



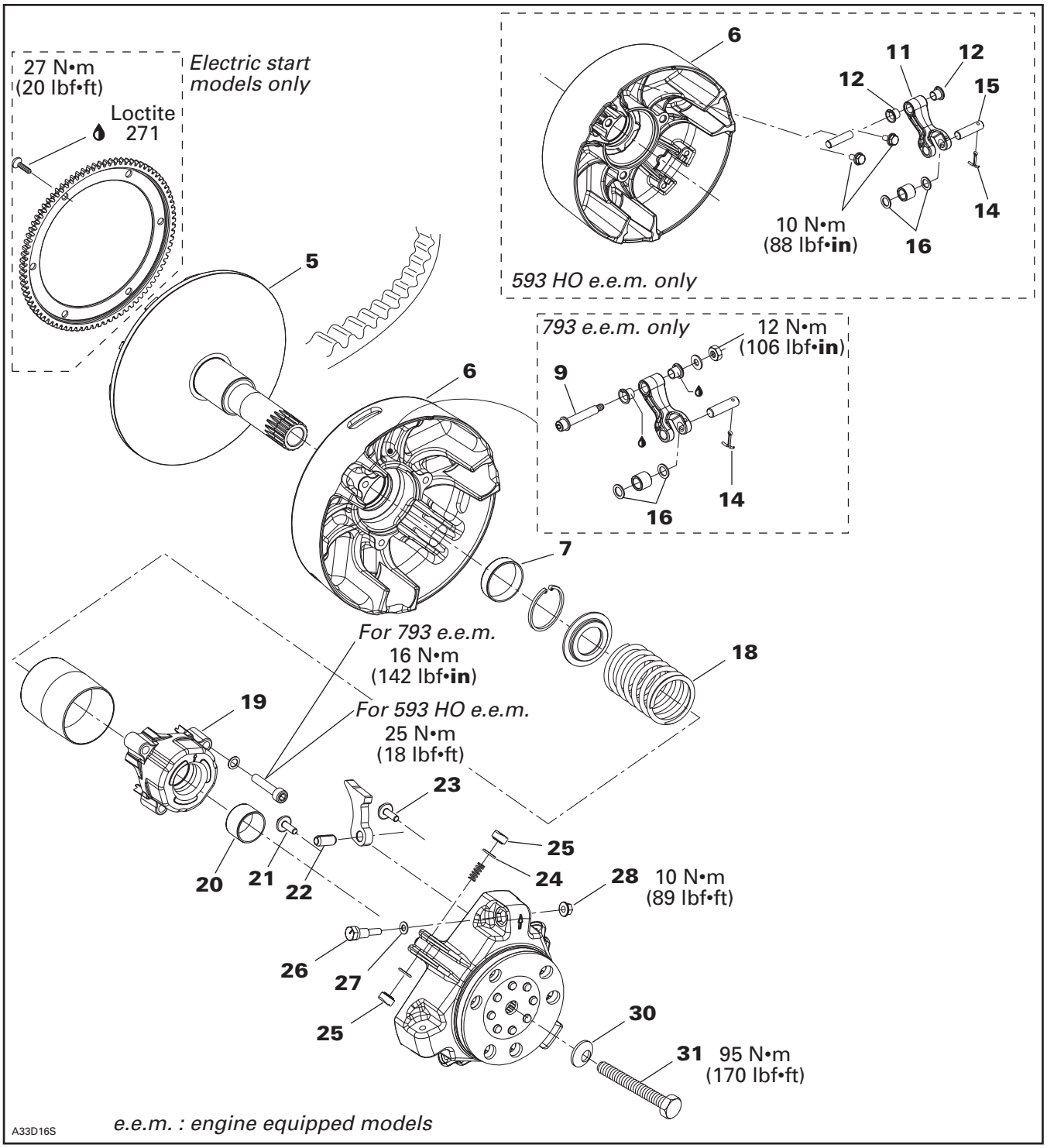

*1. Upper O-ring — force*
*2. Force*
*3. Lower O-ring — deflection*
*4. Reference rule*
*5. Deflection*

# DRIVE PULLEY

## TRA III

***All REV Series Models***

NOTE: This is a lubrication free drive pulley. Always refer to appropriate parts catalog for replacement part. Most parts of TRA III are not interchangeable with those of the TRA.



# GENERAL

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. A service bulletin will give information about calibration according to altitude.

**CAUTION:** Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance. Verify spring specifications before installation. Do not only refer to the spring color code.

NOTE: TRA drive pulley stands for Total Range Adjustable drive pulley.

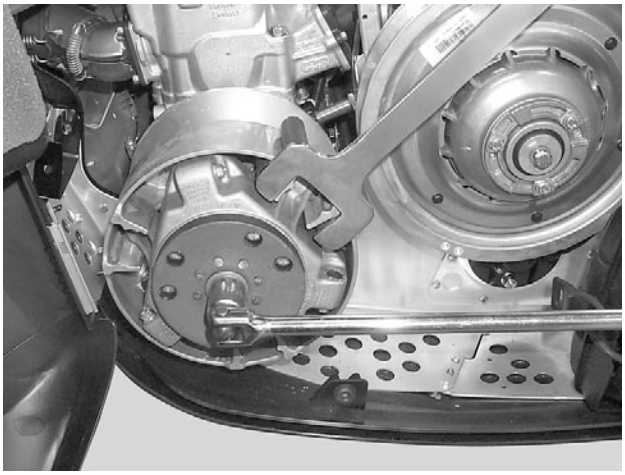
**⚠ WARNING**

**Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.**

# REMOVAL

## 30,31, Conical Spring Washer and Screw

Use holder (P/N 529 035 674).


A32D1WA

*Insert the tool in sliding flange tower*

**⚠ WARNING**

**Never use any type of impact wrench at drive pulley removal and installation.**

Remove retaining screw.

To remove drive pulley ass'y and/or fixed half from engine, use puller (P/N 529 007 900) for 503 engine equipped models and puller (P/N 529 022 400) for liquid cooled models.

**CAUTION:** These pulleys have metric threads. Do not use imperial threads puller. Always tighten puller by hand to ensure that the drive pulley has the same type of threads (metric vs imperial) prior to fully tightening.

To Remove Drive Pulley Ass'y:

Retain drive pulley with clutch holder.

Install puller in pulley shaft then tighten.

# DISASSEMBLY

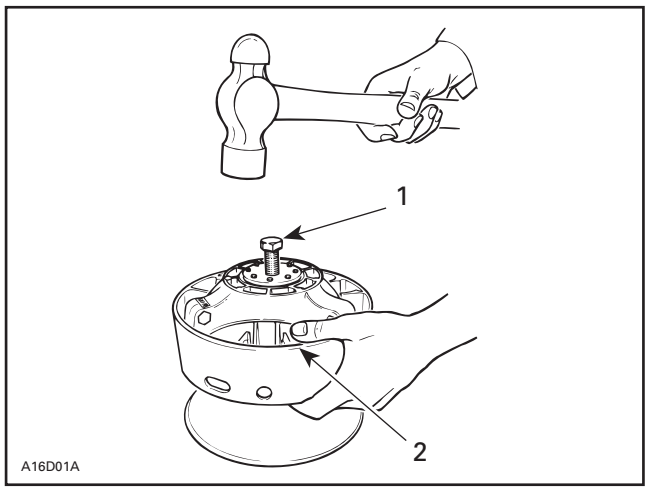
## 1,2, Screw and Ring Gear

**CAUTION:** Retaining screws must be heated before disassembly. Do not exceed 150°C (300°F).

## 5,6, Fixed and Sliding Half

**CAUTION:** Do not tap on governor cup.

Screw puller into fixed half shaft about 13 mm (1/2 in). Raise drive pulley and hold it by the sliding half while knocking on puller head to disengage fixed half.




*TYPICAL*
1. *Puller*
2. *Holding sliding half*

NOTE: No components marking is required before disassembling this drive pulley since it has factory mark and arrows as indexing reference.

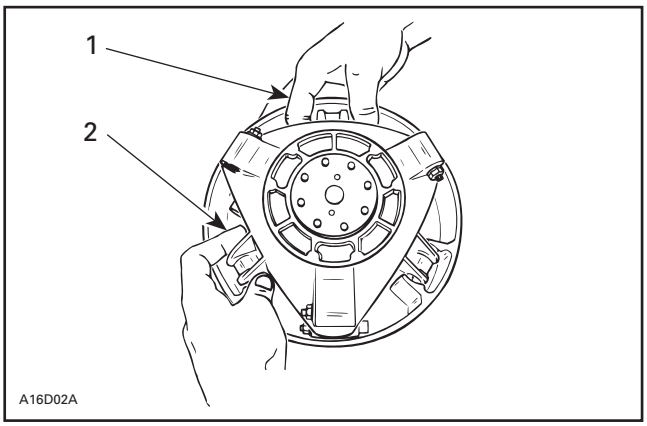
## 32, Cushion Drive

**CAUTION:** Do not disassemble cushion drive. Governor cup and cushion drive are factory balanced as an assembly.

## 25,29, Slider Shoe and Governor Cup

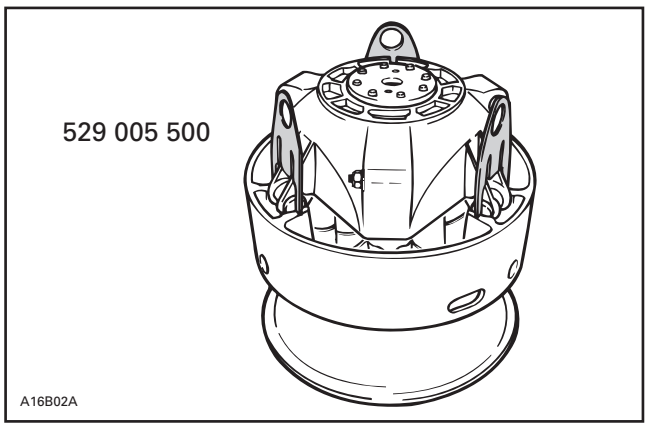
Carefully lift governor cup until slider shoes come at their highest position into guides.

Hold a slider shoe set then carefully lift its housing and remove slider shoes. Proceed the same way for other housings lifting one at a time.




1. *Hold slider shoes*
2. *Lift one housing at a time*

NOTE: To ease disassembly, forks (P/N 529 005 500) should be used to hold slider shoes prior to removing governor cup.




## 19, Spring Cover Ass'y

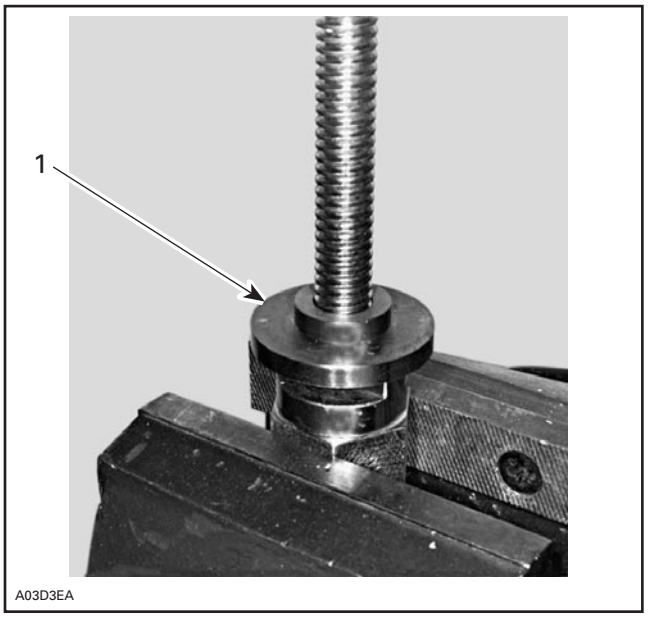
It is pushed by clutch spring pressure.

**⚠ WARNING**

**Clutch spring is very strong. Never attempt to remove spring cover without the recommended tools.**

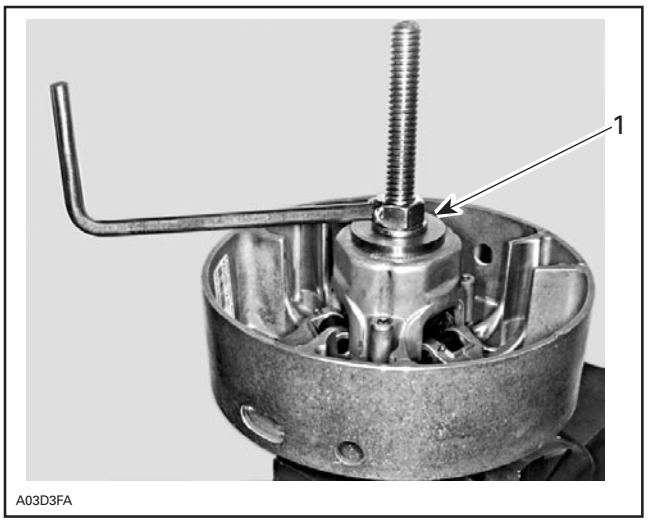
Use spring compressor (P/N 529 035 524).

Install support guide.




1. *Support guide*

Install sliding half then a second support guide. These support guides will prevent bushing damages.




1. *Support guide*

Remove 3 Allen screws retaining spring cover then unscrew compressor.

