CHAPTER 6
PVT SYSTEM

SPECIAL SERVICE TOOLS AND SUPPLIES

Description	Part Number
Drive Clutch Puller	2870506
Clutch Holding Fixture	2871358
Spider Removal Tool	2870341
Offset / Alignment Tool (Std)	2870654
Driven Clutch Puller	2870913
Spider Pin Tool	2870910
Clutch Bushing Removal & Installation	2871226
Piston Pin Puller (Used with 2871226)	2870386
Loctite™ 680	2870584
RTV Silicone Sealer	2870661
Loctite Gasket Remover	2870601

PVT SYSTEM FASTENER TORQUES

Drive Clutch Retaining Bolt	40 ft. lbs.
Driven Clutch Retaining Bolt	17 ft. lbs.
PVT Inner Cover Bolts	12 ft. lbs.
Drive Clutch Spider (Standard Clutch)	200 ft. lbs.
Drive Clutch Cover Plate	90 in. lbs.

PVT OPERATION

The Polaris variable transmission (PVT) consists of three major assemblies: 1) drive clutch; 2) drive belt; and 3) driven clutch. The internal components of the drive clutch and driven clutch control clutch engagement (for initial vehicle movement), clutch upshifting and backshifting. During the development of an ATV, the PVT system is matched first of all to the engine power curve; then to average riding conditions and to vehicle design usage. Modifications to the PVT or variations of components at random are never recommended. Proper PVT system setup and careful inspection of existing components must be the primary objective when troubleshooting and tuning.

⚠ WARNING

⚠ All PVT system maintenance repairs must be performed only by an authorized Polaris service technician who has attended a Polaris sponsored service training seminar and understands the proper procedures as outlined in this manual. **Because of the critical nature and precision balance incorporated into the PVT system, it is absolutely essential that no attempt at disassembly or repair be made without factory authorized special tools and service procedures.**

DRIVE CLUTCH OPERATION

The drive clutch primarily senses engine RPM. The two major components which control its shifting function are the shift weights and the coil spring. When the engine RPM is increased, the centrifugal force of the shift weights working against the coil spring increases. When this force reaches a force higher than the preload in the spring, the moveable sheave of the drive clutch will move inward, contacting the drive belt. The force will pinch the belt between the spinning sheaves and cause the drive belt to move. This movement in turn rotates the driven clutch.

At light throttle settings the drive belt will stay low in the drive clutch and high in the driven clutch. As engine RPM increases, so does the centrifugal force on the shift weights, causing the drive belt to be forced upward in the drive clutch and downward into the driven clutch. The forces in the driven clutch will now affect the upshift.

DRIVEN CLUTCH OPERATION

The driven clutch primarily senses torque. It opens and closes according to the forces applied to it from the drive belt and the transmission input shaft. If the torque resistance on the input shaft is greater than the load from the drive belt, it will keep the drive belt outward at the top of the driven clutch sheaves. As the throttle setting and engine horsepower increase, there will be a greater load on the drive belt, pulling the belt down into the driven clutch and up on the drive clutch. This action, which increases the driven clutch speed, is called upshifting.

If the throttle setting remains the same and the vehicle is subjected to a heavier load, the driven clutch senses this load, moving the belt back up on the sheaves of the driven clutch and down into the sheaves of the drive clutch. This action, which decreases the driven clutch speed, is called downshifting.

In situations where loads vary (such as uphill and downhill) and throttle settings are constant, the drive and driven clutches are continually shifting to maintain optimum engine RPM. At full throttle a perfectly matched PVT system will hold the engine RPMs at the peak of the power curve. This RPM should be maintained during clutch upshift and backshift. In this respect the PVT system is similar to a power governor. Rather than change throttle position, as a governor does, the PVT system changes engine load requirements by either upshifting or downshifting.

PVT MAINTENANCE/INSPECTION

Under normal operation the PVT system will provide years of trouble free operation. Periodic inspection and maintenance is required to keep the system operating at peak performance. The following list of items should be inspected and maintained to ensure maximum performance and service life of PVT components. Refer to the troubleshooting checklist at the end of this chapter for more information.

1. **Belt Tension, Drive to Driven Clutch Offset, Belt Width.** See pages 6.18-6.19, and 6.21.

2. **Drive and Driven Clutch Buttons and Bushings, Drive Clutch Shift Weights and Pins, Drive Clutch Spider Rollers and Roller Pins, Drive and Driven Clutch Springs.** See pages 6.10-6.11 and 6.14-6.15.

3. **Sheave Faces.** Clean and inspect for wear.

4. **PVT System Sealing.** Refer to appropriate illustration below and on the following pages. The PVT system is air cooled by fins on the drive clutch stationary sheave. The fins create a low pressure area in the crankcase casting, drawing air into the system through an intake duct. The opening for this intake duct is located at a high point on the vehicle (location varies by model). The intake duct draws fresh air through a vented cover. All connecting air ducts (as well as the inner and outer covers) must be properly sealed to ensure clean air is being used for cooling the PVT system and also to prevent water and other contaminants from entering the PVT area. This is especially critical on units subjected to frequent water forging.

PVT DRYING

If water is ingested, shift transmission to neutral and rev engine slightly to expel the moisture and air-dry the belt and clutches. Allow engine RPM to settle to idle speed, shift transmission to lowest available range and test for belt slippage. Operate ATV in lowest available range for a short period of time until PVT system is dry.

PVT OVERHEATING

During routine maintenance or whenever PVT system overheating is evident, it's important to check the inlet *and* outlet ducting for obstructions. Obstructions to air flow through the ducts will significantly increase PVT system operating temperatures. The ATV should be operated in LOW RANGE when pulling or plowing heavy loads, or if extended low speed operation is anticipated.

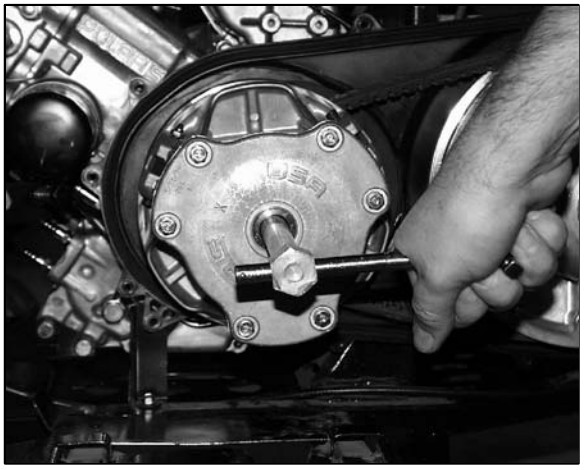
Clutch Drive Belt & Cover Related Issues: Diagnosis	
Possible Causes	**Solutions/What to do**
Loading the ATV into a pickup or tall trailer when in high range.	Shift transmission to low range during loading of the ATV to prevent belt burning.
Starting out going up a steep incline.	When starting out on an incline, use low range, or dismount the ATV after first applying the park brake and perform the "K" turn.
Driving at low RPM or low ground speed (at approximately 3-7 MPH).	Drive at higher speed or use Low Range. The use of Low Range is highly recommended for cooler PVT operating temperatures and longer component life.
Insufficient warm-up of ATVs exposed to low ambient temperatures.	Warm engine at least 5 min., then with transmission in neutral, advance throttle to approx. 1/8 throttle in short bursts, 5 to 7 times. The belt will become more flexible and prevent belt burning.
Slow and easy clutch engagement.	Fast, effective use of the throttle for efficient engagement.
Towing/Pushing at low RPM/low ground speed.	Use Low Range only.
Plowing snow, dirt, etc./utility use.	Use Low Range only.
Stuck in mud or snow.	Shift the transmission to Low Range, carefully use fast, aggressive throttle application to engage clutch. **WARNING:** Excessive throttle may cause loss of control and vehicle overturn.
Climbing over large objects from a stopped position.	Shift the transmission to Low Range, carefully use fast, aggressive, brief throttle application to engage clutch. **WARNING:** Excessive throttle may cause loss of control and vehicle overturn.
Belt slippage from water or snow ingestion into the PVT system.	Shift the transmission to neutral. Using the throttle, vary the engine rpm from idle to full throttle. Repeat several times as required. During this procedure, the throttle should not be held at the full position for more than 10 seconds. Clutch seals should be inspected for damage if repeated leaking occurs.
Clutch malfunction.	For inspection of clutch components, please contact your Polaris dealer.
Poor engine performance.	Fouled plugs, foreign material in gas tank, fuel lines, or carburetor. Contact you dealer for further service information.
GENERAL RANGE OPERATION GUIDELINES:	**Low Range**: Heavy pulling, basic operational speeds less than 7 MPH, riding through rough terrain (swamps, mountains, etc.), low ground speeds.
	High Range: High ground speeds, speeds above 7 MPH.

PVT DISASSEMBLY

NOTE: Some fasteners and procedures will vary. Refer to the appropriate parts manual for proper fasteners and fastener placement. (See page 6.8).

1. Remove seat.
2. Remove or loosen rear cab fasteners as necessary to gain access to PVT outer cover.
3. Remove PVT air outlet duct hose.
4. Remove outer cover screws and clamps. Refer to page 6.6.
5. Mark the drive belt direction of rotation and remove drive belt. See page 6.19 for drive belt removal.
6. Remove drive clutch retaining bolt and remove drive clutch using puller.

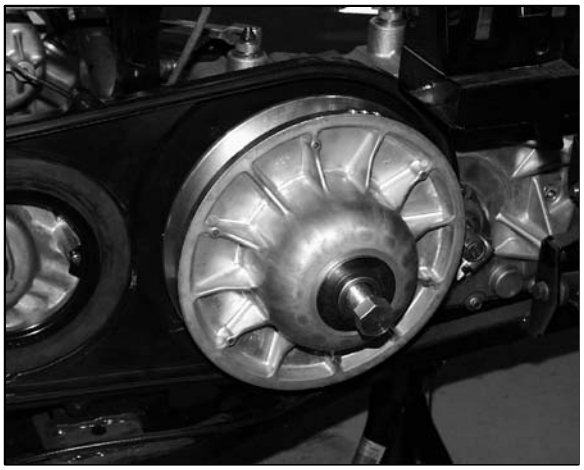
Drive Clutch Puller PN 2870506



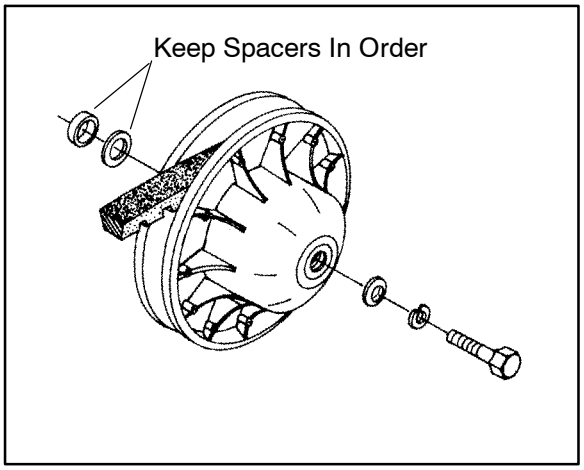
PVT DISASSEMBLY, CONT.