# CLEANING

## 5,6, Fixed and Sliding Half

Clean pulley faces and shaft with fine steel wool and dry cloth.

## 5, Fixed Half and Crankshaft End

Parts must be at room temperature before cleaning.

Using a paper towel with cleaning solvent, clean crankshaft tapered end and the taper inside the fixed half of the drive pulley, crankshaft threads and retaining screw threads.

**⚠ WARNING**

This procedure must be performed in a well-ventilated area.

**CAUTION:** Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all hardened oil deposits that have baked on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper no. 600.

**CAUTION:** Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and cleaning solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

**CAUTION:** Mounting surfaces must be free of any oil, cleaner or towel residue.

## 7,20, Bushing

Only use petrol base cleaner when cleaning bushings.

**CAUTION:** Do not use acetone to clean bushing.

# INSPECTION

Drive pulley should be inspected annually.

## 16,17, Thrust Washer and Roller

Check roller for roundness of external diameter. Check thrust washer for thickness wear. Replace as required.

**CAUTION:** Ensure rollers are in good condition. Replace as required.

## 9,12, Fitting Bolt Ass'y and Flanged Bushing

Check for wear, replace as required.

## 24,25, O-Ring and Slider Shoe

Check if O-rings are cracked, cut or crushed. Replace as required.

Check slider shoes for wear. Replace if groove is not apparent on top.

## 5,29, Fixed Half and Governor Cup

Inspect splines and free play between both parts. Maximum free play is 0.5 mm (.020 in) measured at calibration screw radius. Replace if required.

## 7,20, Sliding Half and Spring Cover Bushing

Visually inspect coating. Replace if worn.

### Sliding Half Bushing Replacement

This bushing is not replacable. If worn out, replace sliding half ass'y.

### Spring Cover Bushing Replacement

Under normal use there is no need to replace this bushing.

Mount compressor (P/N 529 035 524) in a vise.

Use tools (P/N 529 035 932 and 529 035 931) to remove old bushing.

**CAUTION:** Bushing must be bonded with retaining compound.

Apply retaining compound Loctite 609 outside of bushing then press it down to counterbore from outside end.

**CAUTION:** Insert bushing from sliding half side (inner side) of spring cover.

# ASSEMBLY

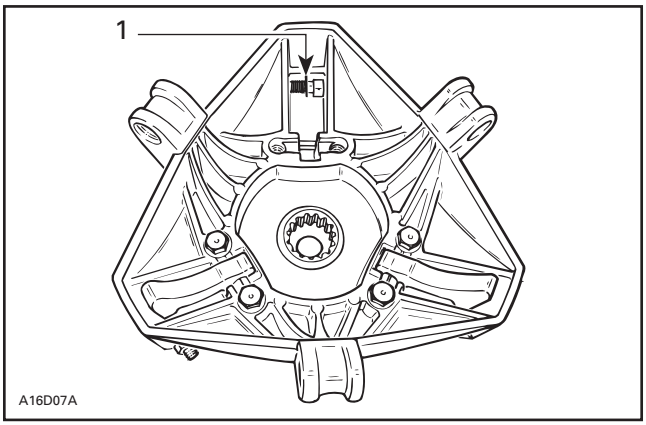
NOTE: This drive pulley is lubrication free. **Do not lubricate** any component.

## 1,2,3, Screw, Ring Gear and Loctite 271

Apply Loctite 271 (P/N 413 702 900) on threads and then torque to 27 N•m (20 lbf•ft).

## 26,27,28, Calibration Screw, Washer and Locking Nut

When installing calibration screw, make sure to install washer as shown.




*1. Washer*

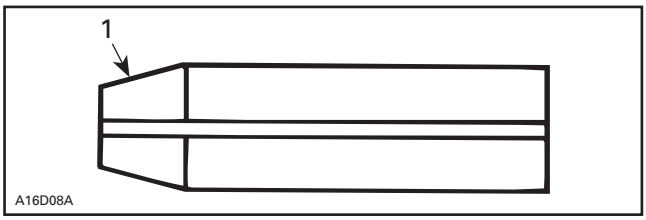
Torque locking nut to 10 N•m (89 lbf•**in**).

## 15, Pin

Always use the same type of pin as originally installed when servicing. Different types have different weights for calibration purpose. Refer to TECHNICAL DATA.

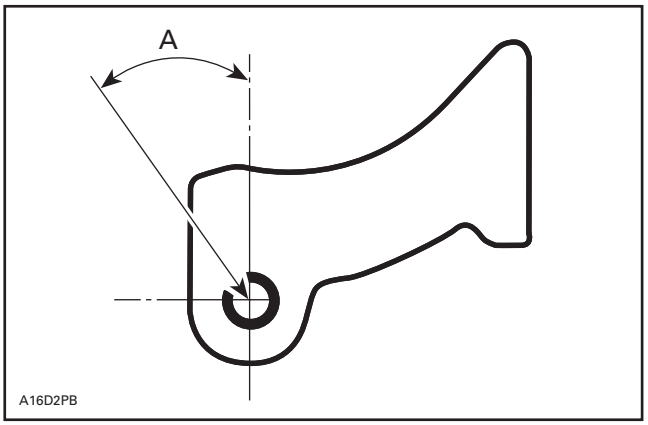
## 21,22,23, Screw, Dowel Tube and Ramp

Insert dowel tube from chamfered side. Make sure ramp is centered on dowel tube.

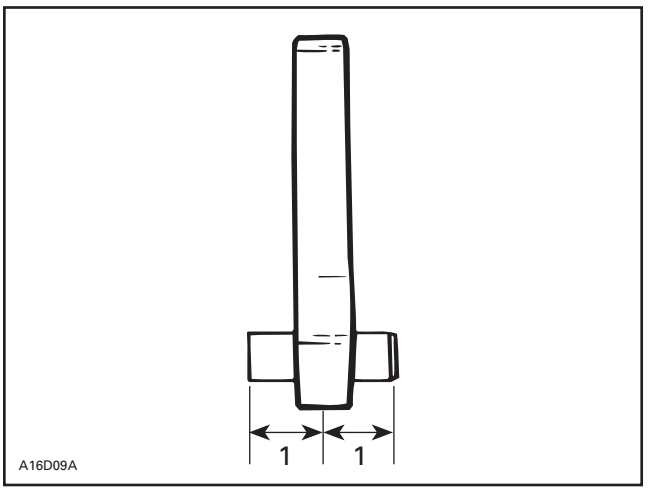



*1. Chamfered side*

Position dowel tube split at the angle A.




| MODEL | ANGLE (A) |
|---|---|
| With TRA III | 45 ± 3° |




*1. Equal distance*

Torque screws to 10 N•m (89 lbf•**in**).

## 9,11,13,14, Screw, Lever Ass'y, Nut and Cotter Pin

NOTE: While installing lever assemblies make sure that the curved sides of the levers are outwards as shown.

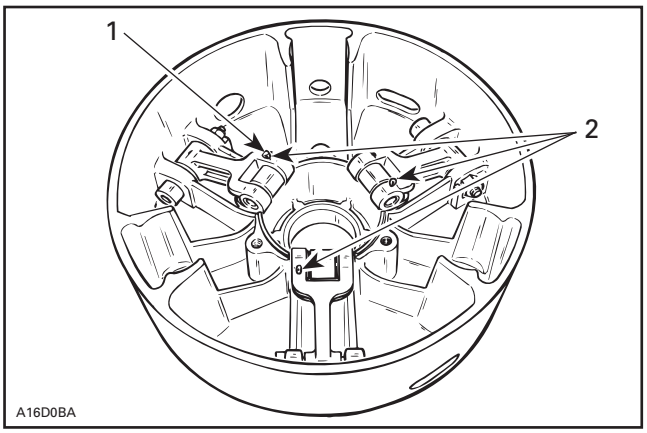

A32D1ZA

Always install lever assemblies so that cotter pins are on the shown side. Besides install cotter pin head on top when lever is sat at bottom of sliding half. Bend cotter pin ends to sit perfectly against lever.

**⚠ WARNING**

Whenever replacing centrifugal levers, always replace all 3 at the same time. Otherwise, drive pulley misbalancing will occur because of levers difference.

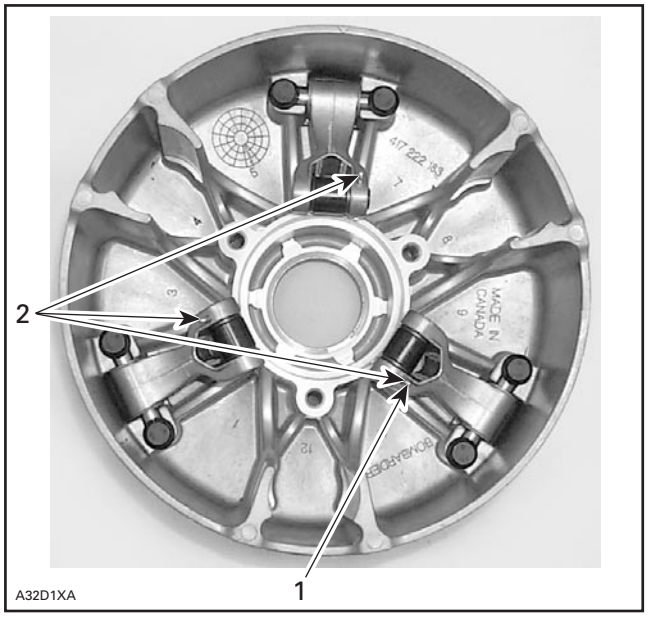
### *793 Engine Equipped Models Only*




*TYPICAL*

1. *Head on top*
2. *All on the same side*

### *593 HO Engine Equipped Models Only*




1. *Head on top*
2. *All on the same side*

### *All Models*

**CAUTION:** Lever assemblies must be installed so that cotter pins are on the same side.

Torque nuts to 12 N•m (106 lbf•**in**).

**CAUTION:** Lever ass'y and rollers must move easily after installation.

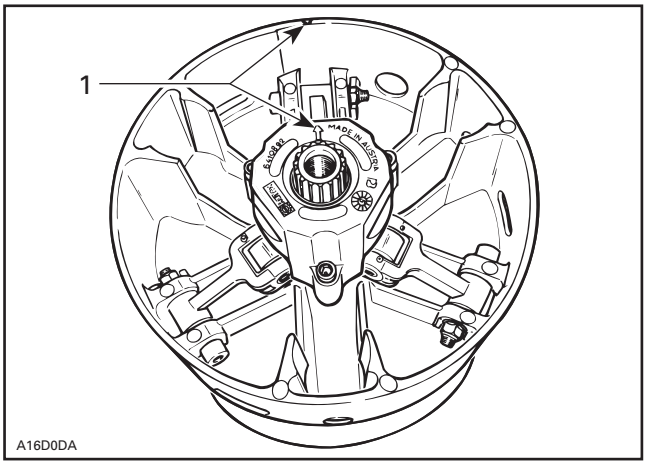
## 5,6,18,19, Fixed Half, Sliding Half, Spring, Spring Cover and Screw

To install spring cover, use spring compressor (P/N 529 035 524).

Assemble fixed and sliding halves. Note that fixed halves have different cone angle. Match cone angle with crankshaft.

Lift sliding half against spring cover and align spring cover arrow with sliding half mark.

### *793 Engine Equipped Models Only*




*TYPICAL*

*1. Align*

### *593 HO Engine Equipped Models Only*

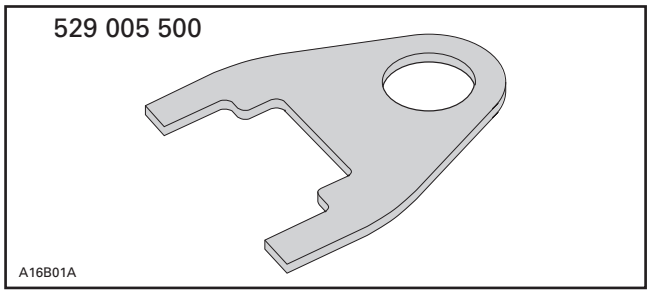

*1. Align*

### *All Models*

Tighten screws to proper torque as mentioned in exploded view.

## 6,25,29, Sliding Half, Slider Shoe and Governor Cup

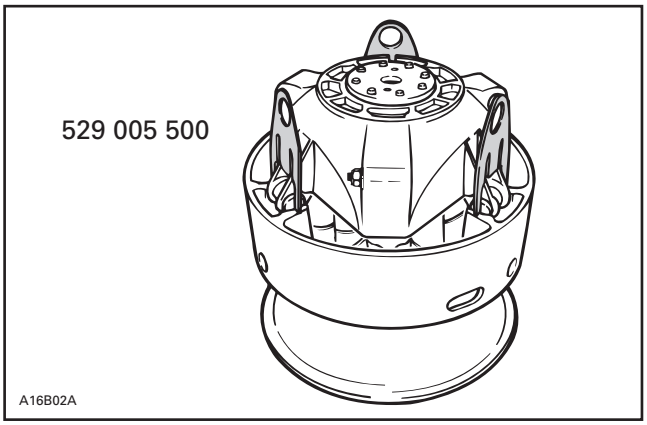
To install governor cup, use following tool:




Insert spring and slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

**CAUTION:** Make sure O-rings are installed on slider shoes and that grooves are positioned vertically.

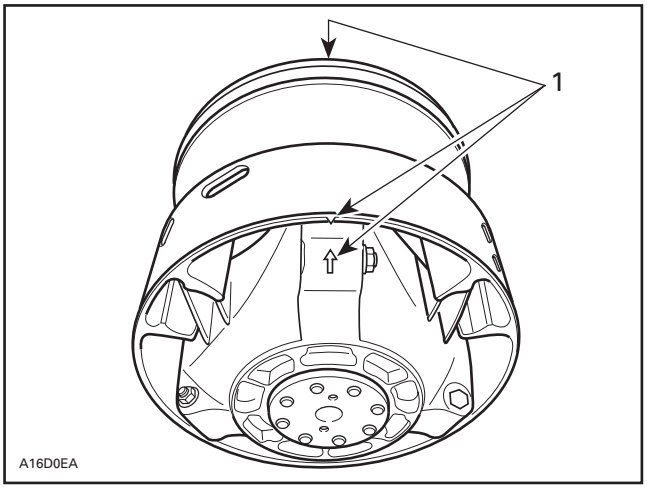
Install fork (P/N 529 005 500) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.




*TYPICAL*

Make sure to align governor cup arrow with sliding half and fixed half mark.

NOTE: If fixed half has no mark, align governor cup mark with segment no. 1 of inner half. Segments are identified on engine side.




*TYPICAL*
*1. Align*

Carefully slide governor cup into sliding half. Align mark of governor cup with mark of fixed half.

Remove forks and push governor cup so that its splines engage with fixed half shaft splines.

**CAUTION:** Make sure splines of both parts are fully engaged.

# INSTALLATION

**⚠ WARNING**

Do not apply anti-seize or any lubricant on crankshaft and drive pulley tapers.

**⚠ WARNING**

Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces as described in CLEANING above.

## Drive Pulley Ass'y

The following installation procedure must be strictly adhered to.

Install drive pulley on crankshaft extension.

Install a new conical spring washer with its concave side towards drive pulley then install screw.

**⚠ WARNING**

Never substitute conical spring washer and/or screw with jobber ones. Always use Bombardier genuine parts for this particular case.

Use holder. See removal procedure.

Torque screw to 80 to 100 N•m (59 to 74 lbf•ft).

Install drive belt and guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

**⚠ WARNING**

Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake, repeat 5 times.

Retorque screw to 90 to 100 N•m (66 to 74 lbf•ft).

**⚠ WARNING**

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

# DRIVE PULLEY ADJUSTMENT

The drive pulley is factory calibrated to transmit maximum engine power at a predefined RPM. Factors such as ambient temperature, altitude or surface condition may vary this critical engine RPM thus affecting snowmobile efficiency.

This adjustable drive pulley allows setting maximum engine RPM in the vehicle to maintain maximum power.

Calibration screws should be adjusted so that actual maximum engine RPM in vehicle matches with the maximum horsepower RPM given in TECHNICAL DATA.

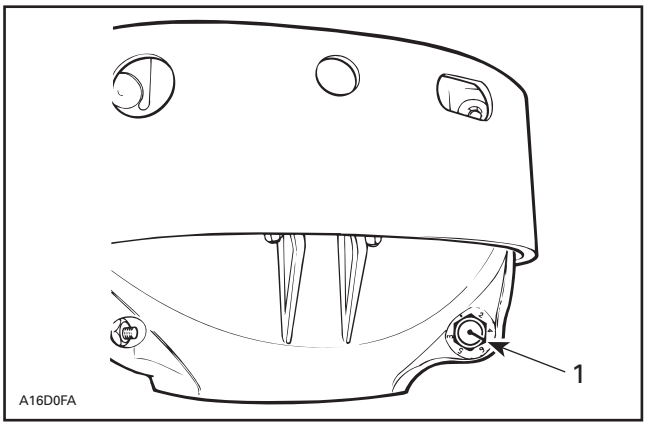
NOTE: Use precision digital tachometer for engine RPM adjustment.

NOTE: The adjustment has an effect on high RPM only.

To adjust, modify ramp end position by turning calibration screws.

## 26,28,29, Calibration Screw, Locking Nut and Governor Cup

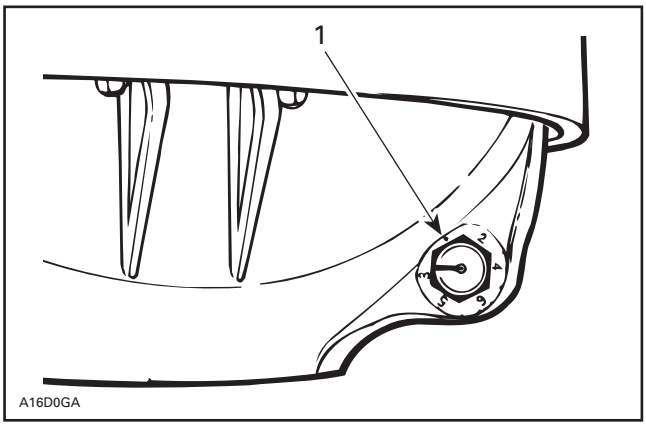
Calibration screw has a notch on top of its head.




*1. Notch*

Governor cup has 6 positions numbered 2 to 6. Note that in position 1 there is no stamped number (due to its location on casting).

See TECHNICAL DATA for original setting.




*1. Position 1 (not numbered)*

Each number modifies maximum engine RPM by about 200 RPM.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

Example:

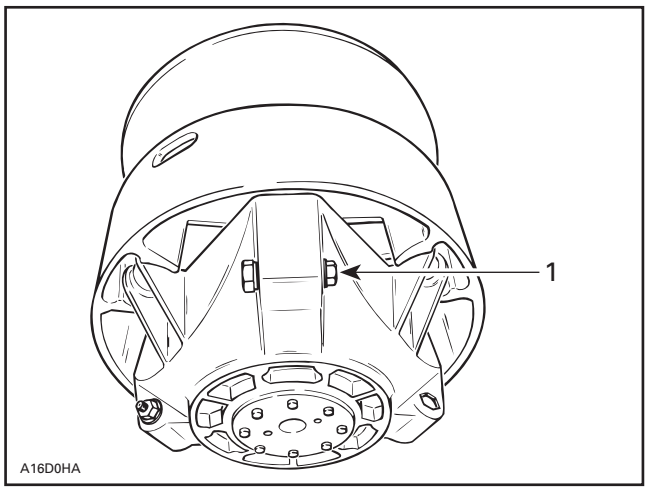
Calibration screw is set at position 3 and is changed to position 5. So maximum engine RPM is increased by about 400 RPM.

### To Adjust:

Just loosen locking nut enough to pull calibration screw **partially** out and adjust to desired position. Do not completely remove the locking nut. Torque locking nuts to 10 N•m (89 lbf•**in**).

**CAUTION:** Do not completely remove calibration screw otherwise its inside washer will fall off.

**CAUTION:** Always adjust all 3 calibration screws and make sure they are all set at the same number.

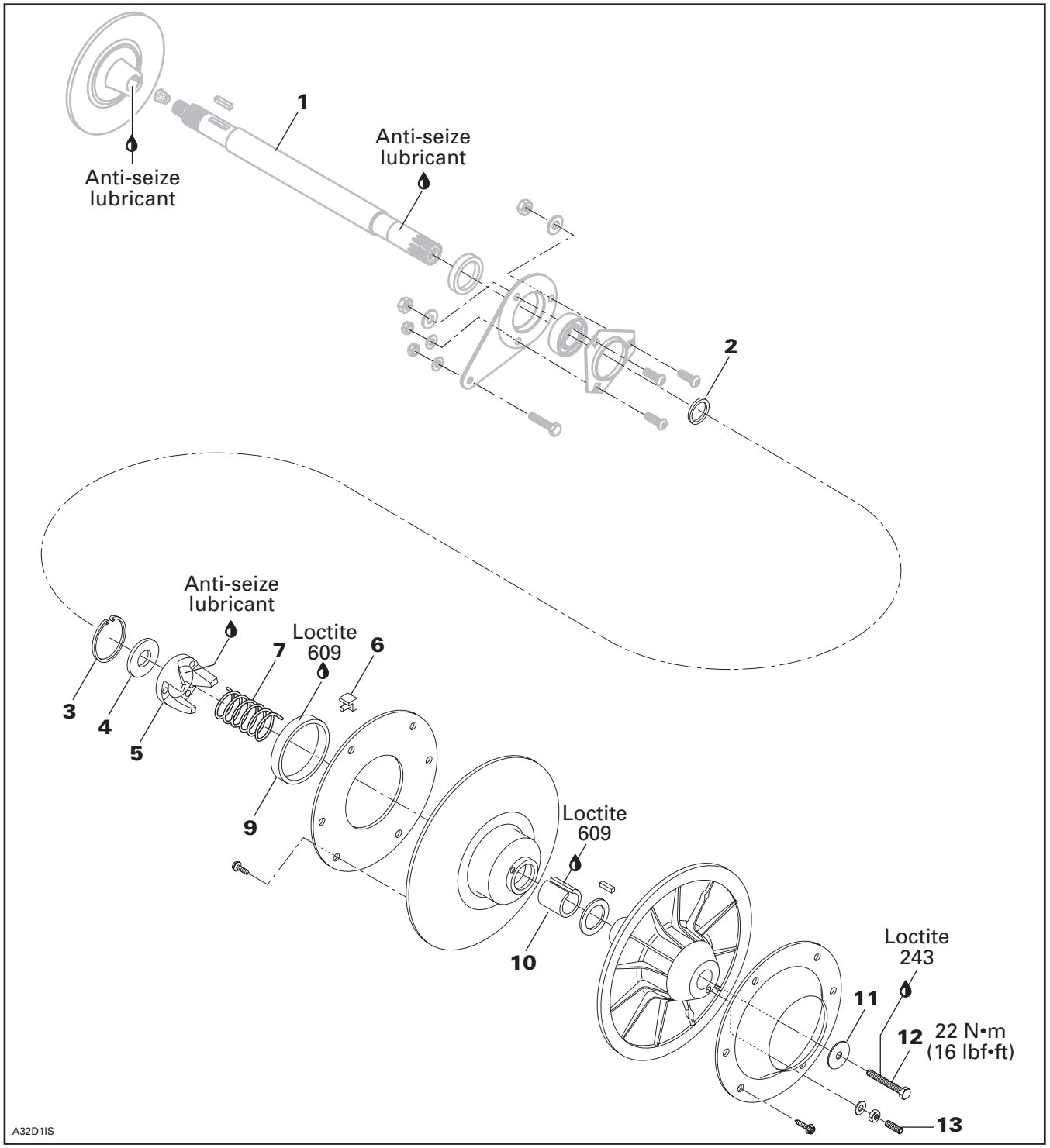



*TYPICAL*

*1. Loosen just enough to permit rotating of calibration screw*

# DRIVEN PULLEY

## FORMULA VSA



# REMOVAL

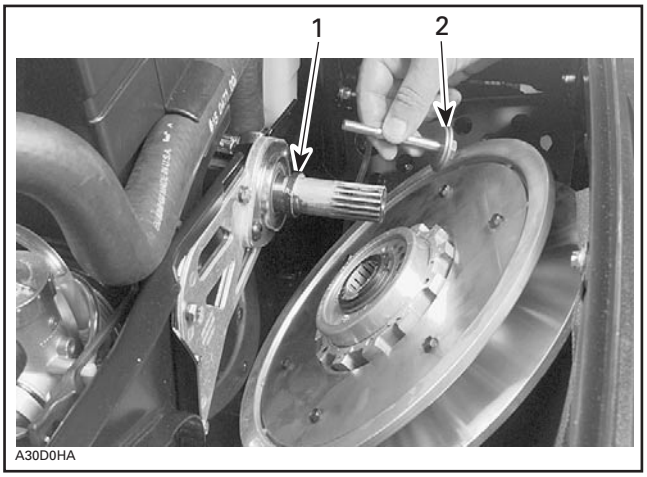
Remove guard and drive belt from vehicle.

Remove cap screw **no. 12** and shouldered washer **no. 11** then pull the driven pulley from the countershaft.

Note shouldered washer position for reinstallation.

Take care not to lose spacer **no. 2**.

NOTE: Make sure that the smaller diameter spacer is against the bearing to avoid damage to the bearing seal.




*TYPICAL*

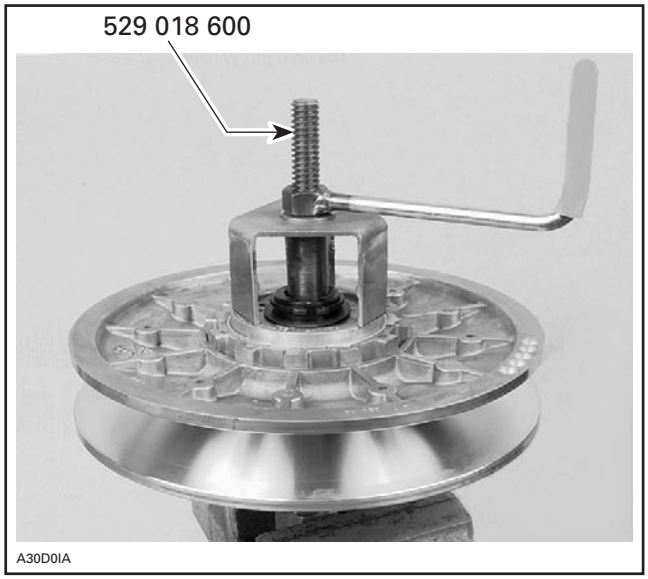
1. *Spacer*
2. *Shoulder on this side*

## 1, Countershaft

Should countershaft **no. 1** removal be required, refer to BRAKE then look for COUNTERSHAFT AND BRAKE DISC REMOVAL.