7. Remove driven clutch retaining bolt and driven clutch. Use puller if necessary.

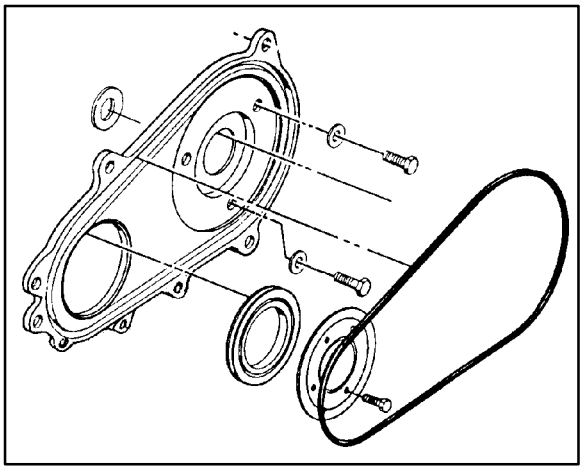
Driven Clutch Puller PN 2870913



8. Remove driven clutch offset spacers from the transmission input shaft.

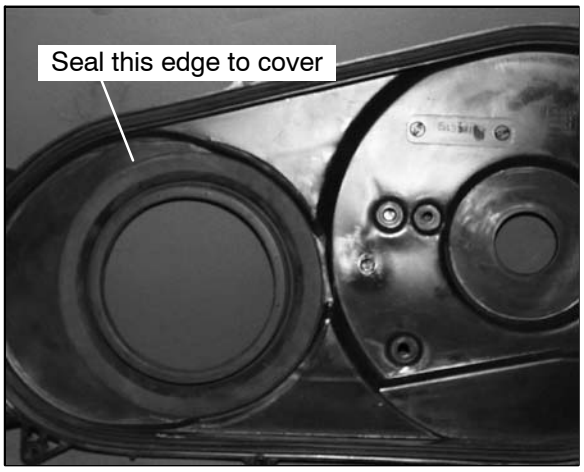


9. Remove screws and retainer plate.
10. Remove inner cover retaining bolts at rear of cover.
11. Remove cover along with foam seal on back of cover or shaft.



PVT ASSEMBLY

1. Inspect PVT inner cover-to engine seal. Replace if cracked or damaged.
2. Place a new foam seal on transmission input shaft.
3. Apply RTV silicone sealant to outside edge of inner cover-to-engine seal, to ensure a water tight fit between the seal and the cover. Surfaces must be clean to ensure adhesion of silicone sealant.
4. Reinstall cover and tighten rear cover bolts just enough to hold it in place.
5. Fit lip of inner cover seal (A)to engine. Install seal retainer plate and tighten screws securely.

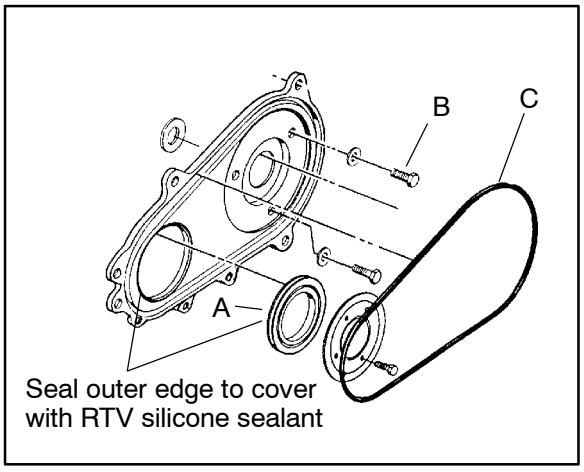


6. Torque rear inner cover bolts (B) to specification.

Inner Cover Bolt Torque (Rear):
12 ft. lbs. (16.6 Nm)

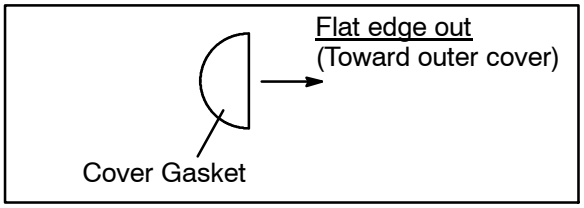
Driven Clutch Retaining Bolt Torque:
17 ft. lbs. (23.5 Nm)

Drive Clutch Retaining Bolt Torque:
40 ft. lbs. (55 Nm)

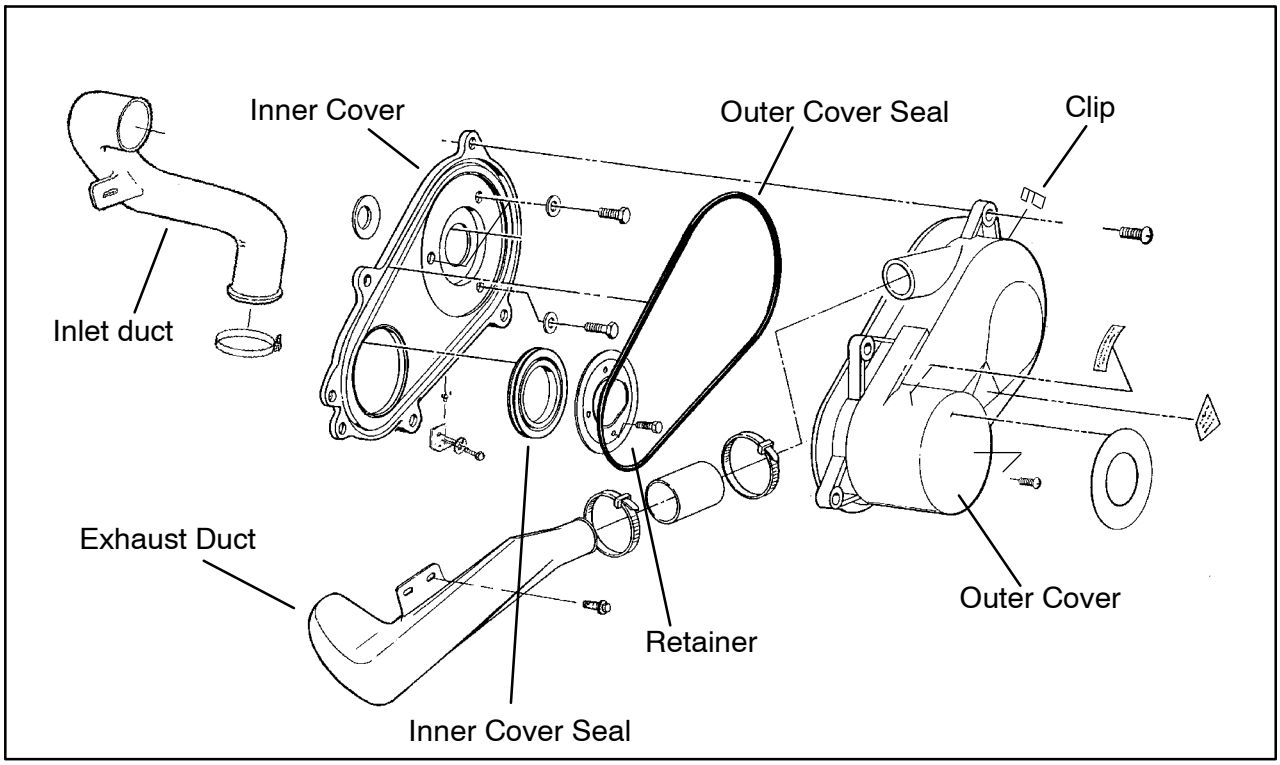


7. Install clutch offset spacers on transmission input shaft.
8. Clean splines inside driven clutch and on the transmission input shaft.
9. Apply a light film of grease to the splines on the shaft.
10. Install the driven clutch, washer, lock washer, and retaining bolt. Torque to specification.
11. Clean end of taper on crankshaft and the taper bore inside drive clutch.
12. Install drive clutch and torque retaining bolt to specification.
13. Reinstall drive belt noting direction of rotation. If a new belt is installed, install so numbers can be easily read.

14. Replace PVT outer cover rubber gasket with the square side out (C).
15. Reinstall PVT outer cover and secure with screws.
16. Reinstall rear cab assembly and seat.



PVT SEALING AND DUCTING COMPONENTS

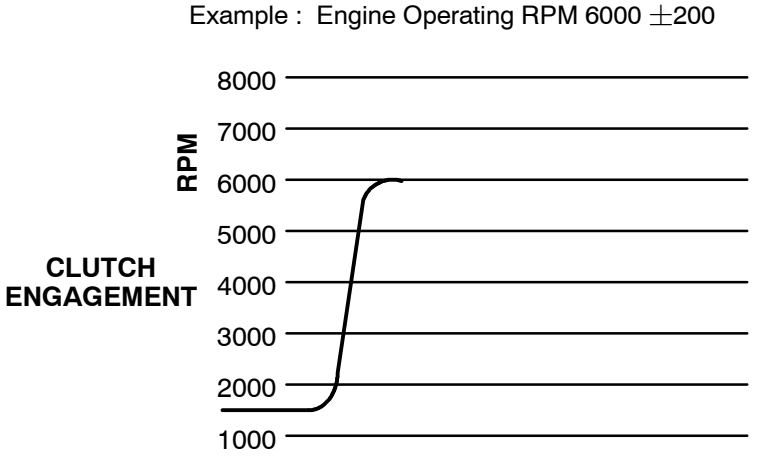


RELATIONSHIP OF DRIVE CLUTCH WEIGHTS AND SPRING IN MAINTAINING OPERATING RPM

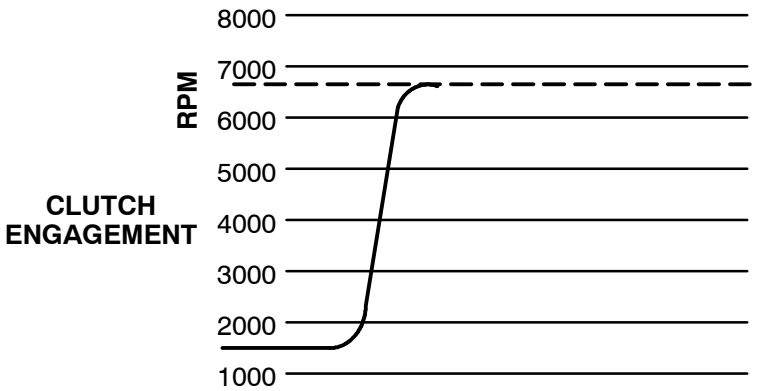
The drive clutch is an RPM unit designed to transfer the maximum amount of horsepower from the engine to the ground. This is accomplished through weights and a spring inside the unit which react to the centrifugal force applied to the clutch from the engine RPM.

The spring and weights work in combination. In a properly set up clutch, the maximum desired operating RPM will be reached immediately after clutch engagement, under full throttle conditions. To gain optimum power this RPM should be maintained. As centrifugal force pushes the weights against the rollers, the moveable sheave will force the belt to climb up the drive clutch sheave and increase vehicle speed.

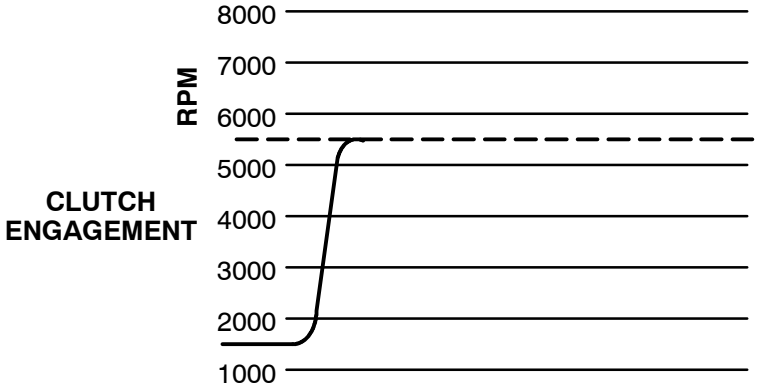
If the weights and spring are matched properly, the engine RPM will go to the desired range and remain there on both the upshift and backshift.



If the weights are too light, or the spring rate too high, the maximum RPM will be too great and the drive belt will not move into high gear at the top of the clutch.



If the weights are too heavy, or the spring rate too low, the engine RPM will be low and the drive clutch will upshift too fast, keeping the engine out of its power band.



DRIVE CLUTCH SPRING SPECIFICATIONS

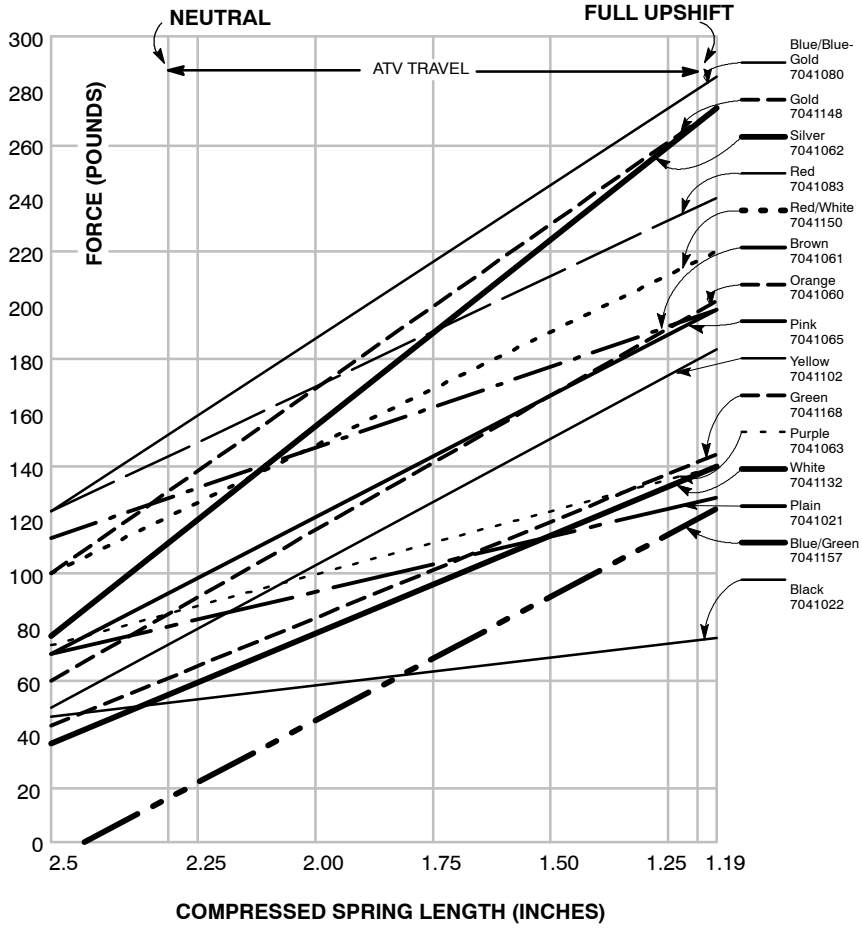
The drive clutch spring has two primary functions:

1. **To control clutch engagement RPM.** The springs which have a higher rate when the clutch is in neutral will increase clutch engagement RPM.
2. **To control the rate at which the drive belt moves upward in the drive clutch sheaves.** This is referred to as drive clutch upshift.

There are other components which control upshift, but the spring is one of the primary components in insuring optimum performance. It is very important that the spring is of the correct design and is in good condition.

CAUTION: Never shim a drive clutch spring to increase its compression rate. This may result in complete stacking of the coils and subsequent clutch cover failure.

The drive clutch spring is one of the most critical components of the PVT system. It is also one of the easiest to service. Due to the severe stress the spring is subject to during operation, it should always be inspected for tolerance limits during any clutch operation diagnosis or repair.

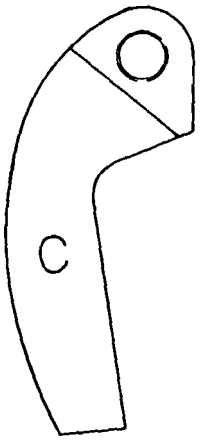


With the spring resting on a flat surface, measure its free length from the outer coil surfaces as shown. Refer to the spring specification chart for specific free length measurements and tolerances. Also check to see that spring coils are parallel to one another. Distortion of the spring indicates stress fatigue, requiring replacement.

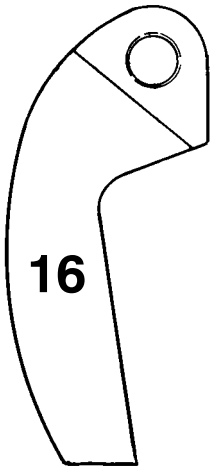
PART NUMBER	COLOR CODE	WIRE DIAMETER	FREE LENGTH ±.125″
7041021	Plain	.157″	4.38″
7041022	Black	.140″	4.25″
7041063	Purple	.168″	4.37″
7041061	Brown	.200″	3.06″
7041132	White	.177″	2.92″
7041168	Green	.177″	3.05″
7041148	Gold	.207″	3.25″
7041150	Red/White	.192″	3.59″
7041157	Blue/Green	.177″	2.53″

SHIFT WEIGHTS

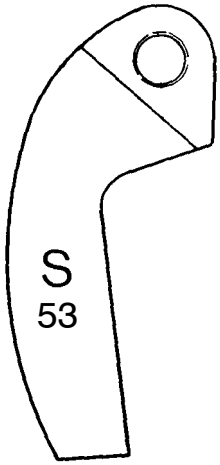
Shown below are the shift weights which have been designed for, or which may be used in the PVT system. These shift weights have many factors designed into them for controlling engagement RPM and shifting patterns. Shift weights should not be changed or altered without first having a thorough understanding of their positioning and the effects they may have on belt to sheave clearance, clutch balance and shifting pattern.



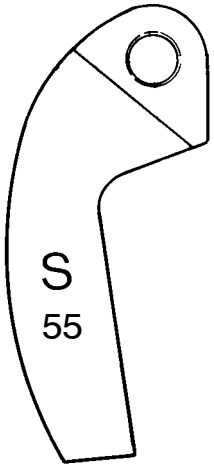
PN 5630418
50 gr
(High Alt. 350L)



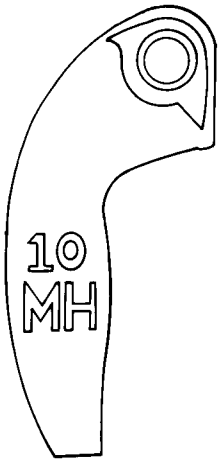
PN 5630279
45 gr



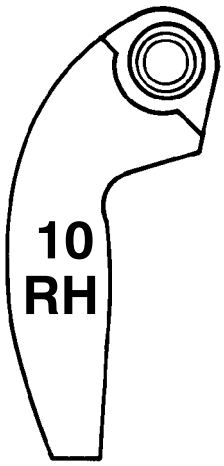
PN 5630095
53 gr



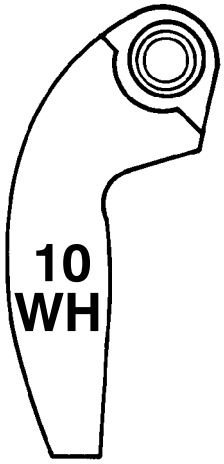
PN 5630509
55 gr



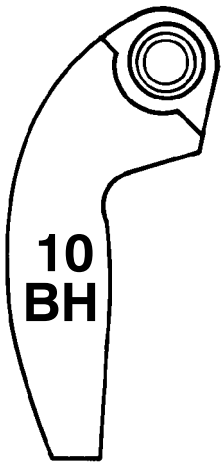
PN 5630513
50.5 gr



PN 5630709*
44 gr



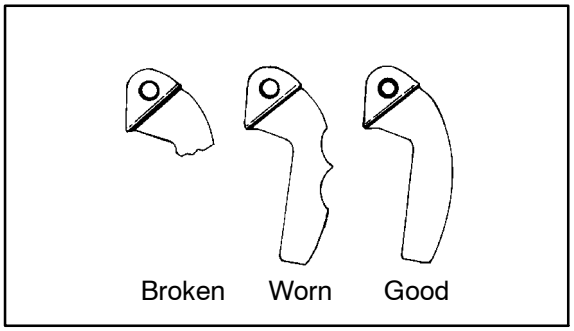
PN 5630710*
46 gr



PN 5630711*
47gr

SHIFT WEIGHT INSPECTION

1. Remove shift weight bolts and weights. Inspect as shown. The contact surface of the weight should be smooth and free of dents or gall marks. Inspect the weight pivot bore and pivot bolts for wear or galling. If weights or bolts are worn or broken, replace in sets of three with new bolts. **NOTE:** A damaged shift weight is usually caused by a damaged or stuck roller in the spider assembly. See roller inspection, page 6.16.



BUTTON TO TOWER CLEARANCE INSPECTION

1. Inspect for any clearance between spider button to tower. If clearance exists, replace all buttons and inspect surface of towers. See spider removal page 6.15.