# DISASSEMBLY

Use spring compressor (P/N 529 018 600).




Remove snap ring **no. 3** and washer **no. 4** to disassemble the cam and the 2 pulley halves.

**⚠ WARNING**

**Driven pulley cam is spring and/or torsion loaded, use above mentioned tool.**

# CLEANING

## 9, Large Bushing

During break-in period (about 10 hours of use), bushing teflon moves toward cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

## Pulley Half Cleaning

Use Pulley Flange Cleaner (P/N 413 711 809).

# INSPECTION

## 9,10, Bushings

Check for cracks, scratch and for free movement when assembled to fixed half.

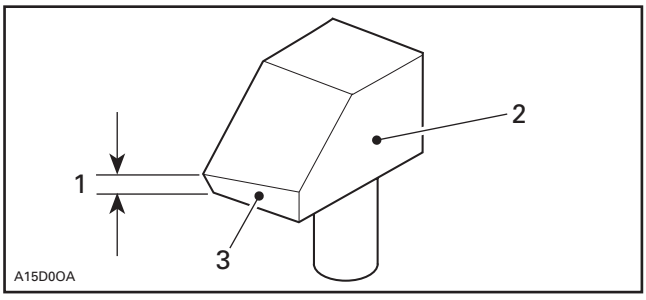
Using a dial bore gauge measure bushing diameter. Measuring point must be at least 5 mm (1/4 in) from bushing edge.


Replace bushing(s) if worn more than specified.

| DRIVEN PULLEY BUSHING WEAR LIMIT mm (in) | |
|---|---|
| Large bushing | 89.15 (3.510) |

## 6, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge thickness of cam slider shoe slope base is worn to 1 mm (.039 in) or less.




*1. Measure thickness of slope base here*
*2. Sliding pulley side*
*3. Slope base*

# ASSEMBLY

## 6, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

## 5, Cam

Coat cam interior with anti-seize lubricant.

# INSTALLATION

## 1, Countershaft

**CAUTION:** Always apply anti-seize lubricant (P/N 293 800 070) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE then look for BRAKE DISC AND COUNTERSHAFT BEARING ADJUSTMENT.

Reinstall the pulley on the countershaft by reversing the removal procedure.

Driven pulley end-play is 0 (zero).

## 12, Pulley Retaining Screw

Torque to 22 N•m (16 lbf•ft).

# ADJUSTMENT

## 7, Spring

### General

It is usual to experience spring setting during breaking period of a new spring. The factory spring preload is slightly higher (about 1 kg (2 lb)) to compensate for spring setting. Specifications in TECHNICAL DATA are applicable after break-in period (about 10 hours of use).

### Spring Torsional Pre-Load

To check spring pre-load adjustment, use spring scale hook (P/N 529 006 500) and a spring scale.

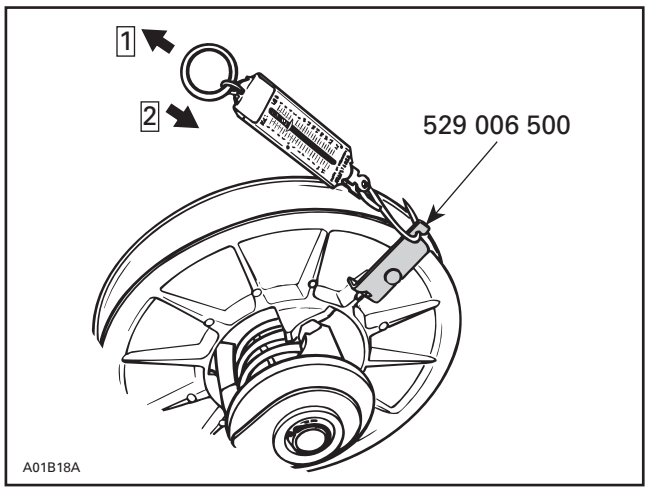
Remove drive belt.

Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicularly with pulley axle.

Take 1st measurement when sliding half begins to turn. Rotate sliding half to 10 mm (3/8 in) of rotation. Hold spring scale at this position. Slowly release tension from spring scale and take 2nd measurement when sliding half begins to return. Spring pre-load is the average measurement between these 2.

$$\frac{\text{1st measurement (when opening)} + \text{2nd measurement (when closing)}}{2} = \text{Spring pre-load}$$

Example: $\frac{\text{3.8 kg (8.4 lb) (when opening)} + \text{3.4 kg (7.5 lb) (when closing)}}{2} = \text{3.6 kg (8 lb) Actual spring pre-load}$

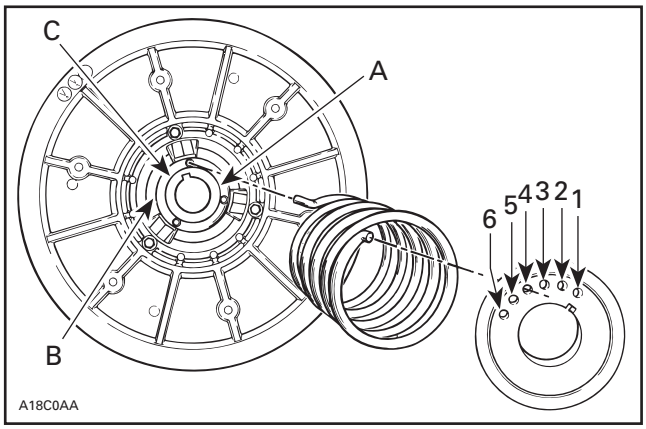



*TYPICAL*

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

To adjust spring pre-load, relocate spring end in cam, moving it clockwise to increase the pre-load and counterclockwise to decrease it. Refer to TECHNICAL DATA.

NOTE: If spring pre-load can not be adjusted, try to relocate the other end of spring in sliding pulley (holes A, B and C).




*TYPICAL*

*Letters and numbers shown in illustration are actual letters and numbers embossed on parts*

NOTE: Always recheck torsional pre-load after adjusting.

## Pulley Alignment and Drive Belt Height

Refer to PULLEY DISTANCE AND ALIGNMENT and DRIVE BELT to perform adjustments.

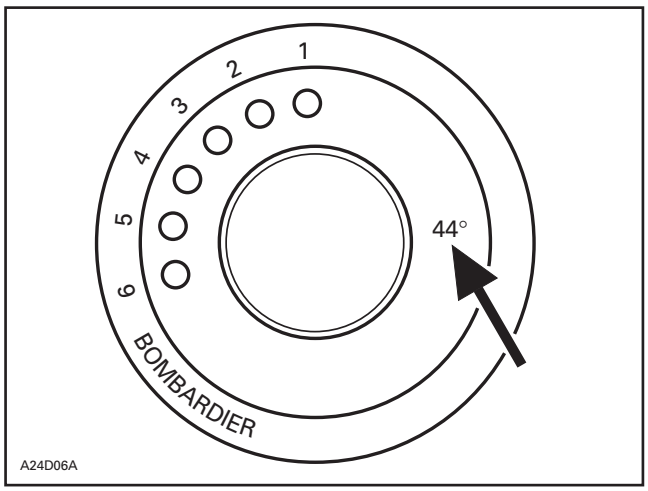
Drive belt height is adjusted by turning Allen screws **no. 13** equally and accordingly.

**CAUTION: Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.**

## 5, Cam

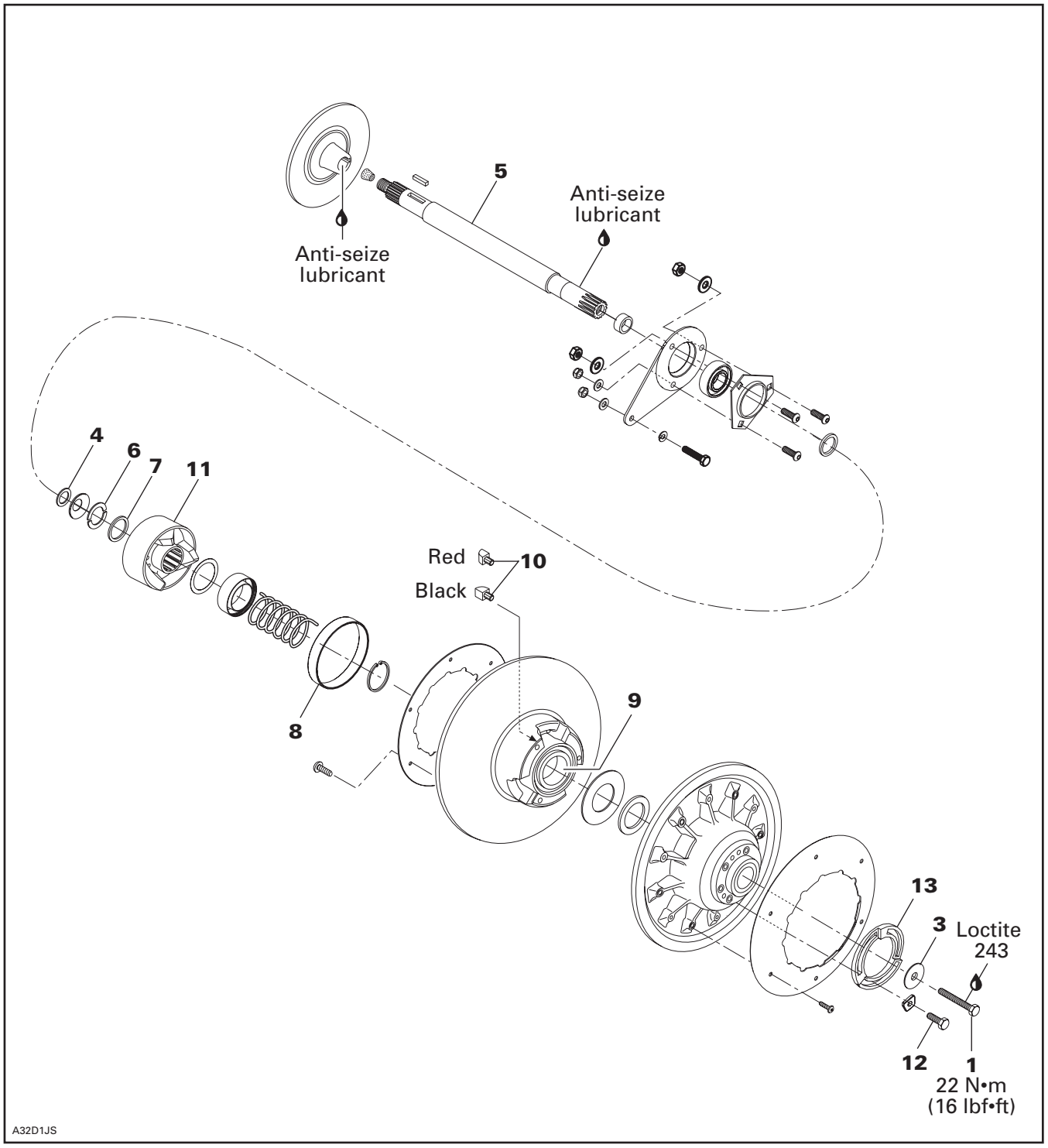
Make sure to install proper cam. Refer to TECHNICAL DATA.

Cam angle is identified on cam.




NOTE: For high altitude regions, a service bulletin will give information about calibration according to altitude.

# HPV27 VSA


5
Anti-seize lubricant
Anti-seize lubricant
4
6
7
11
Red
Black
10
8
9
13
3
Loctite 243
12
1
22 N•m
(16 lbf•ft)
A32D1JS

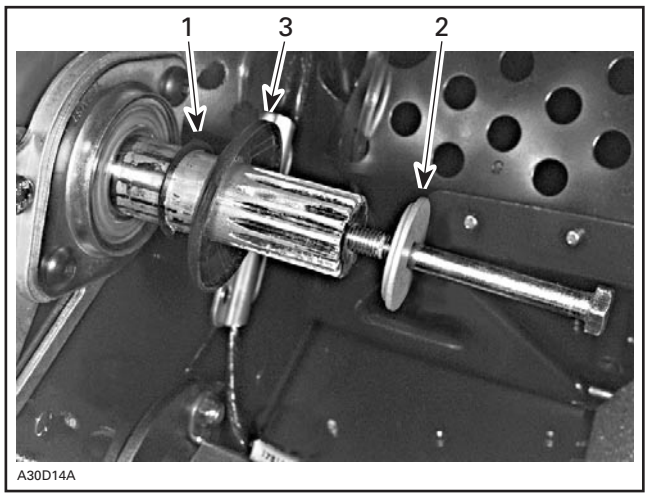
# REMOVAL

Remove guard and drive belt from vehicle.

Remove cap screw **no. 1** and shouldered washer **no. 13** then pull the driven pulley from the countershaft.

Note shouldered washer position for reinstallation.

Take care not to lose spacer **no. 4**.