   Button to Tower Clearance:
   .000 - .001″

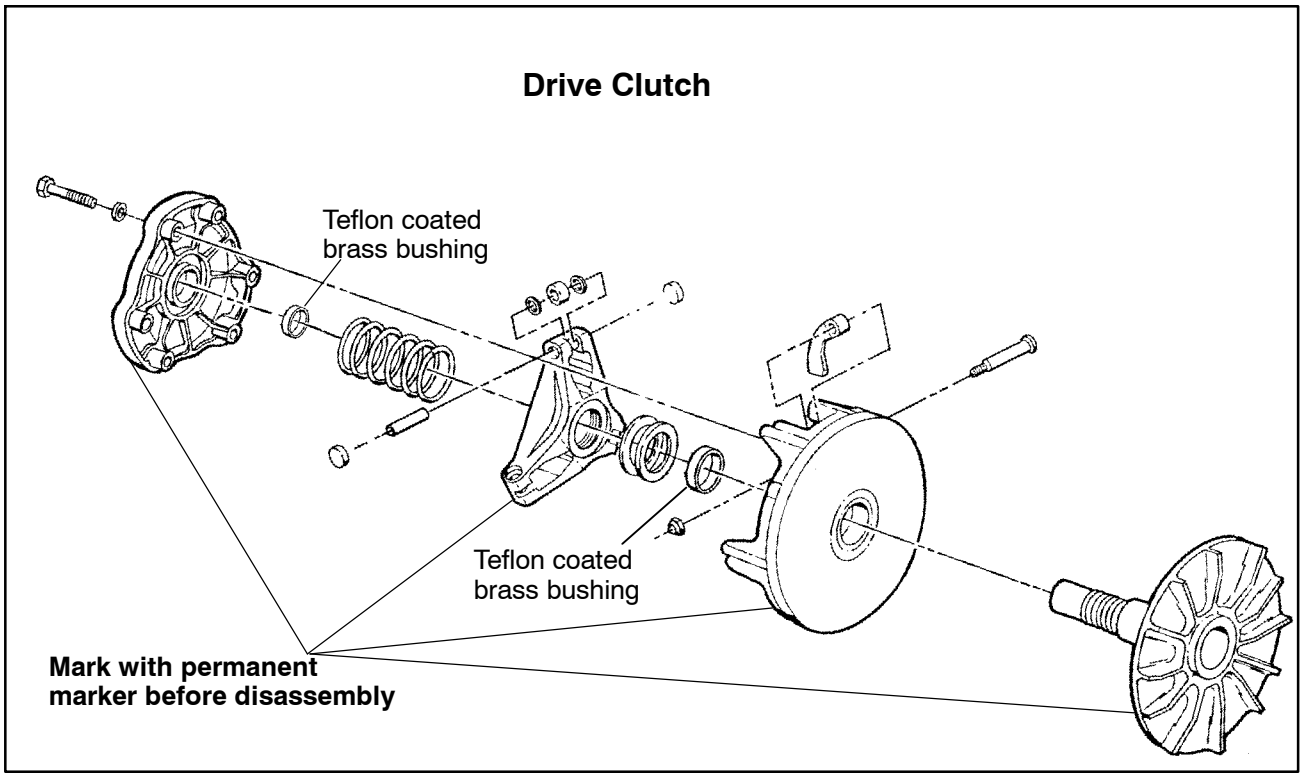
2. Inspect sheave surfaces. Replace the *entire service clutch* if worn, damaged or cracked.

⚠ WARNING

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly!

All PVT system maintenance repairs must be performed only by an authorized Polaris service technician who has attended a Polaris sponsored service training seminar and understands the proper procedures as outlined in this manual. **Because of the critical nature and precision balance incorporated into the PVT system, it is absolutely essential that no attempt at disassembly or repair be made without factory authorized special tools and service procedures.**

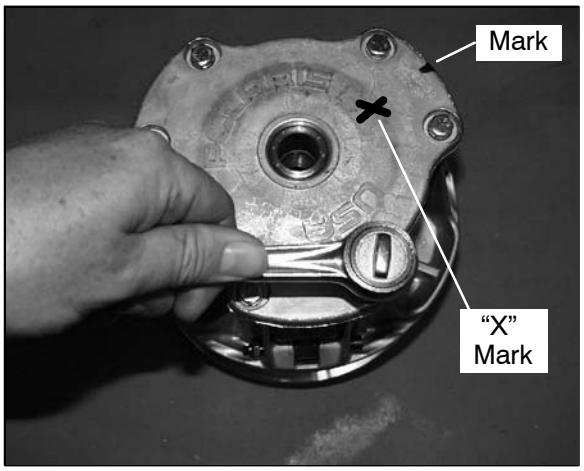
DRIVE CLUTCH EXPLODED VIEW



DRIVE CLUTCH DISASSEMBLY

1. Using a permanent marker, mark the cover, spider, moveable and stationary sheaves, and steel post to the stationary sheave for reference. The X's may not have been in alignment before disassembly.

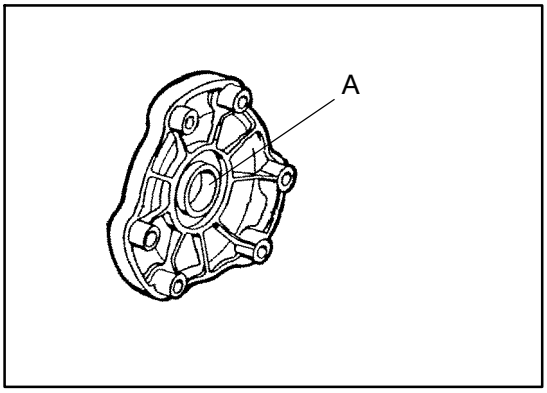
2. Remove cover bolts evenly in a cross pattern, and remove cover plate.



3. Inspect cover bushing (A). The outer cover bushing is manufactured with a Teflon™ coating. Bushing wear is determined by the amount of Teflon™ remaining on the bushing.

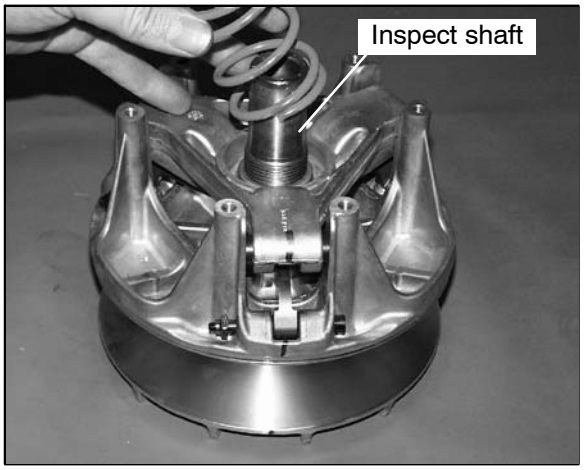
Cover Bushing Inspection:

Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.



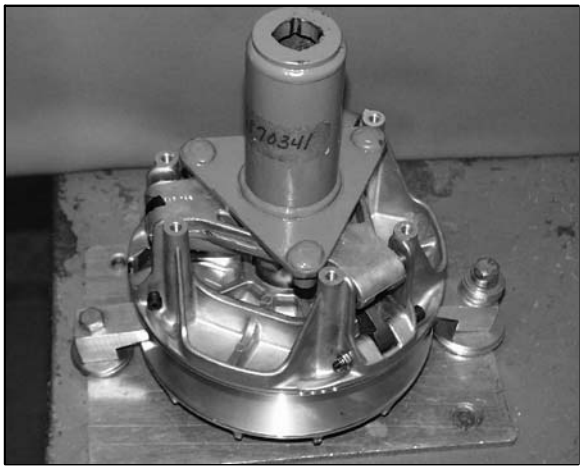
4. Inspect area on shaft where bushing rides for wear, galling, nicks, or scratches. Replace clutch assembly if worn or damaged.

5. Remove and inspect spring. (See page 6.10)



SPIDER REMOVAL

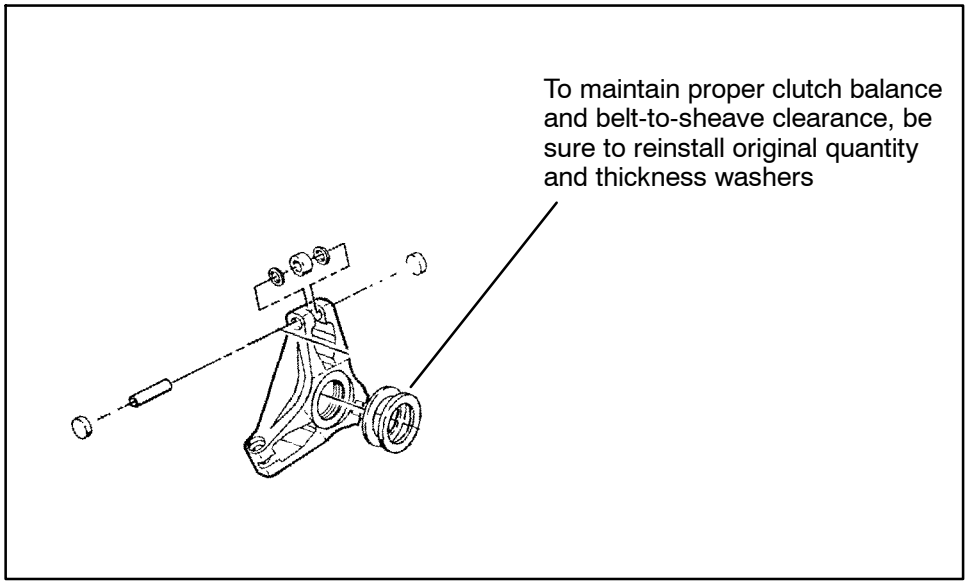
1. Install clutch in holding fixture and loosen the spider (counterclockwise) using spider removal tool.



Clutch Holding Fixture:
PN 2871358

Spider Removal Tool:
PN 2870341

NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly. Be sure to note the number and thickness of these washers.

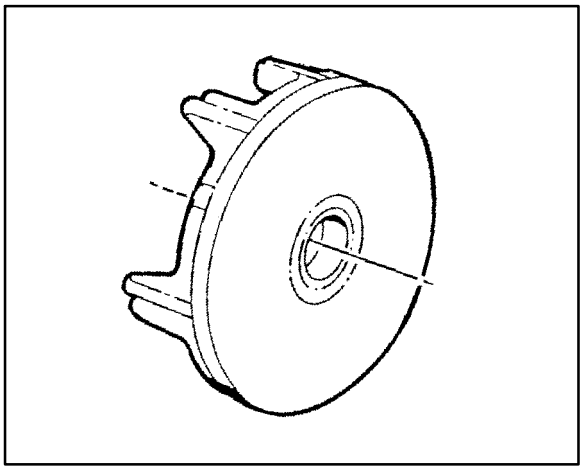


Moveable Sheave Bushing Inspection

2. Inspect the Teflon™ coating on the moveable sheave bushing.

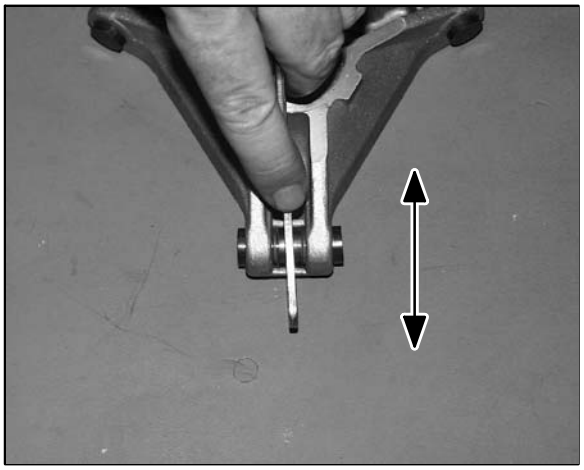
Moveable Sheave Bushing Inspection:

Replace the cover bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

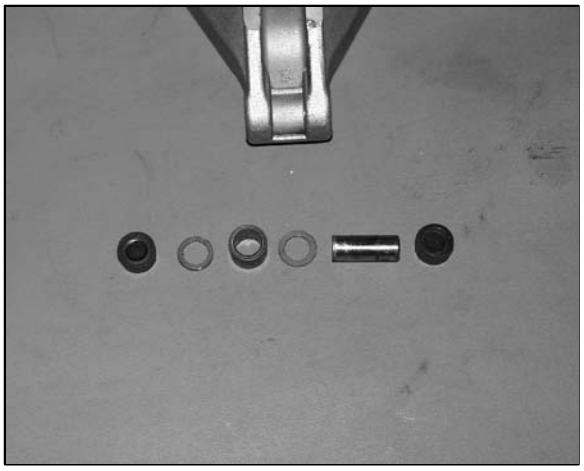


ROLLER, PIN AND THRUST WASHER INSPECTION

3. Inspect all rollers, bushings and roller pins by pulling a flat metal rod across the roller. Turn roller with your finger. If you notice resistance, galling, or flat spots, replace rollers, pins and thrust washers in sets of three. Also inspect to see if roller and bushing are separating. Bushing must fit tightly in roller. Use pin removal tool PN 2870910 to replace rollers and pins. Take care not to damage roller bushing or bearing surface of the new pin during installation.



4. Rubber backed buttons can be used in all ATV clutches *if the hollow roller pin is changed to the solid roller pin.* **NOTE:** The rubber side of the button is positioned toward the solid roller pin.



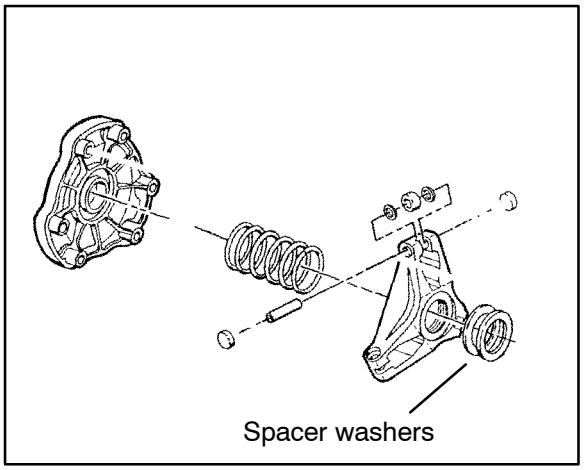
DRIVE CLUTCH ASSEMBLY

NOTE: It is important that the same number and thickness of washers are reinstalled beneath the spider during assembly. The Teflon bushings are self-lubricating. **Do not apply oil or grease to the bushings**.

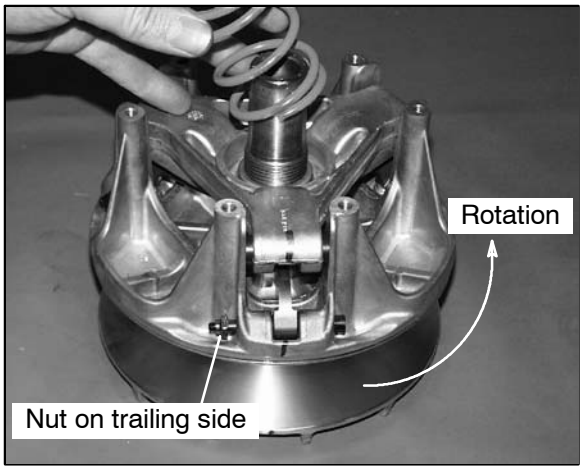
1. Reassemble drive clutch in the following sequence. Be sure the "X", or the marks that were made earlier, are aligned during each phase of assembly.
   a) "X", or the marks that were made earlier, on cover
   b) spider, making sure spacer washers are installed underneath spider and positioned properly in recess
   c) "X", or the marks that were made earlier, under weight
2. Install moveable sheave onto fixed sheave.
3. Install spider spacers. Use same quantity and thickness as were removed.
4. Compress spider buttons for each tower and install spider, making sure that "X", or the marks that were made earlier, on spider aligns with "X", or the marks that were made earlier, in moveable sheave.
5. Torque spider to specification using the holding fixture and spider tool. Torque with smooth motion to avoid damage to the stationary sheave. Refer to page 6.1 for torque specification.

CAUTION:

Be sure the spider spacer washers are fully seated in the recessed area in the spider. Any misalignment will alter clutch balance. Inverting the clutch while initially tightening the spider will help position the washers.



6. Install shift weights using new lock nuts on the bolts.
7. Reinstall clutch spring.



DRIVE CLUTCH ASSEMBLY, CONT.

8. Reinstall cover, aligning "X" mark with other marks. Torque cover bolts evenly to specification.

Spider Torque:
200 ft. lbs. (276 Nm)

Cover Screw Torque:
90 in. lbs. (10.4 Nm)

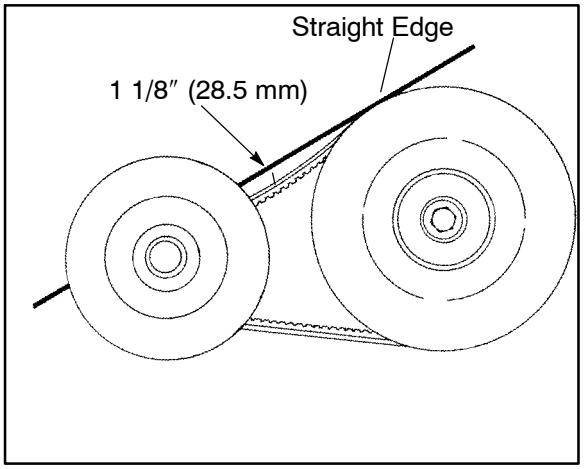
DRIVE BELT TENSION

NOTE: Pinch the sheaves lightly together with clamp to prevent the belt from being pushed into the driven sheave.

1. Place a straight edge on top of the belt between drive and driven clutch.
2. Push down on drive belt until it is lightly tensioned.
3. Measure belt deflection as shown in photo.

Belt Deflection (Tension):

1 1/8″ (2.9 cm) - 1 1/4″ (3.2 cm)



If belt deflection is out of specification, adjust by removing or adding shims between the driven clutch sheaves.

- Remove shims to decrease belt deflection
- Add shims to increase belt deflection

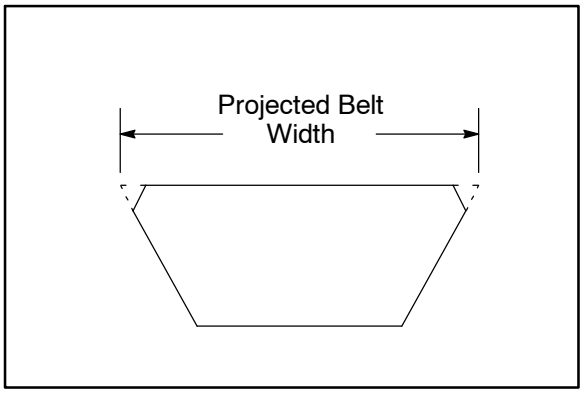
See Driven Clutch Disassembly/Inspection, pages 6.26 - 6.28.

NOTE: At least one shim must remain between the inner and outer sheave of the driven clutch. If proper belt deflection cannot be obtained, measure drive belt width, length, and center distance of drive and driven clutch, outlined in this section; all have an effect on belt deflection.

DRIVE BELT REMOVAL/INSPECTION

1. Remove outer PVT cover as described in PVT Disassembly.
2. Mark drive belt direction of rotation so that it can be installed in the same direction. **NOTE:** Normally positioned so part numbers are easily read.
3. To remove drive belt, apply brake, pull upward and rearward on belt to open driven clutch sheaves, pull out and down on belt to slip over the driven clutch outer sheave.

4. Measure belt width and replace if worn severely. Generally, belt should be replaced if clutches can no longer be adjusted to provide proper belt deflection.
   - The top edges have been trimmed on some drive belts. It will be necessary to project the side profiles and measure from corner to corner.
   - Place a straight edge on each side of the drive belt.
   - Place another straight edge on top of belt.
   - Measure the distance where the side straight edges intersect the top, as shown in the illustration at right.
5. Inspect belt for loose cords, missing cogs, cracks, abrasions, thin spots, or excessive wear. Replace if necessary.
6. Inspect belt for hour glassing (extreme circular wear in at least one spot and on both sides of the belt). Hour glassing occurs when the drive train does not move and the drive clutch engages the belt.



Belt Width:

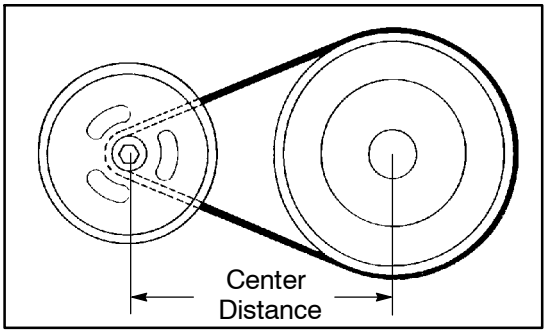
New 1.174 - 1.188″
(2.98-3.02 cm)

Wear Limit 1.125″ (2.86 cm)

DRIVE BELT REMOVAL/INSPECTION, CONT.

7. Measure belt length with a tape measure around the outer circumference of the belt. Belts which measure longer than nominal length may require driven shimming or engine adjustment for a longer center distance to obtain proper belt deflection. Belts which measure shorter than nominal length may require driven shimming or a shorter center distance. *Remember, proper belt deflection is the desired goal – not a specific center distance.*

8. Replace belt if worn past the service limit. Belts with thin spots, burn marks, etc., should be replaced to eliminate noise, vibration, or erratic PVT operation. See Troubleshooting Chart at the end of this chapter for possible causes. **NOTE:** If a new belt is installed, check belt deflection.



Clutch Center Distance -
10″ +.1 / -.05 (254 +2.5 / -1.3mm)
Belt Nominal Length - 40.875″± 3/16
(103.8 cm ± .48 cm)

DRIVE BELT INSTALLATION

1. Loop belt over drive and over top of driven sheave.
2. While pushing down on top of belt, turn the back or moveable driven sheave clockwise.
3. The belt then should be able to be pushed down into and between the sheaves.