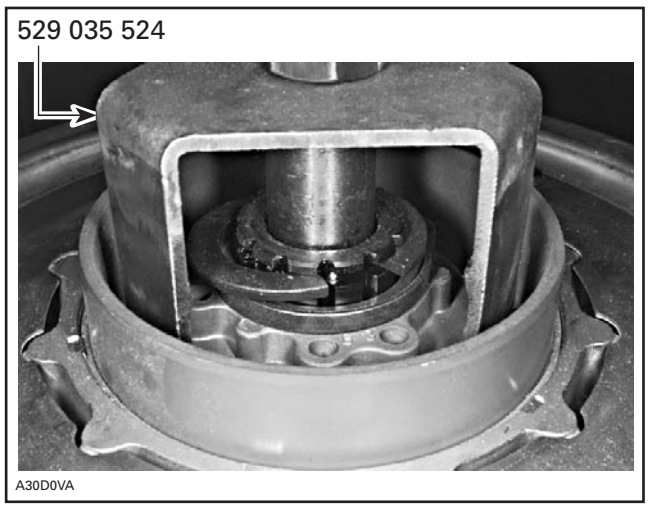

*1. Spacer*
*2. Shoulder on this side*
*3. Concave side facing driven pulley*

## 5, Countershaft

Should countershaft **no. 5** removal be required, refer to BRAKE then look for COUNTERSHAFT AND BRAKE DISC REMOVAL.

# DISASSEMBLY

Use spring compressor (P/N 529 035 524).




Remove half keys **no. 6** and washer **no. 7** to disassemble the cam and the 2 pulley halves.

**⚠ WARNING**

**Driven pulley cam is spring loaded, use above mentioned tool.**

# CLEANING

## 8,9, Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing moves to cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

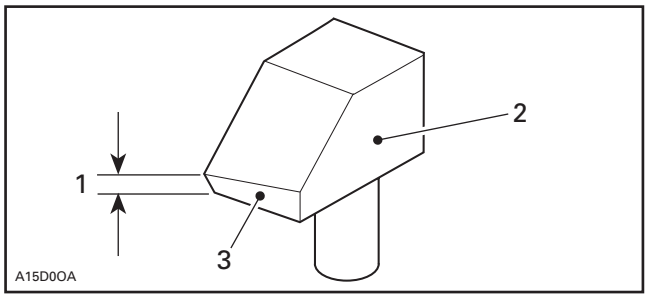
## Pulley Half Cleaning

Use Pulley Flange Cleaner (P/N 413 711 809).

# INSPECTION

## 10, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge thickness of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



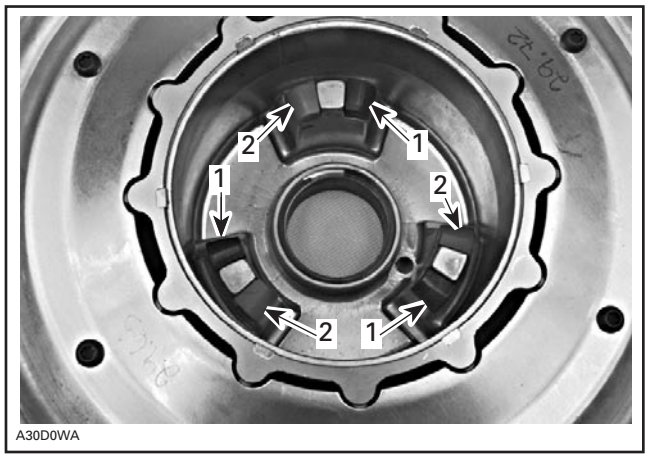

*1. Measure thickness of slope base here*
*2. Sliding pulley side*
*3. Slope base*

# ASSEMBLY

## 10, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Install slider shoes as per following photo. RED slider shoes are being used for reverse and BLACK ones for forward.




*1. BLACK slider shoe*
*2. RED slider shoe*

## 12, Screws

These screws are machined at there end. With the adjustment ring steel to position 0 (zero), screw ends are flush with inner side of fixed pulley half when tighten.

**CAUTION:** If any of these screws is not flush with inner side of sliding pulley, bushings will worn unequally.

Assemble driven pulley components by reversing the disassembly procedure.

## 11, Cam

Coat cam interior with anti-seize lubricant.

# INSTALLATION

## 5, Countershaft

**CAUTION:** Always apply anti-seize lubricant (P/N 293 800 070) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE then look for BRAKE DISC and COUNTERSHAFT BEARING ADJUSTMENT.

Reinstall the pulley on the countershaft by reversing the removal procedure.

Driven pulley end-play is 0 (zero).

## 1, Pulley Retaining Screw

Torque to 22 N•m (16 lbf•ft).

# ADJUSTMENT

## Pulley Alignment and Drive Belt Height

Refer to PULLEY DISTANCE AND ALIGNMENT and DRIVE BELT to perform adjustments.

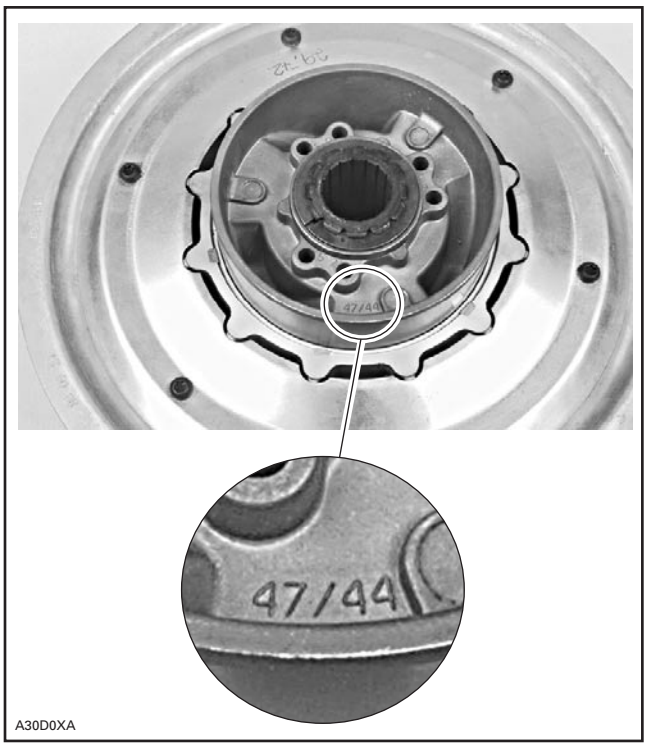
Loosen screws **no. 12**, turn adjustment ring **no. 13** then retighten screws to adjust drive belt height.

**CAUTION:** Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

## 11, Cam

Make sure to install proper cam. Refer to TECHNICAL DATA.

Cam angle is identified on cam.




NOTE: For high altitude regions, a service bulletin will give information about calibration according to altitude.

# PULLEY DISTANCE AND ALIGNMENT

## GENERAL

Both pulley distance and pulley alignment must be checked out to ensure the highest efficiency of the transmission system. Furthermore, optimum drive belt operation and minimal wear will be obtained only with proper pulley alignment.

**CAUTION: Before checking pulley adjustment, the rear suspension must be mounted on the vehicle and track tension/alignment must be done. Always check pulley adjustment after suspension is adjusted.**

**⚠ WARNING**

**Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.**

All Pulley Alignment Specifications Refer to:

X = Distance between straight bar and drive pulley fixed half edge, **measured between pulleys**.

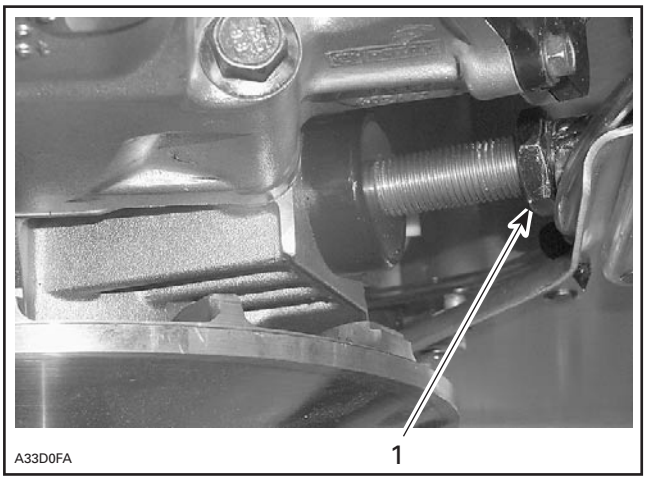
Y = Distance between straight bar and drive pulley fixed half edge, **measured at the end of straight bar**.

Z = Pulley distance is not adjustable on the REV Series models.

## GENERAL PROCEDURE

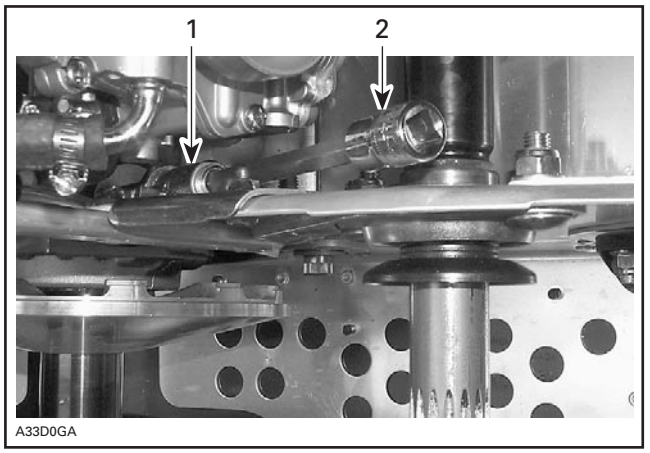
Remove guard, drive belt, driven pulley and air silencer.

Loosen lock nut.



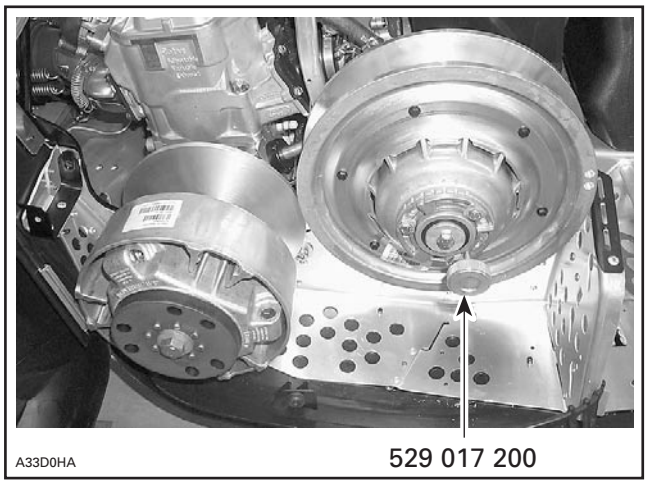

*1. Lock nut*

Untighten torque rod using a long hexagonal key.




*1. Torque rod*
*2. Hexagonal key*

Install driven pulley. By using driven pulley opening tool (P/N 529 017 200) push the sliding half to open the driven pulley.



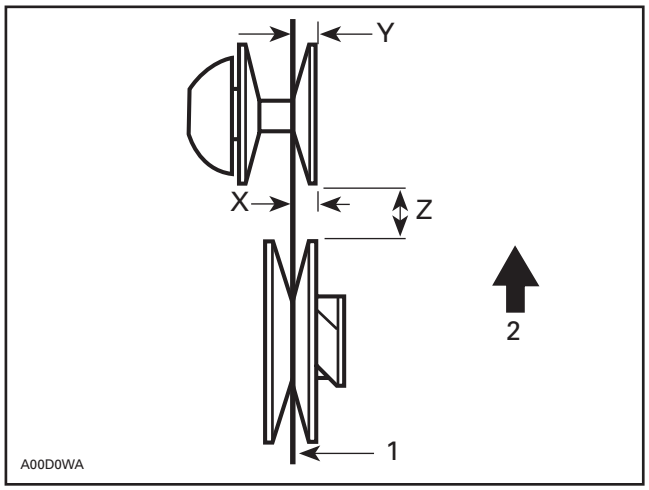

*DRIVEN PULLEY OPENING TOOL*

Insert a straight bar 9.5 mm (.375 in) square, 48 cm (19 in) long or the proper alignment bar into the opened driven pulley.

## Measuring Procedure

### Using Straight Bar

Always measure distances X and Y from the farther straight bar side (including its thickness to the fixed half edge).




*TYPICAL*

1. *Straight bar*
2. *Front of vehicle*

The distance Y **must** exceed distance X to compensate for the twist due to the engine torque.

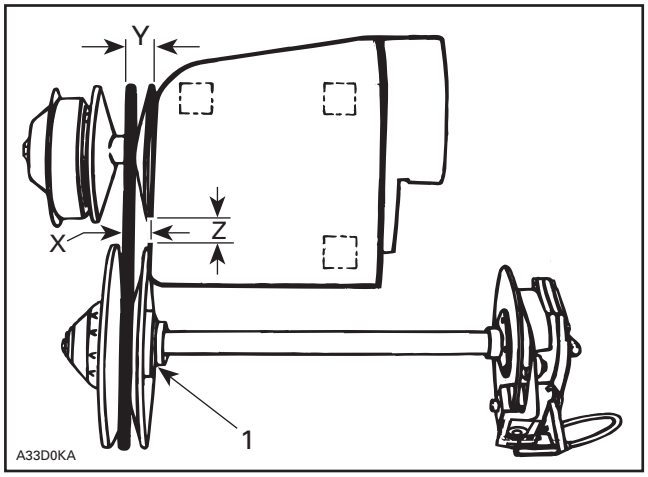
## Drive Belt Deflection

NOTE: When pulley distance and alignment are adjusted to specifications, refer to DRIVE BELT to adjust drive belt deflection.