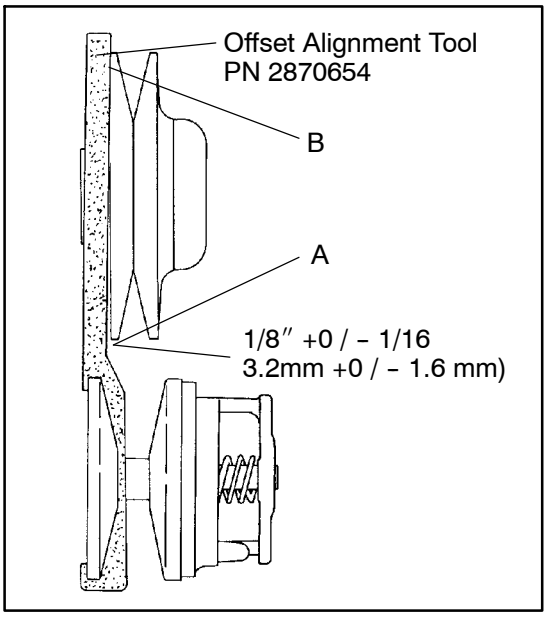
NOTE: Be sure to postion belt so part number is easily read.

CLUTCH ALIGNMENT

1. Remove belt and install offset/alignment tool as shown.
2. With tool touching rear of driven clutch inner sheave, the distance at point “A” should be 1/8″.

If the distance is greater than 1/8″ or less than 1/16″, clutch alignment must be adjusted as follows:

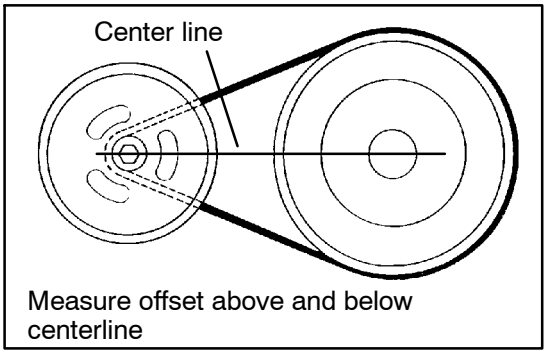
3. Remove drive and driven clutch. See PVT Disassembly, pages 6.5 - 6.6.
4. Remove PVT inner cover.
5. Loosen all engine mounts. Move front of engine to the right or left slightly until alignment is correct.
6. Tighten engine mounts and verify alignment is correct.



7. Measure belt deflection and measure offset both above and below sheave centerlines. Adjust if necessary.

NOTE: On some models, minor adjustments can be made by adding shims between the frame and front lower left engine mount to increase the distance at point “A”. If a shim is present, it can be removed to decrease the distance at point “A”.

Shim Kit PN 2200126



Measure offset above and below centerline

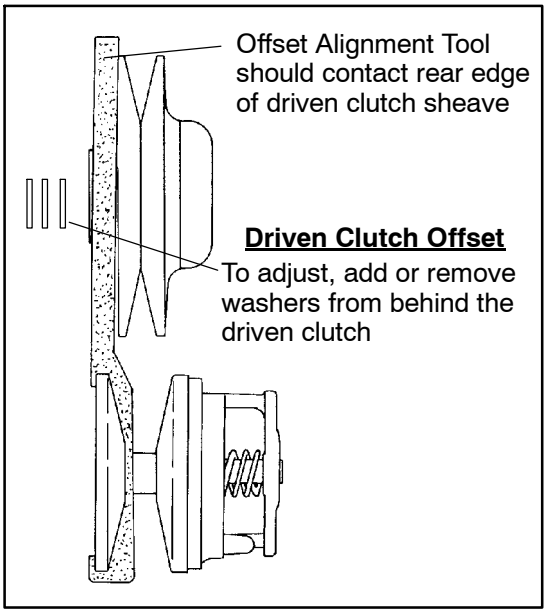
CLUTCH OFFSET

Important: Inspect clutch alignment and center distance before adjusting offset.

1. Install offset alignment tool as shown.

Offset is correct when rear of tool contacts rear of inner sheave with driven clutch pushed completely inward on shaft and bolt torqued. Adjust offset by adding or removing spacer washers between back of driven clutch and spacer as shown.

Spacer Washer PN 7556401



DRIVE CLUTCH BUSHING SERVICE

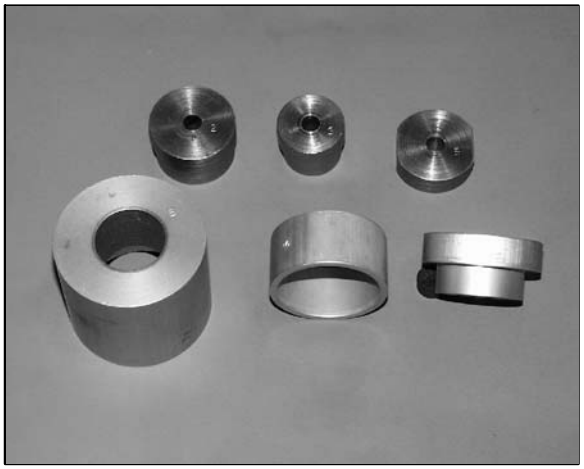
Polaris Kit PN 2871226

Item	Qty.	Part Description	Part No.
2	1	P-90 Drive Clutch and Driven Clutch Bushing Installation Tool	5020628
3	1	Drive Clutch Cover Bushing Removal and Installation Tool (for all drive clutches)	5020629
5	1	P-90 Driven Clutch Bushing Removal Tool	5020631
8	1	Main Puller Adapter	5020632
9	1	Adapter Reducer	5010279
10	1	Number Two Puller Adapter	5020633

DRIVE CLUTCH MOVEABLE SHEAVE - BUSHING REMOVAL

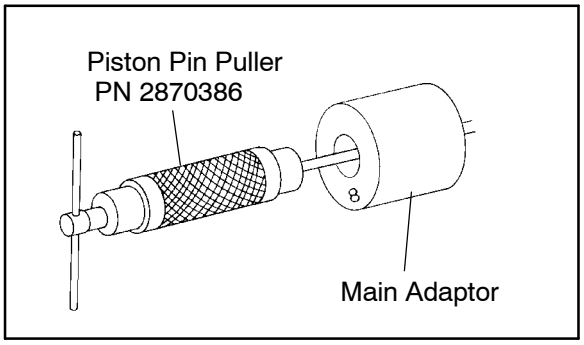
1. Install handle end of piston pin puller securely into bench vise and lightly grease puller threads.

Piston Pin Puller PN 2870386



2. Remove nut from puller rod and set aside.

3. Install main adapter (Item 8) onto puller.



4. Insert adaptor #2 into bushing from belt side as shown. With towers pointing toward vise, slide sheave and bushing onto puller rod.

5. Install nut removed in step 2 onto end of puller rod and hand tighten. Turn puller barrel to increase tension on sheave if needed. Nut is left hand thread.

DRIVE CLUTCH MOVEABLE SHEAVE - BUSHING REMOVAL, CONT.

6. Turn sheave and puller barrel together counterclockwise on puller rod until bushing is removed.
7. Remove nut from puller rod and set aside.
8. Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

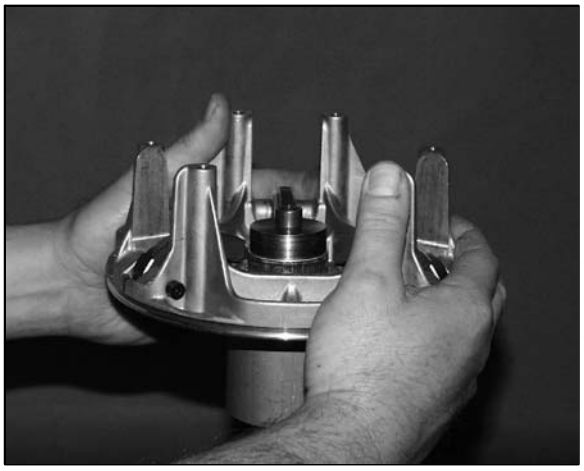
DRIVE CLUTCH MOVEABLE SHEAVE - BUSHING INSTALLATION

1. Place main adapter (Item 8) on puller.
2. Apply Loctite 680 retaining compound to the back side of new bushing. Push bushing into center of sheave on tower side by hand.

Bushing PN 3576504

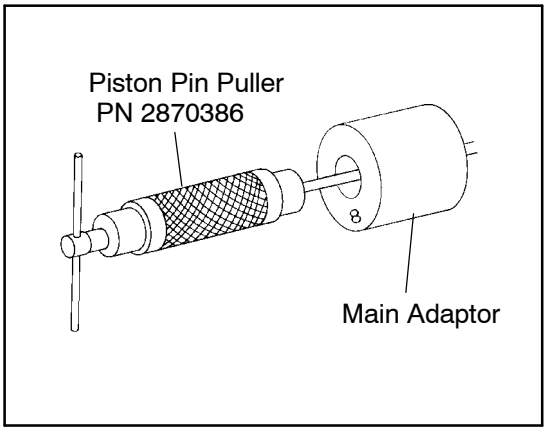
Loctite™ 680 PN 2870584

3. Insert installation tool (Item 2) into center of sheave and with towers pointing away from vise, slide sheave onto puller rod.
4. Install nut on puller rod and hand tighten. Turn barrel to apply additional tension if needed.
5. Turn sheave and barrel together counterclockwise until bushing is seated.
6. Remove nut from puller rod and set aside.
7. Remove sheave from puller.
8. Remove installation tool.



DRIVE CLUTCH COVER - BUSHING REMOVAL

1. Install main adapter (Item 8) on puller.

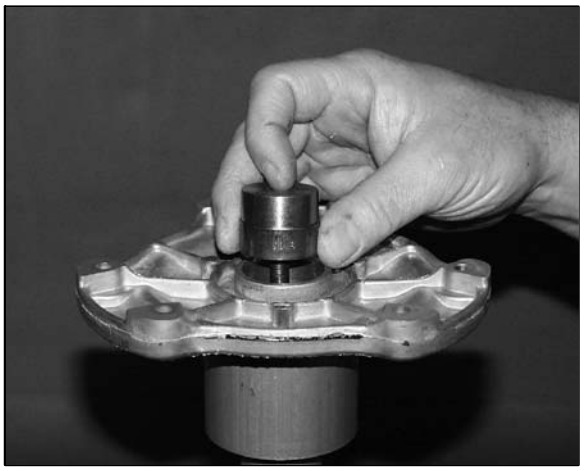


2. From outside of clutch cover, insert removal tool (Item 3) into cover bushing.
3. With inside of cover toward vise, slide cover onto puller.
4. Install nut onto puller rod and hand tighten. Turn puller barrel to increase tension as needed.

5. Turn clutch cover counterclockwise on puller rod until bushing is removed.
6. Remove nut from puller rod and set aside.
7. Remove bushing and bushing removal tool from puller. Discard bushing.

DRIVE CLUTCH COVER - BUSHING INSTALLATION

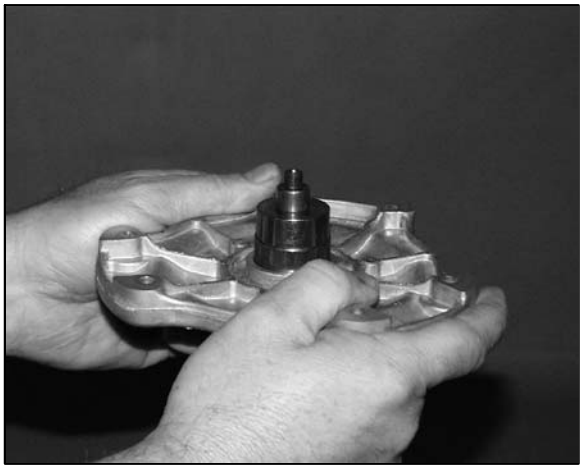
1. Apply Loctite 680 retaining compound to the back side of new bushing. Working from inside of cover, insert bushing and bushing installation tool into center of clutch cover.



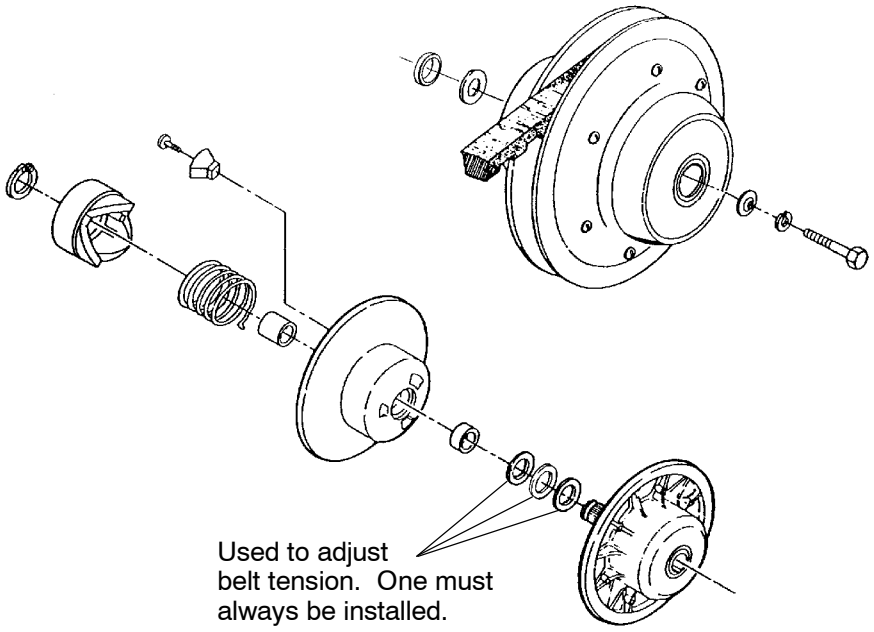
Bushing PN 3576510

Loctite™ 680 PN 2870584

2. With main adapter on puller, insert cover onto puller rod, placing outside of cover toward vise.
3. Install nut on rod and hand tighten. Turn puller barrel to apply more tension if needed.
4. Turn clutch cover and barrel together counterclockwise on puller rod until bushing is seated.
5. Remove nut from puller rod and take installation tool and clutch cover off rod.



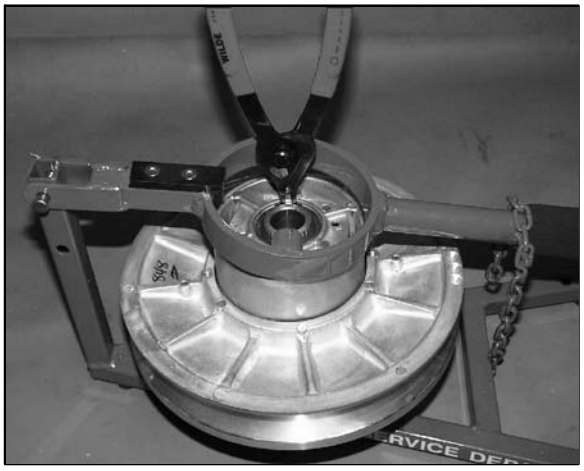
DRIVEN CLUTCH DISASSEMBLY/INSPECTION



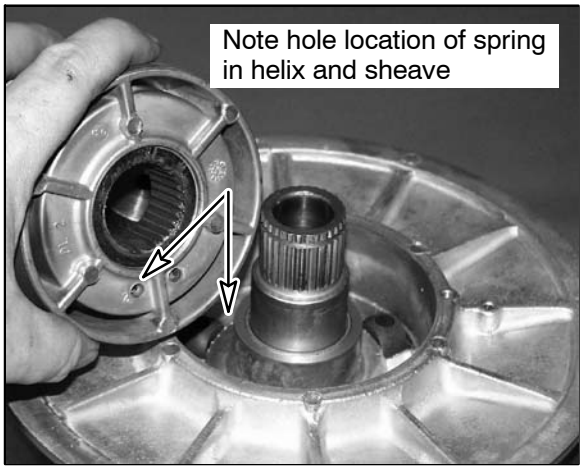
CAUTION:

Wear eye protection when removing snap ring to prevent serious personal injury.

1. Apply and hold downward pressure on the helix, or place driven clutch in compressor tool PN 8700220.
2. Remove snap ring retainer.

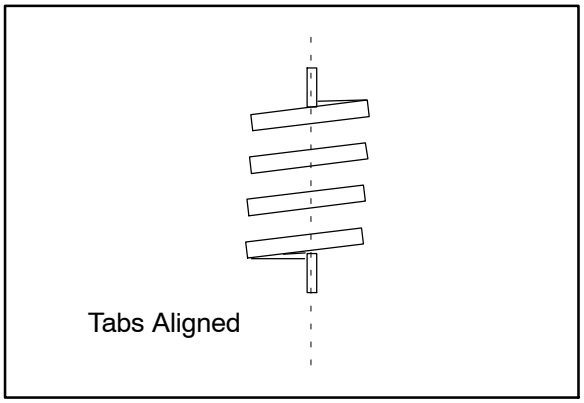


3. Note location of spring and remove helix.
4. Note location of spring in the moveable sheave, and remove the spring.



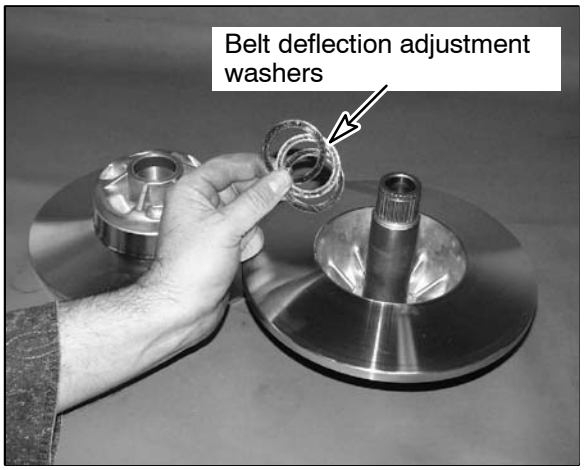
DRIVEN CLUTCH DISASSEMBLY / INSPECTION, CONT.

5. Check alignment of tabs on spring. Replace the spring if tabs are misaligned or the spring coils are distorted.



6. Inspect ramp buttons in the moveable sheave and replace if worn. **NOTE:** The ramp buttons are secured by Torx™ screws (T20).

7. Remove moveable sheave and note the number of spacer washers. One spacer must remain between the sheaves when adjusting belt deflection.



DRIVEN CLUTCH DISASSEMBLY / INSPECTION, CONT.

8. Inspect the Teflon™ coating on the moveable sheave bushing.

Moveable Sheave Bushing Inspection:

Replace the bushing if more brass than Teflon™ is visible on the bushing. Refer to bushing replacement in this chapter.

9. Inspect driven clutch faces for wear or damage.

10. Clean and inspect splines on helix and transmission input shaft.

11. Lube splines with a light film of grease. **Do not lubricate the bushings!**

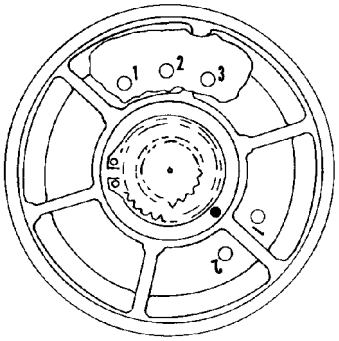
DRIVEN CLUTCH ASSEMBLY

1. Install moveable sheave with spacer washers. **Important:** At least one spacer washer must be installed. Teflon bushings are self-lubricating. Do not apply oil or grease to the bushings.

2. Install spring, inserting spring tab into proper hole in moveable sheave.

3. Insert spring tab into proper hole in helix. See specifications at the beginning of this section.

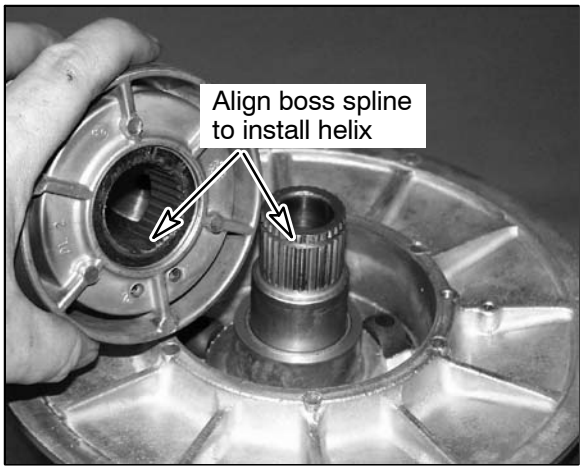
The driven clutch, helix/moveable assembly has several different spring locations which affect clutch shifting and RPMs. The greatest amount of spring tension will raise engine RPMs during clutch upshift and allow quicker backshift or downshift when pulling or negotiating a hill, for example. The least amount of tension will create a slower downshift and a harder upshift.



Example:	Helix		Moveable Sheave	Spring Tension
	2	-	1	Heavy
Spring/	2	-	2	↑
Position	1	-	1	↕
	2	-	3	↕
	1	-	2	↕
	1	-	3	Soft

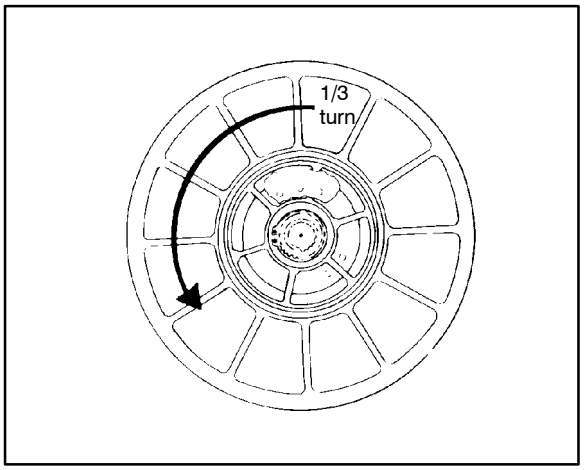
Refer to General Information Chapter 1 for driven clutch spring color and production setting.