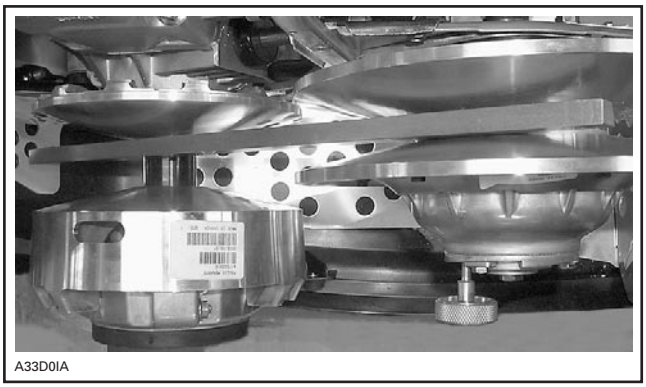
**CAUTION:** This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

# PULLEY ALIGNMENT AND DISTANCE SPECIFICATIONS CHART

| MODEL | PULLEY DISTANCE | OFFSET | | ALIGNMENT BAR P/N |
|---|---|---|---|---|
| | Z | X | Y-X | |
| | ± 0.50 mm (.020 in) | ± 0.50 mm (.020 in) | ± 0.50 mm (.020 in) | |
| ALL REV SERIES MODELS WITH FORMULA VSA | 19.0 (0.748) | 37.0 (1.456) | 1.5 (0.060) | 529 026 700 |
| ALL REV SERIES MODELS WITH HPV 27 VSA | 20.0 (0.787) | 37.0 (1.456) | 1.5 (0.060) | 529 035 831 |




*TYPICAL*
*1. Contact*




*ALIGNMENT BAR IN PULLEYS*

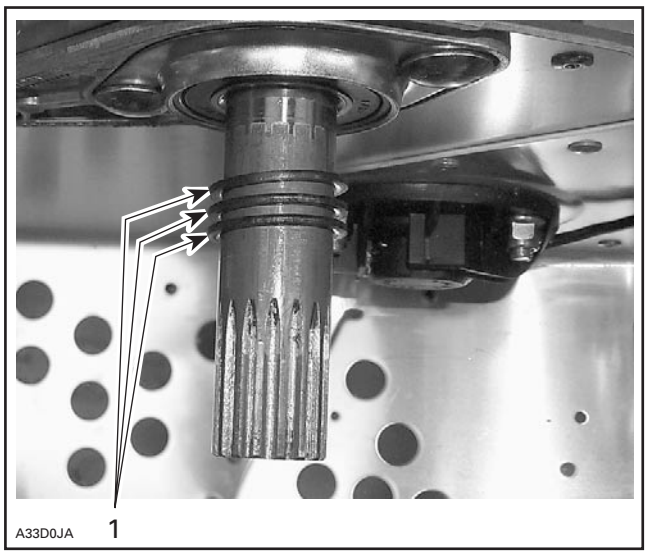
NOTE: Prior to performing pulley adjustment, loosen torque rod and lock nut as mentioned above in the GENERAL PROCEDURE sub-section.

## Pulley Distance Adjustment Method

Pulley distance adjustment cannot be done on REV series models.

## Pulley Alignment Method

Remove pulley and add or remove spacer(s) as required to obtain the specified alignment.

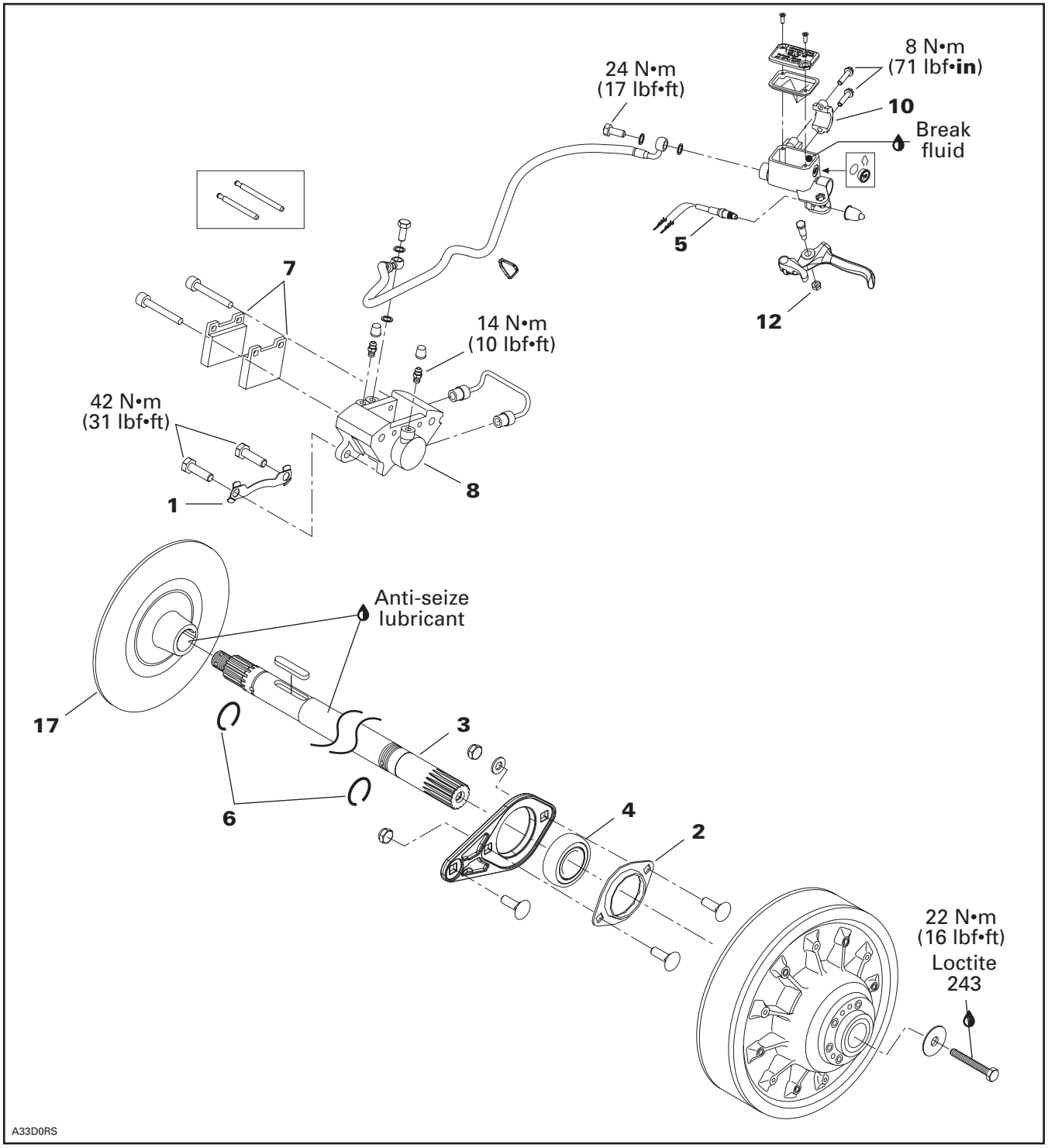



*1. Spacers*

NOTE: After alignment hand tighten torque rod so it slightly contacts engine crankcase. Do not over tighten, it will disalign pulleys.

# BRAKE

## HYDRAULIC BRAKE



# BRAKE FLUID TYPE

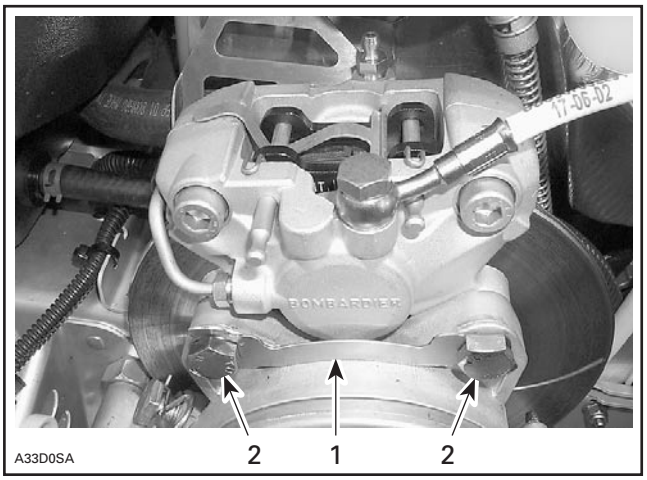
Use recommended brake fluid SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062).

# CALIPER

## Removal

Caliper no. 8 can be removed as follows:

– Unscrew 2 screws and remove locking tab no. 1.




1. *Locking tab*
2. *Screws*

– Pull out caliper from the brake disc.

## Installation

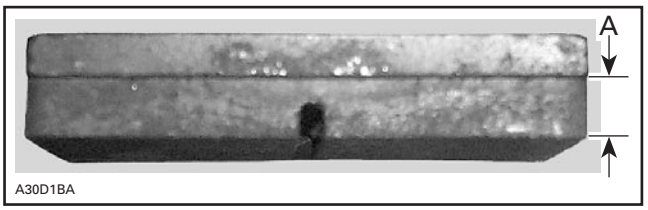
– Install caliper on the brake disc.

– Install locking tab.

# BRAKE PADS REPLACEMENT

Brake pads must be replaced when lining is 1 mm (1/32 in) thick or less.

**CAUTION:** Brake pads must always be replaced in pairs.




*A. 1 mm (1/32 in) minimum*

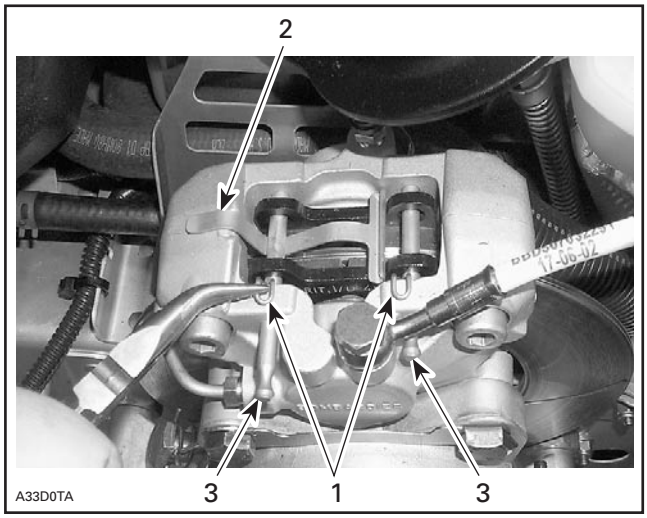
## Removal

Brake pads removal procedure is as follows:

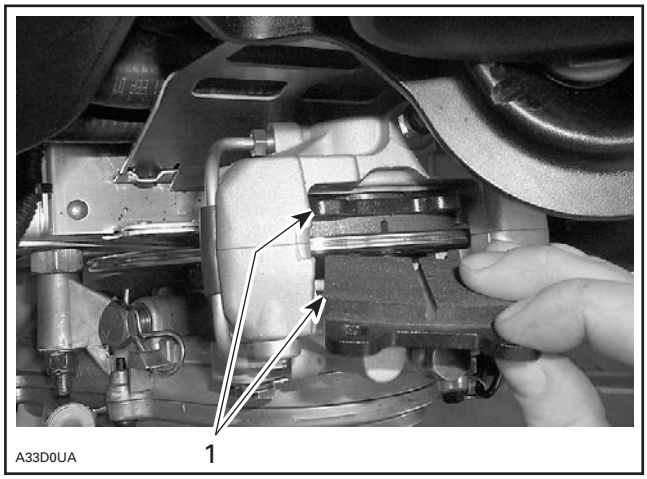
– Remove 2 retainers from the pins.

– Pull out 2 pins which releases the spring.

– Remove the brake pads.




1. *Retainer*
2. *Spring*
3. *Pin*




1. *Brake pad*

## Installation

– Install new brake pads.
– Install spring and push 2 pins to lock the brake pads.
– Install 2 retainers in the pin holes.

To install brake, reverse removal procedure pay attention to the following.

**⚠ WARNING**

**Avoid getting oil on brake pads.**

Each time a new caliper or new brake pads are installed, proceed with the following:

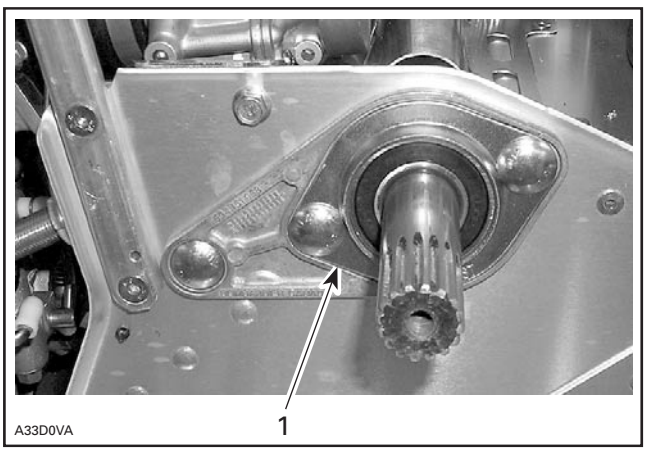
– With caliper not bolted to chaincase, apply brake few times until both new pads are touching each other.
– Push back pads and repeat above step.
– Push back pads then fasten caliper to chaincase.
– Proceed with bleeding as described in this subsection.

# REMOVAL

### BRAKE DISC REMOVAL

Brake disc can be removed without removing chaincase. Proceed as follows:

– Remove belt guard, belt and driven pulley.
– Remove air silencer.
– Loosen the carburetor.
– Unbolt bearing support **no. 2** from chassis.
– Unscrew caliper from chaincase.

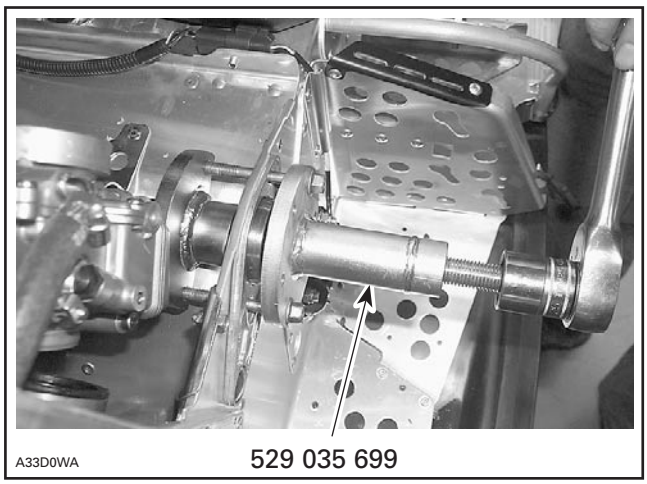



*1. Bearing support*

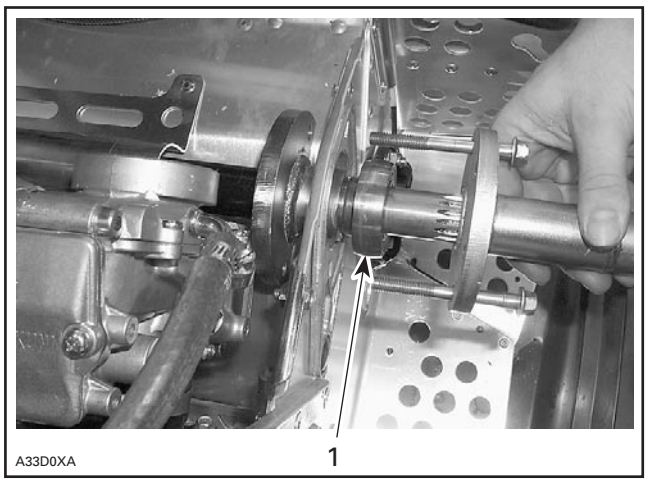
– Open chaincase and remove upper sprocket.
– Pull countershaft **no. 3** toward driven pulley side to free from chaincase and disc.
– Remove disc.

### COUNTERSHAFT BEARING REMOVAL

Unbolt bearing support **no. 2**. Install screws on the remover (P/N 529 035 699).




Install remover (P/N 529 035 699) on countershaft for complete bearing removal.




*1. Bearing*

### COUNTERSHAFT REMOVAL

Proceed the same as for brake disc and countershaft bearing removal and then remove the countershaft.

# DISASSEMBLY

## 7, Brake Pad

Only brake pads are available as spare parts. If caliper or master cylinder are damaged, replace each of them as an assembly.

# CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

**CAUTION:** Do not clean brake pads in solvent. Soiled brake pads must be replaced by new ones.

# INSPECTION

## 7, Brake Pad

**CAUTION:** Brake pads must always be replaced in pairs.

Brake pads must be replaced when lining is 1 mm (1/32 in) thick or less. Refer to the photo in BRAKE PADS REPLACEMENT.

## 17, Brake Disc

Check for scoring, cracking or bending, replace as required.

**CAUTION:** Brake disc should never be machined.

# INSTALLATION

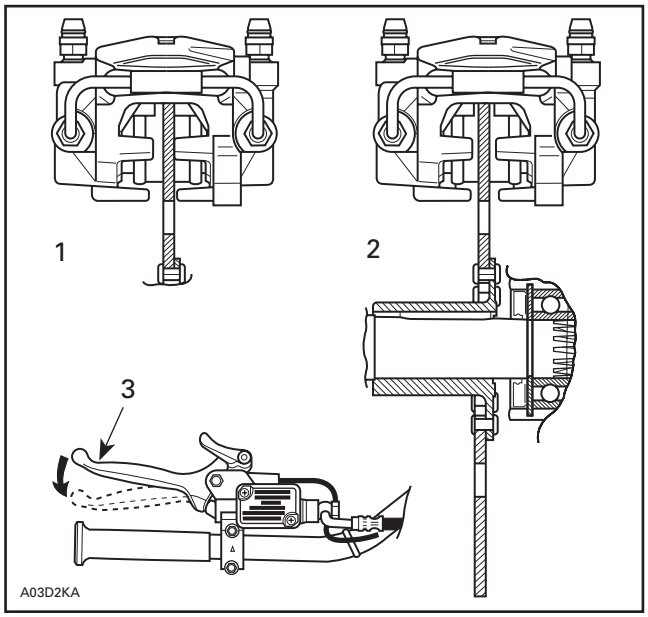
Apply anti-seize lubricant (P/N 293 800 070) on shaft.

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward driven pulley.

## 7, Brake Pad

After brake pads installation, brake disc must be centered in caliper. Apply brake then check for proper brake disc positioning.

Push on appropriate caliper piston in order to move pad inward allowing proper brake disc positioning.




*1. Brake disc not centered*
*2. Brake disc centered*
*3. Apply brake before checking*

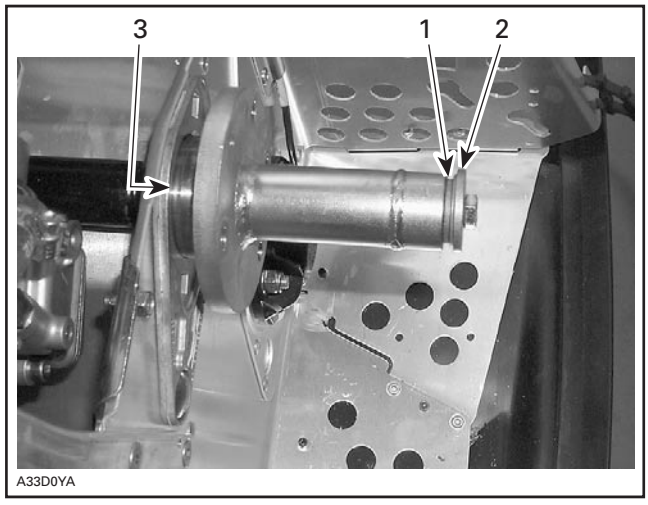
Apply brake then recheck.

## Countershaft Bearing Adjustment

Insert countershaft (with brake disc) from chaincase side through countershaft support (driven pulley side), then insert into chaincase.

Install countershaft bearing no. 4 using proper tool.

To install bearing on countershaft, use remover (P/N 529 030 100) and some flat washers of 3 mm (1/8 in) total thickness. Using original retaining screw and shouldered washer tighten until bearing rests against circlip.




*1. Washers use as a 3 mm (1/8 in) spacer*
*2. Original retaining screw and shouldered washer*
*3. Bearing against circlip*

Ensure that countershaft is properly aligned, then tighten 3 retaining screws.

NOTE: A misaligned countershaft will result in difficulty to center the bearing in its support.

Torque castellated nut of upper sprocket to 45 to 75 N•m (33 to 55 lbf•ft).

Close chaincase referring to CHAINCASE.

### 5,12, Brake Cable and Nut

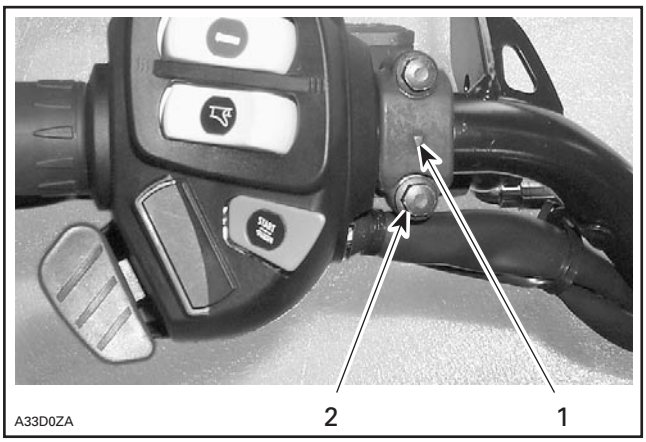
Insert brake cable into upper hole in brake lever and caliper. Install nut and tighten until a few threads exceed.

**⚠ WARNING**

**At least 3 threads must exceed the elastic stop nut.**

### 10, Upper Clamp

Install upper clamp with its arrow pointing downwards. Tighten to 8 N•m (71 lbf•**in**) front screw before rear one.




1. *Arrow on upper clamp pointing downwards*
2. *Tighten front screw first*

## ADJUSTMENT

### Brake

Change brake fluid once a year.

Bleed brake system as follows:

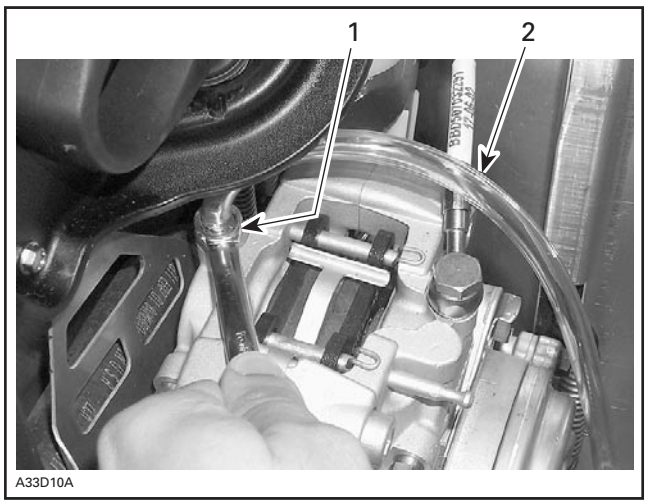
Keep sufficient SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062) brake fluid in reservoir at all times.

**CAUTION: Use only SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062) brake fluid.**

Install a hose on bleeder. Route this hose to a container. Open bleeder.

Pump brake lever until no air escapes from hose.

Close bleeder.




1. *Open bleeder*
2. *Clear hose to catch used brake fluid*

### 5, Brake Light Switch

There is no adjustment on these models. Check that switch is securely installed.

## BLEEDING

Change brake fluid once a year.

Bleed brake system as follows:

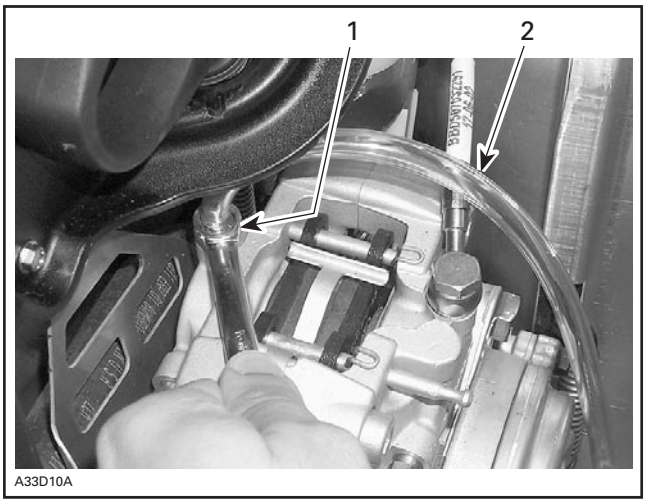
Keep sufficient SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062) 4 brake fluid in reservoir at all times.

**CAUTION: Use only SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062) brake fluid.**

Install a clear hose on bleeder. Route this hose to a container. Open bleeder.

Pump brake lever until no air escapes from hose.

Close bleeder.