4. Line up boss spline and push helix down until it engages the splines 1/2″ to 3/4″.



5. While holding downward pressure on helix, wind moveable sheave counterclockwise approximately 1/3 turn (120°).

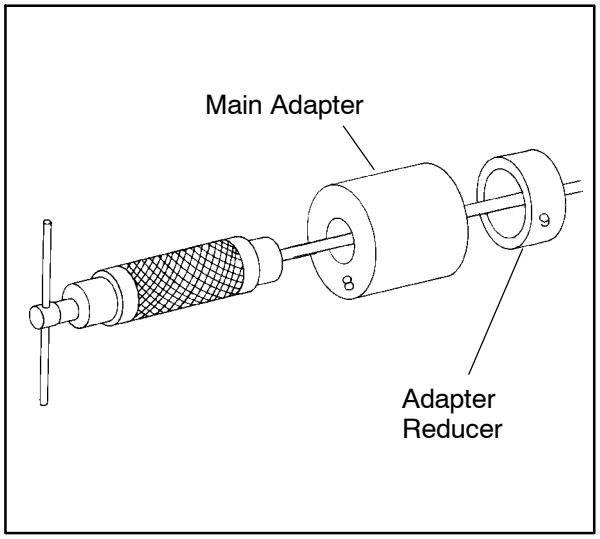
6. Push helix into place and install snap ring.



DRIVEN CLUTCH MOVEABLE SHEAVE - BUSHING REMOVAL

NOTE: Bushings are installed at the factory using Loctite. In order to remove the bushing it will be necessary to apply heat. A press can be used to remove and install some of the bushings. Be sure to support the sheave or cover as close as possible to the bushing bore when using a press.

1. Install main adapter (Item 8) onto puller.
2. Insert adapter reducer (Item 9) onto puller, sliding it inside the main adapter..
3. Remove ramp buttons from moveable sheave.



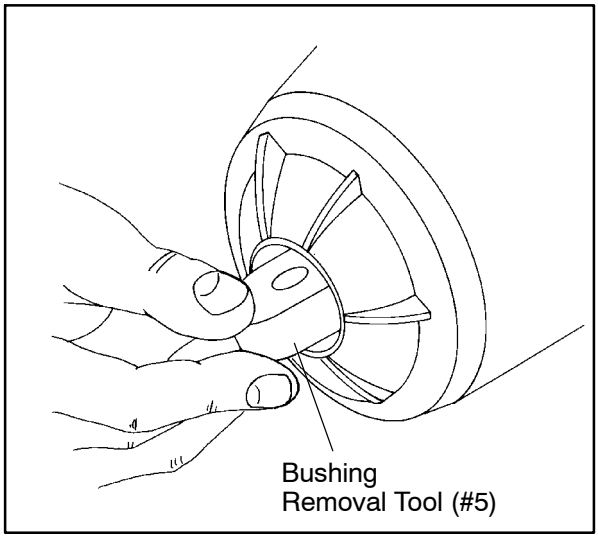
4. Using a hand held propane torch, apply heat directly on bushing until tiny smoke tailings appear.

CAUTION:

Clutch components will be hot! In order to avoid serious burns, wear some type of insulated gloves for the rest of the removal process.

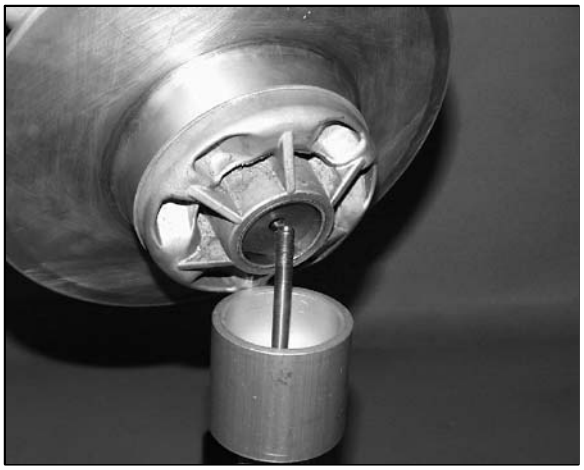
DRIVEN CLUTCH MOVEABLE SHEAVE - BUSHING REMOVAL, CONT.

5. Working from the top, install bushing removal tool (Item 5) into center of clutch sheave with smaller diameter toward bushing to be removed. See illustration at right.



6. Install sheave onto puller.

7. Install nut onto puller rod and tighten by hand. Turn puller barrel for further tension if needed.



8. Turn clutch sheave counterclockwise until bushing is removed. Repeat steps 5 - 8 for other bushing.

9. Remove nut from puller rod and set aside.

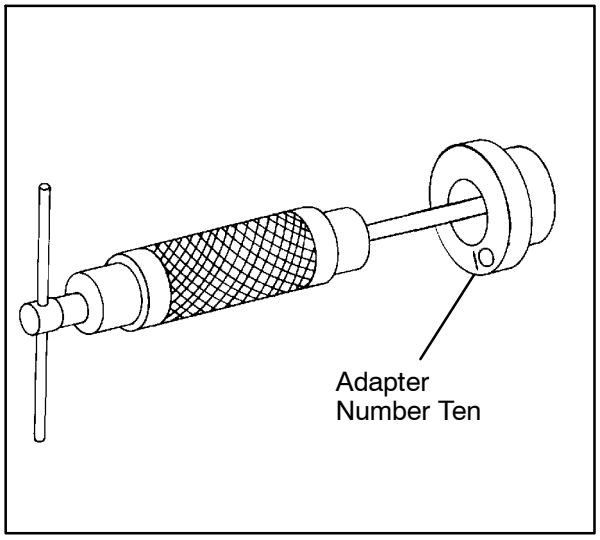
10. Remove adapters from puller.

11. Remove bushing and removal tool from adapters. Discard bushing.

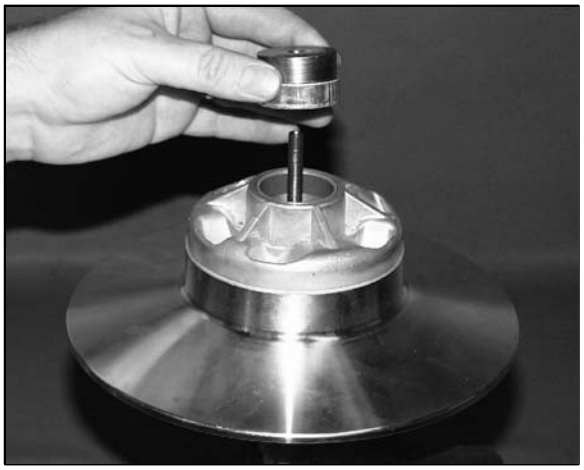
DRIVEN CLUTCH MOVEABLE SHEAVE - BUSHING INSTALLATION

1. Working from the top, insert adapter number ten onto puller. See illustration at right.

2. Start new bushing evenly in moveable sheave. Apply Loctite 680 retaining compound to the back side of new bushing.



3. Install sheave onto puller with new bushing upward as shown. Install adaptor number two.



DRIVEN CLUTCH MOVEABLE SHEAVE - BUSHING INSTALLATION, CONT.

4. Install nut onto puller rod and hand tighten against installation tool.

5. Turn clutch sheave counterclockwise until bushing is seated.
6. Remove nut from puller rod and set aside.
7. Remove installation tool and clutch sheave from puller.
8. Repeat installation procedure for other moveable bushing.

TROUBLESHOOTING

Situation	Probable Cause	Remedy
Engine RPM below specified operating range, although engine is properly tuned.	-Wrong or broken drive clutch spring.	-Replace with recommended spring.
	-Drive clutch shift weight too heavy.	-Install correct shift weight kit to match engine application.
	-Driven clutch spring broken or installed in wrong helix location.	-Replace spring; refer to proper installation location.
Erratic engine operating RPM during acceleration or load variations.	-Drive clutch binding.	a. Disassemble drive clutch; inspect shift weights for wear and free operation. b. Clean and polish stationary shaft hub; reassemble clutch without spring to determine problem area.
	-Belt worn unevenly - thin/burnt spots	Replace belt
	-Driven clutch malfunction.	a. Replace ramp buttons. b. Inspect movable sheave for excessive bushing clearance/ replace.
	-Sheave face grooved.	-Replace the clutch.
Engine RPM above specified operating range.	-Incorrect drive clutch spring (too high spring rate).	-Install correct recommended spring.
	-Drive clutch shift weights incorrect for application (too light).	-Install correct recommended shift weights.
	-Drive clutch binding.	-Disassemble and clean clutch, inspecting shift weights and rollers. Reassemble without the spring and move sheaves through entire range to further determine probable cause.
	-Driven clutch binding.	-Disassemble, clean, and inspect driven clutch, noting worn sheave bushing and ramp buttons and helix spring location.
	-Converter sheaves greasy; belt slippage.	-Clean sheaves with denatured alcohol or brake clearner, install new belt.
Harsh drive clutch engagement.	-Drive belt worn too narrow.	-Replace belt.
	-Excessive belt/sheave clearance with new belt.	-Perform belt/sheave clearance adjustment with shim washers beneath spider.
Drive belt turns over	-Wrong belt for application.	-Replace with correct belt.
	-Clutch alignment out of spec.	-Adjust alignment offset.
	-Engine mount broken or loose.	-Inspect/adjust or replace.
PVT cover overheating (melting)	-Plugged air intake or outlet	-Clear obstruction.
	-Belt slippage due to water, oil, grease, etc., rubbing on cover	-Inspect system. Clean , repair or replace as necessary. Seal PVT system ducts.
	-Clutches or weight being applied to cover while in operation	-Remove weight. Inform operator.
	-High vs. low range	-Instruct operator on guidelines for operation in proper driving range for different terrain as outlined in Owner's Safety and Maintenance Manual.
Water ingestion	-Cover seals or ducts leaking	-Find leak and repair as necessary.
	-Operator error	-Instruct operator on guidelines for operation in wet terrain as outlined in Owner's Safety and Maintenance Manual.

TROUBLESHOOTING

Situation	Probable Cause	Remedy
Belt slippage	-Belt worn out	-Replace belt.
	-Water ingestion	-Inspect and seal PVT system.
	-Belt contaminated with oil or grease	-Inspect and clean.
Belt burnt, thin spots	-Abuse (continued throttle application when vehicle is stationary, excess load)	-Caution operator to operate machine within guidelines.
	-Dragging brake	-Vehicle operated with park brake on. Inspect brake system.
	-Slow, easy clutch engagement	-Fast, effective use of throttle for efficient engagement.
PVT noise	-Belt worn or separated, thin spots, loose belt	-Replace belt.
	-Broken or worn clutch components, cover hitting clutches	-Inspect and repair as necessary.
Engagement erratic or stabby	-Thin spots on belt, worn belt	-Replace belt. Refer to belt burnt troubleshooting and instruct operator.
	-Drive clutch bushings stick	-Inspect and repair clutches.

NOTES