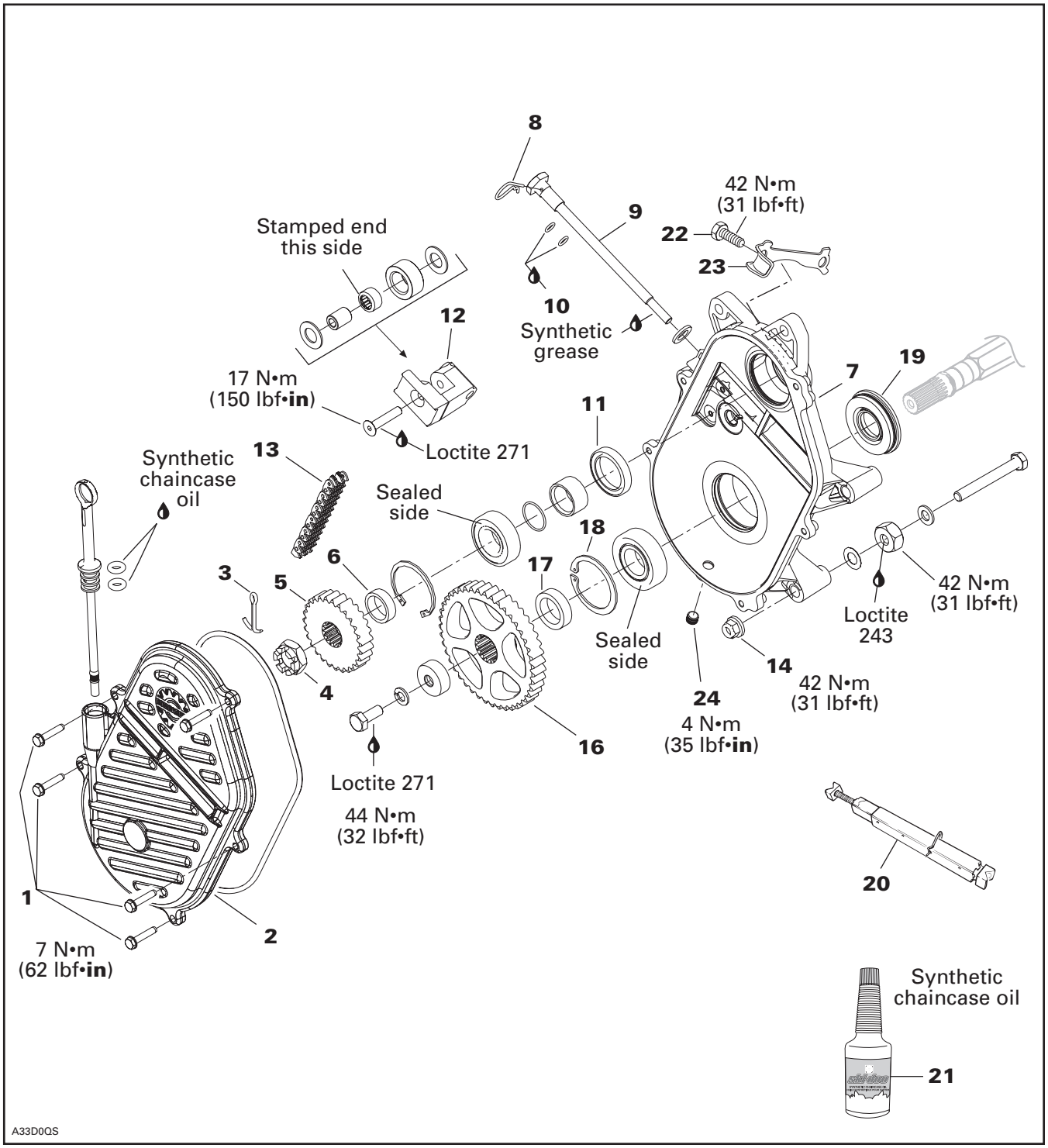



*1. Open bleeder*
*2. Clear hose to catch used brake fluid*

**⚠ WARNING**

Avoid getting oil on brake pads. Do not lubricate or apply antirust or antifreeze solution in brake cable.

# CHAINCASE


8
9
42 N•m
(31 lbf•ft)
22
23
Stamped end
this side
10
Synthetic
grease
12
17 N•m
(150 lbf•in)
Loctite 271
7
19
11
13
Synthetic
chaincase
oil
Sealed
side
18
6
3
5
17
42 N•m
(31 lbf•ft)
Loctite
243
Sealed
side
14
42 N•m
(31 lbf•ft)
4
24
4 N•m
(35 lbf•in)
16
Loctite 271
44 N•m
(32 lbf•ft)
20
1
2
7 N•m
(62 lbf•in)
Synthetic
chaincase oil
21
A33D0QS

# REMOVAL AND DISASSEMBLY

To remove chaincase proceed as follows.

Remove battery (if so equipped) to gain access, refer to BATTERY section.

Remove hair pin **no. 8**. Release drive chain tension by unscrewing tensioner adjustment screw.

Drain oil by removing drain plug **no. 24**.

Remove 5 screws **no. 1**

## 3,4,5,6,13,16,17, Cotter Pin, Nut, Sprocket, Shim and Drive Chain

Apply parking brake.

Remove cotter pin **no. 3** and nut **no. 4** retaining upper sprocket **no. 5** and screw **no. 15** retaining lower sprocket **no. 16**. Pull sprockets and drive chain simultaneously. Remove shims **nos. 6** and **17**.

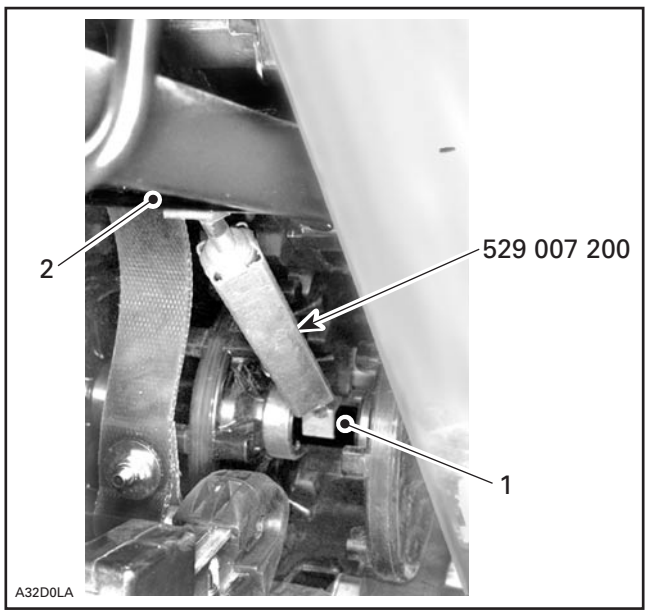
NOTE: Should countershaft removal be required, refer to BRAKE then look for COUNTERSHAFT REMOVAL.

Release parking brake.

Remove 3 nuts **no. 14**.

Unfold locking tab **no. 23** then remove caliper retaining screws **no. 22**.

Release track tension, use drive axle holder **no. 20** (P/N 529 007 200).



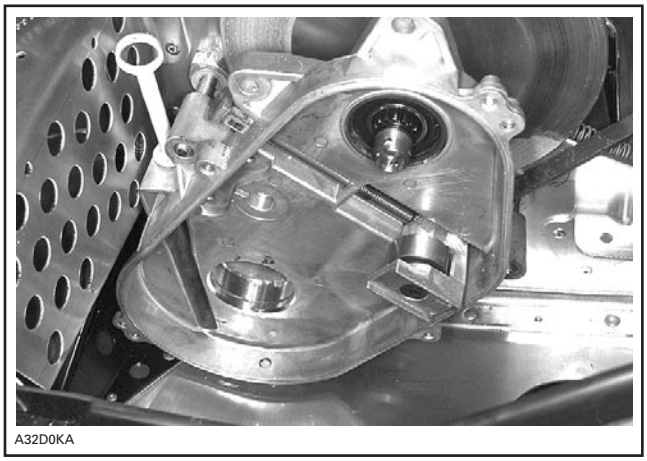

*TYPICAL*

1. *Drive axle*
2. *Suspension front arm upper axle*

Pry out drive axle oil seal **no. 19** from chaincase.

Pull chaincase from drive axle and countershaft.

Using 2 large prybars inserted between chaincase housing **no. 7** and frame, pry complete assembly from vehicle.




*TYPICAL — CHAINCASE HOUSING REMOVAL*

# INSPECTION

Visually inspect the chain for cracked, damaged or missing links. Check for worn or defective bearings, sprockets and chain tensioner components.

**⚠ WARNING**

**If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.**

# GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Refer to TECHNICAL DATA for gear ratios.

**CAUTION: Gear ratio modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.**

NOTE: For high altitude regions, a service bulletin will give information about calibration according to altitude.

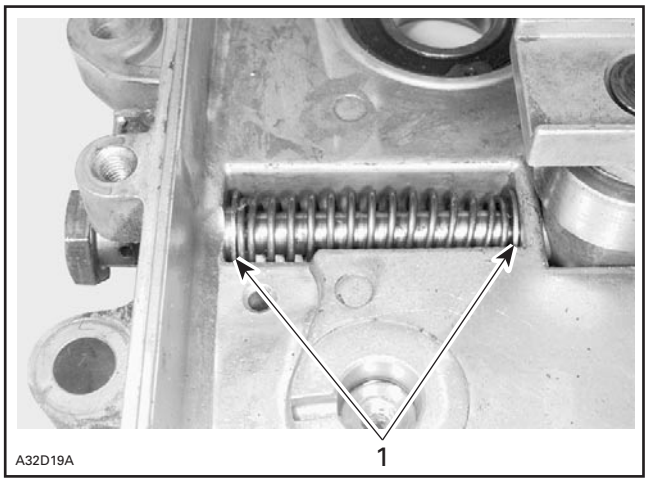
# INSTALLATION AND ASSEMBLY

Reverse removal and disassembly procedure and pay attention to the following. Replace oil seals, gaskets O-rings and drain plug.

## 25, Hardened Washer

***MX Z 007 Special Edition Only***

Make sure to install a hardened washer on each end of spring.




*1. Hardened washers*

***All Models***

## 11, Oil Seal

Using an appropriate pusher, press the oil seal into chaincase hub. Oil seal must fit flush with the chaincase edge.

NOTE: Should installation procedure for countershaft be required, refer to BRAKE.

## 5,16, Sprockets

Position the sprockets with the writing facing the chaincase cover. Sprocket hub faces toward chaincase.

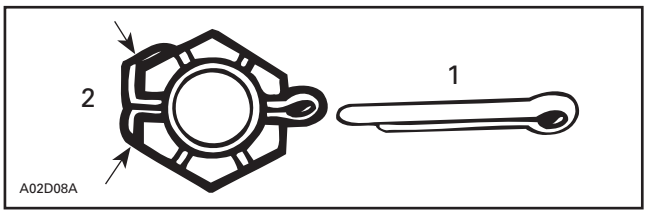
## 4, Upper Sprocket Castellated Nut

Torque to 45 to 75 N•m (33 to 55 lbf•ft).

Install new cotter pin in the position shown.

**CAUTION: When removing a cotter pin always replace with a new one.**

**CAUTION: Cotter pin will rub on chaincase cover if installed otherwise.**




*1. New*
*2. Fold cotter pin over castellated nut flats only*

## 18, Circlip

**CAUTION: It is of the utmost importance to install the circlip otherwise damage to the chaincase components may occur.**

# DRIVE CHAIN ADJUSTMENT

NOTE: Brake disc key must be in good condition before checking if chain is loose.

## 10, O-Ring

Replace O-ring **no. 10** on tensioner adjustment screw. Fully tighten tensioner adjustment screw **by hand**, then back off only far enough for hair pin to engage in locking hole.

This initial adjustment should provide 3 - 5 mm (1/8 - 13/64 in) free-play when measured at the outer circumference of the brake disc.

**CAUTION: Free-play must not exceed 5 mm (13/64 in), readjust if necessary.**

**⚠ WARNING**

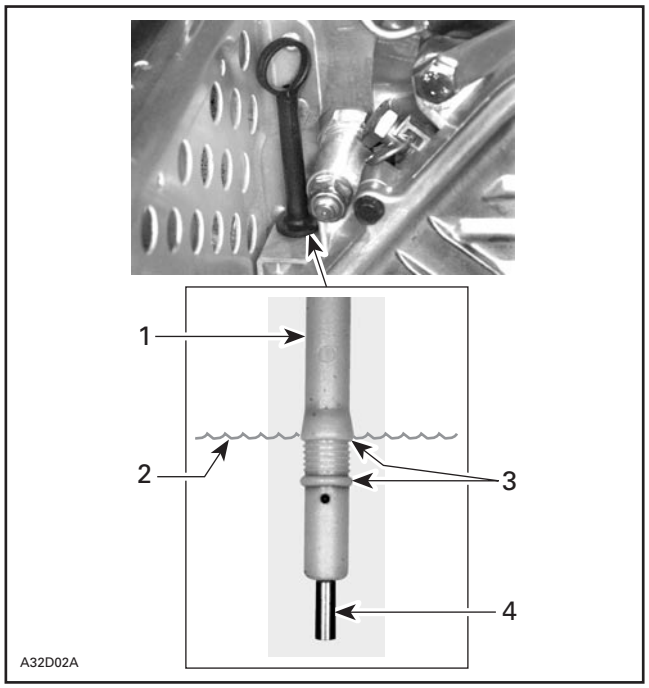
**If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.**

## 21, Chaincase Oil

Pour 250 mL (8.5 U.S. oz) of synthetic chaincase oil (P/N 413 803 300) into chaincase.

NOTE: Chaincase oil capacity is 250 mL (8.5 U.S. oz).

Check oil level with the dipstick then add if required. Remove metal particles from magnet.




*TYPICAL*

1. *Dipstick*
2. *Oil level*
3. *Level between marks*
4. *Magnet*

NOTE: Chaincase must be in its proper position when checking oil level.

# ADJUSTMENT

## Pulley Alignment

Refer to PULLEY DISTANCE AND ALIGNMENT.

## Track Tension and Alignment

Refer to TRACK.

# DRIVE CHAIN

## SILENT CHAIN

Only 13-plates wide type of silent chains are compatible for REV series models. Do not use chain other than the 13-plates wide on REV series models. Fit chain on top sprocket to make sure that you are using right one according to width. Refer to TECHNICAL DATA.

NOTE: No work (separation, lengthening) can be done on the silent chain type.